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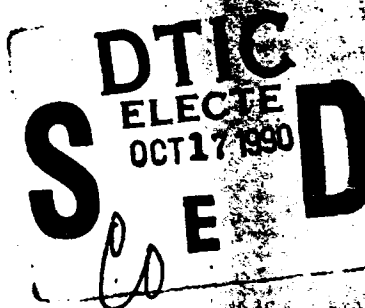
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SECTION 14

DETAILED PROJECT REPORT

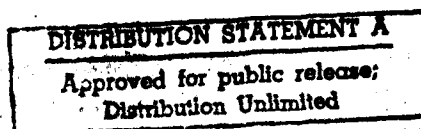
EMERGENCY SHORELINE PROTECTION

PORTERSVILLE BAY
MOBILE COUNTY, ALABAMA



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MAY 1990



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AT
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SYLLABUS

Mobile County, Alabama, requested the assistance of the Mobile District of the United States Army Corps of Engineers in solving a shoreline and streambank erosion problem at Portersville Bay, Alabama. This Section 14 Detailed Project Report presents the findings of a study made to determine the economic justification and environmental feasibility of providing protection from those erosion problems. The study was conducted under the general authority of Section 14 of the Flood Control Act of 1946, as amended.

During the study, three alternatives; gabions, riprap, and timber bulkhead, were equally evaluated for structural protection of the shoreline. All three alternatives were determined to be effective in reducing the shoreline erosion. The timber bulkhead, however, was found to yield the greatest net economic benefits for the resources expended and is the most cost effective of the alternatives. Additionally, the timber bulkhead (NED Plan) is the most preferred option of the local sponsor.

The NED Plan consists of constructing a new timber bulkhead three feet in front of the existing bulkhead, with the existing bulkhead remaining in place except for the top 6-inches which would be cut below grade. The new bulkhead will consist of 2" x 8" vertical sheeting, 3" x 8" wales, and 10" diameter treated piles. The sheeting will be backed by non-woven filter fabric and backfilled with a pervious material (sandy soil).

The total first cost of this plan is \$686,800, of which \$500,000 would be Federal costs and \$186,800 would be non-Federal costs. The annual costs of the project is \$75,900, and the annual benefits are \$116,400; yielding a benefit-to-cost ratio of 1.5 to 1.

SECTION 14

DETAILED PROJECT REPORT PORTERSVILLE BAY, ALABAMA

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INTRODUCTION

1. This report is in response to a request for Federal assistance in providing shoreline protection for prevention of damages to a county road in southern Mobile County by Mrs. Oliveth M. Archer, Mobile County Commissioner, to U.S. Representative Sonny Callahan of Alabama's First Congressional District. Mrs. Archer's letter is dated 30 September 1986, and Congressman Callahan's letter to Mobile District is dated 6 October 1986.

2. AUTHORITY. This report presents results of a study conducted under the continuing authority of Section 14 of the Flood Control Act of 1946, as amended by the Water Resources Development Act approved 17 November 1986. The amended section states:

"The Secretary of Army is hereby authorized to allot from any appropriations heretofore or hereafter made for flood control, not to exceed \$12,500,000 per year, for the construction, repair, restoration, and modification of emergency streambank and shoreline protection works to prevent damage to highways, bridge approaches, and public works, churches, hospitals, schools, and other nonprofit public services when in the opinion of the Chief of Engineers such work is advisable. Provided, that no more than \$500,000 shall be allocated for this purpose at any single locality from the appropriations for any one fiscal year."

3. The report has been prepared in accordance with policies and procedures set forth in current Corps of Engineers regulations governing the development of small projects under the continuing authority.

4. PURPOSE AND SCOPE. The studies presented in this report pertain to streambank and shoreline protective measures at Portersville Bay in Bayou Coden, Alabama. This report describes the nature and extent of the erosion problems, presents alternative plans, and concludes that Federal participation is warranted. Field investigation were made of the study area by the Mobile District's planning, engineering, environmental, and cultural resources personnel. These investigations provided data for development of alternatives and assessment of impacts. Soils

investigations and topographic surveys of existing conditions were obtained in August 1988.

5. PRIOR STUDIES. There have been no previous shore protection studies in the project area.

6. EXISTING FEDERAL PROJECT. The existing Federal project at Bayou Coden, Alabama provides for a channel 8 feet deep by 60 feet wide extending from La Belle Avenue bridge south for about 3,000 feet through the bayou to Portersville Bay, thence 8 feet deep by 100 feet wide extending about 2.3 miles westward across Portersville Bay to connect with the Bayou La Batre channel, and a turning basin 8 feet deep by 60 feet wide by 100 feet long on the west side of the bayou channel about 500 feet south of the La Belle Avenue bridge. The existing project was authorized by the Chief of Engineers, June 2, 1969 under authority of Section 107 of the River and Harbor Act of 1960 and the River and Harbor Act of March 2, 1945 (H. Doc. 824 77th Cong, 2nd sess.). The project construction authorized in 1969 was initiated in April 1975, and completed in March 1976.

STUDY AREA

7. GEOGRAPHIC LOCATION. Portersville Bay is located in the town of Bayou Coden, in south Mobile County, Alabama. Portersville Bay, an arm of Mississippi Sound, is about 7.6 miles northwest of Cedar Point, the southern tip of the western mainland shore of Mobile Bay. Figure 1 is a general map which shows the study area .

8. The tributary area embraces southern Mobile County and the coastal waters and communities along Alabama's southwest coast. Principal cities and towns in the area are Mobile and suburbs, Bayou La Batre, Heron Bay, and Dauphin Island. Bayou Coden is served by Alabama Highway 188 which connects with U. S. Highway 90 and Interstate Highway No. 10 about 11 miles to the northwest between Mobile and Pascagoula, Mississippi, and with Alabama highway 163 about 7 miles to the southeast between Mobile and Dauphin Island. The nearest rail terminal is at St. Elmo, Alabama, 11 miles north of Bayou Coden, on the main line of the CSX (formerly Louisville & Nashville) Railroad. Commercial airline service is available at Mobile.

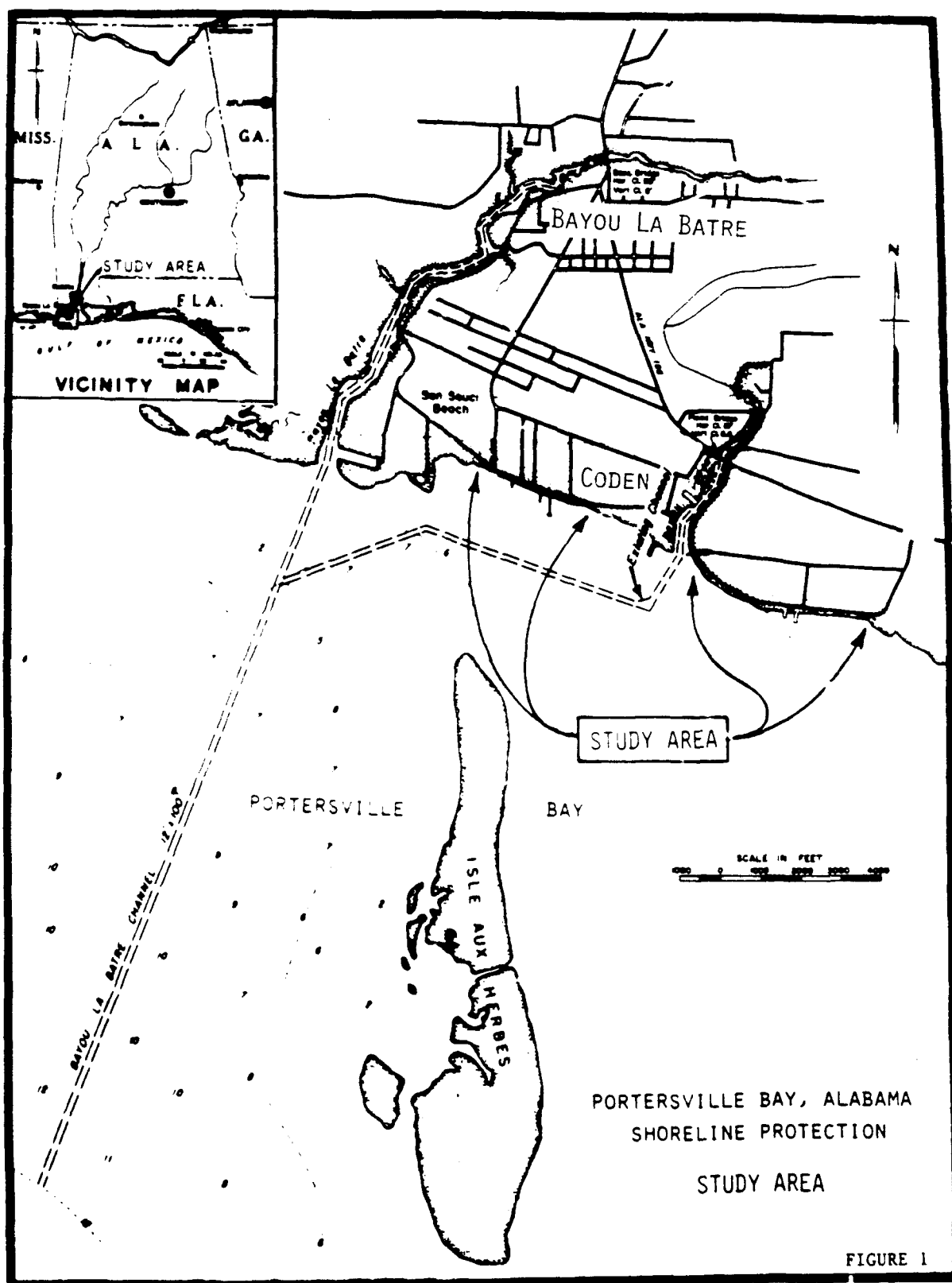


FIGURE 1

9. CONTIGUOUS WATERWAYS. The Gulf Intracoastal Waterway, with minimum dimensions of 12 by 125 feet, extends from Carrabelle, Florida through Mississippi Sound, to Brownsville Texas. Bayou La Batre, about two miles northwest of Bayou Coden, has a 12 by 100-foot channel extending from Mississippi Sound to a turning basin located about 3,000 feet below Highway 188 bridge. From the turning basin, a 12 by 75-foot channel extends upstream to Highway bridge 188. Dauphin Island, about 10 miles southwest of Bayou Coden, has navigation facilities for fishing and recreational craft, and Mobile Harbor and Pascagoula Harbor are important deep draft ports.

10. PHYSIOGRAPHY. The study area is classified as coastal lowlands, ranging from sea level to about 30 feet in elevation and from 1 to 10 miles in width. These flat to gently undulating, locally swampy lowlands are underlain by alluvial, deltaic, estuarine, and coastal deposits which merge with the alluvial-deltaic plains of the streams in the area. Many tidally influenced creeks, rivers and estuaries indent the coastline.

11. Bayou Coden and Mississippi Sound are underlain by consolidated and unconsolidated sediments that range in age from Holocene to Miocene. The oldest (Miocene) sediments that outcrop in the coastal area consists of consolidated light gray to variegated and mottled consolidated clays inter-bedded with sand and gravel zones. The sand and gravel strata contain water under artesian pressure and are a major aquifer in the coastal area. The Miocene section ranges from several hundred to possibly several thousand feet thick. The Pliocene age Citronelle Formation unconformably overlies the Miocene deposits. The Citronelle Formation consists predominantly of reddish brown to orange and yellow gravelly sand. Interspersed in the gravelly sand are lenses and partings of gray, orange, and brown sandy clay. The thickest of the Citronelle Formation varies from a few tens of feet in northern Mobile County to as much as 200 feet in the vicinity of Dauphin Island. Semi-consolidated to unconsolidated sediments (sand, silty sand, clay sand, and clay) of Pleistocene and Holocene age overlay the Citronelle Formation in Mississippi Sound. These sediments are several tens of feet thick and constitute the majority of the material which would be encountered in the considered project improvement at Portersville Bay.

12. CLIMATE. The study area has a humid, temperate to subtropical climate, although occasional subfreezing temperatures

occur. Air temperatures are influenced by the Gulf of Mexico, with average annual temperatures ranging between 60-70° Fahrenheit. Summer temperatures are influenced by the Bermuda High, a semipermanent high-pressure cell that extends over portions of the Gulf of Mexico near 30° North latitude. During the summer, southerly winds generated by the high-pressure cell have a high moisture content which tends to keep coastal temperatures lower than those of inland areas. Summer temperatures range from a low of 70° F to a high of 90° F. In the winter, winds are northerly and move in cold, continental air masses. Temperatures remain relatively mild, ranging from lows in the 40's to highs in 60's F.

13. The normal annual rainfall within the study area is among the highest in the United States, averaging between 55 to 64 inches. Rainfall is fairly evenly distributed over the year, being greatest during the thunderstorm season in July, averaging 7.6 inches, and least in October and November, averaging 3.5 inches. Thunderstorm frequency is one of the highest in the United States. Relative humidity is fairly constant throughout the day and year. Humidity is usually highest between 2400 and 0600 hours (83%), and lowest between 1200 and 2000 hours (62%).

14. TIDES. Tides in the area are diurnal. There are no tide recording gages at Bayou LaBatre or Bayou Coden. Based on tide gages located at Dauphin Island, Alabama, just east of the study area, and Pascagoula, Mississippi located to the west of the study area, the mean tidal range in Portersville Bay is about 1.33 feet. The extreme tide, except during storms, is 1.7 feet NGVD. The following tidal data shown in Table 1, refers to National Geodetic Vertical Datum (NGVD) of 1929:

Table 1

Tide Levels

	<u>Elevation (Ft-NGVD)</u>
Mean Lower Low Water (MLLW)	-0.33
Mean Low Water (MLW)	-0.33
Mean Tide Level	+0.34
Mean High Water (MHW)	+1.00

15. STORMS. The central Gulf of Mexico is one of the more hurricane vulnerable locations along the coastline of the United States. Records of tropical disturbances for the central gulf coast have been compiled since 1872. Since 1872, 84 tropical disturbances with winds intensity greater than 34 knots have directly affected the central Gulf of Mexico coastline between Panama City, Florida and New Orleans, Louisiana. Of that number, 42 are known to have reached hurricane intensity. The vulnerability of the central gulf coast to hurricanes is well documented in the weather records. Over the 117-year period of record (1872-1989), the longest span of consecutive seasons without a hurricane striking the central gulf coast has been six years (1918-1923, inclusive).

16. Storm Surge elevations for Hurricanes Camille (1969) and Frederic (1979), two of the most severe tropical cyclones to have affected the study area, have been measured and are shown below in Table 2:

Table 2

Storm Surge Elevations

<u>Location</u>	<u>Storm Surge Elevation</u> <u>(Ft-NGVD)</u>	
	<u>Camille</u>	<u>Frederic</u>
Bayou LaBatre	8.5	9.9
Bayou Coden	8.3	8.9
AL 188 Bridge, Fowl River	7.3	9.4
Heron Bay	6.6	9.0

17. WINDS. Although wind direction is variable throughout the year, the overall circulation pattern brings about prevailing northerly winds from September through February and southerly winds the remainder of the year. See Table 3.

Table 3

Mobile, Alabama Wind Data

	JAN	FEB	MAR	APR	MAY	JUN
Direction ¹	N	N	S	S	S	S
Velocity ²	8.0	8.2	8.4	8.3	7.7	6.9
	JUL	AUG	SEP	OCT	NOV	DEC
Direction ¹	SW	SW	N	N	N	N
Velocity ²	6.5	6.4	6.8	7.3	7.6	7.8

¹ Direction of prevailing wind.

² Average hourly wind velocity in knots.

18. The percentage of time that winds from 0 to 3 knots prevail is 13.8%. Winds less than 7 knots occur 32% of the time; winds less than 11 knots occur greater than 72% of the time; and winds less than 17 knots occur more than 94% of the time. The time attributable to winds of 17 knots (near 20 m.p.h.) or greater is less than 6%.

19. Additional wind data collected at Keesler Air Force Base, Biloxi, Mississippi, by the Air Weather Service, is similar to the data measured at Mobile. At Keesler, the percent of time the wind is calm is 10%; the percentage of time that winds less than 3 knots prevail is 15%; winds less than 12 knots occur greater than 85% of the time; and winds less than 24 knots occur 99.9% of the time.

20. WAVE ANALYSIS. A strong wind from the south or southwest will produce the most severe wave conditions in Portersville Bay. The fetch in this direction is limited to approximately 10 miles by the barrier islands located to the south of the study area; Dauphin Island, Petit Bois Island, and Horn Island. Isle Aux Herbes (Coffee Island), also provides protection from southwesterly winds. Thom's Fastest-Mile method for determining frequency of winds, as described in the U. S. Army Coastal Engineering and Research Center's (CERC) Shore Protection Manual (SPM), was used to determine the wind speed for various recurrence intervals. Since wave data are not available for

Portersville Bay, methods prescribed in the SPM were used to determine the characteristics of the waves affecting the shoreline for the various wind speeds determined previously. A constant approach depth of 6 feet was assumed. See Table 4 below.

Table 4

Wave Characteristics

<u>Return</u> <u>Interval</u> (Yrs)	<u>Probability of</u> <u>Exceedance</u>	<u>Wind</u> <u>Velocity</u> (MPH)	<u>Wave</u> <u>Height</u> (Ft.)	<u>Wave</u> <u>Period</u> (Sec)	<u>Setup</u> (Ft.)
2	0.5	27	1.5	2.8	1.4
5	0.2	33	1.6	3.0	2.1
10	0.1	40	1.8	3.2	3.1
20	0.05	47	1.9	3.4	4.3
50	0.02	58	2.2	3.7	6.5
100	0.01	66	2.4	3.8	8.5
200	0.005	76	2.5	4.0	11.2

21. Due to the relatively low crest elevation of the proposed shore protection measures, it is anticipated that the structure will be overtopped by waves on a fairly frequent basis during periods of strong southerly winds. When combined with a high tide and wind setup, a wave with a return of interval of 2 years will overtop the proposed structure. From a structural standpoint, the wave which will provide the greatest force against the wall would occur during a low tide, with a wave generated by approximately a 33 mph wind (5-year return interval), breaking and striking the wall. Based on the Miche-Rundgren method for determining non-breaking wave forces, a force of 500 pounds per linear foot of wall can be expected for a non-breaking wave. If that same wave were to break at the wall, the Minikin method for determining breaking wave forces yields a force of 1,600 pounds per linear foot of wall.

22. SUBSURFACE INVESTIGATIONS. Subsurface investigations for this project were conducted in June, 1989 and consisted of nineteen borings (PB-1-89 thru PB-19-89). All borings were

augured to a depth of -15 feet. The subsurface conditions at the project site are characterized by combination of silty sand (SM); clayey silt (ML) with some shell fragments in the upper strata, followed by inorganic clayey silt (MH) to the bottom of the holes. Groundwater encountered during the investigation ranged from a depth of 2.0 feet to 4.8 feet. The Geotechnical Report is provided in Appendix A at the end of this report.

23. PROBLEMS AND OPPORTUNITIES. The major problems at Portersville Bay stem from erosion along a 9,100-foot reach of the shoreline along the bay. The Shell Belt and Coden Belt roads run parallel to the shoreline, where each road is protected from the bay wave action by a timber seawall. The seawalls, which are located four to twelve feet from the shoulder of the roads, were constructed in the 1930's, and due to age, are starting to rapidly deteriorate. This deterioration, especially at the footings, is resulting in a loss of the backfill material which stabilizes the highway. Figure 2 is a drawing which shows the limits of the considered project improvement.

24. Mobile County frequently places fill material behind, and rubble (broken concrete, brick, asphalt, etc.) in front of the seawalls in attempts to abate the erosion. These efforts have not been successful as the material continues to erode into the bay due to the deterioration of the structures by tidal currents and wave action. If no action is taken, erosion will continue and further threaten the integrity of the highway, which could lead to complete loss of access to this area. Figures 3 and 4 provide a pictorial view of the condition at the considered project site. There is an opportunity for Federal and local interests to cooperate and solve a water and related land resource problem which threatens the integrity of the highway and subsequently the homes in this area.

25. STUDY CONSTRAINTS. Section 14 of the Flood Control Act of 1946, as amended, provides authority for the Corps of Engineers to undertake emergency construction, repair, restoration, or modification of streambank and shoreline protection works for the prevention of damage to public properties. Section 915 of the Water Resources Development Act of 1986 established the limit of Federal funding for an individual streambank and shoreline protection project at \$500,000. Cost in excess of this Federal limit must be assumed by the local sponsor. Since nonstructural measures would not prevent damage to the highway, such measures were not considered viable in meeting the Section 14 objectives.

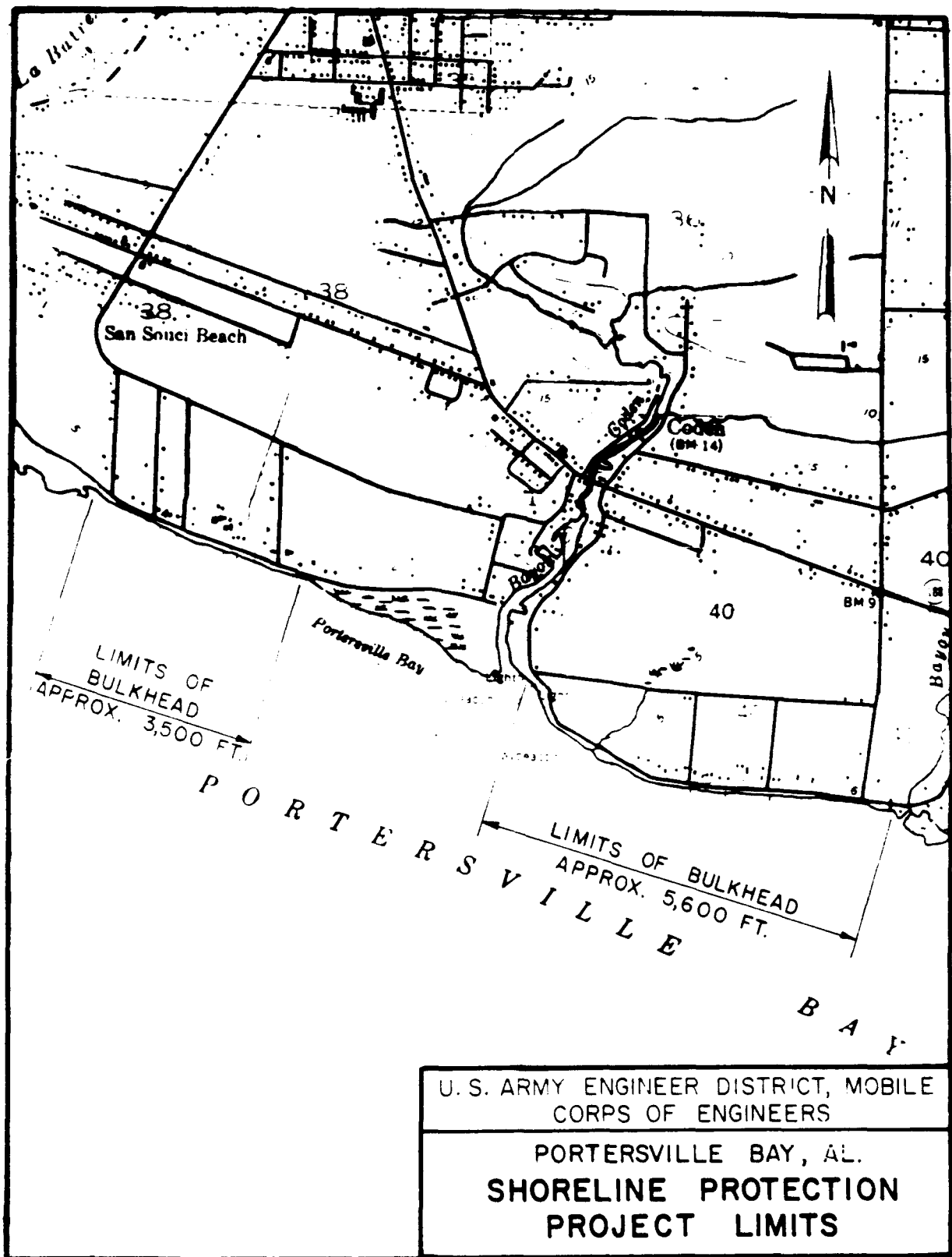


FIGURE 2



LOOKING EAST - DURING HIGH TIDE WATER
WASHES OVER AND THROUGH OPENINGS IN
DETERIORATED BULKHEAD.



LOOKING WEST - LOW TIDE EXPOSES DAMAGED
BULKHEAD AND SHOWS STONE FILL USED TO
REPLACE ERODED SOIL.

FIGURE 3



THIS SECTION OF THE BULKHEAD IN ITS EXISTING CONDITION PROVIDES LITTLE PROTECTION AGAINST SHORELINE EROSION.



SHORELINE EROSION IS A CONTINUING PROCESS DESPITE PERIODIC EFFORTS TO REPLACE SOIL WITH FILL MATERIAL.

FIGURE 4

PLANNING OBJECTIVES

26. NATIONAL OBJECTIVE. The planning process utilized in this study is consistent with the Water Resource Council's Economic and Environmental Principles and Guidelines (P&G). The P&G requires that all Federal and Federally assisted water and related land activities be planned for positive contribution to National Economic Development (NED) while protecting the Nation's environment. NED is to be achieved by increasing the net value to the United States output of goods and services and improving national economic efficiency.

27. The Corps of Engineers' implementation of P&G is accomplished through conformance to an objective and professional analysis of water resources problems and alternative solutions. In this study, an evaluation was made of the adequacy of various water resources management plans following several guidelines to insure that proposed activities are in the best public interest. These guidelines are briefly described as follows:

- o A full range of alternative solutions to a problem, including positive and negative features, are considered from the study's inception;
- o The "with" and "without" conditions of each alternative solution are determined;
- o The flexibility of each solution to meet changing national priorities and values is determined insofar as is possible;
- o The cumulative effects, both adverse and beneficial, of each alternative solution are continuously analyzed as a guide to decision making; and,
- o Feasible plans are in consonance with long-range development goals of local, regional, state and Federal objectives.

28. STUDY OBJECTIVE. In order to adequately proceed with formulation of an efficient plan and to properly consider the plan's impacts, the following planning objectives were established for the study:

- o Contribute to the maintenance, preservation, and protection of the highway along Portersville Bay by providing shoreline protection measures;

- o Contribute to the maintenance, preservation, and protection of the archeological and historical resources in the immediate area of Portersville Bay; and

- o Contribute to the maintenance, preservation, and protection of the environment in the immediate area of Portersville Bay.

ALTERNATIVE PLANS

29. Guidance contained in Engineering Manual 1110-2-301 (Beach Erosion Control and Shore Protection), EM 1110-2-1614 (Design of Coastal Revetments, Seawalls, and Bulkheads), along with existing guidelines developed by the Mobile District were used to assist in design of the structural alternative plans. The structural alternative plans, as discussed below, would provide a permanent, complete, and acceptable solution to the erosion problems along the shores of Portersville Bay.

30. In view of the existing conditions, and the desire of Mobile County for corrective measures to stabilize the shoreline at Portersville Bay, four alternative plans were considered, including that of "No Action" (which is alternative 1). The "No Action" alternative is a valid course to be considered in lieu of impacts of structural improvements. This alternative, however, does not provide a solution to the existing problems, and would permit active shoreline erosion to continue until failure of the seawall and the highway occurred.

31. The three structural alternative plans were evaluated and compared on an equal basis early in plan formulation. The following elements are constant among each of the structural alternative plans:

- o Each plan would be constructed on the bay side of the existing timber bulkhead.

- o The area between the existing bulkhead and the replacement structure would be backfilled with a pervious material and seeded.

- o The drainage pipes which extend to Portersville Bay through the existing bulkhead will have to be extended through any replacement structure.

32. ALTERNATIVE 2. Alternative 2 is a structural shoreline protection plan consisting predominately of riprap revetment protection of the eroding streambank and shoreline. The riprap revetment would consist of 8,200 cubic yards of graded stone (W50=40#) placed over 6 inches of bedding material (2,450 cubic yards). The bedding material will be placed over a layer of filter fabric (22,510 square yards). Top elevation of the revetment would be 3.0 feet, and extend approximately 18 feet from the existing seawall into Portersville Bay. The area behind the riprap will be backfilled with 4,250 cubic yards of pervious material and seeded. The estimated first cost and annual cost for this plan is given in Table 5, and a typical cross section of the plan design is shown in Figure 5.

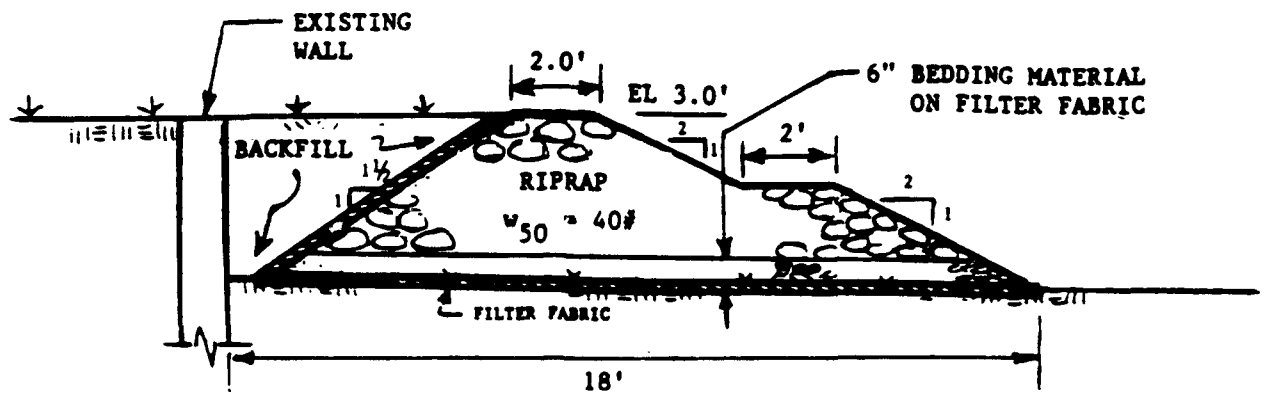
33. ALTERNATIVE 3. Alternative 3 is a structural shoreline protection plan consisting predominately of gabion revetment to eliminate the erosion problem. The gabion revetment would be constructed by placement of 12,720 cubic yards of small stones in 1' x 12' gabion baskets. A 6-inch layer of bedding material (1,970 cubic yards) will be placed over a layer of filter fabric (20,540 square yards). To provide a smooth uniform surface area for the considered gabion revetment, excavation of 11,740 cubic yards of dredged material would be required. The estimated first cost and annual cost for this plan is provided in Table 6, and a typical cross section of the plan design is also shown on Figure 5.

34. ALTERNATIVE 4. Alternative 4 considers construction of new timber bulkheads located three feet in front (bay side) of the existing bulkheads. The bulkheads would be constructed using 12-inch diameter, 12-foot long vertical piles (21,120 linear feet). The treated timber sheeting (140,800 board feet) will be backed by non-woven filter fabric (8,830 square yards). The estimated first cost and annual cost for this plan is provided in Table 7, and a typical cross section of the plan design is shown on Figure 6.

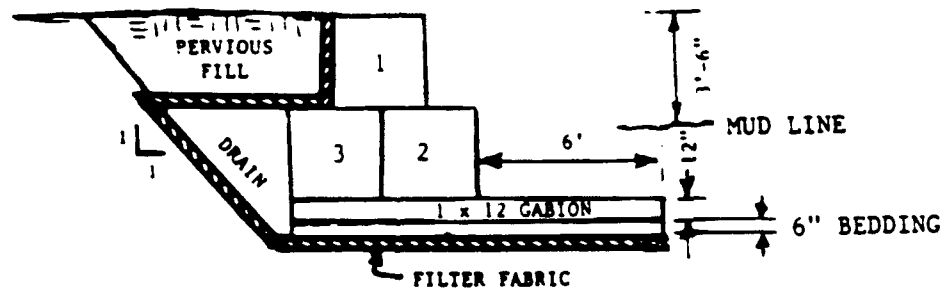
35. COMPARISON OF ALTERNATIVES. All costs and benefits are compared on an average annual equivalent basis. Annual charges include interest and amortization of first costs and operation and maintenance of the improvement for a 50-year project life. An interest rate of 8 7/8 percent is used in both the cost and benefit analyses. The summary comparison of the first costs, annual charges, and annual benefits for each of the alternatives is displayed in Table 8.

TABLE 5
ALTERNATIVE 2 - RIPRAP
OCT. 1989 PRICES - 8 7/8%

ITEM	Qty	Unit	Unit Cost	Total Cost
Description				
FEDERAL:				
Riprap	8200	cy	43	\$353,000
Bedding Material	2450	cy	35	86,000
Filter Fabric	22510	sy	3	68,000
Earth Backfill	4250	cy	3	13,000
Seed & Mulch	2.3	ac	2000	5,000
Culvert Extension	16	ea	700	11,000
Remove Rubble	980	cy	3	3,000
Subtotal Construction				\$539,000
Contingencies (25%)				135,000
Total Construction Cost				\$674,000
Engineering & Design		ls		54,000
Supervision & Administration		ls		40,000
TOTAL PROJECT FIRST COST				\$768,000
Interest During Construction				8,600
Total Investment Cost				\$776,600
Interest and Amortization				\$70,000
Total Federal Annual Cost				\$70,000
NON-FEDERAL:				
Annual O&M Cost				\$7,100
Interest During Construction				400
Total Non-Federal Annual Cost				\$7,500
TOTAL PROJECT ANNUAL COST				\$77,500
TOTAL ANNUAL BENEFITS				\$116,400
BENEFIT/COST RATIO				1.50
NET ANNUAL BENEFITS				\$38,900



PORTERSVILLE BAY
RIPRAP REVETMENT SECTION



PERVIOUS FILL, $\phi = 30^\circ$, $C = 0$

δ BACKFILL $\approx 120 \text{ #/FT}^3$

$$F_v = \frac{1}{2} H^2 K_v, \quad F_H = \frac{1}{2} H^2 K_H$$

FOR TYPE 2 SOILS, $K_v = 15 \text{ #/FT}^2/\text{FT}$

$K_H = 40 \text{ #/FT}^2/\text{FT}$

PORTERSVILLE BAY
GABION REVETMENT SECTION

FIGURE 5

TABLE 6
ALTERNATIVE 3 - GABIONS
OCT. 1989 PRICES - 8 7/8%

ITEM	Qty	Unit	Unit Cost	Total Cost
Description				
FEDERAL:				
GABIONS	12720	cy	100	\$1,272,000
Bedding Material	1970	cy	35	69,000
Filter Fabric	20540	sy	3	62,000
Excavation	11740	cy	3	35,000
Earth Backfill	14370	cy	3	43,000
Seed & Mulch	1.4	ac	2000	3,000
Culvert Extension	16	ea	700	11,000
Remove Rubble	980	cy	3	3,000
Subtotal Construction				\$1,463,000
Contingencies (25%)				366,000
Total Construction Cost				\$1,829,000
Engineering & Design		ls		146,000
Supervision & Administration		ls		110,000
TOTAL PROJECT FIRST COST				\$2,085,000
Interest During Construction				92,200
Total Investment Cost				\$2,177,200
Interest and Amortization				\$196,000
Total Federal Annual Cost				\$196,000
NON-FEDERAL:				
Annual O&M Cost				\$11,800
Interest During Construction				500
Total Non-Federal Annual Cost				\$12,300
TOTAL PROJECT ANNUAL COST				\$208,300
TOTAL ANNUAL BENEFITS				\$116,400
BENEFIT/COST RATIO				0.56
NET ANNUAL BENEFITS				(\$91,900)

TABLE 7
ALTERNATIVE 4 - TIMBER BULKHEAD
OCTOBER 1989 PRICES - 8 7/8%
NED PLAN

ITEM	Qty	Unit	Unit Cost	Total Cost
Description				
FEDERAL:				
Pile	1760	ea	135	\$237,600
Lumber	140800	bd/ft	0.6	84,500
Filter Fabric	8830	sy	3	26,500
Earth Backfill	4250	cy	3	12,800
Seed & Mulch	1.4	ac	2000	2,800
Culvert Extension	16	ea	400	6,400
Remove Concrete Rubble	980	cy	3	2,900
Subtotal Construction				\$373,500
Contingencies (25%)				93,400
Total Construction Cost				\$466,900
Engineering & Design		ls		37,400
Supervision & Administratio		ls		28,000
TOTAL PROJECT FIRST COST				\$532,300
Interest During Construction				5,900
Total Investment Cost				\$538,200
Interest and Amortization				\$48,600
Total Federal Annual Cost				\$48,600
Non-Federal:				
Annual O&M Cost				\$12,900
Interest During Construction				600
Total Non-Federal Annual Cost				\$13,500
TOTAL PROJECT ANNUAL COST				\$62,100
TOTAL ANNUAL BENEFITS				\$116,400
BENEFIT/COST RATIO				1.87
NET ANNUAL BENEFITS				\$54,300



TABLE 8
COMPARISON OF ALTERNATIVES

Alterna- tive	First Cost	Annual Charges	Annual Benefits	BCR
2 (Riprap)	\$768,000	\$77,500	\$116,400	1.50
3 (Gabions)	\$2,085,000	\$208,300	\$116,400	0.56
4 (Timber Bulkhead)	\$532,300	\$62,100	\$116,400	1.87

36. As indicated in Table 8, alternative plan 4 (timber bulkhead) would yield the maximum net economic benefits for the resources expended and would be the most cost effective of the considered plans. The timber bulkhead represents the optimum level of economic development and it is also the plan most preferred by the local sponsor. Accordingly, the timber bulkhead alternative is designated the NED Plan, and therefore, it was developed in greater detail. The riprap, and gabion revetment alternatives were summarily dropped from further consideration. A more detailed analysis and cost estimate of the NED plan is provided in Table 9, and the cost estimate in Code of Cost Accounts format is in Appendix D.

TABLE 9
FIRST COST - TIMBER BULKHEAD
OCT. 1989 PRICES - 8 7/8%
NED PLAN

ITEM			Unit	Total
Description	Qty	Unit	Cost	Cost
CONSTRUCTION:				
Prep. Work				
Mob. & Demob.	job	ls		\$5,000
Seawalls:				
Timber Pile	27300	lf	7.5	204,800
Timber Bulkhead & Whales	134300	bf	0.95	127,600
Bolts	24100	lbs	1	24,100
Filter Fabric	6600	sy	2.75	18,200
General Items:				
Cut Existing Pil	1960	lf	6	11,800
Sheeting Boards	12000	bf	0.5	6,000
Rem Concrete Rub	2100	cy	10	21,000
Debris Removal	300	cy	5	1,500
Compacted Backfi	4400	cy	5	22,000
Seed & Mulch	8	ac	1800	14,400
Subtotal Construction				\$456,400
Contingencies (25%)				114,000
Total Construction				\$570,400
Planning, Eng. & Design		ls		\$50,000
Construction Management		ls		34,000
TOTAL CONSTRUCTION COST				\$654,400
LERRD:				
Const. Staging Area	4	ac	2000	\$8,000
Relocate Finger Piers				10,000
Electrical Relocation	1	job	ls	2,000
'Seawall Drainage:				
"12" Drain Pipe	6	lf	26	200
"15" Drain Pipe	12	lf	32	400
"12" Drain Pipe	27	lf	38	1,000
"12" Drain Pipe	27	lf	48	1,300
Contingencies (25%)				6,500
Planning Eng. & Design		ls		2,000
Construction Management		ls		1,000
Total LERRD				\$32,400
TOTAL PROJECT FIRST COST				\$686,800

TABLE 9 Cont.

ANNUAL COST - TIMBER BULKHEAD
OCT. 1989 PRICES - 8 7/8%
ANNUAL COST - NED PLAN

Item	Amount
CONSTRUCTION:	
Total Construction Cost	\$654,400
Interest During Construction	7,300
Total Investment Cost	\$661,700
Interest and Amortization	60,000
Total Annual Project Cost	\$60,000
LERRD:	
First Cost	\$32,400
Interest During Construction	700
Total Investment Cost	\$33,100
Interest and Amortization	\$3,000
Annual Maintenance Cost	12,900
Total Annual Cost LERRD	\$15,900
TOTAL ANNUAL CHARGES	\$75,900
TOTAL ANNUAL BENEFITS	\$116,400
BENEFIT/COST RATIO	1.5
NET ANNUAL BENEFITS	\$40,500

ECONOMIC ANALYSIS

37. Existing Conditions. The constant wave attacks against the shore line and seawalls at Portersville Bay are eroding land and threatening the roadway access for both segments of road; Coden Belt Road to the east, and Shell Belt Road to the west.

38. Attempts by Mobile County to provide interim protection have met with only marginal success, despite incremental expenditures of \$237,000 on maintenance and repairs during the 9-year period, 1979 through 1987, necessitated by the existing bulkhead's deteriorated condition. The existing bulkheads have been breached intermittently along their entire lengths. Backwash has eroded the material from behind the bulkheads. This condition is threatening to undermine the bulkheads, culverts, adjacent roads, bridges, and utility poles. For evaluation purposes it is assumed that failure of both roads will occur within two years.

39. No Action Alternative. The "no action alternative" is based on the assumption that no Federal, State or local protection would be provided. Under these conditions, an unalterable series of event would take place. With the failure of the bulkheads, adjacent roadbeds would erode at increased rates, resulting in their eventual failure. Without stable support, utility poles located between the roadbed and the water would eventually collapse. Without protection, two ten-ton limit bridges located at either end of the Coden Belt Road would eventually fail, as would a four-ton limit bridge on Shell Belt Road. Natural gas and water pipelines situated north of and adjacent to the existing road would also eventually be rendered inoperable. Access to private property and to public beaches and a public park would be limited or denied, entirely. Ultimately, private residential structures adjacent to and north of the roads would be endangered.

40. Because of the nature and location of the problem at Portersville Bay, "No Action" is not considered a realistic alternative to the proposed Federal project. It is reasonable to assume that some measure of protection would be provided by local interests prior to completion of the chain of events just described, as evidenced by the level of protection provided since 1979.

41. No Federal Action. Under the "No Federal Action" alternative, the current level of protection would continue to be provided by the non-Federal interests until the seawalls and roads fail, two years hence. Given such an occurrence, local, county, and state agencies face at least two obvious alternatives: A) rebuild to the conditions existing immediately prior to failure and protect the reconstructed roadway; or B) allow continued erosion beyond failure of the existing structures and provide permanent alternative access routes to the residential property and park.

42. Alternative A. Rebuilding to conditions existing prior to failure considers two further reasonable options available to local interests, the choice of which is determined by their relative annualized costs:

Option a. Rebuild the bulkheads and roads at their current locations, using fill to rebuild the washed out roadbed and beach front; or

Option b. Build equivalent replacement bulkheads and roads north of, adjacent to, and parallel to the sites of existing seawalls and roads.

43. Either of the two options just described would entail certain common costs.¹ Existing seawalls and roads would require continued maintenance at the current level for the two-year period prior to failure. Road construction costs, including costs for engineering, inspection, underlayment, drainage, and adjustments to private and public property and structures adjacent to the new road are assumed equivalent under both conditions. Three existing bridges and 60 utility poles and

¹ Where necessary, annualized costs are reduced to their present value using the same discount rate. The time period for the present valuation is the assumed duration of time prior to the commencement of each activity. A detailed description of the methodology and the computations for economic benefits are contained in Appendix B.

lines would be replaced at the time of failure. The failed seawalls would have to be replaced to protect the newly-constructed roadways.² Road construction and replacements of bridges, utility poles, and seawalls are estimated to take one year to complete. This would necessitate the temporary closure of the two roads and the consequent costs of rerouting local traffic, and the construction, placement and maintenance of signs and barriers.

44. Annual costs common to both options are as follows:

1. Maintenance to time of failure	\$ 4,173
2. Road construction	40,103
3. Bridges Replacement	4,152
4. Replacement of utility poles and lines	1,609
5. Rerouting local traffic	3,242
6. Construction, placement, and maintenance of temporary signs and barriers	1,139
7. Rebuilding seawall	<u>41,546</u>

Total Common Annual Benefits	\$95,964
------------------------------	----------

45. In addition to those costs common to both options, Option a would require the additional costs of placing approximately 18,333 cubic yards of fill at the Shell Belt Road site and approximately 30,556 cubic yards of fill at Coden Belt Road.

46. Additional annual benefits under Option a include:

Common Annual Costs	\$95,964
Fill to original codition	<u>20,423</u>
Total Annual Costs Option a	\$116,387

47. Option b, building north of and adjacent to existing structures, would require no additional fill beyond that used in the construction of the replacement road, but would entail other

² Protection provided for the road by the newly-constructed seawalls is assumed to be comparable in cost and construction to that provided by the proposed Federal project and would also have an estimated 50-year life expectancy.

additional costs. New 50-foot rights-of-way through expensive beach front private property north of and adjacent to the existing roads would have to be acquired at additional cost to the local interests. Water and natural gas pipelines, currently positioned north of the existing roads along existing rights-of-way, would have to be relocated.

48. Annual economic costs under Option b includes:

8.	Common Annual Costs	\$95,964
9.	Acquisition of rights-of-way	72,295
10.	Relocation of natural gas and water pipelines	<u>15,190</u>

Total Annual Costs, Option b	\$183,449
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49. Therefore, after comparing the total costs of the two options, it is conclusive that the costs to implement Option a is significantly less than the costs to implement Option b. Accordingly, Alternative A, Option a would be the most rational economic choice.

50. Alternative B. Providing permanent alternative access assumes that deterioration of the project site would be allowed to continue beyond the point of failure of the seawalls and roads and that public maintenance of exiting waterfront structures would cease at the time of failure. An alternate equivalent road would then be constructed parallel to the existing road, approximately 350 feet to the north, to provide rear approach access to the private residences facing south along the existing road.

51. Under this alternative, no action would be taken by local public interests after the failure of the existing seawalls to prevent further deterioration of private beach front property. Thus, it is assumed that landowners would provide protection at some point after failure, prior to endangerment of the private residences at the site. For evaluation purposes, it is assumed that construction of two-layer, 6-foot wooden bulkheads would be completed by private landowners within 10 years after failure and that construction would be distributed evenly across that time period. Traffic would be permanently rerouted (that is, for the full 50-year period of the project life); and more costly permanent signs and barriers would have to be constructed and maintained.

52. Construction of alternate roads would also require the acquisition of 50-foot-wide rights-of-way, approximately equal in length to the existing rights-of-way. Property acquired under this alternative project concept would be much less expensive than the beach front property which would be acquired under Alternative A Option b. However, the proximity of extensive wetlands and wildlife habitat to the area of this proposed alternative would likely increase the costs to complete the necessary environmental impact assessments and to ensure compliance with environmental regulations. Additional costs may also accrue to mitigation of disturbed wildlife habitat and wetlands.³

53. Additional costs for maintaining conditions, road construction, bridges replacement, replacement of utility poles and lines, and relocation of water and natural gas pipelines are determined to be equivalent to those described under Alternative A Option b. Providing for alternative access routes would include the following annual costs:

<u>Expenditures</u>	<u>Estimated Annual Cost</u>
1. Maintenance to time of failure	\$ 4,173
2. Acquisition of rights-of-way	9,208
3. Road construction	40,103
4. Construction of one 10-ton limit bridge	1,384
5. Relocation of natural gas and water pipelines	15,190
6. Relocation of utility poles and lines	1,609
7. Construction, placement, and maintenance of permanent signs and barriers	12,653

³ In the interest of time and expense, the cost of mitigation of adverse environmental impact was not evaluated. Evaluation of this category would serve only to increase the benefit-to-cost ratio.

8. Permanent road closure and rerouting local traffic	5,268
9. Construction of bulkheads along private beach front	<u>43,131</u>
Total Annual Cost	\$132,719

54. Without-Project Condition. As a result of comparison of annual costs associated with each alternative No-Federal-Action scenario, it was determined that Alternative A Option a is the most reasonable without-project condition scenario and will be used as the basis for the Federal project economic benefits determination.

55. With-Project Condition. Evaluation of the with-project benefits is premised upon the assumption that local interests must act immediately to prevent further deterioration of the seawalls and roads at the proposed project site. The with-project condition considers the immediate replacement and protection of the seawalls and repair of the adjacent roadbeds and surfaces. The proposed Federal project offers the least-cost solution to the erosion problem at Portersville Bay for the life of the project (50 years). Net annual benefits to replacement of the total length of the seawalls at the project sites would be the difference between the annualized cost of the NED plan, \$66,300, and that of its most likely alternative (Alternative A, Option a), \$116,400, for a net annual benefit of \$50,100.

ENVIRONMENTAL CONSIDERATIONS

56. Construction of the NED plan as described in Alternative 4 would cause minor short term negative impacts and long term beneficial impacts. Adverse impacts include the loss of about 0.61 acres of water bottoms along the shoreline where the bulkhead would be constructed. Beneficial impacts include the protection of the shoreline and highway from further erosion and the creation of good quality habitat for littoral flora and

fauna. An Environmental Assessment (EA) of the proposed plan was prepared in accordance with the provisions of the National Environmental Policy Act of 1969 and is provided following the main report. The Finding of No Significant Impact (FONSI), the Section 404(b)(1) Evaluation, and the Statement of Findings follow the EA.

57. Water Quality Certification and Coastal Zone Consistency. Pursuant to the requirements of the Clear Water Act, State Water Quality Certification is required for the proposed action. On December 1, 1989 the proposed project description was circulated for public comment by a 30-day public notice (Number FP89-BC03-4). By letter of December 12, 1989, the Alabama Department of Environmental Management (ADEM) was requested to issue Water Quality Certification (WQC) and Coastal Zone Consistency (CZC) Certification. ADEM issued State Water Quality Certification and Coastal Zone Management Certification on March 22, 1990.

58. CULTURAL RESOURCES. There are several recorded prehistoric shell middens in the vicinity of Bayou Coden. None of these will be affected by the proposed construction activities since the work area will be confined to the existing paved road adjacent to Portersville Bay and to the immediate area within the Bay. Mobile District archaeologists have determined that no properties listed on, determined to be eligible for, or being nominated to the National Register of Historic Places are located in the project vicinity. Concurrence on this determination and the proposed action has been received from the Alabama State Historic Preservation Officer (SHPO) and is included in the Statement of Findings, which follows the EA.

PROJECT DESIGN

59. The recommended project to be constructed at Coden Belt and Shell Belt roads is designed as a cantilever type bulkhead with an elevation of 3 1/2-foot. This design elevation, however, varies in some locations (see Figure 6). Support for this design was based on the stability of the existing bulkheads which have been in service many years and show no visible signs of overturning. The new bulkheads will be located three feet in front (bay side) of the existing bulkheads. The existing bulkheads will remain in place except for approximately the top 6 inches which will be cut off below backfill grade for maintenance purposes. Eighteen finger piers (as shown on Plates 1-11) will be detached from the existing bulkheads, by the local sponsor, prior to initiation of project construction. The local sponsor will reattach the finger piers to the new bulkhead after construction of the bulkheads is completed. Scheduling of this non-Federal action will be covered in the LCA.

60. The new bulkheads will consist of 2" x 8" vertical sheeting, 3" x 8" wales, and 10" diameter piles. The sheeting is backed by a non-woven filter fabric and backfilled with pervious soil (sandy material). All timber will be pressure treated and the hardware will be hot dipped galvanized. The piles have a penetration depth of approximately 8 to 10 feet and, are spaced four feet center to center. The wales span from pile to pile with the vertical sheeting attached to them. The sheeting will penetrate three feet below the dredged line to prevent wave action from scouring the toe and undermining the bulkheads. The rubble presently located in front of the old bulkheads will be relocated in front of the new bulkheads to help prevent toe scour, and also to dissipate energy from small wave action. The new bulkheads are calculated to last for about 25 years, after which, the entire structure would be replaced. The replacement structure is calculated to last for an additional 25 years, bringing the total project life to 50 years. Annual maintenance costs for the project are calculated to be \$12,900, which is enough money to cover the replacement costs of the bulkhead.

61. Design Loads. Forces acting on the bulkheads were calculated from the soil parameters furnished by the Geotechnical and Materials Branch of Mobile District. A one foot head differential was assumed between the backfill saturation line and the bay pool elevation due to the fluctuation of the tide and wave action. Active and passive soil pressures were used in designing the bulkhead members and performing the stability analysis. Forces from the wave action acting on the structures are not critical. Because the bulkheads are relatively small in height, it is anticipated that the structures will be overtopped by the large waves. Therefore, the forces of these waves would go over and not impact the bulkheads. Small wave forces impacting the bulkheads will be insignificant since the forces will be acting opposite to that of the backfill pressures.

PLAN IMPLEMENTATION

62. In accordance with cost sharing requirements as specified by the Water Resources Development Act of 1986, non-Federal interests will pay 25% of total project costs including 5% in cash. Should the non-Federal contribution (5% cash and LERRD) be less than 25%, the non-Federal interests shall pay an additional amount in cash during construction to bring the total non-Federal contribution up to 25 %. Additionally, non-Federal interests shall assume responsibility for all cost in excess of the Federal limitation of \$500,000. Mobile County, Alabama, is the local sponsor for the considered project. Implementation of the NED Plan includes the first cost for lands, easements, rights-of-way,

relocations, and dredged material disposal areas (LERRD); construction, designs, plans and specifications, and operation and maintenance. The cost of design, plans and specifications and project construction are borne by the Federal government, up to a maximum expenditure of \$500,000. The cost of all LERRD, operation and maintenance, and all construction costs above \$500,000 are to be borne by the local sponsor. Allocation of project cost between the Federal government and the local sponsor is displayed in Table 10.

TABLE 10
FEDERAL AND NON-FEDERAL COST APPORTIONMENT
TIMBER BULKHEAD - NED PLAN

Item	Federal Share	Non-Federal Share
Total Construction (\$686,800)	\$500,000	\$154,400
LERRD	0	\$32,400
Total	\$500,000	\$186,800

INSTITUTIONAL REQUIREMENTS

63. Before the NED Plan can be constructed and function to provide streambank and shoreline protection, a number of specific actions must be completed by both the Federal Government and the local sponsor. The Federal Government would be responsible for the construction of the NED Plan. The Corps of Engineers would prepare the final design, prepare detailed plans and specifications, and supervise and administer the necessary

construction contracts. The Corps would also periodically inspect the completed project to assure that it would function to fulfill the intended purpose. In addition to these responsibilities, the Corps must first assure that the proper review, approval, and local sponsor responsibilities are fulfilled. The events shown in Table 11 are planned prior to the start of any construction.

TABLE 11
EVENTS PRIOR TO CONSTRUCTION

Event	Expected Completion Date
The Mobile District submits the report to the South Atlantic Division for review and requests funds for preparation of plans and specifications	May 1990
The South Atlantic Division approves the report for technical adequacy and forwards it to the Office Chief of Engineers with a request for funding for plans and specifications	Aug 1990
The Mobile District prepares plans and specifications while coordinating with the local sponsor on the draft Local Corporation Agreement (LCA)	Sep 1990
When the plans and specifications are essentially completed by the Mobile District, the draft LCA agreement is submitted to the Office of the Chief of Engineers with a request for approval of construction and authority to advertise for a construction contract	Oct 1990
A fact sheet on the project is sent to the Assistant Secretary of the Army (Civil Works) with a recommendation for inclusion of the project in the construction program	Oct 1990

The Assistant Secretary of the Army (Civil Works) authorizes the Office of the Chief of Engineers to allocate funds for construction of the Project and the Office of the Chief of Engineers approves the project

Nov 1990

The LCA agreement is signed and the local sponsor executes preconstruction commitments

Dec 1990

The construction contract is awarded

Jan 1991

64. The appropriate contractual agreement for providing lands, rights-of-way, and cost sharing, must be in effect prior to any Federal construction being initiated. The LCA, to be entered into by the local sponsor with the Secretary of the Army, would specify all the project related responsibilities of the non/Federal interest. This agreement would contain the following requirements:

- o Provide without cost to the United States all lands, easements, and rights-of-way and utility relocations and alterations required for construction and future maintenance of the project;

- o Hold and save the United States free from damages due to the construction works except damages due to the fault or negligence of the United States or its contractors;

- o Maintain and operate the project after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army;

- o Assume full responsibility for all project costs in excess of the Federal cost limitation of \$500,000;

- o Prevent future encroachments which might interfere with proper functioning of the project;

- o Fulfill the applicable requirements of non-Federal cooperation as specific in the terms and conditions of the

Uniform Relocation Assistance Real Property Acquisition Policies Act of 1970 (Public Law 91-646). approved January 23, 1971; and

o Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) which says that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied, the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance.

65. A draft LCA has been coordinated with Mobile County. A copy of the county's letter of authority and intent to cooperate with the Federal government on the streambank and shoreline protection project at Portersville Bay in Bayou Coden, Alabama, is provided in Exhibit 1 in the back of this report.

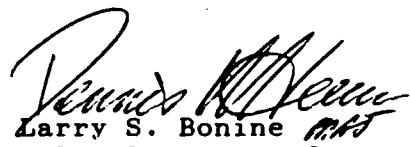
CONCLUSIONS

66. As District Engineer, Mobile District Corps of Engineers, it is my duty in the role as responsible Federal official, to review and evaluate in the overall public interests, the economic and environmental effects of streambank and shoreline stabilization to protect the highway and homes at Portersville Bay, Bayou Coden, Alabama.

67. After weighing all factors involved in the proposed actions, I have concluded that the environmental impacts associated with the plan, described herein as Alternative 4, would not adversely affect the quality of the human environment. I further find that the selected plan for emergency streambank and shoreline protection has the highest net economic development benefits consistent with protection of the environment, and is, therefore, designated as the NED Plan. The selected plan is complete and effective in solving the erosion problems and in realizing the available opportunities. The first cost of the selected plan is \$686,800, and the local sponsor's share would be \$186,800. The benefit-to-cost ratio is 1.5 to 1, and the selected plan is acceptable to the local sponsor and all reviewing agencies.

RECOMMENDATION

68. I recommend that the construction of a streambank and shoreline protection project at Portersville Bay in Bayou Coden, Alabama, at a presently estimated total first cost to the United States of \$500,000, and in cooperation with Mobile County, Alabama, generally in accordance with the NED Plan and conditions of local cooperation described in this report be undertaken under the authority provided by Section 14 of the Flood Control Act of 1946, as amended.

for 
Larry S. Bonine *mms*
Colonel, Corps of Engineers
District Engineer

NOTE:
CONTRACTOR STOCK PILE AND WORK
AREA WILL BE AVAILABLE ON ALABAMA
STATE DOCKS PROPERTY.

END OF PROPOSED SEA WALL

EXISTING SEA WALL

LIMIT RUBBLE SHORE PROTECTION ROCK

PROPOSED SEAWALL EXTENSION

N. LIGHT

S. LIGHT

ALABAMA STATE DOCKS PROPERTY

5 4 3

3

2

1

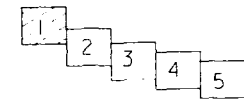
E

D

C

B

A



LIMIT
RUBBLE SHORE PROTECTION
ROCK

EXISTING
SEA WALL



U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALA.
PORTERSVILLE BAY, AL
PLAN-DETAILED DESIGN
TIMBER BULKHEAD

3

2

1

3

2

1

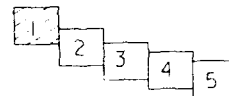
E

D

C

B

A



NOTES:
1. ALL DIMENSIONS ARE IN FEET.
2. ALL DISTANCES ARE MEASURED ALONG THE CENTERLINE OF THE BULKHEAD.
3. ALL ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL.
4. ALL MATERIALS TO BE USED SHALL BE OF THE BEST QUALITY AVAILABLE.
5. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE U.S. ARMY CORPS OF ENGINEERS DESIGN MANUALS.

NOTES:
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LIMIT
RUBBLE SHORE PROTECTION
ROCK

EXISTING
SEA WALL

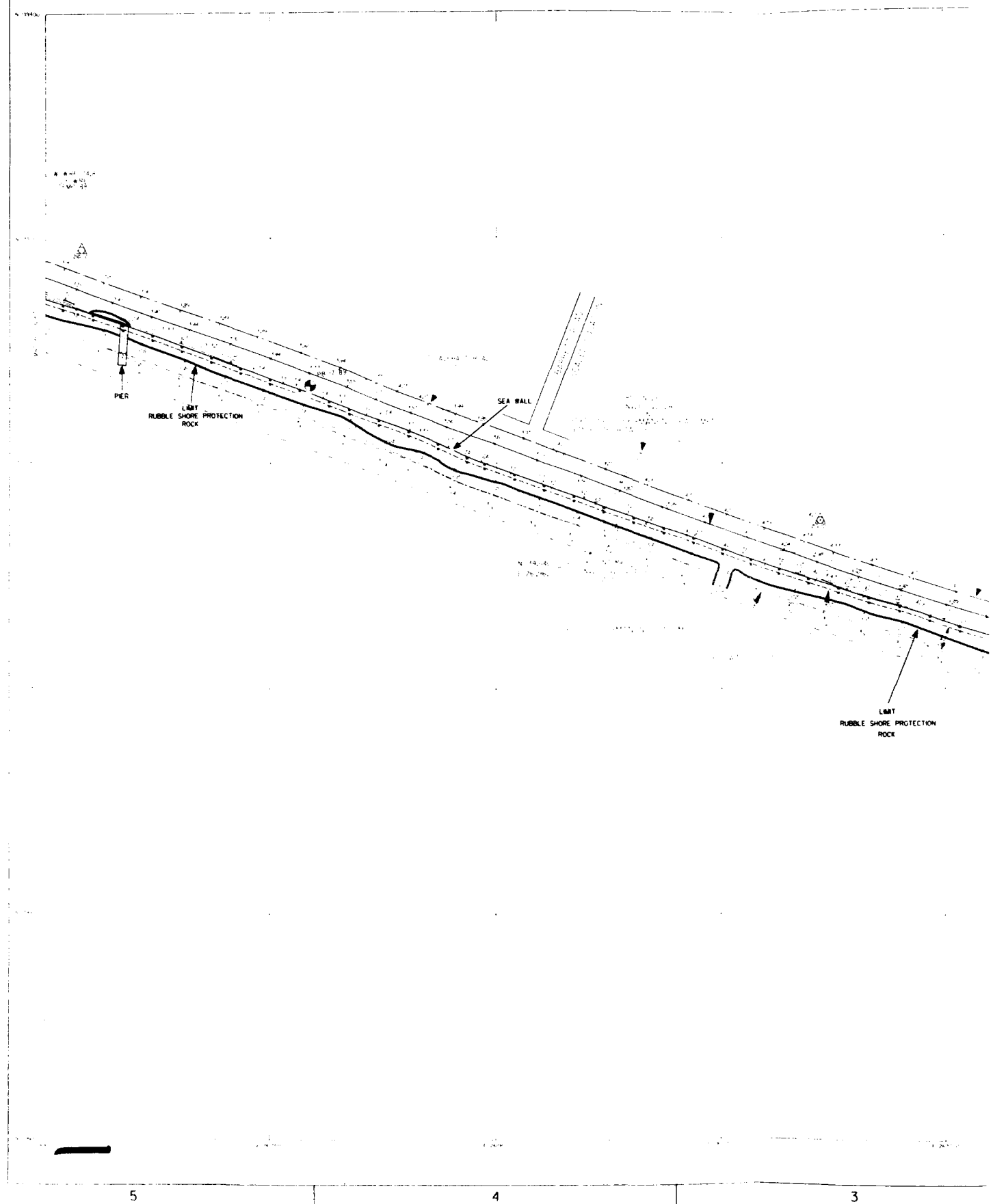


U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALA.
PORTERSVILLE BAY, AL
PLAN-DETAILED DESIGN
TIMBER BULKHEAD

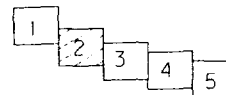
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LEGEND

—	PROPOSED BULKHEAD
---	EXISTING BULKHEAD
---	PROPOSED PILE LINE
---	EXISTING PILE LINE
---	PROPOSED TIE LINE
---	EXISTING TIE LINE
---	PROPOSED FILL LINE
---	EXISTING FILL LINE
---	PROPOSED DRAINAGE CANAL
---	EXISTING DRAINAGE CANAL
---	PROPOSED ROAD
---	EXISTING ROAD
---	PROPOSED RAILROAD
---	EXISTING RAILROAD
---	PROPOSED AIRPORT
---	EXISTING AIRPORT

NOTES

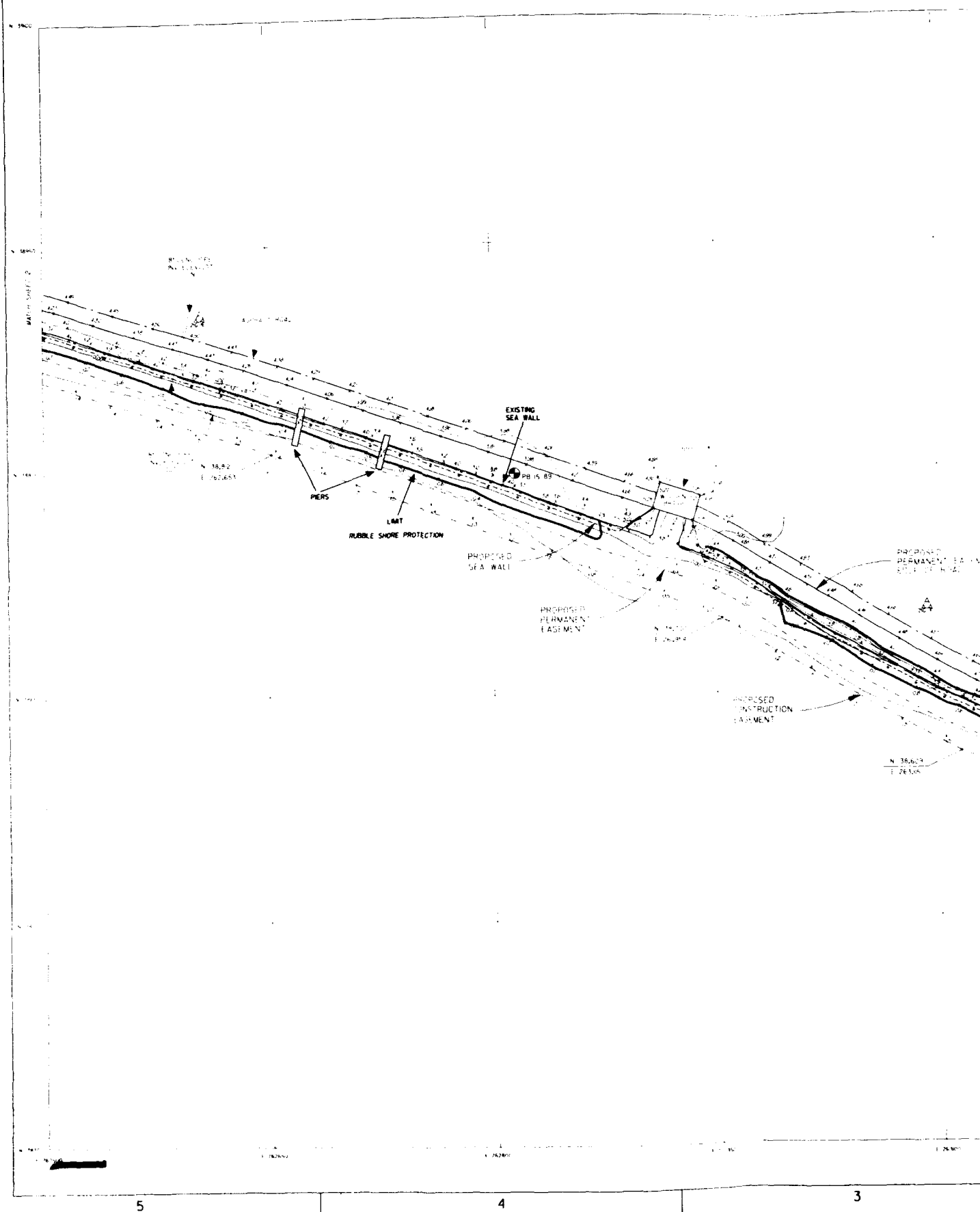
1. ALL DIMENSIONS ARE IN FEET.
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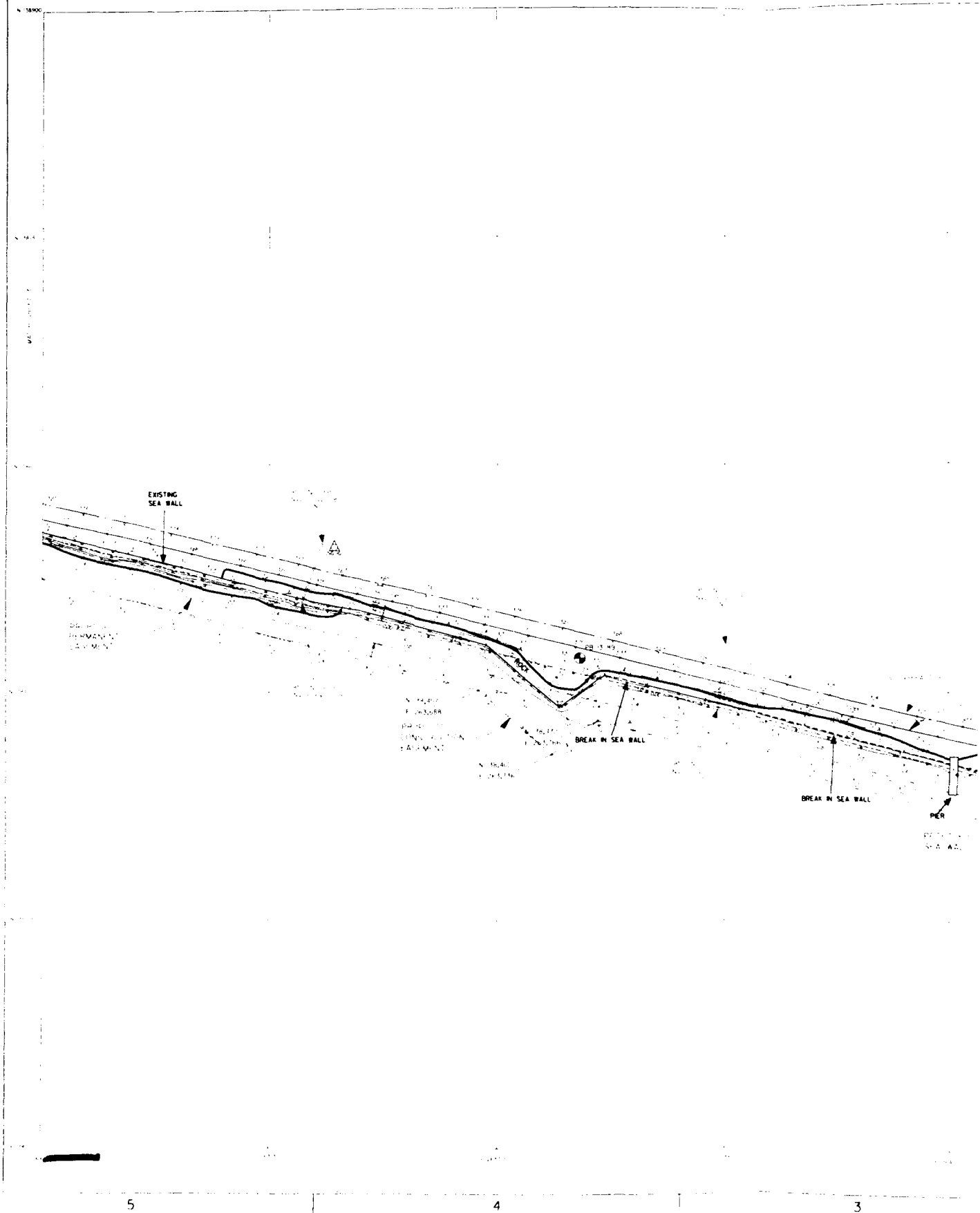


THIS PLAN IS A PRELIMINARY DESIGN AND IS NOT TO BE USED FOR CONSTRUCTION WITHOUT THE APPROVAL OF THE U.S. ARMY ENGINEER DISTRICT, MOBILE, ALA. ANY CHANGES TO THIS PLAN MUST BE APPROVED BY THE U.S. ARMY ENGINEER DISTRICT, MOBILE, ALA.

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALA.

PORTERSVILLE BAY, AL
PLAN-DETAILED DESIGN
TIMBER BULKHEAD





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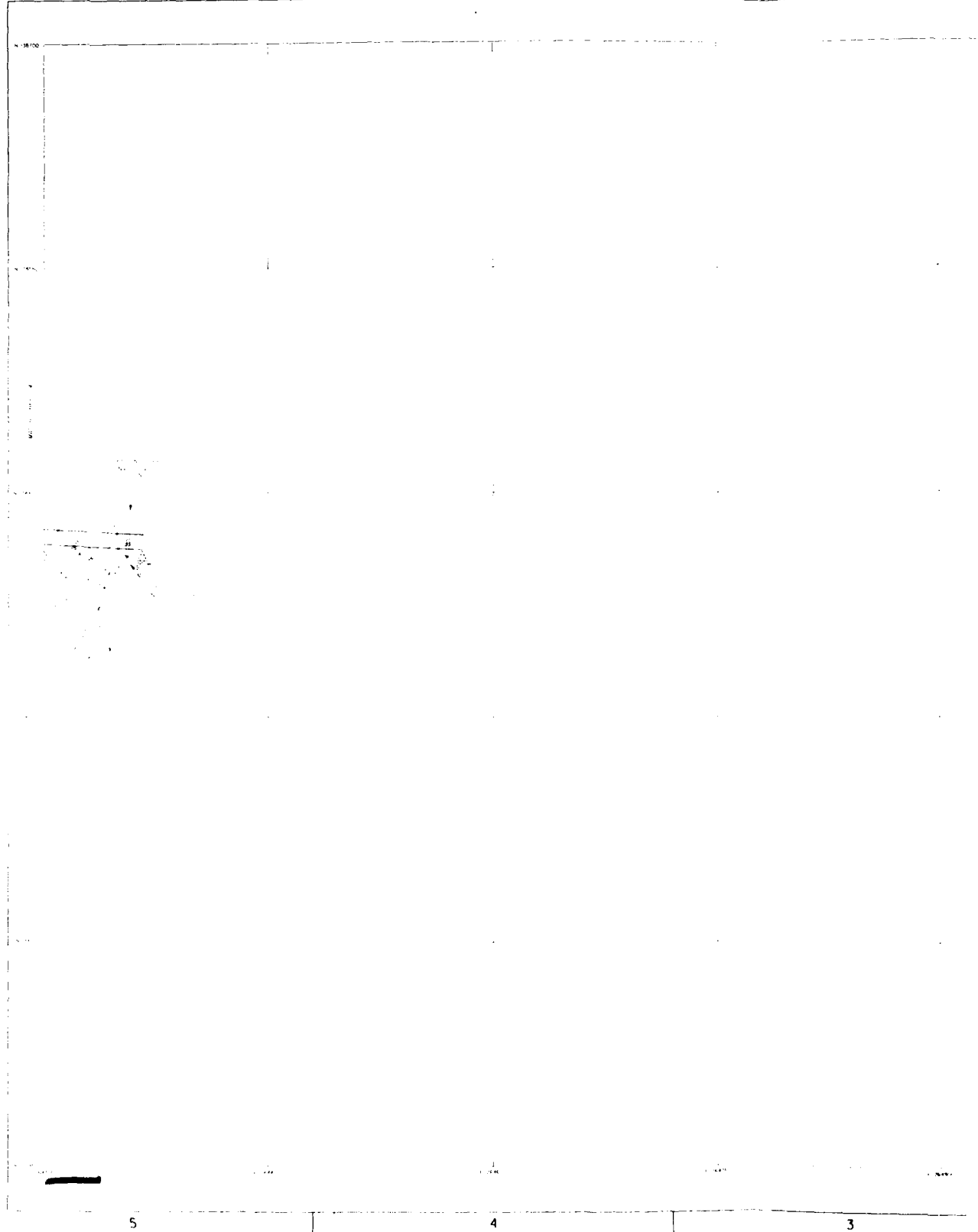
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CORPS OF ENGINEERS

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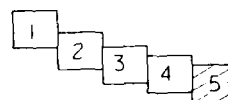


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U.S. ARMY

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Approved: 10/1/49

LEGEND

	CENTER LINE OF WATERWAY
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	CENTER LINE OF DITCH
	CENTER LINE OF ROAD
	CENTER LINE OF RAILROAD
	CENTER LINE OF PIPELINE
	CENTER LINE OF UTILITY LINE
	CENTER LINE OF BOUNDARY
	CENTER LINE OF FENCE
	CENTER LINE OF WALL
	CENTER LINE OF EMBANKMENT
	CENTER LINE OF CUT



Scale: 1 inch = 100 feet
 1:100
 1:200
 1:300
 1:400
 1:500
 1:600
 1:700
 1:800
 1:900
 1:1000

U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MOBILE, ALA. PORTERSVILLE BAY, AL PLAN—DETAILED DESIGN TIMBER BULKHEAD	DRAWN BY CHECKED BY DESIGNED BY APPROVED BY DATE
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PLATE NO. 5

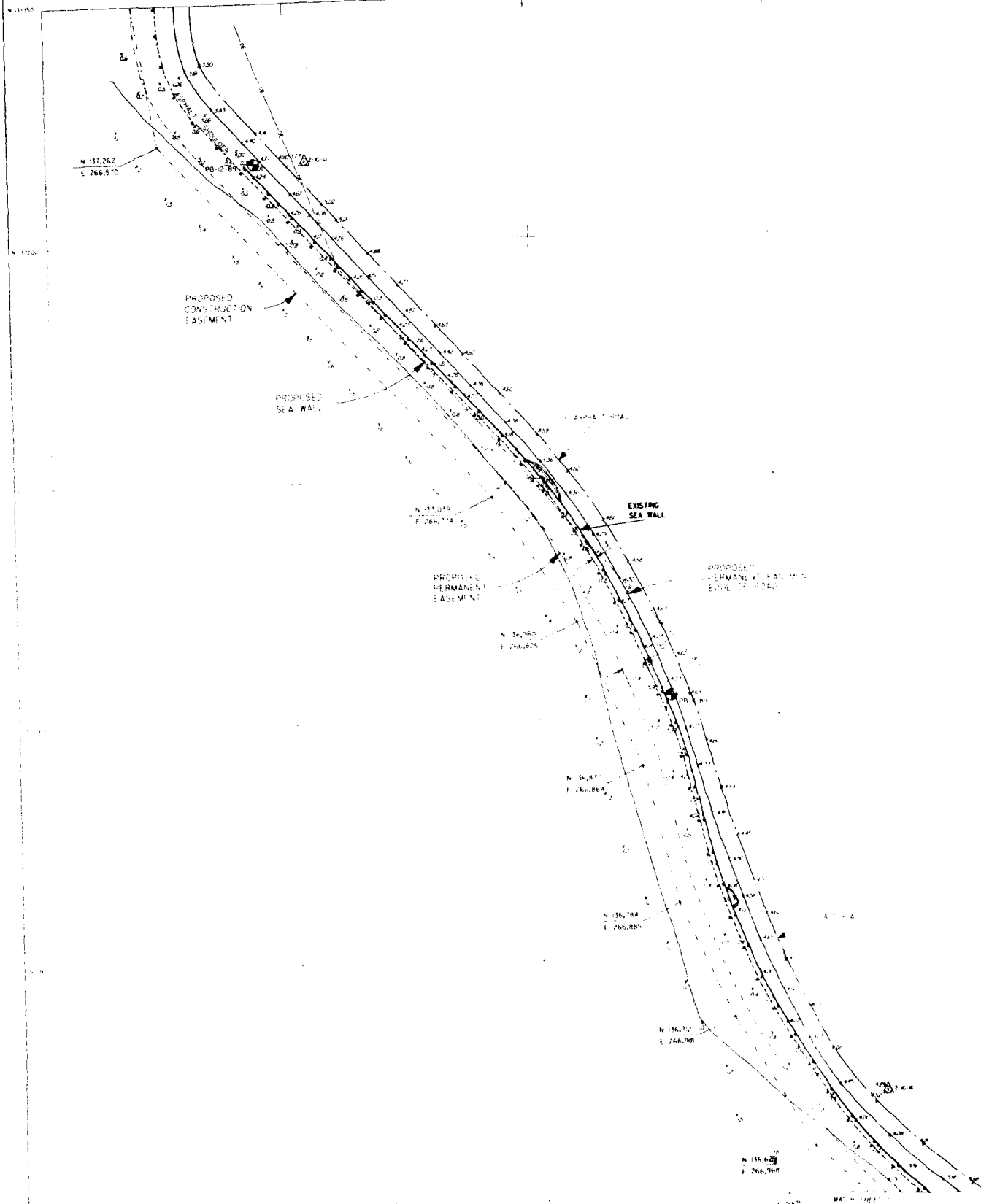
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CORPS OF ENGINEERS

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U.S. ARMY

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

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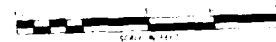
SHEET INDEX

LEGEND

---	OUTER BOUNDARY
---	EDGE OF ROAD
---	WATER
---	RAILROAD
---	ADJUTANT GENERAL'S
---	QUARTERMASTER
---	ENGINEER
---	SEA WALL
---	PERMANENT EASEMENT
---	CONSTRUCTION EASEMENT
---	SEA WALL SYMBOL

NOTE :

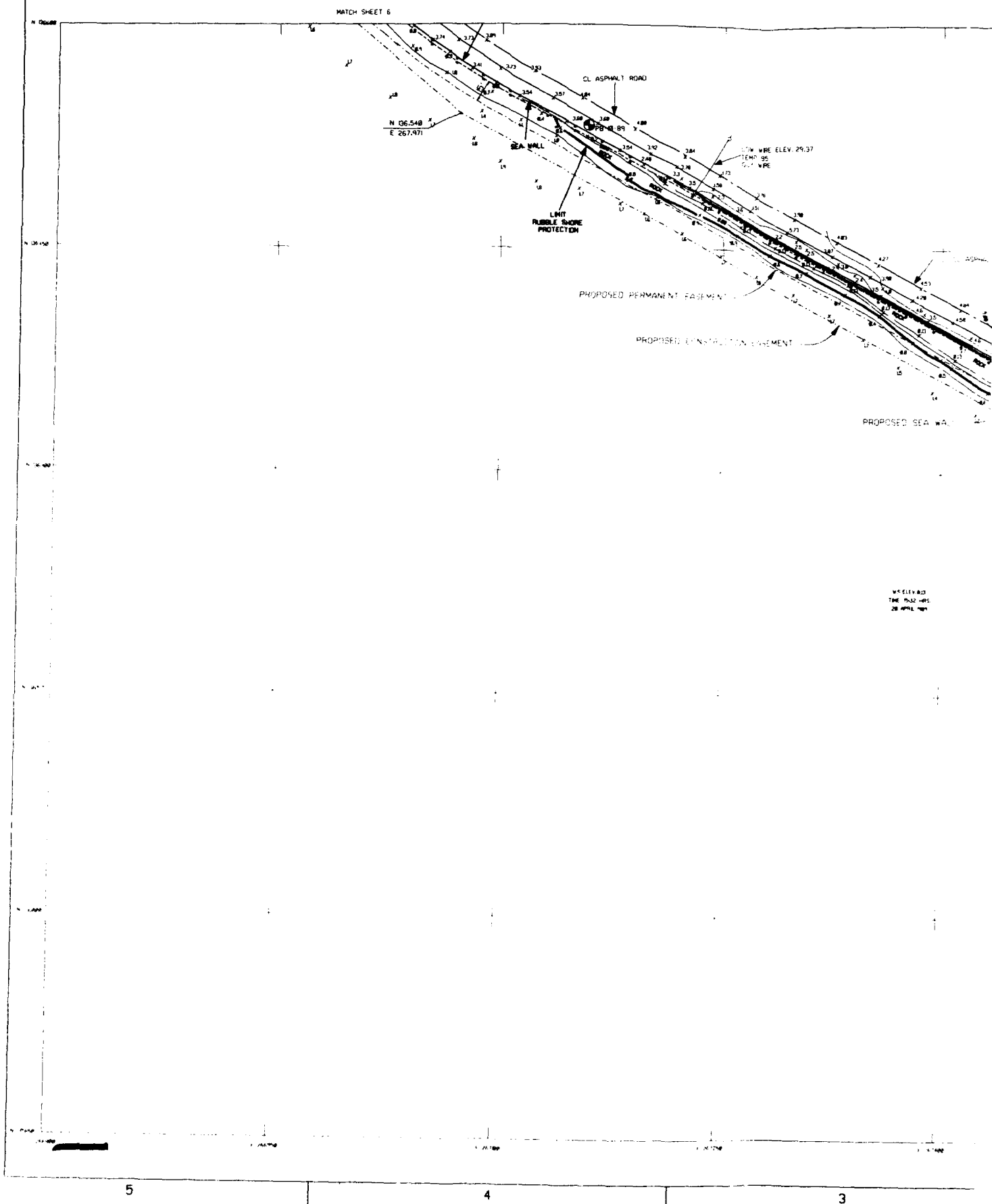
1. SEA WALL SYMBOLS
2. SEA WALL SYMBOLS
3. FOR LOSS OF BURNING
SEE PLANS TO REPORT



ON THE 100' SCALE, THE DISTANCE
FROM THE BURNING TO THE SEA WALL IS
100 FEET. THE DISTANCE FROM THE
SEA WALL TO THE BURNING IS 100 FEET.
THE DISTANCE FROM THE BURNING TO
THE SEA WALL IS 100 FEET.

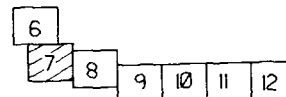
U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MOBILE, ALA.	
PORTERSVILLE BAY, AL.	
PLAN-DETAILED DESIGN TIMBER BULKHEAD	
DATE	BY

PLATE NO. 6



REVISIONS

SYM	DATE	DESCRIPTION	DATE	APPROVED



SHEET INDEX

LEGEND

—	CENTERLINE OF ROAD
—	EDGE OF ROAD
—	WATER EDGE
—	INDEX CONTOUR
—	INTERMEDIATE CONTOUR
—	SPOT ELEVATIONS
—	CONCRETE MENHENT
—	SEA WALL EXISTING
—	CURRENT ELEVATION
—	PROPOSED SEA WALL
—	PERMANENT EASEMENT
—	CONSTRUCTION EASEMENT
—	BORING SYMBOL

NOTE

- FOR TYPE A SECTION OF SEA WALL SEE FEASIBILITY REPORT
- FOR LOGS OF BORINGS SEE FEASIBILITY REPORT



UNIT: FEET
 PORTERSVILLE BAY, ALABAMA STATE PLANS
 SYSTEM: WEST ZONE TRANSVERSE MERIDIAN
 NORTH: VERTICAL CONTROL DATUM 1929
 COMPILED BY: PLANS TABLE SURVEY METHODS

U.S. ARMY ENGINEER DISTRICT, MOBILE
 CORPS OF ENGINEERS
 MOBILE, ALA.

PORTERSVILLE BAY, AL
 PLAN-DETAILED DESIGN
 TIMBER BULKHEAD

DATE: 10/1/50	SHEET NO. 7
DRAWN BY: [blank]	DRAWN BY: [blank]
CHECKED BY: [blank]	CHECKED BY: [blank]
APPROVED BY: [blank]	APPROVED BY: [blank]

PLATE NO. 7



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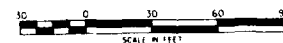
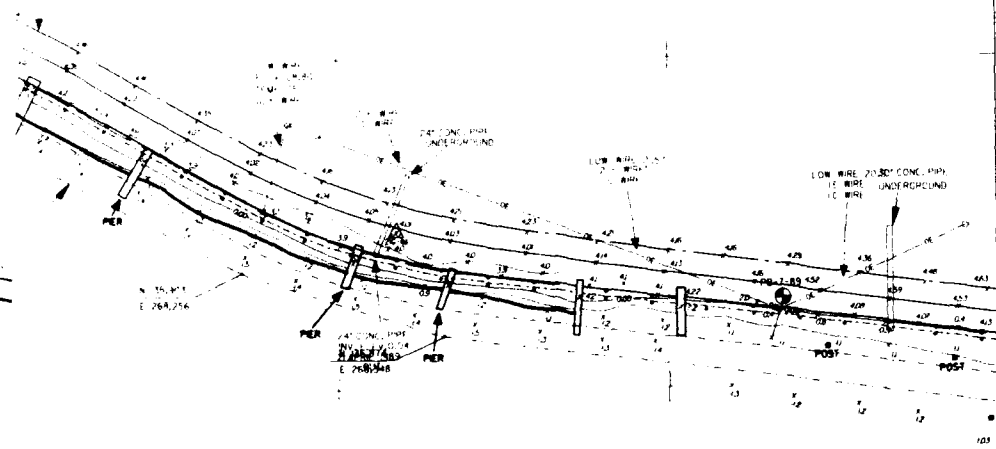
SHEET INDEX

LEGEND

---	CENTERLINE OF ROAD
---	EDGE OF ROAD
---	WATER EDGE
---	INDEX CONTOURS
---	INTERMEDIATE CONTOURS
---	SPOT ELEVATIONS
△	CONCRETE MONUMENT
---	SEA WALL EXISTING
---	OVERHEAD ELECTRIC LINE
---	ROCK
---	PROPOSED SEA WALL
---	PERMANENT EASEMENT
---	CONSTRUCTION EASEMENT
⊙	BORING SYMBOL

NOTE :

1. FOR TYPICAL SECTION OF SEA WALL SEE FEASIBILITY REPORT
2. FOR LOGS OF BORINGS SEE FEASIBILITY REPORT



ONE FOOT CONTOUR INTERVAL.
 50 FOOT GRID BASED ON ALABAMA STATE PLANE COORDINATE
 SYSTEM, WEST ZONE, TRANSVERSE MERCATOR DATUM 1927.
 NAVD83 VERTICAL CONTROL DATUM 1929.
 COMPILED BY PLANNING SURVEY METHODS

DESIGNED BY:	U.S. ARMY ENGINEER DISTRICT, MOBILE		
DRAWN BY:	CORPS OF ENGINEERS		
CHECKED BY:	MOBILE, ALA.		
SUPERVISED BY:	PORTERSVILLE BAY, AL.		
SR. REF. NO.	PLAN-DETAILED DESIGN		
SIZE	TIBER BULKHEAD		
DATE	DRAWING NO.	SHEET NO. OF 12	

PLATE NO. 8



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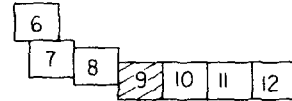
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U.S. ARMY

REVISIONS

SYMBOL	ZONE	DESCRIPTION	DATE	APPROVED



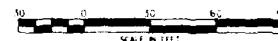
SHEET INDEX

LEGEND

---	CENTERLINE OF ROAD
---	EDGE OF ROAD
---	WATER EDGE
---	INDEX CONTOURS
---	INTERMEDIATE CONTOURS
---	SPOT ELEVATIONS
---	CONCRETE MONUMENT
---	SEA WALL (EXISTING)
---	OVERHEAD ELECTRIC LINE
---	ROAD
---	PROPOSED SEA WALL
---	PERMANENT EASEMENT
---	CONSTRUCTION EASEMENT
---	BORING SYMBOL

NOTE:

1. FOR TYPICAL SECTION OF SEA WALL SEE FEASIBILITY REPORT
2. FOR LOGS OF BORINGS SEE FEASIBILITY REPORT



ONE FOOT CONTOUR INTERVAL
 HORIZONTAL BASED ON ALABAMA STATE PLANE COORDINATE
 SYSTEM, WEST ZONE, TRANSVERSE MERIDIAN DATUM 1927.
 NGVD VERTICAL CONTROL DATUM 1929.
 COMPILED BY PLANE TABLE SURVEY METHODS

DESIGNED BY:	U.S. ARMY ENGINEER DISTRICT, MOBILE		
DRAWN BY:	CORPS OF ENGINEERS		
CHECKED BY:	MOBILE, ALA.		
SUPERVISED BY:	PORTERSVILLE BAY, AL		
SYMBOL NO.:	PLAN-DETAILED DESIGN		
SHEET NO.:	TIMBER BULKHEAD		
DATE:	SHEET NO.	DRAWING NO.	SHEET 9 OF 12

PLATE NO. 9



REVISIONS

SYMBOL	DATE	APPROVED

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SHEET INDEX

LEGEND

—	CENTERLINE OF ROAD
—	EDGE OF ROAD
—	WATER EDGE
—	WATER CONTOURS
—	INTERMEDIATE CONTOURS
—	SPOT ELEVATIONS
—	CONCRETE MONUMENT
—	SEA WALL EXISTING
—	OVERHEAD ELECTRIC LINE
—	ROCK
—	PROPOSED SEA WALL
—	PERMANENT EASEMENT
—	CONSTRUCTION EASEMENT
—	BORING SYMBOL

NOTE:

1. FOR TYPICAL SECTION OF SEA WALL, SEE FEASIBILITY REPORT
2. FOR LOGS OF BORINGS, SEE FEASIBILITY REPORT



UNIT: 1:50,000 (HORIZONTAL)
 UNIT: 1:50,000 (VERTICAL)
 ALL ELEVATIONS ARE IN ALABAMA STATE PLANE COORDINATE
 SYSTEM, BASED ON THE TRANSVERSE MERCATOR DATUM 1927.
 SOURCE: SURVEY CONTROL, DATUM 1929.
 COMPILED BY PLANNING SURVEY METHODS

U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MOBILE, ALA.	
PORTERSVILLE BAY, AL PLAN-DETAILED DESIGN TIMBER BULKHEAD	
DESIGNED BY: DRAWN BY: CHECKED BY: APPROVED BY:	DATE: _____ SCALE: 1" = 100' SHEET NO. OF 10



REVISIONS

SYM.	ZONE	DESCRIPTION	DATE	APPROVED

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SHEET INDEX

LEGEND

- CENTER LINE OF ROAD
- EDGE OF ROAD
- WATER EDGE
- BANK CONTOUR
- GRADE LINE
- SHOT ELEVATION
- QUALITY MEASUREMENT
- SEA WALL ELEVATION
- SEA WALL ELEVATION
- PROPOSED SEA WALL
- PERMANENT EASEMENT
- CONSTRUCTION EASEMENT
- BORING SYMBOL

NOTE:

1. FOR USE OF BORINGS SEE FEASIBILITY REPORT
2. FOR USE OF BORINGS SEE FEASIBILITY REPORT



PORTERSVILLE BAY, AL
 SO LOST (SEE PAGE 10) A. ARAMA STATE PLANNING AND CONSTRUCTION
 SYSTEM, WEST ZONE, TRANSVERSE INFORMATION, DATUM 1929
 NAVY VERTICAL CONTROL DATUM 1929
 COMPUTED BY PLANNING TABLE METHODS

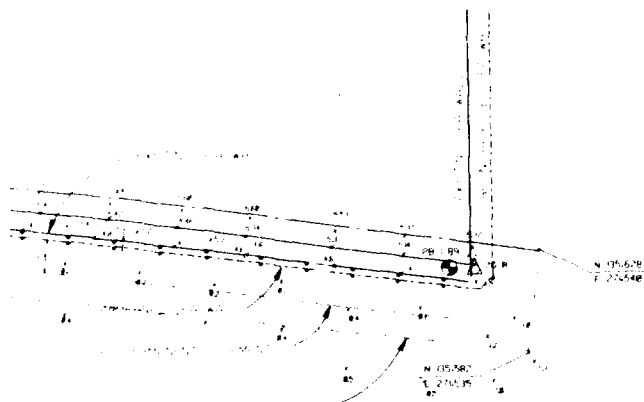
U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MOBILE, ALA.			
PORTERSVILLE BAY, AL PLAN-DETAILED DESIGN TIMBER BULKHEAD			
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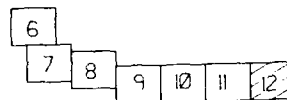
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REVISIONS

NO.	DESCRIPTION	DATE	APPROVED



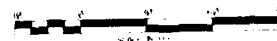
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LEGEND

	PROPOSED SEA WALL
	PROPOSED EQUIPMENT
	CONSTRUCTION EQUIPMENT
	WORKING LIMITS
	PROPOSED SEA WALL
	PROPOSED EQUIPMENT
	CONSTRUCTION EQUIPMENT
	WORKING LIMITS

NOTES

1. This plan shows the proposed sea wall and equipment for the Portersville Bay, AL. The plan is based on the latest available data and is subject to change without notice.



2. The proposed sea wall and equipment are shown in the plan view. The plan view is based on the latest available data and is subject to change without notice.

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALA.
PORTERSVILLE BAY, AL
PLAN-DETAILED DESIGN
TIMBER BULKHEAD

PLATE NO. 12

ENVIRONMENTAL DOCUMENTATION

ENVIRONMENTAL ASSESSMENT
FOR
SHORELINE PROTECTION ALONG PORTERSVILLE BAY
MOBILE COUNTY, ALABAMA

1. PROJECT DESCRIPTION. Portersville Bay is located in the vicinity of Bayou Coden, in south Mobile County, Alabama, about 24 miles southwest of Mobile. The Bay, an arm of the Mississippi Sound, is about 7.6 miles northwest of Cedar Point, the southern tip of the western mainland shore of Mobile Bay. The tributary area embraces southern Mobile County and the coastal waters and communities along Alabama's southwest coast.

The Shell Belt and Coden Belt roads are located on the shore of Portersville Bay and run parallel to the shoreline (See Figure 1). Each road was protected from the bay wave action by a timber seawall which varies from four to twelve feet from the shoulder of each road. However, severe deterioration of the seawalls have resulted in erosion along both roads. A large portion of the seawalls were constructed in the 1930's.

2. DESCRIPTION OF THE PROPOSED ACTION. The proposed action involves the construction of a timber bulkhead approximately 3 feet waterward of the existing bulkhead. The bulkhead would provide protection for approximately 3,500 feet of shore along Shell Belt Road and approximately 5,600 feet along Coden Belt Road. The bulkhead would consist of 1 by 8 inch treated timber sheeting, 3 by 8 inch treated timber wales, and 10-inch diameter 12-foot vertical piles (See Figure 2). The sheeting is backed by a non-woven filter fabric. The embankment behind the bulkhead would be filled with approximately 4,400 cubic yards (cy) of compacted pervious material. The piles will have a penetration depth of approximately eight to ten feet and are spaced four feet center to center. The wales span from pile to pile with attached vertical sheeting. The sheeting will penetrate the bottom approximately three feet below the dredge line to prevent wave action from scouring the toe and undermining the seawall sheeting. Approximately 2,100 cy of rubble from the existing bulkhead consisting of broken concrete, brick, etc., would be relocated to the bay side of the new bulkheads to prevent toe scour and to dissipate small wave action energy.

3. NEED FOR THE PROPOSED ACTION. The majority of the seawalls along both Coden Belt Road and Coden Shore Road were constructed in the 1930's, and due to age, are beginning to deteriorate and fail. In some areas, erosion is beginning to undermine the road. Fill material is continuously being placed behind the seawalls but this material continues to erode into the bay due to the deterioration of the structures. If the seawalls are not repaired, the adjacent roadway could fail.

4. ENVIRONMENTAL IMPACTS OF PROPOSED ACTION. The principle environmental impacts of the proposed action include the loss of water bottoms and its associated littoral fauna, and some existing shoreline where the old seawalls do not extend. Approximately 0.60 acres of water bottoms and an undetermined amount of shoreline intertidal habitat would be lost to the placement of the timber bulkheads, stone, and fill. However, the placement of stones and timber piles in the shallow water zone would add diversity to the ecosystem by

providing new substrate for littoral flora and fauna. This hard substrate would provide good quality attachment, shelter, and foraging habitat for aquatic biota.

Construction impacts would include a slight temporary degradation of existing water quality due to increased turbidity resulting from placement of the timber and fill. Construction would be conducted with land based equipment, therefore, increases in turbidity would be minimal. An extensive system of submerged aquatic grassbeds are located approximately 14 to 20 meters offshore of the existing wall. The grassbeds are extremely valuable to fishery resources such as blue crab, shrimp, flounder, speckled sea trout, etc. The proposed action would have minimal impacts to the nearby grassbeds. The mode of operation (land based equipment) and the inert nature of the fill material would reduce impacts to the grassbeds. In addition, the proposed work would be scheduled to the extent possible during the winter months (November to March) when the grassbeds are dormant and generally dewatered.

The proposed project would not significantly affect existing air quality or noise levels in the area. Some minor aesthetic value decreases could occur. The physical presence of the construction equipment would affect visual qualities of the area. However, this impact would be temporary and would cease immediately after the construction activity is completed.

5. ALTERNATIVES TO THE PROPOSED ACTION. Alternatives to the proposed action which were considered include:

a. No action. In the no action alternative, no structural modification responsive to the problems and needs of the local interest would be accomplished by a Federal action. As a result, the seawall could continue to deteriorate and could eventually result in a loss of portions of Shell Belt and Coden Belt roads, adjacent utilities, public land, and private property unless non-federal entities take some preventive measures.

b. Riprap revetment. The riprap revetment would involve placing appropriately graded stone on 6-inch bedding material and filter fabric. The elevation of the top of the riprap revetment would be approximately 3.0 feet and would extend approximately 18-feet into Portersville Bay from the existing seawall. The area behind the riprap revetment would require filling and seeding.

c. Gabion revetment. This alternative for the replacement of the existing timber bulkhead would utilize the use of gabions. The proposed gabion revetment would consist of gabion baskets founded on a 1 foot by 12 foot gabion mat and bedding material overlying filter fabric. Drainage behind the wall would be provided by free draining porous fill material. The overall height of the wall from bedding to top of the wall would not exceed 7 feet 6 inches.

6. ENDANGERED AND THREATENED SPECIES. Coordination with the National Marine Fisheries Service (5 December 1989) to identify species on the U.S. Department

of Interior List of Endangered and Threatened Wildlife and Plants indicated there would be no adverse effect on any listed endangered, threatened, or proposed species or their critical habitat. By letter dated 27 November 1989, the U.S. Fish and Wildlife Service indicated no endangered, threatened, or proposed species or their critical habitat occur within the project areas.

7. CLEAN WATER ACT CONSIDERATIONS. A Section 404(b)(1) Evaluation for the discharge of fill material into waters of the U.S is appended. By letter dated, 22 March 1990, Alabama Department of Environmental Management (ADEM) issued water quality certification for the proposed action.

8. COASTAL ZONE MANAGEMENT ACT CONSIDERATIONS. Review of the State of Alabama Coastal Zone Management Plan indicates that the proposed construction is consistent with the plan to the maximum extent practicable. ADEM concurred with the consistency determination on 22 March 1990.

9. CULTURAL RESOURCES. There are several recorded prehistoric shell middens in the vicinity of Bayou Coden. None of these would be affected by the proposed construction activities since the work area would be confined to the existing paved road adjacent to and within Portersville Bay. By letter dated, 27 November 1989, the Alabama State Historic Preservation Officer (SHPO) was asked to concur with the Mobile District's archaeologist findings that no cultural resources would be impacted as a result of the action. The SHPO concurred with the letter on 18 December 1989.

10. LIST OF AGENCIES, INTERESTED GROUPS AND PUBLIC CONSULTED.

Alabama Department of Environmental Management

Alabama State Historic Preservation Officer

U.S. Department of Commerce, National Oceanic and Atmospheric
Administration, National Marine Fisheries Service

U.S. Department of Interior, Fish and Wildlife Service

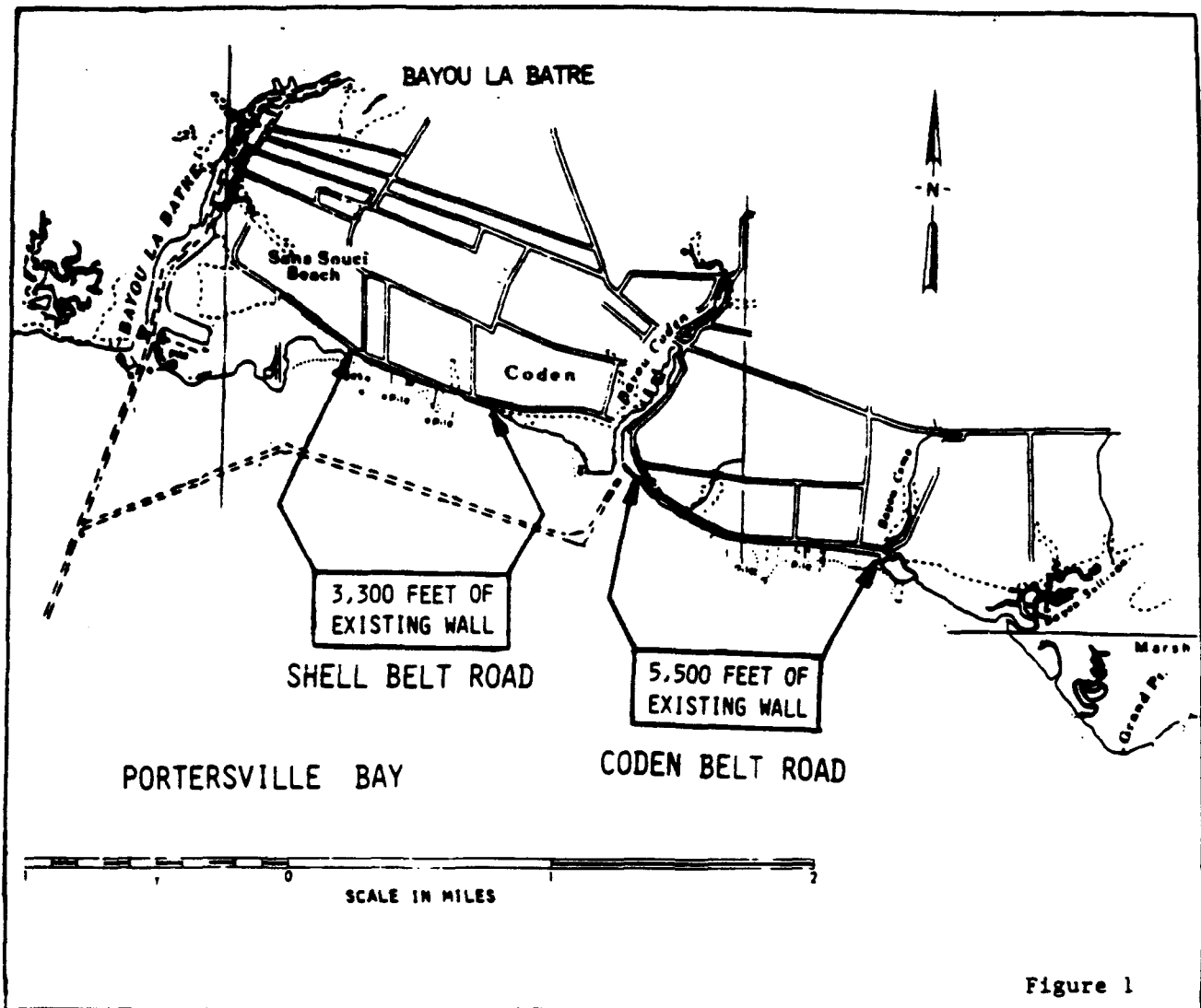
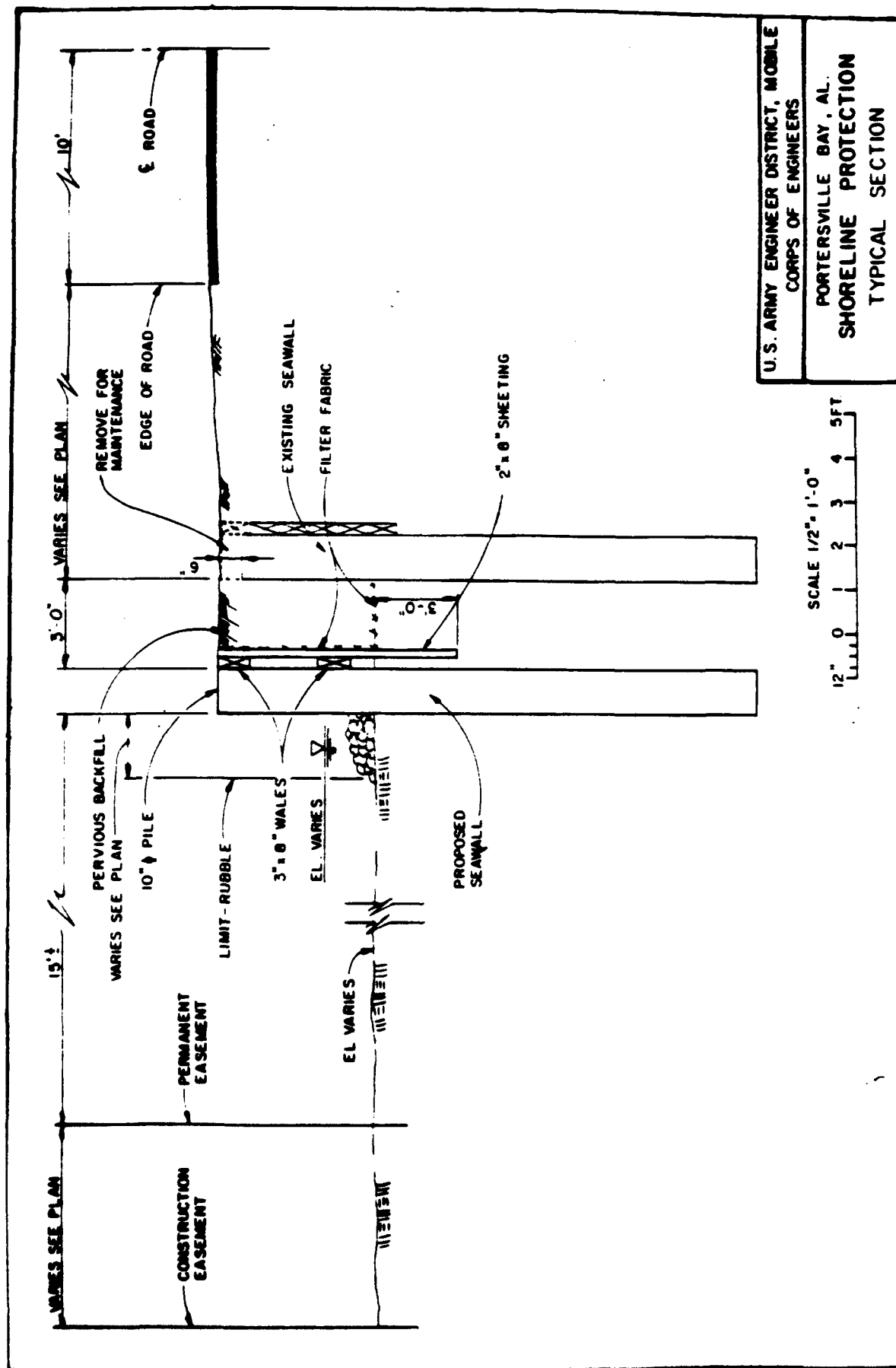


Figure 1



EA-5

Figure 2

SECTION 404(b)(1) EVALUATION REPORT
FOR
SHORELINE PROTECTION ALONG PORTERSVILLE BAY
MOBILE COUNTY, ALABAMA

1. DESCRIPTION OF AUTHORIZED FEDERAL PROJECT.

a. Location. Portersville Bay is located in the vicinity of Bayou Coden, in south Mobile County, Alabama, about 24 miles southwest of Mobile (See Figure 1). The Bay, an arm of the Mississippi Sound, is about 7.6 miles northwest of Cedar Point, the southern tip of the western mainland shore of Mobile Bay. The tributary area embraces southern Mobile County and the coastal waters and communities along Alabama's southwest coast.

b. Description of the Proposed Action. The proposed action involves the construction of a timber bulkhead approximately 3 feet waterward of the existing bulkhead. The bulkhead would provide protection for approximately 3,500 feet of shore along Shell Belt Road and approximately 5,600 feet along Coden Belt Road. The bulkhead would consist of 1 by 8 inch treated timber sheeting, 3 by 8 inch treated timber wales, and 10-inch diameter 12-foot vertical piles (See Figure 2). The sheeting is backed by a non-woven filter fabric. The embankment behind the bulkhead would be filled with approximately 4,400 cubic yards (cy) of compacted pervious material. The piles will have a penetration depth of approximately eight to ten feet and are spaced four feet center to center. The wales span from pile to pile with attached vertical sheeting. The sheeting will penetrate the water bottom approximately three feet below the dredge line to prevent wave action from scouring the toe and undermining the seawall sheeting. Approximately 2,100 cy of rubble from the existing bulkhead consisting of broken concrete, brick, etc., would be relocated to the bay side of the new bulkheads to prevent toe scour and to dissipate small wave action energy.

c. Authority and Purpose. This report was prepared under the authority of Section 14 of the Flood Control Act of 1946, as amended. The purpose of this study and report was to investigate the deterioration of existing seawalls along Coden Belt Road and Shell Belt Road.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Pervious material would be placed behind the bulkhead and existing rubble would be placed in front of the bulkheads to prevent toe scour.

(2) Quantity of Material. Approximately 4,400 cy of compacted pervious material would be used as fill behind the bulkhead. Approximately 2,100 cy of rubble would be placed in the bay at the toe of the bulkhead.

(3) Source of Material. The fill material would be obtained from commercial sources and from the existing bulkhead.

e. General Description of Discharge Sites.

(1) Location. The discharge sites are located approximately 3,500

feet along Shell Belt Road and approximately 5,600 feet along Coden Belt Road (See Figure 1).

(2) Size (Acres). Approximately 0.70 acres of water bottoms will be filled with fill material.

(3) Type of Site. The discharge sites for the construction of the timber bulkheads are primarily in the open water within the littoral zone and adjacent banks of Portersville Bay.

(4) Types of Habitats. Approximately 0.70 acres of aquatic habitat would be covered with fill material.

(5) Timing and Duration of Discharge. The proposed construction will be scheduled to the extent possible, during the winter months and last approximately 6 months.

(6) Description of Discharge Methods. The fill would be trucked to the sites and placed by dragline from the road.

2. FACTUAL DETERMINATIONS.

a. Physical Substrate Determinations.

(1) Substrate elevation and slope. The substrate elevations along Shell Belt Road range from -0.9 to 4.1 feet NGVD. The elevations along Coden Belt Road range from -1.3 to 4.9 feet NGVD.

(2) Sediment type. Refer to Paragraph 1.b.(1) of this evaluation.

(3) Dredged/fill material movement. Due to the nature of the fill material and containment, movement would be insignificant.

(4) Physical effects on benthos. Placement of the fill material and rubble would cover non-motile organisms living within the alignment of the proposed protective structure.

(5) Other effects. No other substrate effects are expected.

(6) Actions taken to minimize impacts. Placement of fill material would be within a defined area, thereby, minimizing impacts to benthos.

b. Water Circulation/Fluctuation, and Salinity Determination.

(1) Water.

(a) Salinity. No significant impacts.

(b) Water Chemistry. No significant impacts.

(c) Clarity. Water clarity may be temporarily reduced due to fill activities but should return to normal shortly after construction is completed.

(d) Color. No significant impacts.

(e) Odor. No significant impacts.

(f) Taste. No significant impacts.

(g) Dissolved Gases. No significant impacts.

(h) Nutrients. No significant impacts.

(i) Eutrophication. No significant impacts.

(2) Current Patterns and Circulation.

(a) Current patterns and flow. No significant impacts.

(b) Velocity. No impacts.

(c) Stratification. No impacts.

(d) Hydrologic effect. No impacts.

(3) Normal Water Level Fluctuations. No significant impacts.

(4) Salinity Gradients. No impacts.

(5) Actions That Will be Taken to Minimize Impacts. Since water circulation, fluctuation, and salinity gradients would not be affected significantly, no actions to minimize impacts would be required.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected changes in suspended particulate and turbidity levels in the vicinity of the disposal site. Temporary and localized increases in turbidity levels are expected during construction activities. However, once construction is completed conditions would return to normal.

(2) Effects on the chemical and physical properties of the water column.

- (a) Light penetration. No significant effects.
- (b) Dissolved Oxygen. Slight decreases in dissolved oxygen concentrations would occur during construction activities.
- (c) Toxic metals and organics. No significant effects.
- (d) Pathogens. No significant effects.
- (e) Aesthetics. No significant effects.
- (f) Others as appropriate. Not applicable.

(3) Effects on biota.

- (a) Primary production, photosynthesis. No significant impacts.
- (b) Suspension/filter feeders. No significant impacts.
- (c) Sight feeders. No significant impacts.
- (4) Actions taken to minimize impacts. No actions to minimize impacts would be required because the impacts are not significant.

d. Contaminant Determination. The materials to be used were not tested because the sand and stone have been determined to meet the exclusion criteria under 40 CFR 230.60. The materials are characterized as inert sand and stone which are sufficiently removed from sources of pollution to provide reasonable assurance that they would not be contaminated by such pollution. The porous fill material would be obtained from a commercial source which is free of contaminants.

e. Aquatic Ecosystem and Organism Determinations.

- (1) Effects on plankton. No significant effects.
- (2) Effects on benthos. Non-motile benthic organisms living on or within the approximately 0.70 acres to be filled would be destroyed.
- (3) Effects on nekton. No significant effects.
- (4) Effects on aquatic food web. No significant effects.
- (5) Effects on special aquatic sites.
 - (a) Sanctuaries and refuges. No significant effects.
 - (b) Wetlands. Marshes are located to the east and west of the

existing bulkhead along Shell Belt Road and to the east of the bulkhead along Coden Belt Road. The replacement bulkheads would tie into land on each end to avoid these marshes.

(c) Mud flats. No effects.

(d) Vegetated shallows. There are submerged grassbeds located approximately 14-20 meters offshore from the existing bulkheads. The construction would be conducted from land to keep turbidity at a minimum. Also, the nature of the fill material, sand and rubble, would also minimize impacts to this resource.

(e) Coral reefs. No effects.

(f) Riffle and pool complexes. No effects.

(6) Threatened and endangered species. Coordination with the U.S. Fish and Wildlife and the National Marine Fisheries Service indicated that no endangered, threatened, or proposed species or their critical habitat occur within the projects areas.

(7) Other wildlife. No significant effects.

(8) Actions to minimize impact. Construction would be conducted from land and to the extent possible in the winter months when the grassbeds are dormant and generally dewatered.

f. Proposed Disposal Site Determinations.

(1) Mixing zone determinations. Not applicable.

(2) Determination of compliance with applicable water quality standards. The proposed action would comply with applicable water quality standards. Water quality certification was received from Alabama Department of Environmental Management on 22 March 1990.

(3) Potential effects on human use characteristics. The replacement of the bulkheads would result in the protection of both Coden Belt Road and Coden Shore Road.

(a) Municipal and private water supply. No impacts.

(b) Recreational and commercial fisheries. No significant impacts.

(c) Water-related recreation. No impacts.

(d) Aesthetics. Only temporary degradation to the aesthetic

environment would occur as a result of the proposed action. Impacts would primarily occur as a result of the physical presence of construction equipment and possibly temporary localized increases in turbidity levels.

(e) Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves. No impacts.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. Cumulative effects would be negligible as the discharge will only occur once and involves relative small quantities of material.

h. Determination of Secondary Effects on the Aquatic Ecosystem. No significant secondary impacts on the aquatic ecosystem are expected to occur as a result of the proposed action.

3. FINDING OF COMPLIANCE

a. No significant adaptations to the guidelines were made relative to this evaluation.

b. Several alternatives to the proposed method of accomplishing the action were considered. These alternatives were discussed in the Environmental Assessment to which this evaluation is appended and are given as follows

(1) No action.

(2) Riprap revetment.

(3) Gabion revetment.

c. The proposed action would not violate any applicable State water quality standards.

d. The proposed action would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. The replacement of the bulkheads would not harm any endangered or threatened species or their critical habitat.

f. The proposed activity would not result in any significant adverse effects on human health or welfare, including municipal or private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

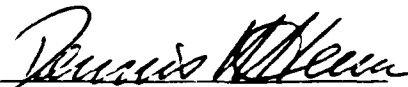
CESAM-PD-EC
Morgan

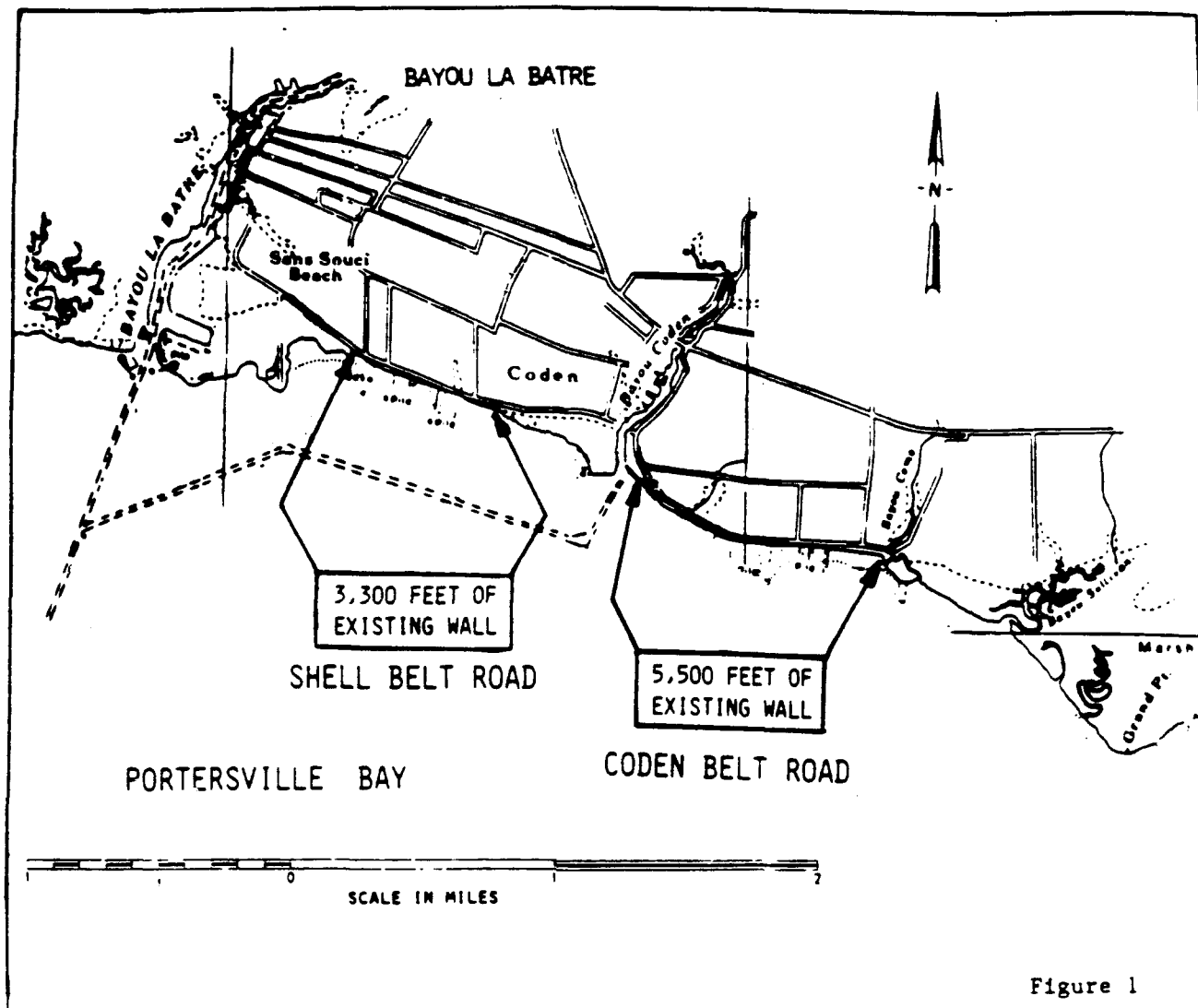
Date Prepared:
23 April 1990

g. On the basis of the guidelines, the proposed sites for the discharge of fill materials are specified as complying with the requirement of these guidelines.

DATE

4 May 90


for Larry S. Bonine *MB*
Colonel, Corps of Engineers
District Engineer



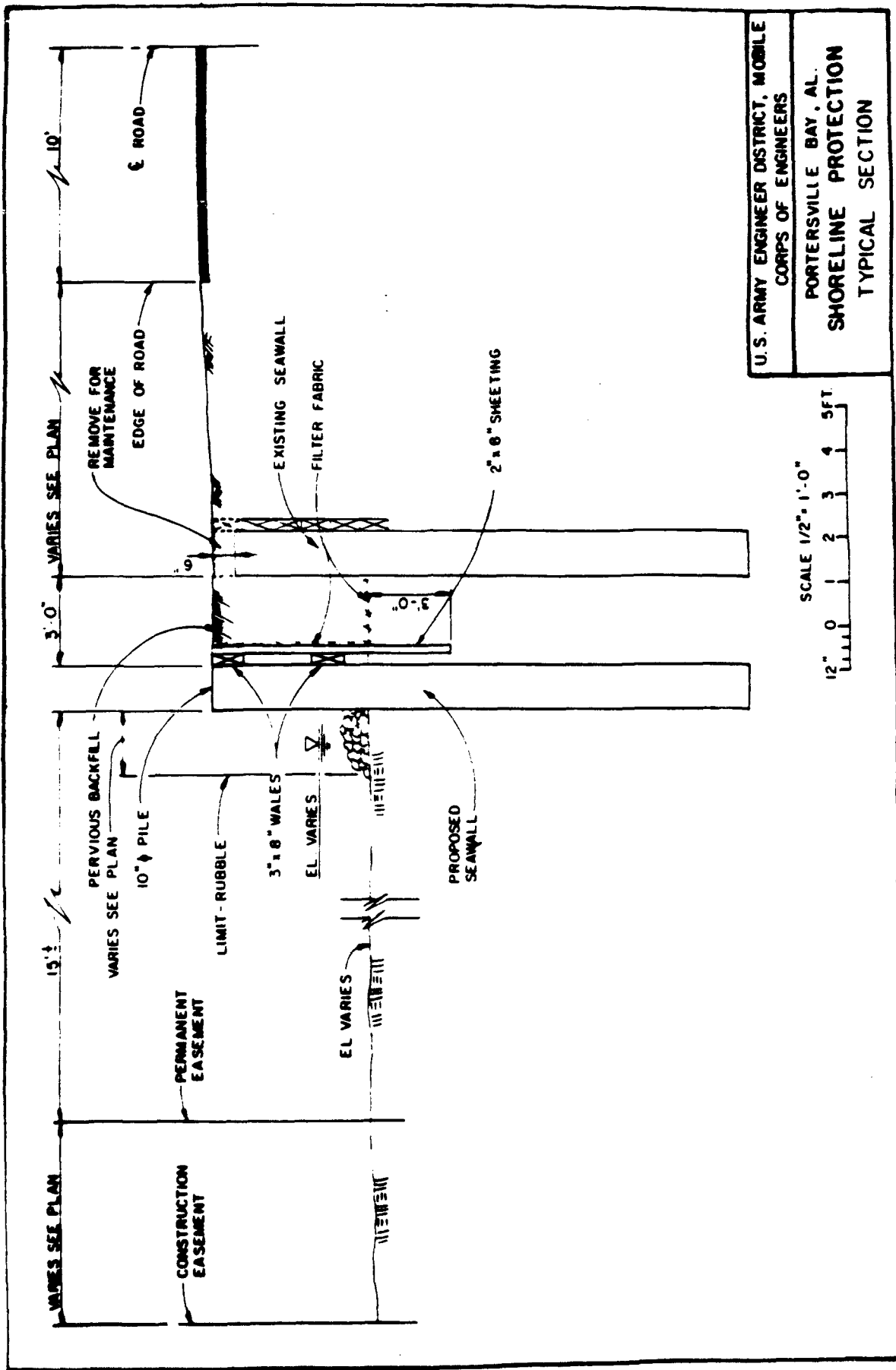


Figure 2

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
FOR
SHORELINE PROTECTION ALONG PORTERSVILLE BAY
MOBILE COUNTY, ALABAMA

I. PROPOSED ACTION. The proposed action involves the construction of a timber bulkhead approximately 3 feet waterward of the existing bulkhead. The bulkhead would provide protection for approximately 3,500 feet of shore along Shell Belt Road and approximately 5,600 feet along Coden Belt Road. The bulkhead would consist of 1 by 8 inch treated timber sheeting, 3 by 8 inch treated timber wales, and 10-inch diameter 12-foot vertical piles. The sheeting is backed by a non-woven filter fabric. The embankment behind the bulkhead would be filled with approximately 4,400 cubic yards (cy) of porous material. The piles will have a penetration depth of approximately eight to ten feet and are spaced four feet center to center. The wales span from pile to pile with attached vertical sheeting. The sheeting will penetrate the water bottom approximately three feet below the dredge line to prevent wave action from scouring the toe and undermining the seawall sheeting. Approximately 2,100 cy of rubble from the existing bulkhead consisting of broken concrete, brick, etc., would be relocated to the bay side of the new bulkheads to prevent toe scour and to dissipate small wave action energy.

II. ALTERNATIVES CONSIDERED.

- a. No action.
- b. Riprap revetment.
- c. Gabion revetment.

III. FACTORS CONSIDERED IN THE DETERMINATION THAT NO SUPPLEMENT TO THE EXISTING ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED.

Based on the results of the Environmental Assessment and 404(b)(1) Evaluation Report, the environmental impacts associated with the proposed action are minor and short-term. Specific factors considered in making this determination include:

- a. No endangered or threatened species or their critical habitat would be affected by the proposed work.
- b. No cultural resources would be affected by the proposed construction since the work area would be confined to the existing paved road adjacent to Portersville Bay and within the bay.
- c. Feasible alternatives to the proposed actions have been considered and none that are practicable have less adverse impacts on the environment.
- d. Turbidity generated by the filling operations would be short-term

and minor in nature.

e. The discharge would be accomplished under conditions which would minimize, to the maximum extent practicable, adverse environmental effects to the aquatic and semi-aquatic ecosystem.

IV. CONCLUSIONS. An evaluation of the attached environmental assessment indicates the proposed action would have no significant impact and a supplement to the existing Final Environmental Impact Statement for this action is not required. By letter dated, 22 March 1990, water quality certification and coastal zone consistency were issued by the Alabama Department of Environmental Management.

Date 4 May 90

Larry S. Bonine
for LARRY S. BONINE *MAS*
Colonel, Corps of Engineers
District Engineer

STATEMENT OF FINDINGS

Proposed Timber Bulkhead Shore Protection
PORTERSVILLE BAY
Mobile County, Alabama
A Federally Authorized Project

As District Engineer, Mobile District Corps of Engineers, it is my duty in the role of responsible Federal Officer to review and evaluate, with regard to the views of other agencies and the concerned public, the environmental effects of this activity. My evaluation and findings are as follows:

1. DESCRIPTION OF THE PROPOSED ACTION.

The proposed action involves the construction of new timber bulkheads along two segments of Portersville Bay shoreline between Bayou la Batre and Bayou Como, Mobile County, to replace existing timber bulkheads that are deteriorating due to age. The new bulkheads will provide protection from severe erosion that is threatening existing paved roadways paralleling the shoreline.

2. RESULTS OF COORDINATION.

a. The proposed action was circulated on a 15 day Corps of Engineers/ADEM joint public notice, Public Notice No. FP89-BCO3-2, which was issued on 1 December 1989 (Enclosure 1).

b. The Alabama State Historic Preservation Officer countersigned and returned our letter of November 27, 1989 agreeing that the proposed project would have no adverse effects on cultural resources. (Enclosure 2)

c. By letter of November 29, 1989, the Mobile District requested the Mobile County Commission to pay a fee of \$500.00 to the State of Alabama for Water Quality Certification (Enclosure 3). The fee amount was subsequently corrected to \$100.00 by telephone.

d. By letter of December 7, 1989, the Fish and Wildlife Service indicated they had no objections to the project (Enclosure 4).

e. On December 12, 1989, the Mobile District requested the Alabama Department of Environmental Management to issue State Water Quality Certification and Coastal Zone Consistency for the project (Enclosure 5).

f. On December 30, 1989, a legal notice was published in the Mobile Press Register (Enclosure 6).

g. By letter of March 22, 1990 the Alabama Department of Environmental Management issued State Water Quality Certification and Coastal Zone Management Certification (Enclosure 7).

h. On March 29, 1990, the National Marine Fisheries Service indicated they would not object to the project (Enclosure 8).

i. By telephone conversation on March 28, 1990, the Environmental Protection Agency indicated they would have no comment on the project (Enclosure 9).

3. ENVIRONMENTAL EFFECTS AND IMPACTS.

a. The environmental effects and impacts of the described action were addressed in the referenced documents and were coordinated with environmental agencies and the public.

b. The impacts associated with the proposed bulkhead construction project are addressed in an Environmental Assessment (EA) prepared for the proposed action. No comments were received in response to the public notice which made it necessary to revise the EA.

b. A detailed evaluation of environmental concerns involved in the proposed project was prepared in accordance with Public Law 92-500, Section 404(b)(1) Guidelines, as promulgated by the U.S. Environmental Protection Agency. The impacts discussed in the referenced Section 404(b)(1) evaluation include temporary turbidity increases, covering of benthic communities, and temporary and insignificant reduction in phytoplankton productivity. No comments were received in response to the public notice which made it necessary to change the previously prepared 404(b)(1) Evaluation.

c. The cumulative effects of this action upon the environment were considered and found to be insignificant.

d. The proposed action is in compliance with applicable laws and regulations regarding the protection of water and air resources, cultural resources, and fish and wildlife resources.

4. Determination.

Based upon the above assessment, the Section 404(b)(1) Evaluation, and analysis of all comments received, I have made the following determinations:

a. Feasible alternatives to the proposed discharge have been considered and none that are practicable will have less adverse impacts on the aquatic and semiaquatic ecosystem.

b. There are no unacceptable environmental impacts on the aquatic and semiaquatic ecosystem.

c. The placement of fill material will be accomplished under conditions which will minimize, to the extent practicable, adverse environmental effects on the aquatic and semiaquatic ecosystem.

5. Findings and Conclusions.

I, therefore, find that the discharge of fill materials into the waters of the United States, described herein, has been specified through the application of the Section 404(b)(1) Guidelines. After weighing all factors involved and considering the cumulative effects of the proposed action upon the environment, I have concluded that this project should proceed.

Date: _____

4 May 90

Larry S. Bonine
for LARRY S. BONINE *ms*
Colonel, Corps of Engineers
District Engineer



DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

CESAM-PD-EC
PUBLIC NOTICE NO. FP89-BC03-4

DECEMBER 1, 1989

JOINT PUBLIC NOTICE

U.S. ARMY CORPS OF ENGINEERS
AND
STATE OF ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

CONSTRUCTION OF WOOD BULKHEAD FOR SHORE PROTECTION IN THE VICINITY OF PORTERSVILLE BAY, MOBILE COUNTY, ALABAMA

Interested persons are hereby notified that the Corps of Engineers, Mobile District, proposes to perform shore protection work in the vicinity of Portersville Bay, Mobile County, Alabama, as authorized and directed by the United States Congress under Section 14 of the Flood Control Act of 1946, as amended.

This Public Notice is being issued in accordance with the rules and regulations published in the Federal Register on 26 April 1988. These regulations provide for the review of dredge and fill activities on Federally authorized projects under the following laws: The Federal Water Pollution Control Act; Clean Water Act; Marine Protection Research and Sanctuaries Act; Coastal Zone Management Act; National Environmental Policy Act; Fish and Wildlife Act; Migratory Marine Game-Fish Act; Fish and Wildlife Coordination Act; Endangered Species Act; and the National Historic Preservation Act. The review under these laws is applicable whenever dredged or fill materials may enter navigable waters. The recipient of this notice is requested specifically to review the proposed placement of fill as it may impact on water quality, relative to the requirements of Section 404(b)(1) of the Federal Water Pollution Control Act. Review of any other potential impacts is also requested.

WATERWAY AND LOCATION: The proposed project site is in two segments along the shoreline of Portersville Bay between Bayou la Batre and Bayou Como, Mobile County, Alabama. The first segment is about 3,700 feet long between Bayou la Batre and Bayou Coden. The second segment is about 5,600 feet long between Bayou Coden and Bayou Como. See Figure 1.

DECEMBER 1, 1989

PROPOSED ACTION: The proposed action involves the construction of new timber bulkheads along the above two segments of shoreline to replace existing timber bulkheads that are deteriorating due to age. The new bulkheads will provide protection from severe erosion that is threatening existing paved roadways paralleling the shoreline.

The new bulkheads would be located three feet in front (bay side) of existing bulkheads which would remain in place. Approximately six inches of the existing bulkheads would be cut off below backfill grade. The new bulkheads would consist of 2"x 8" vertical sheeting, 3"x 8" wales, and 10" diameter piles. The sheeting would be backed by a non-woven filter fabric and backfilled with approximately 4,400 cubic yards of pervious soil. About 2,100 cubic yards of existing rubble consisting of broken concrete, brick, asphalt, etc., would be relocated from the vicinity of the existing bulkheads to the bay side of the new bulkheads to prevent toe scour and to dissipate energy from small wave action.

WATER QUALITY CERTIFICATION: Pursuant to the requirements of the Clean Water Act, State Water Quality Certification is required for the proposed action. Water quality certification is being requested from the Alabama Department of Environmental Management. Upon completion of the required comment period, a decision relative to certification will be made by the Department of Environmental Management.

CERTIFICATION OF CONSISTENCY: Pursuant to the requirements of the Coastal Zone Management Act, coastal area management program consistency has been requested from the State of Alabama. The proposed action is consistent with the program to the maximum extent practicable. Upon review of the action, a determination relative to the issuance of a consistency certification will be made by the Department of Environmental Management.

USE BY OTHERS: The proposed action is not expected to create significant impacts on land use plans. No prime farmland will be affected.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) CONSIDERATIONS: The impacts associated with the proposed bulkhead construction project are addressed in an Environmental Assessment (EA) prepared for the proposed action. Copies of the EA may be obtained from the Mobile District Office at the address given below. The EA will be finalized upon completion of coordination of the Public Notice.

SECTION 404(B)(1) EVALUATION REPORT: A preliminary evaluation of water quality impacts associated with the proposed action was prepared in accordance with guidelines promulgated by the Environmental Protection Agency (EPA) under Section 404(b)(1) of the Clean Water Act. The evaluation report is available upon

DECEMBER 1, 1989

request from the Mobile District Office. Should input be received during the coordination of this notice that would dictate the need to revise the Section 404(b)(1) evaluation report, appropriate changes will be incorporated. Impacts discussed in the 404(b)(1) evaluation report include a temporary increase in turbidity and suspended solid concentrations.

ENDANGERED SPECIES: No listed endangered or threatened species should be affected by the proposed action. Coordination with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service has been initiated.

CULTURAL RESOURCES CONSIDERATION: There are several recorded prehistoric shell middens in the vicinity of Bayou Coden. None of these will be affected by the proposed construction activities since the work area will be confined to the existing paved road adjacent to Portersville Bay and to the immediate area within the bay. No properties listed on, determined to be eligible for, or being nominated to the National Register of Historic Places are located in the project vicinity. Concurrence in the proposed action by the Alabama State Historic Preservation Officer has been requested.

EVALUATION: The decision whether to proceed with the proposed action will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. The proposed action will proceed unless it is found to be contrary to the overall public interest.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to proceed with the Federal activity. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine whether the proposed activity is contrary to the public interest.

DECEMBER 1, 1989

COORDINATION: Among the agencies receiving copies of this public notice are:

Region IV, U.S. Environmental Protection Agency
Field Representative, U.S. Fish and Wildlife Service
Regional Director, National Park Service
Regional Director, National Marine Fisheries Service
Commander, Eighth Coast Guard District
Alabama Department of Conservation and Natural Resources
Alabama Department of Environmental Management
Gulf of Mexico Fishery Management Council
Federal Emergency Management Agency

Other Federal, State, and local organizations, U.S. Senators and Representatives of Alabama are being sent copies of the notice and are being asked to participate in coordinating this proposed work.

CORRESPONDENCE: Any person who has an interest which may be affected by the proposed activity may request a public hearing. Any comments or requests for a public hearing must be submitted in writing to the District Engineer within fifteen days of the date of this public notice. A request for a hearing must clearly set forth the interest which may be affected and the manner in which the interest may be affected.

You are requested to communicate the information contained in this notice to any other parties who may have an interest in the proposed activities.

Correspondence concerning the public notice should refer to Public Notice No. FP89-BC03-4 and should be directed to the Commander, U.S. Army Engineer District Mobile, P.O. Box 2288, Mobile, Alabama 36628-0001, ATTN: CESAM-PD-EC, in time to be received prior to December 15, 1989. Mr. Bill Youngman, telephone number (205) 694-3881, may be contacted for additional information.


N. D. McCLURE IV
U.S. Army Corps of Engineers
Mobile District

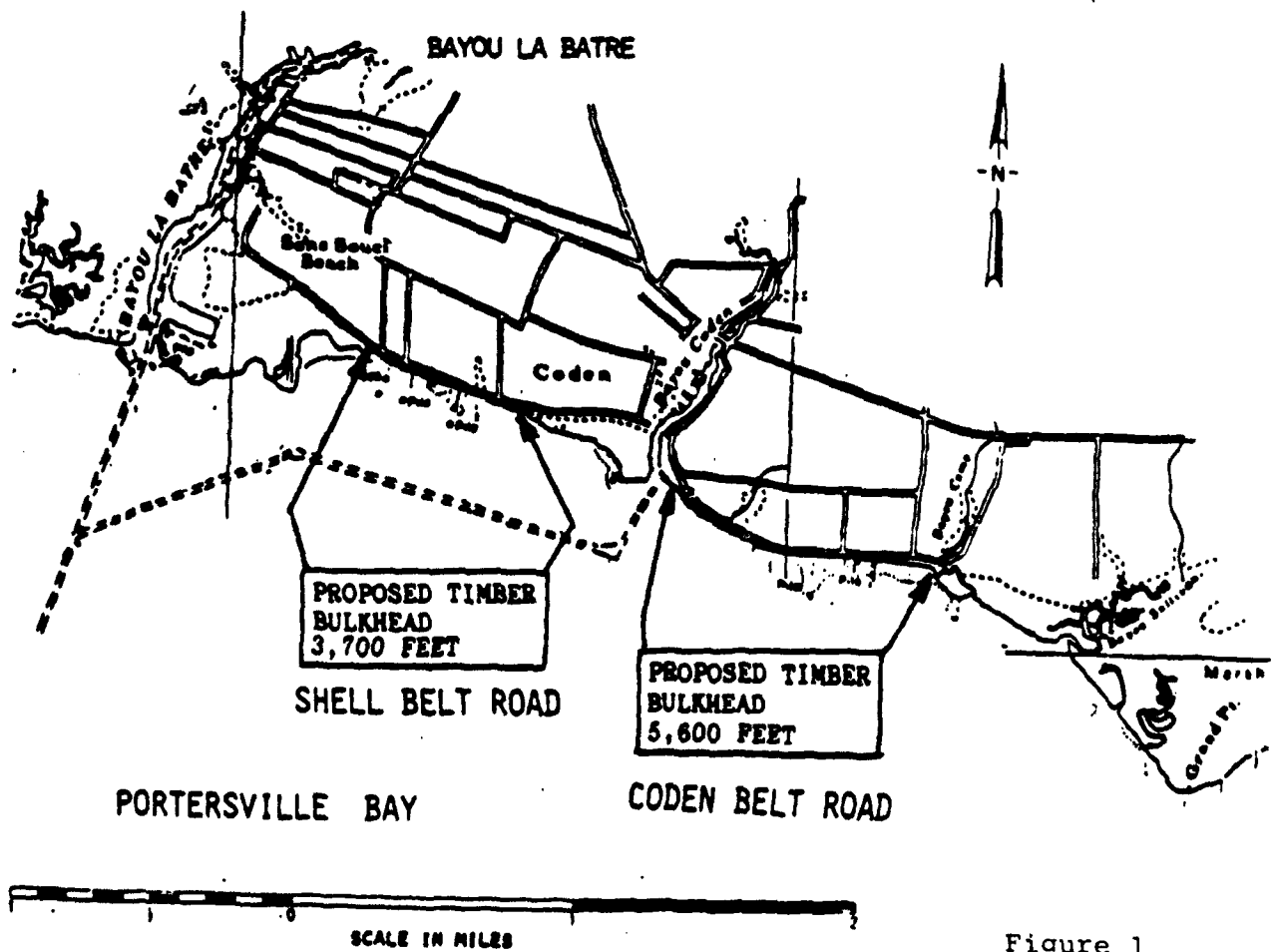
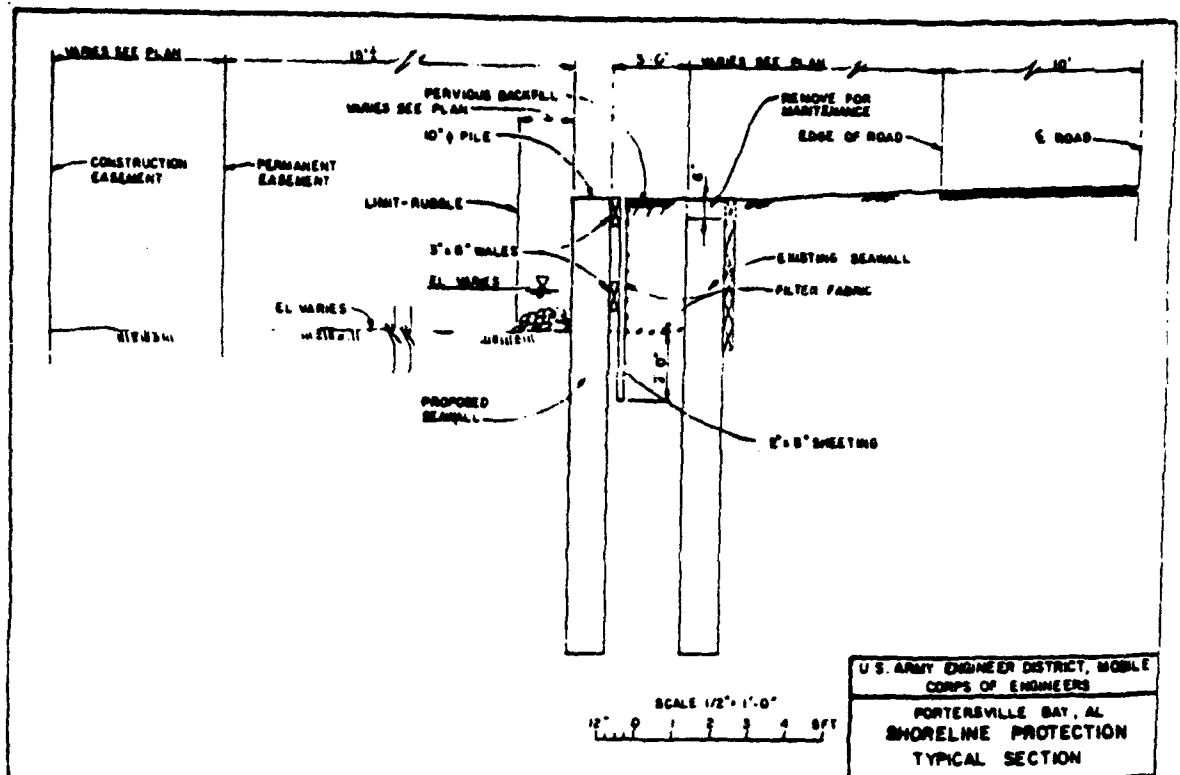


Figure 1

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

November 27, 1989

RECEIVED

NOV 30 1989

Ala. Historical Commission

REPLY TO
ATTENTION OF:

Environmental and Resources
Planning Section

Mr. F. Lawrence Oaks
Alabama State Historic
Preservation Officer
Alabama Historical Commission
725 Monroe Street
Montgomery, Alabama 36104

Dear Mr. Oaks:

The Mobile District, U.S. Army Corps of Engineers, in cooperation with the Mobile County Board of Commissioners, is proposing to replace an existing sea wall for shoreline protection of the north shore of Portersville Bay between Bayou La Batre and Bayou Coden, Alabama. The project location is shown on the attached drawing.

Two alternate construction staging areas have been identified. Alternate one is located at the existing Alabama State Docks facilities at Bayou La Batre, alternate two is a community park west of Bayou Coden. The locations are indicated on the drawing.

There are several recorded prehistoric shell middens in the vicinity of Bayou Coden, (1Mb1, Mb8, and Mb91). None of these will be affected by the proposed construction activities since the work area will be confined to the existing paved road adjacent to Portersville Bay and within the bay.

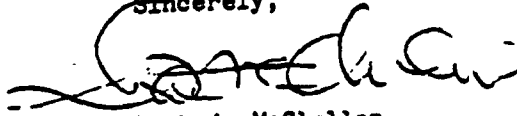
Given the above considerations, it is our opinion that the proposed undertaking will not affect significant cultural resources. If you agree with this determination, please sign this letter in the space provided below and return it to me at your earliest convenience.

ED-20

Enclosure 2

Should you require additional information, please contact Ms. Dottie Gibbens at 205/694-4114. Your continued cooperation in the management of cultural resources under the jurisdiction of the Mobile District is sincerely appreciated.

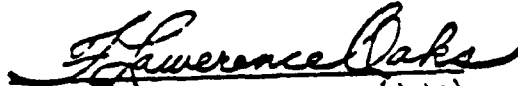
Sincerely,



Hugh A. McClellan
Chief, Environment and Resources
Branch

Enclosure

CONCURRENCE: 



F. Lawrence Oaks
Alabama State Historic
Preservation Officer

(date)

12-14-59

November 29, 1989

Coastal Environment
Section

Mr. James L. Mason
President, Mobile County
Commission
Post Office Box 1443
Mobile, Alabama 36633

Dear Mr. Mason:

Please reference previous correspondence to you regarding the Corps policy on the payment of fees to State agencies for State water quality certification. The State has indicated that it does not have legal authority to waive water quality certification fees for Corps dredging operations. We are in the process of requesting water quality certification from the Alabama Department of Environmental Management (ADEM) for construction of shoreline protection at Portersville Bay. We will request that ADEM process our request for certification to the point of issuance; however, they will not issue certification until the fee is paid. We request that you consider payment of the required fee of \$500.00.

We appreciate your patience and assistance in this matter. My point of contact on this project is Mr. Bill Youngman. If you have any questions or need additional information, he can be reached at 205/694-3881.

Sincerely,

N. D. McClure
Chief, Planning Division

Copy Furnished:
PD-FC

ED-22

Enclosure 3



United States Department of the Interior
FISH AND WILDLIFE SERVICE

P.O. Drawer 1190
Daphne, AL 36526

December 7, 1989

District Engineer
U.S. Army Corps of Engineers
P.O. Box 2288
Mobile, AL 36628

Dear Sir:

This is the report of the U.S. Fish and Wildlife Service (Service) on Public Notice FP89-BC03-4, dated December 1, 1989. The Mobile District Corps of Engineers is proposing to perform shore protection work in the vicinity of Portersville Bay, Mobile County, Alabama. This report is prepared in accordance with the requirements of the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) and is to be used in your determination of 404(b)(1) guidelines compliance (40 CFR 230) and in your public interest review (33 CFR 320.4) as they relate to protection of fish and wildlife resources.

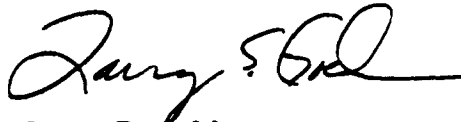
According to the public notice, two new segments of bulkhead (3700 and 5300 linear ft., respectively) would be constructed 3 feet seaward of the existing bulkheads at those sites. Additionally, about 2100 cu. yds. of rubble would be relocated from the vicinity of the existing bulkheads to the bay side of the new bulkheads to dissipate energy from wave action.

We do not expect that construction of the new bulkheads would result in direct significant impacts to fish and wildlife resources or their habitat. However, we are concerned about the potential for impacts to the extensive system of submerged aquatic grassbeds (primarily Halodule and Ruppia) that occur approximately 14 to 20 meters offshore of the existing bulkheads. Submerged grassbeds are extremely valuable as feeding and cover sites for fishery resources such as blue crab, shrimp, flounder, speckled seatrout, etc. Additionally, these beds stabilize the water bottom and export detrital material into the aquatic food chain.

The alternative described in your letter should result in minimal impacts to the nearby grassbeds provided all work is accomplished from the land and the work occurs in the winter (November to March) when the grassbeds are dormant and generally dewatered. Such measures should be specifically required in the project contract.

These views represent the position of the Department of the Interior.
Please advise us of your action regarding this matter.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Larry E. Goldman". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Larry E. Goldman
Field Supervisor

cc: EPA, Atlanta, GA
NMFS, Panama City, FL
ADCNR, Montgomery, AL
ADCNR, Spanish Fort, AL
ADCNR, Dauphin Island, AL
ADEM, Montgomery, AL
ADEM, Mobile, AL

December 12, 1989

Coastal Environment
Section

Mr. Blake Roper
Alabama Department of
Environmental Management
2205 Perimeter Road
Mobile, Alabama 36615

Dear Mr. Roper:

Pursuant to the requirements of the Clean Water Act and Coastal Zone Management Act, water quality certification and coastal zone consistency certification are requested for proposed shoreline protection in the vicinity of Portersville Bay, Mobile County, Alabama. A description of the proposed action is contained within the enclosed public notice FP89-BC03-4. The local sponsor of the project, Mobile County, has been notified of our new policy concerning payment of fees for water quality certification. They have indicated willingness to pay the fee.

Based on a review of the Alabama Coastal Zone Management Program, we find that the proposed action is consistent with the program to the maximum extent practicable.

Following your telephone approval, the enclosed Joint Public Notice Number FP89-BC03-4 was circulated on December 1, 1989. The required legal notice is being processed for publication in the Mobile Press Register, Mobile, Alabama. Proof-of-publication for the legal notice will be furnished to your office. Upon completion of the comment periods for the joint public notice and legal notice, we will provide copies of all comments received and appropriate responses to those comments for your consideration in making the final determination for certification.

A draft copy of the 404(b)(1) evaluation report for the proposed action is enclosed for your use. The draft EA will be sent under separate cover.

-2-

We appreciate your assistance. If you have any questions or need any further information, please contact Mr. Bill Youngman at 205/644-3881.

Sincerely,

N. D. McClure IV
Chief, Planning Division

Enclosure

PD-EC/Youngman
PD-EC/Fikes
PD-E/McClure
PD/McClure

MAGNOLIA

CLIPPING SERVICE
ALABAMA DIVISION
2600 8TH STREET
TUSCALOOSA, AL 36401

MOBILE PRESS REGISTER

Mobile, Alabama

WEEKEND

DEC -30-89

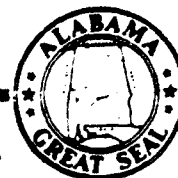
LEGAL NOTICE OF REQUEST FOR STATE CERTIFICATION OF ACTIVITIES REQUIRING A FEDERAL LICENSE OR PERMIT

The U. S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT, hereby gives public notice of shoreline protection work between Bayou la Batre and Bayou Cane, Mobile County, Alabama. The work is authorized under Section 14 of the Flood Control Act of 1946, as amended, and will include construction of about 8,800 linear feet of timber seawall in two segments. In compliance with requirements of Section 401 of the Federal Water Pollution Control Act (33 U.S.C. 1251, 1341), as amended by PL 95-517, and the 1977 the Federal Water Pollution Control Act Amendments, U.S. Army Corps of Engineers, Mobile District, has requested certification from the Alabama Department of Environmental Management that the above-mentioned activity will be in compliance with applicable provisions of Section 301 (33 U.S.C. 1311), Section 302 (33 U.S.C. 1312), Section 303 (33 U.S.C. 1313), Section 305 (33 U.S.C. 1315), and Section 307 (33 U.S.C. 1317) of the Act and applicable requirements of the State law. Any person wishing to make comments pertinent to this action must submit such comments in writing to the Alabama Department of Environmental Management, 208 Perimeter Road, Mobile, Alabama 36603, within 30 days of the date of publication of this notice. At such time, certification will be considered. Additional information concerning the proposed project may be obtained by contacting Mr. Bill Youngman of the Mobile District Office at 265/664-3861.

CEN, Dec. 28, 1988

ADEM

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT



Guy Hunt
Governor

March 22, 1990

Leigh Pegues, Director

1751 Cong. W. L.
Dickinson Drive
Montgomery, AL
36130
205 / 271-7700

Colonel Larry S. Bonine, District Engineer
Mobile Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628-0001

Field Offices:

Re: Corps of Engineers federal project
FP89-BC03-4/COEP-90-01

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205 / 942-6168

Dear Colonel Bonine:

P.O. Box 953
Decatur, AL
3602
205 / 353-1713

The Alabama Department of Environmental Management has completed its review of the Corps of Engineers' proposal to construct new timber bulkheads in the vicinity of Portersville Bay, Mobile County, Alabama. The proposal calls for new bulkheads (one 3700 feet, the other 5600 feet) to be placed in front of existing deteriorating bulkheads to provide protection from severe erosion. The bulkheads will consist of 2" x 8" vertical sheeting that would be backed by a non-woven filter fabric and backfilled with 4,400 cubic yards of pervious soil.

2204 Perimeter Road
Mobile, AL
36615
205 / 479-2336

The Corps of Engineers advertisement of the project by joint public notice with ADEM has been completed. On the basis of all materials submitted and associated with the proposal, it is the opinion of the technical staff that a decision relative to water quality and coastal certification is appropriate.

Action pertinent to water quality and coastal management certification is required by Section 401(a)(1) of the Clean Water Act, 33 U.S.C. §1251, et. seq., and the Alabama Coastal Area Management Program. We hereby issue official certification that there is reasonable assurance that the discharge resulting from the proposed activities as submitted will not violate applicable water quality standards established under Section 303 of the Clean Water Act and Title 22, Section 22-22-9(g), Code of Alabama (1975). We certify that there are no applicable effluent limitations under Sections 301 and 302 nor applicable standards under Sections 306 and 307 of the Clean Water Act in regard to the activities specified. Further, we hereby certify that the project has been found to be consistent with the Alabama Coastal Area Management Program conditional upon continued compliance with the management program. This certification in no way purports to

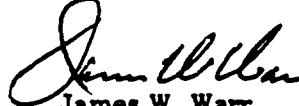
ED-28

Enclosure 7

Colonel Larry S. Bonine
Page Two

vest in you title to lands now owned by the State of Alabama
nor shall it be construed as acquiescence by the State of Alabama
in your possession of lands now owned by the State of Alabama.

Sincerely,


James W. Warr
Deputy Director

JWW/BR/ct

cc: Bill Youngman
Mobile District Corps of Engineers

Hugh Swingle
AL DCNR, Dauphin Island

Bill Kruczynski
USEPA, Gulf Breeze

Sandy Tucker
USFWS, Daphne



file
Buc
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, FL 33702

March 29, 1990 F/SER113/DN

Colonel Larry S. Bonine
District Engineer, Mobile District
Department of the Army, Corps of Engineers
P.O. Box 2288
Mobile, AL 36628

Dear Colonel Bonine:

The National Marine Fisheries Service has reviewed Public Notice number FP89-BC03-4 dated December 1, 1989. The Mobile District Corps of Engineers proposes to construct a wooden bulkhead and place riprap at the toe in waters and wetlands of Portersville Bay, Mobile County, Alabama.

After reviewing the information provided and discussions with personnel from the Environmental Protection Agency and U.S. Fish and Wildlife Service, we do not object to construction of the project as proposed. If you have any questions, please contact Mr. David Nixon of our Panama City Area Office at 904/243-5061.

Sincerely yours,

Edwin Kappner

* Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

Enclosure 8

ED-30



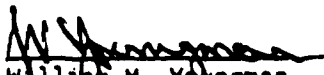
CESAMPD-EC (1105)

Mr. Youngman/wmy/28 Mar 1990

MEMORANDUM FOR RECORD

SUBJECT: Portersville Bay

1. I spoke with Mr. Bill Kruczynski of the Environmental Protection Agency concerning their comments on the above project (FP89-BC03-4). He said that he had not seen the public notice and asked that I describe the project to him. After doing so, he said that the EPA would have no comment on the project.


William M. Youngman

APPENDIX A

GEOTECHNICAL REPORT

GENERAL NOTES

Boring logs shown on the following sheets shall not be copied or altered.

Groundwater depths or elevations shown on the boring logs represent groundwater encountered on the dates shown. Absence of groundwater data on certain borings implies that no data is available, but does not necessarily mean that groundwater will not be encountered at the locations. Groundwater elevations vary and seepage above the depths or elevations shown can be expected at any time.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local minor variations in characteristics of the subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially from the description shown with the logs or profiles.

Soils are classified in accordance with the Unified Soil Classification System, Technical Memorandum No. 3-357 dated April 1960 for civil projects and Military Standard 619B dated 12 June 1968 for military projects.

Driving resistances (blow counts or N values) are determined with a standard split spoon sampler (1-3/8" I.D.) and a 140-lb driving hammer with a 30" drop unless otherwise noted on the boring logs. N values shown numerically on the logs are the sum of blows for the lower two of three 0.5-foot drives that make up the 1.5-foot Standard Penetration Test, except when refusal occurs. Refusal of the splitspoon is defined as 50 blows in less than a 0.5-foot drive. Refusal is shown on the logs as indicated in the following examples:

50/0.3' - Indicates 50 blows (refusal) at depth 0.3' in the first 0.5-foot drive.

20, 50/0.2' - Indicates 20 blows in the first drive and refusal at depth 0.2' in the second 0.5-foot drive.

20, 85/0.8' - Indicates 20 blows in the first drive, 35 blows in the second drive and refusal (50 blows) at depth 0.3' in the third 0.5-foot drive.

"Max size" of gravel or rock fragments shown on the boring logs represents the maximum size of material recovered in the drive sampler and/or core barrel, or observed from augering. "Max size" is that size inferred by the field inspector from examination of broken samples, or noted by the driller from the drilling operation. Note that the maximum logged size of gravel or rock fragments is likely to be smaller than the maximum size of the in-place material, especially when the maximum logged size is more than approximately one-half the diameter of the drive sampler or core barrel, or more than one-third the diameter of the auger.

LEGEND

**COARSE-GRAINED SOILS - MORE THAN
HALF OF MATERIAL IS LARGER THAN
NO. 200 SIEVE SIZE**

- | | | |
|------|---|---|
| GW |  | WELL GRADED GRAVELS OR
GRAVEL-SAND MIXTURES,
LITTLE OR NO FINES |
| GP |  | POORLY GRADED GRAVELS
OR GRAVEL-SAND MIXTURES,
LITTLE OR NO FINES |
| GM |  | SILTY GRAVELS, GRAVEL-
SAND-SILT MIXTURES |
| GC |  | CLAYEY GRAVELS, GRAVEL-
SAND-CLAY MIXTURES |
| SW |  | WELL GRADED SANDS OR
GRAVELLY SANDS, LITTLE
OR NO FINES |
| SP |  | POORLY GRADED SANDS OR
GRAVELLY SANDS, LITTLE
OR NO FINES |
| SM |  | SILTY SANDS, SAND-SILT
MIXTURES |
| SM-H | | SAME AS ABOVE WITH HIGH
LIQUID LIMIT |
| SC |  | CLAYEY SANDS, SAND-CLAY
MIXTURES |
| SC-H | | SAME AS ABOVE WITH HIGH
LIQUID LIMIT |

**FINE-GRAINED SOILS - MORE THAN HALF
OF MATERIAL IS SMALLER THAN NO. 200
SIEVE SIZE**

- | | | |
|----|--|---|
| ML |  | INORGANIC SILTS AND VERY
FINE SANDS, ROCK FLOUR.
SANDY SILTS OR CLAYEY SILTS
WITH SLIGHT PLASTICITY |
| MH |  | INORGANIC SILTS, MICACEOUS
OR DIATOMACEOUS FINE SANDY
OR SILTY SOILS, ELASTIC
SILTS |
| OL |  | ORGANIC SILTS AND ORGANIC
SILT-CLAYS OF LOW
PLASTICITY |
| OH |  | ORGANIC CLAYS OF MEDIUM TO
HIGH PLASTICITY, ORGANIC
SILTS |
| CL |  | INORGANIC CLAYS OF LOW TO
MEDIUM PLASTICITY,
GRAVELLY CLAYS, SANDY
CLAYS, SILTY CLAYS,
LEAN CLAYS |
| CH |  | INORGANIC CLAYS OF HIGH
PLASTICITY, FAT CLAYS |
| PT |  | PEAT AND OTHER HIGHLY
ORGANIC SOILS |
| |  | BITUMEN (AC) |
| |  | CONCRETE (PCC) |

NOTES:



NOT SAMPLES OR NOT RECOVERED

DUAL CLASSIFICATIONS, E.G. SP-SM, GP-GM, ML-CL
AND SM-SC, WILL BE SHOWN BY PLACING BOTH SYMBOLS
SIDE BY SIDE.

ABBREVIATIONS

●	AT	EST.	ESTIMATE, ESTIMATED
ACCUM.	ACCUMULATED	EXCL.	EXCLUDING
ALT.	ALTERNATING	EXTR.	EXTREMELY
ANG.	ANGULAR		
APPROX.	APPROXIMATE, APPROXIMATELY	P.	FINE, FINELY
ANGIL.	ANGILLACEOUS	P _o	IRON
AUG.	AUGER	FERR.	FERRUGINOUS
AVG.	AVERAGE	FIS.	FISSE
		FLD.	FILLED
B.A.	BASE OF ALLUVIUM	FM.	FORMATION
BSL.	BARREL	FOLIA.	FOLIATION
BDD.	BED, BEDDED, BEDDING	POS.	FOSSIL, FOSSILIFEROUS
BDR.	BEDROCK	P.R.	FLUID RETURN
BENT.	BENTONITIC	FRAC.	FRACTURE
BGS.	BEG	FRAG.	
B.I.	BREAKAGE INTERVAL	FRAGS	FRAGMENT (S)
BKY.	BLOCKY	P/T	FISHTAILED
BL.	BLACK, BLACKISH		
BLD.	BOULDER	GEN.	GENERALLY
B.O.H.	BOTTOM OF HOLE	GLAU.	GLAUCONITE, GLAUCONITIC
BR.	BROWN, BROWNISH	GR.	GRAY, GRAYISH
BREC.	BRECCIATED	GRA.	GRAIN, GRAINED
BREK.	BROKEN, BREAKAGE	GRAD.	GRADATIONAL
		GRN.	GREEN, GREENISH
C.	COARSE	GRY.	GROUT
CAL.	CALCITE, CALCAREOUS	GVL.	GRAVEL, GRAVELLY
CARB.	CARBONACEOUS	GYP.	GYPHUM
CAV.	CAVITY	G.W.	GROUNDWATER
CBL.	COBBLE		
C.D.	CORRECTED DEPTH	H/A	HIGH ANGLE
CEM.	CEMENT	H/B	HAMMER BREAK
CHT.	CHERT	HD.	HARD
CIRCLE.	CIRCULATION	HI.	HIGH, HIGHLY
CLY.	CLAYEY	HLD.	HEALED
CUT'D	CEMENTED	HMB.	HAMMER
CONTR. (S)	CONCENTRATION(S)	HOR.	HORIZONTAL
COMP.	COMPACT	HYD.	HYDRAULIC
CONC.	CONCRETE		
CONCR.	CONCRETIONS	INCL.	INCLUDING, INCLUDED
CONGL.	CONGLOMERATE	INDT.	INDURATED
CONT.	CONTINUED	INIT.	INITIAL, INITIALLY
CPM.	CRUMBLY	INTRO.	INTERIOR, INTERSECTED
CR'D	CRUSHED	INTLAM.	INTERLAMINATED
CTD.	COATED	IR.	IRREGULAR, IRREGULARLY
4.	DEPTH	JT.'S	JOINT, JOINTS
D.	DEGREE	JTD.	JOINTED
D.A.	DRILL ACTION		
DECOM.	DECOMPOSED	L/A	LOW ANGLE
DIAG.	DIAGONAL	LAM.	LAMINA, LAMINE,
DIB.	DISSEMINATED		LAMINATED
DK.	DARK	LAY.	LAYER
DOL.	DOLOMITE, DOLOMITIC	L.C.	LOST CORE
DRL.	DRILLING	L.D.W.	LOST DRILL WATER
DSTG.	DISINTEGRATED	LEA.	LEACHED
D.T.	DRILL TIME	LIG.	LIGNITIC
D.W.L.	DRILL WATER LOSS	LIT.	LITTLE
D.W.R.	DRILL WATER RETURN	L.L.	LIQUID LIMIT
		LN., LNS.	LENS, LENSES
EL.	ELEVATION	LO.	LOOSE
ENC.	ENCOUNTERED	LS.	LIMESTONE

LT.	LIGHT	RTS.	ROOTS
MAS.	MASSIVE	SAP.	SAPROLITE
MAX.	MAXIMUM	SAT.	SATURATED
MECH.	MECHANICAL	SCAT.	SCATTEREDLY
MED.	MEDIUM	SCN (S)	SCHIST (OBS)
MIC.	MICACEOUS	SD.	SAND
MIN.	MINIMUM	SDY.	SANDY
MINER.	MINERALIZED	SM.	SMALL
	MINERALIZATION	SMY.	SMEET
MIX.	MIXTURE	SNY.	SNALY
MOD.	MODERATE, MODERATE	SL.	SILT
MOT.	MOTTLED, MOTTLED	SLS.	SILTSTONE
MST.	MOIST	SLY.	SILTY
MTL.	MATERIAL	SL.	SLIGHT, SLIGHTLY
MTR.	MATRIX	SLCH.	SILICIOUS
		SLICH.	SLICKENSIDE
N/A	NOT APPLICABLE	SM.	SMALL
N/E	NOT ENCOUNTERED	SO.	SOFT
NOD.	NODULE	SOL.	SOLUTION, SOLUTIONED,
N/R	NO RECOVERY		SOLUTIONING
NUM.	NUMEROUS	SPG.	SPECIFIC GRAVITY
		SPT.	STANDARD PENETRATION TEST
OB.	OBSERVED		STANDARD SPLITEPOIN
OBS.	OBSERVED	SS.	SANDSTONE
OCC.	OCCASIONAL, OCCASIONALLY	ST.	STAIN, STAINED, STAINING
OOL.	OOLITE, OOLITIC	STP.	STIFF
OP.	OPEN, OPENED	STR.	STRUCTURE
OR.	ORANGE	STRG.	STRINGER
ORG.	ORGANIC.	STYL.	STYLOLITE, STYLOLITIC
		SUR.	SURFACED
PART.	PARTIALLY	TEXT.	TEXTURE
PCS.	PIECES	T.P.R.	TOP OF FIRM ROCK
PETRO.	PETROLEUM, PETROLIFEROUS	TH.	THIN
PHOS.	PHOSPHATE, PHOSPHOROUS	THK.	THICK
P.I.	PLASTICITY INDEX	TI.	TIGHT
PIT	PIT, PITTED, PITTING	TM.	TAN, TANNISH
PKT (S)	POCKET	T.O.R.	TOP OF ROCK
P.L.	PLASTICITY LIMIT	TR.	TRACE
PLA.	PLATT	TRP.	TRIPOLI
PLAS.	PLASTIC	T.S.R.	TOP OF SOUND ROCK
PLN.	PLANE		
PNK.	PINK	U.L.	UNACCOUNTABLE LOSS
PR.	POORLY	UNACC.	UNACCOUNTABLE
PROD.	PREDOMINATELY	UNWEA.	UNWEATHERED
PRESS.	PRESSURE		
PROB.	PROBABLE, PROBABILITY	V/	VERY
P.T.	PRESSURE TEST	VERT.	VERTICAL
PTC.	PARTICLES	VGY.	VUGGY
PTG.	PARTING	W/	WITH
PUR.	PURPLE	WEA.	WEATHERED
		WHT.	WHITE
QTS.	QUARTZ	W/H	WEIGHT OF HAMMER
QTSZ.	QUARTZITE	W.L.	WATER LEVEL
		W/R	WEIGHT OF ROD
REL.	RELEBLE		
REC.	RECOVERED	X-BDD.	CROSS-BEDDED
RECM.	RECOVERED	XL.	CRYSTAL
RD.	RED, REDDISH	XLN.	CRYSTALLINE
RND.	ROUND, ROUNDED		
R.Q.D.	ROCK QUALITY DESIGNATION	YEL.	YELLOW

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-1-89		
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.		INSTALLATION MOBILE DISTRICT		SHEET 1 OF 1 SHEETS		
2. LOCATION (Coordinates or Station) ZONE AL W: N 135619 E 271500		10. SIZE AND TYPE OF BIT 6" AUG.		11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD		
3. DRILLING AGENCY MOBILE DISTRICT		12. MANUFACTURER'S DESIGNATION OF DRILL FALING 314		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 6 UNDISTURBED		
4. HOLE NO. (As shown on drawing title and file number) PB-1-89		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED		
5. NAME OF DRILLER D. BOWDEN		16. DATE HOLE STARTED 28 JUNE 89 COMPLETED 28 JUNE 89		17. ELEVATION TOP OF HOLE 4.8		
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR D. JONES		
7. THICKNESS OF OVERBURDEN		19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED / CHECKED G.H. <i>[Signature]</i>		
8. DEPTH DRILLED INTO ROCK		19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED / CHECKED G.H. <i>[Signature]</i>		
9. TOTAL DEPTH OF HOLE 15.0'		19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED / CHECKED G.H. <i>[Signature]</i>		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
4.8	0.0		(SM) DARK BROWN SILTY SAND		JAR #1	
	2.0		(SM) BLACK SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2	
	3.0					
	6.0		(SM) DARK BROWN SILTY SAND		JAR #3	
	7.5					
	9.0		(SM) YELLOW SILTY SAND		JAR #4	
-5.7	10.5					
	12.0		(MH) YELLOW INORGANIC CLAYEY SILT W/ TRACE (SM) LENSES		JAR #5	
	15.0		(MH) YELLOW INORGANIC CLAYEY SILT		JAR #6	
-10.2						B.O.H.

ENG FORM 1036
(CADD Edition)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-1-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-2-89		INSTALLATION MOBILE DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.					
2. LOCATION (Coordinates or Station) ZONE AL W: N 135683 E 271002				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD					
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALING 314					
4. HOLE NO. (As shown on drawing title and file number) PB-2-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 5		UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES					
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER		GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 28 JUNE 89		COMPLETED 28 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE		4.4			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR D. JONES			
								DRAFTED / CHECKED G.H.	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
4.4	0.0		(SC) DARK BROWN CLAYEY SAND		JAR #1	
1.4	3.0		(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2	
	4.5		(SM) ORANGE & TAN SILTY SAND		JAR #3	
	6.0		(SM) ORANGE SILTY SAND		JAR #4	
-4.6	9.0		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #5	
	12.0					
-10.6	15.0					B.O.H.

ENG FORM 10/36
(CADD Facsimile)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-2-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION MOBILE DISTRICT		Hole No. PB-5-89 SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N135804 E 269505				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314			
4. HOLE NO. (As shown on drawing title and file number) PB-5-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 7 UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 28 JUNE 89 COMPLETED 28 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 4.5			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED / CHECKED G.H. <i>[Signature]</i>	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT	
4.5	0.0		(CL) TAN & GRAY SANDY CLAY		JAR #1		
1.5	3.0		(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2		
	4.5		(SM) ORANGE SILTY SAND		JAR #3		
	6.0		(SM) YELLOW SILTY SAND		JAR #4		
	7.5		(SM) ORANGE SILTY SAND		JAR #5		
-4.0	8.5		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #6	B.O.H.	
	10.5		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #7		
-10.5	15.0						

ENG FORM 1835
(CADD Footnote)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

FILE NO.

PB-5-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-6-89		INSTALLATION MOBILE DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.					
2. LOCATION (Coordinates of Station) ZONE AL W: N 135828 E 269000				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD					
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALING 314					
4. HOLE NO. (As shown on drawing title and file number) PB-6-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 7		UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES					
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER		GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 28 JUNE 89		COMPLETED 28 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE		4.3			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING					
				19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED G.H.		CHECKED	

ELEVATION c	DEPTH d	LEGEND e	CLASSIFICATION OF MATERIALS (Description) f	% CORE RECOVERY OR W.C. g	BOX OR SAMPLE NO. h	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) i SPT BLOWS/FT
4.3	0.0		(CL) TAN & GRAY SANDY CLAY		JAR #1	
1.3	3.0		(SM) DARK GRAY SILTY SAND		JAR #2	
	4.5		(SM) ORANGE SILTY SAND		JAR #3	
	6.0		(SM) YELLOW SILTY SAND		JAR #4	
	7.5		(SM) ORANGE SILTY SAND		JAR #5	
-4.2	8.5		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #6	
	10.5		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #7	
	12.0					
	15.0					
-10.7						B.O.H.

ENG FORM 1836
(CADD Facsimile)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-6-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-7-89		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or S ¹ on) ZONE AL W: N 138890 E 268501				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALLING 314			
4. HOLE NO. (as shown on drawing title and file number) PB-7-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER D. BOWDEN				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED		16. DATE MOLE	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				17. ELEVATION TOP OF HOLE 4.0		18. TOTAL CORE RECOVERY FOR BORING	
7. THICKNESS OF OVERBURDEN				19. SIGNATURE OF INSPECTOR D. JONES		DRAFTED: G.H. CHECKED: [Signature]	
8. DEPTH DRILLED INTO ROCK				9. TOTAL DEPTH OF HOLE 15.0'			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
4.0	0.0					
	3.0		(SM) DARK GRAY SILTY SAND		JAR #1	
	4.5		(SM) TAN SILTY SAND		JAR #2	
	6.0		(SM) GRAY SILTY SAND		JAR #3	
	7.5		(SM) GRAY & ORANGE SILTY SAND		JAR #4	
-3.5	9.0		(MH) GRAY INORGANIC CLAYEY SILT (SANDY)		JAR #5	
	12.0		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #6	
-11.0	15.0					B.O.H.

ENG FORM 1836
(CADD Facsimile)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-7-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION MOBILE DISTRICT		Hole No. PB-8-89 SHEET 1 OF 1 SHEETS																																																																
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.																																																																		
2. LOCATION (Coordinates or Station) ZONE AL W: N 136059 E 268041				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD																																																																		
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314																																																																		
4. HOLE NO. (As shown on drawing title and file number) PB-8-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 7 UNDISTURBED																																																																
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES																																																																		
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED																																																																		
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 28 JUNE 89 COMPLETED 28 JUNE 89																																																																
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 4.3																																																																		
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR D. JONES																																																																
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:10%;">ELEVATION a</th> <th style="width:10%;">DEPTH b</th> <th style="width:10%;">LEGEND c</th> <th style="width:40%;">CLASSIFICATION OF MATERIALS (Description) d</th> <th style="width:10%;">% CORE RECOVERY OR W.C. e</th> <th style="width:10%;">BOX OR SAMPLE NO. f</th> <th style="width:20%;">REMARKS Drilling time, water loss, depth of weathering, etc., if significant! g</th> </tr> </thead> <tbody> <tr> <td>4.3</td> <td>0.0</td> <td style="text-align: center;">[Hatched Pattern]</td> <td>(SC) DARK BROWN CLAYEY SAND</td> <td></td> <td>JAR #1</td> <td></td> </tr> <tr> <td>1.3</td> <td>3.0</td> <td style="text-align: center;">[Dotted Pattern]</td> <td>(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.</td> <td></td> <td>JAR #2</td> <td></td> </tr> <tr> <td></td> <td>4.5</td> <td style="text-align: center;">[Dotted Pattern]</td> <td>(SM) DARK GRAY SILTY SAND</td> <td></td> <td>JAR #3</td> <td></td> </tr> <tr> <td></td> <td>6.0</td> <td style="text-align: center;">[Dotted Pattern]</td> <td>(SM) DARK GRAY SILTY SAND</td> <td></td> <td>JAR #4</td> <td></td> </tr> <tr> <td></td> <td>7.5</td> <td style="text-align: center;">[Dotted Pattern]</td> <td>(SM) YELLOW SILTY SAND</td> <td></td> <td>JAR #5</td> <td></td> </tr> <tr> <td>-4.7</td> <td>9.0</td> <td style="text-align: center;">[Vertical Lines]</td> <td>(MH) ORANGE INORGANIC CLAYEY SILT</td> <td></td> <td>JAR #6</td> <td></td> </tr> <tr> <td></td> <td>10.5</td> <td style="text-align: center;">[Vertical Lines]</td> <td>(MH) DARK GRAY INORGANIC CLAYEY SILT</td> <td></td> <td>JAR #7</td> <td></td> </tr> <tr> <td>-10.7</td> <td>15.0</td> <td style="text-align: center;">[Vertical Lines]</td> <td></td> <td></td> <td></td> <td>B.O.H.</td> </tr> </tbody> </table>								ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS Drilling time, water loss, depth of weathering, etc., if significant! g	4.3	0.0	[Hatched Pattern]	(SC) DARK BROWN CLAYEY SAND		JAR #1		1.3	3.0	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2			4.5	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND		JAR #3			6.0	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND		JAR #4			7.5	[Dotted Pattern]	(SM) YELLOW SILTY SAND		JAR #5		-4.7	9.0	[Vertical Lines]	(MH) ORANGE INORGANIC CLAYEY SILT		JAR #6			10.5	[Vertical Lines]	(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #7		-10.7	15.0	[Vertical Lines]				B.O.H.
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS Drilling time, water loss, depth of weathering, etc., if significant! g																																																																
4.3	0.0	[Hatched Pattern]	(SC) DARK BROWN CLAYEY SAND		JAR #1																																																																	
1.3	3.0	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2																																																																	
	4.5	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND		JAR #3																																																																	
	6.0	[Dotted Pattern]	(SM) DARK GRAY SILTY SAND		JAR #4																																																																	
	7.5	[Dotted Pattern]	(SM) YELLOW SILTY SAND		JAR #5																																																																	
-4.7	9.0	[Vertical Lines]	(MH) ORANGE INORGANIC CLAYEY SILT		JAR #6																																																																	
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-10.7	15.0	[Vertical Lines]				B.O.H.																																																																

ENG FORM 1836
(CADD Facsimile)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-8-89

A-12

DRILLING LOG		DIVISION SOUTH ATLANTIC	INSTALLATION MOBILE DISTRICT		HOLE NO. PB-9-89	SHEET 1 OF 1 SHEETS
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.			10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 136293 E 267600			11. DATUM FOR ELEVATION SHOWN (TBM, MSL, or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT			12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314			
4. HOLE NO. (As shown on drawing title and file number) PB-9-89			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 7		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER D. BOWDEN			15. ELEVATION GROUNDWATER "SEE REMARKS"			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL			16. DATE MOLE 28 JUNE 89		17. ELEVATION TOP OF HOLE 4.8	
7. THICKNESS OF OVERBURDEN			18. TOTAL CORE RECOVERY FOR BORING			
8. DEPTH DRILLED INTO ROCK			19. SIGNATURE OF INSPECTOR D. JONES			
9. TOTAL DEPTH OF HOLE 15.0'			20. DRAFTED / CHECKED G.H. [Signature]			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS Drilling time, water loss, depth of weathering, etc., if significant g
4.8	0.0	[Hatched Pattern]	(SC) DARK BROWN CLAYEY SAND W/ TRACE GRAVEL (1/4"-1/2")		JAR #1	GW. INIT. ENC. @ d. 4.8' FINAL WL NOT OBS.
1.8	3.0	[Vertical Lines]	(ML) DARK GRAY CLAYEY SILT W/ SOME SHELL FRAGS. (SANDY)		JAR #2	
0.3	4.5	[Vertical Lines]	(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #3	
	6.0	[Vertical Lines]	(SM) TAN SILTY SAND		JAR #4	
	7.5	[Vertical Lines]	(SM) YELLOW SILTY SAND		JAR #5	
-4.2	9.0	[Vertical Lines]	(MH) TAN INORGANIC CLAYEY SILT (SANDY)		JAR #6	B.O.H.
	10.0	[Vertical Lines]	(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #7	
-10.2	15.0	[Vertical Lines]				

ENG FORM 1836
(CADD Edition)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-9-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-10-89		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 136533 E 267157				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314			
4. HOLE NO. (as shown on drawing title and file number) PB-10-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER D. BOWDEN				15. ELEVATION GROUNDWATER "SEE REMARKS"		16. DATE MOLE STARTED 29 JUNE 89 COMPLETED 29 JUNE 89	
6. DIRECTION OF MOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				17. ELEVATION TOP OF MOLE 3.6			
7. THICKNESS OF OVERBURDEN				18. TOTAL CORE RECOVERY FOR BORING			
8. DEPTH DRILLED INTO ROCK				19. SIGNATURE OF INSPECTOR D. JONES			
9. TOTAL DEPTH OF MOLE 15.0'				DRAFTED: G.H. <i>[Signature]</i>			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
3.6	0.0		(SM) DARK BROWN SILTY SAND W/ LITTLE SHELL FRAGS.		JAR #1	GW. INIT. ENC. @ d.2.0' FINAL WL NOT OBS.
0.6	3.0		(ML) DARK GRAY CLAYEY SILT W/ SOME SHELL FRAGS.		JAR #2	
-4.4	8.0		(SM) DARK GRAY SILTY SAND		JAR #3	
-5.4	9.0		(MH) TAN & GRAY INORGANIC CLAYEY SILT		JAR #4	B.O.H.
-11.4	15.0		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #5	

ENG FORM 1836
(CADD Footnote)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-10-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION MOBILE DISTRICT		Hole No. PB-II-89 SHEET 1 OF 1 SHEETS																																																									
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.																																																											
2. LOCATION (Coordinates or Station) ZONE AL W: N 136915 E 266883				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD																																																											
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALLING 314																																																											
4. HOLE NO. (as shown on drawing title and file number) PB-II-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 4																																																									
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES		UNDISTURBED																																																									
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED																																																											
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 29 JUNE 89																																																									
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 4.0		COMPLETED 29 JUNE 89																																																									
9. TOTAL DEPTH OF HOLE 15.0'				18. SIGNATURE OF INSPECTOR D. JONES																																																											
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g																																																									
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	6.0		(ML) DARK GRAY CLAYEY SILT W/ SOME SHELL FRAGS.		JAR #2																																																										
-5.0	9.0																																																														
	12.5		(MH) DARK GRAY & ORANGE INORGANIC CLAYEY SILT		JAR #3																																																										
	15.0		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #4																																																										
-11.0						B.O.H.																																																									

ENG FORM 1836
(CADD Footnote)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-II-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-12-89		MOBILE DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.					
2. LOCATION (Coordinates or Station) ZONE AL W: N 137250 E 266628				11. DATUM FOR ELEVATION SHOWN (TBAL, MSL or NGVD) NGVD					
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314					
4. HOLE NO. (as shown on drawing title and file number) PB-12-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 6		DISTURBED 6		UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES					
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED					
7. THICKNESS OF OVERBURDEN				16. DATE HOLE 29 JUNE 89		STARTED		COMPLETED 29 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 4.0					
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING					
				19. SIGNATURE OF INSPECTOR D. JONES					
				DRAFTED: ☒ RECHECKED: ☒ G.H.					

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
4.0	0.0					
	3.0		(ML) DARK GRAY CLAYEY SILT W/ SOME SHELL FRAGS.		JAR #1	
-0.5	4.5		(ML) DARK GRAY CLAYEY SILT (SANDY)		JAR #2	
	6.0		(SM) ORANGE SILTY SAND		JAR #3	
-4.0	8.0		(SM) DARK GRAY SILTY SAND		JAR #4	
	13.5		(MH) TAN INORGANIC CLAYEY SILT W/ TRACE (SM) LENSES		JAR #5	
-11.0	15.0		(MH) DARK GRAY INORGANIC CLAYEY SILT		JAR #6	
						B.O.H.

ENG FORM 1836
(CADD Facsimile)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-12-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-13-89		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 138471 E 263753				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALLING 314			
4. HOLE NO. (as shown on drawing title and file number) PB-13-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 6 UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 29 JUNE 89 COMPLETED 29 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 3.5			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR D. JONES	
						DRAFTED: G.H. [Signature]	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
3.5	0.0		(SM) DARK BROWN SILTY SAND W/ TRACE SHELL FRAGS.		JAR #1		
	3.0						
			(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2		
-2.5	6.0						
	7.5		(MH) BEIGE INORGANIC CLAYEY SILT		JAR #3		
	9.0		(MH) BEIGE INORGANIC CLAYEY SILT		JAR #4		
	12.0		(MH) GREEN INORGANIC CLAYEY SILT		JAR #5		
			(MH) GREEN INORGANIC CLAYEY SILT		JAR #6		
-11.5	15.0					B.O.H.	

ENG FORM 1836
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PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-13-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION MOBILE DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 138595 E 263267				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALLING 314			
4. HOLE NO. (As shown on drawing title and file number)		PB-14-89		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 6 UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE STARTED 29 JUNE 89 COMPLETED 29 JUNE 89			
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 2.8			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR D. JONES DRAFTED: G.H. [Signature]			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
2.8	0.0		(SM) DARK BROWN SILTY SAND W/ TRACE SHELL FRAGS.		JAR #1		
	3.0		(SM) DARK GRAY & ORANGE SILTY SAND W/ TRACE SHELL FRAGS. (MIC.)		JAR #2		
	4.5		(SM) ORANGE & GRAY SILTY SAND W/ TRACE SHELL FRAGS. (MIC.)		JAR #3		
-3.2	6.0		(MH) ORANGE INORGANIC CLAYEY SILT W/ TRACE (SM) LAYERS		JAR #4		
	7.5		(MH) BEIGE INORGANIC CLAYEY SILT W/ TRACE DECOMPOSED ROOTS		JAR #5		
	9.0		(MH) GREEN INORGANIC CLAYEY SILT (SANDY)		JAR #6		
-12.2	15.0					B.O.H.	

ENG FORM 1836
(CADD Edition)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-14-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		Hole No. PB-15-89		SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 138796 E 262814				11. DATUM FOR ELEVATION SHOWN (TBM, MSL, or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FALLING 314			
4. HOLE NO. (As shown on drawing title and the number)		PB-15-89		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED 5 UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED 29 JUNE 89 COMPLETED 29 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 4.0			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR D. JONES DRAFTED, CHECKED G.H.			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS Drilling time, water loss, depth of weathering, etc., if significant! g
4.0	0.0		(ML) DARK BROWN CLAYEY SILT (SANDY) W/ TRACE SHELL FRAGS.		JAR #1	
	3.0		(ML) DARK BROWN CLAYEY SILT (SANDY) W/ TRACE SHELL FRAGS.		JAR #2	
	4.5		(ML) DARK BROWN CLAYEY SILT (SANDY) W/ TRACE SHELL FRAGS.		JAR #3	
	6.0		(ML) DARK BROWN CLAYEY SILT (SANDY) W/ TRACE SHELL FRAGS.		JAR #4	
	9.0					
-7.0	11.0					
			(MH) BEIGE & ORANGE INORGANIC CLAYEY SILT		JAR #5	
-11.0	15.0					B.O.H.

ENG FORM 1836
(CADD Footings)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-15-89

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION MOBILE DISTRICT		Hole No. PB-16-89 SHEET 1 OF 1 SHEETS	
1. PROJECT PORTERSVILLE BAY BAYOU LABATRE AL.				10. SIZE AND TYPE OF BIT 6" AUG.			
2. LOCATION (Coordinates or Station) ZONE AL W: N 138955 E 262340				11. DATUM FOR ELEVATION SHOWN (TBM, MSL or NGVD) NGVD			
3. DRILLING AGENCY MOBILE DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 314			
4. HOLE NO. (As shown on drawing title and file number) PB-16-89				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		13. DISTURBED 6 UNDISTURBED	
5. NAME OF DRILLER D. BOWDEN				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED DEG. FROM VERTICAL				15. ELEVATION GROUNDWATER GW. NOT ENCOUNTERED			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		16. STARTED 29 JUNE 89 COMPLETED 29 JUNE 89	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE 3.4			
9. TOTAL DEPTH OF HOLE 15.0'				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR D. JONES DRAFTED G.H. [Signature]			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY OR W.C. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g SPT BLOWS/FT
3.4	0.0		(SM) BROWN SILTY SAND		JAR #1	
	3.0		(SM) DARK GRAY SILTY SAND W/ TRACE SHELL FRAGS.		JAR #2	
	4.5		(SM) BEIGE SILTY SAND		JAR #3	
-2.6	6.0		(MH) BEIGE & ORANGE INORGANIC CLAYEY SILT W/ TRACE (SM) LENSES		JAR #4	
	7.5		(MH) GREEN INORGANIC CLAYEY SILT		JAR #5	
	9.0		(MH) GREEN INORGANIC CLAYEY SILT W/ TRACE (SM) LENSES		JAR #6	
	12.0					
-11.6	15.0					B.O.H.

ENG FORM 1836
(CADD Edition)

PROJECT

PORTERSVILLE BAY
BAYOU LABATRE AL.

HOLE NO.

PB-16-89

A-20

APPENDIX B

COMPUTATION OF ECONOMIC BENEFITS

Appendix B

Computation of Economic Benefits

1. This appendix provides the methodology and computations by which economic benefits accruing to the proposed Federal project at Portersville Bay, Mobile County, Alabama, were computed.

2. Maintenance of Seawalls and Roads to Time of Failure. Information concerning annual expenditures for the period 1979-1987 for repairs and maintenance of the roadway was provided by Mobile County. Incremental maintenance costs (Table B-1) for seawalls and roads incurred as a direct result of the deteriorated condition of the existing seawalls and roadway averaged \$26,300 per year.

Table B-1

Annual Incremental Costs for Maintenance of Seawalls and Roads

1979	\$ 93,000 (FEMA Funds)
	12,000
1980	12,000
1981	12,000
1982	12,000
1983	12,000
1984	12,000
1985	36,100 (FEMA Funds)
	12,000
1986	12,000
1987	12,000
	<u>\$237,000</u>

3. The average annual expenditures for extraordinary repairs were based on the county road supervisor's estimate of labor, equipment, and materials costs for necessary repairs, in addition to normal, expected maintenance costs, during the period.

4. The average annual maintenance and repair expenditures of \$26,300 for Shell Belt and Coden Belt Roads must be prorated, based on their linear distance open to wave attack (3,300 feet and 5,500 feet, respectively). Thus, the average annual expenditures attributable to the Shell Belt Road are \$9,900 ($\$26,300 \times 0.375$) and to Coden Belt Road are \$16,400 ($\$26,300 \times 0.625$). The roads will be

maintained for two years until the bulkheads fail. The annualized costs for maintenance and repairs are then computed as:

O & M Shell Belt Road:
 $\$9,900 \times 1.762099 \times .090032 = \$1,571$

O & M Coden Belt Road:
 $\$16,400 \times 1.762099 \times .090032 = \$2,602$

Total Annualized Costs = \$4,173

5. Traffic Diversion. Higher costs are incurred when roadway users are forced to travel alternative routes. Vehicles traveling alternative routes consume additional fuel and require additional maintenance and repairs when required to travel longer distances for a sustained period of time. The routes onto which traffic is diverted require increased maintenance and repair. Barriers and detour signs must be constructed and maintained. Accident rates may increase in greater proportion than the additional distance traveled due to congestion on the alternate route.

6. Average daily traffic counts used for this evaluation were developed by the Mobile County Engineering Department. The counts were based on actual traffic counting device recordings during the week of August 23, 1987. The counts are considered typical since both roads accommodate both residential and commercial users and are generally unaffected by seasonal traffic flows.

7. Average daily traffic counts for Shell Belt Road from each of two traffic counters placed on either end of the portion of the road along the water's edge, were 631 and 760. The average daily count equalled 696; the highest daily totals for these two traffic counters were 715 and 858. Average daily traffic counts for the Coden Belt Road was based on a single traffic counter placed at the west end of the project site during the same period. (The remaining counter placed at the east end of the road segment malfunctioned.) The average daily traffic count for Coden Belt Road was 815 vehicles; the highest daily total was 908.

8. Accurate directional analysis cannot be determined since neither surveys nor counts of entry and exist preference were undertaken. Therefore, the choices of direction are assumed to be equally distributed. Thus, traffic using either project road at the Portersville Bay study area site would be indifferent as to the choice of route traveled among equivalent alternatives.

9. However under normal conditions, traffic at the project site is constrained to use the paved perimeter roads (Figure B-1), described by routes ABCDEF and GHIJ. Other roads adjacent to the site of the proposed project are unpaved, poorly drained clay-dirt roads which are crossed at several locations by intermittent streams.

10. Points A and F at Shell Belt Road and Point G and J on Coden Belt Road were selected as the reference points for this analysis. Routes AFE and FABC are assumed to be representative of the average distances traveled east and west, respectively, on Shell Belt Road. Routes GJI and JGH are assumed to be representative of distances traveled on Coden Belt Road. Benefits to the project from traffic diversions would be the difference in the annualized costs to traffic using existing routes and their shortest equivalent alternatives.

Table B-2
Alternative Routes Mileage

Segment	Existing Route	Miles	W/O Project	Miles	Diff.	Count
Shell Belt Rd.	AFE	1.4	ABCDE	2.8	1.4	348
	FABC	1.7	FEDC	2.7	1.0	348
Coden Belt Rd.	GJI	1.5	GHI	1.5	0	407
	JGH	1.5	JIH	1.5	0	408

11. Total annual costs of diverted traffic are estimated by multiplying the number of vehicles per day using each route, by the differences in mileage (from Table B-2), by \$0.14 per mile⁴, by 365 days per year, as shown in Table B-3. These costs are incurred during the one year period of construction.

⁴Motor Vehicle Manufacturers Association, Facts & Figures '88, (Detroit, 1989), page 44.

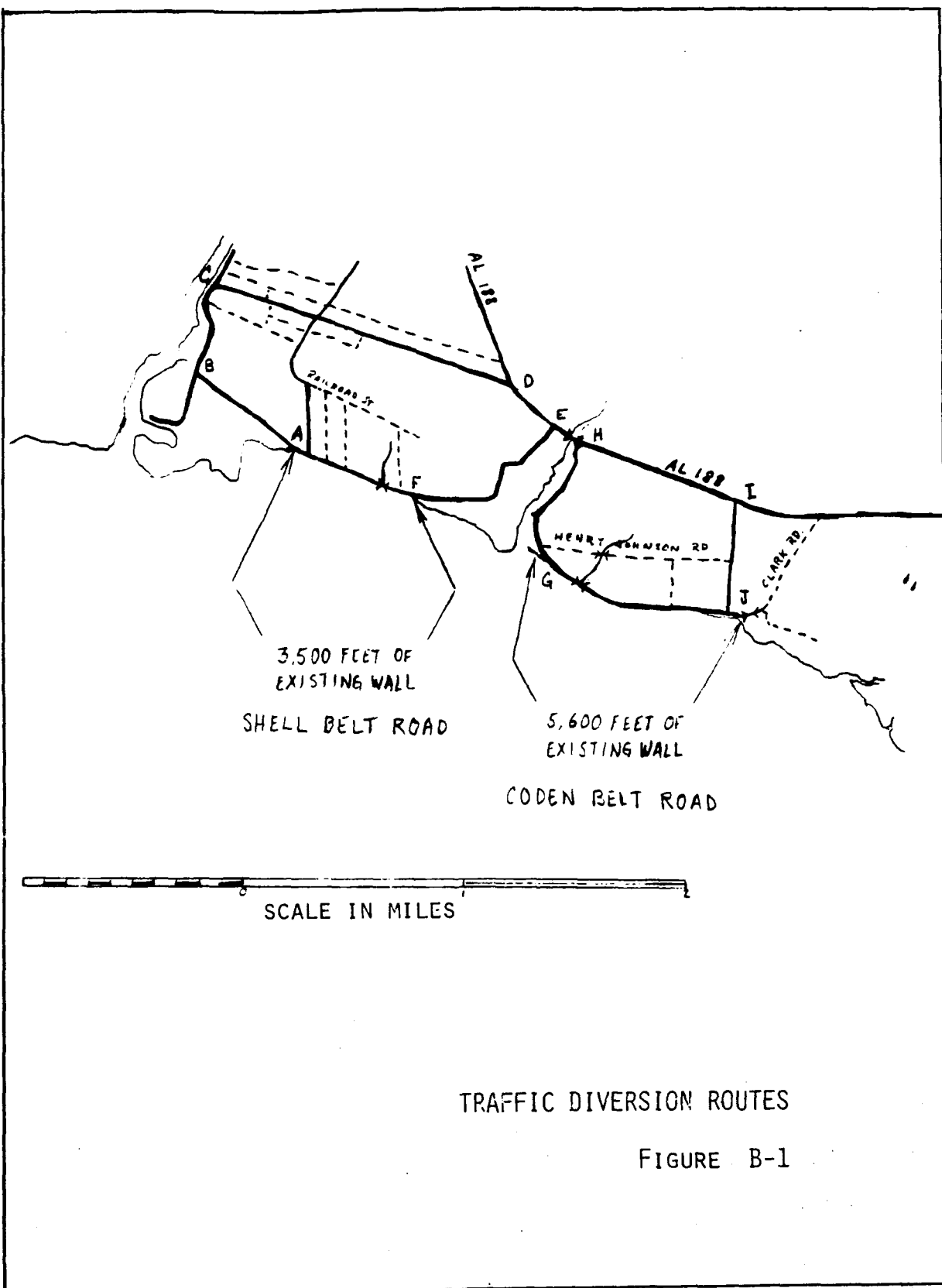


Table B-3

Computation of Annual Costs of Additional Travel

Shell Belt Road:

Route ABCDE:

348 vehicles/day x 1.4 miles
x \$0.14/mile x 365 days/year x .843614 = \$21,003

Route FEDC:

348 vehicles/day x 1.0 miles
x \$0.14/ x 365 days/year x .843614 = \$15,002

Shell Belt Total \$36,005

Coden Belt Road: 0

Total \$36,005

12. The annualized value, based on the 50-year project life is computed as: \$36,005 x .090032 = \$3,242.

13. Road closure would also necessitate the construction, placement, and maintenance of barriers at access points along each project site road segment and warning signs along adjacent roads. According to information provided by the office of the Mobile County Engineer, effective barriers would cost approximately \$1,200 each in annual costs for construction, placement, maintenance, and periodic replacement. Similar annual costs for warning signs would be approximately \$300 each.

Table B-4

Computation of annual Benefits to Barriers and Signs

Shell Belt Road

Signs, 5 @ \$300 x .843614 = \$ 1,265
Barriers, 6 @ \$1,200 x .843614 = 6,074
Total, Shell Belt Road = \$ 7,339

Coden Belt Road

Signs, 5 @ \$300 x .843614 = \$ 1,265
Barriers, 4 @ \$1,200/year x .843614 = 4,049
Total, Coden Belt Road = \$ 5,314

Total = \$12,653

14. The above values for the costs of signs and barriers would be the annualized benefit only under Alternative B, assuming permanent closure. Under Alternative A, signs and barriers would be necessary only for one year, the period of construction and repair. Annualized values for signs and barriers under alternative A would be computed as:

Shell Belt Road		
\$7,339 x .090032	= \$	661
Coden Belt Road		
\$5,314 x .090032	= \$	<u>478</u>
Total	= \$	1,139

15. Bridge Construction. The office of the Mobile County Engineer also provided the replacement cost estimate of \$95,000, each, for the 34-foot-wide, precast, concrete bridges to meet minimum Federal design specifications at the location of the project site. Since the proposed project will extend the life of the bridge service already provided, a credit for this extension is incurred as a project benefit. The computations for these benefits are described below.

Computation of Bridge Replacement Benefits

1.	Cost of new bridge	\$95,000
2.	Life of new bridge	30
3.	Remaining useful life of existing bridge	17
4.	Bridge life extension	13
5.	Interest rate	8.875
6.	Capital recovery factor	.090032
7.	Annual cost	\$ 8,553
8.	Present worth of annuity factor	7.537119
9.	Benefit in year 17 credited to life extension	\$64,465
10.	Single payment present worth factor	.235625
11.	Present worth of bridge life extension at end of period to failure	\$15,190
12.	Average annual credit at end of period to failure	\$ 1,368
13.	Present worth factor for 2 years	.843614
14.	NED benefit for initial bridge life extension	\$ 1,154
15.	Bridge replacement credit 30 years following end of period to failure	\$ 230
16.	NED Benefit per bridge	\$ 1,384
17.	Total NED Benefit (3 bridges)	\$ 4,152

16. All three bridges at the project site were replaced in October 1979, following Hurricane Frederick. According to the Mobile County Engineer's Office, the bridges must be built to equivalent specifications at an average cost of \$95,000. Each has an expected life period of 30 years. The basis for the credit for the extension of the useful life is that the replacement cost for the existing bridges will be deferred 13 years. The annual credit for years 18-30 is assumed to be equal to the average annual value (cost) of the new bridge for each of those years. This annual value (line 7) is estimated by multiplying the cost of the new bridge (line 1) by the capital recovery factor (line 6). The credit is a constant annuity in years 18-30. Its present worth in year 17 (line 9) is the amount of the annuity (line 7) multiplied by the present worth of an annuity for 13 years (line 8). The present worth at the end of the period to failure (line 11) is then this value multiplied by the single payment present worth factor for 17 years (line 10).

17. The average annual value of the credit line (line 12) is the present worth value multiplied by the capital recovery factor for 50 years (line 8). This must then be reduced to its current value by multiplying it by the present worth factor for 2 years (line 13). Since the life of the bridge will be renewed at the end of 30 years, an additional benefit for the difference in the present worth of the 50-year annuity is added as a further NED benefit accruing to the proposed project. Three bridges must be replaced for all alternatives for a total credit of \$4,152 (line 17).

18. Relocation and Replacement of Utility Poles and Lines. According to Alabama Power Company, relocation and replacement of 60 telephone poles adjacent to the seawalls and roadways in the project site would cost approximately \$1,100 per pole. These poles were also replaced following Hurricane Frederick. Each has a useful life expectancy of 25 years. This would increase the project benefits as shown in Table B-5. This cost is incurred under all three alternatives and is computed as a credit, based on the remaining useful life expectancy, as described under "Bridge Construction."

Computation of Utility Poles Bridge Replacement Benefits

1.	Cost of new poles	\$66,000
2.	Life of new poles	25
3.	Remaining useful life of existing poles	12
4.	Poles life extension	13
5.	Interest rate	8.875
6.	Capital recovery factor	.090032
7.	Annual cost	\$ 5,942
8.	Present worth of annuity factor	7.537119
9.	Benefit in year 12 credited to life extension	\$44,786
10.	Single payment present worth factor	.360464
11.	Present worth of poles life extension at end of period to failure	\$16,144
12.	Average annual credit at end of period to failure	\$ 1,453
13.	Present worth factor for 2 years	.843614
14.	NED benefit for initial poles life extension	\$ 1,226
15.	Poles replacement credit 25 years following end of period to failure	\$ 383
16.	Total NED Benefit (60 poles)	\$ 1,609

19. Road Construction. Failure of the existing seawall and roadbed under either alternative would necessitate the construction of an entirely new road. According to estimates provided by the Office of Mobile County Engineer, costs of road construction at the proposed project site would be approximately \$60.00 per linear foot for a 24-foot-wide, rural-type, asphalt road, with an 8-inch sand and clay base and normal subgrade adjustment. This estimate of \$60.00 per linear foot includes cost for actual construction, engineering, inspections, underlayment, drainage, repair of damage to private and public property during construction, and physical adjustments to private and public property and structures adjacent to the newly constructed road. The estimated costs for property condemnation and acquisition are not included in the following estimates. The computations of annualized costs for new road construction under the alternative evaluations are shown in Table B-6.

Table B-6

Benefits to Road Construction Under Project Alternatives.

Segment	Annual Benefits
Shell Belt Road	\$60/ft. x 3,300 ft x .090032 x .843614 = \$15,039
Coden Belt Road	\$60/ft. x 5,500 ft x .090032 x .843614 = 25,064
Total	\$60/ft. x 8,800 ft x .090032 x .843614 = \$40,103

20. Bulkhead Construction. Bulkhead construction costs under the Federal project alternative have been estimated totaling \$329,000 for the Coden Belt Road segment and \$218,000 at Coden Belt Road. Under either option considered under Alternative A, the newly-reconstructed roadbed would have to be protected by a bulkhead equivalent to the Federal project, or face repeated failure of the existing seawalls and roads over the project life period of 50 years.

21. Computations of benefits accruing to the reconstruction of the seawalls under Alternative A, based on the estimated costs of the Federal-project alternative, are shown in Table B-7.

Table B-7

Annual Benefits to Seawalls Reconstruction (Alternative A)

Shell Belt Road:	\$218,000 x .090032 x .843614 = \$16,558
Coden Belt Road:	\$329,000 x .090032 x .843614 = \$24,988
Total :	\$547,000 x .090032 x .843614 = \$41,546

22. Under Alternative B, private landowners would act to protect private residences located at the waterfront within 10 years after the high-water event which caused failure of the roads and seawalls. Given these conditions, private land owners would not be expected to construct a seawall equivalent to that proposed under the Federal-project alternative. This evaluation is based on estimated costs for a 2-layer, 6-foot-high, treated-wood bulkhead averaging \$100 per linear foot. This type private bulkhead is the most common type in the local area capable of surviving the 50-year project life period. Computations of total benefits accruing to the construction of private bulkheads under Alternative B are shown in Table B-8.

Table B-8

Annual Benefits to Private Bulkhead Construction (Alternative B)

Shell Belt Road:	$\frac{\$100/\text{ft} \times 3,300 \text{ ft}}{10} \times .090032 \times 6.453119 \times .843614 = \$16,174$
Coden Belt Road:	$\frac{\$100/\text{ft} \times 5,500 \text{ ft}}{10} \times .090032 \times 6.453119 \times .843614 = \$26,957$
Total	= \$43,131

23. Road Fill (Alternative A, Option a). For this evaluation, the average effect at the time of failure is estimated to result in a 50 percent removal of the roadbed, to a depth of 6 feet, 50-feet wide, throughout the entire length of both segments. This would result in the need to replace 30,556 cubic yards of fill dirt at Coden Belt Road and 18,333 cubic yards at Shell Belt Road. The cost of fill dirt used to reconstruct the road bed to its original condition under Alternative A, Option A, is determined to be approximately \$5.50 per cubic yard, delivered to the construction site. Estimated benefits which would accrue to the placement of fill dirt is shown in Table B-9.

Table B-9

Benefits accruing to Placement of Fill Dirt
(Alternative A, Option a)

Shell Belt Road:	
18,333 cu yds x \$5.50/cu yd x .090032 x .843614 =	\$ 7,659
Coden Belt Road:	
30,556 cu yds x \$5.50/cu yd x .090032 x .843614 =	<u>\$12,764</u>
Total	\$20,423

24. Acquisition. Under the proposed Federal-project alternative, acquisition of additional rights-of-way would be unnecessary. However, both alternatives which provide for relocation of the existing roads and seawalls would necessitate purchasing the necessary right-of-way at fair market value. Estimated fair market value were provided by the Office of the Mobile County Tax Assessor.

25. Under both alternatives property would have to be acquired. The value of beach front property at both project segment locations is currently valued at an estimated average value of \$40,000 for an average residential lot measuring 75 feet across its south face (frontage) by 300 feet deep. Property located approximately 350 feet north of the existing rights-of-way is valued at \$10,000 per acre. It is also estimated that the costs to acquire the necessary property under eminent domain would increase the total cost by approximately 20 percent.

26. The computations in Table B-10 are based on the purchase of additional 50-foot-wide rights-of-way. Average values for the

rights-of-way are prorated as a percentage of the total value of property at the sites; and the average values are assumed to be equal at both project sites, under the respective alternatives. This results in a purchase price of \$88.89 per "front foot" for beach front property (Alternative A Option b) at both project sites, and \$11.48 per linear foot under the Alternative B.

Table B-10

Computation of Annual Benefits to Property Acquisition

Alternative A, Option b:

Shell Belt Road:
 $3,300 \text{ ft} \times \$88.89/\text{ft} \times .090032 \times .843614 \times 1.2* = \$26,736$

Coden Belt road:
 $5,500 \text{ ft} \times \$88.89/\text{ft} \times .090032 \times .843614 \times 1.2* = \$44,559$

Total, Alternative A, Option b = \$71,295

Alternative B:

Shell Belt Road:
 $3,300 \text{ ft} \times \$11.48/\text{ft} \times .090032 \times .843614 \times 1.2* = \$ 3,453$

Coden Belt Road:
 $5,500 \text{ ft} \times \$11.48/\text{ft} \times .090032 \times .843614 \times 1.2* = \$ 5,755$

Total, Alternative B = \$ 9,208

(*Litigation factor.)

27. Relocation of Water and Natural Gas Pipelines. A total estimate of \$200,000 to replace natural gas and water pipelines at both project segments was provided by the Utility Board of the City of Bayou La Batre. Prorating this by the linear distance at each segment and reducing to its net present value would be computed as:

Shell Belt Road:
 $\$75,000 \times .090032 \times .843614 = \$ 5,696$

Coden Belt Road:
 $\$125,000 \times .090032 \times .843614 = \$ 9,494$

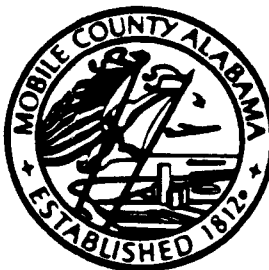
Total = \$15,190

These costs are incurred with Alternative A, Option b and Alternative B.

APPENDIX C

LETTERS OF ASSURANCE FROM LOCAL SPONSOR

JAMES L. "JIM" MASON, PRESIDENT
SAMUEL L. JONES, COMMISSIONER
WILLIAM J. "BILL" MENTON, COMMISSIONER



W. C. HELVESTON
ADMINISTRATOR
DOUGLAS L. MODLING
DEPUTY ADMINISTRATOR

MOBILE COUNTY COMMISSION

POST OFFICE BOX 1443 MOBILE, ALABAMA 36633
TELEPHONE (205) 690-8613 FAX (205) 690-4770

April 11, 1989

Commander
U.S. Army Engineer District, Mobile
Post Office Box 2288
Mobile, Alabama 36628-0001

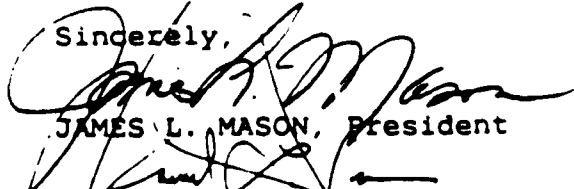
Dear Colonel Bonine:

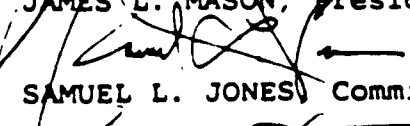
This letter will serve to advise you that it is the intent of the Mobile County Commission to sponsor the Portersville Bay, Alabama, Section 14 shoreline protection project.

We have reviewed the results of the reconnaissance level planning effort and the basic requirements of the Draft Local Cooperation Agreement (LCA). We have determined that the County can meet both the legal and financial obligations of non-Federal sponsorship for this Section 14 project. The Mobile County Commission intends to provide official project sponsorship when the Detailed Project Report has been completed and upon receipt of the final LCA. I have enclosed a certificate of authority which certifies that the county has the legal capability to act as a non-Federal sponsor.

We look forward to continued close cooperation on this project. If we can be of any further assistance toward insuring that the project moves expeditiously to completion, please do not hesitate to call us.

Sincerely,

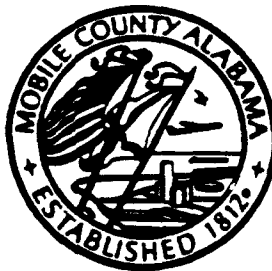

JAMES L. MASON, President


SAMUEL L. JONES, Commissioner


BILL MENTON, Commissioner

Enclosure

JAMES L. "JIM" MASON, PRESIDENT
SAMUEL L. JONES, COMMISSIONER
WILLIAM J. "BILL" MENTON, COMMISSIONER



W. C. HELVESTON
ADMINISTRATOR
DOUGLAS L. MOOLIN
DEPUTY ADMINISTRATOR

MOBILE COUNTY COMMISSION

POST OFFICE BOX 1443 MOBILE, ALABAMA 36633
TELEPHONE (205) 690-8613 FAX (205) 690-4770

April 19, 1989

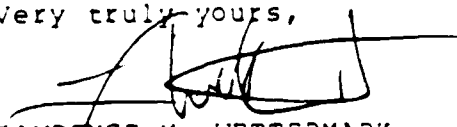
U.S. Army Corps of Engineers
U.S. Army Engineering District
Post Office Box 2288
Mobile, Alabama 36628

Gentlemen:

This letter is written in my capacity as County Attorney. This is to confirm that Mobile County has the legal capacity to act as a non-federal sponsor of the Portersville Bay Shoreline Protection Project.

With best wishes, I am

Very truly yours,


LAWRENCE M. WETTERMARK
County Attorney

LMW/KD

APPENDIX D

CODE OF ACCOUNTS COST ESTIMATE

PORTERSVILLE BAY, ALABAMA - SECTION 14
PROJECT COST

=====				
ITEM			Unit	Total
Description	Qty	Unit	Cost	Cost
=====				
FEDERAL CONSTRUCTION:				
10.0.A	Prep. Work			
	Mob. & Demob.	job	ls	\$5,000
10.0.2.	Seawalls:			
	Timber Pile	27300	lf	7.5 204,800
	Timber Bulkhead			
	& Whales	134300	bf	0.95 127,600
	Bolts	24100	lbs	1 24,100
	Filter Fabric	6600	sy	2.75 18,200
10.0.R	General Items:			
	Cut Existing Pil	1960	lf	6 11,800
	Sheeting Boards	12000	bf	0.5 6,000
	Rem Concrete Rub	2100	cy	10 21,000
	Debris Removal	300	cy	5 1,500
	Compacted Backfi	4400	cy	5 22,000
	Seed & Mulch	8	ac	1800 14,400
	Subtotal Construction			\$456,400
	Contingencies (25%)			114,000
	Total Construction			\$570,400
30.	Planning, Eng. & Design		ls	\$50,000
31.	Construction Management		ls	34,000
	TOTAL CONSTRUCTION COST			\$654,400
NON-FED. LERRD:				
01.	Const. Staging Area	4	ac	2000 \$8,000
02.	Relocate Finger Piers			10,000
10.0.R.	Electrical Relocation	1	job	ls 2,000
10.0.3.	'Seawall Drainage:			
	"12" Drain Pipe	6	lf	26 200
	"15" Drain Pipe	12	lf	32 400
	"12" Drain Pipe	27	lf	38 1,000
	"12" Drain Pipe	27	lf	48 1,300
	Contingencies (25%)			6,500
30.	Planning Eng. & Design		ls	2,000
31.	Construction Management		ls	1,000
	TOTAL			\$32,400
	TOTAL PROJECT FIRST COST			\$686,800
=====				

PORTERSVILLE BAY, ALABAMA - SECTION 14

PROJECT COSTS (CONT.)

3G.	Planning, Engineering and design	
30.A.	Planning	\$ 1,000
30.C.	Local Cooperation Agreements	
30.C.1.	Draft LCA	2,000
30.C.2.	Final LCA & Financial Plan	4,000
30.C.3.	LCA Negotiations	2,000
30.C.4.	Transfer of Project to Sponsor	4,000
30.D.	Environmental and Regulatory Activities	
30.D.9.	All Other	1,000
30.H.	Plans and Specifications	
30.H.A.	Subsurface Explorations	4,000
30.H.B.	Predesign Investigations	9,000
30.H.L.	Bidability, Constructability and Operability Review	6,000
30.H.Y.	All Other EDC	5,000
30.M.	Cost Engineering	6,000
30.T.	PED Phase Life Cycle Project Management	1,000
30.Z.	Miscellaneous Activities	
30.Z.1.	Program Management	<u>5,000</u>
	TOTAL	\$50,000
31.	Construction Management	
31.B.	Contract Administration	
31.B.1.	Preaward Activities	3,000
31.B.2.	Award Activities	3,000
31.B.3.	Review and Approval of Contract Payments	4,000
31.B.5.	Progress and Completion Reports	6,000
31.E.	Inspection and Quality Assurance	
31.E.1.	Schedule Compliance	7,000
31.P.	Project Office Operation	7,000
31.T.	Construction Phase Life Cycle Proj. Management	<u>4,000</u>
	TOTAL	\$34,000

NON-FEDERAL

01	Lands and Damages	\$ 4,000
02	Relocation	10,000
30	Planning, Engineering and Design	2,000
31	Construction Management	1,000
	Contingency	4,250
	TOTAL	<u>\$21,250</u>