U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SILVER SPRING, MARYLAND

ENVIRONMENTAL ASSESSMENT OF LAKE SALVADOR SHORELINE PROTECTION DEMONSTRATION CWPPRA PROJECT BA-15

ST. CHARLES PARISH, LOUISIANA

JULY 1996

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JULY 1996

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TASK ORDER NO. 56-DKNF-5-10006

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St. Charles Parish, Louisiana

1.0 INTRODUCTION

This Environmental Assessment (EA) evaluates the impacts of a project to demonstrate the effectiveness of different breakwater structures and shoreline reconstruction in halting erosion and promoting sediment deposition along the central portion of the northwestern Lake Salvador shoreline. This project is named Lake Salvador Shoreline Protection Demonstration and is referred to as BA-15.

This project is part of the Coastal Wetlands Planning Protection and Restoration Act (Pub. L. No. 101-646, Title III-CWPPRA) made law in 1990. Five federal agencies and the State of Louisiana have combined in a Task Force to implement the "comprehensive approach to restore and prevent the loss of coastal wetlands in Louisiana" mandated by CWPPRA. The five federal agencies involved are: The U.S. Department of the Army, the U.S. Department of Commerce, the U.S. Department of the Interior, the U.S. Department of Agriculture, and the U.S. Environmental Protection Agency (U.S. EPA). The Lake Salvador Shoreline Protection Demonstration Project was included on the Third Annual Priority Project List as a demonstration project (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993) and will soon be ready for implementation.

The Lake Salvador Shoreline Protection Demonstration Project will test the effectiveness of various constructed breakwaters to provide shoreline protection in soils having highly organic, unconsolidated sediments with poor load bearing capacities that cannot support traditional shoreline stabilization structures. Four different breakwater structures will be evaluated including a geotextile tube, a grated apex, a vinyl sheet pile, and an angled timber structure. These structures will be constructed in 3 feet of water approximately 100 to 200 feet from the shoreline and will be evaluated for their ability to re-establish the historical shoreline by encouraging shoreline sediment deposition and reducing the erosive activity associated with wind-generated waves and tidal scouring. In addition to these structures, dredged material from Lake Salvador will be used to reconstruct approximately 2,700 linear feet of eroded vegetated shoreline that separates Baie du Cabanage from Lake Salvador. The effectiveness of this reconstructed shoreline and marsh to protect the inland bay from high energy wave activity present along the lake's northwestern shoreline also will be evaluated in this project.

1.1 Technical Background

The Louisiana Coastal Zone contains 7.9 million acres of which about 3 million acres are coastal marshes. These marshes currently are being converted to open water at a rate of 34.9 square miles per year (Barras *et al.*, 1994). This rate is similar to that measured in previous years by Gagliano *et al.*, 1981 and DeLaune

et al., 1991. This conversion is the result of natural and anthropogenic factors that have altered the hydrology and physical integrity of these wetlands and still persist today.

The primary pattern of land loss in the Louisiana Coastal Zone results from the submergence of coastal marshes and subsequent conversion to open water (Turner, 1990). Generally, submergence occurs when the rate of vertical accretion, including mineral sediment deposition and organic matter accumulation, does not equal or exceed the rate of geologic subsidence and the eustatic sea level rise. Consequently, these marshes begin to break apart and create open shallow ponds within the marsh interior. This ponding increases until the entire marsh area has converted to open water.

Coastal marshes are constructed and nourished by hydrological processes that influence site-specific chemical, physical and biological processes which affect plant growth and mineral sediment deposition (Mendelssohn and Burdick, 1988). Because these processes are interrelated, the site-specific factors influencing conversion of marsh to open water may vary widely and are difficult to assess.

Natural factors associated with coastal land loss include subsurface compaction and subsidence, eustatic sea level rise, physical substrate scouring and erosion, and periodic tropical cyclonic storms (Craig *et al.*, 1979; Boesch *et al.*, 1983). In addition, site-specific natural influences such as increased herbivore activity can promote land loss within coastal marshes (Nyman *et al.*, 1993b).

Anthropogenic activity accounted for 26 percent of total wetland loss within Louisiana between 1955 and 1978 (Turner and Cahoon, 1988). These direct losses were caused by dredging canals and creating spoil banks, draining land, and expanding agricultural and urban areas.

Turner and Cahoon (1988) attribute indirect causes of wetland loss to (1) temporal trends in estuarine salinity, (2) saltwater intrusion in waterways, (3) saltwater movement in marshes, (4) plant responses to salinity change and submergence, and (5) subsidence, water level rise and sediments. Indirect losses were exacerbated by levee construction for flood protection along the Mississippi River (Templet and Meyer-Arendt, 1988), extensive canal construction associated with oil and gas exploration (Turner *et al.*, 1982) and navigation channel development and maintenance dredging. These large-scale perturbations altered existing patterns of surface hydrology and sediment distribution over large areas and facilitated saltwater intrusion into coastal marshes.

1.1.1 Barataria Basin

The Barataria Basin is essentially the western and southern floodplain of the lower Mississippi River. The Lake Salvador Shoreline Protection Demonstration Project is within the central Barataria Basin and is located 22.4 miles southwest of New Orleans, Louisiana, as shown in Figure 1.

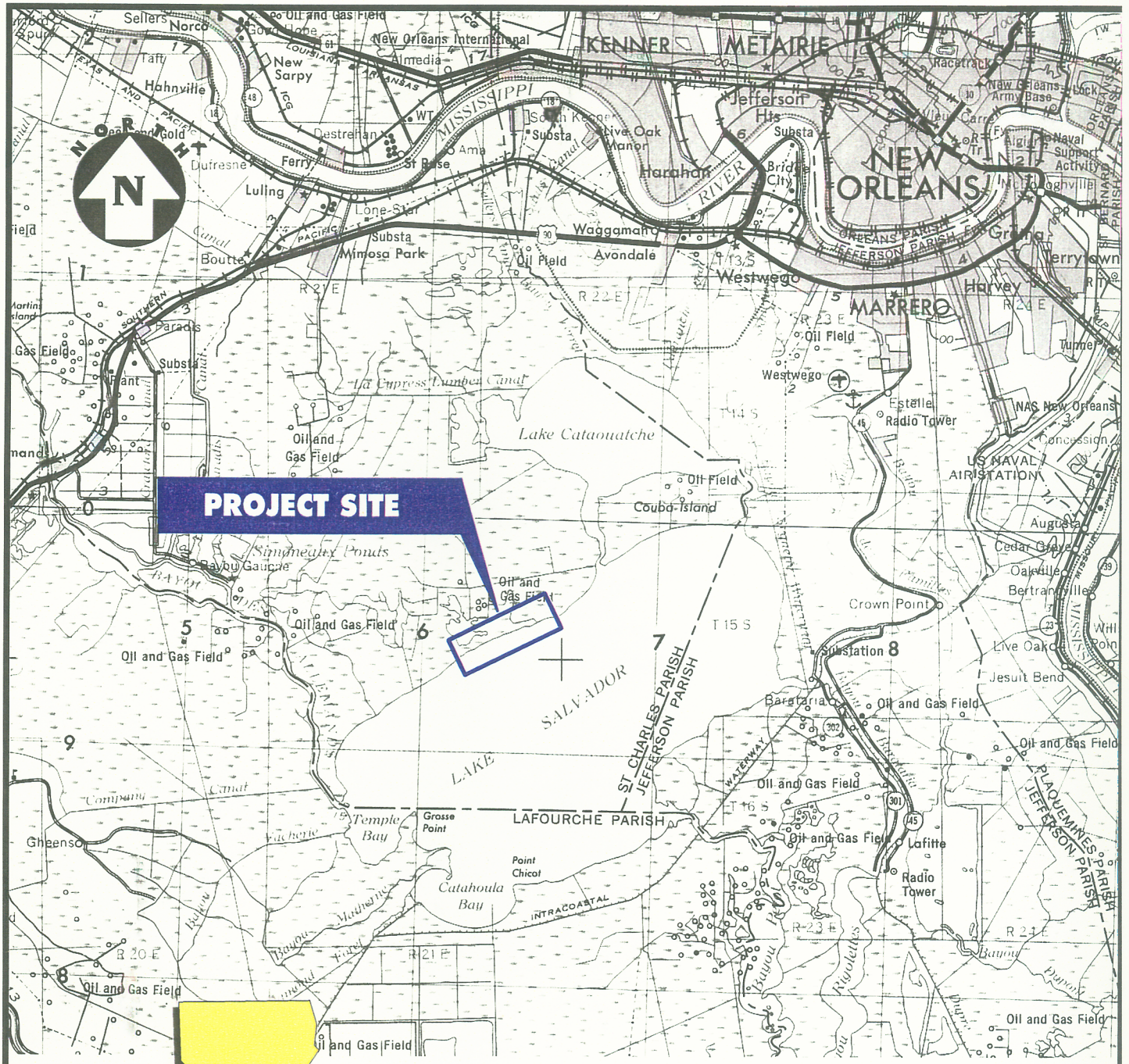

FIGURE 1

NOTE:

BASE MAP TAKEN FROM U. S. G. S. TOPOGRAPHIC-BATHYMETRIC MAP, "NEW ORLEANS, LA." DATED 1963, REVISED 1972, SHORELINE REVISED AND BATHYMETRY ADDED 1979.

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GOTECH, INC.
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LAKE SALVADOR SHORELINE PROTECTION
DEMONSTRATION PROJECT

LOCATION MAP

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

DRAWN	MPC	APPROVED	PJ
CHECKED	SPN	DATE	04/01/96B
		DWG. NO.	A34-106-14

IMAGE: SALVADOR LOCATION LANDSAT

The Barataria Basin forms a 1,565,000-acre triangle with its apex in the north at the historic junction of Bayou Lafourche and the Mississippi River near Donaldsonville, Louisiana. The eastern and western boundaries of the basin are formed by the levees of the Mississippi River and Bayou Lafourche, respectively, with the Gulf of Mexico forming the southern boundary (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993).

The Barataria Basin forms part of a larger estuarine system referred to as the Barataria-Terrebonne Estuary (Barataria-Terrebonne National Estuary Program, 1991). This system is characterized by broad, near sea level wetlands situated between a series of slightly elevated ridges which are levees of distributary channels of the lower Mississippi River. Their slightly elevated position in the landscape is a result of rapid deposition of coarse mineral sediments during seasonal flooding events. The estuaries represent a lower, interdistributary position in the landscape which has been continuously leveled by the slow even deposition of fine silt and clay particles and light organic debris following seasonal flooding events (Conner and Day, 1987).

Land loss within the Barataria Basin was estimated at 5,700 acres per year between 1973 and 1990 (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993). The Mississippi River's hydrologic influence on the geomorphology and ecology of the Barataria Basin combined with the river's historical use as a primary transportation route has significantly influenced this land loss rate during the past 50 years.

The current channel shifting within the Mississippi River deltaic plain from the Plaquemines-Modern delta lobe to the prograding Atchafalaya Delta lobe initiated a natural process of delta lobe deterioration within the Barataria Basin (Neil and Deegan, 1986). During this phase, the hydrologic influences of freshwater that have constructed wetlands in the Barataria Basin are gradually replaced by marine influences of the Gulf of Mexico such as tides, gulf water levels, and wind-driven resuspension (Madden, et al, 1988). As the freshwater influx slowly decreases, the existing freshwater marshes slowly convert to more saline marshes as their hydrologic influences become replaced by marine influences.

In addition to natural processes, anthropogenic activities such as levee construction, dredging canals, creating spoilbanks, and draining for agriculture land have restricted the influx of fresh river water into the upper Barataria Basin, thus accelerating the infiltration of salt water (Turner and Cahoon, 1988). The natural transition of freshwater marshes to more intermediate and saltwater marshes that accompanies natural delta lobe deterioration has been accelerated within the Barataria Basin as a result of man-made activity (Neil and Deegan, 1986).

Although saltwater intrusion remains a function of both natural and man-made causes, accelerated saltwater intrusion into historically brackish and intermediate marshes resulting from channelization, levee construction, erosion, or other related activities is viewed as a preliminary indication of marsh submergence and conversion to open water (Craig *et al.*, 1979). This process has occurred throughout the lower Barataria Basin which has experienced some of the highest rates of land loss in the Louisiana Coastal Zone (Barras *et al.*, 1994).

1.1.2 Lake Salvador

Lake Salvador, a shallow 44,800-acre freshwater lake, is tidally influenced and located within the central portion of the Barataria Basin. Although freshwater inputs into the upper basin have been limited by flood control levees and the closure of Bayou Lafourche at Donaldsonville, high rainfall has maintained the primarily freshwater marsh ecology within the project area (Madden *et al.*, 1988). The southeastern portion of the lake is affected by low salinity waters introduced via Bayous Ferat and Rigalettes and the Barataria Bay Waterway. Lake Salvador is part of a dominant water exchange route between the upper and lower basin which will be expanded by the proposed Davis Pond Freshwater Diversion Project that will reintroduce Mississippi River water into the upper Barataria Basin (Louisiana Coastal Conservation and Restoration Task Force, 1993).

Lake Salvador and the surrounding area offer significant recreational benefits as illustrated in Figure 2. Sections of the Lake Salvador shoreline are part of the 31,000-acre Salvador Wildlife Management Area (SWMA) to the west and the 12,400-acre Jean Lafitte National Historic Park to the east. Surrounding the lake are numerous navigational waterways that provide access to the lower basin and Gulf of Mexico, including Bayou Segnette Waterway, the Barataria Bay Waterway, and the Gulf Intracoastal Waterway. Private fishing camps are located along the shoreline of Lake Salvador and its adjacent waterways. Canal dredging for oil and gas exploration has occurred along the shores and within the lake; the largest field is the Bayou Couba Oil and Gas Field near the northeast shoreline of the lake.

Land loss in the Lake Salvador area is primarily a result of shoreline retreat caused by wave-generated erosion. The shoreline retreat rate averages 13 feet per year for Lake Salvador (Figure 3) and in some areas could widen waterways that would accelerate tidal scouring within the lake or breach into adjacent marshes and accelerate ponding (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993). Thus, protection of the Lake Salvador shoreline is a key factor to reducing the rate of land loss in this area.

1.2 Project Location

The Lake Salvador Shoreline Protection Demonstration Project is located on the northwest shoreline of Lake Salvador in the Barataria Basin in Section 37, Township 15 South, Range 21 East, St. Charles Parish, Louisiana. The site is approximately 22.4 miles south-southwest of New Orleans, Louisiana. Figure 3 shows the project site and shoreline.

1.3 Project Funding

Seventy-five percent of the funding for this demonstration project is provided through CWPPRA with 25 percent cost sharing by the State of Louisiana Department of Natural Resources (LDNR). The project is administered by cooperative agreements between the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) and LDNR.

2.0 PURPOSE AND NEED FOR ACTION

2.1 Purpose

A major goal of CWPPRA is to "restore and prevent the loss of coastal wetlands in Louisiana." The act also provides for "small-scale projects necessary to demonstrate the use of new techniques or materials for coastal wetlands restoration." The purpose of the Lake Salvador Shoreline Protection Demonstration Project is to evaluate the effectiveness of various constructed breakwaters and dredged material to provide shoreline protection in areas having highly organic, unconsolidated sediments.

2.2 Need for Action

The Lake Salvador Shoreline Protection Demonstration Project is one of four demonstration projects recommended by the Louisiana Coastal Wetlands Conservation and Restoration Task Force in 1993 and is the only such project designed to evaluate various shoreline protection structures and evaluate their cost effectiveness. The need to implement the Lake Salvador Shoreline Protection Demonstration Project is based on the potential to identify structures that can significantly reduce the loss of freshwater marsh by providing long-term shoreline protection of marsh ecosystems established on unconsolidated organic deposits. The potential success of the project could play an important role in contributing to the overall effort to reduce coastal land loss by improving the health and stability of fresh and intermediate marshes. In addition to the structures, the feasibility of shoreline reconstruction to retard lake expansion into adjacent open water areas will be assessed.


LAKE CATAOUATCHE
COUBA ISLAND
BAYOU COUBA
BAYOU COUBA OIL & GAS FIELD
SALVADOR WILDLIFE MANGEMENT AREA
BAIE DU CABANAGE
PARADIS
DES ALLEMANDS
PETIT LAC DES ALLEMANDS
PROJ
N
W
E
S
LAKE SALVADOR
BAYOU DES ALLEMANDS
INTRACOASTAL WATERWAY
DELTA FARMS
BAYOU LAFOURCHE

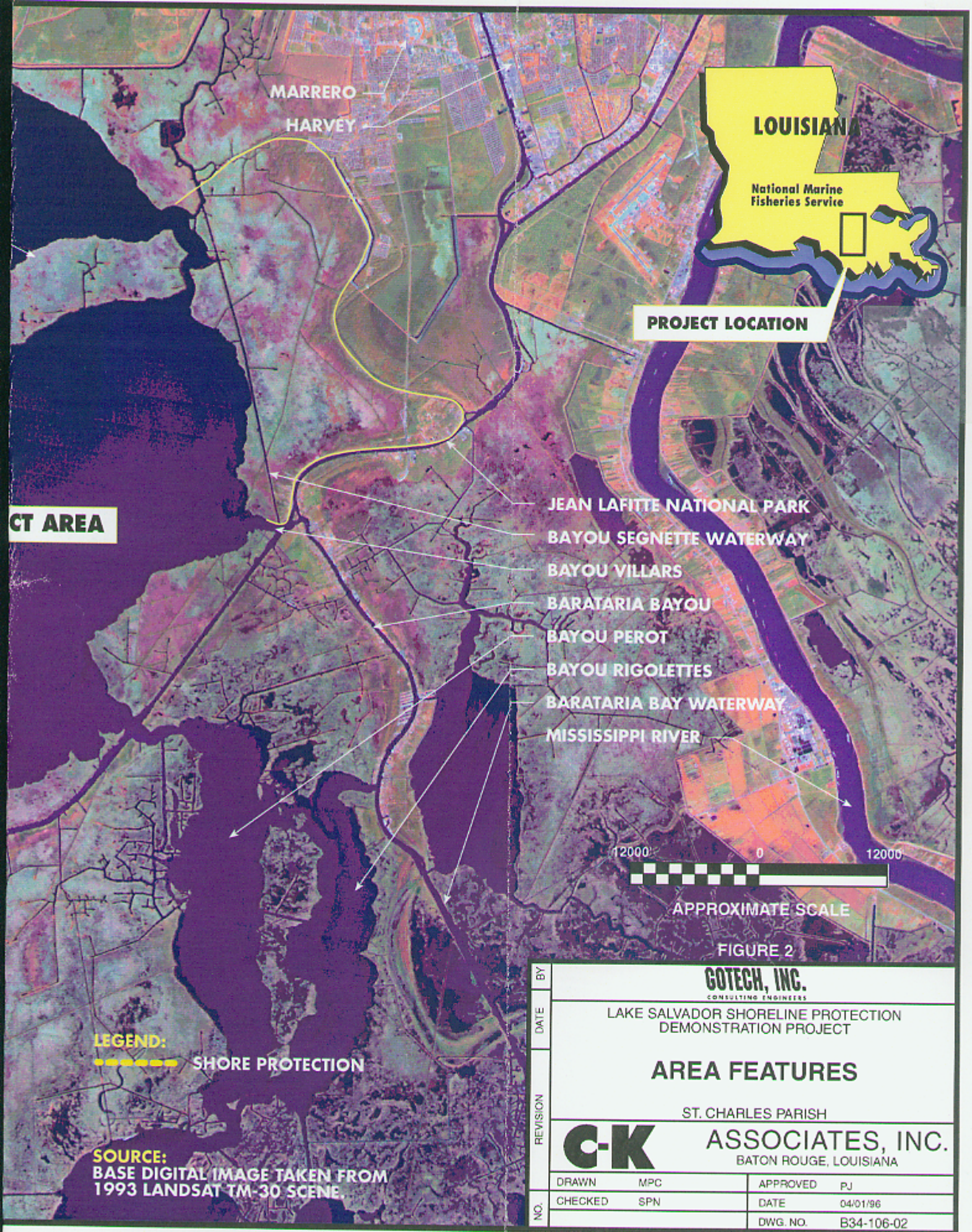

FIGURE 2

GOTECH, INC.
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LAKE SALVADOR SHORELINE PROTECTION
DEMONSTRATION PROJECT

AREA FEATURES

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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FIGURE 3

LEGEND:

LAND LOSS - (1938/1939 - 1982/1983)

LAND ACCRETION - (1938/1939 - 1982/1983)

NOTES:

BASE MAPS TAKEN FROM THE DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, GEOLOGICAL INVESTIGATION OF THE MISSISSIPPI RIVER DELTAIC PLAIN, LAND LOSS AND LAND ACCRETION, CUTOFF, HAHNVILLE AND NEW ORLEANS, LA., DATED 1987.

IMAGE: SALVADOR LAND LOSS

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GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORELINE PROTECTION
DEMONSTRATION PROJECT

LAND LOSS

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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		DWG. NO.	A34-106-16

2.2.1 Preliminary Performance and Cost Analysis

The use of shoreline protection structures in Louisiana coastal wetlands having an unconsolidated organic substrate is a developing technology. The Lake Salvador Shoreline Protection Demonstration Project provides an opportunity to evaluate the effectiveness and costs associated with four different structure types and the strategic placement of dredged material in halting shoreline erosion and/or promoting sediment deposition along the northwestern shore of Lake Salvador. The results of this demonstration project could be used to design and implement a full-scale shoreline restoration project in the same area or in other marshes having similar organic substrates.

2.2.2 Protection of Highly Productive Freshwater Marshes

The loss of freshwater marshes in the Louisiana Coastal Zone from 1956 to the present represents a significant natural resource loss. According to the Wetland Value Assessment (WVA) of the original Lake Salvador Shoreline Protection Demonstration Project, implementation would protect approximately 180 acres of freshwater marshes, benefit 130 acres of submerged aquatic vegetation and enhance 880 acres of coastal wetlands. Since the WVA for the revised location has not been conducted, an estimate of benefits at this site is unavailable. However, because the revised site is nearby, and similar in vegetative and soil composition, the benefits are assumed to be approximately the same as when estimated previously. The exact potential of this demonstration project to protect coastal marsh can not be determined at this time, although successful aspects of the project, if applied elsewhere could result in protecting large areas of freshwater marsh throughout the Louisiana Coastal Zone.

2.3 Authorization

The NMFS is the Federal sponsor for implementation of the Lake Salvador Shoreline Protection Demonstration Project. This project was included on the Third Priority Project List (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1992). The NMFS' responsibility includes conducting an environmental evaluation and other activities required for final decision-making in compliance with the National Environmental Policy Act (NEPA) of 1969. To meet NEPA compliance requirements, an EA must be conducted for each wetland project site that is modified or restored. The Lake Salvador Shoreline Protection Demonstration Project, identified as BA-15 in the CWPPRA Restoration Plan, is located in St. Charles Parish. It is classified as a demonstration project (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993).

3.0 ALTERNATIVES INCLUDING PROPOSED ACTION

The project site and scope were identified by the Louisiana Coastal Wetlands Conservation and Restoration Task Force (1993) and are reviewed in the Third Priority Project List. An LDNR-contracted Engineering Design Report and Engineering Summary for the Lake Salvador Shoreline Protection Demonstration Project was prepared by C-K Associates, Inc. (C-K Associates) in June 1995 (Contract No. DNR 25030-95-22).

Originally, the Lake Salvador Shoreline Protection Demonstration Project was designed to improve the health of 4,070 acres of interior marsh by restoring the historical shoreline along 4.2 miles of shoreline northwest of Bayou des Allemands utilizing two different designs of timber pylon breakwater structures. The proposed Lake Salvador Shoreline Protection Demonstration Project is an alternative to the original CWPPRA project BA-15 that was submitted to the Louisiana Coastal Wetlands Conservation and Restoration Task Force. The selection of the demonstration alternative was based on the need to incorporate additional structures that have design potential to accomplish the project goals. Therefore, the alternative analysis of this EA will be limited to the no-action alternative and the preferred alternative. The final location of the demonstration project was selected to 1) take advantage of dealing with only one land owner, the State of Louisiana, 2) avoid any liabilities or risks to private property if the project fails to reduce shoreline erosion, causes increased erosion, or if the structures break apart and damage adjacent properties, and 3) provide a fairly uniform, unbroken shoreline long enough for four structure types and a control area.

3.1 No-Action Alternative

The no-action alternative would deprive us of the opportunity to evaluate the cost effectiveness of various types of structures and placement of dredged material in protecting the shoreline of Lake Salvador. Failure to implement the Lake Salvador Shoreline Protection Demonstration Project would not satisfy the need to develop breakwater structures that provide long-term shoreline protection in freshwater marshes having unconsolidated organic sediments in the Louisiana Coastal Zone. The no-action alternative is contrary to the recommendations of the Louisiana Coastal Wetlands Restoration Plan and the intent of the Task Force. Also, no action would not be in concert with recommendations of other long-term plans for protecting or restoring Louisiana's coastal wetlands (Edwards *et al.*, 1995; Gagliano, 1994; van Heerden, 1994).

Due to the need to protect our coastal wetlands as evidenced by the public funding through the CWPPRA, the no-action alternative was not the preferred alternative.

3.2 Preliminary Alternative

The original demonstration project, as approved by the Task force in PPL 3, involved testing two types of shoreline protection features: 1) breaches in the shoreline would be plugged with a shell-armored berm; and 2) two styles, linear and v-shaped, of timer pylon breakwaters would be placed in shallow water approximately 300 to 400 feet offshore. Preliminary plans were to place these structures at the southwestern end of Lake Salvador between Baie du Chactas and Bayou des Allemands in an area of poor load-bearing soils.

The location for this alternative was not selected because of the lack of a natural, uniform shoreline (without piers, shoreline revetment, boat channels, etc.) required for an optimum study and control area. Debris from failure of the structures during a storm might damage private property. In addition, since some of the structures have not been tested previously, their effectiveness in erosion control is uncertain and should not be at the expense of an individual landowner.

Testing only two styles of structures on unconsolidated soils was considered inadequate for a demonstration project. Since shell reinforcement has been tried in other shoreline areas of Lake Salvador, this alternative was deleted. Therefore, the preliminary alterative was not the preferred alternative.

3.3 Preferred Alternative

There are four different breakwater structures, plus shoreline nourishment and marsh creation, to be constructed and evaluated for 3 to 5 years in the Lake Salvador Shoreline Protection Demonstration Project. The location of each type of shoreline restoration structure, control site, marsh creation area, and dredging site is shown in Figure 4. The structures to be constructed include a grated apex structure, a geotextile tube, an angled timber structure, and a vinyl sheet pile shown in Figures 5-8, respectively. All structures are designed to meet the requirements for marine construction (20-year life).

Figure 9 shows the areas of proposed dredging and deposition of the material to fill the shallow waters to marsh elevation. Figures 10 and 11 are cross sections showing the depth of dredging or height of dredged material placement to create marsh elevations. The fill areas will be evaluated for their effectiveness in preserving the shoreline. Each structure is designed to reduce wave energy and promote sediment deposition. Therefore, the structures will be evaluated for up to 5 years on their effectiveness on halting erosion and promoting sediment deposition along the shoreline.

Access to the breakwater sites in Lake Salvador will be limited to shallow draft watercraft capable of maneuvering in water depths as shallow as 2 feet. Dredging to access the project site will not be allowed. All structures will be marked with warning signs to indicate that an obstruction exists.

NOTE:
BASE AERIAL PHOTOGRAPHS OBTAINED FROM GULF COAST AERIAL MAPPING CO., INC., DATED 4/27/92, AT A SCALE OF 1"=1000' AND 2/27/92, AT A SCALE OF 1"=500'.

IMAGE: SATELLITE LOCATION LANDSAT

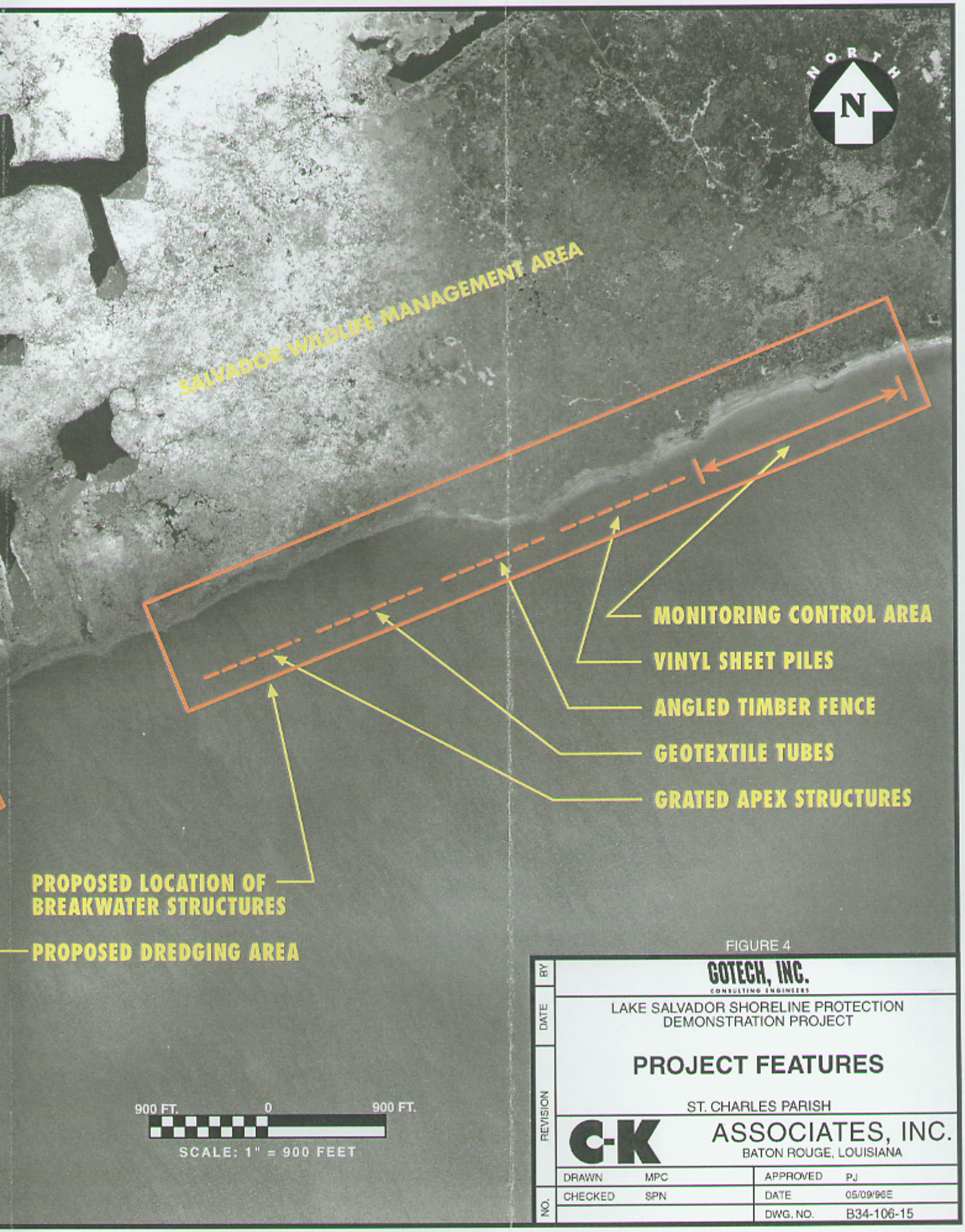
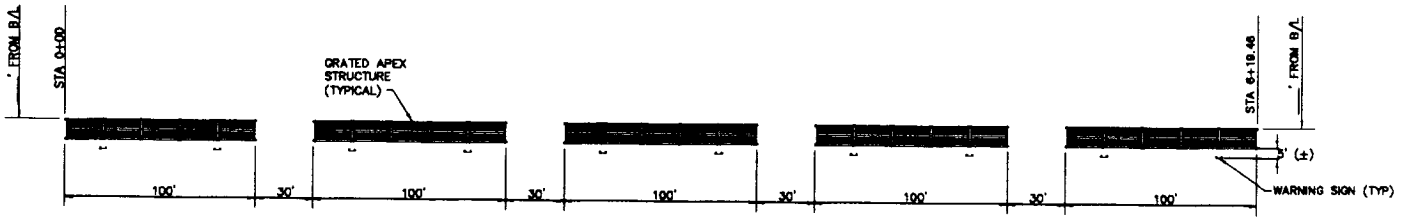


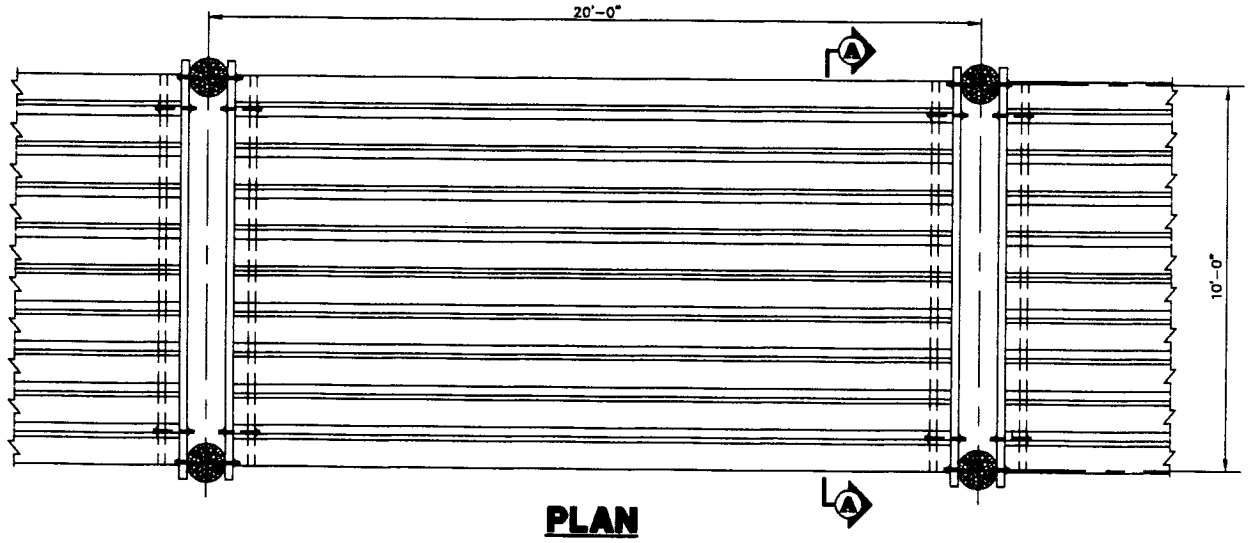
FIGURE 4

BY / DATE / REVISION / NO.	GOTECH, INC. CONSULTING ENGINEERS	
	LAKE SALVADOR SHORELINE PROTECTION DEMONSTRATION PROJECT	
	PROJECT FEATURES	
	ST. CHARLES PARISH	
	C-K ASSOCIATES, INC. BATON ROUGE, LOUISIANA	
	DRAWN MPC	APPROVED PJ
	CHECKED SPN	DATE 05/09/96E
		DWG. NO. B34-106-15



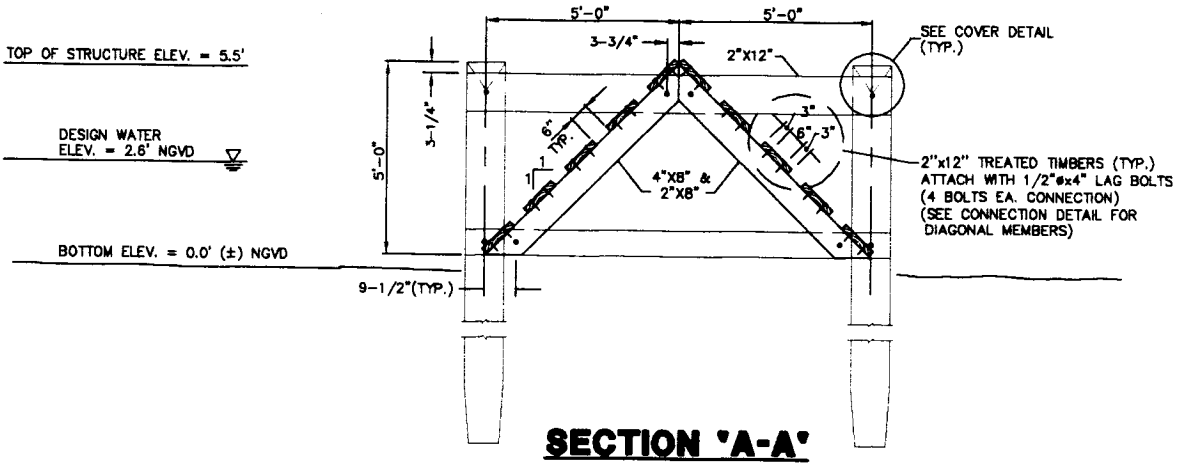
SHORELINE LAYOUT

SCALE: 1" = 40'



PLAN

SCALE: 1" = 5'



SECTION 'A-A'

SCALE: 1" = 5'

FIGURE 5

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION DEMONSTRATION PROJECT

GRATED APEX STRUCTURE

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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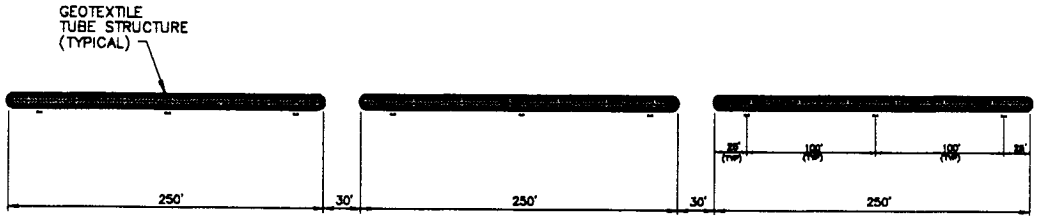
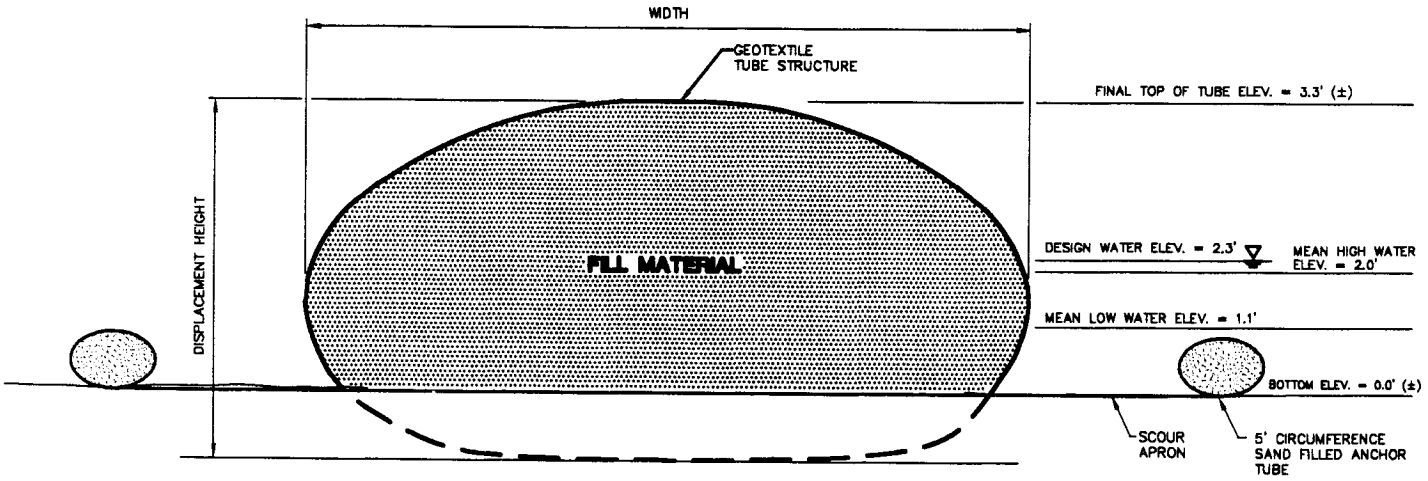
03/29/96B



SHORELINE LAYOUT

SCALE: 1" = 150'



CROSS SECTION

N.T.S

DISPLACEMENT
HEIGHT: 7.0 FT
WIDTH: 13.8 FT
AREA: 82.0 SQ. FT.
CIRCUMFERENCE: 35 FT.

FIGURE 6

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION
DEMONSTRATION PROJECT

GEOTEXTILE TUBE

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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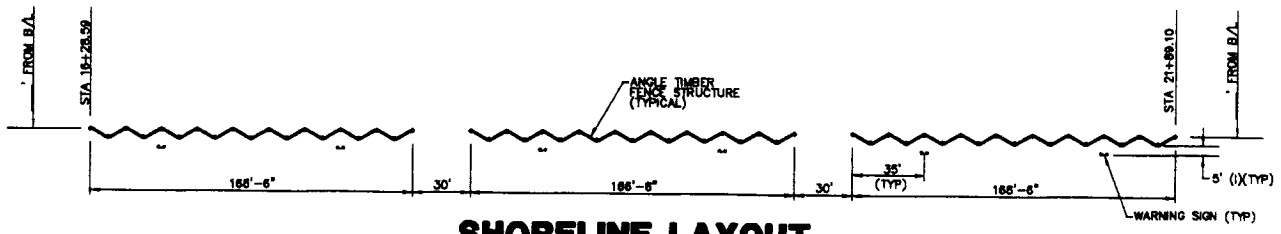
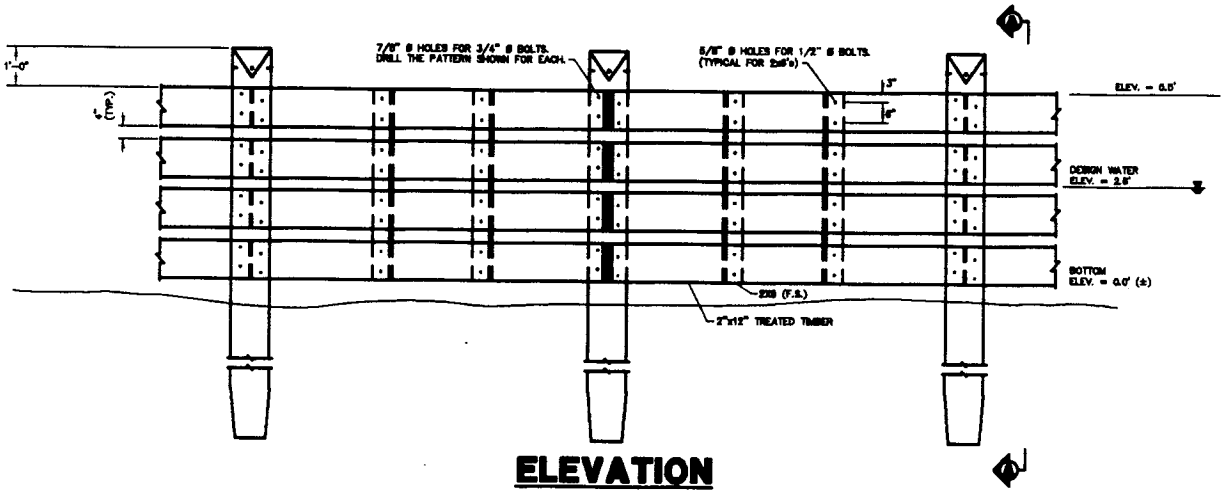
05/08/96C



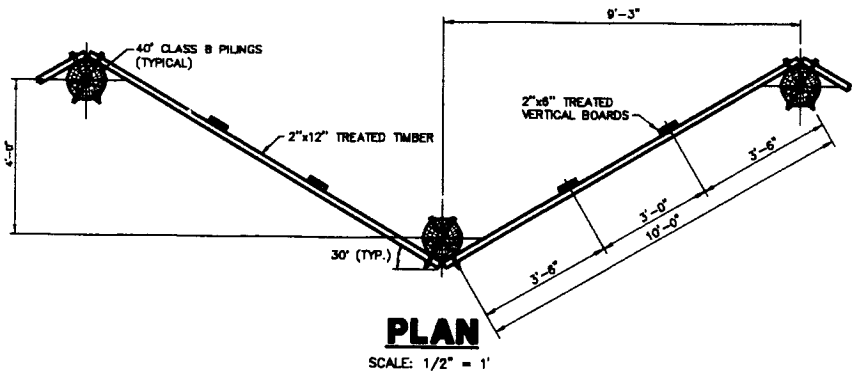
SHORELINE LAYOUT

SCALE: 1" = 100'



ELEVATION

SCALE: 1" = 5'



PLAN

SCALE: 1/2" = 1'

FIGURE 7

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION
DEMONSTRATION PROJECT

ANGLED TIMBER FENCE

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

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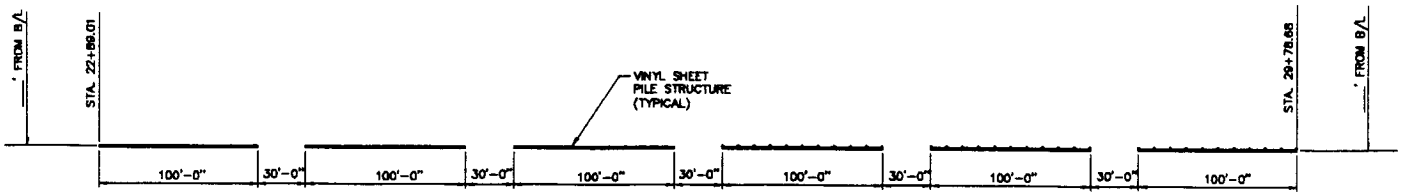
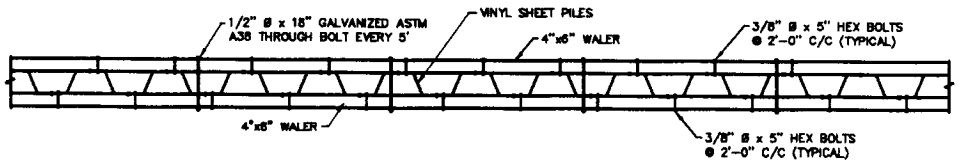


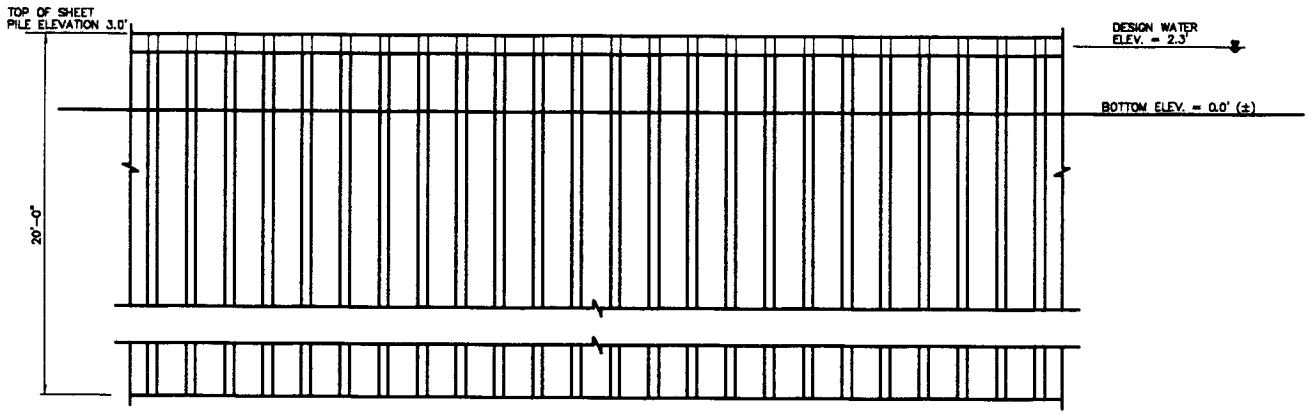
SHORELINE LAYOUT

SCALE : 1" = 120'



PLAN

SCALE : 1" = 5'



ELEVATION

SCALE : 1/2" = 1'

FIGURE 8

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION DEMONSTRATION PROJECT

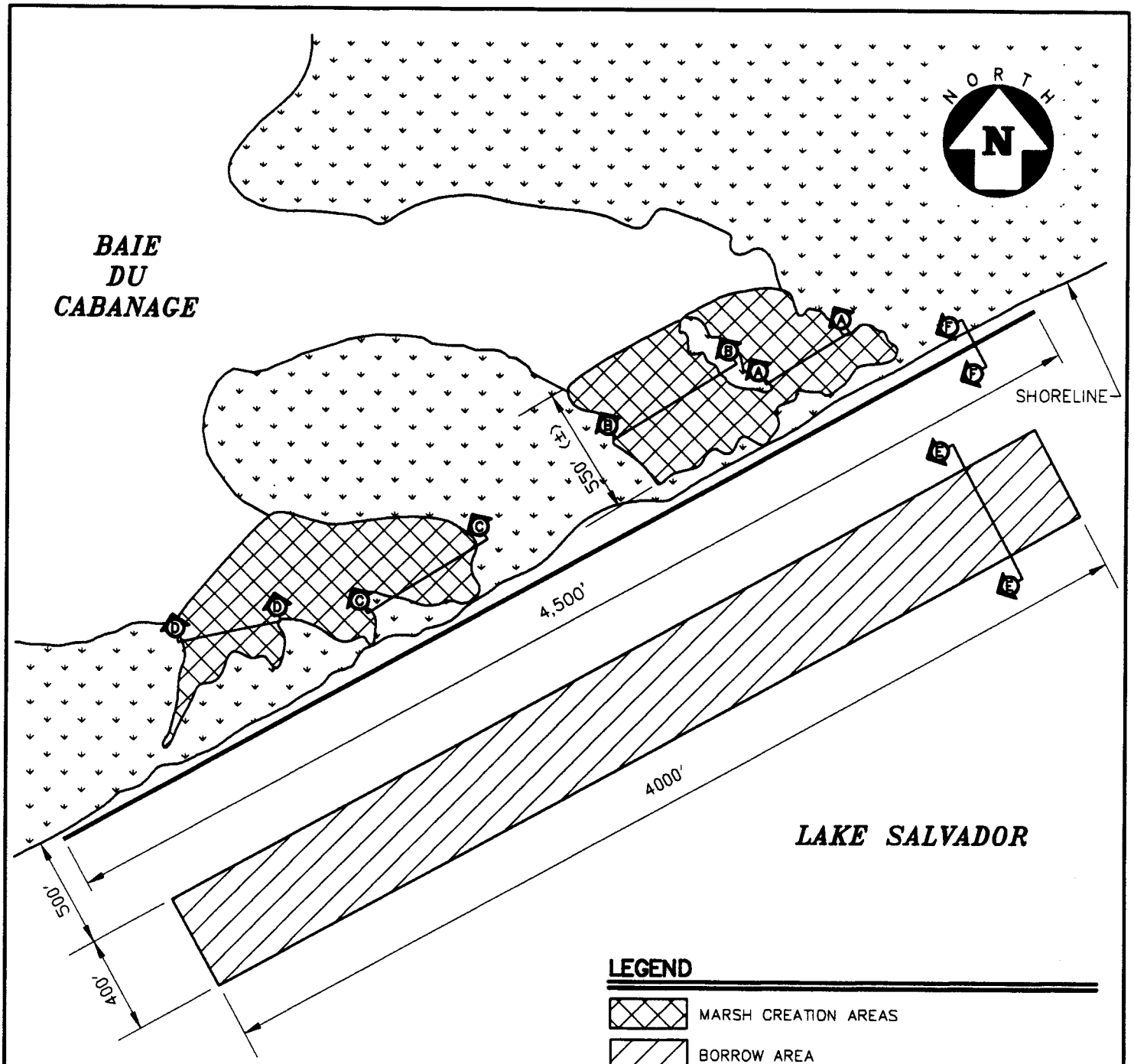
VINYL SHEET PILE STRUCTURE

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

DRAWN	TPL/ACAD	APPROVED	PJ
CHECKED	SPN	DATE	MARCH 29, 1996
SHEET		DWG. NO.	A34-106-13

03/29/96B



LEGEND

- MARSH CREATION AREAS
- BORROW AREA
- MARSH
- SACRIFICIAL BERM

600 0 600

SCALE: 1" = 600'

FIGURE 9

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION
DEMONSTRATION PROJECT

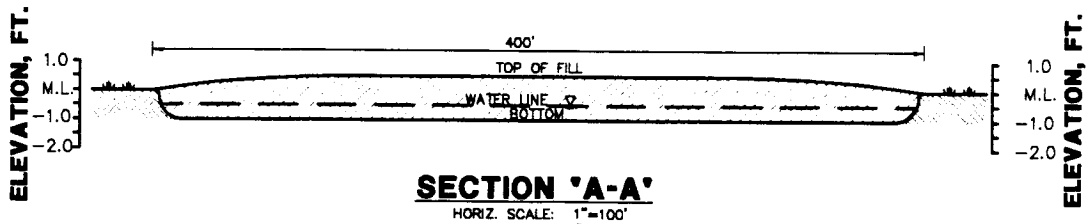
DREDGE AND FILL PLAN VIEW

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

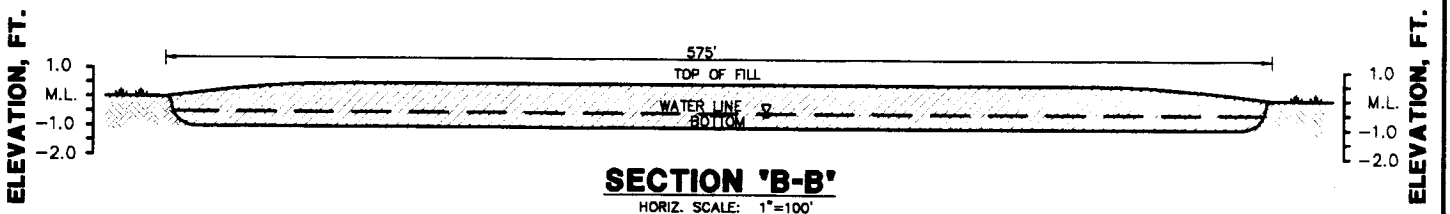
DRAWN	TPL/ACAD	APPROVED	PJ
CHECKED	SPN	DATE	APRIL 29, 1996
SHEET		DWG. NO.	A34-106-17

05/08/96D



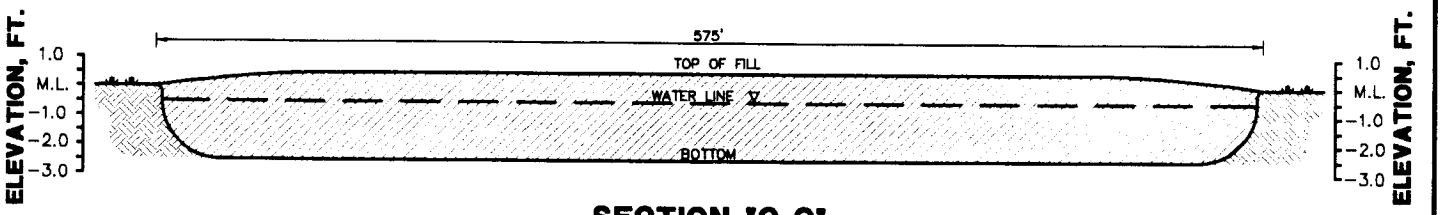
SECTION 'A-A'

HORIZ. SCALE: 1"=100'
VERT. SCALE: 3"=20'



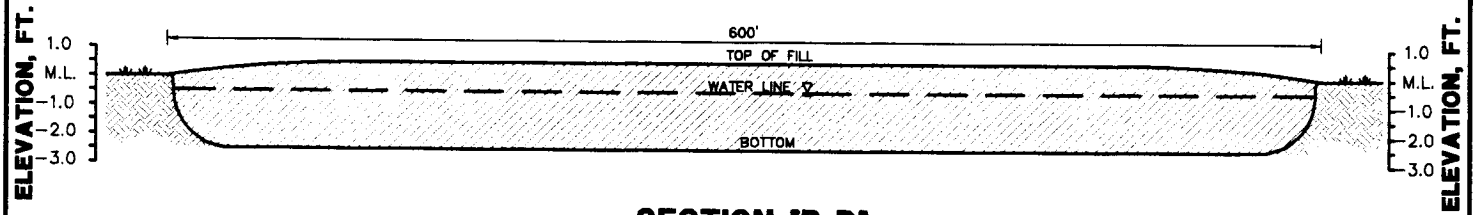
SECTION 'B-B'

HORIZ. SCALE: 1"=100'
VERT. SCALE: 3"=20'



SECTION 'C-C'

HORIZ. SCALE: 1"=100'
VERT. SCALE: 3"=20'



SECTION 'D-D'

HORIZ. SCALE: 1"=100'
VERT. SCALE: 3"=20'

FIGURE 10

LEGEND

- DREDGED MATERIAL
- WETLANDS
- WATER LEVEL

NOTE

FOR LOCATION SEE DWG. A34-106-17

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION
DEMONSTRATION PROJECT

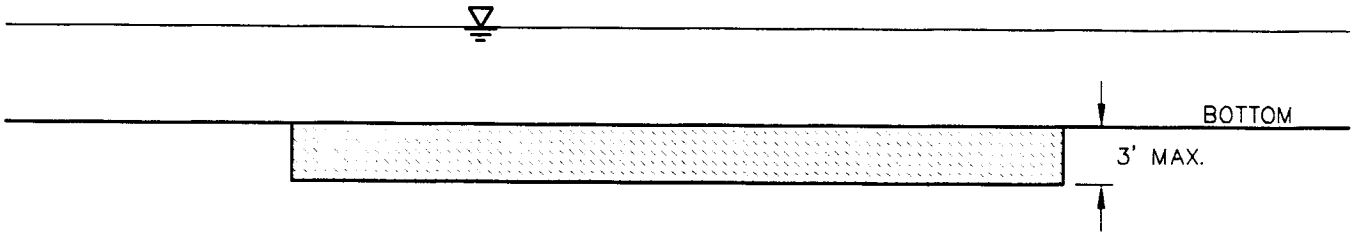
CROSS SECTIONS A'-A' TO D'-D'

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

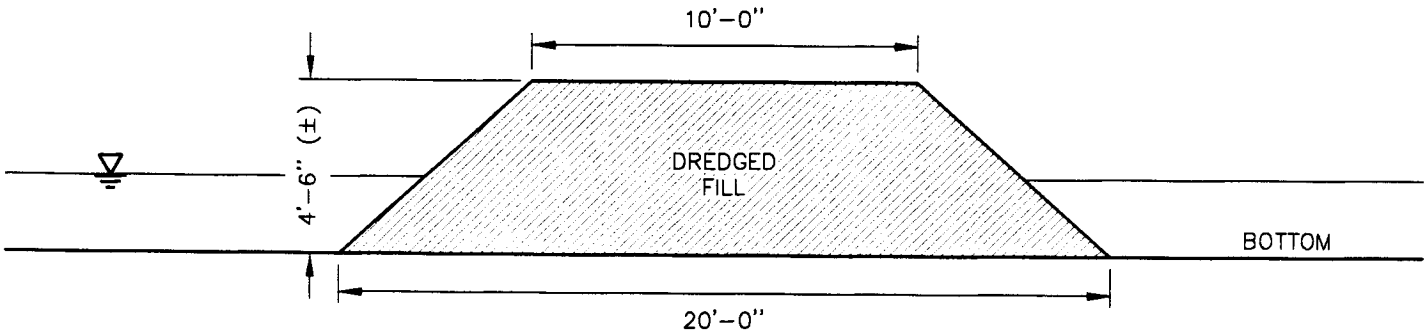
DRAWN	TPL/ACAD	APPROVED	PJ
CHECKED	SPN	DATE	APRIL 29, 1996
SHEET		DWG. NO.	A34-106-19

05/08/96B



SECTION 'E-E'

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 10'



SECTION 'F-F'

1"= 5'

LEGEND

- DREDGED FILL
- BORROW AREA
- WATER LEVEL

NOTE

FOR LOCATION SEE DWG. A34-106-17

FIGURE 11

GOTECH, INC.
CONSULTING ENGINEERS

LAKE SALVADOR SHORLINE PROTECTION
DEMONSTRATION PROJECT

CROSS SECTIONS E'-E' AND F'-F'

ST. CHARLES PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

DRAWN	TPL/ACAD	APPROVED	PJ
CHECKED	SPN	DATE	APRIL 29, 1996
SHEET		DWG. NO.	A34-106-18

05/08/96C

3.3.1 Grated Apex Structure

The grated apex structure (Figure 5) will be a treated timber breakwater structure with a triangular cross-sectional shape. Treated timber piles 10 feet apart will form the "walls" with horizontal boards forming a grated "roof" along the top sides. There will be five grated apex structures, each 100 feet long, supported by two 40-foot long treated timber piles every 20 feet. The structures will be 30 feet apart.

3.3.2 Geotextile Tube Structure

The geotextile tube structure (Figure 6) will consist of three 250-foot long geotextile tubes, 30 feet in circumference, filled with imported sand or other stabilized material. The geotextile material shall be a water pervious fabric woven with a synthetic polymer resistant to deterioration due to ultraviolet exposure. A scour protection geotextile apron will be installed under each tube with 18-inch diameter anchor tubes sewn along the entire outer edge of the apron. Inlet/outlet sleeves will be sewn on each geotextile tube for filling. Tubes will be filled in-place by pumping a slurry of imported commercial sand mixed with lake water into the tubes. The geotextile tubes will be filled to an elevation of 3.0 feet NGVD.

3.3.3 Angled Timber Fence Structure

The angled timber fence structure (Figure 7) will be a treated timber breakwater constructed in a zigzag (connected V's) rather than a linear shape. There will be three sections of fence, each approximately 160 feet long with each leg of the V 10 feet long. Horizontal boards between the piles from the fence. Each section will be spaced 30 feet apart.

3.3.4 Vinyl Sheet Pile Structure

The vinyl sheet pile structure (Figure 8) will be a breakwater structure utilizing vinyl sheet piling rather than conventional steel or timber sheet piling. There will be six 100-foot long sections of sheet piles spaced 30 feet apart. Three of the sections of sheet piling will be reinforced with 40-foot long treated timber piles spaced 10 feet on center. The remaining three will not be reinforced. Vinyl sheet piling used for construction of these structure shall be made of high performance polyvinyl chloride (PVC).

3.3.5 Marsh Creation and Shoreline Nourishment

Hydraulic dredging (Figures 9 and 11) from an area 400 by 4,000 feet, located at least 500 feet from the shore will be performed to obtain material to fill areas of Baie du Cabanage. The dredging will be confined to the upper 3 feet of lake bottom. Material will be transported and deposited, unconfined, in the fill areas to an elevation approximately 6

inches above the existing marsh elevation. This should subside and compact to elevations which would support marsh vegetation. No material will be placed on marsh vegetation. After construction of the breakwaters and filling of the marsh creation area, if sufficient funding and material are available, a berm will be constructed with the center approximately 35 feet from shore. This sacrificial berm would deteriorate from wave activity, however, the displaced sediments should nourish the existing shoreline.

4.0 AFFECTED ENVIRONMENT

The Lake Salvador Shoreline Protection Demonstration Project is located within the Barataria Basin in St. Charles Parish along the central portion of the northwestern Lake Salvador shoreline. This shoreline protection demonstration project would begin at the mouth of Baie du Cabanage and extend northeastward for 2.4 miles in the shallow waters of the lake. Dredging for material for shoreline restoration and marsh creation would occur in Lake Salvador between 400 and 1,000 feet offshore.

The Barataria Basin, bounded by Bayou Lafourche on the west and the Mississippi River on the east, is a large estuarine system. Due to flood control and hurricane protection levees along the Mississippi River and Bayou Lafourche, rainwater is the only source of freshwater to the basin (Hartman *et al.*, 1988). Barataria Basin varies in habitat from freshwater wetland forests in the upper basin to salt marshes along the Gulf of Mexico (Conner *et al.*, 1986). Lake Salvador, located in the central portion of the Barataria Basin, receives freshwater runoff from the upper areas, but also is influenced by the northward movement of brackish water from the Gulf of Mexico via Bayou Perot and the Barataria Bay Waterway.

Jean Lafitte National Historical Park, managed by the U.S. Department of Interior National Park Service, is located along the northeastern shoreline of Lake Salvador. The SWMA is located in the project vicinity and is managed by the Louisiana Department of Wildlife and Fisheries. The remaining perimeter of the lake is privately owned. Breakwater structures will be constructed in the shallow waters of Lake Salvador and will protect freshwater marsh containing small marsh ponds. Dredged material will be placed to reestablish the shoreline in two areas and create marsh elevations.

4.1 Physical Environment

The long-term processes of Mississippi River delta building and deterioration has influenced the project area's physical environment. In the early 1900s, land losses overtook land accretion and the Louisiana Coastal Zone began losing land at a high rate. Causes for this loss range from various natural phenomena (subsidence, storm-induced wave erosion, and subsurface geologic control) to man's activities (dredging channels for navigation and oil and gas access, channelization of streams, and levee construction). The average land loss for

Cutoff, Hahnville and New Orleans Quadrangles, which include the western shoreline of Lake Salvador, was 0.22, 0.11 and 0.17 square miles per year respectively for 1938-1958; 0.53, 0.57 and 0.26 for 1958-1974; and 0.39, 0.43 and 0.14 for 1974-1983 (Britsch and Kemp, 1990). Barras and others (1994) confirmed the land losses in this area.

Shoreline erosion rates reported in the Louisiana Coastal Wetlands Conservation and Restoration Task Force (1993) for the project area are approximately 13 feet per year. Several areas of the Lake Salvador shoreline have breached (May and Britsch, 1987) which resulted in large areas of interior marsh converting to open water (Figure 3). Within the 4,070 acres of shallow open water and fresh marsh of the initial project area, 1,000 acres of marsh have converted to open water since 1956. This equates to approximately 25 percent of the land in the initial project area. The shoreline protection structures of the demonstration project will protect approximately 3,200 feet of shoreline. Berm restoration and marsh creation will reestablish approximately 2,700 feet of shoreline and create 27 acres of marsh.

4.1.1 Geology, Soils and Topography

The Barataria Basin was formed during the last 7,000 years as three of the five major delta-building lobes of the Mississippi River overlapped this area. During the last century construction of flood control and hurricane protection levees along Bayou Lafourche and the Mississippi River has exacerbated wetland loss in the basin by retaining sediment-laden waters within their channels. Therefore, the land is sinking because sediment aggradation no longer matches subsidence (Sasser, 1994). Each of the three major causes of land loss (subsidence, erosion due to wave energy and storms, and erosion associated with the decay of abandoned river deltas) currently is taking place in the Barataria Basin (Mumphrey *et al.*, 1978).

Lake Salvador is located in the central portion of the Barataria Basin in the sump between the two ridges formed by the banks of the Mississippi River and Bayou Lafourche. The lake is about 44,800 acres in size (Louisiana Department of Environmental Quality, 1994) with a mean depth of 2.5 meters. (Madden *et al.*, 1988). Lake Cataouatche, Baie du Cabanage, Baie du Chactas, and Bayou des Allemands are the major freshwater contributors to Lake Salvador on the north and western sides.

Bayou Perot, in the southeastern portion of the lake, and the Barataria Bay Waterway via Bayou Villars and Bayou Segnette are sources of brackish water.

The soils of the project area marshes are classified as Kenner Muck, which is a level, very poorly drained organic soil with thin layers of mineral material within the organic material (U.S. Department of Agriculture, 1987). The thickness of the organic material ranges from 51

to over 100 inches. These soils occur in freshwater marshes and are ponded and flooded most of the time. Kenner Muck is suitable only for wildlife habitat; it is not suited for cropland, pasture or urban development.

Lake bottom soils are not classified, however, surface probes conducted during a field investigation on August 21, 1995, indicated soft, unconsolidated sediments near the shoreline of the project area. Geotechnical investigations off Couba Island (three probes) and between Bayou des Allemands and Bois Chactas Shell Bank (three probes) (northeast and southwest, respectively, of the project area) were performed several years ago (Eustis Engineering Company, Inc., 1993a and b). The upper 7 to 10 feet consists of soft to very soft black humus and extremely soft to soft dark gray or black clay and organic clay. Underlying this, with one exception, is extremely soft to very soft gray clay with humus layers, decayed roots and organic matter to depths of 12 to 16.5 feet. Beneath this are extremely soft to soft gray clay with silt lenses and pockets, clayey silt lenses and layers, and shell fragments to the boring depths of 40 to 50 feet. Sandier sediments have been reported (Cropog, 1996) further offshore in the area of the historic lake bottom. According to engineering design, structures will be placed in water from 2.3 to 2.6 feet deep. The proposed dredging for fill would occur at depths of 3 to 5 feet.

The freshwater marshes of the Barataria Basin can be divided into emergent and floating types. Emergent marsh vegetation is firmly rooted in sediments, whereas floating or flotant marsh vegetation grows on a buoyant peat substrate held together by a matrix of living roots. In the project area, the entire mat would float on either (a) clear water, (b) organic ooze, or (c) semifluid organic ooze (Sasser *et al.*, 1994). Conditions necessary for a floating marsh are a low bulk density substrate free of mineral sediments and plants with extensive fibrous root systems. The organic matter content at Lake Salvador was 83 percent of dry mass (Swarzenski, 1991).

Figure 3 indicates that the shoreline in the project area is slightly scalloped and has retreated from 300 to 1,400 feet since 1938 (May and Britsch, 1987). Marsh elevation is low, ranging from approximately 1 foot to 1.5 feet National Geodetic Vertical Datum (NGVD). Most of the shoreline berm has eroded so that there is little difference in elevation between the marsh/water interface and the interior marsh. Clusters of live oak trees (Quercus virginiana) occur in scattered areas of interior marsh with slightly higher elevations and shallow water ponds have formed in depressions.

4.1.2 Climate and Weather

The Barataria Basin has a humid, subtropical climate. It is characterized by long, hot and humid summers, and short, mild and humid winters. Average daily maximum temperatures from May to October range between 84° to 91° Fahrenheit (F). Average daily maximum and average daily minimum winter temperatures between November and April ranges are 61° to 78°F and 41° to 58°F, respectively (U.S. Department of Agriculture, 1987). Cold spells usually last three days due to the dominance of warm gulf air moving inland from the coast year round. A winter temperature of 32°F or less is expected 15 days per year and there is only a 20 percent chance of temperatures falling below 20°F during the winter.

Copious rains fall throughout the year as a result of the dominant coastal air masses moving inland and mixing with continental air. Average annual rainfall is 60 inches per year and heavy thunderstorms occur frequently. Less rainfall usually occurs in the fall months and snow only occurs at intervals of decades. The growing season for the project area varies between 280 and 290 days (Schumacher *et al.*, 1988).

4.1.3 Air Quality

Air quality over Lake Salvador is good. Air masses are highly unstable in this area due to coastal activity. There are no industrial or automotive air emissions in the vicinity. Oil fields near Bayou des Allemands, Baie du Chactas, Baie du Cabanage, and Bayou Couba would be the closest source of emissions.

4.1.4 Surface Water Resources

Water Quality

The water quality of surface waters of Lake Salvador is good. Data obtained from the Louisiana Department of Environmental Quality (1994) rate surface waters of Lake Salvador as fully supporting, but threatened for primary contact recreation, secondary contact recreation, and propagation of fish and wildlife. The sources of contamination are minor industrial point sources, petroleum activities, spills, contaminated sediments, recreational activities and upstream sources (Louisiana Department of Environmental Quality, 1994).

Lake Salvador is marginally influenced by tides. The upper reach of tidal influence is listed as Bayou des Allemands at des Allemands. The Barataria Bay Waterway provides a direct connection between Lake Cataouatche and the lower Barataria Basin, effectively isolating Lake Salvador hydrologically from the mid-basin system. Because of this isolation, Lake Salvador does not serve as a runoff nutrient processor;

therefore, nutrient and chlorophyll a levels are much lower than in other lakes (Conner and Day 1987).

Salinity

The reported salinity range (Madden *et al.*, 1988) of Lake Salvador is 0 to 6 parts per thousand (ppt). Vegetation maps (Chabreck and Linscombe, 1988), and numerous publications (Conner and Day, 1987; Hatton *et al.*, 1983; Conner *et al.*, 1986; Swarzenski *et al.*, 1991; Sasser, 1994) indicate that the project area is fresh; however, the southeastern and eastern perimeter of Lake Salvador is classified as intermediate marsh.

Salinities of Lake Salvador were more related to local precipitation than Mississippi River discharges in contrast to lower regions of the basin. When saltwater intrusion increased in the lower estuary, salinities of 1 to 2 ppt were detectable in central Lake Salvador (Orlando *et al.*, 1993). After construction and operation of the Davis Pond Freshwater Diversion, the entire area surrounding Lake Salvador will freshen and the project area will be less tidally influenced.

4.2 Biological Environment

4.2.1 Vegetative Communities

Chabreck and Linscombe (1988) classify the land area adjacent to the project site as fresh marsh. Vegetation typical of freshwater emergent marsh includes bulltongue (Sagittaria lancifolia), wapato (Sagittaria latifolia), roseau cane (Phragmites communis) and cattail (Typha latifolia) (Conner *et al.*, 1986).

Although floating marsh vegetation generally is dominated by maidencane (Panicum hemitomon), the seasonally floating marsh which occurs near Lake Salvador is composed of bulltongue (Sasser *et al.*, 1994). Marsh fern (Thelypteris palustris), royal fern (Osmunda regalis), deerpea (Vigna luteola), spikerush (Eleocharis spp.), and smartweed (Polygonum sagittatum) are often present in fresh marshes.

During a field investigation of the initial project area in 1993, the percent of vegetative species recorded was bulltongue, 25 percent; smartweed, 40 percent; cattail, 10 percent; elephants ear (Colocasia antiquorum), 5 percent; bullwhip (Scirpus californicus), 5 percent; and traces of 11 other species. At the time of the 1995 field investigation to the revised location, marsh vegetation was predominately bulltongue. Within the SWMA, clusters of live oak trees occur at the site of Indian shell middens (Neuman, 1977).

4.2.2 Fish and Wildlife Resources

The freshwater habitat of the project area supports bass (Micropterus salmoides), bream, crappie (Pomoxis sp.), catfish (Ictalurus sp.), drum (Aplodinotus grunniens) and garfish (Lipisosteus sp.). Thompson and Forman (1987) reported 31 species of freshwater fishes within the freshwater habitat of Barataria Basin. Gulf Menhaden (Brevoortia patronus) constitute an important commercial fishery in coastal waters. This species, which is estuarine dependent, has been reported in Bayou des Allemands and as far north as Lac des Allemands (Turner *et al.*, 1974). Access by fishery organisms to these freshwater areas is via Lake Salvador. Juveniles of other estuarine dependent species, such as the blue crab (Callinectes sapidus) and shrimp (Penaeus sp.), also would use this area seasonally (RPI International, Inc., 1989).

Game species in SWMA are waterfowl, deer, rabbit, squirrel, rail, gallinule, and snipe. Furbearing animals present are mink, nutria, muskrat, raccoon, opossum, and otter. There is a large population of alligator (Louisiana Department of Wildlife and Fisheries, 1993). Within Barataria Basin marsh habitats, more than 200 species of birds, 30 species of mammals and 70 species of reptiles and amphibians have been reported (Hartman *et al.*, 1988).

In 1990, a census of wading birds and seabird nesting colonies was conducted in Louisiana. Twenty-seven species of colonial nesting waterbirds were studied (Martin and Lester, 1990). The closest sites to the project area were Gheens and Lake Cataouatche West. No nests were observed at Gheens in 1990 although 1,000 to 5,000 birds used the area the previous year. At the Lake Cataouatche West station, there were approximately 750 nesting adults in 1990. The number of birds observed were 450 cattle egrets (Bubulcus ibis), 150 white ibis (Eudocimus albus), 75 little blue herons (Egretta caerulea), and 75 snowy egrets (Egretta thula) (Martin and Lester, 1990).

4.2.3 Threatened and Endangered Species

Threatened and endangered birds listed for the State of Louisiana include the bald eagle (Haliaeetus leucocephalus), Eskimo curlew (Numenius borealis), Bachman's warbler (Vermivora bachmanii), ivory-billed woodpecker, (Campephilus principalis) and the red-cockaded woodpecker (Picoides borealis) (U.S. Fish and Wildlife Service, 1992). The American alligator (Alligator mississippiensis), Louisiana black bear (Ursus americanus luteolus, and the Florida panther (Felis concolor coryi) also are listed as threatened or endangered and occur statewide. Only the bald eagle and the alligator would be expected in the fresh marshes of the project area. There were five bald eagle nests reported in the Barataria Basin in 1991 (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993).

4.3 Cultural Environment

4.3.1 Historical or Archaeological Resources

The Louisiana Department of Culture, Recreation and Tourism has indicated that there was one archaeological site within the project area. According to the Site Record Form, a 27 foot long wooden dugout canoe dating to 1540-1650 was excavated and removed within the project area. However, the Department of Culture, Recreation, and Tourism, Office of Cultural Development, Division of Archaeology has indicated by letter that the demonstration projects will have no effect on this site. A copy of this letter is contained in Appendix B. Although the scattered clumps of live oak trees within the SWMA are located on the site of Indian shell middens (Neuman, 1977), it is not anticipated that these middens would be eligible for the National Register of Historic Places. A copy of the Site Record and location map showing the location of the canoe and Indian shell middens are contained in Appendix B.

4.3.2 Economics (Employment and Income)

Catfish and bullhead harvested from Lac des Allemands and Lake Salvador averaged 1.3 million pounds annually from 1963 through 1976 and ranged from 2.0 million pounds in 1963 to under 1 million pounds in 1970 (U.S. Army Corps of Engineers, 1984). Due to changes in collection and data storage of fishery statistics, more recent figures for Lake Salvador are unavailable.

Fishery landings (all fisheries including oysters, shrimp, etc.) for Lafitte and Barataria, towns located southeast of Lake Salvador, ranked 47th among United States ports for value of commercial fishery landings in 1993. The dockside value of landings for 1991 through 1993 was $11.8, $11.9 and $11.0 million, respectively (U.S. Department of Commerce, 1994). Although little, if any, of these resources were harvested in Lake Salvador, the freshwater habitat of the lake and surrounding marshes could have been used by juvenile stages of commercially important species.

4.3.3 Land Use

Aerial infrared photographs of the project area reveal that the shoreline and the landward areas around Lake Salvador are sparsely inhabited. There are clusters of camps (Figure 2) located along the eastern shore of Bayou des Allemands near its junction with Lake Salvador, on spoil deposits along an oil and gas access canal, and on a probable abandoned bayou ridge, Tabatiere Perdue. The interior marshland near the project area is part of the SWMA (Figure 2).

4.3.4 Recreation

Freshwater fishing and boating activities take place on Lake Salvador and within the SWMA. Fishermen often harvest bass, bream, crappie, catfish, drum and garfish. Game species hunted in the SWMA are waterfowl, deer, rabbit, squirrel, rail, gallinule, and snipe (Louisiana Department of Wildlife and Fisheries, 1993). Commercial fishing is prohibited in the SWMA (Louisiana Department of Wildlife and Fisheries, 1993).

4.3.5 Noise

Lake Salvador and the SWMA are state-owned with no industry other than the oil and gas fields at Bayou des Allemands, Baie des Chactas, Baie du Cabanage and Bayou Couba. Ambient noise in the area results from oil and gas activities, boats, hunters, or wildlife.

4.3.6 Infrastructure

As shown on Figure 2, natural lakes and bayous and dredged waterways (oil and gas access canals) constitute the surface transportation network within the project area. There are two pipelines which cross the southern third of Lake Salvador. The southernmost one is a 16-inch diameter gas line, while the other, a 10-inch diameter Texaco line, breaches the shoreline somewhat south of the project area (Waite, 1992).

5.0 ENVIRONMENTAL CONSEQUENCES

In general, the adverse environmental consequences of the no-action alternative exceed those of the preferred alternative. Dredging and construction of the proposed activities would have short-term localized impacts which would be offset by the long-term environmental benefits. A thorough assessment of the environmental consequences of the preferred alternative is provided below.

5.1 Physical Environment

5.1.1 Geology, Soils and Topography

The structures, as long as they remain in place, are intended to demonstrate potential techniques to reduce or prevent tidal and wave-induced erosion of the shoreline in the protected areas. Berm restoration and marsh creation would prolong the shoreline and reduce wave-induced erosion.

Sediments within Lake Salvador would be redistributed during storms depending on the direction and force of the winds and currents. It is anticipated that the structures would facilitate sedimentation along the shoreline by providing small areas of relatively calm water. The lake

bottom disturbed by dredging should gradually smooth out due to sloughing of the sides and sediment deposition.

5.1.2 Climate and Weather

Shoreline protection structures are designed to maintain their structural integrity for 20 years under standard weather conditions and will be monitored for 3 to 5 years. Since structures are not designed to withstand hurricane conditions, they could be damaged by such events. Loose construction material could adversely impact adjacent wetlands and the absence of structures would leave the shoreline vulnerable to wave erosion again.

Inclement weather could temporarily delay the implementation of the proposed activities.

5.1.3 Air Quality

Minor temporary adverse impacts would result from the proposed activities. Exhaust emissions from construction or dredging equipment with airborne pollutants should be quickly dissipated by prevailing winds and be limited to the construction phase of the project.

5.1.4 Surface Water Resources

Short-term adverse impacts to surface water resources would be limited to the designated dredging, construction and access sites (dredged channels required for equipment and supplies) in Lake Salvador. Short-term adverse impacts to surface water quality would include increased turbidity in waters near the dredging and construction sites. These impacts would be limited to the construction phase of the project. Because Lake Salvador is rather turbid, impacts would be minor and temporary.

5.2 Biological Environment

5.2.1 Vegetative Communities

The proposed activity should result in positive impacts on vegetative communities within the project area. Implementation of the Lake Salvador Shoreline Protection Demonstration Project is intended to demonstrate measures to maintain the shoreline landward of the structures and reduce wave-induced scour and land loss. Structures which prove to be successful would protect vegetation along the shoreline and in the marsh from the effects of erosion.

5.2.2 Fish and Wildlife Resources

Short-term adverse impacts to fish would occur during the construction phase of the project. These impacts include impingement of organisms during dredging, smothering of non-mobile benthic organisms in dredged material deposition sites at the marsh creation area and increased turbidity in waters near the construction sites. Mobile fishery species are expected to move out of the area directly impacted by construction. Birds would avoid the area.

Berm restoration and marsh creation plus the protection of shoreline vegetation behind the structures would allow the continued contribution of organic detritus and nutrients to the aquatic food web of Lake Salvador. The hard surfaces of the structures would provide attachment areas for sessile organisms.

5.2.3 Threatened and Endangered Species

Although the project area is within the known range of bald eagles, no adverse impacts are anticipated since there are no nesting sites within the project area.

It is likely that implementation of the project would slow or reverse land loss, thus preserving an area suitable for foraging habitat for bald eagles.

5.3 Cultural Environment

5.3.1 Historical or Archaeological Resources

There would be no adverse impacts to historical or archaeological resources since no sites, other than the excavated dugout canoe, are expected in the dredging or construction areas.

5.3.2 Economics

No impacts to economic resources would result from the proposed activity.

5.3.3 Land Use

No adverse impacts to current land use would result from the proposed activity. Marsh creation is expected to extend the life of the marsh in the two fill areas and the sacrificial berm would nourish the shoreline until leveled by waves.

5.3.4 Recreation

Some temporary adverse short-term impacts to recreation would occur as a result of dredging activity. These include increased turbidity of surface water and increased noise within the project area during the time of construction.

It is likely that benefits from the proposed activities would include preservation and creation of marsh for wildlife and fisheries habitat. The solid foundation of the structures would provide a base for attached animals and plants, therefore concentrating a food supply and providing shelter for some aquatic organisms.

5.3.5 Noise

Short-term adverse impacts, limited to construction, include increased noise associated with dredging and installation of the structures.

5.3.6 Infrastructure

There will be no adverse impacts to infrastructure. There are no major pipelines in the area. Small flow lines, if any, in the project area would be avoided.

All structure will be marked with warning signs to indicate an obstruction exists.

6.0 CONCLUSIONS

This EA finds that no significant adverse environmental impacts are anticipated by the implementation of the Lake Salvador Shoreline Protection Demonstration Project. This conclusion is based on a comprehensive review of relevant literature, site-specific data, and project-specific engineering reports. This finding supports the recommendations of the CWPPRA Task Force, including NMFS, the sponsoring agency. The natural resource benefits anticipated from the implementation of Lake Salvador Shoreline Protection Demonstration Project are expected to enhance and sustain the diverse ecosystem of Lake Salvador. The knowledge gained from testing different structure types will be applicable in other organic substrates.

7.0 PREPARERS

This EA was prepared by GOTECH, Inc. and C-K Associates, Inc. under contract to NMFS. Sections were written by Mr. Bruce Dyson and Ms. Peggy Jones of GOTECH, Inc. and Mr. Jeff Heaton, Mr. Scott Nesbit and Ms. Laurie Pierce of C-K Associates, Inc. under the direction and guidance of Dr. Teresa McTigue of NMFS. In addition to Dr. McTigue, invaluable reference material and guidance were provided by Mr. John Foret, Mr. Rickey Ruebsamen, Mr. Tim Osborn and Dr. Eric Zobrist of NMFS.

8.0 FINDING OF NO SIGNIFICANT IMPACT

Based on the conclusions of this document and the available information relative to the Lake Salvador Shoreline Protection Demonstration Project (CWPPRA Project BA-15), there will be no significant environmental impacts from this action. Furthermore, preparation of an environmental impact statement for constructing various types of shoreline protection structures is not required by the National Environmental Policy Act or its implementing regulations.

APPENDIX A

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LITERATURE CITED

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APPENDIX B

CULTURAL RESOURCE ASSESSMENT

KATHLEEN BABINEAUX BLANCO
LIEUTENANT GOVERNOR

State of Louisiana
OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT
DIVISION OF ARCHAEOLOGY

PHILLIP J. JONES
SECRETARY

GERRI HOBDY
ASSISTANT SECRETARY

May 2, 1996

Mr. Scott Nesbit
C-K Associates, Inc.
17170 Perkins Road
Baton Rouge, Louisiana 70810

Re: Lake Salvador Shoreline Protection
Demonstration Project
C-K Associates' Project No. 34-106
St. Charles Parish, Louisiana

Dear Mr. Nesbit:

Reference is made to your letter dated April 15, 1996, regarding the above. A review of our files indicates that there are two archaeological sites located within the project area (see enclosed maps). However, it is our opinion that the proposed demonstration projects will have no effect on these sites, and as such, we have no objections.

Should you have any questions or need any further information, please contact Mr. Mike Mahady in the Division of Archaeology at (504) 342-8170.

Sincerely,

Gerri Hobdy
State Historic Preservation Officer

GH:MM:s

Enc: as stated

P.O. BOX 44247 • BATON ROUGE, LOUISIANA 70804-4247 • PHONE (504) 342-8170 • FAX (504) 342-8173

STATE OF LOUISIANA
SITE RECORD FORM

Site Name: Bouquet des Chenes
State Survey No: 16SC15
Other Site Designation: Thibodaux
Parish: St. Charles
Instructions for Reaching Site:
Bouquet des Chenes on Lake Salvador, NW corner
USGS Quad (Name, date, series): New Orleans (1967) 15'
Quad No: 33-P quarter of the quarter of Section 38 Township 15S Range: 22E
UTM Coordinates: Zone: 15 Easting: 759710 Northing: 3327820
Geographical Coordinates: Latitude: Longitude:

PHYSICAL SETTING

Land Form: Beach
Slope:
Geologic Processes:
Elev. ft AMSL:
Site Position:
Near Water:
Flooding:
Soil Characteristics: Marsh
Floral Communities:
Faunal Communities:
Other Potential Resources:
Nearest Known Site:

SITE DESCRIPTION

Site Size:
Plan:
Orientation:
Stratigraphy:
Artifact Density:
Artifact Distribution:
Cultural Features:
Rangia shell midden
Cultural Affiliation:
Neo-Indian (possibly Coles Creek)
Presumed Function: Campsite, extraction locale

COLLECTIONS

Survey Meth: Grab surface collection
Assessment of Collecting Conditions:
Description of Material:
Pot sherds, burned shell

CONDITIONS

Present Use:
Erosion or Disturbance: Severe shoreline erosion
Probable Future Destruction:

STATE OF LOUISIANA
SITE RECORD FORM

Site Name: Lake Salvador Dugout Canoe
State Survey No: 16SC49
Other Site Designation:
Parish: St. Charles
Instructions for Reaching Site:
From Pier 90, just off US 90, take boat down Sellers Canal (Bayou Verret) to Lake Cataouache and proceed to Couba Pass which leads into Lake Salvador
USGS Quad (Name, date, series): Hahnville (1969) 15'
Quad No: 33-O quarter of the quarter of Section Township 15S Range: 21E
UTM Coordinates: Zone: 15 Easting: Northing:
Geographical Coordinates: Latitude: Longitude:

PHYSICAL SETTING

Land Form: Marsh
Slope:
Geologic Processes:
Elev. ft AMSL:
Site Position: Marsh on edge of Lake Salvador
Near Water: Lake Salvador
Flooding:
Soil Characteristics: Marsh
Floral Communities:
Faunal Communities:
Other Potential Resources:
Nearest Known Site:

SITE DESCRIPTION

Site Size: Isolated find
Plan:
Orientation:
Stratigraphy:
Artifact Density:
Artifact Distribution:
Cultural Features:
Wooden dugout canoe
Cultural Affiliation:
Radiocarbon date between 1540 and 1650 (Plaquemine culture)
Presumed Function: Watercraft

COLLECTIONS

Survey Meth: Grab surface collection
Assessment of Collecting Conditions:
Description of Material:
Canoe in 27' 4" long and 2' wide

CONDITIONS

Present Use: On display in Wildlife and Fisheries Building
Erosion or Disturbance: Minor
Probable Future Destruction:

United States Department of Agriculture

Natural Resources Conservation Service

3737 Government Street
Alexandria, Louisiana
71302

August 16, 1996

Mr. Tim Osborn
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
NMFS Restoration Center
SSMC-3 E-W Highway
Silver Spring, Maryland 20910

Dear Mr. Osborn:

RE: Overgrazing Determination Lake Salvador Shoreline Demo Project, Big Island/Atchafalaya Sediment Diversion Project

The USDA-Natural Resources Conservation Service has determined that overgrazing is not a problem in the project areas of the Lake Salvador Shoreline Protection Demonstration project and the Big Island/Atchafalaya Sediment Diversion project.

Sincerely,

Bennett C. Landreneau ACTING FOR

Donald W. Gohmert
State Conservationist

cc: Bennett C. Landreneau, Assistant State Conservationist for Water Resources, NRCS, Alexandria

Post-it® Fax Note 7671	Date 8/26	# of pages ▶ 1
To Terry McTigue	From Don
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

United States Department of the Interior

FISH AND WILDLIFE SERVICE
825 Kaliste Saloom Road
Brandywine Bldg. II, Suite 102
Lafayette, Louisiana 70508

August 7 1996

Post-it® Fax Note 7671	Date	# of pages ▶
To Terry McTigue	From Tim	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

Mr. Tim Osborn
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
1335 East West Highway, 7th Floor
Silver Spring, Maryland 20910-3226

The U.S. Fish and Wildlife Service (Service) has reviewed the draft Environmental Assessment (EA) for the Lake Salvador Shoreline Protection Demonstration Project. That project would be constructed under the authority of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). The Service submits the following comments in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act of 1973, as amended.

General Comments

The Service agrees that various types of structures should be investigated to determine their effectiveness in reducing shoreline erosion in highly organic soils. Soils with poor load bearing capacities often preclude the use of rock dikes and other structures which present load bearing problems. The northern shore of Lake Salvador seems to be a suitable site for the proposed project, as that shoreline is rapidly eroding and composed of highly organic soils.

The fresh marshes north of Lake Salvador provide important habitat for several Federal trust species including wading birds, songbirds, and particularly, migratory waterfowl. The Service agrees that, without shoreline protection measures, erosion of the adjacent marsh will continue as waves continue to erode the shoreline and open water areas become part of Lake Salvador. Loss of emergent wetlands and conversion of shallow water areas to deeper, lake bottom would reduce the area's habitat value for a number of wetland-dependent species.

Specific Comments

Page 4, Paragraph 2, Sentence 3 - Bayous Perot and Rigolettes, southeast of the project area, are erroneously referred to as Bayous Ferat and Rigalettes.

Page 8, Paragraph 1, Sentence 1 - Timer pylon breakwaters should be changed to timber pylon breakwaters.

Page 13, Last Paragraph - This paragraph states: "The Barataria Bay Waterway provides a direct connection between Lake Cataouatche and the lower Barataria Basin, effectively isolating Lake Salvador hydrologically from the mid-basin system. Because of this isolation, Lake Salvador does not serve as a runoff nutrient processor; therefore, nutrient and chlorophyll a levels are much lower than in other lakes." The Barataria Bay Waterway does not provide a direct connection between Lake Cataouatche and the lower Barataria Basin. Lake Cataouatche is indirectly connected to the Barataria Bay Waterway via the

Bayou Segnette Waterway - Bayou Villars - Bayou Barataria - Barataria Bay Waterway route. Lake Salvador has a much more direct connection to the lower basin through the Bayou Perot - Little Lake route. Furthermore, runoff entering Lake Cataouatche flows into Lake Salvador, via Bayou Couba and Bayou Bardeaux, as does runoff from the Bayou Des Allemands watershed. Therefore, Lake Salvador may be more important as a runoff nutrient processor than stated. Perhaps nutrient and chlorophyll levels are lower because of the greater exchange with the lower basin through Bayou Perot.

The Service fully supports the measures proposed thus far for the Lake Salvador Shoreline Protection Demonstration Project. Thank you for the opportunity to provide comments on the EA. If you have any questions regarding our comments, please contact Kevin Roy at 318/262-6662, extension 226.

Sincerely,

David W. Frugé
Field Supervisor

cc:: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LA Dept. Of Wildlife and Fisheries, Baton Rouge, LA