DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWP-A

April 9, 1983

SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana. It is accompanied by the reports of the Board of Engineers for Rivers and Harbors and the District and Division Engineers. These reports are in response to resolutions adopted 12 June 1967 and 13 December 1971 by the Committee on Public Works of the United States Senate, and to a resolution adopted 19 October 1967 by the Committee on Public Works of the United States House of Representatives. The 1967 resolutions of both Committees requested the Board to review the report on the Mississippi River-Gulf Outlet and other pertinent reports with a view to determining whether the existing project should be modified. The Senate's resolution directed particular reference to providing a minimum depth of 50 feet and a minimum bottom width of 750 feet. The 1971 Senate resolution requested that the Board review the report on the Mississippi River, Baton Rouge to the Gulf of Mexico, and other pertinent reports with a view to determining if the existing project should be modified, with particular reference to providing a continuous channel 50 feet deep by 500 feet wide from Baton Rouge to the Gulf of Mexico.

2. The District and Division Engineers recommend that the existing project, Mississippi River, Baton Rouge to the Gulf of Mexico, be modified to provide for navigation improvements. Their proposed plan provides for a 55-foot depth over a 750-foot bottom width from the Gulf of Mexico to Baton Rouge, Louisiana, and a turning basin at the head of the deepened channel in Baton Rouge. Proposed modifications also include deepening the existing 35-foot-deep by 1,500-foot-wide channel at New Orleans to 40 feet, providing river training works in South Pass and Pass a Loutre, and creating wetlands and upland habitat along Southwest Pass. Based on a reanalysis of possible impacts of channel deepening due to saltwater intrusion, the reporting officers provided a supplemental report revising their recommended mitigation measures. The revised mitigation would provide for a sill to be installed on the river bottom during periods of low flow, and a water intake extension.

3. The Board of Engineers for Rivers and Harbors concurs generally in the views and recommendations of the reporting officers. However, the Board notes that the berthing areas will also require deepening in order to realize the estimated savings in transportation costs attributed to the proposed plan. Therefore, the Board believes that deepening of berthing areas should be a part of the proposed plan. The Board also notes that dredging equipment and operations necessary to implement and maintain a portion of the proposed plan in Baton Rouge would be different from those specified by the reporting officers. The different equipment and operations increase the project costs slightly. The Board examined the type and size of vessels expected to use the proposed turning basin in Baton Rouge and believes the basin should be reduced in width by 240 feet. The Board's consideration of vessel size, and including berthing and the use of floating cranes secured to the vessels to assist in loading and unloading, revealed that the Federal channel should be no closer than 200 feet to piers and wharves.

4. It is also noted that the implementation of this project to full depth and length would require a significant capital investment as well as a large amount of dredging equipment. The amount of dredging would involve about 136 million cubic yards initially and about 109 million cubic yards annually to maintain project dimensions. The latter amount is an increase of about 86 million cubic yards over what is dredged annually to maintain the existing project dimensions. The proposed project would increase the U. S. Army Corps of Engineers dredging program, nationally, by about 24 percent. Staged construction of the project would provide a sensible and affordable approach to implementation and earlier realization of benefits. Such a construction sequence would also minimize disruption of navigation and allow for a gradual increase in the dredging program. During pre-construction planning, the reporting officers will consider and develop a construction sequence to implement the recommended project in the most logical and efficient manner. Economic data for various depths and reaches are shown as an attachment to this report.

5. The State of Louisiana is also examining the advisability of staged construction. Governor Treen in his letter of 25 February 1983 stated that studies conducted by his Task Force finds that deepening the Mississippi River to mile 172 AHP would yield substantial net savings in transportation cost and that deepening above mile 172 AHP is less favorable but would still result in net transportation savings. Governor Treen stated general agreement with the Corps findings and recommendations.

6. The Department of Interior noted in its commentary on my proposed report the requirement that the Corps obtain a right-of-way from the Fish and Wildlife Service (FWS) prior to conducting any work on the Delta National Wildlife Refuge and that issuance of the right-of-way will be contingent upon a determination by the FWS Regional Director that the proposed work will be compatible with the purposes for which the refuge was established. In instances where damages may result, the Regional Director may require mitigation measures within the right-of-way or on adjacent FWS land.

7. Cost of the total project, including the revised mitigation measures, deepening of berthing areas, change in dredging equipment and operation in Baton Rouge, and reduced turning basin, is estimated at $525 million. Average annual benefits of savings in transportation costs are estimated at $1.5 billion. The benefit-cost ratio is 8.3 to 1. The Board recommends the project in accordance with the Administration's 15 July 1981 proposed cost-sharing legislation.

8. I concur in the findings, conclusions, and recommendations of the Board, but note that action on proposed cost-sharing legislation did not take place in the last Congress. The Administration is now preparing a new proposal to be sent to Congress for cost recovery and financing for deep draft channels and harbors, which would be applicable to this proposed project.

J K Bratton

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

Incl
as

Deep Draft Access to the Ports of
New Orleans and Baton Rouge, Louisiana

Summary of Economic Analysis of Selected Plan
By Reach and Project Depth 1/

Project Depth (feet)	First Cost	Average Annual Costs	Average Annual Benefits	Benefit-to-Cost Ratio	Net Benefits
	(In Million Dollars)				
	GULF to near DONALDSONVILLE (MILE 172)				
55	$288.9	$ 90.5	$1,258.0	13.9	$1,167.5
	DONALDSONVILLE to BATON ROUGE (MILE 172 to MILE 233.8)				
55	236.1	89.5	244.0	2.7	154.5
	NEW ORLEANS REACH (GULF to MILE 127)				
45	159.0	28.2	497.3	17.6	469.1
50	203.0	43.5	705.3	16.2	661.8
55	264.0	68.9	829.3	12.0	760.4
	NEW ORLEANS to BATON ROUGE (MILE 127 to MILE 233.8)				
45	181.0	32.6	394.1	12.1	361.5
50	212.0	69.2	575.6	8.3	506.4
55	261.0	111.1	672.7	6.0	561.6
	NEW ORLEANS and BATON ROUGE REACHES (GULF to MILE 233.8)				
45	310.0	66.8	891.4	14.6	830.6
50	415.0	112.7	1,280.9	11.4	1,168.2
55	525.0	180.0	1,502.0	8.3	1,322.0

1/ October 1982 Price Levels, 7-7/8%

DEPARTMENT OF THE ARMY
BOARD OF ENGINEERS FOR RIVERS AND HARBORS
KINGMAN BUILDING
FORT BELVOIR, VIRGINIA 22060

REPLY TO
ATTENTION OF:

BERH-PLN

1 April 1982

SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana

Chief of Engineers
Department of the Army
Washington, DC 20314

Summary of Board Action

The Board finds that navigation improvements for the Mississippi River deep-draft channel from the Gulf of Mexico to Baton Rouge, Louisiana, are advisable. The improvements are needed and are economically, environmentally, and socially acceptable. The Board generally concurs with the reporting officers' plan to modify the existing project. The proposed plan provides for a 55-foot depth over a 750-foot bottom width from the Gulf of Mexico to Baton Rouge, and a turning basin at the head of the deepened channel in Baton Rouge. Proposed modifications also include deepening the existing 35-foot-deep by 1,500-foot-wide channel at New Orleans to 40 feet, providing river training works in South Pass and Pass a Loutre, and creating wetlands and upland habitat along Southwest Pass. Mitigation measures would provide for a sill to be installed on the river bottom during periods of low flow, and a water intake extension. Based on October 1981 price levels, the first cost of the proposed plan is estimated at $525 million, and the benefit-cost ratio is 8.4. The Board recommends the plan in accordance with the Administration's 15 July 1981 proposed cost-sharing legislation.

Summary of Report Under Review

1. Authority. This report is in response to resolutions adopted 12 June 1967 and 13 December 1971 by the Committee on Public Works of the United States Senate and on 19 October 1967 by the Committee on Public Works of the United States House of Representatives. The resolutions are quoted in the District Engineer's report.

2. Description of the study area. Focus of the study is on the Federal navigation projects providing deep-draft access to the Ports of New Orleans and Baton Rouge. The study area includes 11 parishes along the Mississippi River from Baton Rouge to the Gulf of Mexico in southeast Louisiana.

3. Economic development. In 1979, the Ports of New Orleans and Baton Rouge ranked first and fourth, respectively, among the Nation's ports in terms of total tonnage of waterborne commerce. In that year, tonnages moved through these ports totaled about 167 million and 77 million, respectively, with over 100 different products. Public and private terminals and transfer and storage facilities are available in both ports and at other locations along this reach of the Mississippi River. There are nine grain elevators and two coal terminals, with plans for several more, along the river south of Baton Rouge.

4. Existing and authorized improvements. Existing Federal navigation improvements pertinent to the study area include:

a. Mississippi River, Baton Rouge to the Gulf of Mexico. This project provides a 40-foot-deep channel with bottom widths varying from 1,000 feet (Head of Passes to New Orleans) to 500 feet (New Orleans to Baton Rouge). Entrance from the Gulf is through Southwest Pass via an 800-foot-wide channel that is 40 feet deep. The project also provides for a 35-foot-deep channel, 1,500 feet wide at New Orleans.

b. Mississippi River-Gulf Outlet. The project provides a 36-foot-deep and 500-foot-wide channel from the Gulf of Mexico to the Gulf Intracoastal Waterway (GIWW), and that portion of the GIWW to the Inner Harbor Navigation Canal. The Inner Harbor Navigation Canal, connecting the GIWW east of New Orleans to the Mississippi River, is owned by the State of Louisiana, but leased and operated by the U.S. Army Corps of Engineers. The Mississippi River-Gulf Outlet Project also provides an inner tidewater harbor consisting of a 1,000- by 2,000-foot turning basin, 36 feet deep. The 1956 River and Harbor Act, which authorized construction of the project, also authorized future construction, when economically justified, of a channel and lock in the vicinity of Meraux. That facility would provide an additional connection between the tidewater harbor and the Mississippi River.

c. Gulf Intracoastal Waterway. The project provides a 12-foot-deep by 125-foot-wide barge canal from Lake Borgne on the east to the Inner Harbor Navigation Canal. From the Harvey Canal Lock at Mississippi River mile 98.3 Above Head of Passes (AHP), the GIWW continues westerly. An alternate westward access is also

b. Enlargement of the existing channel in the Mississippi River from the Head of Passes (mile 0) to within the Port of Baton Rouge (mile 233.0 AHP) to a project depth of 55 feet and a bottom width of 750 feet;

c. A turning basin with a project depth of 55 feet, a bottom width of 1,600 feet, and a length of 4,000 feet, at the end of the enlarged channel in Baton Rouge (mile 233.0 AHP to 233.8 AHP);

d. Enlargement of the existing 35-foot channel along the left bank of the Mississippi River at New Orleans (mile 86.7 AHP to 104.5 AHP) to a project depth of 40 feet at the existing 1,500-foot bottom width;

e. River training works in South Pass and Pass a Loutre;

f. Creation of about 11,600 acres of wetlands and 11,400 acres of upland habitat through overbank disposal of dredged material in the vicinity of Southwest Pass; and

g. Freshwater reservoirs at East Point a la Hache and West Point a la Hache to mitigate for increased saltwater intrusion.

9. Economic evaluation. The District Engineer estimates the first cost of his proposed plan at about $435,000,000, based on May 1980 price levels. Of that amount, $264,600,000 would be Federal and $170,400,000 would be non-Federal, based on traditional cost sharing. Based on a 50-year period for economic analysis and an interest rate of 7-5/8 percent, the estimated annual costs are $147,000,000, including $113,000,000 for annual maintenance. Average annual benefits accruing from transportation savings are estimated at $1,310,200,000, and the benefit-cost ratio is 8.9.

10. Project effects. Implementation of the proposed project would involve dredging about 136 million cubic yards initially and about 109 million cubic yards annually to maintain project dimensions. The latter amount is an increase of about 86 million cubic yards over what is dredged annually to maintain the existing project. The proposed project would increase the National Dredging Program (1981 estimate of 363 million cubic yards) by 24 percent. At Venice (mile 10.5 AHP), dredged material disposal would be in deep areas of the river. From mile 19 BHP to mile 22 BHP, dredging will be by hopper dredge with disposal in the Gulf of Mexico. Between Venice and mile 19 BHP, dredging will be by cutterhead-pipeline dredges with disposal in adjacent overbank areas. This will permit the planned conversion of about 23,000 acres of estuarine areas to 11,600 acres of marsh and 11,400 acres of upland habitat.

provided at the Algiers Canal Lock at about Mississippi River mile 88 AHP. Project dimensions westward also provide a 12-foot depth and 125-foot width.

5. Problems and needs. Navigation problems in the study area consist of inadequate channel depths and widths to accommodate certain existing and expected deep-draft vessels calling on the Ports of Baton Rouge and New Orleans. Of those vessels moving over the Mississippi River in 1975 and 1976, approximately 48 percent of dry-bulk carriers and 68 percent of tankers moved light loaded. As smaller, obsolete vessels are replaced with larger and more efficient ships, the percentage of light-loaded traffic will increase under existing channel dimensions. There is a need to achieve higher economic efficiency and savings in transportation costs by providing larger navigation channels to the Ports of Baton Rouge and New Orleans. In addition, coastal marshlands in the study area are being lost at an increasing rate, currently about 40 square miles per year, as a result of several interrelated factors including erosion, subsidence, and man's activities. Since the national significance of these marshlands has been well established, there is a need to curtail these losses.

6. Improvements desired. Local interests desire the enlargement of the Mississippi River Channel, Baton Rouge to the Gulf of Mexico and the Mississippi River-Gulf Outlet Projects. They also desire creation of wetlands with dredged material in the vicinity of the Mississippi River mouth. Municipalities drawing their drinking water from the Mississippi River also desire mitigation for any significant increases in saltwater intrusion into municipal and industrial water supplies that might result from channel deepening.

7. Alternatives considered. Several alternative plans to provide deeper and wider navigation channels to New Orleans and Baton Rouge were considered. The plans consist of depths of 45, 50, 55, and 60 feet over varying widths in the Mississippi River and the Mississippi River-Gulf Outlet. Alternatives were evaluated incrementally to New Orleans and to Baton Rouge.

8. Plan of improvement. The plan selected by the District Engineer to meet the navigation needs of the study area would modify the Mississippi River, Baton Rouge to the Gulf of Mexico Project to provide for:

a. Enlargement of the existing channel in Southwest Pass from the Head of Passes (mile 0) to deepwater in the Gulf of Mexico at about mile 22 Below Head of Passes (BHP), to a project depth of 55 feet and a bottom width of 750 feet;

11. The proposed project is estimated to worsen existing saltwater intrusion problems. The frequency and duration at which the recognized standard of 250 mg/l chlorides would be exceeded at affected points along the river would be increased. Additional municipal water reservoirs to be provided at East Pointe a la Hache and at West Pointe a la Hache are to mitigate effects of the increased saltwater intrusion on waterworks between East and West Pointe a la Hache and the mouth. Upstream of East and West Pointe a la Hache, the impacts of increased saltwater intrusion were not considered significant and no mitigation measures are proposed.

12. Recommendation of the reporting officers. The District Engineer recommends that the existing project for deep-draft navigation, Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana, be modified to provide for navigation improvements in accordance with plans described in his report and subject to certain items of local cooperation. The Division Engineer concurs.

Review by the Board of Engineers for Rivers and Harbors

13. General. The scope of the Board's review encompassed the overall technical, economic, social, and environmental aspects involved in the improvements proposed by the District Engineer. The study and report were examined to determine compliance with applicable administrative and legislative policies and guidelines and to assure that the study was conducted so that all interested parties had adequate opportunity for input and comment.

14. Responses to the Division Engineer's public notice. The Division Engineer issued a public notice on 1 November 1981 stating the findings and recommendations of the reporting officers and inviting public comment to the Board. Five letters were received in response to the public notice.

a. The Sewerage and Water Board of New Orleans noted that the District Engineer's analysis was based on hydrologic data during years 1939 to 1964, and hence did not include critically low flows that were experienced from 1930 through 1936. The Sewerage and Water Board stated that it will oppose the project until two conditions are fulfilled. These conditions are:

(1) That the District Engineer's analysis of the impact of channel deepening on saltwater intrusion includes low-flow and salinity data dating back to 1930.

(2) That the recommended project includes measures to mitigate increases in saltwater intrusion at the Sewerage and Water Board's intakes.

Inclosures to the Sewerage and Water Board's letter included letters from Jefferson Hospital and the Dixie Brewing Company, New Orleans, stating concerns about impacts from increased saltwater intrusion.

b. Jefferson Parish transmitted a resolution, passed by the Parish Council on 9 December 1981, objecting to the proposed project unless mitigative measures are implemented to provide an alternative drinking water source or to protect the drinking water supply of Jefferson Parish against saltwater intrusion.

c. The Charles Dennery Company, New Orleans, uses water provided by Jefferson Parish in processing foods and has stated that processing operations will have to be curtailed for the duration of saltwater intrusion.

d. The Exxon Company, U.S.A., believes that beneficiaries of the project will be mostly nonpetroleum users, and that such beneficiaries should pay for the relocation of Exxon's pipelines. The company states that the Louisiana Offshore Oil Port (LOOP) monobuoy, when fully operational, will enable deep-draft tankers to discharge their cargoes without entering the river. The company believes that the project will provide little economic benefit to Exxon.

e. The Port of New Orleans states it is aware of some oil interests claiming that petroleum products would not benefit from transportation savings resulting from deepening the project. The Port inclosed a consultant's report which concluded that the project would be a cost-effective alternative for those refiners not members of LOOP. An information sheet prepared by an Executive Director of the Louisiana Offshore Terminal Authority was also inclosed, and showed that there would be a sizeable number of tanker receipts that could benefit from deepening the project.

15. Findings and conclusions. The Board of Engineers for Rivers and Harbors concurs in general with the views and recommendations of the reporting officers. The recommended improvements are economically justified and are engineeringly and environmentally acceptable. The report essentially complies with applicable policies and guidelines.

16. Saltwater intrusion. The Board carefully examined the saltwater intrusion analysis in the District Engineer's report. The analysis did not depict all conditions which could exist during periods of extreme low flow.

a. The reporting officers reanalyzed the impacts of channel deepening and what measures would be needed to mitigate for increased saltwater intrusion. Their reanalysis is provided in the inclosed supplemental report. They find that the Fairview thalweg crossing at about mile 115 AHP near Kenner effectively halts upstream movement of the saltwater wedge with both the existing 40-foot-deep channel and the proposed 55-foot-deep channel. However, the reporting officers find that the proposed channel deepening will significantly increase water surface chlorides at water intakes downstream of the Fairview crossing, and that this requires more extensive mitigation measures than originally provided for in the proposed plan.

b. The most effective and least costly alternative would provide a submerged sill at mile 64.1 AHP and a water intake extension. The sill would be installed during periods of low flow, estimated to average once every 5 years. It would be constructed to elevation -55 with dredged material, and would impede upstream movement of the saltwater wedge. To mitigate increases in saltwater intrusion downstream of mile 64.1 AHP, a new water intake would be provided upstream of the sill on the right bank of the river at mile 65 AHP. A pipeline would extend to West Pointe a la Hache at mile 49.2 AHP, and to a river crossing made to East Pointe a la Hache. The first cost of this alternative is estimated at $21 million. The Board concurs in the reanalysis of the reporting officers and believes that the alternative plan would effectively mitigate the increase in saltwater intrusion resulting from deepening the navigation channel to 55 feet. Installation of this alternative would be in lieu of the mitigation plan described in the feasibility report, and would increase the first costs of the proposed project by a net $19 million.

17. The requirements of local cooperation, which include all relocations of submerged pipelines, conform with current policy and are appropriate for this proposed project. The Board of Commissioners of the Port of New Orleans, designated by the Governor of Louisiana to represent the State, has given satisfactory assurances to provide all requirements of local cooperation.

18. Non-Federal berthing areas will require deepening commensurate with the proposed plan to realize the estimated savings in transportation costs. Accordingly, costs for dredging berthing areas should be included in the proposed project's estimated first and annual costs.

US Army Corps
of Engineers
New Orleans District

Louisiana Department of
Transportation and Development

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA

SALTWATER INTRUSION MITIGATION

DESIGN MEMORANDUM NO. 1

(GENERAL DESIGN)

SUPPLEMENT NO. 6

JULY 1990

CECW-EP-W (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 12th End
SCHELL/tf/(202) 504-2889
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

07 DEC 1992

HQ, U.S. Army Corps of Engineers, Washington, DC 20314-1000

FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

The subject supplement No. 6 to DM No. 1 is approved.

FOR THE DIRECTOR OF CIVIL WORKS:

Encl
nc

PAUL D. BARBER, P.E.
Chief, Engineering Division
Directorate of Civil Works

CELMV-ED-PG 13th End Mr. Burttschell/ts/7246

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080
17 DEC '92

FOR, Commander, New Orleans District, ATTN: CELMN-ED-SP

Referred to note approval.

FOR THE COMMANDER:

Roland J. Dubreuil

Encl
nc

for FRED H. BAYLEY III
Director of Engineering

CECW-EP-W (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 12th End
SCHELL/tf/(202) 504-2889
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

07 DEC 1992

HQ, U.S. Army Corps of Engineers, Washington, DC 20314-1000

FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

The subject supplement No. 6 to DM No. 1 is approved.

FOR THE DIRECTOR OF CIVIL WORKS:

Encl
nc

PAUL D. BARBER, P.E.
Chief, Engineering Division
Directorate of Civil Works

CELMV-ED-PG 13th End Mr. Burttschell/ts/7246

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080
17 DEC '92

FOR, Commander, New Orleans District, ATTN: CELMN-ED-SP

Referred to note approval.

FOR THE COMMANDER:

Encl
nc

FRED H. BAYLEY III
Director of Engineering

CECW-EP-W (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 12th End
SCHELL/tf/(202) 504-2889
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

07 DEC 1990

HQ, U.S. Army Corps of Engineers, Washington, DC 20314-1000

FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

The subject supplement No. 6 to DM No. 1 is approved.

FOR THE DIRECTOR OF CIVIL WORKS:

Encl
nc

PAUL D. BARBER, P.E.
Chief, Engineering Division
Directorate of Civil Works

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 11th End
Mr. Burttschell/cdw/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No.1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080

17 SEP '92

FOR CDR, HQUSACE (CECW-EP-W), WASH, DC 20314-1000

1. Forwarded to note response to outstanding comments on subject design memorandum.

2. We have reviewed the 10th endorsement and concur in its contents.

FOR THE COMMANDER:

Encl
nc wd

for William R. Hill
FRED H BAYLEY III
Director of Engineering

CF:
CELMN-ED-SP

CELMN-ED-SP (CELMN-ED-SP/17 Jul 90) (1110-2-1150a) 10th End
Mr. Elmer/mn/2618
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

DA, New Orleans District, Corps of Engineers, P. O. Box 60267, New Orleans, LA 70160-0267 24 Aug 92

FOR Commander, Lower Mississippi Valley Division, ATTN: CELMV-ED-PG

1. All of the CECW-EE comments on page 1 of enclosure 13 refer to the Reservoir Plan alternative for saltwater intrusion mitigation. Resolution of these comments will not affect the selection of a least cost alternative. We recommend that any attempt to resolve these comments be held in abeyance unless this plan becomes the least cost alternative. This proposed disposition of these comments has been agreed upon in conversations between Mr. Burttschell of CELMV-ED-PG and Mr. Brotnov of CECW-EP-W.

2. The proposed disposition of CECW-LM comments on page 2 of enclosure 13 is as follows:

a. Comment 1. Concur. Barging costs used for the comparison of plans relate only to mitigation for the 45-foot channel. Costs used in the comparison of plans are expressed in present worth terms without inflation. Reimbursement of barging costs has not and will not be made directly to Plaquemines Parish. All reimbursements to Plaquemines Parish will be made by the State of Louisiana. USACE reimbursements are made to the State of Louisiana based on the existing LCA.

b. Comment 2. Concur.

c. Comment 3. The average duration of a round trip should be 2 days rather than 2.5 days for Boothville. Making this correction results in a 0.50 trips/day/barge rather than 0.40 trips/day/barge. The remaining calculations for barging water to Boothville do not change once this correction is made. We can make the assumption that a round trip to Boothville takes an average of 2 days (same as Pointe-a-la-Hache) because barging to Boothville must begin early during an intrusion event when the saltwater has not traveled far up river. In that case, a round trip would take less than 2 days. Later in the event, using an average duration of 2 days for a round trip is an acceptable assumption. This variability also applies to Pointe-a-la-Hache.

The intrusion event occurs later at Pointe-a-la-Hache and the average duration of a round trip will be 2 days. When Pointe-a-la-Hache is first impacted, a round trip would take less than 2 days. During the height of the intrusion event, a round trip would take longer than 2 days. Again, using an average duration of 2 days is an acceptable assumption for Pointe-a-la Hache.

d. Comment 4. Concur.

e. Comment 4a. Concur.

f. Comment 4b. Concur.

g. Comment 4c. We assumed that an increase in the parish's water needs would occur over the project life in 25% increments at years 10, 23 and 35 rather than a gradual increase yearly. This assumption was consistently applied for all plans under consideration. Therefore, the large incremental increase every few years in the "EXP" column is based on this assumption.

13 Encls
nc

W. EUGENE TICKNER
Chief, Engineering Division

The intrusion event occurs later at Pointe-a-la-Hache and the average duration of a round trip will be 2 days. When Pointe-a-la-Hache is first impacted, a round trip would take less than 2 days. During the height of the intrusion event, a round trip would take longer than 2 days. Again, using an average duration of 2 days is an acceptable assumption for Pointe-a-la Hache.

d. Comment 4. Concur.

e. Comment 4a. Concur.

f. Comment 4b. Concur.

g. Comment 4c. We assumed that an increase in the parish's water needs would occur over the project life in 25% increments at years 10, 23 and 35 rather than a gradual increase yearly. This assumption was consistently applied for all plans under consideration. Therefore, the large incremental increase every few years in the "EXP" column is based on this assumption.

13 Encls
nc

W. EUGENE TICKNER
Chief, Engineering Division

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 9th End Burttschell/cdw/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080
30 JUL '92
FOR Commander, New Orleans District, ATTN: CELMN-ED-SP

1. Referred for response to Encl 13 comments. Enclosure 13 has two pages consisting of CECW-LM comments and CECW-EE comments.

2. Your CELMN-LC memorandum, dated 16 Jun 92, subject: Mississippi River Ship Channel, Gulf to Baton Rouge, Phase I - Permanent Saltwater Intrusion Mitigation Plan - Third Supplement to the LCA, was provided to this office for review and processing to HQUSACE. However, as discussed with your staff this document should not be finalized, including final coordination with the local sponsor, until all the comments on DM number 1, Supplement number 6 have been resolved and the supplement has been approved by HQUSACE. This office will provide your staff comments on referenced memorandum during Aug 92.

FOR THE COMMANDER:

13 Encls
nc

for William R. Hill
FRED H BAYLEY III
Director of Engineering

CECW-EP-W (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 8th End
BROTNOV/tf/(202) 504-4534
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

1 5 JUL 1992

HQ U.S. Army Corps of Engineers, Washington, DC 20314-1000
30 JUL '92

FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

1. Design Memorandum No. 1, Supplement No. 6 with 7 endorsements has been reviewed and approval is held in abeyance, subject to resolution of the enclosed comments.

2. Since the DM will be the basis for LCA approval, resolution of comments should be submitted to this office NLT 15 September 1992.

3. The Engineering Division POC is Mr. Bruce Brotnov, CECW-EP-W, (202) 504-4534.

FOR THE DIRECTOR OF CIVIL WORKS:

13 ~~14~~ Encls
wd encls 1-~~13~~ 12
Added 1 encl

PAUL D. BARBER, P.E.
Chief, Engineering Division
Directorate of Civil Works

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 7th End   Burttschell/akh/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6, Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080

11 MAY '92

FOR CDR, HQUSACE (CECW-EP-W), WASH DC 20314-1000

1. The 6th endorsement and added enclosures (Encl 8 through 12) are furnished for your review. Reference 6th endorsement, paragraph 3e, the District has been tasked to furnish an example cost cap table based on the projected construction schedule and OMRR&R costs. These data will be reviewed by LMVD and HQUSACE in advance of or concurrent with the draft LCA.

2. Recommend that Design Memorandum No. 1, Supplement No. 6, be approved.

FOR THE COMMANDER:

for William R. Hill
FRED H. BAYLEY III
Directorate of Engineering

12 Encls
nc

CF:
CELMN-ED-SP

CELMN-ED-SP (CELMN-ED-SP/17 Jul 90) (1110-2-1150a) 6th End
Mr. Elmer/mn/2618
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

DA, New Orleans District, Corps of Engineers, P. O. Box 60267, New Orleans, LA 70160-0267 10 Apr 92

FOR Commander, Lower Mississippi Valley Division, ATTN: CELMV-ED-PG

1. Reference: Meeting held on 6 January 1992 at the New Orleans District to discuss comments on the subject project. A memorandum for record of the meeting and roster of attendees is attached as Enclosure 8.

2. The proposed disposition of CECW-EP-W 4th End comments dated 10 December 1991 is as follows:

a. Comment para 3a. The barging costs shown in the report are based on the costs incurred during the 1988 drought event. These costs were applied to the average annual increase in durations predicted for the 45 and 55 foot channels to determine the annual costs for barging over the project life, including inflation. Increased durations of saltwater intrusion caused by the 45-foot channel during the years 1989, 1990 and 1991 did not overwhelm the ability of the local parish government to handle the situation. Because of this and the ongoing effort between the New Orleans District and local parish officials to develop a permanent saltwater mitigation plan, Plaquemines Parish elected not to request the Corps for reimbursement at that time.

b. Comment para 3b. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

3. The proposed disposition of CEWRC-WLR comments shown in Enclosure 3 to the 4th End is as follows:

a. Comment 1a. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

b. Comment 1b. It was concluded at the 6 January 1992 meeting that conservation measures would not be proposed as an alternative mitigation measure; however, a reservoir alternative has been developed and results are presented in our response to WLRC comment 1e below.

c. Comment 1c. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

d. Comment 1d. Concur. Average annual costs without inflation factors for each alternative is presented in our response to WLRC comment 1e below.

e. Comment 1e. We have analyzed a reservoir alternative sized for the 45-foot channel. The reservoir storage capacity is based on the maximum increase in durations expected at Boothville and West Pointe-a-la-Hache, 20 days and 10 days respectively, and assuming a 100% increase in treatment capacities at each plant from the current total rate of 5 million gallons per day (MGD) (3 MGD at West Pointe-a-la-Hache and 2 MGD at Boothville) to 10 MGD. Based on these requirements, a total useable reservoir capacity of 140 million gallons is needed. Existing borrow pits in the vicinity of the West Pointe-a-la-Hache plant are available for use for the reservoir. In general, the remaining components of the plan consist of a river intake structure and pipelines for filling and replenishing the reservoir, a pumping station and pipeline for supplying West Pointe-a-la-Hache Water Treatment Plant (WPWTP), and approximately 32 miles of pipeline with 5 pumping stations for supplying Boothville Water Treatment Plant (BWTP). Since the reservoir site is not protected against storm surges, an embankment will be constructed to protect against saltwater contamination during storm events. All elements of the plan are designed to provide 6 MGD at West Pointe-a-la-Hache and 4 MGD at Boothville.

A brief description of the specific features of the Reservoir Plan is given below and shown on the enclosed plates A-1 through A-4 (Enclosure 9):

Reservoir. The reservoir covers 83 acres utilizing existing borrow pits surrounded by a geotextile reinforced embankment. Embankment construction would be accomplished in two lifts. Reservoir location and details are shown on plate A-2.

Pipeline Pumping Stations. The six water supply pumping stations for the two water treatment plants are the same with the exception of the pumps' capacity and head. The station buildings are 44' X 24' pile founded, concrete and glass block structures with 3 parallel connected electric motor driven pumps. The pumps are sized such that any 2 of the 3 pumps are capable of supplying the required amounts of water. The pumps for supplying WPWTP are each rated for 2100 GPM at 50 psig and the ones for BWTP are rated for 1400 GPM at 70 psig. All pump motor drives are 100 HP. The pump stations are shown on plate A-4.

Pipelines. Pipeline supplying the treatment plants, with the exception of a submarine and ditch crossings is 16" PVC 1120, SDR 41 pipe with a water working pressure rating of 100 psig. Ductile iron pipe would be used for the ditch and submarine crossings. The total length of the pipeline between the reservoir and WPWTP is estimated to be 8,500' and between the reservoir and BWTP 170,000'. The route of the pipeline to BWTP a large degree would follow State Highway 23 with the exception of the Port Sulphur area. The highway section in the Port Sulphur area is restrictive, with narrow shoulders and urban development. Here the pipeline would follow the back levee and then return to Hwy 23. The pipeline will normally be buried alongside the highway with an earth cover of 3' using the material removed, except for approximately 10,000' of pipeline in Port Sulphur area and a ditch and submarine crossing at Empire. In the Port Sulphur area it is the practice to replace excavated material with trucked in backfill because of the high sulphur content of the soil. At Empire the pipeline will require a submarine crossing at the Doullut Canal and a ditch crossing just south of the canal. The submarine crossing at the Doullut Canal is 650' and consists of twin 16" pipelines with valving on either bank arranged so that either line can be valved off in case of a line break. The ditch crossing is at a pumping station just south of the Doullut Canal. The crossing will be overhead and consists of two pile bents and approximately 72' of ductile iron pipe. The pipeline to WPWTP will have one 2-lane highway crossing and the line to BWTP will have the equivalent of approximately 33 2-lane crossings. The highway crossings will require encasing the water line in 24" X 3/8" steel pipe. Also, the pipeline to BWTP will have an estimated 5,000' requiring replacing the asphalt topping at locations where the line impinges on the highway shoulder or crosses asphalt roads and driveways.

Reservoir Intake Pumping Station and Pipeline. The river intake pumping station (plate A-3) consists of a pile founded concrete structure with two vertical pumps located 80' riverside of the centerline of the protection levee. The pumps are each rated for 1,000 GPM at 60 psig and are driven by 50 HP electric motors. The river intake for the pumps extend out into the river for approximately 126' from the structure at an elevation 15' below mean low water. The water intake will be guarded and marked for marine traffic by two 6 cluster timber pile dolphins with navigation lights. The river intake pipe is 20" in diameter and discharges into an enclosed concrete sump. At this point the water is pumped into a 10" PVC pipeline and routed to the reservoir. The pipeline is approximately 5,700' long and will have one 2-lane highway crossing.

The reservoir plan cost was developed from the real estate, construction and operation and maintenance costs shown on Enclosure 10. The initial construction phase of the reservoir plan consisting of the first lift of the reservoir embankment and all pipelines and pumping plants would take 1-1/2 years, resulting in an operational system. The second lift would be started 1-1/2 years after completion of the first lift of the reservoir embankment. During the initial phase of construction, barging would be required for mitigation.

Plan Cost. We have also updated the costs for barging used to develop the Barging Plan cost and are presented in Enclosure 11. The table below shows both the present value and average annual costs for all three plans considered, Barging, Reservoir and Plaquemines Parish plans. These costs include construction, operation, maintenance, repair, replacement and rehabilitation cost over a 47-year period, the remaining life of the project using both the project interest rate of 8-1/8% and the current interest rate of 8-1/2%. Not shown are the costs for the East Pointe-a-la-Hache works already in place and the Submarine Barrier Sill. These are features of the overall project mitigation plan and a constant for all the three plans shown in the table.

TABLE
Comparison of Plan Cost
(March 1992 Price Levels*)

	Barging		Reservoir		Plaquemines Parish	
	Total P.V.	Avg. Annual	Total P.V.	Avg. Annual	Total P.V.	Avg. Annual
Project Int. Rate 8-1/8%	$14,240,000	$1,190,000	$16,280,000	$1,360,000	$12,990,000	$1,080,000
Current Int. Rate 8-1/2%	$13,700,000	$1,190,000	$16,160,000	$1,400,000	$12,850,000	$1,120,000

*The Plaquemines Parish Plan costs are to an April 1990 Price Level.

This cost comparison indicates that the Barging Plan is the plan to use to establish the Federal cost cap, as discussed at the 6 January 1992 meeting. The following procedure for calculating the cost cap will be used. Compute the "initial cost cap" in present worth terms using traditional economic analysis methods. Base the cost cap on capital costs and allocable OMRR&R costs of the selected least-cost alternative. Apply sunk and first-year capital and/or allocable OMRR&R costs against the initial cost cap. Inflate the remainder (initial cost cap minus sunk and first year costs) by one year's inflation to get the "adjusted remaining cost cap." Apply second-year capital and/or allocable OMRR&R costs against the adjusted remaining cost cap. Inflate the new remainder to get the new adjusted remaining cost cap for the next year. Repeat as necessary for the third and subsequent years until the adjusted remaining cost cap is $0. This procedure will be a part of the Local Cooperation Agreement and the initial cost cap will be established in that document.

f. Comment 1f. The source of the projected increase in the water supply needs of the Parish is the New Orleans-Baton Rouge Metropolitan Area (NOBRA) report on Estimated Population Growth. Growth projections used in the NOBRA report are used for formulation purposes and to assist in plan selection. Future upgrade of mitigation facilities will be based on actual population levels in the project area but will not exceed the NOBRA projections. The first lift of hurricane protection levees is now either complete or under construction. This has resulted in the Federal Emergency Management Agency (FEMA) permitting flood insurance policies to be issued to structures built at existing ground elevation. The lack of flood insurance was a limiting factor on growth in Plaquemines Parish. Now that flood insurance is available, we anticipate that growth in population and industry can resume.

g. Comment 1g. A detailed estimate of the least cost alternative (Barging Plan) is attached as Enclosure 11.

h. Comment 2. As agreed, we offer the following summary discussion for the environmental comments:

(1) The Environmental Impact Statement (EIS)/Feasibility Report for Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, was filed with the Environmental Protection Agency (EPA) on 2 July 1982.

Six plans or combinations for providing 55-foot deep-draft navigation to New Orleans or to New Orleans and Baton Rouge via the Mississippi River and one of its passes or the Mississippi River-Gulf Outlet were included in the Stage 3 array of plans.

The final recommended plan included a provision for a storage reservoir at the East Pointe-a-la-Hache Water Treatment Plant at river mile 49.0 AHP to mitigate the increased saltwater intrusion which would be caused by the enlargement of Southwest Pass.

A Record of Decision (ROD) was signed for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana (Deep-Draft) on 23 December 1986 by H. J. Hatch, Major General, USA, Director of Civil Works. The ROD specified that, "Channel deepening will also result in saltwater intrusion which will be mitigated through the construction of a saltwater barrier on the river bottom during periods of low flow, and a water intake extension to protect municipal water supplies."

(2) A Supplemental Information Report (SIR) was prepared to satisfy the requirements of the National Environmental Policy Act (42 U.S.C. 4321 et seq.) which described the construction of a submarine barrier, or sill, across the bottom of the Mississippi River at mile 64.1 AHP to mitigate the effects of increased saltwater intrusion upon municipal and industrial water supplies. The SIR was distributed for public review on 24 September 1985.

A Section 404(b)(1) evaluation (Clean Water Act) was completed on 16 June 1983 and a Section 401 (Clean Water Act) water quality certificate (DNR 830825-02) was received from the State of Louisiana on 25 August 1983 for the construction of the Prototype Sill at river mile 47.4 AHP.

A Section 404(b)(1) evaluation (Clean Water Act) was completed on 26 March 1984 and a Section 401 (Clean Water Act) water quality certificate (DNR 840228-06) was received from the State of Louisiana on 19 March 1984 for the construction of a submarine barrier sill at river mile 64.1 AHP.

(3) An Environmental Assessment (EA) and unsigned Finding of No Significant Impact (FONSI) dated 27 February 1987 was prepared for the Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, for three modified features.

Three modified features of the Deep-Draft project were evaluated in the EA. One feature dealt with marsh creation, a second feature, with interim saltwater intrusion mitigation (freshwater barge mooring facilities) and the third feature with dredged material disposal areas.

The EA was initially submitted to Federal, State of Louisiana agencies, local officials, environmental groups and Louisiana State officials with an unsigned FONSI.

Written responses were received from three Federal agencies:

(a) EPA, Region 6, Dallas, responded by letter on 20 May 1987. The EPA offered no comments on the FONSI or EA.

(b) USFWS, Lafayette, Louisiana, responded by letter on 27 March 1987. The USFWS offered comments on the EA which dealt with marsh creation aspects and the Corps offered a response to the USFWS.

(c) NMFS, St. Petersburg, Florida, responded by letter on 20 March 1987. The NMFS offered no comments on the FONSI or EA.

(d) The Louisiana Department of Natural Resources can document the receipt of a copy of the Notice of Availability for the EA/FONSI. They have not been able to locate their copy of the EA/FONSI. The New Orleans District is pursuing the lack of formal response from the Coastal Zone Office. In the past, the Coastal Zone Office has not formally responded by letter to Corps request for consistency.

(e) Louisiana Department of Wildlife and Fisheries. No written response to EA/FONSI can be located at New Orleans District.

(f) A signed FONSI, in addition to a comment and response appendix and two revised pages from the EA, was mailed to previous EA recipients on 16 June 1987.

(g) A Section 404(b)(1) evaluation was completed on 19 February 1987 and a Section 401 water quality certificate (WQC 870205-05) was received from the State of Louisiana on 6 April 1987.

(4) An Environmental Assessment (EA) and signed Finding of No Significant Impact (FONSI) dated 15 January 1991 was prepared for the Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, Saltwater Intrusion Mitigation, Plaquemines Parish, Louisiana.

The EA evaluated the construction of a water transmission pipeline between Belle Chasse and lower Plaquemines Parish, Louisiana. The water pipeline would mitigate for the effects of saltwater intrusion that would occur as a result of the deepening of the Mississippi River.

The EA was submitted to Federal, State of Louisiana agencies, local officials (Plaquemines Parish Council), environmental groups and Louisiana State officials.

Responses were received from two Federal and two State of Louisiana agencies:

(a) EPA Region 6, Dallas, responded by letter on 9 March 1991. EPA offered no objection to the project as proposed.

(b) USFWS, Lafayette, Louisiana, responded by verbal concurrence on 5 February 1991. The USFWS concurred with the recommendation of the EA/FONSI.

(c) NMFS, St. Petersburg, Florida. No record of a written response has been located at the New Orleans District.

(d) Although the project would impact fastlands, the Louisiana Department of Natural Resources responded by letter on 5 April 1991 with the following comment:

"The project has been reviewed and found to be consistent with the Louisiana Coastal Resources Program as required in Section 307(c)(1)(2) of the Coastal Zone Management Act of 1972, as amended. Coastal Zone Consistency No. C910024."

(e) Louisiana Department of Wildlife and Fisheries responded by letter on 20 November 1990. No rare, threatened or endangered species or critical habitat were found within the project area.

(f) A Section 404(b)(1) evaluation and a Section 401 water quality certificate were not obtained because the proposed action does not impact wetlands or waters of the United States.

CELMN-ED-SP
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

(5) On 22 October 1991, the Planning Division addressed a letter to the State Historic Preservation Office (SHPO) regarding the effects of project impacts to significant cultural resources. The letter stated that the action will not affect significant cultural resources and no further cultural resources investigations are required. The SHPO chose not to reply within the afforded time, indicating their agreement with our findings.

4. The proposed disposition of CECW-B comments shown in Enclosure 7 to the 4th End is as follows:

a. Comment para 2. Concur. A "buy-out" of the mitigation requirement will not be proposed.

b. Comment para 3. Concur. A lump-sum payment for mitigation will not be proposed. First costs will be based on actual costs incurred for the construction of the mitigation works, subject to the cost cap. Payments for OMRR&R will be made annually unless specific Congressional authority for lump-sum payments is granted.

c. Comment para 4. Section 204 authority is not applicable. The authority for the Government to reimburse the local sponsor for the Government's share of the mitigation costs is the 2d Supplemental Appropriations Act of 1985.

d. Comment para 5. Based on directions from Dr. Ed Dickey of the ASA (CW) office, credit for the completed mitigation works at the East Pointe-a-la-Hache Water Treatment Plant will be allowed. The authority for Dr. Dickey's decision is the 2dSupplemental Appropriations Act of 1985.

WE Tickner 4/10/92

W. EUGENE TICKNER
Chief, Engineering Division

12 Encls (16 cys)
wd 2-7.
Added 5 encls
8-11. as
12. CELMN-LC basic dtd 8/22/91
w/1st End & encl

CELMV-ED-PG (CELMN-ED-SP/17 Jul 1990) (1105-2-10c) 5th End
Mr. Burttschell/eb/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080

23 DEC '91

FOR Commander, New Orleans District, ATTN: CELMN-ED-SP

1. Referred for response to 4th End comments.

2. In para 1 of the 4th End, reference is made to a meeting, if necessary, to resolve issues. Mr. John Burttschell (601-634-7246) is the LMVD POC for the meeting.

FOR THE COMMANDER:

7 Encls nc

for William K. Hill
FRED H. BAYLEY III
Director of Engineering

MEMORANDUM FOR RECORD

SUBJECT: Mississippi River Ship Channel, Meeting on 1/6/92, Discussion on HQUSACE and WLRC comments on GDM Supplement No. 6, Saltwater Intrusion Mitigation

On 6 January 1992, a meeting was held at New Orleans District to discuss comments by HQUSACE and the Washington Level Review Center (WLRC) on GDM Supplement No. 6 for saltwater intrusion mitigation caused by deepening the Mississippi River to 45 feet. HQUSACE, WLRC, LMVD, and New Orleans District representatives participated in the meeting. A roster of attendees is attached.

The proposed disposition of CECW-EP-W 4th End comments dated 10 Dec 1991, (Attachment 1 to this MFR) as agreed upon at the meeting, is as follows:

Comment 3a. - The costs for barging for the 45' channel are based on the increase in duration of saltwater intrusion caused by the deeper channel. The costs incurred during the 1988 event were applied to that duration to determine the annual cost of barging. The cost for barging in GDM Supplement No. 6 included inflation. The barging costs will be recalculated without inflation and the annual equivalent cost will be computed.

Comment 3b. - The basic authority for the local sponsor to perform OMRR&R and for the Government to reimburse the local sponsor for Government's share of these costs is the 2nd Supplemental Appropriations Act of 1986. This Act provides that the project will be implemented under "terms and conditions acceptable to the Secretary." Sole-source contracts will not be involved. A more detailed description of the OMRR&R responsibilities will be shown in the supplemental LCA.

The disposition of CECW-B comments (Attachment 2 to this MFR) shown in Encl 2 to the 4th End, as agreed upon at the meeting, is as follows:

Comment 2. - Concur. A "buy-out" of the mitigation requirement will not be proposed. No further response is required.

Comment 3. - Concur. A lump-sum payment for mitigation will not be proposed. First costs will be based on actual costs incurred for the construction of the mitigation works, subject to the cost cap. Payments for OMRR&R will be made annually unless specific Congressional authority for lump-sum payments is granted. No further response is required.

Encl 8.

Comment 4. - Section 204 authority is not applicable. The authority for the Government to reimburse the local sponsor for the Government's share of the mitigation costs is the 2nd Supplemental Appropriations act of 1985.

Comment 5. - Based on directions from Dr. Ed Dickey of the ASA(CW) office, credit for the completed mitigation works at the East Pointe-a-la-Hache water treatment plant will be allowed. The authority for Dr. Dickey's decision is the 2nd Supplemental Appropriations Act of 1985. No further response is required.

The disposition of the WLRC comments (Attachment 3 to this MFR) shown in Encl 1 to the 4th End, as agreed upon at the meeting, is as follows:

Comment 1a. - It was agreed that since the facilities are required for mitigation, any additional operation by the sponsor to improve drinking water quality would be incidental. Therefore, initial costs need not be allocated between mitigation and water supply. (However, only OMRR&R costs attributable to mitigation would be repaid by the Government.) No further response is required.

Comment 1b. - The Government is committed in the Chief's Report and the original LCA to correct adverse effects on drinking water supply. Conservation does not do that and will not be proposed as alternative mitigation measures. No further response is required.

Comment 1c. - It was agreed at the meeting that we have a responsibility to fully mitigate for the effects of increased saltwater intrusion caused by the project. No incremental costs are needed. No further response is required.

Comment 1d. - Concur. The average annual costs used for selecting the least-cost alternative to the Plaquemines Parish plan will not be based on inflated values. However, price inflation will be reflected in the cost cap.

Comment 1e. - An estimate for a reservoir to mitigate for the 45' channel will be provided. This cost and the cost of barging water will be compared to the cost of improvements to the Plaquemines Parish water system. The least cost alternative to the Plaquemines Parish plan will be used as a cost cap for the Federal interest in mitigation.

Encl 8

Comment 1f. - The source of the estimate of the projected increase in the water supply needs of the Parish is the New Orleans - Baton Rouge Metropolitan Area Report on Estimated Population Growth. An explanation of why those projections are still considered accurate will be provided.

Comment 1g. - A detailed estimate for the least cost alternative will be provided. This estimate does not necessarily have to be an M-CASES estimate, but has to be detailed enough with strong back-up to support its use as the Federal cost cap.

Comment 2. - Updated environmental compliance documentation will be provided.

WLRC listed five additional comments that had been previously resolved during a telephone conference (Attachment 4 to this MFR). These were briefly discussed at this meeting and it was agreed that the disposition of those comment as outlined in the WLRC memorandum was acceptable.

4 Attachments

Encl. 83

ATTENDANCE RECORD

DATE(S)	SPONSORING ORGANIZATION	LOCATION
6 Jan 92	New Orleans District	Room 386

PURPOSE Mississippi River Ship Channel - Mitigation Plan
Discussion of comments by HQUSACE and WLRC

PARTICIPANT REGISTER *

NAME	ORGANIZATION	TELEPHONE NUMBER
Joe Dicharry	NOD, Project Management	(504) 862-1929
Cletis R Wagahoff	DDE/PM NOD	2204
Mike Diffley	DE NOD	2204
Rod Pittman	Programs Mgt NOD	2846
Charles Hill	LMVD	(601) 634-5844
Ernest Barton	NOD; Engr Div	504-862-2608
Rich Manguno	Economics BR NOD	(504) 862-1923
[illegible]	Plan. Div, Econ Br, NOD	(504) 862-1906
[illegible]	[illegible]	[illegible]
Joey Dykes	Plan Form Br, NOD	504-862-2507
Scott Clark	Env. Proj Sec, Plng Div, NOD	504-862-2521
Burnell Thibodeaux	Engr Div H&HBr NOD	504-862-2445
Bill Garrett	HQUSACE	202-272-8514
Bill Arrington	CELMV-ED-TE	601-634-5924
Cecil Grisham	CELMV-ED-TC	601-634-5929
Jim Miskelley	CELMV-ED-PG	601-634-5922
John H. Burttschell	CELMV-ED-PG	601-634-7246
Gene Brown	CELMV-PD-R	601-634-5850
Mark Mugler	CECW-LM	202-272-0287
Hugh E. Wright	CECW-P	
W Eugene Tickner	C/ED NOD	504-862-2240
Bob Fairless	CELMN-ED-E	504-862-1930
Don Gund	CEWLR-M	703-355-2471

LMV FORM 583-R
(replaces LMN 906)
AUG 87

* If you wish to be furnished a copy of the attendance record, please indicate so next to your name.

PROPONENT: CELMV-IM

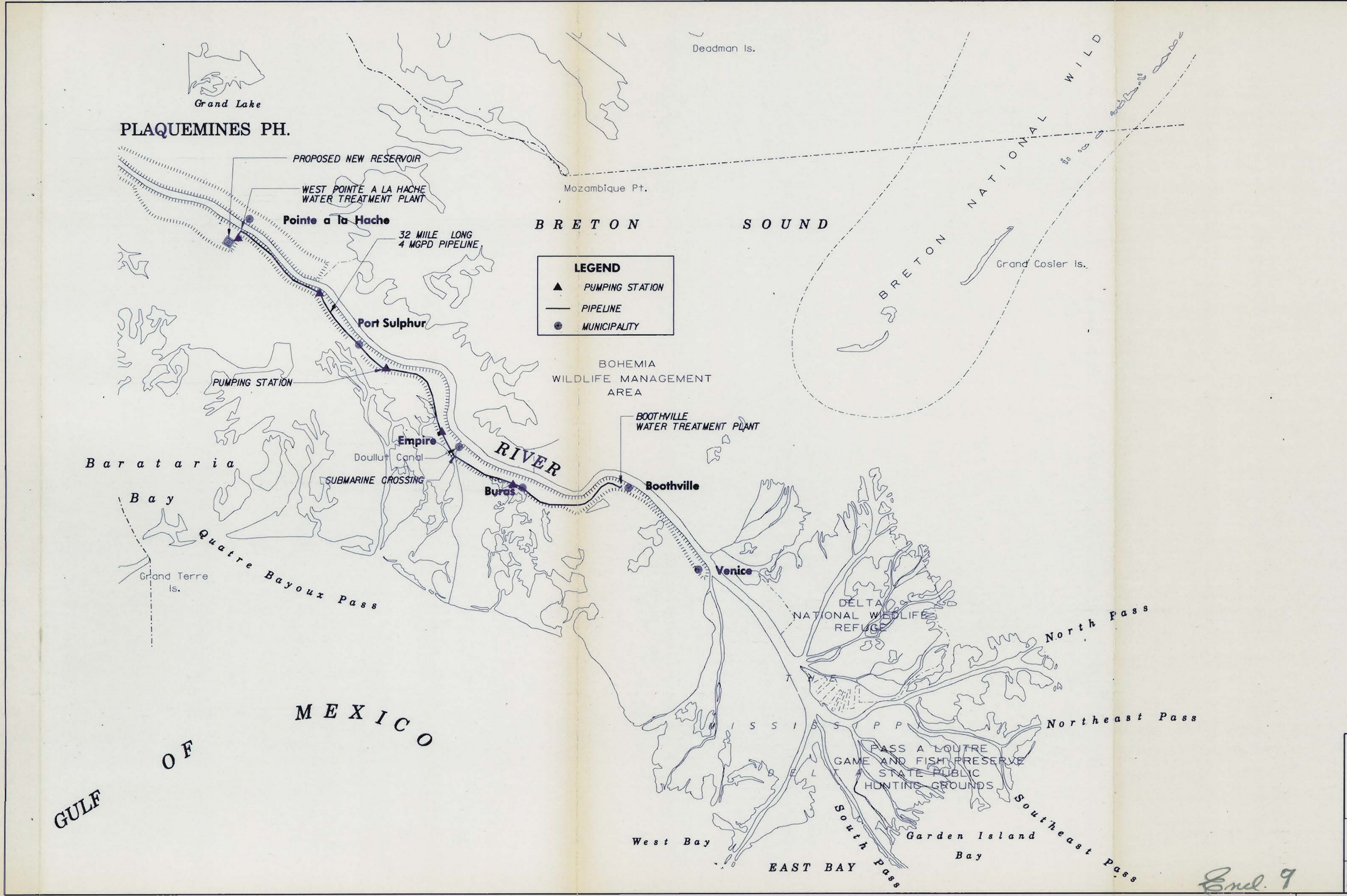
Encl. 84

PARTICIPANT REGISTER (CONTINUED)

NAME	ORGANIZATION	TELEPHONE NUMBER
Dean Caldwell	CELMVPD-A	634-5902
CHRIS ACCARDO	CELMN-OD	862-2320
John Bivona	CELMN-ED-C	862-2730
FRED SCHILLING	CELMN-OD	862-2321
RONALD R. ELMER	CELMN-ED-SP	862-2618
Alfred C Naomi	CELMN-LC	862-2377

LMV FORM 583-R

Encl 8₅



WEST BANK SALTWATER MITIGATION

RESERVOIR PLAN
PIPELINE
FROM POINTE A LA HACHE
TO BOOTHVILLE

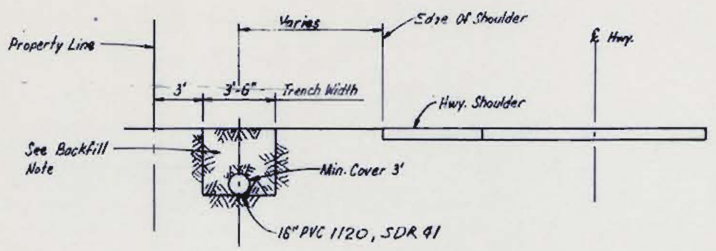
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: D.C.S.
DRAWN BY: G.P.W.
CHECKED BY: D.C.S.

PLOT SCALE:
PLOT DATE: MAR. 92
DATE: MAR. 92
CADD FILE: SALT1.DGN
FILE NO. H-2-30794

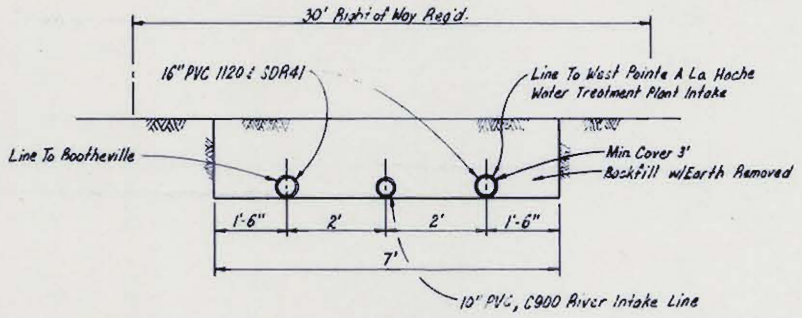
Encl. 9

PLATE A-1

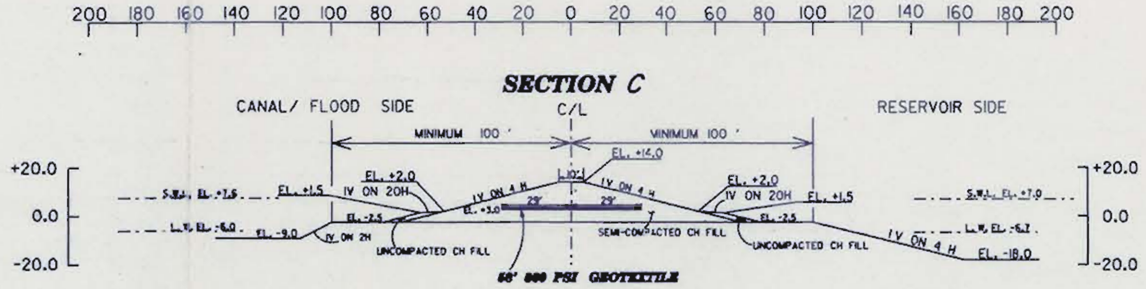


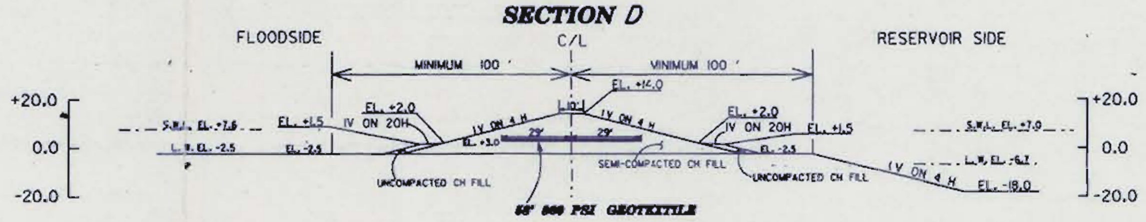
Note: Backfill w/Earth Removed Except From Pipeline Mi. 9 To Mi. 11.5 (Port Sulphur Area). Backfill Pipe Trench With Trucked In River Sand.

"A" TYPICAL PIPELINE SECTION ALONG HWY.
N.T.S.



CROSS SECTION B
N.T.S.





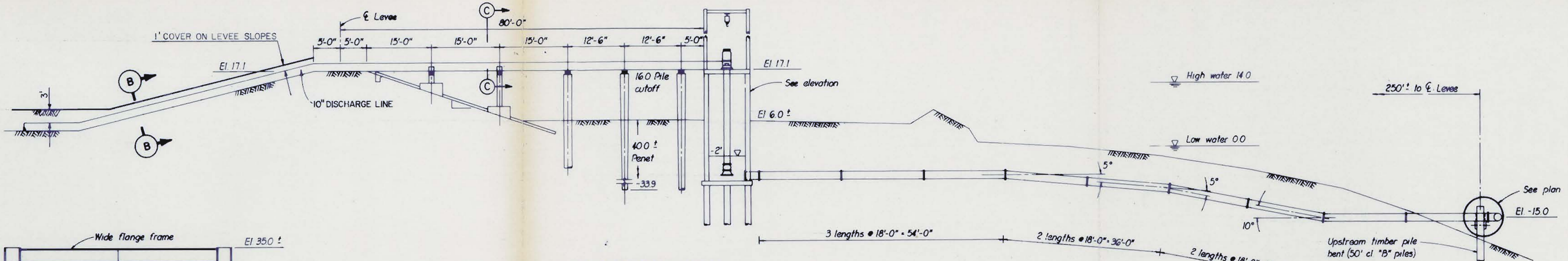
WEST BANK SALTWATER MITIGATION

RESERVOIR PLAN
RESERVOIR

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

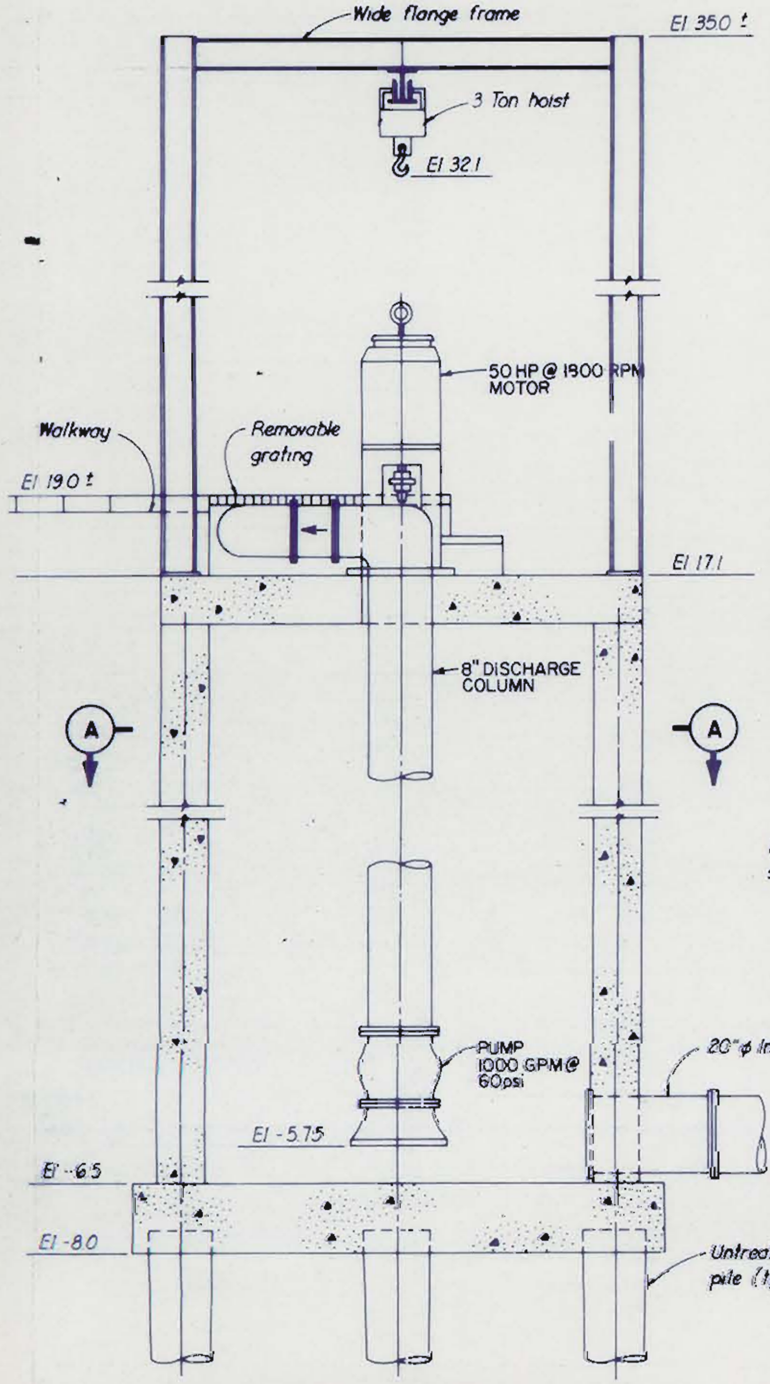
DESIGNED BY: D.C.S. DRAWN BY: G.P.W. CHECKED BY: D.C.S.	PLOT SCALE: 1	PLOT DATE:	CADD FILE:
	DATE: FEB. 1992		FILE NO. H-2-30794

PLATE A-2



ELEVATION VIEW

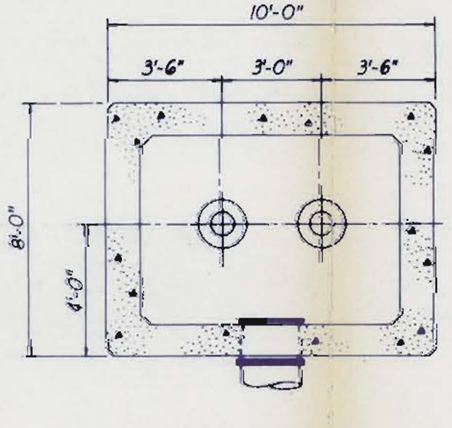
SCALE 1" = 10'



NOTE: Section (A) shown rotated 90°

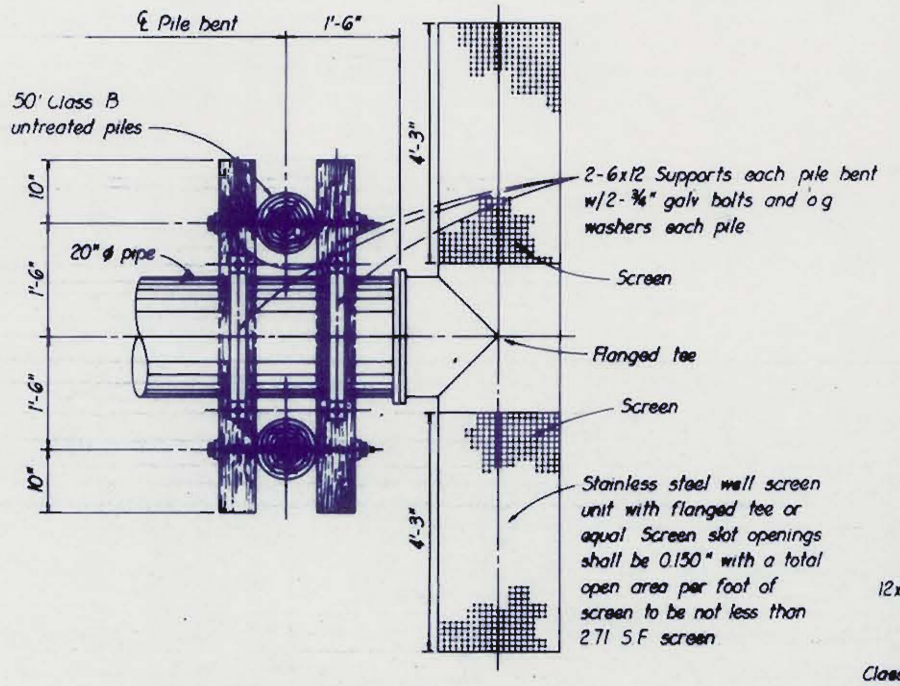
ELEVATION OF WATER INTAKE

SCALE : 1" = 4'



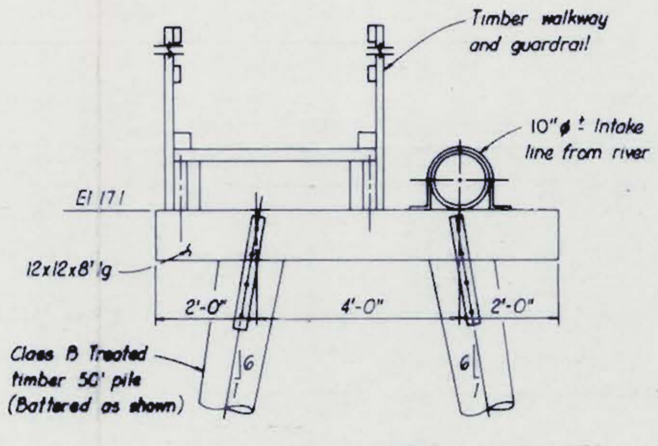
SECTION (A)

SCALE : 1" = 6'



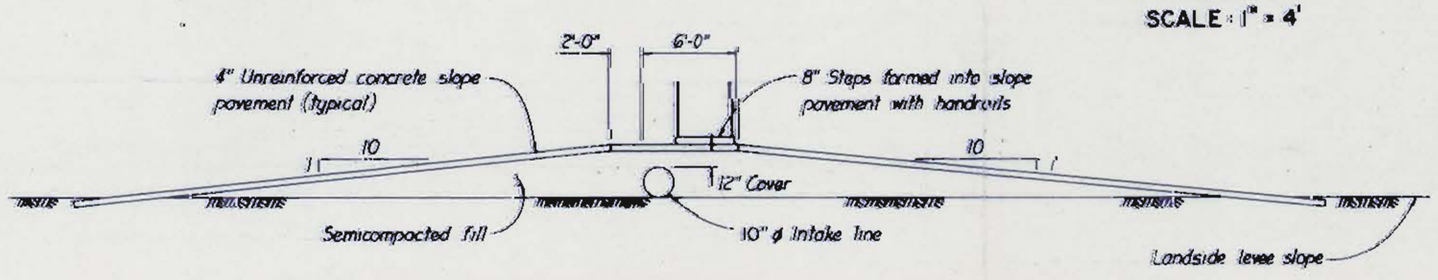
INTAKE PLAN

NTS



SECTION (C)

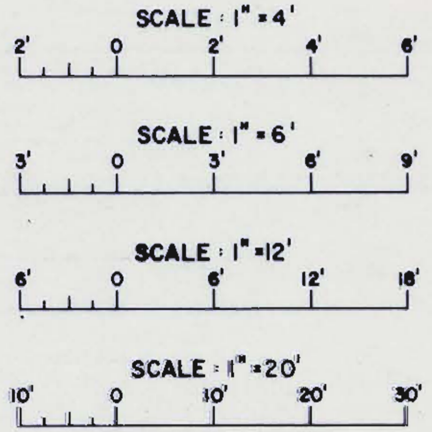
SCALE : 1" = 4'



STAIRWAY / DISCHARGE LINE ON LEVEE SLOPE

SECTION (B)

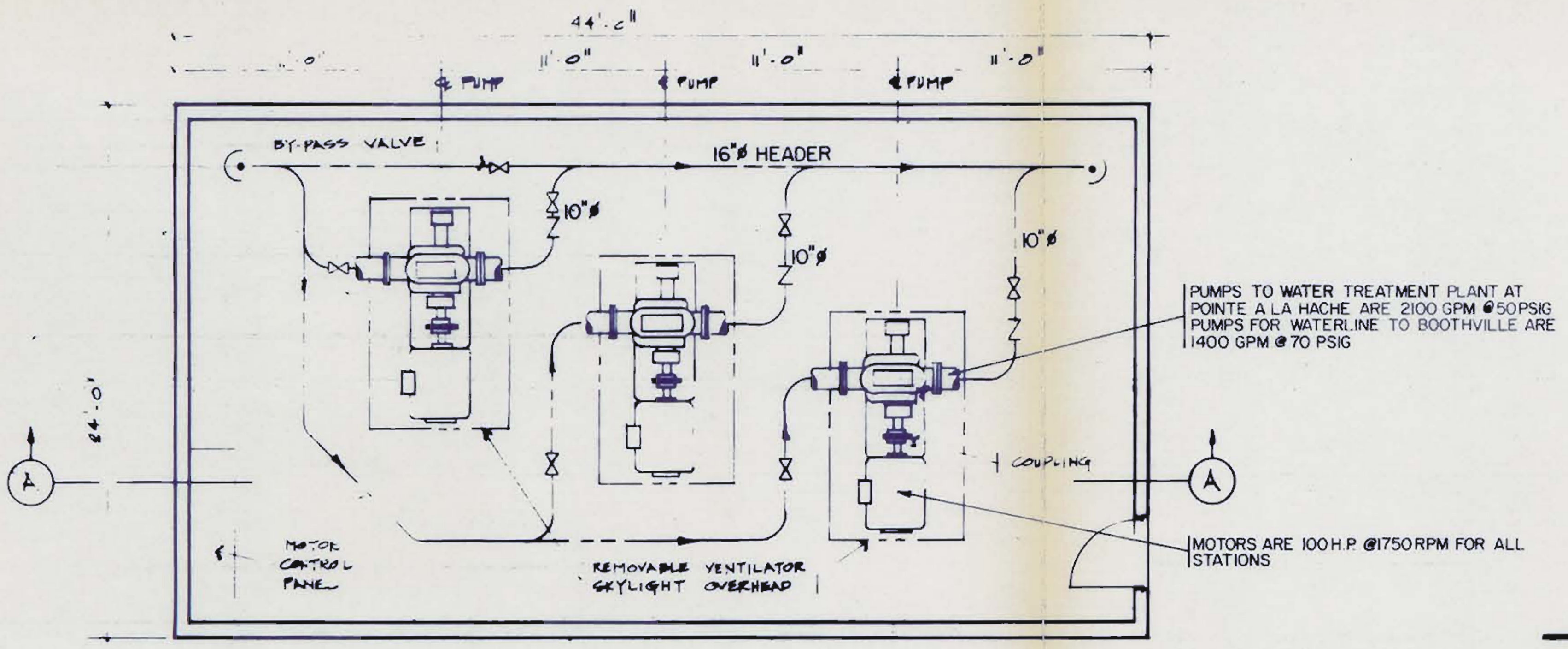
SCALE : 1" = 12'



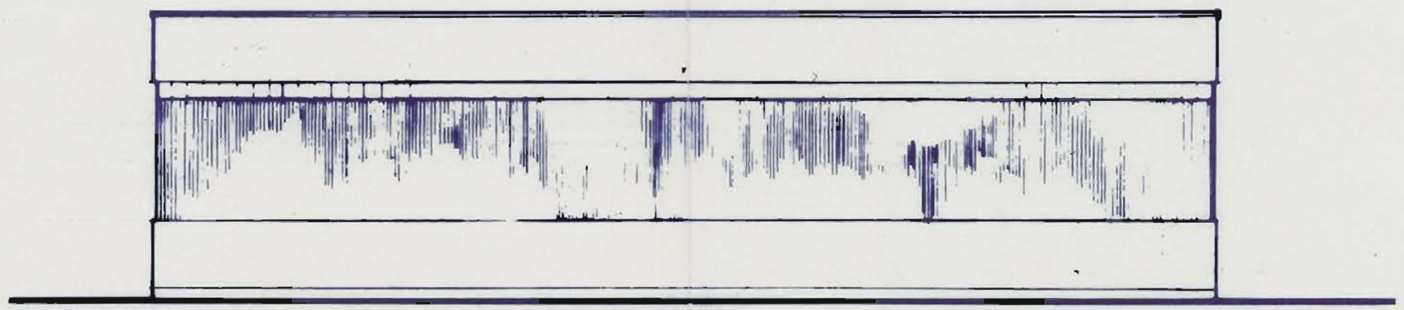
WEST BANK SALTWATER MITIGATION
RESERVOIR PLAN
INTAKE STRUCTURE

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

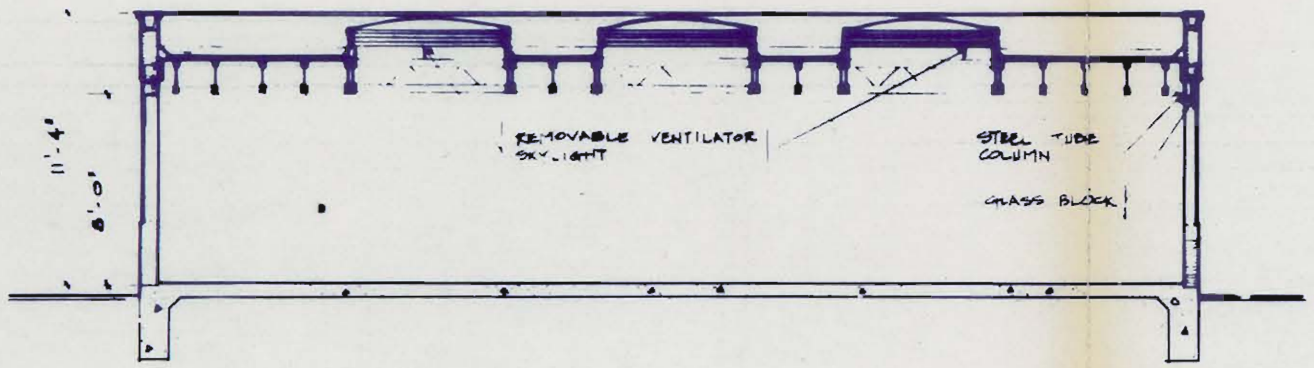
DESIGNED BY: D.C.S.	PLOT SCALE: 1	PLOT DATE:	CADD FILE:
DRAWN BY: G.P.W.			FILE NO.
CHECKED BY: D.C.S.	DATE: FEB. 1992		H-2-30794



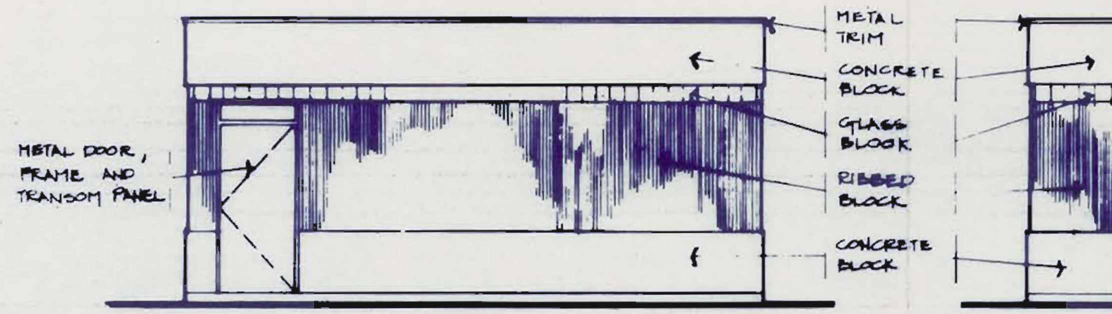
FLOOR PLAN
1/8" = 1'-0"



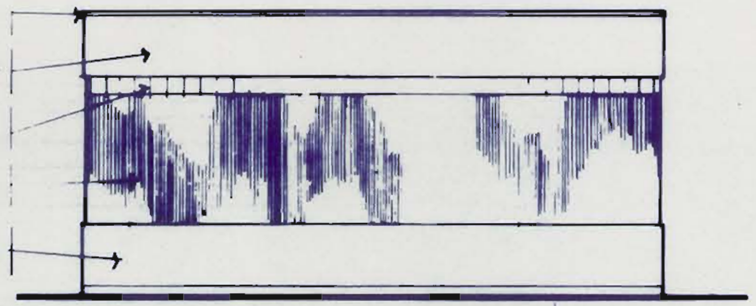
FRONT ELEVATION
REAR ELEVATION SIMILAR
1/8" = 1'-0"



SECTION 'A'
1/8" = 1'-0"



RIGHT ELEVATION
1/8" = 1'-0"



LEFT ELEVATION
1/8" = 1'-0"

SCALE: 1/8" = 1'-0"
5 0 5

NOTE:
PILES NOT SHOWN FOR CLARITY.

WEST BANK SALTWATER MITIGATION
RESERVOIR PLAN
PUMP STATIONS
TO POINTE A LA HACHE
AND BOOTHVILLE

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: D.C.S. DRAWN BY: G.P.W. CHECKED BY: D.C.S.	PLOT SCALE: 1	PLOT DATE:	CADD FILE:
	DATE: FEB. 1992		FILE NO. H-2-30794

IDENTIFICATION
NUMBER 20226R

REAL ESTATE COST ESTIMATE
MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
SALTWATER INTRUSION MITIGATION
PLAQUEMINES PARISH, LOUISIANA

Estimate of Costs (Date of Value - February 1992)

	Acres	Unit Value	Total Value
(a) Lands and Damages			
Fee			
Agricultural	82.64	$5,000	$413,200
Fee (Excluding Minerals)			
Pumping Station Sites (5)		$750/Site	3,750
Perpetual Utility Easement			
Agricultural	0.93	$5,000*20%	930
Drainage Canal		$500	500
Improvements			0
Severance Damage			0
Total (R)			$418,000
(b) Contingencies (25%)			105,000
(c) Acquisition Costs			
Federal			5,000
Non-Federal			26,000
(d) PL 91-646			0
(e) Total Estimated Real Estate Costs (R)			$554,000

NOTE:

Most of the pipeline will be placed under existing road right-of-way.

Acquisition costs are a prorated share of the acquisition costs on the Chart of Accounts dated 14 June 1991 which was prepared for another alternative in which the pipeline would run between Belle Chasse and Fort Jackson.

Judith Y. Gutièrrez
Judith Y. Gutièrrez
Appraiser
26 February 1992

Approved By:

Joseph G. Kopec
Joseph G. Kopec
Chief, Appraisal Branch
26 February 1992

Encl 10,

SALTWATER MITIGATION PLAN
CONSTRUCTION COST ESTIMATE 3/92

A. RESERVOIR AT POINTE A LA HACHE (2nd Lift, 1½ years after 1st Lift)

ITEM NO.	DESCRIPTION	QTY.	
1	Mobilization and Demoblization	LS	25,000
2	Clear and Grubbing (light)	27 AC	8,100
3	Seed and Fertilize	29 AC	14,500
4	Mulch	22 AC	22,000
5	Semicompacted fill		
	½ Mi. Haul	437,000 CY	1,660,600
	½ Opp. Cast and ½ Haul ¼ Mi.	62,200 CY	174,200
6	Geotextile 860psi	44,920 SY	566,000
7	Gabions	8,800 SY	264,000
		SUBTOTAL	$2,734,400
	20% Contingencies		550,000
		SUBTOTAL	$3,284,400

B. PUMPING STATION FROM RESERVOIR TO POINTE A LA HACHE AND ASSOCIATED PIPELINE:

ITEM NO.	DESCRIPTION	QTY.	
1	Pumps: 2100 GPM @ 50 psi	3	22,875
2	100 Hp @ 1750 rpm electric motors w/ motor controls.	3	24,450
3	44'X 24' concrete bldg. as per drawing	1	42,000
4	10" Butterfly Valves	6	7,164
5	10" Check Valves	3	3,939
6	16" Butterfly	5	17,345
7	16" PVC 1120, SDR 41 pipe	8,500'	195,500
8	60' Hwy. Crossing for 16" PVC water line w/24"X 3/8" wall steel casing.	1	12,000
		SUBTOTAL	$325,273
	25% Contingencies		81,000
		SUBTOTAL	$406,273

C. PUMPING STATIONS FROM RESERVOIR AT POINTE A LA HACHE TO BOOTHVILLE AND ASSOCIATED PIPELINE:

ITEM NO.	DESCRIPTION	QTY	
1	Mobilization and Demobilization	LS	100,000
2	Pumps: 1400 GPM @ 70 psi	15	64,695
3	100 Hp @ 1750 rpm electric motors w/motor controls	15	122,250
4	Concrete Bldg., 44'X 24' pile founded as per drawing.	5	335,000
5	Butterfly Valves, 10"	30	35,820
6	Check Valves, 10"	15	19,695
7	Butterfly Valve, 16"	85	294,865
8	Water Line, 16" PVC 1120, SDR 41 w/ 3' earth cover. Backfill with material removed.	153,000'	3,519,000
9	Water Line, 16" PVC 1120, SDR 41 w/ 3' earth cover. Backfill with new material.	10,000'	274,700
10	Hwy. Crossing, 60' lg for 16" PVC water line w/24"X 3/8" wall steel casing.	33	396,000
11	Water Line, 16" PVC 1120, SDR41 w/ 3' total cover and with 8" Asphalt top cover.	5000'	215,125
12	Overhead canal crossing, w/72'of 16" ductile iron pipe including 2 supporting pile bents.	1	10,000

Encl 10c

13	Submerge crossing at the Dullout Canal, twin 16" ductile steel pipelines buried 6' below channel bed, 650' lg crossing.	1	782,500
		SUBTOTAL	$6,169,650
		25% Contingencies	1,542,000
		SUBTOTAL	$ 7,711,650

D. WATER INTAKE STATION FROM RIVER TO POINTE A LA HACHE RESERVOIR:

ITEM	DESCRIPTION	QTY	
1	Pumps: 1000 GPM @ 60 psi vertical pumps w/50 Hp @ 1750 rpm electric motors	2	20,000
2	3 Ton overhead crane	1	4,375
3	165', 20" D.P.I. w/ball joints and 20" D.P.I. "T" style intake strainer	1	91,000
4	10" sch. 40 PVC pipe	5700'	72,675
5	8" Check Valves	2	1,538
6	Pump Structure as per drawing	1	65,000
7	Pile Cluster, for river intake pipe protection consisting of 6- 80' treated timber piles battered on 10V on 1H, tied w/ 20 wraps of 5/8" galv. cable; galv. sht. metal capped and provided w/solar nav. light and 10' galv. ladder attached.	2	36,000
8	60' Hwy. Crossing for 10" PVC water line w/18"X 1/4" wall steel casing.	1	10,000
		SUBTOTAL	$300,588
		25% Contingencies	75,000
		SUBTOTAL	$375,588
		SUBTOTAL	$11,777,911
		E&D and S&A 14%	1,649,000
		TOTAL	$13,426,911

RESERVOIR AT POINTE A LA HACHE (2nd Lift, 1½ years after 1st Lift)

ITEM NO.	DESCRIPTION	QTY.	
1	Mobilization and Demoblization	LS	25,000
2	Clear and Grubbing (light)	63 AC	18,900
3	Seed and Fertilize	66 AC	33,000
4	Mulch	60 AC	60,000
5	Semicompacted fill	252,120 CY	958,000
6	Gabions	7,330 SY	219,900
		SUBTOTAL	$1,314,800
		20% Contingencies	263,000
		SUBTOTAL	$1,577,800
		E&D and S&A 14%	221,000
			$1,798,800

Encl 10₃

SALTWATER MITIGATION PLAN
Operation & Maintenance Cost 3/92

REPLACEABLE EQUIPMENT:

PUMPING STATION FROM RESERVOIR TO POINTE A LA HACHE AND ASSOCIATED PIPELINE:

ITEM NO.	DESCRIPTION	QTY.	
1	Pumps: 2100 GPM @ 50 psi	3	22,875
2	100 Hp @ 1750 rpm electric motors w/Motor controls for 3-100 Hp motors	3	24,450
4	10" Butterfly Valves	6	7,164
5	10" Check Valves	3	3,939
6	16" Butterfly	5	17,345

PUMPING STATIONS FROM RESERVOIR AT POINTE A LA HACHE TO BOOTHVILLE AND ASSOCIATED PIPELINE:

ITEM NO.	DESCRIPTION	QTY	
1	Pumps: 1400 GPM @ 70 psi	15	64,695
2	100 Hp @ 1750 rpm electric motors Motor controls for 3-100 Hp motors	15	122,250
4	10" Butterfly Valves	30	35,820
5	10" Check Valves	15	19,695
6	16" Butterfly Valve	85	294,000

WATER INTAKE STATION FROM RIVER TO POINTE A LA HACHE RESERVOIR:

ITEM	DESCRIPTION	QTY	
1	Pumps: 1000 GPM @ 60 psi vertical pumps 50 Hp @ 1750 rpm electric motors	2	20,000
2	3 Ton overhead crane	1	4,375
3	8" Check Valves	2	1,538

TOTAL EQUIP. $638,146

MATERIAL COST: (PRESENT COST LEVEL MAR'92) = $638,146

Replacement Time	Percentage Replaced		Cost $
5YR	2	TOTAL EQUIP. X .02 =	12,700
15YR	10	TOTAL EQUIP. X .10 =	64,000
25YR	15	TOTAL EQUIP. X .15 =	96,000
35YR	22	TOTAL EQUIP. X .22 =	140,000
45YR	35	TOTAL EQUIP. X .35 =	223,000

LABOR:

	Man days/yr	Cost/man day	Total
Supt.	20	$192	$3840
Laborers for Monthly Operation	60	$108	$6480
Laborers grass cutting and trimming	60	$108	$6480
		TOTAL LABOR/yr	$16,800

Electrical Consumption: $100.00/hr of operation.
Maintenance Elec. Consumption: 2hr./mo. X 12mo. X $100/hr. = $2400.00/yr

Add 25% to the above numbers for contingencies

Encl 10$_4$

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO BOOTHVILLE

2 MGD FOR 15 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.50 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.40 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	2,000,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	13 BARGES
USE	13 BARGES (180X54X12) WITH 2 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:

BARGES	13 EA @	15 DAYS @	$350 /DAY =	$68,250
TUGS	2 EA @	15 DAYS @	$2,500 /DAY =	$75,000

LABOR:

LABORERS	13 EA @	360 HRS/LAB. @	$9.00 /HOUR =	$42,120
FOREMAN	1 EA @	360 HRS @	$13.50 /HOUR =	$4,860

MISC.

CLEANUP/SURVEY BARGES @	$5,000 /BARGE =	$65,000
PUMPS, HOSES, MISC. SUPPLY @	$525 /DAY	$7,875
VALVES, CONNECTIONS @	$50,000 LUMP SUM	$50,000
	SUBTOTAL	$313,105
WITH MARK-UPS (O.H., PROFIT, BOND)	1.35	$422,692
	USE	$425,000

Encl 11,

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO BOOTHVILLE

2.5 MGD FOR 15 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.50 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.40 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	2,500,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	17 BARGES
USE	17 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:				
BARGES	17 EA @	15 DAYS @	$350 /DAY =	$89,250
TUGS	3 EA @	15 DAYS @	$2,500 /DAY =	$112,500
LABOR:				
LABORERS	17 EA @	360 HRS/LAB. @	$9.00 /HOUR =	$55,080
FOREMAN	1 EA @	360 HRS @	$13.50 /HOUR =	$4,860
MISC.				
CLEANUP/SURVEY BARGES @			$5,000 /BARGE =	$85,000
PUMPS, HOSES, MISC. SUPPLY @			$525 /DAY	$7,875
VALVES, CONNECTIONS @			$50,000 LUMP SUM	$50,000
			SUBTOTAL	$404,565
WITH MARK-UPS (O.H., PROFIT, BOND)			1.35	$546,163
			USE	$550,000

Encl 11

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO BOOTHVILLE

3 MGD FOR 15 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.50 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.40 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	3,000,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	20 BARGES
USE	20 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:

BARGES	20 EA @	15 DAYS @	$350 /DAY =	$105,000
TUGS	3 EA @	15 DAYS @	$2,500 /DAY =	$112,500

LABOR:

LABORERS	20 EA @	360 HRS/LAB. @	$9.00 /HOUR =	$64,800
FOREMAN	1 EA @	360 HRS @	$13.50 /HOUR =	$4.860

MISC.

CLEANUP/SURVEY BARGES @	$5,000 /BARGE =		$100,000
PUMPS, HOSES, MISC. SUPPLY @	$525 /DAY		$7,875
VALVES, CONNECTIONS @	$50,000 LUMP SUM		$50,000
		SUBTOTAL	$445,035
WITH MARK-UPS (O.H., PROFIT, BOND)		1.35	$600,797
		USE	$605,000

Encl 11/3

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO BOOTHVILLE

4 MGD FOR 15 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.50 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.40 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	4,000,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	27 BARGES
USE	27 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:				
BARGES	27 EA @	15 DAYS @	$350 /DAY =	$141,750
TUGS	3 EA @	15 DAYS @	$2,500 /DAY =	$112,500
LABOR:				
LABORERS	27 EA @	360 HRS/LAB. @	$9.00 /HOUR =	$87,480
FOREMAN	1 EA @	360 HRS @	$13.50 /HOUR =	$4,860
MISC.				
CLEANUP/SURVEY BARGES @			$5,000 /BARGE =	$135,000
PUMPS, HOSES, MISC. SUPPLY @			$525 /DAY	$7,875
VALVES, CONNECTIONS @			$50,000 LUMP SUM	$50,000
			SUBTOTAL	$539,465
WITH MARK-UPS (O.H., PROFIT, BOND)			1.35	$728,278
			USE	$730,000

Encl 11

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO POINT A LA HACHE

3 MGD FOR 5 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES: 2.00 DAYS

NO. OF TRIPS PER DAY PER BARGE: .50 TRIPS/DAY/BARGE

ASSUME EACH BARGE HOLDS +/-: 300,000 GALLONS

QTY. HAULED PER DAY PER BARGE: 150,000 GAL/DAY

RATE OF LOADING: 3,000,000 GALLONS/DAY

NO. OF BARGES REQUIRED: 20 BARGES

USE 20 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:

BARGES	20 EA @	5 DAYS @	$350 /DAY =	$35,000
TUGS	3 EA @	5 DAYS @	$2,500 /DAY =	$37,500

LABOR:

LABORERS	20 EA @	120 HRS/LAB. @	$9.00 /HOUR =	$21,600
FOREMAN	1 EA @	120 HRS @	$13.50 /HOUR =	$1,620

MISC.

CLEANUP/SURVEY BARGES @	$5,000 /BARGE =	$100,000
PUMPS, HOSES, MISC. SUPPLY @	$525 /DAY	$2,625
VALVES, CONNECTIONS @	$50,000 LUMP SUM	$50,000
	SUBTOTAL	$248,345
WITH MARK-UPS (O.H., PROFIT, BOND)	1.35	$335,266
	USE	$340,000

Encl 1/5

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO POINT A LA HACHE

3.75 MGD FOR 5 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES: 2.00 DAYS

NO. OF TRIPS PER DAY PER BARGE: .50 TRIPS/DAY/BARGE

ASSUME EACH BARGE HOLDS +/-: 300,000 GALLONS

QTY. HAULED PER DAY PER BARGE: 150,000 GAL/DAY

RATE OF LOADING: 3,750,000 GALLONS/DAY

NO. OF BARGES REQUIRED: 25 BARGES

USE 25 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:				
BARGES	25 EA @	5 DAYS @	$350 /DAY =	$43,750
TUGS	3 EA @	5 DAYS @	$2,500 /DAY =	$37,500
LABOR:				
LABORERS	25 EA @	120 HRS/LAB. @	$9.00 /HOUR =	$27,000
FOREMAN	1 EA @	120 HRS @	$13.50 /HOUR =	$1,620
MISC.				
CLEANUP/SURVEY BARGES @			$5,000 /BARGE =	$125,000
PUMPS, HOSES, MISC. SUPPLY @			$525 /DAY	$2,625
VALVES, CONNECTIONS @			$50,000 LUMP SUM	$50,000
			SUBTOTAL	$287,495
WITH MARK-UPS (O.H., PROFIT, BOND)			1.35	$388,118
			USE	$390,000

Encl 11

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO POINT A LA HACHE

4.5 MGD FOR 5 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.00 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.50 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	4,500,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	30 BARGES
USE	30 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:				
BARGES	30 EA @	5 DAYS @	$350 /DAY =	$52,500
TUGS	3 EA @	5 DAYS @	$2,500 /DAY =	$37,500
LABOR:				
LABORERS	30 EA @	120 HRS/LAB. @	$9.00 /HOUR =	$32,400
FOREMAN	1 EA @	120 HRS @	$13.50 /HOUR =	$1,620
MISC.				
CLEANUP/SURVEY BARGES @			$5,000 /BARGE =	$150,000
PUMPS, HOSES, MISC. SUPPLY @			$525 /DAY	$2,625
VALVES, CONNECTIONS @			$50,000 LUMP SUM	$50,000
			SUBTOTAL	$326,645
WITH MARK-UPS (O.H., PROFIT, BOND)			1.35	$440,971
			USE	$445,000

Encl 11,

REASONABLE CONTRACT ESTIMATE WORKSHEET

Project: PLAQUEMINES PARISH FRESHWATER MITIGATION

BARGING FRESHWATER TO POINT A LA HACHE

6 MGD FOR 5 DAYS

PLAN OF OPERATION

This item is for all equipment, labor, materials, and supplies necessary for the barging of freshwater to Plaquemines Parish, LA.

ASSUME ONE TRIP TAKES:	2.00 DAYS
NO. OF TRIPS PER DAY PER BARGE:	.50 TRIPS/DAY/BARGE
ASSUME EACH BARGE HOLDS +/-:	300,000 GALLONS
QTY. HAULED PER DAY PER BARGE:	150,000 GAL/DAY
RATE OF LOADING:	6,000,000 GALLONS/DAY
NO. OF BARGES REQUIRED:	40 BARGES
USE	40 BARGES (180X54X12) WITH 3 TUGS (1,500 TO 2,000 HP)

EQUIPMENT:				
BARGES	40 EA @	5 DAYS @	$350 /DAY =	$70,000
TUGS	3 EA @	5 DAYS @	$2,500 /DAY =	$37,500
LABOR:				
LABORERS	40 EA @	120 HRS/LAB. @	$9.00 /HOUR =	$43,200
FOREMAN	1 EA @	120 HRS @	$13.50 /HOUR =	$1,620
MISC.				
CLEANUP/SURVEY BARGES @			$5,000 /BARGE =	$200,000
PUMPS, HOSES, MISC. SUPPLY @			$525 /DAY	$2,625
VALVES, CONNECTIONS @			$50,000 LUMP SUM	$50,000
			SUBTOTAL	$404,945
WITH MARK-UPS (O.H., PROFIT, BOND)			1.35	$546,676
			USE	$550,000

Encl 11/8

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

CELMN-LC 22 Aug 91

MEMORANDUM THRU Commander, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080, ATTN: CELMV-ED-PG

FOR Commander, HQUSACE, Washinton D. C., 20314-1000
ATTN: CECW-EP-W

SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Saltwater Intrusion Mitigation.

1. Our General Design Memorandum (GDM) Supplement entitled "Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, Saltwater Intrusion Mitigation, Supplement No. 6" was forwarded to your office for review on 9 Aug 91.

2. The proposed plan described in the GDM consists of five contracts to upgrade the existing water distribution system of Plaquemines Parish. Improvements to Plaquemines Parish water distribution system are required as mitigation for saltwater intrusion as a result of deepening the Mississippi River. All five contracts are required to fully mitigate for saltwater intrusion. However, completion of the first contract will close a gap in the existing system and will allow us to abandon the interim plan of barging freshwater to Plaquemines Parish when saltwater threatens the existing intake facilities in the area.

3. In 1988, as a result of extreme low water conditions, we implemented the interim plan and spent $1,400,000 for barging water. To eliminate the possibility of another such cost, we scheduled the first contract of the permanent plan to be complete before the low water period in 1992. Both the Louisiana Department of Transportation and Development (LDOTD - Local Sponsor) and Plaquemines Parish supported this schedule since both are anxious to eliminate barging requirements.

4. According to regulations, the GDM must be approved by your office before the Local Cooperation Agreement (LCA) is forwarded to you for review. Following this procedure, we estimate that a fully executed LCA will be complete in April 92. This schedule will prevent the first contract from being complete before the low water period in 1992 and therefore additional costs for barging water may be incurred.

Encl 12

CELMN-LC
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Saltwater Intrusion Mitigation.

5. An April 92 LCA execution date is unacceptable to LDOTD since this may result in arbitrage penalties incurred by the State. Bonds were sold by the State of Louisiana in Sept 90 for use on this project. Under federal law, this money must be spent in a timely manner, with certain percentages of the available funds spent every six months until all of the bond money is spent within two years. Any delays to our schedule will increase the arbitrage penalties required by the State.

6. To eliminate the possible need for barging water in 1992 and minimize the State's arbitrage penalties, the LCA must be fully executed by Jan 92. To accomplish this, Plaquemines Parish, through LDOTD, has agreed to begin preparing plans and specifications for the first contract before the LCA is executed provided we attempt to complete all reviews (including ASA(CW) review of the LCA) by Dec 91.

7. The review procedure described in paragraph 4 above will prevent us from completing all reviews by Dec 91. Therefore, to accomodate the requests of LDOTD and Plaquemines Parish, we request approval for an expedited concurrent GDM and LCA review by your office. We would expect to forward the draft LCA package to you no later than 30 days after approval of a concurrent review.

8. We would appreciate your position on this matter no later than 30 Sept 91 so that, if approved, Plaquemines Parish can begin their efforts and we can insure that the first contract will be complete before the next low water season.

FOR THE COMMANDER

Gerald J. Dicharry Jr.
for CLETIS R. WAGAHOFF
Deputy District Engineer
for Project Management

Encl 12

CEWRC-WLR-M (10-1-7a) 25 October 1991

MEMORANDUM FOR CECW-EP, ATTN: MR. BROTNOV

SUBJECT: Mississippi River Ship Channel - DM No. 1, Supplement No. 6

1. Reference memorandum CECW-EP, undated, same subject. WLRC comments are enclosed for your consideration.

2. Congress authorized and funded construction of a 45-foot navigation channel from the Gulf of Mexico to mile 181. The plan recommended in the subject GDM mitigates for salinity intrusion resulting from channel deepening. The mitigation measures consist of modifications to water supply treatment plants and Federal payments for annual operation, maintenance repair, and replacement costs throughout the 50-year economic life of the project.

3. Our initial review has been completed. Comments have been informally coordinated with the New Orleans District and Lower Mississippi Valley Division representatives. Enclosure 1 presents unresolved concerns and those comments where additional information will be provided as mutually agreed to during our coordination. Enclosure 2 addresses comments which have been satisfactorily resolved.

4. Our primary concerns with report content are (a) the lack of an incremental justification of mitigation measures; (b) inability to assess compliance with NEPA regulations; (c) Federal financial participation in plans which mitigate more than the incremental impacts of the project; and (d) the cost estimate.

5. Questions on the review comments can be discussed with Don Gund, WLRC review manager, 703-355-2471.

Encls

DONALD A. BANASHEK
Director, Washington Level
Review Center

Encl 12$_4$

Enclosure

Washington Level Review Center Comments - Unresolved

Mississippi River Ship Channel - DM No. 1, Supplement No. 6

1. **Perspective.** The time duration of chloride levels exceeding EPA standards increased when the Federal channel was deepened from 40 feet to 45 feet. According to appendix C, pages 3 and 11, the average duration when chlorides exceed standards if defined as 45 days annually, prior to deepening and 60 days annually after deepening at the Boothville water treatment plant. The peak duration is estimated to be 65 days with the navigation project. At the East and West Point-a-la-Hache plant, standards were not exceeded until channel deepening occurred. This deepening resulted in chloride levels exceeding EPA standards an estimated 5 days annually on average, with the peak being 10 days. To alleviate this condition, the recommended plan is a structural alternative designed to meet EPA chloride standards for projected population levels over a period of 50 years for both with and without project conditions. Selection of the recommended plan is based on local interests desire for a particular structural solution and the field determination that this alternative is the best cost solution.

Comment 1a, Federal Interest. It appears the recommended project is designed to meet EPA water quality standards for both the impacts of deepening the channel from 40 feet to 45 feet as well as adverse salinity conditions that were occurring prior to channel deepening. This approach to Federal participation in development of water treatment plants appears questionable without supporting documentation to justify expenditure of Federal funds. Notwithstanding the authorization history of this project, it is not mandatory that the Chief of Engineers recommend construction. Any recommendations must be based on sound engineering, economic, and environmental justification, in accordance with adopted water resources principles and standards, and Corps policies and procedures for development of water resource projects. The report does not explain why Federal funds should be expended to enhance water quality conditions for water supply use, for adverse conditions existing prior to channel deepening. The authority for using Federal funds should be cited and a rationale as to why this project meets that authority needs to be furnished as supplemental information to support the Federal interest.

Response. Reporting officers noted that the recommended plan represents a mitigation measure necessary to meet a 250 part per million salinity concentration level during critical flow periods. This standard has not been formally adopted in Federal or state regulations, but is a generally accepted standard for chloride levels within the geographic region. Reporting officers consider the fact that the recommended plan corrects salinity

Encl 12₅

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problems that were present prior to deepening of the channel, this correction is incidental and cannot be separated from the salinity impacts induced by the channel deepening.

Analysis. Comment unresolved. Staffs of reporting officers indicate they will address the level of Federal responsibility in greater detail when requested by HQUSACE. Supporting information to justify 75 percent Federal cost sharing in mitigation measures for the 45 day pre-project base condition is needed.

Comment 1b, Alternatives. The report included pipelines and barging as alternatives to the Plaquemines Parish Plan. It is noted that conservation measures were not considered in the report as an alternative to structural solutions. How were these measures addressed in developing alternatives? This includes consideration of treatment plant operating costs during the 5 days and 15 days average annual increase in salinity periods when EPA standards are exceeded. It is recognized that peak conditions are the critical factor; however, annualized values of physical conditions and solutions need evaluation from the economic perspective. Reduced consumption measures in conjunction with increased treatment plant operating costs and reservoirs should also be addressed as an alternative if viable.

Response. Only structural alternatives are considered viable by local interests. Reporting officers will clarify this in a formal response to a request by HQUSACE.

Analysis. Comment unresolved. The review team believes conservation measures are viable alternatives for assessing the Federal interest, even though non-Federal interests may not support these measures.

Comment 1c, Sizing of Alternatives. The alternatives are not presented in such a way that the incremental costs in dollars per unit of output are evident. Information is needed to determine if the recommended plan is the economically optimum scale of development in assessing tradeoffs between levels of salinity reduction and cost of treatment.

Response. Data was not available at this time. Reporting officers agreed to address the issue formally at a later date.

Analysis. Comment unresolved.

Comment 1d, Economic Analysis. Costs shown in the report for alternatives are shown as present worth figures. Information on average annual costs for alternatives is needed to support recommendations. This includes constructions costs as well as opera-

Encl 12

tion, maintenance, repair, replacement, and rehabilitation costs over the life of the project. Information on units of output associated with various alternatives is needed to demonstrate the level of Federal interest.

Response. Reporting officers agreed and their response to this item will be incorporated into comment 1c.

Analysis. Concur.

Comment 1e, Documentation of Plan IV Impacts on Local Land Base. Plan IV (West Bank Reservoir - East Bank Reservoir) was determined in a previous analysis to be the lowest cost plan. Subsequently, Plaquemines Parish officials reasoned that they could not afford to dedicate additional lands within the flood protection system to the storage of water. The reporting officers did not document that the building of the reservoirs, within the flood protection system, would have a major impact on the Parish land base. It appears this alternative may have been based on a 55-foot deep channel compared to the 45-foot constructed channel. The land needs for the 55-foot channel appear to be significantly greater than land needs for the constructed project. The report did not provide sufficient information to show that this plan is not currently implementable. If Plan IV adjusted for a 45-foot channel is still the economically optimum plan, incremental costs of a different recommended plan should be assigned to the locals.

Response. Reporting officers indicated that the reservoir alternative was sized for the 55-foot alternative. Information was not readily at hand to determine the relative land needs of the reservoir alternative associated with the 45-foot navigation channel. Local interests do not consider this alternative acceptable.

Analysis. Comment unresolved. Review team believes this alternative requires analysis to determine the potential Federal interest in this alternative. Review team noted the report does not quantify flood free land in relation to land requirements of varying size reservoirs. Although the alternative is not preferred by local interests, it may be the most cost effective alternative from the Federal perspective.

Comment 1f, Source of Estimate of 100 Percent Increase in Water Supply. The expert source for the 100 percent increase in the water supply is needed. The implicit compound rate of growth is 1.4 percent over 50 years. This rate appears achievable with future growth in population, industry and per capita consumption. Nevertheless, the expert source of the future 100 percent increase should be provided.

Response. The field agreed to furnish the expert source used in the feasibility report. If the rate of population growth is greater than 1.4 percent a year, the government would be obligated to provide an additional unestimated amount of funds to mitigate for the additional future needs.

Analysis. Concur in procedure for resolution.

Comment 1g, Cost Estimate. The estimate included in the DM is insufficient to review. The estimate for the pumping plant and equipment is said to be based on estimates for a similar project. The EC 1110-2-263 requires a detailed estimate addressing crews, equipment, and an explanation as to work procedures. This supporting documentation needs to be made available for review to support the economic analysis and funding schedule.

Response. Reporting officers do not have a response at this time. They intend to discuss this matter by telephone with Mr. Ernie Hale, and provide a response in future correspondence.

Analysis. Concur in procedure for resolution.

2. **Environmental Comments.** Based on the limited environmental information provided in the report and accompanying correspondence, it is not possible to determine if there are critical concerns associated with the report. It is recommended that supplemental information be provided which addressed environmental concerns noted below. The objective is to insure that no significant impact assessment or environmental compliance requirements have been overlooked. Documentation of the appropriate level NEPA work and coordination needs to be addressed for the recommended plan. This includes both site specific and cumulative impacts.

Comment 2a, NEPA Status. The report summarizes effects in terms of palatability, health, corrosion of pipes and appliances, and effects on industrial users. Concern about these effects is the reason for the saltwater intrusion mitigation plan. A series of memorandums (transmittal, division comments, district responses) provided with the report partially summarizes the status of NEPA compliance. However, the report itself contains no environmental information.

(a) Neither the report nor the memoranda explicitly state that an EIS was prepared. Presumably, an EIS was completed in 1981 along with the feasibility report. The field needs to provide supplemental information on the date the EIS was completed, when the review period was held, and when the EIS was filed with EPA. This information will document initial project NEPA compliance.

Encl 12₈

(b) The length of river affected by project-induced saltwater intrusion increased from 49 river miles to 115 river miles after the feasibility report was completed. The mitigation measure constructed by the Federal Government is a submarine barrier sill at river mile 64, a new location from that identified in the feasibility report. It is not clear that the effects of increased saltwater intrusion, or of the new sill location, were evaluated and coordinated in an appropriate NEPA document. Presumably, the 1985 SIR summarized project and compliance status. However, SIRs are not impact assessment tools. According to the field memoranda which accompanied the report, the two EAs discuss only the effects of barging (1987) and pipeline construction (1990), respectively. Because saltwater intrusion is often an area of controversy (aquatic species and habitats, bottomland hardwoods, wetlands), the field should provide supplemental documentation showing that the effects of increased saltwater intrusion and the existing sill have been evaluated and coordinated with environmental resource agencies in an appropriate NEPA document.

Threatened and Endangered Species. The field notes that "based upon studies and investigations at this stage of design, the proposed action is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of such species."

(a) Neither the report nor the memoranda indicate whether the results of the "studies and investigations" were coordinated with the USFWS and, if required, the NMFS.

(b) Any prior section 7 evaluation and coordination work is outdated, especially if it is 1981 or even 1985 vintage. The report does not indicate whether the field coordinated all project changes, if new species lists were requested, if biological assessments or opinions were prepared, or if the USFWS (and NMFS) has agreed that prior section 7 determinations of no effect are still applicable. Supplemental information documenting that the current recommended plan has been considered in accordance with the Endangered Species Act is needed.

Cultural Resources. The 22 miles of pipeline and four booster pumps follow existing rights-of-way; therefore, no additional cultural resources survey work is required. However, it is still necessary to coordinate with the SHPO and obtain a concurrence with the no effect determination. A copy of the SHPO letter should be provided to document this concurrence.

Modifications. Since 1981, the project has undergone a series of modifications, both structural and operational. For example, structural changes involve the location and extent of pipelines,

Encl 12g

pump stations, crossings, siphons, borrow/disposal sites, and reservoirs. Operational changes are related to barging versus piping, and piping alone versus piping in tandem with reservoirs. Environmental documentation has been accomplished in a very fragmented fashion (1981 EIS, 1985 SIR, 1987 EA, 1990 EA), mostly as a result of the way the project has evolved. For the most part, this situation could not have been avoided. However, environmental impact assessments, documentation, and coordination may be out of date for certain actions or resources. Also, environmental laws and regulations have changed, existing conditions may have changed, and certain assessments, determinations, or compliance actions may not longer be valid (wetlands, bottomland hardwoods, endangered species, HTWs, etc.). Summary information demonstrating that all such factors have been accounted for is needed to document environmental compliance.

Response. Reporting officers did not wish to respond to the comments at this time. They agreed to provide a summary discussion of points noted above in future correspondence.

Analysis. Concur in procedure for resolution.

Encl 12,10

Washington Level Review Center Comments - Resolved

Mississippi River Ship Channel - DM No. 1, Supplement No. 6

1. Comment 1, Deauthorization. It is noted that the state does not currently support the 55-foot deep authorized channel. The appropriateness of seeking deauthorization of the currently authorized depth needs to be addressed since this may impact sizing and selection of mitigation alternatives.

Response. Reporting officers believe the present authorization does not require modification at this time. Although local interests do not support increased depths at this time because of cost sharing requirements, there is a reasonable likelihood that this position may change in the future. In addition, any further channel deepening would require a complete economic social and environmental analysis to justify Federal participation.

Analysis. Concur.

2. **Compliance with Corps Regulations and Policies.**

Comment 2a, Inflation Rate May Need Revision. The basis for using the 5 percent inflation factor to arrive at the mitigation payment was not discussed. Page B-2-6 of EC 11-8-2 (FR), dated 31 March 1991 "Inflation factors for the period BY through BY+9 must be used for updating cost estimates...are shown on table 1 of the EC...the BY+9 inflation factors compounded as appropriate must be used for that portion of the construction period beyond BY+9 to project completion." The inflation rate for all other costs ranges from 4.2 percent in 1992 to 3.7 percent in 1997. The rate remains at 3.5 percent in 1995 and beyond. Therefore, the stated inflation rate of 5 percent does not agree with the budget EC and should be revised to be in agreement.

Response. Reporting officers agreed to make the suggested change to the report.

Analysis. Concur.

Comment 2b, Additional Current Interest Rate Display Needed. This project, which has received construction funds, may continue to use the interest rates that were used to prepare the supporting economic data presented to Congress in justification of the initial appropriation of construction funds. However, the subsequent evaluations should have a second display at the current interest rate. (Ref ER 1105-2-100, page 6-205, paragraph 6-235a.) An additional display at the current interest rate is needed to meet the requirements of ER 1105-2-200.

Encl 12

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Response. Reporting officers agreed to show the information in the report.

Analysis. Concur.

Comment 2c, Accuracy of Economic Analysis. The information in appendix C showed capital expenditures starting in year 3. Yet, the year 1 present value factor was applied. This would have the effect of increasing the potential amount of the mitigation payment. Additional explanation is needed on the rationale for the use of the year 3 present value factor.

Response. Reporting officers agreed to make the suggested change by changing the "year" designations. Monetary figures will not change.

Analysis. Concur.

3. **Additional Documentation Needed.**

Comment 1, Agreement for Local Cooperation. Article II - Obligations of Parties Paragraph 9. (1) "The Government shall, subject to the availability of funds, make annual cash payments to the state of an amount equal to estimated annual costs for operation, maintenance replacement, repair and rehabilitation of the Mitigation Plan over the remaining life of the project." The statement needs to be expanded to include a clear reference to the separation of government and local responsibilities for payments. Non-specific statements can result in confusion or litigation.

Response. The field agreed to clarify normal local responsibilities for O&M operation and maintenance and rehabilitation.

Analysis. Concur.

Encl 12,2

COMMENTS OF CECW-B
MISSISSIPPI RIVER SHIP CHANNEL, GULF TO BATON ROUGE, LA
SALTWATER INTRUSION MITIGATION

1. References:

a. Project Management Guidance Letter No. 10, dated 8 March 1991, subject: Credits for Work-in-Kind Performed by Non-Federal Sponsors.

b. CECW-LM Memorandum, dated 10 April 1991, subject: Third Supplement to the Agreement for Local Cooperation between the Department of the Army and the State of Louisiana for Mississippi river Ship Channel Project from Baton rouge, Louisiana to the Gulf of Mexico (Phase I - Depth Enhancement of 45 feet to Mile 181), Advance Draft, dated 28 September 1990.

2. "Buy-out." The local sponsor does not have the authority to relieve the Department of the Army of a mitigation requirement for an authorized project. Only Congress can do that. Rather, the proposed plan will meet the mitigation requirements of the authorized project by invoking the authority of Section 204, WRDA 86. Under this authority, local interests can implement authorized projects, or elements thereof, upon approval of the Secretary. All references to a "buy-out" should be deleted.

3. Lump sum payment. As discussed in Reference 1.b., the Office of the Chief Counsel has determined that the Department of the Army does not have general authority to make lump sum payments. Nor are lump sum payments for the Mississippi River Ship Channel project specifically authorized. Until legislative authority is provided, no lump sum payments may be made. The mitigation plan should propose annual payments, with lump sum payments conditioned on the grant of authority.

4. Draft Third Supplement to the LCA. As discussed in Reference 1.b., the Third Supplement should cite Section 204 authority and provide the procedures and safeguards called for in Section 204.

5. Credit for East Pointe-a-la-Hache. As discussed in Reference 1.a., work-in-kind performed by non-Federal sponsors may receive credit toward construction costs only if the work is performed under the terms of Section 204 or other, project-specific authority. Section 204(e) requires, among other things, that the Secretary approve the plans of construction prior to performance of the work. Furthermore, the regulations implementing Section 204 require that a Local Cooperation Agreement for Section 204 work be executed prior to performance of the work. (In this case, the Third Supplement, which would fold Section 204 into the existing LCA, would need to be executed before any work performed by the local sponsor would be eligible for credit.) Consequently, the already-completed work at East Pointe-a-la-Hache is not eligible for credit.

Encl 12/13

CELMN-ED-SP (CELMN-ED-SP/17 Jul 90) (1110-2-1150a) 6th End
Mr. Elmer/mn/2618
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

DA, New Orleans District, Corps of Engineers, P. O. Box 60267, New Orleans, LA 70160-0267 10 Apr 92

FOR Commander, Lower Mississippi Valley Division, ATTN: CELMV-ED-PG

1. Reference: Meeting held on 6 January 1992 at the New Orleans District to discuss comments on the subject project. A memorandum for record of the meeting and roster of attendees is attached as Enclosure 8.

2. The proposed disposition of CECW-EP-W 4th End comments dated 10 December 1991 is as follows:

a. Comment para 3a. The barging costs shown in the report are based on the costs incurred during the 1988 drought event. These costs were applied to the average annual increase in durations predicted for the 45 and 55 foot channels to determine the annual costs for barging over the project life, including inflation. Increased durations of saltwater intrusion caused by the 45-foot channel during the years 1989, 1990 and 1991 did not overwhelm the ability of the local parish government to handle the situation. Because of this and the ongoing effort between the New Orleans District and local parish officials to develop a permanent saltwater mitigation plan, Plaquemines Parish elected not to request the Corps for reimbursement at that time.

b. Comment para 3b. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

3. The proposed disposition of CEWRC-WLR comments shown in Enclosure 3 to the 4th End is as follows:

a. Comment 1a. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

b. Comment 1b. It was concluded at the 6 January 1992 meeting that conservation measures would not be proposed as an alternative mitigation measure; however, a reservoir alternative has been developed and results are presented in our response to WLRC comment 1e below.

c. Comment 1c. Resolved as per memorandum of record of 6 January 1992 meeting (Enclosure 8).

Rec'd 19 Dec 91

CECW-EP-W (CELMN-ED-SP/17 Jul 1990) (1105-2-10c) 4th End
BROTNOV/tf/(202) 504-4534
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

10 DEC 1991

HQ, U.S. Army Corps of Engineers, Washington, DC 20314-1000

FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

1. Design Memorandum No. 1 (General Design), Supplement No. 6, with three endorsements has been reviewed and the following comments must be resolved before final approval can be given. These comments are being transmitted for your action. HQUSACE is available for a meeting, if necessary, to assist in resolving the outstanding issues.

2. WLRC and CECW-B comments are enclosed (Enclosures ~~1~~ 6 and ~~2~~ 7) and a response to the unresolved comments will be helpful in resolving the outstanding issues before forwarding to OASA(CW).

3. In addition to the comments of WLRC the following comments also apply:

a. The basis for projection of barging costs with the 45-foot channel and with the 55-foot channel should be documented. We understand that the projected average annual costs substantially exceed the historical average annual costs because the historical costs do not include those costs external to the project that are imposed when barges must be diverted for water supply.

b. The legal authority for the local sponsor to perform OMRR&R of the facilities constructed for the federal project and for the government to reimburse the local sponsor for the government's share of OMRR&R costs should be identified and discussed. If a sole-source contract is to be awarded, its relationship to the local cooperation agreement should be described.

4. Expeditious response is requested as these issues must be

CECW-EP-W
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

resolved before approval of the DM and LCA. Request response within 45 days. Mr. Bruce Brotnov, CECW-EP-W, (202) 504-4534, is the POC for any questions.

FOR THE DIRECTOR OF CIVIL WORKS:

7 Encls
~~2 Encls~~ Added
6+7 ae

JOHN A. McPHERSON
Acting Chief, Engineering Division
Directorate of Civil Works

CF: CECW-LM w/o encl
CECW-PC w/o encl
CECC-J

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 3d End
Burttschell/nm/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080
09 AUG '91

FOR CDR, HQUSACE (CECW-EP-W), WASH, DC 20314-1000

1. Enclosed are eighteen copies of subject GDM Supplement which are forwarded for your review and approval.

2. The enclosures that are part of the 2d endorsement have been inserted in the supplement. As a result of LMVD review of the 2d endorsement, the District has revised pages and prepared a new Appendix D; these items have been inserted in the supplement. Information that supplements Appendix D has been forwarded to HQUSACE through real estate channels.

3. Enclosure 5 presents the project cost and cost allocation. The cost estimate presented in the table supersedes data in para 1d of the 2d endorsement.

4. We concur that the recommended Plaquemines Parish Plan, as described in the GDM Supplement, is the best and least costly plan to mitigate for induced saltwater intrusion. Approval of the GDM Supplement is recommended:

FOR THE COMMANDER:

for William R. Hill
FRED H. BAYLEY III
Director of Engineering

5 Encls
2-4. nc
added 1 encl
5. as

CF:
CELMN-ED-SP

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 3d End
Burttschell/nm/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division, Vicksburg, MS 39181-0080
09 AUG '91

FOR CDR, HQUSACE (CECW-EP-W), WASH, DC 20314-1000

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FOR THE COMMANDER:

for William R. Hill
FRED H. BAYLEY III
Director of Engineering

5 Encls
1-4. nc
added 1 encl
5. as

CF:
CELMN-ED-SP

MISSISSIPPI RIVER SHIP CHANNEL

SALTWATER INTRUSION MITIGATION - COST ALLOCATION

	TOTAL	FEDERAL	NON-FED
Submarine Barrier Sill (Life of project, cost brought back to present worth using 8 1/8 % interest rate.)	$3,600,000	$3,600,000	-0-
East Pointe-a-la-Hache Construction (Actual cost since facilities have already been constructed.)	600,000	450,000	150,000
West Pointe-a-la-Hache and Boothville Construction (May 90 Price Level, Local interests estimate, this cost also includes allowances for upgrade of facilities for possible future increases in water needs.)	14,835,000	11,135,000	3,700,000
West Pointe-a-la-Hache and Boothville O&M (Remaining 48 years of project life, 5% inflation brought back to present worth using 8 1/8 % interest rate, this cost also includes O&M allowances for upgrade of facilities for possible future increases in water needs.)	1,000,000	1,000,000	-0-
Real Estate Costs ($20,000 is estimated for in-house hired labor which is subject to a 75/25 cost sharing, the remaining $145,000 will be non-federally funded which will be credited towards the additional 10% of total costs that the local sponsor must pay.)	165,000	15,000	150,000
TOTAL PROJECT COSTS	$20,200,000	$16,200,000	$4,000,000

PAYMENT OF FEDERAL SHARE OF PROJECT

Submarine Barrier Sill - constructed with 100% Federal funds, as required, during the life of the project, O&M General Appropriations.

East Pointe-a-la-Hache Construction - Upon execution of LCA and availability of approprated funds, pay local interest a lump sum of $450,000.

West Pointe-a-la-Hache and Boothville Construction - Upon execution of LCA and availability of appropriated funds, pay local interests $11,135,000. to be sequenced with construction progress.

West Pointe-a-la-Hache and Boothville O&M - Upon completion of construction, pay local interests annual O&M costs from the O&M, General appropiation.

Real Estate Costs - No payment will be made to the local sponsor.

Encl 5

CELMN-ED-SP (CELMN-ED-SP/17 Jul 90) (1110-2-1150a) 2d End
Mr. Elmer/mn/2618
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

DA, New Orleans District, Corps of Engineers, P. O. Box 60267, New Orleans, LA 70160-0267 29 Mar 91

FOR Commander Lower Mississippi Valley Division, ATTN: CELMV-ED-PG

1. Our responses to the comments contained in the 1st End are as follows:

a. Para 2a. An executive summary is enclosed (encl 2) to be placed in front of the table of contents in your copies of the report. The growth assumptions stated in Table 3 are assumptions that were being used at that point in our plan formulation. Our revised Barging Plan cost ($33,900,000) is based on a scenario compatible with that presented in Appendix C.

b. Para 2b. An Environmental Assessment was prepared and distributed to interested parties on 18 January 1991.

c. Para 2c. A field investigation of the highway right-of-way indicated that no wetlands would be adversely impacted by pipeline construction. A state water quality certificate is not required.

d. Para 3. The total revised Plaquemines Parish Plan cost is $20,100,000. The table below shows the breakdown of the total Federal and non-Federal cost. The Federal share includes all O&M and cost for the Submarine Barrier Sill. The remainder is cost shared 75/25. In determining the Federal and non-Federal share, the present worth of the O&M ($1,000,000) was taken out of the $15,900,000 estimate shown in Table 5. The O&M costs for the East Pointe-a-la-Hache feature is included in the present worth analysis provided in Appendix C. Initial construction of West Pointe-a-la-Hache-Boothville and East Pointe-a-la-Hache is construction general funding cost shared 75/25. The Submarine Barrier Sill and O&M is a total Federal cost and will be funded under O&M general.

TABLE

PLAQUEMINES PARISH PLAN
COST ALLOCATION
(May 1990 Price Levels)

Feature	Federal	Non-Federal	Total
West Pointe-a-la-Hache Boothville	$11,175,000	$3,725,000	$14,900,000
East Pointe-a-la-Hache	450,000	150,000	600,000
Submarine Sill	3,600,000	-	3,600,000
O&M	1,000,000	-	1,000,000
TOTAL	$16,225,000	$3,875,000	$20,100,000

e. Para 4a. The LCA will clarify that the East Bank Mitigation works have been constructed. We are enclosing a revised draft LCA incorporating comments (encl 3) to replace Appendix A in your copies of the report.

f. Para 4b. The revised project cost reflects the elimination of cost ($74,520) for the 54 fire hydrants.

g. Para 4c. Initially, we did not anticipate any costs for rights-of-way. We now realize that there will be rights-of-way costs that the State can receive 100% credit to be applied towards the additional 10% of the total project cost that they must repay. Our in-house Real Estate Division is working on an official estimate which will be forwarded to you when completed.

CELMN-ED-SP
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

2. We have revised and are furnishing text pages (encl 4) to reflect changes necessary due to comments. Please replace the original pages before forwarding to HQUSACE.

W. EUGENE TICKNER 3/21/91
Chief, Engineering Division

4 Encls
Added 3 encls (16 cys)
2-4. as

CELMN-ED-SP
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

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W. EUGENE TICKNER
Chief, Engineering Division

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10c) 1st End
Mr. Burttschell/ts/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division,
Vicksburg, MS 39181-0080

11 OCT '90

FOR Commander, New Orleans District, ATTN: CELMN-ED-SP

1. We generally concur in the concept proposed; however, resolution of comments in paragraphs 2 through 4 below is required before we forward the subject document to HQUSACE for approval.

2. General.

a. The process used to select recommended plan should be clarified. For example, the growth assumption stated in Table 3 differs from the assumption used in Appendix C, costs displayed on several tables are not referenced to price levels, and the increase in barging plan costs (Table 4 - \$5,5000,000, Table 5 - \$29,200,000) is not adequately explained. You should prepare an executive summary that outlines the process used to select the recommended plan. At each decision point you should state the basis used for comparison, that is, price level, channel depth, submarine barrier sill (included/not included), operation and maintenance costs, etc. The GDM Supplement adequately describes the saltwater intrusion problem; therefore, the summary need only reference the problem.

b. You should prepare an Environmental Assessment for the 22 miles of pipeline and the four booster pumps. Even though the work will be accomplished by local interests, it is still mitigation for the Federal project and will be constructed with Federal funds.

c. You should verify that no wetlands will be impacted by pipeline construction. Existing rights-of-ways can be considered wetlands in this area,

CELMV-ED-PG (CELMN-ED-SP/17 Jul 90) (1105-2-10q) 1st End
Mr. Burttschell/ts/7246
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

CDR, Lower Mississippi Valley Division,
Vicksburg, MS 39181-0080

11 OCT '90

FOR Commander, New Orleans District, ATTN: CELMN-ED-SP

1. We generally concur in the concept proposed; however, resolution of comments in paragraphs 2 through 4 below is required before we forward the subject document to HQUSACE for approval.

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1 · EXECUTIVE ASSISTANT
~~2 · DEPUTY~~
3 · DEPUTY
4 · DEPUTY
5 · COMMANDER
-ED-SP

and pipeline construction would involve digging and placing of excavated material. Another state water quality certificate may also be required.

3. Page 19, para 24. The derivation of the sharing of mitigation costs is not clear. You should provide supplemental information to clearly show the basis for total Federal cost, Federal funds to be paid local interests, and local interests cost. The discussion and/or table with appropriate footnotes should include O&M costs; allocation of O&M costs; source of appropriations for each item, i.e. Construction, General, or O&M, General; and price level.

4. Appendix C.

a. Page 8. The East Bank Mitigation Works (East Pointe-a-la-Hache) has been constructed at a cost of $600,000. The assigned $450,000 Federal share would amount to a reimbursement to local interests for a system that is in place. The LCA correspondence should clarify that the East Bank Mitigation works has been constructed.

b. Page 23. A line item shows 54 fire hydrants to cost $74,520. The purpose of the mitigation plan is to provide raw water that has an acceptable level of salinity. The inclusion of fire hydrants as part of the mitigation plan is not warranted. You should revise project costs to delete the fire hydrants.

c. Page 29. Explain why there is no cost estimate for rights-of-way.

5. The following comments are for clarification and/or additional information. A response to these comments is not required.

a. Page 1, para 1b. The mileage from the Gulf of Mexico to Baton Rouge is approximately 253 miles, 233 miles from Head of Passes to Baton Rouge and 20 miles from Head of Passes to the Gulf.

b. Page 2, para 4d. In addition to the cost-shared reimbursement, the payment to local interests will include O&M costs which are all Federal costs, to be computed at present worth and included in the lump sum payment.

c. Page 5, para 10. The reference to Figure 2 for stratification should be 65-foot depth - 1000 ppm or 45-foot depth - 100 ppm.

d. Page 5, para 11. In the last line change "larger" to "deeper".

e. Pages 10, 12, 13, 15, and 20. There are incorrect references to the tables on these pages. Reference to Table 6 should be Table 2, to Table 7 should be Table 3, to Table 8 should be Table 4, and to Table 10 should be Table 6.

f. Page 19, Table 5.

(1) The reference to Appendix C for cost detail relates to East and West Pointe-a-la-Hache but not the Submarine Barrier Sill.

(2) The Submarine Barrier Sill should be footnoted "The Underwater Sill to be provided as part of the Government operation and maintenance responsibility, when needed, at no cost to local interests".

g. Appendix A. The draft LCA has been submitted to LMVD by separate correspondence. Division review indicates that revisions will be necessary. The substitute plan for the lump sum payment for mitigation of the 45-foot stage of the authorized 55-foot Gulf to Baton Rouge Ship Channel

CELMV-ED-PG
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

project is subject to approval by ASA(CW). The LCA will continue to be processed by separate correspondence.

FOR THE COMMANDER:

Roland J. Dubuisson

/ Encl
wd

for FRED H. BAYLEY III
Chief, Engineering Division

CELMV-ED-PG
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

project is subject to approval by ASA(CW). The LCA will continue to be processed by separate correspondence.

FOR THE COMMANDER:

Encl
wd

for FRED H. BAYLEY III
Chief, Engineering Division

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:
CELMN-ED-SP (1110-2-1150a) 17 Jul 90

MEMORANDUM FOR Commander, Lower Mississippi Valley Division, ATTN: CELMV-ED-PG

SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

1. The subject design memorandum is submitted for review and approval, and has been prepared generally in accordance with the provisions of ER 1110-2-1150, dated November 1984.

2. A summary of the current status of the Clean Water Act, endangered species, Environmental Impact Statement (EIS), and cultural resources investigations is as follows:

a. Status of EIS. The impacts of the sill were analyzed in a Supplemental Information Report dated 24 September 1985. The impacts of barging were analyzed in an Environmental Assessment/FONSI dated 21 April 1987. The impacts of the approximately 22 miles of pipeline and the four booster pumps have not been discussed in any environmental documents. Since these will follow existing rights of way, impacts will be minor. In addition, work will be accomplished by the Parish, so no additional Federal environmental documentation is necessary.

b. Status of Clean Water Act. The sill was covered in a Section 404(b)(1) Evaluation signed on 26 March 1984. A State of Louisiana Water Quality Certificate was issued on 19 March 1984. There will be no dredged or fill material deposition in connection with the pipeline or booster pumps, so no further Clean Water Act documentation is necessary.

c. Endangered Species. Based on studies and investigations at this stage of design, the proposed action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.

d. Cultural Resources. The sill was previously reviewed and found to have no potential impacts to known cultural resources. The 22 miles of pipeline and four booster pumps follow existing rights of way and accordingly require no additional cultural resource survey.

CELMN-ED-SP (1110-2-1150a)
SUBJECT: Mississippi River Ship Channel, Gulf to Baton Rouge, LA Design Memorandum No. 1, Supplement No. 6 - Saltwater Intrusion Mitigation

3. In accordance with LMVED-TS memorandum dated 5 February 1981, this report has been reviewed by the District Security Officer. There were no comments to be incorporated in the report.

4. Reference CECW-EP, multiple memorandum dated 16 February 1990: GDM Review Process. No adverse issues were raised in the Administration's clearing process + no known policy changes have occurred which would concern OMB relative to the planning and designs presented in this supplemental DM. By letter dated 16 July 1990, a "draft" of the Third Supplement to the LCA pertaining to the Saltwater Intrusion Mitigation Plan has been submitted for approval. A copy of the "draft" agreement is Appendix A in the subject report.

5. Approval of this Design Memorandum as a basis for establishing the estimated mitigation costs and reimbursement to the locals for their construction of the recommended mitigation plan is recommended.

FOR THE COMMANDER:

W. EUGENE TICKNER
Chief, Engineering Division

Encl
(30 cys fwd sep)

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6

SALTWATER INTRUSION MITIGATION

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PERTINENT DATA

Project location	Mississippi River from Venice to Belle Chasse. LA.
Project purpose	To mitigate increased durations of saltwater intrusion caused by the 45-foot Mississippi River Ship Channel.

Climatologic data*

Temperature	
Normal maximum monthly (July)	90.6 degrees Fahrenheit
Normal minimum monthly (January)	45.3 degrees Fahrenheit
Normal Maximum annually	77.6 degrees Fahrenheit
Normal minimum annually	61.3 degrees Fahrenheit
Normal annual	69.5 degrees Fahrenheit
Precipitation	
Normal maximum monthly	7.17 inches
Normal minimum monthly	2.52 inches
Normal annual	61.55 inches

* Based on New Orleans at Audubon Station

Navigation dimensions

Mile 181 to New Orleans	45 x 500 feet
Port of New Orleans	40 x 1500 feet
Within Port of New Orleans	45 x 750 feet
New Orleans to Head of Passes	45 x 750 feet
Southwest Pass	45 x 750 feet
Southwest Pass Bar Channel	45 x 600 feet

Recommended Plan Costs	Federal	Non-Federal
Submarine Barrier Sill	$ 3,600,000	-
East Pointe-a-la-Hache	450,000	$ 150,000
West Pointe-a-la Hache & Boothville	$12,150,000	$3,850,000

STATUS OF DESIGN MEMORANDUM

1	General Design Memorandum	Aug 1983
Supp #1	General Design - Venice, La. to Mile 181	Aug 1986
Supp.#2	General Design - Mile 181 To Mile 232.4	Aug 1990
Supp.#3	General Design - Training Works Mile 181 to Mile 232.4	Feb 1993
Supp.#4	General Design - Training Works 45-Foot Channel Phase	Dec 1986
Supp.#5	General Design - Widening of Jetty Reach in Southwest Pass	Deferred
Supp.#6	General Design - Saltwater Intrusion Mitigation	Jul 1990

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6

SALTWATER INTRUSION MITIGATION

EXECUTIVE SUMMARY

The Mississippi River Ship Channel Project provides for increasing the depth of the authorized channel from 40-foot to 55-foot from the Gulf of Mexico to Baton Rouge, La. The 40-foot channel experiences saltwater intrusion from the Gulf of Mexico. Deepening the channel will increase the upstream movement, the frequency, and the duration of saltwater intrusion events. Authorization of the 55-foot channel required mitigation for the impact of saltwater intrusion. Table 1 lists 12 existing waterworks within the area of concern (below mile 115 above Head of Passes, AHP). The Mississippi River is the only practicable source of raw water for these waterworks.

TABLE 1

Location River Mile AHP	Waterworks	Maximum Increase Duration (Days) 55-Ft. Channel	Daily Usage (MGD)
18.6	Boothville-Venice	69	2.0
49.0	West Pointe-a-la-Hache	63	3.0
49.2	Pointe-a-la-Hache	63	.5
75.8	Belle Chasse	46	5.0
80.9	Dalcour	47	.5
87.9	St. Bernard Districts 1 and 2	51	9.0
95.8	New Orleans Sewerage & Water Board, Algiers	38	10.0
96.7	Gretna	38	3.7
99.1	District #2, Jefferson Parish	38	30.0
101.5	Westwego	38	2.2
104.7	New Orleans Sewerage & Water Board, Carrollton	38	131.0
105.4	District #1, Jefferson Parish	38	58.0

Feasibility phase studies indicated that on average, the increase in saltwater intrusion events for the 55-foot channel would not be significant for the waterworks upstream of 49.2 AHP. The indicated increase was considered significant at the three waterworks downstream of mile 49.2. Pointe-a-la-Hache and West Pointe-a-la-Hache were expected to see increases in current average events from 16 to 20 days. Expected increases in average events for the Boothville-Venice

waterworks were from a current level of 59 days to 68 days. The feasibility study (July 1981) recommended increasing the project depth of the Mississippi River channel from 40-foot to 55-foot and mitigation of increased saltwater intrusion impacts. The recommended mitigation measures envisioned increasing the raw water storage capacity for each of the three affected facilities, at a first-cost of $2,000,000 (October 1981 price levels). The mitigation recommendations did not address future demand growth for water supply at these three locations.

Subsequent model studies accomplished at the Waterways Experiment Station (WES) indicated the impacts of deepening the channel to 55 feet and the need for mitigation measures were greatly underestimated in the feasibility study. The model results predicted significant increases in saltwater intrusion events up to mile 115.0 AHP. Table 1 shows the WES findings relative to each waterworks and in terms of increases in maximum event durations. We determined that mitigation should address growth in water supply demand throughout the life of the project. For the 50-year project life we projected a 100% growth in water supply demand.

Three general approaches were considered in developing measures to mitigate these increased durations of saltwater intrusion:

a. The storage of freshwater for use during periods of increased surface salinities; and

b. The extension of the freshwater intakes upstream to a point on the river where the saltwater durations with the 55-foot channel would be similar to the durations with the 40-foot channel; and

c. The construction of barriers to retard the upstream movement of the saltwater wedge.

We determined that a combination of measures would provide the most cost effective mitigation plan. The recommended mitigation plan included:

a. A submarine barrier sill, composed of dredged material, to protect the waterworks above Mile 64 AHP; and

b. The extension of a freshwater intake line upstream of the submarine sill to provide suitable water for the Pointe-a-la-Hache and West Pointe-a-la-Hache and Boothville-Venice waterworks.

The estimated total first cost of the mitigation plan was $23,550,000 (October 1981 price levels). The average annual cost was estimated at $3,740,000.

During this time, Plaquemines Parish officials were undecided on their views as to the best solution for the increased impacts on the three waterworks facilities below mile 64.1 AHP. The New Orleans District concluded that constructing an underwater saltwater barrier (or sill) at mile 64.1 AHP would protect upstream facilities and extending raw water transport lines from new intake points upstream of the proposed sill downstream to the three waterworks was the most cost effective solution. The results of the WES model studies and the new recommended plan for mitigation were incorporated into the feasibility report by letter of February 1982.

Work on the GDM began early in 1982. The mitigation plan recommended in the feasibility report and all other alternatives were revisited and coordination with representatives of Plaquemines Parish was intensified. Parish officials stated they would not support mitigation alternatives which depend on an underwater saltwater barrier (or saltwater sill) and new raw water intakes upstream of such a sill. They felt the performance of a sill was too unpredictable and the risks to their communities were too great. They preferred increasing the storage of raw water at their facilities, but their plans were still evolving and therefore lacking in detail. Model studies evaluating impacts and alternatives were ongoing at WES.

During the general design memorandum phase, the saltwater sill concept continued to represent the best plan of mitigation for waterworks upstream of mile 64.1 AHP. For the three waterworks downstream of mile 64.1 AHP, five mitigation plans were developed. The plans and their respective costs are shown in Table 2. Each of the plans mitigates for construction of a 55-foot channel from the Gulf of Mexico to Baton Rouge, La. and the associated increases in maximum events of saltwater intrusion to mile 115.0 AHP. Each of the plans provides for future demand growth for potable water at the three waterworks below mile 64.1 AHP. All five plans envision construction of a saltwater sill at mile 64.1 as a requirement for mitigation above mile 64.1. While the saltwater sill is a feature of Plan IV, the sill is not a mitigation component for the three plants downstream of mile 64.1 AHP.

Table 2 shows the five alternatives as they were submitted in Design Memorandum No. 1 - General Design (August 1983). Of the five alternatives, the design memorandum recommended Plan IV. Plan IV provided the lowest annual costs; it also appeared to satisfy Plaquemines Parish's concerns over the reliability of a saltwater sill. We were unsuccessful in our attempts to obtain a review of Plan IV by Plaquemines Parish officials and we submitted the design memorandum without benefit of their comments.

Some time after submission of the design memorandum, Plaquemines Parish came forward with their comments on the recommended mitigation plan. They supported Plan IV but the reservoirs they envisioned were very different. For example they wanted to site the increased raw water storage capacity outside the existing flood protection system and to protect it against hurricane flooding. Plaquemines Parish officials reasoned that they could ill afford to dedicate additional lands within the flood protection system to the storage of water. The costs of the desired changes to Plan IV increased the annual costs dramatically. Plan IV moved from the least costly of the five alternatives to the most costly alternative and Plan I emerged as the most cost effective mitigation plan for the proposed 55-foot channel. Table 3 shows the new ranking of costs for the five plans.

TABLE 2

GDM NO. 1 ALTERNATIVES
(August 1983 Price Levels)

Plan	Description	Initial Cost	Initial Amortized	Annual O&M	Total Annual
		($)	($)	($)	($)
I	Raw water line from Mile 64 to existing West Pointe-a-la-Hache treatment plant. Raw water submarine line to existing east treatment plant.	12,750,000	998,000	200,000	1,198,000
II	New west bank treatment plant, treated submarine line to existing east treatment plant.	14,870,000	1,163,000	135,000	1,298,000
III	New west bank treatment plant. New east bank treatment plant.	14,990,000	1,173,000	173,000	1,346,000
IV	West bank reservoir. East bank reservoir.	13,265,000	1,038,000	90,000	1,128,000
V	West bank raw water line. East bank reservoir.	12,095,000	946,000	183,000	1,129,000

* The construction of the submarine sill at Mile 64.1 is a feature of all plans. The cost of the sill is not included in the estimates.

TABLE 3

SALTWATER MITIGATION PLANS[1]/
(January 1985 Price Levels)

Plan	Description	Initial Cost	Initial Amortized	Annual O&M	Total Annual
		($)	($)	($)	($)
I	Raw water line from Mile 64 to existing West Pointe-a-la-Hache treatment plant. Raw water submarine line to existing east treatment plant.	12,750,000	998,000	200,000	1,198,000
II	New west bank treatment plant, treated submarine line to existing east treatment plant.	14,870,000	1,163,000	135,000	1,298,000
III	New west bank treatment plant. New east bank treatment plant.	14,990,000	1,173,000	173,000	1,346,000
IV	West bank reservoir. East bank reservoir.	21,600,000	1,690,000	196,000	1,886,000
V	West bank raw water line. East bank reservoir.	14,230,000	1,113,000	212,000	1,325,000

[1]/The construction of the submarine sill at Mile 64.1 and the additional pipeline and pumping plant between Pointe-a-la-Hache and Boothville-Venice are a feature of all plans. The cost of these items is not included in the table.

Ongoing negotiations with the State of Louisiana for the execution of a Local Cost Sharing Agreement (LCA) took an unexpected turn. The State requested that the project be pursued in stages with the first stage being a 45-foot channel extending from the Gulf of Mexico to mile 181 AHP. Further, the State was very interested in constructing the new "first phase" during the 1987 dredging season.

The District knew the saltwater intrusion impacts for a 45-foot channel constructed to mile 181 AHP would likely be quite different from those predicted for a 55-foot channel to Baton Rouge. Accordingly, we did not have a permanent mitigation plan and there was not enough time to develop one before the start of the 1987 dredging season.

We decided to develop an interim mitigation plan for the 45-foot channel to mile 181 AHP, again drawing on data from the WES model studies. Table 4 shows the WES predictions relative to each of the waterworks and in terms of maximum increases in saltwater intrusion event durations.

TABLE 4

Location River Mile AHP	Waterworks	Maximum Increase Duration (Days) 45-Ft. Channel	Daily Usage (MGD)
18.6	Boothville-Venice	20	2.0
49.0	West Pointe-a-la-Hache	10	3.0
49.2	Pointe-a-la-Hache	10	.5
75.8	Belle Chasse	13	5.0
80.9	Dalcour	13	.5
87.9	St. Bernard Districts 1 and 2	15	9.0
95.8	New Orleans Sewerage & Water Board, Algiers	16	10.0
96.7	Gretna	16	3.7
99.1	District #2, Jefferson Parish	16	30.0
101.5	Westwego	16	2.2
104.7	New Orleans Sewerage & Water Board, Carrollton	16	131.0
105.4	District #1, Jefferson Parish	16	58.0

Dredging to provide a 45-foot channel from the Gulf of Mexico to mile 181 AHP began in July 1987. The 45-foot channel was in place in December 1988. The District's study of an interim mitigation plan was ongoing.

We proposed to keep the underwater sill feature of the earlier mitigation plans for the upstream waterworks but to substitute barging of raw water to the three downstream waterworks in place of constructing new, extended raw water intakes. While the concept for an interim mitigation plan was simple, the unknowns concerning a permanent mitigation plan presented a complex situation.

Although the State still supported the total 55-foot project, we did not know when we might be able to pursue construction. It was apparent that some combination of 45-foot channel mitigation and 55-foot channel mitigation over time was necessary to any permanent mitigation scenario. Table 5 shows the basic assumptions we formulated in pursuit of mitigating that scenario.

TABLE 5

BASIC ASSUMPTIONS FOR PLAN FORMULATION

Year 0-10	Existing capacities with 45-foot durations.
Year 11-20	25% increase in existing capacities with 45-foot durations.
Year 21-35	50% increase in existing capacities with 55-foot durations.
Year 36-50	100% increase in existing capacities with 55-foot durations.

Guided by the Table 5 assumptions, we focused on three now familiar components to develop a new permanent mitigation effort for the downstream waterworks: a saltwater sill at mile 64.1 AHP for the upstream waterworks; constructing raw water transport lines to intakes above the sill for the downstream waterworks; and barging raw water. Table 6 presents the estimated costs for the different mitigation plans in terms of the assumptions from Table 5.

TABLE 6

COST COMPARISON[1]/
(September 1987 Price Levels)

	BARGING PLAN			PIPELINE EXTENSION PLAN		
Period	Barging Expenditures ($)	O&M ($)	Total Expenditures ($)	Construction Expenditures ($)	O&M ($)	Total Expenditures ($)
Yr 1-10	3,050,000	200,000	3,250,000	15,400,000	5,660,000	21,060,000
Yr 11-20	3,300,000	200,000	3,500,000	8,800,000	5,660,000	14,460,000
Yr 21-35	12,150,000	870,000[2]/	13,020,000	-	10,860,000	10,860,000
Yr 36-50	14,700,000	200,000	14,900,000	-	10,860,000	10,860,000
TOTAL	33,200,000	1,470,000	34,670,000	24,200,000	33,040,000	57,240,000

Present worth of Total Expenditures	5,500,000[3]/	23,300,000[3]/
Average Annual Cost	456,000[3]/	1,930,000[3]/

[1]/The cost of the saltwater sill is not included.

[2]/Includes replacement of mooring facilities.

[3]/8-1/8% Interest rate used.

While Plaquemines Parish officials agreed with the barging of raw water as an interim plan for mitigating the increased impacts of saltwater intrusion, they would not accept it as permanent plan for mitigation. They preferred permanent improvements to their existing waterworks and suggested that the Federal Government consider buying out its obligations for mitigation through a lump sum cash settlement. Plaquemines Parish would then apply the cash settlement to improving their facilities as required to mitigate the impacts of the channel project. The Plaquemines Parish plan provided mitigation for only the first phase of the channel project - the 45-foot channel from the Gulf of Mexico to mile 181 AHP.

The Corps, the State, and Plaquemines Parish agreed in principle to the buy out, with the value to be determined by the most cost effective plan for mitigating the 45-foot channel to mile 181 AHP. The District recast its analysis from Table 6 to eliminate the assumptions in support of a 55-foot channel in order that comparisons of costs could be made. It was apparent that the Barging Plan would remain the most cost effective plan. Therefore, the reanalysis of cost was done only for the Barging Plan. The results of the new analysis are shown in Table 7.

TABLE 7

BARGING PLAN[1]
(January 1988 Price Levels)

Period	Barging Expenditures ($)	O&M ($)	Total Expenditures ($)
Yr 1-10	5,112,000	132,000	5,244,000
Yr 11-20	3,102,000	132,000	3,234,000
Yr 21-35	5,138,000	640,000[2]	5,778,000
Yr 36-50	6,318,000	132,000	6,450,000
TOTAL	19,670,000	1,036,000	20,706,000

Present worth of Total Expenditures $11,400,000[3]

Average Annual Cost $945,000[3]

1/The cost of the saltwater sill is not included.

2/Includes replacement of mooring facilities.

3/8-1/8% interest rate used.

The present worth value of the Barging Plan ranged from $6.4 million assuming no future inflation to 11.4 million assuming 5% inflation. These costs included construction and O&M projected over the 50-year period and brought back to present worth using 8-1/8% interest rate. These costs also included provisions for a 100% gradual increase in the existing capacity of the three treatment plants over 50 years. These estimates do not include costs for the submarine barrier sill. These costs are to Jan 88 price levels.

We were aware the 55-foot channel still had State support. Accordingly, we also evaluated the Corps' plan and the Plaquemines Parish plan against upgrades required to satisfy the requirements of an eventual 55-foot channel from the Gulf of Mexico to Baton Rouge. In each scenario it was practical to upgrade the two plans to adequately address a 55-foot channel project's demands for mitigation; and, in each scenario the Corps' plan of mitigation was the most cost effective.

Towards the end of the second quarter of 1988 it was evident that saltwater intrusion would be a problem that year due to severe drought conditions. The interim mitigation plan, barging, was put into action in June 1988. The experience of the "Drought of 88" showed that the cost estimate for the Barging Plan was low. The actual costs incurred during the barging operations were used as a basis to update the estimate of costs for the Barging Plan. The updated present worth value of the estimated expenditures over the project life was $20,200,000 assuming 5% inflation. These costs include construction and O&M projected over the project life and brought back to present worth using 8-1/8% interest rate.

Table 8 shows a comparison of the "Pre-Drought 88," Post-Drought 88 Barging Plan and Plaquemines Parish Plan costs.

TABLE 8

COMPARISON OF PLAN COST 1/

Feature	Pre-Drought Barging Jan 88	Post-Drought Barging Dec 88	Plaquemines Parish Plan Mar 88
East Pointe-a-la-Hache	$500,000	$500,000	$500,000
West Pointe-a-la-Hache Boothville	$10,900,000	$19,700,000	$13,100,000
	$11,400,000	$20,200,000	$13,600,000

1/ The costs for the submarine barrier sill is not included in the table.

Up until the "Drought of 88" all indications were that the Barging Plan would be the most economical mitigation plan. However, based on the experience of the drought that year the Plaquemines Parish Plan was the most economical of the plans conceived. The current total plan costs for barging is $33,900,000 compared to the Plaquemines Parish Plan of $20,200,000. These costs are based on the actual cost of the East Pointe-a-la-Hache plant which has been completed, and the estimated expenditures for the Saltwater Barrier Sill and West Pointe-a-la-Hache Boothville plants. These costs include construction and O&M projected over the project life and brought back to present worth using 8-1/8% interest rate assuming 5% inflation.

As of this date, we are resolving the final issues surrounding the Corps' buy-out of the Federal Government's obligations for mitigating the impacts of 45-foot project now in place to mile 181 AHP. At the same time, we are pursuing the State's request that we accomplish the construction required to extend the 45-foot channel above mile 181 AHP to mile 232.4 AHP.

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

GENERAL

1. Authority.

a. Study authority. The performance of general design studies and the preparation of this report were authorized by the "Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study," dated July 1981 approved in April 1983.

b. Construction authorization. The project was authorized for construction by the Supplemental Appropriations Act of 1985 (PL 99-88 dated 15 August 1985). This authorization provides for construction of a 55-foot deep channel from the Gulf of Mexico to Baton Rouge, Louisiana, a distance of 253 miles. The Water Resources Development Act of 1986 (PL99-662) provides for innovative cost-sharing between the Federal Government and Non-Federal interest for construction and maintenance of the project.

2. Recommended Plan. Previously, the report entitled "Mississippi River Ship Channel, Gulf to Baton Rouge, La., Design Memorandum No. 1 - General Design" presented the authorized plan for a 55-foot channel from the Gulf of Mexico to Baton Rouge, La. The authorized plan included as one of its features, the construction of a submarine sill at Mile 64[1] and freshwater storage reservoirs for the East and West Pointe-a-la-Hache treatment plants and the Boothville treatment plant to mitigate for increased saltwater intrusion in the Mississippi River caused by the enlargement of Southwest Pass. Although the GDM recommendation for a mitigation plan was raw water storage reservoirs, subsequent studies indicated that one of the other alternatives investigated in the GDM, the extension of raw water intake lines, would be a more economical plan. Subsequently, the State of Louisiana, the local assurer for this project, through the original Local Cost Sharing Agreement, indicated their decision to only pursue and support a 45-foot channel to mile 181 at that time. This decision by the State necessitated a reanalysis of mitigation needs.

3. Purpose. The purpose of this supplement is to present the results of studies and analyses performed to develop a plan to mitigate increased durations of saltwater intrusion caused by the deepening of the Mississippi River Ship Channel to 45 feet.

[1]/ All river miles refer to Above Head of Passes (A.H.P.).

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4. Status of Local Cooperation.

a. On 17 June 1986, the Governor of Louisiana signed into law, pursuant to Chapter 46 of Title 34 of the Louisiana Revised Statutes of 1950, 3401 et seq delegating full authority to the State of Louisiana Department of Commerce to enter into an agreement for the subject project. The 1989 regular session of the Louisiana Legislature amended and reenacted state law to transfer this project to the Department of Transportation and Development.

b. A Local Cooperation Agreement (LCA) was signed on 30 June 1986. The LCA provided for cost-sharing between the State of Louisiana and the Federal Government for deepening the river to 45-feet from the Gulf of Mexico to mile 181. A supplement to the LCA incorporating changes based on the Water Resources Development Act of 1986 (PL 99-662) was signed on 15 June 1987. These agreements require a non-Federal contribution of 25 percent of the cost of the general navigation features of which the saltwater mitigation plan, exclusive of the sill, is a part.

c. A 2nd Supplement to the LCA was needed as a result of the passage of the Water Resources Development Act of 1988 giving the State credit for relocations costs towards their 10% repayment requirement. This supplement also contains language disallowing the State to use any Federal funds for their cash contributions, as per guidance from HQUSACE. This supplement has been approved by the Assistant Secretary of the Army (Civil Works) and is in the process of being signed by the State and Commander, New Orleans District.

d. We have prepared a 3rd Supplement to the LCA to accomplish the reimbursement to the State of Louisiana for this mitigation plan. This agreement has been negotiated with the State and is shown in Appendix A. In turn, the State of Louisiana has negotiated an agreement with Plaquemines Parish for the actual accomplishment of the work. We will reimburse the State for 75 percent of the cost of the plan and then the local sponsor will add their 25 percent before reimbursing Plaquemines Parish.

HYDROLOGY AND HYDRAULICS

5. Introduction. Enlargement of the deep-draft channel in Southwest Pass will cause an increase in saltwater intrusion in the Mississippi River. Because the river is a source for municipal and industrial water supply, the effects of the enlargement on saltwater intrusion are significant.

6. Chlorides. Chlorides are present in all natural waters. Sources are numerous and include many sedimentary rocks, particularly the evaporates, salt "seeps", oil-field drainage, domestic and industrial contamination, and, to some degree, air-borne matter resulting from ocean spray. Chloride concentrations in natural waters vary widely. Background levels in the Lower Mississippi River average about 25 ppm.

High chloride levels in the Mississippi River are due to intrusion from the Gulf of Mexico. Salinity, which is a term normally used in conjunction with sea waters, is equivalent to the total dissolved salt content of water. The salinity of sea water averages 35 parts per thousand. Salinity is related to chlorinity by the following relationship:

$$\text{Salinity} = 0.03 + 1.805 \times \text{Chlorinity}$$

Therefore, the concentration of chlorides in the Gulf of Mexico is about 19,000 ppm.

7. <u>EPA Criterion</u>. The U.S. Environmental Protection Agency chloride standard for public water supplies is explained below in an excerpt from the U.S Environmental Protection Agency, Ecological Research Series, Water Quality Criteria 1972, EPA-R3-73-033, March 1973:

"Chloride ion in high concentrations, as part of the total dissolved solids in water, can be detected by taste and can lead to consumer rejection of the water supply. In undefined high concentrations it may enhance corrosion of water utility facilities and household appurtenances (American Water Works Association 1971)."

"For the public water supplies of the 100 largest cities in the United States, the median chloride concentration was 13 mg/L with a range of 0 to 540 mg/L (Durfor and Becker 1964)."

"The median chloride concentrations detected by taste by a panel of 10 to 20 persons were 182, 160, and 372 mg/L for sodium, calcium, and magnesium salts, respectively (Whipple 1907). The median concentration identified by a larger panel of 53 adults was 395 mg/L chloride for sodium chloride (Richter and Maclean 1939). When compared with distilled water for a difference in taste, the median concentration was 61 mg/L. Coffee was affected in taste when brewed with 210 and 222 mg/L chloride from sodium chloride and calcium chloride respectively (Lockhart et al. 1955). On the basis of taste and because of the wide range of taste perception of humans, and the absence of information on objectionable concentrations, a limit for public water supplies of 250 mg/L chloride appears to be reasonable where sources of better quality water are or can be made available. However, there may be a great difference between a detectable concentration and an objectionable concentration, and acclimatization might be an important factor."

"Recommendation. On the basis of taste preferences, not because of toxic considerations, and because the defined treatment process does not remove chlorides, it is recommended that chloride in public water supply sources not exceed 250 mg/L if sources of lower levels are available."

8. <u>Impacts of Saltwater Intrusion</u>.

a. <u>Physiological effects</u>. The primary concern about the increase in saltwater intrusion is its impact on municipal users of Mississippi

River water. Restrictions on chloride concentrations in drinking water are generally based on palatability requirements rather than on health. Chlorides in drinking water are generally not harmful to humans until the higher concentrations are reached and persist for long durations, although they may cause problems for people who suffer from heart or kidney diseases. The standard for public water supply is based on public acceptance due to taste. Chlorides in water may impart a salty taste at concentrations as low as 100 ppm for taste-sensitive people. For average people the taste threshold is about 400 ppm. Excess chlorides in drinking water are also objectionable because of possible physiological effects. The physiological effects caused by dissolved solids includes laxative effects principally from sodium sulfate and magnesium sulfate and the adverse effects of sodium on some people afflicted with cardiac disease and toxemia associated with pregnancy. A study has shown that 62 percent of the study population developed laxative effects with sulfates ranging from 1000 ppm to 1500 ppm. With concentrations ranging from 200 ppm to 500 ppm, nearly 25 percent of the study population reported difficulties Some surveys indicate that laxative effects of chlorides are generally apparent only when a person has been accustomed to a lower concentration of salt. Within a few days, a person physiologically adjusts to a higher salt intake. Persons on restricted sodium diets may have their intake limited to 500 mg sodium/day to 1000 mg sodium/day. For very restricted sodium diets, the maximum allowable sodium concentration in water is 20 ppm. For moderately restricted diets, 270 ppm is the maximum. This considers the sodium content of food and assumes a water intake of two liters/day. The general population is not adversely affected by sodium.

b. Corrosion. Corrosion and encrustation of metallic surfaces by water containing dissolved solids is well known. In water distribution systems corrosion is controlled by insulating dissimilar metal connections by nonmetallic materials, use of pH control and corrosion (inhibitors, or some form of galvanic or impressed electrical system. Damage in households occurs to water pipes, wastewater pipes, water machines, and dishwashing machines. Use of water with 1750 ppm dissolved solids, as compared with 250 ppm reduced service life by 30 percent for washing equipment (Journal American Water Works Association, 60:1060, Patterson, W.L. and R.F. Banker). The 1750 ppm dissolved solids levels in the study persisted for a long term rather than for a limited time.

c. Industrial uses. Industrial users of water often require lower levels of chlorides than domestic users. Unacceptable chloride levels can cause problems in efficiency and product quality. Some industrial users would need to cease operations or find alternative sources of water while high chloride levels persist. The degree of action needed varies by industrial installation.

9. Saltwater Behavior. The thalweg of the Mississippi River is below the level of the Gulf of Mexico up to a point 350 miles Above Head of Passes, which is about 15 miles downstream of Natchez, Mississippi. Because saltwater in the Gulf has a greater density than the fresh water

flowing in the Mississippi River, the saltwater tends to intrude upstream along the bottom of the river channel at times of low river flow. A number of factors impact on this upstream movement of saltwater from the Gulf. The dominant factor is the volume of flow in the river. However, flow duration, channel slope, wind velocity and direction, tides, and water temperature all influence the movement of the saltwater.

10. Saltwater Wedge. Because saltwater has a greater density than fresh water it moves upstream in the form of wedge, as illustrated in Figure 1. A highly stratified wedge is common to deep rivers with high freshwater flows such as the Mississippi River. The leading edge, or "toe", of the saltwater wedge is well defined. However, some mixing occurs along the freshwater-saltwater interface and mixed flows eventually reach the surface. Historical data on the saltwater wedge indicate that surface flows will exceed the U.S. Environmental Protection Agency public water supply standard of 250 ppm chloride approximately 15 to 25 miles downstream of the toe of the wedge.

The stratification of the saltwater wedge is demonstrated by data collected by the New orleans District in January 1990 when the discharge fell to 188,000 cfs. These data are represented by the curves in Figure 2. The curves show that the water column is highly stratified downstream of the toe. For example, the curve for mile 40 indicates that the chloride concentration at a 65-foot depth was less than 1000 ppm while at a 75-foot depth the concentration was over 9000 ppm.

When the rate of erosion of the saltwater along its leading edge is equal to the saltwater flow upstream along the channel bottom, the location of the wedge is stable. When freshwater flows increase or decrease, the saltwater wedge retreats downstream or advances upstream, respectively. However, the movement of the wedge is less responsive to increases in flows than to decreases (Figure 3). The maximum upstream penetration of the wedge, which has been observed since 1928, occurred in 1934 and 1940 when the toe of the wedge reached mile 120 near Luling, Louisiana. This is 140 miles upstream of the mouth of Southwest Pass.

11. Mitigation. Authorization of the Deep-Draft Project stipulated that design studies include engineering measures that would mitigate for the impacts of increased saltwater intrusion. A goal of the original design criteria was to prevent degradation of municipal water supplies in the project area as a result of the larger channel. This had to be done without adversely impacting navigation or flood control works. The authorized project includes construction of an underwater embankment, or sill, on the riverbed to retard the advance of the saltwater wedge. The sill will prevent saltwater intrusion upstream of the sill location from occurring any longer than would occur with the 40 foot project. For water supplies downstream of the sill, supplemental freshwater will be provided to compensate for the period of increased saltwater intrusion duration due to the deeper channel.

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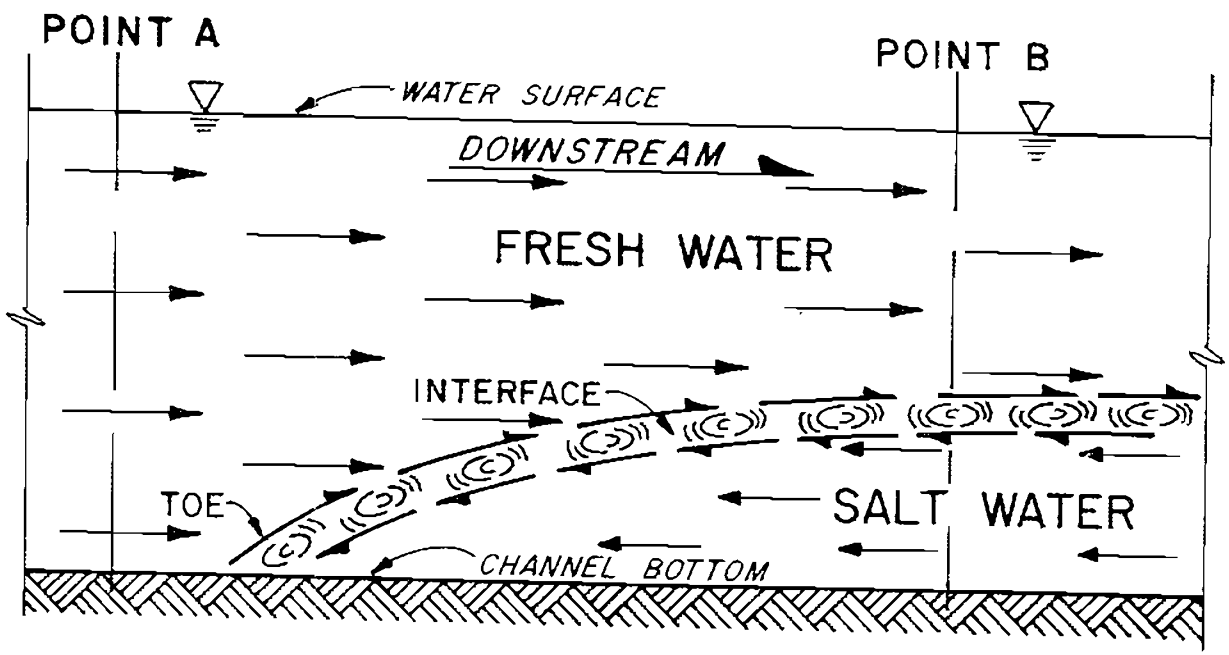
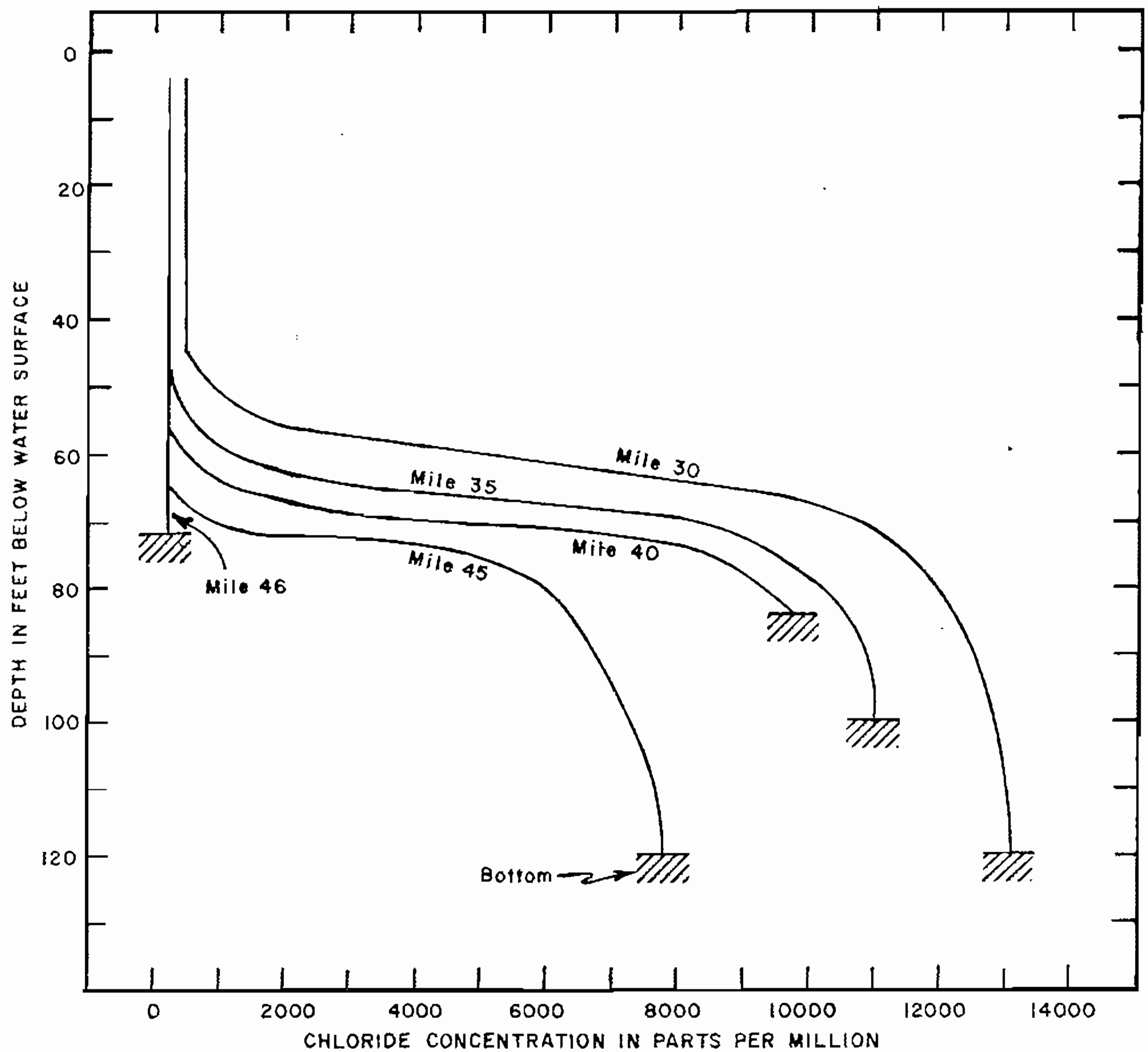


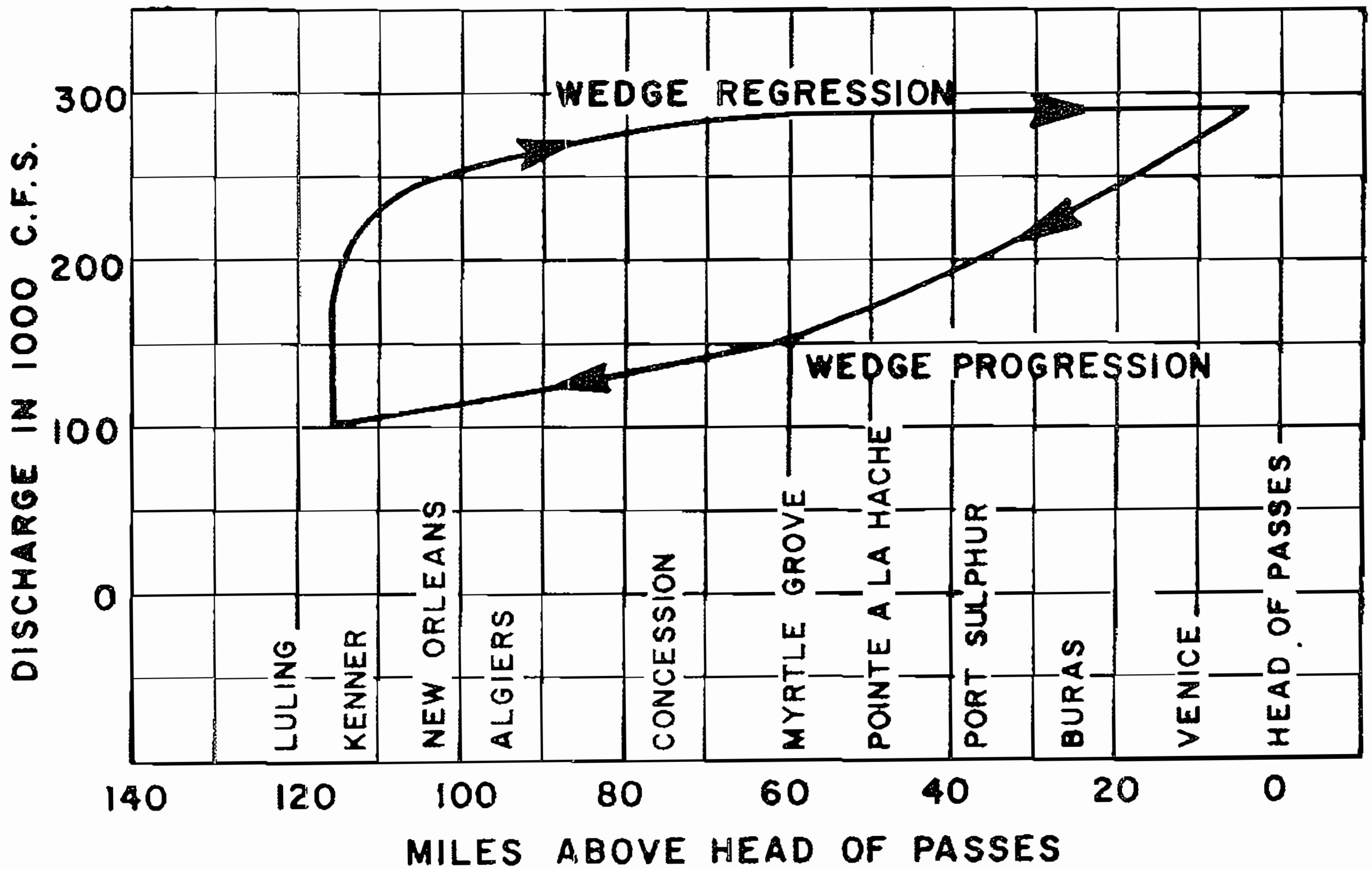
ACTION OF SALTWATER WEDGE

FIGURE 1



Vertical distribution of chloride in the Mississippi River, January 1990

FIGURE 2



SALTWATER WEDGE POSITION VS
MISSISSIPPI RIVER DISCHARGE
(45 FOOT CHANNEL)

FIGURE 3

12. Increased Duration of Saltwater Intrusion. Deepening the Mississippi River Ship Channel from 40 feet to 45 feet or 55 feet will increase the extent and duration of saltwater intrusion. This increase in saltwater intrusion will adversely impact users of Mississippi River water by causing an increase in the duration of unacceptable water quality at municipal and industrial intakes.

The extent of mitigation needed due to these impacts will depend upon the magnitude of the increased extent and duration of saltwater intrusion. To assess these impacts we quantified the increased saltwater intrusion due to the 45-foot and the 55-foot channel through WES model studies. The results of those studies are shown in Table 1 below. Additional information and details about these studies on saltwater intrusion area contained in Appendix B.

TABLE 1

AVERAGE ANNUAL INCREASES IN SALTWATER INTRUSION[1]

Location	Average Annual Increase with 45-Foot Channel (Days)	Average Annual Increase with 55-Foot Channel (Days)
Boothville (Mile 18.6)	15	38
Pointe-a-la-Hache (Mile 49.2)	5	15

1/ Based on surface chloride concentration greater than 250 ppm.

BACKGROUND

13. Deep-Draft Access to the Ports of New Orleans and Baton Rouge, LA - Feasibility Study. The feasibility study submitted in July 1981 addressed the deepening of the Mississippi River Channel from 40 to 55 feet from the Gulf of Mexico via Southwest Pass to Baton Rouge (mile 233.8). The selected plan would cause an increase in the frequency and duration of saltwater intrusion. As the Mississippi River is the only practicable source of raw water for several communities adjacent to the river, measures to mitigate for the increased frequency and duration of saltwater intrusion are required. It was determined that average increases in durations of saltwater intrusion at waterworks upstream of Pointe-a-la-Hache (mile 49.2) would not be significant. However, the average durations at the East & West Pointe-a-la-Hache and the Boothville-Venice waterworks would increase from 16 to 20 days and 59 to 68 days respectively. It was recommended that these increases in durations be mitigated by increasing the storage capacity at the facilities.

14. <u>Supplemental Salinity Intrusion Information (5 Feb 82)</u>. A supplemental Information Report prepared in February 1982 provided results of rather extensive mathematical modeling conducted by the U.S. Army Corps of Engineers Waterways Experiment Station (WES). Further data was developed which indicated that the impact of the enlargement of the existing 40-foot channel to a 55-foot channel on intrusion, and the measures needed to mitigate this impact were both understated in the Feasibility Study. Model results indicated that the Fairview thalweg crossing in the Mississippi River at mile 115 AHP effectively halts the upstream movement of the saltwater wedge with both the existing 40-foot channel and the proposed 55-foot channel. However, significant increases in durations of surface salinities would be caused by the 55-foot channel at the municipal waterworks below mile 115 AHP. Table 2 lists those municipal waterworks below mile 115 and their treatment capacities. Three general approaches were considered in developing measures of mitigation of the increased duration of saltwater intrusion;

(1) The storage of freshwater for use during periods of increased surface salinities,

(2) The extension of the freshwater intakes upstream to a point on the river where the saltwater durations with the 55-foot channel would be similar to the durations with the 40-foot channel, and

(3) The construction of barriers to retard the upstream movement of the saltwater wedge.

It was determined that a combination of measurers would be the most cost effective mitigation plan. It was found from model runs, that a dredged material submarine sill placed at the thalweg crossing downstream of the Belle Chasse water works at mile 64 AHP would slow the upstream movement of the saltwater wedge to a point that durations of saltwater intrusion would be less than under 40-foot channel conditions. The submarine sill would mitigate increased saltwater intrusion for those waterworks above mile 64 AHP.

The plan of mitigation for the East & West Pointe-a-la-Hache and the Boothville-Venice waterworks involved the extension of freshwater intake lines. It was determined that a new intake pump station upstream of the submarine sill location with transmission lines to the West Pointe-a-la-Hache treatment plant could provide suitable water for treatment, along with a transmission line from the West Pointe-a-la-Hache plant across the river to the East Pointe-a-la-Hache plant.

(Revised as per 1st & 2d End)

TABLE 2

LOCATION OF MUNICIPAL WATER INTAKES
ON LOWER MISSISSIPPI RIVER
BELOW FAIRVIEW CROSSING

River Mile AHP	River Bank	Parish	Waterworks	Daily Treatment Capacities MGD
18.6	West	Plaquemines	Boothville-Venice	2.0
49.0	West	Plaquemines	West Pointe-a-la-Hache	3.0
49.2	East	Plaquemines	Pointe-a-la-Hache	0.5
75.8	West	Plaquemines	Belle Chasse	5.0
80.9	East	Plaquemines	Dalcour	0.5
87.9	East	St. Bernard	St. Bernard Districts 1 & 2	9.0
95.8	West	Orleans	New Orleans Sewerage & Water Board, Algiers	10.0
96.7	West	Jefferson	Gretna	3.7
99.1	West	Jefferson	District No. 2	3.0
101.5	West	Jefferson	Westwego	2.2
104.7	East	Orleans	New Orleans Sewerage & Water Board, Carrollton	131.0
105.4	East	Jefferson	District No. 1	58.0

15. Mississippi River Deep-Draft, Design Memorandum No. 1 - General Design (August 1983). During the preparation of the GDM several alternatives to the mitigation plan recommended in the supplemental report to the feasibility study were investigated. Each of the alternatives investigated had as a common feature, the submarine sill. The alternatives compared the extension of freshwater intake lines to freshwater reservoirs and to new water treatment plants. Based on these investigations the recommended plan for mitigation was the construction of two freshwater reservoirs.

Coordination with Plaquemines Parish's Council was conducted throughout the GDM process. The recommended plan, freshwater reservoirs, had the endorsement of the Parish Council, however, there were several concerns raised by the Parish Council that needed to be addressed. Some concerns raised necessitated changes in the reservoir plans and designs. These changes resulted in an increase in the plan costs such that the reservoir plan alternative went from being the most economical plan to the most costly plan of the alternatives investigated. The extension of freshwater intake lines became the most economical plan because of this increase in cost for the reservoir plan.

16. Negotiations on the Local Cost Sharing Agreement with the State of Louisiana. Up until the last quarter of 1985 it was assumed that a

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55-foot channel would be built with a first phase of 50-feet. During the process of negotiating a Local Cost Sharing Agreement (LCA) with the local sponsor, the State of Louisiana, made it known that they would only support, for construction, a 45-foot channel to Mile 181 AHP as a first phase. The State still supported a 55-foot channel but wanted to defer it until sometime in the future. This required a change in the formulation of the saltwater intrusion mitigation plan. We no longer were going to have a 55-foot channel in the near future. Therefore, we had to formulate a plan for a 45-foot channel that could be modified for a 55-foot channel in the future. A push was made to start construction of the 45-foot phase during the 1987 dredging season. The suitability of the previously developed mitigation plans for a 45-foot channel was unknown and the possibility of initiating construction in 1987 required that an interim mitigation plan be developed until a permanent one could be formulated.

The interim plan developed consisted of a submarine saltwater barrier sill to protect waterworks above mile 64 and the barging of freshwater for treatment to the East & West Pointe-a-la-Hache and Boothville-Venice plants for the duration of saltwater intrusion caused by the 45-foot channel. In order to deliver water by barge to the three plants modifications to intake lines would be necessary as well as mooring facilities for the barges. Details of plant modifications and mooring facilities are shown on plates 1-8.

Notification of the State's position to pursue a 45-foot channel as a first phase was received in May 1986. It was then anticipated, subject to passage of the Water Resources Act, that construction of the 45-foot channel would start in June 1987. A supplement to the LCA, detailing cost sharing, was signed in June 1987 with construction starting in July 1987. The interim plan to provide freshwater to the three treatment plants below the submarine barrier sill by barge would be implemented if necessary prior to construction of a permanent mitigation plan.

17. Plan Formulation for Saltwater Intrusion Mitigation. It was uncertain when, if ever, a 55-foot channel would be constructed. As channel depth increases so does the duration of saltwater intrusion. In order to formulate a mitigation plan for the project life of the Mississippi River Ship Channel project it was necessary to make some simplifying assumptions. The assumptions made addressed both the timing of future increases in channel depth as well as the timing of future increases in water needs for the 50 year project life. Table 3 shows the assumptions used in formulating a mitigation plan. In the table "existing capacities" refer to the maximum amount of freshwater each of the three plants can treat per day (see Table 2). The 45 & 55-foot durations refer to the increases in durations above those for the 40-foot channel.

(Revised as per 1st & 2d End)

TABLE 3

BASIC ASSUMPTIONS FOR PLAN FORMULATION

Year 0-10	Existing capacities with 45 foot durations.
Year 11-20	25% increase in existing capacities with 45 foot durations.
Year 21-35	50% increase in existing capacities with 55 foot durations.
Year 36-50	100% increase in existing capacities with 55 foot durations.

Efforts to develop a mitigation plan, using the basic assumptions, focused on two concepts. One, the barging of water as a permanent solution and second, the extension of freshwater intake lines. These plans were compared using the average increase in durations (Table 1) of saltwater intrusion at the three plants as a result of the deeper channel. The results of investigations on the increase in durations of saltwater intrusion due to increases in channel depth are covered in Appendix B.

18. Description of Plans. The barging plan involved the barging of freshwater to the three water treatment plants for the increase in duration. The barging plan was the same as the interim plan described in paragraph 19.

The waterline extension plan involved the extension of freshwater intake lines for the three treatment plants upstream to a point above the location of the submarine sill at approximate mile 64 AHP. This plan is covered in detail in the Mississippi River Deep Draft, Design Memorandum No. 1 - General Design (August 1983).

Costs estimates, for comparison, were developed based upon the assumptions shown in Table 3. Over the project life, the barging plan was determined to be more cost effective. Table 4 shows the results of the cost analysis.

(Revised as per 1st & 2d End)

TABLE 4

COST COMPARISON
(September 1987 Price Levels)

Period	BARGING PLAN Barging Expenditures ($)	O&M ($)	Total Expenditures ($)	PIPELINE EXTENSION PLAN Construction Expenditures ($)	O&M ($)	Total Expenditures ($)
Yr. 1-10	3,050,000	200,000	3,250,000	15,400,000	5,660,000	21,060,000
Yr. 11-20	3,300,000	200,000	3,500,000	8,800,000	5,660,000	14,460,000
Yr. 21-35	12,150,000	870,000 2/	13,020,000	-	10,860,000	10,860,000
Yr. 36-50	14,700,000	200,000	14,900,000	-	10,860,000	10,860,000
TOTAL	33,200,000	1,470,000	34,670,000	24,200,000	33,040,000	57,240,000
Present Worth of Total Expenditures			5,500,000 1/			23,300,000 1/
Average Annual Cost			456,000 1/			1,930,000 1/

1/ 8-1/8% interest rate used.
2/ Includes replacement of mooring facilities.

Based on the cost estimates shown in table 8 the Barging Plan would have been the selected plan. However, the Barging Plan had some implementations problems. When a low water event occurs it cannot be predetermined how long it will last, how far upriver the saltwater wedge will go, or how long the wedge will affect any one particular location. It must be pointed out that the Federal Government is responsible only for the increase in duration of saltwater intrusion caused by the project beyond what would have normally occurred without the project in place. The only way to determine the Federal Governments responsibility for any particular event would be "after the fact."

This could be done by running the actual hydrograph experienced through the model simulations for the 40-foot and 45-foot channel conditions to determine what was the actual increase in duration due to the deeper channel for that particular year. This would show the number of days the Federal Government was responsible for during that event. It was believed that this plan could be implemented and financial agreements reached among the Corps, the State of Louisiana and Plaquemines Parish so that the Barging Plan would become the selected plan for mitigating increased saltwater intrusion.

Discussions were held with the State and Plaquemines Parish representatives. The Barging Plan was presented and Plaquemines Parish representatives were requested to review and provide comments. During these discussions parish representatives informed us that they were in the process of developing a proposal to mitigate for increased saltwater intrusion on their own. The parish felt that the barging plan did not provide a permanent solution.

In October 1987 Plaquemines Parish submitted their proposal for saltwater mitigation and a long term plan for potable water improvements. They had embarked on a program to upgrade their water supply and distribution system. Many improvements had been incorporated into the East and West Bank treatment and distribution systems in recent years but more needed to be done. The Parish felt that if the goal of mitigating saltwater intrusion resulting from deepening the Mississippi River could be made consistent with the parish's objectives then it may be possible to utilize Federal and State funding for the mitigation plan to supplement Parish funds in making overall major improvements to the parish water supply system. These improvements would provide a long term, land-based solution.

Plaquemines Parish proposed that in return for a lump sum settlement they would undertake to effect permanent improvements to its potable water treatment and distribution system which would mitigate the increase in saltwater intrusion and be consistent with their ongoing plans for improvements. Funds required for these improvements in excess of the costs to implement the barging plan would be provided by Plaquemines Parish. The Parish in turn would relieve the project of its responsibility to mitigate for the effects of increased saltwater intrusion resulting from the construction of the 45-foot channel.

The Corps and the State agreed to the proposal. The plan developed by Plaquemines Parish satisfied the mitigation needs for a 45-foot channel only. The cost estimate for the Corps' selected plan (Barging) needed to be finalized to set the limit of Federal contribution. The barging plan was revised to meet the mitigation needs for a 45-foot channel and did not assume construction of a 55-foot channel during the project life so that the two plans could be comparable. Future increases in water needs were included in the cost estimates.

The present worth value of the estimated expenditures over the 50 year life of the project ranged from $4.0 million assuming no future inflation to $9.7 million assuming 5% inflation. These costs included construction and O&M projected over the 50 year period and brought back to present worth using 8-1/8% interest rate. These costs also included provision for a 100% gradual increase in the existing capacity of the three treatment plants over 50 years.

In our discussions on the Barging Plan, Plaquemines Parish identified what they considered to be deficiencies in the plan and measures for correcting them. These included incorporating additional reservoir capacity at West Pointe-a-la-Hache; utilization of the existing Davant Community Center Pond for added reservoir storage at the East Pointe-a-la-Hache plant in lieu of barging to that site; and the incorporation of a pipeline between Belle Chasse - Deer Range and West Pointe-a-la-Hache to provide redundancy in that part of the system. We agreed that the first two measures were appropriate additions to the barging concept. The third measure was clearly a betterment to their existing distribution system and as such was unrelated to any mitigation purpose. The present worth value of the modified barging plan ranged from $6.4 million to $11.4 million for the above cited assumptions as to future inflation.

19. Drought of 88. Negotiations continued with the State and Plaquemines Parish in an effort to come to agreement on a Local Cooperation Agreement (LCA) and the implementation of the mitigation plan. In the midst of these negotiations severe drought conditions were developing on the river much earlier in the year than usual. In June 1988 river flows were less than 30% of average. A saltwater wedge from the Gulf of Mexico began migrating up the river at a rapid rate of about 2.3 miles per day. Saltwater intrusion occurs almost annually in the lower Mississippi River, however, it normally does not occur until September or October, and usually its impact is felt only in lower Plaquemines Parish. As a result of the drought, the saltwater intrusion occurred sooner and to a much greater extent than anticipated. With continued low flows and near constant rate of wedge migration, saltwater intrusion would seriously impact the water supplies of Plaquemines, St. Bernard, Orleans, and Jefferson Parishes if immediate action was not taken to restrict further migration. It was obvious that this saltwater intrusion event was severe and had the potential of becoming significantly more severe over the next few months.

The interim mitigation plan was put into action with the awarding of a contract on 27 June 88 for the construction of the saltwater barrier sill. Construction commenced on 30 June at mile 63.7 AHP and completed 1 Aug.

The sill was originally to be constructed to elevation -60 feet NGVD (roughly 15 feet high) with 1V:40H side slopes and would extend some 1200 feet across the river.

When construction commenced the wedge toe (near Mile 80.0 AHP) was well beyond the sill location. The original design was based upon constructing the sill prior to the saltwater wedge reaching the sill location. It was decided, during the initial phase of construction, to raise the sill to elevation -55 feet NGVD to compensate for the fact that construction started after the wedge passed the sill location. As construction of the sill neared completion, water sampling indicated that wedge movement was slowing down. During the sill construction, WES performed computer simulated studies to determine the effect of the saltwater wedge if the sill was raised to -45 feet NGVD. The studies indicated that a sill to elevation -45 feet NGVD would essentially stop migration of the wedge. On 7 July, Governor Buddy Roemer declared a state of emergency in Plaquemines, St. Bernard, Orleans, and Jefferson Parishes, and requested that the Corps construct the sill to -45 feet NGVD and to continue barging water beyond the maximum time periods caused by the deeper channel.

On the same day the sill contract was awarded, 27 June, bids were advertised for barging water to Plaquemines Parish. Only one bid was received. The lone bid, opened on 1 July, was for $4.4 million, more than 10 times the government estimate of $400,000. The solicitation was cancelled because of the unreasonable bid.

The New Orleans District decided to accomplish the work with Corps barges and in house labor forces. Barging to East & West Pointe-a-la-Hache and Boothville started on 14 July. Plaquemines Parish had previously begun barging on their own to East & West Pointe-a-la-Hache on 5 July. On 5 Aug the barging to East & West Pointe-a-la-hache was discontinued. Barging to Boothville continued until 2 Dec 88.

REEVALUATION OF PROJECT COSTS

20. Reevaluation of Barging Costs. The experience of the "Drought of 88" showed that the cost estimate for the Barging Plan was understated. The actual costs incurred during the barging operations were used as a basis to update the estimate for the barging plan. The updated present worth value of the estimated expenditures over a 48 year project life is $33,900,000 assuming 5% inflation. These costs include construction and O&M projected over the 48 year period and brought back to present worth using 8 1/8% interest rate. These costs also include provision for a 100% gradual increase in the existing capacity of the treatment plants

(Revised as per 1st & 2d End)

over the 48 years. A 48 year project life is being used because project channel dimensions were reached in December 1988, thus we are in the second year of the project.

PROJECT PLAN

21. Authorized Plan. The Mississippi River Deep Draft, Design Memorandum No. 1 - General Design (August 1983) recommended the construction of two freshwater reservoirs to mitigate the increase in saltwater intrusion. Discussions in the Background Section of this report shows the evolution and development of what eventually became the Corps' selected plan, barging.

22. Selected Plan. Up until the "Drought of 88" all indications were that the Barging Plan would be the most economical mitigation plan. All efforts concentrated on setting the Barging Plan costs so that the limit of the Federal Government's contribution towards mitigation could be determined. However, as discussed in paragraph 20 the Barging Plan cost estimate rose considerably based on the experience during the "Drought of 88." The Plaquemines Parish plan became the most economical of the plans conceived. Two common features of both the Corps' selected plan and the Plaquemines Parish Plan are the submarine saltwater barrier sill and the reservoir at the Davant Community Center. The sill mitigates increased durations of saltwater intrusion for reaches of the river above the sill location. The submarine saltwater barrier sill will be placed at Mile 63.7 with a top elevation of -60 feet NGVD, IV on 40H side slopes extending approximately 1200 feet across the river. Plate 9 shows the sill location, design section, and borrow area. Further information on the sill is covered in Appendix B. The pond at the Davant Community Center, on the East Bank, will be used as a reservoir. Plaquemines Parish has connected this reservoir to the river with a siphon. Attendant pumps and piping have been put in place to deliver water from the reservoir to the East Pointe-a-la-Hache treatment plant. The East bank features are covered in Appendix C pages 8 to 10 and details shown on figures 10 & 16 through 16g.

a. The Corps' selected plan, Barging, consisted of the following features:

(1) Mooring facilities and modifications to intake lines at Boothville and West Pointe-a-la-Hache. Details of plant modifications and mooring facilities are shown on plates 1 through 8.

(2) The delivery of water by barge, to the Boothville and West Pointe-a-la-Hache plants. At Boothville water would be pumped into two holding reservoirs, one at Boothville and the other at Fort Jackson. At the West Pointe-a-la-Hache plant a 6 million gallon tank would be constructed for use as a back-up supply in case of an interruption of barge delivery.

b. The Plaquemines Parish plan is presented in detail in Appendix C. In general the Plaquemines Parish Plan consists of increasing the treating capacity at the Belle Chasse Plant and the addition of pipelines and pumping stations to deliver treated water downstream to the West Pointe-a-la-Hache & Boothville water plants.

PROJECT COST

23. 45-Foot Channel Project Cost. The costs presented in Table 5 are total costs. These costs include initial construction, present worth of the O&M projected over a 48 year period the remaining life of the project assuming 5% inflation and brought back to present worth using 8 1/8% interest rate. These costs also include provisions for a 100% gradual increase in consumption over the remaining life of the project. The initial cost for construction of the mooring facilities ($840,000) and the cost of implementing the interim mitigation plan during the "Drought of 88," including construction of the submarine barrier sill ($800,000), and barging water ($2,200,000) are considered sunk costs and not included in the project costs shown in the table.

TABLE 5

COMPARISON OF PLAN COST
(May 1990 Price Levels)

Feature	Corps Selected Plan (Barging)	Plaquemines Parish Plan
Submarine Barrier Sill	$3,600,000	$3,600,000
East Pointe-a-la-Hache	600,000	600,000
West Point-a-la-Hache Boothville	29,700,000	16,000,000
TOTAL	$33,900,000	$20,200,000*

*A detailed breakdown of costs for the EPLH & WPLH-Boothville features of the Plaquemines Plan is presented in Appendix C.

24. Cost Allocation. The mitigation features will be cost shared based upon the Water Resources Development Acts of 1986 & 1988. As per the original LCA for this project, the operation and maintenance costs of this plan is a total Federal responsibility. Also, the submarine sill is a total Federal cost. The real estate costs is a Non-Federal cost and is shown in Appendix D. The remainder of the costs are shared 75/25 with the local sponsor, the State of Louisiana. Based on this, the Federal share is $16,200,000 and the local sponsor's share is $4,000,000. Total payments to the Parish amount to $12,600,000 Federal and $4,000,000 Non-Federal.

(Revised as per 1st & 2d End)

Construction costs will be paid on an as needed basis as construction progresses. Payment for the present worth of the operation and maintenance and future expansion due to increases in water needs will be made when construction is completed.

25. Authorized 55-Foot Channel. Throughout our efforts to develop a mitigation plan a basic assumption was that the authorized project depth of 55-feet would eventually be constructed. The proposal made by Plaquemines Parish did not address mitigation needs for increased durations attributable to a 55-foot channel. A future 55-foot channel is uncertain. Considering the proposal made by Plaquemines Parish to be reimbursed for their mitigation plan, for the project life, that reimbursement will be based on project conditions that we currently have on LCA to construct. Therefore, to adequately substantiate that the Plaquemines Parish Plan is the most cost effective mitigation plan we feel its necessary to show the costs, first for the 45-foot channel conditions and then the costs for upgrading those plans to mitigate 55-foot channel conditions.

As discussed in paragraph 20 we looked at two basic alternatives, barging and the extension of freshwater intake lines. The barging plan is the most economical plan of the two for a 45-foot channel. However, for a 55-foot channel the pipeline extension plan is more economical. The Plaquemines Parish Plan can be upgraded to mitigate for the increased duration for a 55-foot channel. The details and costs are identified in Appendix C pages 34 to 37. Table 6 shows a comparison of costs for the three plans for both 45 & 55-foot channels.

TABLE 6

PROJECT COSTS COMPARISON FOR 45 & 55 FOOT CHANNEL CONDITIONS

	Barging Plan	Pipeline Extension Plan	Plaquemines Parish Plan
45-Foot Channel	$33,900,000	$34,300,000	$20,200,000
55-Foot Channel	$85,600,000	$46,500,000	$24,400,000

RECOMMENDATION

26. Recommended Action. The Plaquemines Parish Plan for saltwater intrusion mitigation is the most cost effective of the plans conceived. The plan is also cost effective if the channel depth is increased to the authorized channel depth of 55-feet. Aside from being the more cost effective plan there are several other advantages to accepting the Plaquemines Parish Plan.

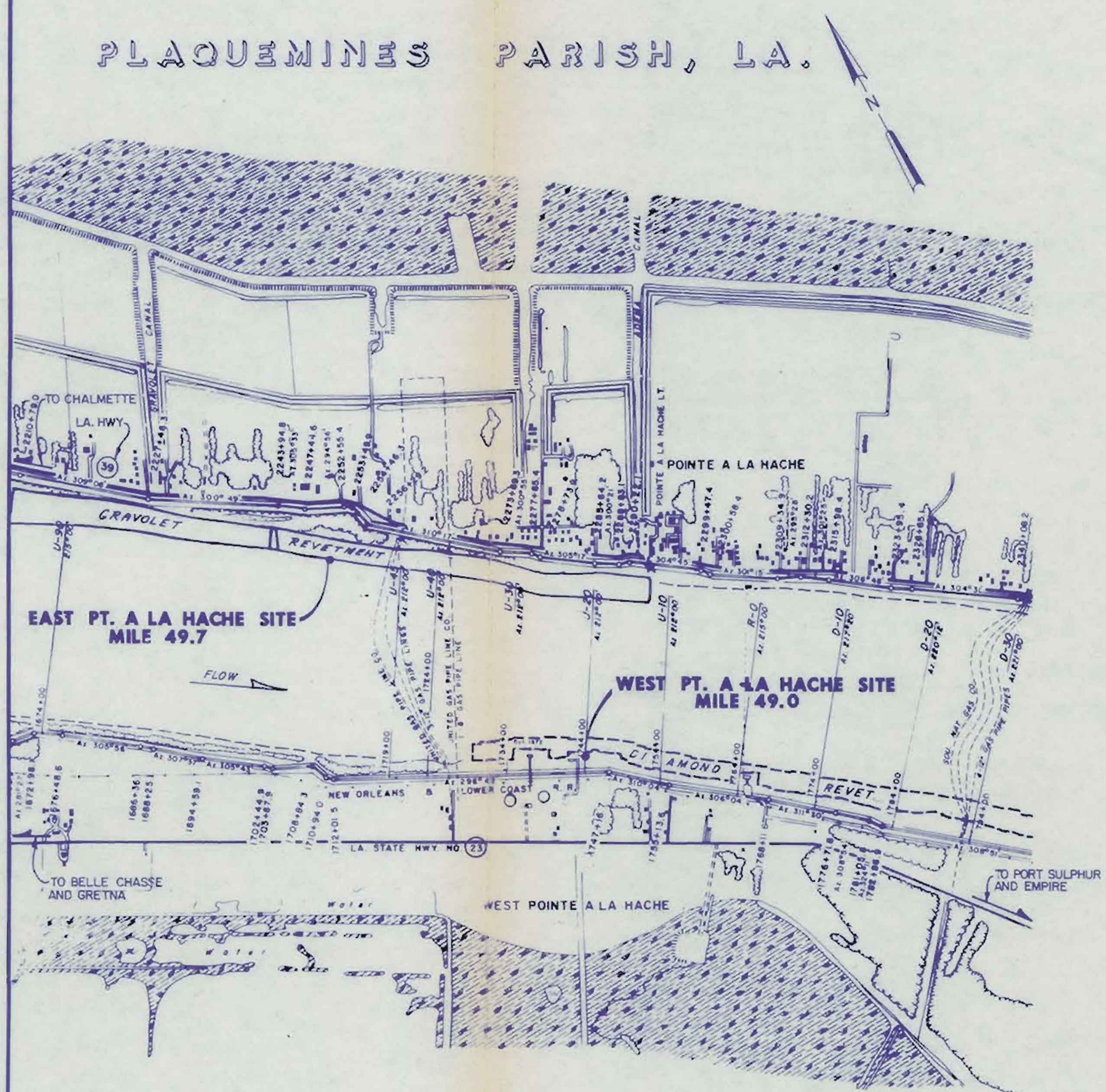
(Revised as per 1st & 2d End)

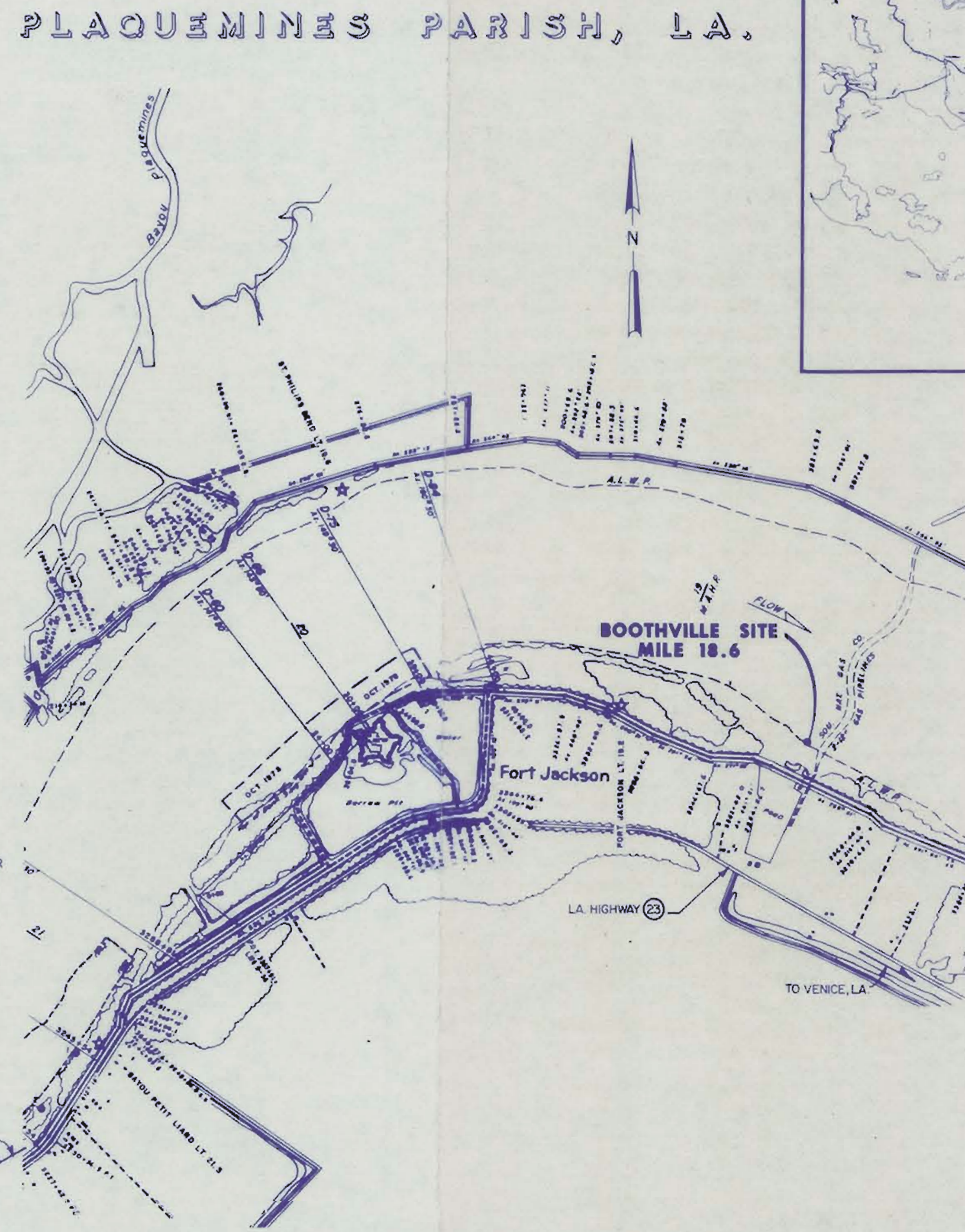
a. It gets the Corps out of the water barging business. This plan has never been wholeheartedly accepted by the Parish. They have been concerned about the timeliness of our response to the need for freshwater, the possibility of disruptions in service resulting from a marine accident or a weather related event (hurricane season coincides closely with the low water season), and whether their perception of the need for freshwater will correspond with ours. From our perspective the water barging plan has been a burden on our normal activities. Whether the need actually arises or not, we must prepare annually for the possibility that we will have to implement the plan. This means that contracts have to be put out for bids, contingency plans made for using Corps barges and tugs, and water pumping equipment kept in a state of readiness. If we have to barge water, equipment and personnel that would otherwise be usefully employed elsewhere must be diverted to this "emergency" service for an indeterminate period of time. The strain on the District's resources is considerable.

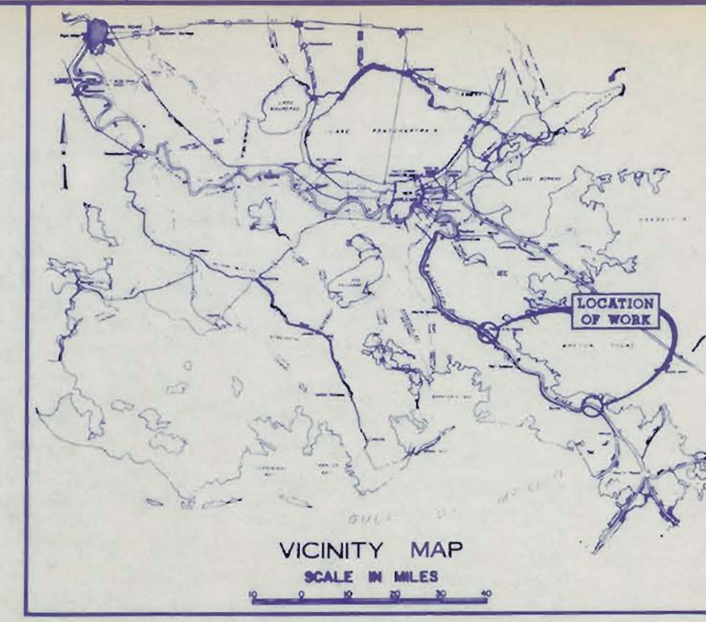
b. It provides a definitive near-term end to the Project's liability for mitigating the effects of the deepened channel. At the completion of the construction of the alternative plan, the parish will release the Project from any further need to mitigate the effects of increased saltwater intrusion due to the 45-foot channel with the exception of the need to construct the saltwater sill should the water supply above Mile 64 AHP be threatened.

c. The funds for this plan will be expended within a 3 to 4 year period, while the barging plan would have to be implemented ad infinitum at a cost subject to factors that are difficult to predict.

The State of Louisiana, Department of Transportation and Development the local assurer for the project has been significantly involved in these studies and negotiations with Plaquemines Parish. They fully endorse the Plaquemines Parish Plan and proposal for construction and reimbursement as set forth in the Local Costsharing Agreement. Therefore, based on the investigation performed to develop a saltwater intrusion mitigation plan as presented in this Supplemental GDM, we recommended approval of the Plaquemines Parish Plan as detailed in Appendix C as the mitigation plan for the 45-foot channel.







LOCATION MAPS

80 0 80 160 240

NOTES

1. ALL RIVER MILES APPLY TO "MILES ABOVE HEAD OF PASSES"
2. ALL ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM (NGVD)

MISSISSIPPI RIVER SHIP CHANNEL GULF TO
BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
LOCATION MAP
AND VICINITY MAP

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: JULY 1990 FILE NO. H-2-30794

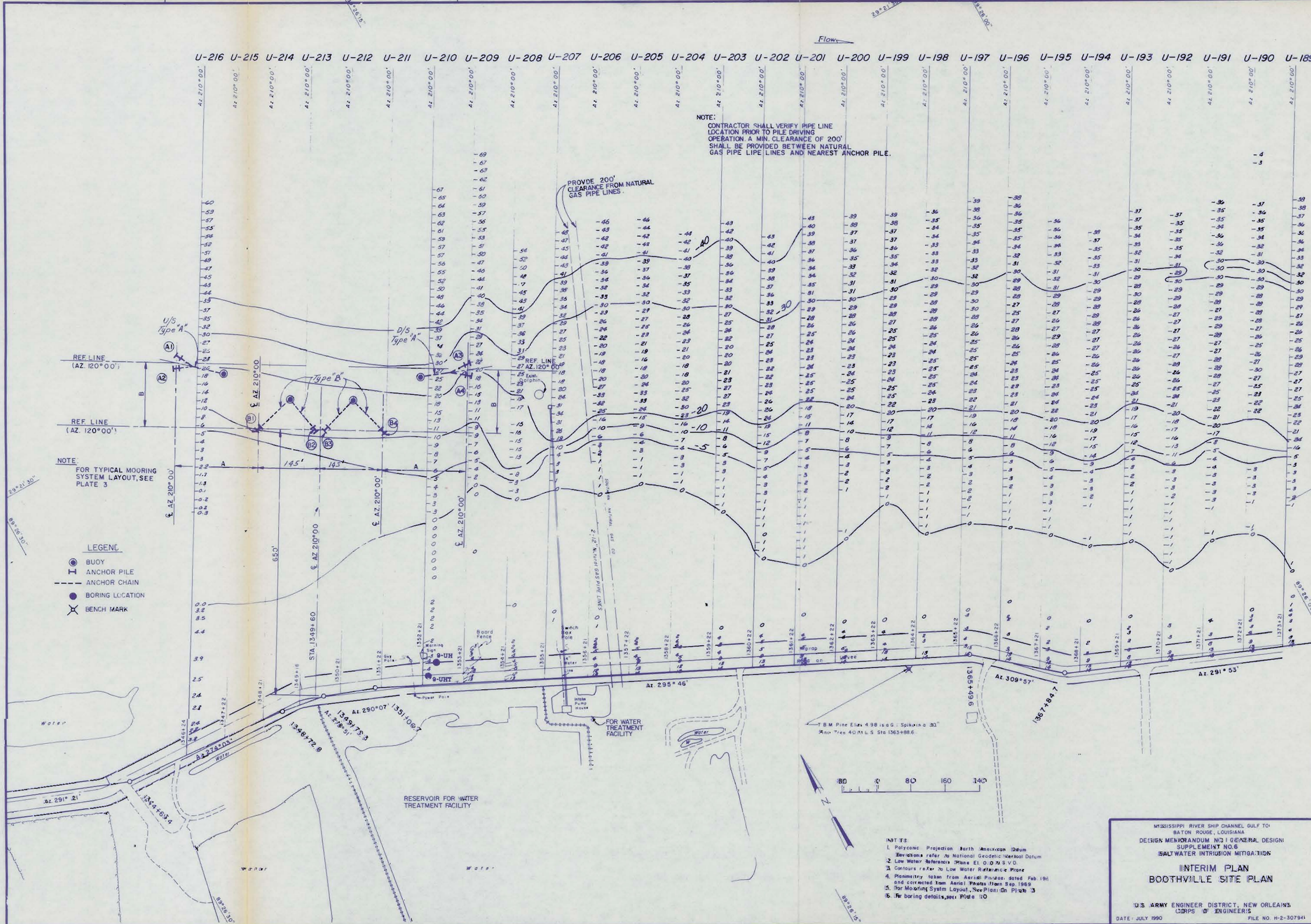
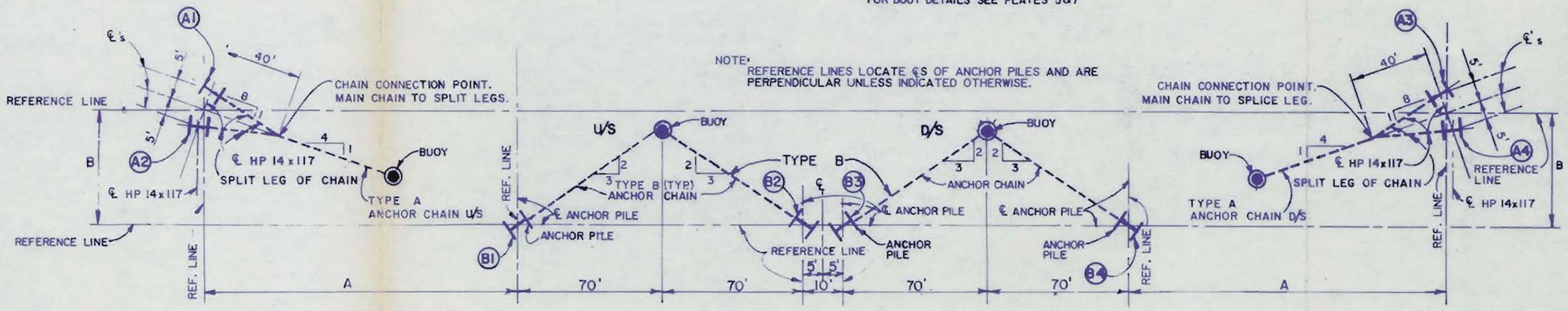

Flow
U-216 U-215 U-214 U-213 U-212 U-211 U-210 U-209 U-208 U-207 U-206 U-205 U-204 U-203 U-202 U-201 U-200 U-199 U-198 U-197 U-196 U-195 U-194 U-193 U-192 U-191 U-190 U-189
Az 210°00'
NOTE:
CONTRACTOR SHALL VERIFY PIPE LINE
LOCATION PRIOR TO PILE DRIVING
OPERATION. A MIN. CLEARANCE OF 200'
SHALL BE PROVIDED BETWEEN NATURAL
GAS PIPE LIPE LINES AND NEAREST ANCHOR PILE.
PROVDE 200'
CLEARANCE FROM NATURAL
GAS PIPE LINES.
U/S Type "A"
D/S Type "A"
Type "B"
REF. LINE
(AZ. 120°00')
REF. LINE
AZ. 120°00'
Exist. Dolphin
NOTE:
FOR TYPICAL MOORING
SYSTEM LAYOUT, SEE
PLATE 3
145'
145'
650'
℄ AZ. 210°00
STA. 1349+60
LEGEND
BUOY
ANCHOR PILE
ANCHOR CHAIN
BORING LOCATION
BENCH MARK
9-UH
9-UHT
Warning Sign
Board Fence
Switch Box Pole
Power Pole
Az. 295° 46'
Az. 309° 57'
Az. 291° 53'
Az. 290°07'
Az. 274°03'
Az. 291° 21'
1349+79.3
1351+06.7
1346+72.8
1344+63.4
1365+49.6
1367+84.7
Intake Pump House
FOR WATER TREATMENT FACILITY
RESERVOIR FOR WATER TREATMENT FACILITY
Water
T.B.M. Pine Elev. 4.98 ...
80 0 80 160 240
N
NOTES:
1. Polyconic Projection North American Datum
Elevations refer to National Geodetic Vertical Datum
2. Low Water Reference Plane El. 0.0 N.G.V.D.
3. Contours refer to Low Water Reference Plane
4. Planimetry taken from Aerial Photos dated Feb. 19..
and corrected from Aerial Photos flown Sep. 1969
5. For Mooring System Layout, See Plan On Plate 3
6. For boring details, see Plate 10
MISSISSIPPI RIVER SHIP CHANNEL GULF TO
BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION
INTERIM PLAN
BOOTHVILLE SITE PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: JULY 1990
FILE NO. H-2-30794

PLATE 2

NOTE:
FOR CHAINS & ACCESSORIES SEE PLATE 6
FOR BUOY DETAILS SEE PLATES 5&7

NOTE:
REFERENCE LINES LOCATE ℄S OF ANCHOR PILES AND ARE PERPENDICULAR UNLESS INDICATED OTHERWISE.



PLAN - TYP MOORING SYSTEM LAYOUT

SITE W & B AS SHOWN
SITE E OPPOS. HAND
N.T.S.

TYPE A MOORING SYSTEM

SITE		E1	E2	L1	L2	L3	P	A	B
E	U/S	-62	-51	114	57	11	50	295	180
	D/S	-62	-65	114	57	25	50	295	180
W	U/S	-56	-56	102	54	18	50	280	178
	D/S	-79	-67	162	63	20	50	345	195
B	U/S	-22	-19	30	36	0	40	195	155
	D/S	-22	-25	24	42	0	40	195	155

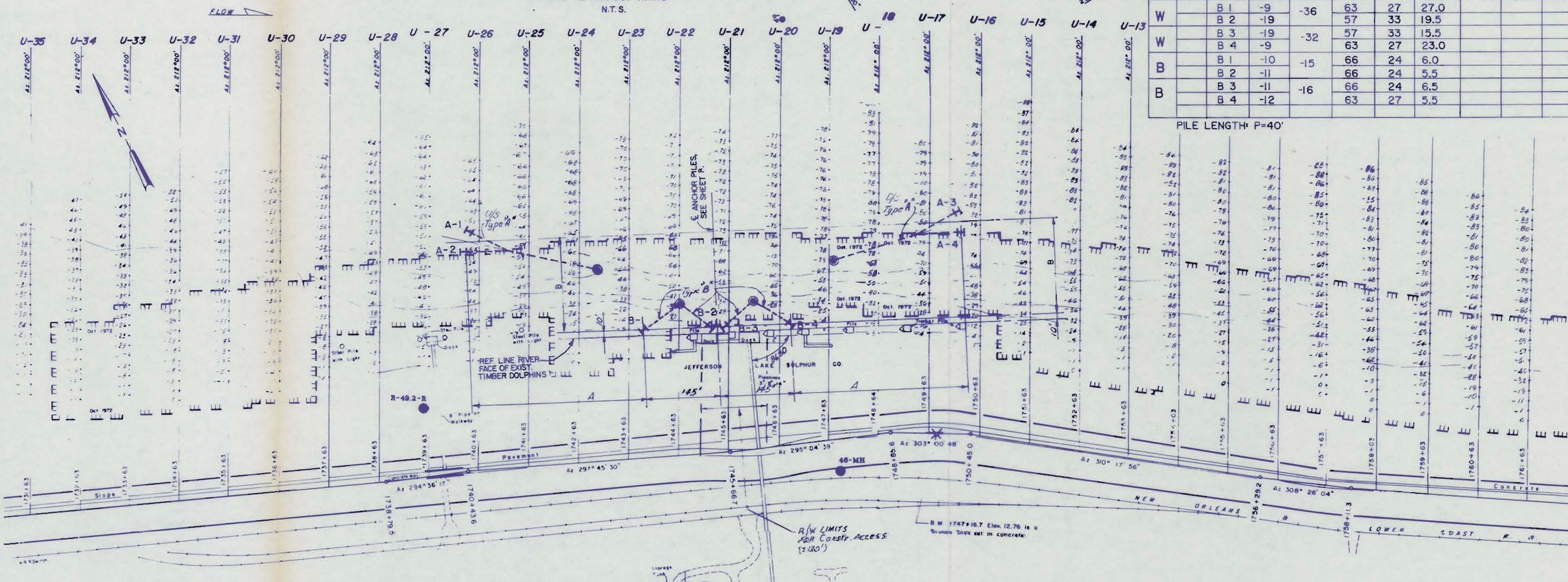
L4=39'

SITE E= EAST } POINTE A LA HACHE SITE
SITE W= WEST }
SITE B= BOOTHVILLE SITE
L1 = LENGTH OF CHAIN FROM BUOY TO FLOUNDER PLATE (SEE DWG.)
L2 = LENGTH OF CHAIN FROM FLOUNDER PLATE TO ANCHOR BUOY (SEE DWG.)
P= LENGTH OF ANCHOR PILE FROM HEAD TO TIP (TOTAL LENGTH).
L3= LENGTH OF CHAIN FROM FLOUNDER PLATE TO SINKER PLATE.

TYPE B MOORING SYSTEM.

SITE	PILE No.	EL. E1	EL. E2	L1	L2	L3
E	B 1	-10	-38	63	27	28.5
	B 2	-20		57	33	20.5
E	B 3	-20	-38	57	33	20.5
	B 4	-10		63	27	28.5
W	B 1	-9	-36	63	27	27.0
	B 2	-19		57	33	19.5
W	B 3	-19	-32	57	33	15.5
	B 4	-9		63	27	23.0
B	B 1	-10	-15	66	24	6.0
	B 2	-11		66	24	5.5
B	B 3	-11	-16	66	24	6.5
	B 4	-12		63	27	5.5

PILE LENGTH: P=40'



NOTES:
1. FOR BORING DETAIL, SEE PLATE 10.
2. CONTOURS REFER TO L.W.R.P.
3. LOW WATER REFERENCE PLAIN ELEV. 0.0 N.G.V.D.
4. PLANIMETRY TAKEN FROM AERIAL PHOTOS DATED 2/67.
5. POLYCONIC PROJECTION NORTH AMERICAN DATUM ELEVATION REFER TO N.G.V.D.

80 0 80 160 240

LEGEND

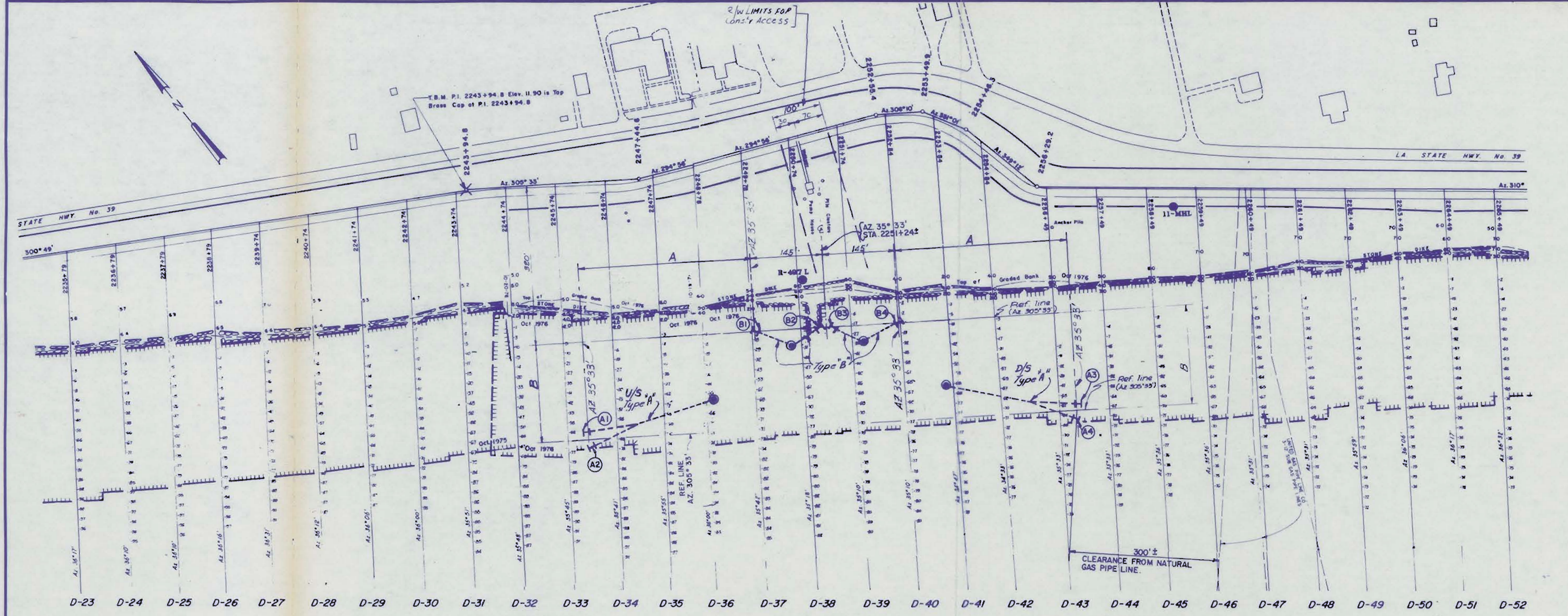
BUOY
ANCHOR PILE
ANCHOR CHAIN
3" THICK ARTICULATED CONC. MATTRESS (ACM)
BORING LOCATION
BENCH MARK

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

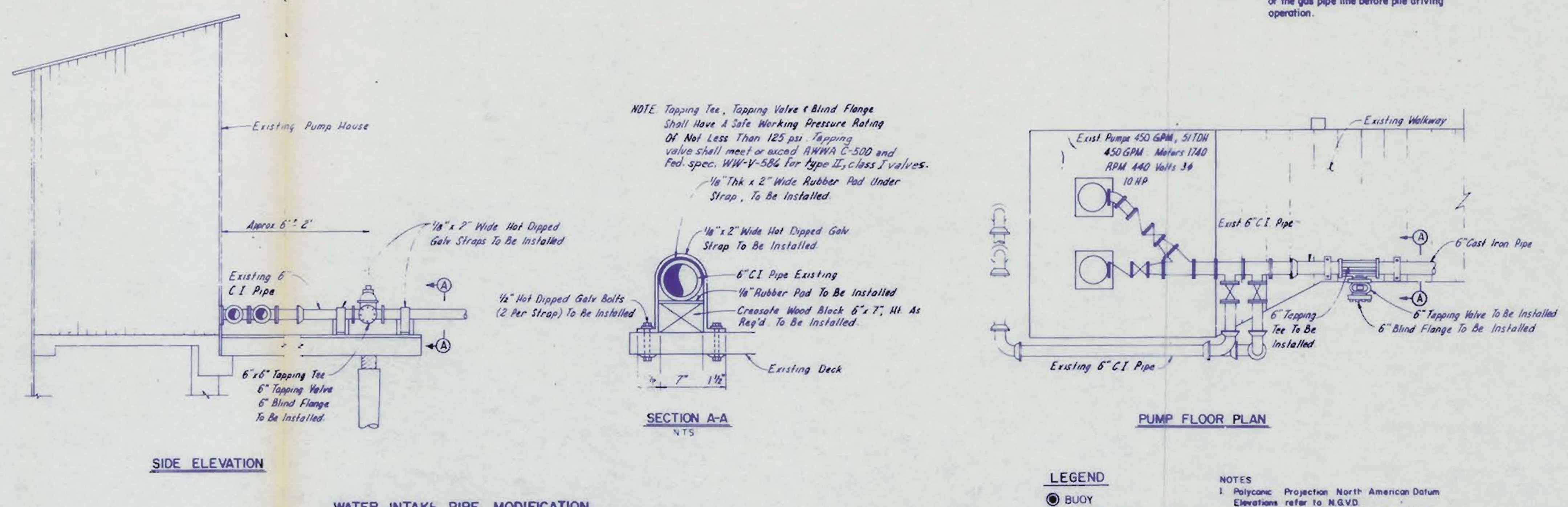
INTERIM PLAN
WEST POINTE A LA HACHE
SITE PLAN

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: JULY 1990
FILE NO. H-2-30754



NOTE:
Contractor shall verify actual location of the gas pipe line before pile driving operation.



SIDE ELEVATION

SECTION A-A
NTS

PUMP FLOOR PLAN

WATER INTAKE PIPE MODIFICATION

LEGEND
- BUOY
- ANCHOR PILE
- ANCHOR CHAIN
- 3" THICK ARTICULATED CONC. MATTRESS (ACM)
- BORING LOCATION
- BENCH MARK

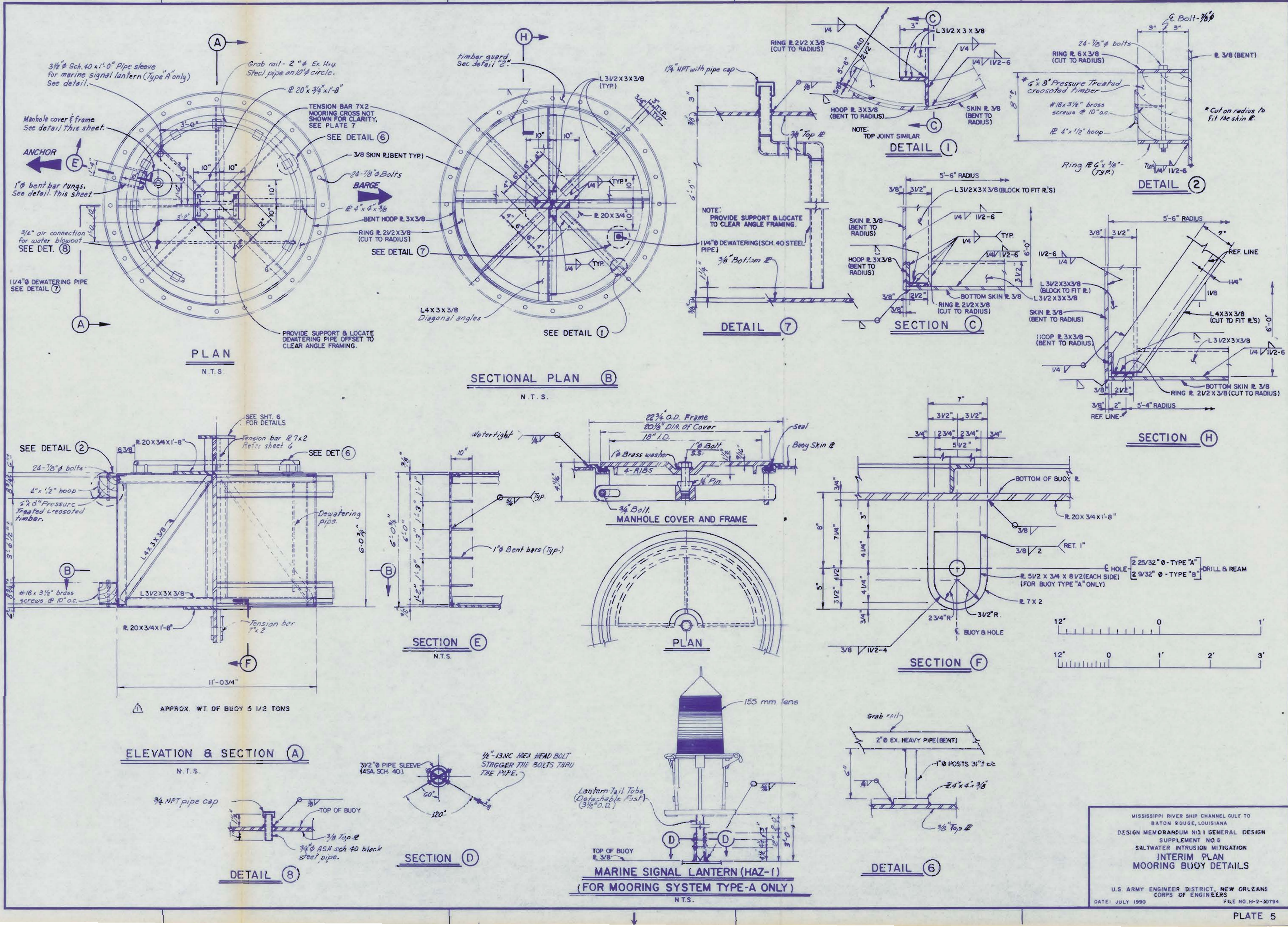
NOTES
1. Polyconic Projection North American Datum. Elevations refer to N.G.V.D.
2. Low Water Reference Plane El=0.0 N.G.V.D.
3. Contours refer to L.W.R.P.
4. Planimetry taken from Aerial Photos dated Feb 1967
5. For typ. Mooring System Layout, See Plan On Plate 3
6. For boring detail see Plate 10

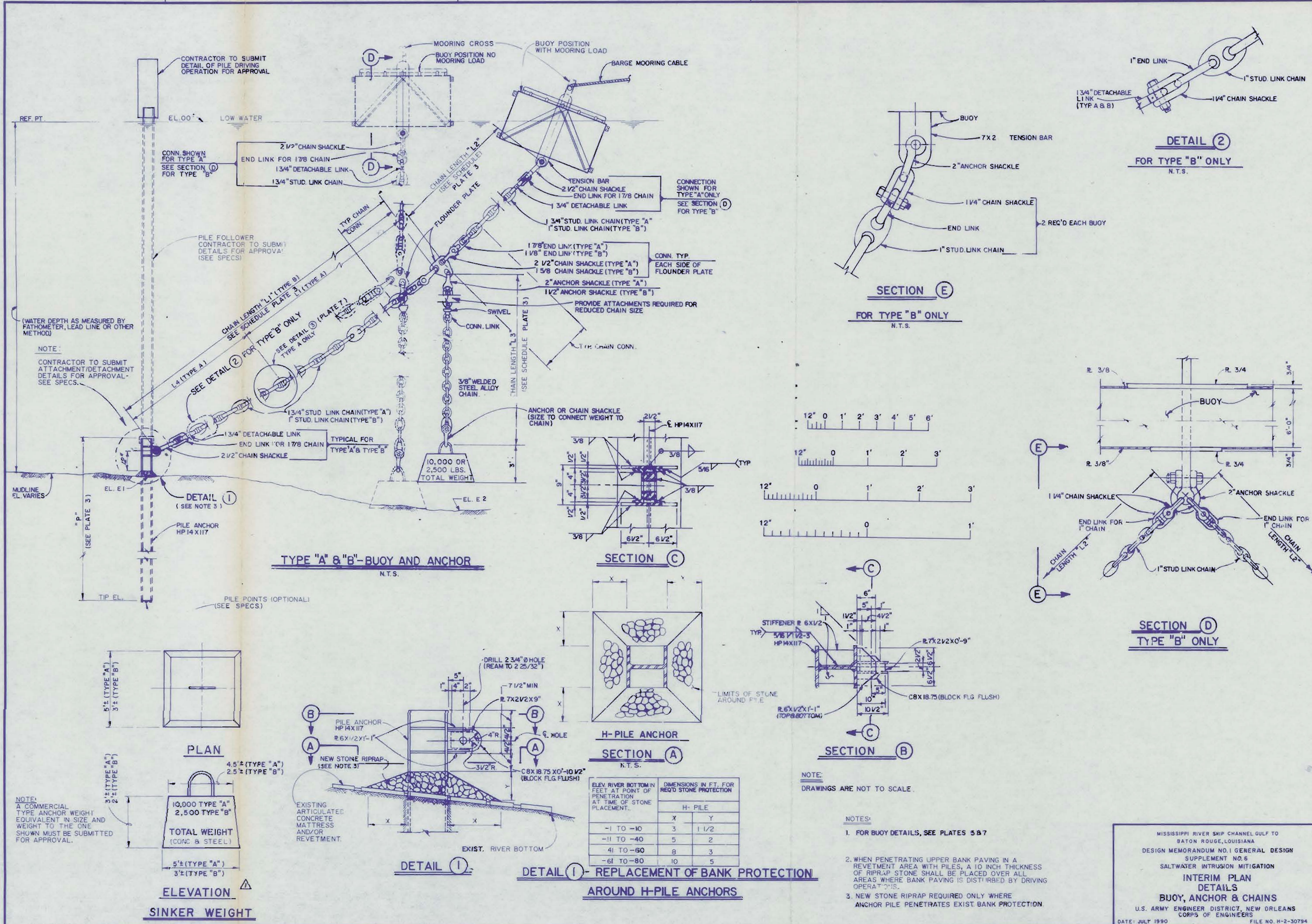
MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
EAST POINTE A LA HACHE
SITE PLAN

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: JULY 1990 FILE NO. H-2-30794


PLAN
N.T.S.
SECTIONAL PLAN (B)
N.T.S.
DETAIL (1)
DETAIL (2)
DETAIL (7)
SECTION (C)
SECTION (H)
ELEVATION & SECTION (A)
N.T.S.
SECTION (E)
N.T.S.
MANHOLE COVER AND FRAME
PLAN
SECTION (F)
DETAIL (8)
SECTION (D)
MARINE SIGNAL LANTERN (HAZ-1)
(FOR MOORING SYSTEM TYPE-A ONLY)
N.T.S.
DETAIL (6)
ANCHOR
BARGE
3½"ø Sch. 40 x 1'-0" Pipe sleeve for marine signal lantern (Type "A" only) See detail.
Grab rail - 2"ø Ex. Hvy Steel pipe on 10'ø circle.
Manhole cover & frame See detail this sheet.
1"ø bent bar rungs, See detail this sheet
3/4" air connection for water blowout SEE DET. (8)
1 1/4"ø DEWATERING PIPE SEE DETAIL (7)
TENSION BAR 7X2 MOORING CROSS NOT SHOWN FOR CLARITY, SEE PLATE 7
SEE DETAIL (6)
3/8 SKIN ℞ (BENT TYP.)
24-7/8"ø Bolts
BENT HOOP ℞ 3X3/8
RING ℞ 2 1/2 X 3/8 (CUT TO RADIUS)
SEE DETAIL (7)
PROVIDE SUPPORT & LOCATE DEWATERING PIPE OFFSET TO CLEAR ANGLE FRAMING.
timber guard Sec detail "2".
L 3 1/2 X 3 X 3/8 (TYP.)
L4 X 3 X 3/8 Diagonal angles
SEE DETAIL (1)
1 1/4" NPT with pipe cap
3/8" Top ℞
NOTE: PROVIDE SUPPORT & LOCATE TO CLEAR ANGLE FRAMING.
1 1/4"ø DEWATERING (SCH. 40 STEEL PIPE)
3/8" Bottom ℞
RING ℞ 2 1/2 X 3/8 (CUT TO RADIUS)
HOOP ℞ 3X3/8 (BENT TO RADIUS)
SKIN ℞ 3/8 (BENT TO RADIUS)
NOTE: TOP JOINT SIMILAR
RING ℞ 6 X 3/8 (CUT TO RADIUS)
24-7/8"ø bolts
℞ 3/8 (BENT)
6" x 8" Pressure Treated creosoted timber
#18 x 3½" brass screws @ 10" o.c.
℞ 4" x ½" hoop
* Cut on radius to Fit the skin ℞.
5'-6" RADIUS
L 3 1/2 X 3 X 3/8 (BLOCK TO FIT ℞'S)
BOTTOM SKIN ℞ 3/8
REF. LINE
L4 X 3 X 3/8 (CUT TO FIT ℞'S)
5'-4" RADIUS
SEE DETAIL (2)
SEE SHT. 6 FOR DETAILS
Tension bar ℞ 7x2 Refer sheet 6
Dewatering pipe.
L4 X 3 X 3/8
L3 1/2 X 3 X 3/8
℞ 20 X 3/4 X 1'-8"
11'-0 3/4"
APPROX. WT. OF BUOY 5 1/2 TONS
1"ø Bent bars (Typ.)
22¾ O.D. Frame
20⅛" DIA. Of Cover
18" I.D.
Watertight
Seal
Buoy Skin ℞
1"ø Brass washer
1"ø Bolt
4-R185
½" Pin.
¾" Bolt.
BOTTOM OF BUOY ℞
℞ 5 1/2 X 3/4 X 8 1/2 (EACH SIDE) (FOR BUOY TYPE "A" ONLY)
℞ 7 X 2
2 25/32" ø - TYPE "A"
2 9/32" ø - TYPE "B"
DRILL & REAM
℄ BUOY & HOLE
3/4 NPT pipe cap
TOP OF BUOY
3/8 Top ℞
3/4"ø ASA sch 40 black steel pipe.
3 1/2"ø PIPE SLEEVE (ASA SCH. 40)
1/2"-13NC HEX HEAD BOLT STAGGER THE BOLTS THRU THE PIPE.
155 mm lens
Lantern Tail Tube (Detachable Post) (3½" O.D.)
TOP OF BUOY ℞ 3/8
Grab rail
2"ø EX. HEAVY PIPE (BENT)
1"ø POSTS 31"± c/c
℞ 4" x 4" x 3/8"
3/8" Top ℞
MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION
INTERIM PLAN
MOORING BUOY DETAILS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: JULY 1990
FILE NO. H-2-30794



ELEV. RIVER BOTTOM IN FEET AT POINT OF PENETRATION AT TIME OF STONE PLACEMENT.	DIMENSIONS IN FT. FOR REQ'D STONE PROTECTION	
	H- PILE	
	X	Y
-1 TO -10	3	1 1/2
-11 TO -40	5	2
41 TO -60	8	3
-61 TO -80	10	5

DETAIL 1 - REPLACEMENT OF BANK PROTECTION AROUND H-PILE ANCHORS

NOTE:
DRAWINGS ARE NOT TO SCALE.

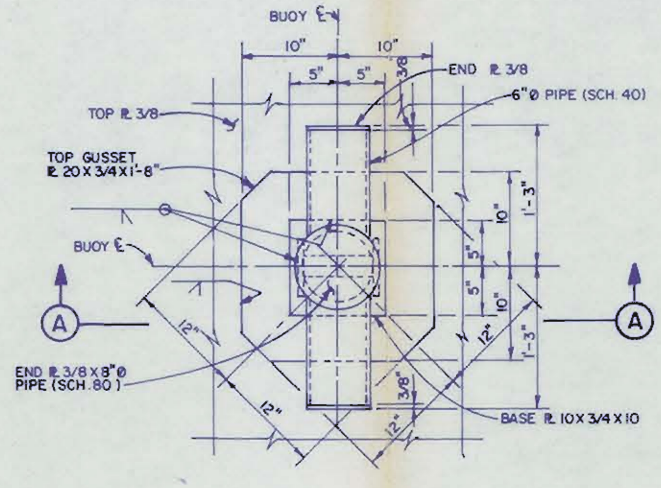
NOTES:

1. FOR BUOY DETAILS, SEE PLATES 5 & 7
2. WHEN PENETRATING UPPER BANK PAVING IN A REVETMENT AREA WITH PILES, A 10 INCH THICKNESS OF RIPRAP STONE SHALL BE PLACED OVER ALL AREAS WHERE BANK PAVING IS DISTURBED BY DRIVING OPERATIONS.
3. NEW STONE RIPRAP REQUIRED ONLY WHERE ANCHOR PILE PENETRATES EXIST. BANK PROTECTION.

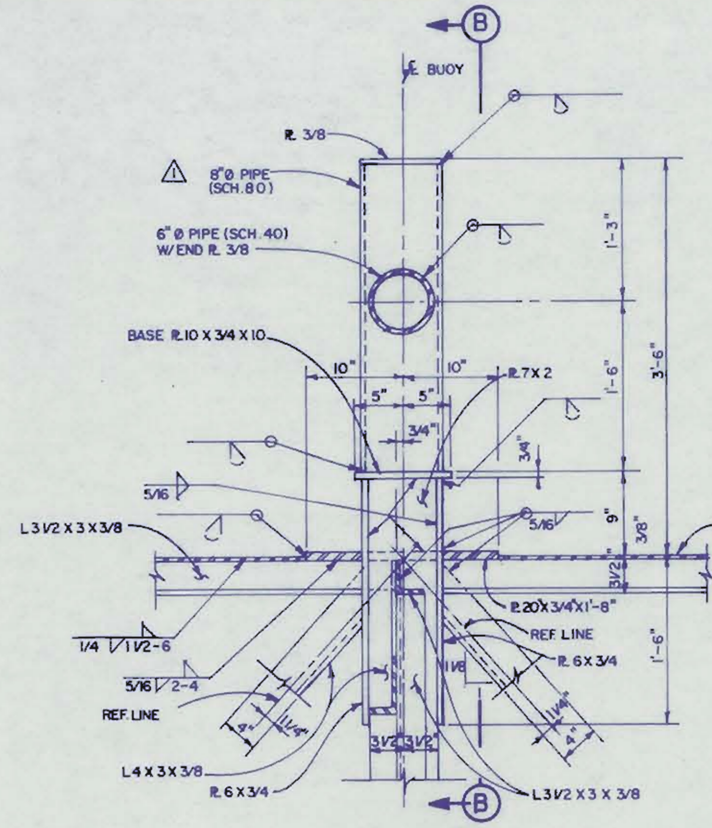
MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
DETAILS
BUOY, ANCHOR & CHAINS

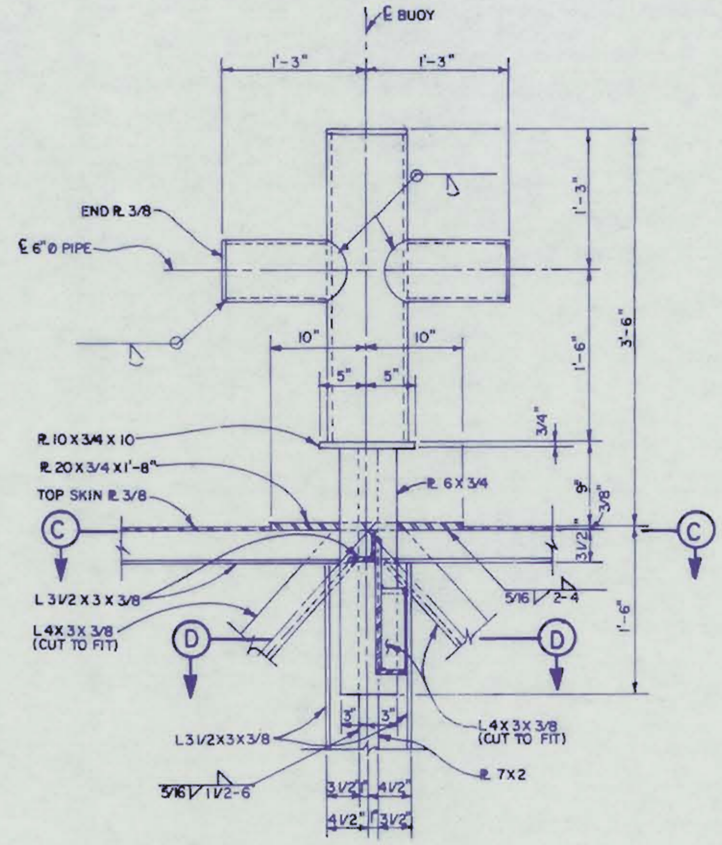
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: JULY 1990 FILE NO. H-2-30794



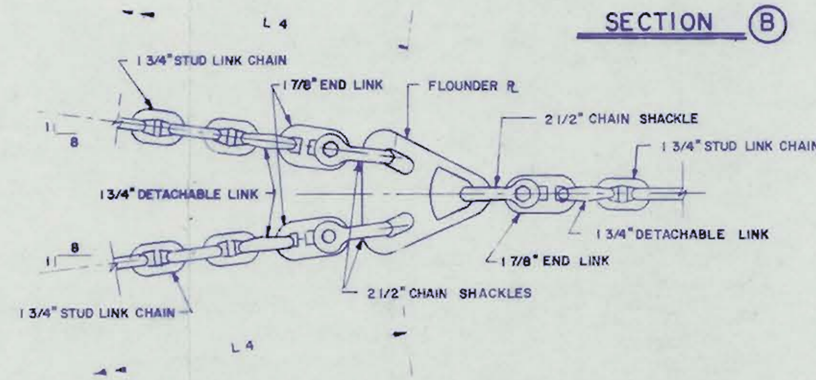
PART PLAN AT ℄ BUOY



SECTION (A)

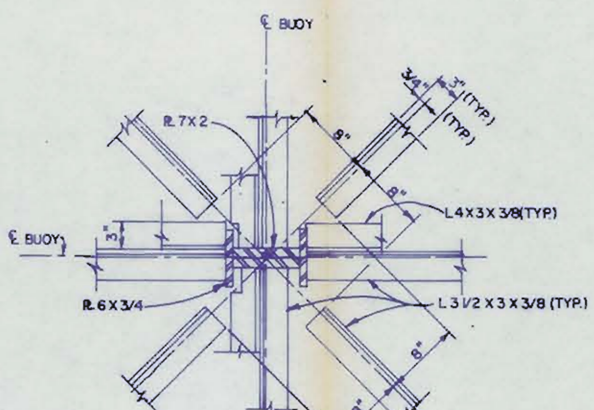


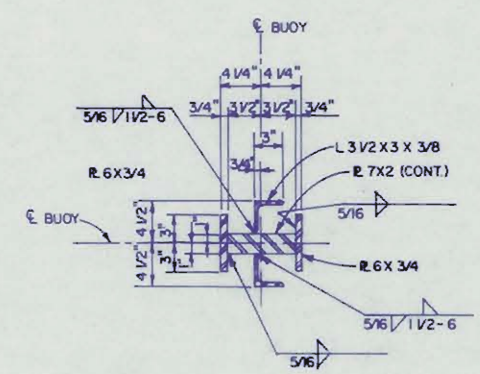
SECTION (B)

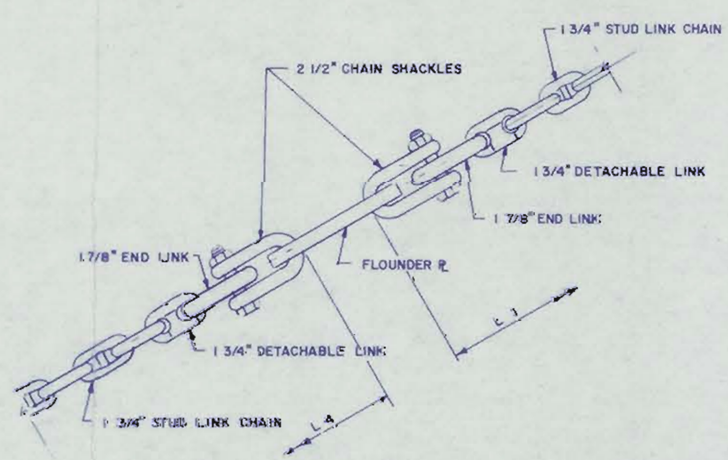


PLAN OF DETAIL 3 (TYPE A ONLY)

N.T.S.







NOTES:

1. HOR. MEMBERS OF TOP FRAME ARE IL 3 1/2 X 3 X 3/8
2. DIAGONAL BRACING MEMBERS SLOPED TO BOTTOM FRAME ARE IL 4 X 3 X 3/8
3. TOP ℞ & WELDS NOT SHOWN.

SECTION (C)

SECTION (D)

DETAIL 3 (TYPE A ONLY)

N.T.S.

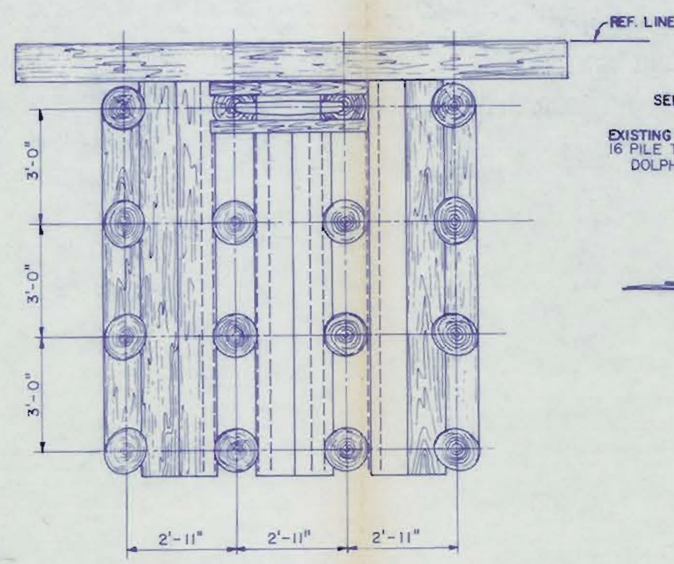
12" 0 1' 2' 3'

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
MOORING CROSS AND BUOY DETAILS

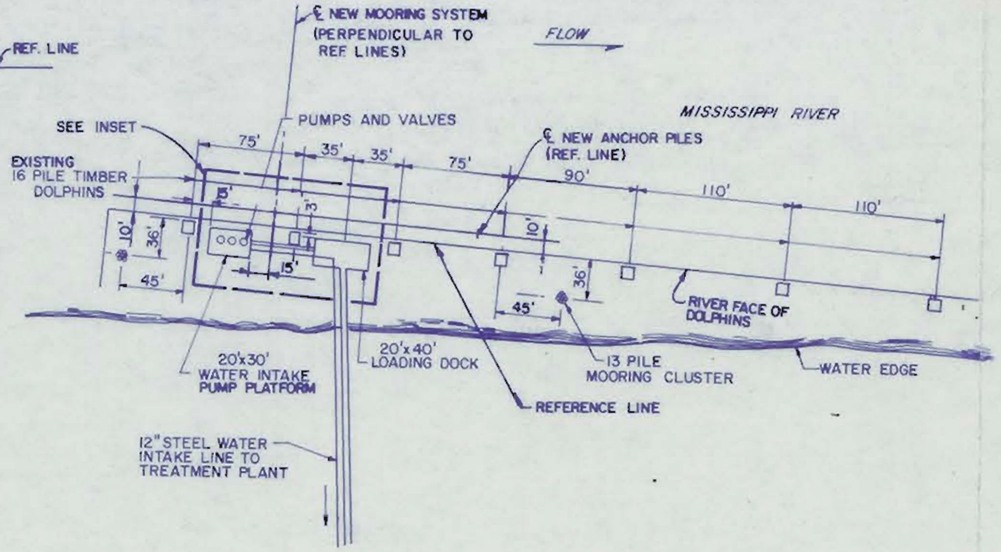
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: JULY 1990 FILE NO. H-2-30794

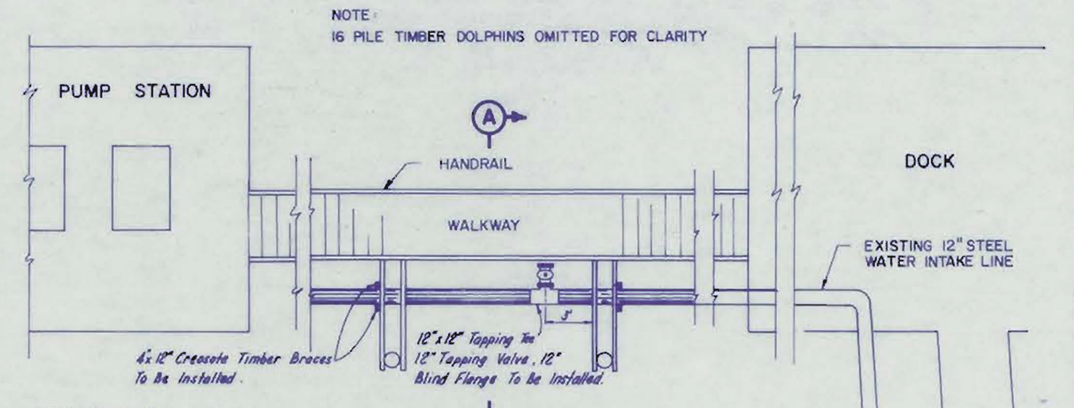


TYP. PLAN-EL. 14.0

EXISTING 16 PILE DOLPHINS

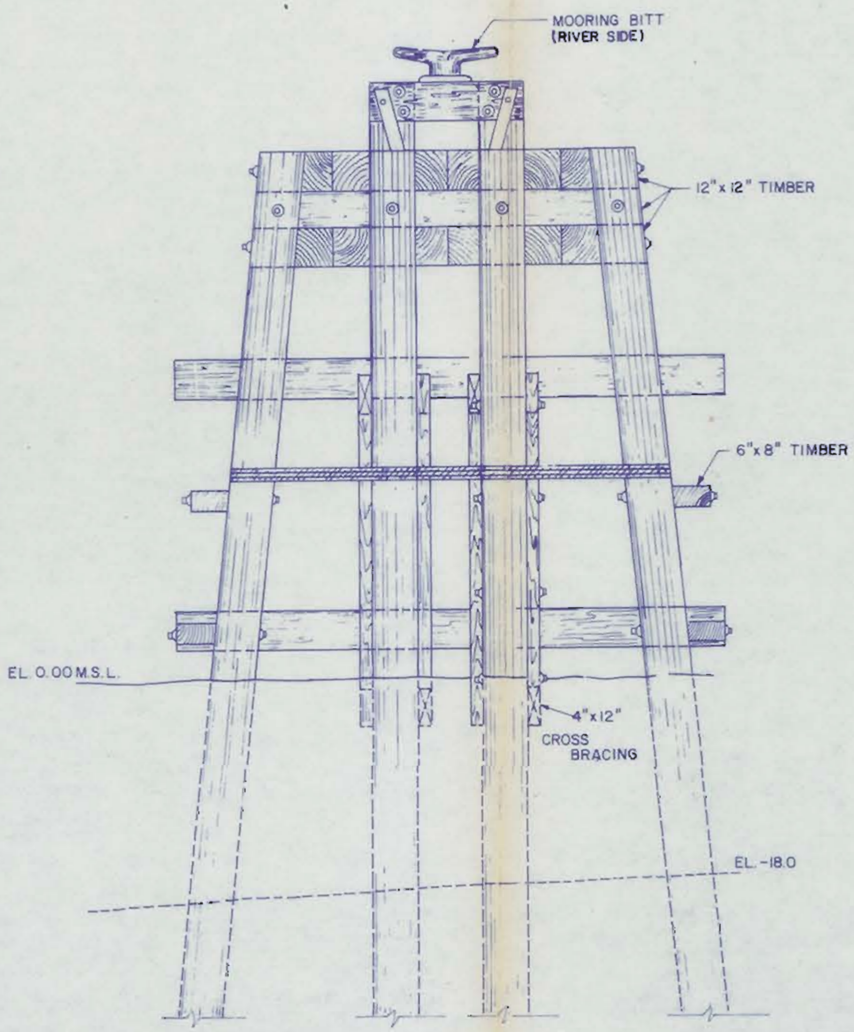


PLAN-EXISTING WATER INTAKE FACILITIES



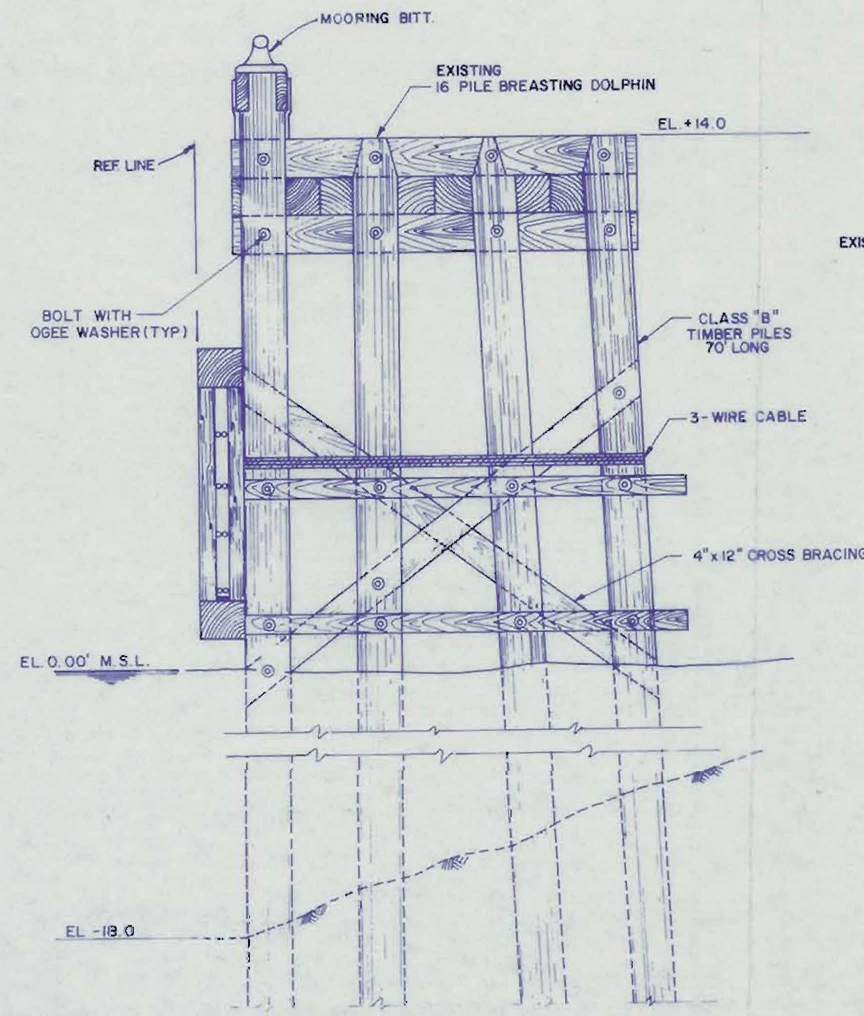
NOTE. Tapping Tee, Tapping Valve & Blind Flange To Be Installed Shall Have A Min. Safe Working Pressure Of 125 psi. Tapping valve shall meet or exceed AWWA C-500 and fed spec. WW-V-586 for Type II, class I valves.

INSET - EXISTING FACILITIES



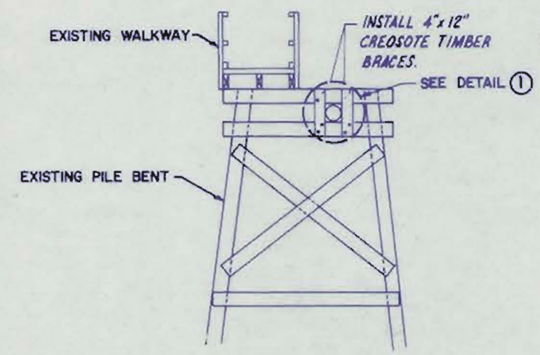
ELEVATION LOOKING RIVERWARD

EXISTING DOLPHINS

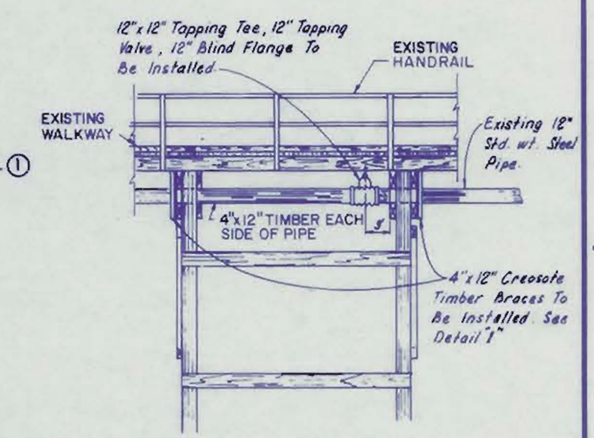


UPSTREAM ELEVATION

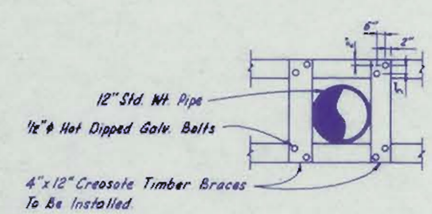
EXISTING DOLPHINS



SECTION A



ELEVATION B-B



DETAIL 1

NOTES:

Seven existing mooring dolphins are shown for information only.

No new construction is required for these dolphins.

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA

DESIGN MEMORANDUM NO. 1 GENERAL DESIGN SUPPLEMENT NO. 6

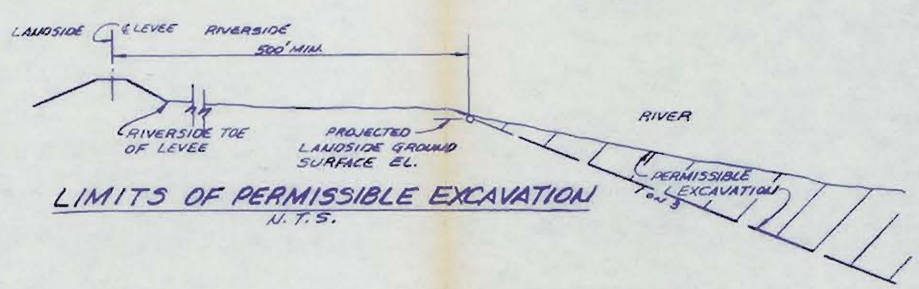
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
WEST POINTE A LA HACHE
EXISTING FACILITIES AND NEW PIPING

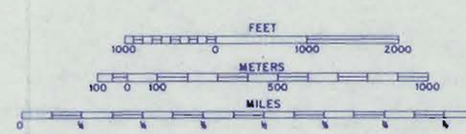
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

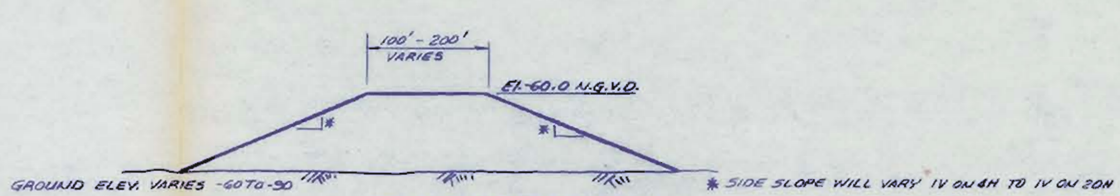
DATE JULY 1990 FILE NO. H-2-30794

All elevations are expressed in feet and refer to Mean Sea Level
Contours below Low Water Reference Plane are expressed in feet at 5 and 10 ft intervals
Contours above Low Water Reference Plane are expressed in feet at 5 ft intervals
Planimetry from aerial photographs flown November 1973
● Distances on Mississippi River above Head of Passes are shown at 1 mile intervals.
1962 survey
Polyconic Projection, North American Datum
L W R P – Low Water Reference Plane
For boring details see Plate 11



LIMITS OF PERMISSIBLE EXCAVATION
N.T.S.



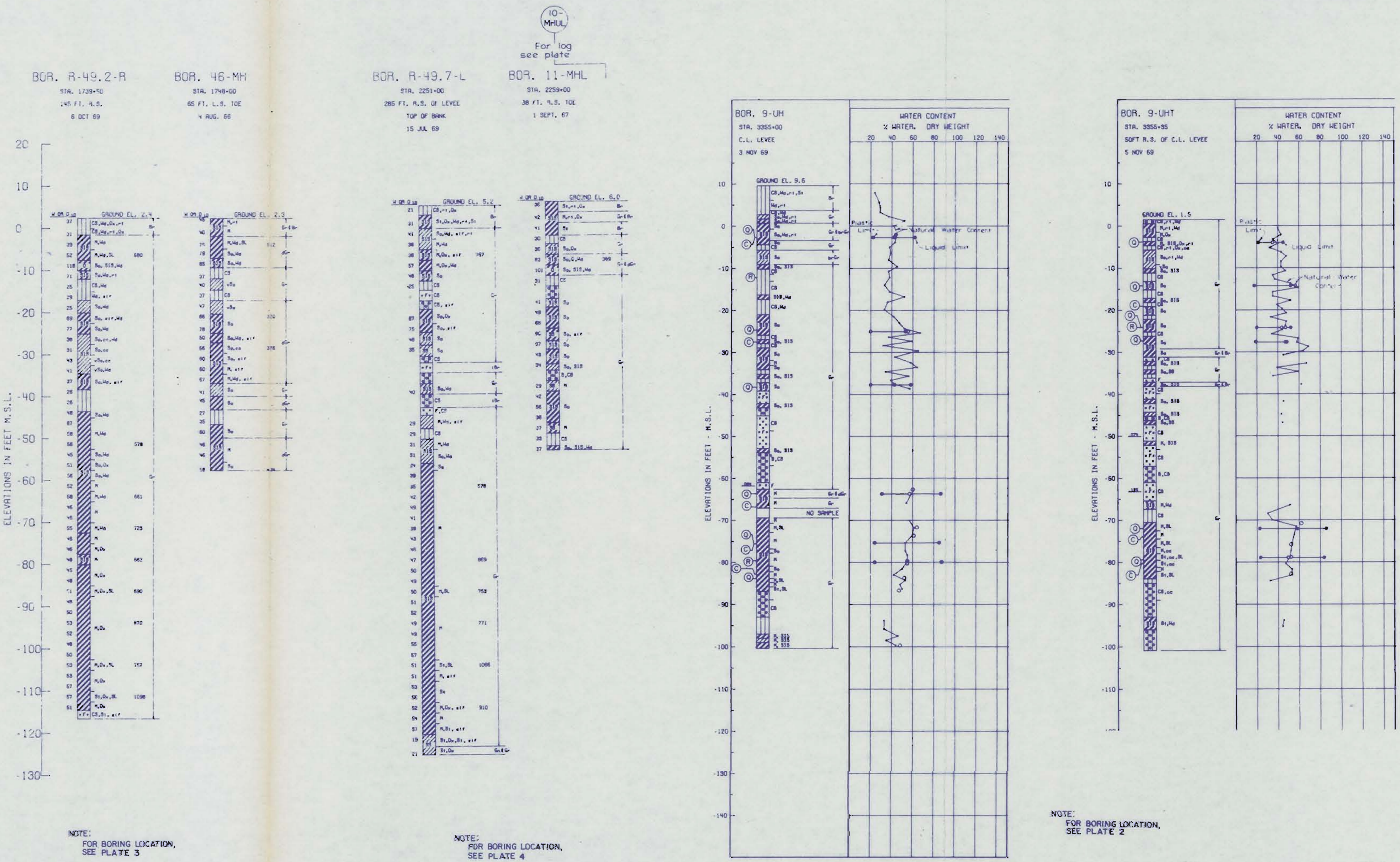


TYPICAL SECTION
N.T.S.

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

SALTWATER BARRIER SILL LOCATION & PLAN

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE JULY 1990 FILE NO. H-2-30794



NOTE:
FOR BORING LOCATION,
SEE PLATE 3

NOTE:
FOR BORING LOCATION,
SEE PLATE 4

NOTE:
FOR BORING LOCATION,
SEE PLATE 2

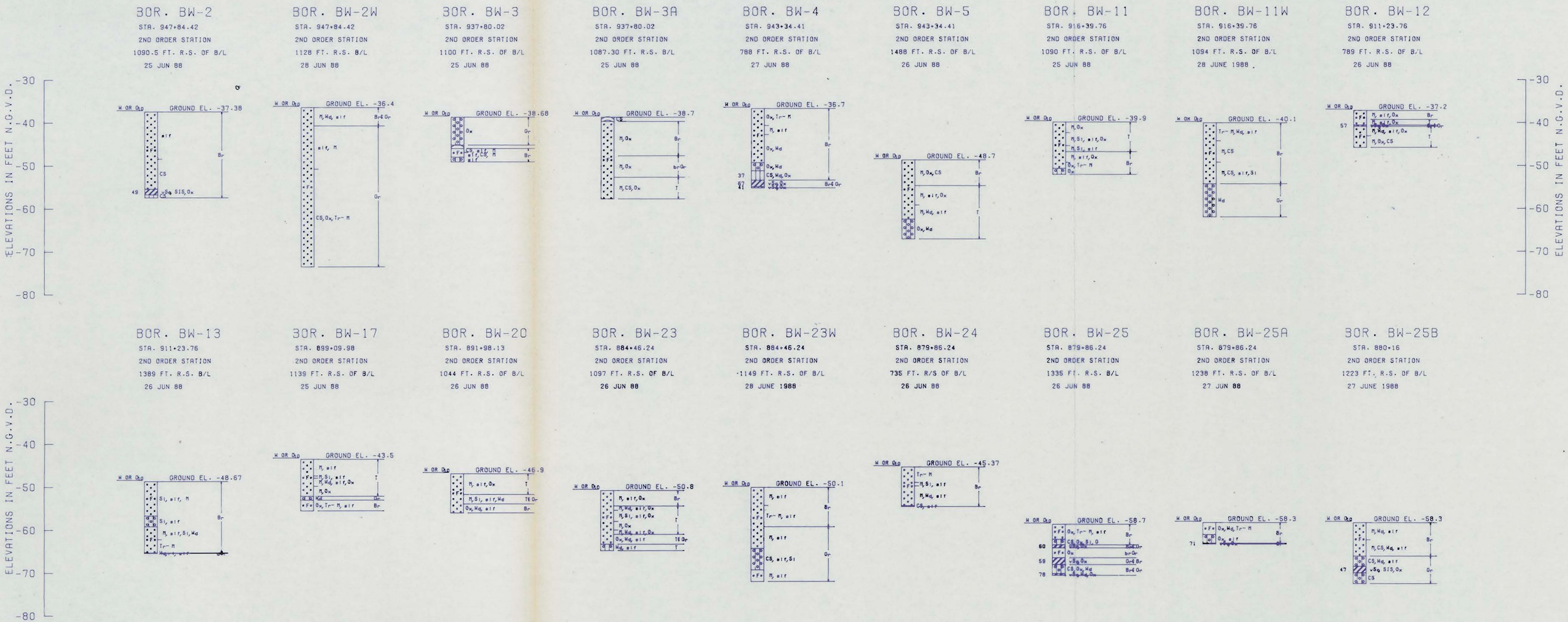
MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA

DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

INTERIM PLAN
SOIL BORING DATA

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE JULY 1990 FILE NO. H-2-30794



MISSISSIPPI RIVER SHIP CHANNEL GULF TO
BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

SALTWATER BARRIER SILL BORROW AREA
SOIL BORING DATA

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: JULY 1990 FILE NO. H-2-30794

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION		TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
COARSE - GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.	CLEAN GRAVEL (Little or No Fines)	GW		GRAVEL, Well Graded, gravel-sand mixtures, little or no fines
			GP		GRAVEL, Poorly Graded, gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES (Appreciable Amount of Fines)	GM		SILTY GRAVEL, gravel-sand-silt mixtures
			GC		CLAYEY GRAVEL, gravel-sand-clay mixtures
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size.	CLEAN SAND (Little or No Fines)	SW		SAND, Well-Graded, gravelly sands
			SP		SAND, Poorly-Graded, gravelly sands
		SANDS WITH FINES (Appreciable Amount of Fines)	SM		SILTY SAND, sand-silt mixtures
			SC		CLAYEY SAND, sand-clay mixtures
FINE - GRAINED SOILS More than half the material is smaller than No. 200 sieve size		SILTS AND CLAYS (Liquid Limit < 50)	ML		SILT & very fine sand, silty or clayey fine sand or clayey silt with slight plasticity
			CL		LEAN CLAY; Sandy Clay; Silty Clay; of low to medium plasticity
			OL		ORGANIC SILTS and organic silty clays of low plasticity
		SILTS AND CLAYS (Liquid Limit > 50)	MH		SILT, fine sandy or silty soil with high plasticity
			CH		FAT CLAY, inorganic clay of high plasticity
			OH		ORGANIC CLAYS of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt		PEAT, and other highly organic soil
WOOD			Wd		WOOD
SHELLS			SI		SHELLS
NO SAMPLE					

NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols

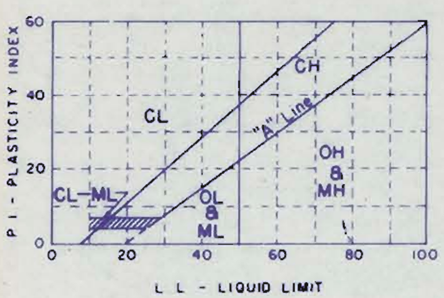
DESCRIPTIVE SYMBOLS

COLOR

COLOR	SYMBOL
TAN	T
YELLOW	[illegible]
RED	R
BLACK	BK
GRAY	Gr
LIGHT GRAY	lGr
DARK GRAY	dGr
BROWN	Br
LIGHT BROWN	lBr
DARK BROWN	dBr
BROWNISH - GRAY	br Gr
GRAYISH - BROWN	gy Br
GREENISH - GRAY	gn Gr
GRAYISH - GREEN	gy Gn
GREEN	Gn
BLUE	Bl
BLUE - GREEN	Bl Gn
WHITE	Wh
MOTTLED	Mot

CONSISTENCY FOR COHESIVE SOILS

CONSISTENCY	COHESION IN LBS./SQ. FT. FROM UNCONFINED COMPRESSION TEST	SYMBOL
VERY SOFT	< 250	vSo
SOFT	250 - 500	So
MEDIUM	500 - 1000	M
STIFF	1000 - 2000	St
VERY STIFF	2000 - 4000	vSt
HARD	> 4000	H



PLASTICITY CHART
For classification of fine-grained soils

MODIFICATIONS

MODIFICATION	SYMBOL
Traces	Tr-
Fine	F
Medium	M
Coarse	C
Concretions	cc
Rootlets	rt
Lignite fragments	lg
Shale fragments	sh
Sandstone fragments	sds
Shell fragments	slf
Organic matter	O
Clay strata or lenses	CS
Silt strata or lenses	SIS
Sand strata or lenses	SS
Sandy	S
Gravelly	G
Boulders	B
Slickensides	SL
Wood	Wd
Oxidized	Ox

NOTES:

FIGURES TO LEFT OF BORING UNDER COLUMN "W OR D_{10}"

Are natural water contents in percent dry weight

When underlined denotes D_{10} size in mm*

FIGURES TO LEFT OF BORING UNDER COLUMNS "LL" AND "PL"

Are liquid and plastic limits, respectively

SYMBOLS TO LEFT OF BORING

▽ Ground-water surface and date observed

(C) Denotes location of consolidation test**

(S) Denotes location of consolidated-drained direct shear test**

(R) Denotes location of consolidated-undrained triaxial compression test**

(Q) Denotes location of unconsolidated-undrained triaxial compression test**

(T) Denotes location of sample subjected to consolidation test and each of the above three types of shear tests**

FW Denotes free water encountered in boring or sample

FIGURES TO RIGHT OF BORING

Are values of cohesion in lbs./sq. ft. from unconfined compression tests

In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler ($1\frac{3}{8}$" I. D., 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remoulded to the estimated natural void ratio

*The D_{10} size of a soil is the grain diameter in millimeters of which 10% of the soil is finer, and 90% coarser than D_{10}

**Results of these tests are available for inspection in the U. S. Army Engineer District Office, if these symbols appear beside the boring logs on the drawings

TYPICAL NOTES:

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially within the purview of clause 4 of the contract.

Ground-water elevations shown on the boring logs represents ground-water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground water data are available from the boring but does not necessarily mean that ground water will not be encountered at the locations or within the vertical reaches of such borings.

Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1 GENERAL DESIGN SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

SOIL BORING LEGEND

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE JULY 1990 FILE NO. H-2-30794

PLATE A

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

APPENDIX A

LOCAL COST SHARING AGREEMENT BETWEEN
U.S. ARMY CORPS OF ENGINEERS & STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

THIRD SUPPLEMENT TO THE
AGREEMENT FOR LOCAL COOPERATION
BETWEEN
THE DEPARTMENT OF THE ARMY
AND
THE State OF LOUISIANA
FOR THE
MISSISSIPPI RIVER SHIP CHANNEL Project
FROM BATON ROUGE, LOUISIANA TO THE GULF OF MEXICO

DRAFT

(Phase I - Depth Enhancement of 45-Feet to Mile 181)

THIS THIRD SUPPLEMENTAL AGREEMENT, entered into this ________ day of ________ 1990, by and between the DEPARTMENT OF THE ARMY (hereinafter referred to as the "Government"), represented by the Assistant Secretary of the Army (Civil Works) and the State OF LOUISIANA (hereinafter referred to as the "State"), acting through and by the Secretary of the Department of Transportation and Development.

WITNESSETH THAT:

WHEREAS, by an agreement dated June 30, 1986 (hereinafter referred to as the "Original Agreement"), the Government and the State, acting through and by the Secretary of the Department of Commerce, shall cooperate in the construction of the MISSISSIPPI RIVER SHIP CHANNEL Project FROM BATON ROUGE, LOUISIANA TO THE GULF OF MEXICO, Phase I - Depth Enhancement of 45 Feet to Mile 181 (hereinafter referred to as the "Project"); and

WHEREAS, by agreement dated June 15, 1987 (hereinafter referred to as the "First Supplemental Agreement"), the Government and the State of Louisiana, acting through and by the Secretary of the Department of Commerce, agreed to certain changes in the Original Agreement necessitated by the Water Resources Development Act of 1986, Public Law 99-662; and

WHEREAS, by Act No. 563 of 1988, the Louisiana Legislature changed the name of the Louisiana Department of Commerce to the Louisiana Department of Economic Development; and

WHEREAS, by Act No. 21 of the 1989 regular session of the Louisiana Legislature designated the Louisiana Department of Transportation and Development to replace the Department of Economic Development as the assuring agency of the State for the Project; and

WHEREAS, by agreement dated June 25, 1990, (hereinafter referred to as the "Second Supplemental Agreement") the Government and the State of Louisiana, acting through and by the Department of Transportation and Development, agreed to certain changes in the Original Agreement and the First Supplemental Agreement necessitated by the Water Resources Development Act of 1988, Public Law 100-676; and

WHEREAS, the Government and the State desire at this time to amend the Original Agreement, as supplemented, to provide the permanent saltwater intrusion mitigation plan for the Project (hereinafter referred to as the "Mitigation Plan" as defined in Article I.a. of this Original Agreement).

NOW, THEREFORE, the Government and the State agree to amend the Original Agreement, as modified and renumbered by the First Supplemental Agreement and Second Supplemental Agreement, as follows:

ALL ARTICLES: Replace the words "Local Sponsor" wherever they appear with the word "State."

ARTICLE I - DEFINITIONS

1. DELETE in Paragraph (a), 6th line the phrase "and mitigation of saltwater intrusion due to channel deeping," and SUBSTITUTE the following: "and the Mitigation Plan."

2. ADD new paragraph (b) as follows:

b. The term "Mitigation Plan" shall mean construction and operation, maintenance, replacement, repair, and rehabilitation of Project components to compensate for the increased saltwater intrusion as it affects the potable water supply below River Mile 64 Above Head of Passes due to increasing the navigation channel depth from 40 feet to 45 feet from Baton Rouge, Louisiana, River Mile 232.4, Above Head of Passes, to the Gulf of Mexico as generally described in the Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, Saltwater Intrusion Mitigation Design Memorandum No. 1 (General Design) Supplement No. 6, prepared by the New Orleans District and dated July 1990 and approved by the Commander, Lower Mississippi Valley Division on _______ 1991, to include components generally as follows: increase the capacity of the water treatment plant for Plaquemines Parish located in Belle Chasse, LA, (Mile 75.8 A.H.P.); water transmission lines and booster pump stations to connect this added capacity to the other water treatment plants on the west bank of the Mississippi River in West Pointe-a-la-Hache, LA, and Boothville, LA; conversion of an existing community pond at Davant, LA, to a storage reservoir; a siphon from the river to the reservoir required to replenish the reservoir with fresh river water; transmission lines and booster pumps to connect the reservoir to the water treatment plant on the east bank of the river at East Point-a-la-Hache, LA; and provisions by the Government, as needed, and at no cost to the State, of an underwater sill at River Mile 64 Above Head of Passes as an element of Project operation and maintenance.

3. In paragraph (d) ADD the following: "Provided that, as pertaining to construction of the Mitigation Plan components, except the underwater sill, the term "period of construction" shall mean the time from the award of the first construction contract by the State to the time of acceptance by the Contracting officer of the construction of all said components as completed."

4. DELETE paragraph (h).

5. DELETE paragraph (i) in its entirety and SUBSTITUTE the following:

i. The term "Agreement" shall mean the combination of the Original Agreement, the First Supplemental Agreement, the Second Supplemental Agreement, and the Third Supplemental Agreement taken as a whole.

6. Renumber all paragraphs in Article I to reflect the above changes and make conforming changes to all references to such paragraphs wherever they appear in the Original Agreement or Supplemental Agreements thereto.

7. ADD new paragraph (i) as follows:

i. The term "highway" shall mean any highway, thoroughfare, roadway, street, or other public road or way.

8. ADD new paragraph (j) as follows:

j. The term "relocations" shall mean alternations, modifications, lowering or raising in place, and/or new construction related to but not limited to, existing: railroads, highways, bridges, railroad bridges and approaches thereto, pipelines, public utilities (such as municipal water and sanitary sewer lines, telephone lines, and storm drains), aerial utilities, cemeteries, and other facilities, structures, and improvements determined by the State and approved by the Government to be necessary for the construction, operation and maintenance of the Project.

9. ADD new paragraph (k) as follows:

k. The term "involuntary acquisition" shall mean the acquisition of lands, easements, and rights-of-way by eminent domain.

10. ADD new paragraph (l) as follows:

l. The term "functional portion of the Project" shall mean a completed portion of the Project as determined by the Contracting Officer, to be suitable for tender to the State to operate and maintain in advance of completion of construction of the entire Project.

ARTICLE II - OBLIGATIONS OF PARTIES

1. RENUMBER paragraphs "f" through "j" in the original agreement, as modified by the first supplement to paragraphs "g" through "k" to reflect the addition of a new paragraph "f" by the second supplement. Make conforming changes to all references throughout the Agreements.

2. Paragraph a, delete the 3rd and 4th lines and substitute "both the State and the Government that funds are available or funding mechanisms sufficient to enable both parties to meet their obligations under this agreement."

3. DELETE paragraph (b) and SUBSTITUTE the following:

b. The State shall assure construction of the Mitigation Plan, excepting the underwater sill, and shall assure construction of, at no expense to the Government all Project features other than those for general navigation features and aids to navigation. The State shall coordinate with the Government's Contracting Officer the design and construction of the Mitigation Plan, excepting the underwater sill, as further specified in Article V of this Agreement.

4. In paragraph (d), remove the period and add the following: "and constructed by the Government, to exclude the cost of the underwater sill."

5. In paragraph (g), line 2, ADD the following after the word "Project": "Other than the Mitigation Plan."

6. In paragraph (i), remove the period and ADD the following: "or the Federal share of the cost of the approved dissimilar features of the Mitigation Plan, whichever is the lesser. As pertaining to a functional portion of the Mitigation Plan, excepting the underwater sill, the State will define and submit to the Government for concurrence documents supporting State claims for a completed functional portion of the Mitigation Plan which is suitable for the State to operate, maintain, repair, replace, and rehabilitate in advance of completion of construction of the entire Mitigation Plan." Also add the words "or approved" after the word "furnished" wherever it appears.

7. In paragraph (j), REPLACE the phrase, "but exclusive of all other saltwater intrusion mitigation features" with the phrase "but exclusive of other components of the Mitigation Plan."

8. In paragraph (k), REPLACE the phrase, "a cash contribution" with the phrase "annual contributions."

9. ADD new paragraph (l) as follows:

l. As further specified in Article VIII of this Agreement, upon completion of the Mitigation Plan, excepting the underwater sill, the State shall perform operation, maintenance, replacement, repair, and rehabilitation the Mitigation Plan, excepting the underwater sill and in consideration of the State assuming full financial responsibility for operation, maintenance, replacement, repair, and rehabilitation of the Mitigation Plan, excepting the underwater sill, the Government shall, subject to the availability of funds, make annual cash payments to the State of an amount equal to estimated annual costs for operation, maintenance replacement, repair and rehabilitation of the Mitigation Plan over the remaining life of the project.

10. ADD new paragraph (m) as follows:

m. As further specified in Article VI of this Agreement upon completion of the period of construction of the Mitigation Plan, excepting the underwater sill, the Government, subject to availability of funds shall make cash payments to the State of an amount equal to 75 percent of the actual costs required for upgrading the Mitigation Plan to provide for future increases in the demand for potable water. When the average consumption of potable water is 25 percent greater than the average consumption of potable water during the last two years preceding completion of construction, as measured at the Belle Chase and West Point-a-la-Hache plants, the initial upgrading plan shall be considered. Subsequent upgrading plans shall be considered when the average consumption of potable water, as measured at the Belle Chase and West Point-a-la-Hache plants, is 25 percent greater than the average consumption of potable water at the time the Mitigation Plan was last upgraded. Any proposed changes in the Mitigation Plan are subject to the review and approval of the Government. Payments to the State shall be made in accordance with the construction procedures of the Mitigation Plan as described in paragraphs e. (1) (a) and e. (1) (b) of Article VI.

11. ADD new paragraph (n) as follows:

n. The State shall assure that the necessary permits required by Section 10 of the River and Harbor Act of 1899 and Section 404 of Public Law 92-500, and all other permits required by the State of Louisiana or political subdivisions thereof for the construction and operation of the Mitigation Plan are obtained, prior to initiation of any activity which requires such permits.

12. ADD new paragraph (o) as follows:

o. As further specified in Article VI hereof, the Government shall provide to the State, during the period of construction, a cash contribution equal to seventy-five (75) percent of the Mitigation Plan's total Project cost, excepting the cost of the underwater sill.

13. ADD new paragraph (p) as follows:

p. The State shall provide necessary facilities and access for inspection by the Contracting Officer of the Mitigation Plan components of the Project, except for the underwater sill.

14. Make conforming changes to all references in such paragraphs wherever they appear in the Original Agreement and the First and Second Supplements thereto.

ARTICLE III - LANDS, FACILITIES AND RELOCATIONS ASSISTANCE

1. Paragraph (a), 4th line, end of first sentence after the word "Project", ADD the following: "to be performed by the Government."

2. Paragraph (a), 5th line after the word 'contract', ADD the following: ', awarded by the Government,'.

3. Paragraph (c), in line 3 after the words 2 January 1971, ADD the following:

'as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17),'

4. ADD new paragraph (d) as follows:

d. The Local Sponsor shall provide, or pay to the Government to cost of providing, all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, determined by the Government to be necessary for construction, operation, or maintenance of the general navigation features of the Project.

ARTICLE IV - VALUATION OF LANDS AND FACILITIES

1. Paragraph (a), second line after the word 'Agreement', SUBSTITUTE the phrase', and are to be credited towards the additional 10 percent of the total Project costs the State must repay pursuant to Article II.e., of this Agreement,'.

ARTICLE V - PROJECT PHASING AND MANAGEMENT

1. Paragraph (a), second sentence between the words 'for' and 'contracts', INSERT the word 'Government.'

2. ADD new paragraph (d) as follows:

d. The State shall prepare or contract for preparation of engineering, design, plans and specifications, detailed cost estimates and construction schedules for the Mitigation Plan, except the underwater sill, and shall construct or contract for construction of the Mitigation Plan, except the underwater sill. The State shall secure competitive bids, by advertising, for all work to be performed by contract, or with the prior approval of the Contracting Officer, perform the construction work with its own forces. All designs, plans and specifications, and other contracting documents shall be submitted by the State to the Contracting Officer, for review and approval as follows:

(1) Prior to issuing invitations for bids, the State shall submit to the Contracting Officer for approval, the detailed design, plans and specifications, data for analysis of design, and a general program outlining the order, rate of prosecution and method (contract or hired labor) of accomplishing the major items of work and setting forth the estimated cost thereof.

(2) The State shall submit to the Contracting Officer a detailed estimate of cost, a tabulation of all bids received, and request for approval of award of a contract, and shall furnish such

copies of the contract as may be required and submit to the Contracting Officer, for approval, any amendments or modifications thereof. Bids selected by the State for award which are in excess of the approved Government's cost estimate must be reviewed and approved by the Contracting Officer. The Contracting Officer reserves the right to require the State to modify the design and make other changes in the bid packages to bring the construction contract cost within the Government's cost estimate and acceptable to the Contracting Officer and the State. Following award of any construction contract, the State shall issue a "Notice to Proceed" to the Contractor with a copy of that document directed to the Contracting Officer.

(3) The State will be responsible for administering all contracts supervising and managing the construction, preparing all contract modifications or change orders, and other contract and construction procedures. However, the Contracting Officer will be afforded the opportunity to review, comment on, and approve all modifications and change orders that would materially alter the Mitigation Plan or the scope of any construction contract. Other, routine constructability change orders and modifications that neither would materially alter the Mitigation Plan or the scope of any construction contract, will not require prior Contracting Officer review and approval. The State will provide the Contracting Officer courtesy copies of routine change orders and modifications, and will address any timely comments made by the Contracting Officer. In the event the Contracting Officer does not approve a proposed contract, modification, or change order, the State shall not proceed with the proposed action until mutually agreed.

(4) The State and the Government shall submit to each other, prior to award of a contract, satisfactory guaranty (1) that sufficient funds are available to pay all estimated costs of the Mitigation Plan, excepting the underwater sill, and (2) that there is no unsettled litigation which will interfere with the conduct or completion of the Mitigation Plan or with its public use and maintenance.

(5) The State shall provide adequate and continuous engineering inspection and submit to the Contracting Officer monthly progress reports showing the work done throughout the construction of the Mitigation Plan.

3. ADD new paragraph (e) as follows:

(e) In acting under the States rights and obligations hereunder, the State agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.II issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap Program and Activities Assisted or Conducted by the

Department of the Army." Any contract awarded by the State shall include provisions consistent will all applicable Federal laws and regulations, including, but not necessarily limited to, applicable Federal labor and equal opportunity laws and regulations such as the Davis-Bacon Act (40 U.S.C. Sec. 276a, et seq.); the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333); Part 3 of Title 29, Code of Federal Regulations; and Title VI of the Civil Rights Act of 1964 (42 U.S.C. Sec. 2000e, et seq.).

ARTICLE VI - METHOD OF PAYMENT

1. In paragraph (a), 4th line after the word "navigation," add the following phrase: "and constructed by the Government except for the underwater sill."

2. In paragraph (b), 1st line after the word "payment", ADD the following phrase: "for the general navigation features of the Project assigned to commercial navigation, constructed by the Government, excepting the underwater sill."

3. ADD new paragraph (e) as follows:

e. Pursuant to Article II.b. of this Agreement the State shall assure construction of the Mitigation Plan, excepting the underwater sill. The Government, subject to availability of funds for that purpose and subject to Government review, audit and determination of applicability, shall pay to the State seventy-five percent (75%) of the total Project cost of the Mitigation Plan, excepting the underwater sill, pursuant to Article II.o. of this Agreement. The current estimate for the total Project cost for the Mitigation Plan, as defined in Article I.b. of this Agreement, excepting the underwater sill, is $16,500,000. In order to meet the Government's share of the total Project cost for the Mitigation Plan, except the underwater sill, the Government must provide a cash contribution to the State currently estimated at approximately $12,375,000 over the term of the construction period. The dollar amounts set forth in this Article are based upon the Government's best estimates which will reflect Projection of costs, price level changes, anticipated inflation, and credits for work performed by the State. Such estimates are subject to adjustments based upon cost actually incurred and are not to be construed as the total financial responsibilities of the Government and the State.

(1) The Government will pay the State the Governments 75 percent share of total Project costs of the Mitigation Plan, excepting the underwater sill, in accordance with the following provisions:

(a) After the award of the first construction contract, the State will send to the Government monthly Statements of actual costs for implementing the Mitigation Plan excepting the underwater sill. Not less than 60 days after receipt of each statement the Government will, subject to subparagraph (b) below, make cash payment for the actual costs in that statement. For purposes of determining the amount of the first monthly payment to be made by the Government, all costs attributable to the Mitigation Plan elements of the Project incurred by both the Government and the State prior to the initiation of construction shall be taken into account. Subsequent payments by the Government for each month shall take into account any total Project costs assigned to the Mitigation Plan and incurred by the Government in that month. The Government's payments to the State are not subject to interest charges, nor adjustments to reflect changes in price levels between the dates of the State's request for payment and completion of payment.

(b) All work for which payment is requested by the State must be certified by the Contracting Officer to have been performed in accordance with this Agreement before the Government shall approve the request for payment. All payments to the State shall be subject to the availability of funds and subject to the Government's review, audit, and determination of applicability.

(c) Upon completion of the period of construction of the Mitigation Plan, excepting the underwater sill, the Government, subject to availability of funds and subject to the Government's review, audit and determination of applicability, shall make payments to the State of an amount equal to 75 percent of the actual costs required for upgrading the Mitigation Plan to provide for future increases in water supply demands over the life of the project. The need for upgrading the Mitigation Plan shall be based on the demand for potable water. When the average consumption of potable water is 25 percent greater than the average consumption of potable water during the last two years preceding completion of construction, as measured at the Belle Chase and West Point-a-la-Hache plants, the initial upgrading plan shall be considered. Subsequent upgrading plans shall be considered when the average consumption of potable water, as measured at the Belle Chase and West Point-a-la-Hache plants, is 25 percent greater than the average consumption of potable water at the time the Mitigation Plan was last upgraded. Any proposed changes in the Mitigation Plan are subject subject to the review and approval of the Government. The estimated present worth of such payments is currently $2,668,000. The estimated present worth of the Government's 75 percent share is $2,001,000. After the Government has approved the State's proposal for upgrading the Mitigation Plan, the Government shall make payments to the State in accordance with the construction procedures of the Mitigation Plan as described in paragraphs e. (1) (a) and e. (1) (b) of Article VI.

4. RENUMBER original paragraph 'e' of Article VI to paragraph 'f.'

5. ADD new paragraph (g) as follows:

g. Upon completion of the period of construction and resolution of all relevant contract claims and appeals for construction of the Mitigation Plan, except the underwater sill, the State shall render to the Government a final accounting of the Government's cost share for construction of said Mitigation Plan, excepting the underwater sill. In the event that the payments by the Government under paragraph e.(1) (a) of this Article are less than the Government's share, the Government shall, no later than 90 calendar days after receipt of written notice, and subject to the availability of funds, make a cash payment to the State of whatever sum is required to meet the Government's share. In the event that the Government has made payments in excess of the Government's share, the State shall, no later than 90 calendar days after the final accounting is complete, return said excess to the Government.

6. ADD new paragraph (h) as follows:

h. The East Bank Mitigation Works has been completed by the State. The completed system consists of a siphon from the river to the Davant, La. reservoir required to replenish the reservoir with fresh river water; transmission lines and booster pumps to connect the reservoir to the water treatment plant on the east bank of the river at East Pointe-a-la-Hache, La. The total cost for this work was $590,000. The Federal cost of this work is $442,500. Within 90 days after this agreement is signed, the Government shall reimburse the State $442,500 as payment for the Federal share.

ARTICLE VIII - OPERATIONS AND MAINTENANCE

1. DELETE paragraph (a) and SUBSTITUTE the following:

a. The State shall operate, maintain, replace, repair, and rehabilitate all portions of the Project as completed, including but not limited to the Mitigation Plan, but excluding general navigation features, aids to navigation, and the underwater sill.

2. DELETE paragraph (c) and SUBSTITUTE the following:

c. The Government shall operate, maintain, replace, repair, and rehabilitate the general navigation features of the Project including the underwater sill of the Mitigation Plan.

3. DELETE paragraph (d) and SUBSTITUTE the following:

d. When the State determines that construction of the Mitigation Plan, except the underwater sill, is complete and the Government concurs, the operations and maintenance period begins. During the operations and maintenance period, the Government, subject to the availability of funds, shall provide the State annual payments for operation, maintenance, repair, replacement, and rehabilitation of the Mitigation Plan except the underwater sill. The payments shall be made within 90 days prior to each operations and maintenance year over the life of the project. The dollar amount of each payment has been determined from estimated annual costs for operation, maintenance, repair, replacement and rehabilitation of the Mitigation Plan, except the underwater sill. The dollar amount of each payment shall be $83,400 as agreed by both the Government and the State. The State, upon acceptance of such cash payments and as consideration for such cash payments, shall assume full financial responsibility for the costs of operation, maintenance, repair, replacement and rehabilitation of the Mitigation Plan, except the underwater sill.

4. ADD new paragraph (e) as follows:

e. In accordance with Article II.i. of this Agreement, as pertaining to the Mitigation Plan, excepting the underwater sill, to be constructed by the State, when the State determines that a functional portion of the Mitigation Plan, except the underwater sill, is complete the State shall be responsible for operation, maintenance, repair, replacement, and rehabilitation, of the functional portion of the Mitigation Plan.

ARTICLE X - MAINTENANCE OF RECORDS

1. ADD the following: "The Government shall conduct an audit when appropriate of the State's records for the Project to ascertain the allowability, reasonableness, and allocability of the State's costs for inclusion as credit against the State's share of Project costs."

ARTICLE XVI - EFFECT OF SUBSEQUENT LEGISLATION

1. DELETE this article.

ADD new Article XVI as follows:

ARTICLE XVI - HOLD HARMLESS AGREEMENT

1. The State shall release and hold the Government harmless and free of any further responsibility or liability to mitigate for increased saltwater intrusion as it affects the potable water supply below Mississippi River Mile 64 Above Head of Passes caused by the 45-foot navigation channel upon completion of; the construction of the Mitigation Plan, the Government payments for operations and maintenance of the Mitigation Plan, the Government payments for upgrading the Mitigation Plan due to increases in water demands and the Government providing the underwater sill when necessary.

ARTICLE XIX - NOTICES

1. CHANGE "Louisiana Department of Commerce" to "Louisiana Department of Transportation and Development."

ADD new Article XXIII as follows:

ARTICLE XXIII - COVENANT AGAINST CONTINGENT FEES

The State warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the State for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability, or, in its discretion, to add to the Agreement or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

IN WITNESS WHEREOF, the parties hereto have executed this Third Supplemental Agreement as of the day and year first above written.

DEPARTMENT OF THE ARMY	State OF LOUISIANA THROUGH THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
BY: ___________________________ Acting Assistant Secretary of the Army	___________________________ NEIL L. WAGONER, P.E. Secretary
DATE: __________________________	DATE: __________________________

AS WITNESSED BY:

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

APPENDIX B

HYDROLOGY & HYDRAULICS
SALTWATER INTRUSION MODEL STUDIES AND ANALYSES

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6

APPENDIX B - HYDROLOGY AND HYDRAULICS

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APPENDIX B - HYDROLOGY AND HYDRAULICS

1. Model Studies.

a. Saltwater intrusion model development. In the early 1980's the New Orleans District (NOD) investigated the impacts of enlarging the Mississippi River Deep-Draft Channel. This included the effects of the larger channel on saltwater intrusion from the Gulf of Mexico. The NOD retained the services of the U.S. Army Corps of Engineers Waterways Experiment Station (WES) for assistance in determining these changes in saltwater intrusion.

The Hydraulics Laboratory at WES adapted an existing two-dimensional breadth-averaged hydrodynamic model to apply to the Lower Mississippi River. This mathematical model, the Laterally averaged Estuarine Model (LAEM) - is an adaptation of another model, the Laterally Averaged Reservoir Model (LARM), modified for application to estuaries. The LAEM couples computation of flow and salinity fields through the influence of salinity on water density. Details of this modeling effort are documented in a report published by WES. (Johnson, Boyd, and Keulegan 1987).

Since the publication of Design Memorandum No. 1 - Mississippi River Deep Draft in 1983, the Waterways Experiment Station has updated its model study of saltwater intrusion in the Lower Mississippi River. Using the LAEM, WES repeated the analysis to develop predictions which reflected river geometry from the latest hydrographic survey data available and a more refined model calibration.

The NOD conducted hydrographic surveys in October 1982 to provide new river geometric data at key river crossings. WES discovered that several major river crossings below New Orleans had not been accurately represented in the preliminary analysis. Since such crossings can play a major role in retarding the intrusion of the saltwater wedge, this emphasized the need to reanalyze the impact of the deeper channel on saltwater intrusion using more recent geometric data at the crossings. Also, only a very limited study of the sensitivity of the model to diffusion coefficients and downstream boundary conditions on salinity and water surface elevation was attempted in the initial analysis. In the later study, WES conducted a more detailed analysis of these factors. The results from this updated model study can be found in a supplement to the Mississippi River Deep Draft Design Memorandum No. 1. (Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, General Design Memorandum No. 1, Supplement No. 1.). However, this report includes computed saltwater wedge positions and saltwater intrusion durations only for the 40-foot and 55-foot channels.

b. Low flow frequency. The conditions of the lower Mississippi River which affect the discharge-wedge location relationship had remained stable for almost 50 years until the 45-foot channel was dredged in 1987. However, the conditions in the Mississippi river and tributaries system which affect flows in the lower river have not been as stable. The two major factors which affected river flows were the completion of the Old River Control project in 1963, and the construction of approximately 180 reservoirs in the Mississippi River and tributaries system between 1940 and the present. Prior to the construction of the Old River Control Structures there had been a progressive increase in the diversion of Mississippi River flows to the Atchafalaya River at Old River (mile 315). This progressive increase was halted with the completion of the structures. The lower Mississippi River now receives approximately 70 percent of the combined flows of the Mississippi and Red Rivers above the latitude of the Old River project. Reservoir construction progressively increased low water flows in the lower Mississippi River and the Red River.

A Mississippi River one-day and 30-day low-flow frequency curves, which reflect present conditions, were developed. To develop the low-flow frequency curves, historical data from 1930 through 1958 were adjusted to reflect the effects of reservoir construction. All flows were adjusted to account for the present operation of the Old River Complex. For this analysis the recurrence interval of a particular discharge in the river was determined in accordance with "Guidelines for Determining Flood Flow Frequency, Bulletin 17A" compiled by the Interagency Committee on Hydrology and published by the United States Water Resources Council. Figure 1 shows the one-day and 30-day low-flow frequency curves for the Mississippi River below Old River for 1930 through 1989.

c. Model hydrograph tests. Hydrograph tests were run to provide insight concerning the extent and duration of saltwater intrusion for changing river flow conditions. WES analyzed eight low-flow hydrographs which represent a range of frequencies of occurrence. Table 1 shows the years selected for analysis and the 30 day low flow frequency for each corresponding hydrograph.

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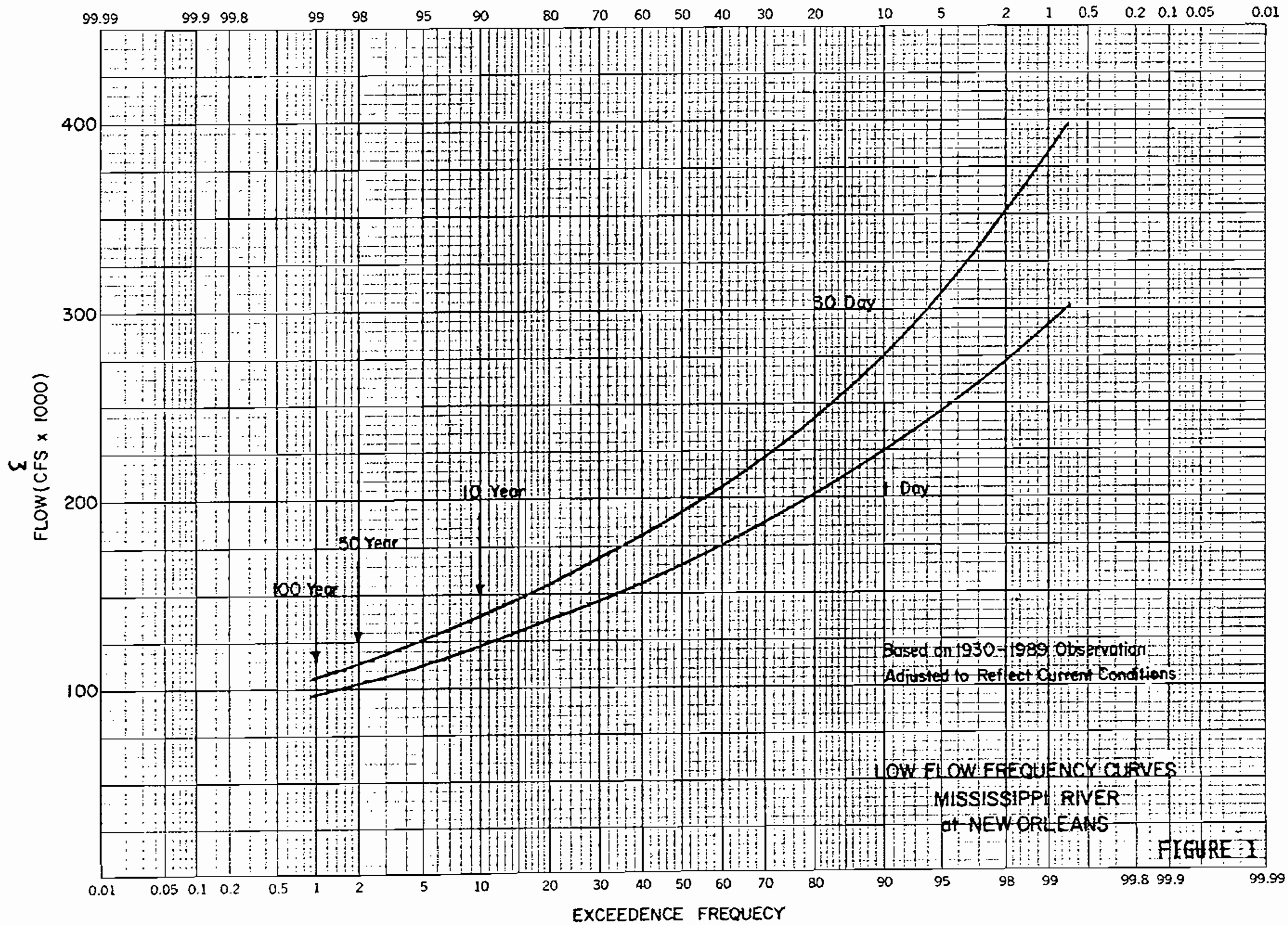


FIGURE 1

TABLE 1

LOW-FLOW HYDROGRAPHS

Low-Flow[1] Hydrograph	30-Day Low-Flow[2] Frequency	Probability of Occurrence in A given Year
1968	2 Yrs.	0.500
1980-81	5 Yrs.	0.200
1938-39	4 Yrs.	0.250
1955-56	9 Yrs.	0.111
1947-48	18 Yrs.	0.056
1952-53	46 Yrs.	0.022
1953-54	100 Yrs.	0.010
1936	100 Yrs.	0.010

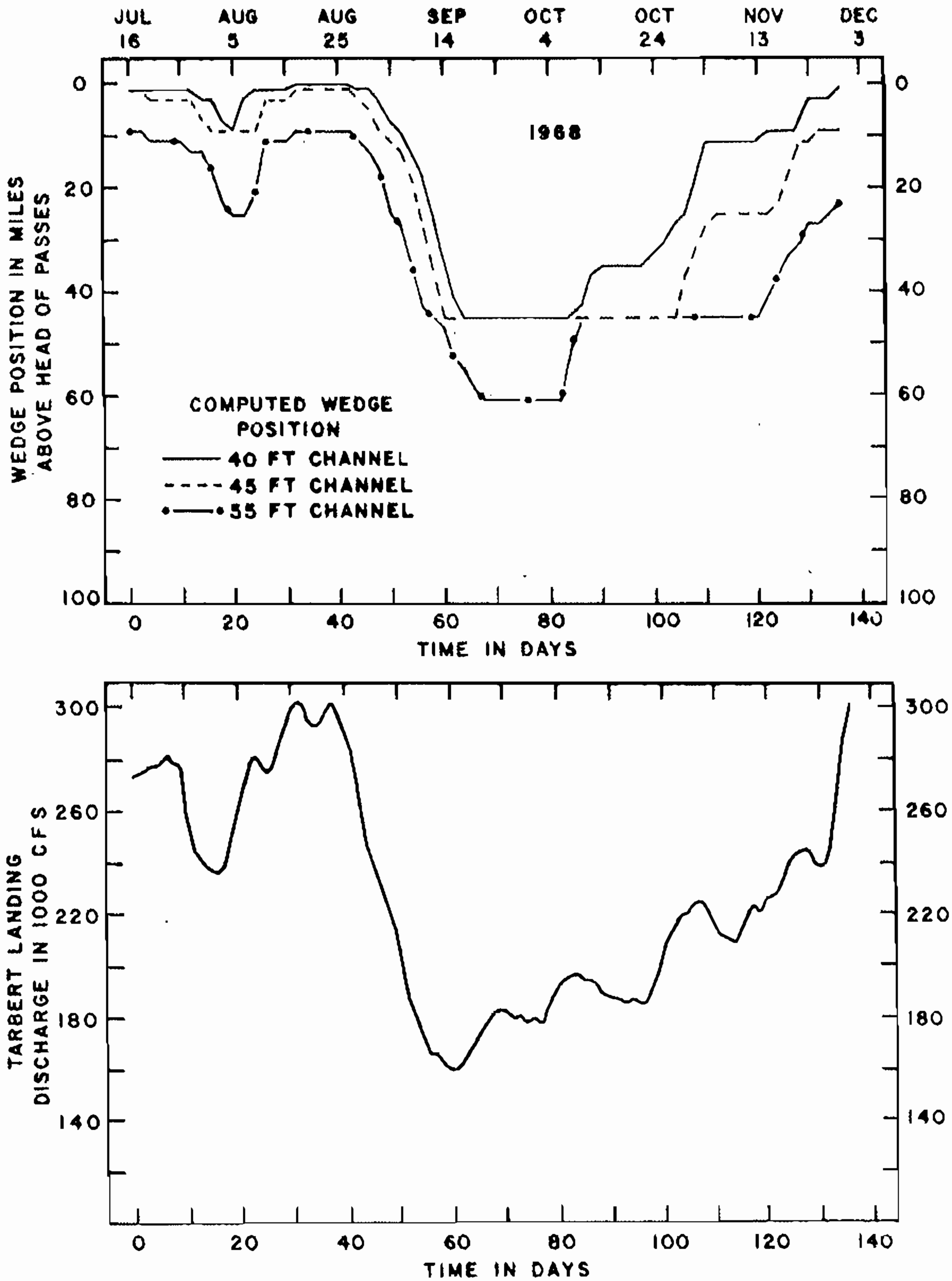
1/Year(s) in which actual low flow hydrograph occurred.
2/The 30-day low-flow frequency is the average frequency of recurrence of the lowest consecutive 30 days of the low-flow hydrograph.

Figures 2 through 9 show the computed wedge position vs. time for the eight corresponding hydrographs. The computed wedge positions for the 40-foot, 45-foot, and 55-foot channels are shown.

The tests for all hydrographs except 1980-81, which was used to calibrate the model, are estimates of how the different channel configurations would respond to these hydrographs rather than specific simulations of what happened during those periods since channel conditions at those times were not represented in the model.

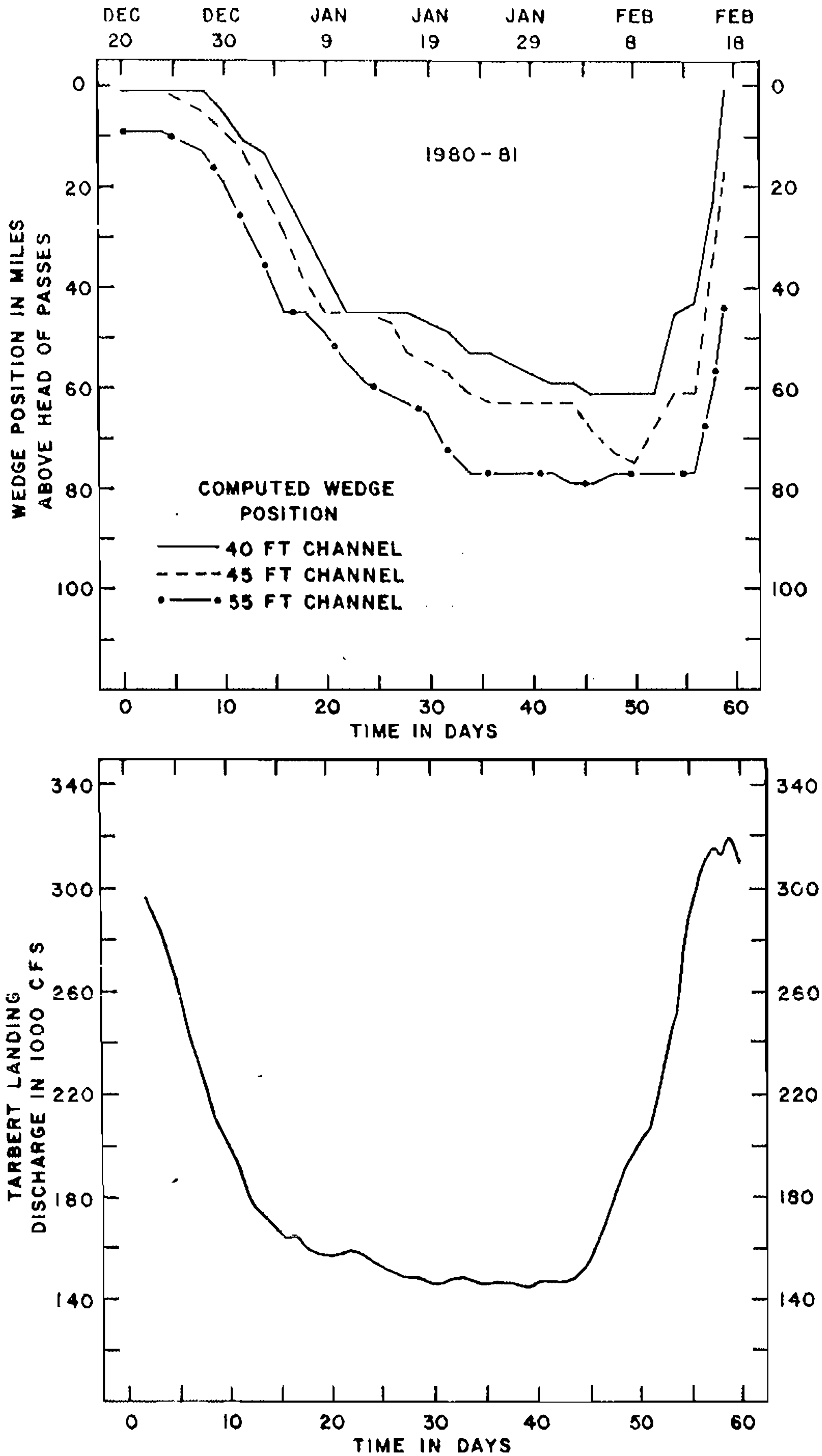
d. Determination of increases in duration. A surface chloride concentration of 250 ppm occurs about 20 miles downstream of the toe of the saltwater wedge. From the plots of the wedge positions for the eight hydrographs we determined the number of days the toe of the wedge would have been at least 20 miles upstream of particular municipal intakes along the river.

Table 2 shows the increases in duration of saltwater intrusion at Boothville for each of the eight low-flow hydrographs. The increases for both the 45-foot and 55-foot channels are included. The increases in duration shown are the increases in the number of days that surface



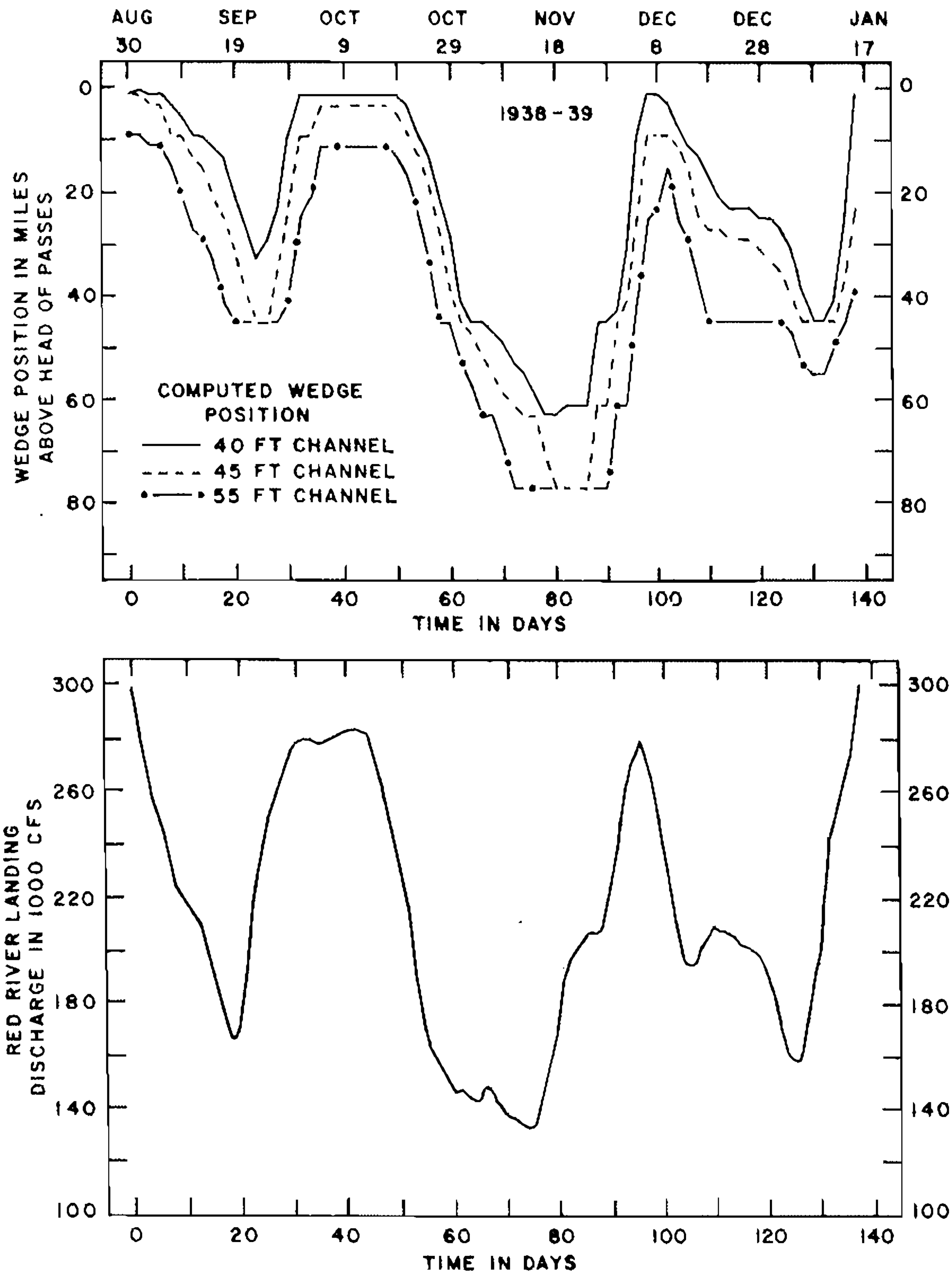
COMPUTED WEDGE POSITION FOR 1968 HYDROGRAPH

FIGURE 2



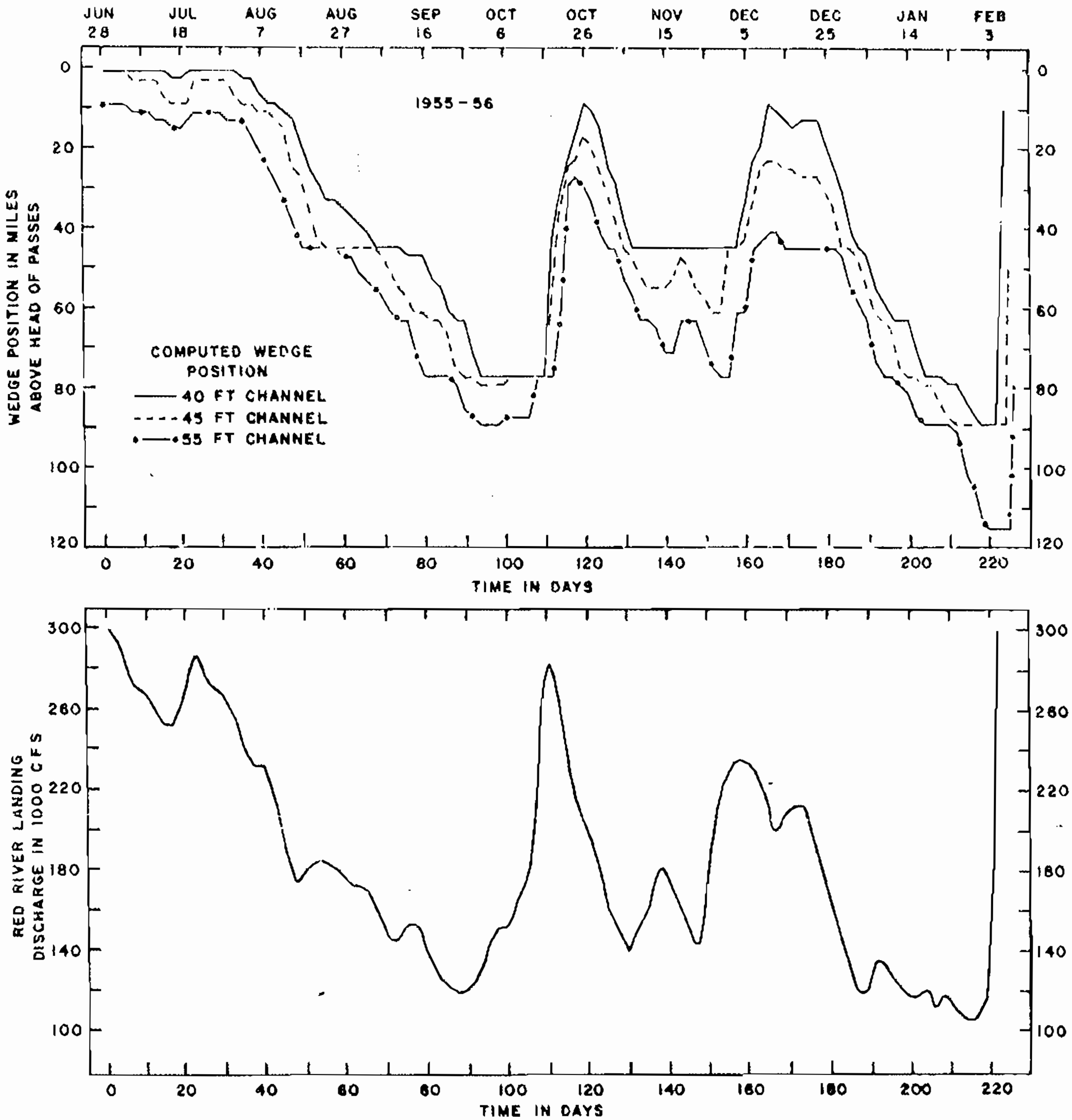
COMPUTED WEDGE POSITION FOR 1980 - 81 HYDROGRAPH

FIGURE 3



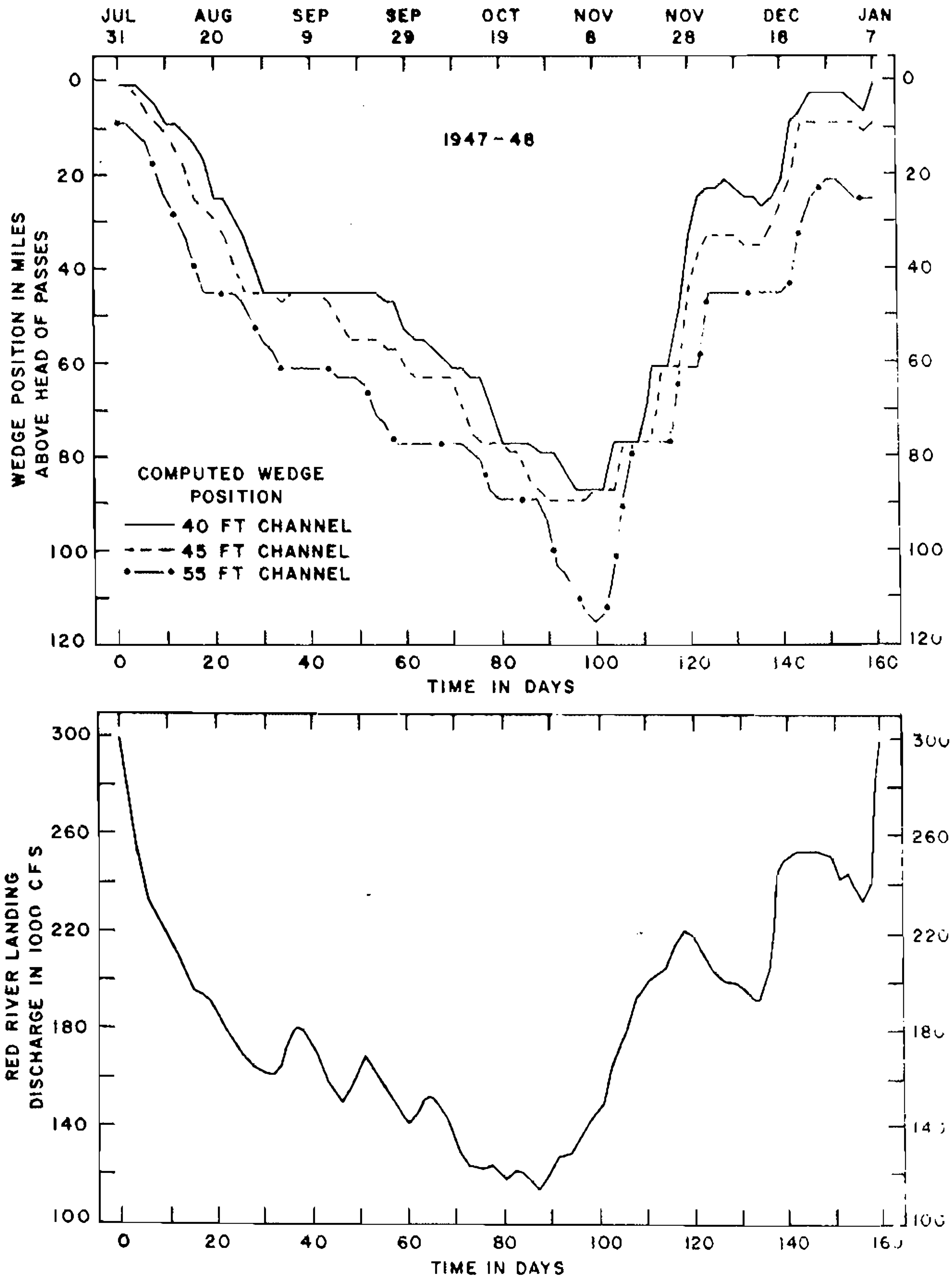
COMPUTED WEDGE POSITION FOR 1938-39 HYDROGRAPH

FIGURE 4



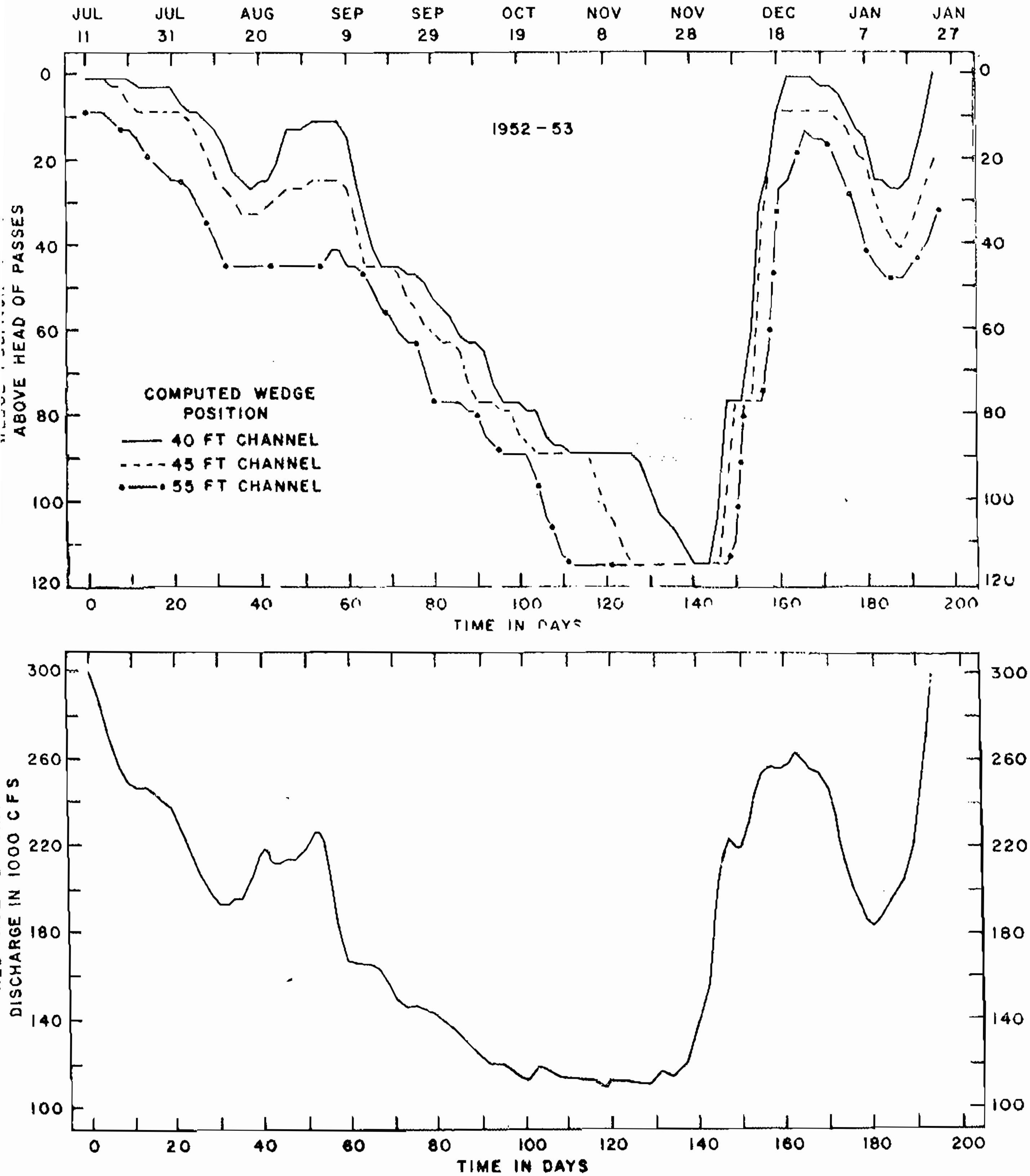
COMPUTED WEDGE POSITION FOR 1955-56 HYDROGRAPH

FIGURE 5



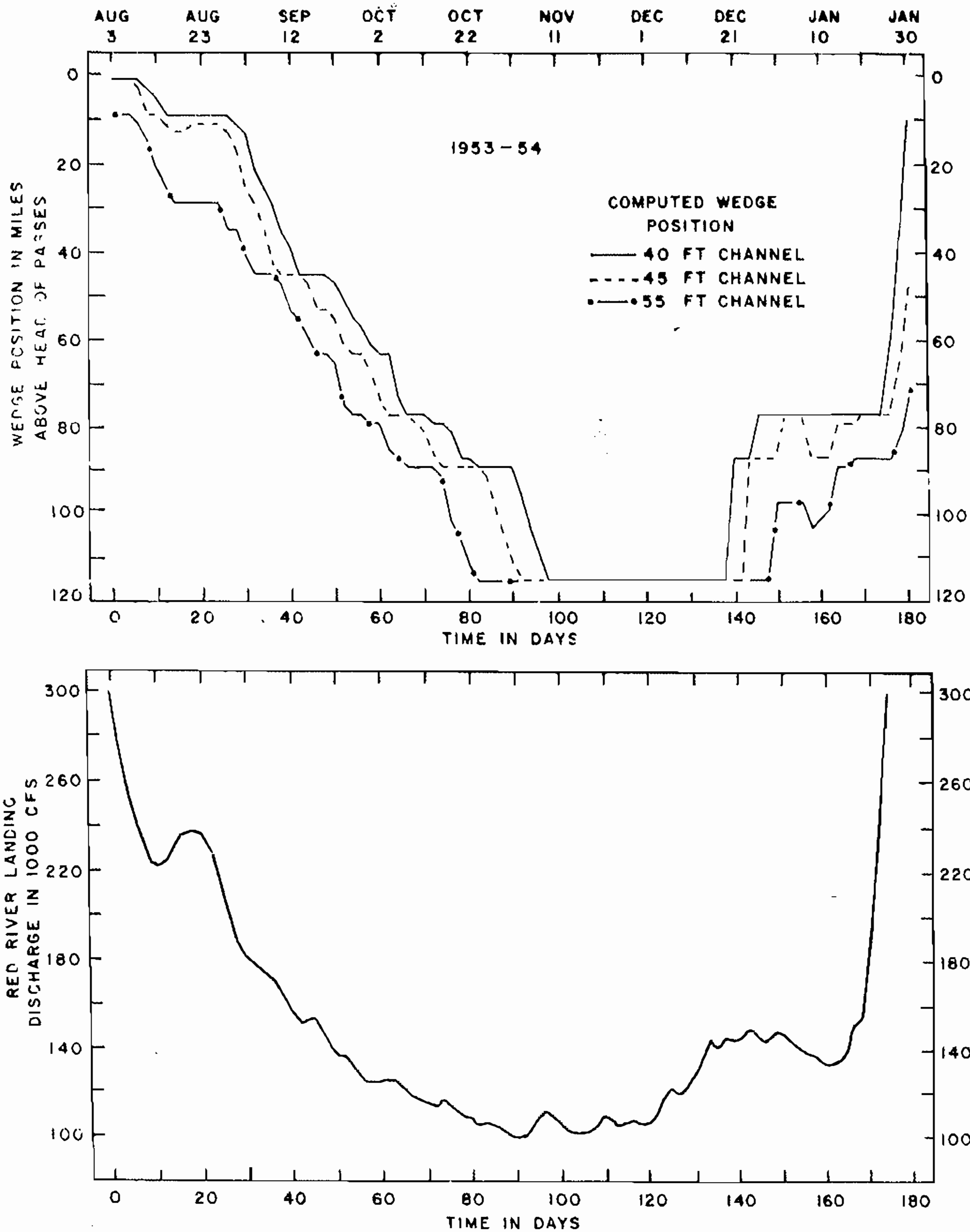
COMPUTED WEDGE POSITION FOR 1947-48 HYDROGRAPH

FIGURE 6



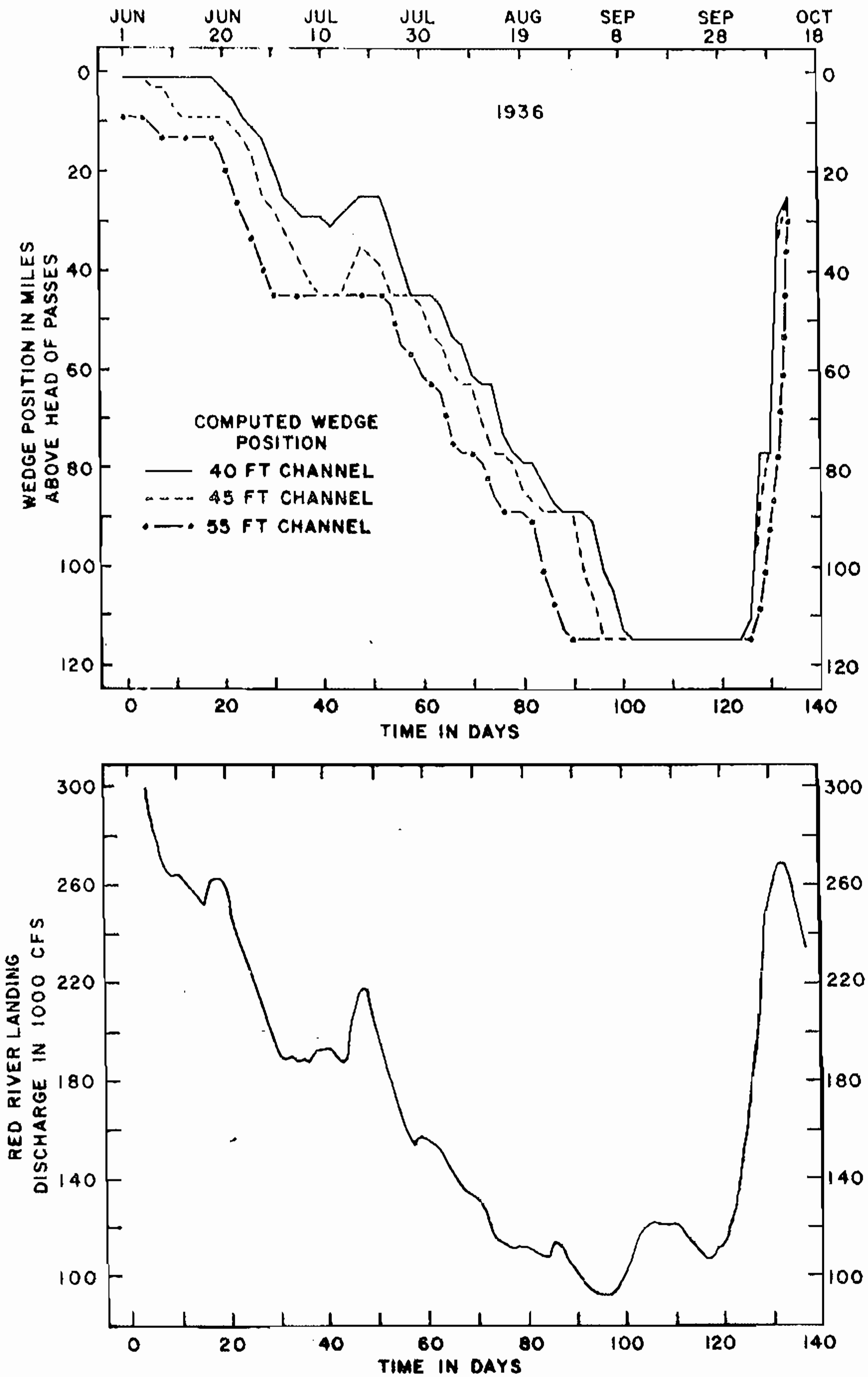
COMPUTED WEDGE POSITION FOR 1952 – 53 HYDROGRAPH

FIGURE 7



COMPUTED WEDGE POSITION FOR 1953-54 HYDROGRAPH

FIGURE 8



COMPUTED WEDGE POSITION FOR 1936 HYDROGRAPH

FIGURE 9

chloride concentrations would exceed the drinking water standard of 250 ppm. Table 3 shows the increases in duration for the same conditions at Pointe-a-la-Hache.

TABLE 2

INCREASES IN DURATIONS OF SALTWATER INTRUSION[1] AT BOOTHVILLE (MILE 18.6) - WITH 45-FOOT AND 55-FOOT CHANNELS

Low-Flow[2]/ Hydrograph	30-Day Low-Flow[3]/ Frequency	Probability of Occurrence in A given Year	Increase with 45-Foot Channel (Days)	Increase with 55-Foot Channel (Days)
1968	2 Yrs.	0.500	20	42
1980-81	5 Yrs.	0.200	4	10
1938-39	4 Yrs.	0.250	12	44
1955-56	9 Yrs.	0.111	20	54
1947-48	18 Yrs.	0.056	6	36
1952-53	46 Yrs.	0.022	6	56
1953-54	100 Yrs.	0.010	6	13
1936	100 Yrs.	0.010	14	30

1/ Based on surface chloride concentration greater than 250 ppm.
2/ Year(s) in which actual low flow hydrograph occurred.
3/ The 30-day low-flow frequency is the average frequency of recurrence of the lowest consecutive 30 days of the low-flow hydrograph.

TABLE 3

INCREASES IN DURATIONS OF SALTWATER INTRUSION[1] AT POINTE A LA HACHE (MILE 49.2) WITH 45-FOOT AND 55-FOOT CHANNELS

Low-Flow[2] Hydrograph	30-Day Low-Flow[3] Frequency	Probability of Occurrence in A given Year	Increase with 45-Foot Channel (Days)	Increase with 55-Foot Channel (Days)
1968	2 Yrs.	0.500	0	0
1980-81	5 Yrs.	0.200	5	26
1938-39	4 Yrs.	0.250	9	21
1955-56	9 Yrs.	0.111	10	38
1947-48	18 Yrs.	0.056	8	31
1952-53	46 Yrs.	0.022	7	20
1953-54	100 Yrs.	0.010	4	14
1936	100 Yrs.	0.010	4	12

1/ Based on surface chloride concentration greater than 250 ppm.
2/ Year(s) in which actual low flow hydrograph occurred.
3/ The 30-day low-flow frequency is the average frequency of recurrence of the lowest consecutive 30 days of the low-flow hydrograph.

The next municipal water intake upstream of Pointe-a-la-Hache is the Bell Chasse intake at mile 75.8. If an intrusion event was to be severe enough to cause saltwater intrusion as far upstream as the Belle Chasse intake, the submarine sill would be constructed at about mile 64 as part of the mitigation plan. The sill would prevent any increase in saltwater intrusion due to the deeper channel from occurring upstream of mile 64. Therefore, with the mitigation plan in effect, there would be no increase in saltwater intrusion due to the deeper channel at any municipal water intakes upstream of Pointe-a-la-Hache.

e. Average annual increase in duration. Table 4 shows the average annual increases in saltwater intrusion duration at Boothville and Pointe-a-la-Hache. The average annual increases shown are the average annual increases in the number of days that surface chloride concentrations would be greater than the drinking water standard of 250 ppm. The increases for both the 45-foot and 55-foot channels are included.

TABLE 4

AVERAGE ANNUAL INCREASES IN SALTWATER INTRUSION[1]

Location	Average Annual Increase with 45-Foot Channel (Days)	Average Annual Increase with 55-Foot Channel (Days)
Boothville (Mile 18.6)	15	38
Pointe-a-la-Hache (Mile 49.2)	5	15

1/ Based on surface chloride concentration greater than 250 ppm.

The average annual increase in duration of saltwater intrusion was estimated by considering the following:

* The range of possible low-flow conditions represented by the observed hydrographs listed above

* The estimated probability of occurrence of each of the low-flow hydrographs

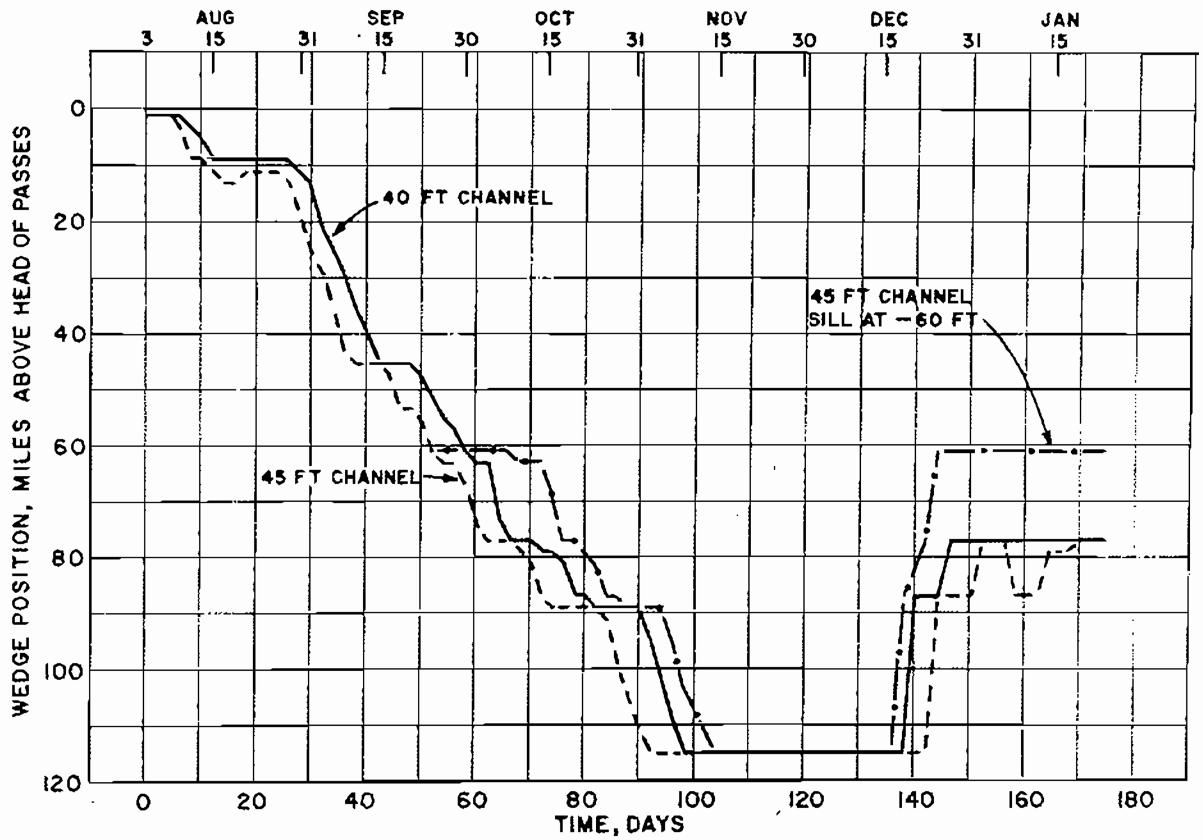
* The number of additional days that saltwater intrusion would have occurred at specific locations under the observed low-flow hydrographs with the additional depth of the 45-foot and 55-foot channels.

The number of additional days that saltwater intrusion would have occurred with the 45-foot channel and with the 55-foot channel for each of the eight tested low-flow hydrographs was determined as previously stated. These increases in duration are shown in Tables 2 and 3. The increased durations were then weighted by their respective probabilities of occurrence in any given year. For example, the additional number of days of saltwater intrusion indicated with a 0.01 probability low-flow hydrograph was weighted by 0.01. The additional number of days indicated with a 0.25 probability low-flow hydrograph was weighted by 0.25, and so on. The average annual increase in duration of saltwater intrusion was computed as the probability-weighted sum of the increased number of days of saltwater intrusion. This procedure weighs the increased duration of saltwater intrusion caused by frequent low-flow events more heavily than the increased duration caused by rare low-flow events. The result of this procedure is the average annual increase in the number of days that surface chloride concentrations would be greater than the drinking water standard.

2. Saltwater Barrier Sill. An underwater embankment, or sill, on the riverbed which would retard the advance of the saltwater wedge was

proposed as a means to mitigate for increased durations of saltwater intrusion at municipal water intakes upstream of Pointe-a-la-Hache. As part of the original model study of saltwater intrusion, WES simulated the construction of a sill to evaluate its effect on retarding the advance of the saltwater wedge. To determine a satisfactory design elevation and location for the sill, WES used the LAEM to simulate saltwater intrusion for the 55-foot channel with sills of several different elevations and at several different locations. The crossing located at about mile 64 was determined to be the best location for the sill. The simulations indicated that with a 55-foot channel and a sill elevation of -55 feet NGVD the movement of the saltwater wedge closely follows the computed wedge movement with the 40-foot channel. Details of the sill tests are documented in the report published by WES (Johnson, et. al. 1987).

With the later adoption of the 45-foot project, additional modeling was needed since the original simulations were for the 55-foot project. WES ran additional tests with a 45-foot channel and sills of several different elevations and at several different locations. The crossing at mile 64 was again determined to be the best location for the sill. Of all the hydrographs tested, the 1953-54 hydrograph produced the most severe salinity conditions at New orleans; although the low-flow of record occurred in 1936. Therefore the 1953-54 flow conditions, as well as the 1936 conditions, were used to test the effect of the sill at mile 64 on saltwater intrusion. Figure 10 shows a plot of the duration of saltwater intrusion for the 1953-54 hydrograph for the 40 foot channel and for the 45-foot channel with and without a sill at elevation -60 feet NGVD at mile 64 AHP. The results demonstrate that the sill has a marked stabilizing impact on saltwater intrusion upstream of the sill. The 45-foot channel with sill condition actually produced an intrusion event of lesser duration than the 40-foot channel at all locations upstream of the sill. The results of the model studies indicate that, with a 45-foot channel, and a sill located at about mile 64, a sill elevation of -60 feet NGVD is needed to prevent the duration of saltwater intrusion from increasing beyond the duration which would occur with the 40-foot channel.



EFFECT OF SILL ON DURATION OF SALTWATER INTRUSION

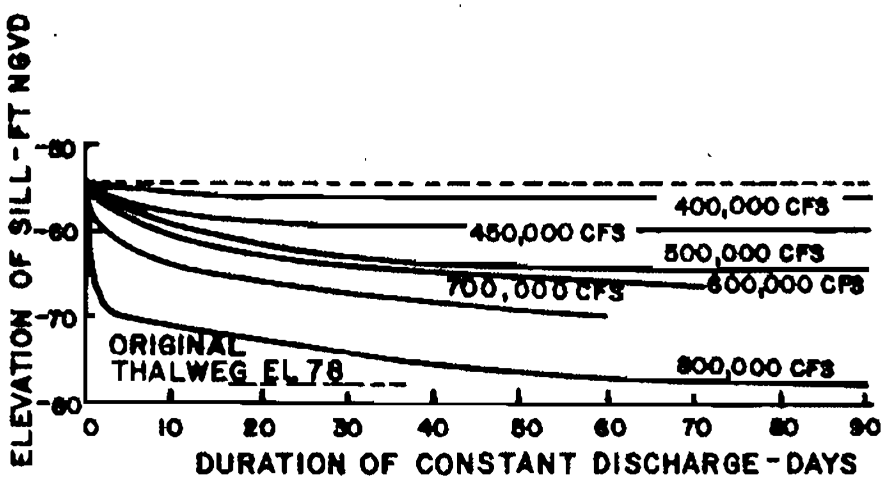
FIGURE 10

3. <u>Sill Stability</u>. Since it is necessary to have available the full river cross section at times of flood, the sill, ideally should be persistent during low flow but short-lived on a rising river. As part of the modeling effort on saltwater intrusion, WES simulated the stability of the sill using a mathematical sediment transport model, HEC-6 (Johnson, et. al. 1987). The calibrated and verified numerical model was used to determine the stability of the sill with an elevation of -55 feet NGVD and a 55-foot channel. Steady-state discharges ranging between 200,000 and 800,000 cfs were simulated for a period of 150 days. The following depths were eroded off the top of the sill:

Discharge, cfs	Erosion, ft
200,000	0.02
300,000	1.4
400,000	2.0
450,000	5.0

Rates of erosion for greater discharges are shown in Figure 11. At a discharge of 800,00 cfs, the sill washed out in about 5 days. The sill may be considered stable when the discharge is less than 400,000 cfs. The behavior of a sill with an elevation of -60 feet NGVD and a 45-foot channel is expected to be similar. Because of this erosion of the sill during higher flows the sill would be only temporary. It would have to be reconstructed if needed for another intrusion event.

4. <u>Sill Reconstruction</u>. Without a sill, surface chlorides would increase to 250 ppm at mile 64 when the toe of the wedge reaches about 20 miles upstream of this point, or approximately mile 84. Table 5 shows the simulated maximum advance of the wedge for the eight hydrographs used in the LAEM model. The maximum advance is given for the 45-foot and 55-foot channels. The table shows that the advance of the wedge approaches mile 84 for the 1980-81 and the 1938-39 hydrographs. The recurrence intervals of these hydrographs are five years for the 1980-81 hydrograph and four years for the 1938-39 hydrograph. The maximum wedge advance for each of those hydrographs is mile 79 with the 55-foot channel. With the 45-foot channel the maximum advance for the 1980-81 hydrograph is mile 75 and for the 1938-39 hydrograph, mile 77. The maximum wedge advance for all other tested hydrographs with recurrence intervals greater than five years exceeds mile 84. Therefore, as a conservative estimate, the sill would need to be constructed an average of about once every five years for both a 55-foot and 45-foot channel in order to prevent the duration of saltwater intrusion from increasing beyond what would occur with the 40-foot channel.



Erosion of triangular sill (IV on 40H)
at mile 63.4

SIMULATED RATES OF EROSION
OF SALTWATER BARIER SILL

FIGURE 11

TABLE 5

MAXIMUM SALTWATER WEDGE ADVANCE FOR THE EIGHT LOW-FLOW HYDROGRAPHS TESTED

Low-Flow[1] Hydrograph	30-Day Low-Flow[2] Frequency	Probability of Occurrence in A given Year	Maximum Wedge Position (Mi. AHP) 45-Foot Channel	Maximum Wedge Position (Mi. AHP) 55-Foot Channel
1968	2 Yrs.	0.500	45	61
1980-81	5 Yrs.	0.200	75	79
1938-39	4 Yrs.	0.250	77	79
1955-56	9 Yrs.	0.111	105	115
1947-48	18 Yrs.	0.056	89	115
1952-53	46 Yrs.	0.022	115	115
1953-54	100 Yrs.	0.010	115	115
1936	100 Yrs.	0.010	115	115

1/ Year(s) in which actual low flow hydrograph occurred.
2/ The 30-day low-flow frequency is the average frequency of recurrence of the lowest consecutive 30 days of the low-flow hydrograph.

5. Experience of 1988. Mississippi River flows in 1988 were very low. The 1988 monthly flows for May, June, and July were the lowest on record. In August, only the flows of 1936 were lower; and September and October were almost as bad.

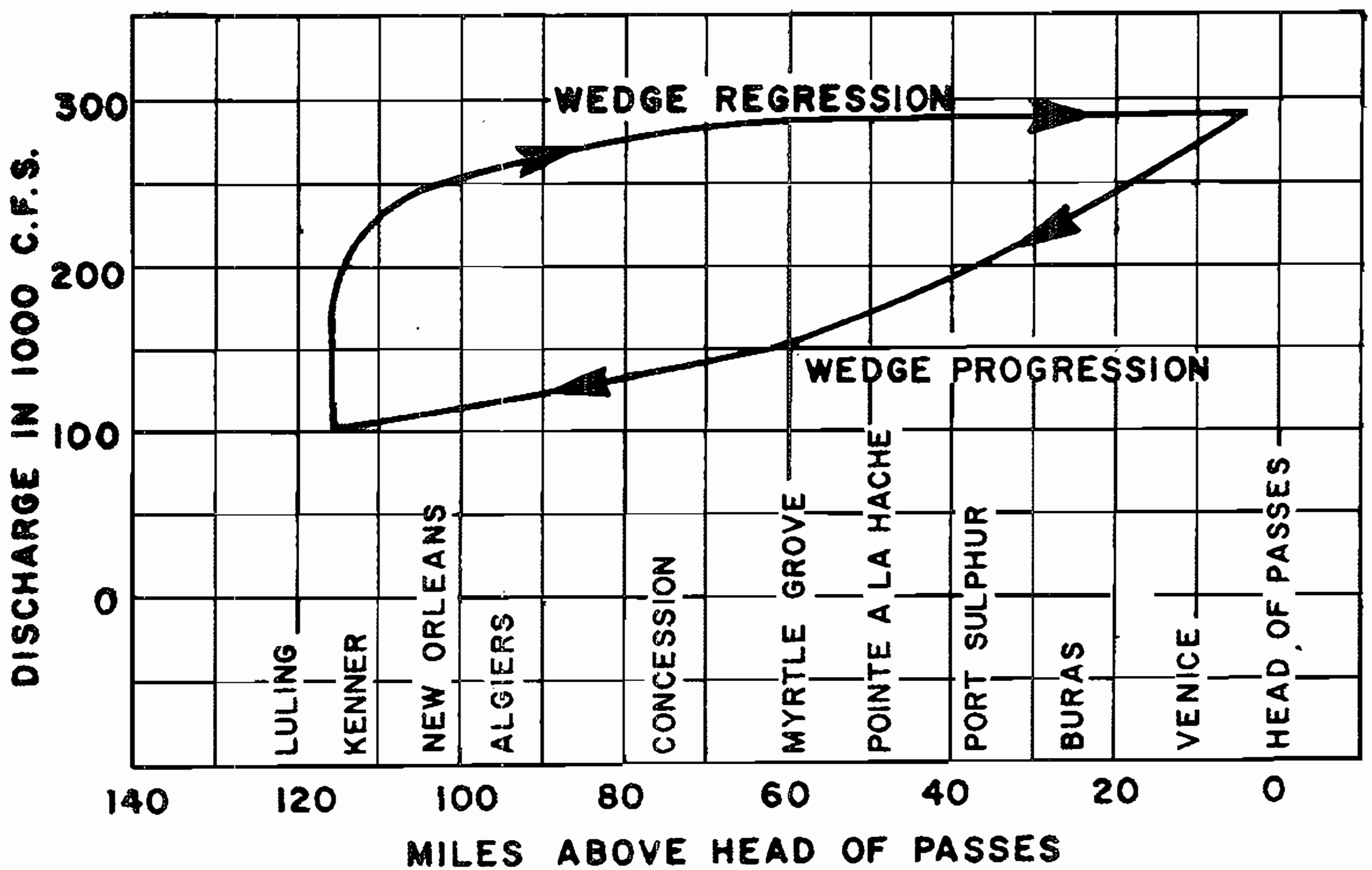
By 1988 the 45 foot channel was in place and the sill had already been planned as a measure to mitigate the impact of deepening the channel for navigation. When the probable severity of the intrusion event became apparent, the Corps of Engineers was asked to expand their actions not only to mitigate the impacts of the deeper channel, but to deal comprehensively with the intrusion problem and preserve metropolitan area water supplies throughout the intrusion event. The Corps concluded, based on a worst case analysis, that construction of the sill to elevation -45 feet NGVD would protect metropolitan area water supplies.

Before the sill was completed, the toe of the wedge had reached mile 104 as a result of the flow decreasing to 111,000 cfs. The toe of the wedge remained there until the flow briefly increased to 170,000 cfs, at which time the sill was completed. Then the wedge rapidly retreated to about mile 70 even though the flow again decreased to 119,000 cfs. Under ordinary circumstances the increase in flow to 170,000 cfs would not be great enough to move the wedge downstream and the wedge would certainly not move downstream when the flow decreased to 119,000 cfs. This can be seen in Figure 12. The sill effectively shut off any upstream transport of salt water upstream of the sill. Water supplies upstream of the sill were protected from saltwater intrusion.

While the experience of 1988 successfully demonstrated the constructability of a sill and the concept to retarding the wedge with a barrier, a sill built to a lower elevation only for mitigation purposes would not be as effective. It would not completely shut off the upstream transport of salt water in most cases. The sill would only decrease the duration of intrusion to approximately what the duration would be with a 40 foot channel.

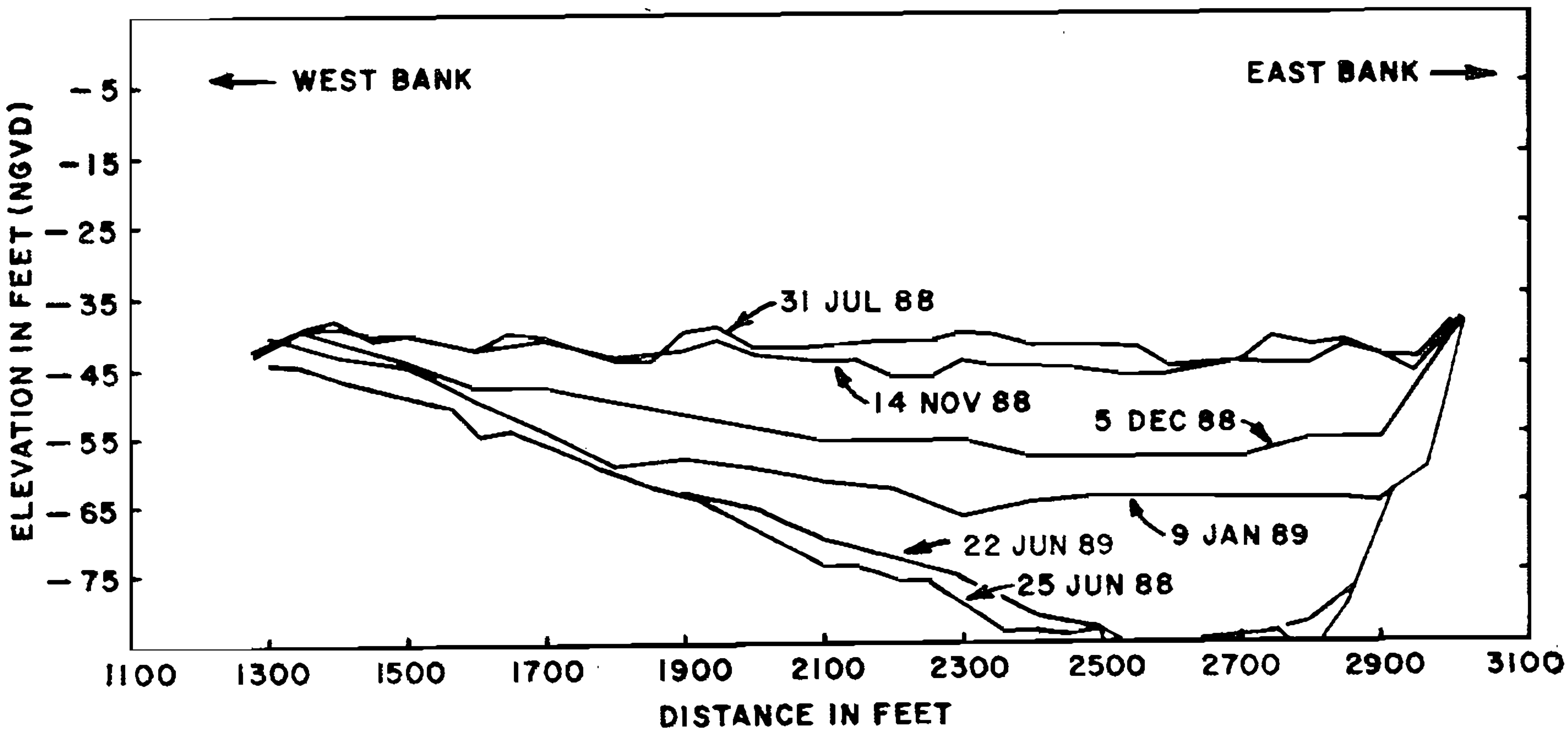
The experience of 1988 also demonstrated the stability of the sill. As Figure 13 indicates, the sill experienced little erosion after completion on 31 July 1988 until the increasing flow in November began to wash it out. At that time it was no longer needed. By the end of June 1989 it had, for all practical purposes, ceased to exist.

The experience gained during the 1988 drought showed that an underwater barrier sill is an effective means of retarding encroaching saltwater intrusion. It also showed that a sill will erode when the flows increase leaving the full river cross section available at times of flood.



SALTWATER WEDGE POSITION VS
MISSISSIPPI RIVER DISCHARGE
(45 FOOT CHANNEL)

FIGURE 12



CHANGES IN SILL ELEVATION
OVER TIME FOR 1988 DROUGHT

FIGURE 13

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE, LOUISIANA
DESIGN MEMORANDUM NO. 1
(GENERAL DESIGN)
SUPPLEMENT NO. 6
SALTWATER INTRUSION MITIGATION

APPENDIX C

PLAQUEMINES PARISH PLAN FOR
MITIGATING THE EFFECT OF SALTWATER INTRUSION
IN THE
MISSISSIPPI RIVER FOR THE 45-FOOT CHANNEL

THE PLAQUEMINES PLAN

FOR

MITIGATING THE EFFECT

OF SALT WATER INTRUSION IN

THE

MISSISSIPPI RIVER

RESULTING

FROM DEEPENING THE CHANNEL

FROM 40 FEET

TO

45 FEET

FOR THE

PLAQUEMINES PARISH GOVERNMENT

POINTE-A-LA-HACHE, LOUISIANA

APRIL 30, 1990

LINFIELD, HUNTER AND JUNIUS, INC.

651 RICHARD STREET

NEW ORLEANS, LOUISIANA 70130

JOB NO. 87-64

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LIST OF ILLUSTRATIONS

INTENT

It is the intent of this Report to describe the improvements required in the Plaquemines Parish potable water supply system to mitigate the increase in salt water intrusion in the raw water supply in the Mississippi River resulting from deepening the channel from 40 to 45 feet.

BACKGROUND

The Corps of Engineers project entitled "Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana" has been under study for many years with the first phase, deepening the channel to 45 feet from the Gulf to New Orleans, being implemented in 1988. Various mathematical models have been reviewed to evaluate the effect that deepening of the River will have on the problem of salt water intrusion at the points of Plaquemines Parish waterworks intakes. The Corps estimates that the raw water supply at Boothville will be affected, that is, it will have a chloride content above 250 parts per million (ppm), on the average of 15 days per year more, or in addition to the salt water period now experienced, and that the peak will be of 20 days (additional) duration. At East and West Pointe-a-la-Hache, which previously experienced little or no salt water problems, the estimate is for an average duration of 5 days with a peak of 10 days. No estimate has been provided of the chloride content of the raw water over what is currently experienced. As part of the ship channel project, the Corps in conjunction with the State, is financially responsible for providing facilities and/or programs for mitigating the effects of this increased salt water intrusion on the raw water supply.

The mitigation measures proposed by the Corps for the 45 foot channel project initially involved barging raw water to the three water plants in lower Plaquemines Parish and the construction of a submarine sill at Mile 64 A.H.P. (Above Head of Passes) to retard the upstream movement of the salt water wedge from moving further upstream. Plaquemines Parish favored a "permanent" solution to the problem involving the construction of additional plant capacity at Belle Chasse and the addition of transmission lines and booster pump stations to supply treated water to the lower sections of the Parish. This was called "The Plaquemines Plan".

In 1988 a severe drought in the Mississippi River valley caused the flow in the Mississippi River to drop to extremely low levels permitting the salt water wedge to extend further up the River than it had in over 50 years. The submarine sill was constructed at Mile 64 and in conjunction with increased river flow the salt water wedge was effectively stopped. The water supplies of metropolitan New Orleans were protected. The water treatment plants at East and West Pointe-a-la-Hache and at Boothville were not protected and it became necessary to barge water to those plants to provide treatable water. Although the EPA threshold of taste is 250 parts per million (ppm) of chlorides Plaquemines Parish accepted 500 ppm as a "reasonable" level for drinking water during the summer of 1988. Had the level of 250 ppm been maintained substantially more water would have been barged.

In the barging operation the Corps utilized barges at East and West Pointe-a-la-Hache as reservoirs. Pumps were installed in these barges to provide continuous flow to the Plants. Piping at the plants was modified so that water could be blended with River water to have a raw water supply with an acceptable chloride level. Raw water was obtained from the Mississippi River in the vicinity of the Corps Reservation (Foot of Prytania Street) and barged to the treatment plants where it was pumped over the levee and into the existing earthern reservoir (Boothville) or barge reservoirs (East and West Pointe-a-la-Hache).

When the salt water wedge retreated and the final costs tallied it became apparent that the cost of barging was substantially higher than had been expected and that the "Plaquemines Plan" was the most cost effective over the 50 year life of the project.

THE PLAN

General Description

The Plaquemines Parish Plan involves the transmission of potable water on the West Bank from Belle Chasse to the communities downstream to supplement their supply during periods of salt water intrusion. On the East Bank it provides for the utilization of an existing borrow pit at Davant as a reservoir with a siphon to draw water from the River and a pump station and force main to deliver raw water to the East Pointe-a-la-Hache plant. The Plaquemines Plan parallels that developed by the Corps in the General Design Memorandum No. 1 (GDM) entitled, "Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana" in that it provides for 100 percent increase in consumption over the 50 year life of the project. The East Bank project is a one time capital expenditure with no future work required to satisfy the 100 percent growth. On the West Bank improvements will be sized initially for 25 percent growth throughout the Parish with additional improvements phased to satisfy future growth as and where it occurs. For the purposes of this report 50 percent growth will occur in Year 12, 75 percent growth in Year 25 and 100 percent growth in Year 37.

EXISTING FACILITIES

The West Bank has three treatment plants: Boothville with a capacity of 2.0 million gallons per day (MGD) and an 85 million gallon reservoir of which 60 million gallons is usable; West Pointe-a-la-Hache with a capacity of 3.0 MGD and no raw water reservoir; and Belle Chasse with a capacity of 5.0 MGD and no raw water reservoir. The Boothville plant cannot be expanded without acquiring additional real estate. Because of potential storm damage experienced in the past to facilities in the lower end of the Parish no further expansion has been contemplated at this location. The West Pointe-a-la-Hache plant can be expanded and real estate is available. The Belle Chasse plant can be expanded on existing Parish land.

The distribution system for the Boothville plant extends downstream to Venice, over the Jump and down Tidewater Road to its terminus with a branch to the Commercial Boat Harbor on Tiger Pass. The system is interconnected at the plant to the system extending downstream from West Pointe-a-la-Hache but is valved off at the plant. Treated water from up stream can currently be dumped into the Boothville Ground Storage Reservoir at a rate of about 0.4 MGD.

The West Pointe-a-la-Hache system includes a recently completed booster pumping station at the site of the abandoned Empire plant and transmission lines serving the communities along the 30 mile stretch between plants. At W. Pointe-a-la-Hache an 8 inch line extends upstream 9755 feet. There is no connection to the Belle Chasse distribution system.

The Belle Chasse system serves the Belle Chasse community, the Naval Air Station, and extends downstream along Highway 23 to Deer Range, 35,073 feet above the W. Pointe-a-la-Hache plant.

The East Bank has two treatment plants: Dalcour, with a capacity of 1.0 MGD and no raw water reservoir; and East Pointe-a-la-Hache, with a capacity of 0.5 MGD and no raw water reservoir. The East Bank distribution system extends from Braithwaite to Bohemia. The single line interconnecting the two plants is of small diameter and thus, although a connection between the two plants exists, the line provides a very limited transmission capacity or redundency of service.

A Schmatic layout of the existing distribution system is included in Figures 3-5.

PROJECTED POPULATION GROWTH

The current population of Plaquemines Parish is approximately 26,000. The recent downturn in the oil and gas industry has resulted in a number of oil field related businesses closing or substantially restricting their operations forcing people to relocate as they seek employment elsewhere. The restrictions on construction in the lower end of the Parish in recent years by FEMA (building restrictions related to flood insurance) have been significant deterents to growth in that area.

However on the positive side, the Parish Administration has taken a strong pro-industry posture encouraging the development of the Mississippi River waterfront, is encouraging the development of commercial seafood port operations in Venice, is actively seeking the development of a fabrication/ shipyard facility in Venice and continues to support Venice as the major terminus of offshore activity in the eastern Gulf. The Parish Administration is encouraged by its negotiations with FEMA which has recently lowered permissable floor elevations for new homes by more than 10 feet in the area below Empire. The Parish hopes to arrive at a satisfactory settlement in the near future for the area above Empire which would permit more conventional construction. The recent opening of the new Greater New Orleans Bridge in 1988 will put pressure on residential development in Belle Chasse and the inevitable return of the oil and gas industry, even at a reduced level will revitalize the service industries along Engineers Road in Belle Chasse and throughout the Parish.

Finally, the completion of the 45 foot channel combined with the extremely low property tax rate of Plaquemines Parish and the abundance of land and deep river frontage can be expected to result in significant industrial development with associated population growth. This population growth for the purpose of this report is assumed to occur uniformly over the 50 year life of the project.

THE EAST BANK - DESIGN AND CONSTRUCTION

The East Bank system was functional in 1989. It consists of a siphon at Mile 53.5 ABP which transfers raw water from the Mississippi River into a reservoir adjacent to the Davant Community Center. This reservoir has approximately 60 million gallons of usable capacity. The raw water is pumped downstream 20,000 feet through an 8 inch pipe line to the East Pointe-a-la-Hache Water Treatment Plant. Pumps are controlled either manually or by time clock. A pressure relief valve is located near the plant spilling into a drainage canal in the event the plant cannot handle the flow of raw water. Valving on the suction line and pumps permits the pumps to go directly from reservoir to River in the event the suction line becomes clogged. The General Arrangement is shown on the Plans, Figures 10 and 16 through 16G.

The total cost of this project is $590,000 including construction, design, contract administration, and legal fees all as shown below. The system is inplace, is sufficient for 100 percent increase in consumption and should function equally as well for a 55 foot channel as for the 45 foot channel.

The construction cost as reflected by the low bid is listed below by bid item together with the cost of engineering design, construction administration and legal expenses incurred in completing the project.

EAST BANK SALT WATER MITIGATION PROJECT

Item	Description	Price
1.	Mississippi River Intake and siphon including intake structure, submerged and buried piping, levee crossing with slope pavement, highway crossing in open cut, vacuum pump system, buried piping to the pond including valves No. 1, 2 and 3, piping in the pond including concrete pad around discharge, all required power and controls, and all incidental labor and materials complete and in place (Lump Sum)	$167,300.00
2.	Reservoir Pump Station including pumps, piping, valves, fittings, power and controls pile supported platform and access bridge complete and in place (Lump Sum)	$ 62,790.00
3.	Construction of 8 inch dia. yard piping from Reservoir Pump Station to Canal Crossing No. 2 including interconnection with siphon piping, valves, fittings, and all incidental labor and material complete and in place (Lump Sum)	$ 19,000.00

Item	Description	Price
4.	Canal Crossings including pipe and fittings, piles and timber supports, straps, relief valve, and all incidental labor and materials complete and in place 2 Each @ $22,300.00 Each	$ 44,600.00
5.	8 Inch Force Main from Canal Crossing No. 1 to Canal Crossing No. 2 including excavation, backfill, piping valves, fittings, splash blocks and all incidental labor complete and in place 24,000 Lin. Ft. @ 10.00/lin. ft.	$240,000.00
6.	8 Inch Force Main from Canal Crossing No. 1 to the East Pointe-a-la-Hache Water Plant including excavation and backfill, piping, valves, fittings, connection to existing piping and all incidental labor and material complete and in place 1000 Lin. Ft. @ $13.20/lin. ft.	$ 13,200.00
	Total Low Bid (Items 1-6 Inclusive)	$546,890.00
	Engineering @ 6%	32,800.00
	Contract Administration	4,700.00
	Legal Costs (Estimated)	5,610.00
	Total Cost	$590,000.00

THE WEST BANK - DETERMINING REQUIRED TRANSMISSION LINE CAPACITIES

To determine the required volume of water to be transmitted through the system on the West Bank to mitigate the effect of deepening the channel to 45 feet, it is necessary to begin at the most downstream treatment plant at Boothville. This plant has a capacity of 2.0 million gallons per day (MGD). This capacity will remain unchanged even with a 100 percent increase in demand. During periods of salt water intrusion, water with high chloride content in the River can be blended with water from the usable 60 million gallons in the reservoir to make potable water with chloride levels of 250 ppm. The "average" duration of chlorides in excess of 250 ppm has been established by the Corps for a 40 foot channel at 45 days. Chloride levels in the River frequently reach 800-1000 ppm. When chloride levels reach this level the blending strategy ceases to be viable and water is taken directly from the reservoir. In "average" years the reservoir has proved of adequate capacity. When the duration of salt water intrusion is greater it has been necessary to supplement the system from upstream at the rate of 0.4 MGD and to curtail usage.

From the discussion above it can be seen that the Boothville plant by both blending and drawing directly from the reservoir can supply 2.0 MGD for the "average" 45 day duration or a total of 90 million gallons. This includes 60 ± million gallons from the reservoir and 30 ± million gallons from the River. With the 45 foot channel in place the peak duration is increased from 45 to 65 days. (The Plaquemines Plan must be responsive to the peak condition, however, any annualized cost analysis will use the "average" increase of 15 days.) The consumption with zero percent growth during the 65 days is 130 million gallons at the rate of 2 MGD. With the Boothville plant capable of providing 90 million gallons an additional 40 million gallons must be provided from upstream over a 65 day period. This amounts to 0.61 MGD over the 65 day period. This must be in addition to the current capability of 0.40 MGD or a total of 1.0 MGD.

Using similar reasoning the quantity of water that must be supplied to Boothville as the result of deepening the River from 40 to 45 feet for the various levels of growth is as follows:

Growth (%)	Consumption (Million Gallons) 65 Days	From Plant Supplied (Million Gallons)	From Upstream Supplied (Million Gallons)	Rate (MGD)	Existing (MGD)	Required Design Flow (MGD)
0	130	90	40	.61	0.4	1.0
25	162.5	90	72.5	1.12	0.4	1.5
50	195	90	105.0	1.62	0.4	2.0
75	227.5	90	137.0	2.11	0.4	2.5
100	260	90	170.0	2.62	0.4	3.0

In the area below West Pointe-a-la-Hache the transmission system of pipe lines, booster pumping stations and water storage tanks must therefore carry an adequate supply of water to service the local communities from West Pointe-a-la-Hache to Triumph but must also carry the Design Flow shown in the Table above. The current capacity of the West Pointe-a-la-Hache plant is 3.0 MGD with a current demand of 2.5 MGD. It is not intended that this plant be increased in capacity even with a 100 percent increase in demand. The quantity of water that must be pumped downstream from West Pointe-a-la-Hache towards Boothville is as follows:

Growth (Percent)	Local Use (MGD)	Flow (MGD) to Boothville	Total (MGD)
0	2.5	1.0	3.5
25	3.13	1.5	4.7
50	3.75	2.0	5.8
75	4.38	2.5	6.9
100	5.0	3.0	8.0

The quality of raw water at West Pointe-a-la-Hache during the summer of 1988 reached levels of 500-600 ppm, and at Belle Chasse levels of 80-120 ppm with the submarine sill in place. High levels were experienced prior to the completion of the submarine sill. Because of the proximity of the sill, chloride levels should not exceed these figures, even under the maximum duration of 20 days. Clearly a blending strategy is valid under these circumstances. However, since no reservoir is available at Pointe-a-la-Hache, the water delivered from upstream must satisfy the peak condition and not the average condition. This would result in blending in the ratio of approximately 60 percent of water from upstream with 40 percent from the River. The water from the River would be treated and placed in the ground storage reservoir. The treated water from upstream would empty into the ground storage reservoir and be mixed prior to discharge. The quantity of water required from upstream is as follows:

Growth (Percent)	Total Use (MGD)	Flow (MGD) Required From Belle Chasse (@ 60% ≤ 5.0 MGD)	Total Produced NTE 3.0 MGD
0	3.5	2.1	1.4
25	4.7	2.8	1.9
50	5.8	3.5	2.3
75	6.9	4.1	2.8
100	8.0	5.0	3.0

The plant at Belle Chasse currently has a capacity of 5.0 MGD with a current demand of approximately 3.0 MGD. The additional capacity of 2.5 MGD (the plant is expandable in increments of 2.5 MGD) provided under the Plaquemines Plan will satisfy the need for treated water downstream for the initial zero and 25 percent growth. The plant capacity at Belle Chasse will be expanded to meet local and downstream demand as follows: (Only the initial 2.5 MGD expansion is chargeable to the Plaquemines Plan. Any other expansion or addition is the local responsibility.)

Growth (Percent)	Local Demand	Flow (MGD) Pointe-a-la-Hache Demand	Total Demand	Capacity MGD
0	3.0	2.1	5.1	7.5
25	3.8	2.8	6.6	7.5
50	4.5	3.5	8.0	10.0*
75	5.3	4.1	9.4	10.0
100	6.0	5.0	11.0	12.5*

*Expansion due to growth paid for by local interests

PIPE LINE CRITERIA

The design criteria for the downstream delivery system includes the following:

Velocity: 6 feet per second (fps), maximum

Pressure: 95 pounds per square inch (psi) maximum 40 pounds per square inch, minimum

Valves: 1000 linear foot spacing (nominal).

Connection of transmission lines to service lines: 5000 linear foot spacing (nominal).

Hydrants: On service lines only, 500 linear foot spacing (nominal).

Services: On service lines only (Deer Range to West Pointe-a-la-Hache).

Materials: Pipe - Ductile Iron or Plastic C900-SDR 18

Valves - 16" and larger - Butterfly Type

12" and smaller - Gate Valve

Fittings - Ductile Iron

BOOSTER PUMPING STATION CRITERIA

In line Booster Pump Stations will be designed with a maximum of four centrifugal pumps, one being a standby. Pumps will be of different capacity permitting a variable flow with different combinations of pumps. Each pump station will be equipped with an emergency diesel generator with automatic transfer switch including exerciser, fuel tank, and batteries all designed for exterior installation.

At each station inlet and outlet pressure will be measured and transmitted continuously by radio signal to the main plant in Belle Chasse. Liquid levels in the various water towers and ground storage reservoirs will also be monitored continuously and reported to Belle Chasse. Pumps may be controlled manually at the booster station or may be controlled from the Belle Chasse Plant.

A typal Booster Pumping Station is shown on Figure 21.

THE WEST BANK - DESIGN

The development of the phasing of the required improvements was aided by computer analysis of flows, usage and line pressures. The KYPipe program was used to evaluate the system and system improvements. This program recognizes elevated water tanks, ground storage reservoirs, in-line booster pumping stations, head losses at valves and fittings, permits the use of different "C" factors for old and new pipe and in general allows the designer to adequately describe the system. For purposes of the computer modeling the water system was divided into 3 network sections as follows:

1. Belle Chasse to W. Pointe-a-la-Hache

2. W. Pointe-a-la-Hache to Empire

3. Empire to Boothville

Flows from the plants at Belle Chasse and at West Pointe-a-la-Hache were adjusted by phased growth in accordance with the previously defined growth rates. Flow from the Empire Booster Pumping Station included the required inflow at Boothville and in addition allowed for consumption between Empire and Boothville increased by phase. Roughness factors, "C" factors were taken at 100 for cast or ductiles iron pipe, 120 for asbestos cement pipe and 140 for the new plastic pipe. Estimates of usage or consumption at various points in the net work were established by consulting records and billings at the Plaquemines Parish Water Department. This consumption was increased in increments of 25 percent.

The analysis of the three areas resulted in a proposed schedule of improvements which are listed in the following sections. Figures 3-5 show a schematic diagram of each of the three systems. Because it is schematic it is not to scale and appears distorted, however, it permits the analysis of a system on a managable size document. On the schematic diagrams all pipes have been sized and numbered. All pipe intersections, or nodes, have been numbered. All points of supply are identified as are water towers and points of consumption. This is the basic input for the KYPipe program.

A sample of KYPipe input data for the network from Belle Chasse to West Pointe-a-la-Hache is included in the Appendix for the 25 percent growth phase. The output for the 25 percent phase is included from Belle Chasse to Boothville with simulations of various water levels in the elevated storage tanks. The pipe numbers and nodes in the printout conform to the schematic layouts.

Improvements to the system required for zero growth and successive 25 percent increments of growth are identified on the schematic layouts by symbol. These improvements are identified in the section that follows and form the basis for the estimates of cost for each phase of improvements included in a following section.

The geographic location of the phased improvements are shown on Figures 6-15. These improvements are identified with the same symbols used on the schematic layouts.

A listing of improvements by network section and by phase follows:

BELLE CHASSE TO W. POINTE-A-LA-HACHE:

The improvements and phasing in this area are listed hereinafter. This system will discharge into the existing one million gallon ground storage reservoir at the West Pointe-a-la-Hache plant.

0% GROWTH:

1. Install 20" dia. transmission line parallel to existing 12" dia. service line from Oakville to Alliance 33,470 ft.

2. Install 20" dia. transmission line parallel to existing 10" dia. service line from Alliance to Mississippi River Grain Elevator 13,400 ft.

3. Install new 20" service line from Deer Range to West Pointe-a-la-Hache 35,203 ft.

4. Install tie-ins, valves and hydrants as required.

5. Expand Belle Chasse Waterworks from 5.0 to 7.5 MGD.

25% GROWTH:

1. Install in line Booster Pump Station No. 1 below the Cedar Grove Elevated Water Tank.

50% GROWTH:

1. Install 16" dia. transmission line parallel to existing 16" dia. service line from Naval Air Station to Oakville 15,713 ft.

2. Install parallel 16" dia. transmission line from Mississippi River Grain Elevator to Ironton 9,226 ft.

3. Increase Capacity of Booster Pump Station No. 1.

4. Install in-line Booster Pump Station No. 2 immediately below the Mississippi River Grain Elevator.

5. Install tie-ins and valves as required.

75% GROWTH:

1. Install 16" dia. transmission line parallel to existing 16" dia. service line from Ironton to Deer Range 24,177 ft.

2. Install in line Booster Pump Station No. 3 at Naval Air Station.

3. Increase capacity of in-line Booster Pump Station No. 2.

4. Install in-line Booster Pump Station No. 4 near Ironton.

100% GROWTH:

1. Increase capacity of Booster Pump Station No. 1.

2. Increase capacity of Booster Pump Station No. 2.

3. Increase capacity of Booster Pump Station No. 3.

4. Increase capacity of Booster Pump Station No. 4.

WEST POINTE-A-LA-HACHE TO EMPIRE

The improvements in this area are based on the service pumps which pump out of the one million gallon ground storage reservoir at the West Pointe-a-la-Hache plant having the necessary capacity to deliver the required volume of treated water at the proper pressure. During the course of the growth process these pumps must be modified and/or replaced to provide increased volume at the proper pressure. This system will discharge into the existing half million gallon reservoir at the Empire Booster Station (old Empire Treatment Plant). The other improvements to the transmission system are as follows:

0% GROWTH:

1. Install 16" dia. transmission line parallel to the existing 15" FRP (fiber glass) line in Port Sulphur 5,270 ft.

25% GROWTH:

1. Install in line Booster Pump Station No. 101 in 20" dia. line 22,850 ft. below West Pointe-a-la-Hache.
2. Modify service pumps at West Pointe-a-la-Hache Plant.

50% GROWTH:

1. Increase capacity of in-line Booster Pump Station No. 101.
2. Modify service pumps at West Pointe-a-la-Hache Plant.

75% GROWTH:

1. Install 18 inch diameter transmission line parallel to existing 16 inch line below Civic Drive to Homeplace 15,690 ft.

2. Install 12" diameter line feed Empire Booster Station 850 ft.

3. Install in-line Booster Pump Station No. 102 approximately below Homeplace.

4. Increase capacity of in-line Booster Pumping Station No. 101.

5. Modify service pumps at West Pointe-a-la-Hache Plant.

100% GROWTH:

1. Increase capacity of in-line Booster Pumping Station No. 101.

2. Modify service pumps at West Pointe-a-la-Hache Plant.

EMPIRE TO BOOTHVILLE:

This area is similar to West Pointe-a-la-Hache with respect to service pump capacity. As the growth continues the service pumps at the Empire Booster station will require modification and/or replacement to keep pace with increased demand. Transmission system improvements between Empire and Boothville are as follows:

0% GROWTH:

1. Install 16" dia. transmission line from the booster station to the 4 lane highway 2,000 ft.

2. Replace existing 4" dump line at Boothville with 12" line.

25% GROWTH:

1. Modify service pumps at Empire Booster Pumping Station.

50% GROWTH:

1. Modify service pumps at Empire Booster Pumping Station.

75% GROWTH:

1. Install in line Booster Pump Station No. 201 near Buras.
2. Modify service pumps at Empire Booster Pumping Station.

100% GROWTH:

1. Increase capacity of in-line Booster Pump Station No. 201.
2. Modify service pumps at Empire Booster Pumping Station.

THE WEST BANK - ESTIMATES OF CONSTRUCTION COST

The program of scheduled improvements differs only slightly from those developed in previous reports. The estimated cost of these improvements was first developed in 1988. In the spring of 1989 the costs were estimated by an independent professional cost estimating firm which resulted in a 6.97 increase over the previous in-house estimate. This compares the Present Value of all improvements with the zero and 25 percent improvements completed initially in years one and two, the 50 percent in year 12, 75 percent in year 25 and the 100 percent in year 37.

The estimates that follow for each phase of growth include a contingency of 15 percent, and allowance of 11 percent for planning, engineering, contract administration, and surveys.

Variations in the current estimate included herein from the previous estimate include a reduction in the number of booster pump stations, the deferal of improvements to a later phase and an increase in the estimated cost of booster pumping stations based on a more indepth study of the system of controls and instrumentation required for such a system. A slight reduction in present valve results from these adjustments.

The estimate is based on detailed plans and specifications for the expansion of the Belle Chasse Water Plant which were authorized in 1985. See Figures 17-20 for the general arrangement of the Plant Expansion and an example of the plan detail. The water line costs are generally in line with recent cost experience in the area. Locations have generally been scouted and no major surprises are expected in terms of physical obstructions. The Booster Pump Stations have been costed generally consistent with the Typical Station shown on Figure 21.

THE WEST BANK - RIGHT-OF-WAY

Right-of-way for major utility lines has generally been obtained by permit from the Department of Transportation and Development within highway rights-of-way. In recent years the Department has not granted permits for utility installations within highway rights-of-way. Under the agreement with the Corps for the 45 Foot Channel Project, the State, through DOTD is responsible for providing the necessary rights-of-way. Discussions with DOTD personnel have indicated that "transmission lines", lines without hydrants or service connections, might well be allowed within highway rights-of-way. Plaquemines Parish has had preliminary

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
19.0.3	Utilities						
19.0.3.Q	20 in. Water Line	35,203	L.F.	44	1,548,932	232,340	1,781,272
19.0.3.Q	20 in. Water Line	46,870	L.F.	44	2,062,280	309,342	2,371,622
19.0.3.Q	16 in. Water Line	7,270	L.F.	34	247,180	37,077	284,257
19.0.3.Q	12 in. Water Line	170	L.F.	26	4,420	663	5,083
19.0.3.Q	Water Line Between Tie-ir	1,350	L.F.	35	47,250	7,088	54,338
19.0.3.Q	Valves	62	Each	900	55,800	8,370	64,170
19.0.3.Q	Fire Hydrants	54	Each	1,200	64,800	9,720	74,520
19.0.3.Q	Instumentation of Reservoirs and Pumps, Remote Control @ Central Monitoring Point	1	L.S	500,000	500,000	75,000	575,000
19.0.3.Q	Pumps & Controls Service @ Empire	2	Each	30,000	60,000	9,000	69,000
19.0.3.Q	Pumps & Controls Service @ Pointe a la Hache	2	Each	30,000	60,000	9,000	69,000
	Subtotal				4,650,662	697,599	5,348,261
19.0.4	Utility Treatment Facilities						
19.0.4.Q	Water Filtration and Treatment Plant (Expansion)						
	General Sitework and Demolition	1	L.S	159,615	159,615	23,942	183,557
	New Basins & Drive Room	1	L.S.	463,403	463,403	69,510	532,913
	Filter Building	1	L.S.	921,852	921,852	138,278	1,060,130
	Service Pump Station	1	L.S.	361,189	361,189	54,178	415,367
	Flash Mixer	1	L.S.	189,038	189,038	28,356	217,394
	Disinfection Building	1	L.S	17,708	17,708	2,656	20,364
	Alum Tanks	1	L.S.	807,818	807,818	121,173	928,991
	Sludge Pit Grating	1	L.S.	4,392	4,392	659	5,051

0% Growth

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
	Chemical Bldg. Mods.	1	L.S.	348	348	52	400
	Electrical	1	L.S.	654,274	654,274	98,141	752,415
	Misc. Equipment	1	L.S.	670,363	670,363	100,554	770,917
	Subtotal				4,250,000	637,500	4,887,499
30.	Planning, Engineering		L.S.	979,073	979,073	146,861	1,125,934
	Subtotal				9,879,735		
19.0.2	Contingencies					1,481,960	
	TOTAL 19.0						$11,361,695

E+D: 6% x .85 to Bidding
6% x .15 during Const.

SA - 5%

11.36[illegible]

25% Growth

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
19.0.3	Utilities						
19.0.3.Q	Pumps & Controls @ Booster Stations	2	Each	250,000	500,000	75,000	575,000
19.0.3.Q	Pumps & Controls, Service Pumps @ W. Pt. a la Hache & Empire	4	Each	30,000	120,000	18,000	138,000
19.0	Utility Treatment Facilities						
30.	Planning, Engineering	1	L.S.	60,550	60,550	9,083	69,633
	Subtotal				680,550		
19.0.2	Contingencies					102,083	
	TOTAL						$782,633

50% Growth

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
19.0.3	Utilities						
19.0.3.Q	16" ø Watermain	24939	L.F.	34	847,926	127,189	975,115
19.0.3.Q	Water Line between Tie-ii	1150	L.F.	35	40,250	6,038	46,288
19.0.3.Q	Valves	25	Each	900	22,500	3,375	25,875
19.0.3.Q	Pumps & Controls @ Booster Stations	1	Each	250,000	250,000	37,500	287,500
19.0.3.Q	Pump Station Mod.	1	Each	50,000	50,000	7,500	57,500
19.0.3.Q	Pumps & Controls, Service Pumps @ W. Pt. a la Hache	2	Each	30,000	60,000	9,000	69,000
19 0 3 Q	Pumps & Controls, Service Pumps @ Empire	2	Each	30,000	60,000	9,000	69,000
30.	Planning, Engineering	1	L.S.	146,374	146,374	21,956	168,330
	Subtotal				$1,477,050		
19 0 2	Contingencies					$199,601	
	TOTAL						$1,698,608

75% Growth

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
19.0.3	Utilities						
19.0.3.Q	16" ø Watermain	24177	L.F.	34	822,018	123,303	945,321
19.0.3.Q	12" ø Watermain	850	L.F.	26	22,100	3,315	25,415
19.0.3.Q	Water Line between Tie-ins	350	L.F.	35	12,250	1,838	14,088
19.0.3.Q	Valves	24	Each	900	21,600	3,240	24,840
19.0.3.Q	Pumps & Controls @ Booster Stations	3	Each	250,000	750,000	112,500	862,500
19.0.3.Q	Pump Station Mod.	3	Each	50,000	150,000	22,500	172,500
19.0.3.Q	Pumps & Controls, Service Pumps	4	Each	30,000	120,000	18,000	138,000
30.	Planning, Engineering	1	L.S.	205,553	205,553	30,833	236,386
	Subtotal				$2,103,521		
19.0.2	Contingencies					$315,528	
	TOTAL						$2,419,049

100% Growth

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingency	Total
19.0.3	Utilities						
19.0.3.E	Metals						
19.0.3.Q	Pump Station Mod.	5	Each	50,000	250,000	37,500	287,500
19.0.3.Q	Pumps & Controls, Service Pumps	4	Each	30,000	120,000	18,000	138,000
30.	Planning, Engineering	1	L.S.	40,700	40,700	6,105	46,805
	Subtotal				$410,700		
19.0 2	Contingencies					$61,605	
	TOTAL						$472.305

discussions with Citrus Lands, the major owner of property between Deer Range and West Pointe-a-la-Hache, about acquiring a 20 foot right-of-way through Citrus Lands for construction of a "service line" and at this time all indications are favorable.

No cost has been included in this project for rights-of-way.

ESTIMATES OF OPERATING COSTS

Using the head (line pressure) and flow figures from the output of the KYPipe program it is possible to compute the horsepower required at each Booster Pumping Station. The horsepower requirements calculated in this manner have been checked against several actual pump selections and found to be in order. These Booster Pumping Station horsepowers have been used to calculate the operating cost of the system.

The elements making up operating costs on the West Bank include power for the main pumping stations at Belle Chasse, West Pointe-a-la-Hache and Empire, power for the Booster Pumping Stations, weekly start up and operation of Booster Pumping Station Emergency Generators for a total of 30 minutes, 4 manhours of monthly maintenance for each Booster Pumping Station. 50 vehicle miles per month per Booster Pump Station and an allowance per month for maintenance of the instrumentation system. The main pumps have been assumed to operate on electric power at $0.08 per horsepower hour. The Booster Pumps have been assumed to operate on the emergency generator with 100KW generators being charged at $10.00 per hour and 250KW generators charged at $24.00 per hour (Source: Means 1989). Maintenance personnel have been charged at $18.00 per hour (including overhead). Vehicles are charged at $.25/mile and maintenance of the instrumentation system at $250 per month with three Booster Stations in service and $400 per month with seven Stations in service. The salt water intrusion event is assumed to have an average duration of 15 days at Boothville and 5 days at West Pointe-a-la-Hache.

Operating costs have been rounded to the figures included in the Table below.

Growth	Event Year	Annual Operating Cost
25%	1	20,000
50%	12	32,000
75%	25	58,000
100%	37	72,000

The operating cost for the East Bank Facility include the cost operation of the siphons, the cost of operating the raw water pumps and the maintenance of the equipment. It is assumed that the siphon operates one third of the time continuously. The duplex pumps are operated one half of the time during a salt water event and for thirty minutes each week for the remaining time. Four hours of maintenance per month has been allowed for the vacuum pumps and another four hours per month for the duplex pumps. Fifty vehicular miles per month has been assumed. There is no instrumentation or emergency generator in the East Bank system. Based on costs previously listed and an average duration of five days the rounded annual operating cost on the East Bank is $3000. This does not change with increased consumption but remains constant through 100 percent growth.

SUMMARY OF COSTS - 45 FOOT CHANNEL

The Summary of Costs for the 45 Foot Channel Project includes the capital costs on the East and West Banks together with the operating costs for the two systems over the fifty year life of the project. Capital and operating costs are escalated at five percent per year and brought back to a Present Value at the eight and one eights rate established in the enabling legislation. Since the Project first started in 1988 the fifty year life of the project will terminate in the year 2038. A forty-eight year project analysis is presented herein.

The actual cost of the East Bank work ($590,000) which has been completed is included in Year 3 Capital Cost. Operating cost for the East Bank begins in Year 3 and for the West Bank in Year 5. In a similar manner the operating cost increases in Years 13, 26, and 38 for the 50, 75, and 100 percent capital increases in Years 12, 25, and 37.

TOTAL COST - THE PLAQUEMINES PLAN - 45 FOOT PROJECT

	45' PLAN				
	Cap. Cost in Present $'s	Operating Cost in Present $'s	∑ Cost Present $'s	∑ Cost Escal. @ 5%	PV of Expenditures Discount @ 8.125%
3	8,589,700	3,000	8,592,700	9,022,335	15,950,110
4	4,144,328	3,000	4,147,328	4,572,429	
5		23,000	23,000	26,625	
6		23,000	23,000	27,957	
7		23,000	23,000	29,354	
8		23,000	23,000	30,822	
9		23,000	23,000	32,363	
10		23,000	23,000	33,981	
11		23,000	23,000	35,681	
12	1,698,608	23,000	1,721,608	2,804,318	
13		35,000	35,000	59,862	
14		35,000	35,000	62,855	
15		35,000	35,000	65,998	
16		35,000	35,000	69,298	
17		35,000	35,000	72,762	
18		35,000	35,000	76,401	
19		35,000	35,000	80,221	
20		35,000	35,000	84,232	
21		35,000	35,000	88,443	
22		35,000	35,000	92,865	
23		35,000	35,000	97,509	
24		35,000	35,000	102,384	
25	2,419,049	35,000	2,454,049	7,537,670	
26		61,000	61,000	196,731	
27		61,000	61,000	206,568	
28		61,000	61,000	216,896	
29		61,000	61,000	227,741	
30		61,000	61,000	239,128	
31		61,000	61,000	251,084	
32		61,000	61,000	263,638	
33		61,000	61,000	276,820	
34		61,000	61,000	290,661	
35		61,000	61,000	305,195	
36		61,000	61,000	320,454	
37	472,305	61,000	533,305	2,941,719	
38		75,000	75,000	434,386	
39		75,000	75,000	456,106	
40		75,000	75,000	478,911	
41		75,000	75,000	502,856	
42		75,000	75,000	527,999	
43		75,000	75,000	554,399	
44		75,000	75,000	582,119	
45		75,000	75,000	611,225	
46		75,000	75,000	641,786	
47		75,000	75,000	673,876	
48		75,000	75,000	707,569	
49		75,000	75,000	742,948	
50		75,000	75,000	780,095	

THE 55 FOOT PROJECT

The 55 Foot Project is intended to mitigate the salt water intrusion resulting from deepening the River from 45 to 55 feet. Under this condition the duration of salt water intrusion is greately increased, particularly at the Boothville Plant. The increase at Boothville is such that it renders the existing reservoirs inadequate for the full duration of the intrusion and requires that 75 percent of the water used (4.0 MGD total) be supplied from upstream if the reservoirs are used efficiently. A similar problem, but of much less magnitude exists at W. Pointe-a-la-Hache which supplies the water to Boothville and receives water from Belle Chasse. The "average" increase for the 55-foot project at Boothville is 38 days and at Pointe-a- la-Hache 15 days.

In order to supply water downstream from Belle Chasse under the 55 foot channel conditions the "Plaquemines Plan" for the 45 channel is improved by the addition of parallel transmission lines, booster pump stations and 2.5 MGD treatment plant capacity. These improvements can be implemented as the demand increases.

In year one, 58,316 feet of additional pipe and two additional in-line booster pumps would be installed. This work would be in the area between Belle Chasse and West Pointe-a-la-Hache. Sixteen inch diameter transmission lines would be installed from lower Belle Chasse to Oakville (23,113 ft.), and twenty inch diameter pipe from Deer Range to West Pointe-a-la-Hache (35,203 ft.). These lines would parallel existing lines and would enable increased flows while maintaining reasonable velocities. The in-line booster pumps would be installed at Belle Chasse and Deer Range.

In year twelve 6,923 feet of additional pipe and 5 additional in-line booster pumps would be installed. This work would be spread between Belle Chasse and Boothville. Sixteen inch diameter pipe would be installed in Belle Chasse (6,823 ft.) and twelve inch diameter pipe would be installed in Boothville (100 ft). Four pumps would be installed between Port Sulphur and Empire and one near Buras.

In year twelve it will be necessary to add 2.5 MGD capacity at the Belle Chasse Water Treatment Plant. This is required in order to supply 2.0 MGD to Boothville during salt water intrusion periods of long duration. The existing capacity at Belle Chasse W. Pointe-a-la-Hache and Boothville appear adequate for 0 percent growth and the Plaquemines Plan is adequate for 25 percent growth up to year twelve.

In year twenty-five 37,970 feet of additional 16 inch diameter pipe and one additional in-line booster pump would be installed. All of the pipe would be installed below Oakville and the booster pump would be installed in Boothville.

The cost of the improvements is estimated at $2.9 million in year one, $6.425 million in year twelve and $1.6 million in year twenty-five. Table shows the cost of the 45 Foot Plaquemines Plan as outlined previously but in a slightly different format in that capital and operating costs have been combined. It also shows the improvements required to upgrade the plan to take care of deepening the channel to 55 feet. The Present Value (PV) of the Plaquemines Plan for the 45 foot channel is $15,950,110. The initial improvements have been scheduled over a two year period with additional improvements in years twelve, twenty-five and thirty-seven. All capital and operating costs have been escalated at 5 percent per year and the PV calculated using the 8-1/8 percent interest rate contained in the enabling legislation.

Operating Costs for the 55 Foot Project have been calculated based on the same unit costs and on the same assumptions used in establishing costs for the 45 foot Project. The operating cost for the 55 Foot Project is substantially greater because of the longer duration of salinity and because the number of booster stations doubles. The operating costs are as follows:

Growth	Event Year	Annual Operating Cost
25%	1	$ 65,000
50%	12	140,000
75%	25	275,000
100%	37	365,000

Improvements for the 55 foot plan have been similarly scheduled with costs escalated at 5 percent. The PV for the incremental cost of upgrading the 45 foot to 55 foot plan is shown for each year as if the upgrading occurred in that year. Finally, the sum of the 45 foot and 55 foot plans is shown for any year in which the 55 foot plan might be implemented. This figure varies from $21,196,461 in year 48 to $24,436,314 in year one.

TOTAL COST - THE PLAQUEMINES PLAN - 45 FOOT PROJECT

		55' PLAN					
	PV of 45' Expenditures	Earliest Sched Expenditures	Operating Cost Present $'s	∑ of Expend.	Excal. @ 5%	PV of 55' Expend.	∑ PVs for 45' + 55'
3	15,950,110	2,900,000	65,000	2,965,000	3,113,250	8,486,204	24,436,314
4			65,000	3,030,000	3,340,575	8,464,284	24,414,395
5			65,000	3,095,000	3,582,849	8,441,226	24,391,337
6			65,000	3,160,000	3,841,000	8,417,114	24,367,225
7			65,000	3,225,000	4,116,008	8,392,029	24,342,139
8			65,000	3,290,000	4,408,915	8,366,046	24,316,156
9			65,000	3,355,000	4,720,822	8,339,238	24,289,348
10			65,000	3,420,000	5,052,898	8,311,675	24,261,785
11			65,000	3,485,000	5,406,379	8,283,423	24,233,534
12		6,425,000	65,000	9,975,000	16,248,224	8,254,545	24,204,655
13			140,000	10,115,000	17,300,083	8,140,927	24,091,037
14			140,000	10,255,000	18,416,507	8,027,662	23,977,772
15			140,000	10,395,000	19,601,323	7,914,824	23,864,934
16			140,000	10,535,000	20,858,579	7,802,484	23,752,595
17			140,000	10,675,000	22,192,558	7,690,708	23,640,818
18			140,000	10,815,000	23,607,789	7,579,555	23,529,665
19			140,000	10,955,000	25,109,061	7,469,085	23,419,195
20			140,000	11,095,000	26,701,440	7,359,349	23,309,459
21			140,000	11,235,000	28,390,285	7,250,398	23,200,508
22			140,000	11,375,000	30,181,261	7,142,279	23,092,389
23			140,000	11,515,000	32,080,359	7,035,033	22,985,144
24			140,000	11,655,000	34,093,914	6,928,702	22,878,812
25		1,600,000	140,000	13,395,000	41,143,061	6,823,321	22,773,432
26			275,000	13,670,000	44,087,116	6,762,150	22,712,260
27			275,000	13,945,000	47,222,720	6,698,815	22,648,925
28			275,000	14,220,000	50,561,666	6,633,492	22,583,603
29			275,000	14,495,000	54,116,449	6,566,350	22,516,460
30			275,000	14,770,000	57,900,307	6,497,548	22,447,658
31			275,000	15,045,000	61,927,260	6,427,238	22,377,348
32			275,000	15,320,000	66,212,157	6,355,564	22,305,675
33			275,000	15,595,000	70,770,726	6,282,665	22,232,775
34			275,000	15,870,000	75,619,621	6,208,671	22,158,781
35			275,000	16,145,000	80,776,479	6,133,706	22,083,816
36			275,000	16,420,000	86,259,974	6,057,888	22,007,998
37			275,000	16,695,000	92,089,877	5,981,329	21,931,439
38			365,000	17,060,000	98,808,383	5,935,447	21,885,558
39			365,000	17,425,000	105,968,516	5,887,222	21,837,332
40			365,000	17,790,000	113,597,641	5,836,826	21,786,936
41			365,000	18,155,000	121,724,757	5,784,425	21,734,536
42			365,000	18,520,000	130,380,591	5,730,178	21,680,288
43			365,000	18,885,000	139,597,696	5,674,235	21,624,345
44			365,000	19,250,000	149,410,560	5,616,739	21,566,849
45			365,000	19,615,000	159,855,717	5,557,827	21,507,937
46			365,000	19,980,000	170,971,863	5,497,628	21,447,738
47			365,000	20,345,000	182,799,984	5,436,266	21,386,377
48			365,000	20,710,000	195,383,487	5,373,860	21,323,970
49			365,000	21,075,000	208,768,341	5,310,519	21,260,629
50			365,000	21,440,000	223,003,221	5,246,351	21,196,461

APPENDIX

ILLUSTRATIONS

DATA FOR 25% GROWTH BELLE CHASE TO W. POINTE A LA HACHE

```
   2  111    84     0          1     1                                                        1
FILE BCWP25.DAT JAN 25, 1990 PIPE NETWORK FROM BELLE CHASSE TO WPALH
IT SIMULATES PRESSURES OF 95 PSI AT THE WATER PLANT AND 1.9 MGD DRAW AT WPALH
TANKS ARE INITIALY ABOUT FULL AT OAKVILLE AND ENGRS RD OUT FILE=BCWP25.OUT
          1      50.   12.          100.         1.35                     230.              1
  168     2     237.   18.          100.         1.2                                        2
    2     3     505.   18.          100.         1.6                                        3
    3     4     866.   16.          120.         2.1                                        4
    4     5    1800.   8.           100.         4.7                                        5
    5     6     250.   8.           100.         1.0                                        6
    7     6    1800.   8.           100.         2.6                                        7
    4     7     400.   18.          120.         1.0                                        8
    7     8     150.   16.          120.         .6                                         9
    8     9    2000.   8.           100.         2.85                                      10
   10     9     250.   8.           100.         .7                                        11
    9    11    1150.   8.           100.         1.95                                      12
   11    12    1200.   8.           100.         2.0                                       13
   12    13    1200.   8.           100.         2.0                                       14
   14    13    1200.   8.           100.         2.0                                       15
   11    14    1200.   8.           100.         2.0                                       16
   14    15    2425.   8.           100.         3.0                                       17
    8    15    2370.   16.          120.         5.5                                       18
   15    16     500.   16.          120.         1.4                                       19
   16    17    1940.   16.          120.         4.5                                       20
   17    18    1000.   12.          120.         2.5                                       21
   18    19     800.   12.          120.         2.0                                       22
   18    20     700.   6.           100.         1.8                                       23
   20    21     750.   14.          120.         1.1                                       24
   21    19     700.   12.          120.         1.8                                       25
   19    22    1020.   12.          120.         2.5                                       26
   22    23     150.   6.           100.         .6                                        27
   23    24     880.   8.           100.         1.4                                       28
   24    25     150.   6.           100.         .9                                        29
   22    25     880.   12.          120.         2.2                                       30
   25    26    1600.   12.          120.         3.8                                       31
   26    27    1400.   12.          120.         2.2                                       32
2  27            78.   12.          120.         2.0                      139.9            33
   27    28   19200.   12.          120.         21.5                                      34
   26    31     200.   12.          120.         .8                                        35
   31    29    3190.   8.           100.         4.2                                       36
   29    30     100.   12.          120.         .5                                        37
   31    30     550.   12.          120.         .5                                        38
    6    10     200.   8.           100.         1.8                                       39
  169    33     145.   18.          100.         1.1                                       41
   35     3     348.   16.          120.         1.1                                       43
   34    35     250.   18.          100.         2.3                                       44
   34   156    1425.   12.          120.         3.4                                       45
   40    41    1104.   12.          120.         2.7                                       46
```

	41	42	5743.	12.	120.	12.8			47
	42	44	80.	12.	120.	.5			48
	149	44	436.	16.	120.	4.2			49
	152	43	1750.	16.	120.	4.1			50
	39	41	80.	16.	120.	.5			51
	38	39	6283.	16.	120.	14.0			52.
	35	38	1800.	16.	120.	4.2			53
	44	45	11013.	16.	120.	24.3			54
	45	46	4700.	16.	120.	10.6	60.		55
	50	48	33470.	12.	120.	73.0			56
	52	46	33470.	20.	140.	73.3			57
	47	52	13440.	20.	140.	29.7			58
	47	50	13440.	10.	100.	29.7			59
	48	47	9226.	16.	120.	20.4			60
	49	48	24177.	16.	120.	53.0			61
	49	51	35203.	20.	140.	77.0			62
2	45		220.	12.	120.	2.5		139.9	63
	33	34	25.	18.	100.	.5			66
	28	105	2300.	12.	120.	2.7			134
	105	106	630.	4.	100.	.9			135
	28	107	630.	12.	120.	.9			136
	21	108	700.	12.	120.	1.0			137
	108	109	750.	12.	120.	.8			138
	20	109	700.	6.	100.	1.0			139
	109	110	1400.	6.	100.	2.3			140
	110	111	750.	8.	100.	.8			141
	38	10	1725.	8.	100.	4.6			142
	30	112	1550.	8.	100.	1.8			143
	48	144	915.	8.	100.	1.9			206
	144	145	190.	8.	100.	2.0			207
	144	146	67.	8.	100.	2.0			208
	145	147	901.	8.	100.	2.0			209
	147	145	928.	8.	100.	2.1			210
	146	148	1021.	8.	100.	2.2			211
	148	146	1080.	8.	100.	2.4			212
	43	149	1350.	16.	120.	4.1			213
	150	149	2250.	8.	100.	4.1			214
	43	150	700.	6.	100.	4.1			215
	151	152	1157.	16.	120.	2.8			216
	155	152	600.	4.	100.	1.4			217
	154	155	1157.	8.	100.	2.5			218
	151	154	700.	8.	100.	1.5			219
	153	154	1050.	8.	100.	2.3			220
	39	153	650.	6.	100.	1.5			221
	39	151	1050.	16.	120.	2.3			222
	156	157	320.	8.	100.	2.7			223
	159	158	400.	8.	100.	.9			224
	160	161	1490.	6.	100.	2.3			225
	160	161	1100.	6.	100.	1.6			226
	161	162	350.	6.	100.	1.0			227
	163	164	470.	4.	100.	1.2			228

	165	166		550.	4.			100.		1.3		229
	167	40		600.	4.			100.		1.3		230
	156	159		406.	12.			120.		.9		231
	159	162		1534.	12.			120.		3.3		232
	162	163		3030.	12.			120.		6.6		233
	163	166		315.	12.			120.		.7		234
	166	40		270.	12.			120.		.6		235
	157	158		700.	8.			100.		1.5		236
	158	160		210.	6.			100.		.6		237
	164	165		300.	4.			100.		1.0		238
	165	167		270.	4.			100.		1.0		239
		168		50.	12.			100.		1.25	230.	241
		169		50.	12.			100.		1.25	230.	242
	1	168		20.	18.			100.		.5		243
	1	169		20.	18.			100.		.5		244
	51	170		100.	20.			140.		.5		300
			10.			1	1	243	244			
.38			10.			2	2	3				
			10.			3	3	4	43			
			10.			4	4	5	8			
			10.			5	5	6				
			10.			6	6	7	39			
			10.			7	7	8	9			
			10.			8	9	10	18			
			10.			9	10	11	12			
.38			10.			10	11	39	142			
			10.			11	12	13	16			
			10.			12	13	14				
.38			10.			13	14	15				
			10.			14	15	16	17			
			10.			15	17	18	19			
.38			10.			16	19	20				
			10.			17	20	21				
			10.			18	21	22	23			
			10.			19	22	25	26			
			10.			20	23	24	139			
			10.			21	24	25	137			
			10.			22	26	27	30			
			10.			23	27	28				
			10.			24	28	29				
			10.			25	29	30	31			
			10.			26	31	32	35			
			10.			27	32	33	34			
.38			10.			28	34	134	136			
			10.			29	36	37				
.38			10.			30	37	38	143			
			10.			31	35	36	38			
.038			10.			33	41	66				
			10.			34	44	45	66			
			10.			35	43	44	63			
			10.			38	52	53	142			

	10.	39	51	52	221	222
.038	10.	40	46	230	235	
	10.	41	46	47	51	
	10.	42	47	48		
.038	10.	43	50	213	215	
.38	10.	44	48	49	54	
	10.	45	54	55	63	
.39	10.	46	55	56	57	
.39	10.	47	58	59	60	
.35	10.	48	60	61	206	
.35	10.	49	61	62		
	10.	50	56	59		
	10.	51	62	300		
	10.	52	57	58		
	10.	105	134	135		
	10.	106	135			
	10.	107	136			
	10.	108	137	138		
	10.	109	138	139	140	
	10.	110	140	141		
	10.	111	141			
	10.	144	206	207	208	
	10.	145	207	209	210	
	10.	146	208	211	212	
	10.	147	209	210		
	10.	148	211	212		
	10.	149	49	213	214	
	10.	150	214	215		
	10.	151	216	219	222	
	10.	152	60	216	217	
	10.	153	220	221		
	10.	154	218	219	220	
	10.	155	217	218		
	10.	156	45	223	231	
	10.	157	223	236		
	10.	158	224	236	237	
	10.	159	224	231	232	
	10.	160	225	226	237	
	10.	161	225	226	227	
	10.	162	227	232	233	
	10.	163	228	233	234	
	10.	164	228	238		
	10.	165	229	238	239	
	10.	166	229	234	235	
	10.	167	230	239		
	10.	168	2	241	243	
	10.	169	41	242	244	
1.9	10.	170	300			

```
-2.
    1         11    10
   54    55    63    56    57    69    58    60    61    62   300
   44    45    46    50    52    47    48    49    51   170
-2.
    1.          .5          2     0     2
   33   140.      110.          53.
   63   140.      110.          53.
   33    27     2  140.
   63    45     2  140.
-2.
```

OUTPUT 25% GROWTH BELLE CHASSE TO W. POINTE A LA HACHE

KYPIPE S/N: 56011358   HMVersion: 4.01

RUN DATE: 02/02/1990   TIME: 11:01:05.81

Data File: bcwp25.dat

FLOWRATE IS EXPRESSED IN MGD AND PRESSURE IN PSIG

A SUCCESSFUL GEOMETRIC VERIFICATION HAS BEEN COMPLETED

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD

THIS SYSTEM HAS 111 PIPES WITH 84 JUNCTIONS , 23 LOOPS AND 5 FGNS

THE RESULTS ARE OBTAINED AFTER 5 TRIALS WITH AN ACCURACY = 0.00141

FILE BCWP25.DAT JAN 25, 1990 PIPE NETWORK FROM BELLE CHASSE TO WPALH
IT SIMULATES PRESSURES OF 95 PSI AT THE WATER PLANT AND 1.9 MGD DRAW AT WPALH
TANKS ARE INITIALY ABOUT FULL AT OAKVILLE AND ENGRS RD OUT FILE=BCWP25.OUT

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	0	1	2.01	0.38	0.00	0.33	3.96	7.66
2	168	2	2.59	0.40	0.00	0.10	2.27	1.70
3	2	3	2.21	0.64	0.00	0.09	1.94	1.27
4	3	4	1.97	1.12	0.00	0.15	2.18	1.29
5	4	5	0.22	1.63	0.00	0.07	0.97	0.91
6	5	6	0.22	0.23	0.00	0.01	0.97	0.91
7	7	6	0.20	1.44	0.00	0.03	0.91	0.80
8	4	7	1.75	0.41	0.00	0.06	1.94	1.04
9	7	8	1.54	0.12	0.00	0.03	1.71	0.82
10	8	9	0.23	1.98	0.00	0.05	1.02	0.99
11	10	9	-0.02	0.00	0.00	0.00	-0.10	-0.01
12	9	11	0.21	0.94	0.00	0.03	0.92	0.82
13	11	12	0.16	0.59	0.00	0.02	0.70	0.50
14	12	13	0.16	0.59	0.00	0.02	0.70	0.50

15	14	13	0.22	1.12	0.00	0.03	0.98	0.93
16	11	14	0.05	0.07	0.00	0.00	0.22	0.06
17	14	15	-0.17	-1.41	0.00	-0.03	-0.76	-0.58
18	8	15	1.31	1.45	0.00	0.18	1.45	0.61
19	15	16	1.14	0.24	0.00	0.03	1.26	0.47
20	16	17	0.78	0.43	0.00	0.05	0.84	0.22
21	17	18	0.76	0.90	0.00	0.09	1.50	0.90
22	18	19	0.68	0.56	0.00	0.05	1.31	0.70
23	18	20	0.10	0.57	0.00	0.02	0.77	0.82
24	20	21	0.09	0.01	0.00	0.00	0.13	0.01
25	21	19	0.10	0.01	0.00	0.00	0.19	0.02
26	19	22	0.76	0.92	0.00	0.09	1.50	0.90
27	22	23	0.12	0.18	0.00	0.01	0.93	1.18
28	23	24	0.12	0.25	0.00	0.01	0.52	0.29
29	24	25	0.12	0.18	0.00	0.01	0.93	1.18
30	22	25	0.64	0.58	0.00	0.05	1.26	0.66
31	25	26	0.76	1.44	0.00	0.13	1.50	0.90
32	26	27	0.38	0.35	0.00	0.02	0.75	0.25
LINE 33 IS CLOSED								
34	27	28	0.38	4.79	0.00	0.19	0.75	0.25
35	28	31	0.38	0.05	0.00	0.01	0.75	0.25
36	31	29	0.04	0.12	0.00	0.00	0.17	0.04
37	29	30	0.04	0.00	0.00	0.00	0.08	0.00
38	31	30	0.34	0.11	0.00	0.00	0.67	0.20
39	6	10	0.42	0.61	0.00	0.10	1.87	3.07
41	169	33	3.56	0.44	0.00	0.17	3.12	3.06
43	35	3	-0.25	-0.01	0.00	0.00	-0.27	-0.03
44	34	35	2.24	0.32	0.00	0.14	1.96	1.30
45	34	156	1.28	3.39	0.00	0.34	2.53	2.38
46	40	41	1.25	2.48	0.00	0.25	2.45	2.25
47	41	42	1.21	12.22	0.00	1.13	2.38	2.13
48	42	44	1.21	0.17	0.00	0.04	2.38	2.13
49	153	44	2.55	0.91	0.00	0.52	2.83	2.09
50	152	43	2.59	3.76	0.00	0.52	2.87	2.15
51	39	41	-0.04	0.00	0.00	0.00	-0.04	0.00
52	38	39	2.55	13.14	0.00	1.74	2.83	2.09
53	35	38	2.49	3.59	0.00	0.50	2.76	1.99
54	44	45	3.38	38.75	0.00	5.29	3.75	3.52
55	45	46	3.38	16.54	101.13	2.31	3.75	3.52
56	50	46	-0.48	-11.81	0.00	-0.92	-0.90	-0.35
57	52	46	-2.53	-17.48	0.00	-3.67	-1.80	-0.52
58	47	52	-2.53	-7.02	0.00	-1.49	-1.80	-0.52
59	47	50	-0.46	-16.15	0.00	-0.78	-1.30	-1.20
60	48	47	-2.60	-19.97	0.00	-2.63	-2.88	-2.16
61	49	48	-2.25	-40.03	0.00	-5.11	-2.49	-1.66
62	49	51	1.90	10.81	0.00	2.17	1.35	0.31
LINE 63 IS CLOSED								
66	33	34	3.52	0.08	0.00	0.07	3.09	3.00
134	28	105	0.00	0.00	0.00	0.00	0.00	0.00
135	105	106	0.00	0.00	0.00	0.00	0.00	0.00
136	28	107	0.00	0.00	0.00	0.00	0.00	0.00

137	21	108	-0.01	0.00	0.00	0.00	-0.02	0.00
138	108	109	-0.01	0.00	0.00	0.00	-0.02	0.00
139	20	109	0.01	0.01	0.00	0.00	-0.02	0.00
140	109	110	0.00	0.00	0.00	0.00	0.06	0.01
141	110	111	0.00	0.00	0.00	0.00	0.00	0.00
142	38	10	-0.07	-0.17	0.00	-0.01	-0.29	-0.10
143	30	112	0.00	0.00	0.00	0.00	0.00	0.00
206	48	144	0.00	0.00	0.00	0.00	0.00	0.00
207	144	145	0.00	0.00	0.00	0.00	0.00	0.00
208	144	146	0.00	0.00	0.00	0.00	0.00	0.00
209	145	147	0.02	0.01	0.00	0.00	0.08	0.01
210	147	145	0.02	0.01	0.00	0.00	0.08	0.01
211	146	148	0.02	0.01	0.00	0.00	0.08	0.01
212	148	146	0.02	0.01	0.00	0.00	0.08	0.01
213	43	149	2.38	2.49	0.00	0.44	2.64	1.84
214	150	149	0.17	1.23	0.00	0.03	0.74	0.55
215	43	150	0.17	1.66	0.00	0.11	1.31	2.22
216	151	152	2.61	2.34	0.00	0.34	2.78	2.02
217	155	152	0.08	2.67	0.00	0.05	1.45	4.29
218	154	155	0.08	0.17	0.00	0.01	0.36	0.15
219	151	154	-0.09	-0.11	0.00	0.00	-0.39	-0.16
220	153	154	0.17	0.59	0.00	0.02	0.75	0.56
221	39	153	0.17	1.48	0.00	0.04	1.33	2.27
222	39	151	2.42	1.99	0.00	0.26	2.68	1.89
223	156	157	0.19	0.23	0.00	0.03	0.85	0.72
224	159	158	0.01	0.00	0.00	0.00	0.03	0.00
225	160	161	0.09	1.09	0.00	0.02	0.72	0.73
226	160	161	0.11	1.09	0.00	0.02	0.85	0.99
227	161	162	0.20	1.08	0.00	0.04	1.57	3.09
228	163	164	0.04	0.46	0.00	0.01	0.65	0.97
229	165	166	0.00	0.01	0.00	0.00	0.08	0.02
230	167	40	0.03	0.46	0.00	0.01	0.57	0.77
231	156	159	1.09	0.71	0.00	0.06	2.15	1.76
232	159	162	1.08	2.67	0.00	0.23	2.14	1.74
233	162	163	1.28	7.20	0.00	0.65	2.53	2.38
234	163	166	1.25	0.71	0.00	0.07	2.46	2.25
235	166	40	1.25	0.61	0.00	0.06	2.46	2.27
236	157	158	0.19	0.50	0.00	0.02	0.85	0.72
237	158	160	0.20	0.65	0.00	0.02	1.57	3.09
238	164	165	0.04	0.29	0.00	0.01	0.65	0.97
239	165	167	0.03	0.21	0.00	0.01	0.57	0.77
241	0	168	2.05	0.40	0.00	0.32	4.05	7.96
242	0	169	2.09	0.41	0.00	0.33	4.11	8.19
243	1	168	0.54	0.00	0.00	0.00	0.47	0.09
244	1	169	1.48	0.01	0.00	0.01	1.29	0.60
300	51	170	1.90	0.03	0.00	0.01	1.35	0.31

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
1	0.00	229.29	10.00	95.02
2	0.38	228.79	10.00	94.81
3	0.00	228.05	10.00	94.49
4	0.00	226.78	10.00	93.94
5	0.00	225.08	10.00	93.20
6	0.00	224.84	10.00	93.10
7	0.00	226.31	10.00	93.73
8	0.00	226.16	10.00	93.67
9	0.00	224.13	10.00	92.79
10	0.38	224.13	10.00	92.79
11	0.00	223.16	10.00	92.37
12	0.00	222.55	10.00	92.11
13	0.38	221.94	10.00	91.84
14	0.00	223.09	10.00	92.34
15	0.00	224.53	10.00	92.96
16	0.38	224.26	10.00	92.85
17	0.00	223.78	10.00	92.64
18	0.00	222.79	10.00	92.21
19	0.00	222.18	10.00	91.95
20	0.00	222.20	10.00	91.96
21	0.00	222.20	10.00	91.95
22	0.00	221.18	10.00	91.51
23	0.00	220.99	10.00	91.43
24	0.00	220.73	10.00	91.32
25	0.00	220.54	10.00	91.24
26	0.00	218.97	10.00	90.55
27	0.00	218.60	10.00	90.39
28	0.38	213.63	10.00	88.24
29	0.00	218.79	10.00	90.48
30	0.38	218.80	10.00	90.48
31	0.00	218.91	10.00	90.53
33	0.04	228.65	10.00	94.75
34	0.00	228.50	10.00	94.68
35	0.00	228.04	10.00	94.48
38	0.00	223.96	10.00	92.71
39	0.00	209.07	10.00	86.27
40	0.04	211.81	10.00	87.45
41	0.00	209.07	10.00	86.27
42	0.00	195.72	10.00	80.48
43	0.04	199.87	10.00	82.28
44	0.38	195.51	10.00	80.39
45	0.00	151.47	10.00	61.30
46	0.39	233.75	10.00	96.96
47	0.39	204.09	10.00	84.11
48	0.35	181.50	10.00	74.32
49	0.35	136.35	10.00	54.75
50	0.00	221.02	10.00	91.44
51	0.00	123.38	10.00	49.13
52	0.00	212.60	10.00	87.79

105	0.00	213.63	10.00	88.24
106	0.00	213.63	10.00	88.24
107	0.00	213.63	10.00	88.24
108	0.00	222.20	10.00	91.95
109	0.00	222.20	10.00	91.95
110	0.00	222.20	10.00	91.95
111	0.00	222.20	10.00	91.95
112	0.00	218.80		
144	0.00	181.50	10.00	74.32
145	0.00	181.50	10.00	74.32
146	0.00	181.50	10.00	74.32
147	0.00	181.49	10.00	74.31
148	0.00	181.49	10.00	74.31
149	0.00	196.94	10.00	81.01
150	0.00	198.20	10.00	81.56
151	0.00	206.83	10.00	85.29
152	0.00	204.15	10.00	84.13
153	0.00	207.55	10.00	85.61
154	0.00	206.95	10.00	85.34
155	0.00	206.77	10.00	85.27
156	0.00	224.78	10.00	93.07
157	0.00	224.52	10.00	92.96
158	0.00	224.00	10.00	92.73
159	0.00	224.00	10.00	92.73
160	0.00	223.33	10.00	92.44
161	0.00	222.22	10.00	91.96
162	0.00	221.10	10.00	91.48
163	0.00	213.25	10.00	88.07
164	0.00	212.78	10.00	87.87
165	0.00	212.49	10.00	87.74
166	0.00	212.47	10.00	87.74
167	0.00	212.27	10.00	87.65
168	0.00	229.28	10.00	95.02
169	0.00	229.26	10.00	95.01
170	1.90	123.33	10.00	49.11

THE NET SYSTEM DEMAND = 6.15

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
1	2.01
241	2.05
242	2.09

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 6.15
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = 0.00

DATA 25% GROWTH W. POINTE A LA HACHE TO EMPIRE

```
    2   36   27    0          1    1                                                 1
THIS PROGRAM IS FROM WEST POINT TO EMPIRE AND  WITH NO IMPROVEMENTS AND AT 25%
GROWTH.  TOWER IS NEAR FULL AT START OF EPS.   JAN 25, 1990  DATA=WPEM25.DAT
OUTPUT= WPEM25.OUT   2.25 MGD DUMPED AT EMPIRE.
         51    200.  20.          120.       1.5                   230.          65
   56    66  22367.  20.          120.       20.0                                67
   51    54  22550.  20.          120.       50.0                                68
   54    55    100.  20.          120.       .5                                  69
   55    56   8338.  20.          120.       18.0            55.                 70
   56   102   3760.  8.           100.       1.7                                 71
  102   103    300.  8.           100.       .6                                  72
  103   104   4540.  8.           100.       .6                                  73
  104    61   7580.  8.           100.       2.5                                 74
   56    57   6370.  6.           100.       2.5                                 75
   57    58    300.  6.           100.       .5                                  76
   58    59   3180.  6.           100.       3.5                                 77
   60    61   7180.  8.           100.       8.0                                 78
   62    66    785.  16.          120.       5.0                                 80
   66    67    190.  16.          120.       4.7                                 81
   67    68   5270.  15.          120.       3.5                                 82
   68    69   5430.  16.          120.       6.6                                 83
   69    70   5650.  16.          120.       3.2                                 84
   70    72    220.  16.          120.       .5                                  85
2        72    153.  12.          120.       2.0                   139.9         86
   69    71   4200.  8.           100.       2.0                                 87
   71    70    755.  16.          120.       1.8                                 88
   78    71  29740.  16.          120.       23.0                                89
   76    72  32100.  12.          120.       23.0                                90
   62    63   3720.  8.           100.       3.0                                 91
   61    62     50.  8.           100.       1.0                                 92
   63    64   6960.  6.           100.       3.9                                 93
   64    65  11420.  8.           100.       3.9                                 94
   78    76   1152.  12.          120.       1.6                                 97
   77    76    800.  12.          120.       2.0                                 98
   73    77     50.  12.          120.       3.0                                 99
  104    60   1150.  8.           100.       1.6                                100
   59    60   1370.  8.           100.       1.6                                101
  102    57   1450.  8.           100.       1.6                                102
  103    58   1450.  8.           100.       1.6                                103
   68    67   5270.  16.          140.        .5                                401
           10.            51    65    68
.3         10.            54    68    69
           10.            55    69    70
.18        10.            56    67    70    71    75
.25        10.            57    75    76   102
           10.            58    76    77   103
           10.            59    77   101
.25        10.            60    78   100   101
           10.            61    74    78    92
```

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              10.        62   80   91   92
              10.        63   91   93
              10.        64   93   94
.15           10.        65   94
              10.        66   67   80   81
              10.        67   81   82  401
              10.        68   82   83  401
              10.        69   83   84   87
              10.        70   84   85   88
.25           10.        71   87   88   89
              10.        72   85   86   90
2.25          10.        73   99
              10.        76   90   97   98
.25           10.        77   98   99
.25           10.        78   89   97
.25           10.       102   71   72  102
              10.       103   72   73  103
.25           10.       104   73   74  100

-2.
    4.            .5      1    0    1
   86   140.        110.       40.
   86     2         120.
-2.
```

OUTPUT 25% GROWTH W. POINTE A LA HACHE TO EMPIRE

KYPIPE S/N: 56011358   HMVersion: 4.01

RUN DATE: 01/27/1990   TIME: 11:49:29.87

Data File: WPEM25.DAT

FLOWRATE IS EXPRESSED IN MGD AND PRESSURE IN PSIG

A SUCCESSFUL GEOMETRIC VERIFICATION HAS BEEN COMPLETED

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD

THIS SYSTEM HAS 36 PIPES WITH 27 JUNCTIONS , 8 LOOPS AND 2 FGNS

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = 0.00189

THIS PROGRAM IS FROM WEST POINT TO EMPIRE AND WITH NO IMPROVEMENTS AND AT 25%
GROWTH. TOWER IS NEAR FULL AT START OF EPS. JAN 25, 1990 DATA=WPEM25.DAT
OUTPUT= WPEM25.OUT 2.25 MGD DUMPED AT EMPIRE.

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
65	0	51	4.63	0.43	0.00	0.25	3.28	2.13
67	56	66	3.31	25.53	0.00	1.71	2.35	1.14
68	51	54	4.63	47.93	0.00	8.37	3.28	2.13
69	54	55	4.33	0.19	0.00	0.07	3.07	1.88
70	55	56	4.33	15.68	72.36	2.64	3.07	1.88
71	56	102	0.62	23.42	0.00	0.20	2.75	6.23
72	102	103	0.27	0.39	0.00	0.01	1.18	1.31
73	103	104	0.22	4.22	0.00	0.01	0.98	0.93
74	104	61	-0.08	-1.02	0.00	0.00	-0.35	-0.13
75	56	57	0.22	23.83	0.00	0.12	1.74	3.74
76	57	58	0.07	0.15	0.00	0.00	0.58	0.49
77	58	59	0.12	3.76	0.00	0.05	0.93	1.18
78	60	61	-0.08	-1.05	0.00	-0.02	-0.36	-0.15
80	62	66	-0.31	-0.03	0.00	-0.01	-0.34	-0.04

81	66	67	3.00	0.54	0.00	0.81	3.32	2.82
82	67	68	1.25	4.02	0.00	0.13	1.57	0.76
83	68	69	3.00	15.32	0.00	1.13	3.32	2.82
84	69	70	2.57	12.00	0.00	0.40	2.85	2.12
85	70	72	0.90	0.07	0.00	0.01	1.00	0.30
LINE 86 IS CLOSED								
87	69	71	0.43	13.11	0.00	0.11	1.89	3.12
88	71	70	-1.67	-0.72	0.00	-0.10	-1.85	-0.96
89	78	71	-1.85	-34.21	0.00	-1.50	-2.05	-1.15
90	76	72	-0.90	-39.68	0.00	-1.13	-1.78	-1.24
91	62	63	0.15	1.68	0.00	0.02	0.66	0.45
92	61	62	-0.16	-0.03	0.00	-0.01	-0.71	-0.51
93	63	64	0.16	12.72	0.00	0.08	1.18	1.83
94	64	65	0.15	5.14	0.00	0.03	0.66	0.45
97	78	76	1.60	4.11	0.00	0.25	3.15	3.57
98	77	76	-2.50	-6.54	0.00	-0.75	-4.92	-8.17
99	73	77	-2.25	-0.34	0.00	-0.92	-4.43	-6.72
100	104	60	0.05	0.07	0.00	0.00	0.22	0.06
101	59	60	0.12	0.40	0.00	0.01	0.53	0.29
102	102	57	0.10	0.32	0.00	0.01	0.45	0.22
103	103	58	0.05	0.07	0.00	0.00	0.20	0.05
401	68	67	-1.75	-4.12	0.00	-0.03	-1.94	-0.78

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
51	0.00	229.32	10.00	95.04
54	0.30	173.02	10.00	70.64
55	0.00	172.76	10.00	70.53
56	0.18	226.84	10.00	93.96
57	0.25	202.89	10.00	83.58
58	0.00	202.74	10.00	83.52
59	0.00	198.93	10.00	81.87
60	0.25	198.46	10.00	81.67
61	0.00	199.52	10.00	82.13
62	0.00	199.55	10.00	82.14
63	0.00	197.86	10.00	81.40
64	0.00	185.05	10.00	75.85
65	0.15	179.88	10.00	73.61
66	0.00	199.60	10.00	82.16
67	0.00	198.25	10.00	81.58
68	0.00	194.10	10.00	79.78
69	0.00	177.65	10.00	72.65
70	0.00	165.25	10.00	67.28
71	0.25	164.43	10.00	66.92
72	0.00	165.18	10.00	67.24
73	2.25	115.83	10.00	45.86
76	0.00	124.37	10.00	49.56
77	0.25	117.08	10.00	46.40
78	0.25	128.73	10.00	51.45
102	0.25	203.22	10.00	83.73
103	0.00	202.81	10.00	83.55

104	0.25	198.58	10.00	81.72

THE NET SYSTEM DEMAND = 4.63

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
65	4.63

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4.63
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = 0.00

```
DATA 25% GROWTH EMPIRE TO BOOTHVILLE

    2    51    39     0          1    1                                               1
THIS PROGRAM ADDS 2000' 16 INCH LINE FROM EMPIRE BOOSTER TO FOUR LANE HWY.
TANK STARTS 3/4 FULL.  JAN 25, 1990 DATA=EMBV25.DAT  OUTPUT=EMBV25.OUT

   73    74    7100.  2.        100.      7.0                                      95
   75    74   22290.  6.        100.      24.0                                     96
   93    92    3271.  12.       120.      1.6                                     104
   82   172    2660.  12.       120.      2.1                                     106
   81    75    2700.  8.        100.      3.0                                     107
   86   171    4888.  16.       120.      4.9                                     108
   81    82      50.  8.        100.      .8                                      109
   81    83      50.  8.        100.      0.0                                     110
  101    86     200.  16.       120.      2.2                                     113
  101    86     200.  16.       120.      2.2                                     114
   87   101      50.  16.       120.      .9                                      115
   90    89    7285.  8.        100.      2.8                                     117
   91    90    6850.  6.        100.      1.7                                     118
  138    88    1235.  12.       120.      .7                                      119
   88    89     200.  8.        100.      1.1                                     120
   87    88     200.  12.       120.      1.1                                     121
   94    87   25088.  16.       120.      10.0                                    122
  143    92    7135.  8.        100.      .5                                      123
2  92           250.  8.        100.      1.7               135.                  124
  131    99      70.  6.        100.      1.0                                     125
   98   100   21675.  6.        100.      3.6                                     126
   97    98     350.  10.       120.      1.2                                     127
   99    92     850.  8.        100.      .8                                      128
   95    96     170.  12.       120.      2.4                                     130
   95    94   36505.  16.       120.      26.5                                    131
   94    93    1330.  12.       120.      2.4                                     132
  136   137    1200.  4.        100.      .6                                      186
  135   136    6540.  6.        100.      2.4                                     187
  100   135    3500.  6.        100.      3.9                                     188
  134   135     150.  6.        100.      .5                                      189
  133   134    1054.  6.        100.      4.2                                     190
  133   134    1054.  6.        100.      3.6                                     191
  136   131    1200.  6.        100.      2.2                                     192
  132   131    6270.  6.        100.      2.8                                     193
  132   133     150.  6.        100.      .5                                      194
  100   132    3040.  6.        100.      2.5                                     195
  138    90      50.  8.        100.      1.8                                     196
  139    91      60.  6.        100.      1.8                                     197
  140   142      60.  6.        100.      1.8                                     198
  141   143      60.  6.        100.      1.8                                     199
  142    91    6100.  8.        100.      .5                                      200
  143   142    4950.  8.        100.      .5                                      201
  139   138    6850.  12.       120.      3.9                                     202
  140   139    6100.  12.       120.      1.0                                     203
  141   140    4950.  12.       120.      1.0                                     204
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   93  141   3864.  12.       120.      1.0                                      205
   75  171   2000.  16.       140.      4.3                                      246
  175  174     25.  16.       120.      3.0                                      249
  174   75     25.  16.       120.      .5                                       250
   75  172     50.  12.       120.      .5                                       251
       175    100.  16.       120.      2.52                   230.0             252
.0012      10.            73   95
.07        10.            74   95   98
           10.            75   96   107  246  250  251
           10.            81   107  109  110
.06        10.            82   106  109
           10.            83   110
           10.            86   108  113  114
.07        10.            87   115  121  122
           10.            88   119  120  121
           10.            89   117  120
.1         10.            90   117  118  196
.1         10.            91   118  197  200
           10.            92   104  123  124  128
.06        10.            93   104  132  205
.21        10.            94   122  131  132
           10.            95   130  131
1.5        10.            96   130
.012       10.            97   127
           10.            98   126  127
.06        10.            99   125  128
.0025      10.           100   126  188  195
           10.           101   113  114  115
           10.           131   125  192  193
           10.           132   193  194  195
           10.           133   190  191  194
           10.           134   189  190  191
           10.           135   187  188  189
           10.           136   186  187  192
.05        10.           137   186
           10.           138   119  196  202
           10.           139   197  202  203
           10.           140   198  203  204
           10.           141   199  204  205
           10.           142   198  200  201
           10.           143   123  199  201
           10.           171   108  246
           10.           172   106  251
           10.           174   249  250
           10.           175   249  252


-2.
    1.         .5       1     0     1
  124  140.      110.       40.
  124   92     2  120.
-2.
```

OUTPUT 25% GROWTH EMPIRE TO BOOTHVILLE

KYPIPE S/N: 56011358   HMVersion: 4.01

RUN DATE: 01/27/1990   TIME: 14:04:20.41

Data File: EMBV25.DAT

FLOWRATE IS EXPRESSED IN MGD AND PRESSURE IN PSIG

A SUCCESSFUL GEOMETRIC VERIFICATION HAS BEEN COMPLETED

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD

THIS SYSTEM HAS 51 PIPES WITH 39 JUNCTIONS , 11 LOOPS AND 2 FGNS

THE RESULTS ARE OBTAINED AFTER 6 TRIALS WITH AN ACCURACY = 0.00469

THIS PROGRAM ADDS 2000' 16 INCH LINE FROM EMPIRE BOOSTER TO FOUR LANE HWY.
TANK STARTS 3/4 FULL. JAN 25, 1990 DATA=EMBV25.DAT OUTPUT=EMBV25.OUT

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
95	73	74	0.00	-0.36	0.00	0.00	-0.09	-0.05
96	75	74	0.07	10.25	0.00	0.12	0.56	0.46
104	93	92	0.01	0.00	0.00	0.00	0.02	0.00
106	82	172	-0.05	-0.01	0.00	0.00	-0.09	-0.01
107	81	75	-0.01	-0.01	0.00	0.00	-0.06	-0.01
108	86	171	-2.16	-7.53	0.00	-0.44	-2.40	-1.54
109	81	82	0.01	0.00	0.00	0.00	0.06	0.01
110	81	83	0.00	0.00	0.00	0.00	0.00	0.00
113	101	86	-1.08	-0.09	0.00	-0.05	-1.20	-0.43
114	101	86	-1.08	-0.09	0.00	-0.05	-1.20	-0.43
115	87	101	-2.16	-0.08	0.00	-0.08	-2.40	-1.54
117	90	89	-0.09	-1.20	0.00	-0.01	-0.39	-0.16
118	91	90	-0.09	-5.16	0.00	-0.01	-0.73	-0.75
119	138	88	-0.78	-1.16	0.00	-0.03	-1.53	-0.94

120	88	89	0.09	0.03	0.00	0.00	0.39	0.16
121	87	88	0.86	0.23	0.00	0.05	1.70	1.14
122	94	87	-1.23	-13.58	0.00	-0.29	-1.36	-0.54
123	143	92	0.11	1.94	0.00	0.00	0.51	0.27
LINE	124 IS	CLOSED						
125	131	99	-0.08	-0.03	0.00	0.00	-0.51	-0.38
126	98	100	-0.01	-0.37	0.00	0.00	-0.09	-0.02
127	97	98	-0.01	0.00	0.00	0.00	-0.03	0.00
128	99	92	-0.12	-0.27	0.00	0.00	-0.55	-0.32
130	95	96	1.50	0.54	0.00	0.33	2.95	3.17
131	95	94	-1.50	-28.53	0.00	-1.14	-1.66	-0.78
132	94	93	-0.48	-0.51	0.00	-0.03	-0.95	-0.38
186	136	137	0.05	2.07	0.00	0.01	0.89	1.72
187	135	136	0.00	0.01	0.00	0.00	0.03	0.00
188	100	135	-0.01	-0.02	0.00	0.00	-0.05	-0.01
189	134	135	0.01	0.00	0.00	0.00	0.08	0.01
190	133	134	0.01	0.00	0.00	0.00	0.04	0.00
191	133	134	0.01	0.00	0.00	0.00	0.04	0.00
192	136	131	-0.05	-0.25	0.00	0.00	-0.36	-0.21
193	132	131	-0.02	-0.23	0.00	0.00	-0.14	-0.04
194	132	133	0.01	0.00	0.00	0.00	0.08	0.01
195	100	132	-0.01	-0.03	0.00	0.00	-0.06	-0.01
196	138	90	0.11	0.01	0.00	0.01	0.47	0.24
197	139	91	0.15	0.11	0.00	0.04	1.20	1.87
198	140	142	0.00	0.00	0.00	0.00	0.03	0.00
199	141	143	-0.03	-0.01	0.00	0.00	-0.27	-0.12
200	142	91	-0.14	-2.58	0.00	0.00	-0.64	-0.42
201	143	142	-0.15	-2.18	0.00	0.00	-0.66	-0.44
202	139	138	-0.67	-4.90	0.00	-0.11	-1.32	-0.72
203	140	139	-0.52	-2.71	0.00	-0.02	-1.02	-0.44
204	141	140	-0.52	-2.18	0.00	-0.02	-1.02	-0.44
205	93	141	-0.55	-1.91	0.00	-0.02	-1.08	-0.49
246	75	171	2.16	2.32	0.00	0.38	2.40	1.16
249	175	174	2.30	0.04	0.00	0.30	2.54	1.72
250	174	75	2.30	0.04	0.00	0.05	2.54	1.72
251	75	172	0.05	0.00	0.00	0.00	0.09	0.01
252	0	175	2.30	0.17	0.00	0.25	2.54	1.72

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
73	0.00	218.41	10.00	90.31
74	0.07	218.77	10.00	90.47
75	0.00	229.14	10.00	94.96
81	0.00	229.12	10.00	94.95
82	0.06	229.12	10.00	94.95
83	0.00	229.12	10.00	94.95
86	0.00	218.47	10.00	90.34
87	0.07	218.17	10.00	90.21
88	0.00	217.90	10.00	90.09
89	0.00	217.86	10.00	90.07
90	0.10	216.72	10.00	89.58

91	0.10	211.55	10.00	87.34
92	0.00	204.85	10.00	84.43
93	0.06	204.85	10.00	84.43
94	0.21	204.31	10.00	84.20
95	0.00	174.64	10.00	71.35
96	1.50	173.78	10.00	70.97
97	0.01	203.92	10.00	84.03
98	0.00	203.92	10.00	84.03
99	0.06	204.57	10.00	84.32
100	0.00	204.28	10.00	84.19
101	0.00	218.33	10.00	90.28
131	0.00	204.54	10.00	84.30
132	0.00	204.31	10.00	84.20
133	0.00	204.31	10.00	84.20
134	0.00	204.30	10.00	84.20
135	0.00	204.30	10.00	84.20
136	0.00	204.29	10.00	84.19
137	0.05	202.22	10.00	83.29
138	0.00	216.71	10.00	89.57
139	0.00	211.70	10.00	87.40
140	0.00	208.97	10.00	86.22
141	0.00	206.78	10.00	85.27
142	0.00	208.97	10.00	86.22
143	0.00	206.79	10.00	85.28
171	0.00	226.44	10.00	93.79
172	0.00	229.14	10.00	94.96
174	0.00	229.23	10.00	95.00
175	0.00	229.57	10.00	95.15

THE NET SYSTEM DEMAND = 2.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
252	2.30

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2.30
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = 0.00

DEEP-DRAFT ACCESS TO THE PORTS OF NEW ORLEANS AND BATON ROUGE, LOUISIANA

FEASIBILITY STUDY

PREPARED BY

NEW ORLEANS DISTRICT, CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

PUBLIC VIEWS AND RESPONSES APPENDIX

Pertinent correspondence and the US Army Corps of Engineers responses to comments in the correspondence is presented in this appendix.

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
1720 Peachtree Road, N. W.
Atlanta, Georgia 30367

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1950

February 3, 1981

Colonel Thomas A. Sands
Department of the Army
Corps of Engineers
Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

We have reviewed the draft Environmental Impact Statement for the "Deep Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana," and offer the following comments for your consideration in the preparation of the final EIS.

As indicated by Table 14, page 48, there would be no direct loss and environmental impact on the natural levee forests, upland hardwoods, and agricultural lands for all alternative plans except alternatives 1 and 1B during the construction and maintenance phase of the projects. However, on page 78 it was indicated for the environmental alternative (Plan 3) and page 72 the preferred alternative (Plan 2B) that the natural levee forests, upland hardwood forests, and agricultural lands would not be directly affected by the implementation of the plans, but commercial development induced by them could result in the loss of portions of these habitat types. No mention was made in any of the alternative plans of forest type acreage estimates, the volume of timber, pulpwood, etc. affected, the value of wood and wood products from loss of forested acreage. Since in plans 2B and 3 there would be extensive impacts due to the increased river mileage affected (from New Orleans to Baton Rouge) it is conceivable that large acreages of forested and agricultural lands could be involved. 1.1 It would help the reviewer to determine the trade offs in the various alternative plans if numbers could be obtained to quantify the forestry and agricultural aspects of the various alternative plans.

We appreciate the opportunity to review this draft EIS and would like to obtain a copy of the final EIS when it is published.

Sincerely,

For: ROBERT D. RAISCH
Area Director

RESPONSE 1.1: Because the lower Mississippi River serves as a link between deep-draft ports throughout the world and the hinterland of the United States, development of the narrow industrial corridor along the Mississippi River between Baton Rouge, Louisiana, and the gulf is expected to continue "with" or "without" the recommended plan. The extent of project-induced development that would occur with the recommended plan is too speculative to quantify.

United States Department of Agriculture
Soil Conservation Service
3737 Government Street
Alexandria, LA 71301

March 4, 1981

2

Colonel Thomas A. Sands
District Engineer
Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

Re: LMNPD-RE
Draft EIS, Main Report and Appendixes, Deep-Draft Access to the Ports of New Orleans and Baton Rouge, LA

No response required.

As requested, we have reviewed the referenced reports. We recognize that the majority of the project actions are within the main channel of the Mississippi River and will have no impact on prime farmland. These reports are well prepared and we have no additional comments.

Sincerely,

Malcolm E. Simmons

Alton Mangum Acting
State Conservationist

cc: Norman Berg, Chief, SCS, Washington
Edward E. Thomas, Assistant Chief, SE, SCS, Washington, D.C.
Billy M. Johnson, Director, STSC, SCS, Fort Worth
Director, Environmental Services, SCS, Washington D.C.

The Soil Conservation Service is an agency of the Department of Agriculture

SCS-AS-1
10-79

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Policy
Washington, D.C. 20230

3

MAR 17 1981

Colonel Thomas A. Sands
New Orleans District
Corps of Engineers
U.S. Department of the Army
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

This is in reference to your draft environmental impact statement entitled, "Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana." The enclosed comments from the National Oceanic and Atmospheric Administration and the Maritime Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four copies of the final statement.

Sincerely,

Robert T. Miki

Robert T. Miki
Deputy Assistant Secretary for
Regulatory Policy (Acting)

Enclosure Memos from: Robert B. Rollins
National Ocean Survey
NOAA

D.R. Ekberg
National Marine Fisheries Service
NOAA

Kenneth W. Forbes
Office of Shipbuilding Costs
Maritime Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

FEB 1981

OA/C52x6:JVZ

TO: PP/EC - Thomas K. Bick

FROM: OA/C5 - Robert B. Rollins

SUBJECT: DEIS #8101.10 - Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

NOS has examined the tide and tidal current aspects of paragraphs 50 through 78 (Hydrology) and paragraphs 88 through 102 (Shoaling Characteristics) of Appendix A. The tide and tidal current information seems to be accurate and sufficiently adequate for the intended purposes of the project. This draft 3.1 environmental impact statement does not, however, consider the possible increased vulnerability of coastal residents and property to the effects of natural hazards (i.e., hurricanes) brought about by the proposed dredging.

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with a historic
tradition of service to the Nation

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

February 24, 1981 F/SER61/AM
893-3503

TO: PP/EC - Joyce Wood

FROM: F/SER6 - D. R. Ekberg

SUBJECT: Review of DEIS No. 8101.10 - Deep-Draft Access to the Ports of New Orleans and Baton Rouge, LA (CE)

The draft environmental impact statement for the Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, that accompanied your memorandum of January 23, 1981, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments:

3.2 The DEIS appears to present a generally sufficient assessment of the resources and what changes the several examined alternatives would cause. However, project effects of enlarging Southwest Pass are inadequately discussed. The discussion should detail the effect of increasing the cross-sectional area of the channel on the sediments available to build and nourish marshes in the delta area. We are concerned that increasing the discharge of sediment via Southwest Pass to the continental slope, would reduce the sediments available to Pass-a-Loutre, Octave Pass, Main Pass, Emaline Pass, Baptiste Collette Pass, Tiger Pass, and Grand Pass which discharge on the continental shelf and are providing the sediment to build and maintain the delta.

3.3 The FEIS should also evaluate and fully consider adoption of an alternative to the proposed plan, wherein no training works or spur dikes would be placed to reduce flows through Pass-a-Loutre. Instead, the redistribution of flows to Southwest Pass proposed by the Corps could still be accomplished by additional training works (spur dikes) being placed to greatly constrict South Pass which, like Southwest Pass, transports most of its sediment over the continental slope. This should result in more marsh building and renourishment than would result if flows were reduced through both Pass-a-Loutre and South Pass along with the enlargement of Southwest Pass.

Specific Comments:

1. SUMMARY

RESPONSE 3.1: Numerical and physical models have been used to study hurricane surges with frequencies from once in 100 years to once in about 1,000 years entering the river at mile 10 through 44 in conjunction with various river discharges from low flow to the project flood. The existing river levees above about mile 80 AHP are adequate for all conditions except the once in 1,000 year or greater hurricane occurring in conjunction with the project flood on the Mississippi River. Below mile 80 AHP hurricane surges would inundate developed areas from the gulfside or outside the river levees anyway. Except for the river crossings at miles 58 and 65, the natural depths of the river equal or exceed the 55-foot project depth from below Venice up to New Orleans, and the storm surge effect in the river above this reach is greatly reduced. In essence, the 55-foot channel depth would have no measurable effect on the hurricane surge in the Mississippi River because the natural depths in the river are greater than 55 feet.

RESPONSE 3.2: The problems dealing with sediment diversion are complex and could not be definitively answered until hydraulic model studies would be conducted in post-authorization studies. For the purposes of this study, we assume that the redistribution of 50 percent of the flows of South Pass to Southwest Pass would result in a similar redistribution of sediment.

RESPONSE 3.3: The training works included in the recommended plans were developed based on analytical designs and are subject to modification as a result of more detailed post-authorization studies. Hydraulic model studies of the recommended training works and alternatives thereto would be conducted at the Corps of Engineers Waterways Experiment Station to determine more definitively their effects on channel maintenance requirements and the environment. Alternative training works are now being developed by the Waterways Experiment Station. Model studies indicate these training works would result in the diversion of significant volumes of sediments to Pass a Loutre while retaining flows to Southwest Pass. The need for and/or the compatibility of the recommended training works would be assessed with respect to those alternative plans. The recommendations have been modified to direct the emphasis of post-authorization studies toward training measures that would effect the diversion of more sediments to the shallow water subdeltas; however, we cannot insure that such measures can be developed. The training measures included in the recommended plan will be retained and their cost and adverse environmental effects included in the study.

1.1 MAJOR CONCLUSIONS AND FINDINGS

Pages EIS-2 and 3, Paragraphs 1.1.2 and 1.1.4

3.4 The tentative selection of Plan 2B should be reevaluated in light of the more desirable river flow distribution that would result by implementing the modification to Plan 2B discussed in our General Comments.

4. ALTERNATIVES

4.3 PLANS CONSIDERED IN DETAIL

Pages EIS-16 and 17, Paragraphs 4.3.5 and 4.3.6

3.5 The modification to Plans 2 and 2B discussed in our General Comments should be "considered in detail" in this section.

TABLE 4.4 - COMPARATIVE IMPACTS OF ALTERNATIVES

Pages EIS-22 thru 25

3.6 In the sections on "Marshes", "Estuarine Water Bodies", and "Fisheries" unavailable or uncomputed habitat and monetary values should be denoted as "-HU" and "$-" to prevent confusion and misunderstanding. Entries of "0 HU" and "$0" in the DEIS suggest calculated values, with or without footnotes.

3.7 Also the discussion of impacts on "Marshes" and "Fisheries" by Alternatives 2 and 2B states they would "Insignificantly redistribute Mississippi River flows and sediment", whereas the discussion of Plan 2 on Page EIS-16 states that "Training works (spur dikes) would be provided in South Pass and Pass-a-Loutre to redistribute flows to Southwest Pass to reduce its maintenance." Enough redistribution to accomplish that objective would be more than "insignificant".

6. ENVIRONMENTAL EFFECTS

6.2 MARSHES

6.2.3 Plan 2.

Page EIS-55, Paragraph 6.2.3

3.8 The discussions of flow and sediment redistribution should include the decreases to the Pass-a-Loutre subdelta to be accomplished with the installation of the training works (spur dikes) in Pass-a-Loutre mentioned on Page EIS-16, paragraph 4.3.5. Since most of the subdelta is on the continental shelf it does not have the high ambient erosion rates the DEIS noted in the vicinity of South and Southwest Passes. The last sentence of Section 6.2.3 would apply to the modification of Plan 2 we are recommending be addressed as an additional alternative to be considered for the proposed plan.

RESPONSE 3.4: See response to comment 3.3 on page 6.

RESPONSE 3.5: See response to comment 3.3 on page 6.

RESPONSE 3.6: Appropriate revisions have been made in the final EIS on pages EIS-21 and EIS-22.

RESPONSE 3.7: Appropriate revisions have been made in the final EIS on pages EIS-21 and EIS-22.

RESPONSE 3.8: The purpose of the training works in Pass a Loutre is to stabilize the pass to prevent it from receiving a portion of the flows diverted from South Pass. No decrease in flows for the Pass a Loutre subdelta would be expected. See response to comment 3.3 on page 6.

3.9 This section should also discuss the impact that deepening and enlarging the river through Southwest Pass would have on flows and accompanying sediment now reaching the other subdeltas nourished by the distributaries enumerated in our General Comments.

6.4 ESTUARINE WATER BODIES

6.4.3 Plan 2.

Page EIS-57, Paragraphs 6.4.3

3.10 The last sentences of these sections incorrectly infer that the conversion of water bodies into marsh has similar adverse impacts to aquatic resources as the conversion of water bodies to uplands. The discussion should be sufficiently separated to portray a definite environmental preference of converting water bodies to marsh rather than uplands.

6.4.5 Plan 3.

3.11 Page EIS-57, Paragraph 6.4.5

See preceeding comment.

CLEARANCE: SIGNATURE AND DATE:

F/HP:RSmith 2/26/81

cc:
F/HP
F/SER612
F/SER613

RESPONSE 3.9: See response to comment 3.3 on page 6.

RESPONSE 3.10: The referenced paragraph has been appropriately revised on page EIS-50.

RESPONSE 3.11: The referenced paragraph has been appropriately revised on page EIS-50.

UNITED STATES DEPARTMENT OF COMMERCE
Maritime Administration
Washington, D.C. 20230

March 2, 1981

MEMORANDUM FOR: Mr. Bruce R. Barrett
Office of Regulatory Policy
Department of Commerce

Subject: Draft Environmental Impact Statement CN 8101.10 - Deep Draft Access to the Ports of New Orleans and Baton Rouge

In accordance with your memorandum of January 26, 1981, the Maritime Administration has reviewed the subject draft environmental impact statement and offers the following observations for your consideration.

The tentatively selected plan, 2B, would provide a 55 foot deep navigation channel for the Mississippi River from Baton Rouge to the sea via Southwest Pass. It appears to be responsive to present and expected general and dry bulk shipping needs in that area.

While the existing 40 foot channel can accommodate large cargo liners, it limits the population of bulk vessels which can transit fully laden. Based upon the reported composition of the world bulk carrier fleet at the beginning of 1980, 72 percent of the vessels in that fleet, most of them under 50,000 DWT in capacity, could operate safely in a 40 foot channel. With a 55 foot channel, 92 percent of them, including some in excess of 100,000 DWT, could operate safely.

The new channel would thus provide for larger individual bulk movements and should foster a significantly higher volume of export bulk trade, particularly in grain and coal. Collateral benefits should include opportunities for port and terminal development at Baton Rouge, New Orleans and other riverside points and for larger domestic shipments - both on the inland waterway system incident to foreign trade and in the coastwise and fertilizer trade.

3.12 With a 25 percent decrease in the width of the channel between Venice and New Orleans (750' vs 1000') and a 6 percent decrease in the Southwest Pass channel width (750' vs 800'), there will be

3.12 a need for careful shiphandling by the larger vessels expected to transit. Between New Orleans and Baton Rouge, however, the channel will be widened by 50 percent (750' vs 500'), which should lower the potential for traffic congestion.

The file copy is returned as requested.

Kenneth W. Forbes

KENNETH W. FORBES
Chief, Division of Environmental Activities
Office of Shipbuilding Costs

RESPONSE 3.12: The channel width is the minimum for safe navigation of a fully-loaded 51-foot ship in a 55-foot channel. The 750-foot width would be the controlling width only in Southwest Pass, immediately upstream of Southwest Pass in the river, and at approximately 15 crossings. In other areas, the channel is naturally wider than 750 feet. The minimal channel width is necessary to facilitate maintenance of the larger channel.

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

4

March 10, 1981 F/SER61/DM
893-3503

Colonel Thomas A. Sands
District Engineer, New Orleans District
Department of the Army, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

This is in response to your January 14, 1981, request for our views, comments, and/or recommendations on your December 1980 Draft Main Report (DMR:Vol. 1) and Technical Appendixes (DTA: Vol. 2) for Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana. The National Marine Fisheries Service comments on the Draft Environmental Impact Statement have been forwarded for inclusion in the comments being submitted by the Deputy Assistant Secretary of Commerce for Environmental Affairs. The plan you propose, 2B, the National Economic Development (NED) plan, generally incorporates sufficient environmental quality (EQ) objectives, with one exception, that of maintaining or even increasing the sediment nourishment of the active delta on the continental shelf.

In the discussion of Plan 2, which is identical to Plan 2B on the delta, the DMR on Pages 41 and 63 states that "Training works would be provided in South Pass and Pass a Loutre to redistribute flows to Southwest Pass to reduce its maintenance".

The Formulation, Evaluation and Assessment of Detailed Plans (Appendix B) states in Paragraph 119 on Page B-38 that "The effects of the dikes would be the diversion of approximately 50 percent of South Pass' flow to Southwest Pass, while maintaining the present flow to Pass a Loutre". After explaining how spur dikes would be installed along 3 miles of both South Pass and Pass a Loutre, the DTA states that, "The training works would effect a significant reduction in the maintenance of Southwest Pass". Table B-4 which follows on the same page, as well as Table 16 on Page 64 of the DMR, show the flows through Pass a Loutre, Main Pass, Baptiste Collette Bayou and Grand Pass to remain unchanged with installation of these training works in South Pass and Pass a Loutre, and Southwest Pass dredged 15 ft. deeper.

There are no calculations presented for the redistribution of sediment flows with implementation of the proposed plan or any of the alternatives. Since Southwest Pass would discharge over 40 percent of the Mississippi River water, 9 percent more than now, through a 15-ft. deeper channel, it appears that less sediment, especially the coarser grained sediment, would flow out the shallower passes (e.g., Pass a Loutre) onto the shelf. We note that the "Engineering Investigations" (Appendix C) states in Paragraph 30, Page C-14 that "The dikes in Pass a Loutre were added to stabilize its channel and prevent its capture of flows diverted from South Pass". Therefore, we believe that the Pass a Loutre subdelta would receive less sediment than now, since that pass would apparently be sufficiently constricted to prevent a greater percentage of Mississippi River water from passing through it. However, the great benefits to an increase of flows through Pass a Loutre have been documented in a discussion of Plans 3 and 3B on Page 78 of the DMR. It states that, "The increase of flows and sediments to the Main Pass subdelta should enhance marsh accretion in the area. This enhancement, coupled with increased flows and sediment to the Pass a Loutre subdelta, which is shallower and more conducive to sediment accretion than the remaining two passes should produce an overall benefit to the active delta".

It appears that some of these benefits which would be realized with implementation of the much more costly Plan 3, or 3B, could still be realized by a slight modification of the less costly Plan 2B you are proposing. We, therefore, recommend that the flows of South Pass, which discharge over the continental shelf, be further restricted from that proposed in Plans 2, or 2B, by installing additional and larger training works along a longer reach of the Pass, leaving only enough channel width for the oil field servicing and the fishing vessels which normally navigate this pass. In addition, if the proposed spur dikes in Pass a Loutre were either not installed or were redesigned to only accomplish stabilization of the channel some of the flows diverted from South Pass could flow through Pass a Loutre, thus ensuring that there will be no decrease and hopefully an increase in the quantity of sediments reaching the Pass a Loutre subdelta.

4.1

Sincerely yours,

D. R. Ekberg
Chief, Environmental and
Technical Services Division

RESPONSE 4.1: See response 3.3 on page 6.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333
(404) 262-6649

March 6, 1981

5

Colonel Thomas A. Sands
District Engineer
Corps of Engineers
U.S. Department of the Army
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

We have reviewed the Draft Main Report and Draft Environmental Impact Statement (EIS) for Deep Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana. We are responding on behalf of the Public Health Service.

5.1 No mention is made of either beneficial or adverse impacts of this project on local mosquito-borne disease problems. We are concerned that salt water from the Gulf will encroach into areas near Baton Rouge and enhance production of salt water mosquito species (e.g. Aedes sollicitans) in that area. This mosquito species is prolific, a long-range flyer, and creates enormous control problems in the New Orleans area. While Aedes sollicitans is primarily a pest, it has been incriminated on the eastern seaboard as a possible accessory vector of Eastern equine encephalitis, a very serious disease of both humans and horses.

5.2 Dredged material disposal sites create highly productive breeding areas for salt water mosquitoes. Such disposal sites cause intense mosquito problems for cities like Charleston, South Carolina, and Savannah, Georgia, as well as New Orleans. The Corps of Engineers now reimburses the city of Savannah for the costs of control of Aedes sollicitans produced on nearby dredged material disposal sites. The Final EIS should provide a description of present and anticipated mosquito problems in the project area. A statement should also be made concerning anticipated control measures including types, amounts, and application rates for insecticides that may be used.

5.3 The Draft EIS does not adequately describe potential noise problems associated with construction and maintenance activities, as well as increased vessel traffic. Present and anticipated noise levels should be provided.

5.4 We also have concerns about salt water intrusion in the Mississippi River that will result from this project. This intrusion will likely create problems for the municipal and industrial users of Mississippi River water, particularly during prolonged periods of low discharge. The Final EIS should provide a detailed discussion of anticipated problems.

Page 2 - Colonel Thomas A. Sands

Thank you for the opportunity of reviewing this Draft EIS. We would appreciate receiving a copy of the final statement when it is available.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

RESPONSE 5.1: Saltwater intrusion would not be expected to enhance production of saltwater mosquitoes in the Baton Rouge vicinity.

RESPONSE 5.2: The impacts of the Deep-Draft project on mosquitoes are discussed on page EIS-62. A discussion of mosquito problems is found on page A-58 of Appendix A. A discussion of control measures is on pages B-23, B-24, and B-48 of Appendix B.

RESPONSE 5.3: The construction and maintenance activities of the recommended plan would require the use of a number of dredges, sometimes on a near continuous basis, particularly in Southwest Pass. The noise associated with the increased dredging activity would be similar to noise associated with present maintenance dredging activities. The difference in noise levels would be due primarily to an increase in the duration of dredging activities associated with the recommended plan. Within the Baton Rouge to Venice reach of the project, any increase in noise impacts on municipalities and individuals would be attenuated by the Mississippi River flood protection levee which averages 15 feet above ground elevation. In the reach of the project below Venice, where population levels are extremely low, noise impacts on humans would be negligible. Impacts of increased dredging activities in this reach would not adversely impact the Delta-Breton National Wildlife Refuge because the majority of the dredging would occur during the spring, summer and early fall when waterfowl usage is limited. The L_{dn}55dB level for the protection of outdoor activities from interference and annoyance, as established by the US Environmental Protection Agency, would not be exceeded with the recommended plan. Vessel traffic, and the noise associated therewith, should not increase as a result of the proposed project. The movement of oceangoing cargo through the study area in larger ships should result in a decrease in vessel traffic and a resultant decrease in overall noise levels.

RESPONSE 5.4: Information on the extent and impacts of increased saltwater intrusion, as a result of the implementation of the recommended plan, is contained in the environmental impact statement and in more detail, in the report appendixes. See pages EIS-26, EIS-72, and EIS-73, pages C-21 and C-34 of Appendix C and page F-39 of Appendix F.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FORT WORTH REGIONAL OFFICE
221 WEST LANCASTER AVENUE
P.O. BOX 2905
FORT WORTH, TEXAS 76113

REGION VI

6

IN REPLY REFER TO:

February 27, 1981

Colonel Thomas A. Sands
District Engineer
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

The Draft Environmental Impact Statement for The Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, has been reviewed in the Department of Housing and Urban Development's New Orleans Area Office and Fort Worth Regional Office, and the following comments are applicable.

6.1
1. Planned improvement in navigation control measures would appear necessary with larger ships in the river, if increased ship collision, loss of life and bridge structural damage are to be avoided. Recent bridge access interruptions have brought about major transportation problems and mid-stream accidents have been excessive.

6.2
2. Suspended heavy-metals, phenols, pesticides and other toxic material dredged from the river bottom apparently will enter the City's potable water system intake in relatively large amounts, unless there are preventative means. It is recommended this situation be developed further in the final statement.

HUD does not oppose the project.

Sincerely,

Victor J. Hancock
Victor J. Hancock
Environmental Clearance Officer

RESPONSE 6.1: Additional aids to navigation have been included in the recommended plan to facilitate navigation of the deeper-draft ships which would move over the enlarged channel in the Mississippi River. The increased safety hazard caused by the larger ships would be offset, to some extent, by the reduction in the number of vessel trips resulting from the movement of an increasing amount of the oceangoing commerce in the larger vessels.

RESPONSE 6.2: Although the water quality studies are not yet complete (the Section 404(b)(1) Evaluation and Ocean Dumping Assessment are scheduled during Phase I AE&D) toxicant levels have been shown to drop considerably within small distances from the dredge. Dredging effluent would be a minimum of a half river's width from any intake structure, a distance which would allow most contaminants to fall to deeper levels than municipal intake structures.

AREA OFFICES
DALLAS, TEXAS · LITTLE ROCK, ARKANSAS · NEW ORLEANS, LOUISIANA · OKLAHOMA CITY, OKLAHOMA · SAN ANTONIO, TEXAS

United States Department of the Interior

OFFICE OF THE SECRETARY
SOUTHWEST REGION
POST OFFICE BOX 2088
ALBUQUERQUE, NEW MEXICO 87103

7

ER-81/71

MAR 11 1981

Colonel, Thomas A. Sands
District Engineer
New Orleans District, Corps
of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

We have reviewed the Draft Environmental Impact Statement, Main Report, and Appendixes for Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, and have the following general and specific comments.

General Comments

In general, the documents adequately describe the existing fish and wildlife resources of the project area and the impacts of the proposed project on these resources. However, they do not adequately discuss project-induced development and the effects of this potential secondary development on fish and wildlife resources. We agree with the statement of the serious problem regarding the loss of coastal marshes throughout the study area. Our Fish and Wildlife Service (FWS) agrees that opportunities exist to partially mitigate these marsh losses by redistribution of Mississippi River flows and sediments to existing marsh and shallow water areas and by creation of marsh with dredged materials. However, additional measures for reducing wetland loss do exist and should be discussed further in the documents.

We believe the documents can be improved in their coverage of impacts to both cultural resources and mineral resources.

Specific Comments

Main Report

7.1 Page 50, paragraph 1 - It is noted that each of the plans considered would result in induced development along the river in the study area. Recent reports indicate that significant new developments may occur with improved navigational access. Preliminary plans for a 400-acre coal storage site west of Southwest Pass, in wetlands, were discussed in a report[1] prepared

[1]/U.S. Department of Energy. 1980. Overview of United States Coal Export Terminals. Prepared by Soros Associates, under Contract No. AP01-80-1A10066, for Assistant Secretary for International Affairs, Washington, D.C.

7.1 for the U.S. Department of Energy. Another document[2] included a discussion of several new coal terminals which are to be located in the study area. Also, at the public hearing for this project held in New Orleans on January 28, 1981, several parties indicated their interest in developing port facilities in the study area. We believe that a thorough discussion of these and other potential project-related developments and their effects on the fish and wildlife resources of the study area should be included in both the final report and environmental impact statement (EIS).

7.2 Page 70, paragraph 2 - Our FWS is pleased that plans call for the creation of an interagency dredged material disposal advisory group to monitor the overbank disposal of dredged material and make recommendations for optimizing benefits from placement of dredged material. It is recommended that this paragraph be revised to include language to the effect that this advisory group will be provided draft plans and specifications for upcoming maintenance dredging contracts, and that technically feasible recommendations developed by that group will be included in final dredging contracts.

Environmental Impact Statement

7.3 The EIS should include a survey report, evaluation of the cultural resources, and identification of the potential impacts to the cultural resources. Coordination with the State Historic Preservation Office, and with appropriate federal agencies such as the National Register of Historic Places Office, and the Advisory Council on Historic Preservation should also be documented. Recognition that shipwrecks may be on the river bottom and that a sufficient level of analysis, prehistoric, terrestrial, and underwater sites should be addressed in this survey report. Primary and secondary areas of impact should be discussed with reference to dredge, disposal, and other construction activities. The Historic Sites Act of 1935 (particularly for National Natural Landmarks), E.O. 11593, and the Archaeological and Resources Protection Act should be cited on page 5 of the EIS.

Mineral resources in the parishes bordering the Mississippi River below Baton Rouge are discussed briefly in the EIS (pp. EIS-48-49) and, indirectly, in other parts of the report describing the economy of the region. We would emphasize that this region is indeed a major mineral-producing and mineral-processing center. Besides the many oil and gas fields, extensive petroleum and petrochemical facilities are present. Additional mineral resources that are not mentioned include clays and shell. Moreover, cement and lime are produced in New Orleans, crude barite is ground for use in drilling mud at three plants in the city, and crude perlite and vermiculite also are processed there; imported ores or intermediate products of aluminum and nickel are processed at refineries near Baton Rouge and New Orleans as well.

Even more significantly, the bulk of waterborne freight in the project area comprises mineral raw materials and products. (See tables 2-5 in the main report.) Thus, on one hand, the mineral industry would be the prime beneficiary

[2]/Haar, H.R. (Associate Port Director, Port of New Orleans, Louisiana). 1980. Gulf Coast Port Facilities: Challenges. Prepared remarks for Energy Bureau, Inc., Conference on Coal Exports: The booming new market place, December 15-16, 1980, Washington, D.C.

RESPONSE 7.1: Although significant development is expected to occur along the lower Mississippi River between Baton Rouge and the gulf, most of the development would occur with or without the recommended plan. The continued development of the area is insured by the availability of industrial sites with deep-draft navigation access and an abundant freshwater supply and, in particular, by the area's role as a deep-draft navigation link between the extensive Mississippi River and tributaries inland navigation system and other ports throughout the world. The 400-acre coal storage facility along Southwest Pass, discussed in the referenced US Department of Energy report, would be a "without-project" facility as it would provide for the transfer of coal from barges in the pass to a deep-draft loading facility offshore and therefore would not require the larger project channels included in the recommended plan. Coal facilities along the lower Mississippi River are being expanded and a number of new coal facilities are in the planning stage, although a Federal project has not been authorized. In summary, substantial development along the lower Mississippi River can be expected to continue with or without the recommended plan, and any quantitative estimates of induced development would be highly speculative.

RESPONSE 7.2: The referenced paragraph on page 79 in the main report has been revised as recommended.

RESPONSE 7.3: The New Orleans District recognizes that shipwrecks might be located in the study area and that there would be problems associated with locating and identifying these remains. On 5 March 1981, representatives of the New Orleans District met with Mr. Robert DeBlieux, State Historic Preservation Officer, and Ms. Jane King, Advisory Council on Historic Preservation, to discuss this project. Remote sensing investigations are under study for select project impact areas. The results of these investigations would be coordinated with the State Historic Preservation Officer. The Federal policies noted in your comment have been cited in the final EIS on page EIS-5.

of any plan to improve navigation on the lower Mississippi River. On the other hand, the project would have adverse effects on mineral resources and production facilities; these impacts are discussed in the EIS, but this assessment of impact is inadequate, although four of the alternative plans considered in detail in the report would have no adverse impact on minerals, plans 2 and 2B (the plan tentatively selected by the Corps) would adversely affect minerals (pp. EIS-31 and EIS-76). According to table 4.4 - Comparative impacts of alternatives, plans 2 and 2B "could hinder the extracting of crude oil and gas along Southwest Pass." However, sections 6.14.3 and 6.14.4 state categorically that plans 2 and 2B ". . . would hinder the extraction of crude oil and natural gas from the fields along Southwest Pass . . ." (Emphasis added.)

One cannot tell from the EIS whether the adverse impact on mineral resources and production operations would be great or small. Several oil and/or gas fields lie astride or adjacent to Southwest Pass, and at many other places along the river below Baton Rouge. It would appear that the proposed plan may affect production of these resources substantially, especially during the construction period.

7.4 Therefore, we recommend that the type, magnitude, and significance of adverse impacts on mineral resources be described more precisely in table 4.4 and in sections 6.14.3 and 6.14.4 of the EIS. Only then will readers and decision-makers be able to weigh the impacts of the project on minerals and other resources in a balanced manner. How many marginal wells could be shut in, for example, and how much oil and gas production might be lost or deferred because of the project? Is increased shoaling in access canals to producing wells a serious problem? Would project lands be available for mineral lease or production during or after construction? Would existing mineral leases or permits be affected? The answers to these and related questions should be addressed.

Summary Comments

A recent study conducted for our FWS and Bureau of Land Management revealed a reduction of approximately 464,500 acres of coastal marsh in the Mississippi Deltaic Plain region of Louisiana during the period of 1955-56 to 1978. The results of this study also indicated a reduction of approximately 67,000 acres of marsh in the active delta of the Mississippi River between 1956 and 1978. Similar habitat changes have been noted on Delta National Wildlife Refuge located within the Mississippi Delta region. The major impacts of the proposed Deep Draft project would occur in this region.

7.5 In view of these considerations, maximum use should be made of opportunities to retard wetland deterioration and to build additional marsh. The Corps of Engineers, through its Waterways Experiment Station, has developed a plan for the existing navigation channel that would redistribute flow and sediments from Southwest Pass to Pass a Loutre and Main Pass in order to reduce maintenance dredging in Southwest Pass. This plan would include channel training works, channel realignment and a lateral dike system, and has the potential for marsh creation on Delta National Wildlife Refuge and Pass a Loutre Wildlife Management Area, as it would result in the diversion of marsh building sediments to the shallow open waters along Pass a Loutre and Main Pass. The recommended plan includes features that will have net positive effect on the

7.5 *fish and wildlife resources in the Mississippi Delta region. However, our FWS recommends that this plan be further modified to result in the creation of additional marsh. This could be accomplished by use of channel training works, channel realignment, the lateral dike system previously discussed, and by the closure of or installation of a lock on South Pass. Presently, much of the sediment carried down South Pass is deposited in the deeper water of the Gulf of Mexico, where no marsh building occurs. Diverting additional sediment flow from South Pass to other passes such as Pass a Loutre and Main Pass would increase deltaic marsh-building potential.*

Our FWS is presently preparing a final Fish and Wildlife Coordination Act Report for this study. It is anticipated that the final report will include recommendations for those additional marsh creation features identified above.

We appreciate the opportunity to comment on these documents.

Sincerely,

Raymond P. Churan

Raymond P. Churan
Regional Environmental Officer

RESPONSE 7.4: The construction of the recommended plan would require the relocation of approximately 64 submarine oil and gas pipelines crossing the Mississippi River and Southwest Pass and would adversely impact oil and gas production along Southwest Pass. The cost of relocating the oil and gas pipelines would total approximately $100 million and would be borne by the pipeline owner. The increased deposition of dredged material along Southwest Pass would impact on production operations due to increased shoaling in access channels and due to damage to older collection pipelines resulting from the increased overburden of dredged material. One marginal operation producing less than 10,000 barrels of crude petroleum a day could be shut down as a result of the recommended plan. The enlarged disposal areas required for the 55-foot channel would encompass lands available for and/or experiencing, mineral lease or production. This situation should prevail throughout the project life, subject to the adverse impacts discussed herein. These adverse impacts to production facilities cannot be quantified because many would occur without the project as dredged material is deposited farther and farther from the channel.

RESPONSE 7.5: See response to comment 3.3 on page 6.

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDER (dpl)
EIGHTH COAST GUARD DISTRICT
HALE BOGGS FEDERAL BLDG.
500 CAMP ST.
NEW ORLEANS, LA. 70130
(504) 589-2961

16475 8

MAR 13 1981

From: Commander, Eighth Coast Guard District
To: District Engineer, New Orleans District, Corps of Engineers (LMNPD-RE)

Subj: DEIS, Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana; comments concerning

1. We have reviewed the draft environmental impact statement for enlarging the Mississippi River channel from the river mouth to Baton Rouge. Completing this project will impact on two Coast Guard programs: Aids to Navigation (ATON) and Port Safety. Because of the limited time available for review, detailed cost figures and system requirements have not been determined; however, my best estimates are provided.

8.1 2. Channel enlargement will necessitate establishing several new aids to navigation. We have identified the need to establish new ranges, emergency back-up lights, and low water buoys. The exact requirements will be difficult to address until such time as the dredging cuts or channels have been designed. I estimate that minimum ATON improvements would cost $370,000 (FY81 dollars).

3. A deepened river channel is anticipated to attract larger vessels; the current practice of light-loading will probably be discontinued; an increase in the movement of coal by barge can also be anticipated. These more congested conditions involving larger, less maneuverable vessels may require increased vessel traffic management efforts and surveillance capability. The New Orleans Captain of the Port and Vessel Traffic Service have identified 13 points along the river where channel width and/or a sharp bend may require additional surveillance equipment. Providing this capability would require approximately $20 million (FY81 dollars).

4. A study is currently being conducted by Louisiana State University, Center for Wetland Resources. The results of this "Lower Mississippi Safety Study" are due in June 1981 and may recommend changes to VTS operations. This is a more in-depth, site specific study than has previously been undertaken of this area and could significantly influence our operational and monetary requirements stated above.

5. We appreciate this opportunity to comment on the possible impact of the 55' channel project on Coast Guard programs. My Planning Officer is prepared to coordinate with you as the project progresses; for additional information, please contact him at 589-2961.

P.A. YOST

Copy: Commandant (G-WS-1)

RESPONSE 8.1: The aids to navigation and other navigation facilities recommended by the US Coast Guard have been included in the recommended plan.

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
P. O. BOX 3929
BATON ROUGE, LOUISIANA 70821

REGION 6

January 30, 1981

9

IN REPLY REFER TO

Deep-Draft Access to the Ports of
New Orleans and Baton Rouge, Louisiana

Colonel Thomas A. Sands
District Engineer
Corps of Engineer
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

Your January 14, 1981, letter requested comments on the subject DEIS.

The document indicates that alternates 1 and 1B would have a major effect on existing bridges and that the tentatively selected plan 2B would not have an effect on surface transportation facilities. It would be preferable from our viewpoint for the selected plan to have the least impact on surface transportation facilities as is possible.

Thank you for providing an opportunity to comment.

Sincerely yours,

for: J. R. Stevens

J. N. McDonald
Division Administrator

No response required.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
~~WASHINGTON, D.C. 20590~~
819 Taylor Street - Room 11A23
Fort Worth, Texas 76102

10

January 22, 1981

Col. Thomas A. Sands, CE
District Engineer
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

We have no comments on the "Draft Main Report and Draft Environmental Impact Statement, Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana"; however, we request that you include the affected railroads in the study area in any solicitation of views.

10.1

Sincerely,

Dr. Jeremy J. Coleman, P.E.
Regional Director of
Federal Assistance

RESPONSE 10.1: All identified railroads in the study area were furnished a copy of the notice of the 28 January 1981 public meeting which included a notice of availability of the draft report and draft environmental impact statement.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

11

March 6, 1981

Colonel Thomas A. Sands
New Orleans District Engineer
U.S. Army Corps of Engineers
P.O. Box 60297
New Orleans, Louisiana 70160

Dear Colonel Sands:

We have completed our review of the Draft Environmental Impact Statement (EIS) and Main Report on the proposed construction and maintenance of the Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Navigation Project. The purpose of this project is to accommodate the progressive increase in the volume of oceangoing commerce through the Ports of New Orleans and Baton Rouge and the worldwide trend toward using larger oceangoing vessels, with correspondingly deeper drafts to achieve their inherent economics of scale. The present restrictions imposed by the existing deep-draft approaches to these ports prevents the efficient utilization by the increasing percentage of ships that must move over their approach partially loaded.

The Corps analyzed various solutions to the problems and needs relating to deep-draft access. Seven Plans with alternatives were developed to resolve the navigation issue; however, three Plans were finally selected for comparison following careful screening.

Plan 1, consisting of Alternatives 1 and 1B, provides for an enlarged deep-draft navigation approach to the New Orleans and Baton Rouge reach of the Mississippi River via the Mississippi River-Gulf Outlet.

Plan 2, consisting of Alternatives 2 and 2B, provides for a deep-draft approach via the Southwest Pass of the Mississippi River. The Mississippi River-Gulf Outlet would not be affected by this Plan.

Plan 3, consisting of Alternatives 3 and 3B, provides for a deep-draft approach similar to Plan 2; however, the navigation route would be via the Mississippi River through the South Pass. A lock would be constructed at the head water of South Pass creating a tide water channel to the Gulf of Mexico. The lock would reduce the frequency of salt water intrusion into the Mississippi River.

The EIS and Main Report conclude that provisions for a larger deep-draft approach to the referenced ports are warranted. The existing ship channel in the Mississippi River via Southwest Pass, Alternative 2B, is the tentatively selected route for providing these enlarged approaches.

Specific features of the tentatively selected Alternative are as follows:

a. Enlargement of the 40-foot project depth channel in the Mississippi River between Baton Rouge, Louisiana, and Head of Passes to a project depth of 55 feet;

b. Enlargement of the 40-foot project depth channel in Southwest Pass between Head of Passes and the Gulf of Mexico to a project depth of 55 feet;

c. Construction of a turning basin 1,600 feet wide, 4,000 feet long, and 55 feet deep at the upstream end of the enlarged channel in Baton Rouge, Louisiana; and

d. Construction of training works, consisting of systems of spur dikes in South Pass and Pass a Loutre to divert more flows to Southwest Pass to reduce its maintenance dredging requirements.

Implementation of any three of the Plans would accrue for the United States annual navigation benefits ranging from an estimated 881 to 885 million dollars. These benefits would provide a benefit-to-cost ratio ranging from 5.6 to 8.5 with average annual net access benefits-over-costs starting at 724 up to 787 million dollars per year.

With Plans 2 or 3, all dredged material would be deposited in the Mississippi River except near the River's mouth where the material would be used to create marsh and upland habitat in areas experiencing significant loss of marsh due to erosion and subsidence. Both Plans would comply with the environmental quality objectives, as an estimated 11,600 to 15,000 acres of freshwater marsh and nesting sites for water fowl would be created by carefully selected deposition of the dredged material.

The following comments are offered for your consideration in the preparation of the Final EIS:

Alternative Analysis

In reference to the three Plans evaluated in the Draft EIS, we recognize that Alternative 2B of Plan 2 has been tentatively selected by the Corps. Alternative 2B was recommended to the District by the U.S. Fish and Wildlife Service in its Fish and Wildlife Coordination Act Report. However, one of our main concerns with any of the Plans for this deep-draft project is the effects they would have on the increase in saltwater intrusion potential up the Mississippi River.

Alternative 2B is shown to cause an increase in the frequency and duration of saltwater intrusion. Although the EIS explains that the impacts to public water supplies would be insignificant and short-term, Alternative 3B of Plan 3 would not provide for the potential of a saltwater intrusion problem since a lock would be provided at the head of South Pass to control both fresh and saltwater inflows. Furthermore, Alternative 3B would not only significantly benefit the creation of marsh, but would also benefit estuarine and freshwater marsh by the redistribution of sediment through improved water circulation. This would allow for sub-deltas to be created at Main Pass and Pass a Loutre, further enhancing marsh accretion.

11.1 Our agency recognizes that Alternative 2B is identified in the EIS to meet the overall environmental quality objectives of the proposed project. However, in view of the extra wetland and water quality benefits and reduced saltwater intrusion potential, we would favor Alternative 3B over the Corp's tentatively selected alternative. Alternative 3B is identified as the Environmental Quality Plan, and we believe it would provide for the best assurance of a environmentally sound project.

Section 404 Analysis

We have evaluated the Draft EIS with regard to the associated dredge and fill activity. Since the Corps has not completed the Section 404 (b)(1) evaluation, our agency cannot provide more specific comment on this area. We have been working with the New Orleans office on the disposal plans and strongly approve and support the marsh creation concept. The specific details of the marsh creation plan have not been completely developed. You can be assured that EPA will be cooperative in continuing the work towards finalization of the disposal plans.

Air Quality

The Draft EIS does not provide sufficient analysis and impact evaluation regarding the potential primary and secondary air quality impacts that may occur as a result of the proposed navigation project. The Final EIS should recognize that both Baton Rouge and New Orleans, Louisiana, have been designated as non-attainment areas for ozone. The State Implementation Plan (SIP) submitted in 1979 contains a demonstration showing that attainment will be achieved by 1982. The demonstration, however, contained little or no margin for error in calculating the emission reductions that would be obtained by the attainment date. Therefore, it is believed that a revised SIP may be required once the 1982 data is analyzed. In 1982, EPA will require State SIP's to identify the emissions associated with Federal actions. To enable Louisiana to fulfill this requirement, the information listed below should be included in the Final EIS:

11.2 a. Identification and quantification of the pollutants which will result directly from the project and from increased shipping, if any.

11.3 b. Identification of the measures that will be implemented to control the pollutants identified in a. above.

RESPONSE 11.1: We agree that plan 3B is the most desirable plan from an environmental standpoint. The recommended plan provides the most desirable mix of economic and environmental features, and we feel it is the most desirable from an overall standpoint. The economic benefits of an open navigation channel were judged to outweigh the environmental advantages of plan 3B.

RESPONSE 11.2: Construction and maintenance of the project would be accomplished with hydraulic dredges and hopper dredges. Smoke, particulate, and oxide of nitrogen emissions would result from project implementation. The quantification of pollutants resulting directly from the project has not been accomplished. The recommended plan would not be expected to significantly affect total tonnage moving on the river; however, the average volume of commerce per vessel trip would increase. Therefore, if there is an effect on ships, it should be to decrease the number of passages as the larger ships are more fully loaded. This would result in a decrease in air emissions.

RESPONSE 11.3: Because vessel numbers would decrease over the project life, implementation of pollutant control measures would not appear necessary.

11.4 Finally, analysis of the effects of these emissions on the existing air quality should be considered and evaluated in the Final EIS.

Noise Impacts

11.5 The analysis of noise quality impacts needs to be strengthened in the Final EIS. The anticipated noise levels for the alternatives considered should be identified. The Final EIS should identify unique places such as residences and/or wildlife refuges where noise levels must be minimized. Any applicable noise standards and/or criteria for the affected areas should be identified. With this information, the microscale impact, by predicting anticipated noise levels for each alternative, should be determined and compared with existing levels and applicable standards or criteria. If noise standards or criteria are to be exceeded, sufficient discussion to identify feasible noise abatement methods to lessen impacts should be addressed and implemented.

We classify your Draft EIS and Main Report as ER-2. Specifically, EPA is expressing environmental reservations regarding the primary and secondary impacts relating to air, noise, and water quality and requests that additional information and/or clarification be provided in these areas. Also, we have severe concerns over the potential adverse impacts of salt water intrusion on the drinking water supplies within the New Orleans area. Region 6 asks that more consideration be given to the final selection of the alternatives evaluated and to our recommendation regarding Alternative 3B. Our classification will be published in the Federal Register according to our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the enclosure. Our procedure is to categorize the EIS on both the environmental consequences of the proposed action and on the adequacy of the EIS at the draft stage whenever possible.

We appreciated the opportunity to review the Draft EIS. Please send our office five (5) copies of the Final EIS at the same time it is sent to the Office of Federal Activities, U.S. Environmental Protection Agency, Washington, D.C.

Sincerely,

Fran Phillips

for Adlene Harrison
Regional Administrator

Enclosure

RESPONSE 11.4: Based on projections of less vessel traffic with the project than without the project, it would seem that adverse air quality impacts associated with vessel traffic would be reduced.

RESPONSE 11.5: See response to comment 5.3 on page 12.

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON 20426

IN REPLY REFER TO:

MAR 12 1981

Mr. Thomas A. Sands
U.S. Department of the Army
Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Sands:

We appreciate the opportunity to review and comment on the draft environmental impact statement (DEIS), Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana. The Office of Pipeline and Producer Regulation (OPPR) of the Federal Energy Regulatory Commission offers the following comments.

12.1 (1) The DEIS states on page A-70 that "there are numerous . . . oil and gas pipelines crossing the Mississippi River-Gulf Outlet and the Mississippi River." Some of these pipelines include major interstate natural gas pipelines owned by such companies as Southern Natural Gas Company, Tennessee Gas Pipeline Company, Transcontinental Gas Pipeline Company, and United Gas Pipe Line Company. These pipelines and companies are under FERC jurisdiction. In order to assure that the dredging and disposal operations would not interfere with the continued operation of these natural gas pipeline facilities, we recommend that the Corps contact these companies to determine the exact locations of the pipeline river crossings.

12.2 (2) The DEIS does not indicate how many of these interstate natural gas pipelines may require relocation in order to accommodate the proposed 55-foot deep channel. In addition, the DEIS does not discuss the specific impact and costs resulting from the relocation and/or replacement of a pipeline if it is

12.2 required. These matters should be fully discussed in the final environmental impact statement.

We hope that our comments will be helpful to you in preparing the final environmental impact statement.

Very truly yours,

Kenneth A. Williams, Director
Office of Pipeline and Producer Regulation

RESPONSE 12.1: Because permits must be obtained from the Corps of Engineers for a pipeline across the Mississippi River, we have adequate information on the location of all submarine pipeline and cable crossings. If a Federal project is authorized, coordination would be established with pipeline owners early in post-authorization studies.

RESPONSE 12.2: The number of pipelines and cables which would require relocation with each plan is included in the description of the plan in the main report, Volume I. The number of pipelines which would be relocated with the recommended plan, plan 2B, is discussed on pages 71 and 80 of the main report. The environmental impacts of the pipeline relocations are discussed in the environmental impact statement, on pages EIS-25, EIS-69, and EIS-70 in Volume I. Cost estimates of the pipeline relocations are included in table E-6, on page E-9 of Appendix E, Volume III.

STATE OF LOUISIANA
DEPARTMENT OF CULTURE, RECREATION AND TOURISM
OFFICE OF PROGRAM DEVELOPMENT

DAVID C. TREEN
Governor

ROBERT B. DeBLIEUX
Assistant Secretary

MRS. LAWRENCE H. FOX
Secretary

13

March 11, 1981

Colonel Thomas A. Sands, CE
District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Re: LMNPD-RE
Draft EIS on Deep-Draft Access to the
Ports of New Orleans and Baton Rouge, Louisiana

Dear Colonel Sands:

My staff has reviewed the above referenced draft environmental impact statement. We concur with the cultural resources evaluation presented in the report, and feel that these resources will be adequately taken into consideration in the development of this project. We will be looking forward to working with you on your inventory and evaluation of cultural resources within the project area.

No response required.

If we may be of assistance to you, please feel free to contact us.

Sincerely,

Robert B. DeBlieux
State Historic Preservation Officer

RBD:GHM:bb

DIVISION OF ARCHAEOLOGY AND HISTORIC PRESERVATION
P. O. Box 44247 Baton Rouge, La. 70804 504 342-6682

State of Louisiana
DEPARTMENT OF HEALTH AND HUMAN RESOURCES
OFFICE OF HEALTH SERVICES AND ENVIRONMENTAL QUALITY
P. O. BOX 60630
NEW ORLEANS, LOUISIANA 70160

DAVID C. TREEN
GOVERNOR

GEORGE A. FISCHER
SECRETARY

14

March 12, 1981

Colonel Thomas Sands
U.S. Army Corps of Engineers
New Orleans District Office
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Colonel Sands:

A copy of your letter of January 14, 1981 and the enclosed report on Deep Draft Access to the Ports of New Orleans and Baton Rouge was forwarded to this office. We note therein the request for comments and/or recommendation thereon by March 15, 1981.

The problem of salt water intrusion during periods of low river flow, causing increased salinity in the drinking water supplies using the Mississippi as a source, is one of considerable health significance. The greatest problems are experienced at the water plants in Boothville and Empire, but water supplies in the New Orleans area have had salinity problems on several occasions.

Deepening the navigation channel can only make salt water intrusion more severe unless the project includes some system to prevent increased salt water migration. The report does explain the probable increased upriver penetration of the "salt water wedge", and attempts to forecast river surface salinities, but does not fully explain what effect increased upriver penetration of the wedge will have on the drinking water supplies. Specifically, the effect on drinking water supplies of the mixing action of present and increased navigation and the mixing action (turbulence) caused by high capacity water plant intakes, has not been explained.

14.1 It is therefore recommended that the study be expanded to include a more comprehensive analysis of the impact on potable water supplies and to include facilities or systems to prevent or restrict the intrusion of salt water to the vicinity of the water works intakes.

Very truly yours,

James F. Coerver, Director
Division of Environmental Services

JFC:ls

cc: Board of Commissioners
Port of New Orleans

RESPONSE 14.1: See response to comment 5.4 on page 12.

15

State of Louisiana

FRANK A. ASHBY, JR.
SECRETARY

JAMES M. HUTCHISON
DEPUTY SECRETARY

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF STATE LANDS

MICHAEL BOURGEOIS
DIRECTOR

March 17, 1981

Colonel Thomas A. Sands
District Engineer
Department of the Army
New Orleans District
Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

RE: Response to the Draft Environmental Impact Statement, (DEIS), Main Report, and Appendixes for the construction and maintenance of the navigation project, Deep-Draft Access to the ports of New Orleans, and Baton Rouge, Louisiana.

Dear Colonel Sands:

Thank you for the opportunity to provide comments on the above DEIS. These comments are not to be construed as the state of Louisiana comments on the final plan. According to Section 307(c) of the Federal Coastal Zone Management Act of 1972 as amended:

"any federal agency which shall undertake any development project in the coastal zone of a state shall ensure that the project is, to the maximum extent practicable, consistent with approved state management programs."

When the final plans are submitted for review the state will then make its comments pursuant to the consistency review section.

Now, we have several comments on the DEIS we would like to submit for your consideration.

Recent reports have documented that Louisiana's coastal area is losing 39.4 square miles per year and two parishes, Plaquemines and St. Bernard, have sustained some of the highest land losses in the past twenty years. We are pleased, then, to see that the Corps recognizes in this proposal the opportunities to "...partially mitigate these marsh losses by redistribution of Mississippi River flows and sediments to existing marsh areas and shallow water areas, and by creation of marsh with dredged materials."

POST OFFICE BOX 44124, BATON ROUGE, LOUISIANA 70804
NATURAL RESOURCES BUILDING

15.1 We agree with those most favored alternatives because of the positive contribution they make to marsh creation through the disposition of dredged material and the increase in flows and accompanying sediment. We are, however, concerned that the DEIS does not address possible contaminants in the dredged material. The possible environmental impacts that may result from disposing of this material should be evaluated.

15.2 A much broader concern of ours arises out of a potential conflict between the Corps efforts to enhance navigation and state efforts to more generally address the problem of marsh deterioration. Studies recently completed indicate that the diversion of freshwater from the Mississippi into the wetlands represents a feasible means of creating marsh in areas where we are now experiencing rapid loss. Our specific concerns in this light have to do with the impact of channel deepening on the operation of freshwater diversions, particularly during months of low water stages. We would like to see this impact addressed in the DEIS and are willing to cooperate with the Corps in discussing details of a freshwater diversion plan.

15.3 Finally, we are somewhat uncomfortable with the dismissal in the DEIS of saltwater intrusion as only a minor problem. The problem is hardly minor given the fact that a major metropolitan area depends on the Mississippi River for its freshwater supplies, as do many industrial plants. The DEIS indicates that the number of days during which saltwater will intrude up to New Orleans if the channel is deepened will increase by a factor of five. The economic and social cost associated with this increase in saltwater intrusion should be addressed in the DEIS.

We look forward to seeing the final report on the plan.

Sincerely,

MICHAEL J. BOURGEOIS
DIRECTOR

RESPONSE 15.1: A discussion of these impacts is on pages EIS-26 and EIS-70 to EIS-74 and included in Appendix F, Water Quality. The main analysis will appear in the Section 404(b)(1) Evaluation which is planned for preparation during post-authorization studies (Phase I).

RESPONSE 15.2: The Mississippi's flow is a resource for which there are many beneficial uses, and one beneficial use may impact adversely on another. For example, diversions for estuarine enhancement, if made during periods of low flow, could engender adverse impacts on municipal water supplies by reason of increased saltwater intrusion. To some extent, the rate of sedimentation in Southwest Pass is a function of flow in the Pass. The diversion of river flows for estuarine enhancement upstream of the head of the Pass could result in some increased shoaling and a corresponding increase in maintenance costs for the navigation project.

The value of current freshwater diversions from the Mississippi to the adjacent estuarine marshes, and the potential for achieving even greater estuarine improvements through additional diversions is recognized. The Corps continues to support construction of the authorized Mississippi Delta Region project which would provide for additional diversions. This project has been authorized for 16 years, but its implementation has not been possible solely because no responsible local body has been found to provide the local cooperation mandated by Congress when it authorized the project. We are currently completing, under two study authorities, Louisiana Coastal Area and Mississippi-Louisiana Estuarine Area, studies which will likely result in recommendations for other diversion works.

In general, estuarine enhancement by diversion of Mississippi River flow has two objectives: salinity modification and addition of land mass. Much of this land mass would be marsh. The former has been the subject of a great deal of objective analysis and, while the relationship between salinity regimes and estuarine productivity is incredibly complex, the probable maximum quantity of water which could reasonably be used for this purpose has been reasonably well defined. This quantity of water is small in comparison to the total available flow to the extent that significant conflict between these needs and others existing or reasonably prospective, is unlikely. The projects and studies for estuarine enhancement referenced above are based on diversions which would have no significant impact on the proposed navigation project.

The problem of additions to land mass is much more complex. The implementation of the recommended plan would result in the creation of marsh with dredged material, a method proven by our existing maintenance dredging operations. The relationship between flow and the production of land mass, however, is not well understood, but is obviously extremely variable. For example, at Pass a Loutre approximately one-third of the Mississippi's annual flow is diverted to relatively shallow water bottoms; yet, there has been no net addition to the total land mass above the ordinary low water in this area for many years. In fact, there has been net land loss. The rate of marsh loss in the Pass a Loutre subdelta, however, has been lower than in the other Mississippi River subdeltas. Much work is needed to determine how river flow might best be managed to create land mass. Past and present studies of the matter have done little more than present a desirable concept which might or might not be practicable to implement. In our opinion, it would be unreasonable to defer measures for which there is a demonstrable immediate benefit of very significant proportions--but which are influenced by river flow--for the possible development of measures not yet defined which might compete for use of river flow. It may be that the measures will be developed in the future which would, as is the case of diverting flow for salinity modification, be implementable without significant impact on the navigational project. If not, trade-offs between marsh creation and the costs for maintaining deep-draft navigation would be inevitable.

The above referenced studies dealing with the feasibility of freshwater diversion measures are being coordinated with the Department of Natural Resources, Division of State Lands.

RESPONSE 15.3: See response to comment 5.4 on page 12.

State of Louisiana

16

FRANK A. ASHBY, JR.
SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS
AIR QUALITY DIVISION

B. JIM PORTER
ASSISTANT SECRETARY

January 20, 1981

Thomas A. Sands
Colonel, CE
District Engineer
Department of the Army
New Orleans District, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Re: Draft EIS - Deep Draft Access to the Ports of New Orleans and Baton Rouge (LMNPD-RE)

Dear Colonel Sands:

The above referenced draft EIS has been reviewed by the Division. The proposal (i.e. plans 1 and 1B) will result in additional ship traffic through the Brenton Bird Refuge. This must result in increased air emissions from the ship's engines or boilers. Smoke, particulate, sulfur dioxide and oxide of nitrogen emissions will increase in the area of the Refuge.

The Brenton Bird Refuge is the only area in the state of Louisiana classified Class I for Prevention of Significant Deterioration Purposes (PSD). This means the Federal Clean Air Act allows very little degradation of air quality in or near the refuge (reference Part C of the Clean Air Act as Amended August, 1977).

16.1 The draft EIS (pages EIS 29 and 72) indicates plan 1 and 1B will not impact the refuge, however, I was unable to find the rational used to come to this conclusion relative to PSD.

Without the rational, this agency is unable to concur with the statements made in Table 1.4 i.e. all alternatives are in full compliance with the Federal Clean Air Act and the State Air Control Act.

Sincerely,

Orey Tanner Jr

Orey Tanner, Jr.
Air Quality Division

OT/ner

RESPONSE 16.1: Plans 1 and 1B probably would impact air quality in the Breton Bird Refuge. If plans 1 or 1B were selected, or further considered, additional investigations would be performed to determine the effects of ship traffic on the air quality of the Breton Bird Refuge.

P.O. BOX 60630 . NEW ORLEANS, LA. 70160 . PHONE 504 568-5121 . 325 LOYOLA AVENUE

State of Louisiana

17

FRANK A. ASHBY, JR.
SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF FORESTRY
(LOUISIANA FORESTRY COMMISSION)

D.L. McFATTER
ASSISTANT SECRETARY AND
STATE FORESTER

January 28, 1981

Colonel Thomas A. Sands, CE
District Engineer
Department of the Army
New Orleans District Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

No response required.

Dear Colonel Sands:

Refernce your letter of January 14, 1981, regarding construction and maintenance of the navigation project.

The "Recommended Plan" (Plan 2b) which will not affect the natural levee forests would be our choice. Although the natural levee forests are not highly commercial forests, they do provide for good, natural wildlife habitat and because of this we feel the Recommended Plan would best serve to protect this natural resource.

We certainly appreciate the opportunity to review and comment on this proposal.

Sincerely,

W. D. MERCER - ASSOCIATE STATE FORESTER

GAR

P.O. BOX 1628 . BATON ROUGE, LA. 70821
5150 FLORIDA BOULEVARD

18

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
400 ROYAL STREET
NEW ORLEANS 70130

JESSE J. GUIDRY
SECRETARY

DAVID C. TREEN
GOVERNOR

March 4, 1981

District Engineer
New Orleans District
Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160

Re: LMNPD-RE Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana. Draft main report and DEIS.

Dear Col. Sands:

The following comments are offered on the above referenced document.

18.1 Page EIS-18, para. 4.3.11. We feel that, for clarity and to prevent any misunderstandings related to mitigating project induced damages, the first sentence of this paragraph should be changed to read "compensation as a mitigative action would not be ...".

18.2 Table 4.3.2 page EIS-20. We seriously question the use of the same Habitat Unit Values for both fresh and intermediate marsh areas. It is unrealistic to assume that the two habitat types have the same value. On the contrary, the assumption, if an assumption is called for, should be that they have different values. The value of 6.03 as reported in the Coordination Act Report was the mean value of the combined marsh types. Considering the data available, there is no justification and no valid basis for separation of the marsh types in the table except under man-day analysis.

18.3 Table 4.4. The use of zero for habitat unit values where no data are available is unjustified and misleading. We suggest the use of some other symbol since no habitat in our opinion has zero value.

RESPONSE 18.1: The requested revision has been made in the final EIS on page EIS-18.

RESPONSE 18.2: Agreed. This point has been clarified in table 4.3.2 of the final EIS on page EIS-19.

RESPONSE 18.3: The suggested revision has been made in table 4.4 of the final EIS beginning on page EIS-21.

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District Engineer
March 4, 1981
Page 2

18.4 As a further mitigative measure to augment marsh accretion, particularly in the East Delta, some action should be taken to divert increased suspended and/or bed load through Pass A Loutre and Cubits Gap. We consider the continued sediment delivery via southwest pass to the deep shelf and slope to be a tragic and, to a degree, preventable loss of a natural resource. Since artificial means have in part created the problem, artificial means must be implemented to partially solve it.

We appreciate the opportunity to work with your office on this project and to provide our comments on the draft document.

Sincerely,

Jesse J. Guidry

Jesse J. Guidry
Secretary

JJG:MW/pc

RESPONSE 18.4: See response to comment 3.3 on page 6.

19

LOUISIANA STATE UNIVERSITY
PAUL M. HEBERT LAW CENTER
BATON ROUGE, LOUISIANA 70803

Sea Grant Legal Program
52-60 Paul M. Hebert Law Center

(504) 388-5931

March 12, 1981

Colonel Thomas Sands
Department of Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands,

The following comments are offered in response to the Corps of Engineers Draft Environmental Impact Statement prepared for the Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana published in December 1980. The comments are in regard to two possible inadequacies of the draft EIS that could be constructively addressed in the Corps of Engineers final EIS to insure its complete compliance with the National Environmental Policy Act.

19.1 The data base used by the Corps of Engineers to develop a cost/benefit discussion of the project in regard to land loss is out of date and incorrect. The Corps relies on Gagliano and Van Beek's 1970 study which indicate Louisiana is losing land in its coastal zone at a rate of 16 square miles peryear. Gagliano and Van Beek's 1981 study conclusively demonstrates that land loss is far in excess of what was previously thought. Their latest work shows Louisiana losing 40 square miles of coastal land per year and that the rate of erosion is increasing geometrically. Use of the 1970 study rather than the 1981 study calls into question the adequacy of the Draft EIS discussion about the positive effects of the project on erosion. The Corps will need increasing amounts of water to keep Southwest Pass sediment free. Gagliano and Van Beek conclude that massive freshwater diversions (and the accompanying sediment are needed to offset the tragic land loss in Louisiana). The Draft EIS (a) fails to recognize the magnitude of the land loss problem (b) fails to

19.2 discuss alternatives to combat the greater land loss (c) fails to discuss the need for freshwater diversion and the increase diversions will effect in maintenance dredging cost (and therefore correspondingly lower benefits) of the project.

It is our hope that these comments will be of value to you in the difficult process of formulating the final EIS. Additionally, the conclusion on the EIS that the project is in full compliance with the approved state Coastal Zone plan is erroneous. The project potentially violates several guidelines of the Louisiana Coastal Zone Plan including 1.7 (a), (c), (d), (e), (h),

19.3 (i), (j), (k), (l), (m), (o), (p), (s), (t); 3.1,3.2, 3.3, 3.9, 4.4, 6.14, 7.1, 7.2, 7.3, 7.4, 8.1, 8.3, 8.4, 8.8. Serious questions regarding the consistency of this project with the state coastal zone management are not discussed in the Draft EIS.

With warm regards,

Mike Wascom

Mike Wascom
Coordinator

Paul Hribernick
Sea Grant Legal Program

RESPONSE 19.1: There are several studies of land loss in the Louisiana coastal zone. A study by Craig, Turner, and Day, published in 1979, was used in calculating land loss for this EIS. The loss rate used was one that applied to the study area as opposed to the entire coast. It is important to point out that the impacts of this project on land loss are evaluated in relation to land loss expected to occur without the project. When land loss is evaluated from this perspective, the greater the rate of land loss the more significant the benefits of marsh creation.

RESPONSE 19.2a: See response to comment 19.1 above.

RESPONSE 19.2b: Alternative measures to deal with land loss are discussed under "Management Measures" on page 42 of the main report.

RESPONSE 19.c: See response to comment 15.2 on page 27.

RESPONSE 19.3: See Appendix G (Consistency Deterimination: Louisiana Coastal Management Program)

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REGIONAL PLANNING COMMISSION
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20

March 12, 1981

Colonel Thomas A. Sands
Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

Subject: (LMNPD-RE) Deep Draft Access to the Ports of New Orleans and Baton Rouge, La.: Draft Main Report and Draft Environmental Impact Statement

The Regional Planning Commission has reviewed the subject document and also disseminated pertinent information on the project to others that we assumed would have interest in the matter. To date, we have received only one comment from the City Planning Commission.(attached) It indicated their concern for the potential of salt water intrusion into the City's water intake.

20.1 It was determined by the Regional Planning Commission that a statement of no conflict be given to this project with the provision that the City's comments be taken into consideration in the final conduct of this project. The proposed project has also been reviewed and recommended by the staff and A-95 Review Committee of the Regional Planning Commission.

Sincerely,

REGIONAL PLANNING COMMISSION

Emile E. Prattini, Sr.

EMILE E. PRATTINI, SR.
CHAIRMAN

EEPSr/BAP/rr
attachment

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SUITE 900
MASONIC TEMPLE BUILDING
333 ST. CHARLES AVENUE
NEW ORLEANS • LOUISIANA 70130

RESPONSE 20.1: In response to the concerns expressed by the City of New Orleans and others over the increase in saltwater intrusion in the Mississippi River, we have reviewed and expanded our analysis of with- and without-project conditions. This reanalysis has confirmed our previous finding that the effects of increased saltwater intrusion on New Orleans municipal water supply would be insignificant; however, measures have been included in the plan to mitigate the increased saltwater intrusion in lower Plaquemines Parish. The mitigation of any other problems caused by increased saltwater intrusion would be a Federal responsibility. See page EIS-73 and C-21 and C-34 of Appendix C.

CITY OF NEW ORLEANS

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February 10, 1981

FEB 1981
RECEIVED
Regional Planning Commission
By

Mr. John M. Bordelon
Executive Director
Regional Planning Commission
Masonic Temple Bldg. - Suite 900
333 St. Charles Avenue
New Orleans, La. 70130

RE: A-95 Review

Dear Mr. Bordelon:

The following items have been reviewed and do not conflict with the Comprehensive Plan or other planned or programmed public improvements:

Docket No.	Title:
2/81	Deep Draft Access to the Ports of New Orleans and Baton Rouge, La.: Draft Main Report and Draft Environmental Impact Statement - LMNPD-RE (this project however is the subject of some concern because of the potential for salt water intrusion into the City's water intake)
3/81	UPARR Planning Grant 1981
4/81	Floodplain and Wetland Notification Almonaster-Michoud Industrial District Environmental Impact Statement City of New Orleans, Orleans Parish, La.
5/81	Comprehensive Training Program in Productivity Evaluation for the City of New Orleans Evaluation Unit
6/81	Full Year/Full Day Head Start
7/81	Handicapped Consortium
8/81	Community Action

20.1

Docket No.	Title:
11/81	Big Sisters Program
12/81	Phase II of the Long Range Master Plan for Children's Hospital Development and Expansion
14/81	Aviation Technical Planning Assistance Grant

Very truly yours,

Harold R. Katner
Director/Secretary

HRK:EJD:cr

cc: Reynard Rochon
James Chubbuck

February 23, 1981

Colonel Thomas A. Sands
District Engineer
New Orleans District
Corps of Engineers
PO Box 60267
New Orleans, Louisiana 70160

Re: Proposed Mississippi River 55 Foot Channel
Gulf of Mexico to Baton Rouge

Dear Colonel Sands:

On Friday we sent you a letter containing our comments on the proposed Mississippi River 55 foot Channel Gulf of Mexico to Baton Rouge. Since we sent out that letter, we have noticed a few typographical errors. We are therefore sending you a corrected copy with the request that you substitute this copy for the one sent you previously.

We are also enclosing pages 53-54 and 96-97 of a recent Congressional Budget Office Study entitled Reducing the Federal Budget: Strategies and Examples, Fiscal Years 1982-86 (February 1981). These pages were inadvertently omitted when we mailed the letter to you on Friday.

Yours very truly,

James T. B. Tripp
Counsel

Environmental Defense Fund, 475 Park Avenue South, New York, NY 10016 (212) 686-4191
OFFICES IN: NEW YORK, NY (NATIONAL HEADQUARTERS); WASHINGTON, DC; BERKELEY, CA; DENVER, CO

February 20, 1981

Colonel Thomas A. Sands
District Engineer
New Orleans District
Corps of Engineers
P O Box 60267
New Orleans, Louisiana 70160

Re: Proposed Mississippi River 55 Foot Channel
Gulf of Mexico to Baton Rouge

Dear Colonel Sands:

You have provided us with a copy of the draft Main Report and draft Environmental Impact Statement for a major navigation project -- the enlargement of the mainstem Mississippi River channel between the Gulf and Baton Rouge to 55 feet. In our view, the Environmental Impact Statement is inadequate in salient respects. First, it fails to evaluate this project as one of at least four major harbor channel expansion projects at Baltimore, Maryland, Norfolk, Virginia, Mobile, Alabama and New Orleans, designed in part to facilitate the export of coal. Second, it fails to evaluate the impact of this project in the context of the overall escalating land loss problem in Coastal Louisiana. Third, it fails to consider significant direct environmental impacts of the project. Fourth, it fails to discuss reasonable alternatives. For reasons which we discuss, supra, these deficiencies can be cured only if the Corps prepares a programmatic EIS assessing all of the navigation channel expansion projects.

1. Navigation Channel Expansion -- A National Perspective

The maintenance and expansion of navigation channels in major coastal estuaries of the country along the Atlantic and Gulf Coasts are typically major sources of environmental degradation Impact on estuarine hydrology, water quality and habitat and estuaries and marine fisheries and shellfisheries can be dramatic. As navigation channels in the Mississippi River and elsewhere in coastal estuaries are dredged deeper and wider, these impacts can be magnified geometrically because the amount of maintenance dredging required climbs exponentially with expanded channel size. Corps Districts along the Great Lakes and the Atlantic and Gulf

Environmental Defense Fund, 475 Park Avenue South, New York, NY 10016 (212) 686-4191
OFFICES IN: NEW YORK, NY (NATIONAL HEADQUARTERS); WASHINGTON, DC; BERKELEY, CA; DENVER, CO

Coasts are in the process of preparing planning reports in support of expansion of navigation channels throughout the coast -- from the St. Lawrence, Great Lakes System, New York, Baltimore-Charleston to the Appalachicola River System, Mobile, Galveston, Corpus Christi and many ports in between, in addition to the lower Mississippi River. Most of these planning proposals coincidentally call for deepening the existing channels by some 10 to 15 feet. Maintenance and expansion of these ship channels are almost entirely financed by the federal government through the U.S. Army Corps of Engineers. Thus, no private economic constraint exists on the demand for channel expansion by port proponents. In large part for this reason, we have called repeatedly for an efficient system of full cost recovery user charges for coastal navigation channels where deeper draft vessels are required to pay incrementally higher user charges corresponding to the economic and environmental costs for which they are responsible.

a. Multi-port channel expansion projects

Last October, former President Carter, through the former Assistant Secretary in the Department of the Army for Civil Works, called for an acceleration in the planning for and construction of enlarged navigation channels at Norfolk, Mobile and New Orleans. Since construction of the larger channel in Baltimore Harbor is presently underway, Baltimore should be added to that list. Based on that administrative evidence, it seems clear that the federal government, through the Corps of Engineers, has an overall program underway for harbor channel enlargement primarily in support of the nation's coal and grain export programs. This national program will have massive, cumulative ecological impacts in estuaries along the Atlantic and Gulf Coasts, and the resulting estuarine degradation will have significant impacts on Atlantic and Gulf Coastal fisheries and shellfisheries. Therefore, compliance with NEPA, CEQ NEPA regulations and Corps of Engineers regulations requires the preparation of a programmatic environmental impact statement looking at this entire program of harbor expansion.

21.1

b. Need for and benefits of a programmatic EIS

Such a programmatic EIS would serve several useful purposes. First, the overall cumulative estuarine and coastal fishery and shellfishery impacts can be evaluated much more rationally, from a broader perspective, in a programmatic EIS than solely in project-specific EISs. Second, only through an overall programmatic EIS is it possible to look at the driving economic forces behind multi-port channel expansion. Although during much of the 1970's a principal economic force was accomodating of oil imports, today the major impetus is promotion of coal and grain exports. Most other commodities, i.e., machinery, do not benefit significantly

RESPONSE 21.1: The feasibility study of the enlargement of deep-draft approaches to the Ports of New Orleans and Baton Rouge, Louisiana, was authorized, conducted, and will be processed independently of the studies of channel enlargement programs for the Ports of Mobile and Norfolk. The possible authorization of the proposed projects in a single legislative package would not impact upon the viability of the proposed projects individually and does not warrant a "programatic" environmental impact statement for the projects.

from very deep-draft navigation. A major justification for the expansion of coal exports, as we will discuss below, is national security and the overall political security of the industrialized European and Asian democracies. It is a fruitless endeavor to consider the impacts of no action or limited channel development in any one port, e.g., the Lower Mississippi River, on these political security claims. Only a programmatic analysis can address these claims in the appropriate context.

Furthermore, as a practical matter, channel deepening projects in one port generate a felt need for similar projects in competing ports, for both economic and political reasons. In terms of facilitating coal exports, for example, we see no justification for the expansion of ship channels in both Mobile Harbor and the Lower Mississippi River. However, in view of political realities of port competition, we can understand why the expansion of navigation channels in both of these ports is being promoted.

Finally, large scale alternatives to channel deepening projects, such as the 55 foot channel proposed for the Lower Mississippi River, can only be reasonably and seriously considered in the larger context which we describe. One such alternative would be channel expansion which private or public investment, backed by deep draft navigation user charges structured to recover the full cost of new construction and operation and maintenance, would justify. It is pointless to consider such an alternative investment strategy designed to impose effective, realistic market constraints on the demand for deeper channels in the context of an isolated proposal for enlargement of the Mississippi River channel. Such an alternative can only be addressed in a larger national context. In this context, we will enclose pages 53-54 and 96-97 of a recent Congressional Budget Office Study entitled Reducing the Federal Budget: Strategies and Examples, Fiscal Years 1982-86 (February 1981).

Another alternative strategy would involve consideration and utilization of innovative technologies, such as offshore loading of grains and coal. Although extensive consideration has been given to offshore trans-shipment facilities for oil, no comparable consideration has been given to similar kinds of facilities for coal and grains. However, such large-scale technological alternatives could be seriously considered only in the larger national context, in large part because public funding of channel expansion discriminates against such technological strategies which would require private funding, and competition necessitates comparable financing schemes.

For all of these reasons, although a site specific EIS for the proposed enlargement of the Mississippi River channel should be prepared, NEPA requirements are not satisfied unless a programmatic EIS is prepared which deals with the economic and political driving forces, alternatives and large-scale impacts which we described above.

2. The Louisiana Coastal Zone - Land Loss

The Mississippi River is far and away the country's largest river. From that point of view, it would appear to be reasonable to give a certain primacy to the Mississippi River as a central navigation artery servicing a major portion of the country.

On the other hand, just because of its immense size, the Mississippi River, through its migrating deltaic lobes, has built the country's most extensive coastal wetland area. That system, as you know, is now in a state of collapse. Historically, it has been estimated that the net rate of growth of the Louisiana Coastal system was around one square mile a year. Deterioration started probably 100 years ago. About ten years ago, Dr. Sherwood Gagliano estimated that the rate of land loss (conversion of wetlands to open water) throughout the Louisiana Coastal Zone, taking into account land building in the Atchafalaya Delta (now shifting to the Atchafalaya Bay), was 16.5 square miles per year. Recent studies of the U.S. Fish and Wildlife Service, Mississippi Deltaic Plain Region Ecological Characterization: Habitat Mapping Study (May 1980) estimate that the rate of land loss is now some 39 square miles per year. This figure indicates that the rate of land loss is rapidly accelerating. At the present rate of acceleration of land loss, it is not unreasonable to project virtually complete loss and collapse of the multi-million acre Louisiana coastal wetland system within 50 to 75 years.

The primary causes of this collapse are reasonably well understood and documented. They include construction and enlargement of canals and channels for all purposes, including navigation and oil pipelines and equipment. Leveeing and channelizing the Mississippi River to minimize maintenance dredging problems, which results in the discharge of a vast bulk of the River's sediments into deep Gulf waters rather than even distribution in a deltaic pattern, is also a major contributing factor.

The State of Louisiana itself has recently recognized the long-term economic value of this coastal zone. Twenty-five percent of the revenues from the OCS natural gas first use tax are to go into a Barrier Island Coastal Land Fund which can be used to support activities designed to enhance the protection of these coastal resources. That tax is being challenged in the United States Supreme Court in State of Maryland et al., plaintiffs v. State of Louisiana, No. 83 Original. We refer you to various briefs submitted by the State of Louisiana in that case for evidence of the extraordinary value of this massive wetland resource.

a. Development of a comprehensive Louisiana coastal land loss abatement program

If the accelerating loss of wetlands in the Louisiana coastal zone is to be abated and reversed, it is essential that responsible state and federal agencies, industry and other interested groups put together expeditiously a comprehensive land loss control program for the Louisiana Coastal Zone. In addition, since the benefits of such a land loss abatement program are widely distributed, it is often difficult to find local sponsors and financial support. For that reason, implementation of an overall land loss control program will be feasible only if civil work projects, such as navigation channel expansion projects, are linked to and implemented simultaneously with programs designed specifically to abate land loss.

21.2 Therefore, a primary alternative which the Corps of Engineers should address in this EIS is an overall land loss abatement program. That alternative should set out the major components of that program and how the 55 foot channel fits into that overall program, if at all.

b. Fresh water and sediment diversion

The Corps of Engineers advises us that it will be able to create, over the life of the tentatively selected plan, some 11,600 acres of additional wetlands from the proper disposal of dredged spoils from the enlarged channel. Although we have no doubt, based in large part on the presentation made by Dr. Glen Montz on December 6th at the Sierra Club's Workshop on Land Loss in New Orleans, Louisiana, that the Corps can calculate the appropriate elevation that would support wetland vegetation in dredged spoil disposal sites, the fact is that the 55 foot channel will contribute far more to land loss than it would give back in the form of newly created wetlands. Everyone recognizes that a primary program for abating the rate of coastal Louisiana land loss is Mississippi River freshwater and sediment diversion. Dr. Sherwood Gagliano has estimated that such a diversion program could generate some ten square miles of new wetlands per year, i.e., between 6,000 and 7,000 acres of wetlands. If this estimate is reasonably accurate, within two years a freshwater and sediment diversion program would create more acres of wetlands than the tentatively selected project's dredged spoil disposal programs over that project's entire life.

If we accept the ten square mile per year figure, over a 50 year period, such a freshwater and sediment diversion program would create 500 square miles of new wetlands or 322,000 acres of wetlands. We understand that the New Orleans District Corps of Engineers is investigating freshwater and sediment diversion as

RESPONSE 21.2: The loss of wetlands in coastal Louisiana is addressed in two ongoing feasibility studies, the Louisiana Coastal Area study and the Mississippi-Louisiana Estuarine Area study. Land loss was considered in the deep-draft study, and marsh building with dredged material, was included in the plan to partially offset the land loss. An overall land loss abatement program for coastal Louisiana is beyond the scope of the deep-draft navigation study. Further, it is not Corps of Engineers policy to obtain local support for water resources projects by combining them with other projects which enjoy strong local support. See also response to comment 15.2 on page 27.

part of two active studies and one relatively inactive study. The question arises, therefore, what the impact of the 55 foot channel would be on the economic, engineering and political feasibility and scope of freshwater and sediment diversion. Logically, since the navigation channel and the fresh water and sediment diversion project would be competing for the same water and sediment resource, an enlargement of that navigation channel would reduce the amount of water and sediment available for the diversion project. The draft EIS seems to suggest that the 55 foot channel might utilize all of the water and sediment in the Mississippi River. This would mean 100% preclusion of fresh water and sediment diversion. Even if the 55 foot channel reduced the amount of water and sediment available for diversion by only 10 percent, the reduction would translate into a net reduction in potential wetland creation over a 50-year period of 32,200 acres (10 percent of 322,000 acres as calculated above), about three times the amount which the tentatively selected project may create.

21.3 Thus, it should be evident that a critical feature of the 55 foot channel is its impact on freshwater and sediment diversion potential. The draft EIS is almost completely silent on this subject. A full exposition of this relationship is essential, and all discussion of the impacts of the project on coastal wetland resources is meaningless without it. As an alternative, therefore, the EIS should discuss a combined program, linking, through the authorization and appropriation process, fresh water and sediment diversion and alternative Mississippi River navigation expansion strategies.

21.4 Any serious consideration of fresh water and sediment diversion entails consideration of Mississippi River water quality and the impact of diversion of water of that quality on receiving estuaries. We recognize that that water is loaded with a wide range of toxic and carcinogenic organic compounds of industrial, agricultural and urban sources. Yet, the EIS, in its present limited form, must address this quality issue because River sediments to be dredged are ladened with these compounds. We would be profoundly skeptical of any claim that the sediments are clean enough to be dredged and discharged in estuaries but the water too polluted to divert. However, because of high levels of toxics in Mississippi River water and sediments, the program which we are describing should consider the impact of vigorous enforcement of the Clean Water Act, Resource Conservation and Recovery and TOSCA requirements on levels of industrial toxic discharges and clearing of floodplain forests with consequent changes in pesticide runoff loads.

21.5 3. Political Security - The Western World

As we indicated above, one of the arguments presented in support of the 55 foot Mississippi River channel, as well as 50 foot plus channels in Mobile, Norfolk, Baltimore and elsewhere, is ful-

RESPONSE 21.3: See response to comment 15.2. on page 27.

RESPONSE 21.4: Impacts of diversion of Mississippi River water on receiving estuaries would be addressed in the Louisiana Coastal and Mississippi-Louisiana Estuarine studies. Based on presently available water quality data, it is not expected that effects on water quality due to implementation of the recommended navigation project would outweigh the desirability of freshwater diversions. Detailed water quality analyses are scheduled for post-authorization studies (Phase I).

The primary enforcement responsibility for environmental laws which control the production, distribution, usage or disposal of toxic and organic compounds does not lie with the US Army Corps of Engineers. This responsibility, rather, lies with other entities, including the State of Louisiana and the US Environmental Protection Agency.

fillment of our obligation to provide our western allies with an alternative fuel source to OPEC oil. Although we would strongly support a program that would reduce immediately and substantially our oil imports (a program which is not yet in place) and we realize the enormous benefits of liberating our western allies' present reliance on Middle Eastern oil, quite frankly we do not see how channel enlargement is particularly germane to this issue.

First, the primary reason for delays in Atlantic ports, and perhaps Gulf ports as well, in coal export shipments is not channel size but on-shore transportation, coal storage, transshipment and other export-related port facility capacity. We have seen no study which indicates that these delays could not be adequately managed through improvements in on-land transportation and port facilities which could be designed to have little impact on estuarine resources.

Second, even if such a study indicated that channel expansion could facilitate coal exports, no reason has been presented as to why the beneficiaries of channel enlargements, including foreign nations importing American coal, should not pay the full economic, social and environmental costs of channel expansion. As we have indicated above, a full cost recovery user charges for deep draft navigation would be a first step in this direction. Coal miners, transporters, ports, shippers and importers could then calculate economically the attractiveness of channel enlargement investments. Third, so long as the port and transportation facilities are adequate, there is no reason to believe that maintenance of existing channels at our major ports, without any channel expansion, could not adequately service all of our coal export needs, in a manner satisfactory to our national security and the energy security of our European and Asiatic allies. We have certainly seen no evidence to the contrary. The security claim is based more on reliability of energy supplies, rather than simply cost.

We understand that French, German, Japanese and other foreign countries are strongly supporting channel enlargement in the Mississippi River and at the other designated ports. The reason for their enthusiasm should be obvious. The Corps of Engineers, with funds from the United States Treasury, constructs, operates and maintains these enlarged channels with taxes contributed by the American taxpayers. Importers in these countries pay nothing towards the cost of these channel enlargement schemes. It is to their interest to support enlarged navigation capacity for which they pay nothing and which may reduce their importing costs. As a general proposition, anyone who can obtain a free economic good desires it. On the other hand, if a full recovery user charge system were instituted or if, in the absence of deeper channels, importers had to engage in lightering operations or develop alternative technologies, i.e., slurry pipelines for

RESPONSE 21.5: The enlargement of deep-draft navigation channels should not significantly alleviate the delays at major coal export ports because the loading rate is determined primarily by the landside facilities. The benefit from channel enlargement would be lower transportation costs of oceangoing commerce. The costs would be lowered because commodities would be moved in larger more fully loaded ships. The Department of the Army has proposed legislation as part of the Army's Civil Works Legislative Program for the 97th Congress focused on full recovery of certain operations, maintenance, and construction costs for deep-draft ports and their connecting channels with an authorized depth of more than 14 feet. The proposal, introduced as H.R. 2959 on 1 April 1981, also contains a provision to encourage and expedite needed port improvements. If a local public body secures non-Federal funds through financing independent of the legislation, Section 9 of the bill would provide authority to the Secretary of the Army, acting through the Chief of Engineers to study, design, construct, and rehabilitate deep-draft channels and port improvements that the Secretary determines to be justified. This is provided that an appropriate non-Federal public body agrees to reimburse the Federal Government for all of its construction costs for the project on an annual basis during construction. Such improvements could be provided and maintained as a Federal project pursuant to laws and policies then in existence and without a requirement for any further congressional authorization. The non-Federal body would be allowed to collect user fees to recover its costs.

offshore loading, they would have to pay the cost of the additional transportation capacity reflected in any of these alternative schemes. Unless the costs of alternative transportation investment strategies are comparably internalized, the availability of "free" public funding for one alternative -- bigger channels-- will always attract a large class of champions who can freeload off the public investment. Their support, however, while understandable in economic terms, should not be confused with furtherance of any national or western political security interest.

21.6 4. International Port Competition

It may also be argued that construction of the 55 foot channel in the Mississippi River, as well as expansion of channels in Mobile, Norfolk and Baltimore (and perhaps other major port locations which want to "compete" for coal and grain export business) is necessary to promote American exports, (in particular, coal and grain) so that this country can compete effectively in international markets with other countries, such as Canada and Argentina, which have in place deep harbor channels for deep draft navigation.

Although we consider this argument to be without merit, the fact that it is being raised in support of the Mississippi 55 foot channel supports our contention that the Corps of Engineers should prepare a programmatic EIS covering all of the major channel expansion projects in the pre-authorization or post-authorization stage. Any reasonable discussion of the relationship between channel depth and the ability of this country to compete in international markets would require a careful economic analysis of the commodities which would benefit from such capacity, the role of this country in those markets and the impact on cost of different transportation alternatives in a broad, national context.

This argument assumes that the availability of deeper draft navigation in certain foreign countries gives them a significant or measurable cost advantage over American exporters of bulk commodities (coal and grains). However, even if, arguendo, enlarged navigation channel capacity in foreign ports had a measurable affect on coal/grain export costs (a proposition which we doubt because of the cost-effectiveness of alternative investments), American coal and grain exports will still have an enormous advantage, over time, over foreign competitors for two reasons -- (1) abundance and (2) reliability. The United States has 28% of the world's known coal reserves (786 billion tons) (vs. 0.7% for Canada), and a far higher percentage of probable reserves (the USGS estimates that the U.S. may have 1.7 trillion tons of coal at depths less than 3000 feet). Two other countries, together with the U.S., have some two-thirds of the world's known reserves of coal. They are the Soviet Union and China. Therefore, if the argument for channel expansion is in part security and reliability,

RESPONSE 21.6: Under the cost-sharing policy recommended in the report, foreign importers of US commodities would accrue a portion of the benefits attributable to the recommended plan without sharing the cost--just as US importers are benefited by improvements in foreign ports. This would become a moot issue if the cost-sharing policy discussed in response 21.5, on the previous page, is adopted.

the western world will logically come to the U.S. for coal. The specific depths of our channels is rather trivial in this broader equation.

The situation is similar, we would submit, with respect to grain products, although a detailed economic investigation should be undertaken to analyze all the relevant factors. Only ten countries in the world export any sizeable amounts of grains and other food products, and four countries, the United States, Canada, Argentina and Australia, are the principal exporters of grain. The United States is a far larger producer and exporter of grains than any of the other three. Given the increasing global demand for American agricultural products, visicitudes of climate and the long-term anticipated political stability of this country, we would suggest that the export potential of American grains will not be affected one iota by the proposed channel deepening in the Mississippi River or other major Atlantic and Gulf ports. In any event, if enlarged navigable capacity had such economic value, the beneficiaries, i.e., the importers and shippers, should gladly bear the cost.

5. Environmental Impacts

We have already discussed one major impact of the 55 foot channel which the EIS has not adequately addressed, namely, the loss of opportunity for wetland creation through fresh water and sediment diversion.

Other environmental impacts of greatest concern are salt water intrusion into the Mississippi River and the water quality impacts of the dredging and disposal of huge volumes of contaminated sediments.

a. Salt water intrusion

21.7 The enlargement of the channel would result in movement of the salt water wedge further up the river particularly during critical low flow periods, such as the Mississippi River has recently experienced. The impact of channel enlargement on salt water intrusion is not adequately addressed in the EIS. Under a critical low flow scenario, the 55 foot channel would result in movement of the salt water wedge to a point where New Orleans and other communities would have to find alternative sources of water. The economic and social implications of that fact must be fully disclosed. In addition, the least cost alternative source of water for communities where that situation might occur must be measured and included as a cost of the project.

As the draft Main Report notes at page B-48 (Volume 2) the New Orleans Sewage and Water Board has already requested that any such costs be borne by the Federal Government, and has reserved

RESPONSE 21.7: See response to comment 5.4 on page 12.

the right to oppose the project at any phase of implementation.

b. Contaminated bottom sediments

The huge volume of contaminated bottom sediments that would be dredged and disposed of during construction and annual maintenance of the deepened channel would also have an impact on municipal water supplies and fish and wildlife. The draft Main Report estimates that Plan 2 B, the tentatively selected plan, would require the excavation of 133,000,000 cubic yards of sediment initially, and annual maintenance dredging of 78,200,000 cubic yards. (Maintenance of the existing channel requires the removal of 21,100,000 cubic yards annually).

These bottom sediments are ladened with heavy metals, pesticides, PCBs and other contaminants (Tables F-11 through F-16, Appendix F, Volume 2). Dredging and disposal plans include agitation of sediments into suspension for removal by river currents and disposal of dredged material in deep river holes, also to be removed by the current. Water quality would be expected to suffer depressed dissolved oxygen, reduced depth of the photic zone and primary productivity, and increased temperature, nutrients and toxics. (p. B-48, Appendix B, Volume 2) Because of the annual maintenance dredging and large volumes of sediment involved, the effects on water quality would be significant and would recurr annually during the maintenance period. The effects would be worse during periods of low flow.

Epidemiological cancer studies of populations whose drinking water is drawn from the Mississippi River and other industrially contaminated rivers have shown statistically significant increased rates of gastrointestinal and urinary tract cancers. 1/ This project would be expected to add to the burden of carcinogenic compounds and their precursors that these populations are exposed to. Fish and other aquatic species would be affected by degradation of water quality as well. The levels of pesticides, metals, and PCBs in their tissues would increase. These impacts should be analyzed in detail.

In addition to dredging and disposal of sediments in the river, overbank disposal of dredged material will degrade water quality in wetlands. Although to some small degree marsh acreage will be increased through careful placement of dredge spoil the water quality impacts should not be ignored. Placement of dredge spoil in wetlands where the material would be exposed to more air than on the river bottom would change its oxidation state and pH. This would affect the availability of certain sediment-bound contaminants. Dissolved in the water column, possibly in a changed chemical form, these compounds might have toxic effects and bioaccumulation potential beyond those of the sediment-bound contaminants. 2/ A more thorough analysis of the risks and benefits of over-
21.8 bank disposal should be presented for evaluation.

Although, as the draft Main Report notes, contaminants of sediments in the Mississippi River do not exceed EPA's "Alert" levels, the variety of contaminants found at their reported levels is cause for serious concern. Generally, criteria such as the alert levels are designed for single contaminants. While individual heavy metals may not exceed the alert criteria, the combined presence of mercury, lead, cadmium, chromium, nickel, etc., may produce additive or synergistic effects on public health and fish and wildlife. Water quality standards are similarly designed. Therefore, levels of contaminants such as pesticides, heavy metals and organics which do not exceed water quality criteria may produce unexpected synergistic or cumulative effects.

21.9 The draft Main Report and draft EIS do not assess contaminant levels of Mississippi River sediments with respect to the hazardous waste criteria of the Resource Conservation and Recovery Act. RCRA defines "solid waste" as "any garbage, refuse, sludge, or any other waste material" which is not specifically excluded in the list of exclusions. (May 19, 1980, 45 FR No. 98 Part 261). A solid waste is further classified as a "hazardous waste" if it (a) appears on lists of hazardous wastes established in Subpart D, or (b) exhibits certain characteristics (ignitable, reactive, corrosive, extractable toxicity) of hazardous waste described in Subpart C. Probably, the concern with dredged materials would be extractable toxicity, or "EP toxicity" (extractable procedure). By the EP toxicity test a material would be a hazardous waste if it contained (mg/l), Arsenic (5), Barium (100), Cadmium (1), Chromium (5), Lead (5), Mercury (2), Selenium (1), Silvex (5), Endrin (.02), Lindane (.4), methoxychlor (10), Toxaphene (.5), 2,4-D (10), or 2,4,5-T (1). PCBs are excluded as are oil and grease --

1/ Harris, R. (1974) "The Implications of Cancer-Causing Substances in Mississippi River Water", Environmental Defense Fund, Washington, D. C.

2/ Gambrell, R.P., R.A. Khalid, V.R. Collard, C.N. Reddy, and W.H. Patrick, Jr., "The Effect of pH and Redox Potential on Heavy Metal Chemistry in Sediment-Water Systems Affecting Toxic Metal Bioavailability," in Dredging: Environmental Effects and Technology, Proceedings of WODCON VII, July 10-12, 1976, World Dredging Conference, San Pedro, California.

RESPONSE 21.8: See page F-42 in Appendix F, Water Quality.

RESPONSE 21.9: See page F-49 in Appendix F, Water Quality.

major contaminants of dredged material. Additionally, these standards suffer the same defects as the previously discussed "Alert levels": they are designed for single contaminants.

21.10 As one alternative to the project at hand, discussed supra, a thorough clean-up of the Mississippi River should be investigated. This would entail strict enforcement of Clean Water Act effluent standards as a first step, and dredging to remove contaminated sediments. All remaining bottomland hardwood forests and other wetlands along the river would have to be left undisturbed to filter out agricultural chemicals and other contaminants in runoff. A thorough study of the literature on the chemistry of these contaminants under the changing redox and pH conditions that would occur during dredging would have to be undertaken.

If such a massive dredging project is to be undertaken in the Mississippi River and removal of existing contaminated sediments were affected, it would be a wasted opportunity if it were not tied to a serious large scale clean up effort.

C. Relocation of utility facilities

21.11 We also expect that the 55 foot channel may necessitate relocation of pipelines and other utilities which presently criss cross the Mississippi River. If this is the case, all of these utilities should be carefully identified. The impacts of the project on them should be disclosed and the economic and environmental costs of relocating them or foregoing their services should be analyzed. In addition, the least cost method of accomodating those existing utilities through relocation or otherwise should be determined and included as a cost of the project.

6. Alternatives

We have already indicated that a reasonable disclosure analysis of alternatives requires the preparation of a programmatic EIS which considers all pending proposals for channel enlargement at New Orleans, Mobile, Norfolk, Baltimore, and other major ports, particularly where a principle objective is facilitation of coal and grain exports. In this context, the following alternatives should be considered:

21.12 1. No action.

21.13 2. Expansion of land transportation, storage and transshipment capacity with state or federal assistance with no increase in channel capacity.

21.14 3. Alternative lightering schemes which would allow for efficient use of existing channels and transshipment to deep draft ocean going vessels off shore.

RESPONSE 21.10: As has been previously mentioned, primary enforcement responsibility for the Clean Water Act does not lie with the US Army Corps of Engineers. It lies, rather, with the State of Louisiana and the US Environmental Protection Agency.

As the use of potentially harmful substances is restricted or phased out, as more careful and modern designs for industrial facilities are installed, as wastewater treatment schemes are developed and employed, and as best management practices are applied to nonpoint sources, it would seem that the level of contaminants in Mississippi River sediments would be expected to decrease in the long term.

RESPONSE 21.11: The enlargement of the deep-draft channel in the Mississippi River would require the relocation of 64 submarine pipelines and 18 submarine cables. The cost of these relocations is included in the first cost of the recommended plan (see table E-6 of Appendix E). The environmental impacts are discussed on pages EIS-25, EIS-69, and EIS-70 of Volume I.

RESPONSE 21.12: The "no action" plan was considered in the feasibility study. It is the plan to which all others are compared.

RESPONSE 21.13: The expansion of land transportation, storage, and transshipment capacity, would occur with the no action plan or the other alternatives considered. Such measures would not serve to reduce the transportation cost of oceangoing commerce on the deep-draft navigation leg of the movement.

RESPONSE 21.14: The lightering of oceangoing cargo to larger ships would occur with the NO ACTION plan; however, a number of factors make extensive lightering operations impracticable. That portion of the cargo lightered would have to be either barged offshore in river barges or transshipped to oceangoing barges. An operation involving river barges would suffer extensive, costly downtime due to adverse weather conditions while the oceangoing barge operation would involve additional transshipment costs with less downtime. Alternatively, an extensive offshore facility could be constructed to protect lightering operations. An extensive protection facility and an extensive amount of lightering equipment would be required due to the diversity and large volume of oceangoing cargo involved.

21.15 4. Development of innovative transportation technologies, including pipelines, for off shore loading of bulk commodities into deep draft ocean going vessels.

21.16 5. A comprehensive land loss abatement program for the Louisiana coastal zone which any proposal for Mississippi River channel enlargement would be one component of

21.17 6. Implementation of an economic program for full cost recovery user charges for the inland waterway system and deep draft navigation.

This alternative would also provide private funding as well as public funding with full cost recovery reimbursement.

21.18 7. The expansion of navigation channels at one Atlantic port and one Gulf port.

21.19 8. Expansion of navigation channels in Atlantic ports to service Europe and no expansion of navigation channels at Gulf ports.

21.20 These comments should also suggest the contours of an EQ Plan which satisfies Principles and Standards requirements. The EQ Plan described in the draft Main Report is only a minor variation of the tentatively selected plan. Instead, the EQ Plan should pick from elements of alternatives 2-6, described supra.

CONCLUSION

In summary, we consider the draft EIS to be inadequate. First, the Corps of Engineers should prepare a programmatic EIS addressing all proposals for enlargement of ship channels in major Gulf and Atlantic ports, in particular Baltimore, Norfolk, Mobile and New Orleans, in support of coal and grain exports.

Second, the EIS fails to consider the impacts of and alternatives to the 55 foot channel in the context of hydrologic and ecological processes operating in the Louisiana coastal zone and accelerating land loss

21.21 Third, the EIS fails to consider many of the significant direct and indirect cumulative and secondary impacts of the 55 foot channel. Fourth, it fails to consider major reasonable alternatives which could obtain most of the transportation objectives of the proposed plan. Specifically, the draft EIS and Main Report include no alternative plan which satisfies EQ objectives or CEQ NEPA regulation requirements.

Yours very truly,

James T. B. Tripp

James T. B. Tripp
Counsel

cc: General E.R. Heiberg

RESPONSE 21.15: These alternatives were considered in preliminary planning. See page 44 of the main report.

RESPONSE 21.16: See response 21.2 on page 39.

RESPONSE 21.17: See response 21.5 on page 41.

RESPONSE 21.18: Each of the deep-draft navigation projects, proposed for authorization in legislation to facilitate the export of steam coal, was independently justified, from an overall standpoint; therefore, to forego some projects in favor of others would be to forego the net benefits to those projects.

RESPONSE 21.19: See response to comment 21.18 above.

RESPONSE 21.20: Plan 3B, the EQ Plan, was formulated as prescribed in US Army Corps of Engineers planning regulations (ER 1105-2-200 series) and is consistent with these regulations.

RESPONSE 21.21: See response to 21.20 above. Reasonable alternatives not within the complete jurisdiction of the lead agency were discussed on page 44 of the main report.

INCREASED WATERWAY USER CHARGES

	Annual Added Revenues (millions of dollars)					Cumulative Five-Year Increase
	1982	1983	1984	1985	1986	
CBO Baseline						
No subsidy	1,170	1,280	1,400	1,530	1,650	7,030
50 percent subsidy	560	610	660	710	760	3,300
Carter Budget						
No subsidy	1,210	1,590	1,650	1,640	1,630	7,720
50 percent subsidy	580	770	790	760	750	3,650

NOTE: Preliminary estimates, subject to change.

The federal government has subsidized inland waterway transportation through construction, operation, and maintenance of inland waterway facilities. Over the next five years, the Army Corps of Engineers will spend an estimated $7.5 billion for inland navigation purposes. Approximately $440 million of these expenditures will be recovered through the existing waterway user charges, leaving a federal subsidy of about $7.0 billion over the 1982-1986 period.

Current waterway user charges, in the form of a fuel tax, were established under the Inland Waterways Revenue Act of 1978. These charges take effect in 1981 and will be phased in over the next five years, rising from 4 cents a gallon at the outset to 10 cents in 1986 and thereafter. The estimated $440 million in receipts for the five-year period 1982-1986 will cover only 6 percent of projected federal expenditures for waterway navigation purposes during the period.

Full recovery of these costs through a fuel tax would require a tax equal to about $1.30 a gallon. Such a high tax is impractical and unlikely to be imposed because of administrative problems and because fuel consumption does not necessarily reflect the benefits received by a given waterway user. The same revenues could be raised through fees or tolls that reflect the actual costs of constructing, maintaining, or operating a particular waterway segment. The use of segment tolls would mean that some marginal projects would not be built and others might be closed down. Thus, the estimated savings would consist of two parts--increased revenues through user fees and reduced outlays by the Corps of Engineers as certain projects were dropped.

The full recovery of total federal expenditures for inland waterways would result in taxpayer savings of approximately $7.0 billion in 1982-1986. Most of the costs of increased user charges would be passed along to shippers and ultimately to consumers in the form of higher prices. The cost burden of waterway facilities would thus be shifted from the general taxpayer to the beneficiaries of these facilities--specifically, the barge industry, shippers, and consumers.

Shifting the full cost of waterway navigation facilities to the beneficiaries (or users) of such facilities would promote more efficient resource allocation. The rates charged to shippers would more nearly reflect the true economic costs of this form of transportation. Distortions in the choice among forms of transportation resulting from taxpayer subsidies would thus be reduced.

Users of waterway facilities might object to the imposition of charges to cover the full costs on the grounds that other forms of transportation are still subsidized. If charges were imposed to cover half of the costs of these projects, the cumulative savings over the 1982-1986 period would be approximately $3.3 billion.

President Carter's budget proposal for fiscal year 1982 recommends a slightly higher program level for waterway projects than assumed in the CBO baseline. Thus, the savings from increased charges are even larger relative to the Carter budget.

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USER CHARGES FOR DEEP-DRAFT NAVIGATION

	Annual Added Revenues (millions of dollars)					Cumulative Five-Year Increase
	1982	1983	1984	1985	1986	
CBO Baseline	540	600	650	710	770	3,270
Carter Budget	590	730	810	820	850	3,800

NOTE: Preliminary estimates, subject to change.

The Army Corps of Engineers and the Coast Guard spend about $560 million a year improving and maintaining ports and channels to accommodate oceangoing vessels and Great Lakes shipping. Full recovery of these costs from users would total about $3.3 billion between 1982 and 1986.

Except for the military, all deep-draft vessels are engaged in for-profit shipping. If the federal government recovered all deep-draft expenditures from international shipping alone, shipping costs would increase by only about 30 cents a ton, or less than 0.2 percent. Such a level seems unlikely to harm the general economy or divert significant traffic to other ports or transportation modes.

Several different taxing mechanisms are available to recover costs. The most common approach used in other countries is a harbor and channel use fee, under which a charge is assessed each time a ship uses a particular channel or harbor. Another possibility is a fuel tax, but in international shipping it can easily be avoided. Costs could also be recovered through taxes based on the value, volume, or weight of the cargo. The U.S. Customs Service already collects a small tonnage tax on international shipping. Receipts from this tax, which go into the general fund, totaled $14 million in 1980, an effective rate of about one cent a ton. Further study would be required to evaluate the effectiveness of these alternatives and to determine the proper allocation of costs among various classes of users and among different types of facilities.

One argument in favor of this option is that the Congress has broadly applied the user charge principle to other modes of transportation, including highways, airports, and to some extent inland shipping.

Arguments against this proposal include the administrative difficulty of allocating the relevant expenditures by the Corps of Engineers and the Coast Guard, and the possibility of some small reductions in international trade and coastal trade.

President Carter's fiscal year 1982 budget recommendations assume a slightly different program level for improving and maintaining deep-draft ports and channels from that assumed in the CBO baseline, thus accounting for the small savings differences shown in the table.

JEFFERSON PARISH
LOUISIANA
OFFICE OF PARISH PRESIDENT

22

JOSEPH S. YENNI
PARISH PRESIDENT

February 6, 1981

Colonel Thomas Sands,
U. S. Army Corps of Engineers,
New Orleans District,
Post Office Box 60267,
New Orleans, Louisiana, 70610

RE: DEEP DRAFT EIS

Dear Colonel Sands:

Our administrative staff in Jefferson Parish has completed the primary review of the plans to provide deep draft access to the Ports of New Orleans and Baton Rouge. This review indicates the vast benefits, not only to the State of Louisiana and Ports of Baton Rouge and New Orleans, but also to the metropolitan area including Jefferson Parish. In view of these benefits we are entirely supportive of this project.

We are concerned, however, that the proposed dredging of the Mississippi River to a minus 55 ft. elevation may basically affect the water source for the Parish of Jefferson.

The existing water system for Jefferson Parish has been developed with an extremely short storage period. Therefore, any contamination of the water source (Mississippi River) could have potentially disastrous results. Because of the aforementioned, I request that the draft EIS be expanded to cover the following topics:

22.1 1. The short term and long term effect of reintroducing contaminants into the water column by dredging activities.

22.2 2. A detailed 404 Evaluation including standard elutriate testing of the sediments down to the -55 foot elevation.

22.3 3. A discussion of the impacts upon Jefferson Parish if the chloride concentration exceeds 250 mg/1 in the raw water source.

22.4 4. A discussion of how the Corps of Engineers can mitigate these impacts including providing an alternate water source, alternate intake location and desalination equipment.

22.5 5. A discussion of the accuracy and precision of the salt water intrusion analysis.

SUITE 402, 3330 N. CAUSEWAY BOULEVARD, P. O. BOX 8550, METAIRIE, LOUISIANA 70011, 504-834-7700

RESPONSE 22.1: As discussed in Appendix F, while dredge effluent does exhibit elevated levels of some contaminants, this effect is diminished 100 yards downstream from the effluent pipe. Rapid dilution occurs when the dredge effluent mixes with river water. In addition, the majority of the contaminants present are associated with the sediment, rather than in dissolved form. Dredging of the sediments is similar to the natural action of the Mississippi River, which can resuspend sediments during rising stages. Over the long run, the Mississippi River is constantly reworking the top sediments.

RESPONSE 22.2: A Section 404(b)(1) Evaluation has not been completed at this time, but is planned for the next planning phase. Some standard elutriate testing might be performed down to the -55-foot level, or possibly deeper. It should be realized that the data presented in Appendix F are based on tests run on maintenance dredged material. Material to be removed during project construction would be native material which is theoretically less exposed to contaminants than is the recently settled (maintenance) material. Over the project life, the majority (> 96 percent) of the material to be dredged would be maintenance dredged material, however.

RESPONSE 22.3: See page F-39 in Appendix F and C-30 of Appendix C.

RESPONSE 22.4: Information on mitigation measures for increased saltwater intrusion is included in the environmental impact statement, page EIS-73, and Appendix C, page C-34.

Colonel Thomas Sands,
February 6, 1981,
Page 2,
RE: DEEP DRAFT EIS

In view of the above, I strongly request that an expanded EIS be prepared that properly covers all areas and sources of impacts of the proposed channel deepening project upon the water source and residents of Jefferson Parish.

In summary, the Jefferson Parish administration is anxious to unconditionally endorse this project and will do so when we have been properly assured that we will be able to provide safe water to the citizens of Jefferson Parish.

Yours very truly,

JOE S. YENNI,
Parish President

JSY/kjl

RESPONSE 22.5: The flow frequency curve used in the report was developed using the latest frequency guidelines contained in Bulletin 17A "Guidelines for Determining Flood Floow Frequency;" an interagency report by the United States Water Resources Council dated November 1977. The prediction of existing saltwater intrusion for the deep-draft 55-foot channel in place for various low flows is based on steady state mathematical formulae developed by G. H. Keulegan. Mr. Keulegan's work entitled "The Mechanism of an Arrested Saline Wedge" is presented in the McGraw-Hill book "Estuary and Coastline Hydrodynamics" A. T. Ippen editor. This work is state of the art as to the mechanism of the arrested (stopped) wedge.

The League of Women Voters of New Orleans

1636 TOLEDANO STREET · SUITE 301 · NEW ORLEANS, LA. 70115 · TEL. 895–2062

February 12, 1981

23

Colonel Thomas A. Sands
District Engineer, Attn: LMNPD-F
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands:

On the subject of the Draft Environmental Impact Statement for the Study Deep-Draft Access to the Ports of New Orleans and Baton Rouge, the League of Women Voters of New Orleans presents the following comments:

1. One of our concerns is with the accelerated loss of farmland to development
uses. The expectation that the grain and soybean exportation will increase because
larger ships will provide greater efficiency is based, at least in part, on the
23.1 assumption that our farms will be able to produce more to export. Considering
that our population is growing, available farmland is shrinking at a rate of three
million acres a year, and the per-acre crop yields are leveling off, the grain-
based cost-benefit ratio of 8.5 seems to us to be short-sighted and unrealistic.

2. The loss of wetlands, accelerated in turn by agricultural encroachment --
farmers are pushed back by urban development into wetlands -- is of very real
23.2 concern to Louisiana and the nation from an economic viewpoint. We hope that the
Deep-Draft Access Project will be planned carefully so that it will not interfere
with or halt fresh water diversion projects necessary to the continuing life of
our valuable marshes.

3. We appreciate the Project's tremendous benefit to trade, but along with other
23.3 speakers at the meeting, question the wisdom of giving the Project first priority
without thorough research on the possibility of increased salinity in our drinking
water supply and in the marshes, and the possibility of releasing into the wetlands
23.4 as fill an accumulation of toxics from bottom sediments.

4. Louisiana already has a concentration of petrochemical industries along the
Mississippi between Baton Rouge and New Orleans. The disposal of their toxic wastes
safely and at great cost is a serious problem and the subject of much controversy.
More industries, especially those which would add more pollutants to air and water,
23.5 springing up along the so-called Cancer Corridor because there are better shipping
facilities, strikes us as an alarming rather than a desirable prospect. We urge the
Corps to consider deeply how best the dilemma of toxic wastes and the public health
might be resolved. We recommend careful screening of industries coming in and strict-
er enforcement of regulations for air emission and waste discharge.

We believe that the Corps does care and hope that the Deep-Draft Project will successfully incorporate the suggestions made and consider further study of environmental and public health concerns.

Sincerely,

Nancy Turner

Nancy Turner, President

Margaret Perko

Margaret Perko, Environmental Issues Director

RESPONSE 23.1: The larger deep-draft channel in the Mississippi River is being recommended to reduce the transportation cost of oceangoing commerce that would move through the study area with or without the enlarged channel. No economic benefits based on commerce movements induced by the enlargement of the channel are included in the benefit-cost analysis. The recommended plan is economically justified with a benefit-cost ratio of 9.1 based on 1980 commerce with no growth at all over the next 50 years.

RESPONSE 23.2: See response to comment 15.2 on page 27.

RESPONSE 23.3: See response to comment 5.4 on page 12.

RESPONSE 23.4: There does exist the possibility of releasing into the wetlands as fill an accumulation of toxics from bottom sediments. This could be most important in the lower reaches of the project, below mile 10 AHP, where overbank disposal could affect the chemical characteristics of the dredged material. Due to the complexity of chemical behavior, it is quite difficult to predict the exact degree to which heavy metals and other contaminants would be mobilized and made available to the marsh ecosystem. Generally, there is a strong association with the sediments, which tends to immobilize contaminants. When exposed to oxygen an uncertain amount of contaminant release occurs. In higher salinities, complexation might increase the levels of some contaminants which could be present in the water column without exerting harmful effects. The Section 404(b)(1) Evaluation and Ocean Dumping Assessment, planned for AE&D studies, would disclose the full analysis of disposal in both fresh and saltwater. In addition, the monitoring of water quality and tissue concentrations of aquatic organisms would be made an integral part of the proposed project; this may afford the best means of assessing levels of contaminants.

RESPONSE 23.5: Wastes, hazardous and nonhazardous, are in great part a product of our society and the needs it expresses. Our standard of living, our comfort, and our economic well-being as a nation, have been greatly enhanced by the veritable explosion of new products. Much of this has been accomplished by the expanding chemical and petrochemical industries. A by-product of this expansion is the generation of waste materials, in either gaseous, liquid, or solid form, which must be properly managed and disposed.

In Louisiana, Federal and state laws exist with the purpose of protecting public health. These laws may take the form of specific limits of contaminants in air or water, limiting discharges, requiring proper handling and disposal of hazardous wastes, or regulating the shipping of materials on navigable waters. The Corps of Engineers is not the agency responsible for implementation of these laws. The responsibility of developing, implementing and enforcing the air pollution, water pollution, and hazardous waste laws lies with the State of Louisiana Department of Natural Resources and the US Environmental Protection Agency, Region VI.

Plaquemines Parish Commission Council

POINTE-A-LA-HACHE, LA. 70082

24

CHALIN O. PEREZ, PRESIDENT
LUKE A. PETROVICH, VICE-PRESIDENT
MRS. E. LAFRANCE, SECRETARY

COMMISSIONERS:
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MICHAEL E. KIRBY
LENNARD H. MACKENROTH

March 11, 1981

Colonel Sands
U. S. Army Corp of Engineers
New Orleans District
Post Office Box 60267
New Orleans, Louisiana 70160

Subject: Environmental Impact Statement of the Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana

Dear Colonel Sands:

With respect to the subject project, the Plaquemines Parish Commission Council would like to go on record identifying several areas of concern, and requests that the Corps of Engineers address these problems specifically in the final publication of the environmental impact statement.

24.1 The first concern of the Commission Council is with the quality of water supply in the Parish as it may be affected by an increase of salt water intrusion in the Mississippi River. The Parish owns and operates six water plants located at Boothville-Venice, Empire, Pointe a la Hache and Belle Chasse on the West Bank and at Pointe a la Hache and Dalcour on the East Bank. Under current conditions, the Boothville-Venice plant annually experiences chloride levels on the order of 600-800 ppm. This year the level exceeded 1000 ppm. Reservoirs constructed at the Boothville-Venice plant supplement the river water supplies during periods of low river, and it is normally possible to blend these two sources to meet the State and EPA water quality standards. This is a very delicate problem, however, in that the reservoir capacity is limited, and any substantial increase in demand, extended period during which only poor quality water is available, or elevated chloride content would all adversely affect the Boothville-Venice facility. The importance of a high quality water supply for the Boothville-Venice facility not only relates to the residential and industrial development in that area but also is important because this plant is a major source of potable water for the offshore oil industry, which loads many of its water barges in this community.

RESPONSE 24.1: Additional water storage facilities have been included in the recommended plan to mitigate the increased saltwater intrusion at the east Pointe a la Hache water plant and the west Pointe a la Hache water plant.

The Empire facility has been closed as a result of a levee setback in this area, which eliminated the reservoir which was used for dilution in the same manner done at Boothville-Venice.

To supplement the West Bank water supply and to provide capacity to make up for the loss of the Empire plant, the Plaquemines Parish Commission Council acquired the Jefferson Lake Sulphur Company water plant in Pointe a la Hache. This plant was renovated and upgraded with the idea of providing an alternate source of water for the entire West Bank below Pointe a la Hache. Research done by the Parish's consulting engineer indicated that the Jefferson Lake plant had never experienced chloride levels above that considered acceptable by the state and EPA. As a result, the Plaquemines Parish Commission Council invested substantial amounts of money at the West Pointe a la Hache facility and has constructed 49 miles of transmission line connecting the Pointe a la Hache and Boothville-Venice water plants. If the "minimal" increase in salt water intrusion results in contaminating the West Pointe a la Hache water plant, the value of the entire water plant and transmission line investment will have been negated. This water supply and water transmission system has been considered to be of prime importance by the Commission Council over the last ten years, and a substantial portion of available capital funds have been invested in the project.

The problem of contaminating the water supply at the West Pointe a la Hache (Jefferson Lake) Water Purification Plant is considered to be extremely important in Plaquemines Parish. Contamination of this supply would be a serious blow to the residents and industry of the lower West Bank of the Parish and would have strong adverse impact on the offshore oil industry served by this water system. There is no alternate source of supply economically available to this plant.

There is no record of chloride problems at the Belle Chasse Water Purification Plant; however, these records are not complete and we believe the records of the New Orleans Sewerage and Water Board Algiers plant would be valid in the Belle Chasse area.

The East Pointe a la Hache water plant is located just upstream and across the river from the old Jefferson Lake facility. During the recent low water, chloride levels hovered just above the allowable 250 ppm. This plant has had chloride problems of limited duration during extreme low water in the past.

The Dalcour plant, to the best of our knowledge, has never experienced chloride levels above that considered allowable.

The Mississippi River levee construction, which has protected the people and development in Plaquemines Parish, has confined fresh water to the river channel and limits fresh water supply to the marshlands that make up 95% of the Parish. The resulting intrusion of salt water into the marshlands has markedly changed the vegetation, caused substantial land loss, and adversely affected the ecological makeup of the remaining land. That these destructive processes can be reversed has been shown on a small scale by existing fresh water siphons. Fresh water diversion and other marsh building projects in Plaquemines Parish are critical to the maintenance of the existing marsh and to reconstruction of marshlands along the shoreline. Construction by the U. S. Corps of Engineers of rock sills across the Baptiste Collette, The Jump, Pass a Loutre, and Cubit's Gap have seriously impaired land build-up in recent years. The proposed deepening of the channel has serious ramifications for existing and future fresh water diversions in Plaquemines Parish, as follows:

24.2 1. An increase in salt water wedge intrusion in the river that reduces the fresh water available for diversion is a major problem which is not adequately addressed in the proposal.

24.3 2. Maintaining sufficient flow of fresh water in the river for navigation, industrial and public use, fresh water diversions, marshland reclamation, and shoreline protection in Plaquemines Parish needs to be evaluated.

24.4 3. If as much as ten percent of the river flow is diverted in the future, how will this affect the quality and/or quantity of water for other uses, including navigation in the lower reaches of the river and channel maintenance at Head of Passes.

24.5 4. How will the anticipated increase in suspended sediment load during construction and post-construction maintenance of the proposed project affect water quality for fresh water diversions, and what alternatives, at what costs, are available for unexpected deleterious effects?

RESPONSE 24.2: The increase in saltwater intrusion into the Mississippi River with the larger channel would not impact upon the potential for freshwater diversion. Saltwater intrusion with or without the recommended plan would only occur when discharges and water levels in the river are very low and the differential water levels preclude significant diversions of flows. During these conditions, the water levels in the bays and marshes surrounding the river would be very similar to those in the river.

RESPONSE 24.3: See response to comment 15.2 on page 27.

RESPONSE 24.4: See response to comment 15.2 on page 27.

RESPONSE 24.5: Increased suspended sediment loads would have marginal effects on freshwater diversion. Freshwater diversions would primarily be accomplished during high water seasons when ambient suspended sediment loads would be high.

24.6 5. How does deepening the channel, coupled with unexpected complications of maintaining the Old River structure, effect existing and future fresh water diversions in Plaquemines Parish? What provisions have been considered for protecting the water supply for these diversions in the event of such a complication?

24.7 6. What effects will future river control structures above Baton Rouge have on total river flow, sediment loads, and water quality and quantity in respect to Plaquemines Parish demands for fresh water diversions?

24.8 From time to time Plaquemines Parish Commission Council water purification plants, particularly those in the lower end of the Parish, have had difficulty in meeting the turbidity requirements of the State Department of Health. The Council is concerned that the necessary dredging required to clear out the channel above Plaquemines Parish and the dredging required to maintain this channel will make the turbidity problem more difficult. It is hoped that requirements will be put upon the dredging procedure that will not result in degradation of the downstream water supply. In addition, prior to the suspending or resuspending of material as a means of dredging, the quality of the material should first be analyzed, thereby reducing the unknown potential of uncovering a hazardous waste condition. The information obtained would serve as a base line for future river dredging activities and would provide the State of Louisiana with needed river quality information.

The subject of suspending dredge material as a means of removal within the boundaries of Plaquemines Parish does not adequately address itself to the land loss that we are experiencing. It is our desire that all material dredged from the river be captured to the maximum extend possible, and that land building activities, marsh reclamation and public use be considered as an alternative to merely suspending the dredged material.

24.9 The following is a list of possible soil disposal sites within the Parish of Plaquemines:

A. On the right descending bank between Myrtle Grove and West Pointe a la Hache between State Highway 23 and the river levee.

B. On the right descending bank in the marsh area between Port Sulphur and Buras.

C. On the right and left descending banks of the river below Venice.

D. On both sides of Southwest Pass.

E. On the left descending bank from Ostrica to Baptiste Collette Bayou.

RESPONSE 24.6: Due to the severe environmental and social effects associated with a change in the course of the Mississippi River, the intent of Congress in authorizing the Old River, Louisiana, project in 1954 will continue to be carried out.

RESPONSE 24.7: The existing 70/30 percent distribution of flows between the Mississippi River would be maintained over the project life.

RESPONSE 24.8: Dredging and in-river disposal would suspend materials in the water column and increase turbidity; however, the extent of this effect is within the fluctuations which occur in the river through scouring and sediment transport processes. A monitoring program is being considered for dredge effluents entering the Mississippi River as a result of project construction and maintenance. It must be acknowledged, however, that the increased suspended organic material may affect the TH_m problem.

RESPONSE 24.9: Only two Mississippi River "crossings" between Venice and New Orleans would require dredging for the construction and maintenance of a 55-foot project depth channel. These crossings are approximately 55 feet in depth and dredging requirements are too small to warrant overbank deposition. Downstream of Venice, Louisiana, the material dredged from the Mississippi River and Southwest Pass would be used to build marsh and other habitats along either side of the channel as suggested in your paragraphs C and D.

RESPONSE 24.10: Although more deeply loaded ships would enter the Mississippi River with the recommended plan, the number of deep-draft vessel--trips would decrease as the average vessel load of commerce would be much larger. Significant increases in bank erosion should not occur.

The proposed marsh building activities below mile 10.7 of the river does not adequately address itself to the needs of the Parish.

The Plaquemines Parish Commission Council is not adverse to deepening the Mississippi River to provide a 55 foot channel and, indeed, endorses the project as one that could have far reaching beneficial impact on the Parish and the State. However, if such impacts seriously reduce the quality of life and the attractiveness of development in the Parish, then changes in the proposed plan must be made to eliminate the undesirable and unacceptable side effects of the project.

24.10 With the entrance of deeper draft vessels into the river, there will probably be increased erosion of the banks and widening of channels. The only solution to this problem is further utilization of articulated mattresses and foreshore rock protection to protect against further widening of the channel and bank erosion.

Please be assured of our continued support of the Corps project in Plaquemines Parish and our interest in cooperating and coordinating our efforts in connection with this particular project.

The comments provided herein are not all inclusive, and supplemental comments may be made from time to time.

Yours very truly,

Plaquemines Parish Commission Council

President

COP:ma

SOUTHERN NATURAL GAS COMPANY

POST OFFICE BOX 2563

BIRMINGHAM, ALABAMA 35202

25

J. W. BLEDSOE
VICE PRESIDENT-TRANSMISSION

February 27, 1981

Department of the Army
New Orleans District
Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Re: Proposal to Provide Deep Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana - Comment of Southern Natural Gas Company

Gentlemen:

Please accept this letter as the formal comment of Southern Natural Gas Company upon the proposal of the Corps of Engineers to provide deep draft access to the Ports of Baton Rouge and New Orleans, Louisiana. Southern Natural sincerely appreciates this opportunity for comment.

Southern Natural Gas Company and its subsidaries own and operate a 7,800-mile underground pipeline system that supplies natural gas to a seven-state area in the Southeastern United States including many major metropolitan areas. The majority of natural gas transmitted through this entire system originates from gas fields on and offshore Louisiana and is transmitted through gas pipelines directly affected by the proposed project.

25.1 Southern submits that the approval of the tentative findings, a draft environmental impact statement and the commencing of the proposed project should not occur without further careful study. In general, the proposed project would have a severe economic impact upon Southern Natural and its customers, as well as the environment and quality of life of the citizens of the neighboring geographical areas.

25.2 The proposal would necessitate the replacement of a number of Southern Natural's natural gas transmission pipelines across the Mississippi River, the cost of which is incalculable at this point without the benefit of detailed engineering and environmental studies. The current dredging technology for laying pipelines across rivers is incapable of

RESPONSE 25.1: The cost of relocating submarine oil and gas pipelines and cables has been included in the recommended plan. This cost would be borne by the owner of the facility and, in most cases, would eventually be distributed among the customers of the company owning the facility. Other than these costs, the impact of relocating these facilities on the environment and quality of life of study area residents would be minimal.

RESPONSE 25.2: Contact with Shell Pipeline Corporation indicates that companies like McDermott, Inc. do have the capability to design and place pipelines to a depth sufficient to accommodate the proposed project.

SOUTHERN NATURAL GAS COMPANY

Department of the Army
New Orleans, Louisiana 70160
February 27, 1981

Page -2-

25.2 placing a pipeline at a depth sufficient to accommodate the proposed project. The lack of alternative techniques and associated technical problems makes it impossible to estimate the actual cost of replacement of Southern Natural's pipelines and those of other affected companies without considerable study. Southern suggests that the Corps of Engineers' estimate of $149 million is too optimistic. These costs can only

25.3 be borne by the ultimate consumer. The Corps of Engineers should also consider the impact on the environment through the loss of wetlands and the advance of salt water into populated areas. Although these considerations are not easily quantifiable, they are no less important in the overall evaluation of the efficacy of the project.

25.4 Louisiana's coastal wetlands are being lost at a staggering rate of some 25,000 acres per year (40 square miles) with an estimated 500,000 acres having been lost since 1956. Intensive study should be given to projects of the magnitude that could result in the enhancement of these loses. Such loses could ultimately result in substantial adverse economic impacts to energy production and transmission facilities throughout the coastal system.

25.5 Southern urges that indepth studies be undertaken to determine the complex long-term economic and environmental impacts of the proposed project.

Very truly yours,

J. W. Bledsoe

J. W. Bledsoe

JWB:ll

RESPONSE 25.3: The impact of marsh loss is addressed in paragraph 6.5.3.4 on pages EIS-56 and EIS-57 and on page B-24 of Appendix B. See response to comment 5.4 on page 12.

RESPONSE 25.4: The recommended plan would result in the creation of approximately 11,600 acres of marsh, with dredged material near the mouth of the Mississippi River, over the 50-year project life. Measures to enhance and possibly create wetlands, through freshwater diversion, are being addressed under two ongoing Corps of Engineers studies, the Louisiana Coastal Area study and the Mississippi-Louisiana Estuarine Area study.

RESPONSE 25.5: The environmental and economic effects, both beneficial and adverse, were carefully considered in the development of the recommended plan. When and if a Federal project is authorized, additional studies would be undertaken, where needed, to ascertain such effects and mitigate any adverse effects, if necessary.

March 12, 1981

26

Colonel Thomas A. Sands
Department of Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160

Dear Colonel Sands,

The following comments and questions are offered in response to the Corps of Engineers Draft Environmental Impact Statement prepared for the Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, published in December 1980. They represent my personal concern about the economic feasibility of the project and the great environmental impact of the proposal. A personal response to my comments and questions would be appreciated in addition to responses and changes in the body of the Final Environmental Impact Statement.

26.1 #1. The EIS is void of any discussion as to the need to extend the 55 foot channel all the way to Baton Rouge. The cost/benefit ratio for plan 2b is not as high as for plan 2; there is no discussion of inadequacy of port facilities in New Orleans to handle larger ships or increased tonnage; there is no discussion of unique properties of the Port of Baton Rouge which make a 110-mile extension of the 55 foot channel desireable. The reader is left to conclude that the channel is being pushed through to Baton Rouge because it is politically expedient to do so, not because of any increased benefits over costs.

26.2 #2. There is no mention of a possible change in flow of the Mississippi River into the Atchafalaya River system as predicted by Fisk and others. The river has a long history of changing its course [it has done so at least five times in the last 5000 years] and the latest scientific data indicates that despite the best efforts of the Corps of Engineers and the Old River Control structure, a greater percentage of the Mississippi's flow will travel to the Gulf of Mexico via the Atchafalaya Basin. The EIS is totally devoid of any discussion of the effects of such a change on (a) the proposed 50 year project life (b) effects of saltwater intrusion in the lower Mississippi (c) the availability of freshwater for diversion projects to save marsh land and prevent land loss (see comment #3, below) (d) the cost consequences of such a change relative to maintaining a 55 foot channel with decreasing amounts of flow to disperse sediment.

26.3 #3. The data base used by the Corps of Engineers to develop a cost/benefit discussion of the project in regard to land loss is hopelessly out of date and dangerously incorrect. The Corps relies on Gagliano and Van Beek's 1970 study which indicate Louisiana is losing land in its coastal zone at a rate of 16 square miles per year. Gagliano and Van Beek's 1981 study conclusively demonstrates that land loss is far is excess of what was previously thought. Their latest work show Louisiana losing

RESPONSE 26.1: The estimated first cost of extending the 55-foot channel from the upper limit of the Port of New Orleans through the Port of Baton Rouge is $219 million, the estimated average annual cost is $90 million, and the estimated average annual benefits total $594.0 million. The resultant benefit-to-cost ratio for the extension is 6.6 and the average annual net benefits (difference in annual benefits and average cost) are $503.9 million. This exercise is accomplished in the plan formulation section of the report by comparing plans 2 and 2B which are identical except the former extends from New Orleans to the gulf while the latter extends from Baton Rouge to the gulf (see table 19 of the main report). Facilities between New Orleans and the gulf are inadequate for the commerce they handle. There are extensive facilities upstream of New Orleans which would benefit from the extension of the channel, as reflected in the incremental economic benefits mentioned above.

RESPONSE 26.2: Due to the obvious severe adverse social and economic effects which would result from a change in the course of the Mississippi River, the intent of Congress in authorizing the Old River, Louisiana, project will continue to be carried out over the 50-year life of the proposed navigation project.

RESPONSE 26.3: See response to comment 19.1 on page 33.

40 square miles of coastal land per year and that the rate of erosion is increasing geometrically. Use of outdated information invalidates all the EIS discussion about the positive effects of the project on erosion. The Corps will need increasing amounts of water to keep Southwest Pass sediment free. Gagliano and Van Beek conclude that massive freshwater diversions (and the accompanying sediment are needed to
26.4 offset the tragic land loss in Louisiana. The EIS (a) fails to recognize the magnitude of the problem (b) fails to discuss alternatives (c) fails to discuss the need for freshwater diversion and the increase diversions will effect in maintenance dredging cost (and therefore correspondingly lower benefits) of the project.

#4. The cost figures developed by the Corps of Engineers smack of Orwellian economics. Particular attention is drawn to pages E-6, E-7 and E-13, E-14 of the Draft technical appendix. As set forth in the EIS, plans 2 and 2b are the same except that Plan 2b calls for the dredging of 110 miles of additional river bottom from New Orleans to Baton Rouge. Sediment from this dredging will be disposed of by "swirling" the sediment into the waters of the Mississippi and letting the current carry
26.5 it down stream. The draft appendix would have the public believe that his "swirl" dredging will cause no increased initial cost in the project from Southwest Pass to New Orleans and no increased cost in maintaining the channel from Southwest Pass to New Orleans. This is patently absurd. Initial swirling of nearly 27 million cubic yards into the Mississippi above New Orleans will have a devastating effect on initial effort and the maintainance effort downstream. This is especially true when the salt water wedged is allowed to penetrate farther upstream during low water due to the 55 foot channel. I submit that your cost figures for plan 2b are fanciful. The <u>real</u> cost of Plan 2b will further reduce its attractiveness in terms of the benefit it will provide.

26.6 #5. The EIS does not address itself to Hurricane surges in the deeper 55 foot channel, and their deleterious effects on communities along the River.

#6. Ship safety issues are not addressed in the EIS. The proposed 55 foot
26.7 channel would attract a greater number of ships and many larger, less maneuverable, ships. The possibilities of collision with resulting property damage, spills etc. were not considered by the EIS or examined as a cost to be included in the program.

26.8 #7. The increased levee erosion caused by a deeper channel is not discussed nor is it examined as a cost to be included in the EIS.

#8. In regard to the ships projected to use the new deep draft channel, the EIS is deficient in several aspects:
(1) By the Corps own figures (at E-31) 81.6 to 97.7% of all the deep draft traffic projected to use the new channel will be foreign flag vessels. Benefits for the project are computed on the basis of the average trip length by these foreign vessels <u>outside</u> the U.S. in savings
26.9 in cost/ton carried. What the project does, <u>in essence</u>, is provide foreign ship owners a massive subsidy. It is extremely doubtful that the National Environmental Policy Act permits environmental costs to U.S. ecosystems to be balanced against "benefits" accruing to foreign shipowners. Again using the Corps and own figures, nearly 60% of the total tonnage moved on the Mississippi travels in barges that will not benefit from a deeper channel. That up to 97% of the remaining 40%

RESPONSE 26.4: See responses to comments 19.1 and 19.2b on page 33 and 15.2 on page 27.

RESPONSE 26.5: The increased dredging operations in the Mississippi River would not affect the volume of flows or sediments through the river system nor would it affect the sediment-carrying capacity of the river except at the site-specific locations of the dredging operations (dredging would not involve river bottoms along the entire reach). Rehandling costs are included in the dredging estimates for the crossings between Baton Rouge and New Orleans due to their close proximity to each other. The volume of dredged material and the dredging requirements, at any specific location far below the dredging operations, would not be significantly affected.

RESPONSE 26.6: See response to comment 3.1 on page 6.

RESPONSE 26.7: The enlargement of the deep-draft channel in the Mississippi River should not result in a significant increase in hazards to navigation. Larger, deep-loaded vessels would move over the deeper channels; however, because significant volumes of induced commerce are not anticipated, the number of vessel trips should be significantly reduced. Additional aids to navigation are included in the recommended plan to facilitate navigation of the larger ships. The net effects of a smaller number of deeper loaded ships is not certain; however, a significant increase in the hazard to navigation is not anticipated.

RESPONSE 26.8: The enlargement of the deep-draft channel, per se, would have no effect on levee erosion. The movement of deeper loaded vessels is not expected to have a significant effect on levee erosion.

26.9 of the tonnage on the river is carried by foreign ships, suggests that the cost/benefit analysis done by the Corps is not meeting the statutory mandate of NEPA. (2) Great importance is placed on the fact that many ships moving in the Mississippi at present on the fact that many ships moving in the Mississippi at present are "light loaded". The fact that some ships do travel light-loaded appears to be one of the major justifications for the otherwise unsupported assumption that the world-wide trend is toward larger vessels of deeper draft. Nowhere does the EIS offer the information that it is quite common for ships to move from port to port with less than a full load. Also absent from the EIS are any additional facts that would justify the assumption that the trend for ships moving in the Mississippi is toward larger, deeper-draft vessels. (3) The EIS provides the percentage of three diferent types of ships moving in the Mississippi, but ommits the number of ships those percentages represent, thereby making it impossible to use the figures in any meaningful way. (4) Corps figures show that without any action, shipping traffic on the Mississippi will increase. It is unclear from the calculation of the benefits accruing to the project are whether or not the benefits assigned to the project include only those in excess of shipping as it would occur without the project or whether benefits are assigned to the project without regard to whether they represent new shipping attracted to the Mississippi by the deeper channel.

#9. 26.10 Finally, the conclusion on the EIS that the project is in full compliance with the approved state Coastal Zone plan is erroneous. The project violates several guidelines of the Louisiana Coastal Zone Plan including 1.7 (a), (c), (d), (e), (h), (i), (j), (k), (l), (m), (o), (p), (s), (t); 3.1, 3.2, 3.3, 3.9, 4.4, 6.14, 7.1, 7.2, 7.3, 7.4, 8.1, 8.5, 8.4, 8.8. Serious questions regarding the consistency of this project with the state coastal zone management are ignored by the EIS.

Very truly yours

Paul Hribernick
Attorney at Law
550 Lee Drive #59
Baton Rouge, La 70808

RESPONSE 26.9a: It is Corps of Engineers policy to claim as national economic development benefits all savings in transportation costs attributable to Federal deep-draft navigation projects. The Department of the Army has submitted to Congress a proposal for the recovery of the Federal costs of future deep-draft navigation projects from local interests, who would be allowed to collect user fees. The National Environmental Policy Act, as amended, does not establish policy for economic analysis of Federal water resources projects. The movement of light-loaded ships over the river is not justification for channel enlargement, but is cited as evidence that larger ships exist to take advantage of larger channels.

RESPONSE 26.9b: The bulk ships that would move the cargo upon which 98 percent of the navigation benefits are based, usually move loaded on one leg of each journey and empty on the return leg, due to the nature of their cargo. Many of these bulk carriers move light on their loaded leg due to restrictive channel depths, and additional vessel trips are required to move a given volume of cargo. Some bulk carriers move light-loaded for other reasons, and it is common for general cargo ships, upon which 2 percent of the benefits are based, to move light-loaded from port to port. The trend to larger ships is evident in the fleet of ships moving over the river today, and the project would be economically justified if the ships that actually moved on the river in 1975 and 1976 could have loaded to drafts of up to about 51 feet (in a 55-foot channel).

RESPONSE 26.9c: Information on the number of vessel trips for the period 1975 through 1979 is presented in table A-29 of Appendix A.

RESPONSE 26.9d: The economic benefits are based only on oceangoing commerce that is expected to move under "without project" conditions.

RESPONSE 26.10: See Appendix G (Consistency Determination: Louisiana Coastal Zone Management Program)

U. S. ARMY ENGINEER
CORPS OF WNGINEER
P.O. BOX 60267
NEW ORLEANS, LA. 70160

1/25/81

27

RE: LMNPD-F

Dear Col. Sands:

As a citizen concerned with our environment, these are some of the questions that I would like to have answered.

1. Dredging material that will be used to create new marshland habitat, which will be from dredge material on an annually basis, will these dredge material eventually create high and dry land and permit the encroachment of urban or industrial development in the wetlands?

27.1

2. With the deepening of the river from forty to fifty-five feet, what about salt water intrusion up the Mississippi River to our drinking water intake, during low river levels like we are now experiencing in January, 1981?

27.2

I would like the above questions to be answered and become part of the EIS.

Respectfully,

A.J. Planche Jr.
5400 Canal Rd.
Marrero, La. 70072

RESPONSE 27.1: Dredged-material disposal would call for movement of the hydraulic dredge pipe as frequently as necessary to optimize marsh creation. This process would result in low mounds of dredged material, partially or completely surrounded by marsh, scattered throughout the disposal area. Those portions of the mounds which would not develop into marsh would be too isolated and small for urban or industrial development without further filling. This type of filling activity would require a permit from the Corps of Engineers.

RESPONSE 27.2: See response to comment 5.4 on page 12.