

Section 4. Recommended Plan

1. General.

The recommended plan provides for the construction of a new, larger lock located adjacent to the existing lock at Bayou Sorrel, for the construction of approach channels to the new lock, for the closure of the existing lock, for measures to mitigate the impacts of the project on fish and wildlife resources, erosion protection, and mooring buoy facilities. Features of the plan are shown in Figure 3.

2. Features.

a. New Lock. The new lock would have a U-shaped concrete chamber, with dimensions of 75 feet by 1,200 feet. The sill depth of the lock would be at an elevation of -15 feet NGVD. Each set of lock gates would consist of two, 70-degree steel sector gate leaves, which would be electrically operated. Emptying and filling of the lock would be accomplished by the controlled opening of the gates. The guide walls, 1,200 feet long on the west side of the lock and 400 feet long on the east side, would be constructed of a high density synthetic material attached to timber piles. The gates and gate bays on the floodway side of the lock, which tie into the East Atchafalaya Basin Protection Levee, would have an elevation of 31.7 feet NGVD, and the chamber walls and landside gates and gate bays would have an elevation of 26.8 feet NGVD.

b. Closure of Existing Lock. When the new lock structure is completed and becomes operational, the existing lock would be closed by an earthen levee extending from the East Atchafalaya Basin Protection Levee south of the existing lock across the floodway side approach channel to the floodway end of the new lock. The existing lock would be abandoned in place and its approach channels and chamber would be filled with dredged material during periodic maintenance of the Morgan City-to-Port Allen Alternate Route.

c. Approach Channels. The construction of the new lock would require the construction of new approach channels on the northern, or protected, side of the lock and on the southern, or floodway side, of the lock. The Atchafalaya Basin Floodway East Access Channel, which currently joins the south approach channel of the existing lock immediately south of the lock, would be relocated west of its existing alignment and extended southward to tie into the Morgan City-to-Port Allen Alternate Route about 5,000 feet south of the new lock. During high water, cross currents from the East Access Channel cause significant problems to tows approaching the south guide wall. Relocating the channel west and extending its junction with the new lock's south approach channel will allow barge traffic ample time to negotiate the cross currents before reaching the lock guide walls.

The northern approach channel to the new lock, on the protected side of the floodway levee, would parallel the existing northern approach channel for about 3,500 feet and then merge with the existing navigation channel.

d. Erosion Protection. Bank stabilization extending 1-½ miles to the north and south of Bayou Sorrel Lock will be placed to minimize the effect on residences of marine transportation activities in the vicinity of Bayou Sorrel Lock. Hydraulic analysis required a minimum 2-foot blanket of stone from the waters edge to natural ground elevation to protect against the most severe wave damage resulting from prop-wash. Geotextile separator fabric will be placed between the existing bankline and the stone paving.

e. Mooring Buoy Facility. In connection with the erosion protection feature of the recommended plan a floating mooring buoy facility will be incorporated to provide a safe location for barges to utilize if needed when using the Lock. The locations will include 14 mooring buoys in the vicinity of the new lock and 13 mooring buoys north of the Bayou Sorrel Bridge. In order to place the 13 mooring buoys north of the Bayou Sorrel Bridge dredging will be required to provide at least 9-feet in the vicinity of the mooring buoy.

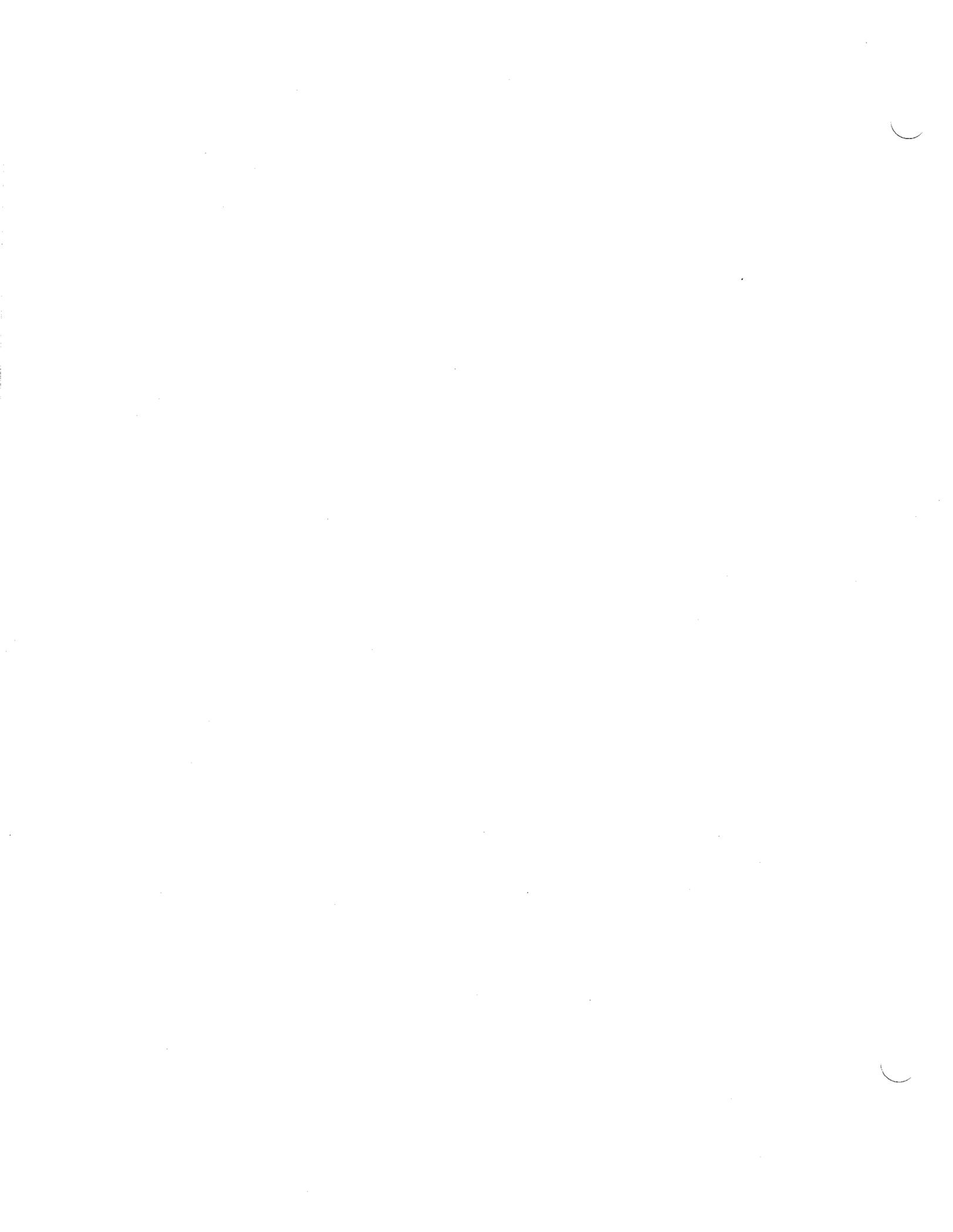
f. Disposal Areas. Material to be dredged from the new tailbay channel would be placed into two existing borrow pits. There would be impacts from the conversion of bottomland hardwood forest to open water resulting from the channel cut, but no net adverse impacts associated with the dredged material disposal. The new forebay channel would be cut through existing disposal areas and bottomland hardwood forest. Dredged material from this new channel would be placed in existing disposal areas to the west of the lock. After the new lock is operational, the East Access Channel would be relocated. Relocating this channel would also impact existing disposal areas and bottomland hardwood forest. Dredged material from this channel would be placed into the old lock's forebay and tailbay channels and the old lock chamber. Mitigation credit would come from the planting and management of disposal areas. The area between the new forebay channel and the relocated East Access Channel would become an uneconomic remnant of real estate to be acquired in fee by the Government. This area would be planted and managed as a hardwood forest. Mitigation credit would also come from eliminating the need for dredged material disposal in the Atchafalaya Basin. In the absence of a new Federal project, cypress swamp and bottomland hardwood would continue to be converted to disposal areas. With the project, existing channels would be used for disposal of material dredged during routine maintenance, for up to 35 years after project completion. These disposal areas would be planted and managed as hardwood forest when they are filled to capacity.

g. Relocations. There is no relocation of pipelines, power lines, or other facilities required for the implementation of the recommended plan.

h. Real Estate Requirements. The new lock will be built on existing fee-owned land (262 acres). The construction of this project will require 273.2 acres of new fee-owned land and 102.4 acres of easement. One landowner owns all new right-of-way. All of the land that will be acquired in fee is already encumbered with U.S. Army Corps of Engineers easements for the Morgan City-to-Port Allen Alternate Route of the Gulf Intracoastal Waterway project or the East Access Channel of the Atchafalaya Basin project, or with a levee easement held by the Atchafalaya Basin Levee District. The

proposed project does not entail any relocations of residences, businesses, or farms covered by Title II of the Uniform Relocation Assistance Act (Public Law 91-646). Within the project area, there are five improvements, consisting of mobile homes and small wood frame structures, located on land over which the United States holds a perpetual channel easement for the GIWW. This area is just north of the existing lock, and we will purchase this land in fee for the construction of the new lock. Our legal staff rendered an opinion that the owners of these improvements (tenants by virtue of a year-to-year lease from the underlying fee owner of the land) are not entitled to compensation and that benefit payments under the provisions of Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (URA), Public Law 91-646, as amended, are not applicable.

i. Mitigation Features. The recommended plan was developed with the objective of avoiding and minimizing adverse impacts to fish and wildlife habitats and compensating for remaining adverse impacts. Most of the impacts of the project could result from dredging of the connecting channels, relocating the East Access Channel, and dredged material disposal. A primary focus of mitigation planning was to minimize adverse impacts to cypress swamp and bottomland hardwood forest within the Atchafalaya Basin. The habitat assessment models do not adequately capture the environmental effects of the conversion of wet, bottomland hardwood forest more upland-type habitat that does not get periodically flooded. Also, the habitat assessment models cannot adequately capture the effect that dredged material disposal areas have on nearby cypress swamps by blocking-off headwater flows. In order to mitigate for these two effects, additional mitigation is planned. A new ditch would be constructed through existing dredged material disposal sites to connect the East Access Channel with the swamp to the west of the disposal sites. A sediment trap would also be built on an existing ditch located along the northern boundary of existing disposal sites. These features would be built during project construction. These mitigation features therefore serve two purposes – mitigation and environmental restoration. The costs associated with planting and reforestation are those costs necessary for preparing the mitigation areas for planting, reducing competing vegetation, replanting as necessary to replace dead seedlings, and monitoring the mitigation sites. No real estate costs are associated with the fish and wildlife mitigation plan. All lands to be used for mitigation would be acquired in fee by the Federal government as part of the project. Some parcels would be acquired as “uneconomic remnants” (land that would be isolated from surrounding areas because of project construction).



3. Design and Construction Considerations

One contract will be awarded to construct the lock structure and connecting channels. Estimated construction time is 3 years. The replacement lock will be located northwest of the existing lock. The lock structure will consist of two sector-gated monoliths with a concrete U-frame chamber 1200 feet in length. The existing lock will remain in operation during construction of the new lock and will be decommissioned only after the new lock is operational. The old lock will become part of the Atchafalaya Basin flood protection after it is closed and closure is placed between its sector-gate monoliths. The construction sequence is as follows:

First Year.

1. Mobilization, clearing and grubbing.
2. Drive probe piles at both gate bays. Perform pile load tests based on probe piles driving resistance.
3. Install piezometers and first stage wellpoints at elevation 4.0 (tip el. -37.0), and start initial excavation and cofferdam construction.
4. Complete construction of the cofferdam and excavate to el. -11.0. Excavated material will be stockpiled onsite at locations where future flood protection will be constructed.
5. Start driving piles and placing stabilization slab for chamber monoliths.
6. Complete excavation.

Second Year.

7. Mobilization of earthwork equipment to mechanical dredging site for Atchafalaya Basin East Access Channel and forebay channel. Start excavation for realignment Atchafalaya Basin East Access Channel.
8. Place first lift of base slab for gate-bay monoliths.
9. Construct/refurbish access roads and retaining dikes for disposal areas east of existing lock and southwest of realigned Atchafalaya Basin East Access Channel.
10. Place base slab and adjacent fill for chamber monoliths.
11. Place walls and adjacent fill for gate-bay and chamber monoliths.
12. Mobilization of hydraulic dredge. Start dredging tailbay for new lock. Dredging of the forebay between the existing East Atchafalaya Basin Protection Flood Protection and new lock location will take place after completion of the lock.

Third Year.

13. Place final fill for gate-bay and chamber monoliths. Start fertilizing and seeding operations.
14. Construct levees for East Atchafalaya Basin Flood Protection; earthen levee sections for T-walls and I-walls and levee enlargement over existing Bayou Sorrel Lock earthen embankments. The sheetpile for the I-wall and T-wall shall be placed to provide temporary flood protection.
15. Construct new operating buildings.
16. Place sector gates and miscellaneous steel. Perform mechanical and electrical work for structure and operating buildings.
17. Complete hydraulic and mechanical dredging for forebay and tailbay. Flood structure.

18. Construct guidewalls and dolphins. Perform associated mechanical and electrical work.
19. Complete mechanical dredging of the access channel. Construct closure of old east access channel.
20. Place stone bedding and riprap (Part of the stone bedding and riprap may be performed in the dry).
21. Open new lock and decommission old lock.
22. Drive piles for T-walls and I-walls for East Atchafalaya Basin Flood Protection. Construct concrete portion of T-walls and I-walls.
23. Construct closure of old lock, including removal of old line of flood protection. Closure construction shall include approximately 236 feet of temporary I-wall sheeting.
24. Complete any miscellaneous work, including fertilizing and seeding.
25. Demobilization.

4. Operation and Maintenance Considerations

The new Bayou Sorrel Lock will be operated 24 hours per day, seven days per week to provide navigation passage through the East Atchafalaya Basin Protection Levee. Major repairs to the lock gates will be carried out on a 12-year cycle, or as needed to maintain the integrity of the paint coating system and repair or replacement of worn or damaged parts. In accordance with a 2001 Memorandum of Agreement between the U.S. Corps of Engineers, the Captain of the Port of U.S Coast Guard in New Orleans, the Louisiana Office of Emergency Preparedness, and the Iberville Parish Office of Emergency Preparedness, mooring facilities will be maintained in the vicinity of the lock, and the lock will be closed to navigation when the north gage exceeds 7.3 feet and remain so until the gage reaches 6.9 feet and falling. Compensatory mitigation for the project would occur during project construction and over the life of the project. During operation and maintenance of the project, monitoring of the mitigation plan would be necessary in order to determine the degree of success and to apply adaptive management if problems arise. Monitoring is planned 1 year after the end of construction and about every 5 years afterwards. Monitoring would be accomplished by the Park Manager of the U.S. Army Corps of Engineers, New Orleans District's Atchafalaya Basin Floodway System Project, Louisiana.

5. Costs of Recommended Plan

Micro Computer-Aided Cost Engineering Systems (M-CACES) figures are being used for the purpose of allocating cost and differ from the Plan Formulation estimates. The difference is not significant enough to affect the selected plan. The figures presented in the following section have been rounded for reporting convenience. In addition, the total implementation cost includes bank stabilization cost added following the public meeting. As a planning tool, all cost have been indexed up to 2003 price levels based on EM 1110-2-1304 Civil Works Construction Cost Index System (CWCCIS), 31 March 2000, tables revised as of 30 September 2003. A summary of the implementation costs of the recommended plan is presented in Table 4-1, and a summary of the operation and maintenance costs is presented in Table 4-2 at 2000 and 2003 price levels, respectively

Table 4 - 1
Summary of Implementation Costs
of the Recommended Plan

	(2000 Price Levels)	(2003 Price Levels) ¹
Construction Cost	\$ 68,387,000	\$73,000,000
Preconstruction Engineering & Design	6,839,000	7,300,000
Construction Management	7,151,000	7,600,000
Relocations	0	0
Real Estate	54,000	58,000
Fish and Wildlife Mitigation	503,000	537,000
Total Implementation Costs	\$82,934,000	\$88,495,000
(Rounded)	\$83,000,000	\$88,500,000

¹2000 Price Levels were indexed to 2003 price levels using a factor of 1.067

Table 4 - 2
Summary of Operation and Maintenance (O&M) Costs
of the Recommended Plan
Average Annual Cost

	(2000 Price Levels)	(2003 Price Levels) ¹
O&M Costs of New 75- by 1,200-Foot Lock		
Annual Operation and Maintenance	\$ 1,462,000	\$1,560,000
Less O&M Costs of Existing 56- by 797-Foot Lock		
Annual Operation and Maintenance	\$ 1,303,000	\$1,390,000
O&M Costs Allocated to Recommended Plan²		
Annual Operation and Maintenance	\$ 159,000	\$170,000

¹2000 Price Levels were indexed to 2003 price levels using a factor of 1.067

²Operation and maintenance costs of new lock less the operation and maintenance cost of existing lock.

The implementation costs include the costs of the construction of the new lock, the channel realignments for the approach channels for the new lock and East Access Channel, the closure of the old lock and its approach channels, and the cost of new levee on the floodside of the old lock; erosion protection, mooring buoy facilities; the cost of the detailed pre-construction engineering and design of the new lock; the costs of managing the construction contract for the new lock and associated features; the costs of acquiring additional real estate interests for the recommended plan; and the costs of features to mitigate adverse impacts to fish and wildlife caused by the construction of the recommended plan.

The operation and maintenance costs of the recommended plan are the total operation and maintenance costs of the new lock and associated features, less the costs of the operation and maintenance costs of the existing Bayou Sorrel Lock.

Table 4-5 reflects the current price levels for the Replacement-In-Kind Lock.

Table 4 - 5
Estimated Implementation Cost
For the
Replacement-In-Kind Lock¹
(2003 Price Levels)²

Construction Cost	\$ 68,000,000
Preconstruction Engineering & Design	6,800,000
Construction Management	4,800,000
Relocations	0
Real Estate	58,000
Fish and Wildlife Mitigation	<u>537,000</u>
Total Implementation Costs	\$80,195,000
(Rounded)	\$80,200,000

¹A lock with the same dimensions as the existing lock, 56 feet wide by 797 feet long.

²2000 Price Levels were indexed to 2003 price levels using a factor of 1.067

Table 4-3 presents the project cost adjusted for inflation during the design and construction phases. The result is a fully funded cost estimate used for budget purposes.

**Table 4-3
Summary of Fully Funded Cost
Of the Recommended Plan**

	00	04	05	06	07	08
Construction Cost	\$68,387,000			\$10,191,095	\$34,523,473	\$28,146,222
Preconstruction E&D	\$6,839,000	\$707,000	\$3,460,860	\$1,150,000	\$1,200,000	\$1,251,000
Construction Management	\$7,151,000			\$2,741,217	\$2,860,400	\$2,981,967
Relocations	\$0					
Real Estate	\$54,000		\$59,670			
Mitigation	\$503,000					\$542,737
Total	\$82,934,000	\$707,000	\$3,520,530	\$14,082,312	\$38,583,873	\$32,921,927
						\$89,815,641

6. Allocations and Apportionment of Costs of the Recommended Plan

The implementation and operation and maintenance costs of the recommended plan are allocated to the project purposes of flood control and inland navigation. The costs allocated to each purpose are then apportioned among various funding sources based on applicable laws and policies. The 2003 price levels are used for this allocation and apportionment of cost.

- a. **Cost Allocation.** The modification of Bayou Sorrel Lock to safely pass the project flood in the Atchafalaya Basin Floodway is a feature of the Atchafalaya Basin, Louisiana project. Since the modifications are authorized for implementation, the plan for the modification of the existing project is the base plan for the development of a plan for inland navigation purposes.

The plan for modifications at Bayou Sorrel Lock to safely pass the project flood in the Atchafalaya Basin was developed based on overall cost-effectiveness, considering the implementation costs of the plan and the delay costs to inland navigation caused the implementation of the plan. As discussed in Section 3, the most cost effective plan for modifications at Bayou Sorrel Lock is an in-kind replacement lock, which would be located on the floodway side of the lock. The implementation costs of this in-kind replacement plan, estimated at \$80,200,000 would be allocated to the Flood Control, Mississippi River and Tributaries project.

All implementation costs in excess of the most cost effective plan for modifications at Bayou Sorrel Lock would be allocated to inland navigation. The total implementation cost of the recommended plan is estimated at \$88,500,000, and the costs allocated to inland navigation would be \$8,300,000. A summary of the cost allocation is presented in Table 4-6.

Table 4-6
Allocation of Costs of Recommended Plan

	First Costs ¹	Operation and Maintenance Costs
Flood Control, MR&T ²	\$80,200,000	-0-
Inland Navigation	<u>8,300,000</u>	<u>170,000</u>
Total	<u>\$88,500,000</u>	<u>\$170,000</u>

¹Includes all preconstruction engineering and design cost, construction supervision and administration costs, fish and wildlife mitigation costs, and real estate costs.

²Flood Control, Mississippi River and Tributaries Project

- b. **Cost Apportionment.** The costs of the recommended plan allocated to flood control, as a part of the Atchafalaya Basin, Louisiana project under the comprehensive Flood Control, Mississippi River and Tributaries Project, would be apportioned 100 percent to the Federal government pursuant to the cost-sharing provision of the Flood Control

Act of 1928, as amended, which states in pertinent part, "no local contribution to the project herein adopted is required." The implementation costs of the recommended plan allocated to inland navigation would be apportioned 50 percent to Federal appropriations and 50 percent to the Inland Waterway Trust Fund.

A summary of the cost apportionment is as follows:

Table 4-7
Apportionment of Costs of Recommended Plan

	Federal Appropriations	Inland Waterway Trust Fund	Total
Implementation Costs			
Flood Control, MR&T	\$80,200,000	0	\$80,200,000
Inland Navigation	<u>\$4,150,000</u>	<u>\$4,150,000</u>	<u>\$8,300,000</u>
Total	\$84,350,000	\$4,150,000	\$88,500,000
Operation and Maintenance Costs			
Flood Control, MR&T	-0-	\$0	\$-0-
Inland Navigation	<u>\$170,000</u>	<u>\$0</u>	<u>\$170,000</u>
Total	\$170,000	\$0	\$170,000

7. Accomplishments of the Recommended Plan

The recommended plan would provide for the safe passage of the project flood in the Atchafalaya Basin Floodway at Bayou Sorrel Lock and would provide a significant reduction in delays to barge tows moving on the Gulf Intracoastal Waterway system west of the Mississippi River and in a reduction in damages to barge tows projected to move through Bayou Sorrel Lock.

- a. **Flood Control Accomplishments.** The implementation of the recommended plan would prevent overtopping of Bayou Sorrel Lock by the Atchafalaya Basin project flood. Although the area that would be inundated by the overtopping of Bayou Sorrel Lock would be limited to the area east of the East Atchafalaya Basin Protection Levee, the flood control benefits for the recommended plan would be the benefits for the entire Flood Control, Mississippi River and Tributaries project. The rationale for the benefits being those for the Flood Control, Mississippi River and Tributaries project is that the overall flood control project was authorized and designed to function as a system. The Flood Control, Mississippi River and Tributaries project provides for the confining of flood flows on the lower Mississippi River system, below Cairo, Illinois, with a system of levees and other measures and for the diversion of up to one-half the flows to the Atchafalaya Basin Floodway.

The most recent economic analysis for the Flood Control, Mississippi River and Tributaries Project, based on remaining project costs and benefits, was

prepared in January 2002 in support of budget activities. The economic analysis is presented in Table 4-8. The average annual benefits to the project are \$3,523,100,000, which are the benefits for the portion of the costs of the recommended plan allocated to the Flood Control, Mississippi River and Tributaries project and for the other features of the project remaining to be constructed. The cost of the modifications to Bayou Sorrel Lock included in the approved cost estimate is \$71,026,000. The portion of the costs of the recommended plan allocated to the Flood Control, Mississippi River and Tributaries project is \$80,200,000. The implementation of the recommended plan would result in an increase in the construction cost of the Flood Control, Mississippi River and Tributaries project of \$9,174,000. The economic analysis presented in Table 4-8 does not reflect the increase cost for modifications of Bayou Sorrel Lock.

Table 4-8
Summary of Remaining Benefits and Costs¹
for the
Flood Control, Mississippi River and Tributaries Project

Construction Costs	\$2,506,209,000
Average Annual Costs ²	
Interest and amortization	14,544,000
Operation and Maintenance	70,458,000
Fish and Wildlife Losses	<u>3,868,000</u>
TOTAL	\$88,870,000
Average Annual Benefits ²	
Flood Control	\$2,627,535,000
Navigation	890,470,000
Recreation	3,257,000
Area Redevelopment	<u>1,838,000</u>
TOTAL	\$3,523,100,000
Benefit-to-Remaining Cost Ratio	39.6

¹Based on 2000 price levels

²Based on an interest rate of 6-3/8 percent.

- b. **Inland Navigation Accomplishments.** The implementation of the recommended plan, with its 75- by 1,200-foot lock chamber, would result in a significant decrease in delays to barge tows projected to move through Bayou Sorrel Lock, which would result in a reduction in the transportation costs of commodities moving on the GIWW system. It would also result in a reduction to damages caused by accidents caused by tows projected to move through the lock.

The implementation of the recommended plan will also provide the opportunity to address erosion concerns voiced at the public meeting held February 13, 2003 in a uniform way.

A systems analysis of the inland navigation channels and locks pertinent to this study was conducted to determine the costs of moving projected tonnage through the system with the existing Bayou Sorrel Lock with its 56- by 797-foot chamber, which is the “without project” condition, and with the recommended plan. This simulation model analyzed emptying and filling times; approach, entry, and exit times for particular tow sizes; a distribution of tow sizes along with average load per tow; the probability of an open pass condition; and the dimensions of the existing and recommended plan locks. The average annual delays per tow were calculated for the most probable future conditions without the recommended plan, and for projected conditions with the recommended plan. The average annual delays per tow with and without the recommended plan are presented in Table 4-9. The recommended plan would result in a significant decrease in delays to a large volume of inland waterway traffic projected to move over the GIWW system.

Table 4-9
Average Annual Delays Per Tow
With and Without the Recommended Plan¹
(in Hours)

Year	Without Recommended Plan ²	With Recommended Plan ³	Difference
2010	12.7	0.9	11.8
2020	15.0	1.2	13.8
2030	17.5	1.2	16.3
2040	28.9	1.2	27.7
2060	114.6	1.3	113.3

¹Based on the most probable future (mid-range scenario) projections of commodity movements over the Gulf Intracoastal Waterway system.

²With the existing 56- by 797-foot lock at Bayou Sorrel

³With the recommended 75- by 100-foot lock at Bayou Sorrel

The wider lock would also result in a reduction in damages caused by tows entering and leaving the lock. The estimates reduction in damages for the 75-foot wide lock chamber and the existing 56-foot wide chamber is expected to average about \$1,277,000 over the life of the project.