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West Bank of the Mississippi River in the Vicinity of New Orleans, La. (East of the Harvey Canal)

Technical Appendixes

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WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF THE HARVEY CANAL) HURRICANE PROTECTION STUDY

FEASIBILITY REPORT

VOLUME 2

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APPENDIX A

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HYDROLOGY/CLIMATOLOGY

1. GENERAL.

This appendix presents detailed descriptions of the climatology and hydrologic regimen of the area and detailed descriptions of hydraulic analysis methods and procedures used in the design of the protection features of the plan. These descriptions include essential data, assumptions, and criteria used in the studies which provide the basis for determining surges, routings, wind tides, wave runup and overtopping, and stage frequencies. Designs for protective structures were developed for SPH, 200-year and 100-year frequency storms. Parameters for various frequency storms were derived from the SPH using methodology furnished by the National Weather Service and differ from the SPH only in central pressure index and windspeed.

The study area lies within Jefferson, Orleans and Plaquemines Parishes on the west bank of the Mississippi River. The area is bounded by the Harvey Canal to the west, the Mississippi River to the north and east and Oakville and the Hero Canal to the south. Lakes Salvador and Cataouatche are estuary areas to the west which connect to the Gulf of Mexico through Barataria Bay. Tidal waters can be carried into the study area through these lakes and Bayou Barataria into the Harvey, Algiers and Hero Canals. Freshwater is introduced into the study area from the Mississippi River via the Harvey and Algiers Locks, direct rainfall and pumpage from leveed areas.

2. TERRAIN.

The project area, located in southeastern Louisiana, is of mostly low relief and characteristic of an alluvial plain. Situated on the western bank of the Mississippi River near New Orleans, land elevations slope gently from an average elevation of about 12 feet NGVD along the natural banks of the Mississippi River to several feet below sea level in portions of the leveed areas. Natural ground elevations in the unleveed marsh areas in the southern part of the study area average 0.5 to 1.0 feet NGVD. Although leveed marshland will subside when pumped, unleveed areas are subject to natural subsidence and in the future will become increasingly vulnerable to flooding from the combined effects of this subsidence and eustatic/global sea level rise. In the study area 2 feet of subsidence was

assumed in the leveed areas during a 100-year period; in unleveed areas from 0.6 to 1.2 feet of subsidence is expected. Sea level rise is assumed to be 0.5 feet in 100-years.

All of the area is protected from Mississippi River overflows by the mainline levee system. Flooding originating in the Gulf of Mexico and Lakes Salvador and Cataouatche can travel across the marsh and through the many natural and man-made channels to threaten the project area from the south. To protect the area from this tidal and storm surge flooding, Federal and local interests have constructed a network of levees that nearly encompass the area. The Bayou Des Familles alluvial ridge at an elevation of approximately 4.5 feet NGVD, reduces the effects of the hurricane surge on the Algiers, Harvey, and Hero Canals and other areas on its eastern side. The Oakville area is not protected from storm surge flooding by a back levee.

3. CLIMATOLOGY.

a. Climate. The study area has a subtropical marine climate. Located in a subtropical latitude, its climate is influenced by the many water surfaces of the lakes, streams, and Gulf of Mexico. Throughout the year, these water bodies modify the relative humidity and temperature conditions, decreasing the range between the extremes. When southern winds prevail, these effects are increased, imparting the characteristics of a marine climate.

The area has mild winters and hot, humid summers. During the summer, prevailing southerly winds produce conditions favorable for afternoon thundershowers. In the colder seasons, the area is subjected to frontal movements which produce squalls and sudden temperature drops. River fogs are prevalent in the winter and spring when the temperature of the Mississippi River is somewhat colder than the air temperature.

b. Precipitation. The average normal precipitation for the study area based on National Climatic Center records at New Orleans Audubon Park and New Orleans Algiers station over the period 1951-1980 is 61.61 inches. At Audubon Park, the maximum monthly rainfall since 1951 occurred during April 1980 with 20.24 inches and the maximum one day for the same period was 9.31 inches on 3 May 1978. At Algiers, the maximum monthly rainfall since 1951 occurred during April 1980 with 22.44 inches, and the 9.78 inches falling on 3 May 1978 was the maximum 24-hour rainfall. There have been several months which recorded no precipitation. The heaviest rainfall usually occurs

during the summer with July being the wettest month with an average monthly normal of 7.49 inches. October is the driest month, averaging 2.70 inches. Snow is rare in the study area with the last measurable snow falling in December 1889. Monthly and annual normals for Audubon Park and Algiers are presented in Table A-I-1.

TABLE A-I-1
MONTHLY AND ANNUAL PRECIPITATION (INCHES)
30-YEAR NORMALS (1951-1980)

Month	Audubon	Algiers	Average	Month	Audubon	Algiers	Average
Jan	4.9	4.76	4.83	Jul	7.17	7.81	7.49
Feb	5.19	4.98	5.09	Aug	6.67	6.08	6.3
Mar	4.68	5.08	4.88	Sep	5.98	5.57	5.78
Apr	4.68	4.76	4.72	Oct	2.52	2.88	2.70
May	5.06	5.46	5.26	Nov	4.01	3.86	3.4
Jun	5.39	5.36	5.38	Dec	5.30	5.07	5.19
				ANNUAL	61.55	61.67	61.61

Source: National Climatic Center

Rainfall amounts used to estimate interior flooding heights and design drainage structures were taken from the National Weather Service Technical Paper (TP) 40, which gives rainfall totals for various durations and frequencies across the United States. In the design studies, rainfall amounts for the design rainfall included lesser duration rainfalls. For instance, imbedded in the 100-year, 24-hour rainfall distribution are the 100-year, 1-hour, 2-hour, 3-hour, 6-hour, and 12-hour rainfall amounts, as given in TP 40. This methodology allows us to determine each area's sensitivity to the various durations of more intense rainfalls. Similar distributions of duration can be applied to any frequency of rainfall, as depicted by TP 40.

c. Temperature. Records of temperatures are available from "Climatological Data" for Louisiana, published by the National Climatic Center. Mean temperatures within the study area can be approximated using data observations from the New Orleans Audubon station and the New Orleans Moisant Airport. The average mean annual temperature based on the period 1951-1980 is 68.9°F with monthly mean temperature normals varying from 53.0°F in January to 82.6°F in July. Temperature normals are shown in Table A-I-2.

Extremes since 1951 were 102°F on 6 July 1980 and 10°F on 23 December 1989 at Audubon and 102°F on 22 August 1980 and 11°F on 23 December 1989 at Moisant.

TABLE A-I-2
MEAN MONTHLY AND ANNUAL TEMPERATURE (°F)
30-YEAR NORMALS (1951-1980)

Month	Audubon	Moisant	Average	Month	Audubon	Moisant	Average
Jan	53.6	52.4	53.0	Jul	83.0	82.1	82.6
Feb	56.1	54.7	55.4	Aug	82.8	81.7	82.3
Mar	62.6	61.4	62.0	Sep	79.8	78.5	79.2
Apr	69.8	68.7	69.3	Oct	70.8	69.2	70.0
May	76.0	74.9	75.5	Nov	61.6	60.0	60.8
Jun	81.3	80.3	80.8	Dec	56.2	54.6	55.4
				ANNUAL	69.5	68.2	68.9

Source: National Climatic Center

d. Wind. Wind data taken at New Orleans Moisant Airport are used to describe the study area. The average velocity of the winds is 7.5 miles per hour (mph) over this period. Southeast winds predominate in the spring and summer. The prevailing winds of the fall and winter are from the northeast. Winter storms in the area have produced wind speeds of up to 47 mph. The summer is often disturbed by tropical storms and hurricanes which produce the highest winds in the area. The maximum wind speed observed (highest one minute average) since 1963 was 69 mph and was a result of Hurricane Betsy in September 1965. Average monthly and annual wind speeds over the period 1973-1990 are presented in Table A-I-3.

e. Stream Gaging Data. Records of stage data for the study area are available at six gaging stations. Hurricane Juan set new record highs at four of these gages. Table A-I-4 gives the period of record and extremes of these stations. Discharge measurements are not taken due to tidal influence.

TABLE A-I-3
AVERAGE MONTHLY AND ANNUAL WIND SPEEDS (MPH)
NEW ORLEANS MOISANT AIRPORT (1973 - 1990)

Month	Avg. Wind Speed	Month	Avg. Wind Speed
Jan	9.1	Jul	5.8
Feb	9.5	Aug	5.6
Mar	9.6	Sep	6.8
Apr	9.2	Oct	7.2
May	8.0	Nov	8.3
Jun	6.7	Dec	9.0
		Annual	7.8

TABLE A-I-4
GAGE DATA

Station	Period of Record	Stage Extremes (ft NGVD) Maximum	Date	Minimum	Date
Mississippi River @ Harvey Lock	Jan 1924 - 1990	19.42	4/24/27	-0.68	12/17/53
Mississippi River @ Algiers Lock	May 1956 - 1990	16.11	4/7/73	-0.15	1/19/81
GIWW @ Harvey Lock	Jan 1925 - 1990	4.74[a]	10/29/85	-1.28	1/26/40
GIWW @ Algiers Lock	May 1956 - 1990	4.45[a]	10/29/85	-1.64	9/9/65
Bayou Barataria @ Barataria	Jan - Sep 1950 and Nov 1951 - 1990	4.25[a]	10/29/85	-0.58	9/10/65
Bayou Barataria @ Lafitte	Oct 1955 - Dec 1960 and May 1963 - 1990	5.05[a]	10/29/85	-0.95	12/23/89

[a] Caused by Hurricane Juan
Source: U. S. Army Engineers District, New Orleans

4. HURRICANES AND TROPICAL STORMS.

a. History. Several hurricanes and tropical storms have passed through or near the study area. Some of the major storms include the 1915 hurricane, the 1947 hurricane, Hurricanes Flossy, Hilda, Betsy, Carmen, Babe, Bob, Danny, Juan, and Andrew. Some major characteristics of these storms are summarized in Table A-I-5. Hurricane tracks are illustrated on Plate A-I-1.

TABLE A-I-5
EXPERIENCED HURRICANES

STORM	DATE	CENTRAL PRESSURE (Inches Mercury)	FORWARD SPEED (Knots)	MAXIMUM RECORDED WINDSPEED (M.P.H.)
1915	22 Sep - 2 Oct 1915	27.87	10	94
1947	4-21 Sep 1947	28.57	16	98
FLOSSY	21-30 Sep 1956	28.76	20	90
HILDA	28 Sep - 5 Oct 1964	28.40	7	98
BETSY	27 Aug - 10 Sep 1965	28.00	20	105
CARMEN	29 Aug - 10 Sep 1974	27.84	9	86
BABE	3-8 Sep 1977	29.85	--	75
BOB	9-16 Jul 1979	29.58	15	75
DANNY	12-20 Aug 1985	29.61	13	85
JUAN	26-31 Oct 1985	29.13	13*	74
ANDREW	16 - 28 Aug 1992	27.66	15	150

* Maximum reported forward speed. Several times during its traversal, the storm stalled while changing direction.

Hurricane Flossy brought torrential rains and tidal flooding to the study area. Golden Meadow, which is below the study area, received 16.7 inches of rain in a 24 hour period. Hurricane Hilda raised water levels at Barataria and Lafitte to 3.6 and 4.0 feet NGVD, respectively. Hurricanes Betsy and Carmen also caused flooding to some parts of the study area. Hurricane Juan broke high water records throughout the area (see Table A-I-4, Gage Data). On the west bank, three local levees were breached and several subdivisions were flooded by tidal inundation and the long duration of high stages. The total storm precipitation for Juan ranged from 8 to 12 inches over the area.

b. Design. The design hurricanes studied were the 100-year and 200-year frequency hurricanes and the Standard Project Hurricane (SPH). The SPH represents the most severe combination of hurricane parameters that is reasonably characteristic of the area, excluding extremely rare combinations. The hurricane would approach each individual site at such a rate of movement as to produce the maximum hurricane surge at each location of interest. The SPH has a central pressure index of 27.4 inches of mercury, a maximum 5 minute average wind velocity offshore (in the Gulf of Mexico) of 100 knots 30 feet above the surface at a radius of 30 nautical miles, and a forward speed of 11 knots along a path critical to each location of interest. The 100- and 200-year frequency hurricanes were derived from the SPH parameters using experienced stage frequencies and data provided by the National Weather Service. Hurricane parameters for lesser frequency storms differ from the SPH only in central pressure index and windspeed.

5. DESCRIPTION AND VERIFICATION OF PROCEDURES.

a. Hurricane Memorandums. The Hydrometeorological Section (HMS), National Weather Service, has cooperated in the development of hurricane criteria for experienced and potential hurricanes in the study area. The HMS memorandums provided isovel patterns, hurricane paths, pressure profiles, rainfall estimates, frequency data, and various other parameters required for the hydraulic computations. A reevaluation of historic meteorologic and hydrologic data was the basis for memorandums relative to experienced hurricanes. Those relative to potential hurricanes were developed through the use of generalized estimates of hurricane parameters based on recent research and concepts of hurricane theory. Memorandums applicable to the study area are listed in the attached bibliography.

b. Surges. Maximum hurricane surge heights along the gulf shores were determined from computations made for ranges extending from the shores out to the continental shelf by use of a general wind tide formula based on the steady state conception of water superelevation (1)(2)(3)*. The average windspeed and average depth in each range were determined from isovel and hydrographic charts for each computation. The storm isovel patterns were furnished by National Weather Service. In order to reach agreement between the computed maximum surge heights and the observed high water marks, it was necessary to introduce a surge adjustment factor or calibration coefficient into the general equation, which in its modified form, was as follows:

$$S=1.165*\frac{10^{-3}V^2FNZ}{D}\cos\Theta$$

where: S = wind setup in feet
V = windspeed in m.p.h.
F = fetch length in statute miles
D = average depth of fetch in feet
Θ = angle between direction of wind and the fetch
N = planform factor, assumed equal to unity
Z = surge adjustment factor

* Numbers in parenthesis indicate reference in bibliography

Hurricane surges at the shore were determined by summation of incremental wind setups along a range above the water surface elevation at the gulf end of the range. A combination of the setup due to atmospheric pressure anomaly and the predicted normal tide was used to determine the initial elevation at the gulf end of the range. Due to the variation in pressure setup between the shoreward end and gulfward end of the range, an adjustment was made at the former to compensate for the difference. This procedure for determining surge heights at the coastline was developed for the Mississippi Gulf Coast, where reliable data was available at several locations for more than one severe hurricane, and is used for the entire coastal Louisiana region. Due to dissimilar shoreline configurations, different factors were required at different locations, but identical factors were used at each location for every hurricane. The value of the factor is apparently a

function of the distance from the shoreline to deep water and varies inversely with this distance. Comparative computed surge heights and observed high water marks for the 1915 and 1947 hurricanes at the locations used to verify the respective procedures are shown in Table A-I-6. All elevations in this appendix are in feet and are referred to National Geodetic Vertical Datum of 1929 (NGVD).

TABLE A-I-6
HURRICANE SURGE HEIGHTS

Location	Surge Adjustment Factor (Z)	1915		1947	
		Observed	Computed	Observed	Computed
		(feet NGVD)		(feet NGVD)	
Long Point, La.	0.21	9.8	9.6	10.0	10.1
Bay St. Louis, Ms.	0.46	11.8	11.8	15.2	15.1
Gulfport, Ms.	0.60	10.2*	9.9	14.1	14.3
Biloxi, Ms.	0.65	10.1*	9.8	12.1	12.6*

* Average of several high water marks.

In those areas where the coastline is characterized by a coastal bay separated from the gulf by an offshore barrier island such as Grand Isle or by a shoal, it is necessary to inject an additional step in the normal procedure to verify experienced hurricane tides. The incremental step computation was completed to the gulf shore of the island and the water surface elevation transposed to the inland bay side of the island from whence the incremental computations were continued using a new surge adjustment factor that was considered representative of the shallower depths within the bay. This procedure resulted in a satisfactory verification of hurricane tides along other portions of the Louisiana coast.

The incremental step computation was used to check elevations experienced during the hurricane of 22 September - 2 October 1915 and Hurricane Flossy, 21-30 September 1956. Verification of surge heights and surge adjustment factors for these hurricanes are shown in Table A-I-7. Surge adjustment factors of 0.80 in open water and 0.48 in Barataria Bay were used for the Manila Village area.

TABLE A-I-7
VERIFICATION OF HURRICANE SURGE HEIGHTS

Location	Surge Adjustment Factor(Z)	Sep 1915 Observed (feet NGVD)	Sep 1915 Computed (feet NGVD)	Sep 1956 (Flossy) Observed (feet NGVD)	Sep 1956 (Flossy) Computed (feet NGVD)
Grand Isle					
Flooding from front	0.80(a)	9.0	8.8	3.9	4.1
Flooding from rear	0.80(a)	-	-	8.0	7.8
	0.48(b)				
Manila Village	0.48(b)	8.0	8.5	-	5.1

(a) In Gulf of Mexico
(b) In Barataria Bay

c. Routing. Since the major hurricane damage in the study area would result from storm induced effects on Lake Salvador, it was necessary to establish a method to determine the stage in the lake at any time during the hurricane occurrence. This procedure involves the construction of a stage hydrograph for Barataria Bay by calculating the hourly flows and rainfall simultaneously through Lake Salvador's natural inlet channels (assumed in this case to be one large channel).

Prerequisite to any routing is the choice of an actual or hypothetical hurricane of known or designated characteristics. It is then possible to develop surge heights for any point in Barataria Bay for the selected hurricane. For routing purposes, Manila Village, which is about 20 miles southeast of Lake Salvador, was selected as the critical point for a hydrograph. It would reflect stages at the mouth of the schematized inlet channel. Such a hydrograph of hourly stages was constructed by computing the incremental setup for each hour and using the maximum surge elevation as the peak of the hydrograph for the critical period. Storm surge hydrographs at Manila Village for other frequencies were determined by identical procedures.

A stage area curve was made for the schematized conveyance channel between Manila Village and the entrance to the Lake Salvador Basin, which consists of Lake Salvador, Lake Cataouatche, and the adjacent marsh area. Since the width of the channel is very large, the depth of water was used as the hydraulic radius.

The cumulative amount of rainfall coincident with the storm significantly affects the lake elevation and, therefore, the routing procedure. The amount of this rainfall was calculated by the methods described in U.S. Weather Service memorandums (4)(5), using a moderate rainfall that would be coincident with a tropical storm. For routing purposes, a moderate rainfall of 8.50 inches in 24 hours was considered as additional inflow into the Lake Salvador Basin. The effect of cumulative rainfall is to raise the average lake level.

With the above mentioned items resolved, the routing procedure was reduced to the successive approximation type problem in which the variable factors were manipulated until a correlation between flows from the gulf through the inlet channel and the rise in the mean elevation of the Lake Salvador Basin was obtained for the incremental time intervals. The use of this method has been illustrated by Bretschneider and Collins (6). For verification of the method, the surge caused by Hurricane Betsy, September 1965, was routed by this procedure. The routed stage for Bayou Barataria at Lafitte (assumed to be the representative stage of the Lake Salvador Basin), was found to be in reasonable agreement with the observed stage for the hurricane. The observed and computed peak stages for Hurricane Betsy are 3.35 and 3.05 feet, respectively. If the average stage between the Lafitte and Barataria, Louisiana, were used as the representative stage, the computed and observed stages would be in very close agreement.

d. Wind Tides. When strong hurricane winds blow over inclosed bodies of shallow water, they tend to drive large quantities of water ahead of them. Therefore, wind tide levels (WTL's) in Lakes Salvador and Cataouatche, respectively, are needed to determine stage damage curves and to design protective levee heights.

Lakes Salvador and Cataouatche are located in a marsh west of the study area and are so situated that the volume of incoming flow from the gulf cannot be measured because the water flows over broad areas of ungaged marshland. Therefore, the extensive marshlands that surround both lakes results in an almost unlimited storage area when lake waters overflow their banks. Hourly lake elevations for the various frequencies used in computing wind tide levels for Lakes Salvador and Cataouatche were obtained from the routed hydrographs that reflect the average lake level.

To compute wind tide, the lake is divided into three zones roughly parallel to wind directions. A nodal line is designated perpendicular to the zones and setup is calculated for the leeward segment and setdown for the windward segment. The average windspeed and average depth in each segment were determined from isovel and hydrographic charts

for each computation. The storm isovel patterns were furnished by the U.S. Weather Service (ESSA)(7). The computation of setup or setdown along each segment was based on the segmental integration method (3) and was calculated by the use of the step method formulas (8) that were modified as follows:

$$Setup = d_t \left(\sqrt{\frac{0.00266^{u}FN+1}{d_t^2}} - 1 \right)$$

$$Setdown = d_t \left(1 - \sqrt{1 - \frac{0.00266 u^2 FN}{d_t^2}} \right)$$

Where: setup or setdown in feet is measured above or below mean water level (mwl) of the surge in the lake.

d = average depth of fetch in feet below m.w.l.
u = windspeed in m.p.h. over fetch.
F = fetch length in miles, node to shoreline.
N = planform factor, equal generally to unity.

Graphs were constructed from the above formulas to determine setup and setdown quickly about the nodal elevation for storms of varied frequencies. Volumes of water along the zones, represented by the setup and setdown with respect to a nodal elevation, were determined and the water surface profiles adjusted until setup and setdown volumes for the lake balanced within 5 percent. Then setup elevations were added to the still water level to yield the WTL. The time dependent SPH and Design Hurricane wind tide hydrographs were computed for the eastern and northern shore of Lakes Salvador and Cataouatche.

Observed wind tide elevations at the shorelines of Lakes Salvador and Cataouatche are not available. Therefore, the method of wind tide level computation could not be verified by comparing observed and computed data. However, the above described method

has been used successfully for the south shore of Lake Pontchartrain at New Orleans, Louisiana. Observed data were available for this lake and the method verified.

In order to obtain wind tide levels along Louisiana Highway 45, it was necessary to use the relationship between the maximum wind tide level and the distance inland from the shoreline.

Marshlands that fringe the shoreline in certain locations are inundated for considerable distances inland by hurricane wind tides that approach the shores. The limit of overland surge penetration depends upon the height of the wind tides and the duration of high stages at the lakeshore. The study of available observed high water marks at the coastline and inland indicates a fairly consistent simple relationship between the maximum surge height and the distance inland from the coast. This relationship exists independently of the speed of hurricane translation, wind speeds, or directions. The data indicates that the weighted mean decrease in surge heights inland is at the rate of 1.0 foot per 2.75 miles. This relationship remains true even in the western portion of Louisiana where relatively high chenieres, or wooded ridges, parallel the coast. Efforts to establish time lags between peak wind tide heights at the shoreline and at inland locations were unsuccessful because of inadequate basic data.

For the purpose of surge routing procedures, the shoreline is defined as the locus of points where the maximum WTL's would be observed along fetches normal to the general shore. This synthetic shoreline is assumed to be along the southern portion of the Lake Cataouatche levee and near the extreme western side of the Bayou Des Familes ridge. In order to determine the maximum water surface elevations at inland locations, it was necessary to compute maximum WTL's at the designated points mentioned above. These computed wind tide levels were then adjusted by application of the average slope of maximum surge height inland (1 foot/2.75 miles) to the location of interest. Hurricane stages were not available for positive verification of the procedure within the area. However, the procedure has given satisfactory results in this area and has verified the observed data in other areas of study with similar topography and bathymetry.

6. LEVEES.

The study area is protected from river overflow by the mainline Mississippi River and Tributaries levee system. The remainder of the levee system was constructed by local

and Federal interests as expanding development demanded protection. Existing non-Federal levee heights vary from 2.5 to 11 feet NGVD. Levee heights along the east side of the Harvey Canal vary from around 2.5 feet to 9 feet NGVD. The Federal levee along the Algiers Canal is maintained at 7.4 feet NGVD. The Plaquemines Parish local levee on the north side of the Hero Canal varies in elevation from 5 to 11 feet NGVD and ends several hundred feet from the Mississippi River levee. The natural ground elevation is approximately 6 feet NGVD in this gap. The community of Oakville is not protected from tidal flooding by a back levee.

Integrity of the local levee system is questionable in view of failures that occurred during Hurricane Juan in the levee system to the west of the Harvey Canal and overflow during Juan across low spots in the Harvey Canal line of protection.

For project conditions, levee heights were determined for the 100-year, 200-year, and SPH hurricanes. Heights of the protective structures were designed to an elevation sufficient to prevent all overflow from wave runup. In exposed reaches a large fetch exists for the generation of waves accompanying the design hurricane. In those areas the hurricane-generated significant wave was used to determine levee height. Waves larger than the significant wave may overtop the protective structures, but, due to the limited number of waves larger than the significant wave, such overtopping will not endanger the security of the structure or cause damaging interior flooding. During the time of maximum surge height, the berms on the flood side of the levee become submerged and waves of lesser height than the significant wave, but of the same period, break further up the levee slope. Sometimes runup from these smaller waves reach an elevation higher than that from the significant wave. Therefore, runup was computed for the significant wave and for smaller waves breaking on each berm and the required levee height was determined by adding the highest computed runup value to the maximum stillwater elevation. Where levees or floodwalls are sheltered from hurricane-generated wave runup, wave runup from small locally-generated waves which cannot be predicted from our standard methodology can overtop the levee. For this study 1-foot waves with small periods, 2.7 seconds, were used to compute runup from these small unpredictable waves for the reaches of limited fetch along the Harvey and Algiers Canals. Methods used for computing wave runup are explained in the Shore Protection Manual, published by the Coastal Engineering Research Center in 1984. Design runup value was 3 feet above the design stage along the exposed reaches along the western side of the study area for each of the storm frequencies studied. Wave runup of 2 feet was determined for the sheltered reaches of levee. Design elevations

for the protective structures in each reach for the alternatives studied are shown in Table A-I-8. Typical cross-sections by reach are shown on Plates A-I-2 through A-I-4.

TABLE A-I-8
DESIGN ELEVATION OF PROTECTIVE STRUCTURES

Location	SPH	200-Year	100-Year
Harvey and Algiers Canals	9.5	8.5	7.5
Hero Canal Levee	10.5	9.5	8.5
Oakville Levee	9.0	8.0	7.0

Protective structures subject to hurricane-generated wave action would be significantly higher without wave berms. Table A-I-9 gives the height of all protective structures without wave berms, assuming side slopes of 1 on 3.

TABLE A-I-9
ELEVATION OF PROTECTIVE LEVEES
WITH 1V on 3H SIDE SLOPES

Location	SPH	200-Year	100-Year
Harvey and Algiers Canals	9.5	8.5	7.5
Hero Canal to Oakville Levee	13.5	11.5	10.0
Oakville Levee	9.0	8.0	7.0

7. STAGES, FREQUENCIES AND DURATIONS.

High tides accompanied by heavy rainfall and hurricanes can cause flooding in the study area. Extended duration weak hurricanes, such as Juan, can produce a storm surge of sufficient height to overtop existing protective embankments and flood the heavily populated developed areas.

In 1973, floodwaters resulting from excessive rainfall and abnormally high tides in Lakes Cataouatche and Salvador and Bayou Barataria prevented adequate drainage and caused damage to residential areas. High tides in the Harvey Canal caused damage to industries located along its banks.

Drainage problems are exacerbated when rainfall is accompanied by high tides. During May 1978 and April 1980, short duration, large accumulation rainfalls occurred in this area. During the rainstorm of 3 May 1978, the stage was 2.3 feet NGVD at Barataria on Bayou Barataria and 2.7 feet NGVD at the Harvey Lock on the Intracoastal Waterway because of strong onshore winds that accompanied the rainstorm. At the city of Algiers, 9.8 inches of rainfall were measured. On 13 April 1980, the rainfall measured at Algiers was 9.7 inches and the accompanying stage at Barataria was 3.8 feet NGVD. At the Harvey Lock, the maximum stage was 3.2 feet NGVD. Pump stations that discharge into the marsh were forced to operate against higher than optimum outside stages during these events, reducing the capacity of these stations.

Continuous records of stages are available at several locations in and near the study area. On the westbank of Jefferson Parish, several continuous gages are operated: Bayou Barataria at Barataria since January 1950, Bayou Barataria at Lafitte since October 1955, and Bayou Rigaud at Grand Isle since August 1947. A recording gage for hurricane stages is located on Grand Isle at the mayor's office. A wire-weight type gage, located in the Intracoastal Waterway at the Harvey Lock, is read daily, usually at 8 a.m. Records for this gage are available from January 1925. Another wire-weight gage is located in the Intracoastal Waterway at Algiers Lock; it is read daily at 8 a.m. Records are available at this location from 1956. In the Mississippi River, the continuous gage located nearest Jefferson Parish is the Carrollton Gage located in Orleans Parish at river Mile 102.8; it has been in operation since January 1872. All of these gage records are published annually in "Stages and Discharges of the Mississippi River and Tributaries." In addition, gage information and stillwater elevations for hurricanes of relatively recent history affecting the area are available in various other publications of the U. S. Army Corps of Engineers and other agencies.

Intense hurricanes such as Betsy have caused high stages along the coastal area of Louisiana (10.5 Feet NGVD at Grand Isle) and moderately high stages inland (3.2 feet NGVD at the Harvey Lock). High stages resulting from several hurricanes are summarized in the section on "Hurricanes and Tropical Storms" in this report. Detailed data is presented in a Corps publication entitled, "History of Hurricane Occurrences along Coastal Louisiana." Examination of gage records at the inland gaging stations reveals that Hurricane Juan caused the highest stage of record on 29 October 1985, along Bayou Barataria at both Barataria (4.25 feet NGVD) and Lafitte (5.05 feet NGVD) and at the Algiers (4.45 feet NGVD) and Harvey (4.74 feet NGVD) Locks.

The normal tide in the study area is diurnal and has a mean range of approximately 0.5 feet. However wind effects can mask the daily ebb and flow variations and during periods of sustained southerly winds, tides rise in direct response to the duration and intensity of the wind stress. This was demonstrated in 1985 by Hurricane Juan. Although a relatively weak storm in terms of maximum sustained windspeed, Hurricane Juan caused higher stages in much of the study area than the more intense Hurricane Betsy. This is directly attributable to the hurricane's erratic, almost stationary, path across southern Louisiana. Gale force winds over a period of 5 days caused tides 3 to 6 feet above normal across the entire coastal area of southern Louisiana.

8. FREQUENCIES.

To determine the design stages for the study area, frequency estimates were developed for experienced hurricane stages and analysis of theoretical hurricane stages. Using stages measured at the gaging stations in the study area, an experienced stage frequency curve was drawn for each station for the combined effects of hurricane induced storm surge and high stages caused by other events, using procedures outlined in EC 1110-2-249, Hydrologic Frequency Analysis.

To develop characteristics for the design hurricanes, information on hurricanes published by the National Weather Service was used. The National Weather Services made a generalized study of hurricane frequencies and parameters and presented the results in NOAA Technical Report NWS23, "Meteorological Criteria for Standard Project Hurricane and Probable Maximum Hurricane Windfields, Gulf and East Coasts of the United States, September 1979"(9). In a 400 mile zone along the central gulf coast from Cameron, Louisiana, to Pensacola, Florida (Zone B), frequencies for hurricane central pressure indexes (CPI) presented in the report reflect the probability of hurricane recurrence in the mid-gulf coastal area. Hurricane characteristics with critical tracks and CPI's representative of the SPH were developed in cooperation with the National Weather Service. The CPI used was 27.45 inches for this hurricane. The SPH described in NHRP Report No. 33, and NWS Report 23 was the basis of development of the Design Hurricane used in the study.

The Standard Project Hurricane is a large storm of moderate forward speed and high wind speed. Relatively weak storms, such as Hurricane Juan, have weak steering currents and historically are the storms that will stall. An intense hurricane, such as Betsy or

Camille, has strong steering currents and moves at a moderate to fast forward speed, making landfall with few changes in course. For these reasons, the SPH was assumed to travel at a moderate forward speed without stalling.

Hurricane Wind Tide Levels (WTL'S) were computed for the theoretical hurricanes in accordance with prescribed procedures for determining setup and setdown in an enclosed lake. Isovels were rotated and the path transposed within allowable limits as necessary to produce maximum surge elevations at the proposed levee.

A synthetic stage frequency curve was developed by correlating stages and frequencies for corresponding CPI's, using a procedure developed for the Lake Pontchartrain study area. Experienced stage frequency curves developed at the gaging stations in the Harvey and Algiers Canals were used to adjust synthetic stages in these canals. Stages for pertinent locations in the area that would accompany the SPH, 200-year and 100-year hurricanes are shown in Table A-I-10.

A one-dimensional model was used to develop the frequency curves for this project. The project has not been redesigned using a two-dimensional model. However, the two-dimensional numerical model, WIFM, was used to compute water surface elevations in the Barataria Basin. The WIFM model, developed by the Waterways Experiment Station (WES), was calibrated by them for the Louisiana coastal area and used extensively for computing hurricane surges in the coastal region and areas adjacent to Lake Pontchartrain. The results from the WIFM model, using the design SPH as the forcing function, verify the mean stages computed with the calibrated one-dimensional model for Lakes Cataouatche and Salvador as well as open coast surge heights at Grand Isle and Venice. Therefore, no further studies using this two-dimensional model were undertaken for this area.

TABLE A-I-10
COMPARATIVE SURGE HEIGHTS

	Stages in feet NGVD		
Location	SPH	200-year	100-year
Harvey, Algiers and Hero Canals	7.5	6.5	5.5
Oakville Levee	7.0	6.0	5.0

The probability value used for a given CPI represents frequency of occurrence from any direction in a 400 mile zone along the central gulf coast. In order to establish frequencies for the locality under study, it was assumed that hurricanes critical to the locality would pass through a 50 mile subzone along the coast. Thus, the number of occurrences in a 50 mile subzone would be 12.5 percent of the number of occurrences in a 400 mile zone, provided that all hurricanes traveled in a direction normal to the coast. A hurricane whose track is perpendicular to the coast ordinarily will cause extremely high tides and inundation for a distance of about 50 miles along the coast. However, the usual hurricane track is oblique to the shoreline. The average projection along the coast of this 50 mile swath for the azimuth of 48 Zone B hurricanes is 80 miles. Since this is 1.6 times the width of the normal 50 mile strip affected by a hurricane, the probability of occurrence of any hurricane in the 50 mile subzone would be 1.6 times the 12.5 percent of the probabilities for the entire mid-gulf Zone B. Therefore, 20 percent of the frequencies of hurricanes for Zone B, mid-gulf, was used to represent the frequencies of hurricanes in the critical 50 mile subzone for each study locality.

Since tracks having major components from the southeast create the most critical stages in the Grand Isle area, maximum hurricane surge heights were computed for synthetic hurricanes approaching the area on a track from that direction. Four-fifths (4/5) of all tracks that approached the Grand Isle area were from the southeast. Therefore, a stage frequency curve was derived using 4/5 of the 50 mile subzone probability for all tracks. Frequencies for observed hurricane stages were then computed on the same basis as the CPI frequencies (10), and a curve plotted. The synthetic frequency curve was then adjusted and plotted to the Grand Isle observed data. A frequency curve for Manila Village was then obtained by adding the additional wind tide setup across Barataria Bay to the appropriate stage frequency value on the adjusted Grand Isle curve.

There is a direct relationship between the stage frequency at Manila Village and the average stage frequency in Lakes Salvador and Cataouatche. However, the critical stage frequency at the shoreline is considerably diminished because the hurricane track required to cause critical stages at the eastern shore of Lake Salvador is unique. Only 6.4 percent of all hurricane tracks observed have followed a track similar to the unique hypothetical track used in this study. The critical track of the Standard Project Hurricane is shown on Plate A-I-5. Stage frequencies were also developed based on the remaining 93.6 percent observed hurricane tracks.

The azimuths of tracks observed in the vicinity of the study area were divided into quadrants corresponding to the four cardinal points. Since 1900, 73 storms have affected the Louisiana coast; 46 had tracks from the south, 18 from the east, 8 from the west, and 1 from the north. Hurricanes with tracks having major components from the south and east generate WTL's that are near critical relative to the study area, while those tracks from the west generate WTL's most critical to the study area. The average azimuth of tracks from the south is 180 degrees. Tracks from the east had an average azimuth of 117 degrees. These azimuths, along with the critical track from the west, were used in computing WTL's for Lakes Salvador and Cataouatche, respectively. Of all experienced tracks since 1900 affecting the Louisiana Coast, approximately 63 percent have come from a southerly direction, 24.6 percent from the east, and 11 percent have come from the west. The probabilities of equal stages for the three groups of tracks were then added arithmetically to develop a curve representing a synthetic probability of recurrence of maximum wind tide levels for hurricanes from all directions.

Table A-I-11 illustrates the synthetic frequency computation for WTL's at the east shore of Lake Salvador. The computation for the north shore of Lake Cataouatche is similar in nature except for variation in WTL heights.

Based on the above described procedures, stage frequency relationships were established under existing conditions for flooding by surges from Lakes Salvador and Cataouatche for the area along Highway 45 between Cousin's Canal and Crown Point, Louisiana.

9. FUTURE CONDITIONS.

Historical evidence of sea level rise and subsidence indicates the need for a projection of storm surge stages and their effect on this project's effectiveness. Sea level rise of 0.5 feet per century along the Gulf Coast is recommended by the latest Corps' guidance. Estimates of subsidence in coastal Louisiana were developed by COE geologists from radio carbon dating of buried marsh deposits. This data was compiled on quadrangle maps for coastal Louisiana. Using the projected sea level rise of 0.25 feet in the next 50 years and the appropriate subsidence rate in the coastal zones bordering the project area, the WIFM model was employed to compute the hurricane surge heights which could be expected in the year 2040. Stages for pertinent locations in the area that would accompany the SPH, 200-year and 100-year hurricanes are shown in Table A-I-12.

TABLE 11

STAGE FREQUENCY COMPUTATION
LAKE SALVADOR

Zone B			Probability	50-Mile SUBZONE					
				Tracks From West		Tracks From South		Tracks From East	
CPI Probability In Yrs occ/100-yr			All Tracks occ/100-yrs	Stage ft/msl	Probability occ/100-yrs	Stage ft/msl	Probability occ/100-yrs	Stage ft/msl	Probability occ/100-yrs
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
29.0	2.5	40	8.0	2.78	.88	4.59	5.04	4.37	1.97
28.3	10.0	10	2.0	7.08	.22	6.47	1.26	6.04	0.49
27.8	50.0	2	0.4	8.56	.04	7.60	0.25	7.18	0.10
27.6	100.0	1	0.2	9.04	.02	7.93	0.13	7.48	0.05

Col. 4 20 percent of Col. 3
Col. 6 11.0 percent of Col. 4
Col. 8 63.0 percent of Col. 4
Col. 10 24.6 percent of Col. 4

TABLE A-I-12
2040 HURRICANE SURGE HEIGHTS

Location	SPH	Stages in feet NGVD 200-year	100-year
Harvey, Algiers and Hero Canals	9.3	8.0	6.8
Oakville Levee	8.8	7.5	6.3

Levee heights for future conditions were determined by adding runup from the appropriate wave condition to the design stillwater level. Where protective structures will be sheltered against significant wave runup, wave runup from the small locally generated wave climate was used to determine levee height. In areas where significant hurricane wave action will occur because of an available fetch, levee heights were designed using wave height determined from methodologies described in the Coastal Engineering Center's Shore Protection Manual. Design elevation of protective structures in each reach are given in Table A-I-13.

TABLE A-I-13
2040 DESIGN ELEVATION OF PROTECTIVE STRUCTURES

Location	SPH	Stages in Feet NGVD 200-year	100-year
Harvey and Algiers Canals	11.3	10.0	8.8
Hero Canal Levee	12.3	11.0	9.8
Oakville Levee	10.8	9.5	8.3

LITERATURE CITED

(1) Beach Erosion Board, "Shore Protection Planning and Design," Technical Report No. 4, June 1954.

(2) Saville, Thorndike, Jr., "Wind Setup and Waves in Shallow Water," Beach Erosion Board, Technical Memorandum No. 27, June 1952.

(3) U.S. Army Engineer District, Jacksonville, "Design Memorandum, Wind Tide Produced by Hurricanes,: Partial Definite Project Report, Central and Southern Florida Project, for Flood Control and Other Purposes. Part IV, Supplement 2, Section 3, July 26, 1956.

(4) U.S. Weather Bureau, "Hurricane Rainfall Estimates Applicable to Middle Gulf Standard Project Hurricanes, Tracks A, C, F, D, and B, New Orleans Study, Zone B," Memorandum HUR 3-5, November 30, 1959.

(5) U.S. Weather Bureau, "Estimates of Moderate Hurricane Rainfall Applicable to Middle Gulf Standard Project Hurricanes," Memorandum HUR 3-5A, December 11, 1959.

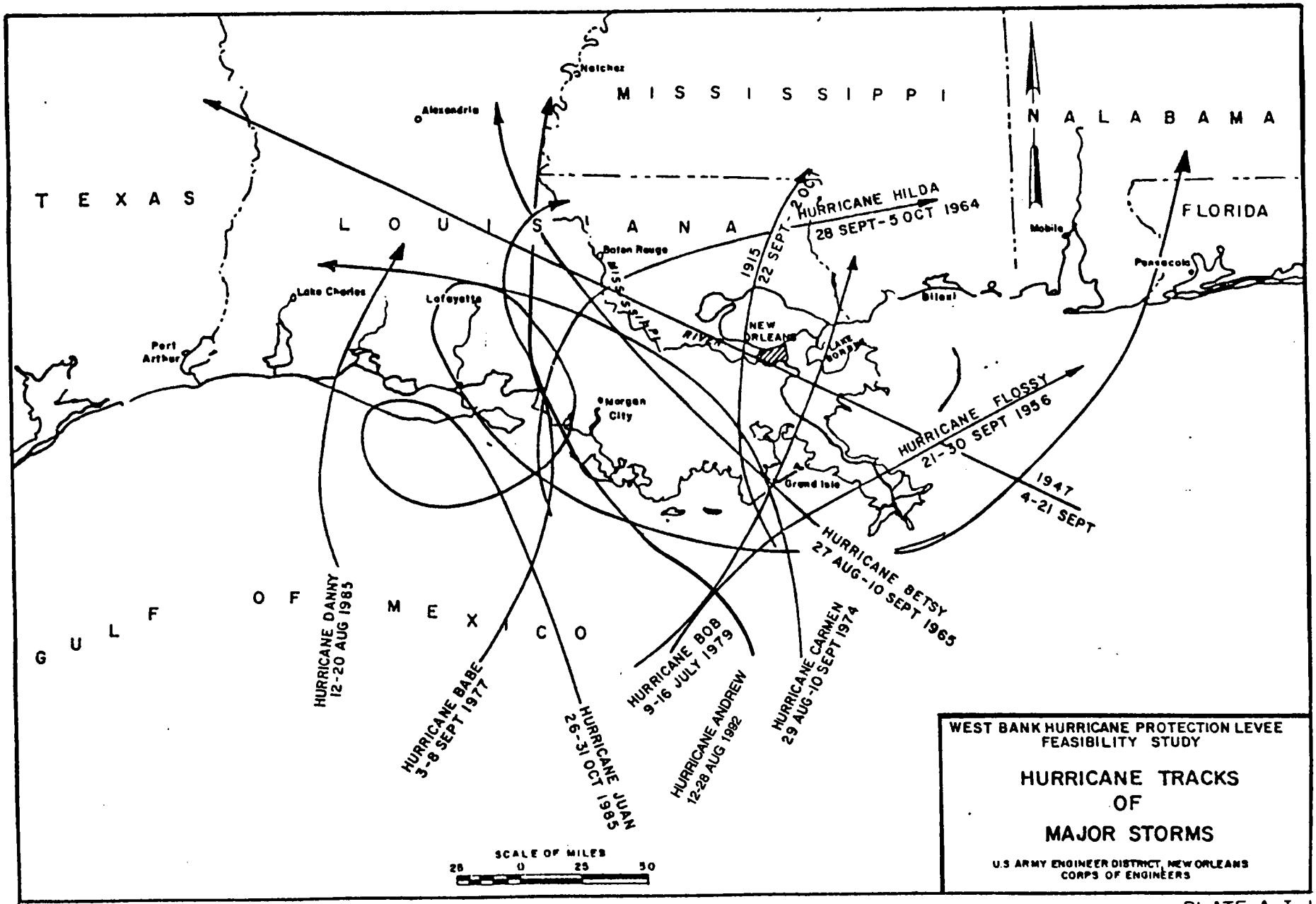
(6) Bretschneider, C. L. and J. I. Collins: "Prediction of Hurricane Surge, An Investigation for Corpus Christi, Texas, and Vicinity," NESCO Technical Report SN-120 to U.S. Army Engineer District, Galveston, National Engineering Science Co., Washington, D.C., 1963.

(7) Environmental Science Services Administration, U.S. Weather Bureau, "Standard Project Hurricane Wind Field Patterns (revised) to Replace Existing Patterns in NHRP Report No. 33 for Zones B and C," Memorandum HUR 7-84, August 17, 1965.

(8) Bretschneider, C. L., "Prediction of Wind Waves and Setup in Shallow Water, with Special Application to Lake Okeechobee, Florida," Unpublished Paper, Texas A&M College, August 1954.

(9) National Weather Service, "Meteorological Criteria for Standard Project Hurricane and Probable Maximum Hurricane Windfields, Gulf and East Coasts of the United States, NOAA Technical Report NWS 23, September 1979.

(10) U.S. Weather Bureau, "Hurricane Frequency and Correlation of Hurricane Characteristics for the Gulf of Mexico Area, P.L. 71," Memorandum HUR Z-4, August 30, 1957.



WEST BANK HURRICANE PROTECTION LEVEE
FEASIBILITY STUDY

HURRICANE TRACKS OF MAJOR STORMS

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

PLATE A-I-1

PROJECT		COMPUTED BY	DATE
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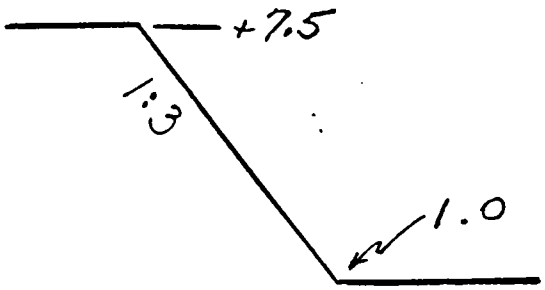
SUBJECT		CHECKED BY	DATE
HURRICANE PROTECTION FEASIBILITY STUDY			

HARVEY + ALGIERS CANALS



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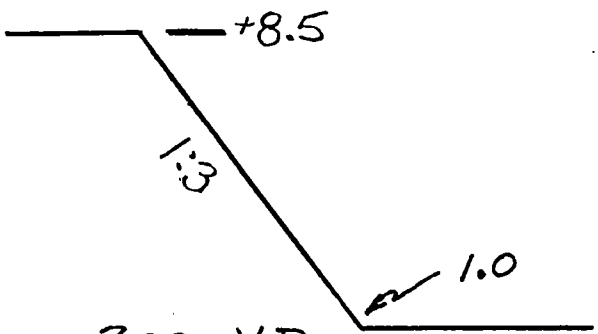
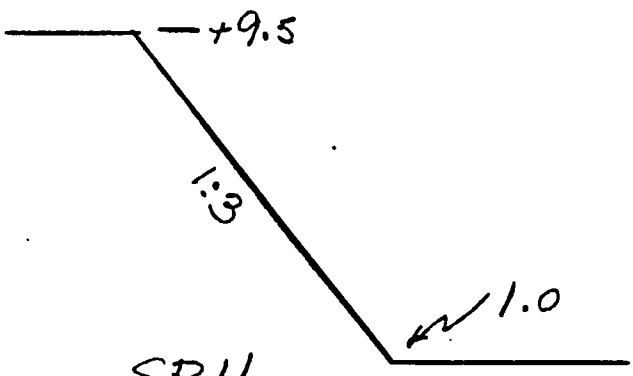


200-YR



SPH

DESIGN SECTIONS

PLATE A-I-2

PROJECT		COMPUTED BY	DATE
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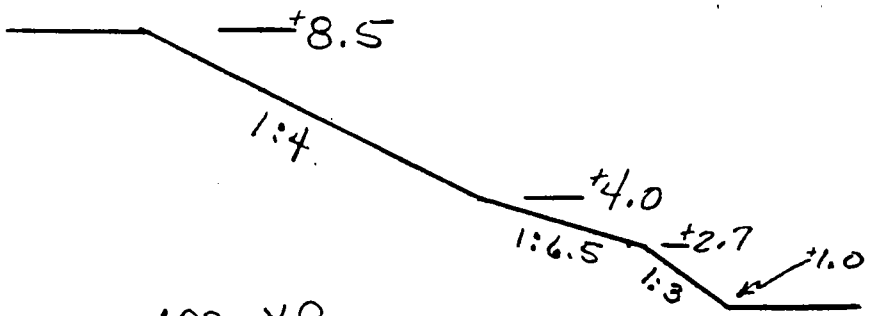
HURRICANE PROTECTION FEASIBILITY STUDY			

HERO CANAL



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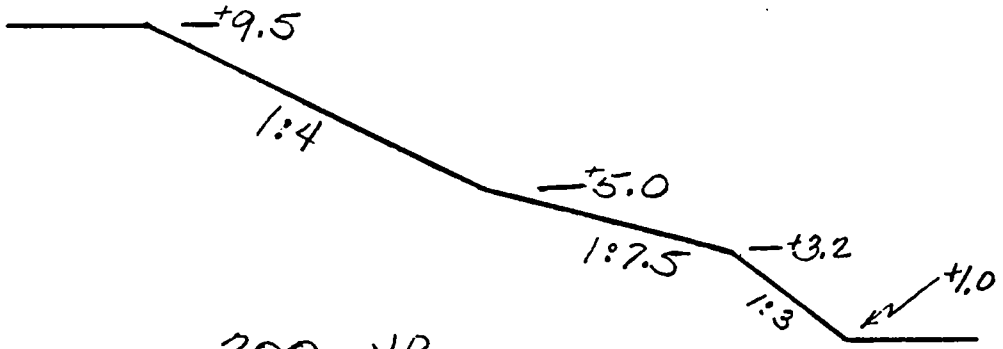

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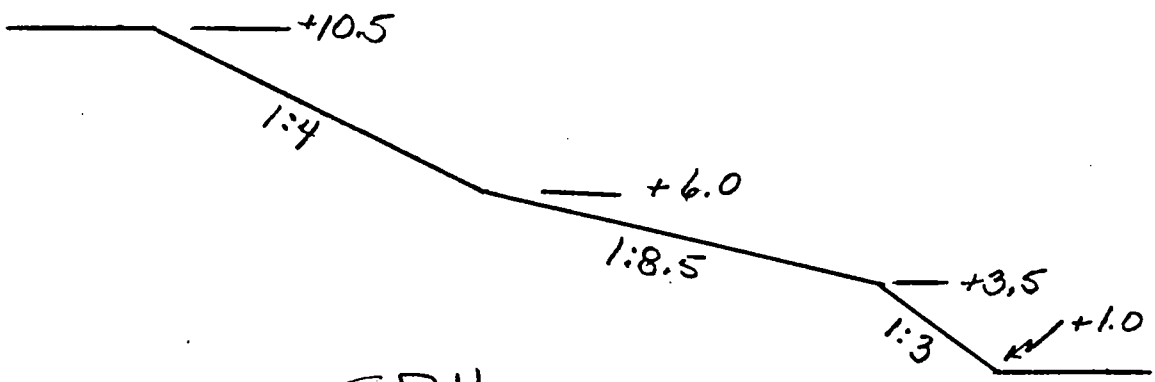

SPH

DESIGN SECTIONS

PLATE A-I-3

PROJECT		COMPUTED BY	DATE
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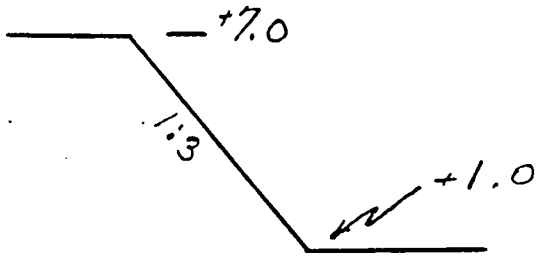
HURRICANE PROTECTION FEASIBILITY STUDY			

OAK VILLE



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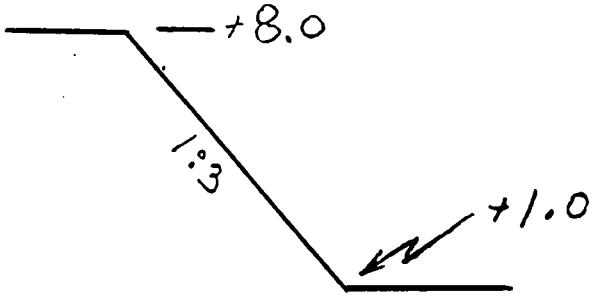

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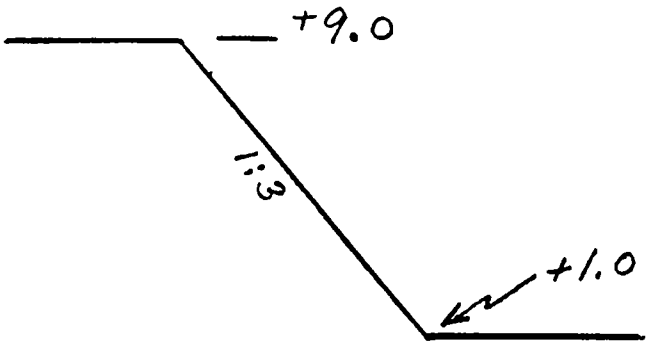

SPH

DESIGN SECTIONS

PLATE A-I-4

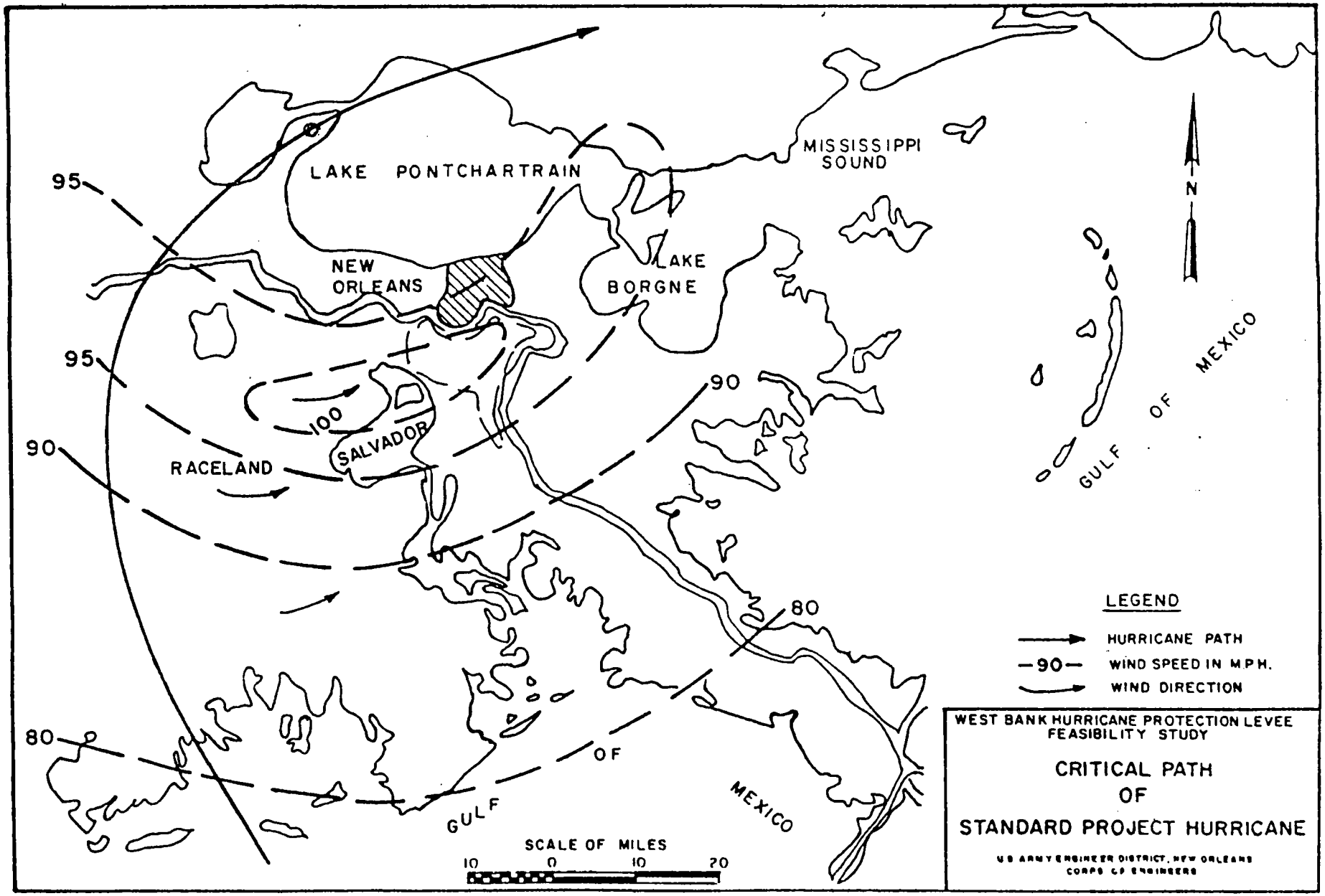
LAKE PONTCHARTRAIN
MISSISSIPPI SOUND
NEW ORLEANS
LAKE BORGNE
95
95
90
90
80
80
100
SALVADOR
RACELAND
GULF OF MEXICO
GULF OF MEXICO
N
SCALE OF MILES
10 0 10 20
LEGEND
HURRICANE PATH
90 WIND SPEED IN M.P.H.
WIND DIRECTION
WEST BANK HURRICANE PROTECTION LEVEE FEASIBILITY STUDY
CRITICAL PATH OF STANDARD PROJECT HURRICANE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS

PLATE A-I- 5

APPENDIX A

SECTION II - HYDRAULICS

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HYDRAULICS

1. INTRODUCTION.

The developed regions of the study area are or will be encompassed by a protective levee system whose purpose is to exclude high tides and storm surges. This levee system is intersected by several canals: Harvey, Algiers, and Hero. Two of these, Algiers and Harvey, provide arteries of commerce and industry to the westbank area. Rainfall and floodwaters are drained from the leveed areas by a system of structures and canals that outflow to pumping stations. Historically, the capacity of these pump stations has not been adequate to handle the volume of floodwaters reaching the stations, and the stations have operated at less than full capacity during flood events. In addition, interior drainage structures through some man-made barriers, such as highway and railroad embankments, have proven inadequate during recent rainfall events and the passage of Hurricane Juan in October 1985.

Standard hydrologic and hydraulic methods were used to analyze the flooding potential of the leveed areas for existing conditions and for the proposed project levee conditions of 100-year, 200-year, and Standard Project Hurricane Protection.

2. DETAILED PLANS.

The study area lies on the western bank of the Mississippi River from the Harvey Canal to the levee south of the small community of Oakville. This area is cut in two by the Algiers Canal and divided further by the levees between Orleans, Jefferson and Plaquemines Parishes. The area is divided into 7 hydrologic units. Between the Harvey and Algiers Canals there are 4 hydrologic units as shown on Plate A-II-1. One is Algiers (Area A), in Orleans Parish, which is separated from Jefferson Parish by a levee at elevation 2.5 feet NGVD. The remaining Jefferson and Plaquemines area is divided into 3 hydrologic units: north of the Westbank Expressway (Area B), south of the Westbank Expressway and northeast of the Belle Chasse Highway (Area C), and south of the Westbank Expressway and southwest of the Belle Chasse Highway (Area D). The area south of the Algiers Canal is divided into 3 hydrologic units. The Algiers Lower Coast (Area E) is located in Orleans Parish and is separated from the second hydrologic area,

Belle Chasse, (Area F) by a levee. The third and last hydrologic area is the small community of Oakville, below Belle Chasse; it is located outside of local protection levees.

The existing protection along the Harvey Canal consists of levees and floodwalls varying in height from 2.5 to 9 feet NGVD. The heights were taken from plans dated 1980 provided by the Louisiana Department of Transportation and Development. The Hero Pumping Station is located along the eastern side of the Harvey Canal. A major levee failure (1000 feet in length) was assumed in the Harvey Canal near the Hero Pumping Station. Another major failure 1000 feet in length was assumed on the eastern side of the Algiers Canal in the Belle Chasse reach of the Plaquemines Parish levee below Alvin Callender Field along Bayou Barataria. The failures were assumed to be initiated when the storm surge came within 2 feet of the top of the levee. Levee heights along the Algiers Canal are maintained to an elevation of approximately 7.0 feet NGVD. Four pumping stations discharge into the Algiers Canal: two from Orleans, one from the Gretna area and one from Belle Chasse. The remaining levee which borders Belle Chasse and turns toward the Mississippi River along the Hero Canal varies in elevation from 5 to 11 feet NGVD and ends where the natural ground is at 6 feet NGVD, several hundred feet before tying into the Mississippi River levee. For analyses of existing conditions no failures were assumed in the Algiers Canal levee system. The decision to allow a levee to fail under existing conditions during the design storm surge was based on the types of material used in constructing the levees and levee failures experienced during Hurricane Juan. Local levees were constructed from available borrow, which is high in peat, other organic materials, stumps and other foreign matter. A levee constructed of these materials lacks the strength required to withstand hurricane surges or prolonged periods of high water. During Hurricane Juan in 1985 several reaches of local levee west of the Harvey Canal failed. These levees failed under the force of stages slightly above 4 feet NGVD. Failures occurred near Lincolnshire, Estelle and Cousins Pumping stations. Federal levees, on the other hand, will be constructed of material selected especially to insure the integrity of the levee under design conditions. This technique is used in NOD and, historically, has allowed Corps constructed levees to withstand hurricane surges and high water undamaged. Therefore, for project conditions, no levee failures were assumed and no storm surge water via crevasse flowed into the interior protected areas for any frequency storm. When storm stages encroach within 2 feet of the crest of the levee wave overtopping occurs across all of the design levees in the project. The amount of this overtopping becomes less as the degree of protection of the project levee increases.

3. INTERIOR DRAINAGE.

Rainfall frequency and duration data derived from TP-40, Rainfall Frequency Atlas of the United States, for storms of 10-, 50-, 100-, and 500-year recurrence intervals were applied to the 7 hydrologic units. Storage curves derived from 1 foot contour topographic maps developed by the Corps of Engineers for the Orleans Parish Flood Insurance Study, by Plaquemines Parish for their parish, and by Bernard and Thomas, Consulting Engineers, Inc., in its Master Drainage Plan for Drainage District No. 9 in Jefferson Parish were used to determine flood heights. Flood elevations for the 7 hydrologic units were established by computing peak water storage volumes resulting from the rainfall runoff, hurricane surge free flow, and wave overtopping, where appropriate. Storage volumes for rainfall runoff were computed by routing flood hydrographs through drainage structures and over roadways into the individual drainage units. Flood hydrographs were routed to outfall canal pumping stations and floodwaters were relieved by pumping. Pumping stations in this study were generally operated at 75 percent capacity, since this capacity reflects historic operating conditions. When significant overtopping occurs, pumping stations were assumed inoperable for several hours during these peak stages.

Future conditions assumed a pumping improvement to the Jefferson Parish Basin between the Harvey and Algiers Canals (Areas B, C, and D), as proposed by local interests. A new pumping station, the District No. 9 Station, having a capacity of approximately 3000 cfs will be constructed near the existing Planters Station on the Algiers Canal. This station will assist in draining the Jefferson and Plaquemines Parish areas between the Harvey and Algiers Canals. The additional pumping capacity was assumed for both the with- and without-project conditions. No determination has been made as to the adequacy or cost-effectiveness of this improvement. The intent of the increased pumping capacity is to either reduce flood heights or durations in protected areas.

Analysis of the drainage system has included routing of rainwaters through several drainage units for various pump capacities. In general, changes in pump capacities affect the peak stages very little but affect the duration of flooding more significantly. For example, increasing pump capacity from 75 percent to 100 percent will reduce the duration of flooding by several hours, but the peak flood stage will be reduced by only a few tenths of a foot. An extensive analysis of the drainage system was not undertaken since the system is not particularly sensitive to reduction in pump capacity. Further analyses are

being conducted as part of the Jefferson and Orleans Parishes, Urban Flood Control Study, to address the problems associated with stormwater runoff in Jefferson and Orleans Parishes.

Storage volumes from hurricane surge overtopping were obtained by computing cumulative volumes of weir flow over levees when stages exceed levee heights or levees were assumed to fail, and by computing cumulative volumes of wave overtopping over levees when stages are lower than levee heights. It should be noted that not all drainage areas are affected by hurricane surge overtopping and that hurricane surge overtopping did not occur during all flood events studied.

The areas of Orleans Parish at the upper end of the Algiers Canal are not subject to surge inflow because of the limited capacity which can be carried by the Algiers Canal. If the height of the levees along the canal are constant, any weir flow, which cannot exceed the conveyance of the canal, will overflow in the lower reaches into the Gretna area to the west and the Belle Chasse area to the east. Therefore, upper and lower Algiers is more susceptible to the cessation of pumping during high stages. Wave overtopping by small locally generated waves on the order of 1 foot can affect all levees in the project area when stages encroach within 2 feet of the crest of the levee. Because of the limited fetch lengths for significant wave generation, hurricane-generated wave overtopping is limited to the reach of levee along the Hero Canal from Bayou Barataria to near the new Oakville back levee. In the remaining reaches levees would be subjected to only the smaller locally generated waves. Thus all levee heights were determined by using the appropriate wave runup on the selected slope of the levee or floodwall. The interior stage was determined for each reach by adding rainfall and overtopping amounts to available storage and removing the volume attributable to pumping.

Plate A-II-1 is a map showing the 7 hydrologic units. Table A-II-1 lists the stages for various frequency events in each of the seven hydrologic reaches under existing conditions.

TABLE A-II-1
EXISTING CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-3.8	0.7	-2.8	-3.3	-2.4	-4.4	3.3
20	-3.8	0.7	-2.3	-2.6	-2.4	-3.6	3.5
50	-3.8	1.0	-1.2	-1.2	-2.4	-2.4	4.0
71	-3.8	1.1	-0.4	-0.4	-2.4	-2.2	4.5
100	-3.8	1.5	0.4	0.4	-2.4	-1.9	5.0
143	-2.0	1.8	1.5	1.5	-2.2	-1.5	5.5
200	-0.5	3.0	3.0	3.0	-2.0	-1.1	6.0
250	1.1	3.7	3.7	3.7	-1.7	-0.5	6.2
333	2.9	4.6	4.6	4.6	-1.1	0.3	6.5
500	5.8	5.8	5.8	5.8	-0.3	1.5	7.0

Plate A-II-2 shows the limits of hurricane overflow for existing conditions. Project-in-place conditions assume that protective structures providing the required degree of protection have been constructed and only more severe events can overtop them. Stage-frequency tables listing the interior stages in the various areas for 30-, 70-, 100-, 200-year and SPH degrees of protection are shown in Tables A-II-2 through A-II-6. Plate A-II-3 shows hurricane stages and levee grades required to protect the area from 100-year, 200-year and SPH storm surges. Plate A-II-4 shows the residual flooding, due primarily to rainfall, which occurs for the SPH project in place with an SPH event.

TABLE A-II-2
30-YEAR PROJECT IN PLACE - STAGE FREQUENCY

FREQUENCY	AREAS			
YEARS	A	B	C	D
10	-3.8	0.7	-3.0	-3.4
20	-3.8	0.7	-3.0	-3.4
50	-3.8	0.7	-3.2	-3.4
71	-3.1	0.7	-2.4	-2.4
100	-2.6	0.7	-1.8	-1.8
143	-2.0	0.7	-0.9	-0.9
200	-1.4	0.7	0.0	0.0
250	-1.3	0.7	0.1	0.1
333	-1.1	0.7	0.2	0.2
500	-0.9	0.7	0.3	0.3

TABLE A-II-3
70-YEAR PROJECT IN PLACE - STAGE FREQUENCY

FREQUENCY	AREAS			
YEARS	A	B	C	D
10	-3.8	0.7	-3.0	-3.4
20	-3.8	0.7	-3.0	-3.4
50	-3.8	0.7	-3.0	-3.4
71	-3.8	0.7	-3.0	-3.4
100	-3.8	0.7	-3.0	-3.3
143	-3.2	0.7	-2.5	-2.5
200	-2.5	0.7	-1.7	-1.7
250	-2.3	0.7	-1.4	-1.4
333	-1.9	0.7	-0.8	-0.8
500	-1.4	0.7	-0.1	-0.1

TABLE A-II-4
100-YEAR PROJECT IN PLACE - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
20	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
50	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
71	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
100	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
143	-3.7	0.7	-2.8	-3.1	-2.2	-3.8	3.7
200	-3.5	0.7	-2.7	-2.7	-2.0	-3.4	4.6
250	-3.2	0.7	-2.3	-2.3	-1.6	-2.9	5.1
333	-2.8	0.7	-1.7	-1.7	-1.1	-2.1	6.0
500	-2.0	0.7	-0.9	-0.9	-0.3	-1.0	7.0

TABLE A-II-5
200-YEAR PROJECT IN PLACE - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
20	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
50	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
71	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
100	-3.8	0.7	-3.0	3.4	-2.4	-4.4	2.9
143	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
200	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
250	-3.8	0.7	-3.0	-3.3	-2.3	-4.2	3.3
333	-3.7	0.7	-2.9	-3.1	-2.3	-3.9	3.8
500	-3.5	0.7	-2.8	-2.8	-2.2	-3.4	4.5

TABLE A-II-6
SPH PROJECT IN PLACE - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
20	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
50	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
71	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
100	-3.8	0.7	-3.0	3.4	-2.4	-4.4	2.9
143	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
200	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
250	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
333	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9
500	-3.8	0.7	-3.0	-3.4	-2.4	-4.4	2.9

With the expected continuation of subsidence and sea level rise, during the next 50-years surge heights associated with tropical storms and hurricanes can be expected to increase in height also. An estimate of the 2040 future surge height associated with hurricanes was projected by the WIFM program during the Louisiana Coastal Area, Hurricane Protection Study. Subsidence and sea level rise will increase existing water depths in coastal water bodies and also expand their surface areas. When wind blows across these water bodies, surge levels and setup will increase in proportion to water depths and fetch lengths. Hurricane surges generated by the WIFM model for future conditions increase in elevation more than the increase in depths due to sea level rise and subsidence because of the effects of increased fetch lengths and reduced friction. Using hurricane surges generated by the WIFM grid, interior flood heights for future conditions with and without the project were computed, see Tables A-II-7 through A-II-12 for stage-frequency relationships.

TABLE A-II-7

FUTURE CONDITIONS WITHOUT PROJECT - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-4.8	-0.3	-2.2	-2.2	-3.4	-5.4	4.3
20	-4.8	-0.3	-1.2	-1.2	-3.4	-4.4	4.5
50	-4.8	0.3	0.3	0.3	-3.3	-2.6	5.2
71	-0.6	1.4	1.4	1.4	-2.8	-1.7	5.8
100	2.6	2.6	2.6	2.6	-2.2	-0.7	6.3
143	5.6	5.6	5.6	5.6	-1.4	0.4	6.9
200	8.0	8.0	8.0	8.0	-0.5	1.5	7.5
250	8.4	8.4	8.4	8.4	0.2	2.0	7.8
333	8.9	8.9	8.9	8.9	2.3	2.7	8.2
500	9.3	9.3	9.3	9.3	3.8	3.8	8.8

TABLE A-II-8

30-YEAR PROJECT IN PLACE FUTURE CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS			
YEARS	A	B	C	D
10	-4.8	-0.3	-4.0	-4.4
20	-4.8	-0.3	-4.0	-4.4
50	-4.7	-0.3	-4.0	-4.3
71	-3.9	-0.3	-3.4	-3.4
100	-3.2	-0.3	-2.6	-2.6
143	-2.7	-0.3	-1.7	-1.7
200	-2.2	-0.3	-0.8	-0.8
250	-2.0	-0.0	-0.6	-0.6
333	-1.8	0.7	-0.4	-0.4
500	-1.5	0.7	0.0	0.0

TABLE A-II-9

70-YEAR PROJECT IN PLACE FUTURE CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS			
YEARS	A	B	C	D
10	-4.8	-0.3	-4.0	-4.4
20	-4.8	-0.3	-4.0	-4.4
50	-4.8	-0.3	-4.0	-4.4
71	-4.8	-0.3	-4.0	-4.3
100	-4.8	-0.3	-4.0	-4.2
143	-3.9	-0.3	-3.0	-3.0
200	-3.1	-0.3	-2.1	-2.1
250	-2.9	-0.3	-1.9	-1.9
333	-2.5	-0.3	-1.4	-1.4
500	-2.2	-0.3	-0.9	-0.9

TABLE A-II-10

100-YEAR PROJECT IN PLACE FUTURE CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
20	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
50	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
71	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
100	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
143	-4.5	-0.3	-4.0	-4.0	-3.1	-4.5	2.9
200	-4.2	-0.3	-3.5	-3.5	-2.7	-3.9	4.4
250	-3.8	-0.3	-3.0	-3.0	-2.3	-3.3	5.4
333	-3.2	-0.3	-2.3	-2.3	-1.7	-2.3	6.6
500	-2.5	-0.3	-1.3	-1.3	-0.7	-1.1	8.8

TABLE A-II-11

200-YEAR PROJECT IN PLACE FUTURE CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
20	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
50	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
71	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
100	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
143	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
200	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
250	-4.7	-0.3	-4.0	-4.2	-3.2	-5.1	2.5
333	-4.4	-0.3	-3.9	-3.9	-3.0	-4.6	3.3
500	-4.2	-0.3	-3.5	-3.5	-2.7	-3.8	4.5

TABLE A-II-12

SPH PROJECT IN PLACE FUTURE CONDITIONS - STAGE FREQUENCY

FREQUENCY	AREAS						
YEARS	A	B	C	D	E	F	OAKVILLE
10	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
20	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
50	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
71	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
100	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
143	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
200	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
250	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
333	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9
500	-4.8	-0.3	-4.0	-4.4	-3.4	-5.4	1.9

Future conditions levee heights required to provide protection from a 100-year, 200-year and SPH storm surge were determined. Stage-frequencies for future conditions assume that by the time the project is constructed additional pumping will be available in District No. 9 with the construction of a new pumping station on the west side of the Algiers Canal.

Businesses and industries along the Harvey Canal would be located outside of the proposed protective levees and floodwalls for Plan 1 and would be subject to flooding under both existing and future conditions. Stages increase a foot or more between existing and future conditions for all flood events studied. Construction of a floodgate of sufficient height at the entrance to the Harvey Canal would limit stages in the canal north of the floodgate. Table A-II-13 is a comparison of stages in the Canal for existing and future conditions without a floodgate, and for existing and future conditions with a floodgate providing SPH protection.

TABLE A-II-13
HARVEY CANAL - STAGE FREQUENCY
WITH AND WITHOUT FLOODGATE FOR EXISTING AND FUTURE CONDITIONS

FREQUENCY	WITHOUT CLOSURE		WITH CLOSURE
YEARS	EXISTING	FUTURE	EXISTING & FUTURE
10	3.3	4.3	3.8
20	3.7	4.7	3.8
50	4.5	5.7	3.8
71	5.0	6.2	3.8
100	5.5	6.7	3.8
143	6.0	7.4	3.8
200	6.5	8.0	3.8
250	6.7	8.3	3.8
333	7.1	8.7	3.8
500	7.5	9.3	3.8

The project floodwall constructed east of Peters Road (Plan 1)would prevent water from flowing across Peter's Road into the sump area as it does now. At the present time significant overtopping of the road occurs when the stage in the canal exceeds 4 feet. This situation will subject the industries located between Peters Road and the proposed

floodwall to increased stages after the project is constructed. Table A-II-14 lists the stages for existing and future conditions for various frequencies for the area between Peters Road and the floodwall.

TABLE A-II-14
STAGE - FREQUENCY
HARVEY CANAL - PETERS ROAD TO FLOODWALL
WITH PROJECT FOR EXISTING AND FUTURE CONDITIONS

FREQUENCY YEARS	EXISTING	FUTURE
10	-3.3	-2.3
20	-2.4	4.7
50	4.5	5.8
71	5.0	6.2
100	5.5	6.8
143	6.0	7.4
200	6.5	8.0
250	6.7	8.2
333	7.0	8.7
500	7.5	9.3

4. GATE AND OUTFALL CANAL ALTERNATIVES.

Of the alternatives studied, the most favorable combined an outfall canal below a diverted Cousins' Pumping Station with a gate across the Harvey Canal a few thousand feet south of Lapalco Blvd. Several design elements make this plan feasible.

The First Avenue Canal which connects the Cousins Pumping station to the Patriot Street Pumping Station to the north must be enlarged to accommodate an anticipated 2000 cfs flow.

With the flat terrain and the absence of containment levees, the First Avenue Canal Enlargement must prevent the design water surface elevation from exceeding the corresponding water surface elevation for existing conditions. The mild slope of the

existing canal implies that the slope of the energy grade line controls the flow in the canal. Therefore the slope of the energy grade line for the existing channel for a flow of 1000 cfs was determined from the known geometry by use of the Manning's Equation. This slope was then applied to the Manning Equation with the increased flow (2000 cfs) to solve for the section factor, AR2/3. By trial and error the depth and bottom width for the channel enlargement were determined (d = 10 + bw = 85).

This alternative also requires an outfall canal directly south of the existing Cousins Pumping Station. The discharge from this station will be diverted into the new outfall canal from its present outfall into the Harvey Canal. This new outfall canal was designed to accept existing and expected future expanded discharges from the Cousins Pumping Station. The new discharge channel for the enlarged Cousins Pumping Station was sized using the continuity equation (Q = VA). A velocity of 3.5 feet per second was chosen based on erodibility of the channel bottom. The head loss through the channel was checked using the HEC-2 Water Surface Profiles computer modeling package. A head loss of 0.3 feet was realized through the channel during the occurrence of the SPH design stage with a pumping station discharge of 6000 cfs.

Analysis of historic stage records at the gage at the Harvey Canal Lock indicates that a stage of + 3 feet NGVD or greater has occurred less than 1% of the time. If the gate is closed at a stage of + 3, it can be expected to remain closed 2 days per years based on the historic records. The stage in the Harvey Canal north of the floodgate will, therefore, be allowed to approach 3 ft NGVD. The design elevation of the interior flood protection adjacent to the canal is +4.0 ft NGVD. This is at or near the existing elevation of protection. The rainfall associated with the design hurricane, 8.5 inches, will not fill the canal north of the closed gate above +4.0 ft NGVD. Due to the limited freeboard, lockages will not be permitted when canal stages exceed 4.0 feet. This eliminates the need for additional levee height required for boat wakes. There will be no significant wind-generated waves to impinge on the levees due to the limited fetch.

If the maximum 48-hour rainfall of 2.1 feet were to occur when the gates are closed, the amount exceeding 1 foot would flow over the levees into Westwego and/or Gretna. The depth of flow at the location of any levee overtopping is expected to approximate sheet flow thus posing no threat to top slab properties. The flow would collect at nearby (i.e. several hundred feet) drainage canals. This excess, 1.1 feet of rainfall, is 136 acre-feet of water, half of which would flow into each area. The 68 acre-feet flowing into Gretna, when compared tot he 26,500 acre-feet of rainfall which accumulates in the area, is

less than one-half percent of the total. A similar situation would occur in Westwego. This would raise stages an imperceptible amount in either basin.

5. SURVEILLANCE PLAN

To assure the proper performance, operation and maintenance of the project, several monitoring features must be included as part of the proposed plan. Several gages should be included in the plan to allow monitoring of stages in and around the project and provide sufficient advance warning for gate closures. Gages should be located at the proposed gate site, at the extremities of the project and also a sufficient distance from the perimeter of the project to allow advance warning of stage abnormalities traversing the marsh and advancing toward the project. Since a surveillance plan was not included in the adjacent Westwego to Harvey Project, gages should be added to this plan to provide adequate monitoring for the Harvey to Westwego project, since its failure would endanger portions of this project. We recommend that the existing gages on the land side at Harvey and Algiers Locks be used to monitor this project. In addition, we recommend the addition of gages at the site of the proposed gate across the Harvey Canal, in Bayou Segnette north of Lapalco Blvd. on the western edge of the Westwego Project, and at the site of the recently discontinued Bayou Barataria gage. The benchmark at the Harvey Lock will be used to set all of these gages. Gages will be equipped with automatic recorders and transmitters. Data will be transmitted to a predetermined site at regular intervals for monitoring of stages. Data indicating impending flooding will be released to local agencies to assist in preparation or evacuation activities.

The gate in the Harvey Canal will be closed when monitoring gages indicate that the stage in the Canal will rise beyond 3 feet. Other project floodgates outside of the protection of the Harvey Canal Floodgate will be closed when stages encroach within 1 foot of the sill of those gates.

As another facet to monitoring, we recommend vertical aerial photography of the study area extending out into the surrounding marsh. Photo coverage will extend from the project levees to the north, Lafitte to the south, Oakville to the east, and Lake Des Allemands to the west. Photography will be to a scale that allows accurate reproduction of levee and marsh details. Photos will be flown in the winter every five years. Also an aerial photography flight must be made when a hurricane causes stages to exceed 4 feet NGVD on the floodside of the project as soon as hurricane cloud cover drops to 25 percent

or less. These photos will enable the sponsor to determine potential problems in the line of protection. By January of the following year, a copy should be provided to the New Orleans District to enable us to determine if the project's degree of protection has been compromised by marsh loss or other factors.

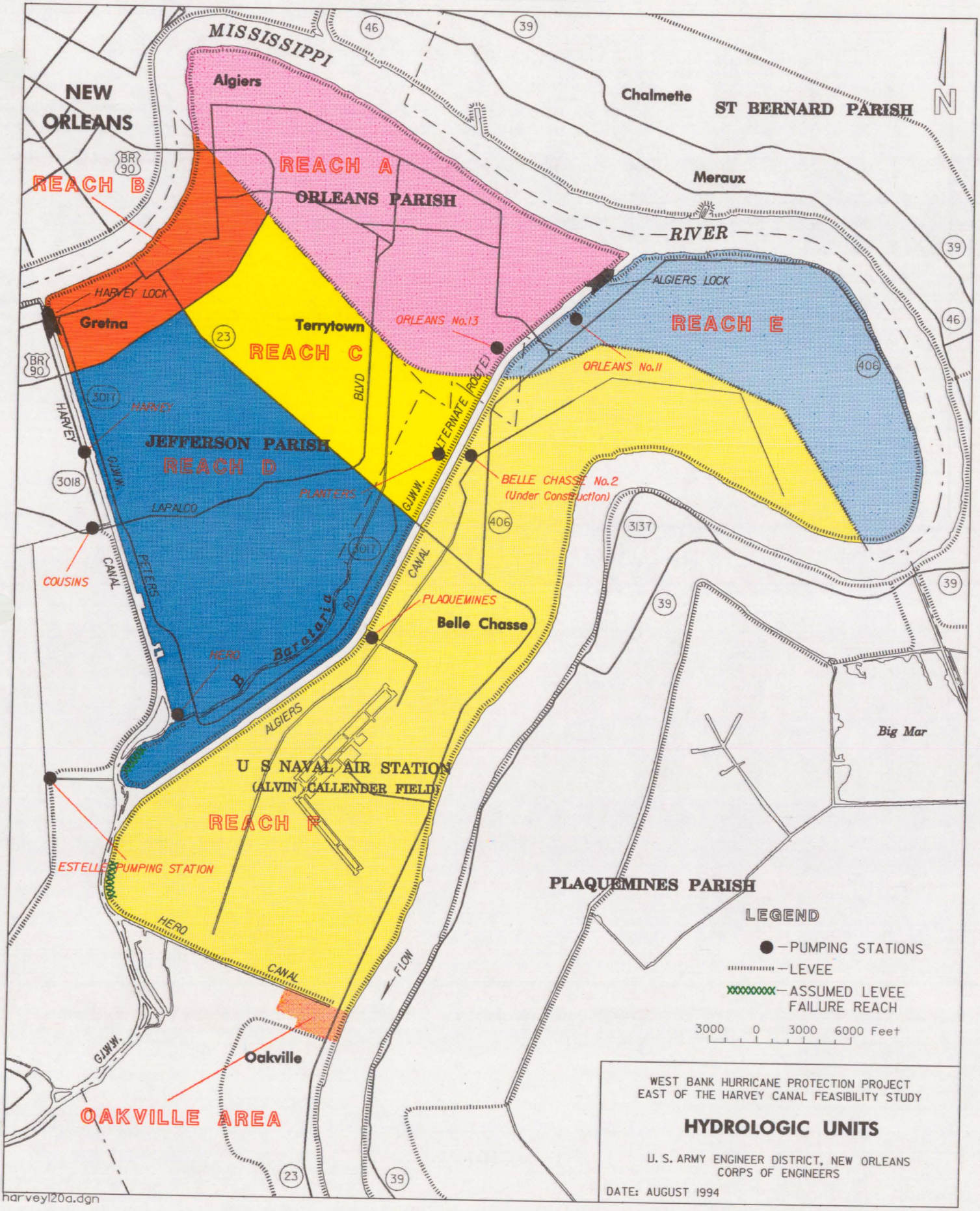
MISSISSIPPI
NEW ORLEANS
Algiers
Chalmette
ST BERNARD PARISH
N
REACH A
ORLEANS PARISH
REACH B
Meraux
RIVER
HARVEY LOCK
ALGIERS LOCK
Gretna
Terrytown
REACH C
ORLEANS No.13
REACH E
ORLEANS No.11
BLVD
ALTERNATE ROUTE
HARVEY
JEFFERSON PARISH
REACH D
G.I.W.W.
PLANTERS
BELLE CHASSE No.2
(Under Construction)
LAPALCO
COUSINS
CANAL
PETERS
PLAQUEMINES
Belle Chasse
HERO
Barataria
RD
ALGIERS
Big Mar
U S NAVAL AIR STATION
(ALVIN CALLENDER FIELD)
REACH F
ESTELLE PUMPING STATION
PLAQUEMINES PARISH
FLOW
Oakville
OAKVILLE AREA
LEGEND
PUMPING STATIONS
LEVEE
ASSUMED LEVEE FAILURE REACH
3000 0 3000 6000 Feet
WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY
HYDROLOGIC UNITS
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: AUGUST 1994
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PLATE A - II- 1

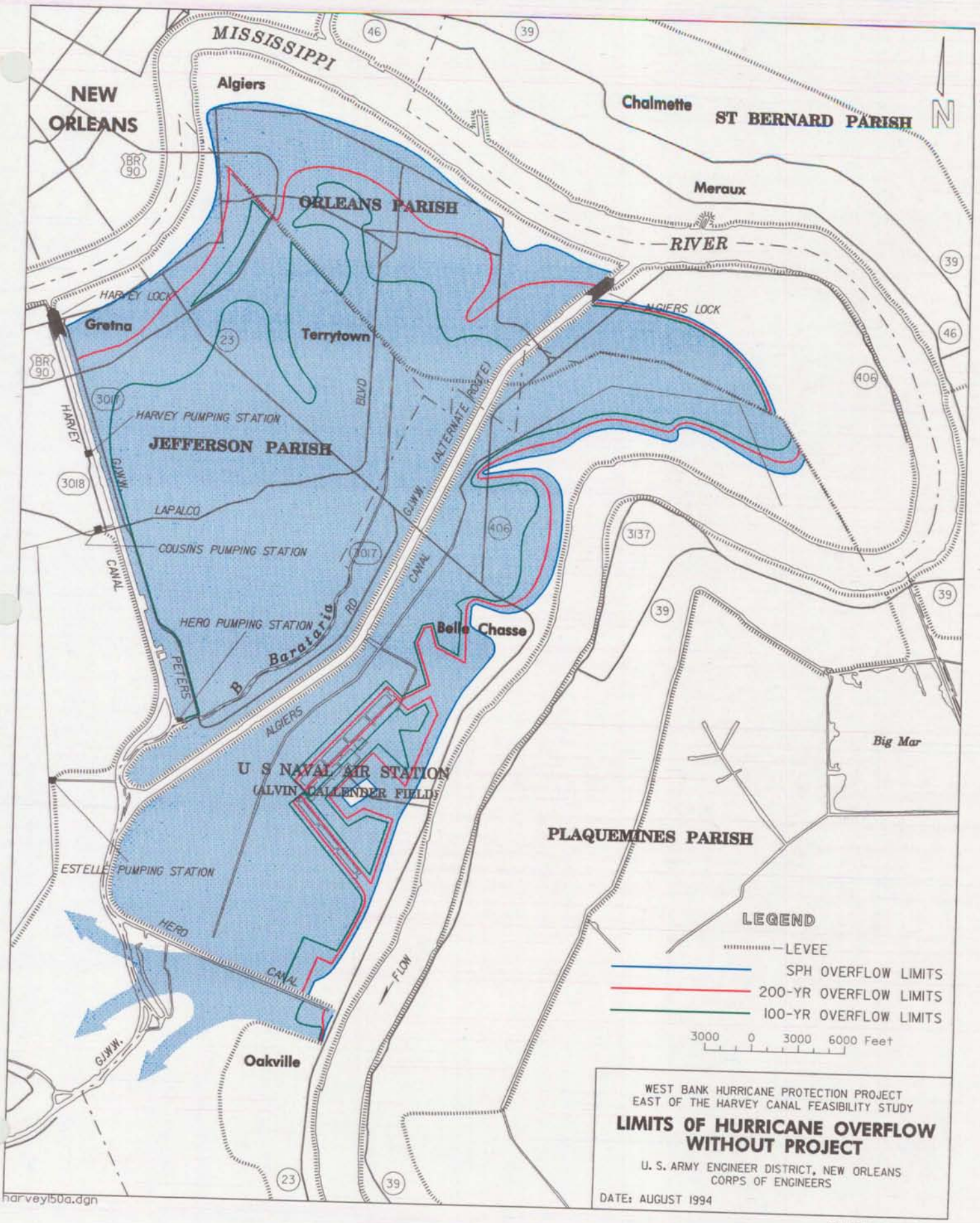
MISSISSIPPI
NEW ORLEANS
Algiers
Chalmette
ST BERNARD PARISH
N
Meraux
ORLEANS PARISH
RIVER
HARVEY LOCK
ALGIERS LOCK
Gretna
Terrytown
HARVEY PUMPING STATION
JEFFERSON PARISH
HARVEY CANAL
G.I.W.W.
LAPALCO
COUSINS PUMPING STATION
HERO PUMPING STATION
J.L. PETERS
Barataria
BLVD
ALTERNATE ROUTE
CANAL
Belle Chasse
ALGIERS
U S NAVAL AIR STATION
(ALVIN CALLENDER FIELD)
Big Mar
PLAQUEMINES PARISH
ESTELLE PUMPING STATION
HERO CANAL
FLOW
Oakville
LEGEND
LEVEE
SPH OVERFLOW LIMITS
200-YR OVERFLOW LIMITS
100-YR OVERFLOW LIMITS
3000 0 3000 6000 Feet
WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY
LIMITS OF HURRICANE OVERFLOW WITHOUT PROJECT
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: AUGUST 1994
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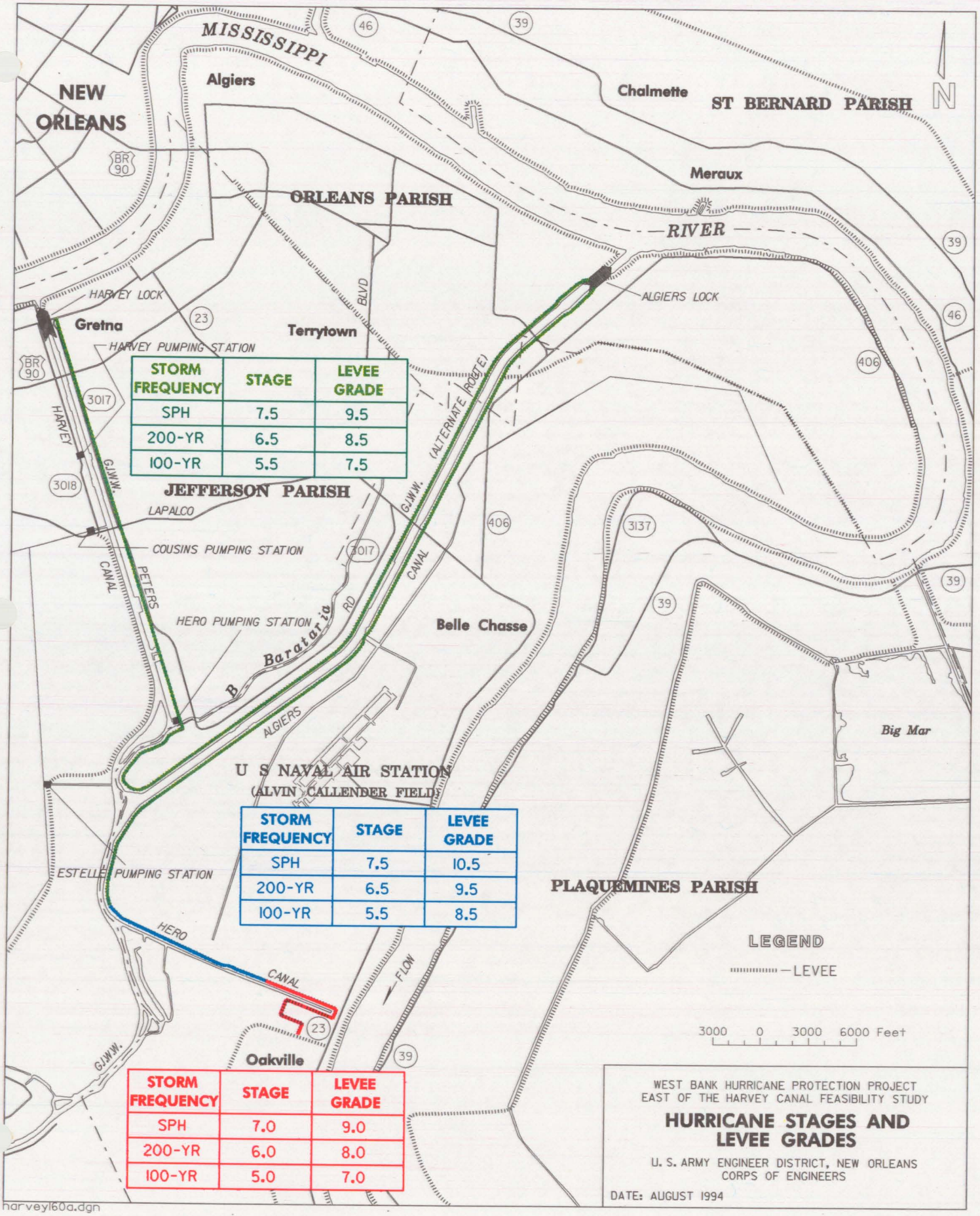
PLATE A - II- 2



STORM FREQUENCY	STAGE	LEVEE GRADE
SPH	7.5	9.5
200-YR	6.5	8.5
100-YR	5.5	7.5

STORM FREQUENCY	STAGE	LEVEE GRADE
SPH	7.5	10.5
200-YR	6.5	9.5
100-YR	5.5	8.5

STORM FREQUENCY	STAGE	LEVEE GRADE
SPH	7.0	9.0
200-YR	6.0	8.0
100-YR	5.0	7.0

LEGEND

——— LEVEE

3000 0 3000 6000 Feet

WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

HURRICANE STAGES AND LEVEE GRADES

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

DATE: AUGUST 1994

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PLATE A - II- 3

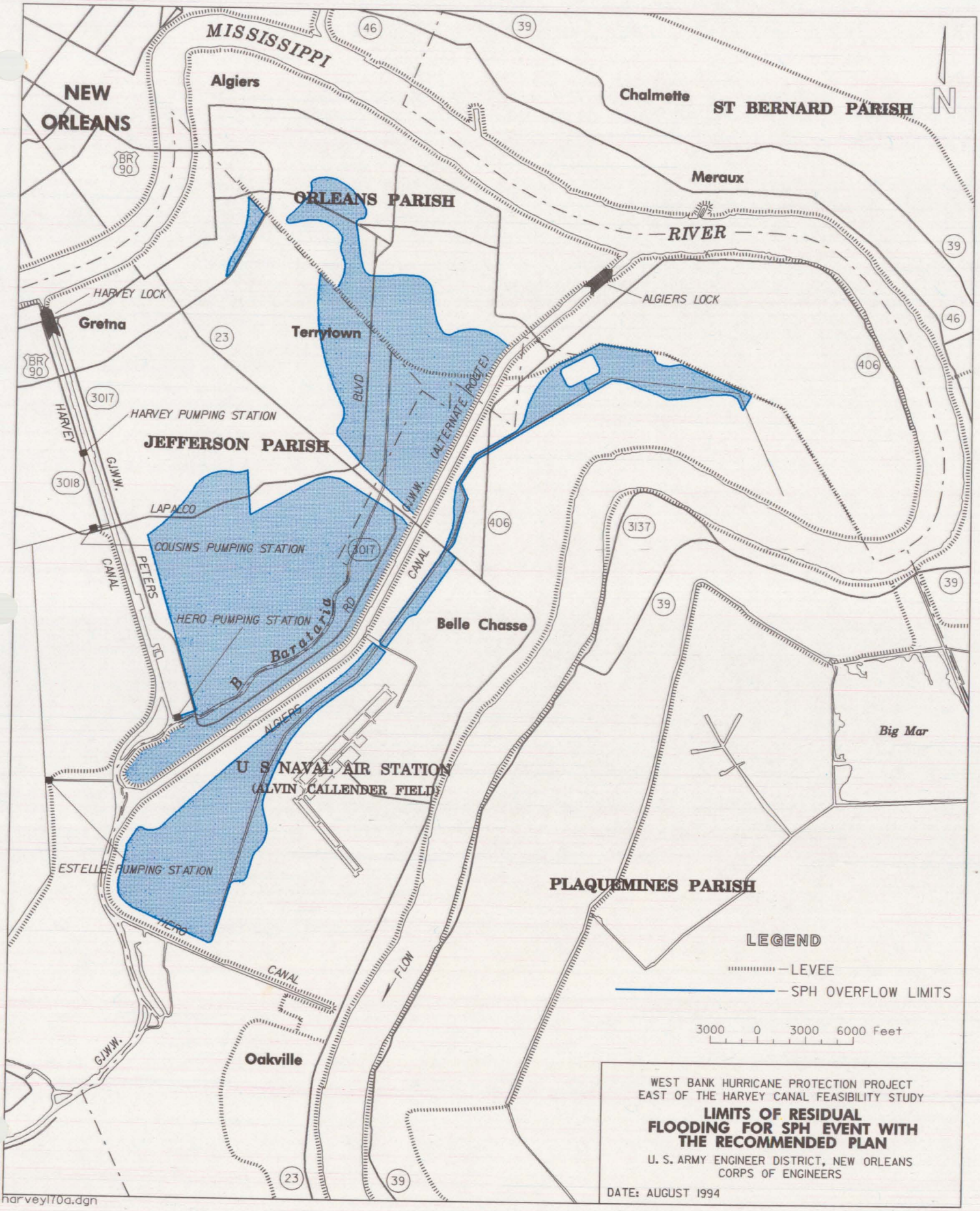
MISSISSIPPI
NEW ORLEANS
Algiers
Chalmette
ST BERNARD PARISH
N
Meraux
ORLEANS PARISH
RIVER
HARVEY LOCK
ALGIERS LOCK
Gretna
Terrytown
BLVD
(ALTERNATE ROUTE)
HARVEY
HARVEY PUMPING STATION
JEFFERSON PARISH
G.I.W.W.
LAPALCO
COUSINS PUMPING STATION
PETERS CANAL
HERO PUMPING STATION
Barataria
RD
Belle Chasse
Big Mar
ALGIERS
U S NAVAL AIR STATION
(ALVIN CALLENDER FIELD)
ESTELLE PUMPING STATION
HERO CANAL
FLOW
Oakville
PLAQUEMINES PARISH
LEGEND
LEVEE
SPH OVERFLOW LIMITS
3000 0 3000 6000 Feet
WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY
LIMITS OF RESIDUAL FLOODING FOR SPH EVENT WITH THE RECOMMENDED PLAN
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: AUGUST 1994
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PLATE A - II- 4

APPENDIX A

SECTION III - GEOLOGY, SOILS AND FOUNDATIONS

TABLE OF CONTENTS

Item	Page
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SUBSIDENCE	A-III-2
MINERAL RESOURCES	A-III-2
SOILS	A-III-2
FOUNDATIONS	
GENERAL	A-III-5
FIELD EXPLORATION & LABORATORY INVESTIGATION	A-III-5
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STABILITY OF LEVEES	A-III-6
CANTILEVER I-WALL	A-III-6
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LIST OF PLATES

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A-III-2	BORING LOCATIONS HERO CANAL TO OAKVILLE
A-III-3	SOIL BORINGS
A-III-4	SOIL BORING LEGEND

GEOLOGY AND SOILS

Physiography. The study area is located on the Deltaic portion of the Mississippi River Alluvial Plain. Specifically, the area is located on the northern edge of the Barataria Basin on the western side of the Mississippi River between miles 73 to 98 above head of passes. The Barataria Basin is an interdistributary basin dominated by features which include natural levee ridges, crevasse-splay deposits, marsh, lakes, and swamp. The eastern and northern edge of the basin is defined by the natural levee ridge of the Mississippi River and the western edge of the basin is defined by the Bayou Lafourche natural levee ridge. The Gulf of Mexico constitutes the southern boundary. Elevations vary from approximately +10 to +15 feet NGVD along the natural levee of the Mississippi River to 0 feet NGVD in the back swamp and lake areas to below 0 feet NGVD in areas under pump.

The area is protected from Mississippi River overflows by the mainline levee system. Flooding originating in the Gulf of Mexico can travel across the marsh and through Bayou Barataria to threaten the area from the south. To protect the area from this tidal and storm surge flooding, local interests have constructed a network of levees that provide a limited degree of protection.

Geology. The geologic history since the end of the Pleistocene Epoch is pertinent to the area. At the close of the Pleistocene, sea level was approximately 360 to 400 feet below present sea level and the Mississippi River was entrenched into the older Pleistocene sediments to the west of the project. As sea level rose to its present stand, the entrenched valley was filled with sediment by the Mississippi River, resulting in an increase in meandering and channel migration. This meandering and channel migration has resulted in a series of deltas extending into the Gulf of Mexico. Seven Holocene deltas are recognized in the lower Mississippi River Valley; however, only four are relevant to the project area. The oldest of the four deltas in the vicinity of the project was the Cocodrie Delta whose distal edges extended across the New Orleans area from west to east. After a diversion to the west and toe formation of the Teche Delta, the course of the Mississippi River returned to the vicinity forming the St. Bernard Delta which followed the same general course as the Cocodrie Delta but extended further to the east. It was during this period that maximum sedimentation into the area ocurred via the Bayou Barataria and des Familles distributaries. A shifting of the river course upstream in response to a shorter route to the Gulf resulted in the formation of the Lafourche Delta southwest of the project.

A final shift of the river brought the flow into its present course forming the Plaquemine Delta just south of New Orleans, and the present Balize Delta below the Plaquemine Delta. Development of the deltas below resulted in the gradual degradation of the study area through subsidence and shoreline retreat.

Subsidence. The project lies in a region of active subsidence that is allowing transgression of Gulf waters. Subsidence and land loss are caused by four major natural processes:

(1) consolidation of soft, compressible sediments,
(2) eustatic sea level rise,
(3) decrease in suspended sediments reaching the marsh areas from the Mississippi River, and
(4) attack of coastal areas by wave action.

Estimated subsidence rates are approximately 0.65 feet per century. Sea level rise has been measured at approximately 0.50 feet per century. Subsidence within the delta and sea level rise are natural processes that can be expected to continue.

Mineral Resources. There are no producing hydrocarbon fields in the immediate vicinity of the project. Sand is dredged periodically from the Mississippi River bed load.

Soils. Engineering properties of the sediments beneath the project vary greatly. Based on existing profiles and borings along the Algiers Canal and the Harvey Canal, the project is generally underlain by Holocene deposits that vary in thickness between 70 and 85 feet. These Holocene sediments are generally comprised of swamp-marsh deposits, interdistributary deposits and prodelta clays in this sequence from the surface to the top of the Pleistocene deposits. The underlying Pleistocene deposits are stiff to very stiff in consistency and yield lower water contents when compared to the Holocene deposits. An exception to the above sequence are the natural levee, crevasse-splay and point bar deposits associated with the present Mississippi River course and the abandoned distributaries which are known to extend through the area. The project area contains 13 soils series that are described below.

- Allemands muck is a poorly drained, organic soil that has been protected from flooding and drained. Surface elevations, which are some of the lowest in the survey area, have been lowered to below sea level since initial drainage.

• Allemands peat is a very poorly drained, unprotected and undrained organic soil at low elevations. The water level is near or a few inches above the soil surface most of the year. Surface runoff is very slow to none. Permeability is rapid in the organic layers and very slow in the mineral layers. Available water capacity is high.

• Allemands Variant muck is a very poorly drained soil at low elevations. The water level is above the soil surface most of the year. There is little or no surface runoff and permeability is very slow.

• Barbary soil is a very poorly drained soil at low elevations between the natural levee of the streams and marshes. The water level is at or above the surface most of the year. Surface runoff is almost nonexistent and permeability is very slow.

• Barbary Variant clay (drained) is a poorly drained mineral soil that has been protected from flooding. Surface elevations have been lowered to below sea level since initial drainage. The water table is regulated by drainage pumps, but is near the surface for short periods following heavy rains; surface runoff is slow.

• Commerce silt is a level, somewhat poorly drained soil at high elevations on natural levees of the Mississippi River and its distributaries. This soil occupies some of the highest elevations in the project area. Surface water runoff occurs at a slow rate. The seasonally high water table fluctuates between a depth of 1.5 and 4 feet.

• Commerce silty clay loam is a level, somewhat poorly drained soil on natural levees of the Mississippi River and its distributaries. Surface water runoff occurs at a slow rate. The seasonally high water table fluctuates between depths of 1.5 and 4 feet.

• Ijam Variet clay is a level, very poorly drained soil adjacent to canal and waterways. The water table is regulated by drainage pumps. Surface water runoff occurs at a slow rate.

• Kenner muck is a very poorly drained soil that occurs at or below sea level. The water level is above the soil surface during most of the year. Permeability is rapid in the organic layers and very slow in the mineral layers. Surface water runoff is very slow.

• Sharkey clay is a level, poorly drained clay soil on the low natural levees of the Mississippi River and its distributaries. Surface water runoff occurs at a slow rate. The

seasonally high water table fluctuates between a depth of one foot and a depth of two feet during rainy seasons.

- Sharkey silty clay loam is a firm soil on the low natural levees of the Mississippi River and its distributaries. The water table is within 15 inches of the surface during rainy seasons. Permeability and surface water runoff are very slow.

- Sharkey Variant clay is a level, poorly drained soil at low elevations adjacent to the higher natural levees of the Mississippi River and its distributaries. Surface water runoff occurs at a slow rate. The seasonally high water table fluctuates between one and two feet during rainy seasons.

- Vacherie complex (gently undulating) is a somewhat poorly drained soil on the natural levees at high local elevations associated with old levee breaks or crevasses. The water table is 20 to 30 inches below the surface during rainy periods of the year. Permeability and surface water runoff are very slow.

Most of the soil types in the study area will settle upon loading, will shrink and oxidize upon dewatering, and have low shear strengths. Therefore, settlement-sensitive structures should be pile supported.

FOUNDATIONS

General. This report addresses design assumptions and parameters for new levees, enlargement of existing levees and floodwalls. The project consist of three (3) design reaches for approximately 12,000 feet of floodwall and 125,000 feet of levee.

Field Exploration and Laboratory Investigation.

a. Soil Borings. Five general type borings were taken along parts of the proposed alignment in Oct 92, and two borrow borings were taken in the borrow pit in Mar 94. The location of these borings can be found on Plates A-III-1 and A-III-2. These 7 boring logs are presented on Plate A-III-3. Other undisturbed and general type borings used for design can be found in the following reports stored in the Foundations Branch of the New Orleans District:

(1) Algiers Lock and Canal - Soils Investigation, Jun 1948
(2) Algiers Lock and Canal - Definite Project Report, Jun 1948

Raising of the existing Algiers Canal levee will provide part of the flood protection for this project.

b. Laboratory Tests. Visual classifications were made on all boring samples and water content determinations were perform-ed on all cohesive samples. Standard Penetration Resistance blow counts were recorded when sampling in granular strata. Unconfined compression (UC) shear tests and grain size analyses were made on selected samples of cohesive and granular soils, respectively. Unconsolidated-undrained (Q), consolidated-undrained (R) triaxial compression shear tests and consolidation (C) tests were perform-ed on selected undisturbed samples and included Atterberg limits.

c. Design Parameters. For the reaches near Hero Canal, shear strength and wet density test results from general borings EHC-3, EHC-4 and EHC-5 were used to determine design parameters. Design parameters for the floodwall were determined from the test results of borings EHC-1 and EHC-2.

Design Reaches. The job was divided into three design reaches based on boring data. Reach III was split into subreaches "a"and "b" based on differing surface conditions.

The reaches are as follows:

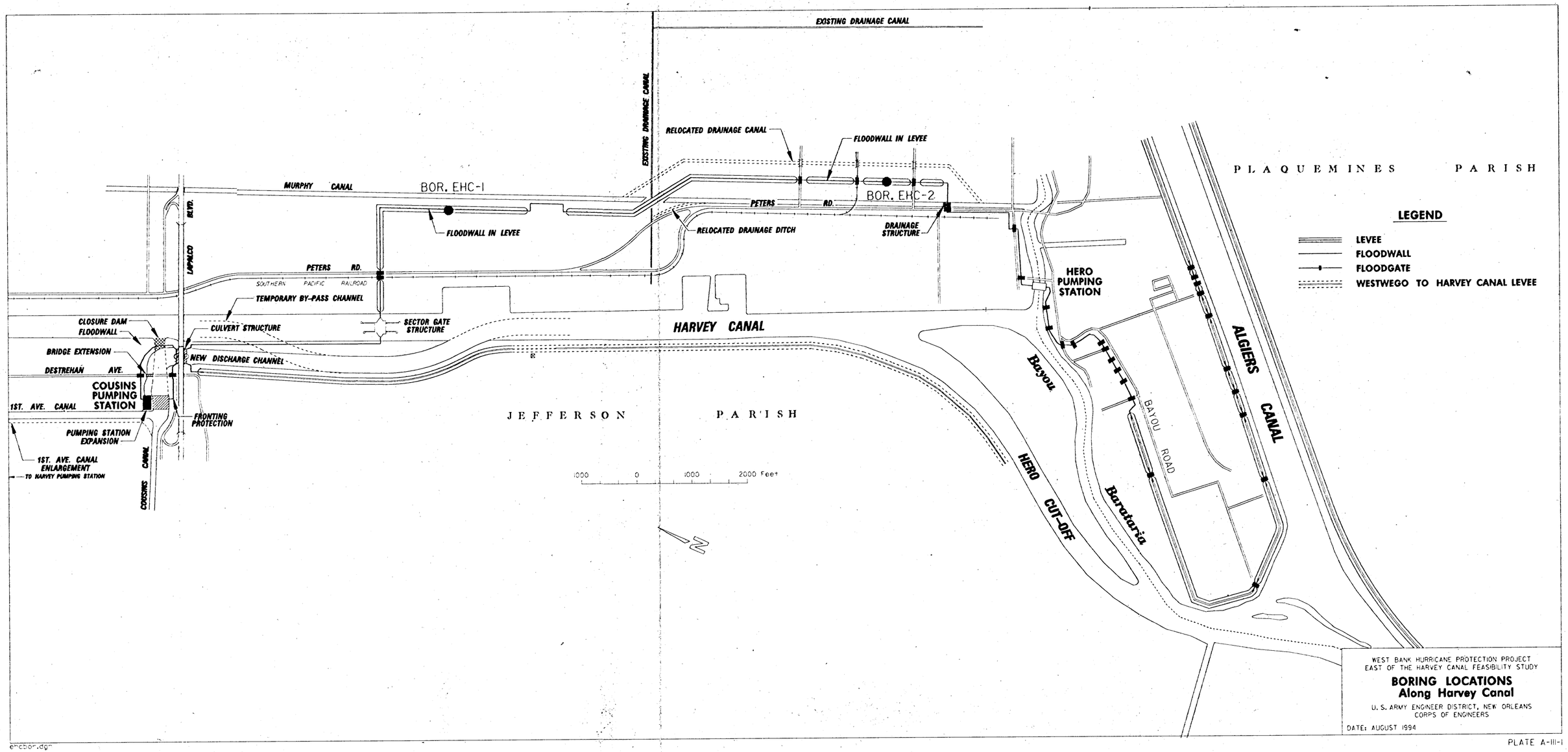
Reach I - Floodwall West of Algiers Canal
Reach II - Algiers Canal, East and West Bank
Reach IIIa - North of Hero Canal
Reach IIIb - South of Hero Canal

The still water level (SWL) used for Reaches I and II was elev. 7.5 (N.G.V.D.). Low water level used was elev. 0.0. The SWL for Reach IIIa was elev. 8.5 and elev. 7.0 for Reach IIIb, both with a low water of elev. 0.0

Stability of Levees. Existing conditions along the proposed alignment were estimated and the slopes and berm distances for the proposed levee were designed for the (Q) construction case. A "Factor of Safety" (F.S.) of 1.3 is required for the levee stability. Typical levee sections and floodwall sections are presented on Plates 18 and 19.

Cantilever I-Wall. I-wall stability and required sheetpile penetration was estimated using a penetration to head ratio of 3:1 to estimate sheetpile penetration. There is no significant wave load on the I-wall.

Settlement. Based on historical data from the Larose to Golden Meadow area, shrinkage and settlement of levee fill should be in the range of 20 to 30 percent over the 3 or 4 years between the first and second lift. The final lift will compensate for the expected lifetime settlement of the levee. The Algiers canal levee should experience minimal settlement since the centerline of the levee will remain unchanged,



WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

BORING LOCATIONS
Along Harvey Canal

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

DATE: AUGUST 1994

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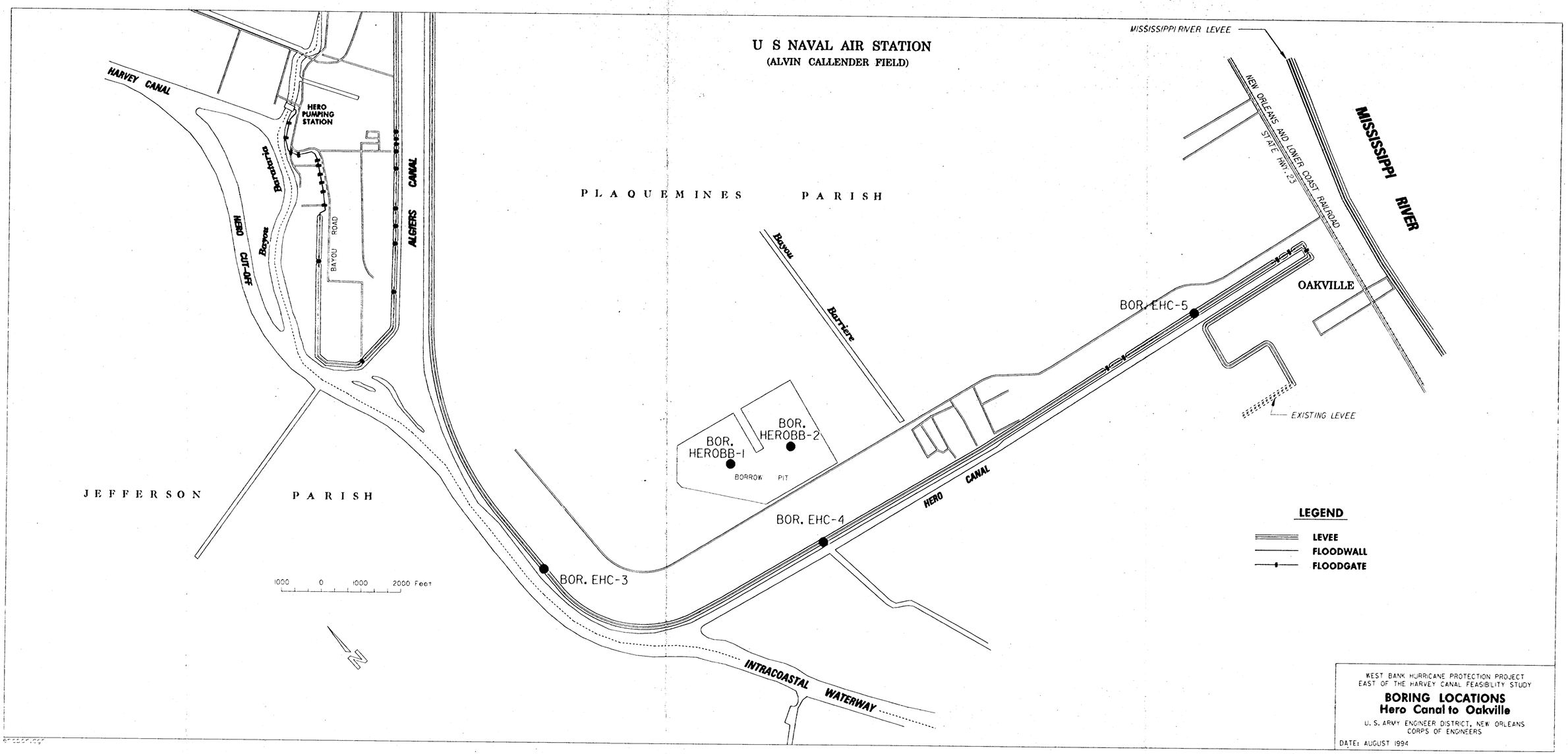
PLATE A-III-1



WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

BORING LOCATIONS
Hero Canal to Oakville

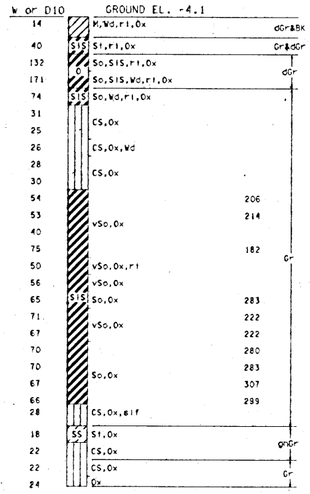
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: AUGUST 1994

PLATE A-III-2

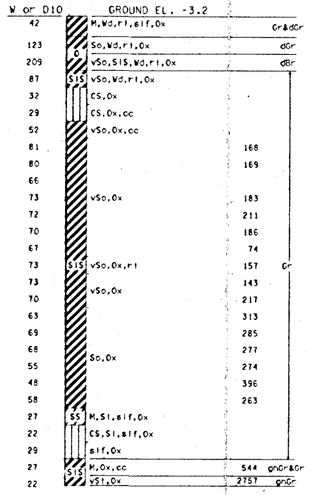
BOR. EHC-1
SEE PLATE A-III-1

28 OCT 92



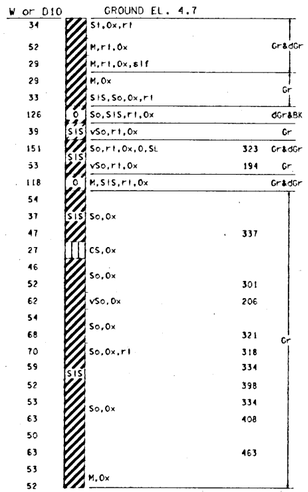
BOR. EHC-2
SEE PLATE A-III-1

29 OCT 92



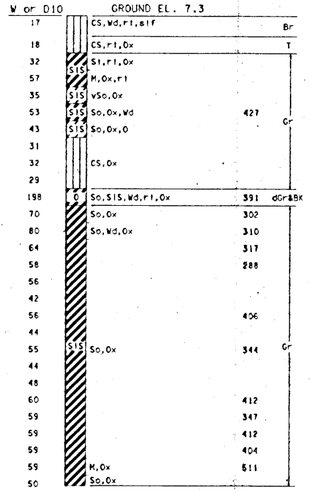
BOR. EHC-3
SEE PLATE A-III-2

21 OCT 92



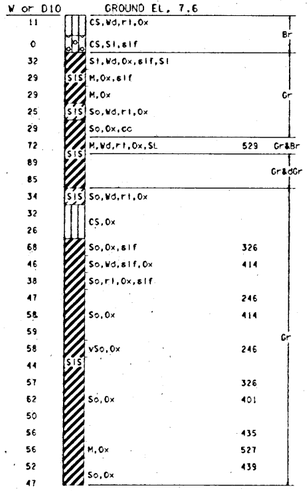
BOR. EHC-4
SEE PLATE A-III-2

22 OCT 92



BOR. EHC-5
SEE PLATE A-III-2

28 OCT 92

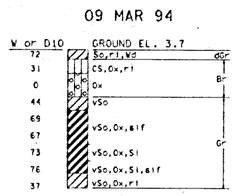


ELEVATIONS IN FEET N.G.V.D.

10 0 -10 -20 -30 -40 -50 -60 -70 -80

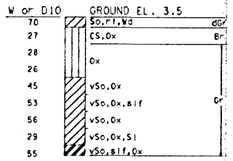
BOR. HEROBB-1
SEE PLATE A-III-2

09 MAR 94



BOR. HEROBB-2
SEE PLATE A-III-2

09 MAR 94



ELEVATIONS IN FEET N.G.V.D.

10 0 -10 -20

CH - Fat Clay
CL - Lean Clay
ML - Silt, Low Plasticity
SM - Silty Sand

NOTES

- BORROW BORINGS (BB) WERE TAKEN WITH A HAND AUGER AND ARE DISCONTINUOUS.
- GENERAL TYPE BORINGS WERE TAKEN WITH A 1⅞" I.D. TUBE SAMPLER AND/OR A 1⅜" I.D. SPLIT SPOON SAMPLER.
- FOR SOIL BORING LEGEND SEE PLATE A
- FOR LOCATION OF BORINGS SEE DWGS.

WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

SOIL BORINGS

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

DATE: AUGUST 1994

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PLATE A-III-3

UNIFIED SOIL CLASSIFICATION

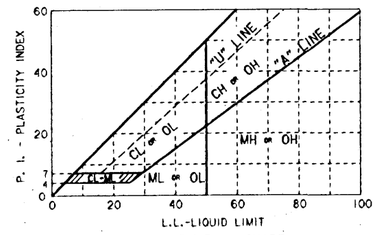
MAJOR DIVISION		TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
COARSE - GRAINED SOILS More than half of material is larger than No. 200 sieve size.	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.		GW		GRAVEL, Well Graded, gravel-sand mixtures, little or no fines
			GP		GRAVEL, Poorly 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 SANDS (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			Sl		SHELLS
NO SAMPLE			NS		No Sample Retrieved

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

DESCRIPTIVE SYMBOLS

COLOR	
COLOR	SYMBOL
TAN	T
YELLOW	Y
RED	R
BLACK	Bk
GRAY	Gr
LIGHT GRAY	lGr
DARK GRAY	dGr
BROWN	Br
LIGHT BROWN	lBr
DARK BROWN	dBr
BROWNISH-GRAY	brGr
GRAYISH-BROWN	gyBr
GREENISH-GRAY	gnGr
GRAYISH-GREEN	gyGn
GREEN	Gn
BLUE	Bl
BLUE-GREEN	BlGn
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 in accordance with ASTM D 2487

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
Ⓒ	Denotes location of consolidation test**
Ⓢ	Denotes location of consolidated-drained direct shear test**
Ⓡ	Denotes location of consolidated-undrained triaxial compression test**
Ⓠ	Denotes location of unconsolidated-undrained triaxial compression test**
Ⓣ	Denotes location of sample subjected to consolidation test and each of the above three types of shear test**
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 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:

1. 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 the contract clause entitled "Differing Site Conditions".
2. Ground-water elevations shown on the boring logs represent 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.
3. 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.
4. Unless otherwise noted:
   a. Undisturbed borings, indicated by the letter "U", are taken with a 5" I.D. Piston Type Sampler.
   b. General type borings are taken with a 1 7/8" I.D. Tube Sampler and/or a 1 3/8" I.D. Split Spoon Sampler.

WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

SOIL BORING LEGEND

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

DATE: AUGUST 1994

plate a.dgn

APPENDIX A

SECTION IV - COST ESTIMATES

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NARRATIVE FOR EAST OF HARVEY

The unit prices and estimated costs were obtained utilizing a computer software developed within NOD. This is the same software used to prepare fair and reasonable Government estimates for bid openings of the M-CACES requirement.

The estimated costs were based upon an analysis of each line item listing quantity, production rate, and time together with equipment, labor, and material costs. Several items have incorporated sub-contractor costs. Such costs were based on evaluating historical data associated with similar navigation and flood control projects recently bid within the New Orleans District.

The estimate was prepared based upon two procedures. On items where details and quantities were available, the estimated costs were prepared analyzing the method of construction for that item and listing the quantity, time and production rate, equipment, and labor and material costs in the worksheets. In items where details were unavailable, the estimated costs were based upon the construction work on similar projects within the New Orleans District and referenced, and indexed to current price levels (evaluated as per the ENR index and the Civil Works Construction Cost index).

This project presents no unusual features of work as floodwall, levee, and sector-gated structures are prevalent throughout the New Orleans District. Projects such as the Larose Floodgate (sector-gated), Vermilion Lock replacement (sector-gated), and numerous on-going floodwall/levee contracts all assisted in providing a sound basis to formulate construction costs.

Since the project is located in the metropolitan New Orleans area, accessibility presents no problem. Logistically, the project can be accessed by land from several major highways and interstates leading from New Orleans and into the west bank via three river crossings: two New Orleans bridges and the Luling-Destrehan bridge. Marine transportation is easily accessible via the Mississippi River and the Harvey and Algiers Canals (the GIWW).

Similar to the various types of work, the materials required for this project are conventional to work performed in the past in NOD and represent no unusual pricing.

Piling (steel and concrete), structural concrete and structural steel suppliers are readily found within the metro New Orleans area with marine transportation virtually at the jobsite.

In addressing the contingency dollars to each item of work, cost engineers met with appropriate designers, reviewed the uncertainties, and established the criteria for input into a range estimating computer program which incorporates a risk analysis by varying both quantity and costs. The computer program yielded contingency costs and subsequent contingency percentages for the various features of work.

The estimated cost for construction was prepared and reviewed by cost engineers in our Cost Engineering Branch. It was further reviewed and approved by the Chief of Cost Engineering Branch, Charles Settoon.

East of Harvey Canal
West Bank of the Mississippi
River in the Vicinity of New
Orleans
- Oct 93 Price Level -

Designed By:
Estimated By: Cost Engineering Branch, NOD

Prepared By:

Date: 05/03/94

Note: M-CACES will not allow variable contingencies. Therefore, the estimate has been changed by hand to show the variable contingencies and the resulting baseline estimate.

Charles E. Settoon
Chief, Cost Engineering Branch, NOD

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
01.-.-.-	LAND AND DAMAGES						
01.-.-.-	Lands and Damages						
01.-.-.-	Lands and Damages (Contract 1 - Sector Gate Complex - West Side of Harvey Canal)						
	Modification to Cousins Pumping Station						
	Perpetual Channel Easement						
	Waterbottom at Cousins Pumping Station						
	Existing Outflow Channel	3.35	AC	$.00			0
	Industrial	6	AC	$59,242.00	355,452	88,863	444,315
	Requirements for new Discharge Channel						
	Perpetual Levee/Floodwall and Channel Easement						
	Within Harvey Canal/Bayou Barataria (205) Project						
	Potential Industrial/Commercial						
	(Encumbered R/W)	7.6	AC	$3,499.90	26,599	6,650	33,249
	(Unencumbered R/W)	11.1	AC	$34,999.00	388,489	97,122	485,611
	Perpetual Channel Easement						
	Within Harvey Canal/Bayou Barataria (205) Project						
	Potential Industrial/Commercial						
	(Encumbered R/W)	22.8	AC	$3,499.90	79,798	19,949	99,747
	(Unencumbered R/W)	13.9	AC	$34,999.00	486,486	121,622	608,108
	Improvements			$.00			0
	Severance Damage			$500,000.00	500,000	125,000	625,000
	Acquisition Costs (estimated 5 tracts)			$319,000.00	319,000		319,000
	Public Law 91-646 (To move personal property)			$50,000.00	50,000		50,000
	Subtotal: Lands and Damages (Contract 1)						2,206,000
	Contingencies						459,000
	Subtotal: Lands and Damages (Contract 1)						2,665,000
	Lands and Damages (Contract 2 - 2nd Lift - Sector Gate Complex - West Side of Harvey Canal)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 5 tracts)			$75,000.00	75,000		75,000
	Subtotal: Lands and Damages (Contract 2)						75,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 2)						75,000
	Lands and Damages (Contract 3 - 3rd Lift - Sector Gate Complex - West Side of Harvey Canal)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 5 tracts)			$71,000.00	71,000		71,000
	Subtotal: Lands and Damages (Contract 3)						71,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 3)						71,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	Lands and Damages (Contract 4 - Modification to Cousins Pumping Station)						
	Perpetual Levee and Floodwall Easement						
	Within Harvey Canal/Bayou Barataria (205) Project						
	Industrial (Encumbered R/W)	10	AC	$6,098.30	60,983	15,246	76,229
	Industrial (Unencumbered R/W	1	AC	$60,983.00	60,983	15,246	76,229
	Acquisition Costs (estimated 12 tracts)			$698,000.00	698,000		698,000
	Subtotal: Lands and Damages (Contract 4)						820,000
	Contingencies						31,000
	Subtotal: Lands and Damages (Contract 4)						851,000
	Lands and Damages (Contract 5 - R of W between Sector Gate Complex and Hero Pumping Station)						
	Perpetual Levee and Floodwall Easement						
	Industrial	3.1	AC	$59,241.00	183,647	45,912	229,559
	Existing Road Right of Way	.3	AC	$.00			0
	Temporary (3-year) Construction Easement						
	Industrial	.7	AC	$10,664.00	7,465	1,866	9,331
	Perpetual Levee and Floodwall Easement						
	Industrial	72.65	AC	$43,559.00	3,164,561	791,140	3,955,702
	Perpetual Channel Easement						
	Industrial	1.8	AC	$43,559.00	78,406	19,602	98,008
	Temporary (3-year) Construction Easement						
	Industrial	1	AC	$7,840.80	7,841	1,960	9,801
	Improvements (Private Roads and Bridges)			$200,000.00	200,000	50,000	250,000
	Acquisition Costs (estimated 16 tracts)			$645,000.00	645,000		645,000
	Public Law 91-646 (To move personal property)			$50,000.00	50,000		50,000
	Subtotal: Lands and Damages (Contract 5)						4,337,000
	Contingencies						911,000
	Subtotal: Lands and Damages (Contract 5)						5,248,000
	Lands and Damages (Contract 6 - 2nd Lift - Sector Gate Complex to Hero Pumping Station)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 16 tracts)			$153,000.00	153,000		153,000
	Subtotal: Lands and Damages (Contract 6)						153,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 6)						153,000
	Lands and Damages (Contract 7 - 3rd Lift - Sector Gate Complex to Hero Pumping Station)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 16 tracts)			$153,000.00	153,000		153,000
	Subtotal: Lands and Damages (Contract 7)						153,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 7)						153,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	Lands and Damages (Contract 8 - R of W between Hero Pumping Station and Belle Chasse Hwy)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial (Encumbered R/W)	107	AC		8,500	2,125	10,625
	Industrial (Unencumbered R/W	19.93	AC	$60,983.00	1,215,391	303,848	1,519,239
	Improvements (Private Roads)				5,000	1,250	6,250
	Acquisition Costs (estimated 22 tracts)			$899,000.00	899,000		899,000
	Subtotal: Lands and Damages (Contract 8)						2,128,000
	Contingencies						307,000
	Subtotal: Lands and Damages (Contract 8)						2,435,000
	Lands and Damages (Contract 9 - Belle Chasse Hwy to Algiers Lock - N/W of GIWW - Orleans Parish)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial/Residential	41	AC	Nuisance	44,500	11,125	55,625
	Acquisition Costs (estimated 89 tracts)			$1,352,000.00	1,352,000		1,352,000
	Subtotal: Lands and Damages (Contract 9 - Orleans Parish)						1,397,000
	Contingencies						11,000
	Subtotal: Lands and Damages (Contract 9 - Orleans Parish)						1,408,000
	Lands and Damages (Contract 9 - Belle Chasse Hwy to Algiers Lock - N/W of GIWW - Plaquemines Parish)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial/Residential	35	AC	Nuisance	6,500	1,625	8,125
	Acquisition Costs (estimated 13 tracts)			$107,000.00	107,000		107,000
	Subtotal: Lands and Damages (Contract 9 - Plaquemines Parish)						114,000
	Contingencies						2,000
	Subtotal: Lands and Damages (Contract 9 - Plaquemines Parish)						116,000
	Lands and Damages (Contract 10 - F-Levee, Hero Canal to Plaquemines Parish Back Levee)						
	Perpetual Levee and Floodwall Easement						
	Industrial (Encumbered R/W)	3.67	AC	$1,999.90	7,340	1,835	9,175
	Industrial (Unencumbered R/W	11.69	AC	$19,999.00	233,788	58,447	292,235
	Improvements (Private Roads)				2,000	500	2,500
	Acquisition Costs (estimated 7 tracts)			$364,000.00	364,000		364,000
	Subtotal: Lands and Damages (Contract 10)						607,000
	Contingencies						61,000
	Subtotal: Lands and Damages (Contract 10)						668,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	Lands and Damages (Contract 11 - GIWW to "F" Floodwall)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial/Residential	147	AC	Nuisance	16,000	4,000	20,000
	Industrial (Encumbered)	15.8	AC	$999.90	15,798	3,950	19,748
	Industrial (Encumbered)	15.8	AC	$349.90	5,528	1,382	6,911
	Industrial (Unencumbered)	20.93	AC	$9,999.00	209,279	52,320	261,599
	Industrial (Unencumbered)	20.93	AC	$3,499.00	73,234	18,309	91,543
	Improvements (Private Roads)				5,000	1,250	6,250
	Acquisition Costs (estimated 32 tracts)			$1,832,000.00	1,832,000		1,832,000
	Subtotal: Lands and Damages (Contract 11)						2,157,000
	Contingencies						81,000
	Subtotal: Lands and Damages (Contract 11)						2,238,000
	Lands and Damages (Contract 12 - Algiers Lock to Plaquemines/Orleans Parish Line, Orleans Parish)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial/Residential	38	AC	Nuisance	43,000	10,750	53,750
	Acquisition Costs (estimated 86 tracts)			$1,246,000.00	1,246,000		1,246,000
	Subtotal: Lands and Damages (Contract 12 - Orleans Parish)						1,289,000
	Contingencies						11,000
	Subtotal: Lands and Damages (Contract 12 - Orleans Parish)						1,300,000
	Lands and Damages (Contract 12 - Algiers Lock to Plaquemines/Orleans Parish Line, Plaquemines Parish)						
	Perpetual Levee and Floodwall Easement						
	Within Existing Algiers Canal Servitude						
	Industrial/Residential	3	AC	Nuisance	1,000	250	1,250
	Acquisition Costs (estimated 2 tracts)			$17,000.00	17,000		17,000
	Subtotal: Lands and Damages (Contract 12 - Plaquemines Parish)						18,000
	Contingencies						1,000
	Subtotal: Lands and Damages (Contract 12 - Plaquemines Parish)						19,000
	Lands and Damages (Contract 13 - "F" Levee along Hero Canal - 2nd Lift)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 7 tracts)			$78,000.00	78,000		78,000
	Subtotal: Lands and Damages (Contract 13 - "F" Levee - 2nd Lift)						78,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 13 - "F" Levee - 2nd Lift)						78,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	Lands and Damages (Contract 14 - "F" Levee along Hero Canal - 3rd Lift)						
	No additional R/W required			$.00			0
	Acquisition Costs (estimated 7 tracts)			$90,000.00	90,000		90,000
	Subtotal: Lands and Damages (Contract 14 - "F" Levee - 3rd Lift)						90,000
	Contingencies						
	Subtotal: Lands and Damages (Contract 14 - "F" Levee - 3rd Lift)						90,000
	Lands and Damages (Borrow Pit, Plaquemines Parish)						
	Perpetual Borrow Easement						
	Agricultural/Potential Indst	92	AC	$3,499.00	321,908	80,477	402,385
	Acquisition Costs (estimated 2 tracts)			$111,000.00	111,000		111,000
	Subtotal: Lands and Damages (Borrow Pit, Plaquemines Parish)						433,000
	Contingencies						81,000
	Subtotal: Lands and Damages (Borrow Pit, Plaquemines Parish)						514,000
	Lands and Damages (Temporary Stockpile Area, Jefferson Parish)						
	Temporary Stockpile Easement (15 years)						
	Potential Commercial/Indstr	100	AC	$31,500.00	3,150,000	788,000	3,938,000
	Acquisition Costs (estimated 2 tracts)			$114,000.00	114,000		114,000
	Subtotal: Lands and Damages (Temporary Stockpile Area, Jefferson Parish)						3,264,000
	Contingencies						788,000
	Subtotal: Lands and Damages (Temporary Stockpile Area, Jefferson Parish)						4,052,000
	Lands and Damages (Mitigation Area, St. Charles Parish)						
	Fee Simple						
	Wet Woodland	312	AC	$700.00	218,400	54,600	273,000
	Acquisition Costs (estimated 2 tracts)			$120,000.00	120,000		120,000
	Subtotal: Lands and Damages (Mitigation Area, St. Charles Parish)						338,000
	Contingencies						55,000
	Subtotal: Lands and Damages (Mitigation Area, St. Charles Parish)						393,000
01.-.-.-	TOTAL: REAL ESTATE						22,527,000
02.-.-.-	RELOCATIONS						
02.-.-.-	RELOCATIONS (Destrehan Ave Bridge and Utility Modification)						
02.1.-.-	ROADS, Construction Activities						

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
02.1.-.-	Raise and Lengthen Existing Bridge at Destrehan Ave.	Lump Sum	LS	$220,000.00	220,000	66,000	286,000
02.3.-.-	Cemeteries, Utilities, and Structures, Construction Activities						
02.3.2.-	Utilities						
02.3.2.-	Relocation of 16" dia HP gas pipelines	2	EA	$250,000.00	500,000	150,000	650,000
02.3.2.-	Relocation of 36" dia water main	Lump Sum	LS	$100,000.00	100,000	30,000	130,000
02.3.2.-	Relocation of 8" dia water main	Lump Sum	LS	$30,000.00	30,000	9,000	39,000
02.3.2.-	Relocation of overhead power lines	Lump Sum	LS	$10,000.00	10,000	3,000	13,000
02.-.-.-	SUBTOTAL: Destrehan Ave Bridge and Utility Modifications						860,000
02.0.Z.-	Contingencies						258,000
02.-.-.-	SUBTOTAL: Destrehan Ave Bridge and Utility Modifications						1,118,000
02.-.-.-	RELOCATIONS (Sector Gate Structure To Hero Pumping Station)						
02.-.-.-	Street Restoration	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
02.-.-.-	Utility relocation through floodwall	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
02.-.-.-	Drainage Structure at Murphy Canal	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
02.-.-.-	Bridges	3	EA	$200,000.00	600,000	180,000	780,000
02.-.-.-	SUBTOTAL: Sector Gate Structure To Hero Pumping Station						1,175,000
02.0.Z.-	Contingencies (rounded)						353,000
02.-.-.-	SUBTOTAL: Sector Gate Structure To Hero Pumping Station						1,528,000
02.-.-.-	RELOCATIONS (Hero to Verret - Protection along West Bank of Algiers Canal)						
02.-.-.-	Relocation of utilities (gas, oil, water, overhead powerlines, telephone lines 14 crossings)	Lump sum	LS	$250,000.00	250,000	75,000	325,000
02.-.-.-	SUBTOTAL: Hero to Verret - Protection along West Bank of Algiers Canal						250,000
02.0.Z.-	Contingencies						75,000
02.-.-.-	SUBTOTAL: Hero to Verret - Protection along West Bank of Algiers Canal						325,000
02.-.-.-	RELOCATIONS (Verret to Orleans - Protection along West Bank of Algiers Canal)						
02.-.-.-	Relocation of utilities (gas, oil, water, overhead powerlines, telephone lines 29 crossings)	Lump sum	LS	$350,000.00	350,000	105,000	455,000
02.-.-.-	SUBTOTAL: Hero to Verret - Protection along West Bank of Algiers Canal						350,000
02.0.Z.-	Contingencies						105,000

DETAILED ESTIMATE OF INCREMENTAL COSTS
(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
02.-.-.-	SUBTOTAL: Hero to Verret - Protection along West Bank of Algiers Canal						455,000
02.-.-.-	RELOCATIONS (West of Algiers Canal, Plaquemines Parish)						
02.1.-.-	Roads, Contr.act., Ramps	6	EA	$11,000.00	66,000	20,000	86,000
02.3.-.-	Utilities						
02.3.2.-	Utilities						
02.3.2.R	Powerlines	Lump sum	LS	$250,000.00	250,000	75,000	325,000
02.-.-.-	SUBTOTAL: West of Algiers Canal, Plaquemines Parish						316,000
02.0.Z.-	Contingencies						95,000
02.-.-.-	SUBTOTAL: West of Algiers Canal, Plaquemines Parish						411,000
02.-.-.-	RELOCATIONS (Orleans Parish to Algiers Lock - West of Algiers Canal)						
02.-.-.-	Relocation of utilities (gas, oil, water, overhead powerlines, telephone lines 6 crossings)	Lump sum	LS	$50,000.00	50,000	15,000	65,000
02.-.-.-	SUBTOTAL: Orleans Parish to Algiers Lock - West of Algiers Canal						50,000
02.0.Z.-	Contingencies						15,000
02.-.-.-	SUBTOTAL: Orleans Parish to Algiers Lock - West of Algiers Canal						65,000
02.-.-.-	RELOCATIONS (Orleans Parish, West of Algiers Canal)						
02.1.-.-	Roads, Contr.act., Ramps	1	EA	$11,000.00	11,000	3,000	14,000
02.3.-.-	Utilities						
02.3.2.-	Utilities						
02.3.2.R	Powerlines	Lump sum	LS	$15,000.00	15,000	5,000	20,000
02.-.-.-	SUBTOTAL: Orleans Parish, West of Algiers Canal						26,000
02.0.Z.-	Contingencies						8,000
02.-.-.-	SUBTOTAL: Orleans Parish, West of Algiers Canal						34,000
02.-.-.-	RELOCATIONS (F-Levee, Plaquemines Parish, East of Algiers Canal)						
02.1.-.-	Roads, Contr.act., Ramps	4	EA	$12,000.00	48,000	15,000	63,000
02.3.-.-	Utilities						
02.3.2.-	Utilities						
02.3.2.R	Powerlines	Lump sum	LS	$65,000.00	65,000	20,000	85,000
02.-.-.-	SUBTOTAL: Orleans Parish, West of Algiers Canal						113,000
02.0.Z.-	Contingencies						35,000
02.-.-.-	SUBTOTAL: Orleans Parish, West of Algiers Canal						148,000
02.-.-.-	RELOCATIONS (F-Levee to Orleans Parish - East of Algiers Canal)						
02.-.-.-	Relocation of utilities (gas, oil, water, overhead powerlines, telephone lines 17 crossings)	Lump sum	LS	$210,000.00	210,000	63,000	273,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
02.-.-.-	SUBTOTAL: F-Levee to Orleans Parish - East of Algiers Canal						210,000
02.0.Z.-	Contingencies						63,000
02.-.-.-	SUBTOTAL: F-Levee to Orleans Parish - East of Algiers Canal						273,000
02.-.-.-	RELOCATIONS (Plaquemines Parish, East of Algiers Canal)						
02.1.-.-	Roads, Contr.act., Ramps	9	EA	$11,000.00	99,000	30,000	129,000
02.3.-.-	Utilities						
02.3.2.-	Utilities						
02.3.2.R	Powerlines	Lump sum	LS	$90,000.00	90,000	30,000	120,000
02.-.-.-	SUBTOTAL: Plaquemines Parish, East of Algiers Canal						189,000
02.0.Z.-	Contingencies						60,000
02.-.-.-	SUBTOTAL: Plaquemines Parish, East of Algiers Canal						249,000
02.-.-.-	RELOCATIONS (Orleans Parish to Algiers Lock - East of Algiers Canal)						
02.-.-.-	Relocation of utilities (gas, oil, water, overhead powerlines, telephone lines						
02.2.R.-	6 crossings)	Lump sum	LS	$50,000.00	50,000	15,000	65,000
02.-.-.-	SUBTOTAL: Orleans Parish to Algiers Lock - East of Algiers Canal						50,000
02.0.Z.-	Contingencies						15,000
02.-.-.-	SUBTOTAL: Orleans Parish to Algiers Lock - East of Algiers Canal						65,000
02.-.-.-	RELOCATIONS (Orleans Parish, East of Algiers Canal)						
02.1.-.-	Roads, Contr.act., Ramps	3	EA	$11,000.00	33,000	10,000	43,000
02.3.-.-	Utilities						
02.3.2.-	Utilities						
02.3.2.R	Powerlines	Lump sum	LS	$12,000.00	12,000	4,000	16,000
02.-.-.-	SUBTOTAL: Orleans Parish, East of Algiers Canal						45,000
02.0.Z.-	Contingencies						14,000
02.-.-.-	SUBTOTAL: Orleans Parish, East of Algiers Canal						59,000
02.-.-.-	TOTAL: RELOCATIONS						4,730,000
05.-.-.-	LOCKS						
05.-.-.-	Locks (Sector Gate in Harvey Canal)						
05.0.A.-	Mob & Demob	Lump sum	LS	$200,000.00	200,000	50,000	250,000
05.0.C.-	Permanent Access Roads and Parking:						
05.0.C.B	Site Work						
05.0.C.B	Road Surfacing (9"thk)	670	SY	$8.50	5,695	1,709	7,404

DETAILED ESTIMATE OF INCREMENTAL COSTS

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East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
05.0.B.-	Care And Diversion Of Water						
05.0.B.B	Site Work						
05.0.B.B	Cofferdam						
05.0.B.B	Earth Embankment	14,000	CY	$2.90	40,600	12,180	52,780
05.0.B.B	Steel Sheet Piling for cells, PSA-23	89,280	SF	$13.85	1,236,528	370,958	1,607,486
05.0.B.B	Cellular Fill	31,900	CY	$19.25	614,075	184,223	798,298
05.0.B.B	Steel Sheet Pile Wall,PZ-22	8,000	SF	$12.75	102,000	30,600	132,600
05.0.B.B	Unwatering Cofferdam						
05.0.B.B	Dewatering	Lump Sum	LS	$750,000.00	750,000	225,000	975,000
05.0.B.B	Removal of Cofferdam	Lump Sum	LS	$350,000.00	350,000	105,000	455,000
05.0.D.-	Earthwork For Structures:						
05.0.D.B	Site work						
05.0.D.B	Structure Excavation	28,000	CY	$3.75	105,000	31,500	136,500
05.0.D.B	Structure Backfill	16,200	CY	$8.30	134,460	40,338	174,798
05.0.D.B	Dispose of contaminatd matl	2,400	CY	$130.00	312,000	93,600	405,600
05.0.E.-	Foundation Work:						
05.0.E.B	Site work						
05.0.E.B	Foundation Preparation						
05.0.E.B	Piling, Test	Lump Sum	LS	$40,000.00	40,000	12,000	52,000
05.0.E.B	Piling, 12" prestrd. conc.	85,650	LF	$16.50	1,413,225	423,968	1,837,193
05.0.E.B	Piling, Steel Sheet, PSA-23	13,200	SF	$13.25	174,900	52,470	227,370
05.0.E.C	Concrete						
05.0.E.C	Conc. in Stab Slabs	350	CY	$70.00	24,500	7,350	31,850
05.0.1.-	Approach Channels:						
05.0.1.B	Site work						
05.0.1.B	Excavation, Common	29,000	CY	$1.70	49,300	14,790	64,090
05.0.1.B	Plastic Filter Fabric	8,150	SY	$4.50	36,675	11,003	47,678
05.0.1.B	Bedding	17,950	CY	$28.25	507,088	152,126	659,214
05.0.1.B	Riprap	44,500	TON	$20.50	912,250	273,675	1,185,925
05.0.2.-	Guide and Guard Walls, Upper and Lower:						
05.0.2.B	Site work						
05.0.2.B	Timber Guide Walls	Lump Sum	LS	$1,090,000.00	1,090,000	218,000	1,308,000
05.0.2.B	Filled Sheet Pile Dolphins	Lump Sum	LS	$1,422,000.00	1,422,000	284,400	1,706,400
05.0.4.-	Sector Gate Structure:						
05.0.4.C	Concrete						
05.0.4.C	Concrete, in place						
05.0.4.C	base slab & walls	9,250	CY	$260.00	2,405,000	481,000	2,886,000
05.0.4.C	needle girder storage rack	Lump Sum	LS	$301,000.00	301,000	60,200	361,200
05.0.4.C	precast concrete needle girders & supports	Lump Sum	LS	$215,000.00	215,000	43,000	258,000
05.0.4.E	Metals						
05.0.4.E	Miscellaneous Metals	Lump Sum	LS	$185,000.00	185,000	55,500	240,500
05.0.4.N	Special Construction						
05.0.4.N	Instrumentation	Lump Sum	LS	$9,000.00	9,000	2,700	11,700
05.0.5.-	Lock Gates and Operating Machinery						

DETAILED ESTIMATE OF INCREMENTAL COSTS

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East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
05.0.5.E	Metals						
05.0.5.E	Sector Gates						
	Incl Cathodic Protection	500,000	LBS	$2.30	1,150,000	230,000	1,380,000
05.0.5.Q	Mechanical						
05.0.5.Q	Gate Operating Machinery	Lump Sum	LS	$1,982,000.00	1,982,000	396,400	2,378,400
05.0.8.-	Power and Lighting Systems:						
05.0.8.R	Electrical						
05.0.8.R	Electrical Service-Emergency including standby generator and diesel engine	Lump Sum	LS	$66,000.00	66,000	19,800	85,800
05.0.8.R	Electric work	Lump Sum	LS	$869,000.00	869,000	260,700	1,129,700
05.0.R.-	Associated General Items:						
05.0.R.B	Sitework						
05.0.R.B	Tile Gages	Lump Sum	LS	$9,000.00	9,000	2,700	11,700
05.0.N.-	Buildings, Project Operations						
05.0.N.C	Concrete						
05.0.N.C	Control Houses	Lump Sum	LS	$105,000.00	105,000	21,000	126,000
05.-.-.-	SUBTOTAL: Sector Gate in Harvey Canal (rounded)						16,816,000
05.0.Z.-	Contingencies (rounded)						4,168,000
05.-.-.-	SUBTOTAL: Sector Gate in Harvey Canal						20,984,000
05.-.-.-	TOTAL: LOCKS						20,984,000
06.-.-.-	FISH & WILDLIFE FACILITIES						
06.0.1.-	Fish & Wildlife Facilities (Bois Piquant)						
06.0.1.A	Development Land survey, posting boundaries, habitat survey, litter cleanup	312	AC	$55.00	17,160		17,160
06.0.1.A	Fencing - barbed wire	14,746	LF	$5.00	73,730		73,730
06.-.-.-	SUBTOTAL: Fish & Wildlife Facilities - Bois Piquant (rounded)						91,000
06.0.Z.-	Contingencies (rounded)						
06.-.-.-	SUBTOTAL: Fish & Wildlife Facilities - Bois Piquant (rounded)						91,000
06.-.-.-	TOTAL: FISH & WILDLIFE FACILITIES						91,000
09.-.-.-	CHANNELS AND CANALS						
09.-.-.-	Channels and Canals (Sector Gate Complex - Navigation Bypass Channel)						
09.0.A.-	Mob & Demob	Lump Sum	LS	$60,000.00	60,000	15,000	75,000
09.0.2.-	Channels:						

DETAILED ESTIMATE OF INCREMENTAL COSTS

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East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
09.0.2.B	Sitework						
09.0.2.B	Clearing and Grubbing	29	AC	$1,575.00	45,675	13,703	59,378
09.0.2.B	Excavation						
09.0.2.B	Excavation, Navigation Bypass	340,700	CY	$1.70	579,190	173,757	752,947
09.0.2.B	Dispose of contaminatd matl	400	CY	$130.00	52,000	15,600	67,600
09.0.2.B	Silt Curtains - 2 locations	2,600	LF	$30.00	78,000	23,400	101,400
09.0.2.B	Slope Treatment						
09.0.2.B	Bedding, Navigation Bypass	21,780	CY	$28.25	615,285	184,586	799,871
09.0.2.B	Riprap, Navigation Bypass	65,340	TON	$20.50	1,339,470	401,841	1,741,311
09.0.5.-	Disposal Areas						
09.0.5.B	Site work						
09.0.5.B	Clearing & Grubbing	34	AC	$1,575.00	53,550	16,065	69,615
09.0.5.B	Dike Construction	266,350	CY	$2.30	612,605	183,782	796,387
09.0.5.B	Restoration						
09.0.5.B	Fertilizing & Seeding	34	AC	$500.00	17,000	5,100	22,100
09.-.-.-	SUBTOTAL: Sector Gate Complex - Navigation Bypass Channel (rounded)						3,453,000
09.0.Z.-	Contingencies (rounded)						1,033,000
09.-.-.-	SUBTOTAL: Sector Gate Complex - Navigation Bypass Channel						4,486,000
09.-.-.-	Channels and Canals (Modification and Expansion of Cousins Pumping Station)						
09.0.2.-	Channels:						
09.0.2.B	Sitework						
09.0.2.B	Clearing and Grubbing	14	AC	$1,575.00	22,050	6,615	28,665
09.0.2.B	Excavation						
09.0.2.B	Excavation, 1st Ave Canal	70,000	CY	$1.15	80,500	24,150	104,650
09.0.2.B	Excavation, Discharge Canal	17,400	CY	$1.15	20,010	6,003	26,013
09.0.2.B	Stockpile Excavted Mtls.	87,400	CY	$2.50	218,500	65,550	284,050
09.0.2.B	Fert & Seed Stkpile Area	9	AC	$500.00	4,500	1,350	5,850
09.0.2.B	Slope Treatment						
09.0.2.B	Bedding, Discharge channel	3,500	CY	$28.25	98,875	29,663	128,538
09.0.2.B	Riprap, Discharge Channel	10,500	TON	$20.50	215,250	64,575	279,825
09.-.-.-	SUBTOTAL: Modification and Expansion of Cousins Pumping Station (rounded)						660,000
09.0.Z.-	Contingencies (rounded)						198,000
09.-.-.-	SUBTOTAL: Modification and Expansion of Cousins Pumping Station						858,000
09.-.-.-	Channels and Canals (Discharge Channel, Culverts & Floodwalls - WOAC)						
09.0.A.-	Mob & Demob	Lump Sum	LS	$80,000.00	80,000	20,000	100,000
09.0.2.-	Channels:						
09.0.2.B	Sitework						
09.0.2.B	Clearing and Grubbing	13	AC	$1,575.00	20,475	6,143	26,618
09.0.2.B	Excavation						
09.0.2.B	Excavation, Discharge Channel	216,650	CY	$1.70	368,305	110,492	478,797
09.0.2.B	Slope Treatment						

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Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
09.0.2.B	Bedding,						
	Discharge channel	7,480	CY	$28.25	211,310	63,393	274,703
09.0.2.B	Riprap, Discharge Channel	21,970	TON	$20.50	450,385	135,116	585,501
09.0.5.-	Disposal Areas						
09.0.5.B	Site work						
09.0.5.B	Clearing & Grubbing	30	AC	$1,575.00	47,250	14,175	61,425
09.0.5.B	Dike Construction						
09.0.5.B	Embankment	238,800	CY	$1.65	394,020	118,206	512,226
09.0.5.B	Restoration						
09.0.5.B	Fertilizing & Seeding	30	AC	$500.00	15,000	4,500	19,500
09.0.R.-	Associated General Items:						
09.0.R.B	Site work						
09.0.R.B	Structural Excavation	23,330	CY	$3.30	76,989	23,097	100,086
09.0.R.B	Structural Backfill	1,170	CY	$8.30	9,711	2,913	12,624
09.0.R.B	Cofferdam	Lump Sum	LS	$37,000.00	37,000	11,100	48,100
09.0.R.B	Dewatering	Lump Sum	LS	$80,000.00	80,000	24,000	104,000
09.0.R.B	Steel Sheet Piles (Permanent)						
09.0.R.B	PSA-23 (seepage cutoff)	8,160	SF	$13.25	108,120	32,436	140,556
09.0.R.B	PZ-27 (Tie-back wall)	14,400	SF	$13.65	196,560	58,968	255,528
09.0.R.B	2" dia Tie Rods	23,090	LBS	$1.50	34,635	10,391	45,026
09.0.R.B	Channel Walers	21,600	LBS	$1.50	32,400	9,720	42,120
09.0.R.B	HP12x53 Steel Piles	5,760	LF	$23.25	133,920	40,176	174,096
09.0.R.B	PZ-40 (vic. conc. culvert)	4,100	SF	$21.15	86,715	26,015	112,730
09.0.R.B	Friction Piles Below Culvert Structure						
09.0.R.B	12" Dia Untreated Piles	31,260	LF	$10.10	315,726	94,718	410,444
09.0.R.B	14" Dia Untreated Piles	50,960	LF	$12.10	616,616	184,985	801,601
09.0.R.B	Piles, Test	Lump Sum	LS	$32,000.00	32,000	9,600	41,600
09.0.R.C	Concrete						
09.0.R.C	Stabilization Slab	500	CY	$70.00	35,000	8,750	43,750
09.0.R.C	Base Slab	3,350	CY	$200.00	670,000	167,500	837,500
09.0.R.C	Conc. in Walls	800	CY	$330.00	264,000	66,000	330,000
09.-.-.-	SUBTOTAL: Discharge Channel, Culverts, and Floodwalls - WOAC (rounded)						4,316,000
09.0.Z.-	Contingencies (rounded)						1,242,000
09.-.-.-	SUBTOTAL: Discharge Channel, Culverts, and Floodwalls - WOAC						5,558,000
09.-.-.-	TOTAL: CHANNELS AND CANALS						10,902,000
11.-.-.-	LEVEES & FLOODWALLS						
11.0.1.-	Levees (Sector Gate Complex - WOAC - 1st lift)						
11.0.1.B	Site Work						
11.0.1.B	Clearing & Grubbing	14	AC	$1,575.00	22,050	6,615	28,665
11.0.1.B	Excavation and Embankment:						
11.0.1.B	Degrade Existing Levee	3,500	CY	$1.60	5,600	1,680	7,280
11.0.1.B	1st Lift for Levee West of the New Discharge Channel; Embankment,						

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Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	Uncompacted Fill	112,000	CY	$1.75	196,000	58,800	254,800
11.0.1.B	Slope Treatment Seeding, Fertilizing and Mulching	14	AC	$500.00	7,000	2,100	9,100
11.0.2.-	Floodwalls						
11.0.2.B	Site Work						
11.0.2.B	Foundation Work						
11.0.2.B	I-Walls, 7' High (Reinforced Conc., Sheet Pile Supported PZ-27)	1,055	LF	$412.00	434,660	130,398	565,058
11.0.2.B	Steel Sheet Piling, PSA-23 For Cellular Floodwall (Reuse from cofferdam of Sector gate; Sand Blast, Paint, & Redrive)	85,000	SF	$3.65	310,250	93,075	403,325
11.0.2.B	Fill For Cells (Salvaged from Sector Gate cofferdam)	22,330	CY	$8.65	193,155	57,946	251,101
	* 2nd & 3rd lifts covered by seperate estimates						
11.-.-.-	SUBTOTAL: Sector Gate Complex - WOAC - 1st lift (rounded)						1,169,000
11.0.Z.-	Contingencies (rounded)						351,000
11.-.-.-	SUBTOTAL: Sector Gate Complex - WOAC - 1st lift						1,520,000
11.0.1.-	Levees (Sector Gate Complex - WOAC - 2nd & 3rd lifts)						
11.0.1.-	Levees, Sector Gate Complex - WOAC - 2nd Lift						
11.0.A.-	Mob & Demob	Lump Sum	LS	$20,000.00	20,000	6,000	26,000
11.0.1.B	Sitework						
11.0.1.B	Clearing of Existing Levee	14	AC	$525.00	7,350	2,205	9,555
11.0.1.B	Clearing of Stockpile Area	14	AC	$525.00	7,350	2,205	9,555
11.0.1.B	Excavation and Embankment						
11.0.1.B	Embankment, Uncompacted Fill	51,131	CY	$2.75	140,610	42,183	182,793
11.0.1.B	Slope Treatment						
11.0.1.B	Seeding, Fertilizing and mulching	28	AC	$500.00	14,000	4,200	18,200
11.0.1.-	Levees, Sector Gate Complex - WOAC - 3rd Lift						
11.0.A.-	Mob & Demob	Lump Sum	LS	$20,000.00	20,000	6,000	26,000
11.0.1.B	Sitework						
11.0.1.B	Clearing of Existing Levee	14	AC	$525.00	7,350	2,205	9,555
11.0.1.B	Clearing of Stockpile Area	13	AC	$525.00	6,825	2,048	8,873
11.0.1.B	Excavation and Embankment						
11.0.1.B	Embankment, Uncompacted Fill	47,885	CY	$2.75	131,684	39,505	171,189
11.0.1.B	Slope Treatment						
11.0.1.B	Seeding, Fertilizing						

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Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	and mulching	27	AC	$500.00	13,500	4,050	17,550
11.-.-.-	SUBTOTAL: Sector Gate Complex - WOAC - 2nd & 3rd lifts (rounded)						369,000
11.0.Z.-	Contingencies (rounded)						111,000
11.-.-.-	SUBTOTAL: Sector Gate Complex - WOAC - 2nd & 3rd lifts (rounded)						480,000
11.0.2.-	Floodwalls (Discharge Channel, Culverts, & Floodwalls)						
11.0.2.B	Sitework						
11.0.2.B	Clearing and Grubbing	4	AC	$1,575.00	6,300	1,890	8,190
11.0.2.B	Excavation and Embankment						
11.0.2.B	Degrade Existing Levee	3,000	CY	$1.60	4,800	1,440	6,240
11.0.2.B	Semicompacted Fill	4,400	CY	$1.90	8,360	2,508	10,868
11.0.2.B	Closure (Across Existing Discharge Channel)	3,260	CY	$28.25	92,095	27,629	119,724
11.0.2.B	Foundation Work						
11.0.2.B	I-Walls, 7' High (Reinforced Conc., Sheet Pile Supported PZ-27)	3,786	LF	$412.00	1,559,832	467,950	2,027,782
11.0.2.B	Slope Treatment						
11.0.2.B	Seeding, Fertilizing and mulching	3	AC	$500.00	1,500	450	1,950
11.0.2.B	44'x8' Roller Gates (incls Steel, Conc., sht pile, & Prstd Piles)	2	EA	$125,000.00	250,000	75,000	325,000
11.-.-.-	SUBTOTAL: Discharge Channels, Culverts, & Floodwalls (rounded)						1,923,000
11.0.Z.-	Contingencies (rounded)						577,000
11.-.-.-	SUBTOTAL: Discharge Channels, Culverts, & Floodwalls (rounded)						2,500,000
11.0.1.-	Levees & Floodwalls (Sector Gate Structure to Hero Pumping Station)						
11.0.1.-	Levees (Sector Gate Structure to Hero Pumping Station - 1st Lift)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$50,000.00	50,000	15,000	65,000
11.0.1.B	Sitework (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	$112,000.00	112,000	33,600	145,600
11.0.1.B	Waste Excavation at Landfill	Lump Sum	LS	$44,000.00	44,000	13,200	57,200
11.0.1.B	Embankment, Semicompacted Fill (Adjacent Borrow)	109,000	CY	$2.75	299,750	89,925	389,675
11.0.1.B	Core Closure (Drainage Canal Closure)	13,000	CY	$28.25	367,250	110,175	477,425
11.0.1.-	Levees (Sector Gate Structure to Hero Pumping Station - 2nd Lift)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$30,000.00	30,000	9,000	39,000
11.0.1.B	Sitework (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	$27,000.00	27,000	8,100	35,100
11.0.1.B	Embankment, Semicompacted Fill (Hauled Fill)	54,000	CY	$8.75	472,500	141,750	614,250
11.0.1.-	Levees (Sector Gate Structure to Hero Pumping Station - 3rd Lift)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$30,000.00	30,000	9,000	39,000
11.0.1.B	Sitework (Clearing & Grubbing	Lump Sum	LS	$27,000.00	27,000	8,100	35,100

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Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	and Fert. & Seeding)						
11.0.1.B	Embankment, Semicompacted Fill (Hauled Fill)	42,000	CY	$8.75	367,500	110,250	477,750
11.0.2.-	Floodwalls (Sector Gate Structure to Hero Pumping Station)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$100,000.00	100,000	30,000	130,000
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$45,000.00	45,000	13,500	58,500
11.0.2.-	I-Wall 8' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	9,280	LF	$474.00	4,398,720	1,319,616	5,718,336
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12 ft High above Ground	900	LF	$1,069.00	962,100	240,525	1,202,625
	b: 14 ft High above Ground	1,100	LF	$1,156.00	1,271,600	317,900	1,589,500
	c: 16 ft High above Ground	240	LF	$1,216.00	291,840	72,960	364,800
11.0.2.-	Swing Gates (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 20'W x 10'H	1	EA	$60,371.00	60,371	12,074	72,445
	b: 30'W x 12'H	1	EA	$87,224.00	87,224	17,445	104,669
	c: 30'W x 15'H	3	EA	$109,000.00	327,000	65,400	392,400
	d: 36'W x 12'H	2	EA	$115,000.00	230,000	46,000	276,000
11.-.-.-	SUBTOTAL: Sector Gate Structure to Hero Pumping Station (rounded)						9,601,000
11.0.2.-	Contingencies (rounded)						2,684,000
11.-.-.-	SUBTOTAL: Sector Gate Structure to Hero Pumping Station						12,285,000
11.0.2.-	Floodwalls (Hero Pumping Station to Verret Canal Extension - WOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$100,000.00	100,000	30,000	130,000
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$45,000.00	45,000	13,500	58,500
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	1,550	CY	$2.10	3,255	977	4,232
11.0.2.B	Reshape Road Ramp at Gate Locations	30	EA	$5,300.00	159,000	47,700	206,700
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,730	LF	$274.00	474,020	118,505	592,525
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	a: 10 ft High above Ground	1,200	LF	$768.00	921,600	230,400	1,152,000
	b: 14 ft High above Ground	950	LF	$1,156.00	1,098,200	274,550	1,372,750
11.0.2.-	Swing Gates (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 16'W x 4'H	2	EA	$31,972.00	63,944	12,789	76,733
	b: 20'W x 4'H	5	EA	$37,160.00	185,800	37,160	222,960
	c: 24'W x 4'H	6	EA	$42,368.00	254,208	50,842	305,050
	d: 32'W x 4'H	5	EA	$52,763.00	263,815	52,763	316,578
	e: 36'W x 4'H	3	EA	$57,951.00	173,853	34,771	208,624
	f: 20'W x 12.5'H	3	EA	$72,445.00	217,335	65,201	282,536
	g: 24'W x 10'H	2	EA	$69,329.00	138,658	27,732	166,390
	h: 24'W x 12.5'H	2	EA	$86,600.00	173,200	51,960	225,160
	i: 32'W x 12.5'H	2	EA	$104,700.00	209,400	62,820	272,220
11.-.-.-	SUBTOTAL: Hero Pumping Station to Verret Canal Extension - WOAC (rounded)						4,481,000
11.0.Z.-	Contingencies (rounded)						1,112,000
11.-.-.-	SUBTOTAL: Hero Pumping Station to Verret Canal Extension - WOAC						5,593,000
11.0.2.-	Floodwalls (Verret Canal Extension to Orleans Parish Line - WOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$10,500.00	10,500	3,150	13,650
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	3,850	CY	$2.10	8,085	2,426	10,511
11.0.2.B	Reshape Road Ramp at Gate Locations	21	EA	$5,300.00	111,300	33,390	144,690
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	4,310	LF	$274.00	1,180,940	295,235	1,476,175
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 ft High above Ground	650	LF	$768.00	499,200	124,800	624,000
11.0.2.-	Swing Gates (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12'W x 4'H	2	EA	$26,765.00	53,530	10,706	64,236
	b: 16'W x 4'H	4	EA	$31,972.00	127,888	25,578	153,466
	c: 20'W x 4'H	3	EA	$37,160.00	111,480	22,296	133,776
	d: 24'W x 4'H	5	EA	$42,368.00	211,840	42,368	254,208
	e: 28'W x 4'H	1	EA	$47,556.00	47,556	9,511	57,067

DETAILED ESTIMATE OF INCREMENTAL COSTS
(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	f: 32'W x 4'H	2	EA	$52,763.00	105,526	21,105	126,631
	g: 36'W x 4'H	4	EA	$57,951.00	231,804	46,361	278,165
11.-.-.-	SUBTOTAL: Verret Canal Extension to Orleans Parish Line - WOAC (rounded)						2,775,000
11.0.Z.-	Contingencies (rounded)						659,000
11.-.-.-	SUBTOTAL: Verret Canal Extension to Orleans Parish Line - WOAC						3,434,000
11.0.2.-	Floodwalls (Hero & Planters Pumping Stations - Modifications - WOAC)						
11.0.2.-	Modification of Hero Pump Sta.	Lump Sum	LS	$360,000.00	360,000	108,000	468,000
11.0.2.-	Modification of Planters Pumping Station	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
11.-.-.-	SUBTOTAL: Hero & Planters Pumping Stations - Modifications - WOAC (rounded)						610,000
11.0.Z.-	Contingencies (rounded)						183,000
11.-.-.-	SUBTOTAL: Hero & Planters Pumping Stations - Modifications - WOAC						793,000
11.0.1.-	Levees (Plaquemines Parish - WOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
11.0.1.B	Clearing & Grubbing	70	AC	$1,050.00	73,500	22,050	95,550
11.0.1.B	Semicompacted Fill	304,400	CY	$9.80	2,983,120	894,936	3,878,056
11.0.1.B	Fertilizing and Seeding	70	AC	$500.00	35,000	10,500	45,500
11.-.-.-	SUBTOTAL: Plaquemines Parish - WOAC (rounded)						3,167,000
11.0.Z.-	Contingencies (rounded)						950,000
11.-.-.-	SUBTOTAL: Plaquemines Parish - WOAC						4,117,000
11.0.2.-	Floodwalls (Orleans Parish Line to Algiers Lock - WOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$50,000.00	50,000	15,000	65,000
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$5,200.00	5,200	1,560	6,760
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,300	LF	$274.00	356,200	89,050	445,250
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 ft High above Ground	600	LF	$768.00	460,800	115,200	576,000
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	1,150	CY	$2.10	2,415	725	3,140
11.-.-.-	SUBTOTAL: Orleans Parish Line to Algiers Lock - WOAC (rounded)						875,000
11.0.Z.-	Contingencies (rounded)						222,000
11.-.-.-	SUBTOTAL: Orleans Parish Line to Algiers Lock - WOAC						1,097,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.0.2.-	Floodwalls (Pumping Stations No. 11 & 13 - Modifications - WOAC)						
11.0.2.-	Modif. of Pump Station NO.11	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
11.0.2.-	Modif. of Pump Station NO.13	Lump Sum	LS	$350,000.00	350,000	105,000	455,000
11.-.-.-	SUBTOTAL: Pumping Stations No. 11 & 13 - Modifications - WOAC (rounded)						600,000
11.0.Z.-	Contingencies (rounded)						180,000
11.-.-.-	SUBTOTAL: Pumping Stations No. 11 & 13 - Modifications - WOAC						780,000
11.0.1.-	Levees (Orleans Parish - WOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
11.0.1.B	Clearing & Grubbing	34	AC	$1,050.00	35,700	10,710	46,410
11.0.1.B	Semicompacted Fill	184,600	CY	$9.80	1,809,080	542,724	2,351,804
11.0.1.B	Fertilizing and Seeding	34	AC	$500.00	17,000	5,100	22,100
11.-.-.-	SUBTOTAL: Orleans Parish - WOAC (rounded)						1,937,000
11.0.Z.-	Contingencies (rounded)						582,000
11.-.-.-	SUBTOTAL: Orleans Parish - WOAC (rounded)						2,518,000
11.0.1.-	Levees (Plaquemines Parish, F-Levee - 1st, 2nd, and 3rd Lifts - EOAC)						
11.0.1.-	Levees, Plaquemines Parish, F-Levee - 1st Lift - EOAC						
11.0.A.-	Mob & Demob	Lump Sum	LS	$15,000.00	15,000	3,000	18,000
11.0.1.B	Clearing & Grubbing - levee	22	AC	$250.00	5,500	825	6,325
11.0.1.B	Clearing & Grubbing - borrow	18	AC	$1,500.00	27,000	4,050	31,050
11.0.1.B	Uncompacted Fill-2mi rdtp haul	180,000	CY	$3.00	540,000	81,000	621,000
11.0.1.B	Fertilizing and Seeding	22	AC	$500.00	11,000	1,650	12,650
11.0.1.-	Levees, Plaquemines Parish, F-Levee - 2nd Lift - EOAC						
11.0.A.-	Mob & Demob	Lump Sum	LS	$15,000.00	15,000	3,000	18,000
11.0.1.B	Clearing & Grubbing - levee	22	AC	$250.00	5,500	825	6,325
11.0.1.B	Clearing & Grubbing - borrow	6	AC	$1,000.00	6,000	900	6,900
11.0.1.B	Uncompacted Fill-2mi rdtp haul	55,000	CY	$3.25	178,750	26,815	205,565
11.0.1.B	Fertilizing and Seeding	22	AC	$500.00	11,000	1,650	12,650
11.0.1.-	Levees, Plaquemines Parish, F-Levee - 3rd Lift - EOAC						
11.0.A.-	Mob & Demob	Lump Sum	LS	$15,000.00	15,000	3,000	18,000
11.0.1.B	Clearing & Grubbing - levee	22	AC	$250.00	5,500	825	6,325
11.0.1.B	Clearing & Grubbing - borrow	6	AC	$1,000.00	6,000	900	6,900
11.0.1.B	Semicompacted Fill-2mi rdtp ha	55,000	CY	$4.00	220,000	33,000	253,000
11.0.1.B	Fertilizing and Seeding	22	AC	$500.00	11,000	1,650	12,650
11.-.-.-	SUBTOTAL: Plaquemines Parish, F-Levee - 1st, 2nd, and 3rd Lifts - EOAC (rounded)						1,073,000
11.0.Z.-	Contingencies (rounded)						163,000
11.-.-.-	SUBTOTAL: Plaquemines Parish, F-Levee - 1st, 2nd, and 3rd Lifts - EOAC						1,236,000
11.0.2.-	Floodwalls (F-Levee to Orleans Parish Line, Plaquemines Parish - EOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$50,000.00	50,000	15,000	65,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$4,200.00	4,200	1,260	5,460
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	450	CY	$2.10	945	284	1,229
11.0.2.B	Reshape Road Ramp at Gate Locations	11	EA	$5,300.00	58,300	17,490	75,790
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	500	LF	$274.00	137,000	34,250	171,250
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 ft High above Ground	500	LF	$768.00	384,000	96,000	480,000
11.0.2.-	Swing Gates (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12'W x 4'H	1	EA	$26,765.00	26,765	5,353	32,118
	b: 20'W x 4'H	2	EA	$37,160.00	74,320	14,864	89,184
	c: 24'W x 4'H	1	EA	$42,368.00	42,368	8,474	50,842
	d: 32'W x 4'H	1	EA	$52,763.00	52,763	10,553	63,316
	e: 20'W x 5'H	3	EA	$39,998.00	119,994	23,999	143,993
	f: 24'W x 5'H	2	EA	$45,706.00	91,412	18,282	109,694
	g: 28'W x 5'H	1	EA	$51,394.00	51,394	10,279	61,673
	h: 32'W x 5'H	1	EA	$57,101.00	57,101	11,420	68,521
11.-.-.-	SUBTOTAL: F-Levee to Orleans Parish Line, Plaquemines Parish - EOAC (rounded)						1,151,000
11.0.Z.-	Contingencies (rounded)						268,000
11.-.-.-	SUBTOTAL: F-Levee to Orleans Parish Line, Plaquemines Parish - EOAC						1,419,000
11.0.2.-	Floodwalls (Plaquemines & New Planters Pumping Stations - Modifications - EOAC)						
11.0.2.-	Modification of Plaquemines Pumping Station	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
11.0.2.-	Modification of New Planters Pumping Station	Lump Sum	LS	$250,000.00	250,000	75,000	325,000
11.-.-.-	SUBTOTAL: Plaquemines & New Planters Pumping Stations - Modifications - EOAC (rounded)						500,000
11.0.Z.-	Contingencies (rounded)						150,000
11.-.-.-	SUBTOTAL: Plaquemines & New Planters Pumping Stations - Modifications - EOAC						650,000
11.0.1.-	Levees (Plaquemines Parish - EOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
11.0.1.B	Clearing & Grubbing	136	AC	$1,050.00	142,800	42,840	185,640
11.0.1.B	Semicompacted Fill	930,400	CY	$4.35	4,047,240	1,214,172	5,261,412
11.0.1.B	Fertilizing and Seeding	136	AC	$500.00	68,000	20,400	88,400

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.-.-.-	SUBTOTAL: Plaquemines Parish - EOAC (rounded)						4,333,000
11.0.Z.-	Contingencies (rounded)						1,300,000
11.-.-.-	SUBTOTAL: Plaquemines Parish - EOAC						5,633,000
11.0.2.-	Floodwalls (Orleans Parish Line to Algiers Lock - EOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$40,000.00	40,000	12,000	52,000
11.0.2.B	Sitework (Clearing, Fert. & Seeding)	Lump Sum	LS	$2,075.00	2,075	623	2,698
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	375	LF	$274.00	102,750	25,688	128,438
11.0.2.-	T-Walls (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 ft High above Ground	250	LF	$768.00	192,000	48,000	240,000
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	350	CY	$2.10	735	221	956
11.0.2.-	Swing Gates (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 36'W x 5'H	1	EA	$62,789.00	62,789	12,558	75,347
11.-.-.-	SUBTOTAL: Orleans Parish Line to Algiers Lock - EOAC (rounded)						400,000
11.0.2.-	Contingencies (rounded)						99,000
11.-.-.-	SUBTOTAL: Orleans Parish Line to Algiers Lock - EOAC						499,000
11.0.1.-	Levees (Orleans Parish - EOAC)						
11.0.A.-	Mob & Demob	Lump Sum	LS	$75,000.00	75,000	22,500	97,500
11.0.1.B	Clearing & Grubbing	32	AC	$1,050.00	33,600	10,080	43,680
11.0.1.B	Semicompacted Fill	176,620	CY	$4.35	768,297	230,489	998,786
11.0.1.B	Fertilizing and Seeding	32	AC	$500.00	16,000	4,800	20,800
11.-.-.-	SUBTOTAL: Orleans Parish - EOAC (rounded)						893,000
11.0.Z.-	Contingencies (rounded)						268,000
11.-.-.-	SUBTOTAL: Orleans Parish - EOAC						1,161,000
11.-.-.-	TOTAL: LEVEES AND FLOODWALLS						45,715,000
13.-.-.-	PUMPING PLANT						

DETAILED ESTIMATE OF INCREMENTAL COSTS

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East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.-.-.-	Pumping Plant (Cousins Pumping Station Expansion - WOAC)						
13.0.A.-	Mob & Demob	Lump Sum	LS	$175,000.00	175,000	43,750	218,750
13.0.B.-	Care and Diversion of Water						
13.0.B.B	Sitework						
13.0.B.B	Fert & Seeding	Lump Sum	LS	$3,000.00	3,000	750	3,750
13.0.B.B	Fence	Lump Sum	LS	$8,200.00	8,200	2,050	10,250
13.0.B.B	Removal & Relocation of Oil Storage Tanks	Lump Sum	LS	$53,000.00	53,000	13,250	66,250
13.0.B.B	Cofferdam for P.S. Expansion						
13.0.B.B	Suction Basin Cofferdam	Lump Sum	LS	$350,000.00	350,000	87,500	437,500
13.0.B.B	Discharge Basin Cofferdam	Lump Sum	LS	$182,000.00	182,000	45,500	227,500
13.0.B.B	Dewatering of Cofferdams	Lump Sum	LS	$150,000.00	150,000	37,500	187,500
13.0.B.B	Removal of Cofferdams	Lump Sum	LS	$37,000.00	37,000	9,250	46,250
13.0.D.-	Earthwork for Structures						
13.0.D.B	Sitework						
13.0.D.B	Structural Excavation	20,000	CY	$3.30	66,000	16,500	82,500
13.0.D.B	Structural Backfill	5,000	CY	$8.30	41,500	10,375	51,875
13.0.E.-	Foundation Work						
13.0.E.B	Sitework						
13.0.E.B	Foundation Preparation						
13.0.E.B	Piling, Test	Lump Sum	LS	$32,000.00	32,000	8,000	40,000
13.0.E.B	Piling, 12" untrtd. timber below pumping station	54,000	LF	$10.10	545,400	136,350	681,750
13.0.E.B	Piling, Stl. Sht. PSA-23						
13.0.E.B	Intake & Discharge Cutoff Walls	2,100	SF	$13.25	27,825	6,956	34,781
13.0.E.B	Cutoff Wall Below Floodwall	1,600	SF	$13.25	21,200	5,300	26,500
13.0.E.B	Retaining Wall Adjacent To Pumping Station						
13.0.E.B	Piling, Stl. Sht. PZ-40	7,200	SF	$21.15	152,280	38,070	190,350
13.0.E.B	Piling, HP 12 x 53	2,160	LF	$23.25	50,220	12,555	62,775
13.0.1.-	Pumping Plant Substructure						
13.0.1.E	Metals						
13.0.1.E	Trash Racks & Machinery	Lump Sum	LS	$127,000.00	127,000	31,750	158,750
13.0.2.-	Pumping Plant Superstructure						
13.0.2.C	Concrete	5,000	CY	$330.00	1,650,000	412,500	2,062,500
13.0.2.E	Metals						
13.0.2.E	Structural Steel	Lump Sum	LS	$135,000.00	135,000	33,750	168,750
13.0.2.E	Metal Siding	Lump Sum	LS	$115,000.00	115,000	28,750	143,750
13.0.2.G	Thermal and Moisture Protection						
13.0.2.G	B.U.Roof	Lump Sum	LS	$22,000.00	22,000	5,500	27,500
13.0.2.H	Doors and Windows						
13.0.2.H	Glass & Glazing	Lump Sum	LS	$22,000.00	22,000	5,500	27,500
13.0.2.H	O.H. & Sliding Doors	Lump Sum	LS	$44,000.00	44,000	11,000	55,000
13.0.2.H	Bldg. Acessories	Lump Sum	LS	$5,000.00	5,000	1,250	6,250
13.0.2.J	Finishes						
13.0.2.J	Painting	Lump Sum	LS	$35,000.00	35,000	8,750	43,750

DETAILED ESTIMATE OF INCREMENTAL COSTS

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East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.0.3.-	Pumping Machinery and Appurtenances						
13.0.3.Q	Mechanical	Lump Sum	LS	$567,000.00	567,000	141,750	708,750
13.0.3.Q	Set Pumps & Materials	Lump Sum	LS	$35,000.00	35,000	8,750	43,750
13.0.5.-	Auxiliary Equipment						
13.0.5.P	Conveying Systems						
13.0.5.P	O.H. Crane	Lump Sum	LS	$97,000.00	97,000	24,250	121,250
13.0.5.R	Electrical	Lump Sum	LS	$119,000.00	119,000	29,750	148,750
13.-.-.-	SUBTOTAL: Cousins Pumping Station Expansion - WOAC (rounded)						4,868,000
13.0.Z.-	Contingencies (rounded)						1,217,000
13.-.-.-	SUBTOTAL: Cousins Pumping Station Expansion - WOAC (rounded)						6,085,000
13.-.-.-	Pumping Plant (Cousins Pumping Station Modification - WOAC)						
13.0.B.-	Care and Diversion of Water						
13.0.B.B	Sitework						
13.0.B.B	Misc Sitework	Lump Sum	LS	$26,400.00	26,400	6,600	33,000
13.0.B.B	Demolition of Existing Floodwalls	Lump Sum	LS	$66,000.00	66,000	16,500	82,500
13.0.B.B	Cofferdam fo Sluice Gates						
13.0.B.B	a. First Structure	Lump Sum	LS	$157,000.00	157,000	39,250	196,250
13.0.B.B	b. Second Structure	Lump Sum	LS	$127,000.00	127,000	31,750	158,750
13.0.E.-	Foundation Work						
13.0.E.B	Sitework						
13.0.E.B	Foundation Preparation						
13.0.E.B	Piling, 12" untrtd. timber below sluice gate struc.	3,000	LF	$10.10	30,300	7,575	37,875
13.0.1.-	Pumping Plant Substructure						
13.0.1.E	Metals						
13.0.1.E	Misc Metals & Exstng Struc	5,350	LBS	$1.50	8,025	2,006	10,031
13.0.2.-	Pumping Plant Superstructure						
13.0.2.C	Concrete						
13.0.2.C	Conc for Modification of Existing Structure						
13.0.2.C	Conc in Slabs & Beams	16	CY	$330.00	5,280	1,320	6,600
13.0.2.C	Conc in Sluice Gate Structure						
13.0.2.C	Conc in Base Slab	34	CY	$200.00	6,800	1,700	8,500
13.0.2.C	Conc in Walls & Floors	166	CY	$330.00	54,780	13,695	68,475
13.0.5.-	Auxiliary Equipment						
13.0.5.Q	7'x10" Sluice Gate & Machinery	6	EA	$95,500.00	573,000	143,250	716,250
13.0.5.Q	72" Dia Butterfly Valves	3	EA	$59,500.00	178,500	44,625	223,125
13.0.5.Q	36" Dia Butterfly Valves	1	EA	$14,500.00	14,500	3,625	18,125
13.-.-.-	SUBTOTAL: Cousins Pumping Station Modification - WOAC (rounded)						1,248,000
13.0.Z.-	Contingencies (rounded)						312,000
13.-.-.-	SUBTOTAL: Cousins Pumping Station Modification - WOAC						1,560,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.-.-.-	TOTAL: PUMPING PLANT						7,645,000
30.-.-.-	ENGINEERING AND DESIGN						
30.D.-.-	FDM - Sector Gate Complex				1,100,000		1,100,000
30.D.-.-	FDM - WOAC				865,000		865,000
30.D.A.-	Sector Gate Complex				2,589,000		2,589,000
30.D.A.-	2nd and 3rd Lift Levees - Sector Gate Complex				60,000		60,000
30.D.A.-	Cousins Pumping Station Expansion & Modification				943,000		943,000
30.D.A.-	Discharge Channel, Culverts, & Floodwalls - WOAC				767,000		767,000
30.D.A.-	Sector Gate Structure to Hero Pumping Station				1,590,000		1,590,000
30.D.A.-	Hero Pumping Station to Verret Canal Extension				706,000		706,000
30.D.A.-	Verret Canal Extension to Orleans Parish Line				461,000		461,000
30.D.A.-	Hero & Planters Pumping Station Modifications				95,000		95,000
30.D.A.-	Plaquemines Parish - WOAC				500,000		500,000
30.D.A.-	Orleans Parish Line to Algiers Lock				140,000		140,000
30.D.A.-	Pumping Stations No. 11 & No. 13				94,000		94,000
30.D.A.-	Orleans Parish - WOAC				283,000		283,000
30.D.-.-	FDM - EOAC				550,000		550,000
30.D.-.-	Soils Report				460,000		460,000
30.D.A.-	Plaquemines Parish, F-Levee, 3 Lifts - EOAC				79,000		79,000
30.D.A.-	F-Levee to Orleans Parish Line - EOAC				317,000		317,000
30.D.A.-	Plaquemines and New Planters Pumping Stations				80,000		80,000
30.D.A.-	Plaquemines Parish - EOAC				654,000		654,000
30.D.A.-	Orleans Parish Line to Algiers Lock				70,000		70,000
30.D.A.-	Orleans Parish - EOAC				137,000		137,000
30.-.-.-	SUBTOTAL: Engineering and Design Contingencies						12,540,000
30.-.-.-	TOTAL: ENGINEERING AND DESIGN						12,540,000
31.-.-.-	CONSTRUCTION MANAGEMENT						
31.-.-.-	Construction Management (S & I)						
31.-.-.-	Sector Gate Complex				3,107,000		3,107,000
31.-.-.-	2nd and 3rd Lift Levees - Sector Gate Complex				53,000		53,000
31.-.-.-	Cousins Pumping Station Expansion & Modification				1,131,000		1,131,000
31.-.-.-	Discharge Channel, Culverts, & Floodwalls - WOAC				920,000		920,000
31.-.-.-	Sector Gate Structure to Hero Pumping Station				1,326,000		1,326,000
31.-.-.-	Hero Pumping Station to Verret Canal Extension				589,000		589,000
31.-.-.-	Verret Canal Extension to Orleans Parish Line				384,000		384,000
31.-.-.-	Hero & Planters Pumping Station Modifications				79,000		79,000
31.-.-.-	Plaquemines Parish - WOAC				420,000		420,000
31.-.-.-	Orleans Parish Line to Algiers Lock				115,000		115,000
31.-.-.-	Pumping Stations No. 11 & No. 13				78,000		78,000
31.-.-.-	Orleans Parish - WOAC				236,000		236,000
31.-.-.-	Plaquemines Parish, F-Levee, 3 Lifts - EOAC				115,000		115,000
31.-.-.-	F-Levee to Orleans Parish Line - EOAC				264,000		264,000
31.-.-.-	Plaquemines and New Planters Pumping Stations				65,000		65,000
31.-.-.-	Plaquemines Parish - EOAC				546,000		546,000
31.-.-.-	Orleans Parish Line to Algiers Lock				57,000		57,000
31.-.-.-	Orleans Parish - EOAC				114,000		114,000

DETAILED ESTIMATE OF INCREMENTAL COSTS

(Oct 93 Price Level)

East of Harvey Canal

Account Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
31.-.-.-	SUBTOTAL: Construction Management (S & I)						9,599,000
	Contingencies						
31.-.-.-	TOTAL: CONSTRUCTION MANAGEMENT						9,599,000
	TOTAL PROJECT						134,733,000

COST ESTIMATES

PROJECT COST ESTIMATES

WEST OF ALGIERS CANAL

Acct Code	Item	PLAN 1 100-yr	PLAN 1 200-yr	PLAN 1 SPH	PLAN 3B SPH
01	Real Estate	13,232,000	13,232,000	14,202,000	8,351,000
02	Relocations	2,609,900	3,264,500	3,274,300	3,936,300
05	Locks	----	----	----	20,814,000
09	Channels	----	----	----	9,650,000
11	Levees	31,707,100	43,508,500	48,363,700	33,384,700
13	Pumping Plant	----	----	----	7,586,000
30	Eng. & Design	4,119,000	5,613,000	6,191,000	8,171,000
31	Const. Mgmt.	3,432,000	4,679,000	5,163,000	8,405,000
	Total Cost	55,100,000	70,297,000	77,194,000	100,298,000

PROJECT COST ESTIMATES

EAST OF ALGIERS CANAL

Acct Code	Item	Level of Protection 100-yr	200-yr	SPH
01	Real Estate	----	----	----
02	Relocations	549,600	791,000	794,000
05	Locks	----	----	----
09	Channels	----	----	----
11	Levees	5,193,400	7,229,000	10,394,000
13	Pumping Plant	----	----	----
30	Eng. & Design	674,000	943,000	1,438,000
31	Const. Mgmt.	558,000	785,000	1,200,000
	Total Cost	6,975,000	9,748,000	13,826,000

OPERATIONS, MAINTENANCE, REPAIR, REPLACEMENT & REHABILITATION COSTS

	West of Algiers		East of Algiers
	Plan 1	Plan 3	
Sector Gate			
Operation	----	2,000/yr	----
Maintenance	----	22,000/yr	----
Floodgates			
Operation	2,500/yr	2,000/yr	----
Maintenance	13,000/yr	10,000/yr	----
Floodwall Maint.	17,000/yr	12,000/yr	----
Levee Maint.	6,500/yr	6,500/yr	6,500/yr
Cousins Expansion			
Operation	----	20,000/yr	----
Maintenance	----	26,000/yr	----
Contingencies	6,500/yr	17,500/yr	----
Subtotal (O&M)	45,500/yr	118,000/yr	6,500/yr
Replacement @ 50yrs	719/yr	3,885/yr	----
Total OMRR&R[1]	46,219/yr	121,885/yr	6,500/yr

[1] The OMRR&R costs used for plan formulation were assumed to be the same for a given plan (did not vary with the level of protection). OMRR&R costs do not include repair costs should the occurrence of an extreme event exceed the design criteria and cause extensive failures in protection. These costs once multiplied by the probability of occurrence and amortized over the life of the project would likely be insignificant.

Replacement Costs

Plan 1 - The replacement costs for Plan 1 are $500,000 at 50 years. This provides for replacement of the sluice gates and miscellaneous drainage work.

Plan 3 - The replacement costs for Plan 3 are $2,300,000 at 50 years. This provides for replacement of the sluice gates and miscellaneous drainage work and replacement of the sector gate machinery.

SPH - PLAN1

(Harvey Lock to Hero Pumping Station)

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALT. 1
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Project Cost			
	SUMMARY OF COST HARVEY LOCK TO HERO PUMPING STATION ==========				
11.-.-.-	LEVEES & FLOODWALLS	30,970,000.00			
02.-.-.-	RELOCATIONS	1,984,000.00			
30.-.-.-	ENGINEERING & DESIGN	3,954,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	3,295,000.00			
01.-.-.-	REAL ESTATE COST	13,232,000.00			
	==========	==========			
	TOTAL PROJECT COST	53,435,000.00			
	==========	==========			
	TOTAL ESTIMATED PROJECT COST				$53,435,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.8	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	3,000.00	$3,000	$900	$3,900
11.0.2.-	I-Walls (Include Struc Excav & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)						
11.0.2.-	a: 4 Ft High above Ground	1,240	LF	252.00	$312,480	$78,120	$390,600
11.0.2.-	a: 5 Ft High above Ground	280	LF	266.00	$74,480	$18,620	$93,100
11.0.2.-	a: 6 Ft High above Ground	350	LF	330.00	$115,500	$34,650	$150,150
11.0.2.-	a: 7 Ft High above Ground	790	LF	396.00	$312,840	$93,852	$406,692
11.0.2.-	a: 8 Ft High above Ground	1,540	LF	454.00	$699,160	$209,748	$908,908
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 5'H	1	EA	39,998.00	$39,998	$8,000	$47,998
	b. 20'W x 7'H	8	EA	48,374.00	$386,992	$77,398	$464,390
	c. 32'W x 4'H	2	EA	52,763.00	$105,526	$21,105	$126,631
	d. 32'W x 5'H	1	EA	57,101.00	$57,101	$11,420	$68,521
	e. 32'W x 7'H	3	EA	69,377.00	$208,131	$41,626	$249,757
	f. 32'W x 8'H	9	EA	78,948.00	$710,532	$142,106	$852,638
11.0.2.-	40'W x 8'H Bottom Roller Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Pre-stressed Concr. Piles and Misc. Items)	2	EA	105,000.00	$210,000	$63,000	$273,000
	SUBTOTAL				$3,336,000	$831,000	$4,166,000
11.0.Z.-	CONTINGENCIES (25% +/-)				$831,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$4,167,000		
30.-.-.-	Engineering and Design				$500,000		
31.-.-.-	Construction Management				$417,000		
	TOTAL COST				$5,084,000		
	TOTAL COST						$5,084,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	150,000.00	$150,000	$45,000	$195,000
	SUBTOTAL				$225,000	$67,500	$292,500
02.0.2.-	CONTINGENCIES (30% +/-)				$68,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$293,000		
30.-.-.-	Engineering and Design				$35,000		
31.-.-.-	Construction Management				$29,000		
	TOTAL COST				$357,000		
	TOTAL COST						$357,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing and Fert & Seeding)	Lump Sum	LS	5,800.00	$5,800	$1,740	$7,540
11.0.2.-	I-wall 8 Ft Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,360	LF	454.00	$617,440	$123,488	$740,928
11.0.2.-	T-Wall 12' Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	8,490	LF	1,069.00	$9,075,810	$2,268,953	$11,344,763
11.0.2.-	32'W x 10'H Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, and Pre-stressed Concr. Piles) Piles)	8	EA	87,224.00	$697,792	$139,558	$837,350
	SUBTOTAL				$10,497,000	$2,564,000	$13,061,000
11.0.Z.-	CONTINGENCIES (24 % +/-)				$2,564,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$13,061,000		
30.-.-.-	Engineering and Design				$1,567,000		
31.-.-.-	Construction Management				$1,306,000		
	TOTAL COST				$15,934,000		
	TOTAL COST						$15,934,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	25,000.00	$25,000	$7,500	$32,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
						$37,500	
	SUBTOTAL				$125,000		
02.0.Z.-	CONTINGENCIES (30% +/-)				$38,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$163,000		
30.-.-.-	Engineering and Design				$20,000		
31.-.-.-	Construction Management				$16,000		
	TOTAL COST				$199,000		
	TOTAL COST						$199,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.8.A.-	Mobilization & Demob.	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
11.8.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	144,000.00	$144,000	$43,200	$187,200
11.8.2.B	Waste Excavation at Landfill	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.8.2.B	Embankment, Semicompacted Fill (Adjacent Borrow)	141,000	CY	2.50	$352,500	$105,750	$458,250
11.8.2.B	Shell Core Closure (Drainage Canal Closure)	13,000	CY	18.00	$234,000	$70,200	$304,200
	SUBTOTAL FIRST LIFT				$845,500	$253,650	$1,099,150
	SECOND LIFT						
11.8.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.8.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.8.2.B	Embankment, Semicompacted Fill (Hauled Fill)	70,000	CY	8.00	$560,000	$168,000	$728,000
	SUBTOTAL SECOND LIFT				$627,500	$188,250	$815,750
	THIRD LIFT						
11.8.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.8.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.8.2.B	Embankment, Semicompacted Fill (Hauled Fill)	54,000	CY	8.00	$432,000	$129,600	$561,600
	SUBTOTAL THIRD LIFT				$499,500	$149,850	$649,350
	SUBTOTAL LEVEE CONSTRUCTION				$1,973,000	$592,000	$2,564,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.8	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.-	I-Wall 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	12,060	LF	454.00	$5,475,240	$1,642,572	$7,117,812
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12 Ft High above Ground	900	LF	1,069.00	$962,100	$240,525	$1,202,625
	b: 14 Ft High above Ground	1,100	LF	1,156.00	$1,271,600	$317,900	$1,589,500
	c: 16 Ft High above Ground	240	LF	1,216.00	$291,840	$72,960	$364,800
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 10'H	1	EA	60,371.00	$60,371	$12,074	$72,445
	b. 30'W x 12'H	1	EA	87,224.00	$87,224	$17,445	$104,669
	c. 30'W x 15'H	3	EA	109,000.00	$327,000	$65,400	$392,400
	d. 36'W x 12'H	1	EA	115,000.00	$115,000	$23,000	$138,000
	SUBTOTAL FLOODWALLS				$8,748,000	$2,437,000	$11,177,000
	SUBTOTAL LEVEES AND FLOODWALLS				$10,713,000	$3,029,000	$13,741,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$3,029,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$13,742,000		
30.-.-.-	Engineering and Design				$1,649,000		
31.-.-.-	Construction Management				$1,374,000		
	TOTAL COST				$16,765,000		
	TOTAL COST						$16,765,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structure at Murphy Canal	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	d. Bridges	3	EA	200,000.00	$600,000	$180,000	$780,000
	SUBTOTAL				$1,175,000	$352,500	$1,527,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$353,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$1,528,000		
30.-.-.-	Engineering and Design				$183,000		
31.-.-.-	Construction Management				$153,000		
	TOTAL COST				$1,864,000		
	TOTAL COST						$1,864,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1988)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Levee and Floodwall Right-of-way						
	Commercial/Industrial	4.2	AC	$108,900.00	$457,380	$114,345	$571,725
	Commercial/Industrial	11.0093	AC	$65,340.00	$719,348	$179,837	$899,185
	Commercial/Industrial	191.8388	AC	$43,560.00	$8,356,498	$2,089,125	$10,445,623
	Improvements	Lump Sum	LS	500,000.00	$500,000	$125,000	$625,000
	Severance Damage	Lump Sum	LS		.00	.00	.00
	SUBTOTAL LANDS AND DAMAGES				$10,033,000	$2,508,000	$12,542,000
	(b) Acquisition Costs (Estimated 100 tracts)						
	Non-Federal	100	Tracts	1,400.00	$140,000	.00	$140,000
	Federal	Lump Sum	LS	50,000.00	$50,000	.00	$50,000
	(c) PL 91-646	Lump Sum	LS	500,000.00	$500,000	.00	$500,000
	TOTAL ESTIMATED REAL ESTATE COST						$13,232,000

SPH - PLAN 2

(Sector Gate with 6,000 cfs Pumping Station near Hero Pumping Station)

SUMMARY OF COST ESTIMATES FOR FEASIBILITY STUDY
EAST OF HARVEY CANAL HURRICANE PROTECTION PLAN --- SPH PROTECTION

NOTE: TOTALS IN THIS PAGE HAVE BEEN ROUNDED TO THE NEAREST $100,000

PROTECTION ALONG HARVEY CANAL
ALTERNATIVE 2 --- SECTOR GATE WITH 6000 CFS PUMP. STA. VIC HERO PUMP. STA.

	$ X 1,000,000
SECTOR GATE STRUCTURE	$22.00
NAVIGATION CHANNEL	$1.30
6000 CFS PUMPING STATION	$61.40
CLOSURE DAM	$2.40
FLOODWALL TIE-INS	$4.20
SUBTOTAL	$91.30
INTERNAL PROTECTION TO EL. 4.0 (FLOODWALL AND LEVEE)	
EAST BANK	$10.00
WEST BANK	$5.70
SUBTOTAL	$15.70
GRAND TOTAL	$107.00

TOTAL COST (IN MILLIONS) $107.00

SPH - PLANS 3A, 3B, 3C, AND 3D

(Sector Gate below Lapalco Boulevard)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR SPH PROTECTION FOR THE SECTOR GATE STRUCTURE

Plan 3

No.	Item	Levees & Floodwalls	Locks	Channels & Canals	Pumping Plant	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Sector Gate Complex	$1,449,000	$20,814,000	$3,628,000			$2,589,000	$3,107,000	$2,524,000	$34,111,000
2	Channels and Canals	$2,372,000		$5,298,000			$767,000	$920,000		$9,357,000
3	Levee Construction (2nd & 3rd Lifts)	$445,000					$45,000	$53,000		$543,000
4	Modification to Cousins Pumping Station			$724,000	$7,586,000	$1,118,000	$943,000	$1,131,000		$11,502,000
	TOTALS	$4,266,000	$20,814,000	$9,650,000	$7,586,000	$1,118,000	$4,344,000	$5,211,000	$2,524,000	$55,513,000

SUMMARY SHEET FOR COST ESTIMATE OF SECTOR GATE STRUCTURE IN HARVEY CANAL SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	TOTAL FOR CONTRACT, SECTOR GATE, CHANNELS, LEVEES & FLOODWALLS						$25,891,000
	TOTAL: ENGINEERING AND DESIGN						$2,589,000
	TOTAL: CONSTRUCTION MANAGEMENT						$3,107,000
	TOTAL: REAL ESTATE						$2,524,000
	TOTAL PROJECT COST (SPH):						$34,111,000

COST ESTIMATE FOR SECTOR GATE STRUCTURE IN HARVEY CANAL SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
05.-.-.-	LOCKS (SECTOR GATE)						
05.B.A.-	MOB & DEMOB	LUMP SUM	LS	$200,000.00	$200,000	$50,000	$250,000
05.B.C.-	PERMANENT ACCESS ROADS AND PARKING:						
05.B.C.B	SITE WORK						
05.B.C.B	SHELL ROAD SURFACING(9" thk)	670	SY	$5.50	$3,685	$1,106	$4,791
05.B.B.-	CARE & DIVERSION OF WATER						
05.B.B.B	SITE WORK						
05.B.B.B	COFFERDAM						
05.B.B.B	EARTH EMBANKMENT	14,000	CY	$2.50	$35,000	$10,500	$45,500
05.B.B.B	STEEL SHEET PILING FOR CELLS, PSA-23	89,200	SF	$13.50	$1,205,200	$361,564	$1,566,864
05.B.B.B	CELLULAR FILL (SHELL)	31,900	CY	$18.00	$574,200	$172,260	$746,460
05.B.B.B	STEEL SHEET PILE WALL,PZ-22	8,000	SF	$12.50	$100,000	$30,000	$130,000
05.B.B.B	UNWATERING COFFERDAM						
05.B.B.B	DEWATERING	LUMP SUM	LS	$1,000,000.00	$1,000,000	$300,000	$1,300,000
05.B.B.B	REMOVAL OF COFFERDAM	LUMP SUM	LS	$350,000.00	$350,000	$105,000	$455,000
05.B.D.-	EARTHWORK FOR STRUCTURES:						
05.B.D.B	SITE WORK						
05.B.D.B	STRUCTURE EXCAVATION	28,000	CY	$3.00	$84,000	$25,200	$109,200
05.B.D.B	STRUCTURE BACKFILL	16,200	CY	$8.00	$129,600	$38,880	$168,480
05.B.E.-	FOUNDATION WORK:						
05.B.E.B	SITE WORK						
05.B.E.B	FOUNDATION PREPARATION						
05.B.E.B	PILING, TEST	LUMP SUM	LS	$40,000.00	$40,000	$12,000	$52,000
05.B.E.B	PILING, 12" PRESTRD. CONC.	85,650	LF	$16.00	$1,370,400	$411,120	$1,781,520
05.B.E.B	PILING, STEEL SHEET, PSA-23	13,200	SF	$13.00	$171,600	$51,480	$223,080
05.B.E.C	CONCRETE:						
05.B.E.C	CONC. IN STAB. SLABS	350	CY	$70.00	$24,500	$7,350	$31,850
05.B.1.-	APPROACH CHANNELS:						
05.B.1.B	SITE WORK						
05.B.1.B	EXCAVATION, COMMON	29,000	CY	$1.50	$43,500	$13,050	$56,550
05.B.1.B	PLASTIC FILTER FABRIC	8,150	SY	$4.50	$36,675	$11,003	$47,678
05.B.1.B	SHELL BEDDING	17,950	CY	$17.00	$305,150	$91,545	$396,695
05.B.1.B	RIPRAP	44,500	TONS	$20.00	$890,000	$267,000	$1,157,000
05.B.2.-	GUIDE AND GUARD WALLS, UPPER AND LOWER:						
05.B.2.B	SITE WORK						
05.B.2.B	TIMBER GUIDE WALLS	LUMP SUM	LS	$2,120,000.00	$2,120,000	$424,000	$2,544,000
05.B.2.B	SHELL FILLED SHEET PILE DOLPHINS	LUMP SUM	LS	$1,250,000.00	$1,250,000	$250,000	$1,500,000
	SUBTOTAL, SECTOR GATE				$9,933,598	$2,633,877	$12,566,667

COST ESTIMATE FOR SECTOR GATE STRUCTURE IN HARVEY CANAL SPH PROTECTION (CON'T)

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
05.0.4.-	SECTOR GATE STRUCTURE:						
05.0.4.C	CONCRETE						
05.0.4.C	CONCRETE, IN PLACE						
05.0.4.C	BASE SLABS & WALLS	9,250	CY	$260.00	$2,405,000	$481,000	$2,886,000
05.0.4.C	NEEDLE GIRDER STORAGE RACK	LUMP SUM	LS	$195,000.00	$195,000	$39,000	$234,000
05.0.4.C	PRECAST CONCRETE NEEDLE GIRDERS & SUPPORTS	LUMP SUM	LS	$273,000.00	$273,000	$54,600	$327,600
05.0.4.E	METALS						
05.0.4.E	MISCELLANEOUS METALS	LUMP SUM	LS	$180,000.00	$180,000	$54,000	$234,000
05.0.4.N	SPECIAL CONSTRUCTION						
05.0.4.N	INSTRUMENTATION	LUMP SUM	LS	$5,000.00	$5,000	$1,500	$6,500
05.0.5.-	LOCK GATES AND OPERATING MACHINERY						
05.0.5.E	METALS						
05.0.5.E	SECTOR GATES	500,000	lbs	$3.50	$1,750,000	$350,000	$2,100,000
05.0.5.Q	MECHANICAL						
05.0.5.Q	GATE OPERATING MACHINERY	LUMP SUM	LS	$1,400,000.00	$1,400,000	$280,000	$1,680,000
05.0.5.R	ELECTRICAL						
05.0.5.R	CATHODIC PROTECTION	LUMP SUM	LS	$50,000.00	$50,000	$15,000	$65,000
05.0.8.-	POWER AND LIGHTING SYSTEMS:						
05.0.8.R	ELECTRICAL						
05.0.8.R	ELECTRIC SERVICE-EMERGENCY, INCLUDING STANDBY GENERATOR AND DIESEL ENGINE	LUMP SUM	LS	$60,000.00	$60,000	$18,000	$78,000
05.0.8.R	ELECTRIC WORK	LUMP SUM	LS	$400,000.00	$400,000	$120,000	$520,000
05.0.R.-	ASSOCIATED GENERAL ITEMS:						
05.0.R.B	SITE WORK						
05.0.R.B	TILE BASES	LUMP SUM	LS	$6,000.00	$6,000	$1,800	$7,800
05.0.N.-	BUILDINGS, PROJECT OPERATIONS						
05.0.N.C	CONCRETE						
05.0.N.C	CONTROL HOUSES	LUMP SUM	LS	$90,000.00	$90,000	$18,000	$108,000
	SUBTOTAL, CONSTRUCTION COSTS				$16,748,000		
05.0.Z.-	CONTINGENCIES:					$4,066,000	
05.-.-.-	SECTOR GATE TOTAL:						$20,814,000

COST ESTIMATE FOR SECTOR GATE STRUCTURE IN HARVEY CANAL SPH PROTECTION (CON'T)							
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
09.-.-.-	CHANNELS AND CANALS NAVIGATION BYPASS CHANNEL						
09.0.A.-	MOB & DEMOB	LUMP SUM	LS	$60,000.00	$60,000	$15,000	$75,000
09.0.2.-	CHANNELS:						
09.0.2.B	SITE WORK						
09.0.2.B	CLEARING AND GRUBBING	29	ACRE	$1,500.00	$43,500	$13,050	$56,550
09.0.2.B	EXCAVATION						
09.0.2.B	EXCAVATION, NAVIGATION BYPASS	340,700	CY	$1.50	$511,050	$153,315	$664,365
09.0.2.B	SLOPE TREATMENT						
09.0.2.B	SHELL BEDDING, NAVIGATION BYPASS	21,780	CY	$17.00	$370,260	$111,078	$481,338
09.0.2.B	RIPRAP, NAVIGATION BYPASS	65,340	TONS	$20.00	$1,306,800	$392,040	$1,698,840
09.0.5.-	DISPOSAL AREAS						
09.0.5.B	SITE WORK						
09.0.5.B	CLEARING & GRUBBING	34	ACRE	$1,500.00	$51,000	$15,300	$66,300
09.0.5.B	DIKE CONSTRUCTION	266,350	CY	$1.50	$399,525	$119,858	$519,383
09.0.5.B	RESTORATION						
09.0.5.B	FERTILIZING & SEEDING	34	ACRE	$1,500.00	$51,000	$15,300	$66,300
	SUBTOTAL, CONSTRUCTION COSTS:				$2,793,000		
09.0.Z.-	CONTINGENCIES					$835,000	
09.-.-.-	TOTAL: CHANNELS & CANALS						$3,628,000

COST ESTIMATE FOR SECTOR GATE STRUCTURE IN HARVEY CANAL SPH PROTECTION (CON'T)

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.-.-.-	LEVEES AND FLOODWALLS						
11.0.1.-	LEVEES:						
11.0.1.B	SITE WORK						
11.0.1.B	CLEARING AND GRUBBING	14	ACRE	$1,500.00	$21,000	$6,300	$27,300
11.0.1.B	EXCAVATION AND EMBANKMENT:						
11.0.1.B	DEGRADE EXISTING LEVEE	3,500	CY	$1.50	$5,250	$1,575	$6,825
11.0.1.B	1ST LIFT FOR LEVEE WEST OF THE NEW DISCHARGE CHANNEL; EMBANKMENT, UNCOMPACTED FILL*	112,000	CY	$1.60	$179,200	$53,760	$232,960
11.0.1.B	SLOPE TREATMENT:						
11.0.1.B	SEEDING, FERTILIZING AND MULCHING	14	ACRE	$500.00	$7,000	$2,100	$9,100
11.0.2.-	FLOODWALLS						
11.0.2.B	SITE WORK						
11.0.2.B	FOUNDATION WORK:						
11.0.2.B	I-WALLS, 7' HIGH (REINFORCED CONC., SHEET PILE SUPPORTED PZ-27)	1,055	LF	$396.00	$417,780	$125,334	$543,114
11.0.2.B	STEEL SHEET PILING, PSA-23 FOR CELLULAR FLOODWALL (Reuse from cofferdam of Sector gate;sand blast, paint, & redrive)	85,000	SF	$3.60	$306,000	$91,800	$397,800
11.0.2.B	SHELL FILL FOR CELLS (Salvaged from Sector Gate cofferdam)	22,330	CY	$8.00	$178,640	$53,592	$232,232
	* 2ND & 3RD LIFTS COVERED BY SEPARATE ESTIMATES						
	SUBTOTAL, CONSTRUCTION COSTS				$1,115,000		
11.0.Z.-	CONTINGENCIES					$334,000	
11.-.-.-	TOTAL: LEVEES & FLOODWALLS						$1,449,000
	TOTALS FOR CONTRACT, SECTOR GATE, CHANNELS, LEVEES & FLOODWALLS				$20,656,000	$5,235,000	$25,891,000
30.-.-.-	ENGINEERING AND DESIGN						$2,589,000
31.-.-.-	CONSTRUCTION MANAGEMENT (S&I)						$3,107,000
01.-.-.-	TOTAL REAL ESTATE						$2,524,000
	PROJECT CONTINGENCIES:			25.34%			
TOTAL PROJECT COST, SECTOR GATE, CHANNELS, LEVEES & FLOODWALLS SPH PROTECTION:							$34,111,000

SUMMARY OF COST ESTIMATE FOR CONCRETE DISCHARGE CULVERT, DISCHARGE CHANNEL, AND FLOODWALLS SPH PROTECTION							
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	TOTAL FOR CONTRACT, CONCRETE DISCHARGE CULVERT, DISCHARGE CHANNEL, AND FLOODWALLS						$7,670,000
	TOTAL: ENGINEERING AND DESIGN						$767,000
	TOTAL: CONSTRUCTION MANAGEMENT						$920,000
	NO ADDITIONAL REAL ESTATE REQD						
	TOTAL PROJECT COST (SPH):						$9,357,000

COST ESTIMATE FOR CONCRETE DISCHARGE CULVERT, DISCHARGE CHANNEL, AND FLOODWALLS SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
09.-.-.-	CHANNELS AND CANALS						
09.B.A.-	MOB & DEMOB	LUMP SUM	LS	$80,000.00	$80,000	$20,000	$100,000
09.B.2.-	CHANNELS:						
09.B.2.B	SITE WORK						
09.B.2.B	CLEARING AND GRUBBING	13	ACRE	$1,500.00	$19,500	$5,850	$25,350
09.B.2.B	EXCAVATION						
09.B.2.B	EXCAVATION, DISCHARGE CHANNEL	216,650	CY	$1.50	$324,975	$97,493	$422,468
09.B.2.B	SLOPE TREATMENT						
09.B.2.B	SHELL BEDDING, DISCHARGE CHANNEL	7,480	CY	$17.00	$127,160	$38,148	$165,308
09.B.2.B	RIPRAP, DISCHARGE CHANNEL	21,970	TONS	$20.00	$439,400	$131,820	$571,220
09.B.5.-	DISPOSAL AREAS						
09.B.5.B	SITE WORK						
09.B.5.B	CLEARING & GRUBBING	30	ACRE	$1,500.00	$45,000	$13,500	$58,500
09.B.5.B	DIKE CONSTRUCTION						
09.B.5.B	EMBANKMENT	238,000	CY	$1.50	$359,200	$107,460	$465,660
09.B.5.B	RESTORATION						
09.B.5.B	FERTILIZING & SEEDING	30	ACRE	$500.00	$15,000	$4,500	$19,500
09.B.R.-	ASSOCIATED GENERAL ITEMS:						
09.B.R.B	SITE WORK						
09.B.R.B	STRUCTURAL EXCAVATION	23,330	CY	$3.00	$69,990	$20,997	$90,987
09.B.R.B	STRUCTURAL BACKFILL	1,170	CY	$8.00	$9,360	$2,806	$12,168
09.B.R.B	COFFERDAM	LUMP SUM	LS	$36,000.00	$36,000	$10,800	$46,800
09.B.R.B	DEWATERING	LUMP SUM	LS	$80,000.00	$80,000	$24,000	$104,000
09.B.R.B	STEEL SHEET PILES (PERMANENT)						
09.B.R.B	PSA-23 (SEEPAGE CUTOFF)	8,160	SF	$13.00	$106,080	$31,824	$137,904
09.B.R.B	PZ-27 (TIE-BACK WALL)	14,400	SF	$13.50	$194,400	$58,320	$252,720
09.B.R.B	2" DIA TIE RODS	23,090	LBS	$1.50	$34,635	$10,391	$45,026
09.B.R.B	CHANNEL WALERS	21,600	LBS	$1.50	$32,400	$9,720	$42,120
09.B.R.B	HP12X63 STEEL PILES	5,760	LF	$23.00	$132,480	$39,744	$172,224
09.B.R.B	PZ-48 (VIC. CONC. CULVERT)	4,100	SF	$21.00	$86,100	$25,830	$111,930
09.B.R.B	FRICTION PILES BELOW CULVERT STRUCTURE						
09.B.R.B	12" DIA UNTREATED PILES	31,260	LF	$10.00	$312,600	$93,780	$406,380
09.B.R.B	14" DIA UNTREATED PILES	50,960	LF	$12.00	$611,520	$183,456	$794,976
09.B.R.B	PILES, TEST	LUMP SUM	LS	$32,000.00	$32,000	$9,600	$41,600
09.B.R.C	CONCRETE						
09.B.R.C	STABILIZATION SLAB	500	CY	$70.00	$35,000	$8,750	$43,750
09.B.R.C	BASE SLAB	3,350	CY	$200.00	$670,000	$167,500	$837,500
09.B.R.C	CONC. IN WALLS	800	CY	$330.00	$264,000	$66,000	$330,000
	SUBTOTAL, CONSTRUCTION COSTS:				$4,116,000		
09.B.Z.-	CONTINGENCIES					$1,182,000	
09.-.-.-	TOTAL: CHANNELS & CANALS (SPH):						$5,298,000

COST ESTIMATE FOR CONCRETE DISCHARGE CULVERT, DISCHARGE CHANNEL, AND FLOODWALLS SPH PROTECTION (CON'T)							
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.-.-.-	LEVEES AND FLOODWALLS						
11.0.2.-	FLOODWALLS						
11.0.2.B	SITE WORK						
11.0.2.B	CLEARING AND GRUBBING	4	ACRE	$1,500.00	$6,000	$1,800	$7,800
11.0.2.B	EXCAVATION AND EMBANKMENT:						
11.0.2.B	DEGRADE EXISTING LEVEE	3,000	CY	$1.50	$4,500	$1,350	$5,850
11.0.2.B	SEMICOMPACTED FILL	4,400	CY	$1.75	$7,700	$2,310	$10,010
11.0.2.B	SHELL CLOSURE (ACROSS EXSTNG DISCHARGE CHANNEL)	3,260	CY	$17.00	$55,420	$16,626	$72,046
11.0.2.B	FOUNDATION WORK:						
11.0.2.B	I-WALLS, 7' HIGH (REINFORCED CONC., SHEET PILE SUPPORTED PZ-27)	3,786	LF	$396.00	$1,499,256	$449,777	$1,949,033
11.0.2.B	SLOPE TREATMENT:						
11.0.2.B	SEEDING, FERTILIZING AND MULCHING	3	ACRE	$500.00	$1,500	$450	$1,950
11.0.2.B	44'X8' ROLLER GATES (INCLS. STEEL, CONC., SHT. PILE, & PRSTD PILES)	2	EA	$125,000.00	$250,000	$75,000	$325,000
	SUBTOTAL, CONSTRUCTION COSTS				$1,824,000		
11.0.2.-	CONTINGENCIES					$547,000	
11.-.-.-	TOTAL: LEVEES & FLOODWALLS						$2,372,000
	TOTALS FOR CONTRACT, DISCHARGE CULVERT, CHANNEL, & FLOODWALLS				$5,940,000	$1,729,000	$7,670,000
30.-.-.-	ENGINEERING AND DESIGN						$767,000
31.-.-.-	CONSTRUCTION MANAGEMENT (S&I)						$920,000
	PROJECT CONTINGENCIES:			29.11%			
01.-.-.-	NO ADDITIONAL REAL ESTATE REQD						
	TOTAL PROJECT COST, DISCHARGE CULVERT, CHANNELS, & FLOODWALLS (SPH):						$9,357,000

COST ESTIMATE FOR 2 LIFTS @ WEST SIDE OF HARVEY CANAL SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
11.-.-.-	LEVEES AND FLOODWALLS						
11.0.1.-	LEVEES (1ST LIFT): COST INCLUDED IN THE CONTRACT FOR CONST. OF SECTOR GATE STRUC.						
11.0.1.-	LEVEES (2ND LIFT):						
11.0.A.-	MOB. & DEMOB.	LUMP SUM	LS	$20,000.00	$20,000	$6,000	$26,000
11.0.1.B	SITE WORK						
11.0.1.B	CLEARING OF EXTNS LEVEE	14	ACRE	$500.00	$7,000	$2,100	$9,100
11.0.1.B	CLEARING OF STKPILE AREA	14	ACRE	$500.00	$7,000	$2,100	$9,100
11.0.1.B	EXCAVATION AND EMBANKMENT:						
11.0.1.B	EMBANKMENT, UNCOMPACTED FILL	51,131	CY	$2.50	$127,828	$38,348	$166,176
11.0.1.B	SLOPE TREATMENT:						
11.0.1.B	SEEDING, FERTILIZING AND MULCHING	28	ACRE	$500.00	$14,000	$4,200	$18,200
11.-.-.-	SUBTOTAL, 2ND LIFT				$175,828	$52,748	$228,576
11.0.1.-	LEVEES (3RD LIFT):						
11.0.A.-	MOB & DEMOB	LUMP SUM	LS	$20,000.00	$20,000	$6,000	$26,000
11.0.1.B	SITE WORK						
11.0.1.B	CLEARING OF EXTNS LEVEE	14	ACRE	$500.00	$7,000	$2,100	$9,100
11.0.1.B	CLEARING OF STKPILE AREA	13	ACRE	$500.00	$6,500	$1,950	$8,450
11.0.1.B	EXCAVATION AND EMBANKMENT:						
11.0.1.B	EMBANKMENT, UNCOMPACTED FILL	47,885	CY	$2.50	$119,713	$35,914	$155,626
11.0.1.B	SLOPE TREATMENT:						
11.0.1.B	SEEDING, FERTILIZING AND MULCHING	27	ACRE	$500.00	$13,500	$4,050	$17,550
11.-.-.-	SUBTOTAL, 3RD LIFT				$166,713	$50,014	$216,726
	SUBTOTAL, CONSTRUCTION COSTS				$343,000		
11.0.Z.-	CONTINGENCIES					$103,000	
	TOTALS FOR 2 LEVEE LIFT CONTRACTS SPH PROTECTION						$445,000
30.-.-.-	ENGINEERING AND DESIGN						$45,000
31.-.-.-	CONSTRUCTION MANAGEMENT (S&I)						$53,000
	TOTAL PROJECT CONTINGENCIES:			30.0%			
01.-.-.-	NO ADDITIONAL REAL ESTATE REQD						
	TOTALS FOR 2 LEVEE LIFT CONTRACTS SPH PROTECTION:						$543,000

SUMMARY OF COST ESTIMATE FOR MODIFICATION AND EXPANSION OF COUSINS PUMPING STATION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	TOTAL FOR CONTRACT, MODIFICATION AND EXPANSION OF COUSINS PUMP STATION AND BRIDGE, UTILITIES, & CHANNELS						$9,428,000
	TOTAL: ENGINEERING AND DESIGN						$943,000
	TOTAL: CONSTRUCTION MANAGEMENT						$1,131,000
	NO ADDITONAL REAL ESTATE REQD						
	TOTAL PROJECT COST:						$11,502,000

COST ESTIMATE FOR EXPANSION OF COUSINS PUMPING STATION SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.-.-.-	PUMPING PLANT						
13.B.A.-	MOB & DEMOB	LUMP SUM	LS	$175,000.00	$175,000	$43,750	$218,750
13.B.B.-	CARE & DIVERSION OF WATER						
13.B.B.B	SITE WORK						
13.B.B.B	FERT. & SEEDING	LUMP SUM	LS	$3,000.00	$3,000	$750	$3,750
13.B.B.B	FENCE	LUMP SUM	LS	$8,200.00	$8,200	$2,050	$10,250
13.B.B.B	REMOVAL & RELOCATION OF OIL STORAGE TANKS	LUMP SUM	LS	$50,000.00	$50,000	$12,500	$62,500
13.B.B.B	COFFERDAM FOR P.S. EXPANSION						
13.B.B.B	SUCTION BASIN COFFERDAM	LUMP SUM	LS	$347,000.00	$347,000	$86,750	$433,750
13.B.B.B	DISCHARGE BASIN COFFERDAM	LUMP SUM	LS	$179,000.00	$179,000	$44,750	$223,750
13.B.B.B	DEWATERING OF COFFERDAMS	LUMP SUM	LS	$150,000.00	$150,000	$37,500	$187,500
13.B.B.B	REMOVAL OF COFFERDAMS	LUMP SUM	LS	$35,000.00	$35,000	$8,750	$43,750
13.B.D.-	EARTHWORK FOR STRUCTURES:						
13.B.D.B	SITE WORK						
13.B.D.B	STRUCTURE EXCAVATION	20,000	CY	$3.00	$60,000	$15,000	$75,000
13.B.D.B	STRUCTURE BACKFILL	5,000	CY	$8.00	$40,000	$10,000	$50,000
13.B.E.-	FOUNDATION WORK:						
13.B.E.B	SITE WORK						
13.B.E.B	FOUNDATION PREPARATION						
13.B.E.B	PILING, TEST	LUMP SUM	LS	$32,000.00	$32,000	$8,000	$40,000
13.B.E.B	PILING, 12" UNTRTD. TIMBER BELOW PUMPING STATION	54,000	LF	$10.00	$540,000	$135,000	$675,000
13.B.E.B	PILING, STL. SHT. PSA-23						
13.B.E.B	INTAKE & DISCHARGE CUTOFF WALLS	2,100	SF	$12.00	$25,200	$6,300	$31,500
13.B.E.B	CUTOFF WALL BELOW FLOODWALL	1,600	SF	$12.00	$19,200	$4,800	$24,000
13.B.E.B	RETAINING WALL ADJACENT TO PUMPING STATION						
13.B.E.B	PILING, STL. SHT. PZ-40	7,200	SF	$21.00	$151,200	$37,800	$189,000
13.B.E.B	PILING, HP 12 X 53	2,160	LF	$23.00	$49,680	$12,420	$62,100
	SUBTOTAL, EXP. OF PMP. STA.				$1,864,480	$466,120	$2,330,600

COST ESTIMATE FOR EXPANSION OF COUSINS PUMPING STATION SPH PROTECTION SPH PROTECTION							
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.0.1.-	PUMPING PLANT SUBSTRUCTURE:						
13.0.1.E	METALS						
13.0.1.E	TRASH RACKS & MACHINERY	LUMP SUM	LS	$127,000.00	$127,000	$31,750	$158,750
13.0.2.-	PUMPING PLANT SUPERSTRUCTURE:						
13.0.2.C	CONCRETE	5,000	CY	$330.00	$1,650,000	$412,500	$2,062,500
13.0.2.E	METALS						
13.0.2.E	STRUCTURAL STEEL	LUMP SUM	LS	$135,000.00	$135,000	$33,750	$168,750
13.0.2.E	METAL SIDING	LUMP SUM	LS	$115,000.00	$115,000	$28,750	$143,750
13.0.2.G	THERMAL AND MOISTURE PROTECTION						
13.0.2.G	B.U. ROOF	LUMP SUM	LS	$22,000.00	$22,000	$5,500	$27,500
13.0.2.H	DOORS AND WINDOWS						
13.0.2.H	GLASS & GLAZING	LUMP SUM	LS	$22,000.00	$22,000	$5,500	$27,500
13.0.2.H	O.H. & SLIDING DOORS	LUMP SUM	LS	$44,000.00	$44,000	$11,000	$55,000
13.0.2.H	BLDG. ACCESSORIES	LUMP SUM	LS	$5,000.00	$5,000	$1,250	$6,250
13.0.2.J	FINISHES						
13.0.2.J	PAINTING	LUMP SUM	LS	$35,000.00	$35,000	$8,750	$43,750
13.0.3.-	PUMPING MACHINERY AND APPURTENANCES:						
13.0.3.0	MECHANICAL	LUMP SUM	LS	$567,000.00	$567,000	$141,750	$708,750
13.0.3.0	SET PUMPS & MATERIALS	LUMP SUM	LS	$35,000.00	$35,000	$8,750	$43,750
13.0.5.-	AUXILIARY EQUIPMENT:						
13.0.5.P	CONVEYING SYSTEMS						
13.0.5.P	O.H. CRANE	LUMP SUM	LS	$97,000.00	$97,000	$24,250	$121,250
13.0.5.R	ELECTRICAL	LUMP SUM	LS	$119,000.00	$119,000	$29,750	$148,750
	SUBTOTAL, CONSTRUCTION COSTS				$4,837,000		
13.0.7.-	CONTINGENCIES:					$1,209,000	
13.-.-.-	TOTAL, EXP. OF PMP. STA.						$6,047,000

COST ESTIMATE FOR MODIFICATION OF COUSINS PUMPING STATION SPH PROTECTION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
13.-.-.-	MODIFICATION OF PUMPING PLANT						
13.B.B.-	CARE & DIVERSION OF WATER						
13.B.B.B	SITE WORK						
13.B.B.B	MISL. SITEWORK	LUMP SUM	LS	$25,000.00	$25,000	$6,250	$31,250
13.B.B.B	DEMOLITION OF EXISTING FLOODWALLS	LUMP SUM	LS	$60,000.00	$60,000	$15,000	$75,000
13.B.B.B	COFFERDAM FOR SLUICE GATES						
13.B.B.B	a. FIRST STRUCTURE	LUMP SUM	LS	$156,000.00	$156,000	$39,000	$195,000
13.B.B.B	b. SECOND STRUCTURE	LUMP SUM	LS	$126,000.00	$126,000	$31,500	$157,500
13.B.E.-	FOUNDATION WORK:						
13.B.E.B	SITE WORK						
13.B.E.B	FOUNDATION PREPARATION						
13.B.E.B	PILING, 12" UNTRTD. TIMBER BELOW SLUICE GATE STRUC.	3,000	LF	$10.00	$30,000	$7,500	$37,500
13.B.1.-	SUBSTRUCTURE:						
13.B.1.E	METALS						
13.B.1.E	MISL. METALS @ EXSTNG STRUC.	5,350	LBS	$1.50	$8,025	$2,006	$10,031
13.B.2.-	PMPING PLANT SUPERSTRUCTURE:						
13.B.2.C	CONCRETE						
13.B.2.C	CONC. FOR MODIFICATION OF EXISTING STRUCTURE						
13.B.2.C	CONC. IN SLABS & BEAMS	16	CY	$330.00	$5,280	$1,320	$6,600
13.B.2.C	CONC. IN SLUICE GATE STRUCTURE						
13.B.2.C	CONC. IN BASE SLAB	34	CY	$200.00	$6,800	$1,700	$8,500
13.B.2.C	CONC. IN WALLS & FLOORS	166	CY	$330.00	$54,780	$13,695	$68,475
13.B.5.-	AUXILIARY EQUIPMENT:						
13.B.5.B	7'X18' SLUICE GATES & MACHINERY	6	EA	$95,000.00	$570,000	$142,500	$712,500
13.B.5.B	72" DIA BUTTERFLY VALVES	3	EA	$58,500.00	$175,500	$43,875	$219,375
13.B.5.B	36" DIA BUTTERFLY VALVES	1	EA	$14,000.00	$14,000	$3,500	$17,500
	SUBTOTAL, CONSTRUCTION COSTS:				$1,231,000		
13.B.Z.-	CONTINGENCIES					$308,000	
13.-.-.-	TOTAL: MODIFICATION OF EXISTING PUMPING STATION						$1,539,000

COST ESTIMATE FOR MODIFICATION TO DESTRAHAN BRIDGE AND UTILITY MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
02.-.-.-	RELOCATIONS						
02.1.-.-	ROADS, CONSTRUCTION ACTIVITIES						
02.1.-.-	RAISE AND LENGTHEN EXISTING BRIDGE AT DESTRAHAN AVE.	LUMP SUM	LS	$220,000.00	$220,000	$66,000	$286,000
02.3.-.-	CEMETERIES, UTILITIES, AND STRUCTURES, CONSTRUCTION ACTIVITIES						
02.3.2.-	UTILITIES						
02.3.2.-	RELOCATION OF 16" DIA HP GAS PIPELINES	2	EA	$250,000.00	$500,000	$150,000	$650,000
02.3.2.-	RELOCATION OF 36" DIA WATER MAIN	LUMP SUM	LS	$100,000.00	$100,000	$30,000	$130,000
02.3.2.-	RELOCATION OF 8" DIA WATER MAIN	LUMP SUM	LS	$30,000.00	$30,000	$9,000	$39,000
02.3.2.-	RELOCATION OF OVERHEAD POWER LINES	LUMP SUM	LS	$10,000.00	$10,000	$3,000	$13,000
	SUBTOTAL, CONSTRUCTION COSTS:				$860,000		
02.8.2.-	CONTINGENCIES					$258,000	
02.-.-.-	TOTAL: DESTREHAN AVE. BRIDGE MODIFICATION AND UTILITY RELOCATIONS						$1,118,000

COST ESTIMATE FOR MODIFICATION AND EXPANSION OF COUSINS PUMPING STATION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
09.-.-.-	CHANNELS AND CANALS:						
09.0.2.-	CHANNELS:						
09.0.2.B	SITE WORK						
09.0.2.B	CLEARING AND GRUBBING	14	ACRE	$1,500.00	$21,000	$6,300	$27,300
09.0.2.B	EXCAVATION						
09.0.2.B	EXCAVATION, 1ST AVE. CANAL	70,000	CY	$1.50	$105,000	$31,500	$136,500
09.0.2.B	EXCAVATION,DISCHRGE CHANL	17,400	CY	$1.50	$26,100	$7,830	$33,930
09.0.2.B	STOCKPILE EXCAVATED MTLS.	87,400	CY	$1.50	$131,100	$39,330	$170,430
09.0.2.B	FERT. & SEED STKPILE AREA	9	ACRE	$500.00	$4,500	$1,350	$5,850
09.0.2.B	SLOPE TREATMENT						
09.0.2.B	SHELL BEDDING, DISCHARGE CHANNEL	3,500	CY	$17.00	$59,500	$17,850	$77,350
09.0.2.B	RIPRAP, DISCHARGE CHANNEL	10,500	TONS	$20.00	$210,000	$63,000	$273,000
	SUBTOTAL, CONSTRUCTION COSTS				$557,000		
09.0.7.-	CONTINGENCIES					$167,000	
09.-.-.-	TOTAL: CANALS & CHANNELS						$724,000
	TOTALS FOR CONTRACT, MOD. & EXP.OF PMP. STA., CHNLS, BRDGS & UTLS.				$7,485,000	$1,942,000	$9,428,000
30.-.-.-	ENGINEERING AND DESIGN						$943,000
31.-.-.-	CONSTRUCTION MANAGEMENT (S&I)						$1,131,000
	TOTAL PROJECT CONTINGENCIES:	25.9%					
01.-.-.-	NO ADDITIONAL REAL ESTATE REQD						
	TOTALS FOR CONTRACT, MOD. & EXP.OF PMP. STA., CHNLS, LEVS & FLDWLS						$11,502,000

SPH - PLANS 3A, 3B, 3C, AND 3D

(Sector Gate to Hero Pumping Station)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR SPH PROTECTION - SECTOR GATE TO HERO PUMPING STATION

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
	PLAN 3A	$14,323,000	$748,000	$1,809,000	$1,507,000	$5,502,000	$23,889,000
	PLAN 3B	$11,725,000	$1,528,000	$1,590,000	$1,326,000	$4,857,000	$21,026,000
	PLAN 3C	$18,439,000	$3,130,000	$2,589,000	$2,157,000	$762,000	$27,077,000
	PLAN 3D	$15,050,000	$653,000	$1,884,000	$1,570,000	$2,498,000	$21,655,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3A
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Project Cost			
	SUMMARY OF COST SECTOR GATE STRUCTURE TO HERO PUMPING STATION				
11.-.-.-	LEVEES & FLOODWALLS	14,323,000.00			
02.-.-.-	RELOCATIONS	748,000.00			
30.-.-.-	ENGINEERING & DESIGN	1,889,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	1,587,000.00			
01.-.-.-	REAL ESTATE COST	5,582,000.00			
	TOTAL PROJECT COST	23,889,000.00			

TOTAL ESTIMATED PROJECT COST $23,889,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3A
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	106,500.00	$106,500	$31,950	$138,450
11.0.2.B	Waste Excavation at Landfill	Lump Sum	LS	18,000.00	$18,000	$5,400	$23,400
11.0.2.B	Embankment, Semicompacted Fill (Adjacent Borrow)	133,000	CY	2.50	$332,500	$99,750	$432,250
11.0.2.B	Shell Core Closure (Drainage Canal Closure)	13,000	CY	18.00	$234,000	$70,200	$304,200
	SUBTOTAL FIRST LIFT				$741,000	$222,300	$963,300
	SECOND LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	65,000	CY	8.00	$520,000	$156,000	$676,000
	SUBTOTAL SECOND LIFT				$587,500	$176,250	$763,750
	THIRD LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	52,000	CY	8.00	$416,000	$124,800	$540,800
	SUBTOTAL THIRD LIFT				$483,500	$145,050	$628,550
	SUBTOTAL LEVEE CONSTRUCTION				$1,812,000	$544,000	$2,356,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3A
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	56,000.00	$56,000	$16,800	$72,800
11.0.2.-	I-Wall 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	13,250	LF	454.00	$6,015,500	$1,804,650	$7,820,150
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12 Ft High above Ground	1,150	LF	1,069.00	$1,229,350	$307,338	$1,536,688
	b: 14 Ft High above Ground	1,100	LF	1,156.00	$1,271,600	$317,900	$1,589,500
	c: 16 Ft High above Ground	240	LF	1,216.00	$291,840	$72,960	$364,800
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 10'H	1	EA	60,371.00	$60,371	$12,074	$72,445
	b. 30'W x 12'H	1	EA	87,224.00	$87,224	$17,445	$104,669
	c. 36'W x 12'H	2	EA	115,000.00	$230,000	$46,000	$276,000
	SUBTOTAL FLOODWALLS				$9,342,000	$2,625,000	$11,967,000
	SUBTOTAL LEVEES AND FLOODWALLS				$11,154,000	$3,169,000	$14,323,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$3,169,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$14,323,000		
30.-.-.-	Engineering and Design				$1,719,000		
31.-.-.-	Construction Management				$1,432,000		
	TOTAL COST				$17,474,000		
	TOTAL COST						$17,474,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3A
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structure at Murphy Canal	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$575,000	$172,500	$747,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$173,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$748,000		
30.-.-.-	Engineering and Design				$90,000		
31.-.-.-	Construction Management				$75,000		
	TOTAL COST				$913,000		
	TOTAL COST						$913,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3A
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1988)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Floodwall and Access Right-of-way						
	Industrial/Commercial	.8	AC	$108,900.00	$87,120	$21,780	$108,900
	Perpetual Floodwall R/W						
	Industrial/Commercial	.54	AC	$108,900.00	$58,806	$14,702	$73,508
	Industrial/Commercial	2.15	AC	43,560.00	$93,654	$23,414	$117,068
	Existing Road Right-of-Way	.17	AC	-	-	-	-
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement						
	Industrial/Commercial	2	AC	$108,900 x .50	$108,900	$27,225	$136,125
	Perpetual Levee Right-of-Way						
	Industrial/Commercial	85.9	AC	43,560.00	$3,741,804	$935,451	$4,677,255
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement						
	Industrial/Commercial	3.4	AC	$43,560 x .50	$74,052	$18,513	$92,565
	Improvements	-		-	0	0	0
	Severance Damage	Lump Sum	LS	100,000.00	$100,000	$25,000	$125,000
	SUBTOTAL LANDS AND DAMAGES (R)				$4,264,000	$1,066,000	$5,330,000
	(b) Acquisition Costs (Estimated 30 tracts)						
	Non-Federal	30	Tract	1,400.00	$42,000	-	$42,000
	Federal	30	Tract	1,000.00	$30,000	-	$30,000
	(c) PL 91-646 (To move personal property)	Lump Sum	LS	100,000.00	$100,000	-	$100,000
	TOTAL ESTIMATED REAL ESTATE COST						$5,502,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3B
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Project Cost
	SUMMARY OF COST	
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION	
	==========	
11.-.-.-	LEVEES & FLOODWALLS	11,725,000.00
02.-.-.-	RELOCATIONS	1,528,000.00
30.-.-.-	ENGINEERING & DESIGN	1,590,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	1,326,000.00
01.-.-.-	REAL ESTATE COST	4,857,000.00
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	TOTAL PROJECT COST	21,026,000.00
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TOTAL ESTIMATED PROJECT COST $21,026,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3B
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	108,000.00	$108,000	$32,400	$140,400
11.0.2.B	Waste Excavation at Landfill	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Embankment, Semicompacted Fill (Adjacent Borrow)	109,000	CY	2.50	$272,500	$81,750	$354,250
11.0.2.B	Shell Core Closure (Drainage Canal Closure)	13,000	CY	18.00	$234,000	$70,200	$304,200
	SUBTOTAL FIRST LIFT				$704,500	$211,350	$915,850
	SECOND LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	25,500.00	$25,500	$7,650	$33,150
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	54,000	CY	8.00	$432,000	$129,600	$561,600
	SUBTOTAL SECOND LIFT				$487,500	$146,250	$633,750
	THIRD LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	25,500.00	$25,500	$7,650	$33,150
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	42,000	CY	8.00	$336,000	$100,800	$436,800
	SUBTOTAL THIRD LIFT				$391,500	$117,450	$508,950
	SUBTOTAL LEVEE CONSTRUCTION				$1,584,000	$475,000	$2,059,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3B
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	44,000.00	$44,000	$13,200	$57,200
11.0.2.-	I-Wall 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	9,280	LF	454.00	$4,213,120	$1,263,936	$5,477,056
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 12 Ft High above Ground	900	LF	1,069.00	$962,100	$240,525	$1,202,625
	b: 14 Ft High above Ground	1,100	LF	1,156.00	$1,271,600	$317,900	$1,589,500
	c: 16 Ft High above Ground	240	LF	1,216.00	$291,840	$72,960	$364,800
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 10'H	1	EA	60,371.00	$60,371	$12,074	$72,445
	b. 30'W x 12'H	1	EA	87,224.00	$87,224	$17,445	$104,669
	c. 30'W x 15'H	3	EA	109,000.00	$327,000	$65,400	$392,400
	d. 36'W x 12'H	2	EA	115,000.00	$230,000	$46,000	$276,000
	SUBTOTAL FLOODWALLS				$7,587,000	$2,079,000	$9,667,000
	SUBTOTAL LEVEES AND FLOODWALLS				$9,171,000	$2,554,000	$11,726,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$2,554,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$11,725,000		
30.-.-.-	Engineering and Design				$1,407,000		
31.-.-.-	Construction Management				$1,173,000		
	TOTAL COST				$14,305,000		
	TOTAL COST						$14,305,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3B
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structure at Murphy Canal	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	d. Bridges	3	EA	200,000.00	$600,000	$180,000	$780,000
	SUBTOTAL				$1,175,000	$352,500	$1,527,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$353,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$1,528,000		
30.-.-.-	Engineering and Design				$183,000		
31.-.-.-	Construction Management				$153,000		
	TOTAL COST				$1,864,000		
	TOTAL COST						$1,864,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 38
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1989)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Floodwall and Access Right-of-way						
	Industrial/Commercial	.8	AC	$108,900.00	$87,120	$21,780	$108,900
	Perpetual Floodwall R/W						
	Industrial/Commercial	.83	AC	$108,900.00	$90,387	$22,597	$112,984
	Existing Road Right-of_Way	.3	AC	-	-	-	-
	Temp. (3 yr) Const. Easement						
	Industrial/Commercial	.7	AC	$108,900 x .20	$15,246	$3,812	$19,058
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement						
	Industrial/Commercial	1.47	AC	$108,900 x .50	$80,042	$20,010	$100,052
	Perpetual Floodwall R/W						
	Industrial/Commercial	1.55	AC	43,560.00	$67,518	$16,880	$84,398
	Perpetual Levee Right-of-Way						
	Industrial/Commercial	70.1	AC	43,560.00	$3,053,556	$763,389	$3,816,945
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement						
	Industrial/Commercial	1	AC	$43,560 x .50	$21,780	$5,445	$27,225
	Perpetual Channel Right-of-Way						
	Industrial/Commercial	1.8	AC	43,560.00	$78,408	$19,602	$98,010
	Temporary (3 yr) Construction Easement						
	Industrial/Commercial	1	AC	$43,560 x .20	$8,712	$2,178	$10,890
	Improvements (Private Roads)	Lump Sum	LS	25,000.00	$25,000	$6,250	$31,250
	Severance Damage	Lump Sum	LS	100,000.00	$100,000	$25,000	$125,000
	SUBTOTAL LANDS AND DAMAGES (R)				$3,628,000	$907,000	$4,535,000
	(b) Acquisition Costs (Estimated 30 tracts)						
	Non-Federal	30	Tract	1,400.00	$42,000	-	$42,000
	Federal	30	Tract	1,000.00	$30,000	-	$30,000
	(c) PL 91-646 (To move personal property)	Lump Sum	LS	250,000.00	$250,000	-	$250,000
	TOTAL ESTIMATED REAL ESTATE COST						$4,857,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3C
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Project Cost			
	SUMMARY OF COST SECTOR GATE STRUCTURE TO HERO PUMPING STATION				
11.-.-.-	LEVEES & FLOODWALLS	18,439,000.00			
02.-.-.-	RELOCATIONS	3,130,000.00			
30.-.-.-	ENGINEERING & DESIGN	2,589,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	2,157,000.00			
01.-.-.-	REAL ESTATE COST	762,000.00			
	TOTAL PROJECT COST	27,077,000.00			
	TOTAL ESTIMATED PROJECT COST				$27,077,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3C
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1989)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Floodwall Right-of-way						
	Industrial/Commercial	.76	AC	$108,900.00	$82,764	$20,691	$103,455
	Existing Road Right-of_Way	4.4	AC	-	-	-	-
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement						
	Industrial/Commercial	1.4	AC	$108,900 x .50	$76,230	$19,058	$95,288
	Industrial/Commercial	2.95	AC	$43,560 x .50	$64,251	$16,063	$80,314
	Existing Railroad Right-of-way						
	Industrial/Commercial	4.9	AC	$108,900 x .50	$266,805	$66,701	$333,506
	Existing Road Right-of_Way	8.5	AC	-	-	-	-
	Perpetual Channel Right-of-Way						
	Industrial/Commercial	2.3	AC	43,560.00	$100,188	$25,047	$125,235
	Improvements	-		.00	.00	.00	.00
	Severance Damage	-		.00	.00	.00	.00
	SUBTOTAL LANDS AND DAMAGES (R)				$590,000	$148,000	$738,000
	(b) Acquisition Costs (Estimated 10 tracts)						
	Non-Federal	10	Tract	1,400.00	$14,000	-	$14,000
	Federal	10	Tract	1,000.00	$10,000	-	$10,000
	(c) PL 91-646	-		-	.00	.00	.00
	TOTAL ESTIMATED REAL ESTATE COST						$762,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3C
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	20,000.00	$20,000	$6,000	$26,000
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 13 Ft High above Ground	4,210	LF	1,113.00	$4,685,730	$1,171,433	$5,857,163
	b: 14 Ft High above Ground	290	LF	1,156.00	$335,240	$83,810	$419,050
	b: 15 Ft High above Ground	4,830	LF	1,186.00	$5,728,380	$1,432,095	$7,160,475
	c: 16 Ft High above Ground	1,200	LF	1,216.00	$1,459,200	$364,800	$1,824,000
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 12'H RR GATE	1	EA	75,000.00	$75,000	$22,500	$97,500
	b. 20'W x 12'H	3	EA	72,445.00	$217,335	$65,201	$282,536
	c. 30'W x 12'H	1	EA	87,224.00	$87,224	$26,167	$113,391
	d. 30'W x 13'H	2	EA	101,214.00	$202,428	$60,728	$263,156
	e. 30'W x 14'H	8	EA	109,000.00	$872,000	$261,600	$1,133,600
	f. 32'W x 12'H	3	EA	104,700.00	$314,100	$94,230	$408,330
	g. 32'W x 14'H	1	EA	113,400.00	$113,400	$34,020	$147,420
	h. 36'W x 12'H	2	EA	115,000.00	$230,000	$69,000	$299,000
	i. 36'W x 14'H	1	EA	125,200.00	$125,200	$37,560	$162,760
	Embankment, Semicompacted Fill (Hauled)	11,000	CY	8.00	$88,000	$26,400	$114,400
	SUBTOTAL LEVEES AND FLOODWALLS				$14,653,000	$3,786,000	$18,439,000
	SUBTOTAL LEVEES AND FLOODWALLS				$14,653,000		
11.0.Z.-	CONTINGENCIES (26% +/-)				$3,786,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$18,439,000		
30.-.-.-	Engineering and Design				$2,213,000		
31.-.-.-	Construction Management				$1,844,000		
	TOTAL COST				$22,496,000		
	TOTAL COST						$22,496,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3C
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocations through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structures at Murphy Canal	3	EA	150,000.00	$450,000	$135,000	$585,000
	d. Drainage Pipes/Catch Basins Parallel to Floodwall	Lump Sum	LS	335,000.00	$335,000	$100,500	$435,500
	e. Relocated Murphy Canal	32,000	CY	1.50	$48,000	$14,400	$62,400
	f. Overhead Powerlines (High Voltage) and Overhead Telephone Lines Relocation (Temporary and Permanent)	Lump Sum	LS	1,250,000.00	$1,250,000	$375,000	$1,625,000
	SUBTOTAL				$2,408,000	$722,000	$3,130,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$722,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$3,130,000		
30.-.-.-	Engineering and Design				$376,000		
31.-.-.-	Construction Management				$313,000		
	TOTAL COST				$3,819,000		
	TOTAL COST						$3,819,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3D
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Project Cost			
	SUMMARY OF COST SECTOR GATE STRUCTURE TO HERO PUMPING STATION				
11.-.-.-	LEVEES & FLOODWALLS	15,050,000.00			
02.-.-.-	RELOCATIONS	653,000.00			
30.-.-.-	ENGINEERING & DESIGN	1,884,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	1,570,000.00			
01.-.-.-	REAL ESTATE COST	2,498,000.00			
	TOTAL PROJECT COST	21,655,000.00			
	TOTAL ESTIMATED PROJECT COST				$21,655,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3D
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	5,000.00	$5,000	$1,500	$6,500
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	60,000	CY	8.00	$480,000	$144,000	$624,000
	SUBTOTAL FIRST LIFT				$535,000	$160,500	$695,500
	SECOND LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	5,000.00	$5,000	$1,500	$6,500
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	30,000	CY	8.00	$240,000	$72,000	$312,000
	SUBTOTAL SECOND LIFT				$275,000	$82,500	$357,500
	THIRD LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	5,000.00	$5,000	$1,500	$6,500
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	15,000	CY	8.00	$120,000	$36,000	$156,000
	SUBTOTAL THIRD LIFT				$155,000	$46,500	$201,500
	SUBTOTAL LEVEE CONSTRUCTION				$965,000	$290,000	$1,255,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3D
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	41,650.00	$41,650	$12,495	$54,145
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 9 Ft High above Ground	1,650	LF	746.00	$1,230,900	$307,725	$1,538,625
	b: 12 Ft High above Ground	940	LF	1,069.00	$1,004,860	$251,215	$1,256,075
	c: 13 Ft High above Ground	2,370	LF	1,113.00	$2,637,810	$659,453	$3,297,263
11.0.2.-	TIE-BACK WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling and Concrete Cap)						
	a: 5 Ft High above Ground	2,660	LF	266.00	$707,560	$176,890	$884,450
	b: 6 Ft High above Ground	160	LF	330.00	$52,800	$15,840	$68,640
	c: 7 Ft High above Ground	1,300	LF	396.00	$514,800	$154,440	$669,240
	d: 8 Ft High above Ground	240	LF	454.00	$108,960	$32,688	$141,648
	e: Tie-Rods	280,000	LB	1.50	$420,000	$126,000	$546,000
	f: C12 X 30 Waler	261,600	LB	1.50	$392,400	$117,720	$510,120
	g: HP12 X 63 Steel Piles	69,760	LF	24.00	$1,674,240	$502,272	$2,176,512
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 32'W x 5'H	12	EA	57,101.00	$685,212	$137,042	$822,254
	b. 32'W x 6'H	1	EA	65,839.00	$65,839	$13,168	$79,007
	c. 32'W x 8'H	7	EA	78,948.00	$552,636	$110,527	$663,163
	d. 32'W x 12'H	2	EA	104,700.00	$209,400	$41,880	$251,280
	e. 32'W x 13'H	3	EA	105,300.00	$315,900	$63,180	$379,080
11.0.2.B	Remove Existing Tie-Rods	Lump Sum	LS	252,000.00	$252,000	$75,600	$327,600
	SUBTOTAL FLOODWALLS				$10,967,000	$2,828,000	$13,795,000
	SUBTOTAL LEVEES AND FLOODWALLS				$11,932,000	$3,118,000	$15,050,000
11.0.Z.-	CONTINGENCIES (26% +/-)				$3,118,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$15,050,000		
30.-.-.-	Engineering and Design				$1,806,000		
31.-.-.-	Construction Management				$1,505,000		
	TOTAL COST				$18,361,000		
	TOTAL COST						$18,361,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3D
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	252,000.00	$252,000	$75,600	$327,600
	b. Utility Relocations through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$502,000	$151,000	$653,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$151,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$653,000		
30.-.-.-	Engineering and Design				$78,000		
31.-.-.-	Construction Management				$65,000		
	TOTAL COST				$796,000		
	TOTAL COST						$796,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ALIGNMENT 3D
SECTOR GATE ALTERNATIVE LEVEES & FLOODWALLS EAST SIDE OF HARVEY CANAL - STRUCTURE TO HERO PUMP. STA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	SECTOR GATE STRUCTURE TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1989)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Floodwall and Levee Right-of-way Industrial/Commercial	12.5	AC	$108,900.00	$1,361,250	$340,313	$1,701,563
	Perpetual Pile Tip Easement with Temp. (3 yr) Construction Easement Industrial/Commercial	10	AC	$108,900 x .50	$544,500	$136,670	$681,170
	Temporary (3 yr) Construction Easement Industrial/Commercial	1.6	AC	$108,900 x .20	$34,848	$8,712	$43,560
	Improvements	-		.00	.00	.00	.00
	Severance Damage	-		.00	.00	.00	.00
	SUBTOTAL LANDS AND DAMAGES (R)				$1,941,000	$486,000	$2,426,000
	(b) Acquisition Costs (Estimated 30 tracts)						
	Non-Federal	30	Tract	1,400.00	$42,000	-	$42,000
	Federal	30	Tract	1,000.00	$30,000	-	$30,000
	(c) PL 91-646	-		-	.00	.00	.00
	TOTAL ESTIMATED REAL ESTATE COST						$2,498,000

SPH - PLAN 3E

(Sector Gate only near Hero Pumping Station)

SUMMARY OF COST ESTIMATES FOR FEASIBILITY STUDY
EAST OF HARVEY CANAL HURRICANE PROTECTION PLAN --- SPH PROTECTION

NOTE: TOTALS IN THIS PAGE HAVE BEEN ROUNDED TO THE NEAREST $100,000

PROTECTION ALONG HARVEY CANAL
ALTERNATIVE 3E -- SECTOR GATE IN VICINITY OF HERO ISLAND -- NO PUMPING STATION

SECTOR GATE STRUCTURE (INCLUDES COFERDAM & BYPASS CHANNEL WORK)	$17,400,000
DISCHARGE CHANNEL FOR COUSINS PUMPING STATION (INCLUDES FLOODWALLS AROUND PUMP. STA. AND BETWEEN PUMP. STA. & SECTOR GATE, AND CONCR. CULVERT AT LAPALCO)	$27,000,000
MODIFICATION OF EXISTING COUSINS PUMP. STA.	$1,400,000
EXPANSION OF COUSINS P. STA. (ADDED 1000 CFS)	$8,500,000
FLOODWALL -- SECTOR GATE TO HERO PUMP. STA.	$1,600,000
LEVEE -- ALONG NEW DISCHARGE CHANNEL AND ON HERO ISLAND	$1,500,000
SUBTOTAL	$57,400,000
CONTINGENCIES (30% +/-)	$17,200,000
SUBTOTAL CONSTRUCTION	$74,600,000
ENGINEERING & DESIGN	$8,900,000
CONSTRUCTION MANAGEMENT	$7,500,000
LANDS & DAMAGES	$3,600,000
GRAND TOTAL	$94,600,000

SPH

PLAN 1, PLAN 2, PLANS 3A, 3B, 3C, 3D, AND 3E

(Hero Pumping Station to Algiers Lock)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR SPH PROTECTION - HERO PUMPING STATION TO ALGIERS LOCK

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Hero Pump Station to Verret Canal Extension	$5,562,000	$325,000	$706,000	$589,000	$970,000	$8,152,000
2	Modifications to Pumping Stations in Jefferson Parish (Hero & Planters)	$793,000	N/A	$95,000	$79,000	N/A	$967,000
3	Plaquemines Parish	$3,795,000	$411,000	$500,000	$420,000	N/A	$5,126,000
4	Verret Canal Extension to Orleans Parish Line	$3,382,000	$455,000	$461,000	$384,000	N/A	$4,682,000
5	Orleans Parish Line to Algiers Lock	$1,083,000	$65,000	$138,000	$115,000	N/A	$1,401,000
6	Orleans Parish	$2,323,700	$34,300	$283,000	$236,000	N/A	$2,877,000
7	Modifications to Pumping Station No. 13	$455,000	N/A	$54,000	$45,000	N/A	$554,000
	TOTALS	$17,393,700	$1,290,300	$2,237,000	$1,868,000	$970,000	$23,759,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Project Cost
	SUMMARY OF COST	
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	5,562,000.00
02.-.-.-	RELOCATIONS	325,000.00
30.-.-.-	ENGINEERING & DESIGN	706,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	589,000.00
01.-.-.-	REAL ESTATE COST	970,000.00
	TOTAL PROJECT COST	8,152,000.00

TOTAL ESTIMATED PROJECT COST $8,152,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	44,000.00	$44,000	$13,200	$57,200
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	1,550	CY	2.00	$3,100	$930	$4,030
11.0.2.B	Reshape Road Ramps at Gate Locations	30	EA	5,000.00	$150,000	$45,000	$195,000
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,730	LF	266.00	$460,180	$115,045	$575,225
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 Ft High above Ground	1,200	LF	768.00	$921,600	$230,400	$1,152,000
	b: 14 Ft High above Ground	950	LF	1,156.00	$1,098,200	$274,550	$1,372,750
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 16'W x 4'H	2	EA	31,972.00	$63,944	$12,789	$76,733
	b. 20'W x 4'H	5	EA	37,160.00	$185,800	$37,160	$222,960
	c. 24'W x 4'H	6	EA	42,368.00	$254,208	$50,842	$305,050
	d. 32'W x 4'H	5	EA	52,763.00	$263,815	$52,763	$316,578
	e. 36'W x 4'H	3	EA	57,951.00	$173,853	$34,771	$208,624
	f. 20'W x 12.5'H	3	EA	72,445.00	$217,335	$65,201	$282,536
	g. 24'W x 10'H	2	EA	69,329.00	$138,658	$27,732	$166,390
	h. 24'W x 12.5'H	2	EA	86,600.00	$173,200	$51,960	$225,160
	i. 32'W x 12.5'H	2	EA	104,700.00	$209,400	$62,820	$272,220
	SUBTOTAL FLOODWALLS				$4,457,000	$1,105,000	$5,562,000
	SUBTOTAL FLOODWALLS				$4,457,000	$1,105,000	$5,562,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$1,105,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$5,562,000		
30.-.-.-	Engineering and Design				$667,000		
31.-.-.-	Construction Management				$556,000		
	TOTAL COST				$6,785,000		
	TOTAL COST						$6,785,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 14 Crossings)	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$250,000	$75,000	$325,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$75,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$325,000		
30.-.-.-	Engineering and Design				$39,000		
31.-.-.-	Construction Management				$33,000		
	TOTAL COST				$397,000		
	TOTAL COST						$397,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL — HERO PUMPING STATION AND PLANTERS PUMP. STA. MODIF.
PUMPING STATION MODIF. WEST BANK OF ALGIERS CANAL - JEFFERSON PARISH, LA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION & PLANTERS PUMPING STATION - MODIFICATIONS						
11.0.2.-	Modification of Hero Pump. Sta	Lump Sum	LS	360,000.00	$360,000	$108,000	$468,000
11.0.2.-	Modification of Planters Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$610,000	$183,000	$793,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$183,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$793,000		
30.-.-.-	Engineering and Design				$95,000		
31.-.-.-	Construction Management				$79,000		
	TOTAL COST				$967,000		
	TOTAL COST						$967,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,PLAQUEMINES PARISH, SPH						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.——	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	6.0	EA	11,000.00	$66,000	$20,000	$86,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	250,000.00	$250,000	$75,000	$325,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,000	$97,000
11.0.1.B.-	CLEARING and GRUBBING	70.0	AC	1,000.00	$70,000	$21,000	$91,000
11.0.1.B.-	SEMICOMPACTED FILL	304,400.0	CY	9.00	$2,739,600	$821,400	$3,561,000
11.0.1.B.-	FERTILIZING and SEEDING	70.0	AC	500.00	$35,000	$11,000	$46,000
	SUBTOTAL						$4,206,000
30.——	E & D						$500,000
31.——	S & I						$420,000
EHWAPPSP				TOTALS			$5,126,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost
	SUMMARY OF COST	
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	FLOODWALLS	3,382,000.00
02.-.-.-	RELOCATIONS	455,000.00
30.-.-.-	ENGINEERING & DESIGN	461,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	384,000.00
01.-.-.-	REAL ESTATE COST	N/A
	TOTAL PROJECT COST	4,682,000.00
	TOTAL ESTIMATED PROJECT COST	$4,682,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	10,000.00	$10,000	$3,000	$13,000
11.0.2.B	Degrade Levee & Constr. Berms on Protected Side	3,850	CY	2.00	$7,700	$2,310	$10,010
11.0.2.B	Reshape Road Ramps at Gate Locations	21	EA	5,000.00	$105,000	$31,500	$136,500
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	4,310	LF	266.00	$1,146,460	$286,615	$1,433,075
11.0.2.-	T-WALLS 10' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	650	LF	768.00	$499,200	$124,800	$624,000
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 12'W x 4'H	2	EA	26,765.00	$53,530	$10,706	$64,236
	b. 16'W x 4'H	4	EA	31,972.00	$127,888	$25,578	$153,466
	c. 20'W x 4'H	3	EA	37,160.00	$111,480	$22,296	$133,776
	d. 24'W x 4'H	5	EA	42,368.00	$211,840	$42,368	$254,208
	e. 28'W x 4'H	1	EA	47,556.00	$47,556	$9,511	$57,067
	f. 32'W x 4'H	2	EA	52,763.00	$105,526	$21,105	$126,631
	g. 36'W x 4'H	4	EA	57,951.00	$231,804	$46,361	$278,165
	SUBTOTAL FLOODWALLS				$2,733,000	$649,000	$3,382,000
	SUBTOTAL FLOODWALLS				$2,733,000	$649,000	$3,382,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$649,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$3,382,000		
30.-.-.-	Engineering and Design				$406,000		
31.-.-.-	Construction Management				$338,000		
	TOTAL COST				$4,126,000		
	TOTAL COST						$4,126,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 29 crossings)	Lump Sum	LS	350,000.00	$350,000	$105,000	$455,000
	SUBTOTAL				$350,000	$105,000	$455,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$105,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$455,000		
30.-.-.-	Engineering and Design				$55,000		
31.-.-.-	Construction Management				$46,000		
	TOTAL COST				$556,000		
	TOTAL COST						$556,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,ORLEANS PARISH,SPH						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	1.0	EA	11,000.00	$11,000	$3,300	$14,300
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	15,000.00	$15,000	$5,000	$20,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,300	$97,300
11.0.1.B.-	CLEARING and GRUBBING	34.0	AC	1,000.00	$34,000	$10,200	$44,200
11.0.1.B.-	SEMICOMPACTED FILL	184,600.0	CY	9.00	$1,661,400	$498,600	$2,160,000
11.0.1.B.-	FERTILIZING and SEEDING	34.0	AC	500.00	$17,000	$5,200	$22,200
	SUBTOTAL						$2,358,000
30.——	E & D						$283,000
31.——	S & I						$236,000
EHWADPSP				TOTALS			$2,877,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	FLOODWALLS	1,083,000.00
02.-.-.-	RELOCATIONS	65,000.00
30.-.-.-	ENGINEERING & DESIGN	138,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	115,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	1,401,000.00
	TOTAL ESTIMATED PROJECT COST	$1,401,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	5,000.00	$5,000	$1,500	$6,500
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,300	LF	266.00	$345,800	$86,450	$432,250
11.0.2.-	T-WALLS 10' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	600	LF	768.00	$460,800	$115,200	$576,000
11.0.2.B	Degrade Levee & Constr. Berm on Protected Side	1,150	CY	2.00	$2,300	$690	$2,990
	SUBTOTAL FLOODWALLS				$864,000	$219,000	$1,083,000
	SUBTOTAL FLOODWALLS				$864,000	$219,000	$1,083,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$219,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$1,083,000		
30.-.-.-	Engineering and Design				$130,000		
31.-.-.-	Construction Management				$108,000		
	TOTAL COST				$1,321,000		
	TOTAL COST						$1,321,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 crossings)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
	SUBTOTAL				$50,000	$15,000	$65,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$15,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$65,000		
30.-.-.-	Engineering and Design				$8,000		
31.-.-.-	Construction Management				$7,000		
	TOTAL COST				$80,000		
	TOTAL COST						$80,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL PUMPING STATION NO. 13
PUMPING STA. MODIF. WEST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 13 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 13	Lump Sum	LS	350,000.00	$350,000	$105,000	$455,000
	SUBTOTAL				$350,000	$105,000	$455,000
02.0.2.-	CONTINGENCIES (30% +/-)				$105,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$455,000		
30.-.-.-	Engineering and Design				$54,000		
31.-.-.-	Construction Management				$45,000		
	TOTAL COST				$554,000		
	TOTAL COST						$554,000

SPH

PLAN 1, PLAN 2, PLANS 3A, 3B, 3C, 3D, AND 3E

(Algiers Lock to Plaquemines Levee near Oakville)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR SPH PROTECTION - ALGIERS LOCK TO PLAQUEMINES LEVEE NEAR OAKVILLE

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Orleans Parish Line to Algiers Lock	$495,000	$65,000	$67,000	$57,000	N/A	$684,000
2	Orleans Parish	$1,079,000	$59,000	$137,000	$114,000	N/A	$1,389,000
3	Modifications to Pumping Station No. 11	$325,000	N/A	$40,000	$33,000	N/A	$398,000
4	Plaquemines Parish	$5,201,000	$249,000	$654,000	$546,000	N/A	$6,650,000
5	F-Levee to Orleans Parish Line	$1,408,000	$273,000	$317,000	$264,000	N/A	$2,262,000
6	Modifications to Pumping Stations in Plaquemines Parish (Plaquemines and New Planters)	$650,000	N/A	$78,000	$65,000	N/A	$793,000
7	Plaquemines Parish F-Levee	$1,236,000	$148,000	$145,000	$121,000	N/A	$1,650,000
	TOTALS	$10,394,000	$794,000	$1,438,000	$1,200,000	N/A	$13,826,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL	
11.-.-.-	FLOODWALLS	495,000.00
02.-.-.-	RELOCATIONS	65,000.00
30.-.-.-	ENGINEERING & DESIGN	67,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	57,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	684,000.00

TOTAL ESTIMATED PROJECT COST $684,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	2,000.00	$2,000	$600	$2,600
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	375	LF	266.00	$99,750	$24,938	$124,688
11.0.2.-	T-WALLS 10' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	250	LF	768.00	$192,000	$48,000	$240,000
11.0.2.B	Degrade Levee & Constr. Berm on Protected Side	350	CY	2.00	$700	$210	$910
11.0.2.-	36'W x 5'H Swing Gate (Includes Struc Steel, Concr., Steel Sheet Piling,Prestressed Concr. Piles and Misc. Items)	1	EA	62,789.00	$62,789	$12,558	$75,347
	SUBTOTAL FLOODWALLS				$397,000	$98,000	$496,000
	SUBTOTAL FLOODWALLS				$397,000	$98,000	$496,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$98,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$495,000		
30.-.-.-	Engineering and Design				$59,000		
31.-.-.-	Construction Management				$50,000		
	TOTAL COST				$604,000		
	TOTAL COST						$604,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 crossings)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
	SUBTOTAL				$50,000	$15,000	$65,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$15,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$65,000		
30.-.-.-	Engineering and Design				$8,000		
31.-.-.-	Construction Management				$7,000		
	TOTAL COST				$80,000		
	TOTAL COST						$80,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,ORLEANS PARISH,SPH						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	3.0	EA	11,000.00	$33,000	$10,000	$43,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	12,000.00	$12,000	$4,000	$16,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,600	$97,600
11.0.1.B.-	CLEARING and GRUBBING	32.0	AC	1,000.00	$32,000	$9,600	$41,600
11.0.1.B.-	SEMICOMPACTED FILL	176,620.0	CY	4.00	$706,480	$212,520	$919,000
11.0.1.B.-	FERTILIZING and SEEDING	32.0	AC	500.00	$16,000	$4,800	$20,800
	SUBTOTAL						$1,138,000
30.——	E & D						$137,000
31.——	S & I						$114,000
EHEAOPSP				TOTALS			$1,389,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL PUMPING STATION
PUMPING STA. MODIF. EAST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. NO. 11 MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 11 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 11	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$250,000	$75,000	$325,000
02.0.2.-	CONTINGENCIES (30% +/-)				$75,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$325,000		
30.-.-.-	Engineering and Design				$40,000		
31.-.-.-	Construction Management				$33,000		
	TOTAL COST				$398,000		
	TOTAL COST						$398,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,PLAQUEMINES PARISH,SPH						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	9.0	EA	11,000.00	$99,000	$30,000	$129,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	90,000.00	$90,000	$30,000	$120,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$23,000	$98,000
11.0.1.B.-	CLEARING and GRUBBING	136.0	AC	1,000.00	$136,000	$41,000	$177,000
11.0.1.B.-	SEMICOMPACTED FILL	930,400.0	CY	4.00	$3,721,600	$1,116,400	$4,838,000
11.0.1.B.-	FERTILIZING and SEEDING	136.0	AC	500.00	$68,000	$20,000	$88,000
	SUBTOTAL						$5,450,000
30.——	E & D						$654,000
31.——	S & I						$546,000
EHEAPPSP				TOTALS			$6,650,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost
	SUMMARY OF COST	
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL	
11.-.-.-	FLOODWALLS	1,408,000.00
02.-.-.-	RELOCATIONS	273,000.00
30.-.-.-	ENGINEERING & DESIGN	317,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	264,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	$2,262,000.00

TOTAL ESTIMATED PROJECT COST $2,262,000.00

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	4,000.00	$4,000	$1,200	$5,200
11.0.2.B	Degrade Levee & Constr. Berms on Protected Side	450	CY	2.00	$900	$270	$1,170
11.0.2.B	Reshape Road Ramps at Gate Locations	11	EA	5,000.00	$55,000	$16,500	$71,500
11.0.2.-	I-Wall 5' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	500	LF	266.00	$133,000	$33,250	$166,250
11.0.2.-	T-WALLS 10' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	500	LF	768.00	$384,000	$96,000	$480,000
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 12'W x 4'H	1	EA	26,765.00	$26,765	$5,353	$32,118
	b. 20'W x 4'H	2	EA	37,160.00	$74,320	$14,864	$89,184
	c. 24'W x 4'H	1	EA	42,368.00	$42,368	$8,474	$50,842
	d. 32'W x 4'H	1	EA	52,763.00	$52,763	$10,553	$63,316
	e. 20'W x 5'H	3	EA	39,998.00	$119,994	$23,999	$143,993
	f. 24'W x 5'H	2	EA	45,706.00	$91,412	$18,282	$109,694
	g. 28'W x 5'H	1	EA	51,394.00	$51,394	$10,279	$61,673
	h. 32'W x 5'H	1	EA	57,101.00	$57,101	$11,420	$68,521
	SUBTOTAL FLOODWALLS				$1,143,000	$265,000	$1,408,000
	SUBTOTAL LEVEES AND FLOODWALLS				$1,143,000	$265,000	$1,408,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$265,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$1,408,000		
30.-.-.-	Engineering and Design				$284,000		
31.-.-.-	Construction Management				$237,000		
	TOTAL COST				$1,929,000		
	TOTAL COST						$1,929,000

LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL — PROTECTION TO SPH LEVEL — F-LEVEE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL — PLAQUEMINES PARISH, LA. — TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 17 crossings)	Lump Sum	LS	210,000.00	$210,000	$63,000	$273,000
	SUBTOTAL				$210,000	$63,000	$273,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$63,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$273,000		
30.-.-.-	Engineering and Design				$33,000		
31.-.-.-	Construction Management				$27,000		
	TOTAL COST				$333,000		
	TOTAL COST						$333,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO SPH LEVEL PLAQUEMINES AND NEW
PUMPING STATION MODIF. EAST BANK OF ALGIERS CANAL - PLAQUEMINES PARISH, LA. PLANTERS PUMP. STA. MODIF.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PLAQUEMINES PUMP. STATION & NEW PLANTERS PUMPING STATION - MODIFICATIONS						
11.0.2.-	Modification of Plaquemines Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
11.0.2.-	Modification of New Planters Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$500,000	$150,000	$650,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$150,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$650,000		
30.-.-.-	Engineering and Design				$78,000		
31.-.-.-	Construction Management				$65,000		
	TOTAL COST				$793,000		
	TOTAL COST						**$793,000**

SPH	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
11.-	LEVEES AND FLOODWALLS						
A.	FIRST LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	22	AC	$250.00	5500	825	$6,325
	(Borrow Pit)	18	AC	$1,500.00	27000	4050	$31,050
11.0.1.B.-	Uncompacted Fill *	180,000	CY	$3.00	540000	81000	$621,000
11.0.1.B.-	Fertilizing & Seeding	22	AC	$500.00	11000	1650	$12,650
	REMARKS:	SUBTOTAL					$689,025
		ENGINEERING & DESIGN					$82,075
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$68,900
		TOTAL FEDERAL COSTS					$840,000

SPH	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
B.	SECOND LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	22	AC	$250.00	5500	825	$6,325
	(Borrow Pit)	6	AC	$1,000.00	6000	900	$6,900
11.0.1.B.-	Uncompacted Fill *	55,000	CY	$3.25	178750	26815	$205,565
11.0.1.B.-	Fertilizing & Seeding	22	AC	$500.00	11000	1650	$12,650
	REMARKS:	SUBTOTAL					$249,440
		ENGINEERING & DESIGN					$27,630
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$22,930
		TOTAL FEDERAL COSTS					$300,000

SPH	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
C.	THIRD LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	22	AC	$250.00	5500	825	$6,325
	(Borrow Pit)	6	AC	$1,000.00	6000	900	$6,900
11.0.1.B.-	Semicompacted Fill *	55,000	CY	$4.00	220000	33000	$253,000
11.0.1.B.-	Fertilizing & Seeding	22	AC	$500.00	11000	1650	$12,650
	REMARKS:	SUBTOTAL					$296,875
		ENGINEERING & DESIGN					$34,435
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$28,690
		TOTAL FEDERAL COSTS					$360,000
		CODE 11 TOTAL(LIFTS 1+2+3)					$1,500,000

Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
0.2-	RELOCATIONS						
0.2.1	Roads, Contr. Act. Ramps	4	EA	$12,000.00	48000	15000	$63,000
0.2.3.2	Utilities						
0.2.3.2.R	Powerlines	Lump Sum	LS	$65,000.00	65000	20000	$85,000
		CODE 02 TOTAL					$148,000
		CODE 11 + CODE 02 TOTAL					$1,648,000
		TOTAL (ROUNDED)					**$1,650,000**

200 YEAR - PLAN 1

(Harvey Lock to Algiers Lock)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR 200 YR PROTECTION - HARVEY LOCK TO ALGIERS LOCK

PLAN 1

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Harvey Lock to Hero Pumping Station	$29,215,000	$1,984,000	$3,744,000	$3,120,000	$13,232,000	$51,295,000
2	Hero Pump Station to Verret Canal Extension	$5,308,000	$325,000	$676,000	$564,000	N/A	$6,873,000
3	Modifications to Pumping Stations in Jefferson Parish (Hero & Planters)	$715,000	N/A	$86,000	$72,000	N/A	$873,000
4	Plaquemines Parish	$2,333,000	$403,000	$328,000	$274,000	N/A	$3,338,000
5	Verret Canal Extension to Orleans Parish Line	$3,222,000	$455,000	$442,000	$368,000	N/A	$4,487,000
6	Orleans Parish Line to Algiers Lock	$1,044,000	$65,000	$133,000	$111,000	N/A	$1,353,000
7	Orleans Parish	$1,216,500	$32,500	$150,000	$125,000	N/A	$1,524,000
8	Modifications to Pumping Station No. 13	$455,000	N/A	$54,000	$45,000	N/A	$554,000
	TOTALS	$43,508,500	$3,264,500	$5,613,000	$4,679,000	$13,232,000	$70,297,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL ALT 1
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Project Cost			
	SUMMARY OF COST HARVEY LOCK TO HERO PUMPING STATION ==========				
11.-.-.-	LEVEES & FLOODWALLS	29,215,000.00			
02.-.-.-	RELOCATIONS	1,984,000.00			
30.-.-.-	ENGINEERING & DESIGN	3,744,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	3,120,000.00			
01.-.-.-	REAL ESTATE COST	13,232,000.00			
	==========	==========			
	TOTAL PROJECT COST	51,295,000.00			
	==========	==========			
	TOTAL ESTIMATED PROJECT COST				$51,295,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	3,000.00	$3,000	$900	$3,900
11.0.2.-	I-Walls (Include Struc Excav & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)						
11.0.2.-	a: 3 Ft High above Ground	1,240	LF	227.00	$281,480	$70,370	$351,850
11.0.2.-	b: 4 Ft High above Ground	280	LF	252.00	$70,560	$17,640	$88,200
11.0.2.-	c: 5 Ft High above Ground	350	LF	266.00	$93,100	$23,275	$116,375
11.0.2.-	d: 6 Ft High above Ground	790	LF	330.00	$260,700	$78,210	$338,910
11.0.2.-	e: 7 Ft High above Ground	1,540	LF	396.00	$609,840	$182,952	$792,792
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 4'H	1	EA	37,160.00	$37,160	$7,432	$44,592
	b. 20'W x 6'H	8	EA	46,036.00	$368,288	$73,658	$441,946
	c. 32'W x 3'H	2	EA	50,160.00	$100,320	$20,064	$120,384
	d. 32'W x 4'H	1	EA	52,763.00	$52,763	$10,553	$63,316
	e. 32'W x 6'H	3	EA	65,839.00	$197,517	$39,503	$237,020
	f. 32'W x 7'H	9	EA	69,377.00	$624,393	$124,879	$749,272
11.0.2.-	40'W x 7'H Bottom Roller Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Pre-stressed Concr. Piles and Misc. Items)	2	EA	92,000.00	$184,000	$55,200	$239,200
	SUBTOTAL				$2,983,000	$735,000	$3,718,000
11.0.Z.-	CONTINGENCIES (25% +/-)				$735,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$3,718,000		
30.-.-.-	Engineering and Design				$446,000		
31.-.-.-	Construction Management				$372,000		
	TOTAL COST				$4,536,000		
	TOTAL COST						$4,536,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	150,000.00	$150,000	$45,000	$195,000
	SUBTOTAL				$225,000	$67,500	$292,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$68,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$293,000		
30.-.-.-	Engineering and Design				$35,000		
31.-.-.-	Construction Management				$29,000		
	TOTAL COST				$357,000		
	TOTAL COST						$357,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing and Fert & Seeding)	Lump Sum	LS	5,800.00	$5,800	$1,740	$7,540
11.0.2.-	I-wall 7 Ft Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,360	LF	396.00	$538,560	$161,568	$700,128
11.0.2.-	T-Wall 11' Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	8,490	LF	1,052.00	$8,931,480	$2,232,870	$11,164,350
11.0.2.-	32'W x 9'H Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, and Pre-stressed Concr. Piles) Piles)	8	EA	83,236.00	$665,888	$133,178	$799,066
	SUBTOTAL				$10,242,000	$2,559,000	$12,801,000
11.0.Z.-	CONTINGENCIES (25 % +/-)				$2,559,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$12,801,000		
30.-.-.-	Engineering and Design				$1,536,000		
31.-.-.-	Construction Management				$1,280,000		
	TOTAL COST				$15,617,000		
	TOTAL COST						$15,617,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	25,000.00	$25,000	$7,500	$32,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
						$37,500	
	SUBTOTAL				$125,000		
02.0.Z.-	CONTINGENCIES (30% +/-)				$38,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$163,000		
30.-.-.-	Engineering and Design				$20,000		
31.-.-.-	Construction Management				$16,000		
	TOTAL COST				$199,000		
	TOTAL COST						$199,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	144,000.00	$144,000	$43,200	$187,200
11.0.2.B	Waste Excavation at Landfill	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Embankment, Semicompacted Fill (Adjacent Borrow)	141,000	CY	2.50	$352,500	$105,750	$458,250
11.0.2.B	Shell Core Closure (Drainage Canal Closure)	13,000	CY	18.00	$234,000	$70,200	$304,200
	SUBTOTAL FIRST LIFT				$845,500	$253,650	$1,099,150
	SECOND LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	70,000	CY	8.00	$560,000	$168,000	$728,000
	SUBTOTAL SECOND LIFT				$627,500	$188,250	$815,750
	THIRD LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	54,000	CY	8.00	$432,000	$129,600	$561,600
	SUBTOTAL THIRD LIFT				$499,500	$149,850	$649,350
	SUBTOTAL LEVEE CONSTRUCTION				$1,973,000	$592,000	$2,564,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.-	I-Wall 7' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	12,060	LF	396.00	$4,775,760	$1,432,728	$6,208,488
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 11 Ft High above Ground	900	LF	1,052.00	$946,800	$236,700	$1,183,500
	b: 13 Ft High above Ground	1,100	LF	1,113.00	$1,224,300	$306,075	$1,530,375
	c: 15 Ft High above Ground	240	LF	1,186.00	$284,640	$71,160	$355,800
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 9'H	1	EA	57,783.00	$57,783	$11,557	$69,340
	b. 30'W x 11'H	1	EA	79,955.00	$79,955	$15,991	$95,946
	c. 38'W x 14'H	3	EA	101,733.00	$305,199	$61,040	$366,239
	d. 36'W x 11'H	1	EA	105,417.00	$105,417	$21,083	$126,500
	SUBTOTAL FLOODWALLS				$7,930,000	$2,201,000	$10,131,000
	SUBTOTAL LEVEES AND FLOODWALLS				$9,903,000	$2,793,000	$12,695,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$2,793,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$12,696,000		
30.-.-.-	Engineering and Design				$1,524,000		
31.-.-.-	Construction Management				$1,270,000		
	TOTAL COST				$15,490,000		
	TOTAL COST						$15,490,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structure at Murphy Canal	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	d. Bridges	3	EA	200,000.00	$600,000	$180,000	$780,000
	SUBTOTAL				$1,175,000	$352,500	$1,527,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$353,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$1,528,000		
30.-.-.-	Engineering and Design				$183,000		
31.-.-.-	Construction Management				$153,000		
	TOTAL COST				$1,864,000		
	TOTAL COST						$1,864,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1988)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Levee and Floodwall Right-of-way						
	Commercial/Industrial	4.2	AC	$108,900.00	$457,380	$114,345	$571,725
	Commercial/Industrial	11.0093	AC	$65,340.00	$719,348	$179,837	$899,185
	Commercial/Industrial	191.8388	AC	$43,560.00	$8,356,498	$2,089,125	$10,445,623
	Improvements	Lump Sum	LS	500,000.00	$500,000	$125,000	$625,000
	Severance Damage	Lump Sum	LS		.00	.00	.00
	SUBTOTAL LANDS AND DAMAGES				$10,033,000	$2,508,000	$12,542,000
	(b) Acquisition Costs (Estimated 100 tracts)						
	Non-Federal	100	Tracts	1,400.00	$140,000	.00	$140,000
	Federal	Lump Sum	LS	50,000.00	$50,000	.00	$50,000
	(c) PL 91-646	Lump Sum	LS	500,000.00	$500,000	.00	$500,000
	TOTAL ESTIMATED REAL ESTATE COST						$13,232,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Project Cost
	SUMMARY OF COST	
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	5,308,000.00
02.-.-.-	RELOCATIONS	325,000.00
30.-.-.-	ENGINEERING & DESIGN	676,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	564,000.00
01.-.-.-	REAL ESTATE COST	N/A
	TOTAL PROJECT COST	6,873,000.00
	TOTAL ESTIMATED PROJECT COST	$6,873,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	44,000.00	$44,000	$13,200	$57,200
11.0.2.B	Degrade Levee & Constr Berms on Protected Side	1,550	CY	2.00	$3,100	$930	$4,030
11.0.2.B	Reshape Road Ramps at Gate Locations	30	EA	5,000.00	$150,000	$45,000	$195,000
11.0.2.-	I-Wall 4' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,730	LF	252.00	$435,960	$108,990	$544,950
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 9 Ft High above Ground	1,200	LF	746.00	$895,200	$223,800	$1,119,000
	b: 13 Ft High above Ground	950	LF	1,113.00	$1,057,350	$264,338	$1,321,688
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 16'W x 3'H	2	EA	29,975.00	$59,950	$11,990	$71,940
	b. 20'W x 3'H	5	EA	34,850.00	$174,250	$34,850	$209,100
	c. 24'W x 3'H	6	EA	39,720.00	$238,320	$47,664	$285,984
	d. 32'W x 3'H	5	EA	49,465.00	$247,325	$49,465	$296,790
	e. 36'W x 3'H	3	EA	54,320.00	$162,960	$32,592	$195,552
	f. 20'W x 11.5'H	3	EA	66,650.00	$199,950	$59,985	$259,935
	g. 24'W x 9'H	2	EA	66,291.00	$132,582	$26,516	$159,098
	h. 24'W x 11.5'H	2	EA	79,670.00	$159,340	$47,802	$207,142
	i. 32'W x 11.5'H	2	EA	96,325.00	$192,650	$57,795	$250,445
	SUBTOTAL FLOODWALLS				$4,253,000	$1,055,000	$5,308,000
	SUBTOTAL LEVEES AND FLOODWALLS				$4,253,000	$1,055,000	$5,308,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$1,055,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$5,308,000		
30.-.-.-	Engineering and Design				$637,000		
31.-.-.-	Construction Management				$531,000		
	TOTAL COST				$6,476,000		
	TOTAL COST						$6,476,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines & Crossings)	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$250,000	$75,000	$325,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$75,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$325,000		
30.-.-.-	Engineering and Design				$39,000		
31.-.-.-	Construction Management				$33,000		
	TOTAL COST				$397,000		
	TOTAL COST						$397,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL — HERO PUMPING STATION AND PLANTERS PUMP. STA. MODIF.
PUMPING STATION MODIF. WEST BANK OF ALGIERS CANAL - JEFFERSON PARISH, LA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION & PLANTERS PUMPING STATION - MODIFICATIONS						
11.0.2.-	Modification of Hero Pump. Sta	Lump Sum	LS	300,000.00	$300,000	$90,000	$390,000
11.0.2.-	Modification of Planters Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$550,000	$165,000	$715,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$165,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$715,000		
30.-.-.-	Engineering and Design				$86,000		
31.-.-.-	Construction Management				$72,000		
	TOTAL COST				$873,000		
	TOTAL COST						$873,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,PLAQUEMINES PARISH, 200 YR					29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.——	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	6.0	EA	10,000.00	$60,000	$18,000	$78,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	250,000.00	$250,000	$75,000	$325,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,200	$97,200
11.0.1.B.-	CLEARING and GRUBBING	66.0	AC	1,000.00	$66,000	$19,800	$85,800
11.0.1.B.-	SEMICOMPACTED FILL	180,250.0	CY	9.00	$1,622,250	$486,750	$2,109,000
11.0.1.B.-	FERTILIZING and SEEDING	66.0	AC	500.00	$33,000	$8,000	$41,000
	SUBTOTAL						$2,736,000
30.——	E & D						$328,000
31.——	S & I						$274,000
EHWAPP20				TOTALS			$3,338,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost			
	SUMMARY OF COST VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL				
11.-.-.-	LEVEES & FLOODWALLS	3,222,000.00			
02.-.-.-	RELOCATIONS	455,000.00			
30.-.-.-	ENGINEERING & DESIGN	442,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	368,000.00			
01.-.-.-	REAL ESTATE COST	N/A			
	TOTAL PROJECT COST	4,487,000.00			
	TOTAL ESTIMATED PROJECT COST				$4,487,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	10,000.00	$10,000	$3,000	$13,000
11.0.2.B	Degrade Levee & Constr. Berms on Protected Side	3,850	CY	2.00	$7,700	$2,310	$10,010
11.0.2.B	Reshape Road Ramps at Gate Locations	21	EA	5,000.00	$105,000	$31,500	$136,500
11.0.2.-	I-Wall 4' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	4,310	LF	252.00	$1,086,120	$271,530	$1,357,650
11.0.2.-	T-WALLS 9' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	650	LF	746.00	$484,900	$121,225	$606,125
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 12'W x 3'H	2	EA	25,090.00	$50,180	$10,036	$60,216
	b. 16'W x 3'H	4	EA	29,975.00	$119,900	$23,980	$143,880
	c. 20'W x 3'H	3	EA	34,850.00	$104,550	$20,910	$125,460
	d. 24'W x 3'H	5	EA	39,720.00	$198,600	$39,720	$238,320
	e. 28'W x 3'H	1	EA	44,585.00	$44,585	$8,917	$53,502
	f. 32'W x 3'H	2	EA	49,465.00	$98,930	$19,786	$118,716
	g. 36'W x 3'H	4	EA	54,320.00	$217,280	$43,456	$260,736
	SUBTOTAL FLOODWALLS				$2,603,000	$619,000	$3,222,000
	SUBTOTAL LEVEES AND FLOODWALLS				$2,603,000	$619,000	$3,222,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$619,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$3,222,000		
30.-.-.-	Engineering and Design				$387,000		
31.-.-.-	Construction Management				$322,000		
	TOTAL COST				$3,931,000		
	TOTAL COST						$3,931,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 29 crossings)	Lump Sum	LS	350,000.00	$350,000	$105,000	$455,000
	SUBTOTAL				$350,000	$105,000	$455,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$105,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$455,000		
30.-.-.-	Engineering and Design				$55,000		
31.-.-.-	Construction Management				$46,000		
	TOTAL COST				$556,000		
	TOTAL COST						$556,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	1,044,000.00
02.-.-.-	RELOCATIONS	65,000.00
30.-.-.-	ENGINEERING & DESIGN	133,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	111,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	1,353,000.00

TOTAL ESTIMATED PROJECT COST $1,353,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	5,000.00	$5,000	$1,500	$6,500
11.0.2.-	I-Wall 4' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,300	LF	252.00	$327,600	$81,900	$409,500
11.0.2.-	T-WALLS 9' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	600	LF	746.00	$447,600	$111,900	$559,500
11.0.2.B	Degrade Levee & Constr. Berm on Protected Side	1,150	CY	2.00	$2,300	$690	$2,990
	SUBTOTAL FLOODWALLS				$833,000	$211,000	$1,043,000
	SUBTOTAL LEVEES AND FLOODWALLS				$833,000	$211,000	$1,043,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$211,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$1,044,000		
30.-.-.-	Engineering and Design				$125,000		
31.-.-.-	Construction Management				$104,000		
	TOTAL COST				$1,273,000		
	TOTAL COST						$1,273,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 crossings)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
	SUBTOTAL				$50,000	$15,000	$65,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$15,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$65,000		
30.-.-.-	Engineering and Design				$8,000		
31.-.-.-	Construction Management				$7,000		
	TOTAL COST				$80,000		
	TOTAL COST						$80,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,ORLEANS PARISH,200 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	1.0	EA	10,000.00	$10,000	$2,500	$12,500
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	15,000.00	$15,000	$5,000	$20,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,300	$97,300
11.0.1.B.-	CLEARING and GRUBBING	35.0	AC	1,000.00	$35,000	$10,500	$45,500
11.0.1.B.-	SEMICOMPACTED FILL	89,750.0	CY	9.00	$807,750	$243,250	$1,051,000
11.0.1.B.-	FERTILIZING and SEEDING	35.0	AC	500.00	$17,500	$5,200	$22,700
	SUBTOTAL						$1,249,000
30.——	E & D						$150,000
31.——	S & I						$125,000
EHWAOP20				TOTALS			$1,524,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL PUMPING STATION NO. 13
PUMPING STA. MODIF. WEST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 13 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 13	Lump Sum	LS	350,000.00	$350,000	$105,000	$455,000
	SUBTOTAL				$350,000	$105,000	$455,000
02.0.2.-	CONTINGENCIES (30% +/-)				$105,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$455,000		
30.-.-.-	Engineering and Design				$54,000		
31.-.-.-	Construction Management				$45,000		
	TOTAL COST				$554,000		
	TOTAL COST						$554,000

200 YEAR

(Algiers Lock to Plaquemines Levee near Oakville)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR 200 YR PROTECTION - ALGIERS LOCK TO PLAQUEMINES LEVEE NEAR OAKVILLE

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Orleans Parish Line to Algiers Lock	$477,000	$65,000	$65,000	$55,000	N/A	$662,000
2	Orleans Parish	$633,000	$56,000	$83,000	$69,000	N/A	$841,000
3	Modifications to Pumping Station No. 11	$325,000	N/A	$40,000	$33,000	N/A	$398,000
4	Plaquemines Parish	$2,844,000	$249,000	$371,000	$309,000	N/A	$3,773,000
5	F-Levee to Orleans Parish Line	$1,343,000	$273,000	$194,000	$161,000	N/A	$1,971,000
6	Modifications to Pumping Stations in Plaquemines Parish (Plaquemines and New Planters)	$650,000	N/A	$78,000	$65,000	N/A	$793,000
7	Plaquemines Parish F-Levee	$957,000	$148,000	$112,000	$93,000	N/A	$1,310,000
	TOTALS	$7,229,000	$791,000	$943,000	$785,000	N/A	$9,748,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	477,000.00
02.-.-.-	RELOCATIONS	65,000.00
30.-.-.-	ENGINEERING & DESIGN	65,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	55,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	662,000.00

TOTAL ESTIMATED PROJECT COST $662,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	2,000.00	$2,000	$600	$2,600
11.0.2.-	I-Wall 4' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	375	LF	252.00	$94,500	$23,625	$118,125
11.0.2.-	T-WALLS 9' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	250	LF	746.00	$186,500	$46,625	$233,125
11.0.2.B	Degrade Levee & Constr. Berm on Protected Side	350	CY	2.00	$700	$210	$910
11.0.2.-	36'W x 4'H Swing Gate (Includes Struc Steel, Concr., Steel Sheet Piling,Prestressed Concr Piles and Misc. Items)	1	EA	57,951.00	$57,951	$11,590	$69,541
	SUBTOTAL FLOODWALLS				$382,000	$95,000	$476,000
	SUBTOTAL LEVEES AND FLOODWALLS				$382,000	$95,000	$476,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$95,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$477,000		
30.-.-.-	Engineering and Design				$57,000		
31.-.-.-	Construction Management				$48,000		
	TOTAL COST				$582,000		
	TOTAL COST						$582,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 crossings)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
	SUBTOTAL				$50,000	$15,000	$65,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$15,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$65,000		
30.-.-.-	Engineering and Design				$8,000		
31.-.-.-	Construction Management				$7,000		
	TOTAL COST				$80,000		
	TOTAL COST						$80,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,ORLEANS PARISH,200 YR					29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	3.0	EA	10,000.00	$30,000	$10,000	$40,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	12,000.00	$12,000	$4,000	$16,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,600	$97,600
11.0.1.B.-	CLEARING and GRUBBING	29.0	AC	1,000.00	$29,000	$8,700	$37,700
11.0.1.B.-	SEMICOMPACTED FILL	92,100.0	CY	4.00	$368,400	$110,500	$478,900
11.0.1.B.-	FERTILIZING and SEEDING	29.0	AC	500.00	$14,500	$4,300	$18,800
	SUBTOTAL						$689,000
30.——	E & D						$83,000
31.——	S & I						$69,000
EHEADP20				TOTALS			$841,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL PUMPING STATION NO.
PUMPING STA. MODIF. EAST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. 11 MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 11 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 11	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$250,000	$75,000	$325,000
02.0.2.-	CONTINGENCIES (30% +/-)				$75,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$325,000		
30.-.-.-	Engineering and Design				$40,000		
31.-.-.-	Construction Management				$33,000		
	TOTAL COST				$398,000		
	TOTAL COST						$398,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,PLAQUEMINES PARISH,200 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.——	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	9.0	EA	11,000.00	$99,000	$30,000	$129,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	90,000.00	$90,000	$30,000	$120,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$23,000	$98,000
11.0.1.B.-	CLEARING and GRUBBING	126.0	AC	1,000.00	$126,000	$37,800	$163,800
11.0.1.B.-	SEMICOMPACTED FILL	480,800.0	CY	4.00	$1,923,200	$577,000	$2,500,200
11.0.1.B.-	FERTILIZING and SEEDING	126.0	AC	500.00	$63,000	$19,000	$82,000
	SUBTOTAL						$3,093,000
30.——	E & D						$371,000
31.——	S & I						$309,000
EHEAPP20				TOTALS			$3,773,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost
	SUMMARY OF COST	
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	1,343,000.00
02.-.-.-	RELOCATIONS	273,000.00
30.-.-.-	ENGINEERING & DESIGN	194,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	161,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	1,971,000.00
	TOTAL ESTIMATED PROJECT COST	$1,971,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YEAR LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	4,000.00	$4,000	$1,200	$5,200
11.0.2.B	Degrade Levee & Constr. Berms on Protected Side	450	CY	2.00	$900	$270	$1,170
11.0.2.B	Reshape Road Ramps at Gate Locations	11	EA	5,000.00	$55,000	$16,500	$71,500
11.0.2.-	I-Wall 4' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	500	LF	252.00	$126,000	$31,500	$157,500
11.0.2.-	T-WALLS 9' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	500	LF	746.00	$373,000	$93,250	$466,250
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 12'W x 3'H	1	EA	25,090.00	$25,090	$5,018	$30,108
	b. 20'W x 3'H	2	EA	34,850.00	$69,700	$13,940	$83,640
	c. 24'W x 3'H	1	EA	39,720.00	$39,720	$7,944	$47,664
	d. 32'W x 3'H	1	EA	49,465.00	$49,465	$9,893	$59,358
	e. 20'W x 4'H	3	EA	37,160.00	$111,480	$22,296	$133,776
	f. 24'W x 4'H	2	EA	42,368.00	$84,736	$16,947	$101,683
	g. 28'W x 4'H	1	EA	47,556.00	$47,556	$9,511	$57,067
	h. 32'W x 4'H	1	EA	52,763.00	$52,763	$10,553	$63,316
	SUBTOTAL FLOODWALLS				$1,089,000	$254,000	$1,343,000
	SUBTOTAL LEVEES AND FLOODWALLS				$1,089,000	$254,000	$1,343,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$254,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$1,343,000		
30.-.-.-	Engineering and Design				$161,000		
31.-.-.-	Construction Management				$134,000		
	TOTAL COST				$1,638,000		
	TOTAL COST						$1,638,000

LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL — PROTECTION TO 200 YEAR LEVEL — F-LEVEE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL — PLAQUEMINES PARISH, LA. — TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 17 crossings)	Lump Sum	LS	210,000.00	$210,000	$63,000	$273,000
	SUBTOTAL				$210,000	$63,000	$273,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$63,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$273,000		
30.-.-.-	Engineering and Design				$33,000		
31.-.-.-	Construction Management				$27,000		
	TOTAL COST				$333,000		
	TOTAL COST						$333,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 200 YR LEVEL PLAQUEMINES AND NEW
PUMPING STATION MODIF. EAST BANK OF ALGIERS CANAL - PLAQUEMINES PARISH, LA. PLANTERS PUMP. STA. MODIF.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PLAQUEMINES PUMP. STATION & NEW PLANTERS PUMPING STATION - MODIFICATIONS						
11.0.2.-	Modification of Plaquemines Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
11.0.2.-	Modification of New Planters Pumping Station	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$500,000	$150,000	$650,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$150,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$650,000		
30.-.-.-	Engineering and Design				$78,000		
31.-.-.-	Construction Management				$65,000		
	TOTAL COST				$793,000		
	TOTAL COST						$793,000

200 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
11.-	LEVEES AND FLOODWALLS						
A.	FIRST LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	20	AC	$250.00	5000	750	$5,750
	(Borrow Pit)	14	AC	$1,500.00	21000	3150	$24,150
11.0.1.B.-	Uncompacted Fill *	140,000	CY	$3.00	420000	63000	$483,000
11.0.1.B.-	Fertilizing & Seeding	20	AC	$500.00	10000	1500	$11,500
	REMARKS:	SUBTOTAL					$542,400
		ENGINEERING & DESIGN					$64,100
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$53,500
		TOTAL FEDERAL COSTS					$660,000

200 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
B.	SECOND LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	20	AC	$250.00	5000	750	$5,750
	(Borrow Pit)	4	AC	$1,000.00	4000	600	$4,600
11.0.1.B.-	Uncompacted Fill *	40,000	CY	$3.25	130000	19500	$149,500
11.0.1.B.-	Fertilizing & Seeding	20	AC	$500.00	10000	1500	$11,500
	REMARKS:	SUBTOTAL					$189,350
		ENGINEERING & DESIGN					$22,200
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$18,450
		TOTAL FEDERAL COSTS					$230,000

200 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)				DATE APR 94		
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
C.	THIRD LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	20	AC	$250.00	5000	750	$5,750
	(Borrow Pit)	4	AC	$1,000.00	4000	600	$4,600
11.0.1.B.-	Semicompacted Fill *	40,000	CY	$4.00	160000	24000	$184,000
11.0.1.B.-	Fertilizing & Seeding	20	AC	$500.00	10000	1500	$11,500
	REMARKS:	SUBTOTAL					$223,850
		ENGINEERING & DESIGN					$25,260
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$20,890
		TOTAL FEDERAL COSTS					$270,000
		CODE 11 TOTAL(LIFTS 1+2+3)					$1,160,000

Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
0.2-	RELOCATIONS						
0.2.1	Roads, Contr. Act. Ramps	4	EA	$12,000.00	48000	15000	$63,000
0.2.3	Utilities						
0.2.3.2.R	Powerlines	Lump Sum	LS	$65,000.00	65000	20000	$85,000
		CODE 02 TOTAL					$148,000
		CODE 11 + CODE 02 TOTAL					$1,308,000
		TOTAL (ROUNDED)					**$1,310,000**

100 YEAR - PLAN 1

(Harvey Lock to Algiers Lock)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR 100 YR PROTECTION - HARVEY LOCK TO ALGIERS LOCK

PLAN 1

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Harvey Lock to Hero Pumping Station	$24,214,000	$1,984,000	$3,144,000	$2,619,000	$13,232,000	$45,193,000
2	Hero Pump Station to Verret Canal Extension	$3,303,000	$130,000	$412,000	$343,000	N/A	$4,188,000
3	Modifications to Pumping Stations in Jefferson Parish (Hero & Planters)	$585,000	N/A	$70,000	$59,000	N/A	$714,000
4	Plaquemines Parish	$1,344,600	$387,400	$208,000	$173,000	N/A	$2,113,000
5	Verret Canal Extension to Orleans Parish Line	$659,000	$65,000	$87,000	$73,000	N/A	$884,000
6	Orleans Parish Line to Algiers Lock	$610,000	$13,000	$75,000	$62,000	N/A	$760,000
7	Orleans Parish	$666,500	$30,500	$84,000	$70,000	N/A	$851,000
8	Modifications to Pumping Station No. 13	$325,000	N/A	$39,000	$33,000	N/A	$397,000
	TOTALS	$31,707,100	$2,609,900	$4,119,000	$3,432,000	$13,232,000	$55,100,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL ALT 1
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Project Cost			
	SUMMARY OF COST HARVEY LOCK TO HERO PUMPING STATION ==========				
11.-.-.-	LEVEES & FLOODWALLS	24,214,000.00			
02.-.-.-	RELOCATIONS	1,984,000.00			
30.-.-.-	ENGINEERING & DESIGN	3,144,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	2,619,000.00			
01.-.-.-	REAL ESTATE COST	13,232,000.00			
	==========	==========			
	TOTAL PROJECT COST	45,193,000.00			
	==========	==========			

	TOTAL ESTIMATED PROJECT COST	$45,193,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	3,000.00	$3,000	$900	$3,900
11.0.2.-	I-Walls (Include Struc Excav & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)						
11.0.2.-	a: 3 Ft High above Ground	1,520	LF	227.00	$345,040	$86,260	$431,300
11.0.2.-	b: 4 Ft High above Ground	350	LF	252.00	$88,200	$22,050	$110,250
11.0.2.-	c: 5 Ft High above Ground	790	LF	266.00	$210,140	$52,535	$262,675
11.0.2.-	d: 6 Ft High above Ground	1,540	LF	330.00	$508,200	$152,460	$660,660
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 3'H	1	EA	34,850.00	$34,850	$6,970	$41,820
	b. 20'W x 5'H	8	EA	39,998.00	$319,984	$63,997	$383,981
	c. 32'W x 3'H	3	EA	49,465.00	$148,395	$29,679	$178,074
	d. 32'W x 5'H	3	EA	57,101.00	$171,303	$34,261	$205,564
	e. 32'W x 6'H	9	EA	65,839.00	$592,551	$118,510	$711,061
11.0.2.-	40'W x 6'H Bottom Roller Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Pre-stressed Concr. Piles and Misc. Items)	2	EA	78,750.00	$157,500	$47,250	$204,750
	SUBTOTAL				$2,679,000	$645,000	$3,324,000
11.0.Z.-	CONTINGENCIES (24% +/-)				$645,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$3,324,000		
30.-.-.-	Engineering and Design				$399,000		
31.-.-.-	Construction Management				$332,000		
	TOTAL COST				$4,055,000		
	TOTAL COST						$4,055,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO WEST BANK EXPRESSWAY						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	150,000.00	$150,000	$45,000	$195,000
	SUBTOTAL				$225,000	$67,500	$292,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$68,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$293,000		
30.-.-.-	Engineering and Design				$35,000		
31.-.-.-	Construction Management				$29,000		
	TOTAL COST				$357,000		
	TOTAL COST						$357,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing and Fert & Seeding)	Lump Sum	LS	5,800.00	$5,800	$1,740	$7,540
11.0.2.-	I-wall 6 Ft Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	1,360	LF	330.00	$448,800	$134,640	$583,440
11.0.2.-	T-Wall 10' Heigh above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	8,490	LF	768.00	$6,520,320	$1,630,080	$8,150,400
11.0.2.-	32'W x 8'H Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, and Pre-stressed Concr. Piles) Piles)	8	EA	78,948.00	$631,584	$126,317	$757,901
	SUBTOTAL				$7,707,000	$1,923,000	$9,629,000
11.0.Z.-	CONTINGENCIES (25 % +/-)				$1,923,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$9,630,000		
30.-.-.-	Engineering and Design				$1,156,000		
31.-.-.-	Construction Management				$963,000		
	TOTAL COST				$11,749,000		
	TOTAL COST						$11,749,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	WEST BANK EXPRESSWAY TO LAPALCO BLVD.						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	25,000.00	$25,000	$7,500	$32,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
						$37,500	
	SUBTOTAL				$125,000		
02.0.Z.-	CONTINGENCIES (30% +/-)				$38,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$163,000		
30.-.-.-	Engineering and Design				$20,000		
31.-.-.-	Construction Management				$16,000		
	TOTAL COST				$199,000		
	TOTAL COST						$199,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	LEVEE						
	FIRST LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	144,000.00	$144,000	$43,200	$187,200
11.0.2.B	Waste Excavation at Landfill	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Embankment, Semicompacted Fill (Adjacent Borrow)	141,000	CY	2.50	$352,500	$105,750	$458,250
11.0.2.B	Shell Core Closure (Drainage Canal Closure)	13,000	CY	18.00	$234,000	$70,200	$304,200
	SUBTOTAL FIRST LIFT				$845,500	$253,650	$1,099,150
	SECOND LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	70,000	CY	8.00	$560,000	$168,000	$728,000
	SUBTOTAL SECOND LIFT				$627,500	$188,250	$815,750
	THIRD LIFT						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing & Grubbing and Fert. & Seeding)	Lump Sum	LS	37,500.00	$37,500	$11,250	$48,750
11.0.2.B	Embankment, Semicompacted Fill (Hauled Fill)	54,000	CY	8.00	$432,000	$129,600	$561,600
	SUBTOTAL THIRD LIFT				$499,500	$149,850	$649,350
	SUBTOTAL LEVEE CONSTRUCTION				$1,973,000	$592,000	$2,564,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.-	I-Wall 6' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Concrete Cap, and Misc. Items)	12,060	LF	330.00	$3,979,800	$1,193,940	$5,173,740
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 10 Ft High above Ground	900	LF	768.00	$691,200	$172,800	$864,000
	b: 12 Ft High above Ground	1,100	LF	1,069.00	$1,175,900	$293,975	$1,469,875
	c: 14 Ft High above Ground	240	LF	1,156.00	$277,440	$69,360	$346,800
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 8'H	1	EA	54,945.00	$54,945	$10,989	$65,934
	b. 30'W x 10'H	1	EA	83,236.00	$83,236	$16,647	$99,883
	c. 30'W x 13'H	3	EA	101,214.00	$303,642	$60,728	$364,370
	d. 36'W x 10'H	1	EA	96,162.00	$96,162	$19,232	$115,394
	SUBTOTAL FLOODWALLS				$6,812,000	$1,883,000	$8,695,000
	SUBTOTAL LEVEES AND FLOODWALLS				$8,785,000	$2,475,000	$11,259,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$2,475,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$11,260,000		
30.-.-.-	Engineering and Design				$1,351,000		
31.-.-.-	Construction Management				$1,126,000		
	TOTAL COST				$13,737,000		
	TOTAL COST						$13,737,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL PARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	LAPALCO BLVD. TO HERO PUMPING STATION						
02.-.-.-	Relocations						
	a. Street Restoration	Lump Sum	LS	75,000.00	$75,000	$22,500	$97,500
	b. Utility Relocation through Floodwalls	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	c. Drainage Structure at Murphy Canal	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	d. Bridges	3	EA	200,000.00	$600,000	$180,000	$780,000
	SUBTOTAL				$1,175,000	$352,500	$1,527,500
02.0.Z.-	CONTINGENCIES (30% +/-)				$353,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$1,528,000		
30.-.-.-	Engineering and Design				$183,000		
31.-.-.-	Construction Management				$153,000		
	TOTAL COST				$1,864,000		
	TOTAL COST						$1,864,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL
EAST BANK OF HARVEY CANAL FARALLEL PROTECTION ALTERNATIVE ------ ALIGNMENT EAST OF PETER'S ROAD

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HARVEY LOCK TO HERO PUMPING STATION						
	REAL ESTATE COSTS (Date of Value: August 1988)						
01.-.-.-	(a) Lands and Damages						
	Perpetual Levee and Floodwall Right-of-way						
	Commercial/Industrial	4.2	AC	$108,900.00	$457,380	$114,345	$571,725
	Commercial/Industrial	11.0093	AC	$65,340.00	$719,348	$179,837	$899,185
	Commercial/Industrial	191.8388	AC	$43,560.00	$8,356,498	$2,089,125	$10,445,623
	Improvements	Lump Sum	LS	500,000.00	$500,000	$125,000	$625,000
	Severance Damage	Lump Sum	LS		.00	.00	.00
	SUBTOTAL LANDS AND DAMAGES				$10,033,000	$2,508,000	$12,542,000
	(b) Acquisition Costs (Estimated 100 tracts)						
	Non-Federal	100	Tracts	1,400.00	$140,000	.00	$140,000
	Federal	Lump Sum	LS	50,000.00	$50,000	.00	$50,000
	(c) PL 91-646	Lump Sum	LS	500,000.00	$500,000	.00	$500,000
	TOTAL ESTIMATED REAL ESTATE COST						$13,232,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Project Cost
	SUMMARY OF COST	
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	3,303,000.00
02.-.-.-	RELOCATIONS	130,000.00
30.-.-.-	ENGINEERING & DESIGN	412,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	343,000.00
01.-.-.-	REAL ESTATE COST	N/A
	TOTAL PROJECT COST	4,188,000.00
	TOTAL ESTIMATED PROJECT COST	$4,188,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	44,000.00	$44,000	$13,200	$57,200
11.0.2.-	T-WALLS (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)						
	a: 8 Ft High above Ground	1,200	LF	724.00	$868,800	$217,200	$1,086,000
	b: 12 Ft High above Ground	950	LF	1,069.00	$1,015,550	$253,888	$1,269,438
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 10.5'H	3	EA	63,390.00	$190,170	$57,051	$247,221
	b. 24'W x 8'H	2	EA	62,953.00	$125,906	$25,181	$151,087
	c. 24'W x 10.5'H	2	EA	72,795.00	$145,590	$43,677	$189,267
	d. 32'W x 10.5'H	2	EA	91,585.00	$183,170	$54,951	$238,121
	SUBTOTAL FLOODWALLS				$2,623,000	$680,000	$3,303,000
	SUBTOTAL LEVEES AND FLOODWALLS				$2,623,000	$680,000	$3,303,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$680,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$3,303,000		
30.-.-.-	Engineering and Design				$396,000		
31.-.-.-	Construction Management				$330,000		
	TOTAL COST				$4,029,000		
	TOTAL COST						$4,029,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL HERO PUMPING STATION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO VERRET CANAL EXTENSION

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION TO VERRET CANAL EXTENSION - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 Crossings)	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
	SUBTOTAL				$100,000	$30,000	$130,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$30,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$130,000		
30.-.-.-	Engineering and Design				$16,000		
31.-.-.-	Construction Management				$13,000		
	TOTAL COST				$159,000		
	TOTAL COST						$159,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL — HERO PUMPING STATION AND PLANTERS PUMP. STA. MODIF.
PUMPING STATION MODIF. WEST BANK OF ALGIERS CANAL - JEFFERSON PARISH, LA.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	HERO PUMPING STATION & PLANTERS PUMPING STATION - MODIFICATIONS						
11.8.2.-	Modification of Hero Pump. Sta	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
11.8.2.-	Modification of Planters Pumping Station	Lump Sum	LS	200,000.00	$200,000	$60,000	$260,000
	SUBTOTAL				$450,000	$135,000	$585,000
02.8.Z.-	CONTINGENCIES (30% +/-)				$135,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$585,000		
30.-.-.-	Engineering and Design				$70,000		
31.-.-.-	Construction Management				$59,000		
	TOTAL COST				$714,000		
	TOTAL COST						$714,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,PLAQUEMINES PARISH, 100 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.——	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	6.0	EA	8,000.00	$48,000	$14,400	$62,400
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	250,000.00	$250,000	$75,000	$325,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,400	$97,400
11.0.1.B.-	CLEARING and GRUBBING	55.0	AC	1,000.00	$55,000	$16,500	$71,500
11.0.1.B.-	SEMICOMPACTED FILL	97,440.0	CY	9.00	$876,960	$263,040	$1,140,000
11.0.1.B.-	FERTILIZING and SEEDING	55.0	AC	500.00	$27,500	$8,200	$35,700
	SUBTOTAL						$1,732,000
30.——	E & D						$208,000
31.——	S & I						$173,000
EHWAPP10				TOTALS			$2,113,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost			
	SUMMARY OF COST				
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL				
11.-.-.-	LEVEES & FLOODWALLS	659,000.00			
02.-.-.-	RELOCATIONS	65,000.00			
30.-.-.-	ENGINEERING & DESIGN	87,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	73,000.00			
01.-.-.-	REAL ESTATE COST	N/A			
	TOTAL PROJECT COST	884,000.00			
	TOTAL ESTIMATED PROJECT COST				$884,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	4,000.00	$4,000	$1,200	$5,200
11.0.2.-	T-WALLS 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	650	LF	724.00	$470,600	$117,650	$588,250
	SUBTOTAL FLOODWALLS				$525,000	$134,000	$658,000
	SUBTOTAL LEVEES AND FLOODWALLS				$525,000	$134,000	$658,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$134,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$659,000		
30.-.-.-	Engineering and Design				$79,000		
31.-.-.-	Construction Management				$66,000		
	TOTAL COST				$804,000		
	TOTAL COST						$804,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL VERRET CANAL EXTENSION
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	VERRET CANAL EXTENSION TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 5 crossings)	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
	SUBTOTAL				$50,000	$15,000	$65,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$15,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$65,000		
30.-.-.-	Engineering and Design				$8,000		
31.-.-.-	Construction Management				$7,000		
	TOTAL COST				$80,000		
	TOTAL COST						$80,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	610,000.00
02.-.-.-	RELOCATIONS	13,000.00
30.-.-.-	ENGINEERING & DESIGN	75,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	62,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	760,000.00
	TOTAL ESTIMATED PROJECT COST	$760,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	50,000.00	$50,000	$15,000	$65,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	2,000.00	$2,000	$600	$2,600
11.0.2.-	T-WALLS 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	600	LF	724.00	$434,400	$108,600	$543,000
	SUBTOTAL FLOODWALLS				$486,000	$124,000	$611,000
	SUBTOTAL LEVEES AND FLOODWALLS				$486,000	$124,000	$611,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$124,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$610,000		
30.-.-.-	Engineering and Design				$73,000		
31.-.-.-	Construction Management				$61,000		
	TOTAL COST				$744,000		
	TOTAL COST						$744,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG WEST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines)	Lump Sum	LS	10,000.00	$10,000	$3,000	$13,000
	SUBTOTAL				$10,000	$3,000	$13,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$3,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$13,000		
30.-.-.-	Engineering and Design				$2,000		
31.-.-.-	Construction Management				$1,000		
	TOTAL COST				$16,000		
	TOTAL COST						$16,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT WEST OF ALGIERS CANAL,ORLEANS PARISH,100 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	1.0	EA	8,000.00	$8,000	$2,500	$10,500
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	15,000.00	$15,000	$5,000	$20,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,700	$97,700
11.0.1.B.-	CLEARING and GRUBBING	24.0	AC	1,000.00	$24,000	$7,200	$31,200
11.0.1.B.-	SEMICOMPACTED FILL	44,560.0	CY	9.00	$401,040	$120,960	$522,000
11.0.1.B.-	FERTILIZING and SEEDING	24.0	AC	500.00	$12,000	$3,600	$15,600
	SUBTOTAL						$697,000
30.——	E & D						$84,000
31.——	S & I						$70,000
EMWAOP10				TOTALS			$851,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL PUMPING STATION NO. 13
PUMPING STA. MODIF. WEST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. MODIFICATIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 13 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 13	Lump Sum	LS	250,000.00	$250,000	$75,000	$325,000
	SUBTOTAL				$250,000	$75,000	$325,000
02.0.2.-	CONTINGENCIES (30% +/-)				$75,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$325,000		
30.-.-.-	Engineering and Design				$40,000		
31.-.-.-	Construction Management				$33,000		
	TOTAL COST				$398,000		
	TOTAL COST						$398,000

100 YEAR

(Algiers Lock to Plaquemines Levee near Oakville)

WEST BANK OF THE MISSISSIPPI RIVER, EAST OF THE HARVEY CANAL FEASIBILITY REPORT
COST SUMMARY FOR 100 YR PROTECTION - ALGIERS LOCK TO PLAQUEMINES LEVEE NEAR OAKVILLE

No.	Item	Levees & Floodwalls	Relocations	Engineering & Design	Construction Management	Real Estate	Project Cost
1	Orleans Parish Line to Algiers Lock	$445,000	$13,000	$55,000	$46,000	N/A	$559,000
2	Orleans Parish	$392,000	$56,000	$54,000	$45,000	N/A	$547,000
3	Modifications to Pumping Station No. 11	$260,000	N/A	$31,000	$26,000	N/A	$317,000
4	Plaquemines Parish	$1,924,400	$213,600	$257,000	$212,000	N/A	$2,607,000
5	F-Levee to Orleans Parish Line	$912,000	$130,000	$125,000	$104,000	N/A	$1,271,000
6	Modifications to Pumping Stations in Plaquemines Parish (Plaquemines and New Planters)	$520,000	N/A	$62,000	$52,000	N/A	$634,000
7	Plaquemines Parish F-Levee	$740,000	$137,000	$90,000	$73,000	N/A	$1,040,000
	TOTALS	$5,193,400	$549,600	$674,000	$558,000	N/A	$6,975,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Project Cost
	SUMMARY OF COST	
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL	
11.-.-.-	LEVEES & FLOODWALLS	445,000.00
02.-.-.-	RELOCATIONS	13,000.00
30.-.-.-	ENGINEERING & DESIGN	55,000.00
31.-.-.-	CONSTRUCTION MANAGEMENT	46,000.00
01.-.-.-	REAL ESTATE COST	
	TOTAL PROJECT COST	559,000.00
	TOTAL ESTIMATED PROJECT COST	$559,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	30,000.00	$30,000	$9,000	$39,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	1,000.00	$1,000	$300	$1,300
11.0.2.-	36'W x 3'H Swing Gate (Includes Struc Steel, Concr., Steel Sheet Piling,Prestressed Concr. Piles and Misc. Items)	1	EA	54,320.00	$54,320	$10,864	$65,184
11.0.2.-	T-WALLS 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	375	LF	724.00	$271,500	$67,875	$339,375
	SUBTOTAL FLOODWALLS				$357,000	$88,000	$445,000
	SUBTOTAL LEVEES AND FLOODWALLS				$357,000	$88,000	$445,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$88,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$445,000		
30.-.-.-	Engineering and Design				$53,000		
31.-.-.-	Construction Management				$45,000		
	TOTAL COST				$543,000		
	TOTAL COST						$543,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL ORLEANS PARISH LINE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL ORLEANS PARISH, LA. TO ALGIERS LOCK

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	ORLEANS PARISH LINE TO ALGIERS LOCK - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines)	Lump Sum	LS	10,000.00	$10,000	$3,000	$13,000
	SUBTOTAL				$10,000	$3,000	$13,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$3,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$13,000		
30.-.-.-	Engineering and Design				$2,000		
31.-.-.-	Construction Management				$1,000		
	TOTAL COST				$16,000		
	TOTAL COST						$16,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,ORLEANS PARISH,100 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	3.0	EA	10,000.00	$30,000	$10,000	$40,000
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	12,000.00	$12,000	$4,000	$16,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,700	$97,700
11.0.1.B.-	CLEARING and GRUBBING	25.0	AC	1,000.00	$25,000	$7,500	$32,500
11.0.1.B.-	SEMICOMPACTED FILL	47,200.0	CY	4.00	$188,800	$56,700	$245,500
11.0.1.B.-	FERTILIZING and SEEDING	25.0	AC	500.00	$12,500	$3,800	$16,300
	SUBTOTAL						$448,000
30.——	E & D						$54,000
31.——	S & I						$45,000
EMEADP10				TOTALS			$547,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL PUMPING STATION NO.
PUMPING STA. MODIF. EAST BANK OF ALGIERS CANAL - ORLEANS PARISH, LA. 11 MODIFIACTIONS

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PUMPING STATION NO. 11 MODIFICATIONS						
11.0.2.-	Modif. of Pump. Sta. No. 11	Lump Sum	LS	200,000.00	$200,000	$60,000	$260,000
	SUBTOTAL				$200,000	$60,000	$260,000
02.0.2.-	CONTINGENCIES (30% +/-)				$60,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$260,000		
30.-.-.-	Engineering and Design				$31,000		
31.-.-.-	Construction Management				$26,000		
	TOTAL COST				$317,000		
	TOTAL COST						$317,000

COST ESTIMATE	EAST OF HARVEY CANAL PROJECT EAST OF ALGIERS CANAL,PLAQUEMINES PARISH,100 YR						29 SEPT 89
Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
0.2.—	RELOCATIONS						
0.2.1.—	ROADS,CONTR.ACT. RAMPS	9.0	EA	8,000.00	$72,000	$21,600	$93,600
0.2.3.—	UTILITIES						
0.2.3.2.-	UTILITIES						
0.2.3.2.R	POWERLINES	LUMP SUM	LS	90,000.00	$90,000	$30,000	$120,000
11.——	LEVEES and FLOODWALLS						
11.0.A.—	MOBILIGATION and DEMOB	LUMP SUM	LS	75,000.00	$75,000	$22,600	$97,600
11.0.1.B.-	CLEARING and GRUBBING	108.0	AC	1,000.00	$108,000	$32,400	$140,400
11.0.1.B.-	SEMICOMPACTED FILL	310,800.0	CY	4.00	$1,243,200	$373,000	$1,616,200
11.0.1.B.-	FERTILIZING and SEEDING	108.0	AC	500.00	$54,000	$16,200	$70,200
	SUBTOTAL						$2,138,000
30.——	E & D						$257,000
31.——	S & I						$212,000
EHEAPP10				TOTALS			$2,607,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Project Cost			
	SUMMARY OF COST				
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL				
11.-.-.-	LEVEES & FLOODWALLS	912,000.00			
02.-.-.-	RELOCATIONS	130,000.00			
30.-.-.-	ENGINEERING & DESIGN	125,000.00			
31.-.-.-	CONSTRUCTION MANAGEMENT	104,000.00			
01.-.-.-	REAL ESTATE COST				
	TOTAL PROJECT COST	1,271,000.00			
	TOTAL ESTIMATED PROJECT COST				$1,271,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YEAR LEVEL F-LEVEE
LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL PLAQUEMINES PARISH, LA. TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
11.-.-.-	FLOODWALLS						
11.0.A.-	Mobilization & Demob.	Lump Sum	LS	40,000.00	$40,000	$12,000	$52,000
11.0.2.B	Site Work (Clearing,Fert. & Seeding)	Lump Sum	LS	2,000.00	$2,000	$600	$2,600
11.0.2.B	Reshape Road Ramps at Gate Locations	11	EA	5,000.00	$55,000	$16,500	$71,500
11.0.2.-	T-WALLS 8' High above Ground (Include Struc Excavation & Backfill, Steel Sheet Piling Prestressed Concrete Piles, Concrete, and Misc. Items)	500	LF	724.00	$362,000	$90,500	$452,500
11.0.2.-	Swing Gates (Include Struc. Steel, Concrete, Steel Sheet Piling, Prestressed Concr. Piles & Misc. Items)						
	a. 20'W x 3'H	3	EA	34,850.00	$104,550	$20,910	$125,460
	b. 24'W x 3'H	2	EA	39,720.00	$79,440	$15,888	$95,328
	c. 28'W x 3'H	1	EA	44,585.00	$44,585	$8,917	$53,502
	d. 32'W x 3'H	1	EA	49,465.00	$49,465	$9,893	$59,358
	SUBTOTAL FLOODWALLS				$737,000	$175,000	$912,000
	SUBTOTAL LEVEES AND FLOODWALLS				$737,000	$175,000	$912,000
11.0.Z.-	CONTINGENCIES (28% +/-)				$175,000		
11.-.-.-	TOTAL CONSTRUCTION COST				$912,000		
30.-.-.-	Engineering and Design				$109,000		
31.-.-.-	Construction Management				$91,000		
	TOTAL COST				$1,112,000		
	TOTAL COST						$1,112,000

LEVEES & FLOODWALLS EAST BANK OF ALGIERS CANAL — PROTECTION TO 100 YEAR LEVEL — F-LEVEE
LEVEES & FLOODWALLS WEST BANK OF ALGIERS CANAL — PLAQUEMINES PARISH, LA. — TO ORLEANS PARISH LINE

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	F-LEVEE TO ORLEANS PARISH LINE - FLOOD PROTECTION ALONG EAST BANK OF ALGIERS CANAL						
02.-.-.-	Relocations						
	Relocation of Utilities (Gas, Oil, Water, Overhead Powerlines, Telephone Lines 6 crossings)	Lump Sum	LS	100,000.00	$100,000	$30,000	$130,000
	SUBTOTAL				$100,000	$30,000	$130,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$30,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$130,000		
30.-.-.-	Engineering and Design				$16,000		
31.-.-.-	Construction Management				$13,000		
	TOTAL COST				$159,000		
	TOTAL COST						$159,000

EAST OF HARVEY CANAL PLAN FEASIBILITY STUDY ---- PROTECTION TO 100 YR LEVEL — PLAQUEMINES AND NEW
PUMPING STATION MODIF. EAST BANK OF ALGIERS CANAL - PLAQUEMINES PARISH, LA. — PLANTERS PUMP. STA. MODIF.

Code	Item	Quantity	Unit	Unit Price	Amount	Contingencies	Project Cost
	PLAQUEMINES PUMP. STATION & NEW PLANTERS PUMPING STATION - MODIFICATIONS						
11.0.2.-	Modification of Plaquemines Pumping Station	Lump Sum	LS	200,000.00	$200,000	$60,000	$260,000
11.0.2.-	Modification of New Planters Pumping Station	Lump Sum	LS	200,000.00	$200,000	$60,000	$260,000
	SUBTOTAL				$400,000	$120,000	$520,000
02.0.Z.-	CONTINGENCIES (30% +/-)				$120,000		
02.-.-.-	TOTAL CONSTRUCTION COST				$520,000		
30.-.-.-	Engineering and Design				$62,000		
31.-.-.-	Construction Management				$52,000		
	TOTAL COST				$634,000		
	TOTAL COST						$634,000

100 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)					DATE APR 94	
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
11.-	LEVEES AND FLOODWALLS						
A.	FIRST LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	18	AC	$250.00	4500	675	$5,175
	(Borrow Pit)	11	AC	$1,500.00	16500	2475	$18,975
11.0.1.B.-	Uncompacted Fill *	110,000	CY	$3.00	330000	49500	$379,500
11.0.1.B.-	Fertilizing & Seeding	18	AC	$500.00	9000	1350	$10,350
	REMARKS:	SUBTOTAL					$432,000
		ENGINEERING & DESIGN					$54,000
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$44,000
		TOTAL FEDERAL COSTS					$530,000

100 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)					DATE APR 94	
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
B.	SECOND LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	18	AC	$250.00	4500	675	$5,175
	(Borrow Pit)	3	AC	$1,000.00	3000	450	$3,450
11.0.1.B.-	Uncompacted Fill *	25,000	CY	$3.25	81250	12200	$93,450
11.0.1.B.-	Fertilizing & Seeding	18	AC	$500.00	9000	1350	$10,350
	REMARKS:	SUBTOTAL					$130,425
		ENGINEERING & DESIGN					$16,575
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$13,000
		TOTAL FEDERAL COSTS					$160,000

100 YR.	COST ESTIMATE FOR OAKVILLE LEVEE ALIGNMENT (F-LEVEE)					DATE APR 94	
Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
C.	THIRD LIFT						
11.0.A.-	Mobilization & Demobilization	Lump Sum	LS	$15,000.00	15000	3000	$18,000
11.0.1.B-	Clearing & Grubbing(Levee)	18	AC	$250.00	4500	675	$5,175
	(Borrow Pit)	3	AC	$1,000.00	3000	450	$3,450
11.0.1.B.-	Semicompacted Fill *	30,000	CY	$4.00	120000	18000	$138,000
11.0.1.B.-	Fertilizing & Seeding	18	AC	$500.00	9000	1350	$10,350
	REMARKS:	SUBTOTAL					$174,975
		ENGINEERING & DESIGN					$19,000
	*Assume 2 mi. Round Trip Haul	SUPERVISION & ADMIN.					$16,025
		TOTAL FEDERAL COSTS					$210,000
		CODE 11 TOTAL(LIFTS 1+2+3)					$900,000

Code	Description	Quantity	Unit	Unit Price	Amount	Contingency	Total Proj Cost
0.2-	RELOCATIONS						
0.2.1	Roads, Contr. Act. Ramps	4	EA	$10,000.00	40000	12000	$52,000
0.2.3	Utilities						
0.2.3.2.R	Powerlines	Lump Sum	LS	$65,000.00	65000	20000	$85,000
		CODE 02 TOTAL					$137,000
		CODE 11 + CODE 02 TOTAL					$1,037,000
		TOTAL (ROUNDED)					**$1,040,000**

APPENDIX B

ECONOMICS

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA EAST OF HARVEY CANAL

ECONOMIC APPENDIX

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WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
EAST OF HARVEY CANAL

ECONOMIC APPENDIX

SECTION 1. GENERAL

INTRODUCTION. This appendix was prepared in accordance with Engineering Regulation (ER) 1105-2-100, Planning Guidance. The National Economic Development Procedures Manual - Urban Flood Damage prepared by the Water Resources Support Center, Institute for Water Resources was also used as a reference. The feasibility report for this flood control study was originally prepared in 1992. However, it has been revised in order to incorporate PGM comments regarding the methods used in the calculation of benefits attributable to the project.

This report presents an economic evaluation of the water resource improvements being considered for the West Bank of the Mississippi River in the vicinity of New Orleans, located east of the Harvey Canal. Two plans with varying levels of protection were selected for detailed economic analysis. (See Plan Formulation for a description of the plans which were eliminated prior to this stage of the analysis.) Plan 1 involves the construction of a floodwall, which will extend along the Harvey Canal from the Harvey Lock to Lapalco Boulevard. A combination of levees and floodwalls will be constructed along the Harvey Canal from Lapalco Boulevard south to the Hero Pumping Station. The existing line of levee protection along the Algiers Canal from the Hero Pumping Station east to the Algiers Lock will be upgraded as part of the project. The features of Plan 1 are indicated on Plate 3. The Plan 1 alignment will provide flood protection for all of the residential development in the portion of the study area west of the Algiers Canal. However, the industrial complexes located along the Harvey Canal will not only be excluded from the flood protection, but will also be subject to induced flooding from the project. Because the economy of the West Bank is closely tied to this industrial base, the inundation of these structures will have an adverse effect the economic health of the entire area.

At the request of the Harvey Canal Industrial Association, the West Jefferson Levee District, and Jefferson Parish officials, a new plan (Plan 3B), which provides flood

protection for the Harvey Canal industrial corridor, was developed. The selected alignment of Plan 3B provides for the construction of a navigable floodgate in the Harvey Canal just south of Lapalco Boulevard. A diverted outfall canal for the Cousins Pumping Station, discharging below the navigable floodgate, will eliminate the need for a new pumping station. The diverted outfall canal will also temporarily accommodate traffic in the Harvey Canal while the floodgate is under construction. The pumping capacity of the Cousins Station will be increased in order to compensate for the temporary closure of the Harvey Pumping Station during the times that the floodgate is closed. On the east side of the Harvey Canal, a combination of levees and floodwalls will be constructed from the location of the floodgate, south to the Hero Pumping Station. The existing levees along the Algiers Canal from the Hero Pumping Station to the Algiers Lock will be upgraded as described in Plan 1. The features of Plan 3B are indicated on Plate 5.

A single structural alternative is being considered for the area east of the Algiers Canal. The existing levees along the Algiers and Hero Canals have been incorporated into the alignment in order to minimize costs and environmental impacts. The plan will provide for the enlargement of the existing levee system along the east side of the Algiers Canal from the Algiers Lock to the Hero Canal, and along the north bank of the Hero Canal. A new levee will be constructed paralleling the western edge of Oakville, and connecting the Hero Canal levee with an existing Plaquemines Parish levee. The east of Algiers Canal alignment is indicated on Plate 6. This alignment could be combined with either of the alternatives for the area west of Algiers Canal. The two plans are described in detail in the Plan Formulation Section of the main report.

The economic analysis consists of a description of the methodology used to determine economic damages and benefits under existing and future conditions, project costs, and benefit-to-cost analyses. Present and future land use under existing and future hydrologic conditions were analyzed for the without and with-project conditions. October 1991 price levels were used in the evaluation in order to determine the recommended plan. The proposed improvements (see Plan Formulation) were evaluated by comparing estimated expected annual benefits that would accrue to the project area with estimated expected annual project costs. Benefits were converted to equivalent annual values by use of the 1991 Federal discount rate of 8-1/2 percent and a project economic life of 100 years. The base year for the area west of the Algiers Canal is the year 2002, and the year 1999 for the area east of the Algiers Canal.

Benefits and costs for the recommended plan were updated to October 1993 price levels through use of the current Federal discount rate of 8 percent and a project economic life of 100 years. The base year of the project in the area east of the Algiers Canal was changed from 1999 to 2002, which is the same base year as the project west of the Algiers Canal.

The Economic Appendix is divided into eleven sections. A description of the study area is provided in Section 2. Damages and benefits for residential and commercial properties are addressed in Sections 3 and 4, and are displayed by reach. Due to the unique nature of Alvin Callender Field and the Harvey Canal industrial corridor, separate analyses were conducted for these areas, and the results are presented in Sections 5 and 6. The navigational impacts of the project are discussed in Section 7. The total equivalent annual benefits and costs for residential, commercial, and industrial interests are evaluated in Section 8. Reach benefits throughout this report are shown by the two separable elements of the project: the area west of the Algiers Canal, Reaches A - D and the Harvey Canal industrial corridor; and the area east of the Algiers Canal, Reaches E and F, and Alvin Callender Field and Oakville (see Figure 1). Sections 9 and 10 discuss net benefits and the recommended plan. Finally, in Section 11, the effects of varying the assumptions regarding the valuation of residential contents, and projections of future conditions are analyzed for their impacts on the B/C ratio of the recommended plan.

NED BENEFITS CONSIDERED. The National Economic Development Procedures Manual for Urban Flood Damage recognizes four primary categories of benefits for urban flood control plans: inundation reduction, intensification, location, and employment benefits. Inundation reduction is the only primary category of NED benefits considered. The future development accounted for in the analysis would occur either without or with the project in place.

Inundation Reduction Benefits. Most benefits from a hurricane protection project result from the reduction of actual or potential damages due to inundation. Physical inundation reduction damages include damages to residential and commercial structures, losses to the contents in those structures, and damages to privately owned automobiles. Because land use is the same with or without a project, benefits accrue primarily through the reduction in actual or potential damages associated with existing and future land use. Physical damages are evaluated separately for residential, commercial, and industrial properties. Non-physical inundation reduction categories considered include income loss, emergency costs and benefits, FIA administrative costs and benefits, and reduced fill benefits.

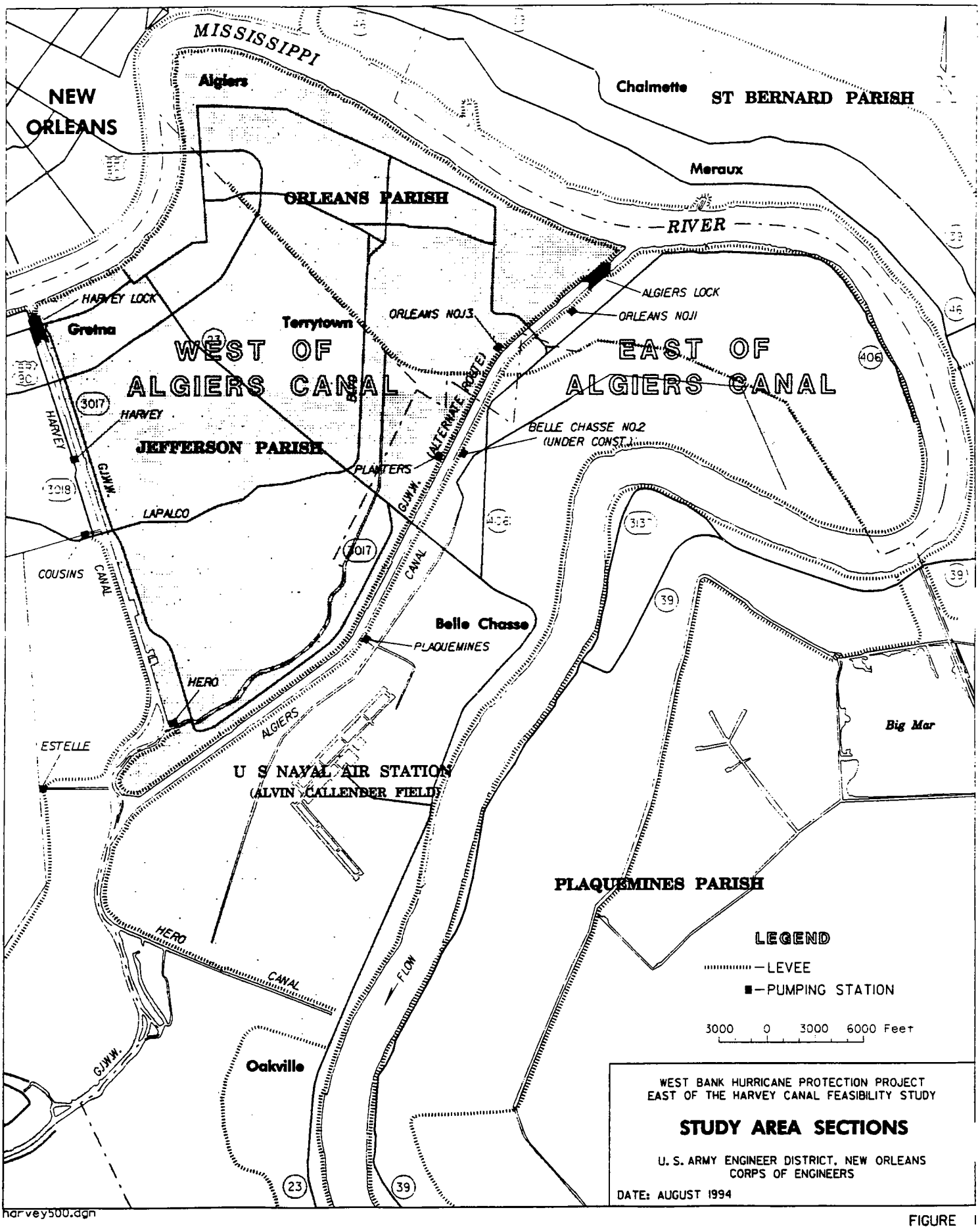

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FIGURE 1

Income Losses. In addition to physical flood damages, some level of income loss can occur due to lost sales and/or net profits to business. Prevention of income loss is creditable as a benefit only if it cannot be compensated for by postponement of an activity or transfer of the activity to other establishments. In most cases, losses under this category are extremely difficult to estimate and document. Therefore, income losses were not quantified in this feasibility study.

Emergency Costs and Benefits. A significant cost that is incurred with major hurricanes is the emergency costs of preparing for the storm and clean-up afterwards. Included with this is the damage sustained by public property, such as roads and bridges, pumping stations, etc. Certain public property damages can be prevented, and some emergency costs reduced based on protection provided by the project. Reduction of these costs are a benefit creditable to the project.

FIA Administrative Costs and Benefits. After a flood control project has been completed, certain indirect benefits often result that contribute to the NED account. Benefits considered in this category consist of the potential reduction in FIA administrative costs. The net national cost of the flood insurance program includes the costs of claims adjustment, agent commissions, and the cost of servicing the policies. Potential benefits from a project arise due to a reduction in this administrative overhead. The current administrative cost per policy is $111.

Flood insurance is required by mortgage lenders based on the ground elevation and the vulnerability of the area to rainfall or hurricane flooding. The additional flood protection provided by the project will not significantly alter the existing flood zone designations. Thus, only home owners who own their homes outright will have the option of forgoing the purchase of flood insurance. In the previous analysis, the reduction of FIA costs was found to be less than 1 percent of total benefits. The reduction of FIA costs was not included as an NED benefit category in this analysis because it was found to be an insignificant amount.

Reduced Fill Benefits. Future homeowners in the study area may incur fill reduction benefits that result from the lowering of the 100-year flood event by the project. The reduced stages may lead to a lowering of the 100-year base flood elevation required by the Federal Emergency Management Agency (FEMA). These benefits can be quantified as the cost savings generated by the reduction of fill material necessary to bring a structure up to

the required 100-year base flood elevation. Thus, homeowners could be in complaince with FEMA flood proofing regulations at a lower cost.

Because the study area is subject to both hurricane and rainfall flooding, the base flood elevation is defined as the the highest stage created by either the 100-year hurricane or the 100-year rainfall event. Usually the hurricane will create the higher stage. However, with the project in place, the stages from the hurricane flooding would be lowered. Thus, the stages from the rainfall event would become the determining factor. Separate studies are being conducted to address the problems associated with stormwater runoff in Jefferson and Orleans Parishes. The reduced fill benefits attributable to the project would equal the difference between the original 100-year base flood elevation determined by hurricane stages and the new base flood elevation determined by the 100-year rainfall event. The amount of required fill must accomodate the rainfall stages, and would be reduced by only 1 foot or less within the study area. Because the resulting benefits are minimal, reduced fill benefits were not quantified as a non-physical inundation reduction benefit category in this analysis.

SECTION 2. DESCRIPTION OF STUDY AREA

LAND USE. The study area is located within a 35,000-acre leveed area along the West Bank of the Mississippi River, which extends southward from a point near the Harvey Canal in Jefferson Parish, along the Lower Coast through Orleans Parish, to the Hero Canal below Belle Chasse in Plaquemines Parish. Jefferson, Orleans, and Plaquemines Parishes are all part of the New Orleans Metropolitan Statistical Area (MSA), which also includes St. Bernard, St. Charles, St. John the Baptist, St. James, and St. Tammany Parishes. (Plaquemines and St. James Parishes were added to the New Orleans MSA in 1993.) The majority of the 22,550 acres of urban development in the study area are located west of the Algiers Canal/Gulf Intracoastal Waterway (GIWW). Most of the remaining 11,300 acres of forested or undeveloped lands, along with an estimated 800 acres of agricultural land, are located east of the Algiers Canal/GIWW.

The area east of the Algiers Canal/GIWW includes two large tracts of land currently used for a U.S. Coast Guard Reservation and a U.S. Naval Air Station (Alvin Callender Field). This area also includes approximately 3,600 acres of undeveloped land in Lower Coast Algiers, and approximately 2,800 vacant acres in the Belle Chasse area. The recently completed twin span of the Crescent City Connection bridge has contributed to the development of remaining vacant lands east of the Algiers Canal/GIWW. Much of the land used for industrial development is located along the river. Residential communities include Harvey, Gretna, Terrytown, and Algiers, which are west of the Algiers Canal/GIWW, and Belle Chasse, which is east of the Algiers Canal/GIWW. Table 1 gives a breakdown of land usage by acres for 1985 and 1989 in the study area. Between 1985 and 1989, 669 acres of forested land were converted to urban use.

There are four main categories of existing land use in the study area: residential, commerical, industrial, and public. Residential property includes single-family and multi-family residences, which are owned by the residents either individually or cooperatively, by corporations, by government agencies, or by landlords. Commerical property includes retail, wholesale, and distribution operations, warehousing, office and professional buildings, etc. Industrial property includes marine, mining, and pipe-fitting plants along the Harvey Canal. Public property includes civic centers, court houses, schools, military and park facilities, and others owned by public jurisdiction.

TABLE 1

WEST BANK - EAST OF HARVEY CANAL
LAND USAGE BY ACRES*
1985 and 1989

Land Use	No. of Acres	
	1985	1989
Forested	11,993	11,324
Urban	21,881	22,550
Agricultural	811	811
Open Water	1,232	1,232
Total Study Area	35,917	35,917

*Note: The number of acres and its usage was estimated from infrared photography.

With the exception of the Stonebridge Subdivision in Reach D, the portion of the study area west of the Algiers Canal (Reaches A, B, C, and D) is almost completely developed. Minimal new land usage is expected in these areas. Residential land usage is expected to continue expanding in the portion of the study area east of the Algiers Canal (Reaches E and F), where there are large tracts of vacant land. Additional land usage has been projected for these areas in order to compensate for the shifts in population that will occur as people move from urbanized segments of the New Orleans MSA to these newer, more rural areas. Commercial land usage in Reaches E and F should increase in order to support the potential population increases in these areas. Industrial land uses along the Harvey Canal and the Mississippi River have the potential to grow with the recent passage of the North American Free Trade Agreement (NAFTA). Future residential and commercial development is expected to continue, with or without the project in place.

DELINEATION OF HYDROLOGIC REACHES. The study area was divided into six reaches (A through F) based on hydrologic characteristics. The reaches were further divided into sub-areas based on a combination of other factors, including geography, major thoroughfares, and housing characeristics. The division of the area into sub-areas is necessary in order to simplify the data collection process, and to facilitate the future identification of the areas. Reaches E and F have no sub-areas because they contain large tracts of undeveloped land. The other reaches in the study area have as many as 17 sub-areas. Figure 2 delineates the reaches and sub-areas.

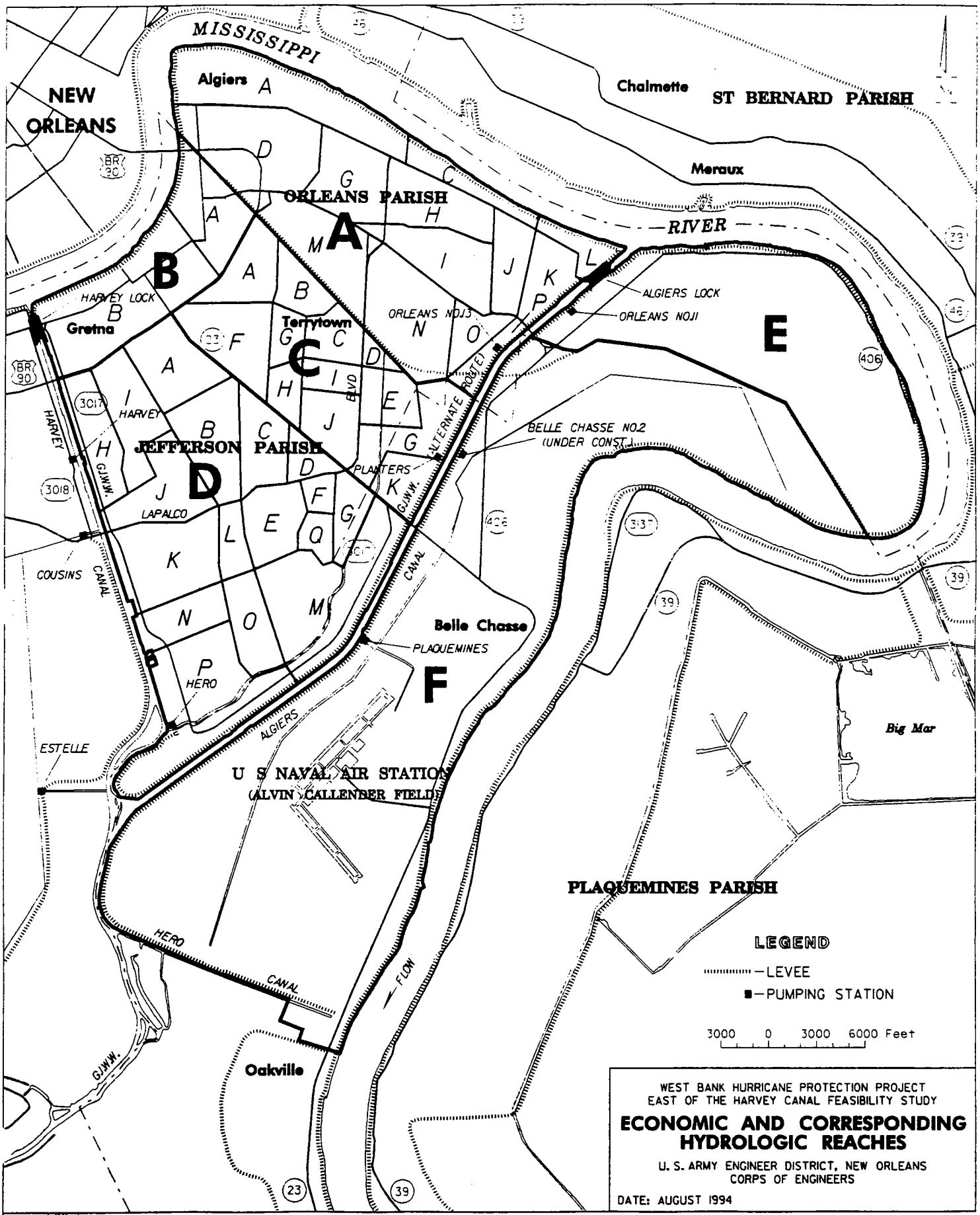

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FIGURE 2

Reach A. This reach lies entirely within Orleans Parish. The reach is almost pie-shaped, and therefore, has only three boundaries; the Mississippi River to the North, the Algiers Canal/GIWW alternate route and the Donner Canal. This reach encompasses the earliest developed areas of the West Bank, and has 12 sub-areas.

Reach B. Reach B lies entirely within Jefferson Parish, and is bounded by the Mississippi River, Donner Canal, West Bank Expressway, and the Harvey Canal/GIWW. This reach has only two sub-areas.

Reach C. The majority of Reach C is located in Jefferson Parish, while approximately 20% of the reach is in Plaquemines Parish. The reach is bounded by the West Bank Expressway, Donner Canal, Algiers Canal/GIWW, and Belle Chasse Highway. Reach C has 11 sub-areas.

Reach D. Reach D consists of a densely populated area with widely varying land uses. In addition to residential and commercial structures, there is an industrial belt along the Harvey and Algiers Canals. This reach lies predominently within Jefferson Parish, with less then 10% of the reach in Plaquemines Parish. The boundaries of the reach include West Bank Expressway, Belle Chasse Highway, Algiers Canal/GIWW, and the Harvey Canal/GIWW. Reach D has 17 sub-areas.

Reach E. Reach E is the least populated reach within the project area. Being almost semi-circular in shape, the reach has only three boundaries, the Mississippi River, Donner Canal, and the Algiers Canal. While this reach has the fewest structures in the study area, it is also the site of an exclusive development called English Turn. Sales of home sites have already begun in the first five phases of English Turn development. The average price of a lot in this community is $200,000, while the average selling price of a home is $550,000. English Turn should lead to the residential and commercial development of the adjacent areas in Reach E. Approximately 1,000 acres in this reach have recently converted into a wilderness park and breeding center for endangered species. This reach is entirely within Orleans Parish and has no sub-areas.

Reach F. This is the largest reach in the project area in terms of total area. Except for a small slice of land in Orleans Parish, the entire reach lies within Plaquemines Parish. Its boundaries include Donner Canal to the north, the Mississippi River to the east, Hero Canal to the south, and Algiers Canal/GIWW to the west. This area has a large amount of

undeveloped land within its boundaries. There are no sub-areas in this reach. A large portion of this reach is made up of the Naval Air Station New Orleans (Alvin Callender Field). Facilities within the base have slab elevations ranging from 0 to 3 feet and are located above the 100-year flood plain. Communities in lower Plaquemines Parish use the base as a hurricane evacuation center.

BUSINESS/INDUSTRIAL ACTIVITY AND REGIONAL GROWTH. The study area, which includes portions of Jefferson, Orleans, and Plaquemines Parishes, is part of the New Orleans Metropolitan Statistical Area (MSA). Until recent years, the economy in this part of the state was dominated by oil and gas activities. However, with the decline of this industry that began in 1981, other segments of the economy have become increasingly more important. The West Bank economy is primarily centered around the port and related commercial and manufacturing activities, such as shipbuilding, grain transport, and storage. Most of the heavy industries in Jefferson Parish are located along the Harvey Canal and the Mississippi River, including one of the largest manufacturing industries in the state at Avondale. This industrial base has attracted retail trade and services to the surrounding area. In addition to these activities, the West Bank, especially Plaquemines Parish, has been a major producer of natural gas, petroleum, sulfur, salt, fish and shellfish. With the advent of the Louisiana gaming industry and the likelihood that a gambling boat will be located on the Harvey Canal, the West Bank will have the potential for a growing tourist industry.

One of the fastest growing industries on the West Bank, as well as in the entire metro area, is health care. Several new hospitals, medical complexes, and extended care facilities have been constructed on the West Bank during the past few years. Continued growth has been projected for this sector of the economy.

The opening of the twin span of the Crescent City Connection bridge and the completion of the elevated Westbank Expressway will continue to benefit the retail activity in the area. The Oakwood Shopping Center has undergone extensive renovation during the past few years, and this was highlighted by the opening of the new Maison Blanche store. This shopping mall currently has the most retail space of any shopping center in the New Orleans area.

The establishment of a more diversified economy to offset declines in the oil and gas industry is important for future economic growth. Port activity along the Harvey Canal

and the expansion of the tourist and health services industries will be major factors in promoting future economic growth.

EMPLOYMENT. According to a March 1994 report prepared by the Louisiana Department of Labor, the total nonagricultural employment in the New Orleans MSA was estimated to be 573,000 as of February 1994. This represents an increase of 11,600 jobs since February of 1993. The majority of this increase occurred in the health, amusement, and recreation segments of the services industry, which gained an additional 7,500 new jobs. Manufacturing, mining, and wholesale and retail trade showed a slight decline. Even though the number of jobs increased during the period, the unemployment rate for the New Orleans MSA rose from 6.6% in February 1993 to 7.0% in February 1994. The unemployment rate for the state of Louisiana increased from 7.7% to 8.0% during the same period. Table 2 provides a summary of the non-agricultural wage and salary employment in the New Orleans MSA.

TABLE 2

WEST BANK - EAST OF HARVEY CANAL
NEW ORLEANS METROPOLITAN STATISTICAL AREA
NON-AGRICULTURAL WAGE AND SALARY EMPLOYMENT
(IN THOUSANDS BY INDUSTRY)

Non-agricultural Employment	Feb. 1994	Jan. 1994	Feb. 1993	Net Change from Jan. 1994	Net Change from Feb. 1993
TOTAL	573.0	569.7	561.4	+3.3	+11.6
Manufacturing	47.5	47.4	47.7	+0.1	-0.2
Mining	14.1	14.0	14.4	+0.1	-0.3
Construction	25.2	25.7	24.1	-0.5	+1.1
Transportation & Public Utilities	43.4	42.2	43.0	+1.2	+0.4
Wholesale & Retail Trade	139.0	138.0	139.2	+1.0	-0.2
Finance, Ins., & Real Estate	29.9	29.9	29.2	0	+0.7
Services	171.5	170.5	164.0	+1.0	+7.5
Government	102.4	102.0	99.8	+0.4	+2.6

Source: State of Louisiana, Department of Labor, "Louisiana Labor Market Information". March 25, 1994. Includes data for Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, and St. Tammany Parishes.

The University of New Orleans Division of Business and Economic Research predicts that total employment in metropolitan New Orleans will increase over the next two years. The UNO Model projects employment will increase by over 3,600 jobs by the end of 1994, and by another 11,000 jobs in 1995. While the oil and gas industry is expected to remain stable, tourism and the health services industry are predicted to experience rapid growth. Construction, retail trade, and state and local government are also expected to experience employment growth. Employment in the gaming industry will increase as the temporary land-based casino opens in mid-1994, and as more riverboat casinos begin operation.

INCOME. Table 3 shows per capita personal income levels for the three parishes in the study area, the New Orleans Metropolitan Statistical Area, and the State of Louisiana Between 1981 and 1986, the growth rate in per capita income of the New Orleans MSA averaged a modest 3.4% per year. However, this average almost doubled to 6.0% per year during the period 1987-1991. This increase is reflective of the upswing in the metropolitan economy during the same period.

TABLE 3

WEST BANK - EAST OF HARVEY CANAL
PER CAPITA PERSONAL INCOME 1989, 1990, and 1991
FOR PARISHES WITHIN THE STUDY AREA, NEW ORLEANS MSA, AND STATE

				Percent Change	Average Annual Change	
Area	1991	1990	1989	1990-91	1987-90	1981-86
Jefferson Parish	$17,489	$16,849	$15,707	3.8%	8.1%	3.3%
Orleans Parish	17,130	16,474	15,262	4.0%	9.2%	4.2%
Plaquemines Parish	15,865	14,643	13,460	8.3%	n/a	n/a
New Orleans MSA	17,198	16,302	15,288	5.5%	8.6%	3.4%
Louisiana	15,054	14,300	13,235	5.3%	8.9%	2.8%

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis, "Survey of Current Business," April 1993.

According to recent statistics released by the Commerce Department, Louisiana is one of the few states where per capita income growth exceeded the national average from 1990 to 1991. The per capita income of Louisiana averaged $15,054 in 1991. This represents a gain of 5.3% from 1990, and compares favorably to the national average increase rate of 2.1%. However, per capita income in this state is still well below the 1991 national per capita income average of $19,082.

The University of New Orleans reports that the per capita income of the New Orleans MSA increased 3.7% between 1992 and 1993. However, in nominal terms, this measure is expected to grow at a slower rate during the next two years.

POPULATION AND COMMUNITY. Table 4A summarizes the 1990 Census Bureau population count for the three parishes within the project area.

TABLE 4A

WEST BANK - EAST OF HARVEY CANAL
TOTAL POPULATION 1980, 1990, 1992, AND 1993

Area	1980	1990	1992	1993	% Change '80 - '90	% Change '92 - '93
New Orleans MSA	1,304,212	1,286,270	1,304,298	1,306,546	- 1.38	0.17
Plaquemines Parish	26,049	25,575	25,869	26,075	- 1.82	0.80
Jefferson Parish	454,593	448,306	456,389	457,069	- 1.38	0.15
Orleans Parish	557,515	496,938	495,116	493,021	- 10.87	- 0.42

Note: New Orleans Metropolitan Statistical Area (MSA) included population for Jefferson, Orleans, St. Bernard, St. Tammany, St. Charles, St. John the Baptist, Plaquemines, and St. James Parishes. Plaquemines and St. James Parishes were added to the New Orleans MSA per OMB Bulletin No. 93-50, December 28, 1992.

Sources: U.S. Census Bureau; and 1992 and 1993 figures are preliminary unpublished estimates provided by Louisiana Tech University, College of Administration and Business, Research Division.

The total population in the metropolitan area declined during the 1980's primarily due to the collapse of the oil and gas industry. A majority of this out-migration occurred on the East Bank of Orleans Parish. Preliminary population estimates prepared by Louisiana Tech University show that by 1993 the population in Jefferson and Plaquemines Parishes, as well as the entire New Orleans MSA, had surpassed the 1980 levels. Only the population of Orleans Parish continued in a downward trend. Population growth is expected to continue paralleling the local economic activity.

According to the University of New Orleans, continued employment gains in excess of 7,500 jobs per year will support a 1% population growth in the metro area. The exact location of the population growth will be influenced by many factors including land availability, improvements to the transportation network, and improvements in the local economy.

Table 4B provides the 1980 and 1990 Census Bureau population estimates for the individual communities within the project area.

TABLE 4B

WEST BANK - EAST OF HARVEY CANAL
TOTAL POPULATION BY COMMUNITY
CENSUS DATA - 1980 AND 1990

Area	Population 1980	Population 1990	Change Pop. #	Change %
Algiers	59,120	56,707	-2,413	- 4.0
Terrytown	23,548	23,787	+ 239	1.0
Gretna	20,615	17,208	-3,407	-16.5
Harvey	22,709	21,222	-1,487	- 6.5
Stonebridge/ Timberlane	8,638	14,524	+5,886	68.0
Belle Chasse Area	8,844	8,910	+ 66	0.1
Total Study Area	143,474	142,358	-1,116	-0.1

Source: U.S. Census Bureau

Note: A small portion of Harvey above the West Bank Expressway is on the west side of the Harvey Canal.

The upscale subdivisions, including Stonebridge and Timberlane, experienced rapid growth, while the lower income areas in Harvey, Gretna, and Algiers showed a decline in total population. Additional population growth within the study area is expected to occur as more homes are constructed in existing subdivisions, and as residential development takes place in the vacant land east of the Algiers Canal.

PROPERTY VALUES AND HOUSING. Table 5 shows the change in the total number of housing units for the three-parish area.

TABLE 5

WEST BANK - EAST OF HARVEY CANAL
NUMBER OF HOUSING UNITS *
JEFFERSON, ORLEANS, AND PLAQUEMINES PARISHES
1980 AND 1990

Parishes	1980 Census Housing Units	1990 Census Housing Units	Housing Unit Change
Jefferson	166,124	185,072	**18,948
Orleans	226,055	225,573	-482
Plaquemines	9,490	9,432	-58
Total	401,669	420,077	18,408

SOURCE: U.S. Department of Commerce, Bureau of the Census

* The 1990 Census estimate for vacant housing units in Jefferson and Orleans Parishes was 19,207 and 38,174, respectively. Estimates for Plaquemines Parish were not available.

** The growth in housing units mainly occurred on the East Bank of Jefferson Parish.

Although housing prices in the metropolitan area generally showed a downward trend during the mid to late 1980's, they have increased between 6% and 7% per year since 1990. According to the Real Estate Market Analysis prepared by the University of New Orleans, the price of an average house in the metropolitan area increased from a low of $82,613 in 1990 to an all time high of $98,789 in 1993. By national standards, however, the prices of homes in the New Orleans area still remain 20% or more below the national average. The highest average sales price in the metropolitan area was recorded in English

Turn, which is located in Reach E of the study area. Housing sales in this community averaged $550,000 during the first nine months of 1993.

During the past year, there has been a shift in the real estate market throughout the area to purchases of larger homes. If the market continues its recovery and the demand for larger houses increases, there exists the potential for the average price of a house in the area to rise above $110,000. However, this price increase will only be sustained if employment gains occur in the metro area.

After nearly a decade of falling occupancy rates and rents, the apartment market has also stabilized and has begun to improve. The average occupancy rate in the metro area increased from 90.3% in mid-1993 to almost 91.5% by the end of the year. Apartment occupancy ranged from 88.5% in Orleans Parish, to 92.7% in Jefferson Parish. These rates are expected to continue rising if employment gains occur due to the construction and opening of a land-based casino.

The recent gains for housing values in affluent neighborhoods and for occupancy rates in large apartment complexes on the West Bank of Orleans Parish are encouraging signs for the future.

Low occupancy rates and rents characterize the office, retail, and warehouse markets on the West Bank, particularly in Algiers and Gretna. Newer and larger commercial construction will gain only at the expense of older and smaller buildings.

PUBLIC FACILITIES, SERVICES, AND TAX REVENUE. The transportation network on the West Bank has improved greatly with the opening of the Crescent City Connection twin span and the completion of the elevated West Bank Expressway. Also, the high-rise bridge across the Algiers Canal/GIWW has improved the access to the Lower Coast of Algiers and the English Turn Community. These improvements to the infrastructure of the area will have a positive impact on residential and commercial development.

There are three large military installations in the project area: the Naval Support Activity located in Algiers, the U.S. Coast Guard Station located in the Lower Coast of Algiers, and the Naval Air Station New Orleans (Alvin Callender Field) located in Belle Chasse. Facilities of the Alvin Callender Field are used as an evacuation shelter for residents of Plaquemines Parish. Adequate drainage and flood control are necessary to sustain the continued maintenance and development of these public facilities and services. Without

the additional hurricane protection which the project would provide, additional tax revenues would be needed to mitigate the effects of periodic hurricane surges and flood damage in the study area.

ECONOMIC OUTLOOK. The establishment of a more diversified economy, along with the continued expansion of tourism and health services, is important for future economic growth. With the decline of the oil and gas industry and the continued loss of jobs in manufacturing, the area must create the climate for growth in other sectors of the economy. This growth should be separate from the potential job gains due to gaming construction and employment.

As the 21st century approaches, the strategic geographical location of the New Orleans metro area could allow it to take advantage of the increased trade associated with the development of the North American Free Trade Agreement (NAFTA). With proper positioning, the New Orleans metro area could gain a share of the increased north/south commerce generated by the bill and expand its port activities. This could also create the potential for the development of satellite industries connected with the flow of trade.

Table 6 shows the 1990 OBERS New Orleans MSA projections based on historical trends for population, per capita income, and employment. These projections include only six parishes rather than the expanded eight parish area. The projected compounded annual population growth rate is 0.03% during the 50-year period, while the per capita income and employment were projected at 0.9% and -0.2%, respectively, during the same period. The population projections were recently adjusted to reflect the 1990 Census data for the entire eight-parish area. In the revised projection, the compounded annual population growth rate falls to 0.02%.

In view of the preliminary population estimates prepared by Louisiana Tech University, and a historical average population growth rate of 1% per year, the OBERS projections, which shows practically no-growth for the next fifty years, appears to be overly conservative. According to Louisiana Tech estimates, the current population in the New Orleans Metro area has already surpassed the OBERS population projection for the year 2000. It should also be noted that the projections do not consider the population shifts that will occur as people move from urban areas to newer more rural areas within the MSA. Consequently, OBERS population projections were not used for future development projections in the area East of the Algiers Canal through the year 2040.
As with any long term projection, a high degree of uncertainty is implicit.

TABLE 6
NEW ORLEANS, LA (MSA)
Population, Per Capita Income, and Employment, 1973-1988, and Projected, 1995-2040

	1973	1979	1983	1988	1995	2000	2005	2010	2020	2040
Population as of July 1 (thousands)	1,1525	1,1238	1,320	1,307	1,304	1,306	1,307	1,312	1,333	1,322
Per capita personal income (1982 dollars)	9,242	11,050	11,373	11,272	12,509	13,383	14,116	14,772	15,862	18,750
	Thousands of Jobs									
Total employment	520.4	616.0	636.9	632.4	654.1	671.0	676.6	674.7	646.4	604.9
Farm	1.4	1.5	1.6	1.4	1.4	1.3	1.3	1.3	1.1	1.0
Nonfarm	518.9	614.5	635.3	630.9	652.7	669.7	675.3	673.4	645.2	603.9
Private	436.5	521.5	535.4	533.9	557.6	574.9	581.7	581.4	558.4	524.2
Agricultural services, forestry, fisheries, and	2.1	2.4	2.7	(D)	3.9	4.3	4.6	4.7	4.8	4.7
Mining	(D)	(D)	22.0	(D)	16.4	16.0	15.5	14.9	13.6	11.9
Construction	35.1	45.5	42.7	30.5	29.6	29.2	28.6	27.9	25.9	23.3
Manufacturing	58.3	60.5	51.0	45.2	44.7	44.8	44.5	43.9	41.6	38.3
Nondurable goods	28.3	28.4	24.9	22.0	20.9	20.5	20.0	19.5	18.1	16.3
Durable foods	30.0	32.1	26.0	23.2	23.9	24.3	24.4	24.4	23.5	22.0
Transportation and public utilities	48.2	57.3	53.7	48.0	47.9	48.3	47.9	47.3	44.7	41.3
Wholesale trade	(D)	(D)	38.6	34.4	34.2	34.2	34.0	33.8	32.2	29.9
Retail trade	82.4	104.9	109.0	115.8	120.0	123.9	125.2	125.0	119.7	111.7
Finance, insurance, and real estate	33.8	43.4	46.5	50.0	51.5	52.8	53.2	53.0	50.7	47.6
Services	122.2	145.3	169.1	189.1	209.2	221.3	228.2	231.0	225.3	215.4
Government and government enterprises	82.4	92.9	99.9	97.0	95.1	94.8	93.6	92.0	86.67	79.7
Federal, civilian	33.8	43.4	46.5	50.0	51.5	52.8	53.2	53.0	50.7	47.6
Federal, military	8.6	8.5	9.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1
State and local	60.6	68.9	75.8	71.0	69.4	69.2	68.3	67.0	62.8	57.0

Source: OBERS, Bureau of Economic Analysis, Regional Projections To 2040, Volume 2, 1990

Please Note: Not Revised to include 1990 Census Data and only includes Six Parishes as part of the N. O. Metro area: Jefferson, Orleans, St.Bernard, St. Charles, St. John the Baptist, and St. Tammany.

SECTION 3. FLOOD DAMAGE EVALUATION

SURVEY OF STRUCTURES. The study area to be surveyed was delineated based on overflows provided by Hydraulics and Hydrology (H&H). Structures at risk were defined as any structure which would flood in the future without project condition by the 500-year (SPH) event. A 100% field survey was deemed the best method for identifying every structure at risk in the study area. Due to the recent construction activity that has taken place during the past few years, the number of structures in the Belle Chasse area (Reach F), the English Turn Community (Reach E), and the Stonebridge Subdivision (Reach D) has been increased from the total provided in the original 1992 report. The additional structures have been included in the structure inventory of this report.

The inadequacy of the existing protection system is demonstrated by the fact that of the 34,362 structures in the area, 13,628 structures will be flooded by the 100-year storm, and 28,522 structures by the Standard Project Hurricane. (See Tables 18A, B, C, and D for a delineation of the current existing and future condition flood zones.) Ground elevations for Orleans and Jefferson Parishes were determined using Federal Insurance Administration maps with 1-foot contour lines. Ground elevations within Plaquemines Parish were determined using 1-foot contour maps that were provided by parish officials. The following sections describe in detail the procedures used to inventory residential, commercial, apartments, and industrial structures.

Residential Structures. This category was subdivided into single-story, two-story, and multi-family structures. Structures were aggregated according to reaches provided by H&H. Economics further divided the reaches into sub-areas to make the data more manageable (see Figure 2). Within sub-areas, homogeneous areas were identified based on house characteristics. These homogeneous areas were used as a basis for determining structure value for a number of houses. These areas ranged in size from one-half block to as large as several blocks. First floor elevations were found by adding between 0.5 and 4.0 feet to the average ground elevation in the area. The height of the structure above the ground was based on a visual observation, with hand levels used to ensure accuracy.

The depreciated replacement cost of each residential structure was calculated by using the Marshall and Swift Residential Estimator Program. This computer program uses continuously price-adjusted costs per square foot, which have been geographically localized by zip code. The structure values derived by the program were also used for similar structures within the same neighborhood.

An example of a residential report is shown in Table 7. Mobile homes were not included because of the relatively small number of these structures included in the survey. Also, the depreciated value of the mobile homes was found to be insignificant.

TABLE 7

WEST BANK - EAST OF HARVEY CANAL
MARSHALL AND SWIFT
RESIDENTIAL REPORT

Reach	: D
Reach Sub-Area	: D-C
Ground Elev	: -3.0
1st Flr Ht Above Ground	: 2.8
Struc Value	: $120,160
Profile No.	: 31(5)
Slab or Pier	: Slab
No. of Structures	: 32
Street Name	: Hawthorne, Meadowbrook, Commerce

Single Family Residence — Floor Area: 2,600 square feet
Effective Age: 5 years — Quality: Good
Condition: Good

Style:	One Story
Heating & Cooling:	Warmed and Cooled Air
Exterior Wall:	Common Brick
Roofing:	Composition Shingle
Floor Structure:	Wood Subfloor
Floor Cover:	Standard Allowance
Plumbing:	Standard Allowance
Appliances:	Standard Allowance

	Units	Cost	Total
Basic Structure Cost	2,600	45.55	118,419
Garage:			
Built-in Garage	350	14.50	5,075
Replacement Cost New	2,600	47.50	123,494
Less Depreciation:			
Physical and Functional	<2.7%>		<3.334>
Depreciated Cost	2,600	46.22	120,160

Cost data by MARSHALL and SWIFT

Non-residential Structures. The number of commercial and industrial establishments was determined during a field survey of the area. Field teams surveyed these structures by sub-area for pertinent characteristics (i.e., type of business, number of stories, type of foundation and construction, and the physical condition and dimensions of the structure). The Marshall and Swift Commercial Estimator Program was used to determine cost per square foot based on a number of factors. One of these factors is the use or occupancy of the structure. Marshall and Swift includes over 100-occupancy categories in their program. Buildings are classified by construction types in order to determine the base cost per square foot. This base cost is then adjusted for factors such as heating and cooling, local construction cost, current cost conditions, and age and life expectancy of the building. The price per square foot was multiplied by the square footage of the building to determine a total value for each commercial structure. Occupancy codes were aggregated into fifteen established categories (see Table 8) for depth damage purposes. A sample Marshall and Swift Commercial Estimator report is shown in Table 9.

Table 10 displays the number and value of structures by reach for residential, apartment and commercial properties.

Table 8

WEST BANK - EAST OF HARVEY CANAL
NON-RESIDENTIAL CATEGORIES

1. Business Services
2. Public Gathering Places, Communications, Transportation, Utilities
3. Cleaning, Maintenance and Grooming
4. Contractor Operations
5. Department Stores
6. Eating and Drinking Establishment
7. Gas Service Stations
8. Grocery Stores
9. Food Stores (Specialty)
10. Home and Auto Supplies, Appliances
11. Medical Buildings
12. Proprietary (Drug) Stores
13. Repair Services
14. Ready-to-Wear
15. Miscellaneous

TABLE 9

WEST BANK - EAST OF HARVEY CANAL
MARSHALL AND SWIFT
COMMERCIAL REPORT

Reach	: D
Ground Elev	: -4.5
1st Flr Elev	: 1.5
Struc Value	: $771,120
Occupancy Code	: 314
Profile No.	: 89(14)
Slab or Pier	: Slab
Business Name	: Country Club

Occupancy:	Country Club		
Floor Area:	12,100 square feet	Number of stories:	1.0
Class:	Masonry	Average story height:	15.0 feet
Cost rank:	Above Average	Effective age:	3 years

Heating & Cooling:
Package Unit 100%
Other features:
Sprinklers serving 12,100 square feet

	Units	Cost	Total
Basic Structure Cost	12,100	65.70	794,970
Less Depreciation			
Physical and Functional	<3.0%>		<23,849>
Depreciated Cost			771,120

Cost data by MARSHALL and SWIFT

Table 10

WEST BANK - EAST OF HARVEY CANAL
VALUES IN $1,000s
OCTOBER 1993

Reach*	Category of Structure	Number of Structures	Value of Structures
A	Residential	12,078	$ 692,347
	Apartments	151	163,819
	Commercial	410	249,293
	Total	12,641	1,105,460
B	Residential	2,446	66,826
	Apartments	29	4,410
	Commercial	606	133,082
	Total	3,081	204,318
C	Residential	6,200	375,873
	Apartments	118	91,958
	Commercial	303	129,075
	Total	6,621	596,906
D	Residential	8,821	585,465
	Apartments	49	98,486
	Commercial	643	156,722
	Total	9,513	849,672
E	Residential	229	41,946
	Commercial	3	11,254
	Total	232	53,200
F	Residential	1,488	115,061
	Apartments	10	3,384
	Commercial	190	39,005
	Total	1,688	157,450
OAKVILLE	Residential	17	170
	Total	17	170
ALVIN CALLENDER	Residential	11	1,008
	Commercial	225	108,469
	Total	236	109,477
HARVEY CANAL	Commercial	333	39,628
	Total	333	39,628

* See Figure 2 for reach delineation

CONTENTS AS A PERCENT OF STRUCTURE VALUE. A detailed survey of the residential structures and their contents was conducted in 1984 by the contracting firm, CH2M Hill, Inc., as part of the Lake Pontchartrain Hurricane Protection Project (LPHPP) study. A total of 125 residential structures was surveyed, and detailed room-by-room inventories of all contents were made. These contents were later valued by standardized procedures using catalogues of several national mail-order houses. Each item was valued at current prices, and then depreciated to reflect its current condition (allowing for age, wear and tear). These depreciated contents values were related as a percent of the house value. Overall percent values were obtained by a least squares fit of these data. The results are shown in Table 11. (Sensitivity analysis is performed on this variable in Section 11 of the Economic Appendix.)

Since both studies are in the urbanized portion of the New Orleans metropolitan area, and the study area of the two studies is essentially the same, the LPHPP relationships were deemed applicable to the West Bank study area. Given that the East and West Banks of the Mississippi River developed at approximately the same time, and have the same construction and housing patterns, this is a reasonable assumption. Both areas have a combination of older wood frame houses with pier foundations, and newer brick homes with pile supported slab foundations.

Non-residential contents value was also expressed as a percentage of structural value. This data is based on interviews with management personnel of all sample structures, and included the value of all contents, i.e., machinery and equipment, furnishings, stock, goods in process, and finished goods. These results are displayed in Table 12.

DEPTH-DAMAGE RELATIONSHIPS FOR STRUCTURES. Depth-damage relationships are estimates of damages that would occur to structures at varying elevations of flooding. Depth-damage relationships for the study area were compiled by 1/2-foot increments of flooding to a depth of 15 feet over the ground floor elevation. Damages are expressed as a percentage of the pre-flood structure value.

Residential. During the course of the LPHPP study, the structural components of 15 residential structure types were analyzed by an independent contractor in order to determine the depth-damage relationships for various residential structures. These were further aggregated into three structure types: single-story, two-story, and mobile homes. Table 13 presents the depth-damage relationships for the saltwater damage that would

occur as a result of the overtopping of area levees during a hurricane. As stated in the previous section of this report, the use of the LPHPP data was deemed appropriate because the range of structure types in the two studies is virtually identical.

Table 11

WEST BANK - EAST OF HARVEY CANAL
CONTENTS AS A PERCENT OF STRUCTURAL VALUE
RESIDENTIAL STRUCTURES

Structure Value Range ($)	Contents as a Percent of Structure Value (%)	Contents Value Range ($)
000 - 10,000	75	000 - 7,500
10,001 - 20,000	75	7,501 - 15,000
20,001 - 30,000	72	14,400 - 21,600
30,001 - 40,000	72	21,601 - 28,800
40,001 - 50,000	72	28,801 - 36,000
50,001 - 60,000	67	33,500 - 40,200
60,001 - 70,000	67	40,201 - 46,900
70,001 - 80,000	62	43,400 - 49,600
80,001 - 90,000	62	49,601 - 55,800
90,001 - 100,000	57	51,300 - 57,000
100,001 - 110,000	57	57,001 - 62,700
110,001 - 120,000	52	57,200 - 62,400
120,001 - 130,000	52	62,401 - 67,600
130,001 - 140,000	52	67,601 - 72,800
140,001 - 150,000	49	68,600 - 73,500
+ 150,000	48	- 73,500

TABLE 12

WEST BANK - EAST OF HARVEY CANAL
CONTENTS AS A PERCENT OF STRUCTURAL VALUE
NON-RESIDENTIAL STRUCTURES

CATEGORY	CONTENTS VALUE (Percent of Structural Value)
Business Services	109
Public Gathering Places	24
Cleaning, Maintenance, Grooming	209
Contractor Operations	97
Department Stores	205
Eating and Drinking Establishments	102
Gas Service Station	83
Grocery Stores	84
Food Stores (Specialty)	98
Home and Auto Supplies, Appliances	127
Medical Buildings	41
Proprietary (Drug) Stores	129
Repair Service	152
Ready to Wear	190
Miscellaneous	113

TABLE 13

WEST BANK - EAST OF HARVEY CANAL
SALTWATER DEPTH-DAMAGE RELATIONSHIP
FOR
RESIDENTIAL STRUCTURES

Depth of Flooding* (Ft)	Percent Damage to Structure		
	One Story (%)	Two Story (%)	Mobile Homes (%)
-1.0	0.0	0.0	0.0
-0.5	0.5	0.5	2.0
0.0	14.5	7.5	30.0
0.5	22.9	12.3	63.5
1.0	29.3	15.7	76.8
1.5	34.0	18.3	87.0
2.0	38.0	20.7	92.0
2.5	41.3	22.8	95.6
3.0	44.3	24.4	97.8
3.5	47.0	25.8	99.0
4.0	49.0	26.8	99.8
4.5	51.4	27.9	100.0
5.0	52.9	28.6	100.0
5.5	54.4	29.2	100.0
6.0	55.7	29.9	100.0
6.5	57.0	30.0	100.0
7.0	57.9	30.0	100.0
7.5	58.7	30.0	100.0
8.0	59.5	30.7	100.0
8.5	60.0	33.2	100.0
9.0	60.8	37.0	100.0
9.5	61.3	40.0	100.0
10.0	61.5	42.3	100.0
10.5	62.0	44.3	100.0
11.0	62.1	46.1	100.0
11.5	62.3	47.5	100.0
12.0	62.4	48.2	100.0
12.5	62.5	49.3	100.0
13.0	62.5	49.9	100.0
13.5	62.5	50.1	100.0
14.0	62.5	50.3	100.0
14.5	62.5	50.4	100.0
15.0	62.5	50.5	100.0

*0.0Ft. = Ground floor elevation

Non-residential. Non-residential depth damage relationships were developed based on construction cost data published by Marshall and Swift Publication Company. The extent of damage is based on the architectural and engineering expertise of the contracting firm. Structural components of five building types were analyzed, and the resulting data were averaged to give the relationships shown in Table 14. Damage data for freshwater and saltwater are the same for these structures.

DEPTH-DAMAGE RELATIONSHIPS FOR CONTENTS. Depth damage data for residential contents developed as part of the LPHPP and based on 15 residential structural types have been used in this study. This information was compiled in a survey of 125 residences. Each item of the household contents was individually appraised for varying levels of water over the floor. These were aggregated for single-story and two-story structures. Mobile homes are included with single-story residences due to lack of sufficient samples. The depth damage relationship for residential contents is about the same for either freshwater or saltwater flooding. Table 15 displays the results.

Depth damage relationships for non-residential contents were also obtained from the LPHPP report. These curves represent estimated damage to the contents and inventories of 250 sample organizatations which would result from cumulative half-foot increments of flooding. This data is aggregated by the means of weighted averages into the 15 non-residential categories. The saltwater depth damage relationships are shown in Table 16. Saltwater damage to contents of non-residential structures is greater than freshwater damage.

TABLE 14

WEST BANK - EAST OF HARVEY CANAL
FRESHWATER AND SALTWATER
DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL STRUCTURES

Depth of Flooding* (Feet)	Percent Damage to Structures (%)
0.0	0.0
0.5	4.9
1.0	8.6
1.5	11.9
2.0	14.3
2.5	16.7
3.0	18.4
3.5	19.5
4.0	20.6
4.5	21.4
5.0	22.0
5.5	22.1
6.0	22.2
6.5	22.3
7.0	22.4
7.5	23.0
8.0	23.8
8.5	24.7
9.0	25.9
9.5	27.3
10.0	29.0
10.5	30.8
11.0	33.0
11.5	35.2
12.0	37.0
12.5	38.8
13.0	40.0
13.5	41.2
14.0	41.9
14.5	42.1
15.0	42.3

*0.0= Ground Elevation

Table 15

WEST BANK - EAST OF HARVEY CANAL
FRESHWATER AND SALTWATER
DEPTH-DAMAGE RELATIONSHIPS
for
RESIDENTIAL CONTENTS

Depth of Flooding (Ft)	Percent Damage to Contents: One-Story Structures and Mobile Homes (%)	Percent Damage to Contents: Two-Story Structures (%)
0.0	0.0	0.0
0.5	11.5	10.0
1.0	21.5	16.0
1.5	31.0	20.0
2.0	39.7	23.6
2.5	46.8	26.2
3.0	52.5	28.1
3.5	57.5	30.0
4.0	61.7	30.3
4.5	64.8	32.4
5.0	67.3	33.5
5.5	69.3	34.3
6.0	70.7	35.0
6.5	71.7	35.5
7.0	72.6	36.0
7.5	73.6	36.5
8.0	74.1	37.0
8.5	74.8	37.4
9.0	75.7	37.9
9.5	76.1	38.5
10.0	76.6	39.3
10.5	77.1	41.6
11.0	77.5	44.8
11.5	77.8	47.5
12.0	78.0	50.5
12.5	78.1	53.0
13.0	78.2	55.9
13.5	78.4	59.0
14.0	78.6	62.0
14.5	78.8	64.6
15.0	79.0	66.9

TABLE 16

WEST BANK - EAST OF HARVEY CANAL
SALTWATER DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL CONTENTS

Depth of Flooding Over Ground Floor (Ft.)	Business Services (%)	Public Gathering Places Communications, Transportation, Utilities (%)	Cleaning, Maintenance Grooming (%)
0.0	0.0	0.0	0.0
0.5	14.0	4.0	32.0
1.0	26.0	7.8	48.0
1.5	35.0	10.7	58.0
2.0	42.0	13.2	65.7
2.5	47.0	15.2	70.6
3.0	51.0	17.0	74.0
3.5	54.3	18.9	77.0
4.0	57.5	20.0	78.3
4.5	60.0	21.5	80.0
5.0	62.2	22.9	81.0
5.5	63.8	24.0	82.0
6.0	64.5	25.0	83.0
6.5	65.7	26.0	83.7
7.0	66.5	27.0	84.0
7.5	67.0	28.0	84.4
8.0	67.5	29.2	85.0
8.5	67.7	30.1	85.5
9.0	67.8	31.0	86.0
9.5	67.9	32.0	86.1
10.0	68.0	32.7	86.2
10.5	68.0	33.5	86.4
11.0	68.1	34.0	86.5
11.5	68.2	34.5	86.5
12.0	68.4	34.9	86.6
12.5	68.6	35.5	86.7
13.0	69.0	35.8	86.8
13.5	69.2	35.9	86.9
14.0	69.4	36.0	87.0
14.5	69.6	36.2	87.0
15.0	69.9	36.4	87.0

TABLE 16

WEST BANK - EAST OF HARVEY CANAL
SALTWATER DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL CONTENTS

Depth of Flooding Over Ground Floor (Ft.)	Home and Auto Supplies, Appliances (%)	Medical Buildings (%)	Drug Store (%)
0.0	0.0	0.0	0.0
0.5	35.0	43.8	11.0
1.0	42.3	48.0	18.0
1.5	48.0	50.5	26.6
2.0	54.3	52.2	34.5
2.5	60.4	54.0	43.0
3.0	65.5	56.0	51.0
3.5	70.9	57.6	60.0
4.0	75.0	58.9	68.4
4.5	78.6	60.2	77.0
5.0	81.3	61.7	85.0
5.5	83.0	62.5	93.1
6.0	84.3	63.7	97.2
6.5	85.5	64.5	99.0
7.0	86.2	65.4	99.0
7.5	87.0	66.2	99.1
8.0	87.9	67.0	99.3
8.5	88.3	67.8	99.5
9.0	88.9	68.1	99.7
9.5	89.4	69.3	99.8
10.0	89.8	70.0	99.9
10.5	89.9	70.8	99.9
11.0	90.0	71.4	100.0
11.5	90.0	71.8	100.0
12.0	90.1	72.1	100.0
12.5	90.2	72.5	100.0
13.0	90.3	72.8	100.0
13.5	90.4	73.0	100.0
14.0	90.5	73.1	100.0
14.5	90.6	73.2	100.0
15.0	90.7	73.3	100.0

TABLE 16

WEST BANK - EAST OF HARVEY
SALTWATER DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL CONTENTS

Depth of Flooding Over Ground Floor (Ft.)	Gas Service Stations (%)	Grocery Stores (%)	Specialty Food Stores (%)
0.0	0.0	0.0	0.0
0.5	11.0	30.0	13.0
1.0	17.2	40.0	28.0
1.5	23.0	47.0	36.7
2.0	30.0	52.0	43.7
2.5	35.0	56.8	50.0
3.0	41.5	60.3	55.0
3.5	47.0	64.0	58.4
4.0	52.0	67.0	61.4
4.5	57.0	70.0	64.4
5.0	62.0	72.5	66.7
5.5	66.2	74.8	69.2
6.0	71.0	76.8	70.8
6.5	74.5	78.0	72.3
7.0	78.0	79.5	73.7
7.5	81.9	80.7	75.0
8.0	85.6	81.8	76.0
8.5	88.0	82.3	77.0
9.0	91.0	83.3	78.0
9.5	93.4	84.0	78.7
10.0	95.3	84.5	79.4
10.5	96.5	85.3	80.0
11.0	97.8	85.7	80.5
11.5	98.0	86.0	81.3
12.0	98.1	86.1	81.7
12.5	98.2	86.1	82.0
13.0	99.0	86.2	82.1
13.5	99.3	86.2	82.2
14.0	99.4	86.3	82.3
14.5	99.4	86.4	82.3
15.0	99.4	86.5	82.3

TABLE 16

WEST BANK - EAST OF HARVEY CANAL
SALTWATER DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL CONTENTS

Depth of Flooding Over Ground Floor (Ft.)	Contractor Operations (%)	Department Stores (%)	Eating and Drinking Establishments (%)
0.0	0.0	0.0	0.0
0.5	15.3	2.0	4.0
1.0	24.0	9.0	16.0
1.5	31.0	15.0	26.9
2.0	36.0	20.0	35.0
2.5	40.0	25.0	42.0
3.0	44.0	29.0	48.0
3.5	48.0	33.1	53.0
4.0	52.0	37.3	57.0
4.5	56.0	40.5	61.0
5.0	60.0	43.5	64.0
5.5	63.0	46.0	66.0
6.0	66.0	48.7	68.0
6.5	69.0	51.0	70.0
7.0	71.0	53.0	71.5
7.5	73.5	55.0	72.9
8.0	75.5	57.0	74.0
8.5	76.5	59.0	74.8
9.0	78.0	60.8	75.8
9.5	79.5	62.3	76.1
10.0	80.0	63.8	76.8
10.5	81.0	65.0	77.5
11.0	82.0	66.1	78.0
11.5	82.5	67.5	78.3
12.0	83.0	68.3	78.8
12.5	83.5	69.7	79.4
13.0	84.0	70.6	79.6
13.5	84.5	71.5	79.8
14.0	85.0	72.1	80.0
14.5	85.4	73.0	80.0
15.0	85.8	73.9	80.0

TABLE 16

WEST BANK - EAST OF HARVEY CANAL
SALTWATER DEPTH-DAMAGE RELATIONSHIPS
FOR
NON-RESIDENTIAL CONTENTS

Depth of Flooding Over Ground Floor (Ft.)	Repair Services (%)	Ready-to-Wear (%)	Miscellaneous (%)
0.0	0.0	0.0	0.0
0.5	23.0	16.0	18.2
1.0	32.0	33.3	28.3
1.5	39.0	46.0	36.1
2.0	46.0	57.1	42.8
2.5	56.3	65.0	47.9
3.0	65.3	72.0	52.7
3.5	74.0	77.5	57.2
4.0	81.0	82.0	60.8
4.5	86.7	85.0	64.3
5.0	91.4	87.7	67.3
5.5	94.8	90.1	69.5
6.0	97.3	92.0	71.5
6.5	99.0	93.6	73.2
7.0	99.9	94.8	74.5
7.5	100.0	96.0	75.5
8.0	100.0	97.1	76.9
8.5	100.0	98.2	77.4
9.0	100.0	98.3	78.2
9.5	100.0	98.9	79.0
10.0	100.0	99.6	79.4
10.5	100.0	100.0	79.9
11.0	100.0	100.0	80.4
11.5	100.0	100.0	80.7
12.0	100.0	100.0	81.0
12.5	100.0	100.0	81.3
13.0	100.0	100.0	81.6
13.5	100.0	100.0	81.8
14.0	100.0	100.0	82.1
14.5	100.0	100.0	82.2
15.0	100.0	100.0	82.3

INVENTORY OF VEHICLES. Only automobiles and small trucks in private use and on car dealership lots have been included in this study. No vehicles were assigned to commercial properties. Based on statistics obtained from the Louisiana Motor Vehicle Division and from the 1990 Census, each residential structure and occupied apartment unit in the state of Louisiana has an average of just under two automobiles. During a flood event, it is assumed that one vehicle per household will be used for evacuation, while the other vehicle(s) will remain parked at the residence. Thus, automobile damages were calculated on one vehicle per residential structure. A total of 3,090 vehicles were counted on the lots of car dealerships. 2,250 of these vehicles are new cars, while the remaining 840 vehicles are used cars.

Each vehicle in private use and each used car on the lot of a car dealership was assigned an average value of $6,440. This value was estimated by the Hertz Corporation in 1986 and was updated by using the October 1991 price index for used cars from the Survey of Current Business. New cars on dealership lots were assigned an average value of $14,448 based on the list price for August 1988 obtained from the Bureau of Economic Analysis. This value was updated to $15,517 by using the October 1991 price index for new cars from the Survey of Current Business. After being adjusted for taxes and the profit margin of the car dealerships, the average value of new cars used in this analysis decreased to $13,345.

Flood damage was determined by assigning vehicles an average elevation six inches below the slab level of existing residential or commercial structures for each sub-area. The depth damage relationship for vehicles is shown in Table 17.

TABLE 17

WEST BANK - EAST OF HARVEY CANAL
DEPTH-DAMAGE RELATIONSHIPS
FOR
VEHICLES

Depth of Flooding Over the Ground (Feet)	Percent Damage to Vehicles Personal Automobiles (%)
0.0	0.0
0.5	1.0
1.0	15.3
1.5	27.0
2.0	41.3
2.5	88.7
3.0	100.0
3.5	100.0
4.0	100.0
4.5	100.0
5.0	100.0
5.5	100.0
6.0	100.0
6.5	100.0
7.0	100.0
7.5	100.0
8.0	100.0
8.5	100.0
9.0	100.0
9.5	100.0
10.0	100.0
10.5	100.0
11.0	100.0
11.5	100.0
12.0	100.0
12.5	100.0
13.0	100.0
13.5	100.0
14.0	100.0
14.5	100.0
15.0	100.0

SECTION 4. DAMAGE AND BENEFIT ANALYSIS - RESIDENTIAL AND COMMERCIAL

HYDRAULICS. Stage-frequency curves for existing and future conditions without project, and future conditions with-project (100-year, 200-year, and SPH levels of protection) were provided by the H & H Branch. In order to better define the maximization of net benefits, two additional levels of protection (30-year and 70-year) were also provided for the area west of the Algiers Canal. These additional curves were not required for the area east of the Algiers Canal because the existing levees in this portion of the study area provide a relatively high level of protection.

The existing conditions represent the 1991 hydrologic conditions, while the future conditions represent the year 2040, which is 50 years from the study year. The curves include stages for 10 frequency storms (10, 20, 50, 71, 100, 143, 200, 250, 333, and 500-year events). Individual curves for the unique hydrologic reaches were provided for existing and future without- and with-project conditions. The combined effects of rising sea-levels and ground subsidence, projected to occur in the study area, were included in the future condition analysis. In order to account for these changes, the elevation of the structure inventory was lowered by one foot in the year 2040.

DAMAGE CALCULATIONS. The Hydrologic Engineering Center - Flood Damage Analysis Package, which includes the Structure Inventory for Damage Analysis (SID) and the Expected Annual Flood Damage Computation (EAD) interactive computer programs, was used to calculate property damage. Inputs to these programs include flood plain structure inventory, depth-damage relationships, and stage probabilities obtained from stage-frequency curves for each hydrologic reach.

The SID computer program was used to generate an elevation-damage curve for the existing and future conditions and for the three levels of hurricane protection. These results were then input into the EAD program in order to weigh the damage corresponding to each magnitude of flooding by the percentage chance of exceedance. From these weighted damages, the program determines the expected annual damage for each year within the period of analysis. The base year for the project in the area west of the Algiers Canal is the year 2002, and for the area east of the Algiers Canal is the year 1999. The life of each separable project is assumed to be 100 years. The program takes frequency-damage data for the two input years (1991 and 2040) and computes similar data for the base year and for each of the next five decades. The frequency-damage data for each year

other than the input years are computed by linear interpolation. After the year 2039, the frequency-damage data is assumed to be the same for the remaining years of the evaluation period.

Tables 18A, 18B, 18C, and 18D show the properties in each category divided into flood zones, based on first floor elevations for the existing without project and SPH protection conditions, and future (2040) without project and with SPH protection conditions. The flood zones were delineated based on stage-frequency data provided by H & H Branch. The with-project SPH protection flood zones for the Harvey Canal industrial corridor were based solely on the floodgate alternative. The flood zones for the floodwall alternative would be similar to the without-project condition because of the induced flooding associated with this plan. However, because the structures along the east side of Peters Road would be subject to induced flooding from the project, they would be subject to damages from more frequent flood events. The projected future development in Reaches E and F has been included in the tables for the year 2040.

TABLE 18A

WEST BANK - EAST OF HARVEY CANAL
NUMBER OF STRUCTURES IN THE FLOOD PLAINS BY REACH
WITHOUT PROJECT CONDITIONS - 1991

REACH	CATEGORY OF STRUCTURE	0-10 YEAR	10-50 YEAR	50-100 YEAR	100-500 YEAR	ABOVE 500 YEAR	TOTAL STRUCTURES
REACH A	RESIDENTIAL	0	0	0	8,798	3,282	12,080
	APARTMENTS	0	0	0	148	3	151
	COMMERCIAL	2	0	0	290	118	410
	TOTAL	2	0	0	9,236	3,403	12,641
REACH B	RESIDENTIAL	0	10	0	1,464	972	2,446
	APARTMENTS	2	2	2	23	0	29
	COMMERCIAL	33	32	49	401	91	606
	TOTAL	35	44	51	1,888	1,063	3,081
REACH C	RESIDENTIAL	104	1,856	2,621	1,619	0	6,200
	APARTMENTS	0	45	21	52	0	118
	COMMERCIAL	4	40	87	172	0	303
	TOTAL	108	1,941	2,729	1,843	0	6,621
REACH D	RESIDENTIAL	570	4,881	2,418	886	66	8,821
	APARTMENTS	3	18	14	14	0	49
	COMMERCIAL	44	157	182	259	1	643
	TOTAL	617	5,056	2,614	1,159	67	9,513
REACH E	RESIDENTIAL	0	0	0	26	203	229
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	3	3
	TOTAL	0	0	0	26	206	232
REACH F	RESIDENTIAL	0	7	32	428	1,021	1,488
	APARTMENTS	0	1	3	2	4	10
	COMMERCIAL	1	64	14	74	37	190
	TOTAL	1	72	49	504	1,062	1,688
ALVIN CAL.	RESIDENTIAL	0	0	0	11	0	11
	ARARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	43	12	140	30	225
	TOTAL	0	43	12	151	30	236
HARVEY	RESIDENTIAL	0	0	0	0	0	0
CANAL	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	114	57	66	87	9	333
	TOTAL	114	57	66	87	9	333
OAKVILLE	RESIDENTIAL	0	0	17	0	0	17
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	0	0
	TOTAL	0	0	17	0	0	17
TOTAL FOR ALL REACHES		877	7,213	5,538	14,894	5,840	34,362

Note: The structures were grouped into flood plains based on the first floor elevation. The numbers provided in the table are not cumulative.

TABLE 18B

WEST BANK - EAST OF HARVEY CANAL
NUMBER OF STRUCTURES IN THE FLOOD PLAINS BY REACH
SPH PROTECTION - 1991

REACH	CATEGORY OF STRUCTURE	0-10 YEAR	10-50 YEAR	50-100 YEAR	100-500 YEAR	ABOVE 500 YEAR	TOTAL STRUCTURES
REACH A	RESIDENTIAL	0	0	0	0	12,080	12,080
	APARTMENTS	0	0	0	0	151	151
	COMMERCIAL	2	0	0	0	408	410
	TOTAL	2	0	0	0	12,639	12,641
REACH B	RESIDENTIAL	0	0	0	0	2,446	2,446
	APARTMENTS	2	0	0	0	27	29
	COMMERCIAL	33	0	0	0	573	606
	TOTAL	35	0	0	0	3,046	3,081
REACH C	RESIDENTIAL	104	0	0	0	6,096	6,200
	APARTMENTS	0	0	0	0	118	118
	COMMERCIAL	4	0	0	0	299	303
	TOTAL	108	0	0	0	6,513	6,621
REACH D	RESIDENTIAL	545	0	0	0	8,276	8,821
	APARTMENTS	3	0	0	0	46	49
	COMMERCIAL	44	0	0	0	599	643
	TOTAL	592	0	0	0	8,921	9,513
REACH E	RESIDENTIAL	0	0	0	0	229	229
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	3	3
	TOTAL	0	0	0	0	232	232
REACH F	RESIDENTIAL	0	0	0	0	1,488	1,488
	APARTMENTS	0	0	0	0	10	10
	COMMERCIAL	1	0	0	0	189	190
	TOTAL	1	0	0	0	1,687	1,688
ALVIN CAL.	RESIDENTIAL	0	0	0	0	11	11
	ARARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	225	225
	TOTAL	0	0	0	0	236	236
HARVEY	RESIDENTIAL	0	0	0	0	0	0
CANAL	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	13	4	0	6	310	333
	TOTAL	13	4	0	6	310	333
OAKVILLE	RESIDENTIAL	0	0	0	0	17	17
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	0	0
	TOTAL	0	0	0	0	17	17
TOTAL FOR ALL REACHES		751	4	0	6	33,601	34,362

Note: The structures were grouped into flood plains based on the first floor elevation. The numbers provided in the table are not cumulative.

TABLE 18C

WEST BANK - EAST OF HARVEY CANAL
NUMBER OF STRUCTURES IN THE FLOOD PLAINS BY REACH
WITHOUT PROJECT CONDITIONS - 2040

REACH	CATEGORY OF STRUCTURE	0-10 YEAR	10-50 YEAR	50-100 YEAR	100-500 YEAR	ABOVE 500 YEAR	TOTAL STRUCTURES
REACH A	RESIDENTIAL	0	0	7,582	4,498	0	12,080
	APARTMENTS	0	0	147	4	0	151
	COMMERCIAL	2	0	229	173	6	410
	TOTAL	2	0	7,958	4,675	6	12,641
REACH B	RESIDENTIAL	0	10	700	1,722	14	2,446
	APARTMENTS	2	2	15	10	0	29
	COMMERCIAL	33	32	257	278	6	606
	TOTAL	35	44	972	2,010	20	3,081
REACH C	RESIDENTIAL	1,960	3,327	900	13	0	6,200
	APARTMENTS	45	52	21	0	0	118
	COMMERCIAL	44	157	101	1	0	303
	TOTAL	2,049	3,536	1,022	14	0	6,621
REACH D	RESIDENTIAL	5,451	2,818	364	188	0	8,821
	APARTMENTS	21	20	7	1	0	49
	COMMERCIAL	201	272	139	31	0	643
	TOTAL	5,673	3,110	510	220	0	9,513
REACH E	RESIDENTIAL	0	0	2	3,987	65	4,054
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	3	0	3
	TOTAL	0	0	2	3,990	65	4,057
REACH F	RESIDENTIAL	0	39	3,830	1,329	413	5,611
	APARTMENTS	0	4	0	6	0	10
	COMMERCIAL	1	94	55	38	2	190
	TOTAL	1	137	3,885	1,373	415	5,811
ALVIN CAL.	RESIDENTIAL	0	0	11	0	0	11
	ARARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	55	50	120	0	225
	TOTAL	0	55	61	120	0	236
HARVEY CANAL	RESIDENTIAL	0	0	0	0	0	0
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	179	83	33	38	0	333
	TOTAL	179	83	33	38	0	333
OAKVILLE	RESIDENTIAL	17	0	0	0	0	17
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	0	0
	TOTAL	17	0	0	0	0	17
TOTAL FOR ALL REACHES		7,956	6,965	14,443	12,440	506	42,310

Note: The structures were grouped into flood plains based on the first floor elevation. The numbers provided in the table are not cumulative.

TABLE 18D

WEST BANK - EAST OF HARVEY CANAL
NUMBER OF STRUCTURES IN THE FLOOD PLAINS BY REACH
SPH PROTECTION - 2040

REACH	CATEGORY OF STRUCTURE	0-10 YEAR	10-50 YEAR	50-100 YEAR	100-500 YEAR	ABOVE 500 YEAR	TOTAL STRUCTURES
REACH A	RESIDENTIAL	0	0	0	0	12,080	12,080
	APARTMENTS	0	0	0	0	151	151
	COMMERCIAL	2	0	0	0	408	410
	TOTAL	2	0	0	0	12,639	12,641
REACH B	RESIDENTIAL	0	0	0	0	2,446	2,446
	APARTMENTS	2	0	0	0	27	29
	COMMERCIAL	33	0	0	0	573	606
	TOTAL	35	0	0	0	3,046	3,081
REACH C	RESIDENTIAL	104	0	0	0	6,096	6,200
	APARTMENTS	0	0	0	0	118	118
	COMMERCIAL	4	0	0	0	299	303
	TOTAL	108	0	0	0	6,513	6,621
REACH D	RESIDENTIAL	545	0	0	0	8,276	8,821
	APARTMENTS	3	0	0	0	46	49
	COMMERCIAL	44	0	0	0	599	643
	TOTAL	592	0	0	0	8,921	9,513
REACH E	RESIDENTIAL	0	0	0	0	4,054	4,054
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	3	3
	TOTAL	0	0	0	0	4,057	4,057
REACH F	RESIDENTIAL	0	0	0	0	5,611	5,611
	APARTMENTS	0	0	0	0	10	10
	COMMERCIAL	1	0	0	0	189	190
	TOTAL	1	0	0	0	5,810	5,811
ALVIN CAL.	RESIDENTIAL	0	0	0	0	11	11
	ARARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	225	225
	TOTAL	0	0	0	0	236	236
HARVEY CANAL	RESIDENTIAL	0	0	0	0	0	0
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	13	4	0	6	310	333
	TOTAL	13	4	0	6	310	333
OAKVILLE	RESIDENTIAL	0	0	0	0	17	17
	APARTMENTS	0	0	0	0	0	0
	COMMERCIAL	0	0	0	0	0	0
	TOTAL	0	0	0	0	17	17
TOTAL FOR ALL REACHES		751	4	0	6	41,549	42,310

Note: The structures were grouped into flood plains based on the first floor elevation. The numbers provided in the table are not cumulative.

A summary of current dollar damages under existing (1991), and future (2040) conditions is displayed in Tables 19A and 19B for the portion of the study area west of the Algiers Canal, and in Tables 19C and 19D for the portion of the study area east of the Algiers Canal. It should be noted that Tables 19A and 19B do not include damages to the Harvey Canal industrial corridor because these damages will be discussed in a separate section of this report. Also, it should be noted that the future development projected for the area east of the Algiers Canal has not been included in Tables 19C and 19D.

TABLE 19A

WEST BANK - EAST OF HARVEY CANAL
WEST OF ALGIERS CANAL
DAMAGES FOR VARIOUS FLOOD EVENTS
1991 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 33,614	$ 226,630	$ 558,203	$ 1,940,730
100-YEAR PROTECTION	25,235	25,235	25,235	282,186
200-YEAR PROTECTION	25,235	25,235	25,235	44,265
SPH PROTECTION	25,235	25,235	25,235	25,235

TABLE 19B

WEST BANK - EAST OF HARVEY CANAL
WEST OF ALGIERS CANAL
DAMAGES FOR VARIOUS FLOOD EVENTS
2040 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 221,026	$ 721,495	$ 1,554,175	$ 2,500,371
100-YEAR PROTECTION	25,235	25,235	25,235	342,302
200-YEAR PROTECTION	25,235	25,235	25,235	60,097
SPH PROTECTION	25,235	25,235	25,235	25,235

TABLE 19C

WEST BANK - EAST OF HARVEY CANAL
EAST OF ALGIERS CANAL
DAMAGES FOR VARIOUS FLOOD EVENTS
1991 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 67	$ 14,184	$ 25,981	$ 139,306
100-YEAR PROTECTION	55	55	55	45,793
200-YEAR PROTECTION	55	55	55	320
SPH PROTECTION	55	55	55	55

TABLE 19D

WEST BANK - EAST OF HARVEY CANAL
EAST OF ALGIERS CANAL
DAMAGES FOR VARIOUS FLOOD EVENTS
2040 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 172	$ 24,998	$ 85,467	$ 247,545
100-YEAR PROTECTION	55	55	55	75,066
200-YEAR PROTECTION	55	55	55	1,768
SPH PROTECTION	55	55	55	55

Tables 20A and 20B summarize the expected annual damages for the study year, base year, the next five decade years, and the end of the period of analysis. This information is shown for the without-project, 100-year protection, 200-year protection, and the SPH level of protection for the areas west and east of the Algiers Canal, respectively. The damages for the Harvey Canal industrial corridor and the future development projected for Reaches E and F have not been included in these tables.

TABLE 20A

WEST BANK - EAST OF HARVEY CANAL
EXPECTED ANNUAL FLOOD DAMAGES
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

Reach	PLAN	STUDY YEAR 1991	BASE YEAR 2002	DECADE YEARS 10 2011	20 2021	30 2031	40 2041	50 2051	END OF PERIOD 2101
A	W/O Project	2,338	3,365	4,525	6,028	7,567	8,902	8,902	8,902
	100-Year Protection	60	68	75	83	92	103	103	103
	200-Year Protection	24	25	25	26	26	27	27	27
	SPH Protection	24	24	24	24	24	24	24	24
B	W/O Project	2,291	2,586	2,836	3,110	3,363	3,566	3,566	3,566
	100-Year Protection	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
	200-Year Protection	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
	SPH Protection	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
C	W/O Project	5,165	7,094	8,911	11,186	13,818	16,407	16,407	16,407
	100-Year Protection	337	360	381	405	431	454	454	454
	200-Year Protection	169	170	170	172	173	174	174	174
	SPH Protection	166	166	166	166	166	166	166	166
D	W/O Project	11,742	15,864	19,732	24,739	30,116	35,064	35,064	35,064
	100-Year Protection	1,636	1,702	1,758	1,819	1,881	1,936	1,936	1,936
	200-Year Protection	1,012	1,020	1,028	1,036	1,044	1,052	1,052	1,052
	SPH Protection	959	959	959	959	959	959	959	959
Totals									
	W/O Project	21,536	28,909	36,004	45,063	54,864	63,939	63,939	63,939
	100-Year Protection	3,408	3,505	3,589	3,682	3,779	3,868	3,868	3,868
	200-Year Protection	2,580	2,590	2,598	2,609	2,618	2,628	2,628	2,628
	SPH Protection	2,524	2,524	2,524	2,524	2,524	2,524	2,524	2,524

Note: Does not include damages to Harvey Canal industrial corridor.

TABLE 20B

WEST BANK - EAST OF HARVEY CANAL
EXPECTED ANNUAL FLOOD DAMAGES
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

Reach	PLAN	STUDY YEAR 1991	BASE YEAR 1999	DECADE YEARS 10 2008	20 2018	30 2028	40 2038	50 2048	END OF PERIOD 2098
E	W/O Project	3	12	31	50	66	81	84	84
	100-Year Protection	3	4	5	6	7	8	9	9
	200-Year Protection	0	0	0	0	0	0	0	0
	SPH Protection	0	0	0	0	0	0	0	0
F	W/O Project	564	589	622	665	713	768	780	780
	100-Year Protection	41	46	52	59	66	74	75	75
	200-Year Protection	6	6	6	6	6	7	7	7
	SPH Protection	5	5	5	5	5	5	5	5
OAK	W/O Project	2	3	5	7	10	14	15	15
	100-Year Protection	1	1	1	1	1	1	1	1
	200-Year Protection	0	0	0	0	0	0	0	0
	SPH Protection	0	0	0	0	0	0	0	0
ALCAL	W/O Project	521	678	862	1,066	1,268	1,469	1,508	1,508
	100-Year Protection	83	93	105	118	132	146	149	149
	200-Year Protection	0	0	0	0	1	2	2	2
	SPH Protection	0	0	0	0	0	0	0	0
Totals									
	W/O Project	1,090	1,282	1,520	1,788	2,057	2,332	2,387	2,387
	100-Year Protection	128	144	163	184	206	229	234	234
	200-Year Protection	6	6	6	6	7	9	9	9
	SPH Protection	5	5	5	5	5	5	5	5

NOTE: Does not include future development damages for reaches E and F.

In order to calculate the equivalent annual flood damages, the stream of expected annual flood damages must be discounted back to the base year of the project. The discount rate used in the analysis is 8-1/2 percent. The expected annual damage for each year is assumed to occur at the end of the year. After being discounted back to the base year, it must then be amortized over the period of analysis.

Tables 21A, 21B, and 21C summarize the equivalent annual damages and benefits for the area west of the Algiers Canal (Reaches A, B, C, and D), while Tables 21D, 21E, and 21F summarize the equivalent annual damages and benefits for the area east of the Algiers Canal (Reaches E and F). In each of these tables, the damage under base conditions is compared to the damage under a given level of flood protection in order to determine the benefits attributable to the project.

TABLE 21A

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 100-YEAR LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 100-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
A	$ 4,925	$ 77	$ 4,848
B	2,891	1,375	1,516
C	9,575	388	9,187
D	21,131	1,771	19,360
Total	$ 38,522	$ 3,611	$ 34,911
% Damage Prevented			90.6%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 21B

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 200-YEAR LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 200-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
A	$ 4,925	$ 25	$ 4,900
B	2,891	1,375	1,516
C	9,575	170	9,405
D	21,131	1,030	20,101
Total	$ 38,522	$ 2,600	$ 35,922
% Damage Prevented			93.2%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 21C

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR SPH LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH PROTECTION	EQUIVALENT ANNUAL BENEFITS
A	$ 4,925	$ 23	$ 4,902
B	2,891	1,375	1,516
C	9,575	166	9,409
D	21,131	959	20,172
Total	$ 38,522	$ 2,523	$ 35,999
% Damage Prevented			93.4%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 21D

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 100-YEAR LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 100-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 34	$ 5	$ 29
F	635	54	581
OAK	6	1	5
ALCAL	909	107	802
Total	$ 1,584	$ 167	$ 1,417
% Damage Prevented			89.4%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 21E

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 200-YEAR LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 200-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 34	$ 0	$ 34
F	635	7	628
OAK	6	0	6
ALCAL	909	0	909
Total	$ 1,584	$ 7	$ 1,577
% Damage Prevented			99.6%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 21F

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR SPH LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 34	$ 0	$ 34
F	635	5	630
OAK	6	0	6
ALCAL	909	0	909
Total	$ 1,584	$ 5	$ 1,579
% Damage Prevented			99.7%

NOTE: Structural and automobile damages and benefits have been combined in this table.

Tables 22A, 22B, 22C, 22D, 22E, and 22F provide damage information and inundation reduction benefits for the three levels of hurricane protection according to the damage category, which includes structure, contents, and automobiles. Also shown is the percentage of damage prevented by the project.

TABLE 22A

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 100-YEAR LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 100-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 13,127	$ 1,244	$ 11,883
Two Story	3,487	216	3,271
Mobile Home	0	0	0
Apartment	1,216	78	1,138
Commercial	1,563	150	1,413
Total Structures	$ 19,393	$ 1,688	$ 17,705
Contents			
Residential	$ 9,693	$ 344	$ 9,349
Mobile Home	0	0	0
Apartment	616	36	580
Commercial	3,959	261	3,698
Total Contents	$ 14,268	$ 641	$ 13,627
Automobiles	$ 4,862	$ 1,282	$ 3,579
TOTAL	$ 38,523	$ 3,611	$ 34,911
% Damage Prevented			90.6%

NOTE: Does not include damages to Harvey Canal industrial corridor.

TABLE 22B

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 200-YEAR LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 200-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 13,127	$ 798	$ 12,329
Two Story	3,487	99	3,388
Mobile Home	0	0	0
Apartment	1,216	48	1,168
Commercial	1,563	129	1,434
Total Structures	$ 19,393	$ 1,073	$ 18,319
Contents			
Residential	$ 9,693	$ 93	$ 9,600
Mobile Home	0	0	0
Apartment	616	22	594
Commercial	3,959	209	3,750
Total Contents	$ 14,268	$ 324	$ 13,944
Automobiles	$ 4,862	$ 1,203	$ 3,659
TOTAL	$ 38,523	$ 2,601	$ 35,922
% Damage Prevented			93.2%

NOTE: Does not include damages to Harvey Canal industrial corridor.

TABLE 22C

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR SPH LEVEL OF PROTECTION
REACHES A - D
AREA WEST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 13,127	$ 754	$ 12,373
Two Story	3,487	90	3,397
Mobile Home	0	0	0
Apartment	1,216	45	1,171
Commercial	1,563	128	1,435
Total Structures	$ 19,393	$ 1,017	$ 18,376
Contents			
Residential	$ 9,693	$ 81	$ 9,612
Mobile Home	0	0	0
Apartment	616	20	595
Commercial	3,959	207	3,753
Total Contents	$ 14,268	$ 308	$ 13,960
Automobiles	$ 4,862	$ 1,199	$ 3,663
TOTAL	$ 38,523	$ 2,524	$ 35,999
% Damage Prevented			93.4%

NOTE: Does not include damages to Harvey Canal industrial corridor.

TABLE 22D

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 100-YEAR LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 100-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 168	$ 17	$ 151
Two Story	29	5	24
Mobile Home	0	0	0
Apartment	4	0	4
Commercial	249	27	222
Total Structures	$ 450	$ 49	$ 401
Contents			
Residential	$ 91	$ 4	$ 87
Mobile Home	0	0	0
Apartment	2	0	2
Commercial	920	104	816
Total Contents	$ 1,013	$ 108	$ 905
Automobiles	$ 121	$ 10	$ 111
TOTAL	$ 1,584	$ 167	$ 1,417
% Damage Prevented			89.4%

NOTE: Does not include future development projected for Reaches E and F.

TABLE 22E

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 200-YEAR LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 200-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 168	$ 6	$ 162
Two Story	29	0	29
Mobile Home	0	0	0
Apartment	4	0	4
Commercial	249	0	249
Total Structures	$ 450	$ 6	$ 444
Contents			
Residential	$ 91	$ 0	$ 91
Mobile Home	0	0	0
Apartment	2	0	2
Commercial	920	1	919
Total Contents	$ 1,013	$ 1	$ 1,013
Automobiles	$ 121	$ 0	$ 121
TOTAL	$ 1,584	$ 7	$ 1,577
% Damage Prevented			99.6%

NOTE: Does not include future development projected for Reaches E and F.

TABLE 22F

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR SPH LEVEL OF PROTECTION
REACHES E, F, OAKVILLE AND ALVIN CALLENDER
AREA EAST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH PROTECTION	EQUIVALENT ANNUAL BENEFITS
Structures			
Residential			
One Story	$ 168	$ 5	$ 163
Two Story	29	0	29
Mobile Home	0	0	0
Apartment	4	0	4
Commercial	249	0	249
Total Structures	$ 450	$ 5	$ 445
Contents			
Residential	$ 91	$ 0	$ 91
Mobile Home	0	0	0
Apartment	2	0	2
Commercial	920	0	920
Total Contents	$ 1,013	$ 0	$ 1,013
Automobiles	$ 121	$ 0	$ 121
TOTAL	$ 1,584	$ 5	$ 1,579
% Damage Prevented			99.7%

NOTE: Does not include future development projected for Reaches E and F.

FUTURE DEVELOPMENT ANALYSIS. While the development in Reaches A through D is substantially complete, most of the total acreage located east of the Algiers Canal in Reaches E and F is currently undeveloped. In these parts of the study area, a projection was made of the damages that would occur to the anticipated future development of these acres. These damages will be added to the damages previously calculated, which were based on existing structures under changing future hydrologic conditions.

According to ER 1105-2-100, Section 6-36, projections of the future development in a study area should be based on the following: projections compiled by a national agency, such as OBERS; past historical trends; and/or conversations with local officials. Each of these sources of information were used in this analysis.

The most recent OBERS projection, which utilizes 1990 Census data, projects a compounded annual population growth rate of 0.02% for the New Orleans Metropolitan Area through the year 2040. However, this projection does not consider the shifts in population that will take place within the eight-parish metro area as people move from urbanized areas on the East Bank of Orleans Parish to the less developed areas in the surrounding parishes. As an example, the 1993 population in St. Tammany Parish, has already met the OBERS population projection for the year 2010. The area in Reaches E and F has many of the same characteristics as St. Tammany Parish. Due to the improvements in the local transportation network (completion of the second bridge across the Mississippi River and the connecting bridge above the Westbank Expressway), the land availability, and the current construction activity, and the rural setting in Reaches E and F, the slow growth rate for the New Orleans MSA was deemed inappropriate for these reaches. Each of these factors will be discussed in the following section of this report.

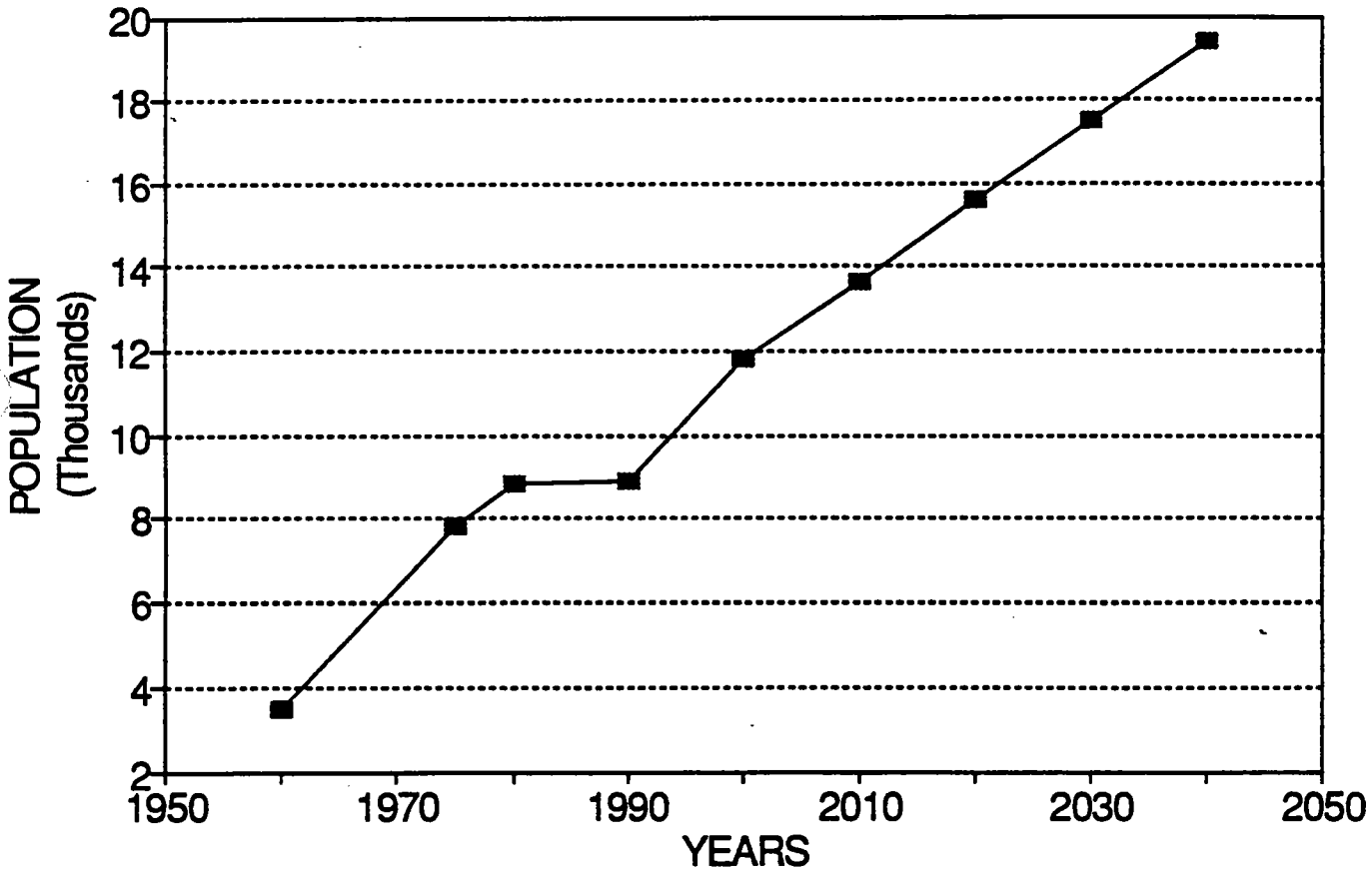
Reach F - Belle Chasse Area (Plaquemines Parish). According to the 1983 Belle Chasse Land Use Plan, 2,849 undeveloped acres located in the Belle Chasse area were available for future residential construction at the time the Land Use Plan was prepared. Due to the problems in the local economy that occurred during the 1980's as a result of the decline in the oil and gas industry, the development of these acres did not take place as expected. Now that the local economy has stabilized, residential development in Belle Chasse has resumed. According to parish officials, approval has been granted and construction has begun on five new upscale subdivisions. Most of this construction is taking place in urbanized areas, while the remainder is taking place in the undeveloped acres located just outside the corporate limits. The new subdivisions include 248 lots, each consisting of

approximately 8,000 square feet of land. The lots are valued at $40,000, and the homes under construction are in the $120,000 range.

If the existing zoning ordinances are kept in place, the most recent land use report of the parish projects that an additional 16,293 homes will be constructed on these acres. This projection assumes that 7 houses will be constructed on each of 1,024 acres, and 5 houses will be constructed on each of 1,825 acres. While the 1983 Land Use Plan assumed that 3 people will live in each house, the 1990 Census indicates that the size of an average household in the New Orleans MSA is about 2.69 people per household. (See 1990 Census of Population and Housing, "Summary Population and Housing Characteristics, Louisiana," 1990 CPH-1-20, Table 6, page 73.) Thus, the Belle Chasse population can be expected to increase to approximately 53,000 people. This population projection parallels the actual compounded annual growth rate of 3.16% that occurred between 1960 and 1990. Using this historical trend, the population would increase to 43,000 by the year 2040. However, due to the uncertainty of future economic trends, the projection based on the Land Use Plan is best regarded as the potential number of people that could live in the area if most of the undeveloped land becomes inhabited. This projection is shown as Scenario I in Table 23.

If the population projection for the Belle Chasse area is based on historical trends determined by an ordinary least squares equation, rather than on the projections the most recent land use study, the population can be expected to increase at a much lower rate. The ordinary least squares equation was developed using historical Census data for the period 1960 through 1990 and population information provided by the parish contractor in the 1983 Belle Chasse Land Use Plan. Using this method, the population in Belle Chasse was found to increase from 8,910 in 1990 to approximately 20,000 in the year 2040. The projected annual growth rate for the 50-year period is approximately 2.5%. These projections are shown as Scenario II in Table 23. A line graph has also been provided (see Figure 3). It should be noted that despite the collapse of the oil and gas industry during the early 1980's, which led to a decrease in the population of most of the areas within the New Orleans MSA, the population in Belle Chasse demonstrated a slight increase throughout the decade.

FIGURE 3
BELLE CHASSE AREA - REACH F



These long term projections are consistent with the short term residential construction activity and population growth that took place between the years 1990 and 1993. Permits for the construction of 150 homes were issued by the Belle Chasse Planning Office during this period. Based on this number of permits, the Belle Chasse population was estimated to increase by slightly more than 400 people. The new construction that took place between these years has been included in the existing condition structure file. The population increase projected by the ordinary least squares trend line was used to determine the number of structures to be added to the existing condition structure file in order to determine the future condition structure file. A total of 4,122 structures was added to the structure file of Reach F. Based on field observations of existing development in the area, 70% of the new structures were assumed to be one-story homes valued at $110,000, and 30% were assumed to be two-story homes valued at $120,000. 15% of these structures were assumed to have a first floor elevation of 2.0 feet NGVD and 85% were assumed to have a first floor elevation of -0.5 feet NGVD. (Currently, the base flood elevation is -1.5 feet NVGD.) The only high ground in the area is located along the Mississippi River. However, because this high area does not have easy assess to the transportation network of the West Bank, less development is expected to take place here.

Reach E - Lower Coast of Algiers (Orleans Parish). Reach E includes approximately 5,500 acres of generally rural land bounded by the Mississippi River, the Intracoastal Waterway, and the Orleans/Plaquemines Parish line. Almost 80% of this land has been classified as vacant due to a lack of easy access to the site and a lack of infrastructure. According to the New Orleans Planning Commission, a land use plan has been approved for 3,600 acres of this undeveloped land. Approximately 1,000 acres are currently being developed as part of the English Turn Development, while another 2,600 acres are available for future non-English Turn development.

English Turn is a 900-acre residential and recreational community that was developed by golfer Jack Nicklaus. At present, 152 homesites have been sold in the English Turn Community. While 80 families are currently living in the area, developers expect that 115 families will be residing in English Turn by the end of 1994. For purposes of this study, only these 115 structures, along with the 3 commercial structures, have been included in the existing condition structure file.

The future condition structure file includes the total number of structures to be built during the first 5 phases of English Turn development, which are currently under construction, as well as the structures to be built on the remaining acres zoned for residential development.

The residential development in the English Turn Community will total 675 acres and will include approximately 1,000 homes. (A total of 885 structures was added to the existing structure file.) The value of these structures will range from $225,000 to $550,000. Lots are generally priced at $140,000. The ground elevation of the lots ranges from -2.0 to +1.0, and in accordance with flood plain regulations, the homes must be built 1.5 feet above the center line of the street.

According to the land-use plan of the New Orleans Planning Commission, approximately 979 acres in Reach E adjacent to the English Turn area have been zoned for residential development. The recent construction of a high-rise bridge across the Algiers Canal has improved the vehicular access to the area from the New Orleans CBD. Also, the city has formulated a capital improvement plan for the area that will include the construction of major streets and public utilities. These recent and future improvements will make the area more attractive to potential developers. Thus, this study will assume that one half of the acres outside of English Turn will be developed during the 50-year period.

Assuming a low density plan for residential development similar to that in Belle Chasse, 6 houses will be constructed on each acre of land. A total of 2,940 homes has been projected for construction in the area during the next 50 years. Based on field observations of existing development in the area, 70% of the new structures were assumed to be one-story homes valued at $110,000, and 30% were assumed to be two-story homes valued at $120,000. The majority of the available acres are located along the Mississippi River where the ground is relatively high. Thus, the future condition structure file includes 40% of the structures, or 1,176 houses, at a first floor elevation of 0 feet NGVD (mean sea level), and 60%, or 1,764 houses, at a first floor elevation of +4.0 feet NGVD. (Currently, the base flood elevation is -0.5 feet NVGD.)

While the land-use study projects a future population increase of 35,000 to 40,000 people in Reach E, this study projects that the population in Reach E will increase to approximately 10,600 people. This projection is displayed in Table 24.

TABLE 23

WEST BANK - EAST OF HARVEY CANAL
BELLE CHASSE, LOUISIANA
HISTORICAL AND PROJECTED POPULATION

	Historical				Projected
	1960	1975	1980	1990	2040
Scenario I - residential development of all available acres identified by the 1983 Land Use Plan	3,499	7,871	8,844	8,910	53,000
Scenario II - based on historical trends (Ordinary Least Squares)	3,499	7,871	8,844	8,910	20,000

Source: Historical - Census data (1960,1980, and 1990) and 1983 Belle Chasse Land Use Plan (1975)

TABLE 24

WEST BANK - EAST OF HARVEY CANAL
LOWER COAST OF ALGIERS
HISTORICAL AND PROJECTED POPULATION

	Historical		Projected
	1980	1990	2040
Scenario I - based on Development continuing in English Turn and development of half the acres outside English Turn	315	332	10,600

Note: English Turn was not included in the 1990 Census data

Compliance With PGL 25 and Executive Order 11988. Recent improvements in the transportation network (the opening of the twin span of the Crescent City Connection bridge, and improvements in its connection with the West Bank Expressway), current residential construction activity, and the recent performance of the local economy are the most important factors that will affect development in the study area. Between 1985 and 1990, approximately 700 forested acres were developed into urbanized areas. During this period and into the early 1990's, the Belle Chasse area (Reach F) population demonstrated a slight increase despite the decline in the local economy. Also during this period, the area south of Lapalco Boulevard (Reach D) experienced a population increase of 68%. Construction continued in two upscale subdivisions: Stonebridge in Reach D, and English Turn in Reach E. Given these recent growth trends, it is reasonable to assume that development in the area will continue with or without the project, and will not conflict with PGL 25 and EO 11988. The future development in the area will not be attributable to the project, but rather to improvements in the transportation network, affordability of land, and general economic trends.

While the project will not induce growth in the study area, growth can be expected to continue on the remaining undeveloped land. The future growth rate used in the analysis for Reaches E and F is based on a continuation of past historical trends. Thus, future damages for these reaches are based on non-project related growth. No future development was projected in Reaches A through D because the development in these reaches is substantially complete.

FUTURE DEVELOPMENT DAMAGE CALCULATIONS. Table 25 summarizes the expected annual damages for the study year, base year, the next five decade years, and the end of the period of analysis. This information is shown for the without-project, 100-year protection, 200-year protection, and the SPH level of protection for the area east of the Algiers Canal (Reaches E and F). It should be noted that damages to existing development have not been included in the following tables.

TABLE 25

WEST BANK - EAST OF HARVEY CANAL
EXPECTED ANNUAL FLOOD DAMAGES
REACHES E AND F - FUTURE DEVELOPMENT
AREA EAST OF ALGIERS CANAL
(000's)

Reach	PLAN	STUDY YEAR 1991	BASE YEAR 1999	DECADE YEARS 10 2008	20 2018	30 2028	40 2038	50 2048	END OF PERIOD 2098
E	W/O Project	0	22	108	274	528	913	1,011	1,011
	100-Year Protection	0	8	19	37	61	92	98	98
	200-Year Protection	0	0	0	0	0	0	0	0
	SPH Protection	0	0	0	0	0	0	0	0
F	W/O Project	0	288	715	1,312	2,028	2,850	3,026	3,026
	100-Year Protection	0	12	32	68	123	197	215	215
	200-Year Protection	0	0	0	0	0	0	0	0
	SPH Protection	0	0	0	0	0	0	0	0

In order to calculate the equivalent annual flood damages, the stream of expected annual flood damages must be discounted back to the base year of the project. The discount rate used in the analysis is 8 1/2 percent. The expected annual damage for each year is assumed to occur at the end of the year. After being discounted back to the base year, it must then be amortized over the period of analysis.

Tables 26A, B, and C summarize the equivalent annual damages and benefits for the area east of the Algiers Canal (Reaches E and F). In each of these tables, the damage under base conditions is compared to the damage under a given level of flood protection in order to determine the benefits attributable to the project. It should be noted that damages to existing development have not been included in the following tables.

TABLE 26A

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 100-YEAR LEVEL OF PROTECTION
REACHES E AND F - FUTURE DEVELOPMENT
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 100-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 195	$ 27	$ 168
F	923	50	873
Total	$ 1,118	$ 77	$ 1,041
% Damage Prevented			93.1%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 26B

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR 200-YEAR LEVEL OF PROTECTION
REACHES E AND F - FUTURE DEVELOPMENT
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH 200-YEAR PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 195	$ 0	$ 195
F	923	0	923
Total	$ 1,118	$ 0	$ 1,118
% Damage Prevented			100%

NOTE: Structural and automobile damages and benefits have been combined in this table.

TABLE 26C

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR SPH LEVEL OF PROTECTION
REACHES E AND F - FUTURE DEVELOPMENT
AREA EAST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH PROTECTION	EQUIVALENT ANNUAL BENEFITS
E	$ 195	$ 0	$ 195
F	923	0	923
Total	$ 1,118	$ 0	$ 1,118
% Damage Prevented			100%

NOTE: Structural and automobile damages and benefits have been combined in this table.

EMERGENCY COST REDUCTION BENEFITS. Emergency cost are those costs incurred by the community during and immediately following a major storm. These costs can be divided into three categories. The first includes the reduction in emergency costs, such as sandbagging and police overtime, damages to public property, such as roads and bridges, and the subsequent clean-up of private and public properties. The second category includes the costs of evacuating and providing subsistence for those residents forced from their homes. The final category consists of the reoccupation costs required by homeowners in order to move back into their homes. Some of these damages and costs will be reduced due to the flood protection provided by the project. The reduction of these costs will be considered a benefit attributable to the project. This analysis is based only on existing condition and not future condition hydraulics. Thus, the benefits have been expressed as average annual values.

It should also be noted that the emergency cost reduction benefits for the 200-year level of protection have been assumed to be the same as those for the SPH plan. In general, the major difference between these two storm events is in the depth of flooding. Because the number of structures inundated by the two storms is approximately the same, the reduction in emergency costs resulting from the two flood protection plans would be equivalent.

Reduction in Emergency Costs and Damage to Public Property. Benefits attributed to this category are defined as the elimination or lowering of emergency costs. These costs include flood fighting efforts, disaster relief, and increased costs of police and military patrols, as well as damage to roads, bridges, and other public property. The costs associated with evacuation and subsistence, and reoccupation are addressed in the following section of this report.

Data associated with the October 1985 flooding of the West Bank area of Jefferson, Orleans, and Plaquemines Parishes from Hurricane Juan were compiled from FEMA damage report surveys and newspaper articles (Table 28). The storm affected Louisiana's weather for four to five days with the West Bank area receiving widespread damages and incurring extensive emergency costs. Gauges on the Harvey Canal recorded stages equivalent to a storm with an annual probability of .0167 (once in 60 years). Although this was not a true 60-year storm, Juan's circular course pushed enough water to build stages to that of a larger storm.

The emergency costs and damages to public property identified by the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, Feasibility Report of December 1986, have been used as a benchmark for estimating possible emergency costs in the current study area. The previous West Bank study claimed $4 million for the emergency costs and damage to public property for a 60-year storm (Juan). Approximately 2,500 structures on the West Bank and in Grand Isle and Lafitte, were flooded as a result of Hurricane Juan. A portion of this amount resulted from breaks in and overtopping of the local levee system. The average emergency cost per structure flooded above first floor elevation was found to be $1,600. After being price adjusted to the October 1991 level, this amount was increased to $1,870.

In order to determine average annual emergency costs, the costs associated with storms of different frequencies of occurence must be determined. The number of structures flooded above first floor elevation for the 10, 50, 100, and 500-year storm events were provided by SID program outputs for the base and with project conditions. These numbers were then multiplied by the $1,870 average emergency cost per structure, in order to establish frequency-damage relationships. Finally, these relationships were entered into the EAD program to determine the average annual damages for the without- and with-project conditions.

Because fewer structures will flood with the project in place, a frequency damage relationship with lower damages was entered into the EAD program. The portion of the average annual figure that will be reduced by the project is considered the emergency costs saved. These reductions in emergency costs costs for the selected plans are shown in Table 27.

TABLE 27

WEST BANK - EAST OF HARVEY CANAL
EMERGENCY COST AND DAMAGE TO PUBLIC PROPERTY
AVERAGE ANNUAL EMERGENCY COSTS AND BENEFITS
(0000's)

REACH	(1) EXISTING CONDITIONS AVG. ANNUAL COSTS	(2) 100-YEAR PLAN AVG. ANNUAL BENEFITS (cost savings)	(3) 200-YEAR & SPH PLANS AVG. ANNUAL BENEFITS (cost savings)
A	$ 85,980	$ 84,220	$ 85,980
B	13,380	13,000	13,000
C	362,650	343,200	343,200
D	827,450	721,350	721,610
E	370	360	370
F	26,320	6,480	8,000
AL-CAL.	1,180	1,180	1,180
TOTAL	$1,317,330	$1,169,790	$1,173,340

TABLE 28

WEST BANK - EAST OF HARVEY CANAL
EMERGENCY COST AND DAMAGE TO PUBLIC FACILITIES
JEFFERSON PARISH AND WESTBANK DAMAGE REPORT
HURRICANE JUAN
OCTOBER 1985
(0000's)

CATEGORY	LOCATION	AMOUNT
Debris Removal	Parishwide	$ 338,715
Protective Measures	Parishwide	855,902
Roads and Bridges	Westbank	62,224
Levee Repair	Westbank	186,352
Pumping Stations	Westbank	1,688,743
Public Utilities	Westbank	795,630
State Police, Natl. Guard, Off. of Emrg. Preparedness	Westbank	110,000
TOTAL	Westbank area	$4,037,566

SOURCE: F.E.M.A. Damage Survey Reports

* Did not include damage to Public Buildings totaling $641,719 because they were included in the structure inventory for inundation damage calculations.

Reduction in Evacuation and Subsistence Costs. The emergency cost savings associated with the occurence of hurricanes for both evacuation and subsistence may be claimed in this benefit category. The costs considered include meals, clothing and shelter assistence for evacuees. Hurricane Juan affected Louisiana's weather for four to five days as parishes along the Louisiana coast received widespread damages and incurred extensive emergency costs. Schools and amories were opened in the southern half of Louisiana for the approximately 13,000 evacuees that were forced to flee their homes because of flooding.

The American Red Cross opened 23 shelters for flood victims in ten parishes and set up 44 mobile feeding units. Approximately 50,000 people were fed by these units. Cash vouchers were given to flood victims for items such as clothing, home furnishings, medicine, and health aids. Actual spending by American Red Cross totaled $8 million for the 12,980 families that registered for aid in the parishes flooded by Hurricane Juan. The average assistance paid to each family was $616.

The Salvation Army opened several relief centers throughout the West Bank area. Aid was provided to approximately 1,200 families and their total spending was $240,000. The average assistance supplied to each family was $200.

Relief efforts were also sponsored by local schools, religious organizations, and businesses for flood victims. However, no value was assigned to this activity. The total assistance provided each household flooded above first floor elevation was $816. After being priced indexed to October 1991 levels, this amount was increased to $995.

In order to determine average annual subsistence and evacuation costs, the subsistence and evacuation costs for storms of different frequencies of occurence must be known. The number of structures flooded above first floor elevation for the 10, 50, 100, and 500-year storm events were provided by SID program outputs for the base and with project conditions. These numbers were then multiplied by the $995 total subsistence and evacuation cost per structure, in order to establish frequency damage relationships. Finally, these relationships were entered into the EAD program to determine the average annual costs for the project conditions.

Because fewer structures will flood with the project in place, a frequency damage relationship with lower damages was entered into the EAD program. The portion of the average annual figure that will be reduced by the project is considered the emergency costs saved. These reductions in emergency costs for the selected plans are shown in Table 29.

TABLE 29

WEST BANK - EAST OF HARVEY CANAL
AVERAGE ANNUAL EVACUATION AND SUBSISTENCE COSTS AND BENEFITS
(0000's)

REACH	(1) EXISTING CONDITIONS AVG. ANNUAL COSTS	(2) 100-YEAR PLAN AVG. ANNUAL BENEFITS (cost savings)	(3) 200-YEAR & SPH PLANS AVG. ANNUAL BENEFITS (cost savings)
A	$ 45,750	$ 44,930	$ 45,750
B	7,120	6,920	6,920
C	192,960	182,610	182,610
D	433,280	375,570	376,960
E	200	190	200
F	14,010	3,450	4,260
AL-CAL.	630	630	630
TOTAL	$693,950	$614,300	$617,330

Reoccupation costs. Benefits attributed to this category are defined as the elimination or lowering of reoccupation costs. These costs result from the flooding of residential structures at or above first floor elevation, and include the many hours that homeowners spend to contract, supervise, and inspect repairs, to clean and disinfect their homes, and to fill-out casualty loss forms for flood insurance and other disaster assistance.

According to a survey of former flood victims in the Amite River area of this district, the average time spent in flood clean-up per household totaled 170 hours. In order to be conservative in our estimate, the number of hours for the West Bank study area was reduced to 115 hours. Table 31 details the various activies involved in the reoccupation process. Because the homeowners were forced to forego other activities, including work time, during the flood aftermath, an opportunity cost per hour was assigned. This was determined to be $11.23 per hour, or the average hourly wage in the New Orleans SMSA for employees covered under the Louisiana Employment Securities Law. Thus, the total reoccupation costs for each household is $11.23 x 115 hours or $1,291.

In order to determine average annual reoccupation costs, the reoccupation costs for storms of different frequencies of occurence must be known. The $1,291 cost per household was multiplied by the number of structures flooded above first floor elevation for events of five different frequencies of occurence in our study areas to develop a frequency-damage relationship. The number of structures flooded above first floor elevation for the 10, 50, 100, and 500-year events were available from SID program outputs for without and with project conditions. The frequency-damage relationship was entered into the EAD program to determine average annual reoccupation costs.

Because fewer structures will flood with the project in place, a frequency-damage relationship with lower damages was entered into the EAD program. The portion of the average annual figure that will be reduced by the project is considered the reoccupation costs saved. These reductions in reoccupation costs for the selected plans are shown in Table 30.

TABLE 30

WEST BANK - EAST OF HARVEY CANAL
AVERAGE ANNUAL REOCCUPATION COSTS AND BENEFITS
(0000's)

REACH	(1) EXISTING CONDITIONS AVG. ANNUAL COSTS	(2) 100-YEAR PLAN AVG. ANNUAL BENEFITS (cost savings)	(3) 200-YEAR & SPH PLANS AVG. ANNUAL BENEFITS (cost savings)
A	$ 59,360	$ 58,150	$ 59,360
B	9,230	8,9800	8,980
C	250,370	236,940	236,940
D	562,250	487,380	489,180
E	260	260	260
F	18,170	4,480	5,520
AL-CAL.	810	810	810
TOTAL	$900,450	$797,000	$801,050

TABLE 31

WEST BANK - EAST OF HARVEY CANAL
HOURS SPENT ON REOCCUPATION ACTIVIES

No. of Hours	Reoccupation Activies after a flood
6	Removal of carpet and padding, and moving of furniture.
16	Initial interior cleaning - hose and mop interior floor walls, including closets, cabinets, tubs, toilets, electric outlets, and phone plugs, etc.
16	Exterior cleaning - hose exterior walls, porches, patios, carports, storage buildings, central air conditioning units, etc.
2	Cleaning of lot, trash and debris removal.
16	Final interior cleaning and sterilization - mop and sponge floors, walls, cabinets, closets, tubs, toilets, etc., especially kitchen and bath areas, with cleaning and disinfecting solutions.
8	Time spent in gathering information and meeting with officials about insurance and disaster assistance services, and then completing the corresponding forms.
20	Seeking and meeting with contractors to gather estimates for repairs on appliances, carpentry, plumbing, floor and wall covering, and air conditoning and heating.
16	Locating and selecting replacement carpets, wall coverings, appliances, furniture, and paint.
15	Overseeing and coordinating work of various contractors, and subcontractors and specialists for repair work and replacement.
115	The total hours spent on reoccupation of a single family house that had flooding above first floor elevation.

Total Emergency Costs. The total NED benefits for this category are determined by combining the average annual cost savings from emergency cost and damage to public property, evacuation and subsistence measures, and reoccupation of houses by flood victims. The total average annual cost savings are apportioned to the hydrologic reaches for the study area in Table 32.

TABLE 32

WEST BANK - EAST OF HARVEY CANAL
TOTAL AVERAGE ANNUAL EMERGENCY COST SAVINGS
(0000's)

	Project Alternative		
Reach	100-year	200-year	SPH-year
A	$187,300	$191,090	$191,090
B	$28,900	$28,900	$28,900
C	$762,750	$762,750	$762,750
D	$1,584,300	$1,587,750	$1,587,750
E	$810	$830	$830
F	$14,410	$17,780	$17,780
AL-CAL.	$2,620	$2,620	2,620
Total	$2,581,090	$2,591,720	$2,591,720

SECTION 5. DAMAGE AND BENEFIT ANALYSIS - NAVAL AIR STATION NEW ORLEANS

DAMAGE PRESENTATION. The Naval Air Station New Orleans (Alvin Callender Field), a military installation located in the Plaquemines Parish city of Belle Chasse, is operated by the U.S. Navy, and also used by the U.S. Coast Guard and the U.S. Air Force. Although it is situated within Reach F, it is being analyzed separately from the rest of that reach because of its unique nature. Structures on the base include residential housing for enlisted personnel, and their families, commercial establishments, such as the commissary store, bowling alley, gym, etc., training classrooms, industrial maintenance and repair facilities, and storage warehouses for equipment, ammunition, vehicles and airplanes.

STRUCTURE VALUE. An extensive structure inventory was compiled in order to determine the potential flood damage to the Naval Air Station. Information taken from the Detailed Inventory of Naval Shore Facilities, was used in conjunction with the Marshall and Swift Valuation Service to assign a value to these structures. The Navy document listed the present use of each structure, along with its age, original cost, current present value, square footage, height, and number of stories. The age and condition of each facility were used by the Marshall and Swift Valuation Service to convert the current present value of each structure to its depreciated replacement value. Table 33 shows the number and total values of properties on the Naval Air Station.

TABLE 33

SUMMARY OF STRUCTURE TYPE, QUANTITY, CONTENTS & VALUES
NAVAL AIR STATION NEW ORLEANS
(ALVIN CALLENDER FIELD - REACH F)

STRUCTURE TYPE	TOTAL QUANTITY	STRUCTURE VALUE 1000'S	CONTENTS VALUE 1000'S
Residential	11	$ 958	$ 492
Facilities	225	105,989	148,323
Ammunition	N.A.	N.A.	16,184
Vehicles	1468	13,120	N.A.
TOTAL		$120,067	$164,999

CONTENTS VALUE. A damage survey form was distributed to the commanding officers of the Coast Guard, Air Force, and Navy Operations, in order to obtain a precise listing of the industrial and military contents of each facility. The actual contents value provided in these surveys was used in the analysis whenever possible. However, for the structures not included in the survey, such as the residential housing, recreational facilities, and classroom buildings, the normal contents to structure relationships provided by CH2M Hill, Inc. were used. The total value of the contents of each facility on the Naval Air Station is displayed in Table 33. The ammunition inventory not associated with any particular facility has been shown as a separate damage category, with its own unique depth-damage curve. This information was provided by a military authority.

VEHICLES. The directors of the motor pools for each of the three military operations were contacted in order to determine the number and depreciated value of the military-owned vehicles on the Naval Air Station. These vehicles included cars, pick-up and delivery trucks, forklifts, and fuel trailers. The vehicles were grouped into the following categories for analysis: cars, small trucks, large trucks, semi-tractors, and semi-trailers. The appropriate depth-damage relationship developed by CH2M Hill, Inc., was applied to each category. The analysis also included vehicles that are privately-owned by the enlisted personnel and their families. It was assumed that one car was associated with each of the 633 separate living quarters (220-family housing units and 413 enlisted personnel quarters.) The ground elevation assigned to each of these vehicles was dependent upon its location at the Air Station.

GROUND ELEVATION. Ground elevations were determined by using contour maps provided by the engineers in the Air Station's Public Works Facility. These elevations ranged from -3.0 to +2.0 MSL. The first floor elevations were obtained by visual observations made by a field survey team. Hand levels were used to ensure accuracy.

DEPTH-DAMAGE RELATIONSHIPS. Salt-water depth-damage curves developed by CH2M Hill, Inc., were used to indicate the percentage of the total non-residential structure value that would be damaged from flooding at and above first floor elevation. Information taken from the returned damage surveys was used to develop the relationship between the depth of flooding over first floor and the percent damage to contents for each half-foot increment of flooding up to four feet. Unique depth-damage relationships were developed for the contents of 43 facilities. This was added to the content depth-damage relationships developed by CH2M Hill Inc., that were applied to the other facilities, and displayed in Table 16.

STAGE-FREQUENCY CURVES. Stage-frequency curves were used to show water stages for the different frequency storm events. In this analysis, separate curves were determined for both without and with-project conditions, and under existing and future conditions. (See Appendix A for stage-frequency curves.) The same hydraulics applied to the other areas of Reach F have been used for analyzing the Naval Air Station.

DAMAGE CALCULATION. Damage was calculated using the Hydrologic Engineering Center Flood Damage Analysis Package, the flood plain structure inventory, depth-damage relationships, and stage-probabilities obtained from stage-frequency curves. The Structure Inventory for the Damage Analysis (SID) computer program was used to calculate elevation-damage curves. Elevation-damage curves were produced for existing and future conditions and for each plan of improvement. Damages were calculated for residential structures and contents, facilities and contents, and vehicles. A summary of actual damages under existing and future conditions for the without project and SPH level of protection are shown for the 10, 50, 100, and 500-year storms in Tables 34A and 34B. The HEC Expected Annual Flood Damage Computation (EAD) computer program was used to weigh the damage corresponding to each magnitude of flooding by the percent chance of exceedance and sum the weighted damage to determine the expected annual damage. A summary of the expected annual damages by decade during the period of analysis and the equivalent annual damages and benefits are displayed in Section 4 of this report.

TABLE 34A

WEST BANK - EAST OF HARVEY CANAL
EAST OF ALGIERS CANAL
ALVIN CALLENDER
DAMAGES FOR VARIOUS FLOOD EVENTS
1991 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 0	$ 3,963	$ 11,644	$ 85,091
100-YEAR PROTECTION	0	0	0	30,007
200-YEAR PROTECTION	0	0	0	11
SPH PROTECTION	0	0	0	0

TABLE 34B

WEST BANK - EAST OF HARVEY CANAL
EAST OF ALGIERS CANAL
ALVIN CALLENDER
DAMAGES FOR VARIOUS FLOOD EVENTS
2040 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 0	$ 16,345	$ 56,561	$136,090
100-YEAR PROTECTION	0	0	0	47,622
200-YEAR PROTECTION	0	0	0	1,049
SPH PROTECTION	0	0	0	0

SECTION 6. DAMAGE AND BENEFIT ANALYSIS - INDUSTRIAL SECTOR ON HARVEY CANAL

DAMAGE PRESENTATION - HARVEY CANAL BUSINESSES. Development along both banks of the Harvey Canal from the Harvey Canal Lock south to the juncture with Bayou Barataria, is comprised almost exclusively of industrial complexes that utilize the waterway. Industrial concerns primarily include offshore oil and gas fabrication and service operations, ship repair facilities, manufacturing, and supply services.

LAND USE. As previously stated, land use for the strip of land between the canal and Peters Road is virtually all commercial/industrial. Because industrial land commands higher prices than land used for other purposes, this land cannot be put to a higher economic use. Also, because of the heavily industrialized nature of the area, as well as its relatively small size, no change in current usage is expected.

STRUCTURE VALUATION. In order to determine the potential flood damages to structures along the Harvey Canal, an updating of the structure data from the 1988 study was required. The first step was to distribute a new damage survey form to each of the companies located on the waterway, in coordination with the Harvey Canal Industrial Association. (A sample of the questionnaire is included in this report.) The completed surveys of five companies located along the Harvey Canal were received after the completion of the 1991 report, but have been included in the structure file of this revised report. The 1988 damage survey data, updated by the Marshall and Swift Valuation Program, was used for those companies that did not respond to the new survey. Finally, a windshield survey was conducted to obtain structure data on companies that did not respond to either survey. The data collected included ground elevation, estimated slab height (first floor), condition of the building, type of construction, size, and present or past usage. This information was used in determining depreciated structure value based on valuations made with the Marshall and Swift Commercial Valuation Program.

Table 35 shows the number of structures and the total structure value for the east side of Peters Road (non-canal side), west side of Peters Road (canal side) and Destrehan Avenue (canal side and non-canal side only between Lapalco Boulevard and Patriot Street). The 333 commercial structures listed in the table are associated with approximately 100 businesses. The mobile homes shown in the table are used by these businesses as additional office space.

Harvey Canal Damage Survey

1. Name of Business: _____
   Address: _____
   _____ (East or West Bank?)

2. Type of Business: _____

3. Number of Major Structures? _____

4. How Long Have You Been at this Address? _____
   How Many times Have Flood Damages Occurred at This Location? _____
   How Much Advance Warning Time Do You Generally Have Before a Flood? _____
   Do You Take Measures to Reduce Damages Once Flooding Appears Imminent? _____ Describe: _____
   _____
   _____
   Estimated Site Clean-up Cost After a Flood? $_____
   Daily Fixed Overhead During Periods of Shut-down? $_____
   Any Other Losses? _____
   _____
   _____
   _____
   _____

5. Structure Inventory*:

Structure 1

Size, sq. ft: _____ First Floor Elevation: _____ft. MSL
Type of Construction: _____ Age and Condition: _____
Nature of Contents: _____
Total Value of Structure (depreciated replacement): $_____
Total Value of Contents/Inventory: $_____
Estimated Percentage Damage:

Degree of Flooding	%Damage to Structure	%Damage to Contents
1'	___%	___%
2'	___%	___%
3'	___%	___%
4'	___%	___%
-	___%	___%
6'	___%	___%
7'	___%	___%
8'	___%	___%
9'	___%	___%
10'	___%	___%

* Damageable inventory stored outdoors should be treated as contents, with no structure description shown. Reproduce additional Structure Forms if needed.

CONTENTS. The actual contents value provided in the surveys was used whenever available. Actual content values reported in the surveys ranged from $10,000 to $5,000,000 for a particular structure. For those businesses that did not respond to the survey, the normal percentage of contents to structure for non-residential structures developed by CH2M Hill, Inc. was used. A contents factor of 109% was used for the office segments of buildings, while 113% was used for storage sheds. However, the majority of the companies, that did not respond, were categorized as repair service establishments, and as such, were assigned a contents factor of 152%. This is the same percentage as the average contents to structure ratio determined in the 1988 study. The total value of the contents associated with businesses located in the three areas along the Harvey Canal can be found in Table 35.

VEHICLES. Major companies along the Harvey Canal were surveyed by telephone to determine the number and depreciated value of company-owned vehicles associated with each establishment. These vehicles included company cars, pick-up and delivery trucks, forklifts, tractor/trailer and cranes. For the purpose of analysis, the vehicles were grouped into the following categories: cars, small trucks, large trucks, semi-tractors, and semi-trailers. The appropriate depth-damage relationship developed by CH2M HILL, Inc., was applied to each category. It was assumed that each vehicle was parked at ground floor elevation. There were 919 vehicles included in the damage analysis. No account was taken of employee-owned vehicles, since most would be evacuated with the coming of a storm.

GROUND ELEVATIONS. Ground elevations were determined by using GIS maps with 1-foot contour lines. These maps were provided by Jefferson Parish officials. The first floor elevation was obtained by visual observations made by a field survey team. Hand levels were used to ensure accuracy.

TABLE 35

WEST BANK - EAST OF HARVEY CANAL
HARVEY CANAL INDUSTRIAL CORRIDOR
SUMMARY OF STRUCTURE TYPE, QUANTITY, CONTENTS & VALUES

REACH	STRUCTURE TYPE	TOTAL QUANTITY	STRUCTURE VALUE $1000'S	CONTENTS VALUE $1000'S
EAST SIDE OF PETERS	COMMERCIAL	118	$ 14,385	$ 23,235
	MOBILE HOME	6	$ 108	$ 81
	VEHICLES	639	$ 7,915	N.A.
	SUBTOTAL		$ 22,408	$ 23,316
WEST SIDE OF PETERS	COMMERCIAL	98	$ 12,676	$ 42,588
	MOBILE HOME	0	$ 0	$ 0
	VEHICLES	135	$ 3,003	N.A.
	SUBTOTAL		$ 15,679	$ 42,588
DESTREHAN AVENUE	COMMERCIAL	104	$ 11,468	$ 36,182
	MOPILE HOME	7	$ 70	$ 53
	VEHICLES	145	$ 3,298	N.A.
	SUBTOTAL		$ 14,836	$ 36,235
HARVEY CANAL TOTALS	COMMERCIAL	320	$ 38,529	$102,005
	MOBILE HOME	13	$ 178	$ 133
	VEHICLES	919	$ 14,216	N.A.
	GRAND TOTAL		$ 52,923	$102,138

DEPTH-DAMAGE RELATIONSHIPS. Saltwater depth-damage curves developed as part of the LPHPP study, were used to indicate the percentage of the total non-residential structure value that would be damaged from flooding at and above first floor elevation. Information taken from the returned questionnaires was used to develop the relationship between the depth of flooding over the first floor elevation and the percent damage to contents. Companies with similar operations were grouped together for purposes of analysis. The resulting depth-damage relationships for contents are shown in Table 36. For those businesses that did not respond to either the updated or the 1988 surveys, the appropriate non-residential depth-damage relationship developed by CH2M Hill, Inc., for non-residential contents was applied.

STAGE-FREQUENCY CURVES. Under the existing and future without project conditions, the west side of Peters Road (canal side) and Destrehan Avenue would incur flood damage from the Harvey Canal. The without project flooding on the east side of Peters Road is caused by water from the South (Reach D) and from the Harvey Canal. With a floodgate structure in the canal, Peters Road (east and west) and Destrehan Avenue would incur only minimal flooding from rainfall. Under the floodwall plan, the east side of Peters Road would experience induced flooding from the project. The west side of Peters Road and Destrehan Avenue would not receive protection. (Stage-frequency curves are shown in Appendix A of the report.)

DAMAGE CALCULATION. Damage was calculated using the Hydrologic Engineering Center-Flood Damage Analysis Package, the flood plain structure inventory, depth-damage relationships, and stage-probabilities obtained from stage-frequency curves for each of the three areas of the Harvey Canal. The Structure Inventory for Damage Analysis (SID) computer program was used to calculate elevation-damage curves. Elevation-damage curves were produced for the existing and future conditions and for each plan of improvement.

TABLE 36

WEST BANK - EAST OF HARVEY CANAL
HARVEY CANAL INDUSTRIAL CORRIDOR
CONTENTS DEPTH-DAMAGE RELATIONSHIPS

Depth of Flooding Over slab (feet)	General Oil Field Equipment & Electrical Supplies (%)	Boat Repair and Fabrication Equipment (%)
1.0	20	30
2.0	40	50
3.0	70	70
4.0	75	80
5.0	80	90
6.0	85	100
7.0	90	100
8.0	100	100
9.0	100	100
10.0	100	100

Depth of Flooding Over slab (feet)	Manufacturing Plant and Warehouse Equipment (%)	Production & Compressor Equipment (%)
1.0	30	5
2.0	60	10
3.0	80	15
4.0	90	28
5.0	100	33
6.0	100	39
7.0	100	47
8.0	100	55
9.0	100	63
10.0	100	70

Damages were calculated for commerical structures, mobile homes, the contents of each, and vehicles. A summary of actual damages under existing and future without-project conditions, and the floodgate and floodwall plans for the 10, 50, 100, and 500-year storms is displayed in Tables 37A and 37B. The construction of a floodwall on the east side of the Harvey Canal will not only leave the industrial complexes along the canal unprotected, but will also cause the induced flooding of these structures. The amounts of the induced flooding damages that will result from the Floodwall alternative for the 4-frequency storm events are also shown in Tables 37A and 37B for both existing and future conditions.

TABLE 37A

WEST BANK - EAST OF HARVEY CANAL
WEST OF ALGIERS CANAL
HARVEY CANAL INDUSTRIES
DAMAGES FOR VARIOUS FLOOD EVENTS
1991 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 7,148	$ 19,661	$ 33,009	$ 67,916
SPH - FLOODGATE	84	105	118	197
SPH - FLOODWALL	7,148	31,477	45,489	73,062
INDUCED DAMAGES	0	11,816	12,480	5,146

TABLE 37B

WEST BANK - EAST OF HARVEY CANAL
WEST OF ALGIERS CANAL
HARVEY CANAL INDUSTRIES
DAMAGES FOR VARIOUS FLOOD EVENTS
2040 CONDITIONS
(000's)

	10-YEAR	50-YEAR	100-YEAR	500-YEAR
WITHOUT PROJECT	$ 27,788	$ 46,959	$ 63,625	$ 94,146
SPH - FLOODGATE	84	105	118	197
SPH - FLOODWALL	27,788	63,212	76,558	94,146
INDUCED DAMAGES	0	16,253	12,933	0

The Hydrologic Engineering Center (HEC) Expected Annual Flood Damage Computation (EAD) computer program was used to weigh the damage corresponding to each magnitude of flooding by the percent chance of exceedance and sum the weighted damage to determine the expected annual damage. Table 38 summarizes the expected annual damages for the study year, base year, the next five decade years, and the end of the period of analysis. This information is shown for the without-project, the floodgate SPH level of protection, and the floodwall SPH level of protection. Also shown is the expected annual induced damages from the floodwall alternative.

TABLE 38

WEST BANK - EAST OF HARVEY CANAL
AREA WEST OF ALGIERS CANAL
EXPECTED ANNUAL FLOOD DAMAGES
HARVEY CANAL
(000's)

Reach	PLAN	STUDY YEAR 1991	BASE YEAR 2002	DECADE YEARS 10 2011	20 2021	30 2031	40 2041	50 2051	END OF PERIOD 2101
HC	W/O Project	1,601	2,125	2,569	3,072	3,582	4,051	4,051	4,051
	Floodgate, SPH	10	10	10	10	10	10	10	10
	Floodwall, SPH	1,965	2,576	3,126	3,769	4,431	5,070	5,070	5,070
	Induced Damages	364	451	557	697	849	1,019	1,019	1,019

DAMAGES AND BENEFITS TO HARVEY CANAL. In order to calculate the equivalent annual flood damages, the stream of expected annual flood damages must be discounted back to the base year of the project. The discount rate used in the analysis is 8-1/2 percent. The expected annual damage for each year is assumed to occur at the end of the year. After being discounted back to the base year, it must then be amortized over the period of analysis.

Tables 39A and 39B summarize the equivalent annual damages and benefits for the Harvey Canal Industrial Corridor. In each of these tables, the damage under base conditions is compared to the damage under a given level of flood protection in order to determine the benefits attributable to the project. Tables 40A and 40B provide damage information and indundation reduction benefits for three levels of hurricane protection according to the damage category, which includes structure, contents, and vehicles. Also shown is the percentage of damage prevented by the project.

TABLE 39A

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR FLOODGATE - SPH LEVEL OF PROTECTION
HARVEY CANAL REACH
AREA WEST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH FLOODGATE - SPH	EQUIVALENT ANNUAL BENEFITS
HC	$ 2,686	$ 10	$ 2,676
% Damage Prevented			99.6%

TABLE 39B

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR FLOODWALL - SPH LEVEL OF PROTECTION
HARVEY CANAL REACH
AREA WEST OF ALGIERS CANAL
(000's)

AREA	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH FLOODWALL - SPH	EQUIVALENT ANNUAL BENEFITS
HC	$ 2,686	$ 3,285	$ <599>
% Damage Prevented			<22%>

NOTE: The industrial complexes located along the Harvey Canal will not only be excluded from the flood protection provided by the floodwall, but will also be subject to induced flooding from the project.

TABLE 40A

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR FLOODGATE - SPH LEVEL OF PROTECTION
HARVEY CANAL REACH
AREA WEST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH - FLOODGATE	EQUIVALENT ANNUAL BENEFITS
Structures			
Mobile Home *	$ 9	$ 0	$ 9
Commercial	302	2	300
Total Structures	$ 311	$ 2	$ 309
Contents			
Mobile Home	$ 3	$ 0	$ 3
Commercial	2,208	8	$ 2,200
Total Contents	$ 2,211	$ 8	$ 2,203
Vehicles	$ 164	$ 0	$ 164
TOTAL	$ 2,686	$ 10	$ 2,676
% Damage Prevented			99.6%

* Offices

TABLE 40B

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL DAMAGES AND BENEFITS
FOR FLOODWALL - SPH LEVEL OF PROTECTION
HARVEY CANAL REACH
AREA WEST OF ALGIERS CANAL
(000's)

PROPERTY TYPE	EQUIVALENT ANNUAL DAMAGES UNDER BASE CONDITION	EQUIVALENT ANNUAL DAMAGES WITH SPH - FLOODWALL	EQUIVALENT ANNUAL BENEFITS
Structures			
Mobile Home *	$ 9	$ 12	$ (3)
Commercial	302	394	(92)
Total Structures	$ 311	$ 406	$ (95)
Contents			
Mobile Home	$ 3	$ 5	$ (2)
Commercial	2,208	2,620	$ (412)
Total Contents	$ 2,211	$ 2,625	$ (414)
Vehicles	$ 164	$ 254	$ (90)
TOTAL	$ 2,686	$ 3,285	$ (599)
% Damage Prevented			(22.3%)

* Offices

SECTION 7. NAVIGATIONAL IMPACTS

GENERAL. The draft feasibility report of the subject study recommends a plan that includes the construction of a navigable floodgate in the Harvey Canal south of the Lapalco bridge. With the exception of very small movements that operate within the canal itself, the canal would be effectively closed to navigation during the estimated 15-months of constructing the floodgate. Harvey Lock traffic is an extremely close approximation of canal through traffic and in 1990 Harvey Lock handled approximately 3.6 million tons of commerce. In order to avoid the closure of the canal, a temporary by-pass channel is being considered. Below is a description of the economic analysis demonstrating the justification of building a by-pass channel.

With- and Without-Project Conditions. Since navigation is expected to be unaffected during the construction of a floodgate in the Harvey Canal with the availability of a by-pass channel, existing free flow conditions represent the with-project scenario. The 15-month closure of the Harvey Canal/Lock with no by-pass channel is the without-project condition.

Calculation of Transportation Costs and Savings. Traffic which normally uses Harvey Lock has two possible detours available, one through Algiers Lock (the more likely alternative) and the second through the Morgan City-Port Allen Alternate Route. The Algiers Lock connects the Algiers Canal with the Mississippi River and in 1990 handled approximately 24.8 million tons of commerce. The Morgan City-Port Allen Alternate Route (64 miles long) connects Morgan City, Louisiana, on the GIWW, to Port Allen, Louisiana, on the Mississippi River, and has two locks on the waterway, Port Allen and Bayou Sorrel. Each of these locks handled approximately 27.6 million tons in 1990.

The General Equilibrium Model (GEM) was used to evaluate the with and without-project conditions. The GEM model is a tool used for the economic evaluation of potential changes to various components of a navigation system. The model estimates the total transportation costs, including congestion costs, incurred by individual movements using all or portions of a navigation system. System transport costs for these individual movements are then compared to the total transport costs of that movement via the least-cost alternative mode or alternative non-system water route. If the alternative means of transport has lower costs than water system transport for a given movement, then that movement is presumed to be diverted from the navigation system to the alternative mode/non-system route. This potential movement enjoys no transport cost reductions

resulting from the navigation system. Conversely, movements enjoying less costly transportation on the navigation system will realize a net savings equal to the difference between the costs of system transport and the next least costly alternative means of movement. The sum of all these transportation costs savings represents the total resource saving to the nation attributable to the navigation system.

Using a 1990 traffic base, developed and used for the Inner Harbor Navigation Canal Lock Replacement Study, and reflecting third quarter CY 1992 price level operating costs, the GEM model was run on existing conditions and then again with Harvey Lock closed. As indicated earlier, closure of Harvey Lock closely approximates closure of Harvey Canal at the proposed floodgate site. The difference in the total transportation savings between these two scenarios was then multiplied by 1.25 to reflect the cost to the towing industry of a 15-month Harvey Canal/Lock closure with no by-pass channel. Therefore this estimate also represents the total benefits of the availability of a temporary by-pass channel.

Economic Justification. The attached table displays the results of the GEM model runs for the with- and without-project conditions. The amount of commerce processed and the average delay per tow estimates at each of the above mentioned locks are shown along with the total transportation savings associated with each scenario. As Table 41 indicates, closing the Harvey Lock/Canal causes approximately 79 percent of the traffic that would normally use the Harvey Lock to divert to the Algiers Lock, with the remaining 21 percent of traffic using the Morgan City-Port Allen Alternate Route. Also shown in the table is the expected increase in average delays per tow at Algiers, Port Allen and Bayou Sorrel locks resulting from this diversion. The difference between the with and without-project total transportation savings of $9,300,000 represents the total benefits of having a by-pass channel during a single year. This figure becomes $11,625,000 after adjusting it to reflect the 15-months of closure. Assuming a 100-year project life and using 8 percent as the discount rate, the average annual benefits totaled $930,000. Applying appropriate shallow-draft vessel operating cost indices, this figure was updated to reflect October 1993 price levels, equaling $953,000. It should be noted that since 1990 traffic levels were used to estimated navigation costs and the resulting savings due to a by-pass channel, the savings estimate is understated to the extent that actual traffic volume in the year in which the floodgate would be constructed would be slightly higher. With higher traffic volume, diversion costs would also be higher.

The cost of building the by-pass channel is approximately $3,628,000, which when annualized over 100-years at an 8 percent discount rate, becomes $290,000. As a result, net benefits affiliated with the by-pass channel equal $663,000, representing the difference between average annual benefits and average annual costs. The associated benefit-cost ratio is 3.3.

It should also be noted that once completed, the floodgate would remain open except during hurricane events. The floodgate would provide an opening of 110 feet and would be aligned with the existing opening under the Lapalco Bridge. The gate opening was sized to conform with the 110-foot standard opening being evaluated for other navigation structures along the GIWW. Construction of the floodgate to a width of less than 110 feet would not be sufficient given the fabrication of offshore equipment along the canal. The existing Harvey Lock, located north of the floodgate, only provides an opening of 75 feet. Current delays at the Harvey Lock average 30 minutes. Heavy industrial development along the Harvey Canal, in conjunction with restrictions at the Harvey Lock and the Lapalco Bridge, creates very congested conditions. These conditions limit the speed of barge traffic in the canal. The navigable floodgate feature of Plan 3B should not further impact navigation along the Harvey Canal.

TABLE 41

WEST BANK - EAST OF HARVEY CANAL
NAVIGATIONAL IMPACTS

	Without Project		With Project	
Lock	Tons Processed (Thousands)	Average Delay/Tow (Hours)	Tons Processed (Thousands)	Average Delay/Tow (Hours)
Algiers	27,506	7.6	24,501	3.3
Port Allen	28,576	1.9	27,811	1.7
Bayou Sorrel	27,860	6.9	27,095	5.5
Harvey	0	0	3,780	0.32

Without Project Total Transportation Savings For One Year =	$1,249,300,000
With Project Total Transportation Savings For One Year =	$1,258,600,000
Benefits Associated with the By-Pass Channel For One Year =	$9,300,000
Total Benefits Associated with the By-Pass Channel Adjusted For The 15-Month Closure =	$11,625,000
Average Annual Benefits (Sept 1992 Price Levels) =	$930,000
Average Annual Benefits (October 1993 Price Levels) =	$953,000
Total Costs of Building The By-Pass Channel =	$3,628,000
Average Annual Costs =	$290,000
Net Benefits =	$663,000
BCR =	3.3

SECTION 8. PRESENTATION OF EQUIVALENT ANNUAL BENEFITS AND COSTS

TOTAL EQUIVALENT ANNUAL NED BENEFITS. The total equivalent annual benefits attributable to the to the project are displayed in Table 42. The benefits have been shown separately for the areas west and east of the Algiers Canal because the flood control improvements in these areas are considered two separable elements. Reaches A - D and the Harvey Canal Industrial Corridor have been aggregated into the area west of the Algiers Canal, while Reaches E and F, Alvin Callender Field, and Oakville are included in the area east of the Algiers Canal. (See Figure B-1) Benefits are shown in the table by benefit categories, and by the various levels of protection.

TABLE 42

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL BENEFITS BY NED BENEFIT CATEGORY
(000'S)

NED BENEFIT CATEGORY	LEVEL OF PROTECTION 100-YEAR FLOODWALL	200-YEAR FLOODWALL	SPH FLOODWALL	SPH FLOODGATE
REACHES A - D				
Inundation Reduction				
Structural	$ 31,332	$ 32,263	$ 32,336	$ 32,336
Automobile	3,579	3,659	3,663	3,663
Sub-Total	$ 34,911	$ 35,922	$ 35,999	$ 35,999
Emergency Cost Reduction	$ 2,563	$ 2,570	$ 2,570	$ 2,570
Sub-Total	$ 37,474	$ 38,492	$ 38,569	$ 38,569
HARVEY CANAL INDUSTRIAL CORRIDOR				
Inundation Reduction				
Structural	$ (509)	$ (509)	$ (509)	$ 2,512
Vehicles	(90)	(90)	(90)	164
Sub-Total	$ (599)	$ (599)	$ (599)	$ 2,676
WEST OF ALGIERS CANAL TOTAL	$ 36,875	$ 37,893	$ 37,970	$ 41,245
REACHES E, F, ALVIN CALLENDER AND OAKVILLE				
Inundation Reduction				
Structural	$ 1,306	$ 1,456	$ 1,456	$ 1,457
Automobile	111	121	121	121
Sub-Total	$ 1,417	$ 1,577	$ 1,577	$ 1,578
Emergency Cost Reduction	$ 18	$ 21	$ 21	$ 21
Future Development (E & F)	$ 1,041	$ 1,118	$ 1,118	$ 1,118
EAST OF ALGIERS CANAL TOTAL	$ 2,476	$ 2,716	$ 2,716	$ 2,717

NOTE: The Floodwall alternative induces damages to industries along the Harvey Canal.

TOTAL EQUIVALENT ANNUAL COSTS. The construction period for each of the two separable elements is 15 years. Relatively poor foundation conditions and the absence of higher quality borrow material result in the need for phased levee construction. New levees are generally constructed in three lifts. The first lift is overbuilt and allowed to settle for between 4 and 5 years before the second lift is added. The third lift accounts for future settlement that will occur throughout the project life.

Phase one of the west of Algiers Canal project is defined as the completion of the first levee lift along the Harvey Canal between Lapalco Boulevard and the Hero Pumping Station, and along the Algiers Canal between the Hero Pumping Station and the Algiers Lock. Plan 1 also involves the construction of a floodwall, which will extend along the Harvey Canal from the Harvey Lock to Lapalco Boulevard. In the case of Plan 3B, where a structure in the canal is involved, phase one is defined as completion of the sector gate complex and the first levee lift. This project is expected to become operational by the beginning of the year 2002.

Construction on the east side of Algiers Canal includes one lift on the Algiers Canal levee and three lifts on the Oakville levee. All of the first levee lifts will be completed by the year 1999, at which time Reaches E and F and Alvin Callender Field will have been provided with the design level of protection. The second and third lifts are only required on the Oakville levee, which is approximately one mile long. Construction of these lifts will begin when the first lift has settled to design grade. This project is expected to become operational by the year 1999.

The cost of over-building the floodwalls and levees in the tenth year has been included in Tables 43 and 44 as Future Protection. This process will account for the rising sea level and subsidence that will take place over the life of the project. The cost has been discounted back to the base year by using the Federal discount rate. If the cost of over-building the floodwalls and levees is included in the last year of the construction schedule as part of the third and final lift, then the first cost and the average annual cost of the project would increase by slightly over 1% for each plan. This would result in a slight lowering of the B/C ratio.

Consideration was given to altenative methods of raising the protection to account for future conditions. The levees, floodwalls, and floodgates could be initially constructed to account for changes projected to occur throughout the project life. Initially raising the levees an additional 1.8 feet would likely require the acquisition of additional rights-of-

way, thereby significantly increasing the cost. The design of the project would also be based on conditions which are only projected to occur during the next 50 years. Even though sea level rise and subsidence are based on past historical trends, our ability to accurately predict future changes in these parameters has a high degree of uncertainty.

If the projections were found to be in error at some point in the future, additional work on levees and floodwalls would likely be required. Another option would be to periodically (approximately every 10 years) raise the protection. In order to maintain SPH protection, the levees and floodwalls would have to be raised by 1.8 feet over the next 50 years. This equates to an increase of less than 0.5 feet every 10 years. A large portion of the cost to raise the protection by such a small amount would be associated with items (mobilization, clearing, grubbing, fertilizing, seeding, and demobilization) which are relatively independent of the increase in the protection. These costs would be incurred on a periodic basis increasing the overall costs for raising the protection. This option would also disrupt the lives of residents and businesses located adjacent to the protection on a periodic basis. Monitoring the effects of sea level rise and subsidence and determining the appropriate time to raise the protection is the best available option.

COMPARISON OF BENEFITS AND COSTS. The economic justification of the proposed improvements was determined by comparing the equivalent annual costs and benefits which are expected to accrue over the life of the project (100 years). These values were converted to an equivalent time frame by using the Federal discount rate of 8-1/2%. The base year for this conversion is year in which the project becomes operational (2002 for the area west of the Algiers Canal, and 1999 for the area east of the Algiers Canal). Finally, the costs and benefits are expressed as the equivalent annual value of the present worth of all expenditures and first costs.

Tables 43 and 44 display equivalent annual benefits and costs for the areas east and west of Algiers Canal. For the area east of Algiers Canal, Plan 1 and Plan 3B are identical and therefore have the same benefits and costs. Table 45 summarizes equivalent annual costs, benefits, and a incremental B/C ratio of Plan 3 as compared to Plan 1. Equivalent annual mitigation costs have also been included. The mitgation plans and costs are described in detail in Appendix C.

IMPACTS TO THE WESTWEGO TO HARVEY CANAL PROJECT. The previously authorized Westwego to Harvey Canal project includes the construction of a combination of levees and floodwalls along the west bank of the Harvey Canal. The floodwall will

extend along Destrehan Avenue from the Cousins Pumping Station at Lapalco Boulevard to the Harvey Lock. If a navigable floodgate is constructed in the Harvey Canal to the SPH level of protection as part of Plan 3B, along with a diverted outfall canal for the Cousins Pumping Station, then the need for parallel protection north of the Cousins Pumping Station will be eliminated. This will result in a cost savings of $15,052,000 to the Westwego to Harvey Canal project. According to the construction schedules of the two projects, completion of the floodgate feature of Plan 3B will take place in the same year as the Westwego to Harvey Canal floodwall. Because the construction of the floodgate will not delay benefits to the Westwego to Harvey Canal project, the full $15,052,000 savings can be claimed as a reduction in the cost of the East of Harvey Canal project .

This cost savings is reflected in Table 43 as a reduction in the gross investment cost at the end of the installation period for Plan 3B, SPH level of protection. The cost savings has been increased to $19,209,000 to account for interest earned during the period of construction. The Plan 3B alternative to the West Bank - East of the Harvey Canal project is being recommended as a modification to the Westwego to Harvey Canal project. Because the construction of the floodgate will reduce the combined cost of the two projects, the $15 million saved by the elimination of the floodwall on the west side of the canal will be regarded as a reduction in the total cost of this project, rather than as a benefit attributable to it.

TABLE 43

WEST BANK - EAST OF HARVEY CANAL

WEST BANK COST
INTEREST 8-1/2
BASE YEAR BEGINNING OF 2002
WEST OF ALGIERS CANAL (REACHES A-D)

	PLAN 1			PLAN 3B
	100-YEAR LEVEL	200-YEAR LEVEL	SPH LEVEL	SPH LEVEL
PROJECT FIRST COST WEST OF A.C	$55,100,000	$70,297,000	$ 77,194,000	$100,298,000
INTEREST DURING CONSTRUCTION	20,959,196	25,574,347	26,836,291	35,388,265
GROSS INVESTMENT COST AT END OF INSTALLATION PERIOD	76,059,196	95,871,347	104,030,291	116,477,109*
PROJECT ANNUAL CHARGES WEST OF A.C.				
INTEREST 0.08500	6,465,321	8,149,064	8,842,575	9,900,554
AMORTIZATION 0.00002	1,521	1,917	2,081	2,330
O&M	45,500	45,500	45,500	118,500
REPLACEMENT COST @50 YRS	719	719	719	3,885
FUTURE PROTECTION	191,776	236,900	300,825	293,304
PROJECT AVG ANNNUAL COST WEST OF A.C.	6,704,548	8,434,101	9,191,700	10,318,573
MITIGATION AVERAGE ANNUAL COSTS	11,000	13,000	14,000	51,000
TOTAL AVERAGE ANNUAL COSTS WEST OF A.C.	6,715,548	8,447,101	9,205,700	10,369,573
TOTAL EQUIVAL.ANNUAL BENEFITS W. OF A.C.	36,876,000	37,893,000	37,970,000	41,245,000
NET BENEFITS	30,160,452	29,445,899	28,764,300	30,875,427
BENEFIT/COST RATIO	5.49	4.49	4.12	3.98

* Implementation of Plan 3B to the SPH level of protection results in a cost reduction of $19,209,000, which includes the $15,052,000 savings plus $4,157,000 interest earned during the period of construction.

TABLE 44

WEST BANK - EAST OF HARVEY CANAL

WEST BANK COST
INTEREST 8-1/2
BASE YEAR BEGINNING OF 1999
EAST OF ALGIERS CANAL REACHES E-F

		100-YEAR PROTECTION	200-YEAR PROTECTION	SPH PROTECTION
PROJECT FIRST COST EAST OF A.C		$6,975,000	$9,747,999	$ 13,826,000
INTEREST DURING CONSTRUCTION		750,049	988,884	1,336,932
GROSS INVESTMENT COST AT END OF INSTALLATION PERIOD		7,725,049	10,736,883	15,162,932
PROJECT ANNUAL CHARGES EAST OF A.C.				
INTEREST	0.08500	656,629	912,635	1,288,849
AMORTIZATION	0.00002	155	215	303
O&M		6,500	6,500	6,500
FUTURE PROTECTION		63,925	82,727	101,528
PROJECT AVERAGE ANNUAL COST		727,209	1,002,077	1,397,181
MITIGATION AVERAGE ANNUAL COSTS		18,000	19,000	20,000
TOTAL EQUIVALENT ANN. COSTS E. OF A.C.		745,209	1,021,077	1,417,181
TOTAL EQUIVALENT ANN. BENEF. E. OF A.C.		2,475,560	2,716,500	2,717,890
NET BENEFITS		1,730,351	1,695,423	1,300,709
BENEFIT/COST RATIO		3.32	2.66	1.92

TABLE 45

WEST BANK - EAST OF HARVEY CANAL
EQUIVALENT ANNUAL COST,
EQUIVALENT ANNUAL BENEFITS,
NET BENEFITS,
B/C RATIO, AND
INCREMENTAL B/C

ALTERNATIVE AND AREA	ECONOMIC SUMMARY			
	EQUIVALENT ANNUAL COST	EQUIVALENT ANNUAL BENEFIT	NET BENEFIT	B/C RATIO
WEST OF ALGIERS CANAL (REACHES A-D)				
BASE YEAR 2002				
PLAN 1 100-YEAR	$ 6,715,548	$ 36,876,000	$ 30,160,452	5.49
PLAN 1 200-YEAR	8,447,101	37,893,000	29,445,899	4.49
PLAN 1 SPH	9,205,700	37,970,000	28,764,300	4.12
PLAN 3B SPH	10,369,573	41,245,000	30,875,427	3.98
INCREMENTAL OF PLAN 3 TO PLAN 1-SPH	1,163,873	3,275,000	2,111,127	2.81
INCREMENTAL OF PLAN 3 TO PLAN 1-100	3,654,025	4,369,000	714,975	1.20
EAST OF ALGIERS CANAL (REACHES E-F)				
BASE YEAR 1999				
100-YEAR	745,209	2,475,560	1,730,351	3.32
200-YEAR	1,021,077	2,716,500	1,695,423	2.66
SPH	1,417,181	2,717,890	1,300,709	1.92

SECTION 9. MAXIMIZATION OF NET BENEFITS

GENERAL. The NED plan is the plan that most reasonably maximizes net tangible economic development benefits consistent with Federal regulations. Benefits are maximized at the point where the excess benefits over costs is the greatest, and marginal costs equal marginal benefits. The net benefits of the project begin to decrease at any level of protection past this point.

Figures B-4 and B-5 plot the costs and benefits of the project at varying levels of protection for the areas west and east of Algiers Canal, respectively. The equivalent annual costs are plotted on the X-axis and the net benefits (excess benefits over costs) are plotted on the Y-axis.

WEST OF ALGIERS CANAL. The Plan 1 net benefit curve for the area west of the Algiers Canal peaks at the 100-year level of protection, and begins to decline through the SPH level of protection. Two additional levels of protection were examined in order to better define the net benefit curve. Table 46 displays benefits and costs for 30-year and 70-year levels of protection.

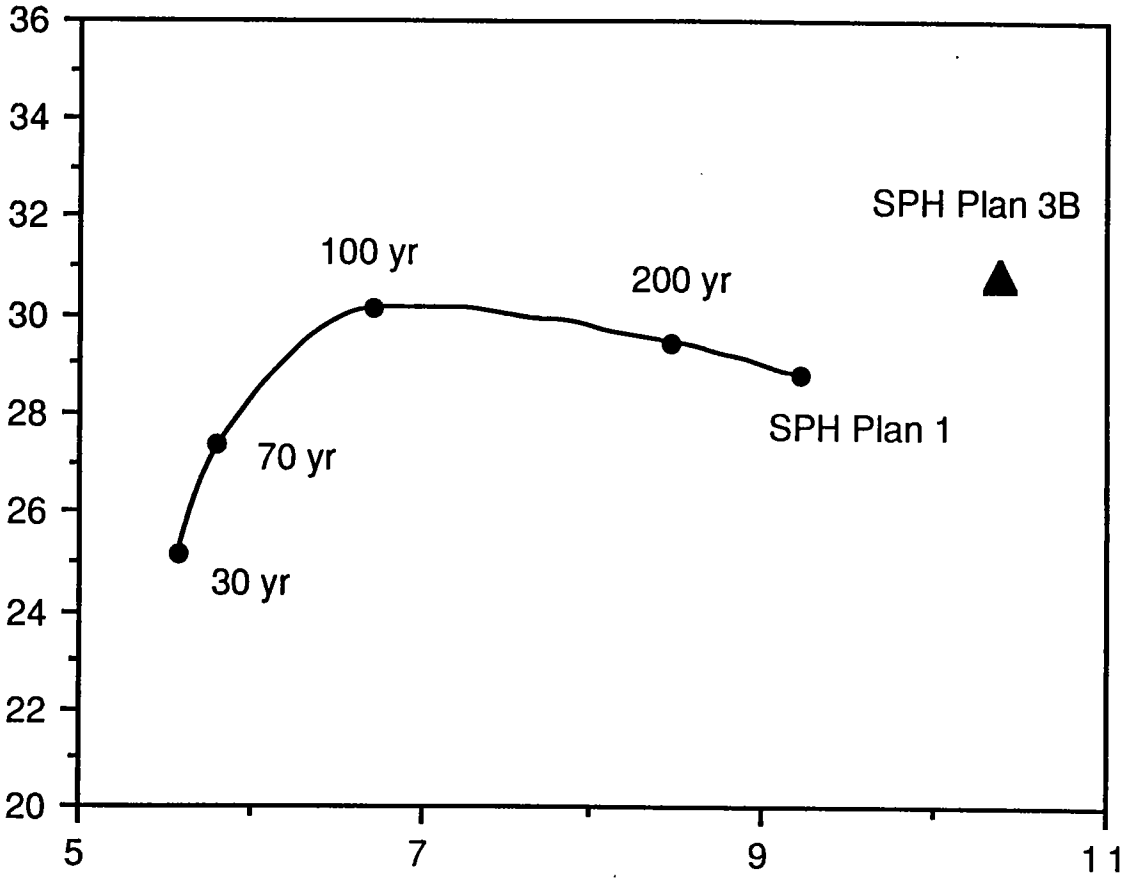
Table 46

WEST BANK - EAST OF HARVEY CANAL
AREA WEST OF THE ALGIERS CANAL
TOTAL AVERAGE ANNUAL BENEFITS AND COSTS
30- AND 70-YEAR LEVEL OF PROTECTION

BENEFITS/COSTS	LEVEL OF PROTECTION	
	30-year	70-year
EQUIVALENT ANNUAL BENEFITS	$30,705,000	$33,209,000
EQUIVALENT ANNUAL COSTS	5,573,000	5,814,000
NET BENEFITS	25,132,000	27,395,000
B/C RATIO	5.51	5.71

Figure B-4 plots the net benefits and costs for the area west of Algiers Canal. Net benefits increase from the 30-year to the 70-year levels, and peak near the 100-year level with $30,160,452 of excess benefits over costs. Plan 1 benefits begin to decline for the 200-year and 500-year levels. Plan 3B, SPH level of protection, has net benefits of $30,875,427 which are slightly higher than those of the Plan 1, 100-year level of protection. Also, Plan 3B does not induce damages to the industries located along the Harvey Canal. Thus, Plan 3B, SPH level of protection, is considered the NED plan.

FIGURE B-4
WEST OF ALGIERS CANAL



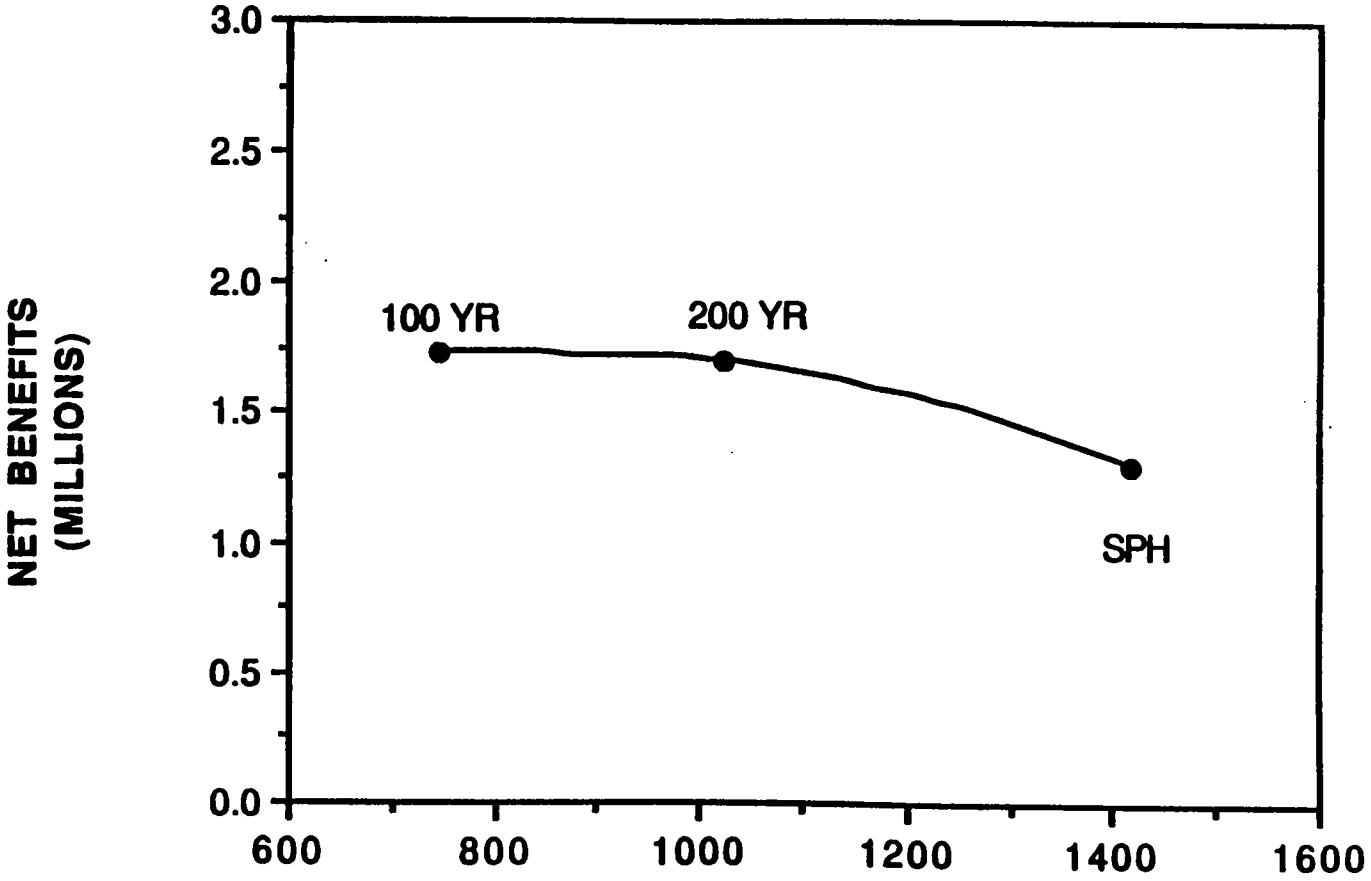
● PLAN 1

30 YR = $25,132,457
70 YR = $27,395,169
100 YR = $30,160,452
200 YR = $29,445,899
SPH = $28,764,300

▲ PLAN 3B

SPH = $30,875,427

FIGURE B-5
EAST OF ALGIERS CANAL



100 YR = $1,730,351
200 YR = $1,695,423
SPH = $1,300,709

EAST OF ALGIERS CANAL. Figure B-5 plots net benefits and costs at the 100-year, 200-year, and SPH level of protection for the area east of Algiers Canal (Reaches E and F). Excess benefits over costs peak at the 100-year level and begin to decline after this point. Thus, the 100-year level of protection is considered the NED plan. The 30-year and 70-year levels of protection were not analyzed because the existing levee system in the area provides a relatively high level of protection.

ECONOMIC SUMMARY. Table 47 provides and economic summary of the equivalent annual costs and benefits, tangible net benefits, and B/C ratios for the flood control alternatives (Plan 1 and Plan 3B) at the various levels of protection. This data has been provided for the areas west and east of the Algiers Canal.

West of the Algiers Canal. A review of the economic data related to the benefits accruing from each of the alternatives, shows that Plan 3B (navigable floodgate below Lapalco Boulevard), SPH level of protection, best approximates maximization of net tangible benefits over costs. The plan with the second greatest net benefits is Plan 1 (floodwall along the Harvey Canal) providing a 100-year level of protection. Although the first cost for Plan 3B, SPH protection, is considerably higher than Plan 1, 100-year protection, the incremental BCR is 1.20. Because the selection of the NED plan is not clearly defined, other factors (tangible and intangible) must be taken into consideration. Plan 3B was selected as the NED plan because in addition to providing greater net benefits ($716,000), it has a number of other advantages. Plan 3B does not induce damages to the industries along the Harvey Canal, and does not restrict their access to the canal. Plan 3B would also eliminate a feature of the authorized Westwego to Harvey Canal project, resulting in a cost savings of $15,052,000. The implementation of Plan 3B would provide SPH protection, a level of protection that is consistent with the authorized protection for the surrounding metropolitan area. SPH protection would also minimize the potential for catastrophic loss of life due to the occurrence of an extreme event. Plan 3B was therefore selected as the NED plan for the area west of the Algiers Canal.

East of the Algiers Canal. For the area east of the Algiers Canal, the remaining alignment was evaluated at three levels of protection. A review of the economic data shows that the 100-year level of protection provides the greatest net benefits over costs and was therefore identified as the NED plan. However, the difference in the equivalent annual net benefits between the 100-year level of protection and 200-year level of protection is only $36,000,

which is a difference of 2.0%. If the residential development of all or most of the available acres identified by the 1983 Land Use Plan takes place, (see Scenario 1 in the future development analysis of this report), then the 200-year level of protection would become the NED Plan.

The NED plan is, therefore, a combination of Plan 3B, SPH protection for the area west of the Algiers Canal and a 100-year level of protection for the area east of the Algiers Canal.

TABLE 47

WEST BANK - EAST OF HARVEY CANAL
ECONOMIC SUMMARY
OCTOBER 1991

ALTERNATIVE AND AREA	EQUIVALENT ANNUAL COST	EQUIVALENT ANNUAL BENEFIT	NET BENEFIT	B/C RATIO
WEST OF ALGIERS CANAL REACHES A-D (base year 2002)				
PLAN 1 30-YEAR	$ 5,572,543	$30,705,000	$25,132,457	5.51
PLAN 1 70-YEAR	5,813,831	33,209,000	$27,395,169	5.71
PLAN 1 100-YEAR	6,715,548	36,876,000	$30,160,452	5.49
PLAN 1 200-YEAR	8,447,101	37,893,000	$29,445,899	4.49
PLAN 1 SPH	9,205,700	37,970,000	$28,764,300	4.12
PLAN 3B SPH	10,369,573	41,245,000	$30,875,427	3.98
INCREMENTAL OF PLAN 3B TO 1-SPH	1,163,873	3,275,000	2,111,127	2.81
INCREMENTAL OF PLAN 3B TO 1-100	3,654,025	4,369,000	714,975	1.20
EAST OF ALGIERS CANAL REACHES E-F (base year 1999)				
PLAN 1 100-YEAR	$ 745,209	$ 2,475,560	$ 1,730,351	3.32
PLAN 1 200-YEAR	1,021,077	2,716,500	1,695,423	2.66
PLAN 1 SPH	1,417,181	2,717,890	1,300,709	1.92
PLAN 3B SPH	$ 1,417,181	$ 2,717,890	$ 1,300,709	1.92

SECTION 10. RECOMMENDED PLAN

GENERAL. After a thorough evaluation of the various flood protection alternatives, the SPH level of protection for the areas east and west of the Algiers Canal was chosen to be the recommended plan. The analysis leading to this decision included a comprehensive review of all economic, social, hydraulic, environmental, and public interest factors relating to the project. For the area west of the Algiers Canal, the recommended plan is the same as the NED Plan. In addition to providing the greatest net benefits, Plan 3B does not induce damages and does not restrict access to the industries located along the Harvey Canal. For the area east of the Algiers Canal, the 100-year level of protection has the highest net benefits and is the NED Plan, but the SPH level of protection was selected as the recommended plan.

There are two major factors that led to the selection of SPH protection for the entire area. First, because the area west of the Algiers Canal is a densely populated metropolitan area, and Reaches E and F are expecting continued residential development, a major flooding event has the potential to cause extensive property damage and loss of life. The lives of approximately 142,000 people living within the study area would be endangered by a 500-year event. Also, almost 29,000 structures would be inundated and the existing without-project damages would total slightly over $2.1 billion. Implemenation of the recommended plan will reduce these damages to $25.5 million, and only 761 structures would be affected in the project area.

Second, SPH level of protection would be consistent with the existing protection in the adjacent areas of the New Orleans metropolitan area. The residents of these communities expect equal protection with other nearby areas. Without this consistency, the required evacuation of only the residents in the area east of the Algiers Canal would become ineffective. Residents may not have a clear understanding as to the degree of protection provided by the project, thus endangering their lives.

M-CACES COST ESTIMATE, GROSS APPRAISAL, AND REAL ESTATE COST ESTIMATE. Upon selection of the recommended plan, an M-CACES Cost Estimate, a Gross Appraisal, and a Real Estate Supplement, were prepared for this alternative. Because a considerable amount of time and cost is associated with the development of these additional data, it is cost prohibitive to generate these data for each of the other plans. The additional level of detail resulted in a cost increase for the recommended plan. The cost presented for the recommended plan cannot be compared to the cost for the

alternative plans because it contains a different level of detail. If these data were also generated for the other alternative plans, similar cost increases would be expected due to the acquisition of lands along the Algiers Canal and the indexing of costs to the October 1993 level.

Similarly, the benefits attributable to the project were also price indexed to the October 1993 level using the Marshall and Swift Residential and Commercial Valuation System. The current Federal discount rate of 8.0% was used to convert these values to an equivalent time frame. Tables 49 and 50 display the first cost, equivalent annual cost, equivalent annual benefit, and B/C ratios for the recommended plan.

TABLE 48

WEST BANK - EAST OF HARVEY CANAL
ECONOMIC SUMMARY FOR THE RECOMMENDED PLAN
INCLUDES M-CACES COST ESTIMATE AND GROSS APPRAISAL
WEST OF ALGIERS CANAL
OCTOBER 1993

ITEM		FLOODGATE PLAN 3B
PROJECT FIRST COST WEST OF A.C. *		$114,369,000
INTEREST DURING CONSTRUCTION		19,652,213
GROSS INVESTMENT COST AT END OF INSTALLATION PERIOD **		115,085,685
PROJECT ANNUAL CHARGES WEST OF A.C.		
INTEREST	0.08400	9,206,855
AMORTIZATION	0.00004	4,603
O&M		223,000
REPLACEMENT COST @50 YRS		4,608
FUTURE PROTECTION		289,177
PROJECT AVERAGE ANNUAL COST		9,728,243
MITIGATION AVERAGE ANNUAL COST		51,000
TOTAL EQUIVAL.ANNUAL COST		9,779,243
TOTAL EQUIVAL.ANNUAL BENEFITS		44,549,000
NET BENEFITS		34,769,757
BENEFIT/COST RATIO		4.56

* Project first cost does not include mitigation costs. These costs have been added as a separate item.

** The gross investment has been reduced by $18,936,000 to account for deleting the floodwall feature of the Westwego to Harvey Canal project ($15,052,000) and the interest during construction ($3,884,000).

TABLE 49

WEST BANK - EAST OF HARVEY CANAL
ECONOMIC SUMMARY FOR THE RECOMMENDED PLAN
INCLUDES M-CACES COST ESTIMATE AND GROSS APPRAISAL
EAST OF ALGIERS CANAL
OCTOBER 1993

ITEM		SPH PROTECTION
PROJECT FIRST COST EAST OF A.C. *		$ 19,880,000
INTEREST DURING CONSTRUCTION		4,422,433
GROSS INVESTMENT COST AT END OF INSTALLATION PERIOD		24,302,433
PROJECT ANNUAL CHARGES WEST OF A.C.		
INTEREST	0.08000	1,944,195
AMORTIZATION	0.00004	972
O&M		12,000
FUTURE PROTECTION		100,100
PROJECT AVERAGE ANNUAL COST		2,057,267
MITIGATION AVERAGE ANNUAL COST		20,000
TOTAL EQUIVAL.ANNUAL COST		2,077,267
TOTAL EQUIVAL.ANNUAL BENEFITS		3,219,620
NET BENEFITS		1,142,353
BENEFIT/COST RATIO		1.55

* Project first cost does not include mitigation costs. These costs have been added as a separate item.

RELATIONSHIP TO WESTWEGO TO HARVEY CANAL PROJECT. Implementation of the recommended plan for East of Harvey Canal (including the areas east and west of the Algiers Canal) would provide for the construction of a navigable floodgate in the Harvey Canal. The location of the floodgate would not only tie the line of protection to the Westwego to Harvey Canal project, but would also delete a feature of the authorized project. The floodwall feature of the Westwego to Harvey Canal project extending from the Cousins Pumping Station to the Harvey Lock would be eliminated. This results in a savings of $15,052,000 in the total project first cost. The total savings, including interest during construction is $18,936,000. Beneficial completion of the Westwego to Harvey Canal project is currently scheduled for 2001. Completion of the floodgate is scheduled for 2001, with beneficial completion of Plan 3B, west of Algiers Canal scheduled for 2002.

The proposed modification to the Westwego to Harvey Canal project would not result in a delay in benefits. The savings were taken as a cost offset in calculating the average annual cost for Plan 3B, west of Algiers Canal.

In order to accurately compare the two projects, the costs and benefits of the Westwego to Harvey Canal project were updated from 1989 to 1993 price levels by use of the Engineering News Record, Construction Cost Index. Also, an interest rate of 8.00% was used to compare the Westwego and East of Harvey studies. Table 50 shows that the combination of the Westwego to Harvey Canal project and the recommended plan for East of Harvey Canal provides greater net benefits than the Westwego to Harvey Canal project alone.

TABLE 50

WEST BANK - EAST OF HARVEY CANAL
WEST BANK HURRICANE PROTECTION
COMPARISON OF PLANS
(000's)

	Westwego to Harvey[1]	East of Harvey Canal	Sum of Projects
Westwego to Harvey Canal Project Alone (Existing Project)			
First Cost	$89,885	$0	$89,885
Gross Investment	191,190	0	191,190
Avg. Annual Costs	15,388	0	15,388
Equivalent Annual Benefits	29,609	0	29,609
Net Benefits	14,221	0	14,221
Westwego to Harvey Canal Modified to Include East of Harvey Canal (Recommended Plan)			
First Cost	$89,885	$134,249[2]	$224,134
Gross Investment	191,190	139,387[3]	330,577
Avg. Annual Costs	15,388	11,856	27,244
Equivalent Annual Benefits	29,609	47,769	77,378
Net Benefits	14,221	35,913	50,134

[1] The figures for the Westwego to Harvey Canal project were taken from the Draft LMV Form 23B-R, dated 16 June 1994. These figures were then updated from 1989 to 1993 price levels.

[2] Project first cost does not include mitigation costs. These costs have been added as a separate item.

[3] The gross investment has been reduced by $18,936,000 to account for deleting the floodwall feature of the Westwego to Harvey Canal project ($15,052,000) and the interest during construction ($3,884,000).

SECTION 11. SENSITIVITY ANALYSIS

GENERAL. Even though every attempt is made to ensure the accuracy of each variable in the analysis, a degree of uncertainty is implicit in many areas of planning for water resource projects. The potential for error exists in all variables that have been assigned a single point value rather than a range of values. Sensitivity analysis can be performed on each of these variables in order to determine how much the equivalent annual benefits of the project will change as a result of a change in the estimation of that variable. In this feasibility study, sensitivity analysis was performed on the contents-to-structure values, and on the future conditions for the recommended plan in the areas west and east of the Algiers Canal. The sensitivity analysis has been performed on the recommended plan both with and without the M-Caces cost estimate, and the Gross Appraisal and Real Estate Supplement.

CONTENTS-TO-STRUCTURE VALUES. In the economic analysis of this report, the contents-to-residential structure value ratios were based on relationships established in the 1981 LPHPP study. These ratios ranged from 48% to 75%, with the lower valued structures having a higher contents percentage. In the PGM comments to the original West Bank - East of the Harvey Canal Feasibility Report, it was suggested that a 50% contents-to-structure ratio should be used for each residential property, regardless of its structural value. With the residential contents set at 50% of structure values, the benefits in the area west of the Algiers Canal decreased 5.3%, with or without the more detailed cost estimate, and the benefits in the area east of the Algiers Canal changed less than 1.0%, under both cost estimates. The benefit/cost ratio for each recommended plan remained considerably above 1.0. More specifically, the benefit/cost ratio for the area west of the Algiers Canal decreased to 4.31, and for the area east of the Algiers Canal remained at 1.55. Also, in the area west of Algiers Canal, Plan 3B (floodgate alternative) still had the highest net benfits.

FUTURE CONDITIONS. Three scenarios were analyzed in which changes were made to the future conditions projected for the study area. The first scenario excludes all benefits from the future development projected in the area east of the Algiers Canal, and all benefits resulting from changes in the hydraulics of the area due to rising sea levels and subsidence. The second scenario assumes that no future development will take place, but the hydraulics will change in the future. The final scenario assumes that the maximum amount of residential development will take place on the currently vacant land zoned for residential development in Reaches E and F. There are currently 2,849 acres available for residential development in Reach F and 979 acres available for residential development in

Reach E. If six structures are constructed on each of these acres, then a total of 16,293 structures will be added to Reach F, and 5,874 structures will be added to Reach E. The ground elevations and structural values assigned to these structures were similar to those used in the economic analysis of this report. The scenario also assumes that the hydraulics of the areas west and east of the Algiers Canal will change in the future due to rising sea levels and subsidence. The effects of these changes on the net benefits and the benefit/cost ratio of the recommended plan are shown in the following tables. Table 51 shows the recommended plan without M-Caces and the Gross Appraisal and Real Estate Supplement. Table 52 displays the costs and benefits with the more detailed cost estimates in October 1993 dollars.

TABLE 51

WEST BANK - EAST OF HARVEY CANAL
FUTURE CONDITIONS SENSITIVITY ANALYSIS
RECOMMENDED PLAN WITHOUT M-CACES AND GROSS APPRAISAL
(000'S)

	Scenario 1: No Future Development, No Future Hydraulics	Scenario 2: No Future Development, Future Hydraulics	Scenario 3: Maximum Future Development, Future Hydraulics
West of Algiers Canal			
Equivalent Annual Benefits	$ 23,175	$ 41,245	$ 41,245
Dollar Change in Benefits	$ (18,070)	$ 0	$ 0
Percentage Change in Benefits	(41.6%)	0.0%	0.0%
B/C Ratio	2.23	3.98	3.98
East of Algiers Canal			
Equivalent Annual Benefits	$ 1,116	$ 1,600	$ 5,505
Dollar Change in Benefits	$ (1,602)	$ (1,118)	$ 2,787
Percentage Change in Benefits	(58.9%)	(41.1%)	102.5%
B/C Ratio	0.78	1.12	3.80

Note: Analysis based on October, 1991 price level, and 8.5% interest rate.

TABLE 52

WEST BANK - EAST OF HARVEY CANAL
FUTURE CONDITIONS SENSITIVITY ANALYSIS
WITH M-CACES AND GROSS APPRAISAL
(000'S)

	Scenario 1: No Future Development, No Future Hydraulics	Scenario 2: No Future Development, Future Hydraulics	Scenario 3: Maximum Future Development, Future Hydraulics
West of Algiers Canal			
Equivalent Annual Benefits	$ 26,092.55	$ 44,549.00	$ 44,549.00
Dollar Change in Benefits	$ (18,519.54)	$ 0.00	$ 0.00
Percentage Change in Benefits	(41.6%)	0.0%	0.0%
B/C Ratio	2.66	4.56	4.56
East of Algiers Canal			
Equivalent Annual Benefits	$ 1,151.23	$ 1,750.16	$ 6,854.62
Dollar Change in Benefits	$ (2,068.39)	$ (1,469.46)	$ 3,634.98
Percentage Change in Benefits	(64.2%)	(45.6%)	112.9%
B/C Ratio	0.55	0.84	3.30

Note: Analysis based on October, 1993 price level, and 8.0% interest rate.

SUMMARY. For the area west of the Algiers Canal, there was no future development projected. Thus, only changes in the future hydraulics of the area, which include ground subsidence and rising sea-levels, had an effect on results. Despite a decrease in equivalent annual benefits of approximately 42%, the recommended plan had a B/C ratio of over 2.0. Also, Plan 3B, SPH level of protection, remained the NED plan and the recommended plan.

For the area east of the Algiers Canal, the project becomes unjustified without the projected future development and changes in future hydraulics. When only the changes in future hydraulics are included, the project has a B/C ratio of 1.12, but becomes unjustified when the M-CACES and Gross Appraisal are added. In the third scenario, which assumes maximum future development, the B/C ratio increases to over 3.0. In this scenario, the 200-year level of protection has the highest net benefits and becomes the NED plan.

APPENDIX C

ENVIRONMENTAL SUPPORTING DOCUMENTATION

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

SUPPORTING ENVIRONMENTAL DOCUMENTATION

Section	Item
I	Water Quality
II	Section 404(b)(1) Evaluation
III	Coastal Zone Management Program Consistency Determination
IV	Mitigation / Incremental Analysis
V	Endangered Species Coordination
VI	Farmland Protection Policy Act Coordination
VII	EIS Mailing List
VIII	Contaminant Investigation and Disposal Plan
IX	Cultural Resources Coordination

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section I

Water Quality

WATER USE DESIGNATIONS

The Louisiana Department of Environmental Quality (DEQ) has established water use designations for surface waters in the State. The seven designated water uses are:

1) Primary Contact Recreation
2) Secondary Contact Recreation
3) Fish and Wildlife Propagation
4) Drinking Water Supply
5) Oyster Propagation
6) Agriculture
7) Outstanding Natural Resource Waters

DEQ has designated the waters of the study area according to these uses. The designated uses are:

Primary Contact Recreation
Secondary Contact Recreation
Fish and Wildlife Propagation

Under these designations, water should be suitable for swimming, water skiing, skin diving, boating, fishing, and other similar activities. It should also be suitable for preservation and reproduction of aquatic biota such as indigenous species of fish, invertebrates, reptiles, amphibians, and other wildlife associated with the aquatic environment.

WATER QUALITY CLASSIFICATION

The waters of the study area have been classified "Effluent Limited" by the State of Louisiana. The "Effluent Limited" classification indicates that water quality is meeting and will continue to meet applicable water quality standards, or that water quality will meet those standards in the future after application of effluent limitations required by the Federal Clean Water Act.

WATER QUALITY CRITERIA

The Louisiana Department of Environmental Quality has established water quality criteria for surface waters in the State. Water quality criteria describe the chemical, physical, and biological

characteristics of waters suitable for each of the designated stream uses. A criterion for a substance represents the permissible level for that substance at which water quality will remain sufficient to support a designated use. The water quality criteria specifically apply to substances attributed to waste discharges or the activities of humans as opposed to natural phenomena. Natural waters may, on occasion, have characteristics outside the limits established by these criteria, in which case, the criteria do not apply.

General Criteria

The General Criteria are qualitative in nature and apply to all waters in the State. They address aesthetics, color, floating solids, suspended solids, settleable solids, taste, odor, toxic substances, oils and greases, foaming or frothing materials, nutrients, and turbidity.

Numerical Criteria

The numerical criteria are specific for each major water body and its tributaries and distributaries in the State. Table C-1-1 lists the numerical criteria applicable to the waters of the study area.

TABLE C-1-1

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

STUDY AREA WATER QUALITY CRITERIA

Chloride (mg/L)	N/A
Sulfate (SO_4) (mg/L)	N/A
Dissolved Oxygen (mg/L)	4.0
pH Range (Std. Units)	6.5 - 9.0
Temperature (Deg. C, Max.)	35
Total Dissolved Solids (mg/L)	N/A

Coliforms - Primary Contact Recreation - Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100 mL.

DEQ also promulgates numerical criteria, which apply to all waters in the State, for 49 toxic substances. These criteria were last revised in 1989 and are listed in Table C-1-2. The toxic substances criteria are based on the following publications of the U.S. Environmental Protection Agency:

* Water Quality Criteria, 1972
* Quality Criteria for Water, 1976
* Ambient Water Quality Criteria, 1980 (EPA 440/5-80)
* Ambient Water Quality Criteria, 1984 (EPA 440/5-84-85)
* Quality Criteria for Water, 1986-with updates

EPA is continually updating and revising these criteria. Table C-1-3 lists their most recent status for freshwater aquatic life.

TABLE C-1-2

1989 LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

NUMERICAL CRITERIA FOR SPECIFIC TOXIC SUBSTANCES

(In micrograms per liter (ug/L) or parts per billion (ppb) unless otherwise stated)

	Aquatic Life Protection				Human Health	
Toxic Substance	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Drinking Supply[1]	Non Drinking Supply[2]
Pesticides and PCB's						
Aldrin	3.00	-	1.300	-	0.04 ng/L	0.04 ng/L[3]
Chlordane	2.40	0.0043	0.090	0.0040	0.19 ng/L	0.19 ng/L
DDT	1.10	0.0010	0.130	0.0010	0.19 ng/L	0.19 ng/L
TDE (DDD)	0.03	0.0060	1.250	0.2500	-	-
DDE	52.5	10.500	0.700	0.1400	-	-
Dieldrin	2.50	0.0019	0.710	0.0019	0.05 ng/L	0.05 ng/L
Endosulfan	0.22	0.0560	0.034	0.0087	0.47	0.64
Endrin	0.18	0.0023	0.037	0.0023	0.26	0.26
Heptachlor	0.52	0.0038	0.053	0.0036	0.07 ng/L	0.07 ng/L
Hexachlorocyclohexane (gamma BHC, Lindane)	2.00	0.0800	0.160	-	0.011	0.02
Polychlorinated Biphenols, Total (PCB's)	2.00	0.0140	10.00	0.0300	0.03 ng/L	0.03 ng/L
Toxaphene	0.73	0.0002	0.210	0.0002	0.24 ng/L	0.24 ng/L
2,4-Dichlorophenoxyacetic acid (2,4-D)	-	-	-	-	100.0	-
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP, Silvex)	-	-	-	-	10.00	-
Volatile Organic Chemicals						
Benzene	2249	1125	2700	1350	1.1	12.5
Carbon Tetrachloride (Tetrachloromethane)	2730	1365	15000	7500	0.22	1.2
Chloroform (Trichloromethane)	2890	1445	8150	4075	5.3	70
Ethylbenzene	3200	1600	8760	4380	2.39 mg/L	8.1 mg/L[4]
1, 2-Dichloroethane (EDC)	11800	5900	11300	5650	0.36	6.8
1, 1, 1-Trichloroethane	5280	2640	3120	1560	200	31.34 mg/L
1, 1, 2-Trichloroethane	1800	900	-	-	0.56	6.9
1, 1, 2, 2-Tetrachloroethane	923	462	902	451	0.16	1.8
1, 1-Dichloroethylene	1160	580	22400	11200	0.05	0.58
Trichloroethylene	3900	1950	200	100	2.8	21
Tetrachloroethylene	850	425	130	65	0.65	2.5
Toluene	1270	635	950	475	9.1 mg/L	69.3 mg/L
Vinyl Chloride (Chloroethylene)	-	-	-	-	1.9	35.8
Bromoform (Tribromomethane)	2930	1465	1790	895	5.1	45
Bromodichloromethane	-	-	-	-	5.3	70
Methylene chloride (Dichloromethane)	19300	9650	25600	12800	4.4	87
Methyl chloride (Chloromethane)	55000	27500	27000	13500	5.3	70
Dibromochloromethane	-	-	-	-	5.3	70
1-3 Dichloropropene	606	303	79	39.5	0.18	3.0

TABLE C-1-2 (cont.)

1989 LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

NUMERICAL CRITERIA FOR SPECIFIC TOXIC SUBSTANCES

(In micrograms per liter (ug/L) or parts per billion (ppb) unless otherwise stated)

	Aquatic Life Protection				Human Health	
Toxic Substance	Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic	Drinking Supply[1]	Non Drinking Supply[2]
Acid - Extractable Organic Chemicals						
2-Chlorophenol	258	129	-	-	0.100	126.4
3-Chlorophenol	-	-	-	-	0.100	-
4-Chlorophenol	383	192	535	268	0.100	-
2, 3-Dichlorophenol	-	-	-	-	0.040	-
2, 4-Dichlorophenol	202	101	-	-	0.300	232.6
2, 5-Dichlorophenol	-	-	-	-	0.500	-
2, 6-Dichlorophenol	-	-	-	-	0.200	-
3, 4-Dichlorophenol	-	-	-	-	0.300	-
Phenol (Total)	700	350	580	290	5.000	5.000[5]
Base/Neutral Extractable Organic Chemicals						
Benzidine	250	125	-	-	0.08 ng/L	0.17 ng/L
Hexachlorobenzene	-	-	-	-	0.24 ng/L	0.24 ng/L
Hexachlorobutadiene[6]	5.1	1.02	1.6	0.32	0.09	0.11
Metals						
Arsenic	360	190	69.00	36.00	50.00	-
Chromium III (Tri)[7]	(980,1700,3100)	(120,210,370)	515	103.0	50.00	-
Chromium VI (Hex)	16	11	1.100 mg/L	50.00	50.00	-
Zinc[8]	(65,120,210)	(59,110,190)	95.00	86.00	5.000 mg/L	-

1 Applies to surface waterbodies designated as a Drinking Water Supply and also protects for primary and secondary contact recreation and fish consumption.

2 Applies to surface waterbodies not designated as a Drinking Water Supply and protects for primary and secondary contact recreation and fish consumption.

3 ng/L = nanograms per liter, parts per trillion

4 mg/L = milligrams per liter, parts per million

5 total phenol as measured by the 4 - aminoantipyrine (4AAP) method

6 Includes Hexachloro-1,3-butadiene

7 Hardness-dependent criteria for fresh water based on the following natural logarithm formulas for acute and chronic protection respectively: acute = e(0.8190[ln(hardness)]+3.688), chronic = e(0.8190[ln(hardness)]+1.561), numbers in parenthesis represent criteria in ug/L at hardness values of 50, 100, 200 mg/L $CaCo_3$ rounded off to whole numbers

8 Hardness-dependent criteria for fresh water based on the following natural logarithm formulas for acute and chronic protection respectively: acute = e(0.8473[ln(hardness)]+0.8604), chronic = e(0.8473[ln(hardness)]+0.7614), numbers in parenthesis represent criteria in ug/L at hardness values of 50, 100, 200 mg/L $CaCo_3$ rounded off to whole numbers

TABLE C-1-3

1986 EPA **FRESHWATER** AQUATIC LIFE CRITERIA

(All values in ug/L except where noted)

Parameter	Chronic (24-Hour Average)	Acute (Maximum at Any Time)	Chronic[1] (4-Day Average)	Acute[2] (1-Hour Average)
Aesthetic Qualities	(Narrative statement - SEE CRITERIA DOCUMENT)			
Aldrin[P]	-	3.0	-	-
Alkalinity	(20 mg/L MINIMUM)			
Ammonia	(Criteria are pH and temperature dependent-SEE CRITERIA DOCUMENT)			
Arsenic(III)[P]	-	-	190	360
Boron	(750 ug/L for long-term irrigation on sensitive crops)			
Cadmium[4,P]	-	-	1.1/1.6/2	3.9/1.6/8.6
Chlordane[P]	0.0043	2.4	-	-
Chlorine	-	-	11	19
Chlorpyrifos	-	-	0.041	0.083
Chromium (VI)[P]	-	-	11	16
Chromium(III)[4]	-	-	210/289/370	1700/2420/3100
Color	(Narrative statement - SEE CRITERIA DOCUMENT)			
Copper[4,P]	-	-	12/17/21	18/22/34
Cyanide[P]	-	-	5.2	22
DDT[P]	0.0010	1.1	-	-
Demeton[P]	0.1	-	-	-
Dieldrin[P]	0.0019	2.5	-	-
Endosulfan[P]	0.056	0.22	-	-
Endrin[P]	0.0023	0.18	-	-
Gases, Total Dissolved	(Narrative statement - SEE CRITERIA DOCUMENT)			
Guthion	0.01	-	-	-
Heptachlor[P]	0.0038	0.52	-	-
Hexachlorocyclohexane (Lindane)[P]	0.080	2.0	-	-
Iron	1000	-	-	-
Lead[4,P]	-	-	3.2/5.3/7.7	82/137/200
Malathion	0.1	-	-	-
Mercury[P]	-	-	0.012	2.4
Methoxychlor	0.03	-	-	-
Mirex	0.001	-	-	-
Nickel[4,P]	-	-	160/222/280	1400/1999/2500
Oil and Grease	(Narrative statement - SEE CRITERIA DOCUMENT)			
Oxygen, Dissolved	(Warmwater and Coldwater Matrix - SEE CRITERIA DOCUMENT)			
Parathion	-	-	0.013	0.065
Polychlorinated Biphenyls (PCB's)[P]	0.014	2.0	-	-
Pentachlorophenol (PCP)[3,P]	-	-	3.5/13/43	5.5/20/68
pH	(6.5 - 9.0 su)	-	-	-
Selenite (inorganic)[P]	35	260	-	-
Silver[4,P]	-	4.1/8.2/13	-	-
Solids (Suspended) and Turbidity	(Narrative statement - SEE CRITERIA DOCUMENT)			
Sulfide-Hydrogen Sulfide	2.0	-	-	-
Temperature	(Species dependent criteria - SEE CRITERIA DOCUMENT)			
Toxaphene[P]	-	-	0.0002	0.73
Zinc[4,P]	-	-	110/149/190	120/165/210

1 4-day average concentration not to be exceeded more than once every 3 years on the average.
2 1-hour average concentration not to be exceeded more than once every 3 years on the average.
3 pH dependent criteria. Values presented are for 6.5/7.8/9.0 standard pH units.
4 Hardness dependent criteria. Values presented are for 100/150/200 mg/L as $CaCO_3$.
P Priority Pollutant

DEQ also states:

> "For purposes of criteria assessment, the most stringent criteria for each toxic substance will apply. For determination of criteria attainment in ambient water where the criteria are below the detection limit, then no detectable concentrations will be allowed."

WATER QUALITY DATA

Water quality data in the study area were collected by Jefferson Parish from 1983 to the present. Most of the samples were collected monthly at various locations throughout the drainage canal system on the West Bank of the Mississippi River. Three of these sample locations are applicable to the study area:

* Cousins Canal at the intake of the Cousins Pumping Station
* Bayou Barataria at the intake of the Hero Pumping Station
* Planters Canal Bypass on the intake side of the Planters Canal Bypass Pumping Station

Samples were analyzed for:

Biochemical Oxygen Demand
Chemical Oxygen Demand
Total Suspended Solids
pH
Total Coliforms
Fecal Coliforms
Cadmium
Chromium
Copper
Mercury
Lead
Arsenic

In April 1987, the New Orleans District collected bottom surface sediment samples from the Algiers and Harvey Canals. The locations of these sampling sites are:

AC1 - Algiers Canal at Algiers Lock tailbay
AC2 - Algiers Canal near Planters Canal
AC3 - Algiers Canal near pumping station
AC4 - Algiers Canal near intersection with Harvey Canal

HC1 - Harvey Canal at Harvey Lock tailbay
HC2 - Harvey Canal at Cousins Canal
HC3 - Harvey Canal at Hero Canal

Surface water was collected at the AC3 site and used to prepare elutriates with each of the four Algiers Canal sediment samples. In the Harvey Canal, surface water was collected at site HC2 and used to prepare elutriates with each of the three Harvey Canal sediment samples. Also collected was a water and sediment core sample taken from the Gulf Intracoastal Waterway (GIWW) at Hero Canal (Site GIWW 85-7) in 1985. This core sample was divided into three sections (top, middle, bottom). Elutriates were prepared from the water sample and each of the core sample sections. The locations of these samples are indicated on Figure 1.

The elutriate test is a simplified simulation of the dredging and disposal process wherein predetermined amounts of dredging site water and sediment are mixed together to approximate a dredged material slurry. The test provides an indication of the chemical constituents likely to be released to the water column during a disposal/filling operation.

Samples were analyzed for selected metals, nutrients, and organic compounds. Tables C-1-4 and C-1-5 display water and elutriate data obtained from these samples. Organic compound data are not included because no organic compounds were detected in any of the samples. The tables also include the United States EPA criteria and/or Louisiana Department of Environmental Quality water quality criteria.

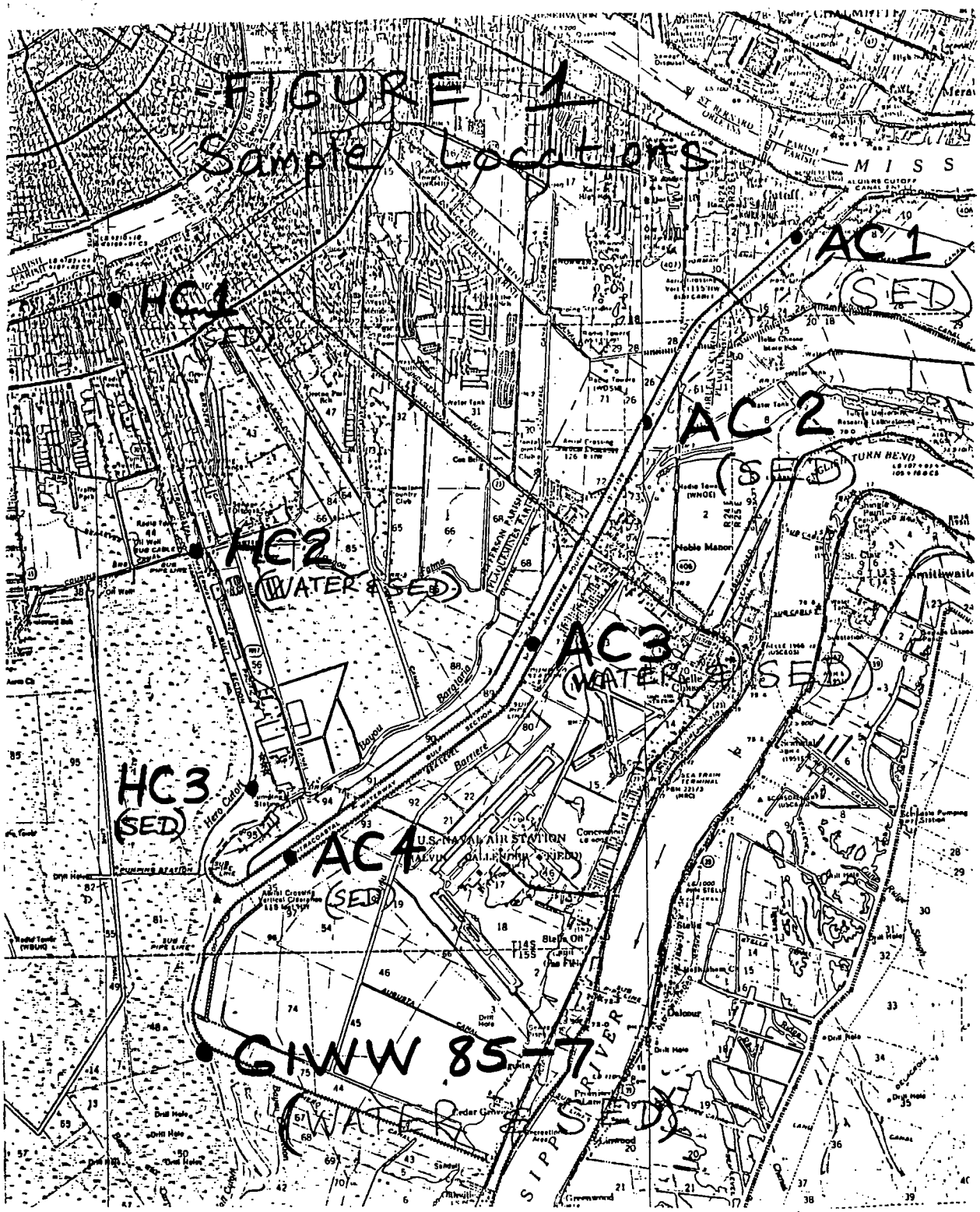


FIGURE 1
Sample Locations
HC1
HC2
(WATER & SED)
HC3
(SED)
AC1
(SED)
AC2
(SED)
AC3
(WATER & SED)
AC4
(SED)
GIWW 85-7
(WATER & SED)
MISS
TURN BEND
U.S. NAVAL AIR STATION
CALVIN
SIPS
RIVER

TABLE C-1-4

RESULTS OF WATER QUALITY SAMPLING AND ELUTRIATE ANALYSES FROM ALGIERS AND HARVEY CANALS, APRIL 1987
CONCENTRATIONS IN ug/l

PARAMETER	Acute* Criteria	Chronic* Criteria	HC2 Total	HC2 Diss.	HC1 Elut.	HC2 Elut.	HC3 Elut.	AC3 Total	AC3 Diss.	AC1 Elut.	AC2 Elut.	AC3 Elut.	AC4 Elut.
Copper	23.02	15	8	< 1	1	< 1	1.5	8	< 1	1.4	< 1	< 1	< 1
Zinc	120.13	108.8	50	12	18	18	24	43	10	41	22	36	15
Arsenic	-	-	7	5	6	8	9	7	5	7	5	11	9
Arsenic(III)	360	190	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	6	< 1	< 1	1	1	142	1.8	< 1	< 1	< 1	< 1
Chromium(VI)	16	11	-	-	-	-	-	-	-	-	-	-	-
Chromium(III)	2180	260	-	-	-	-	-	-	-	-	-	-	-
Mercury	2.4	0.012	0.45	< 0.05	4.09	4.75	4.55	0.43	0.43	0.97	3.72	4.83	6.35
Cadmium	5.36	1.41	0.5	< 0.1	< 1	< 1	6.3	0.3	< 1	0.6	< 1	< 1	< 1
Lead	117.4	4.58	14.2	< 1	< 1	< 1	5.3	7.6	< 1	< 1	< 1	1.2	< 1
Nickel	1794	199.4	14	12	95	107	512	338	12	76	206	23	101
Iron	-	1000	3800	2.4	38.8	52	44	3700	4.5	17.8	24.4	16.8	31.5
Manganese	-	-	212	93	514	956	1120	256	118	326	614	336	282
Calcium	-	-	30,800	23,700	17,100	52,200	37,500	29,400	29,400	20,200	25,300	25,000	23,200
Magnesium	-	-	13,500	12,000	11,000	19,600	17,500	14,300	13,400	16,200	15,500	14,500	19,000
COD	-	-	21,200	12,300	21,600	14,700	31,800	18,900	6,600	24,300	17,600	23,600	31,200
Total Phosphorus	-	-	160	20	10	30	30	-	-	-	-	-	-

*Harvey Canal and Algiers Canal criteria are the same.

TABLE C-1-5

RESULTS OF WATER QUALITY SAMPLING AND ELUTRIATE ANALYSES FROM THE GIWW AT HERO CANAL 1985

CONCENTRATIONS IN ug/l

	Acute Criteria	Chronic Criteria	GIWW 85-7 Water	GIWW 85-7 Top Elut.	GIWW 85-7 Mid Elut.	GIWW 85-7 Both Elut.
Copper	23.02	15	3	12	6	6
Zinc	120.13	108.8	45	45	< 30	< 30
Arsenic	-	-	< 5	< 5	< 5	< 5
Arsenic(III)	360	190	-	-	-	-
Chromium	-	-	5	2	2	1
Chromium(VI)	16	11	-	-	-	-
Chromium(III)	2180	260	-	-	-	-
Mercury	2.4	0.012	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium	5.36	1.41	< 0.1	< 0.1	< 0.1	< 0.1
Lead	117.4	4.58	1	27	1	< 1
Nickel	1794	199.4	5	10	9	9
Iron	-	1000				
Total Phosphorus						

Additional bottom surface sediment samples were collected in the Harvey Canal at the location of the proposed floodgate and at the north and south intersections of the proposed bypass channel and the Harvey Canal. Bottom surface sediment samples were also collected in the Cousins Pump Station outflow channel. Sediment core samples were also collected adjacent to the Harvey Canal and Cousins Pump Station outflow channel. Land based background surface sediments were collected at four locations in the general study area. The additional bottom surface sediment samples, the background sediment samples, and the core samples were analyzed for priority pollutants. Plate C-8-2 shows the general locations of the additional bottom surface sediment samples and the sediment core samples. The exact locations of sampling stations indicated on Plate C-8-2 are located on sampling maps in the files of the New Orleans District. Table C-1-6 shows the results of the metals analyses for these samples. No other constituents were present in significant concentrations so they are not presented here.

Toxicity Characteristic Leaching Procedure (TCLP) tests were performed on the following four of these additional sediment samples:

* EH1C - Harvey Canal approximately 1420 feet south of Lapalco Bridge, approx. 36 feet from west bank (bottom surface sediment sample)
* EH4C - Harvey Canal approximately 5060 feet south of Lapalco Bridge, approx. 36 feet from west bank (bottom surface sediment sample)
* EH7C - Harvey Canal approximately 3550 feet south of Lapalco Bridge, approx. 10 feet from east bank (bottom surface sediment sample)
* EH12 - Behind golf driving range (east side of Hwy 3017 and the south side of Lapalco Blvd intersection) approximately 50 feet west of the Murphy Canal and approx. 100 feet south of Lapalco Blvd (background surface sample)

TCLP procedures were performed for only the toxic metals on EPA's TCLP regulatory list.

The TCLP test is a standard EPA test which is used to determine the leaching potential of toxic constituents in a waste. The test is designed to identify wastes that are likely to leach hazardous constituents into groundwater under improper management conditions.

TABLE C-1-6

HARVEY CANAL

BOTTOM SEDIMENT, BACKGROUND, AND CORE SAMPLES

		Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Tl	Zn	Al	Ba	Ca	Co	Fe	Mg	Mn	K	N	V
B	EH12	<0.50	9.9	1.0	2.0	51.6	38.2	125	0.256	48.3	0.6	0.4	0.5	916	19800	293	11300	13.0	24800	6830	575	2530	410	45
B	EH13	<0.50	19.2	1.3	0.7	37.6	38.0	50.3	0.146	34.4	2.3	0.2	0.4	108	29800	143	2500	7.0	30500	4960	328	3020	423	73.9
B	EH14	<0.50	3.9	1.0	0.5	30.7	20.2	27.9	<0.100	21.3	0.7	0.2	0.2	87.4	25300	146	3800	7.2	22600	5070	235	2990	230	51
B	EH15	<0.50	8.0	0.8	0.5	18.0	23.0	26.4	0.122	30.2	2.00	0.2	0.5	89.7	14800	214	11800	5.6	12800	4690	141	1550	1800	49.3
S	EH1A	<0.50	7.4	0.8	0.7	28.8	24.8	28.5	<0.100	28.2	<0.50	0.5	0.3	104	16100	487	4710	8.5	28300	5150	699	2340	3580	35.1
S	EH1B	<0.50	10.2	1.3	2.5	36.8	54.2	110	0.302	41.2	<0.50	0.9	<0.10	447	17500	1610	10000	13.8	23200	5810	778	2320	390	36.2
S	EH1C	<0.50	10.6	1.3	2.7	42.4	59.1	111	0.346	44.6	<0.50	0.9	0.2	488	20500	1860	9640	14	24400	5880	794	2550	358	40.3
S	EH4A	<0.50	10.2	1.1	2.4	44.6	58.2	141	0.397	41.7	<0.50	0.6	<0.10	579	16300	566	9400	10.6	24600	4900	894	2290	407	36.9
S	EH4B	<0.50	11.2	1.3	2.6	49.1	64.5	188	0.397	44.7	<0.50	0.5	0.1	535	22400	1040	10100	12.6	29200	5720	1250	2690	421	41.6
S	EH4C	<0.50	5.6	1.2	1.0	45.4	60.0	124	0.492	43	<0.50	0.9	0.1	460	20500	1210	9480	10	32300	5440	834	2650	354	38.3
S	EH7A	<0.50	7.6	1.3	<0.10	49.6	59.4	121	0.412	43.8	<0.50	<0.10	0.2	507	20800	1570	8870	12.4	24900	5560	845	2740	352	40.4
S	EH7B	<0.50	7.5	1.0	<0.10	45.1	55.9	112	0.374	37.9	<0.50	<0.10	0.1	561	17600	1560	8940	10.1	24500	5080	888	2460	302	33.5
S	EH7C	<0.50	8.7	1.1	<0.10	41.4	51.7	104	0.411	37.7	<0.50	<0.10	0.2	487	20400	2350	9190	10.0	24300	5260	803	3000	336	41.6
S	EH8A	<0.50	7.4	0.8	0.7	22.6	19.3	36.1	<0.100	27.9	<0.50	0.4	<0.10	137	10600	150	6850	10.5	14700	4330	289	1420	364	26
S	EH8B	<0.50	7.3	1.0	1.2	23.6	24.0	52.9	<0.100	29.4	<0.50	0.6	0.3	186	14700	467	7930	12.2	17300	5250	384	1790	412	31.9
S	EH8C	<0.50	7.0	1.0	1.3	22.1	22.8	47.9	<0.100	31.3	<0.50	0.5	0.3	171	12000	398	7730	11.4	16700	5100	380	1660	364	30.3
S	EH100	<0.50	7.0	0.8	1.2	1.5	<0.50	24.1	<0.100	4.6	<0.50	0.4	0.3	<0.60	12400	413	7600	13.0	14200	4530	<0.40	1790	337	36.5
S	EH300	<0.50	3.7	0.8	1.2	<0.8	<0.50	44.1	0.122	<0.50	<0.50	0.4	0.5	<0.70	13500	620	7490	<0.90	14900	4730	352	2050	318	29.1
C	EH2A	<0.50	8.5	0.8	0.1	31.4	32.4	31.5	0.173	22.6	0.8	0.5	0.4	93.8	23000	208	4760	4.5	24400	5900	183	3050	377	40.6
C	EH2B	<0.50	3.2	0.8	4.4	22.4	25.0	19.7	0.13	35.3	<0.50	1.1	0.4	63.4	11900	140	3660	6.6	16600	4000	277	1740	436	30
C	EH2C	<0.50	3.3	0.5	0.3	18.3	17.4	16.3	<0.100	25.4	<0.50	0.5	0.1	56.5	9100	191	3280	6.6	13100	3850	254	1680	452	23.6
C	EH2D	<0.50	3.7	0.6	0.5	19.6	16.7	16.1	<0.100	23.5	<0.50	0.5	0.1	53.7	12300	179	4570	5.1	15700	4910	323	2110	506	25.7
C	EH5A	<0.50	4.2	0.9	1.0	26.1	29.7	36.4	0.221	30	<0.50	0.8	0.1	101	15100	323	11300	6.3	21600	6470	784	2680	770	33.4
C	EH5B	<0.50	5.4	0.7	1.1	23.5	20.4	17.3	<0.100	26	<0.50	<0.10	0.1	72	15100	144	13700	7.3	17900	7630	634	2850	1830	29.2
C	EH5C	<0.50	8.5	0.7	<0.10	24.9	21.5	21.2	<0.100	27.3	<0.50	<0.10	0.1	81	12700	166	13800	7.1	18700	7790	683	2730	2220	29.1
C	EH9A	<0.50	6.4	0.8	0.6	25.4	22.9	54.3	0.129	28.8	<0.50	0.4	0.3	153	15300	232	11800	8.1	19900	5200	344	2180	233	41.3
C	EH9B	<0.50	6.5	0.9	0.4	28.6	26.1	43.7	0.128	27.6	<0.50	0.4	0.3	107	16800	205	12900	6.3	20800	5590	313	2350	502	44.6
C	EH10A	<0.50	5.8	1.6	0.6	38.4	34.1	49.8	<0.100	39.7	0.7	0.4	0.2	125	27000	216	7210	8.7	27000	6830	274	2860	296	65.1
C	EH10B	<0.50	5.7	1.4	0.6	39.0	32.2	36.7	<0.100	38.2	<0.50	0.4	0.4	112	28000	211	7980	9.6	30900	7230	363	3480	469	66.6
C	EH10C	<0.50	3.9	1.5	0.3	39.1	37.8	34.6	0.11	34.4	1.4	0.3	0.4	83.1	3170	245	10600	2.7	24300	8620	231	3080	1830	73.6
C	EH11A	<0.50	10.8	1.2	1.6	34.6	42.5	145	0.183	33.8	0.7	0.3	0.6	332	21300	534	14600	7.7	27700	6500	368	2610	344	56.5

B = Background Sample C = Core Sample S = Bottom Surface Sediment

xxx indicates concentration exceeds the greatest backgroung sample concentration

WATER QUALITY IN PROTECTED AREA

Despite the "Effluent Limited" designation, water quality problems have occurred. Water quality standards have not always been met. The worst conditions occur during and shortly after storm events when runoff from the entire area, which is mostly urbanized, flows into the drainage canals. This is when elevated levels of metals, nutrients, biochemical oxygen demand, and fecal coliforms most often occur, as well as low levels of dissolved oxygen. The concentrations of most of these constituents return to acceptable levels shortly after storm events. However, fecal coliform concentrations often persist at levels that do not meet the primary contact recreation standard. This is most likely due to treated wastewater effluent and infiltration/inflow, due to infrastructure problems, from the urbanized area. Overall, water quality of the study area can be considered only marginally acceptable, primarily due to the high fecal coliform levels.

WATER QUALITY OF ALGIERS AND HARVEY CANALS

Despite the "Effluent Limited" designation, water quality problems have occurred. The Algiers and Harvey canals receive most of the runoff generated in the study area via several drainage pump stations. This runoff, which is pumped into the Algiers and Harvey canals during and shortly after storm events, often contains elevated levels of metals, nutrients, biochemical oxygen demand, and fecal coliforms (See previous paragraph, "Water Quality in Protected Area"). These runoff events impact the quality of Algiers and Harvey canal waters. Other major factors affecting these canals are the heavy concentration of industries along their banks, heavy commercial vessel traffic, saline water which intrudes upstream from Bayou Barataria, and Mississippi River water which enters through the Algiers and Harvey locks. Circulation is often sluggish with some tidal influence from the Gulf of Mexico via Bayou Barataria. Mississippi River water entering the upstream ends of these canals through the Algiers and Harvey locks provides some flushing during dry periods.

The concentrations of all tested organic compounds in the Algiers and Harvey canal water samples were less than detection limits. This indicates that pesticides and organic chemicals are not present in concentrations that are harmful to the environment. Mercury was the only metal in the dissolved phase that exceeded the chronic freshwater aquatic life criteria. None of the dissolved metals exceeded the acute freshwater aquatic life criteria. The total concentration of total chromium exceeded the

acute freshwater aquatic life criterion for chromium (VI). This indicates that the chromium (VI) criteria may have been exceeded but there is not enough data to be sure. Total concentrations of mercury, lead, nickel, and iron exceeded the chronic freshwater aquatic life criteria. However, the freshwater aquatic life criteria for metals presented in Tables C-1-2 and C-1-3 are for the dissolved fraction of the metals, not the total concentration. Thus, these metals data indicate that, except for mercury, excessive metals concentrations do not normally exist in the Algiers and Harvey canals. However, during times of pumped storm runoff, there are probably localized elevated levels of metals that exceed the freshwater aquatic life criteria. Due to the high concentration of industries and vessel traffic along the Algiers and Harvey Canals, elevated levels of contaminants occur occasionally due to accidental and/or unauthorized spills and discharges of chemicals. Most of these elevated contaminant levels are localized and of a short duration.

FUTURE WATER QUALITY WITH PROJECT

The completed project would have little effect on water quality. Since levees already exist along the alignment of most of the proposed levees and floodwalls, the proposed upgraded levees and floodwalls would have virtually no effect on water quality in the area. Normal hydrologic conditions would not be changed. The proposed floodgate structure would be closed only in anticipation of extreme high tides. Water circulation would be minimally altered except in the rare cases when the structure would be closed. Therefore, water quality would not be significantly affected by the floodgate structure.

The potential for toxicity in study area water bodies would not be increased. The project would not affect marine traffic and therefore would not increase the potential for accidental spills. Because of the urban nature of the area, runoff quality is characterized by urban runoff water quality characteristics. The increased level of storm surge protection would improve water quality during storm surges by reducing, or preventing, the inundation of developed areas and the impacts associated with that flooding. In addition, future improvements in urban runoff quality control and infrastructure improvements will improve water quality, especially in relation to bacteriological quality.

There would be some water quality impacts associated with the construction phase of the project. During excavation activities, a temporary increase in turbidity and suspended solids levels in

adjacent waterbodies would occur. These increases would be localized and short-lived. After the levees are completed and covered with grass, and the channel and canal closures are faced with riprap, the fill material would not erode. Turbidity and suspended solids would return to background levels.

Water quality impacts due to construction will be minimized at the site of the floodgate structure. A cofferdam will be constructed to enclose and dewater the site. Excavation and construction activities will take place within the cofferdam in the dry, minimizing impacts to the water column. Due to the concern of DEQ of higher than background concentrations of several metals in the Harvey Canal bottom surface sediment samples (See Table C-1-6), the top two feet of the material within the cofferdam will be hauled off to an industrial landfill. The remaining material will be used in the construction of the adjacent levee.

The use of silt curtains will minimize water quality impacts due to excavation of the bypass channel. The silt curtains will confine the extent of increased turbidity and suspended solids to the immediate area. The majority of the bypass channel would be excavated in the dry. Likewise, the top two feet of the sediment at the intersection of the proposed bypass channel and Harvey Canal will also be hauled off to an industrial landfill. The remaining material excavated from the bypass channel will also be used in the construction of the levee.

As previously mentioned, Tables C-1-4 and C-1-5 contain water and elutriate data for the samples collected in the area as well as the acute and chronic freshwater aquatic life criteria. The chronic criteria are intended to protect aquatic organisms from long-term exposure to contaminants while the acute criteria are intended to protect them from short-term exposure to contaminants. The construction process would occur temporarily and would not produce a continuous discharge. Also, dredged material perturbations generally return to normal within 30 minutes to two hours after dredging/disposal operations end. Therefore, the acute freshwater aquatic life criteria apply to evaluation of construction impacts.

As previously stated, all organic compound concentrations in these water, sediment, and elutriate samples were less than detection limits. Therefore, all organic compound concentrations were within the criteria. These tests indicate that construction activities would not cause an increase in organic compound levels in waters of the area.

The purpose of the elutriate test is to provide information on the potential effects of a disposal operation on water quality. The results can be compared to appropriate water quality criteria. However, since the sediment to liquid ratio used in the test is based on hydraulic dredging ratios, results from the elutriate test are conservative and will probably overestimate the release from disposal activities associated with the less dynamic dredging techniques such as clamshell dredging. The elutriate test predicts the concentration of a particular parameter at the point of dredging or discharge and not at the edge of the allowable mixing zone. Thus, the test is also conservative with respect to both dredging and disposal operations in that allowable mixing zones are not accounted for. Therefore, a comparison of elutriate test concentrations with criteria is conservative. Because of the nature of the comparisons, an elutriate test result less than established criteria would indicate that adverse water quality impacts would not be expected. Conversely, an elutriate test result exceeding established criteria would not necessarily imply that adverse water quality impacts would occur.

The results of the elutriate tests show that only cadmium and mercury have the potential to be elevated above the acute criteria. Excavation and placement of the material would be performed by mechanical means other than hydraulic dredging. Therefore, cadmium and mercury concentrations would not necessarily increase above the criteria. If there were to be any increase above criteria, it would be very localized. Mixing zone calculations show that the mixing zone needed to reduce the levels of these constituents to the criteria would be very small. In addition, the use of silt curtains would minimize the areal extent of possible contamination.

The TCLP tests show that none of the tested metals would leach from soils and sediments present in the area in concentrations anywhere close to what EPA considers hazardous. This indicates that materials excavated from the area of the bypass channel and floodgate structure are not hazardous. However, as previously stated the top two feet of these materials will be hauled off to an industrial landfill.

FUTURE WATER QUALITY WITHOUT PROJECT

Water quality conditions in the future without the project would be very similar to those conditions with the project. Because of the urban nature of the area, runoff quality is characterized by urban runoff water quality characteristics. Without the project, the level of storm surge protection would not be increased to reduce or prevent storm surges. Inundation of developed areas and the water quality impacts associated with that flooding would occur more often than with the project in place. Since there would be no construction, the minor impacts associated with construction activity would not occur. Future improvements in urban runoff quality control and infrastructure improvements will also occur, improving water quality, especially in relation to bacteriological quality.

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section II

Section 404(b)(1) Evaluation

WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
EAST OF HARVEY CANAL
404(b)(1) EVALUATION

I. PLAN DESCRIPTION

a. LOCATION. Construction features, planned for the west bank of the Mississippi River in the vicinity of New Orleans (see Plates 3 and 6, Volume I Feasibility Report and Environmental Impact Statement (EIS)), would offer protection to areas east of the Harvey Canal in Jefferson and Orleans Parishes. Protection would also be offered to areas north of the Hero Canal and Oakville in Plaquemines Parish.

b. AUTHORITY AND PURPOSE. The study was authorized by resolutions adopted 10 November 1965 and 6 May 1966 by the Committee on Public Works of the United States Senate, and by resolutions adopted 5 May 1966 and 5 October 1966 by the Committee on Public Works of the U.S. House of Representatives.

c. GENERAL DESCRIPTION. The Recommended Plan consists of a combination of hurricane surge protection levees and floodwalls, enlargement of a drainage canal, a navigation floodgate and approach channel, a temporary by-pass channel, and a pumping station discharge canal. Discharges regulated by 404(b)(1) guidelines would occur in the vicinity of two general areas: the Cousins Pumping Station Area and the Oakville Area; and, would involve four separate discharge sites.

Cousins Pumping Station Area. The First Avenue drainage canal adjacent to the Cousins Pumping Station would be enlarged and require placement of erosion control material. A navigation floodgate and approach channel would be placed in the Harvey Canal approximately 3,600 feet south of Lapalco Boulevard. Prior to construction of the floodgate, a navigation by-pass channel would be constructed to accommodate navigation through the Harvey Canal. A retaining dike would be constructed adjacent to the by-pass channel in order to retain additional material removed from the by-pass. Following completion of the floodgate, the northern portion of the by-pass would be closed and the remainder would become part of a new and enlarged Cousins Pumping Station discharge channel which would be diverted into the Harvey Canal below the floodgate. The existing protection levee south of Cousins Pumping Station would be degraded and the earthen

material would be incorporated into a new levee providing protection for the proposed discharge canal. That area immediately adjacent to, and landward, of this proposed levee (i.e. west of the discharge canal and south of Cousins Pumping Station) would be utilized as a stockpile area for material used in construction of additional levee lifts.

Oakville Area. A levee and floodwall would be constructed to tie the existing Hero Canal levee to the Plaquemines Parish levee in an area north and west of Oakville. Erosion control material would be placed along portions of this levee.

The four specific Section 404(b)(1) discharges/disposal sites evaluated include the following:

Discharge site (i). Specific discharges would involve placement of erosion protection material along the banks of the newly enlarged First Avenue drainage canal (see Plate 10).

Discharge site (ii). Specific discharges on approximately 122 acres of bottomland hardwood wetlands would involve placement of material related to the following: construction of a levee, the stockpile of material for additional levee lifts, construction of a retaining dike, closure of the northern portion of the temporary by-pass channel, closure of the Cousins Pumping Station discharge channel, and erosion control (see Plate 10).

Discharge site (iii). Specific discharges on approximately 1 acre within the Harvey Canal would involve placement of materials related to construction of a cofferdam, a floodgate, and approach channel (see Plate 10).

Discharge site (iv). Specific discharges on approximately 14 acres of wooded swamp wetlands near Oakville would involve placement of materials utilized for construction of a proposed levee and associated erosion control (see Plate 13).

d. GENERAL DESCRIPTION OF DREDGED OR FILL MATERIAL.

(1) Soil Types at the Discharge Sites.

The Soil Conservation Service's Soil Survey of Jefferson Parish, Louisiana provides the following soil types for discharge sites i-iii:

Discharge site (i): Harahan clay.

Discharge site (ii): Barbary muck and Sharkey clay.

Discharge site (iii): transported muds, silts, and clay bottoms of the Harvey Canal.

Personal communication (i.e., telephone conversation) with the representative of the Soil Conservation Service at the Belle Chase Office revealed soils of the Oakville area:

Discharge site (iv): Rita mucky clay.

(2) Quantity of Material.

Discharge site (i). Erosion control would require placement of 3,500 cubic yards (cy) of shell bedding and 10,500 tons of various grades of riprap.

Discharge site (ii). Approximately 340,700 cy of earthen material would be side-cast to provide a navigation by-pass channel to the Harvey Canal. Approximately 400 cy of this material, consisting of the top 2 feet of material from the initial and end cuts of the bypass channel (i.e. that material immediately adjacent to and along the bank of the Harvey Canal) would be excavated and hauled to an industrial waste facility. The remainder of the material would be placed in the stockpile area later use.

The open portion of the by-pass channel would be incorporated into the Cousins Pumping Station's new discharge channel following completion of the floodgate. Completion of the new discharge channel would require excavation of 216,650 cy of earthen material that would be initially placed in the stockpile area and later used in construction of the adjacent levee. Placement of erosion control material for the proposed discharge channel would require the use of 21,780 cy of bedding material and 65,340 tons of various grades of riprap. Closure of the Cousins Pumping Station's discharge channel would require 4,400 cy of earthen material, taken from the by-pass channel, and 3,260 cy of bedding material.

Approximately 266,350 cy of earthen material removed from the bypass channel would be used to construct a retaining dike landside of the adjacent levee. The dike would be used to retain additional material removed from the by-pass channel. Erosion control would require placement of 7,480 cy of bedding material and 21,970 tons of various grades of riprap.

The levee west of the Harvey Canal, adjacent to the new discharge canal, and extending south of Cousins Pumping Station would require approximately 112,000 cy of earthen embankment fill taken from the by-pass channel and the First Avenue drainage canal enlargement.

Discharge site (iii). Construction of the floodgate would require placement of 14,000 cy of earthen material, taken from the temporary by-pass channel, and 31,900 cy of cellular fill material in the Harvey Canal to aid in dewatering the cofferdam and help reinforce the cofferdam walls. Following completion of the floodgate, this material would be re-used for levee and floodwall construction. Approximately 16,200 cy of earthen material, taken from the temporary by-pass channel, and 350 cy of concrete would be placed into the Harvey Canal as a foundation for the floodgate. The approach channel would require excavation of 29,000 cy of earthen material. The top 2 feet of this material, approximately 2,400 cy, would be hauled offsite to an industrial waste facility. The remainder of this material would be removed from within the cofferdam and used to construct the levee. Approximately 8,150 square yards of plastic filter fabric, 17,950 cy of

bedding material, and 44,500 tons of various grades of riprap would be placed in the excavated approach channel to prevent undermining of the floodgate. After completion of the floodgate, the northern connection between the by-pass channel and the Harvey Canal would be closed with a floodwall and 22,330 cy of cellular fill material salvaged from the sector gate cofferdam.

Discharge site (iv). Approximately 197,000 cy of earthen embankment fill, taken from the designated borrow pit in a nearby open pasture, would be required to construct the levee near Oakville.

(2) Source of Material. The bedding material, cellular fill, stone, concrete, and filter fabric would be obtained from commercial sources. Specific sources of material for each of the five evaluated discharge sites includes the following.

Discharge site (i): See Section I.d.(1) - "Quantity of Material", *Discharge site (i).*

Discharge site (ii): See Section I.d.(1) - "Quantity of Material", *Discharge site (ii).*

Discharge site (iii): See Section I.d.(1) - "Quantity of Material", *Discharge site (iii).*

Discharge site (iv): See Section I.d.(1) - "Quantity of Material", *Discharge site (iv).*

e. DESCRIPTION OF THE PROPOSED DISCHARGE SITE.

(1) Location and Size of Site and Type of Habitat.

Discharge site (i): See Section I.b. - "General Description", *Discharge site (i).*

Discharge site (ii): See Section I.b. - "General Description", *Discharge site (ii).*

Discharge site (iii): See Section I.b. - "General Description", *Discharge site (iii).*

Discharge site (iv): See Section I.b. - "General Description", *Discharge site (iv).*

(2) Timing and Duration of Discharge. See Section I.d.(1) - "Quantity of Material".

Discharge site (i): approximately 2 months.

Discharge site (ii): approximately 5 months for the by-pass and discharge channel; approximately 15 years for the stockpile area; the levee would be built in three lifts, each lift would take approximately 9 months for a total of 27 months, with intervals of 2 to 3 years between each lift .

Discharge site (iii): approximately 3 years.

Discharge site (iv): the levee would be built in three lifts, with intervals of 2 to 3 years between each lift; each lift would take approximately 9 months for a total of 27 months.

f. DESCRIPTION OF DISPOSAL METHODS.

Discharge site (i): Placement of erosion protection material would be on the landside by mechanical dredging techniques (e.g., enclosed clamshell dredge) or the most appropriate and practicable means to minimize any adverse impacts.

Discharge site (ii): Placement of materials would be by mechanical dredging techniques (e.g., enclosed clamshell dredge) or the most appropriate and practicable means to minimize any adverse impacts.

Discharge site (iii): Placement of materials would be by mechanical dredging techniques (e.g., enclosed clamshell dredge) or the most appropriate and practicable means to minimize any adverse impacts.

Discharge site (iv): Construction of the levee and placement of erosion protection material would be on the landside by mechanical means (e.g., clamshell dredge) or the most appropriate and practicable techniques that would minimize any adverse impacts.

II. FACTUAL DETERMINATIONS

a. PHYSICAL SUBSTRATE DETERMINATIONS.

(1) Effects on Substrate Elevation and Slope.

Discharge site (i): Placement of fill and erosion control material used in the enlargement of the First Avenue drainage canal would substantially alter the substrate elevation and bottom contours by leveling and minimizing any existing waterway elevational gradients. This enlargement would increase the volume and discharge rates, which would in turn, also affect local current patterns and downstream flow. These changes would have no significant adverse impacts on the system because they would occur primarily only during operation of the pumping station. The duration of the changes would be at least for the life of the project.

Discharge site (ii): Placement of fill and erosion control material to construct and close the by-pass and discharge channel would substantially alter substrate slopes. The channel bottoms would become embankments.

Placement of fill and erosion control material to construct the levee would substantially alter the substrate elevation of the levee rights-of-way. Soils would be compacted and substrate elevation would increase from 9.0 - 10.5 feet; any adjacent wetlands would become levees.

Placement of material stockpiled for construction of additional levee lifts would substantially alter the substrate elevation of the bottomland hardwood wetlands located in the levee rights-of-way. Soils would be compacted and substrate elevation would increase several feet; the adjacent bottomland hardwood wetlands would become buried.

There would be a loss of 122 acres of seasonally flooded bottomland hardwood wetland soils and their associated values and functions. The duration of all of the above described changes would be at least for the life of the project.

Discharge site (iii): Placement of fill and erosion control material for construction of the cofferdam would significantly change the canal bottom through compaction and reducing bottom contours. Construction of the floodgate and approach channel would change the canal bottom into a concrete structure. Soils would be compacted and diversity of bottom contours would be reduced. Duration of these changes would be at least for the life of the project.

Discharge site (vi): Placement of fill and erosion control material to construct the Oakville levee would substantially alter the substrate elevation of the levee rights-of-way. Soils would be compacted and substrate elevation would increase from 9.0 - 10.5 feet; any adjacent wooded swamp wetlands would become levees. Duration of these changes would be at least for the life of the project.

(2) Effects on Sediment Type.

Discharge site (i): Material used for erosion protection (e.g. shell and riprap) would be different from the type of material currently in place.

Discharge site (ii): Sediments stored on the stockpile area would be similar to existing soils since they would be excavated from the adjacent by-pass and new discharge channels.

Material used to close the by-pass channel, the Cousins Pumping Station discharge channel, and the embankment connecting the floodgate and the west bank of the Harvey Canal would also be similar to existing substrate. Material for these closures would also be obtained from excavating the adjacent by-pass/discharge channel and floodgate.

The filter fabric, shell, and riprap placed for levee and bank protection would be a significant change in substrate. However, since the Harvey Canal is already lined with these materials, this would be compatible with the surrounding environment.

Discharge site (iii): Construction of the cofferdam, floodgate, and approach channel would use sediments excavated from the adjacent temporary by-pass and the discharge channels. These sediments are similar to those currently in place. Hence, effects on sediment type for this discharge site would be primarily due to the addition of the floodgate's concrete foundation and placement of rock and shell.

Discharge site (iv): Material used for construction of the Oakville levee would be similar to the existing material under the levees, since it would be extracted from designated borrow sites.

(3) Effects on Fill Material Movement. No significant movement of excavated materials would occur on any of the discharge sites. The material would be stockpiled in a continuous manner along the levee right-of-way and ultimately be shaped and formed to conform to final levee grades and slopes. Silt screens and/or hay bales would be used to minimize overland runoff. Therefore only minor erosion of levee material may occur, but this would be short-lived. Grass would be planted as soon as possible after construction. Once the grass is established, it would prevent erosion of the levee surfaces. Since the levees would not be subject to regular inundation, only minor losses of material would occur after plan completion. This would be primarily due to erosion. Excavated material placed in the channel and canal closures would be faced with filter fabric, shells, and riprap. This would prevent movement and erosion of any of this material.

(4) Physical Effects on Benthos.

Discharge site (i): As a direct result of construction, any resident benthic populations in the First Avenue drainage canal would be destroyed. However, populations would become reestablished within approximately 6 - 12 months following construction.

Discharge site (ii): As a direct result of stockpiling sediments and construction materials, closing the by-pass and discharge channel, and placement of the levee any resident benthic populations on 122-acres of seasonally flooded bottomland hardwoods would be destroyed by burial. The seasonally flooded bottomland hardwood areas would support benthos primarily during those times they were flooded.

Discharge site (iii): Construction of the cofferdam, floodgate and approach channel in the Harvey Canal would destroy any resident benthic populations in the immediate construction area (approximately 1 acre).

Discharge site (iv): As a direct result of levee construction, resident benthic populations on 14 acres of wooded swamp wetlands would be destroyed by burial. Wooded swamp wetlands would normally support benthos year-round.

(5) Actions to Minimize Impacts.

Discharge sites (i): During construction, the use of silt curtains and/or hay bales would minimize the effects of stormwater runoff, overland flow, sediment movement and erosion, into adjacent wetlands and/or waterways. This would also restrict the extent of turbidity and suspended particulates to the immediate construction area. The use of shell and assorted riprap would help control erosion along the enlarged drainage canal. These actions would thereby minimize any adverse biotic effects associated with increased turbidity and suspended particulates.

Discharge site (ii): During construction, the use of silt curtains and/or hay bales would minimize the effects of stormwater runoff, overland flow, sediment movement and erosion, into adjacent wetlands and/or waterways. This would also restrict the extent of turbidity and suspended particulates to the immediate construction area. The use of shell and assorted riprap would help control erosion along the enlarged drainage canal. These actions would thereby minimize any adverse biotic effects associated with increased turbidity and suspended particulates. Silt curtains would minimize the effects of any incidental redeposition of dredged material during excavation of the by-pass and drainage channel. Filter fabric, shell, and riprap placed along the levee for bank protection and the establishment of grass on completed levee surfaces would also minimize erosion. Turbidity and suspended particulate levels would return to background levels once the by-pass and discharge channel are completed, and the levee is completed and covered with grass. The storage of sediments excavated from the adjacent by-pass and discharge channels would minimize the introduction of unlike-sediments into the area. Hence, placement of like-on-like material. Material would be stockpiled in a continuous manner and shaped to minimize runoff. Habitat losses will be mitigated by the acquisition and management of 312 acres of wooded wetlands in the Bayou Bois Piquant area of St. Charles Parish, LA.

Discharge site (iii): The use of the cofferdam during construction of the floodgate and approach channel would minimize any adverse effects associated with suspended particulates and associated turbidity in the water column. Material for construction of the floodgate and approach channel would be obtained during excavation of the enlargement of the First Avenue drainage canal, and the adjacent temporary by-pass and discharge channel. Hence, there would be placement of like-on-like material.

Discharge site (iv): Levee construction and/or enlargement would occur on the landside, thereby avoiding impacts to adjacent waterways. During construction, the use of silt curtains and/or hay bales would minimize the effects of stormwater runoff, overland flow, and sediment movement and erosion into adjacent wetlands and/or waterways. This would also restrict the extent of turbidity and suspended particulates to the immediate construction area. Filter fabric, shell, and riprap placed along the levee for bank protection and the establishment of grass on completed levee surfaces would also minimize sediment movement and erosion. Habitat losses will be mitigated by the acquisition and management of 312 acres of wooded wetlands in the Bayou Bois Piquant area of St. Charles Parish, LA. prevent the movement of excavated material into adjacent waterways.

For all discharge sites evaluated, mechanical dredging techniques using an enclosed clamshell dredge (or an equally or more effective method), and the use of operational controls to minimize resuspension of sediments would minimize any potentially adverse impacts. In addition, the use of silt curtains, silt screens and/or hay bales, mechanical dredging techniques including operational controls, consideration of the allowable mixing zone, and the hauling of contaminated material to an industrial waste disposal site, rather than utilizing any on-site disposal method, would further minimize the potential for any adverse impacts.

b. WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS.

(1) Effects on Water.

(a) Effects on Salinity. Direct salinity changes would not occur due to the construction process for *discharge sites (i), (ii), and (iv)*. Under normal hydrologic conditions the completed Recommended Plan would not affect the salinity regime in any of the adjacent waterways (e.g., the Harvey Canal, Hero Canal, and Algers Canal).

Discharge site (iii): The floodgates would ordinarily be open, allowing water to circulate from one side to the other with little more restriction than at present. However, during high tides and hurricanes the floodgates would be closed. This would prevent water from circulating from one side of the gates to the other. Water advancing northward due

to these high tides and hurricanes would probably have increased salinity. The structure would prevent the northward movement of this water. Therefore, the completed Recommended Plan would reduce salinity in the Harvey Canal from the structure to the Mississippi River during high tides and hurricanes when the structure would be closed.

(b) Effects on Water Chemistry. For all discharge sites evaluated, minor and temporary alteration of local water chemistry is anticipated during fill material discharge. Typical changes in local water chemistry include the elevation of: oxygen demand, dissolved solids, nitrogen, iron, and manganese concentrations. Normally, the affected surface waters have sufficient buffer capacity to prevent radical changes in pH. Dilution tends to limit the degree of modifications in water chemistry.

(c) Effects on Clarity. For all discharge sites evaluated, elevated turbidity and suspended solids levels would reduce surface water clarity during placement of dredged material, particularly in the areas of the channel and canal closures. This would be a temporary and localized condition. Clarity would soon return to normal, especially after placement of the erosion protection on the closures and establishment of grass on the levees.

(d) Effects on Color. For all discharge sites evaluated, no long-term changes in color would occur. However, color in surface waters near the location of work may be intensified. These temporary color changes would be associated with the high organic content of soils found in the area, which would be placed into the water column.

(e) Effects on Odor. For all discharge sites evaluated, excavation of the organic soils would release odors otherwise contained. This condition would not be hazardous. It would be localized and short-lived. The odors would not occur beyond the construction period.

(f) Effects on Taste. For all discharge sites evaluated, no potable water intakes are known to exist in the area. Therefore, any alteration of taste caused by construction activities would be temporary and of little consequence.

(g) Effects on Dissolved Gas Levels. For all discharge sites evaluated, short term decreases in dissolved oxygen levels could occur in the areas of dredged material placement, due to the oxygen demands associated with dredged sediments. Dissolved oxygen would return to background levels shortly after construction.

(h) Effects on Nutrients. For all discharge sites evaluated, based on the results of elutriate tests, some nutrient concentrations could temporarily increase as a result of construction activities. Ammonia, nitrate, and total Kjeldahl nitrogen (TKN) concentrations were elevated in the elutriate samples. The source of these increases is the organic soils which would be placed in waters of the area for levees and channel closure structures. Nutrient levels would return to background concentrations shortly after construction is completed.

(i) Effects on Eutrophication. For all discharge sites evaluated, the proposed material placement process would be of short duration. Any increase in nutrient levels would occur during construction. After completion of the Recommended Plan, no additional nutrients would be available to contribute to an increase in eutrophic levels. Consequently, no long-term enrichment of surface waters in the study area would occur.

(2) Effects on Current Patterns and Circulation.

(a) Effects on Current Patterns and Flow.

Discharge site (i): Enlargement of the First Avenue drainage canal and associated placement of erosion protection material would increase flow during times of pumping station operation, but would make no change to existing current patterns.

Discharge site (ii): The new Cousins Pump Station discharge channel would discharge stormwater into the Harvey Canal south of the proposed floodgates instead of just north of the Lapalco bridge as it presently does. Capacity of this new channel would be increased by 1,000 cfs. Therefore, any current patterns would change in response to the new channel configuration.

Discharge sites (iii): Under normal conditions the floodgates would be open, allowing water to circulate from one side to the other with little more restriction than at present. The floodgates would be closed only to prevent storm-induced flooding via the Harvey Canal during high tides and hurricanes. On these rare occasions, water would be prevented from circulating past the floodgates. During construction, water would circulate into and through the new by-pass channel.

Discharge site (iv): N/A.

(b) Effects on Velocity.

Discharge site (i): Enlargement of the drainage canal will cause a slight decrease in water velocity.

Discharge site (ii): Addition of the by-pass and discharge channel would probably decrease the velocity of the Harvey Canal along that stretch from current conditions.

Discharge site (iii): Velocity would increase in the vicinity of the floodgates due to the constriction in the Harvey Canal channel cross section at that location.

Discharge site (iv): N/A.

(c) Effects on Stratification. For all discharge sites evaluated, the Recommended Plan would have no appreciable effect on water column stratification from current conditions.

(d) Effects on the Hydrologic Regime. For all discharge site evaluated, the normal hydrologic regime would not be altered by the Recommended Plan. However, during events when the floodgates would be closed, water would be prevented from flowing northward in the Harvey Canal past the structure.

(3) Effects on Normal Water Level Fluctuations. For all discharge sites evaluated, normal water level fluctuations would not be altered by the plan. However, during events when the floodgates would be closed, tidal level increases in the Harvey Canal would be prevented from occurring north of the floodgates.

(4) Effects on Salinity Gradients. For all discharge sites evaluated, normal salinity gradients would not be altered. The only plan-caused salinity changes would occur during the rare events when the floodgates would be closed. (See Section II.b.(1)(a) - "Effects on Salinity")

c. SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS.

(1) Expected Changes in Suspended Particulate and Turbidity Levels in the Vicinity of the Discharge Sites. For all discharge sites evaluated, turbidity and suspended particulates would temporarily increase during construction. The action of the mechanical dredging equipment would cause a small amount of the material to become suspended in the surrounding water. This turbidity and suspended particulate increase would be localized and short-lived. The use of silt curtains would minimize resuspension of particulates. The use of silt screens and/or hay bales would minimize overland flow and aide in erosion control. Once the levees are completed and covered with grass, and the channel and canal closures are faced with riprap, the fill material would not erode. Turbidity and suspended particulates would return to background levels.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Effects on Light Penetration. For all discharge sites evaluated, decreased light penetration would be associated primarily with water column turbidity and suspended material generated during construction. This condition would be localized and short-lived. Once the levees are completed and covered with grass, and the channel and canal closures are faced with riprap, the fill material would not erode. Turbidity and suspended material levels would decrease, and light penetration would return to background levels.

(b) Effects On Dissolved Oxygen. For all discharge sites evaluated, there would be localized, short term decreases in dissolved oxygen levels could occur due to release of nutrients from the organic soils. The increase in turbidity and suspended particulates during construction would have little effect. Dissolved oxygen would return to background levels shortly after construction.

(c) Effects on Toxic Metals and Organics. To evaluate the effects on toxic metals and organics three testing protocols were used: (1) Bulk sediment analyses were performed on bottom surface sediment samples collected in the Harvey Canal and in the Cousins Pumping Station outflow channel in the vicinity of the proposed construction, (2) Analysis of elutriates were prepared from three of the above sediment samples in combination with Harvey Canal water, and (3) Toxicity analysis using the Toxicity Characteristic Leaching Procedure (TCLP) tests were performed on three of the other sediment samples. Sediment core samples were also collected adjacent to the Harvey Canal and Cousins Pumping Station outflow channel in the area. In addition, land based background surface sediments were collected at four locations within the study area.

BULK SEDIMENT ANALYSIS: The bulk sediment analysis provides information on the total concentration of chemical constituents in a sample. However, it has been recommended that bulk sediment analysis results **not** be used to evaluate potential environmental impacts of a proposed dredging operation. There is little relationship between total sediment concentration and effects on water quality or biological availability.

Results of the bulk sediment analyses indicate that concentrations of several toxic metals (e.g., barium, silver, manganese, etc., see Table C-VIII-5) in sediments of the areas that would be dredged exceed the background sediment concentrations. Also, several organic compounds (only methylene chloride and acetone were present in more than one sample) are present in very low concentrations in the sediments of some of the areas that would be dredged.

ELUTRIATE ANALYSIS: The elutriate test is a better indicator of the potential environmental impacts of a proposed dredging and disposal operation than the bulk sediment analysis. However, since the sediment-to-liquid ratio used in the test is based on **hydraulic dredging** ratios, results from the elutriate test are conservative and will probably overestimate the release from disposal activities associated with the less dynamic dredging techniques such as clamshell dredging. The elutriate test predicts the concentration of a particular parameter at the point of discharge and not at the edge of the allowable mixing zone. Thus, the test is also conservative with respect to both the dredging and disposal operations because mixing zones are not considered. The test is a simplified simulation of the dredging and disposal process wherein predetermined amounts of dredging site water and sediment are mixed together to approximate a dredged material slurry. The test provides an indication of the chemical constituents likely to be released to the water column during a disposal/filling operation.

The elutriate tests show that the levels of some metals have the potential to increase near the construction site. Arsenic, cadmium, copper, chromium, iron, mercury, manganese, nickel, lead, and zinc concentrations were greater in some of the elutriate samples than in the water sample, although only mercury and cadmium levels exceeded the Environmental Protection Agency's (EPA) acute level for aquatic life criteria. Lead, nickel, and iron exceeded EPA's chronic level for aquatic life criteria. These tests probably overestimate the actual potential for release of these contaminants into the water column. The method of construction would be by mechanical means rather than hydraulic dredging. Any increase in toxic metals would occur only during construction activities (See Section I.e.(2), Timing and Duration of Discharge) and in the immediate construction area. Levels would return to background with completion of construction.

No organic compounds were detected in the water sample or the sediment samples that were used in composing the elutriates. Organic compounds were also not detected in the elutriate samples. This indicates that construction activities would not cause a detectable increase in organic compound levels in waters of the area.

TCLP ANALYSIS: The TCLP test is a standard EPA test which is used to determine the leaching potential of toxic constituents in a waste. The test is designed to identify wastes that are likely to leach hazardous constituents into groundwater under improper management conditions. The results of the TCLP tests show that constituent concentrations are well below EPA's regulatory levels (Resta, J., S. Kistner, and M. Brown, Oct. 1991, " The Environmental Update"). This indicates that the material is not classified as a hazardous waste.

(d) Effects on Pathogens. For all discharge sites evaluated, the Recommended Plan would have no significant effect on fecal coliform or pathogenic organism concentrations.

(e) Effects on Esthetics. For all discharge sites evaluated, the increased turbidity caused during discharge of dredged material would be esthetically displeasing, but would last only during the construction period.

(3) Effects on Biota.

(a) Primary Production and Photosynthesis. Elevated suspended particulate and turbidity levels, associated with dredged-material discharge and construction activities, would limit light penetration and reduce photosynthesis. There would also be reductions in primary productivity in both wetlands and waterways. Since the discharge would be of short duration, the loss of biomass caused by the reduction in photosynthesis and primary productivity would only be minor and of short duration. The flow of energy through the community, starting with the fixation of sunlight by plants and phytoplankton, and stored by photosynthetic activity would be temporarily lost for *discharge site (i)*; permanently lost from within the 1-acre area occupied by the floodgate and approach channel of *discharge site (iii)*, and from 136 acres of seasonally flooded bottomland hardwoods and wooded swamp wetlands (i.e., in the vicinity of *discharge sites (ii) and (iv)* respectively). The energy accumulated by plants, primary production, would also be permanently lost. Consequently, there would also be permanent loss of biomass from this 136-acre wetland area and the 1-acre area occupied by the floodgate in the Harvey Canal. Long term adverse wildlife habitat impacts would be mitigated by implementation of the mitigation plan.

De minimis incidental soil movement and the related increase of suspended particulates in the water column occurring during normal dredging operations have the potential to result in the increase of some toxic metals (i.e., mercury, cadmium, iron, nickel, and lead) during excavation of the initial and end cuts to the by-pass channel and excavation of the top two feet of the floodgate and approach channel. Such *de minimis* discharges would not generally be within 404 jurisdiction. However, due to the toxic nature of these heavy metals and their potential for bioavailability, any adverse impacts of this aspect of the project is appropriately, and more fully, discussed in the Environmental Impact Statement.

(b) Suspension/Filter Feeders. Suspension/filter feeders would be lost from the 136 acres of seasonally flooded bottomland hardwoods and wooded swamp wetlands (i.e., *discharge site (ii), and (iv)*). For the remainder of the study area, impacts

on suspension or filter feeders would only be minor due to increased turbidity. The Waterways Experiment Station (WES) Dredged Material Research Program showed that adult filter feeders are capable of withstanding temporary increases in suspended particulates and can recover from minor amounts of new sediment deposits. Larval and juvenile forms may be lost even with temporary turbidity increases. However, repopulation of any lost benthos would occur shortly after completion of each lift.

(c) Sight Feeders. Sight feeders, primarily fish and mobile shellfish, would not be adversely affected by the temporarily increased turbidities. These animals are generally highly mobile and can escape or avoid any areas of high turbidities. However, there would be a permanent loss of 136 acres of seasonally flooded bottomland hardwoods and wooded swamp wetlands (*discharge site (ii) and (iv)*) which provides spawning and nursery areas for some of these types of organisms.

(4) Actions Taken to Minimize Impacts.

Discharge sites (i): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (ii): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (iii): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (iv): See Section II.a.5 - "Actions Taken to Minimize Impacts".

d. CONTAMINANT DETERMINATIONS.

Discharge site (i): N/A.

Discharge site (ii): N/A.

Discharge site (iii) and (iv): The elutriate test data indicate, with the exception of cadmium and mercury, that contaminants would not be introduced into the water column in concentrations that would exceed applicable criteria (See Section II.c.(2)(c) - "Effects on Toxic Metals and Organics"). However, the potential for cadmium and mercury to be introduced into the water column is minimal because of the mechanical dredging techniques that would be employed (See Section II.c.(2)(c) - "Effects on Toxic Metals and Organics"). The material at the locations of levee construction and channel closures is similar to the material in the borrow areas. See also Sections II.c.(2)(c) -"Effects on Toxic Metals and Organics", II.a.(2) -"Sediment Type", and II.f.(2) - "Determination of Compliance with Applicable Water Quality Standards".

Discharge site (v): N/A.

Discharge site (vi): N/A.

e. AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS.

(1) Effects on Plankton. For all discharge sites evaluated, phytoplankton in adjacent waterways would be destroyed due to elevated turbidity levels. As described in Section II.c.(3)(a)- "Primary Production and Photosynthesis" above, turbidity associated with discharge would temporarily reduce photosynthesis, primary productivity, and biomass. Since discharges would be of short duration, eutrophication is not likely to occur, thus there would be minimal effects on plankton populations.

(2) Effects on Benthos. See Section II.a.(4) - "Physical Effects on Benthos" and Section II.c.(3)(a) - "Primary Production and Photosynthesis" above. For all discharge sites evaluated, any erosion protection for completed levees (e.g., placement of shellbedding and various grades of riprap) would provide substrate to support a new benthic community. Information presented at the International Riprap Workshop, 12-16 July, 1993, Fort Collins, Colorado, by Dardeau, Killgore, and Miller (researchers from WES) showed that stable riprap provides hard substrate for invertebrates, such as aquatic insects and thin-shelled mussels. Riprap has particular habitat value and can be especially important in alluvial river systems where natural coarse-grained substrate is scarce or absent.

(3) Effects on Nekton. See Section II.c.(3)(c) - "Sight Feeders" above. For all discharge sites evaluated, the loss of 136 acres of seasonally flooded bottomland hardwoods or wooded swamp wetlands would adversely impact the fishery in the study area. The nekton inhabiting the rights-of-way would be destroyed during construction if they could not escape the study area. These wetlands would no longer be available as possible nursery areas for juvenile fish and shellfish. Adverse impacts due to turbidity, contaminants, or water quality on the nekton would not occur. Shore protection (e.g., shellbedding and riprap) adjacent to the completed levee would provide cover and a spawning area for some fish species. Riprap and other coarse-grained material can provide velocity shelters, predator refugia, and feeding areas for all life stages of a fish. In addition, it would attract fish due to the increased food base (See Section II.e.(2) - "Effects on Benthos").

(4) Effects on the Aquatic Food Web. For all discharge sites evaluated, the loss of 136 acres of wooded wetlands would adversely impact the aquatic food web in these wetlands area by changing the photosynthetic, nutrient, and detrital cycling, as described above. However, as described in Section II.e.(2) - "Effects on Benthos" and Section II.e.(3) - "Effects on Nekton" above, shore protection (e.g., shellbedding and riprap) adjacent to the completed levee could provide substrate, cover, and spawning areas

for establishment of new planktonic, benthic, and nektonic species/communities following levee construction.

(5) Effects on Special Aquatic Sites.

(a) Wetlands.

Discharge site (i): N/A.

Discharge site (iii): N/A.

Discharge site (ii, and iv): The total amount of wetlands that would be lost due to the proposed levee and associated features is approximately 136 acres, as described above. All wetland functions and values (e.g., wildlife, fishery, recreation, storm water retention, nutrient and detrital cycling, etc.) would be permanently lost from these wetlands.

(b) Mudflats. N/A.

(c) Vegetated Shallows. N/A.

(d) Coral Reefs. N/A.

(e) Riffle and Pool Complexes. N/A.

(f) Sanctuaries and Refuges. N/A.

(6) Threatened or Endangered Species. For all discharge sites evaluated, although the study area lies within the range of several endangered and threatened species (Florida panther, Eskimo curlew, Arctic peregrine falcon, Bachmans's warbler, and ivory-billed woodpecker), the only species noted by the U.S. Fish and Wildlife Service (USFWS) during consultation as occurring on or near the study area was the bald eagle. A Biological Assessment, prepared by the New Orleans District, U.S. Army Corps of Engineers, determined that the proposed action would not adversely impact the bald eagle nest located approximately 5 miles from the closest construction area. In letters dated October 6, 1988, and November 8, 1989, the USFWS stated that no impact would occur to bald eagles and that the proposed action would not adversely affect bald eagles. Subsequent to receiving these letters, a pair of bald eagles constructed a nest within one mile of a portion of the study area. Consequently, another Biological Assessment dated May 19,1992, regarding impact of the proposed action (Tentatively Selected Plan) to this new nest site was sent to the USFWS. By letter dated June 11, 1992, USFWS concurred that no impact would occur to the nest provided no work would occur in this area during the nesting season (Oct 1 to May 15). In our most recent consultation as to the original

question of the presence of any species or critical habitat that may be affected by what has now become the Recommended Plan, the USFWS again reaffirmed that the bald eagle (and those aspects already documented) would be the only species or critical habitat impacted by the Recommended Plan. (Walther, David, USFWS, personal communication, March 18, 1994). However, the bald eagle would not be affected with construction not being conducted during the October 1 through May 15 period. The American alligator also occurs in the study area, and is listed as threatened due to similarity of appearance. However, a regulated harvest of alligators is permitted in Louisiana.

(7) Wildlife. *Discharge sites (i and iii)* would show no appreciable effects. The 122 acres of seasonally-flooded bottomland hardwoods (*discharge sites (ii)*) and the 14 acres of wooded swamp (*discharge site (iv)*), that would be filled as a result of various construction activities, are now good wildlife habitat. The resulting levee, discharge channel, and stockpile area would be poor wildlife habitat. However, as described in II.e.(2-4) above, the use of shell bedding and riprap shore protection to reduce erosion could also provide substrate for an aquatic food web which wading and shorebirds could utilize.

(8) Actions to Minimize Impacts. Habitat losses will be mitigated by the acquisition and management of 312 acres of wooded wetlands in the Bayou Bois Piquant area of St. Charles Parish, LA. prevent the movement of excavated material into adjacent waterways.

Discharge sites (i): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (ii): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (iii): See Section II.a.5 - "Actions Taken to Minimize Impacts".
Discharge site (iv): See Section II.a.5 - "Actions Taken to Minimize Impacts".

f. PROPOSED DISPOSAL SITE DETERMINATIONS.

(1) Mixing Zone Determination. For all discharge sites evaluated, mixing zone calculations show that the maximum dilution factor needed to reduce potential contaminants to criteria levels not to be exceeded, is one to one. Excavated materials would be placed for use as levee fill, and as fill for the channel closures, in such a way to minimize the loss of solids to waterbodies. The volume of potentially contaminated water which would be displaced during the mechanical dredging process would be minimal. Runoff from the newly constructed levees would be distributed along their length. Erosion of material used to build the channel closures would also be distributed along their entire length. Consequently, the volume of runoff or erosion in any one area would be small, and an associated mixing zone would be very small.

(2) Determination of Compliance with Applicable Water Quality Standards. Bottom sediments were collected from the center of the channel at three sites in the Harvey Canal. The locations of these sites are:

HC1 - Harvey Canal at Harvey Lock Tailbay
HC2 - Harvey Canal at Cousins Canal
HC3 - Harvey Canal at Hero Canal

Surface water was collected at the HC2 site and used to prepare elutriates with each of the three sediment samples. Samples were analyzed for selected metals, nutrients, and organic compounds.

Table 3 in Section 1 of Appendix C displays water and elutriate data obtained from these samples. Organic compound data are not included in the table because no organic compounds were detected in any of the samples. This table also includes the Louisiana Department of Environmental Quality (LDEQ) water quality criteria and/or EPA freshwater criteria. Acute and chronic criteria are included. The chronic criteria are intended to protect aquatic organisms from long-term exposure to contaminants while the acute criteria are intended to protect them from short-term exposure to contaminants. Since the construction process would not produce a continuous discharge and would occur temporarily, the acute criteria apply. According to the LDEQ:

> "Numerical criteria for specific toxic substances are mostly derived from the following publications of the EPA: Water Quality Criteria, 1972 (commonly referred to as the "Blue Book"); Ambient Water Quality Criteria, 1980 (EPA 440/5-80); Ambient Water Quality Criteria, 1984 (EPA 440/5-85); and Quality Criteria for Water, 1986 - with updates (commonly referred to as the "Gold Book"). Natural background conditions, however, are also considered."
>
> "For purposes of criteria assessment, the most stringent criteria for each toxic substance will apply. For determination of criteria attainment in ambient water where the criteria are below the detection limit, then no detectable concentrations will be allowed."

As previously mentioned, all organic compound concentrations in these water, sediment, and elutriate samples were less than detection limits. Therefore, all organic compound concentrations were within the State criteria. These tests indicate that dredging activities would not cause a detectable increase in organic compound levels in waters of the study area.

The results of the elutriate tests show that only cadmium and mercury have the potential to be elevated above the acute criteria. However, since the sediment-to-liquid ratio used in the test is based on hydraulic ratios, results from the elutriate test would be conservative and would probably overestimate the release from disposal activities associated with less dynamic dredging techniques such as clamshell dredging. The elutriate test predicts the concentration of a particular parameter at the point of discharge and not at the edge of the allowable mixing zone. Thus, the test is also conservative with respect to both dredging and disposal operations in that allowable mixing zones are not considered. Therefore, a comparison of elutriate test concentrations with criteria is conservative. Because of the nature of the comparisons, under normal circumstances, an elutriate test result less than established criteria would indicate that adverse water quality impacts would not be expected. However, in this case, an elutriate test result exceeding established criteria would not necessarily imply that adverse water quality impacts would occur. This is because excavation and placement of the material would be performed by mechanical means (e.g., clamshell dredging) rather than by hydraulic dredging. Therefore, cadmium and mercury concentrations would not necessarily increase above the acute freshwater aquatic life criteria. If there is any increase above criteria it would occur only during construction activities (see Section I.e.(2) Timing and Duration of Discharge) and in the immediate area. Mixing zone calculations show that the mixing zone needed to reduce the levels of these constituents to the criteria would be very small. See Section II.c.(2)(c) - "Toxic Metals and Organics" and Section II.f.(1) - "Mixing Zone Determination."

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. For all discharge sites evaluated, the Recommended Plan and construction activity would have no effect on any municipal or private water supply intakes.

(b) Recreational and Commercial Fisheries. For all discharge sites evaluated, recreational fishing and boating are limited in the deposition area due to isolation from roadways, areas of public access, and the existence of other more desirable fishing and boating opportunities in the vicinity. The Harvey Canal area is very heavily utilized for navigation for industrial purposes and receives little commercial and recreational fishing use. However, the loss of 122 acres of seasonally flooded bottomland hardwoods and 14 acres of wooded swamp wetlands would reduce the fish population in the study area by removing spawning and nursery habitat. Each acre of wooded swamp has been estimated to produce 114 pounds of commercial fish per year. Therefore, the loss of 14 acres of wooded swamp wetlands could conceivably result in the loss of 1,596 pounds of fish annually.

(c) Water Related Recreation. For all discharge sites evaluated, there is little water related recreation in the proposed discharge area. Three major recreational areas of significance exist on the west bank, including Lake Salvador Wildlife Management Area, the Jean Lafitte National Historic Park, and the Bayou Segnette State Park. Deposition would have no impact on recreation in the study area.

(d) Esthetics. For all discharge sites evaluated, esthetics would be adversely impacted due to the presence of mud, machinery, and other equipment associated with construction. In addition, the visual quality of the area would be adversely impacted due to the temporary loss of vegetation lining the bank and land side of the levee. The removal of trees for deposition of materials would also be esthetically displeasing to people in nearby neighborhoods. However, volunteer vegetation will become established and return some of this visual quality. There would be temporary, minor adverse impacts to air quality near construction areas. Dust and exhaust fumes from construction equipment would occur during construction. However, no violations of state air quality standards are expected to occur during construction. Deposition of material to build the levee would cause esthetic concerns related primarily to increases in turbidity and water discoloration during construction. Noise levels would increase temporarily in the study area during construction. Since construction would take place during daylight hours, sleep interference would be minimal. EPA has a limit of 85 dBA for eight hours of continuous exposure to protect against permanent hearing loss. Noise above this level would not occur for periods longer than eight hours.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. For all discharge sites evaluated, three major areas of significance exist in the general vicinity of the Recommended Plan. These include Lake Salvador Wildlife Management Area, Jean Lafitte National Historic Park, and Bayou Segnette State Park. There would be no impact to these areas from the Recommended Plan.

(f) Determination of Cumulative Effects on the Aquatic Ecosystem. The loss of 136 acres of wooded wetlands would be added to the other wetland losses, both man-induced and natural, in the Barataria Bay ecosystem. Between 1956 and 1989 approximately 6,000 acres of bottomland hardwoods and over 2,000 acres of marsh were lost in the plan area. Most of these acres have become developed, resulting in the loss of all wetland values and functions associated with these areas. Development involving the clearing of wooded lands under the future-without-plan condition would result in the loss of considerable forested lands (e.g. 136 acres of bottomland hardwood and wooded swamp) over the entire west bank area since the demand for land to develop is so great. For

example, the projected development associated with the selected plan of the previously authorized Westwego to Harvey plan would occur at a rate approximately 10 percent faster than without that plan.

Considering the highly industrialized nature of the study area and the consequential continued input of heavy metals and other toxic contaminants by these industries into the system, it is imperative that any dredging and/or deposition activities be conducted in such a manner that they not contribute to any further contamination, via resuspension, to the system. Therefore, as has been detailed for the present study, it is important to use the most appropriate and applicable techniques and operational controls in order to minimize resuspension of heavy metal contaminated sediments and thereby reduce any potentially adverse impacts. For the Recommended Plan, the discharge site is adjacent to the extraction site and subject to the same sources of contaminants. Furthermore, materials at the discharge site are substantially similar to materials at the extraction site. Consequently, the fact that the material to be discharged may be a carrier of contaminants, is not likely to result in degradation of the disposal site.

(g) Determination of Secondary Effects on the Aquatic Ecosystem. No wetlands would be enclosed by levee construction. Earthen embankment fill material for construction of the majority of the levee would come from non-wet borrow areas, from a degraded levee north of Cousins Pumping Station and the 1st Avenue Drainage Canal, and from adjacent excavation activities such as the by-pass/discharge channel. There are essentially no wetland values associated with these borrow areas. Construction of a hurricane protection levee would effectively eliminate the ecosystem benefits associated with a seasonal flooding regime. It is acknowledged, however, that the pumping station currently in place has already removed a considerable amount of seasonal flooding and, thus, wetland habitat value. The loss of the 136 acres of wooded wetlands would also indirectly impact fauna on adjacent areas forcing individuals within the existing wetland ecosystem into ever-decreasing suitable habitat. Competition for limited wetland resources would result in a loss of biodiversity, a decrease in density, and loss of associated wetland values and functions. Such losses would occur not only to organisms that predominantly utilize wetlands, but also to organisms that are only occasional users of wetlands. It is the continued loss of suitable wetland habitat and the tangential impacts that would have perhaps the greatest long-term biological significance. The use of mechanical dredging techniques and appropriate operational controls, the use of silt curtains, silt screens and/or hay bales, grassing levee surfaces, shell and riprap, consideration of the allowable mixing zone, and the hauling of contaminated material to an industrial waste disposal site, rather than utilizing any on-site disposal method, all contribute to further minimization of the potential for adverse impacts associated with discharges of the type described herein.

III. FINDING OF COMPLIANCE FOR THE WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA EAST OF HARVEY CANAL HURRICANE PROTECTION PLAN

a. **ADAPTATION OF THE SECTION 404(b)(1) GUIDELINES TO THIS EVALUATION.** No significant adaptations of the guidelines were made relative to this evaluation.

b. **EVALUATION OF AVAILABILITY OF PRACTICABLE ALTERNATIVES TO THE PROPOSED DISCHARGE SITE WHICH WOULD HAVE LESS ADVERSE IMPACT ON THE AQUATIC ECOSYSTEM.** See the Environmental Impact Statement, Section 4.3 - "Plans Considered in Detail". Several alternatives were considered. There is no practicable alternative to the proposed discharge which would have less impact or less adverse environmental consequences on the aquatic ecosystem. The "No Action" alternative would result in substantial risk to life and property due to the lack of hurricane surge protection levees and floodwalls. The "No Action" alternative would also result in the continued use of and inadequate drainage canal and discharge channel. The Recommended Plan was identified taking into consideration economic feasibility and cost, existing technology, and logistics in light of overall project purposes and based on minimal impact to the aquatic ecosystem.

c. **COMPLIANCE WITH APPLICABLE STATE WATER QUALITY STANDARDS.** See Section II.f.(2) - "Determination of Compliance with Applicable Water Quality Standards." A letter has been received for the Water Control Division of the Louisiana Department of Environmental Quality granting certification.

d. **COMPLIANCE WITH APPLICABLE TOXIC EFFLUENT STANDARD OF PROHIBITION UNDER SECTION 307 OF THE CLEAN WATER ACT.**

(1) Borrow material taken from the nonwet field borrow site is not expected to exceed applicable Louisiana Water Quality Standards.

(2) The 65 pollutants designated as toxic under Section 307(a)(1) of the Clean Water Act have not been adopted by the State of Louisiana and are not therefore regulatory. They are used in a comparative context only.

e. **COMPLIANCE WITH ENDANGERED SPECIES ACT OF 1973.** The proposed discharge would not jeopardize the continued existence of any threatened or endangered species, nor result in the destruction or adverse modification of critical habitat

if the guidelines outlined under Section II.e.(6) - " Threatened or Endangered Species" are followed. Specifically, no adverse impacts would occur to the bald eagle nest within the project area provided no work would occur in the affected area during the bald eagle nesting season (i.e., October 1 to May 15).

f. **COMPLIANCE WITH THE SPECIFIED PROTECTION MEASURES FOR MARINE SANCTUARIES DESIGNATED BY THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972.** The Marine Protection, Research and Sanctuaries Act of 1972 would not apply.

g. **EVALUATION OF EXTENT OF DEGRADATION OF THE WATERS OF THE UNITED STATES.** None of the proposed discharges would result in unacceptable adverse effects on human health and welfare, including: municipal and private water supplies, recreational and commercial fisheries, plankton, fish, shellfish, wildlife, and special aquatic sites. Furthermore, none of the discharges would result in unacceptable adverse effects on the life stages of aquatic or semi-aquatic organisms, the aquatic ecosystem, diversity, productivity, stability, or recreation and esthetics resources, and economic values.

h. **APPROPRIATE AND PRACTICABLE STEPS TAKEN TO MINIMIZE POTENTIAL ADVERSE IMPACTS OF THE DISCHARGE ON THE AQUATIC ECOSYSTEM.** Appropriate and practicable steps would be taken to minimize the potential adverse impact of the dredging, levee construction, and related activities on the aquatic ecosystem. Levee construction and/or enlargement would occur on the landside, thereby avoiding impacts to adjacent waterways. During construction, the use of silt curtains and/or hay bales would minimize the effects of stormwater runoff, overland flow, and sediment movement and erosion into adjacent wetlands and/or waterways. This would also restrict the extent of turbidity and suspended particulates to the immediate construction area. Filter fabric, shell, and riprap placed along the levee for bank protection and the establishment of grass on completed levee surfaces would also minimize sediment movement and erosion. The use of the most appropriate and applicable technology and operational controls would minimize any potentially adverse impacts. In addition, consideration of the allowable mixing zone, and the hauling of contaminated material to an industrial waste disposal site, rather than utilizing any on-site disposal method, would further minimize the potential for any adverse impacts to the aquatic ecosystem.

i. ON THE BASIS OF THE GUIDELINES, THE PROPOSED DISPOSAL SITES FOR THE DISCHARGE OF DREDGED OR FILL MATERIAL ARE SPECIFIED AS COMPLYING WITH THE REQUIREMENTS OF THESE GUIDELINES, WITH THE INCLUSION OF THE APPROPRIATE AND PRACTICAL CONDITIONS TO MINIMIZE ADVERSE EFFECTS ON THE AQUATIC ECOSYSTEM. With inclusion of the above discussed conditions to minimize adverse effects to the aquatic ecosystem, it can be concluded that the Recommended Plan occurring in the vicinity the Cousins Pumping Station Area and the Oakville Area, and consisting of a combination of hurricane surge protection levees and floodwalls, enlargement of a drainage canal, a navigation floodgate and approach channel, a temporary by-pass channel, and a pumping station discharge canal is specified as complying with the Section 404(b)(1) guidelines.

19 Aug 94
Date

Kenneth H. Clow
Colonel, U.S. Army
District Engineer

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section III

Coastal Zone Management Program Consistency Determination

State of Louisiana

EDWIN W. EDWARDS
GOVERNOR

JOHN F. ALES
SECRETARY

DEPARTMENT OF NATURAL RESOURCES

August 1, 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: C940222 Coastal Zone Consistency
U.S. Army Corps of Engineers
Direct Federal Action
Proposed hurricane protection project, West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana, (East of Harvey Canal).
Jefferson, Orleans, and Plaquemines Parish

Dear Mr. Schroeder:

The above referenced project has been reviewed by this office and has been found to be consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program as required in Section 307 (c) of the coastal Zone Management Act of 1972, as amended. If you have any questions concerning this determination please contact Paul Clifton of the Consistency Section at (504) 342-7591.

Sincerely,

Terry W. Howey

Terry W. Howey
Administrator

cc: Tim Killeen, CMD/FI
Patricia Thompson, Orleans Parish
Marnie Winter, Jefferson Parish

COASTAL MANAGEMENT DIVISION P.O. BOX 44487 BATON ROUGE, LOUISIANA 70804-4487

WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA,
EAST OF THE HARVEY CANAL

COASTAL USE GUIDELINES
CONSISTENCY DETERMINATION

INTRODUCTION

Section 307 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et. seq. requires that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." In accordance with Section 307, a Consistency Determination has been made for the proposed action. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program and serve as a set of performance standards for evaluating projects. Compliance with the Louisiana Coastal Resources Program and therefore, Section 307, requires compliance with applicable Coastal Use Guidelines.

PROJECT DESCRIPTION

As a continuation of the West Bank of the Mississippi River, Westwego to Harvey, Louisiana, project, (Westwego to Harvey) additional hurricane protection would be provided to the area east of the Harvey Canal including portions of Jefferson, Orleans, and Plaquemines Parishes. The protection would include features consisting of a floodgate in the Harvey Canal that would connect to the authorized Westwego to Harvey project floodwall or levee on the west side of the canal (see Vol. 1, Plates 2 and 9). From the floodgate, a levee/floodwall would be constructed on the east side of the Harvey Canal to the Hero Pumping Station. The existing levee would be upgraded from the Hero Pumping Station to the Algiers Lock. From the Algiers Lock, the existing levee on the east side of the Algiers Canal would be upgraded to its connection to the Hero Canal levee and from that point adjacent to the Hero Canal to the terminus of that canal in the vicinity of Highway 23. A very short section of floodwall would be constructed along the highway and a new levee would be built to connect the proposed levee with the existing Plaquemines Parish levee approximately 0.4 mile south of the Hero Canal. The new protection system would be designed for a standard project hurricane. Material needed for

levee upgrading along the Harvey Canal would be obtained from the Murphy and Cousins Outfall Canal. Borrow material for upgrading the levees along the Algiers and Hero Canals would be taken from a borrow site located in fast land north of the Hero Canal. Borrow material for levee construction in the Oakville area would be taken from the adjacent land. Other alternative borrow sites could be located in fast land along the Algiers Canal. Approximately 14 million cubic yards of material would be needed for all construction. A temporary bypass channel would be constructed adjacent to the floodgate site to allow navigation. This channel would be used as the permanent discharge channel for the Cousins pumping station near Lapalco Boulevard following construction. Construction of the floodgate would be done by the construction of a cofferdam. The area within the cofferdam would be dewatered and the top two feet of material would be removed and hauled to an industrial landfill. The top, or outer, two feet of material excavated from the canal bank at each end of the bypass channel would also be removed and hauled to an industrial landfill. Movement of the materials would be in accordance with all applicable regulations. Approximately 46 acres of wooded swamp south of the Hero Canal would be directly impacted by construction of the levee. The habitat value of these impacts would be fully mitigated through preservation of a bottomland hardwood and wooded swamp tract near Bayou Bois Piquant and the Lake Salvadore Wildlife Management Area. Maintenance of the project would be performed by the local sponsoring agencies. This Consistency Determination considers the impacts of the proposed action on the 46-acre wooded swamp area and on the canals. All other areas to be directly effected by the proposed action are either (1) already levees, (2) are in areas of high industrial/residential usage (along the Harvey Canal), or (3) consist of the floodwall/levee connection to the authorized Westwego to Harvey hurricane protection levee (adjacent to the proposed floodgate) (see Plate 9).

GUIDELINES

1.0 GUIDELINES APPLICABLE TO ALL USES.

Guideline 1.7: It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid, to the maximum extent practicable, significant:

Guideline 1.7(a): Reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

Response 1.7(a): The proposed project is expected to induce minimal, if any, reductions in the natural supply of sediment and nutrients as effected by freshwater flow.

Guideline 1.7(b): Adverse economic impacts on the locality of the use and affected government bodies.

Response 1.7(b): The project would have a beneficial economic impact on the area within the protection system.

Guideline 1.7(c): Detrimental discharges of inorganic nutrient compounds into coastal waters.

Response 1.7(c): The small area of proposed levee construction in wetlands south of the Hero Canal would not release detrimental discharges of inorganic nutrient compounds into coastal waters. There would be a localized release of inorganic nutrients at the floodgate construction site during the driving of sheet piling to construct the cofferdam and during the excavation of the bypass/outfall channel. Silt curtains would be used to contain any release and minimize impacts while the bypass channel is being constructed.

Guideline 1.7(d): Alterations in the natural concentration of oxygen in coastal waters.

Response 1.7(d): During construction, a localized and temporary reduction in dissolved oxygen would occur in the immediate area of disturbance in the Harvey Canal; however, this would not significantly impact aquatic life.

Guideline 1.7(e): Destruction or adverse alternations of streams, wetlands, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

Response 1.7(e): Approximately 1-2 acres of canal bottom could be disturbed to install the floodgates. Benthic recolonization of the disturbed areas would occur within approximately six months after construction ceases. Forty-six acres of cypress swamps would be adversely impacted south of Hero Canal. However, the habitat quality of those swamps lost would be mitigated by the preservation and management of approximately 70 acres of wooded wetlands.

Guideline 1.7(f): Adverse disruption of existing social patterns.

Response 1.7(f): The proposed project would have no significant adverse impacts on existing social patterns, but would have beneficial effects to the human population within the protected area considering the protection it would provide.

Guideline 1.7(g): Alterations of the natural temperature regime of coastal waters.

Response 1.7(g): Increased turbidity would result in minimally raised water temperatures at the work area in the Harvey Canal. The effect would be local and temporary, and suspended sediments would be confined by silt curtains.

Guideline 1.7(h): Detrimental changes in existing salinity regimes.

Response 1.7(h): The proposed project would have no impact on the existing salinity regime.

Guideline 1.7(i): Detrimental changes in littoral and sediment transport processes.

Response 1.7(i): The proposed action would have no impact on littoral and sediment transport processes.

Guideline 1.7(j): Adverse effects of cumulative impacts.

Response 1.7(j): The proposed action would result in very few additional impacts to this urbanized area. In the long term, it would tend to limit the area for development and even reduce the incentive for development outside the levee system and, thereby, may reduce impacts to these areas.

Guideline 1.7(k): Detrimental discharges of suspended solids into coastal waters including turbidity resulting from dredging.

Response 1.7(k): During dredging, suspended solids would be increased; however, these increases would be temporary and localized through the use of silt curtains at the bypass channel, and would not cause significant adverse impacts. Suspended solids discharged by construction of the Oakville levee would cause temporary and limited impacts.

Guideline 1.7(l): Reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

Response 1.7(l): There would be no reduction or blockage of water flow or natural circulation to the nearby marsh/estuarine system. The levee would follow the boundary of an existing construction debris landfill and an existing levee across a small swamp area before it connects to an existing levee. Circulation patterns within the swamp may be altered but would not be reduced or blocked. The levee would serve as a barrier to circulation between the landfill and the swamp to the west of it, thereby retarding the free movement of contaminants into and out of the swamp area. Therefore, the altered water circulation pattern should not be detrimental.

Guideline 1.7(m): Discharges of pathogens or toxic substances into coastal waters.

Response 1.7(m): There are contaminants in the (Harvey) Canal substrates that originated from both industrial and urban runoff and navigation. Some contaminants would be temporarily reintroduced into the water column during construction operations; however, they would be generally confined to the canal and would be suspended in the water column for a short period before resettling to the bottom. Silt curtains would be used to contain the suspended material. The use of the cofferdam and removal of the top 2 feet of sediments from within the cofferdam, as well as the material from the canal banks at each end of the bypass channel, would include relocation of these materials from this site to an industrial landfill. The removal and relocation plan has been developed through meetings with officials of the Louisiana Department of Environmental Quality (LDEQ).

Guideline 1.7(n): Adverse alterations or destruction of archeological, historical, or other cultural resources.

Response 1.7(n): No impacts are anticipated on these resources. This work has been coordinated with the Louisiana State Historic Preservation Officer.

Guideline 1.7(o): Fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

Response 1.7(o): No significant detrimental secondary impacts are anticipated.

Guideline 1.7(p): Adverse alteration or destruction of valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestland.

Response 1.7(p): None of the above would be affected over the long term since full mitigation of all habitat losses would be achieved by implementation of the proposed

mitigation plan. Threatened and endangered species coordination has been accomplished with the U.S. Fish and Wildlife Service (Service). A segment of the proposed project would be constructed near a bald eagle nest site. Timing of the construction of the project in that area would be in accordance with the recommendations of the Service.

Guideline 1.7(q): Adverse alteration or destruction of public parks, shoreline, access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

Response 1.7(q): No such areas would be impacted by the proposed action.

Guideline 1.7(r): Adverse disruptions of coastal wildlife and fishery migratory patterns.

Response 1.7(r): No disruptions of coastal wildlife and fishery migratory patterns would occur.

Guideline 1.7(s): Land loss, erosion and subsidence.

Response 1.7(s): There would be negligible land loss and erosion associated with the proposed project. There would be no impact on natural subsidence.

Guideline 1.7(t): Increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

Response 1.7(t): The proposed action would reduce the potential for damages from these disasters throughout the project area.

Guideline 1.7(u): Reductions in the long-term biological productivity of the coastal ecosystem.

Response 1.7(u): There could be a slight reduction in long-term productivity because of the projected removal of about 46 acres of swamp at that particular site. However, those losses would be effectively compensated by implementation of the proposed mitigation plan at that site.

2.0 GUIDELINES FOR LEVEES

Guideline 2.1: The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Response 2.1: Several miles of levee upgrading is planned. Only a short reach, about 0.5 mile, would involve wetlands. The levee would not encircle and enclose biologically productive wetlands at that site but rather would effectively confine a landfill from further expansion into coastal wetlands. The alignment of the levee in that location to effectively prevent further expansion of the landfill into coastal wetlands is considered to be in the interest of protecting biologically productive wetlands.

Guideline 2.2: Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.

Response 2.2: The proposed protection system follows existing levees and dikes. Considerable realignment of the initially proposed protection levee was done to minimize and avoid segmenting and impacting wooded swamp in the Oakville area south of the Hero Canal. The present alignment essentially protects developed areas only. The habitat value of those wetlands impacted in that area would be fully compensated through implementation of the mitigation plan.

Guideline 2.3: Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.

Response 2.3: The proposed levee near Oakville would not induce but rather would limit development in wetlands.

Guideline 2.4: Hurricane and flood protection levees shall be located at the non-wetland/wetland interface or landward to the maximum extent practicable.

Response 2.4: The proposed action would be located on the existing levees in essentially all of the work area. These levees are generally at the non-wetland/wetland interface. Placement along the Harvey Canal is in a non-wetland area. The proposed location of the levee at Oakville would be in accordance with the interface to the extent practicable, when considering limiting further development into coastal wetlands.

Guideline 2.5: Impoundment levees shall only be constructed in wetland areas as part of approved water or marsh management projects or to prevent release of pollutants.

Response 2.5: See response 2.1.

Guideline 2.6: Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize

disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the levee system.

Response 2.6: The proposed project complies with this guideline.

3.0 GUIDELINES FOR LINEAR FACILITIES
Not applicable.

4.0 GUIDELINES FOR DREDGED SPOIL DEPOSITION
Not applicable.

5.0 GUIDELINES FOR SHORELINE MODIFICATIONS
Not applicable.

6.0 GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1: Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses will be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

(a) on lands five feet or more above sea level or within fast lands; or

(b) on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

(1) the land is already in high intensity of development use, or

(2) there is adequate supporting infrastructure, or

(3) the vicinity has a tradition of use for similar habitation or development.

Response 6.1: The proposed alignment and plan are supported by all points outlined in Guideline 6.1.

Guideline 6.2: Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

(a) they protect or serve those areas suitable for development pursuant to Guidelines 6.1; and

(b) they are consistent with the other guidelines; and

(c) they are consistent with all relevant adopted state, local, and regional plans.

Response 6.2: The proposed project is consistent with the above guideline.

Guideline 6.3: BLANK (Deleted)

Guideline 6.4: To the maximum extent practicable, wetland areas shall not be drained or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response 6.4: The proposed action is not a drain or fill project, but rather a project to provide protection to inhabitants of the area from tidal surge. Minimization of impacts has resulted in a final estimate of 46 acres of wetlands into which fill would be deposited or otherwise impacted during construction of the levee south of Hero Canal to provide this protection. A 100-acre wooded wetland area would be impacted by the use as a stockpile area upon which material would be stored after excavation from the outfall channel. The material would be used for future lifts. Those habitat losses would be fully mitigated.

Guideline 6.6: Areas modified by surface alteration activities shall, to the maximum extent practicable, be revegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response 6.6: The levee would be a permanent structure. Staging areas would be restored to predevelopment conditions, to the maximum extent practicable, after project completion.

Guideline 6.7: Site clearing shall, to the maximum extent practicable, be limited to those areas immediately required for physical development.

Response 6.7: The proposed project would comply with this guideline.

Guideline 6.8: Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.

Response 6.8: The proposed project would not adversely impact any critical vegetation areas or wildlife areas. Implementation of the proposed mitigation plan would increase habitat protection to areas adjacent to the Lake Salvadore Wildlife Management Area. The proposed plan would include the proposed transfer of the tract to the Louisiana Department of Wildlife and Fisheries for protection and management.

Guideline 6.9: Surface alterations which have high adverse impacts on natural functions shall not occur, to the maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Response 6.9: None of these areas would be impacted.

Guideline 6.10: The creation of low dissolved oxygen conditions in the water or traps for heavy metals shall be avoided to the maximum extent practicable.

Response 6.10: Low dissolved oxygen conditions as a result of increased turbidity would occur during excavation for the floodgate, bypass channel, and drainage canal enlargement; however, this would be on a temporary basis only. The proposed project would not create a trap for heavy metals.

Guideline 6.11: Surface mining and shell dredging shall be carried out utilizing the best practical techniques to minimize adverse environmental impacts.

Response 6.11: Not applicable.

Guideline 6.12: The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Response 6.12: Not applicable.

Guideline 6.13: Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response 6.13: The handling of contaminants as described would comply with this guideline.

Guideline 6.14: To the maximum extent practicable, only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

Response 6.14: Fill material for the levee near Oakville would be obtained from adjacent lands and is not expected to have contaminants. The landfill that the levee would be adjacent to accepts construction debris. Records of the Louisiana Department of Environmental Quality indicate no apparent violations in the operation of this landfill..

7.0 GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS
Not applicable.

8.0 GUIDELINES FOR DISPOSAL OF WASTES
Not applicable.

9.0 GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATERS DRAINING INTO COASTAL WATERS
Not applicable.

10.0 GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES
Not applicable.

CONSISTENCY DETERMINATION

The New Orleans District, U.S. Army Corps of Engineers, has determined that the proposed hurricane protection project for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal) is consistent, to the maximum extent practicable, with the guidelines of the State of Louisiana's approved Coastal Resources Program.

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section IV

Mitigation / Incremental Analysis

State of Louisiana

Joe L. Herring
Secretary

Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(504) 765-2800

Edwin W. Edwards
Governor

August 23, 1994

Colonel Kenneth H. Clow
District Engineer, New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Supplemental comments, West Bank of the Mississippi River, in the Vicinity of New Orleans, Louisiana, East of the Harvey Canal.

Dear Colonel Clow:

We reference our previous correspondence on this project discussing the acquisition of mitigation lands.

We would like to reenforce our original comments dealing the our capability and willingness to accept the proposed mitigation area. The Department is fully capable of operating and managing the proposed tract or a similar tract adjoining the Salvador Wildlife Management Area, and would accept that responsibility if requested.

Sincerely,

Joe L. Herring
Secretary

JLH/MBW/mw

cc: Mike Windham, Refuge Division
Environmental Branch

State of Louisiana

Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(504) 765-2800

Joe L. Herring
Secretary

Edwin W. Edwards
Governor

13 July 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
US Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

RE: West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Draft Environmental Impact Statement

Dear Mr. Schroeder:

Personnel of our technical staff have reviewed the data provided for the above referenced project and have found that significant adverse effects to fish and wildlife populations are not likely to occur as a result of this proposed action if the following recommendations are included in the permit:

1) Work near the Estelle Pumping Station should not occur between October 1 and May 15 due to the close proximity to an active bald eagle nest.

2) Unavoidable losses to fish and wildlife habitat be mitigated for with the Bayou Bois Piquant Mitigation Plan.

In the event the proposed mitigation plan is rejected, this Department has mitigation available on the Sherburne Wildlife Management Area which can possibly be used as an alternative.

We appreciate the opportunity to review this project during the preliminary stage. If you have any questions please contact Mr. Donovan Mire (504) 765-2334 of my staff.

Sincerely,

Joe L. Herring
Secretary

JLH/DJM/djm

SECTION IV
MITIGATION/INCREMENTAL ANALYSIS

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MITIGATION/INCREMENTAL ANALYSIS

CATEGORIZATION OF FISH AND WILDLIFE RESOURCES

Implementation of the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana: Area East of the Harvey Canal, Project results in losses to two habitats that are described as significant resources in Section 5 of the Environmental Impact Statement (EIS). These are bottomland hardwood forest (BLH) and undrained swamp. The plant community described as undrained swamp in the EIS is essentially the same as that described as Zone II of the overall category of bottomland hardwood forests as described by Wharton, et. al. (1982). The overall bottomland hardwood forest community is made up of four wooded zones according to Whorton's classification with Zone II as the wooded area with the longest duration of flooding and Zone IV as the area with the shortest duration of flooding.

Section 5.2 of the EIS includes a description of the importance of bottomland hardwoods and swamps. These are both productive wetland ecosystems that depend on water fluctuations for the maintenance of their structure and function (Wilkinson et al., 1987) and are ecologically, recreationally, and aesthetically valuable (EPA 1984). In the following list the potential functions are ranked in descending order of their probability and extent of occurrence on a nationwide scale (From Adamus and Stockwell, 1983).

1. Passive recreation and heritage value
2. Habitat for aquatic wildlife and fisheries
   Sediment trapping (short term)
   Ground Water Discharge
3. Nutrient retention (short term)
   Food chain support (nutrient export)
   Dissipation of erosive forces
   Active recreation potential
4. Flood desynchronization
   Food chain support (of clearly food-limited species of commercial/sport value)
5. Nutrient retention/removal (long term)
6. Sediment trapping (long term)
   Shoreline anchoring
7. Ground water recharge

Adams et al. (1987) revised the list of functions slightly, but the same principles remain in effect. Because of their importance, mitigation for loss of wetland resources is necessary. The Water Resources Development Act of 1986 (Public Law 99-662) Section 906, requires that bottomland hardwood forests be mitigated in-kind, to the extent possible. Fish and wildlife resources are important because of the Fish and Wildlife Coordination Act, National Environmental Policy Act, Endangered Species Act, interest of national and state conservation organizations, and interest of local citizenry. The fish and wildlife resources of concern in the project area are those that could be impacted either directly or indirectly.

The analysis in this report follows the intent of in-kind mitigation of impacts to bottomland hardwood resources. However, investigators made a further separation of bottomland hardwoods in determining the appropriateness of in-kind mitigation. It was determined that due to their scarcity and value in this highly-developed area, bottomland hardwood forests and cypress swamps in their natural undrained state should be mitigated specifically in-kind with undrained bottomland hardwood and swamp measures. The other habitat, drained bottomland hardwoods, is not as scarce in the area, and does not have the high value from both the fish and wildlife habitat and other wetland function standpoint. Therefore, those losses do not have to be mitigated in-kind with drained bottomland hardwood measures, but could be mitigated out-of-kind with undrained bottomland hardwood features as available.

HABITAT EVALUATION METHODOLOGIES

Two habitat evaluation methodologies were utilized to evaluate the effects of each alternative on wildlife resources. They are discussed in the following paragraphs.

HABITAT EVALUATION SYSTEM (HES)

The Corps of Engineers, Lower Mississippi Valley Division has developed a habitat based analysis, called Habitat Evaluation System for Water Resources Planning (HES), (COE 1980) to predict and assess impacts to the biological environment. The fundamental assumption of HES is that the presence or absence, and abundance and diversity of animal populations within a habitat or community are determined by basic biotic and abiotic factors that can readily be quantified.

In order to predict and assess impacts there are six steps necessary to follow when using

HES. Step #1 is the delineation of acreage of each habitat type in the project area. Step #2 is the determination of a Habitat Quality Index (HQI) for each land use category or habitat type. Several key variables (both biotic and abiotic) for each habitat type are chosen and assigned relative weights based upon their importance to that particular habitat type and associated animal species. To obtain an HQI the key variables are measured in the field. The measured value of each key variable is then converted into a HQI score using a specific functional curve for that key variable and habitat type. The product of the HQI score and the key variable's assigned relative weight yields a weighted score for that key variable. The weighted HQI scores for all key variables measured at each sampling site are summed and multiplied by .01 to yield an aggregate HQI for that habitat type. An average of the aggregate HQI's for each habitat type in the project area is produced. The final HQI value will be between 0 and 1.0, with 1.0 representing optimum conditions for that habitat type. This allows a single HQI that is representative of the quality of that particular habitat type to be used in assessing impacts and mitigation.

Step #3 involves the projection of future HQI values for specific target years during the life of the project. These target years are chosen to coincide with major construction events or ecological changes. HQI values are projected for each habitat type for project action alternatives being considered, and for the no action alternative.

Step #4 consists of the determination of overall habitat value. This is called the Habitat Unit Value (HUV) and is representative of both the quality and quantity of the respective habitat for a given time period. Changes in the HUV over the time period are based upon estimated changes in habitat acreage resulting from man's actions (i.e., development) or natural causes (i.e., subsidence), and changes in habitat quality, again resulting from natural or man) made influences. The acreages generated in Step #1 are multiplied by the HQI applicable to the habitat for the given target years and cumulated over the analysis period. The annualized habitat value (AHUV) is then derived by dividing this cumulative habitat value by the number of years in the analysis period. This step is conducted both for the future without project (FWOP) and the future with project (FWP) condition. The comparison of the FWP to the FWOP is the determination of impacts in habitat units of each alternative.

Step #5 involves determining mitigation requirements for each alternative. By determining and implementing the alternative that has the least environmental impact, mitigation through avoidance and/or minimization can be partially achieved. For unavoidable impacts, mitigation can achieved by compensating for project) induced losses to the environment expressed as AHUV. The same four steps described above to determine project impacts are used to determine compensation mitigation for each

alternative. The only difference being that the project action alternative is the proposed mitigation plan. The gain in AHUV between future without mitigation and future with mitigation is the net effect of mitigation. When AHUV gained by mitigation are equivalent to AHUV lost due to project impacts, then adequate mitigation has been achieved. The acreage that produces the equivalent AHUV is the amount of land needed for compensatory mitigation.

To accomplish the described step to obtain AHUV for mitigation from an area of land, that area must be managed or manipulated to increase its existing habitat value over the no action value. Another way of achieving compensation mitigation is through preservation. The habitat to be preserved under the mitigation action alternative must be projected to have decreased in quantity or quality during the analysis period under the no action alternative. Mitigation due to preservation is calculated by determining the difference between AHUV gained with preservation and AHUV lost without preservation using the same four steps outlined above. When the AHUV gained by preservation are equivalent to AHUV lost due to project impacts, then adequate mitigation through preservation is achieved.

HABITAT EVALUATION PROCEDURES (HEP)

A USFWS Habitat Evaluation Procedures (U.S. Fish and Wildlife Service, 1980) (HEP) analysis was also completed for the proposed action. This was done for the area of swamp and BLH habitats that would be impacted by the proposed project. The HEP data used in this report are based on an analysis furnished by the FWS (see FWS Coordination Act Report (CAR) in Appendix D). The HEP is based on the assumption that a given area has a measurable value to wildlife and that positive or negative impacts can be calculated and expressed in terms of quantity and quality of the area for a given species or group of species. The expression for quality of the habitat is the Habitat Suitability Index (HSI), which can have values ranging from 0.0 to 1.0. An HSI value of 0.0 indicates that there is no habitat available for a particular evaluation species, whereas a value of 1.0 indicates that optimum habitat is available. When multiplied by the number of acres involved, a final measurement value, Habitat Units (HU), results. One HU is theoretically equal to one acre of optimum habitat for a given species. The HU's for each species are annualized over the project life to produce average annual habitat units (AAHUs). Differences are determined between the action and no action alternatives for the analysis period. Necessary mitigation is then determined in a somewhat similar manner to that described for the HES.

An interagency team of biologists from the USFWS, Corps of Engineers, and the Louisiana Department of Wildlife and Fisheries (LDWF) participated in the selection of species for the HEP analysis and collection of field data for both the HEP and HES analyses. Evaluation species were carefully selected to measure the value of the overall habitat and to reflect future changes in habitat quality.

MITIGATION DEFINITION

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include:

(a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

MITIGATION PLANNING OBJECTIVE

The mitigation plan objective was to replace in-kind, to the maximum extent justifiable, one hundred percent of the unavoidable habitat losses as reflected by annualized habitat units (AHUV) for the entire project. Impacts to bottomland hardwood forests would be mitigated in-kind.

APPLICATION OF PLANNING

The mitigation of adverse impacts is applicable to the development of all alternatives. However, the actual impacts to wildlife habitat for each alternative are similar. Therefore, early in the mitigation evaluation process, a decision was made to display the compensation analysis for the Recommended Plan only. This report follows that decision except for the comparison with the alternative (Plan 1 SPH) that was the Recommended Plan all except during the final stage of the analysis period.

SIGNIFICANT NET LOSSES

Implementation of the Recommended Plan could cause direct loss to significant fish and wildlife habitat from the destruction of 233 acres of BLH and 46 acres of swamp. This would result in associated habitat losses of 116 AHUVs, with 95 to BLH and 21 to swamp. The acreages of impacted areas were measured on 1989 NASA infrared photographs. Potential impacts of the Recommended Plan and alternative mitigation measures were analyzed using the HES and the HEP. Information within the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, Feasibility Study and Environmental Impact Statement (Westwego to Harvey) (COE 1986) and background knowledge of wetland ecological systems of the area were significant in the analysis. The cost effectiveness of alternative mitigation plans are described in this report in terms of HES. The HEP compensation analysis was conducted for the selected mitigation plan. Significant net losses in habitat units (AHUVs) according to the HES for the respective alternatives are displayed in Table C-IV-1.

TABLE C-IV-1

SIGNIFICANT LOSSES IN HABITAT UNITS (AHUV'S)

ALTERNATIVE		LOSSES	
	BLH	Swamp	Total
Plan 1: 100-yr	25	21	46
Plan 1: 200-yr	30	21	51
Plan 1: SPH	35	21	56
Plan 3B: SPH	95	21	116

MITIGATION BY AVOIDANCE, MINIMIZATION, RECTIFICATION, REDUCTION, COMPENSATION

Project-induced impacts could be avoided completely only by selection of the No Action alternative. However, potential hurricane flooding problems would remain in the project area if that alternative was chosen. Partial avoidance would leave some residents with inadequate hurricane surge protection. Destruction of 66 acres of BLH along the Harvey Canal could be avoided by selecting Plan 1, but that would result in disruption to businesses along the canal. Borrow pits have been located in project design such that

wooded areas and wetlands would be avoided entirely. Minimization of impacts to the aquatic environment would be accomplished through the use of silt curtains in the Harvey Canal around the outfall/bypass channel area during construction. To minimize possible future impacts contaminated sediments excavated from the area of the proposed floodgate and outfall/by pass channel would be incorporated into or buried in parts of the levee under a minimum of 2 feet of earthen fill. The design of the Recommended Plan follows existing alignments or is located in disturbed areas except for short sections near Oakville, along the Harvey Canal, and at the intersection of the Algiers and Harvey Canals. By incorporating these levees into the project plans, impacts due to levee construction would be minimized. Impacts to functional wetlands would be minimized by aligning the levee as close to the wetland - nonwetland interface as possible and incorporating an existing levee into new levee construction. Rectification was not possible in this project since the destruction of wooded or aquatic habitat is not something that can be repaired or rectified when incorporated into a levee or floodgate, but rather something that can only be replaced. Reduction or elimination of the impact over time was not applicable since the impact occurred so terminally at one time. The only remaining mitigation measure for this project is compensation. Compensation amounts were calculated with the use of HES and HEP methodologies described previously and discussed below.

PROJECT IMPACTS ACCORDING TO HES

Construction of any of the hurricane surge protection alternatives would result in direct loss of swamp and bottomland hardwoods. However, essentially all areas that would benefit from the project are within existing levees and forced (pumped) drainage systems. Therefore, it was determined that the development rate within those levees would not be increased by implementation of any alternative considered. Table C-IV-2 summarizes the forested acreage impacted by direct construction which is the basis for the habitat units expressed previously.

HQI values developed as a result of habitat sampling are shown as follows:

(1) Levee east side of Harvey Canal and west side of Algiers Canal (42 drained BLH) - 0.682
(2) Levee east side of Algiers Canal (25 drained BLH) - 0.755
(3) Oakville levee (46 undrained BLH) - 0.705
(4) Outfall channel + stockpile (166 drained BLH) (Alternative 3B only) - 0.682

TABLE C-IV-2

DIRECT CONSTRUCTION IMPACTS OF ALTERNATIVES (ACRES)

ALTERNATIVE		HABITAT	
	Swamp	Drained BLH	Total
Plan 1 100-yr	44	63	107
Plan 1 200-yr	45	74	119
Plan 1 SPH	46	86	132
Plan 3B SPH	46	233	279

The HES data were analyzed to predict overall habitat quality for the life of the project action and no action alternatives. The following target years were used to calculate annualized habitat units (AHUV's) for each alternative: 0, 1, 3, 10, 25, 50, 75, and 100. Only SPH levels were evaluated because differences in impacts between levels were minimal. The future-without-project or no action conditions were estimated by applying a forest loss rate factor due to development of 1.135 percent per year as shown by actual measurements from 1978 and 1989 infrared photographs of the project area. Habitat value (HQIs) were projected to stay the same since those same factors that caused the forests to develop as they have in the past are also expected to continue in the future. Table C-IV-2A displays habitat values used in both the HES and the HEP for the impacted area and for the recommended mitigation area.

PROJECT IMPACTS ACCORDING TO HEP

Use of HEP to describe the impacts of the Recommended Plan revealed that the plan would cause significant habitat losses that equate to a cumulative loss of 132 AAHU's within the drained BLH for swamp rabbit, downy woodpecker, and gray squirrel. Significant losses in cypress swamp habitat total 67 AAHU's for swamp rabbit, mink, and downy woodpecker. (See Appendix D for details).

The habitat values for both drained BLH and swamp habitats during the life of the project for both with and without-project conditions and the changes effecting the selected species are shown in Table C-IV-3.

HSI&HQIH
Mar-94

TABLE C-IV-2A

COMPARATIVE HABITAT VALUES

TARGET YEAR	PLAN	HES			HEP					
		BLH1	BLH2	Swamp	BLH			Swamp		
					Gray Sqrl	Downy Wdpkr	Swamp Rabbit	Mink	Downy Wdpkr	Swamp Rabbit
(Construction Area)										
0	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
1	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
3	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
10	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
25	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
50	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
75	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
100	FWOP	0.68	0.76	0.71	0.14	0.72	0.80	0.78	1.00	0.44
0	FWP	********** ALL CATEGORIES SAME AS FWOP **********								
1	FWP									
3	FWP									
10	FWP									
25	FWP									
50	FWP									
75	FWP									
100	FWP									
(Mitigation Area)										
0	FWOP	0.77		0.68	0.57	0.34	0.88	0.70	0.54	0.10
1	FWOP	0.77		0.68	0.57	0.34	0.88	0.70	0.54	0.10
3	FWOP	0.77		0.68	0.57	0.34	0.88	0.70	0.54	0.10
10	FWOP	0.77		0.68	0.61	0.36	0.83	0.70	0.54	0.10
25	FWOP	0.25		0.25	0.00	0.20	1.00	0.70	0.54	0.10
50	FWOP	0.45		0.40	0.32	0.10	1.00	0.70	0.54	0.10
75	FWOP	0.25		0.25	0.00	0.20	1.00	0.70	0.54	0.10
100	FWOP	0.45		0.40	0.32	0.10	1.00	0.70	0.54	0.10
0	FWP	0.77		0.68	0.57	0.34	0.88	0.70	0.54	0.10
1	FWP	0.77		0.68	0.57	0.34	0.88	0.70	0.54	0.10
3	FWP	0.77		0.68	0.57	0.40	0.90	1.00	0.54	0.10
10	FWP	0.77		0.68	0.61	0.60	1.00	1.00	0.88	0.33
25	FWP	0.77		0.68	0.77	0.80	0.96	1.00	0.88	0.33
50	FWP	0.77		0.68	0.74	0.77	0.88	1.00	0.94	0.33
75	FWP	0.77		0.68	0.83	0.88	1.00	1.00	0.94	0.33
100	FWP	0.77		0.68	0.79	0.83	0.96	1.00	0.94	0.33

TABLE C-IV-3
AVERAGE ANNUAL HABITAT UNITS (AAHUs) FOR HABITATS

SPECIES	HABITAT		AAHU's	
		FWOP	FWP	Change
Swamp rabbit	DBLH	64.07	0.53	63.54
Downy woodpecker	DBLH	57.66	0.48	57.19
Gray Squirrel	DBLH	11.21	0.09	11.12
Total				131.85
Swamp rabbit	Swamp	13.39	0.10	13.24
Downy woodpecker	Swamp	30.34	0.23	30.10
Gray squirrel	Swamp	23.65	0.18	23.47
Total				66.81

These losses are a direct impact of the borrow pit and levee construction in the Oakville area, levee construction along the Algiers and Harvey Canals and the construction of the bypass/outfall channel. These losses result from the destruction or alteration of food plants, cover, and breeding and nesting areas. The swamp rabbit and downy woodpecker would be impacted primarily by the loss of BLH. These adverse impacts are relatively minor considering the size of the proposed project.

GOAL OF INCREMENTAL ANALYSIS

The purpose of incremental analysis is to identify the most cost efficient method of providing full mitigation while optimizing the monetary and non) monetary project benefits. The analysis is conducted by comparing the cost to a unit of output (usually AHUV) for several, independent mitigation actions which can be summed to achieve the mitigation goal. The mitigation actions are referred to as management features. Typical features could include such actions as placing nesting boxes, fencing, planting of vegetation (trees, food plots, etc..) or any other actions that would benefit wildlife (increase AHUV's). If one or more management features are so interrelated that when the

features are separated the output (AHUV's) cannot be achieved then this combination of features can be viewed as a mitigation plan increment. A single management feature can be a single increment. Increments can compliment each other or be interrelated but must not be functionally dependent upon another increment. The combination of increments that completely mitigates project impacts in the most cost effective manner would become the recommended mitigation plan.

IDENTIFICATION AND ASSESSMENT OF POTENTIAL MITIGATION STRATEGIES

Mitigation plans were originally developed for Alternative 1 which at the time, recommended all borrow material being evacuated from existing canals. This was the Recommended Plan for much of the study. However, late in study planning Plan 3B became the Recommended Plan because of socioeconomic concerns expressed by the Harvey Canal Industrial Association. This rendered mitigation plans no longer adequate. Following the designation of Plan 3B as the Recommended Plan, concern about contaminants in the canal bottoms necessitated the use of borrow from upland sites. At this time it became apparent that the expansion of the levee berms along the Algiers Canal was not incorporated into the original impact assessment or mitigation planning. Therefore, original mitigation plans developed for Plan 3B did not compensate for all project impacts.

Mitigation plans developed for Plan 1 were viewed as possible alternative increments or management features to be used towards completing full mitigation of all impacts. Mitigation plans developed for Plan 1 are as follows; Planting in 404(c) area, Backfilling Canals, Wetland Creation, and Backfilling and Wetland Creation. Most of the impacts occur in BLH that is leveed and under pump. These impacts can be mitigated with land that is currently under pump or unaltered BLH. Impacts to BLH that are not under pump (still functional wetlands) would be mitigated in areas that are not under pump, otherwise the functional wetland value of these lands would not be mitigated. Mitigation plans were developed to accomplish the goal of mitigating the functional wetland value of the different forms of habitat impacted (swamp and drained BLH). Features within each increment were examined to determine the most cost-effective method of mitigation.

New mitigation plans and strategies developed to fully compensate project impacts include preservation of BLH, management of BLH to increase HUV's, and reforestation of open fields with BLH species. Mitigation on project lands is not possible because project lands will consist of levees that cannot be forested. Public lands available for mitigation in the project area are identified with the respective mitigation increment or feature. No land

that was contiguous with the project area could be identified as being available for mitigation. Mitigation on separable noncontiguous lands in the vicinity of the project area was also investigated. These plans and features are noted below. No mitigation feature was located outside of the drainage basin where the impacts were located. Neither was the mitigation located at such a distance from project area that the mitigation area would not be utilized by the local cost-sharing public.

Fee title acquisition of mitigation land for flood control projects is required by current agency regulations. Purchase of private lands for mitigation must be acquired from a willing seller. Private lands acquired for mitigation would be accessible to the public in various degrees, each depending on the stewardship goal of the agency or department overseeing the mitigation land. The goal of the prospective overseer is mentioned with each respective management increment or feature. Because the Recommended Plan and the NED plan are not the same, mitigation has been developed and analyzed so that regardless which hurricane protection plan is implemented, mitigation and mitigation costs are available.

DETERMINATION OF MITIGATION PLAN INCREMENTS AND ESTIMATION OF COST

Mitigation increments and features were developed to compensate for project losses to both cypress swamp and drained BLH. If a management feature could exist independent of other management features, that feature was analyzed as an increment. Mitigation increments having the same mitigation feature (i.e., preservation, reforestation) but having a cost difference due to a difference in the location of the mitigation feature were viewed as separate increments. Examination of management features in each mitigation plan increment was done to ensure that the most cost effective increments and features were utilized in developing the recommended mitigation plan.

Development of annual costs for all the separable mitigation increments for the SPH plan is shown in Table C-IV-4 and C-IV-5. The costs of each increment as well as the outputs in habitat units are graphically displayed in Figures C-IV-1 through C-IV-4. First cost includes acquisition of real estate, and initial development costs. Real estate costs include contingencies, acquisition, and other related costs. The interest rate for the project is 8 1/2 percent. Operation and maintenance costs reflect costs associated with ensuring the continued existence of mitigation features as represented primarily by stewardship of the features. Replacement costs represents the costs to replace items necessary to ensure the

$DBLH

TABLE C-1V-4

INCREMENTS AND ASSOCIATED COSTS
DRAINED BOTTOMLAND HARDWOODS

INCREMENT ITEM	BAYOU SEGNETTE	BAYOU BOIS PIQUANT PRESERVATION	B. BARRIERE CATTLE REMV REMOVAL	B. BARRIERE TIMBER MGMT.	B. BARRIERE REFOREST	B.BARRIERE COMBO.
Real Estate	$169,000	$348,000	$1,565,000	$1,565,000	$1,565,000	$1,565,000
Development	$7,645	$17,160	$18,920	$18,920	$18,920	$18,920
Fencing	$49,213	$73,731	$77,420	$77,420	$77,420	$77,420
Planting	$39,580					
Clearing & Planting					$99,548	
Clear, Disk, & Plant						$108,240
Construction						
TOTAL FIRST COST	$265,438	$438,891	$1,661,340	$1,661,340	$1,760,888	$1,769,580
PV & GROSS INVEST	$367,860	$607,761	$2,302,385	$2,302,385	$2,440,344	$2,452,390
Interest	$31,268	$51,660	$195,703	$195,703	$207,429	$208,453
Amortization	$7	$12	$46	$46	$49	$49
O & M	$1,390	$3,100	$3,440	$3,440	$3,440	$3,440
Replacements:						
Fencing:						
Target Year 20	$9,627	$14,377	$15,145	$15,145	$15,145	$15,145
Target Year 45	$1,252	$1,870	$1,970	$1,970	$1,970	$1,970
Target Year 70	$163	$243	$256	$256	$256	$256
Target Year 95	$21	$32	$33	$33	$33	$33
Timber Stand Mgmt.:						
Target Year 3				$20,685		$20,685
Target Year 5				$5,557		$5,557
Target Year 15				$1,890		$1,890
Target Year 30				$556		$556
Target Year 45				$164		$164
Target Year 65				$32		$32
Target Year 85				$6		$6
Target Year 100				$2		$2
TOTAL ANNUAL COST	$43,728	$71,294	$216,593	$245,485	$228,322	$258,238
AHUV MITIGATED	95	116	5	22	27	49
ANNUAL COST / AHUV	$460	$615	$43,319	$11,158	$8,456	$5,270

$SWAMP

TABLE C-IV-5

INCREMENTS AND ASSOCIATED COSTS
UNDRAINED BOTTOMLAND HARDWOODS
(SWAMP)

INCREMENT	BAYOU BOIS PIQUANT PRESERVATION	WETLAND CREATION & BACKFILL	WETLAND CREATION
ITEM			
Real Estate	$348,000	$8,000	$8,000
Development	$17,160		
Fencing	$73,731	$0	$0
Construction		$225,674	$228,207
TOTAL FIRST COST	$438,891	$233,674	$236,207
PV & GROSS INVEST	$607,761	$323,839	$327,350
Interest	$51,660	$27,526	$27,825
Amortization	$12	$6	$7
O & M	$3,100	$0	$0
Replacements:			
Fencing:			
Target Year 20	$14,377		
Target Year 45	$1,870		
Target Year 70	$243		
Target Year 95	$32		
TOTAL ANNUAL COST	$71,294	$27,532	$27,832
AHUV MITIGATED	116	3	3
ANNUAL COST / AHUV	$615	$9,177	$9,277

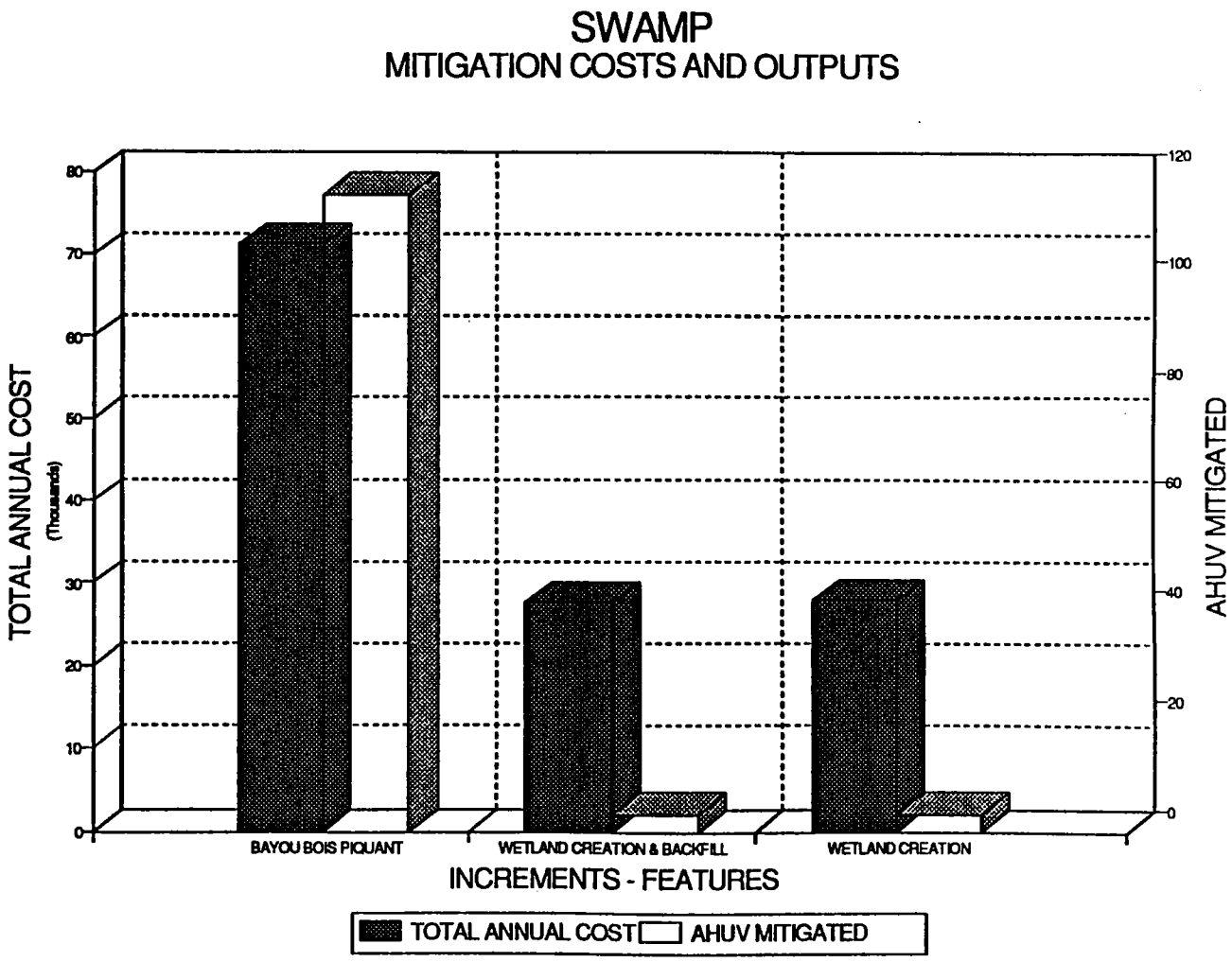

SWAMP
MITIGATION COSTS AND OUTPUTS
TOTAL ANNUAL COST
(Thousands)
AHUV MITIGATED
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120
BAYOU BOIS PIQUANT
WETLAND CREATION & BACKFILL
WETLAND CREATION
INCREMENTS - FEATURES
TOTAL ANNUAL COST
AHUV MITIGATED

Figure C-IV-1

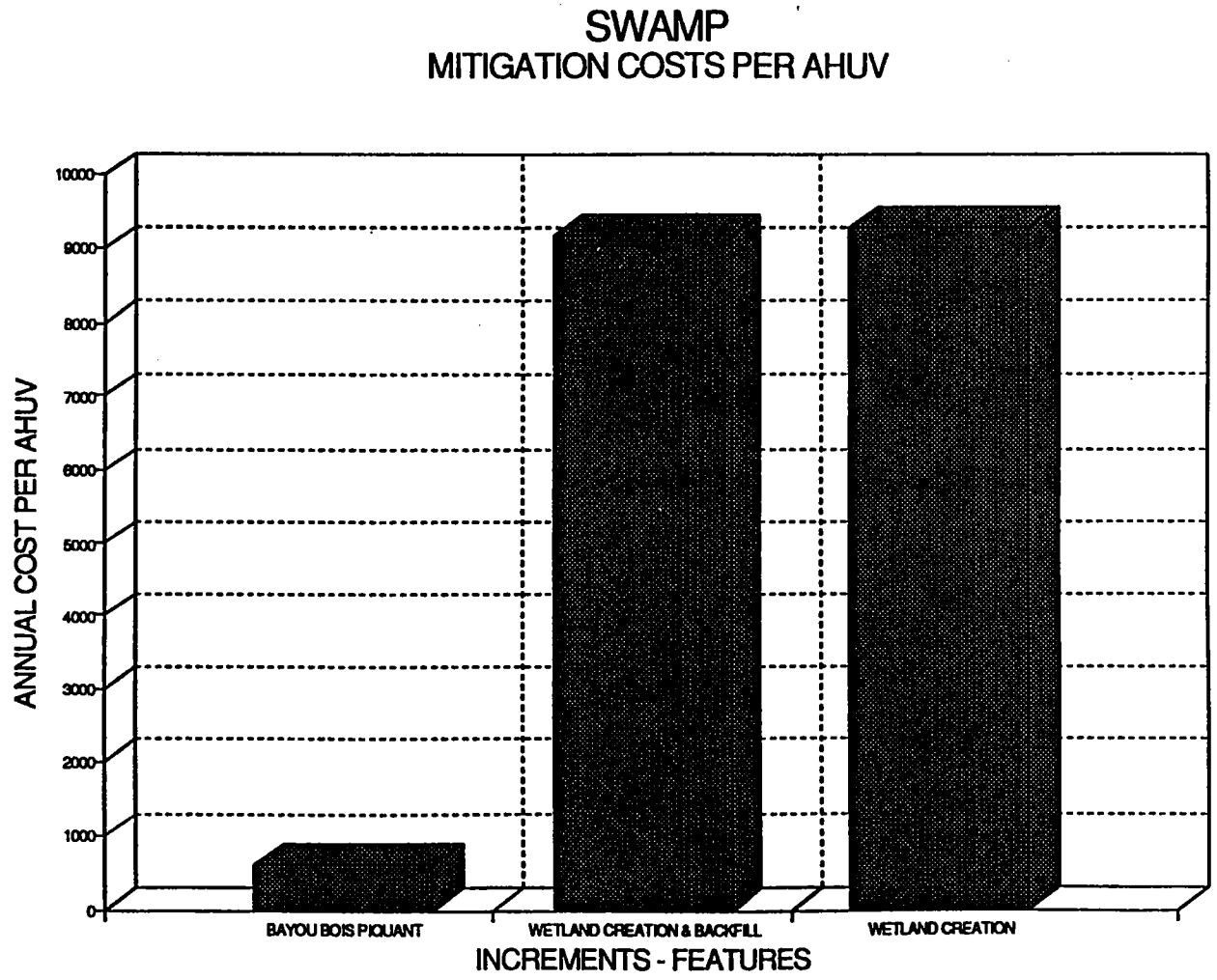

SWAMP
MITIGATION COSTS PER AHUV
ANNUAL COST PER AHUV
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
BAYOU BOIS PICUANT
WETLAND CREATION & BACKFILL
WETLAND CREATION
INCREMENTS - FEATURES

Figure C-IV-2

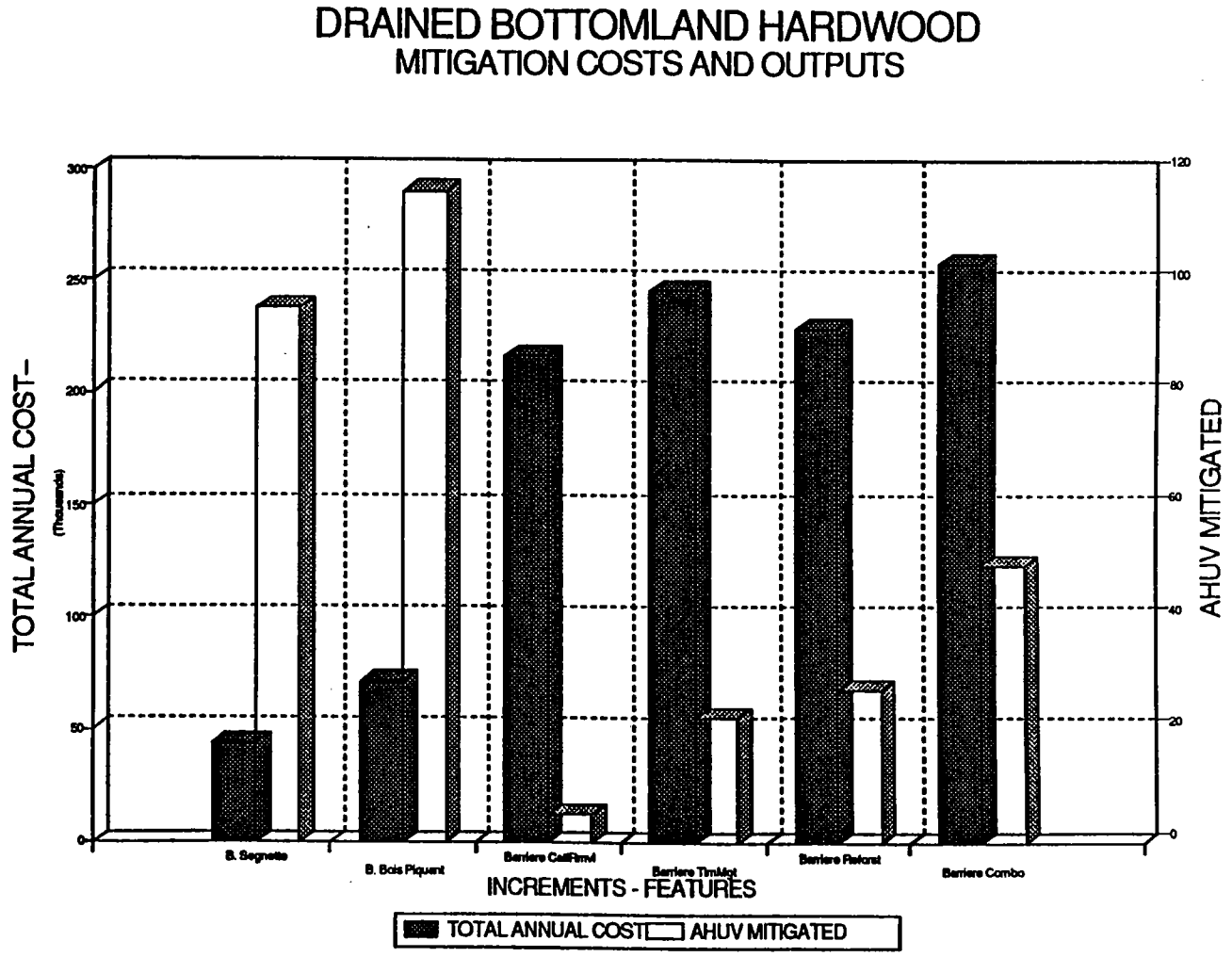
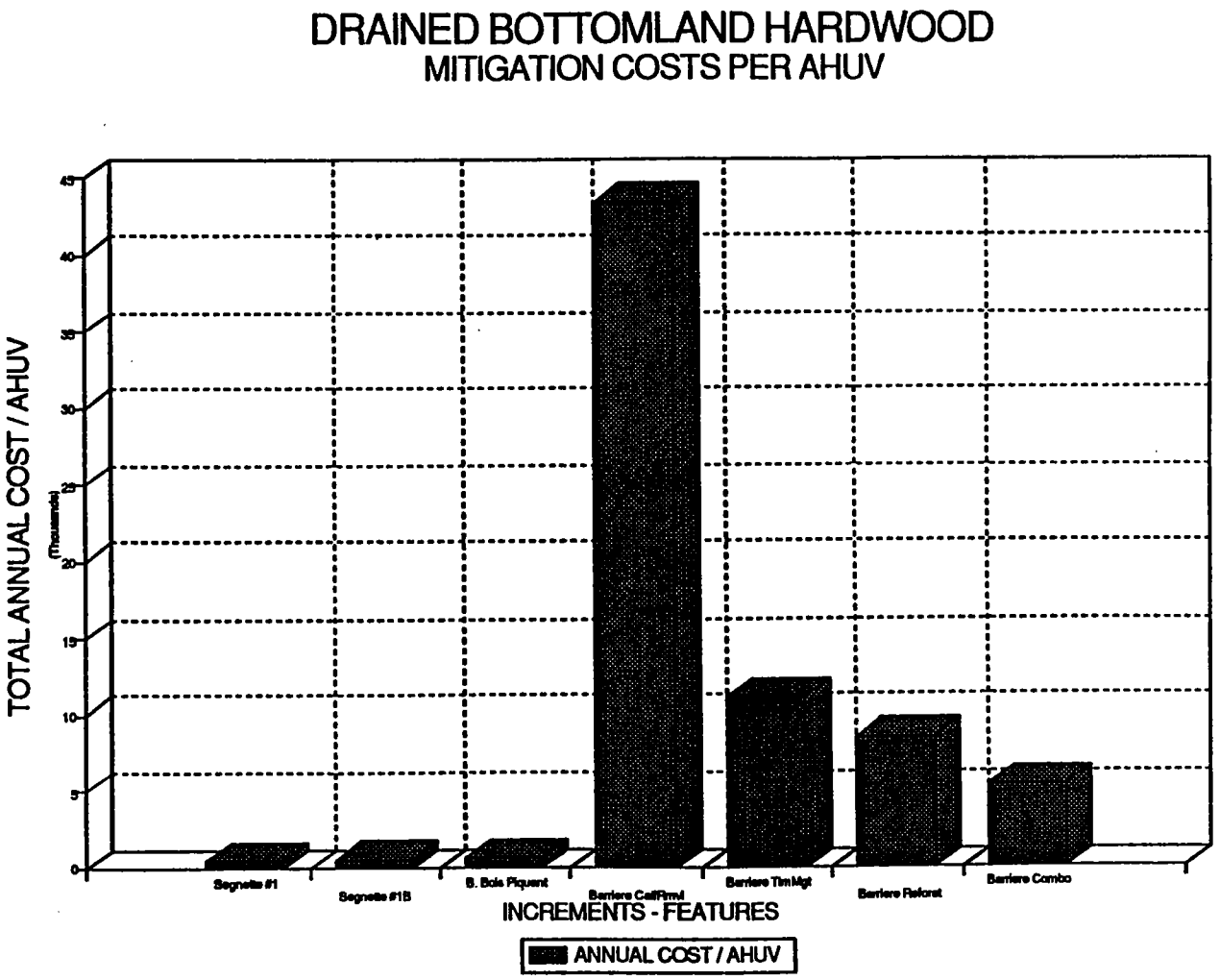

DRAINED BOTTOMLAND HARDWOOD
MITIGATION COSTS AND OUTPUTS
TOTAL ANNUAL COST-
(Thousands)
AHUV MITIGATED
300
250
200
150
100
50
0
120
100
80
60
40
20
0
B. Segnette
B. Bois Piquant
Barriere CatFlmvl
Barriere TimMgt
Barriere Reforst
Barriere Combo
INCREMENTS - FEATURES
TOTAL ANNUAL COST
AHUV MITIGATED

Figure C-IV-3

Figure C-IV-4


DRAINED BOTTOMLAND HARDWOOD
MITIGATION COSTS PER AHUV
TOTAL ANNUAL COST / AHUV
(Thousands)
0
5
10
15
20
30
40
45
Segnette #1
Segnette #1B
S. Bois Piquant
Barriere Cell/Firm
Barriere Tim Mgt
Barriere Reforst
Barriere Combo
INCREMENTS - FEATURES
ANNUAL COST / AHUV

mitigation object is attained (i.e., fencing, posting of boundaries). Other specific costs are explained within the respective feature.

PLANTINGS IN 404(c) INCREMENT

An alternative mitigation measure to plant BLH tree species along a powerline right-of-way in the EPA 404(c) area at Bayou aux Carpes was considered. This mitigation would be on acquired land south of the project area. The plantings would be done within a BLH forest and would mitigate impacts to drained and undrained BLH. Tree are generally not allowed to grow in a powerline ROW. Unless the powerline ROW is abandoned, planting in the area would be virtually impossible. This measure was eliminated since it was unimplementable.

BACKFILLING CANALS INCREMENT

This feature consisted of "backfilling" abandoned oil and gas canal(s). Backfilling the canals would consist of degrading the disposed dredged material banks with bucket dredges. These canals presently have limited wildlife and fisheries value. The value could be increased by degrading the dredged material banks so that the affected areas would have the same surface elevation of surrounding wetlands. Disposed dredged material would be placed in the canals restoring marsh, creating valuable shallow water habitat, and returning a more natural hydrology to the area.
There are several abandoned canals and slips that could be backfilled in the Barataria Oil and Gas Field, located southwest of Oakville, in the Bayou Segnette Oil and Gas Field, and in the Lac des Allemands Oil and Gas Field. The West Barataria Oil and Gas Field, and canals on the 404(c) area were also investigated, but did not have abandoned canals with vegetation of low wildlife value, thereby eliminating the justification for backfilling. This feature cannot be broken down into separable features that could mitigate impacts independently from the other features; thus, it is a complete increment. This feature was developed to mitigate for impacts to marsh, however the levee was realigned to avoid all impacts to marsh. Therefore, no costs were developed for this feature and the feature was eliminated from further analysis.

WETLAND CREATION INCREMENT

This mitigation feature calls for canals to be filled with dredged material pumped from the

Gulf Intracoastal Waterway (GIWW), the Bayou Segnette Waterway, or other potential source to an elevation conducive to the growth of swamp tree species. It also includes planting of the area with cypress seedlings. This feature could be used for mitigating impacts to both drained and undrained BLH. The Bayou Segnette and the Lac des Allemands Oil and Gas Fields are possible mitigation areas. Other oil and gas fields located south of the project area would experience water salinities too high to guarantee survival of the swamp tree species; therefore, those sites were eliminated. The size and number of oil and gas canals were measured in three oil and gas fields. An average of 12 canals per field were determined with an average size of 4 acres. This is comparable to the average canal size of 3 acres as determined by Neil and Turner (1987) who measured 33 oil and gas field canals across the state.

Because of the uncertainty of natural succession producing an adequate stand, cypress seedlings would be planted to ensure the mitigation goal was achieved. Herbivore guards would be added because of high nutria populations and their devastating effects on cypress seedlings in the region. The cypress trees would be planted following the solidification of the disposed dredged material, within approximately one year of disposal. The remote location of the canals could allow the feature to be implemented and then left alone with no fencing or stewardship provided. It would be reasonable to assume that the mitigation areas would not be compromised by trespassing or other activities by man. Posting of the area to designate it as a mitigation area may be necessary.

The placement of pumped material into the abandoned canals would require one end of the canal to be plugged. The plug would be constructed with a shell core and capped with borrow taken from the enclosed side of the canal. Dredged material would then be placed behind the plug. Depending on the height and location of existing canal banks, some upgrading or construction of banks may be necessary to retain the pumped material. The dredged material would be pumped to an initial height which would be conducive to the growth of swamp tree species following settling and compaction. Attaining the correct elevation for the entire area is dependent on the plug holding the material in the canal. Success of this measure is dependent on the final elevation of the pumped material being placed to a height conducive to survival of swamp tree species. Therefore, this feature cannot be broken down into any separable features, i.e., amount of materials, that would be a separate increment.

The habitat units gained from creating swamp forest in this manner in a typical 4-acre canal were determined. Three AHUV's would be gained from each 4-acre canal filled with dredged material. A typical oil and gas field would mitigate approximately 34 AHUV's. Bayou Segnette and Lac des Allemands Oil and Gas Fields would each mitigate

approximately 33 AHUV's. Annual costs for implementing this method of mitigation in a typical canal would be approximately $27,832 (see Figure C-IV-1 and Table C-IV-5) or $9,277 per AHUV (see Figure C-IV-2). To completely mitigate all impacts to undrained BLH (swamp) this cost would be approximately 700 percent of the single canal cost. As shown in Figures C-IV-1 and 2, this plan is not the most cost-effective feature available, hence it is not the most desirable mitigation feature or increment.

BACKFILLING AND WETLAND CREATION INCREMENT

This feature is a combination of the backfilling using adjacent material from previous dredging and the wetland creation feature (increments) of using material to be pumped from other nearby available sources. As does the other increment, it also includes planting of cypress seedlings equipped with herbivore guards. It could be used to mitigate impacts to swamp.

The same oil and gas fields suggested as mitigation areas for the wetland creation alternative would be used in this alternative. Plugging of the canal would be done first and then material would be pumped into the canals. Following consolidation of the dredged material, the canal banks could be degraded and placed into the canal. This would provide the additional material needed to achieve the elevation necessary to support swamp tree species.

The habitat units gained from creating swamp forest in this manner in a typical 4-acre canal was computed. Three AHUV's would be gained from each typical 4-acre canal filled with dredged material (see Table C-IV-6). A typical oil and gas field would mitigate approximately 34 AHUV's. Bayou Segnette and Lac des Allemands Oil and Gas Fields would each mitigate approximately 33 AHUV's. Based on implementing this feature in a typical 4-acre canal, the annual cost for this feature would be $23,533 or $9,178 per AHUV (see Table C-IV-5). To completely mitigate all impacts to swamp, this cost would be approximately 700 percent of the unit price.

TREE PLANTING ALONG BAYOU BARATARIA INCREMENT

Planting of trees along one bank of Bayou Barataria and other larger bayous and canals within the project area as partial compensation mitigation was considered. Water oak, Nuttall oak, and red maple were considered for planting. However, erosion of the bank of the bayou is occurring at a slow rate. Therefore, the area planted in trees would be reduced over the life of the project, reducing the effectiveness of mitigation. This would

require other mitigation actions to be continually implemented elsewhere during the life of the project. The process involved in making the necessary mitigation determinations would prove to be very complicated. Considering the difficulty in finding adequate mitigation areas within the project vicinity at the present time the conclusion could be made that as time passes the difficulty involved in finding adequate mitigation areas will only increase. This could possibly preventing the mitigation features from being implemented within an area that the local cost-sharing public could easily access. Additionally, along Bayou Barataria it is a common practice to secure idle tows to trees along the bank. This practice results in the degradation of the habitat along the bank. The lack of adequate dock space along the bayou would make the prevention of this practice difficult. This practice could prevent achievement of the mitigation goal. Based on the above concerns, this alternative was eliminated without further investigation.

MITIGATION ON FEDERAL LANDS IN THE PROJECT AREA INCREMENT

Officials at the U.S. Coast Guard facility and at the U.S. Naval Air Station on the West Bank in the project area were asked about the possibility of conducting mitigation actions on their lands. Neither was interested in mitigation measures being implemented on their lands for a variety of reasons.

EXPANDED ALGIERS CANAL LEVEE BERM INCREMENT

Expansion of the levee berm along the Algiers Canal and planting trees was also investigated. Expanding the berm would require a substantial increase in the cost of levee construction (possibly double) and additional right-of-way would be needed. The new right-of-way presently has trees on and adjacent to it and some business are located in the new right) of) way. Expansion of the berm would require the removal of existing BLH, requiring additional mitigation. Levees are typically kept clear of trees for reasons of seepage prevention, stability, visibility, and access during emergencies. Problems encountered with obtaining acceptable borrow material for the Westwego to Harvey Canal Project could occur for this project also. Expansion of existing pits or locating new pits in forests or wetlands could occur because of the limited area from which borrow can economically or feasibly be obtained. This would then become an additional project impact and additional mitigation would be needed. Therefore, this alternative was dismissed.

BAYOU BOIS PIQUANT INCREMENT

This mitigation features involves the preservation of high quality wetlands in the Bayou Bois Piquant - Bayou des Saules finger ridge area in St. Charles Parish (Plate 25). The area contains numerous natural ridges extending into the swamp. Because of the juxtaposition of the two habitat types in the mitigation area, purchase of one type without the other is virtually impossible. Therefore, impacts to both swamp and drained BLH could be mitigated with this alternative. This area has also been identified as a priority site for preservation by the Louisiana Nature Conservancy. This ridge area has already experienced some development, with pressures continuing. The Davis Pond freshwater diversion project could enclose some of the land in one of the alternatives of the proposed mitigation area between the diversion levees and within the flowage easement of that project. This may preclude development, but would not prevent timber harvesting or other activities that would be detrimental to wildlife species and their habitat. Because of the decreased chance of disturbance within the diversion project levees, a decision was made to try to preserve land outside of the proposed levees. This area would be at a greater risk to adverse habitat alteration. The finger ridge area is unique and highly valuable for fish and wildlife. It is composed of a complex mixture of swales and ridges that eventually grade into the marshes near Lake Salvador. The ecotones and diversity of habitat are unprecedented in the West Bank area and perhaps in southeast Louisiana.

The Lake Salvador Wildlife Management Area (WMA)is located southeast of this proposed mitigation area. Therefore, the lands purchased could be licensed to the LDWF and added to the Lake Salvadore WMA. This mitigation feature would also complement the mitigation feature that was approved for the authorized Westwego to Harvey Project.

To determine the amount of mitigation lands that would be required, consideration was given to the benefits gained by preserving the valuable woodlands. For example, between 1978 and 1989 about 170 acres of ridge BLH were developed. A conservation credit factor of 0.5 for BLH in the mitigation area was generated in the Westwego to Harvey analysis (1986), meaning that 50 percent of the habitat value of then current BLH would be lost over the project life. Analysis of recent development rates since the 1986 analysis indicates that this figure is reasonably correct. However, the anticipated low probability of permits being issued to develop the area using fill and the required mitigation associated with 404(b)(1) permits prevents preservation mitigation from being used to preserve a large portion of the area requiring a 404(b)(1) permit. Also, recent proposed changes in wetland regulations could possibly allow increased unmitigated development. Activities which have occurred and are viewed as reasons why some preservation is applicable include the following: the reconnaissance investigation by the New Orleans

District concerning the possibility of constructing a hurricane protection project near the Lake Cataouatche portion of the West Bank area, the completion of Interstate Highway 310 with river bridge connecting Interstate Highway 10 located north of the Mississippi River (a major access route to and from New Orleans and the surrounding metropolis) and U.S. Highway 90 immediately north of the proposed mitigation area, and additional recent activities occurring in the vicinity which are usually viewed as being associated with anticipated development of an area. It was determined that some development would occur but would be minimal in this area throughout the 100-year project life. If mitigation land outside the freshwater diversion project levees cannot be purchased for some reason, then the preservation of lands within the levees could be investigated and the acreage required for mitigation be purchased.

A timber harvest was projected for the area as a future condition without any Federal action. This is based upon the current perception of the public that the 404(b)(1) permitting process denies landowners the ability to realize the total value of their property and the high quality of marketable hardwoods in the area. Therefore, it is projected that at some time in the future without the project, the area would be subject to a harvest of the marketable hardwoods. Based on the current timber stand composition, the logging of this area would be expected to occur at target year 25 and again at target year 75. Having established the future conditions with no Federal action being taken to address the hurricane protection objective, a process was developed to determine the amount of acreage necessary to mitigate the project losses. Depending upon the exact location of the mitigation site, approximately 312 acres would be purchased to achieve the mitigation goal (see Table C-IV-5A). Table C-IV-5B presents the analysis process displaying the acres necessary to provide the compensation required for Alternative 1. Annual costs for this plan are $71,294 (Table C-IV-4 and C-IV-5 and Figures C-IV-3 and C-IV-4). Annual costs per AHUV produced are $615 (Table C-IV-4 and C-IV-5). The final location of the mitigation area would be determined through coordination with the LDWF and the USFWS. The location chosen will depend upon many factors, such as ability to acquire real estate, real estate costs, and logistics of management.

Preservation of the unique BLH in the Bayou Bois Piquant area is a management feature that has no discernible separate increments. Requisites necessary for the preservation of this landare functionally dependent upon each other. Requisites include the purchase of the land, posting, fencing of boundaries, and stewardship of the land. Without some form of property rights, preservation of the land and the associated natural resources cannot be guaranteed. Purchase of mitigation land is necessary to secure the necessary rights that would allow the land to be preserved in a manner that would not compromise the mitigation objective at any time over the life of the project. Posting and fencing of

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TABLE C-IV-5A
WESTBANK HABITAT IMPACT AND MITIGATION ANALYSIS
ALTERNATIVE 3B IMPACTS AND MITIGATION

HABITAT IMPACT ANALYSIS

BOTTOMLAND HARDWOODS						BOTTOMLAND HARDWOODS						SWAMP					
PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWOP	0	208	0.68	141		FWOP	0	25	0.76	19		FWOP	0	46	0.71	33	
FWOP	1	208	0.68	140	141	FWOP	1	25	0.76	19	19	FWOP	1	46	0.71	33	33
FWOP	3	201	0.68	137	277	FWOP	3	24	0.76	18	37	FWOP	3	46	0.71	33	65
FWOP	10	186	0.68	126	920	FWOP	10	22	0.76	17	124	FWOP	10	46	0.71	33	229
FWOP	25	156	0.68	106	1744	FWOP	25	19	0.76	14	234	FWOP	25	27	0.71	19	389
FWOP	50	118	0.68	80	2328	FWOP	50	14	0.76	11	313	FWOP	50	27	0.71	19	479
FWOP	75	88	0.68	60	1750	FWOP	75	11	0.76	8	235	FWOP	75	27	0.71	19	479
FWOP	100	66	0.68	45	1316	FWOP	100	8	0.76	6	177	FWOP	100	27	0.71	19	479
					8475						1138						2153
				AAHUV	85					AAHUV	11					AAHUV	22
(impact)		208						25						46			
FWP	0	208	0.68	141		FWP	0	25	0.76	19		FWP	0	46	0.71	33	
FWP	1	0	0.68	0	71	FWP	1	0	0.76	0	10	FWP	1	0	0.71	0	16
FWP	3	0	0.68	0	0	FWP	3	0	0.76	0	0	FWP	3	0	0.71	0	0
FWP	10	0	0.68	0	0	FWP	10	0	0.76	0	0	FWP	10	0	0.71	0	0
FWP	25	0	0.68	0	0	FWP	25	0	0.76	0	0	FWP	25	0	0.71	0	0
FWP	50	0	0.68	0	0	FWP	50	0	0.76	0	0	FWP	50	0	0.71	0	0
FWP	75	0	0.68	0	0	FWP	75	0	0.76	0	0	FWP	75	0	0.71	0	0
FWP	100	0	0.68	0	0	FWP	100	0	0.76	0	0	FWP	100	0	0.71	0	0
					71						10						16
				AAHUV	1					AAHUV	0					AAHUV	0
		Loss in AAHUV =			84			Loss in AAHUV =			11			Loss in AAHUV =			21
		TOTAL BLH LOSSES =			95									TOTAL SWAMP LOSSES =			21

MITIGATION CREDIT ANALYSIS

BAYOU BOIS PIQUANT SITE — SOUTH

BOTTOMLAND HARDWOODS						BOTTOMLAND HARDWOODS						SWAMP					
PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWP	0	242	0.77	186		FWP	0	0	0.77	0		FWP	0	70	0.68	48	
FWP	1	242	0.77	186	186	FWP	1	0	0.77	0	0	FWP	1	70	0.68	48	48
FWP	3	242	0.77	186	373	FWP	3	0	0.77	0	0	FWP	3	70	0.68	48	95
FWP	10	242	0.77	186	1304	FWP	10	0	0.77	0	0	FWP	10	70	0.68	48	333
FWP	25	242	0.77	186	2795	FWP	25	0	0.77	0	0	FWP	25	70	0.68	48	714
FWP	50	242	0.77	186	4659	FWP	50	0	0.77	0	0	FWP	50	70	0.68	48	1190
FWP	75	242	0.77	186	4659	FWP	75	0	0.77	0	0	FWP	75	70	0.68	48	1190
FWP	100	242	0.77	186	4659	FWP	100	0	0.77	0	0	FWP	100	70	0.68	48	1190
					18634						0						4760
(20%)				AAHUV	186					AAHUV	0					AAHUV	48
-0.227%																	
		242						0						70			
FWO	0	242	0.77	186		FWO	0	0	0.77	0		FWO	0	70	0.68	48	
FWO	1	241	0.77	186	186	FWO	1	0	0.77	0	0	FWO	1	70	0.68	48	48
FWO	3	240	0.77	185	371	FWO	3	0	0.77	0	0	FWO	3	70	0.68	48	95
FWO	10	237	0.77	182	1285	FWO	10	0	0.77	0	0	FWO	10	70	0.68	48	333
FWO	25	229	0.25	57	1785	FWO	25	0	0.25	0	0	FWO	25	70	0.25	18	488
FWO	50	216	0.45	97	1940	FWO	50	0	0.45	0	0	FWO	50	70	0.40	28	569
FWO	75	204	0.25	51	1843	FWO	75	0	0.25	0	0	FWO	75	70	0.25	18	569
FWO	100	193	0.45	87	1732	FWO	100	0	0.45	0	0	FWO	100	70	0.40	28	569
					9141						0						2671
				AAHUV	91					AAHUV	0					AAHUV	27
		Gain in AAHUV =			95			Gain in AAHUV =			0			Gain in AAHUV =			21
		TOTAL BLH AHUV GAINS =			95									TOTAL SWAMP AAHUV GAINS =			21
		MITIGATION ACREAGE REQUIRED =			312												

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TABLE C-IV-58
WESTBANK HABITAT IMPACT AND MITIGATION ANALYSIS

ALTERNATIVE 1 IMPACT ANALYSIS

BOTTOMLAND HARDWOOD						BOTTOMLAND HARDWOOD						SWAMP					
PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWOP	0	61	0.68	41		FWOP	0	25	0.76	19		FWOP	0	46	0.71	33	
FWOP	1	60	0.68	41	41	FWOP	1	25	0.76	19	19	FWOP	1	46	0.71	33	33
FWOP	3	59	0.68	40	81	FWOP	3	24	0.76	18	37	FWOP	3	46	0.71	33	65
FWOP	10	54	0.68	37	270	FWOP	10	22	0.76	17	124	FWOP	10	46	0.71	33	229
FWOP	25	46	0.68	31	511	FWOP	25	19	0.76	14	234	FWOP	25	27	0.71	19	389
FWOP	50	34	0.68	23	683	FWOP	50	14	0.76	11	313	FWOP	50	27	0.71	19	479
FWOP	75	26	0.68	18	513	FWOP	75	11	0.76	8	235	FWOP	75	27	0.71	19	479
FWOP	100	19	0.68	13	386	FWOP	100	8	0.76	6	177	FWOP	100	27	0.71	19	479
					2485						1138						2153
				AHUV	25					AHUV	11					AHUV	22
		61						25						46			
FWP	0	61	0.68	41		FWP	0	25	0.76	19		FWP	0	46	0.71	33	
FWP	1	0	0.68	0	21	FWP	1	0	0.76	0	10	FWP	1	0	0.71	0	16
FWP	3	0	0.68	0	0	FWP	3	0	0.76	0	0	FWP	3	0	0.71	0	0
FWP	10	0	0.68	0	0	FWP	10	0	0.76	0	0	FWP	10	0	0.71	0	0
FWP	25	0	0.68	0	0	FWP	25	0	0.76	0	0	FWP	25	0	0.71	0	0
FWP	50	0	0.68	0	0	FWP	50	0	0.76	0	0	FWP	50	0	0.71	0	0
FWP	75	0	0.68	0	0	FWP	75	0	0.76	0	0	FWP	75	0	0.71	0	0
FWP	100	0	0.68	0	0	FWP	100	0	0.76	0	0	FWP	100	0	0.71	0	0
					21						10						16
				AHUV	0					AHUV	0					AHUV	0
		AHUV LOSSES =			25			AHUV LOSSES =			11			AHUV LOSSES =			21
		TOTAL BLH LOSSES =			38									TOTAL SWAMP LOSSES =			21

MITIGATION ANALYSIS

-0.227%

BAYOU BOIS PIQUANT SITE

BOTTOMLAND HARDWOOD						BOTTOMLAND HARDWOOD						SWAMP					
PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWM	0	92	0.77	71		FWM	0	0	0.68	0		FWM	0	70	0.68	48	
FWM	1	92	0.77	71	71	FWM	1	0	0.68	0	0	FWM	1	70	0.68	48	48
FWM	3	92	0.77	71	142	FWM	3	0	0.68	0	0	FWM	3	70	0.68	48	95
FWM	10	92	0.77	71	498	FWM	10	0	0.68	0	0	FWM	10	70	0.68	48	333
FWM	25	92	0.77	71	1063	FWM	25	0	0.68	0	0	FWM	25	70	0.68	48	714
FWM	50	92	0.77	71	1771	FWM	50	0	0.68	0	0	FWM	50	70	0.68	48	1190
FWM	75	92	0.77	71	1771	FWM	75	0	0.68	0	0	FWM	75	70	0.68	48	1190
FWM	100	92	0.77	71	1771	FWM	100	0	0.68	0	0	FWM	100	70	0.68	48	1190
					7084						0						4760
				AHUV	71					AHUV	0					AHUV	48
		92						0						70			
FWOM	0	92	0.77	71		FWOM	0	0	0.68	0		FWOM	0	70	0.68	48	
FWOM	1	92	0.77	71	71	FWOM	1	0	0.68	0	0	FWOM	1	70	0.68	48	48
FWOM	3	91	0.77	70	141	FWOM	3	0	0.68	0	0	FWOM	3	70	0.68	48	95
FWOM	10	90	0.77	69	489	FWOM	10	0	0.68	0	0	FWOM	10	70	0.68	48	333
FWOM	25	87	0.25	22	682	FWOM	25	0	0.68	0	0	FWOM	25	70	0.25	18	488
FWOM	50	82	0.45	37	734	FWOM	50	0	0.68	0	0	FWOM	50	70	0.40	28	569
FWOM	75	78	0.25	19	704	FWOM	75	0	0.68	0	0	FWOM	75	70	0.25	18	569
FWOM	100	73	0.45	33	655	FWOM	100	0	0.68	0	0	FWOM	100	70	0.40	28	569
					3475						0						2671
				AHUV	35					AHUV	0					AAHU	27
		AHUV GAINS =			36			AHUV GAINS =			0			AHUV GAINS =			21
		TOTAL BLH AHUV GAINS =			36									TOTAL SWAMP AHUV REPLACED =			21
		MITIGATION ACREAGE REQUIRED =			162												

boundaries would prevent unintentional trespassing and possibly decrease the amount of intentional trespassing on the mitigation area. Current off) road and all-terrain vehicle (ATV) use in the proposed mitigation area, in addition to gathering of firewood are activities that, if left unregulated or not stopped, would lower the habitat value and the resulting AHUV's of the area. Posting, fencing, and stewardship are all necessary to prevent this from happening. Required stewardship of mitigation lands is implied by agency regulations that require fee) title acquisition of fish and wildlife mitigation lands. Also, stewardship is necessary to prevent the above-mentioned activities that would prevent attainment of the mitigation planning objective. This feature provides mitigation for all impacts as determined by HES for both swamp and drained BLH.

BAYOU BARRIERE INCREMENT

This mitigation alternative is located adjacent to the proposed borrow pit for this project (Plate 24). The area consists of approximately 257 acres of drained BLH and approximately 41 of pasture. Approximately 46 acres of an adjacent area is scrub-shrub. The area is currently under pump; therefore, any actions implemented at the site would mitigate losses to drained bottomland hardwoods only. This alternative would depend upon the reforestation of the pasture area and would include the management of the existing BLH. This land is located within the project area and is owned by local cost-sharing governments.

The habitat value of the existing BLH in the proposed mitigation area could be increased by selective timber harvesting and girdling of less desirable tree species, creating small clearings, brush piles, and snags. In addition, the planting of selected species in both the understory, pasture lands, and cleared areas would raise the habitat value resulting in higher habitat quality for the overall area. BLH species which would be planted include water, Nuttall, and willow oaks.

Allowing natural succession to occur is normally an inexpensive method of achieving a BLH forest and thus, mitigating BLH impacts. However, an exotic species in the area presents a severe problem. Numerous Chinese tallow (tallow) trees are present adjacent to the edge of the mitigation area. This exotic tree species is very prolific and persistent and is considered to be a very undesirable tree species for wildlife. The tallow can become completely established on relatively large acreages of land within two to three years. The tallow forest easily persists in excess of twenty years, it typically regenerates from underneath its own overstory rather than being succeeded by another species, and can virtually eliminate the chance of any valuable wildlife tree species from becoming

established during this period. Once established, the most effective removal of tallow tree forests is through expensive clearing operations (approximately $2,000 per acre). Costly, labor-intensive herbicide applications could be used to control the invasion of tallow trees. These applications would have to be continued until sufficient canopy cover and tree height is obtained by desirable tree species to eliminate the competitive advantage tallow trees exhibit. Therefore, planting rather than natural succession was selected as the only way to ensure that the mitigation goal would be achieved. The planting of tree seedlings would shift the competitive advantage towards the planted species. Tallows could invade, but would eventually be dominated by the planted seedlings. It is possible that subsequent herbicide injections would be required.

The Bayou Barriere feature is composed of separable management features that have functionally independent increments within the plan. Increments include management of the existing BLH and reforestation. Management features within both increments that could not function independently include real estate acquisition, posting, fencing, and stewardship of the areas. Management of the BLH is composed of two increments; removal of cattle to eliminate grazing, and timber stand improvement for wildlife. AHUV's produced by each increment are shown in Table C-IV-6. Annual costs and annual costs per AHUV produced for each increment are shown on Table C-IV-4 and displayed in Figures C-IV-3 and C-IV-4. The reforestation increment could not be broken down into smaller components. This mitigation plan provides for 49 AHUV's, leaving 21 AHUV's of swamp and 46 AHUV's of drained BLH unmitigated (Table C-IV-6). Existing adjacent land not owned by the local governments and within the project area could also be considered as potential mitigation areas. Costs to purchase, manage, and oversee those lands could be comparable to costs presented for this alternative.

The amount of borrow area required for project construction is related to this mitigation plan. Approximately 90 acres of borrow area are needed for the project. No soil borings were taken in the location of the proposed borrow area in the early stages of the study. Recently (March 1994), plans were made to take one boring of the proposed borrow area. Still, the quality of the material in the area is still unknown as to its suitibility for the purpose at hand. It has been necessary to enlarge borrow areas for the Westwego to Harvey Project because of the extensive amount of organic overburden in the project area. Approximately 100 additional open acres have been included as potential borrow area to prevent expansion or relocation of the borrow site into wet and/or wooded areas if this situation occurs at this borrow site. If the indicated amount of acreage needed for borrow does not change, the remaining acreage could be incorporated into this mitigation feature. Of the additional 100 acres of borrow area provided, approximately 66 acres would be needed to completely mitigate project impacts to drained BLH. The area is currently

ipmtbb3b

-1.147%

TABLE C-IV-6
WESTBANK HABITAT IMPACT AND MITIGATION ANALYSIS
BAYOU BARRIERE MITIGATION SITE

IMPACT ANALYSIS FOR ALTERNATIVE 3B

FUTURE WITHOUT PROJECT (FWOP)

	BOTTOMLAND HARDWOOD					BOTTOMLAND HARDWOOD					SWAMP				
PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWOP	0	208	0.68	141		FWOP	0	25	0.76	19		FWOP	0	46	0.71	33	
FWOP	1	206	0.68	140	141	FWOP	1	25	0.76	19	19	FWOP	1	46	0.71	33	33
FWOP	3	201	0.68	137	276	FWOP	3	24	0.76	18	37	FWOP	3	46	0.71	33	65
FWOP	10	185	0.68	126	919	FWOP	10	22	0.76	17	123	FWOP	10	46	0.71	33	229
FWOP	25	156	0.68	106	1740	FWOP	25	19	0.76	14	234	FWOP	25	27	0.71	19	389
FWOP	50	117	0.68	79	2318	FWOP	50	14	0.76	11	311	FWOP	50	27	0.71	19	479
FWOP	75	88	0.68	60	1737	FWOP	75	11	0.76	8	233	FWOP	75	27	0.71	19	479
FWOP	100	66	0.68	45	1302	FWOP	100	8	0.76	8	175	FWOP	100	27	0.71	19	479
					8434						1133						2153
				AHUV	84					AHUV	11					AHUV	22

FUTURE WITH PROJECT (FWP)

		208						25						46			
FWP	0	208	0.68	141		FWP	0	25	0.76	19		FWP	0	46	0.71	33	
FWP	1	0	0.68	0	71	FWP	1	0	0.76	0	10	FWP	1	0	0.71	0	16
FWP	3	0	0.68	0	0	FWP	3	0	0.76	0	0	FWP	3	0	0.71	0	0
FWP	10	0	0.68	0	0	FWP	10	0	0.76	0	0	FWP	10	0	0.71	0	0
FWP	25	0	0.68	0	0	FWP	25	0	0.76	0	0	FWP	25	0	0.71	0	0
FWP	50	0	0.68	0	0	FWP	50	0	0.76	0	0	FWP	50	0	0.71	0	0
FWP	75	0	0.68	0	0	FWP	75	0	0.76	0	0	FWP	75	0	0.71	0	0
FWP	100	0	0.68	0	0	FWP	100	0	0.76	0	0	FWP	100	0	0.71	0	0
					71						10						16
				AHUV	1					AHUV	0					AHUV	0
		Total AHUV =			84			Total AHUV =			11			Total AHUV =			21

TOTAL BLH AHUV LOST = 95

TOTAL SWAMP AHUV LOS 21

BOTTOMLAND HARDWOOD (DRAINED) MITIGATION ANALYSIS

FUTURE WITHOUT MITIGATION (FWOM)

PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM	PLAN	TY	ACRES	HQI	HUV	CUM
FWOM	0	41	0.00	0		FWOM	0	257	0.75	193		FWOM	0	257	0.75	193	
FWOM	1	41	0.00	0	0	FWOM	1	257	0.75	193	193	FWOM	1	257	0.75	193	193
FWOM	3	41	0.00	0	0	FWOM	3	257	0.75	193	386	FWOM	3	257	0.75	193	386
FWOM	10	41	0.00	0	0	FWOM	10	257	0.75	193	1349	FWOM	10	257	0.75	193	1349
FWOM	25	41	0.00	0	0	FWOM	25	257	0.75	193	2891	FWOM	25	257	0.75	193	2891
FWOM	50	41	0.00	0	0	FWOM	50	257	0.75	193	4819	FWOM	50	257	0.75	193	4819
FWOM	75	41	0.00	0	0	FWOM	75	257	0.75	193	4819	FWOM	75	257	0.75	193	4819
FWOM	100	41	0.00	0	0	FWOM	100	257	0.75	193	4819	FWOM	100	257	0.75	193	4819
					0						19275						19275
				AHUV	0					AHUV	193					AHUV	193

FUTURE WITH (FW) MITIGATION ALTERNATIVES

	REFORESTATION					CATTLE REMOVAL						TIMBER STAND IMPROVEMENT					
		41						257						257			
FWR	0	41	0.00	0		FWCR	0	257	0.75	193		FWTSI	0	257	0.75	193	
FWR	1	41	0.00	0	0	FWCR	1	257	0.76	195	194	FWTSI	1	257	0.75	193	193
FWR	3	41	0.00	0	0	FWCR	3	257	0.77	198	393	FWTSI	3	257	0.76	195	388
FWR	10	41	0.30	12	43	FWCR	10	257	0.77	198	1385	FWTSI	10	257	0.79	203	1394
FWR	25	41	0.68	28	301	FWCR	25	257	0.77	198	2968	FWTSI	25	257	0.84	216	3142
FWR	50	41	0.79	32	753	FWCR	50	257	0.77	198	4947	FWTSI	50	257	0.85	218	5429
FWR	75	41	0.79	32	810	FWCR	75	257	0.77	198	4947	FWTSI	75	257	0.85	218	5461
FWR	100	41	0.79	32	810	FWCR	100	257	0.77	198	4947	FWTSI	100	257	0.85	218	5461
					2717						19783						21468
				AHU	27					AHU	198					AHU	215
		AHUV GAINED BY REFOREST =			27			AHUV GAINED BY FWCR =			5			AHUV GAINED BY FWTSI =			22

COMBINATION OF FWR AND FWTS 49

AHUV NOT MITIGATED BY COMBINATION = 48

SWAMP AHUV NOT MITIGATED = 21

TOTAL AHUV NOT MITIGATED = 67

COMBINATION OF FWR AND FWCR 32

AHUV NOT MITIGATED BY COMBINATION = 63

SWAMP AHUV NOT MITIGATED = 21

TOTAL AHUV NOT MITIGATED = 84

pasture. Reforestation with mast producing species would produce the remaining 46 AHUV needed to completely mitigate impacts to drained BLH. The Bayou Barriere mitigation feature will not depend on the use of this area for mitigation until sufficient soil borings in the borrow area and other necessary engineering studies have determined that the additional borrow area is not needed. Therefore, no further development of this area for mitigation was done. When the borrow pit is no longer needed, the edge bordering the mitigation area could be planted with cypress and button bush. Because of the small size of this strip of land, no gain in AHUVs could be shown. However, this would provide a protective corridor between the edge of the woods and the borrow pit and along the edge of the borrow pit which would allow a greater usage of this ecotone and the water.

BAYOU SEGNETTE INCREMENT

This mitigation area is located on the west bank of the Mississippi River in the vicinity of the project area (Plate 25). The habitat to be created would mitigate losses to drained bottomland hardwoods but would not be appropriate mitigation for losses to undrained bottomland hardwoods or swamp. This plan would involve the purchase of 144 acres of shrub) scrub area adjacent to the Bayou Segnette State Park. The land would be reforested with mast-producing trees such as Nuttall, water, and willow oaks. Park officials have expressed interest in obtaining land adjacent to the park. Park personnel would oversee this area. The area would be maintained as a buffer zone to isolate the park from future development. Since the management of state parks is recreationally orientated, certain recreation activities that would not compromise the habitat value of the mitigation area would be allowed. This could include activities such as construction of a limited number of nature trails. Late stage evaluation of this increment and observation of the surrounding woodlands has revealed that Chinese tallow is such a prolific invader that there is a significant amount of uncertainty involving (1) the amount of additional seedlings to plant in order for the oaks to out-compete the tallow, (2) how much the with-mitigation project HQI should be adjusted to reflect the severe competition caused by the tallow trees, and (3) if, in fact, overcoming the prolific invader is a realistic possibility.

Reforestation through natural succession was also eliminated due to Chinese tallow invasion problems. In addition, no adjacent seed sources for BLH species exist near the mitigation area. This would result in a much longer successional period before the mitigation goal would be achieved. In order to achieve the mitigation goal within the project life, considerable additional acreage would be needed.

Reforestation of mitigation lands adjacent to the state park cannot be separated into any functionally independent increments. The mitigation area cannot be planted unless real estate is acquired. In order to ensure success in gaining the AHUV's predicted in the mitigation increment, fencing and posting of boundaries and stewardship of the area would be required. Therefore, the combination of each of these elements --- real estate acquisition; fencing and posting; and stewardship --- would comprise an independent increment. This reforestation plan provides 95 AHUV's which would be complete mitigation for the drained BLH losses. It should be noted, however, that the 95 AHUV's is an optimal projection due to the uncertainties listed previously caused by the invading Chinese tallow. Costs for completely mitigating all impacts to drained BLH with this plan are presented in Table C-IV-4 and displayed in Figures C-IV-3 and C-IV-4).

POSSIBLE COMBINATION OF MITIGATION PLANS AND FEATURES

An effort was made to produce a cost-effective combination of increments that would mitigate both swamp and drained bottomland hardwood losses. The combination would include one increment that would mitigate the 95 AHUV losses to drained BLH and another to mitigate the 21 AHUV losses to swamp. Increments that could be used to mitigate impacts specifically to drained BLH include the Bayou Bois Piquant preservation increment, Bayou Barriere timber stand improvement increment, Bayou Barrier reforestation increment, Bayou Barriere cattle removal increment, and the Bayou Segnette reforestation increment. Features that could be used to mitigate impacts specifically to swamp include the Bayou Bois Piquant preservation increment, wetland creation increment, and the backfilling and wetland creation increment.

Table C-IV-4 presents total annual costs for increments that would mitigate impacts to drained BLH. Figure C-IV-3 compares total annual costs while Figure C-IV-4 compares annual costs per AHUV produced. As shown, the two increments that are the most effective for mitigating impacts to this habitat are the Bayou Segnette reforestation and Bayou Bois Piquant preservation features. These increments were then used to determine the most cost-effective mitigation plan.

Similarly, Table C-IV-5 presents total annual costs for increments that would mitigate impacts to swamp. Figure C-IV-1 compares annual costs while Figure C-IV-2 compares annual costs per AHUV produced. As is shown, the most cost-effective increment for mitigating impacts to this habitat, by far, is the Bayou Bois Piquant preservation feature. A search was then made for the most cost-effective combination of increments to mitigate

losses to both swamp and drained bottomland hardwood habitats.

Upon examination it would appear that the individual increments for mitigating impacts to swamp and drained BLH separately would be the Bayou Segnette reforestation and the Bayou Bois Piquant preservation increments, respectively. However, as previously mentioned, the juxtaposition of habitats caused by ridges and swales in the Bayou Bois Piquant mitigation area prevents the separation of these habitats into parcels of land that could realistically be purchased separately for mitigating either habitat. Therefore, the Bayou Segnette reforestation increment for drained BLH losses would need to be combined with the next most cost-effective increment for mitigating losses to swamp, the wetland creation and backfilling increment. This combination of increments, Bayou Segnette producing 95 AHUVs for drained BLH with wetland creation and backfilling producing 21 AHUVs for swamp, has annual costs totalling $236,591 ($9,637 per habitat unit) and is not the most cost-effective plan when the Bayou Bois Piquant plan is considered (see Figures C-IV-5 and C-IV-6).

The combination of increments, as just described when considering both habitats --- swamp and drained bottomland hardwood --- is actually a moot point because of a decision described very early in this report. Early in the analysis process it was agreed upon by investigators that all forests of the area, whether drained or undrained, are considered to be bottomland hardwoods in the general sense of the term. However, scarcity and wetland functions of the swamp increases the significance of this habitat when compared to the drained bottomland hardwood category. Therefore, the decision was made to mitigate undrained habitats in-kind, i.e., undrained losses would be compensated with undrained mitigation measures, but drained habitats could be mitigated either in-kind or out-of-kind as available within the general bottomland hardwood (including swamp) habitat type.

RATIONALE FOR SELECTION OF THE RECOMMENDED MITIGATION PLAN

Selection of the mitigation plan was based, primarily, on implementation of the most cost-effective combination of increments that would successfully achieve the mitigation goal. Since mitigation measures implemented in swamp habitats can also mitigate drained bottomland hardwood losses, the most cost-effective increment by far is the Bayou Bois Piquant preservation plan. The Bayou Bois Piquant plan provides mitigation at a cost of only $615 per habitat unit achieved (see Table C-IV-4 and C-IV-5). Therefore, this increment is the Recommended Mitigation Plan (RMP).

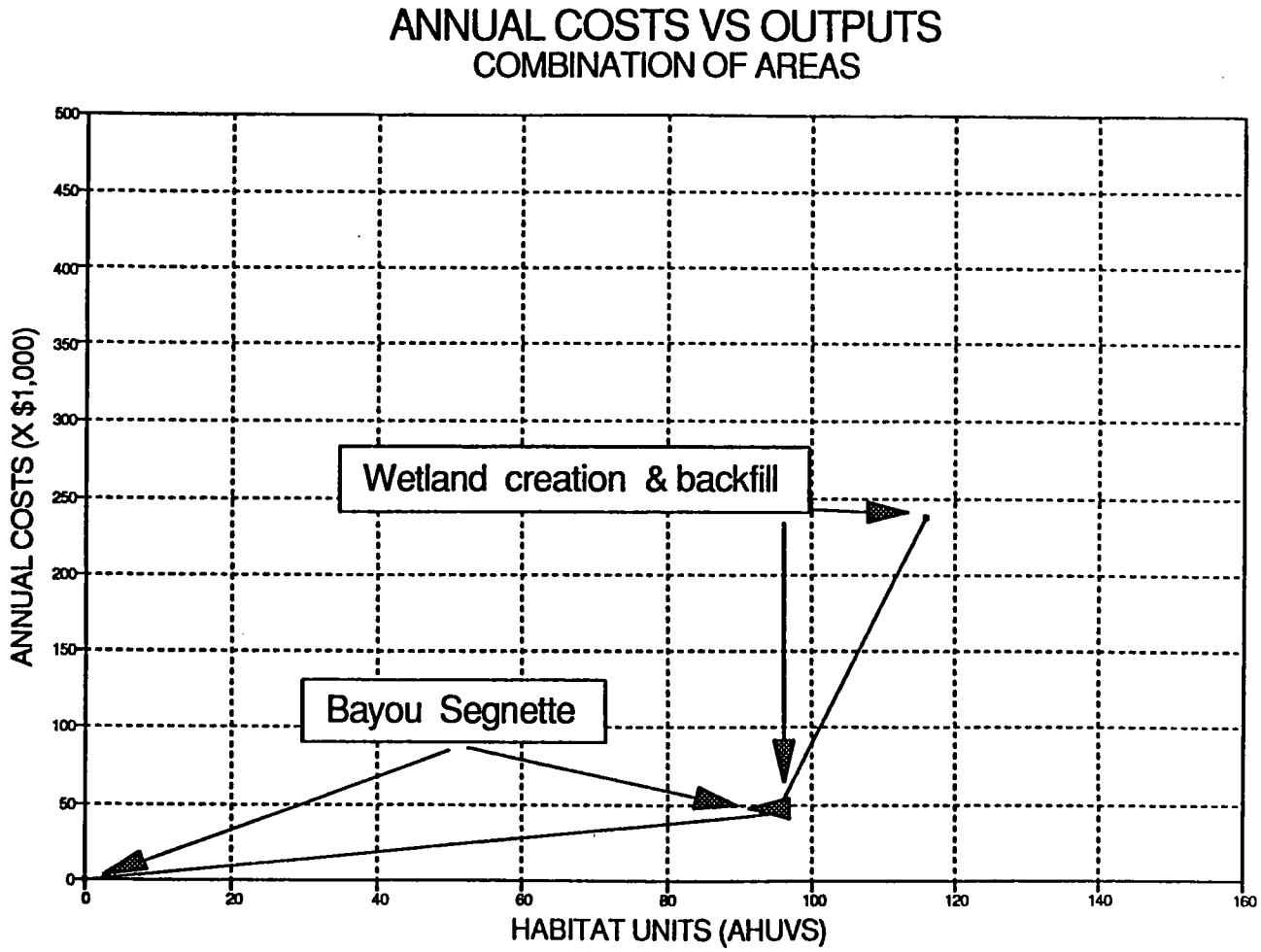

ANNUAL COSTS VS OUTPUTS
COMBINATION OF AREAS
ANNUAL COSTS (X $1,000)
500
450
400
350
300
250
200
150
100
50
0
Wetland creation & backfill
Bayou Segnette
0
20
40
60
80
100
120
140
160
HABITAT UNITS (AHUVS)

Figure C-IV-5

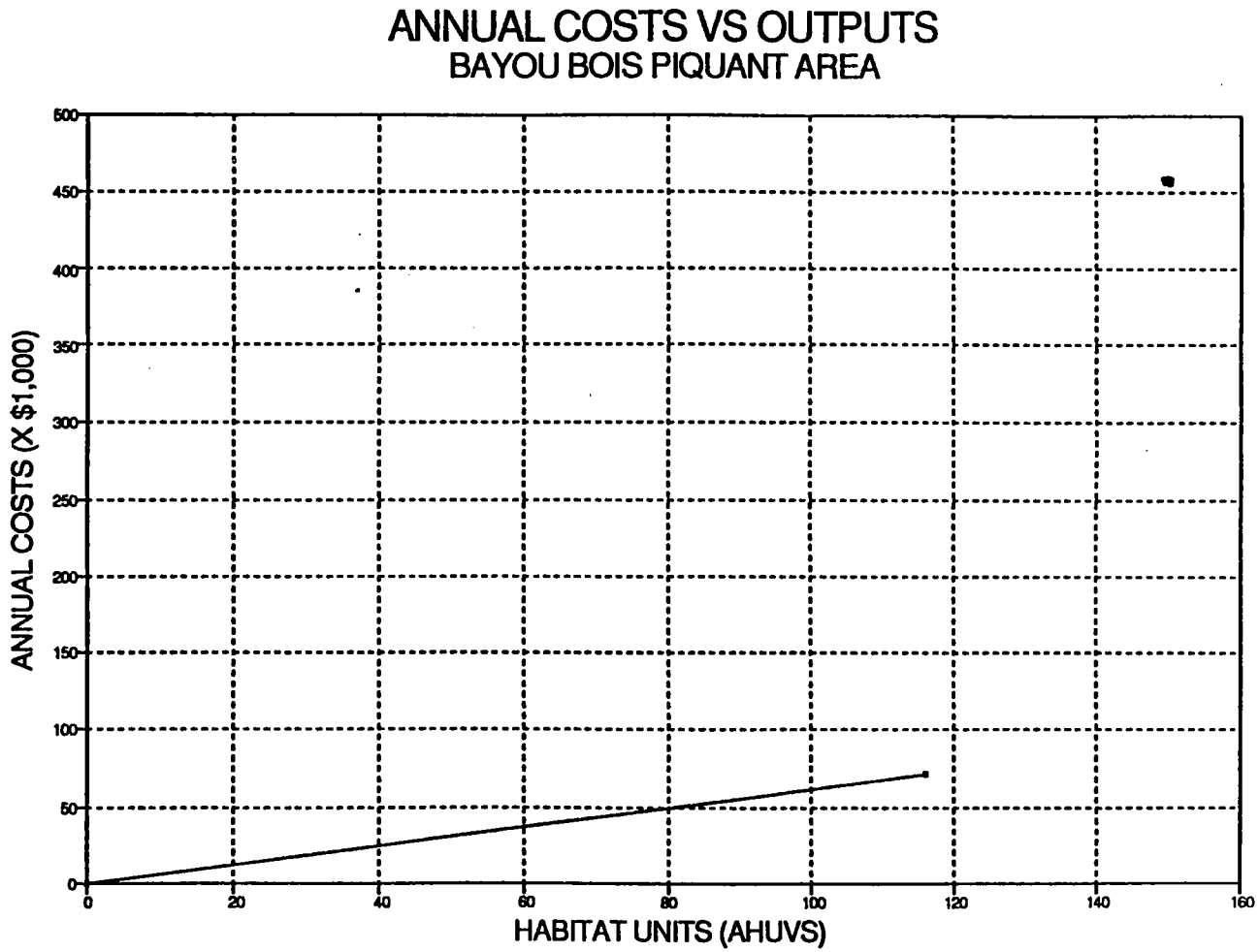

ANNUAL COSTS VS OUTPUTS
BAYOU BOIS PIQUANT AREA
ANNUAL COSTS (X $1,000)
500
450
400
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
HABITAT UNITS (AHUVS)

Figure C-IV-6

Other factors that were viewed as being pertinent to the selection of the RMP had a bearing on the selection process. Mitigation plans that would be implemented in areas that are enclosed by levees and are under pump could, in time, become isolated wooded areas surrounded by development. The original intent of preserving these areas for wildlife could then be viewed as being incompatible (i.e., producing nuisance animals and insect pests) with local interests and views. The changing of the management goal of these areas to a goal that would be viewed as being more compatible with adjacent development (i.e., recreational parks) should not be dismissed.

Even though 2,000 acres of forested land are predicted to exist at the end of the project life; wheir location or contiguousness cannot be predicted. One of the key variables utilized by HES in BLH areas is tract size. The larger the tract size, the more valuable the woodlands making up the tract. If a mitigation area is placed within a leveed area and development surrounds the area, the total habitat value of the area for mitigation has been reduced. This can reduce the extent to which the ecological function of the habitat is replaced and could result in a marked insufficiency of the area meeting the mitigation goal. Therefore, mitigation areas that are not located in areas being protected from flooding, i.e., leveed and under pump, are more desirable because of the lesser chance that the mitigation goal would be compromised in the future. Also, these unleveed areas are of a greater ecological value because of their direct connection and linkage with adjacent swamps and marshes. Because the project impacted both swamp and undrained BLH, mitigation for these impacts could be implemented in the same form of habitat (undrained, drained). However, dividing mitigation between sites and types leads to fragmentation of habitats.

The subdivision of mitigation onto physically separate segments of land would most likely lead to an increase in cost. For example, fencing costs (and replacements) would increase since fencing costs are based upon fencing the perimeter of the mitigation area. As the mitigation acreage is divided between areas the perimeter-to-area ratio would increase. Depending on location of the area, stewardship costs could also increase due to travel or need for additional personnel to oversee separate tracts of land. Therefore, the single contiguous location of the Bayou Bois Piquant area provides an additional reason for its selection as the TSMP.

The Bayou Bois Piquant site as previously stated, is located contiguous to the authorized Mississippi River freshwater diversion project levee. The mitigation feature of the Westwego to Harvey Hurricane Protection Project abuts the levee and is also located adjacent to the Salvadore Wildlife Management Area (WMA). The Salvadore WMA is under active management by the Louisiana Department of Wildlife and Fisheries. Since

the proposed mitigation site is adjacent to the existing WMA, the logistics of management of the proposed area would be minimal. The Salvadore WMA is approximately 31,000 acres; therefore, the additional 312 acres would add a minimal one percent to the managed area. Admittedly, the Bayou Segnette site is also located adjacent to the Bayou Segnette State Park and could be managed by the Office of State Parks. Still, additional acreage to mitigate the swamp losses would have to be obtained at some location. The most cost-effective location would be at the Bayou Bois Piquant site, but would involve the acquisition of one tract there as well as the tract at Bayou Segnette to mitigate losses to both categories of habitats. The acquisition of both sites and the involvement of the local sponsor with two agencies in management, as well as the uncertainties of being able to overcome the problems of the invading Chinese tallow to sufficiently mitigate those losses, in addition to the reasons mentioned previously, provide the basis for the selection of the Bayou Bois Piquant site for the mitigation of both categories of losses.

IMPLEMENTATION OF THE MITIGATION PLAN

The RMP would be implemented concurrent with construction of the project as required by Section 906 of Public Law 99-662 (Water Resource Development Act of 1986). Cost sharing of the mitigation measures would be the same as for the hurricane protection measures, that is, 65 percent Federal and 35 percent non-Federal.

CONCLUSION

The RMP, Bayou Bois Piquant preservation plan, would achieve the goal of mitigating, to the extent practicable, the functions and values of habitats impacted by the Recommended Plan. Examination of alternative features and increments available for mitigating these impacts has led to the selection of that feature as the most cost-effective plan for achieving the mitigation goal. The Louisiana Department of Wildlife and Fisheries in their letter of response to the Draft Feasibility Report and DEIS (see C-IV-i) has indicated support for the mitigation plan through their no objection to the proposed West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, East of Harvey Canal, Draft EIS provided it contains the recommended Bayou Bois Piquant mitigation plan. Additionally, their letter of supplemental comments relative to this concern indicates their full capability and willingness to operate and manage the area if requested.

REFERENCES CITED

Adamus, P.R., E.J. Clairain, Jr., R.D. Smith, and R.E. Young. 1987. Wetland Evaluation Techniques (WET); Volume II: Methodology. Operational Draft. Technical Report Y-87. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Adamus, P.R. and L.T. Stockwell. 1983. A Method For Wetland Functional Assessment: Volume I. Critical Review and Evaluation Concepts. U.S. Department of Transportation Report No. FHWA-IP-82-23. Washington, D.C.

U.S. Environmental Protection Agency. 1984. Literature Review of Wetland Evaluation Methodologies. USEPA. Chicago, Illinois.

U.S. Army Corps of Engineers. 1980. A Habitat Evaluation System For Water Resources Planning. U.S. Army Engineer Division, Vicksburg, MS.

U.S. Army Corps of Engineers. 1986. West Bank of the Mississippi River in the Vicinity of New Orleans, LA, Feasibility Report and Environmental Impact Statement. U.S. Army Engineer District, New Orleans, LA.

U.S. Fish and Wildlife Service. 1980. Habitat Evaluation Procedures (HEP). U.S.D.I. Fish and Wildlife Service. Division of Ecological Services. ESM 102.

Wilkinson, D.L., K. Schneller-McDonald, R.W. Olson, and G.T. Auble. 1987. Synopsis of Wetland Functions and Values: Bottomland Hardwoods With Special Emphasis on Eastern Texas and Oklahoma. U.S. Fish and Wildlife Service, Biological Report 87(12). Washington, D.C.

Wharton, C.H., W.M. Kitchens, and T.W. Sipe. 1982. The Ecology of Bottomland Hardwood Swamps of the Southeast: A Community Profile. U.S. Fish and Wildlife Service, FWS/OBS-81/37. Washington, D.C.

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section V

Endangered Species Coordination

JUN 15 1992

United States Department of the Interior
FISH AND WILDLIFE SERVICE
825 Kaliste Saloom Road
Brandywine Bldg. II, Suite 102
Lafayette, Louisiana 70508

June 11, 1992

Colonel Michael Diffley
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Diffley:

Please refer to your letter of May 19, 1992, and attached Biological Assessment regarding the proposed West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of Harvey) Hurricane Protection Project. The Biological Assessment addresses the potential impacts of the proposed project to the endangered bald eagle. The following comments are provided in accordance with provisions of the Endangered Species Act of 1973, as amended.

The Fish and Wildlife Service (Service) concurs with your finding that the proposed project would not adversely affect bald eagles. If the scope or location of this project is changed or project construction is not begun within one year, consultation with the Service should be re-initiated. Should future consultation be required, a telephone call will be sufficient.

Thank you for the opportunity to review the Biological Assessment. If you have any questions or need further information, please contact Kim Mitchell of this office.

Sincerely yours,

David W. Frugé
Field Supervisor

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

REPLY TO
ATTENTION OF:

Planning Division
Environmental Analysis Branch

19 May 1992

Mr. David Fruge'
U.S. Fish and Wildlife Service
Brandywine II, Suite 102
825 Kaliste Saloom Road
Lafayette, Louisiana 70508

Dear Mr. Fruge':

In accordance with the Endangered Species Act of 1973, a Biological Assessment is submitted that updates the impacts of the proposed West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of Harvey) Hurricane Protection Project.

Based on this Biological Assessment, the U.S. Army Corps of Engineers, New Orleans District, has determined that the construction and/or maintenance of the proposed project would have no adverse impact on bald eagles (Haliaeetus leucocephalus). Please provide comments within 30 days of the date of this letter.

If you have any questions, please contact Mr. David Walther at the above address or telephone (504) 862-2523.

Sincerely,

for R. H. Schroeder, Jr.
Chief, Planning Division

Enclosures

Biological Assessment

West Bank Hurricane Protection (East of Harvey Canal)

This assessment addresses the potential impacts to a new bald eagle (Haliaeetus leucocephalus) nesting site resulting from the construction of the proposed West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of Harvey) Hurricane Protection Project (Figure 1). Eagle nest, Number 57, is located approximately 4,600 feet southwest of the nearest area of proposed construction, at the intersection of the Hero Canal and the Gulf Intracoastal Waterway. This nest was identified by the U.S. Fish and Wildlife Service (FWS), and this information was relayed to the Corps in a telephone conversation on December 2, 1991.

The southern bald eagle is a large raptor that has undergone a pronounced population decline since the late 1940's. The greatest factor in this decline is the reduced reproduction caused by pesticide accumulation through the food chain. It appears that high residue, especially of diedldrin, has resulted in thin eggshells. Other factors affecting the eagle's population are shooting, electrocution, severe weather, habitat loss, human disturbance, and lead poisoning.

Nesting densities of bald eagles have been correlated with adequate prey availability, water body productivity, and size of the water body. Large shallow open water areas with a relatively high rate of productivity are normally located near the nesting habitat. Nests are usually constructed in a stand of trees near the water. The nest is usually located just below the crown of the largest tree in the stand. The nest tree is normally alive, and in Louisiana, is usually a bald cypress. Usually a clear flight path to water, a good perching tree, and open view of the surrounding area are selected. A typical nesting site would be located in flooded second growth bald cypress-tupelogum or mixed hardwood swamp with marshes, canals, and water bodies nearby (Dugoni, 1980).

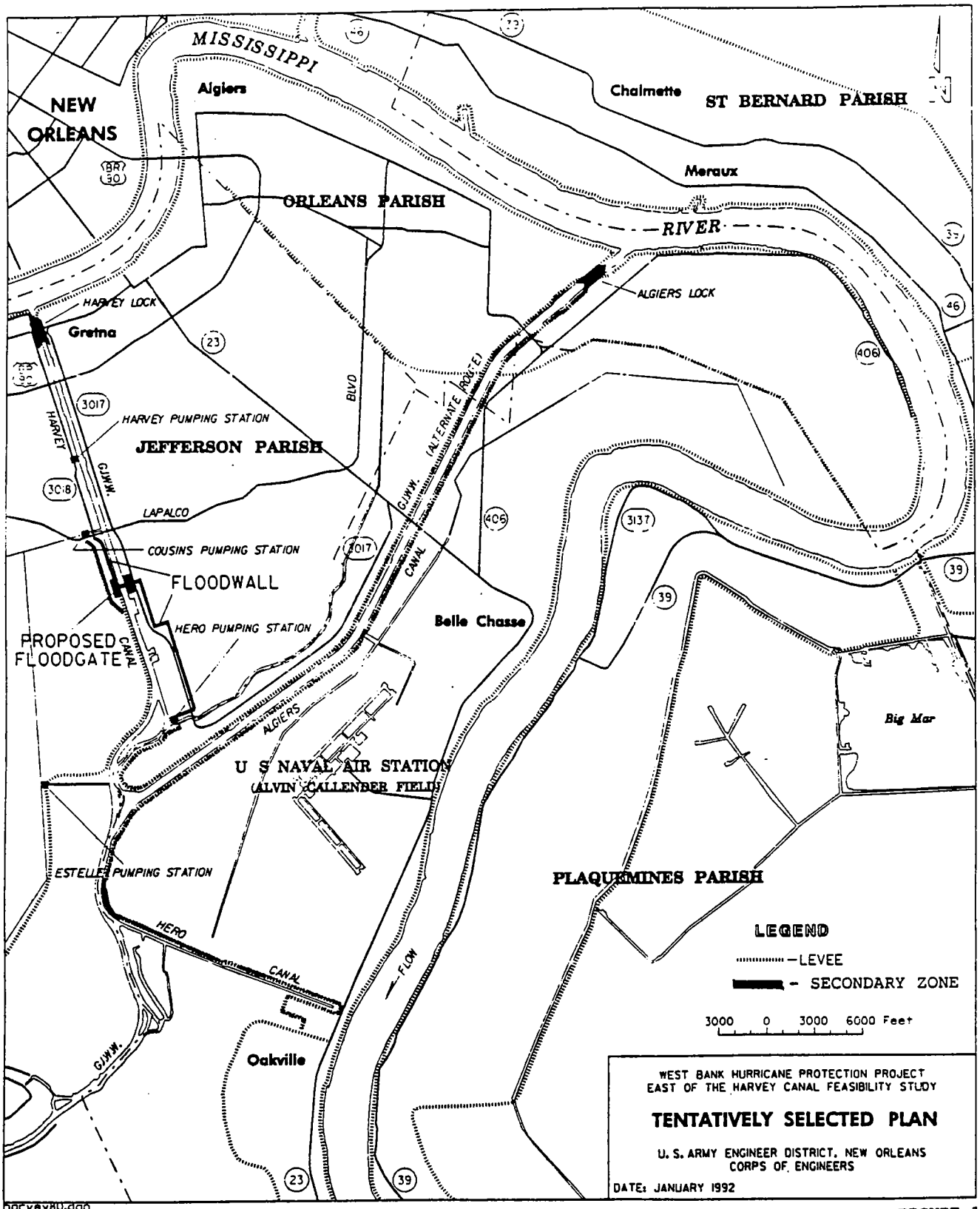

MISSISSIPPI
NEW ORLEANS
Algiers
Chalmette
ST BERNARD PARISH
Meraux
ORLEANS PARISH
RIVER
HARVEY LOCK
ALGIERS LOCK
Gretna
BLVD
(ALTERNATE ROUTE)
HARVEY
HARVEY PUMPING STATION
JEFFERSON PARISH
G.I.W.W.
LAPALCO
COUSINS PUMPING STATION
FLOODWALL
HERO PUMPING STATION
PROPOSED FLOODGATE
CANAL
Belle Chasse
ALGIERS
U S NAVAL AIR STATION
(ALVIN CALLENDER FIELD)
Big Mar
ESTELLE PUMPING STATION
PLAQUEMINES PARISH
HERO
CANAL
FLOW
Oakville
LEGEND
—LEVEE
- SECONDARY ZONE
3000 0 3000 6000 Feet
WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY
TENTATIVELY SELECTED PLAN
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: JANUARY 1992
harvey80.dgn

FIGURE 1

The nesting season in Louisiana is from September through May (Dugoni, 1980). Eggs are laid during November or December, and the young hatch during January or February. By April and May, the young are fledged. Generally, both adults and juveniles leave the project area by early summer.

Nest Number 57 was first recorded in 1989 and produced two eagles that year; the following year the nest produced one eagle. The production is typical for Louisiana (Dugoni, 1980). Prior to finding nest Number 57, a Biological Assessment was prepared for the project and sent to the FWS on September 12, 1988 (Attachment 1).

Though the bald eagle is an opportunistic feeder, its main food source is fish and birds. Fish species the eagle feeds on include shad, bass, catfish, gar, mullet, and sunfish; ducks and the common moorhen are the primary bird species of prey. The common moorhen and freshwater catfish are the eagle's predominant prey in Louisiana (Dugoni, 1980). No foraging information has been gathered for nest Number 57.

Data has been gathered from an eagle nest, Number 6, located in similar habitat on the northwest corner of Lake Cataouatche. The data showed that foraging for prey generally occurs within 2,100 feet of the nest. At this nest site, the eagles diet was composed of mammals (21%), birds (51%), and fish (28%). Nutria comprized 18% of the mammals; ducks represented 33%, and rails 15% of the birds, and freshwater catfish compose 15% of the fish (Dugoni, 1981). However, data obtained from the North Lafitte nest (Number 2) indicated that about half of the birds' diet was catfish (53%), a third of the diet was birds (33%), of which the Common Moorhen alone was 20% and the remainder, mammals (7%) and reptiles (7%) (Dugoni, 1980). The habitat where this nest (Number 2) is located, more closely resembles the habitat around nest Number 57 than does nest Number 6.

Numerous eagle sightings occur along the GIWW in the vicinity of the project area; it is not known if these are migrant bald eagles or part of the

resident population. Some of the bald eagles observed along the GIWW are probably foraging there and in the Harvey Canal (Muth, 1991).

FWS recommends that a primary zone of 1,500-foot radius around a nest have no disturbance (FWS, 1987). The critical primary zone identified by FWS would not be impacted by the proposed project.

Results from several studies suggest that nesting territory ranges from 1,312 to 2,625 feet radius (Grier, 1969; McEwan, 1977; Mahaffy and Frenzel, 1987), possibly in relation to food availability (Mahaffy, 1981). The proposed project would be located approximately 2,000 feet from the edge of the 2,625 feet radius. Home ranges have been more difficult to identify and are variable (Newton, 1976; Dugoni et al., 1978; Dugoni, 1980).

FWS recommends that disturbances within the secondary management zone (1 mile radius centered at the nest) should be minimized (FWS, 1987). The project as planned would have minimal impact to the secondary management zone. Approximately 3,300 linear feet of levee within the secondary zone is planned for upgrading (Figure 2). Approximately two additional acres of existing woodland and grassland would be cleared on the protected side of the levee. The removal of this vegetation would not impact food resources of the eagle. Trees growing along the edge of the waterway within this secondary management zone would probably not be removed during levee upgrading. Work associated with upgrading the levees along the Harvey, Algiers, and Hero Canal could disrupt feeding activities in the immediate vicinity. However, alternate foraging areas exist to the south and west of the project area, in addition to portions of the project area that would not be under construction.

All new earthen material placed on the levee would be seeded and fertilized to accelerate revegetation of the levee. Upgrading of the levee would occur outside of the nesting season (October 1 to May 15), although some

Figure 2 was withheld from this document to avoid publishing the exact location of the nest site.

reseeding and fertilizing of the levee may be required during this period. The current levee has been mowed during the previous nesting season. Therefore, reseeding and fertilizing should not present a threatening disturbance to the nesting site. All work-related equipment would be removed from the secondary management zone prior to nesting season. Other impacts expected to occur at the construction site are exhaust emissions and noise generated by heavy equipment. Noise levels would rarely be above 80 dB beyond 50 meters from the equipment (Carstea et al., 1976), and exhausts would not impact the nest. No increase in development near the eagle nests would be encouraged because of the proposed work. All other impacts would be outside the secondary management zone.

Based upon the above discussion, New Orleans District believes that construction of the West Bank (East of Harvey Canal) Hurricane Protection Project would not threaten the continued existence of the bald eagle pair using nest Number 57, nor their critical habitat.

LITERATURE CITED

Bettinger, K. 1988. FWS personal communication with B. Martinson, NOD, COE.

Carstea, D. et al. 1976. Considerations for the Environmental Impact Assessment of Small Structures and Related Activities as Applied to the New Orleans District U.S. Army Corps of Engineers. Mitre Technical Report MTR-7126. The Mitre Corporation, McLean, Viriginia.

Dugoni, J.A. 1980. Habitat Utilization, Food Habits, and Productivity of Nesting Southern Bald Eagles in Louisiana. M.S. Thesis, Louisiana State University, Baton Rouge, Louisiana.

FWS (see U.S. Fish and Wildlife Service).

Grier, J.W. 1969. Bald eagle behavior and productivity responses to climbing to nests. J. Wildl. Manage. 33:961-966.

Mahaffy, M.S. 1981. Territorial behavior of the bald eagle on the Chippewa National Forest. M.S. Thesis, University of Minnesota, St. Paul.

Mahaffy, M.S. and L.D. Frenzel. 1987. Elicited territorial responses of northern bald eagles near active nests. J. Wildl. Manage. 51:551-554.

Martinson, Bob. 1990. Biological Assessment. West Bank of Mississippi River, East of Harvey Preliminary Draft EIS.

McEwan, L.C. 1977. Nest site selection and productivity of the southern bald eagle. M.S. Thesis, University of Florida, Gainesville, Florida.

Muth, David. 1992. National Park Service, personal communication with D. Walther, NOD, COE.

Newton, I. 1976. Population limitation in diurnal raptors. Can. Field-Nat. 90:274-300.

U.S. Fish and Wildlife Service. 1987. Management Guidelines for the Bald Eagle in the Southeast Region. U.S. Fish and Wildlife Service, Atlanta, Georgia.

Biological Assessment

West Bank Hurricane Protection (East of Harvey Canal)

This assessment addresses the impacts that may occur to bald eagles (Haliaeetus leucocephalus) from the construction of the West Bank (East of Harvey) Hurricane Protection Project (Figure 1). One nest (Number 25) is located approximately 5.0 miles southeast of the nearest area of proposed construction along the Hero Canal near Oakville (Figure 2 and 3) and two other nests (Number 2 and Number3a) are located approximately 10.0 miles southwest of the same construction area (Figures 2 and 4). These nests were identified in the U.S. Fish and Wildlife Service (FWS) letter to the U.S. Army Corps of Engineers (COE) dated April 28, 1988. The bald eagle was the only threatened or endangered species identified by the FWS in the area.

The three nests are active and have been utilized for many years. Recent production data are shown in Table 1. The production is typical for Louisiana (Dugoni, 1980). Background data on eagles in Louisiana are discussed in Attachment 1, a Biological Assessment for Freshwater Diversion for Breton Sound, Barataria Basin and Terrebonne Basin, which included nests 2 and 3a.

TABLE 1

NUMBER OF YOUNG PRODUCED RECENTLY IN THE BALD EAGLE NESTS NORTH AND SOUTH LAFITTE AND JESUIT BEND.*

	Year	
Nest Number	1986	1987*
2	2	2
3a	2	vacant
25	2	2

* (Bettinger, 1988, personal communication).

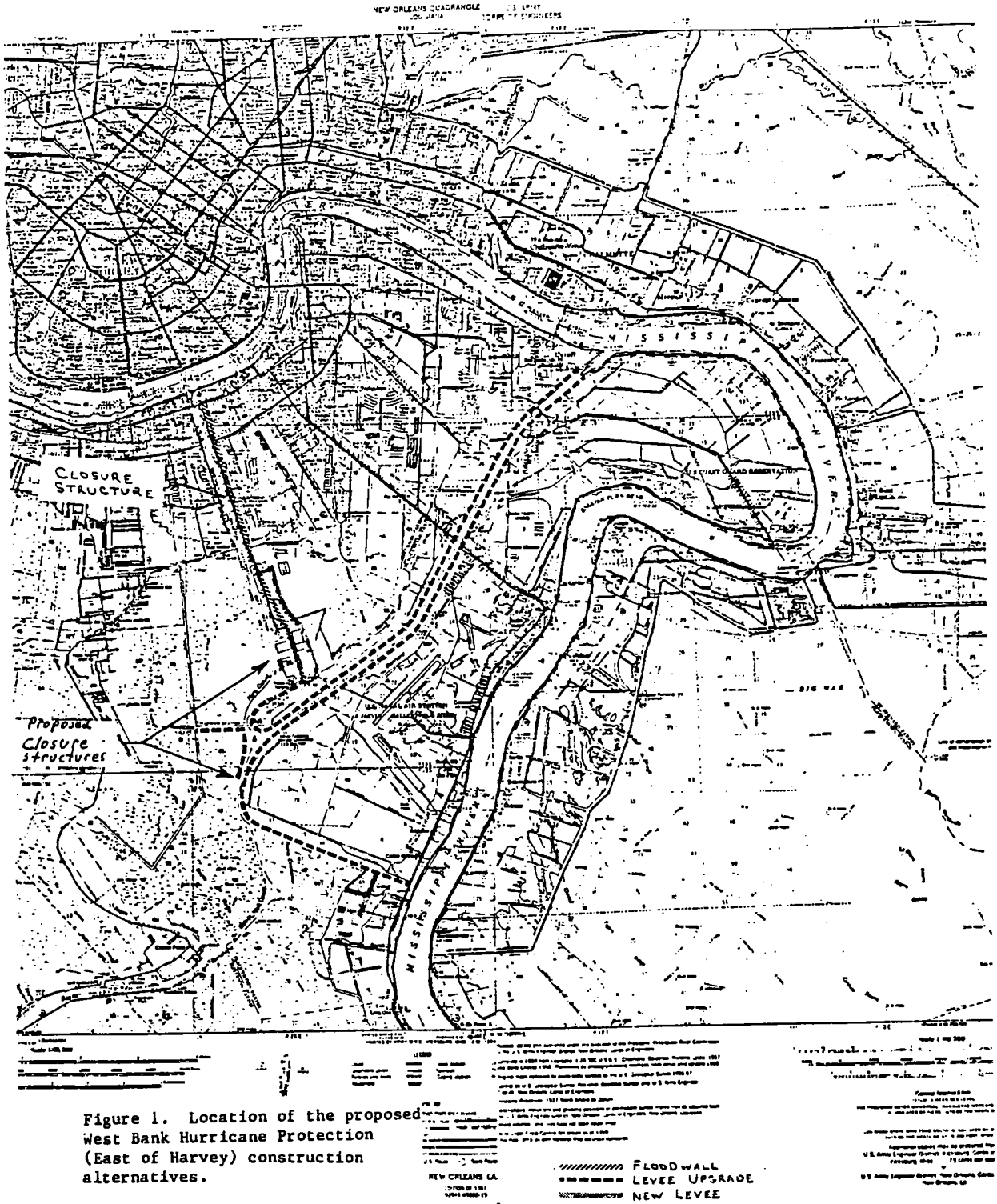


Figure 1. Location of the proposed West Bank Hurricane Protection (East of Harvey) construction alternatives.

Figures 2, 3, and 4 were withheld from this document to avoid publishing the exact location of the nest sites.

The area of proposed work nearest the eagle nests would be levee construction near Oakville. The construction would occur in an area that is already settled and, for the most part, has levees around it. Therefore, no impacts are expected outside the immediate construction site, except for exhaust emissions and noise generated by heavy equipment. Noise levels would rarely be above 80 dBA beyond 50 meters from the equipment (Carstea et al. 1976), and exhausts would not impact the nests. The small amount of vegetated area that would be removed for levee construction would have no impact on the food resources of the eagles. No increase in development near the eagle nests would be encouraged because of the proposed work.

All impacts would be well outside the secondary (buffer) zone (FWS, undated) of one mile around nest locations. FWS recommends that disturbances within the secondary zone should be minimized. FWS recommends that a primary zone of 1,500-ft radius around a nest have no disturbance (FWS undated). Results from several studies suggest that nesting territory ranges from 0.4 to 0.8 km radii (Grier 1969; McEwan 1977; Mahaffy and Frenzel 1987), possibly in relation to food availability (Mahaffy 1981). The proposed project should have no impact on nesting territory. The critical primary zone identified by FWS would not be impacted by the proposed project. Home ranges have been more difficult to identify and are variable (Newton 1976; Dugoni, et al. 1978; Dugoni 1980). However, it is not expected that any of the proposed work locations represent preferred feeding grounds and may not be included in the eagles' home ranges at all because better feeding areas are located closer to the nests.

LITERATURE CITED

Bettinger, K. 1988. FWS personnal communication with B. Martinson COE.

Carstea, D. et al. 1976. Considerations for the Environmental Impact Assessment of Small Structures and Related Activities as Applied to the New Orleans District U.S. Army Corps of Engineers. Mitre Technical Report MTR-7126. The Mitre Corporation, McLean, Viriginia.

Dugoni, J.A. 1980. Habitat Utilization, Food Habits, and Productivity of Nesting Southern Bald Eagles in Louisiana. M.S. Thesis, Louisiana State University, Baton Rouge, Louisiana.

FWS (see U.S. Fish and Wildlife Service).

Grier, J.W. 1969. Bald eagle behavior and productivity responses to climbing to nests. J. Wildl. Manage. 33:961-966.

Mahaffy, M.S. 1981. Territorial behavior of the bald eagle on the Chippewa National Forest. M.S. Thesis, University of Minnesota, St. Paul.

Mahaffy, M.S. and L.D. Frenzel. 1987. Elicited territorial responses of northern bald eagles near active nests. J. Wildl. Manage. 51:551-554.

McEwan, L.C. 1977. Nest site selection and productivity of the southern bald eagle. M.S. Thesis, University of Florida, Gainesville, Florida.

Newton, I. 1976. Population limitation in diurnal raptors. Can. Field-Nat. 90:274-300.

U.S. Fish and Wildlife Service. Undated. Management Guidelines for the Bald Eagle in the Southeast Region. U.S. Fish and Wildlife Service, Atlanta, Georgia.

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section VI

Farmland Protection Policy Act Coordination

Farmland Protection Policy Act Compliance

Farmland Conversion Impact Rating forms were sent on three different occasions throughout development of the proposed action, to the regional office of the Soil Conservation Service, for the purpose of achieving compliance with the Farmland Protection Policy Act (FPPA) regarding proposed actions. The form on each occasion was returned clearly indicating that the lands in question did not meet the criteria for protection under the FPPA. Therefore, no further action is required.

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request February 1992
Name Of Project West Bank of the Mississippi River, East of the Harvey Canal Hurricane Protection	Federal Agency Involved U.S. Army Corps Engineers, New Orleans Dist.
Proposed Land Use Borrow area	County And State Plaquemines, Louisiana
PART II *(To be completed by SCS)*	Date Request Received By SCS 2-24-92 9EB

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☐ No ☑		Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS 2-25-92	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	200 acres			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	200 acres			
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points			
1. Area In Nonurban Use				
2. Perimeter In Nonurban Use				
3. Percent Of Site Being Farmed				
4. Protection Provided By State And Local Government				
5. Distance From Urban Builtup Area				
6. Distance To Urban Support Services				
7. Size Of Present Farm Unit Compared To Average				
8. Creation Of Nonfarmable Farmland				
9. Availability Of Farm Support Services				
10. On-Farm Investments				
11. Effects Of Conversion On Farm Support Services				
12. Compatibility With Existing Agricultural Use				
TOTAL SITE ASSESSMENT POINTS	160			
PART VII *(To be completed by Federal Agency)*				
Relative Value Of Farmland *(From Part V)*	100			
Total Site Assessment *(From Part VI above or a local site assessment)*	160			
TOTAL POINTS *(Total of above 2 lines)*	260			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

Enclosure 2

(See Instructions on reverse side)

Form AD-1006 (10-83)

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: November 1990
Name Of Project: West Bank of the Mississippi River, East of the Harvey Canal	Federal Agency Involved: U.S. Army Corps of Engineers
Proposed Land Use: Borrow araa	County And State: Jefferson, Plaquemines, LA
PART II *(To be completed by SCS)*	Date Request Received By SCS: 11/27/90

Does the site contain prime, unique, statewide or local important farmland? *(If no; the FPPA does not apply – do not complete additional parts of this form).*	Yes ☐	No ☒	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction: Acres: %		Amount Of Farmland As Defined in FPPA: Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System		Date Land Evaluation Returned By SCS: 12/10/90	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating: Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	175 acres			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	175 acres			
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

* U.S. GOVERNMENT PRINTING OFFICE: 1984-451-159/1324

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request October 6, 1989
Name Of Project West Bank of the Mississippi R. East of the Harvey Canal	Federal Agency Involved U. S. Army Corps of Engineers
Proposed Land Use Levee and outfall channel construction and borrow areas	County And State Jefferson, Orleans, Plaquemines, LA
PART II *(To be completed by SCS)*	Date Request Received By SCS 10/18/89

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☐ No ☑		Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	167	259	189	300
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	167	259	189	300
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points			
1. Area In Nonurban Use				
2. Perimeter In Nonurban Use				
3. Percent Of Site Being Farmed				
4. Protection Provided By State And Local Government				
5. Distance From Urban Builtup Area				
6. Distance To Urban Support Services				
7. Size Of Present Farm Unit Compared To Average				
8. Creation Of Nonfarmable Farmland				
9. Availability Of Farm Support Services				
10. On-Farm Investments				
11. Effects Of Conversion On Farm Support Services				
12. Compatibility With Existing Agricultural Use				
TOTAL SITE ASSESSMENT POINTS	160			
PART VII *(To be completed by Federal Agency)*				
Relative Value Of Farmland *(From Part V)*	100			
Total Site Assessment *(From Part VI above or a local site assessment)*	160			
TOTAL POINTS *(Total of above 2 lines)*	260			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section VII

EIS Mailing List

EIS MAILING LIST

All U.S. Senators and Congressmen representing Louisiana, Federal and state agencies, state officials, interested groups, and individuals initiating correspondence or making requests were mailed copies of the EIS when it was in the draft form. Additionally, copies were furnished to the local libraries listed below.

CONGRESSIONAL DELEGATION

Honorable J Bennett Johnston
Honorable John B Breaux

Honorable Billy Tauzin
Honorable Jim McCrery
Honorable Richard Baker
Honorable Robert L Livingston
Honorable William Jefferson

FEDERAL AGENCIES

Federal Emergency Mgmt Administration
  Mr John Seyffert, National Office
  Regional Office
Federal Highway Administration, Division Administrator
US Dept of Commerce
  NOAA, Ofc of Ecology & Conservation
  National Marine Fisheries Svc, Ms Peggy Jones
    Habitat Conserv Div c/o CCEER
  National Marine Fisheries Svc, Chief, Habitat Conservation Division
  Coast Guard 8th District, Commander (OAN)
US Advisory Council on Historic Preservation-Executive Director
US Advisory Council on Historic Preservation
US Dept of Agriculture
  Forest Service-Env Coordinator
    Planning & Budget Staff Unit
  Dr. Peter Smith
  Soil Conservation Service
    State Conservationist
    District Office, Boutte
US Dept of Energy, Office of Envir Compliance

US Dept of Housing & Urban Development
US Dept of the Interior
  Fish & Wildlife Service, Slidell
  Fish & Wildlife Service, Lafayette
  Asst Sec for Prog Dev & Bud / Ofc of Env Proj Review
  National Park Service
    Jean Lafitte National Historical Park
US Dept of Navy
  Alvin Callender Field, Commanding Officer
US Envir Protection Agency
  Administrator
  Marine Protection Br, Chief, (WH-585)
  Office of Federal Activities
  EIS Coordinator - Reg VI

STATE OFFICIALS

Honorable Bob Odom, Commissioner of Ag & Forestry
Honorable Edwin W Edwards, Governor of Louisiana
Honorable Melinda Schwegmann, Lieut Governor of Louisiana
Honorable Richard Ieyoub, Attorney General
Honorable W Fox McKeithen, Secretary of State

STATE AGENCIES / OFFICIALS

Department of Health and Hospitals
  Office of Health Services and Environmental Quality
Department of Health and Human Resources
  Office of Preventive & Public Health Services
Department of Transportation and Development
  Secretary
  Office of Public Works, Chief Engineer
  Office of Highways, Chief Engineer
  Asst. Chief Engineer, Water Resources
  Public Hearings & Environmental Impact Engineer (Sect 208)
Department of Wildlife and Fisheries
  Secretary
  Ecological Studies Section
  Natural Heritage Program

Department of Environmental Quality
- Secretary
- Water Pollution Control Division
- Inactive and Abandoned Sites
- Southeast Regional Office

Department of Natural Resources
- Geological Survey
- Title and Records Section
- Office of Coastal Restoration and Management
  - Consistency Coordinator
- Coastal Management Division, Coastal Resources Analyst

Department of Agriculture & Forestry
- Commissioner
- Office of Forestry
- Office of Agriculture and Environmental Sciences

Department of Culture, Recreation and Tourism
- State Historic Preservation Officer
- Office of State Parks

Department of Urban and Community Affairs, Office of Planning and Technology

Division of Administration
- State Planning Office
- Federal Programs Review Coordinator

Governor's Coastal Protection Task Force

SENATORS / REPRESENTATIVES

Senator Samuel B. "Sammy" Nunez, Jr.
Senator Francis C. Heitmeier
Senator J. Chris Ullo

Representative John A. Alario, Jr.
Representative Steve J. Theriot
Representative Joseph F. Toomy
Representative Steve Windhorst
Representative Kyle Mark Green
Representative Frank J. Patti

LEVEE BOARDS
West Jefferson Levee District, Board of Commissioners
Orleans Levee District, Board of Commissioners

PLAQUEMINE PARISH OFFICIALS

Parish President Luke A. Petrovich

OFFICIALS, CITY OF NEW ORLEANS

Mayor Marc Morial
Chief Administrative Officer, Leonard Simmons

JEFFERSON PARISH OFFICALS

Jefferson Parish President, Michael J. "Mike" Yenni
Robert B. "Bob" Evans, Council Chairman

OTHER LOCAL OFFICIALS

Mayor, City of Gretna, Ronnie C. Harris
Mayor, Town of Jean Lafitte, Timothy P Kerner
Mayor, City of Westwego, Robert E Billiot
St Charles Parish Council, Joan Becnel, Secretary

ENVIRONMENTAL ORGANIZATIONS

Audubon Society-National Chairman
Audubon Society-Orleans, Mr Barry Kohl-Conserv Chairman
Audubon Society-National, Ms Doris Falkenheiner, Baton Rouge Chapter
Audubon Society-National, Southwestern Regional Office
Coalition of Coastal Parishes
Coalition to Restore Coastal Louisiana, Mr Mark Davis/Exec Director
South La Environmental Council, Mr Donald Landry-President
Environmental Defense Fund, Mr James T B Tripp
La Nature Conservancy, Mr Paul Davidson, Director, BBCC
La Wildlife Federation, Mr Randy P Lanctot-Exec Director
National Wildlife Federation
Natural Resources Defense Council
Sierra Club, Delta Chapter
Sierra Club, Legal Defense, Mr Robert Wiygul
League of Women Voters of Louisiana

LIBRARIES

Belle Terre Library
Gretna Library
Marrero Library
West Bank Regional Library
Algiers Regional Library
Jefferson Parish Library
Dillard University Library
Xavier University of La, Library
Loyola University Library
Plaquemines Parish Library
Coastal Studies Institute
La Collection, University of New Orleans Library
Mr Colin Hamer/Louisiana Division, New Orleans Public Library
La Ofc Comm & Indus Research
La Collection/Howard-Tilton, Tulane Univ-Ms Joan Caldwell
Library, Louisiana State University

BUSINESSES, OTHER GROUPS, AND INDIVIDUALS

Harvey Canal Industrial Association, Inc
Brown, Cunningham, and Gannuch
Waldemar, S. Nelson, and Company
Industrial Pipe, Inc.
Norwood Land Company
Rathborne Properties, Inc.
Design Engineering, Inc.
Coastal Engineering, Inc.
Burke Kleinpeter, Inc.
Home Builders Association of New Orleans
Terrytown Civic Association
Timberlane Improvement Association
Baywood Civic Association
Drainage Advisory Board
Algiers Drainage Committee

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section VIII

Contaminant Investigation and Disposal Plan

CONTAMINANT INVESTIGATIONS AND DISPOSAL PLAN

CONTAMINANT INVESTIGATIONS

Introduction

Within the study area, past and present commercial and industrial activities have been located primarily along the Harvey and Algiers Canals and the Mississippi River. Commercial activities located along the Harvey and Algiers Canals are primarily associated with support of the petrochemical extraction industry and the shipping industry. Prior to regulation, these industries could have released toxic or hazardous substances into the canals. The Harvey and Algiers Canals also receive almost all stormwater runoff from the study area, thus the canals act as a sink area for many contaminants associated with residential and commercial development in the area. Sampling in the Algiers and Harvey Canal by the Louisiana Department of Environmental Quality (LDEQ) and the Corps of Engineers (COE) revealed the presence of pollutants in these waterways.

Concern about the use of contaminated material from the Harvey Canal for levee construction exists because of the residential development in the area and the potential for future development to occur closer to the levee. Additional concern centered over leachates running off into the Harvey Canal and impacting or bioconcentrating in the local fish community.

Use of existing levee material for construction was also questioned because these levees have been improved with material taken from the canal. Therefore, a sampling plan was developed in coordination with LDEQ to determine the composition and concentration of pollutants in the proposed work areas in the Harvey Canal and on the adjacent levee. LDEQ approval of the sampling plan is noted in their agency letter dated September 12, 1991. A copy of the sampling plan is available for review at NOD. Results of the sampling in the Harvey Canal and adjacent area are presented below and are also addressed in Appendix C, Section I, Water Quality.

Source of Contaminants in the Harvey Canal

In addition to the sources of contamination presented in the introduction, other possible sources of contamination exist and are discussed below.

Five sites along the Harvey Canal and one site along the Algiers Canal underwent a preliminary assessment (PA) by the Environmental Protection Agency (EPA) for possible inclusion on the National Priorities List (NPL) "Superfund Program." The investigation of a site to be included in the "Superfund Program" is done when, for some reason, suspected contamination of a site is reported to EPA. This does not mean that contamination at the site does exist, but is only suspected. Following completion of the PA's, EPA assigned the sites a "no further action" status because the sites did not score high enough as rated by the Hazard Ranking System (HRS) to be eligible for cleanup under the superfund program. However, because the sites did not score high enough to be included on the NPL does not mean they are contaminant-free. LDEQ has investigated four of these sites and is currently overseeing further sampling, cleanup, or has already approved the completed remediation at these sites. Runoff or leachates from these sites could decrease the water quality in the Harvey Canal and act as a source of contamination. Some of these sites are discussed below in more detail.

Spillage of cargo from the decks of boats and barges could create localized concentrations of contaminants. The contaminants could then be dispersed throughout the canal and continually reintroduced into the water column by currents generated by boat traffic. Bilge water pumped from boats and barges could contain small amounts of contamination, also contributing to the existing problem.

Barges abandoned in the Harvey Canal and the Gulf Intracoastal Waterway (GIWW) pose another possible source of contamination in the canal. Approximately 6 barges have been abandoned within the project area. These barges are located in the Harvey Canal and near the intersection of the Harvey and Algiers Canals. None are located in the Algiers Canal. Illegal dumping of material into the abandoned barges has been documented by the United States Coast Guard (USCG). Sampling of the barges by the USCG has revealed the presence of illegally dumped waste oil and asphalt in some of the barges.

Other Areas of Concern

LDEQ was contacted about other possible soil contamination sites along the alignment of the Recommended Plan. The following contaminated sites were identified by LDEQ. The proposed action at each site is presented.

The levee alignment at the intersection of the Algiers and Harvey Canals is currently offset from the present levee alignment (Plate 11). Local commercial activities indicated they did not wish to be included in an improved hurricane protection system. Relocation of some of their facilities would be required if the existing levee is upgraded. Commercial activities

at this location consist primarily of barge cleaning operations. Prior to environmental regulation the cleaning of barges may have resulted in the release of chemicals carried by barges, possibly polluting the local environment. Alignment of the Recommended Plan would avoid potential problems.

Other barge cleaning operations were located north and east of the Hero Pumping Station. Hurricane protection in these areas would be provided by floodwalls with emplementation of the Recommended Plan. Floodwalls would be constructed by driving steel sheet piles into the ground. Construction of a floodwall would minimize disturbance of the soil in these areas.

Alignment of the levee south of the Hero Canal in the Oakville area caused concern about possible HTRW problems. A construction demolition landfill parallels the Hero Canal for approximately 1,700 feet. However, LDEQ has reported that no known Hazardous, Toxic, Radioactive Wastes (HTRW) materials have been landfilled at this site. Leachate and topsoil samples taken at the site by LDEQ revealed no contaminants present. The Oakville levee alignment associated with the Recommended Plan would enclose the landfill in this area as requested by LDEQ.

Upgrading of existing levees in the remaining project area should not involve any HTRW problems. The proposed borrow site is located in a pasture, and no record could be found of any type of development previously occurring on the site. LDEQ was contacted concerning the location of the borrow site, and they indicated no known HTRW sites were located on this area. LDEQ also did not know of any HTRW sites located on the suggested alternate borrow sites (Plate 23).

Other Alternatives that Were Examined in the Feasibility Report

Examination of the alternatives in the Feasibility Report was done to determine if an alternative existed that would avoid work in an area that has contaminated sediment or soil. Because all alignments for the different alternatives follow the same route along the Algiers Canal, the Hero Cutoff Area (the intersection of the Algiers and Harvey Canals), the Hero Canal, and the Oakville area, there is no difference in the chance of encountering contaminated soil and sediments. Sampling in the Harvey Canal indicated contamination exists throughout the canal. Areas having lower concentrations of some contaminants exist towards the southern end of the Harvey Canal, however more environmental damage to bottomland hardwood forests would result by relocating the structure to this area and contaminants would still be encountered.

Alternative 1 provides hurricane protection by the construction of parallel sheet pile walls along the Harvey Canal up to the Harvey Lock at the Mississippi River (Plate 3). Though this alternative would have avoided contaminated sediment in the Harvey Canal, records of violations including records of contaminated soil have occurred along the alignment for this alternative. There has been considerable concern for past HTRW violations in this area. These sites possibly would need to be remediated before sheet pile could be driven. Depending on the level of remediation achieved, sheet piling might then be driven in the area. Based upon these facts and the considerable opposition to Alternative 1 by the industries along the Harvey Canal, the determination was made that Alternative 3B would be the Recommended Plan.

Alternative 2 would require the construction of a closure structure across the southern end of the Harvey Canal near the Hero Cutoff, construction of a 6,000 cubic feet per second (cfs) pumping station adjacent to the floodgate, and excavating a new navigation channel west of the closure structure (Plate 4). The site of the closure structure and new pumping station are located near sites that LDEQ has identified as having been, or currently still are, contaminated. Prior to regulation, industries in this area could have released pollutants into the Harvey Canal. Samples taken from the Harvey Canal in this area indicate that these sediments are contaminated (See Appendix C, Section I, Water Quality). Since excavation would be required in the Harvey Canal and near sites known to have been contaminated (or still contaminated) this alternative does not avoid or reduce the amount of contaminated sediment or soil that would be handled. This alternative was also the most costly of the alternatives examined and would impact a greater amount of bottomland hardwood forests.

Investigations

Soil and sediment samples were taken on several different occasions from the Harvey Canal and surrounding areas. The first series of samples were taken by the COE in April, 1987. In August of 1988, LDEQ took samples throughout the area, two of which were located at the project site. The locations are shown on Plate 22. Then, in September of 1991, a third series of samples were taken in a cooperative effort with both LDEQ and COE (Plate C-VIII-1). This third series of samples was concentrated in the study area.

Investigation Progression

Samples and testing methods were conducted as a result of individual agency concerns and as a result of meetings between the COE and the LDEQ. Soil and sediment samples were taken on several different occasions from the Harvey Canal and surrounding areas.

Sediment samples were taken by the COE in April, 1987, in both the Harvey and Algiers Canals. In August of 1988, LDEQ took samples throughout the area, two of which were located at the site of the proposed floodgate. Sampling locations are shown on Plate 22. Then, in September of 1991, both sediment and soil samples were taken in a cooperative effort with both LDEQ and COE. This third series of samples was concentrated in the Harvey Canal area, as shown on Plate C-VIII-1. Representatives of the Waterways Experiment Station (WES) Environmental Laboratory as well as the U.S. Fish and Wildlife Service were participants at one or more of the COE and LDEQ meetings. The 1991 samples were confined to the area around the proposed floodgate; however, comparable background samples came from nearby, but not adjacent, areas. The decision was made by the COE and the LDEQ to test for metals via bulk analyses on both the sediments within the canal and on the soil on the bank adjacent to the end cuts of the bypass channel. Background samples were taken for comparison with the soil samples. Tests for priority pollutants (organic compounds) were conducted for each sample also. The analysis of these samples was done by the WES Environmental Laboratory. LDEQ recommended, upon seeing the results of the bulk analyses from the sediment and the soil samples, that TCLP (leachate) tests be conducted on three of the sediment samples. The TCLP test was not recommended for any of the soil samples.

Sediment Sampling.

The sediment samples taken in 1987 by the COE were analyzed for metals. Of these samples, HC 2 and HC 3 were taken in the Harvey Canal near the location of the proposed floodgate and the bypass/outfall channel. Both a bulk sediment analysis and an elutriate test were conducted. The bulk sediment analysis indicates the total concentration of chemical constituents in a sample (Table C-VIII-1), while the elutriate test is designed to provide an indication of the chemical constituents likely to be released to the water column during a disposal/filling operation. The results of the elutriate test can be compared to appropriate water quality criteria (Table C-VIII-2). These numerical water quality criteria were developed by the Environmental Protection Agency (EPA) and are based on chronic and acute toxicity of various pollutants to aquatic organisms. Included in this table is a water sample from the HC 2 location which was used in the elutriate tests of the sediments. Cyanide and phenol levels in all samples in Table C-VIII-2 were below detection limits.

The sediment samples taken by LDEQ in 1988 (02-HC-02 and 02-HC-03) and the sediment samples taken in 1991 by COE/LDEQ (EH 1, 4, 7, and 8) were analyzed for metals and priority pollutants, including Acid Extractables, Base/Neutral Extractables, Pesticides, Polychlorinated Biphenyls (PCB's) and Volatile Organic Compounds (Table C-VIII-3). The highest value of three replicates of a given sample of the 1991 sampling effort are reported in

Tables C-VIII-1 & C-VIII-3. All sediment samples, except EH 7, were taken from sections of the Harvey Canal that would be excavated in the wet. Sample EH 7 is from the area where the floodgate would be located. Excavation for the floodgate will be done in the dry, through the use of a cofferdam. Blank spaces in these tables indicate compounds tested for, but not detected.

Comparison of values in Table C-VIII-1 gives an indication of the variability of bottom sediments in the Harvey Canal. The samples shown were all from the Harvey Canal between the Harvey and Hero pumping stations, and were taken within a four and a half year period. For most metals, values for the different samples are within an order of magnitude of each other. The elutriate tests performed on two of the samples (HC 2 and HC 3) revealed elevated levels of mercury. As Table C-VIII-2 shows, mercury concentrations in both elutriates was greater than the EPA Acute Criteria. Cadmium concentration in the elutriate from sample HC 3 exceeded the Acute Criteria. The tables show that although the HC 2 sediment had more than twice the cadmium concentration of the HC 3 sediment, its elutriate had much less cadmium. In general, the elutriate test results do not closely parallel bulk sediment concentrations.

Table C-VIII-3 summarizes the results of the priority pollutant analyses of the 1988 and 1991 samples. Only those compounds that were detected are listed. Neither pesticides nor acid extractables were detected in any of the samples, except a low concentration of Heptachlor in EH 4. Numerous base/neutral extractables and volatile organic compounds were measured, particularly in the 1988 samples. High phthalate concentrations can sometimes be traceable to plastics contamination of a sample. Plastic contamination can occur during sampling operations. Of particular concern is the high concentration of Aroclor 1254 (6.2 ppm), a PCB, in a sample taken by the Hero Pump Station.

Following bulk sediment analysis and priority pollutant analysis of samples, Toxicity Characteristic Leaching Procedure (TCLP) tests were performed on three sediment samples and one background soil sample (1991 series) to assess the risk of contaminated leachates reaching the groundwater from the excavated sediments. Levels within the remaining soil samples were sufficiently low that LDEQ did not recommend TCLP tests on those samples. Table C-VIII-4 shows the results of these tests. Constituent concentrations are well below EPA's regulatory levels.

The data suggests that if the Harvey Canal sediments were to be excavated in the wet using a hydraulic dredge, resulting temporary water column concentrations of both cadmium and mercury would likely be greater than the Acute Criteria. Although water column

TABLE C-VIII-1

RESULTS OF BULK SEDIMENT ANALYSES
HARVEY CANAL, CONCENTRATIONS IN mg/kg dry weight

	Station							
PARAMETER	HC 2	HC 3	02-HC-02	02-HC-03	EH 1	EH 4	EH 7	EH 8
Copper	16.3	4.22	62.9	97.1	59.1	64.5	59.4	24
Zinc	403	222	853	1490	488	579	561	186
Arsenic	30.4	31.5	4.33	11.6	10.6	11.2	8.7	7.4
Chromium	25.2	15.5	43	49.9	42.4	49.3	49.6	23.6
Mercury	0.031	0.216	0.18	0.11	0.346	0.492	0.412	<0.100
Cadmium	2.05	0.812	3.85	1.49	2.7	2.6	<0.10	1.3
Lead	151	42.2	196	167	111	188	121	52.9
Nickel	42.4	52.9	*	*	44.6	44.7	43.8	31.3
Iron	29,800	23,400	27,000	25,700	28,300	32,300	24,900	17,300
Manganese	606	500	*	*	794	1,250	888	384
Calcium	2,300	1,910	*	*	10,000	10,100	9,190	7,930
Magnesium	3,730	3,860	*	*	5,880	5,720	5,560	5,250
Beryllium	*	*	*	*	1.3	1.3	1.3	1
Aluminum	*	*	*	*	20500	22400	20800	14700
Barium	*	*	*	*	1860	1210	2350	467
Cobalt	*	*	*	*	13.8	12.6	12.4	12.2
Silver	*	*	*	*	0.9	0.9	<0.10	0.6
Thallium	*	*	*	*	0.3	0.1	0.2	0.3
Potassium	*	*	*	*	2550	2690	3000	1790
Sodium	*	*	*	*	3580	421	352	412
Vanadium	*	*	*	*	40.3	41.6	41.6	31.9
Oil & Grease	4,670	3,490	*	*	*	*	*	*
COD	106,000	178,000	*	*	*	*	*	*
TVS	65,200	103,000	*	*	*	*	*	*
Total Phosphorous	2,750	1,260	*	*	*	*	*	*

* Sample not analyzed for listed parameter.

HC 2 and HC 3 samples taken in April, 1987, by USCOE. 02-HC-02 and 02-HC-03 samples taken by DEQ in August, 1988. Samples EH1, EH4, EH7, and EH8 taken in coordinated effort in April, 1991. Values reported (EH series only) are the highest of three replicates of a given canal cross-section. Antimony and Selenium not detected in EH series samples.

TABLE C-VIII-2

RESULTS OF 1987 WATER AND SEDIMENT ELUTRIATE ANALYSES
CONCENTRATIONS IN PPB

PARAMETER	Acute Criteria	Chronic Criteria	HC 2 Total	HC 2 Diss.	HC 2 Elut.	HC 3 Elut.
Copper	23.02	15	8	<1	<1	1.5
Zinc	120.13	108.8	50	12	18	24
Arsenic			7	5	8	9
Arsenic (III)	360	190				
Chromium			6	<1	1	1
Chromium (VI)	16	11				
Chromium (III)	2,180	260				
Mercury	2.4	0.012	0.45	<0.05	4.75	4.55
Cadmium	5.36	1.41	0.5	<0.1	<1	6.3
Lead	117.4	4.58	14.2	<1	<1	5.3
Nickel	1794	199.4	14	12	107	512
Iron		1,000	3,800	2.4	52	44
Manganese			212	93	956	1,120
Calcium			30,800	23,700	52,200	37,500
Magnesium			13,500	12,000	19,600	17,500
COD			21,200	12,300	14,700	31,800
Total Phosphorous			160	20	30	30

Exceeds Acute Criteria
Exceeds Chronic Criteria

TABLE C-VIII-3

RESULTS OF PRIORITY POLLUTANT ANALYSES, CONCENTRATIONS IN PPB

Parameter	02-HC-02	02-HC-03	EH1	EH4	EH7	EH8
Aroclor 1254		6,200				
Acenapthene	150	610				
Flourene	90	550				
Hexachlorobenzene	375					
Phenanthrene		2,700				
Flouranthene	830	5,000				
Pyrene	1,700	5,500				
Bis(2-ethylhexyl) phthalate	41,000	4,000				
Benzo(a)anthracene	400	1,900	0.089			
Chrysene	720	2,600				
Benzo(k)flouranthene		1,600				
Acetone				0.34		
Vinyl Chloride		5				
Methylene chloride			0.26	0.27	0.033	0.024
Heptachlor				0.0053		
1,1-Dichloroethane				0.011		
t-1,2-Dichloroethane		7				
Trichloroethene		3				
Benzene	1	1				
Tetrachloroethene		2				
Toluene	2	1				
Chlorobenzene		1				
Ethylbenzene	2	2				

Includes analysis for PCB's, Pesticides, Acid extractables, Base/Neutral extractables, and Volatile Organic Compounds.

TABLE C-VIII-4

TCLP TEST RESULTS, CONCENTRATIONS IN PPM

PARAMETER	EH 1	EH 4	EH 7	EH 12	BLANK	REGULATORY LIMITS (PPM)
Arsenic	0.0055	0.0431	0.0066	0.0043	<0.0020	5
Barium	1.69	2.3	2.02	2.64	<0.010	100
Cadmium	0.005	<0.004	<0.004	<0.004	<0.0001	1
Chromium	0.0011	0.0012	<0.0010	0.0028	0.00083	5
Lead	0.018	0.0258	0.02	0.0196	<0.0010	5
Mercury	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	0.2
Selenium	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	1
Silver	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	5

EH-12 is background soil sample.

concentrations of lead, nickel and iron would likely exceed Chronic Criteria during dredging, the effects would be temporary. Such conditions are also possible whenever heavy boat traffic in the canal causes bottom sediments to be resuspended. It is, therefore, apparent that the contaminants present in the sediments of the Harvey Canal would pose a reduced threat to the environment, and would be less available to aquatic organisms, if removed. However, due to the risk of exceeding Acute Criteria for certain parameters, the use of dredging techniques and equipment which minimize resuspension of sediments during excavation and disposal would be utilized. Mechanical dredging, utilizing closed clamshell or equally effective measures to minimize resuspension of sediments, would be used. The use of silt curtains surrounding the dredging activity would also limit the spread of contaminants by confining the resuspended sediments until settling occurs (see Plate C-VIII-2).

Soil Sampling.

The coordinated sampling effort in 1991 included soil samples in locations where the excavation of material is required for construction of the navigable floodgate and the temporary bypass/outfall channel. Tests were made for priority pollutants utilizing bulk soil analyses. Table C-VIII-5 shows the concentrations of numerous metals in the soil samples, including the mean concentration of four background samples. Concentrations are similar to those found in Harvey Canal sediments, with slightly lower concentrations of barium and cobalt in the soils. Selenium was detected at low levels in the soil, and was not detected in any sediments.

Table C-VIII-6 shows the concentrations of priority pollutants in the soil samples. Of the large number of compounds tested for, only 5 were detected. Sample EH 2 contained less than 2 ppb of two phthalates, compounds associated with plastics. Three samples contained low levels of acetone, which may be the result of rinsing laboratory containers with this solvent between samples. Methylene chloride was detected in all soil samples (as well as four sediment samples). Aroclor 1254, a polychlorinated biphenyl (PCB) compound, was detected in sample EH 5, at a concentration of 0.15 ppb. TCLP tests were not run on the soil samples as discussed previously because of the lower level of contamination of metals found in the bulk soil analysis as compared to the sediment analysis.

Summary of Investigations

Chemicals and metals present in the soils and sediments of the project area reflect the industrialized nature of the Harvey Canal and the surrounding residential areas. Similar levels of metals were observed in both the soil and sediment samples, when compared to the

TABLE C-VIII-5

RESULTS OF BULK SOIL ANALYSES
HARVEY CANAL, CONCENTRATIONS IN mg/kg dry weight

	Station					
PARAMETER	EH 2	EH 5	EH 9	EH 10	EH 11	BACKGROUND
Copper	32.4	29.7	26.1	37.8	42.5	29.9
Zinc	93.8	101	153	125	332	300
Arsenic	8.5	8.5	6.5	5.8	10.8	10.3
Beryllium	0.8	0.9	0.9	1.6	1.2	1
Chromium	31.4	26.1	28.6	39.1	34.6	34.5
Mercury	0.173	0.221	0.129	0.11	0.183	0.175
Cadmium	4.4	1.1	0.6	0.6	1.6	0.9
Lead	31.5	36.4	54.3	49.8	145	57.4
Nickel	35.3	30	28.8	39.7	33.8	33.6
Iron	24,400	21,600	20,800	30,900	27,700	22,700
Manganese	323	784	344	363	368	320
Calcium	4,760	13,800	12,900	10,600	14,600	7,350
Magnesium	5,900	7,790	5,590	8,620	6,500	5,390
Aluminum	23000	15100	16800	28000	21300	22400
Barium	208	323	232	245	534	199
Cobalt	6.6	7.3	8.1	9.6	7.7	8.2
Selenium	0.8	<0.50	<0.50	1.4	0.7	1.4
Silver	1.1	0.8	0.4	0.4	0.3	0.3
Thallium	0.4	0.1	0.3	0.4	0.6	0.4
Potassium	3050	2850	2350	3480	2610	2523
Sodium	506	2220	502	1830	344	716
Vanadium	40.6	33.4	44.6	73.6	56.5	54.8

Samples EH 2, EH 5, EH 9, EH 10, EH 11, and Background were taken in a coordinated effort in April, 1991. Background values are means of samples EH 12 through EH 15. Values for other samples are the highest of up to four replicates.

TABLE C-VIII-6

RESULTS OF PRIORITY POLLUTANT
SOIL ANALYSIS
CONCENTRATIONS IN PPB

Parameter	EH 2	EH 5	EH 9	EH 10	EH 11	BACK-GROUND
Aroclor 1254		0.15				
Dibutylphthalate	1.3					
Bis(2-ethylhexyl)phthalate	1.9					
Acetone		0.22	0.37	0.16		
Methylene chloride	0.13	0.072	0.15	0.095	0.021	0.051

Includes analysis for PCB's, Pesticides, Acid extractables, Base/Neutral extractables, and Volatile Organic Compounds.

background samples. Much greater numbers of organic compounds in higher concentrations were detected in the sediment samples than in the soil samples.

Given the nature of existing conditions in the project area, the net result of the project would be the removal of the contaminated sediment from the water bottom and hauling of these materials to an industrial landfill. Excavated soils, with lower levels of contamination, would be used in levee construction. Temporary exceedances of Acute Criteria during dredging of the canal are possible for certain pollutants. Dispersal of these contaminants would be minimized by the use of silt curtains.

Methods employed to minimize exposure of the public and fish and wildlife resources to the contaminants during construction and transport are discussed in the following Sediment Disposal Plan.

SEDIMENT DISPOSAL PLAN

Introduction

The area east of the Harvey Canal includes both the Harvey and Algiers Canals. Commercial and industrial activities located along these canals are primarily associated with the support of the petrochemical extraction industry and the shipping industry. These canals also receive all stormwater runoff from the study area. Water and sediment quality sampling performed by the Corps of Engineers and by the Louisiana Department of Environmental Quality (LDEQ) along the Harvey Canal revealed the presence of contaminated sediments. Concern about the use of contaminated material from the Harvey Canal for levee construction exists because of the proximity of existing residential development and the potential for future development to occur closer to the levee.

In order to better define the extent of possible contamination, additional sediment samples were collected from areas in the Harvey Canal that would be impacted by construction of the proposed project. Bulk sediment analyses and Toxicity Characteristic Leaching Procedure (TCLP) tests were performed on the additional samples. The test results were well below EPA's regulatory levels. This indicates that the material is not classified as a hazardous waste and would not require special handling. In informal review the LDEQ has not disagreed with this determination. However, at a March 16, 1994, meeting held in the office of the Inactive and Abandoned Wastes Sites Division of the LDEQ, concern was expressed for levels of cadmium and barium shown in the results of the TCLP tests done for the soil samples. Cadmium and barium, at the levels resulting from the TCLP tests and according to 40 CFR 300, Section 102, and 54 FR 33418, are CERCLA regulated substances. Therefore, a plan for handling and depositing the material excavated from the Harvey Canal was developed.

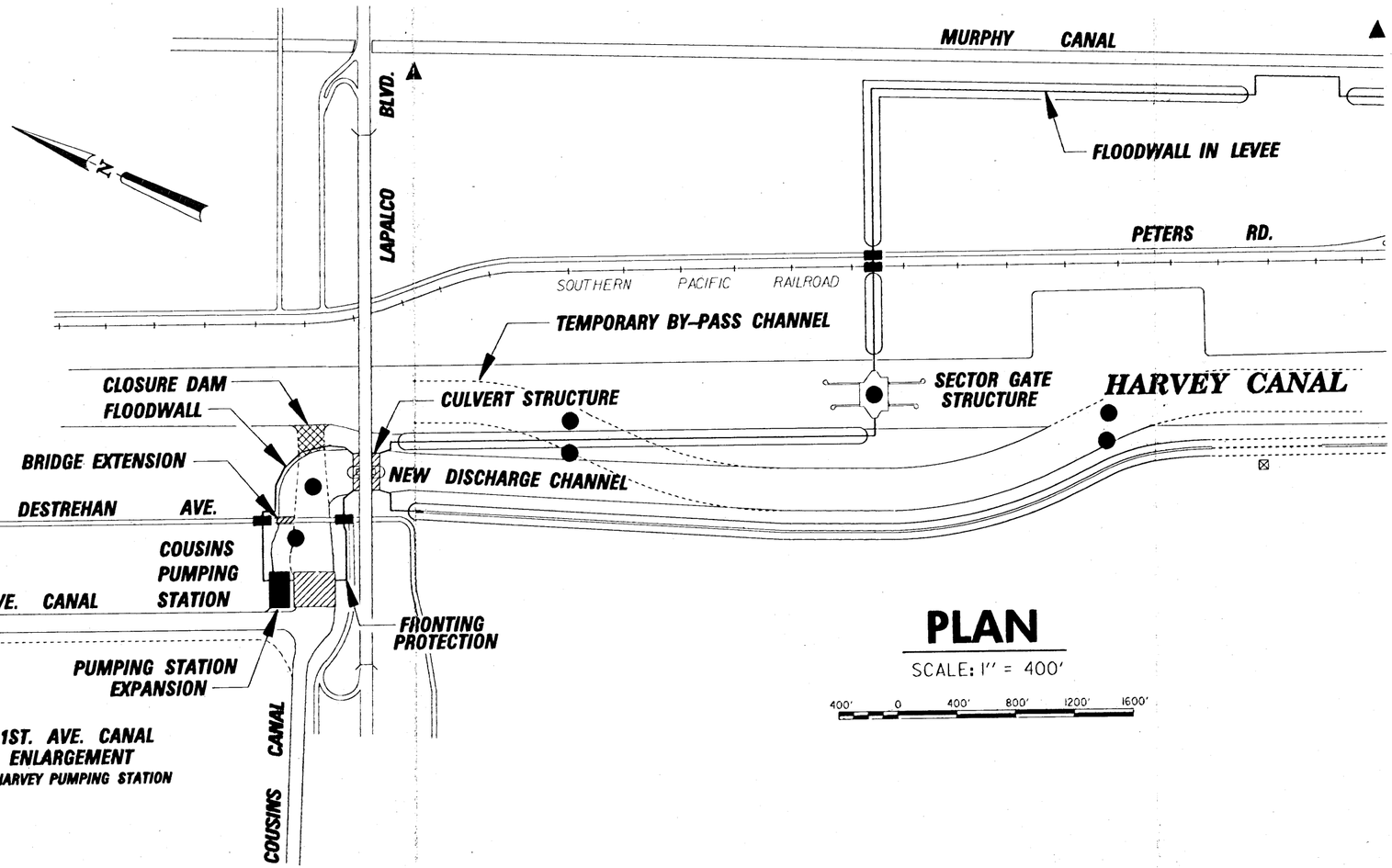
Sediment Disposal Plan

The proposed East of Harvey Canal project includes the construction of a navigable floodgate in the Harvey Canal. The floodgate would be located approximately 3,600 feet south of Lapalco Boulevard. A cofferdam would be used to dewater the construction site and material within the cofferdam would be excavated in the dry. To safely dispose of material excavated from the construction site, the top 2 feet of the surface sediments excavated from within the cofferdam (approximately 2,400 cubic yards) would be removed and transported to an industrial landfill (see Plate C-VIII-2).

The plan also includes the construction of a navigation bypass channel to temporarily accommodate Harvey Canal traffic while the floodgate is under construction. The top 2 feet of interface material along the bank of the Harvey Canal at both ends of the bypass canal (approximately 400 cubic yards) would also be removed and transported to an industrial landfill. Silt curtains would be used at the excavation sites to help confine sediments suspended in water. The silt curtains would be left in place until the turbidity of the water has returned to an acceptable level. A mechanical dredge utilizing best management practices would be used to minimize disturbance of contaminated material during excavation.

Materials relocated to the industrial landfill would be transported in full accordance with all applicable State of Louisiana, as well as any other, requirements. Pertinent state safety and health regulations (40 CFR 1920) for personnel and equipment would be used during the excavation, transportation, and disposal operations.

J E F F E R S O N P A R I S H



PLAN

SCALE: 1" = 400'

400' 0 400' 800' 1200' 1600'

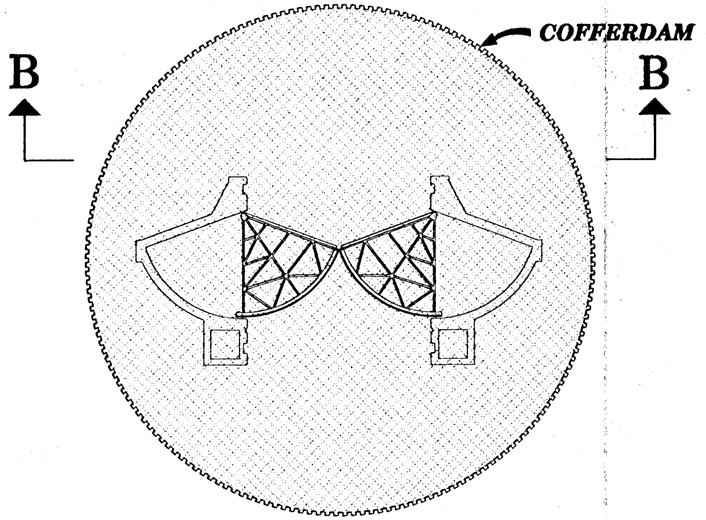
WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
FEASIBILITY STUDY

FLOODGATE AREA FEATURES
AND
SAMPLE LOCATIONS

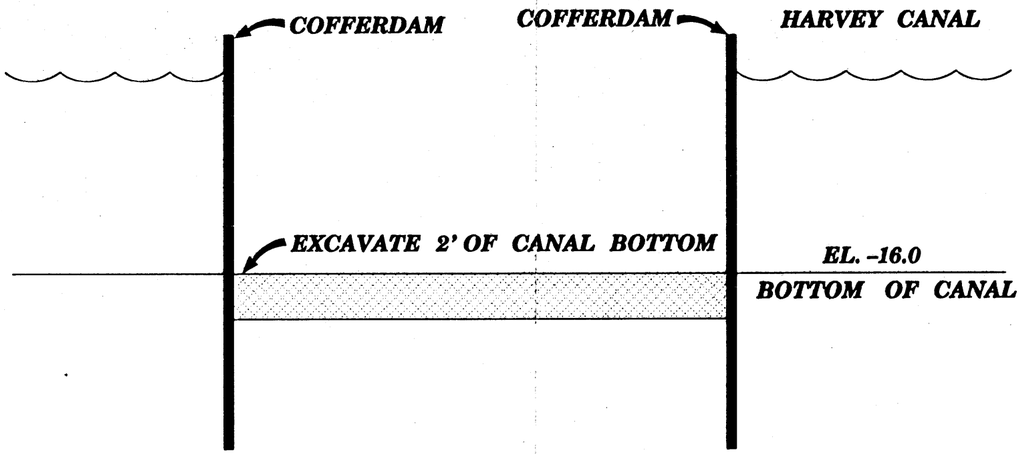
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: AUGUST 1994 FILE NO. PLCVIIII.DGN

PLATE C-VIII-1

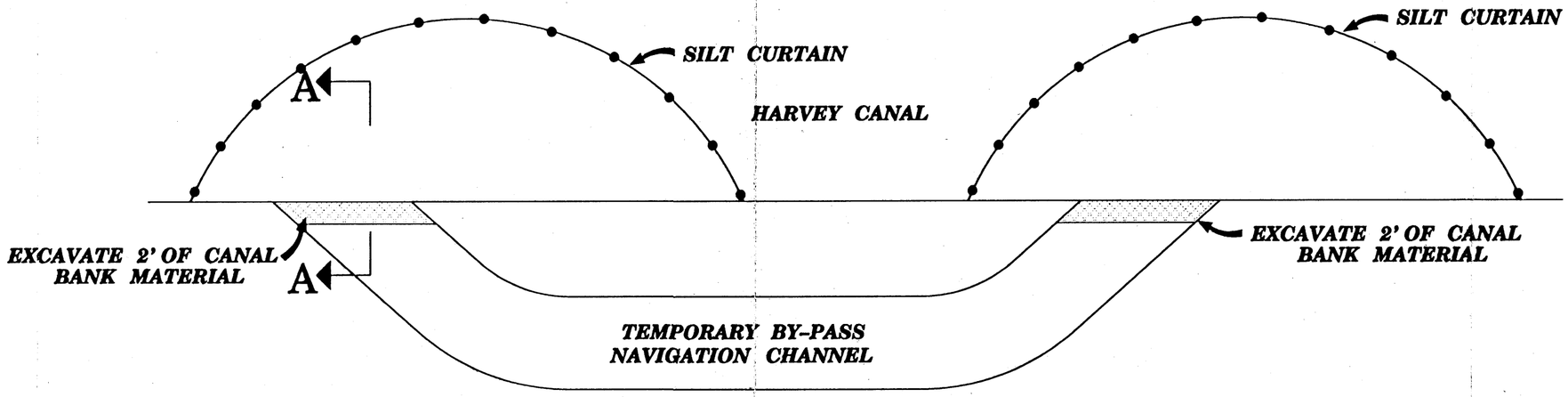


PLAN

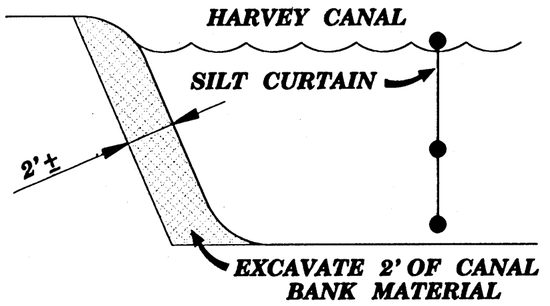


SECTION (B)

SECTOR GATE STRUCTURE COFFERDAM



PLAN



SECTION (A)

WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
FEASIBILITY STUDY

HARVEY CANAL
SEDIMENT EXCAVATION PLAN

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

DATE: AUGUST 1994 FILE NO. PLCVIII2.DGN

APPENDIX C

West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana: East of the Harvey Canal

Section IX

Cultural Resources Coordination

Buddy Roemer
Governor

Paul Hardy
Lieutenant Governor
and Commissioner

State of Louisiana
Department of Culture, Recreation and Tourism
OFFICE OF CULTURAL DEVELOPMENT

Henry A. Truxillo
Secretary

Leslie P. Tassin, Sr.
Assistant Secretary

December 13, 1988

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Proposed Floodwalls (Harvey
Canal & Peters Road)
Jefferson Parish, Louisiana

Dear Mr. Schroeder:

Reference is made to your letter dated November 17, 1988, concerning the above. We have reviewed the proposed plans and have the following comments to offer.

After a careful consideration of the history of the project area and the results of past cultural resources surveys in similar environments, it is our opinion that a survey is not warranted in this particular instance. We agree that the history of industrial development within the two proposed floodwall corridors makes the presence of significant intact archaeological deposits unlikely. Monitoring during construction is an alternative, but not a necessary one.

Thank you for the opportunity to comment. If we may be of further assistance, do not hesitate to contact my staff in the Division of Archaeology.

Sincerely,

Leslie Tassin

Leslie P. Tassin
State Historic Preservation Officer

LPT:PGR:s

C-IX-1

Kathleen M. Byrd, Ph.D., Director
Division of Archaeology
P.O. Box 44247 (900 Riverside North)
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Assistant Secretary

State of Louisiana
Department of Culture, Recreation and Tourism
OFFICE OF CULTURAL DEVELOPMENT

August 15, 1991

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Draft Report
Cultural Resources Investigations for the Westbank Hurricane Protection Project, Plaquemines and Jefferson Parishes, Louisiana
R. Christopher Goodwin & Associates, Inc.

Dear Mr. Schroeder:

Receipt is acknowledged of your letter dated July 2, 1991, transmitting two copies of the above report. We have completed our review and have the following comments.

The archival research and survey methodology were very thorough and leave little doubt that the proposed project will have no effect on significant cultural resources. As a result, we have no objections to the plans as proposed.

We have a few comments concerning the report for consideration in the preparation of the final.

Page 1, 1st paragraph - should be Section 106, rather than 1-06.

Pages 2 & 3, Figures 1 & 2 - suggest including a state insert map showing the project location.

Page 22, Table - suggest including a footnote explaining why the information on sites 16PL40 & 41 is shaded.

Kathleen M. Byrd, Ph.D., Director
Division of Archaeology
P.O. Box 44247 (900 Riverside North)
Baton Rouge, LA 70804

Additionally, archaeological update forms and accompanying CAD forms need to be completed and submitted for sites 16PL40 and 16PL41 which were reinvestigated as part of the survey.

Thank you for the review opportunity. Should you have any questions concerning our comments, contact Mr. Duke Rivet in the Division of Archaeology at (504) 342-8170.

Sincerely,

Leslie P. Tassin
State Historic Preservation Officer

LPT:PR:s

c: R. Christopher Goodwin & Associates, Inc.

APPENDIX D

FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

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

TAKE PRIDE IN AMERICA

August 22, 1994

Colonel Kenneth H. Clow
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Clow:

Attached is the Fish and Wildlife Coordination Act Report on the selected plan for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal), feasibility study. This report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and has been coordinated with the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service. Comments by those agencies are enclosed.

We appreciate the cooperation of your staff throughout our involvement in this study. Should your staff have any questions regarding our report, please have them contact David Walther of this office at 318/262-6662, ext. 227.

Sincerely,

David W. Frugé
Field Supervisor

Enclosures

cc: NMFS, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA, (EAST OF HARVEY CANAL) STUDY

FISH AND WILDLIFE COORDINATION ACT REPORT

SUBMITTED TO

NEW ORLEANS DISTRICT

U.S. ARMY CORPS OF ENGINEERS

NEW ORLEANS, LOUISIANA

PREPARED BY

LOYD C. MITCHELL, FISH AND WILDLIFE BIOLOGIST

AND

DAVID A. WALTHER
FISH AND WILDLIFE BIOLOGIST

ECOLOGICAL SERVICES

LAFAYETTE, LOUISIANA

U.S. FISH AND WILDLIFE SERVICE

SOUTHEAST REGION

ATLANTA, GEORGIA

AUGUST 1994

State of Louisiana

Joe L. Herring
Secretary

Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(504) 765-2800

Edwin W. Edwards
Governor

18 August 1994

Mr. David W. Fruge'
U.S. Fish and Wildlife Service
825 Kaliste Saloom Road
Brandywine Bldg. II, Suite 102
Lafayette, Louisiana 70508

RE: West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of the Harvey Canal) Study

Dear Mr. Fruge':

Personnel of our technical staff have reviewed the project data provided for the above referenced project. The Department concurs with the recommendations for the Finalization to the Fish and Wildlife Coordination Act Report.

We appreciate the opportunity to review and comment on this project.

Sincerely,

Lee Caubarreaux
Assistant Secretary

LC:dm

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
c/o Louisiana State University
Baton Rouge, Louisiana 70803-7535

August 19, 1994 F/SEO24/PJ:jk
504/389-0508

Mr. David Frugé
U.S. Fish and Wildlife Service
825 Kaliste Saloom II, 102
Lafayette, Louisiana 70508

Dear Mr. Frugé:

The Baton Rouge office of the National Marine Fisheries Service has received the Fish and Wildlife Coordination Act Report on the selected plan for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal), hurricane protection study transmitted by your August 17, 1994, fax. We have reviewed the report and endorse the measures recommended to mitigate adverse project impacts.

Thank you for this review opportunity.

Sincerely,

Rickey N. Ruebsamen

Rickey N. Ruebsamen
Branch Chief

EXECUTIVE SUMMARY

This is a summary of the U.S. Fish and Wildlife Service's (Service) findings and recommendations relative to the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of Harvey Canal) Study. Our findings and recommendations are presented in accordance with the Fish and Wildlife Coordination Act, and have been developed on the basis of surveys and analyses of the study area, the Selected Plan, and other structural alternatives.

The New Orleans District, Corps of Engineers (Corps) has investigated several alternatives to improve hurricane protection to the West Bank areas located east and north of Harvey and Hero Canals. Hurricane protection for the area between Crown Point and Lafitte was also considered, but was rejected on economic grounds. The Selected Plan involves the construction of a navigable floodgate across Harvey Canal approximately 3,600 feet south of LaPalco Boulevard, and an outfall diversion channel and parallel protection via levee and floodwall located on the west side of Harvey Canal, between the Cousins Pumping Station and the proposed floodgate. On the east bank of Harvey Canal, hurricane protection would be provided by a combination levee-floodwall that would extend from the proposed floodgate to the Hero Pumping Station. Existing levees would be upgraded from that point to the Algiers Lock, and from the Algiers Lock to the end of Hero Canal. A new levee would be constructed from the end of Hero Canal to tie into the existing Plaquemines Parish levee, which is located about 0.4 mile to the south.

Although most construction would take place in developed areas and on existing levees, the project would directly impact bottomland hardwood and swamp habitat of moderate to high value for fish and wildlife resources. Those impacts would result from levee right-of-way expansion; construction of borrow pits, the outfall diversion channel, and the Plaquemines Parish levee tie-in; and through altered hydrology as a result of enclosing wetlands within the protected area. Building the new levee to standard project hurricane levels would result in the loss of 279 acres of drained and undrained forested wetlands (bottomland hardwoods and swamps).

Project-related impacts to fish and wildlife resources were assessed with a habitat acreage projection analysis and the Service's Habitat Evaluation Procedures. Those analyses revealed that implementation of the Selected Plan would result in the loss of 295 Average Annual Habitat Units.

Due to their value and scarcity, in-kind compensation for project-induced losses to undrained swamp and bottomland hardwood habitats should be implemented. Drained bottomland habitats, due to previous impacts and proximity to other developments, are of medium value to fish and wildlife resources; therefore, out-of-kind compensation for losses of drained bottomland hardwoods is permissible.

After considering various mitigation options, the Service developed a mitigation plan consisting of acquisition and management of forested wetlands in the Bayou Bois Piquant area of St. Charles Parish,

approximately 18 miles west of the project area. That plan would increase fish and wildlife resource values in undrained bottomland hardwood and swamp habitat, and would adequately offset all project-related losses of fish and wildlife habitat values.

The Service does not oppose the Selected Plan, provided that the following mitigation measures are implemented:

1. The portion of the Plaquemines Parish levee tie-in extending perpendicular to Hero Canal and south of the industrial facility should be constructed on top, or immediately east, of the existing levee.

2. The proposed 100-acre stockpile area on the west side of the Harvey Canal area should be located and configured to avoid and minimize impacts to bottomland hardwood habitat.

3. A freshwater diversion structure (Louisiana Coastal Wetlands Conservation and Restoration Program project BA-13) in the vicinity of Hero Canal has been identified as a critical long-term wetland restoration project in the Barataria Basin feature of the Louisiana Coastal Restoration Plan, formulated in accordance with the Coastal Wetlands Planning, Protection, and Restoration Act (PL 101-646). That project has received strong endorsement from Jefferson and Plaquemines Parishes as a means to reduce or prevent the loss of low-salinity marshes south of Hero Canal. Therefore, detailed design of the Plaquemines Parish tie-in feature should be coordinated with the possible implementation of the proposed Hero Canal Freshwater Diversion project.

4. Unavoidable project-related losses to fish and wildlife resources should be fully compensated by acquisition and management of 264 acres of forested wetlands, including not less than 190 acres of bottomland hardwood wetlands and 74 acres of forested swamp, within the Bayou Bois Piquant area of St. Charles Parish.

5. Mitigation lands should be acquired in fee simple; administration and management of those lands should be conducted in accordance with the General Plan process contained in Section 3(b) of the Fish and Wildlife Coordination Act. Acquisition, operation and management of mitigation lands should be at project expense.

6. Detailed design of the hurricane protection and mitigation features should be coordinated with the Service, the Louisiana Department of Wildlife and Fisheries, and other interested natural resource agencies.

7. Mitigation should be implemented simultaneously with other project features.

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INTRODUCTION

The West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, (East of Harvey Canal) Study was authorized by four resolutions adopted by the House and Senate Committees on Public Works in 1965 and 1966. The purpose of the study is to determine the feasibility of providing hurricane protection to portions of the West Bank area, which is located along the right descending bank of the Mississippi River in Jefferson, Orleans, and Plaquemines Parishes. The New Orleans District, Corps of Engineers (Corps) previously prepared a Feasibility Report and Environmental Impact Statement for a hurricane project within that portion of the West Bank extending west of Harvey Canal to Westwego (U.S. Army Corps of Engineers 1986). That project is presently under construction. The current study addresses hurricane protection for that portion of the West Bank located east of Harvey Canal and north of Hero Canal. The study also evaluates tying-in hurricane protection for the study area with the existing Plaquemines Parish hurricane protection levee, located south of Hero Canal, in the vicinity of Oakville, Louisiana. Finally, the study evaluates the feasibility of providing hurricane protection to the Crown Point-Lafitte area of Jefferson Parish.

This report provides an analysis of the impacts of the Selected Plan (Alternative 3b) on fish and wildlife resources. Recommendations to mitigate adverse impacts on those resources are also presented. Previous reports were transmitted to the Corps in March 1989, February 1990, July 1992, and April 1994. This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

DESCRIPTION OF SELECTED PLAN AND OTHER ALTERNATIVES

The Corps has investigated seven alternatives for providing hurricane protection in the study area (Figure 1). Features common to all seven alternatives include upgrading existing levees between the Hero Pumping Station and the Algiers Lock, thence down the south side of Algiers Canal to the end of Hero Canal, and construction of a new levee from the end of Hero Canal, where it would tie into the existing Plaquemines Parish levee, located about 0.4 mile to the south. Three levels of protection were considered for levee/floodwall construction and upgrading: the 100-year storm, the 200-year storm, and the standard project hurricane. Levee dimensions increase progressively with each storm-event design. Thus, the standard project hurricane levee is 2 feet higher and 20 feet wider (base width) than the 100-year levee.

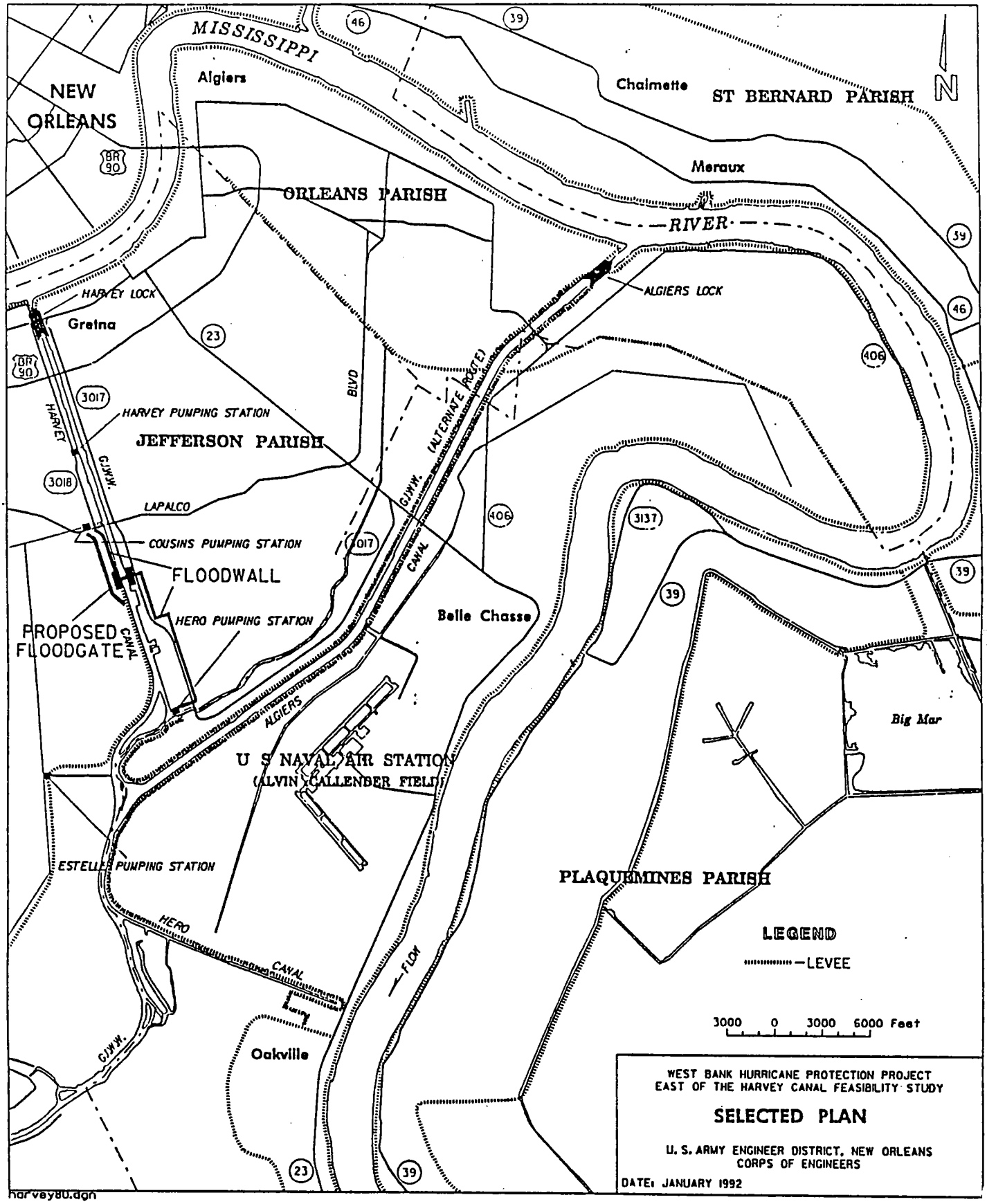

Figure 1. West Bank (East of Harvey Canal) study area.

Alternative 1 includes a combination levee/floodwall along Peters Road (on the east side of Harvey Canal) from the Harvey Lock to the Hero Pumping Station. Alternative 2 replaces the levee/floodwall featured in Alternative 1 with a navigable floodgate and pumping station in Harvey Canal, just above the Hero Pumping Station.

Alternatives 3a through 3d each feature a navigable floodgate across Harvey Canal approximately 3,600 feet south of LaPalco Boulevard, and an outfall diversion channel along the west bank of Harvey Canal, extending from the Cousins Pumping Station to just below the proposed floodgate. Parallel protection along the outfall channel would be provided by a floodwall and a hurricane protection levee; the hurricane protection levee along the outfall channel is a feature of the Westwego to Harvey Canal hurricane protection project. On the east bank of Harvey Canal, hurricane protection would be provided by a combination levee/floodwall extending from the proposed floodgate to the Hero Pumping Station; Alternatives 3a through 3d differ from each other in the alignment of that levee/floodwall combination.

Alternative 3e is identical to Alternative 2, except that the pumping station feature would be replaced with an upgrade of the Cousins Pumping Station capacity, and an outfall diversion channel would be constructed from the Cousins Pumping Station along the west side of Harvey Canal to just below the proposed navigable floodgate.

The Corps has designated Alternative 3b, at the standard project hurricane level, as the Selected Plan (Figure 1). Because this report discusses only the impacts resulting from the Selected Plan, any future reconsideration of the rejected plans or changes to the Selected Plan may require revision of this report.

DESCRIPTION OF THE STUDY AREA

The study area is located in portions of Orleans, Jefferson, and Plaquemines Parishes, Louisiana, and is bounded by the Mississippi River, Hero Canal, the Gulf Intracoastal Waterway, and Harvey Canal; a small portion of the west bank of Hero Canal is also included. Levees constructed by local interests provide various degrees of flood protection, and most of the study area is under forced drainage via several pumping stations. Forced drainage has facilitated development for residential, commercial, and/or industrial purposes within much of the area north of Algiers Canal and east of Harvey Canal. Most of the land along Hero Canal, the south side of Algiers Canal, and along the Plaquemines Parish levee in the vicinity of Oakville remains undeveloped.

The study area is relatively flat; the major natural topographic feature is the natural levee of the Mississippi River. Natural elevations range from slightly below sea level to approximately 5 feet National Geodetic Vertical Datum.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Description of Habitats

Habitat types in the study area can be generally classified as upland developed and forested wetlands (swamps and bottomland hardwoods). Upland developed habitat includes residential, commercial, and industrial areas, as well as roads and existing levees.

Most of the bottomland hardwood wetlands in the study area are within leveed areas and are subject to forced drainage. Those drained bottomland hardwoods occur in parcels ranging from 10 to 130 acres and are located adjacent to Algiers Canal. A single, large (over 300 acres) contiguous block of bottomland hardwoods is located north, west, and south of Callender Air Base. Dominant woody vegetation typically includes sugarberry, red maple, baldcypress, and black willow. Common over- and mid-story associates include American elm, Nuttall oak, wax myrtle, common buttonbush, green ash, swamp dogwood, boxelder, American sycamore, and deciduous holly. Shrubby and herbaceous vegetation typically includes elderberry, rattan vine, peppervine, Virginia creeper, blackberry, lizard's tail, and poison ivy.

Swamp and bottomland hardwood areas in the vicinity of the proposed Plaquemines Levee tie-in are outside levee systems and are hydrologically linked to adjacent marshes, bayous, and canals. Those bottomland hardwood sites are similar in species composition to drained bottomland hardwoods; however, wetter sites may be dominated by black willow or red maple and lack herbaceous ground cover.

Swamp sites commonly exhibit an overstory dominated by red maple, with baldcypress, pumpkin ash, black willow and green ash as associates. The shrub layer is moderately developed; palmetto, buttonbush, wax myrtle, and red maple are dominant. Due to the extended hydroperiod, ground cover is very sparse, and usually consists of lizard's-tail, hydrocotyl, and alligator-weed.

Fishery Resources

Due to artificial drainage and isolation by levees, the drained bottomland hardwoods have no value to finfish. However, vegetated wetlands in the vicinity of Oakville probably provide moderate amounts of organic detritus important to maintenance of fish and shellfish production in adjacent estuarine waters. Common freshwater fish within interior permanent-water areas include bowfin, spotted gar, shads, and mosquitofish.

Wildlife Resources

Migratory and resident waterfowl and other wetland game birds make minimal use of study-area wetlands, due to artificial drainage and human development. Wetland game birds that may occur in the study area are the wood duck, common snipe and American woodcock.

Non-game birds in the study area include many species of wading birds, shorebirds, and songbirds (both migratory and non-migratory). Wading birds include the little blue heron, great blue heron, great egret, snowy egret, cattle egret, and green-backed heron. The killdeer is a

common shorebird in the project area. Forested wetland habitats also support raptors such as Mississippi kite, red-shouldered hawk, and barred owl; woodpeckers such as pileated, downy, hairy, and red-bellied woodpeckers; and a variety of songbirds including northern parula, yellow-rumped warbler, prothonotary warbler, red-eyed vireo, Carolina chickadee, and tufted titmouse.

The project area supports a moderate diversity of mammalian species. White-tailed deer, the only big game animal found in the study area, utilize project-area forested wetlands. Small game mammals, such as swamp rabbit, gray squirrel, and raccoon, also utilize those habitats. Commercially important furbearers in the project area include nutria, mink, river otter, raccoon, and gray fox. Nutria are most abundant in the swamp habitat, and river otter and mink utilize forested habitats in proximity to open water. Numerous species of small rodents, insectivores, and bats inhabit the area, as do other mammals such as the Virginia opossum and nine-banded armadillo.

Various species of frogs, turtles, and snakes are common in the project area. Representative species include pig frog, bronze frog, green tree frog, red-eared turtle, Mississippi mud turtle, speckled kingsnake, broad-banded water snake, and western cottonmouth. The American alligator also occurs in the project area.

Endangered Species

The bald eagle, a Federally listed endangered species, may use project area wetlands for foraging, and an active nest is located within one mile of the project area. The Service by a June 11, 1992, letter concurred with the Corps' May 19, 1992, Biological Assessment which addressed possible impacts to bald eagles in the project vicinity. The Service agreed with the "not likely to adversely affect" determination because the relatively small amount of work to be done within the secondary protection zone (i.e., one mile from the nest site) will occur outside the nesting season (i.e, October to May 15).

FISH AND WILDLIFE CONCERNS IN THE STUDY AREA

The study area is located in the east-central portion of the Barataria Basin, a large interdistributary region confined by the Mississippi River to the north and east, Bayou Lafourche to the west, and the Gulf of Mexico to the south. Nearly 25 percent (140,000 acres) of wetlands in the Barataria Basin have been lost over the past 30 years due to their conversion to open water areas or uplands. Contributing factors responsible for that wetland loss include subsidence, saltwater intrusion, sea level rise, canal and levee construction, urban expansion, and navigation and flood-control projects (Bahr et al. 1983). Such wetland losses have resulted in serious biological and socioeconomic impacts. For example, aquatic species, while gaining available open-water habitat, are adversely affected by decreases in productivity, nursery habitat, and detrital export associated with wetland loss. Consequently, essential food supplies for those species become less available. All terrestrial animals are adversely affected by the loss of cover, nesting, and feeding habitat. Even relatively small or localized wetland losses can, when combined with other such

events, have significant, long-term impacts to fish and wildlife resources on a regional scale.

Urban expansion has led to increased eutrophication of many of the streams located in and around the project area. Important factors in that process include increased volume of urban runoff, decreased acreage of wetlands that serve to filter nutrients emanating from developed urban areas, and increased structural flood control and drainage measures which directly shunt urban runoff into downstream aquatic systems, bypassing adjacent wetlands. Consequently, degraded water quality in the Barataria Basin is of increasing concern relative to fish and wildlife resources (Seaton and Day 1979).

EVALUATION METHODOLOGY

Project-related impacts to fish and wildlife resources were evaluated with a habitat acreage projection analysis and the Service's Habitat Evaluation Procedures (U.S. Fish and Wildlife Service 1980). Both analyses require the projection of acreage trends for bottomland hardwood and swamp habitat types in the study area under future with-project and future without-project conditions. The future without-project development rate for bottomland hardwoods was estimated using planimetered data from 1978 and 1988 aerial photographs. The rate of clearing observed during that period was held constant throughout the project life. Because the project area is already protected by levees, the proposed flood protection improvements would not constitute a significant incentive for additional bottomland hardwood development. Therefore, future with-project conditions do not consider any induced bottomland hardwood clearing.

Examination of 1978 and 1988 aerial photography revealed no detectable loss of swamp habitat in the study area during that period. However, under future without-project conditions, 19 acres of swamp within the boundaries of an industrial facility south of Hero Canal were assumed to be lost to industrial development after Target Year 10.

Baseline habitat acreages (233 acres for bottomland hardwoods and 46 acres for swamp) represent the total acreage impacted for each habitat type under the Selected Plan. The Habitat Evaluation Procedures methodology and assumptions are discussed in Appendix A. A man-day/monetary analysis was not performed due to the relatively small impact area involved.

PROJECT IMPACTS

Construction of the Plaquemines levee tie-in feature will result in the direct and permanent loss of 4 acres of bottomland hardwood habitat and 27 acres of swamp habitat (Table 1). Construction of that tie-in will also result in the indirect loss of 19 acres of swamp to be enclosed by the project and subjected to forced drainage; that acreage is part of an existing industrial facility and will likely be developed as a result of enclosure and hydrologic modification. Borrow to construct the tie-in will be obtained from an offsite, non-

Table 1. Impacts associated with Alternative 3b, West Bank (East of Harvey Canal) Louisiana, Project.

Project feature	Impact (acres)	Habitat Type
Plaquemine Parish levee tie-in:		
construction alignment	4	blh[1]
	27	swamp
enclosed wetlands	19	swamp
Cousins Pumping Station outfall channel	66	blh
Stockpile Area	100	blh
Other construction alignment	63	blh
Total	279	

[1] blh = bottomland hardwood

wetland borrow area.

Material needed to upgrade levees will be obtained from a non-wetland borrow pit constructed in the Bayou Barriere area. Construction of the Cousins Pumping Station outfall channel will convert 66 acres of drained bottomland hardwood habitat to open water or upland (levee). Material excavated for channel construction will be stockpiled for future levee lifts; the stockpile will destroy 100 acres of bottomland hardwoods in that area. Construction of a new levee alignment in the vicinity of Bayou Road will result in the loss of 30 acres of bottomland hardwood habitat. Most other construction activities will occur on developed land or existing levees, with the exception of 33 acres of bottomland hardwood habitat to be lost due to expanded levee rights-of-way.

Impacts associated with the project, expressed in Average Annual Habitat Units, are shown in Table 2. Construction of the Selected Plan would result in the direct loss of 229 acres of drained bottomland hardwood habitat, 4 acres of undrained bottomland hardwood habitat, and the direct loss or conversion of 46 acres of swamp habitat. The Service considers undrained bottomland hardwood wetland habitat to have greater fish and wildlife resource value than drained bottomland habitat, primarily due to greater functional capability of the former in terms of detrital export, fish/shellfish nursery habitat, and floodwater storage. However, the overall impact assessment combines those two habitats for analytical purposes, due to the relatively small area of undrained bottomland hardwood habitat to be impacted by the project.

FISH AND WILDLIFE CONSERVATION MEASURES

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include:

> (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

The Service supports and adopts this definition of mitigation, and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process.

Project-induced impacts could be avoided altogether by selection of a No Action alternative. However, the benefits (in terms of human safety) gained by providing hurricane protection in the study area are relatively great. The Corps will avoid impacts over much of the project area by limiting upgrade work to existing levee rights-of-way.

Table 2. Net loss of Average Annual Habitat Units, West Bank (East of Harvey Canal) Louisiana, Project.

Species	Future without project	Future with project	Change[1]
Bottomland Hardwoods:			
gray squirrel	19.6	0.2	-19.4
downy woodpecker	101.0	0.8	-100.2
swamp rabbit	112.3	0.9	-111.4
Swamp:			
mink	23.7	1.1	-22.6
downy woodpecker	30.3	1.4	-28.9
swamp rabbit	13.3	0.6	-12.7

[1] Change = Future with-project minus Future without-project.

Project impacts could be minimized by selection of a less-damaging alternative. Selection of Alternative 1, at the standard project hurricane level of protection, would reduce wildlife habitat losses (expressed as total AAHU's) by 10 percent. Impacts could be further reduced by selection of Alternative 1 at the 100-year storm level of protection. Relocating the stockpile area to a nonforested site would reduce impacts to bottomland hardwood by 100 acres.

Opportunities to rectify the impacts of the Selected Plan by repairing, rehabilitating, or restoring the adversely affected habitat are not available.

Significant impacts to fish and wildlife resources remaining after the above measures have been considered should be compensated by implementing a mitigation plan to preserve and/or manage existing wetlands or restore former wetlands at project expense. The Service's Mitigation Policy (Federal Register, Vol. 46, pp. 7644-7663, January 23, 1981) provides guidance to insure that the level of mitigation recommended by the Service is consistent with the value and scarcity of the fish and wildlife resources involved.

Swamp and undrained bottomland hardwood forest habitats affected by the project are considered by the Service to have high fish and wildlife resource value (Appendix A); such habitats are becoming scarce on a national and regional basis. Mitigation should provide for full and in-kind replacement of project-induced losses to such habitats. The Service considers the drained bottomland hardwood habitat in the study area to have medium value to fish and wildlife resources, due to hydrological modification/isolation and proximity to human disturbances (borrow pits, landfills, pasture, and residences). However, the growing scarcity of bottomland hardwood forest habitat is still of major concern. Thus, the mitigation goal for drained bottomland habitats in the study area is no net loss of habitat value while minimizing loss of in-kind value; thus, replacement of habitat values need not be restricted to drained bottomland forest habitat types and can include preservation, restoration, or management of other wetland habitats of equal or greater value to fish and wildlife resources.

The mitigation plan proposed in this report consists of acquisition and management of forested wetlands in the Bayou Bois Piquant area of St. Charles Parish. The proposed mitigation area is located approximately 18 miles west of the project area, near the northernmost portion of the State-owned Salvador Wildlife Management Area (Figure 2). The proposed mitigation area is also located west, or outside, of the authorized alignment of the west guide levee for the Davis Pond Freshwater Diversion project. The proposed management plan described

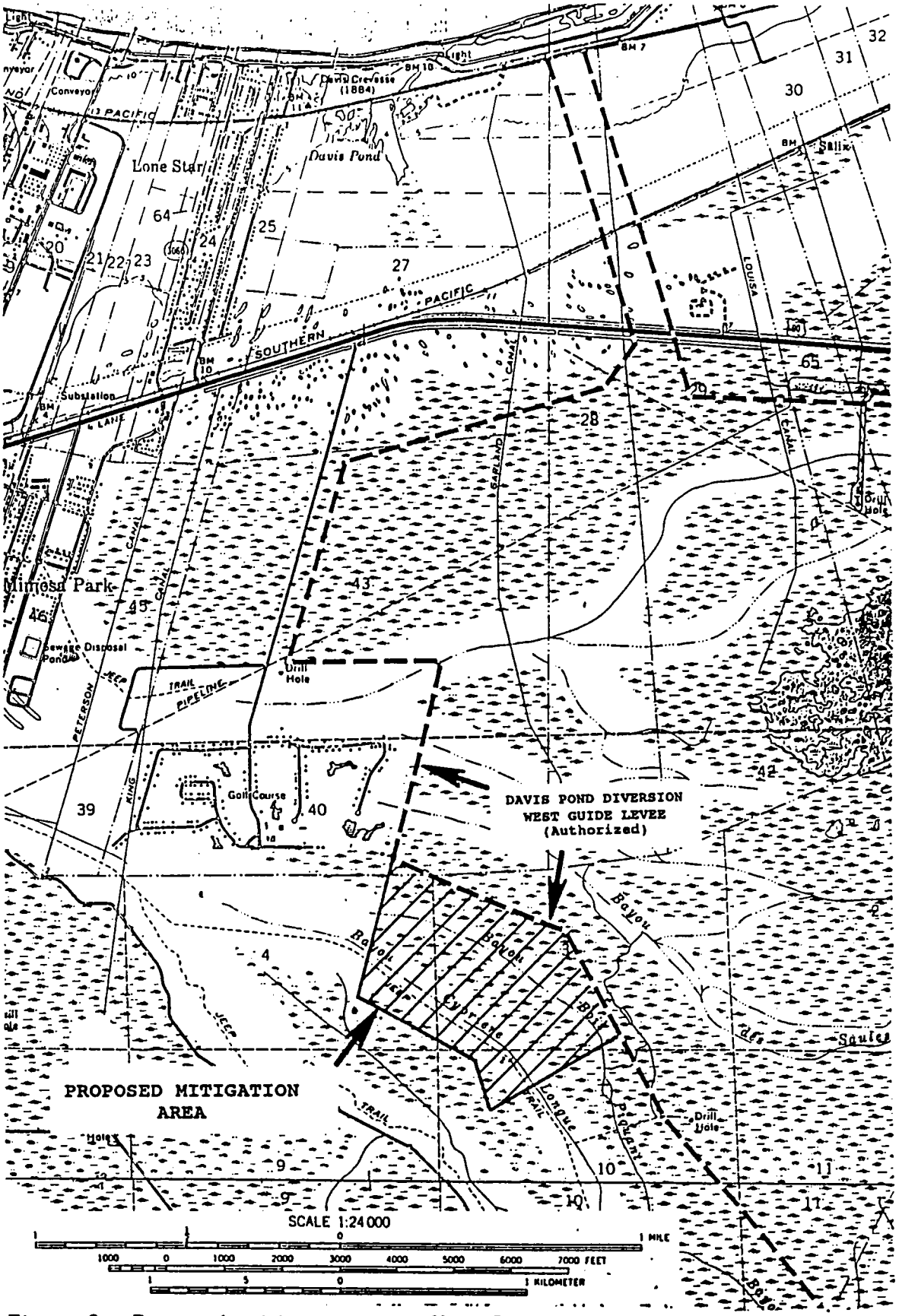

Figure 2. Proposed mitigation area, West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, East of Harvey Canal Study.

in Appendix B includes the maintenance of a high diversity of mast-producing trees and shrubs (in a semi-mature to mature bottomland hardwood forest) through timber management, tree planting, and hydroperiod enhancement in adjacent swamp habitat.

The Service estimates that purchase in fee title and management, as described above, of approximately 264 acres, including not less than 190 acres of bottomland hardwood wetlands and 74 acres of swamp, would be required to offset the significant wildlife habitat losses associated with Alternative 3b. Acquisition and management of mitigation land should begin simultaneously with project implementation.

SERVICE POSITION AND RECOMMENDATIONS

Based on our review of project plans, the Service does not oppose the Selected Plan, provided that the following mitigation measures are implemented in the interest of equal consideration for fish and wildlife resources:

1. The portion of the Plaquemines Parish levee tie-in extending perpendicular to Hero Canal and south of the industrial facility should be constructed on top, or immediately east, of the existing levee.

2. The proposed 100-acre stockpile area on the west side of the Harvey Canal area should be located and configured to avoid and minimize impacts to bottomland hardwood habitat.

3. A freshwater diversion structure (Louisiana Coastal Wetlands Conservation and Restoration Program project BA-13) in the vicinity of Hero Canal has been identified as a critical long-term wetland restoration project in the Barataria Basin feature of the Louisiana Coastal Restoration Plan, formulated in accordance with the Coastal Wetlands Planning, Protection, and Restoration Act (PL 101-646). That project has received strong endorsement from Jefferson and Plaquemines Parishes as a means to reduce or prevent the loss of low-salinity marshes south of Hero Canal. Therefore, detailed design of the Plaquemines Parish tie-in feature should be coordinated with the possible implementation of the proposed Hero Canal Freshwater Diversion project.

4. Unavoidable project-related losses to fish and wildlife resources should be fully compensated by acquisition and management of 264 acres of forested wetlands, including not less than 190 acres of bottomland hardwood wetlands and 74 acres of forested swamp, within the Bayou Bois Piquant area of St. Charles Parish.

5. Mitigation lands should be acquired in fee simple; administration and management of those lands should be

conducted in accordance with the General Plan process contained in Section 3(b) of the Fish and Wildlife Coordination Act. Acquisition, operation and management of mitigation lands should be at project expense.

6. Detailed design of the hurricane protection and mitigation features should be coordinated with the Service, the Louisiana Department of Wildlife and Fisheries, and other interested natural resource agencies.

7. Mitigation should be implemented simultaneously with other project features.

LITERATURE CITED

Bahr, L.M., Jr., R. Constanza, J.W. Day, Jr., S.E. Bayley, C. Neill, S.G. Leibowitz, and J. Fruci. 1983. Ecological characterization of the Mississippi Deltaic Plain Region: a narrative with management recommendations. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-82/69. 189 pp.

Seaton, A.M., and J.W. Day, Jr. 1979. The development of a trophic state index for the quantification of eutrophication in the Barataria basin. Pages 113-125 in J.W. Day, Jr., D.D. Culley, Jr., R.E. Turner, and A.J. Mumphrey, Jr., eds. Proc. Third Coastal Marsh and Estuary Management Symposium, La. State Univ., Div. of Continuing Education, Baton Rouge.

U.S. Army Corps of Engineers. 1986. West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana: feasibility report and environmental impact statement. New Orleans. 2 vols.

U.S. Fish and Wildlife Service. 1980. Habitat evaluation procedures. U.S. Fish and Wildl. Service, Division of Ecological Services, Washington, D.C. Ecological Services Manual 102.

WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS,
LOUISIANA, (EAST OF HARVEY CANAL) STUDY

APPENDIX A

HABITAT EVALUATION PROCEDURES ANALYSIS AND RESULTS

The Habitat Evaluation Procedures (Procedures) were developed by the Fish and Wildlife Service (Service) to document the quality and quantity of available habitat for fish and wildlife species in a given area. The Procedures are based on the assumptions that positive or negative impacts to wildlife habitat can be quantitatively and qualitatively expressed, optimum habitat for a selected species can be described numerically by a Habitat Suitability Index (HSI), and that there is a linear relationship between HSI and the carrying capacity of a habitat. Using the Procedures, habitat quality and quantity in a given area can be measured for baseline conditions, and can be predicted for future without-project and future with-project habitat conditions. This standardized, species-based methodology allows a numerical comparison of each future condition, hence providing an estimate of project-induced impacts on fish and wildlife resources. The 1980 version of the Procedures (U.S. Fish and Wildlife Service 1980), which has become the most widely accepted technique for assessing wildlife impacts, was used for this project.

This analysis covers two wetland habitat types, bottomland hardwood forest and swamp forest, as described in the main report. The Corps of Engineers' New Orleans District (Corps) provided the estimates of acreages within the study area under existing conditions, the rate of development and habitat change throughout the study area, and the acreage estimates for construction-related impacts for each project alternative. Bottomland hardwood habitat acreages within the study area under future without-project conditions were assumed to change at current rates.

Several species that are economically important, and/or which represent various trophic levels of wildlife utilizing bottomland hardwoods and swamp habitats in the study area, were selected as evaluation elements. Species selected for bottomland hardwoods were swamp rabbit, downy woodpecker, and gray squirrel. Evaluation species used in the swamp analysis were swamp rabbit, downy woodpecker, and mink. Several sample sites, representative of the different stands of bottomland hardwoods and swamps, were inspected on October 19, 1988, and April 27, 1991, by teams of biologists representing the Corps, the Louisiana Department of Wildlife and Fisheries, and the Service. Detailed records of sample site locations, individual sample site scores, and related data are on file in the Service's Lafayette, Louisiana, Field Office.

Data collected at each sampling site were used in conjunction with mathematical models to compute an HSI value for each evaluation species for bottomland hardwood and swamp habitat types. Due to obvious differences in stand conditions between sample sites, bottomland hardwood stands were combined into four groups according to general stand condition relative to basal area, age or size of trees, etc. An overall species HSI was developed for each bottomland hardwood evaluation species by calculating a weighted average of the HSI's from each of the four stand-type groups.

An evaluation species HSI was determined for each target year throughout the project life. Target years were established to

illustrate significant changes in habitat quality or quantity at specific points in time.

The Habitat Unit is defined by the Procedures as the basic unit for measuring project effects on wildlife. Habitat Units are the product of an evaluation species' HSI value and the acreage of available habitat at a given target year. Future Habitat Units change according to changes in habitat quality and/or quantity; those changes are predicted for various target years over the project life for both future without-project and future with-project conditions. Results are annualized over the project life to determine the Average Annual Habitat Units available for each species. The change (increase or decrease) in Average Annual Habitat Units for each future with-project alternative, compared to future without-project conditions, provides a quantitative measure of anticipated project impacts. A net gain of Average Annual Habitat Units indicates that the project is beneficial to the evaluation species; a net loss of Average Annual Habitat Units indicates that the project is damaging to the evaluation species.

For the purpose of the current impact analysis, no distinction was made between drained and undrained bottomland hardwood habitats, due to the relatively small amount of impacted undrained bottomland hardwoods. However, it is acknowledged that undrained bottomlands are generally of higher value to fish and wildlife resources than drained bottomland habitats, and that mitigation goals differ between the two habitat types.

All impacts were assumed to occur in Target Year 1. Once construction is complete, proposed maintenance will not affect any more wetlands than were lost to construction. The HSI values for each evaluation species (Table A-1) were assumed to remain constant throughout the 100-year project life. Habitat acreages present at the various target years were multiplied by the appropriate habitat suitability indices to calculate Habitat Units for each of the target years. The Habitat Units were then annualized to establish Average Annual Habitat Units for each evaluation species under each future condition (Table A-2). The Average Annual Habitat Units provide a quantitative measure of habitat conditions under future-without project and future-with project scenarios.

Table A-1. Average Habitat Suitability Index (HSI) values for evaluation species, West Bank (East of Harvey) Louisiana, Project Habitat Evaluation Procedures analysis.

Species	HSI
Bottomland Hardwoods:	
gray squirrel	0.14
downy woodpecker	0.72
swamp rabbit	0.80
Swamp:	
mink	0.78
downy woodpecker	1.00
swamp rabbit	0.44

Table A-2. Average Annual Habitat Units under future without-project and future with project conditions, Alternative 3b, West Bank (East of Harvey) Louisiana, Project Habitat Evaluation Procedures analysis.

Species	Future without project	Future with project	Change due to project
Botomland Hardwoods:			
gray squirrel	19.6	0.2	-19.4[1]
downy woodpecker	101.0	0.8	-100.2
swamp rabbit	112.3	0.9	-111.3
Subtotal	232.9	1.9	-230.9
Swamp:			
mink	23.7	1.1	-22.6
downy woodpecker	30.3	1.4	-28.9
swamp rabbit	13.3	0.6	-12.7
Subtotal	67.3	3.1	-64.2
Total	300.3	5	-295.2

[1] Numbers in columns and rows may not total exactly due to rounding.

LITERATURE CITED

U.S. Fish and Wildlife Service. 1980. Habitat evaluation procedures. U.S. Fish and Wildl. Service, Division of Ecological Services, Washington, D.C. Ecological Services Manual 102.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA, (EAST OF HARVEY CANAL) STUDY

APPENDIX B

GENERAL PLAN FOR MANAGEMENT OF FISH AND WILDLIFE COMPENSATION LANDS, CALCULATION OF BENEFITS FROM COMPENSATION LANDS, AND DETERMINATION OF COMPENSATION NEEDS

The Fish and Wildlife Service (Service) has quantified unavoidable project impacts on wildlife resources and calculated mitigation needs associated with Alternative 3b (built to standard project hurricane level). Estimates were developed by use of the Service's Habitat Evaluation Procedures (methodology described in Appendix A).

MANAGEMENT PLAN

To compensate for unavoidable project impacts to fish and wildlife resources, the Service recommends acquisition and management of forested wetlands within the Bayou Bois Piquant area of St. Charles Parish (Figure 2, Main Report).

The proposed mitigation area consists of bottomland hardwood wetland ridges separated by wooded swamps. However, the ridges and portions of the interspersed swamp are enclosed within a private levee system that was constructed in the late 1970's. The levee system was built along the ridge/swamp interface to enhance the development potential of the ridges by providing protection from seasonal flooding. The proposed mitigation area lies outside of the authorized Davis Pond Freshwater Diversion Project floodway, construction of which is anticipated to begin in 1996 and be complete by 2010. Under future without-management conditions, it is predicted that the proposed mitigation area would remain in private ownership, with only limited development occurring due to Clean Water Act (Section 404) restrictions. Approximately 20 percent (61 acres) of the mitigation area is predicted to be developed over the project life. It is also anticipated that the bottomland hardwood ridges will be intensively logged twice during the project life to obtain short-term economic returns from the land. Intensive timber harvest would result in habitat losses to gray squirrel and downy woodpecker, but would benefit swamp rabbit. The swamp would not be logged due to the relatively low value (i.e., small size) of the timber.

Management Measures

Management activities under future with-management conditions would be designed and implemented with the goal of increasing the value of bottomland hardwood ridges and swamps for the evaluation species. The management objectives on the ridges would be to establish and maintain a high diversity of mast- and fruit-producing trees and shrubs, establish and maintain a diversity of age classes within the overstory (slightly skewed toward the older age classes), maximize herbaceous and shrub-layer canopy cover while maintaining a semi-mature to mature bottomland hardwood timber stand, and maintain adequate numbers of snags. The primary swamp management objectives would be to restore hydrology and enhance herbaceous growth in sparsely-timbered areas.

Bottomland hardwood management objectives would be accomplished through selective seedling underplanting, cutting, tree girdling, and/or injection. Selective cutting, tree girdling, and/or injection would remove overstory tree species of lower value to wildlife, particularly where individuals of such species compete with, or suppress, mast- and fruit-producing trees. Removal of such trees

would increase the vigor of remaining trees, and reduce overstory canopy closure, in turn stimulating increased herbaceous and shrub-layer growth. However, it is anticipated that such removal or clearing would not be widespread. Basal area would be maintained at 90 to 110 square feet per acre. That stocking rate would be sufficient to maintain a semi-mature to mature bottomland hardwood forest providing mast trees for gray squirrels, snags for downy woodpeckers, and a moderate amount of herbaceous cover for swamp rabbits. Tree girdling and/or injection would be used to enhance snag numbers if necessary; those activities would be carried out on species of low wildlife value, thus contributing to the achievement of overall management objectives. However, snag numbers are anticipated to reach optimum levels simply as a result of maintaining a mature to semi-mature bottomland hardwood forest.

Swamp management objectives would be achieved by constructing small dikes with erosion resistant materials (e.g., crushed limestone, rock, etc.), in the interior drainage ditch and in Bayou Bois Piquant and Bayou Cypriere Longue. Rainwater held behind the dikes would help mitigate the hydrologic isolation that resulted from the construction of the local flood protection levees. The mitigation dikes would be built to partially restore hydrology, yet not cause flooding on the ridge tops or outside the mitigation area. Hydrologic restoration would result in a slightly increased hydroperiod, thus improving habitat for mink. The increased hydroperiod would also result in the death of some individuals of less flood-tolerant species (red maple, green ash) that have become established since construction of the local flood protection levee, thereby increasing the number of snags and, to a lesser degree, the amount of herbaceous and shrub cover.

The proposed mitigation plan was formulated to provide in-kind compensation of bottomland hardwood and swamp losses on the project site with similar habitats on the mitigation site.

ANTICIPATED BENEFITS

Bottomland hardwood compensation benefits were evaluated for three target species: gray squirrel, downy woodpecker, and swamp rabbit. Swamp benefits were evaluated for mink, downy woodpecker, and swamp rabbit. Habitat suitability index (HSI) models for the target species were used to evaluate the benefits accrued through acquisition and management of the compensation lands described previously.

Implementation of the proposed management plan is predicted to improve the value of the bottomland hardwood ridges to wildlife, particularly downy woodpeckers and gray squirrels, as stand conditions are enhanced. Habitat values for gray squirrels and downy woodpeckers would increase, due to the increased quantity and quality of mast-producing trees and increased snag density. Habitat quality for swamp rabbit would increase slightly due to moderate increases in shrub and herbaceous cover after selective cutting. The swamp habitat value is predicted to increase due to the increased hydroperiod resulting from levee construction. Mink will benefit directly by the increased flood duration. Downy woodpeckers and swamp rabbit will benefit as less

flood-tolerant trees, such as red maple and green ash, die as a result of the extended flooding regime. Death of such trees will provide snags, and will thin the canopy, thereby stimulating limited amounts of herbaceous and shrub growth typical of open swamp/marsh habitats.

Changes by target year in the evaluation species HSI's (Table B-1) reflect predicted habitat conditions under future with- and future without-management scenarios.

HSI values under future with-management conditions were projected based on the following scenario:

Year 0 - Existing conditions. The bottomland hardwood ridges consist of semi-mature stands of mixed bottomland hardwood forest with a high stocking rate and overstory canopy closure. The ridges are subject to flooding for only very brief periods during the growing season. Mast trees are moderately abundant. The swamps are composed predominately of baldcypress and water tupelo, with scattered red maple, green ash, and pumpkin ash.

Year 1 - Project construction complete. Overstory canopy closure and basal area have been reduced over a limited area on the ridges through selective cutting and tree girdling. Selected areas have been underplanted with swamp chestnut oak and sweet pecan seedlings. Levees have been constructed, restoring the hydrology of the swamps.

Years 2 through 3 - Snags have been created as a result of tree girdling conducted in TY1. Herbaceous vegetation has increased in those areas subjected to overstory thinning in TY1. Mink have benefitted due to increased hydroperiod.

Years 4 through 10 - Management practices continue at a level necessary to maintain overall stand basal area between 80 and 100 square feet per acre and overstory canopy closure at 80 percent. Underplanting continues where necessary to increase the future density of hard-mast producing species. Herbaceous and shrub cover have increased slightly due to thinning of the overstory canopy. Swamp basal area has decreased slightly due to tree mortality caused by increased hydroperiod. Snags become more numerous, shrub (buttonbush) cover increases moderately, and herbaceous cover increases slightly.

Years 11 through 25 - Bottomland hardwood management practices continue. Some saplings and young trees established during earlier selective cuttings begin to die as a result of canopy closure. Shrub and herbaceous cover also decrease slightly. Mast-producing tree

Table B-1. Habitat Suitability Index values for target species on the proposed mitigation area, West Bank (East of Harvey) Louisiana, Project compensation analysis.

		Habitat Suitability Index Values	
Target species	Target Year	Future without-management	Future with-management
Bottomland Hardwoods:			
Gray Squirrel	0	0.57	0.57
	1	0.57	0.57
	3	0.57	0.57
	10	0.61	0.61
	25	0.00	0.77
	50	0.32	0.74
	75	0.00	0.83
	100	0.32	0.79
Downy Woodpecker	0	0.34	0.34
	1	0.34	0.34
	3	0.34	0.40
	10	0.36	0.60
	25	0.20	0.80
	50	0.10	0.77
	75	0.20	0.88
	100	0.10	0.83
Swamp Rabbit	0	0.88	0.88
	1	0.88	0.88
	3	0.88	0.90
	10	0.83	1.00
	25	1.00	0.96
	50	1.00	0.88
	75	1.00	1.00
	100	1.00	0.96
Swamp:			
Mink	0	0.70	0.70
	1	0.70	0.70
	3	0.70	1.00
	10	0.70	1.00
	25	0.70	1.00
	50	0.70	1.00
	75	0.70	1.00
	100	0.70	1.00

Table B-1. Continued.

Target species	Target Year	Habitat Suitability Index Values: Future without-management	Future with-management
Swamp:			
Downy Woodpecker	0	0.54	0.54
	1	0.54	0.54
	3	0.54	0.54
	10	0.54	0.88
	25	0.54	0.88
	50	0.54	0.94
	75	0.54	0.94
	100	0.54	0.94
Swamp Rabbit	0	0.10	0.10
	1	0.10	0.10
	3	0.10	0.10
	10	0.10	0.33
	25	0.10	0.33
	50	0.10	0.33
	75	0.10	0.33
	100	0.10	0.33

species become increasingly dominant in the overstory canopy. Snag density decreases slightly in the swamp due to rapid decomposition of relatively small snags formed during earlier years.

Years 26 through 50 - Bottomland hardwood management practices continue. Oak seedlings planted during earlier years begin producing mast. Basal area continues to increase slowly, and the average diameter of overstory trees increases. The number of mast-producing species has increased, and snag density is reaching optimum levels. Herbaceous cover continues to decline. Swamp basal area continues to drop slightly.

Years 51 through 75 - Bottomland hardwood management practices continue. Selective cutting and girdling increases slightly, resulting in a short-term reduction in basal area and increased shrub and herbaceous growth. Snag density and size are at optimum levels. Swamp basal area declines slightly.

Years 76 through 100 - Management practices continue. The bottomland hardwood stands have increased in average tree age and diameter, but with a variety of age and diameter classes represented. Average basal area ranges from 90 to 110 square feet per acre. Overstory canopy closure averages 80 percent, and the number of hard mast-producing tree species has increased from 3 to 4. The swamp habitat has opened up slightly, to be interspersed with patches of scrub and emergent herbaceous wetlands.

Habitat Evaluation Procedures Analysis of Compensation Needs
An HSI value was developed for each target species and each target year for the bottomland hardwood ridges and swamps of the proposed mitigation area based on predicted future with- and future without-management habitat conditions. The HSI value for each target year was multiplied by the corresponding acreage value to obtain a habitat unit value. These values were annualized over all target years to obtain Average Annual Habitat Unit values for each species. The difference between future with-management and future without-management Average Annual Habitat Units values expected to result from the above-described mitigation scenario (Table B-2) reflect the net benefit of the management actions.

The goal of the mitigation plan is to provide for equal replacement of habitat unit losses associated with the Alternative 3b. An equal replacement compensation plan would provide an increase in Habitat Units equal in magnitude to the Habitat Unit losses, regardless of how those losses were apportioned among evaluation species. A mathematical expression of this goal is:

$$\sum_{i=1}^{n} M_i + \sum_{i=1}^{m} I_i = 0$$

Table B-2. Average Annual Habitat Units for future with-management and future without-management conditions for the proposed West Bank (East of Harvey Canal), Louisiana, Project mitigation plan.

Species	Future without-management	Future with-management	Change
Bottomland Hardwood:			
Gray Squirrel	61.43	224.82	163.39
Downy Woodpecker	51.78	229.93	178.15
Swamp Rabbit	260.61	284.14	23.52
Swamp:			
Mink	210.00	298.20	88.20
Downy Woodpecker	161.14	267.63	106.49
Swamp Rabbit	30.98	95.45	64.48

where M = Average Annual Habitat Units gained through mitigation for a target species;

I = Average Annual Habitat Unit losses (due to project impacts) for impacted species;

i = species number;

n = total number of target species; and

m = total number of impacted species.

The equal replacement compensation goal specifies that the gain of one Habitat Unit can be used to offset the loss of one Habitat Unit for any species. The trade-offs can be between any of the species. The management area required to compensate for project-induced losses can be determined by the following formula:

$$\text{Compensation Area} = -A\left(\sum_{i=1}^{n} I_i / \sum_{i=1}^{m} M_i\right)$$

where M, I, i, n, and m conform to previous usage, and A is the size in acres, of a hypothetical mitigation area.

In this case, the compensation acreage required for equal replacement would be -300 (-131.85/323.25), or 190 acres; the swamp compensation acreage required would be -300 (-64.28/259.18), or 74 acres (Table B-3).

Costs

The first cost of fee-simple acquisition of 264 acres in the proposed mitigation area, including not less than 190 acres of bottomland hardwood ridge habitat and 74 acres of swamp, is estimated to be $211,200. That cost does not include one-time development costs of $60 per acre, or operation and management costs of $10 per acre annually, as calculated by the Service. The mitigation management work would consist of selective timber harvest, tree girdling, and seedling underplanting and would cost approximately $33 per acre. Costs should be borne as project expenses.

Table B-3. Compensation requirements for West Bank (East of Harvey Canal) Louisiana, Project based on equal replacement of habitat units: I_i = change in Average Annual Habitat Units (AAHU's) for evaluation species i resulting from project impacts; M_i = mitigation gains (based on 300-acre hypothetical mitigation area); and compensation required = $(-300)(I_i/M_i)$.

Species	I_i	M_i
Bottomland Hardwood:		
Gray squirrel	-19.48	163.39
Downy woodpecker	-100.18	178.15
Swamp rabbit	-111.31	-23.52
Total	-230.98	365.06
Compensation required	189.8 acres	
Swamp:		
Mink	-22.58	88.20
Downy Woodpecker	-28.96	106.49
Swamp Rabbit	-12.74	64.48
Total	-64.28	259.17
Compensation required	74.0 acres	

APPENDIX E

INITIAL HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

SITE ASSESSMENT

INITIAL HAZARDOUS, TOXIC AND RADIOACTIVE WASTE SITE ASSESSMENT

WEST BANK OF THE MISSISSIPPI RIVER,
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
EAST OF THE HARVEY CANAL

Algiers Canal, Harvey Canal, and Hero Canal

Jefferson, Orleans, and Plaquemines Parishes

HTRW # 28

SUMMARY

The portions of the west bank of the Mississippi River from the Harvey Canal eastward to the community of Oakville were investigated for the potential presence of hazardous, toxic, and radioactive waste (HTRW). The proposed work involves earthen levee enlargement, floodwall construction, and floodgate construction along Harvey, Algiers, and Hero Canals. This assessment relies on site inspections, existing literature, historic aerial photography analysis, land-use studies, agency coordination, and document research. Based on results of this initial investigation, HTRW risk during construction is minimal. No additional HTRW work is recommended.

INTRODUCTION

The purpose of this initial assessment is to gather and evaluate data regarding the existence or potential for encountering HTRW located in or close to U.S. Army Corps of Engineers civil works projects. The assessment relies on aerial photography analysis, land-use studies, historical records search, and site visits. Early identification of sanitary and industrial waste disposal sites or permitted discharges within the project area must be accomplished prior to any land acquisition. The assessment is intended to minimize the liability of the Federal and local sponsoring proponents, insure that health and safety of field personnel is not jeopardized by undocumented HTRW during field investigations, and document the existence of sites that are in need of technical remediation.

This assessment is prepared under guidance of the Corps of Engineers Regulation ER **1165-2-132**, Water Resources Policies and Authorities for Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, June 26, 1992.

PROJECT DESCRIPTION

PROJECT PURPOSE

The purpose of this study is to determine the feasibility of providing increased levels of hurricane surge protection to the portion of the west bank of the Mississippi River from the Harvey Canal eastward to the community of Oakville. Improved hurricane protection for the Lafitte-Barataria area was determine infeasible and therefore this project focuses on the east of the Harvey canal area.

The project area is a part of the greater New Orleans area and is bounded by the Mississippi River on the north and east, the Harvey Canal and Bayou Barataria on the west, and the Hero Canal on the south. This is an area of heavy residential, commercial, and light agricultural development. Although there are some sizeable forested tracts remaining in the project area, the total of which is approximately 11,300 acres, most of this acreage will be subject to development in the future, either with or without the proposed project. Due to low ground elevations in the study area, much being below sea level, and the inadequacy of existing levee systems, disastrous flooding can occur. Flooding was experienced in 1985 during Hurricane Juan, which was not classed as a major storm.

PROJECT NEED

The physical and topographic characteristics of the study area have created the need for protection levees, drainage canals, and pumping stations. Protection from high seasonal flows on the Mississippi River is provided by levees constructed as part of the Mississippi River and Tributaries Flood Control Project. In addition to the threat of flooding from the Mississippi River, the study area is also at risk to inundation from hurricane surge. The surge generated by hurricanes in the Gulf of Mexico can travel across the marsh and through Bayou Barataria to threaten the area from the south. To protect the area from tidal and storm surge flooding, local interests have constructed a network of levees that provide a very limited degree of protection. Limited protection is also provided to a portion of the study area by the Algiers Canal levees, constructed as part of the Algiers Canal alternate route (GIWW).

PROJECT AUTHORITY

The study was authorized by four resolutions: two adopted by the Committee on Public Works of the United States Senate at the request of Senator Russell B. Long and the late Senator Allen J. Ellender and two adopted by the Committee on Public Works of the United States House of Representatives at the request of the late Representative Hale Boggs.

The Senate Committee resolutions adopted November 10, 1965, and May 6, 1966, respectively, read as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers for Rivers and Harbors created under Section 3 of the River and Harbor Act approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers, on the Mississippi River Delta at and below New Orleans, Louisiana, published as House Document Numbered Five-Fifty, Eighty Seventh Congress, and other pertinent reports, with a view to determining if the existing project should be modified in any way at this time with particular reference to improvements for hurricane protection, flood control, and related purposes in that part of Jefferson Parish, Louisiana, between the Mississippi River and Bayou Barataria and Lake Salvador."

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on the Mississippi River Delta at and below New Orleans, Louisiana, published as House Document Numbered 550, Eighty-seventh Congress, and other pertinent reports, with a view to determining whether any modifications of the recommendations contained therein are advisable at this time, with particular reference to improvements for hurricane protection, flood control, and related purposes in the area on the West Bank of the Mississippi River at and in the vicinity of New Orleans, Louisiana."

The House Committee resolutions adopted on May 5, 1966, and October 5, 1966, respectively, read as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports on the Mississippi River Delta at and below New Orleans, Louisiana, to determine if the existing project should be modified at this time with respect to improvements for hurricane protection, flood control, and related purposes in that part of Jefferson Parish, Louisiana, between the Mississippi River and Bayou Barataria and Lake Salvador."

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on the Mississippi River Delta at and below New Orleans, Louisiana, published as House Document Number 550, Eighty-seventh Congress, and other pertinent reports, with a view to determining whether any modifications of the recommendations contained therein are advisable at this time, with particular reference to improvement for hurricane protection, flood control, and related purposes in the area on the West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana, including Plaquemines, Orleans, Jefferson, and St. Charles Parishes."

PRIOR PROJECT DOCUMENTATION

A number of studies and reports on water resources development in the vicinity of the study area have been prepared by the U.S. Army Corps of Engineers, other Federal, state, and local agencies, research institutes, and individuals. Previous Federal and non-Federal studies have established an extensive data base for this report. The more relevant studies, reports, and projects are described in the following paragraphs.

- A report entitled "Flood Control, Mississippi River and Tributaries," published as House Document No. 90, 70th Congress, 1st Session, submitted December 8, 1927, resulted in authorization of a project by the Flood Control Act of May 15, 1928. The project provides comprehensive flood control for the lower Mississippi Valley below Cairo, Illinois, and has had a significant impact on water and land resources in the study area.

- A feasibility report entitled "West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana," was published by the U.S. Army Corps of Engineers in December 1986. The report investigated the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between the Harvey Canal and Westwego and down to the vicinity of Crown Point, Louisiana.

- A reconnaissance study entitled "West Bank Hurricane Protection, Lake Cataouatche, Louisiana," was completed by the U. S. Army Corps of Engineers in February 1992. The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between Bayou Segnette and the St. Charles Parish line.

- A study of drainage along the Harvey Canal and Bayou Barataria between the Roussel Pumping Station and Crown Point was authorized by resolutions adopted September 11, 1961, and May 10, 1962, by the U.S. Senate and House Committees. The study was completed and approved for construction on January 22, 1964. Construction of the Harvey Canal-Bayou Barataria levee was initiated under the authority of Section 205 of the Flood Control Act of 1948 (Public Law 87-874). The project has not been completed.

PROJECT ACTION

The District studied five protection alignments and three levels of protection [100-year, 200-year, and standard project hurricane]. Plan 1 (with floodwalls along Harvey Canal), 100-year plan, would be the least damaging environmentally. The tentatively selected plan is Plan 3B, SPH (floodgate in Harvey Canal, with floodwall/levee combination). This plan maximizes flood protection, results in little disruption to Harvey Canal businesses, maintains low costs, and results in a relatively minor increase in environmental damage over Plan 1. Environmental features of the plan include using existing alignments wherever possible, obtaining levee-building material from clean non-wetland areas if possible, and mitigating

unavoidable losses of forested wetlands by acquiring and preserving 312 acres of high quality wooded wetlands in a nearby location. Existing levees would be raised approximately two to four feet to an elevation of +9.5 feet NGVD.

ENVIRONMENTAL SETTING

GEOLOGIC/GEOMORPHIC FEATURES

The geologic history since the end of the Pleistocene Epoch is pertinent to the area. At the close of the Pleistocene, sea level was approximately 360 to 400 feet below present sea level and the Mississippi River was entrenched into the older Pleistocene sediments to the west of the project. As sea level rose to its present stand, the entrenched valley was filled with sediment by the Mississippi River, resulting in an increase in meandering and channel migration. This meandering and channel migration has resulted in a series of deltas extending into the Gulf of Mexico. Seven Holocene deltas are recognized in the lower Mississippi River Valley; however, only four are relevant to the project area. The oldest of the four deltas in the vicinity of the project was the Cocodrie Delta whose distal edges extended across the New Orleans area from west to east. After a diversion to the west and toe formation of the Teche Delta, the course of the Mississippi River returned to the New Orleans area forming the St. Bernard Delta which followed the same general course as the Cocodrie Delta, but extended further to the east. It was during this period that maximum sedimentation into the area occurred via the Bayou Barataria and Bayou des Familles distributaries. A shifting of the river course upstream in response to a shorter route to the Gulf resulted in the formation of the Lafourche Delta southwest of the project. A final shift of the river brought the flow into its present course forming the Plaquemine Delta just south of New Orleans, and the present Balize Delta below the Plaquemine Delta. Development of the deltas below New Orleans have resulted in the gradual degradation of the study area through subsidence and shoreline retreat.

SOILS

Engineering properties of the sediments beneath the project vary greatly. Based on existing profiles and borings along the Algiers Canal and the Harvey Canal, the project is generally underlain by Holocene deposits that vary in thickness between 70 and 85 feet. These Holocene sediments are generally comprised of swamp-marsh deposits, interdistributary deposits and prodelta clays in this sequence from the surface to the top of the Pleistocene deposits. The underlying Pleistocene deposits are stiff to very stiff in consistency and yield lower water contents when compared to the Holocene deposits. An exception to the above sequence are the natural levee, crevasse-splay and point bar deposits associated with the present Mississippi River course and the abandoned distributaries which are known to extend through the area.

VEGETATION/WILDLIFE

Most of the land within the existing hurricane protection system has already been developed. However, there is still a significant area remaining of about 11,300 acres of bottomland hardwoods in large tracts. Dominant species are red maple and black willow. The bottomland hardwoods have lost much of their value and function as wetland areas because they have been leveed and drained. Swamp remains at the location of the proposed levee system near Oakville. Approximately 39 percent of the bottomland hardwoods can be classified as wetlands. A variety of wildlife species use the wetlands for primary habitat.

The canals in the study area provide low to moderate habitat value for fish and aquatic organisms. The larger canals do not offer much habitat diversity and the smaller canals can become choked with vegetation during the summer. The Harvey Canal experiences poor water and sediment quality from industrial pollutants, as well as from pumped stormwater runoff, which diminishes its value for fish and other aquatic life. The Algiers Canal has somewhat better water quality, but it does contain sediment contaminants (especially near the Harvey Canal). Water samples taken above and below the intersection of the GIWW and the Hero Canal indicate the Hero Canal could have slightly better water quality than the Harvey Canal. However, portions of the Hero Canal contain some contaminated sediments according to the Louisiana Department of Environmental Quality (DEQ).

CLIMATE

The climate of the area is humid subtropical. Annual average temperature in the project area is 68°F, with monthly normal temperatures varying from 82°F in July to 53°F in January. Average annual precipitation over the area is 63 inches, varying from a monthly average of 7.7 inches in July to an average of 4.2 inches in November. At least 10 major hurricanes or tropical storms have affected the project area since 1915 including Betsy (1965), Carmen (1974), Juan (Juan), and Andrew (1992). These storms caused elevated water levels of 3 to 6 feet above normal in the project area.

HYDROLOGY

Normal astronomical tides at the coastline are diurnal and can have a spring range of as much as 2.0 feet. Inland, this range is on the order of 0.5 feet. Winds with a strong southerly component that are sustained for 30 hours or more yield an increase in tide height of about 1 foot for each 10 miles per hour. Sometimes the passage of a front is delayed creating strong winds that lead to abnormally high tides.

Drainage problems are exacerbated when rainfall is accompanied by high tides. During May 1978 and April 1980, short duration, large accumulation rainfalls occurred in this area. On May 3, 1978, the Algiers area received 9.8 inches of rainfall. Heavy rainfall and strong onshore winds resulted in a stage of 2.3 feet NGVD at Barataria on Bayou Barataria, and 2.7 feet NGVD at the Harvey Lock on the Intracoastal Waterway. On April 13, 1980, the rainfall

measured at Algiers was 9.7 inches and the accompanying stage at Barataria was 3.8 feet NGVD. At the Harvey Lock, the maximum stage recorded was 3.2 feet NGVD. The pump stations that discharge into the marsh were forced to operate against higher than optimum outside stages during these events, reducing their pumping efficiency.

Intense hurricanes such as Betsy have caused high stages along the coastal area of Louisiana (10.5 ft NGVD at Grand Isle) and moderately high stages inland (3.2 ft NGVD at the Harvey Lock). High stages resulting from previous hurricanes are summarized in Volume 2, Appendix A, Section I. Detailed hurricane data is presented in a Corps publication entitled, "History of Hurricane Occurrences along Coastal Louisiana." Examination of gage records at the inland gaging stations reveals that Hurricane Juan caused the highest stage of record on October 29, 1985, along Bayou Barataria at both Barataria (4.25 ft NGVD) and Lafitte (5.05 ft NGVD) and at the Algiers (4.45 ft NGVD) and Harvey (4.74 ft NGVD) Locks.

Normal tidal influence within the study area is relatively insignificant. However, wind effects can mask the daily ebb and flow variations, and during periods of sustained southerly winds, tides rise in direct response to the duration and intensity of the wind stress. This was demonstrated in 1985 by Hurricane Juan. Although a relatively weak storm in terms of maximum sustained windspeed, Hurricane Juan caused higher stages in much of the study area than the more intense Hurricane Betsy. This is directly attributable to the hurricane's erratic, almost stationary, path across southern Louisiana. Gale force winds over a period of five days caused tides 3 to 6 feet above normal across the entire coastal area of southern Louisiana.

ENVIRONMENTAL CONCERNS

If undocumented waste sites are uncovered during the course of construction, work delays, increased coordination with regulatory agencies, and increased project costs could result, as well as potential worker exposure to HTRW. During the course of this investigation, specific activities undertaken include locating existing or historical waste release sites and locating substances that could be detrimental to the human as well as the non-human environment.

The general route of exposure from toxic chemicals occurs from dermal adsorption, injection, ingestion, or inhalation. The degree of human exposure is primarily a function of the concentration of the contaminant found in the top several inches of soil. The surface layer is exposed to sunlight where many chemicals rapidly volatilize or are metabolized by soil microorganisms. Exposure to contaminated soil may pose not only a direct (acute), but also an indirect long-term (chronic) hazard for humans. Chemicals can leach into the groundwater or enter streams and bayous via surface runoff, creating a threat to birds, fish, deer, rabbits, and other wildlife species.

Because many of the properties along the Harvey and Algiers Canals are occupied by businesses that may use, manufacture, or transport hazardous materials or wastes, it was

necessary to do detailed research of the area history. A Land Use History was conducted to reveal businesses and locations that could present problems with hazardous or toxic wastes. The Land Use History Report revealed that much of the project area is occupied by sites that are potential HTRW sites. Many of these sites were selected because of the type of business that is presently located or was previously located on a particular piece of property. Industrial activities within the study area are located primarily along the Harvey and Algiers Canals. The Land Use History Report, on-site investigations, and a record search of DEQ files were used to evaluate the potential HTRW problems for the alignments of the proposed alternatives.

ASSESSMENT METHODOLOGY

HTRW OBJECTIVE

The objective of this assessment is to minimize through early detection the potential exposure from any undiscovered waste site or contaminated material during the construction of the project. The intent of this study is to provide a reasonable assessment of potential problem areas that can be considered by project management and the local sponsor in decisions of property transfer or future testing requirements. The focus of this preliminary assessment is to identify information that would: (1) identify known sites adjacent to or near the proposed construction site, and (2) determine relative probabilities for potential contamination adjacent to or within the proposed construction site.

AERIAL PHOTOGRAPHY ANALYSIS

Aerial photographs dating from 1945 to 1991 were utilized to determine the extent of commercial and industrial development in the proposed project area. These photographs provided an additional series of chronological reference points for the appearance, alteration, and disappearance of structures. The obvious drawback of aerial photographs is that the use of structures depicted is often a matter of guesswork unless alternative documentation is available.

LAND USE STUDIES

The Land Use History Report was developed by Earth Search, Inc. under contract by the New Orleans District (NOD) Office. A one volume report was prepared through the examination of historic maps, aerial photographs, and state, Federal, and parish environmental records. This document is on file at the NOD.

The Land Use History Report was conducted to reveal businesses and locations, within the parish and more specifically within a one mile radius of the project area, that could present problems with hazardous or toxic wastes. The Land Use History Report evaluated the types of businesses located in the project area and made HTRW determinations at all addresses in

the project area. This document revealed that much of the project area is occupied by sites that have high interest HTRW potential. High interest determinations were made because a business, that is presently located or was previously located on a particular piece of property, either produced, transported, or stored hazardous substances. However, some high interest businesses were never associated with any type of hazardous substance or waste. These businesses were classified as high interest because they conducted similar activities to another business that had some type of hazardous waste permit.

HISTORIC RECORDS

The U.S. Environmental Protection Agency, several divisions of DEQ, and the Louisiana Department of Natural Resources were all contacted regarding any known HTRW problems both in the project area and in the levee ROW.

Documents and publications of DEQ and the U.S. Environmental Protection Agency (EPA) were examined for reference to any businesses or sites of HTRW interest in the project area. The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list is a computer database that identifies businesses or sites without describing the nature of HTRW concern. The Resource Conservation and Recovery Information System (RCRIS) list is an additional source of information on businesses. The RCRIS list provides a categorization of the RCRA notifier as a generator, transporter, treater, storer, disposer, or burner/blender of hazardous waste. The quantity of waste generated by businesses is also stated in RCRIS. Included in the Louisiana Site Remediation Information System (LASRIS) is an inventory of sites for which DEQ has files in their Division of Inactive or Abandoned Sites (IAS). The Toxic Release Inventory (TRI) contains data on the quantity of hazardous substances released into the environment by individual facilities. The Underground Storage Tank Description Report (USTDR) has information on the location, owner, size, contents, and construction material of known underground storage tanks. In many instances, once a business or site of HTRW interest has been identified, separate files must be accessed for more detailed data on HTRW activity to be compiled. Most notably, the Division of Hazardous Waste of DEQ maintains hazardous waste regulation compliance files for many RCRIS-listed businesses.

SITE VISITS

Two field trips to the project area were conducted to evaluate the proposed alignment and determine if there were any visible HTRW problems within the proposed right-of-way (ROW). The levee and floodwall ROW were visually inspected for presence of pipes, containers, tanks or drums, ponds or lagoons, car bodies, tires, refrigerators, trash dumps, electrical equipment, oil drilling equipment, gas or oil wells, discoloration of vegetation or water sheens, discoloration of soils, out-of-place dirt mounds or depressions in the landscape, evidence of fire, stressed soils with lack of vegetation, discoloration of vegetation, animal remains, unusual animal behavior, biota indicative of a disturbed environment, and odors indicative of poor water quality or chemical presence.

Most of the proposed levee and floodwall alignments were inspected by vehicle and portions were investigated on foot. Many of the sites, where problems with HTRW may exist, were out of the ROW for all of the proposed alignments, and these sites were not investigated further.

SITE ANALYSIS

The results of the Land Use History Report showed that approximately 400 different pieces of property were located in the project area. Many of these properties had been subdivided and many had addresses of as many as ten different businesses on the same piece of property since 1945. Of the 400 different pieces of property in the project area, 159 were classified as high interest HTRW sites because of the nature of the present business or past business. High interest sites are those properties that either produced, transported, stored, or may have been remotely associated with hazardous substances. Because of the number of high interest HTRW sites in the overall area, the scope of the assessment was reduced to those sites in the ROW of the proposed alignments. This reduced the number of high interest HTRW sites to 88. A search of the hazardous waste files at DEQ revealed that 41 of the 88 sites had a hazardous waste permit or contaminated waste activity. Approximately 24 business locations with hazardous waste files at DEQ were either classified as low interest sites or not discovered by the Land Use History Report. A total of 65 businesses with hazardous waste files at DEQ were examined to determine the possible risks associated with encountering HTRW. Most of the businesses within the ROW had good records of compliance and proper hazardous waste handling procedures. However, seven address locations along Peters Road had violations, including spills and improper handling of hazardous wastes.

Designation of a limited ROW for the proposed levee and floodwall allowed for the elimination of numerous high interest sites from consideration. The Algiers Canal and Hero Canal levees would be raised to the project height with borrow material that would be obtained from an off-site borrow pit. The construction of these levee lifts would limit ROW to the area between the canals and approximately 120 feet landward from the centerline of the existing levee. Disruption to adjacent properties would be reduced, so real estate acquisition could be minimized. This method of construction would greatly minimize the potential to disturb any underground storage tanks or nearby HTRW contamination sites that are located within a construction or business yard.

ASSESSMENT RESULTS AND FINDINGS

AERIAL PHOTOGRAPHY ANALYSIS

Commercial and industrial development along the project corridor as of 1945, 1955, 1965, 1975, and 1991 is presented in Figures 2 through 20 of the Land Use History Report. These figures are based on information contained in aerial photographs of the project area. Available air photo coverage of the project area begins in 1945.

Although the Harvey Canal had been an active transportation corridor for almost a century prior to 1945, widespread commercial and industrial development within the project area began after World War II. The alignment and dimensions of the Harvey Canal have remained unchanged from 1945 to present. In 1965, the West Bank Expressway was present; at that date it passed below the Harvey Canal via the Harvey Tunnel. At this locus, the canal is today crossed by bridges linked to the elevated roadway of the West Bank Expressway, erected after 1975. Lapalco Boulevard, and its bridge across the Harvey Canal, first appear in 1975 photos.

The Harvey Pumping Station on the western side of the canal and the Hero Pumping Station on the eastern side of the canal were present in 1945, but no industrial structures were visible along the course of the Harvey Canal below the West Bank Expressway. The Cousins Pumping Station on the western side of the canal first appears in 1975 photographs. In 1945, the canal banks south of the industrialized zone were occupied by marsh or forest, except near Bayou Barataria, where drained marsh extended north 1 to 1.3 km from the bayou on the eastern side of the Harvey Canal and between the Harvey and Murphy Canals.

LAND USE

The industrialized nature of the Harvey and Algiers Canals allows a high probability of encountering hazardous substances in adjacent business properties. The north side of the Algiers Canal, between Belle Chasse Highway and the Algiers Lock, borders residential communities where few problems with HTRW would be encountered. The south side of the Algiers Canal is primarily residential and rural agricultural. However, several commercial properties that include a golf course and an oil field construction yard are located adjacent to this levee. The Hero Canal levees are used primarily for cattle pasture, except for the south side near Oakville where a landfill for construction demolition materials is located.

The results of the Land Use History Report showed that approximately 400 different pieces of commercial property were located in the area of the proposed project. Of the 400 different properties in the project area, 159 were designated as high interest HTRW sites because of the nature of the present or past business. Many high interest sites were eliminated from consideration because of the limited ROW requirements. This reduced the number of high interest HTRW sites to 88.

The Land Use History Report identified the businesses that had records of underground storage tanks. There were 17 recorded UST's on properties that bordered the alignments of the proposed alternatives. Because the location of the floodwall would probably be located at the edge rather than the middle of businesses, many of these UST's would be avoided by the alignment. If the UST does fall within the floodwall alignment, then it and any surrounding contaminated sediments would have to be removed.

HISTORIC RECORDS

The Land Use History Report contacted Federal and state agencies to obtain information on businesses located in the project area. This study reported which properties had permits to generate, store, or transport hazardous wastes. The DEQ files containing information on inactive and abandoned sites, groundwater protection, and hazardous waste were inspected for additional information on businesses located within the project ROW.

Of the 88 high interest sites within the direct ROW for the alignments, 41 sites had a hazardous waste file at DEQ. Records investigation revealed that 24 additional properties, not classified as high interest sites, also had hazardous waste files at DEQ. A total of 65 business and location files, along the proposed alignment, were examined for hazardous and toxic waste problems. Two businesses, located along Peters Road, had both a hazardous waste file and a groundwater protection file at DEQ. Both of these businesses had records of hazardous spills on the property and soil testing revealed that levels of contamination were above detection limits. One of these businesses had an extensive hazardous waste file with numerous spills and improper handling violations on various properties along Peters Road. It is recommended that these properties be specifically avoided by the proposed levee alignments. Another business at the south end of Peters Road, near the Hero Pumping Station, had barge cleaning pits located on the property. The DEQ file described that the sediments surrounding some pits as well as the pits had become contaminated with barge wastes. It is recommended that this property be avoided by the proposed alignment. The Tentatively Selected Plan proposes to construct the floodgate across the Harvey Canal adjacent to 2730 Peters Road. At this location, the businesses at 1255, 2500, 2800, 2801, and 2804 Peters Road would be avoided. The proposed floodwall would intersect the Hero Pumping Station at the southern end of Peters Road. At this location the business at 4640 Peters Road would be avoided by the floodwall.

The Harvey Canal was noted as an inactive or abandoned site (IAS) in the files at DEQ. This was the only IAS that was in the path of the proposed alignments. A contaminant investigation has been coordinated with DEQ and the results of those investigations are being included in Appendix C, Section VIII of this Feasibility Study. No other IAS was located in the path of the proposed alignment.

Businesses that deal with hazardous substances, located within the proposed levee alignment, had permits from DEQ and the EPA which allowed them to transport, store, or generate hazardous wastes. Most of the businesses within the ROW had very good records of compliance and hazardous wastes were handled properly. These businesses did not present any significant HTRW problems. Some businesses that were listed as high interest HTRW sites did not have hazardous waste files at DEQ. This could be because the business has never handled hazardous substances and never requested a permit from DEQ. Another reason for a business not having a file at DEQ is that the business has never been reported for violations and no investigations have been made. On-site visits were conducted to evaluate all the high interest HTRW businesses located within the proposed alignments.

Information collected from state agencies through a search of their current and historical databases did not reveal significant sources of contamination that could delay the proposed work.

SITE VISITS

A field trip to the project area was conducted on February 6, 1993, by a team of biologists from the NOD. A follow-up field inspection was conducted on April 21, 1994 to evaluate the businesses that were designated as high interest sites in the Land Use History Report. Most of the proposed levee and floodwall alignments were inspected by vehicle and portions were investigated on foot. Some of the alignment locations were not accessible because they were accessible by water only or because they were behind locked gates. Many of the sites, where problems with HTRW may exist, were out of the ROW for all of the proposed alignments and these sites were not investigated further.

The on-site inspection of the site revealed that the great majority of the project area, particularly along the Harvey and Algiers Canals, was commercial property. The only business along the Hero canal was a landfill which received construction demolition materials. Records of DEQ indicate that there has never been any violations of the state permit at this facility. This property did not appear to present any problems with HTRW. Along the south side of the Algiers Canal, one business was noted as a high interest HTRW site in the Land Use History Report. This area was inspected on foot and by vehicle. No materials or evidence of contaminants were detected that would present any HTRW problems. Several other businesses along the south side of the Algiers levee had fill materials and oil-field construction materials temporarily stored on the levee. These businesses did not present any HTRW problems. Along the north side of the Algiers Canal, within the proposed levee ROW, there were 40 high interest HTRW businesses and 18 business locations had hazardous waste files at DEQ. All of the businesses along the Algiers Canal had excellent compliance records at DEQ and the on-site survey revealed that potential problems with HTRW, within the proposed levee ROW, were minimal.

At the intersection of the Algiers Canal and the Harvey Canal, several industrial waste ponds are presently undergoing on-site cleanup operations. These ponds were used for collection of wastes from a company that cleaned barges. The proposed levee alignment would enclose these ponds on the protected side of the hurricane levee. Cleanup is scheduled to be completed in June 1994. After that time, these ponds will not present any HTRW problems for the levee alignment.

Along the Harvey Canal alignment, 28 business locations had a hazardous waste file at DEQ. One business with four present address locations and two previous address locations had an extensive file at DEQ. Two of these address locations had both a hazardous waste file and a groundwater protection file at DEQ. The proposed alignment for Plan 1, one to two blocks east of Peters Road, would run along the far east side of this property and most of the contaminated property would be avoided. However, the file at DEQ described several spills

of hazardous materials which ran into the storm drains. Perhaps, this material drained toward the Harvey Canal, but it may have drained toward Murphy Canal. During the on-site inspection, we noted the drainage ditches surrounding this particular piece of property and did not notice any evidence of contamination. Tests conducted by DEQ in the ditches showed pH levels between 11 and 13. It is recommended that the four locations of this business be avoided by the floodwall alignment. The proposed floodgate on the Harvey Canal intersects Peters Road at a point north of the two other property locations of this business. At the location where the floodwall intersects the Hero Pumping Station, a business that cleaned barges produced hazardous wastes which were collected in pits. The proposed location of the floodwall would border the perimeter of this property along Peters Road, however, the interior of this property would not be disrupted by the floodwall. The remaining businesses along Peters Road had excellent compliance records at DEQ and the on-site survey revealed that potential problems with HTRW, within the proposed levee ROW, were minimal.

Data appendices and the Final Land Use History Report that were used in making these determinations are on file at the NOD, Planning Division. Project details including photographs, site visit data, and other support material have also been included in this file.

ASSESSMENT DISCOVERY

The south side of the Algiers Canal and the Hero Canal levee segments were relatively free of businesses and sites that would present problems with HTRW. The north side of the Algiers Canal and the east side of the Harvey Canal were heavily industrialized and numerous businesses were investigated as high interest HTRW sites. However, upon further on-site investigations and a thorough review of the records at DEQ, there were only a few business locations that would present problems with HTRW. A detailed business review was limited to that area which is in the direct ROW of the proposed alignments, while a general parish and one mile radius review was performed for the rest of the project area. Underground storage tanks could be avoided by the levee and floodwall alignments. The location of the floodgate on the Harvey Canal will pass just to the north of two pieces of property that should be avoided. The remaining levee lifts along the Harvey, Algiers, and Hero Canals should not present any problems with HTRW materials.

RELATIVE RISK ASSESSMENT

Based upon field inspection, agency coordination, and Land Use History, there is a minimal risk of encountering an HTRW site during the construction of this project. NOD has completed the initial HTRW assessment and recommends that the properties at 1255 and 2500 Peters Road be avoided from the alignment for Plan 1. It is recommended that the present alignment location of the floodgate for Plan 3 on the Harvey Canal remain at the presently planned location and intersect Peters Road south of the property at 2500 Peters Road and north of the property at 2800, 2801, and 2804 Peters Road. The location of the floodwall at

the Hero Pumping Station should border existing roadways along Bayou Barataria and should not disrupt the property at 4640 Peters Road. Acquisition of real estate interests for the levee lifts along the north side of the Algiers Canal should be limited to the area within the required levee ROW and should not include any property located more than 120 feet landward from the centerline of the existing levee. The planned alignments should remain within that ROW. These recommendations are made so as to avoid the potential problems of encountering a HTRW site.

PREPARERS

The primary assessment was prepared by Mr. Michael H. Saucier, Fishery Biologist, U.S. Army Corps of Engineers, New Orleans District, Planning Division.

Land use research, supporting historical documentation, agency coordination, and petroleum well assessment for the borrow sites was completed by Earth Search, Inc. under contract from the U.S. Army Corps of Engineers, New Orleans District, Planning Division.

CONCLUSION AND RECOMMENDATION

Limitations

Compilation of historical environmental data within the State of Louisiana has not been a continuing effort. Comprehensive historical environmental databases have not been maintained which would provide a complete HTRW history. Files at DEQ are complete from 1980 to the present, however, businesses that were present prior to 1980 may not have a file because no problems have been reported. Because of the nature of this industrial corridor, there may be unrecorded UST's located on properties within the project alignments.

Conclusion and Recommendation

The risk of encountering HTRW sites along the Harvey Canal, Algiers Canal, and Hero Canal levee segments is minimal. However, the properties at 1255 and 2500 Peters Road should be avoided from the alignment for Plan 1. The present alignment location of the floodgate, for Plan 3, on the Harvey Canal should remain at the presently planned location and intersect Peters Road north of the property at 2800, 2801, and 2804 Peters Road. The business property at 4640 Peters Road should be avoided by the floodwall alignment. The levee lifts along the north side of the Algiers Canal should only acquire real estate interests within the required levee ROW and should not disrupt any property located more than 120 feet from the centerline of the existing levee. Upon selection of a final alignment, a meeting should be arranged with appropriate offices of DEQ to review the selected alignment and construction methods to insure implementation of a safe project.

Report Preparation

Prepared by: Michael H. Sancin Date: Aug 9, 1994

Reviewed by: John C. Weber Date: 9 Aug 94

APPENDIX F

REAL ESTATE SUPPLEMENT

REAL ESTATE SUPPLEMENT TO THE FEASIBILITY REPORT FOR
WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA

(EAST OF HARVEY CANAL)

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REAL ESTATE SUPPLEMENT TO THE FEASIBILITY REPORT FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA

(EAST OF HARVEY CANAL)

PROJECT NAME

West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal)

RECONNAISSANCE REPORT

The study for the project area was initiated at a feasibility study stage. Subsequently, a reconnaissance report is not available.

LOCATION

The study area is located in southeastern Louisiana on the west bank of the Mississippi River within Jefferson, Orleans, and Plaquemines Parishes. The area is generally bounded by the Harvey Canal to the west, the Mississippi River to the north and east, and the Hero Canal to the south. The area lies about 10 miles south-southwest from the New Orleans central business district. It is partially located on two sections of the Gulf Intracoastal Waterway (GIWW) - Harvey Canal to Hero Cut-Off portion and the Algiers Alternate Route. The remaining portion is located mostly along Hero Canal in Plaquemines Parish.

GENERAL DESCRIPTION OF THE AREA

The area is predominately flat, at or near sea level. It is in an area of heavy residential, commercial, and agricultural development. There are over 11,000 acres of forested land near the project area. The area, due to the low elevation, is periodically subjected to flooding from hurricanes and heavy rains.

ACREAGE TO BE ACQUIRED

The acreage needed for the project and the uses thereof are as follows:

Fee	Acres
Mitigation	312.00
Easements	
Channel	47.85
Levee, Floodwall/Channel	18.70
Levee/Floodwall	566.80
Borrow	92.00
Temporary Construction	1.70
Temporary Stockpile	100.00

Total acreage required for the proposed project is approximately 1,139.05 acres.

FEDERALLY OWNED LAND

The Corps, on behalf of the United States, acquired fee lands for some portions of the Algiers Alternate Route of the GIWW and the Harvey Canal to Hero Cut-Off sections. Approximately 4 acres of the lock site will be used for the proposed hurricane protection levee. At Harvey Canal to Hero Cut-Off section, approximately 4 acres will be used as the site for the sector gate structure. The sector gate required for the project will be situated in the channel.

Additionally, the Corps, on behalf of the United States, acquired a channel easement extending from the lock site at Algiers to its intersection with the Harvey Canal. The proposed hurricane protection levee will run on each side of the existing Algiers banklines to the outer limits of the channel easement. The hurricane protection levee will occupy approximately 402 acres of land encumbered by the existing channel easement.

The New Orleans District (NOD) intends to use portions of the Federal-fee-lands at the Algiers Lock and the Harvey Canal (Sector Gate Site) without the local sponsors obtaining any realty interest.

The Local Cooperation Agreement (LCA) will require that the local sponsors maintain and operate those portions of the hurricane protection project, within the Federal-fee-lands.

The local sponsors will not be credited for the value of the Federal-fee-lands included for project purposes. However, they will receive credit for those portions of lands previously provided as an item of local cooperation for a Federal Project, which includes portion of Section 205 levee, located on the west side of Harvey Canal for which they are required to acquire additional interest.

The Department of the Navy, on behalf of the United States, acquired 5 acres of fee land along the Algiers Alternate Route. Its ownership is encumbered by the Corps channel easement. The Navy owns a wharf on the Algiers canal, and their oil pipelines run from the wharf then, under the existing levee to a storage location. The Navy has a delivery of oil approximately every 10 days. It hopes to have little or no interruption of their operations. Further, it has requested that relocations of their pipelines be part of the levee construction contract. The initial contact with the Navy shows support for the project, or at least no objection.

LOCAL SPONSOR-OWNED LAND

There are three local sponsors for this project - one in each of the affected parishes. The West Jefferson Levee District is the assurer for the Jefferson Parish portion of the project. The Levee District has a levee servitude on a portion of the proposed project rights-of-way lying west of the Harvey Canal. The Levee District has offered the servitude for project levee purposes.

The Orleans Levee District (OLD) is the sponsor for the Orleans Parish portion of the project. NOD has found no record of OLD ownership in the project.

Plaquemines Parish Government is the local sponsor for the Plaquemines Parish portion of the project. NOD has found no record of ownership by the Parish within the proposed project rights-of-way.

LOCAL SPONSORS' LAND ACQUISITION EXPERIENCE

According to Louisiana Revised Statues R.S. 38:281 et seq., the West Jefferson Levee District and the Orleans Levee District are political subdivisions of the State of Louisiana organized for the purpose, and charged with the duty, of constructing and maintaining levees and all other things incidental thereto within their territorial limits. The provisions of R.S. 38:513 pursuant to Article VI, Sections 16 and 38 of the Louisiana Constitution gives Plaquemines Parish Government the same purpose and duty as a levee district within its territorial limits.

The West Jefferson Levee District, the Orleans Levee District, and the Plaquemines Parish Government are local sponsors for numerous other projects. The local sponsors have both the land acquisition experience and ability to acquire all real estate necessary for this project. In the past, these agencies have clearly demonstrated that they have the authority and capability to perform all of the requirements of a local cooperation agreement.

PUBLIC LAW 91-646

There are no houses, other dwellings, or places of businesses located within the proposed limits of work that are eligible for URA benefits.

There are no churches, schools, or cemeteries within the project area that will be affected.

Several items of personal property are located near the proposed alignment. URA payments are estimated at $100,000.00.

NOD will advise the local sponsors of the requirements of Public Law 91-646, as amended. They will be advised that Public Law 91-646, as amended, applies to acquisitions in anticipation of a Federal project with local cooperation. The local sponsors will keep records which demonstrate the landowners have been informed of their rights under Public Law 91-646, as amended. Also, they will be required to keep records which evidence benefit determinations. They will be required to have an appeals procedure for Public Law 91-646, as amended claims.

BASELINE COST ESTIMATE

See Exhibit "A" entitled "Real Estate Baseline Cost Estimates for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal)."

MAPS

Plate 1 shows the general vicinity of the project area. Plate 2 shows the stockpile area, the borrow area, and proposed project alignment with general project features, and minimal estates. A map showing property lines, utilities and facilities to be relocated, and any known potential hazardous toxic waste (HTW) has not been compiled.

The project will be approximately 30-miles-long with the rights-of-way varying from 50- to 200-feet-wide. The project limits will be aligned around all improvements by the use of floodwalls.

A levee and floodwall will extend on the west from the Cousins Pumping Station on the Harvey Canal to the Plaquemines Parish levee in the community of Oakville. A sector gate will be constructed in the Harvey Canal which will provide a closure of the Harvey Canal to prevent flooding north of Lapalco Boulevard. The rights-of-way for the sector gate includes lands located primarily on the south end of the Harvey canal inside the channel area.

Rights-of-way in Jefferson Parish will include existing levee and new rights-of-way on unencumbered lands.

Most of the rights-of-way in Orleans Parish are located within the existing Gulf Intracoastal Waterway - Algiers Alternate Route channel servitude.

Likewise, rights-of-way in Plaquemines Parish are mostly in the Gulf Intracoastal Waterway - Algiers alternate Route. The remaining right-of-way is on lands over which the parish has sufficient interest.

A temporary stockpile area is located on the west side of Harvey Canal south of Lapalco Boulevard. It is adjacent to the landside levee right-of-way for the outflow channel. All the land is located outside of the Harvey Canal-Bayou Barataria servitude (the Section 205 levee project).

A 92-acre borrow pit will be located on an unimproved tract of land northeast of the intersection of Hero Canal and Bayou Barataria in Plaquemines Parish.

A 312-acre mitigation area is located in St. Charles Parish in the vicinity of the proposed Davis Pond Freshwater Diversion Project. This land consists of wet and dry woodlands.

No current tract ownership data has been compiled. However, records of the Gulf Intracoastal Waterway - Algiers Alternate Route, and the Harvey Canal project maps indicate that there are approximately 300 ownerships affected, of which 250 are located along the Algiers Canal.

Several items were observed which raise questions about the possible existence of hazardous and toxic waste. Items such as open water/sludge storage pits, the presence of old tires, barrels/drums which may contain chemical, open dump sites, and a multitude of manufacturing and industry type businesses which may have a bearing on the possibility of environmental problems.

MINERAL ACTIVITIES

There are no present or expected future hydrocarbon activities within the immediate vicinity of the project area. No subsurface right will be acquired.

ESTATES

There are 5 standard and 2 non-standard estates required for subject project as follows: Fee Excluding Minerals (With Restriction on Use of Surface); Channel and Channel Improvement Easement; Levee/Floodwall and Channel Easement; Levee/Floodwall Easement; Borrow Easement; Temporary Construction Easement; Temporary Stockpile Easement. (See Exhibit "B" entitled "Estates for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, East of Harvey Canal)."

Levee/Floodwall and Channel Easement - This easement is needed within a long narrow strip on the west side of the Harvey Canal; it is in a confined area, so a broader estate is required. The exact proportion of the levee/floodwall or the channel on this particular strip of land is not known. Thus, it is preferable to have the local sponsor acquire both the rights for a levee/floodwall easement and a channel easement in this area.

Temporary Stockpile Easement - This easement is required for 15 years as compared to the 3 years required for the Temporary Construction/Work Area Easement. The rights required in the stockpile easement are also much less burdensome to the landowner than those required in the Construction Easement. It is preferable that the local sponsor acquire a non-standard estate that provides only the rights needed for the construction of the project.

SCHEDULE

See EXHIBIT "C" entitled "Real Estate Acquisition Activities and Milestones for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of Harvey Canal)."

RELOCATION OF PUBLIC FACILITIES AND UTILITIES

Preliminary investigation indicates that about 100 item of relocations are within the proposed project area. We have done a preliminary investigation of the compensability of the affected facility. (See Exhibit "D") From this investigation it appears that all of the relocations will be in new right-of-way. Based on this finding, we have assume that all items of relocation will be compensable. Although location within new right-of-way is not the sole determining factor of compensability, it is the predominant factor.

This project is several years from initiations, and the information to determine final compensability could change during that time.

Therefore, assuming that all of the relocations are compensable gives us a fairly accurate view, but also a worst case analysis that is appropriate for Feasibility Report purposes.

Finally, the issues of the existing navigation rights-of-way along the Algiers Canal and the 205 levee rights-of-way along the Harvey Canal will probably have to be readdressed at the time of the land acquisition. We will have to review all the permits issued for the facilities in those areas and determine how, if any, they affect the compensability.

NAVIGATION SERVITUDE

The land needed for construction of the proposed project does not lie along a natural navigable stream. The navigational servitude will not be invoked in this project.

ATTITUDE OF LANDOWNERS

The attitude of the landowners is not known at this time. We will conduct public meetings for landowners within 6 months after construction is authorized. However, since most of the required right-of-way is already encumbered with existing servitudes, it is unlikely that a landowner would oppose the project; or that if a landowner did oppose the project, they should not be able to obtain excessive judgments similar to those awarded in the Westwego to Harvey Canal, Louisiana, Hurricane Protection Project which is adjacent to this project.

EXHIBIT A - BASELINE COST ESTIMATES

Real Estate Baseline Cost Estimate for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal)

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			(R)$22,527,000
01	LANDS AND DAMAGES		$22,527,180
01A	PROJECT PLANNING		$40,220
01AX	CONTINGENCIES	$8,060	
01B	ACQUISITIONS		$4,677,060
01B1	BY GOVT	$754,920	
01B2	BY LOCAL SPONSOR (LS)	$2,986,720	
01B3	BY GOVT ON BEHALF OF LS		
01B4	REVIEW OF LS		
01BX	CONTINGENCIES	$935,420	
01C	CONDEMNATIONS		$108,040
01C1	BY GOVT	$12,900	
01C2	BY LS	$73,520	
01C3	BY GOVT ON BEHALF OF LS		
01C4	REVIEW OF LS		
01CX	CONTINGENCIES	$21,620	
01D	INLEASING		
01D1	BY GOVT		
01D2	BY LS		
01D3	BY GOVT ON BEHALF OF LS		
01D4	REVIEW OF LS		
01DX	CONTINGENCIES		
01E	APPRAISALS		$1,701,090
01E1	BY GOVT (IN HOUSE)	$51,210	
01E2	BY GOVT (CONTRACT)		
01E3	BY LS	$1,309,640	
01E4	BY GOVT ON BEHALF OF LS		
01E5	REVIEW OF LS		
01EX	CONTINGENCIES	$340,240	
01F	PL 91-646 ASSISTANCE		$719,400
01F1	BY GOVT	$153,970	
01F2	BY LS	$421,540	
01F3	BY GOVT ON BEHALF OF LS		
01F4	REVIEW OF LS		
01FX	CONTINGENCIES	$143,890	
01G	TEMPORARY PERMITS		$1,198,370
01G1	BY GOVT	$137,900	
01G2	BY LS	$819,190	
01G3	BY GOVT ON BEHALF OF LS		
01G4	REVIEW OF LS		
01G5	OTHER		
01G6	DAMAGE CLAIMS		
01GX	CONTINGENCIES	$241,280	
01H	AUDITS		
01H1	BY GOVT		
01H2	BY LS		

01H3	BY GOVT ON BEHALF OF LS			
01H4	REVIEW OF LS			
01HX	CONTINGENCIES			
01J	ENCROACHMENTS AND TRESPASS			
01J1	BY GOVT			
01J2	BY LS			
01J3	BY GOVT ON BEHALF OF LS			
01J4	REVIEW OF LS			
01JX	CONTINGENCIES			
01K	DISPOSALS			
01K1	BY GOVT			
01K2	BY LS			
01K3	BY GOVT ON BEHALF OF LS			
01K4	REVIEW OF LS			
01KX	CONTINGENCIES			
01L	REAL PROPERTY ACCOUNTABILITY			
01LX	CONTINGENCIES			
01R	REAL ESTATE PAYMENTS			$14,083,000
01R1	LAND PAYMENTS		$11,184,000	
01R1A	BY GOVT			
01R1B	BY LS	$11,184,000		
01R1C	BY GOVT ON BEHALF OF LS			
01R1D	REVIEW OF LS			
01R2	PL 91-646 ASSISTANCE PAYMENTS		$100,000	
01R2A	BY GOVT			
01R2B	BY LS	$100,000		
01R2C	BY GOVT ON BEHALF OF LS			
01R2D	REVIEW OF LS			
01R3	DAMAGE PAYMENTS			
01R3A	BY GOVT			
01R3B	BY LS			
01R3C	BY GOVT ON BEHALF OF LS			
01R3D	REVIEW OF LS			
01R9	OTHER			
01RX	CONTINGENCIES		$2,799,000	
01S	REAL ESTATE RECEIPTS			
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS			
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS			
01T	LERRD CREDITS			
01T1	LAND PAYMENTS			
01T2	ADMINISTRATIVE COSTS			
01T3	PL 91-646 ASSISTANCE			
01T4	ALL OTHER			
01TX	CONTINGENCIES			
21	RECONNAISSANCE STUDIES			
21H	REAL ESTATE AC			
21V	FEASIBILITY			

			(R) $8,000
22	FEASIBILITY STUDIES		$7,530
22H	REAL ESTATE PLAN		$7,530
22S	REPORT PREPARATION		
22S1	REAL ESTATE ACTIVITIES		
22S9	ALL OTHER ACTIVITIES		
22U	REAL ESTATE DESIGN MEMORANDUM		
22V	REAL ESTATE PLANNING REPORT		
24	MISCELLANEOUS		
24A	REAL ESTATE ACTIVITIES		
24D	ALL OTHER		
25	COLLECTION AND STUDY OF BASIC DATA		
25A	REAL ESTATE ACTIVITIES		
25D	ALL OTHER		
26	RESEARCH AND DEVELOPMENT		
26A	REAL ESTATE ACTIVITIES		
26B	ALL OTHER		
27	REFORMULATION STUDIES		
27A	REAL ESTATE ACTIVITIES		
27D	ALL OTHER		
			(R) $13,000
29	LOCAL COOPERATION AGREEMENTS (LCA)		$13,350
29A	DRAFT LCA		$6,770
29A1	REAL ESTATE ACTIVITIES	$6,770	
29A9	ALL OTHER ACTIVITIES		
29B	FINAL LCA AND FINANCIAL PLAN		$3,360
29B1	REAL ESTATE ACTIVITIES	$3,360	
29B9	ALL OTHER ACTIVITIES		
29C	LCA NEGOTIATIONS		$3,530
29C1	REAL ESTATE ACTIVITIES	$3,370	
29C9	ALL OTHER ACTIVITIES		
29D	TRANSFER OF PROJECT SPONSOR		
51	OPERATION & MAINTENANCE DURING CONSTRUCTION		
51A	REAL ESTATE LEASING		
51A1	INLEASING		
51A2	RELOCATION ASSISTANCE		
51A3	DISPOSAL ASSISTANCE		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS		

51B REAL ESTATE MANAGEMENT SERVICES
51B1 INSPECTIONS
51B1A COMPLIANCE
51B1B UTILIZATION
51B2 OUTGRANTS
51B2A REGULAR
51B2B OIL AND GAS
51B3 DISPOSALS
51B4 ENCROACHMENTS AND TRESPASS

51C OTHER OPERATION & MAINTENANCE EXPENSES

51D REVENUES FROM OUTLEASES RETURNED TO U.S.

51E AUDITS

51F TIMBER HARVEST

51G REPAYMENTS AND COST DISTRIBUTIONS

51H MISCELLANEOUS RECEIPTS
51H1 REAL ESTATE MANAGEMENT INCOME
51H9 OTHER INCOME

52 SURVEYS AND LAYOUTS

53 REAL ESTATE ADMINISTRATIVE ACTIVITIES

Real Estate Baseline Cost Estimate for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Contract No. 1 - Jefferson Parish

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				(R)$2,665,000
01	LANDS AND DAMAGES			$2,664,520
01A	PROJECT PLANNING		7050	
01AX	CONTINGENCIES	1410		
01B	ACQUISITIONS		198700	
01B1	BY GOVT	16980		
01B2	BY LOCAL SPONSOR (LS)	141980		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	39740		
01C	CONDEMNATIONS		3900	
01C1	BY GOVT	520		
01C2	BY LS	2600		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	780		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		39750	
01E1	BY GOVT (IN HOUSE)	1270		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	30530		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	7950		
01F	PL 91-646 ASSISTANCE		31260	
01F1	BY GOVT	7090		
01F2	BY LS	17920		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	6250		
01G	TEMPORARY PERMITS		37860	
01G1	BY GOVT	4060		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7570		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			2346000
01R1	LAND PAYMENTS		1837000	
01R1A	BY GOVT	0		
01R1B	BY LS	1837000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		50000	
01R2A	BY GOVT	0		
01R2B	BY LS	50000		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		459000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R) $0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$450
22H	REAL ESTATE PLAN		450	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$ 640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Contract No. 2 - Jefferson Parish

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				(R)$75,000
01	LANDS AND DAMAGES			$75,100
01A	PROJECT PLANNING		6990	
01AX	CONTINGENCIES	1400		
01B	ACQUISITIONS		30110	
01B1	BY GOVT	11480		
01B2	BY LOCAL SPONSOR (LS)	12610		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	6020		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		38000	
01G1	BY GOVT	4170		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7600		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			0
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R) $0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$160
22H	REAL ESTATE PLAN		160	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$ 640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for 6 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 3 - Jefferson Parish

				(R)$71,000
01	LANDS AND DAMAGES			$70,920
01A	PROJECT PLANNING		6990	
01AX	CONTINGENCIES	1400		
01B	ACQUISITIONS		25930	
01B1	BY GOVT	8130		
01B2	BY LOCAL SPONSOR (LS)	12610		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	5190		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		38000	
01G1	BY GOVT	4170		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7600		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			0
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
21	RECONNAISSANCE STUDIES			(R) $0 $0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$160
22H	REAL ESTATE PLAN		160	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$ 640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 4 - Jefferson Parish

6 APR 94

				(R) $851,000
01	LANDS AND DAMAGES			$851,370
01A	PROJECT PLANNING		6000	
01AX	CONTINGENCIES	1200		
01B	ACQUISITIONS		314540	
01B1	BY GOVT	61260		
01B2	BY LOCAL SPONSOR (LS)	190370		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	62910		
01C	CONDEMNATIONS		8760	
01C1	BY GOVT	780		
01C2	BY LS	6230		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	1750		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		92230	
01E1	BY GOVT (IN HOUSE)	3820		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	69960		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	18450		
01F	PL 91-646 ASSISTANCE		48880	
01F1	BY GOVT	9530		
01F2	BY LS	29570		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	9780		
01G	TEMPORARY PERMITS		227960	
01G1	BY GOVT	25000		
01G2	BY LS	157370		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	45590		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			153000
01R1	LAND PAYMENTS		122000	
01R1A	BY GOVT	0		
01R1B	BY LS	122000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		31000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$450
22H	REAL ESTATE PLAN		450	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for 6 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 5 - Jefferson Parish

			(R) $5,248,000
01	LANDS AND DAMAGES		$5,247,800
01A	PROJECT PLANNING		750
01AX	CONTINGENCIES	150	
01B	ACQUISITIONS		382210
01B1	BY GOVT	59480	
01B2	BY LOCAL SPONSOR (LS)	246290	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	76440	
01C	CONDEMNATIONS		10380
01C1	BY GOVT	1040	
01C2	BY LS	7260	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	2080	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		120850
01E1	BY GOVT (IN HOUSE)	3820	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	92860	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	24170	
01F	PL 91-646 ASSISTANCE		92610
01F1	BY GOVT	21470	
01F2	BY LS	52620	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	18520	
01G	TEMPORARY PERMITS		38000
01G1	BY GOVT	4170	
01G2	BY LS	26230	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	7600	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			4603000
01R1	LAND PAYMENTS		3642000	
01R1A	BY GOVT	0		
01R1B	BY LS	3642000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		50000	
01R2A	BY GOVT	0		
01R2B	BY LS	50000		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		911000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$0
22H	REAL ESTATE PLAN		0	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$ 640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for 6 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 6 - Jefferson Parish

				(R)$153,000
01	LANDS AND DAMAGES			$153,090
01A	PROJECT PLANNING		680	
01AX	CONTINGENCIES	140		
01B	ACQUISITIONS		114410	
01B1	BY GOVT	24280		
01B2	BY LOCAL SPONSOR (LS)	67250		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	22880		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		38000	
01G1	BY GOVT	4170		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7600		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			0
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R) $0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$160
22H	REAL ESTATE PLAN		160	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$ 640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Contract No. 7 - Jefferson Parish

5 APR 94

				(R) $153,000
01	LANDS AND DAMAGES			$153,090
01A	PROJECT PLANNING		680	
01AX	CONTINGENCIES	140		
01B	ACQUISITIONS		114410	
01B1	BY GOVT	24280		
01B2	BY LOCAL SPONSOR (LS)	67250		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	22880		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		38000	
01G1	BY GOVT	4170		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7600		
01H	AUDITS			0
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENT(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$160
21H	REAL ESTATE ACTIVITIES		160	
21V	FEASIBILITY COST SHARING AGREEMENT		0	

22	FEASIBILITY STUDIES			(R) $0 $0
22H	REAL ESTATE PLAN		0	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
29	LOCAL COOPERATION AGREEMENTS (LCA)			(R) $1000 $ 520
29A	DRAFT LCA		510	
29A1	REAL ESTATE ACTIVITIES	510		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		
51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	

51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 5 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 8 - Plaquemines Parish

				(R)$2,435,000
01	LANDS AND DAMAGES			$2,435,420
01A	PROJECT PLANNING		1640	
01AX	CONTINGENCIES	330		
01B	ACQUISITIONS		518280	
01B1	BY GOVT	86850		
01B2	BY LOCAL SPONSOR (LS)	327770		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	103660		
01C	CONDEMNATIONS		16060	
01C1	BY GOVT	1430		
01C2	BY LS	11420		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	3210		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		166950	
01E1	BY GOVT (IN HOUSE)	6360		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	127200		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	33390		
01F	PL 91-646 ASSISTANCE		112900	
01F1	BY GOVT	17190		
01F2	BY LS	73130		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	22580		
01G	TEMPORARY PERMITS		83590	
01G1	BY GOVT	9170		
01G2	BY LS	57700		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	16720		
01H	AUDITS		0	
01H1	BY GOVT	0		
01H2	BY LS	0		

01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESP		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABTY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			1536000
01R1	LAND PAYMENTS		1229000	
01R1A	BY GOVT	0		
01R1B	BY LS	1229000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PANTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		307000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	
21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R)$1000
22	FEASIBILITY STUDIES			$ 990

22H	REAL ESTATE PLAN		990	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$1300
29A	DRAFT LCA		580	
29A1	REAL ESTATE ACTIVITIES	580		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		360	
29B1	REAL ESTATE ACTIVITIES	360		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		360	
29C1	REAL ESTATE ACTIVITIES	360		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		
51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	

51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Contract No. 9 - Plaquemines Parish

5 APR 94

				(R) $116,000
01	LANDS AND DAMAGES			$116,419
01A	PROJECT PLANNING		20	
01AX	CONTINGENCIES	0		
01B	ACQUISITIONS		28560	
01B1	BY GOVT	5550		
01B2	BY LOCAL SPONSOR (L	17300		
01B3	BY GOVT ON BEHALF OS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	5710		
01C	CONDEMNATIONS		740	
01C1	BY GOVT	100		
01C2	BY LS	490		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	150		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		66780	
01E1	BY GOVT (IN HOUSE)	2540		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	50880		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	13360		
01F	PL 91-646 ASSISTANCE		6380	
01F1	BY GOVT	1130		
01F2	BY LS	3970		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	1280		
01G	TEMPORARY PERMITS		4940	
01G1	BY GOVT	730		
01G2	BY LS	3220		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	990		
01H	AUDITS		0	
01H1	BY GOVT	0		
01H2	BY LS	0		

01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			9000
01R1	LAND PAYMENTS		7000	
01R1A	BY GOVT	0		
01R1B	BY LS	7000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		2000	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	
21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R)$0
22	FEASIBILITY STUDIES			$10

22H	REAL ESTATE PLAN		10	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $0
29	LOCAL COOPERATION AGREEMENTS (LCA)			$30
29A	DRAFT LCA		10	
29A1	REAL ESTATE ACTIVITIES	10		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		10	
29B1	REAL ESTATE ACTIVITIES	10		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		10	
29C1	REAL ESTATE ACTIVITIES	10		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		
51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	

51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No. 9 - Orleans Parish

				(R) $1,408,000
01	LANDS AND DAMAGES			$1,408,000
01A	PROJECT PLANNING		540	
01AX	CONTINGENCIES	110		
01B	ACQUISITIONS		635030	
01B1	BY GOVT	111410		
01B2	BY LOCAL SPONSOR (LS)	396610		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	127010		
01C	CONDEMNATIONS		16850	
01C1	BY GOVT	2250		
01C2	BY LS	11230		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	3370		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		440440	
01E1	BY GOVT (IN HOUSE)	11450		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	340900		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	88090		
01F	PL 91-646 ASSISTANCE		146090	
01F1	BY GOVT	25930		
01F2	BY LS	90940		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	29220		
01G	TEMPORARY PERMITS		113050	
01G1	BY GOVT	16700		
01G2	BY LS	73740		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	22610		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			56000
01R1	LAND PAYMENTS		45000	
01R1A	BY GOVT	0		
01R1B	BY LS	45000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		11000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
21	RECONNAISSANCE STUDIES			(R)$0 $0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$320
22H	REAL ESTATE PLAN		320	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $0
29	LOCAL COOPERATION AGREEMENTS (LCA)			$480
29A	DRAFT LCA		240	
29A1	REAL ESTATE ACTIVITIES	240		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		120	
29B1	REAL ESTATE ACTIVITIES	120		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		120	
29C1	REAL ESTATE ACTIVITIES	120		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES		0
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Est. ate for 5 APR 94
West Bank of the Mississippi River in the Vicinity
of New Orleans, Louisiana (East of the Harvey Canal)
Contract No.10 - Plaquemines Parish

				(R) $668,000
01	LANDS AND DAMAGES			$668,420
01A	PROJECT PLANNING		750	
01AX	CONTINGENCIES	150		
01B	ACQUISITIONS		241360	
01B1	BY GOVT	27750		
01B2	BY LOCAL SPONSOR (LS)	165340		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	48270		
01C	CONDEMNATIONS		7460	
01C1	BY GOVT	520		
01C2	BY LS	5450		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	1490		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		55650	
01E1	BY GOVT (IN HOUSE)	2540		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	41980		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	11130		
01F	PL 91-646 ASSISTANCE		20250	
01F1	BY GOVT	520		
01F2	BY LS	15680		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	4050		
01G	TEMPORARY PERMITS		38950	
01G1	BY GOVT	4170		
01G2	BY LS	26990		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7790		
01H	AUDITS		0	
01H1	BY GOVT	0		
01H2	BY LS	0		

01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			304000
01R1	LAND PAYMENTS		243000	
01R1A	BY GOVT	0		
01R1B	BY LS	243000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		61000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	
21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R)$0
22	FEASIBILITY STUDIES			$450

22H	REAL ESTATE PLAN		450	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		
51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	

51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 5 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Contract No.11 - Plaquemines Parish

			(R)$2,238,000
01	LANDS AND DAMAGES		$2,237,990
01A	PROJECT PLANNING		3990
01AX	CONTINGENCIES	800	
01B	ACQUISITIONS		1220510
01B1	BY GOVT	141650	
01B2	BY LOCAL SPONSOR (LS)	834760	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	244100	
01C	CONDEMNATIONS		24230
01C1	BY GOVT	2770	
01C2	BY LS	16610	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	4850	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		235330
01E1	BY GOVT (IN HOUSE)	3820	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	184440	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	47070	
01F	PL 91-646 ASSISTANCE		145290
01F1	BY GOVT	33990	
01F2	BY LS	82240	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	29060	
01G	TEMPORARY PERMITS		202640
01G1	BY GOVT	22220	
01G2	BY LS	139890	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	40530	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			406000
01R1	LAND PAYMENTS		325000	
01R1A	BY GOVT	0		
01R1B	BY LS	325000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		81000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $2,000
22	FEASIBILITY STUDIES			$2,390
22H	REAL ESTATE PLAN		2390	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $3,000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$2,980
29A	DRAFT LCA		1410	
29A1	REAL ESTATE ACTIVITIES	1410		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		700	
29B1	REAL ESTATE ACTIVITIES	700		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		870	
29C1	REAL ESTATE ACTIVITIES	870		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES		0
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Contract No.12 - Orleans Parish

			(R) $1,300,000
01	LANDS AND DAMAGES		$1,300,430
01A	PROJECT PLANNING		520
01AX	CONTINGENCIES	100	
01B	ACQUISITIONS		613610
01B1	BY GOVT	107650	
01B2	BY LOCAL SPONSOR (LS)	383240	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	122720	
01C	CONDEMNATIONS		16280
01C1	BY GOVT	2170	
01C2	BY LS	10850	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	3260	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		426130
01E1	BY GOVT (IN HOUSE)	11450	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	329450	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	85230	
01F	PL 91-646 ASSISTANCE		78660
01F1	BY GOVT	25060	
01F2	BY LS	37870	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	15730	
01G	TEMPORARY PERMITS		111230
01G1	BY GOVT	16130	
01G2	BY LS	71250	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	23850	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			54000
01R1	LAND PAYMENTS		43000	
01R1A	BY GOVT	0		
01R1B	BY LS	43000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		11000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$310
22H	REAL ESTATE PLAN		310	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $0
29	LOCAL COOPERATION AGREEMENTS (LCA)			$450
29A	DRAFT LCA		230	
29A1	REAL ESTATE ACTIVITIES	230		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		110	
29B1	REAL ESTATE ACTIVITIES	110		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		110	
29C1	REAL ESTATE ACTIVITIES	110		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES		0
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Contract No.12 - Plaquemines Parish

				(R)$19,000
01	LANDS AND DAMAGES			$19,290
01A	PROJECT PLANNING		10	
01AX	CONTINGENCIES	0		
01B	ACQUISITIONS		4400	
01B1	BY GOVT	860		
01B2	BY LOCAL SPONSOR (LS)	2660		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	880		
01C	CONDEMNATIONS		130	
01C1	BY GOVT	20		
01C2	BY LS	80		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	30		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		11000	
01E1	BY GOVT (IN HOUSE)	800		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	8000		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	2200		
01F	PL 91-646 ASSISTANCE		990	
01F1	BY GOVT	180		
01F2	BY LS	610		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	200		
01G	TEMPORARY PERMITS		760	
01G1	BY GOVT	110		
01G2	BY LS	500		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	150		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			2000
01R1	LAND PAYMENTS		1000	
01R1A	BY GOVT	0		
01R1B	BY LS	1000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		1000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R)$0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$10
22H	REAL ESTATE PLAN		10	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $0
29	LOCAL COOPERATION AGREEMENTS (LCA)			$30
29A	DRAFT LCA		10	
29A1	REAL ESTATE ACTIVITIES	10		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		10	
29B1	REAL ESTATE ACTIVITIES	10		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		10	
29C1	REAL ESTATE ACTIVITIES	10		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Contract No.13 - Plaquemines Parish

				(R)$78,000
01	LANDS AND DAMAGES			$77,590
01A	PROJECT PLANNING		680	
01AX	CONTINGENCIES	140		
01B	ACQUISITIONS		38910	
01B1	BY GOVT	13360		
01B2	BY LOCAL SPONSOR (LS)	17770		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	7780		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		38000	
01G1	BY GOVT	4170		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7600		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			0
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R) $0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$160
22H	REAL ESTATE PLAN		160	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1,000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES		0
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Contract No.14 - Plaquemines Parish

				(R)$90,000
01	LANDS AND DAMAGES			$89,550
01A	PROJECT PLANNING		680	
01AX	CONTINGENCIES	140		
01B	ACQUISITIONS		53480	
01B1	BY GOVT	13360		
01B2	BY LOCAL SPONSOR (LS)	29420		
01B3	BY GOVT ON BEHALF OF LS	0		
01B4	REVIEW OF LS	0		
01BX	CONTINGENCIES	10700		
01C	CONDEMNATIONS		0	
01C1	BY GOVT	0		
01C2	BY LS	0		
01C3	BY GOVT ON BEHALF OF LS	0		
01C4	REVIEW OF LS	0		
01CX	CONTINGENCIES	0		
01D	INLEASING		0	
01D1	BY GOVT	0		
01D2	BY LS	0		
01D3	BY GOVT ON BEHALF OF LS	0		
01D4	REVIEW OF LS	0		
01DX	CONTINGENCIES	0		
01E	APPRAISALS		0	
01E1	BY GOVT (IN HOUSE)	0		
01E2	BY GOVT (CONTRACT)	0		
01E3	BY LS	0		
01E4	BY GOVT ON BEHALF OF LS	0		
01E5	REVIEW OF LS	0		
01EX	CONTINGENCIES	0		
01F	PL 91-646 ASSISTANCE		0	
01F1	BY GOVT	0		
01F2	BY LS	0		
01F3	BY GOVT ON BEHALF OF LS	0		
01F4	REVIEW OF LS	0		
01FX	CONTINGENCIES	0		
01G	TEMPORARY PERMITS		35390	
01G1	BY GOVT	2080		
01G2	BY LS	26230		
01G3	BY GOVT ON BEHALF OF LS	0		
01G4	REVIEW OF LS	0		
01G5	OTHER	0		
01G6	DAMAGE CLAIMS	0		
01GX	CONTINGENCIES	7080		
01H	AUDITS		0	
01H1	BY GOVT	0		

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			0
01R1	LAND PAYMENTS		0	
01R1A	BY GOVT	0		
01R1B	BY LS	0		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		0	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
21	RECONNAISSANCE STUDIES			(R) $0 $0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$160
22H	REAL ESTATE PLAN		160	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1,000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS	160	160	
29C1	REAL ESTATE ACTIVITIES	0		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES			0
51B1	INSPECTIONS		0	
51B1A	COMPLIANCE	0		
51B1B	UTILIZATION	0		
51B2	OUTGRANTS		0	
51B2A	REGULAR	0		
51B2B	OIL AND GAS	0		
51B3	DISPOSALS		0	
51B4	ENCROACHMENTS AND TRESPASS		0	
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0	
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0	
51E	AUDITS		0	
51F	TIMBER HARVEST		0	
51G	REPAYMENTS AND COST DISTRIBUTIONS		0	
51H	MISCELLANEOUS RECEIPTS		0	
51H1	REAL ESTATE MANAGEMENT INCOME	0		
51H9	OTHER INCOME	0		
52	SURVEYS AND LAYOUTS		0	
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0	

Real Estate Baseline Cost Estimate for 7 APR 94
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Borrow Pit - Plaquemines Parish

			(R) $514,000
01	LANDS AND DAMAGES		$513,690
01A	PROJECT PLANNING		750
01AX	CONTINGENCIES	150	
01B	ACQUISITIONS		50590
01B1	BY GOVT	13450	
01B2	BY LOCAL SPONSOR (LS)	27020	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	10120	
01C	CONDEMNATIONS		1300
01C1	BY GOVT	520	
01C2	BY LS	520	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	260	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		11000
01E1	BY GOVT (IN HOUSE)	800	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	8000	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	2200	
01F	PL 91-646 ASSISTANCE		9050
01F1	BY GOVT	1610	
01F2	BY LS	5630	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	1810	
01G	TEMPORARY PERMITS		38000
01G1	BY GOVT	4170	
01G2	BY LS	26230	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	7600	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0		
01H3	BY GOVT ON BEHALF OF LS	0		
01H4	REVIEW OF LS	0		
01HX	CONTINGENCIES	0		
01J	ENCROACHMENTS AND TRESPASS		0	
01J1	BY GOVT	0		
01J2	BY LS	0		
01J3	BY GOVT ON BEHALF OF LS	0		
01J4	REVIEW OF LS	0		
01JX	CONTINGENCIES	0		
01K	DISPOSALS		0	
01K1	BY GOVT	0		
01K2	BY LS	0		
01K3	BY GOVT ON BEHALF OF LS	0		
01K4	REVIEW OF LS	0		
01KX	CONTINGENCIES	0		
01L	REAL PROPERTY ACCOUNTABILITY		0	
01LX	CONTINGENCIES	0		
01R	REAL ESTATE PAYMENTS			403000
01R1	LAND PAYMENTS		322000	
01R1A	BY GOVT	0		
01R1B	BY LS	322000		
01R1C	BY GOVT ON BEHALF OF LS	0		
01R1D	REVIEW OF LS	0		
01R2	PL 91-646 ASSISTANCE PAYMENTS		0	
01R2A	BY GOVT	0		
01R2B	BY LS	0		
01R2C	BY GOVT ON BEHALF OF LS	0		
01R2D	REVIEW OF LS	0		
01R3	DAMAGE PAYMENTS		0	
01R3A	BY GOVT	0		
01R3B	BY LS	0		
01R3C	BY GOVT ON BEHALF OF LS	0		
01R3D	REVIEW OF LS	0		
01R9	OTHER		0	
01RX	CONTINGENCIES		81000	
01S	REAL ESTATE RECEIPTS		0	
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0		
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0		
01T	LERRD CREDITS		0	
01T1	LAND PAYMENTS	0		
01T2	ADMINISTRATIVE COSTS	0		
01T3	PL 91-646 ASSISTANCE	0		
01T4	ALL OTHER	0		
01TX	CONTINGENCIES	0		
				(R) $0
21	RECONNAISSANCE STUDIES			$0
21H	REAL ESTATE ACTIVITIES		0	

21V	FEASIBILITY COST SHARING AGREEMENT		0	
				(R) $0
22	FEASIBILITY STUDIES			$450
22H	REAL ESTATE PLAN		450	
22S	REPORT PREPARATION		0	
22S1	REAL ESTATE ACTIVITIES	0		
22S9	ALL OTHER ACTIVITIES	0		
22U	REAL ESTATE DESIGN MEMORANDUM		0	
22V	REAL ESTATE PLANNING REPORT		0	
24	MISCELLANEOUS		0	
24A	REAL ESTATE ACTIVITIES	0		
24D	ALL OTHER	0		
25	COLLECTION AND STUDY OF BASIC DATA		0	
25A	REAL ESTATE ACTIVITIES	0		
25D	ALL OTHER	0		
26	RESEARCH AND DEVELOPMENT		0	
26A	REAL ESTATE ACTIVITIES	0		
26B	ALL OTHER	0		
27	REFORMULATION STUDIES		0	
27A	REAL ESTATE ACTIVITIES	0		
27D	ALL OTHER	0		
				(R) $1,000
29	LOCAL COOPERATION AGREEMENTS (LCA)			$640
29A	DRAFT LCA		320	
29A1	REAL ESTATE ACTIVITIES	320		
29A9	ALL OTHER ACTIVITIES	0		
29B	FINAL LCA AND FINANCIAL PLAN		160	
29B1	REAL ESTATE ACTIVITIES	160		
29B9	ALL OTHER ACTIVITIES	0		
29C	LCA NEGOTIATIONS		160	
29C1	REAL ESTATE ACTIVITIES	160		
29C9	ALL OTHER ACTIVITIES	0		
29D	TRANSFER OF PROJECT SPONSOR		0	
51	OPERATION & MAINTENANCE DURING CONSTRUCTION			0
51A	REAL ESTATE LEASING		0	
51A1	INLEASING	0		
51A2	RELOCATION ASSISTANCE	0		
51A3	DISPOSAL ASSISTANCE	0		
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0		
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0		

51B	REAL ESTATE MANAGEMENT SERVICES		0
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Stockpile Area Acquisition - Jefferson Parish

26 APR 94

			(R)$4,052,000
01	LANDS AND DAMAGES		$4,051,900
01A	PROJECT PLANNING		750
01AX	CONTINGENCIES	150	
01B	ACQUISITIONS		47230
01B1	BY GOVT	11360	
01B2	BY LOCAL SPONSOR (LS)	26420	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	9450	
01C	CONDEMNATIONS		650
01C1	BY GOVT	260	
01C2	BY LS	260	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	130	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		17490
01E1	BY GOVT (IN HOUSE)	1270	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	12720	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	3500	
01F	PL 91-646 ASSISTANCE		9780
01F1	BY GOVT	2450	
01F2	BY LS	5370	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	1960	
01G	TEMPORARY PERMITS		38000
01G1	BY GOVT	4170	
01G2	BY LS	26230	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	7600	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0	
01H3	BY GOVT ON BEHALF OF LS	0	
01H4	REVIEW OF LS	0	
01HX	CONTINGENCIES	0	
01J	ENCROACHMENTS AND TRESPASS		0
01J1	BY GOVT	0	
01J2	BY LS	0	
01J3	BY GOVT ON BEHALF OF LS	0	
01J4	REVIEW OF LS	0	
01JX	CONTINGENCIES	0	
01K	DISPOSALS		0
01K1	BY GOVT	0	
01K2	BY LS	0	
01K3	BY GOVT ON BEHALF OF LS	0	
01K4	REVIEW OF LS	0	
01KX	CONTINGENCIES	0	
01L	REAL PROPERTY ACCOUNTABILITY		0
01LX	CONTINGENCIES	0	
01R	REAL ESTATE PAYMENTS		3938000
01R1	LAND PAYMENTS		3150000
01R1A	BY GOVT	0	
01R1B	BY LS	3150000	
01R1C	BY GOVT ON BEHALF OF LS	0	
01R1D	REVIEW OF LS	0	
01R2	PL 91-646 ASSISTANCE PAYMENTS		0
01R2A	BY GOVT	0	
01R2B	BY LS	0	
01R2C	BY GOVT ON BEHALF OF LS	0	
01R2D	REVIEW OF LS	0	
01R3	DAMAGE PAYMENTS		0
01R3A	BY GOVT	0	
01R3B	BY LS	0	
01R3C	BY GOVT ON BEHALF OF LS	0	
01R3D	REVIEW OF LS	0	
01R9	OTHER		0
01RX	CONTINGENCIES		788000
01S	REAL ESTATE RECEIPTS		0
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0	
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0	
01T	LERRD CREDITS		0
01T1	LAND PAYMENTS	0	
01T2	ADMINISTRATIVE COSTS	0	
01T3	PL 91-646 ASSISTANCE	0	
01T4	ALL OTHER	0	
01TX	CONTINGENCIES	0	
			(R) $0
21	RECONNAISSANCE STUDIES		$0
21H	REAL ESTATE ACTIVITIES		0

21V	FEASIBILITY COST SHARING AGREEMENT		0
			(R) $0
22	FEASIBILITY STUDIES		$450
22H	REAL ESTATE PLAN		450
22S	REPORT PREPARATION		0
22S1	REAL ESTATE ACTIVITIES	0	
22S9	ALL OTHER ACTIVITIES	0	
22U	REAL ESTATE DESIGN MEMORANDUM		0
22V	REAL ESTATE PLANNING REPORT		0
24	MISCELLANEOUS		0
24A	REAL ESTATE ACTIVITIES	0	
24D	ALL OTHER	0	
25	COLLECTION AND STUDY OF BASIC DATA		0
25A	REAL ESTATE ACTIVITIES	0	
25D	ALL OTHER	0	
26	RESEARCH AND DEVELOPMENT		0
26A	REAL ESTATE ACTIVITIES	0	
26B	ALL OTHER	0	
27	REFORMULATION STUDIES		0
27A	REAL ESTATE ACTIVITIES	0	
27D	ALL OTHER	0	
			(R) $1,000
29	LOCAL COOPERATION AGREEMENTS (LCA)		$640
29A	DRAFT LCA		320
29A1	REAL ESTATE ACTIVITIES	320	
29A9	ALL OTHER ACTIVITIES	0	
29B	FINAL LCA AND FINANCIAL PLAN		160
29B1	REAL ESTATE ACTIVITIES	160	
29B9	ALL OTHER ACTIVITIES	0	
29C	LCA NEGOTIATIONS		160
29C1	REAL ESTATE ACTIVITIES	160	
29C9	ALL OTHER ACTIVITIES	0	
29D	TRANSFER OF PROJECT SPONSOR		0
51	OPERATION & MAINTENANCE DURING CONSTRUCTION		0
51A	REAL ESTATE LEASING		0
51A1	INLEASING	0	
51A2	RELOCATION ASSISTANCE	0	
51A3	DISPOSAL ASSISTANCE	0	
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0	
51A5	RENTS, INITIAL ALTERATIONS AND RESTORATIONS	0	

51B	REAL ESTATE MANAGEMENT SERVICES		
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

Real Estate Baseline Cost Estimate for
West Bank of the Mississippi River in the Vicinity of
New Orleans, Louisiana (East of the Harvey Canal)
Mitigation - St. Charles Parish

26 APR 94

			(R)$393,000
01	LANDS AND DAMAGES		$392,590
01A	PROJECT PLANNING		750
01AX	CONTINGENCIES	150	
01B	ACQUISITIONS		44790
01B1	BY GOVT	15780	
01B2	BY LOCAL SPONSOR (LS)	20050	
01B3	BY GOVT ON BEHALF OF LS	0	
01B4	REVIEW OF LS	0	
01BX	CONTINGENCIES	8960	
01C	CONDEMNATIONS		1300
01C1	BY GOVT	520	
01C2	BY LS	520	
01C3	BY GOVT ON BEHALF OF LS	0	
01C4	REVIEW OF LS	0	
01CX	CONTINGENCIES	260	
01D	INLEASING		0
01D1	BY GOVT	0	
01D2	BY LS	0	
01D3	BY GOVT ON BEHALF OF LS	0	
01D4	REVIEW OF LS	0	
01DX	CONTINGENCIES	0	
01E	APPRAISALS		17490
01E1	BY GOVT (IN HOUSE)	1270	
01E2	BY GOVT (CONTRACT)	0	
01E3	BY LS	12720	
01E4	BY GOVT ON BEHALF OF LS	0	
01E5	REVIEW OF LS	0	
01EX	CONTINGENCIES	3500	
01F	PL 91-646 ASSISTANCE		17260
01F1	BY GOVT	7820	
01F2	BY LS	5990	
01F3	BY GOVT ON BEHALF OF LS	0	
01F4	REVIEW OF LS	0	
01FX	CONTINGENCIES	3450	
01G	TEMPORARY PERMITS		38000
01G1	BY GOVT	4170	
01G2	BY LS	26230	
01G3	BY GOVT ON BEHALF OF LS	0	
01G4	REVIEW OF LS	0	
01G5	OTHER	0	
01G6	DAMAGE CLAIMS	0	
01GX	CONTINGENCIES	7600	
01H	AUDITS		0
01H1	BY GOVT	0	

01H2	BY LS	0	
01H3	BY GOVT ON BEHALF OF LS	0	
01H4	REVIEW OF LS	0	
01HX	CONTINGENCIES	0	
01J	ENCROACHMENTS AND TRESPASS		0
01J1	BY GOVT	0	
01J2	BY LS	0	
01J3	BY GOVT ON BEHALF OF LS	0	
01J4	REVIEW OF LS	0	
01JX	CONTINGENCIES	0	
01K	DISPOSALS		0
01K1	BY GOVT	0	
01K2	BY LS	0	
01K3	BY GOVT ON BEHALF OF LS	0	
01K4	REVIEW OF LS	0	
01KX	CONTINGENCIES	0	
01L	REAL PROPERTY ACCOUNTABILITY		0
01LX	CONTINGENCIES	0	
01R	REAL ESTATE PAYMENTS		273000
01R1	LAND PAYMENTS		218000
01R1A	BY GOVT	0	
01R1B	BY LS	218000	
01R1C	BY GOVT ON BEHALF OF LS	0	
01R1D	REVIEW OF LS	0	
01R2	PL 91-646 ASSISTANCE PAYMENTS		0
01R2A	BY GOVT	0	
01R2B	BY LS	0	
01R2C	BY GOVT ON BEHALF OF LS	0	
01R2D	REVIEW OF LS	0	
01R3	DAMAGE PAYMENTS		0
01R3A	BY GOVT	0	
01R3B	BY LS	0	
01R3C	BY GOVT ON BEHALF OF LS	0	
01R3D	REVIEW OF LS	0	
01R9	OTHER		0
01RX	CONTINGENCIES		55000
01S	REAL ESTATE RECEIPTS		0
01S1	DISPOSAL RECEIPTS-REIMBURSEMENTS(CR)-LANDS	0	
01S2	DISPOSAL RECEIPTS-GENERAL FUND(CR)-LANDS	0	
01T	LERRD CREDITS		0
01T1	LAND PAYMENTS	0	
01T2	ADMINISTRATIVE COSTS	0	
01T3	PL 91-646 ASSISTANCE	0	
01T4	ALL OTHER	0	
01TX	CONTINGENCIES	0	
			(R)$0
21	RECONNAISSANCE STUDIES		$0
21H	REAL ESTATE ACTIVITIES		0

21V	FEASIBILITY COST SHARING AGREEMENT		0
			(R) $0
22	FEASIBILITY STUDIES		$450
22H	REAL ESTATE PLAN		450
22S	REPORT PREPARATION		0
22S1	REAL ESTATE ACTIVITIES	0	
22S9	ALL OTHER ACTIVITIES	0	
22U	REAL ESTATE DESIGN MEMORANDUM		0
22V	REAL ESTATE PLANNING REPORT		0
24	MISCELLANEOUS		0
24A	REAL ESTATE ACTIVITIES	0	
24D	ALL OTHER	0	
25	COLLECTION AND STUDY OF BASIC DATA		0
25A	REAL ESTATE ACTIVITIES	0	
25D	ALL OTHER	0	
26	RESEARCH AND DEVELOPMENT		0
26A	REAL ESTATE ACTIVITIES	0	
26B	ALL OTHER	0	
27	REFORMULATION STUDIES		0
27A	REAL ESTATE ACTIVITIES	0	
27D	ALL OTHER	0	
			(R) $1,000
29	LOCAL COOPERATION AGREEMENTS (LCA)		$640
29A	DRAFT LCA		320
29A1	REAL ESTATE ACTIVITIES	320	
29A9	ALL OTHER ACTIVITIES	0	
29B	FINAL LCA AND FINANCIAL PLAN		160
29B1	REAL ESTATE ACTIVITIES	160	
29B9	ALL OTHER ACTIVITIES	0	
29C	LCA NEGOTIATIONS		160
29C1	REAL ESTATE ACTIVITIES	160	
29C9	ALL OTHER ACTIVITIES	0	
29D	TRANSFER OF PROJECT SPONSOR		0
51	OPERATION & MAINTENANCE DURING CONSTRUCTION		0
51A	REAL ESTATE LEASING		0
51A1	INLEASING	0	
51A2	RELOCATION ASSISTANCE	0	
51A3	DISPOSAL ASSISTANCE	0	
51A4	RELOCATION ASSISTANCE PAYMENTS (PL 91-646)	0	
51A5	RENTS,INITIAL ALTERATIONS AND RESTORATIONS	0	

51B	REAL ESTATE MANAGEMENT SERVICES		
51B1	INSPECTIONS		0
51B1A	COMPLIANCE	0	
51B1B	UTILIZATION	0	
51B2	OUTGRANTS		0
51B2A	REGULAR	0	
51B2B	OIL AND GAS	0	
51B3	DISPOSALS		0
51B4	ENCROACHMENTS AND TRESPASS		0
51C	OTHER OPERATION & MAINTENANCE EXPENSES		0
51D	REVENUES FROM OUTLEASES RETURNED TO U.S.		0
51E	AUDITS		0
51F	TIMBER HARVEST		0
51G	REPAYMENTS AND COST DISTRIBUTIONS		0
51H	MISCELLANEOUS RECEIPTS		0
51H1	REAL ESTATE MANAGEMENT INCOME	0	
51H9	OTHER INCOME	0	
52	SURVEYS AND LAYOUTS		0
53	REAL ESTATE ADMINISTRATIVE ACTIVITIES		0

EXHIBIT B - ESTATES

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

FEE EXCLUDING MINERALS (With Restriction on Use of Surface)

The fee simple title to the land described, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; excepting and excluding from the taking all coal, oil, gas and other minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said coal, oil, gas and other minerals, but without the right to enter upon or over the surface of said land for the purpose of drilling and extracting therefrom said coal, oil, gas and other minerals.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

CHANNEL AND CHANNEL IMPROVEMENT EASEMENT

A perpetual and assignable right and easement to construct, operate, and maintain a channel and channel improvement works on, over and across the land described, for the purposes as authorized by the Act of Congress approved _____, including the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions therefrom; to excavate, dredge, cut away, and remove any or all of said land and to place thereon dredge or excavated material; and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

LEVEE, FLOODWALL AND CHANNEL EASEMENT

A perpetual and assignable right and easement in the land described, to construct, maintain, repair, operate, patrol and replace a flood protection levee and/or floodwall including all appurtenances thereto; with a perpetual and assignable right and easement to construct, operate, and maintain a channel and channel improvement works on, over and across the land described, for the purposes as authorized by the Act of Congress approved _____, including the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions therefrom; to excavate, dredge, cut away, and remove any or all of said land and to place thereon dredge or excavated material; and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

LEVEE AND FLOODWALL EASEMENT

A perpetual and assignable right and easement in the land described, to construct, maintain, repair, operate, patrol and replace a flood protection levee and/or floodwall, including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

BORROW EASEMENT

A perpetual and assignable right and easement to clear, borrow, excavate and remove soil, dirt, and other materials from the land described; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges in said land as may be used without interfering with or abridging the rights and easement hereby acquired.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

TEMPORARY CONSTRUCTION EASEMENT

A temporary easement and right-of-way in, on, over and across the land described, for a period not to exceed three (3) years, beginning with date possession of the land is granted to the _____, for use by the _____, the United States, its representatives, agents, and contractors as a construction or work area, including the right to borrow and/or deposit fill and excavated material thereon; move, store and remove equipment and supplies, and erect and remove temporary structure on the land and to perform any other work necessary and incident to the construction of the _____ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit "B"

ESTATE FOR WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)

TEMPORARY STOCKPILE EASEMENT

A temporary easement and right-of-way in, on, over and across the land described, for a period not to exceed fifteen (15) years, beginning with date possession of the land is granted to the _____, for use by the _____, the United States, its representatives, agents, and contractors as a stockpile area, including the right to store, deposit and/or remove fill and excavated material thereon; and to perform any other work necessary and incident to the construction of the _____ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Exhibit "B"

EXHIBIT C - REAL ESTATE ACQUISITION AND MILESTONES

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 1 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jun/96	11/Jun/96		
Prepare Mapping and Legal Description			11/Jun/96	30/Aug/96
Review Mapping and Legal Description	30/Aug/96	09/Sep/96		
Obtain Title Evidence			09/Sep/96	22/Jan/97
Review Title Evidence	22/Jan/97	06/Feb/97		
Obtain Tract Appraisal			09/Sep/96	07/Jan/97
Review Tract Appraisal	07/Jan/97	17/Jan/97		
Conduct Negotiations			17/Jan/97	17/Apr/97
Perform Closings			17/Jan/97	17/May/97
Prepare Condemnation			17/Jan/97	16/Feb/97
Review Condemnations	16/Feb/97	18/Mar/97		
Perform Condemnation			18/Mar/97	17/Apr/97
Obtain Possession			17/Apr/97	17/May/97
Complete PL 91-646 Benefits Assistance			17/Jan/97	17/May/97
Review PL 91-646 Payments	17/May/97	01/Jun/97		
Certify All Necessary LERRD is Available for Construction	01/Jun/97	06/Jun/97		
Prepare and Submit Credit Requests			06/Jun/97	05/Aug/97
Review Credit Requests	05/Aug/97	14/Sep/97		
Approve or Deny Credit	14/Sep/97	14/Oct/97		
Establish Value for Creditable LERRD in F&A Cost Accounting System	14/Oct/97	29/Oct/97		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 2 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Dec/03	11/Dec/03		
Certify All Necessary LERRD is Available for Construction	11/Dec/03	10/Mar/04		
Prepare and Submit Credit Requests			09/Apr/04	08/Jun/04
Review Credit Requests	08/Jun/04	18/Jul/04		
Approve or Deny Credit	18/Jul/04	17/Aug/04		
Establish Value for Creditable LERRD in F&A Cost Accounting System	17/Aug/04	01/Sep/04		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF HARVEY CANAL)

Contract No. 3 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jan/08	11/Jan/08		
Certify All Necessary LERRD is Available for Construction	11/Jan/08	10/Apr/08		
Prepare and Submit Credit Requests			10/May/08	09/Jul/08
Review Credit Requests	09/Jul/08	28/Aug/08		
Approve or Deny Credit	28/Aug/08	27/Sep/08		
Establish Value for Creditable LERRD in F&A Cost Accounting System	27/Sep/08	12/Oct/08		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK
OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 4 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Dec/96	11/Dec/96		
Prepare Mapping and Legal Description			11/Dec/96	01/Mar/97
Review Mapping and Legal Description	01/Mar/97	11/Mar/97		
Obtain Title Evidence			11/Mar/97	24/Jul/97
Review Title Evidence	24/Jul/97	08/Aug/97		
Obtain Tract Appraisal			11/Mar/97	09/Jul/97
Review Tract Appraisal	09/Jul/97	19/Jul/97		
Conduct Negotiations			19/Jul/97	17/Oct/97
Perform Closings			19/Jul/97	16/Nov/97
Prepare Condemnation			19/Jul/97	18/Aug/97
Review Condemnations	18/Aug/97	17/Sep/97		
Perform Condemnation			17/Sep/97	17/Oct/97
Obtain Possession			17/Oct/97	16/Nov/97
Complete PL 91-646 Benefits Assistance			19/Jul/97	16/Nov/97
Review PL 91-646 Payments	16/Nov/97	01/Dec/97		
Certify All Necessary LERRD is Available for Construction	01/Dec/97	06/Dec/97		
Prepare and Submit Credit Requests			06/Dec/97	04/Feb/98
Review Credit Requests	04/Feb/98	16/Mar/98		
Approve or Deny Credit	16/Mar/98	15/Apr/98		
Establish Value for Creditable LERRD in F&A Cost Accounting System	15/Apr/98	30/Apr/98		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 5 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jun/97	11/Jun/97		
Prepare Mapping and Legal Description			11/Jun/97	30/Aug/97
Review Mapping and Legal Description	30/Aug/97	09/Sep/97		
Obtain Title Evidence			09/Sep/97	22/Jan/98
Review Title Evidence	22/Jan/98	06/Feb/98		
Obtain Tract Appraisal			09/Sep/97	07/Jan/98
Review Tract Appraisal	07/Jan/98	17/Jan/98		
Conduct Negotiations			17/Jan/98	17/Apr/98
Perform Closings			17/Jan/98	17/May/98
Prepare Condemnation			17/Jan/98	16/Feb/98
Review Condemnations	16/Feb/98	18/Mar/98		
Perform Condemnation			18/Mar/98	17/Apr/98
Obtain Possession			17/Apr/98	17/May/98
Complete PL 91-646 Benefits Assistance			17/Jan/98	17/May/98
Review PL 91-646 Payments	17/May/98	01/Jun/98		
Certify All Necessary LERRD is Available for Construction	01/Jun/98	06/Jun/98		
Prepare and Submit Credit Requests			06/Jun/98	05/Aug/98
Review Credit Requests	05/Aug/98	14/Sep/98		
Approve or Deny Credit	14/Sep/98	14/Oct/98		
Establish Value for Creditable LERRD in F&A Cost Accounting System	14/Oct/98	29/Oct/98		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK
OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 6 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Feb/04	11/Feb/04		
Certify All Necessary LERRD is Available for Construction	11/Feb/04	11/May/04		
Prepare and Submit Credit Requests			10/Jun/04	09/Aug/04
Review Credit Requests	09/Aug/04	18/Sep/04		
Approve or Deny Credit	18/Sep/04	18/Oct/04		
Establish Value for Creditable LERRD in F&A Cost Accounting System	18/Oct/04	02/Nov/04		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 7 - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Aug/08	11/Aug/08		
Certify All Necessary LERRD is Available for Construction	11/Aug/08	09/Nov/08		
Prepare and Submit Credit Requests			09/Dec/08	07/Feb/09
Review Credit Requests	07/Feb/09	19/Mar/09		
Approve or Deny Credit	19/Mar/09	18/Apr/09		
Establish Value for Creditable LERRD in F&A Cost Accounting System	18/Apr/09	03/May/09		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 8 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jun/98	11/Jun/98		
Prepare Mapping and Legal Description			11/Jun/98	30/Aug/98
Review Mapping and Legal Description	30/Aug/98	09/Sep/98		
Obtain Title Evidence			09/Sep/98	22/Jan/99
Review Title Evidence	22/Jan/99	06/Feb/99		
Obtain Tract Appraisal			09/Sep/98	07/Jan/99
Review Tract Appraisal	07/Jan/99	17/Jan/99		
Conduct Negotiations			17/Jan/99	17/Apr/99
Perform Closings			17/Jan/99	17/May/99
Prepare Condemnation			17/Jan/99	16/Feb/99
Review Condemnations	16/Feb/99	18/Mar/99		
Perform Condemnation			18/Mar/99	17/Apr/99
Obtain Possession			17/Apr/99	17/May/99
Complete PL 91-646 Benefits Assistance			17/Jan/99	17/May/99
Review PL 91-646 Payments	17/May/99	01/Jun/99		
Certify All Necessary LERRD is Available for Construction	01/Jun/99	06/Jun/99		
Prepare and Submit Credit Requests			06/Jun/99	05/Aug/99
Review Credit Requests	05/Aug/99	14/Sep/99		
Approve or Deny Credit	14/Sep/99	14/Oct/99		
Establish Value for Creditable LERRD in F&A Cost Accounting System	14/Oct/99	29/Oct/99		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 9 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jun/99	11/Jun/99		
Prepare Mapping and Legal Description			11/Jun/99	30/Aug/99
Review Mapping and Legal Description	30/Aug/99	09/Sep/99		
Obtain Title Evidence			09/Sep/99	22/Jan/99
Review Title Evidence	22/Jan/00	06/Feb/00		
Obtain Tract Appraisal			09/Sep/99	07/Jan/00
Review Tract Appraisal	07/Jan/00	17/Jan/00		
Conduct Negotiations			17/Jan/00	16/Apr/00
Perform Closings			17/Jan/00	16/May/00
Prepare Condemnation			17/Jan/00	16/Feb/00
Review Condemnations	16/Feb/00	17/Mar/00		
Perform Condemnation			17/Mar/00	16/Apr/00
Obtain Possession			16/Apr/00	16/May/00
Complete PL 91-646 Benefits Assistance			17/Jan/00	16/May/00
Review PL 91-646 Payments	16/May/00	31/May/00		
Certify All Necessary LERRD is Available for Construction	31/May/00	05/Jun/00		
Prepare and Submit Credit Requests			05/Jun/00	04/Aug/00
Review Credit Requests	04/Aug/00	13/Sep/00		
Approve or Deny Credit	13/Sep/00	13/Oct/00		
Establish Value for Creditable LERRD in F&A Cost Accounting System	13/Oct/00	28/Oct/00		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 10 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Mar/94	11/Mar/94		
Prepare Mapping and Legal Description			11/Mar/94	10/May/94
Review Mapping and Legal Description	10/May/94	20/May/94		
Obtain Title Evidence			20/May/94	18/Aug/94
Review Title Evidence	18/Aug/94	02/Sep/94		
Obtain Tract Appraisal			20/May/94	19/Jul/94
Review Tract Appraisal	19/Jul/94	29/Jul/94		
Conduct Negotiations			29/Jul/94	27/Oct/94
Perform Closings			29/Jul/94	26/Nov/94
Prepare Condemnation			29/Jul/94	28/Aug/94
Review Condemnations	28/Aug/94	27/Sep/94		
Perform Condemnation			27/Sep/94	27/Oct/94
Obtain Possession			27/Oct/94	26/Nov/94
Complete PL 91-646 Benefits Assistance			29/Jul/94	26/Nov/94
Review PL 91-646 Payments	26/Nov/94	11/Dec/94		
Certify All Necessary LERRD is Available for Construction	11/Dec/94	16/Dec/94		
Prepare and Submit Credit Requests			16/Dec/94	14/Feb/95
Review Credit Requests	14/Feb/95	26/Mar/95		
Approve or Deny Credit	26/Mar/95	25/Apr/95		
Establish Value for Creditable LERRD in F&A Cost Accounting System	25/Apr/95	10/May/95		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 11 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Mar/97	11/Mar/97		
Prepare Mapping and Legal Description			11/Mar/97	30/May/97
Review Mapping and Legal Description	30/May/97	09/Jun/97		
Obtain Title Evidence			09/Jun/97	22/Oct/97
Review Title Evidence	22/Oct/97	06/Nov/97		
Obtain Tract Appraisal			09/Jun/97	07/Oct/97
Review Tract Appraisal	07/Oct/97	17/Oct/97		
Conduct Negotiations			17/Oct/97	15/Jan/98
Perform Closings			17/Oct/97	14/Feb/98
Prepare Condemnation			17/Oct/97	16/Nov/97
Review Condemnations	16/Nov/97	16/Dec/97		
Perform Condemnation			16/Dec/97	15/Jan/98
Obtain Possession			15/Jan/98	14/Feb/98
Complete PL 91-646 Benefits Assistance			17/Oct/97	14/Feb/98
Review PL 91-646 Payments	14/Feb/98	01/Mar/98		
Certify All Necessary LERRD is Available for Construction	01/Mar/98	06/Mar/98		
Prepare and Submit Credit Requests			06/Mar/98	05/May/98
Review Credit Requests	05/May/98	14/Jun/98		
Approve or Deny Credit	14/Jun/98	14/Jul/98		
Establish Value for Creditable LERRD in F&A Cost Accounting System	14/Jul/98	29/Jul/98		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK
OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract 12 - Orleans Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Dec/97	11/Dec/97		
Prepare Mapping and Legal Description			11/Dec/97	01/Mar/98
Review Mapping and Legal Description	01/Mar/98	11/Mar/98		
Obtain Title Evidence			11/Mar/98	24/Jul/98
Review Title Evidence	24/Jul/98	08/Aug/98		
Obtain Tract Appraisal			11/Mar/98	09/Jul/98
Review Tract Appraisal	09/Jul/98	19/Jul/98		
Conduct Negotiations			19/Jul/98	17/Oct/98
Perform Closings			19/Jul/98	16/Nov/98
Prepare Condemnation			19/Jul/98	18/Aug/98
Review Condemnations	18/Aug/98	17/Sep/98		
Perform Condemnation			17/Sep/98	17/Oct/98
Obtain Possession			17/Oct/98	16/Nov/98
Complete PL 91-646 Benefits Assistance			19/Jul/98	16/Nov/98
Review PL 91-646 Payments	16/Nov/98	01/Dec/98		
Certify All Necessary LERRD is Available for Construction	01/Dec/98	06/Dec/98		
Prepare and Submit Credit Requests			06/Dec/98	04/Feb/99
Review Credit Requests	04/Feb/99	16/Mar/99		
Approve or Deny Credit	16/Mar/99	15/Apr/99		
Establish Value for Creditable LERRD in F&A Cost Accounting System	15/Apr/99	30/Apr/99		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK
OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract 12 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Dec/97	11/Dec/97		
Prepare Mapping and Legal Description			11/Dec/97	01/Mar/98
Review Mapping and Legal Description	01/Mar/98	11/Mar/97		
Obtain Title Evidence			11/Mar/98	24/Jul/98
Review Title Evidence	24/Jul/98	08/Aug/98		
Obtain Tract Appraisal			11/Mar/98	09/Jul/98
Review Tract Appraisal	09/Jul/98	19/Jul/98		
Conduct Negotiations			19/Jul/98	17/Oct/98
Perform Closings			19/Jul/98	16/Nov/98
Prepare Condemnation			19/Jul/98	18/Aug/98
Review Condemnations	18/Aug/98	17/Sep/98		
Perform Condemnation			17/Sep/98	17/Oct/98
Obtain Possession			17/Oct/98	16/Nov/98
Complete PL 91-646 Benefits Assistance			19/Jul/98	16/Nov/98
Review PL 91-646 Payments	16/Nov/98	01/Dec/98		
Certify All Necessary LERRD is Available for Construction	01/Dec/98	06/Dec/98		
Prepare and Submit Credit Requests			06/Dec/98	04/Feb/99
Review Credit Requests	04/Feb/99	16/Mar/99		
Approve or Deny Credit	16/Mar/99	15/Apr/99		
Establish Value for Creditable LERRD in F&A Cost Accounting System	15/Apr/99	30/Apr/99		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK
OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 13 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Aug/02	11/Aug/02		
Certify All Necessary LERRD is Available for Construction	11/Aug/02	09/Nov/02		
Prepare and Submit Credit Requests			09/Dec/02	07/Feb/03
Review Credit Requests	07/Feb/03	19/Mar/03		
Approve or Deny Credit	19/Mar/03	18/Apr/03		
Establish Value for Creditable LERRD in F&A Cost Accounting System	18/Apr/03	03/May/03		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Contract No. 14 - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Feb/07	11/Feb/07		
Certify All Necessary LERRD is Available for Construction	11/Feb/07	12/May/07		
Prepare and Submit Credit Requests			11/Jun/07	10/Aug/07
Review Credit Requests	10/Aug/07	19/Sep/07		
Approve or Deny Credit	19/Sep/07	19/Oct/07		
Establish Value for Creditable LERRD in F&A Cost Accounting System	19/Oct/07	03/Nov/07		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF HARVEY CANAL)
Borrow Pit Acquisition - Plaquemines Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Mar/94	11/Mar/94		
Prepare Mapping and Legal Description			11/Mar/94	10/May/94
Review Mapping and Legal Description	10/May/94	20/May/94		
Obtain Title Evidence			20/May/94	18/Aug/94
Review Title Evidence	18/Aug/94	02/Sep/94		
Obtain Tract Appraisal			20/May/94	19/Jul/94
Review Tract Appraisal	19/Jul/94	29/Jul/94		
Conduct Negotiations			29/Jul/94	27/Oct/94
Perform Closings			29/Jul/94	26/Nov/94
Prepare Condemnation			29/Jul/94	28/Aug/94
Review Condemnations	28/Aug/94	27/Sep/94		
Perform Condemnation			27/Sep/94	27/Oct/94
Obtain Possession			27/Oct/94	26/Nov/94
Complete PL 91-646 Benefits Assistance			29/Jul/94	26/Nov/94
Review PL 91-646 Payments	26/Nov/94	11/Dec/94		
Certify All Necessary LERRD is Available for Construction	11/Dec/94	16/Dec/94		
Prepare and Submit Credit Requests			16/Dec/94	14/Feb/95
Review Credit Requests	14/Feb/95	26/Mar/95		
Approve or Deny Credit	26/Mar/95	25/Apr/95		
Establish Value for Creditable LERRD in F&A Cost Accounting System	25/Apr/95	10/May/95		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF HARVEY CANAL)
Stockpile Area Acquisition - Jefferson Parish, Louisiana

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jun/96	11/Jun/96		
Prepare Mapping and Legal Description			11/Jun/96	30/Aug/96
Review Mapping and Legal Description	30/Aug/96	09/Sep/96		
Obtain Title Evidence			09/Sep/96	22/Jan/97
Review Title Evidence	22/Jan/97	06/Feb/97		
Obtain Tract Appraisal			09/Sep/96	07/Jan/97
Review Tract Appraisal	07/Jan/97	17/Jan/97		
Conduct Negotiations			17/Jan/97	17/Apr/97
Perform Closings			17/Jan/97	17/May/97
Prepare Condemnation			17/Jan/97	16/Feb/97
Review Condemnations	16/Feb/97	18/Mar/97		
Perform Condemnation			18/Mar/97	17/Apr/97
Obtain Possession			17/Apr/97	17/May/97
Complete PL 91-646 Benefits Assistance			17/Jan/97	17/May/97
Review PL 91-646 Payments	17/May/97	01/Jun/97		
Certify All Necessary LERRD is Available for Construction	01/Jun/97	06/Jun/97		
Prepare and Submit Credit Requests			06/Jun/97	05/Aug/97
Review Credit Requests	05/Aug/97	14/Sep/97		
Approve or Deny Credit	14/Sep/97	14/Oct/97		
Establish Value for Creditable LERRD in F&A Cost Accounting System	14/Oct/97	29/Oct/97		

Exhibit "C"

REAL ESTATE ACQUISITION ACTIVITIES AND MILESTONES FOR WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF HARVEY CANAL)
Mitigation, Non-Federal

Activity	COE Initiate	COE Complete	LS Initiate	LS Complete
Formal transmittal of final ROW drawings to acquire LERRD	01/Jul/96	11/Jul/96		
Prepare Mapping and Legal Description			11/Jul/96	29/Sep/96
Review Mapping and Legal Description	29/Sep/96	09/Oct/96		
Obtain Title Evidence			09/Oct/96	21/Feb/97
Review Title Evidence	21/Feb/97	08/Mar/97		
Obtain Tract Appraisal			09/Oct/96	06/Feb/97
Review Tract Appraisal	06/Feb/97	16/Feb/97		
Conduct Negotiations			16/Feb/97	17/May/97
Perform Closings			16/Feb/97	16/Jun/97
Prepare Condemnation			16/Feb/97	18/Mar/97
Review Condemnations	18/Mar/97	17/Apr/97		
Perform Condemnation			17/Apr/97	17/May/97
Obtain Possession			17/May/97	16/Jun/97
Complete PL 91-646 Benefits Assistance			16/Feb/97	16/Jun/97
Review PL 91-646 Payments	16/Jun/97	01/Jul/97		
Certify All Necessary LERRD is Available for Construction	01/Jul/97	06/Jul/97		
Prepare and Submit Credit Requests			06/Jul/97	04/Sep/97
Review Credit Requests	04/Sep/97	14/Oct/97		
Approve or Deny Credit	14/Oct/97	13/Nov/97		
Establish Value for Creditable LERRD in F&A Cost Accounting System	13/Nov/97	28/Nov/97		

Exhibit "C"

EXHIBIT D - ATTORNEY'S PRELIMINARY INVESTIGATION AND REPORT OF COMPENSABLE INTEREST

ATTORNEY'S PRELIMINARY INVESTIGATION AND REPORT OF COMPENSABLE INTEREST

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF HARVEY CANAL HURRICANE PROTECTION PROJECT) FEASIBILITY REPORT

LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT

JEFFERSON, ORLEANS AND
PLAQUEMINES PARISHES

This investigation and report is made in accordance with DIVR 1110-2-2 (See also DIVR 110-2-1, 1 September 1985) and EFAR Q-73-203 and Q-73-204. This report is prepared without the benefit of formal surveys to identify facilities that will be affected by the project. Therefore, the following is a preliminary list of facilities which may be affected by the subject project:

I.

PARTIES OWNING AFFECTED FACILITIES

A. Parish of Jefferson:

1. Vicinity of Cousins Pumping Station.

   a. Item B-1: A portion of Destrehan Avenue and bridge across Cousins Canal, being an unclassified roadway and bridge, 28-feet wide, constructed of precast and prestressed concrete.

   b. Item W-1: A 36-inch water main.

   c. Item W-2: An 8-inch water main.

2. Sector Gate Structure to Hero Pumping Station.

   a. Item R-1: Portions of Peters Road, an unclassified roadway, approximately 30-feet wide, constructed of concrete.

b. Item S-1: A steel drainage structure.

c. Items B-2, B-3 and B-4: Three minor bridge structures.

B. United Gas Pipeline Company:

1. Vicinity of Cousins Pumping Station.

a. Item P-1: A 16-inch high pressure natural gas transmission pipeline.

2. Orleans Parish Line to Algiers Lock - West of Algiers Canal.

a. Item P-24: A 12-inch natural gas transmission pipeline.

3. Orleans Parish Line to Algiers Lock - East of Algiers Canal.

a. Item P-25: A 12-inch natural gas transmission pipeline.

C. Louisiana Gas Service Company:

1. Vicinity of Cousins Pumping Station.

a. Item P-2: A 16-inch high pressure natural gas transmission pipeline.

2. Sector Gate Structure to Hero Pumping Station.

a. Item G-1: A steel natural gas service line.

3. Proposed Verret Canal to Orleans Parish Line - West of Algiers Canal.

a. Item P-7: A 16-inch steel natural gas transmission line.

D. Louisiana Power and Light Company:

1. Vicinity of Cousins Pumping Station.

a. Item E-1: An aerial electric service line.

b. Item E-2: A 13.8 kW electrical transmission line.

2. Hero Pumping Station to Proposed Verret Canal - West of Algiers Canal.

a. Items E-3 through E-10: Eight aerial electric service lines.

3. Proposed Verret Canal to Orleans Parish Line - West of Algiers Canal.

   a. Items E-11 through E-18: Eight aerial electric service lines.

4. Plaquemines Parish - West of Algiers Canal.

   a. Item E-19: An aerial electric service line.

5. Orleans Parish Line to Algiers Lock - West of Algiers Canal.

   a. Item E-20: An aerial electric service line.

6. Orleans Parish Line to Algiers Lock - East of Algiers Canal.

   a. Item E-21: An aerial electric service line.

7. F-Levee, Plaquemines Parish - East of Algiers Canal.

   a. Item E-22: An aerial electric service line.

8. Plaquemines Parish - East of Harvey Canal.

   a. Item E-23: An aerial electric service line.

E. South Central Bell Telephone Company:

1. Proposed Verret Canal to Orleans Parish Line - West of Algiers Canal.

   a. Item C-3: An aerial 15 cable telephone service line.

   b. Item C-4: An aerial 9 cable telephone service line.

   c. Item C-5: An aerial copper telephone service line.

2. Orleans Parish Line to Algiers Lock - West of Algiers Canal.

   a. Item C-6: An aerial 9 cable telephone service line.

3. Orleans Parish Line to Algiers Lock - East of Algiers Canal.

   a. Item C-7: An aerial 9 cable telephone service line.

F. New Orleans Sewerage and Water Board:

1. Orleans Parish Line to Algiers Lock - West of Algiers Canal.

   a. Item W-3: A buried 12-inch CI water service supply line.

   b. Item W-4: A buried 12-inch duct iron water service supply line.

   c. Items S-2 and S-3: Two buried concrete sewer lines.

2. Orleans Parish Line to Algiers Lock - East of Algiers Canal.

   a. Item W-5: A buried 12-inch CI water service supply line.

   b. Item W-6: A buried 12-inch duct iron water service supply line.

   c. Items S-2 and S-3: Two buried concrete sewer lines.

G. Other Unknown Owner:

1. Hero Pumping Station to Proposed Verret Canal - West of Algiers Canal.

   a. Items P-3 through P-6: Four pipelines of unknown ownership and unknown use.

   b. Items C-1 and C-2: Two utility cables of unknown ownership, use and capacity.

2. Proposed Verret Canal to Orleans Parish Line - West of Algiers Canal.

   a. Items P-7 through P-23: Seventeen pipelines of unknown ownership and unknown use.

3. Plaquemines Parish - West of Algiers Canal.

   a. Items R-2 through R-7: Six asphalt road ramps across the levee.

4. Orleans Parish Line to Algiers Lock - West of Algiers Canal.

   a. Item R-8: An asphalt road ramp across the levee.

5. Orleans Parish Line to Algiers Lock - East of Algiers Canal.

   a. Items R-9 through R-11: Three asphalt road ramps across the levee.

6. F-Levee, Plaquemines Parish - East of Algiers Canal.

   a. Items R-12 through R-15: Four asphalt ramps across the levee.

   b. Items P-26 through P-42: Seventeen pipelines of unknown ownership and unknown use.

7. Plaquemines Parish - East of Harvey Canal.

   a. Item R-16: An asphalt road ramp across the levee.

II.
LOCATION OF FACILITY

Although right-of-way maps showing the location of the facilities affected by this project have not been prepared at this time, the general position of these facilities can be located on plates 9 through 14B of maps entitles "West Bank Hurricane Protection Project, East of the Harvey Canal, Feasibility Study" dated August, 1994, found in Volume One of the Feasibility Report and Environmental Impact Statement on the West Bank of the Mississippi River in the Vicinity of New Orleans, La. (East of the Harvey Canal) project.

Inasmuch as it has been determined that the existing rights possessed by the Government along the Algiers Canal and the Harvey Canal, where the facilities in question are located, are insufficient for the project purposes, we have assumed for the purposes of this report that the rights of the facility owners are superior to the rights of the Government.

III.
COMPENSABLE INTEREST OF THE FACILITY

A. Parish of Jefferson (Jeff) is a political subdivision of the State of Louisiana. As a political subdivision, it is vested with the right of eminent domain and the authority to enter into relocation agreements with the Government, to convey interest in their facilities and to accept substitute facilities in return, La. R.S. 33:4621. All of its facilities are publicly owned and held in trust for the citizens of the parish. A political subdivision with the power of expropriation may acquire a right in the real property in accordance with La. R.S. 19:14.

The items B-1 through B-4, W-1, W-2, R-1 and S-1 listed under A. above state that Jeff is the owner of roadways, bridges and sewer and water service lines used in connection with its duties as the political governing authority for the citizens of Jefferson Parish. Jeff does not provide any information regarding its ownership of rights-of-way or the ownership of the property these facilities cross. We have not attempted to research the ownership of these rights at this stage of the project. However, because of the above cited authority, Jeff is deemed to own servitudes over the property which the above referenced facilities cross, notwithstanding the evidencing of its interest in the records of the Clerk of Court for Jefferson Parish, Louisiana.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, Jeff will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by Jeff.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, Jeff must subordinate its present rights-of-way to this project.

B. United Gas Pipeline Company (UGPC) is a Delaware corporation. It is in the business of gathering, processing, transporting and marketing natural gas to private concerns through its pipelines. UGPC's pipelines are privately owned facilities. It is a common carrier. In accordance with La. R.S. 19:2(8), UGPC has the power of expropriation. A company with the power of expropriation may acquire a right in the real property of another in accordance with La. R.S. 19:14.

The items P-1, P-24 and P-25 listed under B. state that UGPC is the owner of natural gas pipelines used in connection with its petroleum business. UGPC does not provide any information regarding its ownership of rights-of-way or to the ownership of the property this facility crosses. We have not attempted to research the ownership of these rights at this stage of the project. However, because of the above cited authority, UGPC is deemed to own servitudes over the property which the above referenced facility crosses, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, UGPC will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by UGPC.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, UGPC must subordinate its present rights-of-way to this project.

C. Louisiana Gas Service Company (LGSC) is a Louisiana corporation. It is in the business of gathering, processing, transporting and marketing natural gas to private concerns through its pipelines. LGSC's pipelines are privately owned facilities. It is a common carrier. In accordance with La. R.S. 19:2(8), LGSC has the power of expropriation. A company with the power of expropriation may acquire a right in the real property of another in accordance with La. R.S. 19:14.

The items P-2, G-1 and P-7 listed under C. state that LGSC is the owner of natural gas pipelines used in connection with its petroleum business. LGSC does not provide any information regarding its ownership of rights-of-way or to the ownership of the property this facility crosses. We have not attempted to research the ownership of these rights at this stage of the project. However, because of the above cited authority, LGSC is deemed to own servitudes over the property which the above referenced facility crosses, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, LGSC will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by LGSC.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, LGSC must subordinate its present rights-of-way to this project.

D. Louisiana Power and Light Company (LP&L) is a Delaware corporation. It is in the business of transmitting electricity for private and public use throughout south Louisiana. LP&L's powerlines are all privately owned facilities. It is not a common carrier. In accordance with La. R.S.'s 19:2(7), LP&L has the power of expropriation. A corporation with the power of expropriation may acquire a right in the real property of another in accordance with Louisiana Revised Statute 19:14.

The items E-1 through E-23 listed under D. state that LP&L is the owner of numerous and assorted power transmission lines and poles used in connection with its transmission of electrical power to various consumers. LP&L does not provide any information regarding its ownership of rights-of-way or to the ownership of the property these facilities cross. We have not attempted to research the ownership of these rights at this stage of the project. However, because of the above cited authority, LP&L is deemed to own servitudes over the property which the above referenced facilities cross, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, LP&L will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by LP&L.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, LP&L must subordinate its present rights-of-way to this project.

E. South Central Bell Telephone Company (SCB) is a wholly owned subsidiary of Bellsouth Company, a Georgia corporation which is authorized to do business in the State of Louisiana. It is in the business of transmitting electronic communications through its cables. SCB's cables are privately owned facilities, and it is a common carrier. In accordance with La. R.S. 19:2(6), SCB has the power of expropriation. A company with the power of expropriation may acquire a right in the real property of another in accordance with La. R.S. 19:14.

The items C-3 through C-7 listed under C. state that SCB is the owner of numerous and assorted aerial and buried communication lines connected with its transmission of electronic communications. SCB does not provide any information regarding its ownership of rights-of-way or to the ownership of the property these facilities cross. We have not attempted to research the ownership of these rights at this stage of the project. However, because of the above cited authority, SCB is deemed to own servitudes over the property which the above referenced facilities cross, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, SCB will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by SCB.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, SCB must subordinate its present rights-of-way to this project.

F. Sewerage and Water Board of New Orleans (S&WB) is a political subdivision of the State of Louisiana. Under its enabling authority, La. R.S. 33:4071, et seq., its function is to construct, acquire, maintain and operate water, drainage and sewerage services within its statutory boundaries. S&WB has the authority to enter into relocation agreements with the Government, to convey interest in its facilities and to accept substitute facilities in return. All of its facilities are publicly owned and held in trust for the citizens of the New Orleans. In accordance with La. R.S. 19:2(1), S&WB has the power of expropriation. A political subdivision with the power of expropriation may acquire a right in the real property of another in accordance with La. R.S. 19:14.

The items W-3 through W-6 and S-2 through S-5 listed under F. state that S&WB is the owner of buried water service supply and sewerage service pipelines used in connection with its duties as the supplier of water , drainage and sewerage service to the City of New Orleans.

S&WB does not provide any information regarding its ownership of rights-of-way or to the ownership of the property this facility crosses. We have not attempted to research the ownership of these rights at this stage of the project. However, by the above cited authority, S&WB is deemed to own servitudes over the property the above referenced facility crosses, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, S&WB will be considered as being entitled to have such portions of its facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by S&WB.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having its facilities relocated at project expense, S&WB must subordinate its present rights-of-way to this project.

G. Other Unknown Owners (OUO) are various unknown owners, both private and public, of numerous minor facilities. Although we do not presently know the nature of these unknown facility owners business or service, it will be assumed for the purposes of this report that they all would fall within one of the categories listed in La. R.S. 19:2 and have the power of expropriation. It is further assumed that they would have the authority to enter into relocation agreements with the Government, to convey interest in their facilities and to accept substitute facilities in return. An entity with the power of expropriation may acquire a right in the real property of another in accordance with La. R.S. 19:14.

The items P-3 through P-23, P-26 through P-42, C-1, C-2 and R-2 through R-15 listed under F. above state that OUO are the owner of various pipelines, roads and utility cables in connection with their business or statutory duties. We do not have any information regarding OUO's ownership of rights-of-way or the ownership of the property these facilities cross. We have not attempted to research the ownership of these rights at this stage of the project. However, by the above presumed authority, OUO are deemed to own servitudes over the property the above referenced facility crosses, notwithstanding the evidencing of its interest in the records of the appropriate clerk of court's office.

We have assumed that the Government owns insufficient rights-of-way where the above facilities will be affected by the project. Therefore, OUO will be considered as being entitled to have such portions of their facilities that will be affected by the project replaced by substitute facilities that will as nearly as practicable serve them in the same manner and reasonably as well as did the existing facilities. Anything provided over and above such construction at increased cost, unless required solely as a result of the relocation, must be considered a betterment and the payment of the cost thereof must be borne by OUO.

The relocation of these facilities must be accomplished within the proposed right-of-way for this project. Therefore, as a part of the consideration of having their facilities relocated at project expense, OUO must subordinate their present rights-of-way to this project.

IV.
AUTHORITY AND OBLIGATION

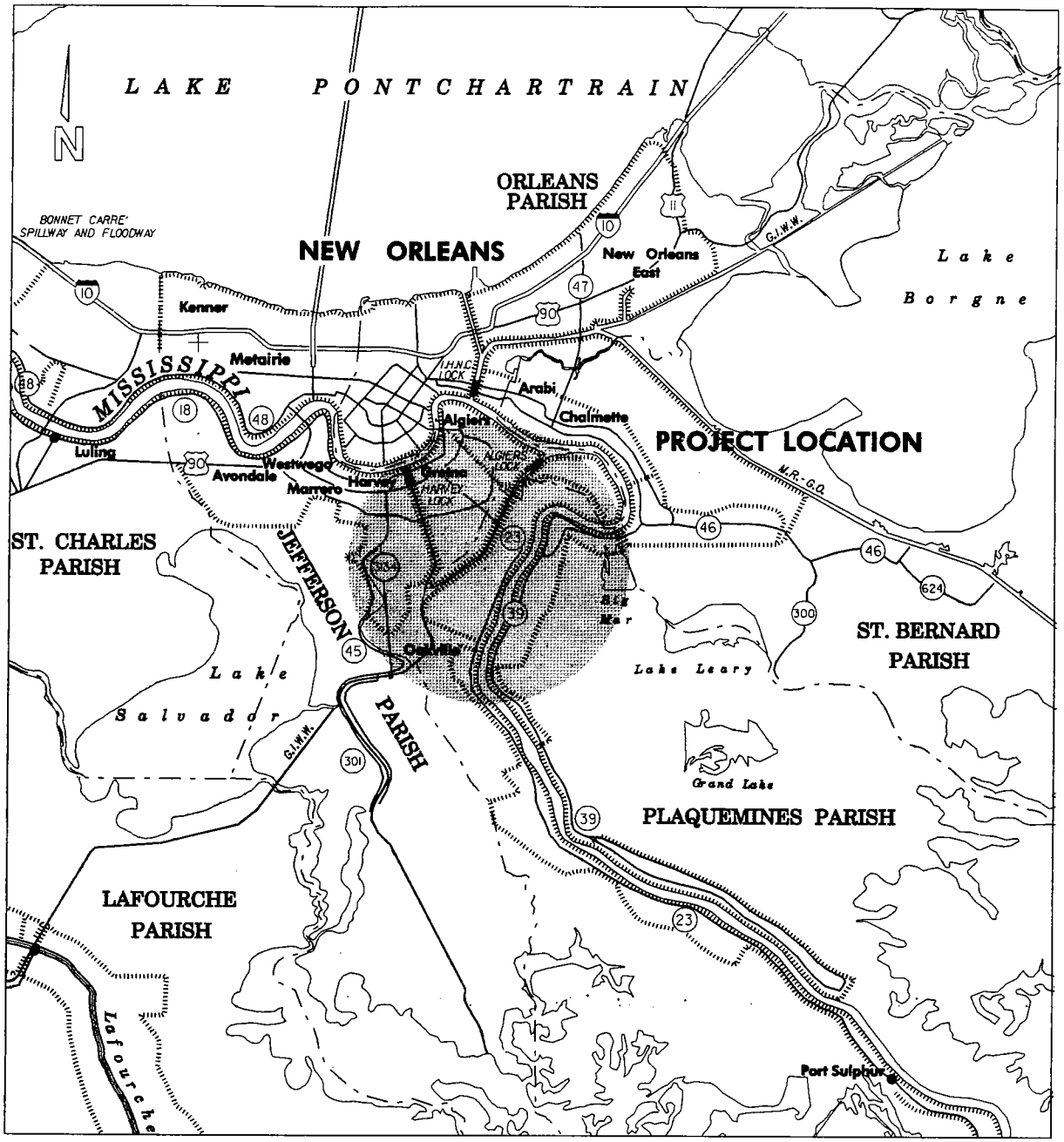
Authority for planning, engineering and design of the East of the Harvey Canal Hurricane Protection project was authorized by the resolutions of the committee on Public Works of the United States Senate dated November 10, 1965 and May 6, 1966, and by resolutions of the Committee on Public Works of the United States House of Representatives dated May 5, 1966 and October 5, 1966. Reimbursement of costs to local cooperating agencies for furnishing rights-of-way and perfecting relocations of interfering facilities is authorized pursuant to Public Law 99-662.

V.
SUMMARY

The facilities addressed herein are presumed to be located entirely within new right-of-way, pursuant to the permission or acquiescence of the land owner, and must be relocated by the local sponsor. The local sponsor will be entitled to reimbursement for any sum exceeding fifty percent of the total project cost.

August 23, 1994
DATE

Mary T. Kinsey
for MARCO A. ROSAMANO
Attorney-Advisor
U.S. Army Engineer District
New Orleans, Louisiana



WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

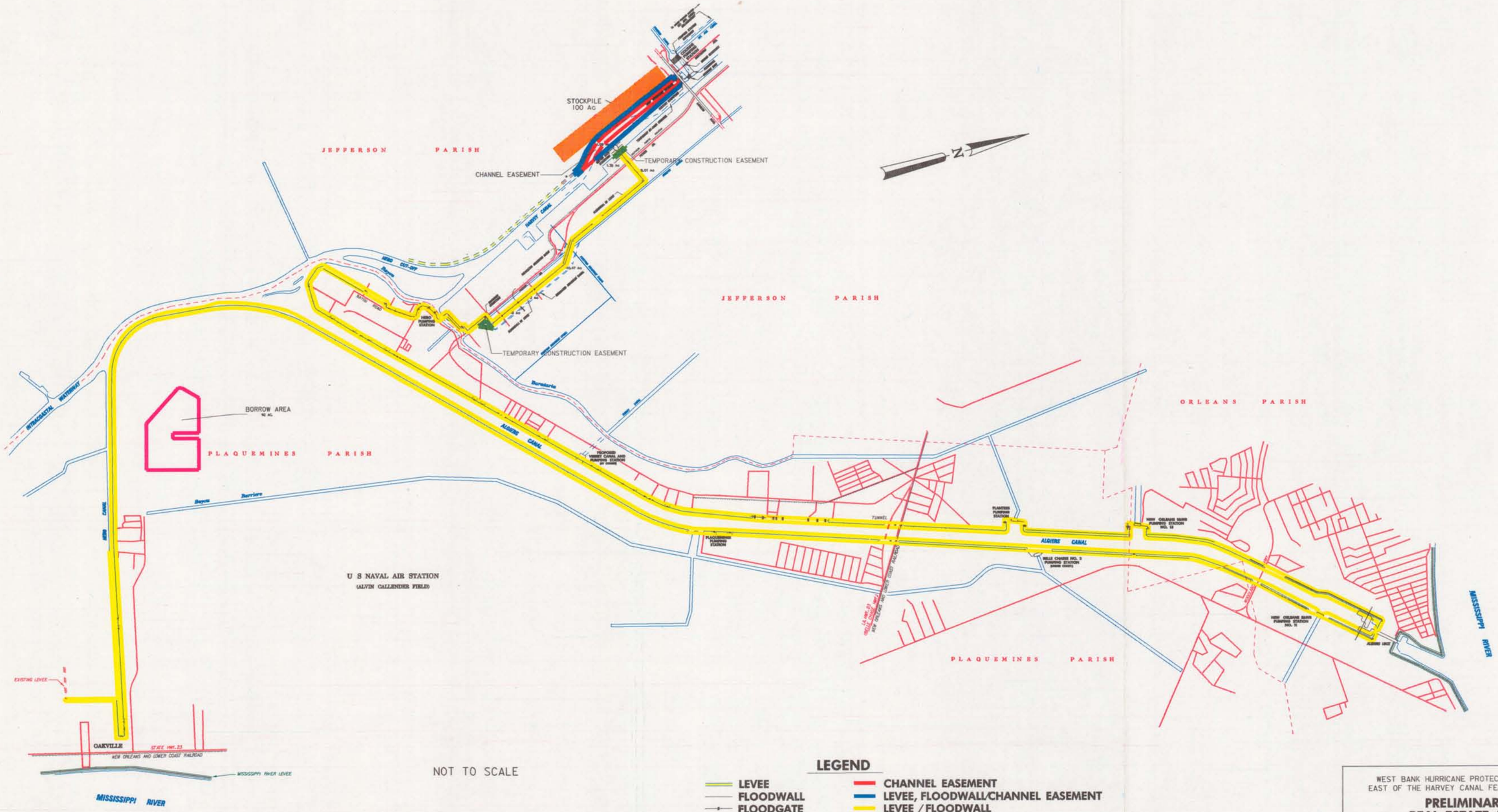
REAL ESTATE LOCATION AND VICINITY MAP

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

DATE: AUGUST 1994

eohvlcmp.dgn

PLATE 1



NOT TO SCALE

LEGEND

- LEVEE
- FLOODWALL
- FLOODGATE
- CHANNEL EASEMENT
- LEVEE, FLOODWALL/CHANNEL EASEMENT
- LEVEE / FLOODWALL
- BORROW
- TEMPORARY CONSTRUCTION EASEMENT
- TEMPORARY STOCKPILE EAESMENT

WEST BANK HURRICANE PROTECTION PROJECT
EAST OF THE HARVEY CANAL FEASIBILITY STUDY

PRELIMINARY REAL ESTATE MAP

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

DATE: AUGUST 1994

abhd7.dgn

PLATE 2

APPENDIX G

PUBLIC VIEWS AND RESPONSES

APPENDIX G

PUBLIC VIEWS AND RESPONSES

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PUBLIC VIEWS AND RESPONSES

INTRODUCTION

This appendix provides information on the public involvement program conducted as part of the planning process. The views of Federal, state, and local agencies and interested groups and individuals on the recommended plan are included. Response to views are included where applicable. A summary of the public meeting held on July 21, 1994, is also included in this appendix.

PUBLIC INVOLVEMENT PROGRAM

Public meetings concerning the need for increased levels of hurricane protection for the west bank of the Mississippi River were held in 1966, 1972, 1984, 1986, 1989, and 1994. The earlier meetings held in 1966 and 1972 were broad in scope and were primarily concerned with protection over the multi-parish area. The meetings in 1984 and 1986 were concerned with the area between Westwego, Louisiana and the Harvey Canal. The final feasibility report for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, study was issued in December 1986. This report recommended a Standard Project Hurricane (SPH) level of protection for the area between Westwego and the Harvey Canal. This report also recommended further studies for the area east of the Harvey Canal.

A notice of intent to prepare a draft EIS for the East of Harvey Canal feasibility study was published in the Federal Register on February 11, 1988, which explained the study and the scoping process. A scoping input request was issued on March 29, 1988. A scoping document which summarized all comments received during the scoping period was sent out on October 29, 1988. A meeting was held at the New Orleans District on April 14, 1989 to present the preliminary findings and to receive comments from local interests. Due to concern regarding parallel protection along the Harvey Canal and the potential impacts to industries in the area, additional studies were conducted. A second meeting was held on September 11, 1989 to present the new alternatives and the tentatively selected plan.

Several meetings were held with representatives of Federal, state, and local agencies throughout the study process. The meetings provided a forum to discuss the study process and the direction of the study. Included at these meetings were representatives from the Louisiana Department of Transportation and Development, the West Jefferson Levee District, the Orleans Levee District, and the Plaquemines Parish Government. Meetings of the local civic associations and other local interest groups were also attended.

The draft feasibility report and EIS was distributed to the public the week of June 6, 1994. A public meeting was held on July 21, 1994, in Harvey, Louisiana, at the Jefferson Parish School Board Administration Building. There were approximately 85 people in attendance at the public meeting. After opening statements by Colonel Klow, District Engineer, New Orleans District, a slide presentation was given by the study manager. Upon completion of the presentation, Colonel Klow called on the individuals who had indicated a desire to publicly comment on the recommendations presented in the draft report. The tentatively selected plan was favorably received, but some opposition was expressed concerning the locals being required to share the costs of work along the Algiers Canal and about the alignment of the protection south of the Hero Pumping Station and in the vicinity of Oakville. A summary of the oral statements presented at the public meeting are summarized on the following pages.

ORAL STATEMENTS PRESENTED AT PUBLIC MEETING

July 21, 1994

Mr. Luke Petrovich, Plaquemines Parish President

Mr. Petrovich thanked the Corps of Engineers, the United States Congress, the State of Louisiana, and the parishes for providing the funds necessary for the continuance of these studies and projects. Plaquemines Parish is glad to participate and support the East of Harvey Canal project to the fullest extent possible. The parish is working on obtaining Congressional authority to construct portions of the project along the Algiers Canal and to receive credit or reimbursement. This work could be accomplished using parish forces or by contract work. This approach would allow Plaquemines Parish to provide protection to residents within their parish at the earliest date possible. Plaquemines Parish continued support is assured.

Honorable Joseph Toomy, State Representative District 85

Mr. Toomy feels that the most impressive part of the draft feasibility report is the potential for extensive devastation to occur within the area as a result of hurricane surge. The potential loss of life and property damage highlights the need for this project. Mr. Toomy fully supports the proposed project and stressed that all efforts be made to accelerate completion of the project. He is glad to see that we are now working towards protecting both the east and west sides of the Harvey Canal. He also stated that as detailed plans are developed, the Corps of Engineers needs to ensure that existing drainage facilities are not adversely impacted either during construction or upon completion of the project. He thanked the West Jefferson Levee District and the Corps of the Corps of Engineers for getting the project to this point.

Ms. Stephanie Edwards, Congressman William Jefferson's Office

Ms. Edwards read a prepared statement for Congressman Jefferson. The devastation which was caused by Hurricane Juan and more recently by Hurricane Andrew highlight the

importance of hurricane protection. Congressman Jefferson fully supports the project and is prepared to move quickly to authorize and appropriate funds for the construction of this project. The proposed project will provide much needed protection to west bank residents.

Mr. Curtis Patterson, Director of Public Works and Flood Control (DOTD)

The Louisiana Department of Transportation and Development supports this project and will continue to work towards making it a reality. Act 1012 of the 1993 Louisiana legislative session directed DOTD to serve as the non-Federal sponsor for construction of the Westwego to Harvey Canal project and modifications which include the East of Harvey Canal project and the Lake Cataouatche project. These three projects combined would provide protection to over 90 percent of the west bank residents living in Jefferson, Orleans, and Plaquemines Parishes. The East of Harvey Canal project would prevent an estimated $2 billion in hurricane surge damage throughout the project life. Mr. Patterson urged the Corps of Engineers to expedite work so that this project could become a reality. DOTD will provide the necessary non-Federal assurances. The local governmental agencies (West Jefferson Levee District, Orleans Levee District, and Plaquemines Parish Government) will still provide the necessary rights-of-way. Additional comments can be found in a letter from DOTD on page G-25.

Mr. Roger Stack, Administrative Assistant to Jefferson Parish Councilman Lawson

Mr. Stack read a letter prepared by Councilman Lawson responding to the draft feasibility report. "I am in total support of this project and the tentatively selected plan along the Harvey Canal due to its extreme importance to both our residents and businesses located on the east side of the Harvey Canal and on the west bank of Jefferson Parish. I hope that this project will proceed expeditiously to its ultimate conclusion." A copy of Resolution No. 77228, adopted by the Jefferson Parish Council on Wednesday, July 20, 1994, was also introduced. This resolution states that the Jefferson Parish Council supports this vitally important project and urges the expeditious completion. Additional comments can be found in a letter from Councilman Lawson on page G-30.

Mr. Jim Huey, Commissioner Orleans Levee Board

Mr. Huey stated that the Orleans Levee Board highly supports the East of Harvey Canal project. This project will complete protection on the westbank to residents living in Jefferson, Orleans, and Plaquemines Parishes. Mr. Huey urged the expeditious completion of the project.

Mr. Ken Stuart, President Industrial Pipe, Incorporated

Mr. Stuart offered his full support for the proposed project with a few minor changes. Mr. Stuart stated that the Oakville area is not currently leveed and that this might be the only time that a levee alignment could be established in this area. The land located to the west of the proposed alignment at Oakville and outside of the protection was used as a solid waste landfill. This landfill would be disturbed with the proposed alignment. Mr. Stuart stated that he believes the Louisiana Department of Environmental Quality would prefer to leave the landfill alone. This would require connecting with the existing Plaquemines Parish levee further to the west. Mr. Stuart also suggested that the levee along the south side of the Hero Canal be located a sufficient distance away from the canal to avoid impacting his facilities which include loading and unloading materials on the canal bank. Mr. Stuart also asked that the newly protected community of Oakville be provided with some type of interior drainage. Additional comments can be found in a letter from Mr. Stuart on page G-37.

Mr. Richard Meyer, Meyer Engineers, Ltd.

Mr. Meyers firm prepared the drainage master plan for drainage district No. 9, which is that area in Jefferson Parish east of the Harvey Canal. Mr. Meyer was asked to attend by Councilman Ward to advise the Corps of two drainage projects that are being considered. Funding for Phase 1 for Pump Station No. 3 (Verret Pumping Station) is in place and bidding is anticipated by the end of the year. This should be considered in the detailed design of the project. The Murphy Canal is an important drainage channel and any modifications to this canal should be looked at closely. The Murphy Canal should also not be shut down at any point during the construction period. Additional comments can be found in a letter from Mr. Meyer on page G-39

Mr. Harry Cahill, President West Jefferson Levee District

The East of Harvey Canal project is a vital link in providing hurricane protection to west bank residents living in portions of Jefferson, Orleans, and Plaquemines Parish. The extensive damages that occurred as a result of Hurricane Juan in 1985 and the potential damages that could have been caused by Hurricane Andrew in 1992 had it taken a more northerly course, highlight the need for increased protection. The West Jefferson Levee District concurs in the plan developed by the Corps of Engineers and asks that a plan of local participation be developed that allows for the maximum utilization of local and Federal funding. To assist in providing needed assurances, the state legislature in 1993, designated the Louisiana Department of Transportation and Development to serve as the non-Federal sponsor.

Mr. Allen Hero, Hero Lands Company

Hero Lands Company owns land in both Plaquemines and Orleans Parishes. The Algiers Canal was constructed in the 1950's and the existing levees were constructed to provide the residents with protection as a result of the canal. Why should the local governments be asked to pay for upgrading levees designed and built by the Corps of Engineers as a result of the Algiers Canal. Raising this levee should be a government responsibility and paid for at 100 percent Federal cost.

Mr. Numa Hero, Jr., Hero & Son-Hero Wall Co.

Mr. Hero congratulated the Corps of Engineers in the overall design of the proposed project, however, there are a few things he would like to see changed. Hero & Son and Hero Wall Co. own land north of the Hero Pumping Station (about 35 acres). They have a problem with the alignment between the floodgate and the Hero Pumping Station. How will drainage be provided to those industries located on the floodside of the protection? Who will pay the severance damage to industries which are not protected? Who will maintain the protection along the Harvey Canal to protect these industries? Mr. Hero has talked to many of the land owners along this alignment and he feels that most of them would prefer an alignment that followed the Harvey Canal. Additional comments can be found in a letter from Mr. Hero in page G-52.

Mr. Thomas Harrington, Jr., Individual

Mr. Harrington commended the Corps of Engineers for the work which has lead to the development of the proposed plan. Mr. Harrington does not agree with the locals being asked to share in the cost of raising the protection along the Algiers Canal. The Algiers Canal was a total land cut where no previous waterway existed. The initial work and maintenance should have been a 100 percent Federal cost. The requirements of local cooperation for the Algiers Canal project required local interests to provide at no cost to the Government all lands, easements and spoil areas required for the initial work and subsequent maintenance and that the United States Government be held harmless from damage incident to construction. If the Algiers Canal had not been constructed, the need for hurricane protection in this area would be much less. The local residents should not be asked to pay for the cost in raising levees to provide protection along a canal constructed by the United States government. Additional comments can be found in a letter from Mr. Harrington on page G-65.

Mr. Charles Belsom, Harvey Canal Industrial Association

Mr. Belsom represents the Harvey Canal Industrial Association (HCIA) and read a letter from the association. The hurricane protection project in and around the Harvey Canal area, has been closely monitored and avidly studied by representatives of the association. The HCIA is pleased to endorse the concept of the proposed plan that places a 110 foot wide floodgate structure in the Harvey Canal and improves the Cousins Pumping Station. This comprehensive hurricane protection plan eliminates the need for floodwalls on both sides of the Harvey Canal between the Mississippi river and Lapalco Boulevard which is a concept that this association has supported since the beginning of the planning process. The final alignment of floodwalls and levees on the east bank of the Harvey Canal, south of the floodgate is an area of concern. Individual land owners should be contacted to determine the most beneficial alignment. The HCIA offered their assistance to insure a smooth transition into the construction phase of the project. Additional comments can be found in a letter from the Harvey Canal Industrial Association on page G-35.

Mr. William Jacks, Chairman Jefferson Parish Citizens Drainage Advisory Board

Mr. Jacks and the Jefferson Parish Citizens Drainage Advisory Board supports the proposed project. It is vital that this project proceed without delay due to the effects not only to the area east of the Harvey Canal but also to the area west of the Harvey Canal. The floodgate would tie the line of protection for the area east of the Harvey Canal to the currently authorized Westwego to Harvey Canal project and complete protection for this area. Until the floodgate is completed, the area west of the Harvey Canal would not receive complete protection.

Mr. Ron Besson, Individual

Mr. Besson congratulated the Corps of Engineers on finally getting the draft feasibility report out for public review. He did however express concern about the length of time it has taken to prepare a report when the basic plan had been developed back in 1989. The delays in completing this study are inexcusable. Mr. Besson also thinks that Plan 1 (floodwall along the Harvey Canal) should be eliminated from consideration due to the fact that it would never become a reality. The Corps of Engineers concern for forested wetlands is of concern because it is affecting peoples lives and the economy of the west bank. Concern was also expressed about the fact that Crown Point and the Lafitte-Barataria area is not included in the protection and is being addressed by another study. Mr. Besson urged the Corps to expedite the processing of this report and the implementation of hurricane protection on the west bank.

Mr. Hank Berschak, President Terrytown Civic Association

Mr. Berschak complemented the Corps on producing a very comprehensive document. Our study assumes that the Pumping Station No. 3 will be constructed, but we offer no Federal assistance in providing the necessary funds. He urged the Federal Government to assist in the funding for this badly needed drainage improvement Terrytown is the largest population center located with the study area, however, they are not identified on the study area maps. Mr. Berschak suggested that Terrytown be added to the maps. The Terrytown Civic Association offers there support and would like to see this project to become a reality.

Mr. Ronald Jones, Commissioner West Jefferson Levee District

Mr. Jones was speaking as someone who has personally experienced flooding as result of hurricane surge. Mr. Jones residence was flooded during hurricane Juan in 1985. He stated that the personal devastation associated with this type of flooding is very hard to describe. This project must become a reality and must be built as soon as possible to provide the badly needed protection to residents of the west bank. Mr. Jones encouraged everyone to work together to get the project constructed.

Mr. Ray Fuenzalida, Harvey Canal Ltd. Partnership

Mr. Fuenzalida is the General Manager of the Harvey Canal Ltd. Partnership. They are landowners both north and south of the proposed floodgate along the Harvey Canal. They support the proposed alignment of the protection along the Murphy Canal. They own waterfront property south of the floodgate and they emphatically do not want any type of floodwall along the canal. This would make their property unusable.

COMMENTS AND RESPONSES

A copy of the letters received from Federal and state agencies, parish governments, and other interested organizations and individuals during the public review period are provided on the following pages. A response to comments contained in these letters has also been provided where applicable.

BILLY TAUZIN

WASHINGTON OFFICE
TELEPHONE 202 225-4031
2330 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON DC 20515

Congress of the United States
House of Representatives
Washington, DC 20515-1803

July 19, 1994

Mr. Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Herr:

This correspondence is in reference to the public hearing scheduled for July 21 regarding the Corps of Engineers Draft Feasibility Report covering the west bank of the Mississippi River in the vicinity of New Orleans, Louisiana (East of the Harvey Canal), hurricane protection project.

Please be advised that I fully support this much needed and long awaited project in order that the citizens of the affected areas will have adequate protection from storm surges and floods. Without this levee system, the surge produced by a major hurricane could result in a catastrophic loss of life and property to area residents. The economic devastation to the area would also be severe, serving as another reason for this project to proceed in a timely fashion.

Once completed, this project will tie into the Westwego to Harvey Canal project and will ultimately protect over 190,000 residents.

Once again, I reiterate my full support for this critical project. If I may be of further assistance regarding this matter, please do not hesitate to contact me.

Sincerely,

BILLY TAUZIN
Member of Congress

BT/djc

cc: Mr. Harry Cahill, III, West Jefferson Levee District

G-10

COMMENTS NOTED

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

July 13, 1994

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
Plan Formulation Branch
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Schroeder:

Enclosed are comments on the Draft Environmental Impact Statement for West Bank of the Mississippi River in the Vicinty of New Orleans, LA (East of the Harvey Canal). We hope our comments can assist you. Thank you for giving us an opportunity to review the document.

Sincerely,

Donna S. Wieting
Director
Ecology and Conservation Office

Enclosure

G-11

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Coast and Geodetic Survey
Silver Spring, Maryland 20910

JUL 11 1994

MEMORANDUM FOR: Donna Wieting
Ecology and Environmental Conservation Office
Office of the Chief Scientist

FROM: Rear Admiral J. Austin Yeager, NOAA
Director, Coast and Geodetic Survey

SUBJECT: DEIS 9406.06-West Bank of the Mississippi River in the Vicinity of New Orleans (East of the Harvey Canal), Jefferson, Orleans, Plaquemines Parishes, Louisiana

The subject statement has been reviewed within the areas of Coast and Geodetic Survey's (C&GS) responsibility and expertise and in terms of the impact of the proposed actions on C&GS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control points in Jefferson, Orleans, and Plaquemines Parishes is provided on the diskettes accompanying this memorandum. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, C&GS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation.

1.1

C&GS recommends that funding for this project include the cost of any relocation required for C&GS monuments. For further information about these monuments, please contact John Spencer, NOAA, NGS, N/CG174, SSMC3, Station 9202, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, telephone 301-713-3242.

Attachments

JUL 13 1994

G-12

1.1 The standard procedure will be followed and a determination will be made during the advanced engineering and design phase of the project as to whether any geodetic survey control monuments will be required to be moved.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
P. O. BOX 2659
BATON ROUGE, LOUISIANA 70821

REGION 6

July 22, 1994

IN REPLY REFER TO

Draft Feasibility Report
and Draft Environmental
Impact Statement
"West Bank of the
Mississippi River
in the Vicinity of
New Orleans, Louisiana
(East of the Harvey Canal)"

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Schroeder:

Your June 6, 1994, letter transmitted the subject document for our review.

Our review centers mainly around highway transportation issues on both the State and Local level. It is noted that the conflicts with highways and local roads appear to have been addressed with the use of either swing or bottom roller gates in the floodwall sections or ramping over the earthen levee sections. We would encourage, if not already done, the coordination of the roadway safety issues and any related cost issues with the appropriate roadway Administrators in the LDOTD and Parish Governments.

COMMENTS NOTED

It should be noted that any adjustments to the roadways are viewed as a water resource or flood control responsibility and not a Federal Highway Trust fund responsibility.

Thank you for the opportunity to comment on a substantial and needed effort.

Sincerely yours,

William A. Sussmann
Division Administrator

Federal Emergency Management Agency
Region VI
Federal Regional Center
800 North Loop 288
Denton, TX 76201-3698

MT

July 29, 1994

New Orleans District, Corps of Engineers
ATTN: Planning Division
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Sirs:

This responds to your Draft Feasibility Report and Environmental Impact Statement for the West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana, dated, June 6, 1994 but not received in this office office until July 27, 1994. Jefferson, Orleans, and Plaquemines Parishes participate in the National Flood Insurance Program (NFIP) and have adopted an appropriate floodplain management ordinance for issuing development permits in their floodplains.

The floodplain administrators in each Parish must be contacted to review the project to make a final determination that it will be reasonably safe from flooding and after all other state and federal clearances and permits have been obtained by the applicant,to issue a Parish development permit for any development in their floodplains in accordance with Parish and NFIP requirements. This office will periodically verify and evaluate the local review and permitting processes to establish eligibility for the community's continued participation in the NFIP.

In addition to complying with the NFIP requirements, this office is also concerned that the project will avoid any short or long term adverse impacts associated with the occupancy, modification or destruction of wetlands to the maximum extent possible.

For further information contact the appropriate floodplain administrator:

Jefferson Parish	Mr. Mike Yenni, Pres, Police Jury (504)-736-6824
Orleans Parish Planning	Mr. Michael Centineo, Dir, Sec of (504)-565-6165
Plaquemines Parish	Ms. Shelia Robeaux, Supt, Plng, Permits & Zoning (504)-392-6690

Sincerely,

Charles D. Ellison
Natural Hazards
Program Specialist

Concur. The offices of the floodplain administrators within each parish were provided with a copy of the draft feasibility report during the public review process. Coordination will be maintained with these offices during project design and construction.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Post Office Box 649
Albuquerque, New Mexico 87103

ER 94/466

July 28, 1994

Colonel Kenneth H. Clow
District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Clow:

The U.S. Department of the Interior has reviewed the Draft Feasibility Report, Draft Environmental Impact Statement (DEIS) and Technical Appendices for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal). In this regard, the following comments are provided for your consideration.

G-15

General Comments

2.1 Overall, the draft Feasibility Report and DEIS accurately document impacts and describe mitigation necessary to replace fish and wildlife habitat that would be lost as the result of providing hurricane protection in the proposed project area. The Fish and Wildlife Service (FWS) concurs that the proposed project will have no adverse impact on any Federally-listed threatened or endangered species or their critical habitat.

Specific Comments

2.2 Feasibility Study, Page 99, First Paragraph - The increased pumping capability (1,000 cubic feet per second) of the Cousins Pumping Station should not be used to lower water levels in the drainage canals below their currently-maintained depth. Further lowering of water levels would reduce the fish and wildlife habitat value of swamps and bottomland hardwoods located south of the pumping station and would require detailed impact analysis and additional in-kind mitigating measures. To preclude these requirements, we recommend that a commitment be made in the Feasibility Study and the DEIS stating that water levels will not be pumped below the currently-maintained elevation.

2.1 Comment Noted.

2.2 The Cousins Pumping Station currently has the capacity to pump the canals upstream of the station dry during non-flood periods. However, Jefferson Parish has decided not to do that but to maintain stages within the canals at -10.0 to -10.5 feet National Geodetic Vertical Datum (NGVD). The decision to maintain this level is based upon the following factors that occur when stages are maintained too low: canal bank failure problems, concrete sloping failures, increased adverse subsidence effects on surrounding urban areas, and infiltration between the storm sewer system and the sanitary sewer system. Therefore, the additional 1,000 cfs pumping capacity does nothing to alleviate those problems that would manifest if canals would be pumped below the determined level. Thus, the additional pumping capacity would not result in the drying of the remaining swamps and bottomland hardwood forests south of the pumping station.

2.3

DEIS Page 59, Paragraph 7.5.2 - This paragraph addresses the FWS recommendation made under the Fish and Wildlife Coordination Act (Appendix D) that the portion of the Plaquemines Parish levee tie-in extending perpendicular to the Hero Canal and south of the industrial facility be constructed on top, or immediately east (i.e., non-wetland, protected side), of the existing levee. The first part of the Army Corps of Engineers' response states that constructing the levee on top of the existing levee may require additional borrow to backfill an adjacent canal, thus increasing project costs and possibly increasing environmental impacts. That justification for not implementing the FWS recommendation is acceptable. However, the second part of the Corps' response is not acceptable. The Corps states that the relocation of the levee could be further examined during the detailed engineering and design phase of the project. We strongly recommend that the Final Feasibility Report and EIS specify that the proposed levee will be located on the protected side of the existing levee. Failure to specify the proposed levee location in the Final Feasibility Report and EIS could result in failure to avoid adverse impacts to bottomland hardwoods. Accordingly, additional detailed impact analysis would have to be conducted and mitigation requirements would have to be recalculated if the proposed levee location is not specified prior to project authorization.

2.4

Appendix C, Page C-II-15, Section 3a - The last paragraph of Section 3a in the 404(b)1 Certification should reference the Contaminant Investigation and Disposal Plan discussion in Appendix C, Section VIII.

2.5

Appendix C, Section IV, Page C-IV-28, Second Paragraph - This paragraph indicates that approximately 90 acres of suitable borrow are needed for this project. Plates A-III-2 and A-III-3 in Appendix A, Section III, entitled "Geology, Soils, and Foundations," indicate that two soil borings have been taken at the proposed borrow site. However, these borings were not used to determine the size or location of the borrow site. We are concerned that, if the planned borrow material is not suitable, additional borrow material may be obtained from wetlands and/or bottomland hardwood sites. Therefore, additional borings should also be taken as necessary to accurately determine the needed borrow-area location and size. If this recommendation is not feasible, then we recommend that the expanded borrow area remain as proposed in the report.

Thank you for the opportunity to review these documents. We trust our comments will be of assistance during preparation of the proposed project final documentation.

Sincerely,

Glenn Sekavec

Glenn B. Sekavec
Regional Environmental Officer

G-16

2.3 The levee addressed in the comment is a minimal levee and canal; however, that levee would provide a base for a straddle enlargement. The levee also is non-wooded. That is, the use of that levee and the minimal canal landward of it would minimize the destruction of forested lands (some of which are wetlands) in the construction of the hurricane protection levee. The current alignment for the levee is based upon the recognition of the wetland value of the adjacent swamps and includes routing the levee approximately 1,000 feet east to preserve those wetland values. The location of the levee will include placement either on top or landward of the small levee rather that toward the unprotected side as long as possible future development on the landward side does not make that design cost prohibitive.

2.4 Concur.

2.5 Concur.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

AUG 1 0 1994

Colonel Kenneth H. Clow
District Engineer
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Colonel Clow:

Pursuant to Section 309 of the Clean Air Act and Section 102(2)(c) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has completed its review of the U.S. Army Corps of Engineers' (COE) Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Hurricane Protection Study.

The proposed action consists of providing additional hurricane surge protection for the west bank of the Mississippi River. Plans were developed for areas west and east of the Algiers Canal. The tentatively selected plan for west of the Algiers Canal (Plan 3B) would provide Standard Project Hurricane (SPH) protection with: 1) the construction of a navigable floodgate in the Harvey Canal, 2) a navigation bypass channel to temporarily accommodate Harvey Canal traffic during construction of the floodgate, 3) increase capacity of the Cousins Pumping Station by 1,000 cubic feet per second, and 4) a combination of levees and floodwalls to provide protection on the east side of the Harvey Canal. The tentatively selected plan for east of the Algiers Canal would provide SPH protection by: 1) raising the existing protection along the east side of the Algiers Canal and the north bank of the Hero Canal, and 2) constructing a new levee near Oakville.

The EPA offers the following comments for your consideration in development of the Final Environmental Impact Statement (FEIS).

■ PROPOSED ALTERNATIVES

3.1 Section 1505.2(b) of the NEPA regulations requires responsible agencies to identify all alternatives that were considered, "...specifying the alternative or alternatives that were considered to be environmentally preferable." The environmentally preferable alternative is the alternative that

3.1 Comment noted.

G-17

will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes least damage to the biological and physical environment. While we would prefer Plan 1 due to the minimization of impacts to remaining bottomland hardwoods in the project area, we agree with the rationale to provide SPH protection to industries located along the Harvey Canal and thereby avoid the potential for encountering hazardous, toxic and radioactive waste materials that may be associated with the Plan 1 alignment. Therefore, EPA supports Plan 3B for west of the Algiers Canal and the SPH level of protection for east of the Algiers Canal as the environmentally preferred alternatives.

3.1

■ IMPACT ANALYSIS

Regarding the analysis of impacts associated with the proposal, an abundance of information is presented in quantitative form. However, we believe that potential secondary and indirect impacts are not as well addressed. For example, with the need to accommodate increased stormwater runoff confined within the protected area, additional pumping capacity will be required. Increased pumping capacity lowers the surrounding water table causing localized subsidence and changes to surface and subsurface hydrology. This in turn affects the stability of soils and may modify vegetative communities. Therefore, we request that additional discussion be included in the FEIS on cause and effect relationships, such as those described above, that may be associated with providing hurricane level protection in the project area.

3.2

■ AFFECTED RESOURCES

Wetlands

There is limited information in the DEIS describing the present condition and/or value of remaining wetlands inside the leveed portions of project area. We suggest that additional information be included in the FEIS to adequately describe the condition of remaining natural resources, including wetlands, within the project area.

3.3

Mitigation

Provisions provided in the 1990 joint Memorandum of Agreement (MOA) between EPA and the COE on mitigation established a goal of no overall net loss of wetland functions and values. The MOA allows for simple purchase or "preservation" of existing wetland resources only in exceptional circumstances as compensatory mitigation. While a ratio of 1:1 acre replacement is proposed for the loss of 279 acres of forested wetlands through the acquisition of 312 acres of high quality forested wetlands, this cannot be viewed as meeting a goal of no net loss. The mitigation measures to compensate for potential impacts were

3.4

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3.2 Increased pumping capacity of the Cousins Pumping Station will be required to handle those stormwaters that would have been handled by the Harvey Pumping Station since the outlet for that station will be cut off during hurricane events by the closure of the sector gate structure. The comment is concerned particularly with the effects of that increased pumping capacity on area subsidence including the secondary and indirect effects of that subsidence on plant communities. Mr. Dan Modianos, an authority on pump designs, pumped drainage, and pumped drainage systems in the New Orleans area, is a consultant to the Jefferson Parish Department of Public Works. Mr. Modianos explained that it is the intent that the drainage system be operated to try to maintain the level of the water in the canals that keeps subsidence at a minimum. Dry weather conditions are the primary factor that is used in determining the canal water levels. The drainage canals in the area of the Cousins Pumping Station are maintained from 10.0 to 10.5 feet Cairo Datum. This is equivalent to -10.0 to -10.5 ft. NGVD. This level is necessary to prevent dewatering of soils, to prevent earthen canal bank and concrete sloping failure, and to maintain the necessary relationship between the storm sewer system and the sanitary sewer system to prevent infiltration between the two systems. The two systems must be kept at very near the same levels to minimize problems. Thus, the additional pumping capacity that would be utilized in hurricane and other storm periods has essentially nothing to do with dry weather conditions, which, in addition to the soils native to the area and the retained soil moisture, are the factors most consequential to subsidence in the New Orleans area.

3.3 Discussion of wetlands in the project area is included under two significant resources in the DEIS. These are bottomland hardwoods (BLH) and swamp. The value of the bottomland hardwood forests is discussed in Paragraph 5.2.2.1., Significance, while the value of the swamp is discussed in Paragraph 5.2.3.1., Significance. Particular emphasis of the value of woodlands in the leveed portion of the study area is contained in Paragraph 5.2.2.1.

developed through the analysis of available alternatives, and by recommendations provided by resource agencies. However, we have some concerns with the sole use of compensatory mitigation for this project. We believe the DEIS does not adequately support this proposal as an "exceptional circumstance."

3.4

Therefore, we suggest that the FEIS include additional discussion on what factors, other than economics, were used as the basis for selecting preservation as compensatory mitigation for this project.

3.5

Water Quality

The definition and discussion of "effluent limited stream segments" is contradictory (pg. 27). We recommend changing the statement to read as follows.

3.6

An "effluent limited" stream segment is defined as a segment where water quality is meeting, or is expected to meet applicable water quality standards, after the application of technology-based effluent limitations required by sections 301(b) and 306 of the Clean Water Act.

- EPA DEIS RATING

EPA rates this proposed action/DEIS as "EC-2," i.e., EPA has "Environmental Concerns" and requests additional information in the FEIS. The basis for our concerns regarding the proposal and the additional information needed in the FEIS include: 1) secondary and cumulative effects, 2) description of natural resources within the project area, and 3) the basis for using preservation as mitigation.

Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions. We appreciate the opportunity to review the DEIS. We request that you send our office two copies of the FEIS at the same time that it is sent to the Office of Federal Activities, EPA, 401 M Street S.W., Washington, D.C. 20460.

Sincerely yours,

Jane N. Saginaw
Regional Administrator

3.4 The comment is understood to mean that the mitigation in the recommended mitigation plan consists solely of preservation with an insufficient basis, and, thus, does not adequately follow the intent of the 1990 joint Memorandum of Agreement (MOA). It is important to state that the referenced 1990 MOA is not applicable to Corps of Engineers civil works activities, but is specifically applicable to the Section 404 Regulatory Program as is stated in the third sentence of the MOA.

Appropriate mitigation for this study was substantiated both by the COE HES and the USFWS HEP systems for evaluating effects of actions on habitats as is explained in Appendix C, Section IV (Mitigation/Incremental Analysis) and in Appendix D (Fish and Wildlife Coordination Act Report). The acreage for the future-without condition projected for the mitigation area is directly related to the historical development of the remaining portion of the study area. It was projected that a conservative estimate of development (conversion) of the BLH forests of the mitigation area would be approximately 20 percent of the rate of development determined for woodlands within the project construction area. Since that development rate was -1.135%, 20 percent of that rate is .227%. Hence the projected decline on Table C-IV-5A of the BLH acreage from 242 to 193 acres in the 100-year period of analysis. Additionally, the projected timber harvest at Target Year 25 and again at Year 75 causes a decline in habitat value. No development is projected on the swamp acreage but the timber harvest is projected on the swamp. Thus, as is shown in Table C-IV-5A, the appropriateness of the mitigation is fully substantiated when the FWP (future with project) mitigation plan is compared to the FWOP (future without) situation. It is noted that the 264-acre recommendation of the USFWS utilizing the HEP analysis and the same assumption for a FWOP condition is less that produced by the HES analysis for appropriate compensation. Thus, according to both analyses there is "no net loss" of wetland habitat value with the recommended mitigation plan.

3.5 The explanation will be included within the FEIS itself rather than totally in Appendix C, Section IV, that complete replacement of all habitat quality lost in the most cost-effective manner was the goal in determination of the recommended mitigation plan.

3.6 Comment noted.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive
St. Petersburg, Florida 33702

July 12, 1994

Colonel Kenneth Clow
District Engineer, New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Dear Colonel Clow:

The National Marine Fisheries Service (NMFS) has received the draft Feasibility Report and Environmental Impact Statement for the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal). The documents, transmitted by letter of June 6, 1994, from your Planning Division, address impacts associated with providing increased levels of hurricane protection to the area between the Mississippi River, Hero Canal, and Harvey Canal.

COMMENTS NOTED

Fishery resources for which the NMFS is responsible and alternatives to mitigate impacts to these resources have been adequately addressed in the subject documents. Therefore, we have no comments.

Thank you for this review opportunity.

Sincerely,

Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

SENATE
STATE OF LOUISIANA

SAMUEL B. NUNEZ, JR.
State Senator
President of the Senate

2016 Packenham Drive
Chalmette, Louisiana 70043
(504) 279-5551

July 11, 1994

Mr. Brett Herr, Study Manager
Planning Division, Plan Formulation Branch
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, LA 70160-0267

RE: Hurricane Protection Project
Tentative Plan for the
West Bank of the Mississippi River
in the Vicinity of New Orleans, LA
(East of the Harvey Canal)

Dear Mr. Herr:

I have been informed that a public hearing is to be held on July 21, 1994 to discuss the above referenced project. I will make every effort to be in attendance at this hearing; however, if I am unable to do so I would appreciate your relaying to those in attendance that this project has my full support.

The safety and protection of the citizens in this area must be given top priority at this point in time. Also all effort must be made to protect their property from the flooding and devastation that follows severe storms and hurricanes indigenous to our state.

COMMENTS NOTED

After input from the local residents as well as interested groups and agencies, I trust a final report can be issued and action taken as expeditiously as possible.

If I can be of assistance in this process, please feel free to contact me.

Sincerely,

Samuel B. Nunez, Jr.

SBN/lw

G-21

SENATE
STATE OF LOUISIANA

J. Chris Ullo
State Senator
2120 W. Bank Expressway
Suite 305
Harvey, LA 70058-1924
Office: 504-361-xxxx
Home: 504-340-9001
Fax: 504-361-xxxx

July 20, 1994

Standing Committees
Banks
Commerce
Labor
Natural Resources

Select Committees
Economic & Industrial Development
Education
Natural Resources & Environment

Mr. Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
U. S. Army Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Herr,

This correspondence is in reference to the public hearing scheduled July 21, 1994, regarding the U. S. Army Corps of Engineers' Draft Feasibility Report covering the west bank of the Mississippi River in the vicinity of New Orleans, Louisiana, East of the Harvey Canal, hurricane protection Project.

I fully support this much needed and long awaited Project in order that the citizens of the affected areas will have adequate protection from storm surges and floods. Without this levee system, the surge produced by a major hurricane could result in a catastrophic loss of life and property. The economic devastation to the area would also be sever, serving as another reason for this Project to proceed in a timely manner.

Once this Project is completed, it will tie into the Westwego to Harvey Canal Project and will ultimately protect over 190,000 residents.

If I may be of further assistance regarding this matter, please do not hesitate to contact me.

With kindest personal regards, I remain

Sincerely yours,

J. Chris Ullo
State Senator

JCU/lc

cc: Harry Cahill, III, President
West Jefferson Levee District

G-22

COMMENTS NOTED

STATE OF LOUISIANA
HOUSE OF REPRESENTATIVES

KYLE M. GREEN
DISTRICT 87

July 27, 1994

Mr. Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Draft Feasibility Report
Hurricane Protection Project
Westbank of Mississippi River,
New Orleans vicinity (east of
Harvey Canal)

Dear Mr. Herr:

I regret my schedule did not allow me to attend the public hearing on July 21, 1994 in Harvey, Louisiana, regarding the above captioned Hurricane Protection Project.

However, I am very supportive of this much needed and long awaited project. This endeavor would afford the citizens of the affected areas with adequate protection from storm surges and floods. Without this levee system, the surge waters produced by a major hurricane could result in a catastrophic loss of life and property. The economy of our area would also be devastated. The project, once completed, will tie into the Westwego to Harvey Canal project, thus, ultimately protecting over 190,000 residents.

COMMENTS NOTED

Again, I support this project and urge that it proceed in a timely manner.

With best regards, I am

Sincerely,

Kyle M. Green

KMG/spm
cc: Mr. Harry L. Cahill, III
President, West Jefferson Levee District
HERR.LTR

State of Louisiana

EDWIN W. EDWARDS
GOVERNOR

JOHN F. ALES
SECRETARY

DEPARTMENT OF NATURAL RESOURCES

August 1, 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: **C940222 Coastal Zone Consistency**
U.S. Army Corps of Engineers
Direct Federal Action
Proposed hurricane protection project, West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana, (East of Harvey Canal).
Jefferson, Orleans, and Plaquemines Parish

Dear Mr. Schroeder:

The above referenced project has been reviewed by this office and has been found to be consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program as required in Section 307 (c) of the coastal Zone Management Act of 1972, as amended. If you have any questions concerning this determination please contact Paul Clifton of the Consistency Section at (504) 342-7591.

Sincerely,

Terry W. Howey

Terry W. Howey
Administrator

cc: Tim Killeen, CMD/FI
Patricia Thompson, Orleans Parish
Marnie Winter, Jefferson Parish

COMMENTS NOTED

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P. O. Box 94245
Baton Rouge, Louisiana 70804 9245

August 1, 1994

EDWIN W. EDWARDS
GOVERNOR

JUDE W P PATIN
SECRETARY

Colonel Kenneth H. Clow
District Engineer
New Orleans District,
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Clow:

This is in response to the "Announcement of Public Meeting," requesting comments regarding the West Bank Hurricane Protection Project (East of Harvey Canal).

We have reviewed the Draft Feasibility Report and Draft Environmental Impact Statement and are in agreement with the project as proposed. However, there are several issues, which we would like to reserve the right to resolve at a later date, so not to delay authorization of the project.

4.1 a. We do not agree with the determination that new easements are required along the Algiers and Hero Canals. In our opinion, the existing easements owned by the Federal Government along both canals are adequate to accomplish the intended project. Furthermore, since the levees along both of these canals are presently Federally maintained, they should remain a Federal maintenance responsibility, after completion of the proposed improvements.

4.2 b. We would like to be able to make suggestions concerning minor alignment changes. Some of these changes could result in a reduction of the project cost.

AN EQUAL OPPORTUNITY EMPLOYER
A DRUG-FREE WORKPLACE

G-25

4.1 The existing servitudes along the Algiers and Hero Canals were taken as part of a navigation project. Their purpose is for levee construction sufficient to prevent flooding so that the canal can be operated year round. The levee servitudes were not intended to act as hurricane or storm surge flood protection for the surrounding land. We have thoroughly researched the issue of whether such servitudes acquired for one purpose are sufficient for a more extensive purpose. We have not been able to find any clear authority on this issue. There are no precedent setting cases that have addressed it. Therefore, we must look to other jurisprudence to guide us in determining this problem.

One of the primary tenets of servitude law is that servitudes are strictly construed in favor of the landowner and against the holder of the servitude. What this means is that the courts will always take the most restrictive view of an easement in determining its applicability. In light of this, we have decided that the best approach is to not expose the Government to claims of inverse condemnation of property. As a result, the real estate estimates were prepared assuming that new servitudes will be required along both the Algiers and Hero canals.

The cost sharing provisions for project costs allocated to hurricane and storm damage reduction were established by the Water Resources Development Act of 1986 (Public Law 99-886). This act provides that non-Federal interest pay 35 percent of the project construction costs and 100 percent of the operations and maintenance costs allocated to hurricane and storm damage reduction. The recommended plan for East of Harvey Canal represents an opportunity for non-Federal interests to enter into an agreement with the Federal Government to provide a higher degree of hurricane protection to the areas along either side of the Algiers Canal by raising the existing Federal levees.

4.2 We will maintain close coordination with your office during the preconstruction, engineering, and design (PED) phase of the project scheduled to begin in Oct. 94. It is during this phase that detailed designs are prepared.

4.3

We urge you to expedite the authorization process, so that this vitally important project can be implemented without delay. As the non-Federal sponsor, we stand ready to provide whatever assistance may be required.

If I can be of further assistance, please contact me or Mr. Curtis Patterson, (504) 379-1294.

Sincerely,

Jude W. P. Patin
Secretary

pc: Plaquemines Parish Government
Orleans Levee District
West Jefferson Levee District
Mr. John Evanco
District Engineer Administrator,
District 02

4.3 Comment Noted.

State of Louisiana

Joe L. Herring
Secretary

Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, LA 70898-9000
(504) 765-2800

Edwin W. Edwards
Governor

13 July 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
US Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

G-27

RE: West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Draft Environmental Impact Statement

Dear Mr. Schroeder:

Personnel of our technical staff have reviewed the data provided for the above referenced project and have found that significant adverse effects to fish and wildlife populations are not likely to occur as a result of this proposed action if the following recommendations are included in the permit:

5.1 1) Work near the Estelle Pumping Station should not occur between October 1 and May 15 due to the close proximity to an active bald eagle nest.

5.2 2) Unavoidable losses to fish and wildlife habitat be mitigated for with the Bayou Bois Piquant Mitigation Plan.

In the event the proposed mitigation plan is rejected, this Department has mitigation available on the Sherburne Wildlife Management Area which can possibly be used as an alternative.

5.1 All levee upgrading work within the one-mile radius of the nest would occur outside of the Oct. 1 through May 15 period. However, some reseeding and fertilization may be required during this period. This should not present a problem since mowing of this segment of the levee has previously occurred during the nesting period.

5.2 Concur.

We appreciate the opportunity to review this project during the preliminary stage. If you have any questions please contact Mr. Donovan Mire (504) 765-2334 of my staff.

Sincerely,

Joe L. Herring
Secretary

JLH/djm

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P.O. Box 94245
Baton Rouge, Louisiana 70804-9245

July 22, 1994
(504) 929-9190

EDWIN W. EDWARDS
GOVERNOR

JUDE W. P. PATIN
SECRETARY

Mr. Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
US Army Corps of Engineers, New Orleans
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Herr:

Re: West Bank of the Mississippi River
in the Vicinity of New Orleans, LA
(East of the Harvey Canal)

We have reviewed the Draft Feasibility Report/Environment Impact Statement (EIS) and Technical Appendixes for the above referenced project.

We do not object to the proposed project, provided you comply with all of the NPDES Regulations to minimize the deposit of mud and dirt on all state highway systems during construction.

Sincerely,

V. Pizzolato

Vincent Pizzolato
Environmental Engineer Administrator

VP/klh
Doc. 51

COMMENTS NOTED

JEFFERSON PARISH
LOUISIANA
OFFICE OF THE COUNCIL

JAMES E. LAWSON, JR.
COUNCILMANIC DISTRICT 2

POST OFFICE BOX 9
GRETNA, LOUISIANA 70054
504 364 2611
FAX 504 364 7411

June 30, 1994

Mr. Brett Herr, Study Manager
Planning Division, Plan Formulation Branch
U. S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Herr:

I received a copy of the Draft Feasibility Report covering the West Bank of the Mississippi River in the vicinity of New Orleans, Louisiana (East of the Harvey Canal) and have completely reviewed same.

This is to advise that I am in total support of this project and the Tentatively Selected Plan along the Harvey Canal due to its extreme importance to both our residents and businesses located on the East side of the Harvey Canal on the West Bank of Jefferson Parish.

I hope that this project will proceed expeditiously to its ultimate conclusion.

If I can be of any assistance, please advise.

Sincerely,

James E. Lawson, Jr.
Vice-Chairman
Councilman, District 2

JELjr:rgb
CC: Mr. Harry L. Cahill, III, President
West Jefferson Levee District
Post Office Box 608
Marrero, Louisiana 70072

COMMENTS NOTED

JEFFERSON PARISH
LOUISIANA
OFFICE OF THE COUNCIL

July 22, 1994

Col. Eugene S. Witherspoon
U. S. Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160

Dear Col. Witherspoon:

Enclosed herewith is a certified copy of Resolution No. 77228 adopted by the Jefferson Parish Council on Wednesday, July 20, 1994, which is self explanatory.

Yours truly,

Terrie T. Rodrigue, Parish Clerk
Jefferson Parish Council

TTR/ehl
encl.

On motion of Mr. Lawson, seconded by Mr. Evans, the following resolution was offered:

RESOLUTION NO. 77228

A resolution stating the support of the Jefferson Parish Council for the hurricane protection project defined in the draft report entitled *West Bank of the Mississippi River in the Vicinity of New Orleans Louisiana (East of the Harvey Canal)--Draft Feasibility Report and Draft Environmental Impact Statement* as developed by the U.S. Army Corps of Engineers and urging all parties involved complete this vitally important project as expeditiously as possible.

WHEREAS, the U.S. Army Corps of Engineers has released a draft of the hurricane protection plan of West Jefferson east of the Harvey Canal; and,

WHEREAS, the Corps and the West Jefferson Levee Board believes that this project will serve a vital public service by providing much needed hurricane flood protection in the area east of the Harvey Canal;

NOW, THEREFORE, BE IT RESOLVED by the Jefferson Parish Council of Jefferson Parish, Louisiana acting as governing authority of said Parish:

SECTION 1. That this Council hereby supports the hurricane protection project defined in the draft report entitled *West Bank of the Mississippi River in the Vicinity of New Orleans Louisiana (East of the Harvey Canal)--Draft Feasibility Report and Draft Environmental Impact Statement* as developed by the U.S. Army Corps of Engineers.

SECTION 2. That this Council hereby urges all parties involved to complete this vitally important project as expeditiously as possible.

SECTION 3. That the Parish Clerk be, and she is hereby, requested to forward certified copies of this resolution to the U.S. Army Corps of Engineers and the West Jefferson Levee District.

The foregoing resolution having been submitted to a vote, the vote thereon was as follows:

YEAS: 6 NAYS: None ABSENT: (1) Ward

The resolution was declared to be adopted on this the 20th day of July, 1994.

GLD/bf-July 5, 1994.

THE FOREGOING IS CERTIFIED
TO BE A TRUE & CORRECT COPY

Terrie T. Rodrigue

TERRIE T. RODRIGUE
PARISH CLERK
JEFFERSON PARISH COUNCIL

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COMMENTS NOTED

T. J. "BUTCH" WARD
COUNCILMAN, DISTRICT 1
JEFFERSON PARISH

402 New Courthouse Bldg.
P.O. Box 9
Gretna, LA 70054
364-2607
364-2608

July 26, 1994

Colonel Kenneth H. Clow
Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: West Bank of the Mississippi River
in the vicinity of New Orleans, LA
(East of Harvey Canal)

Dear Colonel Clow:

I was unable to attend the public hearing July 21, 1994 due to medical reasons, but I want to formally provide input on the project.

This flood protection project is extremely important to the residents of Jefferson Parish, east of the Harvey, Canal, and should proceed expeditiously. In addition to levee improvements, the USACE should also, as part of this flood protection project, and as previously requested of USACE, include the funding for Pump Station No. 3 at Bayou Barataria near the Verret Canal. This pump station is required to protect the citizens of Drainage District No. 9 from flooding and has been determined to be needed by our drainage consultants, LA DOTD, and the USACE.

Please include the funding for Pump Station No. 3 in the East of Harvey flood protection project.

Yours very truly,

T. J. "Butch" Ward

T. J. "Butch" Ward
Councilman
District No. 1

TJW/WPT/tab

G-33

6.1

6.1 The purpose of the proposed East of Harvey Canal project is to provide increased levels of hurricane protection to residents of the west bank living in Jefferson, Orleans, and Plaquemines Parishes. Including a detailed analysis of drainage improvements as part of the feasibility study would have resulted in significant delays in the completion of the study. The Jefferson Parish, Louisiana, Urban Flood Control study will address rainfall flooding problems within Jefferson Parish. This study is scheduled for completion in Nov. 97.

CITY OF GRETNA

OFFICE OF THE MAYOR

RONNIE C. HARRIS
MAYOR

July 29, 1994

Mr Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
U S. Army Corps of Engineers, New Orleans
P O Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr Herr,

The City of Gretna wishes to offer its support of the Hurricane Protection Levee System Plan for east of the Harvey Canal. Unfortunately, I was out of town and could not attend the public meeting held on July 21, 1994.

Each year as hurricane season approaches, our constituents believe that the existing levees will hold the storm surge back from destroying our homes and property We know that this not the case and must develop plans to address this serious problem.

With this selected plan in place, we can be comfortable knowing that we have a level of protection to safeguard our property for a standard project hurricane This most important project is needed now to protect the residents of Gretna.

Please proceed on this project as quickly as possible with the knowledge that the City of Gretna is in full support of this plan

Yours very truly,

Ronnie C. Harris

Ronnie C Harris
Mayor

RCH/str

CC: Board of Aldermen
Harry Cahill, President
West Jefferson Levee District

P O BOX 404
OFFICE 363 1505 GRETNA, LOUISIANA 70054 FAX 363 1509

COMMENTS NOTED

HARVEY CANAL INDUSTRIAL ASSOCIATION

July 21, 1994

Lieutenant Colonel Gregory S. Kuhr
Department of the Army
New Orleans District Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

RE: Public Meeting July 21, 1994
Tentative Plan for the West Bank
of the Mississippi River in the
vicinity of New Orleans, LA
East of the Harvey Canal
Hurricane Protection Project

G-35

Dear Colonel Kuhr:

7.1 The Harvey Canal Industrial Association (HCIA), formed in 1946, is comprised of 321 member companies and is represented by 608 individuals. The hurricane protection project in and around the Harvey Canal area, has been closely monitored and avidly studied by representatives of our association. We are pleased to endorse the concept of the proposed plan that places a 110 foot wide floodgate structure in the Harvey Canal and improves the Cousin Pumping station. This comprehensive hurricane protection plan eliminates the need for floodwalls on both sides of the Harvey Canal between the Mississippi River and Lapalco Boulevard which is a concept that this association has supported since the beginning of the planning process.

7.2 The final alignment of floodwalls and levees on the east bank of the Harvey Canal, south of the floodgate structure, is an area of concern. We request that the Corps of Engineers coordinate with the individual land owners and this association to determine the most beneficial alignment. We look forward to meeting with the U. S. Army Corps of Engineers to discuss the final alignment.

Post Office Box 397 • Harvey, Louisiana 70059-0397 • Phone (504) 367-1721

7.1 Comment Noted.

7.2 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

Lieutenant Colonel Gregory S. Kuhr
New Orleans, Louisiana

July 21, 1994

This comprehensive hurricane protection plan will protect both the residents and businesses located on the West Bank of the Mississippi River near New Orleans and is long overdue. We look forward to the completion of the plan and offer our assistance to insure a smooth transition into the construction phase of the project.

Respectfully submitted,

HARVEY CANAL INDUSTRIAL ASSOCIATION

James B. Ronquillo, Jr.
President

CLB:JBR,JR/ljs

Industrial Pipe Inc

11266 Highway 23
Belle Chasse, Louisiana 70037
(504) 656-2232

Lt. Col. Gregory S. Kuhr
Department of the Army
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: West Bank Hurrocane Protection Project
East of the Harvey Canal Feasibility Study

July 21, 1994

Dear Sir:

I am Kennett F. Stewart, President of Industrial Pipe Incorporated, and reside at Hwy23 , Belle Chasse, Louisiana, in the Oakville area.

The Oakville area is the only part of the study area currently not leveed and this will probably be the only time that a levee alinement can be established. Once established, it is highly unlikely that any additional area can or will be enclosed within a protected area because of environmental concerns.

For that reason it becomes important to make a case for including as much land in the proposed protected area as is practical. The following are important considerations:

8.1

1. The downstream adjacent levee was terminated at the northern terminus of Perez property and did not include the Oakville area which it should have. In todays atmosphere the local levee would have extended to the south side of Hero Canal and then followed that Canal to join with the existing levee on the north side of Hero Canal.

2. Prior to my acquisition of this property, primarily for the purpose of using it for the proper disposal of construction materials, the back portion of the property was used for many years as a solid waste landfill. The old haul road leading to those dump areas has been added to the detailed map. Our understanding with the Louisiana Department of Environmental Quality is that DEQ does not want the old landfill disturbed, which would happen with the current Corps alinement. As stated several times in your study, Industrial Pipe has complied with the State of Louisiana requirements in our operations. We will continue to do so. However I am concerned that materials of a detrimental nature will be outside the protected area. The better solution is to place these old dump areas within the protected area and to seperate these from the adjacent wooded areas and marsh.

I ask for your thoughtful consideration of the realinement shown in detail on one of my exhibits which you may copy and also on a smaller scale on the quad map attached.

I also offer the following:

8.2

1. Part of my operations will be on the floodside of the protection. Sufficient room is required on the canal bank to load/unload materials. Approximately two hundred twenty-five (225 ') are required for those operations. The levee

8.1 The District is aware of the history of the older landfill that extended beyond the current western boundary of the Industrial Pipe landfill and recycling facility. Closure of the landfill in the mid-1980's was under orders of the Louisiana Department of Environmental Quality (DEQ). That closure included covering the landfill with a two-foot clay cap. Breaching of several gaps in a surrounding levee and haul road to allow water interchange through the adjacent swamp was required by the New Orleans District. The draft feasibility report and environmental impact statement (EIS) have now been fully coordinated with the DEQ. The DEQ has made no statement of opposition to any feature of the recommended plan including the levee in the Oakville area. The alignment of the proposed levee around the existing landfill is designed to mitigate adverse impacts by avoidance when possible and to replace those resources for which avoidance was not possible or practical. Thus, if the alignment for the proposed levee were to be moved to the west, mitigation by avoidance would not have been accomplished. Also, the requirement for off-site compensatory mitigation would be increased because of the enclosure of additional woodlands. Additionally, compliance with Coastal Zone Management guidelines would not have been met because wooded swamp lands of the coastal zone would have been leveed unnecessarily.

8.2 along the south side of Hero Canal should be that distance from the canal bank. About two traverses over the levee are needed for my operations. This can be accomplished either by gates or by less expensive ramps.

8.3 2. One piece of property approximately sixty five feet (65') wide belonging to another land owner, runs the length of the property and would make a good location for the levee and accompanying drainage without severing multiple owners.

8.4 3. Interior drainage of this newly protected area of Oakville under either the Corps plan or the realinement will be important. Consideration should be given to the dedication of part of the added area as sump or pumping capacity added.

Thank you for the consideration of the above. As details of the plan are developed I will be glad to cooperate with your engineers.

Sincerely yours,

Kennett F. Stewart

KENNETT F. STEWART

8.2 Comment Noted.

8.3 Comment Noted.

8.4 Comment Noted.

MEYER ENGINEERS, LTD.
ENGINEER & ARCHITECT

Charles E. Meyer, P.E.
President
Richard C. Meyer, P.E.
Vice President
David H. Dupré, P.E.
Thomas W. Healy, Architect
Jitendra C. Shah, P.E.
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4937 Hearst Avenue, Suite B
P.O. Box 763
Metairie, Louisiana 70004

(504) 885-9892
Fax (504) 887-5056

July 22, 1994

Colonel Kenneth B. Clow
Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: West Bank of the Mississippi River
in the Vicinity of New Orleans, LA
(East of Harvey Canal)
A/E Project No. 6755 - Funding

Dear Colonel Clow,

I testified concerning Drainage District No. 9 at the public hearing on July 21, 1994.

I wanted to reiterate that the USACE flood control project will impact the interior drainage system of Drainage District No. 9. In particular the impacts will be as follows:

9.1

1) Pump Station No. 3 - Pump Station No. 3 is a new Pump Station proposed along Bayou Barataria near the Verret Canal. This Pump Station is an important flood protection project within Drainage District No. 9.

2) Pump Station No. 4 - This proposed 850 CFS Pump Station is to be constructed off of the Murphy Canal near Lapalco. It is to pump into the Harvey Canal. See attached map.

9.2

3) Murphy Canal - The Murphy Canal drains the flood prone subdivisions of Woodland West and Maplewood. Any modification to the Murphy Canal should not impede drainage during construction.

9.1 Upon completion of the final feasibility report, the New Orleans District will begin the preconstruction, engineering, and design (PED) phase. It is during this phase that detailed designs will be prepared. The proposed drainage improvements to District No. 9 (Pump Station No. 3 and Pump Station No. 4) can be easily incorporated into the protection at this time.

9.2 Comment Noted.

Please consider these important drainage projects in your memorandum.

Sincerely,

Meyer Engineers, Ltd.

Richard C. Meyer

RCM/cbs

Enclosures

cc: President Michael Yenni
Councilman T.J. "Butch" Ward
B.K. Sneed

NORWOOD LAND COMPANY
3630 GENERAL MEYER AVENUE
POST OFFICE BOX 6188
NEW ORLEANS, LOUISIANA 70174

J. ROBERT NORMAN

July 26, 1994

Colonel Kenneth H. Clow
U.S. Army District Engineer
New Orleans District
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Re: HURRICANE PROTECTION PROJECT
WEST BANK OF THE MISSISSIPPI RIVER
IN THE VICINITY OF NEW ORLEANS, LOUISIANA
(EAST OF THE HARVEY CANAL)

Dear Colonel Clow:

We attended the Public Hearing on July 21, 1994 on behalf of Norwood Land Company, the owner of approximately 139 acres of land in Orleans Parish within the area of the above captioned Project.

We compliment the Corps on the very helpful presentation. Further, we enthusiastically join the many other attendees in support of the Project and the protection it will afford our growing community.

COMMENTS NOTED

The project plans and their execution will significantly impact our property. The owners of property so impacted should be compensated to the full extent of their loss. Therefore, we feel discussions on some of these issues can be helpful and lead to a fair and equitable solution to problem areas. We offer our full cooperation toward this objective.

Sincerely yours,

NORWOOD LAND COMPANY

J. Robert Norman
Managing Director

JRN/lrz

G-41

BARNETT MARINE, INC.

P O BOX 566
HARVEY, LOUISIANA 70059
Phone: (504) 394-6055

July 25, 1994

Mr. Brett Herr
Study Manager
Planning Division, Plan Formulation Branch
US Army Corps of Engineers, New Orleans
P.O. Box 60267
New Orleans, La 70160-0267

Dear Sir:

10.1 Barnett Marine, Inc., owns and operates a shipyard adjacent to and west of the Hero Pumping Station, located on the Harvey Canal. We are aware of the proposed Hurricane Protection Levee, and would like to arrange for a meeting with you to discuss the proposed location of the seawall, where it will border or traverse our property.

Please advise a time convenient to you for this meeting.

Sincerely,

BARNETT MARINE, INC.

James F. Flannigan

James F. Flannigan
Executive Vice President

JFF/sb

10.1 The alignment of the protection along the east bank of the Harvey Canal was developed in an attempt to minimize impacts to the industries and businesses along the canal. Upon completion of the final feasibility report, the New Orleans District will begin the preconstruction, engineering, and design (PED) phase. It is during this phase that detailed designs will be prepared. Meetings with landowners and industries along the Harvey Canal will be held at this time to ensure that the impacts associated with the proposed project are minimized.

JOSEPH L. McREYNOLDS
(504) 593-0606

DEUTSCH, KERRIGAN & STILES
(A PARTNERSHIP INCLUDING PROFESSIONAL LAW CORPORATIONS)
755 MAGAZINE STREET
NEW ORLEANS 70130-3672
TELEPHONE (504) 581-5141
CABLE ADDRESS "DEKEST"
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TELECOPY: 504/566-1201

ST TAMMANY OFFICE
65 WHISPERWOOD BOULEVARD
SLIDELL, LA 70458-1188
TELEPHONE (504) 641-1070
MAILING ADDRESS
P O BOX 220
SLIDELL, LA 70459-0220

July 28, 1994

BY HAND DELIVERY

Col. Kenneth H. Clow
U.s. Army Corps of Engineers
Post Office Box 60267
7400 Leake Street
New Orleans, Louisiana 70160-0267

We are furnishing you with copies of comments by the Hero interests to the proposed Hurricane Protection Plan draft feasibility study, which we have submitted in response to the letter of R. H. Schroeder, Jr. dated June 6, 1994.

With kind regards, I am

Sincerely,

Joseph L. McReynolds

JLM.mb
Enclosure

Hero Wall Company

428 PLANTERS CANAL ROAD
BELLE CHASSE, LOUISIANA 70037
(504) 394-5188
FAX (504) 394-5189

July 28, 1994

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
Plan Formulation Branch
New Orleans District Corps
of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Sir:

As requested in your letter of June 6, 1994, addressed "To Interested Parties," Hero Wall Company, as an interested and affected property owner and taxpayer, makes the following comments to the draft "Feasibility Report/Environmental Impact Statement (EIS) and Technical Appendices for the Westbank of the Mississippi River in the vicinity of New Orleans, Louisiana (East of the Harvey Canal)" ("the Plan").

These comments address your request specifically and, where relevant, refer to other matters which overall and implicitly involve your specific request: On behalf of Hero Lands Company, Mr. Numa C. Hero, Jr. appeared at a public hearing with regard to the Plan on July 21, 1994. Comments made at that time are incorporated by reference in this response to further illuminate the comments set forth below.

The draft proposal for a hurricane protection levee system for Jefferson, Plaquemines and Orleans Parishes is as a whole an excellent plan. Hero Walls' first concern is the use of state and local taxes for construction and maintenance of the levees.

11.1

The Gulf Intracoastal Canal is a man-made waterway. It was built in the 1950's through Plaquemines, Jefferson and Orleans Parishes along a route which had no previous canal. Construction of the canal included, as a necessary part, the construction of levees to protect parish residents from storm waters and flooding and to keep the canal navigational for its intended commercial uses.

In the condemnation proceedings brought against the Hero interests, the U.S. Government stated repeatedly that all costs of maintenance of the canal and its attendant

G-44

11.1 The cost sharing provisions for project costs allocated to hurricane and storm damage reduction were established by the Water Resources Development Act of 1986 (Public Law 99 886). This act provides that non-Federal interest pay 35 percent of the project construction costs and 100 percent of the operations and maintenance costs allocated to hurricane and storm damage reduction. The recommended plan for East of Harvey Canal represents an opportunity for non-Federal interests to enter into an agreement with the Federal Government to provide a higher degree of hurricane protection to the areas along either side of the Algiers Canal by raising the existing Federal levees.

levees were to be at federal, not state or local expense. The final judgment of taking specifically recognizes these maintenance obligations in the right of ways acquired for the canal. See Exhibit 1.

In the Plan, however, the U.S. Government proposes to allocate a portion of the costs of building and maintaining the levees to state and local governments at an estimated "total project first costs of $41,719,000.00 non-federal" participation. Syllabus, page 3.[1]

11.1 In Exhibit 1 to the Plan, attaching letters from non-Federal Sponsors, the Department of Transportation and Development (DOTD), through its Secretary Jude W. P. Patin, referred to Louisiana 1993 legislation naming DOTD as "the non-Federal Sponsor." Secretary Patin states that the DOTD's function is "subject to legislative appropriations. (April 19, 1994 letter). The State of Louisiana, through its West Jefferson Levee District, on May 24, 1994, recognized its "Plan of Participation" but stated that it was not "an agreement to provide funding in excess of the non-Federal share." It is Hero Wall's position that the "non-Federal share" should not include maintenance, repair and operation of the "Louisiana-Texas Intracoastal Waterway."

G-45

Hero Wall believes that total costs for construction and maintenance should be paid for by the federal government, with no participation by state or local governments, for two reasons. First, federal funding for levee and canal maintenance was anticipated and promised in the original taking without local participation. Second, the proposed Plan is part of a national planning objective that "reasonably maximizes net national economic development benefits." See Plan, page 9. Moreover, the Flood Control Act of 1928, 33 U.S.C. 702B, (cited in the Plan) specifically recognizes that flood control projects along alluvial plain of the lower Mississippi River are a matter of national concern, "in the interests of national prosperity, the flow of interstate commerce, and the movement of the United States mails," which should be funded without local contributions. The intracoastal canal, as a man-made extension of the Mississippi River, was built with the view of furthering the nation's economic interests. It seems inordinately unfair, in light of these considerations, to shoulder local taxpayers with these costs.

In addition to its concern over the proposed non-federal participation, Hero Wall

---

[1]We note however that the May 24, 1994, letter from the West Jefferson Levee District, Exhibit I to the Plan, indicates a total non-federal participation of $56,000,000.

Company also objects to the location of the proposed levee protection system in both Jefferson and Plaquemines Parishes. Hero Wall Company owns the properties indicated by cross-hatches on the attached map, Exhibit 2.

11.2

a. **Jefferson Parish Properties**

As shown in Exhibit 2, Hero Wall Company owns approximately twenty acres of land in Jefferson Parish lying along Peters Road with no Harvey Canal frontage. The Plan proposes to place a levee behind this property, rather then along Harvey Canal, essentially leaving the property with no additional flood protection.

Hero Wall Company believes that the proposed levee should be along the original right of way along Harvey Canal. Placement there will result in the following benefits:

a. Alignment along the Harvey Canal will allow the present drainage for the property to be uninterrupted.

b. It will not require the maintenance of an additional minimal levee along Harvey Canal to prevent flooding from minimal storms - which flooding would damage equipment and buildings built in this low area.

c. It will not require the payment of severance damages to the owners of the property outside the hurricane protection system.

d. It would not require right of way acquisition costs.

e. It would not subject this property to possible determination as wetlands.

11.3

b. **Plaquemines Parish Properties**

In Plaquemines Parish, the levee line depicted in the Plan cuts across the property of Hero Wall Company from the Hero Pumping Station to the junction of the Intracoastal Canal and Bayou Barataria, but at the public hearing the levee was depicted as following the present levee line.

Hero Wall Company urgently requests that the proposed levee follow the present

G-46

11.2 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

11.3 The alignment of the protection south of the Hero Pumping Station was also established in an effort to minimize impacts to the industries along the Harvey Canal. These industries will be contacted during the PED phase and minor adjustments to the alignment, if warranted, will be incorporated during the preparation of detailed designs.

11.3

levee system as depicted at the public hearing. This alignment will also (1) allow for normal drainage to exist for the drainage of this sixty acre tract; (2) not require the maintenance of a minimal levee along Bayou Barataria to prevent flooding from minimal storms; (3) save severance damages and rights of way costs; (4) afford protection to the surface improvements in the area; and (5) probably prevent classification of the area between the levee and Bayou Barataria as wetlands.

We hope that you will consider these comments in the final design and assessment of present and future costs.

Sincerely,

HERO WALL COMPANY

BY: GEORGE A. HERO, III
PRESIDENT

Herowall.ltr

Hero Lands Company

428 PLANTERS CANAL ROAD
BELLE CHASSE, LOUISIANA 70037
(504) 394-5188
FAX (504) 394-5189

July 28, 1994

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
Plan Formulation Branch
New Orleans District Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Sir:

G-48

As requested in your letter of June 6, 1994, addressed "To Interested Parties," Hero Lands Company, as an interested and affected property owner and taxpayer, makes the following comments to the draft "Feasibility Report/Environmental Impact Statement (EIS) and Technical Appendices for the Westbank of the Mississippi River in the vicinity of New Orleans, Louisiana (East of the Harvey Canal)" ("the Plan").

These comments address your request specifically and, where relevant, refer to other matters which overall and implicitly involve your specific request: On behalf of Hero Lands Company, Mr. Allen Hero appeared at a public hearing with regard to the Plan on July 21, 1994. Comments made at that time are incorporated by reference in this response to further illuminate the comments set forth below.

The draft proposal for a hurricane protection levee system for Jefferson, Plaquemines and Orleans Parishes is as a whole an excellent plan. Hero Lands' principal concern is the use of state and local taxes for construction and maintenance of the levees.

12.1

The Gulf Intracoastal Canal is a man-made waterway. It was built in the 1950's through Plaquemines, Jefferson and Orleans Parishes along a route which had no previous canal. Construction of the canal included, as a necessary part, the construction of levees to protect parish residents from storm waters and flooding and to keep the canal navigational for its intended commercial uses.

In the condemnation proceedings brought against the Hero interests, the U.S. Government stated repeatedly that all costs of maintenance of the canal and its attendant levees were to be at federal, not state or local expense. The final judgment of taking specifically recognizes these maintenance obligations in the right of ways acquired for the canal. See Exhibit 1, attached to this letter.

In the Plan, however, the U.S. Government proposes to allocate a portion of the costs of building and maintaining the levees to state and local governments at an estimated "total project first costs of $41,719,000.00 non-federal" participation. Syllabus, page 3.[1]

12.1

In Exhibit 1 to the Plan, attaching letters from non-Federal Sponsors, the Department of Transportation and Development (DOTD), through its Secretary Jude W. P. Patin, referred to Louisiana 1993 legislation naming DOTD as "the non-Federal Sponsor." Secretary Patin states the DOTD"s function is "subject to legislative appropriations." (April 19, 1994 letter). The State of Louisiana, through the West Jefferson Levee District, on May 24, 1994, recognized this "Plan of Participation" but states that it was not "an agreement to provide funding in excess of the non-Federal share." It is Hero Lands' position that the "non-Federal share" should not include maintenance, repair and operation of the "Louisiana-Texas Intracoastal Waterway."

C-49

Hero Lands believes that total costs for construction and maintenance should be paid for by the federal government, with no participation by state or local governments, for two reasons. First, federal funding for levee and canal maintenance was anticipated and promised in the original taking without local participation. Second, the proposed Plan is part of a *national* planning objective that "reasonably maximizes net *national* economic development benefits." See Plan, page 9. Moreover, the Flood Control Act of 1928, 33 U.S.C. 702b, (cited in the Plan) specifically recognizes that flood control projects along the alluvial plain of the lower Mississippi River are a matter of national concern, "in the interests of national prosperity, the flow of interstate commerce, and the movement of the United States mails," which should be funded without local contributions.

The intracoastal canal, as a man-made extension of the Mississippi River, was built with the view of furthering the nation's economic interests. It seems inordinately unfair, in light of these considerations, to shoulder local taxpayers with these costs.

---

[1]We note however that the May 24, 1994, letter from the West Jefferson Levee District, Exhibit I to the Plan, indicates a total non-federal participation of $56,000,000.

12.1 The cost sharing provisions for project costs allocated to hurricane and storm damage reduction were established by the Water Resources Development Act of 1986 (Public Law 99 886). This act provides that non-Federal interest pay 35 percent of the project construction costs and 100 percent of the operations and maintenance costs allocated to hurricane and storm damage reduction. The recommended plan for East of Harvey Canal represents an opportunity for non Federal interests to enter into an agreement with the Federal Government to provide a higher degree of hurricane protection to the areas along either side of the Algiers Canal by raising the existing Federal levees.

We hope that you will consider these comments in the final design and assessment of present and future costs.

Sincerely,

HERO LANDS COMPANY

BY: GEORGE A. HERO, III
PRESDIENT

Schroeder.ltr

Numa C. Hero & Son
428 PLANTERS CANAL ROAD
BELLE CHASSE, LA 70037
394-5188

July 28, 1994

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
Plan Formulation Branch
New Orleans District Corps
of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Sir:

As requested in your letter of June 6, 1994, addressed "To Interested Parties," Numa C.Hero & Son, as an interested and affected property owner and taxpayer, makes the following comments to the draft "Feasibility Report/Environmental Impact Statement (EIS) and Technical Appendices for the Westbank of the Mississippi River in the vicinity of New Orleans, Louisiana (East of the Harvey Canal)" ("the Plan").

These comments address your request specifically and, where relevant, refer to other matters which overall and implicitly involve your specific request: On behalf of Hero Lands Company, Mr. Numa C. Hero, Jr. appeared at a public hearing with regard to the Plan on July 21, 1994. Comments made at that time are incorporated by reference in this response to further illuminate the comments set forth below.

Numa C. Hero & Son incorporates by reference the comments of Hero Lands Company and Hero Wall Company to the same extent as though incorporated herein.

Exhibit 3 shows the location in cross-hatches of approximately 38 acres owned by Hero & Son in Jefferson Parish.

13.1 As with the comments made by Hero Wall Company, the proposed alignment of the levee system in Jefferson Parish leaves this property outside the flood protection proposed in the Plan. This property has a present assessed value of over $2,000,000, not including the value of the buildings and improvements thereon. Numa C. Hero & Son suggests that the proposed levee be placed along the original right of way along Harvey Canal. For the same reasons stated by Hero Wall Company, this will result in the following benefits:

G-51

13.1 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

13.1

a. Alignment along the Harvey Canal will allow the present drainage for the property to be uninterrupted.

b. It will not require the maintenance of an additional minimal levee along Harvey Canal to prevent flooding from minimal storms - which flooding would damage equipment and buildings built in this low area.

c. It will not require the payment of severance damages to the owners of the property outside the hurricane protection system.

d. It would not require right of way acquisition costs.

e. It would not subject this property to possible determination as wetlands.

G-52

13.2

Additionally, Numa C. Hero & Son does not believe that state or parish monies should be expended for the construction or maintenance of levees in the Plan.

We hope that you will consider these comments in the final design and assessment of present and future costs.

Sincerely,

Numa C. Hero & Son Partner

NUMA C. HERO & SON

BY: NUMA C. HERO
GENERAL PARTNER

Hero-son.ltr

13.2 The cost sharing provisions for project costs allocated to hurricane and storm damage reduction were established by the Water Resources Development Act of 1986 (Public Law 99-886). This act provides that non-Federal interest pay 35 percent of the project construction costs and 100 percent of the operations and maintenance costs allocated to hurricane and storm damage reduction. The recommended plan for East of Harvey Canal represents an opportunity for non-Federal interests to enter into an agreement with the Federal Government to provide a higher degree of hurricane protection to the areas along either side of the Algiers Canal by raising the existing Federal levees.

SMITH, MARTIN, SCHNEIDER, SHIELDS & MOTT
ATTORNEYS AT LAW
700 CAMP STREET
NEW ORLEANS, LOUISIANA 70130

TELEPHONE (504)525-0134
TELEFAX (504)525-0163

JAMES E. SMITH, JR.

BY HAND

August 1, 1994

Mr. R. H. Schroeder
Chief, Planning Division
Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

RE: Hurricane Protection Plan - Westbank of the Mississippi River in the Vicinity of New Orleans, Louisiana
Our File No. BOOM-JS7500-01

Dear Mr. Schroeder:

I am writing on behalf of Louisiana-I Gaming, a Louisiana Partnership in Commendam, d/b/a Boomtown, which owns the property located at 4132 Peters Road. We have reviewed the plans for the hurricane protection project proposed by the Corps of Engineers, and attended the public hearing on this matter. We have also reviewed the revisions to the plan suggested by Numa Hero, the owner of property adjoining the Boomtown site.

Boomtown supports the Corps' efforts at flood protection as outlined in the Draft Feasibility Report and at the public hearing. At the same time, Boomtown recognizes the concerns of property owners such as the Hero family and others along the lower portion of the Harvey Canal. Boomtown urges that you give careful consideration to their concerns and proposals.

To this extent, Boomtown pledges its cooperation to the Corps, public officials and landowners in the affected area. Boomtown will consider all flooding and drainage proposals which will not adversely affect its business operations. In particular, Boomtown supports the proposal of Mr. Hero to position the floodwall along

G-53

14.1

14.1 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

14.1 the Harvey Canal, thereby providing protection to the Boomtown and Hero properties, as long as the floodwall is placed along the perimeter of Boomtown's slip and the wall does not traverse the slip.

Thank you for the opportunity to comment upon this most significant project.

With kind regards, I am

Sincerely,

James E Smith, Jr. MAJ

James E. Smith, Jr.

cc: Mr. Jay Rabalais
Mr. Numa Hero

mar\boom\ltr\schroede 102

EVANS INDUSTRIES, INC.

TELEPHONE:
(504) 368-6000

REPLY TO: P. O. DRAWER 68
HARVEY, LA 70059

July 21, 1994

Lieutenant Colonel Gregory S. Kuhr
Department of the Army
New Orleans District Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Lieutenant Colonel Kuhr:

It is our recommendation that changes be made in the location of the floodgate on the Harvey Canal.

15.1 With virtually no additional cost, the gate could be moved to the south end of the Harvey Canal and that portion of the flood levee that is proposed for the east side of the canal could be constructed on the west side of the canal. This would bring into the protection plan extremely valuable industrial waterfront property so vital to marine construction and operations.

The present location excludes protection of a large part of such heavy industrial property.

Very truly yours,

EVANS INDUSTRIES, INC.

Jimmy Richoux
Vice President

JR/vc(495)

G-55

15.1 The recommended location of the floodgate in the Harvey Canal was established in order to provide maximum protection to the industries along the Harvey Canal while avoiding the need to construct a new pumping station. Your suggestion for the location of the floodgate at the southern end of the Harvey Canal is very similar to Plan 2 described in the draft feasibility report (page 55). This plan requires the construction of a new high-capacity pumping station adjacent to the floodgate. The pumping station is required to compensate for the Harvey and Cousins Pumping Stations located to the north. These pumping stations would not be able to continue discharging into the Harvey Canal during hurricane events when the floodgate is closed. This plan was eliminated from consideration due to excessive cost.

TRINITY MARINE GROUP *TRINITY INDUSTRIES, INC.*
P.O. BOX 3029 / GULFPORT, MS 39505 / 13085 SEAWAY ROAD / GULFPORT, MS 39503
601 896-0029 / TELEX 6821246 / TELECOPY 601-897-4866

BY TELEFAX: 504/862-2572

August 1, 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
New Orleans District Corps of Engineers
P.O. Box 60627
New Orleans, Louisiana 70160-0267

Subject: Hurricane Protection-Harvey Canal-West Side

Reference: Your letter of June 6,1994, same subject

Dear Mr. Schroeder:

Gretna Iron and Machine Works, is a wholly owned subsidiary of Trinity Industries Inc. The Trinity Marine Group manages all the Shipyards in the Trinity family and is also a wholly owned subsidiary of Trinity Industries Inc.

G-56

The purpose of the letter is register our very strong objection to the plans to move the protection levee from its present location to the east. Such a move would seriously remove much of the economic viability of the yard and would threaten the employment of the nearly 200 people that Trinity employs there. In addition, the moving of the levee would put at risk several million dollars in equipment and buildings.

16.1

In our view increased levee protection could be obtained with less expense, with no job loss, and with little disruption to existing businesses in the area, by merely heightening the present levee and gate system.

We sincerely hope the Corps takes these factors into account before it takes action to seriously hamper our operations and jeopardizes the well being and livelihood of our 200 employees.

Very truly yours,

Harvey B. Halpert
Senior Vice President

16.1 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. Industries along the canal would still be allowed to maintain the existing protection. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

WALDEMAR S. NELSON AND COMPANY
INCORPORATED
ENGINEERS AND ARCHITECTS
1200 ST. CHARLES AVENUE
NEW ORLEANS, LA. 70130-4334
Phone (504) 523-5281
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Telex 584351

Waldemar S. Nelson, P.E., Chairman
Charles W. Nelson, P.E., President
Richard J. Cabrio, P.E.
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Thomas G. Ehrlicher, P.E.
Donald J. Guidry, P.E.
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Peter M. Smith, Sc.D., P.E.
Thomas W. Wells, P.E.

John D. Fernandez, Jr., P.E.
Dale T. Hunn, P.E.
Samuel P. Landry, Jr., P.E.
James B. Lane, P.E.
Eduardo N. Lucoff, Arch.
Alan Greenacre, P.E.
Wayne J. Hingle, P.E.
Kenneth H. Nelson, P.E.
Stephen M. Pumilia, P.E.
Arthur J. Smith III, P.E.
Stephen A. Troxler, P.E.

July 29, 1994

HAND DELIVERED

Mr. R. H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
New Orleans District Corps of Engineers
Foot of Prytania Street
New Orleans, LA 70118

Dear Mr. Schroeder:

We transmit herewith five (5) copies addressed to the District Engineer of a comment on the West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal) Hurricane Protection Plan, as invited at the public hearing held July 21, 1994.

You will note we have suggested relocating the flood gate in Harvey Canal to Hero Cut-Off, eliminating all high level flood protection from Hero Pump Station to Harvey Locks.

Our client, Debbie S. Zeligson, et als, referred to, is the daughter of Louis G. Shushan, with whom we have been consulting on this property since 1969.

Very truly yours,

WALDEMAR S. NELSON AND COMPANY
Incorporated
Engineers and Architects

Waldemar S. Nelson

Waldemar S. Nelson, P.E.
Chairman of the Board

WSN/ngh
Enclosures

xc: Mr. Louis G. Shushan (w/encl.)

69018.AK0

G-57

WALDEMAR S. NELSON AND COMPANY
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Alan Greenacre P E
Wayne J Hingle P E
Kenneth H Nelson P E
Stephen M Pumilia P E
Arthur J Smith III P E
Stephen A Troxler P E

July 28, 1994

Lt. Col. Gregory S. Kuhr, U.S. Army
Acting District Engineer
Department of the Army
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: West Bank of the Mississippi River
in the Vicinity of New Orleans, LA
(East of the Harvey Canal)
Hurricane Protection Study

Dear Lt. Col. Kuhr:

1. In response to your invitation to submit statements following the public meeting on July 21, 1994 on the subject project, we present the following suggestion in the public interest and on behalf of our client, Debbie S. Zeligson, et als.

2. We have reviewed the Tentatively Selected Plan along Harvey Canal for flood protection from hurricane surges, as shown on Plate 10 of the Draft Feasibility Report. This plan shows a sector gate structure in Harvey Canal, a short distance south of Cousins Pumping Station and Lapalco Boulevard. This location is directly in front of our client's property fronting on the canal. The plan requires construction of a new discharge channel from Cousins Pumping Station along and through our client's property, which will remove approximately 5,000' of the navigable water frontage of this potentially productive industrial property.

3. The tentatively selected plan also requires construction on the east bank of Harvey Canal through the industries located there of flood walls in levees; provision of flood wall gates at two Southern Pacific Railroad crossings, two crossings of Peters Road, and three crossings of other roads; location of a drainage structure in the flood wall, and relocation of a drainage canal with a railroad crossing and two roadway crossings of the canal.

17.1 4. We propose, as an Alternate Plan, that the sector gate structure be located at approximately the mid-length of the Hero Cutoff of Harvey Canal, and that a levee approximately seven-tenths (7/10) of a mile long be constructed from Hero Pumping Station to the sector gate structure. This levee would be located on the island between Hero Cutoff and Bayou

G-58

17.1 The location of the navigable floodgate as recommended in the East of Harvey Canal feasibility report was selected in an effort to provide protection to the industries along the Harvey Canal while at the same time avoiding the requirement to construct a new pumping station. Although placing the floodgate at the southern end of the Harvey Canal appears attractive, consideration must be given to a number of potential problems. Your proposal recommends the construction of a levee from the floodgate, across the island between the Hero Cutoff and Bayou Barataria, connecting with the Hero Pumping Station. This levee would be constructed through or very near the site of a previous barge cleaning operation. Based on the files maintained at the Louisiana Department of Environmental Quality (DEQ), there is a high probability that hazardous, toxic, and radioactive wastes (HTRW) would be encountered if construction were to be undertaken in this area. Detailed sampling and testing would be required before a determination of the severity of the contamination could be made. Using the original Harvey Canal channel and Bayou Barataria for the temporary bypass channel might also lead to problems. This is a very narrow channel which is already congested by the operations of the many industries in the area. This channel would become even more congested with the additional traffic, resulting in impacts to the adjacent industries and delays along the Harvey Canal. Dredging might also be required to provide the necessary channel dimensions for increased traffic.

Barataria, and would include damming the end of old Harvey Canal at Bayou Barataria. During construction of this sector gate, the original Harvey Canal Channel and Bayou Barataria could be used for the bypass, thus eliminating the necessity for constructing a separate bypass. This Alternate Plan proposal is shown on Alternate Plate 10. The original Plate 10 and Alternate Plate 10 are both enclosed with this letter.

17.1

5. To maintain drainage capability under the Alternate Plan, the 1000 cfs Harvey Pumping Station capacity proposed to be added at Cousins Pumping Station under the Tentatively Selected Plan would be added at Estelle Pumping Station. The 3,000 cfs Cousins Pumping Station capacity, instead of being discharged through a massive flow reversal structure, closure dam, flood wall, culvert and new discharge channel, would have its 3,000 cfs pumping capacity added to Estelle Pumping Station. To accommodate these drainage changes, First Avenue Canal proposed for enlargement in the Tentatively Selected Plan would be enlarged as contemplated. The flow of Cousins Canal, which has ample capacity, would be reversed during hurricane emergencies and the pipeline canal connecting Cousins Canal to Estelle Pumping Station would be enlarged to accommodate the 4,000 cfs flow. The general configuration of drainage pumping stations in the area is shown on Plan 3 (Plate 5) of the Draft Feasibility Report, enclosed herewith. A revised copy of this plan dated July 27, 1994, and titled WSNCo Job No. 69018, Drawing No. AA, is marked to show the proposed alternate usage of existing drainage canals referred to. A copy accompanies this letter.

17.2

G-59

6. Locating the sector gate as suggested in Hero Cutoff would eliminate the need for all high level hurricane flood protection on both sides of Harvey Canal from Hero Pumping Station to the Harvey Locks; would eliminate the hazard of flood gates not being closed in time in advance of an approaching hurricane; would eliminate the operating problems and possible commercial losses sustained by businesses and industries located along the canal, occasioned by the flood control structures, and would greatly reduce the expense of maintaining levees and flood walls.

17.3

7. We have made a preliminary estimate of the cost of the Alternate Plan, including a 4,000 cfs pumping capacity addition to Estelle Pumping Station using cost figures from the Draft Feasibility Report and an estimated cost of canal improvements, and arrived at a total of $135,892,000 for the Alternate Plan, compared with the estimated cost in the Draft Feasibility Report of $135,642,000 for the T.S.P. We believe a life cycle analysis comparing the two plans would show the proposed Alternate Plan to be very competitive with the Tentatively Selected Plan.

17.4

17.2 We also have some concerns regarding your proposal to use existing pipeline canals to divert the water from the Harvey and Cousins Pumping Stations to the Estelle Pumping Station during hurricane events. The Cousins Canal is currently designed to carry approximately 2,000 cfs toward the Cousins Pumping Station. The alternate location for the floodgate would require that this canal be sized to carry approximately 6,000 cfs in the opposite direction during periods when the floodgate is closed (a capacity of 6,000 cfs was used due to proposed pumping station improvements). This would require a significant enlargement of the canal and would likely involve replacing the culverts under Lapalco Boulevard with a bridge and replacing the existing Woodmere bridge with a larger bridge. This would also require the expansion of the Estelle Pumping Station by a minimum of 4,000 cfs. In order to expand the Estelle Pumping Station by 4,000 cfs, the sump would need to be lowered form -8.0 feet NGVD to -10.0 feet NGVD. The current 404 Permit does not allow lowering the sump below -8.0 feet NGVD. This plan would also dramatically alter the drainage patterns within the area by connecting the Harvey/Cousins drainage basin with the Estelle drainage basin. This plan would have to be closely reviewed by the Jefferson Parish Drainage Department.

17.3 The feasibility report recommends a location for the floodgate that would eliminate all work along the Harvey Canal north of Lapalco Boulevard. Your proposed location for the floodgate would, as stated, eliminate even the remaining work below Lapalco Boulevard. Eliminating this work is, however, more than offset by the need to construct a new high-capacity Estelle Pumping Station and to significantly enlarge the existing pipeline canals. The operation of the floodgate for either the recommended location or your proposed location, would be identical. Closure of the floodgate would only occur when a predetermined stage in the Harvey Canal is reached and there is the impending threat of an approaching hurricane.

We believe, in the public interest, that it would be greatly preferable to locate the sector gate as proposed rather than providing flood control infrastructure along both sides of the Harvey Canal from Harvey Locks to Hero Pumping Station.

We would be pleased to discuss this plan with you at a mutually convenient time.

Very truly yours,

WALDEMAR S. NELSON AND COMPANY
Incorporated
Engineers and Architects

Waldemar S. Nelson

Waldemar S. Nelson, P.E.
Chairman of the Board

WSN/ngh
Enclosures

xc: Mr. Louis G. Shushan

17.4 The cost estimate for your alternative proposal does not seem to include several items that would significantly increase the total project costs. Your estimate does not include replacing the existing culverts under Lapalco Boulevard with a bridge or replacing the existing Woodmere bridge with a larger bridge. Both of these items would be needed due to the enlargement of the Cousins Canal and the pipeline canals. Enlarging the existing pipeline canals would result in significant environmental impacts which would have to be mitigated. The cost for this mitigation work does not appear to be included in your estimate. There would also likely be a number of relocations along the pipeline canal which have also not been included in your estimate. Your cost estimate does not include any costs for encountering potentially hazardous, toxic, and radioactive wastes (HTRW). According to files maintained at DEQ, there is a high likelihood of encountering HTRW materials in the proposed location for the floodgate and the adjoining levee. The outfall canal for the Estelle Pumping Station would also need to be enlarged to handle to the additional drainage. We feel that if these additional costs were to be included in your estimate, the total cost would increase well beyond the cost for the recommended plan.

WEST JEFFERSON PROPERTIES, LTD.
P O BOX 157 HARVEY LOUISIANA 70059
TELEPHONE (504) 368 6355

July 21, 1994

CERTIFIED MAIL RETURN RECEIPT

Lieutenant Colonel Gregory S. Kuhr
Department of the Army
New Orleans District Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

Attn: Planning Division
Plan Formulation Branch

Re: West Bank Hurricane Protection Project
East of the Harvey Canal
Plan Alternative 3B

Dear Lieutenant Colonel Kuhr:

G-61

I am writing this letter to express our concern regarding the effects of the Plan 3B alignment on our property along Peters Road south of Lapalco.

A brief outline of our problems with Plan 3B and the solutions acceptable to us is in order. A survey is attached for your reference. Plan 3B calls for the location of a control structure in the canal about 3,600 feet south of Lapalco. This would place the control structure at approximately the southern line of our Parcel L. Parcel L fronts 1000 feet on the canal by a depth of 525 feet. A 20,000 square foot pipe rolling mill building is located on Parcel L approximately 160 feet from the southern property line. 18.1

To continue fully utilizing the building and property, we believe that two things must be accomplished. First, the control structure and its associated fender system must be located a minimum of 100 feet from the waterfront property line. This will allow us to continue using the waterfront directly in front of the mill building. Second, the centerline of the floodwall running east from the control structure towards the Murphy Canal should be located on the southern property line of Parcel L. This will allow us the maximum distance between the floodwall and the side entrance to the mill building.

Plan 3B calls for the construction of a floodwall/levee system in an easterly direction from the control structure across Peters Road to the Murphy Canal, then southerly along the Murphy Canal to Bayou Barataria. The Plan would bisect our Parcel N with a 18.2

18.1 The proposed location of the floodgate in the Harvey Canal was selected in an effort to provide protection to the industries along the canal while at the same time avoiding the requirement to construct a new pumping station. The recommended plan would provide for the construction of a navigable floodgate in the Harvey Canal approximately 3,600 feet south of Lapalco Boulevard. The proposed location of the floodgate is approximate and was determined without the development of detailed surveys and soil borings. The plan formulation would not be sensitive to minor adjustments in the location of the floodgate. Upon completion of the final feasibility report, the New Orleans District will begin preconstruction, engineering, and design (PED). It is during the PED phase that detailed designs will be prepared. Interested landowners and industries will be contacted during the PED phase to ensure that all of their concerns have been considered and impacts have been minimized.

18.2

floodwall/levee leaving approximately 45 acres of the total 130 acre parcel outside of the flood protection. The plan would also divide our tenant's pipe coating operations into two yards. We believe the best way to resolve these problems is to cross Peters Road with the floodwall, then proceed southerly along Peters Road to the southern line of the LP&L Right of Way and then proceed easterly to the Murphy Canal. Our plan would have the benefits of keeping Parcel N in one piece, providing flood protection for an additional 45 acres of land and avoiding the severance damages that would result from the bisection of our property.

If we can work out our differences with the Corps, our company would be in a position to donate the rights of way necessary to construct the project. We have met with the West Jefferson Levee District concerning these issues and they agree that we are proposing an economically viable solution to our problems. We welcome the opportunity to meet with the Corps and the West Jefferson Levee District to further discuss these issues.

If you have any questions, please call me at the office.

Very truly yours,

Gregory C. Lier

GCL:rfc
Enclosure

cc: West Jefferson Levee District

F:\USER\BARBARA\GCL\LTKUHR.720

G-62

18.2 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and an alignment which followed the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the PED phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal.

M-I Drilling Fluids Co.
A Dresser Halliburton Company

P O BOX 317 HARVEY, LOUISIANA 70059 504-368 1414

July 29, 1994

Mr. R.H. Schroeder, Jr.
Chief, Planning Division
Department of the Army
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Sir,

M-I Drilling Fluids is currently leasing property adjacent to the Harvey Canal from Numa C. Hero & Son. We feel that the proposed Hurricane Protection Levee System is as a whole an excellent plan. However, the alignment of the proposed levee should be placed adjacent to the Harvey Canal for the following reasons:

19.1

1. This alignment would allow the present drainage for the property to be uninterrupted.
2. Eliminate the maintenance of a minimal levee along the Harvey Canal to prevent flooding from minimal storms.
3. Resale value of property would not be affected. M-I Drilling Fluids' buildings and improvements are currently being advertised for sale for approximately $1.2 million.

We hope that you will consider these matters in the final decision and assessment of your proposed Hurricane Protection Levee System for the East Bank of the Harvey Canal.

Sincerely,

Larry Maddox

Larry Maddox
Operations Manager

LM/jgk

19.1 The alignment of the protection between the floodgate structure and the Hero Pumping Station was based on meetings and conversations with interested land owners, industries, and businesses along the Harvey Canal. During the plan formulation it was determined that an alignment which generally followed the Murphy Canal would minimize impacts to the industries along the canal. This alignment was also determined to be the least costly. The impacts associated with leaving the industries located between the floodgate structure and the Hero Pumping Station on the floodside of the protection were considered preferable to constructing a floodwall along the Harvey Canal. A floodwall along the canal would seriously disrupt the operations of many of these facilities. During the public review process, we have received suggestions for a minimum of three different alignments in this area. With a difference in cost of only $629,000 between the recommended alignment and the alignment along the Harvey Canal, the plan formulation is not sensitive to the alignment of the protection in this area. All interested parties will be contacted during the preconstruction, engineering, and design (PED) phase and adjustments to the alignment will be considered to minimize impacts to the industries along the Harvey Canal. We anticipate initiating the PED phase in Oct. 94.

ALGIERS DRAINAGE COMMITTEE
2710 Danbury Drive
New Orleans, LA 70131
July 29, 1994

Colonel Ken Clow
District Engineer
US Army Corps of Engineers, New Orleans
Post Office Box 60267
New Orleans, LA 70160-0267

Dear Colonel Clow:

As a representative of the Algiers Drainage Committee, I was in attendance at the public meeting held July 21, 1994 at the Jefferson Parish School Board Media Center relative to the proposed hurricane protection plan for West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal). Although I chose not to speak at that meeting, I would like to go on record in support of this proposed project.

Our committee has long advocated many of the improvements which are included in this project. We feel strongly that the raising of the levees along the Intracoastal Waterway in Algiers will offer our community and its citizens the storm surge protection that is so greatly needed in this region. In the recent past and with minimal storms such as Hurricane Juan, water was literally within inches of spilling over into our densely populated community.

Mr. Brett Herr, at our invitation, has met with the Algiers Drainage Committee on several occasions to hear our concerns and present the Corps proposals. We deeply appreciate this courtesy he has extended to the committee. We pledge to work with the Corps in any manner needed on this project to insure its timely completion.

When the actual work begins on the project, we urge that the first phase of construction be the raising of the levee along the Algiers Canal. We ask that the Corps do everything in its power to see that work is performed expeditiously and in complete accordance with plans.

The Algiers Drainage Committee would like to go on record in commending the Corps of Engineers for the outstanding work done on the project and feel that the thoroughness of the proposal will have a lasting positive impact on the proposed area and its citizens and business establishments.

Sincerely,

Jack D. Stewart
Chairman

cc: Mr. Brett Herr

COMMENTS NOTED

Lt. Col. Gregory S. Kuhr
Department of the Army
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

RE: West Bank Hurricane Protection Project
East of the Harvey Canal Feasibility Study

July 21. 1994

Dear Sir:

I am Thomas E. Harrington, Jr. and I reside at 114 Hunt Street, Belle Chasse, LA 70037. I live in the area being considered for protection.

The plan developed by the U.S. Army Corps of Engineers is a good plan but I take exception to the requirements of local cooperation in regards to that portion of the project along the Algiers Canal.

The Algiers Canal was authorized by P.L. 14, 79th Congress, 1st Session on March 2, 1945. The requirements of local cooperation contained in that authorization are as follows:

".....;subject to the provision that local interests furnish free of cost to the United States all lands, easements, rights-of-way, and spoil-disposal areas required for the initial work and subsequent maintenance, and furnish assurances satisfactory to the Secretary of War that they will maintain and operate necessary bridges at their expense, and hold and save the United States free from damage incident to construction and maintenance of the improvement."

The Algiers Canal was a total land cut where no previous waterway existed. That initial work and maintenance thereof should have been a one hundred percent Federal cost. But the assurances were approved and accepted by local interests. For example, the estimated cost of local interests annual maintenance of the bridges was $30,000 per year. At todays prices that would amount to about one bridge tender, including overhead. At one time we had two bridges that had to be operated but that has been reduced to one, as one was replaced with a high level bridge (at State expense).

The costs of drainage rectification was another issue. My understanding is that the Corps said to capitalize the cost and offer that ot local interests; and that was done and local interests accepted. But with rising fuel costs and accelerated growth in the area, the capitalized amount was soon expended and the local taxpayer had to pay the bills, which continue to this day.

And now because of the Federally approved and constructed Algiers Canal, local interests are being asked to pay a share of the costs for raising the levees along that canal for hurricane protection. THIS IS GRIEVIOUS INDEED. If the canal had not been dug, then local interests burden for hurricane protection would be much less.

I request that for the portion of the project along Algiers Canal that the costs be 100% Federal, and if that is infeasible, then no more strenuous than the original requirements for the Algiers Canal construction.

Sincerely yours,

Thomas E Harrington, Jr.

G-65

20.1

20.1 The cost sharing provisions for project costs allocated to hurricane and storm damage reduction were established by the Water Resources Development Act of 1986 (Public Law 99-886). This act provides that non-Federal interest pay 35 percent of the project construction costs and 100 percent of the operations and maintenance costs allocated to hurricane and storm damage reduction. The recommended plan for East of Harvey Canal represents an opportunity for non-Federal interests to enter into an agreement with the Federal Government to provide a higher degree of hurricane protection to the areas along either side of the Algiers Canal by raising the existing Federal levees.

EXHIBIT 1

PUBLIC MEETING AGENDA, SLIDE PRESENTATION AND ATTENDEES

PUBLIC MEETING

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA (EAST OF THE HARVEY CANAL)

JULY 21, 1994

AGENDA

I. WELCOME	COLONEL KENNETH H. CLOW DISTRICT ENGINEER U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT
II. OPENING STATEMENT	COLONEL KENNETH H. CLOW
III. PRESENTATION	BRETT HERR STUDY MANAGER U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT
IV. PUBLIC STATEMENTS	INTERESTED PARTIES (Elected Officials, Agency Representatives, Organizations, Individuals, etc.)
V. CLOSING REMARKS	COLONEL KENNETH H. CLOW

WELCOME

COLONEL CLOW

GOOD EVENING, LADIES AND GENTLEMEN, AND WELCOME TO THE MEETING. I AM COLONEL KENNETH CLOW, DISTRICT ENGINEER OF THE NEW ORLEANS DISTRICT. I WOULD LIKE TO EXPRESS MY APPRECIATION FOR THE OPPORTUNITY TO DISCUSS WITH YOU THE FINDINGS OF OUR STUDY TO DETERMINE THE FEASIBILITY OF PROVIDING INCREASED LEVELS OF HURRICANE PROTECTION ON THE WEST BANK OF THE MISSISSIPPI RIVER FOR THE AREA EAST OF THE HARVEY CANAL.

HOWEVER, BEFORE PROCEEDING FURTHER, I WOULD LIKE TO RECOGNIZE MS. STEPHANIE EDWARDS FROM CONGRESSMAN WILLIAM JEFFERSON'S OFFICE; STATE REPRESENTATIVE MR. JOSEPH TOOMY; MR. LUKE PETROVICH, PLAQUEMINES PARISH PRESIDENT; MR. CURTIS PATTERSON, LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT; MR. HARRY CAHILL, PRESIDENT WEST JEFFERSON LEVEE DISTRICT; MR. JIM HUEY, ORLEANS LEVEE BOARD; AND MR. ROGER STACK, ASSISTANT TO JEFFERSON PARISH COUNCILMAN LAWSON.

OUR PURPOSE HERE TONIGHT IS TO GIVE ALL INTERESTED PEOPLE THE CHANCE TO PRESENT THEIR VIEWS ON THE FINDINGS OF OUR FEASIBILITY STUDY.

OPENING REMARKS

COLONEL CLOW

FIRST, I WOULD LIKE TO INTRODUCE THE MEMBERS OF MY NEW ORLEANS DISTRICT STAFF. THEY WILL BE AVAILABLE DURING AND AFTER THE MEETING FOR FURTHER DISCUSSION AND TO ANSWER YOUR QUESTIONS.

I WOULD LIKE TO INTRODUCE MR. BRETT HERR, WHO IS SEATED AT MY LEFT. HE IS THE STUDY MANAGER FOR THE EAST OF HARVEY CANAL PROJECT.

OTHER REPRESENTATIVES FROM THE CORPS, PLEASE RAISE YOUR HAND. IF YOU HAVE ANY QUESTIONS AS THE EVENING PROGRESSES, PLEASE FEEL FREE TO ASK ONE OF THESE PEOPLE.

ALSO ATTENDING TONIGHT FROM THE LOWER MISSISSIPPI VALLEY DIVISION OFFICE IN VICKSBURG, MISSISSIPPI, IS MR. RICHARD STUART.

WHEN YOU CAME HERE TONIGHT, YOU WERE ASKED TO FILL OUT AN ATTENDANCE CARD. IF ANYONE DIDN'T FILL OUT A CARD, PLEASE RAISE YOUR HAND AND WE WILL BRING ONE TO YOU. PLEASE COMPLETE THE CARD. IT IS PART OF THE RECORD OF THE MEETING AND WILL ENABLE US TO NOTIFY YOU OF FUTURE DEVELOPMENTS RELATIVE TO THE STUDY.

WITH 35 HURRICANES HAVING MADE LANDFALL WITHIN 125 MILES OF NEW ORLEANS WITHIN THE PAST 100 YEARS, WE ALL RECOGNIZE THE IMPORTANCE OF HURRICANE PROTECTION. THE EXTENSIVE FLOODING WHICH OCCURRED ON THE WEST BANK AS A RESULT OF HURRICANE JUAN IN 1985 AND THE NEAR MISS BY HURRICANE ANDREW IN 1992 HAVE

DEMONSTRATED A REAL NEED FOR INCREASED PROTECTION WITHIN THE STUDY AREA.

AFTER WE HAVE A CHANCE TO CONSIDER THE INFORMATION WE RECEIVE FROM YOU AT THIS MEETING, WE WILL PREPARE OUR RESPONSE TO CONGRESS IN THE FORM OF A FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT. FIRST, THE REPORT AND EIS WILL BE SUBMITTED TO THE DIVISION ENGINEER, LOWER MISSISSIPPI VALLEY DIVISION, IN VICKSBURG, MISSISSIPPI. NEXT, THE REPORT WILL BE PROCESSED THROUGH THE OFFICE OF THE CHIEF OF ENGINEERS, THE SECRETARY OF THE ARMY, THE PRESIDENTS' OFFICE OF MANAGEMENT AND BUDGET, AND THEN TO CONGRESS FOR ACTION. IF CONGRESS RESPONDS FAVORABLY TO THE PROJECT, IT WOULD APPROPRIATE FUNDS FOR ADVANCED ENGINEERING AND DESIGN, PREPARATION OF PLANS AND SPECIFICATIONS, AND SUBSEQUENTLY, FOR CONSTRUCTION. THIS PROCESS WILL REQUIRE SUPPORT BY LOCAL INTERESTS FOR THE PROJECT.

WE ARE HERE TONIGHT TO OBTAIN YOUR VIEWS SO THAT WE CAN INSURE THAT THE TENTATIVELY SELECTED PLAN IS TRULY RESPONSIVE TO THE PROBLEMS AND NEEDS WHICH LED TO THE INITIATION OF THIS STUDY.

I WOULD LIKE TO THANK THE SENATORS AND REPRESENTATIVES OF THE U.S. CONGRESS THAT HAVE BEEN SO SUPPORTIVE BY ENSURING THAT FUNDS FOR THE CONTINUATION OF THIS STUDY WERE PROVIDED.

NOW I WOULD LIKE TO ASK MR. BRETT HERR TO DESCRIBE THE RESULTS OF OUR STUDY AND PRESENT THE TENTATIVELY SELECTED PLAN.

PUBLIC STATEMENTS

COLONEL CLOW

AT THIS TIME I WOULD LIKE TO EMPHASIZE THAT THE PRIMARY PURPOSE OF OUR MEETING IS TO RECEIVE YOUR VIEWS AND OPINIONS RELATIVE TO THE TENTATIVELY SELECTED PLAN THAT IS BEING PROPOSED. ONLY BY HEARING FROM YOU AND USING YOUR KNOWLEDGE AND INPUT WILL WE BE ABLE TO KNOW HOW TO PROCEED WITH OUR PLANNING EFFORT. I'D LIKE TO ASK EACH PERSON WHO WANTS TO MAKE A STATEMENT TONIGHT TO FIRST STATE HIS OR HER NAME AND THE AGENCY OR ORGANIZATION (IF APPLICABLE) HE OR SHE REPRESENTS. I ALSO ASK THAT EVERYONE WHO MAKES A STATEMENT, SPEAK INTO THE MICROPHONE THAT IS LOCATED AT THE FRONT OF THE SEATING AREA SO EVERYONE IN THE AUDIENCE CAN HEAR WHAT YOU HAVE TO SAY. IT'S ALSO IMPORTANT BECAUSE WE ARE GOING TO BE RECORDING THE STATEMENTS AND THEY WILL BECOME A PART OF THE FORMAL INPUT TO THE STUDY EFFORT.

I ASK THAT ALL STATEMENTS BE LIMITED TO FIVE MINUTES IN ORDER TO GIVE EVERYONE A CHANCE TO SPEAK. WRITTEN STATEMENTS MAY ALSO BE SUBMITTED AT THIS MEETING OR SENT TO ME BY MAIL. ALL WRITTEN STATEMENTS MUST BE RECEIVED BY AUGUST 1, 1994. BOTH ORAL AND WRITTEN STATEMENTS WILL BE GIVEN EQUAL CONSIDERATION IN MAKING A FINAL DECISION.

CLOSING REMARKS

COLONEL CLOW

IF THERE ARE NO OTHER STATEMENTS, ID LIKE TO EMPHASIZE THAT ANYONE WHO WANTS TO SUBMIT A WRITTEN STATEMENT, THE DEADLINE IS THE 1ST OF AUGUST. WE ARE LOOKING FOR INPUT ON BOTH THE DRAFT FEASIBILITY REPORT AS WELL AS THE DRAFT EIS. AFTER AUGUST 1ST, THE OFFICIAL TIME FOR SUBMISSION WILL HAVE EXPIRED AND THE RECORD OF THE MEETING WILL BE CLOSED. THE WRITTEN COMMENTS, IF NOT SUBMITTED TONIGHT, SHOULD BE DIRECTED TO THE DISTRICT ENGINEER, NEW ORLEANS DISTRICT, CORPS OF ENGINEERS, P.O. BOX 60267, NEW ORLEANS, LA 70160. MAKE THAT TO THE ATTENTION OF PLANNING DIVISION, PLAN FORMULATION BRANCH. YOU SHOULD HAVE BEEN GIVEN A HANDOUT WHEN YOU ENTERED THE ROOM THAT HAS THE ADDRESSES THAT I JUST MENTIONED. ONE CAN ALSO BE PICKED UP ON THE WAY OUT IF YOU DO NOT ALREADY HAVE ONE.

BEFORE WE CONCLUDE, I WOULD LIKE TO EXPRESS OUR APPRECIATION TO ALL OF YOU WHO HAVE TAKEN THE TIME TO COME OUT TONIGHT AND PROVIDE US WITH YOUR INPUT. THIS IS WHAT THE MEETING WAS ALL ABOUT. I FEEL LIKE THE THOUGHTS THAT YOU HAVE EXPRESSED WILL HELP US PIECE TOGETHER A TRUE PICTURE OF WHAT THE PUBLIC WANTS IN THIS PROJECT. WITH THIS, I THANK YOU FOR BEING HERE AND I CLOSE THE MEETING NOW. OUR PEOPLE WILL STAY AROUND TO DEAL WITH ANY QUESTIONS YOU MAY HAVE AND TO CLEAR UP ANYTHING THAT WAS NOT COVERED DURING THE PRESENTATION. THANK YOU VERY MUCH FOR COMING.

EAST OF HARVEY CANAL
PUBLIC MEETING

SLIDE PRESENTATION

Slide No.	Description
1	STUDY TITLE
2	OTHER STUDIES UNDER AUTHORITY - East of Harvey Canal is the second of three studies is being conducted to determine the feasibility of providing increased levels of hurricane protection to west bank residents. 1) The first study covered the area from Westwego to the Harvey Canal (as shown in orange on this slide). The study was completed in early 1987 and recommended a Standard Project Hurricane (SPH) level of protection. Construction was initiated in early 1991 and is continuing. 2) The second study, East of Harvey Canal, shown in purple on this slide, is the reason for this public meeting. 3) The third study, Lake Cataouatche, as shown in green on this slide, encompasses an area directly to the west of Westwego. Detailed studies are being conducted to determine the feasibility of modifying Westwego to Harvey Canal to include this area. These three study areas combined encompass over 90% of the west bank residents living within Jefferson, Orleans, and Plaquemines Parishes.
3	PURPOSE OF STUDY - The purpose of the East of Harvey Canal study is to determine the feasibility of providing additional hurricane surge protection for the west bank of the Mississippi River east of the Harvey Canal.
4	STUDY AREA - The study area as shown on this slide is bounded by the Harvey Canal to the west, the Mississippi River to the north and east, and the Hero Canal to the south and includes portions of Jefferson, Orleans, and Plaquemines Parishes. Natural elevations within the study area vary from approximately 10 to 15 feet above sea level along the ridges of the Mississippi River to well below sea level in some of the areas under pump.
5	EXISTING CONDITIONS - I will now briefly discuss the existing conditions within the study area.
6	MISSISSIPPI RIVER LEVEES - The northern and eastern boundaries of the study area are protected by the Mississippi River levees. These levees, which are around 25 feet above sea level, provide sufficient levels of hurricane protection.

7 HARVEY LOCK - Two features of the Gulf Intracoastal Waterway (GIWW) are located within the study area. These are the Harvey and Algiers Canals. This slide shows the Harvey Lock which connects the Harvey Canal with the Mississippi River. The study area lies to the left of the Harvey Canal.

8 HARVEY CANAL - Heavy industrial development has occurred along the Harvey Canal. This slide was taken near the Lapalco Bridge looking north towards the Mississippi River. You can see New Orleans in the upper right hand corner. The protection along the Harvey Canal generally consists of locally constructed levees and bulkheads, and varies from below 3 ft above sea level in some areas to over 10 ft above sea level in others.

9 COUSINS PUMPING STATION - There are three pumping stations located along the Harvey Canal which provide interior drainage to the area. These pumping stations are essential given the areas low lying topography and frequent occurrence of heavy rainfall. This slide shows the Cousins Pumping Station located along the west bank of the Harvey Canal near the Lapalco Bridge.

10 HARVEY CANAL - This slide shows the protection provided by a bulkhead along a stretch of the Harvey Canal just below the Lapalco bridge. As you can see the protection is only a couple of feet above the existing water level in the canal.

11 ALGIERS LOCK - This slide shows the Algiers Lock which connects the Algiers Canal with the Mississippi River.

12 ALGIERS CANAL - This slide of the Algiers Canal was taken near the lock looking to the northwest. Federally constructed levees along both the east and west banks extend from the Algiers Lock to Bayou Barataria. The levees are maintained at approximately 7 ft above sea level. There are also four pumping stations located along the canal which discharge floodwaters that pond within the leveed areas. This slide shows the Orleans Pumping Station #11 located along the east bank of the Algiers Canal.

13 ALGIERS CANAL - This slide of the Algiers Canal was taken just north of the Belle Chasse Hwy. and shows the levees along the canal, the Planters Pumping Station and a portion of the Bayou Barriere Golf Course (one of 8 golf courses within the project area for golf enthusiasts like myself)

14 HARVEY AND ALGIERS CANALS - This slide taken from just south of the study area looking to the north shows both the Harvey and Algiers Canals. The Algiers Canal is on the right and the Harvey Canal is on the left.

15 PUMPING STATIONS - There are a total of seven existing pumping stations located along the Harvey and Algiers Canals. Together they have a combined capacity of over 20,000 cfs.

16 ALVIN CALLENDER FIELD - Alvin Callender Field is a large Naval Air Station in

Plaquemines Parish which encompasses approximately 5,000 acres just south of Belle Chasse.

17 POPULATION OF THE STUDY AREA - The study area is densely populated with a total population of over 140,000. This slide shows the population of the major communities within the study area.

18 PROBLEMS & NEEDS OF THE STUDY AREA - I will briefly discuss some of the problems and needs of the study area related to hurricane protection.

19 PREVIOUS FLOODING - This slide shows the flooding which occurred in the Westminster subdivision as a result of Hurricane Juan in 1985. Although this subdivision is located west of the Harvey Canal and outside of the study area, only the extensive use of sandbags prevented similar flooding east of the Harvey Canal.

20 PREVIOUS FLOODING - Another slide showing the extensive flooding in the Westminster subdivision as a result of Hurricane Juan. You must remember that Hurricane Juan was only a minimal category 1 hurricane.

21 VULNERABILITY OF STUDY AREA - There are a total of 31,650 residential structures located within the study area. Of these, 12,627 are located in areas vulnerable to flooding from the 100-year event, 18,438 are vulnerable to flooding from the 200-year event, and 26,098 or over 80% are vulnerable to flooding from the SPH event. A similar percentage of the commercial facilities located within the study area are also vulnerable to storm surge.

22 AVERAGE ANNUAL DAMAGES BASED ON EXISTING CONDITIONS - Damages from hurricane surge if no Federal project were to be constructed would be expected to average in excess of $41 million annually for the area west of the Algiers Canal and $2.7 million annually for the area east of the Algiers Canal.

23 LIMITED EVACUATION ROUTES - There are nearly 1.2 million people living in surge vulnerable areas throughout southeast Louisiana. There are a limited number of evacuation routes available to evacuees, almost all of which must cross open water. The limited capacity of these roadways result in extremely long evacuation times for the New Orleans metropolitan area. The low level of protection which currently exists within the study area also results in frequent evacuations.

24 PLAN FORMULATION - I will now discuss the alternative plans that were evaluated in the study and our rationale for the selected plan.

25 EAST AND WEST OF THE ALGIERS CANAL - The Algiers Canal physically divides the study area into the areas both east and west of the Algiers Canal as shown on this slide. Plans were considered for each area independently of the other.

26 WEST OF THE ALGIERS CANAL - The area west of the Algiers Canal is partially protected by the Mississippi River levee on the north, the Algiers Canal levee on the southeast, and a series of bulkheads, floodwalls and earthen dikes along the Harvey Canal on the west. The existing protection is not considered adequate given the densely populated area.

27 PLAN 1 - Plan 1 would provide for the construction of a floodwall extending along the east bank of the Harvey Canal from the Harvey Lock to Lapalco Boulevard. The alignment would vary one to two blocks east of Peters Road. Gates would be provided in the floodwall to facilitate vehicular access to the industries and businesses along the Harvey Canal. South of Lapalco a combination of levees and floodwalls would connect to the Hero Pumping Station. From the Hero Pumping Station to the Algiers Lock, the alignment would follow the existing line of protection along the west bank of the Algiers Canal. Constructing a floodwall east of Peters Road would minimize access problems to industries along the Harvey Canal but would also exclude these industries from the protection.

28 PLAN 2 - Plans 2 and 3 were developed as a result of efforts to provide protection to the industries along the Harvey Canal without creating access problems. This requires the construction of a navigable floodgate in the Harvey Canal. Plan 2 would provide for the construction of a floodgate just north of the existing Hero Pumping Station. The floodgate would only be closed during a hurricane or times of extremely high tides. The Harvey and Cousins Pumping Stations would continue to discharge rainfall into the canal during these periods. To avoid overtopping of protection along the canal, a new pumping station would be required to discharge water pumped into the canal. The new pumping station would be located adjacent to the floodgate and would have a capacity of 6,000 cfs. The costs of the pumping station alone would be approximately $60,000,000. The total cost for Plan 2 would be in excess of $120,000,000.

29 PLAN 3 - Plan 3 was developed to evaluate the feasibility of constructing a floodgate in the Harvey Canal at a location that would still provide protection to the industries along the canal but would not require a new pumping station. A navigable floodgate constructed in the Harvey Canal approximately 3,600 feet south of Lapalco Boulevard along with a diverted outfall canal for the Cousins Pumping Station, discharging below the navigable floodgate, would eliminate the need to construct a new pumping station. The diverted outfall canal would also accommodate Harvey Canal traffic while the floodgate is under construction. When the floodgate structure is closed, the existing Harvey Pumping Station would be shut-down and drainage would be diverted to the Cousins Pumping Station. The capacity of the Cousins Pumping Station would be increased by 1,000 cfs and the 1st Avenue Canal which connects the Harvey and Cousins Pumping Stations would be enlarged to handle the additional drainage. On the east side of the Harvey Canal, a combination of levees and floodwalls would provide protection from the navigable floodgate to the Hero Pumping Station. Protection from the Hero Pumping Station to the Algiers Lock would be provided by upgrading the existing levees along the west bank of

the Algiers Canal.

30 COMPARISON OF COSTS - Costs for Plan 1 were developed for three levels of protection (100-yr, 200-yr, and SPH). Plan 2, with a first cost of $120 million was eliminated from further consideration. Costs for Plan 3 were only developed for SPH protection because lower levels of protection would jeopardize the authorized Westwego to Harvey Canal project. Although Plan 3 is more costly, the additional benefits for providing protection to the industries along the Harvey Canal more than offset the additional costs.

31 EAST OF THE ALGIERS CANAL - The area east of the Algiers Canal is protected by the Mississippi River levee to the north and east, the Algiers Canal levee to the west and the Hero Canal levee to the south. The Hero Canal levee is not tied to the Mississippi River levee on the southern end and must be closed by sandbags during hurricanes. The integrity of the existing protection and the high cost of modifying existing drainage systems make the existing line of protection the only practical alignment for increased protection.

32 EAST OF THE ALGIERS CANAL - The plan for the area east of the Algiers Canal would provide for the enlargement of the existing levees along both the Algiers and Hero Canals. From the Algiers Lock, the existing levee would be upgraded along the east side of the Algiers Canal and along the north bank of the Hero Canal. The protection would wrap around the head of the Hero Canal and continue approximately 2,000 feet west along the south bank of the canal. A new levee would be constructed along the western edge of the community of Oakville connecting the Hero Canal levee with an existing Plaquemines Parish levee.

33 COMPARISON OF COSTS - The alignment for the area east of the Algiers Canal was analyzed for the 100-yr, 200-yr, and SPH levels of protection. The first cost for 100-yr protection is $6,975,000, 200-yr protection first costs are $9,748,000 and SPH protection costs $13,826,000.

34 PLAN 4 - Plan 4 was the only alternative considered that would provide protection to the areas both east and west of the Algiers Canal. This plan would include the construction of a navigable floodgate in the Gulf Intracoastal Waterway (GIWW) below the junction of the Algiers and Harvey Canals. Due to the location of the floodgate, increased protection along the Harvey and Algiers Canals would not be required. However, a high-capacity pumping station would be required to evacuate water being discharged into the Harvey and Algiers Canals. The pumping station would be located adjacent to the floodgate and would have a required capacity of approximately 25,000 cfs. Protection to the east of the structure would be provided by enlarging the existing Hero Canal levee. Due to the large capacity of the new pumping station, the estimated project first costs would be in excess of $200,000,000. The costs for Plan 4 are, in excess of $85 million greater that the costs for the other alternatives.

35 NED PLAN - Alternative plans were evaluated from an economic standpoint by comparing estimated average annual benefits with estimated average annual costs. The amount of environmental impacts that would likely result from the implementation of each plan and required mitigation measures were also considered in the analysis. The National Economic Development (NED) plan is that plan which reasonably maximizes net economic benefits. For the area west of Algiers Canal, Plan 3 constructed to the SPH level of protection best approximates the NED plan. For the area east of Algiers Canal, a 100-year level of protection provides the greatest net benefits over costs.

36 RATIONALE FOR DEVIATING FROM THE NED PLAN - We are recommending a deviation from the NED plan for the area east of the Algiers Canal for a number of reasons: (1) Providing SPH protection would provide a consistent level of protection to that provided to surrounding portions of metropolitan New Orleans; (2) Highway 23 parallels the Mississippi River and provides the only evacuation route for lower Plaquemines Parish. Providing SPH protection would ensure that this evacuation route would not be inundated during the early stages of an evacuation; (3) Alvin Callender Field is a large military installation located within the east of Algiers Canal study area. Impacts to Alvin Callender Field would be minimized by providing SPH protection; (4) Development within the area east of the Algiers Canal is expected to continue. A higher level of protection will become even more critical as the population increases; (5) The area is used to shelter residents evacuating from lower Plaquemines Parish. Their degree of safety is directly tied to the level of protection provided to the area; and (6) The extremely long evacuation times are another factor for providing a higher level of protection.

37 TENTATIVELY SELECTED PLAN -

38 TENTATIVELY SELECTED PLAN (MAP) - The tentatively selected plan is a combination of Plan 3 west of the Algiers Canal and the alignment for the area east of the Algiers Canal both constructed to provide SPH protection.

39 TSP WEST OF ALGIERS CANAL - The tentatively selected plan west of the Algiers Canal would have a total first cost of $99,317,000. Using a project life of 100 years and an interest rate of 8%, the average annual cost would be $9,779,000. Average annual benefits for SPH protection are $44,549,000. This gives a benefit/cost ratio of 4.6 to 1. The number which probably means the most to residents within the study area is project effectiveness. This means that 93 percent of the without project damages attributable to storm surge would be eliminated with the implementation of the project. The remaining damages are due to rainfall flooding.

40 TSP EAST OF ALGIERS CANAL - The tentatively selected plan east of the Algiers Canal would have a total first cost of $19,880,000. Using a project life of 100 years and an interest rate of 8%, the average annual cost would be $2,077,000. Average annual benefits for SPH protection are $3,022,000. This gives a benefit/cost ratio of 1.6 to 1. For the area east of the Algiers Canal the project effectiveness is 99 percent. Implementing the

project would eliminate all but less than 1 percent of damages.

41 ENVIRONMENTAL LOSSES - Significant unavoidable environmental losses that would result from the implementation of the tentatively selected plan are 233 acres of bottomland hardwood forest and 46 acres of wooded swamp. The majority of these impacts are associated with the excavation of the outfall canal for the Cousins Pumping Station. Contaminated material which is excavated from the Harvey Canal will be hauled to an industrial landfill to avoid impacts to the aquatic ecosystem and associated wetlands.

42 TENTATIVELY SELECTED MITIGATION PLAN - The proposed mitigation plan consists of the acquisition and management of 312 acres of high quality wooded lands, a large portion of which is wetlands.

43 LOCATION OF MITIGATION SITE - The proposed mitigation site is located west of the study area in St. Charles Parish.

44 SCHEDULE FOR IMPLEMENTATION - This slide shows the current schedule for completing the feasibility phase as well as the detailed design and construction phases. Construction is currently scheduled to begin in April of 1996 with beneficial completion in 2002. Beneficial completion is that point at which the project would provide the intended level of protection. This concludes my presentation.

PUBLIC MEETING

LIST OF PERSONS ATTENDING

Name	Representing
Mrs. Stephanie Edwards	Congressman Jefferson's Office
Honorable Joseph Toomy	Louisiana House of Representatives
Mr. Ward Filgo	Louisiana Department of Transportation and Dev. (DOTD)
Ms. Geneva Grille	DOTD
Ms. Karen Lewis-Homes	DOTD
Mr. Curtis Patterson	DOTD
Mr. Wally Buras	Plaquemines Parish Government
Mr. Luke Petrovich	Plaquemines parish Government
Mr. Frank Mineo	Orleans Levee District
Mr. Steven Spencer	Orleans Levee District
Mr. Roger Stack	Councilman Lawson's Office
Mr. William Townsend	Councilman Ward's Assistant
Mr. Ernest Tassin	Alderman City of Westwego
Mr. Rosemary Bourgeois	West Jefferson Levee District
Mr. Harry Cahill	West Jefferson Levee District
Mr. Anthony Caramonta	West Jefferson Levee District
Mr. Ronald Jones	West Jefferson Levee District
Mr. Giusseppie Miserenaina	West Jefferson Levee District
Ms. Rita Scheffler	West Jefferson Levee District
Mr. Jerry Spohrer	West Jefferson Levee District
Colonel Kenneth Clow	District Engineer-New Orleans
Mr. Terral Broussard	New Orleans District
Mr. Joey Dykes	New Orleans District
Mr. Brett Herr	New Orleans District
Ms. Janis Hote	New Orleans District
Mr. Brian Maestri	New Orleans District
Ms. Wanda Martinez	New Orleans District
Ms. Pat Perkins	New Orleans District
Mr. Marco Rosamano	New Orleans District

Mr. Bob Schroeder	New Orleans District
Mr. Richard Stuart	Lower Mississippi Valley Division
Mr. Leroy Thompson	New Orleans District
Ms. Deanna Walker	New Orleans District
Mr. Bill Wilson	New Orleans District
Mr. Charles Belsom	Harvey Canal Industrial Assn.
Mr. Hank Berchak	Terrytown Civic Association
Mr. Ron Besson	Individual
Mr. Allen Beiber	Individual
Mr. Frances Bieber	Individual
Mr. Edwin Blair	Citrus Land of Louisiana
Ms. Ellen Boothe	Gretna Machine
Mr. Kenneth Boothe	Gretna Machine
Ms. Bernice Boyter	Woodland Oaks Subdivision
Mr. Ken Brown	Brown, Cunningham & Gannuch
Mr. George Clarke	Individual
Ms. Shirley O. Davison	Individual
Mr. Frank Deemer	Individual
Mr. James Flannigan	Barnett Marine Inc.
Mr. Ray Fuenzalida	Harvey Canal Ltd. Partnership
Mr. Bill Giardina	Burk-Kleinpeter, Inc.
Mr. Charles Grandbouche	Noorwood Land Company
Mr. David Haines	Petrex, Inc.
Mr. Thomas Harrington, Jr.	Individual
Mr. Allen Hero	Hero Lands co.
Mr. Numa Hero, Jr.	Hero & Son-Hero Wall Co.
Mr. Hielsen	Innovative Design Group
Mr. William Jacks	Jefferson Parish Citizens' Drainage Advisory Board
Mr. Biran LaCour	Petrex, Inc.
Ms. Suezette LaCour	Petrex, Inc.
Mr. Norman Lanoix	Terrytown Civic Association
Ms. Jacquelyn Luke	Individual
Mr. Mitchel Lulich	Chamber of Commerce
Mr. Harold Magee	Individual
Ms. Mary D. Magee	Woodland West Civic Association
Mr. Oneil Malbrough	Coastal Engineering

Page	Representing
Mr. Blaine McMahon	Individual
Mr. Richard Meyer	Meyer Engineers, Ltd.
Mr. Patrich Murphy	Individual
Mr. & Mrs. Robert Norman	Individuals
Ms. Valerie Oliver	Woodland Lake Civic Association
Mr. Edward Pointer	West Jefferson Properties, Ltd.
Mr. Frazer Rankin	Citrus Lands of Louisiana
Mr. Paul Rivera	Individual
Mr. Ivo Roberts	Individual
Mr. Jim Ronquillo	Harvey Canal Industrial Association
Ms. Ira Rosenzweig	Individual
Jean Schliem	Harvey Canal Industrial Association
Mr. & Mrs Jack Stuart	Algiers Drainage Committee
Mr. Kenny Stuart	Industrial Pipe, Inc.
Mr. L. J. Treuting, Jr.	Treuting Inc. Ama Land
Mr. Louis Treuting, III	Treuting Inc. Ama Land
Ms. Teri Wilkinson	Individual
Mr. John Harrington	WVUE-TV
Mr. Vincent Lee	The Times Picayune