Appendix G.1 Cost Estimation

Cost Estimation Methodology

Due to the large study area and vast array of measures analyzed, cost estimates employed standardization and simplification techniques to ensure a like comparison of measures across the full array of alternatives. A large library of unit and lump sum costs was assembled from recently constructed hurricane protection projects from the Gulf Coast region. The library was standardized for all subgroups of the analysis team to employ, and then each subgroup applied the unit and lump sum cost library values to the alternatives under their charge. In some cases, such as calculating earthen levee fill costs, technology allowed for the quick calculation of actual quantities over a varying terrain surface and the application of a unit cost. In other cases of complex structures such as the medium and small navigation gates, a sufficient history of similar structure construction costs existed from which the team was able to aggregate and simplify costs for such structures into a single lump sum unit cost that encompasses all aspects of construction and installation.

Data Cost Library Description

The data cost library assembled was used across all elements of the analysis team in order to standardize assumptions of cost and reporting. The library is constructed in a manner such that applicable unit costs for a given structure type or quantity may be accessed and manipulated to include contingency and the quantity of the cost item required. The cost library contains all the structural protection elements from which unit costs were derived.

Identification and Sizing of Major Structures

The following sections detail how structures were identified and sized for the proposed alignments to provide protection from the 2085 1% AEP storm surge event. Structures were categorically separated into highways crossings, railroad crossings, gravity drainage structures, navigable gates, and pumping stations, as discussed in the sections below.

Highway and Railroad Crossings

The proposed levee alignments were analyzed using the Texas Department of Transportation GIS Database, along with satellite aerial photography, to identify and size all major road and railroad crossings. Minor crossings, such as rural roads in agricultural fields, were not included in this analysis because slight levee grade alterations could be made to accommodate agricultural equipment in future studies. All gates were sized to maintain, at least, current service capacity.

Navigable Gates

The navigable gate structures along the alignment facilitate transportation, maritime navigation, and/or storm water runoff drainage. These structures were identified through a multi-step process. The initial step was to”fly the lines” using satellite imagery to identify all evidence that a water way may be used regularly for navigation, whether for commerce or pleasure. Visual inspection for clues such vessels actively traversing a waterbody, docks, boat ramps, etc. we noted. This data was vetted through local knowledge of the project team. In a parallel effort, existing top of structure elevations such as the vertical lift gates in Freeport, were compared to the 2085 1% AEP storm surge elevations to discern if they are already of acceptable nature. No replacements of existing gates or locks were deemed necessary. Finally, the crossings were categorized by the types of gates required. For the purposes of this study, all newly proposed navigable gate structures were categorized into four basic groups:

- Small, 30-foot-wide sinkable barge swing-type steel gates
- Medium, 56-foot-wide sector-type steel gates
- Large, 250-foot-wide sector-type steel gates (only used Neches River).
- Extra Large, 840-foot-wide floating sector-type steel gates (only used for Houston Ship Channel).

More refined structure sizing, as well as preferred make, should be evaluated as part of stakeholder outreach, alignment alternative studies, detailed numeric modeling of stage/storage runoff characterization to optimize channel cross section requirements, project-specific planning studies, and the assessment of available funding.

Drainage Structures

The study area is serviced by a mix of forced drainage and gravity systems. The areas to be protected by some of the proposed alignments currently are served by a gravity drainage system. Multiple thru-levee drainage structures and pumps would be required to maintain gravity flow during non-tropical rain events, while allowing the levee system to be closed during storm surge events. These structures are also necessary to protect the interior areas from surge backflow in gravity drainage canals. In identification of drainage structure location and size, a combination of the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), satellite imagery, and topographic maps were used to identify approximately which channels would require drainage structures. For the purposes of this study, drainage structures were assumed to be characterized by box culverts with vertical lift/sluice gates and concrete T-wall tie-ins to the adjacent levees. Further analysis will be needed to refine the size of structure needed to accommodate existing gravity drainage flow rates.

The study team assumed that the areas with existing protection have adequate existing drainage structures and no additional drainage structures were determined to be necessary for the areas already serviced by a forced drainage system.

Pumping Stations

As with the identification and sizing of the drainage structures, forced drainage of storm water runoff was separated into two basic classifications:

- Areas with existing levee and forced drainage systems (Texas City, Freeport and Port Arthur Hurricane Protection systems)
- Those areas with no existing levee or forced drainage systems which are currently served through a vast network of gravity drainage natural bayous, canals ditches, and conduits.

It is the conclusion of this report that gravity drainage should be maintained for areas that would be served by the proposed new alignments, and pumping systems would be required for use during tropical events, when the levee system is closed and no gravity drainage is allowed to occur. This open system, also referred to as a "leaky levee" system, is a concept widely employed in Southeastern Louisiana in order to maintain gravity drainage of storm water flows, while also providing protection for rare tropical events.

The study team conducted a drainage analysis for each alternative based on the future with project conditions. This analysis indicated the volume of water that would have to be forced drain via pump stations from the system during a tropical event.

Development of Quantities for Levee Sections

The study team assumed a standard earthen levee cross sectional template for all alignments, with the exception of the Coastal Spine alignment. The team assumed the borrow areas with suitable material would be located within 10 miles of the alignment, except for the Coastal Spine alternative, which assumed suitable borrow was located within 30 miles of the alignment footprint. In many cases, adjacent material to the footprint may be suitable for levee construction. The design team accounted for sea-level rise and minor regional subsidence over the planning horizon to help determine an overbuild value.

Proposed Levee Profile

All levees were analyzed with 4H:1V slopes on the flood side, with 3H:1V slopes on the protected side, and with a 12-foot crown width for vehicular access. Generally, slopes steeper than 3H:1V are difficult to maintain due to accessibility for mowing equipment and potential runoff erosion. On the flood side, 4H:1V slopes were chosen so that minimal armoring is required to mitigate the potential erosion due to wave action or water run up. The Coastal Spine alignment subscribes to this same geometry with the exception that a 20H:1V wave berm was assumed on the flood side due to the increased wave climate the levee would experience along the barrier shoreline of the Gulf of Mexico. All levee profiles were assumed to have 10-20 feet of ROW cleared parallel to the toes of the levee. Additional ROW could be needed for future levee lift events to address future conditions. In this case, additional land acquisition and mitigation costs could be incurred that are not quantified in this report.

Proposed Floodwall Profile

Where existing right of ways were optimum for barrier alignment but restrictive in terms of available land, reinforced concrete T-walls were employed. Generally, T-walls are most usefully employed in urban landscapes where extensive land acquisition, as in the case of earthen levees, may be prohibitive.

The relative profile of the study T-walls was derived from Army Corp of Engineer Engineering Manual standard designs along with anecdotal designs from coastal Louisiana. Typical floodwalls are comprised of a reinforced concrete footing typically supported by steel H-piles. A steel sheet pile cut off wall is also installed under the footing to prevent seepage of surge side water under the footing to the protected side. A reinforced concrete stem wall extends, usually from the approximate center of the concrete footing, to necessary flood design height. The footings are generally poured on grade with pile embedment on the order of 60 to 100 feet for H-piles and 20 to 40 feet for steel sheet piles depending on local geotechnical conditions and the relative load induced by the hydrostatic free wall height and/or wave loads. For the purposes of this study typical T-wall profiles are assumed to have a 20 foot wide footing, or base, with a 10 foot inspection right of way to either side for a total of 40 feet.

Floodwalls built within existing waterways were assumed to have a different profile since T-walls are not conducive to in water construction. Waterway floodwall profiles consist of a “combi-wall” system made up of vertically driven steel or concrete sheet piles. The vertical sheets are capped with reinforced concrete which also serves to connect the wall to lateral bracing piles. Lateral bracing piles are battered, or sloped, away from the vertical wall and generally steel pipe piles or pre-stressed concrete piles. For taller walls, as with the large navigable waterways like the Houston Ship Channel, the vertical wall is comprised of soldier piles or augmented with king piles between sheet piles to achieve the necessary bending capacity. Soldier piles and/or king piles are generally assumed to be pre-stressed concrete cylinder piles for this study since they possess the necessary bending capacity and corrosion resistance for a long service life.

Existing Levee and Survey Data

Existing ground surface elevations were taken from publically available LiDAR datasets to create a three-dimensional point field of data, over which existing ground and levee surface elevations could be assessed. These sets included:

- 2006 Texas Water Development Board (TWDB) Lidar: Galveston County
- 2006 Texas Water Development Board (TWDB) Lidar: Jefferson County
- 2006 Texas Water Development Board (TWDB) Lidar: Orange County
- 2006 Texas Water Development Board (TWDB) Lidar: Brazoria County
- 2008 Harris-Galveston Area Council (HGAC) Lidar: Harris County

Development of Cost Elements

Development of cost was based primarily on collection and evaluation of existing feasibility studies, design reports, and construction bid data for projects recently constructed or proposed along the Gulf Coast, primarily in neighboring Louisiana. A library of relevant structure and unit costs was compiled from the data sources listed below.

- Morganza to the Gulf-Local Projects (Lafourche and Terrebonne Parishes, LA);
- Larose to Golden Meadow Flood Protection Project (Lafourche Parish, LA);
- Southwest Coastal LA Feasibility Study (St. Mary and Iberia Parishes, LA);
- Calcasieu Lock Feasibility Study (Calcasieu Parish, LA);
- Donaldsonville to the Gulf Feasibility Study (Lafourche and St. Charles Parishes, LA);
- Hurricane Protection Master Plan-Lafourche Basin Levee District (Lafourche Parish, LA);
- New Orleans Federal Hurricane Storm Damage Risk Reduction System, HSDRRS (Orleans, Jefferson, St. Bernard, and Plaquemines Parishes, LA).

Costs were updated to 2015 prices using the United States Army Corps of Engineers’ Civil Works Construction Cost Index System, Amendment No. 6 (March, 2015) into a cost menu from which the appropriate costs were used in this report. In the development of costs, more consideration was given to recently constructed projects than to engineer’s estimates and costs used in other studies. All costs were also converted using the same USACE index to Texas-based coasts in instances that they originated from another region or state.

For all costs in this report, a 25 percent contingency was added to account for the vast array of uncertainties and unforeseeable market changes which could occur in the near future and drive present-day costs up beyond the rate of inflation. Exceptions were made for the Houston Ship Channel and Neches River gates, where a 40 percent contingency was used due to the extreme complexity and rarity of such structures. The analysis team, after consultation with stakeholders and with technical experts, believed conservative value was in order for civil works projects such as the proposed levee alignments in this report.

Note that elevations listed were selected to address not only present conditions, but are sufficient to address future conditions as well.

Highway and Railroad Crossings

Highway Crossing

All road crossings identified would be served by swinging roller gates or raised earthen ramps over the protection system, depending on space requirements. Gates would remain open year-round and be closed only upon impending landfall of tropical events. Unit costs were calculated to include the accompanying tie-in and receiving structures and range from $3.5M for two-lane closures up to $17.0M for multi-lane Interstate Highway closures. A summary of highway gates identified for inclusion in the proposed alignments and upgrades to existing reaches can be found in Appendix G.2- Consolidated GCCPRD Cost Estimate.

Railroad Crossing:

All railroad crossings identified would be served by swinging roller gates, which are widely used as part of the USACE's HSDRRS. Gates would remain open year-round and be closed only upon impending landfall of tropical events. Unit costs were calculated to include the accompanying tie-in and receiving structures and range from $3.6M for a single track closure to $6.0M for multi-track closures. A summary of railroad gates identified can be found in Appendix G.2- Consolidated GCCPRD Cost Estimate.

Drainage Structures

A uniform thru-levee vertical lift/sluice gate structure was assigned to preserve sufficient channel cross section for gravity drainage. As stated previously, many areas to be protected are served by a gravity drainage system. Multiple thru-levee drainage structures would be required to maintain gravity flow during non-tropical rain events, while allowing the levee system to be closed during storm surge events. This is necessary to protect the interior areas from surge backflow in gravity drainage canals. This gate type was broken out into three categories: less than 500 cfs capacity, 500 to 1000 cfs capacity, and greater than 1000 cfs capacity, with costs ranging from $2.5M to $11.7M respectively. Unit costs were calculated to include the accompanying tie-in and receiving structures. A summary of drainage structures identified can be found in Appendix G.2- Consolidated GCCPRD Cost Estimate.

Navigable Gates

Navigation gates are intended to remain open year-round to maintain continuous navigation and gravity storm water runoff drainage. It is anticipated that they would only be closed during impending tropical events. Unit costs were calculated to include the accompanying tie-in and receiving structures. Existing navigation structures serving the Freeport levee system were all determined to be of sufficient geometry to defend against the 2085 1% AEP storm event, and thus, no alterations are proposed. A summary of navigable gates identified can be found in Appendix G.2- Consolidated GCCPRD Cost Estimate.

Costs include all tie-in structures, foundation and sill structures, and receiving structures.

Large Navigation Gate

Large channel navigation gates will be required on the Houston Ship Channel, and Neches River, within the Coastal Spine and the Neches River Crossing Alignments. The Houston Ship Channel gate is assumed to have a sill depth of -60 ft. and a channel opening width of 840 ft. It is proposed as a floating sector gate across the navigation channel which will be flanked by combi-wall and twenty-five 100 ft. wide vertical lift gates to maintain the tidal prism. The Neches River gate is assumed to have a sill depth of -52 ft. and a channel opening of 250 ft. It is proposed as a traditional sector gate across the navigation channel which will flanked by combi-wall and four 100 ft. wide vertical lift gates to maintain the tidal prism. Both gates will provide sufficient cross section to maintain present navigation requirements as well as to cope with proposed future channel deepening projects. Gates would only be closed during impending tropical events.

Small Navigation Gate

Smaller channel navigation gates will be required on multiple smaller canal crossings within the proposed Galveston Ring/ SH 146, Coastal Spine, Southern, and Northern Alternative Alignments. Similar to the large navigation gate methodology, locations were refined based on identification of navigation infrastructure and evidence of recreational boating activity through satellite aerial analysis. Because most of the channels requiring small navigation gates were of similar geometry, uniform opening widths of 30 ft. and 56 ft. swing barge and sector gates were chosen with -8 to -12 ft. sill depths. These sizes were assigned to provide for adequate navigation and to maintain channel cross section for gravity drainage. A summary of small navigation gates identified can be found in Appendix G.2 - Consolidated GCCPRD Cost Estimate. A unit cost of $18.3M was assumed for all 30 ft. barge gate locations. A unit cost of $40.0M was assumed for all 56 ft. sector gate locations.

Pumping Stations

The Calcasieu Lock Replacement Feasibility Study – Value Engineering Study Report details how pump station costs should be more accurately developed to account for "various 'lessons learned' from among recent New Orleans District, local area and other Corps district projects. This study recommends using a $16,000 per cfs cost for pump station construction cost estimates based on average cost data from the data library shown in Table 1. Additionally, actual costs for similar projects recently constructed in South Louisiana were compiled for comparison. These actual costs are relatively consistent with the suggested methodology in the Value Engineering Study Report.

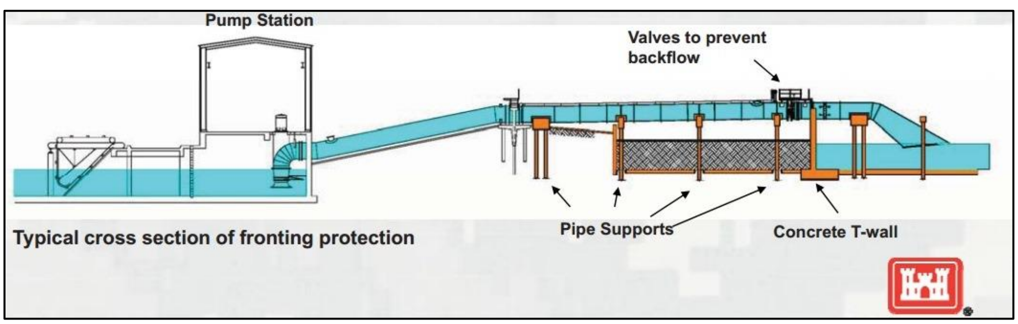
Table 1. Recent South Louisiana Projects Incorporating Drainage Pump Stations

Pump Station	Parish	Capacity (cfs)	Project	Cost	Cost per cfs	Year Completed
Cross Bayou Pump Station	St Charles	1,300	Pontchartrain Levee District	$18,800,000	$14,500	2013
Henderson Bayou Pump Station	Ascension	1000	East Ascension Drainage Board	$15,800,000	$15,800	2011
Bayou Trepagnier Pump Station*	St Charles	800	Pontchartrain Levee District	$11,500,000	$14,400	2004
Marvin Braud Pump Station Expansion	Ascension	1,000	East Ascension Drainage Board	$13,800,000	$13,800	2012
Dwyer Road Pump Station Improvements	Orleans	875	New Orleans S&WB	$13,600,000	$15,500	2010

*Bayou Trepagnier Pump Station costs reflect present-day value based on the original cost of $8,500,000, constructed in 2004.

Where existing pumping station discharge piping crossed levee infrastructure that was deemed to be of insufficient elevation, frontal protection costs include the discharge piping support, concrete T-wall, and backflow valves associated with moving storm water over a protection feature, as depicted on Figure 1. Pump frontal protection costs were assigned as a rolled-up cost per linear foot requisite with similar recently constructed projects.

Figure 1: Typical Pump Frontal Protection Diagram



Levee Sections

Borrow material unit costs were developed by evaluating bid tabs from numerous recently constructed levee projects and recently conducted planning studies in nearby Coastal Louisiana.

An average unit cost for borrow of $33 per cubic yard was determined to be the most probable unit cost for the fill of the new levees. An exception was made for the Coastal Spine alternative, which assumed a unit cost of $40 per cubic yard due to increased haul distances to the project area from the mainland. In future levels of geotechnical investigation, adjacent areas and materials may be deemed suitable for levee construction. In these cases, the unit cost of material would be greatly decreased.

The proposed alignment fill quantities assumed a lift at initial construction with a 25% overbuild factor to account for construction settlement, subsidence, and future sea level rise. Lifts to meet target levee elevation over the next 50 years were assumed to fall under the umbrella of future operations and maintenance cost.

Floodwall Sections

T-wall costs per unit foot were developed by evaluating other coastal barrier studies and bid tabs for similar constructed projects in nearby Coastal Louisiana. T-walls were a necessary component of some of the optimum alternative alignments where real estate is at a premium like the Galveston Ring Levee. When compared to earthen levees, T-walls are significantly more expensive. But similar to levees, the option to refine quantities at even this preliminary study phase was available with use of GIS technology. Since T-wall expense for long T-wall reaches has significant implications to cost benefit ratio, and since an option for refinement was available with GIS, an effort was made to realistically reflect variance in cost for walls of varying heights.

Existing geographical elevations within the study reaches were subtracted from the locally specific barrier design height to derive the necessary T-wall free heights. Constructed costs for walls of varying heights were evaluated and normalized with professional judgment for factors like regional geotechnical conditions, footing width, average pile lengths, and parametrically derived pile count per linear foot of wall. A range of wall costs per unit foot of wall were established for the range of free heights within the study varying from 10 to 25 feet. The applicable free height unit cost was applied to the GIS derived free height of individual wall segments.

Cost per linear foot of updating existing I-walls within existing levee reaches includes full replacement with T-wall per USACE guidelines. Assumed existing and required floodwall cross sections can be found in

Real Estate, Right-of-Way, and Structures

Typical cross sections were developed for each alignment and the corresponding width was input into ArcGIS from which a footprint and acreage were calculated. Proposed alignments were drawn to avoid wetlands where practicable. Revisions to the alignment during the design phase would allow further refinement and reduction of impacts.

The proposed acreage and number of structures in each of the reaches are presented in Table 1. Many of the identified structures could be avoided with slight revisions of the alignment during the next design phase, but any shift could, in turn, cause other cost increases for wetland mitigation. All areas within the footprint were visually reviewed using current aerial photography for the presence of structures.

The analysis team utilized in-house Real Estate (RE) personnel to leverage their experience/expertise gained from decades of acquiring ROW for multiple Governmental and non-Governmental agencies. The RE group utilized several sources of information to arrive at their fair market valuation of properties which were generally categorized by type. Valuation was initially determined in cost per square foot which was then convert to cost per acre. Table 2 illustrates the values that were used by the study team to determine right of way costs.

Table 2: Right of Way Valuations by Property Type (Dollars per Acre)

Rural		
Agricultural and Undeveloped	Ac	$4,792
Urban		
Commercial	Ac	$730,501
Governmental	Ac	$732,679
Utility Company	Ac	$9,583
Industrial	Ac	$285,754
Residential		
Mobile Home	Ac	$60,113
Multi-family	Ac	$524,898
Single Family	Ac	$1,405,681
Vacant Property	Ac	$569,329
Railroad Property	Ac	$9,600,000
Relocation Costs	Parcel	$6,000

The RE group also utilized their professional judgment to arrive at the cost methodology summarized below.

1. Used the Galveston or Harrison County Appraisal District tax appraisal values and applied a 30 % markup that was necessary to adjust for property owners not willing to sell their property.
2. Added 10 % to the results obtained from above Item B.1 resulting from invoking the Government's rights under "eminent domain" and compared this 40 % additional factor to "Zillow's Zestimate" to arrive at what would be considered a "Fair Market Value".
3. Made a distinction between a "partial" and a "whole" taking based on professional judgment which was based on whether the property being acquired could still be utilized for its intended purposes and/or use.
4. Utilized professional judgment in determining whether "relocation costs" were necessary as a result of either a "partial" or a "whole" taking.

The RE group adhered to Federal rules and regulations as it pertains to "relocation costs" as required under the Uniform Relocation Assistance and Real Property Acquisition Policies Act that Congress passed in 1970, and amended in 1987. The Code of Federal Regulations (CFR), Title 49, Part 24 is applicable to all Federal, State and local government agencies, as well as others receiving Federal financial assistance for public programs and projects, that require the acquisition of real property, must comply with the policies and provisions set forth in the Uniform Act and the regulation.

Pipelines and Utilities Crossings

The entire project area is traversed by a great number of oil and gas transmission pipelines as well as public utilities such as water and sewer lines. For the reaches of sufficient geometry, no further actions or costs were assumed. For reaches that are currently insufficient to defend against the 2085 1% AEP storm event, crossings were identified through an examination of data available from the Texas Railroad Commission Pipeline Database, the Texas General Land Office Pipeline Database, and the Texas General Land Office Electric Reliability Council of Texas Transmission Line Database, and manual satellite aerial analysis to determine where existing ROWs were present (e.g., mowed or maintained with no trees present). Manual detection of pipeline ROWs was conducted using aerial photography. A unit cost of $250,000 was assigned to each crossing based on research of similar constructed or studied projects.

A summary of all structural elements costs can be found in Appendix G.2- Consolidated GCCPRD Cost Estimate

Wetland Mitigation

This section describes the cost of environmental mitigation elements for the proposed alternatives. Mitigation cost estimates were determined for all NWI waters and threatened and endangered species critical habitat impacts identified under Sections 4.1.8 and 4.1.4 respectively. The impacted NWI acreage was separated into the following categories:

1. Freshwater Forested and Shrub Wetland
2. Freshwater Emergent Wetland
3. Freshwater Pond
4. Estuarine and Marine Wetland
5. Riverine
6. Lakes
7. Estuarine and Marine Deepwater
8. Other Freshwater Wetlands

Appendix F provides a breakdown for each alternative and individual reach for each of the categories.

For existing levees, the impacts were estimated on the difference between the proposed ROW width and the present day ROW width. Based on current aerial photography, the NWI maps were not consistent with the existing reaches because many of the levees were constructed after the NWI maps were developed; therefore, many of the habitat types were not indicative of present-day conditions. Each reach was also manually inspected via use of aerial photography to ensure proper wetland classification when the NWI dataset was invalid.

Recommendations for cost development were taken from a survey of region mitigation banks within the area. The costs are assumed to be representative for establishing forested and emergent wetland habitat and reflect both construction and real estate costs. The costs per acre for wetland mitigation are reflected in Table 4. The acreage of estimated impact wetlands by type is presented in Table 5. Note Riverine impacts were measured per linear foot, not per acre. Unit cost of Riverine impacts we $750/LF.

Table 4 Estimated Cost of Wetland Mitigation by Category

Impact Type	Unit Cost of Mitigation (ac)
Freshwater Forested and Shrub Wetland	$195,000
Freshwater Emergent Wetland	$195,000
Freshwater Pond	$195,000
Estuarine and Marine Wetland	$250,000
Lakes	$195,000
Estuarine and Marine Deepwater	$250,000

Other Freshwater Wetlands	$195,000

Acreage rounded to the nearest acre.

Table 5. Estimated Wetland Mitigation for Each of the Proposed Alternatives and Individual Reaches

Alternative	NWI Wetland Acres	NWI Riverine Linear Feet	Piping Plover Critical Habitat Acres	Total Mitigation Cost Estimate
	Northern Region Alternative 1			
Sabine River Levee	212.32	1,036		$56,317,125
Neches River Crossing	15.99			$4,292,188
Port Arthur Federal System	4.58	328		$5,854,750
Northern Region Alternative 1 Totals	**232.89**	**1,364**	**0**	**$66,464,063**
	Northern Region Alternative 2			
Sabine River Levee	212.32	1,036		$56,317,125
East bank Neches River	231.64	165		$63,589,563
Port Arthur Federal System	4.58	328		$5,854,750
West Bank Neches River	111.06	5,433		$32,384,313
Northern Region Alternative 2 Totals	**559.6**	**6,962**	**0**	**$158,145,751**
	Central Region Alternative 1			
Coastal Spine Totals	**303.35**	**0**	**47**	**$69,074,378**
	Central Region Alternative 2			
Galveston Ring Levee	48.59			$12,967,188
Texas City Extension North	33.79			$9,613,375
Texas City Extension West	15.50	798		$4,913,313
Texas Federal System	24.12	4,358		$10,102,375
Central Region Alternative 2 Totals	**122.00**	**5,156**	**0**	**$37,596,251**
	Southern Region Alternative 1			
Freeport Federal System	37.03	5,405		$15,378,876
Freeport Extension to Angleton	11.97	882		$3,744,563
Southern Region Alternative 1 Totals	**49**	**6,287**		**$19,123,439**
	Southern Region Alternative 2			
Freeport Federal System	37.03	5,405		$15,378,876
Freeport Extension to Angleton	11.97	882		$3,744,563
Jones Creek Levee	22.45			$5,472,188
Jones Creek Terminal Levee	29.39			$7,163,813
Chocolate Bayou Levee	29.05	209		$7,906,625
Southern Region Alternative 2 Totals	**129.89**	**6,496**	**0**	**$39,666,065**