SHREAD - KUYRKENDALL & ASSOCIATES, INC.
ENGINEERS • SURVEYORS • PLANNERS
13000 Justice Avenue, Suite 16 • Baton Rouge, Louisiana 70816
(225) 296-1335 • Email: skaengr@shreadkuyrkendall.com

BST

March 4, 2008

Mr. Sam Scholle, Director
St. Charles Parish Department of Public Works
P.O. Box 705
Luling, LA 70070

RE: DES ALLEMANDS FLOODWALL
CONSTRUCTION COST ESTIMATE
ST. CHARLES PARISH, LOUISIANA
SKA PROJECT NO. 89071.4

Dear Mr. Scholle,

In accordance with your recent request, transmitted herewith is our current Preliminary Construction Cost Estimate for the referenced project. As you can see, our estimate for the northern section of the floodwall is approximately $6 million and for the southern section it is approximately $5 million. It should be noted that no geotechnical engineering or design engineering has been done at this point, so these estimates are subject to significant change based on actual soil conditions. We have also included a typical section of an I-Wall and T-Wall, as well as a typical profile through the floodwall and the Corp design criteria for both the I-Wall and the T-Wall.

Another item included in this package is a copy of a previously submitted grant application for the Des Allemands floodwall. This grant application was submitted by the Parish to the State Office of Emergency Preparedness, Hazardous Mitigation Grant Program, in the spring of 1999, but was not selected for funding. A lot of the information submitted in this application is no longer current, but may be of some limited value to the Parish in the preparation of the new application.

Please review this information and call me if you have any questions.

Very truly yours,

Richard R. Shread

Richard R. Shread, P.E., P.L.S.

cc: Councilman Authement
Councilman Hogan
Councilwoman Schexnaydre

Des Allemands Floodwall (Northern Section)
"I" Wall Construction

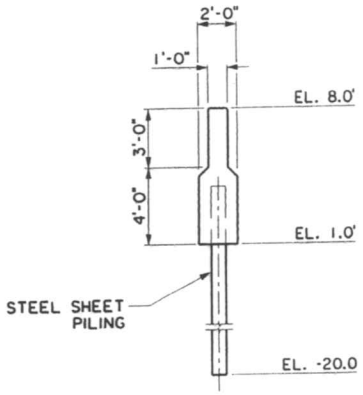
ESTIMATE OF PROBABLE COST

Item	Description	Quantity	Unit	Unit Price	Amount
1	Floodwall ("I" -Wall Section)	4100	LF	$ 1,238.00	$ 5,075,800.00
2	Gates @ Pier Openings	LUMP	LUMP	$ 200,000.00	$ 200,000.00
3					
		SUBTOTAL			**$ 5,275,800.00**
		15% CONTINGENCY			**$ 791,370.00**
		TOTAL CONSTRUCTION COST			**$ 6,067,170.00**

Des Allemands Floodwall (Southern Section)
"I" Wall Construction

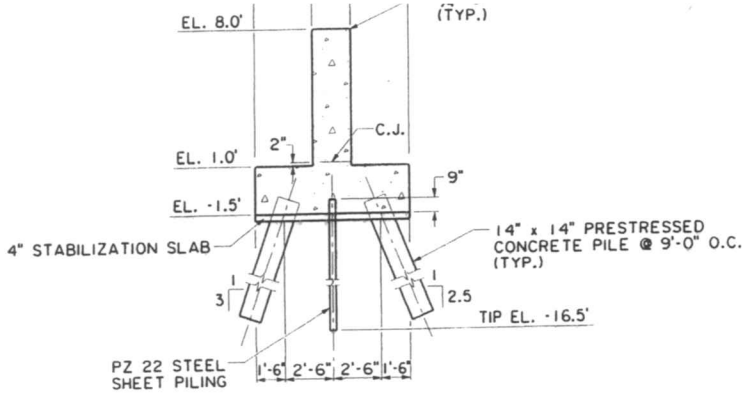
ESTIMATE OF PROBABLE COST

Item	Description	Quantity	Unit	Unit Price	Amount
1	Floodwall ("I" -Wall Section)	3000	LF	$ 1,238.00	$ 3,714,000.00
2	Flood Gate @ Railroad	LUMP	LUMP	$ 400,000.00	$ 400,000.00
3	Gates @ Pier Openings	LUMP	LUMP	$ 150,000.00	$ 150,000.00
4					
		SUBTOTAL			**$ 4,264,000.00**
		15% CONTINGENCY			**$ 639,600.00**
		TOTAL CONSTRUCTION COST			**$ 4,903,600.00**



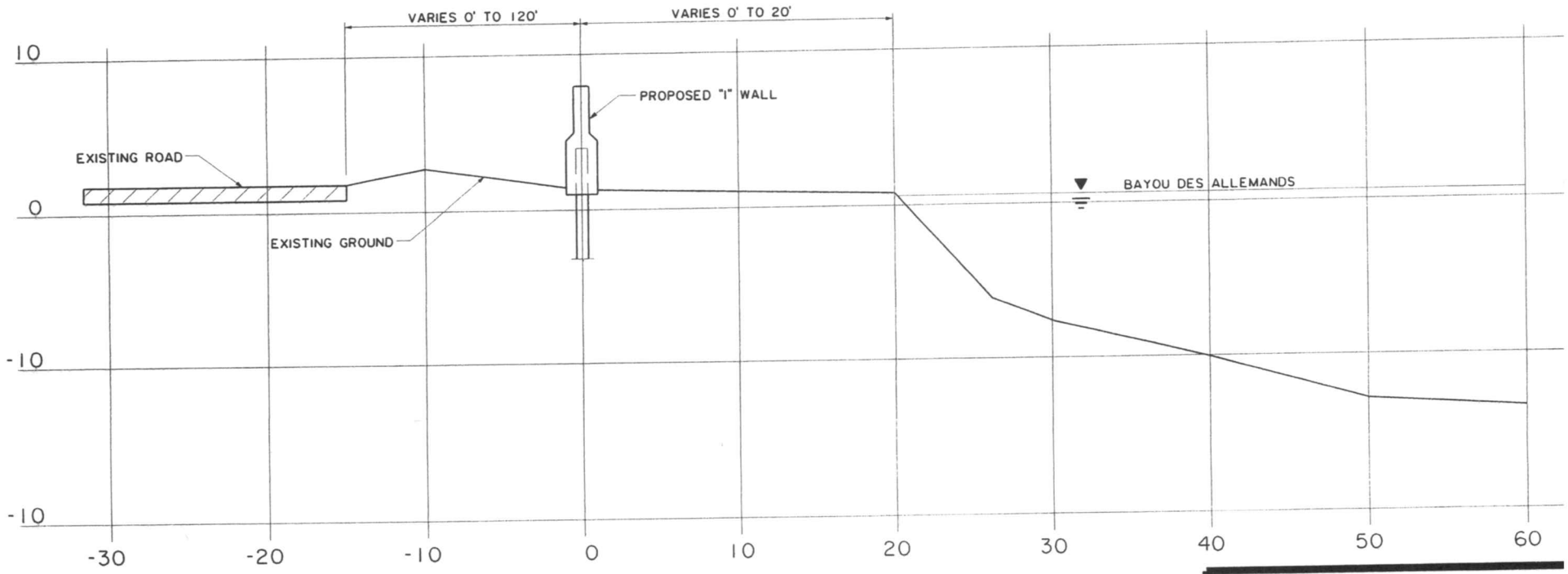
TYPICAL "I" FLOODWALL SECTION

(FOR WALL HEIGHTS ≤ 6')
SCALE: 1" = 10'



TYPICAL "T" FLOODWALL SECTION

(FOR WALL HEIGHTS > 6')
SCALE: 1" = 10'



PROFILE

SCALE: 1" = 10'

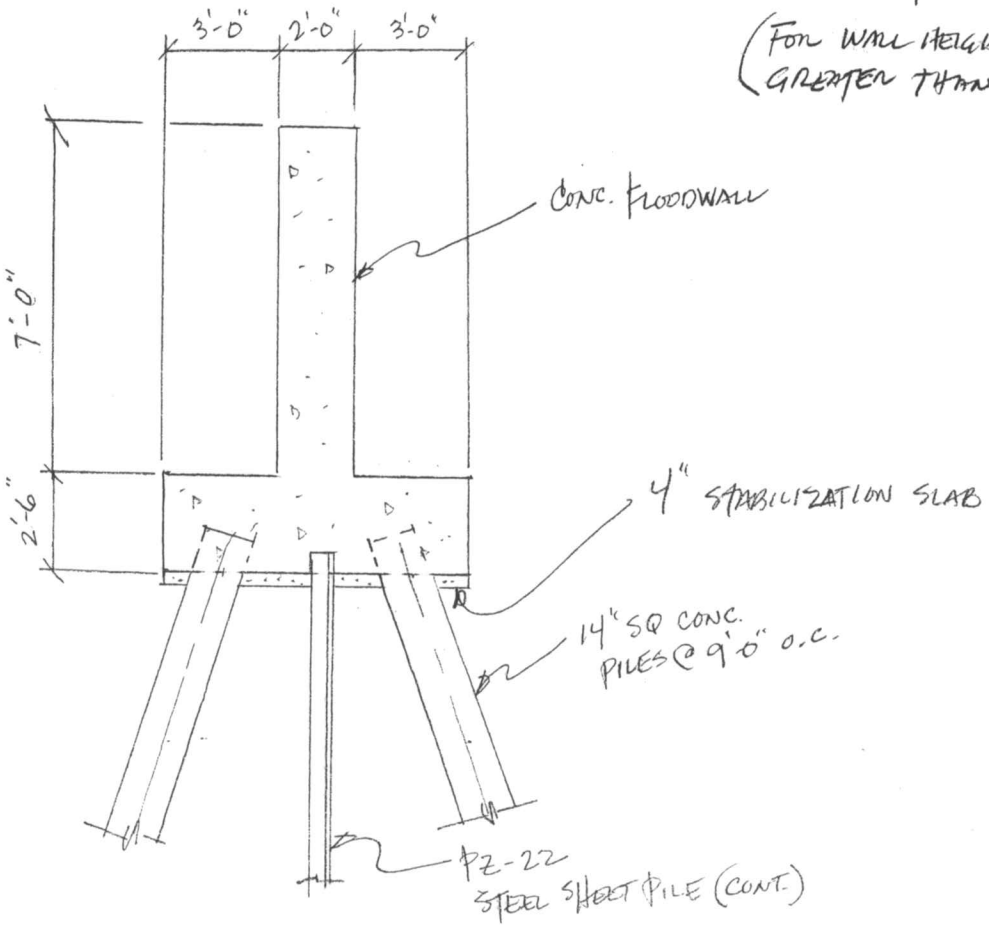
W.B. HURRICANE PROTECTI
FLOODWALL SECTION

SHREAD - KUYRKENDALL & ASSOC
ENGINEERS - SURVEYORS - PLANN
BATON ROUGE, LOUISIANA

DESIGNED	DRAWN	CHECKED	
	E.O.B.		

DES ALLEMANDS FLOODWALL COST PER LINEAR FOOT - "T-WALL" SECTION

(FOR WALL HEIGHTS GREATER THAN 6')



DETERMINE QUANTITY AND COST FOR 9'-0" SECTION

1. CONCRETE (FLOODWALL)

$(2' \times 7') + (2.5' \times 8') = 34\ ft^2 \times 9\ ft = 306\ ft^3 \Rightarrow 11.3\ yd^3$

2. STABILIZATION SLAB

$(8' \times 0.34') = 2.72\ ft^2 \times 9\ ft = 24.5\ ft^3 \Rightarrow 0.91\ yd^3$

3. 14" SQ CONCRETE PILES

2 - 60 ft $\Rightarrow$ 120 LF $\Rightarrow$ 120 LF

4. STEEL SHEETPILE

15' x 9' = 135 SF 135 SF

ESTIMATE COSTS FOR 9'-0" SECTION

1. CONCRETE (FLOODWALL)

11.3 yd^3 x $800/$yd^3$ $9,040.00

2. STAB. SLABS $350.00

3. 14" SQ CONC. PILE

120 LF x $60/LF $7,200.00

4. STEEL SHEETPILES

135 SF x $45/SF $6,075.00

$22,665.00

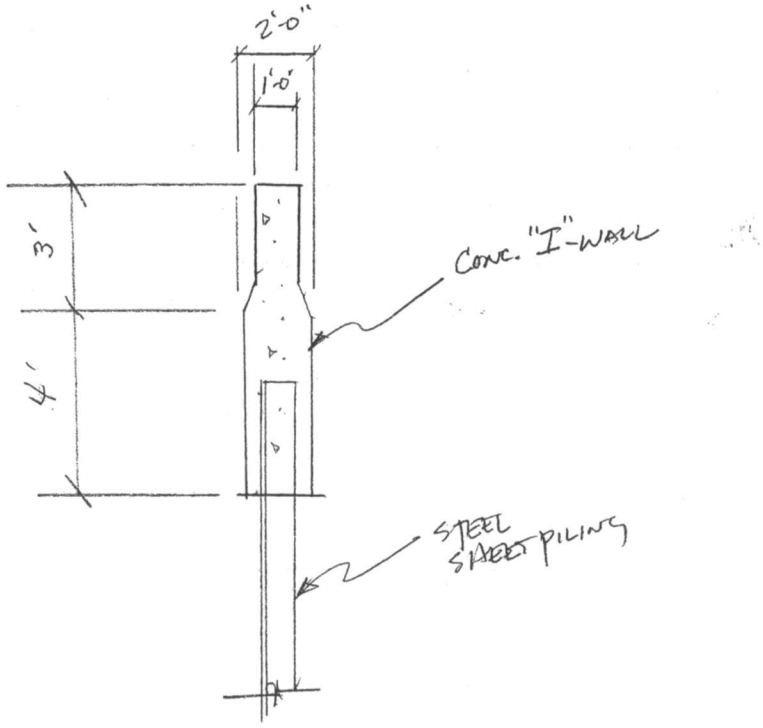
∴ $22,665/9 = $2518/LF

∴ TOTAL COSTS FOR 7100 LF OF FLOODWALL

→ 7100 LF x $2518/LF = $17,877,800.00

* NORTHERN FLOODWALL SECTION - 4100 LF x $2518/LF = $10,323,800.
* SOUTHERN FLOODWALL SECTION - 3000 LF x $2518/LF = $7,554,000.

COMPUTE COST OF "I-WALL" FLOODWALL (FOR WALL HEIGHTS LESS THAN OR EQUAL TO 6')



1. CONCRETE

$(3' \times 1') + (4' \times 2') = 11\ ft^2 \times 1\ ft = 11\ ft^3 = 0.41\ yd^3$

2. STEEL SHEET PILING

$20' \times 1' = 20\ ft^2$ $\qquad 20\ ft^2$

ESTIMATE COST

1. CONC.

$0.41\ yd^3 \times \$800/yd^3 = \$328/LF$

2. STEEL SHEET PILING

$20\ ft^2 \times \$45/ft^2 = \$900/LF$

COST FOR "I-WALL" (CONT'D)

$1238/LF x 7100 LF = $8,789,800.00

* NORTHERN FLOODWALL SECTION - 4100 LF x $1238/LF = $5,075,800.00
* SOUTHERN FLOODWALL SECTION - 3000 LF x $1238/LF = $3,714,000.00

TOTAL $8,789,800.00

POST KATRINA HURRICANE FLOOD PROTECTION
I-WALL Design Criteria
(15 December 2005)

* *I-Walls that serve as or impact hurricane flood protection.*

General Design Guidance

- Damaged I-walls will be re-constructed back to pre-Katrina elevations i.e., to the elevations shown on existing drawings, but constructed using the latest datum, NAVD 88. Reinforcing and strengthening details should be implemented in areas that caused failures to occur.

- I-Walls shall be limited in height to 5- 6 ft maximum and on case by case basis. I-walls are acceptable as tie-ins to levee embankments. Site and soil conditions will dictate. The minimum sheet piling type will be hot rolled PZ – 27. I-walls will not be allowed where there is potential for impact loading. T-walls or a levee section are required.

Geotechnical Design

- **(Global Stability Analysis)**

    - Levee Embankment Slope Stability Use Lower Mississippi Valley Division (LMVD) method of planes for slope stability analysis. Our criteria requires the slope stability of the levee embankment to have a minimum Factor of Safety of 1.3 utilizing the "Q" shear strengths with water load on the embankment to Still Water Level (SWL). The levee system also needs to be designed for low water conditions.

    - I-wall/ Embankment Slope Stability The system shall be designed (global stability analysis) for water to the top of the I-wall for a minimum Safety Factor of 1.3 utilizing the "Q" shear strengths.

- **(Seepage Analysis)**

    - Underseepage / Piping The I-wall / embankment system must be designed for underseepage / piping. This analysis can be performed by various methods such as Lane Weighted Creep Ratio, flow nets, or Harr's Method. A standard design procedure of I-wall / embankment system for Hurricane Protection is to use Lane's Weighted Creep Ratio. Engineering judgment should be exercised in selecting appropriate Lane's Weighted Creep Ratio values for this analysis and using the weighted creep length based on flow path through the different foundation materials.

- **(I-Wall Sheet Piling Tip Penetration)**

  - Wall Stability Wall stability and required penetration are determined by the Fixed Surface Wedge Method or Coulomb earth pressure Coefficient Method with Factors of Safety (FOS) applied to both active and passive soil parameters. No wall friction or adhesion shall be used in the analyses to decrease the load on the wall or to increase the passive resistance of the soil.

  - For the cohesion, the FOS is applied as follows:

    $C_d = C_a / FOS$
    where: C_d = developed cohesion
    C_a = available cohesion

  - For the friction angle, the FOS is applied as follows:

    $\varphi_d = \tan^{-1}(\tan \varphi_a / FOS)$
    where: φ_d = developed friction angle
    φ_a = available friction angle

  - Q-Case

    FOS = 1.50 - Water to Top Of Wall + No Wave Load

    FOS = 1.25 - Water to SWL + Wave Load

  - S-Case

    FOS = 1.20 – Water to SWL + Wave Load (If no significant wave load, use Q-Case criteria only. Other load conditions with appropriate safety factor applied for river levees.)

  - Minimum Tip Penetration In some cases, especially Q-case penetrations derived for low heads, the theoretical required penetration could be minimal. In order to ensure adequate penetration to account for unknown variations in ground surface elevations and soil, when the resulting penetration to head ratio is less than 3 to 1, then increase as necessary to achieve a penetration to head ratio (with water to top of wall) of 3 to 1. Engineering judgment should be exercised in selecting appropriate loading cases and penetration to head ratios and stickup ratios.

- **(Heave Analysis)**

- If applicable, heave analysis should be checked. Safety Factor for Total Weight analysis is 1.2.

Structural Design

- All I-walls shall be designed for:
  - Water to the top of wall (No overstress will be allowed for this load condition.)
  - SWL plus wave load. (A 33 1/3% overstress will be allowed for inclusion of this load condition.) Typically, the SWL elevation is approximately two (2) to three (3) feet below top of wall, but can vary based on the wall's location.
  - Where appropriate, walls shall also be designed including wind load. (A 33 1/3% overstress will be allowed for inclusion of this load condition.)
  - For any construction load condition, such as equipment loads, a 16 2/3% overstress is appropriate.

- **(Sheet Piling Section)**
  - Design the steel sheet piling, using the factored moments and shears obtained from the geotechnical design for tip penetration, with allowable steel stresses, $F_b = 0.5\ F_y$ and $F_v = 0.33\ F_y$.

- **(Reinforced Concrete Section)**
  - Reinforced concrete hydraulic structures must follow Corps criteria, where the ACI factored loads are typically multiplied by an additional hydraulic factor, $\mathbf{H_f = 1.3}$. The hydraulic factor is used to improve crack control in hydraulic concrete structures by increasing reinforcement requirements, thus reducing steel stresses.
  - For ease of construction, no tapered I-walls shall be used. Reinforcement bars should generally be kept to # 4, 6 & 8's. Adequate reinforcement must be provided around the sheet piling in I-walls at monolith joints to prevent cracks and spalls.

Utility Crossings, Levee Tie-ins and Overtopping Scour Protection

- For a structural alternative on utility crossings, the utility shall only be allowed to pass thru a pile founded T-Wall. Utilities should pass thru a pipe sleeve in the cut-off sheet piling. On case-by-case bases, utilities may pass thru the concrete wall.

- The tie-in details for I-walls that end into a levee section must follow the new guidance. As a minimum, uncapped sheet piling must extend 30 feet pass the end of the wall into the levee section. Proper earthen cover and scour protection is mandatory. Future settlement should be accounted for in detailing scour protection over the sheeting piling. (See Tie-In and Scour Protection Guidance.)

- Typical NOD details should be used for transitions from T-wall to T-wall, T-wall to I-wall and to uncapped sheet piling (slip joint). Lengths of I-wall monoliths, between expansion joints, should generally be 30 ft.

- All I-walls shall have scour protection between 5 to10 feet on the protected side and if applicable down the levee slope. Scour protection materials and details should be properly engineered and suitable for the specific site location. Backfilling around I-walls shall be repaired with suitable material to 95% compacted density. When sheet piling is exposed below I-walls, a cement / bentonite mixture for seepage control should be used. Scour protection on the flood side should be considered on a case-by-case basis, especially if hurricane wave loading exists.

Painting

- Steel sheet piling, that will be installed in new fill materials and all uncapped sheet piling should be painted with a coal tar epoxy system. Sheet piling in I-walls shall be painted a minimum of 6 inches into the wall and to 5' below new fill material or disturbed soil. Use Engineering judgment for final painting requirements.

POST KATRINA HURRICANE FLOOD PROTECTION
T-WALL Design Criteria
(15 December 2005)

* *T-Walls that serve as or impact hurricane flood protection.*

General Design Guidance

- Damaged T-walls shall be re-constructed back to pre-Katrina elevations i.e., to the elevations shown on existing drawings, but constructed using the latest datum, NAVD 88. Reinforcing and strengthening specific details shall be used in areas that may have precipitated failures.

- T-walls shall be used for walls greater in height than 5-6 FT, or where there is the potential for impact loading or unbalanced forces resulting from a deep-seated stability analysis.

- Seepage, global stability, heave, settlement and any other pertinent geotechnical analysis shall be performed in order to ensure that the overall stability of the system is designed to meet all Corps criteria for an inverted "T-Wall".

- The steel sheet piling is a pile acting to control seepage and resist unbalanced forces due to global stability. The wall's foundation support piles, shall be designed such that settlement is limited to an acceptable amount and differential settlement is negligible. Engineering judgment should be used to limit vertical and horizontal pile cap displacements. In general, vertical movement of the cap should be less than 0.50" and horizontal deflection of the cap should be limited from between 0.50" to 0.75". Where levees will be raised or new embankment constructed, the adverse effects of foundation consolidation must be considered which includes drag forces on both the sheet pile cut-off and support piles. In addition, these drag forces must be considered in settlement calculations.

Geotechnical Design

- **(Global Stability Analysis)**

    - Stability Use the Mississippi Valley Division (MVD) method of planes analysis incorporating a Factor-of-Safety (FOS) of 1.3 into the soil strengths and water at still water level. Check failure surfaces beneath the structure to determine any unbalanced soil forces. Unbalanced soil force (net driving force) per slip plane below the structure is determined by summing all horizontal driving and resisting forces of the slip plane obtained from the

stability analysis minus the free water (above the ground surface) horizontal force. Use the following equation to determine the unbalanced soil forces (net driving forces) per slip plane. Whereas F_W = the free water horizontal force. This horizontal force is carried by the structure above the base.

Equation 1: $(D_A\text{-}F_W) - (\Sigma R_F + D_p) = (D_A\text{-}F_W) - (R_A + R_B + R_P + D_p)$

For the slip plane at the structure base, assume $R_B = 0$ for the width of the base slab since settlement may occur below the base, and there may be no contact between the base and the soil.

- Stability Analysis Results

(Case 1.) If there are no unbalanced soil loads (Resisting Forces are greater than the Driving Forces), the structure is required to carry only the net at-rest loads acting above the base. These loads must be carried axially by the piles below the base. The sheet piling required below the base is determined only by seepage analysis or other requirements i.e. erosion control.

(Case 2.) If there are unbalanced soil loads, the structure is required to carry the net at-rest loads acting above the base plus the sheet pile cutoff wall anchor load determined below. These loads must be carried axially by the piles below the lowest failure surface giving an unbalanced soil load determined by Equation 1. The elevation of the lowest failure surface giving an unbalanced load shall be determined. This is the slip plane where $(D_A\text{-}F_W) - (\Sigma R_F + D_p)$ is approximately = 0. Stability berms (if applicable) can be added to reduce or eliminate the unbalanced soil loads.

- **(Seepage Analysis)**

  - Underseepage / Piping The T-wall / embankment system must be designed for underseepage / piping. This analysis can be performed by various methods such as Lane Weighted Creep Ratio, flow nets, or Harr's Method. A standard design procedure of T-wall / embankment system for Hurricane Protection is to use Lane's Weighted Creep Ratio. Engineering judgment should be exercised in selecting appropriate Lane's Weighted Creep Ratio values for this analysis and using the weighted creep length based on flow path through the different foundation materials.

- **(T-Wall Sheet Piling Cut-off Tip Penetration)**

  - Minimum Tip Penetration Seepage

    At a minimum seepage protection shall extend 10 ft. beneath the T-wall base.

- Tip Penetration Unbalanced Forces (Case 2.)

  Perform an anchored bulkhead analysis for the sheet pile cutoff wall using the structure base as the anchor. At each unbalanced failure surface, apply a uniform pressure distribution composed of the unbalanced soil load determined by the method of planes analysis above (Equation 1) to the wall system from the ground surface to the current failure surface in lieu of the existing soil. For the anchor wall analysis, incorporate a FOS = 1.5 into the soil strengths below the lowest failure surface giving an unbalanced soil load (passive resistance) and perform a bulkhead analysis for the sheet pile cutoff. The bottom of the structure base slab will be the top of the bulkhead wall and anchor location to determined the required tip elevation and maximum moment. Neglect the part of the unbalanced soil load above the base in the bulkhead analysis for each unbalanced failure surface. Perform the same bulkhead analysis with a FOS = 1.0 applied to the soils below the lowest failure surface giving an unbalanced load to determine the anchor load transmitted to the base slab. This anchor load is then applied to the structure pile foundation in addition to the net-at-rest loads. The at-rest pressure diagram, largest anchor load (FOS =1.0) and the unbalanced soil force diagram below the structure base (deep-seated stability with FOS =1.3 incorporated into the soil properties) shall be supplied to the Structural Designer for their analyses.

- Guidance for Bulkhead Analysis

  The CWALSHT program can be used to perform the bulkhead analysis or the analysis can be performed by hand. Utilizing the CWALSHT program, anchored bulkhead analysis would incorporate the uniformed unbalanced soil load below the base slab as a horizontal distributed load determined by the method of planes, and anchor at the top of the wall (slab base), with a horizontal ground surface at the lowest failure surface giving an unbalanced load. If the next stratum below the lowest failure surface giving an unbalanced load is a clay stratum, then the bulkhead analysis calculations can be performed easily by hand. The net passive resistance pressure for the clay stratum would be 4c/FOS. You would then sum moments equal to 0 about the base of the structure (neglecting load above base) to determine the sheet pile tip elevation incorporating a factor-of-safety of 1.5 into the soil parameters. To determine the required anchor load, you would perform the same bulkhead analysis utilizing a FOS =1.0 into the soil parameters to determine a new tip by summing the moments equal to 0 about the base slab, and determining the anchor load by summing the horizontal forces equal to 0.

(Note: The CWALSHT program will normally insert a tension crack on the active side of the wall, which will reduce the net resistance pressures. The designer may need to adjust (double) the cohesion strength for the depth of the tension crack to overcome this problem, if required.) For passive pressures in silt and sand layers below the lowest unbalanced soil load, you will need to model in the effective overburden pressures as a vertical load.

- **(Heave Analysis)**
    - If applicable, heave analysis should be checked. Safety Factor for Total Weight analysis is 1.2.
- **(T-Wall Pile Foundation Tip Penetration – PPC, Steel H and Pipe)**
    - Pile lengths will be based on soil boring data from existing contracts or, if time permits, new borings. If existing pile test data is available, it can be used to determine pile lengths. FOS = 2.0 with pile test data or FOS = 3.0 without pile test data, for tension and compression ultimate capacity.
    - Ignore the pile capacity above any failure plane that results in an unbalanced soil load. The elevation of the lowest failure surface giving an unbalanced load is the slip plane where $(D_A\text{-}F_W) - (\Sigma R_F + D_p)$ (Equation 1.) is approximately = 0. For determining modulus of horizontal subgrade or P-Y curves, the entire embedded length of pile is considered to be laterally braced.
    - The anchor force from the unfactored anchor wall analysis (FOS = 1.0) shall be included in the pile foundation analysis (CPGA) to determine design support pile lengths

Structural Design

- All T-walls shall be designed for:
    - For any construction load condition a 16 2/3% overstress is appropriate.
    - Water to the top of wall (No overstress will be allowed for this load condition.)
    - SWL plus wave load. (A 33 1/3% overstress will be allowed for inclusion of this load condition.) Typically, the SWL elevation is approximately two (2) to three (3) feet below top of wall, but can vary based on the wall's location.

- Wind load, debris or boat impact, if applicable. (A 33 1/3% overstress will be allowed for inclusion of this load condition.)

- Unbalanced forces. The foundation of T-wall structures on piles shall be analyzed to determine if any unbalanced soil forces exist. If any are found, they must be carried by the structure. The pile foundation and, if necessary, sheet pile cutoff wall must resist the unbalanced soil forces.

    a. Water to SWL plus unbalanced loads – no overstress.

    b. Water to top of Wall plus unbalanced loads - 331/3 overstress is appropriate.

- **(Sheet Piling Section)**

    - If unbalanced forces exist, design the steel sheet piling cut-off as a structural member from the base of the structure to its point of embedment, using the un-balanced factored loads obtained from the geotechnical design stability analysis. Allowable steel stresses are, F_b = 0.75 F_y and F_v = 0.40 F_y.

    - If no unbalanced forces exist, a minimum PZ-22 hot rolled sheet piling shall be utilized for seepage cut-off.

- **(Reinforced Concrete Section)**

    - Reinforced concrete hydraulic structures must follow Corps criteria, where the ACI factored loads are typically multiplied by an additional hydraulic factor, $\mathbf{H_f = 1.3}$. The hydraulic factor is used to improve crack control in hydraulic concrete structures by increasing reinforcement requirements, thus reducing steel stresses.

    - For ease of construction, no tapered T-wall stems should be used. Reinforcement bars should generally be kept to # 4, 6 & 8's. U-bar reinforcement shall be provided at each sheet pile handling hole to prevent pull out.

Utility Crossings, Levee Tie-ins and Overtopping Scour Protection

- For a structural alternative on utility crossings, the utility shall only be allowed to pass thru a pile founded T-Wall. Utilities should pass thru a pipe sleeve in the cut-off sheet piling. On case-by-case bases, utilities may pass thru the concrete wall.

- The tie-in details for T-walls that end into a levee section must follow the new guidance. As a minimum, the cut-off sheet piling must extend 30 feet pass the end of the wall into the levee section. Proper earthen cover and scour protection is mandatory. Future settlement should be accounted for in detailing scour protection over the sheeting piling. (See Tie-In and Scour Protection Guidance.)

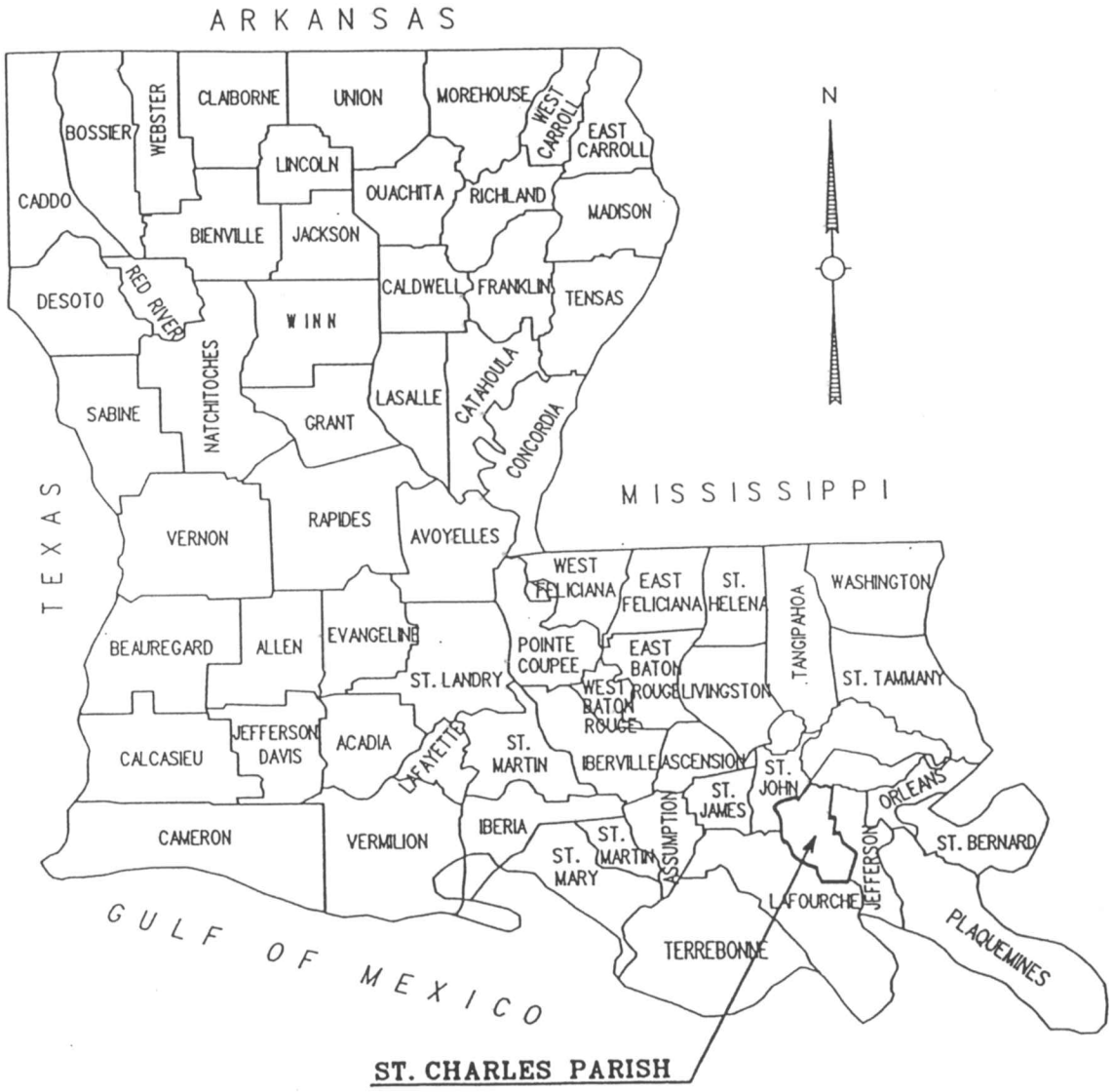
- Typical NOD details should be used for transitions from T-wall to T-wall, T-wall to I-wall and to uncapped sheet piling (slip joint). Lengths of T-wall monoliths, between expansion joints, should generally be from between 40 to 60 ft.

- All repaired T-walls shall have scour protection slab between 5 to10 feet on the protected side which can include part of base slab. Site conditions will dictate width. Scour protection materials and details should be properly engineered and suitable for the specific site location. Backfilling around T-walls shall be repaired with suitable material to 95% compacted density. When sheet piling is exposed below T-walls, a cement / bentonite mixture for seepage control should be used. Scour protection on the flood side should be considered on a case-by-case basis, especially if hurricane wave loading exists.

Painting

- Steel sheet piling, H and Pipe piling, that will be installed in new fill materials and all uncapped sheet piling should be painted with a coal tar epoxy system. The H-piles and sheet piling for T-walls shall be painted 3 inches above the stab slab and to a 5' minimum below new fill material or disturbed soil. Use Engineering judgment for final painting requirements.

TABLE OF CONTENTS

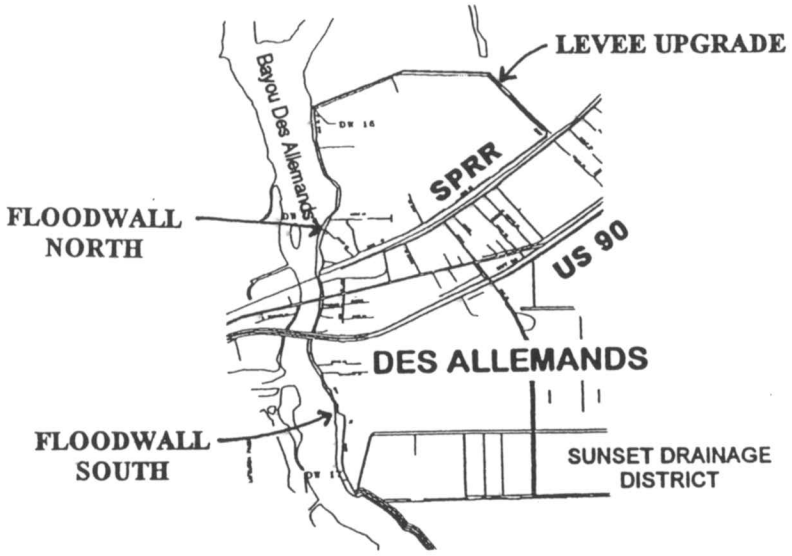


DES ALLEMANDS FLOOD PROTECTION PROJECT
ST. CHARLES PARISH, LA

GENERAL LOCATION MAP

B. EXECUTIVE SUMMARY

St. Charles Parish Department of Public Works is burdened each hurricane and winter storm season to provide temporary emergency flood protection measures for the community of Des Allemands, Louisiana. A proposed plan to construct a floodwall along the bayou front and upgrade an existing levee will provide a permanent relief from temporary expenditures and protect the community from the potentials of severe flooding. The project has been underway since 1997 when the Corps of Engineers and Coastal Zone Management Division put the project out for public notice. The Parish received public notice comments and held two town hall meetings to obtain comments from local citizens. Since this time the Parish has addressed and resolved public notice comments and expanded the project, at the request of its citizenry, to include the area south of the railroad. The Parish is prepared to continue the permit process for the proposed project in its entirety and within a reasonable time frame of 120 days can expect approval of all permit requirements. In order to have the project in place for the hurricane season of 2001, the Parish is prepared to complete the permit process, develop construction documents, obtain required right-of-way, and begin construction by April 2000.



The proposed project has an estimated construction cost of $5,543,937.$\underline{00}$. An additional estimated $367,063.$\underline{00}$ is required for servitude acquisition, wetland mitigation and construction documents. The total estimated project cost is $5,911,000.$\underline{00}$. The proposed project includes approximately 7100 feet of floodwall along the bayou front. The wall as proposed is sheet pile with a concrete cap, a standard Corps of Engineers design. The wall will vary in height between three to four feet above existing ground with a top elevation of +7.0 feet NGVD. Gates within the wall will provide access to the bayou front for boat launches, boat sheds, and pedestrian needs. In addition, approximately 5000 feet of existing levee is to be upgraded to add the necessary freeboard required by FEMA. The preferred alternative will directly impact approximately five acres of fresh marsh along the linear strip of levee upgrade. It is recommended that compensatory mitigation for these unavoidable wetland losses are obtained through an approved mitigation area.

C. PROJECT DESCRIPTION

1. Community Description

a. Location

The community is located in southeastern Louisiana on the southern boundary of the Parish, where St. John the Baptist and St. Charles Parish border along Bayou Des Allemands. The community is located along U.S. Hwy. 90, approximately 10 miles south of the Hale Boggs Mississippi River Bridge.

b. Vulnerable Population

Des Allemands is in Evacuation Zone Numbers 3 and 5 for St. Charles Parish, as designated by the Technical Data Report of the Southeast Louisiana Hurricane Preparedness Study of 1994. The 5,000 inhabitants of Des Allemands, and their homes, businesses, and transportation routes are vulnerable to inundation from storm surge of fast moving Category 3 and slow moving Category 2 storm scenarios.

c. Barataria Basin

The Barataria Basin is an interdistributary estuarine-wetland system that is located between the natural levee of the active Mississippi River and the abandoned Bayou Lafourche distributary. The basin is an extremely dynamic system undergoing constant change because of geologic and human processes. The Basin is divided into five environmental units: levee and developed lands, swamp forest, fresh marsh, brackish marsh, and salt marsh. Des Allemands is situated in the middle basin along Bayou Des Allemands between Lac des Allemands and Lake Salvador. This portion of the Basin is comprised mostly of fresh marsh surrounding Des Allemands that is situated on swamp forest intruding from the upper reaches of the Basin. Des Allemands stands on a large crevasse splay deposit of the Mississippi River. Des Allemands is located ten miles from the river at the very end of the splay. The elevations of natural levees and crevasse splays, three to five feet above sea level, provide high ground for roads, towns, and agriculture in the Des Allemands area.

d. Sunset Drainage District

1) Existing Levee System

The Sunset Drainage District is a forced drainage system that extends from Bayou Des Allemands northward to Paradis. The eastern border of the District is an existing levee built to elevation +7.0 feet NGVD. The western border is the existing railroad bed for the Southern Pacific Railroad that is built to an elevation of +7.0 feet NGVD. The southern border of the district, along Bayou Des Allemands, is partially protected by an existing levee constructed to elevation +7.0 feet NGVD. However, this southern levee does not continue westward to the Des Allemands community and there is approximately 3000 feet of bayou frontage without protection. There is an existing timber bulkhead along the bayou frontage constructed to an elevation of approx. +3.0 feet NGVD.

2) Paradis Fastlands

The Paradis Fastland is a leveed area, presently managed by the Sunset Drainage District. Primarily uses are agricultural crops and grazing. The predominate vegetation for this area is pastureland grasses. The commerce soils are suitable as prime agricultural land and is considered by the U.S. Department of Agriculture as of major importance in meeting the nation's long-range needs for food and fiber. In the United States, prime agricultural land is rapidly being converted to urban use. By preserving farmlands and preventing urban encroachment upon farmland areas, communities promote compact growth. The land is leveed and drained to the point where no natural wetland processes occur.

2. Community Infrastructure

a. Highways / Railroads / Utilities

The Old Spanish Trail runs through Des Allemands, an historic route used for trade and migration during by early European inhabitants. The route has now been upgraded to a modern highway linking the City of New Orleans to the oil industries along the Gulf coast. This highway is a major hurricane evacuation route for south Louisiana. The mainline of the Southern Pacific Railroad separates the community into two distinct drainage basins. The Parish sewerage and water systems service the Des Allemands community. Community facilities include a post office, park, and school (grades K-2).

b. Business and Industry

The fishing industry is maintained by processing plants along the bayou and is strongly supported by residents of fisherman and trappers. Catfish are shipped worldwide, and crabmeat and shrimp are processed. Support services are clustered along the highway corridors.

3. Community Heritage

a. Fishing Community

In the village of Des Allemands fishing is of major importance. This community has retained its fishing village atmosphere after more than a century. The spirit and industry of the people reflects the influence of the hard working independent nature of the first settlers of the German Coast. The community, like many in St. Charles Parish, is family-oriented. It continues to thrive on the fishing industry that fostered its beginnings. Each July the community celebrates its industry and heritage with the Catfish Festival.

b. Community History

In 1719, as New Orleans was in its infancy, twenty-one families arrived from Germany and settled along the bayou to build "Le premier ancien Village allemand." Floods inundated the village, it did not survive the 'great hurricane of 1721'. Over time, sugarcane plantations, the oil industry would replace old life styles; however, the fishing industry would maintain its importance and character. In 1900, the St. Gertrude mission chapel was established and continues today as a central part of the community. A post was maintained at Des Allemands with 150 Federal troops that captured the area in the spring of 1862. Later that year, Confederate General Richard Taylor of Fashion Plantation halted Federal movements westward into Louisiana by capturing the Union post on the bayou.

4. Flooding Conditions

a. Existing Conditions

1) FEMA Designations

The FEMA Flood Insurance Study for St. Charles Parish (Community No. 220160) Revised dated June 16, 1992 and the accompanying Flood Insurance Rate Maps (FIRM) designate the flood zone for the area south of the railroad as Zone X, areas protected by levees from 100-year flood. This area protected from the 100-year flood by levee, dike, or other structure subject to failure or overtopping during larger flooding. No floodways were calculated as part of this FEMA study. For the streams studied by approximate methods, the 100-year floodplain boundaries remain essentially unchanged from the delineation shown on the previously printed Flood Insurance Study for the unincorporated areas of St. Charles Parish dated November 2, 1982. FEMA specifies that all levees must have a minimum of three feet freeboard against 100-year flooding to be considered a safe flood protection structure. The current FEMA flood zone designation offers false security in this area due to the lack of required freeboard along the existing 3,000-ft. timber bulkhead fronting the bayou. For this reason, it is necessary to provide additional flood protection along the frontage of Bayou Des Allemands for the area south of the railroad to maintain the Zone X designation.

The area north of the railroad is designated by FEMA as a Special Flood Hazard Area inundated by the 100-year flood. A base flood elevation of 4 feet has been determined and the area is designated as Zone AE. Please note that coastal base flood elevations in the FEMA study include the effects of wave action and these elevations may differ significantly from those developed by the National Weather Service for hurricane evacuation planning. However, the existing flood protection does not meet FEMA freeboard criteria for the 100-year flood. For this reason, it is necessary to upgrade the existing levee system and provide additional protection along the bayou frontage.

b. Drainage Basins

1) North of Railroad

The drainage basin north of the Southern Pacific Railroad bed contains 317 acres and is bounded on the west by the bayou front and east by an existing levee and old shell roadbed. The community is concentrated along the bayou front (Up the Bayou Road), the railroad (Railroad Avenue), and interior streets (Tregle Lane, Ridge Road, and Cortez Lane). The drainage area is served by two separate pump station locations. One 24" diameter pump (DW 15) is located south of the intersection of Cortez Lane and Up the Bayou Road. The pump off elevation is -3.0 feet. The other pump station (DW 16), located at the end of Up the Bayou Road, is a single electrically operated 36" diameter pump on a concrete deck with a diesel auxiliary. The pump off elevation is -2.6 feet.

Each pump station discharges under Up the Bayou Road and into Bayou Des Allemands. The combined pumping capacity is 33,000 gallons per minute. Separate drainage canals feed the pump stations. The drainage area is low-lying and flat with high ground along the bayou and

roads. Storm water runoff is to the rear away from the residences where it is collected by drainage canals and carried to the pump stations and discharged. The inhabited area is only a small portion of the drainage area, which provides for a large adequate ponding area in the rear.

2) South of Railroad

The drainage area south of the railroad lies wholly within the jurisdictional boundary of the Sunset Drainage District. Highway 632 separates the drainage basin from the District and the runoff is discharged directly into Bayou Des Allemands from the parish pump station (DW 17), located in the southwest corner of the drainage basin. To reach the pump station, runoff passes through three culverts under Old Hwy 90 and through four culverts under new Hwy 90 and discharges directly into Bayou Des Allemands.

The internal drainage system for the area south of the railroad does not address high tide conditions in Bayou Des Allemands. The 3,000 feet section of timber bulkhead along the bayou front is generally below elevation +3.0 feet NGVD. This condition does not meet FEMA freeboard requirements along the bayou.

c. Flooding Conditions

1) Hurricane Juan (1986)

During Hurricane Juan, the area was threatened from high tides in Bayou Des Allemands that overtopped the levee to flood the interior. Up the Bayou Road acts as a levee along the bayou but has a profile as low as +2.2 feet NGVD in some areas. These areas are subject to inundation from high tides. The pump stations are then only re-circulating the water in Bayou Des Allemands. Extensive sandbagging efforts are required to provide the necessary protection along the bayou front and levee.

2) Hurricane George (1998)

The hurricane season of 1998, where tidal readings reached elevations of +3.8 feet NGVD while other storms lurked in the Gulf, required extensive efforts by local communities to provide sandbagging and temporary pumping capacity to ward off threatening floodwaters.

3) Historical Flooding Events

Gage: Des Allemands
Period of Record: 1950 – 1992

DATE	EVENT	STAGE
October 1985	Hurricane Juan	3.90 feet NGVD
April 1973	Winter Storm	3.74 feet NGVD
April 1980	Winter Storm	3.45 feet NGVD
September 1977	Hurricane Babe	3.12 feet NGVD

5. Proposed Action

a. Upgrade Floodwall

For most of the 3,000 feet along the bayou front that is south of the railroad, there is an existing timber bulkhead. The proposed project is to replace this bulkhead, which has a top elevation of

approximately three feet NGVD, with a floodwall that has a top elevation of seven feet NGVD. Essentially, the project is upgrading the existing protection. The floodwall will be replace the existing bulkhead and have minimal additional impact on the community. A slide gate will be installed at the seafood processing plant located near the railroad.

b. New Floodwall

North of the railroad, the existing protection is limited to the existing roadbed for Up the Bayou Road and some areas with a small levee between the roadbed and bayou front. The proposed project is the construction of a floodwall to an elevation of 7.0 feet NGVD along the bayou front. The floodwall will stand 3 to 4 feet above existing ground. The floodwall will be located at a minimum of 10 feet from the edge of the existing roadway, however, in most locations a distance greater than 10 feet is desirable to maintain the thoroughfare and access to the bayou front activities. Gates are provided in the floodwall to accommodate boat landings and docks, pedestrian access, sheds, and businesses.

c. Upgrade Levee

There is an existing levee that extends from the northern end of Up the Bayou Road eastward and southeastward for approximately 5400 feet to the Southern Pacific Railroad. The levee is at an approximate elevation of 5.0 feet NGVD and has an existing 15-foot berm between the levee toe and top bank of the existing borrow canal. The proposed project is to raise the levee height to elevation +7.0 NGVD or an additional two feet to provide the FEMA required freeboard. Four alternative construction techniques are being considered for upgrading the existing levee. The preferred alternate is Alt. 1, to reconstruct using haul embankment material. This alternative is a little more costly but minimizes the direct impact to wetlands. Alternative 2 is to reconstruct the levee using borrow material from across the borrow canal which is mostly bottomland hardwood forest. Alternate 3 is to reconstruct the levee using borrow material from the levee side of the borrow canal. The additional wetland impact would be mostly to fresh marsh. The fourth alternate is to provide the additional required freeboard with a floodwall constructed through the existing levee. For all alternatives, a floodwall is proposed for approximately 300 feet to avoid nearby in situ archaeological findings.

D. ENVIRONMENTAL CONSIDERATIONS

1. Wetland Identification

a. Acreage / Habitat Type and Value

A wetland determination map was prepared for project planning purposes only and approved by the US Army Corps of Engineers. The determination was made by project biologists using existing available data such as National Wetland Inventory maps, infrared satellite photography, and USGS habitat maps. The wetland determinations were not field verified or formally delineated. Wetland types that are included within the project area include Fresh Marsh, Bottomland Forest, and the Bayou waterbottom.

b. Avoidance of Wetland Impacts

The avoidance of wetlands in the project area is difficult while maintaining practicable costs. The construction of a combination floodwall and levee to avoid wetland impacts increases the

construction cost four folds for that portion of the project. It is recommended that minimization measures be taken since avoidance is not practicable because of cost.

c. Minimization of Wetland Impacts

Efforts used to minimize direct wetland impacts include bringing in fill material from offsite thereby reducing the footprint of the proposed project.

d. Mitigation of Unavoidable Wetland Impacts

A formal mitigation plan is to be a part of the Section 404 permit process and has not been approved as of yet. However, compensatory mitigation should include restoration of existing degraded wetlands or creation of man-made wetlands. In-kind compensatory mitigation is preferred. Areas adjacent to the site or off-site in the same watershed are to be considered. The functional value of wetlands lost will be considered when the plan is developed. At this time, due to the minimal project induced wetland impacts, compensatory mitigation from an approved mitigation area is recommended.

e. Wetland Impoundment

1) Mitigation of Secondary Impacts

Project imposed secondary impacts to wetlands are minimal, if any. The interior wetlands that would be subject to secondary impacts have already been impacted since they have been impounded for over twenty-five years. There should be no mitigation required for secondary impacts.

2) Conservation Servitude

"Conservation Servitude" means a non-possessory interest of a holder in immovable property imposing limitations or affirmative obligations the purposes of which include retaining or protecting natural, scenic, or open-space values of immovable property, assuring it availability for agricultural, forest, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, archaeological, or cultural aspects of unimproved immovable property. A conservation servitude may be created, conveyed, recorded, assigned, released, modified, terminated, or otherwise altered or affected in the same manner as other servitudes created by contract. A conservation servitude is unlimited in duration unless the instrument creating it otherwise provides. The holder of the conservation servitude may be a governmental body empowered to hold an interest in immovable property under the laws of Louisiana or the United States, or a charitable organization or trust.

Any interest in immovable property in existence at the time a conservation servitude is created is not impaired by the conservation servitude unless the owner of the interest is a party to the conservation servitude or consents to it. The acquisition of rights to land for the purposes of a conservation servitude are can only be obtained by the consent of the owner. It is therefore recommended that for wetlands within the levee upgrade, which are presently impounded and have been for over twenty-five years, that a conservation servitude not be a part of or condition of this project.

2. *Wild and Scenic River*

Bayou Des Allemands is considered by the State of Louisiana as a Wild and Scenic River and the activities proposed will require a Scenic Rivers permit from the Louisiana Department of Wildlife and Fisheries. On November 24, 1997, in response to the Scenic Rivers Permit Application No. 397 dated August 17, 1997, the department visited the project site as part of the review process. Indications were that concerns were minimal and could be adhered to within the realm of the project. At that time, because the life of the permit is limited, it was requested that issuance of the formal scenic rivers permit be held until project construction was near term.

3. *Archaeological Site*

The archaeological test units placed at Site 16SC75 determined that undisturbed significant archaeological deposits exist at the site making it eligible for the National Register of Historic Places under Criterion D (NPS 1991:37). The archaeological deposits consisted of a stratum of Rangia shell and prehistoric artifacts located between 10 and 20 cmbs. The diagnostic prehistoric artifacts consisted of pottery types and varieties relating to a Plaquemine/Mississippian occupation that probably occurred during Bayou Petre phase between A.D. 1500-1700, although a presence during the earlier Baratatia Phase (A.D. 1200-1500) cannot be discounted. Faunal and floral remains relating to subsistence were recovered from the site. The site contains a prehistoric burial of at least two individuals.

There is a corridor on the north side of the existing levee where shovel test units and site studies have determined that archaeological deposits have been disturbed by earlier activities. The Division of Archaeology, State of Louisiana has determined that construction is permissible within the corridor where archaeological deposits have been previously disturbed. To insure that in situ deposits remain undisturbed, a floodwall rather than a levee will be used through the corridor. This will reduce the footprint of the project through the archaeological site. Additionally, an archaeologist is to be on site during construction in the area. An area south of the canal has been identified as an area to avoid when obtaining fill material for the levee.

4. *Community Planning*

a. Horizontal Clearance to Obstructions for Local Roads

The AASHTO published 'Policy on Geometric Design of Streets' recommends that a clear zone of 10 feet or more from the edge of the traveled way, appropriately graded, is desirable. Special conditions of this project, such as the maneuverability of in-tow fishing boats, accessibility to the waterfront, access for emergency vehicles; all dictate a desirable horizontal clearance.

b. Existing Land Use & Future Land Use

The community encompasses approximately 5400 acres of land. Of which, about 300 acres are used for family residences with nearly 20 acres of supporting commercial uses. The community is graced with approximately 180 acres of wetlands and nearly 4300 acres of agricultural lands. The developmental objective of this community is to maintain the existing land use mix and preserve the unique fishing community character along Bayou Des Allemands. The area located between the highway corridors will be encouraged to become a commercial and residential mixed district. Over 4,000 acres are proposed for continued agricultural land uses. The future

land use plan projected and approved by the parish indicate that the interior wetlands for the project are to remain as wetlands and are not subject to development induced by the project.

E. ALTERNATIVES

1. New Levee Locations

The wetland environment in which the project is located is not conducive to a new or different location for the levee. A minimum servitude of 150 feet would destroy over fifteen acres of forested wetlands and eliminate the existing wetland area that is presently being used as a storm drainage basin. The forested wetlands in the project area have been impounded for over twenty-five years serving the communities drainage requirements. A new levee location is not recommended because of the additional wetland acreage that would be destroyed, additional costs for right-of-way, severance of private lands, and the reduction in the storm water storage capacity for the community.

2. Construction Techniques

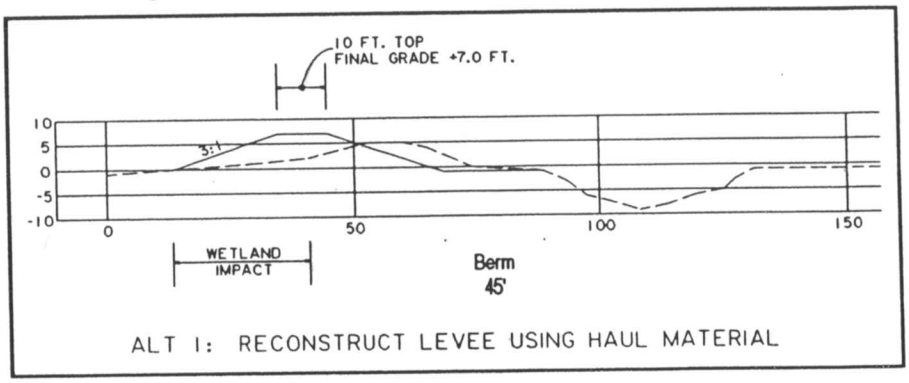
Preliminary geotechnical investigations indicate that for a final top of levee elevation of 7.0 ft. NGVD a minimum berm of approximately 45 feet is required between the toe of the levee and the bank of the borrow canal. These findings are subject to and conditioned upon detailed geotechnical analysis to be completed during the design phase.

There are four construction technique alternatives being considered for upgrading the levee for this project. The alternatives are being considered to minimize environmental impacts, construction costs, and right-of-way requirements.

a. Levee Construction Alternatives

1) Alt. 1: Reconstruct Levee Using Haul Material

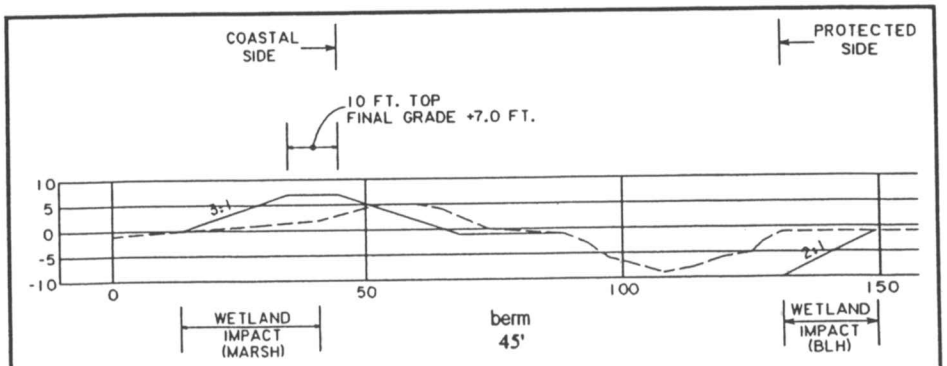
Reconstruct the existing levee using haul material obtained offsite. The existing stability berm, which is 15-feet wide, will be widened to accommodate the additional levee height. The preliminary berm width is approximated at 45-ft. This alternative will impact approximately five acres of fresh marsh, and will require approximately six acres of additional right-of-way. This is the preferred alternative because it minimizes wetland and right-of-way impacts. This preference is contingent upon detailed geotechnical evaluations.



ALT 1: RECONSTRUCT LEVEE USING HAUL MATERIAL

2) Alt. 2: Reconstruct Levee Using On-Site Material from Protected Side of Borrow Canal

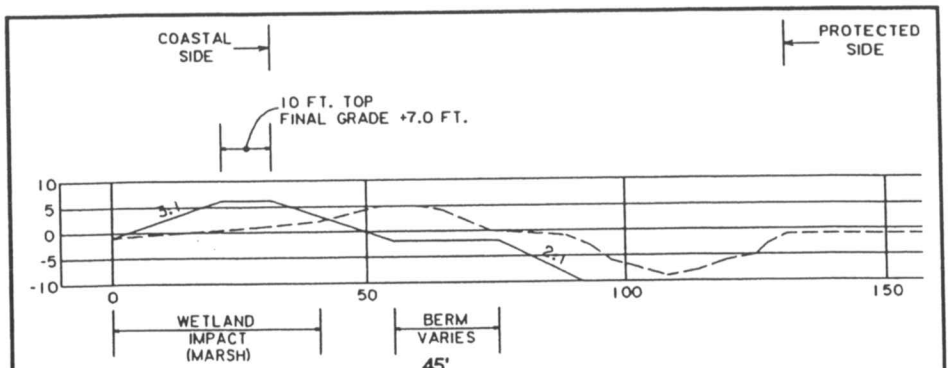
Reconstruct the existing levee using on-site material taken from the protected side of the existing borrow canal. The existing stability berm, which is 15-feet wide, will be widened to accommodate the additional levee height. The preliminary berm width is approximated at 45-ft. Alternative 2 will impact approximately five acres of fresh marsh and 2.3 acres of bottomland hardwood forest. Approximately nine acres of additional right-of-way will be required.



ALT 2: RECONSTRUCT LEVEE USING ON-SITE MATERIAL FROM PROTECTED SIDE OF BORROW CANAL

3) Alt. 3: Reconstruct Levee Using On-Site Material from Coastal Side of Borrow Canal

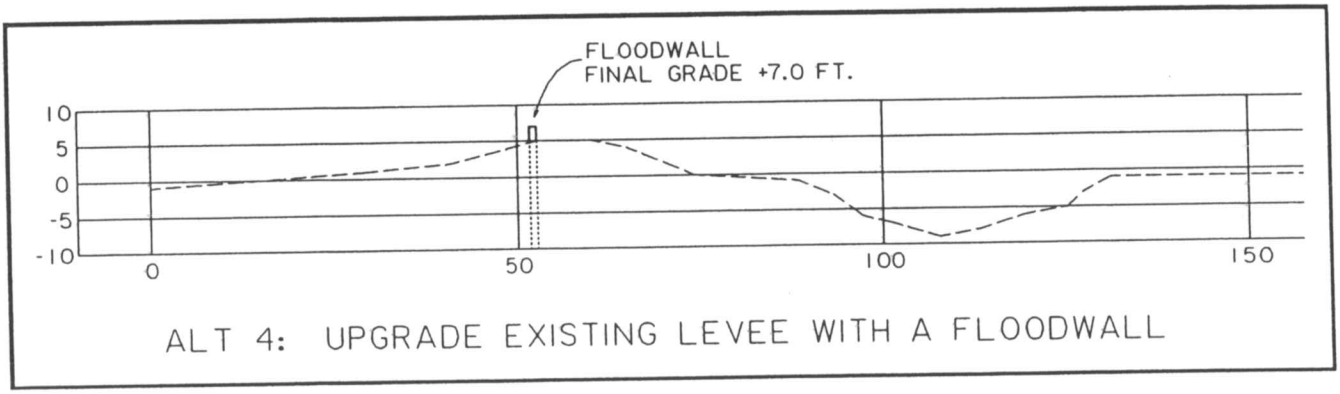
Reconstruct the existing levee using on-site material taken from the coastal side of the existing borrow canal. The existing stability berm, which is 15-feet wide, will be widened to accommodate the additional levee height. The preliminary berm width is approximated at 45-ft. Alternative 3 will impact approximately 6.3 acres of fresh marsh. Approximately seven acres of additional right-of-way will be required.



ALT 3: RECONSTRUCT LEVEE USING ON-SITE MATERIAL FROM COASTAL SIDE OF BORROW CANAL

b. Alt. 4: Combination Floodwall-Levee

This alternative will provide the additional freeboard by constructing a floodwall through the existing levee section and grading the levee to accommodate a maintenance roadway. This alternative can be constructed within the existing right-of-way and no wetlands will be impacted. However, construction costs are approximately three million dollars greater than the preferred alternative.



ALT 4: UPGRADE EXISTING LEVEE WITH A FLOODWALL

c. Construction of Floodwall along Bayou from Waterway

The inconvenience that local residences experience during construction may be reduced if construction of the floodwall along the bayou front is done from a barge in the bayou. This may reduce the number and extent of time that Up the Bayou may be blocked during construction.

3. No Build Alternative

Should the No-Build alternative be selected and the project not constructed, the community flood protection system will not be in accordance with FEMA requirements.

F. COST ESTIMATES

1. Estimated Project Cost Table

SITE	ENGR/CONSTR.	R/W	MITIGATION	PROJECT COSTS
ALT. 1	**$5,870,000**	**$12,000**	**$29,000**	**$5,911,000**
ALT. 2	$5,572,000	$18,000	$38,000	$5,628,000
ALT. 3	$5,566,000	$14,400	$35,600	$5,616,000
ALT. 4	$8,270,000	--	--	$8,270,000
		PREFERRED ALT. COSTS		**$5,911,000**

The preferred alternative, ALT. 1, is not the least costly alternative but does impact the least amount of wetland acreage of all the practicable alternatives.

2. *Preliminary Construction Cost Estimates*

TABLE OF PRELIMINARY CONSTRUCTION COST ESTIMATES								
	ALTERNATE	ITEM	QUANTITY		UNIT PRICE	COST	
	Upgrade Floodwall South of Railroad	FLOODWALL	3000	FT.	$450.00	$1,350,000.00	
		GATES	150	FT.	$500.00	$75,000.00	
		CONTINGENCIES	30%		$1,425,000.00	$427,500.00	
		SUBTOTAL				$1,852,500.00	$1,852,500.00
	New Floodwall North of Railroad	FLOODWALL	4100	FT.	$450.00	$1,845,000.00	
		GATES	700	FT.	$500.00	$350,000.00	
		EMBANKMENT	5000	CY	$9.00	$45,000.00	
		CONTINGENCIES	30%		$2,240,000.00	$672,000.00	
		SUBTOTAL				$2,912,000.00	$2,912,000.00
ALT. 1	Reconstruct Levee Using Haul Material	EMBANKMENT	50,185	CY	$9.00	$451,666.67	
		CLEAR/GRUBBING	5.1	AC.	$4,000.00	$20,400.00	
		FLOODWALL	300	FT.	$425.00	$127,500.00	
		CONTINGENCIES	30%		$599,566.67	$179,870.00	
		SUBTOTAL				$779,437.00	$779,437.00
		ALTERNATE 1: ESTIMATED CONSTRUCTION COST					$5,543937.00
ALT. 2	Reconstruct Levee Using On-Site Material from Protected Side of Borrow Canal	EMBANKMENT	50,185	CY	$4.50	$225,832.50	
		CLEAR/GRUBBING	7.3	AC.	$4,000.00	$29,200.00	
		FLOODWALL	300	FT.	$425.00	$127,500.00	
		CONTINGENCIES	30%		$382,532.50	$114,759.75	
		SUBTOTAL				$497,292.00	$497,292.00
		ALTERNATE 2: ESTIMATED CONSTRUCTION COST					$5,261,792.00
ALT. 3	Reconstruct Levee Using On-Site Material from Coastal Side of Borrow Canal	EMBANKMENT	50,185	CY	$4.50	$225,832.50	
		CLEAR/GRUBBING	6.3	AC.	$4,000.00	$25,200.00	
		FLOODWALL	300	FT.	$425.00	$127,500.00	
		CONTINGENCIES	30%		$378,532.50	$113,559.75	
		SUBTOTAL				$492,092.00	$492,092.0
		ALTERNATE 3: ESTIMATED CONSTRUCTION COST					$5,256,592.0
ALT. 4	Upgrade Existing Levee with a Floodwall	GRADING	6	AC.	$5,000.00	$30,000.00	
		CLEAR/GRUBBING	6	AC.	$4,000.00	$24,000.00	
		FLOODWALL	5400	FT.	$425.00	$2,295,000.00	
		CONTINGENCIES	30%		$2,349,000.00	$704,700.00	
		SUBTOTAL				$3,053,700.00	$3,053,700.0
		ALTERNATE 4: ESTIMATED CONSTRUCTION COST					$7,818,200.0
	TOTAL PROPOSED CONSTRUCTION COST						$5,543,937.0

3. *Servitude Acquisition Costs*

a. State Lands

La. R.S. 41:1171. Roads established by parochial authorities over state lands. All public roads heretofore traced out and established by the parochial authorities of the respective parishes over lands belonging to the state are recognized as such, and the parochial authorities of all the parishes of the state may establish public roads not exceeding one hundred feet in width on the public lands of the state. The location of the floodwall must consider the desired horizontal

clearance for the roadway. The proposed floodwall location will be along the ordinary low water mark and within the right-of-way for public roads through state lands.

b. Private Lands

The proposed levee upgrade can be accommodated requiring minimal additional lands. The preferred alternative will require approximately four acres of additional right-of-way. The floodwall along the bayou front will in most instances be located along the ordinary water line and within state lands. However, an agreement with riparian owners is desirable.

c. Conservation Servitude

It is recommended that a conservation servitude not be a part of or condition of this project unless one is initiated and granted by a landowner. The interior wetlands for the project are presently impounded and have been for over twenty-five years. The proposed project does not induce development of the interior wetlands and the future land use plan of the parish recognizes the aesthetic quality and storm water storage capacity these land posses.

d. Construction Servitude

Generally, the lands between the roadway and the bayou will be required for construction of the floodwall and land tracts within the community may be required for staging construction equipment. However, it is the desire of the local community that construction be undertaken from the bayou side using barges, etc., in order to minimize disruption and blockage to Up the Bayou Road.

4. Relocation Assistance Costs

a. Boat Sheds and Docks

The proposed floodwall location along the bayou front north of the railroad will impact eight boat docks, fourteen boat sheds, and one building. None of these structures house residents and are only used for the purpose of access to the bayou or storage of bayou related equipment. Most sheds are metal buildings on timber piling. The proposed action is to add pilings on the bayou side of the existing shed or dock and extend the distance that is removed for floodwall construction. The extended shed and docks would be the same size as the existing sheds and docks prior to the project.

5. Wetland Mitigation Costs

The types of wetlands identified that will be impacted by the project include fresh marsh and bottomland hardwood forest. For estimating costs for mitigating unavoidable impacts, a cost of $3500 per acre of bottomland hardwoods and $5500 for fresh marsh was used. Along the bayou frontage, the proposed floodwall will be located along the ordinary low water mark or along an existing levee. The wetland impacts for the floodwall are considered to be minimal and have not been specifically identified at this time.

G. MAINTENANCE SCHEDULES

Maintenance operations for the proposed levee will consist mainly of vegetation management and control. This will encompass mowing, weed eradication and control, seeding, sodding, and the prevention of deep-rooted vegetation. The side slopes of the levee and berm are design to allow mowing machinery safe usage. Mowing should be started as soon as the grass or weeds are high enough to be cut and it should continue at periodic intervals throughout the growing season. Grass cuttings can be left as mulch. Seeding, sodding, and the planting of vegetation are important maintenance operations for the prevention of erosion. The Parish Public Works Department provides mowing and vegetation maintenance throughout the parish, providing work schedules and tasks for maintenance workers throughout the year.

The floodwall requires annual inspection prior to each flooding season. The inspection should include checking and recording areas of concern such as cracking, fluffing, exposed steel, and joints. An operational plan is to include a plan for the maintenance and periodic test operation of all gates and seals along the floodwall. Monitoring and maintenance of vegetation along the floodwall is a duty of the parish.

H. COST / BENEFIT ANALYSIS

St. Charles Parish is under continual threat of flooding each and every storm season. Recent expenditures for storms in this decade grossed nearly four million dollars in federal disaster relief for temporary flood protection measures. The Des Allemands area requires a significant amount of this aide for temporary sand bagging and other flood control activities.

1. Natural Disaster Related Data

a. Affected Population

The Des Allemands community has approximately 5000 residents on approximately 300 developed acres. The near 300 homesites are mostly located along the bayou front and most vulnerable to high tidal flooding conditions.

b. Benefited Population

The 5000 residents of Des Allemands are directly benefited from this project. However, the benefits are easily spread to the westbank of St. Charles Parish reducing the time and laborious activities such as sandbagging.

c. Direct Damage to Homes & Businesses

Depth-damage for structures

58.70% Residential, saltwater, 1 week, single story

66.30% Mobile Homes, saltwater, 1 week, single story

41.10% Commercial, saltwater, 1 week, wood or steel frame

Depth-damage for vehicles

95.80% Average value $18,200 assume 90% vehicles evacuated

d. Non Structural Damages

Depth-damage for contents

95%	Residential
99.80%	Commercial - Retail
99.10%	Commercial - Groceries / Gas
88.40%	Commerical - Eating / Recreation

Content to structure value ratio (CSVR)

0.69	Residential
0.79	Moble Homes
0.53	Commercial - Retail
2.03	Commercial - Groceries / Gas
0.63	Commerical - Eating / Recreation

Source: "Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Ratios in Support of the Jefferson and Orleans Flood Control Feasibility Studies" prepared by GEC, Inc. for COE,NOD

2. Life of Proposed Project

The estimated life of the proposed floodwall and levee improvements is expected to be fifty years.

3. Frequency of Event

The potentially damaging floodwaters have occurred on a ten-year cycle. Over the 50-year life of the project, ten occurrences are likely. Recently, the threat of flooding requiring emergency preparation has occurred on two-year intervals. Federal expenditures for recent temporary emergency activities within St. Charles Parish included:

1998	(FEMA-1246) Hurricane George, TS Earl, & TS Francis	$1,715,962
1997	Preparation for threat of hurricane	$137,127
1995	(FEMA-1049) May 8th & 9th Flooding	$1,189,174
1992	(FEMA-956) Hurricane Andrew	$805,318

4. Cost of Damages per Event

The estimated cost of damages for each event was determined using the factors stated above for structural and non-structural impacts to residences and businesses. The impacts were based on estimates of two feet of floodwater for a one-week period. These estimates are approximately $30,000,000 per event. The prime farmland within the Sunset Drainage District is subject to an additional $5,000,000 in damages for an approximate amount of $35,000,000 per event.

5. Cost of Proposed Project

The proposed project cost has been estimated at $5,911,000. This cost estimate includes estimated R/W acquisition costs, wetland mitigation costs, engineering and geotechnical investigation costs, and construction costs.

6. Benefit – Cost Ratio

BENEFIT / COST RATIO = $35,000,000 X 5 / $5,911,000 = 29.6 : 1.

I. APPENDICES

1. Project Area Maps

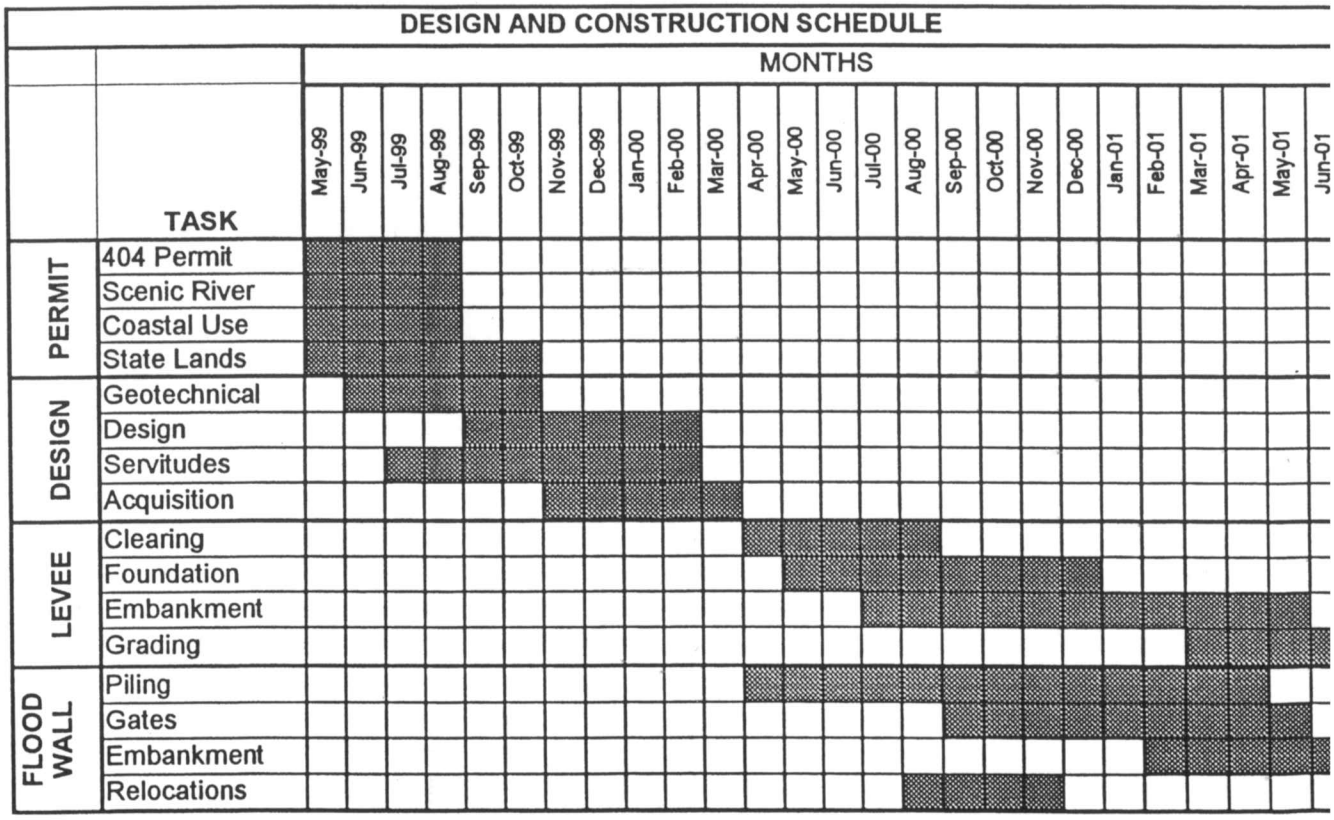
a. Project Description
   1) Location Map
   2) Proposed Action
   3) Floodwall Typical Section

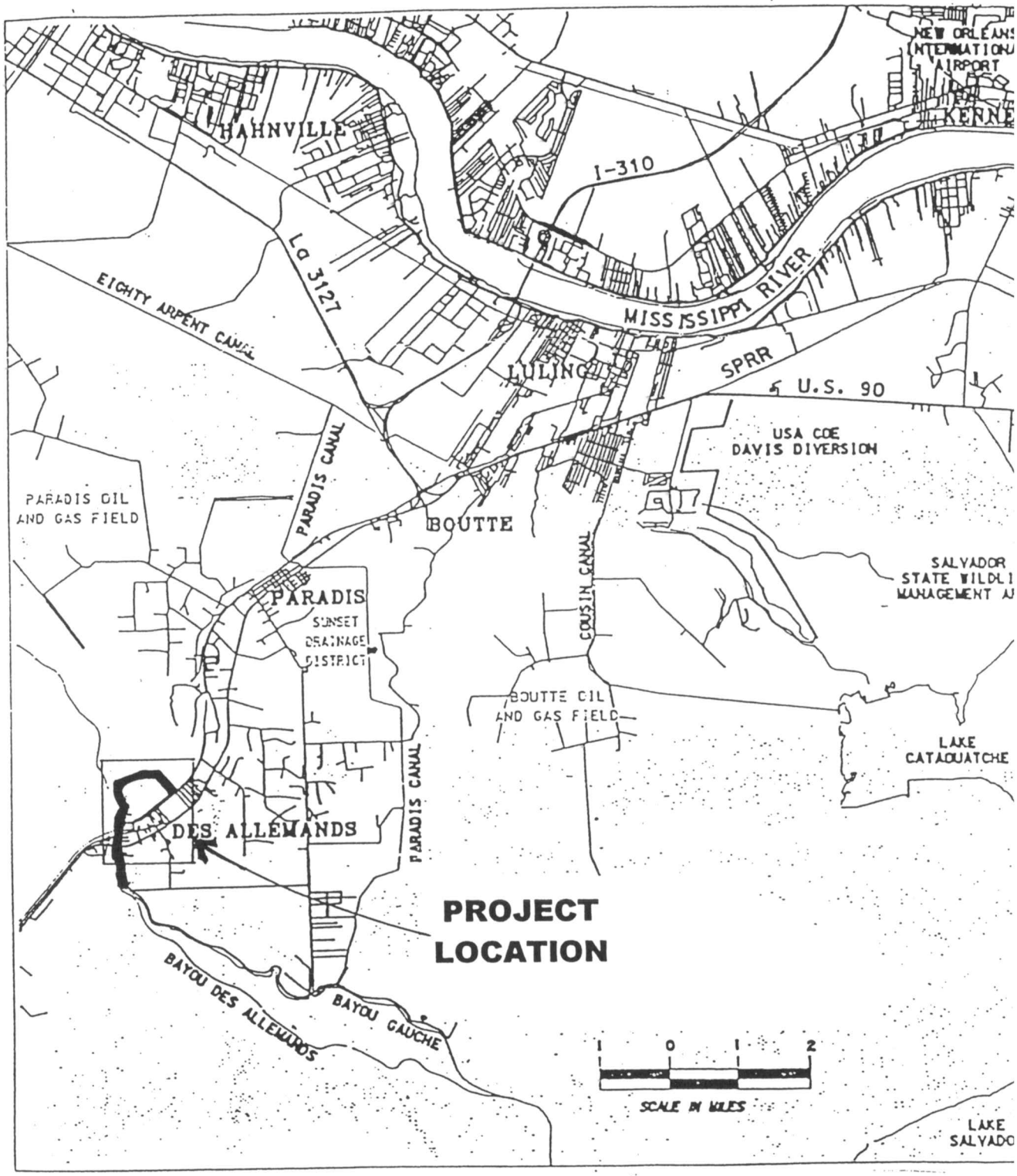
b. Environmental Considerations
   1) Wetland Identification Map
      With letter of Certification
   2) Archaeological Site Map

2. Letters from Coordinating Agencies

a. *DEQ Letter of No Objection dated September 2, 1997
b. *DNR, P961791 - Public Notice dated September 3, 1997
c. *State Historic Preservation Officer
d. *Corps of Engineers, EI - 19 - 970 - 1186 - Comment Letter dated July 29, 1997
e. US Dept of Agriculture, Natural Resources Conservation Service
f. *Department of Wildlife and Fisheries - Scenic Rivers Permit no. 397
g. State Flood Insurance Coordinator
h. U.S. Geological Survey

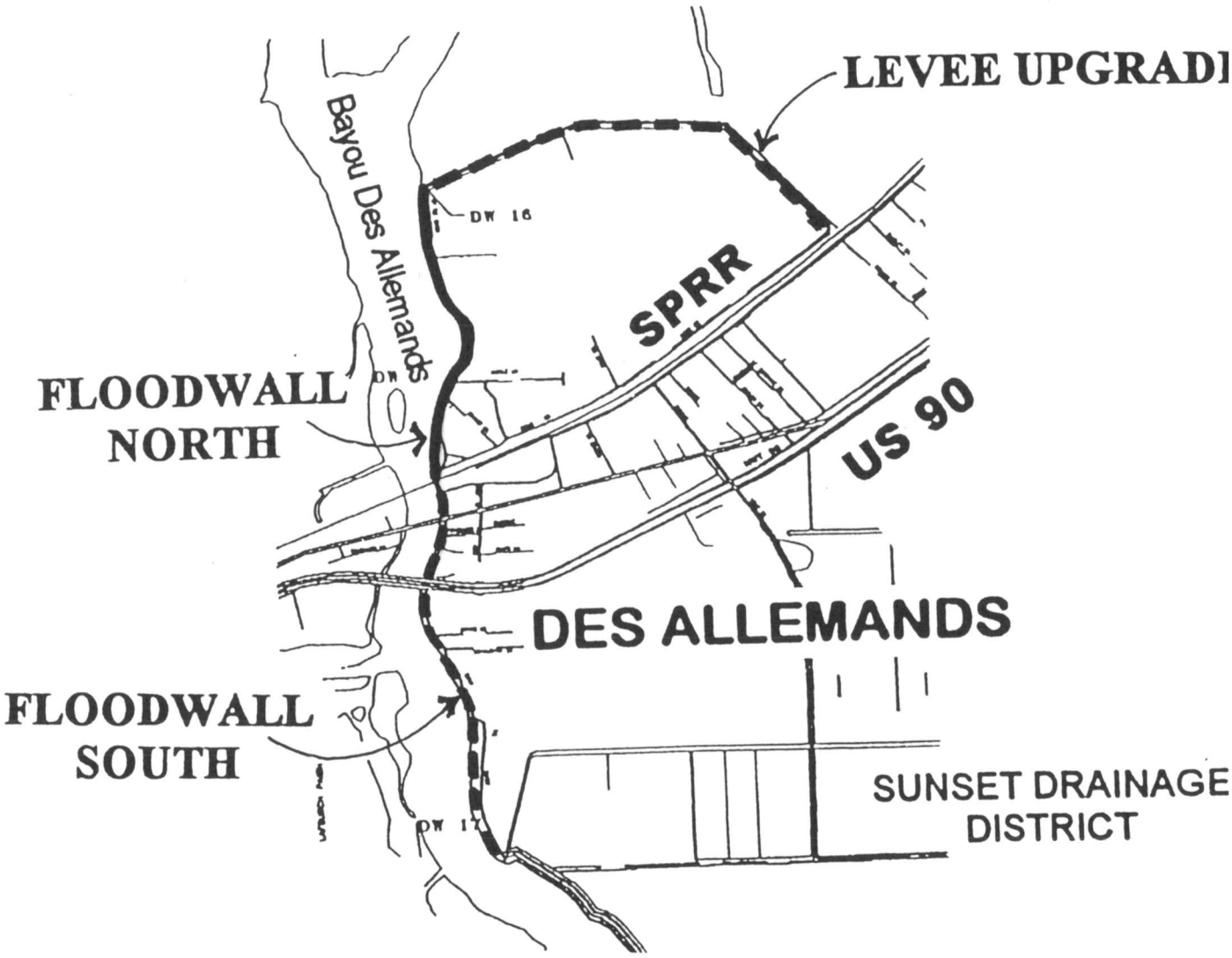
3. Proposed Work Schedule





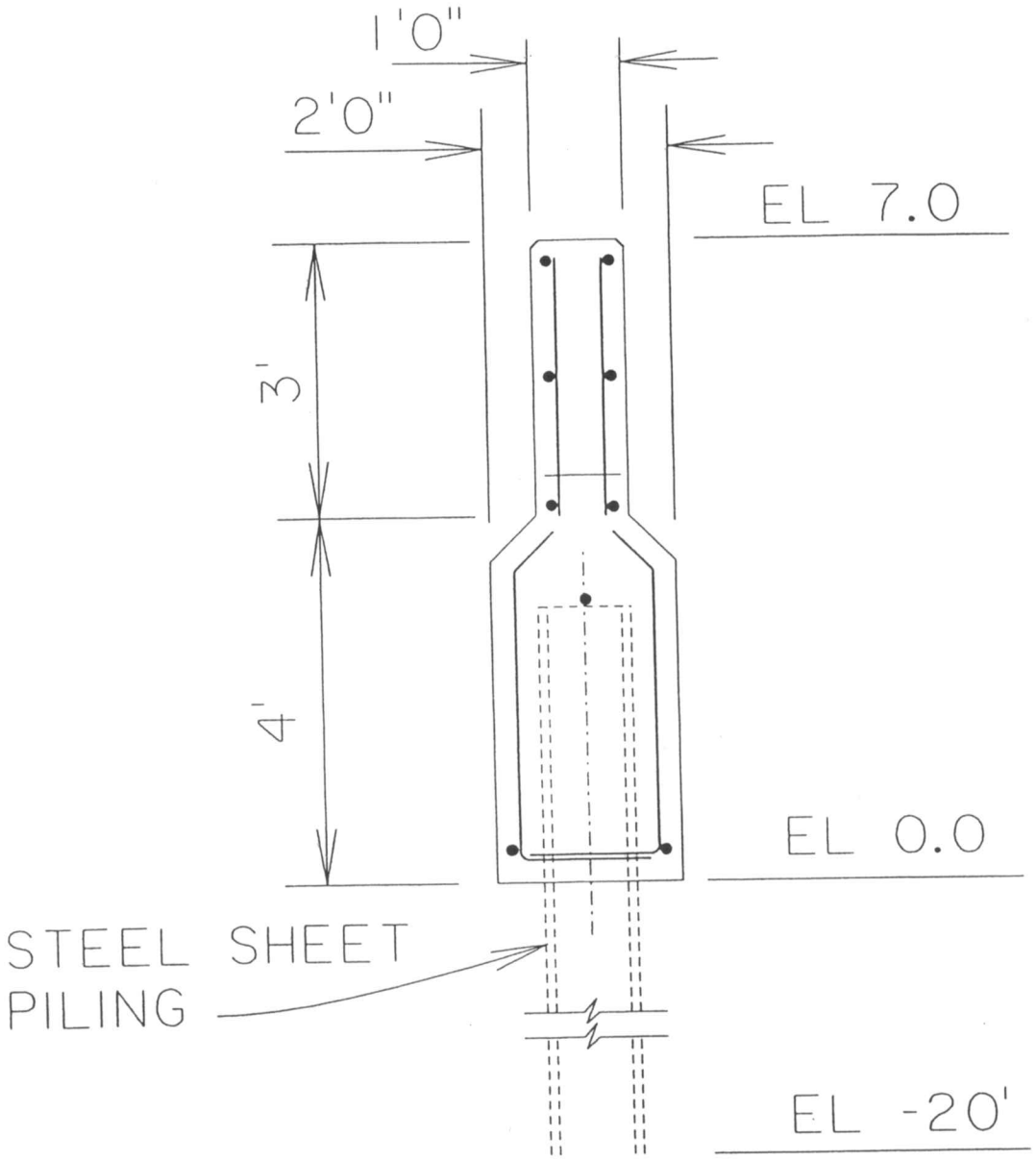
DES ALLEMANDS FLOOD PROTECTION PROJECT
ST. CHARLES PARISH, LA

LOCATION MAP



DES ALLEMANDS FLOOD PROTECTION PROJECT
ST. CHARLES PARISH, LA

PROPOSED ACTION

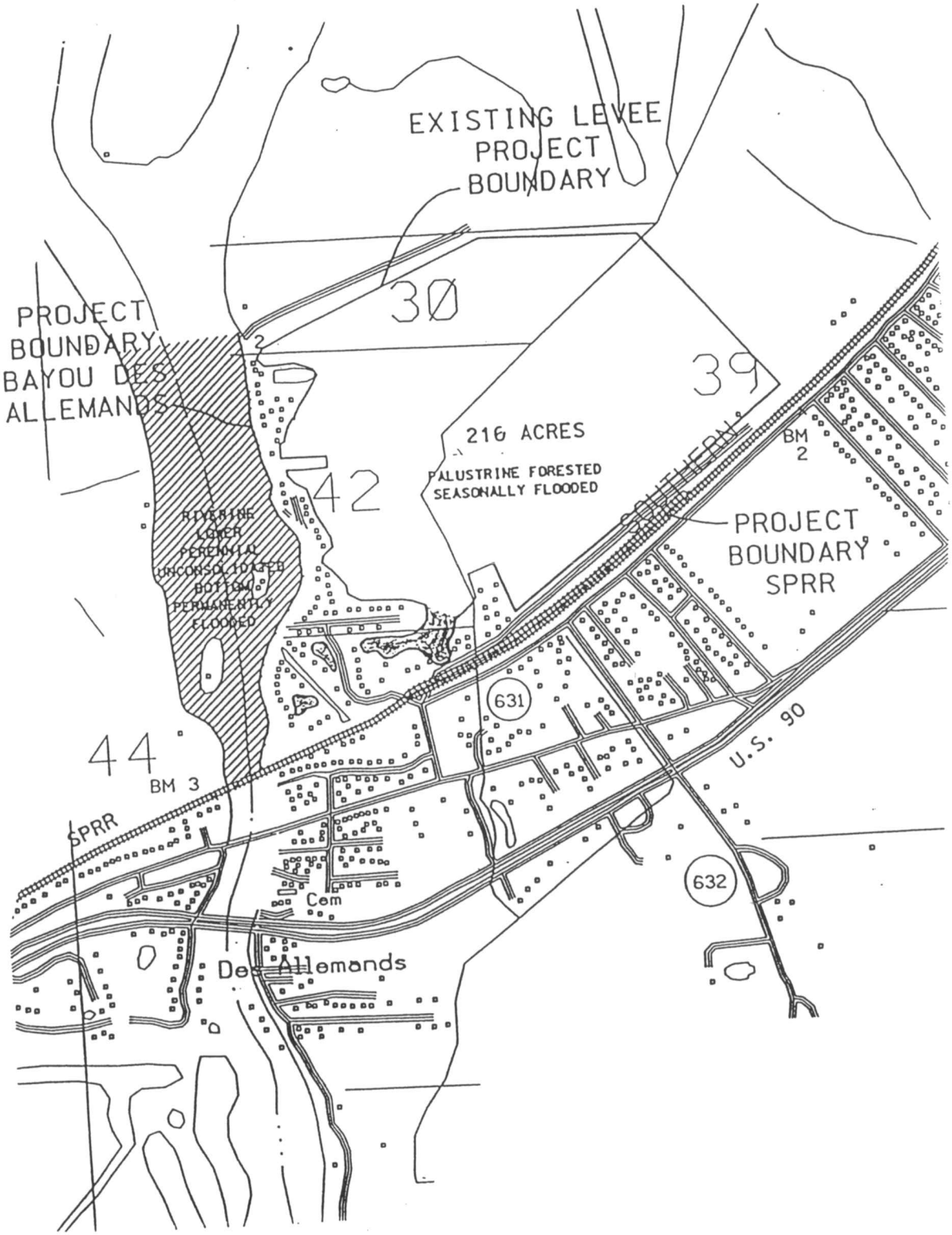


WALL DETAIL

NOT TO SCALE

DES ALLEMANDS FLOOD PROTECTION PROJECT
ST. CHARLES PARISH, LA

FLOODWALL
TYPICAL SECTION



DES ALLEMANDS FLOOD PROTECTION PROJECT
ST. CHARLES PARISH, LA

WETLAND
IDENTIFICATION MAP

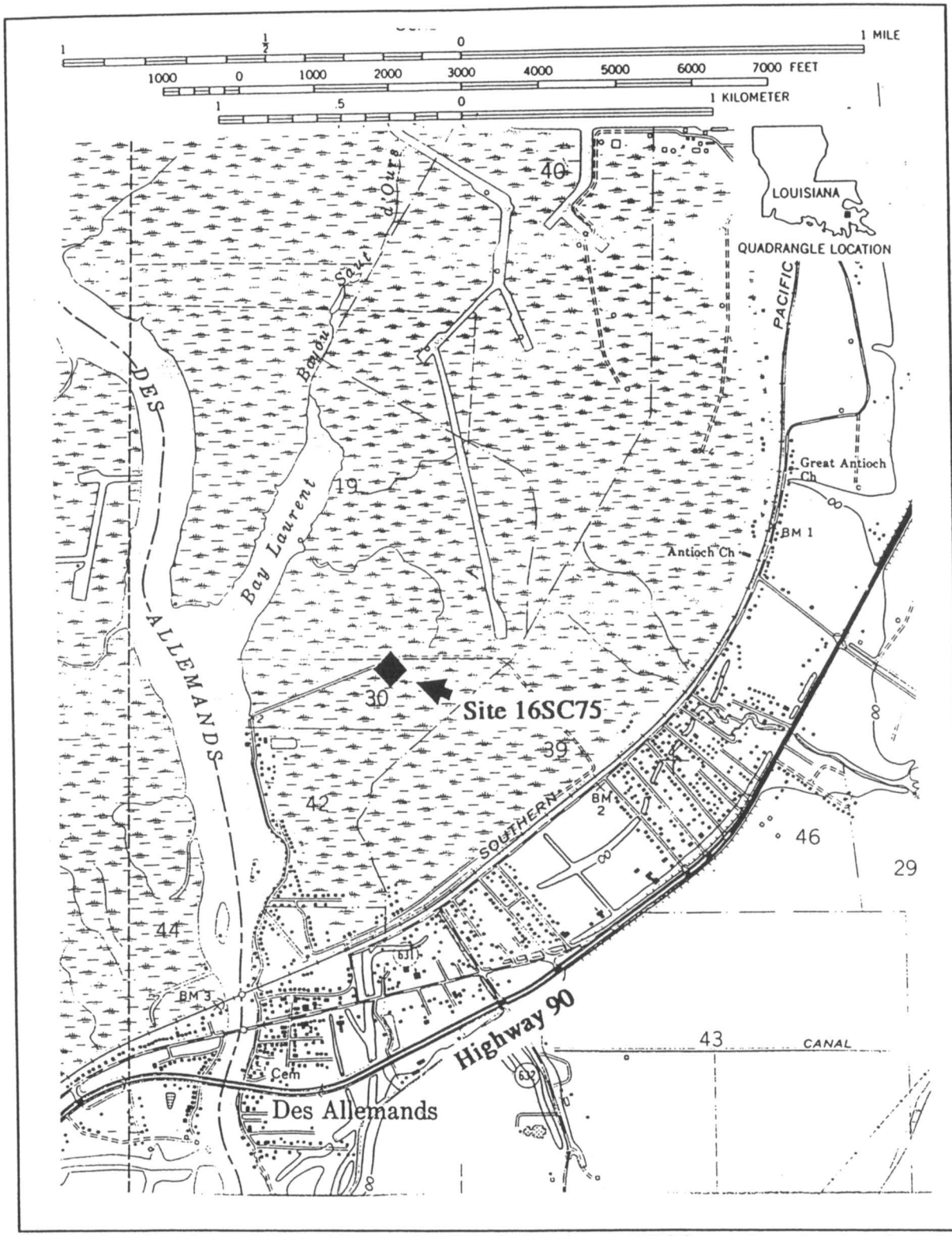


Figure 1: Portion of Des Allemands, LA 7.5 minute USGS quadrangle showing the location of archaeological site 16SC75.