GEN. DES. SECTION
BRUBACHER

U. S. ARMY CORPS OF ENGINEERS

MISSISSIPPI RIVER-GULF OUTLET, LOUISIANA

GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION

- 7810
Job 7710
Book No. 66-158
pp 10-16
Aug 25-66
67-835
pp 1-4
mm 3-1967

TC
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dm2
1968
Suppl. 3

Prepared in the Office of the District Engineer
New Orleans District, Corps of Engineers

February 1968

Mr.Wiss/dal/238

LMNED-DD

17 July 1968

Mr. Walter R. Hager, Program Director
Federal Activities Coordination
U. S. Department of the Interior
Federal Water Pollution Control Administration
South Central Region
1114 Commerce Street
Dallas, Texas 75202

Dear Mr. Hager:

It is proposed to construct a building consisting of dormitory, kitchen, storage, and office areas for the Bayou La Loutre Reservation at the location as shown on the inclosed drawing.

A layout of the sewage disposal system, calculations on the absorption area requirements, and a brochure on the two destroilets proposed for use are inclosed for your comments.

A reply to the above is requested prior to 7 August 1968.

Sincerely yours,

Ussing

Franklin

JEROME C. BAEHR
Chief, Engineering Division

Baehr

4 Incl
1. Adv Cy Plumbing & Heating Layout (dupe)
2. Calculations (dupe)
3. General Plan & Vic. Map
4. Brochure on Destroilet

CF:
Ch,Oprs Divn

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
1402 ELM STREET, 3RD FLOOR
DALLAS, TEXAS 75202

August 7, 1968
Your Ref: LMNED-DD

AIR MAIL

District Engineer
U. S. Army Engineer District, New Orleans
P. O. Box 60267
New Orleans, Louisiana 70160

Attn: Mr. Jerome C. Baehr
Chief, Engineering Division

Dear Sir:

In response to your letter of July 17, 1968, this office has reviewed the plan, design criteria and brochure of the two destroilets proposed for the waste disposal facilities at Bayou La Loutre Reservation. This review was made to determine the adequacy and effectiveness of the proposed waste disposal facilities in accordance with Executive Order 11288. The proposed waste treatment and disposal processes apparently have the capability to meet the requirements of Section 4 of the Order. However, the following suggestion is provided for your guidance:

> A 500 gallon septic tank may be installed on the kitchen effluent line in lieu of the proposed grease trap. This suggestion results from consideration of these factors: a) The facility will receive infrequent use, thus, the grease trap presents a maintenance problem. Grease would likewise be trapped in the septic tank but would decompose in the time between uses. b) The grease trap would not remove solids as would a septic tank. In the long run these solids could cause stoppage in the seepage pits. Should this installation be called upon for full time use, a grease trap would be needed ahead of the septic tank. There would then be full time maintenance available for this unit.

The comments of the Louisiana State Department of Health are included in these comments.

Please furnish the following information for this project:

1. Date bids for construction will be taken
2. Date construction will be started
3. Date that facilities will be placed in operation and schedule of occupancy of the six man crew.

We appreciate the opportunity to review and comment on the proposed waste disposal facilities.

Sincerely yours,

Walter R. Hager

WALTER R. HAGER, Program Director
Federal Activities Coordination

cc: Louisiana State Department of Health
New Orleans, Louisiana

August 7, 1968
Your Ref: LMNED-DD

AIR MAIL

District Engineer
U. S. Army Engineer District, New Orleans
P. O. Box 60267
New Orleans, Louisiana

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Sincerely yours,

WALTER R. HAGER, Program Director
Federal Activities Coordination

WH/ar

LMNED-PP

Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou LaLoutre Reservation

Ch, Pnds & Mtls Br (1 cy)
ATTN: Mr. Cannon
Ch, Design Br (1 cy)
Waterways (Mr.Gillespie)
Waterways (Mr.Johnson)
General Design (Mr. Drupbacher
Ch, Hyd Br

Ch, Plng & Rpts Br

22 Oct 68
Mr.Galloway/jlf/430

1. Reference is made to DF dated 4 March 1968 which inclosed a copy of the above GDM Supplement.

2. The inclosed copy of the 1st through 7th Indorsements is forwarded for your information and inclusion in your copy of DM No. 2, Supplement No. 3, Bayou LaLoutre Reservation.

William B. Seale
for WALTER S. MASK
Chief, Planning and Reports Branch

Incl
as

LMVED-TD (NOD 29 Feb 68) 7th Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, Lower Mississippi Valley Division, Corps of Engineers, Vicksburg, Miss. 39180 4 Oct 68

TO: District Engineer, New Orleans, ATTN: LMNED-PP

Actions taken to satisfy comments in previous indorsements are satisfactory.

FOR THE DIVISION ENGINEER:

George B. Davis
for A. J. DAVIS
Chief, Engineering Division

LMNED-PP (NOD 29 Feb 68) 6th Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, New Orleans District, Corps of Engineers, PO Box 60267, New Orleans, La. 70160 18 Sept 68

TO: Division Engineer, Lower Mississippi Valley, ATTN: LMVED-TD

1. The following is offered in response to the comments in the 5th Ind.

2. Paragraph 2. The reference applies to paragraphs IV-3 and III-9.

3. Paragraph 3. The referenced discrepancy has been resolved. The calculation for a partially penetrating well is as follows:

$$\Delta h_w = \frac{Q_w \theta a}{K.D.} \text{(Eq. 3-32a); } \theta a \text{ from Fig 3-38, } \frac{a}{r_w} = \frac{12}{0.104} = 115, \frac{W}{D} = \frac{11}{31} = 0.355$$

$$\Delta h_w \text{ (a=12')} = \frac{2.78}{0.05 \times 31}(2.0) = 1.79 \times 2.0 = 3.58', \; h_w = h_e - \Delta h_w = 30.7' - 3.58' = 27.12'$$

$$h_w - H_w = 27.12' - 3.96' = 23.16' > 23' \text{ (0'K')}$$

4. Paragraph 4. This comment is concurred with.

HERBERT R. HAAR, JR.
Colonel, CE
District Engineer

LMNED-PP

Mississippi River-Gulf Outlet, La.
GDM No. 2, Supp. No. 3

Ch, Fnds. & Mtls. Br.
Ch, Design Br.

Ch, Plng. & Rpts. Br.

23 Aug 68
Mr. Chenevert/kn/430

1. A copy of 5th Ind to Supp. No. 3, Bayou La Loutre Reservation, is inclosed for your information and reply to the comments of OCE as applicable.

2. Receipt of your reply is required by 5 Sep 68.

for William B. Seale
WALTER S. MASK
Chief, Planning & Reports Branch

Incl
as

MVED-TD (NOD 29 Feb 68) 5th Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, Lower Mississippi Valley Division, Corps of Engineers, Vicksburg, Miss. 39180 15 Aug 68

TO: District Engineer, New Orleans, ATTN: LMNED-PP

1. Actions taken to satisfy comments in the 1st Ind are satisfactory, subject to the following comments on the 4th Indorsement.

2. Para 2. The reference to para IV-3 should apparently be to para III-9. Sec. III-9 & Plate IV-3

3. Incl 3. The values of h_e and Q_p are calculated on the basis of a partially penetrating slot. However, the values of Δh_w are computed for conditions of a fully penetrating system. This discrepancy should be resolved.

4. Incl 4. If the head in the sand is lowered as indicated on Incl 3, it would not be necessary to place the filter as indicated to control seepage gradients adjacent to the sheet piling during construction. Our original comment on the possibility of this condition developing was to point out that such a condition could develop if the piezometric head in the sand was not lowered with a well point system.

FOR THE ACTING DIVISION ENGINEER:

George B. Davis

wd all incl

GEORGE B. DAVIS
Acting Chief, Engineering Division

DISPOSITION FORM

(AR 340-15)

DD

REFERENCE OR OFFICE SYMBOL	SUBJECT
LMNED-P	Mississippi River-Gulf Outlet, La. GDM, No. 2 Supplement No. 3, Bayou La Loutre Reservation

TO Ch: Design Br.
Hyd. Br.
Fnds. & Mtls. Br.

FROM Ch, Projs. Plng. Br.

DATE 8 Aug 68

CMT 1

Galloway/dmh/430

1. Reference is made to DF dated 4 March 68 which inclosed a copy of the subject GDM Supplement.

2. Inclosed is a copy of the 1st thru 4th Ind. and inclosures thereto for your information and inclusion in your copy of GDM No. 2, Supplement No. 3, Bayou La Loutre Reservation.

3. Further indorsements relative to the subject GDM Supplement will be furnished when they are made available.

Thomas C. Harrington Jr.
for WALTER S. MASK
Chief, Projects Planning Branch

LMNED-PP (NOD 29 Feb 68) 4th Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, New Orleans District, Corps of Engineers, PO Box 60267, New Orleans, La. 70160 1 Aug 68

TO: Division Engineer, Lower Mississippi Valley, ATTN: LMVED-TD

1. The following is offered in response to the comments in the 1st Ind.

2. Section III, paragraphs 8 and 9, page III-2. The anchor tie-back system will be designed for 1.5 times the load shown in the design memorandums. The size of anchor rods will be increased to 1 7/8" diameter and the wales will be 10U25. The pile penetrations will be based on a factor of safety of 2.0 using 1.5 times the load. Due to the increased penetration into the sand, 12BP53 steel piles will be used in lieu of the 12" by 12" concrete piles as shown. The reference to prestressed concrete piling should be deleted from paragraph IV-3. Inclosure 2 shows the required anchor pile design penetrations.

3. Section III, paragraphs 14a and 14b, page III-3. Inclosure 3 contains an analysis for the wellpoint line required so that the ramp can be constructed in the dry. Inclosure 4 contains the revised filter gravel section for control of seepage gradients adjacent to the sheet pile. Accordingly, the sequence of construction as shown on Plate III-1 will be revised as follows:

1. Interim excavate phase I to elevation 2 in the dry, leaving an earthen traverse to elevation 5.0 across Bayou La Loutre end of the slip.
2. Install wellpoints and piezometer and lower piezometer head.
3. Place gravel in area before driving sheet piles.
4. Drive anchor piles which may coincide with driving of sheet piles.
5. Install anchor rods, construct bulkhead complete.
6. Interim excavate phase II in the dry and construct boat-launch ramp.
7. Complete installation of collector drain and backfill.
8. Flood area and complete excavation of boat slip.
9. Remove wellpoints after flooding of boat-launch ramp excavation.
10. Install shell and riprap blanket.
11. Construct timber piers.
12. Grade area and construct road which may run concurrent with step 10.
13. Construct field offices.

LMNED-PP (NOD 29 Feb 68) 4th Ind 1 Aug 68
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

The cost of the steel sheet pile, concrete cap, and excavation for the boat-launching ramp is included with "Steel Sheet Pile Bulkhead and Slip." A revised cost estimate incorporating the above changes is shown in inclosure 5.

4. Plate III-1. Concur.

5. Section IV. a. The sheet pile will be coated with 20 mil Coal-Tar Epoxy above elevation -12.0 on the canalside and above elevation -5.0 on the landside. The tie rods will also be coated with 20 mil Coal-Tar Epoxy. The cost estimate has been revised accordingly.

b. The Corps of Engineers facility is not intended for use as a designated hurricane shelter. However, this does not preclude the use of this structure as a haven of refuge to stragglers or those cast adrift by the storm. In any such case, the facility would be used only during the period of the storm and would not be operated as a hurricane shelter.

6. Plate IV-4. The diagonal cross bracing has been eliminated and a thrust member provided. The cost estimate has been revised accordingly. A typical section through the timber bent is attached (inclosure 6).

7. Section V, paragraph 2, pages V-1 and V-2. a. The unit price has been increased to $4.00 per square foot.

b. The item for 12" by 12" square concrete piling has been deleted. See paragraph 2.

c. The $700/MFBM for treated timber pile has been verified.

8. Section V. The statement is included in the PB-3 for the Mississippi River-Gulf Outlet, La. effective 1 July 1968.

9. In view of the cost changes, the following paragraphs are resubmitted:

a. Section V - Cost Estimates, page V-1, paragraph 2. Joint-use first cost. The first cost of constructing the joint-use facilities, which includes the steel sheet pile bulkhead and boat slip, boat-launching ramp, walkway-fender system, roads and parking areas, and site developments is $266,600, of which the Corps of Engineers will contribute $133,300 and the U. S. Coast Guard $133,300. Details of these costs are given in table V-1 (Revised).

LMNED-PP (NOD 29 Feb 68) 4th Ind 1 Aug 68
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

b. Paragraph 4, Corps of Engineers, first cost. The first cost allocated to the Corps is $171,300, which includes $133,300 for the joint-use facilities and $38,000 for specific facilities. Summary of the first cost is shown below in table V-3 (Revised); details are available in tables V-1 (Revised) and V-2.

TABLE V-3 (Revised)
CORPS OF ENGINEERS, FIRST COST

Cost acct. No.	Item	Cost
19	Buildings, ground, and utilities	$144,000
30	Engineering and design	16,100
31	Supervision and administration	11,200
		$171,300

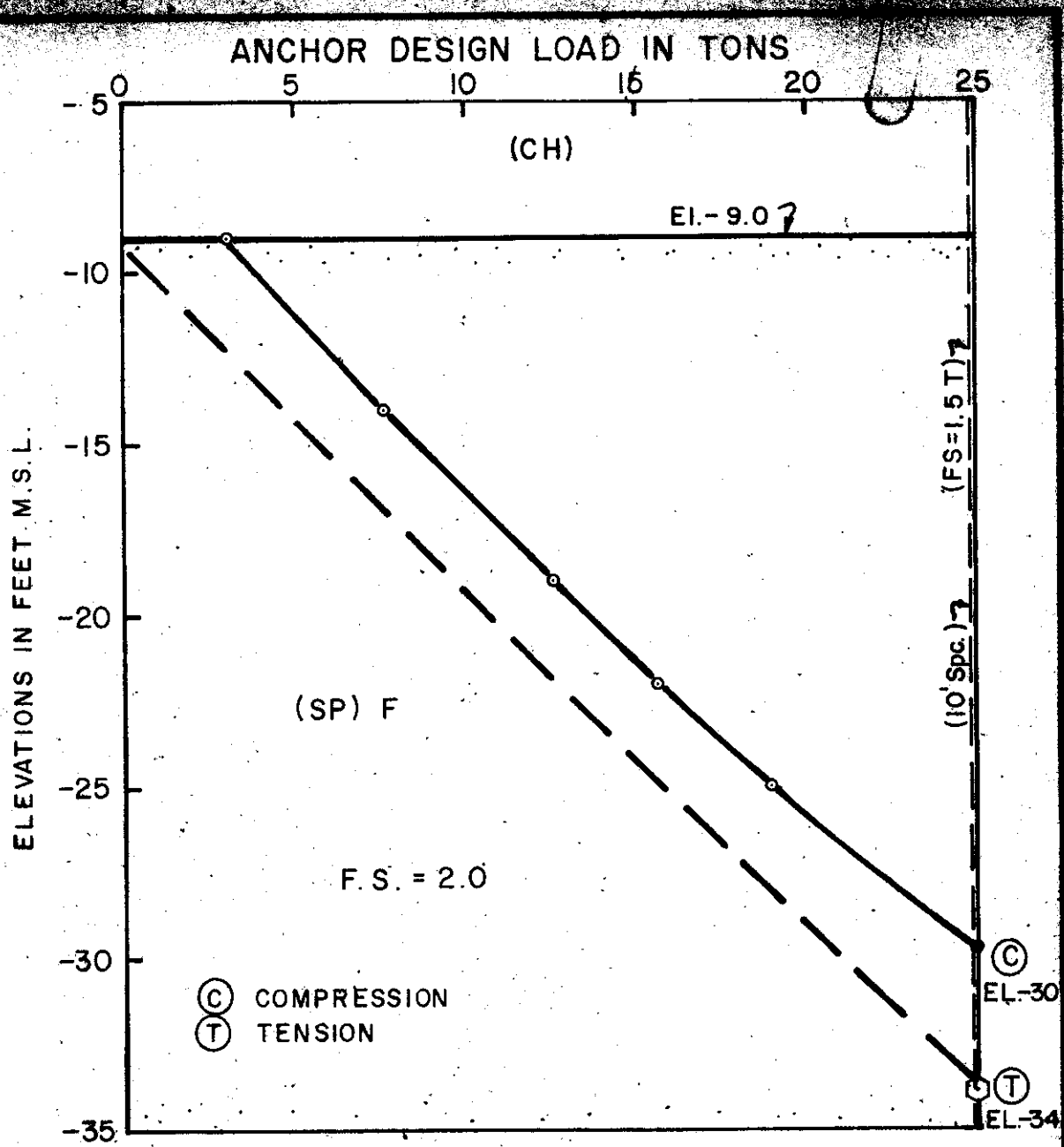
c. Section VI, paragraph 3, page VI-2. Annual charge. The average annual charge consists of interest and amortization of the first cost $171,300 @ 2 5/8 percent for 50 years, an amount of $6,200 per year, and the average annual operation and maintenance cost which is $1,600 for a total average annual charge of $7,800.

d. Section VI, paragraph 4, page VI-2. Benefit-cost ratio. The average annual benefit of $10,500 and average annual charge of $7,800 result in a favorable benefit-cost ratio of 1.3 to 1.

Herbert R. Haar, Jr.

HERBERT R. HAAR, JR
Colonel, CE
District Engineer

5 Incl (16 cys)
2. Anchor pile design penetrations
3. Plate III-3
4. Revised filter gravel section
5. Revised cost estimate
6. Typical section



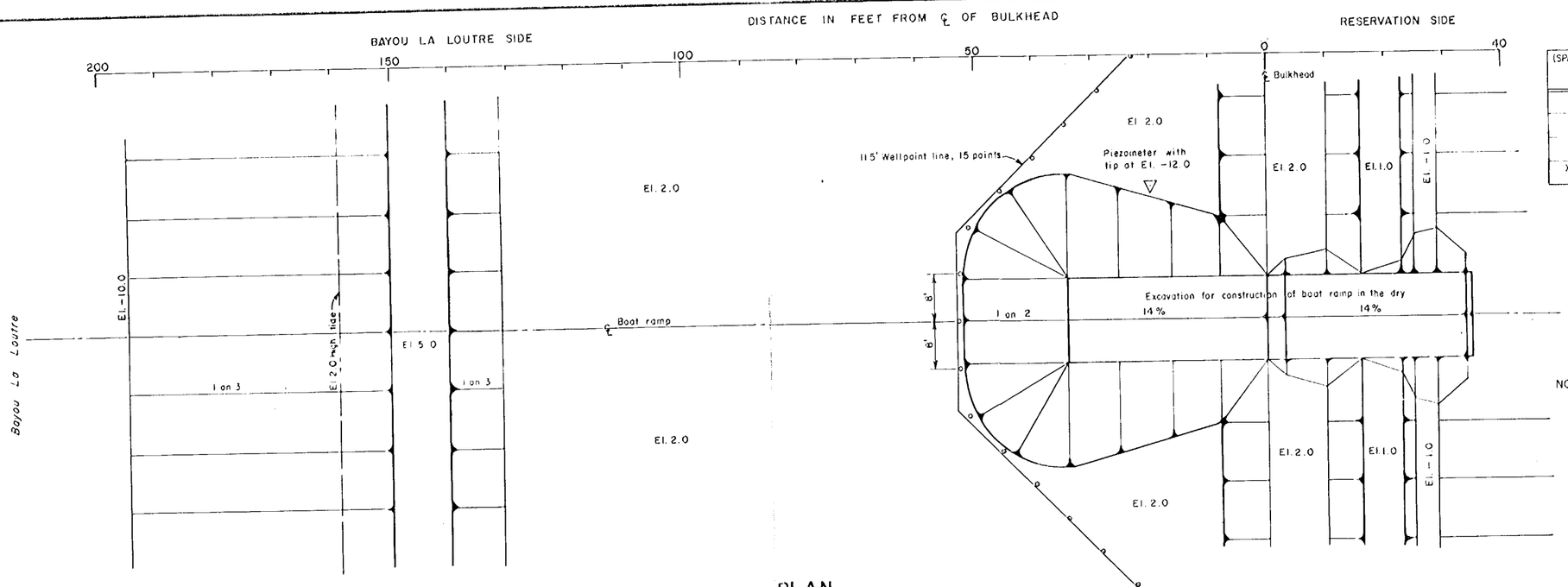
DESIGN LOAD VS TIP
ELEVATION AND SPACING

MISSISSIPPI RIVER-GULF OUTLET
LOUISIANA

BAYOU LA LOUTRE RESERVATION

REVISED BY DIVISION COMMENTS
1st INDORSEMENT, 19 MARCH 1968
PARAGRAPH 2

JULY 1968



PLAN

(SPACING) a ft.	Q_w (Q_p x a) cfm	Q_w (Q_p x a x 7.5) gpm	Δh_w ft.	h_w = h_e + Δh_w ft.	HEAD LOSS IN WELLPOINT - FT. H_s	H_e	$H_r + H_v$	Σ = H_w	$h_w - H_w$ ft.
6	1.39	10.4	0.31	30.39	0.74	0.25	0.34	1.33	29.1
8	3.6	13.9	0.48	30.22	1.30	0.30	0.60	2.20	28.0
10	2.32	17.4	0.65	30.06	1.80	0.40	0.87	3.07	27.0
*12	2.78	20.9	0.83	29.87	2.50	0.46	1.00	3.96	25.9*

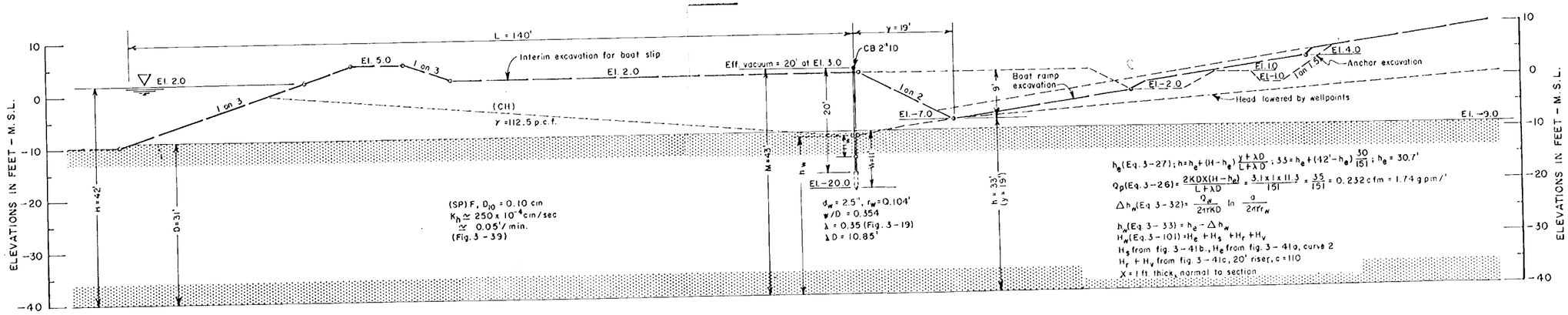
*$h_w - H_w \geq M - 20'$ vacuum, 26' > 43' - 20' (OK). To allow for finite length of wellpoint line, to increase efficiency of points, and to assure ample funds in cost estimate, use spacing of 8'.

NOTE;

Procedure from chapter No. 3, "Dewatering", Foundation Engineering Text, Leonards Editor. Authors - Mansur and Kaufman.

Revised by division comments 1st. indorsement, 19 March 1968. paragraph 3

Elevations are in feet mean sea level



SECTION ALONG ℄ BOAT RAMP

MISSISSIPPI RIVER - GULF OUTLET, LA.
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3

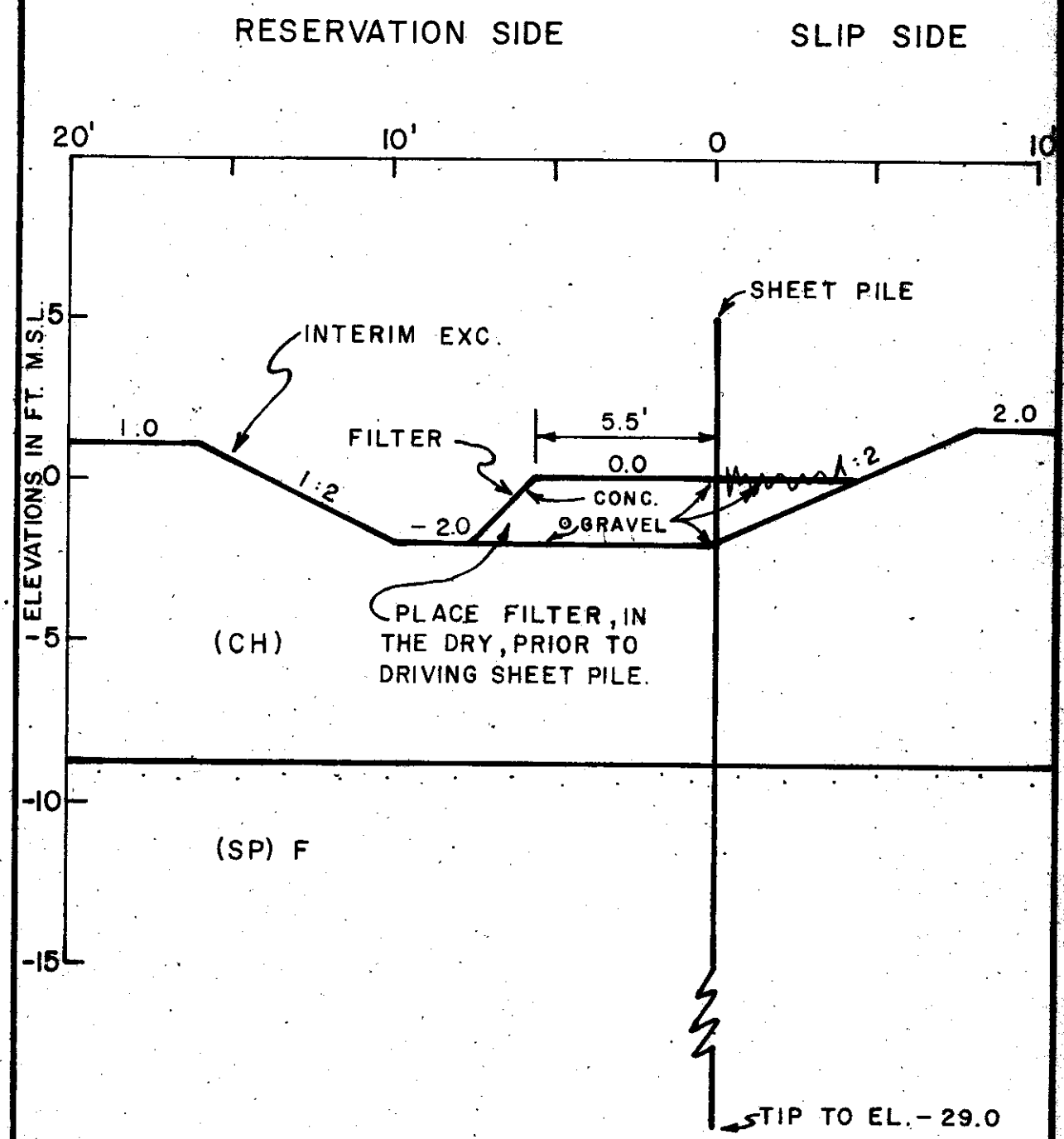
DEWATERING SYSTEM FOR CONSTRUCTION OF BOAT RAMP IN THE DRY

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

JULY 1968

FILE NO. H-2-24312

PLATE III-3



MISSISSIPPI RIVER - GULF OUTLET
LOUISIANA

BAYOU LA LOUTRE RESERVATION

REVISED BY DIVISION COMMENTS
1st INDORSEMENT, 19 MARCH 1968
PARAGRAPH 3 AS RELATES TO
PIPING ALONG PILE.

JULY 1968

Incl 4

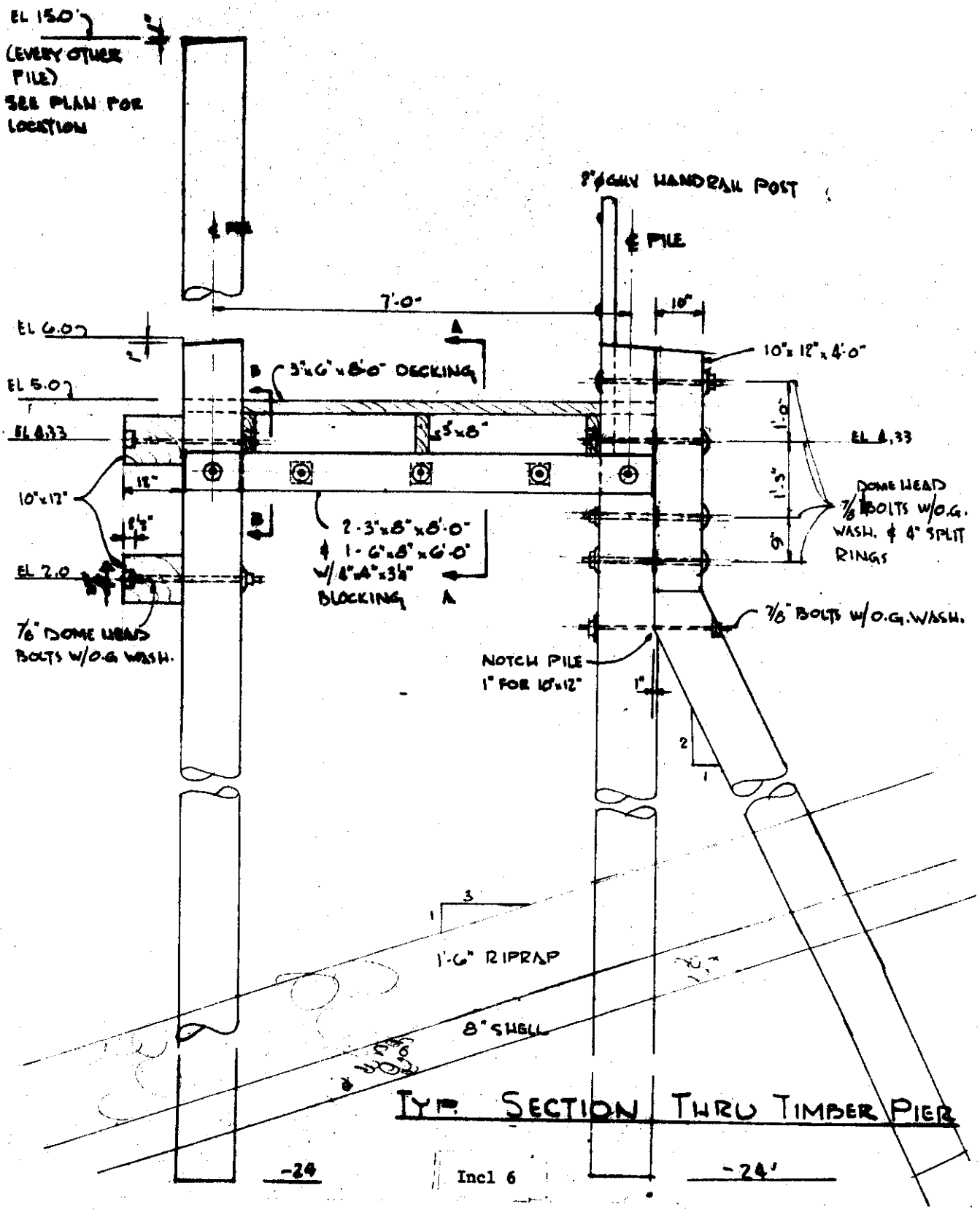
TABLE V-1 (Revised)
DETAILS OF JOINT-USE FACILITIES, FIRST COST
(Sep 67 price level)

Item No.	Description	Estimated quantity	Unit	Unit price	Estimated amount
1	STEEL SHEET PILE BULKHEAD AND SLIP				
	Excavation	31,500	c.y.	$ 1.50	$ 47,250
	Backfill	1,400	c.y.	1.50	2,100
	Conc. in pile cap	40	c.y.	100.00	4,000
	Cement	55	bbl.	5.00	280
	Reinf. steel	4,900	lb.	0.175	860
	Steel sheet pile (Z-27)	8,800	sq.ft.	4.00	35,200
	Paint sheet pile & anchor rods	7,100	sq.ft.	.40	2,840
	Struct. steel (incl tie rod)	18,500	lb.	.50	9,250
	Shell backfill	515	c.y.	3.50	1,800
	Gravel drain	145	c.y.	8.00	1,160
	6" dia. perf. pipe (steel)	240	l.f.	5.00	1,200
	6" dia. pipe (steel)	15	l.f.	5.00	80
	6" flap valve	2	ea.	200.00	400
	Riprap	50	c.y.	10.00	500
	Shell	25	c.y.	3.50	90
					107,010
2	BULKHEAD PILE ANCHORS				
	Conc. for pile caps	40	c.y.	100.00	4,000
	Cement	50	bbl.	5.00	250
	Reinf. steel	4,500	lb.	0.175	800
	Steel piling (12BP53)	1,550	l.f.	6.00	9,350
					14,400
3	BOAT-LAUNCHING RAMP				
	Concrete, approach slab	7	c.y.	30.00	210
	Concrete	19	c.y.	100.00	1,900
	Cement	35	bbl.	5.00	180
	Reinf. steel	3,350	lb.	0.175	590
	Class "B" treated timber piles (12# treatment)	120	l.f.	2.75	300
	Dewatering	job	L.S.	5,000.00	5,000
					8,190
4	FENDER SYSTEM				
	Class "B" treated timber piles (12# treatment)	3,800	l.f.	2.75	10,450
	Treated timber	20.0	MFBM	700.00	14,000
	Hardware	3,500	lb.	.45	1,580
	Riprap	1,800	tons	10.00	18,000
	Shell	480	c.y.	3.50	1,680
					45,710

Incl 5

TABLE V-1 (Revised) (cont'd)

Item No.	Description	Estimated quantity	Unit	Unit price	Estimated amount
5	ROADWAYS AND PARKING AREAS				
	Shell road and parking area (compacted)	625	c.y.	$ 5.75	$ 3,590
6	SITE DEVELOPMENT				
	Fill (reservation)	11,000	c.y.	1.00	11,000
	Security fence (6' high chain link)	1,850	l.f.	3.00	5,500
	Gates (20' chain link 6' high)	1	ea.	200.00	200
	Fertilizing and seeding	10	acre	150.00	1,500
	Subtotal				$197,040
	Contingencies 15%±				29,560
	Subtotal				$226,600
	E&D 10.0%±				22,600
	Subtotal				$249,200
	S&A 7%±				17,400
	Total				$266,600
	Corps of Engineers (½)				$133,300
	U. S. Coast Guard (½)				$133,300



TYP. SECTION THRU TIMBER PIER

Incl 6

LMVED-TD (NOD 29 Feb 68) 1st Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 19 Mar 68

TO: Chief of Engineers, ATTN: ENGCW-V/ENGCW-E

1. Supplement No. 3 to subject design memorandum is forwarded for review and approval pursuant to para 17, ER 1110-2-1150. Approval is recommended subject to annotations marked in red on Plates III-1 and IV-1 and to the following comments.

2. Sec. III, Paras 8 and 9, Page III-2. To allow for increased load in the anchor rods due to drag on the anchor, redistribution of earth pressures from that assumed in design, and stresses induced during backfill operations, the design load in the anchor rods should be increased 50 percent. The anchor tie-back system should also be designed for this increase in anchor load, with the required pile penetrations based on a factor of safety of 2.0 in lieu of 1.5. Based on the above increase in anchor load, it appears that a two-inch diameter anchor rod would be required.

3. Sec. III, Paras 14a and 14b, Page III-3. With the method and sequence of construction indicated, it will not be possible to construct the boat ramp in the dry without a dewatering system utilizing well points. The need and cost of such a system have not been presented in the DM. Also, with the bulkhead sheet piling penetrating into the sand, seepage into the adjacent interim excavation could occur due to piping along the sides of the piling during periods of high tide. In view of the above, the DM should be revised to present the required dewatering facilities necessary to accomplish the work in the proposed manner. Should the cost of dewatering be excessive in relation to the magnitude of the work requiring it, consideration should be given to alternate methods of providing the required facilities without the need for dewatering.

4. Plate III-1. To help prevent damage to the flap valve, the outlets of the collector drains should be located in the recessed portion of the sheet pile as indicated in red.

5. Section IV. a. The only indicated provision for corrosion prevention is the inclusion in the estimate of cost for painting 2,500 sq ft of steel piling. Piling in the splash zone should be coated and protection should be provided for the anchor rods.

b. If it is intended that the facilities are to be used during a hurricane, provision should be made for emergency power, fuel, and

water facilities which cannot be damaged or contaminated by natural forces which would normally be encountered during a hurricane. In the event such emergency provisions are proposed, they should be included in a supplement to the subject design memorandum or covered in a feature design memorandum.

6. Plate IV-4. a. Additional study should be made of the typical bent framing. The effectiveness of the cross bracing is limited to the strength of the bolted connections which will be weakened by the spacer blocks required at most connections to permit assembly. Also, the width of the cross bracing members need not be greater than as required to develop the connections.

b. Consideration should be given to eliminating the diagonal cross bracing and providing a thrust member between the two 3 x 8's bearing on the piles so that the thrust transferred between piles will not be limited to the strength of the bolted connection.

7. Section V, Para 2, Pages V-1 and V-2. a. For the small quantity of sheet pile (7-27) the price of $3.75 per sq ft appears low and should be checked.

b. The price of $5.50 per lin ft for 12" x 12" sq concrete pile is low and should be increased about $1.00 per lin ft or explained.

c. Treated timber at $700/MFBM is unduly high and should be verified.

8. Section V. ER 1110-2-1150 requires that a comparison be made with the latest approved Project Cost Estimate (PB-3). The work described herein is not included in the PB-3. The following statement should be included: "The latest approved Project Cost Estimate (PB-3) for the Atchafalaya Basin with an effective date of 1 July 1967, approved on 9 May 1967, does not include the work described herein."

FOR THE DIVISION ENGINEER:

1 Incl (14 cy)
wd 2 cy

A. J. DAVIS
Chief, Engineering Division

Copy furnished:
NOD, ATTN: LMNED-PP
w/marked cy incl

ENGCW-EZ (LMNED-PP, 29 Feb 68) 2nd Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, Office of the Chief of Engineers, Washington, D.C., 20315 21 May 1968

TO: Division Engineer, Lower Mississippi Valley

Subject Supplement No. 3, General Design Memorandum No. 2 is approved, subject to the comments of the Division Engineer.

FOR THE CHIEF OF ENGINEERS:

wd all incls

for WENDELL E. JOHNSON
Chief, Engineering Division
Civil Works

LMVED-TD (NOD 29 Feb 68) 3d Ind
SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

DA, Lower Mississippi Valley Division, Corps of Engineers, Vicksburg, Miss. 39180 24 May 68

TO: District Engineer, New Orleans, ATTN: LMNED-PP

Referred for necessary action.

FOR THE DIVISION ENGINEER:

A. J. DAVIS
Chief, Engineering Division

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

IN REPLY REFER TO

LMNED-PP

29 February 1968

SUBJECT: Mississippi River-Gulf Outlet, La., General Design Memorandum No. 2, Supplement No. 3, Bayou La Loutre Reservation

TO: Division Engineer, Lower Mississippi Valley
ATTN: LMVED-TD

1. In accordance with the provisions of ER 1110-2-1150 dated 1 July 1965, the general design memorandum, subject as above, is submitted for review and approval.

2. The need for a field office, as a base of operations, has become particularly evident since the field office on the barge at Bayou Yscloskey was sunk during hurricane "Betsy" on 9-10 September 1965. During the period of construction, provisions were made in the placement of spoil to provide a permanent reservation area at the junction of the Mississippi River-Gulf Outlet and Bayou La Loutre; however, the development was to be sometime in the future because of the lack of an access road to the site and since the field office-barge appeared to provide adequate interim facilities. The Louisiana Department of Highways now has extended a highway to the site. In addition, the U. S. Coast Guard requested that they be permitted to participate in the development and cost of the joint-use facilities of the reservation area. This joint construction will result in economics for the joint-use facilities.

3. Approval of subject supplement is recommended.

Thomas J. Bowen

THOMAS J. BOWEN
Colonel, CE
District Engineer

1 Incl (16 cys)
Suppl No. 3

MISSISSIPPI RIVER-GULF OUTLET, LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION

STATUS OF DESIGN MEMORANDA

Design Memo No.	Title	Status
1-A	Channels, mile 63.77-mile 68.85	Approved 11 Sep 57
1-B	Channels, mile 39.01-mile 63.77	Approved 27 Jan 59
1-C	Channels, mile 0-mile 36.43, mile 0-mile -9.75	Approved 2 Feb 60
1-C	Supplement No. 1, Stone Retention Dike Extension	Approved 31 Jan 66
2	Mississippi River-Gulf Outlet, La. GDM	Approved 16 Sep 59
2	Supplement No. 2, Relocation and Modification of Turning Basin	Approved 17 Mar 64
2	Supplement No. 3, Bayou La Loutre Reservation	Submitted 29 Feb 68
2	Supplement No. 4, Adjacent Levee Foreshore Protection	Scheduled May 68

MISSISSIPPI RIVER-GULF OUTLET, LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3

BAYOU LA LOUTRE RESERVATION

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PLATES

TABLES

APPENDIX

MISSISSIPPI RIVER-GULF OUTLET, LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION

SECTION I - GENERAL

1. Project authorization. The Mississippi River-Gulf Outlet, La. (MR-GO), a modification of the project, "Mississippi River, Baton Rouge to the Gulf of Mexico," was authorized by the River and Harbor Act of 29 March 1956 (Public Law 455, 84th Congress, Second Session), substantially in accordance with the report of the Chief of Engineers dated 5 May 1948 printed in House Document No. 245, 82d Congress, First Session.

2. Purpose. The purposes of this supplement are to obtain authority to construct improvements at the Bayou La Loutre reservation area, to present the design of the various features, and to set forth the cost sharing arrangements of the Corps of Engineers with the U. S. Coast Guard for the joint-use facilities. The views and recommendations of the U. S. Coast Guard are stated in their letter of 22 January 1968. (See appendix A.)

3. Project status.

a. The general plan for the project is shown on plate I-1. Dredging of the project channel was initiated 17 March 1958 and, except for the narrow restriction at Paris Road, was completed on 22 July 1965, including a turning basin at the Inner Harbor Navigation Canal terminus. An "interim channel" (-36 feet mean low gulf (m.l.g.) by 250 feet and -38 feet m.l.g. by 300 feet), usable for shipping, was completed on 5 July 1963 and dedicated on 25 July 1963, at which time the first ship traveled from New Orleans to the Gulf of Mexico via the Mississippi River-Gulf Outlet. The new high level bridge at Paris Road was opened to automobile traffic on 21 July 1967. The narrow restriction at the Paris Road crossing was removed in January 1968. In Breton Sound, the "interim and project channels" were completed on 21 September 1962 and on 10 November 1962, respectively. Twin stone retention dikes were completed between miles 23.2 and 20.2 on 21 October 1963, and the south dike extension to mile 18.2 was completed on 3 August 1966.

b. Maintenance dredging during construction was initiated 4 September 1963 and completed on 23 January 1966. Maintenance dredging is continuing, as required, to maintain the project channel section.

4. Plan of improvement. The reservation consists essentially of a fenced area of approximately 10 acres containing a multi-purpose

Corps of Engineers building, a parking area, a boat slip with an appurtenant small boat-launching ramp, a walkway-fender system, and a U. S. Coast Guard building. About one-half of the reservation will be used by the Corps of Engineers and the other half will be used by the U. S. Coast Guard under permit for a light attendant station. The general plan for the reservation is shown on plate IV-1.

5. Real estate requirements. The original site was donated by the Board of Commissioners of the Port of New Orleans to the United States by Act of Donation on 17 October 1966. However, the original site was insufficient in size so an exchange of lands was made with Mr. Joseph M. Meraux. This exchange was approved by 3d Ind, Office, Assistant Secretary of the Army (I&L), dated 24 August 1967, to basic LMNRE-M letter of 28 June 1967, "Mississippi River-Gulf Outlet, Exchange of Lands, Joseph M. Meraux, Portion of Tract No. 135 and Tract No. 135-2." The exchange has been consummated, and the required site, comprised of the original site donated by the Board of Commissioners of the Port of New Orleans and the exchange with Mr. Joseph M. Meraux, is shown on plate IV-1.

6. Access roads. The project site can be reached from the New Orleans District and Area Office via Louisiana Highway 39 to Poydras, thence to Ysclosky by Louisiana Highway 46, thence to the site by Louisiana Highway 624. Construction of Louisiana Highway 624, between Ysclosky and the reservation site, was completed in January 1968 by the Louisiana Department of Highways, but has not been opened to traffic.

LAKE PONTCHARTRAIN

INNER HARBOR NAVIGATION CANAL

GIWW

LAKE BORGNE

BAYOU LA LOUTRE RESERVATION

NEW ORLEANS

Paris Rd

Meraux

NEW ORLEANS DISTRICT OFFICE

WATERWAY

Poydras

Shell Beach

Yscloskey

Hopedale

Bayou La Loutre

CHANDELEUR SOUND

CHANDELEUR ISLANDS

LOUISIANA

INTRACOASTAL

GULF

PLAQUEMINES PARISH

JEFFERSON PARISH

ST. BERNARD PARISH

MISSISSIPPI RIVER-GULF OUTLET

MISSISSIPPI RIVER

BRETON SOUND

N

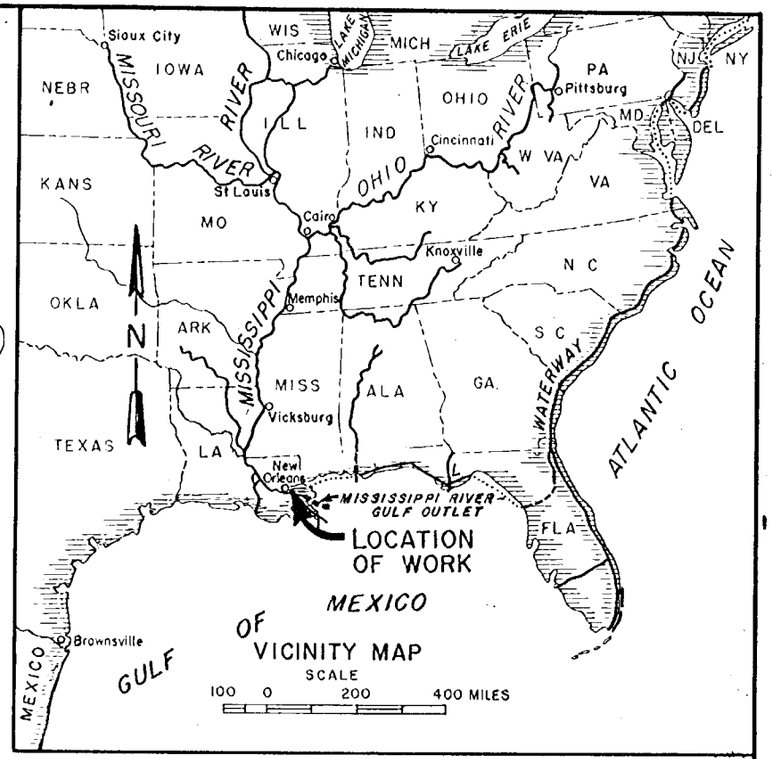
-38 ft. Contour

South Pass

Southwest Pass

GULF OF MEXICO

SCALE
10 0 10 MILES



MISSISSIPPI RIVER—GULF OUTLET
LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION
GENERAL PLAN AND VICINITY MAP
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FEBRUARY 1968 FILE NO. H-2-24312

PLATE I-1

SECTION II - HYDROLOGIC DATA

1. Normal stages. The normal tidal fluctuation on the Mississippi River-Gulf Outlet for the period 1962 through 1965 is not great, varying from a mean high water elevation of 1.7 feet m.s.l.* to a mean low water elevation of 0.5. The minimum recorded water stage elevation of -1.62 at Shell Beach (about 5 miles west of the Bayou La Loutre Reservation) was experienced in December 1956. The highest stages experienced, under other than hurricane conditions, have not exceeded elevation 3.7 at Shell Beach for the period of record.

2. Hurricane stages. The standard project hurricane, which has a frequency of about once in 200 years, will produce a surge to elevation 15.0 in this area (Reference, "Lake Pontchartrain, Louisiana and Vicinity, Design Memorandum No. 1, Hydrology and Hydraulic Analysis, Part IV - Chalmette Extension").

*All elevations in this design memorandum are in feet and refer to mean sea level (m.s.l.) datum unless otherwise noted.

SECTION III - FOUNDATION INVESTIGATION

GEOLOGY

1. General. The physiography and general geology are discussed in detail in U. S. Army Engineer Waterways Experiment Station Miscellaneous Paper No. 3-249, February 1958, entitled "Geological Investigation of the Mississippi River-Gulf Outlet Channel."

2. Foundation conditions. The subsurface consists of Recent deposits, approximately 85 to 87 feet thick underlain by Pleistocene (prairie formation) deposits. The Recent in the project area consists of 12 to 14 feet of soft natural levee clays underlain by 70 to 75 feet of abandoned distributary deposits of silt, sandy silt and sand. Underlying the natural levee and abandoned distributary deposits are stiff Pleistocene clays.

SOILS

3. Field exploration. A 5-inch diameter steel tube piston type undisturbed soil boring No. 1-U, and general type soil boring No. 2 (using a 1-7/8-inch I.D. core barrel in the cohesive soils and a 1-3/8-inch I.D., 2" - O.D. split-spoon in the granular soils), were made in the reservation area. The borings are located as shown on plates III-1 and IV-1. Undisturbed boring No. 1-U was taken in the boat slip area at station 6+00 which is 330 feet on the Bayou La Loutre side of the baseline. This boring extended from elevations 9.8 to -89.0. Boring No. 2 was taken in the field office reservation area at station 6+00 which is 180 feet on the Bayou La Loutre side of the baseline. This boring extended from elevations 12.6 to -81.5. Logs of the borings are shown on plate III-2. Split-spoon driving resistances are shown adjacent to boring log No. 2.

4. Laboratory tests. Visual classifications were made on all soil samples obtained from the borings. Water content determinations were made on the cohesive soil samples. D-10 grain sizes were determined on representative granular materials and are shown adjacent to the boring logs on plate III-2. Unconfined compression (UC), consolidation tests, and liquid and plastic limits were performed on representative clay soils. The soil test data are shown adjacent to the undisturbed boring log on plate III-2.

5. Foundation conditions. The Corps of Engineers building and boat slip sites are located in the existing MR-GO spoil area. The subsurface consists of clayey spoil material with some sand from approximate elevations 12.0 to -4.0, clay foundation soils from -4.0 to -9.5, sands from -9.5 to -45.0, clays from -45.0 to -63.0, and sands from -63.0 to -90.0. The spoil materials are soft to medium

in consistency with water contents of about 50 percent. The foundation clays below the spoil and above the sands are soft with water contents of about 60 percent. The clays below the upper sands are soft to medium in consistency with water contents of about 60 percent.

6. Design problems. The principal problems to be resolved in the foundation design were as follows:

a. Design of boat slip, anchored sheet pile bulkhead penetration, excavation slopes, and berm distances to meet stability requirements;

b. Design of concrete pile anchor penetrations; and

c. Determination of type of Corps of Engineers building and boat slip walkway-fender system timber pile penetrations.

7. Stability of slopes. The stability during construction and final slopes of the boat slip anchored bulkhead was determined by the method of planes based on unconfined compression tests using shear strengths as shown on plate III-2. The stability was investigated at a depth of failure to the top of the foundation sand and factors of safety with respect to shear strength were determined for various assumed failure planes. The water conditions, assigned soil stratification, design shear strengths, critical failure surfaces, and their corresponding analyses are shown on plate III-1.

8. Stability of anchored sheet pile bulkhead. The lateral earth pressures on the steel sheet pile bulkhead were determined by the method of planes using the (S) shear strengths shown on the stability analysis, plate III-1. A factor of safety of 1.5 was applied to the design shear strength as follows: (C=0): ϕ developed = $\tan^{-1} \frac{(\tan \phi \text{ available})}{(\text{factor of safety})}$. Using the resulting shear strength, net lateral water and earth pressure diagrams were determined for movement toward each side of the sheet piles. Using these distributions of pressure and the design anchor load, the summation of horizontal forces was equated to zero. At these penetrations, summations of overturning moments about the bottom of the sheet piles were determined. The required depth of penetration was determined as that where the summation of moments was equal to zero. The water conditions, stability section, assigned soil stratification, design shear strengths, required penetration, and net pressure diagram are shown on plate III-1.

9. Anchor pile analysis. Twelve-inch square precast, prestressed, concrete piles with a concrete cap will be used to serve as an anchor for the steel tie rods to the bulkhead. The skin friction above the top of the sand was disregarded in the penetration analysis and a factor of safety of 1.5 with respect to shear strength

was applied to the sand. Based on (S) tests in the general area, a shear strength of C=0 and $\emptyset$=30° was assigned to the sand. A conjugate stress ratio (K_0) = 1.0 was used for determining the normal pressures on the pile surface. The influence of the excavated boat slip and of the adjacent spoil was taken into account in the calculation of the lateral earth pressures against the piles. The relation of pile compression and tension design loads, tip elevation, and anchor spacing was determined and are shown adjacent to the anchor pile analysis on plate III-1. For purposes of slope stability, construction excavation will be limited to that required to construct the individual pile caps. Installation of the sheet piles, construction of the anchor and collector system, placement of the backfill, and construction of the boat ramp will be accomplished during the interim construction stage for the boat slip excavation. (See interim section on plate III-1.)

10. Pile penetration for walkway-fender system. Penetration of the piles was selected based on past experience with fender piles in this type of service. The assigned penetration is shown on plate IV-4. The walkway fender system will be installed after the bulkhead is constructed and after the boat slip is completed.

11. Field office building bearing piles. The same design criteria was applied in the penetration determination of the timber piles as was applied in paragraph 9. The analysis and required penetration of the timber piles are shown on plate III-1.

12. Settlement. The consolidation data on the surface clay stratum above the foundation sands indicate that they are normally loaded and settlement of the reservation area is not a major problem.

13. Spoil disposal. A small amount of the boat slip spoil will be placed on the existing MR-GO spoil. The spoil will be kept a minimum distance of 100 feet from the top of the excavation slope for the boat slip and from the top of the slope of the existing spoil paralleling Bayou La Loutre and the MR-GO. The spoil section will be limited to 1 on 4 side slopes to a height of 8 feet and thence 1 on 20 slope. Stability analyses are not presented in this report for the spoil section.

14. Sequence of construction.

a. The boat slip and bulkhead interim excavation will be constructed in the dry. An earthen traverse to elevation 5.0 will be left across the Bayou La Loutre end of the slip to provide protection against flooding by high tides.

b. The sheet piles for the bulkhead will be driven, anchors constructed, collector drains installed, shell and clay backfill placed to final grade, concrete cap constructed on bulkhead, and boat ramp constructed.

c. The earthen traverse will be opened and water will be allowed to enter the slip excavation. The remainder of the boat slip excavation will be accomplished in the wet.

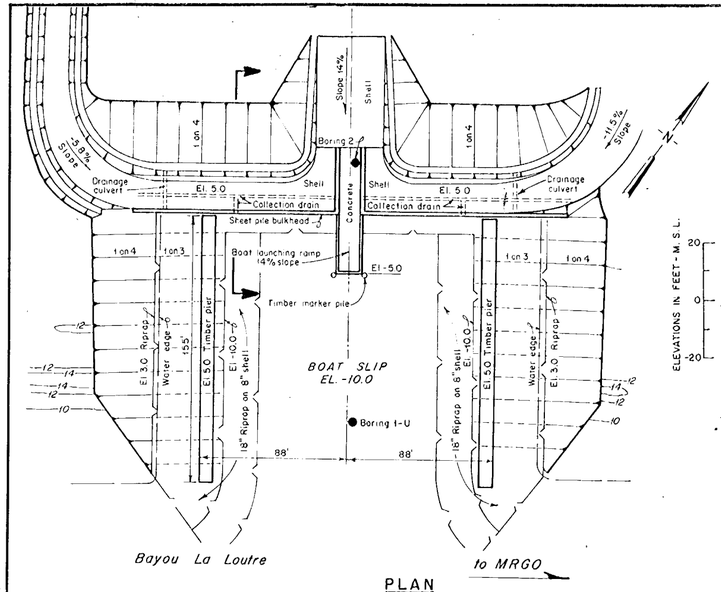
d. The walkway-fender system pilings will be driven using floating plant equipment.

e. After the reservation area is graded, the Corps of Engineers building and U. S. Coast Guard building can be constructed concurrently with the foregoing work.

15. Erosion protection. Erosion protection will be provided along slopes as shown in plan on plate III-1.

16. Settlement observations. Periodic settlement observations will be made on the bulkhead and Corps of Engineers building.

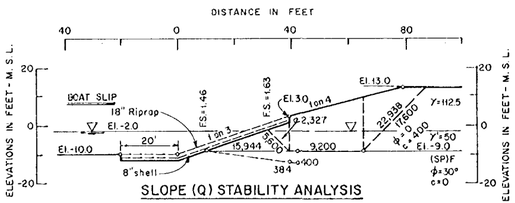
17. Jetting of timber and concrete piles. Jetting may be required to within 3 feet of the final tip elevations to install the piles to the required penetrations.



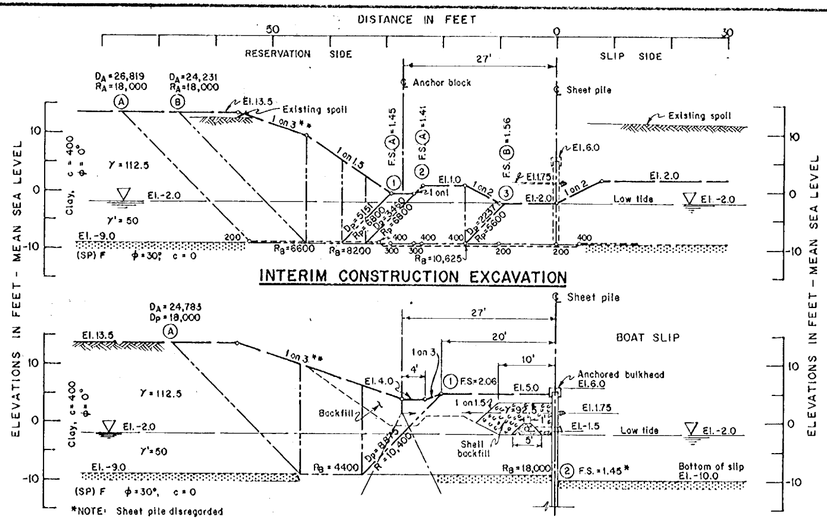
PLAN

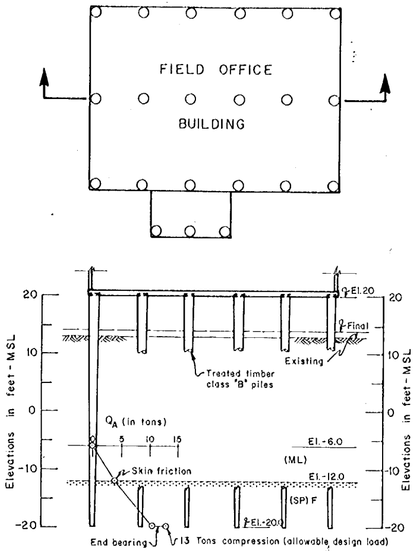
SCALE IN FEET

40 0 40 80

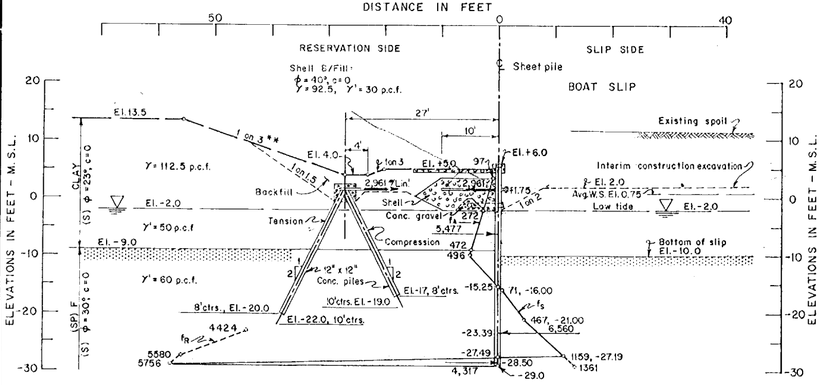


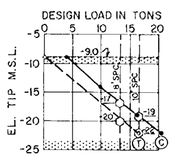
SLOPE (Q) STABILITY ANALYSIS



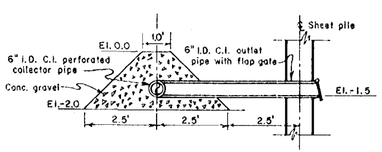


BUILDING BEARING PILES

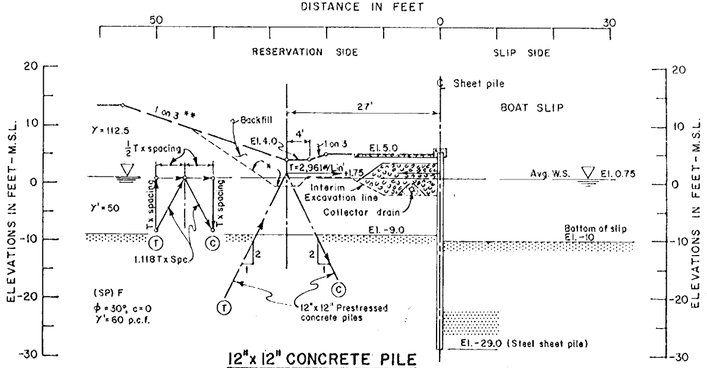




DESIGN LOAD VS TIP ELEV. AND SPACING



COLLECTOR DRAIN



NOTE: Factor of safety of 1.50 applied to sand shear strength. Conjugate stress ratio (Ko) of 1.0 applied to lateral earth pressures. Skin friction disregarded above elevation -9.0. Influence of boat slip and spoil was taken into account in calculation of lateral earth pressures against piles.
*Interim construction excavation to be limited to that required to construct individual pile caps.

SEQUENCE OF CONSTRUCTION

1. Interim excavation, in the dry. Leave an earthen traverse to elevation +5.0 across Bayou La Loutre end of the slip.
2. Drive sheet pile bulkhead.
3. Construct anchor.
4. Construct collector system, shell backfill, clay backfill, and boat ramp.
5. Construct bulkhead cap and place shell surfacing.
6. Open earthen traverse and allow water to enter interim excavation.
7. Final excavation, in the wet.
8. Construct fender system.
9. Construct field office building.

NOTE: Spoil from construction excavation not to be placed within 100 feet of top of slope of slip excavation and/or top of slope of existing Mississippi River-Gulf Outlet spoil paralleling Bayou La Loutre and the Mississippi River-Gulf Outlet. Spoil section not to exceed a 1 on 3 slope for 8 feet, thence 1 on 20.
**Will be constructed to 1 on 4 slope to facilitate maintenance.

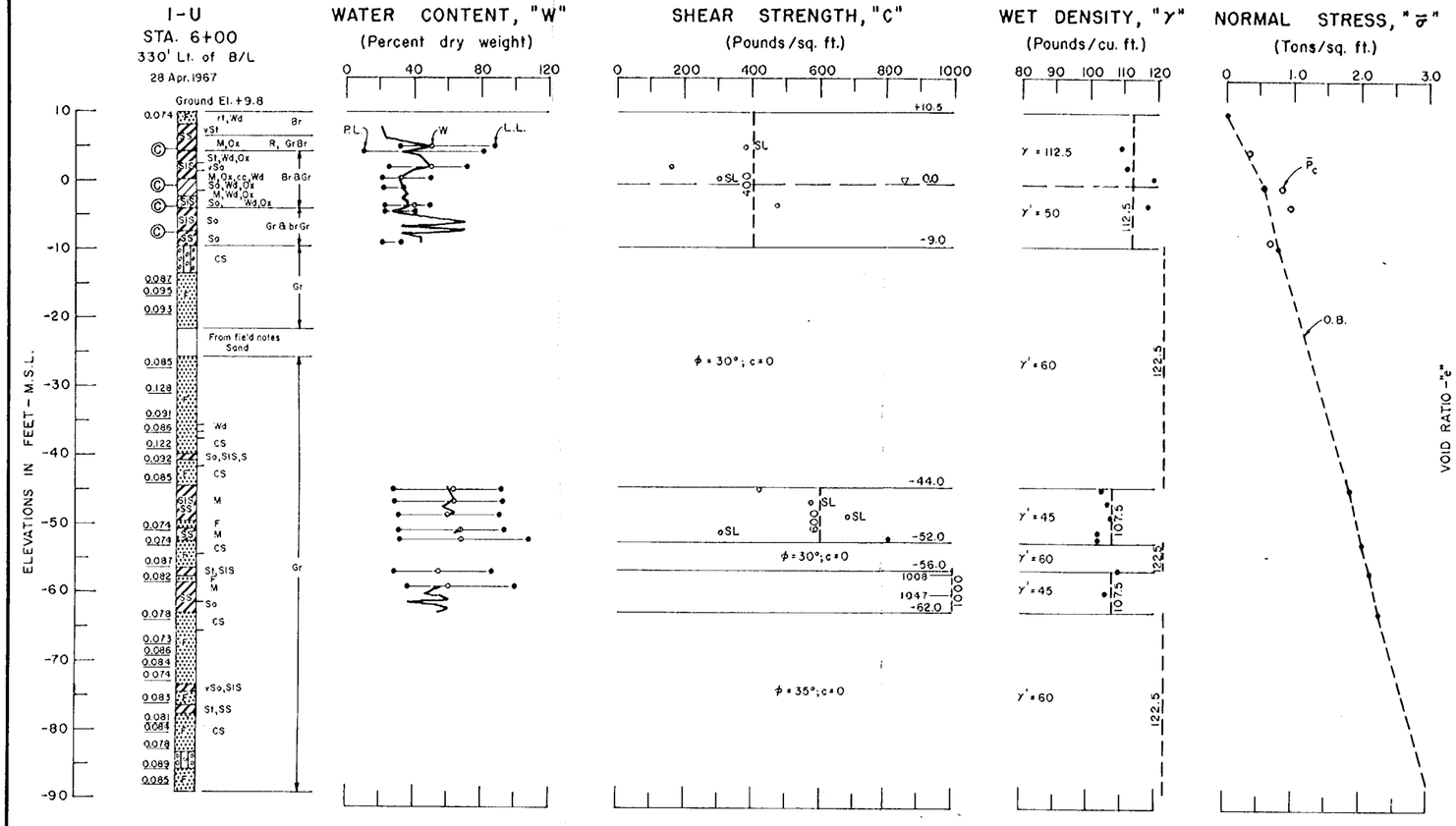
MISSISSIPPI RIVER—GULF OUTLET, LA.
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3

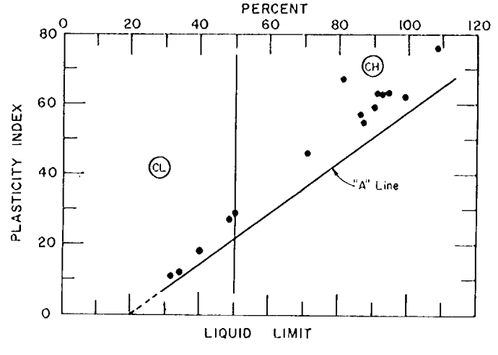
BAYOU LA LOUTRE RESERVATION
FOUNDATION DESIGNS

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

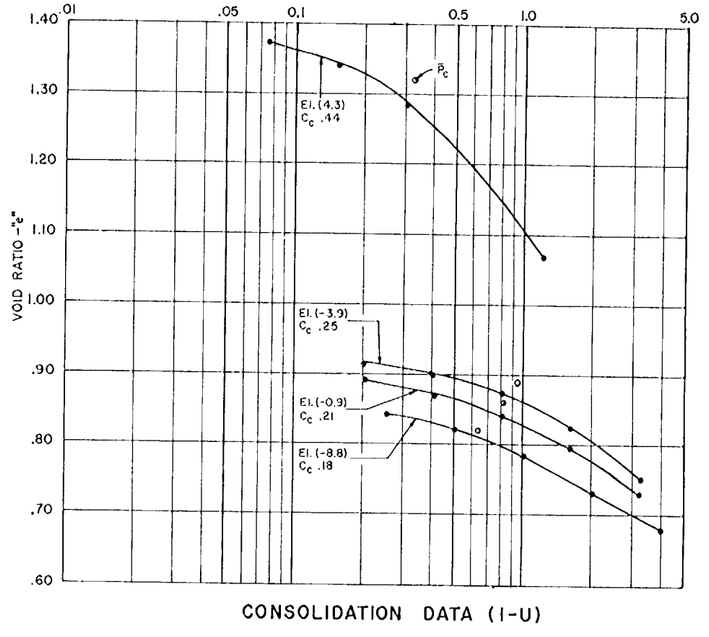
FEBRUARY 1968 FILE NO. H-2-24312

PLATE III-1

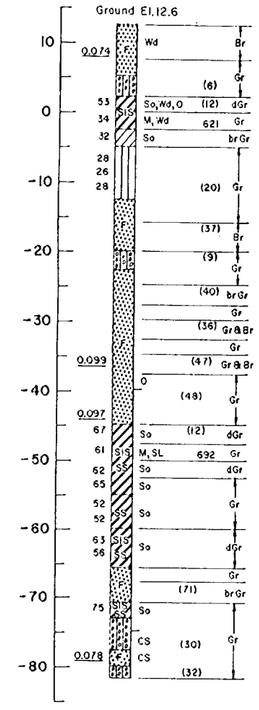




PLASTICITY CHART



CONSOLIDATION DATA (I-U)



NOTE:

General type 2 boring was taken with a 1⅞" I.D. core barrel sampler. Where driving resistances are shown, samplas were taken with a 1⅜" I.D., 2" O.D., split spoon sampler using a 140 lb. hammer and a 30" drop. Undisturbed "IU" boring was taken with a 5" diameter steel tube piston type sampler.

For soil boring legend see plate A.
For location of borings see plate IV-1.

GENERAL NOTES

- ⊙ UC - Unconfined compression shear
- Ⓒ - Consolidation test
- W - Natural water content
- L.L. - Liquid limit
- P.L. - Plastic limit
- c - Unit cohesion
- φ - Angle of friction
- γ - Unit weight of soil-water system
- σ̄ - Normal stress
- O.B. - Overburden
- $\bar{P}_c$ - Preconsolidation pressure
- e - Void ratio
- C_c - Compression index

MISSISSIPPI RIVER—GULF OUTLET, LA.
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3

UNDISTURBED BORING I-U DATA AND BORING LOG 2

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

FEBRUARY 1968 FILE NO. H-2-24312

PLATE III-2

UNIFIED SOIL CLASSIFICATION

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

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

NOTES:

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

- Are natural water contents in percent dry weight
- When underlined denotes D_{10} size in mm *

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

- Are liquid and plastic limits, respectively

SYMBOLS TO LEFT OF BORING

- ▽ Ground-water surface and date observed
- (C) Denotes location of consolidation test **
- (S) Denotes location of consolidated-drained direct shear test **
- (R) Denotes location of consolidated-undrained triaxial compression test **
- (Q) Denotes location of unconsolidated-undrained triaxial compression test **
- (T) Denotes location of sample subjected to consolidation test and each of the above three types of shear tests **
- FW Denotes free water encountered in boring or sample

FIGURES TO RIGHT OF BORING

- Are values of cohesion in lbs./sq. ft. from unconfined compression tests
- In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler ($1\frac{3}{8}$" I.D., 2" O.D.) and a 140 lb. driving hammer with a 30" drop
- Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample
- Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remculded to the estimated natural void ratio

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

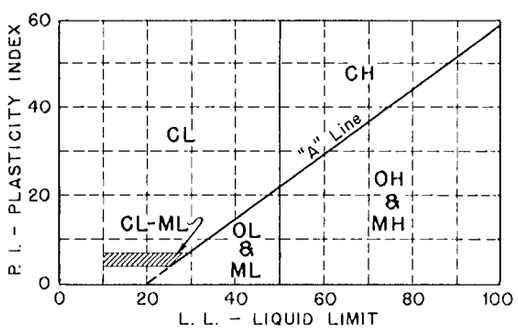
**Results of these tests are available for inspection in the U.S. Army Engineer District Office, if these symbols appear beside the boring logs on the drawings.

DESCRIPTIVE SYMBOLS

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

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

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



PLASTICITY CHART

For classification of fine - grained soils

GENERAL NOTES:

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

Ground-water elevations shown on the boring logs represent ground-water surfaces encountered on the dates shown. Absence of water surface data on certain borings implies that no ground-water data is available, but does not necessarily mean that ground water will not be encountered at the locations or within the vertical reaches of these borings.

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

REVISION	DATE	DESCRIPTION	BY
2	6-8-64	SYMBOL FW, NOTE REVISED	OPAL FROM L.M.V.G.G. 5 JUNE 1964
1	9-17-63	1ST. PAR. OF GENERAL NOTES REVISED	L. M. V. D. MULTIPLE LETTER, DATED 5 SEPT., 1963

SOIL BORING LEGEND

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FILE NO. H-2-21800

PLATE A

SECTION IV - STRUCTURAL DESIGN

1. General. Structural design has been accomplished in accordance with standard engineering practice and criteria set forth in "Engineering Manuals for Civil Works Construction," published by the Office, Chief of Engineers.

2. Basic data. Basic data relevant to the design of the protective works are shown in the following table:

a. Water elevations

	Elevations for design (Feet m.s.l.)
Low tide	-2.0
Average water surface	0.75
Maximum expected surge from a standard project hurricane	15.0

b. Unit weights

Item	Lb. per Cu. Ft.
Water	62.5
Concrete	150
Steel	490
Earth	(See plates III-1 & III-2)

3. Allowable working stresses. The allowable working stresses for concrete and structural steel are in accordance with those recommended in "Working Stresses for Structural Design," EM 1110-1-2101, dated 1 November 1963. Concrete will be designated by basic minimum compressive strength 3000 p.s.i., except for prestressed concrete piling which shall be designated 5000 p.s.i. Steel sheet piling will meet the requirements of ASTM A328-54, "Standard Specification for Steel Sheet Piling." For convenient reference, pertinent allowable stresses are tabulated below:

Reinforced concrete	Stress - p.s.i.
fc'	3,000
fc	1,050
v (without web reinforcement)	60
v (with web reinforcement)	274
fs (reinforcing steel)	20,000
Minimum tensile steel	0.0025bd
Shrinkage and temperature steel	0.0020bt
Structural steel (ASTM A-36)	
Basic stress tensile stress	18,000

4. Responsibility. The Corps of Engineers is responsible for the design and construction of the joint-use facilities which will include filling and grading the reservation, a security fence, roads and parking areas, boat-launching ramp, sheet pile bulkhead and the tie backs, the walkway-fender system, shell access roads, and the boat slip. The buildings will be designed by each participating agency; however, the Corps of Engineers will supervise and inspect the construction (to be accomplished by contract) of all the features. The general plan is shown on plate IV-1 and detail sections are shown on plates IV-3 through IV-5.

5. Boat slip. Excavation for the boat slip will be in two stages as shown on plate III-1. The material from this excavation will be used to grade the entire reservation. The final grade will have a 1 percent slope from elevation 12.0 along Bayou La Loutre up to the property line along Louisiana Highway 624.

6. Roads and parking areas. The roads and parking areas will be constructed by use of 4-inch shell over compacted fill. The parking area will be large enough to accommodate cars for the crew of the dredge "Langfitt."

7. Fence. A 6-foot chainlink fence will be erected around the reservation as a safety measure and for the security of the structures.

8. Sheet pile bulkhead. A steel sheet pile bulkhead with a concrete cap will be installed at the northwest end of the boat slip. Net load and moment diagrams for the bulkhead are shown on plate IV-2. Six-inch drains with flap gates will be provided behind the bulkhead with an invert elevation of -1.5 to provide runoff of rain water confined in the area behind the bulkhead. Also, a shell access road will be provided adjacent to the bulkhead, and a walkway-fender system will be provided along both sides of the boat slip. In the design of the steel sheet pile bulkhead, a surcharge load of 100#/ft^2 was considered, but this did not appreciably change the factor of safety of 1.5 applied to soil.

9. Boat-launching ramp. The boat-launching ramp was designed for 100#/ft^2 and will consist of a reinforced concrete ramp on timber piles. A concrete curb on the sides and bottom of the ramp will aid in preventing trailers from falling off the ramp.

10. Corps of Engineers building.

a. This multiple-purpose building will be of hurricane resistant construction on a timber pile foundation. The piling will extend above ground surface sufficiently to permit construction of the floor level at elevation 20, which is above the maximum hurricane tide, including wave action. Included in the Corps of Engineers

building will be a dormitory to house ten men on temporary assignment, a kitchen area, a material storage area, and a field office. The floor plan and typical section are shown on plate IV-5.

b. Commercial electric power, 120/240 volt, single phase, 60 cycle, will be available at the site and will be used for power and lighting loads.

c. Sanitation facility will consist of a gas-fired toilet capable of burning human wastes to carbon dioxide and water vapor. Bath and domestic waste water will be drained directly into Bayou La Loutre.

d. Potable and wash water will be obtained from the municipal water supply at Hopedale, La., using a 2,000-gallon capacity tank wagon towed by a pickup truck. A disconnect coupling will be provided for connecting the tank to the domestic water system. The domestic water system will include an electric motor-driven pump and pressure tank, and a gas hot water heater.

e. A 500-gallon liquid propane gas storage tank will be provided for operation of four wall-mounted vented gas furnaces, water heater, and gas-fired toilet.

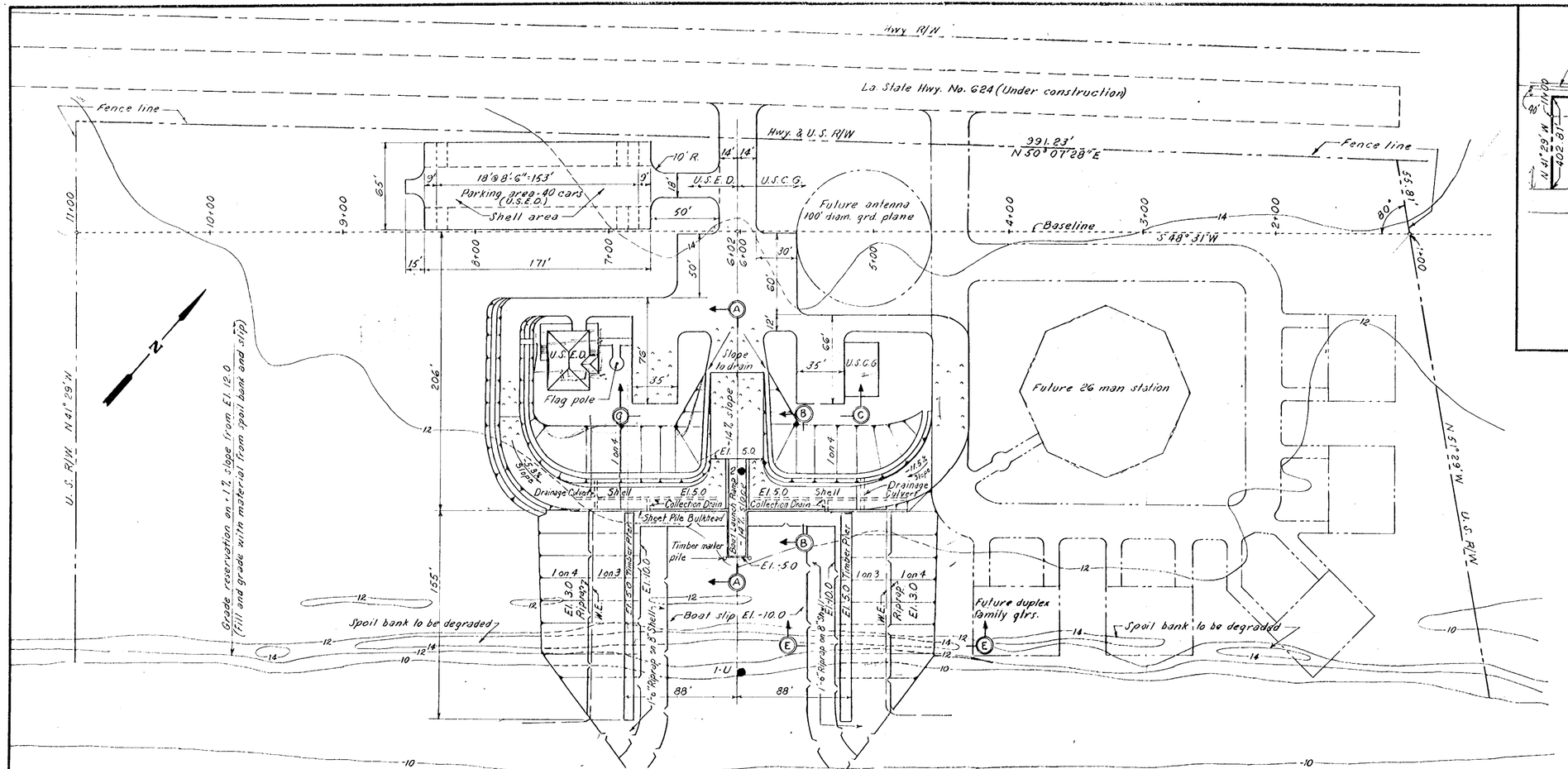
f. Each room will be provided with an electrical receptacle for operation of window-type air conditioning units, if required.

g. A 35-pound capacity, 5 cu.ft., L.P. gas-fired incinerator will be included for garbage disposal.

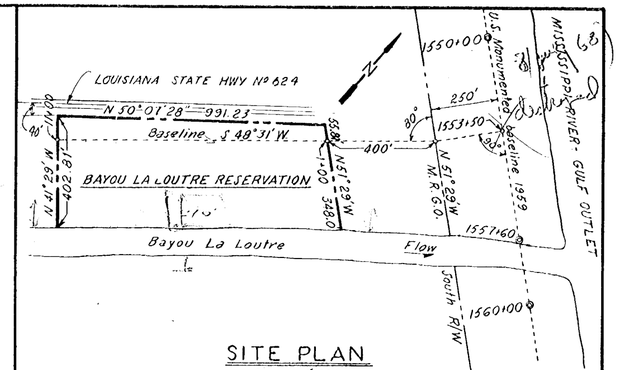
11. Schedule for design and construction. The schedule for design and construction is as follows:

Design, P&S		Construction			Est. const. cost
Start	Complete	Advertise	Award	Complete	(incl.contgy.)
Jun 67	Apr 68	Jun 68	Jul 68	Jul 69	$312,700*

*Includes $102,000 contributed funds from the U. S. Coast Guard for joint-use facilities and $75,000 for U. S. Coast Guard building



PLAN
Scale 1:400



SITE PLAN
Scale 1"=200'

Notes:
Elevations are in feet and refer to M.S.L.
All roads and parking areas to be surfaced with shell.
For sections A-A through D-D, see plate IV-3
For boring logs, see plate III-2
For sections E-E see plate IV-4

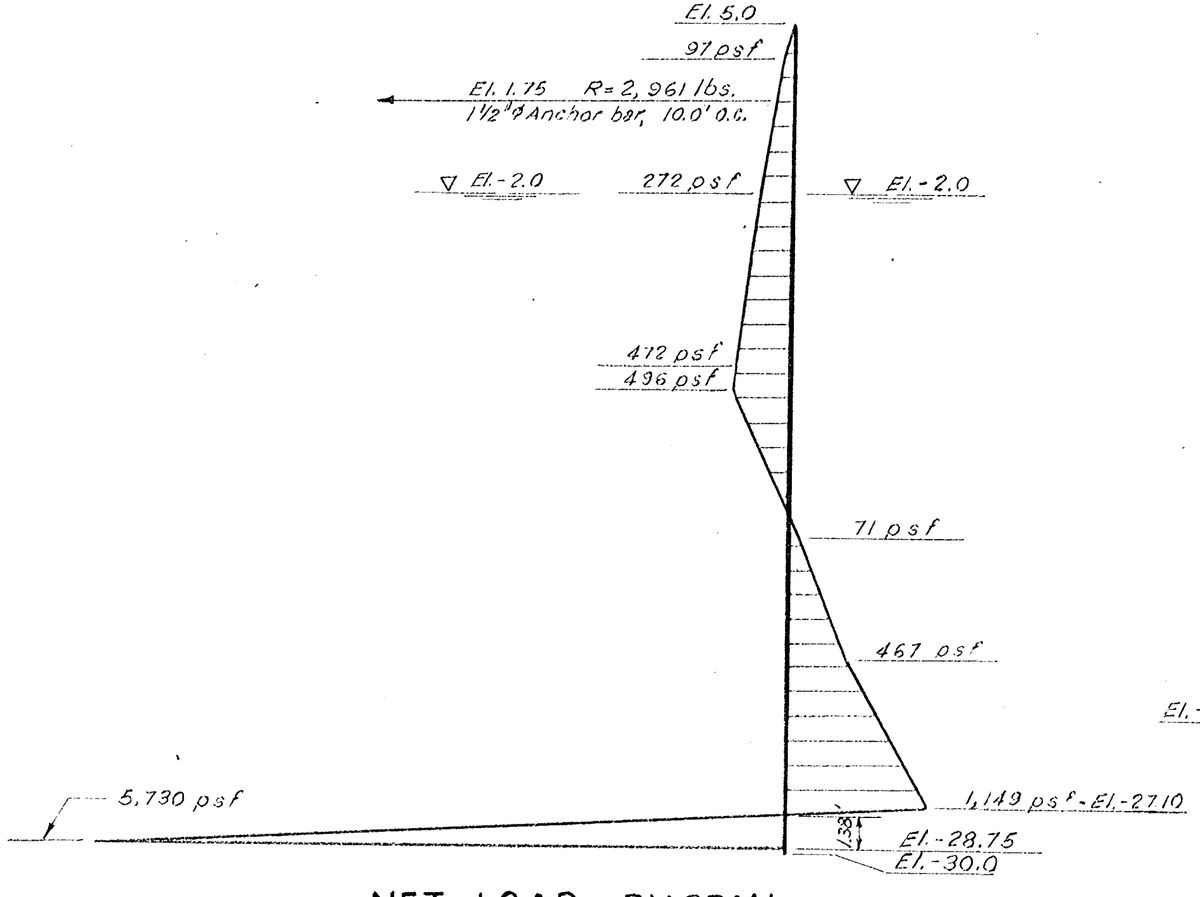
MISSISSIPPI RIVER-GULF OUTLET, LA.
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3

BAYOU LA LOUTRE RESERVATION
GENERAL PLAN

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

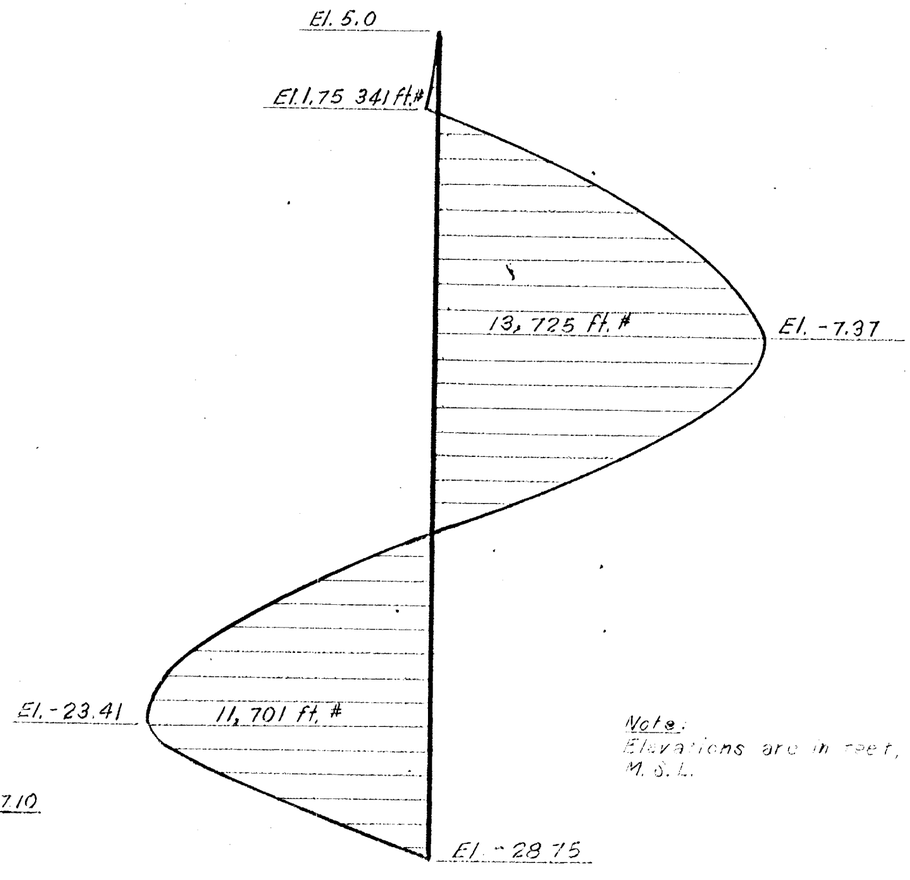
FEBRUARY 1968 FILE NO. H-2-24312

PLATE IV-1



NET LOAD DIAGRAM

Scales: 1" = 5'
1" = 1,000 psf



MOMENT DIAGRAM

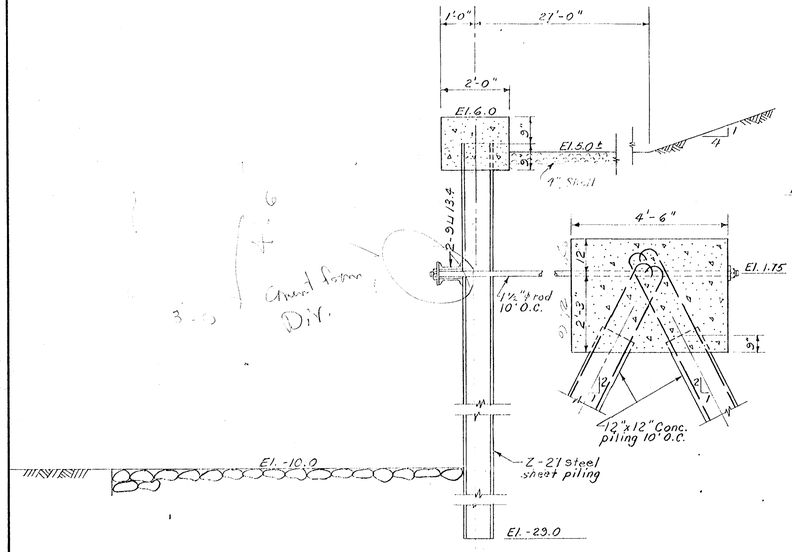
Scales: 1" = 5'
1" = 5,000 ft#

Note:
Elevations are in feet, M.S.L.

Note: For typical section of bulkhead wall, see plate IV 3

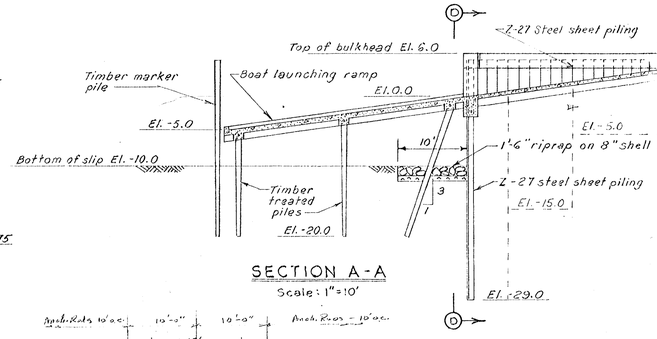
MISSISSIPPI RIVER — GULF OUTLET
LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION
BULKHEAD DESIGN ANALYSIS
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FEBRUARY 1968 FILE NO. H-2-24312

PLATE IV-2



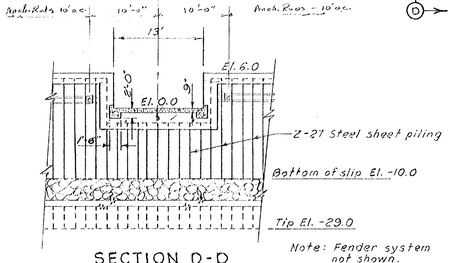
BULKHEAD DETAILS

Scale: ½" = 1'-0"



SECTION A-A

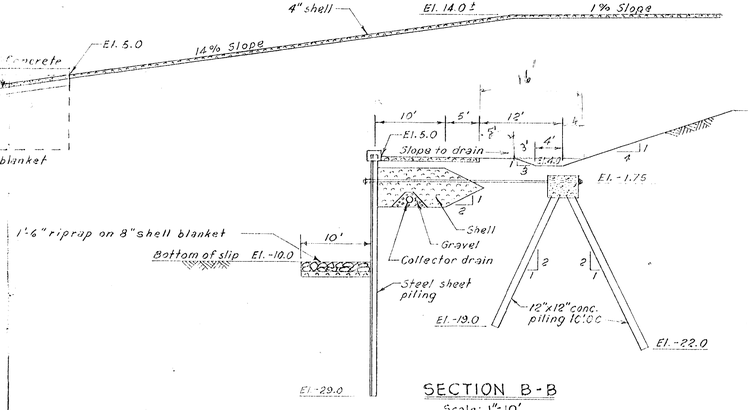
Scale: 1" = 10'



SECTION D-D

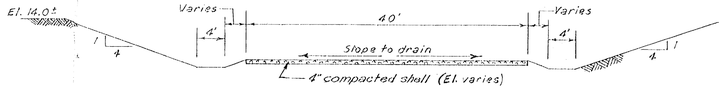
Scale: 1" = 10'

Note: Fender system not shown.



SECTION B-B

Scale: 1" = 10'



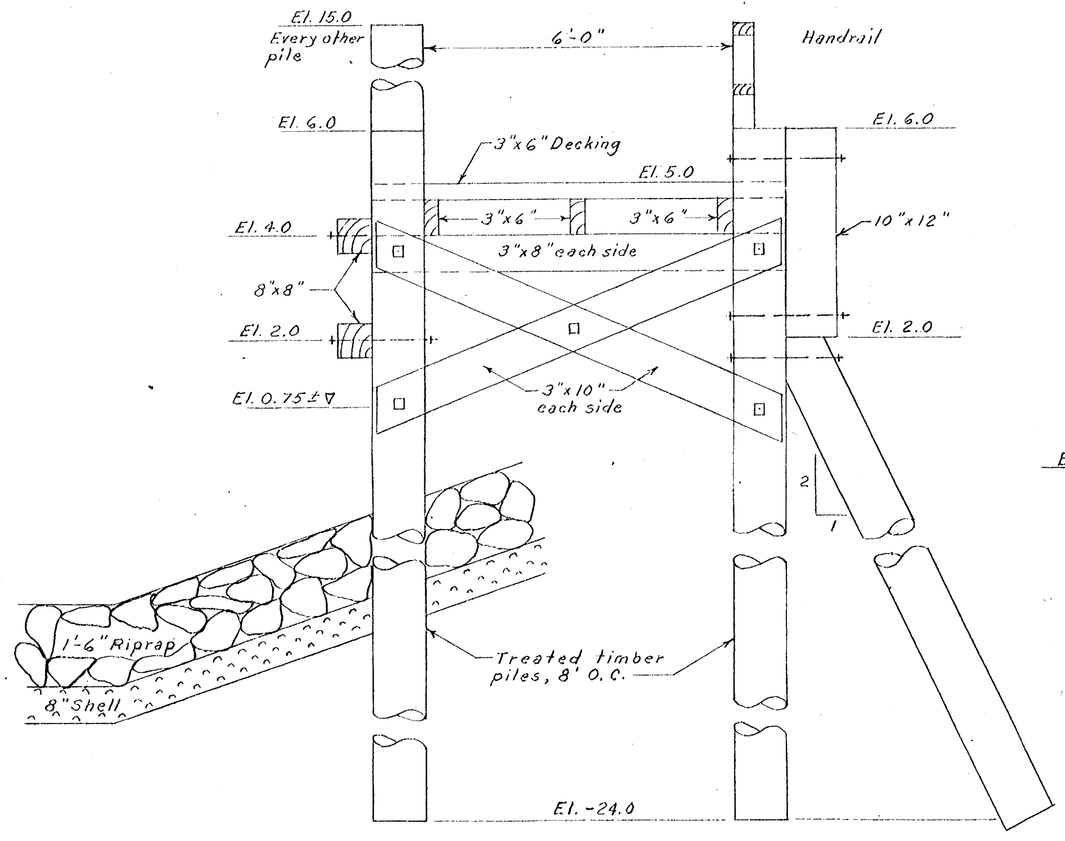
SECTION C-C

Scale: 1" = 10'

Note:
Elevations are in feet, M.S.L.

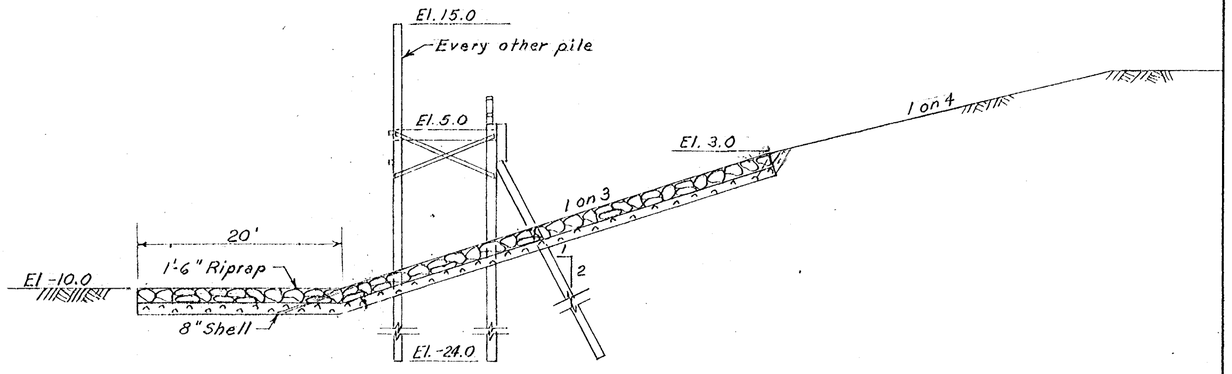
MISSISSIPPI RIVER - GULF OUTLET
LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION
SECTIONS
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FEBRUARY 1968 FILE NO. H-2-24312

PLATE IX-3



TYPICAL SECTION WALKWAY FENDER

Scale: 1/2" = 1'-0"



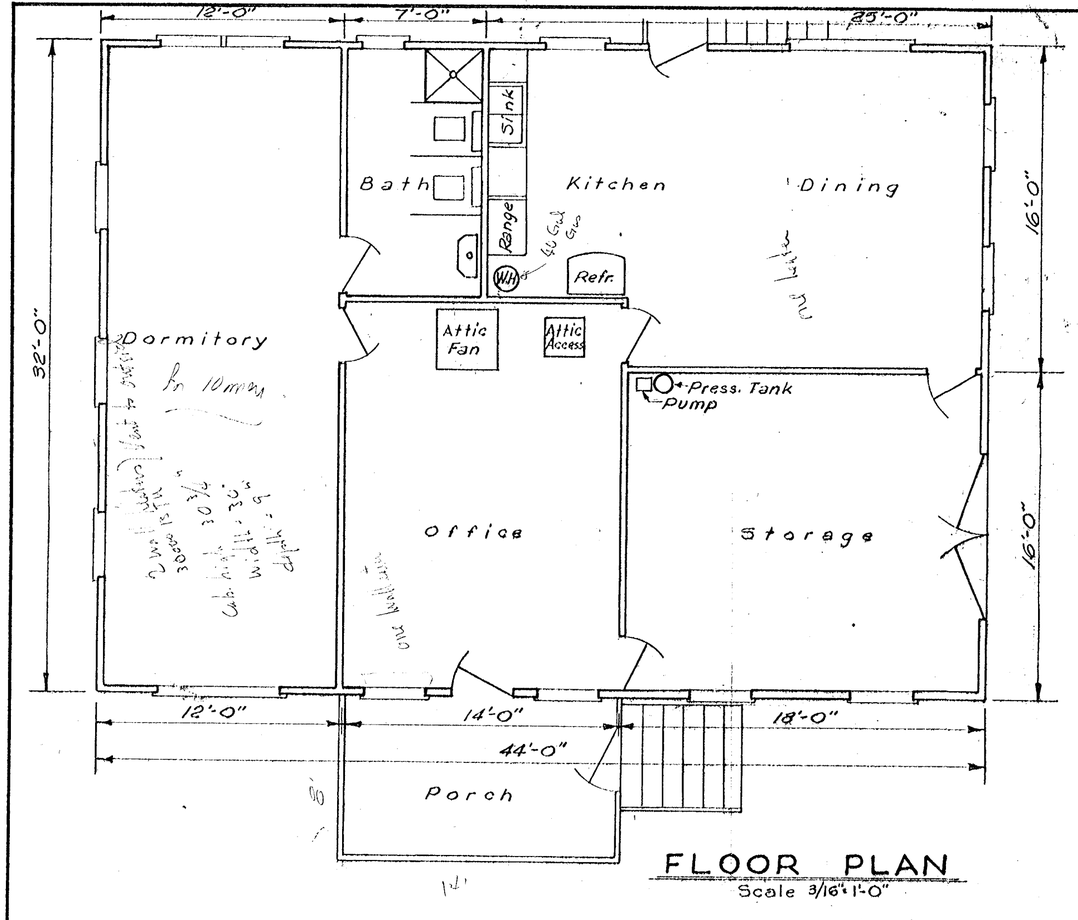
SECTION E-E

Scale: 1" = 10'-0"

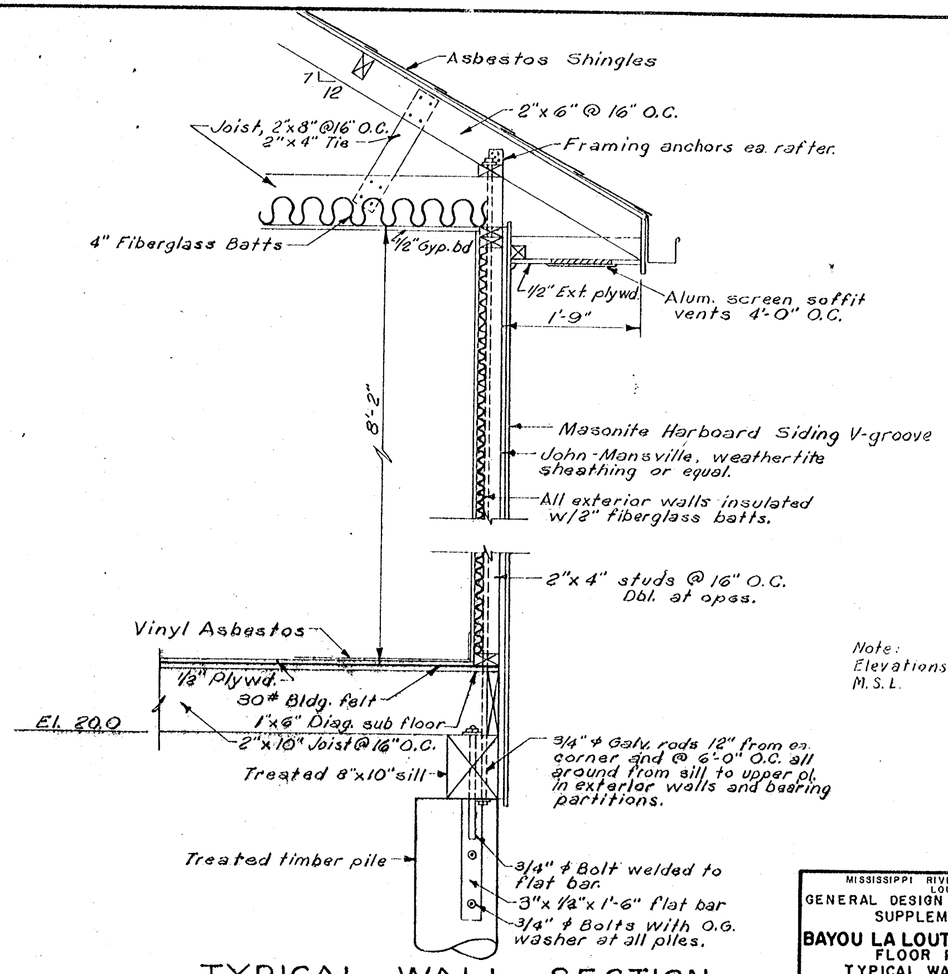
Note:
Elevations are in feet, M.S.L.

MISSISSIPPI RIVER - GULF OUTLET
LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION
SECTIONS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FEBRUARY 1968 FILE NO. H-2-24312

PLATE IX-4



FLOOR PLAN
Scale 3/16"=1'-0"



Note:
Elevations are in feet, M.S.L.

TYPICAL WALL SECTION
Scale 3/4"=1'-0"

MISSISSIPPI RIVER – GULF OUTLET
LOUISIANA
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 3
BAYOU LA LOUTRE RESERVATION
FLOOR PLAN AND
TYPICAL WALL SECTION
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FEBRUARY 1968
FILE NO. H-2-24312

PLATE IV-5

SECTION V - COST ESTIMATES

1. General. Costs for constructing, operating, and maintaining the joint-use facilities will be shared by the Corps of Engineers with the U. S. Coast Guard on a 50-50 basis. Fiscal requirements, both first and annual cost, for the facilities will be funded by the individual agency.

2. Joint-use first cost. The first cost of constructing the joint-use facilities, which includes the steel sheet pile bulkhead and boat slip, boat-launching ramp, walkway-fender system, roads and parking areas, and site developments is $240,000, of which the Corps of Engineers will contribute $120,000 and the U. S. Coast Guard $120,000. Details of these costs are given in table V-1.

TABLE V-1
DETAILS OF JOINT-USE FACILITIES, FIRST COST
(Sep 67 price level)

Item No.	Description	Estimated quantity	Unit	Unit price	Estimated amount
1	STEEL SHEET PILE BULKHEAD AND SLIP				
	Excavation	31,500	c.y.	$1.50	$ 47,250
	Backfill	1,400	c.y.	1.50	2,100
	Conc. in pile cap	40	c.y.	100.00	4,000
	Cement	55	bbls.	5.00	280
	Reinf. steel	4,900	lbs.	0.175	860
	Steel sheet pile (Z-27)	8,800	sq.ft.	3.75	33,000
	Paint sheet pile	2,500	sq.ft.	.40	1,000
	Struct.steel (incl. tie rod)	13,800	lb.	.50	6,900
	Shell backfill	600	c.y.	3.50	2,100
	Gravel drain	60	c.y.	8.00	480
	6" dia. perf.pipe (steel)	240	l.f.	5.00	1,200
	6" dia.pipe (steel)	15	l.f.	5.00	80
	6" flap valve	2	ea.	200.00	400
	Riprap	50	c.y.	10.00	500
	Shell	25	c.y.	3.50	90
2	BULKHEAD PILE ANCHORS				
	Conc. for pile caps	40	c.y.	100.00	4,000
	Cement	50	bbl.	5.00	250
	Reinf. steel	4,500	lbs.	0.175	800
	Conc. piling (12" x 12" sq.)	1,115	l.f.	5.50	6,150

Par 2

TABLE V-1 (cont'd)

Item No.	Description	Estimated quantity	Unit	Unit price	Estimated amount
3	BOAT-LAUNCHING RAMP				
	Concrete	19	c.y.	$100.00	$ 1,900
	Cement	27	bbl.	5.00	140
	Reinf. steel	2,850	lbs.	0.175	500
	Class "B" treated timber piles (12# treatment)	120	l.f.	2.75	300
4	FENDER SYSTEM				
	Class "B" treated timber piles (12# treatment)	3,800	l.f.	2.75	10,450
	Treated timber	15.0	MFBM	700.00	10,500
	Hardware	1,950	lbs.	.45	880
	Riprap	1,800	tons	10.00	18,000
	Shell	480	c.y.	3.50	1,680
5	ROADWAYS AND PARKING AREAS				
	Shell road and parking area (compacted)	625	c.y.	5.75	3,590
6	SITE DEVELOPMENT				
	Fill (reservation)	11,000	c.y.	1.00	11,000
	Security fence (6' high chain link)	1,850	l.f.	3.00	5,500
	Gates (20' chain link 6' high)	1	ea.	200.00	200
	Fertilizing and seeding	10	acre	150.00	1,500
	Subtotal				$177,580
	Contingencies 15%+				26,420
	Subtotal				$204,000
	E&D 10.0%+				20,000
	Subtotal				$224,000
	S&A 7%+				16,000
	Total				$240,000
	Corps of Engineers (1/2)				$120,000
	U. S. Coast Guard (1/2)				$120,000

Note:- Is cost of Liquid propane (500gal.) included with office Bldg? or where?

3. Corps of Engineers facilities, first cost. The cost of providing the building and the parking area is $38,000. Details of these first costs are shown in table V-2.

TABLE V-2
CORPS OF ENGINEERS, SPECIFIC FACILITIES, FIRST COST

Item No.	Description	Estimated quantity	Unit	Unit price	Estimated amount
1	Office building	1	l.s.		$ 23,500
2	Corps of Engineers parking area	330	c.y.	6.00	1,980
3	Water wagon	1	l.s.		1,200
	Subtotal				$ 26,680
	Contingencies 15%+				4,020
	Subtotal				$ 30,700
	E&D 15%+				4,800
	Subtotal				$ 35,500
	S&A 7%+				2,500
	Total				$ 38,000

4. Corps of Engineers, first cost. The first cost allocated to the Corps is $158,000, which includes $120,000 for the joint-use facilities and $38,000 for specific facilities. Summary of the first cost is shown below in table V-3; details are available in tables V-1 and V-2.

TABLE V-3
CORPS OF ENGINEERS, FIRST COST

Cost Acct. No.	Item	Cost
19	Buildings, ground, and utilities	$132,700
30	Engineering and design	14,800
31	Supervision and administration	10,500
	Total	$158,000

5. Corps of Engineers, operations and maintenance cost. The annual cost of operating and maintaining the facilities of the reservation is $1,600 annually, which includes grass cutting, road and parking area repairs, walkway-fender system repair, building upkeep, and utilities cost for the building. All of the facilities are

expected to last for the 50-year project life with proper ordinary maintenance. No major replacements are anticipated except as may be inflicted by storms.

6. U. S. Coast Guard, operations and maintenance costs. The U. S. Coast Guard will be responsible for all operations and maintenance costs on their part of the reservation. However, when economically feasible, it is anticipated that certain items, such as road and parking lot repairs, and walkway-fender system repairs, may be accomplished by the Corps of Engineers under single contracts with reimbursement by the Coast Guard for work in its area.

SECTION VI - ECONOMICS

1. General. The economic analysis presented herein applies only to the Corps of Engineers area and does not attempt to justify the U. S. Coast Guard development.

2. Benefits. A summary of the average annual benefits accruing to the Corps facilities is shown on table VI-1. Details of the benefit analysis are as follows:

a. Dormitory space. Currently survey parties making condition surveys of the MR-GO leave the New Orleans District Office each work morning, travel to the job site, work, and return each evening. It is estimated that an average of 3 party-hours is lost each day because of this travel requirement. Motel or hotel facilities, which would significantly reduce the travel time, are not available in the area. Since condition surveys are made about 3 months each year, the savings that will result from use of the dormitory are as follows:

3 party-hrs/day x 3 mo/yr x 22 days/mo x $45/party-hr = $8,910 per year.

b. Docking facilities.

(1) The survey boat used for the condition surveys will use the dock at the boat slip when such surveys are being made. The rental cost for boat dockage is estimated to be $1 ft/month, and since this type boat averages 45 feet in length, the benefit accruing to the docking facility is as follows:

3 mo/yr x $1/ft/mo x 45 ft = $135 per year.

(2) A survey boat making reconnaissance surveys will use the dock at the boat slip about 80 percent of the time. Since this type boat averages 45 feet in length, the benefit accruing to the docking facility is as follows:

10 mo/yr x $1/ft/mo x 45 ft = $450 per year.

(3) In addition, the Area Engineer, New Orleans Area Office, will use the dock for a 45-foot boat at the slip at all times when not in use and another 30-foot boat about 20 percent of required dockage time. The benefit accruing to the docking facility for this is as follows:

12 mo/yr x $1/ft/mo x 45 ft	=	$540 per year
2.5 mo/yr x $1/ft/mo x 30 ft	=	75 per year
		$615 per year

(4) The crew boat for the hopper dredge "Langfitt" will use the dock at the slip at least 15 percent of the required dockage time. The benefit accruing to the docking facility for this is as follows:

2 mo/yr x $1/ft/mo x 45 ft = $90 per year.

c. Storage space. The storage space will be used to store survey equipment and materials, and boat equipment. Rental cost of space is considered to be a measure of this benefit. The benefit is estimated as follows:

250 sq ft x $0.05/sq ft/mo x 12 mo/yr = $150 per year.

d. Crew boat service, hopper dredge "Langfitt." The crew boat for the hopper dredge "Langfitt" presently is serviced from the Shell Beach area when working in the MR-GO. Use of the boat slip at this reservation will reduce the round trip distance by 10 miles. The benefit accruing is equal to at least the fuel for operating the 45-foot boat. The benefit is estimated as follows:

2 mo/yr x 30 days/mo x $0.15/gal x 20 gals/day = $180 per year.

e. Intangible benefits. In addition to the tangible benefits, certain intangible benefits accrue to the facility. These include the convenience to personnel of the dredge "Langfitt" in having a secured parking area for their private automobiles while on duty, and the use of this hurricane resistant structure during such storms as a haven of refuge and after such occurrences as a field office in recovery operations.

TABLE VI-1
SUMMARY OF AVERAGE ANNUAL BENEFITS

Dormitory space		$ 8,910
Docking facilities		1,290
Storage space		150
Crew boat service		180
	Total	$10,530
	Rounded to	$10,500

3. Annual charge. The average annual charge consists of interest and amortization of the first cost $158,000 @ 2-5/8 percent for 50 years), an amount of $5,700 per year, and the average annual operation and maintenance cost which is $1,600 for a total average annual charge of $7,300.

4. Benefit-cost ratio. The average annual benefits of $10,500 and average annual charge of $7,300 result in a favorable benefit-cost ratio of 1.4 to 1.

SECTION VII - RECOMMENDATION

1. Recommendation. The plan of improvement presented herein consists of the grading and fencing of the reservation area, and construction of a steel sheet pile bulkhead riprap protected boat slip, walkway-fender system, a small boat-launching ramp, roads, and parking areas, a multi-purpose Corps building, and a U. S. Coast Guard building. The reservation will be shared with the U. S. Coast Guard and the boat-launching ramp, boat slip, and access have been designed for joint use. Approval of the plan presented herein is recommended.

APPENDIX A

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:
COMMANDER (ecv)
Eighth Coast Guard District
Customhouse
New Orleans, La. 70130

11019
22 January 1968
Serial 1134

From: Commander, Eighth Coast Guard District
To: District Engineer, U. S. Army Engineer District, New Orleans

Subj: Mississippi River - Gulf Outlet -- Bayou LaLoutre -- Hopedale Light Attendant Station

Ref: (a) Your No. LMNED-PP-11
(b) Your telegram of 12 Jan 1968
(c) Your LMNED-DD of 6 Nov 1967

1. The plot plan as submitted in reference (c) is approved.

2. Funds in the amount of $120,000.00 to share the cost of site improvements, bulkheads, ramps, etc. as outlined in reference (c) has been allotted.

3. It is desired that your office advertise for bids, supervise and inspect the entire project including the Coast Guard building. Funds in the amount of $78,000.00 have been allotted for the construction of the Coast Guard building including a 3,000 gallon potable water cistern. Plans and specifications for our building will be submitted to you not later than 5 April 1968.

4. Coast Guard funds will be available in the Fourth Quarter FY 1968. No expenditures will be made prior to 1 July 1968.

H. G. KOSKY
By direction