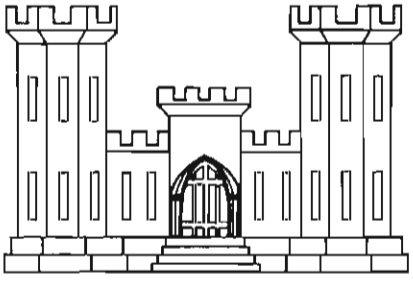
LAKE PONTCHARTRAIN LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
AND CHALMETTE AREA PLAN

DESIGN MEMORANDUM NO. 4
GENERAL DESIGN
FLORIDA AVENUE COMPLEX, IHNC



DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
JUNE 1980

PREPARED BY

n-y ASSOCIATES, INC.
CONSULTING ENGINEERS
ARCHITECTS & PLANNERS

SERIAL NO. 5

LEGEND

EXISTING IMPROVEMENTS

- Levee
- Seawall
- Location of work covered in this document.
- Portion of U.S. Hwy 90 to serve as part of Barrier Embankment

AUTHORIZED IMPROVEMENTS

- New Levee
- Levee Enlargement
- Control Structure
- Drainage Structure
- Lock
- Floodgate
- Navigation Channel
- Floodwall
- Seawall Strengthening
- Rock Fill

Mandeville

Seawall
* Indefinitely Deferred

PASS MANCHAC

LAKE MAUREPAS

LAKE PONTCHARTRAIN CAUSEWAY

LAKE PONTCHARTRAIN

ST. JOHN THE BAPTIST PARISH
ST. CHARLES PARISH

* Indefinitely Deferred

ST. CHARLES PARISH
JEFFERSON PARISH

JEFFERSON PARISH
ORLEANS PARISH

ST TAMMANY PARISH
ORLEANS PARISH

Apple Pie Ridge

N

THE RIGOLETS

South Point

New Orleans Lakefront Airport

Seabrook Lock

Seawall

NEW ORLEANS EAST

CITRUS

ORLEANS PARISH
ST. BERNARD PARISH

WATERWAY

CHEF MENTEUR PASS

GULF INTRACOASTAL

LAKE BORGNE

Location of work

BONNET CARRE SPILLWAY

ST CHARLES PARISH

JEFFERSON PARISH

NEW ORLEANS

FLORIDA AVE. BRIDGE

INNER HARBOR NAVIGATION CANAL

EXISTING LOCK

CHALMETTE

Bayou Bienvenue

MISSISSIPPI RIVER - GULF OUTLET

Chalmette

Violet

Bayou Dupre

Verret

Caernarvon

MISSISSIPPI RIVER

SCALE OF MILES
1 0 1 2 3 4 5

LAKE PONTCHARTRAIN
AND VICINITY, LA.
(HURRICANE PROTECTION)

AUTHORIZED PLAN OF PROTECTION

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

NOVEMBER 1965 FILE NO. H-2-23693

REV DEC. 1970 AND *APRIL 1978

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY

STATUS OF DESIGN MEMORANDUMS

Design Memo No.	Title	Status
1	Hydrology and Hydraulic Analysis	
	Part I - Chalmette	Approved 27 Oct 66
	Part II - Barrier	Approved 18 Oct 67
	Part III - Lakeshore	Approved 6 Mar 69
	Part IV - Chalmette Extension	Approved 1 Dec 67
2	Lake Pontchartrain Barrier Plan, GDM, Advance Supplement, Inner Harbor Navigation Canal Levees	Approved 31 May 67
2	Lake Pontchartrain Barrier Plan, GDM, Citrus Back Levee	Approved 29 Dec 67
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 1, Lake Pontchartrain Barrier, Rigolets Control Structure, Clsoure Dam, and Adjoining Levees	Approved 10 Nov 70
2	Lake Pontchartrain Barrier Plan, GDM Supplement No. 2, Lake Pontchartrain Barrier, Rigolets Lock and Adjoining Levees	Approved 19 Oct 71
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 3, Lake Pontchartrain Barrier, Chef Menteur Pass Complex	Approved 19 Sep 69
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 4, New Orleans East Back Levees	Approved 18 Aug 71
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 5, Orleans Parish Lakefront Levees - West of IHNC	Scheduled Mar 81
2	Lake Pontchartrain Barrier Plan, GDM, Supplement 5A, Citrus Lakefront Levees - IHNC to Paris Road	Approved 12 Jul 76

STATUS OF DESIGN MEMORANDUMS (cont'd)

Design Memo No.	Title	Status
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 5B, New Orleans East Lakefront Levee - Paris Road to South Point	Approved 5 Dec 72
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 5C, Orleans Parish Outfall Canals - West of the IHNC	Scheduled Dec 82
2	Lake Pontchartrain Barrier Plan, GDM Supplement No. 5D, Orleans Parish Lakefront Levees, Orleans Marina	Approved 24 May 78
	Lake Pontchartrain Barrier Plan, GDM Supplement No. 6, St. Charles Parish Lakefront Levees	Approved 4 Nov 70
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 7, St. Tammany Parish, Mandeville Seawall	Scheduled Mar 81
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 8, IHNC Remaining Levees	Approved 6 Jun 68
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 9, New Orleans East Levee from South Point to GIWW	Approved 1 May 73
2	Lake Pontchartrain Barrier Plan, GDM, Supplement No. 10, Jefferson Parish Lakefront Levees	Scheduled Dec 80
3	Chalmette Area Plan, GDM	Approved 31 Jan 67
3	Chalmette Area Plan, GDM, Supplement No. 1, Chalmette Extension	Approved 12 Aug 69
4	Lake Pontchartrain Barrier Plan, and Chalmette Area Plan, GDM, Florida Avenue Complex, IHNC	Scheduled Jun 80
5	Chalmette Area Plan, DDM, Bayous Bienvenue and Dupre Control Structures	Approved 29 Oct 68

STATUS OF DESIGN MEMORANDUMS (cont'd)

Design Memo No.	Title	Status
6	Lake Pontchartrain Barrier Plan, DDM, Rigolets Control Structure and Closure	Indefinite
7	Lake Pontchartrain Barrier Plan, DDM, Chef Menteur Control Structure and Closure	Indefinite
8	Lake Pontchartrain Barrier Plan, DDM, Rigolets Lock	Approved 20 Dec 73
9	Lake Pontchartrain Barrier Plan, DDM, Chef Menteur Navigation Structure	Indefinite
10	Lake Pontchartrain Barrier Plan, Corrosion Protection	Approved 21 May 69
12	Sources of Construction Materials	Approved 30 Aug 66
1	Lake Pontchartrain, Louisiana, and Vicinity, and Mississippi River-Gulf Outlet, Louisiana, GDM, Seabrook Lock	Approved 4 Nov 70
2	Lake Pontchartrain, Louisiana, and Vicinity, and Mississippi River-Gulf Outlet, Louisiana, DDM, Seabrook Lock	Scheduled July 80
Report	Lake Pontchartrain Barrier Plan, Seabrook Lock Breakwater	Scheduled July 80
12	Lake Pontchartrain and Vicinity, Louisiana, Sources of Construction Materials (Revised)	Approved Apr 79

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX I.H.N.C.

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APPENDICES

PERTINENT DATA

Location of project		Southeastern Louisiana in Orleans Parish
Hydrologic data		
Temperature:	Maximum	38.9° C
	Minimum	13.9° C
	Normal	20° C
Annual precipitation:	Maximum	83.5 inches
	Minimum	31.1 inches
	Normal	68.0 inches
Hydraulic design criteria--tidal		
Design hurricane--Standard Project		
Hurricane (SPH) Frequency		1 in 200 yrs.
Central Pressure Index (CPI)		27.4 inches of mercury
Maximum 5-min. average wind		100 m.p.h.
Floodwall (I and T)		
Floodwall (I and T)		0.39 miles
Elevation, varies		14.0' to 16.0'[1]
Gates		
Location		
W/L Stations 103+35.57 and 107+66.97, West I.H.N.C. and 7+52.66, East I.H.N.C.		Three (3) steel swing type in concrete monoliths
W/L Stations 99+98.65 and 103+91.51, West I.H.N.C. and 4+51.99 and 9+19.91, East I.H.N.C.		Four (4) overhead roller type in concrete monolith
W/L Stations 101+30.58, West I.H.N.C. and 5+84.65 East I.H.N.C.		Two (2) dual vertical lift sluice type gates in concrete monoliths
Rights-of-way		
Construction easements		6.0 acres

[1]Elevations contained herein are in feet referred to National Geodetic Vertical Datum unless otherwise noted.

PERTINENT DATA (Cont'd)

Estimated First Cost	
Floodwalls	$ 9,580,000
Engineering and design	1,240,000
Supervision and administration	1,140,000
Relocations	1,138,000
Lands and damages	2,000
TOTAL	$13,100,000

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX I.H.N.C.

PROJECT AUTHORIZATION

1. Authority.

a. Public Law. Public Law 298, 89th Congress, 1st Session, approved 27 October 1965, authorized the "Lake Pontchartrain, Louisiana, and Vicinity," hurricane protection project, substantially in accordance with the recommendations of the Chief of Engineers in House Document No. 231, 89th Congress, 1st Session, except that the recommendations of the Secretary of the Army in that document shall apply with respect to the Seabrook lock feature of the project.

b. House Document. The report of the Chief of Engineers dated 4 March 1964 printed in House Document No. 231, 89th Congress, 1st Session, submitted for transmission to Congress the report of the Board of Engineers for Rivers and Harbors, accompanied by the reports of the District and Division Engineers and the concurring report of the Mississippi River Commission for those areas under its jurisdiction. The report stated with respect to the Lake Pontchartrain Barrier Plan:

"For protection from hurricane flood levels, the reporting officers find that the most suitable plan would consist of a barrier extending generally along US Highway 90 from the easternmost levee to high ground east of the Rigolets, together with floodgates and a navigation lock in the Rigolets, and flood and navigation gates in Chef Menteur Pass; construction of a new lakeside levee in St. Charles Parish extending from the Bonnet Carre' Spillway guide levee to and along the Jefferson Parish line; extension upward of the existing riprap slope protection along the Jefferson Parish levee; enlargement of the levee landward of the seawall along the 4.1 mile lakefront, and construction of a concrete-capped sheet-pile wall along the levee west of the Inner Harbor Canal in New Orleans; raising the rock dikes and landward gate bay of the planned Seabrook lock; construction of a new levee lakeward of the Southern Railway extending from the floodwall at New Orleans Airport to South Point; enlargement of the existing levee extending from US Highway 90 to the Gulf Intracoastal Waterway, thence westward along the waterway to the Inner Harbor Canal, together with riprap slopes along the canal; construction of a

concrete capped sheet-pile wall along the east levee of the Inner Harbor Canal between the Gulf Intracoastal Waterway and the New Orleans Airport...."

and with respect to the Chalmette Area Plan:

"...For the Chalmette area, the reporting officers find that the most suitable plan would consist of about 17.3 miles of new and enlarged levees extending generally along the southerly banks of the Gulf Intracoastal Waterway and the Mississippi River-Gulf Outlet channel to Bayou Dupre and thence westerly to the Mississippi River levee at Violet...."

c. BERH recommendation. The report of the Chief of Engineers stated: "...The Board (of Engineers of Rivers and Harbors) recommends authorization for construction essentially as planned by the reporting officers...I concur in the recommendation of the Board of Engineers for Rivers and Harbors."

2. Purpose and scope. This memorandum presents the essential data, assumptions, criteria, and computations for developing the plan, design, and cost for the project floodwall feature along the Inner Harbor Navigation Canal (IHNC) in the vicinity of Florida Avenue. Its purpose is to present sufficient detail to provide an adequate basis for preparing plans and specifications for the levee and appurtenant structure construction without additional design analysis, and is accordingly presented in feature design memorandum scope.

3. Local cooperation.

a. Flood Control Act of 1965 (Public Law 89-298). The conditions of local cooperation pertinent to this supplement and as specified in the report of the Board of Engineers for Rivers and Harbors and concurred in by the report of the Chief of Engineers are as follows: "It is proposed that construction of the barrier plan of protection for the areas around Lake Pontchartrain, and of the plan of protection for Chalmette shall be subject to the conditions that prior to initiation of construction on each separable independent feature, local interests give assurances satisfactory to the Secretary of the Army that they will without cost to the United States:

"(1) Provide all lands, easements, and rights-of-way, including borrow and spoil disposal areas, necessary for construction, operation and maintenance of the project;

"(2) Accomplish all necessary alterations and relocations to roads, railroads, pipelines, cables, wharves, drainage structures, and other facilities made necessary by the construction of the project;

"(3) Hold and save the United States free from damages due to the construction works;

"(4) Bear 30 percent of the first cost, to consist of the fair market value of the items listed in subparagraphs (1) and (2) above and a cash contribution presently estimated at $14,384,000 for the barrier plan and $3,644,000 for the Chalmette Area Plan...to be paid either in a lump sum prior to initiation of construction or in installments at least annually in proportion to the Federal appropriation prior to start of pertinent work items, in accordance with construction schedules as required by the Chief of Engineers, or, as a substitute for any part of the cash contribution, accomplish in accordance with approved construction schedules items of work of equivalent value as determined by the Chief of Engineers, the final apportionment of costs to be made after actual costs and values have been determined;

"(5) For the barrier plan, provide an additional cash contribution equivalent to the estimated capitalized value of operation and maintenance of the Rigolets navigation lock and channel to be undertaken by the United States, presently estimated at $4,092,000, said amount to be paid either in a lump sum prior to initiation of construction of the barrier or in installments at least annually in proportion to the Federal appropriation for construction of the barrier;

"(6) Provide all interior drainage and pumping plants required for reclamation and development of the protected areas;

"(7) Maintain and operate all features of the works in accordance with regulations prescribed by the Secretary of the Army, including levees, floodgates, and approach channels, drainage structures, drainage ditches or canals, floodwalls, seawalls, and stoplog structures, but excluding the Rigolets navigation lock and channel and the modified dual purpose Seabrook lock; and

"(8) Acquire adequate easements or other interest in land to prevent encroachment on existing ponding areas unless substitute storage capacity or equivalent pumping capacity is provided promptly; Provided that construction of any of the

separable independent features of the plan may be undertaken independently of the others, whenever funds for that purpose are available and the prescribed local cooperation has been provided...."

b. Water Resources Development Act of 1974 (Public Law 93-251). The local interest payment procedures outlined in the original conditions of local cooperation were modified in 1974 as follows: "The hurricane-flood protection project on Lake Pontchartrain, Louisiana, authorized by section 204 of the Flood Control Act of 1965 (Public Law 89-298) is hereby modified to provide that non-Federal public bodies may agree to pay the unpaid balance of the cash payment due, with interest, in yearly installments. The yearly installments will be initiated when the Secretary determines that the project is complete but in no case shall the initial installment be delayed more than ten years after the initiation of project construction. Each installment shall not be less than one twenty-fifth of the remaining unpaid balance plus interest on such balance, and the total of such installments shall be sufficient to achieve full payment, including interest, within twenty-five years of the initiation of project construction."

INVESTIGATIONS

4. Project document investigations. Studies and investigations made in connection with the report on which authorization is based (H.D. No. 231, 89th Congress, 1st Session) consisted of: research of information which was available from previous reports and existing projects in the area; extensive research in the history and records of hurricanes; damage and characteristics of hurricanes; extensive tidal hydraulics investigations involving both office and model studies relating to the ecological impact of the project on Lakes Pontchartrain and Borgne; an economic survey; and survey scope design and cost studies. A public hearing was held in New Orleans on 13 March 1956 to determine the views of local interests.

5. Investigations made subsequent to project authorization. Surveys and studies made subsequent to project authorization include:

a. Alternate plan studies to include alternative alignment studies and alternative construction method studies;

b. Aerial and topographic surveys;

c. Soils investigations including general and undisturbed type borings and associated laboratory evaluations;

d. Detailed design studies for levee and I-type floodwall construction including bank and levee section stability determinations;

e. Detailed studies to establish the required sizes for floodgate structures and general features of T-type floodwalls and relocation of the Florida Avenue bridge approach;

f. Tidal hydraulic studies required for establishing design grades for protective work based on revised hurricane parameters furnished subsequent to project authorization by the National Weather Service;

g. Real estate requirements and appraisals;

h. Cost estimates for the concrete floodwalls and gap closures and utility relocations;

i. Economic studies for evaluation of justification of proposed works;

j. Environmental effects and evaluations;

k. Comprehensive public meeting held on 22 February 1975.

6. Planned future investigations. Upon completion of the entire reach, this feature will be turned over to local interests. Accordingly, any future investigations would be performed by local interests and no future investigations will be required by and/or for the Government.

LOCAL COOPERATION

7. Local cooperation requirements. The conditions of local cooperation as specified in the authorizing laws are quoted in Paragraph 3. Essentially local interests must:

a. Provide all lands, easements, and rights-of-way, including borrow and spoil-disposal areas;

b. Accomplish necessary alterations and relocations to existing facilities required by construction of the project;

c. Hold and save the United States free from damages due to the construction works;

d. Bear 30 per cent of the first cost including the fair market value of items (a) and (b) above;

e. For the barrier plan, provide an additional cash contribution equivalent to the estimated capitalized value of operation and maintenance of the Rigolets navigation lock and channel.

f. Provide all interior drainage facilities necessary for reclamation and development of the protected areas;

g. Maintain and operate the project works in accordance with regulations prescribed by the Secretary of the Army.

8. Status of local cooperation.

a. On 2 November 1965 the Governor of the State of Louisiana designated the Louisiana Department of Public Works as "...the agency to coordinate the efforts of local interest and to see that the local commitments are carried out promptly...." By State of Louisiana Executive Order dated 17 January 1966, the Board of Commissioners of the Orleans Levee District was designated as the local agency to provide the required local cooperation for all portions of the Lake Pontchartrain, La. and Vicinity, project in Orleans, Jefferson, St. Charles, and St. Tammany Parishes. Assurances were requested through the Louisiana Department of Public Works from the Board of Commissioners of the Orleans Levee District for the section of the Chalmette area plan falling in Orleans Parish on 21 January 1966, and from the St. Bernard Parish Police Jury and the Board of Commissioners of the Lake Borgne Basin Levee District for the remainder of the Chalmette area plan on 8 February 1966. An acceptable joint act of assurance for the portion of the Chalmette area plan located in St. Bernard Parish, supported by resolutions adopted by the St. Bernard Parish Police Jury and the Board of Commissioners of the Lake Borgne Basin Levee District on 15 and 16 August 1966, respectively, was approved and accepted on behalf of the United States on 28 September 1966. An act of assurance for the portion of the Chalmette area plan located in Orleans Parish, supported by a resolution of the Board of Commissioners of the Orleans Levee District dated 28 July 1966, was approved and accepted on behalf of the United States on 10 October 1966.

b. Assurances from the Board of Levee Commissioners of the Orleans Levee District for the Barrier Plan portion of the project, of which the west side of the Florida Avenue Complex, I.H.N.C. is a part, were originally accepted on 10 October 1966. Because of the rising non-Federal cost of participation and the widespread benefits to be derived by surrouding parishes, the Orleans Levee Destrict requested assistance in carrying out the assurances. Accordingly, the Governor of the State of Louisiana by Executive Order Number 80, dated 5 March 1971, designated the Louisiana Department of Public Works as the local coordinating agency. Through this procedure the Orleans Levee District, the Pontchartrain Levee District and the St. Tammany Parish Police Jury were designated the assurers of local cooperation for the portions of the subject project within their respective jurisdictions. The designation was under the authority of Section 81, Title 38, Louisiana Revised Statutes of 1950.

c. Assurances of local cooperation were received from the Orleans Levee District on 16 September 1971 and from the Pontchartrain Levee District on 7 October 1971. Due to the reluctance of the St. Tammany Parish Police Jury to furnish required assurances of local cooperation for that portion of the project within St. Tammany Parish, the Governor of the State of Louisiana executed assurances on behalf of the St. Tammany Parish Police Jury on 8 May 1972 under authority of Section 81, Title 38, Louisiana Revised Statutes of 1950.

d. Recognizing the increasing burden of providing required matching local funds, Representative F. Edward Hebert sponsored Congressional legislation to defer required local payments over an extended period of time. This legislation was enacted in March 1974 as Section 92 of the Water Resources Development Act of 1974. This act modified the authorizing law by providing that non-Federal public bodies may agree to pay the unpaid balance of their required cash payment due, with interest, in annual installments in accordance with a specified formula. A plan for the application of the provisions of this legislation is being implemented.

e. We have received the necessary agreements, legal opinions, and resolutions from the Orleans Levee District, jointly from the Lake Borgne Basin Levee District and the St. Bernard Parish Police Jury and from the Pontchartrain Levee District approving the deferred payment plan and incorporating the requirements of Public Law 91-646 ("Uniform Relocation and Real Property Acquisition Policies Act of 1970"). We have also received the required agreements, legal opinions and assurances from the Louisiana Department of Transportation, Office of Public Works

and the Governor of Louisiana stating that the Office of Public Works is now the local sponsor in behalf of the St. Tammany Parish Police Jury and that the Office of Public Works will lend financial assistance, when required, to the Pontchartrain Levee District. These assurances were approved on behalf of the United States on 7 December 1977.

f. Section 221 of the Flood Control Act of 1970 (Public Law 91-611) is not applicable to this project since construction of the Lake Pontchartrain, Louisiana and Vicinity project commenced prior to 1 January 1972. A description of the overall plan of protection is included in the report of the Chief of Engineers dated 4 March 1964.

9. Views of local interests. The Orleans Levee District is the agency responsible for providing local interest assurances for this feature of the project. The plan presented herein was coordinated in detail with the Orleans Levee District engineering staff and bears the approval of that agency. The intention and capability of this sponsor to provide the required non-Federal contribution for this feature have been amply demonstrated; in fact, considerable work on other completed features of the overall project has already been accomplished by this sponsor.

LOCATION OF PROJECT AND TRIBUTARY AREA

10. Project location. The Florida Avenue Complex, I.H.N.C. segment of the Lake Pontchartrain, Louisiana and Vicinity hurricane protection project, as shown on plate 1, is located in southeastern Louisiana in the east central portion of New Orleans on the Inner Harbor Navigation Canal which connects the Mississippi River with Lake Pontchartrain. The project area covered in this memorandum is located in Orleans Parish.

11. Tributary area. The tributary area of Lake Pontchartrain varies in character from flat tidal marsh at or near sea level to upland areas of significant relief with natural ground elevations as high as 250 feet above mean sea level (m.s.l.). Runoff from within the project area drains into either Lake Borgne or Lake Pontchartrain, generally by pumping from within the protected areas, although some developed areas located on alluvial ridges in St. Charles, St. Bernard, and St. Tammany Parishes are drained by gravity. In addition to runoff from the project area, Lake Pontchartrain receives the runoff of 4,700 square miles located to the north and west of the lake. During major floods on the

Mississippi River and its tributaries, floodflows may be diverted from the Mississippi River to Lake Pontchartrain through the Bonnet Carre' Spillway, a controlled overbank floodway constructed under the Flood Control, Mississippi River and Tributaries project.

PROJECT PLAN

12. General. The Lake Pontchartrain, Louisiana and Vicinity hurricane protection project, as shown on the flyleaf map, consists of two separate and distinct major features--the Chalmette Area Plan and the Lake Pontchartrain Barrier Plan. This memorandum is concerned only with segments of both plans, the Florida Avenue Complex, I.H.N.C. west side is a portion of the Lake Pontchartrain Barrier Plan and the east side a portion of the Chalmette Area Plan. The overall Lake Pontchartrain Barrier Plan is described in GDM No. 2, Citrus Back Levee, approved 29 December 1967.

13. Florida Avenue Complex, I.H.N.C. This floodwall (T-and I-type) will be located along both the west and east sides of the Inner Harbor Navigation Canal (I.H.N.C.) in the vicinity of Florida Avenue. The floodwall along the west side of the I.H.N.C. extends from a tie-in with the existing I-wall at wall line station 99+06.49 to a tie-in with the existing T-wall near the south end of the France Road Terminal at wall line station 108+31.54. See plates 2 and 3 for details. This feature of the project will also include installation of two steel overhead roller gates (at Florida Avenue and Harbor Road); two steel swing gates (at the existing double track railroad [Southern Railway and New Orleans Public Belt Railroad] and at the future spur track of the New Orleans Dock Board); a dual vertical lift gate structure at the Florida Avenue Canal and modification of the existing canal by installation of a covered concrete box structure and headwall. The floodwall on the east side of the I.H.N.C. extends from a tie-in with the existing floodwall along the east side of the I.H.N.C. at the south end of the project at base line station 55+97.40 to an intersection with the I.H.N.C. East Levee-North of Florida Avenue at wall line station 10+96.43. See plates 43 and 44 for details. This feature of the project will also include installation of two steel overhead roller gates at Florida Avenue and at the roadway connecting Harbor Road with Florida Avenue; one steel swing gate at the single track Southern Railway; a dual vertical lift gate installation at the Florida Avenue Canal; modification of the existing concrete open-top box canal structure of the Florida Avenue Canal and a ramp over

the new floodwall at Surekote Road. Features of the project common to both sides of the I.H.N.C. include the relocation or modification of underground sanitary sewer, drainage and natural gas pipelines, and overhead and underground electrical transmission lines; construction of temporary sheet pile cofferdams, walls, and dewatering systems and removal of existing floodwalls.

14. Departures from project document plan. The plan presented herein is similar to that presented in the project document. The following changes, which are considered to be within the discretionary authority of the Chief of Engineers, were adopted:

a. The net grades were revised upward one foot (13.0 to 14.0) in accordance with the results of tidal hydraulics studies utilizing the latest hurricane parameters developed by the U.S. Weather Bureau subsequent to the studies contained in House Document No. 231/89.

b. Engineering investigations and designs during the planning stage show that the use of the "sheet piling wall with concrete cap" provided in the project document plan is impracticable since the required height of the wall above the ground is in excess of six feet. Accordingly, an "I"-type floodwall was adopted where the height above the ground is less than ten feet and a bearing pile supported concrete inverted "T"-type floodwall where the height above ground is greater than ten feet. In addition to its structural inadequacy, the exposed steel of the concrete capped sheet pile wall would be subject to rapid corrosion due to the highly saline water in the I.H.N.C.

HYDROLOGY AND HYDRAULICS

15. General. The Hydrology and Hydraulic Analysis design memorandum for the Lake Pontchartrain Barrier Plan and Chalmette Area Plan was presented in a series of three separate reports entitled Design Memorandum No. 1 and subtitled Part I - Chalmette, Part II - Barrier, and Part III - Lakeshore. Part I - Chalmette was approved on 27 October 1966; Part II - Barrier was approved on 18 October 1967; and Part III - Lakeshore was approved on 6 March 1969. These documents present detailed descriptions and analyses of the tidal hydraulic methods and procedures used in the tidal hydraulic design of the features for the plan and include the essential data, assumptions, and criteria used and results of studies which provide the basis for determining surges, routing, wind tides, runup, overtopping, and frequencies. The criteria applicable to this floodwall feature is presented in Appendix B to this memorandum.

GEOLOGY

16. Physiography. The project area is located within the Gulf Coastal Plain on the deltaic plain of the Mississippi River. Dominant physiographic features are the marshes, the lake, and the lake shoreline. Maximum elevations are slightly above mean sea level. Minimum elevations are slightly below mean sea level.

17. General geology. Only the geologic history since the end of the Pleistocene Period significantly influences the project area. When sea level reached its present level, the Mississippi River began to migrate laterally back and forth across the alluvial valley. Each time the river migrated toward the eastern margin of the valley, the project area was subjected to heavy sedimentation. However, construction of levees along the Mississippi River has eliminated the introduction of sediment into the project area.

18. Subsidence. Continued subsidence and downwarping have been occurring since the end of the Pleistocene. As a result, the Pleistocene surface has been downwarped toward the south and west. The Pleistocene surface outcrops along the north shore of Lake Pontchartrain and dips gradually to an elevation of -500 m.s.l. at the edge of the continental shelf approximately 80 miles south of New Orleans. Subsidence in the Pleistocene surface within the study area is at a rate of about .39 foot per century, whereas subsidence in the recent sediments is at a rate of approximately 0.78 ft. per century and greater.

19. Investigations performed. A total of four undisturbed borings and five general type borings were taken in the project area.

20. Foundation conditions. The subsurface, as plate 73 shows, consists of Holocene deposits approximately 40 to 50 feet thick underlain by sediments of Pleistocene Age. Generally, the Holocene sediments consist of a thin surface layer of fill material, underlain by a 10 to 20 feet thick layer of soft marsh clays and organic material. The marsh deposits are underlain by a layer of interdistributary clays approximately 20 to 30 feet thick which are in turn underlain by a layer of sand representing a buried beach approximately 15 to 30 feet thick. At the base of the Holocene deposits is a discontinuous thin layer of Bay-Sound clays.

21. Mineral resources. Oil and gas production is not found within the immediate vicinity of the project. Likewise, development of sand, gravel, shell or other construction materials is not found within the project area.

22. Sources of construction materials. Design Memorandum, "Lake Pontchartrain Hurricane Protection, Sources of Construction Materials," DM 12, contains a listing of the sources of sand, gravel, shell, and rocks available in the region.

23. Conclusions. Stability and settlement will be major problems to contend with due to the low shear strengths and high compressibility of the recent sediments.

FOUNDATION INVESTIGATIONS AND DESIGN

24. General. This section includes the soil and foundation investigations and design for approximately 2000 feet of floodwall (T-walls, I-walls, and road, railroad and canal gates) that will be incorporated into the Florida Avenue Complex Project on the west and east sides of the Inner Harbor Navigation Canal. On the west side, the proposed floodwall ties in to the existing I-wall in the levee at the south end and ties in to the existing T-wall adjacent to the Dock Board's France Road Terminal on the north end. On the east side, the proposed floodwall ties in to the existing I-wall adjacent to Surekote Road at the south end and will tie in to the I.H.N.C. East Levee - north of Florida Avenue.

25. Field exploration. A total of four (4) undisturbed 5-in. diameter soil borings were made in the project area, each to a depth of 103 feet below existing ground surface at the locations shown on plates 2, 43 and 44. Two (2) borings, designated 5-UWF and 6-UWF, are located on the west side and two (2) borings, designated 6-UEF and 7-UEF, are located on the east side. The individual logs of these four undisturbed borings are shown on plates 65 through 68 and are shown in profile on plate 73. A total of five general type core borings, 1-7/8-in. I.D., were made to depths of 75 and 80 feet below existing ground surface at the locations shown on plates 2, 43 and 44. Two borings, designated 3-WF and 4-WF, are located on the west side and three borings, designated 3-EF, 4-EF and 5-EF, are located on the east side. The logs of these five borings are shown on plates 63 and 64.

26. Laboratory tests. All samples obtained from the borings were visually classified. Water content determinations were made on all cohesive soil samples. Unconfined compression (UC) shear tests and grain size analyses were made on selected samples of cohesive and granular soils, respectively. Water content determinations, unconfined compression test results and the D_{10} determined from grain size analyses are shown adjacent to the logs on the boring profiles presented on plates 63 and 64. Unconsolidated-undrained (Q), consolidated-undrained (R), consolidated drained (S) shear tests and consolidation (C) tests were made on representative soil samples obtained from the undisturbed borings. Liquid and plastic limits were obtained on the undisturbed test specimens. These test results are summarized on the individual boring logs shown on plates 65 through 68 and the individual shear strength data sheets are shown on plates 69 through 72. Design shear strength parameters are shown on plate 64.

27. Foundation conditions. The soil types and stratifications in the project area are shown on the soil and geologic profiles on plate 73. Fill materials are present over most of the project area to a maximum thickness of 5 feet except at the levee and railroad embankments. Generally, the natural subsoils consist of swamp deposits with organic matter, Interdistributary clays, Nearshore Gulf sands and, on the east side, Bay-Sound clays to elevations ranging between -62 and -70 NGVD, where the surface of the Pleistocene formation is encountered.

28. T-walls and gates.

a. General. Flood protection in the project area will consist predominantly of T-type floodwalls supported by piles. Inverted T-type roller and swing gates supported by piles will provide access at roadways and the railway crossings. Vertical lift gates also supported by piles will provide passage for flow in the Florida Avenue Canal.

b. Steel sheet pile cutoffs. A steel sheet pile cutoff will be used beneath the T-walls and gates to provide protection against hazardous seepage during a hurricane. The sheet pile penetration required to satisfy Lane's weighted creep ratio (LWCR) of 3 was determined for the sections where the maximum hydrostatic differential will exist. These analyses are shown on plates 77 and 81.

c. Deep-seated stability analysis. A conventional stability analysis utilizing a 1.30 factor of safety incorporated into the soil parameters was performed for various potential failure surfaces beneath the T-wall sections at two locations on the west side and

at one location on the east side. For the two T-wall sections on the west side, the summation of horizontal driving and resisting forces results in a value of Ep that decreases with depth indicating that the critical surface is at the base of the structure and no other load need be applied beneath the base. Analysis of the east side T-wall indicates an unbalanced load of 636 must be applied beneath the base between elevations -15.0 and -26.7 NGVD. Deep seated analyses were also performed for the east and west side sluice gate and the results indicate that the critical surface is at the base of the structure. All deep seated stability analyses are shown on plates 77, 78, 81 and 84.

d. Pile foundations.

(1) Ultimate compression and tension pile capacities versus tip elevations were developed for 12, 14 and 16-in. square precast concrete piles and 12 and 14-in. steel "H" piles. In determining the normal pressure on the pile surface, a lateral pressure coefficient (K_o) of 1.0 and 0.7 was used for compression and tension, respectively. Values of adhesion and soil to pile frictional resistance shown in EM-1110-2-2906 were used to compute pile capacities. The results of pile design loads versus tip elevations analyses are shown on plates 74 and 75. The recommended pile tip elevations for cost estimating purposes are based on applying a factor of safety of 2.0 in compression and tension. The pile groups supporting the east and west side sluice gate foundations were investigated and, it was determined that a reduction of the single pile load capacity for group efficiency is not required.

(2) Prior to construction, several test piles will be driven and load tested in the project area. The results of the pile load tests will be used to determine the length of the job piles.

(3) The settlement of foundations supported on piles should be small and should not exceed 0.5 inch.

(4) Subgrade moduli curves for estimating lateral restraint of the soil beneath the pile supported gates and T-walls are shown on plates 74 and 75. The procedures used in the development of this data are as stated in the notations on the design plates.

29. I-walls.

a. General. Cantilever I-type floodwalls consisting of steel sheet piling driven into existing embankments will also be utilized to provide the required flood protection. On the west

side, an I-type wall at elevation 14.5 NGVD[1] will be used to tie together the new T-wall and the existing I-wall in the south end levee. On the east side, an I-wall at elevation 15.0 NGVD will tie together the new T-wall and the T-wall in the I.H.N.C. Levee - north of Florida Avenue. Also, on the east side, I-walls at elevation 16.0 NGVD will be driven adjacent to Surekote Road. The existing I-wall beneath Surekote Road will be removed and replaced with a new I-wall beneath the raised roadway.

b. Cantilever I-wall analyses. The required penetration of the steel sheet piling below ground surface was determined by the method of planes using an "S" shear strength of c=0 and $\emptyset=23^{\circ}$ for the clay strata. A factor of safety of 1.5 was applied to the design shear strengths as follows: $\emptyset$ developed = $\tan^{-1}$ (tan $\emptyset$ available/safety factor). Using the resulting shear strengths, net lateral soil and water pressure diagrams were developed for movement toward each side of the sheet pile. With these pressure distributions, the summation of horizontal forces was equated to zero for various tip penetrations, and the overturning moments about the tip of the sheets were determined. The required depth of penetration to satisfy the stability criteria was determined where the summation of moments were equal to zero. Maximum bending moments and deflections were also determined. Results of these analyses are shown on plates 76 and 82.

c. Estimated future settlement - east side of I.H.N.C. Based on information obtained by the Orleans Levee Board regarding the I-wall in the existing levee between approximate stations 8+15 and 10+90, it is estimated that settlement of the new I-wall in this reach will not exceed 12 inches during the next 45 years. On this basis, the top of the sheet piles will be set at elevation 15.0 NGVD. Further information obtained by the Orleans Levee Board in the area of Surekote Road indicates that 24 inches of settlement may occur in future years. Therefore, the tops of sheet piles driven adjacent to Surekote Road will be set at elevation 16.0 NGVD.

30. Sluice gate excavation.

a. General. Dual pile supported sluice gates will provide flood protection in the Florida Avenue Canal on both the east and west side. On the east side, stability of the required excavation will be provided by cellular cofferdams. On the west side, stability of the required excavation will be provided by cellular cofferdams to the north of the canal and an anchored sheet pile bulkhead to the south. On both the east and west sides earth dikes will be constructed across the existing canal on each side of the

[1]Refers to National Vertical Geodetic Datum.

excavation. A well point dewatering system will be installed prior to construction to maintain stability of the bottom of the excavation against heaving and/or blow out.

b. Well point dewatering - east side of I.H.N.C. For cost estimating purposes only, design of a well point dewatering system for the east side excavation was made utilizing the procedures outlined in TM 5-818-5, Dewatering and Ground Water Control for Deep Excavations, dated April 1971. Results of the design analyses as well as the criteria and assumptions used are presented on plate 83. The plan flow net shown was developed with the use of an analog field plotter.

c. Cofferdam analysis - east side of I.H.N.C.

(1) Excavated condition. Using lateral soil pressures developed by a method of planes analysis, cellular cofferdams were designed following procedures outlined in the USS Steel Sheet Piling Design Manual, dated July 1975. For a sheet pile penetration to elevation -52 NGVD and a ratio of cell diameter to unsupported height of 1.5, an adequate factor of safety is indicated for soil bearing, horizontal sliding, overturning, vertical shear, horizontal shear and the vertical load on the inboard sheet piles. The maximum interlock tension is 1950 pounds per linear inch.

(2) Operating condition. To prevent the possibility of a deep seated failure into the Florida Avenue Canal between W/L station 6+52.82 and W/L station 7+27.71, all but one cell will be left in place after construction of the sluice gate. Analyses of the three remaining cells were made for an operating condition with low water at elevation -14.5 NGVD in the canal. Results of the computations indicate that the driving force developed by the active wedge on the protected side for the operating condition is substantially the same as the excavated condition. However, the resisting force developed by the passive wedge on the flood side will be appreciably greater for the operating condition due to the weight of the structure and a minimum water depth of 5 feet. Further, the point of application of this greater resisting force will be approximately 5 feet higher, causing a still further reduction of the net overturning and bending moments. Considering this, the factor of safety for stability of the cofferdams will be significantly higher for the operating condition than for the excavated condition.

d. Anchored bulkhead - west side of I.H.N.C. Lateral soil pressures used for analysis of the anchored sheet pile bulkhead were developed by a method of planes analysis. For determination of the required sheet pile penetration, a factor of safety of 1.4 was applied to the soil parameters and a factor of safety of 1.0 was used to determine the maximum bending moment and required anchor force. Results of the analyses indicate a sheet pile

penetration to elevation -53.5 NGVD, an anchor force of 6.9 kips per linear foot and a maximum bending moment of 77.5 ft-kips at elevation -24.5 NGVD.

31. Stability Analyses. Stability analyses were performed at the location of the north end T-wall on the west side; levee embankments with I-walls on the east and west sides, and the sluice gate excavations on the east and west sides. The method of planes analysis was used wherein horizontal potential failure surfaces along with the active and passive wedges are varied to arrive at the lowest numerical value of safety factor. The resulting safety factors along with typical computations for critical wedges and the soil parameters used are shown on plates 76, 77, 79, 80 and 82.

DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

32. Floodwalls and gates.

a. Floodwalls - west side of I.H.N.C. I-type floodwall will be provided at the tie in with the existing I-type wall in the levee parallel with Florida Avenue. This I-type wall will replace the existing wall between W/L stations 99+06.49 and 99+33.49 and extend along the new wall alignment from the latter station to W/L station 99+42.65. The balance of the floodwall to be constructed along the west side of the I.H.N.C. under this project will be T-type walls supported on precast prestressed concrete foundation piles with a sheet pile cutoff wall to minimize seepage through the protection works below the elevation of the base of the T-type wall. The T-type wall between W/L stations 105+81.64 and 107+04.65 extends across the site of the proposed drainage pumping station No. 19 to be constructed by the Sewerage and Water Board of New Orleans. This portion of the floodwall will be incorporated as an integral part of the foundation structure for the future pumping station when the design for the pumping station is finalized. Although the T-type wall between W/L station 105+81.64 and 107+04.65 will require design modification to incorporate it into the substructure for the future pumping station, it is being included in this design memorandum to provide a comparative estimated cost for the Federal portion of the construction costs under the revised design. The T-type wall will tie in to the existing T-type wall at W/L station 108+31.54 at the south end of the France Road Terminal of the Dock Board. The general location and alignment of the proposed floodwall is shown on plate 1. The detailed alignment and profile of the floodwall and features contiguous thereto are shown on plates 2 and 3. Typical design sections are shown on plates 4 and 5.

b. Gates - west side of I.H.N.C.

(1) Swing gates. Two steel swing gates will be included in the floodwall along the west side of the I.H.N.C. The locations are across the future railroad spur of the Dock Board, designated gate No. 1W (centerline at W/L station 107+66.97) and across the existing parallel railroad lines of the New Orleans Public Belt Railroad and the Southern Railway, designated gate No. 3W (centerline at W/L station 103+35.57). Horizontal clearances are 17 feet and 31'-6" respectively. Horizontal clearances to the centerline of the future Dock Board spur and the track of the Southern Railroad is 10'-0". Details of these gates are shown on plates 31 and 37.

(2) Overhead roller gates. Two steel overhead roller gates will be included in the floodwall on the west side of the I.H.N.C. The locations are across Florida Avenue, designated gate No. 5W (centerline at W/L station 99+98.65) and across the revised alignment of Harbor Road, designated gate No. 2W (centerline at W/L station 103+91.51). The horizontal clearance at the Florida Avenue gate is 40 feet and the total width of the gate opening at Harbor Road is 47'-2-3/4" for the skewed intersection which provides a horizontal clearance perpendicular to the roadway of approximately 32 feet. Details of these gates are shown on plates 7 and 36.

(3) Vertical lift gates - west side of I.H.N.C. A dual vertical lift gate (sluice gate) installation will be included in the floodwall. The location of the dual gate structure designated gate No. 4W (centerline at W/L station 101+30.58) coincides with the centerline of the Florida Avenue Canal. This feature of the project also includes covering a portion of the existing Florida Avenue Canal by constructing a pile supported reinforced concrete box culvert. The covered portion of the Florida Avenue Canal will extend 39'-4½" from the gate structure on the protected side of the floodwall and 161 feet on the flood side. The outlet on the flood side of the covered portion of the Florida Avenue Canal is protected by a pile supported reinforced concrete headwall 146'-7" in length. The decision to cover the Florida Avenue Canal and install the headwall was dictated by the potential for a deep-seated failure of the soil structure revealed by the stability analysis. This feature of the project also includes electrical operation of the sluice gates by electric motor operators. Manual operation in the event of power failure is also provided for. Details of the sluice gate structure and the covered section of the Florida Avenue Canal are shown on plates 12 through 30.

c. Floodwalls - east side of I.H.N.C. I-type floodwall will be provided at the tie in with the existing I-type wall in the existing levee parallel with Surekote Road. The I-type wall will replace the existing I-type wall (between baseline stations 55+97.40 and 56+23.50) and extend along new wall alignment from W/L station 0+00 (baseline station 56+20.50) to W/L station 0+35.44 at which location Surekote Road will ramp over the floodwall. At W/L station 0+67.44 beyond the Surekote Road ramp, I-type wall will also be provided to W/L station 0+86.55 at which point T-type wall will begin. T-type wall will be provided from this point to a point just north of the Southern Railway track at W/L station 8+15.08. Between W/L station 7+39.66 to W/L station 8+15.08 and W/L station 8+97.41 to W/L station 9+81.91, T-type walls will be provided to include the overhead roller gate at the roadway connection between Harbor Road and Florida Avenue. From W/L station 9+81.91 to W/L station 10+96.43, I-type walls will be provided to tie in to the I.H.N.C. East Levee - North of Florida Avenue at W/L station 0+00 on that project. The general location and alignment of the proposed floodwall are shown on plate 1. The detailed alignment and profile of the floodwall along the east side of the I.H.N.C. and features contiguous thereto are shown on plates 43 and 44. Typical design sections are shown on plate 45.

d. Gates - east side of I.H.N.C.

(1) Swing gates. One steel swing gate will be included in the floodwall along the east side of the I.H.N.C. The location is across the single track of the Southern Railway, designated gate No. 3E (centerline at W/L station 7+52.66). Horizontal clearance is 20' to provide a minimum clearance to the centerline of the railroad track of 10'. Details of this gate are shown on plate 56.

(2) Overhead roller gates. Two steel overhead roller gates will be included in the floodwall on the east side of the I.H.N.C. The locations are across Florida Avenue, designated gate No. 1E (centerline at W/L station 4+51.99) and across the roadway connecting Harbor Road with Florida Avenue, designated gate No. 4E (centerline at W/L station 9+19.91). The horizontal clearance at the Florida Avenue gate is 40' and the total width of the gate opening at the roadway connecting Harbor Road with Florida Avenue is 36' for the skewed intersection which provides a horizontal clearance perpendicular to the roadway of approximately 31'-6". Details of these gates are shown on plates 48 and 57.

(3) Vertical lift gates - east side of I.H.N.C. A dual vertical lift gate (sluice gate) installation similar to that on the west side of the I.H.N.C. will be included in the floodwall.

The location of the dual gate structure, designated gate No. 2E (centerline at W/L station 5+84.65) coincides with the centerline of the Florida Avenue Canal. This feature of the project also includes the removal and reconstruction of a portion of the existing open-top reinforced concrete box canal structure on both the flood side and protected sides of the floodwall. The removal and reconstruction of the canal structure is required to permit lowering the canal invert elevation to -23.43 NGVD at the sills of the dual sluice gates. The reconstruction will also provide for transitioning the walls of the existing canal to meet the width of the dual gate installation. The reconstruction of the pile supported reinforced concrete open-top box extends 40 feet on the flood side of the vertical lift gate structure and 40 feet on the protected side. This feature of the project also includes electrical operation of the sluice gate by electric motor operators and provision for manual operation in the event of power failure. Details of the sluice gate structure and the reconstruction of the open-top reinforced concrete Florida Avenue Canal structure are shown on plates 48 through 55.

33. Ramp at Surekote Road - east side of I.H.N.C. The floodwall between W/L stations 0+35.44 and 0+67.44 will consist of a sheet pile wall under the reconstructed roadway of Surekote Road (centerline at W/L station 0+51.44). The top of the sheet pile wall will be at elevation 14 NGVD or approximately one foot below the top of pavement of Surekote Road. Based on settlement readings taken within the last ten years it is expected that Surekote Road will settle several feet at the ramp over the floodwall over an extended period of time. The top of sheet pile wall will afford one foot of freeboard above the wind tide elevation. This design, details of which are shown on plate 47, is intended to provide for a design life of approximately 10 years at which time the clay plug adjacent to the top of the sheet pile wall under the roadway will be raised and the roadway reconstructed to the design elevation of approximately 15 NGVD. The design for phased construction of the roadway section is included as a practical alternative to construction of the roadway to an elevation several feet higher which would result in prohibitive approach grades on Surekote Road.

34. Temporary structures.

a. Temporary structures - west side of I.H.N.C. The flow in the Florida Avenue Canal will be reversed and temporary earth plugs will be installed in the canal during construction of the dual vertical lift gate structure, the reinforced concrete box culvert and the headwall at the outlet of the box culvert on the flood side of the protection works. The temporary earth plugs will be installed in the canal beyond the limits of construction for this project. The deep excavation required for the construction of the dual sluice gate structure and the reinforced concrete

box in the Florida Avenue Canal will be protected by a tied-back sheet pile retaining wall parallel with, and south of, the canal. On the north, similar protection will be afforded by a line of cellular steel sheet pile cofferdams. The latter structures will be located at a considerable distance from the centerline of the canal as they will also be used as temporary protection for the excavation to accomodate construction of a portion of the suction canal for the proposed drainage pumping station No. 19 by the New Orleans Sewerage and Water Board. The tied-back steel sheet pile wall along the south side of the Florida Avenue Canal will also extend a considerable distance west of the limits of the construction for the floodwall. This additional length will also accomodate the construction of the previously mentioned suction canal. As a result of the intended multi-purpose use of the structures protecting the deep excavation in the Florida Avenue Canal, they are not being considered as a part of this project. To arrive at an equitable portion of their cost attributable to the construction of the floodwall on the west side of the I.H.N.C., the estimated first cost for the project includes an amount equal to the estimated cost of the steel sheet pile cofferdams and the installation and operation of the dewatering system required at the location of the similar dual sluice gates on the east side of the I.H.N.C. A plan view and cross section through the excavation and the supporting structures is shown on plate 30.

b. Temporary structures - east side of I.H.N.C. The flow in the Florida Avenue Canal will be reversed and temporary earth plugs similar to those on the west side of the I.H.N.C. will be installed during construction of the dual vertical lift gate structure and the modification of the reinforced concrete canal structure. The temporary earth plugs will be placed in the canal beyond the limits of construction for this project. The deep excavation required for construction of the dual sluice gate structure and the modification of the pile supported reinforced concrete canal structure will be protected by cellular sheet pile cofferdams. These cofferdams will be located immediately adjacent to the canal and will be tied in to the existing canal walls beyond the limits of construction. The excavation will be dewatered by the installation of five wells as shown on plate 83. The plan view and a cross section through the excavation at the cofferdams is shown on plate 55. A temporary cantilever steel sheet pile wall will also be installed adjacent to Surekote Road extending from approximate W/L station 0+75 to 2+15. This sheet pile wall will support the roadway during excavation for the construction of the T-type floodwall. Temporary falsework will also be installed to support the Southern Railway main line at W/L station 7+52.66 during construction of the base slab for the T-type steel swing gate. A temporary cantilever sheet pile wall will also be installed to support the railroad during construction of the T-wall monolith from W/L station 6+52.82 to W/L station 7+27.71.

STRUCTURAL DESIGN

35. Criteria for structural design. The structural designs presented herein comply with standard engineering practice and criteria set forth in engineering manuals for civil work construction published by the Office, Chief of Engineers, subject to modifications indicated by engineering judgement and experience to meet local conditions.

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

a. Water elevations

WEST SIDE I.H.N.C. W.S. Elev--Ft, NGVD			EAST SIDE I.H.N.C. W.S. Elev--Ft, NGVD	
Flood Side	Protected Side	Case	Flood Side	Protected Side
14.0	-8.5	I	14.0	-8.5
4.0	-14.5	II	4.0	-14.5
-14.0	-3.0	III	-14.0	-3.0

CASE I - Design hurricane--dry inside
CASE II - Mean H.W. outside--dry inside
CASE III - Reverse head--gates closed

b. Floodwall gross grade

	Elevation (Ft. NGVD)
(1) West Side I.H.N.C.	
I-wall (sta. 99+06.49 to sta. 99+42.65)	14.5
T-wall (sta. 99+42.65 to sta. 108+31.54)	14.0
(2) East Side I.H.N.C.	
I-wall (sta. -0+22.08 to sta. 0+35.44)	16.0
Sheet pile wall (0+35.44 to sta. 0+67.44)	14.0
I-wall (sta. 0+67.44 to sta. 0+86.55)	16.0
T-wall (sta. 0+86.55 to sta. 8+15.08)	14.0

I-wall (sta. 8+15.08 to sta. 8+97.41)	15.0
T-wall (sta. 8+97.41 to sta. 9+81.91)	14.0
I-wall (sta. 9+81.91 to sta. 10+96.43)	15.0

c. Unit weights

	lb. per cu. ft.
Water	62.5
Concrete	150
Steel	490

d. Design loads

Wind loads	50 p.s.f.
Water loads	62.5 p.c.f.

e. 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 and amendment no. 2 dated 17 January 1972. The basic minimum 28-day compressive strength concrete will be 3,000 p.s.i. except for concrete in the Florida Avenue Canal gates and conduits where the minimum will be 4,000 p.s.i. and except for prestressed concrete piling where the minimum will be 5,000 p.s.i. Steel for steel sheet piling will meet the requirements of ASTM 328-75a, "Standard Specification for Steel Sheet Piling." For convenient reference, pertinent allowable stresses are tabulated below:

(1) Reinforced concrete

fc'	3,000 p.s.i.
fc' (Florida Avenue Canal gates and conduits)	4,000 p.s.i.
fc	1,050 p.s.i.
fc (Florida Avenue Canal gates and conduits)	1,400 p.s.i.
Vc (without web reinforcement)	60 p.s.i.
Vc (with web reinforcement)	274 p.s.i.

	fs	20,000 p.s.i.
	minimum area steel	0.0025 bd
	shrinkage and temperature steel area	0.0020 bt
(2)	Structural steel (ASTM A-36)	
	Basic working stress	18,000 p.s.i.

37. Location and alignment.

a. West side of I.H.N.C. The new floodwall will tie in to an existing floodwall at W/L station 99+06.49 in the existing levee along the north side of the Dock Board property south of Florida Avenue and continue along the west side of the Inner Harbor Navigation Canal (I.H.N.C.) and end at a tie-in with the existing floodwall at the south end of the Dock Board France Road Terminal at W/L station 108+31.54.

b. East side of I.H.N.C. The new floodwall on the east side of the Inner Harbor Navigation Canal (I.H.N.C.) will tie into an existing floodwall at W/L station -0+22.08 (baseline station 55+97.40) just east of Surekote Road and continue along the east side of the I.H.N.C. and end at a tie with the existing I.H.N.C. East Levee - North of Florida Avenue at W/L station 0+00 on that project. In lieu of a gate, Surekote Road is ramped over the flood protection to elevation 14 NGVD (centerline at W/L station 0+51.44).

38. I-type floodwall.

a. General. The floodwall from W/L station 99+06.49 to W/L station 99+42.65 on the west side of the I.H.N.C. and from W/L station -0+22.08 to W/L station 0+35.44, from W/L station 0+67.44 to W/L station 0+86.55, from W/L station 8+15.08 to W/L station 8+97.41 and from W/L station 9+81.91 to W/L station 10+96.43 on the east side of the I.H.N.C. will be concrete I-wall. The I-wall will consist of sheet piling driven into the existing ground and the upper portion of the sheet piling will be capped with concrete. The sheet piling will be driven to the required depth with approximately one foot of the sheet pile extending above the finish ground elevation. The concrete portion of the floodwall will extend from approximately two feet below the finish ground elevation to the required protection height. See plates 4 and 45 for typical I-wall details.

b. Loading Cases. In the design of the I-wall, one loading case was considered.

Case I. Static water at the top of the wall, no wind, no dynamic wave force.

c. Joints. Expansion joints in the I-wall will be spaced a maximum of thirty feet apart, adjusted to fall at sheet pile interlocks. Where the I-wall joins the T-wall, the deflection of the I-wall will produce a lateral displacement. To take care of this displacement a special seal located in a notch in the I-wall will be provided to prevent water from flowing through this joint. See plate 5 for details.

39. T-type floodwall.

a. General. Floodwall from W/L station 99+42.65 to W/L station 108+31.54 on the west side of the I.H.N.C. will be concrete T-wall except for one overhead roller gate and two swing gate monoliths and a dual vertical lift gate monolith at the Florida Avenue Canal. On the east side of the I.H.N.C. the floodwall from W/L station 0+86.55 to W/L station 8+15.08 will be concrete T-wall except for one overhead roller gate and one swing gate monolith and a vertical lift gate monolith in the Florida Avenue Canal. Also on the east side of the I.H.N.C. the floodwall from W/L station 8+97.41 to W/L station 9+81.91 will be concrete T-wall except for one overhead roller gate monolith. The T-wall will consist of a reinforced concrete stem on a monolithic concrete base of varying width supported on precast prestressed concrete piles. The base of the T-wall will be constructed on a six inch concrete stabilization slab. A continuous steel sheet pile wall will be provided beneath the base of the T-wall. The sheet piling will be driven to the required depth with approximately nine inches extending into the concrete base of the T-wall monolith. See plates 4 and 45 for details.

b. Loading cases. In the design of the T-wall, two loading cases were considered as follows:

Case I. Water at the top of the wall floodside, water at the top of the base monolith protected side, no wind, no dynamic wave force, impervious sheet pile cutoff.

Case II. Water at the top of the wall floodside, water at the top of the base monolith protected side, no wind, no dynamic wave force, pervious sheet pile cutoff.

c. Joints. Expansion joints in the T-wall will be spaced not more than sixty feet apart except at gate monoliths. The joints will be adjusted to fall at sheet pile interlocks. To take care of expansion, contraction or displacement, three - bulb type water stops and premolded expansion joint fillers will be provided.

40. Gates and gate monoliths.

a. General. Five gates will be constructed in the floodwall along the west side of the I.H.N.C. These include two steel overhead roller gates, two steel swing gates and a dual vertical lift gate. Four gates will be constructed in the floodwall along the east side of the I.H.N.C. These will consist of two steel overhead roller gates, one steel swing gate and one dual vertical lift gate. Gates will be closed by local interests when a hurricane approaches. See plates 3, 4, 43 and 44 for locations of these gates and gate monoliths. Typical swing gate computations are shown on plates 32 through 35, typical overhead gate computations are shown on plates 8 through 11, and typical vertical lift gate computations are shown on plates 18 through 24.

b. Swing gates.

(1) Description. Three swing gates will be constructed in the floodwalls at the following locations: one at the double track railroad west side of the I.H.N.C., centerline at W/L station 103+35.57, one at the future Dock Board railroad spur on the west side of the I.H.N.C., centerline at W/L station 107+66.97 and one at Southern Railway track on the east side of the I.H.N.C., centerline at W/L station 7+52.66. To assure a proper seal, each gate will be constructed so that it can be adjusted in either the horizontal or vertical direction. The side and bottom seals can also be adjusted in either the horizontal or vertical direction. Plan, elevation and details are shown on plates 31, 37 and 56.

c. Overhead roller gates. Four overhead roller gates will be constructed in the floodwall at the following locations: one at Florida Avenue on the west side of the I.H.N.C., centerline at W/L station 99+98.65, one at Harbor Road on the west side of the I.H.N.C., centerline at W/L station 103+91.51, one at Florida Avenue on the east side of the I.H.N.C., centerline at W/L station 4+51.99 and one at the roadway connecting Harbor Road with Florida Avenue on the east side of the I.H.N.C., centerline at W/L station 9+19.91. To assure a proper seal, each gate will be constructed with side and bottom seals that can be adjusted in either the horizontal or vertical direction. Plan, elevations and details are shown on plates 7, 36, 48 and 57.

d. Vertical lift gates. Two dual vertical lift gates (sluice gates) will be constructed in the existing Florida Avenue Canal at the following locations: one at the canal on the west side of the I.H.N.C., centerline at W/L station 101+30.58 and one in the canal on the east side of the I.H.N.C., centerline at W/L station 5+84.65. The dual vertical lift gates include reinforced concrete gate monoliths with vertical walls extending to a platform at an elevation 1.57 feet above the top of the floodwall. This platform will support the operating machinery of the dual sluice gate. The sluice gates will be cast iron discs 12'-6" wide by 13' high. The discs will be of the two piece type and weigh approximately 32,200 pounds each including the five inch diameter stainless steel stems. Plans, elevations and details are shown on plates 12 through 16 and 49 through 52.

e. Loading cases. The gate structures were designed for the following loading conditions:

(1) Swing gates.

Case I. Gate closed, no wind, ballast saturated.

Case II. Gate closed, water at top of wall floodside, water at top of base slab protected side, no wind, impervious sheet pile cutoff.

Case III. Gate closed, water at top of wall floodside, water at top of base slab protected side, no wind, pervious sheet pile cutoff.

Case IV. Gate opened, ballast saturated, no wind, train on edge of slab on floodside.

Case V. Gate opened, ballast saturated, no wind, train on edge of slab protected side.

(2) Overhead roller gates.

A. Below elevation of top of wall:

Case I. Gate closed, water at top of wall floodside, water at top of base slab protected side, no wind, impervious sheet pile cutoff.

Case II. Gate closed, water at top of wall floodside, water at top of base slab protected side, no wind, pervious sheet pile cutoff.

Case III. Gate opened, no water, no wind, truck on edge of slab, floodside.

Case IV. Gate opened, no water, no wind, truck on edge of slab, protected side.

Case V. Gate opened, no water, wind from protected side, 33-1/3 percent increase in allowable stresses.

Case VI. Gate closed, water at top of wall, wind from floodside, 33-1/3 percent increase in allowable stresses.

B. Superstructure above top of wall:

Case I. Gate open, no water, no wind.

Case II. Gate closed, no wind.

Case III. Gate open, wind from right, 33-1/3 percent increase in allowable stresses.

Case IV. Gate closed, wind from right, 33-1/3 percent increase in allowable stresses.

Case V. Gate closed, wind from left, 33-1/3 percent increase in allowable stresses.

Case VI. Gate open, no wind, hangar loads centered on middle column.

Case VII. Gate open, no wind, one hangar load near center of span, one hangar load 1 foot (plus or minus) from end column.

(3) Vertical lift gates (sluice gates)

Case I. Construction case, no backfill, gates raised, no water.

Case II. Water level at elevation 14 NGVD flood-side, at elevation -8.5 NGVD protected side, impervious cutoff.

Case III. Water level at elevation 14 NGVD flood-side, at elevation -8.5 NGVD protected side, pervious cutoff.

Case IV. Water level at elevation 4 NGVD flood-side, at elevation -14.5 NGVD protected side, impervious cutoff.

Case V. Water level at elevation 4 NGVD flood-side, at elevation -14.5 NGVD protected side, pervious cutoff.

Case VI. Water level at elevation -14 NGVD flood-side, at elevation -3 NGVD protected side, impervious cutoff.

Case VII. Water level at elevation -14 NGVD flood-side, at elevation -3 NGVD protected side, pervious cutoff.

41. Concrete box structures in Florida Avenue Canal.

a. Description. On the west side of the I.H.N.C. the project includes covering the Florida Avenue Canal in a reinforced concrete box extending 39'-4 1/2" from the gate monolith or 50'-4 1/2" from the wall line on the protected side. On the flood side of the protection works the canal is covered in a similar reinforced concrete box extending 161 feet from the gate monolith or 175 feet from the wall line where a concrete headwall is provided. The concrete headwall is 146'-7" in length and has a top elevation varying from elevation 1.57 NGVD to elevation 5.57 NGVD. Details of the reinforced concrete box and headwall on the west side of the I.H.N.C. are shown on plates 25 through 27. On the east side of the I.H.N.C. the existing canal structure will be removed to a point 57'-3" from the wall line on the flood side and to a point 54'-3" from the wall line on the protected side. Reconstruction of this portion of the existing Florida Avenue Canal structure is included in this project as an open-top reinforced concrete box to provide the required transition in width and invert elevation to conform with the vertical lift gate monolith. Details of the revised canal structure are shown on plates 53 and 54.

b. Loading cases. The reinforced concrete box structures were designed for the following loading conditions:

(1) West Side of I.H.N.C.

Case I. Dry inside, water at elevation -4.5 NGVD outside, full surcharge.

Case II. Water inside, water at elevation -4.5 NGVD outside, full surcharge.

Case III. Dry inside, water at elevation 14 NGVD outside, full surcharge.

Case IV. Water inside, water at elevation 14 NGVD outside, full surcharge.

(2) East Side of I.H.N.C.

Case I. Water at elevation -14 NGVD, full surcharge.

Case II. Water at elevation +14 NGVD, full surcharge.

Case III. Dry inside, water at top of wall outside, full surcharge.

42. Electrical continuity. Except for bonding, no corrosion protection measures are proposed, since all steel sheet piling shall be bonded together to obtain electrical continuity and provide for installation of cathodic protection if the need arises in the future. The piles will be bonded together with no. 6 reinforcing bars welded to each of the piles near the top. Flexible jumpers insulated with cross-linked polyethelene will be welded or brazed to adjacent sheet piles at the monolith joints 3 inches below the bottom of the concrete.

43. Corrosion control. The swing gates, corner plates, and all ferrous metal components which are not galvanized or stainless steel will be coated with a 5-coat vinyl paint system as required for corrosion control.

REAL ESTATE REQUIREMENTS

44. General. All rights-of-way and construction easements required for construction of this project will be acquired by the Orleans Levee District and furnished without cost to the United States. There will be no acquisition by the United States. Right-of-way and construction easement limits are shown on plates 2 and 3 for the west side of I.H.N.C. and plates 43 and 44 for the east side of I.H.N.C.

RELOCATIONS

45. General. Under the authorizing law, local interests are responsible for the accomplishment of "...all necessary alterations and relocations to roads, pipelines, cables, wharves, drainage structures and other facilities made necessary by the construction..." Included in the required modifications are utilities and drainage rectification work.

46. Utilities crossing floodwall. Locations of utilities crossing through the floodwall are shown on plates 41 and 61. Typical details of utilities crossing through the floodwall are shown on plate 42. Special details covering three large diameter pipelines of the Sewerage and Water Board crossing through the T-wall monolith between W/L station 2+90 and W/L station 3+10 on the east side of the I.H.N.C. are shown on plate 62. The required utility relocations on the west side of the I.H.N.C. have already been accomplished under Sewerage and Water Board Contract No. 5075-1 which was completed on March 31, 1979. Each utility crossing will be so constructed that any anticipated settlement or deflection of the I-wall or any small movements of the pipe or conduit will not seriously affect either the wall or the utility line.

COORDINATION WITH OTHER AGENCIES

47. General. As previously mentioned, the State of Louisiana, Department of Public Works, was appointed project coordinator for the State by the Governor of Louisiana. This agency has functioned to coordinate the needs, desires, and interests of state agencies and the Corps of Engineers. The Orleans Levee District will provide the local cooperation for this feature of

the hurricane protection project. The project plan presented herein is acceptable to both of the above agencies. The entire Lake Pontchartrain hurricane protection project, including this project feature, has been discussed at numerous public and private meetings since its authorization. Such meetings have been held before regional, state, local, community, social and educational organizations and have served generally to inform the public of the proposed works, to explain project functions, and to solicit the public viewpoint. The latest public meeting was held in New Orleans on 22 February 1975. It was a combined public information meeting and a meeting to discuss the plan for disposal of dredged material as per Section 404 of the Federal Water Pollution Control Act of 1972. A statement of findings has been prepared and approved by the Environmental Protection Agency. The project has also been described and discussed in press and by communications media, as well as by organizational and individual correspondence.

48. U.S. Department of the Interior, Fish and Wildlife Service. Extensive coordination with the U.S. Fish and Wildlife Service was accomplished during preauthorization studies and subsequent to authorization of the project. By letter dated 2 April 1968, the Regional Director, U.S. Fish and Wildlife Service, Atlanta, Georgia, was informed of the current layout for the Lake Pontchartrain Barrier Plan feature of the Lake Pontchartrain, Louisiana and Vicinity, hurricane protection project and requested to furnish views and comments on the entire Lake Pontchartrain Barrier Plan. By letter dated 15 May 1968, the Acting Regional Director stated "...We are of the opinion that hurricane control structures in the Rigolets and Chef Menteur tidal passes have little appreciable effect on salinities in Lakes Maurepas, Pontchartrain, and Borgne. Therefore, no adverse effects on fish and wildlife resources in these areas are expected." Any significant modifications to the current plan will be forwarded to the Regional Director for further review and comment.

49. U.S. Department of the Interior, Federal Water Pollution Control Administration (now Environmental Protection Agency).

a. Review and recommendations. By letter dated 8 April 1968, the Regional Director, Federal Water Pollution Control Administration, was informed of the current layout for the Lake Pontchartrain Barrier Plan feature of the Lake Pontchartrain, Louisiana and Vicinity, hurricane protection project and requested to furnish views and comments on the project. The Regional Director requested in his letter of response dated 15 May 1968 that consideration be given of the following:

(1) Minimizing water quality degradation during construction.

(2) Minimizing the accidental spillage of petroleum products or other harmful materials and maintenance of sanitary facilities to adequately treat domestic wastes.

(3) Constructing and operating water quality control structures so as to insure that ecological conditions remain unchanged.

b. Project incorporation of recommendations. Provisions relative to water quality degradation during construction, control of accidental spillages, and maintenance of adequate sanitary facilities by construction contractors will be incorporated into the construction plans and specifications. The Seabrook Lock will be operated to provide a desirable salinity regimen in Lake Pontchartrain to the end that deleterious alterations in the lake ecology will be avoided. The Regional Director has been advised of the action to be taken in connection with his comments.

ENVIRONMENTAL ANALYSIS

50. Environmental quality.

a. General. The engineering treatment required for preserving and maintaining the environmental quality of the project has been considered during preparation of this memorandum.

b. Enhancement. Construction of the Florida Avenue Floodwall Complex will have little adverse impact on the area. The entire area is developed as heavy industrial. Addition of a concrete wall and gates will be hardly noticed among the walls of concrete and steel that exist, together with the steel bridges and cranes that are prevalent. Weathered gray concrete is as compatible as anything else with existing structures. Existance of the wall will help protect people and structures in the area.

51. Environmental statement.

a. Initial EIS. The final environmental statement for the Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection project was filed with the President's Council on Environmental Quality on 9 January 1975; notice of this was published in the Federal Register on 17 January 1975.

b. New EIS. On 30 December 1977, with subsequent amendments in March 1978, the US District Court in New Orleans issued an order enjoining any further construction of the Chef Menteur and Rigolets Complexes, until a new EIS has been prepared. The Florida Avenue floodwall is not a portion of the project which is enjoined. It was not contested during the litigation procedure, but will be addressed along with the rest of the project in the new EIS. No adverse environmental effects are anticipated.

52. Cultural resources. An architectural survey of the Mississippi River - Gulf Outlet, Shiplock Project, conducted by the New Orleans District in 1979 revealed no significant structures near the proposed action. The area has been filled and developed; urban and business development precludes discovery of historic or prehistoric remains. If cultural resources are uncovered during construction, work will cease and the contractor will immediately notify the District Engineer.

ESTIMATE OF COST

53. General. Based on April 1980 price levels, the estimated first cost of construction of the Florida Avenue Complex, I.H.N.C. is $13,100,000. This estimate consists of $2,000 for lands and damages, $1,138,000 for relocations, $9,580,000 for floodwall, $1,240,000 for engineering and design, and $1,140,000 for supervision and administration. The detailed estimate of the first cost is shown on table 1.

54. Division of cost. The estimate of first cost of construction has been divided into three parts as follows:

I. West Side of I.H.N.C. - Excluding Floodwall at Pumping Station
II. West Side of I.H.N.C. - Floodwall at Pumping Station (W/L Station 105+81.64 to 107+04.65)
III. East Side of I.H.N.C.

The division of estimated cost between the two sides of the Inner Harbor Navigation Canal define the probable costs for these major portions of the project which are anticipated to be accomplished separately. The further division of the work on the west side of the I.H.N.C. in the area of the pumping station is offered to permit comparison of the estimated cost for the conventional floodwall with the cost after this reach of the floodwall is modified to incorporate it into the foundation of the pumping station.

LAKE PONTCHARTRAIN BARRIER PLAN
AND CHALMETTE AREA PLAN
FLORIDA AVENUE COMPLEX, I.H.N.C.

TABLE 1

ESTIMATE OF FIRST COST
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price $	Estimated Amount $
	I. West Side of I.H.N.C. - Excluding Floodwall at Pumping Station				
	LANDS AND DAMAGES				
01	Lands*				1,000
	TOTAL LANDS AND DAMAGES				1,000
	RELOCATIONS				
02	Relocations				
	15" Ø concrete drain pipe	96	l.f.	25.00	2,400
	Remove 15" concrete drain pipe	64	l.f.	15.00	960
	Relocate catch basins	2	Ea.	1,500.00	3,000
	Remove and repave street	3,200	s.f.	3.50	11,200
	Remove and replace street curb	160	l.f.	12.00	1,920
	Remove and replace fence	60	l.f.	22.00	1,320
	**Relocate Utilities including: 48" Ø Steel water main 54" Ø Steel sewer main including canal crossing Underground electrical conduit and manholes (Completed in 1979)	Lump Sum	l.s.		737,137
	Subtotal				757,937
	Contingencies 20%±				4,063***
	Subtotal				762,000

*Land and Damages have only a nominal value since the area is all encumbered with easement servitudes, permits or historical use by the City of New Orleans, and the Sewerage and Water Board, the Southern Railway, the Public Belt Railroad, New Orleans Public Service for electrical transmission lines, and the Dock Board for its Harbor Road.

**Completed by the Sewerage and Water Board of New Orleans in March, 1979, under Contract No. 5075-1.

***Does not include work accomplished under Sewerage and Water Board Contract 5075-1.

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price	Estimated Amount
				$	$
30	Engineering & Design 10%+				75,000
	Subtotal				837,000
31	Supervision & Administration 7%+				60,000
	TOTAL RELOCATIONS FOR FLOODWALL				897,000
CONSTRUCTION					
11	Floodwalls				
	Compression pile test	2	Ea.	20,000.00	40,000
	Additional comp. pile test	2	Ea.	3,000.00	6,000
	Tension pile test	2	Ea.	21,000.00	42,000
	Steel sheet piling PMA-22	19,135	s.f.	13.00	248,760
	Steel sheet piling PZ-27	1,080	s.f.	12.00	12,960
	Prestressed conc. piles 12" x 12"	24,800	l.f.	23.00	570,400
	Prestressed conc. piles 14" x 14"	11,790	l.f.	25.00	294,750
	Conc. in stabilization slab	267	c.y.	120.00	32,040
	Conc. in T-wall base	730	c.y.	130.00	94,900
	Conc. in walls, columns & beams	439	c.y.	240.00	105,360
	Conc. in sluice gate and canal structure	2,300	c.y.	280.00	644,000
	Steel reinforcement	520,200	lb.	0.45	234,090
	Structural steel	61,200	lb.	2.25	137,700
	Sluice gates, appurtenances & machinery incl. electrical	2	Ea.	136,000.00	272,000
	Miscellaneous metal	2,860	lb.	3.00	8,580
	Waterstops, L-type	50	l.f.	27.00	1,350
	Waterstops, 3-bulb type	380	l.f.	7.00	2,660
	Gate seals	240	l.f.	42.00	10,080
	Waterproof finish	65,500	s.f.	1.00	65,500
	Structural excavation	16,215	c.y.	10.00	162,150
	Structural backfill	6,187	c.y.	16.00	98,990
	Expansion joint filler	680	s.f.	2.00	1,360
	Trolley, overhead roller gates	1	job	L.S.	15,000
	Concrete removal	580	c.y.	75.00	43,500
	Timber pile removal	200	Ea.	60.00	12,000

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price $	Estimated Amount $
Floodwalls (cont'd)					
	Sheet pile removal	65	Ea.	75.00	4,880
	Temporary sheet pile walls PZ-38	1,500	s.f.	16.00	24,000
	*Temporary sheet pile cofferdam	1	job	L.S.	775,000
	*Dewatering	1	job	L.S.	305,000
	Environmental protection (0.005)				21,300
	Subtotal				4,286,310
	Contingencies 20%±				857,690
	Subtotal				5,144,000
30	Engineering & Design 12%±				600,000
	Subtotal				5,744,000
31	Supervision & Administration 10%±				560,000
	TOTAL CONSTRUCTION FOR FLOODWALL				6,304,000
I.	TOTAL, WEST SIDE OF I.H.N.C. (Excluding Floodwall at Pumping Station)				7,202,000
	II. West Side of I.H.N.C. - Floodwall at Pumping Station (W/L Station 105+81.64 to 107+04.65)				
LANDS AND DAMAGES					
01	Lands**				0
	TOTAL LANDS AND DAMAGES				0

*An amount equal to the actual estimated cost for these items on the East side of the I.H.N.C. has been included.

**Land and Damages have only a nominal value since the area is all encumbered with easement servitudes, permits or historical use by the City of New Orleans, and the Sewerage and Water Board, the Southern Railway, the Public Belt Railroad, New Orleans Public Service for electrical transmission lines, and the Dock Board for its Harbor Road.

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price $	Estimated Amount $
CONSTRUCTION					
11	Floodwalls				
	Steel sheet piling PMA-22	2,500	s.f.	13.00	32,500
	Prestressed concrete piles 12" x 12"	2,690	l.f.	23.00	61,870
	Conc. in stabilization slab	18	c.y.	120.00	2,160
	Conc. in T-wall base	91	c.y.	240.00	21,840
	Conc. in walls, cols. & beams	68	c.y.	280.00	19,040
	Steel reinforcement	24,000	lb.	0.45	10,800
	Waterstops, 3-bulb type	80	l.f.	7.00	560
	Waterproof finish	4,600	s.f.	1.00	4,600
	Structural excavation	655	c.y.	10.00	6,550
	Structural backfill	340	c.y.	16.00	5,440
	Expansion joint filler	140	s.f.	2.00	280
	Environmental protection (0.005)				830
	Subtotal				166,470
	Contingencies 20%±				33,530
	Subtotal				200,000
30	Engineering & Design 12%±				25,000
	Subtotal				225,000
31	Supervision & Administration 10%±				25,000
	TOTAL CONSTRUCTION FOR FLOODWALL				250,000
II.	TOTAL, WEST SIDE OF I.H.N.C. - FLOODWALL AT PUMPING STATION (W/L STATION 105+81.64 TO 107+04.65)				250,000

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price $	Estimated Amount $
	III. East Side of I.H.N.C.				
	LANDS AND DAMAGES				
01	Lands*				1,000
	TOTAL LANDS AND DAMAGES				1,000
	RELOCATIONS				
02	Relocations				
	6" Ø steel water pipe	120	l.f.	22.00	2,640
	8" Ø steel gas pipe thru sheet pile wall	1	job	L.S.	2,500
	12" Ø steel gas pipe	380	l.f.	75.00	28,500
	12" Ø steel water pipe	440	l.f.	50.00	22,000
	12" Ø steel sewer pipe - force main	440	l.f.	60.00	26,400
	6" Ø steel sewer pipe - force main bypass	40	l.f.	24.00	960
	U.G. electrical duct 20" x 25" thru sheet pile wall	2	ea.	5,000.00	10,000
	48" Ø steel water pipe thru T-wall	1	job	L.S.	45,000
	54" Ø steel sewer pipe - force main, thru T-wall	1	job	L.S.	50,000
	66" Ø steel sewer pipe - force main, thru T-wall	1	job	L.S.	60,000
	Railroad falsework	1	job	L.S.	30,000
	Remove & repave street incl. ramp at Surekote Rd.	10,000	s.f.	3.50	35,000
	Subtotal				313,000
	Contingencies 20%±				63,000
	Subtotal				376,000

*Land and Damages have only a nominal value since the area is all encumbered with easement servitudes, permits or historical use by the City of New Orleans, and the Sewerage and Water Board, the Southern Railway, the Public Belt Railroad, New Orleans Public Service for electrical transmission lines, and the Dock Board for its Harbor Road.

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price $	Estimated Amount $
30	Engineering & Design 10%±				40,000
	Subtotal				416,000
31	Supervision & Administration 7%±				30,000
	TOTAL RELOCATIONS FOR FLOODWALL				446,000
CONSTRUCTION					
11	Floodwalls				
	Compression pile test	2	Ea.	20,000.00	40,000
	Additional comp. pile test	2	Ea.	3,000.00	6,000
	Tension pile test	2	Ea.	21,000.00	42,000
	Steel sheet piling PMA-22	20,371	s.f.	13.00	264,820
	Steel sheet piling PZ-27	7,868	s.f.	12.00	94,420
	Prestressed conc. piles 12" x 12"	17,922	l.f.	23.00	412,210
	Prestressed conc. piles 14" x 14"	7,566	l.f.	25.00	189,150
	Prestressed conc. piles 16" x 16"	1,719	l.f.	28.00	48,130
	Conc. in stabilization slab	199	c.y.	120.00	23,880
	Conc. in T-wall base	670	c.y.	130.00	87,100
	Conc. in walls, cols. & beams	459	c.y.	240.00	110,160
	Conc. in sluice gate & canal structures	858	c.y.	280.00	240,240
	Steel reinforcement	297,600	lb.	0.45	133,920
	Structural steel	39,541	lb.	2.25	88,970
	Sluice gates, appurtenances & machinery including electrical	2	Ea.	136,000.00	272,000
	Miscellaneous metal	3,860	lb.	3.00	11,580
	Waterstops, L-type	90	l.f.	27.00	2,430
	Waterstops, 3-bulb type	370	l.f.	7.00	2,590
	Gate seals	150	l.f.	42.00	6,300
	Waterproof finish	34,200	s.f.	1.00	34,200
	Structural excavation	4,620	c.y.	10.00	46,200
	Structural backfill	1,140	c.y.	16.00	18,240

ESTIMATE OF FIRST COST (cont'd)
(April 1980 Price Levels)

Cost Acct. No.	Item	Estimated Quantity	Unit	Unit Price	Estimated Amount
				$	$
Floodwalls (cont'd)					
	Compacted shell	1,020	c.y.	20.00	20,400
	Expansion joint filler	760	s.f.	2.00	1,520
	Trolleys, overhead roller gate	1	job	L.S.	15,000
	Concrete removal	450	c.y.	75.00	33,750
	Timber pile removal	110	Ea.	60.00	6,600
	Sheet pile removal	650	Ea.	75.00	48,750
	Temporary sheet pile walls PZ-38	8,200	s.f.	16.00	131,200
	Temporary sheet pile cofferdams	1	job	L.S.	775,000
	Dewatering	1	job	L.S.	305,000
	Environmental protection (0.005)				17,560
	Subtotal				3,529,320
	Contingencies 20%±				706,680
	Subtotal				4,236,000
30	Engineering & Design 12%±				500,000
	Subtotal				4,736,000
31	Supervision & Administration 10%±				465,000
	TOTAL CONSTRUCTION FOR FLOODWALL				5,201,000
III.	TOTAL, EAST SIDE I.H.N.C.				5,648,000
	SUMMARY				
I.	WEST SIDE OF I.H.N.C. - EXCLUDING FLOODWALL AT PUMPING STATION				7,202,000
II.	WEST SIDE OF I.H.N.C. - FLOODWALL AT PUMPING STATION				250,000
III.	EAST SIDE OF I.H.N.C.				5,648,000
	TOTAL PROJECT COST				13,100,000

55. Comparison of costs. The project document included a cost for the protective works along the I.H.N.C. which for the New Orleans East Unit, west side of I.H.N.C., includes 5.8 miles of levee raising using sheet piling wall with a concrete cap and for the Chalmette unit, east side of I.H.N.C., includes 1 mile of concrete capped sheet piling. The Florida Avenue Complex as such was not detailed in these estimates. The design memorandum entitled "Lake Pontchartrain, LA & Vicinity Chalmette Area Plan" Design Memorandum No. 3 General Design dated November 1966 provides the basis for the East side Florida Avenue Complex estimate. An estimate for the west side was not included in any of the previous design memorandums but a combined estimate for both the east and west sides was presented in a letter report dated 12 May 1972 subject "Hurricane Protection for I.H.N.C., Florida Avenue Complex". This letter report was approved 29 November 1973 and using price escalations on the report estimates, the Florida Avenue Complex was detailed for the first time in the 1 July 1974 PB-3. Comparisons of the 1 July 1974 PB-3, 1 October 1979 PB-3 estimates and the estimates presented in this GDM are shown in Tables 2 and 3.

56. Reasons for the difference.

a. 01 Lands and Damages.

(1) The 1 October 1979 PB-3 estimate for lands and damages was based on an escalation of the 1 July 1974 PB-3 which reflects the fair market value of Real Estate in the locale of the proposed work. Subsequent assessments determined that lands and damages have only a nominal value since the area is encumbered with easement servitudes, permits or historical use by the City of New Orleans, and the Sewerage and Water Board, the Southern Railway, the Public Belt Railroad, New Orleans Public Service for electrical transmission lines, and the Dock Board for its Harbor Road. Therefore, this item decreased by $453,000 on the East Side of the I.H.N.C. and by $124,000 on the West Side of the I.H.N.C.

b. 02 Relocations.

(1) The 1 October 1979 PB-3 estimated cost of relocations was determined from an escalation of costs shown in the 1 July 1974 PB-3 estimate. Subsequent engineering studies and resulting alignment changes have affected these early estimates substantially. For the East Side of the complex the estimate of cost of relocations has been reduced by $440,000. This reduction in cost is attributed to elimination of the need for a road ramp at Florida Avenue. The

West Side relocation cost shown in this DM are actual costs required to accomplish the needed relocations. This work was accomplished by local interest and completed in March 1979. The increased cost of $235,097 between the 1 October 1979 PB-3 estimate and the actual incurred cost was due to underestimation of the original cost of relocations.

c. 11 Levees and Floodwalls.

(1) As mentioned in paragraph 55 above, the original estimates for the Florida Avenue Complex called for concrete capped sheet piling to form the main line of protection at Florida Avenue. Subsequent engineering studies showed that pile supported T-walls would be required at a number of locations instead of I-wall construction and that at least one new vehicular gate would be required on either side of the I.H.N.C. Also, the alignment shifts mentioned in paragraph 56.b. above resulted in additional length of wall on both sides of the I.H.N.C. As a result of these design changes, the GDM levees and floodwall estimate for the east side increased by $1,250,000. On the west side, the GDM estimate increased by $2,380,000 over the 1 October 1979 estimate. A substantial portion of this increase is attributed to the need for a concrete box structure to insure stability of west side wall paralleling the Florida Avenue Canal.

d. 30 Engineering and Design.

(1) Design changes. This item increased $106,000 for the east side design work and $390,000 for the west side design work. The amount of the increase is directly attributable to the increased effort required to design the project.

e. 31 Supervision and Administration.

(1) Design changes. An increase of $148,000 for the east side supervision and administration along with an increase of $324,000 for the west side is directly attributable to the increase in engineering effort required to design and construct the project. Also, additional supervision and inspection effort is required because of the more complex construction methods required by the current design.

TABLE 2

COMPARISON OF ESTIMATES
WEST SIDE FLORIDA AVE. COMPLEX

Cost Acct. No.	Feature	PB-3 (1 July 74 Price Levels)	PB-3 (1 Oct 79 Price Levels)	GDM No. 4 (April 80 Price Levels)	Difference GDM No. 4 1 Oct 79 PB-3
01	Lands & Damages	65,000	125,000	1,000	-124,000
02	Relocations	370,000	527,000	762,000	+235,000
11	Levees & Floodwalls	1,900,000	2,962,000	5,344,000	+2,382,000
30	Engineering & Design	230,000	408,000	700,000	+292,000
31	Supervision & Administration	230,000	333,000	645,000	+312,000
TOTAL		2,795,000	4,355,000	7,452,000	+3,097,000

TABLE 3

COMPARISON OF ESTIMATES
EAST SIDE FLORIDA AVE. COMPLEX

Cost Acct. No.	Feature	PB-3 (1 July 74 Price Levels)	PB-3 (1 Oct 79 Price Levels)	GDM No. 4 (April 80 Price Levels)	Difference GDM No. 4 1 Oct 79 PB-3
01	Lands & Damages	249,000	454,000	1,000	-453,000
02	Relocations	573,000	816,000	376,000	-440,000
11	Levees & Floodwalls	2,640,000	3,034,000	4,236,000	+1,202,000
30	Engineering & Design	290,000	445,700	540,000	+94,300
31	Supervision & Administration	290,000	360,500	495,000	+134,500
TOTAL		4,042,000	5,110,200	5,648,000	+ 537,800

SCHEDULE FOR DESIGN AND CONSTRUCTION

57. Schedule. The estimated schedule is as follows:

a. West Side of I.H.N.C. south of Harbor Road Gate:

1. Design plans and specifications. (By local interests)

Start - March 1979
Complete - April 1980

2. Construction. (By local interests)

Start - September 1980
Complete - September 1982

b. West Side of I.H.N.C. north of Harbor Road Gate:

1. Design plans and specifications. (By local interests)

Start - March 1979
Complete - April 1982

2. Construction. (By local interests)

Start - March 1983
Complete - December 1984

c. East Side of I.H.N.C.:

1. Design plans and specifications. (By local interests)

Start - May 1980
Complete - January 1981

2. Construction. (By local interests)

Start - June 1981
Complete - December 1982

OPERATION AND MAINTENANCE

58. General. The Florida Avenue Complex floodwalls and gates will be maintained and operated at the expense of local interest as a feature of local cooperation for the project. The estimates of annual operations and maintenance costs for different features of the project are as follows:

(1) Floodwall - $760.00
(2) Gates - $6,880.00

The floodwall annual cost includes grass cutting of embankments and debris removal from manholes; the gates annual cost includes periodic painting, cleaning, and test operation.

ECONOMICS

59. Economic justification. The current economic analysis for the entire Lake Pontchartrain, Louisiana and Vicinity hurricane protection project, at the October 1979 price level, indicated a benefit-cost ratio of 11.8 to 1. An economic reanalysis of the entire Lake Pontchartrain, Louisiana and Vicinity hurricane protection project is presently being prepared and will be submitted at a later date. This reanalysis will include incremental justification for each portion of the entire project.

60. Water conservation measures. The use of water conservation measures in the construction of the Florida Avenue Complex was investigated during the planning and design stages. It was concluded that the nature and scope of construction required at Florida Avenue did not afford the opportunity for use of these measures. Also, the construction of the project will neither encourage nor discourage the use of potable water as the area protected by the floodwalls is considered fully developed at this time. Future demands for increased consumptive use will depend on future population density trends and future industrial development along the I.H.N.C. and will not be influenced by project construction.

61. Federal and non-Federal cost breakdown. The breakdown of the construction cost into the Federal and non-Federal shares are shown in Table 4 below:

TABLE 4

FEDERAL AND NON-FEDERAL
COST BREAKDOWN

Item	Federal	Non-Federal	Total
Floodwall	9,200,000	2,760,000	11,960,000
Lands & Damages	-	2,000	2,000
Relocations	-	1,138,000	1,138,000
TOTAL	$9,200,000	$3,900,000	$13,100,000

RECOMMENDATION

62. Recommendation. In partial response to Public Law 298, 89th Congress, 1st session, approved 27 October 1965, it is recommended that the plan presented herein be constructed in order to provide hurricane protection for the Florida Avenue Complex, I.H.N.C. of the Lake Pontchartrain, Louisiana and vicinity hurricane protection project.

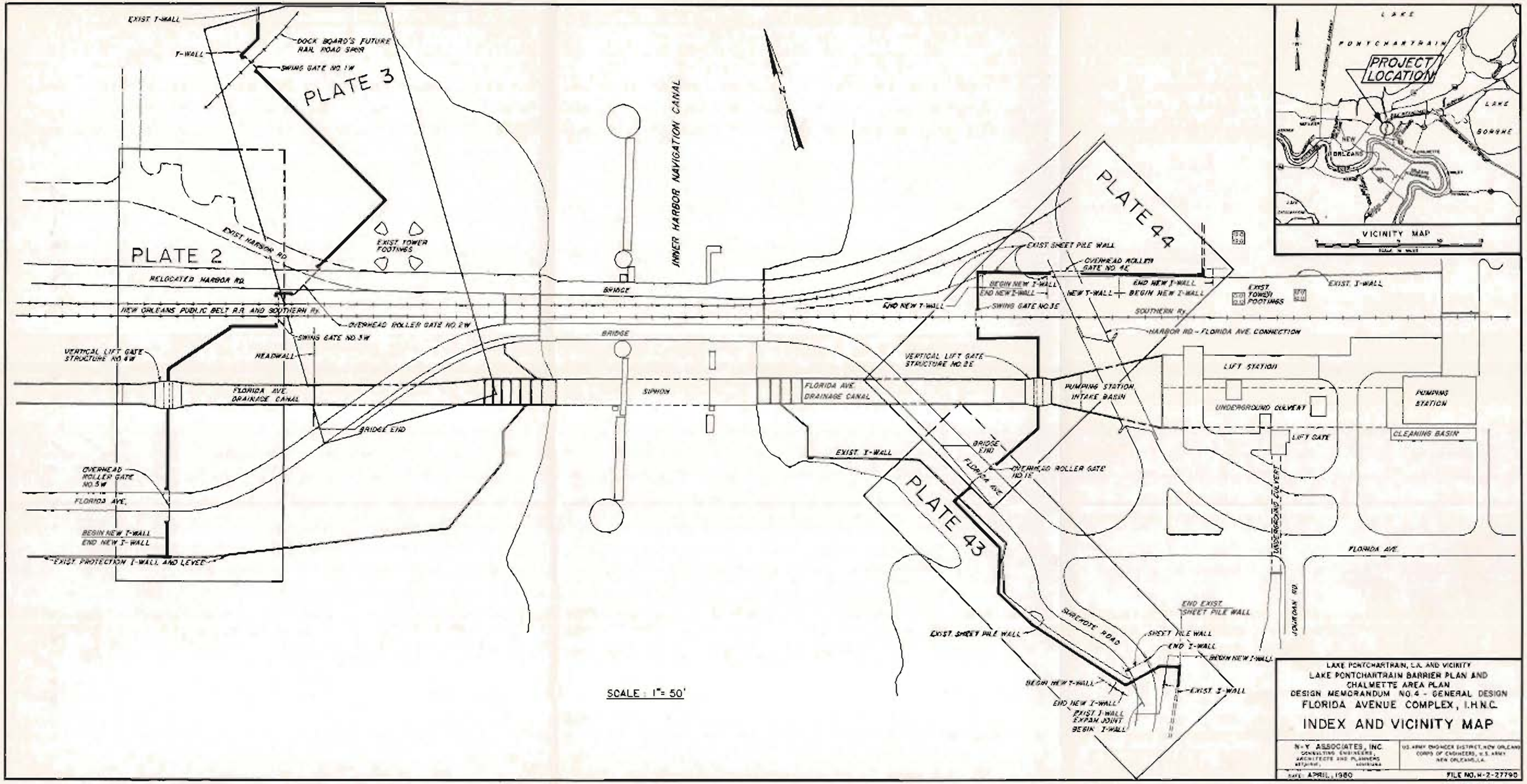
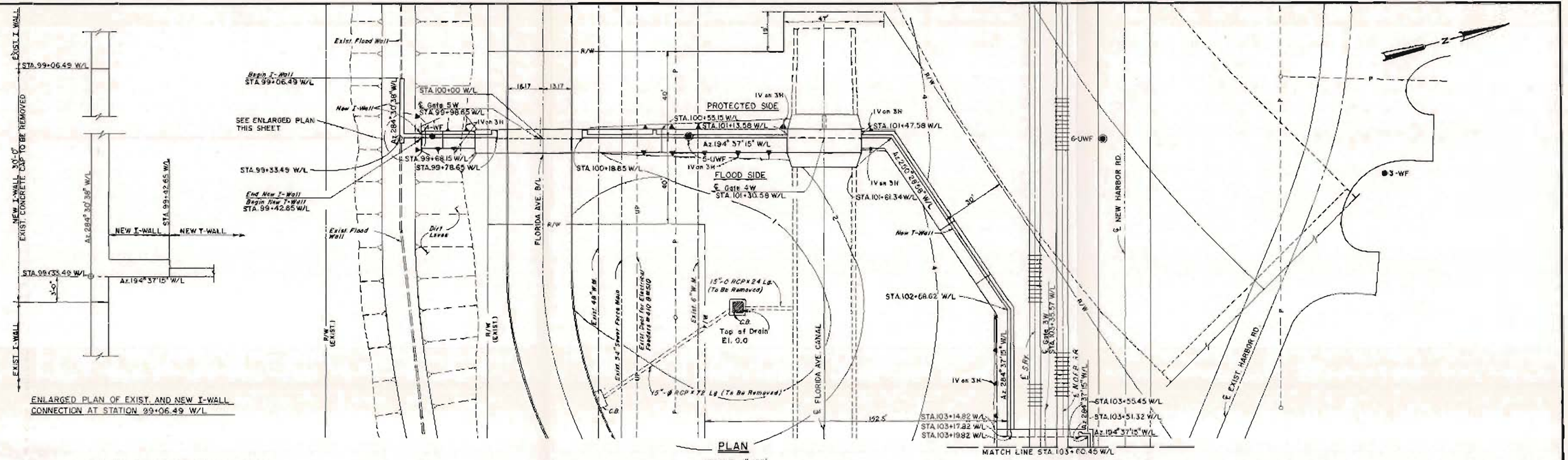


PLATE 3
PLATE 2
PLATE 44
PLATE 43
INNER HARBOR NAVIGATION CANAL
EXIST T-WALL
T-WALL
DOCK BOARD'S FUTURE RAIL ROAD SPUR
SWING GATE NO. 1W
EXIST. HARBOR RD.
EXIST. TOWER FOOTINGS
RELOCATED HARBOR RD.
NEW ORLEANS PUBLIC BELT R.R. AND SOUTHERN Ry.
OVERHEAD ROLLER GATE NO. 2W
SWING GATE NO. 3W
VERTICAL LIFT GATE STRUCTURE NO. 4W
HEADWALL
FLORIDA AVE. DRAINAGE CANAL
BRIDGE END
OVERHEAD ROLLER GATE NO. 5W
FLORIDA AVE.
BEGIN NEW T-WALL
END NEW T-WALL
EXIST. PROTECTION T-WALL AND LEVEE
BRIDGE
SIPHON
EXIST. SHEET PILE WALL
OVERHEAD ROLLER GATE NO. 4E
BEGIN NEW T-WALL
END NEW T-WALL
NEW T-WALL
END NEW T-WALL
BEGIN NEW T-WALL
SWING GATE NO. 3E
EXIST. T-WALL
EXIST TOWER FOOTINGS
SOUTHERN Ry.
HARBOR RD. - FLORIDA AVE. CONNECTION
VERTICAL LIFT GATE STRUCTURE NO. 2E
FLORIDA AVE. DRAINAGE CANAL
PUMPING STATION INTAKE BASIN
LIFT STATION
UNDERGROUND CULVERT
PUMPING STATION
LIFT GATE
CLEANING BASIN
BRIDGE END
FLORIDA AVE.
OVERHEAD ROLLER GATE NO. 1E
EXIST. T-WALL
LAKE PONTCHARTRAIN BARRIER CANAL
FLORIDA AVE.
END EXIST. SHEET PILE WALL
SHEET PILE WALL
END T-WALL
BEGIN NEW T-WALL
SURFSIDE ROAD
EXIST. SHEET PILE WALL
BEGIN NEW T-WALL
END NEW T-WALL
EXIST T-WALL EXPAN JOINT
BEGIN T-WALL
EXIST. T-WALL
JOURDAN RD.
LAKE
PONTCHARTRAIN
PROJECT LOCATION
LAKE
BORGNE
NEW ORLEANS
VICINITY MAP
SCALE : 1" = 50'
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
INDEX AND VICINITY MAP
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS
ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.
DATE: APRIL, 1980
FILE NO. H-2-27790

PLATE 1



NOTE:
Solid Contour Lines Indicate Finished Grade.
Dashed Contour Lines Indicate Existing Grade.

LEGEND:
● 3-WF GENERAL TYPE BORING
◉ 5-UWF UNDISTURBED BORING

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

PLAN AND PROFILE WEST I.H.N.C.

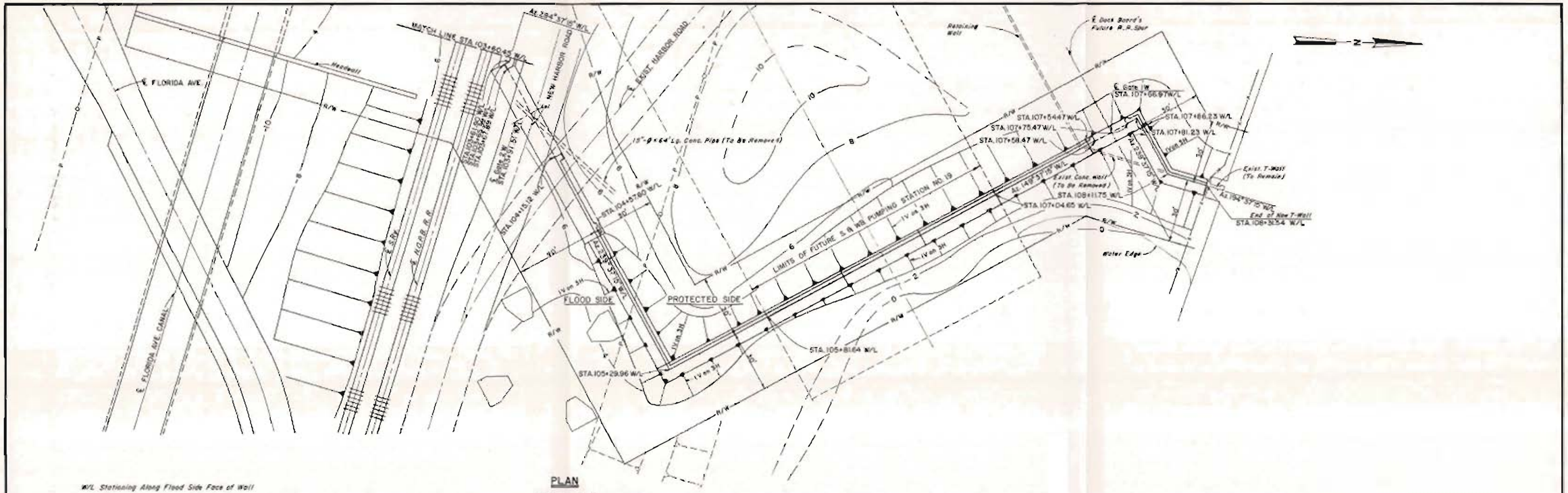
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1990

FILE NO. H-2-27790

PLATE 2



LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

PLAN AND PROFILE WEST I.H.N.C.

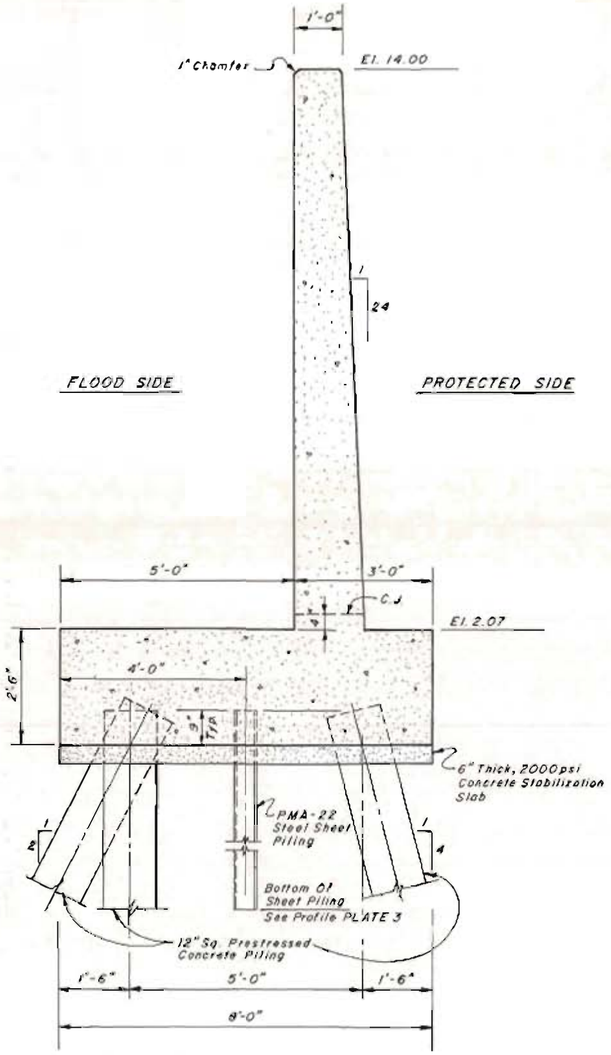
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL 1980

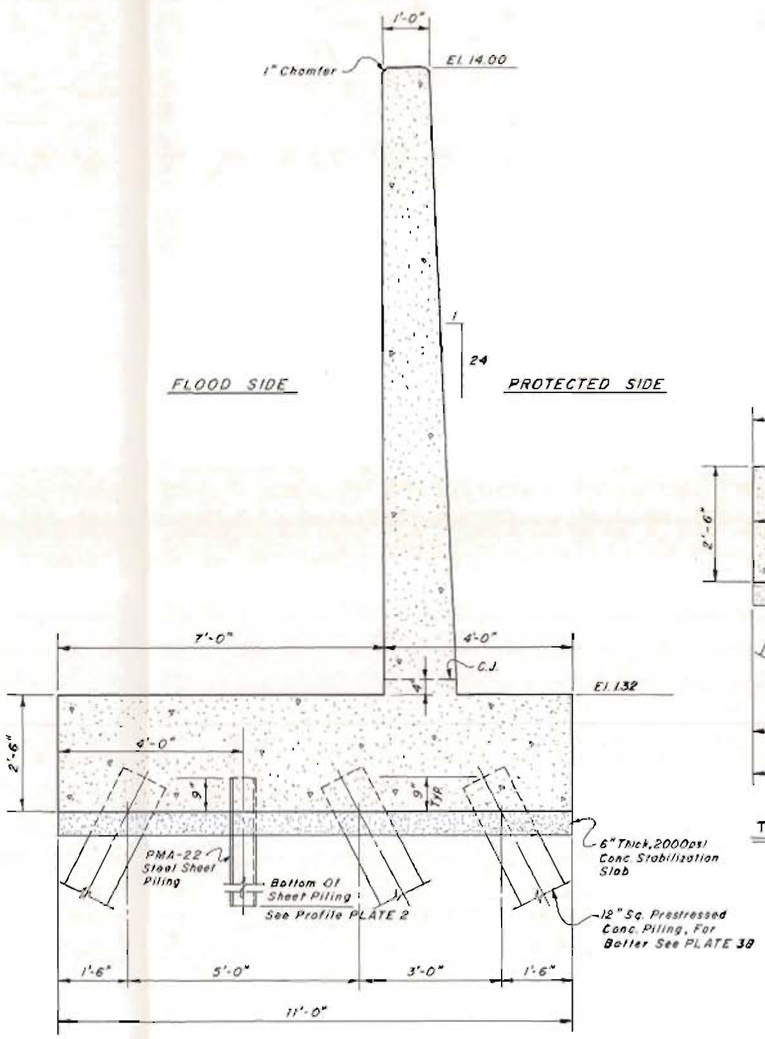
FILE NO. N-2-27790

PLATE 3



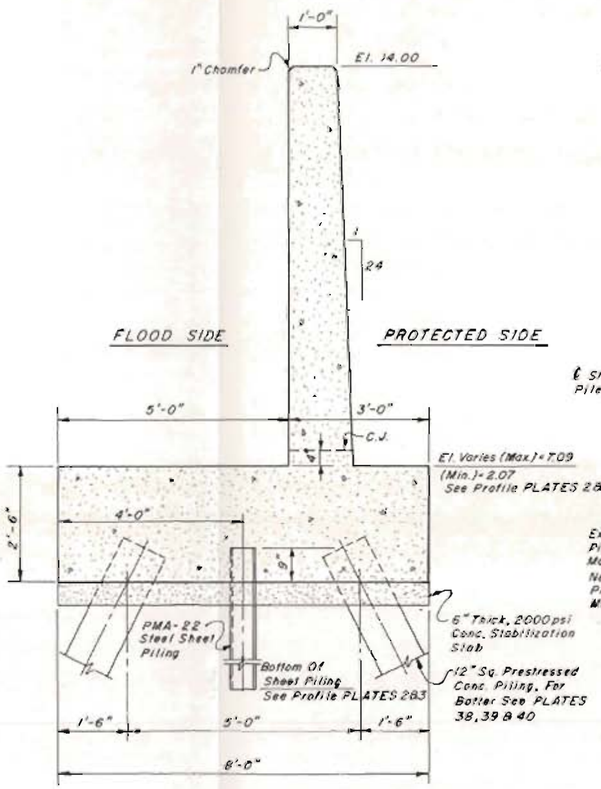
"T" WALL SECTION MONOLITH 13-WEST SIDE

SCALE: 3/4" = 1'-0"



"T" WALL SECTION MONOLITH 5-WEST SIDE

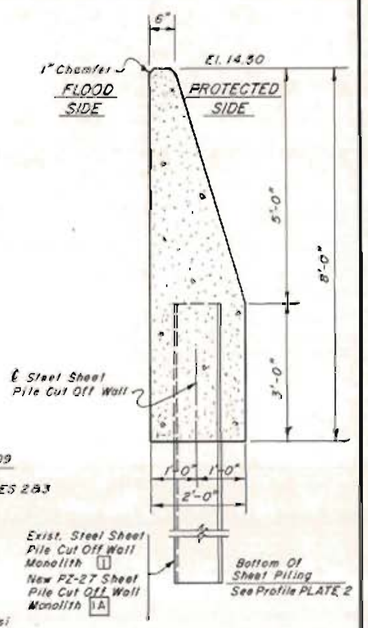
SCALE: 3/4" = 1'-0"



TYPICAL "T" WALL SECTION-WEST SIDE

SCALE: 3/4" = 1'-0"

MONOLITHS 2 3 6 7 8 9 12 14 15 16 17 18 & 20



TYPICAL "I" WALL SECTION
WEST WALL

SCALE: 3/4" = 1'-0"

MONOLITHS 1 & 1A

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

TYPICAL WALL SECTIONS WEST I.H.N.C.

M-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
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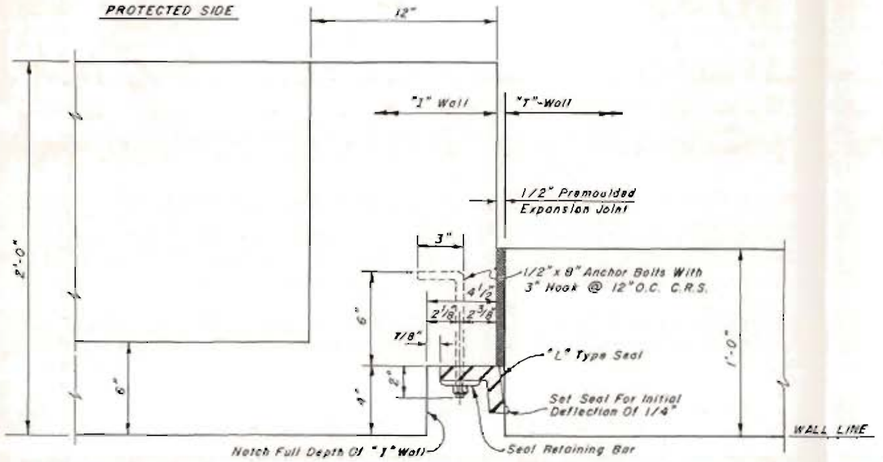
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1980

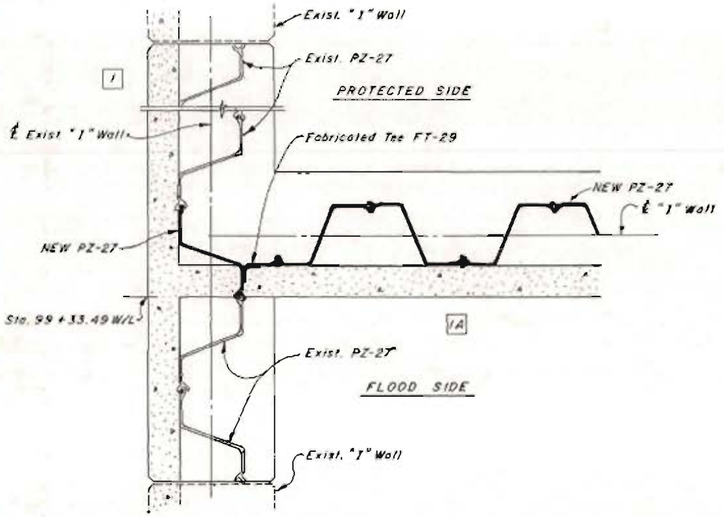
FILE NO. H-2-27790

PLATE 4



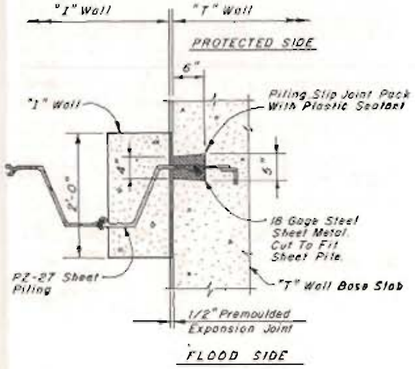
PLAN AT JUNCTION OF "I" WALL & "T" WALL

SCALE: 3" = 1'-0"



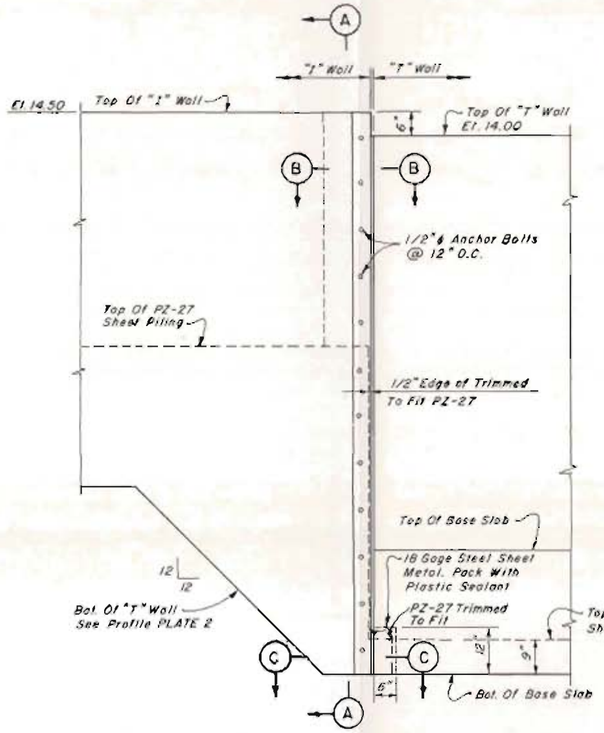
PLAN-SECTION AT JUNCTION OF EXISTING "I" WALL & NEW "I" WALL

SCALE: 1" = 1'-0"



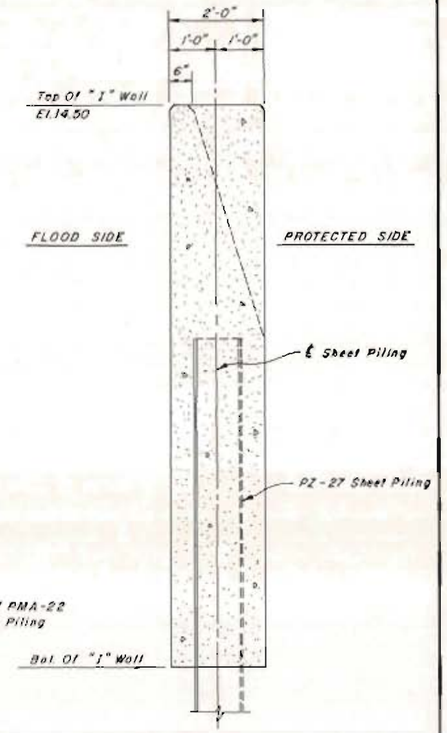
SECTION C

SCALE: 1" = 1'-0"



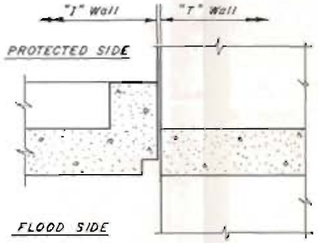
FLOOD SIDE ELEVATION - JUNCTION OF "I" WALL & "T" WALL

SCALE: 3/4" = 1'-0"



SECTION A

SCALE: 3/4" = 1'-0"



SECTION B

SCALE: 3/4" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

TYPICAL WALL SECTIONS WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

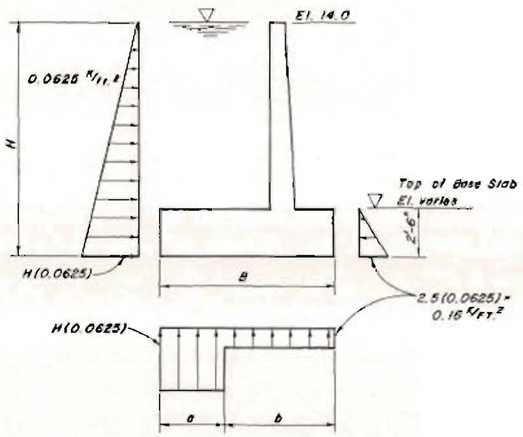
PLATE 5

LOADING CASES

Case I - Flood Condition, Water at El. 14.0, Flood Side, Top of Base Slab, Protected Side, Impervious Cutoff

Case II - Flood Condition, Water at El. 14.0, Flood Side, Top of Base Slab, Protected Side, Pervious Cutoff

CASES I & II



CASE I - IMPERVIOUS CUTOFF

CASE II - PERVIOUS CUTOFF

BASE WIDTH B	DIM. a	DIM. b
8'-0"	4'-0"	4'-0"
11'-0"	4'-0"	7'-0"

PILE DESIGN

Allowables for 12" x 12" precast prestressed concrete piles

Compression = 80^K

Tension = 40^K

P = axial pile load

Q = Transverse pile load

Maximum bending moment = 0.5 RQ

R = Effective length

$R = \sqrt[4]{\frac{EI}{K}}$

E = modulus of elasticity of pile = 4.29×10^6 psi (f'_c = 5,000 psi)

I = moment of inertia of pile = $\frac{bh^3}{12} = \frac{12^4}{12} = 1728$ in.⁴

K = modulus of subgrade reaction = 100 psi

$R = \sqrt[4]{\frac{(4.29 \times 10^6)(1728)}{100}} = 92.8$ in.

M = 0.5RQ = 0.5 (92.8)Q = 46.4Q

f_b = actual bending stress

$f_b = \frac{M}{S}$

where S = section modulus of pile = $\frac{bh^2}{6} = \frac{12(12)^2}{6} = 288$ in.³

$f_b = \frac{46.4Q}{288} = 0.161Q$

f_a = actual axial stress

$f_a = \frac{P}{A}$

where A = area of pile = 144 in.²

$f_a = \frac{P}{144} = 0.006944P$

F_b = allowable bending stress

F_a = allowable axial stress

COMPRESSION PILES

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$F_a = F_b = 750$ psi

(0.35 f'_c - max. prestress 0.2 f'_c = 1750 - 1000 = 750 psi)

$\frac{0.006944P}{750} + \frac{0.161Q}{750} = 1.0$

$0.006944(80{,}000) + 0.161Q = 750$

$Q_{allow.} = 1207 \text{ lb.} \approx 1.21^K$

TENSION PILES

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$F_a = F_b = 840$ psi

(min. effective prestress after losses = 840 psi)

$\frac{0.006944P}{840} + \frac{0.161Q}{840} = 1.0$

$0.006944(40000) + 0.161Q = 840$

$Q_{allow.} = 3490 \text{ lb.} = 3.49^K$

Results from computer program, K29010, "Three Dimensional Analysis Of Pile Foundations." Program based on planar method of pile analysis developed by A. Hrennikoff and extended to three dimensions by W.E. Saul.

CRITICAL PILE LOADS

MONOLITH	GROUP	MAX. PILE LOAD P	MAX. PILE LOAD Q	CASE NO. P	CASE NO. Q	ALLOW. PILE LOAD P	ALLOW. PILE LOAD Q	% ALLOW. P	% ALLOW. Q
2	A	-7.3	-1.4	I	II	-40.0	3.49	18.2	40.1
	B	28.7	1.4	I	II	80.0	3.48 ▷	35.9	40.1
3	A	-18.0	-0.6	I	II	-40.0	3.49	45.0	17.2
	B	44.5	-0.5	I	II	80.0	1.21	55.6	41.3
5	A	-32.6	-0.5	II	II	-40.0	3.49	81.5	14.3
	B	63.8	0.4	I	II	80.0	1.21	79.8	33.1
6	A	-28.8	-0.4	II	II	-40.0	3.49	72.0	11.5
	B	47.4	0.4	I	II	80.0	1.21	59.2	33.1
7	A	-14.1	-0.4	I	II	-40.0	3.49	35.2	11.5
	B	35.1	0.4	I	II	80.0	1.21	43.9	33.1
8	A	-23.1	-0.3	I	II	-40.0	3.49	57.8	8.6
	B	36.5	0.2	II	II	80.0	1.21	45.6	16.5
9	A	-9.1	-0.9	I	II	-40.0	3.49	22.8	25.8
	B	53.5	1.0	II	II	80.0	1.21	66.9	83.3
12	A	-27.1	1.5	I	I	-40.0	3.49	67.8	43.0
	B	57.6	-1.6	I	I	80.0	2.17 ▷	72.0	73.7
13 ◁	A	-47.1	-0.9	II	II	-43.0 ▷	3.18 ▷	109% ▷	28.3
	B	68.5	0.9	I	II	80.0	1.21	85.6	74.4
14 ◁	A	-41.1	0.8	I	II	-43.0 ▷	3.49	95.6	22.9
	B	68.6	0.7	II	II	80.0	1.21	85.8	57.9
15,16&17	A	-29.7	1.8	I	I	-40.0	3.49	74.2	51.6
	B	60.5	-1.9	I	I	80.0	2.05 ▷	75.6	92.7
18	A	-32.8	1.9	I	I	-40.0	3.49	82.0	54.4
	B	64.2	-2.0	I	I	80.0	1.89 ▷	80.2	105.8 ▷
20	A	-39.8	0.6	I	I	-40.0	3.49	99.5	17.2
	B	51.0	-0.6	I	I	80.0	1.21	63.8	49.6

▷ Q ALLOW CORRESPONDING TO P_{MAX}

▷ EXCEEDS 100%

◁ SOIL CAPACITY OF PILE

◁ SEE PILE INTERACTION PLATE 46

Notes:

1. - Denotes tension (Loads in kips)
   + Denotes compression (Loads in kips)
2. Group A - Piles on Flood Side
   Group B - Piles on Protected Side
3. All "T-Wall Monolith Piles are 12" square prestressed concrete piles. The pile length used in calculations was 64 feet. Final pile lengths may have to be increased to obtain required allowable pile capacity.
4. Allowable transverse load calculated for maximum axial load, not allowable axial load.
5. The Critical Pile Loads for the gates are tabulated on the following Plates;

   Gate 5W — Plate 7
   Gate 4W — Plate 23 & Plate 29
   Gate 3W — Plate 35
   Gate 2W — Plate 36
   Gate 1W — Plate 37

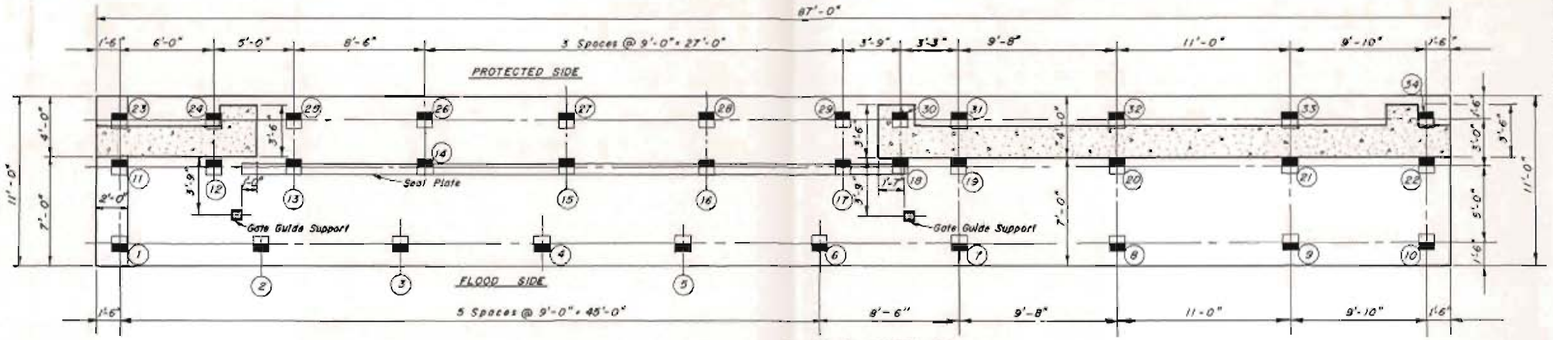
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
T-WALL PILE ANALYSIS
WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

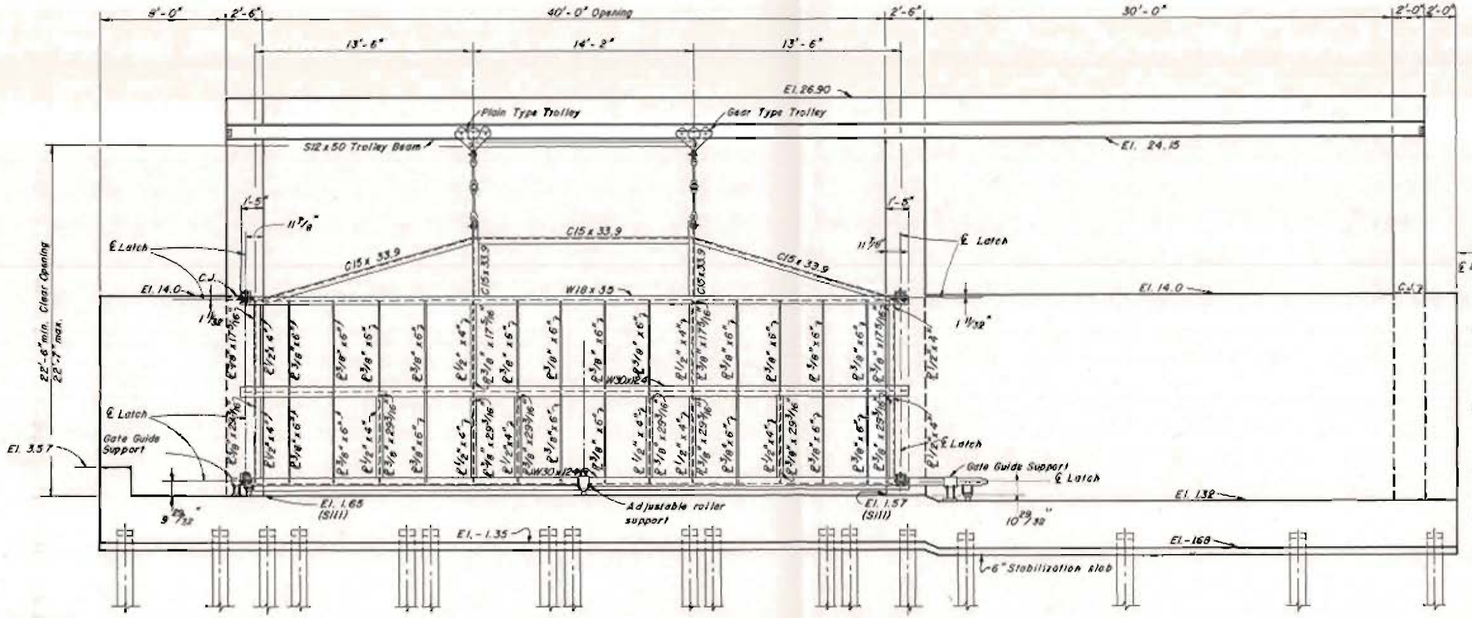
US ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL 1980

FILE NO. H-2-27790

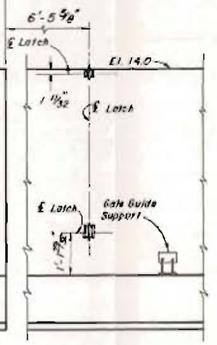


PLAN AT ELEV. 2.0



FLOOD SIDE ELEVATION

SCALE: 1/4" = 1'-0"

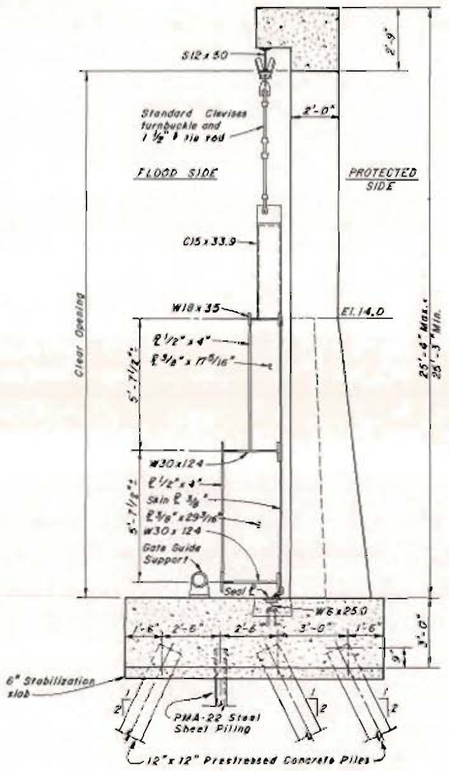


Notes:
1. All piles to be 12" sq. prestressed concrete piles.
2. All piles to be batter 2V on 1H (U.N.O.)

Indicates direction of batter.

CRITICAL PILE LOADS								
GROUP	MAX. PILE LOAD		CASE NO.		ALLOW PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
TENSION PILE	-39.6	-0.4	I	II	-40.0	3.49	99.0	11.5
COMPRESSION PILE	62.3	+1.1	IV	IV	80.0	12.1	78.0	91.0

See Plate 6 for notes and allowable loads
See Plate 8 for Load Case definitions



TYPICAL SECTION

SCALE: 3/8" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVENUE GATE NO. 5W WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. H-2-27790

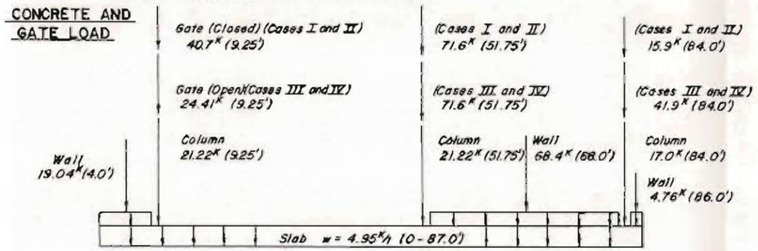
PLATE 7

BASE SLAB DESIGN

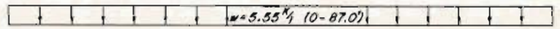
Note: See page 27 for description of Load Cases.

MOMENTS ABOUT Y-Y AXIS

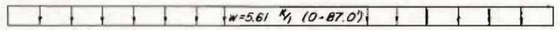
Consider slab as a beam loaded with external vertical loads and supported by piles' vertical components.



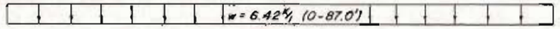
WATER
(Cases I & II)



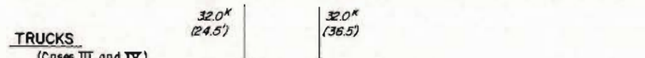
UPLIFT
(Impervious – Case I)



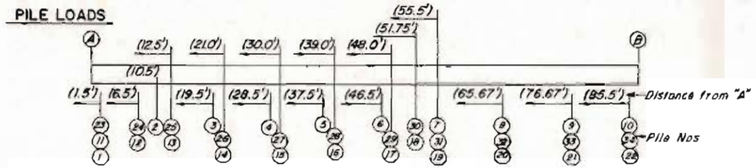
UPLIFT
(Pervious – Case II)



TRUCKS
(Cases III and IV)



PILE LOADS



Cases I and II

Max. Moment = 1780.8 IK at 50.50' from "A"
Max. Shear = 147.22 at 38.25 from "A"

Cases III and IV

Max. Moment = 1059.4 IK at 50.50' from "A"
Max. Shear = 125.6K at 29.25' from "A"

$M = kbd^2$

$d = \sqrt{\frac{M}{kb}} = \sqrt{\frac{1780.8 \times 12}{(0.152)(132)}} = 32.64" > 32"$ OK

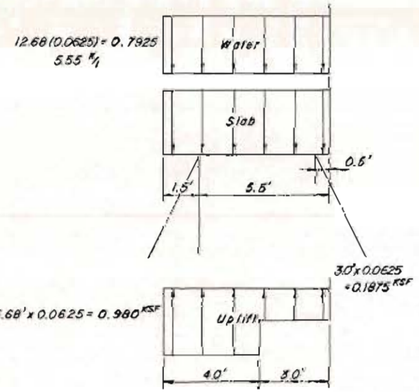
$v_f = \frac{V}{bd} = \frac{147.22}{132 \times 30} = 0.37^{KSI}$ Allow. $v_f = 0.060^{KSI}$ without shear reinf

MOMENTS ABOUT X-X AXIS

Bending at face of wall

Consider Piles 7,8,9,19,20,21 acting over 21 feet of wall

Case I Impervious Cutoff



FORCE Fz		Arm FT	Mx IK
Piles 3, 4, 5, 6	34.07	5.5	187.39
Piles 13, 14, 15, 16, 17	-32.11	0.5	-16.06
Slab (3.0)(7.0)(0.15) =	3.15	3.5	11.03
Water (0.7925)(7) =	5.55	3.5	19.43
Uplift (0.98)(4.0) =	-3.92	3.5	-13.72
(0.1875)(3.0) =	-0.56	0.0	0.0
Σ	6.18		188.07 IK

$M = Kbd^2$

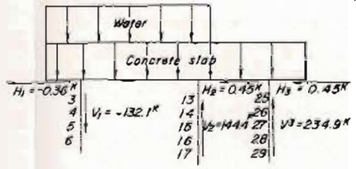
$d = \sqrt{\frac{M}{Kb}} = \sqrt{\frac{188.07 \times 12}{(0.152)(12)}} = 35.18" > 32"$ OK but provide compress. reinforcement.

$V_f = \frac{V}{bd} = \frac{6.18^K}{(12)(32)} = 0.017^{KSF}$ Allow. $v_f = 0.60$ without shear reinf.

TORSIONAL ANALYSIS

Analyze section within gate opening

Case I



FORCE		Dist. from slab center	Torsional Moment
Water (0.7925)(7.0)(40.0)	= 221.9	2.0	443.8
Uplift (0.980)(4.0)(40.0)	= 156.8	3.5	-548.8
Uplift (0.1875)(3.0)(40.0)	= 22.5	0.0	0.0
H_1	0.36	4.0	1.4
H_2	-0.45	1.0	-0.5
H_3	-0.45	4.0	-1.8
V_1	132.1	4.0	528.4
V_2	-144.4	1.0	-144.4
V_3	-234.9	4.0	-939.6
			-661.5

Piles: 3,4,5,6,13,14,15,16,17,25,26,27,28 and 29.

$H_1 = \frac{2}{\sqrt{5}}$ (-0) (3) (4) (5) (6) = -0.1 -0.1 -0.1 = -0.36K

V_1 = -34.1 - 33.4 - 32.6 - 32.0 = -132.1K

$H_2 = \frac{2}{\sqrt{5}}$ (0.1 + 0.1 + 0.1 + 0.1 + 0.1) (13) (14) (15) (16) (17) = 0.45K

V_2 = 25.7 + 27.2 + 28.9 + 30.5 + 32.1 = 144.4K

$H_3 = \frac{2}{\sqrt{5}}$ (0.1 + 0.1 + 0.1 + 0.1 + 0.1) (25) (26) (27) (28) (29) = 0.45K

V_3 = 43.8 + 45.3 + 46.9 + 48.6 + 50.3 = 234.9K

Torsional Moment 661.5 IK
Torsional Moment divides equally between columns

$M_T = \frac{661.5}{2} = 330.75^{IK}$

Shear stress due to torsion v_f

$v_f = \frac{n M_1}{b^2 h} = \frac{5(330.75)(12)}{(36)^2 (132)} = 0.116$ ksi

$v = v_f + v_f = 0.113 + 0.013 = 0.126$ ksi > 0.060 ksi
< 0.274 ksi allow. with shear reinf.

∴ Slab OK but provide shear reinforcement.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 5W
BASE SLAB DESIGN

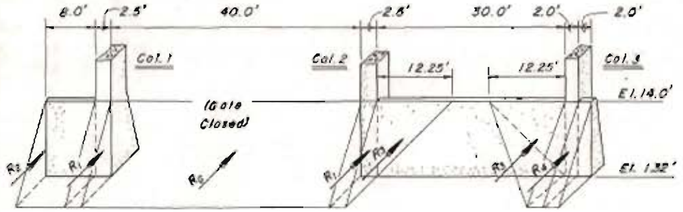
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. N-2-27790

PLATE 8

LOADING



Water to El. 14.0 ~ Gate Closed	Force	Arm	Moment
Column 1			
R_1 & R_2 = $\frac{1}{2}$ (10.5) (10.0625) $(12.25)^2$	49.23	4.083	201.0
R_5 = $\frac{1}{2}$ (40) $\frac{1}{2}$ $(12.25)^2$ (0.0625)	93.79	4.083	383.0
Σ	143.02		584.0

Investigate Column 1 with water at El. 14.0 and no wind

WATER FORCES

COMPUTATIONS	F	Arm_y	Mx	Arm_x	My
R_1 = $\frac{1}{2}$ (2.5) (0.0625)$(12.25)^2$	-11.72	4.083		–	47.85
R_2 = $\frac{1}{2}$ (8.0)(0.0625)$(12.25)^2$	-37.52	4.083	-196.96	5.25	153.21
R_5 = $\frac{1}{4}$ (40)(0.0625) $(12.25)^2$	-93.78	4.083	-1055.13	11.25	-382.9
Σ	-143.02		-1252.1		-583.97

COLUMN DEAD LOAD

Above El. 14.0 ~ 2.5 (2.0) (10.08)(0.15) = 7.56^K

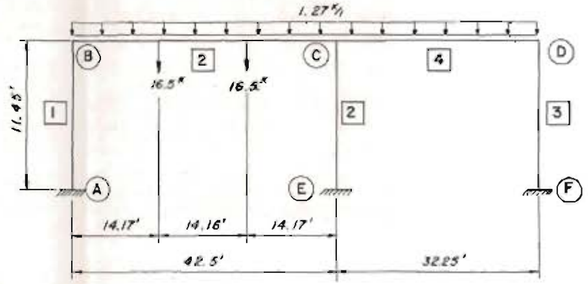
Below El. 14.0 ~ 2.5 (2.0)(12.25)(0.15) = 9.19^K

- 2.5 (1.5) ($\frac{1}{2}$) (12.25)(0.15) = 3.45^K

2.02^K

FRAME ANALYSIS

LOAD CASE II : Gate Closed
No Wind



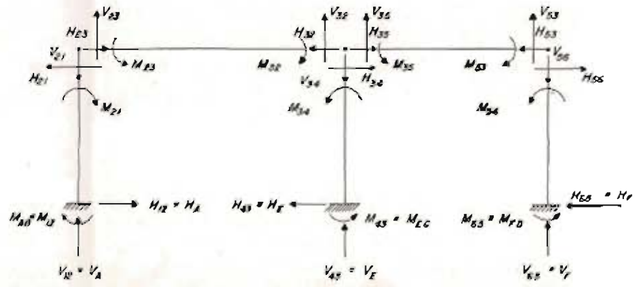
Results from frame analysis by computer program G-FRAME

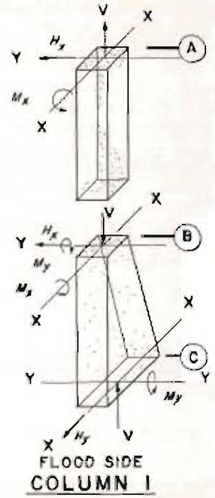
M_{AB} = 99.26'^{K}	V_A = 40.70^K	H_A = 29.70^K
M_B = 0	V_B = 0	H_B = 0
M_C = 0	V_C = 0	H_C = 0
M_{EC} = 100.8'^{K}	V_E = 77.55^K	H_E = 22.73
M_D = 0	V_D = 0	H_D = 0
M_{FD} = 33.96'^{K}	V_F = 15.92^K	H_F = 6.99^K

$V_{21} + V_{23} = 0$
$H_{21} + H_{23} = 0$
$M_{21} + M_{23} = 0$

$V_{32} + V_{35} + V_{34} = 0$
$H_{32} + H_{35} + H_{34} = 0$
$M_{32} + M_{35} + M_{34} = 0$

$V_{53} + V_{56} = 0$
$H_{53} + H_{56} = 0$
$M_{53} + M_{56} = 0$

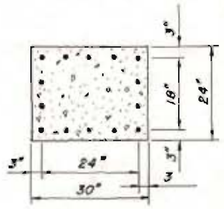




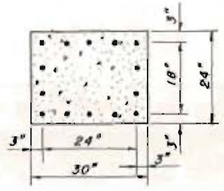
COLUMN 1

POINT ELEV.	Mx	My	V	Hx	Hy
(A) El. 26.83	-161.2	0			0
(B) El. 14.0	-101.57	65.43	40.8	-29.8	0
(C) El. 1.75	0	549	71.6	0	124.7

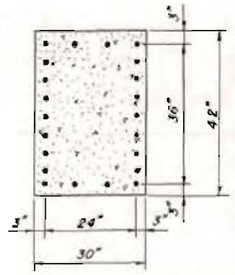
14 - #11 bars in the column at El. 24.5
f_c = 0.611 ksi allowable f_c = 1.05 ksi
f_s = 11.623 ksi allowable f_s = 20.0 ksi



14 - #11 bars in the column at El. 14.0
f_c = 0.527 ksi allowable f_c = 1.05 ksi
f_s = 4.371 ksi allowable f_s = 20.0 ksi



22 - #11 bars in the column at El. 1.75
* f_c = 1.165 ksi allowable f_c = 1.05 ksi
f_s = 16.833 ksi allowable f_s = 20.0 ksi



* Overstressed but acceptable

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 5W
COLUMN DESIGN

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

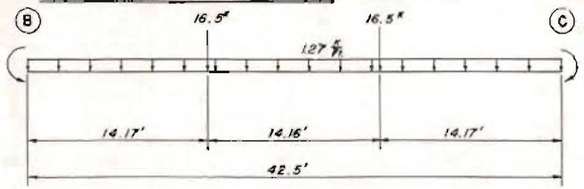
US ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1980

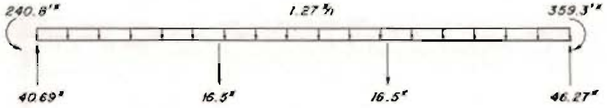
FILE NO. H-2-27790

PLATE 9

BEAM DESIGN * (BEAM 2)

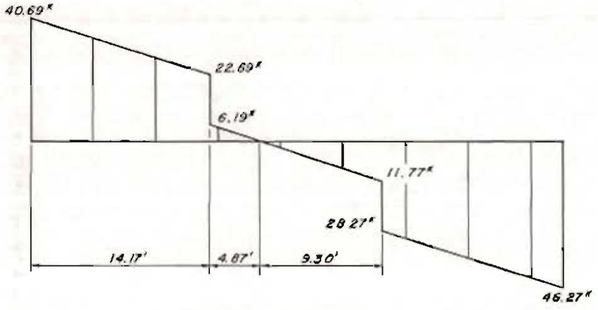


LOADING

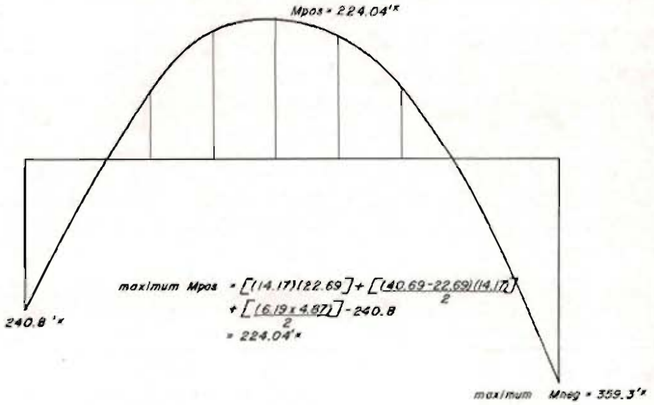


RESULTS FROM FRAME ANALYSIS

* Maximum positive moment occurs between joints B and C; maximum negative moment occurs at joint C.

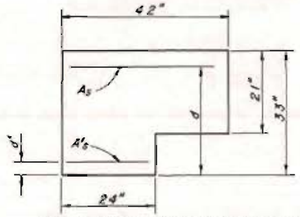


SHEAR DIAGRAM



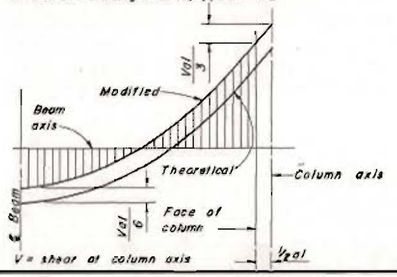
MOMENT DIAGRAM

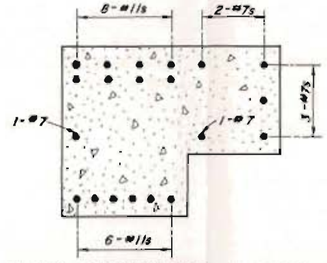
NEGATIVE MOMENT



k = 0.326 j = 0.891 K = 152 psi f_s = 20 ksi f_c = 1.05 ksi d' = 3.5 in.
l = 33 in. b = 24 in. d = 28 in. f'_c = 3.0 ksi n = 9.2 a = 1.44

The maximum negative moment can be reduced by $\frac{Val}{3}$ (Ref. ACI 8.5.2.2. and "Continuity In Concrete Building Frames," pp. 28-30)





BEAM REINFORCING LAYOUT

$a' = 2.5'$ $l = 42.5$ $a = \frac{2.5}{42.5}$

$M'neg = Mneg - \frac{Val}{3} = 359.3 - \frac{46.27(2.50)}{3} = 320.74^{'k}$

$dbal = \sqrt{\frac{12M}{Kb}} = \sqrt{\frac{12(320.74)}{.152(24)}} = 32.48$ in

$dbal = 32.44$ in $>$ dprov. $= 28$ in $\therefore$ compression steel required

$\frac{d'}{d} = \frac{3.5}{28} = 0.125$ $\therefore c = 0.825$ *

$F = \frac{bd^3}{12{,}000} = \frac{24(28)^3}{12{,}000} = 1.57$

$KF = 152(1.57) = 238.6$

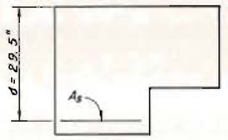
$M - KF = 320.74 - 238.6 = 82.14^{'k}$

$As = \frac{M}{ad} = \frac{320.74}{1.44(28)} = 7.95 in^2$ (8-#11s used, A = 12.48 in.)

$A's = \frac{M - KF}{cd} = \frac{82.14}{0.825(28)} = 3.56 in^2$

* See ACI Publication SP-3: Reinforced Concrete Design Handbook, Working Stress Design, Example 5.

POSITIVE MOMENT



The maximum positive moment can be reduced by $\frac{Val}{6}$

$\therefore M'pos = 224.04 - \frac{46.27(2.5)}{6} = 204.8^{'k}$

$dbal = \sqrt{\frac{12(204.8)}{.152(24)}} = 25.96$ in

dprov. $= 29.5$ in. $>$ dbal $= 25.96$ in.

$\therefore$ no compression steel needed

$As = \frac{M}{fsjd} = \frac{204.8(12)}{20(0.89)(29.5)} = 4.67 in^2$

$\therefore$ Total As (required) $= 4.67 + 3.56 = 8.23 in^2$

$\therefore$ Use 6-#11s, As $= 9.36 in^2$

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE NO. 5W OVERHEAD BEAM DESIGN

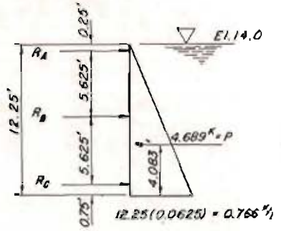
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. H-2-27790

PLATE 10

LOADING



$12.25(0.0625) = 0.766\ ^K/_{ft}$

$P = \frac{wh^2}{2} = (10.0625)(12.25)^2(0.5) = 4.689^K$

Pressure @ (B) $= (5.625' + 0.25')(0.0625) = 0.367\ ^K/_{Sq.ft.}$

$R = 0.367^K(5.625' + 0.75')(0.5) = 1.170^K$

$(0.766^K - 0.367^K)(5.625' + 0.75')(0.5)(0.333) = 0.423^K$

$(0.367^K)(5.625 + 0.25)(0.5)(2)(0.333) = 0.719^K$

$\Sigma R_B = 2.312$

$R_A = 0.719^K \times 0.5 = 0.360^K$

$R_C = 1.170^K\ [0.423^K \times 2] = 2.017^K$

$\Sigma R_A + R_B + R_C = 4.689^K$

SKIN PLATE

Load, $W = 11.25(0.0625) = 0.703\ ^K/_{'}$

$t\ min = 5/16$ in., Use $t = 3/8$ in.

$S = \frac{bt^2}{6} = 0.2812\ in^3$

Maximum Allowable Moment $= SF_b$

$SF_b = 0.2812\ (20.) = 5.624^{'K} = 0.469^{K'}$

Interior Span, $M = 1/12\ wl^2$

$1/12\ wl^2 = 0.469$

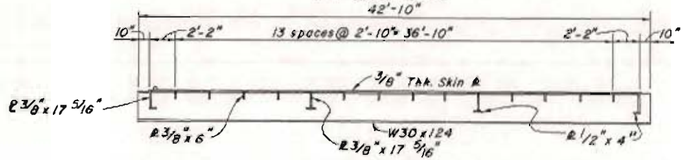
$1/12\ (0.703)l^2 = 0.469$

$l = 2.83$ ft., use 2.83 ft.

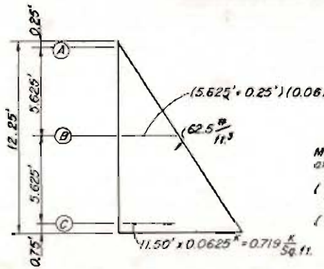
Exterior Span, $M = 1/10\ wl^2$

$1/10\ wl^2 = 0.469$

$l = 2.58$ ft., use 42'-10"



VERTICAL STIFFENERS



$(5.625' + 0.25')(0.0625^K) = 0.367\ ^K/_{Sq.ft.}$

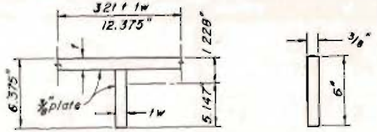
$11.50' \times 0.0625^K = 0.719\ ^K/_{Sq.ft.}$

Max. Mom. between (B) and (C) at 3.25' from (B)

$(\frac{2}{9\sqrt{3}})(\frac{0.352^K \times 5.625'}{2})(5.625) = 0.71^{'K}$

$(\frac{0.367 \times 3.25}{2})(5.625 - 3.25) = 1.42^{'K}$

$EM = 2.13^{'K}$



Effective Flange Width

AISC 19.1.2

$\frac{95^K}{\sqrt{36,000}} = 16$

$2(16 \times 0.375") + 0.375 + 12 = 12.375$

ITEM	AREA	y	Ay	Ay	Io
Plate 12.375" x 3/8"	4.641	0.1875	0.870	0.163	—
Plate 6" x 3/8"	2.250	3.375	7.594	25.630	6.75
	6.891	3.563	8.464	25.793	6.75

$\bar{y} = \frac{\Sigma Ay}{\Sigma A} = \frac{8.464}{6.891} = 1.228$ in.

$I = I + \Sigma Ay^2 - (\Sigma Ay \times \bar{y})$

$= 6.75 + 25.793 - (846.4 \times 1.228)$

$= 22.149\ in^4$

$S_{TOP} = \frac{I}{C_{TOP}} = \frac{22.149}{1.128} = 18.04\ in^3$

$S_{BOT} = \frac{I}{C_{BOT}} = \frac{22.149}{5.147} = 4.30\ in^3$

$f_s = \frac{M}{S_{BOT}} = \frac{2.13(12)(2.83)}{4.30} = 16.82$ ksi << allow = 18 ksi

GIRDER

Span = Opening + Column face to bar + Column face to bar

$= 40.0' + 1.25' + 1.25' = 42.5$ ft

Top Girder

Try W18 x 35

Load, $w = 0.36\ ^K/_{'}$

$M = \frac{wl^2}{8} = \frac{1}{8}(0.36)(42.5)^2 = 81.3^{'K}$

As per AISC - 1.5.1.4.1 and EM - 1110 - 1 - 2101,

$F_b = 20.0$ ksi

$f_b = \frac{M}{S} = \frac{81.3(12)}{58.0} = 16.82 ksi < F_b$ ∴ use W18 x 35

Center Girder, Try W30 x 124

Load $= 2.31\ ^K/_{'}$

$M = \frac{1}{8}(2.31)(42.5)^2 = 522.20^{'K}$

$F_b = 20$ ksi

$f_b = \frac{522.20(12)}{355} = 17.55 < F_b$ ∴ use W30 x 124

Bottom Girder, Try W30 x 124

Load $= 2.02\ ^K/_{'}$

$M = \frac{1}{8}(2.02)(42.5) = 456.08^{'K}$

$F_b = 20$ ksi

$f_b = \frac{456.08(12)}{355} = 15.42 < F_b$ ∴ use W30 x 124

Deflection (Top, Center, and Bottom Girders)

$\Delta Top = \frac{5wl^4}{384EI} = \frac{5(0.36)(42.5)(42.5 \times 12)^3}{384(29 \times 10^6)(513)} = 1.78$ in.

$\Delta Cen. \frac{5(2.31)(42.5)(42.5 \times 12)^3}{384(29 \times 10^6)(5630)} = 1.04$ in.

$\Delta Bott. \frac{(5)(202)(42.5)(42.5 \times 12)^3}{384(29 \times 10^6)(5630)} = 1.00$ in.

$\Delta Allow = \frac{l}{360} = \frac{42.5(12)}{360} = 1.42$ in > Δ Top, Δ Con., Δ Bott.

Use W18 x 35 - Top Girder

Use W30 x 124 - Center Girder

Use W30 x 124 - Bottom Girder

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 5W
STEEL DESIGN

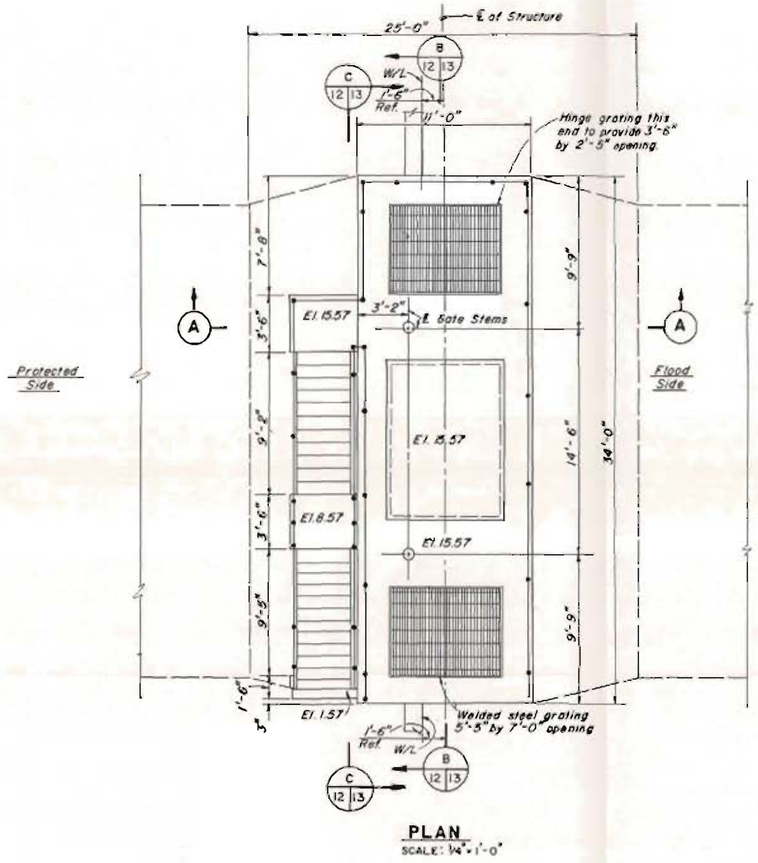
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

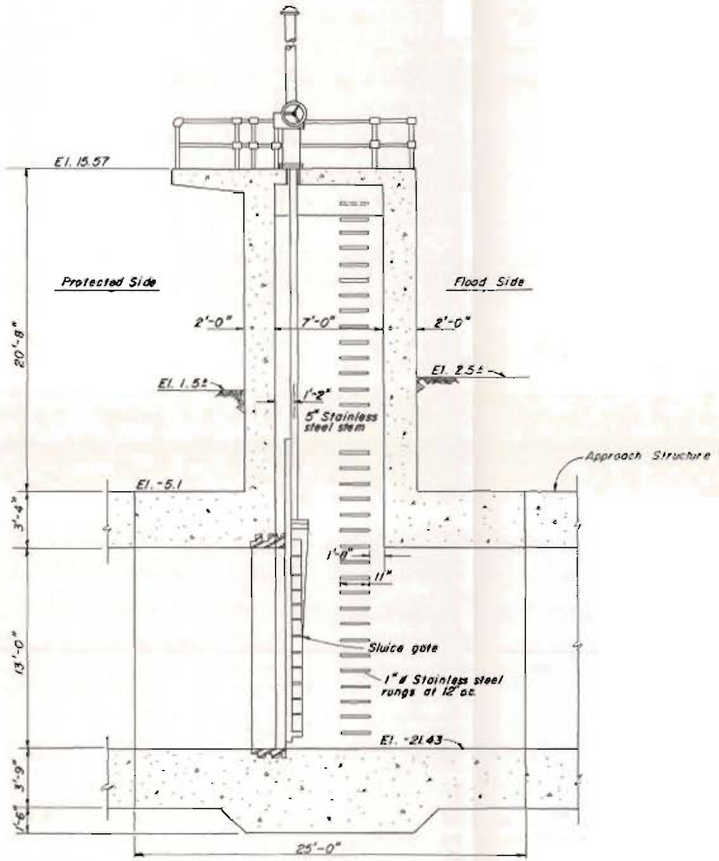
DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 11



PLAN
SCALE: 1/4" = 1'-0"



SECTION (A)
SCALE: 1/4" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

FLORIDA AVE. CANAL GATE NO. 4W - WEST I.H.N.C.

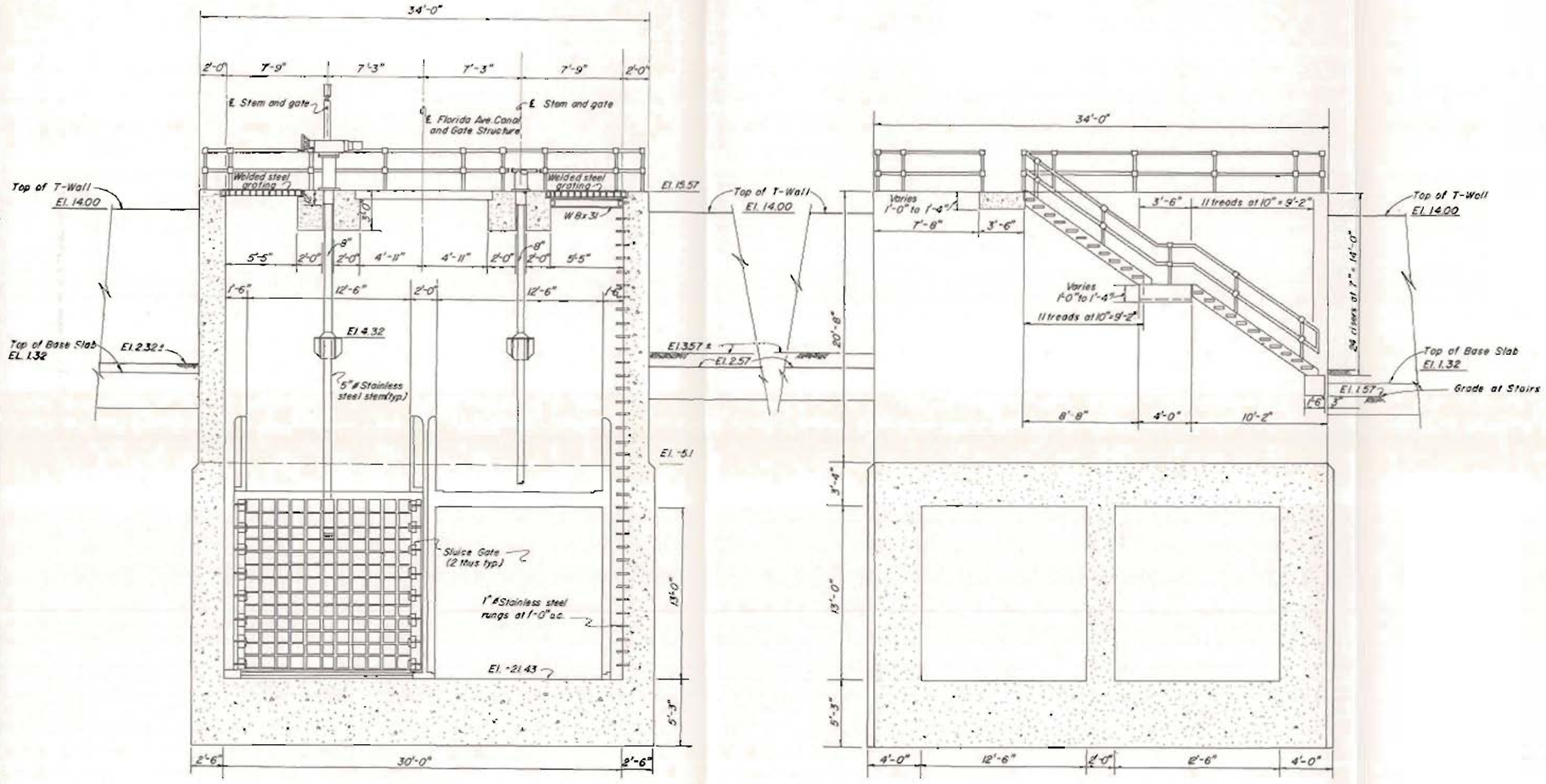
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL 1980

FILE NO. H-2-27790

PLATE 12



LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

FLORIDA AVE. CANAL GATE NO. 4W - WEST I.H.N.C.

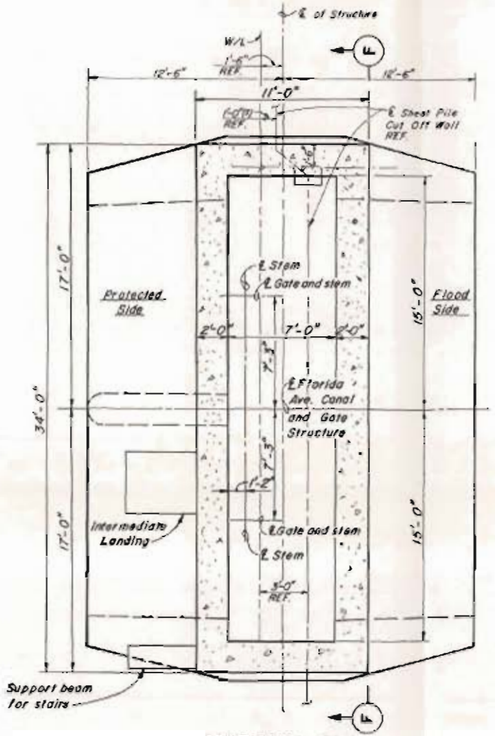
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

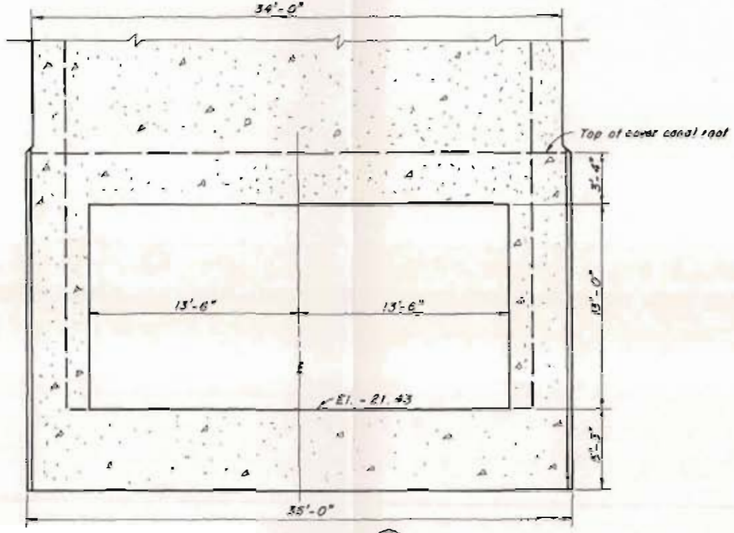
FILE NO. H-2-27790

PLATE 13



SECTIONAL PLAN AT ELEVATION 10.0

SCALE: 1/4"=1'-0"



SECTION (F)

SCALE: 1/8"=1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVE. CANAL GATE
NO. 4W - WEST I.H.N.C.

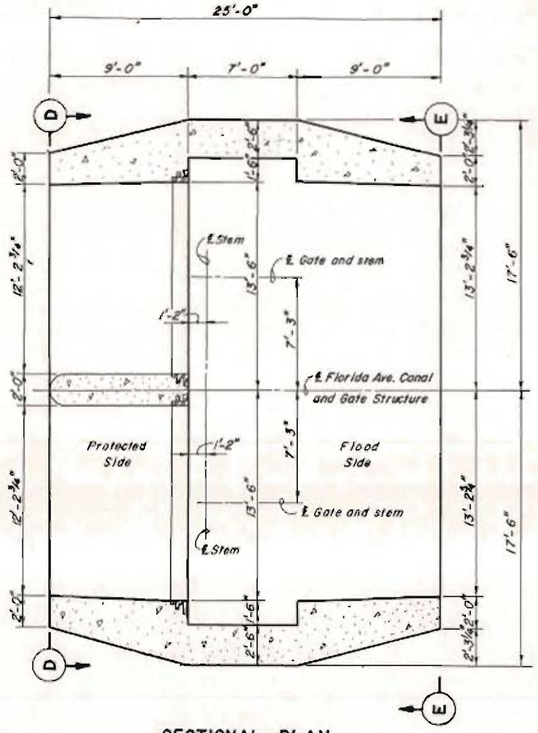
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

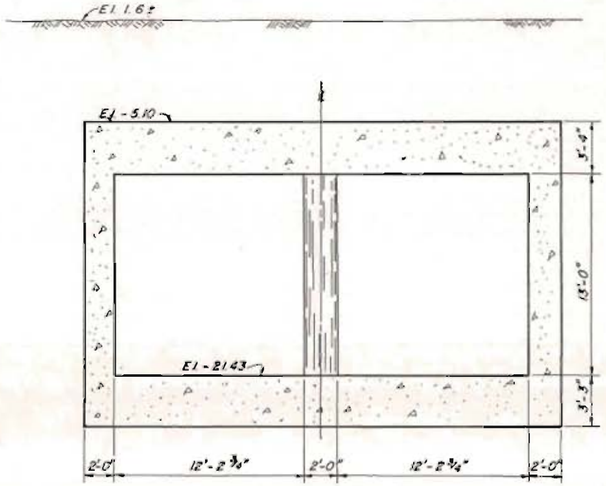
DATE: APRIL, 1980

FILE NO. NO-27720

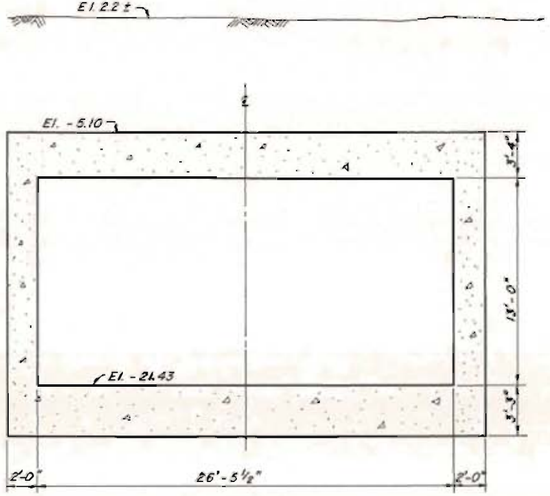
PLATE 14



SECTIONAL PLAN
AT ELEVATION - 21.43
SCALE: 1/4" = 1'-0"



SECTION (D)
SCALE: 1/4" = 1'-0"



SECTION (E)
SCALE: 1/4" = 1'-0"

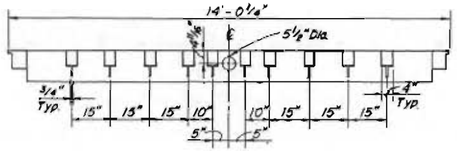
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVE. CANAL GATE NO. 4W - WEST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

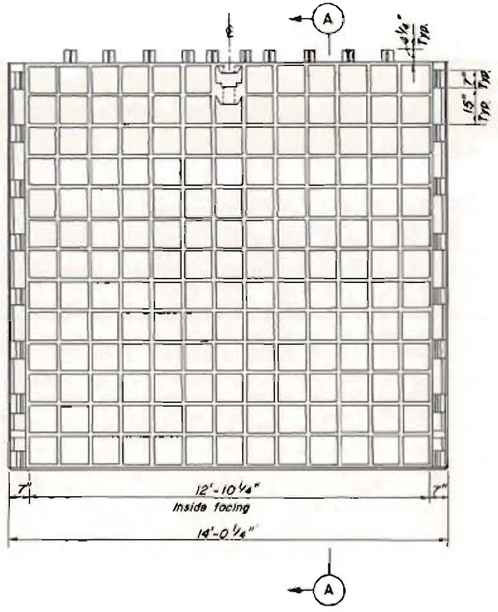
US ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1980
FILE NO. H-2-27790

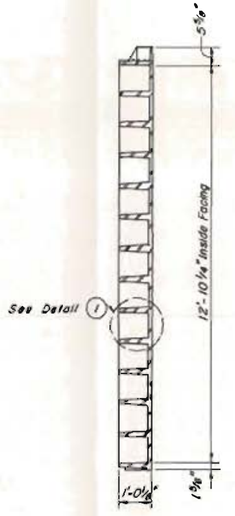
PLATE 15



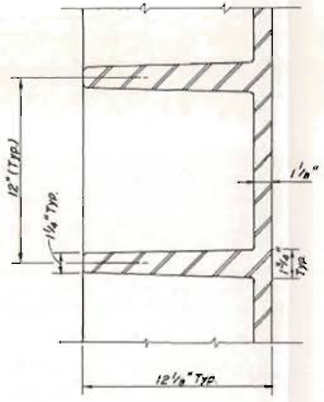
TOP VIEW
N.T.S.



SLUICE GATE DISC
N.T.S.



SECTION A
N.T.S.



DETAIL 1
N.T.S.

NOTES:

1. Approximate Total Weight 30,000#
2. Cast Iron Conforming To A.S.T.M. A126 Class B
3. 2 - Required

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

FLORIDA AVE. CANAL GATE NO. 4W - WEST I.H.N.C.

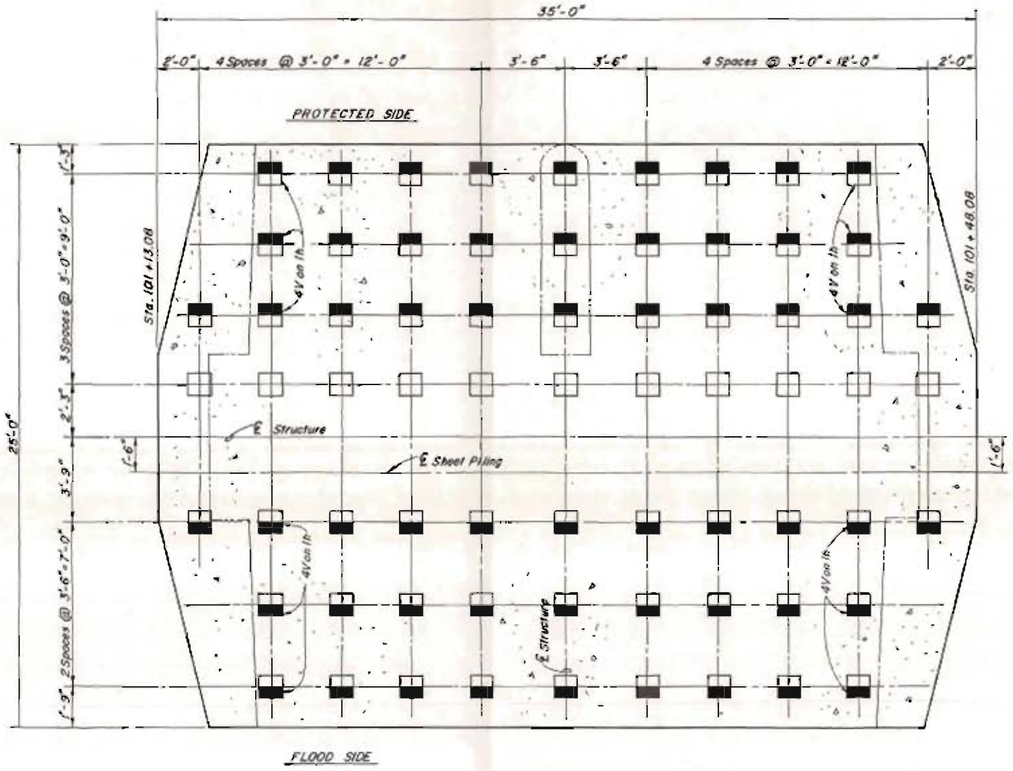
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 16



PLAN AT ELEVATION - 18.0'

SCALE: 3/8" = 1'-0"

Notes:

1. All piles to be 14" sq. prestressed concrete piles.
2. All piles to be batter 2V on 1h (U.N.O.)

■ indicates direction of batter.

□ indicates vertical pile.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE 4W - FOUNDATION PILE LAYOUT

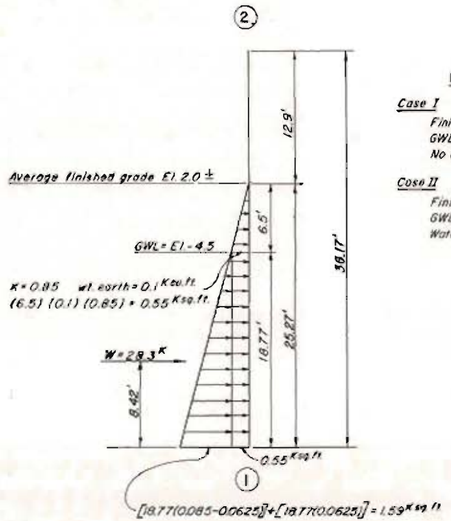
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 17



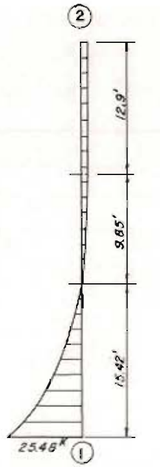
LOADING (Case I)

LOAD CASES

Case I
Finished grade at El. 2.0
GWL at El. -4.5
No water inside

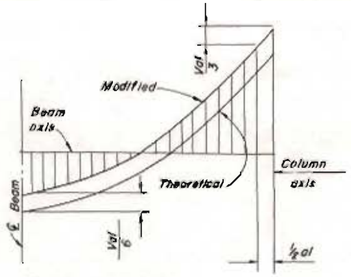
Case II
Finished grade at El. 2.0
GWL at El. -4.5
Water inside

RESULTS FROM FRAME ANALYSIS
(Case I)



SHEAR DIAGRAM
(Case I)

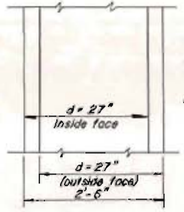
MOMENT DIAGRAM
(Case I)



V = shear at column axis

The maximum negative moment can be reduced by $\frac{Vol}{3}$ (Ref. AC) 8-5-2-2) and "Continuity in Concrete Building Frames" pages 29-30.

NEGATIVE MOMENT (Case I-shown)



k = 0.359 f = 30°
j = 0.88 b = 12"
K = 221 fc = 4000 psi
fs = 20 ksi n = 8
fc = 1.4 ksi d = 33"

al = 5.25' ℓ = 38.17'

$M'neg = Mneg - \frac{Vol}{3} = 131.1^{IK} - \frac{25.48(5.25)}{3} = 86.5^{IK}$

$d\ bal = \sqrt{\frac{(12)\,86.5}{0.221(12)}} = 19.8"$

d bal = 19.8" < d prov = 27"

No compression steel required

$As = \frac{M}{ad} = \frac{86.5^{IK}}{1.44 \times 27} = 2.22^{in^2}$ (#9 @ 4 req'd - inside face)

NEGATIVE MOMENT (Case II - not shown)

al = 5.25 ℓ = 38.17'

$M'neg = Mneg - \frac{Vol}{3} = 227.5 - \frac{36.4\,(5.25)}{3} = 163.8^{IK}$

$d\ bal = \sqrt{\frac{(12)\,163.8}{0.221(12)}} = 27.2$

d bal = 27.2 d prov = 27.2

No compression steel required

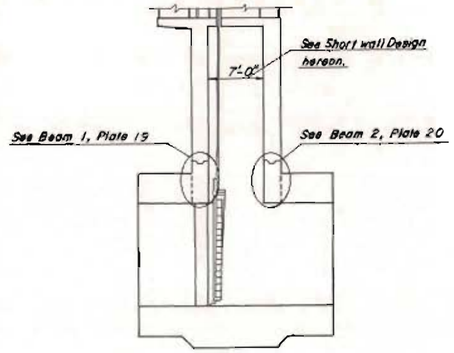
$As = \frac{M}{ad} = \frac{163.8}{1.44 \times 27} = 4.21\ in^2$ (#11 @ 4 outside)

Max V (Case I = 25.48 K Case II = 36.4, use Case II

Reduce V to face of support

$V = 36.4 - \frac{(5.25 + 1.0)(36.4)}{15.42} = 21.64^{K}$

$v = \frac{21,640^{\#}}{12 \times 27} = 66.8\ psi$



LONGITUDINAL SECTION - ℄ GATE STRUCTURE

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE 4W - WALL ANALYSIS

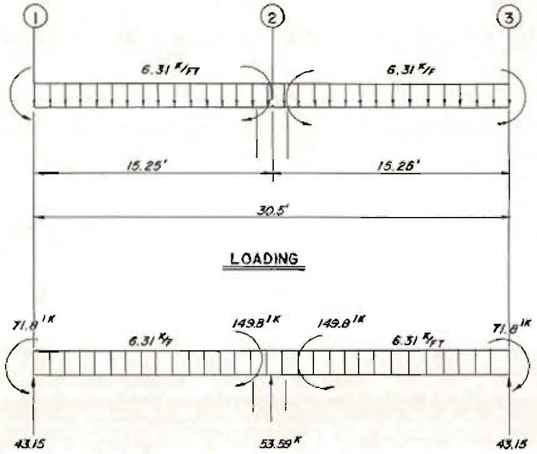
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

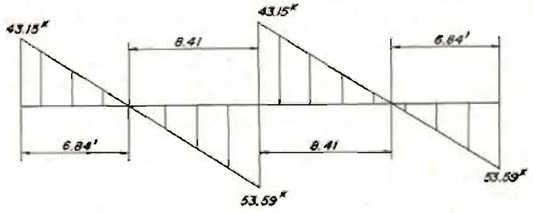
DATE: APRIL, 1980

FILE NO. H-2-27790

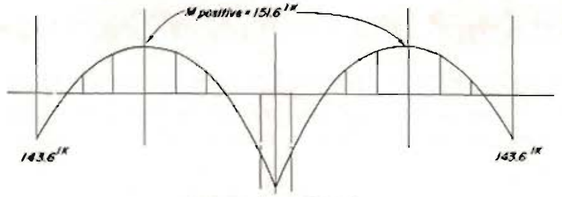
PLATE 18



RESULTS FROM FRAME ANALYSIS



SHEAR DIAGRAM



Maximum Mneg = 299.6 IK

Maximum Mpositive = $\left(\frac{43.15 \times 6.84}{2}\right)$ - 71.8 IK = 75.8 IK

Moments for b = 12" for 24'

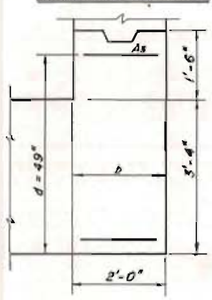
71.8 IK x 2 = 143.6 IK

149.8 IK x 2 = 299.6 IK

75.8 IK x 2 = 15.6 IK

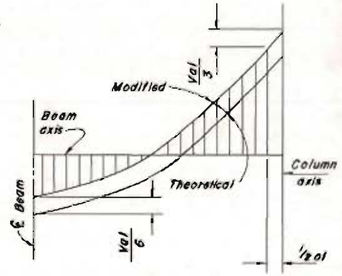
MOMENT DIAGRAM

NEGATIVE MOMENT



k = 0.359 t = 52"
j = 0.88 b = 24"
K = 221 fc = 4000
fs = 20ksi n = 8
fc = 1.4ksi d = 49"

The maximum negative moment can be reduced by $\frac{Val}{3}$ (Ref. ACI 8.5.2.2 and "Continuity in Concrete Building Frames," pages 26-30.



V = shear at column axis

al = 2.0 λ = 15.25 $a = \frac{2.0}{15.25}$

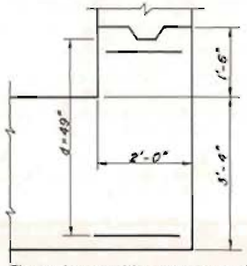
M'neg. = Mneg - $\frac{Val}{3}$ = 299.6 - $\frac{107.2(2.0)}{3}$ = 228.1

d bal = $\sqrt{\frac{12M}{Kb}}$ = $\sqrt{\frac{(12)228.1}{0.221(24)}}$ = 22.71"

d bal = 22.71 < d provided = 49" (no compression steel required)

As = $\frac{M}{ad}$ = $\frac{228.1}{1.44(49}$ = 3.23 in² (4#9 used A = 4.0)

POSITIVE MOMENT



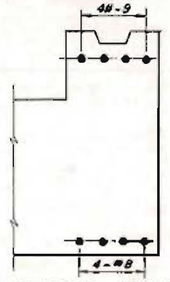
The maximum positive moment can be reduced by $\frac{Val}{6}$

Mpositive = 151.6 - $\frac{107.2(2)}{6}$ = 115.9 IK

d bal = $\sqrt{\frac{12(115.9)}{0.221(24}}$ = 16.19"

d prov = 49in > 16.19in (no compression steel required)

As = $\frac{M}{fs\,j\,d}$ = $\frac{115.9(12)}{20(0.88 \times 49)}$ = 1.62 in² (4#8 used A = 3.16)



BEAM REINFORCING LAYOUT

Note

For location of Beam #1, See Plate

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE 4W – BEAM ANALYSIS

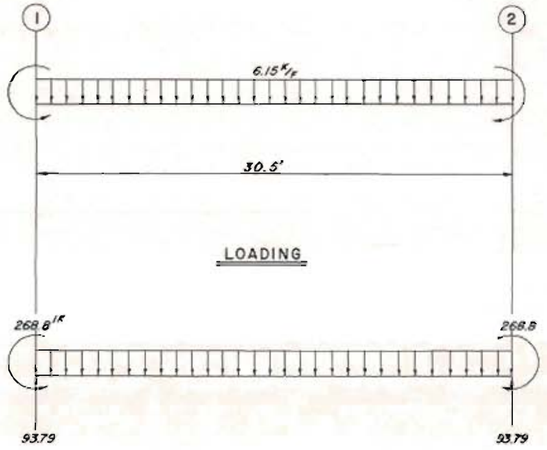
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

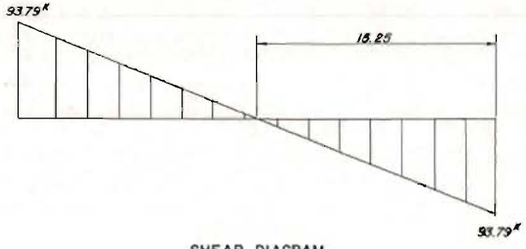
DATE: APRIL, 1980

FILE NO. H-2-27790

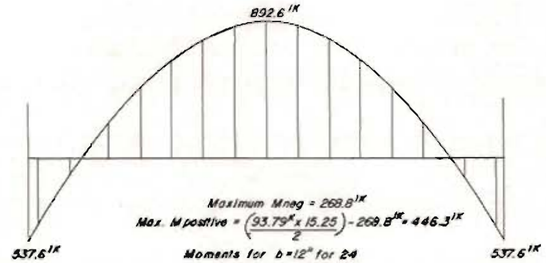
PLATE 19



RESULTS FROM FRAME ANALYSIS



SHEAR DIAGRAM



Maximum Mneg = 268.8 IK

Max. M positive = $\left(\frac{93.79^K \times 15.25}{2}\right)$ - 268.8 IK = 446.3 IK

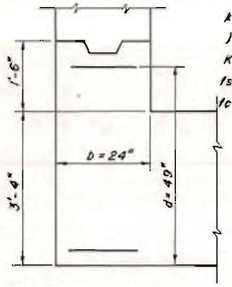
Moments for b = 12" for 24

446.3 x 2 = 892.6 IK

268.8 x 2 = 537.6 IK

MOMENT DIAGRAM

NEGATIVE MOMENT



k = 0.359 t = 52"

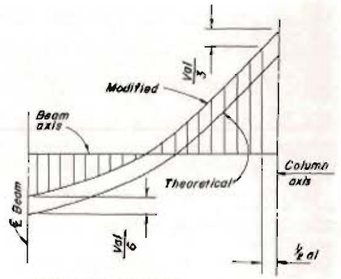
j = 0.88 b = 24"

K = 221 fc = 4000

fs = 20ksi n = 8

fc = 1.4ksi d = 49"

The maximum negative moment can be reduced by $\frac{Val}{3}$ (Ref. ACI 8-5-2-2) and "Continuity in Concrete Building Frames" pages 28-30.



V = shear at column axis

al = 3.83 $\quad$ $\mathcal{R}$ = 30.5 $\quad$ a = $\frac{3.83}{30.5}$

M'neg = Mneg - $\frac{Val}{3}$ = 537.6 - $\frac{93.79\,(3.83)}{3}$ = 417.9 IK

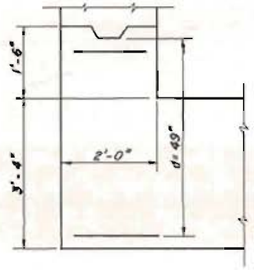
d bal = $\sqrt{\frac{12\,M}{K\,b}}$ = $\sqrt{\frac{12\,(417.9)}{0.221\,124}}$ = 30.74

d bal = 30.74 in. < d prov. = 49"

No compression steel required

As = $\frac{M}{a\,d}$ = $\frac{417.9}{1.44\,(49)}$ = 5.92 in² (6 #9 bars required)

POSITIVE MOMENT



The maximum positive moment can be reduced by $\frac{Val}{6}$

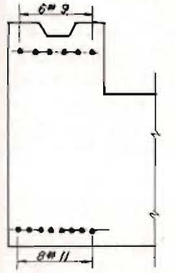
M post = 892.6 - $\frac{93.79\,(3.83)}{6}$ = 832.8 IK

d bal = $\sqrt{\frac{12\,(832.8)}{0.221\,(24)}}$ = 43.4

d bal = 43.4 in < d prov = 49"

No compression steel required

As = $\frac{M}{fs\,j\,d}$ = $\frac{832.8\,(12)}{20\,(0.88)\,49}$ = 11.59 in (8 # 11 bars required)



BEAM REINFORCING LAYOUT

Note:
For location of Beam # 2, see Plate 18

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

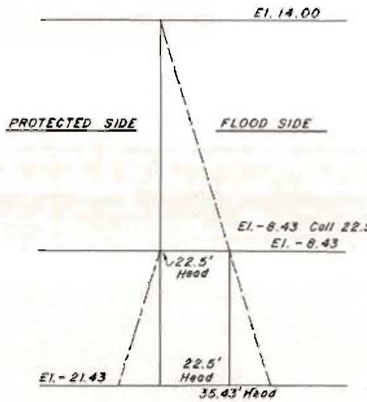
GATE 4W – BEAM ANALYSIS

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

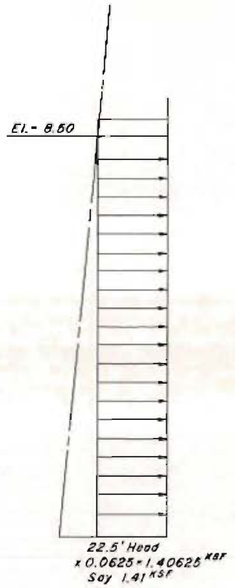
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1980 $\quad$ FILE NO. H-2-27790

PLATE 20

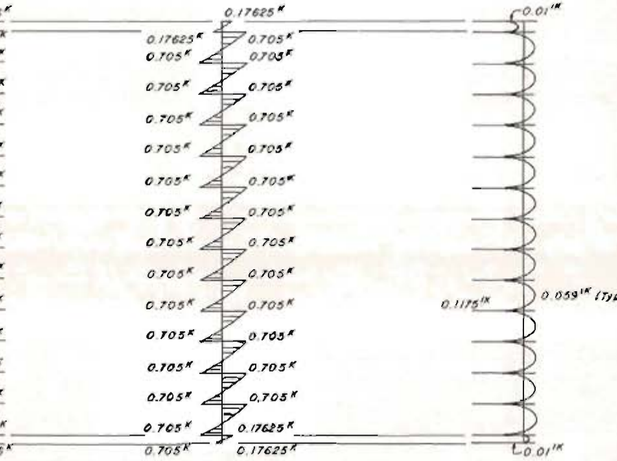


LOAD DIAGRAM



LOAD DIAGRAM

REACTIONS



SHEAR DIAGRAM

MOMENT DIAGRAM

Design Moment = 0.1175 K-F

F_b (allowable bending stress) = 15.5 KSI

$Req'd. = \frac{M}{F_b} = \frac{0.1175(12)}{15.5} = 0.091$

$t = \sqrt{\frac{6s}{b}} = \sqrt{\frac{6(0.091)}{12}} = \sqrt{0.0455}$

$t = 0.2113" < 1\ 1/8"$ furnished

$f_b = \frac{M}{S} = \frac{0.1175(12)}{\frac{b^2}{6}} = \frac{1.41}{\frac{(2(1.125)^2}{6}}$

$f_b = 0.557$ KSI

Biaxial stresses in skin plate.

f_b = flexural stress in skin plate as a vertical continuous beam spanning between horizontal girders.

f_{bc} = flexural stress in skin plate acting as a flange of the horizontal girders.

$$\frac{fb^2 - fb\ fbc + fbc^2}{fy^2} \leq 1.125^2$$

$$\frac{0.557^2 - (0.557)(4.56) + (4.56)^2}{31^2} = 0.0193 < 1.125^2 = 1.27$$

NOTE: All loads, reactions, shears and moments shown are for one foot width of skin plate.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W
METAL GATE ANALYSIS

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

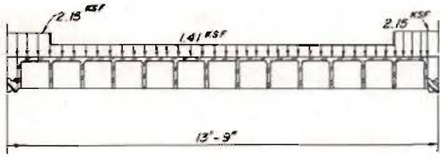
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1980

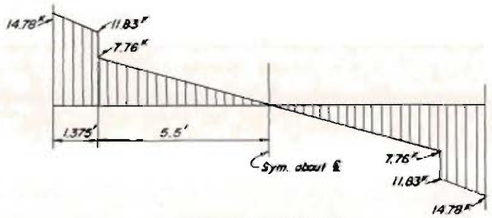
FILE NO. H-2-27790

PLATE 21

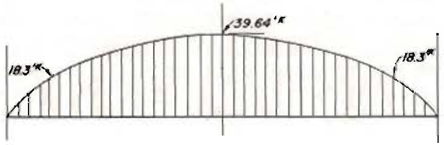
HORIZONTAL GIRDER DESIGN



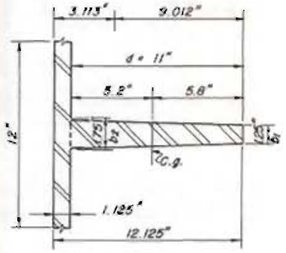
LOAD DIAGRAM



SHEAR DIAGRAM



MOMENT DIAGRAM



1. Effective flange width (Per AISC 1.9.12)
(Unstiffened compression element)

Width: Thickness ratio = $\frac{95.0}{\sqrt{Fy}}$ = 17

Effective flange width = 2 (17 t$_f$) + Tw = 39.75" (limited to 12")

2. Depth – thickness ratio of the web (Per AISC 1.10.2)

$d/t = \frac{14,000}{\sqrt{Fy\,(Fy + 16.5)}} = 601$

Allowable depth = 322 (1.5) = 483"
depth = 12" ok

ITEM	AREA	y	Ay	Ay^2	I_o
①	16.5	5.2	85.8	446.16	164.83
②	13.5	0.5625	7.594	4.272	
	30.0		93.394	450.432	164.83

$y' = \frac{93.394}{30} = 3.113"$

$I = I_o + \Sigma Ay^2 - (\Sigma Ay \times \bar{y})$

$= 164.83 + 450.432 - (93.394 \times 3.113) \qquad S = \frac{324.526}{3.113} = 104.25$

$I = 324.526\ in^4$

Tensile stress in flange @ Midspan

$f_{bt} = \frac{Mc}{I} = \frac{(39.64 \times 12)(9.012)}{324.526}$

$f_{bt} = 13.2^{KSI} < \text{allowable} = 15.5^{KSI}$

Compression stress in flange @ Midspan

$f_{bc} = \frac{Mc}{I} = \frac{(39.64 \times 12)(3.113)}{324.526}$

$f_{bc} = 4.56^{KSI} < \text{allowable} = 15.5^{KSI}$

Web

Shear stress at end of girder in web
depth of web = 11"

$f_v = \frac{V}{A_w} = \frac{14.78^K}{12.125\left(\frac{1.75 + 1.25}{2}\right)} = 0.813^{KSI} < 10.33$

Check Shear stress between stiffeners

$F_v = \frac{Fy\,C_v}{2.89}\ (0.833 \leq 0.33\ Fy\ (AISC\text{-}1\text{-}10)$

$C_v = \frac{190}{h/t}\sqrt{\frac{K}{Fy}}$

$K = 5.34 + \frac{4.00}{(a/h)^2}$

$K = 5.34 + \frac{4.00}{(1.09)^2}$

$K = 8.71$

a = 12"
h = 11"
t = 1.5 (Ave)
$a/h = \frac{12}{11} = 1.09$
$h/t = \frac{11}{1.5} = 7.33$

$C_v = \frac{190}{7.33}\sqrt{\frac{8.71}{31}}$

$C_v = 13.73$

$F_v = \frac{(31)(1373)}{2.89}\ (0.833) = 122.68^{KSI} > 0.33\ Fy$

$\therefore Fy = (0.33)(31) = 10.23$

$f_v = 0.813^{KSI}$

Since $f_v < Fy$ no intermediate Stiffeners required

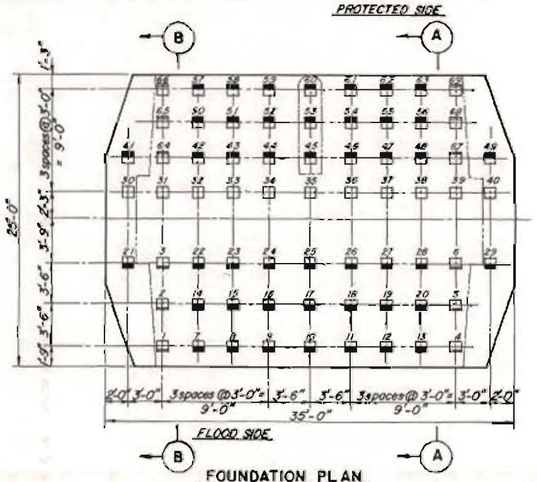
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W
METAL GATE ANALYSIS

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

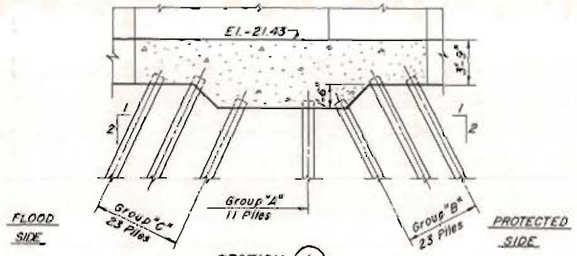
DATE: APRIL, 1980 FILE NO. H-2-27790

PLATE 22



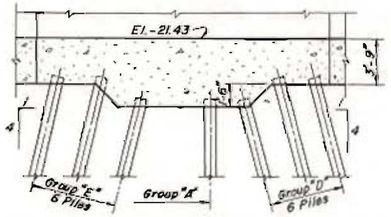
FOUNDATION PLAN

SCALE: 3/16"=1'-0"



SECTION (A)

SCALE: 3/16"=1'-0"



SECTION (B)

SCALE: 3/16"=1'-0"

GATE STRUCTURE LOADING CASES			
CASE NO.	WATER SURFACE ELEVATIONS		DESCRIPTION
	FLOOD SIDE	PROTECTED SIDE	
I	No water	No water	Construction condition, no backfill
II	El. 14.0	El. -8.5	Impervious cutoff
III	El. 14.0	El. -8.5	Pervious cutoff
IV	El. 4.0	El. -14.5	Impervious cutoff
V	El. 4.0	El. -14.5	Pervious cutoff
VI	El. -14.0	El. -3.0	Impervious cutoff
VII	El. -14.0	El. -3.0	Pervious cutoff

SUMMARY OF MAXIMUM PILE LOADS										
GROUP	MAX. PILE LOAD		CASE NO.		PILE NO.		ALLOW. LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q	P	Q
A	0	-0.3	0	VI	0	30	-50	4.35	0	6.0
	45.0	0	X	0	30	0	100	0	45.0	0
B	0	-0.1	0	II	0	57	-50	4.35	0	2.0
	90.6	0.4	II	VI	57	42	100	2.02	90.6	20.0
C	-20.06	-0.4	VII	VI	21	9	-50	4.35	40.08	9.0
	41.5	0	VI	0	7	0	100	0	41.5	0
D	-47.54	-0.1	II	III	66	67	-50	4.35	95.08	2.3
	106.9	0.2	II	VI	69	64	100	2.02	106.9	9.0
E	-26.97	-0.2	II	VI	2	4	-50	4.35	53.9	4.6
	99.05	0	VI	0	4	0	100	0	99.05	0

– Denotes Tension

+ Denotes Compression

Results are from computer program, K29010, "Three Dimensional Analysis of Pile Foundations" Program based on Planar Method of Pile Analysis Developed by A. Hrennikoff and extended to Three Dimensions by W.E. Saul.

LEGEND	
Vertical Piles	Group "A"
Battered Piles Protected Side	2V on 1h towards Group "B"
Battered Piles Flood Side	2V on 1h towards Group "C"
Battered Piles Protected Side	4V on 1h towards Group "D"
Battered Piles Flood Side	4V on 1h towards Group "E"

Note:
All piles 14"x14" prestressed concrete.

PILE DESIGN

Soil allowables for 14"x14" precast prestressed concrete piles.
Compression = 100 K
Tension = 50 K

P = axial pile load
Q = transverse pile load
Maximum bending moment = 0.5RQ
R = Effective length

$R = \sqrt[4]{\frac{EI}{K}}$

E = Modulus of elasticity of pile = 4.29×10^6 psi
I = Moment of inertia of pile = $\frac{bh^3}{12} = \frac{14^4}{12} = 3201 in.^4$
K = Modulus of subgrade reaction = 100 psi

$R = \sqrt[4]{\frac{(4.29 \times 10^6)(3201)}{100}} = 108.3$ in.

M = 0.5 RQ = 0.5 (108.3) Q = 54.2Q

f_b = Actual bending stress

$f_b = \frac{M}{S}$

where S = Section modulus of pile = $\frac{bh^2}{6} = \frac{14(14)^2}{6} = 457.3 in.^3$

$f_b = \frac{54.2Q}{457.3} = 0.1185Q$

f_a = Actual axial stress

$f_a = \frac{P}{A}$

where A = area of pile = 196 $in.^2$

$f_a = \frac{P}{196} = 0.005102P$

F_b = Allowable bending stress

F_a = Allowable axial stress

COMPRESSION PILES

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$F_a = F_b = 750$ psi

(0.35 f'_c - max. prestress 0.2 f'_c) = 1750 - 1000

$\frac{0.005102P}{750} + \frac{0.1185Q}{750} = 1.0$

$0.005102P(100,000) + 0.1185Q = 750$

$Q_{allow.} = 2024$ lb. $= 2.024$ kips

TENSION PILES

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$F_a = F_b = 822$ psi

(min. effective prestress after losses)

$\frac{0.005102P}{822} + \frac{0.1185Q}{822} = 1.0$

$0.005102P(50,000) + 0.1185Q = 822$

$Q_{allow.} = 4784$ lb. $= 4.784$ kips

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE NO. 4W – PILE DESIGN SUMMARY

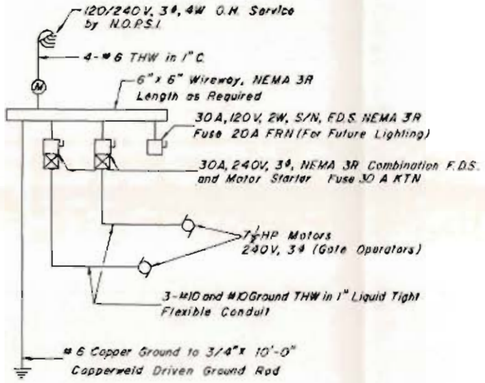
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS NEW YORK, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27720

PLATE 23



ELECTRICAL FEEDER DIAGRAM

NOTES:

1. Motor starter shall be hand-off type with line voltage holding coils and heating elements.
2. O.H. service drop and service pole shall be furnished and installed by local power company (New Orleans Public Service Inc.)

METAL GATE

Opening Size = 12.5' x 13.0' = 162.5 sq. ft.

Max. Ht. of water = 22'

(℄ Gate El. - 14.93 - Ht. of water = El. 7 - Difference = 21.93' call 22')

Wt. disc = 185 lbs. sq. ft. x 162.5 sq. ft. = 30,000 lbs.

5 in. dia. stem = 23' x 85 lb./ft. = 2,000

Force to open gate = F(water) + F(wedge) + F(weight)

F(water) = (f)(H)(W)(A)

(f) = 0.35 = Coefficient of friction

H = head at ℄ of gate = 22.0'

W = 62.5 lbs. (cu ft. of water)

A = Area = 162.5 sq. ft.

F(water) = (0.35)(22)(62.5)(162.5) = 78,203 lbs.

F(wedge) = (0.5)(30,000) = 15,000 lbs.

F(weight) = 30,000 + 2,000 = 32,000

Force to open gate = 78,203 + 15,000 + 32,000 = 125,203

Torque (frictionless) = (r_1) (F) $\propto$

Stem threads - 2 Sp acme type - two per inch - pitch diameter = 4.75 in.

$r_1 = \frac{4.75''}{2}$ F = 125,203 lbs. $\propto$ = 1.92°

$\text{Tan} \propto = \frac{0.5''}{\pi 4.75''} = 0.03351$ = Tan 1.92° $r_1 = \frac{4.75''}{2} = 0.198'$

∴ Torque = (0.198') (125,203 lb) (0.03351) = 831 '-lbs.

Efficiency = 0.35

Torque = (831 '-lbs.) $(\frac{1}{0.35})$ = 2374 '-lbs.

Assume opening time 6" per min.

$\frac{6 \text{ in. per min.}}{\text{at 2 threads per in.}}$ = 12 RPM

One horse power required to move 33,000 lbs. per ft. per min.

$HP = \frac{2\pi TN}{33,000} = \frac{TN}{5240}$

$HP = \frac{(2374 \text{ '-lbs.})(12)}{5240} = 5.44$ HP Use 7.5 HP

"J" pitch dia. $= \frac{\pi D^4}{32} = 49.98$ in.

$f_s = \frac{T}{(J) r_1} = \frac{2374 \text{ '-lbs.} \times 12}{49.98 \times \frac{4.75''}{2}} = 240$ psi

Tension $= \frac{125,203}{(4.75)^2 \frac{\pi}{4}} = 7065$ psi

Buckling (Euler)

$P_c = \frac{\pi^2 E I}{L^2} = \frac{(\pi)^2 (29 \times 10^6) (25)}{(24 \times 12)^2} (2) = 172,516$ lbs. > 1.25 (125,203) = 156,503

c=2

Assume 6" per minute Vertical Travel Speed

Therefore opening time approximately 26 minutes

For emergency operation provide a 10 kw 240V 3ϕ Portable generator (Hand operation is not feasible due to time involved)

Conclusions

Use nominal 7.5 HP motor with gear package to move gate vertically 6 in./min. and a gear speed of 12 rpm. To accomlish this use motor gear set with worm gear actuator, self contained, side mount and internal helical gear set.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W
MECH. AND ELEC. ANALYSIS

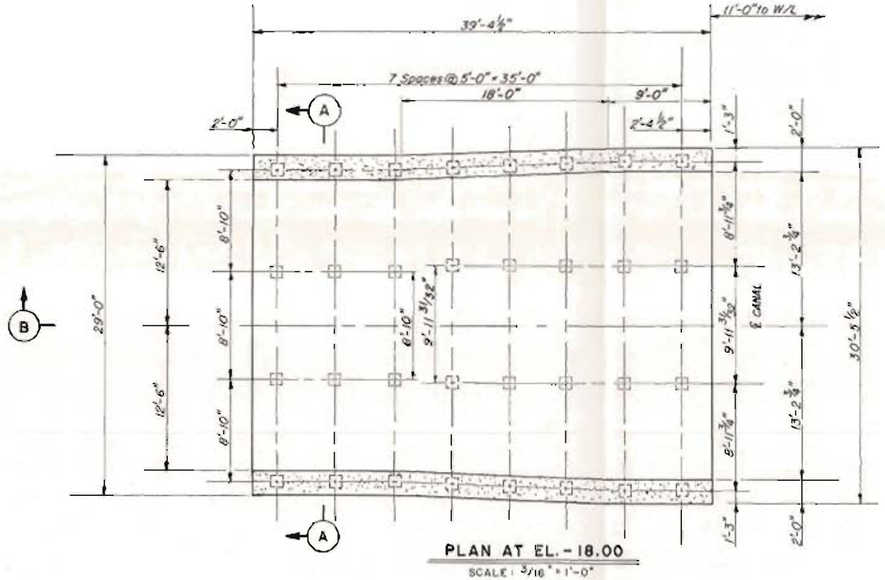
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

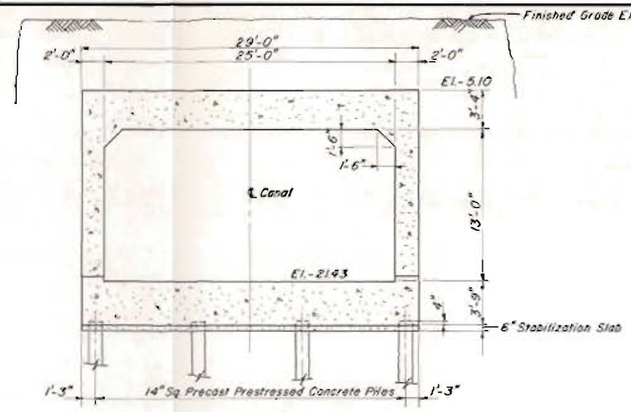
FILE NO. H-2-27750

PLATE 24



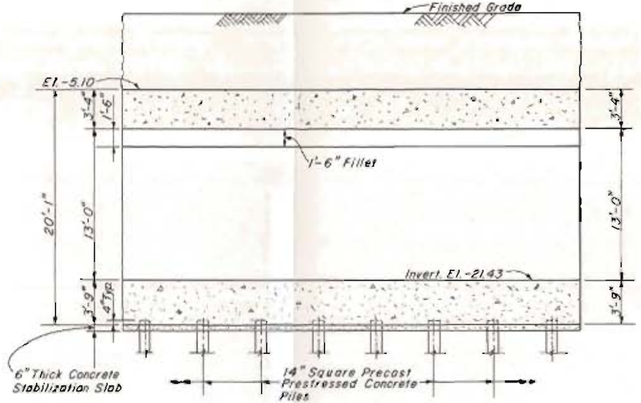
PLAN AT EL. - 18.00

SCALE : 3/16" = 1'-0"



SECTION (A)

SCALE : 3/16" = 1'-0"



SECTION (B)

SCALE : 3/16" = 1'-0"

Notes :

1. All Piles to be 14" sq. Prestressed Concrete Piles.
2. All Piles to be Vertical.

□ Indicates Vertical Pile.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN

FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W - APPROACH STRUCTURE - PROTECTED SIDE

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 25

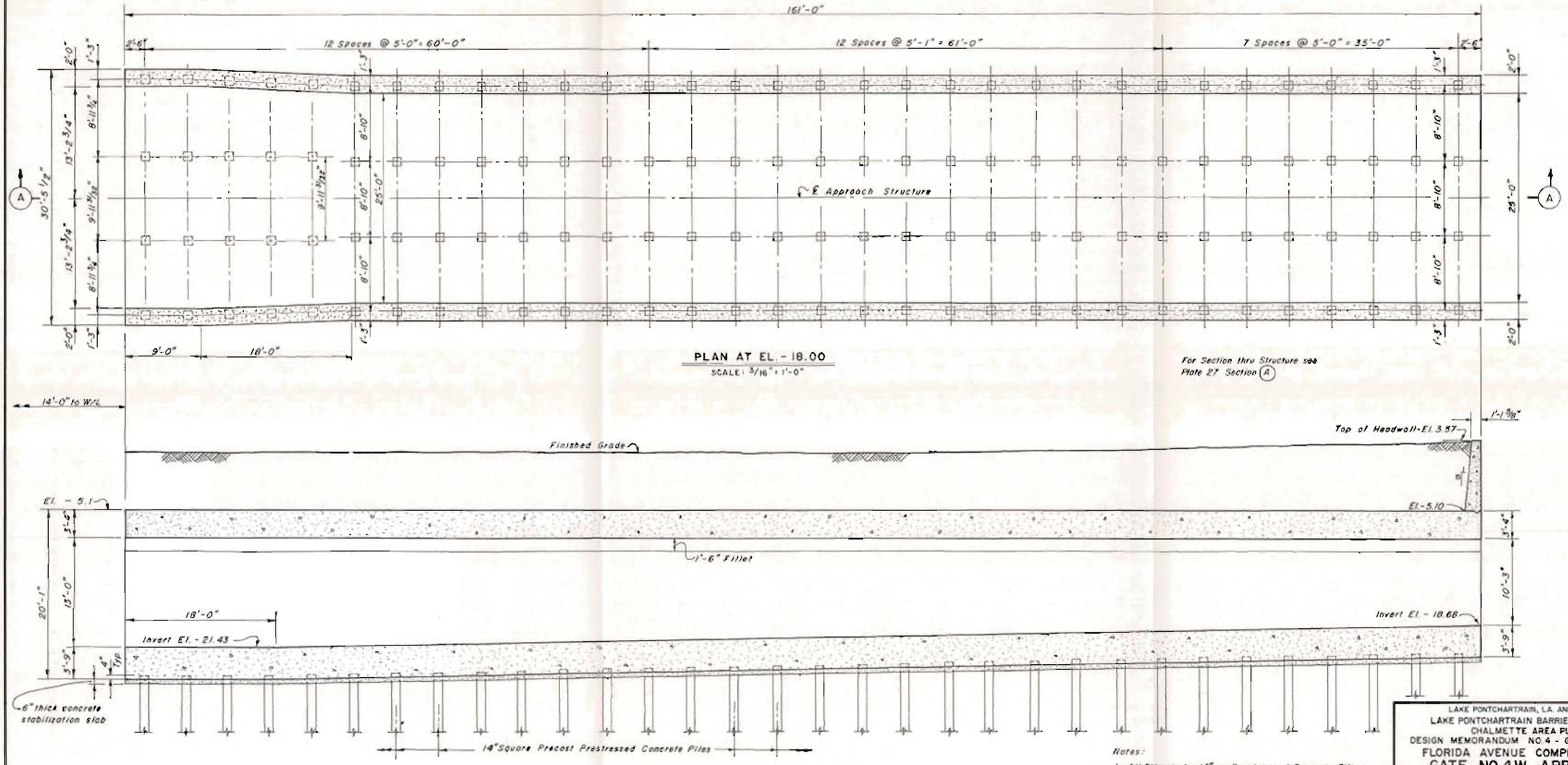
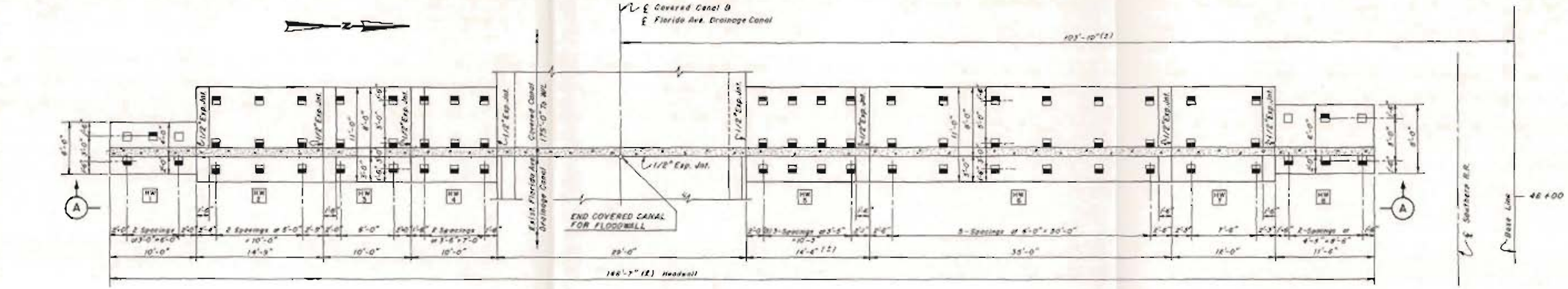
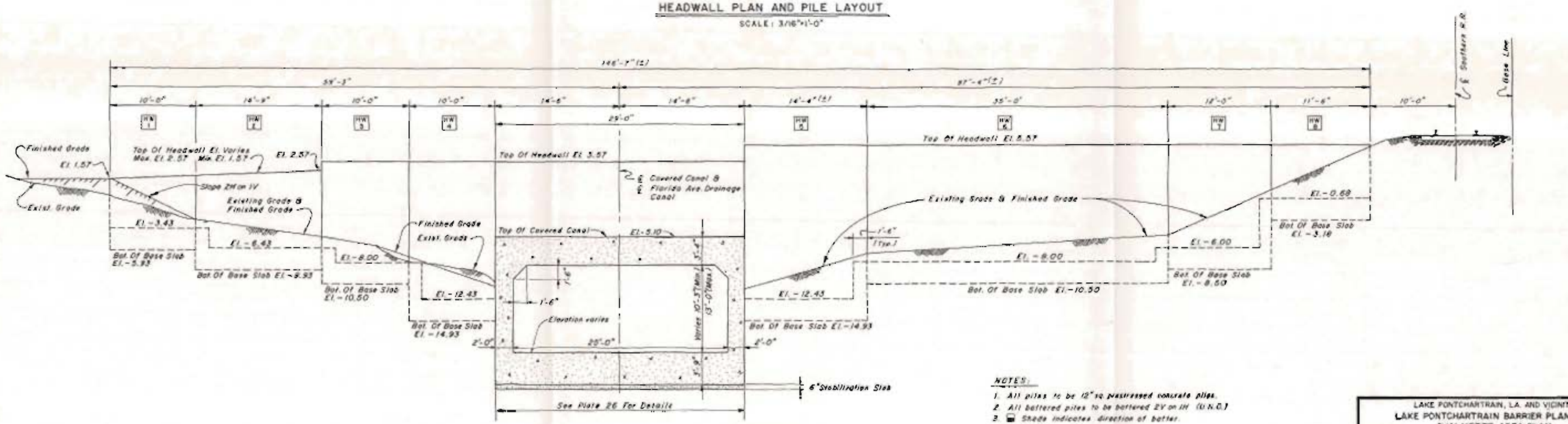

161'-0"
2'-6"
12 Spaces @ 5'-0" = 60'-0"
12 Spaces @ 5'-1" = 61'-0"
7 Spaces @ 5'-0" = 35'-0"
2'-6"
2'-0"
1'-3"
8'-11 3/4"
13'-2 3/4"
30'-5 1/2"
8'-10"
25'-0"
9'-11 3/32"
Approach Structure
9'-0"
18'-0"
PLAN AT EL. - 18.00
SCALE: 3/16" = 1'-0"
For Section thru Structure see Plate 27 Section A
14'-0" to W/L
Finished Grade
Top of Headwall-El. 3.57
1'-1 5/16"
El. - 5.1
El.-5.10
2'-6"
1'-6" Fillet
20'-1"
13'-0"
10'-3"
3'-9"
4" Typ
18'-0"
Invert El. - 21.43
Invert El. - 18.68
6" thick concrete stabilization slab
14" Square Precast Prestressed Concrete Piles
SECTION A
SCALE: 3/16" = 1'-0"
Notes:
1. All Piles to be 14" sq. Prestressed Concrete Piles.
2. All Piles to be Vertical.
Indicates Vertical Pile.
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W - APPROACH STRUCTURE - FLOOD SIDE
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA
US ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.
DATE: APRIL 1980
FILE NO. H-2-27790

PLATE 26



HEADWALL PLAN AND PILE LAYOUT

SCALE: 3/16"=1'-0"



SECTION (A)

SCALE: 3/16"=1'-0"

NOTES:

1. All piles to be 12" sq. prestressed concrete piles.
2. All battered piles to be battered 2V on 1H (U.N.O.)
3. ▬ Shade indicates direction of batter.
4. □ Vertical pile.
5. HW 1 Monolith number.
6. The pile length used in calculations was 64 feet for HW1 HW2 & HW3 and was 60 feet for HW4 HW5 HW6 HW7 & HW8

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO.4W - APPROACH STRUCT HEADWALL - FLOOD SIDE

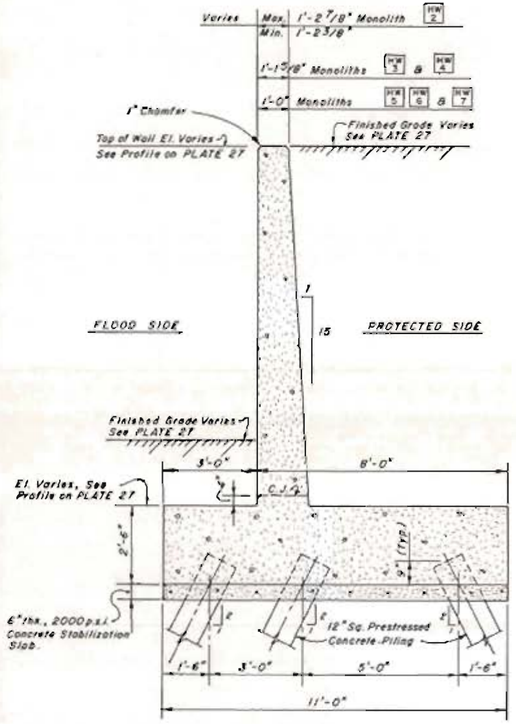
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1960

FILE NO. N-2-277(P)

PLATE 27



TYPICAL HEADWALL SECTION

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

MONOLITHS HW 2 HW 3 HW 4 HW 5 HW 6 & HW 7

CRITICAL PILE LOADS

MONOLITH	GROUP	MAX. PILE LOAD P	MAX. PILE LOAD Q	CASE NO. P	CASE NO. Q	ALLOW. PILE LOAD P	ALLOW. PILE LOAD Q	% ALLOW. P	% ALLOW. Q
HEADWALL 1	A	-15.8	-0.2	III	III	-40.0	3.49	39.5	5.7
	B	23.2	0.2	I	I	80.0	1.21	29.0	16.5
HEADWALL 2	A	-2.0	-0.6	III	III	-40.0	3.49	5.0	17.2
	B	49.8	0.6	I	III	80.0	1.21	62.2	49.6
HEADWALL 3	A	-12.8	-0.7	III	III	-40.0	3.49	32.0	20.1
	B	75.6	0.9	I	I	80.0	1.21	94.5	74.4
HEADWALL 4	A	-26.2	-0.5	III	I	-40.0	3.49	65.5	14.3
	B	60.1	0.5	I	I	80.0	1.21	75.1	41.3
HEADWALL 5	A	-38.3	-0.4	III	I	-40.0	3.49	95.8	11.5
	B	63.2	0.3	I	I	80.0	1.21	79.0	24.8
HEADWALL 6	A	-34.2	-0.8	III	III	-40.0	3.49	85.5	22.9
	B	75.6	0.8	III	III	80.0	1.21	94.5	66.1
HEADWALL 7	A	-24.7	-1.0	III	III	-40.0	3.49	61.8	28.7
	B	84.4	0.8 ▷	III	III	90.0 ▷	0.8	93.8	100.0
HEADWALL 8	A	-23.0	-0.3	III	III	-40.0	3.49	57.5	86.0
	B	24.2	0.3	I	III	80.0	1.21	30.2	24.8

▷ Not greatest shear — but most critical.

▷ Pallow. corresponding to Qmax.

NOTES:

1. — denotes tension (load in kips)
   + denotes compression (load in kips)
2. Group A - tension piles.
   Group B - compression piles.
3. All piles above are 12" square prestressed precast concrete piles.
4. Allowable axial load calculated for maximum transverse load.
5. MONOLITHS 1 2 & 3 calculations are based on 64 foot long piles.
   MONOLITHS 4 5 6 7 & 8 calculations are based on 60 foot long piles.
   MONOLITH 7 piles may have to be increased to 64 feet to attain required pile capacity.

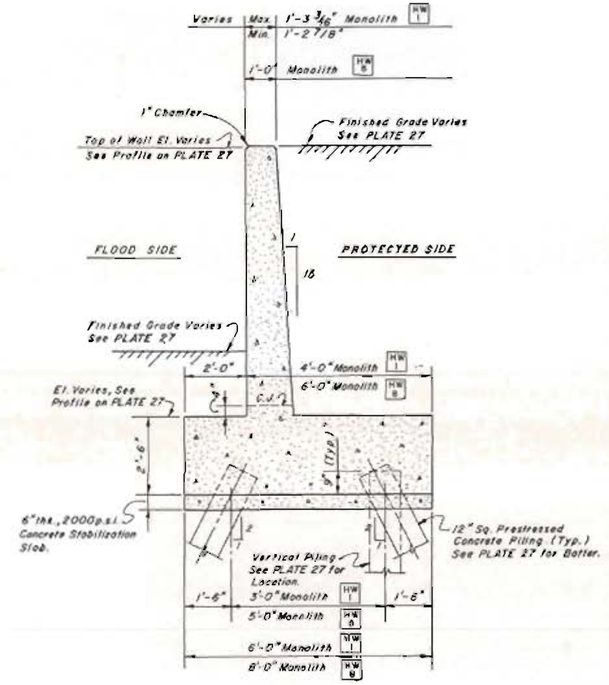
LOADING CASES

Case I — SOIL SATURATED, WATER LEVEL BELOW SLAB BASE ON EAST SIDE.

Case II — SOIL SUBMERGED AND WATER AT TOP ON BOTH SIDES.

Case III — WATER AT TOP ON WEST SIDE AND AT TOP OF BASE ON EAST.

6. See Plate 6 for additional Notes and Calculations.



TYPICAL HEADWALL SECTION

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

MONOLITHS HW 1 & HW 8

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE NO. 4W - HEADWALL - FLOOD SIDE - PILE ANALYSIS

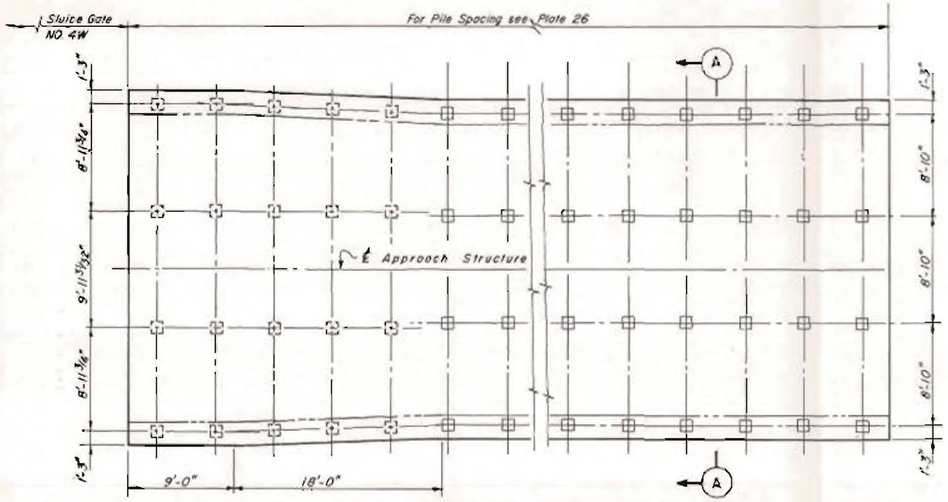
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 28



FOUNDATION PLAN – FLOOD SIDE

SCALE : 3/16" = 1'-0"

APPROACH STRUCTURE LOADING CASES	
CASE NO.	DESCRIPTION
I	Construction Case
II	Water @ El. 14.0 , 9 ft. earth cover
III	Water @ El. 4.0 , 9 ft. earth cover
IV	Water @ El -14.0, 9 ft. earth cover

Note: Max. width 30.46', max. depth 20.08', GWL El. -4.5

SUMMARY OF MAXIMUM PILE LOADS										
GROUP	MAX PILE LOAD		CASE NO.		PILE NO.		ALLOW LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q	P	Q
A	72.9	0	II	0	—	—	100	2.024	91.12	—

Note: All piles in compression

Results from manual calculations (Loads in kips)

PILE DESIGN

Soil allowables for 14" x 14" precast prestressed concrete piles.

Compression = 100 K

Tension = 50 K

P = axial pile load

Q = transverse pile load

Maximum bending moment = 0.5RQ

R = effective length

$R = \sqrt[4]{\frac{EI}{K}}$

E = modulus of elasticity of pile = 4.29×10^6

I = moment of inertia of pile = $\frac{bh^3}{12} = \frac{14^4}{12} = 3201\ in^4$

K = modulus of subgrade reaction = 100 psi

$R = \sqrt[4]{\frac{(4.29 \times 10^6)(3201)}{100}} = 34.2\ in.$

$M = 0.5RQ = 0.5(1083)Q = 542Q$

f_b = actual bending stress

$f_b = \frac{M}{S}$

where S = section modulus of pile = $\frac{bh^2}{6} = \frac{14^3}{6} = 457.3\ in^3$

$f_b = \frac{542Q}{457.3} = 0.1185Q$

f_a = actual axial stress

$f_a = \frac{P}{A}$

where A = area of pile = $196\ in^2$

$f_a = \frac{P}{196} = 0.00510 2P$

F_b = allowable bending stress

F_a = allowable axial stress

COMPRESSION PILES

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$F_a = F_b = 750\ psi$

$(0.35 f'_c$ - max. prestress $0.2 f'_c)$

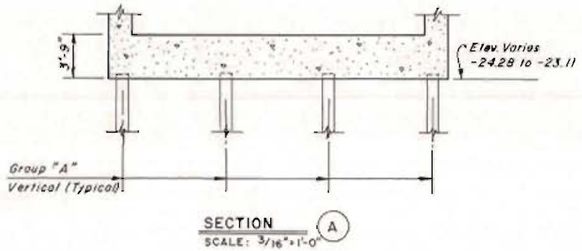
$= 1750 - 1000 = 750$

$\frac{0.00510 2P}{750} + \frac{0.1185Q}{750} = 1.0$

$0.00510 2(100,000) + 0.1185Q = 750$

$= 510.16 + 0.1185Q = 750$

$Q_{allow} = 2024 lb = 2.024 kips$



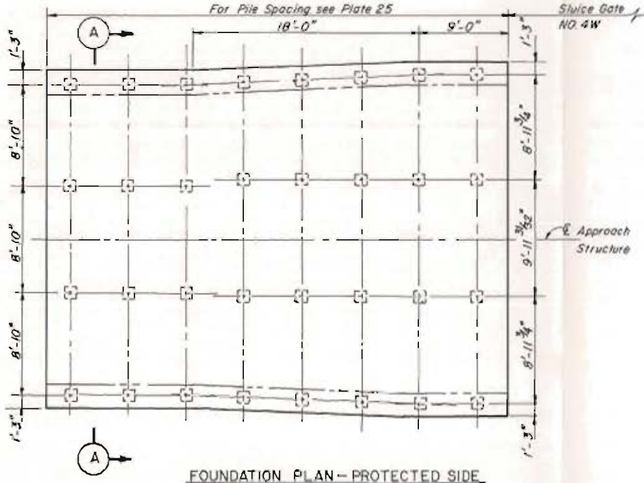
SECTION (A)

SCALE: 3/16" = 1'-0"

LEGEND

□ Vertical Piles - Group "A"

Note: All piles 14" X 14" precast prestressed concrete.



FOUNDATION PLAN – PROTECTED SIDE

SCALE : 3/16" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY

LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN

DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN

FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE NO. 4W – APPROACH STRUCT. PILE DESIGN SUMMARY

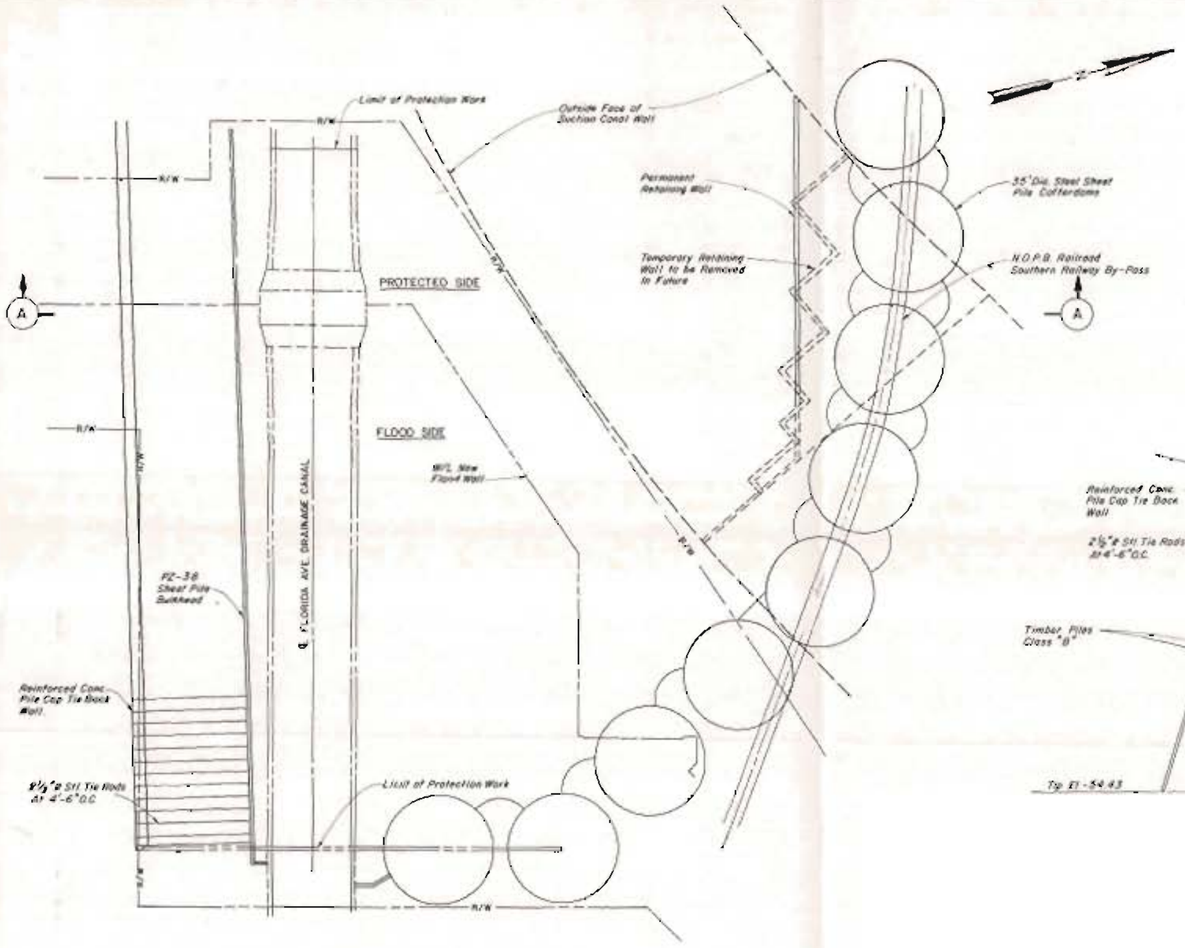
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

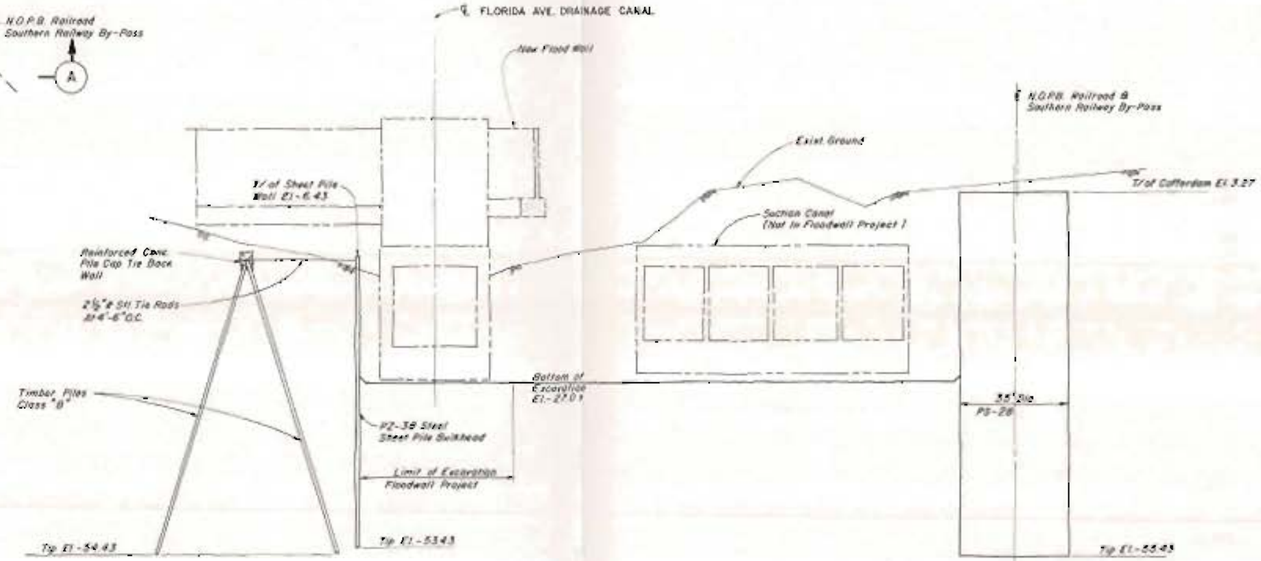
FILE NO. H-2-27790

PLATE 29



PLAN

SCALE: 1"= 20'



SECTION (A)

SCALE: 1"= 20' HORIZ
1"= 10' VERT

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 4W - EXCAVATION PLAN & COFFERDAM

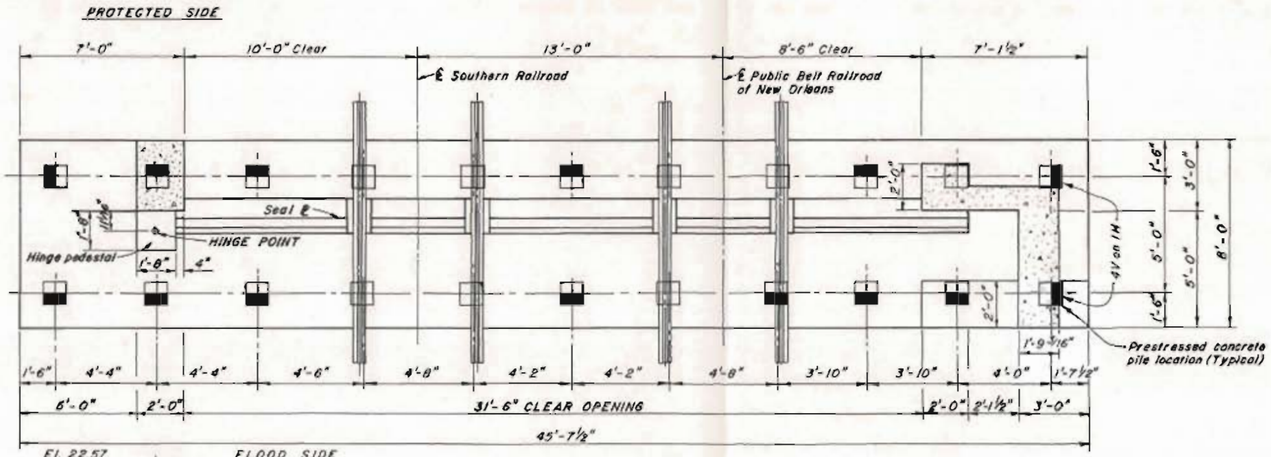
N+Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

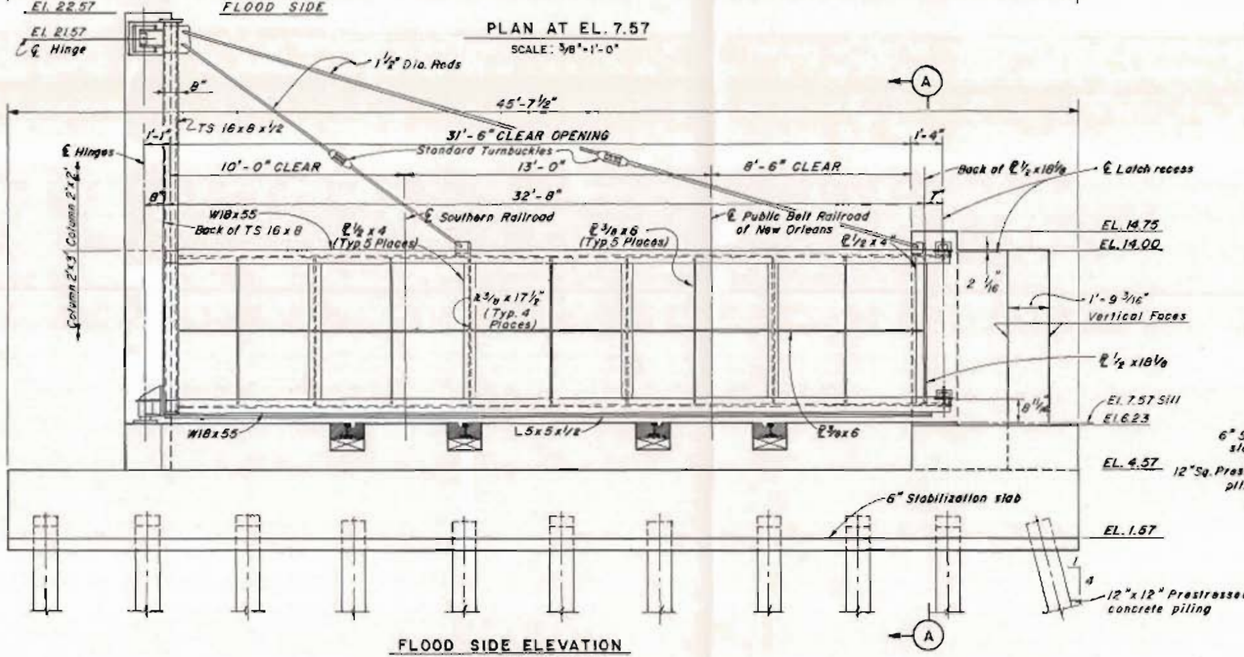
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

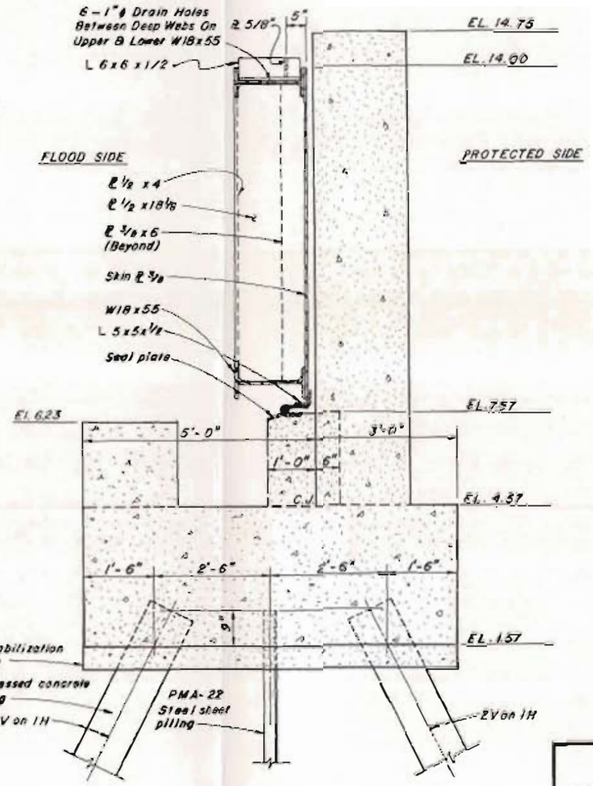
DATE: APRIL, 1985

FILE NO. H-2-27790

PLATE 30







SECTION A
Scale: 3/4"=1'-0" (HORIZ.)
N.T.S. (VERT.)

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
SO. RY. - N.O.P.B. R.R. GATE
NO. 3W - WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27795

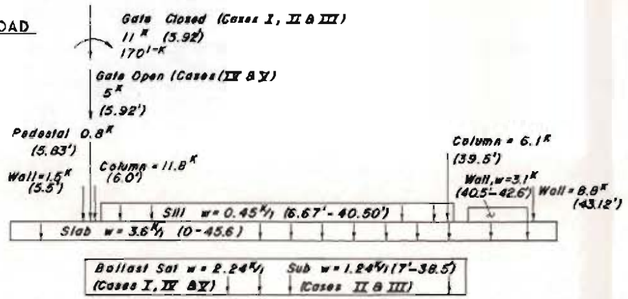
PLATE 31

BASE SLAB DESIGN

MOMENTS ABOUT Y-Y AXIS

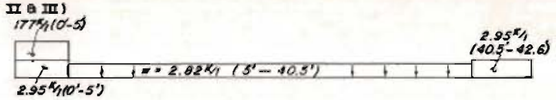
Consider slab as a beam loaded with external vertical loads and supported by piles vertical components.

DEAD LOAD



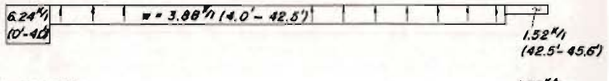
WATER

(Cases II & III)

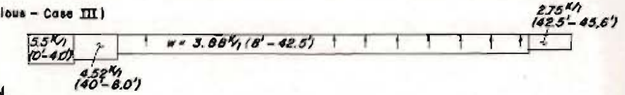


UPLIFT

(Impervious - Case II)

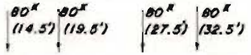


(Pervious - Case III)



TRAIN

(Cases IV & V)



PILE LOADS

Case II

Max. Moment = 203.2 $^{I-K}$ @ 40.00' from A
Max. Shear = 64.3 ^{K} @ 44.00' from A

Case V

Max. Moment = 890.0 $^{I-K}$ @ 19.33' from A
Max. Shear = 97.4 ^{K} @ 36.16' from A

$M = kbd^2$

$d = \sqrt{\frac{M}{kb}} = \sqrt{\frac{(890.0)(12)}{(0.152)(96)}} = 27.05$ in. (d provided = 31 in.)

$v_f = \frac{V}{bd} = \frac{97.4}{(96)(31)} = 0.033$ ksi Allow $v_f = 0.060$ ksi (without shear reinf.)

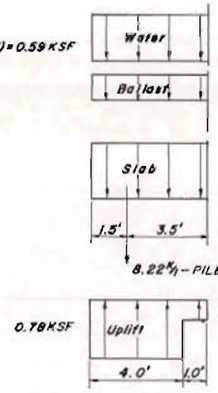
MOMENTS ABOUT X-X AXIS

Bending at face of wall

Consider Piles 8, 9, and 10 acting over 12 feet of wall.

Case II

9.43 (0.0625) = 0.59 KSF



FORCE F_z		Arm y	M_x
Piles 8, 9 & 10	8.22	3.50	28.77
Ballast (1.24 x 8.5/(2 x 12) = 0.44		2.50	1.10
Slab (3.0)(5.0)(0.150) = 2.25		2.50	5.62
Water (0.59)(5.0)	= 2.95	2.50	7.38
Uplift (0.78)(4.0)	= -3.12	3.00	-9.36
(0.19)(1.0)	= -0.19	0.50	-0.10
	10.55		33.41

$M = kbd^2$

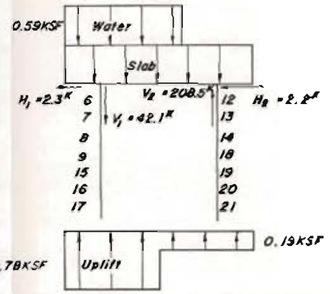
$d = \sqrt{\frac{M}{kb}} = \sqrt{\frac{(33.41)(12)}{(0.152)(12)}} = 14.82$ in. (d prov'd. = 32.5 in.)

$v_f = \frac{V}{bd} = \frac{10.55}{(12)(32.5)} = 0.027$ ksi (Allow $v_f = 0.060$ ksi without shear reinf.)

TORSIONAL ANALYSIS

Analyze section within gate opening

Case II



Piles: 6, 7, 8, 9, 15, 16, 17, 12, 13, 14, 18, 19, 20 & 21

$H_1 = \frac{2}{\sqrt{3}}$ (0.3 + 0.4 + 0.4 + 0.4) + 0.3 + 0.3 + 0.4 = 2.3 K (6) (7) (8) (9) (15) (16) (17)

V_1 = -11.7 - 22.6 - 29.8 - 32.9 + 19.7 + 18.6 + 16.6 = -42.1 K (6) (7) (8) (9) (15) (16) (17)

$H_2 = \frac{2}{\sqrt{5}}$ (0.2 + 0.3 + 0.4) + 0.3 + 0.3 + 0.4 + 0.4 = 2.2 K (12) (13) (14) (18) (19) (20) (21)

V_2 = 43.1 + 48.9 + 54.5 + 17.6 + 16.5 + 14.5 + 13.4 = 208.5 K (12) (13) (14) (18) (19) (20) (21)

FORCE		Dist., from slab center	Torsional Moment
Water (0.59)(5.0)(31.5)	= 92.92	1.50	139.38
Uplift (0.78)(4.0)(31.5)	= -98.28	2.0	-196.56
Uplift (0.19)(4.0)(31.5)	= -23.94	-2.0	47.88
H_1	2.3	-1.5	-3.45
H_2	2.2	-1.5	-3.30
V_1	42.1	2.5	105.25
V_2	-208.5	-2.5	521.25
	Σ		610.45

Torsional Moment = 610.45 $^{I-K}$

Assume Torsional Moment divides equally between columns

$M_T = \frac{610.45}{2} = 305.22^{I-K}$

Shear stress due to torsion v_t

$v_t = \frac{n}{b^2 h} \frac{M_T}{} = \frac{5(305.22)(12)}{(36)^2(96)} = 0.147$ ksi

$v = v_t + v_f = 0.147 + 0.033 = 0.180$ ksi > 0.060 ksi < 0.274 ksi (allow with shear reinf.)

Slab OK but provide shear reinf.

NOTE:

For Load - Case designations see Plate 35

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 3W
BASE SLAB DESIGN

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

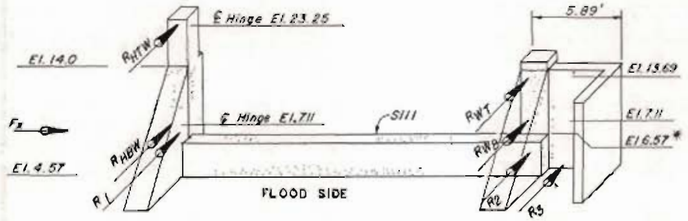
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS, CORPS OF ENGINEERS, U.S. ARMY, NEW ORLEANS, LA.

DATE: APRIL, 1980 FILE NO. H-2-27790

PLATE 32

COLUMN DESIGN

Column 1 — Column 2.



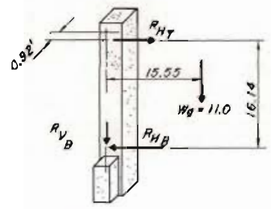
Column 1 - *Investigate Column at El. 4.57 with Hinge Pedestal*

WATER FORCES

COMPUTATIONS	F_x	F_y	Arm_z	M_x	M_y	Arm_y	M_z
$R_{H_{T_W}}$	—	-3.33	18.68	-62.20	—	—	—
$R_{H_{B_W}}$	—	-24.39	2.54	-61.95	—	—	—
R_1 $(1/2)(2.0)(9.43)^2(0.0625)$	—	- 5.56	3.14	-17.45	—		
R_x $1/2$ $(3.0)(9.43)^2(0.0625)$	8.34		3.14		-26.19	0	0
Σ	8.34	-33.28		-141.60	-26.19		0

GATE DEAD LOAD

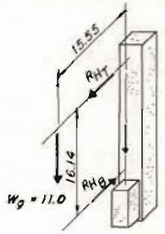
GATE CLOSED



$R_{H_T} = R_{H_B} = \frac{11.0(15.55)}{16.14} = 10.6^K$

$R_{V_B} = 11.0^K$

GATE OPEN



Assume Jack not supporting Gate

$R_{H_T} = R_{H_B} = \frac{11.0(15.55)}{16.14} = 10.6^K$

$R_{V_B} = 11.0^K$

GATE CLOSED	F_z	F_x	Arm_z	M_y	Arm_y	M_z	Arm_y	M_x
R_{HT}	—	10.6	18.68	-198.01	2.42	-25.65	0	0
R_{HB}		-10.6	2.54	26.92	2.42	25.65	0	0
R_{VB}	11.0	—	—	0	0	0	2.42	26.62
Σ	11.0	0		-171.09		0		26.62

GATE OPEN	F_z	F_y	Arm_z	M_x
R_{HT}	—	10.6	18.68	198.01
R_{HB}	—	-10.6	2.54	-26.92
R_{VB}	11.0	—	2.42	26.62
Σ	11.0	0		197.71

COLUMN DEAD LOAD		F_z	Arm_y	M_x
COLUMN	(2.0)(2.0)(19.68)(0.150) ▷	11.81	—	0
HINGE PEDESTAL	(1.67)(1.67)(2.0)(0.150)	0.84	1.54	1.29
	Σ	12.65		1.29

▷ Does not include Portion of Lower Column.

Case I - Flood Condition, Water @ El. 14.0, Gate Closed

Case II - Dead Load Only, Gate Open

LOAD SUMMATION							
CASE	ITEM	F_x	F_y	F_z	M_x	M_y	M_z
I	WATER	8.34	-33.28	0	-141.60	-26.19	0
	GATE CLOSED	0	0	11.0	26.62	-171.09	0
	COL. DEAD LOAD	0	0	12.65	1.29	0	0
	Σ	8.34	-33.28	23.65	-113.69	-197.28	0
II	GATE OPEN	0	0	11.0	197.71	0	0
	COL. DEAD LOAD	0	0	12.65	1.29	0	0
	Σ	0	0	23.65	199.00	0	0

COLUMN 2 — *Investigate Column at El. 4.57*

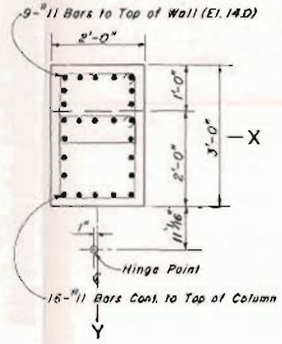
WATER FORCES

COMPUTATIONS	F_y	Arm_z	M_x	Arm_x	M_z
R_{W_T}	-8.22	9.12	-74.97	0.44	-3.60
R_{W_B}	-19.50	2.54	-49.53	0.44	-8.58
$R_2 = R_1$ (Column)	- 5.55	3.14	-17.43	—	—
$R_3 = (1/2)(1/2)(2.89)(9.43)^2(0.0625)$	- 4.02	3.14	-12.62	2.44	-9.81
Σ	-37.29		-154.55		-21.99

LOAD SUMMATION							
CASE	ITEM	F_x	F_y	F_z	M_x	M_y	M_z
I	WATER	0	-37.29	0	-154.55	0	-21.99
	COL DEAD LOAD (2.0)(2.0)(0.150)(10.18)	0	0	6.11	0	0	0
	Σ	0	-37.29	6.11	-154.55	0	-21.99

COLUMN 1

SECTION AT EL. 4.57



GATE CLOSED - CASE I

NOTE:

COLUMN IS 2' by 3' TO TOP OF WALL (El. 14.0). COLUMN IS 2' by 2' FROM TOP OF WALL TO TOP OF COLUMN.

ANALYSIS BASED ON "REINFORCED CONCRETE DESIGN HANDBOOK", ACI SP-3.

ELEVATION LATER CHANGED TO 7.57. COMPUTATIONS NOT MATERIALLY AFFECTED.

M_x
f_s = 5,800 psi
f_c = 240 psi

M_y
f_s = 10,900 psi
f_c = 600 psi

$\Sigma f_s = 5,800 + 10,900 = 16,700$ psi

$\Sigma f_c = 240 + 600 = 840$ psi

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 3W
COLUMN DESIGN

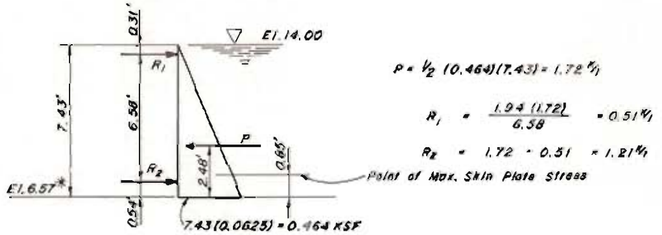
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. H-2-27790

PLATE 33

LOADING



$P = \frac{1}{2}(0.464)(7.43) = 1.72^{K}/_{1}$

$R_1 = \frac{1.94\,(1.72)}{6.58} = 0.51^{K}/_{1}$

$R_2 = 1.72 - 0.51 = 1.21^{K}/_{1}$

SKIN PLATE

Load, $w = 0.0625(7.43 - 0.85) = 0.411^{K}/_{1}$

$^{5}/_{16}$" Minimum thickness, use $^{5}/_{8}$" THICK PLATE

$S = \frac{bt^2}{6} = 0.281\ in^3/FT.$

Maximum Allowable Moment = SF_b =

$0.281\ (20.0) = 5.6^{IN\text{-}K}/_{FT} = 0.468^{FT\text{-}K}/_{FT}.$

Interior Span, $M = \frac{1}{12} w\ell^2$

$\frac{1}{12} w\ell^2 = 0.468$

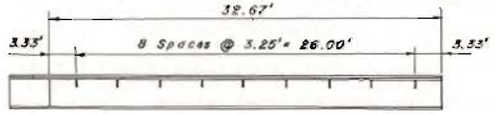
$\frac{1}{12}(0.411)\ \ell^2 = 0.468$

$\ell = 3.69$ FT. (Allow. Span), use 3.25 FT.

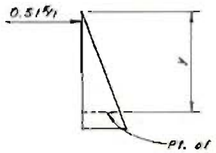
Exterior Span, $M = \frac{1}{10} w\ell^2$

$\frac{1}{10} w\ell^2 = 0.468$

$\ell = 3.37$ FT. (Allow. Span), use 3.33 FT.



VERTICAL STIFFENERS

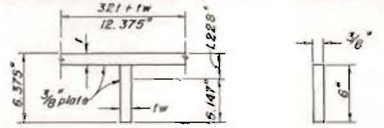


$\frac{1}{2}(0.0625)\ y^2 = 0.51^{K}/_{1}$

$y = 4.04'$

Moment $= 0.51\,(4.04 - 0.31) - \frac{1}{6}(0.0625)(4.04)^3$

$= 1.22^{I\text{-}K}/_{1}$



Effective Flange Width

AISC 1.9.1.2

$\frac{95^{K}}{\sqrt{36,000}} = 16$

$2\,(16 \times 0.375") + 0.375 + 12 = 12.375$

ITEM	AREA	y	Ay	Ay	Io
Plate 12.375" x 3/8"	4.641	0.1875	0.870	0.163	—
Plate 6" x 3/8"	2.250	3.375	7.594	25.630	6.75
	6.891	3.563	8.464	25.793	6.75

$\bar{y} = \frac{\Sigma Ay}{\Sigma A} = \frac{8.464}{6.891} = 1.228$ in.

$I = I + \Sigma Ay^2 - (\Sigma Ay)\bar{y}$

$= 6.75 + 25.793 - (8.46 \times 1.228)$

$= 22.149\ in^4$

$S_{TOP} = \frac{I}{C_{TOP}} = \frac{22.149}{1.128} = 18.04\ in^3$

$S_{BOT} = \frac{I}{C_{BOT}} = \frac{22.149}{5.147} = 4.30\ in^3$

$f_s = \frac{M}{S_{BOT}} = \frac{1.22\,(3.25)(12)}{4.30} = 11.07$ ksi $<<$ allow $= 20.0$ ksi

GIRDERS

Span = Opening + Column Face to ℄ Hinge + Column Face to ℄ 1½" Bearing Bar

Span = 31.50 + 1.08 + 0.56 = 33.14'

Top Girder

Try W18x55 (min. thickness requirement)

Load, $w = 0.51^{K}/_{1}$

$M = \frac{1}{8} w\ell^2 = \frac{1}{8}(0.51)(33.14)^2 = 70.01^{I\text{-}K}$

per A.I.S.C. 1.5.1.4.1 and EM 1110-1-2101

$F_b = 20.0$ ksi

$f_b = \frac{M}{S} = \frac{70.01(12)}{98.4} = 8.54$ ksi < 20.0 ksi, ok use W18x55

Bottom Girder

Load, $w = 1.21^{K}/_{1}$

$M = \frac{1}{8} w\ell^2 = \frac{1}{8}(1.21)(33.14)^2 = 166.11^{I\text{-}K}$

$S_{req'd} = \frac{M}{F_b} = \frac{166.11(12)}{20.0} = 99.67\ IN^3$

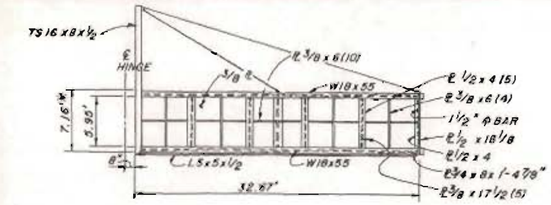
Try W18x55 WITH 7" WIDTH OF $^{3}/_{8}$" SKIN PLATE EFFECTIVE

$S_x = 104.6\ IN^3$ $I_x = 1,083\ IN.^4$

Deflection

$\frac{5w\ell^4}{384EI} = \frac{5(1.21)\,33.14\,(33.14 \times 12)^3}{384\ (29 \times 10^3)\,(1,083)} = 1.05$ IN.

allow $\Delta = \frac{\ell}{360} = \frac{33.14 \times 12}{360} = 1.11$ IN. OK use 18x55



ITEM	COMPUTATION		WEIGHT (LB)	x (FT)	wx (FT · LB)
3/8 ℄	7.16 x 32.67 x 15.3	=	3,580	17.0	60,860
W18 x 55	2 x 55 x 33.58	=	3,690	17.0	62,730
℄ ½ x 18⅛	6.52 x 31.5	=	210	33.33	7,000
℄ ¾ x 17½	5 x 6.52 x 22.3	=	730	17.0	12,410
℄ 3/8 x 6 (10)	32.67 x 7.65	=	250	17.0	4,250
℄ 3/8 x 6 (4)	4 x 6.52 x 7.65	=	200	17.0	3,400
℄ ½ x 4 (5)	5 x 5.95 x 6.8	=	200	17.0	3,400
℄ ½ x 4 (2)	5.95 x 6.8	=	40	33.17	1,330
L 5 x 5 x ½	31.16 x 16.2	=	510	17.0	8,670
1½" ϕ BAR	7 x 7.65	=	50	33.14	1,660
℄ ¾ x 8 x 1-4⅞	1.41 x 20.4	=	30	33.14	990
WELD ▷ 1/4 / 1/4	0.21 x (4 x 32.7 + 16 x 6.84)	=	50	17.0	850
SEAL			90	17.0	1,530
TS 16 x 8 x ½	17 x 78		1,330	1.0	1,330
			10,960		170,410

GATE DEAD WEIGHT

TUBING POST

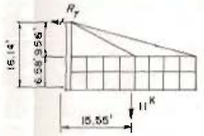
$F_y = 46$ ksi $F_b = 0.6F_y = 0.6 \times 46 = 27.6$ ksi

Try TS 16x8x½, $S_x = 87\ in^3$, $S_y = 59\ in^3$

A.I.S.C. 1.9.2.2

$\frac{b}{t} = \frac{17}{0.5} = 34 < \frac{238}{\sqrt{F_y}} = \frac{238}{\sqrt{46}} = 36$

GATE WEIGHT FORCE



$R_T = \frac{15.55 \times 11}{16.14} = 10.6^{K}$

$M_y = 10.6 \times 9.56 = 101.3^{I\text{-}K}$

$f_y = \frac{101.3 \times 12}{59} = 20.6$ ksi

NOTE:
ELEVATION LATER CHANGED TO 7.57. COMPUTATIONS NOT MATERIALLY AFFECTED.

WATER FORCE

$F = 3.3^{K}$

$M_x = 3.3 \times 9.56 = 31.5^{I\text{-}K}$

$f_x = \frac{31.5 \times 12}{87} = 4.4$ ksi

COMBINED

$\frac{4.4}{27.6} + \frac{20.6}{27.6} = 0.16 + 0.75 = 0.91 < 1.0$

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 3W
STEEL DESIGN

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. H-2-27790

LOADING CASES

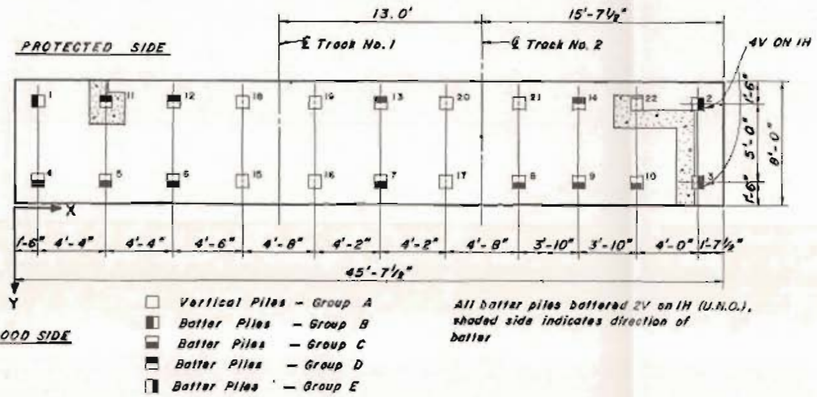
Case I – Dead Load Only

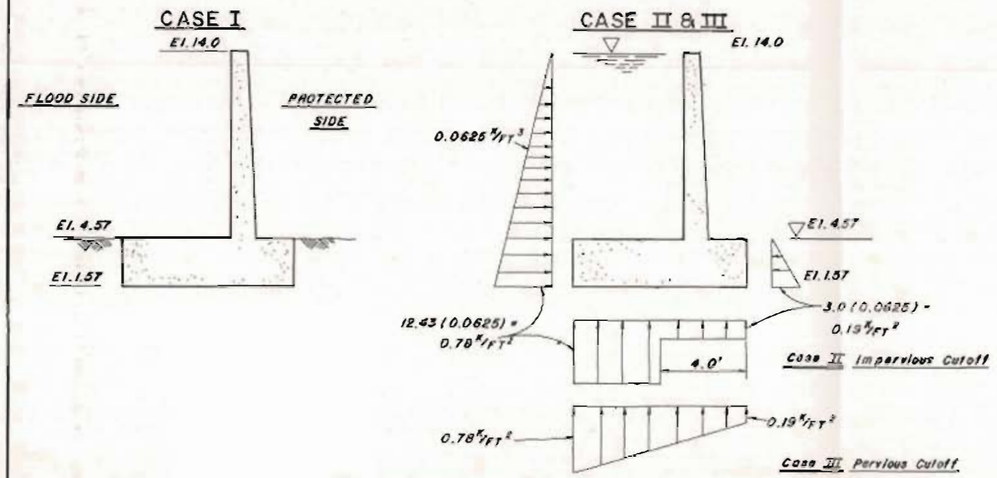
Case II – Flood Condition, Water at El. 14.0 Flood Side, El. 4.57 Protected Side, Impervious Cutoff

Case III – Flood Condition, Water at El. 14.0 Flood Side, El. 4.57 Protected Side, Pervious Cutoff

Case IV – Train Load on Flood Side, 2 Axles each track

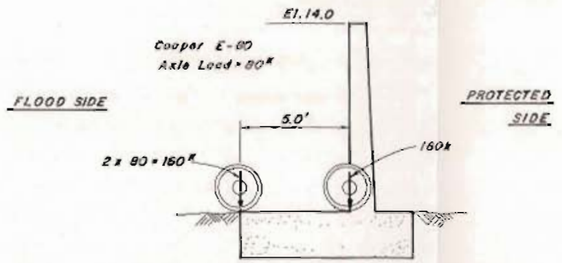
Case V – Train Load on Protected Side, 2 Axles each track



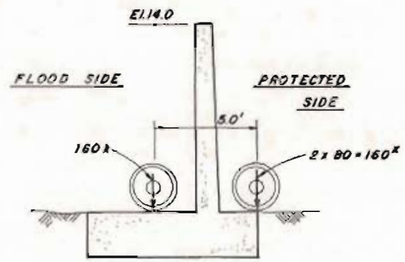


TRAIN LOADS

CASE IV



CASE V



LOAD TABULATION

LOAD NO.	ITEM	F_x k	F_y k	F_z k	M_x I-k	M_y I-k	M_z I-k
1.	CONCRETE	0	0	211	-884	-5131	0
2.	GATE-OPEN	0	0	5	-24	-30	0
3.	GATE-CLOSED	0	0	10	-46	-222	0
4.	BALLAST-SAT.	0	0	71	-284	-1615	0
5.	BALLAST-SUB.	0	0	39	-156	-887	0
6.	WATER-VERT.	0	0	137	-378	-2806	0
7.	WATER-HOR.	36	-175	0	-760	-158	-4100
8.	UPLIFT-IMP.	0	0	-179	534	3771	0
9.	UPLIFT-PERV.	0	0	-184	612	3988	0
10.	TRAIN-CASE IV	0	0	320	-800	-7520	0
11.	TRAIN CASE V	0	0	320	-1760	-7520	0

MAX. PILE CAP MOVEMENTS

	HORIZONTAL	VERTICAL	ROTATION
CASE	III	IV	IV
	0.0749 in	0.0436 in	0.00055 rad.

LOAD SUMMATION

CASE	ITEM	F_x K	F_y K	F_z K	M_x I-K	M_y I-K	M_z I-K
I	1+3+4	0	0	232	-1214	-6968	0
II	1+3+5+6+7+8	36	-175	218	-1690	-5433	-4100
III	1+3+5+6+7+9	36	-175	218	-1612	-5216	-4100
IV	1+2+4+10	0	0	607	-1992	-14256	0
V	1+2+4+11	0	0	607	-2052	-14296	0

SUMMARY OF MAXIMUM PILE LOADS

GROUP	MAX. PILE LOAD		CASE NO.		PILE NO.		ALLOW LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q	P	Q
A	64.3	0.6	IV	III	17	21	80	1.21	80.4	49.6
B	-24.3	0.5	III	III	1	1	-40	3.49	60.8	14.3
C	-40.6	0.6	III	III	10	10	-40	3.46	101.5	17.3
D	61.2	0.6	II	II	14	14	80	1.21	76.5	49.6
E	56.8	0.6	IV	III	3	3	80	1.21	71.0	49.6

NOTE: The pile length used in calculations was 64 feet. (See Plate 6 for additional Notes)

Results from computer program, K29010, "Three Dimensional Analysis of Pile Foundations." Program based on Planar Method of Pile Analysis Developed by A. Hrennikoff and extended to Three Dimensions by W.E. Soul.

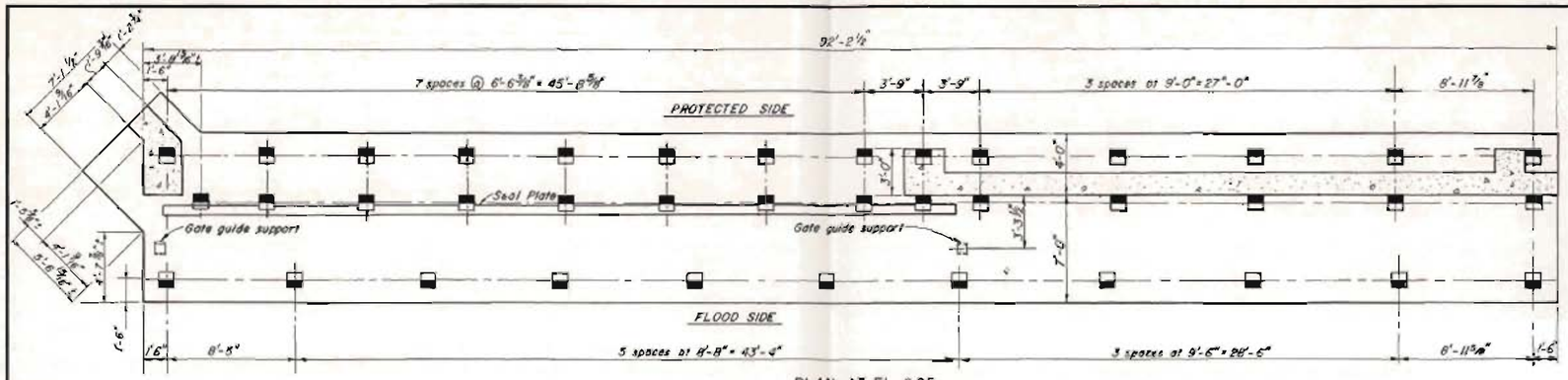
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 3W
PILE ANALYSIS

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS NEW ORLEANS, LOUISIANA

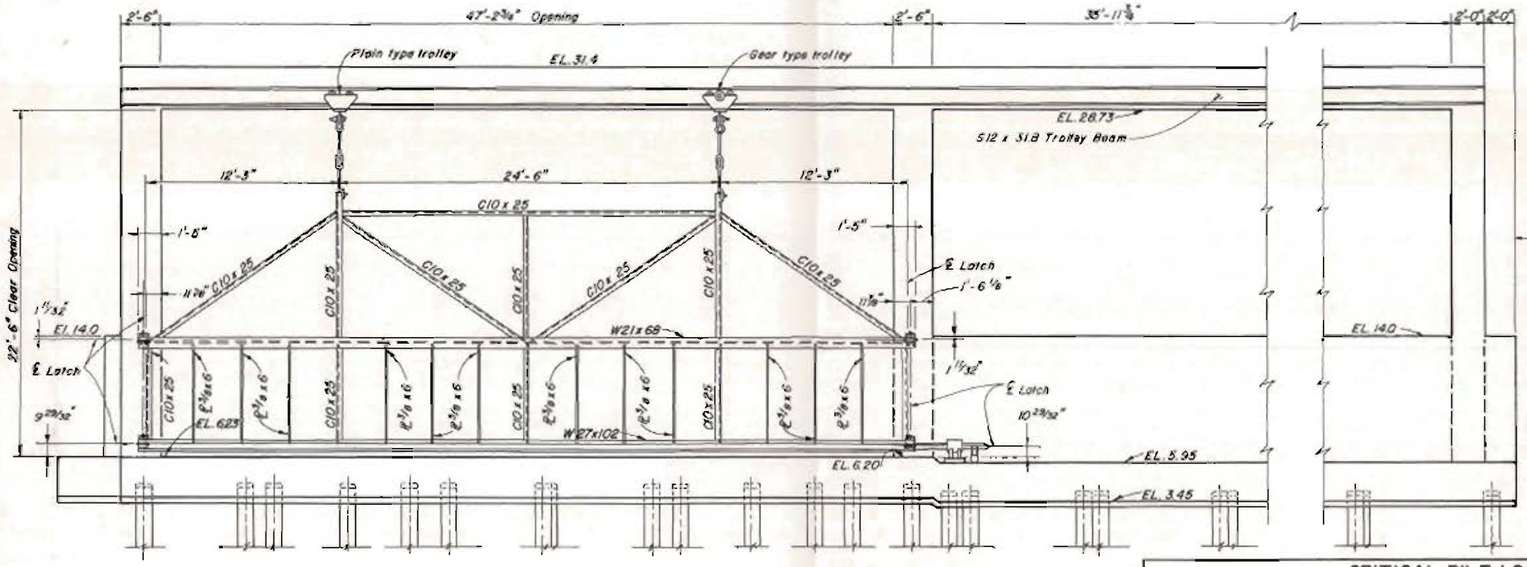
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL, 1980

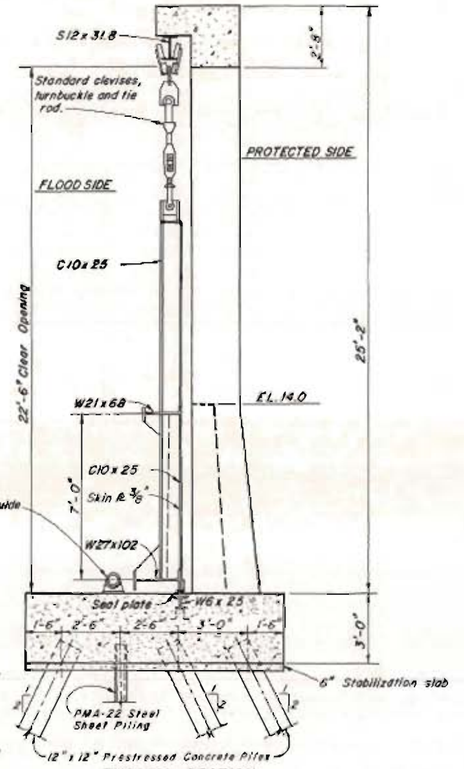
FILE NO. H-2-27790



PLAN AT EL. 6.25
SCALE: 1/4" = 1'-0"



FLOOD SIDE ELEVATION
SCALE: 1/4" = 1'-0"



TYPICAL SECTION
SCALE: 3/8" = 1'-0"

Notes
1. All piles to be 12" sq. prestressed concrete piles.
2. All piles to be batter 2V on 1H(U.N.O.)

Indicates direction of batter.

CRITICAL PILE LOADS

GROUP	MAX. PILE LOAD		CASE NO.		ALLOW. PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
TENSION PILE	-27.0	-0.6	I	III	-40.0	3.49	68.0	17.0
COMPRESSION PILE	70.7	1.1	I	I	80.0	1.21	88.0	91.0

See Plate 6 for notes and allowable Load.
See Plate 8 for similar Load Case definition

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

HARBOR ROAD GATE NO. 2W — WEST I.H.N.C.

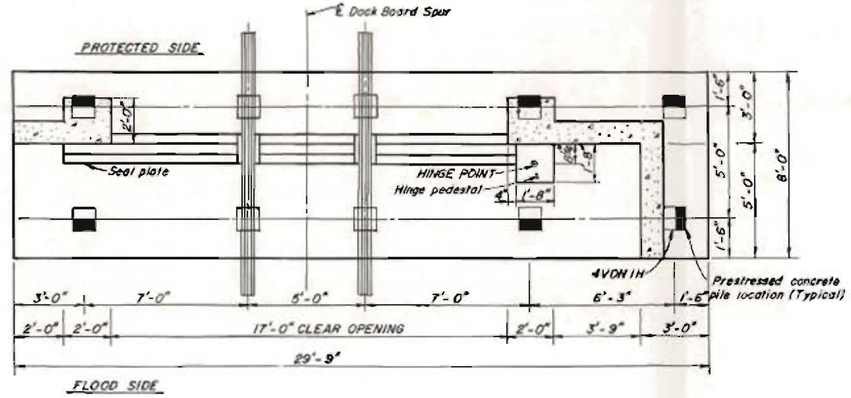
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

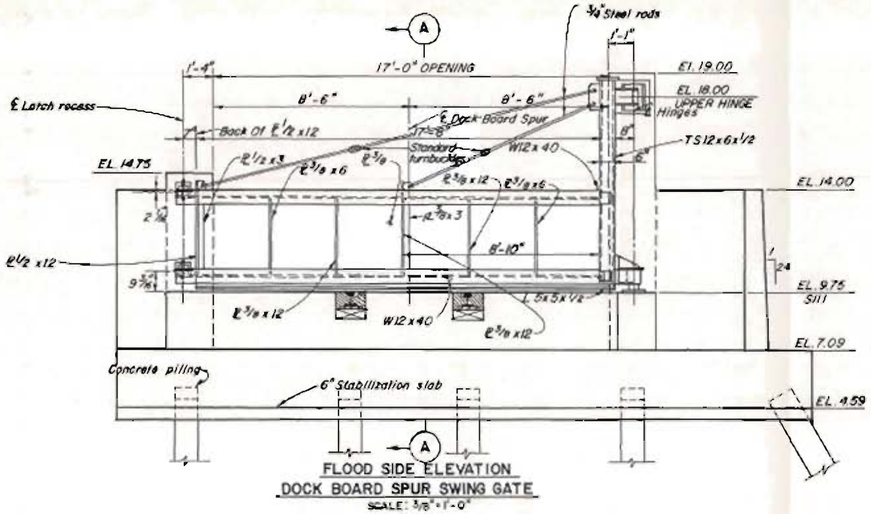
DATE: APRIL 1980

FILE NO. H-2-27790

PLATE 36



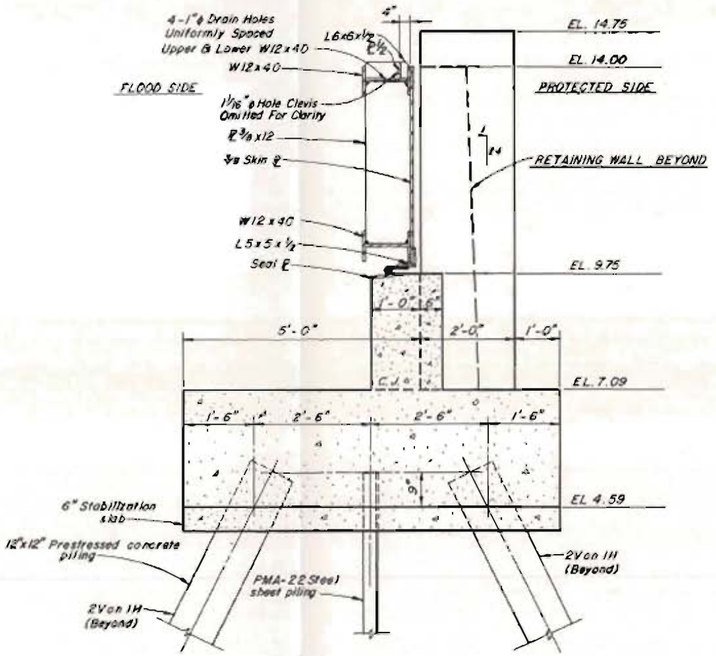
PLAN AT EL. 9.75
SCALE: 3/8" = 1'-0"



CRITICAL PILE LOADS

GROUP	MAX PILE LOAD		CASE NO.		ALLOW PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
TENSION PILE	-276	0.7	III	III	-400	3.49	69.0	20.1
COMPRESSION PILE	718	0.7	X	III	800	1.21	89.8	57.9

See Plate 6 for Notes.
See Plate 35 for Loading Cases definition.



SECTION
SCALE: 3/8" = 1'-0" (A)

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

FUTURE DOCK BOARD SPUR GATE NO. IW - WEST I.H.N.C.

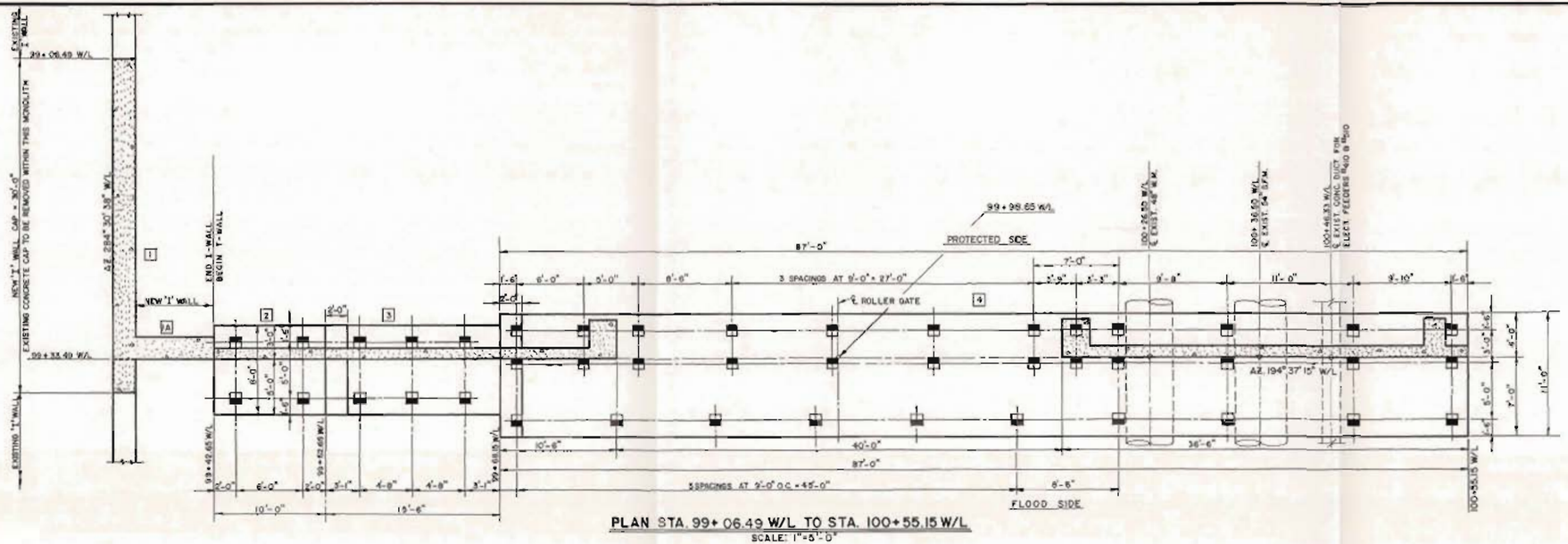
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

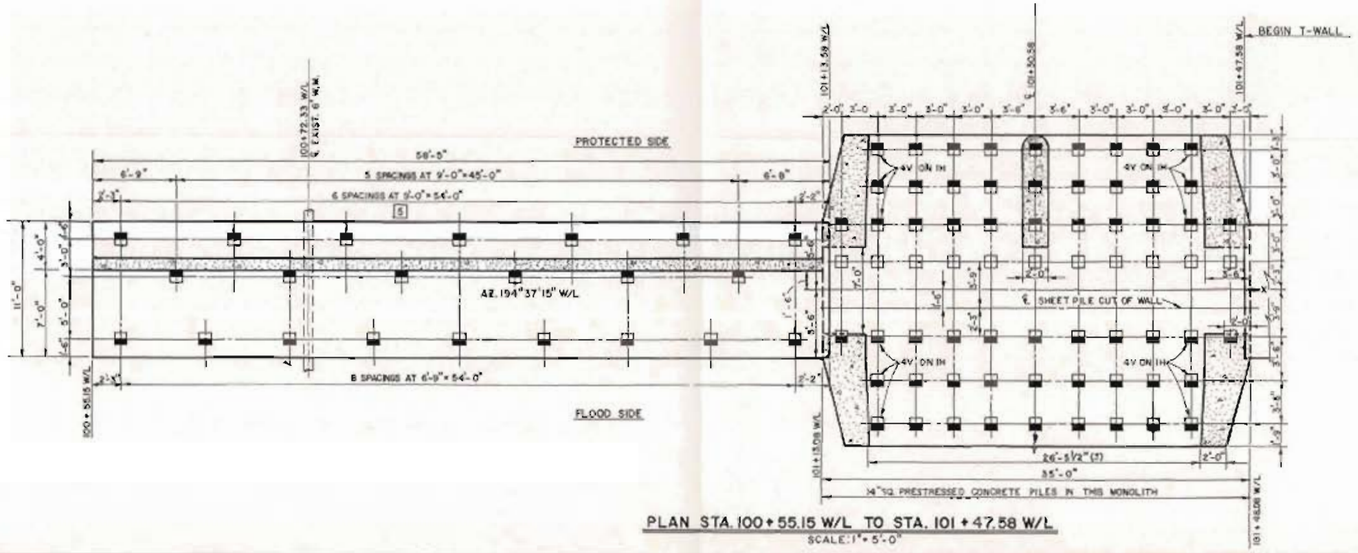
FILE NO. M-2-27790

PLATE 37



PLAN STA. 99+06.49 W/L TO STA. 100+55.15 W/L

SCALE: 1"=5'-0"



PLAN STA. 100+55.15 W/L TO STA. 101+47.58 W/L

SCALE: 1"=5'-0"

NOTES:

1. ALL PILES TO BE 12" SQ. PRESTRESSED CONCRETE PILES (U.N.O.)
2. ALL PILES TO BE BATTERED 2V ON IH. (U.N.O.)
3. ▬ INDICATES DIRECTION OF BATTER.
4. □ INDICATES VERTICAL PILE.
5. [5] DENOTES MONOLITH NUMBER
6. SEE PLATE 5 FOR I-WALL TO T-WALL CONNECTION DETAILS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

PILE & MONOLITH PLAN WEST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL 1980

FILE NO. H-2-27793

PLATE 38

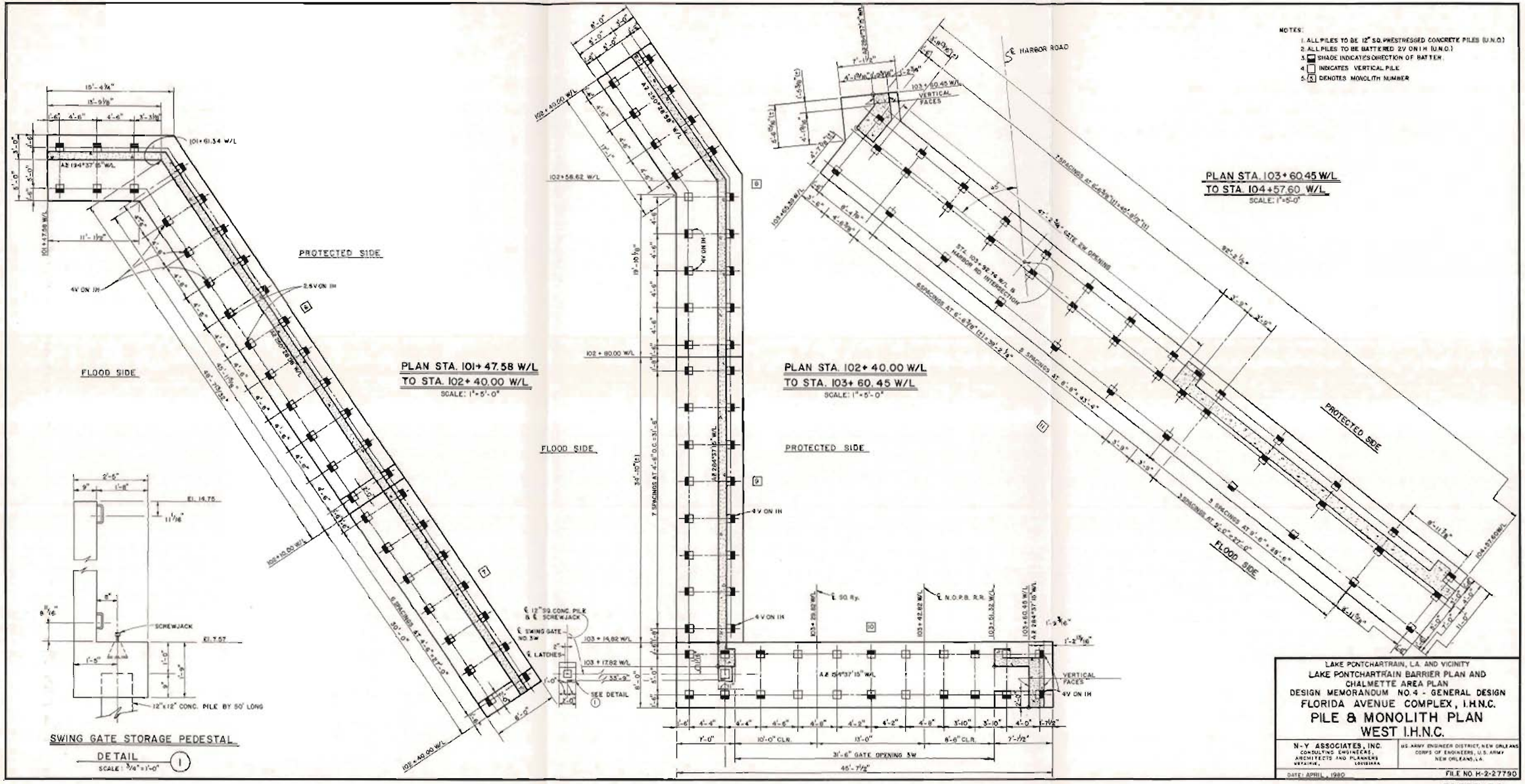

NOTES:
1. ALL PILES TO BE 12" SQ. PRESTRESSED CONCRETE PILES (U.N.O.)
2. ALL PILES TO BE BATTERED 2V ON 1H (U.N.O.)
3. SHADE INDICATES DIRECTION OF BATTER.
4. INDICATES VERTICAL PILE
5. DENOTES MONOLITH NUMBER
PROTECTED SIDE
FLOOD SIDE
4V ON 1H
2.5V ON 1H
PLAN STA. 101+47.58 W/L
TO STA. 102+40.00 W/L
SCALE: 1"=5'-0"
PLAN STA. 102+40.00 W/L
TO STA. 103+60.45 W/L
SCALE: 1"=5'-0"
PLAN STA. 103+60.45 W/L
TO STA. 104+57.60 W/L
SCALE: 1"=5'-0"
HARBOR ROAD
VERTICAL FACES
SCREWJACK
12"x12" CONC. PILE BY 50' LONG
SWING GATE STORAGE PEDESTAL
DETAIL (1)
SCALE: 3/4"=1'-0"
SEE DETAIL (1)
31'-6" GATE OPENING SW
45'-7½"
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE & MONOLITH PLAN
WEST I.H.N.C.
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.
DATE: APRIL, 1980
FILE NO. H-2-27790

PLATE 39

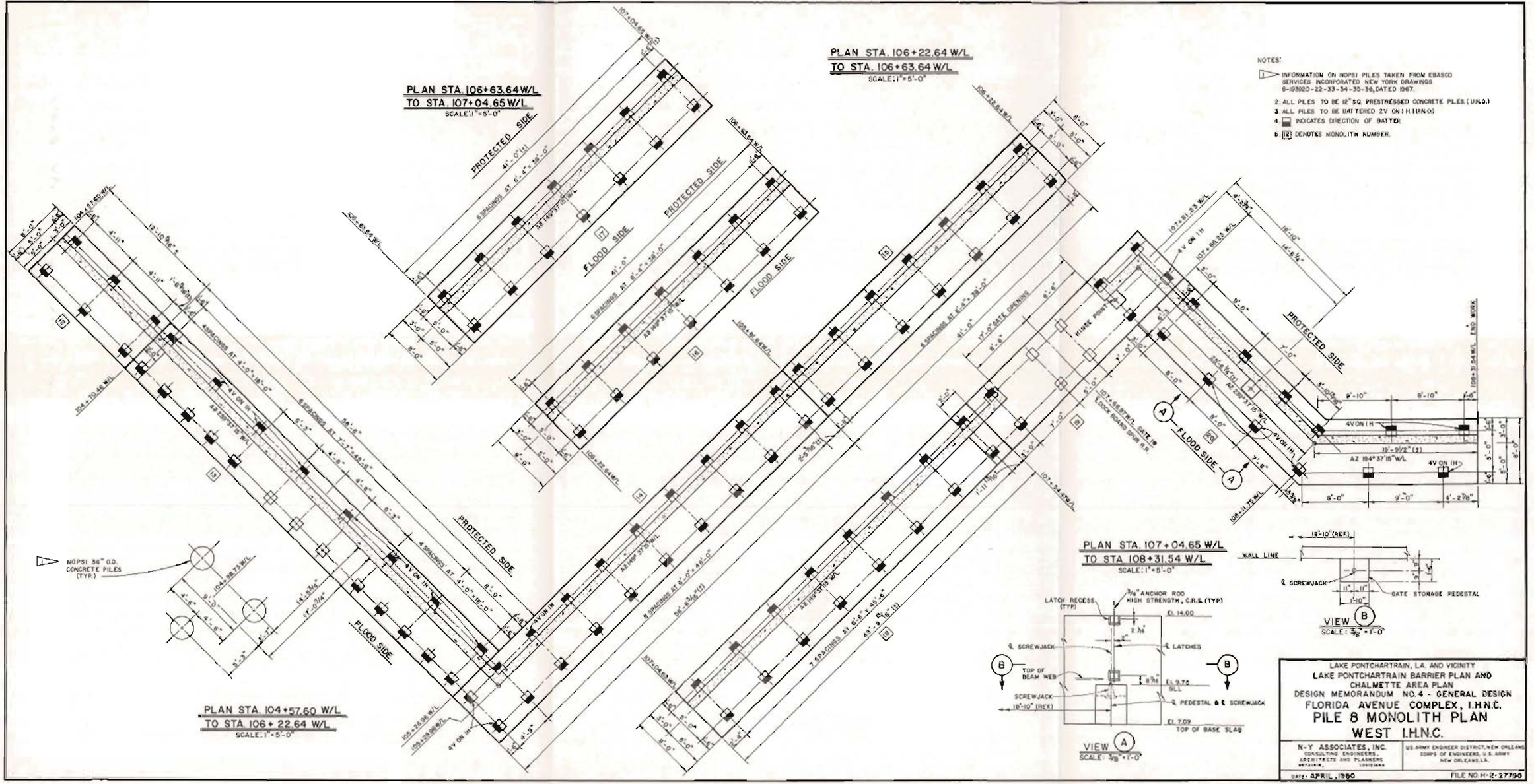
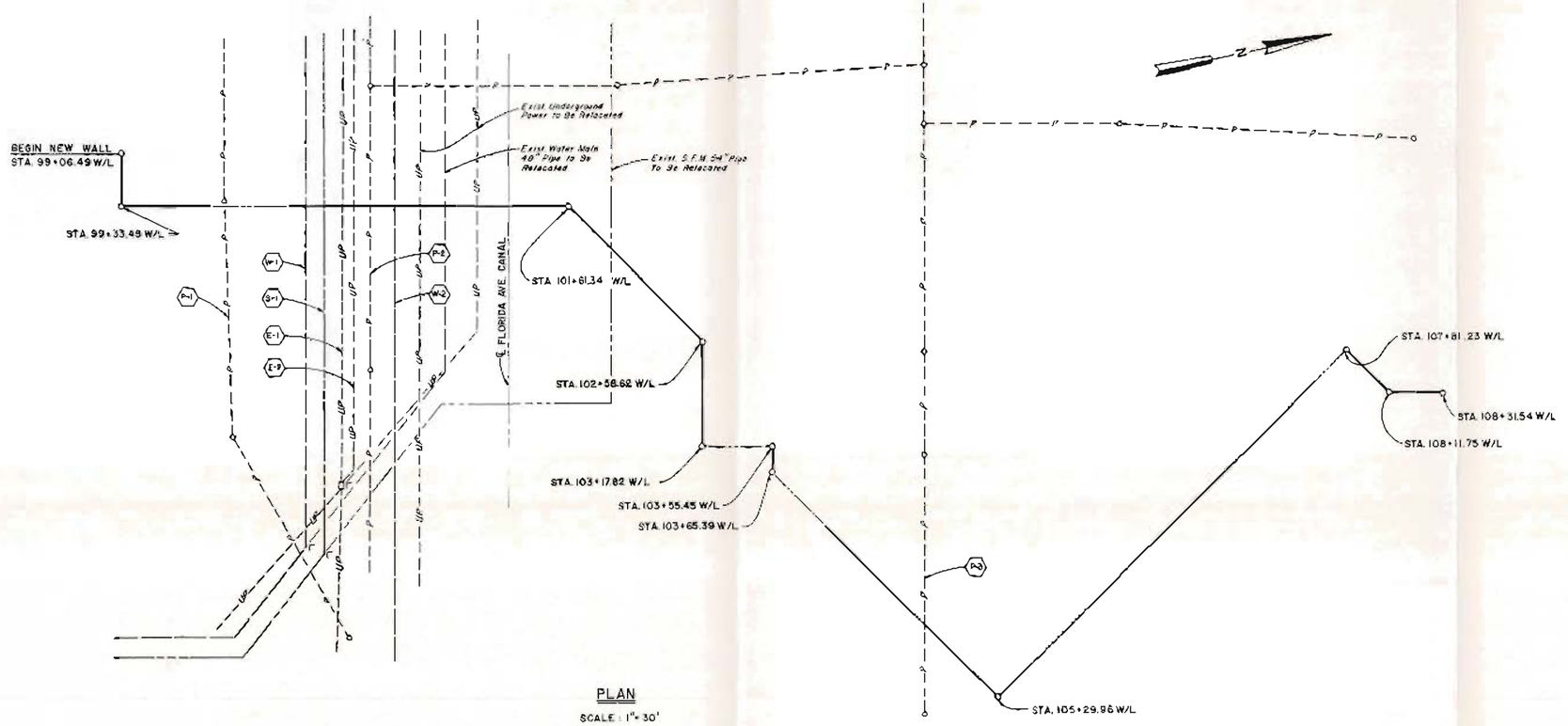

PLAN STA. 106+63.64 W/L
TO STA. 107+04.65 W/L
SCALE: 1"=5'-0"
PLAN STA. 106+22.64 W/L
TO STA. 106+63.64 W/L
SCALE: 1"=5'-0"
PLAN STA. 104+57.60 W/L
TO STA. 106+22.64 W/L
SCALE: 1"=5'-0"
PLAN STA. 107+04.65 W/L
TO STA. 108+31.54 W/L
SCALE: 1"=5'-0"
NOTES:
1. INFORMATION ON NOPSI PILES TAKEN FROM EBASCO SERVICES INCORPORATED NEW YORK DRAWINGS 8-193920-22-33-34-35-36, DATED 1967.
2. ALL PILES TO BE 12" SQ. PRESTRESSED CONCRETE PILES. (U.N.O.)
3. ALL PILES TO BE BATTERED 2V ON 1 H. (U.N.O.)
4. INDICATES DIRECTION OF BATTER.
5. (12) DENOTES MONOLITH NUMBER.
PROTECTED SIDE
FLOOD SIDE
NOPSI 36" O.D. CONCRETE PILES (TYP.)
VIEW (A)
SCALE: 3/8" = 1'-0"
VIEW (B)
SCALE: 3/8" = 1'-0"
LATCH RECESS (TYP)
3/4" ANCHOR ROD HIGH STRENGTH, C.R.S. (TYP)
EL. 14.00
℄ SCREWJACK
℄ LATCHES
TOP OF BEAM WEB
EL. 9.75 SILL
SCREWJACK
℄ PEDESTAL & ℄ SCREWJACK
EL. 7.09 TOP OF BASE SLAB
WALL LINE
℄ SCREWJACK
GATE STORAGE PEDESTAL
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE & MONOLITH PLAN
WEST I.H.N.C.
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.
DATE: APRIL, 1980
FILE NO. H-2-27790

PLATE 40



PLAN

SCALE : 1"= 30'

UTILITY SCHEDULE

UTILITY MARK	APPROX. W/L STA.	TYPE	SIZE	OWNER	DETAIL THRU WALL	TOP ELEVATION	REMARKS
P-1	99+83	Overhead Power	N/A	NOPSI	N/A	Above Top Wall	
W-1	100+26	Water Main	48"Dia.	S&WB	①(Pl.42)	T.O.P. - 3.93	
S-1	100+36	Sewer Force Main	54"Dia.	S&WB	①(Pl.42)	T.O.P. - 3.43	
E-1	100+46	Underground Power	5"Dia.	S&WB	②(Pl.42)	T/of Conc Duct -4.93	Both E-1 & E-2 Have 5" Conduits Encased in a Concrete Duct 20" wide x 25" high
E-2	100+46	Underground Power	5"Dia.	S&WB	②(Pl.42)		
P-2	100+63	Overhead Power	N/A	NOPSI	N/A	Above Top Wall	
W-2	100+72	Water Main	6"Dia.	S&WB	③(Pl.42)	T.O.P. - 12.18	
P-3	104+79	Overhead Power	N/A	NOPSI	N/A	Above Top Wall	

LEGENDS

- WALL LINE (W/L)
- —P— OVERHEAD POWER LINE
- —UP— UNDERGROUND POWER LINE
- WATER LINE
- SEWER FORCE MAIN
- (P-1) UTILITY MARK, SEE UTILITY SCHEDULE
- EXIST. & RELOCATED LINE BREAK POINT

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
UTILITY PLAN & SCHEDULE
WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

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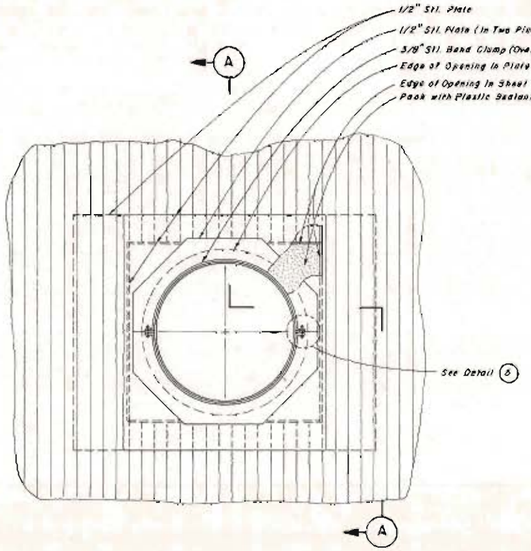
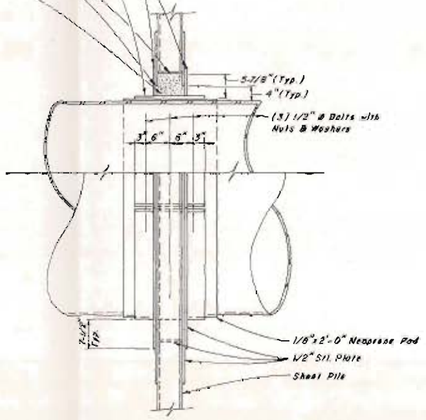
PLATE 41



ELEVATION

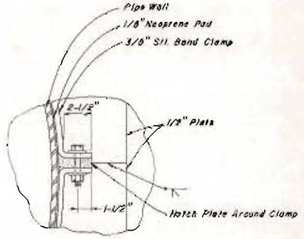
DETAIL OF 36" TO 66" DIAMETER PIPE THRU STEEL SHEET PILING (1)

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



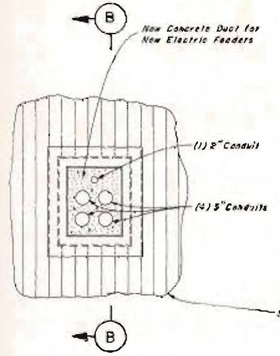
SECTION (A)

SCALE : 3/4"=1'-0"



DETAIL (5)

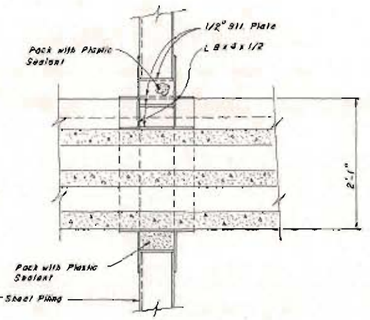
N.T.S.



ELEVATION

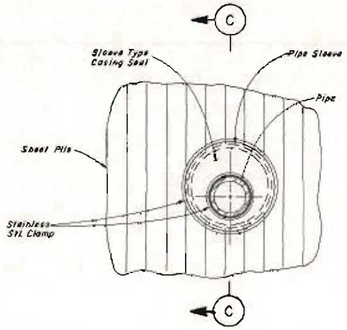
DETAIL CONCRETE DUCT THRU STEEL SHEET PILING (2)

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



SECTION (B)

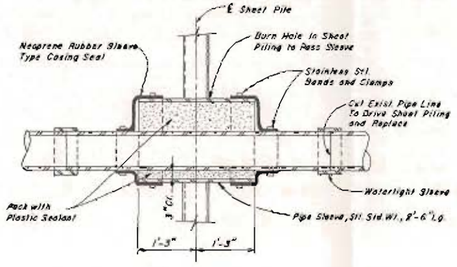
SCALE : 1"=1'-0"



ELEVATION

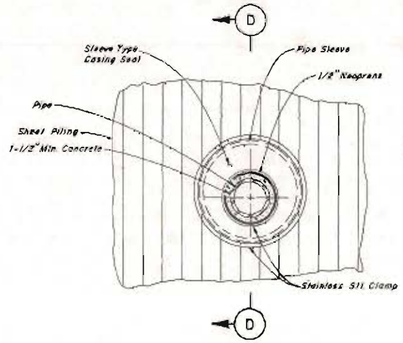
DETAIL PIPE LESS THAN 12" DIA. THRU STEEL SHEET PILING (3)

SCALE : 3/4"=1'-0"



SECTION (C)

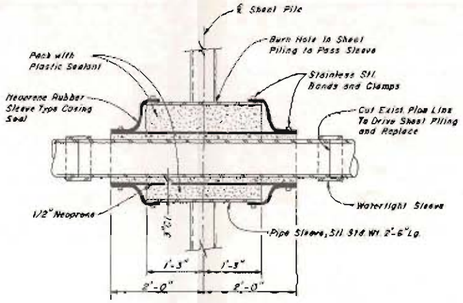
SCALE : 3/4"=1'-0"



ELEVATION

DETAIL GAS PIPE THRU STEEL SHEET PILING (4)

SCALE : 3/4"=1'-0"



SECTION (D)

SCALE : 3/4"=1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

TYPICAL UTILITY CROSSING DETAIL – WEST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 42

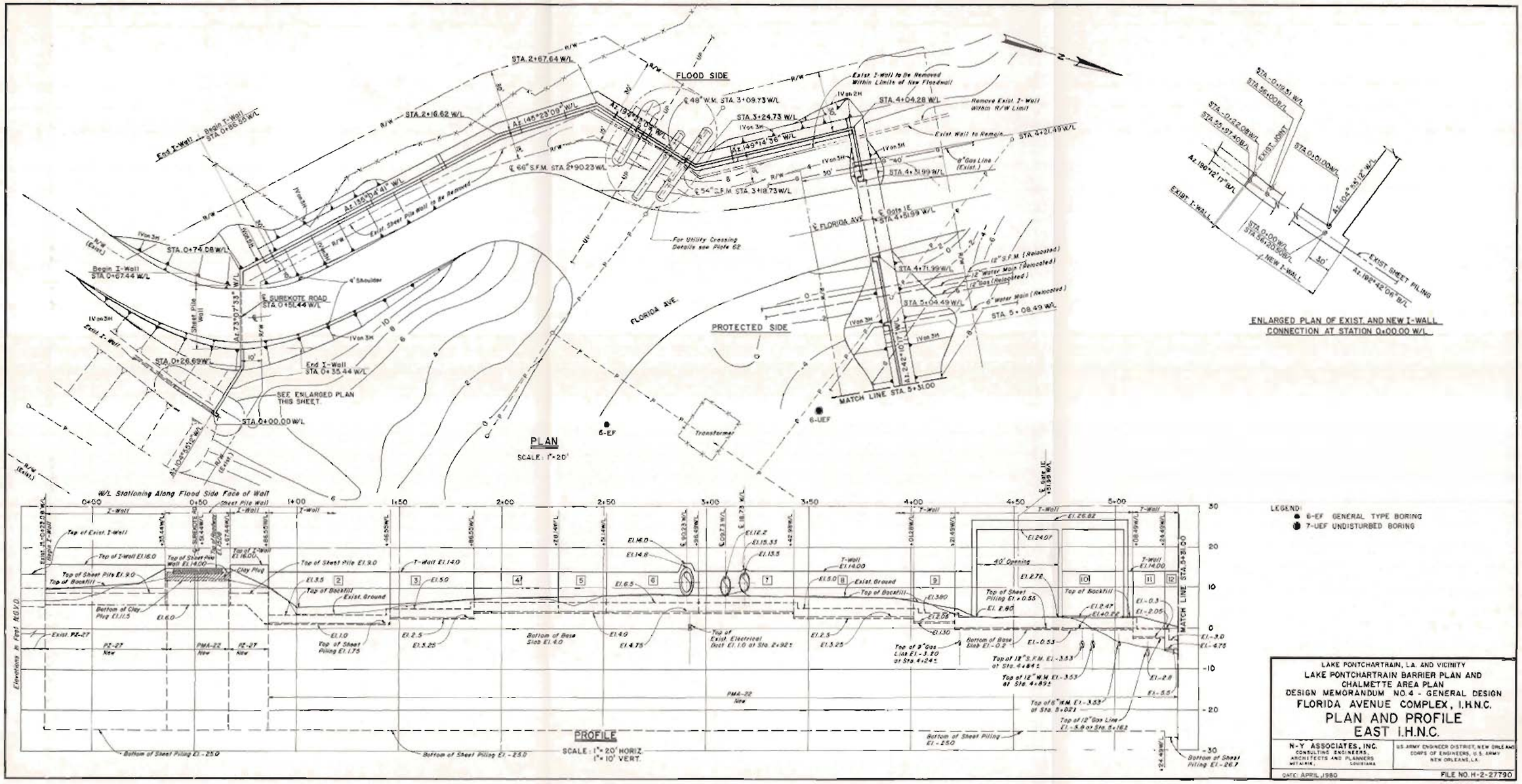
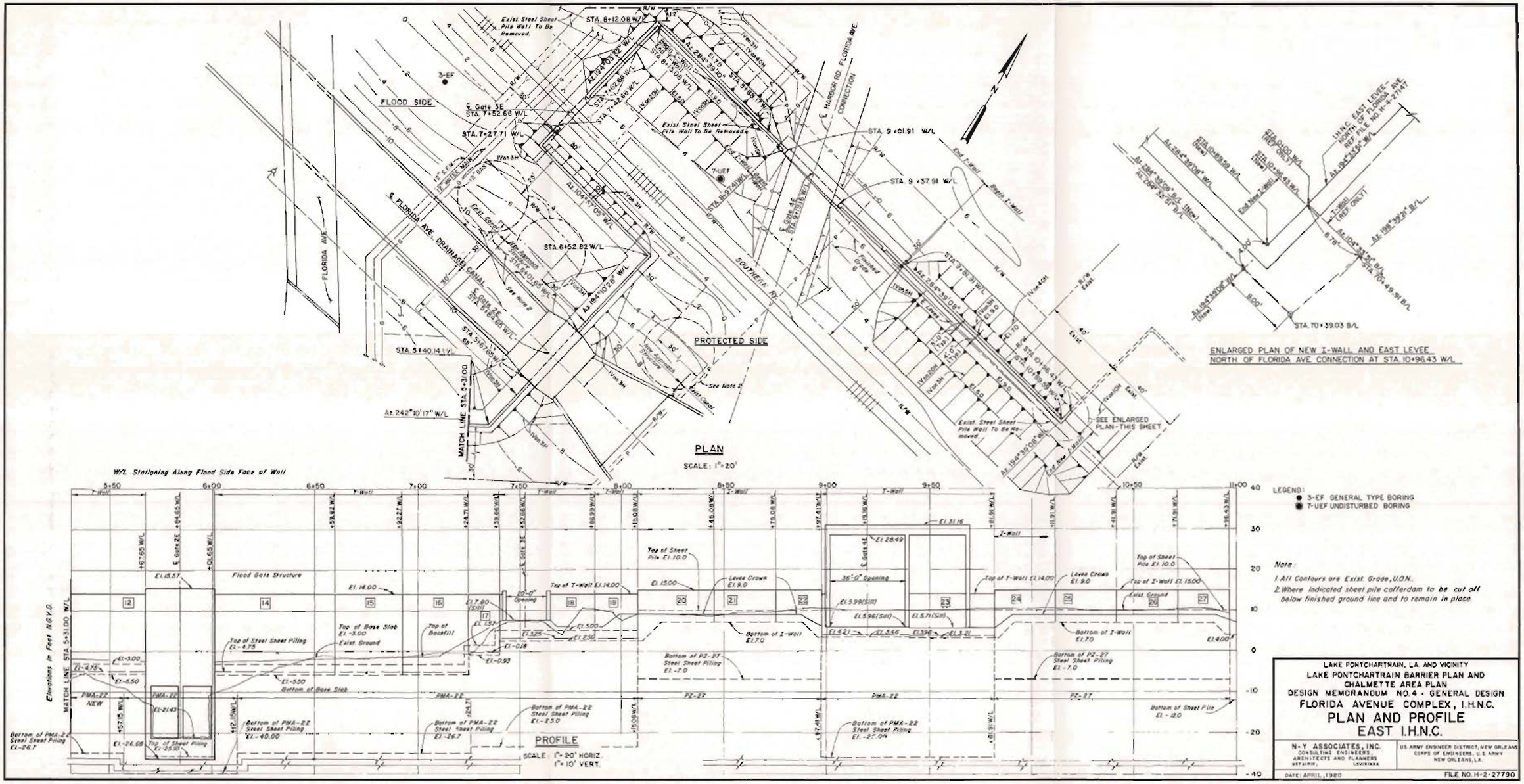

FLOOD SIDE
PROTECTED SIDE
FLORIDA AVE
PLAN
SCALE: 1"=20'
PROFILE
SCALE: 1"= 20' HORIZ.
1"= 10' VERT.
W/L Stationing Along Flood Side Face of Wall
ENLARGED PLAN OF EXIST. AND NEW T-WALL CONNECTION AT STATION 0+00.00 W/L
LEGEND
6-EF GENERAL TYPE BORING
7-UEF UNDISTURBED BORING
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PLAN AND PROFILE
EAST I.H.N.C.
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.
DATE: APRIL 1980
FILE NO. H-2-27790

PLATE 43



LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

PLAN AND PROFILE EAST I.H.N.C.

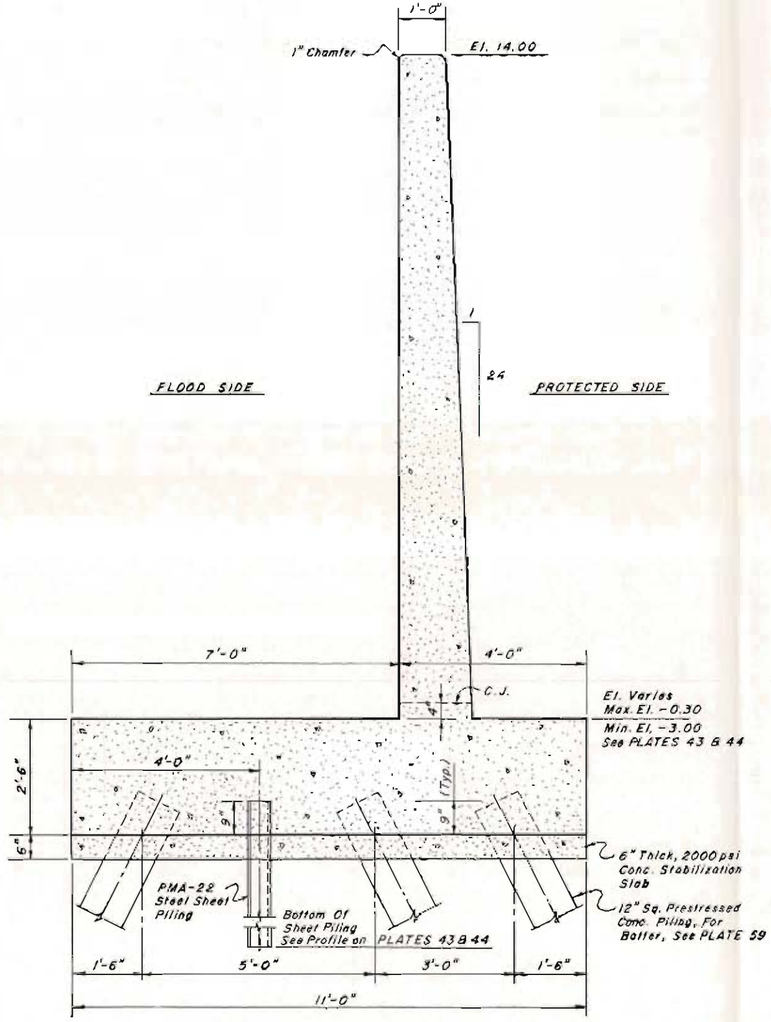
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

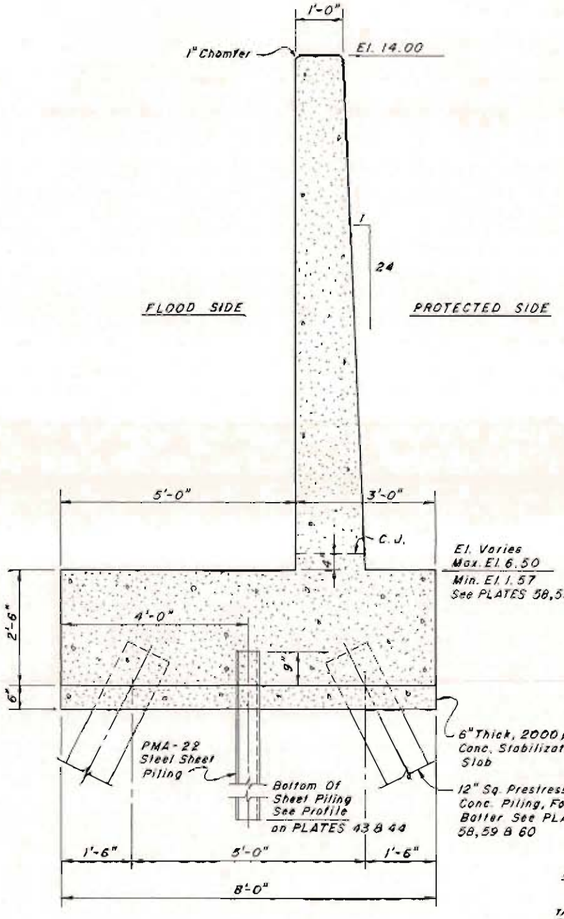
PLATE 44



"T" WALL SECTION - EAST SIDE

SCALE: 3/4" = 1'-0"

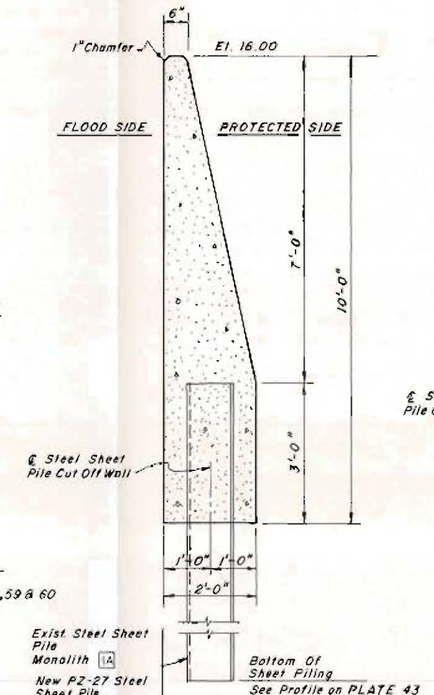
MONOLITHS: 11 12 14 15 & 16



"T" WALL SECTION- EAST SIDE

SCALE: 3/4" = 1'-0"

MONOLITHS: 2 3 4 5 6 7 8 9 17 & 19

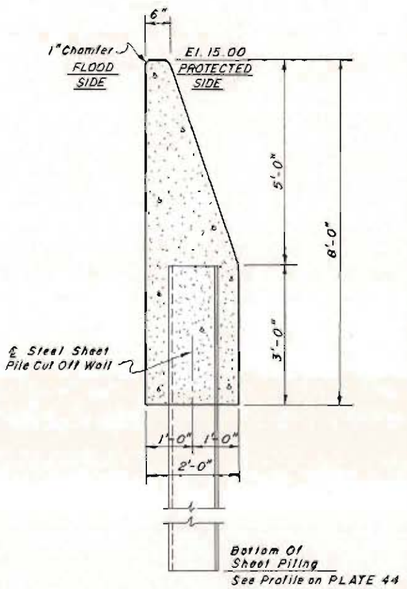


TYPICAL "I" WALL SECTION

EAST SIDE

SCALE: 3/4" = 1'-0"

MONOLITHS: 1A 1B & 1C

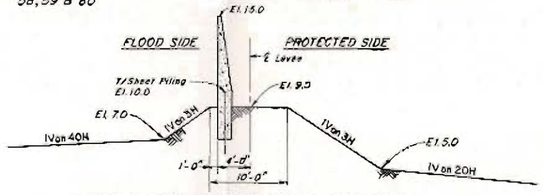


TYPICAL "I" WALL SECTION

EAST SIDE

SCALE: 3/4" = 1'-0"

MONOLITHS: 20 21 22 24 25 26 & 27



TYPICAL "I" WALL SECTION EAST SIDE

SCALE: 1/8" = 1'-0" HORIZ.
1/4" = 1'-0" VERT.

MONOLITHS: 20 21 22 24 25 26 & 27

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
TYPICAL WALL SECTIONS
EAST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS,
ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

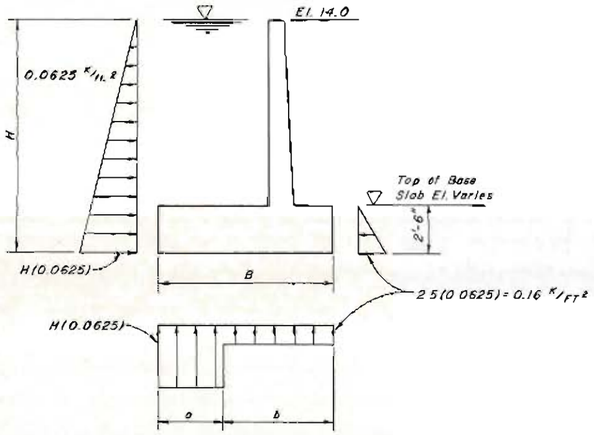
PLATE 45

LOADING CASES

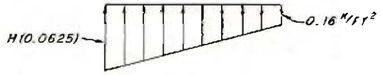
Case I – Flood Condition, Water at El 14.0 Flood Side, Top of Base Slab, Protected Side, Impervious Cutoff

Case II – Flood Condition, Water at El. 14.0 Flood Side, Top of Base Slab, Protected Side, Pervious Cutoff

CASES I & II



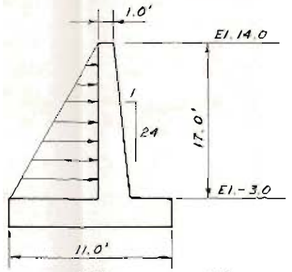
CASE I - IMPERVIOUS CUTOFF



CASE II - PERVIOUS CUTOFF

BASE WIDTH B	DIM. a	DIM. b
8'-0"	4'-0"	4'-0"
11'-0"	4'-0"	7'-0"

STEM THICKNESS ANALYSIS



$F/FT = \frac{\gamma H^2}{2} = 0.0625 \times \frac{17^2}{2} = 9.03$ K/I

$M/FT = \frac{FH}{3} = \frac{9.03 \times 17}{3} = 51.18$ K/I

$f_c = 3000$ psi $f_c = 0.35 f'c - 0.35 \times 3000 = 1050$ psi

$n = 9.2$ $K = 152$ $k = 0.326$ $j = 0.891$ $p = 0.0085$

$f_s = 20{,}000$ psi $\alpha = 1.44$ Bar Cover = 2.5"

Assume #10 vertical tension bars & #6 vertical compression bars

$d = (12 + \frac{17}{2}) - 2.5 - 0.64 = 17.36$"

$\frac{20{,}000}{9.2} + 1050 = 3224$ psi

$\frac{Kd}{17.36} = \frac{1050}{3224}$ ∴ $Kd = 5.65$"

$jd = \frac{5.65}{3} - 17.36 = 15.48$"

$C_1 = T_1 = \frac{1050}{2} \times 12 \times 5.65 = 35{,}780$ lbs.

$As_1 = \frac{35{,}780}{20{,}000} = 1.79$ in.²/ft.

$M_1 = 35{,}780 \times \frac{15.48}{12{,}000} = 46.16$ IK

COMPRESSION STEEL

$d' = 2.5 + 0.38$ (#6) $= 2.88$"

$M_2 = 51.18 - 46.16 = 5.02$ IK

$As_2 = \frac{5.02 \times 12{,}000}{20{,}000\,(17.36 - 2.88)} = 0.21$ in.²/ft.

$As_{TENSION} = 0.21 + 1.79 = 2.0$ in.²/ft.

$(9.2 - 1.0)(A's)(5.65 - 2.88)$
$= 9.2 \times 0.21 \times (17.36 - 5.65)$

$A's_{COMP.} = 1.0$ in.²/ft.

SHEAR

$v = \frac{9030}{12 \times 17.36} = 43$ psi < 60 psi

NOTES:

1. – Denotes tension (Loads in kips)
   + Denotes compression (Loads in kips)
2. Group A – Tension
   Group B – Compression Piles
3. All "T" Wall Monolith Piles are 12" square prestressed concrete piles. The pile length used in calculations was 70 feet. Final pile lengths may have to be increased to obtain required allowable soil capacity.
4. Allowable transverse load calculated for maximum axial load, not allowable axial load.
5. The Critical Pile Loads for the gates are tabulated on the following Plates;

   Gate 1E — Plate 48
   Gate 2E — Plate 52
   Gate 3E — Plate 56
   Gate 4E — Plate 57

CRITICAL PILE LOADS

MONOLITH	GROUP	MAX. PILE LOAD P	MAX. PILE LOAD Q	CASE NO. P	CASE NO. Q	ALLOW. PILE LOAD P	ALLOW. PILE LOAD Q	% ALLOW. P	% ALLOW. Q
2	A	-24.7	-0.8	I	II	-40.0	3.49	61.8	22.9
	B	62.4	0.7	I	II	80.0	1.21	78.0	57.9
3	A	-15.0	-1.9	I	II	-40.0	3.49	37.5	54.4
	B	51.7	1.9	I	II	80.0	2.43 ▷*	64.6	78.2
4	A	-38.9	1.5	I	II	-40.0	3.49	97.2	43.0
	B	61.2	-1.4 ▷	I	II	80.0	2.03 ▷*	76.5	69.0
5	A	-7.1	-2.4	I	II	-40.0	3.49	17.8	68.8
	B	37.2	2.4	I	II	80.0	3.12 ▷*	46.5	76.9
6	A	-38.8	-0.7	II	II	-40.0	3.49	97.0	20.1
	B	56.3	0.7	II	II	80.0	1.21	70.4	57.9
7	A	-19.0	0.5	II	II	-40.0	3.49	47.5	14.3
	B	50.1	0.5	II	II	80.0	1.21	62.6	41.3
8	A	-17.4	-2.1	I	II	-40.0	3.49	43.5	60.2
	B	65.3	2.0	II	II	80.0	1.84 ▷*	81.6	108.7 ▷
9	A	-38.1	1.3	II	II	-40.0	3.49	95.1	37.2
	B	50.9	1.2	II	II	80.0	1.21	63.6	99.2
11	A	-31.9	-0.4	II	II	-40.0	3.49	79.8	11.5
	B	51.8	0.4	I	II	80.0	1.21	64.8	32.2
12 ▷	A	-45.5	0.8	II	II	-61.0 ◁	3.49	74.6	22.9
	B	74.3	0.7	I	II	80.0	1.21	92.9	57.9
14 ▷	A	-48.9	-1.0	II	II	-61.0 ◁	3.11 ▷	80.2	32.2
	B	59.1	1.3	II	II	80.0	2.11 ▷	73.9	61.6
15 ▷	A	-46.9	-0.9	II	II	-61.0 ◁	3.19 ▷*	76.9	28.2
	B	60.7	0.9	II	II	80.0	1.21	75.9	74.4
16 ▷	A	-45.6	-1.2	II	II	-61.0 ◁	3.25 ▷*	74.8	36.9
	B	79.7	1.1	II	II	80.0	1.21	99.6	90.9
17	A	-36.0	1.8	I	II	-40.0	3.49	90.0	51.5
	B	67.2	-1.7	II	II	80.0	1.76 ▷*	84.0	96.6
19	A	-28.1	0.6	I	I	-40.0	3.49	40.1	17.2
	B	65.1	0.7	I	II	80.0	1.21	81.4	57.9

▷ ° ALLOW. CORRESPONDING TO $P_{MAX.}$

▷ NOT GREATEST SHEAR – BUT MOST CRITICAL.

▷ EXCEEDS 100%

◁ SOIL CAPACITY OF PILE

▷ PILE INTERACTION

Determine P allow in tension corresponding to a Q of 1,100 lbs. (Monolith 15), see PLATE 6 for interaction calculations.

$0.006944\,(P\text{allow}) + 0.1611\,(1{,}100) = 840$

$\therefore$ P allow = 95,448 LB. = 95.4 K

THE SOIL CAPACITY OF THE PILE IS 61.0 K

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
T-WALL PILE ANALYSIS
EAST I.H.N.C.

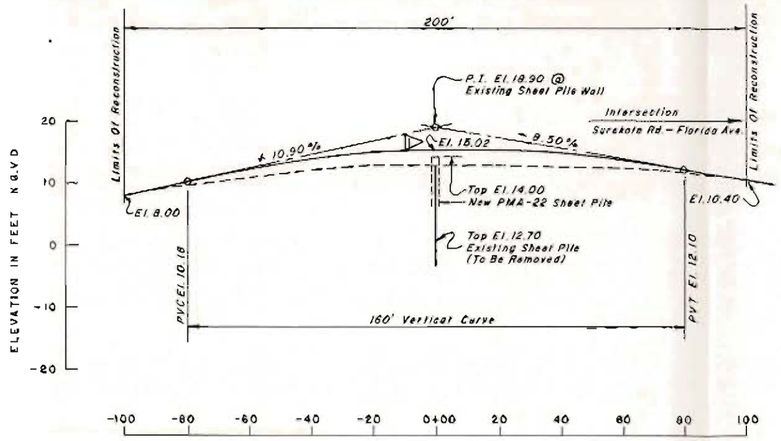
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

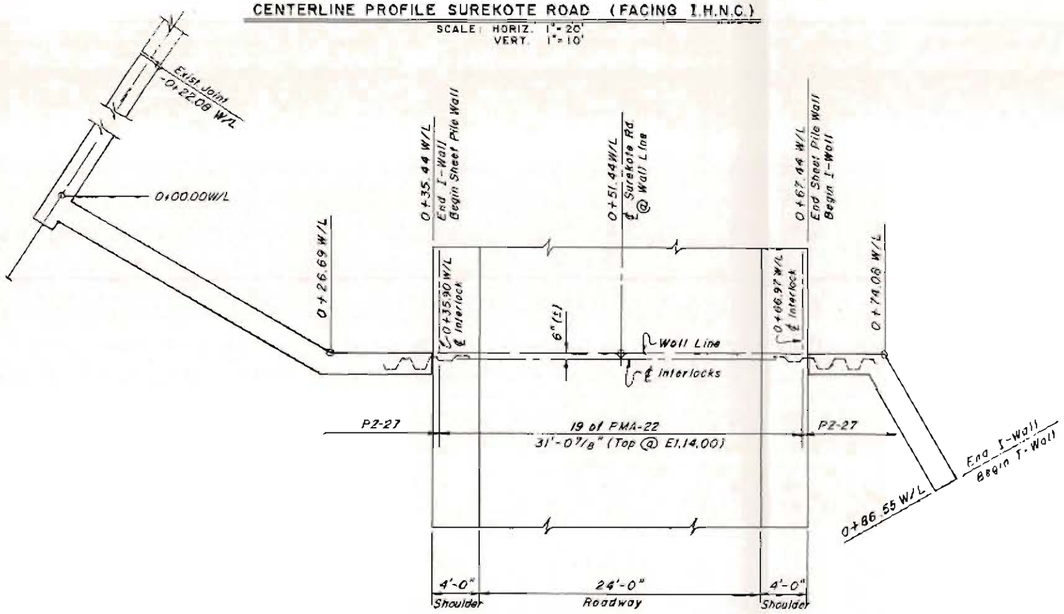
FILE NO. H-2-27790

PLATE 46



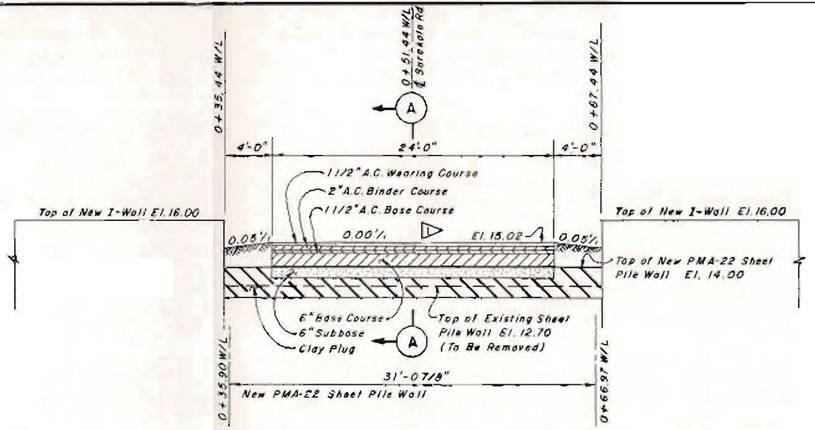
CENTERLINE PROFILE SUREKOTE ROAD (FACING I.H.N.C.)

SCALE: HORIZ. 1"=20'
VERT. 1"=10'



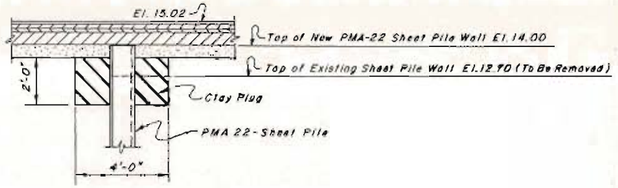
PLAN VIEW AT SUREKOTE ROAD

SCALE: 3/16"=1'-0"



SECTION THRU SUREKOTE ROAD AT NEW FLOODWALL

SCALE: HORIZ. 3/16"=1'-0"
VERT. 3/8"=1'-0"



SECTION A

SCALE: 3/8"=1'-0"

1 Based on settlement readings taken within the last ten years, it is expected that Surekote Road will settle several feet, at the flood protection crossing, over an extended period of time. Phased construction of the roadway section is proposed as a practical alternate to construction of the roadway to an elevation several feet higher than shown on this drawing.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

SUREKOTE ROAD RAMP & ROADWAY - EAST I.H.N.C.

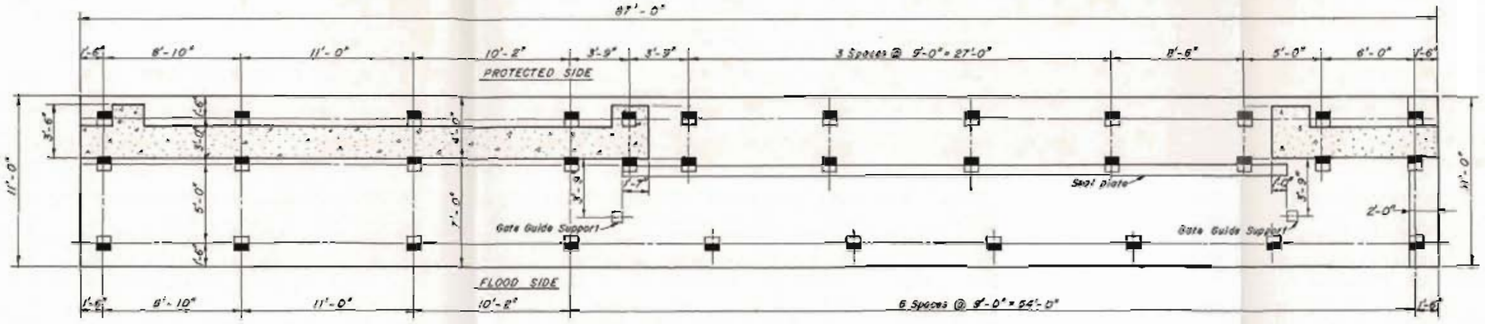
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL 1960

FILE NO. H-2-27790

PLATE 47

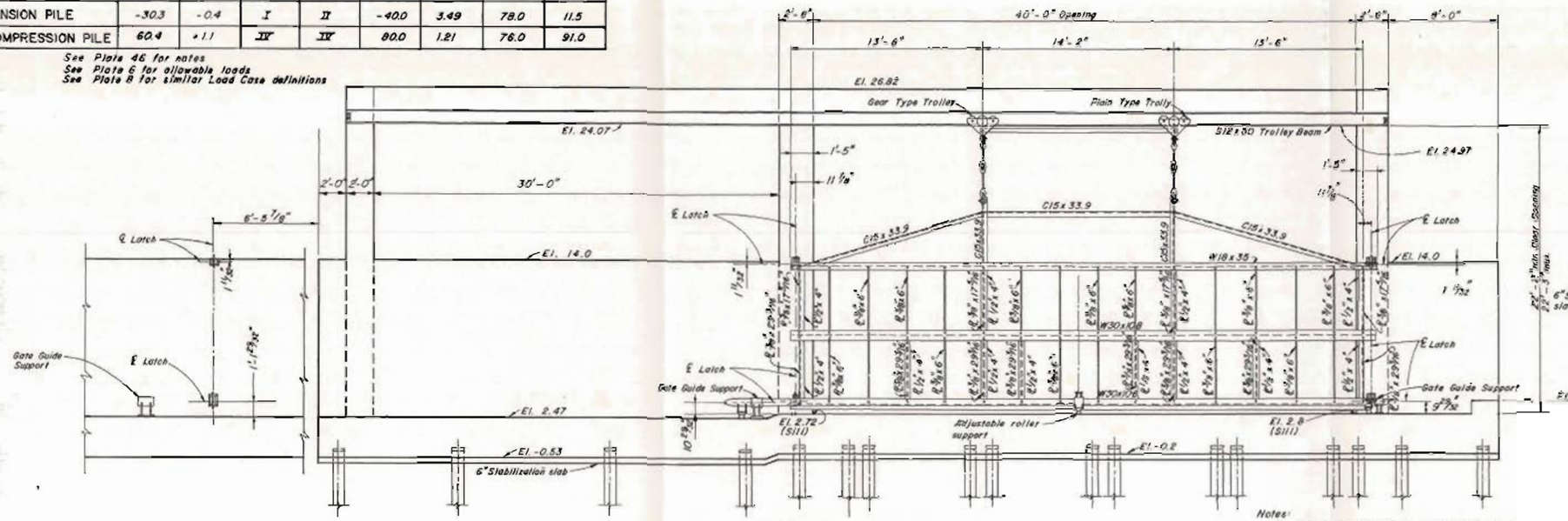


PLAN AT EL. 3.0

CRITICAL PILE LOADS

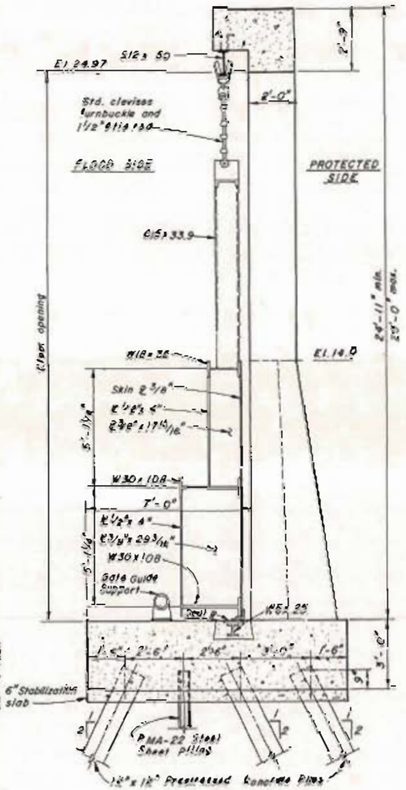
GROUP	MAX PILE LOAD		CASE NO.		ALLOW. PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
TENSION PILE	-30.3	-0.4	I	II	-40.0	3.49	78.0	11.5
COMPRESSION PILE	60.4	+1.1	III	IV	80.0	1.21	76.0	91.0

See Plate 46 for notes
See Plate 6 for allowable loads
See Plate 8 for similar Load Case definitions



FLOOD SIDE ELEVATION
SCALE: 1/4"=1'-0"

Notes:
1. All piles to be 12" sq. prestressed concrete piles
2. All piles to be batter 2V on 1H (U.N.O.)
Indicates direction of batter.



TYPICAL SECTION
SCALE: 3/8"=1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVENUE GATE NO. 1E - EAST I.H.N.C.

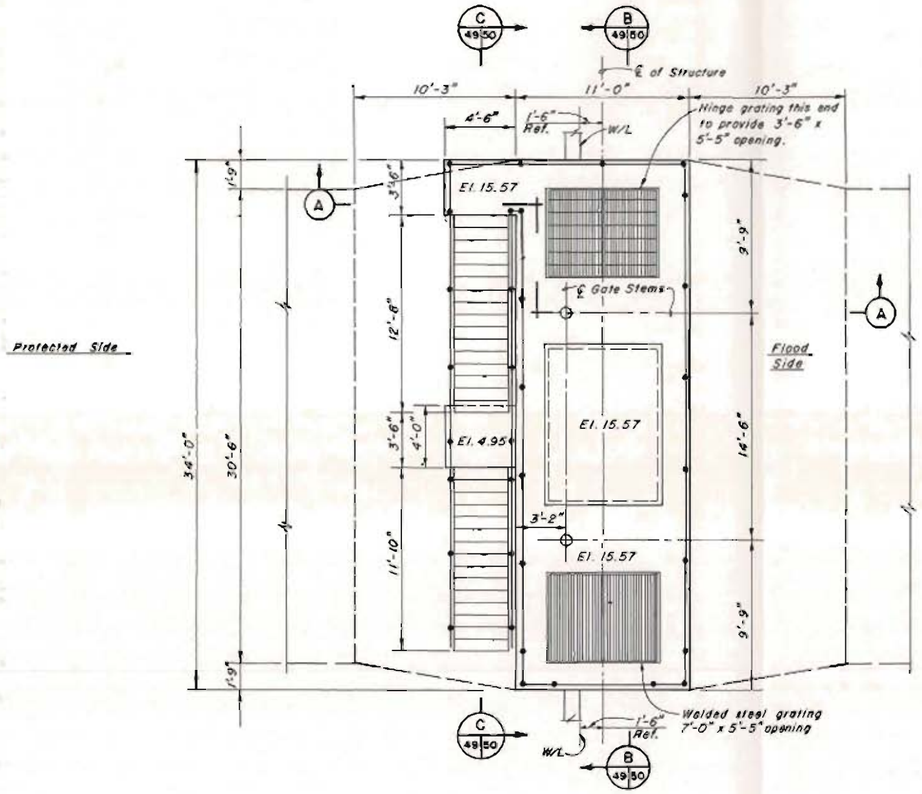
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

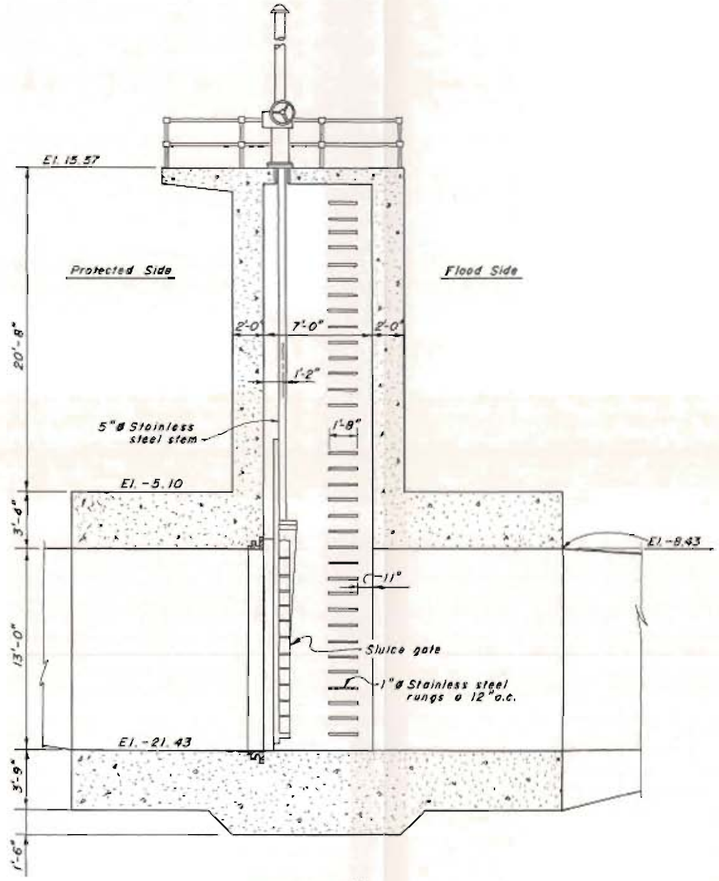
DATE: APRIL 1960

FILE NO. H. 2-27790

PLATE 48



PLAN
SCALE: 1/4"=1'-0"



SECTION (A)
SCALE: 1/4"=1'-0"

Note:
Gate detail similar to plate 16

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

FLORIDA AVENUE CANAL GATE NO. 2E - EAST I.H.N.C.

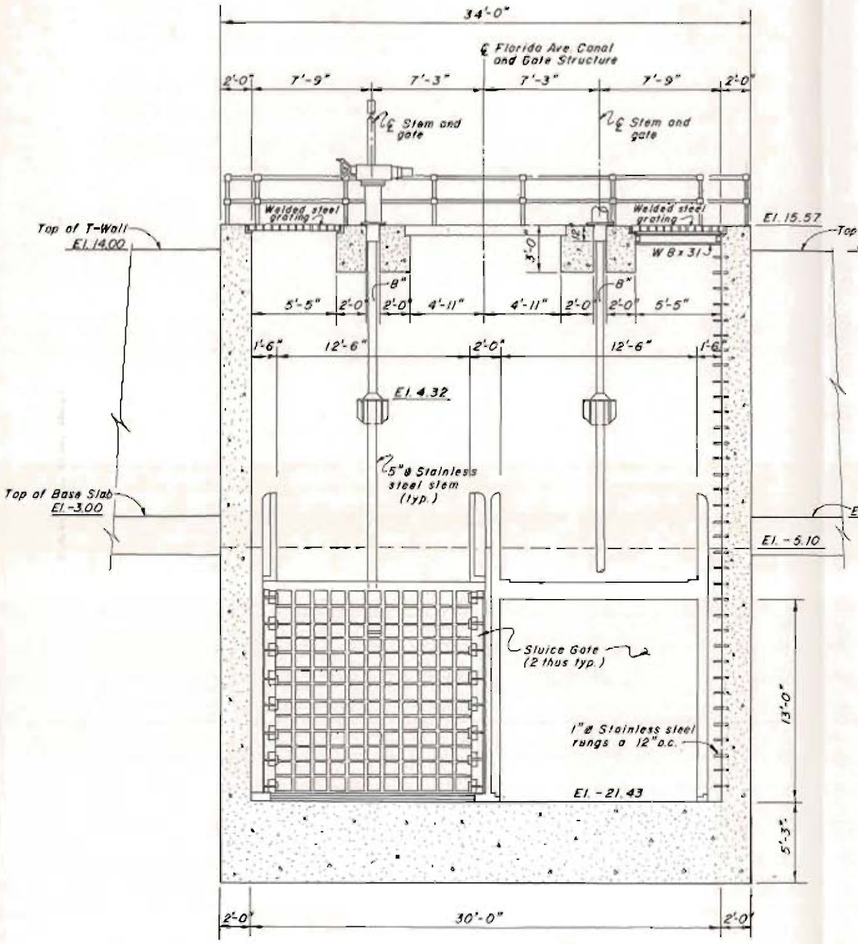
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

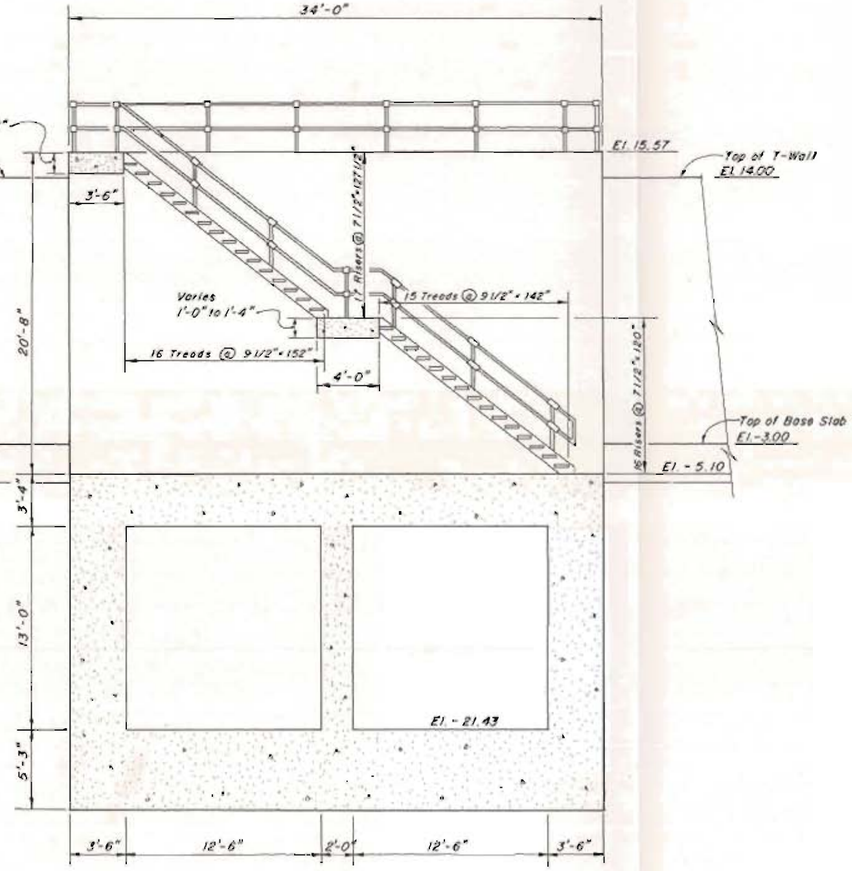
DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 49



SECTION B
SCALE: 1/4" = 1'-0" 49 50



SECTION C
SCALE: 1/4" = 1'-0" 49 50

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVENUE CANAL GATE NO. 2E - EAST I.H.N.C.

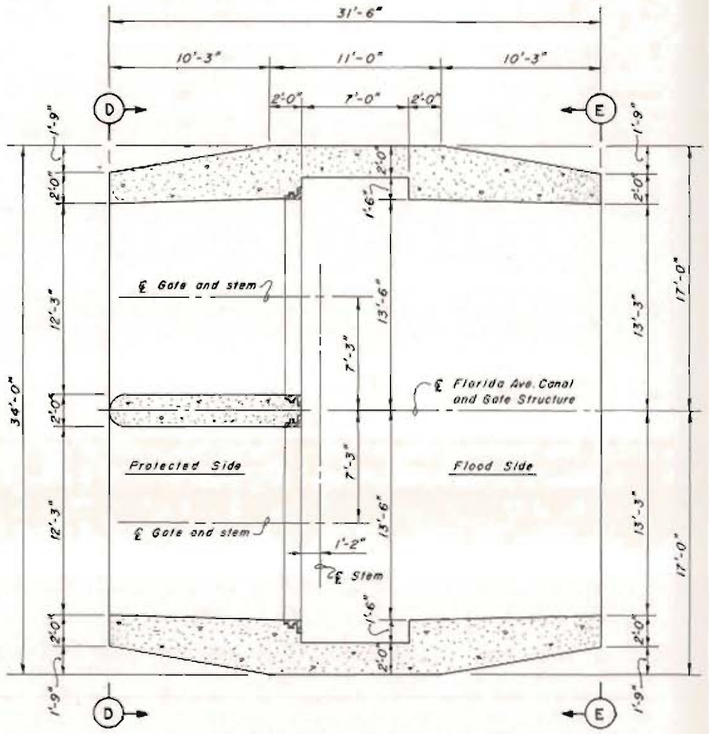
N+Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL 1980

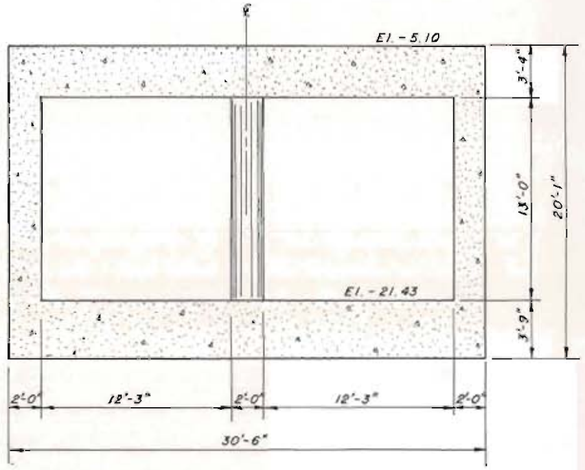
FILE NO. H-2-27790

PLATE 50



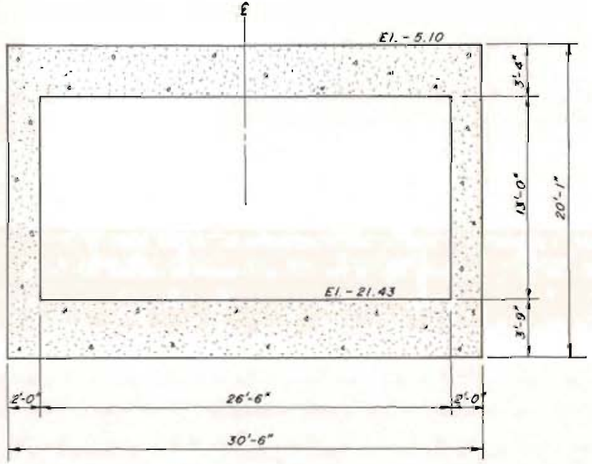
PLAN - SECTION AT ELEVATION -21.43

SCALE : 1/4" = 1'-0"



SECTION D

SCALE : 1/4" = 1'-0"



SECTION E

SCALE : 1/4" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
FLORIDA AVENUE CANAL
GATE NO. 2E - EAST I.H.N.C.

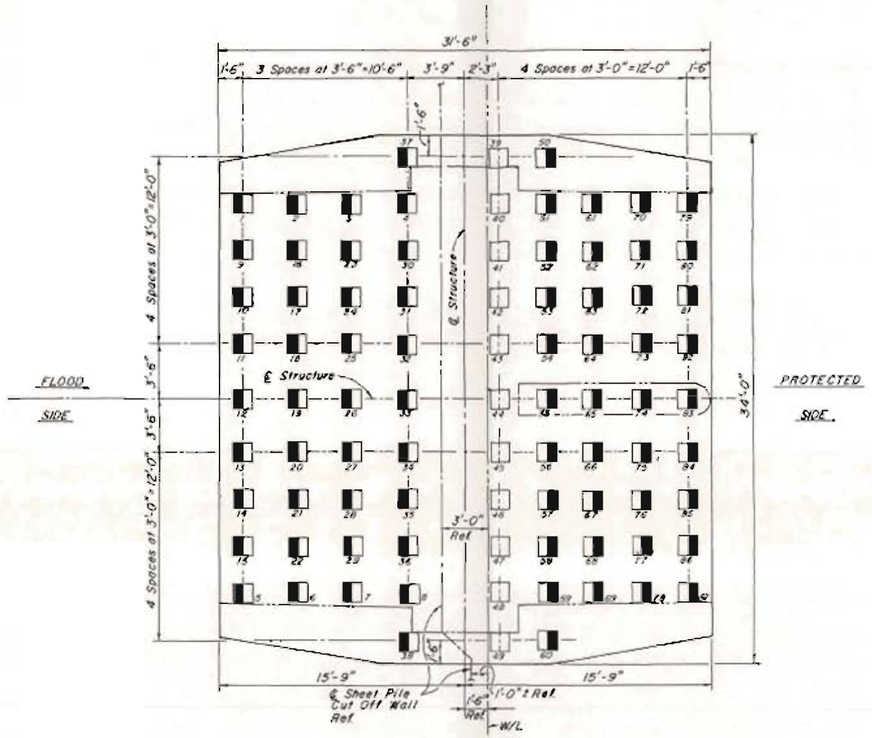
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS,
ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

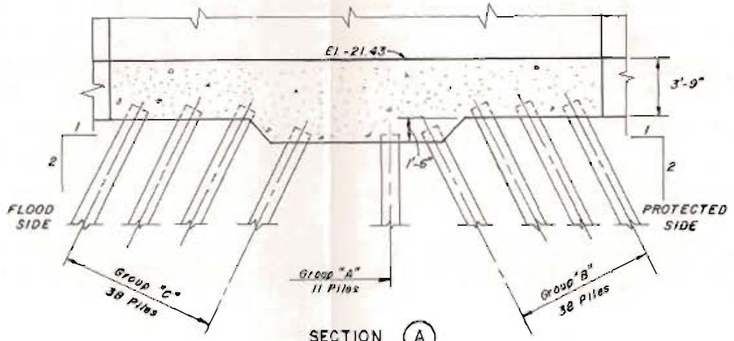
FILE NO. H-2-27790

PLATE 51



PLAN AT ELEVATION -22.0

SCALE: 1/4" = 1'-0"



SECTION (A)

SCALE: 1/4" = 1'-0"

SUMMARY OF MAXIMUM PILE LOADS

GROUP	MAX. PILE LOAD		CASE NO.		PILE NO.		ALLOW. LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q	P	Q
A	0	0.7	0	X	0	31	-50	4.35	0	16
	35.0	0	III	0	31	0	100	2.02	35	0
B	-26.1	-0.9	XI	X	5	6	-50	4.35	26.1	21
	55	0	X	0	5	0	100	2.02	55	0
C	0	0	0	0	0	0	-50	4.35	0	0
	75.3	-0.9	X	XI	50	79	100	2.02	75.3	0

Results are from computer program, K29010, "Three Dimensional Analysis of Pile Foundations" Program based on Planar Method of Pile Analysis Developed by A. Hrennikoff and extended to Three Dimensions by W.E. Saul

LEGEND

- Vertical Piles Group "A"
- Battered Piles 2V on 1h towards Protected Side Group "B"
- Battered Piles 2V on 1h towards Flood Side Group "C"

Notes:

1. All piles 14"x14" prestressed concrete

2. See Plate 23 for Gate Structure Loading Cases and Pile Design Data

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 2E - FOUNDATION PILE LAYOUT

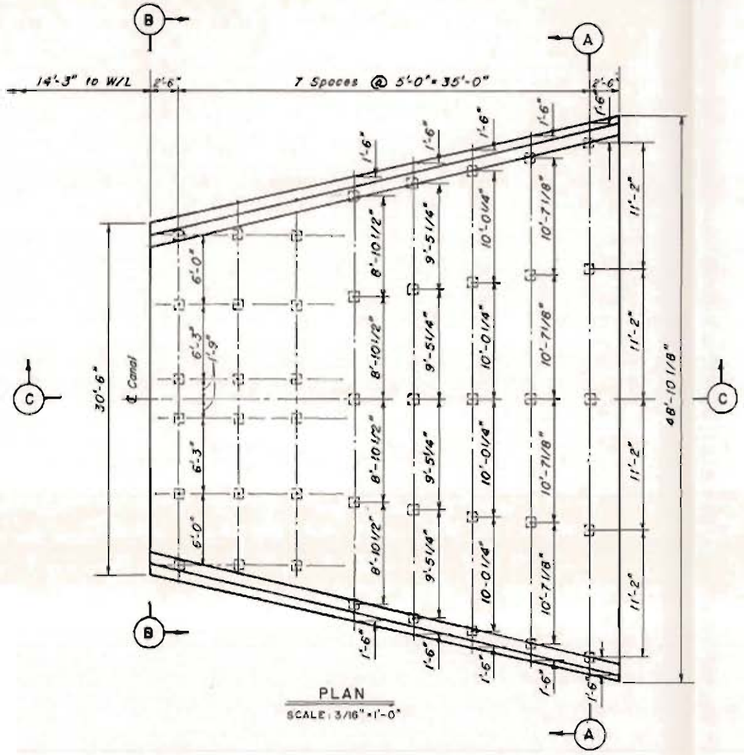
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

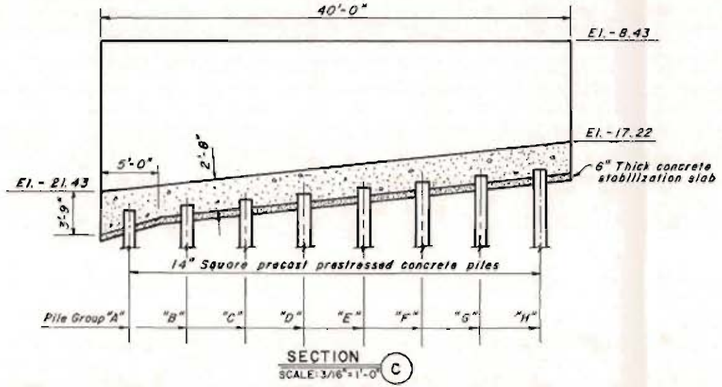
DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 52



PLAN
SCALE: 3/16" = 1'-0"



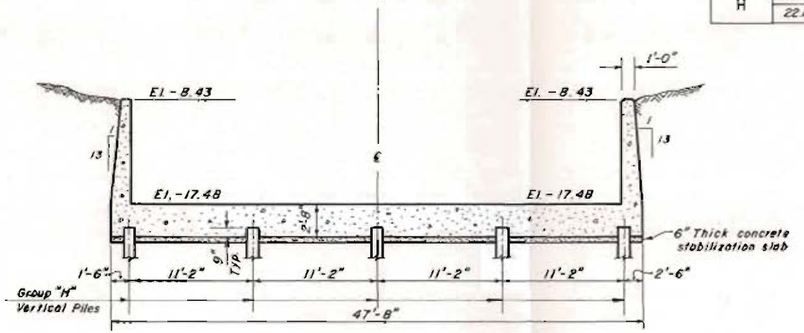
SECTION
SCALE: 3/16" = 1'-0" (C)

SUMMARY OF MAXIMUM PILE LOADS								
GROUP	MAX. PILE LOAD		CASE NO.		ALLOW. LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q
A	-1187	—	II	—	-50	—	24	—
	18.6	—	II	—	100	—	18.6	—
H	-12.14	—	II	—	-50	—	24	—
	22.8	—	II	—	100	—	22.8	—

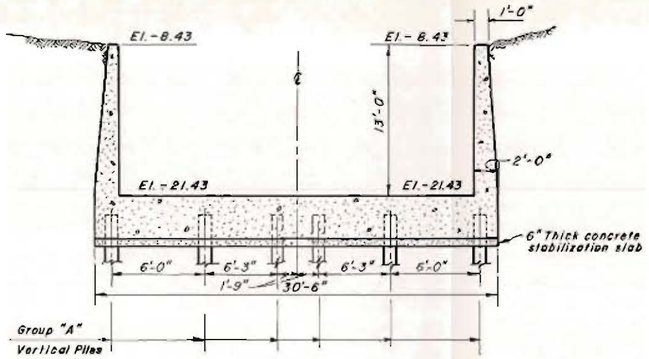
-Denotes Tension
+Denotes Compression

Results from manual calculations(Load in kips)
See Plate 23 for interaction calculations on 14" piles

LOADING CASES
Case I - Water at -3.0
Case II - Water at El. -10.7 (Top of Wall)



SECTION
SCALE: 3/16" = 1'-0" (A)



SECTION
SCALE: 3/16" = 1'-0" (B)

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 2E - APPROACH STRUCTURE - PROTECTED SIDE

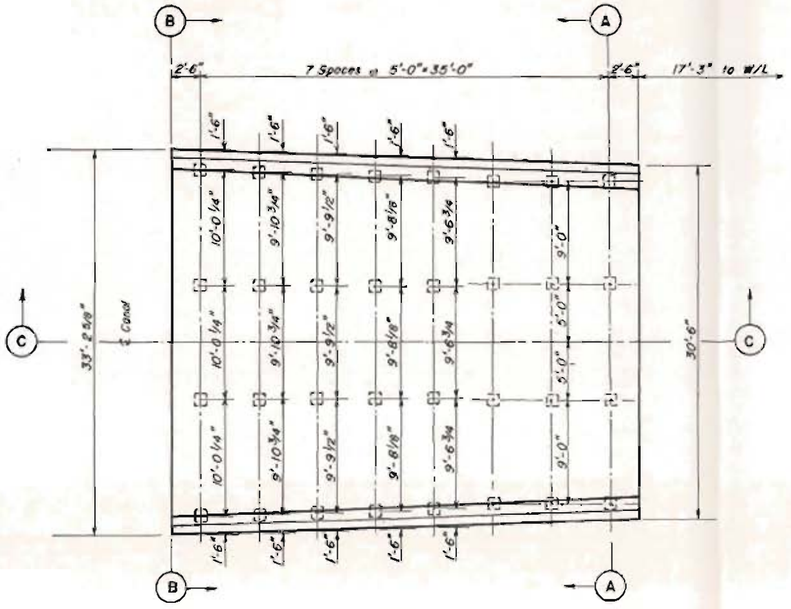
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

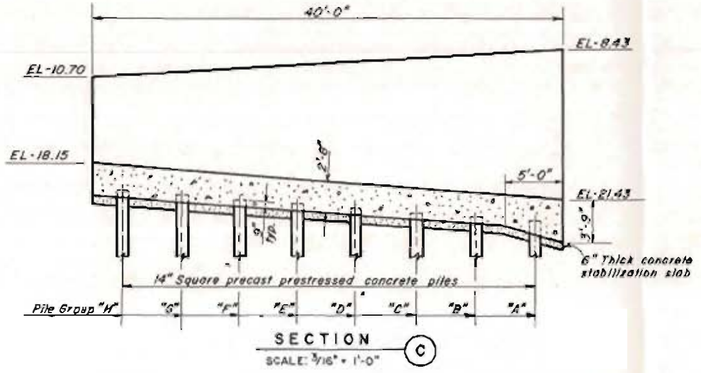
DATE: APRIL, 1980

FILE NO. H-2-27790

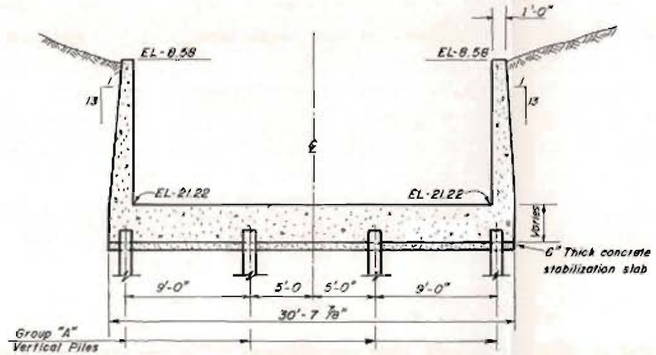
PLATE 53



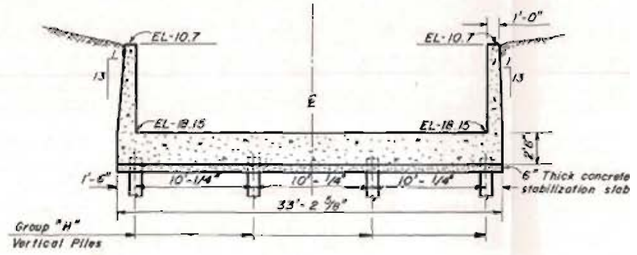
PLAN
SCALE: 3/16" = 1'-0"



SECTION
SCALE: 3/16" = 1'-0"
C



SECTION
SCALE: 3/16" = 1'-0"
A



SECTION
SCALE: 3/16" = 1'-0"
B

SUMMARY OF MAXIMUM PILE LOADS								
GROUP	MAX. PILE LOAD		CASE NO.		ALLOW. LOAD		% ALLOW.	
	P	Q	P	Q	P	Q	P	Q
A	-143	—	II	—	-50	—	29	—
	304	—	II	—	100	—	30.4	—
H	-667	—	II	—	-50	—	13	—
	2808	—	II	—	100	—	28	—

— Denotes Tension
→ Denotes Compression

Results from manual calculation (Loads in Kips)
See Plate 23 for interaction calculation on 14" piles

LOADING CASES
Case I - Water Level at El. 14.0
Case II - Water Level at El. -8.43 (Top of Wall)

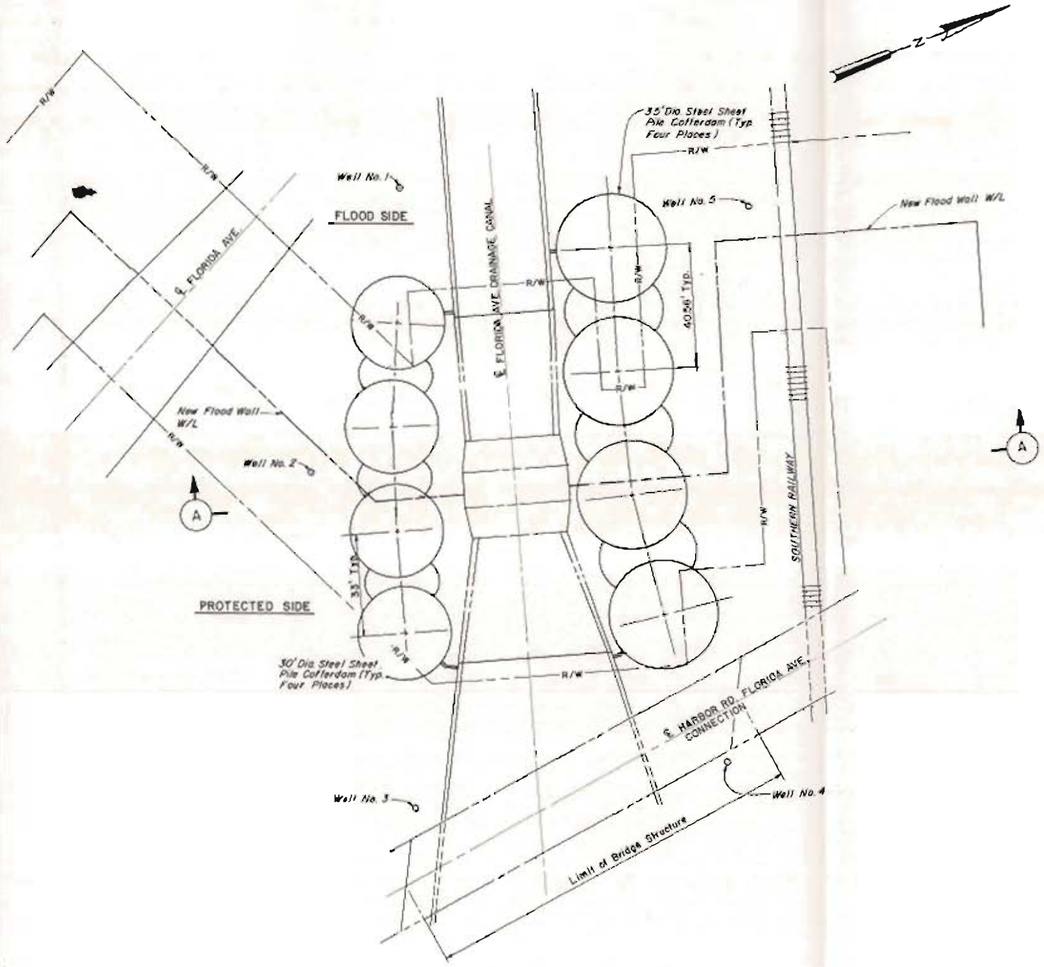
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
GATE NO. 2 E - APPROACH STRUCTURE - FLOOD SIDE

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

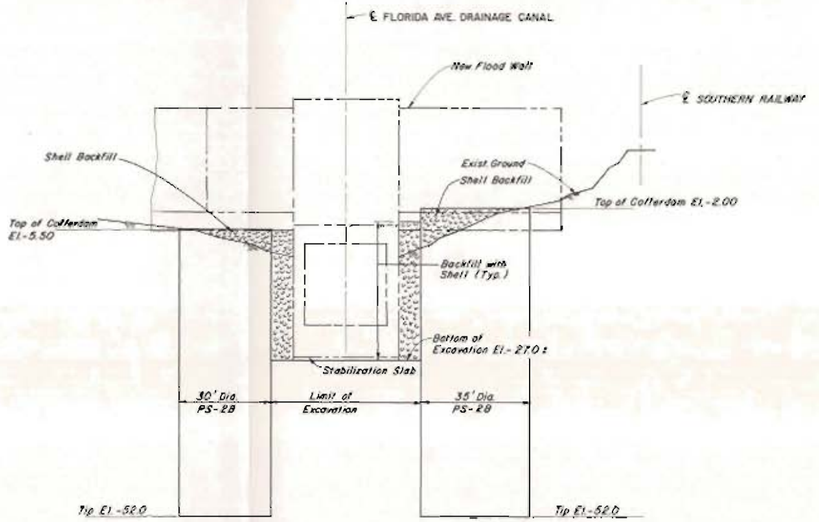
DATE: APRIL, 1980
FILE NO. H-2-27790

PLATE 54



PLAN

SCALE: 1" = 20'



SECTION (A)

SCALE: 1" = 20' HORIZ.
1" = 10' VERT.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GATE NO. 2E – EXCAVATION PLAN & COFFERDAM

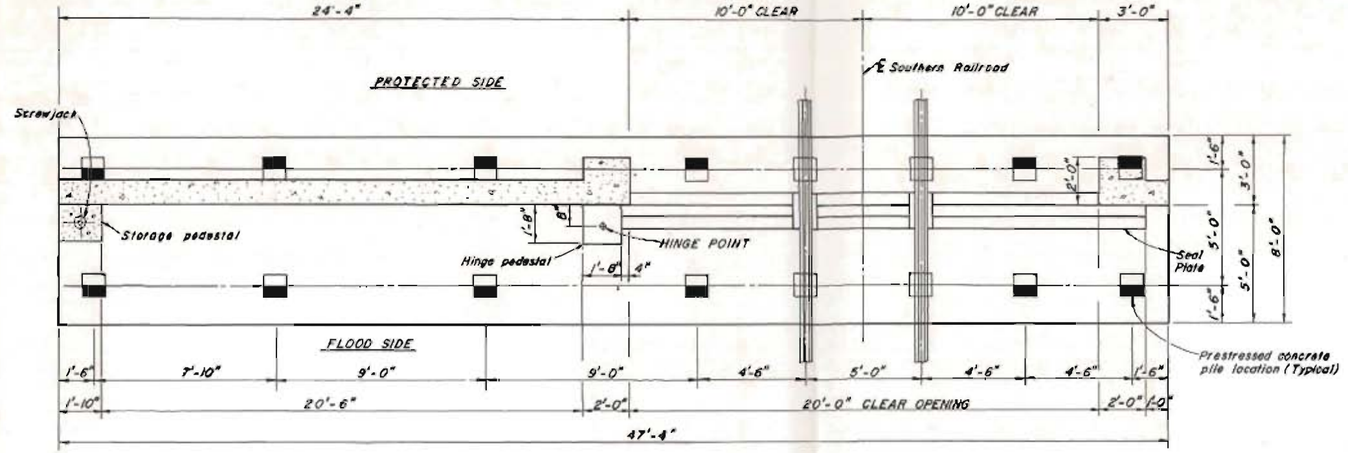
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

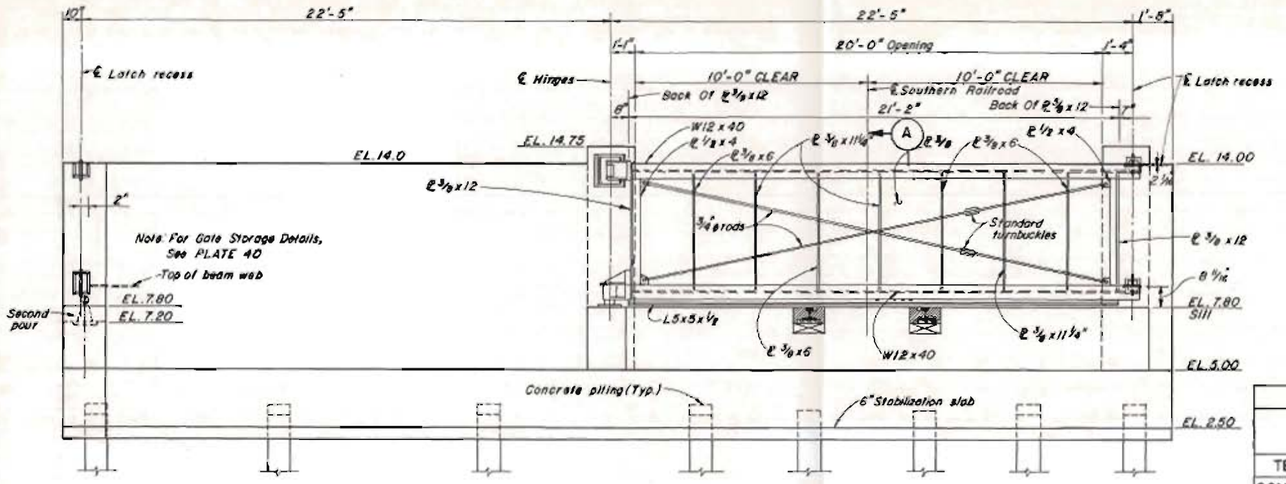
DATE: APRIL, 1960

FILE NO. H-2-27790

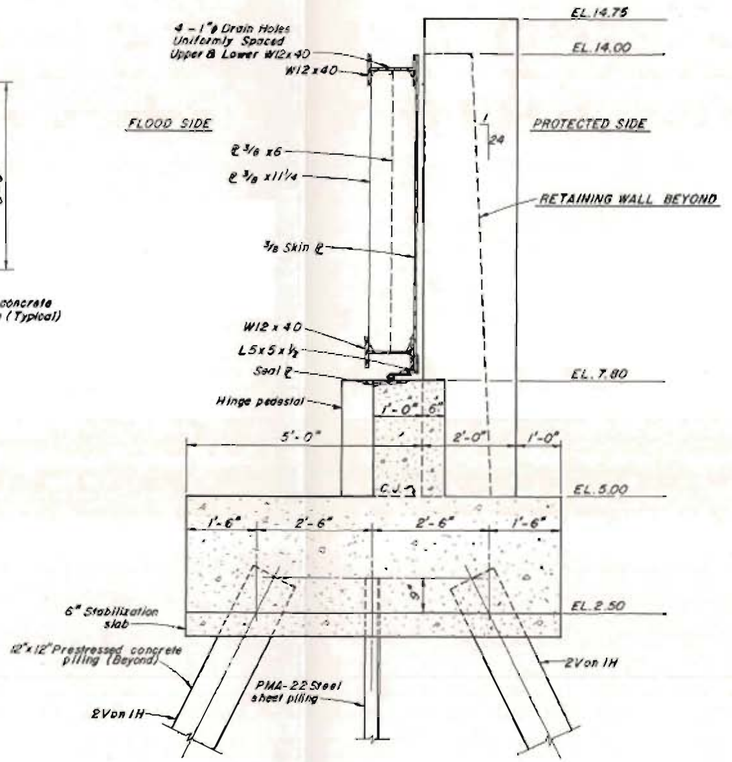
PLATE 55



PLAN AT EL. 7.80
SCALE: 3/8"=1'-0"



FLOOD SIDE ELEVATION
RAILROAD SWING GATE
SCALE: 3/8"=1'-0"



SECTION (A)
SCALE: 3/4"=1'-0"

CRITICAL PILE LOADS								
GROUP	MAX. PILE LOAD		CASE NO.		ALLOW PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
TENSION PILE	-22.4	0.5	II	III	-40.0	3.49	56.0	14.3
COMPRESSION PILE	63.7	0.4	V	III	80.00	1.21	79.6	33.1

See Plate 6 for Notes
See Plate 35 for Loading Cases definition

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
SOUTHERN RY. – GATE NO. 3E
EAST I.H.N.C.

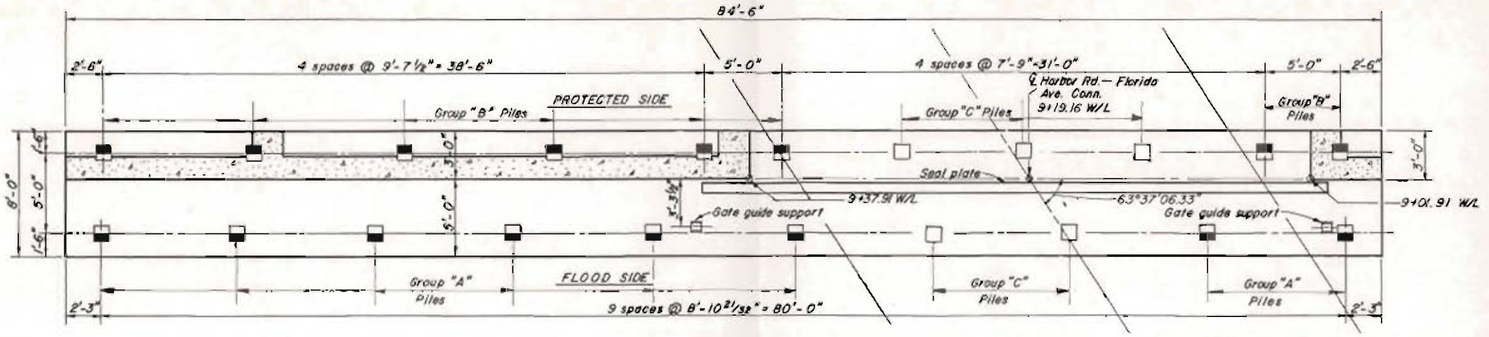
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
MIAMI, LOUISIANA

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

DATE: APRIL, 1980

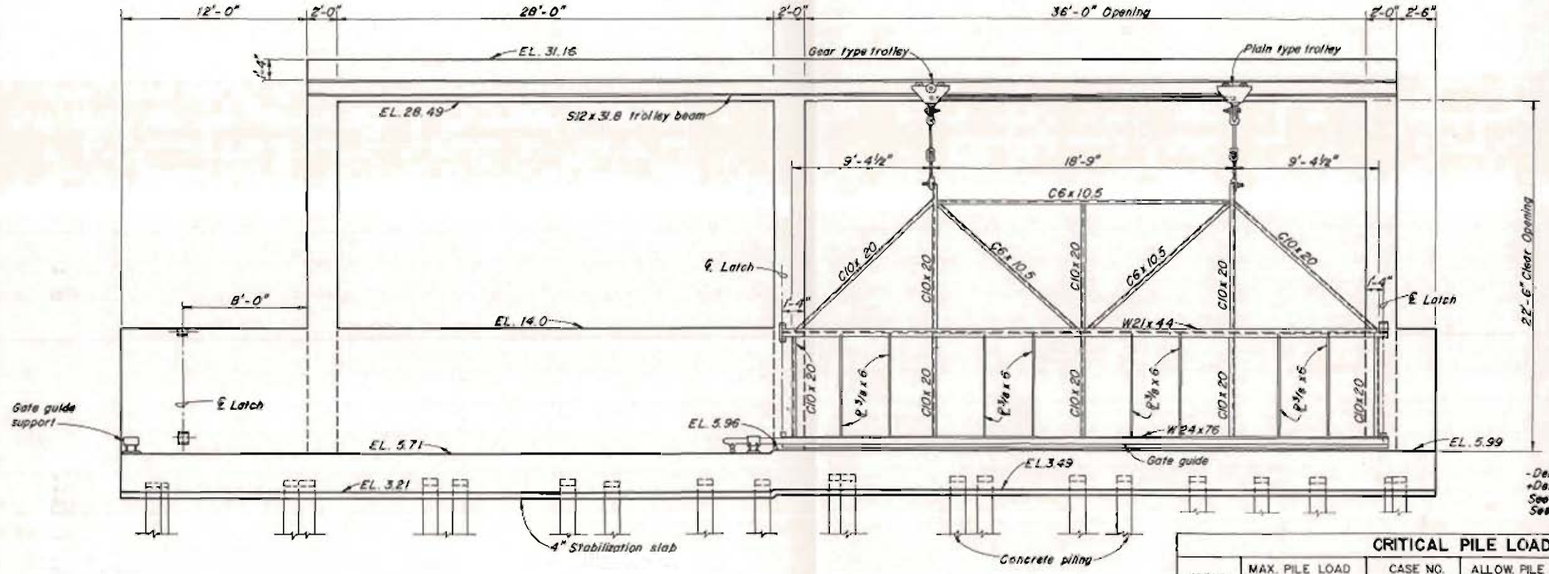
FILE NO. H-2-27790

PLATE 56



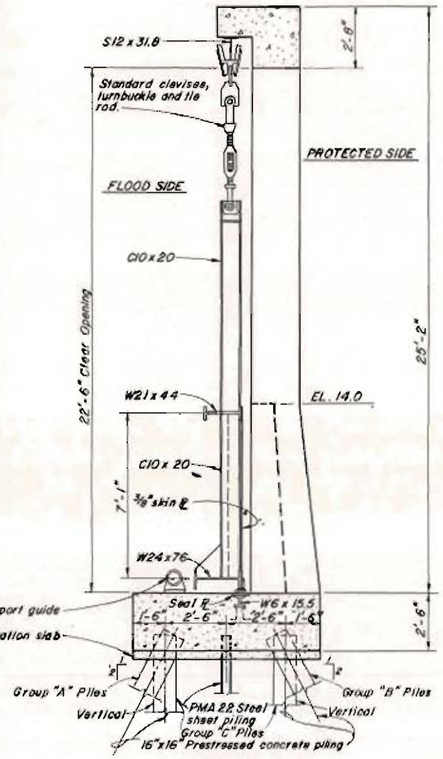
PLAN AT EL. 6.0

SCALE: 1/4"=1'-0"



FLOOD SIDE ELEVATION

SCALE: 1/4"=1'-0"



TYPICAL SECTION

SCALE: 3/16"=1'-0"

-Denotes Tension
+Denotes Compression
See Plate 6 for notes and allowable loads.
See Plate 8 for similar load conditions.

1. All piles to be 16" sq. prestressed concrete piles.
2. All piles to be batter 2V on 1H(U.N.O.)

■ Indicates direction of batter.

□ Indicates vertical piles.

CRITICAL PILE LOADS

GROUP	MAX. PILE LOAD		CASE NO.		ALLOW. PILE LOAD		%ALLOW.	
	P	Q	P	Q	P	Q	P	Q
A	-26.2	-0.5	I	II	-40	-3.49	65.5	14.3
	27.4	0.3	III	IV	80	1.21	34.2	24.7
B	—	-0.4	—	IV	-40	-3.49	0	11.4
	56.7	0.4	II	II	80	1.21	70.8	33.0
C	-13.6	-0.5	IV	II	-40	-3.49	34.0	14.3
	63.1	0.3	II	IV	80	1.21	78.8	24.7

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
HARBOR RD. ~ FLORIDA AVE. CONN. GATE NO. 4E - EAST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 57

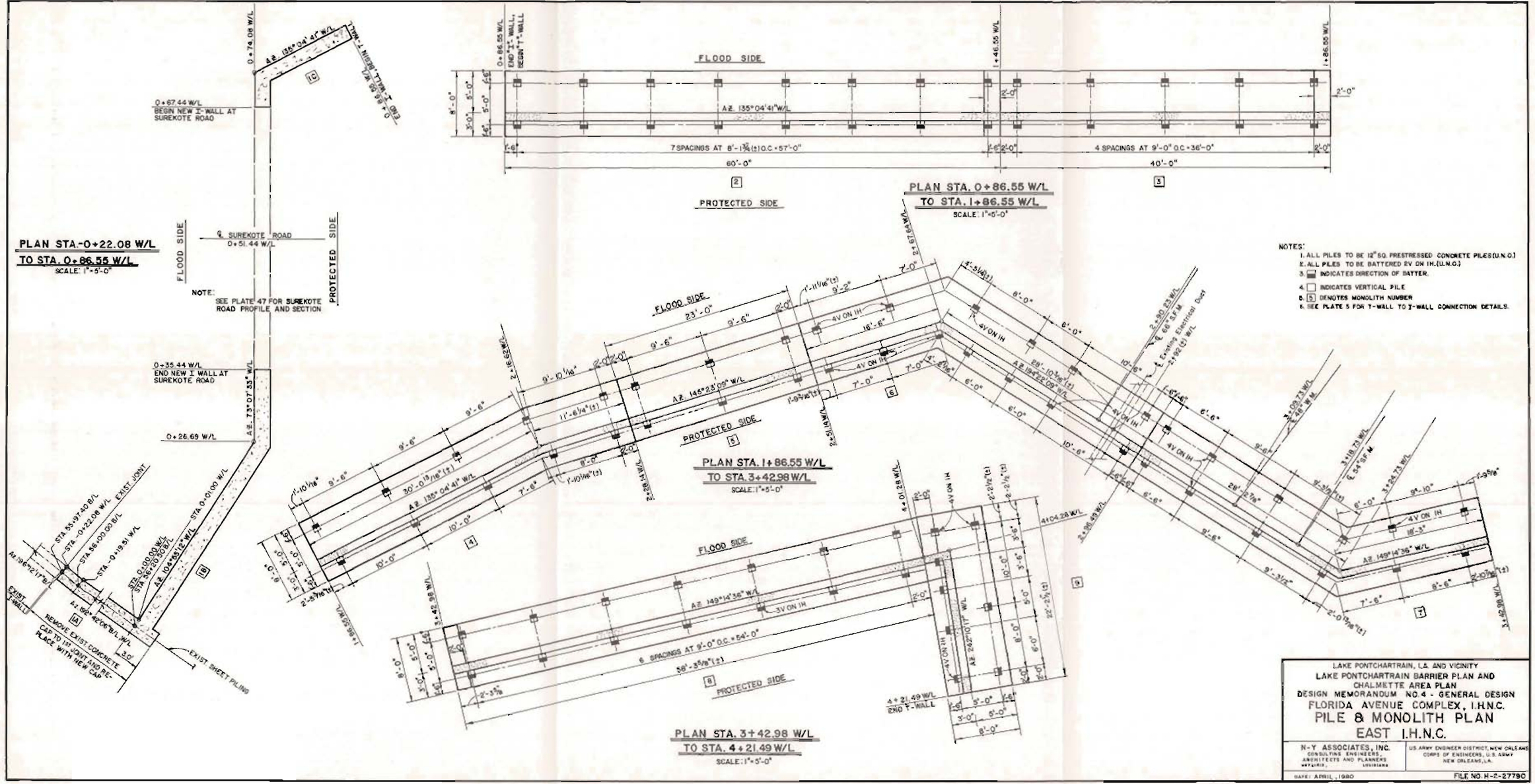

PLAN STA. -0+22.08 W/L
TO STA. 0+86.55 W/L
SCALE: 1"=5'-0"
FLOOD SIDE
PROTECTED SIDE
℄ SUREKOTE ROAD
0+51.44 W/L
NOTE:
SEE PLATE 47 FOR SUREKOTE ROAD PROFILE AND SECTION
0+74.08 W/L
Az. 135°04'41" W/L
0+67.44 W/L
BEGIN NEW I-WALL AT SUREKOTE ROAD
0+35.44 W/L
END NEW I WALL AT SUREKOTE ROAD
Az. 73°07'35" W/L
0+26.69 W/L
STA 55+97.40 B/L
STA -0+22.08 W/L
EXIST. JOINT
STA 56+00.00 B/L
STA -0+19.51 W/L
STA 0+00.00 W/L
STA 56+20.30 B/L
STA 0+01.00 W/L
Az. 104°53'12" W/L
Az. 18°12'17" B/L
EXIST T-WALL
Az. 152°42'06" B/L
W/L
REMOVE EXIST. CONCRETE CAP TO 1ST JOINT AND RE-PLACE WITH NEW CAP
EXIST. SHEET PILING
0+86.55 W/L END I-WALL, BEGIN T-WALL
1+46.55 W/L
1+86.55 W/L
FLOOD SIDE
Az. 135°04'41" W/L
7 SPACINGS AT 8'-1 3/4"(±) O.C. = 57'-0"
60'-0"
4 SPACINGS AT 9'-0" O.C. = 36'-0"
40'-0"
PROTECTED SIDE
PLAN STA. 0+86.55 W/L
TO STA. 1+86.55 W/L
SCALE: 1"=5'-0"
NOTES:
1. ALL PILES TO BE 12" SQ. PRESTRESSED CONCRETE PILES (U.N.O.)
2. ALL PILES TO BE BATTERED 2V ON 1H. (U.N.O.)
3. INDICATES DIRECTION OF BATTER.
4. INDICATES VERTICAL PILE.
5. DENOTES MONOLITH NUMBER
6. SEE PLATE 5 FOR T-WALL TO I-WALL CONNECTION DETAILS.
FLOOD SIDE
PROTECTED SIDE
Az. 145°23'09" W/L
Az. 135°04'41" W/L
4V ON 1H
PLAN STA. 1+86.55 W/L
TO STA. 3+42.98 W/L
SCALE: 1"=5'-0"
Az. 194°23'09" W/L
Existing Electrical Duct
Az. 149°14'36" W/L
3V ON 1H
6 SPACINGS AT 9'-0" O.C. = 54'-0"
PROTECTED SIDE
PLAN STA. 3+42.98 W/L
TO STA. 4+21.49 W/L
SCALE: 1"=5'-0"
END T-WALL
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE & MONOLITH PLAN
EAST I.H.N.C.
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA
US ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.
DATE: APRIL, 1980
FILE NO. H-2-27790

PLATE 58

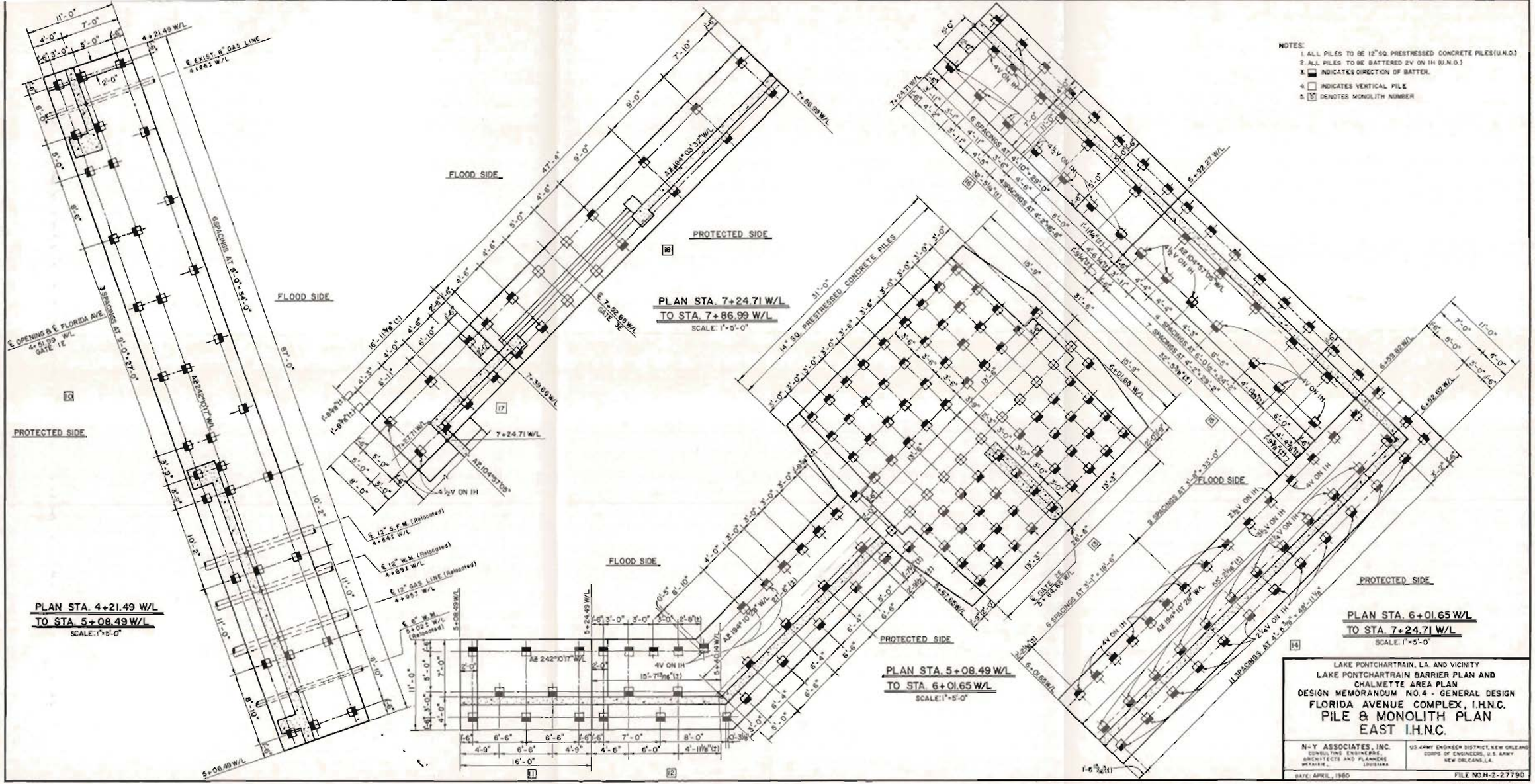
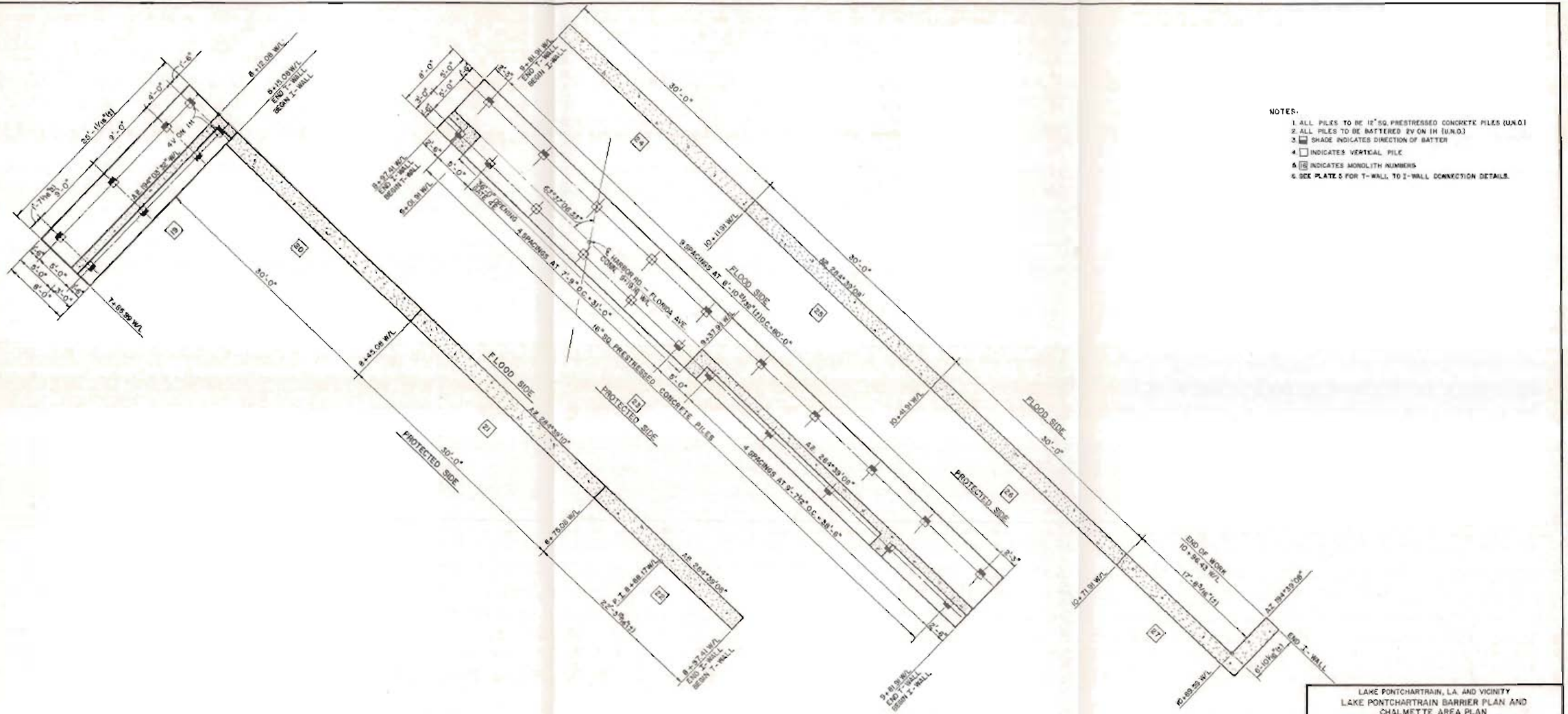

NOTES:
1. ALL PILES TO BE 12" SQ. PRESTRESSED CONCRETE PILES (U.N.O.)
2. ALL PILES TO BE BATTERED 2V ON 1H (U.N.O.)
3. INDICATES DIRECTION OF BATTER.
4. INDICATES VERTICAL PILE
5. DENOTES MONOLITH NUMBER
PLAN STA. 4+21.49 W/L
TO STA. 5+08.49 W/L
SCALE: 1"=5'-0"
PLAN STA. 5+08.49 W/L
TO STA. 6+01.65 W/L
SCALE: 1"=5'-0"
PLAN STA. 6+01.65 W/L
TO STA. 7+24.71 W/L
SCALE: 1"=5'-0"
PLAN STA. 7+24.71 W/L
TO STA. 7+86.99 W/L
SCALE: 1"=5'-0"
FLOOD SIDE
PROTECTED SIDE
℄ EXIST. 8" GAS LINE
℄ OPENING @ ℄ FLORIDA AVE.
℄ 12" S.F.M. (Relocated)
℄ 12" W.M. (Relocated)
℄ 12" GAS LINE (Relocated)
℄ GATE 2E
℄ GATE 1E
14 SPACINGS AT 5'-0" = 70'-0"
6 SPACINGS AT 6'-0" = 36'-0"
3 SPACINGS AT 9'-0" = 27'-0"
7 SPACINGS AT 4'-2" = 29'-2"
4 SPACINGS AT 4'-3" = 17'-0"
4 SPACINGS AT 4'-6" = 18'-0"
9 SPACINGS AT 5'-3" = 47'-3"
11 SPACINGS AT 4'-5 5/8" = 48'-11 1/4"
14" SQ. PRESTRESSED CONCRETE PILES
4V ON 1H
4 1/2V ON 1H
2 1/2V ON 1H
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE & MONOLITH PLAN
EAST I.H.N.C.
N+Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.
DATE: APRIL, 1980
FILE NO. N-2-27790

PLATE 59



LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE & MONOLITH PLAN
EAST I.H.N.C.

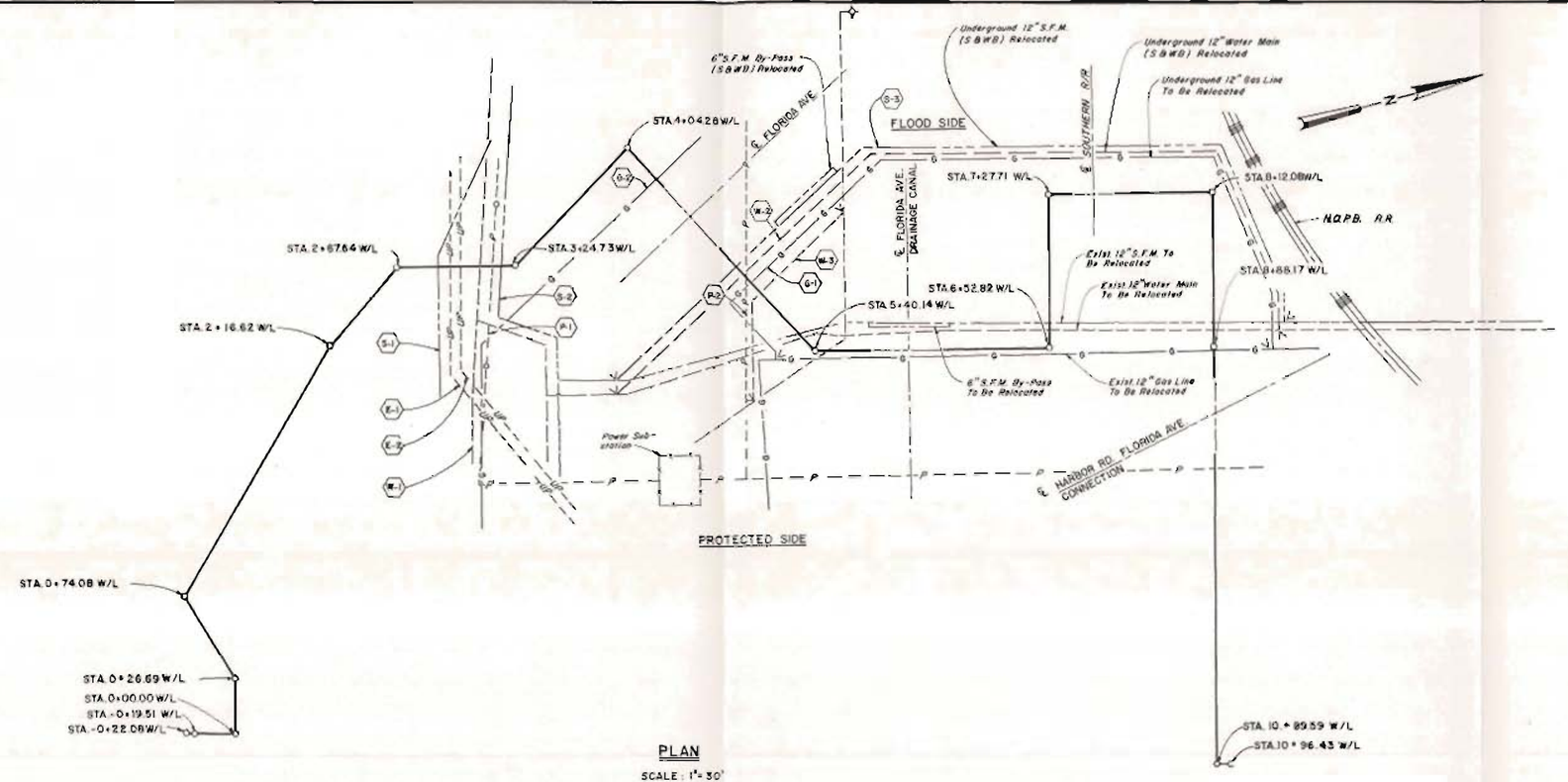
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS
ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 60



PLAN

SCALE : 1" = 30'

UTILITY SCHEDULE

UTILITY MARK	APPROX. W/L STA.	TYPE	SIZE	OWNER	DETAIL THRU WALL	TOP ELEVATION	REMARKS
S-1	2+90.23	Sewer Force Main	66"Dia.	S&WB	②(Pl.62)	See Plate 62	
E-1	2+92 ±	Underground Power	5"Dia	S&WB	②(Pl.42)	El. 10	Both E-1 & E-2 Have 5" Conduits Encased In a Concrete Duct 20" wide x 25" high
E-2	2+92 ±	Underground Power	5"Dia.	S&WB	②(Pl.42)	El. 10	
W-1	3+09.73	Water Main	48"Dia.	S&WB	②(Pl.62)	See Plate 62	
S-2	3+18.73	Sewer Force Main	54"Dia.	S&WB	②(Pl.62)		
P-1	3+13 ±	Overhead Power	N/A	NOPSI	N/A	Above Top Wall	
P-2	4+87 ±	Overhead Power	N/A	NOPSI	N/A	Above Top Wall	
S-3	4+84 ±	Sewer Force Main	12"Dia.	S&WB	③(Pl.42)	El. -3.53	
W-2	4+89 ±	Water Main	12"Dia.	S&WB	③(Pl.42)	El. -3.53	
W-3	5+02 ±	Water Main	6"Dia.	S&WB	③(Pl.42)	El. -3.53	
G-1	4+95 ±	Gas	12"Dia.	NOPSI	④(Pl.42)	El. -3.53	
G-2	4+26 ±	Gas	8"Dia.	NOPSI	④(Pl.42)	El. -3.20	

LEGENDS

- WALL LINE (W/L)
- OVERHEAD POWER LINE
- UNDERGROUND POWER LINE
- WATER LINE
- SEWER FORCE MAIN
- GAS LINE

EXIST. & RELOCATED LINE BREAK POINT

UTILITY MARK, SEE UTILITY SCHEDULE

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
UTILITY PLAN & SCHEDULE
EAST I.H.N.C.

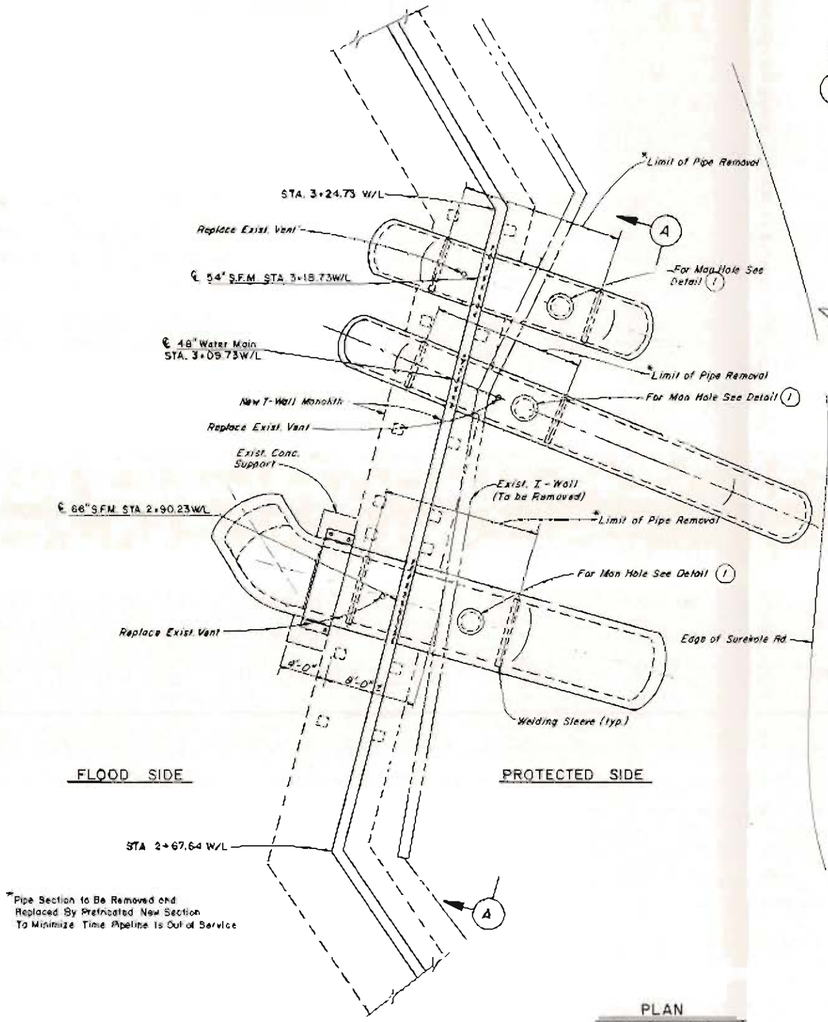
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

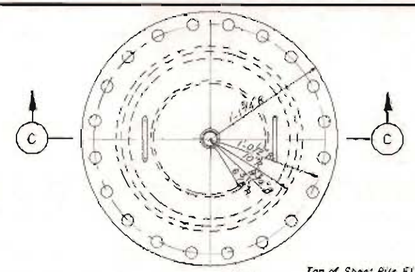
FILE NO. H-2-27790

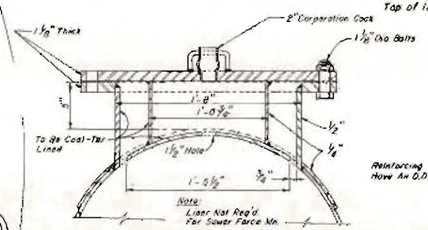
PLATE 61



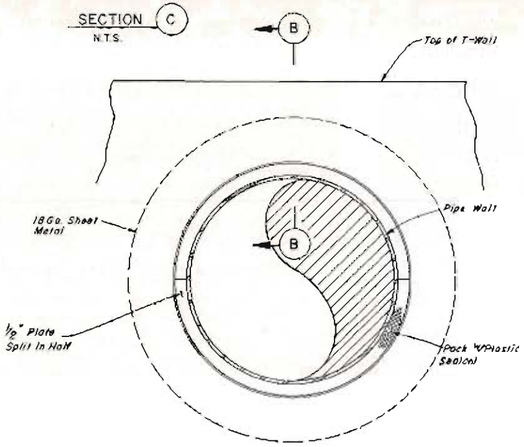
*Pipe Section to Be Removed and Replaced By Prefabricated New Section To Minimize Time Pipeline Is Out of Service

PLAN
SCALE: 3/16" = 1'-0"

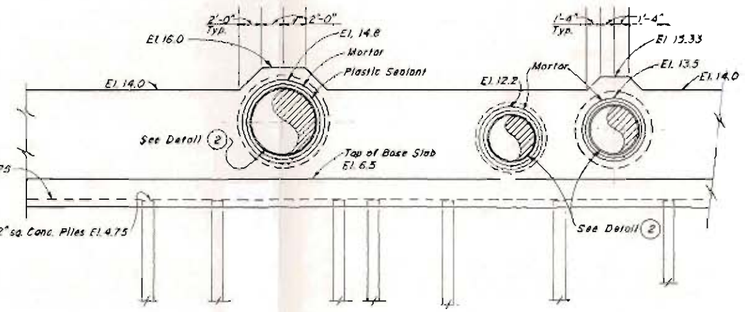




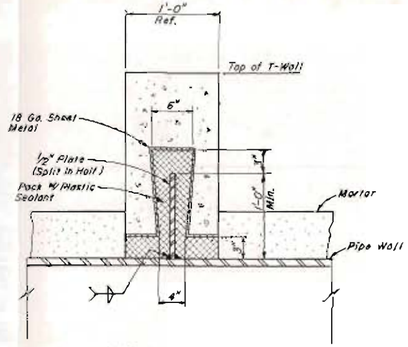
SECTION (C)
N.T.S.



DETAIL (2)
SCALE: 3/4" = 1'-0"



SECTION (A)
SCALE: 3/16" = 1'-0"



Typical for 66" S.F.M., 54" S.F.M., & 48" W.M. Pipes.

SECTION (B)
SCALE: 1 1/2" = 1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
TYPICAL UTILITY CROSSING DETAILS EAST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980
FILE NO. H-2-27790

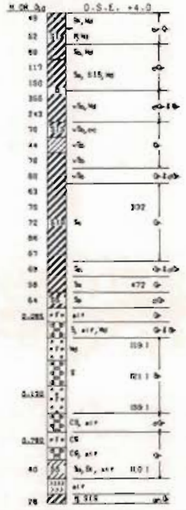
PLATE 62

BOR. 3-WF

STA 8+50

640 FT. CANAL SIDE B.L.

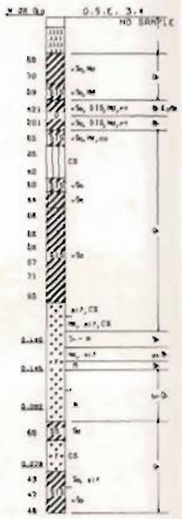
12 DEC 66



BOR. 4-WF

25 FT. SOUTH OF FLA. AVE

DEC. 71

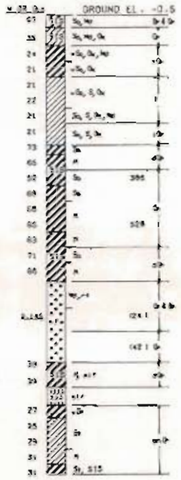


BOR. 3-EF

STA. 59+95

300 FT. LT. B.L.

13 DEC 66

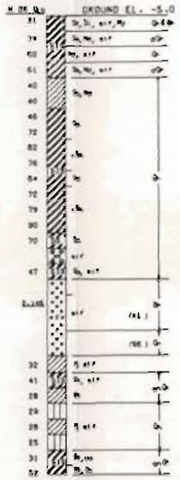


BOR. 4-EF

STA. 59+95

300 FT. LT. B.L.

DEC. 71

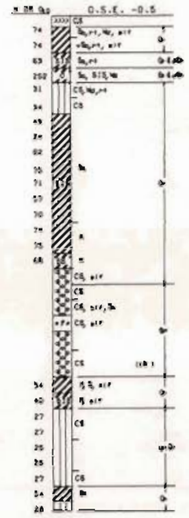


BOR. 5-EF

STA 2+44

25 FT. NORTH OF FLA. AVE

10 NOV 71



ELEVATIONS IN FEET M.S.L.

10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140

NOTE:

Boring 3-WF is located on plate 2.
Boring 3-EF is located on plate 44.
Boring 5-EF is located on plate 43.
For Soil Boring Legend see plate A.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GENERAL TYPE BORING LOGS 384-WF, 385-EF

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS

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

DATE: APRIL, 1980

FILE NO. N-E-27780

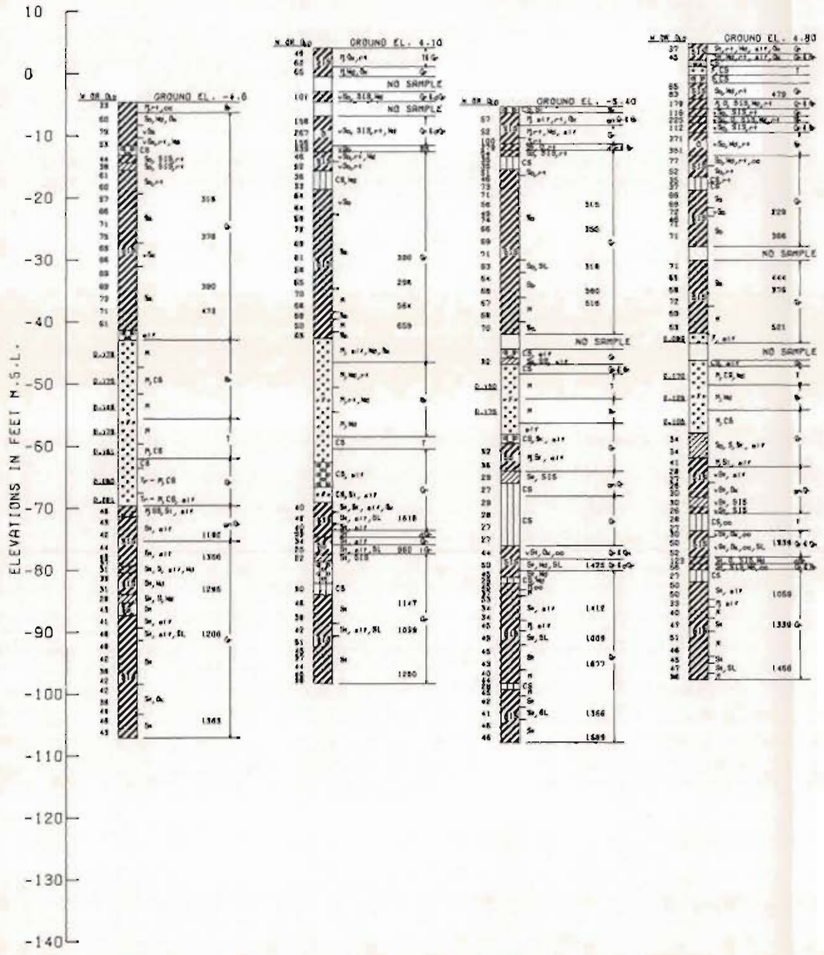
PLATE 63

BOR. 5-UWF
STA 75FT N OF C/L OF FLORIDA AVE RD 15 FT. NORTH OF SO. R.R.
WATER TABLE AT 4.5 FT.
13-15 SEPT 1971

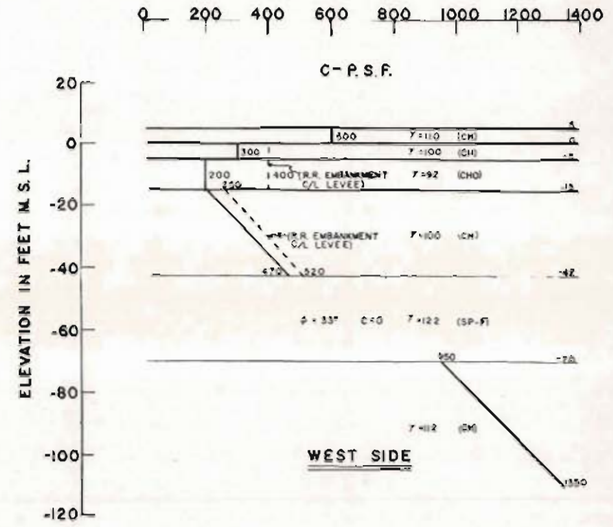
BOR. 6-UWF
NORTHERNMOST TRACK
8-10 SEPT. 71

BOR. 6-UEF
110FT EAST OF END OF BRIDGE AND 20 FT. NORTH OF LAND N R.R.
40FT SOUTH OF DRAINAGE DITCH WALL
WATER TABLE AT 0.8 FT.
20-21 SEPT. 1971

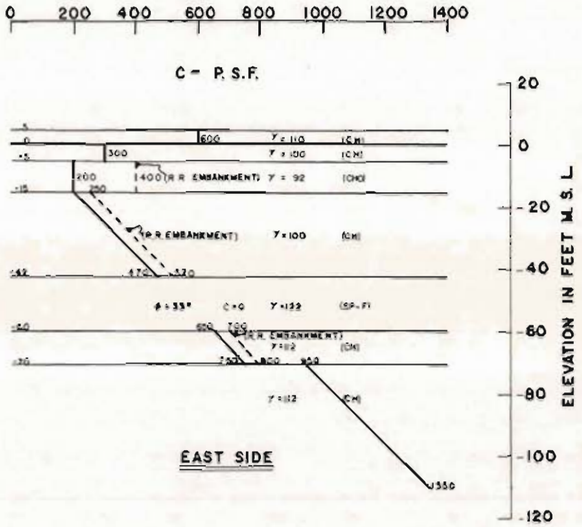
BOR. 7-UEF
NORTH TRACK
WATER TABLE AT 6.4 FT.
22-23 SEPT. 71



SHEAR STRENGTH



SHEAR STRENGTH



NOTE :

Boring 6-UEF is located on plate 43
Boring 6-UWF is located on plate 2.
Boring 7-UEF is located on plate 44
For Soil Boring Legend see plate A.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

GENERAL TYPE BORING LOGS 5&6-UWF, 6 &7 UEF

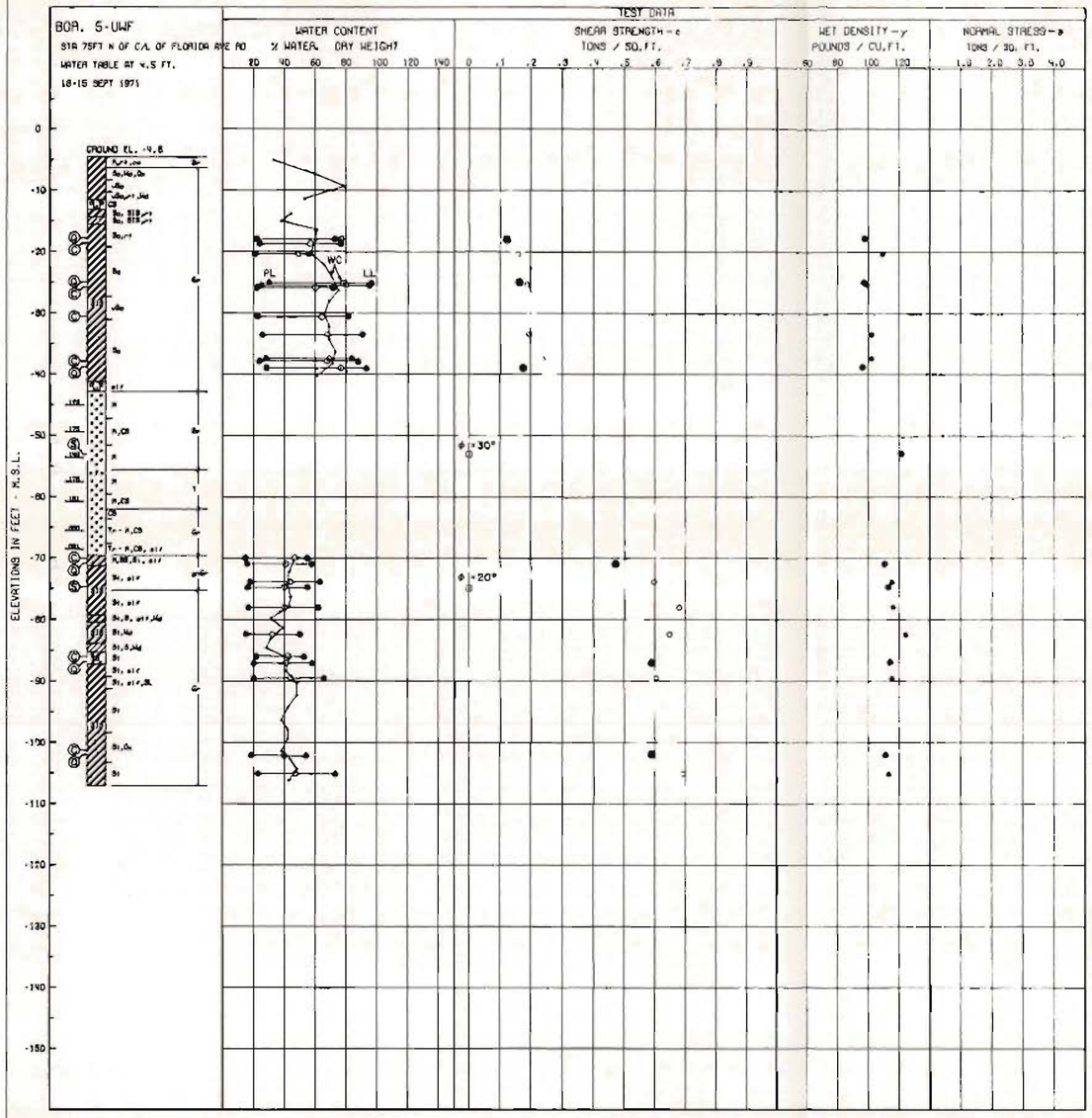
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS

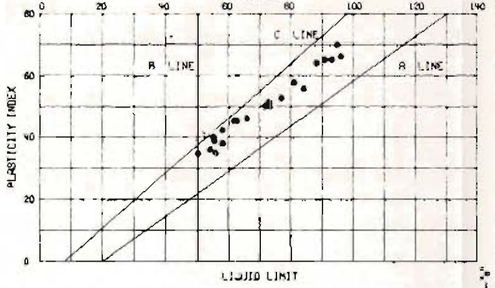
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL, 1980

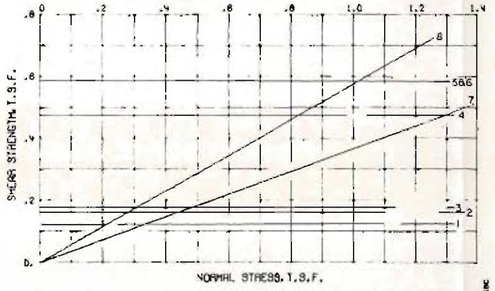
FILE NO. N-2-27780

PLATE 64



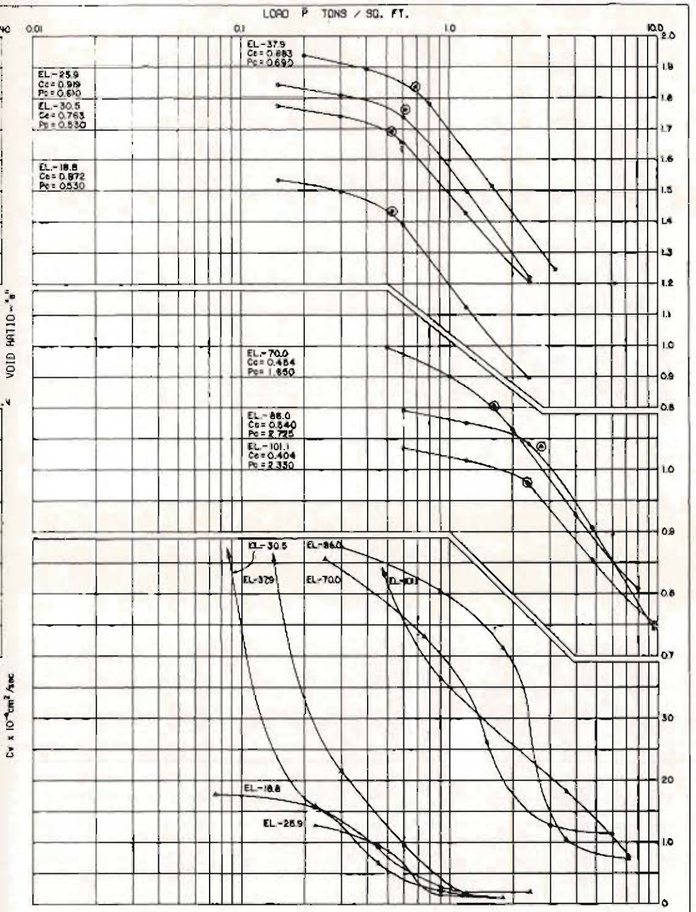


PLASTICITY CHART



SHEAR STRENGTH DATA

BORING NO.	ENVELOPE NC.	ENVELOPE Ø	TYPE	STRENGTH C (T.S.F.)	STRENGTH Ø	CLASS
S-UWF	1	-17.9	Q	0	0.126	CH
	2	-25.0		0	0.163	CH
	3	-38.8		0	0.175	CH
	4	-70.9		0	0.475	CH
	5	-86.9		0	0.588	CH
	6	-102.0		0	0.588	CH
	7	-53.1	S	30	0	SP
	8	-74.8		20	0	CH



CONSOLIDATION DATA

○ - (UC) UNCONFINED COMPRESSION TEST
● - (Q) UNCONSOLIDATED - UNDRAINED SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED SHEAR TEST
□ - (S) CONSOLIDATED - DRAINED SHEAR TEST
BORINGS WERE TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER
FOR SOIL BORING LEGEND SEE PLATE A
FOR LOCATION OF BORINGS SEE PLATE N/A

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

UNDISTURBED BORING S-UWF DATA

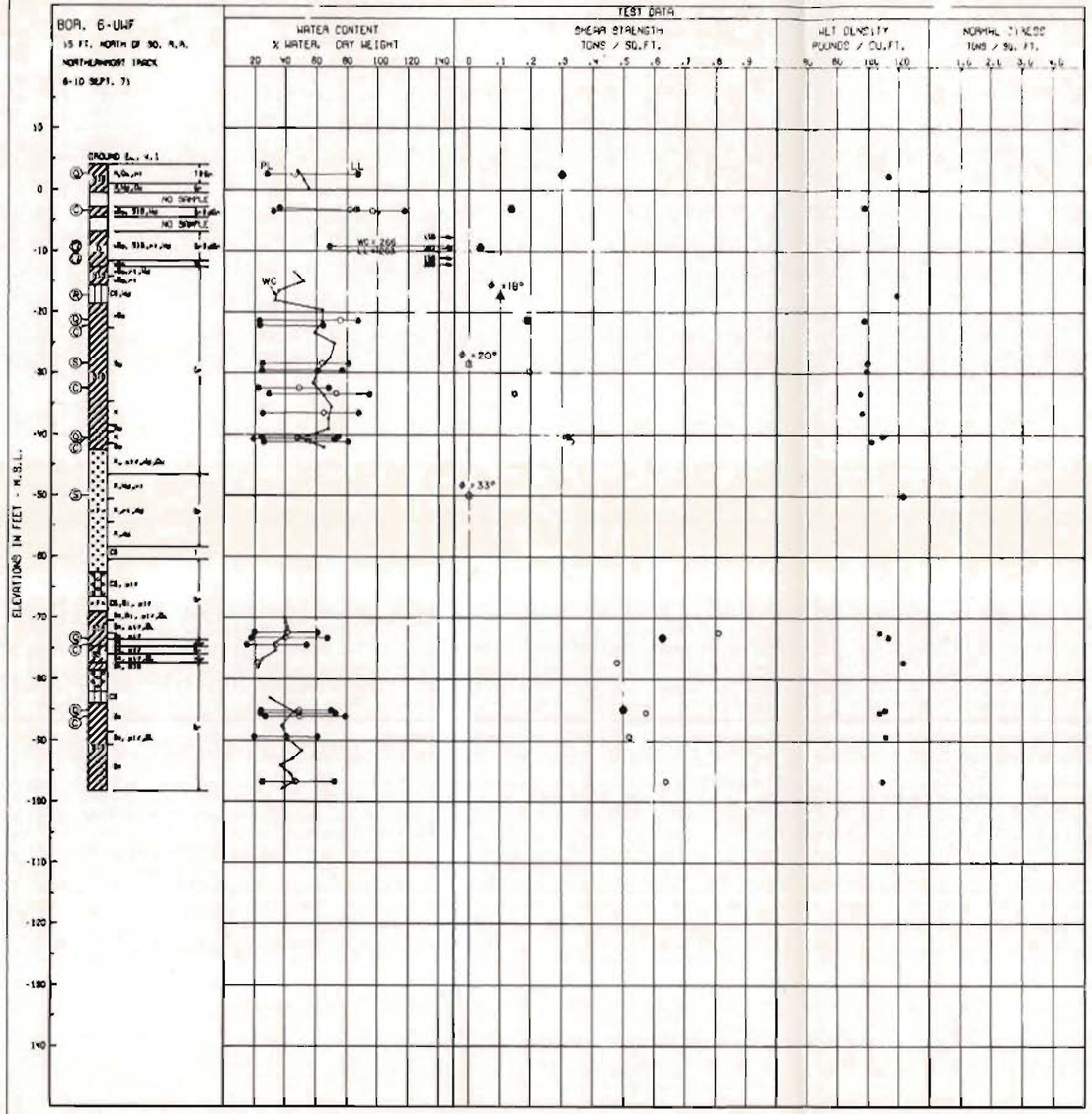
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS BATON ROUGE, LOUISIANA

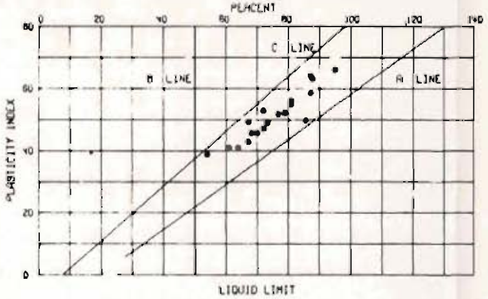
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL, 1980

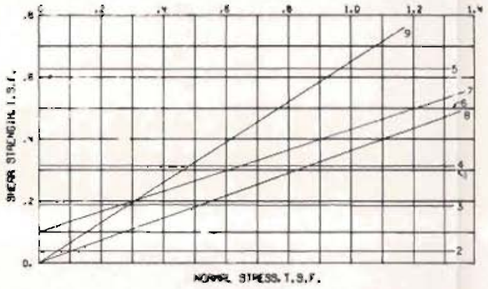
FILE NO. H-2-27790

PLATE 65





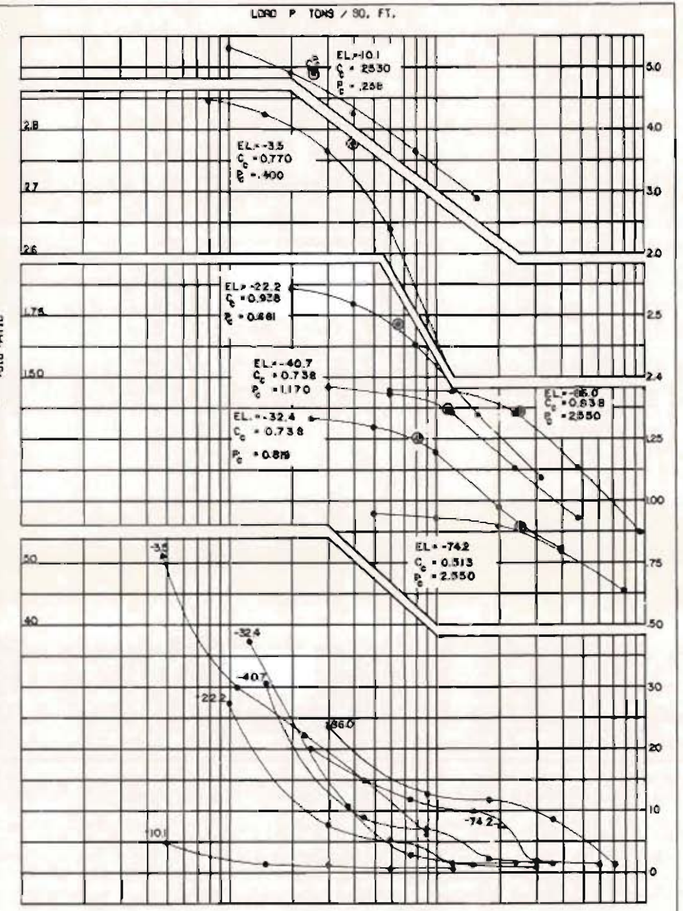
PLASTICITY CHART



SHEAR STRENGTH DATA

BORING NO.	ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH φ°	STRENGTH C - TSF	CLASS
6-UWF	1	2.6	Q	0	0.300	CH
	2	-9.2		0	0.038	CH
	3	-21.3		0	0.188	CH
	4	-40.3		0	0.313	CH
	5	-73.3		0	0.625	CH
	6	-85.1		0	0.500	CH
	7	-17.3	R*	18	0.100	ML
	8	-28.4	Q	20	0	CH
	9	-50.0	S	33	0	SM

*BASED ON $(\sigma_1 - \sigma_3)$ AT MAXIMUM PORE PRESSURE



CONSOLIDATION DATA

○ - (UC) UNCONFINED COMPRESSION TEST
● - (Q) UNCONSOLIDATED - UNDRAINED SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED SHEAR TEST
□ - (S) CONSOLIDATED - DRAINED SHEAR TEST

BORINGS WERE TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER

FOR SOIL BORING LEGEND SEE PLATE A

FOR LOCATION OF BORINGS SEE PLATE 2

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

UNDISTURBED BORING 6-UWF DATA

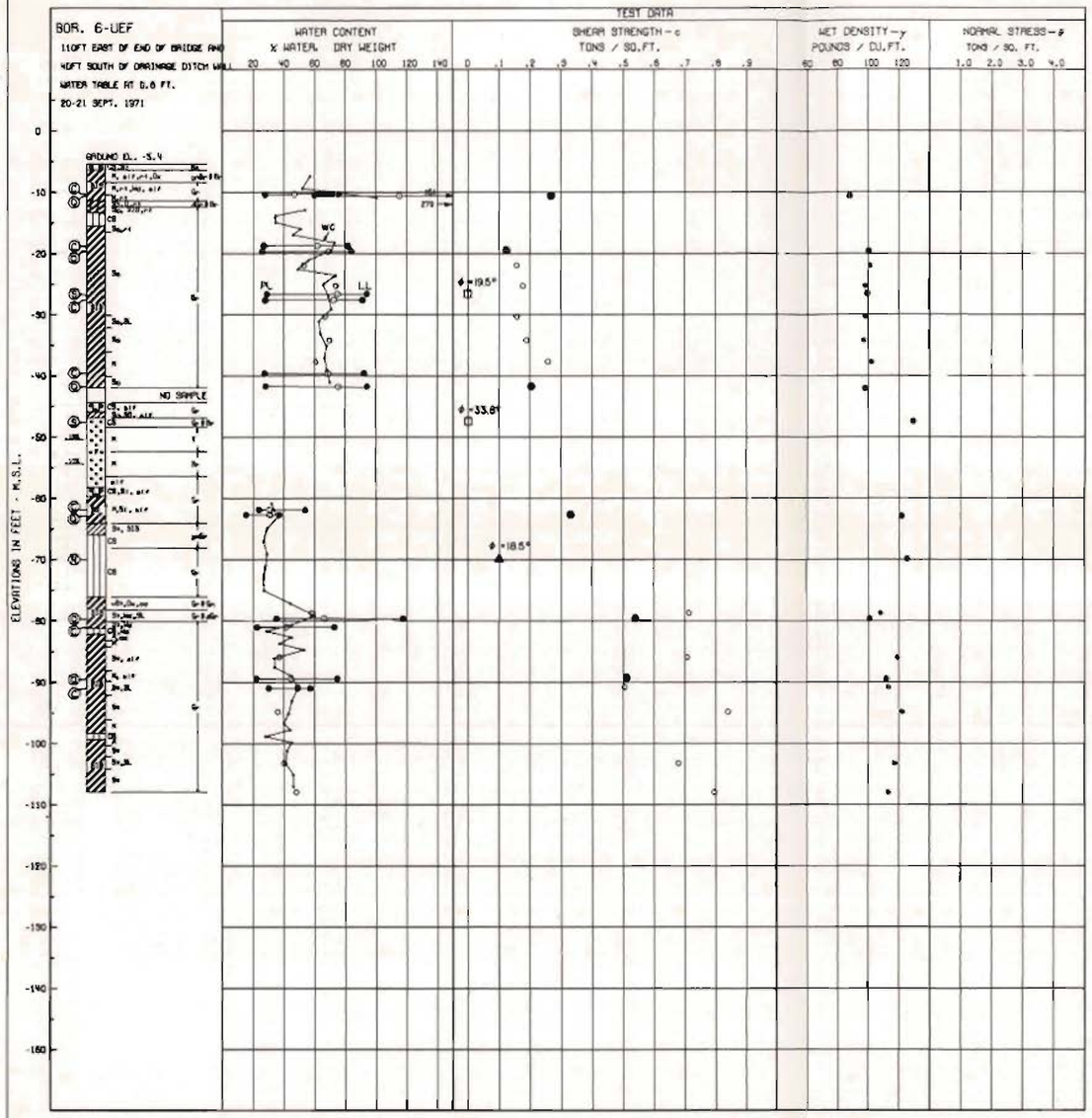
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

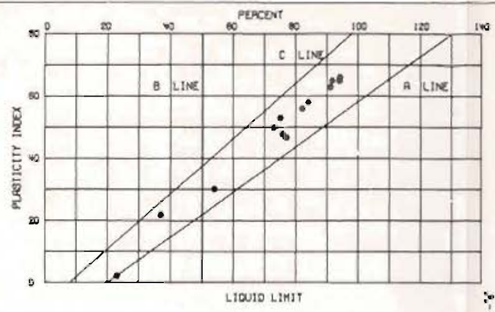
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL, 1980

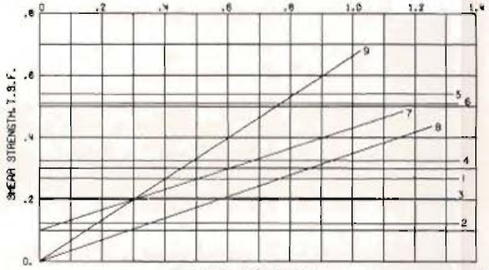
FILE NO. N-2-27790

PLATE 66





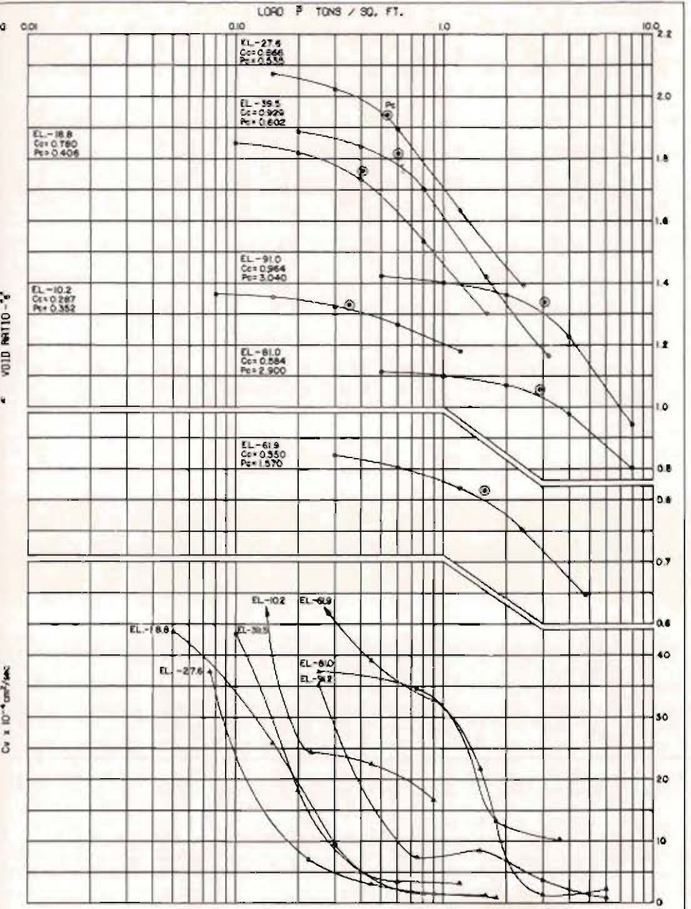
PLASTICITY CHART



SHEAR STRENGTH DATA

BORING NO.	ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Φ°	STRENGTH C - TSF	CLASS
6-UEF	1	-10.6	Q	0	0.268	CH
	2	-19.7		0	0.123	CH
	3	-41.8		0	0.202	CH
	4	-62.8		0	0.325	CL
	5	-79.6		0	0.540	CH
	6	-89.4		0	0.510	CH
	7	-69.9	R*	18.5	0.100	ML
	8	-26.7	R	19.5	0	CH
	9	-47.5	S	33.8	0	SM

*BASED ON $(\sigma_1 - \sigma_3)$ AT MAXIMUM PORE PRESSURE



CONSOLIDATION DATA

○- (UC) UNCONFINED COMPRESSION TEST
●- (Q) UNCONSOLIDATED - UNDRAINED SHEAR TEST
▲- (R) CONSOLIDATED - UNDRAINED SHEAR TEST
□- (S) CONSOLIDATED - DRAINED SHEAR TEST

BORINGS WERE TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER

FOR SOIL BORING LEGEND SEE PLATE A

FOR LOCATION OF BORINGS SEE PLATE 65

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

UNDISTURBED BORING 6-UEF DATA

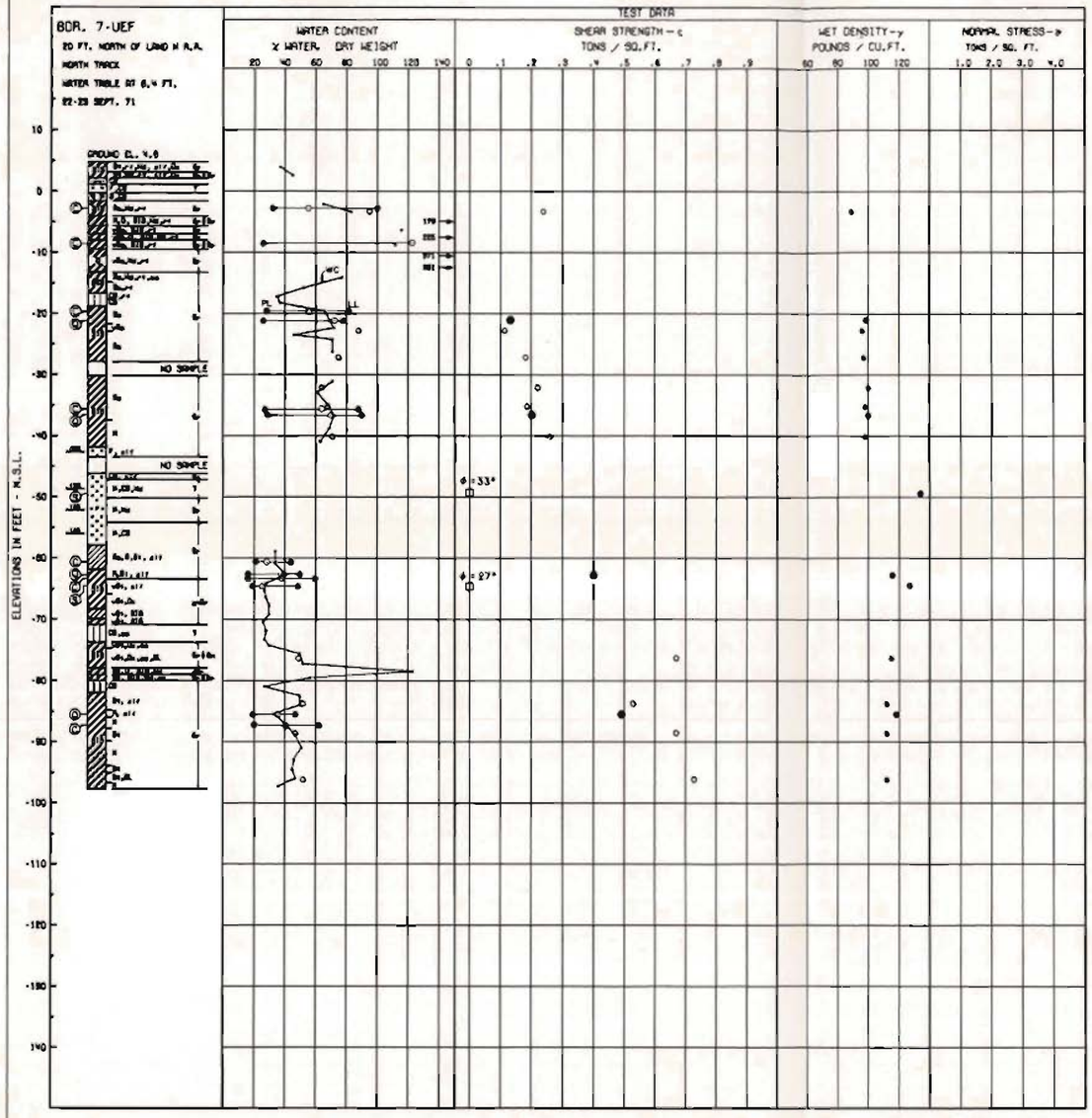
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

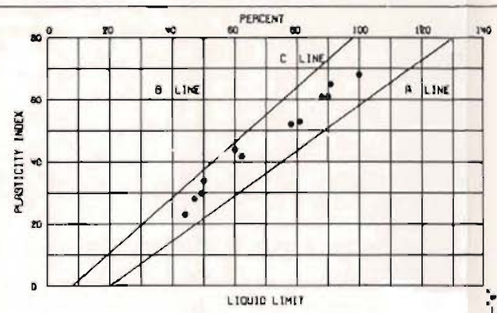
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

DATE: APRIL, 1980

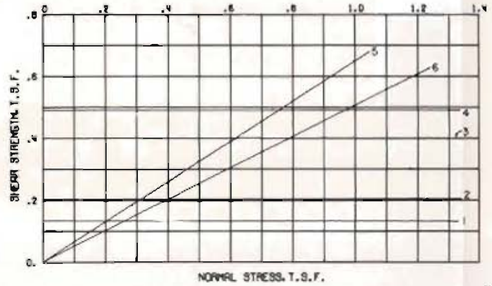
FILE NO. H-2-27790

PLATE 67



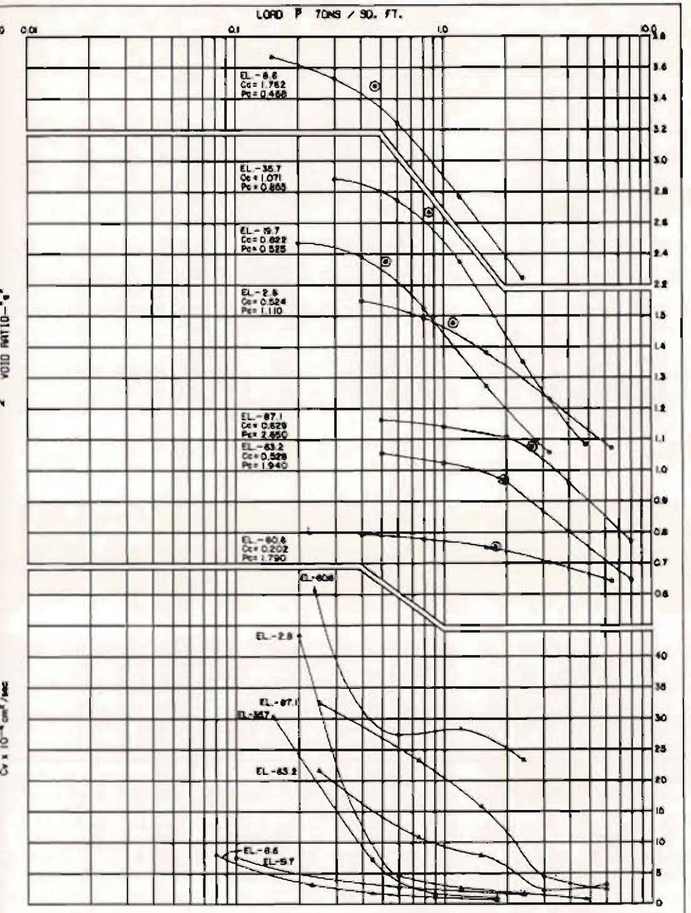


PLASTICITY CHART



SHEAR STRENGTH DATA

BORING NO.	ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH φ°	STRENGTH C - TSF	CLASS
7-UEF	1	-21.1	Q	0	0.131	CH
	2	-36.6	Q	0	0.203	CH
	3	-62.8	Q	0	0.400	CH
	4	-85.5	Q	0	0.490	CH
	5	-49.5	S	33	0	SP(F)
	6	-64.6	S	27	0	CH



CONSOLIDATION DATA

○ - (UC) UNCONFINED COMPRESSION TEST
● - (Q) UNCONSOLIDATED - UNDRAINED SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED SHEAR TEST
□ - (S) CONSOLIDATED - DRAINED SHEAR TEST

BORINGS WERE TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER

FOR SOIL BORING LEGEND SEE PLATE A

FOR LOCATION OF BORINGS SEE PLATE 44

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

UNDISTURBED BORING 7-UEF DATA

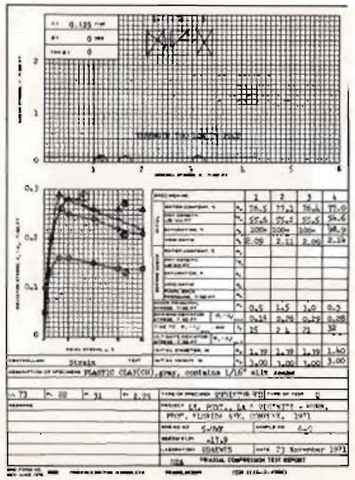
H-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

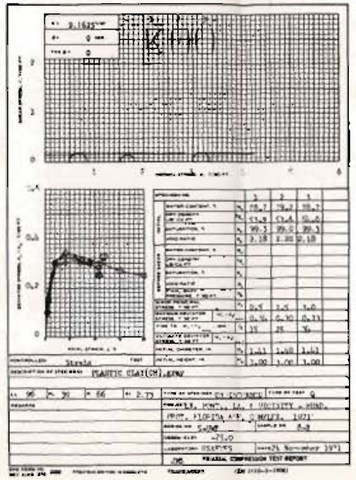
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS CORPS OF ENGINEERS, U.S. ARMY NEW ORLEANS, LA.

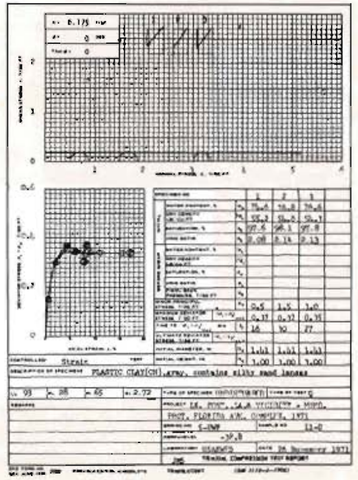
DATE: APRIL, 1980

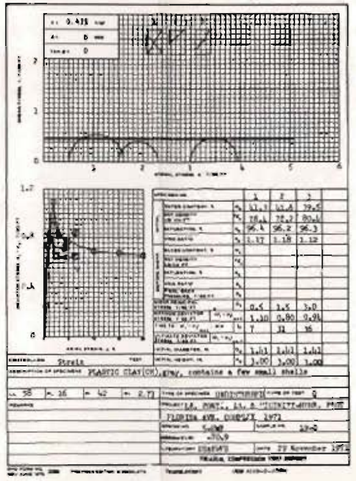
FILE NO. H-2-27780

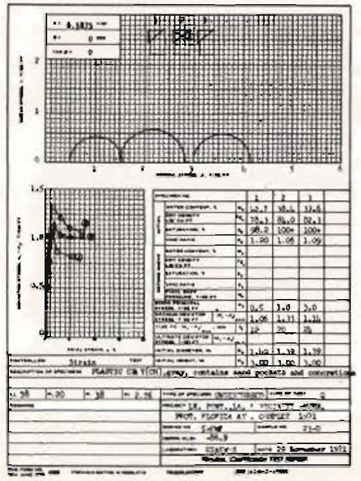
PLATE 68

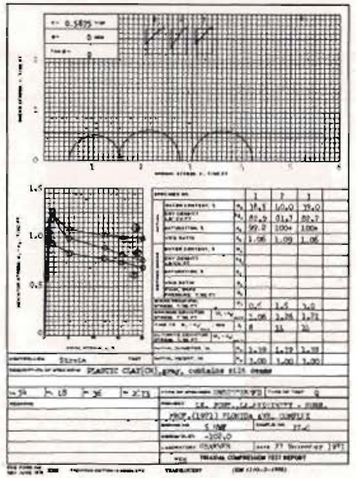


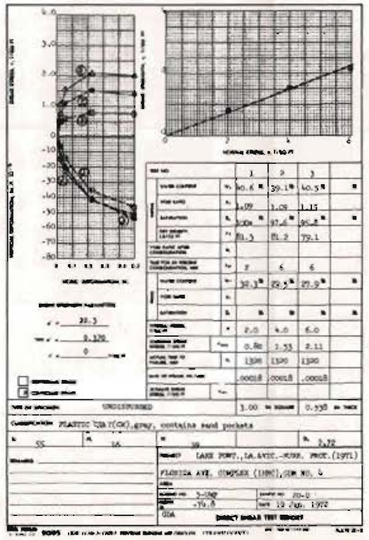


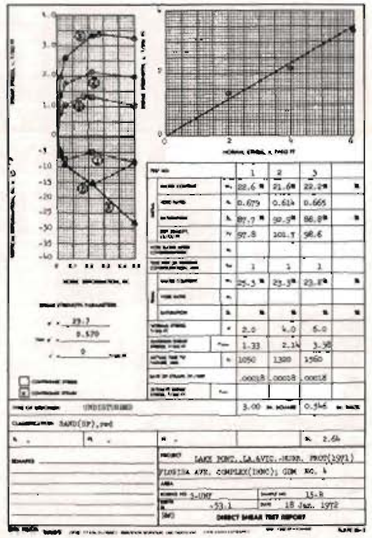












LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DETAIL SHEAR STRENGTH
DATA BORING 5-UWF

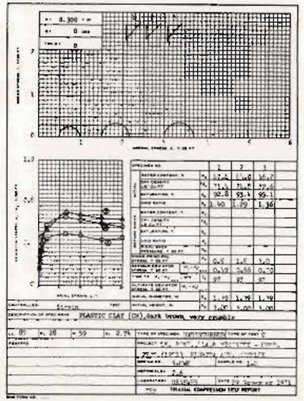
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS,
ARCHITECTS AND PLANNERS
NEW ORLEANS, LA.

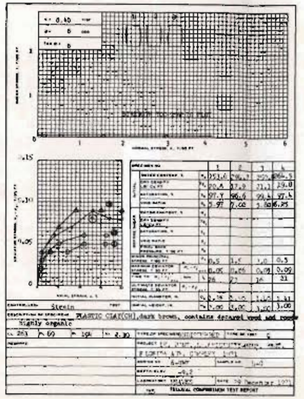
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

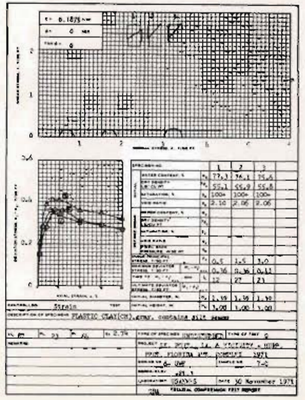
DATE: APRIL, 1980

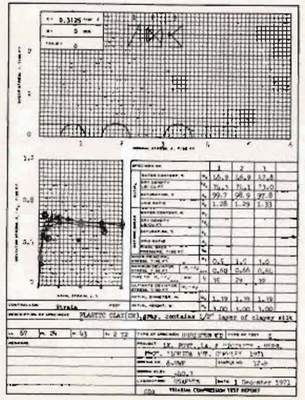
FILE NO. N-Y-27790

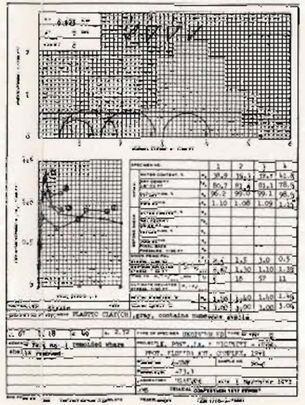
PLATE 69

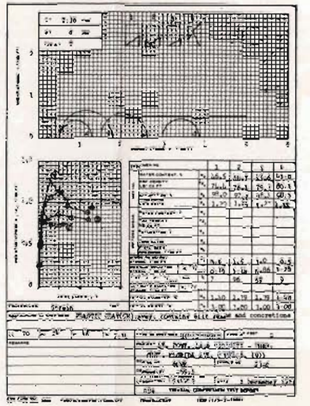


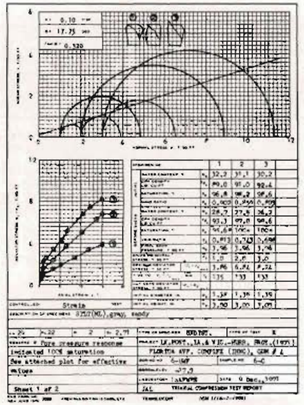


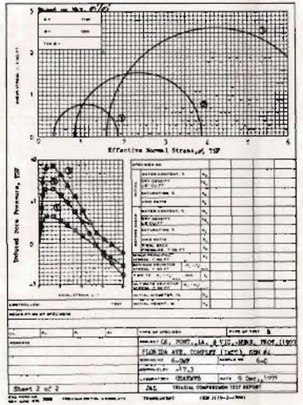


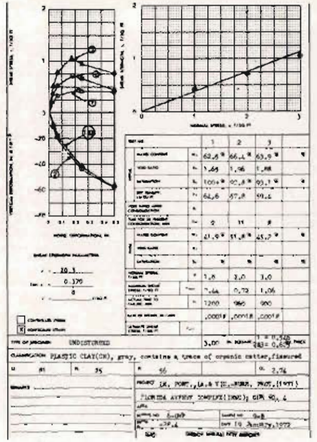


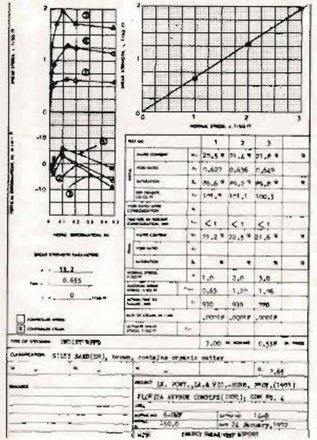












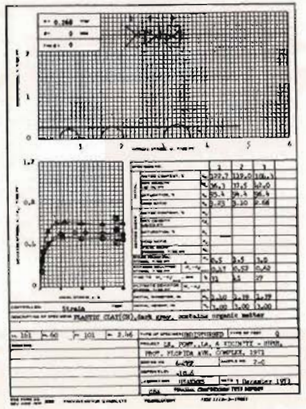
LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DETAIL SHEAR STRENGTH
DATA BORING 6-UWF

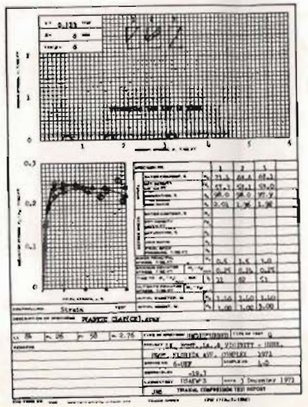
M-Y ASSOCIATES, INC.
CONSULTING ENGINEERS,
GEOTECHNICAL AND PLANNING
CONSULTANTS

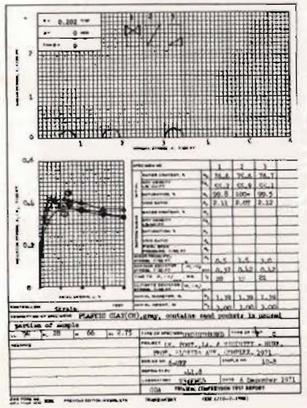
DATE APRIL, 1980

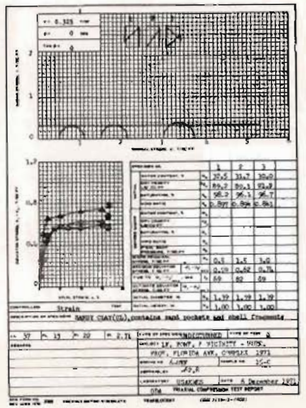
FILE NO. M-B-27780

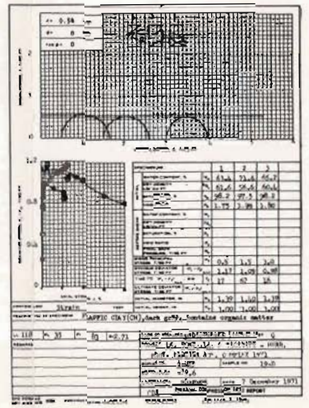
PLATE 70

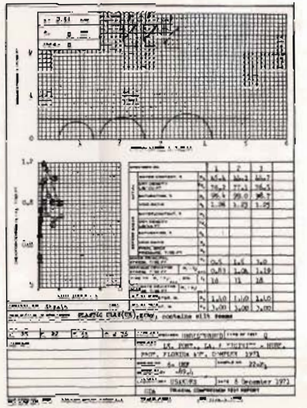


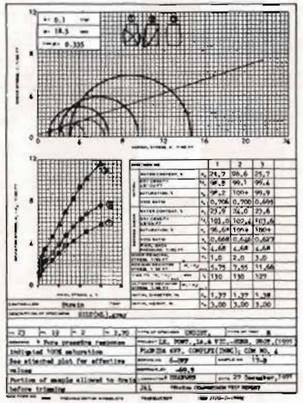


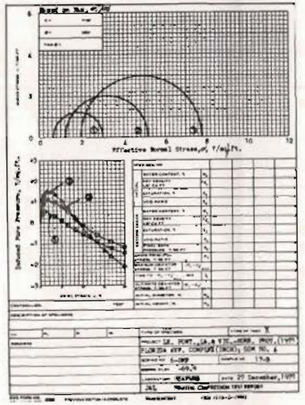


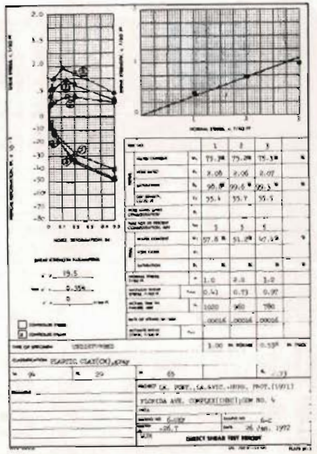


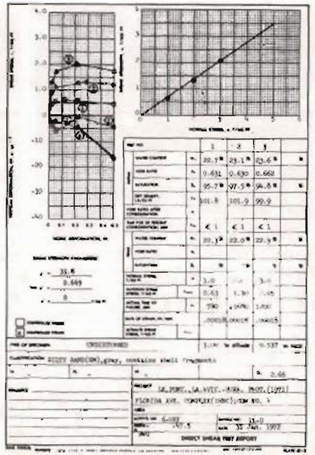












LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.M.N.C.
DETAIL SHEAR STRENGTH
DATA BORING 6-UEF

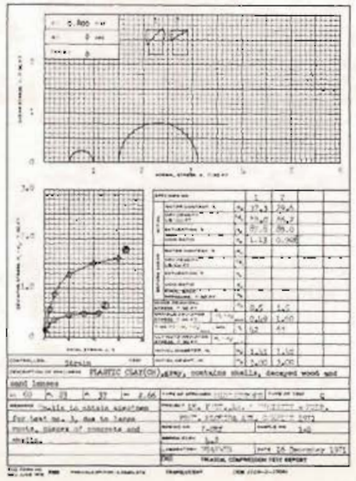
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS
GEOLOGISTS AND PLANNERS
METAIRIE, LOUISIANA

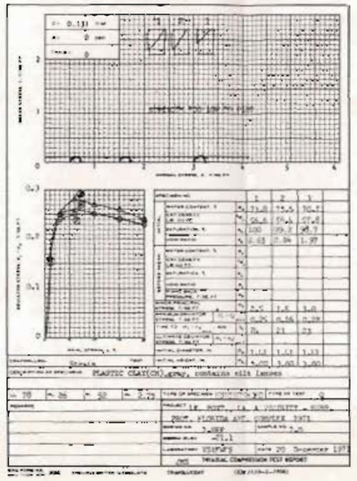
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

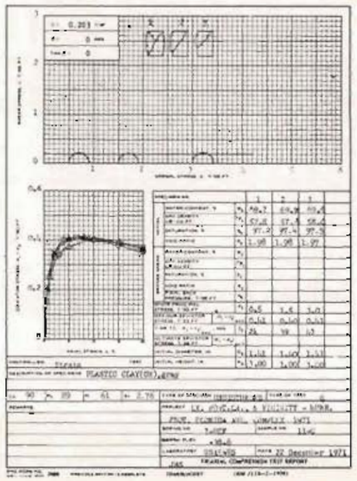
DATE: APRIL, 1980

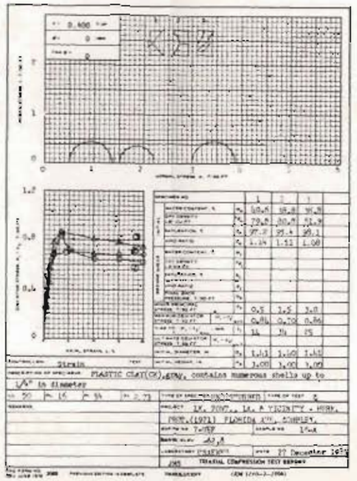
FILE NO. N-E-27795

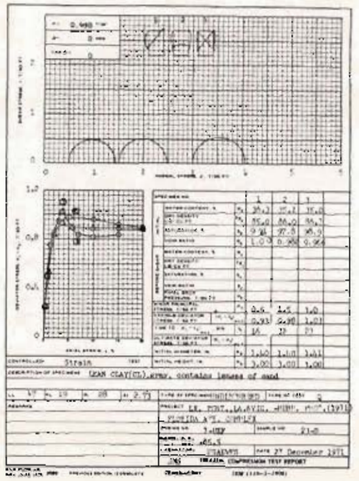
PLATE 71

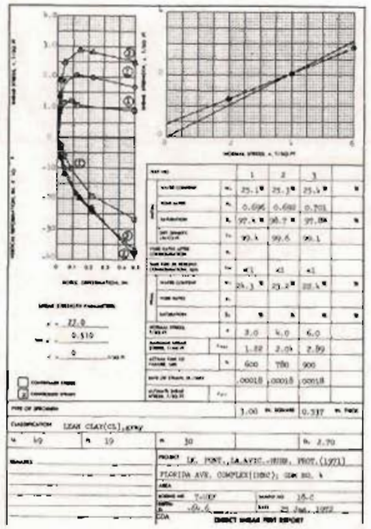


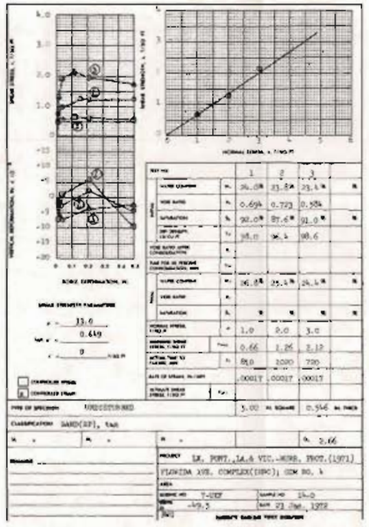












LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

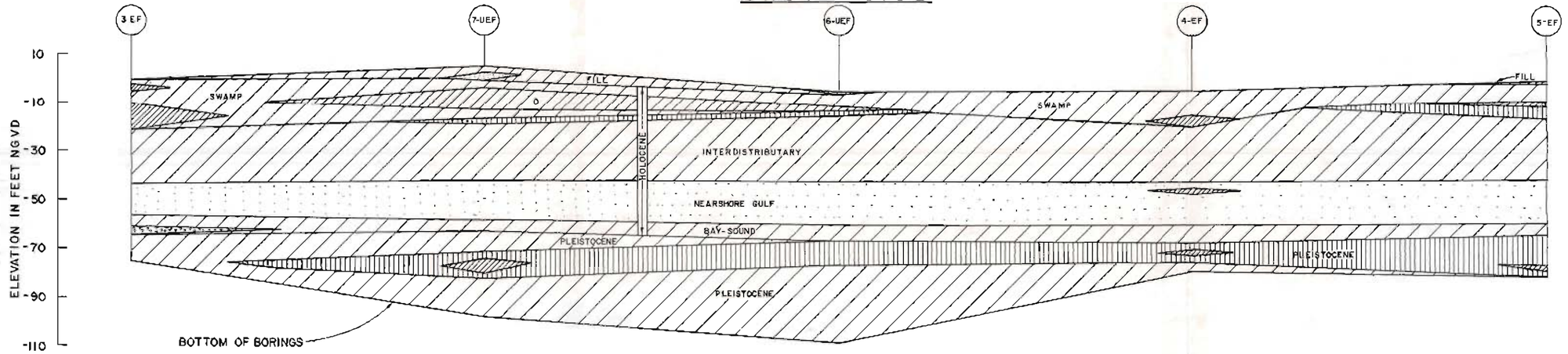
DETAIL SHEAR STRENGTH DATA BORING 7-UEF

H-F ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS

FILE NO. M-E-27780

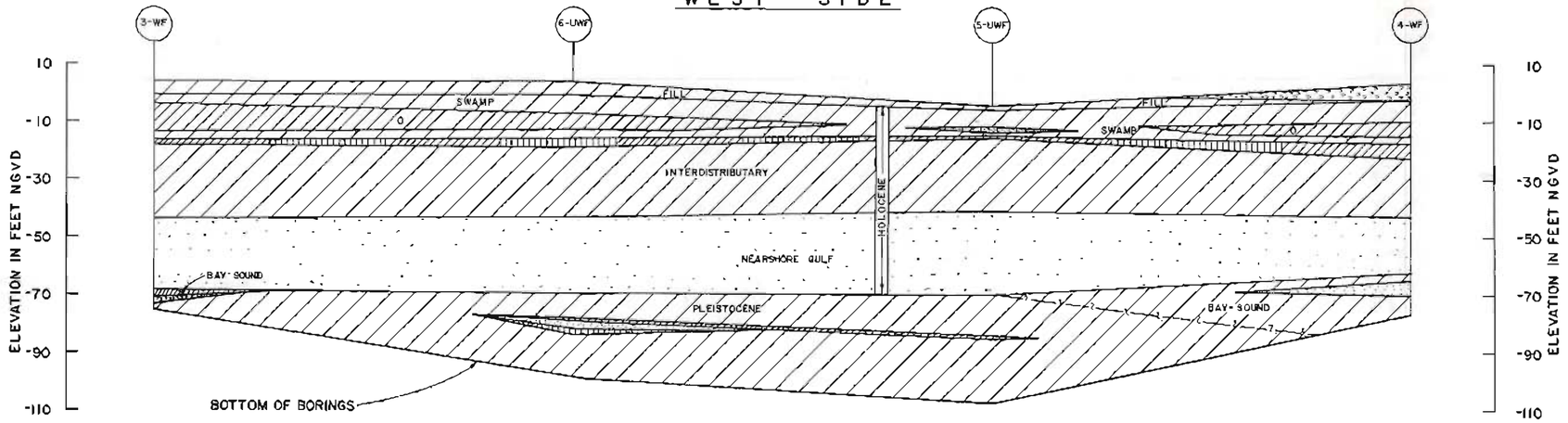
PLATE 72

EAST SIDE



HORIZONTAL SCALE: NOT TO SCALE

WEST SIDE



SH
SP
SM
ML
CL
CH
O = ORGANIC

HOLOCENE

FILL ---- MEDIUM TO STIFF CLAYS, SHELLS AND SAND LAYERS.

SWAMP-- VERY SOFT TO MEDIUM CLAYS WITH ORGANIC MATERIALS.

INTERDISTRIBUTARY--- VERY SOFT TO MEDIUM CLAYS.

NEARSHORE GULF---- FINE SAND WITH SHELL FRAGMENTS.

BAY-SOUND --------- VERY SOFT TO MEDIUM CLAYS WITH DISCONTINUOUS LAYERS OF SHELLS AND SAND.

PLEISTOCENE-- MEDIUM TO VERY STIFF CLAYS WITH SILT STRATA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

SOIL AND GEOLOGIC PROFILES

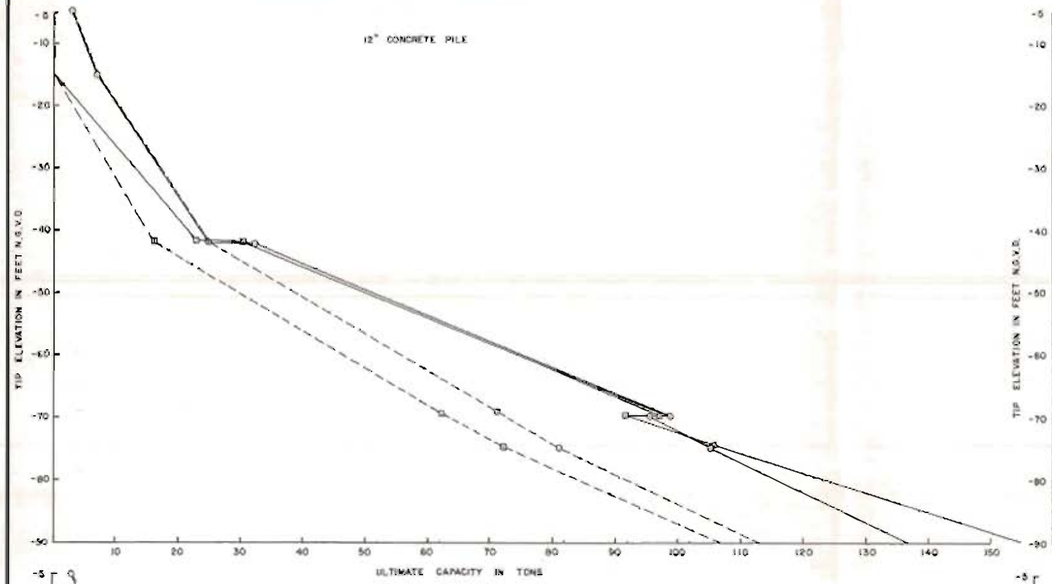
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

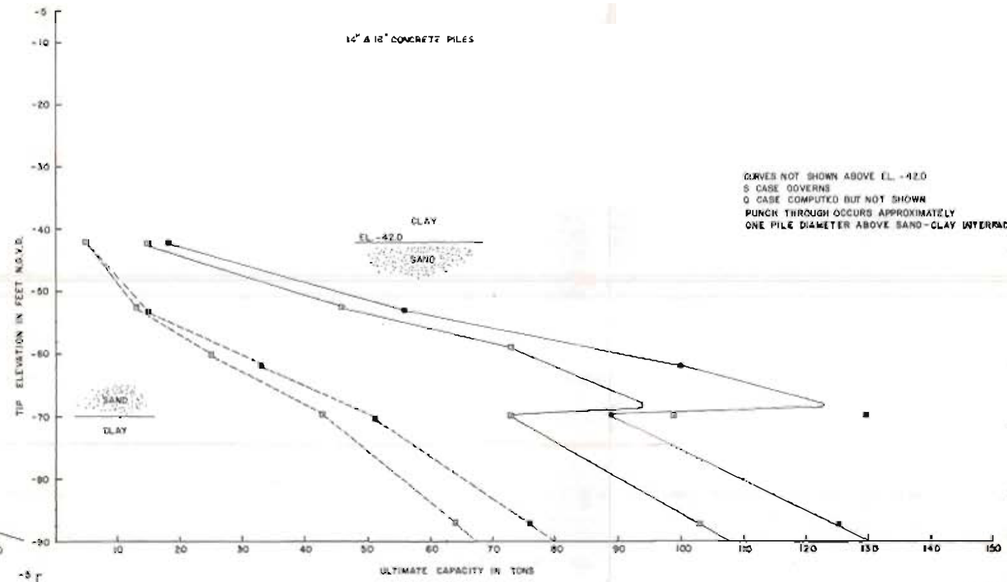
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL, 1960

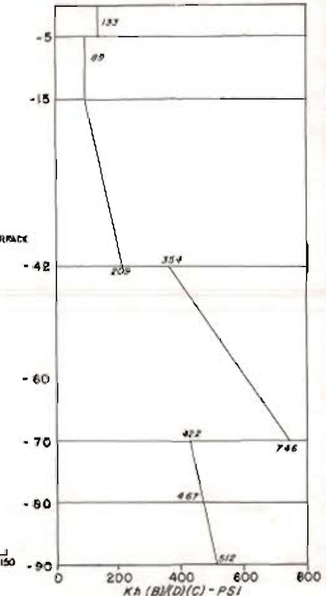
FILE NO. H-2-27790

PLATE 73

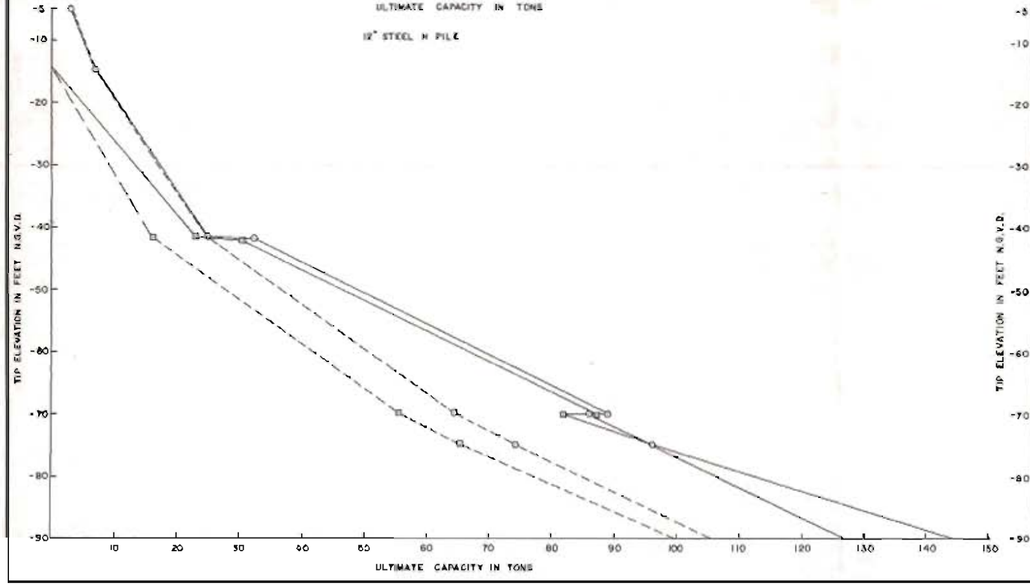


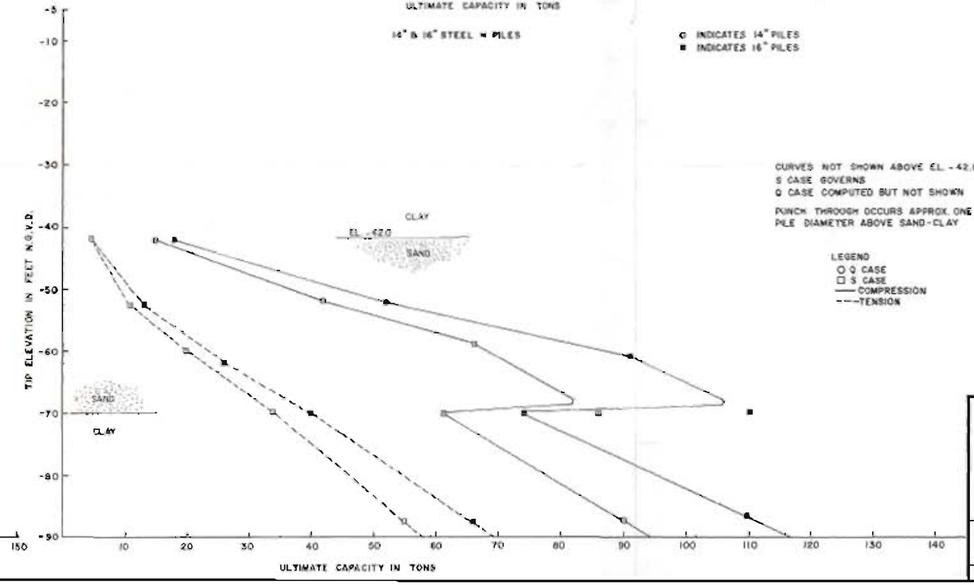


CURVES NOT SHOWN ABOVE EL. -42.0
S CASE GOVERNS
Q CASE COMPUTED BUT NOT SHOWN
PUNCH THROUGH OCCURS APPROXIMATELY ONE PILE DIAMETER ABOVE SAND-CLAY INTERFACE



MODULUS OF HORIZONTAL SUBGRADE REACTION FOR LATERALLY LOADED PILES





○ INDICATES 14" PILES
■ INDICATES 16" PILES

CURVES NOT SHOWN ABOVE EL. -42.0
S CASE GOVERNS
Q CASE COMPUTED BUT NOT SHOWN

PUNCH THROUGH OCCURS APPROX. ONE PILE DIAMETER ABOVE SAND-CLAY

LEGEND
○ Q CASE
□ S CASE
—— COMPRESSION
- - - TENSION

NOTE:
1. PILE CAPACITIES CONSIDER EXCESS PORE PRESSURE IN SAND STRATA (EL. -42.0 TO EL. +10.0) AND A CORRESPONDING REDUCTION IN INTERGRANULAR PRESSURE FOR THE STRATA.
2. SHOWN ARE ULTIMATE PILE CAPACITIES ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING A FACTOR OF SAFETY EQUAL TO 2.0.
3. $\bar{\delta}'B$ INCLUDES AN INDUCTION OF SOIL OVERBURDEN ON EITHER SIDE OF THE GATE (EL. 0.0 TO EL. -2.5), AVERAGE EXCESS UPLIFT < 6.5 FT. $(\frac{13-0}{2})$ IN SAND STRATUM, AND LIMITING $\frac{D\delta}{B}$ RATIO = 1.5 (FOR 14" PILE = $\bar{\delta}'B$ AT EL. -60).
4. FOR STEEL "H" PILE USE 1/2(33+20) = 26.5° FOR SKIN FRICTION.
5. CA (SOIL - PILE ADHESION) = 0.5 + 0.25 (C - 0.5) WHERE C > 0.5 TSF
6. FOR STEEL "H" $\frac{\tan 26.5}{\tan 33} = 0.77$
7. K = 0.7 WHERE $\delta \neq 0$

STEEL H PILES ARE SHOWN FOR INFORMATION ONLY - NOT USED IN DESIGN

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE CAPACITY CURVES WEST I.H.N.C.

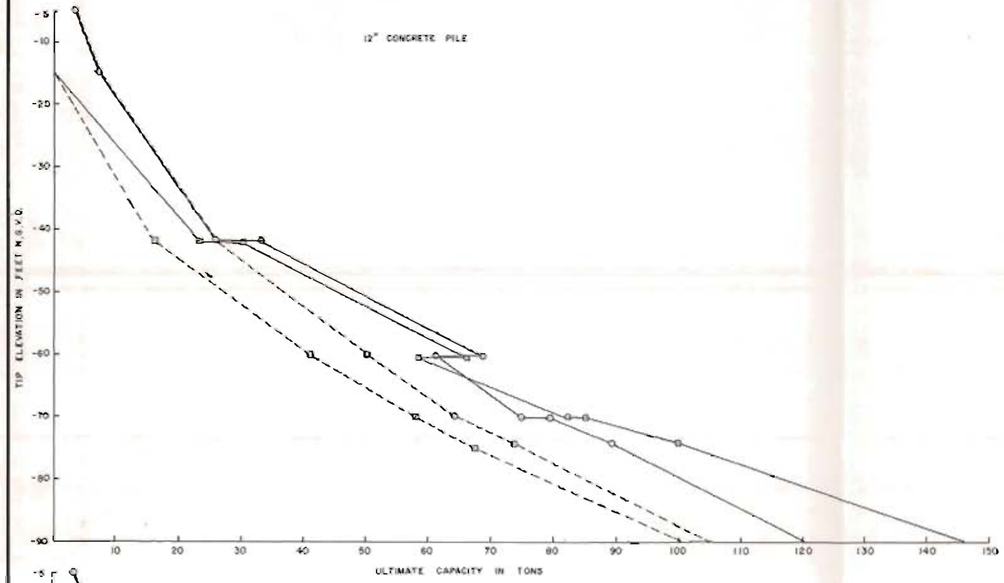
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS; ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

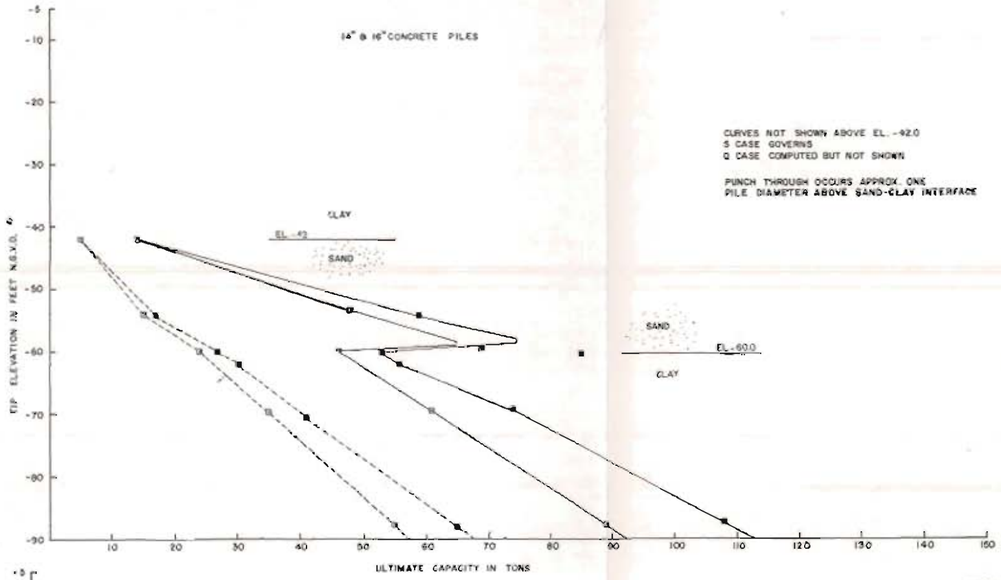
US ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS, U.S. ARMY
NEW ORLEANS, LA.

DATE: APRIL 1980

FILE NO. H-2-27790

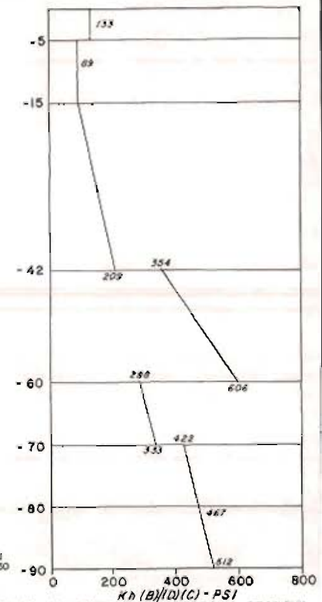
PLATE 74



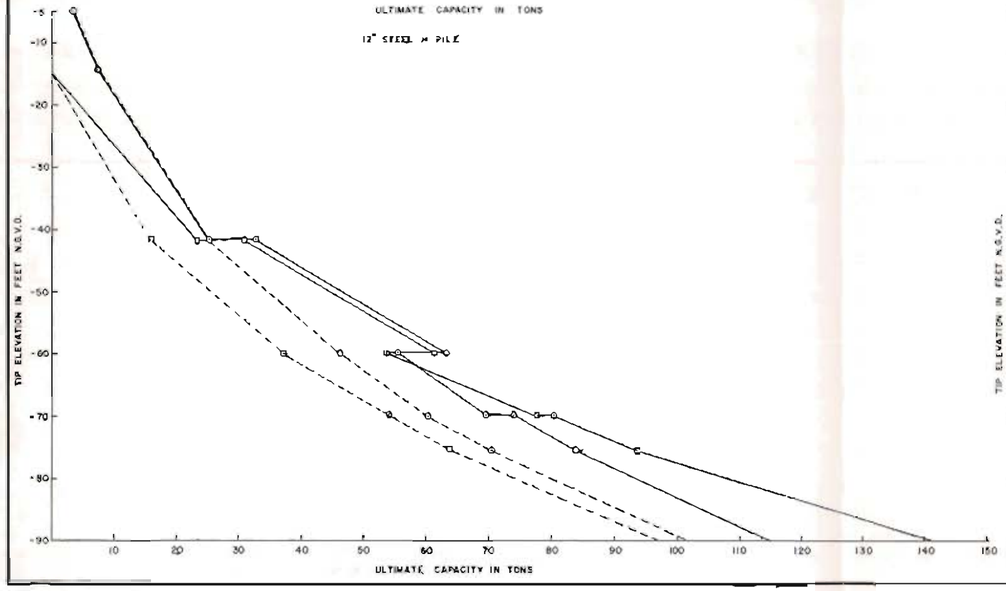


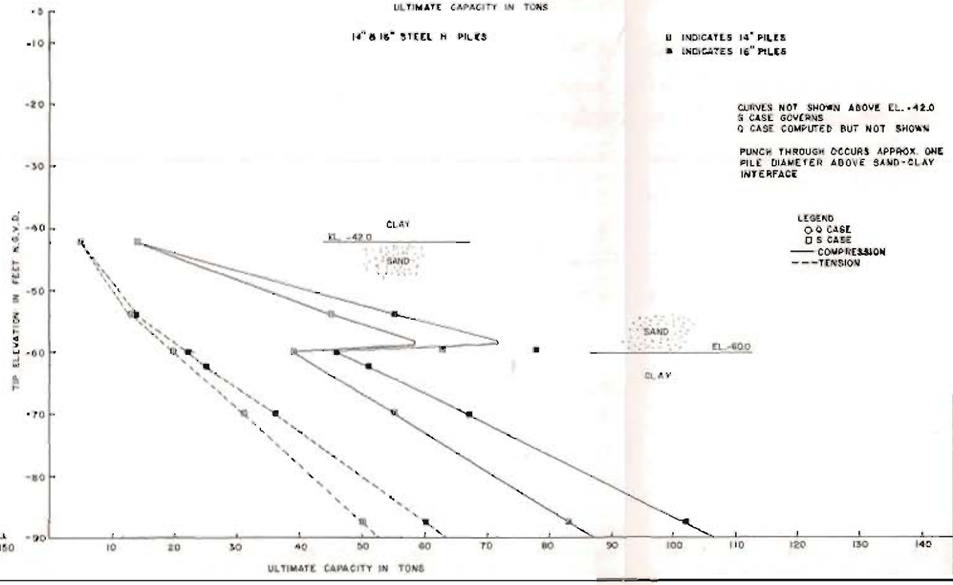
CURVES NOT SHOWN ABOVE EL. -42.0
S CASE GOVERNS
Q CASE COMPUTED BUT NOT SHOWN

PUNCH THROUGH OCCURS APPROX. ONE PILE DIAMETER ABOVE SAND-CLAY INTERFACE



MODULUS OF HORIZONTAL SUBGRADE REACTION FOR LATERALLY LOADED PILES





B INDICATES 14" PILES
■ INDICATES 16" PILES

CURVES NOT SHOWN ABOVE EL. -42.0
S CASE GOVERNS
Q CASE COMPUTED BUT NOT SHOWN

PUNCH THROUGH OCCURS APPROX. ONE PILE DIAMETER ABOVE SAND-CLAY INTERFACE

LEGEND
○ Q CASE
□ S CASE
—— COMPRESSION
– – – TENSION

NOTE:
1. PILE CAPACITIES CONSIDER EXCESS PORE PRESSURE IN SAND STRATA (EL. -42.0 TO EL. -60.0) AND A CORRESPONDING REDUCTION IN INTERGRANULAR PRESSURE FOR THE STRATA.
2. SHOWN ARE ULTIMATE PILE CAPACITIES. ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING A FACTOR OF SAFETY EQUAL TO 2.0.
3. $\bar{\sigma}'z$ INCLUDES AN INDUCTION OF SOIL OVERBURDEN ON EITHER SIDE OF THE GATE (EL. 0.0 TO EL. -2.5), AVERAGE EXCESS UPLIFT = $6.5\,FT.(\frac{53-0}{2})$ IN SAND STRATUM, AND LIMITING $\frac{\bar{\sigma}'z}{\sigma}$ RATIO = 15 (FOR 14" PILE – $\bar{\sigma}'z$ AT EL. -60).
4. FOR STEEL "H" PILE USE $\frac{1}{2}(53+20)=26.5°$ FOR SKIN FRICTION.
5. C_a (SOIL – PILE ADHESION) = $0.5+0.25(C-0.5)$ WHERE $C=0.5$ T.S.F.
6. FOR STEEL "H" $\frac{\tan 26.5}{\tan 53} = 0.77$
7. K = 0.7 WHERE $\bar{\sigma}'z/\sigma$

STEEL H PILES ARE SHOWN FOR INFORMATION ONLY - NOT USED IN DESIGN

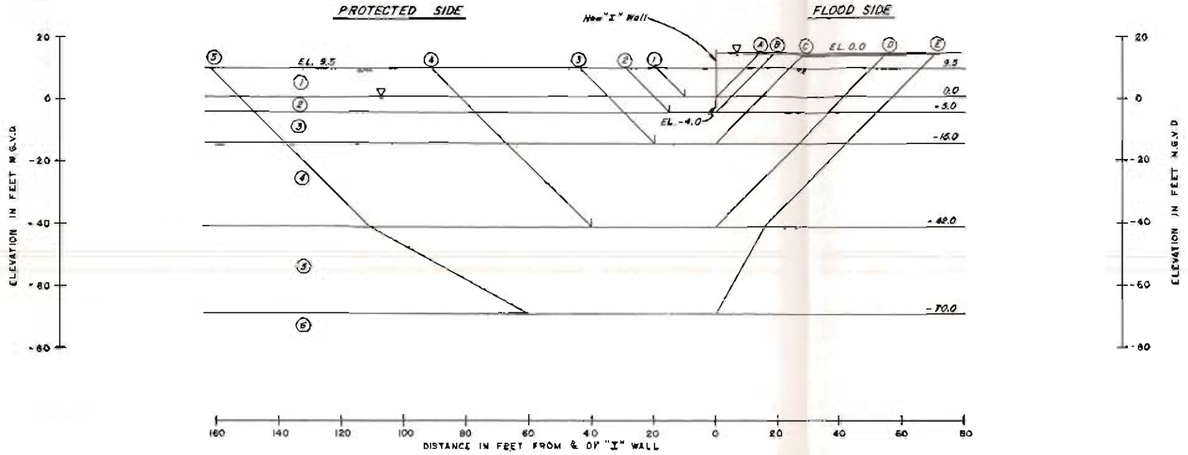
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
PILE CAPACITY CURVES EAST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1960
FILE NO. H-2-27790

PLATE 75

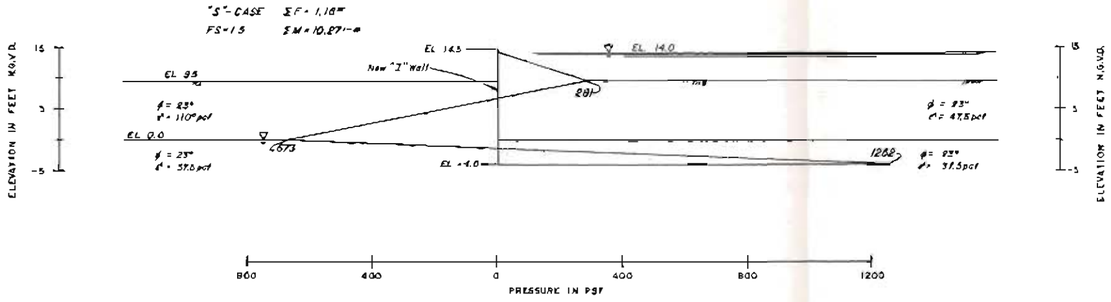


PROFILE LOOKING NORTH AT BEGINNING OF NEW FLOOD WALL STA. 99+33.49 WEST I.H.N.C.

ST. NO.	SOIL TYPE	UNIT WEIGHT PCF	COHESION PSF	FRICTION ANGLE DEG
1	CH	110	600	0
2	CH	100	300	0
3	CHO	92	200	0
4	CH	100	200/470	0
5	SP	122	0	33
6	CH	118	950	0

SURFACE	ELEV.	RA	RESISTING FORCE RB	RP	ΣR	DRIVING FORCE DA	DP	ΣO	FS = ΣR/ΣO
A-1	0	11400	6000	11400	28800	8257	4961	13197	8.736
B-2	-3.0	14400	4500	14400	33300	15367	10657	4710	7.069
C-3	-15.0	18400	4000	18400	40800	32028	24007	7521	5.425
D-4	-42.0	36490	18900	36490	91780	94925	79738	15127	6.067
E-5	-70.0	109188	57000	264290	430468	198029	175027	23002	18.715

Max. Moment = 41.1'K
Max. Deflection = 0.239"



PROFILE LOOKING NORTH AT BEGINNING OF NEW FLOOD WALL STA. 99+33.49 WEST I.H.N.C.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
STABILITY & I-WALL ANALYSIS WEST I.H.N.C.

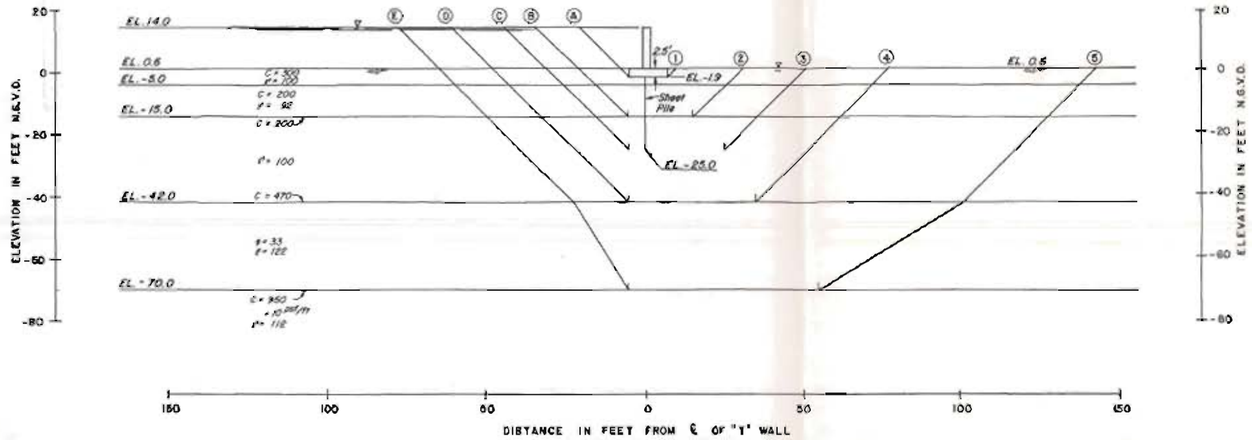
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE APRIL, 1980

FILE NO. H-2-27790

PLATE 76



CROSS-SECTION AT STA. 101+60 WEST I.H.N.C.
DEEP SEATED ANALYSIS

No.	ELEV.	U_A		U_P			$U_A = D_A - R_A$	$U_P = R_B + R_P + D_P$	$E_P = U_A - U_P$
		R_A	D_A	R_B	R_P	D_P			
A-1	-1.9	1155	7828	0	1155	117	6673	1272	5401
B-2	-15.00	5667	22906	3080	5667	4282	17239	12969	4270
C-3	-25.00	9507	38312	6930	9507	11248	28805	27685	1120
D-4	-42.00	19599	73220	14480	19599	31914	53621	65993	-12372
E-5	-70.00	60728	163288	43860	88505	98517	102560	230882	-128323

FS = 1.3 applied to soil strengths - Decreasing Ep with depth indicates that the critical surface is at the base of the structure, and no other load need be applied beneath the base.

DEPTH OF SHEET PILE ANALYSIS

Lane's Weighted Creep Ratio Method

$$LWCR = \frac{\text{Creep Distance}}{\text{Head}} \times 3$$

$$3 = [2.5 + 1/3(5) + d + d + 1/3(6) + 2.5] \div 13.4$$

$$40.2 = 8.67 + 2d$$

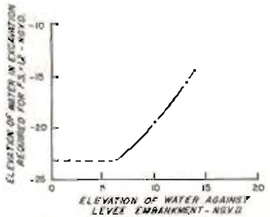
$$d = 15.8' \text{ or El. } -17.7$$

Extend Sheet Pile Cutoff to El. -25 to Penetrate Silt Layer.

See plate 73 for location of silt layer.

ST. No.	SOIL TYPE	UNIT WEIGHT P.C.F.	COHESION P.S.F.	FRICTION ANGLE DEG.
1	CH	110	600	0
2	CH	100	300	0
3	CHO	92	200	0
4	CH	100	200/470	0
5	SP	122	0	33
6	CH	112	950	0

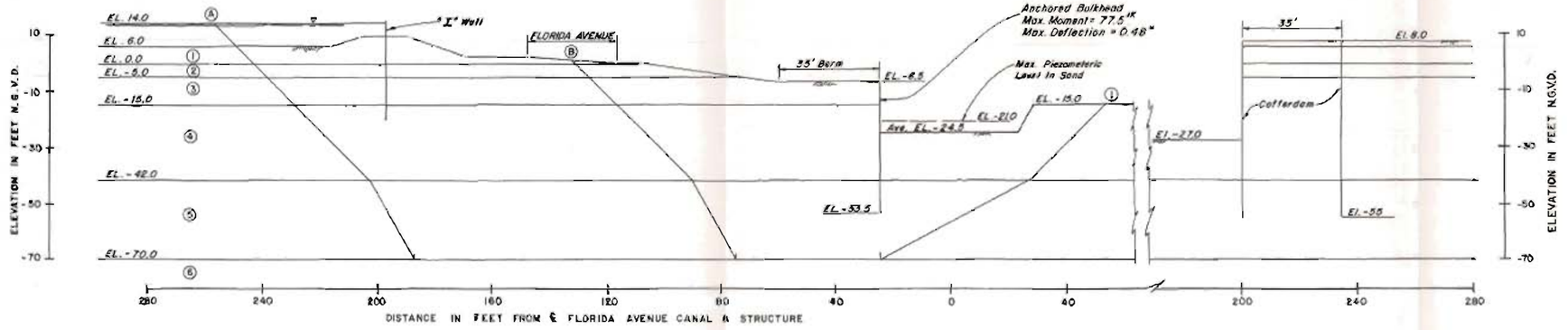
SURFACE	ELEV.	RESISTING FORCE R_A	R_B	R_P	ΣR	DRIVING FORCE D_A	D_P	ΣD	$FS = \frac{\Sigma R}{\Sigma D}$
A-1	-70.00	125813	153900	101991	381704	313791	105669	208122	1.834
B-1	-70.00	97302	71250	101991	270543	232349	105669	126680	2.136



EXCAVATION REWATERING REQUIREMENTS
BASED ON STABILITY OF SOUTHSIDE LEVEE EMBANKMENT

The above curve indicates the amount of water which must be placed into the excavation in order to obtain a factor-of-safety of 1.2. The assumed failure surface extends from the levee embankment (located on the south side of and parallel to the Florida Ave. Canal) to the excavation behind the sheetpile bulkhead. The sheetpile bulkhead is considered as not offering any resistance to failure.

Below elevation + 6 N.G.V.D. the water against the embankment has no effect on the stability as indicated by the dashed portion of the curve. The factor-of-safety of the embankment for water elevations below elevation + 6 and for the excavation dry is 1.17.



CROSS-SECTION THROUGH ℄ FLOOD WALL AND SLUICE GATE – WEST I.H.N.C.

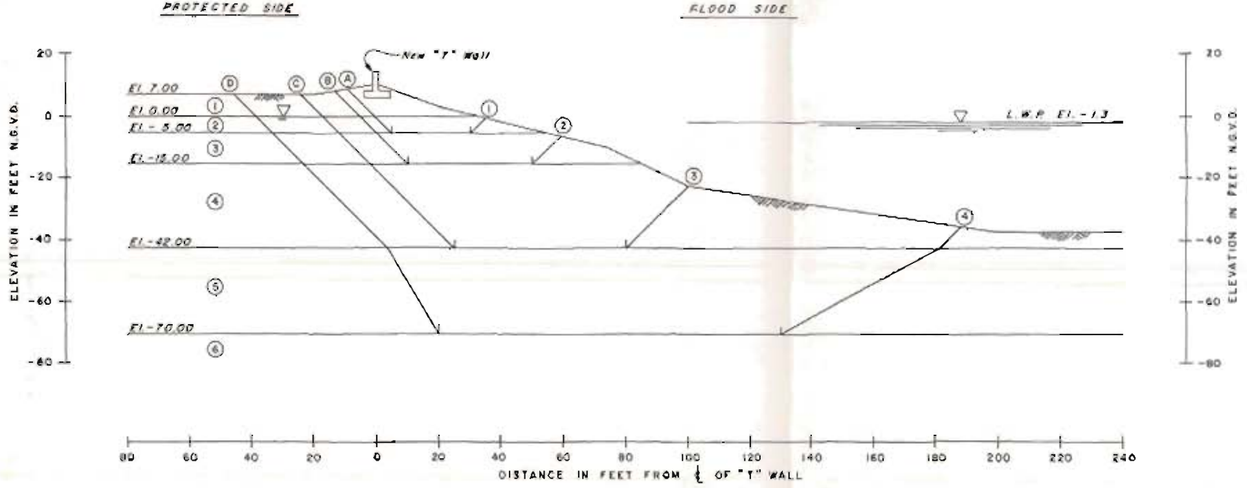
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
STABILITY & DEEP-SEATED ANALYSIS – WEST I.H.N.C.

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL 1960
FILE NO. H-2-27790

PLATE 77

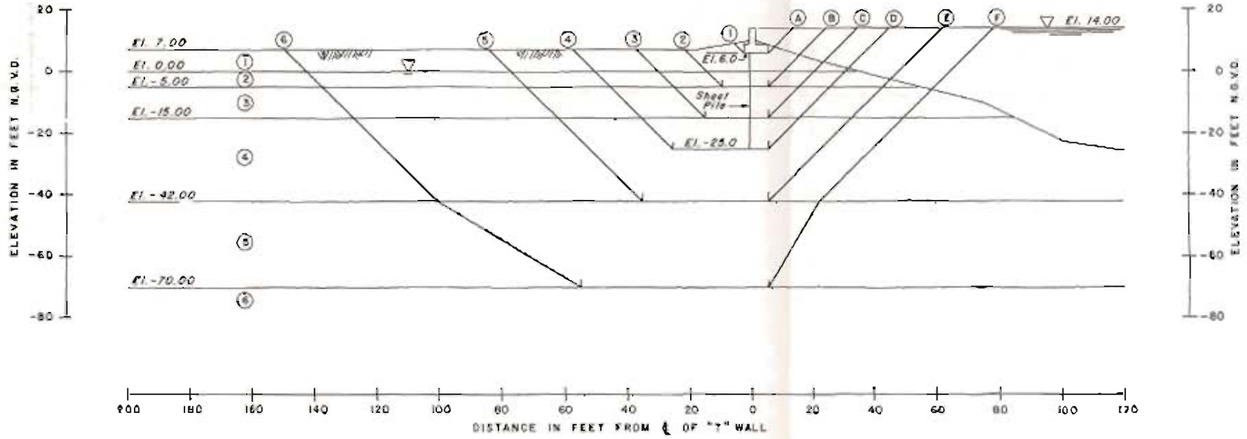


PROFILE LOOKING NORTH AT END OF NEW FLOOD WALL STA. 108 + 31.20 WEST I.H.N.C.

ST. No.	SOIL TYPE	UNIT WEIGHT P.C.F.	COHESION P.S.F.	FRICTION ANGLE DEG.
1	CH	110	600	0
2	CH	100	300	0
3	CHO	92	200	0
4	CH	100	200/470	0
5	SP	122	0	33
6	CH	118	950	0

SURFACE	ELEV.	RESISTING FORCE R_A	R_B	R_P	ΣR	DRIVING FORCE D_A	D_P	ΣD	$FS = \frac{\Sigma R}{\Sigma D}$
A-1	- 5.00	12391	7500	2679	22570	10155	799	9356	2.412
B-2	- 15.00	15087	6000	3461	26548	22424	1399	21025	1.263 (1)
C-3	- 42.00	31090	25850	13400	70340	65579	10907	54672	1.287 (1)
D-4	- 70.00	91502	104500	89283	285285	151585	36420	115165	2.477

(1) Factor of safety is acceptable considering very short length of levee in this area.



PROFILE LOOKING NORTH AT END OF NEW FLOOD WALL STA. 108 + 31.20 WEST I.H.N.C.
DEEP SEATED ANALYSIS

No.	ELEV.	U_A O_A	R_A	U_P D_P	R_P	R_B	$U_A' = D_A - R_A$	$U_P' = D_P + R_P + R_B$	$E_P' = U_A - U_P$
A-1	6.00	2109	1736	333	2033	0	373	2366	- 1993
B-2	- 5.00	13741	7434	7140	8778	3465	6307	19383	- 13076
C-3	- 15.00	28021	8554	18114	11858	3080	19467	33052	- 13585
D-4	- 25.00	44736	10618	32614	15698	6930	34120	55242	- 21122
E-5	- 42.00	80377	18462	65982	25762	14480	61915	106224	- 44309
F-6	- 70.00	175426	69124	153508	126663	43860	106302	324031	- 217729

FS = 1.3 applied to soil strengths – Decreasing E_P' with depth indicates that the critical surface is at the base of the structure, and no other loads need be applied beneath the base.

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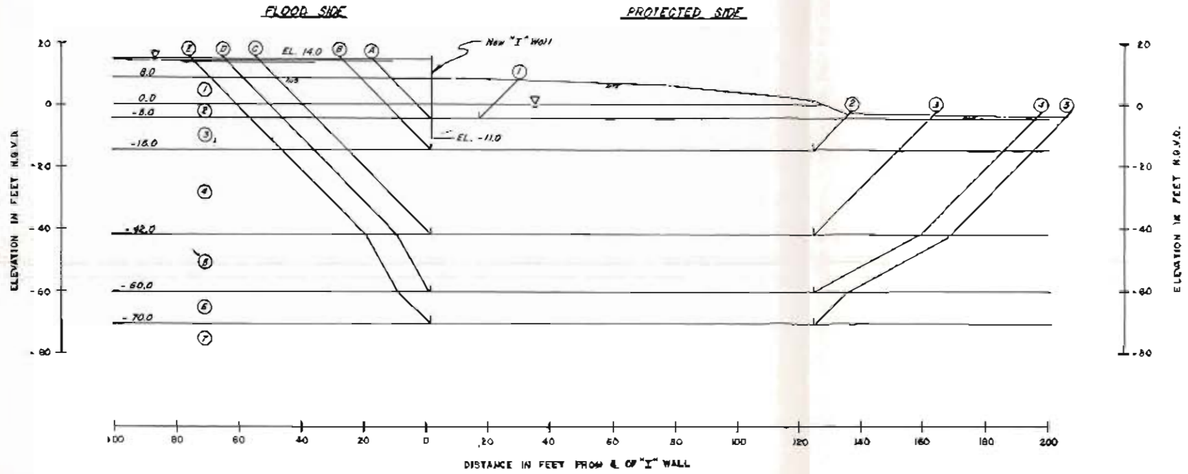
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DEEP-SEATED ANALYSIS
WEST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980 FILE NO. H-2-27730

PLATE 78

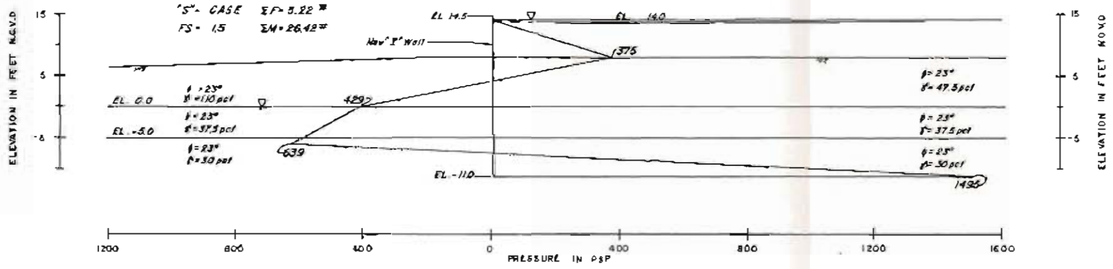


PROFILE LOOKING WEST AT BEGINNING OF NEW FLOOD WALL STA. 0+00.00 EAST I.H.N.C.

ST NO.	SOIL TYPE	UNIT WEIGHT PCF	COHESION PSF	FRICTION ANGLE DEG.
1	CH	110	600	0
2	CH	100	300	0
3	CHO	98	200	0
4	CH	100	250/470	0
5	SP	122	0	33
6	CH	117	620/750	0
7	CH	112	950	0

SURFACE	ELEV.	RESISTING FORCE RA	RB	RP	RR	DRIVING FORCE DA	DP	RD	FS = RF/RD
A-1	- 8.0	12800	4500	11894	28944	14580	7926	6554	4.426
B-2	-19.0	16600	24000	5196	48776	30332	3187	27145	1.586
C-3	-42.0	34650	58600	22949	114739	51305	26875	64650	1.770
D-4	-60.0	76839	90000	107148	273445	150894	50420	90444	3.023
E-5	-70.0	90728	90000	118762	300439	191926	87877	104048	2.888

Max. Moment = 8.7" K
Max. Deflection = 1.164"



PROFILE LOOKING EAST AT BEGINNING OF NEW FLOOD WALL STA. 0+00.00 EAST I.H.N.C.

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.

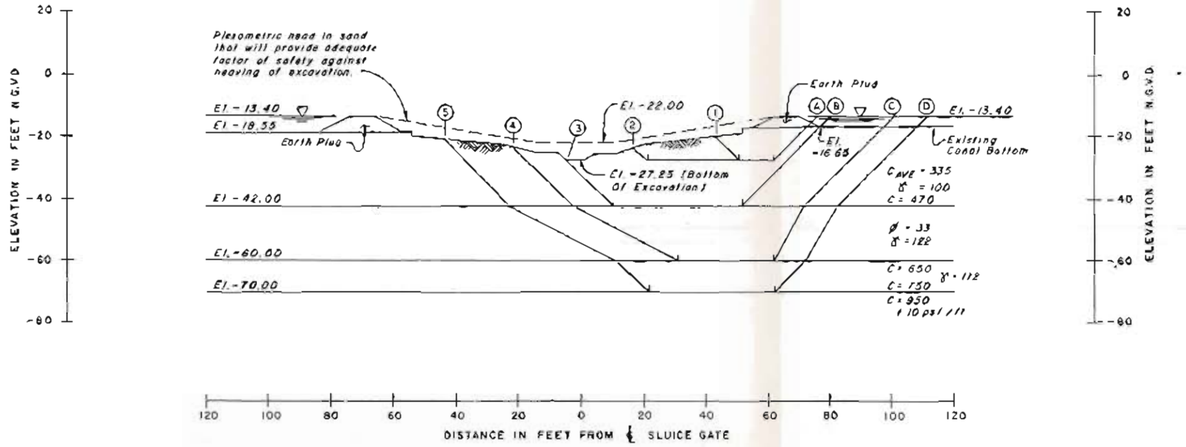
STABILITY & I-WALL ANALYSIS - EAST I.H.N.C.

N+Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

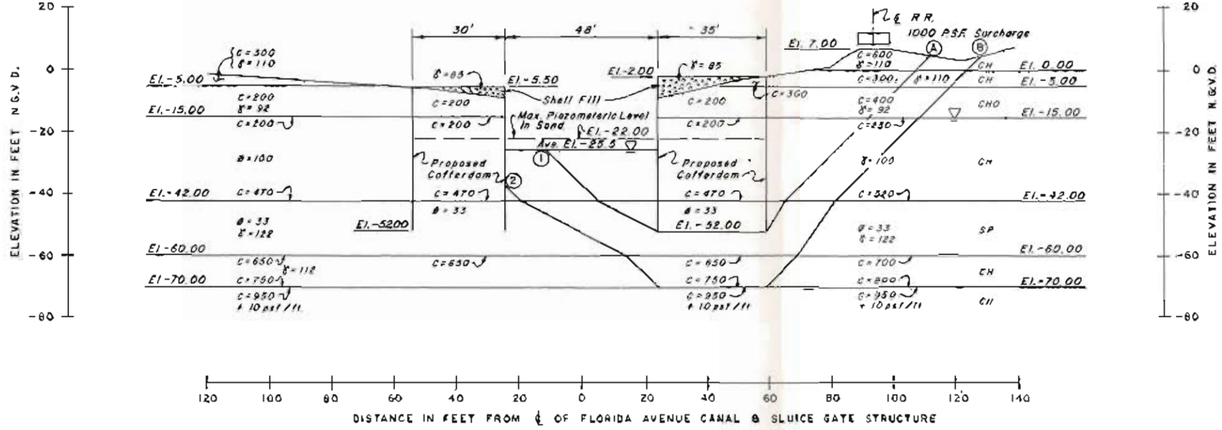
DATE: APRIL, 1960
FILE NO. H-2-27750

PLATE 79



EARTH PLUG FOR SLUICE GATE EXCAVATION

No.	RESISTING FORCE ELEV.	R_A	R_B	R_P	ΣR	DRIVING FORCE D_A	D_P	ΣD	$FS = \frac{\Sigma R}{\Sigma D}$
A-1	-27.25	6483	3553	3918	13954	10400	3190	7210	1.935
A-2	-27.25	6483	13243	2178	21904	10400	1110	9290	2.358
B-3	-42.00	17420	17572	11642	46635	33598	5492	28103	1.659
C-4	-60.00	41187	20150	58780	120117	80695	33195	47500	2.529
D-5	-70.00	51448	30750	69101	151299	112370	60856	51514	2.937



TRANSVERSE CROSS-SECTION THROUGH CENTERLINE OF EAST SIDE SLUICE GATE

No.	RESISTING FORCE ELEV.	R_A	R_B	R_P	ΣR	DRIVING FORCE D_A	D_P	ΣD	$FS = \frac{\Sigma R}{\Sigma D}$
A-1	-32.00	57401	75262	32708	165371	131407	14733	116674	1.417
B-2	-70.00	91706	26250	64532	182568	214967	77985 *	136972	1.333

* Includes skin friction on sheet piles.

Note: For the operating condition with the water at elevation -1.45 NGVD in the Florida Avenue Canal, driving forces developed by the active wedges are substantially unchanged while resisting forces developed by the passive wedges are appreciably greater due to the weight of the structure and 5-ft. water depth in the canal. Resistance of the piles supporting the concrete structure as well as the shear strength of the concrete are disregarded.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
STABILITY & I-WALL ANALYSIS - EAST I.H.N.C.

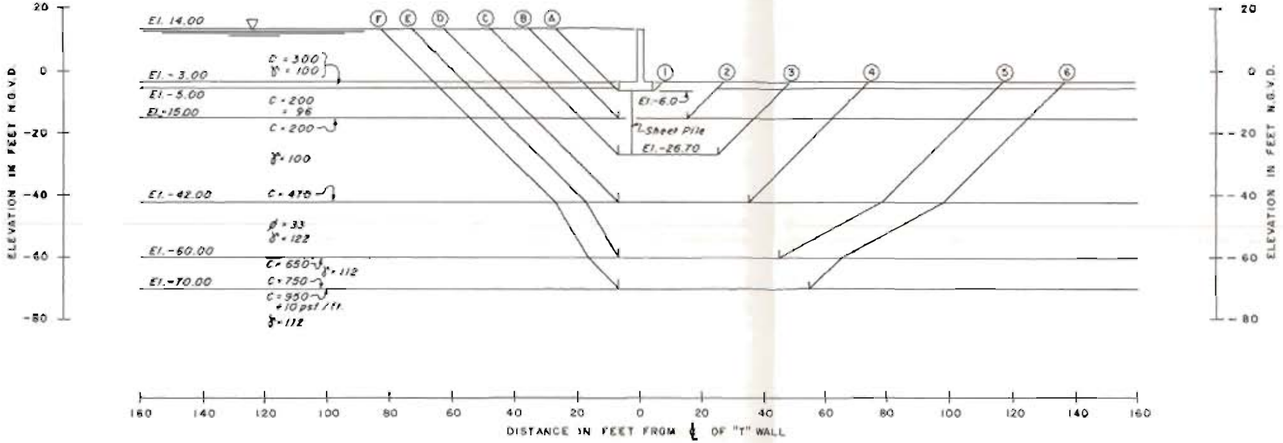
N.Y. ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS, METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 80



CROSS-SECTION AT STA. 6+26 EAST I.H.N.C.
DEEP SEATED ANALYSIS

No.	ELEV.	U_A		U_P			U_A = $D_A - R_A$	U_P = $D_P + R_P + R_B$	E_P = $U_A - U_P$
		D_A	R_A	D_P	R_P	R_B			
A-1	- 6.00	12393	1232	168	1232	0	11161	1400	9761
B-2	- 15.00	24125	4004	2333	4004	5082	20121	11419	8702
C-3	-26.70	40411	7844	7993	7844	7392	32567	23229	9338
D-4	-42.00	76820	17908	26353	17908	15204	58912	59445	- 533
E-5	-60.00	130907	39506	61288	43508	26000	91401	130796	-39395
F-6	-70.00	168857	50264	88605	54267	35774	118593	178646	-60053

FS = 1.3 applied to soil strengths – Decreasing E_P with depth indicates the critical surface is at the base of the structure, and no other loads need be applied beneath the base.

DEPTH OF SHEET PILE ANALYSIS

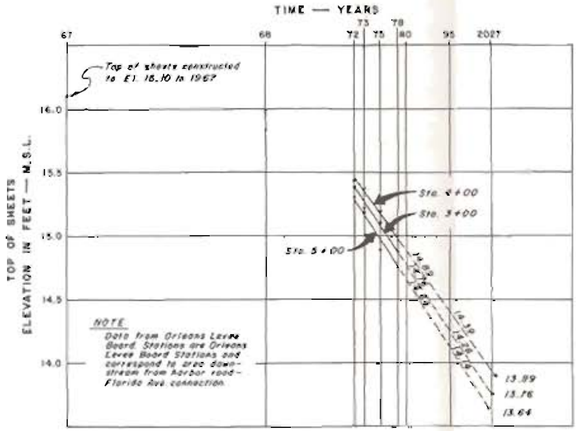
Lane's Weighted Creep Ratio Method

$$L_WCR = \frac{\text{Creep Distance}}{\text{Head}} = 3$$

$$3 = \frac{3 + 1/3(4) + d + d + 1/3(7) + 3}{17}$$

$$51 = 9.67 + 2d$$

$$d = 20.7' \text{ or } El -26.7$$



ESTIMATED FUTURE SETTLEMENT OF EXISTING LEVEE
STA. 8+17 — STA. 10+96

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DEEP SEATED & SETTLEMENT ANALYSIS – EAST I.H.N.C.

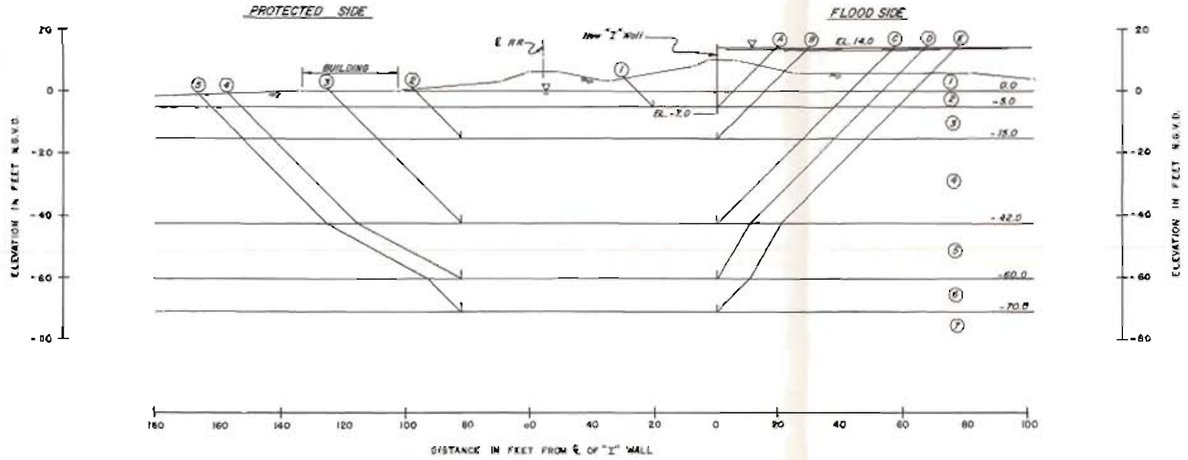
N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

FILE NO. H-2-27790

PLATE 81

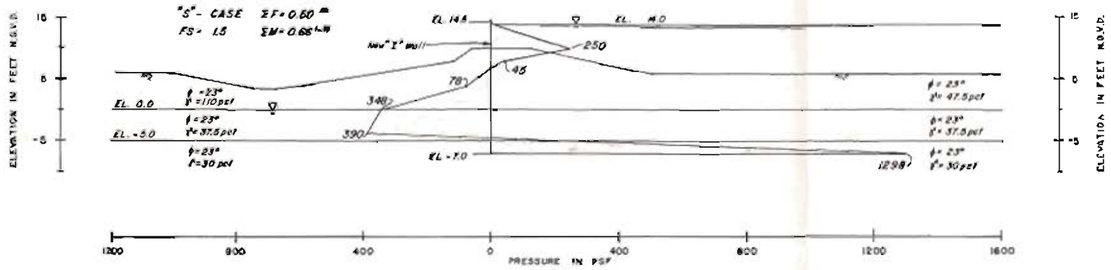


PROFILE LOOKING WEST AT END OF NEW FLOOD WALL STA. 10+89.59 EAST I.H.N.C.

ST. NO.	SOIL TYPE	UNIT WEIGHT PCF	COHESION PSF	FRICTION ANGLE DEG.
1	CH	110	600	0
2	CH	100	300	0
3	CHO	92	200	0
4	CH	100	200/470	0
5	SP	122	0	33
6	CH	112	650/750	0
7	CH	112	950	0

SURFACE	ELEV.	R_A	RESISTING FORCE R_B	R_P	ΣR	DRIVING FORCE D_A	D_P	ΣD	FS = $\frac{\Sigma F}{\Sigma D}$
A-1	-5.0	13122	6000	8200	27322	15305	4743	10641	2.568
B-2	-15.0	15035	18000	7514	38549	31127	5817	25310	1.523
C-3	-42.0	32290	37600	25090	94980	89601	33013	56588	1.678
D-4	-60.0	75422	60000	115708	251131	148992	88815	60378	3.124
E-5	-70.0	88407	80000	127469	275876	189395	97338	91057	3.030

Max Moment = 33'K
Max Deflection = 0.333"



PROFILE LOOKING WEST AT END OF NEW FLOOD WALL STA. 10+89.59 EAST I.H.N.C.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO.4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
STABILITY & I-WALL ANALYSIS - EAST I.H.N.C.

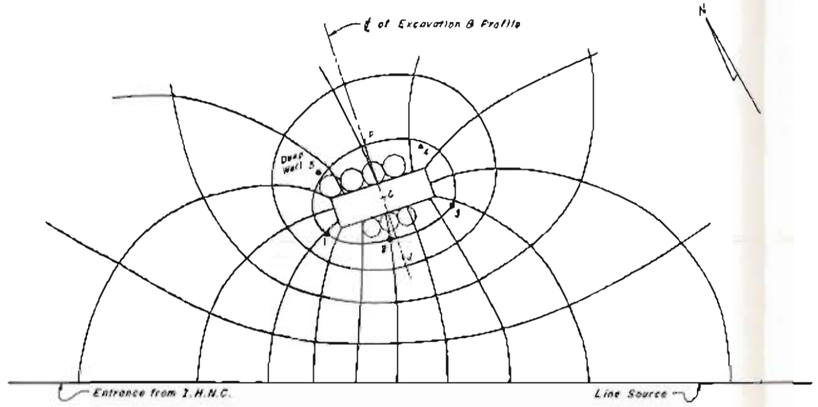
N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

DATE: APRIL, 1980

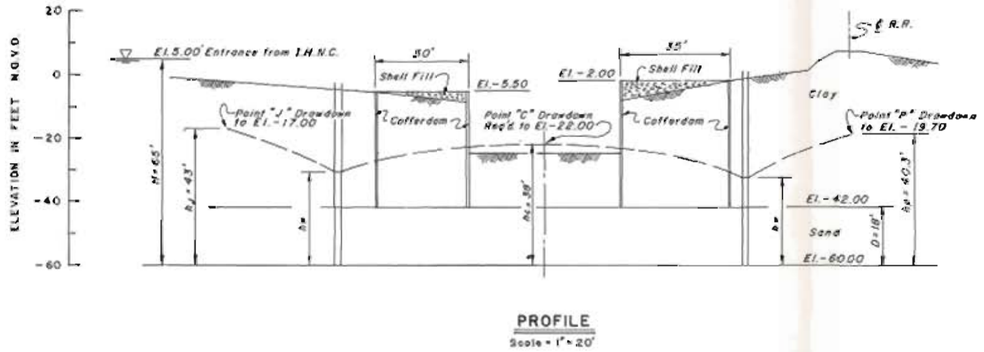
FILE NO. H-5-27790

PLATE 82



PLAN FLOWNET
Scale: 1" = 100'

LEGEND
1 ● — Well No. 1



PROFILE
Scale = 1" = 20'

From equations determine flow at wells for required drawdown at center of excavation (Point "C") to El. -22.00 for operating condition with steady state flow and high water in I.H.N.C. at El. 5.00.

$$H - h_c = \frac{F_c}{2\pi KD} \qquad \text{(Eq. IV-65)}$$

$$65 - 38 = \frac{F_c}{2\pi (0.08)(18)}$$

$F_c = 244.3$

$$F_c = \sum_{i=1}^{i=n} Q_{wi} \ln \frac{S_i}{f_i} \qquad \text{(Eq. IV-66)}$$

$$F_c = Q_{w1} \ln \frac{530}{102} + Q_{w2} \ln \frac{518}{65} + Q_{w3} \ln \frac{580}{117} + Q_{w4} \ln \frac{664}{101} + Q_{w5} \ln \frac{630}{110}$$

Assume $Q_{w1} = Q_{w2} = Q_{w3} = Q_{w4} = Q_{w5}$

$Q_w = 27.13$ ft.^{3}/min.

Determine Drawdown At Wells

$$F_w = Q_{wj} \ln \frac{2L_j}{r_{wj}} + \sum_{i=2}^{i=n} Q_{wi} \ln \frac{S_{ij}}{f_{ij}} \qquad \text{(Eq. IV-66)}$$

$$F_1 = 27.13 \ln \frac{2(832)}{1} + 27.13 \left[\ln \frac{470}{98} + \ln \frac{548}{202} + \ln \frac{620}{202} + \ln \frac{562}{98} \right]$$

$F_1 = 314.0$

$F_2 = 321.6$ from similar calculation

$F_3 = 319.4$ from similar calculation

$$F_4 = 27.13 \ln \frac{2(370)}{1} + 27.13 \left[\ln \frac{621}{202} + \ln \frac{599}{155} + \ln \frac{653}{105} + \ln \frac{720}{169} \right]$$

$F_4 = 335.3$

$F_5 = 327.6$ from similar calculation

Determine Drawdown At Points "P" And "J"
Substitute F_p for F_c in Eq. IV-66

$$F_p = \sum_{i=1}^{i=n} Q_{wi} \ln \frac{S_i}{f_i} \quad \text{solve for } F_p$$

$$F_p = 27.13 \left[\ln \frac{617}{159} + \ln \frac{609}{160} + \ln \frac{675}{175} + \ln \frac{758}{91} + \ln \frac{715}{89} \right]$$

$F_p = 223.7$

$F_j = 199.4$ from similar calculation

Substitute F_w, F_p and F_j for F_c in Eq. IV-65

$H - h_1 = \frac{F_w}{2\pi KD}$ solve for drawdown at wells

$h_1 = 30.3'$ or El. -29.70
$h_2 = 29.4'$ or El. -30.60
$h_3 = 29.7'$ or El. -30.30
$h_4 = 27.9'$ or El. -32.00
$h_5 = 28.8'$ or El. -31.20

$H - h_p = \frac{F_p}{2\pi KD}$ solve for drawdown at Point "P"

$h_p = 40.3'$ or El. -19.70

$H - h_j = \frac{F_j}{2\pi KD}$

$h_j = 43.0'$ or El. -17.00

Determine Hydraulic Head Losses At Well No. 4

Entrance Head Loss = 0.55' from Fig. IV-24a with Q = 203 gal./min. per 18 ft.
Head Loss in Screen = 0.01' from Fig. IV-24b with screen length = 18 ft.
Head Loss in Riser = 0.02' from Fig. IV-24b with 42 ft. of riser pipe at C = 130.
Velocity Head Loss = 0.03' from Fig. IV-24c
Total Hydraulic Head Loss 0.61'

Check Flow Per Well By Flownet

$Q_1 = KDHS$ $\quad S = \frac{\text{Flow lines}}{\text{Equipotential Lines}}$ and H = Drawdown at Point "C"

$Q_1 = 0.08(18)(65-38)\left(\frac{14}{4.5}\right)$

$Q_1 = 121$ ft.^{3}/min.

$Q_w = 24.2$ ft.^{3}/min. < 27.13 ft.^{3}/min.

Basic Assumptions:

Artesian flow
Single line source - from I.H.N.C. (extension of El. -42.00 contour)
Fully penetrating wells
Use dewatering TM-5-818-5
Require drawdown to El. -22.00 at centerline of excavation
Locate wells outside of cofferdams
Operating condition with steady state of groundwater flow
Maximum water in I.H.N.C. of El. 5.00 N.G.V.D. for operating condition

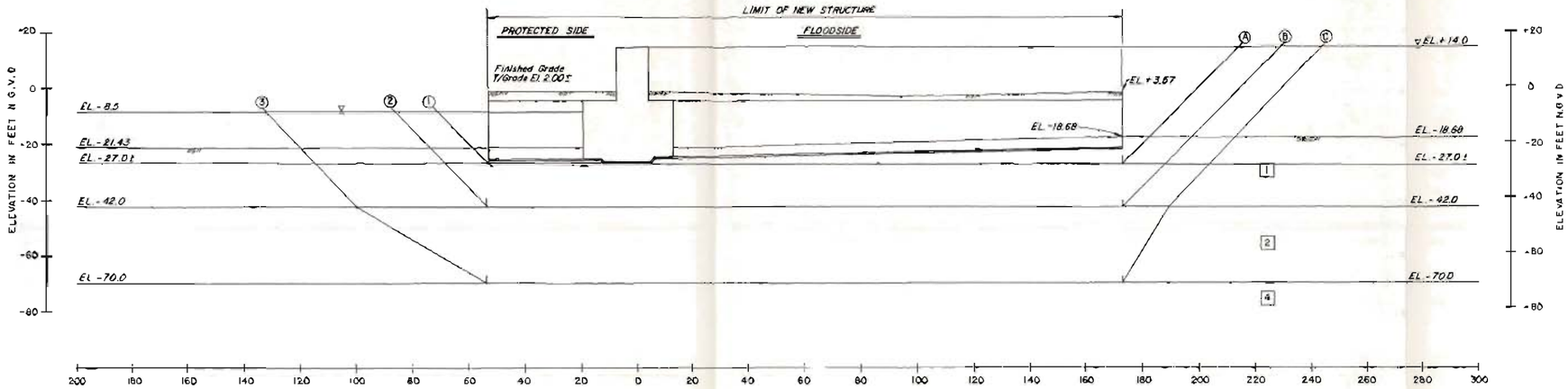
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DEWATERING ANALYSIS
GATE NO. 2E - EAST I.H.N.C.

N-Y ASSOCIATES, INC. CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS METAIRIE, LOUISIANA

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

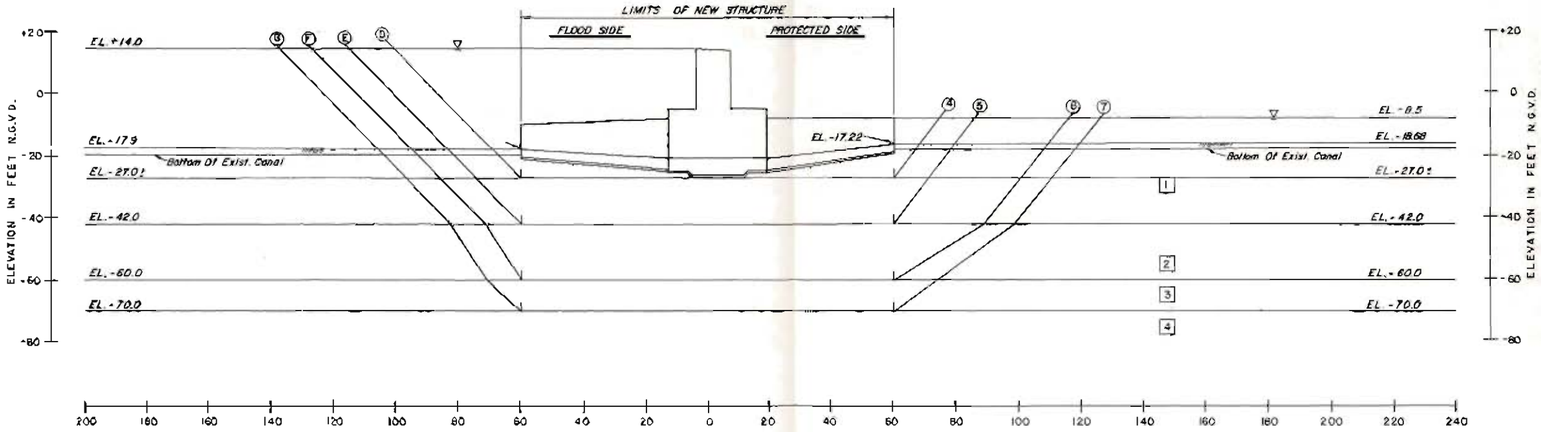
DATE: APRIL, 1980 FILE NO. H-2-27790

PLATE 83



WEST I.H.N.C. GATE 4W

ST. No.	SOIL TYPE	UNIT WEIGHT P.C.F.	COHESION P.S.F.	FRICTION ANGLE DEG.
1	CH	100	200/470	0
2	SP	122	0	33
3	CH	112	850/1750	0
4	CH	112	950	0



EAST I.H.N.C. GATE 2E

No	ELEV	U_A		U_D			$U_A - R_A$	$U_D + R_D + R_B$	$E_p = U_A - U_p$
		D_A	R_A	D_p	R_p	R_B			
A - 1	-27.00	53835	3735	11282	2520	55960	50100	69762	-19662
B - 2	-42.00	108195	12855	43015	12525	81812	95344	137353	-42009
C - 3	-70.00	278512	42673	171088	85741	188206	235839	422035	-186196
D - 4	-27.00	53900	3570	12382	3990	20862	50333	44434	+5896
E - 5	-43.00	108375	12576	46314	13132	37755	95799	97201	- 1402
F - 6	-60.00	207018	28482	120296	55558	49362	178536	225216	- 46680
G - 7	-70.00	278385	39242	177967	86318	65778	239143	310063	- 70920

FS - 1.3 applied to soil strengths - Decreasing E_p with depth indicates the critical surface is at the base of the structure, and no other loads need be applied beneath the base.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND
CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX, I.H.N.C.
DEEP SEATED ANALYSIS
SLUICE GATES 4W & 2E

N-Y ASSOCIATES, INC.
CONSULTING ENGINEERS
ARCHITECTS AND PLANNERS
METAIRIE, LOUISIANA

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

DATE: APRIL, 1960

FILE NO. H-2-27790

PLATE 84

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					

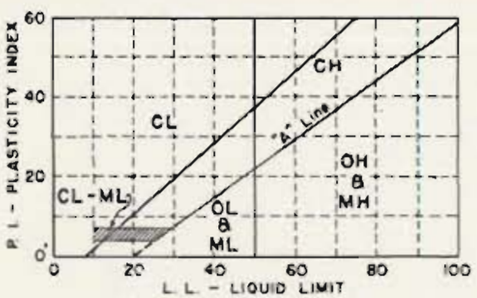
NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols

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	gnGr
GRAYISH - GREEN	gyGn
GREEN	Gn
BLUE	Bl
BLUE - GREEN	BlGn
WHITE	Wh
MOTTLED	Mot

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

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

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 (1⅜" 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 remolded 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.

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
3	5-3-71	ADDED UPPER LIMIT LINE (EQUATION: PI = 0.9 (LL-8)) ON PLASTICITY CHART	LMVED-S LETTER DTD 15 APRIL 1971
2	6-6-64	SYMBOL FW, NOTE REVISED	ORAL FROM LMVED 5 JUNE 1964
1	6-17-63	1ST PAR OF GENERAL NOTES REVISED	LMVD MULTIPLE LETTER, DATED 3 SEPT. 1963

SOIL BORING LEGEND

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
FILE NO. H-2-21803

PLATE A

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 – GENERAL DESIGN
FLORIDA AVENUE COMPLEX I.H.N.C.

APPENDIX A
CORRESPONDENCE RELATIVE TO COORDINATION WITH OTHER AGENCIES

ERNEST N. MORIAL, President
HARRY McCALL, JR., President Pro-Tem.

Sewerage & Water Board OF NEW ORLEANS
CITY HALL · CIVIC CENTER
NEW ORLEANS, LA., 70165 · 586-4547

G. JOSEPH SULLIVAN
General Superintendent

May 19, 1978

Pepper and Associates, Inc.
3012 - 26th Street
Metairie, Louisiana 70002

Attention: Mr. Jerome Pepper
President

RE: S&WB Contract 5075-1
Drainage Pumping Station #19
Flood Gates on Florida Ave. Canal

Gentlemen:

We are in receipt of your letter of May 12, 1978. The drawings have been reviewed and it has been determined that the structure as shown does not offer any restrictions to our operation. The Board therefore has no objection to this design.

The Sewerage and Water Board however reserves the right to review and approve the method and/or sequence of the construction of the gate structure.

Very truly yours,

GENERAL SUPERINTENDENT

GJS/L
Enc. - Set of Plates
3, 18 & 19

FILE
DISTRIBUTION

PEPPER & ASSOCIATES, INC. RECEIVED MAY 22 1978 NEW ORLEANS, LA.

PHOTOCOPIES

(5)

PEPPER AND ASSOCIATES, INC.
CONSULTING ENGINEERS
3012 26TH STREET
METAIRIE, LOUISIANA 70002
504: 837-7330

JEROME PEPPER, P. E.
WARREN M. LAVELLE, P. E.

May 12, 1978

Mr. G. Joseph Sullivan
General Superintendent
Sewerage and Water Board
of New Orleans
City Hall - Civic Center
New Orleans, Louisiana 70165

RE: Pumping Station
Floodgate on Florida Avenue
Canal

Dear Mr. Sullivan:

As you are aware, the Orleans Levee Board has authorized the Sewerage and Water Board to increase the scope of the present Pepper & Associates contract for design of the pumping station to include design of construction plans for floodgate and floodwall on the westbank by the Pumping Station.

Since we have taken bids on the relocation of underground utilities and the Sewerage and Water Board on May 10, 1978, approved award of a construction contract to the low bidder, it is essential that we determine the new location as soon as possible as a part of the floodwall is already in this contract.

With this in mind, we have contacted the Corps of Engineers to obtain from them their most current plans for the floodgate and wall. In our discussions with the Corps, it became apparent that the Sewerage and Water Board never formally reviewed and approved the size of the openings of the proposed floodgate structure. Therefore, before we proceed to determine the new location of the structure, we are forwarding herewith, for your review, comments, and approval, two sets of concept plans indicating the Corps' proposed floodgate structure, which I am advised is based on previous conferences held between personnel of the Corps and the Sewerage and Water Board.

Please return one set of plans as soon as possible with your comments so that we can obtain concurrence from the Corps of Engineers, if any revisions are requested.

Very truly yours,

PEPPER & ASSOCIATES, INC.

Jerome Pepper
President

JP/dm
Enclosures
CC: Mr. John McNamara (with enclosures-Plate 3,18 & 19)
Corps of Engineers

(4)

Mr Henderson

MOON LANDRIEU, President
ULISSE M. NOLAN, President Pro-Tem.

Sewerage & Water Board OF NEW ORLEANS
CITY HALL · CIVIC CENTER
NEW ORLEANS, LA. 70112 · 529-4311

G. JOSEPH SULLIVAN
General Superintendent

September 15, 1972

Colonel Richard L. Hunt, CE
District Engineer
Department of the Army
N. O. District, Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

RE: Lake Pontchartrain hurricane protection -
Florida Avenue Complex

Dear Colonel Hunt:

This is to confirm our understanding and our answers to inquiries made during a meeting at your office on September 5, 1972 with Mr. Stuart Brehm, Jr. and the writer representing the Sewerage and Water Board.

It is our understanding from your statement that the pumping station on the west bank of the Industrial Canal at Florida Ave. is being programmed and 70% funded by a Federal grant for hurricane protection in the area. The remaining 30% funding for this pumping facility will be by local participation. It was discussed and agreed that the Sewerage and Water Board would handle the design of the new pumping station with a Consulting Engineer. The Sewerage and Water Board will also supervise the construction of the new pumping facility. It was further understood that the local portion of funding would fall upon the Orleans Levee Board and the Sewerage and Water Board.

The Sewerage and Water Board confirmed that the capacity of the new station would be determined by the capacity of the siphon in the amount of 2,360 c.f.s.

The Corps of Engineers asked about the future requirements of the Florida Ave. siphon and if this structure could be abandoned. The Florida Ave. siphon will still be necessary to back pump from the east bank of the Industrial Canal to the new drainage facility. Both the Florida Ave. siphon and Station #5 will be necessary after the construction of the new station if the east side of the Industrial Canal is to be protected at Florida Ave.

Concerning dry weather flow after the new facility is complete. This could be handled in the same manner through Station "D" without changing our present pumping arrangements.

The Corps of Engineers mentioned a by-pass channel to be utilized in the Florida Ave. Canal for construction of a new flood gate. The Sewerage & Water Board advised that this could be handled by a pipe line by-pass for dry weather flow and work could be stopped during storm run-off and resume work directly after water is removed from the channel. The Sewerage and Water Board also agreed to supervise this operation since this is a normal canal construction sequence used in the Sewerage and Water Board network.

The construction schedule for the pumping station, in accordance with Sewerage and Water Board needs, is as follows:

6 months - design time using Consultant
3 months - advertisement of bids
3 months - award of construction contract
2 years - construction time

The Corps of Engineers advised that it will take approximately two (2) years to complete construction of the new levee in the area and since the pumping station will require three (3) years, it is felt it may be difficult to coordinate the construction activities and obtain flood protection at an earlier date. The Corps of Engineers was advised by the Sewerage and Water Board that construction of the lower portion of the pumping station could be completed within two (2) years and thus provide total flood protection to the top of the levee simultaneously with the Corps of Engineers project. Superstructure of the pumping station and machinery installation would require an additional year; making a total of three (3) years.

A short discussion on permits, revealed that the following permits will have to be filed before the start of construction and these permit requests would be prepared when the project obtained a definite status:

1. Orleans Levee Board
2. U. S. Engineers
3. Department of Public Works, State of Louisiana
4. Stream Control Commission
5. U. S. Coast Guard
6. Dock Board
7. Health Department, State of Louisiana
8. Health Department, City of New Orleans

The above is our best understanding of our meeting and we are awaiting additional information from your office prior to proceeding any further with the matter. Please advise if we can be of any assistance in getting this project under way.

Yours very truly,

S. Joseph Sullivan

GENERAL SUPERINTENDENT

GJS/atp
cc: Mr. Stuart H. Brehm, Jr.

The Board of Levee Commissioners

Orleans Levee District

200 WILDLIFE AND FISHERIES BUILDING
415 ROYAL STREET
New Orleans, La.
70130

July 10, 1972

Mr. Jerome C. Baehr
Chief, Engineering Division
Department of the Army
New Orleans District
Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

Re: Florida Ave. Complex

Dear Mr. Baehr:

Enclosed are copies of letters and plans received from the Sewerage and Water Board and New Orleans Public Service, Inc. concerning their comments in response to your letter of 5 April 1972 in regard to the relocation of interferring utilities in the Florida Avenue Complex.

Yours truly,

JOHN P. MCNAMARA
CHIEF ENGINEER

JPMCN:sm

Encl.

cc: Hon. Guy F. LeMieux, Pres.

Sewerage & Water Board OF NEW ORLEANS
CITY HALL · CIVIC CENTER
NEW ORLEANS, LA. 70112 · 529-4311

G. JOSEPH SULLIVAN
General Superintendent

July 6, 1972

Mr. John P. McNamara
Chief Engineer & Asst. Secretary
The Board of Levee Commissioners
Orleans Levee District
200 Wildlife and Fisheries Building
418 Royal Street
New Orleans, Louisiana 70130

RE: Hurricane Protection - Florida Avenue

Dear Mr. McNamara:

We herewith return to you one print of the Florida Avenue Complex recommended protection plan marked to show the following comments.

1. Vertical Gate Structure West Side of Industrial Canal.

The drawing as marked by your engineering department shows a bypass channel around the gate structure. This channel is marked in yellow. This channel as shown will not adequately carry a storm flow of 2,000 cfs. It is also not required. By placing two low level dams at the east and west end of the construction daily dry weather flow can be prevented from flowing through the construction site.

A 72" steel pipe is more than adequate to carry the 35 M.G.D. dry weather flow. Storm waters would flow between the cofferdam and the steel sheeting over and through the construction site. This is standard practice in canal construction.

We believe the actual size of the vertical gate structure as shown is too wide and too long. A reduction in the physical size of the structure could very well result in a layout that would not disturb the existing 48" water main and the existing 54" sewer main. Shifting the entire structure in an easterly direction would also reduce the cost of a covered canal between the gate structure should the covered canal materialize.

2. Vertical gate Structure East Side of Industrial Canal.

The same general remarks with reference to low level dams, daily flow, and storm flow can be made for this structure. This is also true of the size of the gate structure.

Shifting the entire gate structure in a westerly direction would also reduce the cost of a covered canal between the gate structure should the covered canal materialize.

By allowing the force mains to pass through the flood wall and by moving the overhead roller gate structure at the roadway in a southerly direction, the present location of the 48" water main and the 54" sewer main could be maintained.

We would appreciate your comments on the points raised in this letter and shown on the drawing.

Yours truly,

G. Joseph Sullivan

GENERAL SUPERINTENDENT

GJS/ELS/L
Attachment

NEW ORLEANS PUBLIC SERVICE INC.
POST OFFICE BOX 60340
JOHN F. VOGT, JR.
VICE PRESIDENT
ENGINEERING
AREA CODE 504 529-4545
317 BARONNE STREET

June 23, 1972

Mr. John P. McNamara, Chief Engineer
Orleans Levee Board
200 Wildlife and Fisheries Building
418 Royal Street, Room 200
New Orleans, Louisiana 70130

SUBJECT: Proposed Floodwall Project
Florida Ave. and Inner Harbor
Navigation Canal

Dear Mr. McNamara:

Enclosed is the drawing of the subject project, which was received with your letter of May 24, 1972. We have indicated our existing electric distribution facilities in brown on this drawing. Our comments regarding these facilities are as follows:

West Side of Industrial Canal

Pole No. 3 - Possible conflict with proposed pump station. This pole may be relocated north of N.O.P.B. and Southern R.R. Tracks to resolve conflict.

Pole No. 4 & Pole No. 5 - Conflict with proposed pump station. These poles may be relocated to the east to eliminate conflict.

Listed below at locations shown on enclosed plan are the approximate height of the lowest wires over existing ground elevation.

At Location "A" - 43' NOPSI Primary Wires - 37' S&WB Wires
At Location "B" - 45' Primary Wires - 32' Sec. Wires
At Location "C" - 37' Primary Wires
28' Secondary Wires

Vicinity overhead roller gate (Harbor Road) - Possible conflict between gate structure and NOPSI Supervisory Control Cable. Such a conflict, if it exists, can be removed by raising the cable. During construction period, this cable could be temporarily rerouted to the north of the construction area, if necessary.

East Side of Industrial Canal

Pole No. 1 & Pole No. 2 - Possible conflict with proposed T-wall and overhead roller gate. These poles may be relocated toward the Industrial Canal to eliminate conflict. Pole No. 2 has a primary capacitor installation.

Listed below at locations shown on enclosed plan are the approximate height of the lowest wires over existing ground elevation.

At Location "D" - 38' NOPSI Primary Wires
At Location "E" - 37' NOPSI Primary Wires
At Location "F" - 39' NOPSI Primary Wires
33' S&WB Wires

In addition to the above electric distribution facilities, it appears that our 8" gas main shown on the east side of the Industrial Canal will require partial relocation.

No relocation of any of our facilities is contemplated until final plans of the proposed floodwall project are received and the phases of construction are known.

Please keep us apprised of the progress of this project and contact us if we can be of further assistance in its regard.

Very truly yours,

John F. Vogt, Jr.

GAM/mh
Enclosures

The Board of Levee Commissioners

OF THE

Orleans Levee District

200 WILDLIFE AND FISHERIES BUILDING
418 ROYAL STREET
New Orleans, La.
70130

JOHN P. MCNAMARA,
CHIEF ENGINEER
GEORGE J. LABRECHE,
EXECUTIVE ADMINISTRATOR

March 6, 1972

Mr. Jerome C. Baehr
Chief, Engineering Division
Department of the Army
New Orleans District
Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Baehr:

As requested by your letters of 7 December 1971 and 5 January 1972, I am enclosing comments received from New Orleans Public Belt Railroad dated February 25, 1972 relative to the construction procedures on the gates to be installed across their tracks near the France Road Ramp and on either side of the Industrial Canal at Florida Avenue.

Also enclosed is a copy of a letter from Southern Railway System dated February 7, 1972 outlining their comments as well as a copy of excerpts from the specifications which they have revised and revisions to the drawings.

Yours truly,

JOHN P. MCNAMARA
CHIEF ENGINEER & ASST. SEC.

JPMCN:sm

Encl.

cc: Hon. Edw. N. Lennox, Pres.

NEW ORLEANS PUBLIC BELT RAILROAD
SUITE 1224
INTERNATIONAL TRADE MART BLDG.
No. 2 CANAL STREET
NEW ORLEANS, LA. 70151

...ALL
...AUDITOR
...MANAGER
D. CHEEKESS
...ENGINEERING AND
...ANCE

P. A. WEBB, JR.
GENERAL MANAGER

J. N. LAIGAST
GENERAL SUPERINTENDENT
A. C. MARINELLO
CLAIM AGENT

February 25, 1972.

PLEASE REFER TO
FILE

Mr. John P. McNamara,
Chief Engineer and Assistant Secretary,
The Board of Levee Commissioners of the
Orleans Levee District,
418 Royal Street,
New Orleans, Louisiana 70130.

Dear Mr. McNamara:

RE: Floodwall and Gates -
West Side Industrial Canal -
France Road Ramp to Florida Avenue Bridge.

Refer please to your letter of January 7, 1972, in which you transmitted U. S. Corps of Engineer Drawings and Specifications, File No. H-4-25958, Sheets 1 through 27, showing proposed Floodwall, Levees, and Gates on the West Side of the Industrial Canal, and your letter of December 16, 1971, in which you transmitted Plans titled "Lake Pontchartrain, La. and Vicinity - Florida Avenue Complex," Sheets 1 through 6, and excerpts from their specifications.

We have reviewed these Drawings and Specifications, and would like to make the following remarks:

File H-4-25958:

Sheet 23 - Gate 10-W - PLAN-FALSEWORK. - We feel an additional timber pile is required on the west end of each pile cap, and consequently the pile caps will have to be lengthened.

Also, on the same sheet under "ELEVATION - FALSEWORK SPAN" we wish to emphasize the fact that the Top of Rail elevation on the falsework bridge cannot differ drastically from the existing track elevations.

This Gate is crossing the Public Belt's Running Track No. 2 which leads to France Yard, L. & N. - N.O.P.B. Interchange, various industries on both sides of the Industrial Canal and the Public Bulk Terminal. Because of the importance of this track, it cannot be taken out of service for any long periods. After discussing the matter with our General Superintendent, it was concluded that the Contractor will have approximately six hours of a normal work day period to perform his duties before

New Orleans, Louisiana.
February 25, 1972.

2-LTR. MR. MC NAMARA
RE: FLOODWALL AND GATES

the track is put back into service. The Contractor will have to closely coordinate his work with this Office during the installation of falsework bridge.

Plans Titled Lake Pontchartrain and Vicinity - Florida Avenue Complex:

Sheet 2 - Again we wish to emphasize the fact that the Top of Rail elevation on the falsework bridge cannot differ drastically from the existing track elevations.

Sheet 6 - (A) - We would like to have the top of the headwall for the C.M.P. Culvert at approximately the same elevation as the top of the cross ties in that area, whereby allowing the Switchman's shell walkway to be relatively level. If the shells are sloped to the headwall, as shown on this drawing, it would create a dangerous situation. Another suggestion concerning the above would be to move the headwall out at least 10 Feet from the rail (instead of 8 Feet) and slope the shells to it.

(B) We are unable to determine the exact amount of cover over the C.M.P. Culvert, that is, the distance between the bottom of the cross ties and the top of the pipe. It appears to us, from using a scale on the plan, that there isn't enough cover.

Also, would you please supply this Office with the locations and elevations of your "Bench Marks" in the area of these gates, so that we can collect elevation information that would be on the same data as your plans.

Very truly yours,

D. D. Childress/sa

SA/eo

MANAGER, ENGINEERING
AND MAINTENANCE

Southern Railway System
Office of Vice President
New Orleans, La. 70150

J. C. HAUNEY
VICE PRESIDENT

P. O. BOX 52110
1205 ST. LOUIS STREET

February 7, 1972

335-1

Mr. John P. McNamara
Chief Engineer and Asst. Secy.
The Board of Levee Commissioners
of the Orleans Levee District
418 Royal Street
New Orleans, La. 70130

Hurrican Protection Gate Vicinity of
Florida Avenue Bridge, New Orleans
Terminal Company

Dear Mr. McNamara:

Reference is made to our several recent exchanges of correspondence concerning the above subject.

Enclosed is a copy of "SPECIAL PROVISIONS," furnished by you, in which certain changes in the wording have been made. The sections involved are as follows:

1. (Page 2) Section entitled "WORK ON OR ADJACENT TO RAILROAD," Paragraph "g."

2. Section entitled "TEMPORARY FALSEWORK FOR RAILROAD GATE STRUCTURES." Item "1. Scope." (Page 4). Item "5. TIMBER WORK." (Page 7.) Item "7. REMOVAL OF TEMPORARY STRUCTURES." (Page 8.).

3. (Page 10.) " SEQUENCE OF CONSTRUCTION ON ONE TRACK RAILROAD GATE FALSEWORK." Items 2, 4 and 10.

4. (Page 11) "SEQUENCE OF CONSTRUCTION ON TWO TRACK RAILROAD GATE FALSEWORK." Items 2, 4, and 11.

In addition, we are enclosing prints of Sheets 2 and 3 of the plans which have been marked in red to indicate changes to be made to the falsework to conform to our specifications.

If the above questions are satisfactorily answered and changes completed, we shall be glad to handle for approval of the proposed work.

Yours very truly,

J. C. Hauney

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 – GENERAL DESIGN
FLORIDA AVENUE COMPLEX I.H.N.C.

APPENDIX B
HYDROLOGY AND HYDRAULICS

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN AND CHALMETTE AREA PLAN
DESIGN MEMORANDUM NO. 4 - GENERAL DESIGN
FLORIDA AVENUE COMPLEX I.H.N.C.

APPENDIX B

HYDROLOGY AND HYDRAULICS

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APPENDIX B

HYDROLOGY AND HYDRAULICS

1. General. This appendix presents all hydrologic and hydraulic design criteria and analyses associated with the Florida Avenue Complex floodwall. The overall plan of improvement is described in detail in the main body of this memorandum and references to the main text are cited where appropriate.

2. Tidal hydraulics.

a. General. The Hydrology and Hydraulic Analysis design memorandum for the Lake Pontchartrain and Vicinity Barrier-Low Level plan was presented in a series of three separate reports entitled Design Memorandum No. 1 and subtitled Part I - Chalmette, approved 27 October 1966; Part II - Barrier, 18 October 1967; and Part III - Lakeshore, 6 March 1969. These memorandums presented detailed descriptions of the climatology and hydrologic regimen of the area and detailed descriptions and analyses of the hydraulic methods and procedures used in design of the features for the plan. Also included in the memorandums are essential data, assumptions and criteria used, and results of studies which provide the basis for determining surges, routings, wind tides, wave runup and overtopping, and frequencies. All basic hydraulic information required for design of the Florida Avenue Complex is included in Part I - Chalmette.

b. Design Hurricane.

(1) Selection of design hurricane. The standard project hurricane (SPH) was selected as the design hurricane (Des H) due to the urban nature of the project area. A design hurricane of lesser intensity would indicate a lower net floodwall grade and expose the project area to disastrous flooding in the event of the occurrence of a hurricane approximating SPH character.

(2) Description of design hurricane. The design hurricane for the Florida Avenue Complex area is a hypothetical hurricane intended to represent the most severe combination of hurricane parameters that is reasonably characteristic of the

area, excluding extremely rare combinations. It was assumed that the design hurricane would approach the site from such a direction and at such a rate of movement as to produce the maximum hurricane surge at the location of interest. The design hurricane has a central pressure index of 27.4 inches of mercury; a maximum 5-minute average wind velocity offshore (in the Gulf of Mexico) of 100 mi/h 30 ft above the surface at a radius of about 30 nautical miles; a forward speed of 11 knots; a frequency of occurrence of once in about 200 years; and would progress along a path critical to the area of interest. Detailed information on the design hurricane is presented in Design Memorandum No. 1, Hydrology and Hydraulic Analysis, Part I - Chalmette.

c. Design floodwall height and freeboard.

(1) Insufficient open water areas exist for the generation of waves, therefore, no data on wave characteristics is furnished in this tidal hydraulics portion of the hydrology and hydraulics appendix.

(2) Occurrence of a design hurricane would produce a maximum storm surge level of 13.0[1] along the Florida Avenue Complex and wave runup would be practically nonexistent. In accordance with criteria previously approved by higher authority, the freeboard selected is 1 foot above stillwater level. Consequently, the final net grade design for the Florida Avenue Complex floodwall is 14.0 feet.

3. Climatology.

a. Climate. The project is located in a subtropical latitude having mild winters and hot, humid summers. During the summer, prevailing southerly winds produce conditions favorable for convective thundershowers. In the colder seasons, the area experiences frontal passages which produce squalls and sudden temperature drops. River fogs are prevalent in the winter and spring when the temperature of the Mississippi River is somewhat colder than the air temperature. Climatological data for the area are contained in monthly and annual publications by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), titled, "Climatological Data for Louisiana," and "Local Climatological Data, New Orleans, La."

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[1]Elevations shown herein are in feet referred to National Geodetic vertical datum unless otherwise noted.

b. Temperature. The first order weather station in New Orleans has temperature records extending back to 1871. The normal temperature is about 20°C and the recorded extremes are -13.9°C to 38.9°C. Normal temperatures range from 14.5°C in winter to 28.9°C in the summer months.

c. Rainfall. Precipitation is generally heavy in two fairly definite rainy periods. Summer showers occur from about mid-June to mid-September and heavy winter rains generally occur from mid-December to mid-March. Based on the records from NOAA National Weather Service Station in New Orleans, the normal annual precipitation is 68 inches, with extreme variations of 83.5 inches in 1961 to 31.1 inches in 1899. Extreme monthly rainfalls exceeding 12 inches are not uncommon and as much as 25 inches have been recorded in a single month. Normal monthly rainfalls range from 6.7 inches in July to 2.3 inches in October. Several stations have experienced calendar months in which no rainfall was recorded, the latest being October 1963.

d. Wind. The National Weather Service anemometer at the New Orleans International Airport, Moisant Field, installed in 1949 provides the longest record available for the New Orleans area. Until the passage of Hurricane Camille in August 1969 a recording anemometer was also located at the GIWW and Paris Road bridge; this instrument was established in February 1960. The average velocity is 8.6 m.p.h. but winds over 100 m.p.h. are experienced occasionally in hurricanes. The predominant wind directions are south to southeast from January through July, and northeast to east-northeast from September through November.

4. Hydrology.

a. General. The Inner Harbor Navigation Canal (I.H.N.C.) serves as a connection for several navigation arteries of major importance to the New Orleans area. Deep draft vessels enter the I.H.N.C. via the Mississippi River Gulf Outlet (MRGO). Barge traffic has access through the I.H.N.C. to Lake Borgne via the MRGO and the Gulf Intracoastal Waterway (GIWW), Mississippi Sound via the GIWW and Breton Sound via the MRGO.

A stage recorder has been maintained by the NOD at the Florida Avenue Bridge since 1945.

Chlorides and other water quality data have been collected in the I.H.N.C. at the following locations:

Station 76060 - IHNC @ SEABROOK BRIDGE
Station 76062 - LAKE PONTCHARTRAIN @ IHNC ENTRANCE
Station 76063 - IHNC @ GENTILLY ROAD BRIDGE (mi. 4.0)
Station 76064 - IHNC @ GIWW (mi. 2.0)
Station 76120 - IHNC @ FLORIDA AVE. BRIDGE
Station 76160 - IHNC (IWW) @ LAKE END OF LOCK

The period of records for the chloride data vary, depending on the station. The earliest record was taken in February 1957 at station 76060. In addition, station 76160 has hourly chloride data available for the period 13 April 1971 to 28 December 1976. The hourly chloride readings are obtained from a continuous conductivity record converted to equivalent chloride concentration.

b. Stages. The maximum stage recorded at the Florida Avenue bridge was 9.82 feet N.G.V.D. on 18 August 1969, which was associated with the passage of hurricane Camille. The minimum stage of -1.05 feet N.G.V.D. occurred on 25 February 1965. The average annual high stage at this location for the period 1945-1977 is 4.37 feet N.G.V.D. The average low stage for the same period is -0.53 feet N.G.V.D.

c. Chloride. The maximum recorded chloride concentration of 14,250 p.p.m. was observed at station 76060 on 15 August 1963. The minimum recorded concentration of 16 p.p.m. was observed at station 76160 on 10 May 1973. Average chloride concentrations in the I.H.N.C. range from 7,100 p.p.m. at the Seabrook Bridge location to 3,809 p.p.m. at the same location.

d. Water Quality Data. All other water quality data available for this area are summarized in the following tables.

STORET DATE 80/03/03

76060 14766221 GC1
30 01 45.0 090 01 58.0 2
IHNC AT SEABROOK BRIDGE, N.O.,LA
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS. 102191

/TYPA/AMBNT/STREAM

11COELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	581	21.3716	46.5937	6.82596	.319391	.283188	34.5000	5.50000	67/04/19	75/06/02
00020	AIR	TEMP	CENT	132	21.6355	39.6559	6.29729	.291062	.548109	33.3000	5.00000	67/08/16	73/04/06
00064	DEPTH OF	STREAM	MEAN(FT)	34	29.7647	24.1862	4.91795	.165227	.843421	47.0000	23.0000	72/01/04	72/12/20
00094	CNDUCTVY	FIELD	MICROMHO	60	13427.5	.705E+08	8397.65	.625407	936.886	37300.0	4000.00	70/01/13	73/04/06
00299	DO	PROBE	MG/L	365	7.08073	6.83112	2.61364	.369120	.136809	13.4000	1.20000	67/08/16	73/04/06
00400	PH		SU	817	7.47616	.135172	.367658	.049177	.012863	9.80000	6.60000	57/06/01	75/06/02
00940	CHLORIDE	CL	MG/L	5278	3809.42	6364778	2522.85	.662267	34.7262	14250.0	40.0000	57/02/14	72/06/27
70301	DISS SOL	SUM	MG/L	990	8865.03	.174E+08	4181.23	.471654	132.888	24787.0	593.000	62/04/30	71/12/27

TABLE 1

STORET DATE 68/03/03

/TYPA/AMBNT/STREAM

76061 IM1
30 01 45.0 090 01 56.0 2
IHNC NR SEABROOK BRIDGE N.O., LA
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS, 102191

11COELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER	TEMP	CENT		24	26.4791	4.56268	2.14077	.080847	.436982	30.6000	22.8000	67/04/19	67/09/20
00020 AIR	TEMP	CENT		5	26.7800	5.04687	2.24652	.076059	1.00466	31.5000	25.7000	67/05/10	67/07/05
00299 DO	PROBE	MG/L		15	7.16666	.406965	.952347	.132516	.245895	8.50000	5.80000	67/05/10	67/07/05
00400 PH		SU		24	7.51249	.067181	.259193	.034502	.052906	7.90000	6.90000	67/04/19	67/09/20
00940 CHLORIDE	CL	MG/L		23	4262.60	2581294	1606.64	.375155	335.008	9500.00	2500.00	67/04/19	67/09/20
70301 DISS SOL	SUM	MG/L		23	8166.69	7663383	2768.28	.338889	577.227	17322.0	5722.00	67/04/19	67/09/20

TABLE 2

STORET DATE 80/03/03

76062 IM2
30 02 05,0 090 01 55,0 2
LK PONTCHARTRAIN AT IHNC ENTR
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS, 102191

/TYPA/AMBNT/STREAM

11COELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER	TEMP	CENT		500	21,5226	39,1756	6,25904	,290812	,280354	32,0000	6,00000	67/04/19	77/12/15
00020 AIR	TEMP	CENT		105	21,9066	41,6103	6,45061	,294459	,629515	33,0000	5,10000	67/05/10	73/05/10
00064 DEPTH OF	STREAM	MEAN(FT)		2	28,0000	288,000	16,9706	,606092	12,0000	40,0000	16,0000	73/05/03	73/10/30
00070 TURB	JKSN	JTU		28	51,1428	766,426	27,6844	,541315	5,23186	113,000	1,00000	73/04/13	73/06/26
00077 TRANSP	SECCHI	INCHES		6	11,2500	4,50000	2,12132	,188562	,750000	12,0000	6,00000	73/04/13	73/05/10
00080 COLOR	PT-CO	UNITS		26	64,1426	2249,17	47,4254	,739371	8,96255	250,000	1,00000	73/04/13	73/06/26
00081 AP COLOR	PT-CO	UNITS		28	162,643	5593,37	74,7689	,459835	14,1336	330,000	15,0000	73/04/13	73/06/26
00094 CNDUCTVY	FIELD	MICROMHO		249	4073,45	,185E+08	4301,57	1,05600	272,601	25400,0	100,000	70/01/13	77/12/15
00299 DO	PROBE	MG/L		376	8,16093	2,64182	1,62537	,198678	,083822	12,8000	3,40000	67/05/10	77/12/15
00310 BOD	5 DAY	MG/L		28	7,00356	245,293	15,6618	2,23626	2,95980	84,0000	1,10000	73/04/13	73/06/26
00400 PH		SU		566	7,57560	,257771	,507712	,067018	,021341	9,20000	5,30000	67/01/13	77/12/15
00410 T ALK	CACO3	MG/L		28	76,4643	449,000	21,1896	,277054	4,00446	100,000	30,0000	73/04/13	73/06/26
00515 RESIDUE	DISS-105	C MG/L		26	38,8571	474,795	21,7898	,560766	4,11786	84,0000	5,00000	73/04/13	73/06/26
00549 RESIDUE	VOL NSET	MG/L		26	8,57143	49,2910	7,02076	,819088	1,52680	34,0000	,000000	73/04/13	73/06/26
00550 DIL-GRSE	TOT-SILT	MG/L		17	9,68823	244,600	15,6397	1,61430	3,79319	65,0000	,000000	73/04/13	73/06/26
00610 NH3+NH4-	N TOTAL	MG/L		28	,112500	,003212	,056675	,503780	,010711	,340000	,080000	73/04/13	73/06/26
00620 NO3-N	TOTAL	MG/L		28	1,33750	,379819	,616290	,460782	,116469	2,60000	,180000	73/04/13	73/06/26
00680 T ORG C	C	MG/L		16	5,97500	4,08734	2,02172	,338363	,505429	10,9000	3,70000	73/04/13	73/06/26
00900 TOT HARD	CACO3	MG/L		28	199,786	10082,2	100,410	,502590	18,9757	493,000	100,000	73/04/13	73/06/26
00940 CHLORIDE	CL	MG/L		360	3495,21	2480446	1574,94	,450601	60,7929	8750,00	24,0000	67/01/13	73/10/30
01002 ARSENIC	AS,TOT	UG/L		26	14,8929	50,2475	7,08855	,475970	1,33961	31,0000	10,0000	73/04/13	73/06/26
01045 IRON	FE,TOT	UG/L		26	189,286	40251,3	200,627	1,05992	37,9150	900,000	100,000	73/04/13	73/06/26
31504 TOT COLI	MFIM LES	/100ML		24	5629,21	,128E+09	11321,0	2,01290	2310,86	50000,0	3,00000	73/04/13	73/06/26
31616 FEC COLI	MFM-FCBR	/100ML		22	167,727	123436	351,335	2,09468	74,9049	1500,00	,000000	73/04/13	73/06/26
32240 TANNIN	LIGNIN	MG/L		27	,107407	,017635	,132798	1,23640	,025557	,600000	,000000	73/04/13	73/06/26
32260 CTE		MG/L		17	,020000	,465E-09	,000022	,001079	,000005	,020000	,020000	73/04/13	73/06/26
32270 CHLORO-	FORM EXT	MG/L		17	,040000	,931E-09	,000031	,000763	,000007	,040000	,040000	73/04/13	73/06/26
34330 ALDRIN		TOT UG/L		16	,025000	,496E-09	,000022	,000891	,000006	,025000	,025000	73/04/13	73/06/26
39360 DIELDRIN		TOTUG/L		17	,025000	,648E-09	,000026	,001057	,000006	,025000	,025000	73/04/13	73/06/26
70301 DISS SOL	SUM	MG/L		311	7412,26	9644933	2201,12	,296957	124,818	16333,0	2756,00	67/01/13	71/12/27
70331 SUSP SED	PARTSIZE	2-,062MM		9	95,5777	10,6719	3,26676	,034179	1,08893	99,4000	88,6000	73/04/15	73/10/30
70507 PHOS-T	DETHO	MG/L P		27	,366296	,199576	,447077	1,22053	,086040	2,00000	,010000	73/04/13	73/06/26
80154 SUSP SED	CONC	MG/L		9	154,867	12356,8	111,205	,719643	37,1016	384,000	52,0000	73/04/15	73/10/30
80220 SUSPSAND	CONC	MG/L		9	6,33333	46,0000	6,78521	1,09393	2,30940	23,0000	1,00000	73/04/15	73/10/30
80222 SUSPSLT	CONC	MG/L		9	146,333	11794,3	108,601	,732144	36,2005	362,000	51,0000	73/04/15	73/10/30

TABLE 3

STORET DATE 80/03/03

76063 IM3
30 00 30.0 090 01 32.0 2
1MNC AT GENTILLY RD BR N.O, MI 4
22071 LOUISIANA
5001MCENTRAL-LOWER MISS, 102191

/TYPA/AMBNT/STREAM

11CDELMN
0000 CLASS OC

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	57	16.6701	41.4839	6.44080	.344979	.853105	30.6000	10.0000	70/10/17	73/04/06
00020	AIR	TEMP	CENT	15	19.4200	50.7185	7.12169	.366720	1.83881	30.6000	7.20000	72/07/31	73/04/06
00068	DEPTH OF	STREAM	MEAS(FT)	9	36.0000	1.75000	1.32288	.034813	.440959	40.0000	36.0000	72/07/31	72/12/20
00094	CNDUCTVY	FIELD	MICROMHO	32	18459.4	.152E+09	12366.2	.669916	2186.06	47600.0	4000.00	72/07/31	73/04/06
00299	DO	PROBE	MG/L	30	7.96333	14.1127	3.75669	.471749	.685875	11.8000	.300000	72/07/31	73/04/06
00400	PH		SU	30	7.65666	1.15220	1.07341	.140192	.195976	9.50000	3.40000	72/07/31	73/04/06
00940	CHLORIDE	CL	MG/L	43	6744.16	2287146	1512.33	.224242	230.628	10000.0	4750.00	70/07/16	71/06/17
70301	DISS SOL	SUM	MG/L	12	14903.6	.110E+08	3323.78	.223019	959.494	18390.0	8735.00	71/03/15	71/06/17

TABLE 4

STORET DATE 80/03/03

76060 IHA
29 59 15.0 090 01 15.0 2
IHNC AT JCT WITH IWW, MI 2.0
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS. 102191

/TYPA/AMBNT/STREAM

11CDELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	64	18.9952	52.8569	7.26890	.382670	.908613	30.7000	6.50000	70/07/18	73/04/06
00020	AIR	TEMP	CENT	16	19.6750	55.7015	7.46535	.383228	1.86584	31.1000	4.40000	72/07/31	73/04/06
00064	DEPTH OF	STREAM	MEAN(FT)	9	41.8889	.612793	.782811	.018686	.260937	43.0000	41.0000	72/07/31	72/12/20
00070	TURB	JKSN	JTU	4	11.7500	82.2500	9.06918	.771845	4.53459	25.0000	5.00000	72/10/20	72/12/04
00080	COLOR	PT-CO	UNITS	8	12.5000	25.0000	5.00000	.400000	2.50000	20.0000	10.0000	72/10/20	72/12/04
00081	AP COLOR	PT-CO	UNITS	4	36.2500	222.917	14.9304	.411873	7.46520	55.0000	20.0000	72/10/20	72/12/04
00094	CNDUCTVY	FIELD	MICROMHO	32	20009.4	.169E+09	13034.7	.651431	2304.24	49000.0	4600.00	72/07/31	73/04/06
00299	DO	PROBE	MG/L	27	7.21481	16.1452	4.01810	.556924	.773284	12.3000	.100000	72/07/31	73/04/06
00310	BOD	5 DAY	MG/L	4	1.20000	.260000	.509902	.424918	.254951	1.90000	.700000	72/10/20	72/12/04
00400	PH		SU	62	7.88543	.178351	.422316	.053556	.053634	9.10000	7.10000	70/08/15	73/04/06
00410	T ALK	CACO3	MG/L	4	81.5000	433.000	20.8087	.255321	10.4043	110.000	60.0000	72/10/20	72/12/04
00515	RESIDUE	DISS-105	C MG/L	4	19.2500	7.58333	2.75378	.143054	1.37689	22.0000	16.0000	72/10/20	72/12/04
00549	RESIDUE	VOL FSED	MG/L	4	12.0000	24.6667	4.96655	.413879	2.48328	16.0000	6.00000	72/10/20	72/12/04
00610	NH3+NH4+	N TOTAL	MG/L	8	.857500	.015092	.122849	.143268	.061425	1.02000	.740000	72/10/20	72/12/04
00620	NO3+N	TOTAL	MG/L	4	.222500	.011625	.107819	.484580	.053910	.330000	.120000	72/10/20	72/12/04
00900	TOT HARD	CACO3	MG/L	4	2472.75	412299	642.105	.259672	321.052	3360.00	1932.00	72/10/20	72/12/04
00940	CHLORIDE	CL	MG/L	40	7100.00	3274948	1809.68	.254885	286.136	10500.0	5250.00	70/07/18	71/06/17
01045	IRON	FE,TOT	UG/L	4	100.000	.000000	.000000		.000000	100.000	100.000	72/10/20	72/12/04
01051	LEAD	PB,TOT	UG/L	4	500.000	.000000	.000000		.000000	500.000	500.000	72/10/20	72/12/04
01092	ZINC	ZN,TOT	UG/L	4	100.000	.000000	.000000		.000000	100.000	100.000	72/10/20	72/12/04
31508	TOT COLI	MFIM LES	/100ML	3	3450.00	.322E+08	5675.16	1.64497	3276.56	10000.0	.000000	72/10/20	72/12/04
31616	FEC COLI	MFM-FCBR	/100ML	3	413.333	441733	664.830	1.60798	383.724	1180.00	.000000	72/10/20	72/12/04
70301	DISS SOL	SUM	MG/L	36	13149.1	.121E+08	3483.00	.264884	580.500	19310.0	9655.00	70/08/15	71/06/17
80154	SUSP SED	CONC	MG/L	28	19.6786	221.856	14.8948	.756907	2.81486	80.0000	2.00000	70/08/15	71/03/15
80220	SUSPSAND	CONC	MG/L	28	5.75000	16.2685	4.03302	.701465	.762245	17.0000	1.00000	70/08/15	71/03/15
80222	SUSPSLT	CONC	MG/L	28	13.5714	207.143	14.3925	1.06050	2.71992	76.0000	1.00000	70/08/15	71/03/15

TABLE 5

STORET DATE 80/03/03

76120 14E69367
29 58 53.0 090 01 15.0 2
IHNC AT FLA AVE BRIDGE ND, LA.
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS. 102191

/TYPA/AMBNT/STREAM

11COELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	2577	20.3759	44.6172	7.04395	.345700	.138758	31.1000	3.90000	70/04/18	77/12/31
00094	CNDUCTVY	FIELD	MICROMHO	17	1517.65	432795	657.872	.433481	159.557	2700.00	600.000	75/04/15	75/05/07
00299	DO	PROBE	MG/L	17	8.17647	1.02194	1.01091	.123637	.245182	10.2000	6.70000	75/04/15	75/05/07
00400	PH		SU	17	8.10588	.144379	.379972	.046876	.092157	8.80000	7.60000	75/04/15	75/05/07

TABLE 9

STORET DATE 80/03/03

76160 IMS
29 57 52.0 090 01 42.0 2
IHNC SIMMS AT LAKE END OF LOCK
22071 LOUISIANA
SOUTHCENTRAL-LOWER MISS. 102191

/TYPA/AMBNT/STREAM

11COELMN
0000 CLASS 00

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	69	16.3579	51.6710	7.18825	.391563	.865364	30.4000	7.50000	70/07/16	73/04/20
00020	AIR	TEMP	CENT	15	20.1066	36.9194	6.07613	.302195	1.56885	31.1000	8.30000	72/06/23	73/04/04
00064	DEPTH OF	STREAM	MEAN(FT)	9	36.0000	9.50000	3.08221	.085617	1.02740	42.0000	33.0000	72/06/23	72/12/20
00070	TURB	JKSN	JTU	6	100.833	8104.17	90.0232	.892792	36.7518	260.000	20.0000	72/12/29	73/05/18
00080	COLOR	PT-CO	UNITS	6	65.0000	3700.00	60.8276	.935810	24.8328	160.000	15.0000	72/12/29	73/05/16
00081	AP COLOR	PT-CO	UNITS	6	277.500	59937.5	244.821	.882239	99.9479	700.000	60.0000	72/12/29	73/05/18
00094	CNDUCTVY	FIELD	MICROMHO	32	15081.2	.129E+09	11363.1	.753459	2006.73	42400.0	2000.00	72/06/23	73/04/20
00299	DO	PROBE	MG/L	30	6.60666	9.93030	3.15124	.476979	.575335	10.0000	.600000	72/06/23	73/04/20
00310	BOD	5 DAY	MG/L	6	3.55000	14.4870	3.80355	1.07142	1.55279	10.6000	1.10000	72/12/29	73/05/16
00400	PH		SU	30	7.63666	.156174	.395189	.051749	.072151	8.50000	7.10000	72/06/23	73/04/20
00410	T ALK	CACO3	MG/L	6	87.3333	261.872	16.1824	.185295	6.60646	106.000	62.0000	72/12/29	73/05/18
00515	RESIDUE	DISS-105	C MG/L	6	101.667	3676.27	60.6323	.596383	24.7530	196.000	26.0000	72/12/29	73/05/18
00549	RESIDUE	VOL FSET	MG/L	6	14.0000	110.800	10.5262	.751866	4.29728	33.0000	3.00000	72/12/29	73/05/16
00550	OIL+GRSE	TOT+SXLT	MG/L	3	3.30000	7.63000	2.76224	.837044	1.59478	5.50000	.200000	73/04/20	73/05/18
00610	NH3+NH4+	N TOTAL	MG/L	6	.186666	.014947	.122257	.654947	.049911	.420000	.080000	72/12/29	73/05/18
00620	NO3-N	TOTAL	MG/L	6	.946333	.648337	.805194	.849062	.328719	2.00000	.060000	72/12/29	73/05/18
00680	T ORG C	C	MG/L	3	6.86666	2.57345	1.60420	.233621	.926184	8.40000	5.20000	73/04/20	73/05/18
00900	TOT HARD	CACO3	MG/L	6	626.833	373504	611.149	.974979	249.501	1714.00	152.000	72/12/29	73/05/18
00940	CHLORIDE	CL	MG/L	87	6331.36	5246011	2301.31	.363477	335.660	12000.0	16.0000	70/07/16	73/05/18
01002	ARSENIC	AS,TOT	UG/L	3	19.0000	245.000	15.5885	.820445	9.00000	37.0000	10.0000	73/04/20	73/05/16
01045	IRON	FE,TOT	UG/L	6	816.666	2457667	1567.69	1.91963	640.009	4000.00	100.000	72/12/29	73/05/18
01051	LEAD	PB,TOT	UG/L	1	500.000					500.000	500.000	72/12/29	72/12/29
01092	ZINC	ZN,TOT	UG/L	1	100.000					100.000	100.000	72/12/29	72/12/29
31504	TOT COLI	MFIM LES	/100ML	6	29900.0	.325E+10	57025.0	1.90719	23280.3	146000	1600.00	72/12/29	73/05/16
31616	FEC COLI	MFM-FCBR	/100ML	7	866.428	248007	498.003	.574776	188.227	1600.00	75.0000	72/12/29	73/05/16
32240	TANNIN	LIGNIN	MG/L	5	.060000	.008000	.089443	1.49071	.040000	.200000	.000000	73/02/22	73/05/16
32260	CTE		MG/L	3	.020000	.232E-09	.000000		.000000	.020000	.020000	73/04/20	73/05/18
32270	CHLORD+	FORM EXT	MG/L	3	.040000	.372E-05	.000061	.001526	.000035	.040000	.040000	73/04/20	73/05/18
39330	ALDRIN		TOT UG/L	3	.025000	.931E-09	.000031	.001221	.000018	.025000	.025000	73/04/20	73/05/18
39380	DIELDRIN		TOTUG/L	3	.025000	.931E-09	.000031	.001221	.000018	.025000	.025000	73/04/20	73/05/18
70301	DISS SOL	SUM	MG/L	12	14626.9	9575934	3094.18	.206687	893.212	18390.0	10574.0	71/03/15	71/06/17
70507	P-DS-T	CRTHD	MG/L P	5	1.05600	1.25228	1.11925	1.06172	.500456	2.60000	.250000	73/02/22	73/05/18

TABLE 7

5. Existing Inner Harbor Navigation Canal Siphon

a. General. In order to design the proposed vertical lift gated structures and perform the necessary hydraulic computations, head losses through the existing New Orleans Sewerage and Water Board Siphon and their resultant effects on the structure capacities were computed. The inverted siphon conveys water in the Florida Avenue Canal under the IHNC, see plate 1. The siphon consists of two 10 by 13 foot and one 10 by 4 foot conduits, 182 feet long.

b. Hydraulic Capacity. For a storm centered over the west (or upstream) side of the IHNC, the siphon could meet the full requirements of the pumping station which discharges into Bayou Bienvenue. This discharge would be 2500 c.f.s. and the siphon would be operating under a submerged head of 2.4 ft. The head losses (Δh) through the siphon were computed by the following equations:

(1) Δh = entrance loss + exit loss + bend loss + friction loss

(2) entrance loss = $0.20\ V^2/2g$

(3) exit loss = $1.00\ V^2/2g$

(4) bend loss = $0.68\ V^2/2g$

(5) friction loss (H_f) = $(f)(L/D)\ (V^2/2g)$ Darcy-Weisbach equation

(6) $f = 185\ n^2/D^{1/3}$

(7) $D = 4R$

In the above equations:

V = average velocity in siphon in ft/sec

g = 32.16 ft/sec^2

f = Darcy-Weisbach friction factor

L = length of siphon = 182 ft.

n = Manning's roughness coefficient = 0.015

R = Hydraulic radius of siphon = 2.5 ft.

The rating curve for this siphon is shown on figure 1.

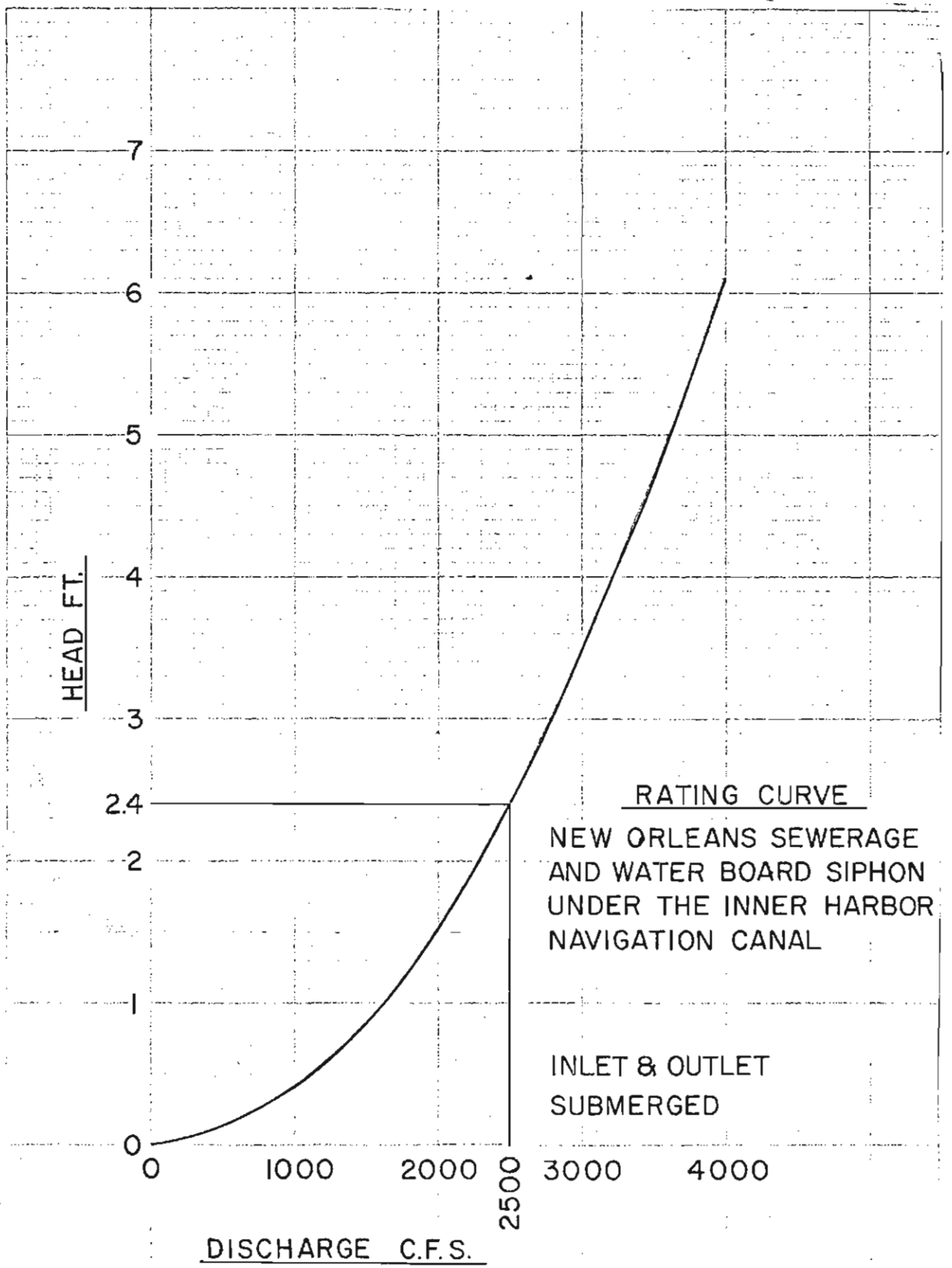
7
6
5
4
3
2.4
2
1
0
HEAD FT.
0
1000
2000
2500
3000
4000
DISCHARGE C.F.S.
RATING CURVE
NEW ORLEANS SEWERAGE
AND WATER BOARD SIPHON
UNDER THE INNER HARBOR
NAVIGATION CANAL
INLET & OUTLET
SUBMERGED

FIGURE 1