US Army Corps
of Engineers
New Orleans District

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY

HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN

ORLEANS PARISH
LAKEFRONT REMAINING WORK

APRIL 1993

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

CELMN-ED-SP (1110-2-1150a) 21 May 93

MEMORANDUM FOR Commander, Lower Mississippi Valley Division,
ATTN: CELMV-ED-PG

SUBJECT: Lake Pontchartrain, Louisiana, and Vicinity, High Level Plan Design Memorandum No. 22 - General Design, Orleans Parish Lakefront Remaining Work

1. The subject Design Memorandum is submitted for review and approval, and has been prepared generally in accordance with the provisions of ER 1110-2-XXXX (Draft) dated 1 July 1991.

2. A summary of the current status of the Clean Water Act, endangered species, Environmental Impact Statement (EIS) and cultural resources investigations is as follows:

a. A final EIS for the barrier plan for the subject project was filed with Council on Environmental Quality (CEQ) on 17 January 1975. A final supplement to this EIS was filed with Environmental Protection Agency (EPA) on 7 December 1984. The final supplement assessed the impacts associated with the increased levee height for a high level of protection for the New Orleans Lakefront reach. An Environmental Assessment is required prior to construction to assess the construction impacts of the New Basin Canal Gate and Frontage protection.

b. Prior to construction of the New Basin Canal Gate, an Environmental Assessment will be required and will include a 404(b)(1) evaluation associated with the placement of the sluice gate in the canal. The remainder of the Corps construction responsibilities associated floodwalls and floodgates requires no deposition of fill material in waters of the U.S. and therefore is not under the jurisdiction of the 404 process.

c. Evaluation of project related effects on threatened or endangered species and their habitat has been coordinated with and reviewed by U.S. Fish and Wildlife Service and National Marine Fisheries Service. As a result of this review, the Corps and the resource agencies jointly conclude, based on current investigations and studies, that no adverse impact to threatened or endangered species or their habitat would occur as a result of the proposed action.

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d. No cultural resource impacts are expected and no cultural resources studies are necessary. With the exception of the Bayou St. John closure, all work is located within the previously disturbed levee/floodwall corridors. All identified cultural resource issues were resolved and no further studies or coordination are necessary.

3. In accordance with LMNED-TS memorandum dated 5 February 1981, this report has been reviewed by the District Security Officer. There were no comments to be incorporated in the report.

4. Reference CECW-EP multiple memorandum dated 16 February 1990: GDM Review Process. No adverse issues were raised in the Administration's clearing process or no known policy changes have occurred which would concern OMB relative to the planning and designs presented in this DM. Amended assurance for the High Level Plan were executed by the Orleans Levee District on 29 May 1985 and accepted by the United States on 21 June 1985.

5. Approval of this Design Memorandum as a basis for preparation of plans and specifications is recommended.

FOR THE COMMANDER:

Encl
(16 cys fwd sep)

W. EUGENE TICKNER
Chief, Engineering Division

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EXECUTIVE SUMMARY

This Design Memorandum presents the High Level plans, designs and costs for 4 locations (Orleans Marina Floodwall, Bayou St. John, Orleans Lakefront Airport Floodwall and Lincoln Beach Floodwall) along the lakefront that were not covered in DM Nos. 13 and 14. This DM also covers the existing Pontchartrain Beach Floodwall which is on an alignment different than the one recommended in DM 13.

This DM presents plans for modifying the existing floodwalls so that they provide high level plan protection. The existing floodwalls were built under the barrier plan. Two plans of closure at Bayou St. John are presented. The least costly recommended Federal plan to provide flood protection at Bayou St. John is an earthen closure of the bayou which incorporates flow through culverts and sluice gates to maintain circulation between the bayou and Lake Pontchartrain. This plan was developed to establish the amount of credits that the Orleans Levee Board could receive for construction of a navigable gated structure. Construction of this navigable structure eliminates the need for the earthen closure but is considered a betterment under the Lake Pontchartrain project. The design for the Pontchartrain Beach Floodwall was presented in DM No. 13; however, the alignment for the floodwall was subsequently changed, and the floodwall was constructed by the Orleans Levee Board to a lakefront alignment. This DM details the designs and cost for the OLB alignment and is presented in order to establish credits due to the Orleans Levee Board.

The total first cost covered in this DM for the plans are as follows: Orleans Marina Floodwall - $1,730,000; New Basin Canal Floodgate - $1,180,000; Bayou St. John Closure - $3,010,000; Pontchartrain Beach Floodwall - $5,930,000; Lakefront Airport Floodwall - $560,000; and Lincoln Beach Floodwall - $810,000.

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LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
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PERTINENT DATA

Location of Project	Southeastern Louisiana in Orleans Parish along south shore of Lake Pontchartrain
Datum Plane	National Geodetic Vertical Datum (NGVD)1/
Hydrologic Data	
Temperature:	
Maximum monthly	90.6 degrees Fahrenheit
Minimum monthly	45.3 degrees Fahrenheit
Average annual	69.5 degrees Fahrenheit
Annual precipitation:	
Maximum	83.54 inches
Minimum	40.11 inches
Average	61.55 inches
Hydraulic Design Criteria-Tidal	
Design hurricane-Standard Project Hurricane (SPH)	
Frequency	1 in 300 years
Central Pressure Index (CPI)	27.6 inches of mercury
Maximum 5-min. average wind speed	100 m.p.h.
Radius of maximum winds	30 miles
Average forward speed	6 knots
Stillwater level	11.5 feet

1/ Elevations herein are in feet referred to National Geodetic Vertical Datum (NGVD) unless otherwise noted.

PERTINENT DATA (Continued)

Marina Floodwall

Floodwall Location	W/L Sta. 0+32.52 to W/L Sta. 17+72.80
Elevation (varies)	13.5 to 14
Floodgate	
Location	C/L Sta. 15+33.80 W/L
Number and type	Two steel swing in concrete monoliths
Estimated First Cost	$1,730,000

New Basin Canal Sluice Gate

Location	C/L, W/L Sta. 405+10.40
Elevation	13.5
Number of Gates	4
Estimated First Cost	$1,180,000

Bayou St. John Earthen Closure

Location	B/L Sta. -0+64.59 WBLA to B/L Sta. 2+01.70 EBLA
Elevation	18.0
Estimated First Cost	$3,010,000

Pontchartrain Beach Floodwall and Levee

Location	10+03.45 W/L to 39+78.39 W/L
Elevation (varies)	18.0 to 20.5
Estimated First Cost	$5,930,000

Lakefront Airport Floodwall

Location	W/L Sta. 10+13.70 to W/L Sta. 32.58.15
Elevation	13.5
Estimated First Cost	$560,000

Lincoln Beach Floodwall

Location	W/L Sta. 100+00 to W/L Sta. 115+51.81
Elevation	13.5
Estimated First Cost	$810,000

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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 of the Board of Engineers for Rivers and Harbors stated: "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 sheetpile wall along the levee west of the Inner Harbor Canal in New Orleans."

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. General design of the Lake Pontchartrain High Level Plan, Orleans Parish Lakefront Levee, was presented in Design Memorandums (DMs) Nos. 13 and 14. The plan, which assumed no barriers in the Chef Menteur and Rigolets Passes, recommended the least costly method of modifying the existing lakefront levee so that a high level plan of protection can be achieved. DMs Nos. 13 and 14 did not address high level plan designs for 4 locations (Orleans Marina Floodwall, Bayou St. John, Orleans Lakefront Airport Floodwall and Lincoln Beach

Floodwall) along the lakefront (see Plate 1). This DM covers plans, designs and cost estimates for these areas. The existing Pontchartrain Beach Floodwall is also covered in this DM. The Orleans Levee Board (OLB) constructed the floodwall along an alignment different than the one recommended in DM 13. This DM gives design details for the OLB alignment and provides a basis for establishing credits to the Orleans Levee Board for this work.

This DM presents plans for modifying the existing Orleans Marina Floodwall so that it provides high level plan protection. The existing Orleans Marina Floodwall was built under the barrier plan. Detailed designs were presented in DM No. 2 Supplement No. 5D, dated April 1978. A gate at the Lake Marina Drive ramp and a plan for providing positive closure at the New Basin Canal pumping station are also included.

Two plans of closure at Bayou St. John are presented. The recommended Federal plan to provide flood protection at Bayou St. John is a an earthen closure of the bayou which incorporates flow through culverts and sluice gates to maintain circulation between the bayou and Lake Pontchartrain. This plan was developed to establish the amount of credits that the Orleans Levee Board could receive for construction of a navigable gated structure. Construction of this navigable structure eliminates the need for the earthen closure but is considered a betterment under the Lake Pontchartrain project. Detailed discussions of Bayou St. John are presented in paragraph 10.

The design for the Pontchartrain Beach Floodwall was presented in DM No. 13; however, the alignment for the floodwall was subsequently changed, and the floodwall was constructed by the Orleans Levee Board to a lakefront alignment. This DM details the designs and cost for the OLB alignment and is presented in order to establish credits due to the Orleans Levee Board.

The New Orleans Lakefront Airport Floodwall and floodgates were built under the barrier plan. These designs were detailed in DM No. 2 Supplement No. 5A, Citrus Lakefront Levees - IHNC to Paris Road, approved 12 July 1976. They are deficient in height by about 3 feet for the HLP design water levels. This DM provides design details to modify this floodwall reach so that HLP design criteria is satisfied. Special design requirements are necessary for the segment of wall located at the end of the north-south runway where wall heights must be limited to satisfy FAA requirements. A folding floodwall design is presented to meet this requirement.

Like the Lakefront Airport, the existing Lincoln Beach floodwall and gate system is deficient in HLP designs. The system was also built under the barrier plan and detailed in Supplement No. 5A. These walls require raising to meet HLP design water levels and loads. Details for modifying the existing wall and gates are presented herein.

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 by the report of the Chief of Engineers are as follows: "...That the barrier plan for protection from hurricane floods of the shores of Lake Pontchartrain...be authorized for construction, ... Provided that prior to construction of each separable independent feature local interests furnish 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 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 works;

"(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...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, 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."

4. Project Document Investigations. Studies and investigations made in connection with the report on which authorization is based (House Document 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. In December 1977, a Federal court injunction was issued stopping construction of portions of the authorized project. The injunction was issued on the basis that the 1975 final Environmental Impact Statement (EIS) for the Lake Pontchartrain project was inadequate. The court directed, among other things, that the EIS be rectified to include adequate development and analysis of alternatives to the then ongoing proposed action. The results of these studies are contained in a three volume report entitled "Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project, Reevaluation Study", dated July 1984. The reevaluation report recommended a "tentatively selected" high level plan of protection. This recommendation necessitated the preparation of DMs Nos. 13 and 14 and this report as part of the Lake Pontchartrain Hurricane Protection Project. This report was prepared because the features described in paragraph 2 were not addressed in DMs Nos. 13 and 14. Engineering and environmental studies made in connection with this

report are discussed herein. Surveys and studies accomplished in preparing this DM include the following:

a. Alternative methods of construction required to optimize the proposed plan of protection for modifying the existing floodwalls;

b. New aerial photography and topographic and hydrographic surveys;

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

d. Detailed design studies for alternative plans (including stability analysis);

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

f. Real Estate requirements;

g. Detailed cost estimates for the proposed plan of protection as well as alternative plans and necessary utility relocations;

h. Environmental effects and evaluations; and

i. A comprehensive public meeting for the "tentatively selected" high level plan held on 12 April 1984.

6. Planned Future Investigations. Upon satisfactory approval of this DM, detailed Engineering Designs and Specifications will be prepared to support construction of these project features except for the Pontchartrain Beach Floodwall and the Bayou St. John closure. Some additional field surveys are anticipated at this time to support these designs.

7. Local Cooperation Requirements. The conditions of local cooperation as specified in the authorizing laws are quoted in Paragraph 3. These conditions are applicable to the "Barrier Plan." A post authorization report for a "High Level Plan" recommended that assurances be amended. A complete list of local assurance items (as amended) are set forth as follows:

a. Provide all lands, easements, and rights-of-way, including borrow and spoil-disposal areas necessary for construction, operation, and maintenance of the project; and

b. Accomplish all necessary alterations and relocations to roads, railroads, pipelines, cables, wharves, drainage structures, and other facilities required by the construction of the project; and

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

d. Bear 30 percent of the first cost, to consist of the fair market value of the items listed in subparagraphs (a) and (b) above and a cash contribution as presently estimated below, 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:

COST TO ORLEANS LEVEE DISTRICT
($1,000,000's)

	FIRST COST 1/	LOCAL SHARE
ORLEANS LEVEE DISTRICT		
Citrus New Orleans East	112.5	33.8
New Orleans	249.1	74.7
TOTAL	361.6	108.5

1/ Cost to complete after October 1979; October 1981 price levels.

e. This item has been deleted in full: Provide an additional cash contribution equivalent to the estimated capitalized value of maintenance and operation of the Rigolets navigation lock and channel to be undertaken by the United States, presently estimated at $3,816,000, the final determination to be made after construction is complete, 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, and

f. Provide all interior drainage and pumping plants required for reclamation and development of the protected areas; and

g. Maintain and operate all features of the project in accordance with regulations prescribed by the Secretary of the Army, including levees, floodgates and approach channels, drainage structures, drainage ditches or canals, floodwalls, and stoplog structures (the remainder of this item is deleted); and

h. 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; and

i. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970", Public Law 91-646; and

j. Assume the responsibility to pay its share of the non-Federal project costs (the remainder of this item is deleted); and

k. As a minimum, adhere to the payment schedule of the deferred payment plan, the apportionment of costs to be made as actual costs, values, and schedules are determined. The first payment under the deferred payment plan was due on 1 October 1976, with subsequent payments being due on 1 October of each succeeding year, up to and including 1 October 1990. Interest is charged on the unpaid balance during this period at the rate of 3.225 percent per annum. Cash contributions required subsequent to 30 September 1991 shall be computed in accordance with the basic 30 percent requirement stipulated in Section 204 of the Flood Control Act of 1965, Public Law 89-298 and House Document 231, 89th Congress; and

l. Recognize that subsections (b), (c), and (e) of Section 221 of the "Flood Control Act of 1970", Public Law 91-611 shall apply to paragraph (k) above. This agreement is subject to and shall become effective upon the approval of the Secretary of the Army; and

m. Comply with Section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, that no person shall be excluded from participation in, denied the benefits of, or subjected to discrimination in connection with the Project on the grounds of race, creed, or national origin.

While the above requirements reflect the present agreements of local assurance as signed in June 85, they do not address the need for mitigation as required by the Fish and Wildlife Coordination Act of 1958, 16 U.S.C. 661 et seq. (PL 85-624, Aug 58).

8. Status of Local Cooperation. Amended assurances for the High Level Plan were executed by the Orleans Levee District on 29 May 1985, and accepted by the United States on 21 June 1985.

9. Views of Local Interests. The Orleans Levee District is the local assurer for the Orleans Parish portion of the Lake Pontchartrain Hurricane Protection project and thus is the agency responsible for providing local interests assurances for these remaining features of the project. We have furnished copies of the draft DM for the Board's and their engineering staff's review and comments. Where possible, we have made every effort to incorporate in the designs the desires of the local sponsor. An issue concerning the nature of the designs for providing flood protection at Bayou St. John has been raised and has remained unresolved pending completion of this DM. The history of this Special Issue is explained in detail in paragraph 10 below. We have included in Appendix A the DM review comments of the Orleans Levee District to insure that this issue is fully explained from their prospective.

We have also included other pertinent correspondence on this matter including an August 21, 1985, Resolution Number 5-82185 which gives the Levee District's position on the matter when this issue was last being actively debated.

LOCATION OF PROJECT AND TRIBUTARY AREA

10. Project Location. The Orleans Parish remaining work segment of the Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project as shown on Plate 1 is located in southeastern Louisiana on the south side of Lake Pontchartrain in Orleans Parish.

SPECIAL ISSUE

11. Bayou St. John. At the time of authorization for the Lake Pontchartrain project barrier plan, 1965, the existing parallel levees on each side of the bayou from the lake south to Robert E. Lee Boulevard were judged to be adequate to provide Standard Project Hurricane (SPH) protection. Consequently, no work at this location was identified in the project document. Shortly after authorization, the U.S. Weather Service issued new parameters for the SPH, which rendered the existing flood protection along Bayou St. John inadequate, both in section and elevation. At the time input for the Reevaluation Report was prepared (roughly 1979 to 1982), the OLB had proposed a levee closure and ground level road crossing for Lakeshore Drive near the mouth of Bayou St. John with gated culverts passing through the levee to permit limited tidal interchange between the lake and the bayou. The Lakeshore Drive street crossing was to have been located adjacent to, and part of, the protected side toe of the levee. The existing Lakeshore Drive mid-rise bridge had been closed and scheduled for demolition because of its unsafe deteriorated state. Since the levee closure at the time appeared to be the least costly workable solution, the Reevaluation Study cost estimate allowed for the levee closure solution as the recommended plan. However, neither the Reevaluation Study nor the supplemental assurances on the project are of sufficient detail to describe the details of the hurricane protection at Bayou St. John. The construction cost for Bayou St. John in the Reevaluation Report is included in the line item called "Clay Embankment."

In January 1979, the OLD submitted a permit request for the closure dam. After the appropriate public meetings were held, on 2 May 1980, the New Orleans District issued a permit to the OLB, authorizing discharging of dredged and fill material into Bayou St. John. The permit was issued under the authority of Section 404 of the Clear Water Act only. Section 10 of the Rivers and Harbors Act of 1899 was not applicable, since Bayou St. John was declared to be a non-navigable waterway by Congress in 1936. Our action in issuing the permit was subsequently challenged in U.S. District court by the Bayou St. John Improvement Association. The Association also filed a lawsuit in State court to stop the ongoing construction by the OLD. The Federal court ruled in favor of OLD and the Corps; the State court, however, halted construction by OLD.

Because of an organized public involvement, the State Legislature added Bayou St. John into the state's "Natural and Scenic Rivers System" during 1983. To satisfy the requirements of the Act, the OLD submitted a permit application for the earthen closure to the Louisiana Department of Wildlife and Fisheries. The permit was denied on 22 December 1983, on the basis that the earthen closure dam violated the Act's guidelines.

During January 1984, the OLD submitted a new permit application to the Louisiana Wildlife and Fisheries, presenting an entirely different plan for flood protection at the bayou. This plan included levees and floodwalls on both sides of the bayou; a navigable sector gated structure located approximately 1100 feet from the lake; removal of the existing closure at Robert E. Lee Boulevard; and twin mid-rise bridges at the Lakeshore Drive Crossing. A permit was subsequently issued by the State Wildlife and Fisheries. The navigable sector gated structure was included as part of OLD's plan as a condition to satisfy the requirements of the State's "Scenic Rivers Act." In an interoffice memo dated 20 March 1984, Mr. Earl Magner, Chief Engineer for OLD, indicated that the sector gates on the navigable structure would be closed at all times except when the lake's watersurface elevation is less than 0.0 ft NGVD during daylight hours. Records show that this condition occurs on the average about 6 days a year. The reason for this requirement is that the natural elevation of the levee ridges or banks on Bayou St. John, south of Robert E. Lee Boulevard, are only 2.0 to 2.5 ft NGVD. It is anticipated that protracted closures of the gates would induce sand and sediment deposits in the bayou that would require removal before the gates could be operated. As a practical matter, this means that the sector gated structure represents a permanent closure of the bayou.

It is clear from the foregoing that the navigable gates serve the same physical purpose as the earthern closure and were only included in OLB's plan as a quid pro quo for the approval of the plan by the administrator of the Natural and Scenic Rivers Act. In a chain of correspondence, basic dated 27 November 1984, between CELMN-ED-DD and CELMV-ED-TD, the above matters were presented and reviewed by the Division office. By 3d Endorsement dated 20 May 1985, CELMV concluded that the navigable gates served the same purpose as an earthen closure and they issued no objection to its construction. However, for the purposes of credits on the project, the navigable gated structure would be considered a betterment to the originally preferred least cost earthen levee plan with flow through culverts and sluice gates. The additional costs for the betterment are considered to be 100% the responsibility of the local sponsor and not creditable to cost sharing on the project. As to any argument that constructibility of the least costly plan was not implementable, the Division Office concluded that: "During our review it was learned that there was no suit in Louisiana State Courts regarding the issuance of a permit under the Louisiana Scenic Streams Act with conditions. The issue became a matter of negotiations between the levee board and the permitting agency.

The settlement was an agreement to grant a permit on the condition that a navigable sector gated structure be built. The settlement prevented a judicial determination by the State courts."

Based on the foregoing, we have prepared an alternative plan which employs an earthen closure or levee with flow through culverts and sluice gates to provide the Federal high level plan of protection. The plan is shown on Plate 16.

PROJECT PLAN

12. Floodwalls, Gates and Levees.

a. General. The project work will consist of raising the remaining flood protection along the south shore of Lake Pontchartrain in Orleans Parish, Louisiana, to the design hurricane project elevation as approved in Design Memorandums Nos. 13 and 14. With the exception of the Pontchartrain Beach Floodwall, the reaches shown below will require improvements to the existing protection.

FLOODWALL	REACH FROM	REACH TO	EXISTING TOP ELEVATION	PROPOSED TOP ELEVATION
Marina Floodwall	W/L Sta. 0+32.52	W/L Sta. 17+72.80	10.9	13.5 to 14.0
New Basin Canal Sluice Gate	C/L, W/L Sta.	405+10.40	N/A	13.5
Bayou St. John Earthen Closure	B/L Sta. -0+64.59 WBLA	B/L Sta. 2+01.70 EBLA	N/A	18.0
Pontchartrain Beach Floodwall & Levee*	10+03.45 W/L	39+78.39 W/L	Varies	Varies
Lakefront Airport Floodwall	W/L Sta. 10+13.20	W/L Sta. 32+58.15	Varies	13.5
Lincoln Beach Floodwall	W/L Sta. 100+00	W/L Sta. 115+51.81	Varies	13.5

* Constructed by Orleans Levee Board to hurricane flood protection high level elevations.

b. Floodwalls and levees.

(1) Marina Floodwall. This floodwall is in the vicinity of the New Orleans Marina just north of Lake Marina Drive. The improvements to this floodwall will consist of extending the top of the existing floodwall and constructing new concrete capped portion of the I-wall.

The raising of the existing floodwall will consist of scarifying the top of the wall, placing rebar dowels and placing reinforced concrete to Elevation 13.5. Additional structural support for the wall will consist of driving piling on the protected side, welding stud anchors to the sheetpiling and placing reinforced concrete around the stud anchors and the piling. The base slab for the piling will be constructed on the protected outside edge of the existing floodwall.

New capped I-type wall will be provided from Sta. 12+68 W/L to Sta. 14+96.30 W/L and from Sta. 15+68.80 W/L to Sta. 17+72.80 W/L. Between Sta. 12+68.00 W/L and Sta. 12+95.79 W/L, the existing I-wall will be demolished and rebuilt.

The profile and elevations of the floodwall are shown on Plates 3 through 6. The location and alignment of the existing I-wall and new I-wall are shown on Plate 2. Typical design sections and details are shown on Plates 7 through 11.

(2) Bayou St. John.

(a) Alternative 1. I-type wall and earthen closure will be provided in the vicinity of the Bayou St. John. I-type wall will be constructed from B/L Sta. 4+96.15 EBLA to B/L Sta. 2+01.70 EBLA. Earthen closure will be constructed from Sta. 200+00.00 W/L to Sta. 203+26.92.

The existing levee will be raised to Elevation 18.0 (net grade) from B/L Sta. 2+57.59 EBLA to B/L Sta. -1+29.03 EBLA.

The elevation of the top of the floodwalls and levee is shown on Plate 18. The location and alignment are shown on Plate 17. Typical design sections are shown on Plates 19 through 22.

(b) Alternative 2. I-type wall and T-type wall will be provided in the vicinity of the Bayou St. John. I-type wall will be constructed from B/L Sta. -0+64.59 WBLA to B/L Sta. 5+78.51 WBLA; from B/L Sta. 7+85.62 WBLA to B/L Sta. 9+81.16 WBLA; B/L Sta. 13+11.55 EBLA to B/L Sta. 12+45.00 EBLA; and B/L Sta. 9+68.09 EBLA to B/L Sta. 2+01.70 EBLA. T-type wall will be constructed from Sta. 200+00.00 W/L to Sta. 200+60.50 W/L and from Sta. 201+60.00 W/L to Sta. 202+23.74 W/L.

The elevation of the top of the floodwalls is shown on Plates 26 and 27. The general location and alignment are shown on Plate 22. Typical design sections are shown on Plates 24 through 29.

(3) Pontchartrain Beach Floodwall. This floodwall is in the vicinity of the Pontchartrain Beach. The improvements to the hurricane flood protection for this area were completed by the Orleans Levee Board in 1987.

The completed floodwall deviates from the alignment as presented in DM 13.

The alignment deviation was approved based on the projected use of the Pontchartrain Beach real property. The projected land use was assessed to be of better value to the owners with the hurricane flood protection floodwall lakefront of the DM 13 alignment.

The profile and elevations of the floodwall is shown on Plates 31 and 32. The location and alignment of the existing I-wall are shown on Plate 30. Typical design sections and details are shown on Plates 34 through 39.

(4) Lakefront Airport Floodwall. This floodwall is in the vicinity of the New Orleans Lakefront Airport. The improvements to this floodwall will consist of extending the top of the existing floodwall to Elevation 13.5.

Because of Federal Aviation Authority (FAA) regulations concerning the height of fixed structures within an airport runway's flight path, the I-wall cannot be raised permanently for a distance of approximately 580 feet, from Sta. 16+93 W/L to Sta. 22+74 W/L. This reach of I-wall will not be raised by using dowels and reinforced concrete. For this area metal flap gates will be provided. The metal flap gates will be hinged on the flood side and will be secured on the top of the existing I-wall. Each metal flap gage will weigh between 250 and 265 pounds and will be 10' - 5" in length.

The raising of the existing floodwall outside the airport flight path will consist of scarifying the top of the wall, placing rebar dowels and reinforced concrete to Elevation 13.5.

The profile and elevations of the floodwall are shown on Plates 42 and 43. The location and alignment of the existing I-wall are shown on Plate 40. Typical design sections and details are shown on Plates 44 through 46.

(5) Lincoln Beach Floodwall. This floodwall is in the vicinity of Lincoln Beach. The improvements to the Lincoln Beach Floodwall will consist of demolishing the existing I-wall floodwall, leaving only the steel sheetpiling in place, and constructing a new capped I-type wall.

I-type wall will be constructed from Sta. 101+20.00 W/L to Sta. 106+92.91 W/L and from Sta. 109+18.91 W/L to Sta. 114+31.81 W/L.

The existing T-type wall stem will be removed from Elevation 5.5 to Elevation 10.5 and replaced with a new stem from Elevation 5.5 to Elevation 13.5. The modified T-type wall will be constructed from Sta. 106+92.91 W/L to Sta. 107+49.41 W/L and from Sta. 108+25.41 W/L to Sta. 109+18.91 W/L.

A metal extension on top of the floodgate monoliths will be constructed between Sta. 107+49.41 W/L and Sta. 107+51.91 W/L, Sta. 107+87.91 W/L and Sta. 108+14.41 W/L, and Sta. 108+16.41 W/L and Sta. 108+25.41 W/L.

The profile and elevations of the top of the floodwalls are shown on Plates 48 and 49. The location and alignment are shown on Plate 47. Typical design details and sections are shown on Plate 50.

c. Floodgates.

(1) Marina Floodwall.

(a) Existing floodgates. Three existing swing gates will be extended from Elevation 10.4 to Elevation 13.5. Typical design sections and details are shown on Plate 7. The existing gates are located as shown below:

Centerline Station	Opening Width
C/L Sta. 0+69.46	17'
C/L Sta. 4+67.89	24'
C/L Sta. 7+76.31	24'

(b) New floodgates. Two new swing type floodgates will be built at C/L Sta. 15+33.80 W/L. Typical design sections and details are shown on Plates 10 and 11.

(2) New Basin Canal Floodgate. A 4-gated sluice gate structure will be provided at C/L Sta. 405+10.40 W/L. Typical design elevations, sections and details are shown on Plates 14 through 16. The location and alignment are shown on Plate 12.

(3) Bayou St. John.

(a) Alternative 1 - Federal Plan. To provide ingress and egress of water within Bayou St. John, a sluice gate structure will be provided at centerline Sta. 12+78. Elevations of the structure are shown on Plate 18. Typical design elevations, sections and details are shown on Plate 22.

(b) Alternative 2 - OLB Preferred Plan. To provide ingress and egress of water within Bayou St. John, a sluice and sector gated structure will be provided between Sta. 200+06.50 W/L and Sta. 201+60.00 W/L with the centerline of the sector gated structure at Sta. 201+00.00 W/L. Plans, details and elevations of the structures are shown on Plates 23 through 29.

(4) Pontchartrain Beach Floodwall. A schedule is shown on Plate 30 for the existing floodgates. Typical design elevations, sections and details are shown on Plates 36 through 39.

(5) Lakefront Airport Floodwall.

(a) Existing floodgates. Two existing floodgates will be extended to Elevation 13.5. Typical design sections and details are shown on Plate 44.

Centerline Station	Opening Width
C/L Sta. 29+10.77	22'
C/L Sta. 31+70.15	42'

(b) New floodgates. Metal flap type gates will be provided from Sta. 16+93 W/L to Sta. 22+74 W/L. The metal flap gates will be hinged on the flood side and will be secured on the top of the existing I-wall. Each metal flap gate will weigh between 250 and 265 pounds and will be 10' - 5" in length. Typical design sections and details are shown on Plate 46.

(6) Lincoln Beach Floodwall. The raising of the existing floodgate and floodgate monolith will consist of adding a metal extension to the top of the wall and floodgate.

A metal extension on top of the floodgates will be constructed from the top of the floodgate to Elevation 13.5 between Sta. 107+49.41 W/L and Sta. 107+51.91 W/L, Sta. 107+87.91 W/L and Sta. 108+14.41 W/L, and Sta. 108+16.41 W/L and Sta. 108+25.41 W/L.

Typical design sections and details are shown on Plate 50.

HYDROLOGY AND HYDRAULICS

13. General. The hydrology and hydraulic analysis for the Remaining Work in Orleans Parish for the Lake Pontchartrain and Vicinity High Level Plan was presented in two separate reports entitled Design Memorandum No. 13, Orleans Parish Lakefront Levee West of IHNC, November 1984 and Design Memorandum No. 14, Citrus Lakefront Levee, IHNC to Paris Road, July 1984. 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 of the plan. Also included in these 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 Remaining Work in Orleans Parish protective structures is includes in these reports.

14. Design Hurricane.

a. Selection of the 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.

b. Description of the design hurricane. The design hurricane for the 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 27.6 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 6 knots and a potential to produce a lake stage frequency of occurrence of once in about 300 years if it progresses along a path critical to the area of interest. Detailed information on the design hurricane is presented in the Design Memorandums referenced above.

15. Design Heights of Protective Structures.

a. Orleans Marina Floodwall. This site is located at the Orleans Marina Behind two recreational parks and a raised parking lot exceeding 5 ft in elevation and approximately 1,000 ft in width. Concrete walls, buildings, boathouses and other structures are located adjacent to and lakeward of the marina. Waves generated in Lake Pontchartrain, which would normally be critical to the floodwall site, need to traverse a route free of large obstructions in order to maintain wave parameters of sufficient magnitude to produce wave runup on the structure. But the structures lakeward of the marina minimize wave heights prior to their reaching the marina; waves reaching the marina would be of insignificant height to cause significant runup on the floodwall.

Occurrence of a design hurricane would produce a maximum wind tide level of 11.5 ft NGVD along the Orleans Marina Floodwall and wave runup would be practically nonexistent. In accordance with criteria previously approved by higher authority, the freeboard selected is 2 ft above the stillwater level. Consequently, the final net grade of the floodwall and the adjoining road ramps is 13.5 ft NGVD.

b. New Basin Canal gate. Also located behind the Orleans Marina is the New Basin Canal pumping station, which currently has a 1,000 CFS capacity and which will probably be expanded to 1,250 CFS in the future. The station pumps into an underground conduit which discharges into the New Basin Canal at the Orleans Marina. The proposed sluice gated structure fronting this canal ties into the Orleans Marina Floodwall. The gate is exposed to the same wave attenuating obstructions as the remainder of the floodwall and thus has the same top elevation as the surrounding floodwall, 13.5 ft NGVD. The gate will remain open to allow pumped water to flow freely into the marina. The gate will only be closed in the event of a pump failure and reverse flow; then the gates will be closed to prevent the reverse flow from occurring. The gate extends the existing two barrel underground conduit another 19 ft. The 4 gate openings each will be 11 ft wide by 10 ft high fronting the existing conduit which measures 24 ft wide by 9 ft high on each side. The gate dimensions were optimized to encourage laminar flow and minimize head loss. The addition of the gate and extension will cause an additional head loss of no more than 0.15 ft, as computed by the formula:

$$H = \left[\frac{1.555\ (1+Ke)}{D^4} + \frac{287.64 n^2 L}{D^{16/3}}\right]\left[\frac{Q}{10}\right]^2$$

where:

Ke	=	0.2	Entrance & Exit Losses
n	=	0.012	Friction Coefficient
L	=	19.	ft. (length)
D	=	11.	ft. (diameter)
Q	=	1250.	cfs

Riprap protection will be added as an apron surrounding the gate outlet to prevent scour resulting from pumping station discharges. Riprap will be placed in an 18-inch thickness, extending 20 ft from the gate outlet into the harbor in front of the gate and wrapping around the sides. The riprap gradation is:

Percent Lighter by Weight	Limits of Stone Weight (lbs)
100	25 - 10
50	10 - 5
15	5 - 2

c. Bayou St. John.

(1) Earthen closure. For an earthen levee closure across the bayou lakeward of the Lakeshore Drive bridge, the significant wave height and period critical to the south shore of Lake Pontchartrain must be used to design the cross section and height. The design cross section is shown on Plate 20. Wave data, runup elevations and the required elevation of the closure levee are given below.

Wave Runup and Proposed Elevation of Protective Structure
Standard Project Hurricane
Bayou St. John Closure Levee

Location	H ft	T sec	WTL Elevation ft NGVD	Runup ft	Elevation of Structure ft NGVD
Bayou St. John entrance	7.8	7.3	11.5	6.5	18.0

Since this closure levee will be constructed in the lake, the toe of the levee will be subjected to the erosive effects of daily wave activity. To protect the levee toe, riprap must be placed on the lakeside of the embankment from natural ground to EL +5 ft NGVD. The riprap is designed to protect the toe from a 4 ft wave occurring during the average annual high stage of +4 ft NGVD. The required gradation for this 3 ft thick stone follows.

Percent Lighter by Weight	Limits of Stone Weight (lbs)
100	2200 - 900
50	930 - 440
15	460 - 130

(2) Sector gated structure. The Bayou St. John complex consists of a gate closure across the canal and the adjoining floodwalls. The gate and floodwall heights were determined using wave runup. These structures are constructed to an elevation sufficient to prevent all overtopping from the significant wave and waves smaller than the significant wave accompanying the SPH. Waves larger than the significant wave will be allowed to overtop the protective structures; however, such overtopping will not endanger the security of the structure or cause material interior flooding.

The hurricane parameters of the SPH and the physical characteristics of Lake Pontchartrain affecting the entrance at Bayou St. John are summarized in Appendix I of DM No. 13, Orleans Parish Lakefront Levee, West of IHNC, November 1984. The SPH winds critical to Bayou St. John's entrance blow across Lake Pontchartrain, causing a significant wave height of 7.8 ft at the entrance to the bayou. In 1987 a hydraulic model investigation was performed by the Coastal Engineering Research Center on the effects of a narrow canal on wave propagation up that canal. The results were published in a paper entitled, "Effects of Wave Action on a Hurricane Protection Structure for London Avenue Outfall Canal, Lake Pontchartrain, New Orleans, Louisiana," (MP CERC-87-14). This investigation was performed on a canal near Bayou St. John which has many of the same physical characteristics, i.e., a narrow entrance and levees along each side of the canal. The London Avenue Canal was subjected to the same wave parameters that would affect the entrance of Bayou St. John during the design hurricane. The model study revealed that the significant wave height diminishes rapidly as the waves travels up the canal from the entrance. Results of this study indicate that during the SPH the significant wave of 7.8 ft traveling up a narrow canal would have a reduced height of no more than 2.1 ft at a site approximately 600 ft from the entrance of the canal. Since Bayou St. John has similar properties and the gate across the canal will be located approximately 600 ft from the entrance, the wave results of this study were used to determine the height of the gated crossing. Wave data, runup elevations and required elevation of the floodgate are shown below.

Wave Runup and Proposed Elevation of Protective Structure
Standard Project Hurricane
Bayou St. John Floodgate

Location	H ft	T sec	WTL Elevation ft NGVD	Runup ft	Elevation of Structure ft NGVD
Bayou St. John	2.1	7.3	11.5	5.0	16.5

The floodwall on levee configuration is used to close the protective system between the floodgate and the existing levees. The elevation of these tie-in sections is compatible with the adjoining levees and gates and provides the same degree of protection.

d. Pontchartrain Beach Floodwall. The protection at Pontchartrain Beach consists of a levee and floodwall system fronted by a sand beach several hundred feet wide. The protective system is directly affected by waves generated in Lake Pontchartrain during the SPH. Therefore, the heights of protection were determined using wave runup. The hurricane characteristics of the SPH and the physical characteristics of Lake Pontchartrain used in determining wave heights are summarized in Appendix I of DM No. 13, Orleans Parish Lakefront Levee, West of IHNC, November 1984. The wave height used in determining runup, 7.8 ft, is the wave used along other segments of the lakefront levee in Orleans Parish.

The protective system at this site is fronted by a wide, 200 ft, sand beach with elevations varying between 4.5 and 7.5 ft NGVD. Significant wave heights are modified by this natural beach. Because beach elevations at the base of the levee vary, significant waves breaking on the levee and floodwall can vary in heights from 6.1 to 3.9 ft.

For our design a wave height of 6.1 ft was used. The levee cross section selected for this reach has 1 on 5 side slopes and a height of 20 ft NGVD. No overtopping of this levee will occur during the SPH. Wave runup and the height of the proposed structures are given in the following table.

Wave Runup and Proposed Elevation of Protective Structure
Standard Project Hurricane
Pontchartrain Beach Levee

Location	H ft	T sec	WTL Elevation ft NGVD	Runup ft	Elevation of Structure ft NGVD
Pontchartrain Beach	6.1	7.3	11.5	8.5	20.0

In several areas along this reach, buildings or other obstructions prevent the construction of the design levee cross section. Along these reaches a floodwall on levee configuration was constructed. The floodwall was constructed to 20 ft NGVD. In the areas where the wall was constructed because of right-of-way restrictions, some overtopping may occur along these reaches. Overtopping of these reaches during the SPH will not result in measurable flooding in the ponding area protected by the floodwall. Computations indicate that approximately 50 acre feet of water will splash over the reaches of wall during the SPH. This rate of overtopping will not endanger the security of the protective system. Beyond the ends of the 20 ft levee and floodwall, tie-in floodwalls connect the Pontchartrain Beach protective system with the adjacent levee. These tie-in floodwalls vary in height from 17 to 18 ft NGVD. No overtopping of these walls is expected during the SPH, since these floodwalls are fronted by a berm of sufficient height and width to prevent overtopping.

e. New Orleans Airport Floodwall. The New Orleans Airport Floodwall is located behind the New Orleans Airport. The plan of improvement consists of raising the existing floodwall 3 feet. The design height of the floodwall, 13.5 ft NGVD, was determined by adding 2 ft of freeboard to the design stillwater level of 11.5 ft NGVD. The New Orleans Airport extends more than a mile out into Lake Pontchartrain. The airport buildings and the elevations of the airport runways and roads break the wave action which would ordinarily run up on the floodwall. Because of these obstructions, wave activity at the floodwall during the SPH would be minimal.

The SPH hurricane parameters produce a windtide level of 11.5 ft NGVD along the entire Citrus lakefront. Description of the SPH hurricane parameters is contained in Appendix A of DM No. 14, Citrus Lakefront Levee, IHNC to Paris Road.

f. Lincoln Beach Floodwall. Lincoln Beach is located along the Citrus lakefront. The plan of protection here consists of raising the existing floodwall 3 feet to elevation 13.5 ft NGVD. The design height of the floodwall was determined by adding 2 feet of freeboard to the design stillwater level of 11.5 ft NGVD. The area fronting the floodwall is an abandoned beach and amusement park which is now overgrown with trees and brush. Currently there are no plans for improvement to this site. The elevation of the beach in combination with the trees and abandoned buildings will dissipate wave action. During the SPH, wave action is minimal and the floodwall can therefore be designed with the addition of freeboard only. The tie-in floodwalls on both sides are each approximately 100 feet in length and will transition from the 13.5 ft NGVD floodwall into the existing 14.5 ft NGVD adjacent levees. No significant wave activity is expected in these transition reaches.

The SPH hurricane produces a windtide level of 11.5 ft NGVD at this site and also along the entire Citrus lakefront levee. Description of the hurricane parameters is contained in Appendix A of DM No. 14, Citrus Lakefront Levee, IHNC to Paris Road.

g. Floodwalls at St. Charles, Citrus and Jahncke pumping stations. These three pumping stations have discharge pipes which pass underneath Haynes Blvd. and discharge at or beyond the existing stone protection along Citrus lakefront. At the present time each of these pipes flows through a short length of floodwall which is incorporated into the SPH line of protection along Citrus lakefront. The floodwalls are not protected from wave attack, but are fronted by the same types of structures as Citrus lakefront levee, i.e., railroad embankment and stone dike. The heights of these floodwalls are currently less than 1 foot below the design grade along this reach, 14.5 ft NGVD. The length of each of these floodwalls is less than 150 feet. Because the lengths of these walls are short and the deficiencies in height are small, overtopping across these 3 structures is minimal and does not pose a threat to interior flooding or to the levee's security during the design event. Therefore, at this time, we are not raising the structures to design grade. However, if they fall below 13.0 ft NGVD in the future, raising of these floodwalls to design grade will be required.

SPH hurricane parameters and resulting stillwater levels and wave heights, plus the levee design for the Citrus lakefront, are given in Appendix A of DM NO. 14, Citrus Lakefront Levee, IHNC to Paris Road.

16. Drainage. Where floodwalls and levees already exist along the alignment for the high level plans of improvement, existing gravity drainage structures and related works located in close proximity to the floodwall will not be affected by any of these plans.

GEOLOGY

17. Geology.

The geology of the study sites was not specifically addressed in this report but can be found in previous reports for the same area. For specific geologic information see:

a. Design Memorandum No. 2 - General Design, Supplement No. 5D, Orleans Parish Lakefront Levees, Orleans Marina.

b. Design Memorandum No. 13 - General Design, Orleans Parish Lakefront Levee, West of IHNC.

c. Design Memorandum No. 2 - General Design, Supplement No. 5A, Citrus Lakefront Levee, IHNC to Paris Road.

FOUNDATION INVESTIGATION AND DESIGN

18. General. This section includes the soils investigations and foundation design for Orleans Marina, Orleans Marina Extension, Bayou St. John, Pontchartrain Beach, New Orleans Lakefront Airport,

St. Charles pumping station, Citrus pumping station, Jahncke pumping station and Lincoln Beach. The protection consists of I-walls, levees and pile supported structures.

19. Field Exploration.

a. New borings taken since Barrier Plan reports:

(1) Eleven borings taken by an A-E for the Orleans Levee Board at Bayou St. John were used in conjunction with the COE borings in the foundation design. One boring was made with a 5 inch diameter Shelby Tube sampling barrel and ten of the borings were made with a 3 inch diameter Shelby Tube sampling barrel. Borings 1 through 6 and 11 ranged in depth from 60 to 105 ft. Borings 7 through 10 ranged in depth from 14 to 19 ft. The locations of borings taken by the A-E and the boring logs are shown in Appendix B.

(2) Ten borings taken by an A-E for the Orleans Levee Board at Pontchartrain Beach were used in conjunction with old COE borings in the foundation design. One boring was made with a 5 inch Shelby Tube sampling barrel and eight borings were made with a 3 inch diameter Shelby Tube sampling barrel. Borings 1 through 5 and 7 through 10 ranged in depth from 55 to 80 feet below the existing ground surface. Boring 6-PBU was drilled to a depth of 100 feet below the existing ground surface with a 5 inch diameter piston type sampler. Samples obtained from this boring were forwarded to the New Orleans District, U.S. Army Corps of Engineers for classifications and testing. The locations of borings taken by the A-E and the boring logs of borings 1 through 5 and 7 through 10 are shown in Appendix B. The boring log of boring 6-PBU is shown on Plate 55 with test results summarized on the boring log. The test data sheets are shown in Appendix B.

b. Old borings used in the design:

(1) 1-UIYH and 2-UIYH. For reference see Design Memorandum No. 2 - General Supplement No. 5D, Orleans Parish Lakefront Levees, Orleans Marina.

(2) 3-ULO, 7-ULO, 8-ULO, 10-U, 11-U, 10-SW, 1-UJP, 3-JUE, 1-JP, 2-JP and 6-SW. For reference see Design Memorandum No. 13 - General, Orleans Parish Lakefront Levee, West of IHNC.

(3) 2-AU, 1-C, 3-A, 2-C, 4-A, 5-AU, 3-C, 6-AU, 7-A, 8-C, 1-L, 1-CT, 1-ULC, 2-ULC, 3-L, 3-CT, 13-C, 10-ULC, 14-C, 21-C, 22-C, 9-AU, 27-C, 11-ULC and 28-C. For reference see Design Memorandum No. 2 - General Design, Supplement No. 5A, Citrus Lakefront Levee, IHNC to Paris Road.

20. Laboratory Tests.

a. COE borings. Visual classifications were made on all samples obtained from the soil borings. Water content determinations were made on all cohesive soil samples. Consolidation (C) tests, Unconfined Compression (UCT), Unconsolidated-Undrained (Q), and Consolidated-Drained (S) shear tests were performed on samples from the undisturbed borings that were representative of the soils encountered. Liquid and plastic shear tests were performed when applicable. These tests are summarized on the boring logs shown in the reports referenced in paragraph 19 above.

b. A-E borings. Laboratory test consisting of natural water content, unit weight and either Unconfined compression (UC) or Unconsolidated-Undrained (Q) one point or three point shear tests were performed by the A-E on samples obtained from the A-E borings. Liquid and plastic limit tests were made on selected samples. Laboratory tests results are shown in Appendix B. (UC) tests, one point and three point (Q) tests, in silts and sands were not plotted on the design shear strength profiles.

c. Design shear strengths. Design shear strength parameters are shown on Plates 56 through 60.

21. Design Problems Considered.

a. Stability of the existing floodwalls with an increase of three feet in SWL.

b. Pile capacities of the existing pile supported structures with an increase of three feet in SWL.

c. Adequacy of the existing sheetpile I-walls and cutoff walls for seepage with an increase of three feet in SWL.

22. Pile Foundations.

a. Bearing capacity. Ultimate compression and tension pile capacities versus tip elevations developed for Class B timber piles for the sluice gate at New Basin Canal, Orleans Marina Extension are shown on Plate 61. Pile load tests were conducted at Orleans Marina, New Orleans Airport and Lincoln Beach by COE contracts. At the Bayou St. John Bridge and Sector Gate the pile tests were conducted by Orleans Levee Board Contract. No pile load tests were conducted at Pontchartrain Beach. Plates 62 through 64 are results of pile load tests for the Orleans Marina, Bayou St. John Bridge and Sector Gate, New Orleans Airport and Lincoln Beach. Pile capacity curves for 12-inch and 14-inch prestressed concrete piles at Pontchartrain Beach Floodgates are shown on Plate 65. Values of soil to pile frictional resistance, lateral earth pressure coefficients for compression and tension, and bearing capacity factors used to compute pile capacities are shown in Table 1. The tip elevations for cost estimating purposes are based on applying a factor-of-safety of 2.0 with a pile test and a factor-of-safety of 3.0 without a pile test.

TABLE 1
PILE CAPACITIES FOR Q AND S CASES

Timber Piles

	Q-Case					S-Case				
	PHI	K_c	K_t	N_c	N_q	PHI	K_c	K_t	N_c	N_q
Clay	0°	1.0	1.0	9.0	0.0	23°	1.0	0.7	0.0	10.0
Silt	15°	1.0	0.7	12.9	4.4	30°	1.0	0.7	0.0	22.0
Sand	33°	1.0	0.7	0.0	22.0	33°	1.0	0.7	0.0	22.0

Concrete Piles

	Q-Case					S-Case				
	0	K_c	K_t	N_c	N_q	0	K_c	K_t	N_c	N_q
Clay	0°	1.0	1.0	9.0	0.0	23°	1.0	0.7	0.0	10.0
Silt	15°	1.0	0.7	12.5	4.5	30°	1.0	0.7	0.0	22.0
Sand	28°	1.0	0.7	0.0	17.5	30°	1.0	0.7	0.0	22.0
	30°	1.0	0.7	0.0	22.0	30°	1.0	0.7	0.0	22.0

b. <u>Subgrade modulus</u>. Subgrade moduli curves for estimating lateral resistance of the soil beneath the pile supported structures are shown on Plates 61 through 65.

c. <u>Settlement</u>. Visual inspection and surveys of the existing I-walls adjacent to the pile supported structures indicate no significant settlements. No settlement is expected for the sluice gate structure on the New Basin Canal or the Pontchartrain Beach floodgates.

23. <u>Levees</u>.

a. <u>Stability</u>. Conventional earthen levee enlargements are used at Bayou St. John - B/L Stations 6+43 to 13+11 East Side and B/L Stations 3+80 to 9+18 West Side, at Pontchartrain Beach - W/L Stations 18+63 to 21+07 and W/L Stations 26+77 to 34+10 and at the New Orleans Airport - W/L Station 32+75 to 33+21. The stability of the levee was determined by the LMVD Method of Planes using the design (Q) shear strengths and applying a minimum factor-of-safety of approximately 1.3. No levee enlargements or additional work are required at Bayou St. John or Pontchartrain Beach since these levees have been raised to the High Level Plan by the New Orleans Levee Board. Stability was checked and presented on Plates 66 through 68. The levee at the New Orleans Airport will be constructed in one lift by enlarging the existing levee built in 1980. The levee enlargement will be constructed by placing semi-compacted clay fill on the existing levee to the design grades and sections shown on Plate 69.

b. Settlement. Using consolidation data from borings, theoretical analyses indicate that approximately 0.5 ft of settlement is expected to occur of the levee crown at the New Orleans Airport. An estimate for shrinkage of fill is included in this figure. To compensate for this expected settlement, the levee crown will be overbuilt.

c. Underseepage. The embankments required for stability were checked for underseepage using the Lane's Weighted Creep Ratio method. See Plate 68 for sample analysis.

24. Bayou St. John Earthen Closure.

a. Stability. A fully compacted earthen closure is used for Bayou St. John Alternative No. 1. The stability of the closure was determined by the IMVD Method of Planes analysis using the design (Q) shear strengths and applying a minimum factor-of-safety of 1.5 since the closure includes a sluice-gated structure. See Plate 70 for analysis.

b. Settlements. The closure will be constructed to one foot above net grade in the first lift and maintained to net grade with an estimated future lift to one and one-half feet above net grade. The second lift will be added when the closure settles one-half foot below net grade estimated to be approximately two years after the first lift. This estimate is based on a theoretical analysis using data contained in Appendix B. The sluice gated-structure will consist of flexible cambered piping with the inlet, outlet and sluice gate structures being soil-founded to react with foundation settlements. The closure will be fully compacted to minimize settlements of the fill material.

c. Seepage. The closure section required for hydraulics and stability was checked for underseepage using the Lane's Weighted Creep Ratio method. See Plate 70 for analysis. The sluice gated structure will utilize an 18 inch drainage blanket around the protected side one-third of the piping and a controlled exit filter to control any potential seepage along the structure.

25. I-Walls.

a. General. The protection between wall line (W/L) stations listed in Table 2 below consists of either new or existing cantilever I-type floodwall of sheetpiling driven through existing levees and/or fill and capped with a concrete wall.

b. Stability. The stability of the I-wall in levee or natural ground was determined by the IMVD Method of Planes, using the design (Q) shear strengths and applying a minimum factor-of-safety of approximately 1.3. Stability analyses are presented on Plates 71 through 79.

c. Cantilever I-wall analysis. The required penetration of the steel sheetpiling below ground surface was determined by the method of planes using either "S" case shear strengths of ϕ=23° and c=0 for clay strata, and ϕ=30° and c=0 for silts or "Q" case design strengths based on data shown on Plates 56 through 60. The factors-of-safety applied to the design shear strengths were as follows: ϕ developed = arctan ϕ (tan ϕ available/factor-of-safety) and c/factor-of-safety. Using the resulting shear strengths, net lateral soil and water pressure diagrams were developed for movement toward each side of the sheetpile. With these pressure distributions, the summation of horizontal forces were equated to zero for various tip penetrations and the overturning moments about the tip of the sheetpile were determined. The required depth of penetration to satisfy the stability criteria was determined where the summation of moments was equal to zero. Design tip elevations determined from the governing criteria are shown in Table 2. The analyses are presented on Plates 80 through 102. The sheetpile wall design criteria for hurricane protection levees are as follows:

TIP PENETRATIONS

Q-CASE

F.S. = 1.5 With water to SWL
F.S. = 1.25 With water to SWL and waveload
F.S. = 1.0 With water to SWL + 2 ft. freeboard

S-CASE

F.S. = 1.2 With water to SWL and waveload (if applicable)
F.S. = 1.25 With water to SWL and waveload for Pontchartrain Beach (Special case - defines existing criteria when constructed)

BENDING MOMENTS

Governing Tip Penetration Case

TABLE 2

FLOODWALL DESIGN SECTIONS

Steel Sheet Pile Penetration

REACH	STATION ALONG W/L	EXISTING TIP ELEVATION	DESIGN TIP ELEVATION
Orleans Marina	0+31.60 to 4+14.31	-37.0	-37.0
Orleans Marina	5+06.47 to 7+22.73	-37.0	-37.0
Orleans Marina	8+14.89 to 10+67.00	-37.0	-37.0
Orleans Marina	4+26.39 to 4+51.39	-30.0	-25.0
Orleans Marina	4+84.39 to 4+94.39	-30.0	-25.0
Orleans Marina	7+34.81 to 7+59.81	-30.0	-25.0
Orleans Marina	7+92.81 to 8+02.81	-30.0	-25.0
Orleans Marina	11+78.02 to 12+06.10	-24.0	-9.2
Orleans Marina	12+66.10 to 12+95.29	-13.0	-5.0
Orleans Marina	12+95.29 to 13+77.00	--	-5.0
Orleans Marina	13+77.00 to 14+37.00	--	-9.2
Orleans Marina	14+37.00 to 14+96.30	--	-25.0
Orleans Marina	15+67.80 to 16+28.00	--	-25.0
Orleans Marina	16+28.00 to 17+72.80	--	-9.2
Bayou St. John	2+02 to 5+25 East	-14.5	-8.4
Bayou St. John	6+43 to 8+61 East	-14.5	-5.3
Bayou St. John	8+61 to 9+63 East	-4.0	-3.8
Bayou St. John	12+50 to 13+11 East	-4.0	-2.0
Bayou St. John	1+31 to 2+61 West	-14.5	-10.8
Bayou St. John	3+80 to 5+08 West	-14.5	-4.7
Bayou St. John	5+08 to 5+73 West	-4.0	-3.4
Bayou St. John	7+90 to 9+18 West	-4.0	-3.7
Pontchartrain Beach	10+3.45 to 11+97.67	-10.0	-10.4
Pontchartrain Beach	11+97.67 to 13+91.89	-12.0	-10.4
Pontchartrain Beach	13+91.89 to 18+73.56	-14.0	-10.4
Pontchartrain Beach	20+95.75 to 26+85.54	-14.0	-10.4
Pontchartrain Beach	33+98.52 to 35+20.97	-14.0	-10.4
Pontchartrain Beach	35+20.97 to 37+82.60	-12.0	-10.4
Pontchartrain Beach	37+82.60 to 39+78.39	-10.0	-10.4
N.O. Lakefront Airport	10+13.20 to 17+53.20	-17.0	-11.3
N.O. Lakefront Airport	17+53.20 to 18+43.20	-12.5	-6.0
N.O. Lakefront Airport	18+43.10 to 22+09.5	-12.0	-4.3
N.O. Lakefront Airport	22+09 to 23+89	-12.5	-6.0
N.O. Lakefront Airport	23+89 to 26+03	-13.0	-6.4
N.O. Lakefront Airport	26+03 to 26+88	-13.5	-9.5
N.O. Lakefront Airport	26+88 to 28+95.27	-17.5	-11.3
N.O. Lakefront Airport	29+26.27 to 31+06.27	-17.5	-11.3
N.O. Lakefront Airport	31+06 to 31+42	-14.0	-11.3
N.O Lakefront Airport	32+58 to 32+80	-14.0	-11.3
Lincoln Beach	100+00.50 to 101+50	-10.0	-0.8
Lincoln Beach	101+50 to 106+92.91	-13.0	-11.3
Lincoln Beach	109+18.91 to 114+00	-13.0	-11.3
Lincoln Beach	114+23.81 to 115+43.81	-10.0	-0.8

If the penetration to head ratio is less than 2.5 to 1, it is increased to 2.5 to 1. The SWL is used to calculate head, for penetration to head ratio. The I-walls between the Bayou St. John Bridge and the sector gate are a special case. In lieu of wave forces the SWL to the top of the wall with appropriate F.S. for waveloads were used.

d. Underseepage. The sheetpile tip elevations of the I-walls, either existing or new, were checked by the Lane's Weighted Creep ratio method. See Plate 74 for example calculations.

26. T-Walls.

a. Deep-seated analysis. Deep-seated stability analyses utilizing a 1.3 factor-of-safety incorporated into the soil properties were performed for various potential failure surfaces below T-walls and floodgates. The horizontal driving forces minus the horizontal resisting forces results in either:

(1) a value that is positive at the base and negative as the elevation of the failure surface is lowered, or

(2) a positive value below the base of the structure, but the value is less than the net at-rest force acting above the base.

Since the net driving forces are less than the net at-rest forces in all analyses, the structures are assumed to be stable and all loads (vertical and horizontal) are carried by the pile supported structure. See Plates 103 through 110 for the deep seated analyses.

b. Underseepage. The sheetpile cutoff beneath the T-walls were checked or designed with either Lane's Weighted Creep Ratio method, Harr's method or a flownet. See Plates 107, 108 and 109 for example calculations.

ACCESS ROADS

27. Access Roads. Vehicular access to the project site is available via many roads. Lakeshore Drive traverses parallel to almost the entire reach of the project. Other major thoroughfares which provide access to the project area are Franklin Avenue, Elysian Fields Avenue, Canal Boulevard and West End Boulevard. Haynes Boulevard traverses parallel to the Lincoln Beach portion of the project.

STRUCTURAL DESIGN

28. Criteria for Structural Design. The structural designs to be used in preparing the final plans and specifications for construction of the structural feature presented herein will comply with standard engineering practices and criteria set forth in Engineering Manuals and

Engineering Technical Letters for civil works construction published by the Office, Chief of Engineers, subject to modifications indicated by engineering judgement and experience to meet local conditions.

29. Basic Data. Basic data relevant to the design of the floodwall extensions are described in paragraphs 12a through 12c, collectively titled, "Project Plan" and/or presented in Table 3.

TABLE 3

RELEVANT STRUCTURAL DESIGN DATA

a. Water elevations.	Elevation (ft NGVD)
Lake Pontchartrain Wind Tide Level Elevation 11.5 plus 2 ft freeboard	13.5
Landside of Floodwall	0.0
b. Unit weights.	Lb. per cu. ft.
Water	64.0
Concrete	150.0
Steel	490.0
Earth	See Plates 66 through 79
c. Design loads.	
Earth pressures (lateral)	See Plates 56 through 60
Wind loads	50.0 p.
Water loads	See Plates 66 through 79

30. Design Methods.

a. Reinforced concrete. The allowable stresses used in the design of conventionally reinforced concrete structures shall be in accordance with the requirements of the strength design method of the current ACI Building Code, as modified by the guidelines of "Strength Design Criteria for Reinforced Concrete Hydraulic Structures", EM 1110-2-2104 dated 30 April 1992. Pertinent stresses are tabulated below:

TABLE 4

PERTINENT STRESSES FOR REINFORCED CONCRETE DESIGN

Reinforced Concrete	
f'_c	3,000 psi
f_y (Grade 60 reinforcing steel)	48,000 psi
Maximum Flexural Reinforcement	0.25 x Balance Rat
Minimum Flexural Reinforcement	200 / f_y
Prestressed Concrete	
f'_c (for prestressed concrete piles)	5,000 psi
f_u (prestressing strands, Grade 250)	250,000 psi
f_u (prestressing strands, Grade 270)	270,000 psi

b. Structural steel. The basic stresses for structural steel shall be in accordance with the current edition of AISC, Manual of Steel Construction, as modified by "Working Stresses for Structural Design", EM 1110-2-2101. The basic working stresses for ASTM A-36 steel is 18,000 psi. Steel for steel sheetpiling will meet the requirements of ASTM 328, "Standard Specifications for Steel Sheet Piling".

c. Welds. Allowable stresses for the design of welds shall be in accordance with the latest AWS Welding Code as modified by EM 1110-2-2101.

31. I-Type Floodwall.

a. General. The I-type wall will consist of steel sheetpiling driven into the existing ground. The upper portion of the sheetpiling will be capped with concrete. The sheetpiling will be driven to the required depth with 1 foot of the sheet piling extending above the finished ground elevation. The concrete portion of the floodwall will extend from 2 feet below the finished ground elevation to the required protection height. For details see Plate 50.

For the I-type wall requiring extensions from an existing elevation to a higher elevation, the sheetpiling will not be disturbed.

b. Loading cases. In the design of the I-wall, two loading cases were considered.

Case I:

(1) For confined area, the factor of safety (FS) used = 1.5 with static water at the top of the wall (still water level (SWL) plus freeboard) and no dynamic wave force.

(2) For unconfined areas along the lakefront adjacent to open water, such as Bayou St. John, the FS used = 1.5 with static water at the SWL (and no dynamic wave force) and FS= 1.25 with static water at the SWL and a dynamic wave force.

Case II: No water, lateral soil pressure (where applicable).

c. Joints. Expansion joints in the I-wall and the I-wall extensions will be spaced approximately 30 feet apart, adjusted to fall at sheetpile interlocks. To compensate for expansion, contraction, or displacement, three-bulb waterstops and premolded expansion joint fillers will be provided. Where the I-wall joins T-wall, the deflection of the I-wall will produce a lateral displacement. To compensate for this displacement, a special seal located in a notch in the I-wall has been designed to prevent water from flowing through the joint. See Plates 46 through 48 for details.

32. T-Type Floodwall.

a. General. The T-wall will consist of a reinforced concrete stem on a monolithic concrete base supported on either precast prestressed concrete piling or steel H-piles. The base of the T-wall will be constructed on a four inch concrete stabilization slab. A continuous steel sheetpile wall will be provided beneath the base for seepage cut-off purposes.

The T-wall extensions will consist of modifying the stem of the T-wall, with either removing a portion of the existing T-wall stem and replacing it with a new stem or attaching a metal extension on top of the stem.

b. Loading cases. The T-walls will be designed for the following load conditions during development of plans and specifications.

Case I. Static water pressure, no wind, impervious sheetpile cutoff, no dynamic wave force.

Case II. Static water pressure, no wind, pervious sheetpile cutoff, no dynamic wave force.

Case III. Still water pressure to Elevation 11.5, no wind, impervious sheetpile cutoff, dynamic wave force (75% forces used).

Case IV. Still water pressure to Elevation 11.5, no wind, pervious sheetpile cutoff, dynamic wave force (75% forces used).

Case V. No water, no wind.

Case VI. No water, wind from protected side (75% forces used.

Case VII. No water, wind from flood side (75% forces used).

c. Joints. Expansion joints in the T-wall will be spaced not more than sixty feet apart except at gate monoliths. New T-wall joints will be adjusted to fall at the sheetpile interlocks. T-wall extension joints will fall at the existing T-wall joints. To compensate for expansion, contraction, or displacement, three-bulb waterstops and premolded expansion joints will be provided. See Plates 46 through 48 for details.

33. Gates and Gate Monoliths.

a. General. Gate monoliths and two swing gates will be constructed on the lakeside end of the Marina Drive ramp. The wall stems of all other gate monoliths and the tops of the existing gates will be modified. Each gate monolith will include or does include a steel gate which will be closed by local interests when a hurricane approaches. Swing gates will be built only for the completion of the floodwall in the vicinity of the New Orleans Marina. The swing gates are described below. The modifications to the three types of existing gates are described below, also.

b. New swing gates. Two swing gates will be constructed in the floodwalls at the New Orleans Marina Floodwall. The locations of the gates are described in paragraph 12c. 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 as alternate or supplemental means to assure that a proper seal is obtained. Details of these swing gates are shown on Plates 9 and 10.

c. Existing swing gates. The locations of the gates are described in paragraph 12c. The side seals will be added which can be adjusted as alternate or supplemental means to assure that a proper seal is obtained. Details of the modifications to these gates are shown on Plates 44 and 50.

d. Existing bottom roller gates. The locations of the gates are described in paragraph 12c. The side seals will be added which can be adjusted as alternate or supplemental means to assure that a proper seal is obtained. Details of the modifications to these gates are shown on Plates 44 and 50.

e. Existing overhead roller gates. The locations of the gates are described in paragraph 12c. The side seals will be added which can be adjusted as alternate or supplemental means to assure that a proper seal is obtained. Details of the modifications to these gates are shown on Pages 44 and 50.

f. Loading cases. The gates will be designed and or analyzed for the following load conditions during development of plans and specifications:

Case I. Gate closed, still water pressure to elevation 11.5, no wind, impervious sheetpile cutoff, dynamic wave force (75% forces used).

Case II. Gate closed, still water pressure to Elevation 11.5, no wind, pervious sheetpile cutoff, dynamic wave force (75% forces used).

Case III. Gate open, truck on protected side of base slab, no wind.

Case IV. Gate open, truck on flood side of base slab, no wind.

Case V. Gate open, truck on protected side of base slab, wind from protected side (75% forces used).

Case VI. Gate open, truck on protected side of base slab, wind from floodside (75% forces used).

34. *Cathodic Protection and Corrosion Control*.

a. *Cathodic protection for steel sheetpiling*. All new steel sheetpiling will be bonded together to obtain electrical continuity. No other corrosion protection measures will be provided. The sheetpiles will be bonded together with a No. 6 reinforcing bar welded to the top of each pile. Flexible jumpers insulated with cross-linked polyethylene will be welded or brazed to adjacent sheetpiles at the monolith joints 3 inches below the bottom of the concrete.

b. *Corrosion control*. The new steel gates, existing steel gate extensions, corner plates and all ferrous metal components which are not galvanized or stainless steel will be coated with a 7-coat vinyl paint system as required for corrosion control.

SOURCES OF MATERIALS

35. *Sources of Construction Materials*. In addition to the information presented in this memorandum relative to borrow area location and material, Design Memorandum "Lake Pontchartrain Hurricane Protection, Sources of Construction Material", DM 12, contains a listing of the sources of sand, gravel and rock available in the region.

REMAINING LEVEES
SOURCES OF MATERIALS

a. Quantities and qualities.

Project	Feature	Concrete Quantity	28* Day Compressive Strength (psi)
Marina Floodwall	Footing	255 CY	3,000
	Gutters	80 LF	3,000
	Pavement	36 CY	3,000
	Walls	528 CY	3,000
Bayou St. John Floodwall	Footing	545 CY	3,000
	Stab Slab	92 CY	2,000
	Walls	851 CY	3,000
New Basin Canal Floodgate	Base Slab	140 CY	3,000
	Stab Slab	30 CY	2,000
	Walkway	70 CY	3,000
	Walls	175 CY	3,000
Lakefront Airport Floodwall	Walls	196 CY	3,000
Lincoln Beach Floodwall	Stab Slab	41 CY	2,000
	Walls	665 CY	3,000

*90 if pozzolan used

b. Environmental conditions. The concrete will not be subjected to any critical environmental or functional conditions.

c. Specification requirements. Concrete construction will be specified using CW-03301, entitled, "Cast-In-Place Structural Concrete", as a guide. Because of the nature of local aggregates, low alkali cementitious materials will be specified.

d. Commercial ready mix. Ready mix concrete meeting the requirements of this project and produced from batch plants meeting the guidelines of Cast-In-Place Structural Concrete (CW-03301) is available from several area ready mix companies.

e. Sand and gravel. For this project 3/4" and either 1-1/2 or 1" nominal maximum size coarse aggregate will be used. Several area sources are capable of furnishing sand and/or gravel meeting ASTM quality and ASTM or Louisiana State Department of Transportation and Development gradation requirements for concrete aggregates.

REAL ESTATE

36. General. This project requires the acquisition of 15.56 acres of right-of-way for a Perpetual Levee/Floodwall Easement and 7.84 acres right-of-way for a Temporary Construction Easement. All new right-of-way reportedly is owned by the Orleans Parish Levee District.

No improvements are located in the perpetual easement area, and none of the plans require P.L. 91-646 relocations.

RELOCATIONS

37. Road Ramps. A road ramp will be constructed at Bayou St. John. The location of the ramp is shown on Plate 17. Details of the ramp are shown on Plate 21.

38. Utilities Crossing Flood Protection. Known utilities crossing the flood protection have been identified and incorporated into the construction of the existing floodwall. Typical utility crossing sections and details are shown on Plate 54.

ENVIRONMENTAL ASSESSMENT

39. General. The project is within the Mississippi Deltaic Plain and characterized by near sea level elevations. The dominant feature is Lake Pontchartrain, a large, shallow body of water lying within an extensive estuarine complex. The remaining works addressed here include floodwall capping, gated protection at Bayou St. John, frontage protection at New Basin Canal and the alignment adjustment along the New Orleans Lakefront at Pontchartrain Beach. All of these works, with the the exception of the Bayou St. John and New Basin frontage protection, have been covered in the Lake Pontchartrain and Vicinity Hurricane Protection EIS filed in 1975 or the Final Supplement I filed in 1984.

The remaining works addressed here are, or will be, constructed at or near the water's edge along that portion of the lakefront in Orleans and Jefferson Parishes west of the IHNC. There will be both temporary consequences associated with the construction and long term effects as a result of structure placement. Some construction impacts are common to all of the remaining works and not site specific. Most of these impacts are short term, only occurring during the construction period. There would be short term increases in airborne dust and turbidity in adjacent waters. Other impacts associated with construction involve increases in background noise levels. Residential areas of work would experience a perceived higher level of noise than areas more commercial in nature. The noise should not reach levels that would cause any disruption in normal daily routines. Work will be limited to waking hours in order to minimize any disturbances. These impacts would be minor and temporary and would neither significantly affect the surrounding environment nor the critical wildlife habitat. No endangered species are known to occur in the work areas. An endangered species assessment and a Coastal Zone Management Consistency Determination have been conducted and filed with the Final Supplement I, to the Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project EIS, filed 1984.

It is expected that most environmental features including biological, recreational, cultural and socioeconomic would return to normal after construction.

40. Biological.

a. Floodwall capping. That portion of the New Orleans Lakefront where floodwall capping will be constructed is fronted by a seawall, presently flanked by a floodwall constructed in the existing low level levee. Previously the beach area on the flood side had been used as both a recreational beach and an amusement park. The protected side has been developed as residential with some recreational green spaces on the lakeward side of the levee and floodwall. These areas are primarily used for jogging, picnicking and recreational games. The existing vegetation consists of various lawn grasses and decorative plants interspersed with stands of pine and, in some cases, oak. The value of the area as wildlife habitat is minimal due to the lack of food and cover, and its urban setting.

Trees in the area may provide some habitat for songbirds and squirrels. Some small mammals such as field mice and rabbits may intermittently utilize the green grassy areas. The tree lined areas and green spaces may provide marginal resting areas for migratory species during seasonal migrations.

Construction impacts associated with the levee/floodwall combination along Pontchartrain and Lincoln Beaches, as well as the capping of the existing floodwall, would result in the temporary loss of expanses of grass covered areas through burial or removal. Areas within the construction right-of-way would be temporarily lost, but would be revegetated shortly after construction is completed. Therefore, minimal impact on wildlife is expected. The levee alignment on Pontchartrain Beach results in a reduction of recreational use on the floodside of the levee. This aspect only becomes important if Pontchartrain Beach is to be used as a recreation beach some time in the future.

b. Bayou St. John closure. Bayou St. John is, at present, an arm of Lake Pontchartrain. The area of construction is located at the intersection of the bayou with Lake Pontchartrain at Lakeshore Drive. This area is characterized by a large, firm, silt and sand delta that extends into the lake north of the Lakeshore Drive bridge. South of the bridge and protected by it and the adjacent seawall is the remains of a large dense grass bed that extends to the blockage wall at Robert E. Lee Boulevard. The bayou is inhabited by as many as 60 species of crab, fishes and shrimp (Thompson 1978). While interchange between the lake and the bayou is prevented by the blockage at Robert E. Lee Boulevard., many species utilize the grassbeds and sand flats at the bayou mouth for cover, food and spawning.

The Corps had proposed a low level bridge crossing at Bayou St. John that incorporates flow-through culverts to maintain the connection of the lake with the bayou up to the blockage at Robert E. Lee Boulevard. An Environmental Assessment was prepared by Operations Division in 1981, addressing impacts of this work. The findings indicated that the low level crossing and culverts could preclude some fish that presently utilize the grassbeds in the bayou for nursery, food and protection purposes. The young of some migratory species may not be able to enter the bayou in search of food or cover. In addition, some possibility exists that nutrient exchange between the grassbeds and the lake could cause a loss or reduction in grassbeds remaining after construction. The fill placement associated with the low level crossing itself would cause a permanent loss of benthic habitat through burial.

At present, the Orleans Levee Board is constructing an alternate to the low level closure at Bayou St. John. The construction of this alternative is being done independent of the Corps. The responsibility for assessing the environmental impacts of this alternative and obtaining the appropriate environmental compliance required is the responsibility of the Orleans Levee Board.

c. New Basin Canal. This canal provides interior drainage for a portion of the city of New Orleans. The canal connects its urban drainage area to Lake Pontchartrain via the outfall in the New Orleans Marina Boat Basin. As with most urban drainage canals, it is characterized by poor water quality, intermittent flows and little submerged aquatic vegetation. The fish fauna found in these canals are only those tolerant of poor water quality and have a high tolerance for sustained levels of low oxygen. Representative fish species that might be found in this area would include gar, mullet, killifishes, various topminnows and some catfish. Where the canal enters Lake Pontchartrain in the New Orleans Marina, the quality of these receiving waters are also marginal to poor. The water here can be characterized as nutrient rich "soup," heavily dominated by various algae. Within these waters there is normally a mix of marine contaminants associated with harbors, which may include marine fuels, various cleaning compounds and chemicals contained in antifouling paints, etc.

Due to the confluence of the boat basin with Lake Pontchartrain, the fish fauna in the boat basin may be somewhat more diverse than those of the canal. The fish may move in and out of this area to the higher quality water of Lake Pontchartrain if water quality conditions within the boat basin dictate. In this area, fish may include catfish, gar, mullet, sheepshead, silversides, menhaden and anchovy. Invertebrates which may be included in the area may include clams, polycheates, barnacles, copepods, amphipods and sponges, as well as various crabs and shrimp.

Since the Corps will be constructing the frontage protection at the New Basin Canal, an Environmental Assessment must be prepared prior to construction to evaluate any construction impacts and obtain NEPA compliance. Preliminary review based on this stage of design indicates minimal impact to the fish and wildlife resources would result from this construction. The "shore based" construction and placement of the sluice gate and supporting structure would minimize impact. Increased turbidity and possible contaminant release from bottom sediments during structure construction could result in the greatest impact. Some marginal benthic habitat could be lost due to structure placement. There is a possibility that use of one boat slip may be either lost or reduced in size.

41. Cultural Resources. No cultural resource impacts are expected and no cultural resources studies are necessary. With the exception of the Bayou St. John closure, all work is located within the previously disturbed levee/floodwall corridors. The alternate alignment plan constructed by the Orleans Levee Board was subject to cultural resources review through the section 404 permit review process for the "low level crossing." All identified cultural resource issues were resolved and no further studies or coordination are necessary.

42. Recreation. Proposed floodwall and levee work will take place in four distinct areas. Various neighborhood parks and parkways existing in the vicinity of work provide aesthetic areas conducive to active and passive recreational pursuits. Recreation facilities existing within the New Orleans Lakefront area include: 4 picnic shelters, 2 covered pavilions, 3 children's play areas, 72 portable picnic tables, 1 fishing pier and 26 boat launch lanes, satisfying 473,000 annual man-days of recreation. Also existing in the area are activities such as informal ball games, field sports, jogging, walking, sightseeing, fishing, crabbing and observation of wildlife. These activities take place in linear park space and are not dependent on recreation facilities. Man-days estimates have not been quantified for these open field sport activities; however, during weekends of the summer season, maximum use does occur. During levee and floodwall construction, people will be discouraged from using the open space adjacent to the work area due to safety concerns resulting from construction activity and temporarily higher noise and dust levels.

Aesthetic values in the area will be temporarily reduced, resulting in short-term changes to the existing landscape. Impacts to localized aesthetics and recreational activity, e.g., jogging, will be temporary during construction. Floodwalls and floodwall capping planned for the area will be designed with an aesthetic surface treatment, thereby softening the impacts to the visual environment. Revegetating in areas adjacent to floodwalls will be accomplished by the seeding of new grass and the replacement of any removed trees.

43. Socioeconomic. The Orleans Parish lakefront levee west of the IHNC is an element of the overall Lake Pontchartrain Hurricane Protection Plan designed to reduce the effects of overflows from a project hurricane in the New Orleans area. The process of levee construction and drainage maintenance has historically been the method used for land development and flood protection in the New Orleans urbanized areas.

Since 1964, as many as eleven tropical storms reaching hurricane force have passed through Louisiana's gulf coast (including Hurricanes Betsy, Camille, Juan and Andrew), some causing heavy damage and loss of life. The economic life of the area is supported largely by port activities, tourist trade, regional market activities, the production of minerals (including crude petroleum, natural gas, sulfur and natural gas liquids), commercial fishing, shipbuilding and related service industries. As widely reported in the press, the study area experienced unusually severe economic fluctuations during the 1980's, including high unemployment and outmigration. The six parishes designated by the Bureau of the Census in 1983 as the New Orleans Metropolitan Statistical Area (MSA) include Jefferson, Orleans, St. Bernard, St. Charles, St. John the Baptist and St. Tammany Parishes. Portions of Plaquemines Parish are also designated as part of the New Orleans Urbanized Area. The Corps' statistical designation of the Port of New Orleans includes the entire stretch of the Mississippi River adjacent to Plaquemines Parish. The combined population of the New Orleans MSA and Plaquemines Parish in 1990 totaled 1,264,000. In June of 1992, the estimated civilian labor force in this area totaled 613,800, while employment was 569,100, resulting in a 7.3 percent unemployment rate; it was somewhat less than the seasonally adjusted 7.7 percent unemployment figure for the state. In 1990, per capita personal income for the 7-parish area was approximately $16,490, somewhat higher than the $14,528 estimate for the entire state. Appendix B-2 of the 1984 Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project Reevaluation Report provides a general assessment of socioeconomic impacts of remaining work through a brief outline of 16 social and economic parameters. In addition to the economic cost of remaining work, minor adverse impacts would probably include the following: temporary reductions in leisure opportunities and increased noise from the construction and development; reduced aesthetic values to the extent that changes in the existing landscape would occur; and possible declines in community cohesion to the extent that competition for land resources could be encouraged. One of the major benefits of completing the new project, however, could also be an increase in community cohesion resulting from the improved security provided by additional flood protection. The remaining work would provide new benefits to land use, property values, and business and industrial activity, as well as benefits to employment, housing local tax revenues, public facilities and services and overall community and regional growth.

44. Environmental Impact Statement. The final Environmental Impact Statement (EIS) for the entire Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project, was filed with the President's Council on Environmental Quality on 17 January 1975. A draft supplement to this EIS was filed with the Environmental Protection Agency (EPA) in December of 1983. The draft supplement assessed the impacts associated with increased levee height for a high level plan of protection for the New Orleans Lakefront project reach. The Final Supplement I to the DIS was filed with EPA in December of 1984.

An Environmental Assessment is to be prepared prior to construction of the New Basin Canal frontage protection.

ESTIMATE OF COST

45. General. Listed below is the estimated first cost for constructing the following:

Orleans Marina Floodwall	$1,730,000
New Basin Canal Sluice Gate	$1,180,000
Lakefront Airport Floodwall	$560,000
Lincoln Beach Floodwall	$810,000

The estimated costs for the Bayou St. John earthen closure ($3,010,000) and the Pontchartrain Beach Floodwall ($5,930,000) were developed for crediting purposes only. The detailed estimates of cost are shown in Appendix E.

46. Basis of Cost Estimate. The cost estimates were based upon an evaluation of each line item from Cost Engineering's historical data: two recent New Orleans Lakefront Floodwall projects and previous M-CACES projects (Orleans Outfall and London Ave.). For certain line items, construction costs were established in detailed estimating procedures.

Cost Engineering evaluated data for the risk analysis (with the exception of the Pontchartrain Beach Floodwall) and obtained contingency costs based on range estimating (using a computer program which addresses the uncertainty in quantity and costs). The results indicated a contingency cost comparable to 25 percent on all projects except the Lincoln Beach and Lakefront Airport, where contingency costs equated to 40%. This apparent high contingency percentage reflects small individual construction contracts.

Contingencies for PED are based on the uncertainties involved in the preparation of P&S and in engineering during construction. These include cost of field data collection, unanticipated design problems, change in design based on the review of the report or due to information from surveys, changes in design criteria and changes in overhead rates. Based on these uncertainties and the scope of the project, a contingency of 15% was used for all PED estimates.

47. Unit Prices. Unit prices for this project were derived through analysis of recent bids for the type of work involved, adjusted based on extensive experience of qualified cost estimators.

SCHEDULE FOR DESIGN AND CONSTRUCTION

48. Schedule for Design and Construction. The schedule for design and construction is as shown in Table 5.

TABLE 5

SCHEDULE FOR DESIGN AND CONSTRUCTION

ACTIVITY	PLANS & SPEC.4/		CONSTRUCTION			ESTIMATED CONSTRUCTION COSTS5/
	START	COMPLETE	ADVER.	AWARD	COMPLETE	
Orleans Marina Floodwall	Apr 94	Dec 94	Apr 95	May 95	Jun 96	$988,000
New Basin Canal Floodgate	Apr 94	Dec 94	Apr 95	May 95	Jun 96	$806,000
N.O. Lakefront Airport Floodwall	Jul 94	Mar 95	Jul 95	Aug 95	Sep 96	$243,000
Lincoln Beach Floodwall	Jul 94	Mar 95	Jul 95	Aug 95	Sep 96	$378,000
Pontchartrain Beach Floodwall1/	COMPLETE		COMPLETE			
Bayou St. John Closure						
a. Earthen Dike2/	NOT SCHEDULED		NOT SCHEDULED			
b. Sector Gate3/		UNDER CONSTRUCTION				

1/ Designed and constructed by the Orleans Levee District. This work was coordinated and reviewed by the New Orleans District.

2/ This alternative was prepared for crediting purposes only. The Orleans Levee Board is presently constructing a Sector Gate Structure at this location. The Sector Gate is not fully creditable under the project.

3/ The Sector Gate Structure is presently under construction by the Orleans Levee Board. The design was coordinated and reviewed by the New Orleans District.

4/ Design completion dates affect resolution of all review comments.

5/ This cost includes contingencies and Federal and non-Federal construction cost, but not E&D and S&I costs.

49. Funds Required by Fiscal Year. To maintain the schedule for design, construction, relocations and land acquisition as shown in Table 5, funds will be required by fiscal year as shown in Table 6.

TABLE 6

FEDERAL FUNDING BY FISCAL YEAR

Funds Through FY 93	$400,000
Funds Required FY 94	$671,000
Funds Required FY 95	$2,012,000
Funds Required FY 96	$751,000

OPERATION AND MAINTENANCE

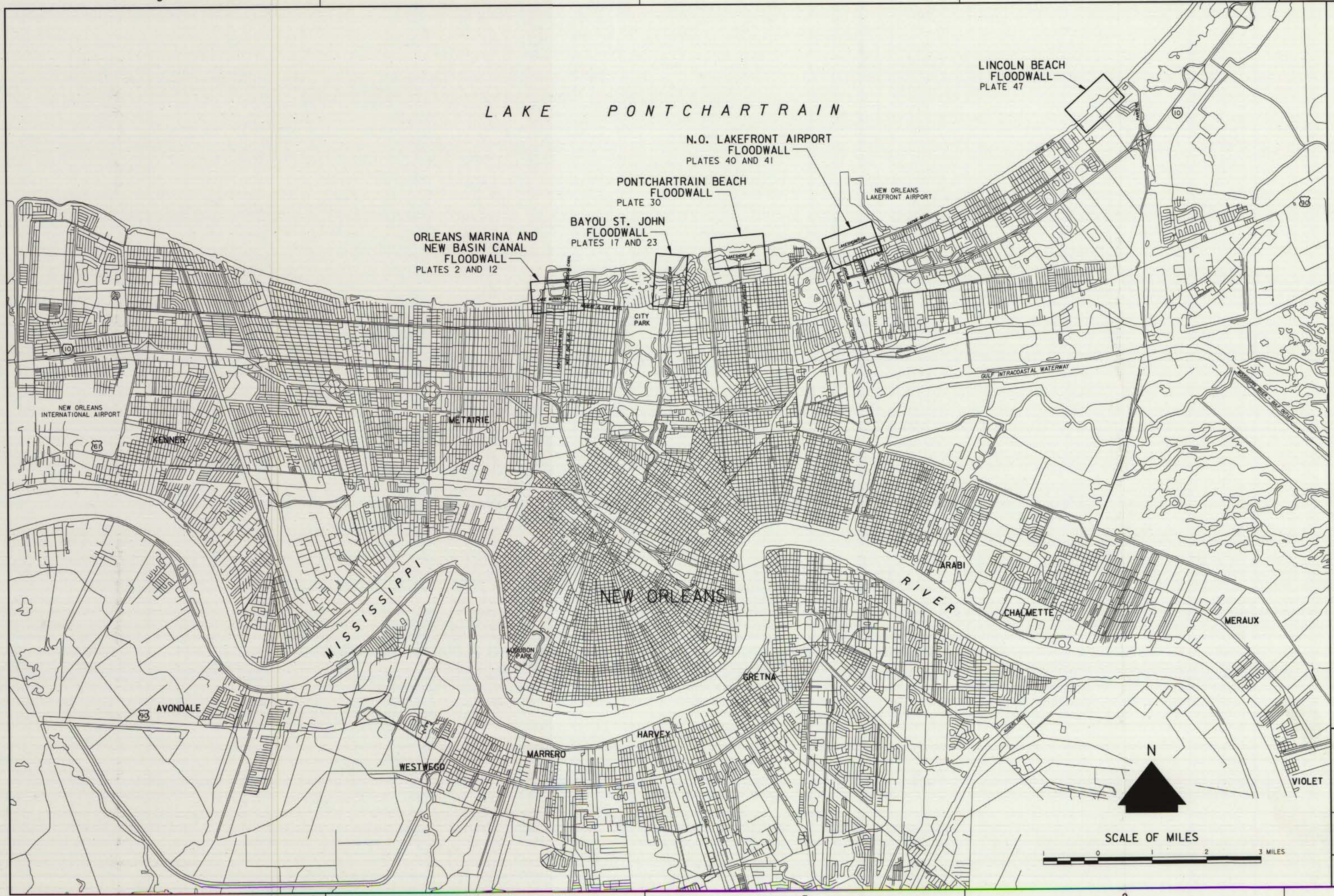
50. General. These six features of the New Orleans lakefront will be maintained and operated at the expense of local interests as a feature of local cooperation for the project. The estimate of the annual operation and maintenance costs for the features was included in DM 13.

ECONOMICS

51. Economic Justification. The detailed economic analysis for the entire Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project is contained in the Reevaluation Study entitled "Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project", dated December 1983. The total benefit/cost ratio based on the project interest rate of 3-1/8 percent is 10.3 to 1. At the current interest rate of 8-1/2 percent the benefit/cost ratio is 4.0 to 1. The remaining benefit/cost ratio based on the project interest rate of 3-1/8 percent is 12.6 to 1. At the current interest rate of 8-1/2 percent the remaining benefit/cost ratio is 7.7 to 1.

RECOMMENDATION

53. Recommendation. The plan presented in this Design Memorandum is recommended for approval as a basis for preparing plans and specifications for the Marina Floodwall, New Basin Canal Sluice Gate, Lakefront Airport Floodwall and Lincoln Beach Floodwall. This Design Memorandum will also serve as the basis for determining credit for the local sponsor for the Bayou St. John closure and the Pontchartrain Beach area.



NOTE:
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED ONE HALF THE ORIGINAL SCALE

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

LOCATION AND INDEX MAP

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

DESIGNED BY: GRUBB	PLOT SCALE: 4800	PLOT DATE: 23 MAR 93	CADD FILE: 30962MAP.DGN
DRAWN BY: HOWAT			FILE NO. H-2-30962
CHECKED BY: DESAI	DATE: APRIL 1992		

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PLAN
VICINITY ORLEANS MARINA

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

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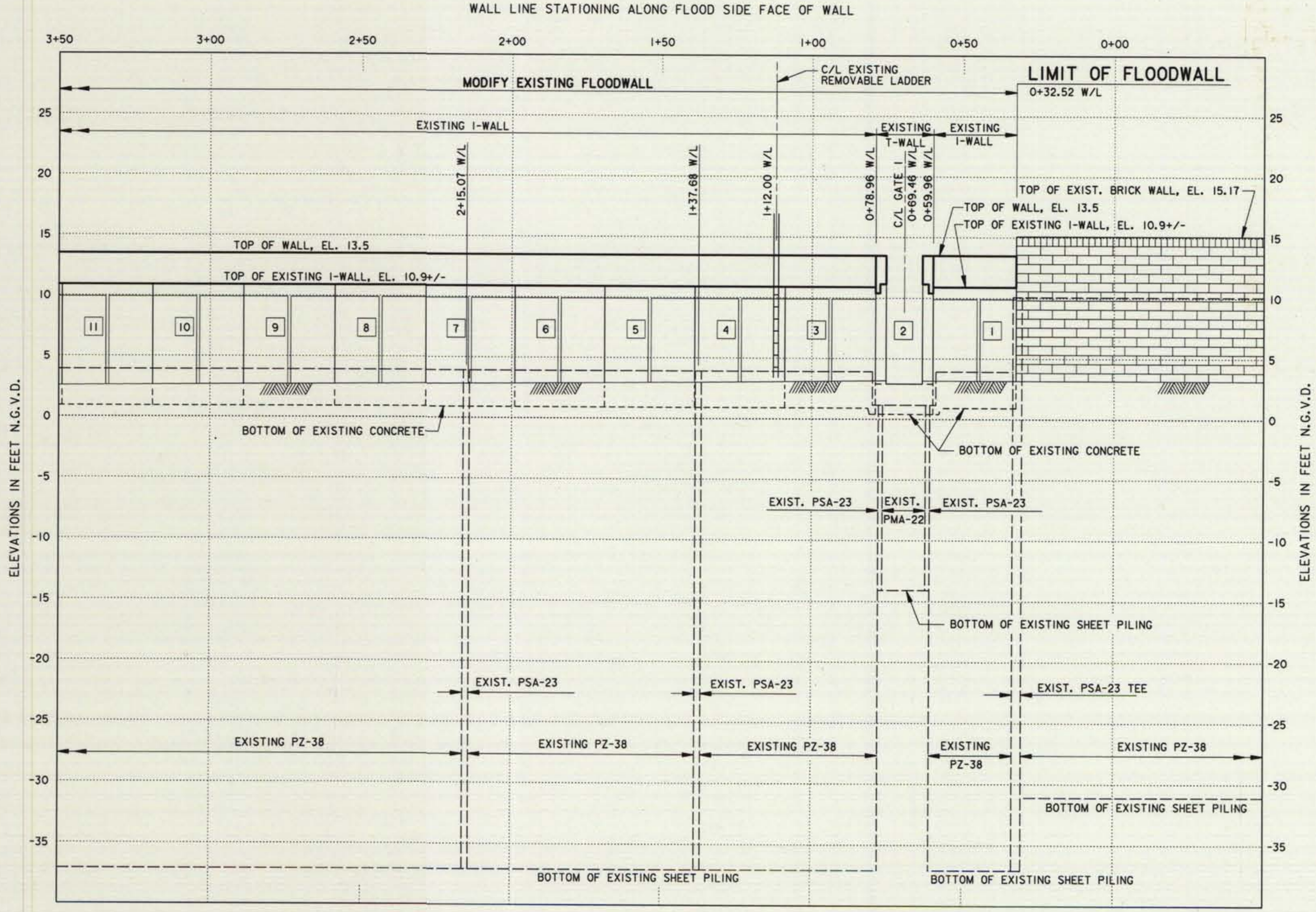
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	DESAI	DATE: APRIL 1992		

PLATE 2



PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY ORLEANS MARINA

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

C·A·D

DESIGNED BY:	GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962B13.DGN
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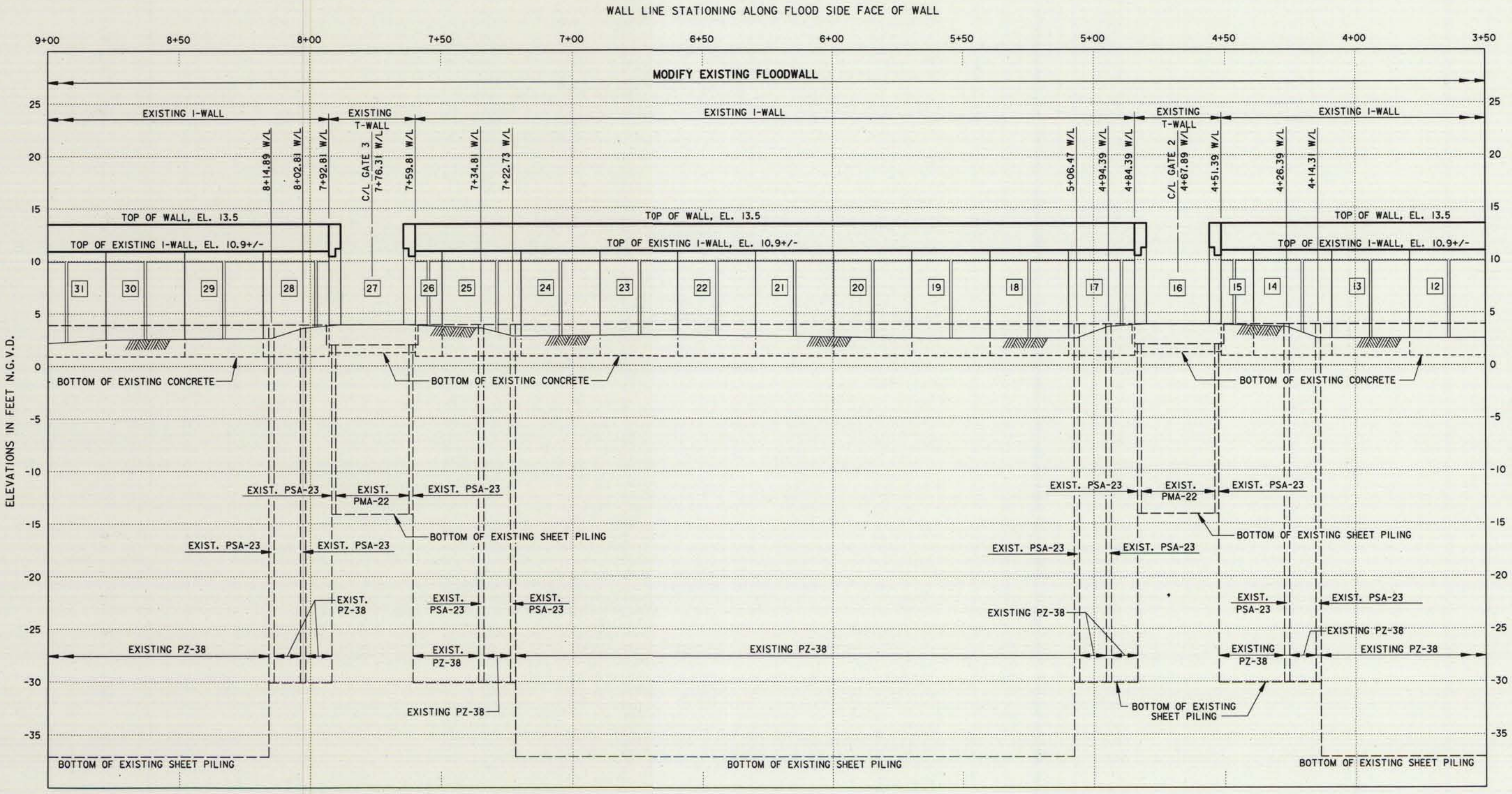
CHECKED BY:	DESAI	DATE: APRIL 1992		

PLATE 3



PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PROFILE
VICINITY ORLEANS MARINA

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

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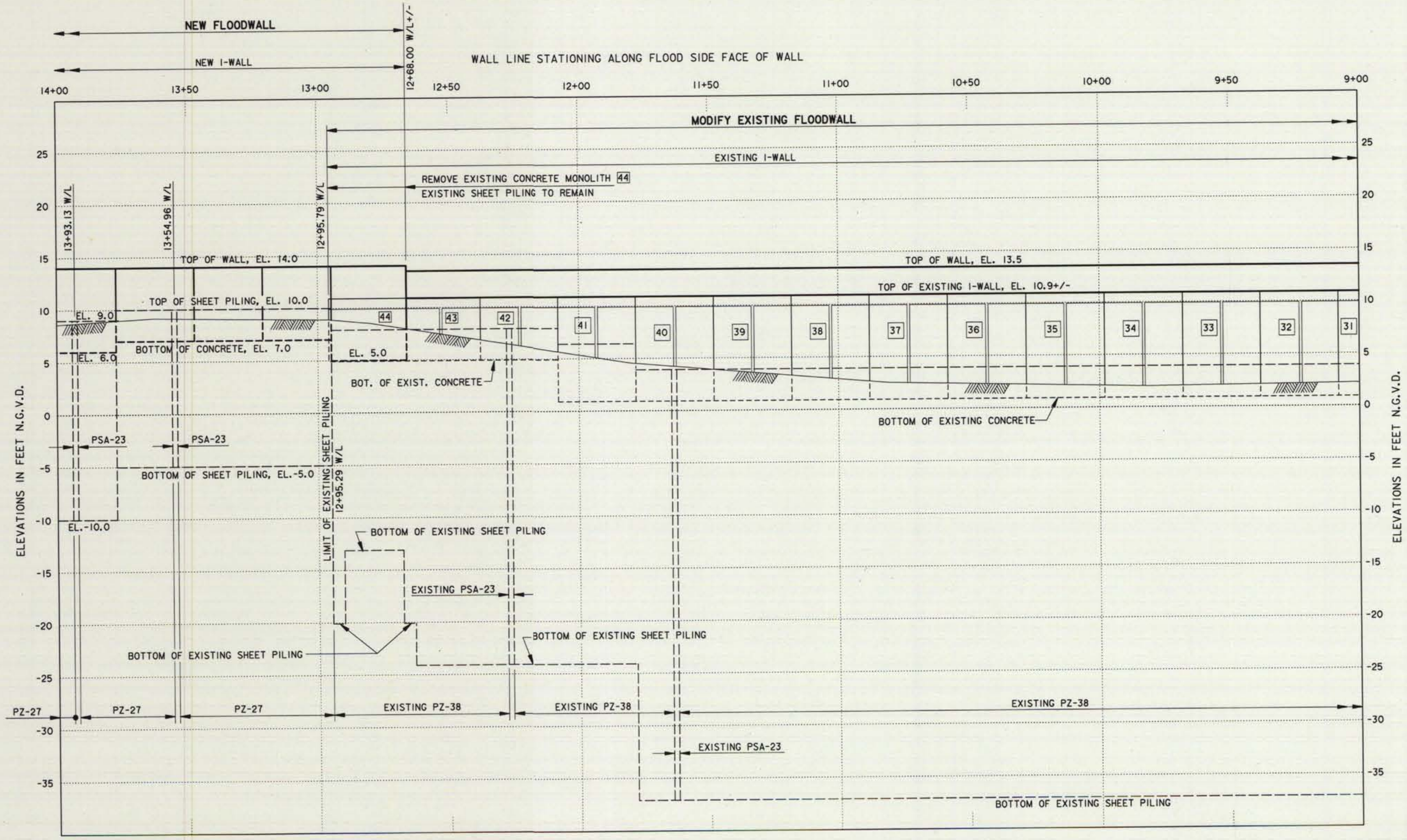
CHECKED BY:	DESAI	DATE: APRIL 1992		

PLATE 4



PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY ORLEANS MARINA

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

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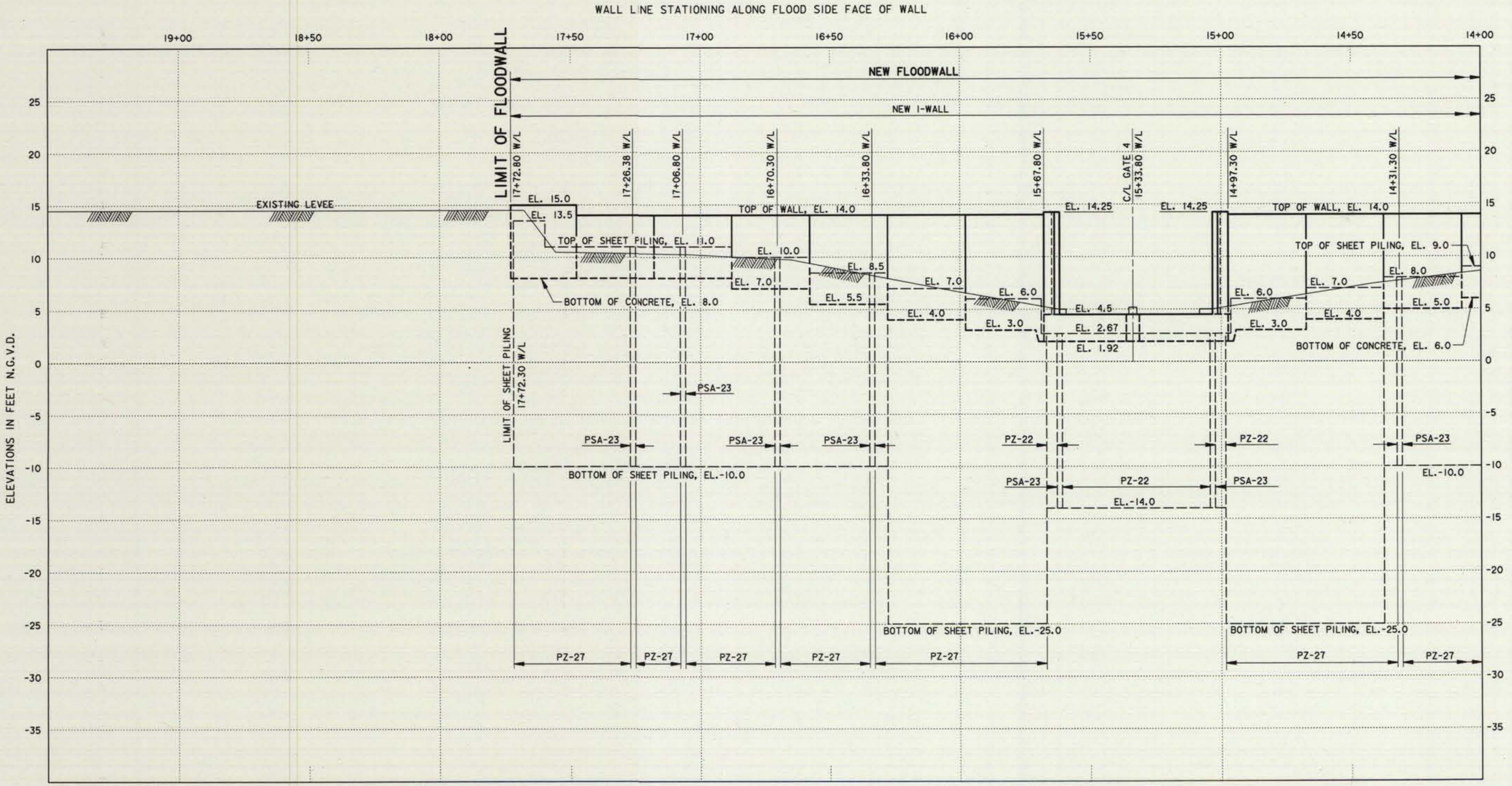

PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PROFILE
VICINITY ORLEANS MARINA

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

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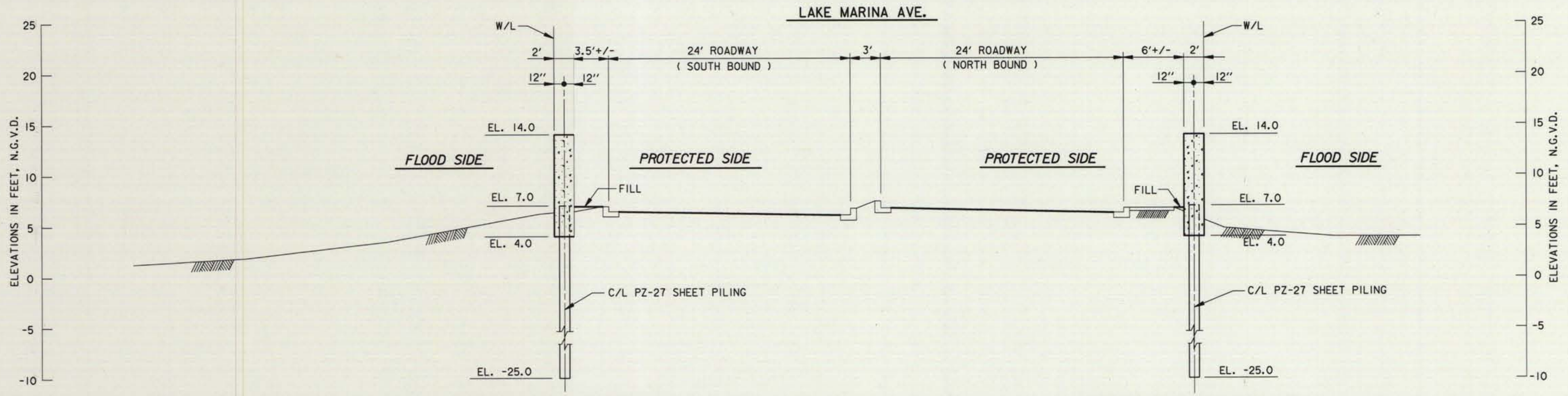
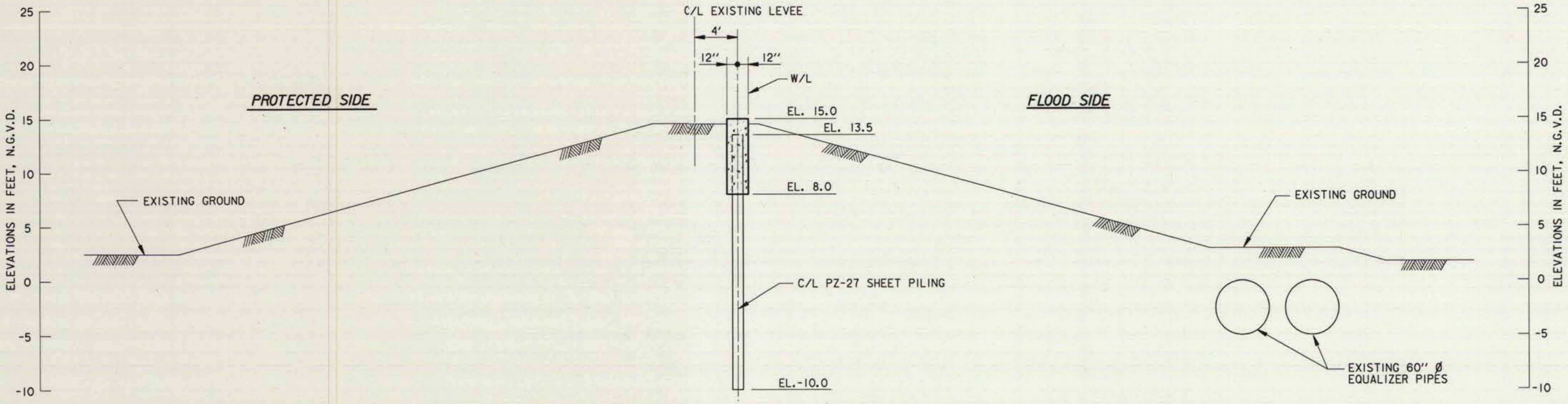
C·A·D



VICINITY STA. 16+02.80 W/L

VICINITY STA. 14+62.30 W/L

TYPICAL SECTION



VICINITY STA. 17+70.80 W/L

TYPICAL SECTION

SCALE: 1" = 5'

5' 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

CROSS SECTIONS
VICINITY ORLEANS MARINA

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

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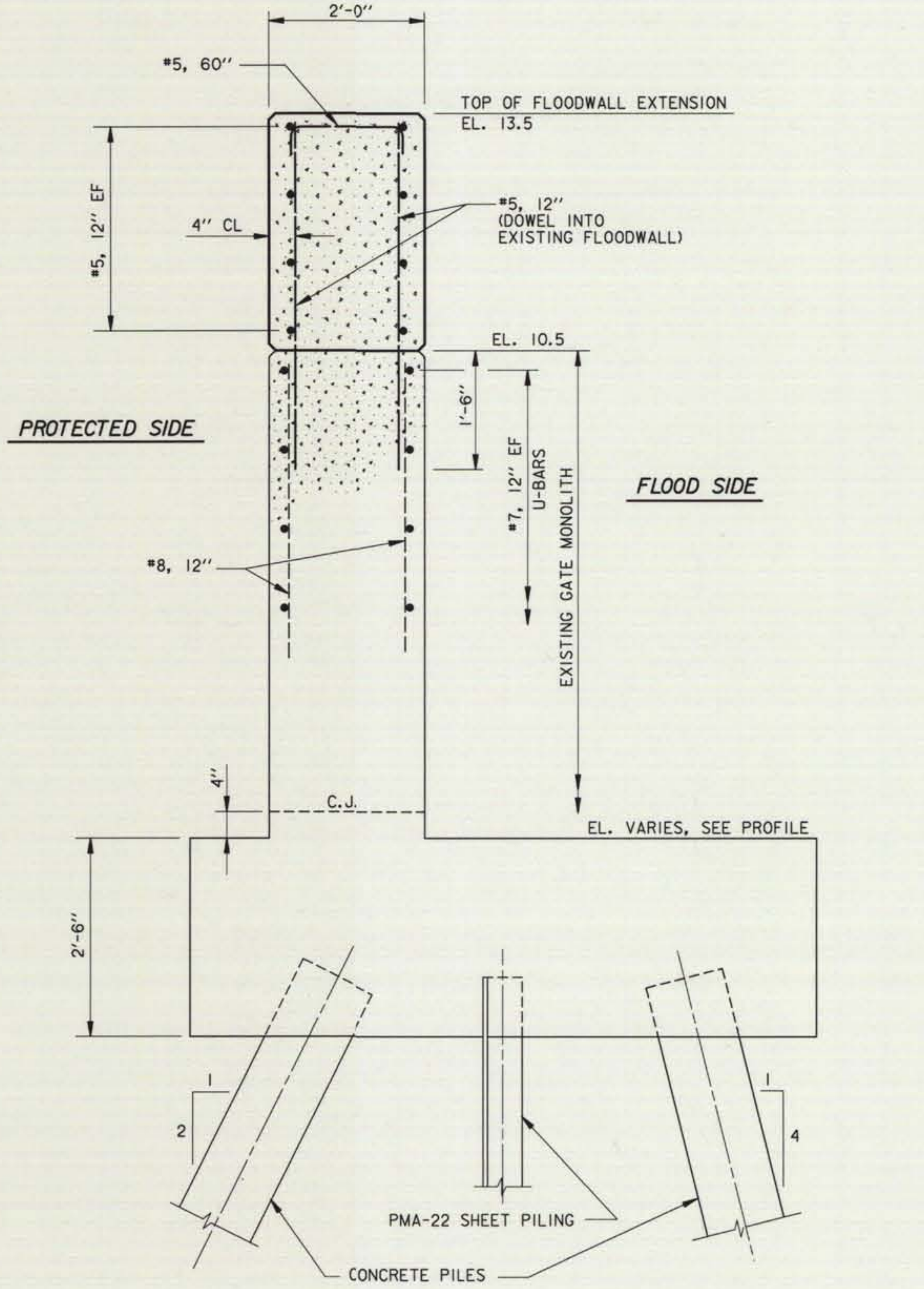
CHECKED BY:	GRUBB			

C·A·D



NOTE:
ONLY PERTINENT REINFORCING SHOWN IN EXISTING GATE MONOLITH.

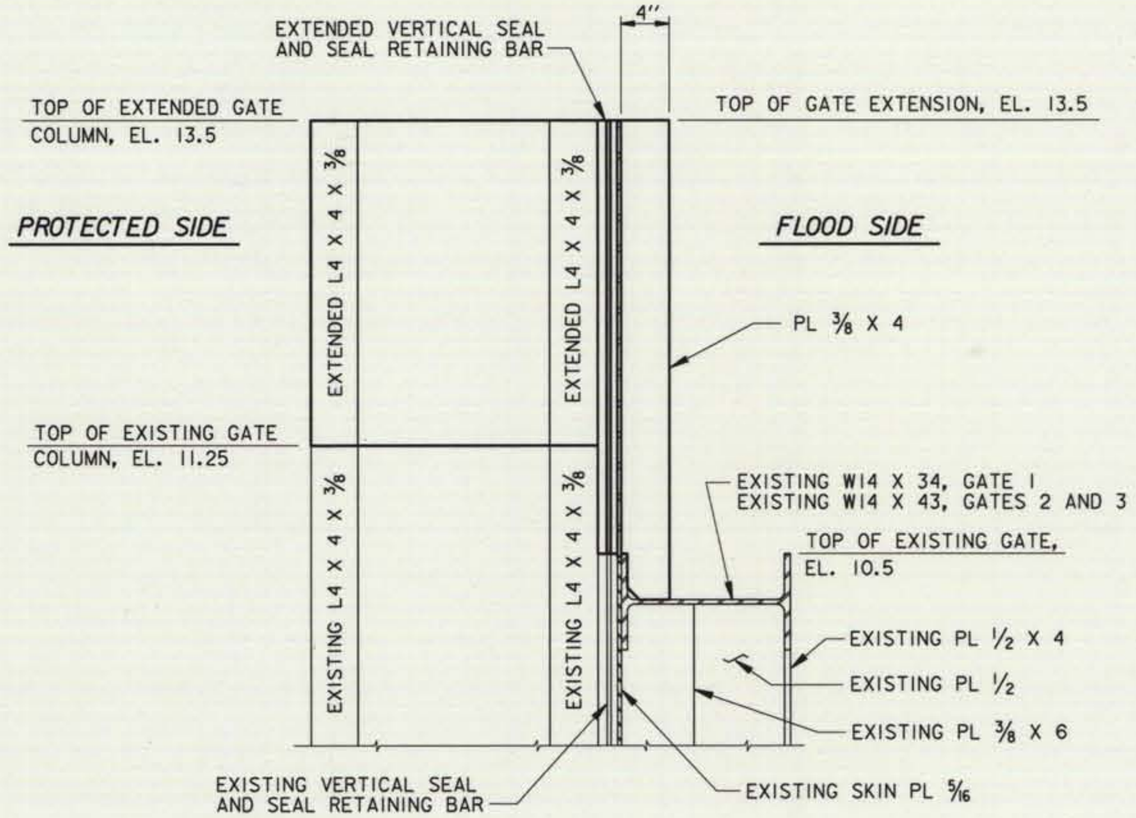
STA. 0+59.96 W/L TO STA. 0+78.96 W/L (NOT CONTINUOUS) - GATE NO. 1

STA. 4+51.39 W/L TO STA. 4+84.39 W/L (NOT CONTINUOUS) - GATE NO. 2

STA. 7+59.81 W/L TO STA. 7+92.81 W/L (NOT CONTINUOUS) - GATE NO. 3

GATE MONOLITH - GATE NOS. 1, 2 AND 3

SCALE: 1" = 1'- 0"



SWING GATE EXTENSION

GATE NOS. 1, 2 AND 3

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

SCALE: 1" = 1'- 0"

12" 0 1' 2' 3' 4' 5'

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

12" 0 1' 2' 3'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

MODIFIED GATE MONOLITH AND GATE VICINITY ORLEANS MARINA

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

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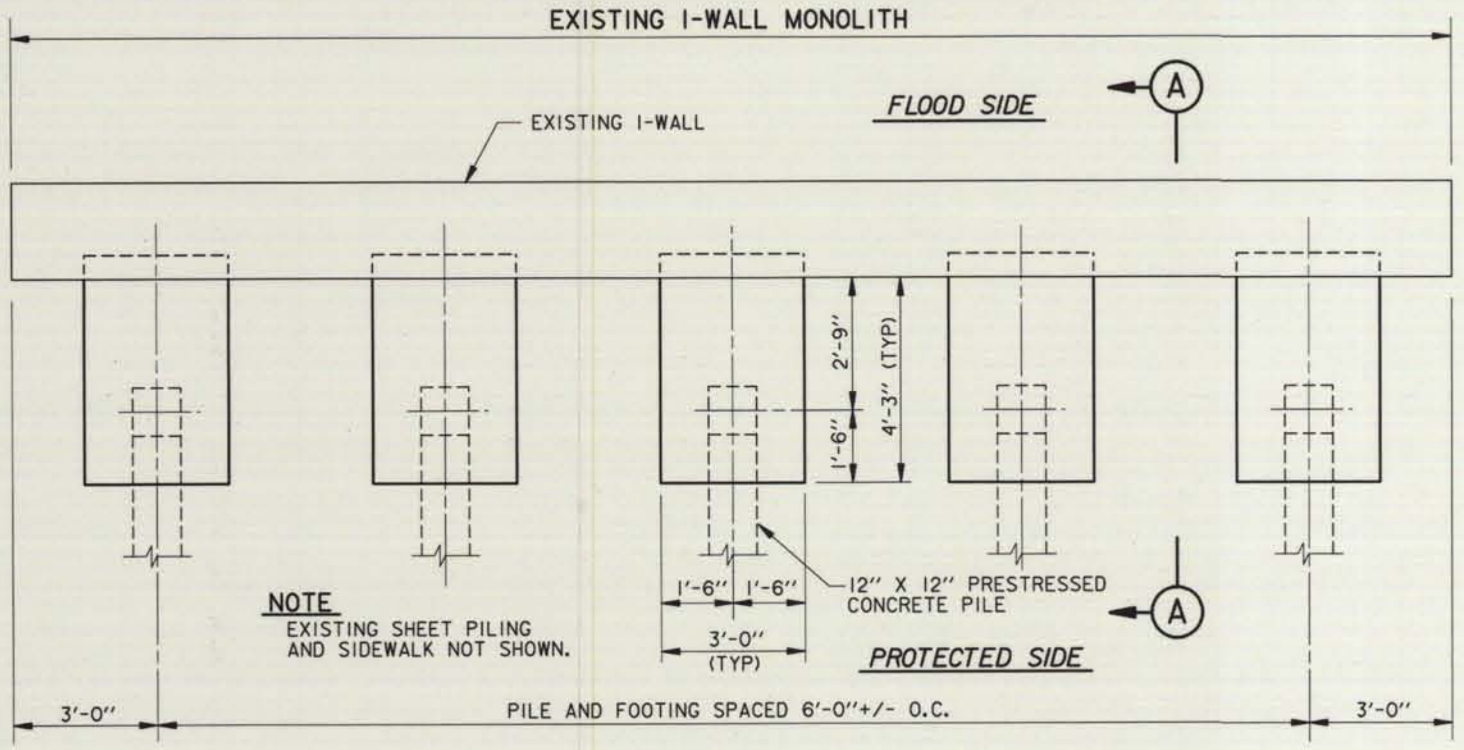
CHECKED BY: DESAI			



PLAN

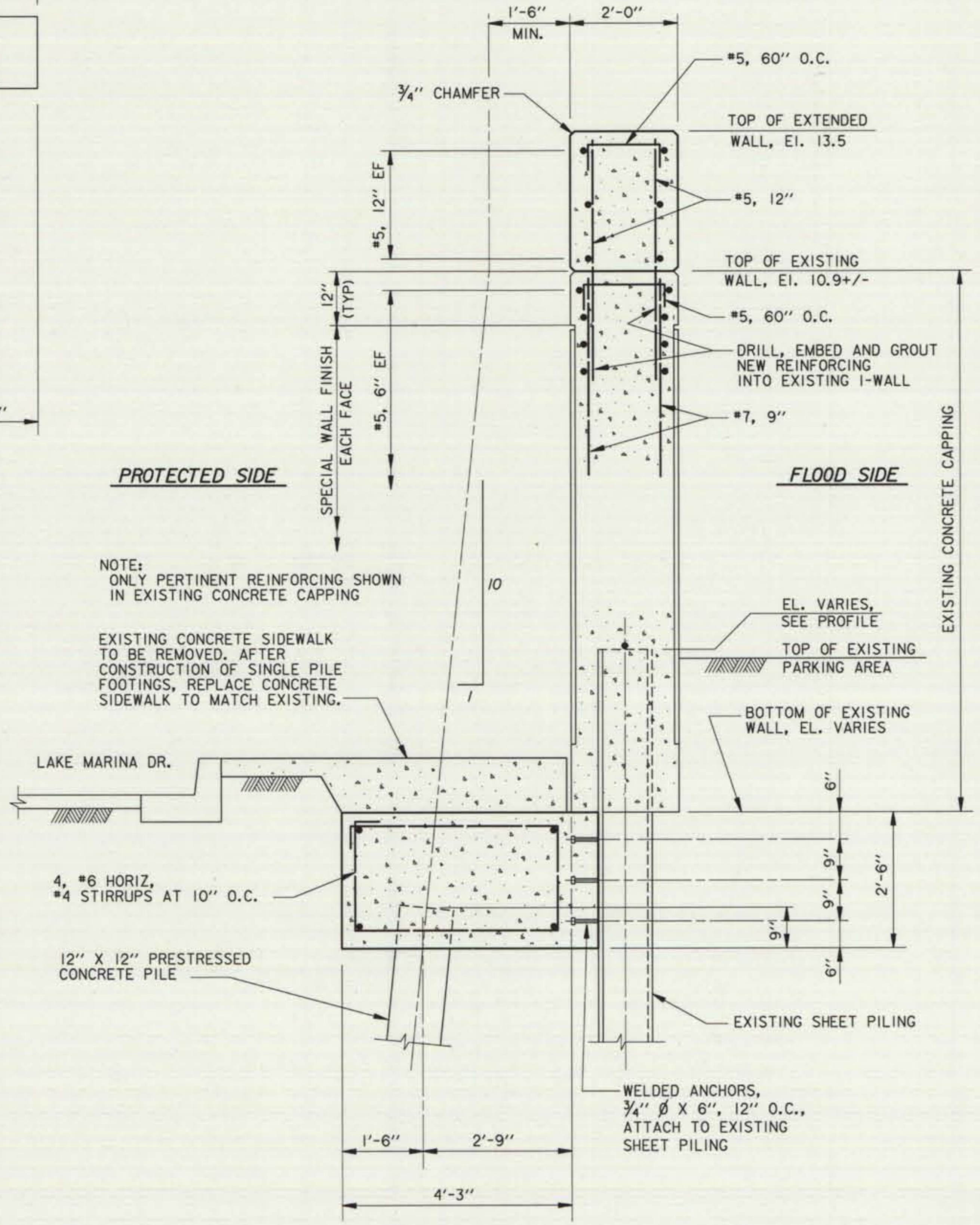
STA. 0+32.52 W/L TO STA. 0+59.96 W/L
STA. 0+78.96 W/L TO STA. 4+51.39 W/L
STA. 4+84.39 W/L TO STA. 7+59.81 W/L
STA. 7+92.81 W/L TO STA. 12+68.00 W/L+/-

FOUNDATION MODIFICATIONS TO EXISTING I-WALL

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

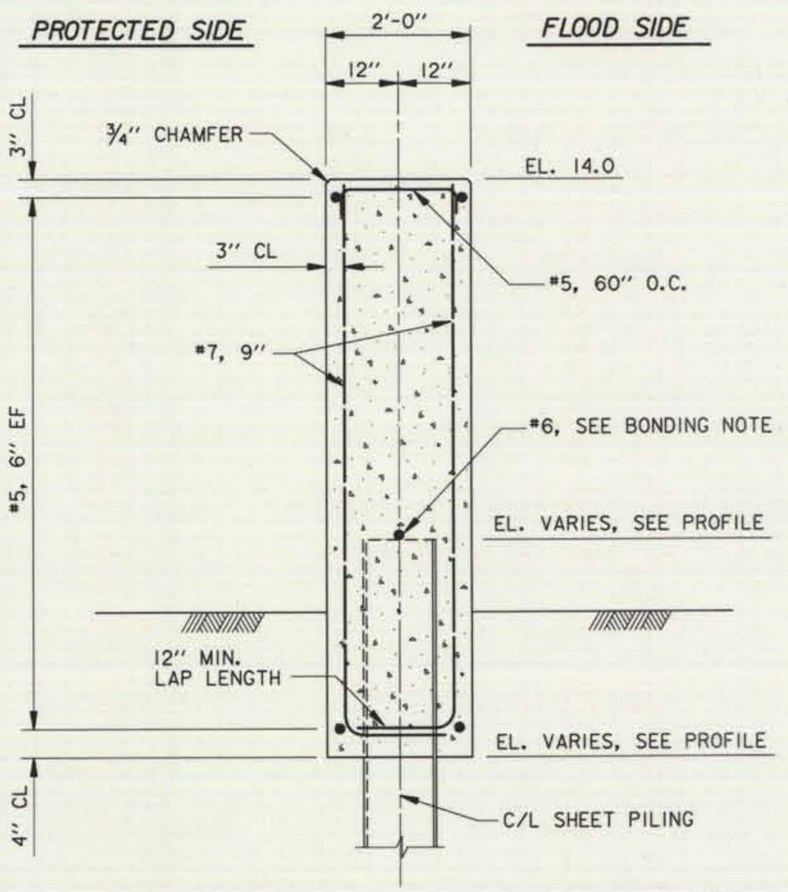
BONDING NOTE

#6 REINFORCING BAR TO BE WELDED TO THE TOP OF EACH STEEL SHEET PILE. #6 REINFORCING BAR SHALL NOT EXTEND ACROSS THE MONOLITH JOINT. INSTALL BOND CABLE AT ALL T-WALL AND I-WALL JOINTS AND AT ALL TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
BOND CABLE SHALL BE TYPE CPS, 7-STRAND, #4 AWG, CLASS B, COPPER, INSULATION SHALL BE BLACK, HIGH MOLECULAR WEIGHT POLYETHYLENE WITH A 110 MIL MINIMUM INSULATION WALL THICKNESS.
BOND CABLE SHALL HAVE AN 8" DIAMETER LOOP TO ALLOW FOR STRESSES.
BOND CABLES SHALL BE WELDED AS SPECIFIED TO ADJACENT STEEL PILES 12" BELOW THE BOTTOM OF BASE SLAB FOR T-WALL JOINTS, 7" BELOW BOTTOM OF CONCRETE CAP FOR I-WALL JOINTS AND AT TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
WELDED CONNECTIONS SHALL BE COATED WITH SPLICING EPOXY TO OBTAIN MOISTURE PROOF JOINT.
SEE SPECIFICATIONS.



SECTION (A)

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



STA. 12+68.00 W/L+/- TO STA. 14+97.30 W/L
STA. 15+67.00 W/L TO STA. 17+72.80 W/L

TYPICAL I-WALL SECTION

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

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

12" 0 2' 4' 6' 8'

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

12" 0 1' 2' 3' 4' 5'

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

12" 0 1' 2' 3'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

TYPICAL I-WALL SECTIONS
VICINITY ORLEANS MARINA

C·A·D

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

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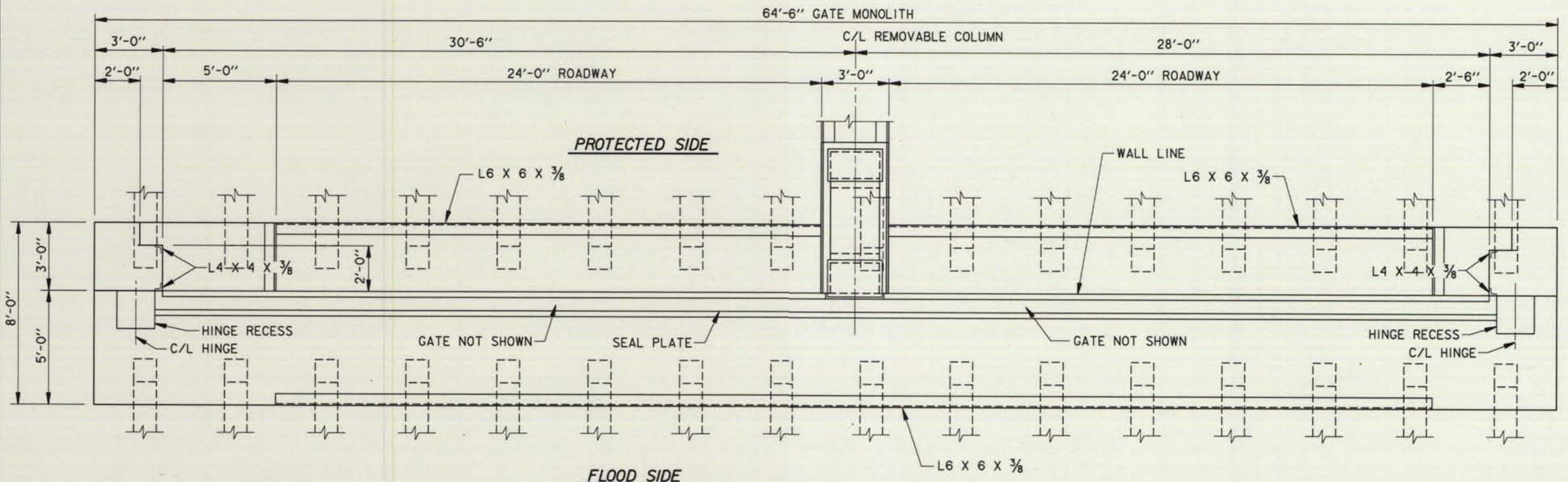
CHECKED BY:	DESAI	DATE: APRIL 1992		H-2-30962

PLATE 9



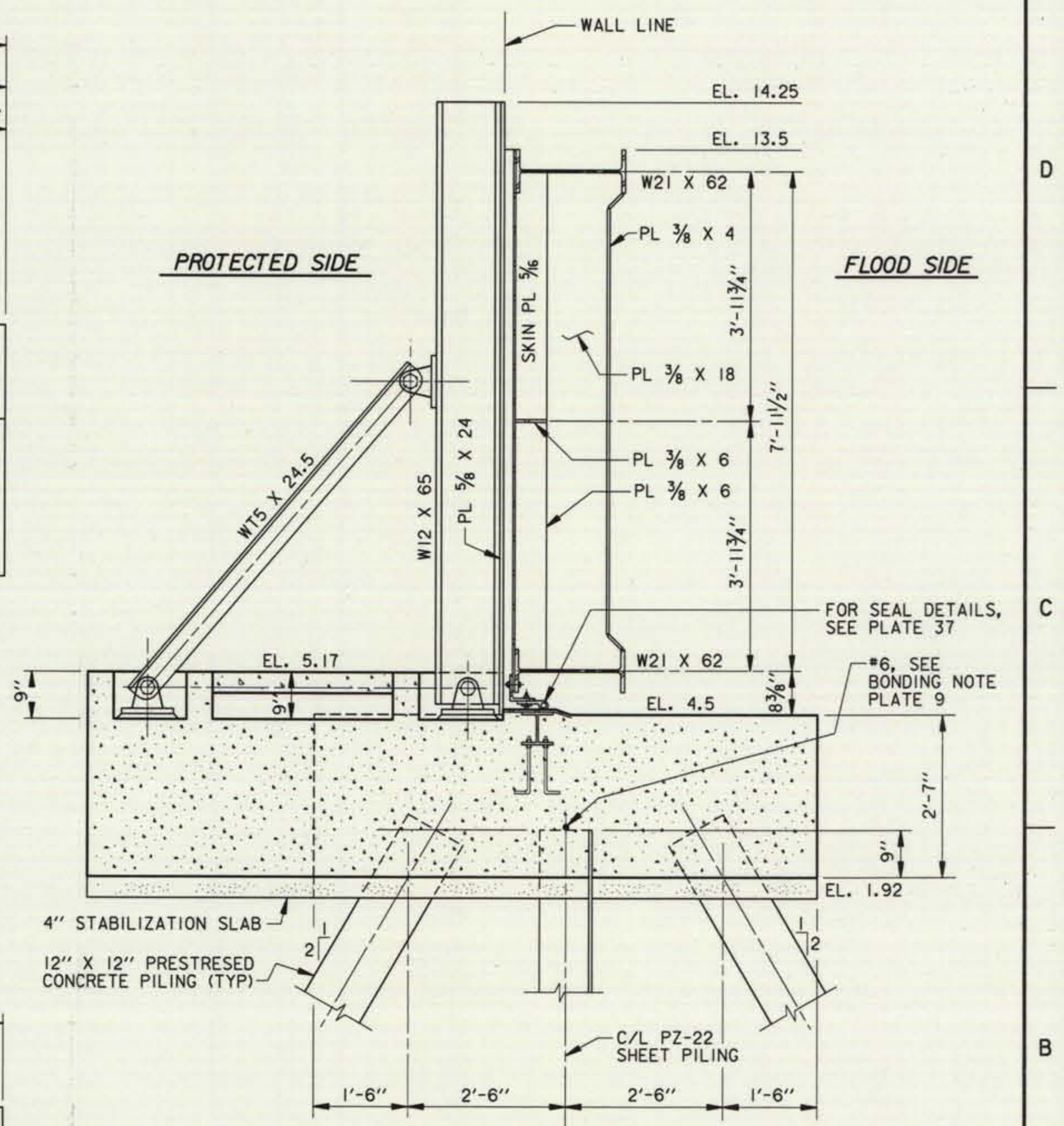
PLAN AT EL. 14.25

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

LEGEND

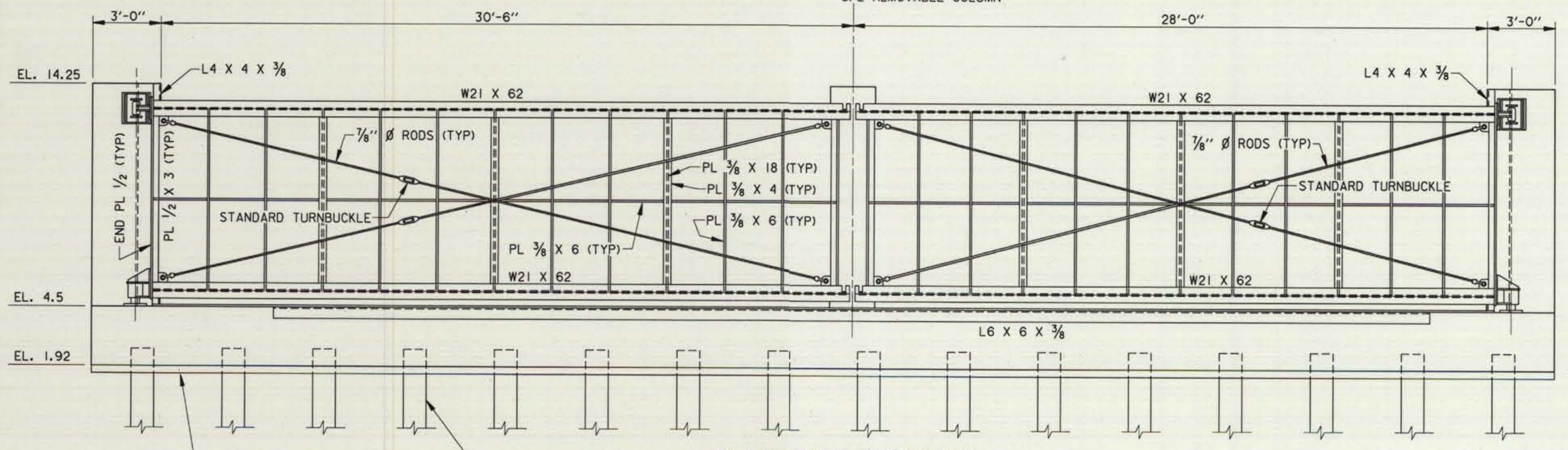
VERTICAL PILE

BATTER PILE



TYPICAL SECTION

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



FLOOD SIDE ELEVATION

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

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

12" 0 2' 4' 6' 8' 10'

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

12" 0 1' 2' 3' 4' 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE NO. 4 DETAILS
VICINITY ORLEANS MARINA

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

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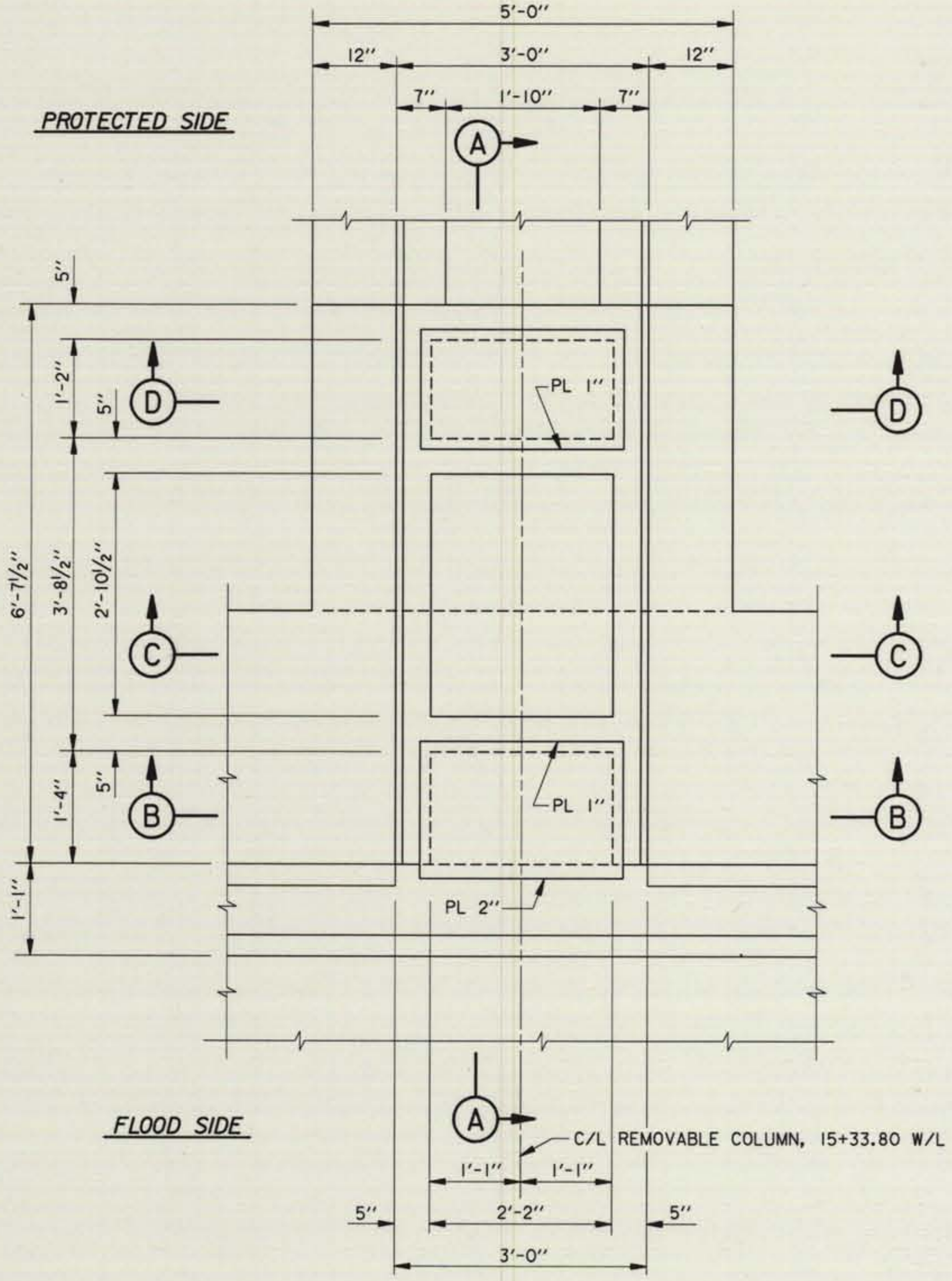
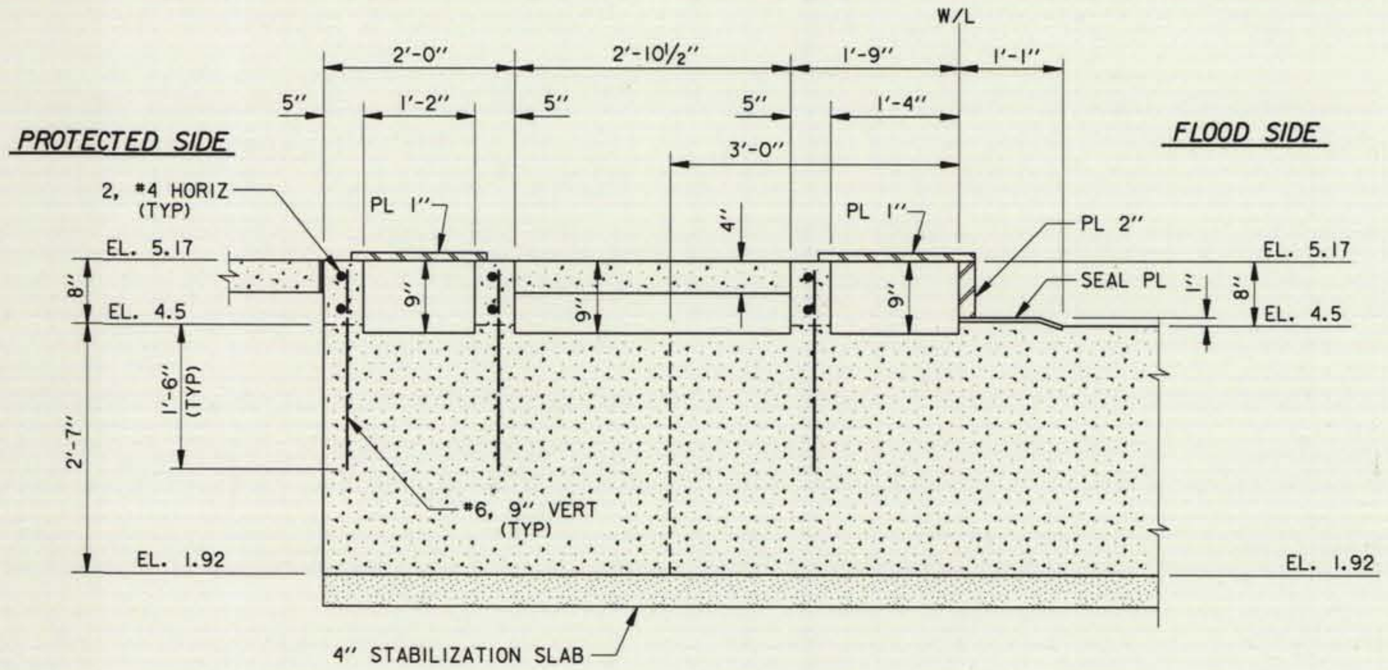
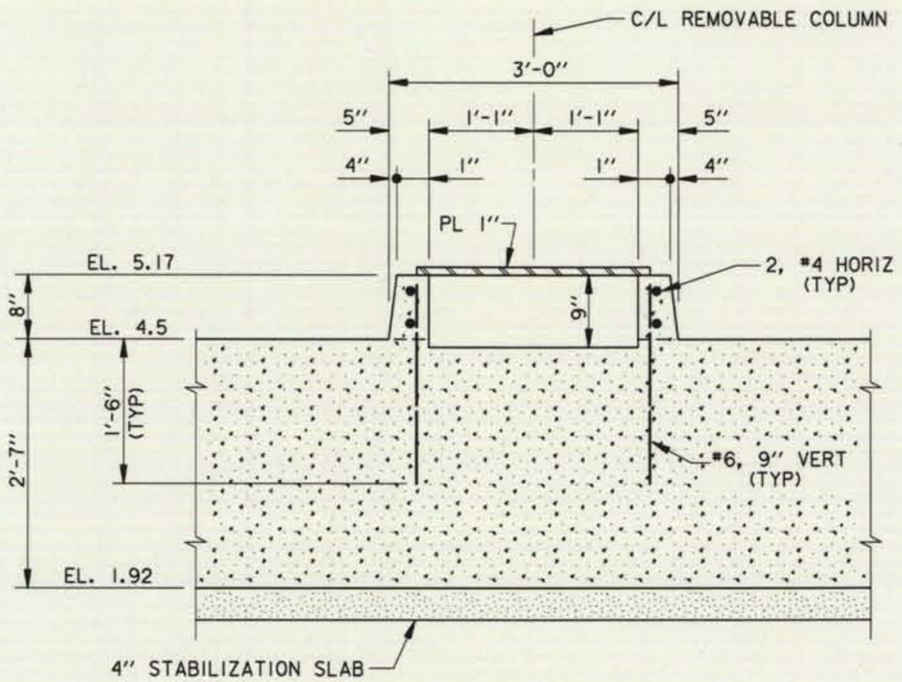
PLATE 10



PART PLAN
REMOVABLE COLUMN MANHOLE DETAILS

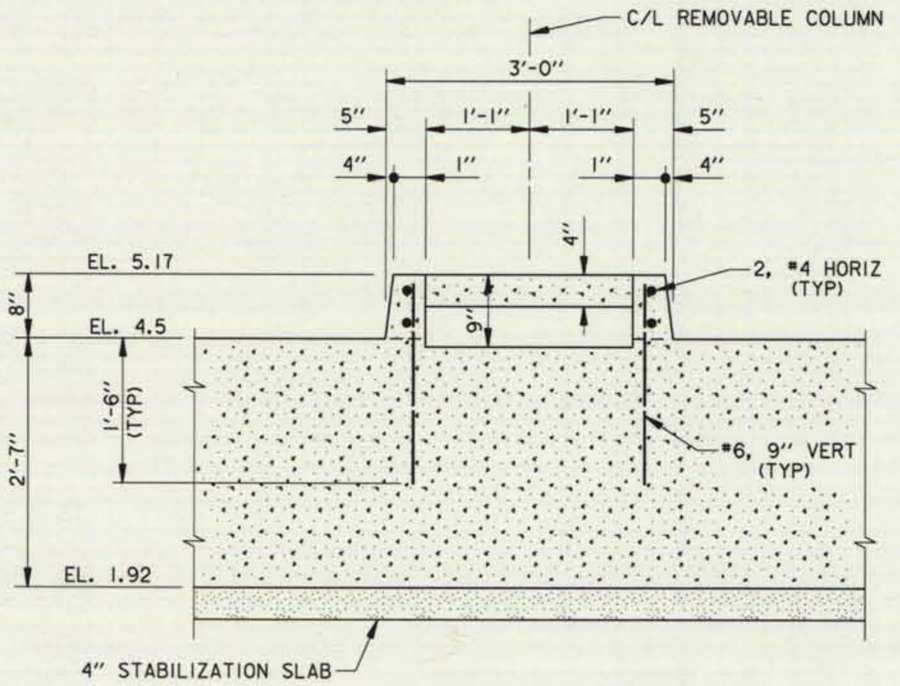


SECTION (A)

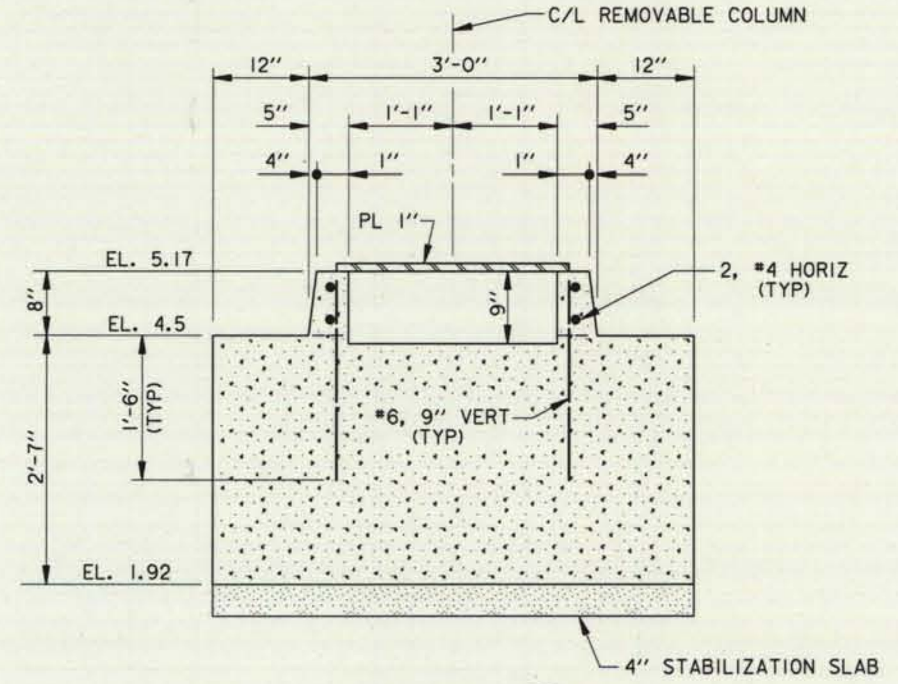


SECTION (B)

NOTE:
MONOLITH BASE SLAB REINFORCEMENT NOT SHOWN.



SECTION (C)



SECTION (D)

NOTE:
MONOLITH BASE SLAB REINFORCEMENT NOT SHOWN.

SCALE: 1" = 1'- 0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE NO. 4 DETAILS
VICINITY ORLEANS MARINA

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

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LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PLAN
VICINITY NEW BASIN CANAL

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

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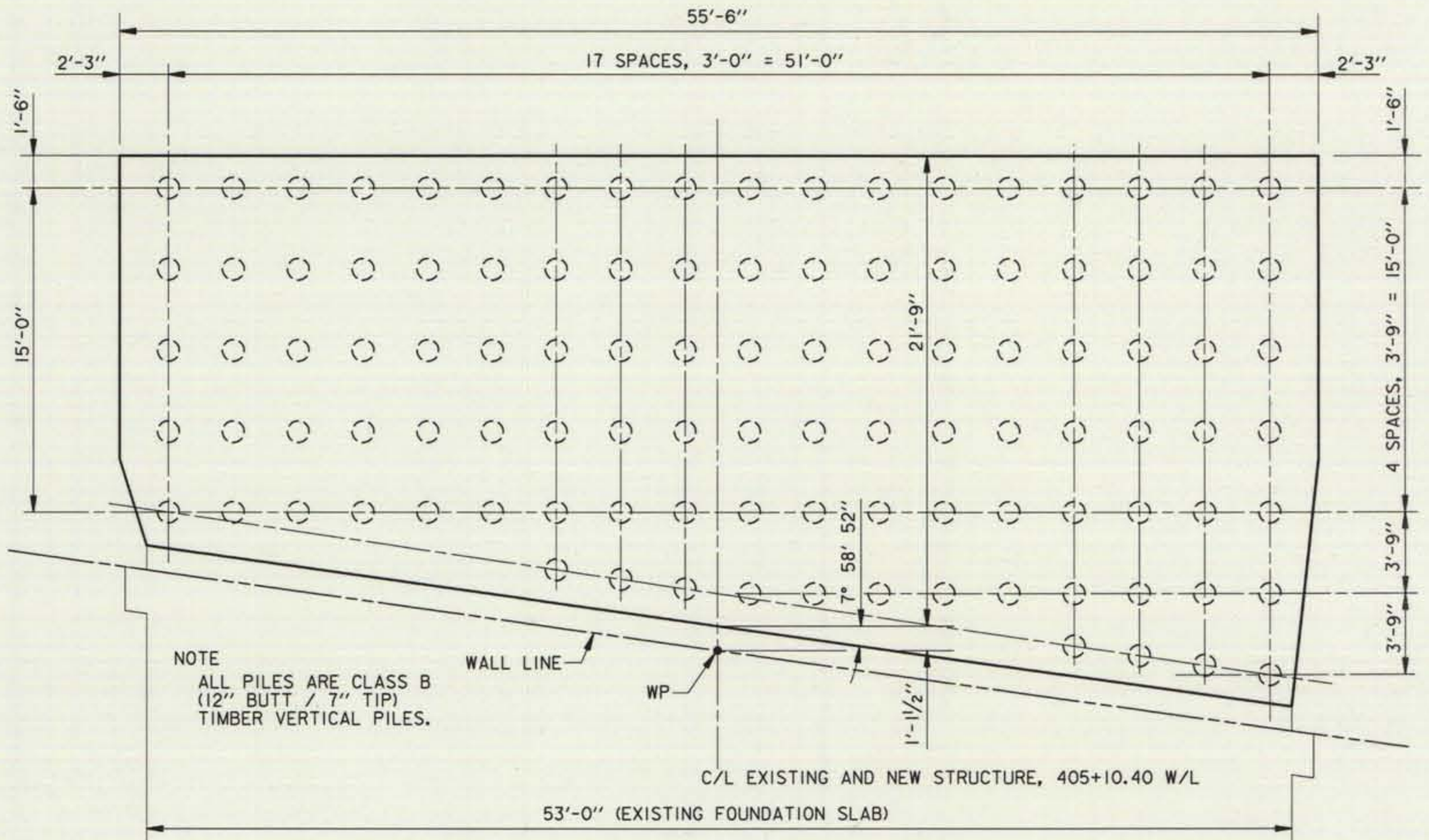
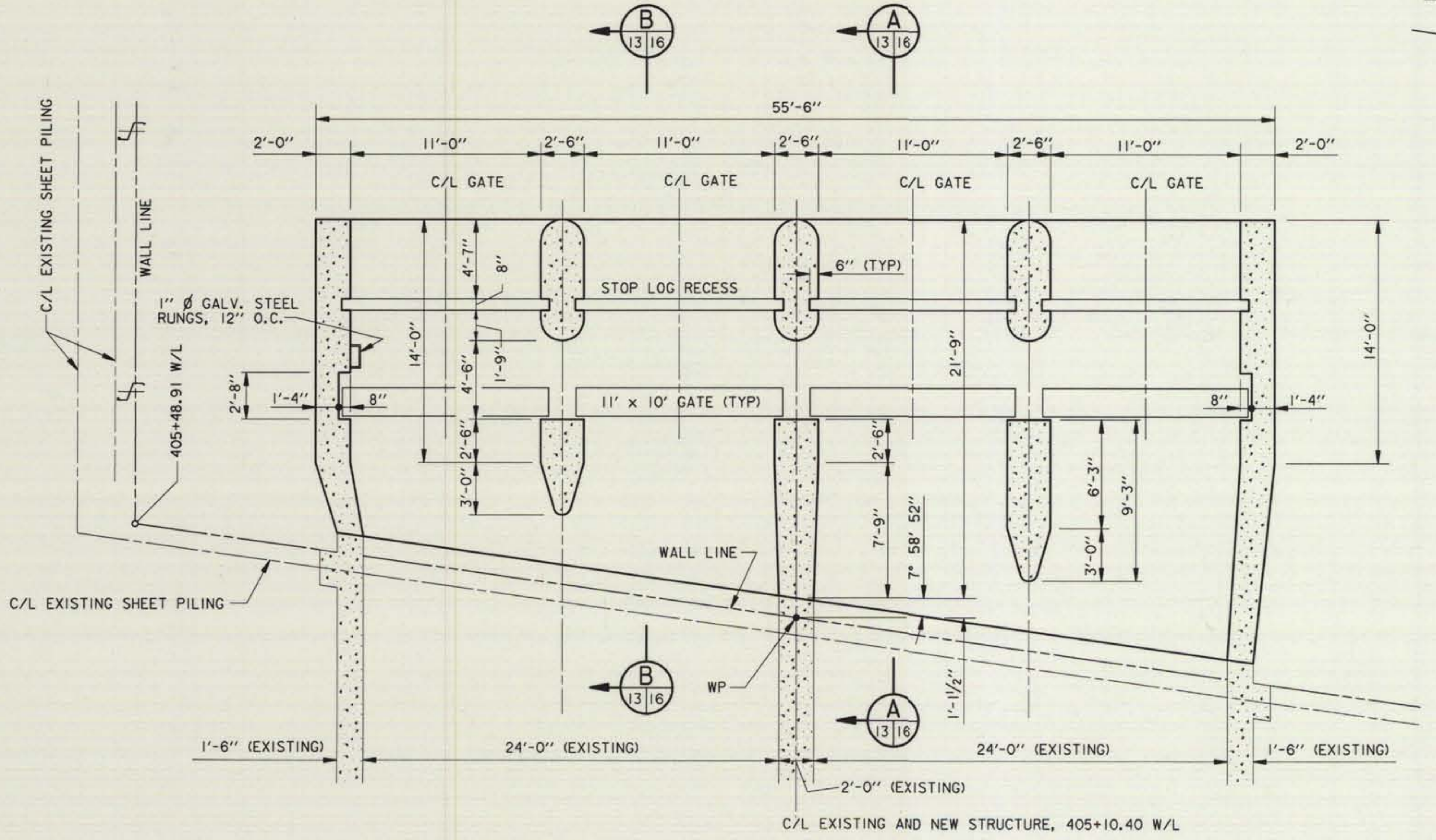


SLUICE GATE STRUCTURE

PLAN AND PILE LAYOUT



SLUICE GATE STRUCTURE

PLAN AT EL.-11.0

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

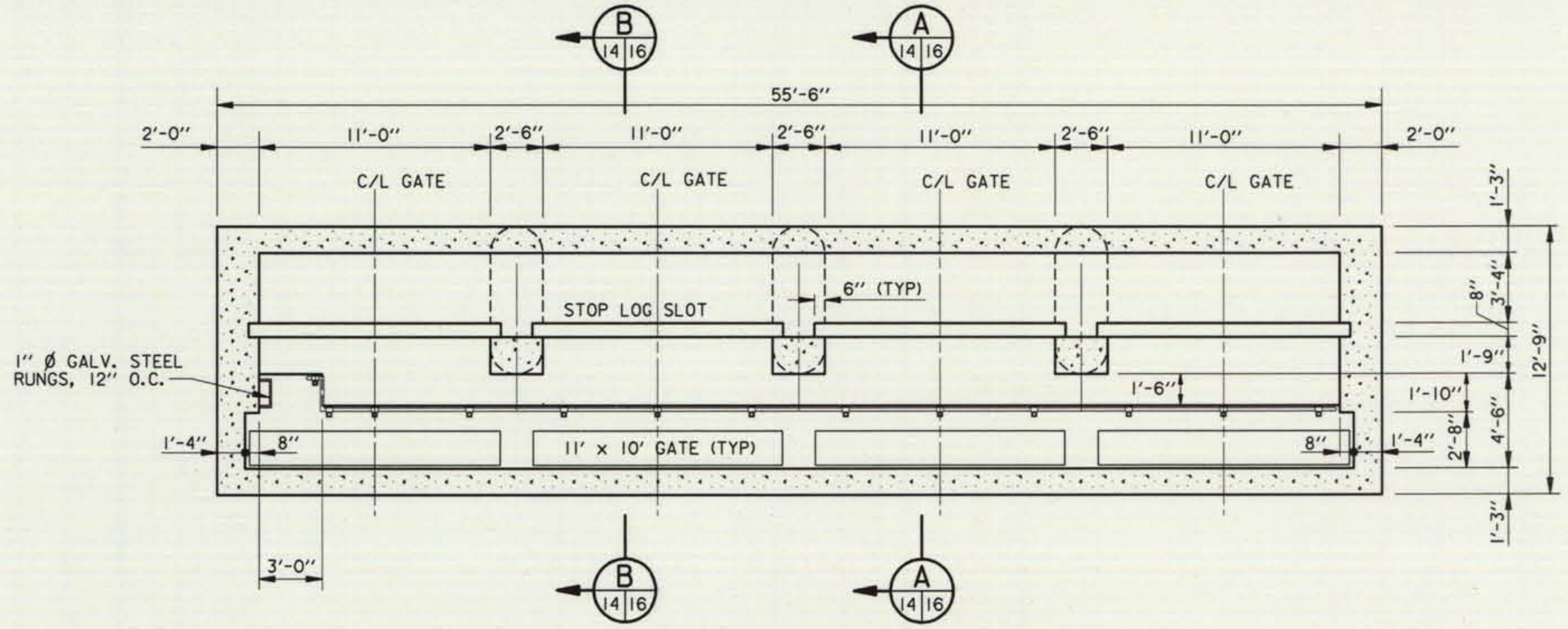
12" 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SLUICE GATE STRUCTURE - PLAN
VICINITY NEW BASIN CANAL

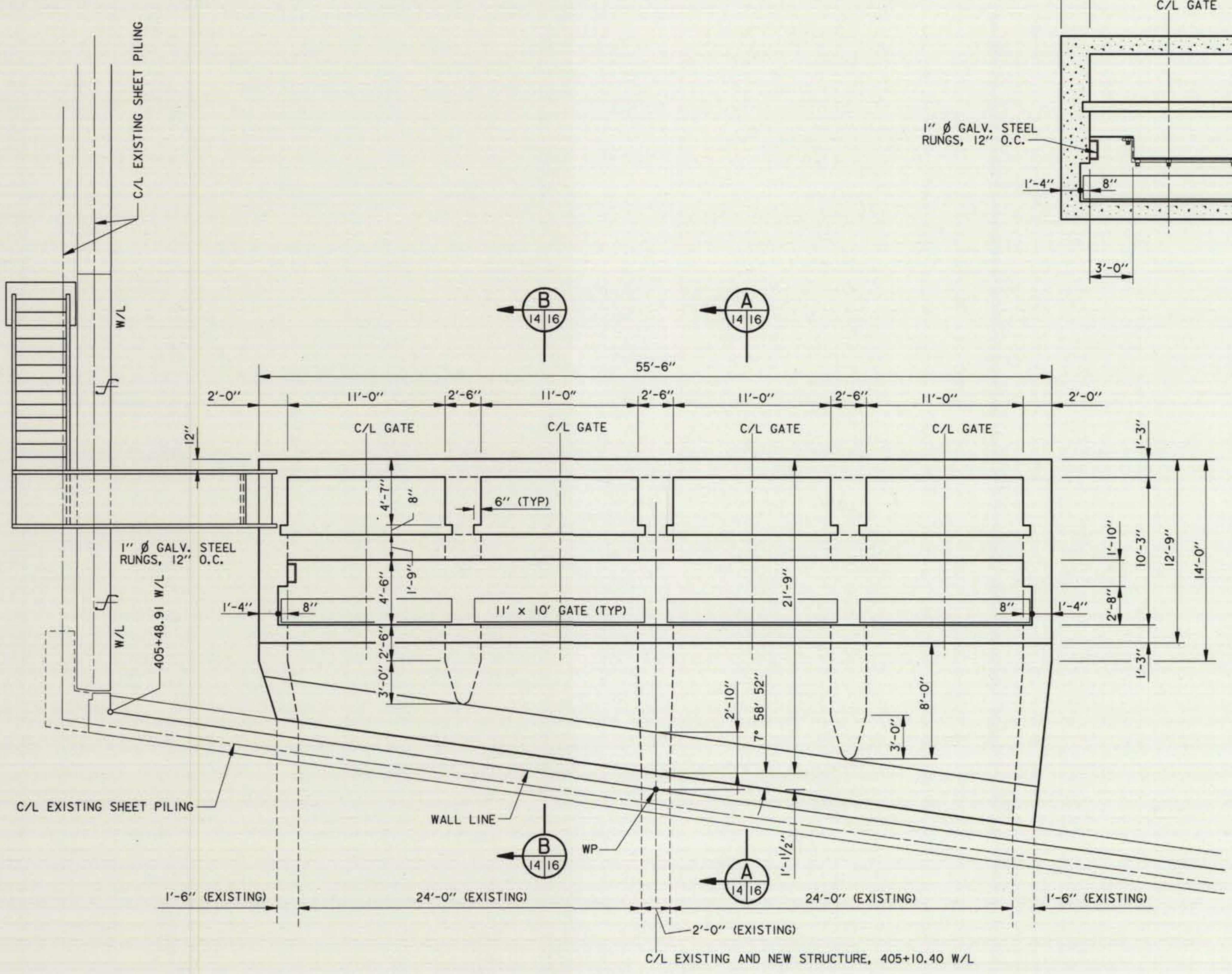
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:	DESAI	PLOT SCALE: 48	PLOT DATE: 23 MAR 93	CADD FILE: 30962B16.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	GRUBB	DATE: APRIL 1992		



SLUICE GATE STRUCTURE

PLAN AT EL. 8.0



SLUICE GATE STRUCTURE

PLAN AT EL. 16.0

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

12" 0 5' 10' 15' 20'

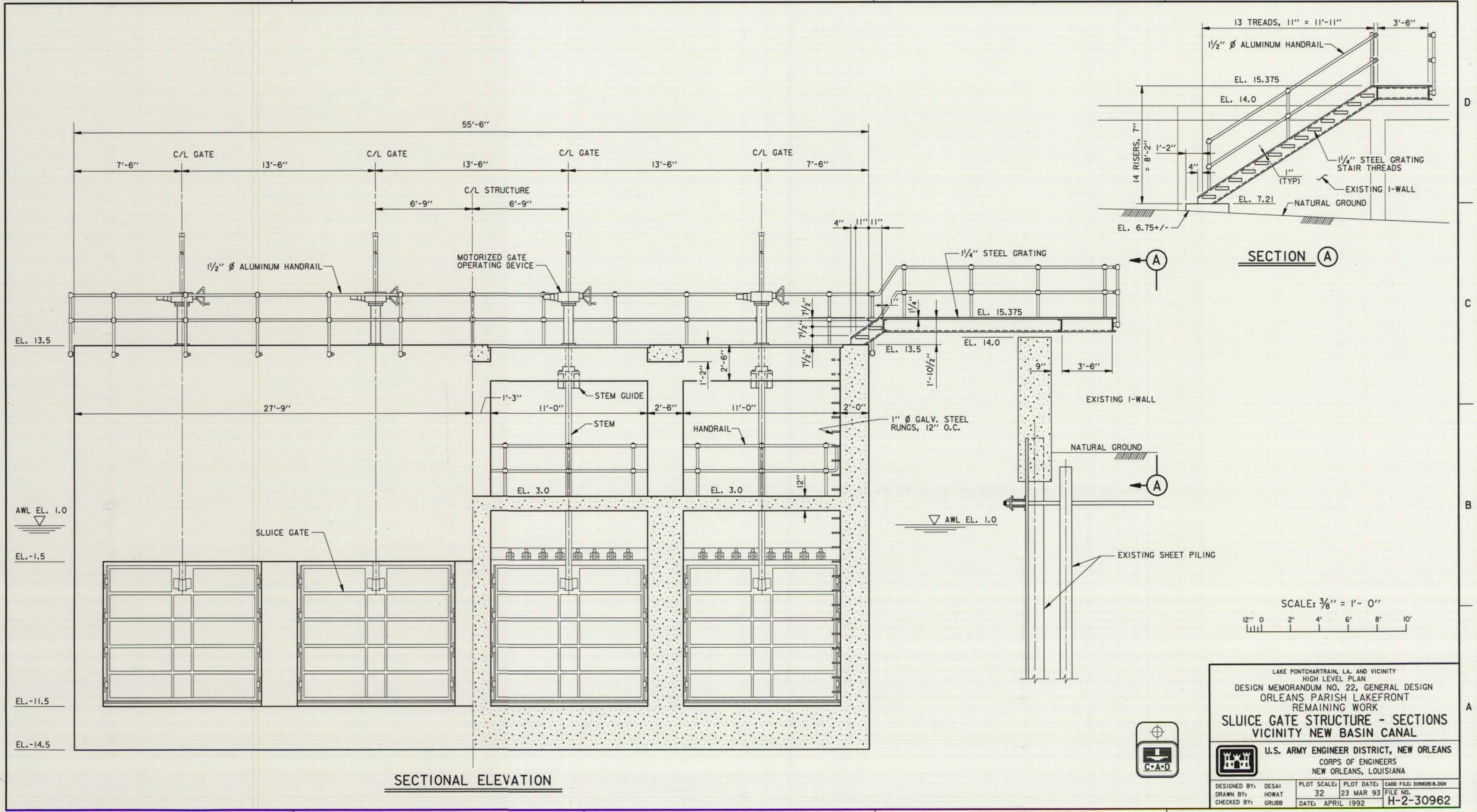
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SLUICE GATE STRUCTURE - PLAN
VICINITY NEW BASIN CANAL

C•A•D

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

DESIGNED BY:	DESAI	PLOT SCALE: 48	PLOT DATE: 23 MAR 93	CADD FILE: 30962B17.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	GRUBB	DATE: APRIL 1992		

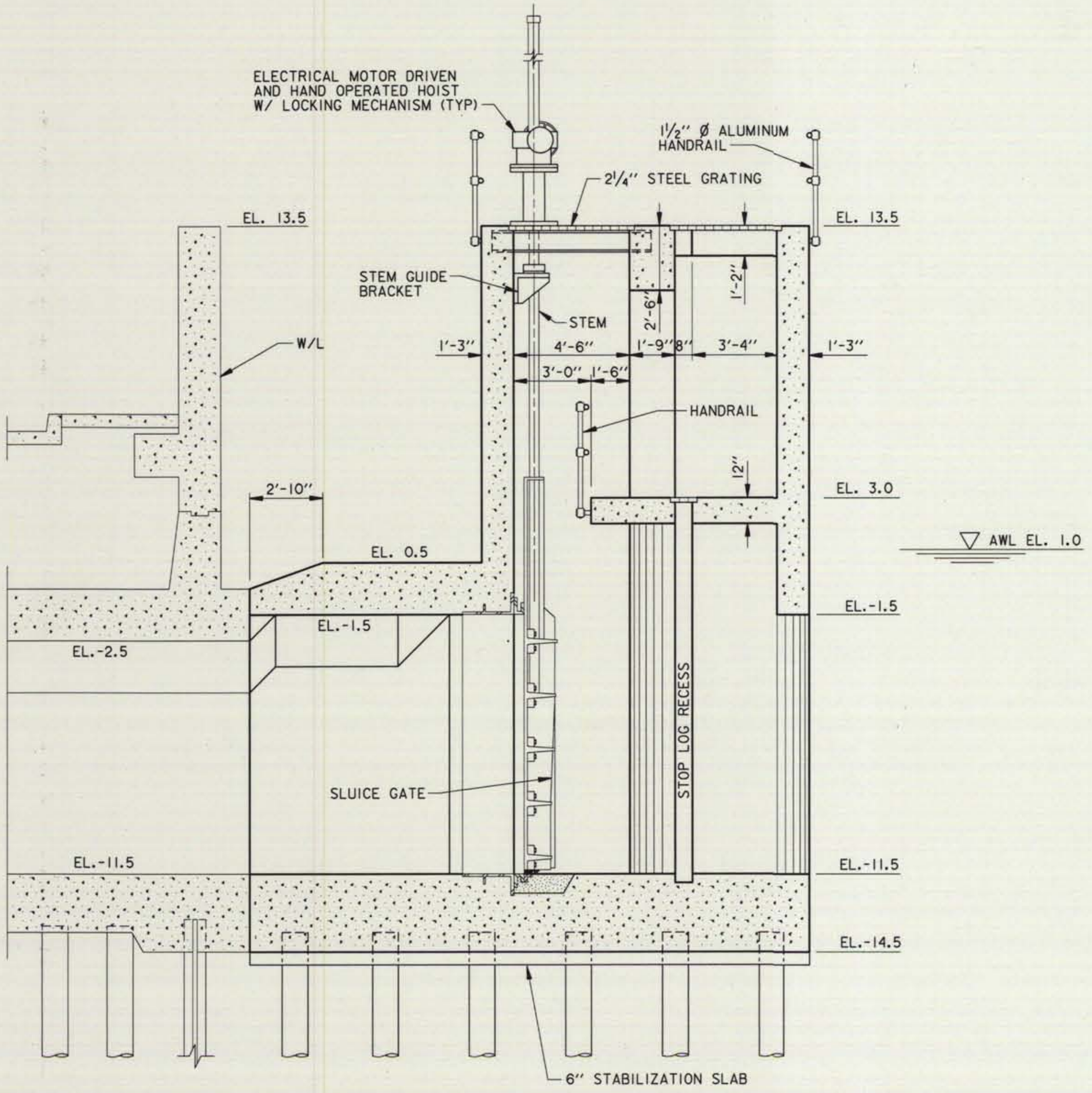


LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

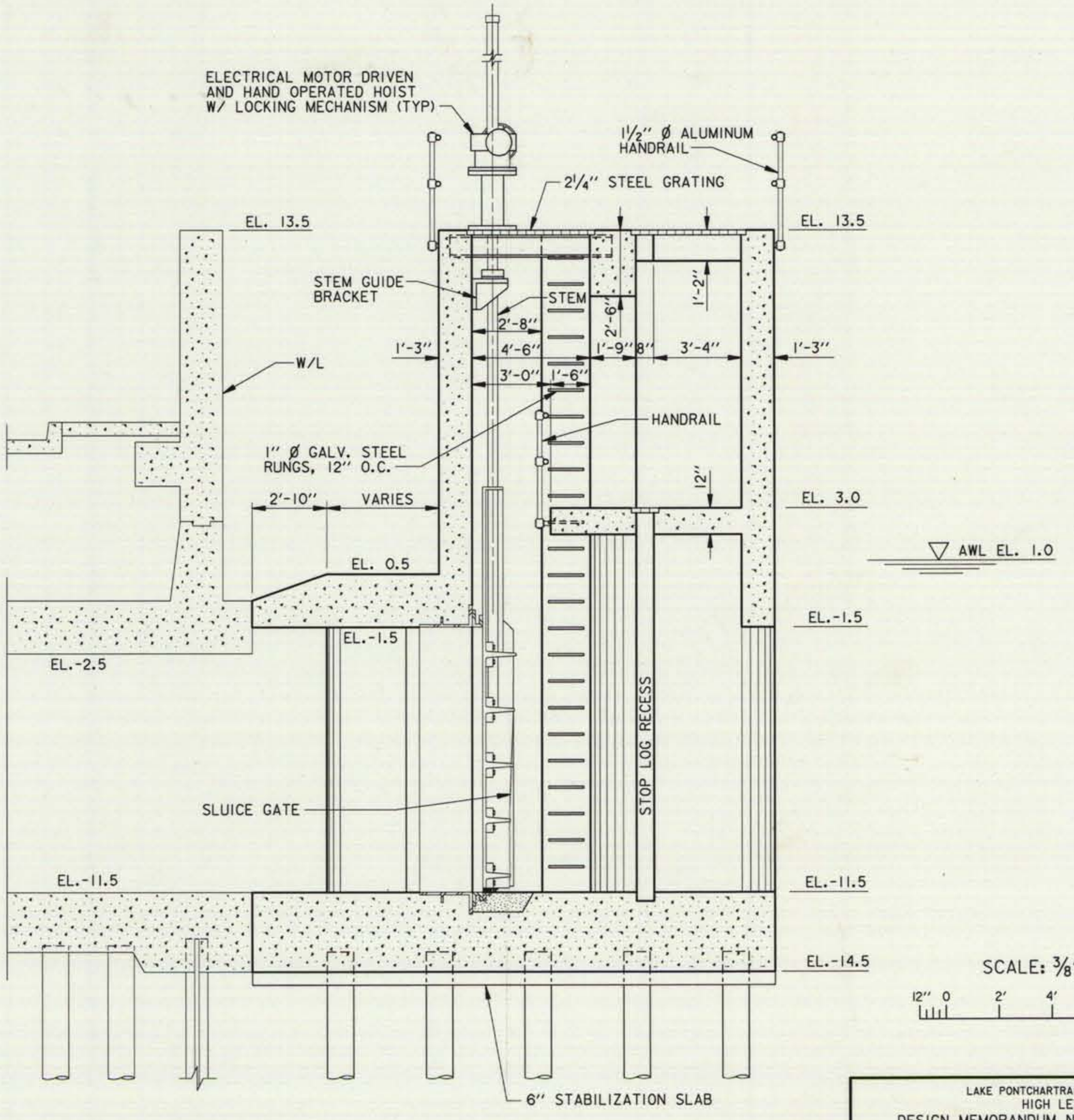
SLUICE GATE STRUCTURE - SECTIONS
VICINITY NEW BASIN CANAL

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

DESIGNED BY:	DESAI	PLOT SCALE: 32	PLOT DATE: 23 MAR 93	CADD FILE: 30962B18.DGN
DRAWN BY:	HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY:	GRUBB			



SECTIONS (A 13|16) (A 14|16)



SECTIONS (B 13|16) (B 14|16)

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

12" 0 2' 4' 6' 8' 10'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SLUICE GATE STRUCTURE - SECTIONS
VICINITY NEW BASIN CANAL

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

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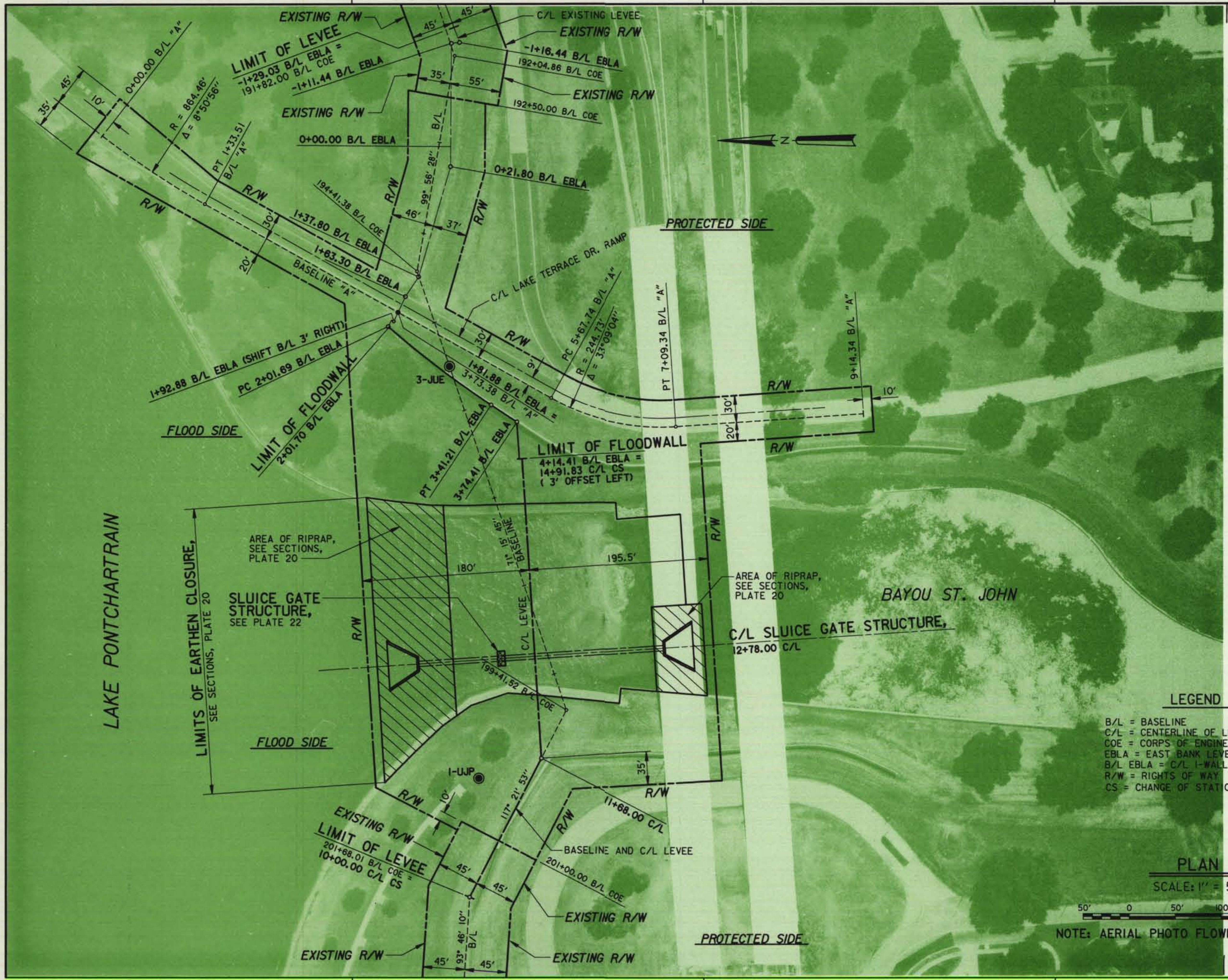
DESIGNED BY:	DESAI	PLOT SCALE: 32	PLOT DATE: 23 MAR 93	CADD FILE: 30962B19.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	GRUBB	DATE: APRIL 1992		



LEGEND

B/L = BASELINE
C/L = CENTERLINE OF LEVEE
COE = CORPS OF ENGINEERS
EBLA = EAST BANK LEVEE ALIGNMENT
B/L EBLA = C/L I-WALL
R/W = RIGHTS OF WAY
CS = CHANGE OF STATION

PLAN

SCALE: 1" = 50'

50' 0 50' 100' 150' 200'

NOTE: AERIAL PHOTO FLOWN 21 AUGUST 1991

BORING LEGEND AND NOTES

◉ UNDISTURBED TYPE

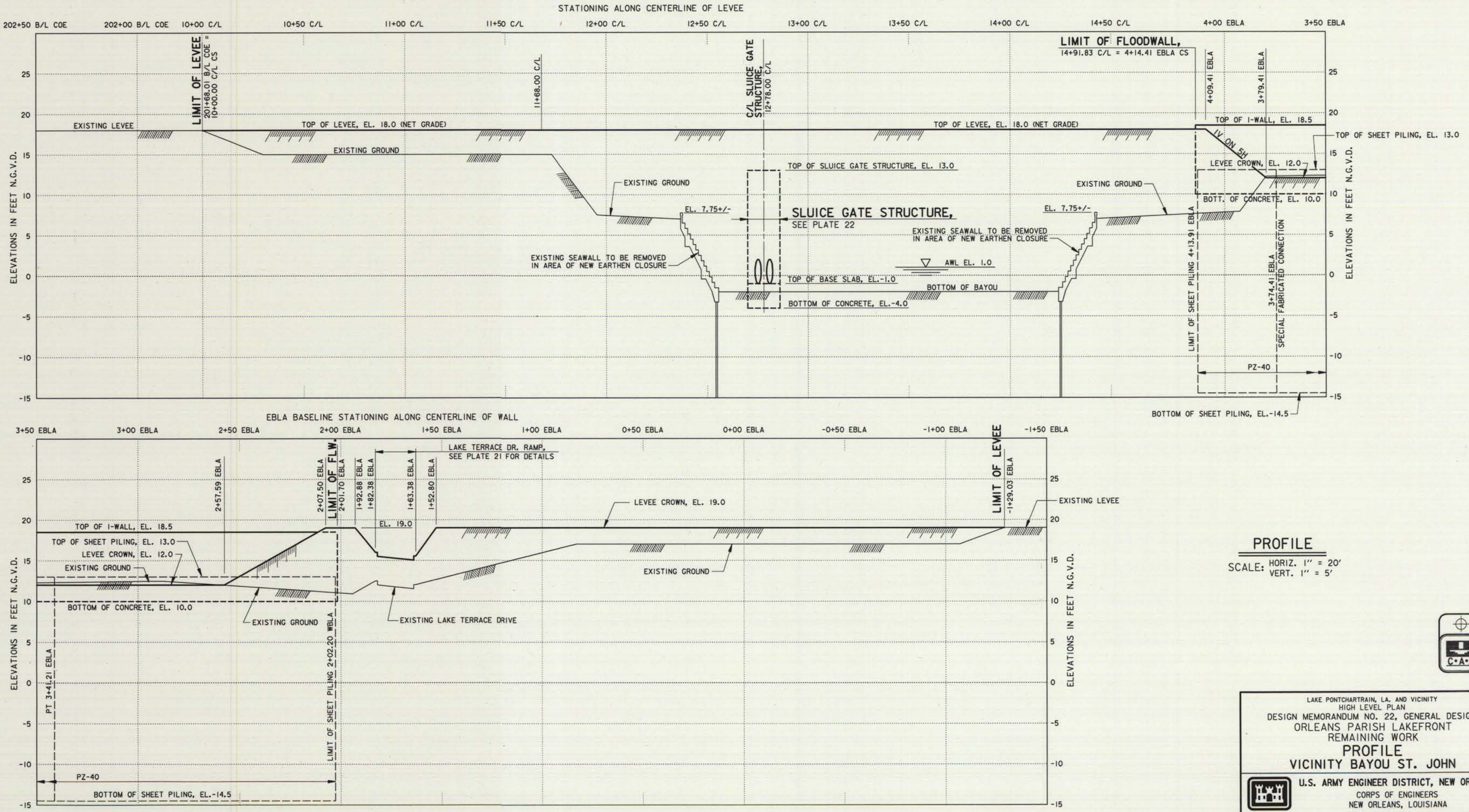
1. SEE DESIGN MEMORANDUM NO. 13, GENERAL DESIGN, ORLEANS PARISH LAKEFRONT LEVEE, WEST OF I.H.N.C., PLATE 87 FOR 1-UJP UNDISTURBED BORING LOG AND PLATE 88 FOR 3-JUE UNDISTURBED BORING LOG.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PLAN
VICINITY BAYOU ST. JOHN

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

DESIGNED BY:	GRUBB	PLOT SCALE: 600	PLOT DATE: 23 MAR 93	CADD FILE: 30962B04.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	DESAI	DATE: APRIL 1992		



PROFILE

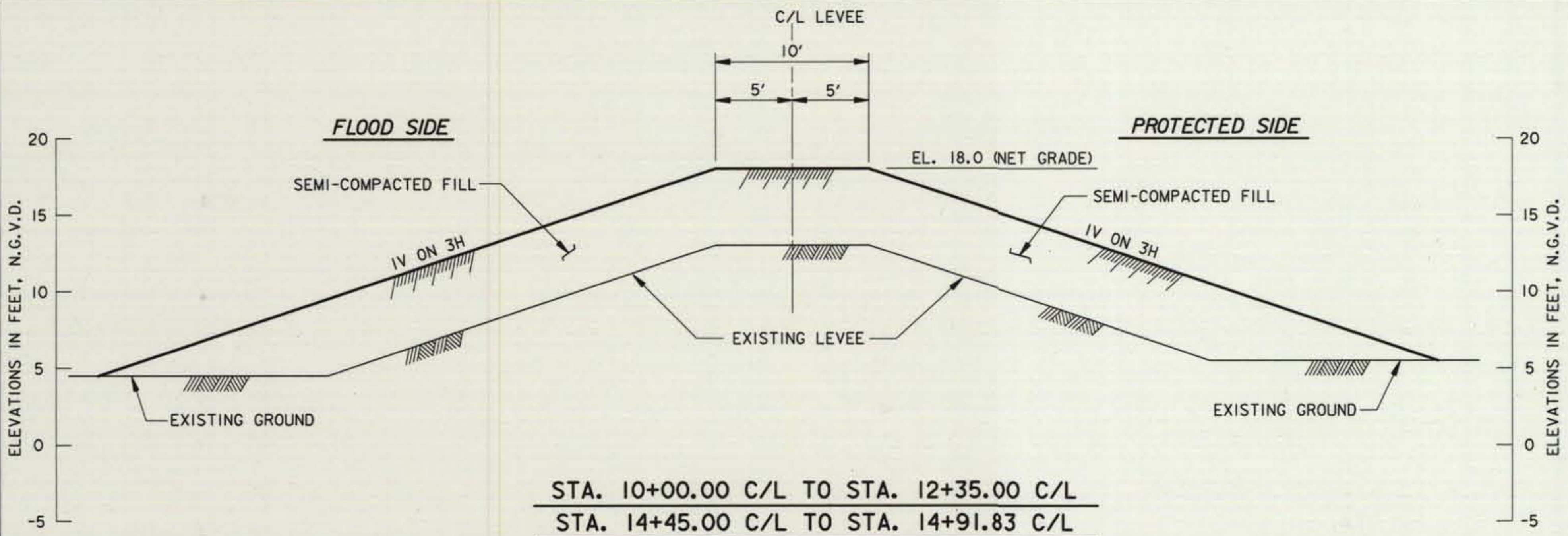
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY BAYOU ST. JOHN

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

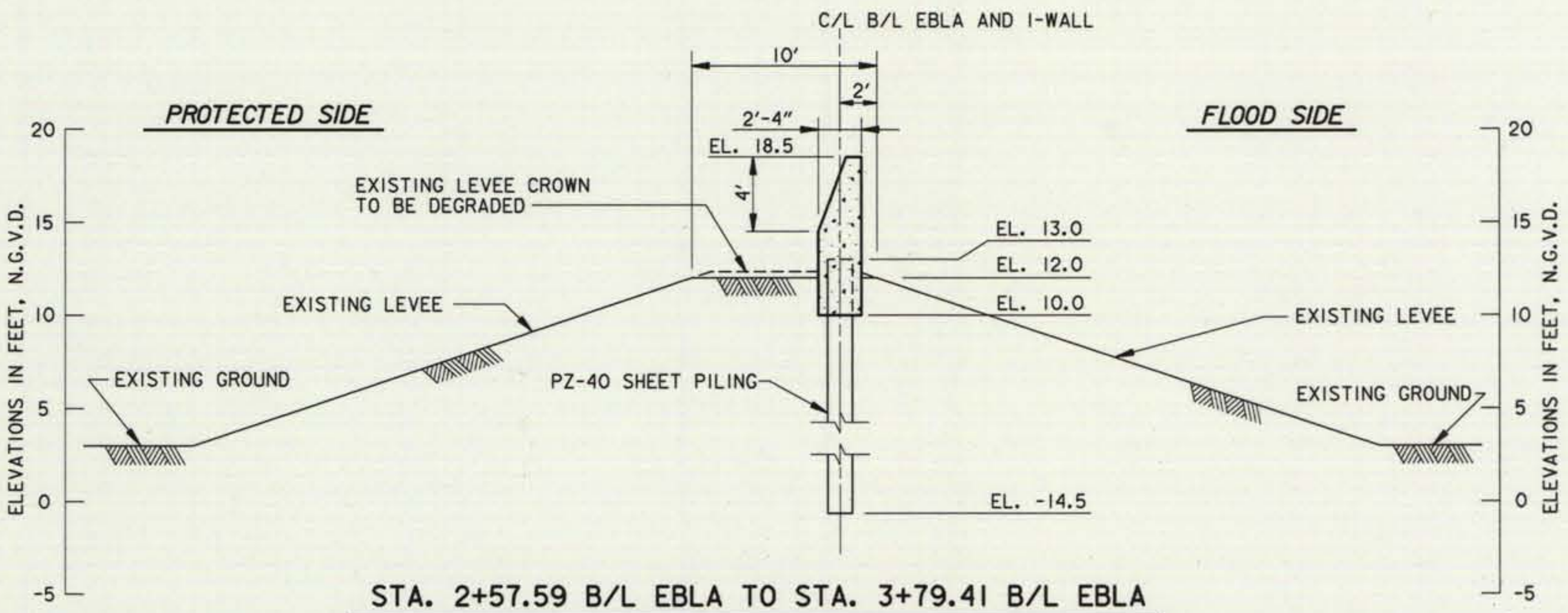
DESIGNED BY: GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962B20.DGN
DRAWN BY: HOWAT			FILE NO. H-2-30962
CHECKED BY: DESAI	DATE: APRIL 1992		



STA. 10+00.00 C/L TO STA. 12+35.00 C/L
STA. 14+45.00 C/L TO STA. 14+91.83 C/L

TYPICAL SECTION - WEST BANK LEVEE ALIGNMENT

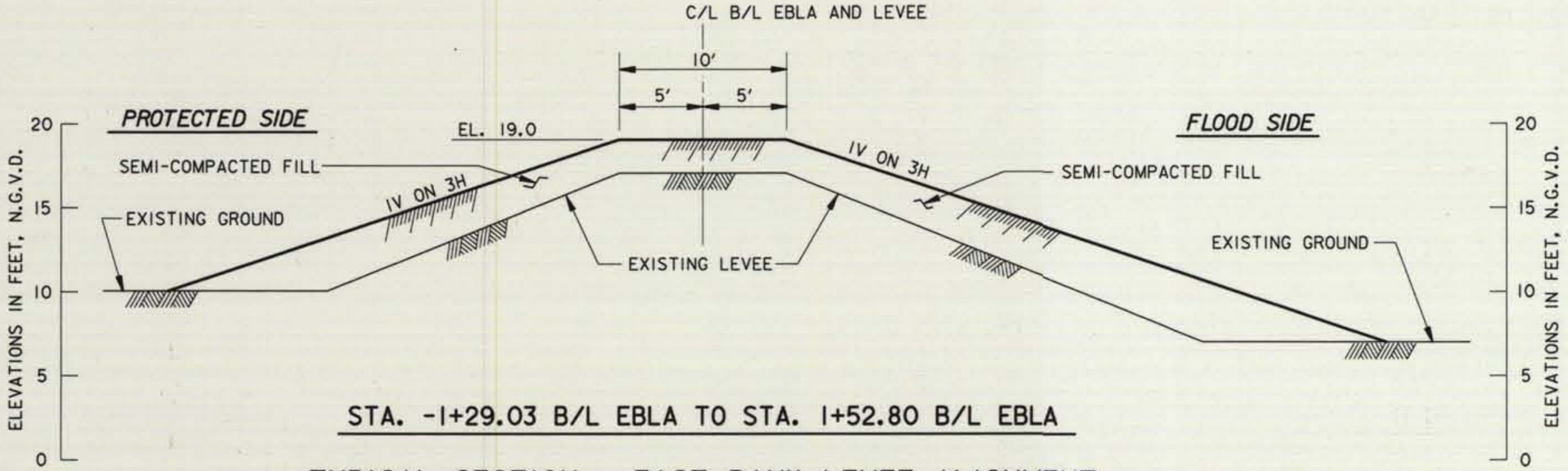
SCALE: 1" = 5'



STA. 2+57.59 B/L EBLA TO STA. 3+79.41 B/L EBLA

TYPICAL SECTION - EAST BANK LEVEE ALIGNMENT

SCALE: 1" = 5'



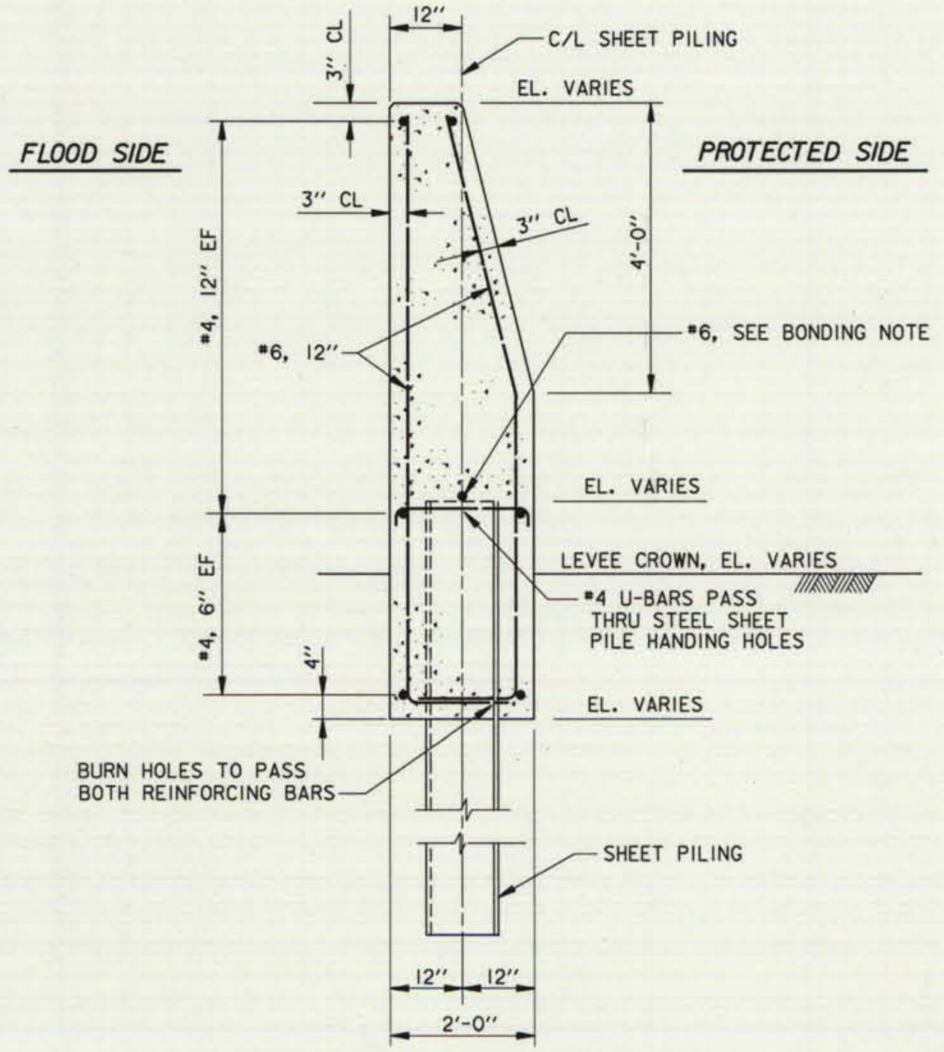
STA. -1+29.03 B/L EBLA TO STA. 1+52.80 B/L EBLA

TYPICAL SECTION - EAST BANK LEVEE ALIGNMENT

SCALE: 1" = 5'

BONDING NOTE

#6 REINFORCING BAR TO BE WELDED TO THE TOP OF EACH STEEL SHEET PILE. #6 REINFORCING BAR SHALL NOT EXTEND ACROSS THE MONOLITH JOINT. INSTALL BOND CABLE AT ALL T-WALL AND I-WALL JOINTS AND AT ALL TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
BOND CABLE SHALL BE TYPE CPS, 7-STRAND, #4 AWG, CLASS B, COPPER, INSULATION SHALL BE BLACK, HIGH MOLECULAR WEIGHT POLYETHYLENE WITH A 110 MIL MINIMUM INSULATION WALL THICKNESS.
BOND CABLE SHALL HAVE AN 8" DIAMETER LOOP TO ALLOW FOR STRESSES.
BOND CABLES SHALL BE WELDED AS SPECIFIED TO ADJACENT STEEL PILES 12" BELOW THE BOTTOM OF BASE SLAB FOR T-WALL JOINTS, 7" BELOW BOTTOM OF CONCRETE CAP FOR I-WALL JOINTS AND AT TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
WELDED CONNECTIONS SHALL BE COATED WITH SPLICING EPOXY TO OBTAIN MOISTURE PROOF JOINT.
SEE SPECIFICATIONS.



TYPICAL I-WALL SECTION

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

SCALE: 3/4" = 1'- 0"
12" 0 1' 2' 3' 4' 5'

SCALE: 1" = 5'
5' 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
CROSS SECTIONS
VICINITY BAYOU ST. JOHN

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

DESIGNED BY:	GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962P04.DGN
DRAWN BY:	MAGEE	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY:	DESAI			

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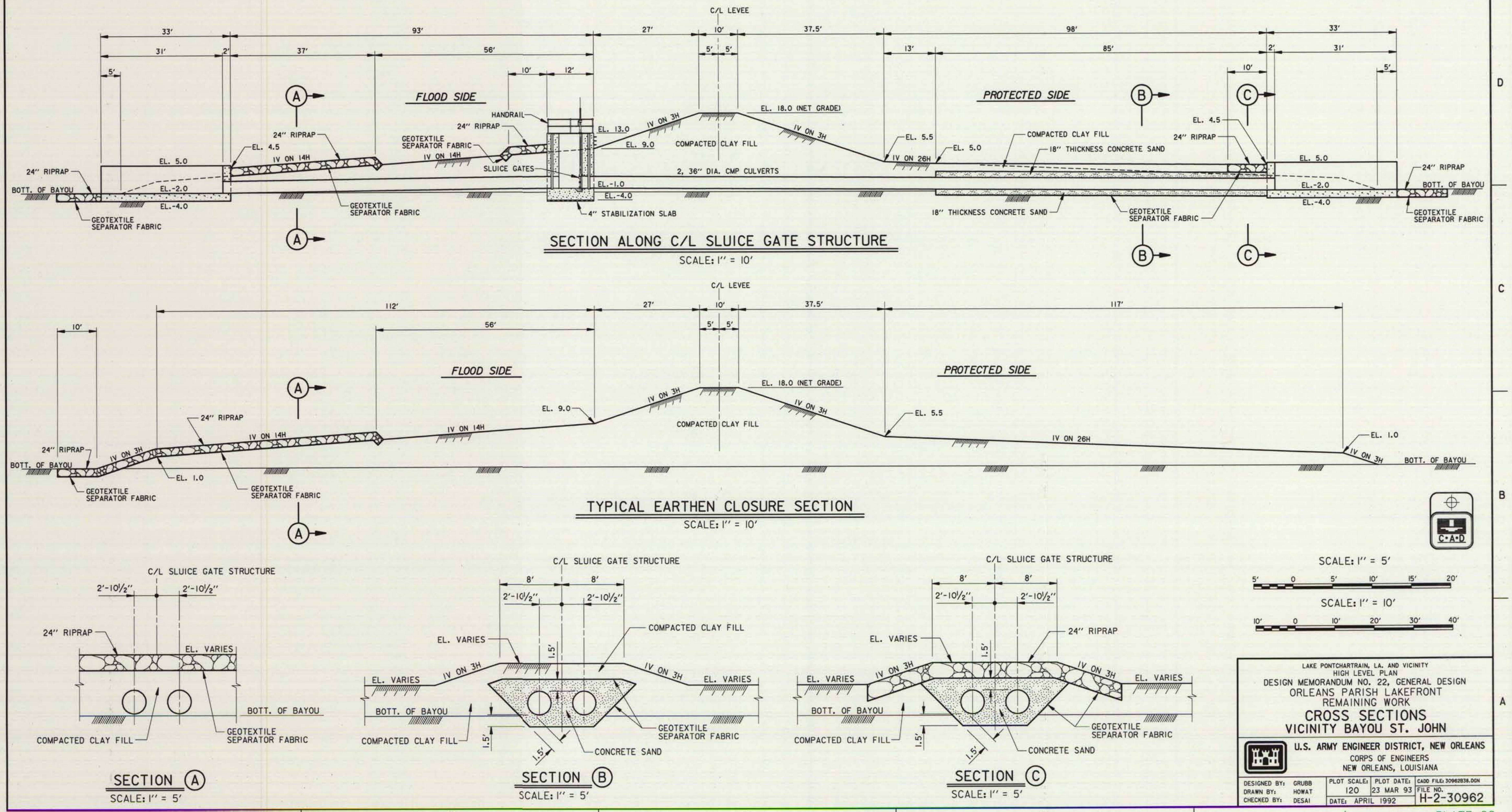
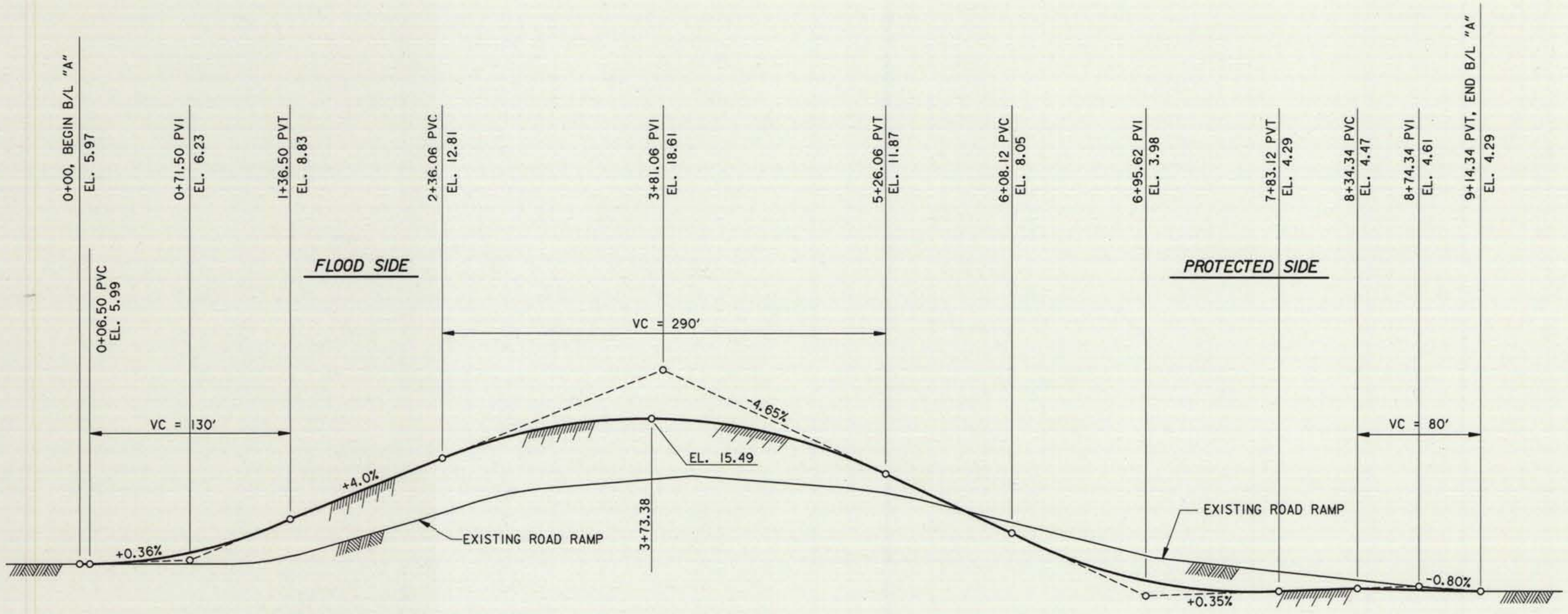


LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

CROSS SECTIONS
VICINITY BAYOU ST. JOHN

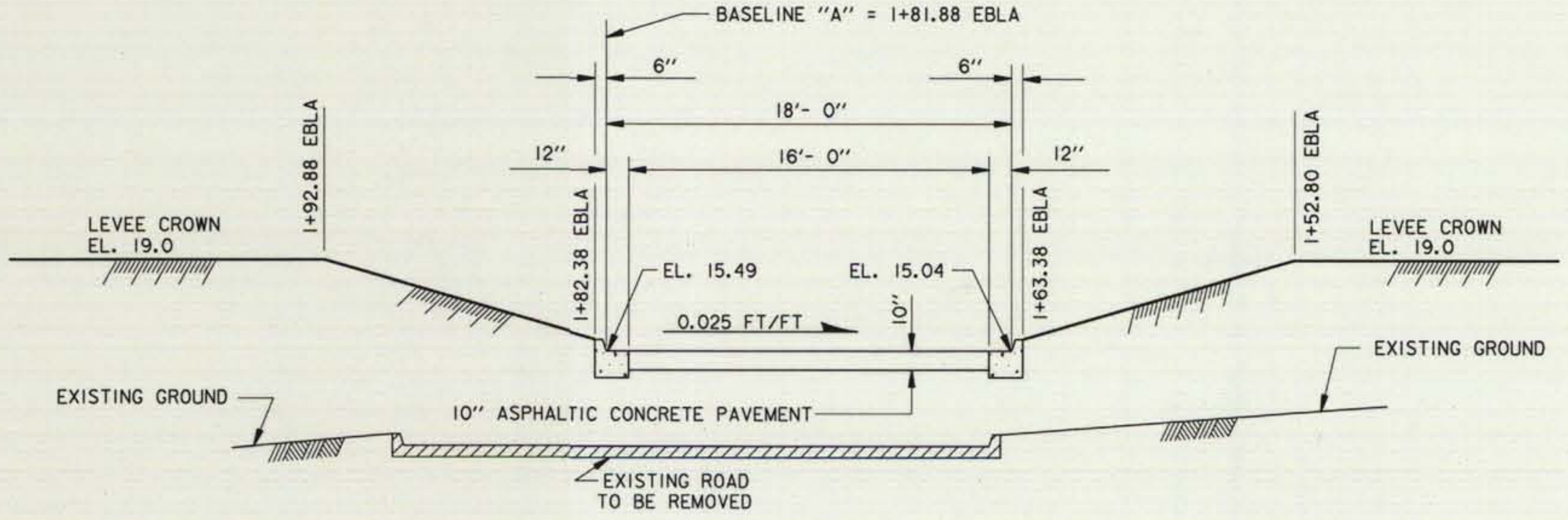
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: GRUBB	PLOT SCALE: 120	PLOT DATE: 23 MAR 93	CADD FILE: 30962B38.DGN
DRAWN BY: HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY: DESAI			



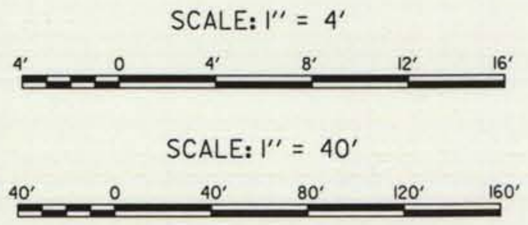
PROFILE ALONG BASELINE "A"

SCALE : HORIZ. 1" = 40'
VERT. 1" = 4'



SECTION

SCALE : 1" = 4'

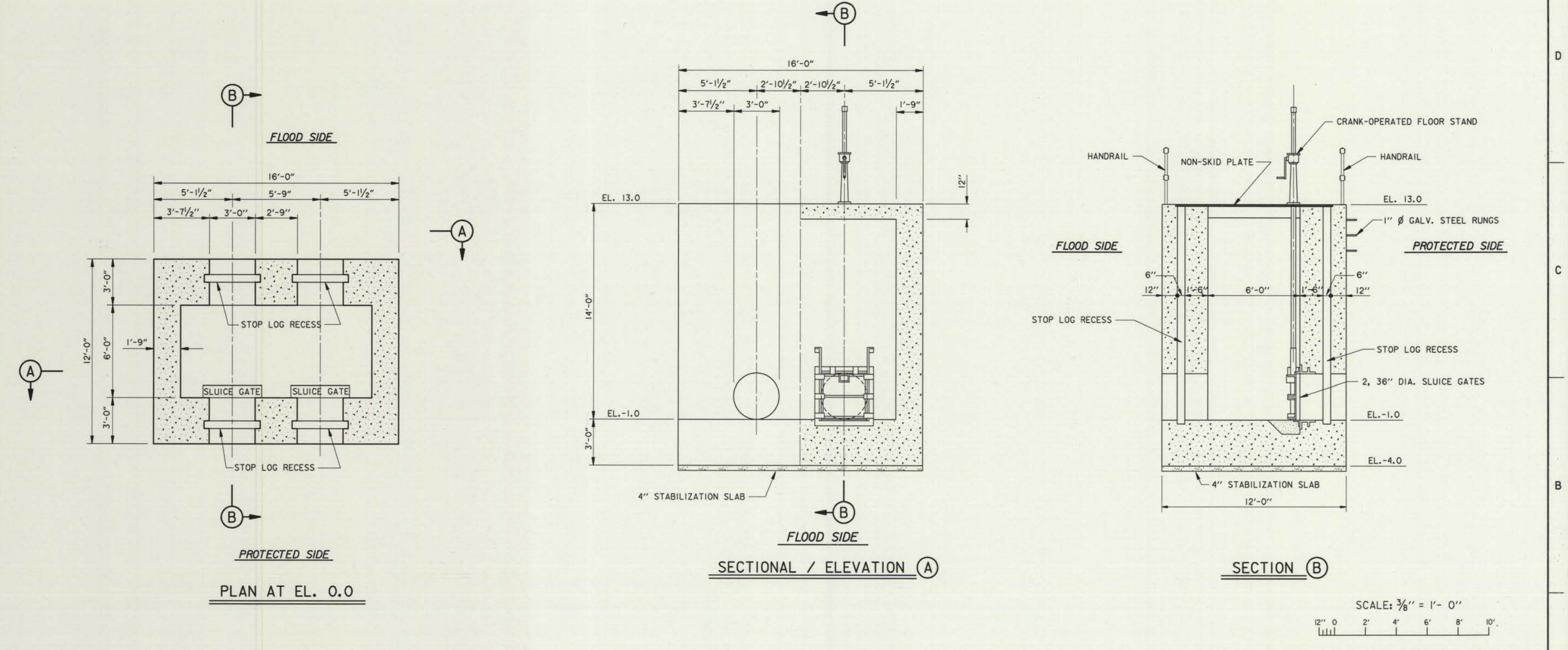


LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

LAKE TERRACE DRIVE - RAMP
VICINITY BAYOU ST. JOHN

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

DESIGNED BY: GRUBB	PLOT SCALE: 48	PLOT DATE: 23 MAR 93	CADD FILE: 30962P01.DGN
DRAWN BY: MAGEE			FILE NO. H-2-30962
CHECKED BY: DESAI	DATE: APRIL 1992		



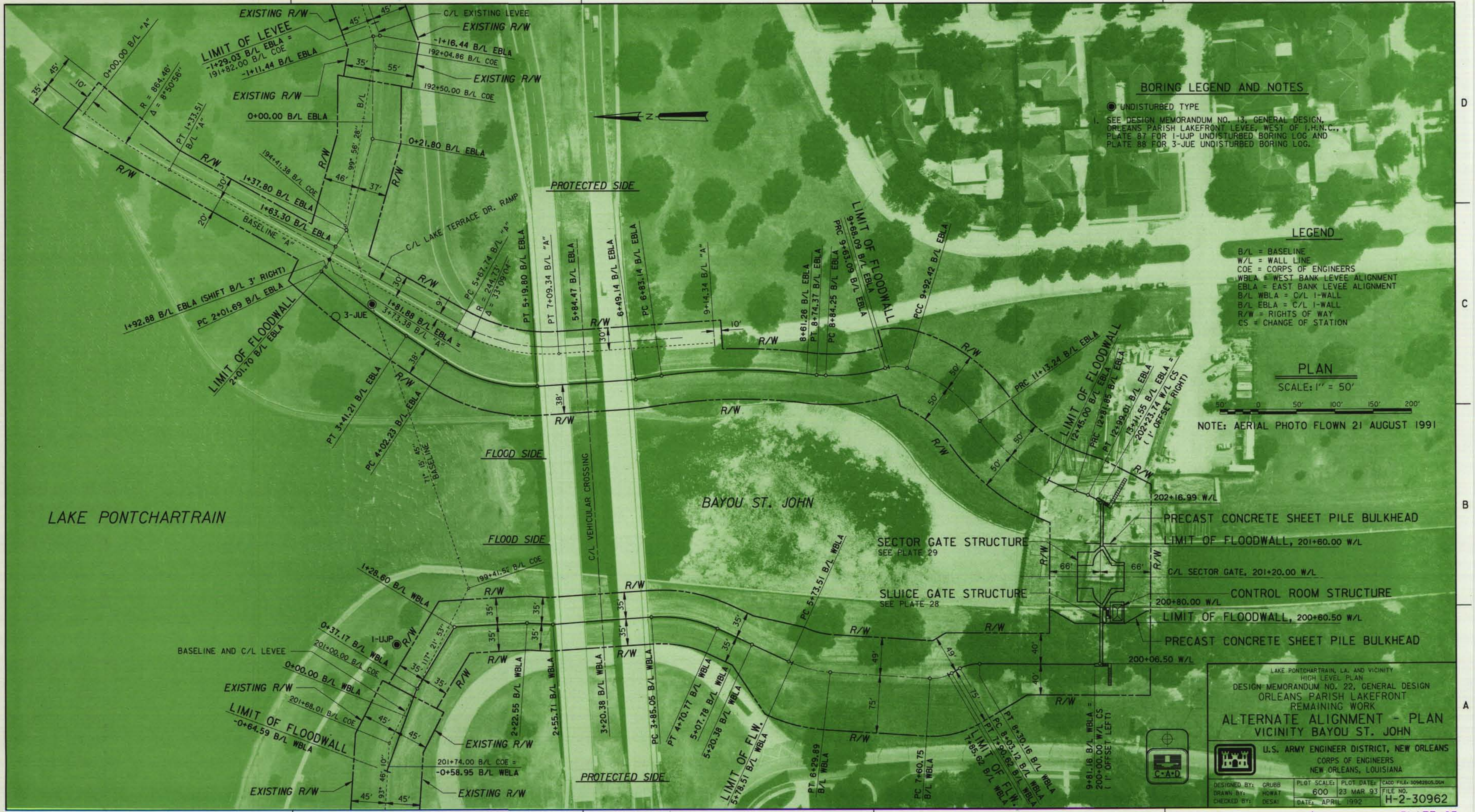
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SLUICE GATE STRUCTURE
VICINITY BAYOU ST. JOHN

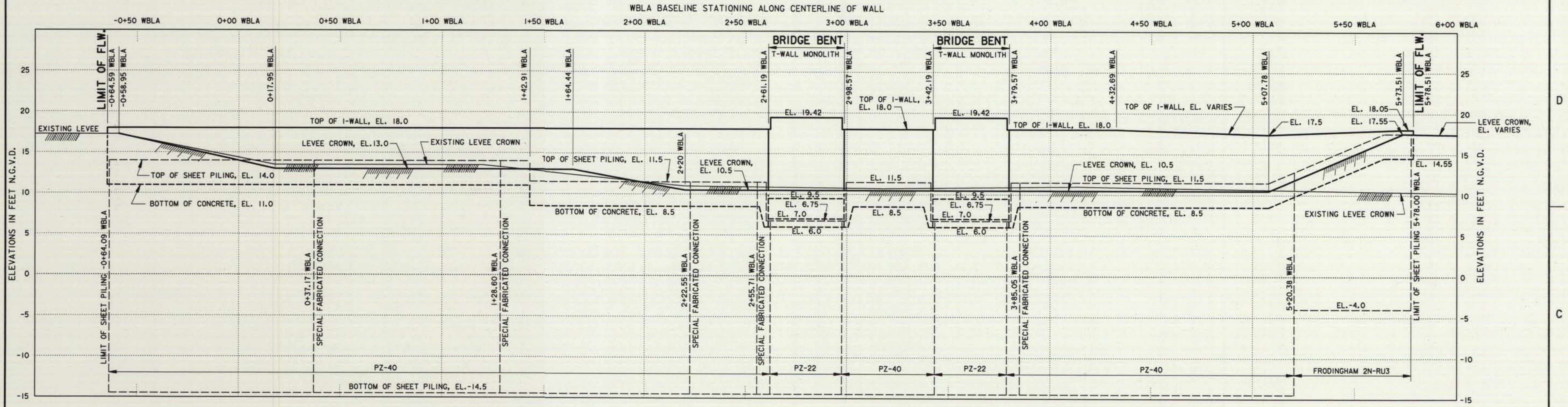
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

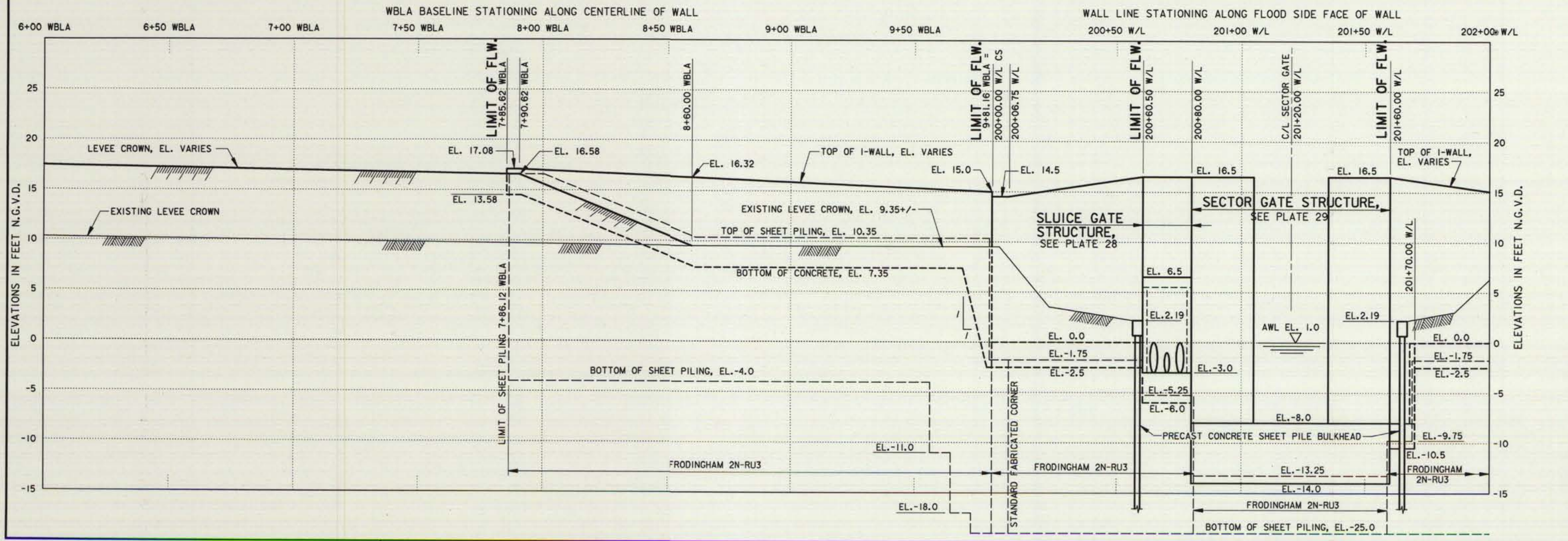
DESIGNED BY: GRUBB	PLOT SCALE: 32	PLOT DATE: 23 MAR 93	CADD FILE: 30962B3T.DGN
DRAWN BY: HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY: DESAI			

PLATE 22



BORING LEGEND AND NOTES
UNDISTURBED TYPE
1. SEE DESIGN MEMORANDUM NO. 13, GENERAL DESIGN, ORLEANS PARISH LAKEFRONT LEVEE, WEST OF I.H.N.C., PLATE 87 FOR 1-UJP UNDISTURBED BORING LOG AND PLATE 88 FOR 3-JUE UNDISTURBED BORING LOG.
LEGEND
B/L = BASELINE
W/L = WALL LINE
COE = CORPS OF ENGINEERS
WBLA = WEST BANK LEVEE ALIGNMENT
EBLA = EAST BANK LEVEE ALIGNMENT
B/L WBLA = C/L I-WALL
B/L EBLA = C/L I-WALL
R/W = RIGHTS OF WAY
CS = CHANGE OF STATION
PLAN
SCALE: 1" = 50'
NOTE: AERIAL PHOTO FLOWN 21 AUGUST 1991
LAKE PONTCHARTRAIN
BAYOU ST. JOHN
PROTECTED SIDE
FLOOD SIDE
FLOOD SIDE
PROTECTED SIDE
C/L VEHICULAR CROSSING
C/L LAKE TERRACE DR. RAMP
LIMIT OF LEVEE
EXISTING R/W
C/L EXISTING LEVEE
BASELINE "A"
BASELINE AND C/L LEVEE
LIMIT OF FLOODWALL
2+01.70 B/L EBLA
LIMIT OF FLOODWALL
9+68.09 B/L EBLA
LIMIT OF FLOODWALL
12+45.00 B/L EBLA
LIMIT OF FLOODWALL
-0+64.59 B/L WBLA
LIMIT OF FLW.
5+78.51 B/L WBLA
LIMIT OF FLW.
7+85.62 B/L WBLA
3-JUE
1-UJP
SECTOR GATE STRUCTURE
SEE PLATE 29
SLUICE GATE STRUCTURE
SEE PLATE 28
PRECAST CONCRETE SHEET PILE BULKHEAD
LIMIT OF FLOODWALL, 201+60.00 W/L
C/L SECTOR GATE, 201+20.00 W/L
CONTROL ROOM STRUCTURE
200+80.00 W/L
LIMIT OF FLOODWALL, 200+60.50 W/L
PRECAST CONCRETE SHEET PILE BULKHEAD
200+06.50 W/L
202+16.99 W/L
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
ALTERNATE ALIGNMENT - PLAN
VICINITY BAYOU ST. JOHN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: GRUBB
DRAWN BY: HOWAT
CHECKED BY: DESAI
PLOT SCALE: 600
PLOT DATE: 23 MAR 93
DATE: APRIL 1992
FILE NO. H-2-30962
C·A·D





PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

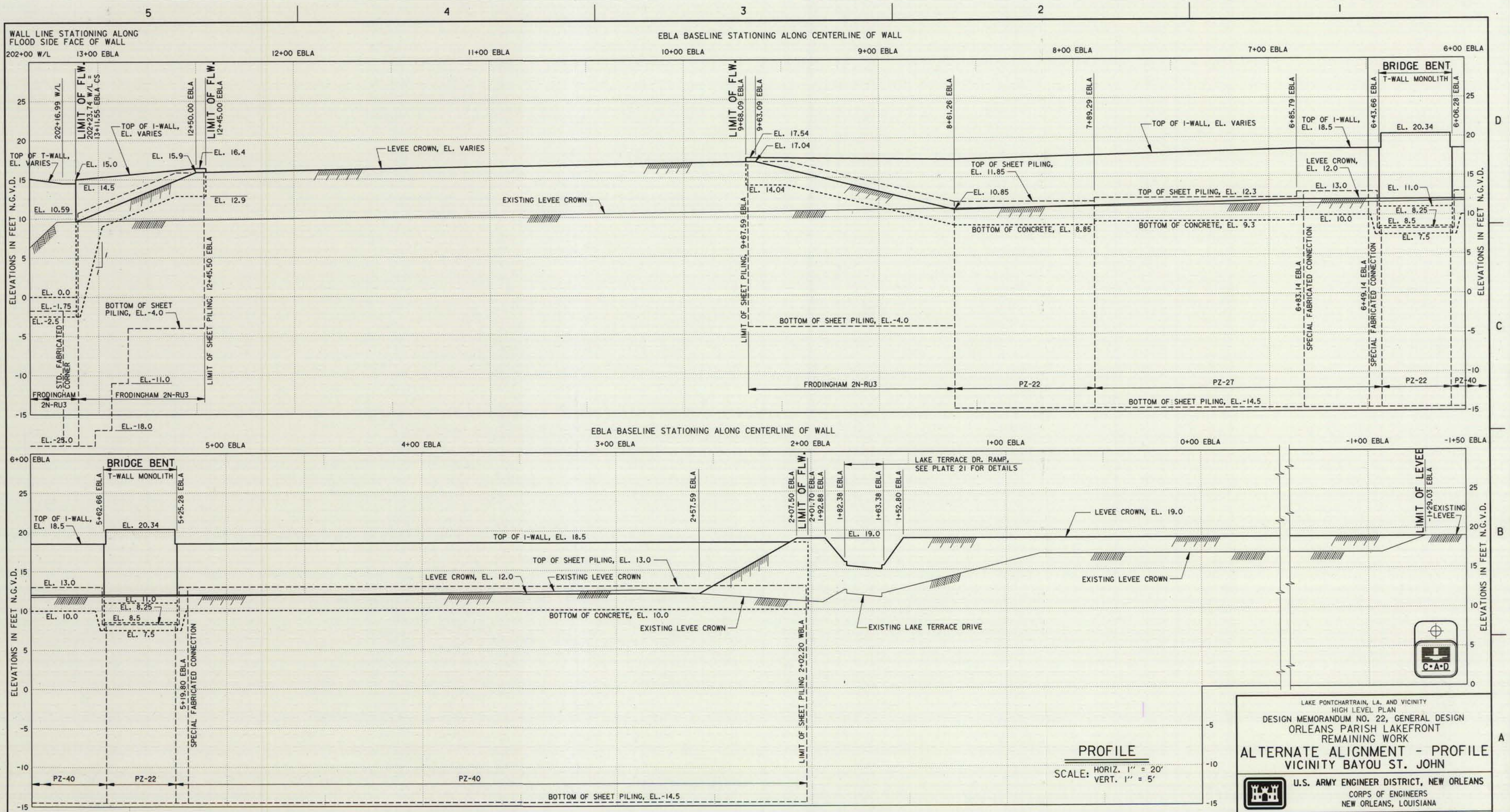
C•A•D

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

ALTERNATE ALIGNMENT - PROFILE
VICINITY BAYOU ST. JOHN

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

DESIGNED BY:	GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962B35.DGN
DRAWN BY:	HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY:	DESAI			



PROFILE

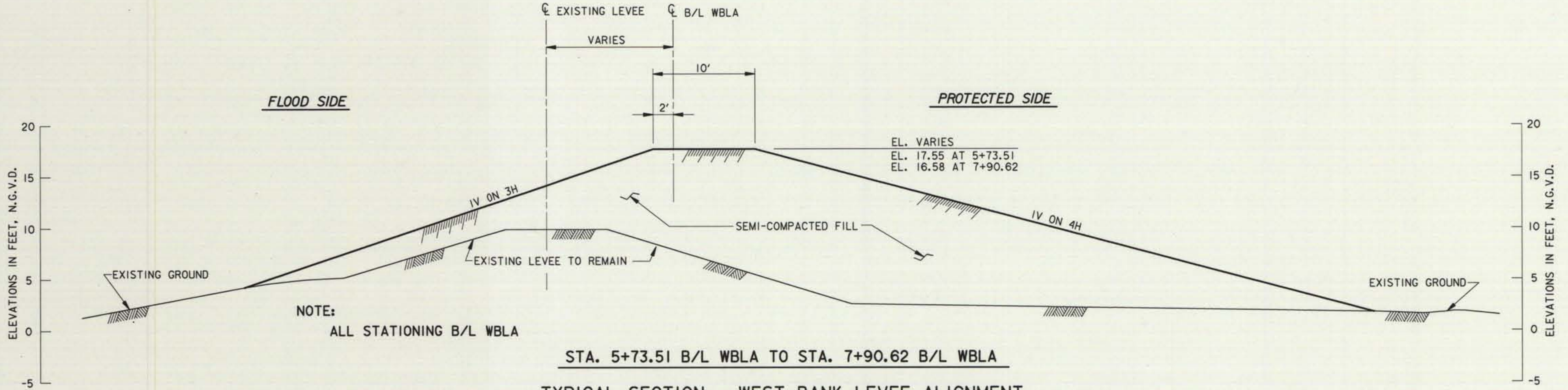
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

ALTERNATE ALIGNMENT - PROFILE
VICINITY BAYOU ST. JOHN

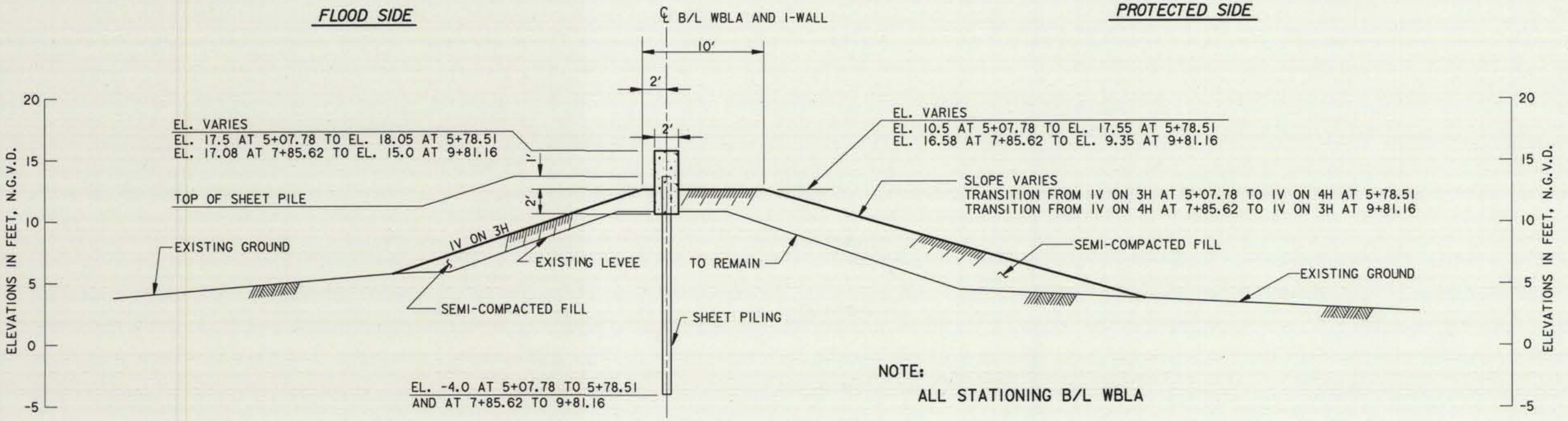
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962B36.DGN
DRAWN BY: HOWAT			FILE NO. H-2-30962
CHECKED BY: DESAI	DATE: APRIL 1992		



STA. 5+73.51 B/L WBLA TO STA. 7+90.62 B/L WBLA

TYPICAL SECTION - WEST BANK LEVEE ALIGNMENT



STA. 5+07.78 B/L WBLA TO STA. 5+78.51 B/L WBLA

AND STA. 7+85.62 B/L WBLA TO STA. 9+81.16 B/L WBLA

TYPICAL SECTION - WEST BANK LEVEE ALIGNMENT

SCALE: 1" = 5'

5' 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

ALTERNATE ALIGNMENT - CROSS SECTIONS
VICINITY BAYOU ST. JOHN

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

DESIGNED BY: GRUBB	PLOT SCALE:	PLOT DATE:	CADD FILE: 30962P03.DGN
DRAWN BY: MAGEE	60	23 MAR 93	FILE NO.
CHECKED BY: DESAI	DATE: APRIL 1992		H-2-30962

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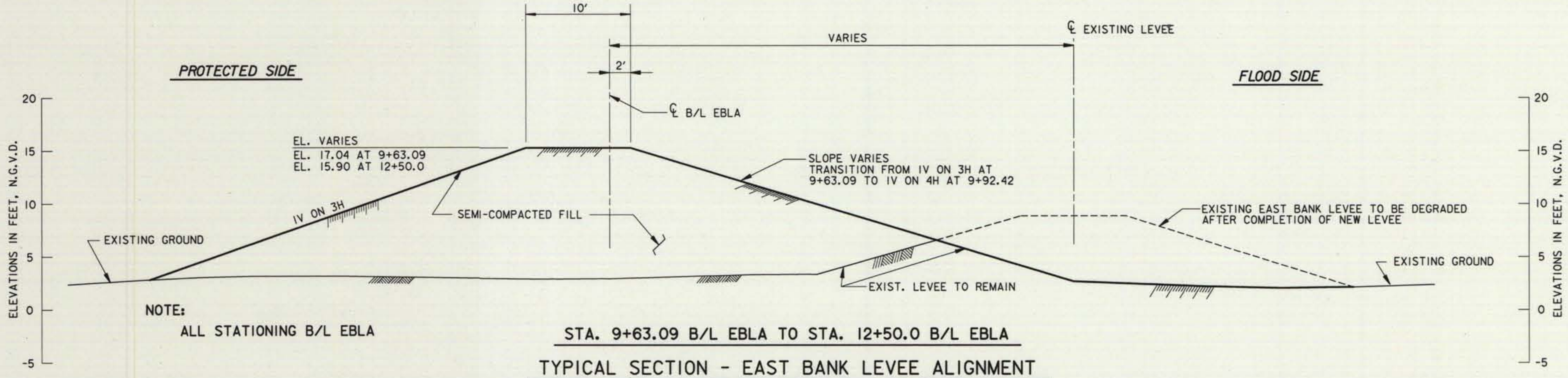
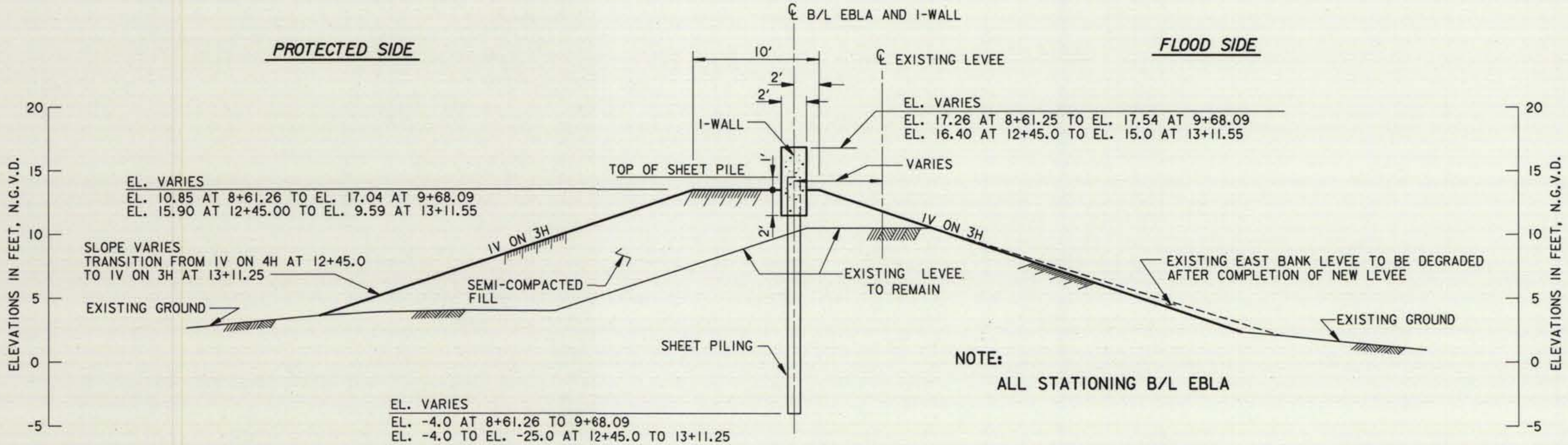


STA. 9+63.09 B/L EBLA TO STA. 12+50.0 B/L EBLA

TYPICAL SECTION - EAST BANK LEVEE ALIGNMENT



STA. 8+61.26 B/L EBLA TO STA. 9+68.09 B/L EBLA

AND STA. 12+45.0 B/L EBLA TO STA. 13+11.55 B/L EBLA

TYPICAL SECTION - EAST BANK LEVEE ALIGNMENT

SCALE: 1" = 5'

5' 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

ALTERNATE ALIGNMENT - CROSS SECTIONS
VICINITY BAYOU ST. JOHN

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

DESIGNED BY: GRUBB	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962P02.DGN	
DRAWN BY: MAGEE			FILE NO. H-2-30962	
CHECKED BY: DESAI	DATE: APRIL 1992			

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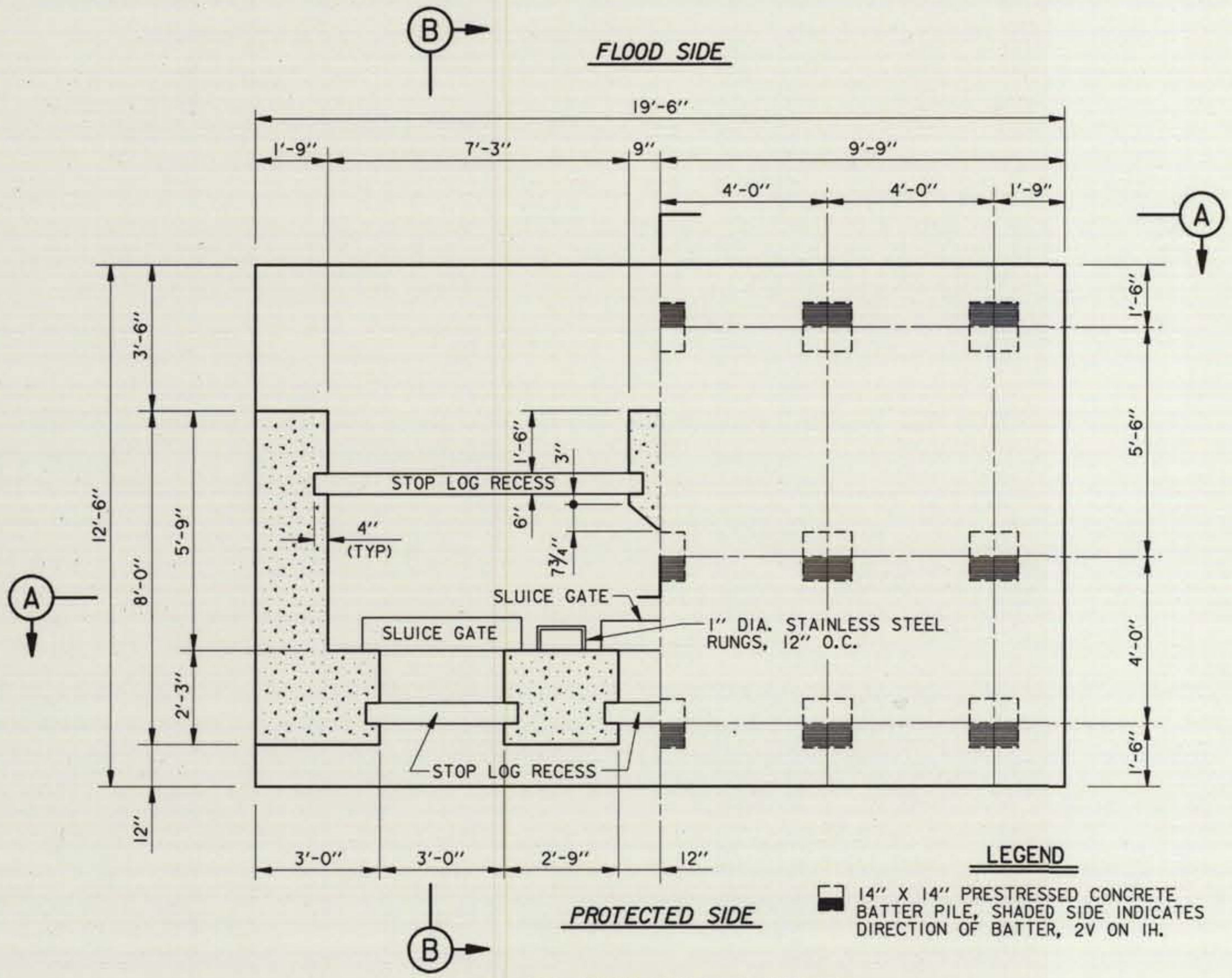
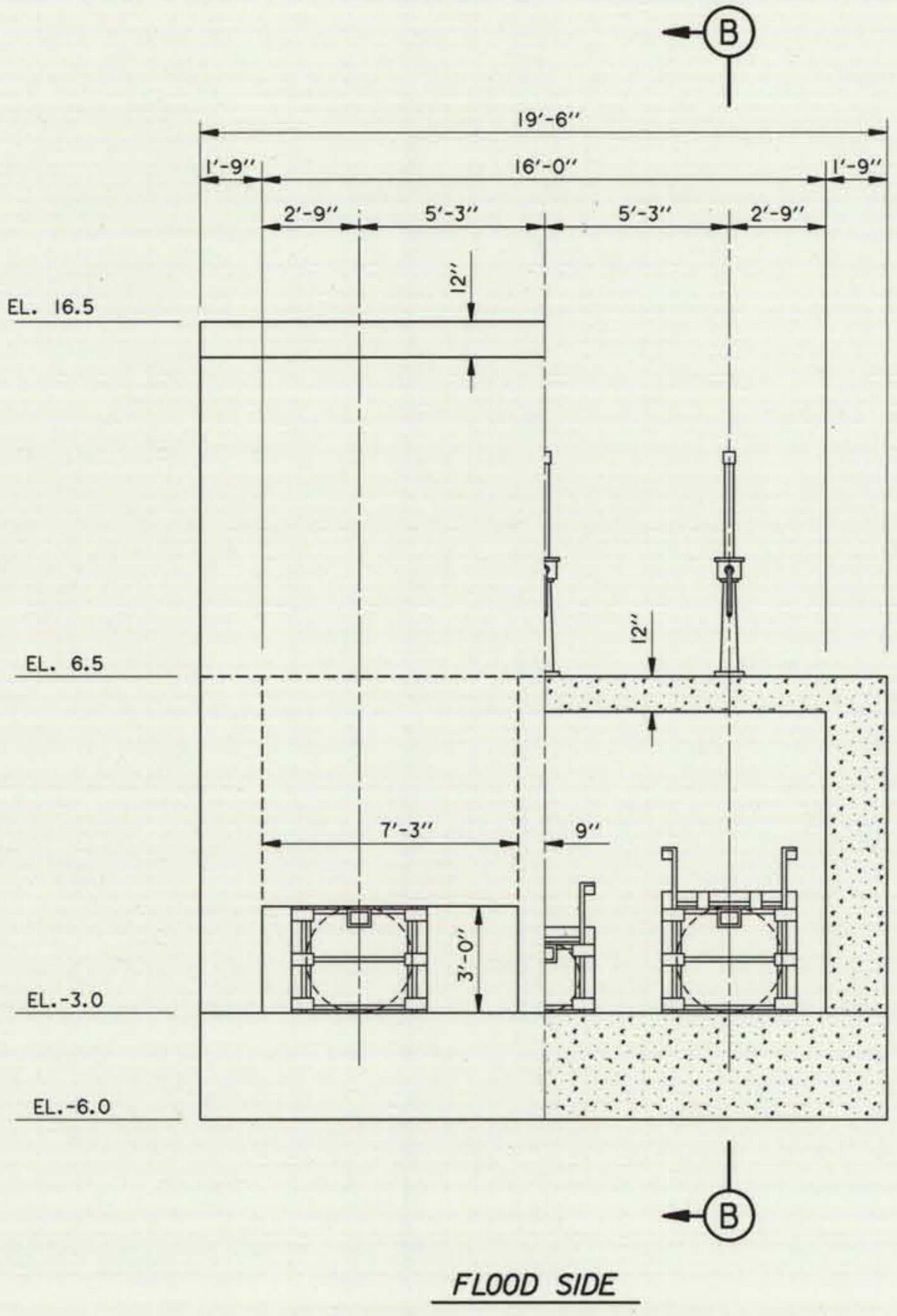


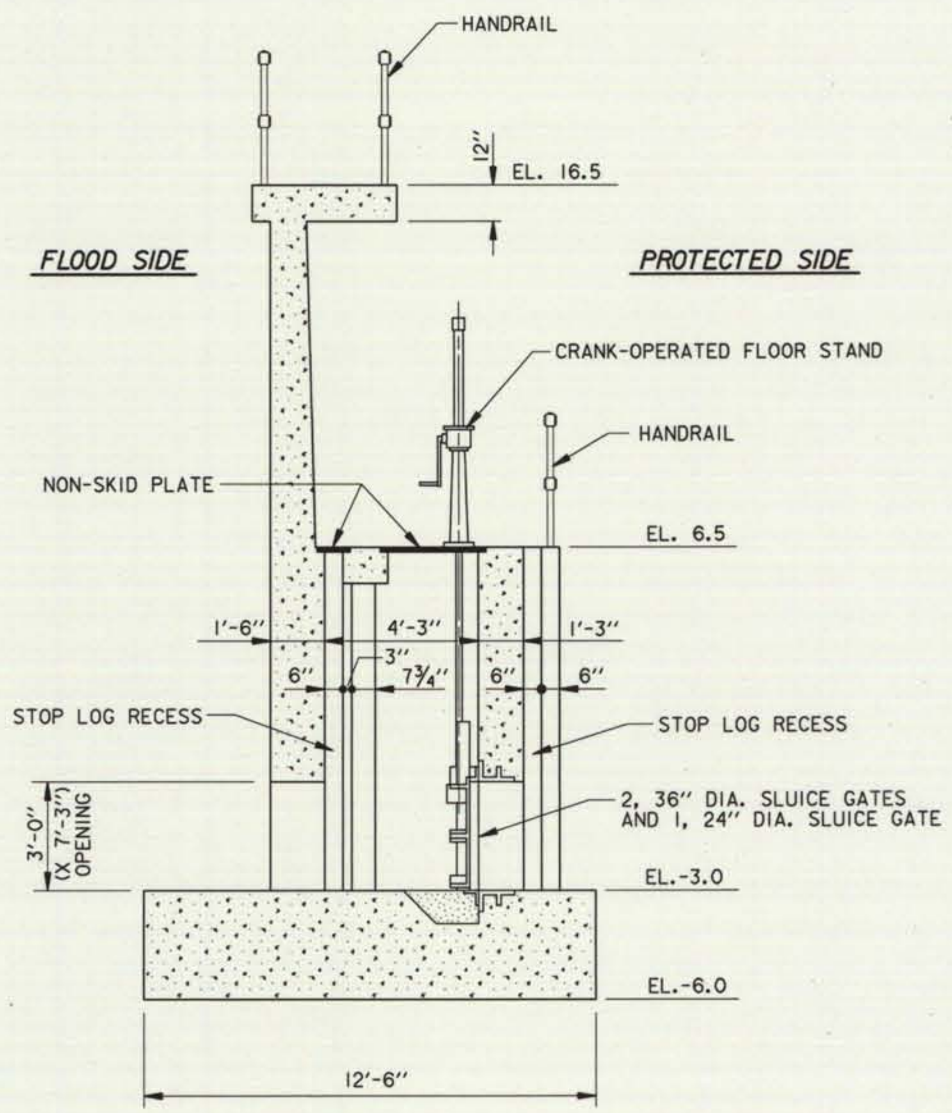
PLAN AND PILE LAYOUT

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



SECTIONAL / ELEVATION (A)

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



SECTION (B)

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

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

12" 0 2' 4' 6' 8' 10'

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

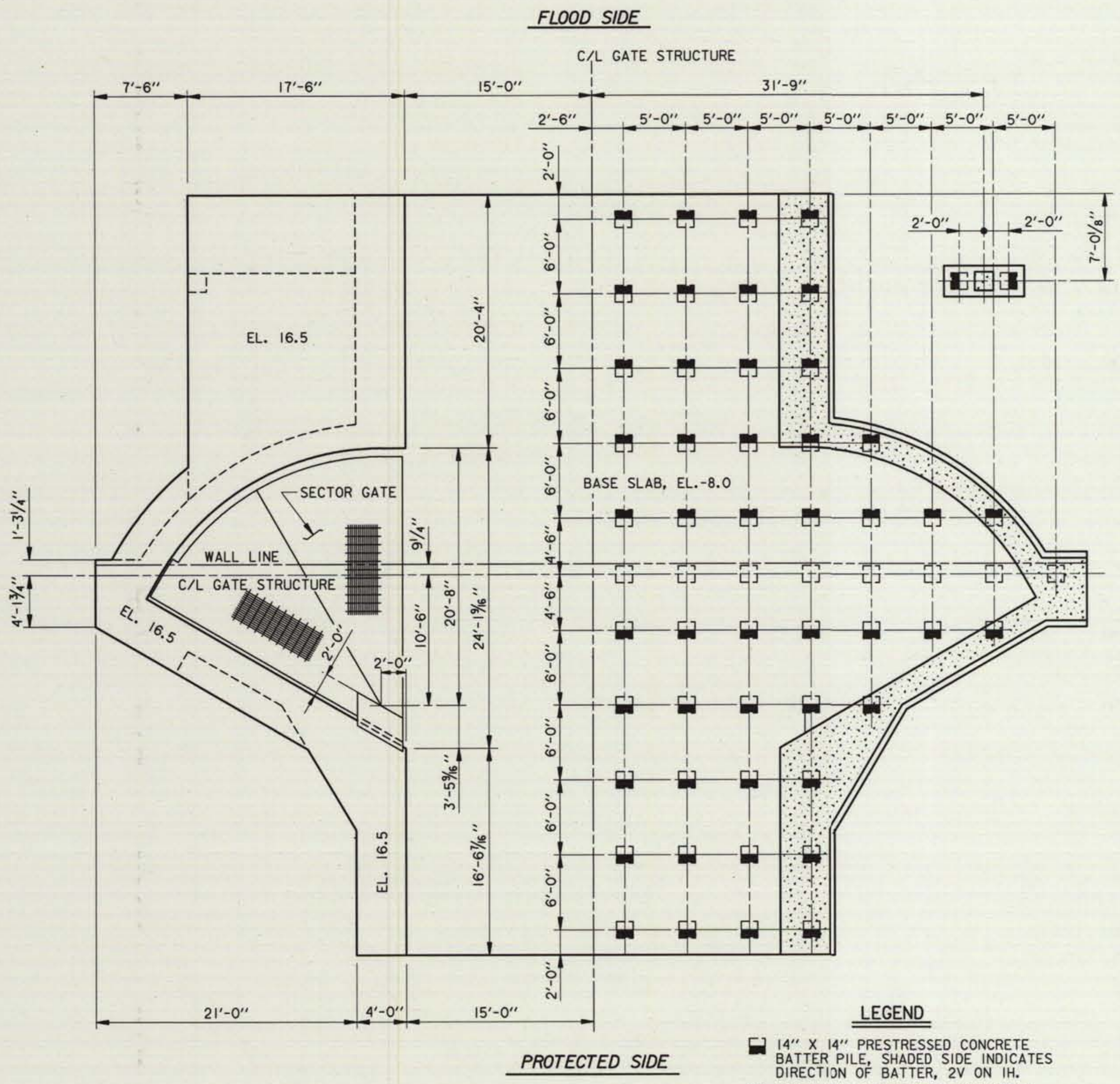
12" 0 2' 4' 6' 8'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

ALTERNATE ALIGNMENT - SLUICE GATE STRUCTURE
VICINITY BAYOU ST. JOHN

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

DESIGNED BY:	GRUBB	PLOT SCALE: 32	PLOT DATE: 23 MAR 93	CADD FILE: 30962B28.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	DESAI	DATE: APRIL 1992		

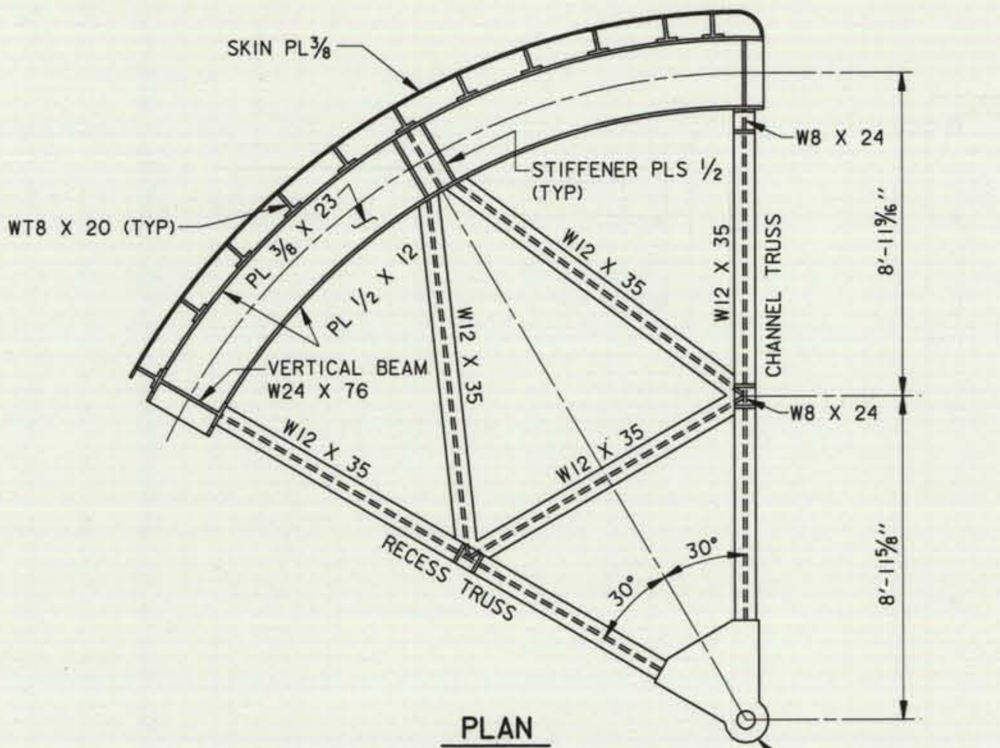


LEGEND

- 14" X 14" PRESTRESSED CONCRETE BATTER PILE, SHADED SIDE INDICATES DIRECTION OF BATTER, 2V ON 1H.
- 14" X 14" PRESTRESSED CONCRETE VERTICAL PILE.

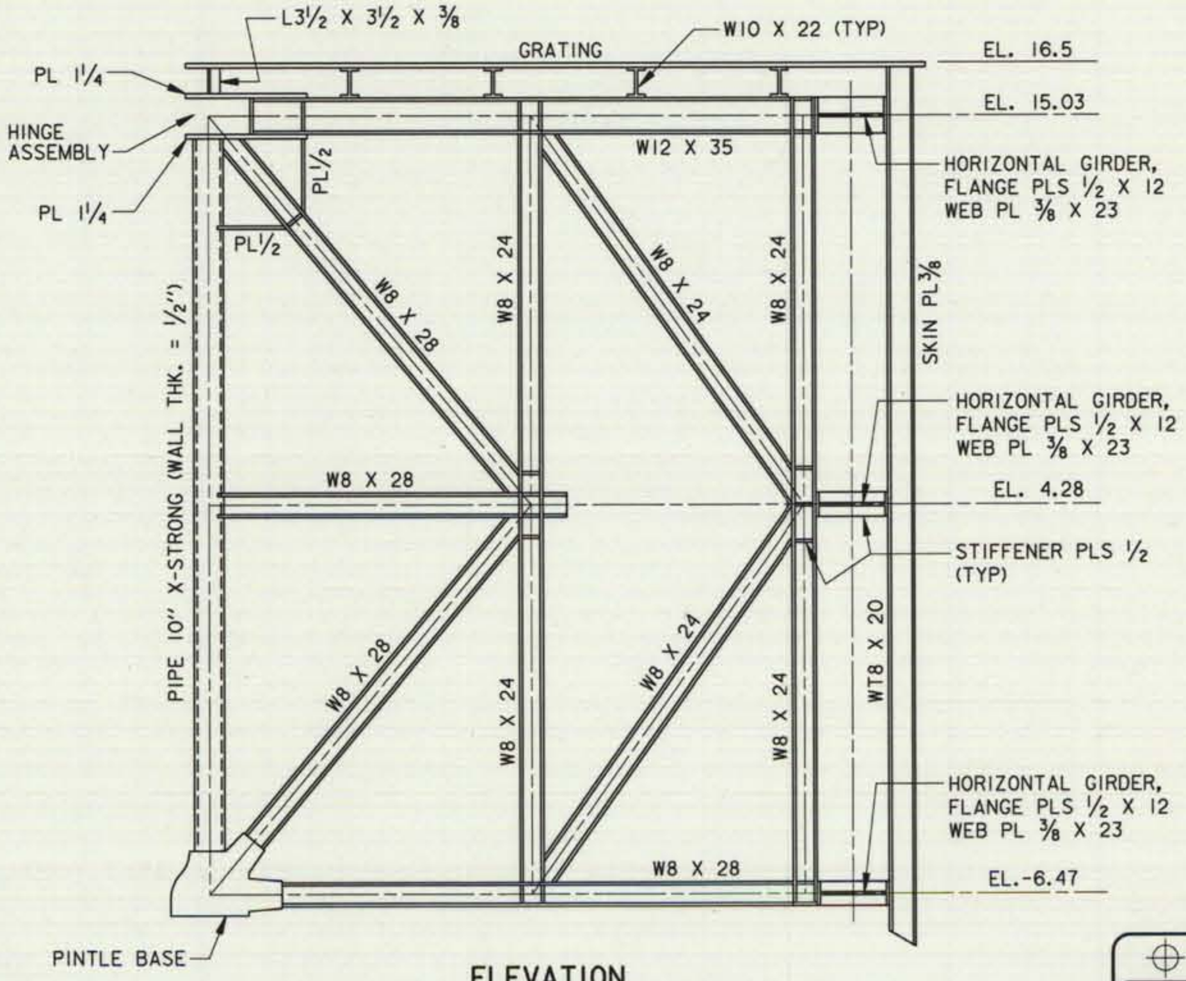
PLAN AND PILE LAYOUT

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



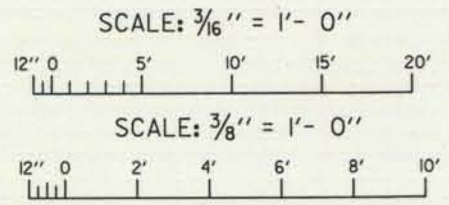
PLAN
HORIZONTAL FRAME

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



ELEVATION
VERTICAL FRAME - CHANNEL TRUSS

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



LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

**ALTERNATE ALIGNMENT - SECTOR GATE STRUCTURE
VICINITY BAYOU ST. JOHN**

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

DESIGNED BY:	GRUBB	PLOT SCALE: 32	PLOT DATE: 23 MAR 93	CADD FILE: 30962B27.DGN
DRAWN BY:	HOWAT			FILE NO. H-2-30962
CHECKED BY:	DESAI	DATE: APRIL 1992		

BORING LEGEND AND NOTES

◉ UNDISTURBED TYPE

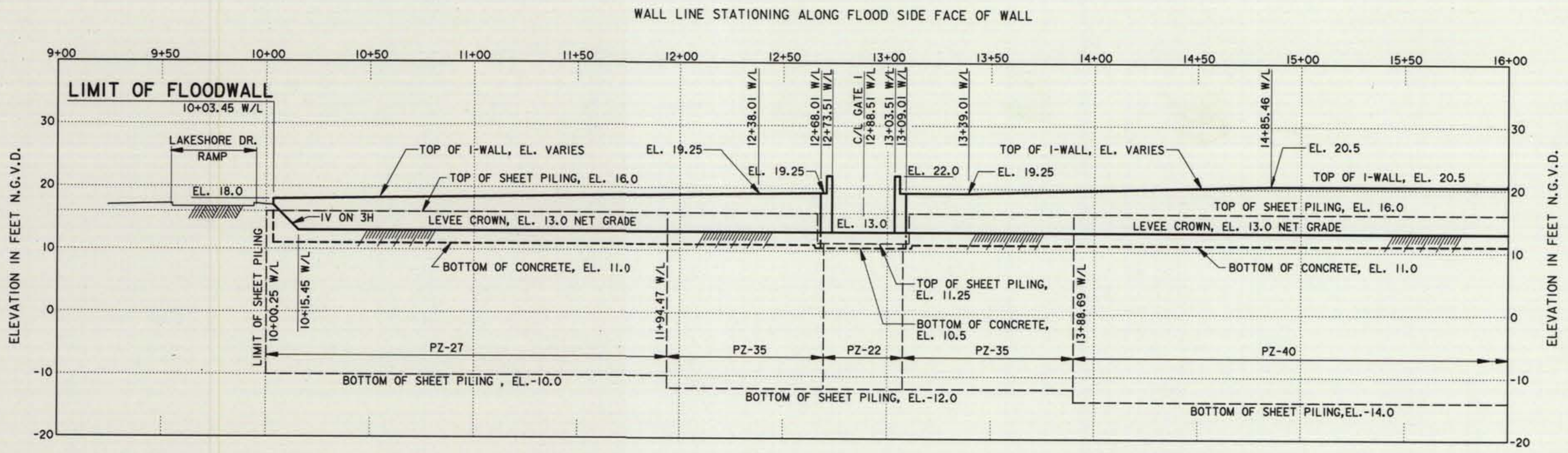
1. SEE PLATE 55 FOR BORING 6-PBU UNDISTURBED BORING LOG.
2. SEE DESIGN MEMORANDUM NO. 13, GENERAL DESIGN, ORLEANS PARISH LAKEFRONT LEVEE, WEST OF I.H.N.C., PLATE 81 FOR 3-ULO UNDISTURBED BORING LOG.
3. SEE APPENDIX B FOR A-E BORING'S LOCATIONS AND BORING LOGS.

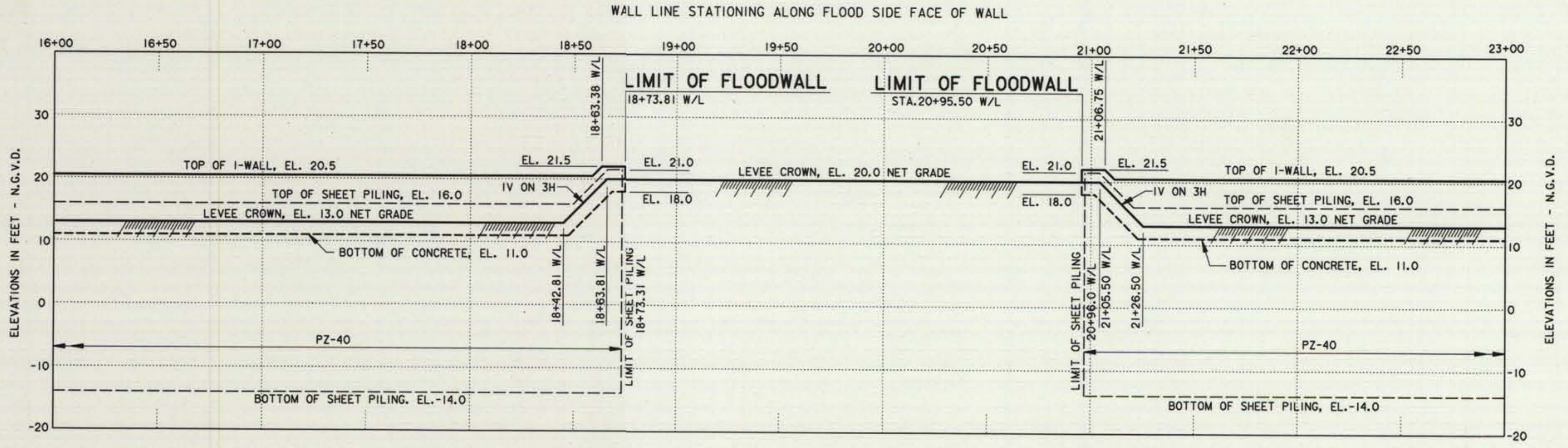
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PLAN
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 1200	PLOT DATE: 23 MAR 93	CADD FILE: 30962806.DGN
DRAWN BY: HOWAT			FILE NO.
CHECKED BY: GRUBB	DATE: APRIL 1992		H-2-30962





PROFILE

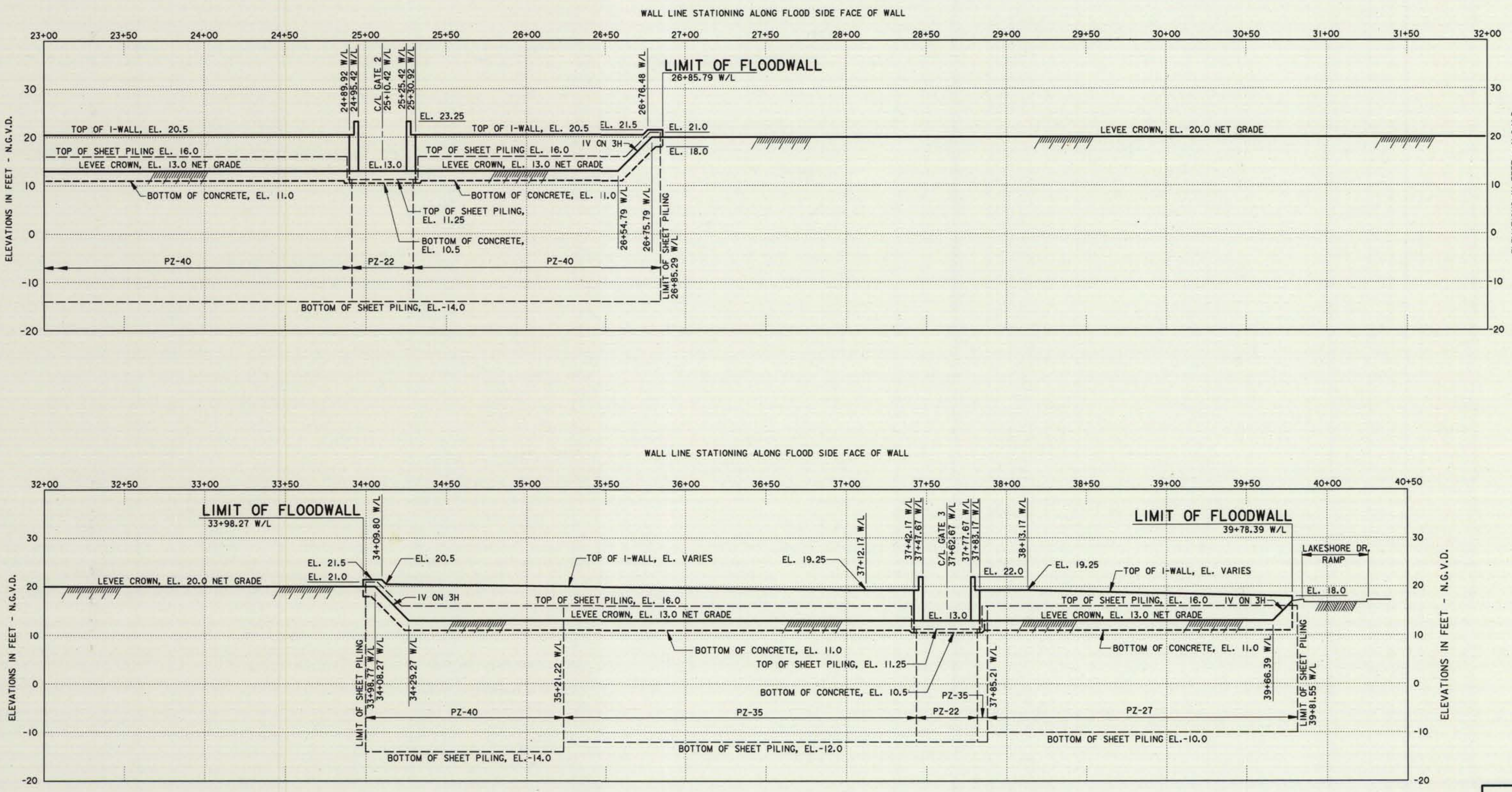
SCALE: HORIZ. 1"=30'
VERT. 1"=10'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY:	DESAI	PLOT SCALE: 120	PLOT DATE: 23 MAR 93	CADD FILE: 30962H05.DGN
DRAWN BY:	BRAKEL			FILE NO.
CHECKED BY:	GRUBB	DATE: APRIL 1992		H-2-30962



PROFILE

SCALE: HORIZ. 1"=30' VERT. 1"=10'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 120	PLOT DATE: 23 MAR 93	CADD FILE: 30962H08.DGN
DRAWN BY: BRAKEL	DATE: APRIL 1992		FILE NO. H-2-30962
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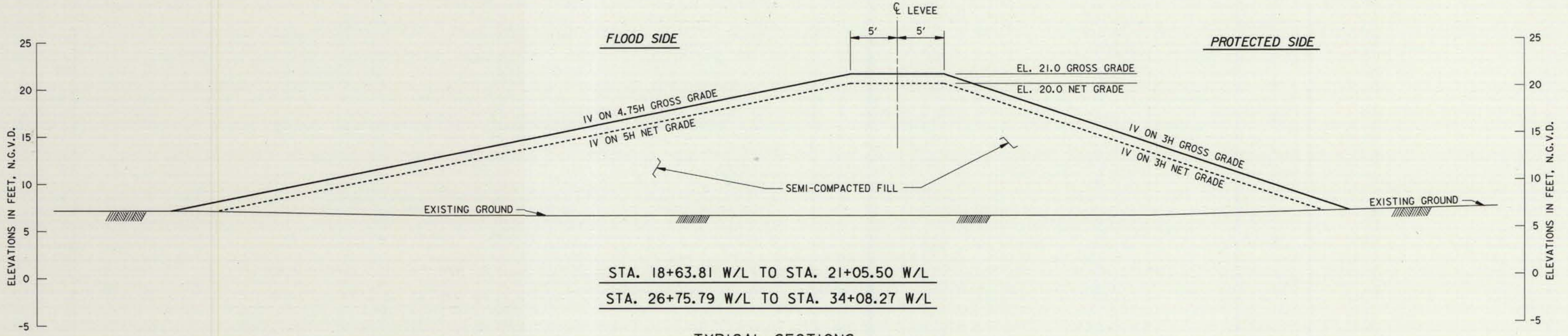
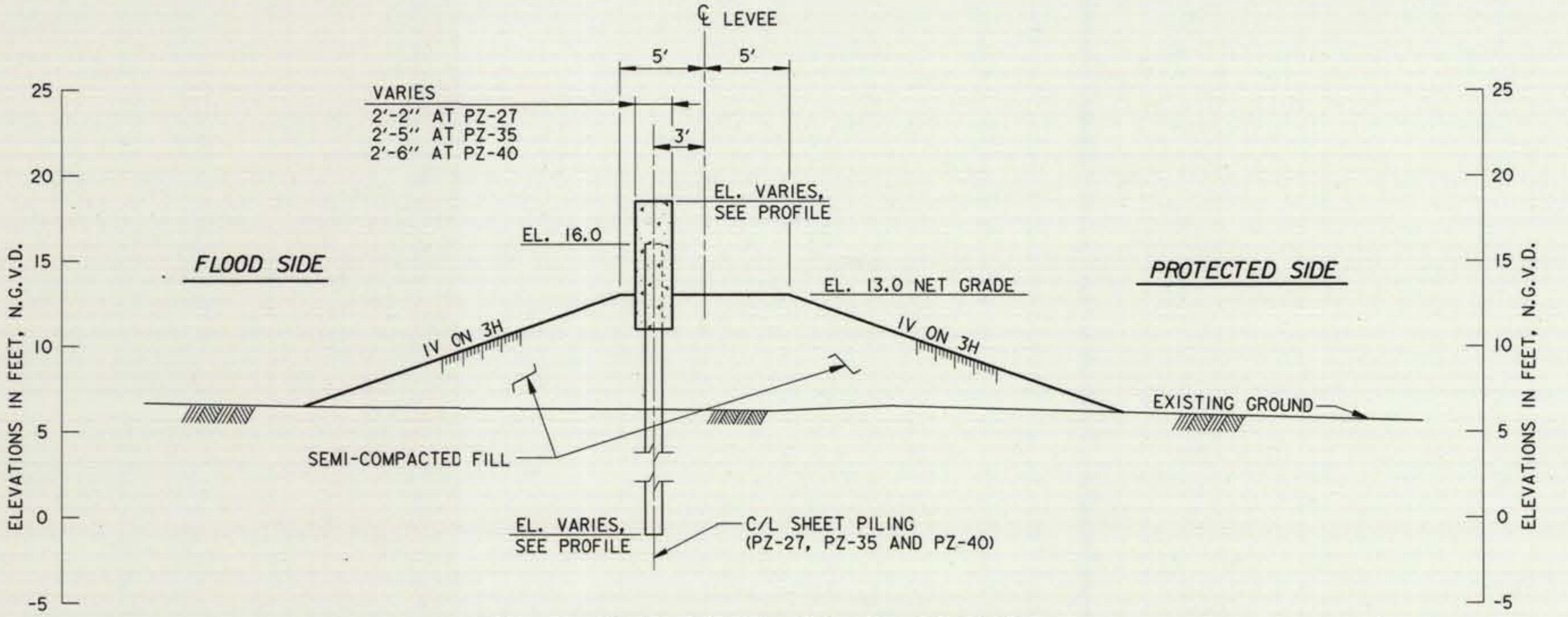


STA. 18+63.81 W/L TO STA. 21+05.50 W/L

STA. 26+75.79 W/L TO STA. 34+08.27 W/L

TYPICAL SECTIONS



STA. 10+15.45 W/L TO STA. 12+68.01 W/L

STA. 13+09.01 W/L TO STA. 18+42.81+/- W/L

STA. 21+26.50+/- W/L TO STA. 24+89.92 W/L

STA. 25+30.92 W/L TO STA. 26+54.79+/- W/L

STA. 34+29.27+/- W/L TO STA. 37+42.17 W/L

STA. 37+83.17 W/L TO STA. 39+66.39 W/L

TYPICAL SECTIONS

SCALE: 1" = 5'

5' 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

CROSS SECTIONS
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962P06.DGN
DRAWN BY: MAGEE	DATE: APRIL 1992		FILE NO. H-2-30962
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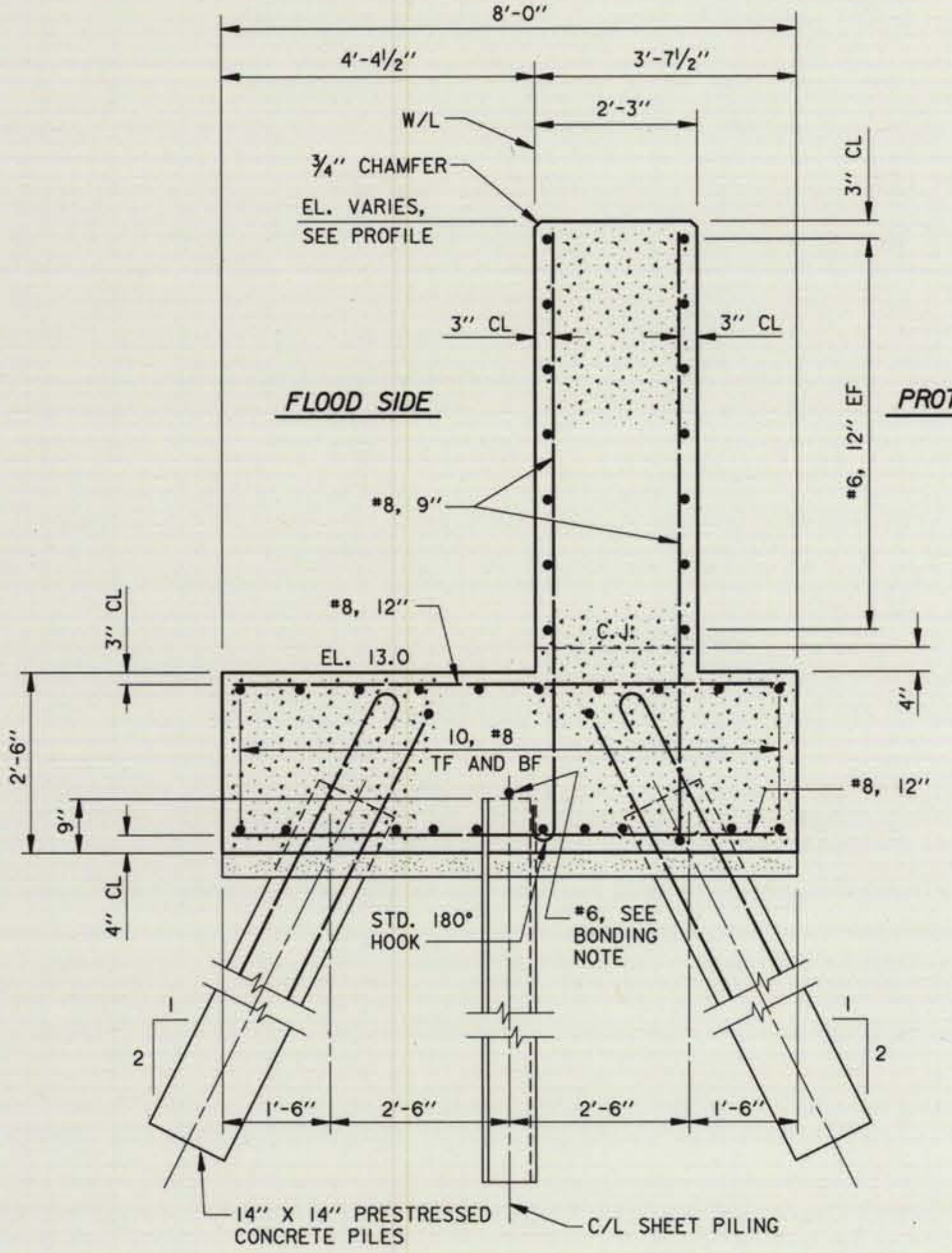
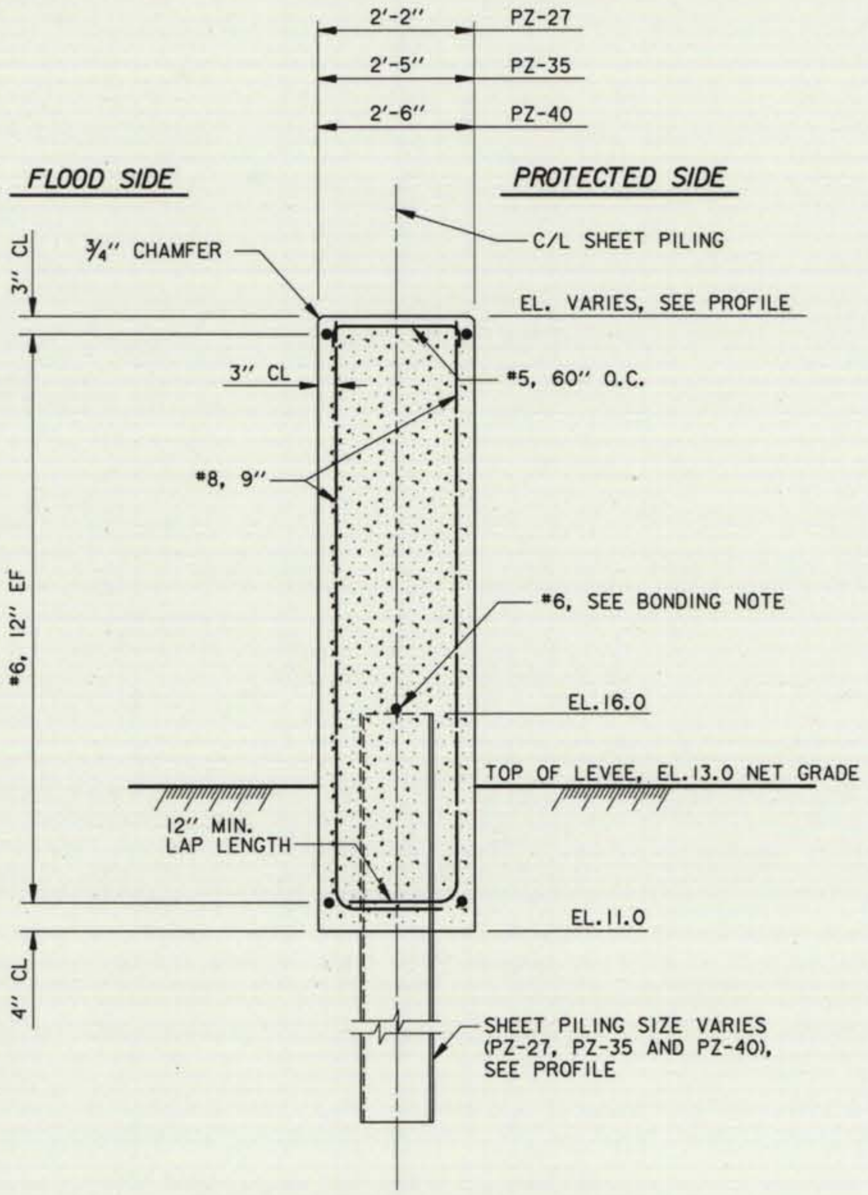


TYPICAL T-WALL SECTION

SCALE: ¾"=1'-0"



TYPICAL I-WALL SECTION

SCALE: ¾"=1'-0"

BONDING NOTE

#6 REINFORCING BAR TO BE WELDED TO THE TOP OF EACH STEEL SHEET PILE. #6 REINFORCING BAR SHALL NOT EXTEND ACROSS THE MONOLITH JOINT. INSTALL BOND CABLE AT ALL T-WALL AND I-WALL JOINTS AND AT ALL TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
BOND CABLE SHALL BE TYPE CPS, 7-STRAND, #4 AWG, CLASS B, COPPER, INSULATION SHALL BE BLACK, HIGH MOLECULAR WEIGHT POLYETHYLENE WITH A 110 MIL MINIMUM INSULATION WALL THICKNESS.
BOND CABLE SHALL HAVE AN 8" DIAMETER LOOP TO ALLOW FOR STRESSES.
BOND CABLES SHALL BE WELDED AS SPECIFIED TO ADJACENT STEEL PILES 12" BELOW THE BOTTOM OF BASE SLAB FOR T-WALL JOINTS, 7" BELOW BOTTOM OF CONCRETE CAP FOR I-WALL JOINTS AND AT TRANSITIONS FROM T-WALL TO I-WALL JOINTS.
WELDED CONNECTIONS SHALL BE COATED WITH SPLICING EPOXY TO OBTAIN MOISTURE PROOF JOINT.
SEE SPECIFICATIONS.

SCALE: ¾" = 1'- 0"

12" 0 1' 2' 3' 4' 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

TYPICAL WALL SECTIONS
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 16	PLOT DATE: 23 MAR 93	CADD FILE: 30962831.DGN
DRAWN BY: HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY: GRUBB			

SWING GATES
TABLE OF ELEVATIONS, DIMENSIONS AND MEMBER SIZES

		GATE NO. 1	GATE NO. 2	GATE NO. 3
ELEVATIONS	(A)	22.00	23.25	22.00
	(B)	19.25	20.50	19.25
	(C)	13.00	13.00	13.00
	(D)	23.00	24.00	23.00
	(E)	22.00	23.25	22.00
DIMENSIONS	(G)	4'-9 1/16"	6'-0 1/16"	4'-9 1/16"
	(H)	7 3/4"	7 3/4"	7 3/4"
	(J)	30'-0"	30'-0"	30'-0"
	(K)	41'-0"	41'-0"	41'-0"
	(L)	2'-11"	2'-11	2'-11"
	(M)	2'-7"	2'-7"	2'-7"
MEMBERS	(S)	W21 X 93	W21 X 93	W21 X 93
	(T)	W21 X 93	W21 X 93	W21 X 93
	(U)	PL 1/2 X 4	PL 1/2 X 4	PL 1/2 X 4
	(V)	PL 1/2 X 21 5/8	PL 1/2 X 21 5/8	PL 1/2 X 21 5/8
	(X)	TS20 X 12 X 3/8	TS20 X 12 X 3/8	TS20 X 12 X 3/8
	(Y)	L6 X 3 1/2 X 5/16	L6 X 3 1/2 X 5/16	L6 X 3 1/2 X 5/16
	(Z)	PL 1/2	PL 1/2	PL 1/2

PILE SCHEDULE

GATE NO.	PILE SIZE	NUMBER OF PILES	PILE BATTER	TIP EL.	PAYMENT LENGTH		SPACING	
					FLOOD SIDE	PROTECTED SIDE	FLOOD SIDE	PROTECTED SIDE
1	14" X 14"	4	2V ON 1H	-50.34	69'		7'-3"	
		2	VERTICAL	-59.75	71'		7'-6"	
		4	2V ON 1H	-50.34		69'		7'-3"
		2	VERTICAL	-59.75		71'		7'-6"
2	14" X 14"	4	2V ON 1H	-46.76	65'		7'-3"	
		2	VERTICAL	-51.75	63'		7'-6"	
		6	2V ON 1H	-46.76		65'		5'-0"
		2	VERTICAL	-51.75		63'		5'-8"
3	14" X 14"	4	2V ON 1H	-50.34	69'		7'-3"	
		2	VERTICAL	-59.75	71'		7'-6"	
		4	2V ON 1H	-50.34		69'		7'-3"
		2	VERTICAL	-59.75		71'		7'-6"

C•A•D

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE SCHEDULE
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 1	PLOT DATE: 23 MAR 93	CADD FILE: 30962H07.DGN	
DRAWN BY: BRAKEL	DATE: APRIL 1992		FILE NO. H-2-30962	
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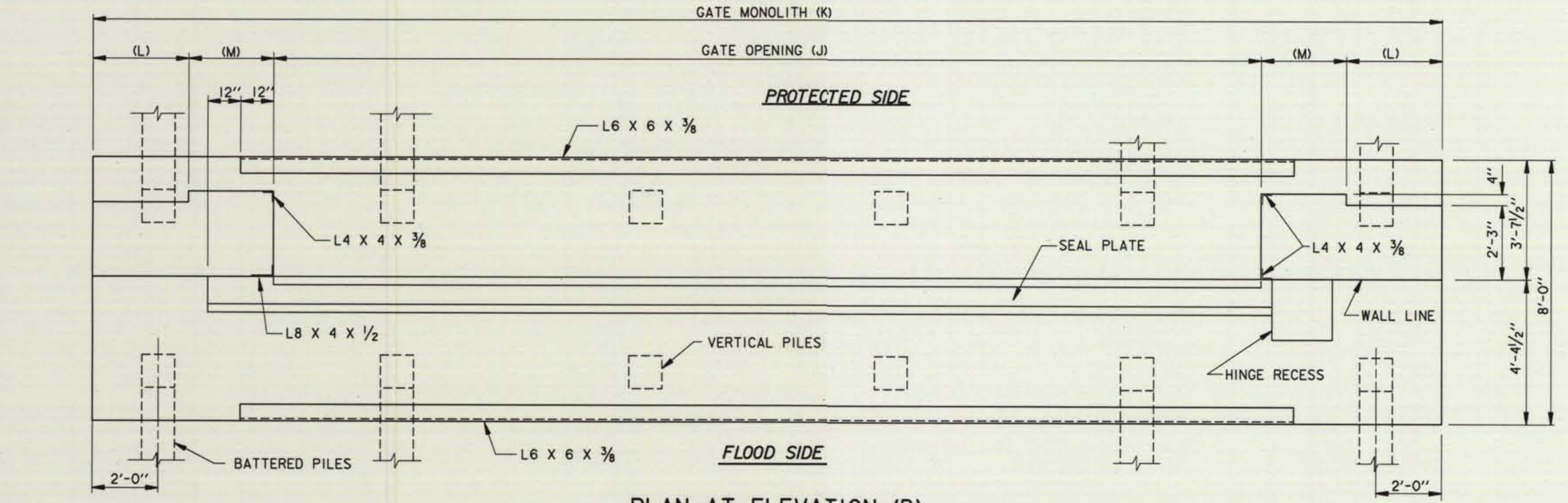
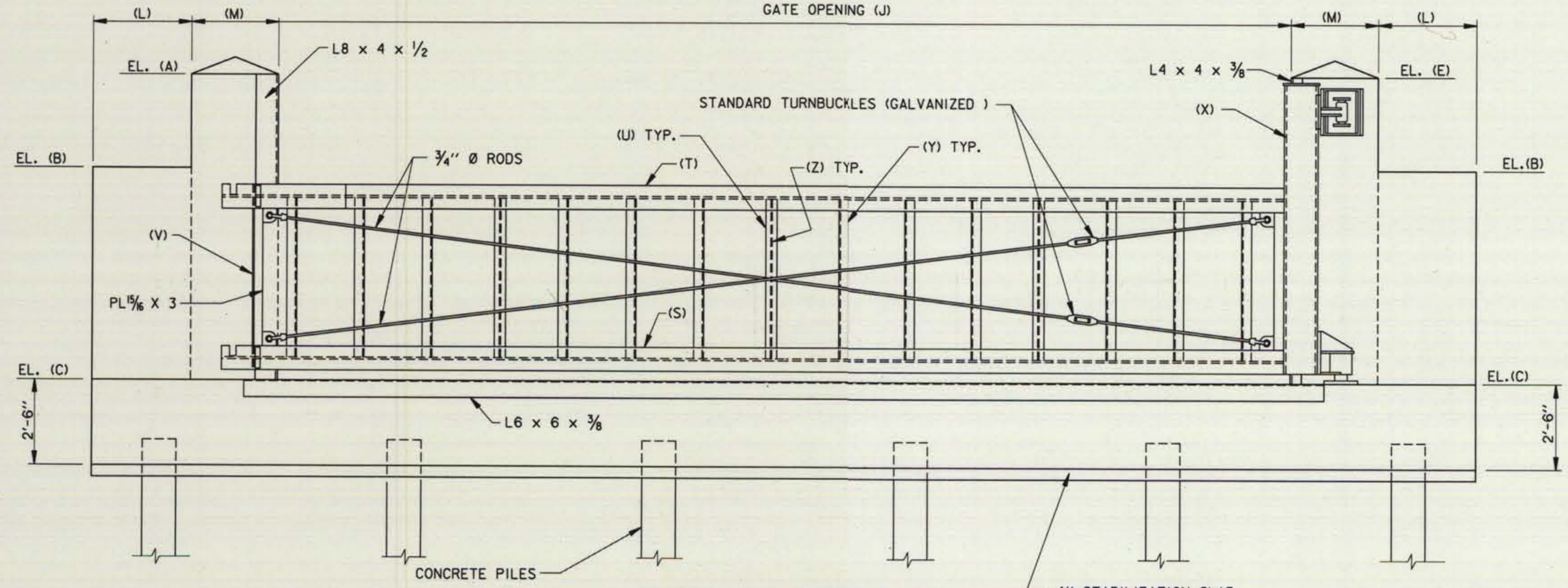


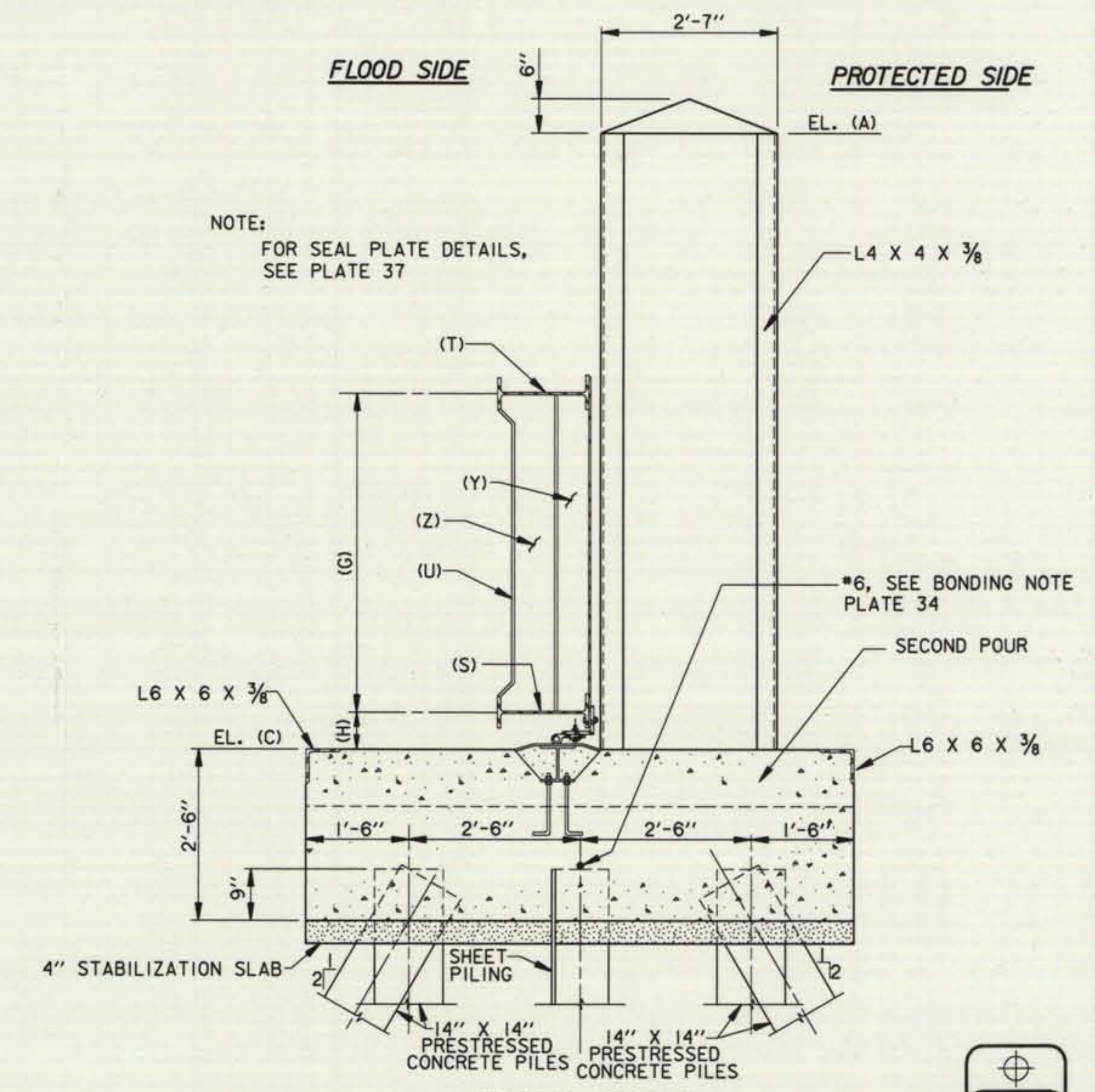
PLAN AT ELEVATION (D)

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



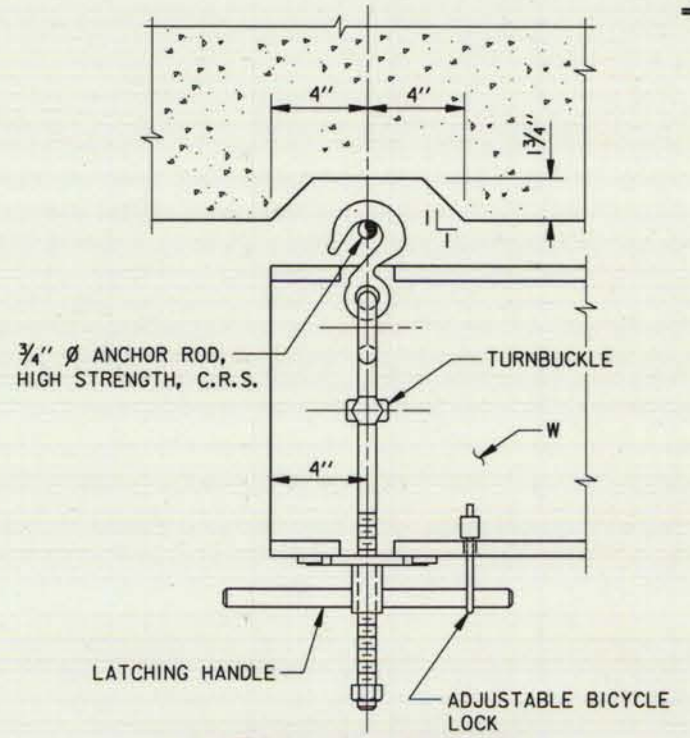
FLOOD SIDE ELEVATION

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



TYPICAL SECTION

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



LATCHING ASSEMBLY

SCALE: 3'' = 1' - 0''

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

12'' 0 2' 4' 6' 8'

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

12'' 0 1' 2' 3' 4' 5'

SCALE: 3'' = 1' - 0''

12'' 0 1'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE DETAILS
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 24	PLOT DATE: 23 MAR 93	CADD FILE: 30962H08.DGN	
DRAWN BY: BRAKEL	DATE: APRIL 1992		FILE NO. H-2-30962	
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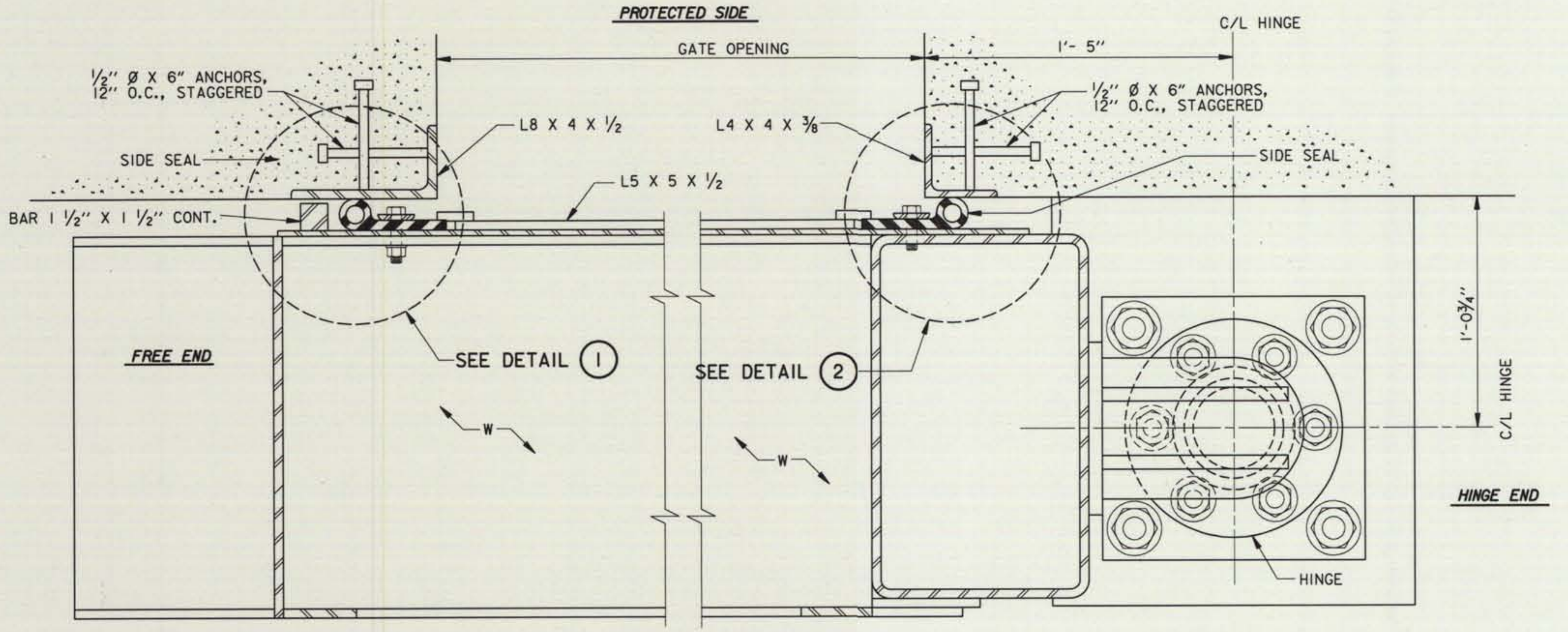
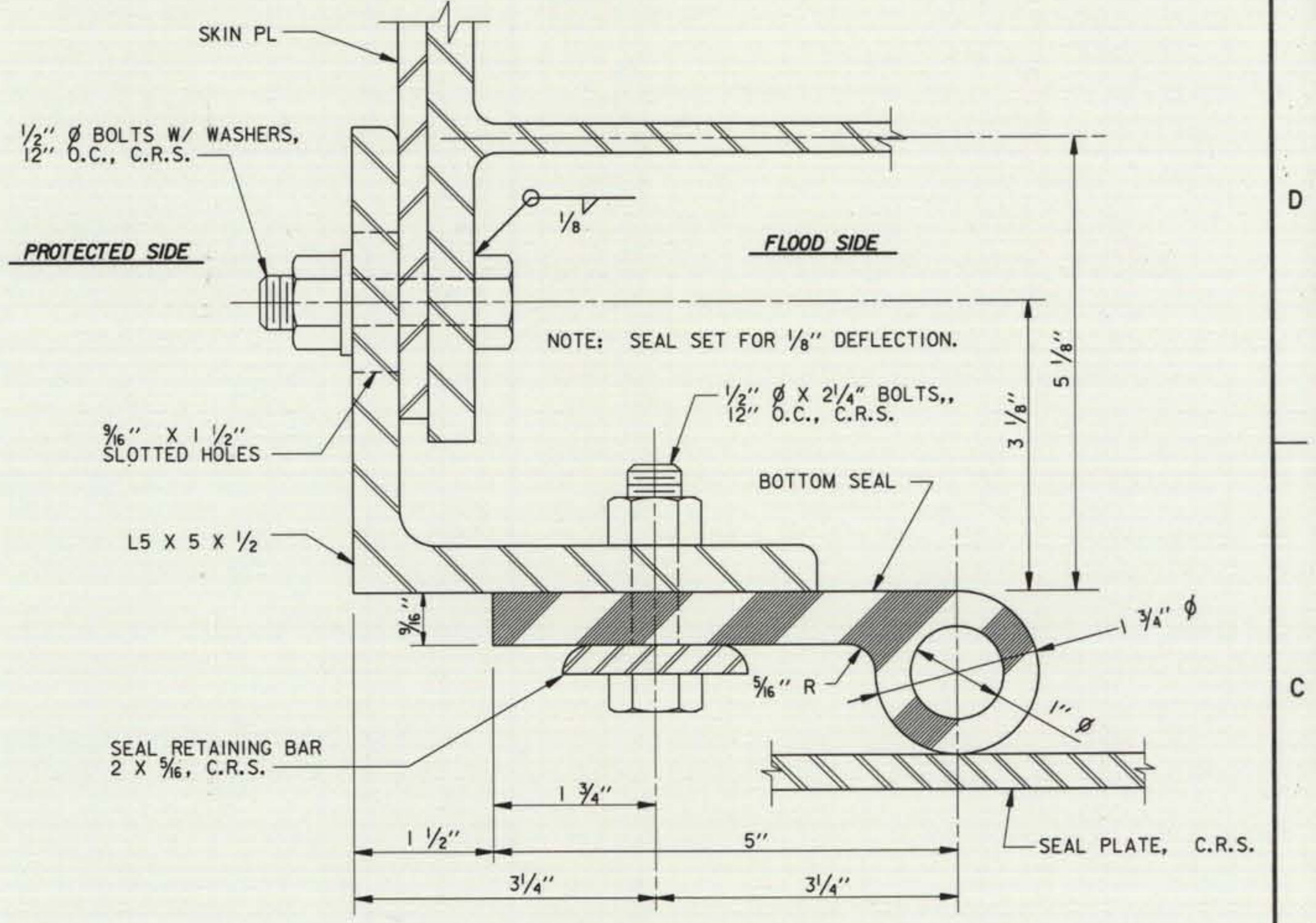


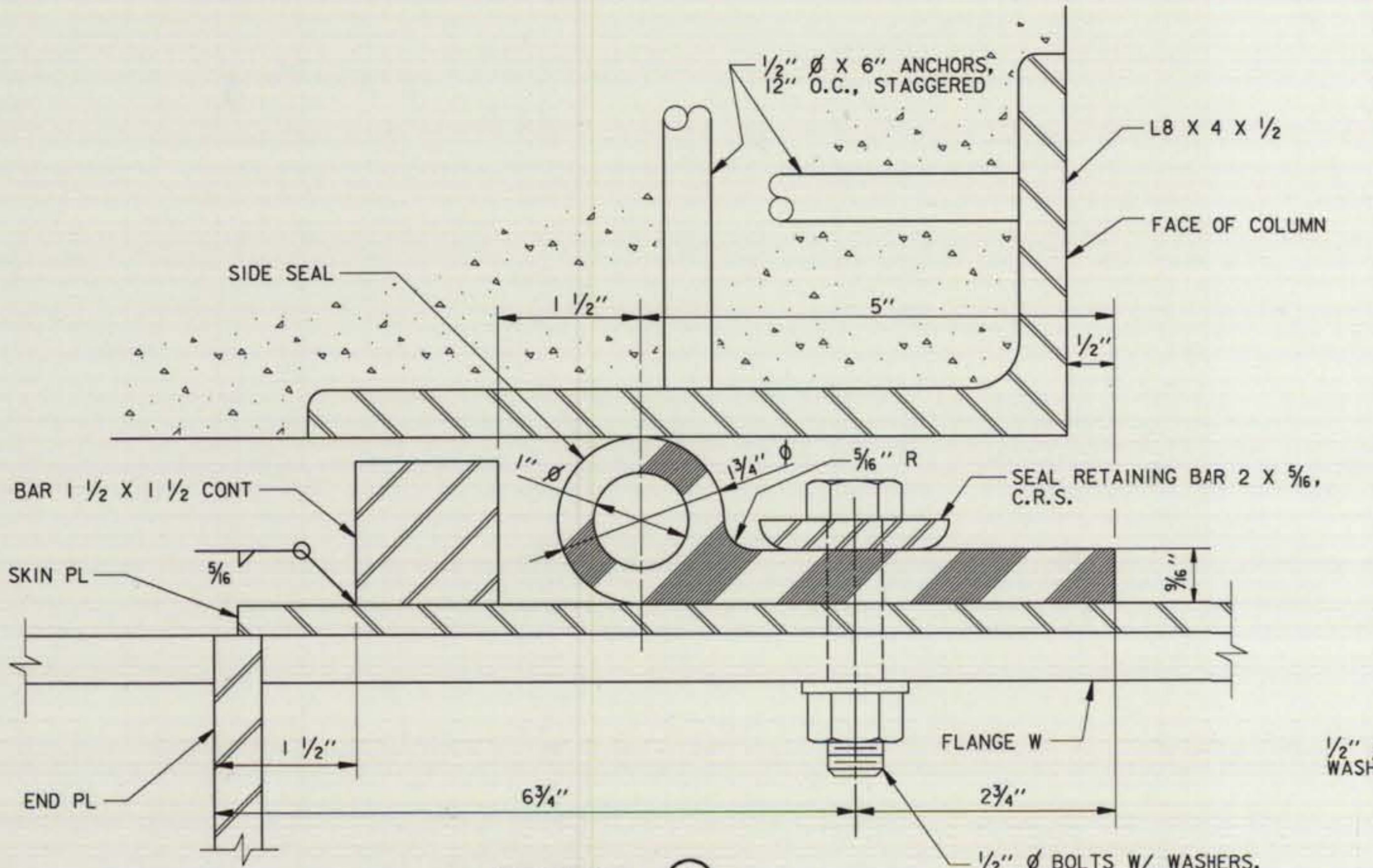
TYPICAL SECTION THRU SWING GATE

SCALE: 3" = 1' - 0"



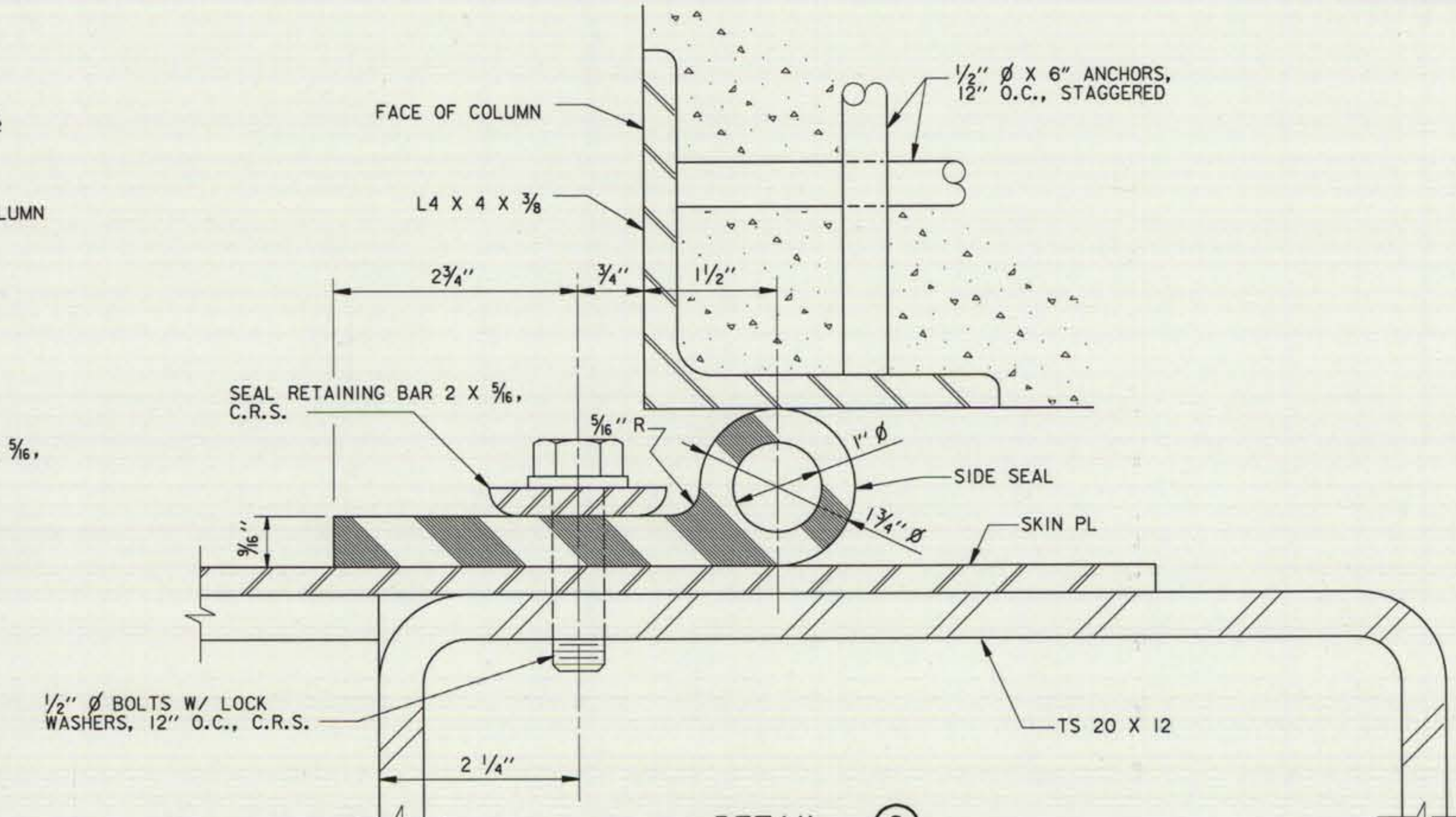
SECTION THRU BOTTOM SEAL

SCALE: 12" = 1' - 0"



DETAIL 1

SCALE: 12" = 1' - 0"



DETAIL 2

SCALE: 12" = 1' - 0"

C•A•D

SCALE: 3" = 1' - 0"
12" 0 1'

SCALE: 12" = 1' - 0"
6" 3" 0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE SEAL DETAILS
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY:	DESAI	PLOT SCALE: 1	PLOT DATE: 23 MAR 93	CADD FILE: 30962B21.DGN
DRAWN BY:	HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
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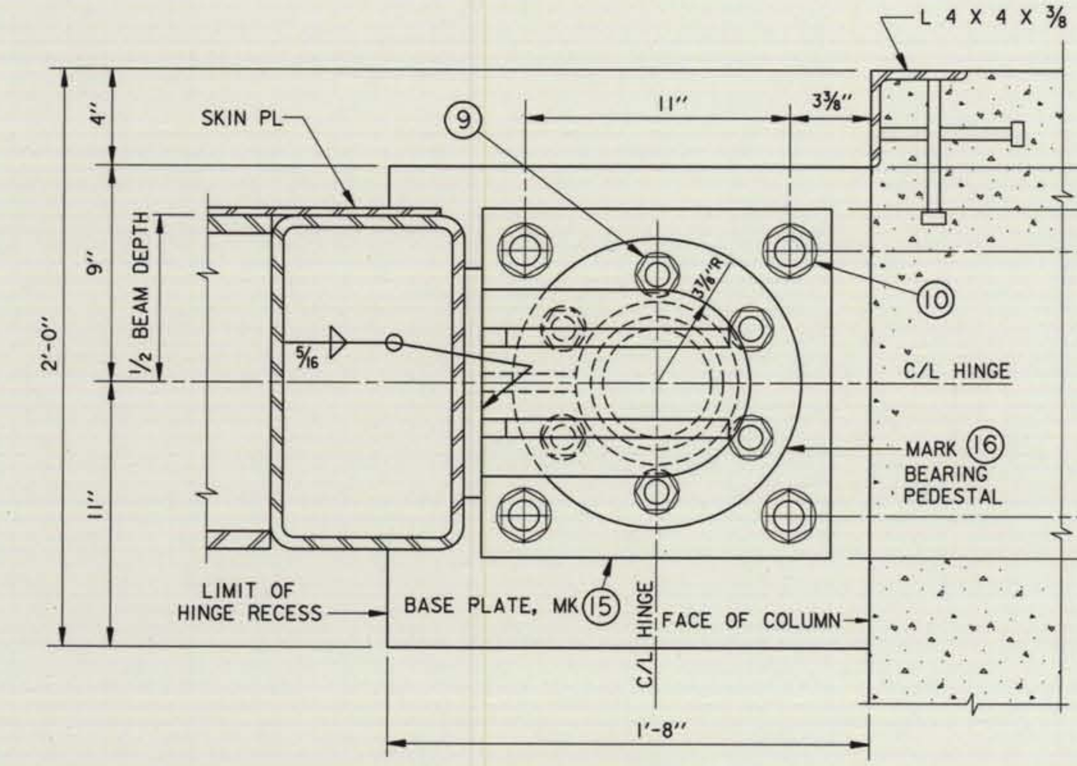
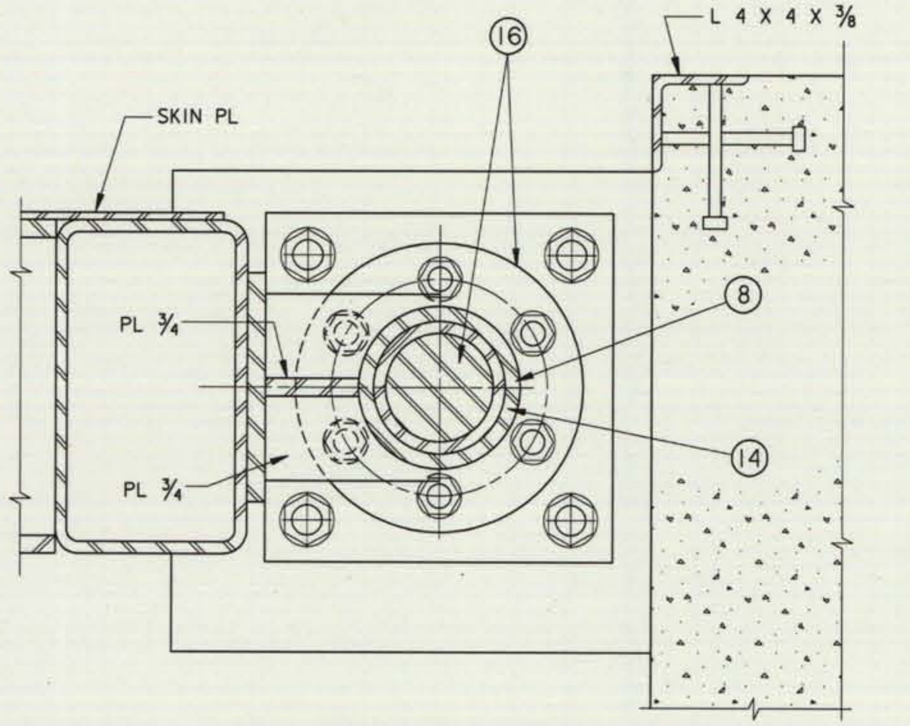


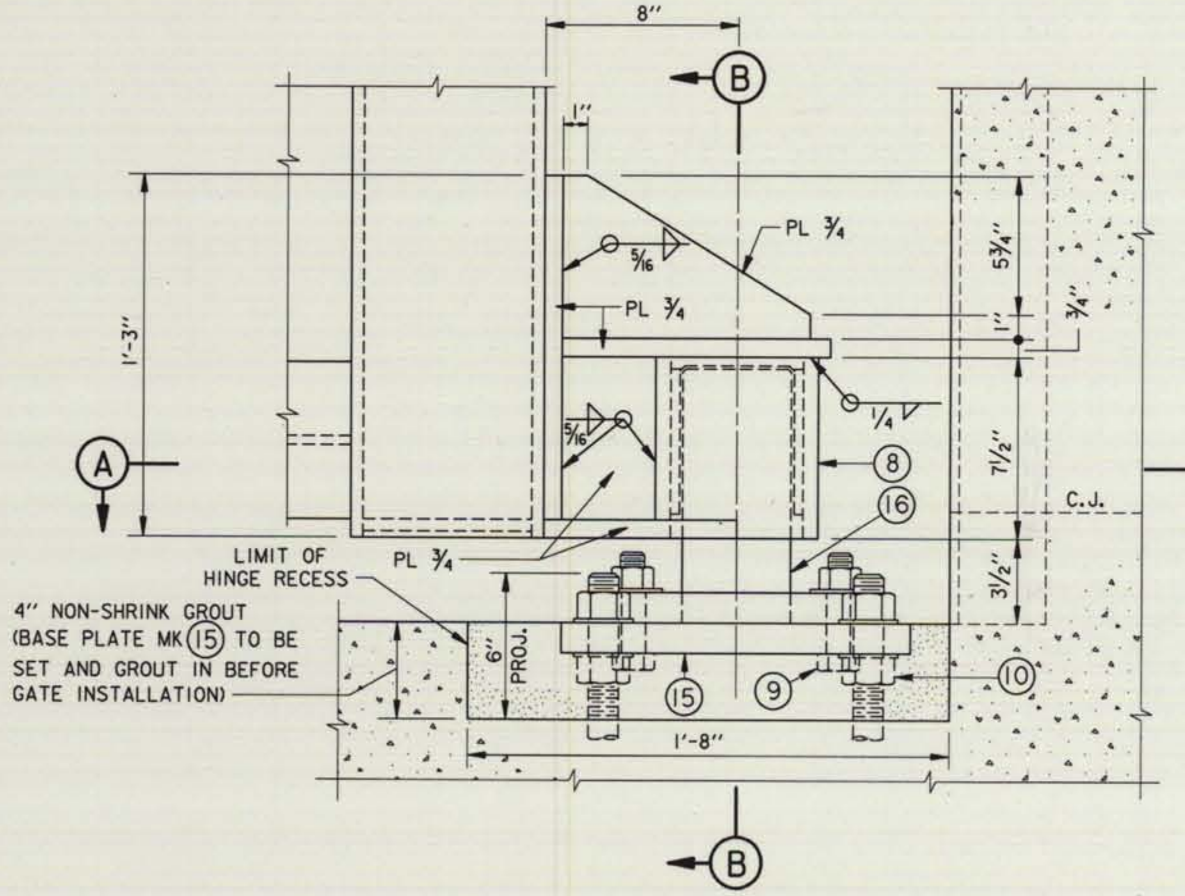
PLAN



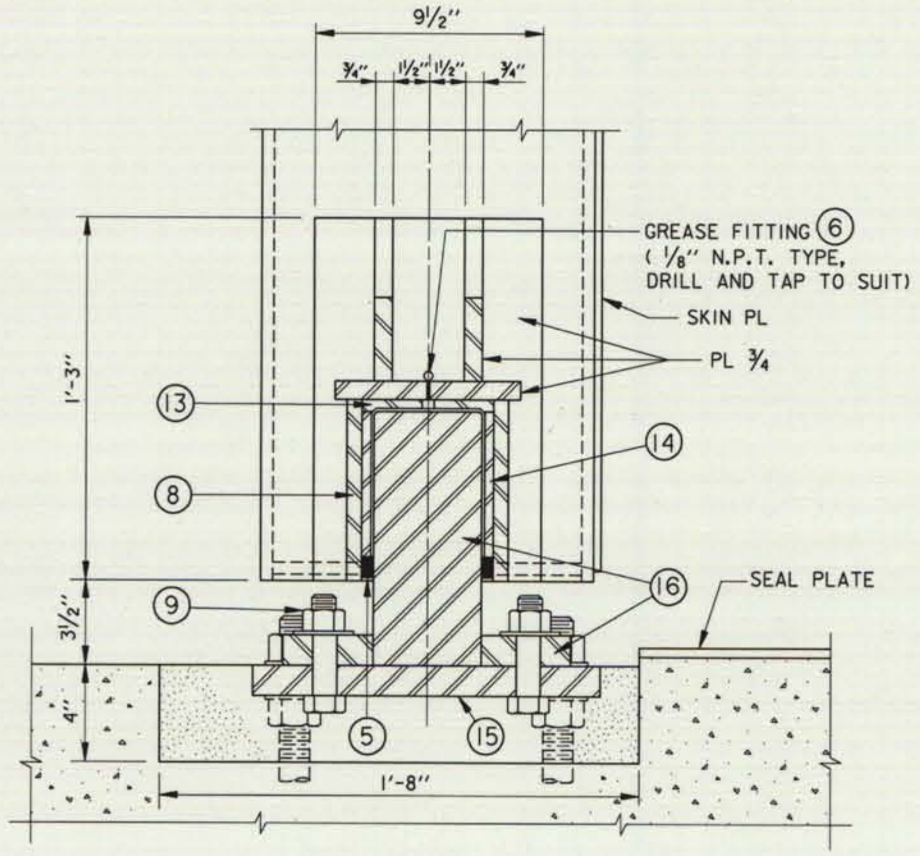
SECTION (A)

MARK NO.	QUANTITY	DESCRIPTION		MATERIAL
PARTS NOT DETAILED				
1	4	SET SCREW - HEX SOCKET, 1" Ø X 2 1/2" LONG, CLASS 3A, FLAT POINT		FED. SPEC. FF-S-200A(2) C.R.S., ALLOY 304
2	4	1" Ø HEX BOLT WITH NUT AND FLAT WASHER 1 1/16" I.D. X 2 1/2" O.D. X 5/32" THK.		ASTM F593, GROUP 2, ALLOY 316, CONDITION CW
3	1	NUT, HEAVY HEX 1 1/2"-6 UNC-2B, W/ FLAT WASHER 1 5/8" I.D. X 3 1/2" O.D. X 3/16" THK.		ASTM F594, GROUP 2, ALLOY 316, CONDITION CW
4	2	GREASE SEAL, GARLOCK KLOZURE NO. 63 - 2176 OR EQUAL		COMMERCIAL GRADE
5	1	GREASE SEAL, GARLOCK KLOZURE NO. 53 - 2753 OR EQUAL		COMMERCIAL GRADE
6	2	GREASE FITTING, 1/8" N.P.T. TYPE		COMMERCIAL GRADE
7	1	MECHANICAL TUBING, 5 1/4" O.D. X 4" I.D. X 7" LONG MACHINED FOR CLASS 6 FIT BETWEEN I.D. OF TUBING AND O.D. OF MK-11 BUSHING		A-513, TYPE 6
8	1	MECHANICAL TUBING, 6 3/4" O.D. X 5 1/2" I.D. X 7 1/2" LONG MACHINED FOR CLASS 6 FIT BETWEEN I.D. OF TUBING AND O.D. OF MK-14 BUSHING		A-513, TYPE 6
9	6	1" Ø X 4" LONG HEX BOLT WITH NUT AND FLAT WASHER 1 1/16" I.D. X 2 1/2" O.D. X 5/32" THK.		SAME AS MARK NO. 2
10	4	1 1/4" Ø X 2'-0" LONG HEX BOLT WITH DBL. NUT AND FLAT WASHERS		SAME AS MARK NO. 2
11	1	BUSHING, 4" O.D. X 3" I.D. X 6" LONG		B-22, NO.937
12	1	UPPER HINGE SHAFT, 2.99" O.D. X 11 1/2" LONG		A-276, TYPE 431
13	1	THRUST WASHER, 5 7/16" Ø WITH 1/2" HOLE		B-22, NO.937
14	1	BUSHING, 5 1/2" O.D. X 4 1/2" I.D. X 6" LONG		B-22, NO.937
15	1	BASE PLATE 1 1/4" X 14 1/2 X 1'-2 1/2"		STEEL A-36
16	1	BEARING PEDESTAL	PLATE 1 1/4 X 12" Ø	A-276, TYPE 304
			SHAFT 4 1/2" Ø X 10 1/2" LONG	A 276, TYPE 431
17	AS REQ'D	SHIM PLATE 1/8 X 5 X 0'-12"		STEEL A-36
18	4	1" Ø X 12" LONG HEX BOLT WITH NUT & WASHER		SAME AS MARK NO. 2
19	2	PLATE 3/8 X 3 X 0'-9"		STEEL A-36
20	4	PLATE 3/8 X 4 X 0'-4"		STEEL A-36

NOTE: QUANTITIES SHOWN ARE FOR ONE COMPLETE SWING GATE.



ELEVATION



SECTION (B)

LOWER HINGE

SCALE: 3" = 1'-0"

NOTES:

(10) DENOTES MARK NUMBERS.

WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.

SCALE: 3" = 1' - 0"

12" 0 1'

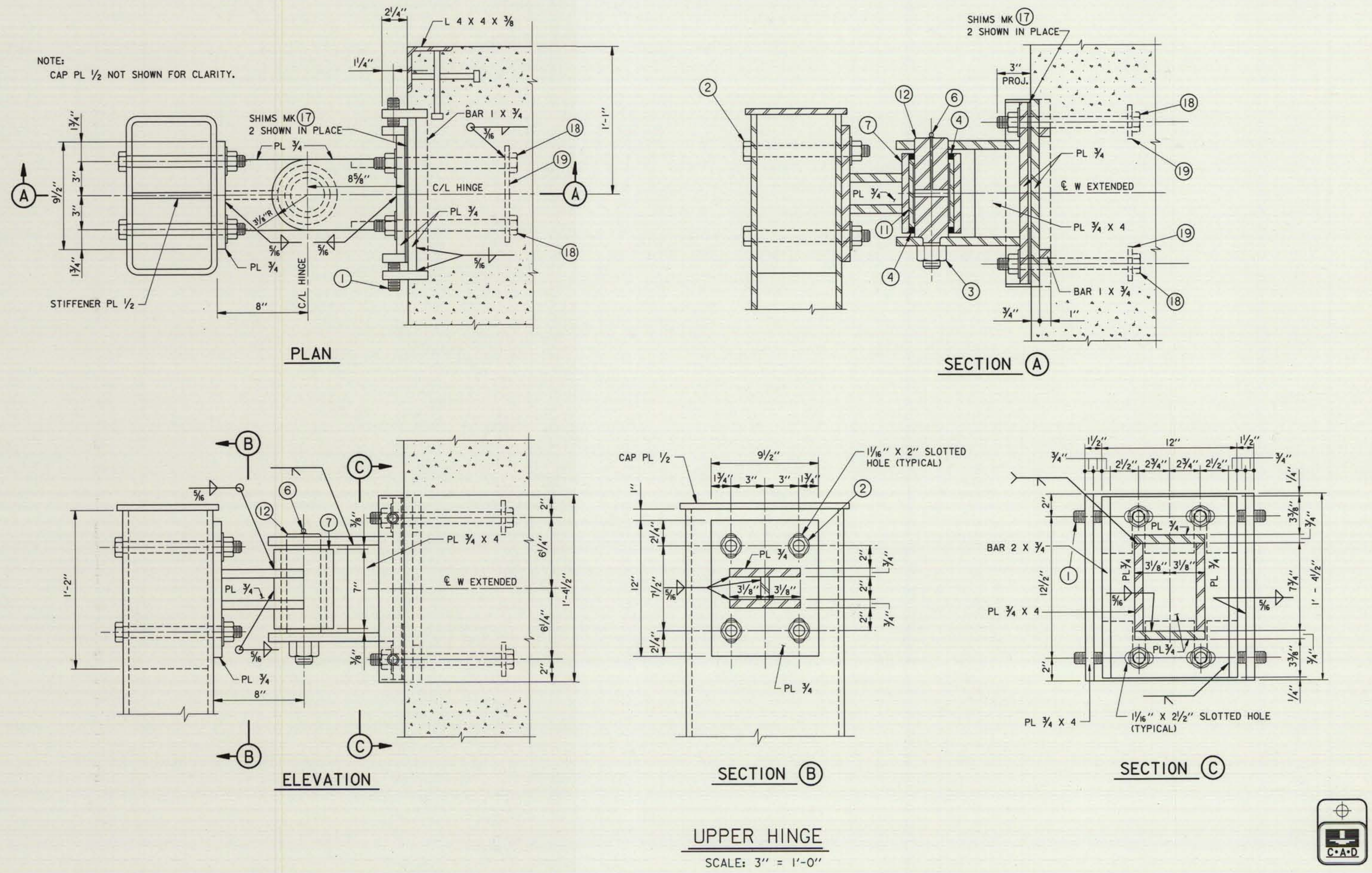
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE LOWER HINGE
VICINITY PONTCHARTRAIN BEACH

C•A•D

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

DESIGNED BY: DESAI	PLOT SCALE: 4	PLOT DATE: 23 MAR 93	CADD FILE: 30962B22.DGN	
DRAWN BY: HOWAT			FILE NO.	
CHECKED BY: GRUBB	DATE: APRIL 1992		H-2-30962	



NOTES:

(10) DENOTES MARK NUMBERS, SEE PLATE 38

WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.

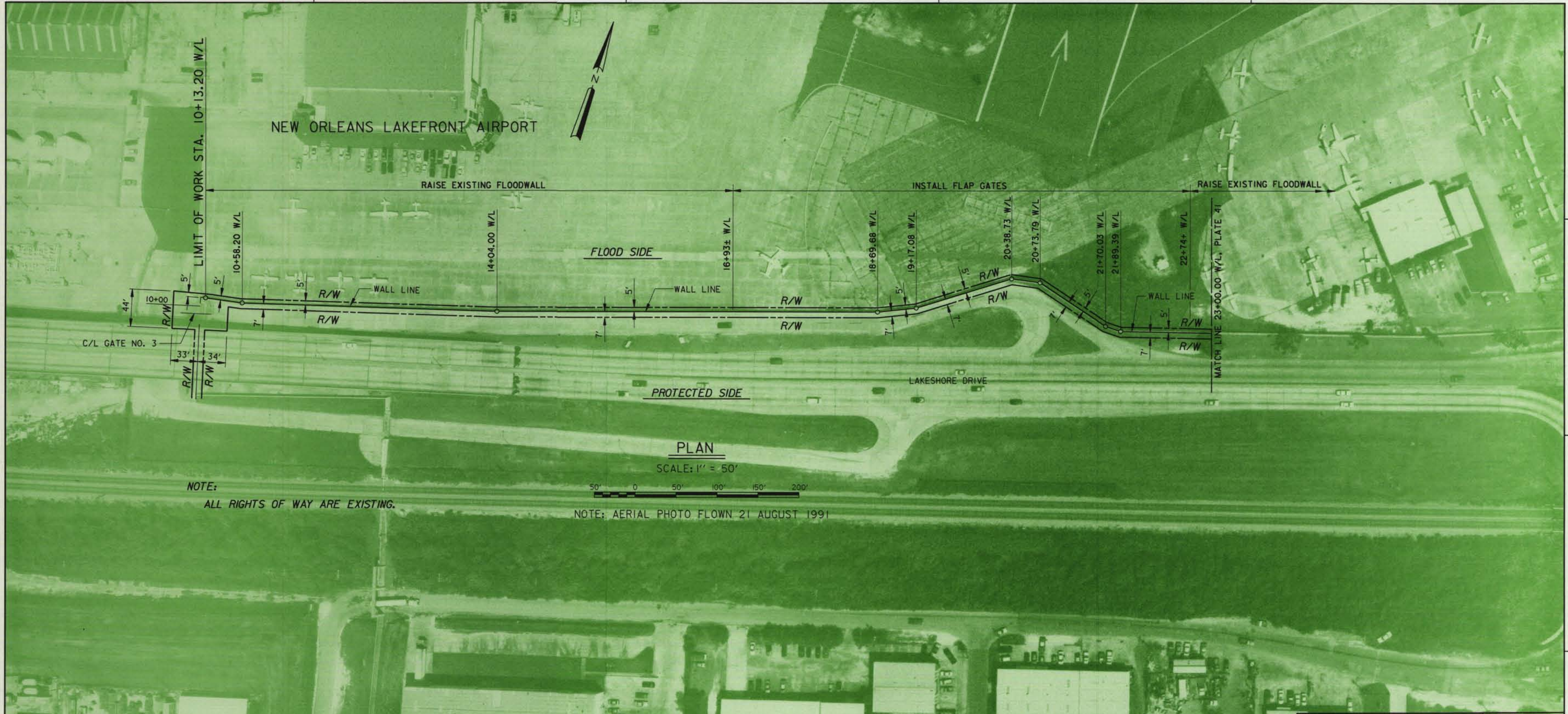
SCALE: 3" = 1' - 0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SWING GATE UPPER HINGE
VICINITY PONTCHARTRAIN BEACH

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

DESIGNED BY:	DESAI	PLOT SCALE: 4	PLOT DATE: 23 MAR 93	CADD FILE: 30962B23.DGN
DRAWN BY:	HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY:	GRUBB			

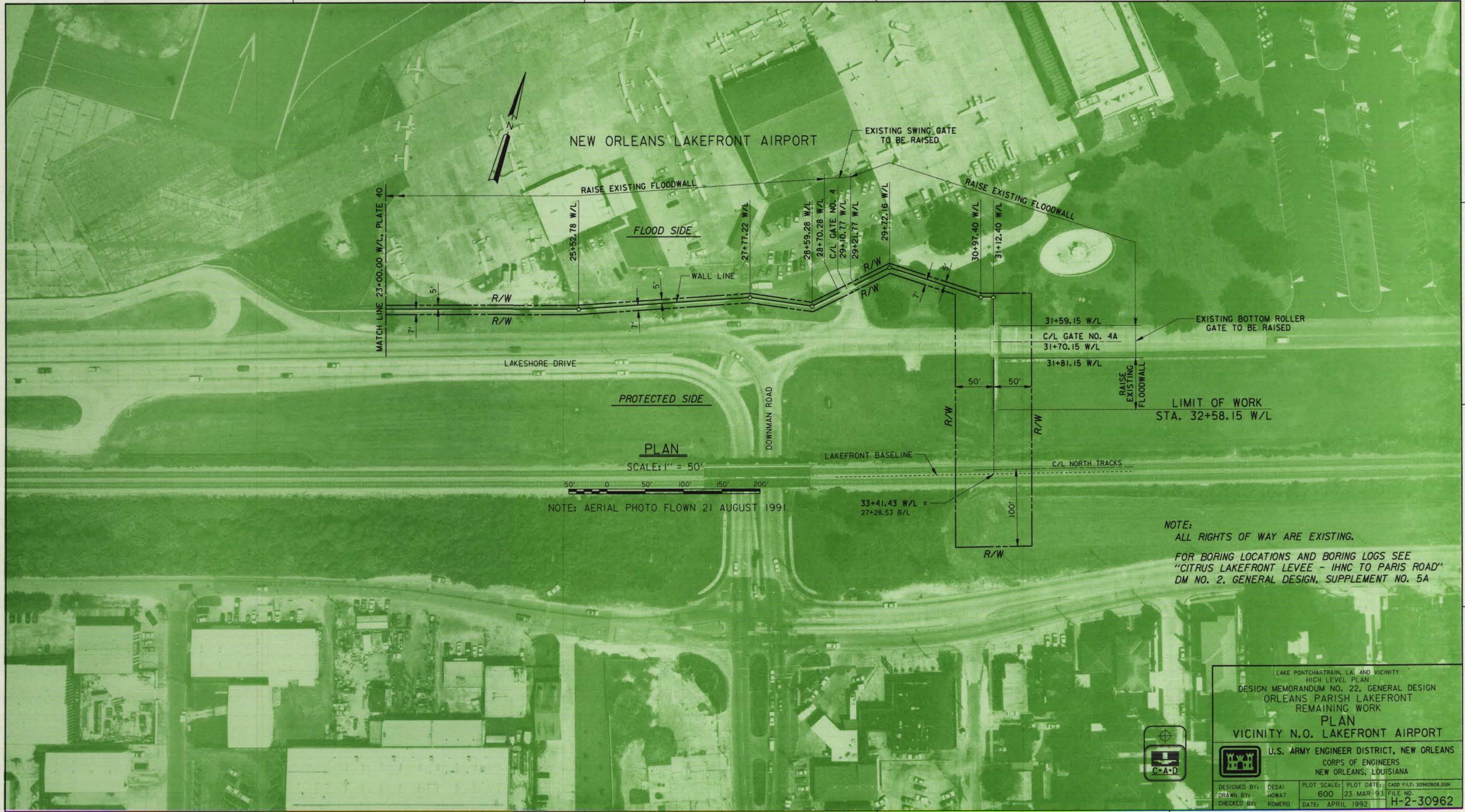


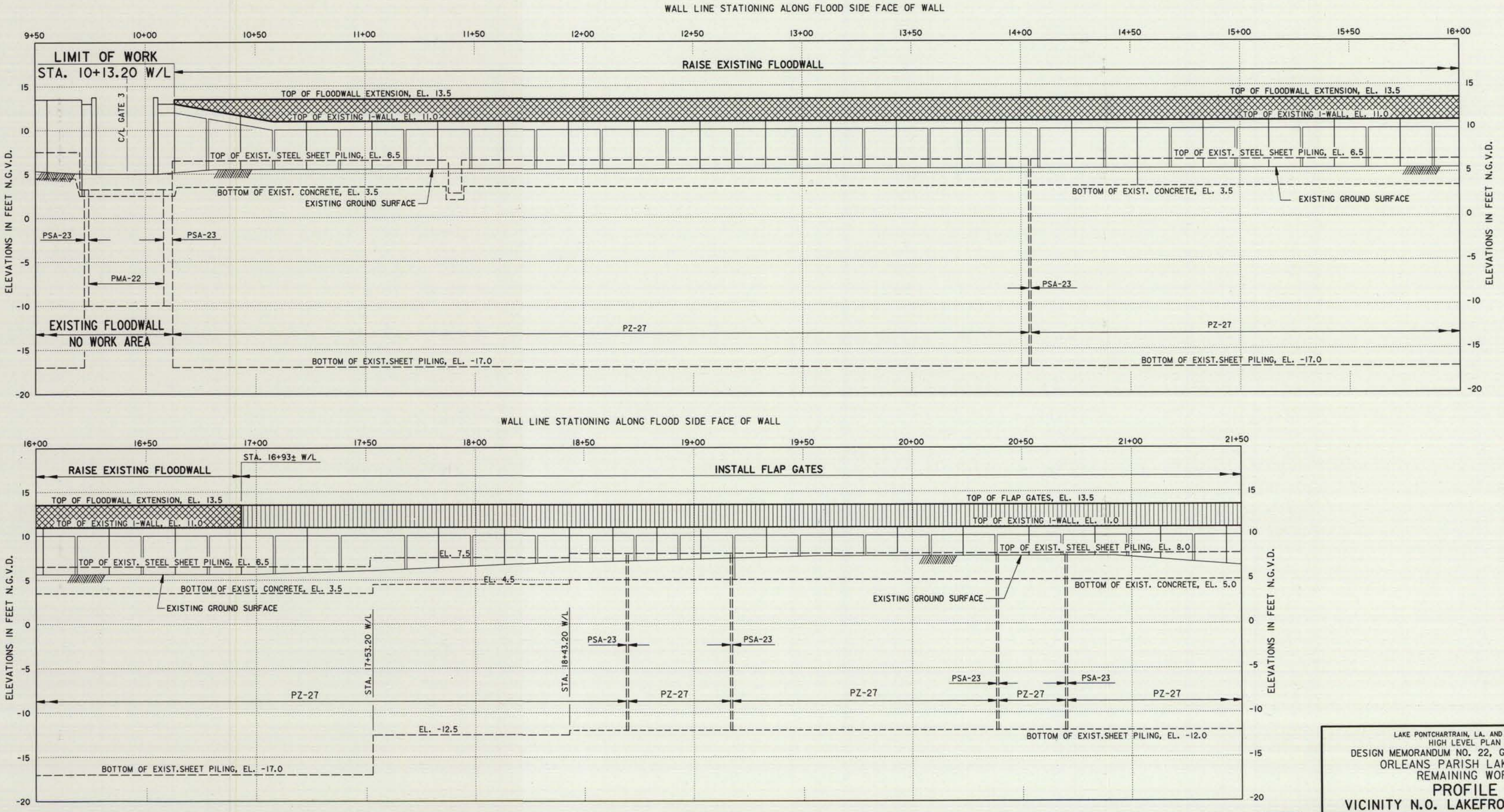
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PLAN
VICINITY N.O. LAKEFRONT AIRPORT

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

DESIGNED BY: DESAI DRAWN BY: HOWAT CHECKED BY: ROMERO	PLOT SCALE: 600	PLOT DATE: 23 MAR 93	CADD FILE: 30962807.DGN
	DATE: APRIL 1992		FILE NO. H-2-30962


NEW ORLEANS LAKEFRONT AIRPORT
N
EXISTING SWING GATE TO BE RAISED
RAISE EXISTING FLOODWALL
RAISE EXISTING FLOODWALL
MATCH LINE 23+00.00 W/L, PLATE 40
25+52.78 W/L
27+77.22 W/L
28+59.28 W/L
28+70.28 W/L
C/L GATE NO. 4
29+10.77 W/L
29+21.77 W/L
29+72.16 W/L
30+97.40 W/L
31+12.40 W/L
FLOOD SIDE
WALL LINE
R/W
5'
7'
31+59.15 W/L
C/L GATE NO. 4A
31+70.15 W/L
31+81.15 W/L
EXISTING BOTTOM ROLLER GATE TO BE RAISED
RAISE EXISTING FLOODWALL
50'
50'
LIMIT OF WORK
STA. 32+58.15 W/L
LAKESHORE DRIVE
PROTECTED SIDE
DOWNMAN ROAD
PLAN
SCALE: 1" = 50'
50' 0 50' 100' 150' 200'
NOTE: AERIAL PHOTO FLOWN 21 AUGUST 1991
LAKEFRONT BASELINE
C/L NORTH TRACKS
33+41.43 W/L =
27+28.53 B/L
100'
NOTE:
ALL RIGHTS OF WAY ARE EXISTING.
FOR BORING LOCATIONS AND BORING LOGS SEE "CITRUS LAKEFRONT LEVEE - IHNC TO PARIS ROAD" DM NO. 2, GENERAL DESIGN, SUPPLEMENT NO. 5A
C·A·D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PLAN
VICINITY N.O. LAKEFRONT AIRPORT
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: DESAI
DRAWN BY: HOWAT
CHECKED BY: ROMERO
PLOT SCALE: 600
PLOT DATE: 23 MAR 93
DATE: APRIL 1992
CADD FILE: 30962B08.DGN
FILE NO. H-2-30962



PROFILE

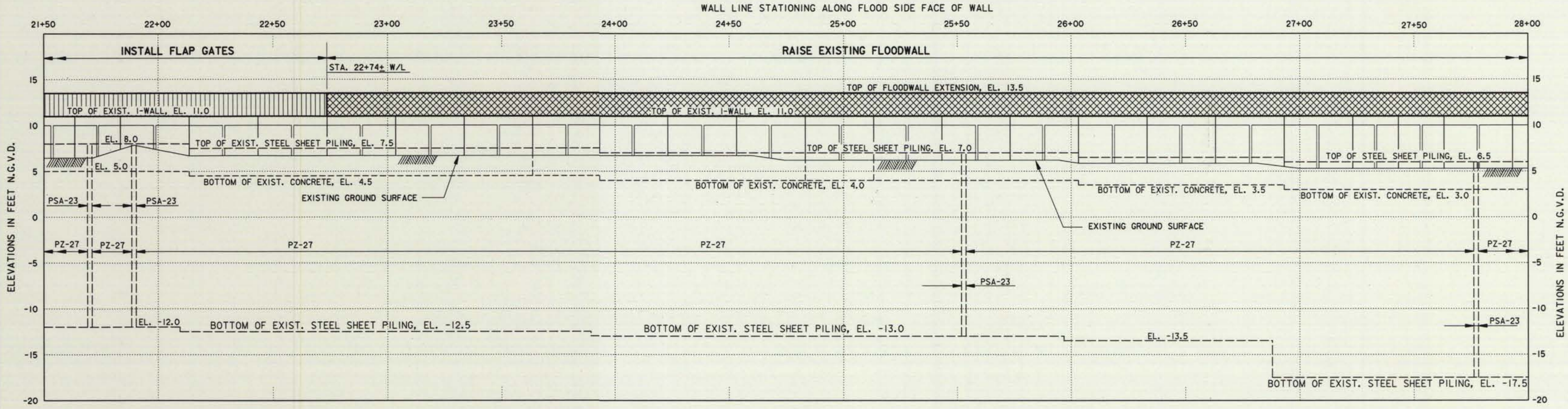
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

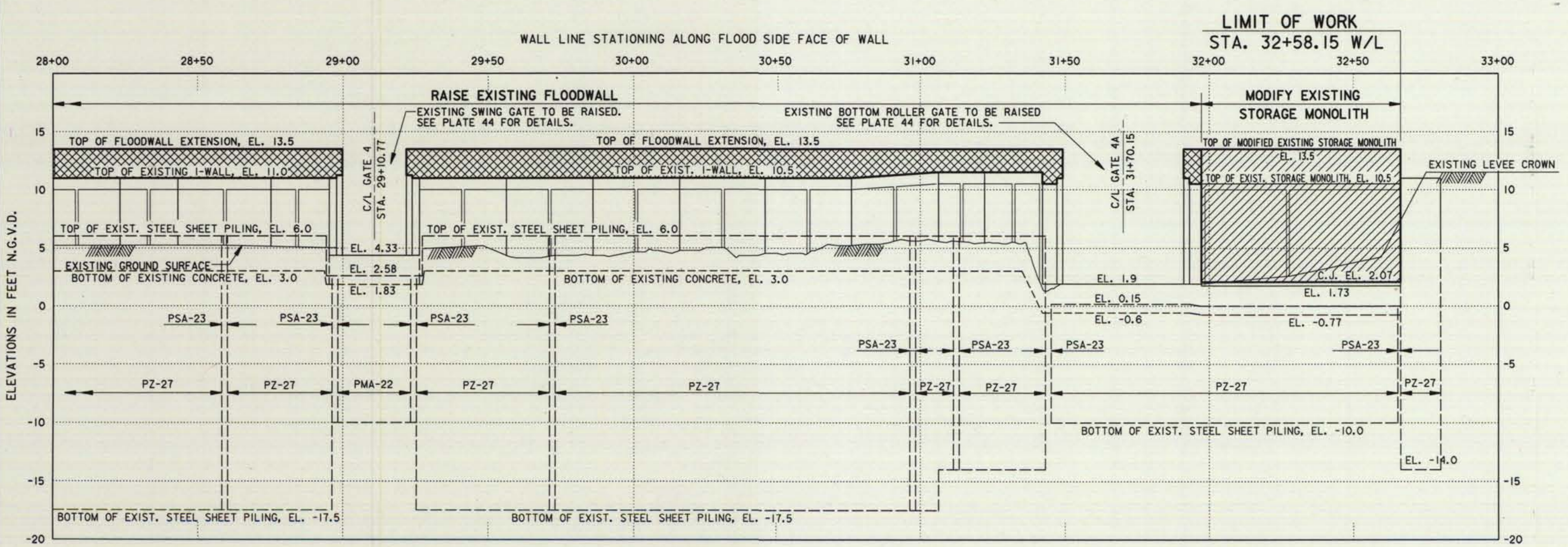
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY N.O. LAKEFRONT AIRPORT

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

DESIGNED BY:	DESAI	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962H03.DGN
DRAWN BY:	BRAKEL			FILE NO. H-2-30962
CHECKED BY:	ROMERO	DATE: APRIL 1992		





PROFILE

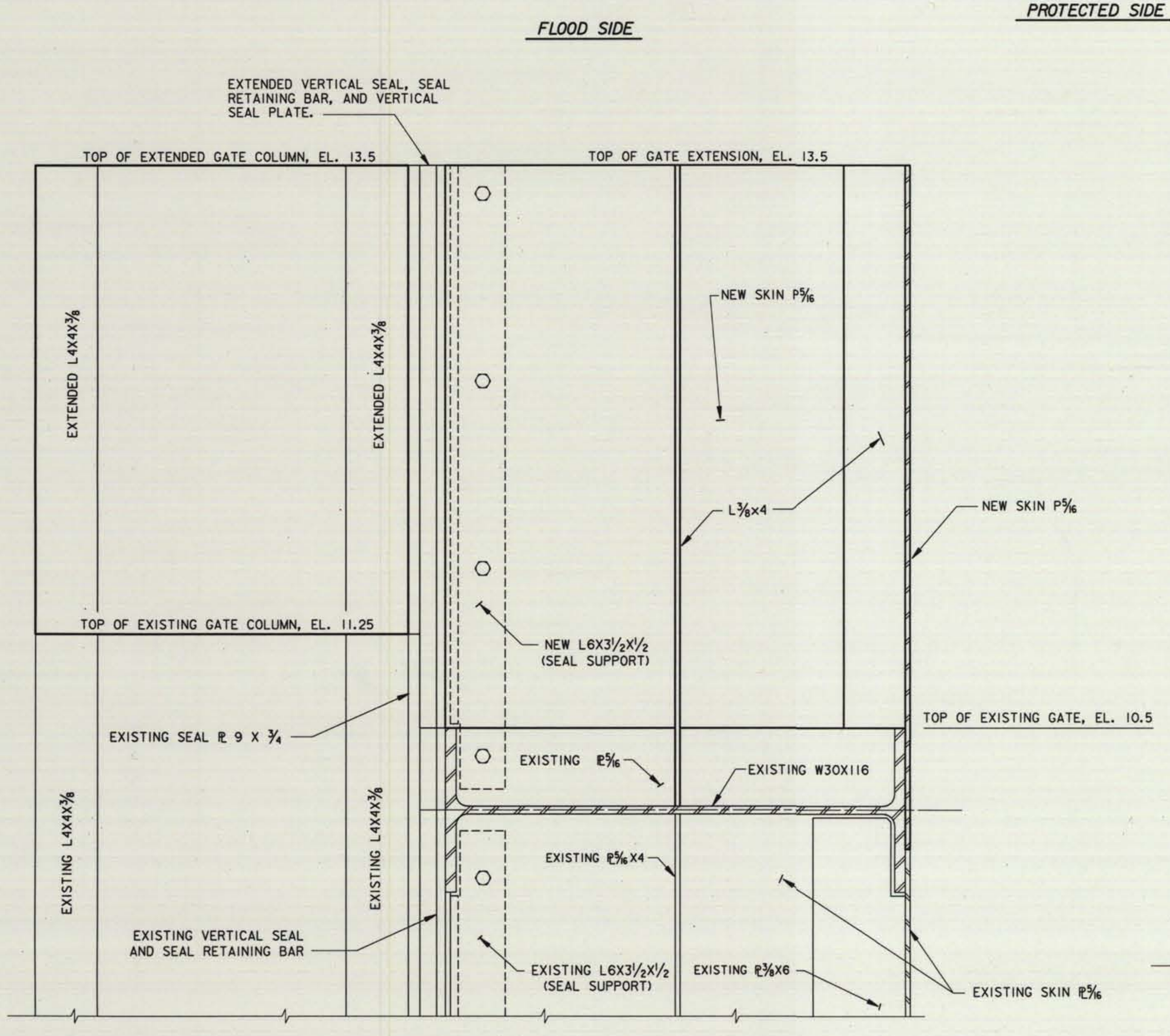
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY N.O. LAKEFRONT AIRPORT

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

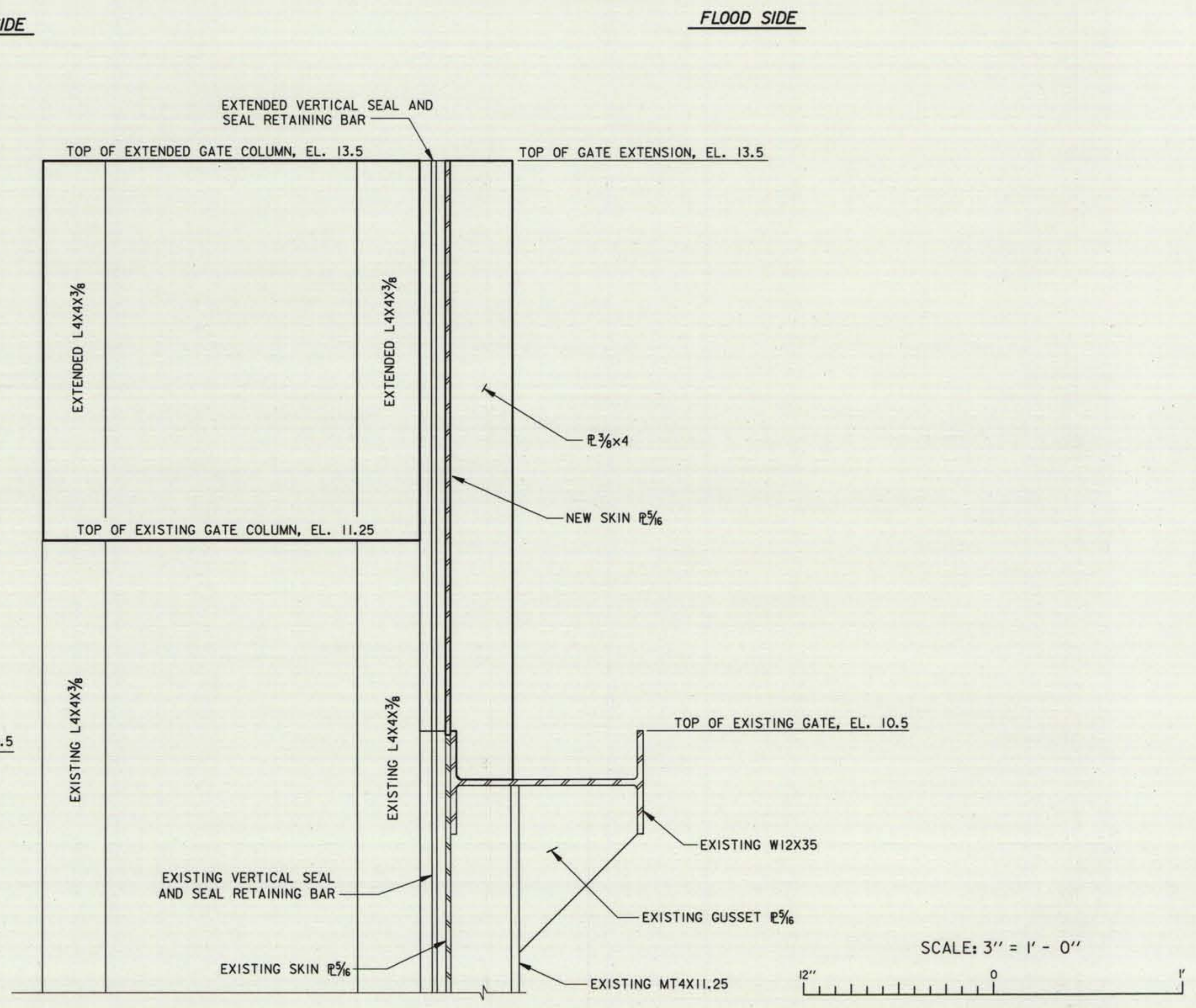
DESIGNED BY:	DESAI	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962H04.DGN
DRAWN BY:	BRAKEL			FILE NO. H-2-30962
CHECKED BY:	ROMERO	DATE: APRIL 1992		



BOTTOM ROLLER GATE EXTENSION

VICINITY STA. 30+70 W/L

SCALE: 3" = 1' - 0"



SWING GATE EXTENSION

VICINITY STA. 29+10 W/L

SCALE: 3" = 1' - 0"

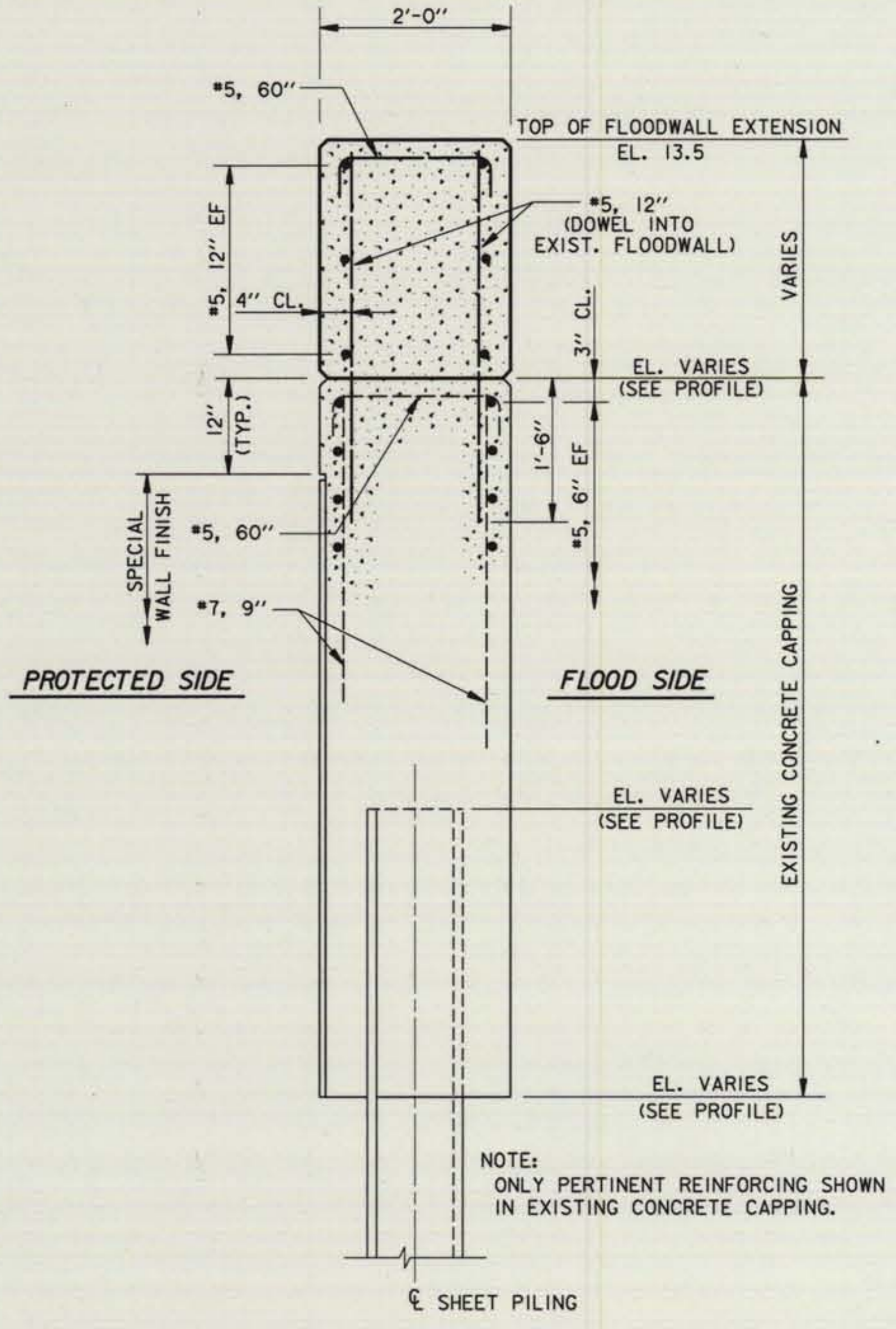
C•A•D

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

GATE EXTENSIONS
VICINITY N.O. LAKEFRONT AIRPORT

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

DESIGNED BY:	M.DESAI	PLOT SCALE: 4	PLOT DATE: 23 MAR 93	CADD FILE: 30962A04.DGN
DRAWN BY:	B.DORCEY			FILE NO. H-2-30962
CHECKED BY:	R.GRUBB	DATE: APRIL 1992		



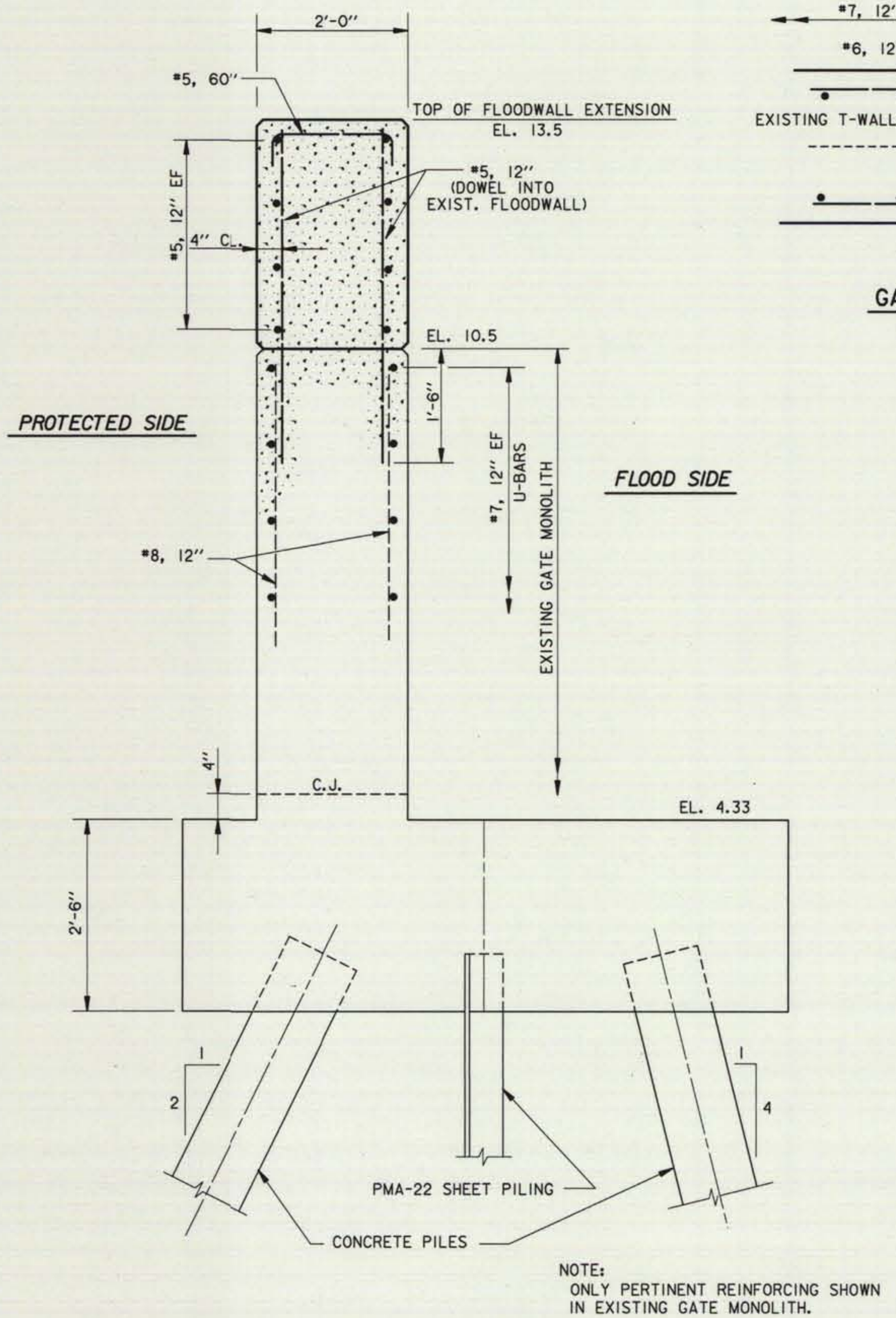
STA. 10+13.20 W/L TO STA. 17+00.0 W/L

STA. 22+60.0 W/L TO STA. 28+95.27 W/L

STA. 29+26.27 W/L TO STA. 31+42.15 W/L

TYPICAL I-WALL SECTION

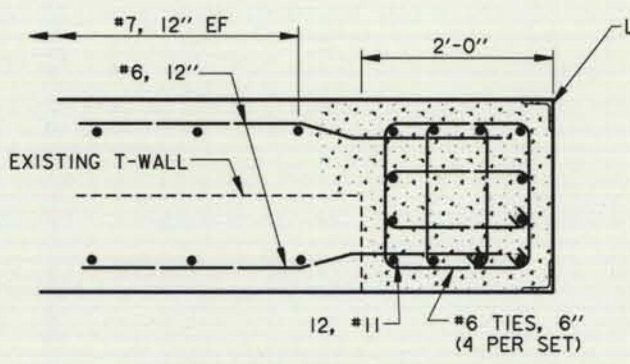
SCALE: 1" = 1'- 0"



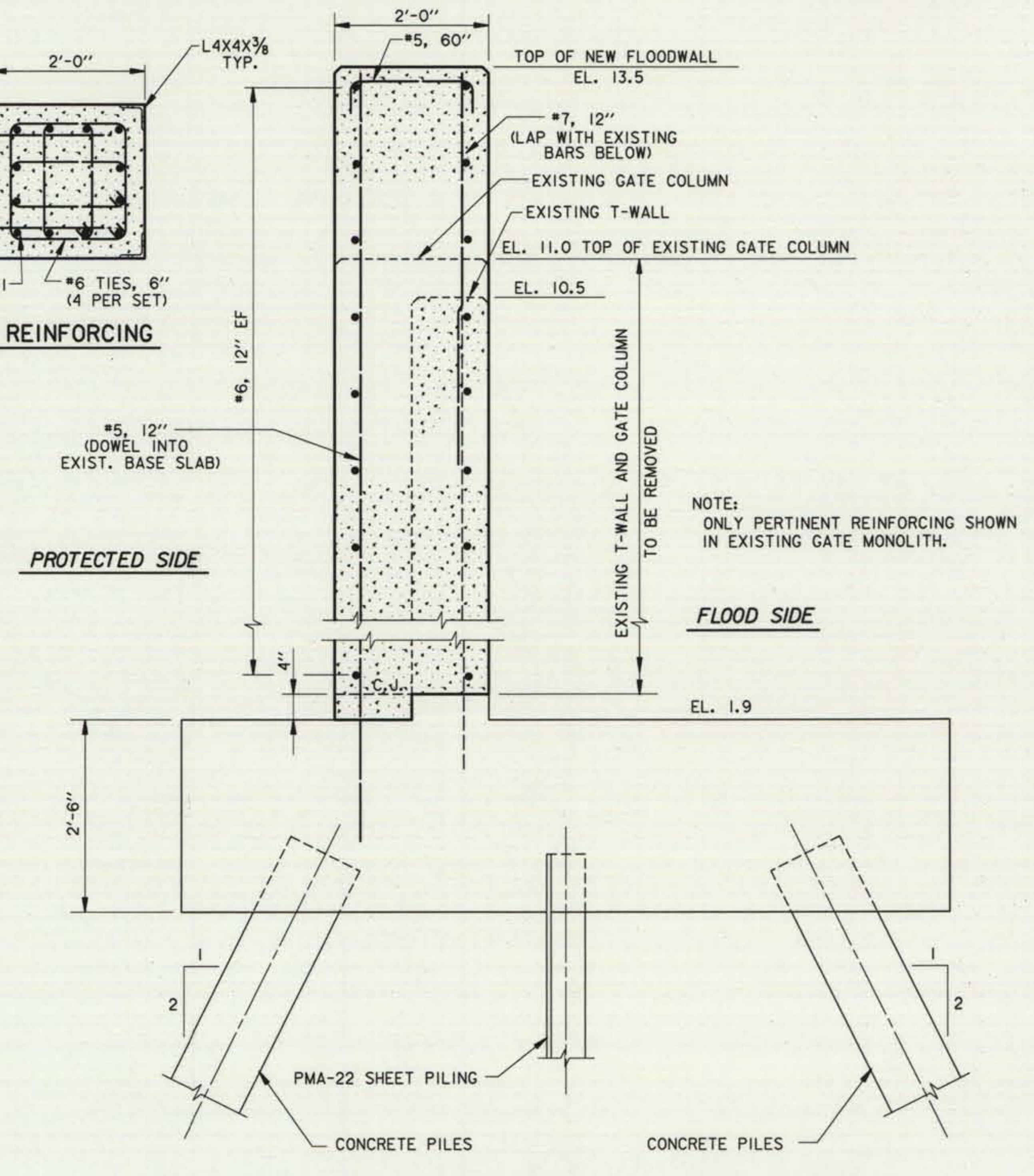
STA. 28+95.27 W/L TO STA. 29+26.27 W/L (NOT CONTINUOUS)

GATE MONOLITH-GATE NO. 4

SCALE: 1" = 1'- 0"



GATE COLUMN REINFORCING



STA. 31+42.15 W/L TO STA. 31+98.15 W/L (NOT CONTINUOUS)

GATE MONOLITH-GATE NO. 4A

SCALE: 1" = 1'- 0"

SCALE: 1" = 1'- 0"

12" 0 1' 2' 3' 4' 5'

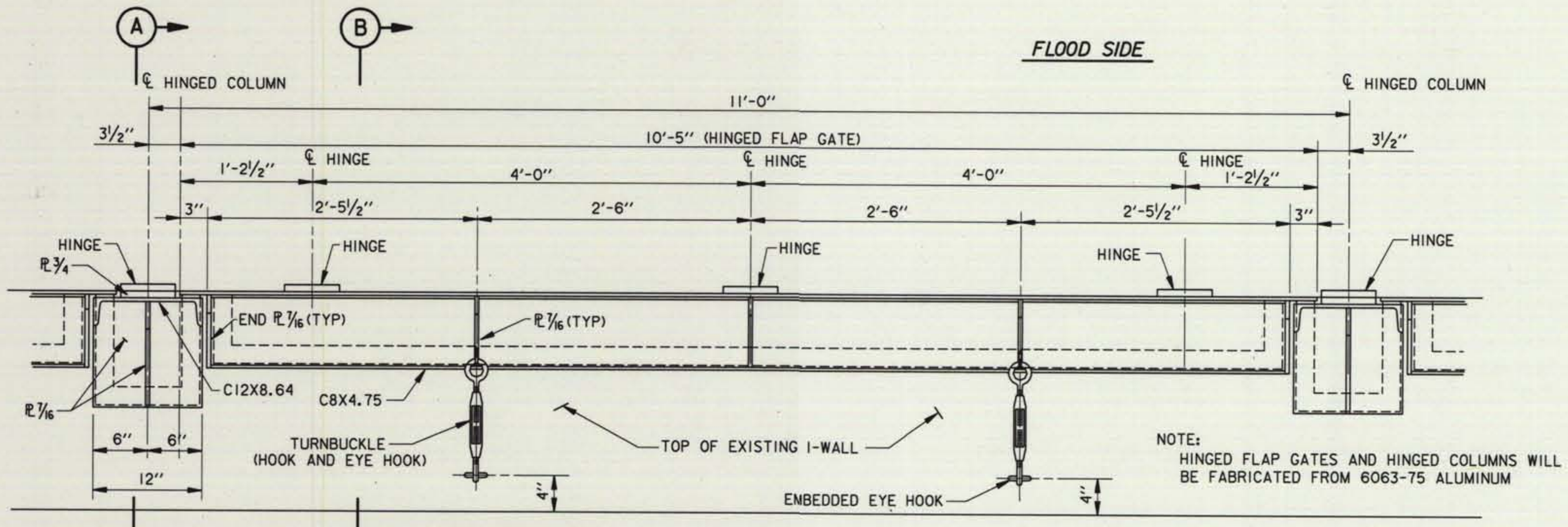
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

MODIFIED FLOODWALL SECTIONS
VICINITY N.O. LAKEFRONT AIRPORT

C·A·D

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

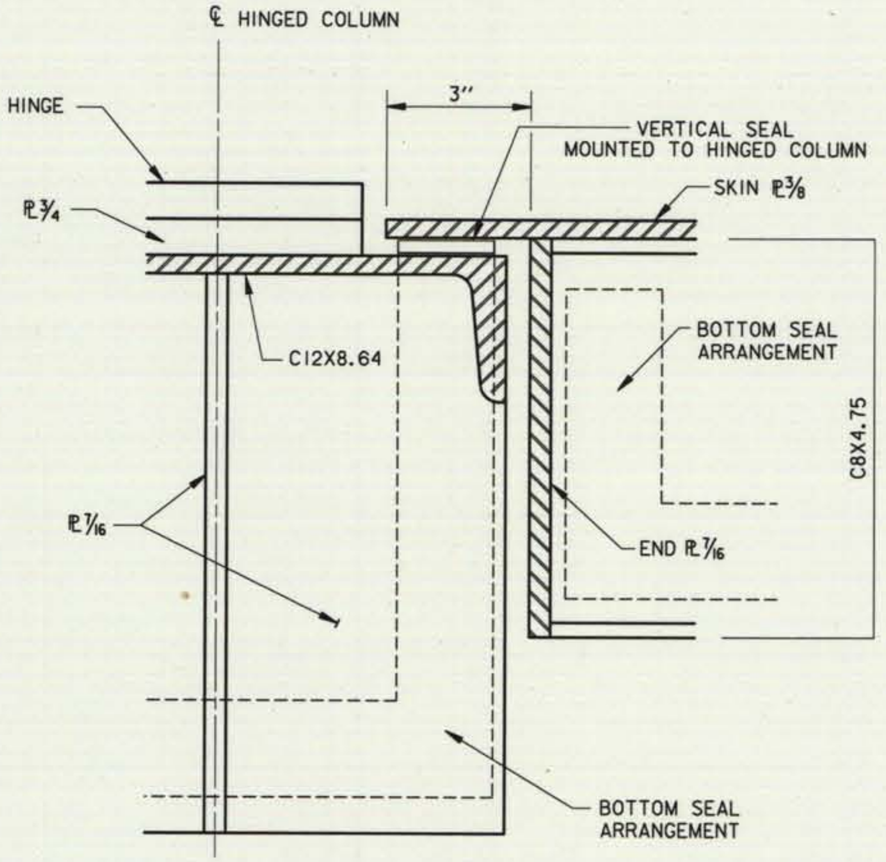
DESIGNED BY:	R.GRUBB	PLOT SCALE: 12	PLOT DATE: 23 MAR 93	CADD FILE: 30962A01.DGN
DRAWN BY:	B.DORCEY			FILE NO.
CHECKED BY:	M.DESAI	DATE: APRIL 1992		H-2-30962



PLAN

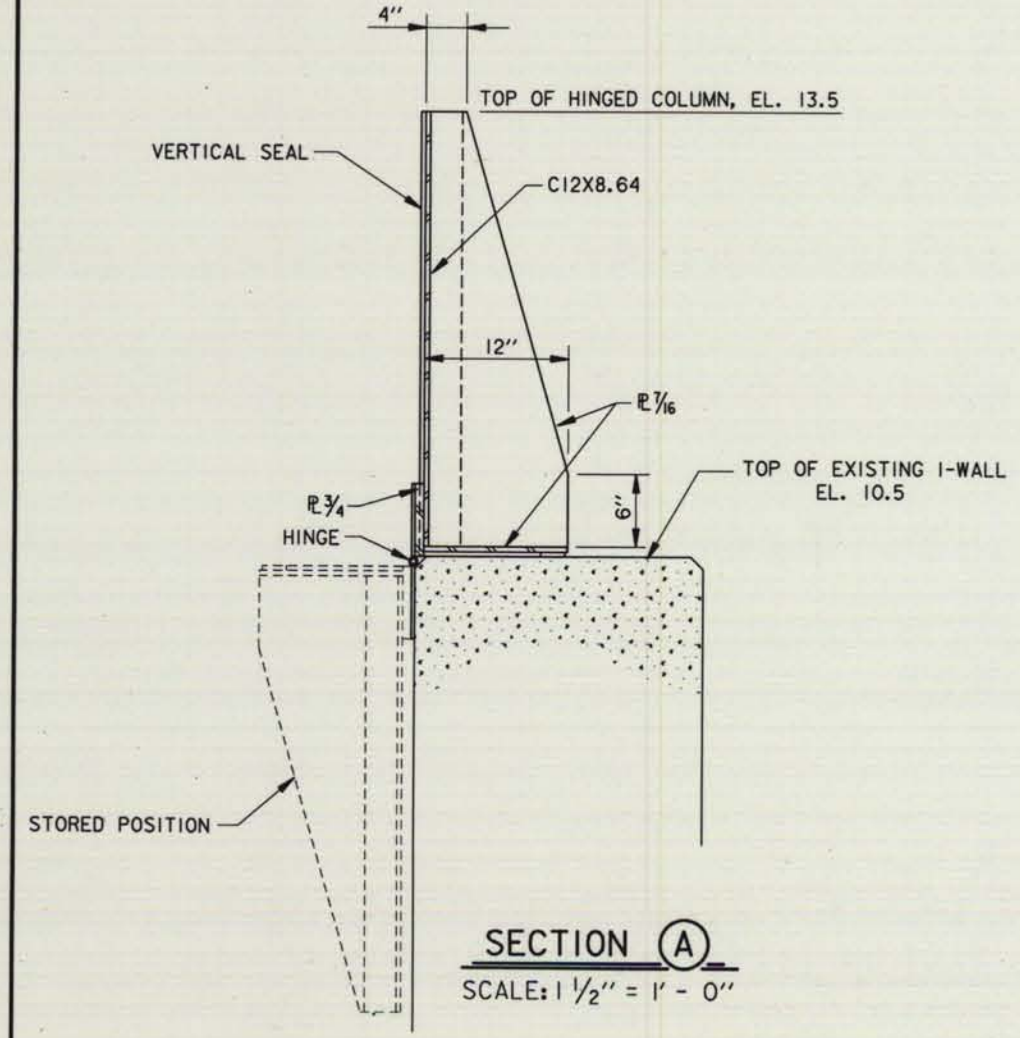
TYPICAL HINGED FLAP GATE ARRANGEMENT

SCALE: 1 ½" = 1' - 0"



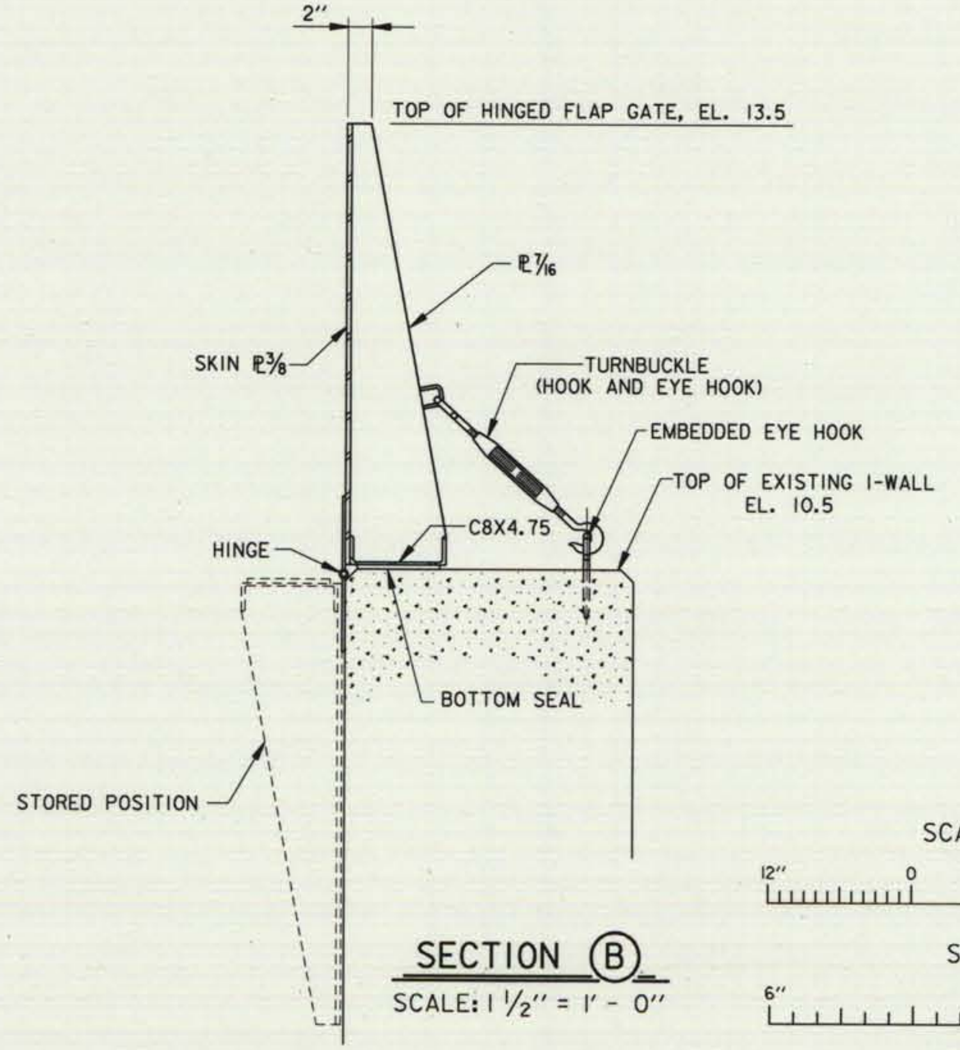
SEAL ARRANGEMENT

SCALE: 6" = 1' - 0"



SECTION (A)

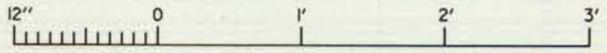
SCALE: 1 ½" = 1' - 0"



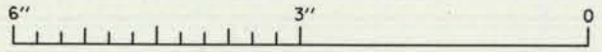
SECTION (B)

SCALE: 1 ½" = 1' - 0"

SCALE: 1 ½" = 1' - 0"



SCALE: 6" = 1' - 0"

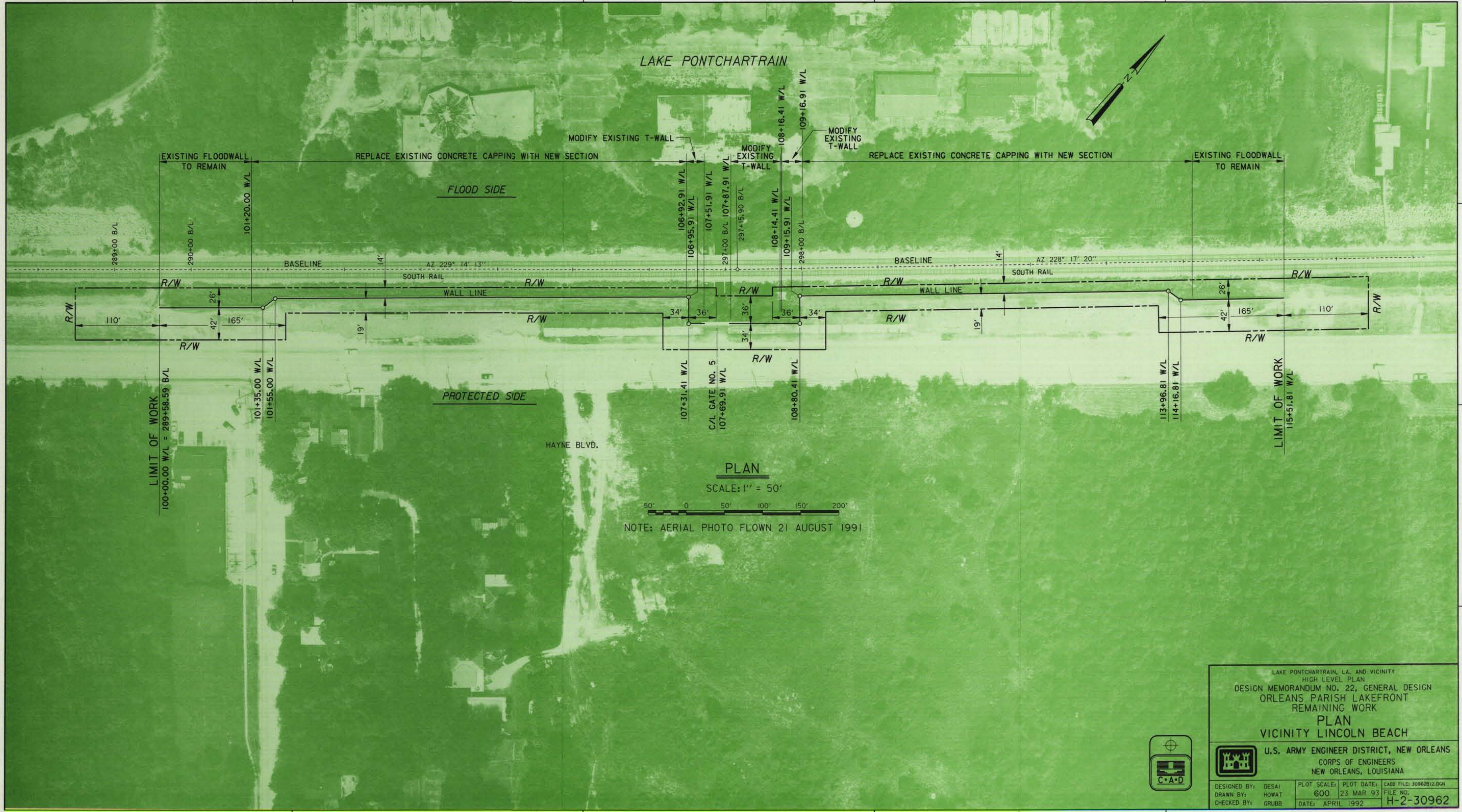


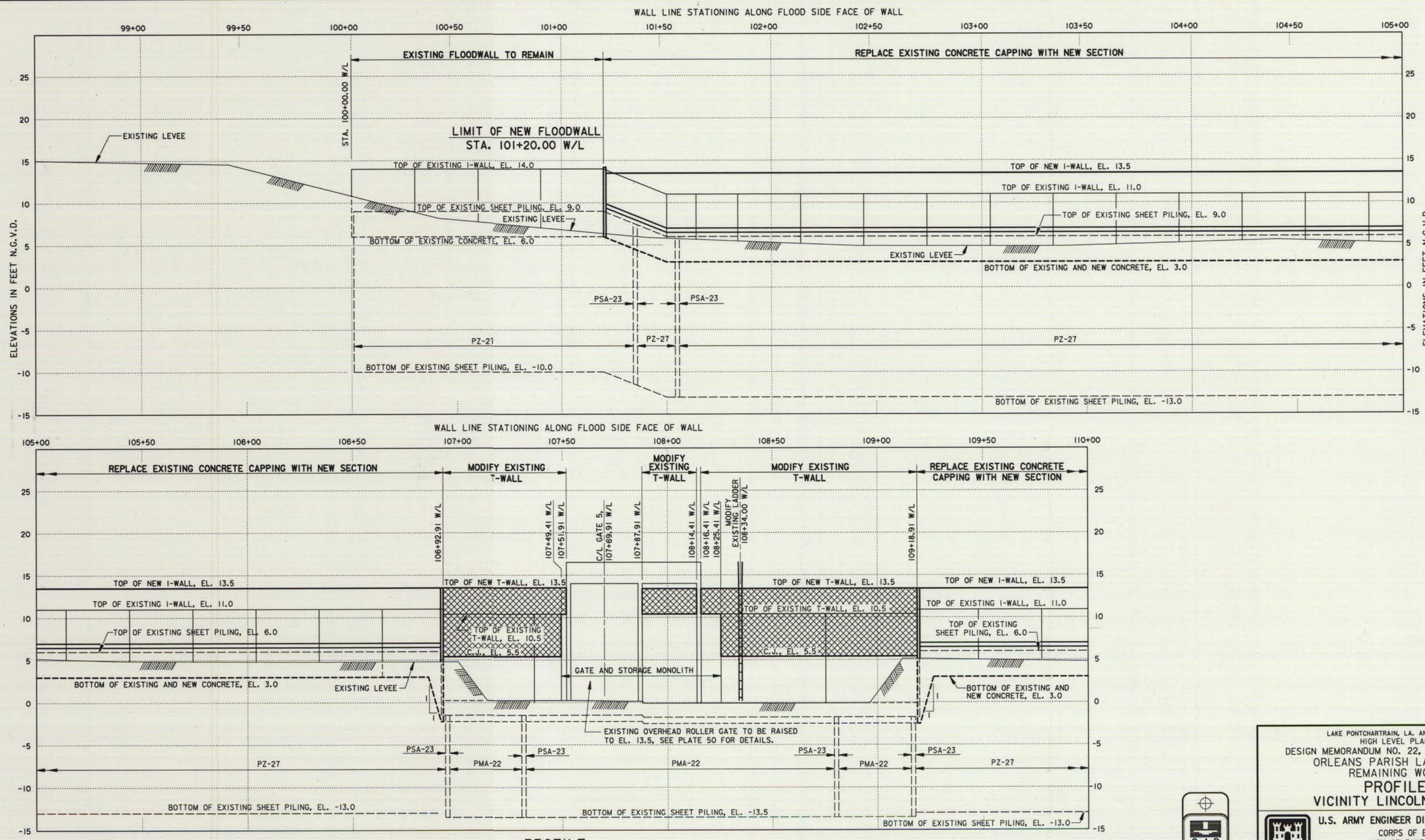
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

HINGED FLAP GATES
VICINITY N.O. LAKEFRONT AIRPORT

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

DESIGNED BY:	M.DESAI	PLOT SCALE: 8	PLOT DATE: 23 MAR 93	CADD FILE: 30962A02.DGN
DRAWN BY:	B.DORCEY			FILE NO. H-2-30962
CHECKED BY:	J.ROMERO	DATE: APRIL 1992		


LAKE PONTCHARTRAIN
N
EXISTING FLOODWALL TO REMAIN
REPLACE EXISTING CONCRETE CAPPING WITH NEW SECTION
MODIFY EXISTING T-WALL
MODIFY EXISTING T-WALL
MODIFY EXISTING T-WALL
REPLACE EXISTING CONCRETE CAPPING WITH NEW SECTION
EXISTING FLOODWALL TO REMAIN
FLOOD SIDE
289+00 B/L
290+00 B/L
101+20.00 W/L
106+92.91 W/L
106+95.91 W/L
107+51.91 W/L
107+87.91 W/L
297+00 B/L
297+15.90 B/L
108+14.41 W/L
108+16.41 W/L
109+15.91 W/L
109+16.91 W/L
298+00 B/L
BASELINE
AZ 229° 14' 13''
BASELINE
AZ 228° 17' 20''
SOUTH RAIL
SOUTH RAIL
WALL LINE
WALL LINE
R/W
14'
26'
42'
110'
165'
19'
34'
36'
PROTECTED SIDE
LIMIT OF WORK
100+00.00 W/L = 289+58.59 B/L
101+35.00 W/L
101+55.00 W/L
107+31.41 W/L
C/L GATE NO. 5
107+69.91 W/L
108+80.41 W/L
113+96.81 W/L
114+16.81 W/L
LIMIT OF WORK
115+51.81 W/L
HAYNE BLVD.
PLAN
SCALE: 1'' = 50'
50' 0 50' 100' 150' 200'
NOTE: AERIAL PHOTO FLOWN 21 AUGUST 1991
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PLAN
VICINITY LINCOLN BEACH
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
C•A•D
DESIGNED BY: DESAI
DRAWN BY: HOWAT
CHECKED BY: GRUBB
PLOT SCALE: 600
PLOT DATE: 23 MAR 93
DATE: APRIL 1992
CADD FILE: 30962B12.DGN
FILE NO. H-2-30962



PROFILE

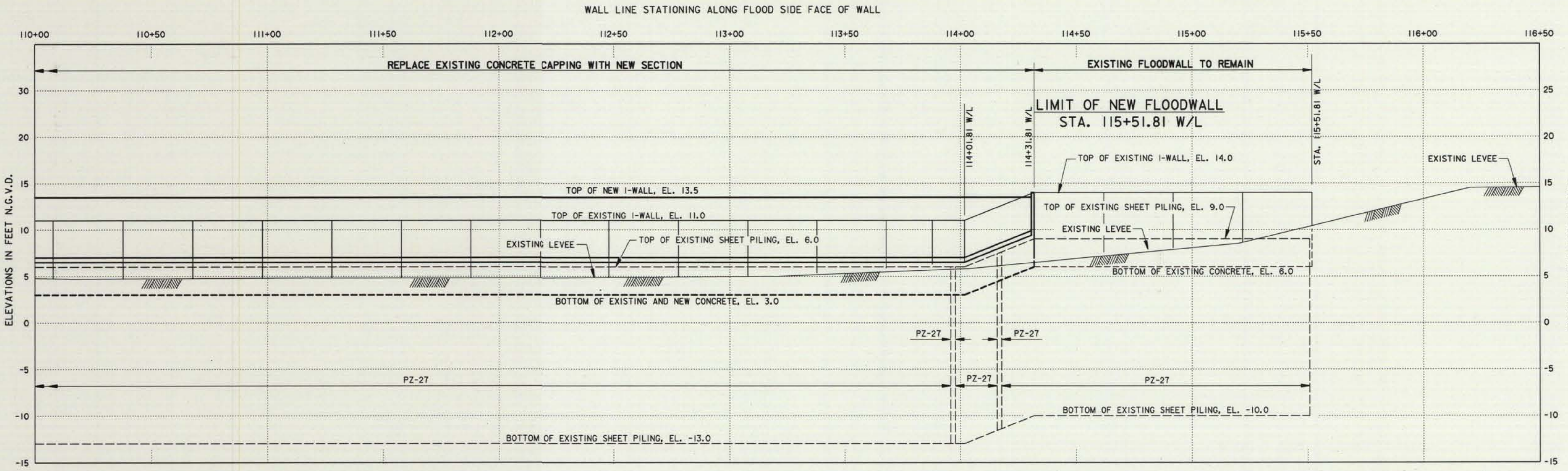
SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PROFILE
VICINITY LINCOLN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962H01.DGN
DRAWN BY: BRAKEL/DORCEY			FILE NO. H-2-30962
CHECKED BY: GRUBB	DATE: APRIL 1992		



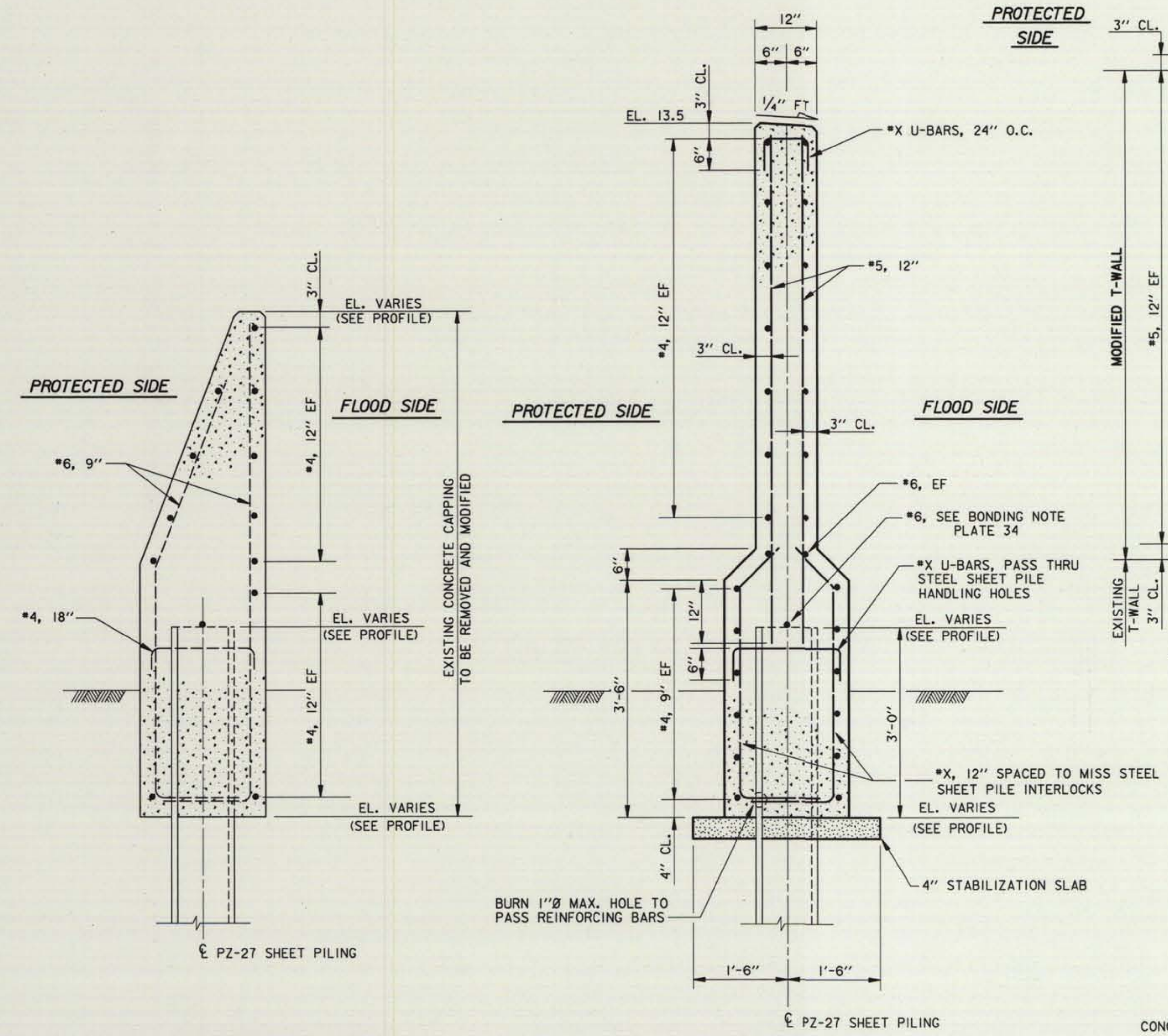
PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PROFILE
VICINITY LINCOLN BEACH

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

DESIGNED BY: DESAI	PLOT SCALE: 60	PLOT DATE: 23 MAR 93	CADD FILE: 30962H02.DGN
DRAWN BY: BRAKEL/DORCEY			FILE NO. H-2-30962
CHECKED BY: GRUBB	DATE: APRIL 1992		



EXISTING SECTION

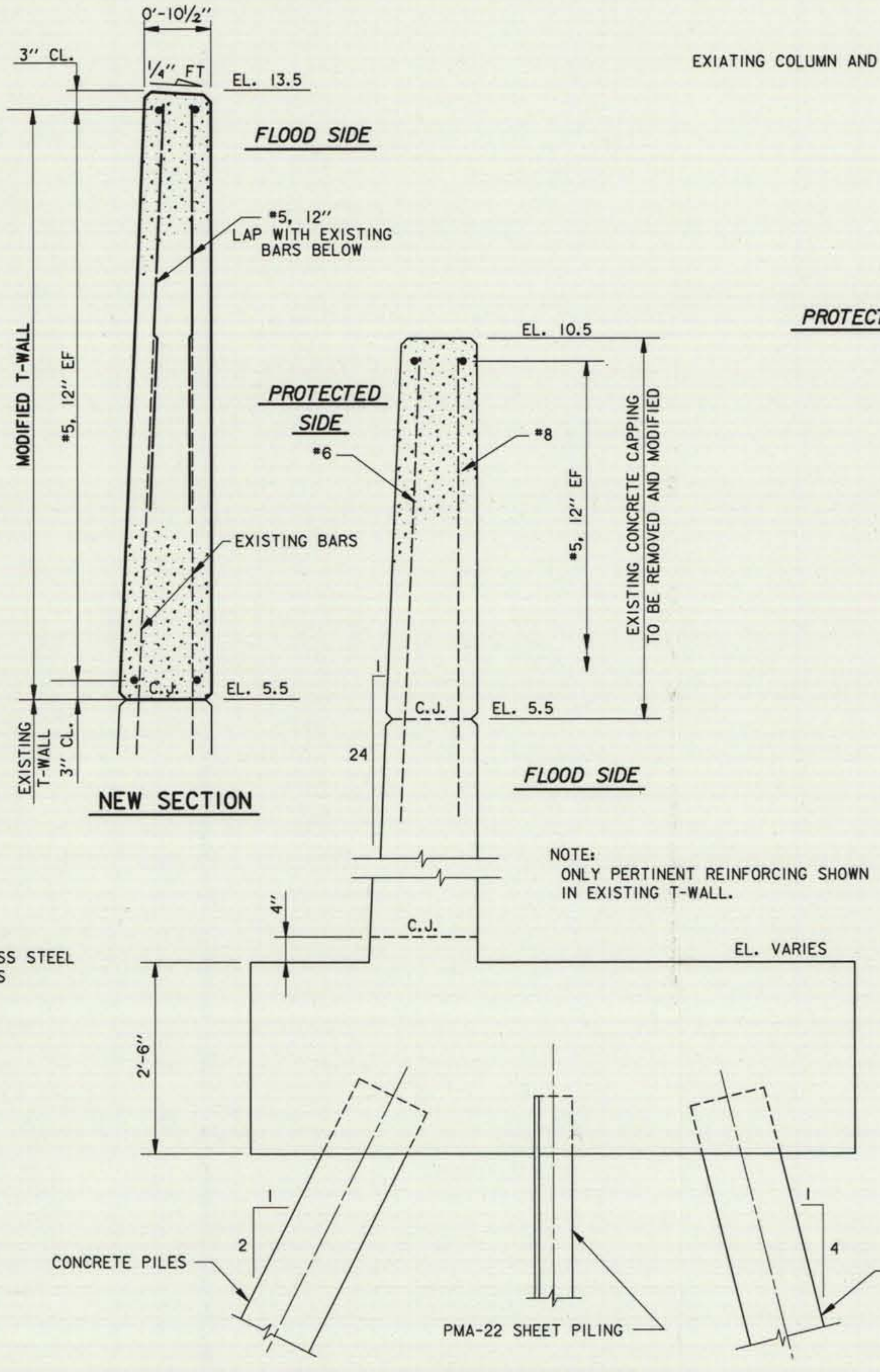
NEW SECTION

STA. 101+20.0 W/L TO STA. 106+92.91 W/L

STA. 109+18.91 W/L TO STA. 114+31.81 W/L

TYPICAL I-WALL SECTION

SCALE: 1" = 1'- 0"



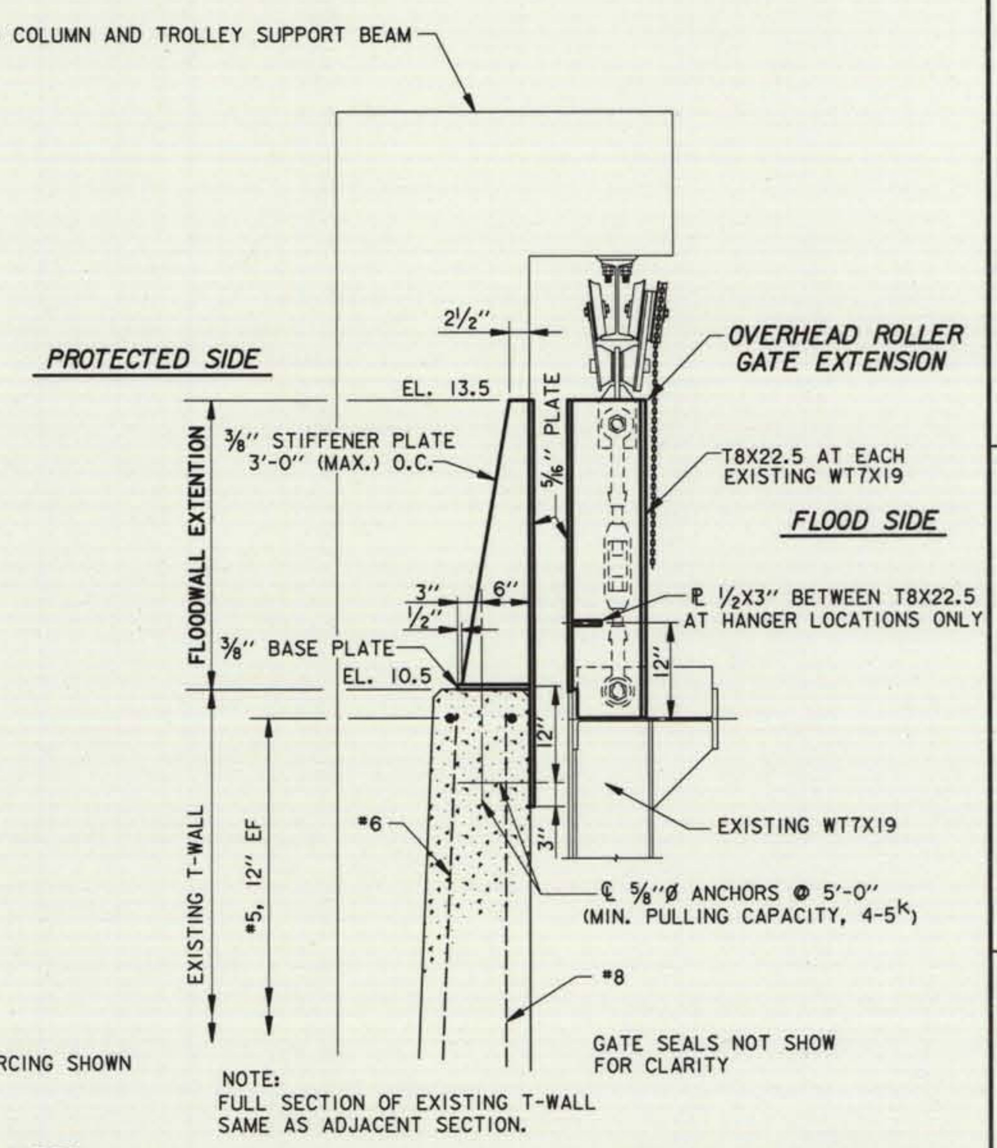
EXISTING SECTION

STA. 106+92.91 W/L TO STA. 107+49.41 W/L

STA. 108+25.41 W/L TO STA. 109+18.91 W/L

TYPICAL T-WALL

SCALE: 1" = 1'- 0"



NOTE:
FULL SECTION OF EXISTING T-WALL SAME AS ADJACENT SECTION.

STA. 107+49.41 W/L TO STA. 107+51.91 W/L

STA. 107+87.91 W/L TO STA. 108+14.41 W/L

STA. 108+16.41 W/L TO STA. 108+25.41 W/L

TYPICAL T-WALL

SCALE: 1" = 1'- 0"

SCALE: 1" = 1'- 0"

12" 0 1' 2' 3' 4' 5'

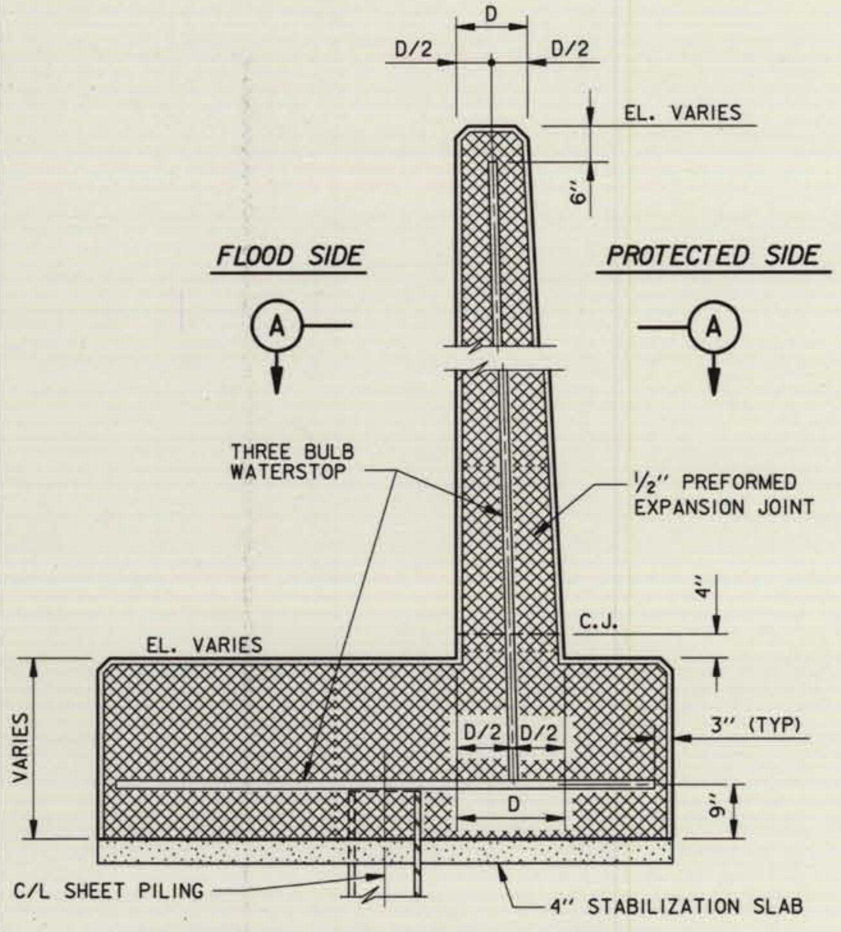
C·A·D

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

MODIFIED FLOODWALL SECTIONS
VICINITY LINCOLN BEACH

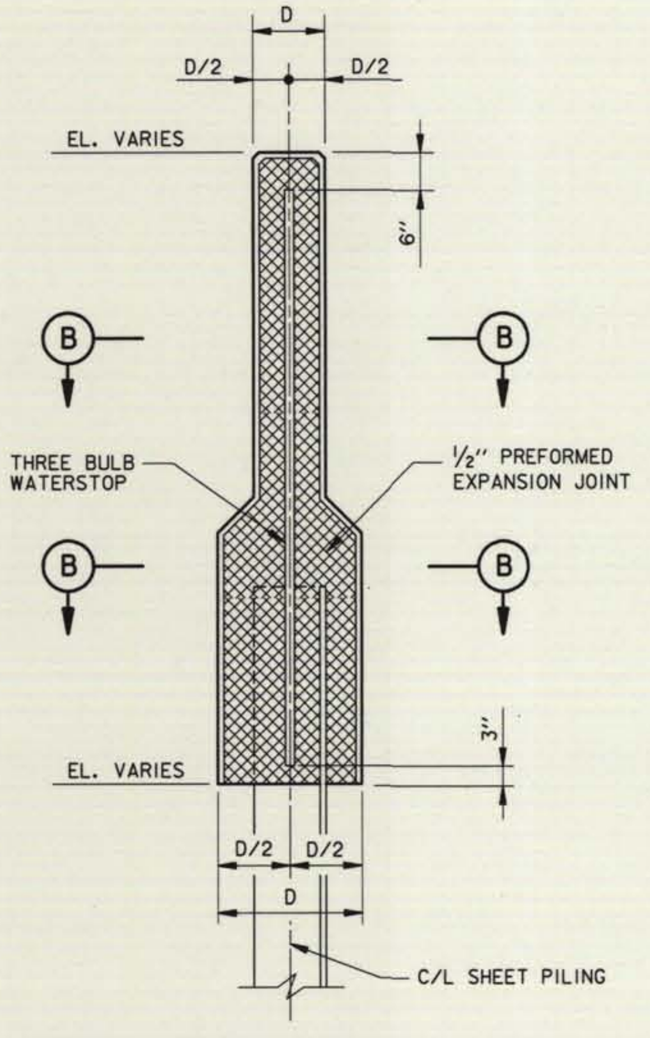
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:	M.DESAI	PLOT SCALE: 12	PLOT DATE: 23 MAR 93	CADD FILE: 30962A03.DGN
DRAWN BY:	B.DORCEY			FILE NO. H-2-30962
CHECKED BY:	R.GRUBB	DATE: APRIL 1992		



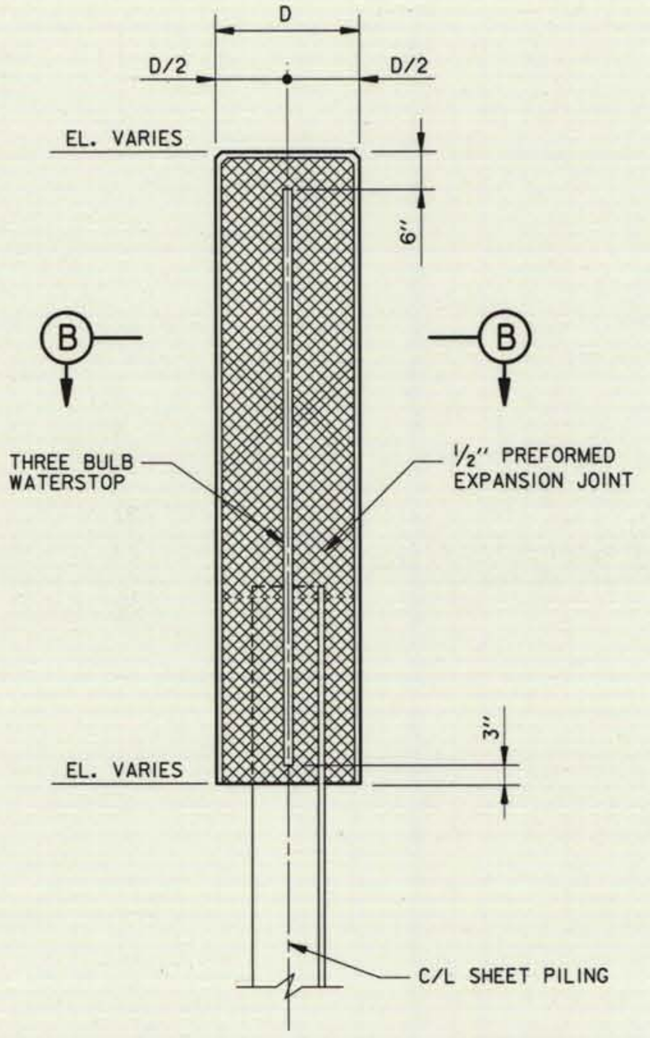
TYPICAL T-WALL JOINT

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



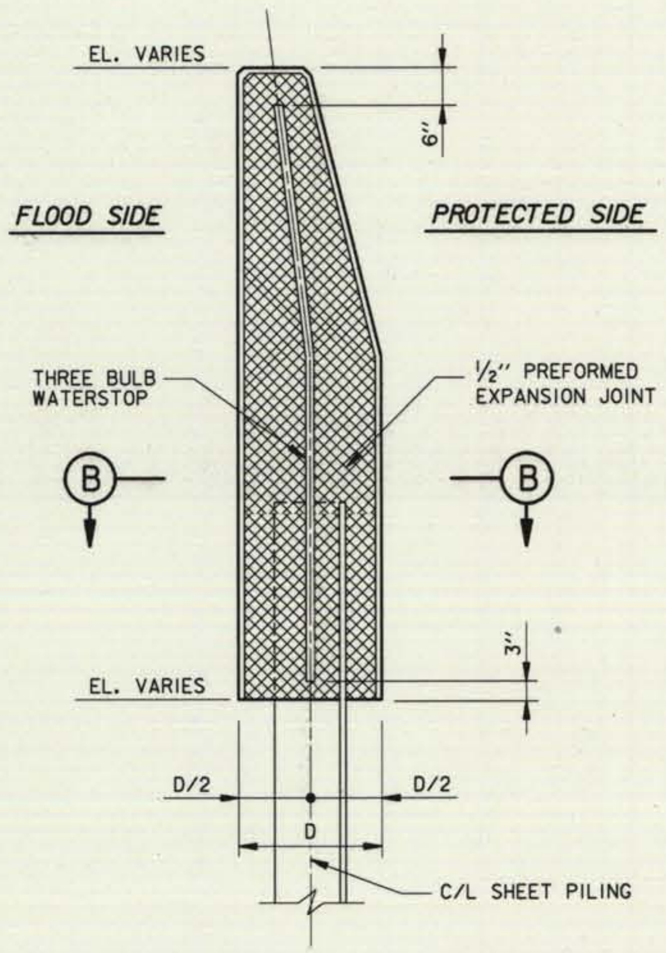
TYPICAL I-WALL JOINT

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



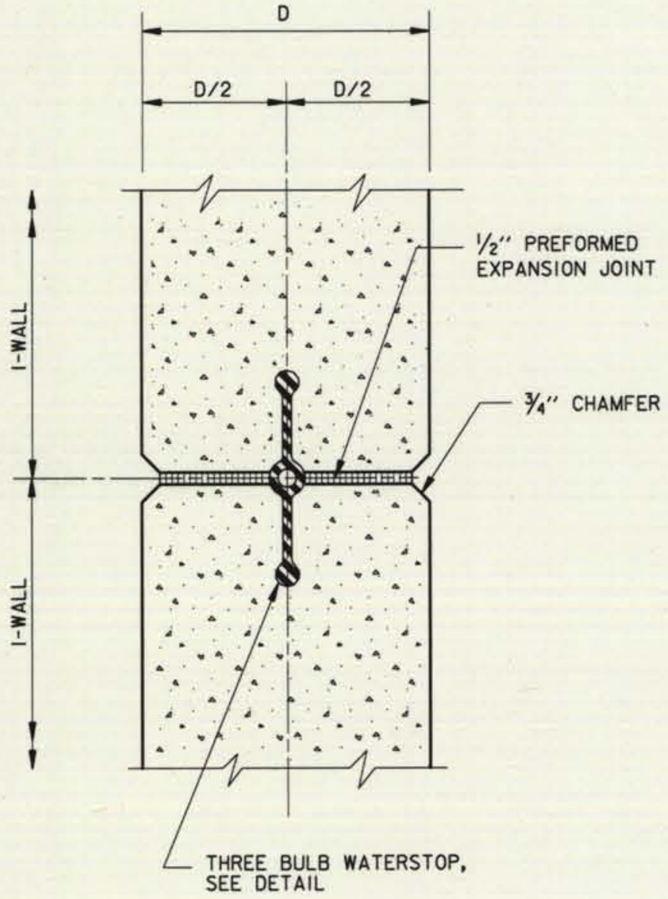
TYPICAL I-WALL JOINT

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



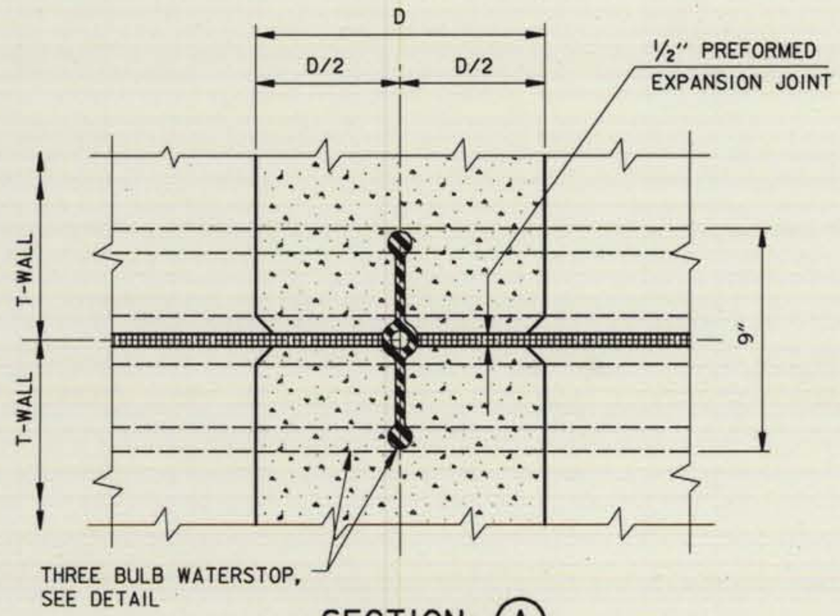
TYPICAL I-WALL JOINT

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



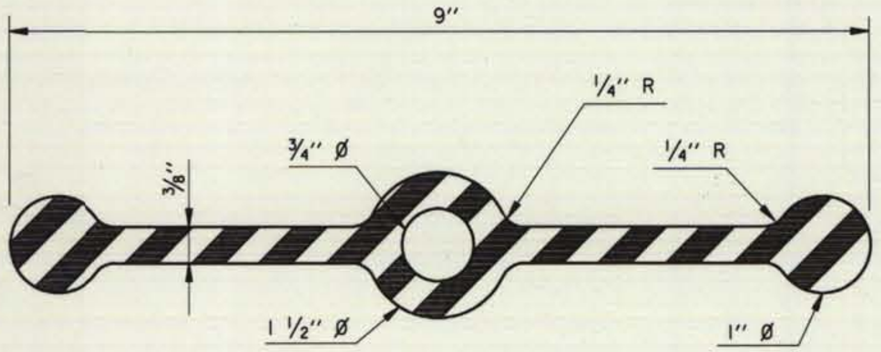
SECTION B

SCALE: 3" = 1' - 0"



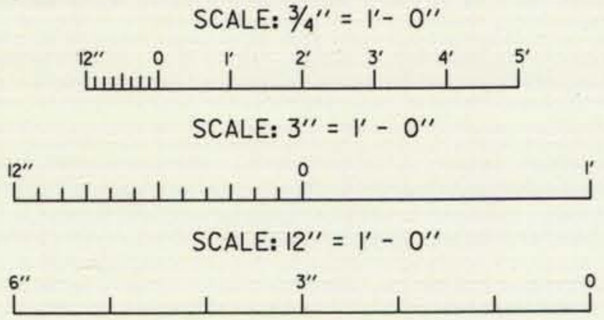
SECTION A

SCALE: 3" = 1' - 0"



THREE BULB WATERSTOP

SCALE: 12" = 1' - 0"



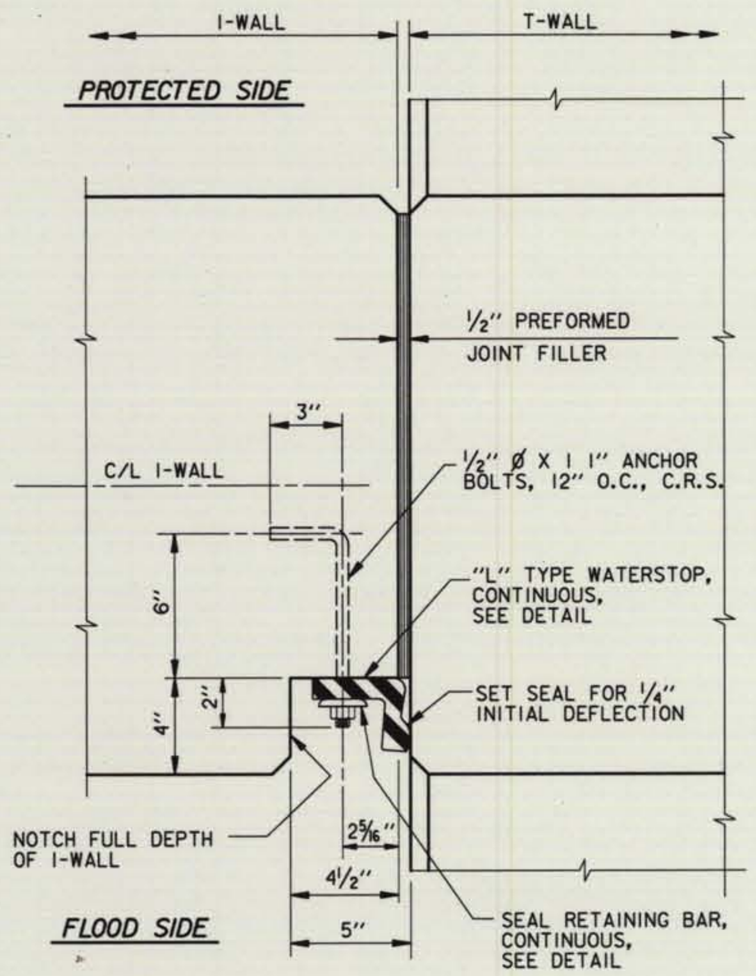
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

TYPICAL JOINT DETAILS

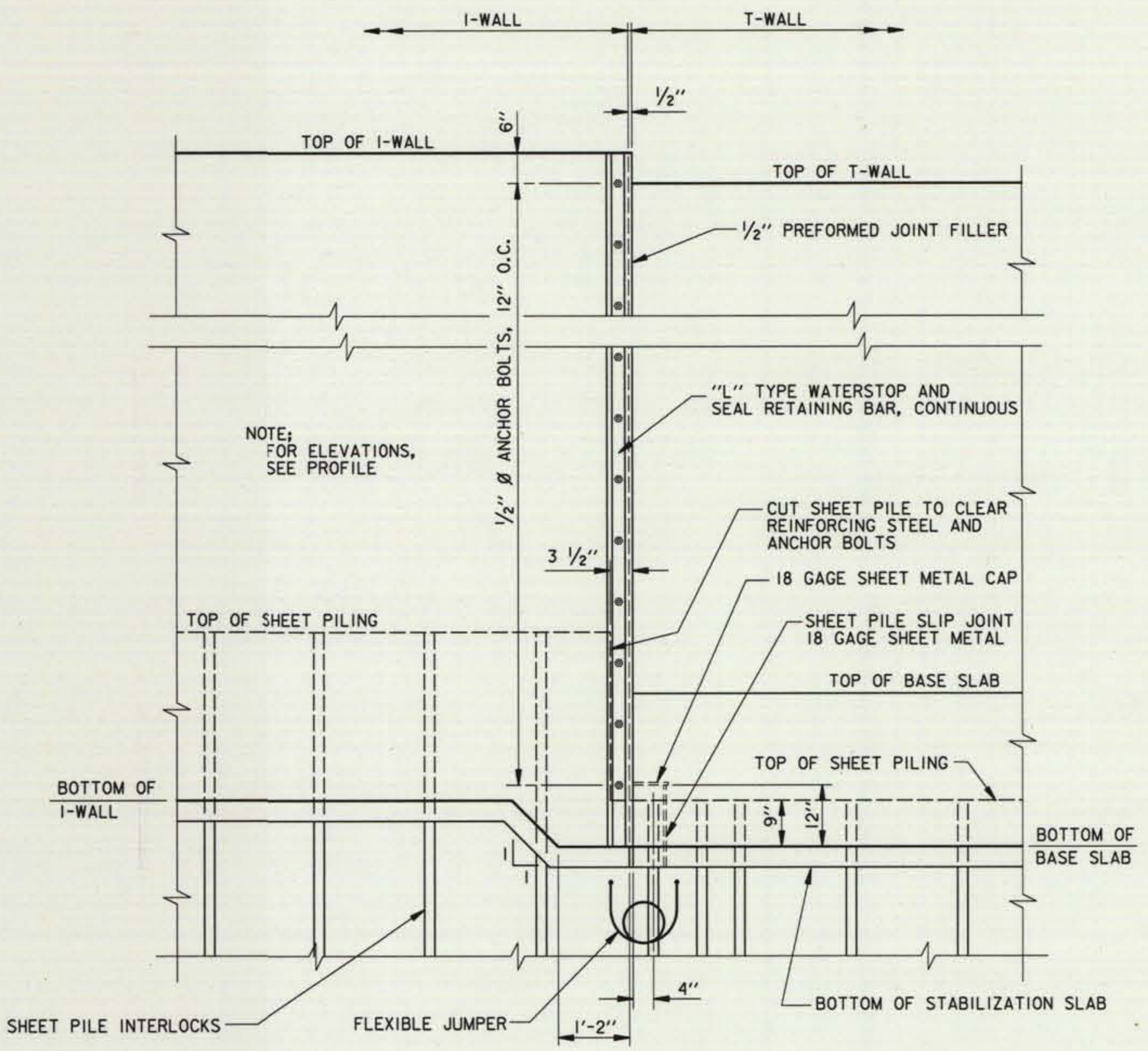
C·A·D

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

DESIGNED BY:	GRUBB	PLOT SCALE: 1	PLOT DATE: 23 MAR 93	CADD FILE: 30962H09.DGN
DRAWN BY:	BRAKEL			FILE NO.
CHECKED BY:	DESAI	DATE: APRIL 1992		H-2-30962

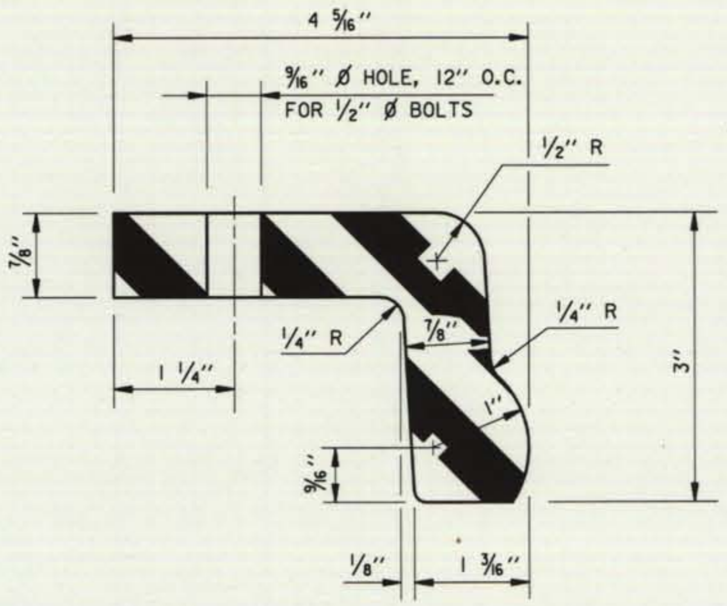


PLAN
SCALE: 3" = 1' - 0"

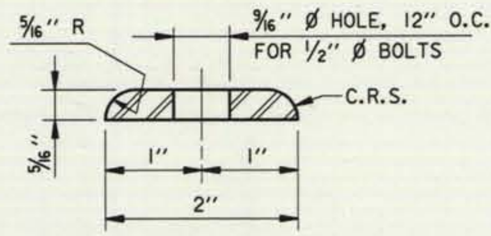


FLOOD SIDE ELEVATION
SCALE: 3/4" = 1'- 0"

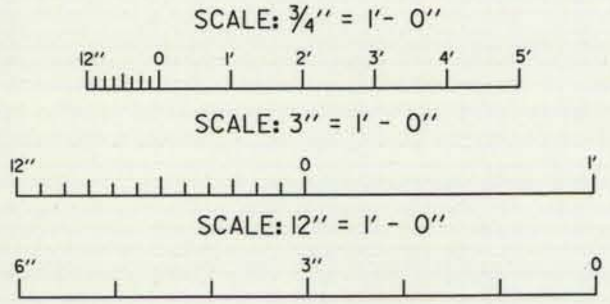
TYPICAL JOINT BETWEEN I-WALL AND T-WALL



" L " TYPE WATERSTOP
SCALE: 12" = 1' - 0"



SEAL RETAINING BAR
SCALE: 12" = 1' - 0"



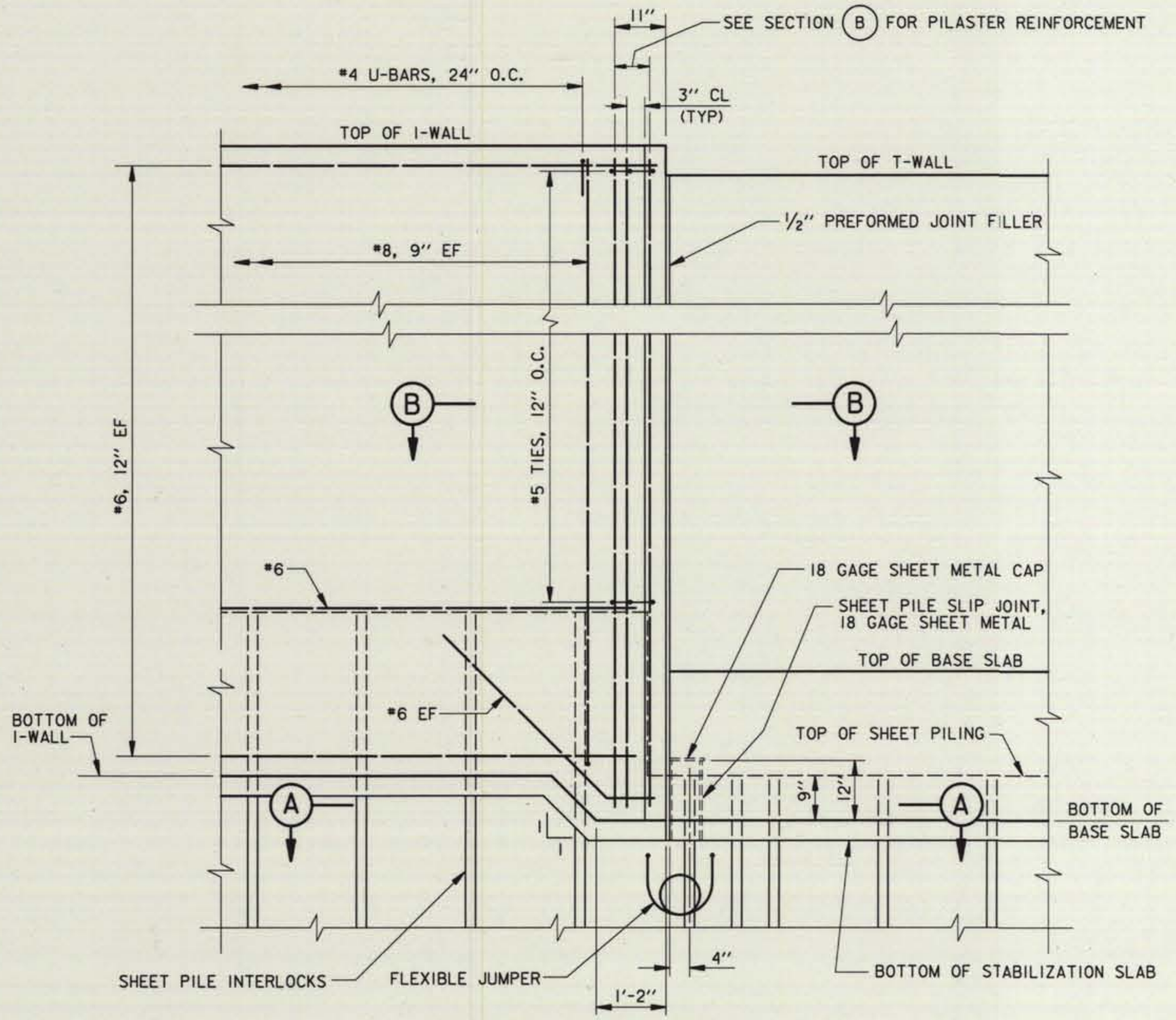
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

TYPICAL WALL JOINTS

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

DESIGNED BY:	GRUBB	PLOT SCALE: 16	PLOT DATE: 23 MAR 93	CADD FILE: 30962B24.DGN
DRAWN BY:	HOWAT	DATE: APRIL 1992		FILE NO. H-2-30962
CHECKED BY:	DESAI			

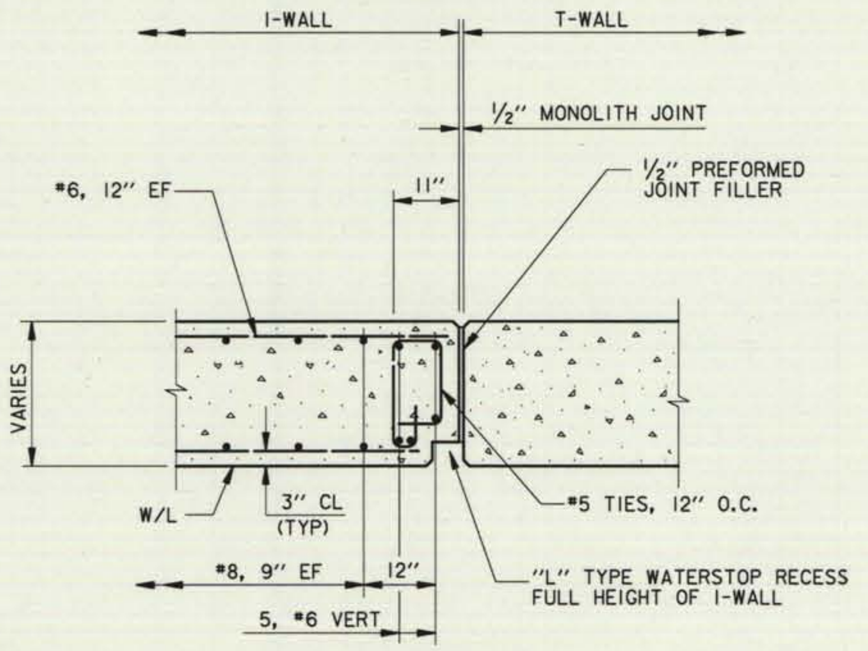
C•A•D



FLOOD SIDE ELEVATION

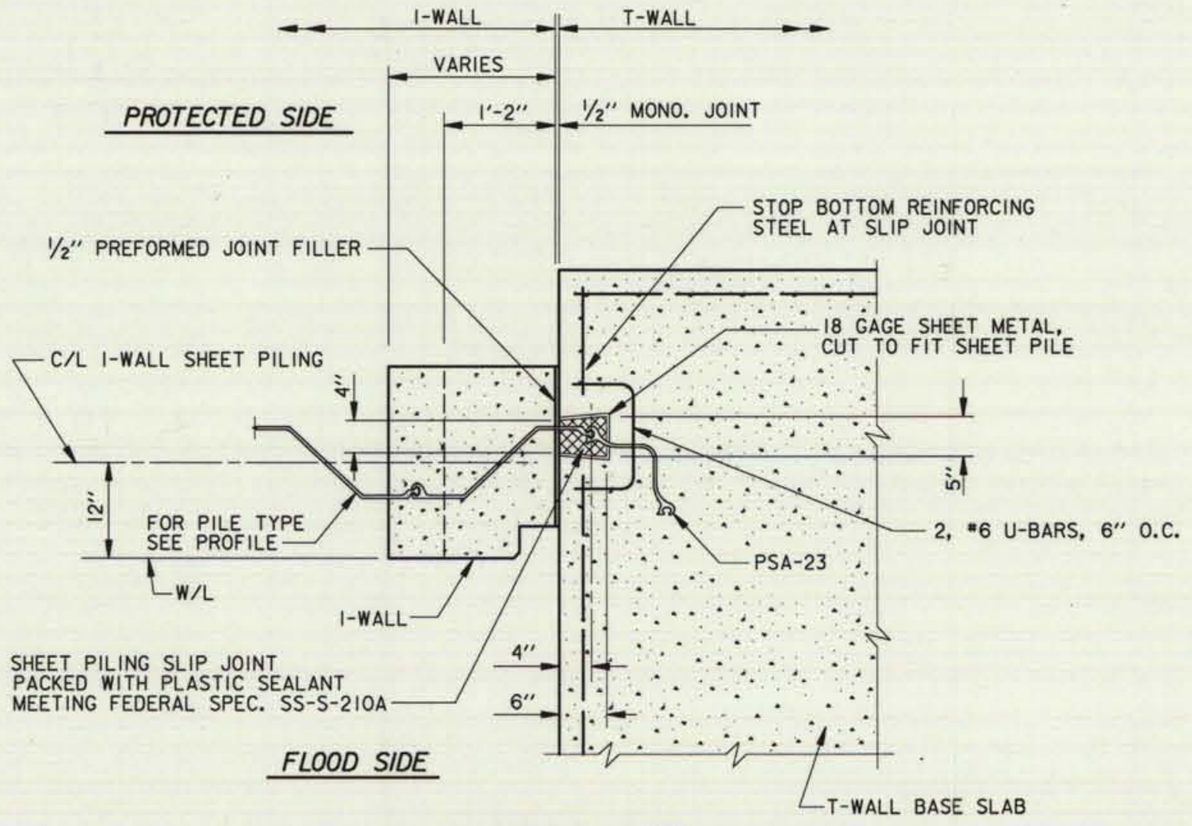
TYPICAL DETAIL FOR TRANSITION I-WALL TO T-WALL

SCALE: ¾" = 1'- 0"



SECTION (B)

SCALE: ¾" = 1'- 0"



SECTION (A)

SCALE: 1" = 1'- 0"

SCALE: ¾" = 1'- 0"

12" 0 1' 2' 3' 4' 5'

SCALE: 1" = 1'- 0"

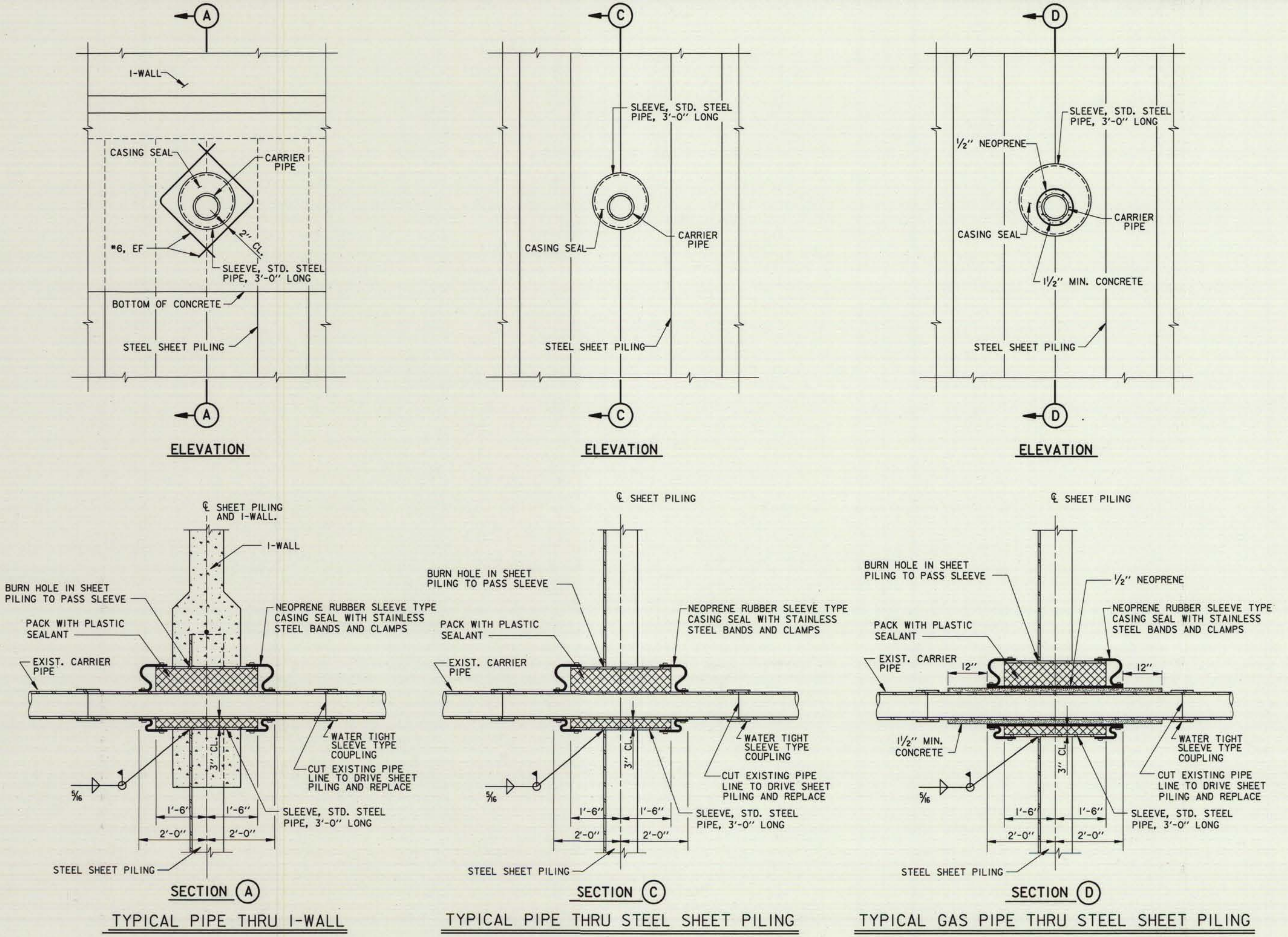
12" 0 1' 2' 3' 4' 5'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

TYPICAL WALL JOINTS REINFORCEMENT

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

DESIGNED BY: GRUBB	PLOT SCALE: 16	PLOT DATE: 23 MAR 93	CADD FILE: 30962825.DGN	
DRAWN BY: HOWAT			FILE NO. H-2-30962	
CHECKED BY: DESAI	DATE: APRIL 1992			



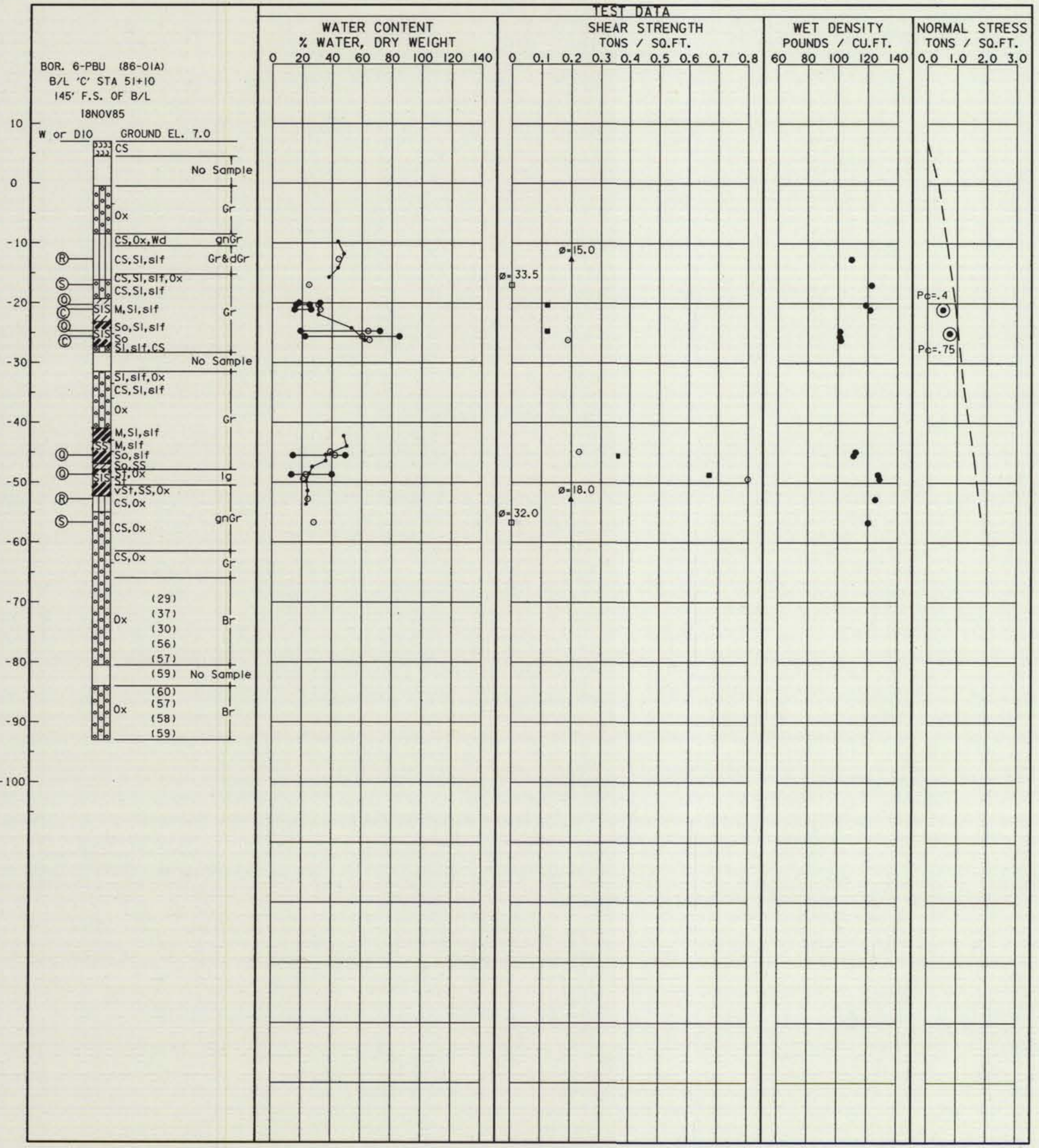
SCALE: 3/4" = 1'- 0"

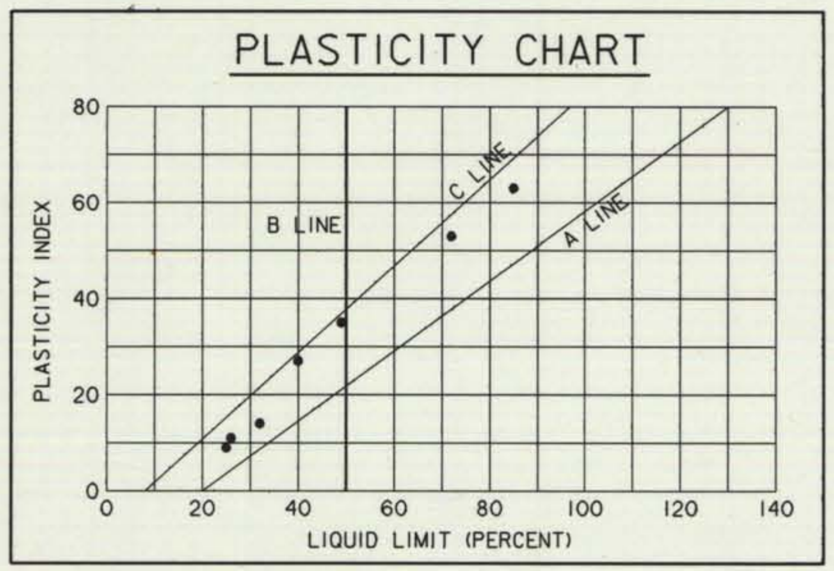
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

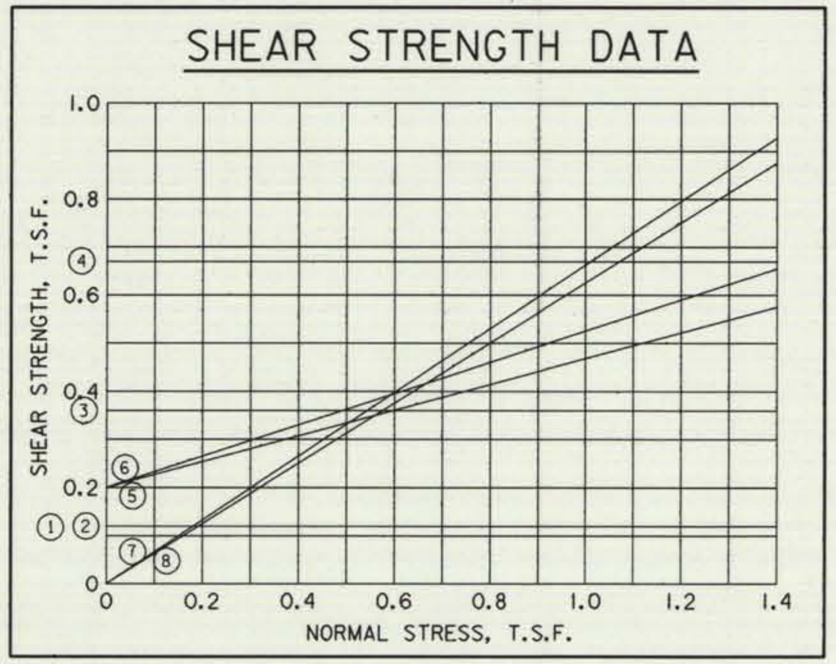
UTILITIES

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

DESIGNED BY: GRUBB	PLOT SCALE: 16	PLOT DATE: 23 MAR 93	CADD FILE: 30962H11.DGN
DRAWN BY: BRAKEL			FILE NO. H-2-30962
CHECKED BY: DESAI	DATE: APRIL 1992		







TABULAR TEST DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Φ	STRENGTH C - TSF	CLASS
1	-20.30	Q	0.0	0.120	CL
2	-24.70	Q	0.0	0.120	CH
3	-45.50	Q	0.0	0.360	CH
4	-48.70	Q	0.0	0.670	CL
5	-12.70	R	15.0	0.200	ML
6	-52.80	R	18.0	0.200	CL
7	-17.00	S	33.5	0.000	ML
8	-56.70	S	32.0	0.000	ML

NOTES

○ - (UC) UNCONFINED COMPRESSION TEST
■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
ω_P ω_N ω_L ATTERBERG LIMITS

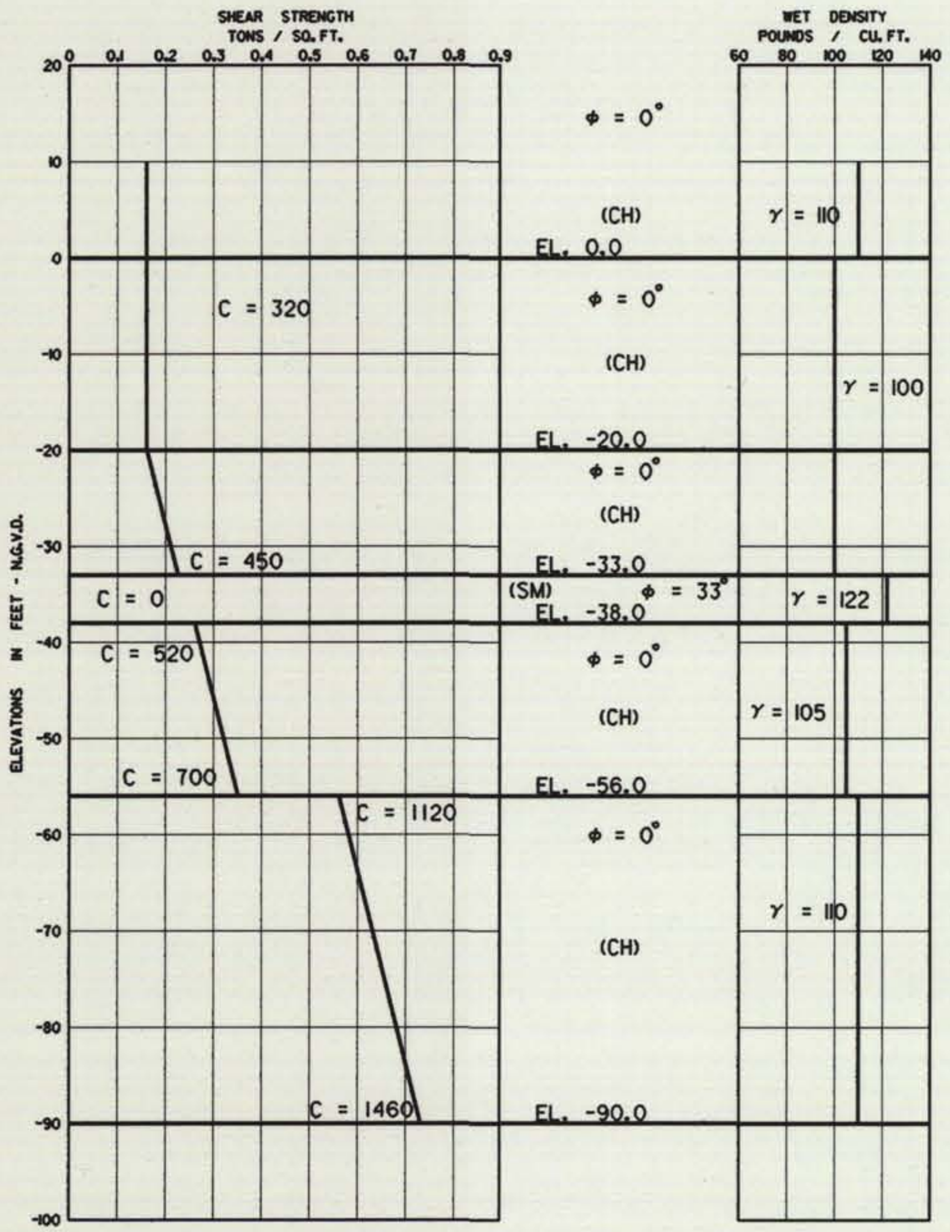
BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE A.
FOR LOCATION OF BORING SEE PLATE 30
FOR DETAILED TEST DATA SEE APPENDIX B

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
UNDISTURBED BORING 6-PBU
PONTCHARTRAIN BEACH

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

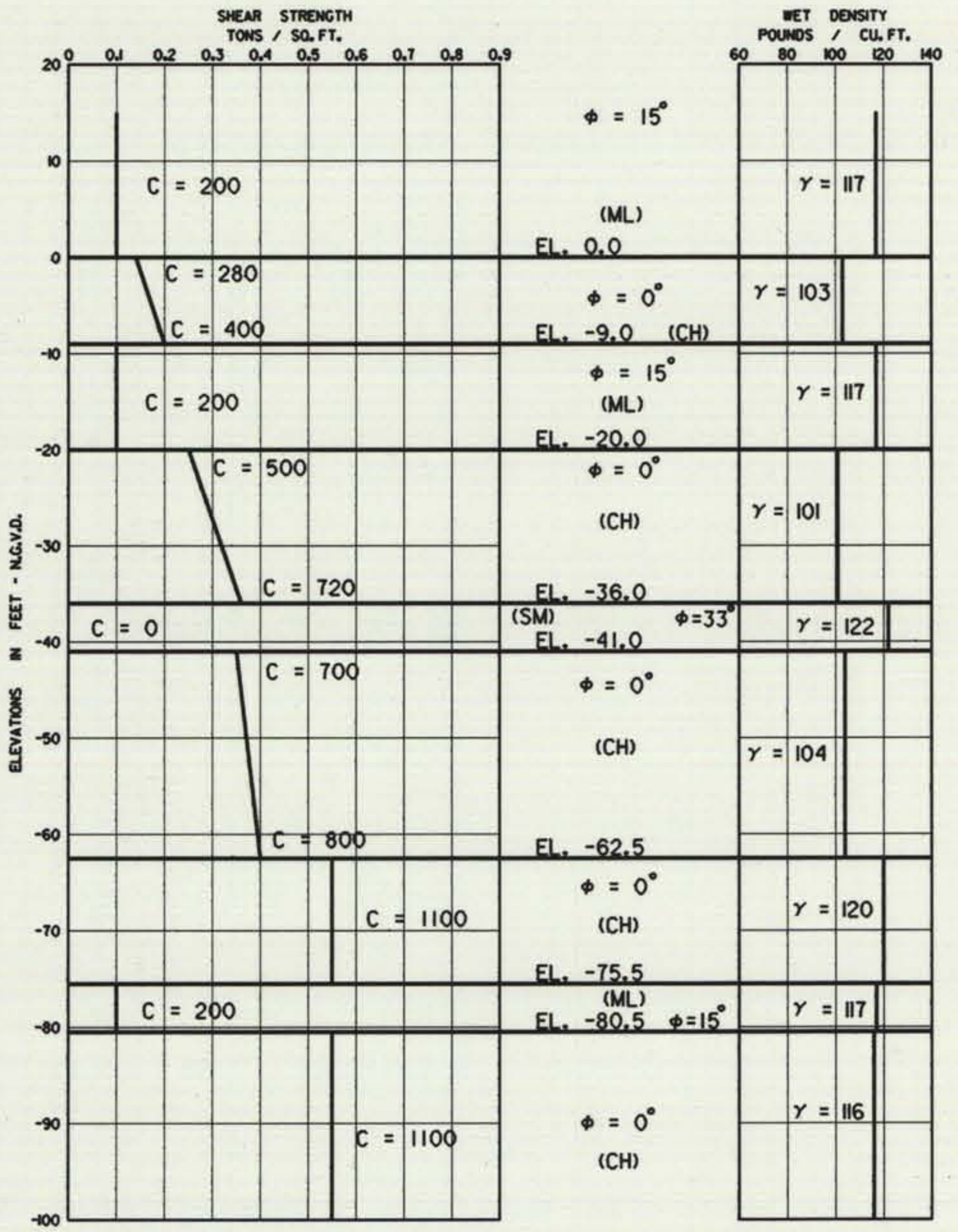
DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: PBU6.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

ORLEANS MARINA
STA. 0+00.0 TO 13+92.00 W/L



NOTE: BASED ON BORINGS 1-UIYH AND 2-UIYH AS PRESENTED IN DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN SUPPLEMENT NO. 5D, ORLEANS PARISH LAKEFRONT LEVEES, ORLEANS MARINA.

ORLEANS MARINA EXTENSION
SLUICE GATE
STA. 303+59.39 TO STA 321+30.99 B/L



NOTE: SEE PLATE 100 OF DESIGN MEMORANDUM NO. 13-GENERAL DESIGN, ORLEANS PARISH LAKEFRONT LEVEE, WEST OF IHNC FOR PRESENTATION OF TEST DATA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

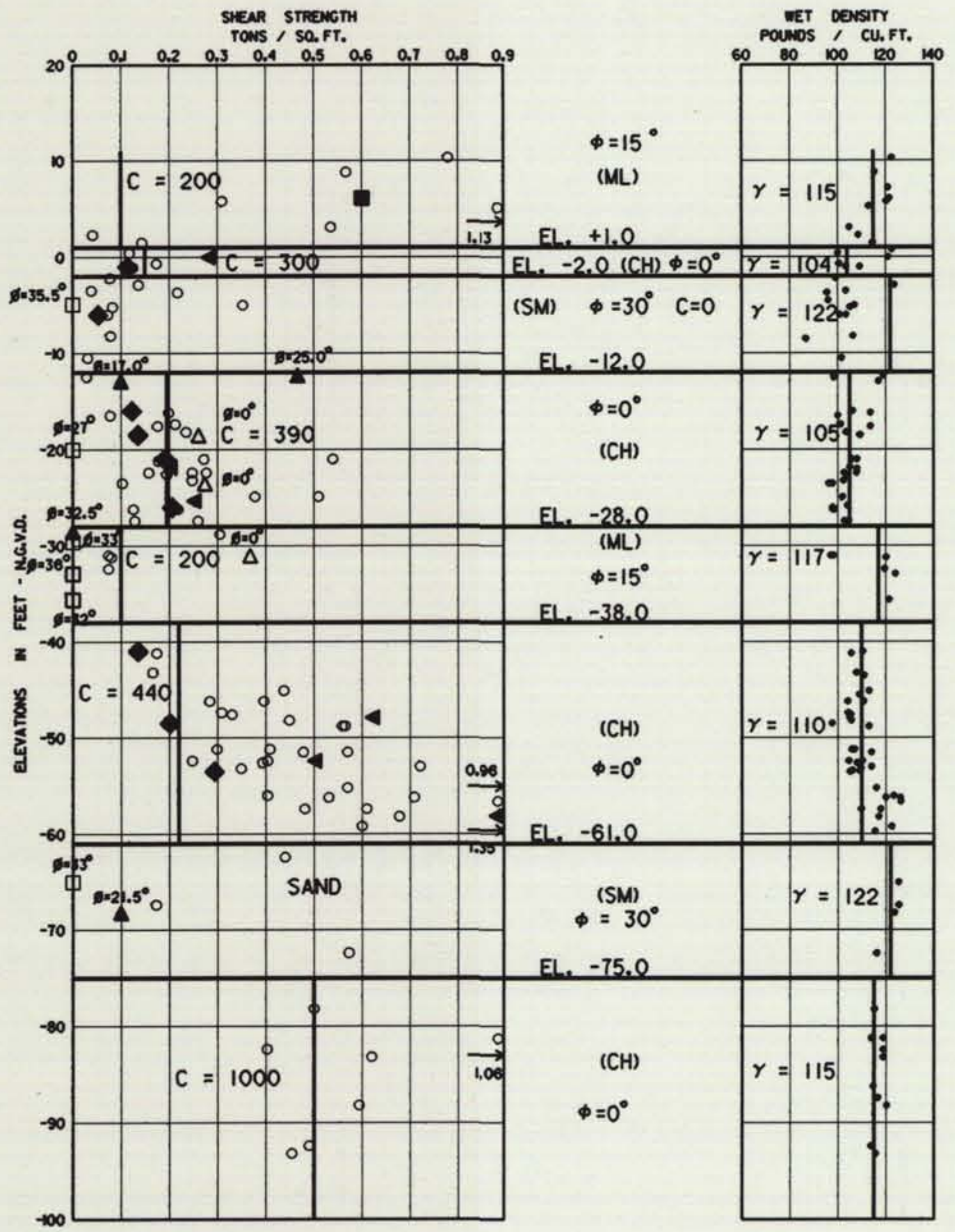
SOIL DESIGN PARAMETERS

ORLEANS MARINA & ORLEANS MARINA EXTENSION

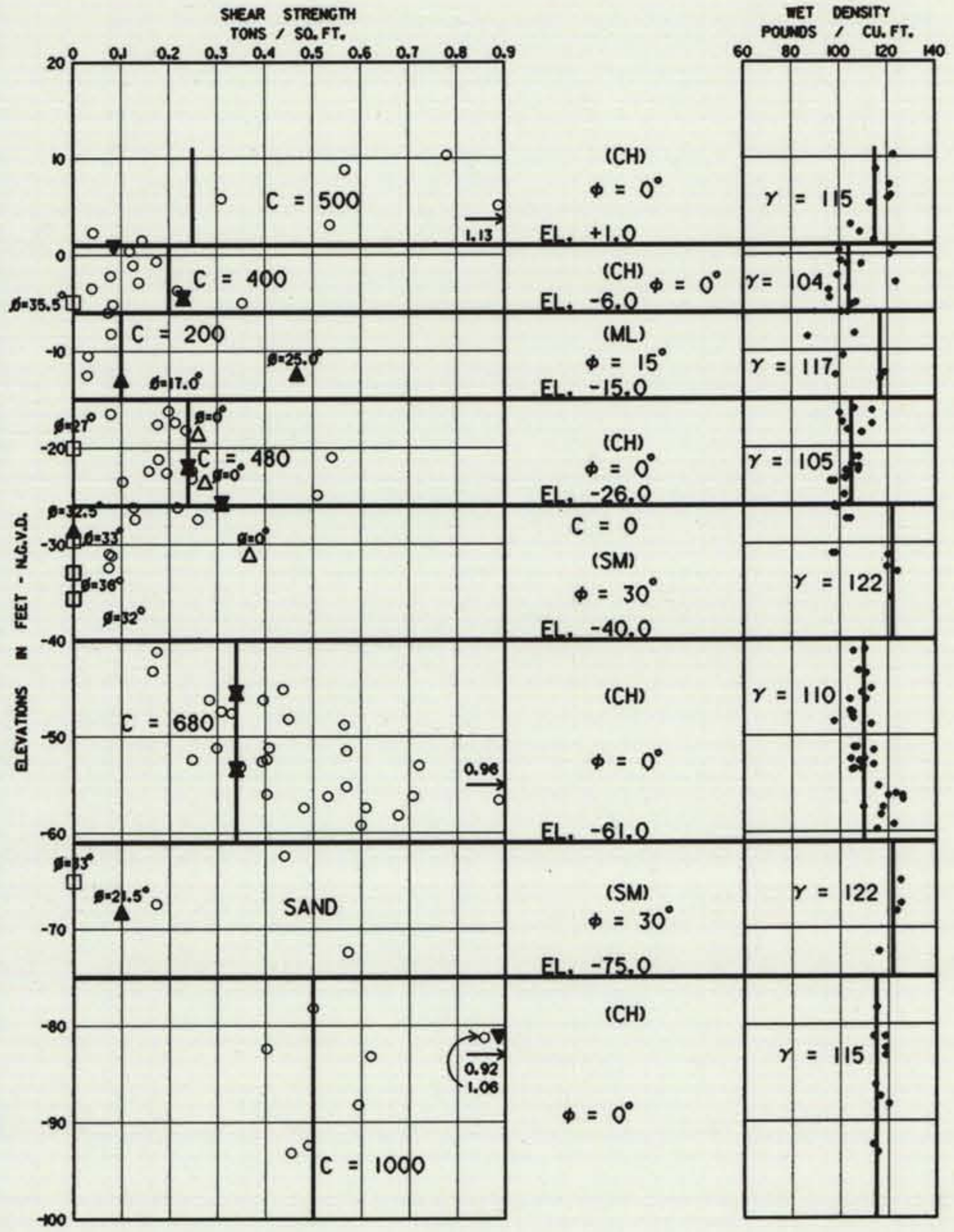
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: STJOHNS.DGN
DRAWN BY: WOODS-3			FILE NO. H-2-30962
CHECKED BY: RICHARDSON	DATE: APRIL 1993		

℄ BAYOU ST. JOHN & WEST SIDE OF BAYOU ST. JOHN



EAST SIDE OF BAYOU ST. JOHN



BORING LEGEND :

- ■ BORING I — UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, I POINT
- ◆ BORING II — UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, I POINT
- ◀ BORING I-UJP — UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, 3 POINT
- ○ (UC) UNCONFINED COMPRESSION TEST BORINGS 1,2,3,4,5,6,9,10,11
- ▲ (R) CONSOLIDATED - UNDRAINED SHEAR TEST BORINGS I-UJP,3-JUE
- □ (S) CONSOLIDATED - DRAINED SHEAR TEST BORINGS I-UJP,3-JUE
- △ (R) CONSOLIDATED - UNDRAINED SHEAR TEST I POINT BORING II

BORING LEGEND :

- ▼ BORING 6 — UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, I POINT
- ⧗ BORING 3-JUE — UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, 3 POINT
- ○ (UC) UNCONFINED COMPRESSION TEST BORINGS 1,2,3,4,5,6,9,10,11
- ▲ (R) CONSOLIDATED - UNDRAINED SHEAR TEST BORINGS I-UJP,3-JUE
- □ (S) CONSOLIDATED - DRAINED SHEAR TEST BORINGS I-UJP,3-JUE
- △ (R) CONSOLIDATED - UNDRAINED SHEAR TEST I POINT BORING II

BORINGS 1,2,3,4,5,6,9,10 3" I.D.

BORING 11 5" I.D.

NOTE: FOR DETAIL TEST DATA, SEE APPENDIX B.

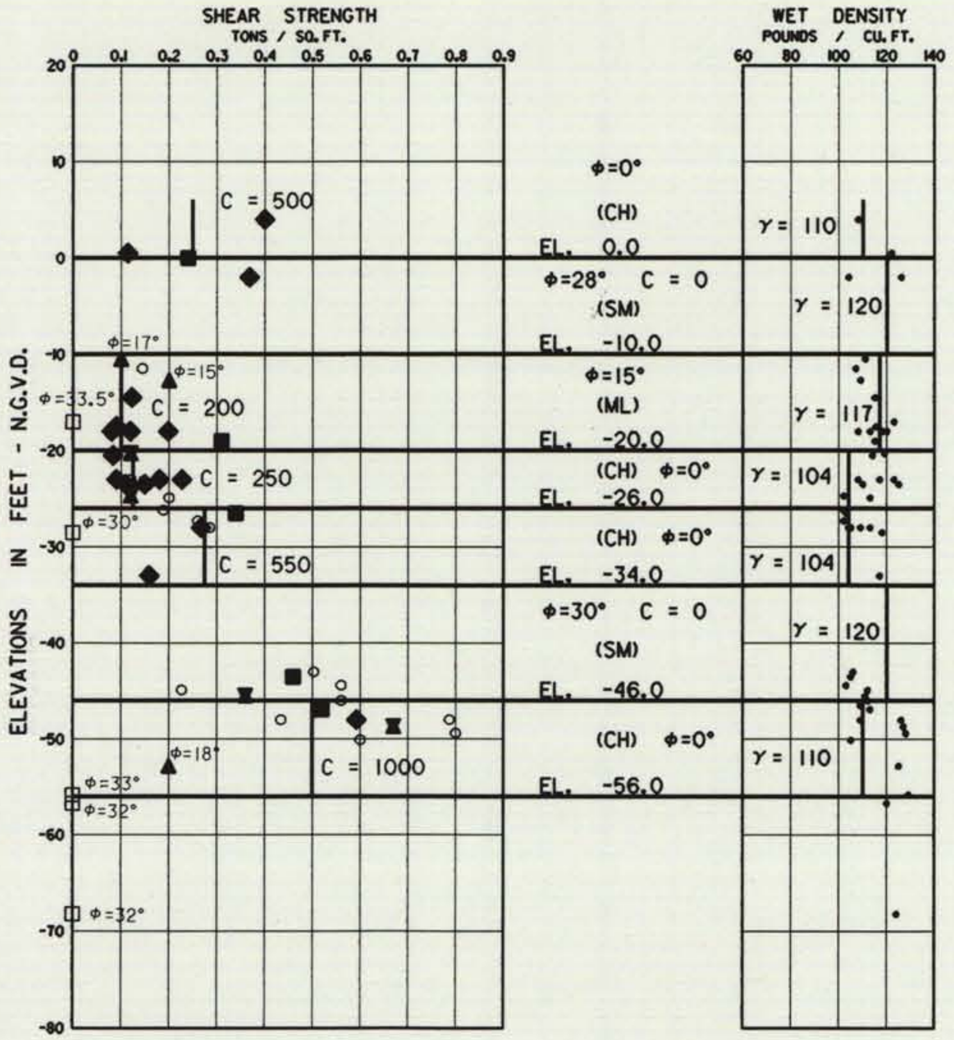
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SOIL DESIGN PARAMETERS
BAYOU ST JOHN

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: STJOHN7.DGN
DRAWN BY: WOODS			FILE NO. H-2-30962
CHECKED BY: RICHARDSON	DATE: APRIL 1993		

PONTCHARTRAIN BEACH



NOTE: FOR DETAIL TEST DATA SEE
1. APPENDIX B FOR AE BORINGS
2. DESIGN MEMORANDUM NO. 13- GENERAL DESIGN, ORLEANS PARISH LAKEFRONT LEVEE, WEST OF IHNC FOR CORPS' BORING 3-ULO.

BORING LEGEND :

◆	BORINGS 1-5 AND BORINGS 7-10	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, 1 POINT (AE CONTRACTOR BORINGS)
■	BORING 3-ULO	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, 3 POINT (CORPS BORING)
⧗	BORING 6-PBU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS, 3 POINT (BORING TAKEN BY AE FOR CORPS)
○		(UC) UNCONFINED COMPRESSION TEST BORINGS: AE CONTRACTOR AND CORPS BORINGS
▲		(R) CONSOLIDATED - UNDRAINED SHEAR TEST BORINGS 3-ULO, 6-PBU
□		(S) CONSOLIDATED - DRAINED SHEAR TEST BORINGS 3-ULO, 6-PBU

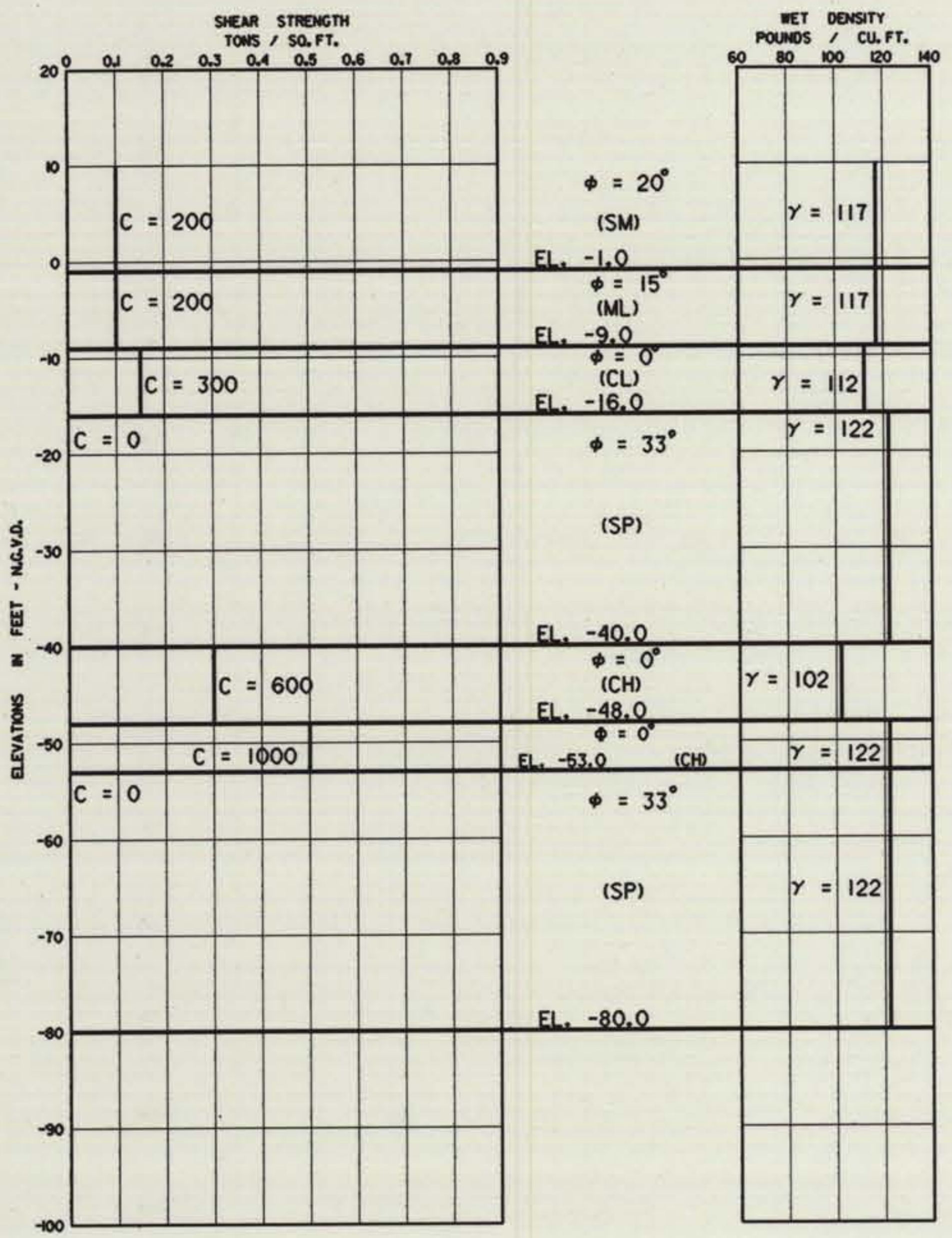
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SOIL DESIGN PARAMETERS
PONTCHARTRAIN BEACH

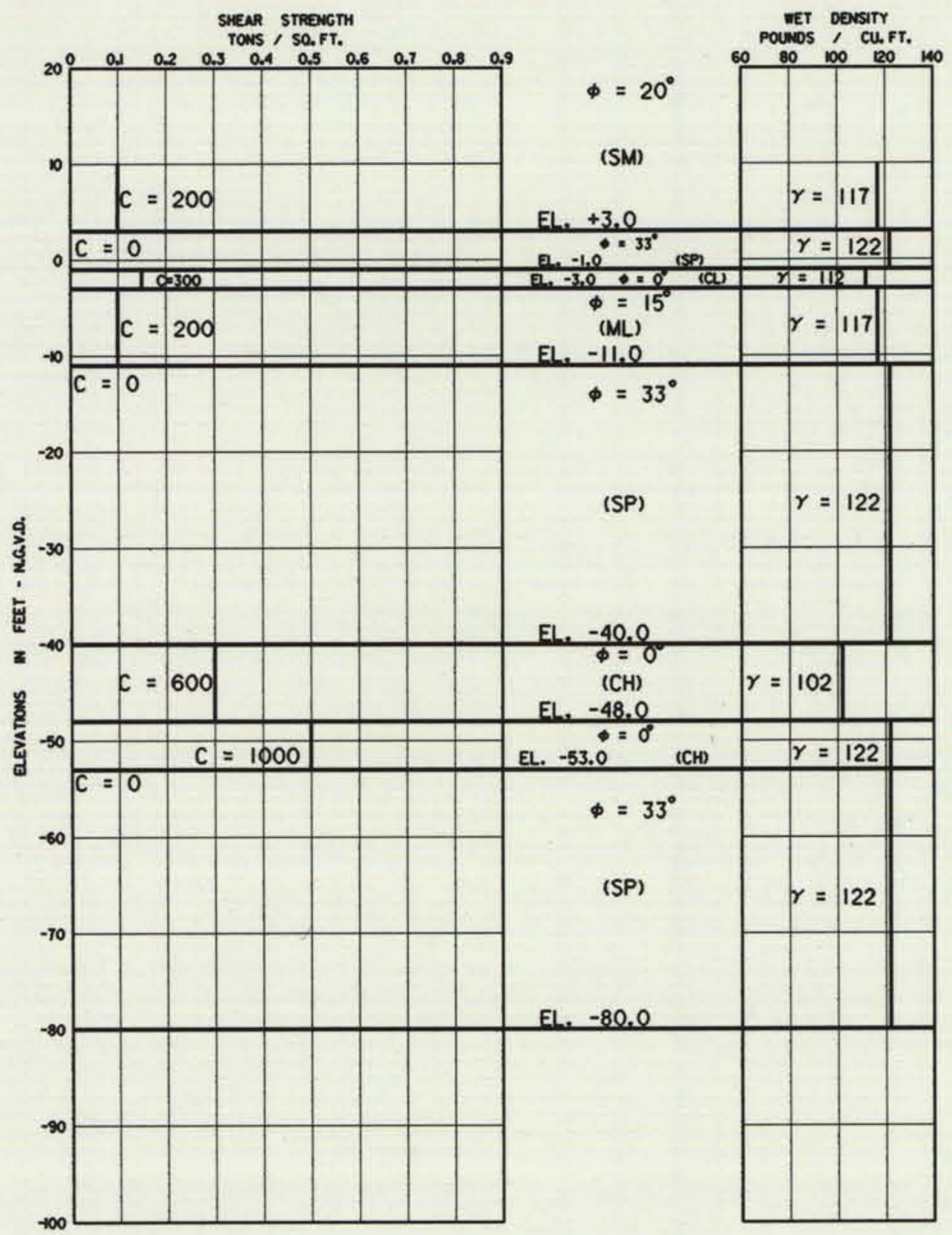
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BEACH2.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

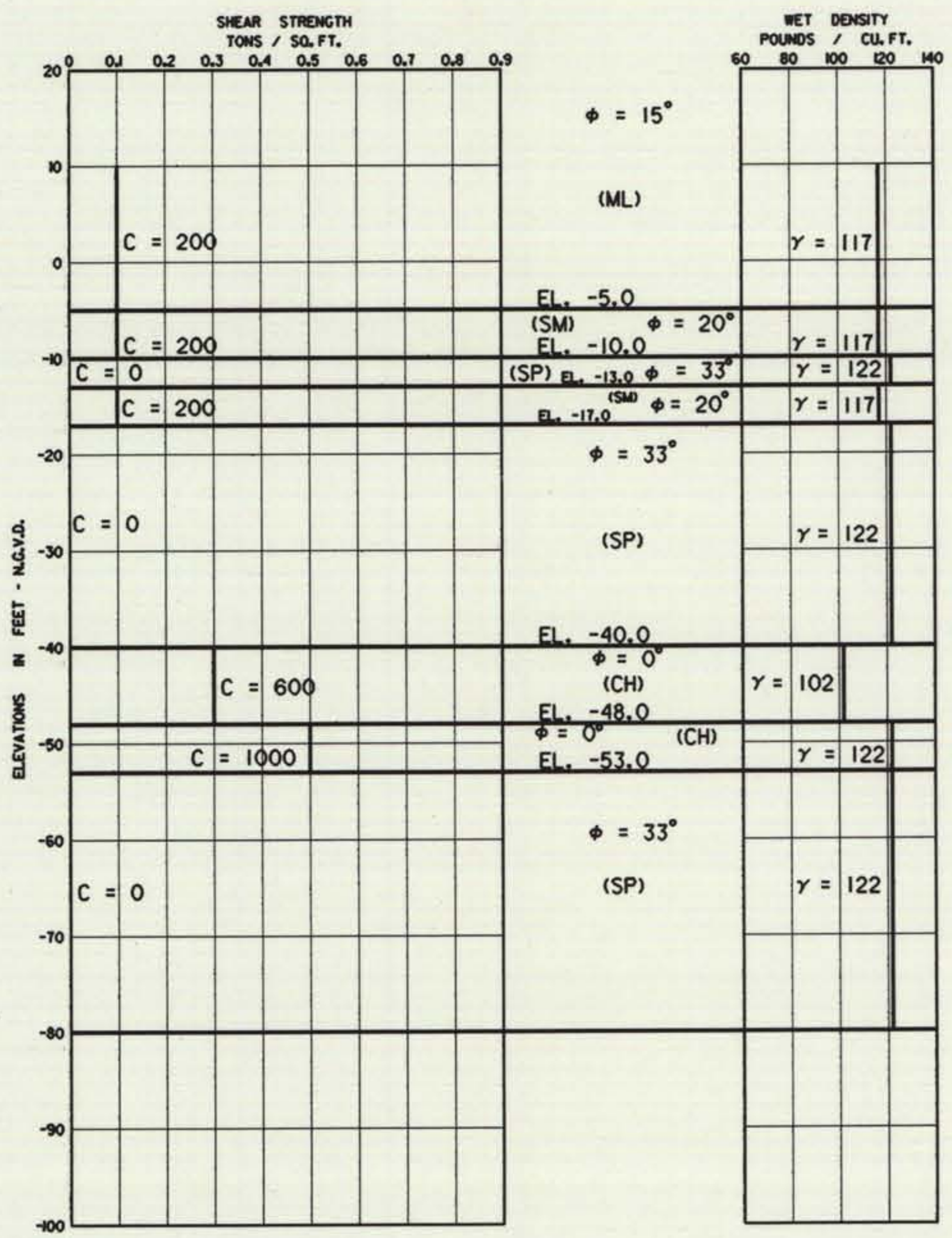
NEW ORLEANS AIRPORT
STA. 10+13.20 TO 18+40 W/L



NEW ORLEANS AIRPORT
STA. 18+40 TO STA. 26+88 W/L



NEW ORLEANS AIRPORT
STA. 26+88 TO STA. 31+06.27 W/L



CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD, DM NO. 2 GENERAL SUPPLEMENT NO. 5A," DATED MAY 1976. SEE PLATES 43, 44, 47 AND 48.

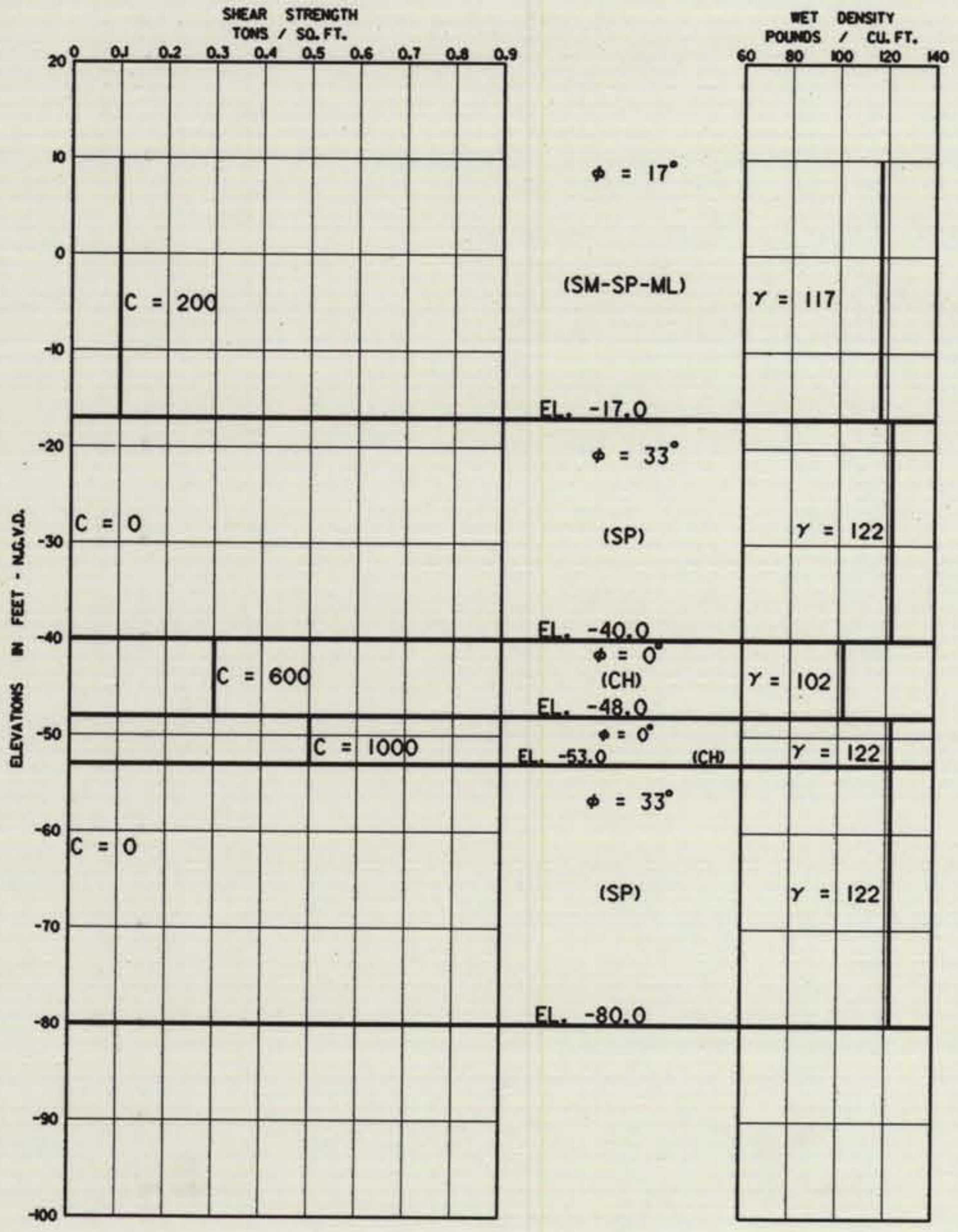
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

SOIL DESIGN PARAMETERS
NEW ORLEANS AIRPORT

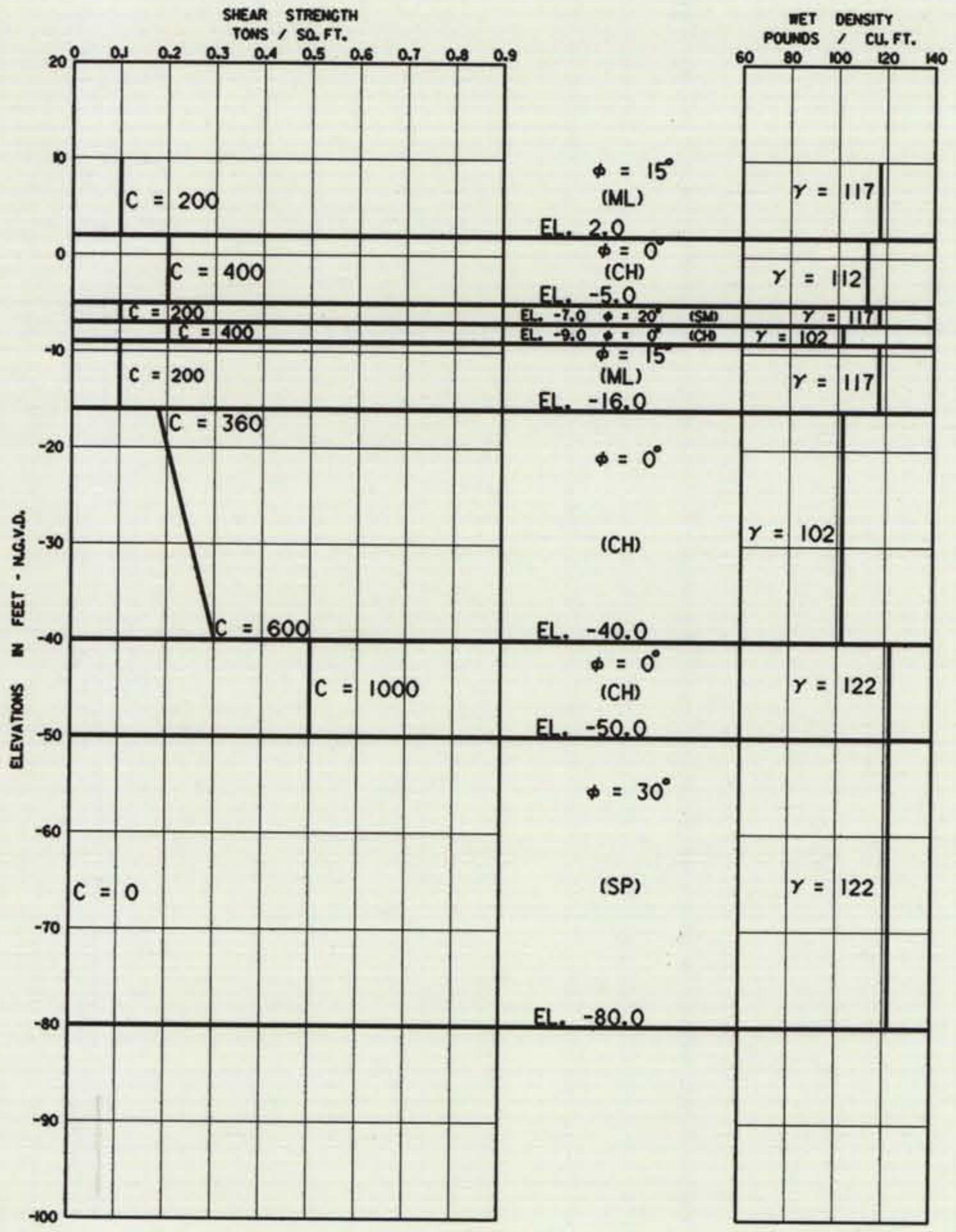
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: STJOHN8.DGN
DRAWN BY: WOODS-I			FILE NO.
CHECKED BY: RICHARDSON	DATE: APRIL 1993		H-2-30962

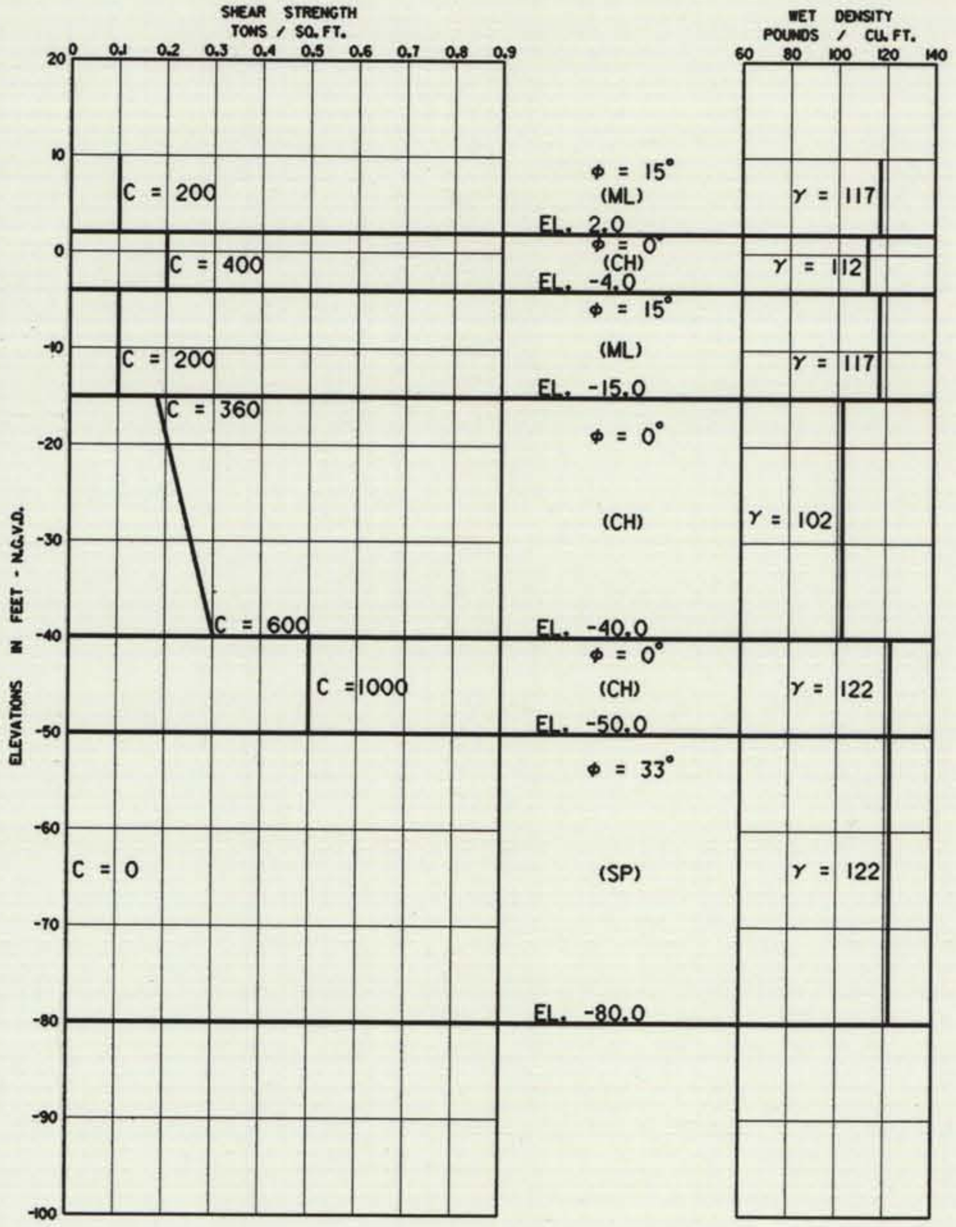
NEW ORLEANS AIRPORT
STA. 31+06.27 TO 32+47.46 W/L



LINCOLN BEACH
STA. 100+00 TO 101+20
STA. 114+23.81 TO 116+41.81 W/L



LINCOLN BEACH
STA. 101+20 TO 114+23.81 W/L



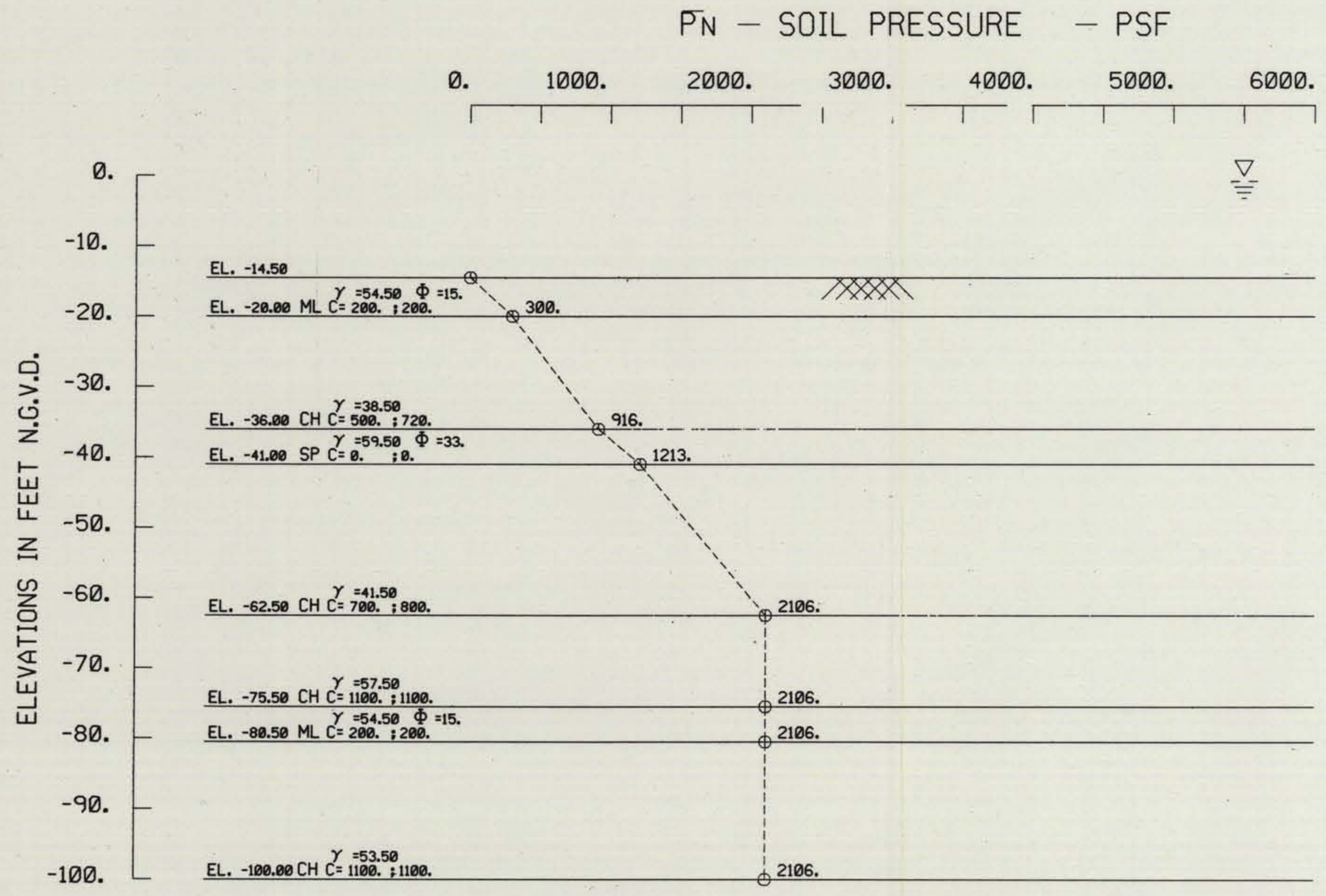
CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD, DM NO. 2 GENERAL SUPPLEMENT NO. 5A," DATED MAY 1976. SEE PLATES 43, 44, 47 AND 48.

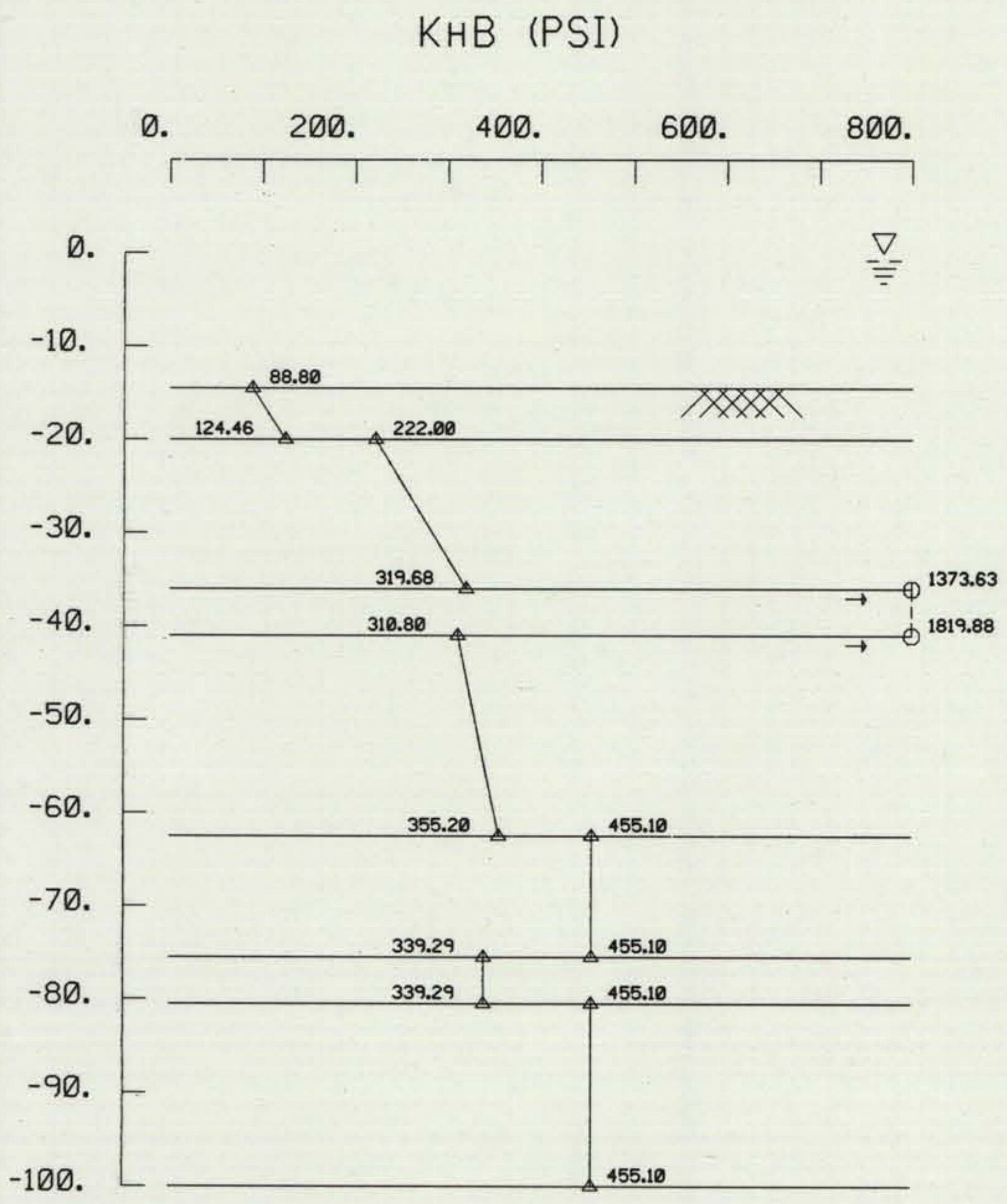
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

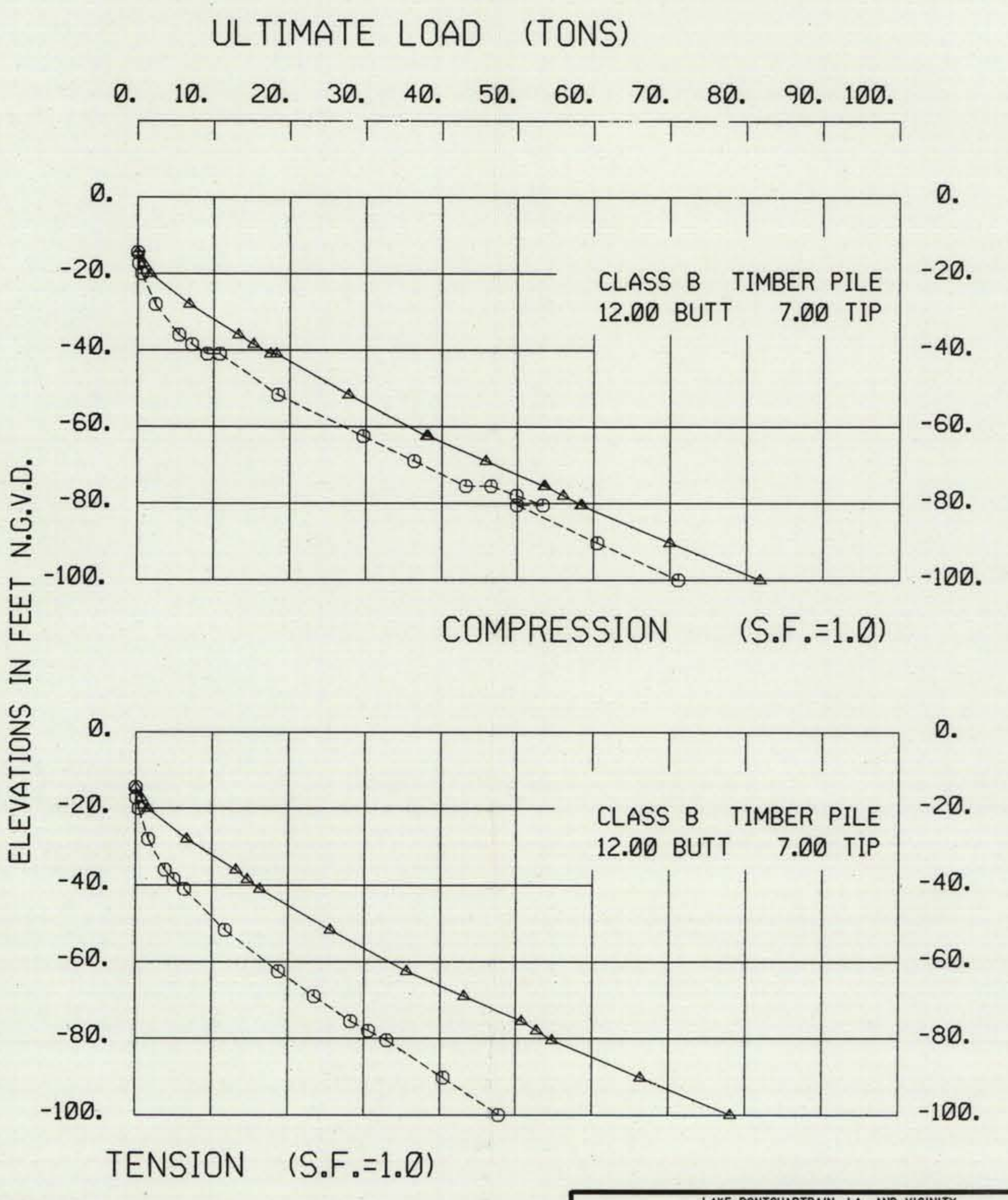
SOIL DESIGN PARAMETERS
NEW ORLEANS AIRPORT & LINCOLN BEACH

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93
DRAWN BY: WOODS-2		CADD FILE: STJOHNS.DGN
CHECKED BY: RICHARDSON	DATE: APRIL 1993	FILE NO. H-2-30962







TYPICAL SOIL PROFILE

SHEAR STRENGTH AND WET DENSITIES
SEE PLATE 56

S-CASE
CH,CL- Φ=23°
ML- Φ=30°
SM,SP- Φ=30°

D	PILE SPACING IN DIRECTION OF LOADING
1.00	8B
.85	7B
.70	6B
.55	5B
.40	4B
.25	3B
C	**LOADING CONDITION**
1.00	INITIAL LOADING
0.30	CYCLIC LOADING

NOTES: KH = αK1/B=(0.2222qu/B)(C)(D) COHESIVE
α = 0.4 = Factor of material properties of soil and pile
k1 = Modulue of subgrade reaction for test plate (pci)
B1 = Width or diameter of test plate (in)
K1 = k1B1 = 80qu(pcf) = 0.5556qu(psi)
qu = 2 c = Unconfined compressive strength (psf)
C = Reduction for cyclic loading-not applicable
D = Group effect reduction factor
B = Width of pile measured at right angles to the direction of displacement (in)
KH = (nh)(Z/B)(C)(D) COHESIONLESS
nh = Coeficient of horizontal subgrade reaction (pci)
Z = Depth below equivalent ground surface (in)

THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX:

$$K_h = \frac{0.2222qu(C)(D)}{(B)}$$

NOTE: ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING F.S. = 2.0 WITH PILE TEST OR F.S. = 3.0 WITHOUT PILE TEST

- - - - - S-CASE
——— Q-CASE

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PILE LOAD CAPACITY CURVES-TIMBER PILES
ORLEANS MARINA EXTENSION
NEW BASIN CANAL SLUICE GATE

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

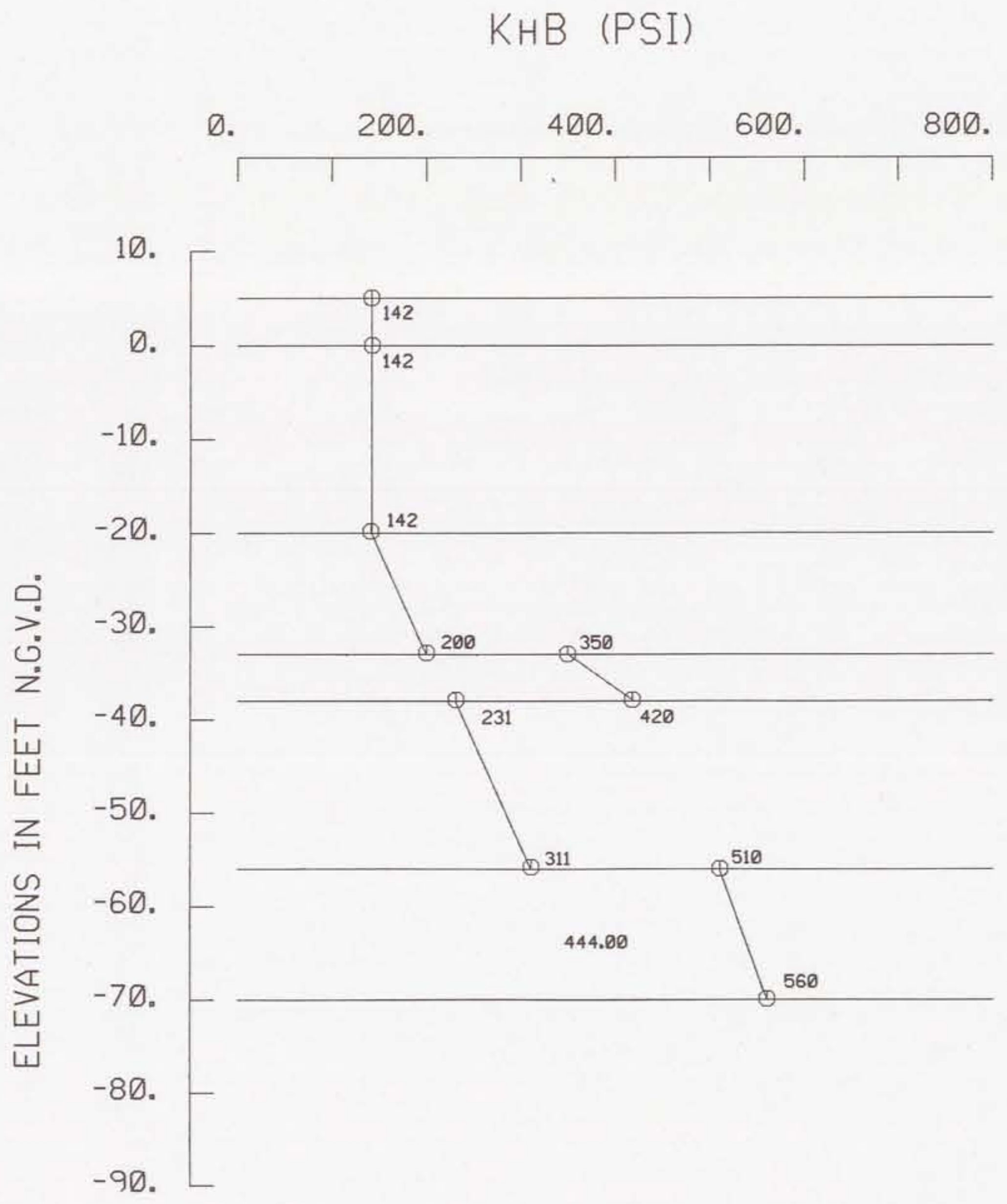
DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: OMPIL.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

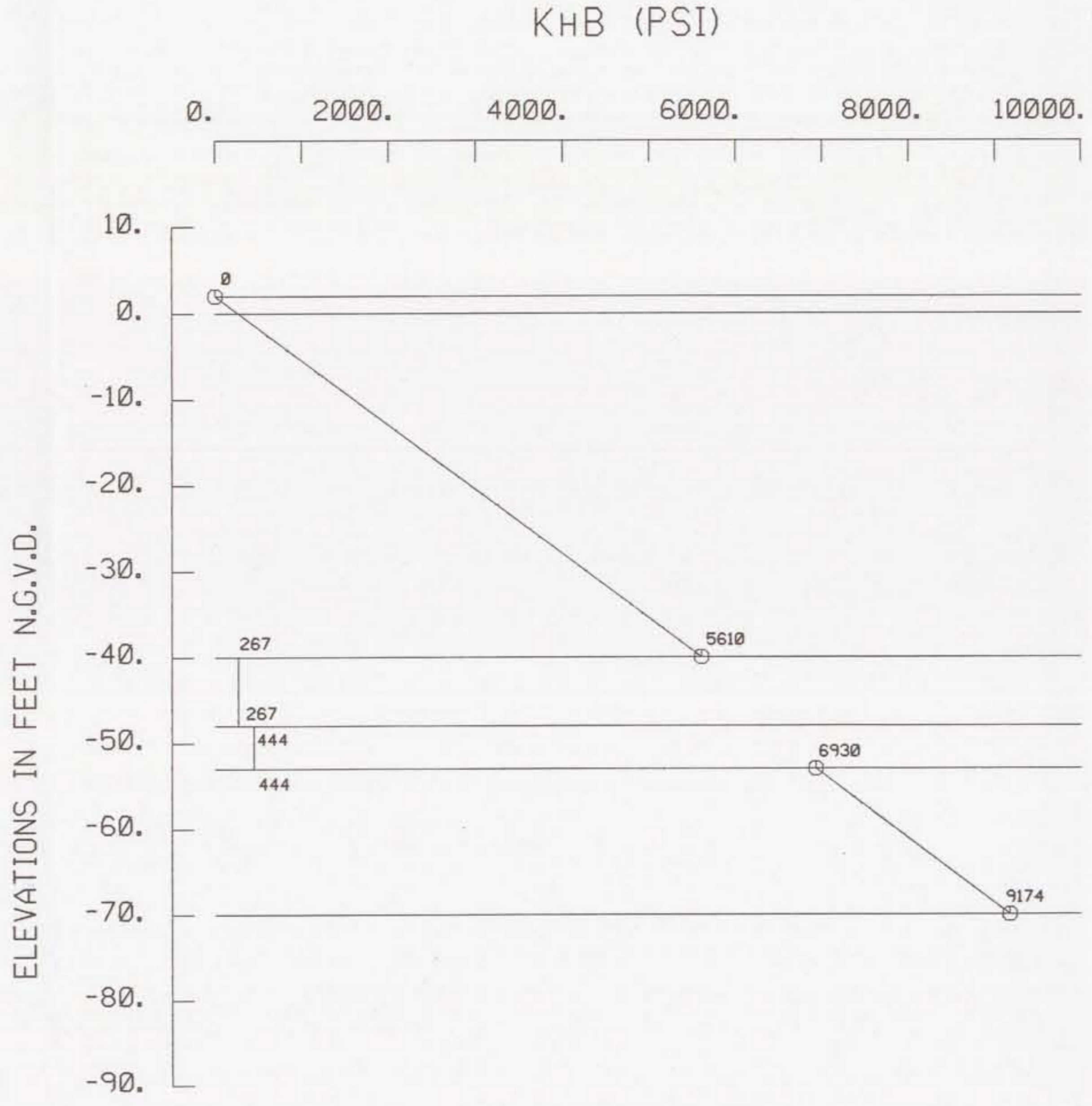
PILE LOAD TEST DATA - ORLEANS MARINA

12" SQUARE PRESTRESSED CONCRETE PILE		
CORPS OF ENGINEERS METHOD	TIP EL. -65.0 COMPRESSION TEST TONS	TIP EL. -64.9 TENSION TEST TONS
a. .25 inches Net Settlement	90	-------
b. Tangent Method	90	-------
c. Slope = 0.01 inch/ton	90	-------
d. 300% Design Load (2 hrs.)	-------	60
Ultimate Capacity $\frac{a+b+c}{3}$ or d	90	60

PILE LOAD TEST DATA - NEW ORLEANS AIRPORT

12" SQUARE PRESTRESSED CONCRETE PILE		
CORPS OF ENGINEERS METHOD	TIP EL. -55.0 COMPRESSION TEST TONS	TIP EL. -55.0 TENSION TEST TONS
a. .25 inches Net Settlement	-------	-------
b. Tangent Method	-------	-------
c. Slope = 0.01 inch/ton	-------	-------
d. 300% Design Load (2 hrs.)	120	60
Ultimate Capacity $\frac{a+b+c}{3}$ or d	120	60





THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX:

$$K_h = \frac{0.2222qu(C)(D)}{(B)}$$

SEE PLATE 61 FOR TABLE OF REDUCTION FACTORS AND ALLOWABLE CAPACITY NOTE.

NOTES: KH = a K1/B=(0.2222qu/B)(C)(D) COHESIVE
- a = 0.4 = Factor of material properties of soil and pile
- k1 = Modulue of subgrade reaction for test plate (pci)
- B1 = Width or diameter of test plate (in)
- K1 = k1B1 = 80qu(pcf) = 0.5556qu(psi)
- qu = 2 c = Unconfined compressive strength (psf)
- C = Reduction for cyclic loading-not applicable
- D = Group effect reduction factor
- B = Width of pile measured at right angles to the direction of displacement (in)
- KH = (nh)(Z/B)(C)(D) COHESIONLESS
- nh = Coeficient of horizontal subgrade reaction (pci)
- Z = Depth below equivalent ground surface (in)

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

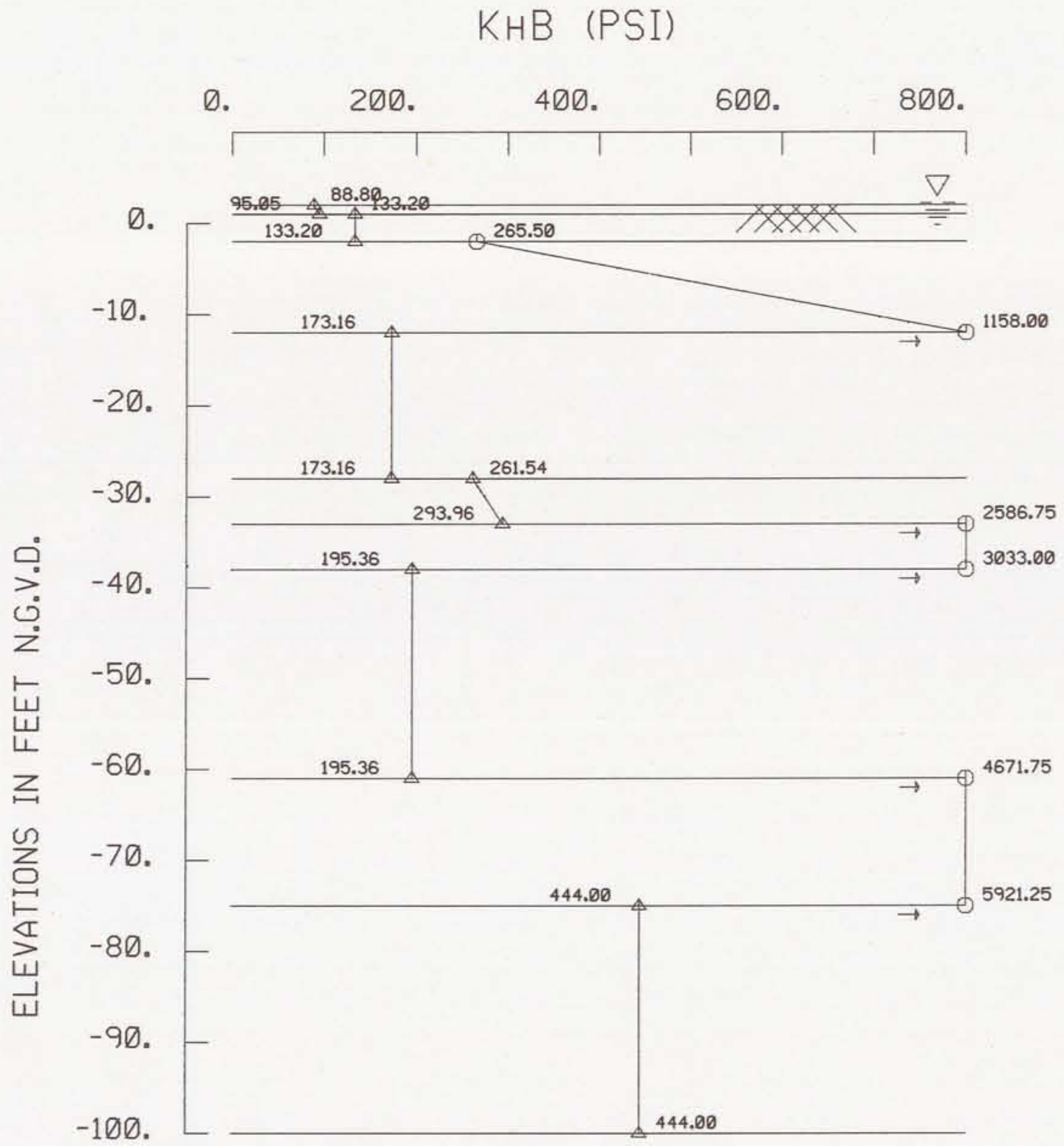
PILE LOAD TEST RESULTS
ORLEANS MARINA AND NEW ORLEANS AIRPORT

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: PILE1.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

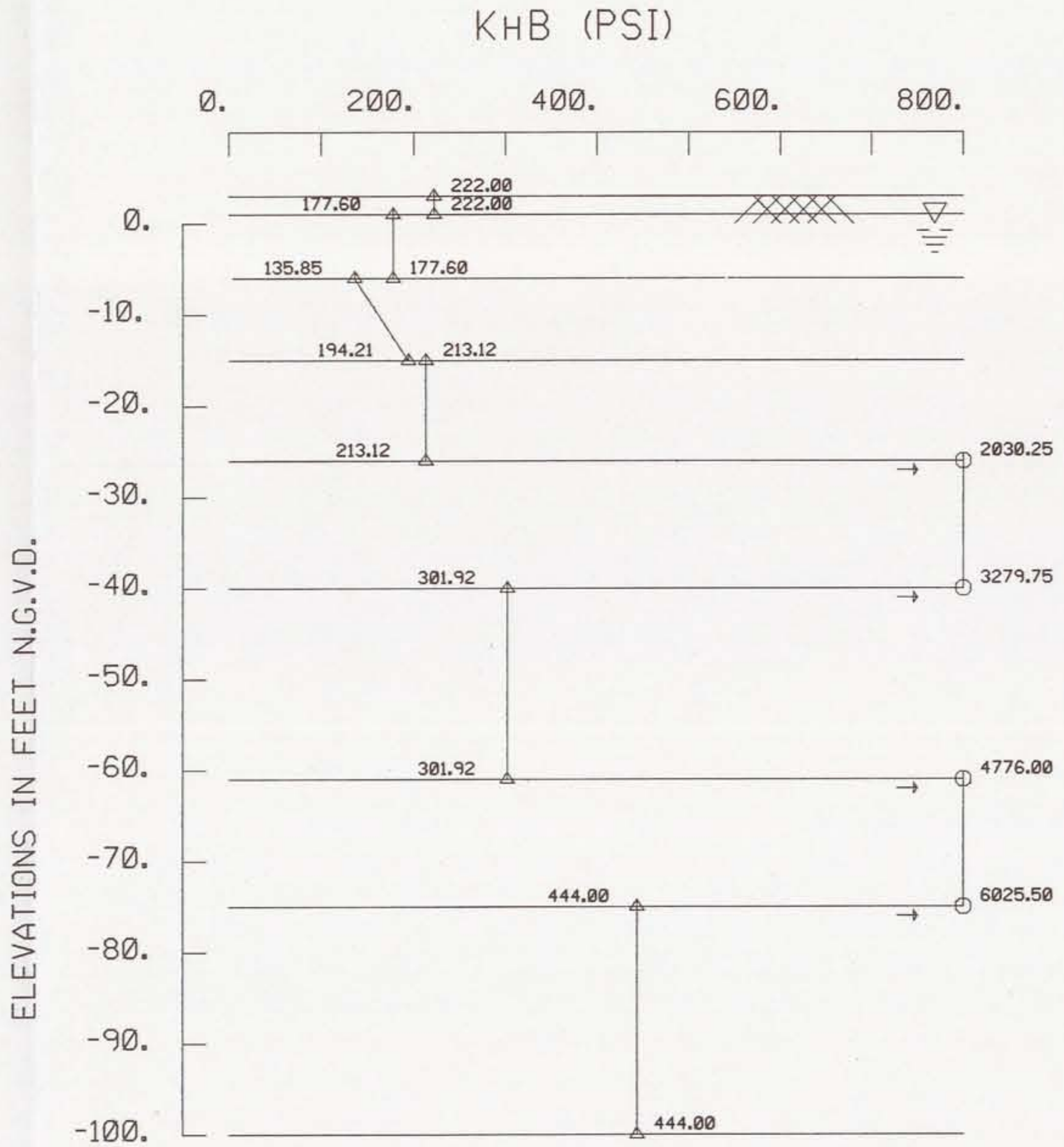
PILE LOAD TEST DATA - BAYOU ST JOHN

16" SQUARE PRESTRESSED CONCRETE PILE		
CORPS OF ENGINEERS METHOD	EAST SIDE ABUTMENT TIP EL. -65.75 COMPRESSION TEST TONS	WEST SIDE BENT #4 TIP EL. -70.75 COMPRESSION TEST TONS
a. .25 inches Net Settlement	-------	153.5
b. Tangent Method	-------	153.5
c. Slope = 0.01 inch/ton	-------	153.5
d. 300% Design Load (1 hr.)	197.4	-------
Ultimate Capacity $\frac{a+b+c}{3}$ or d	197.4	153.5



PILE LOAD TEST DATA - BAYOU ST JOHN

14" SQUARE PRESTRESSED CONCRETE PILE	
CORPS OF ENGINEERS METHOD	EAST SIDE BENT #10 TIP EL. -66.00 COMPRESSION TEST TONS
a. .25 inches Net Settlement	-------
b. Tangent Method	-------
c. Slope = 0.01 inch/ton	-------
d. 300% Design Load (1 hr.)	133.5
Ultimate Capacity $\frac{a+b+c}{3}$ or d	133.5



THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX:

$$K_h = \frac{0.2222qu(C)(D)}{(B)}$$

SEE PLATE 61 FOR TABLE OF REDUCTION FACTORS AND ALLOWABLE CAPACITY NOTE.

NOTES: KH = a K1/B=(0.2222qu/B)(C)(D) COHESIVE
- a = 0.4 = Factor of material properties of soil and pile
- k1 = Modulue of subgrade reaction for test plate (pci)
- B1 = Width or diameter of test plate (in)
- K1 = k1B1 = 80qu(pcf) = 0.5556qu(psi)
- qu = 2 c = Unconfined compressive strength (psf)
- C = Reduction for cyclic loading-not applicable
- D = Group effect reduction factor
- B = Width of pile measured at right angles to the direction of displacement (in)
- KH = (nh)(Z/B)(C)(D) COHESIONLESS
- nh = Coeficient of horizontal subgrade reaction (pci)
- Z = Depth below equivalent ground surface (in)

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

PILE LOAD TEST RESULTS
BAYOU ST JOHN BRIDGE

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

DESIGNED BY: VOJKOVICH / DRAWN BY: WOODS / CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: PILE3.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

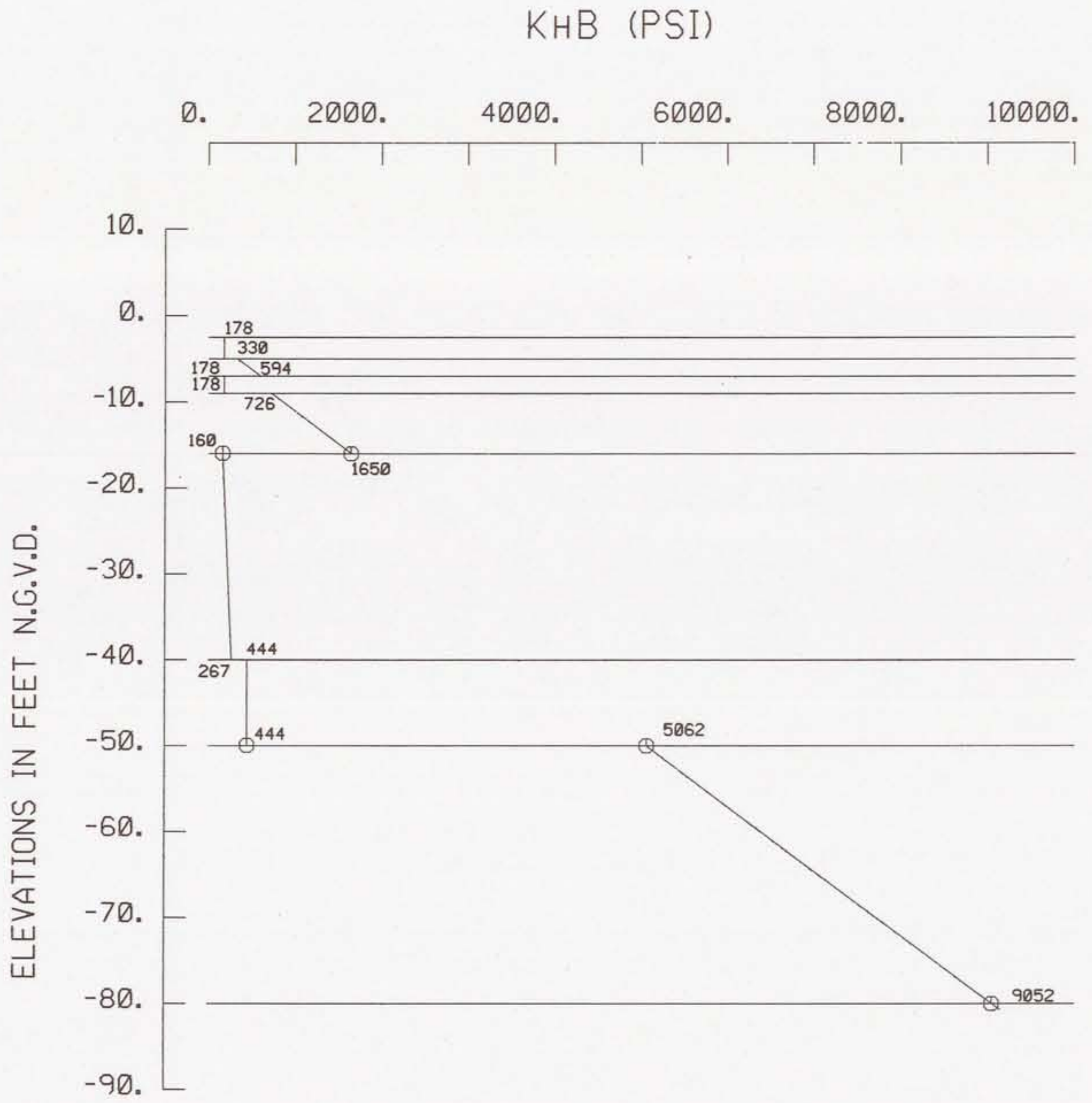
PILE LOAD TEST DATA - LINCOLN BEACH

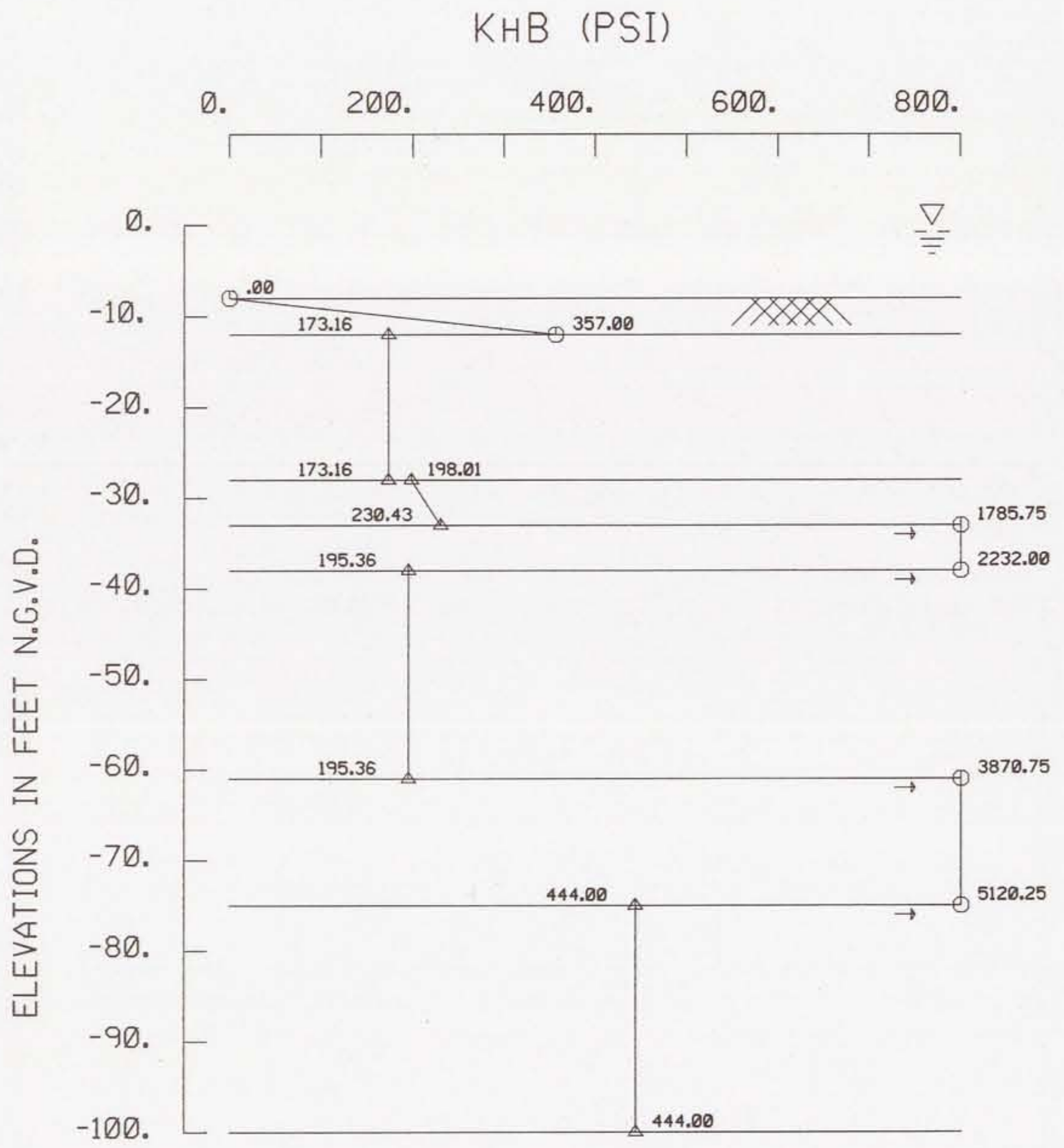
12" SQUARE PRESTRESSED CONCRETE PILE		
CORPS OF ENGINEERS METHOD	TIP EL. -53.6 COMPRESSION TEST TONS	TIP EL. -53.0 TENSION TEST TONS
a. .25 inches Net Settlement	82	-------
b. Tangent Method	83	-------
c. Slope = 0.01 inch/ton	78	-------
d. 300% Design Load (2 hrs.)	-------	60
Ultimate Capacity $\frac{a+b+c}{3}$ or d	81	60

PILE LOAD TEST DATA - BAYOU ST JOHN

14" SQUARE PRESTRESSED CONCRETE PILE		
	SECTOR GATE	
CORPS OF ENGINEERS METHOD	COMPRESSION TEST TONS	TENSION TEST TONS
a. .25 inches Net Settlement	-------	-------
b. Tangent Method	-------	-------
c. Slope = 0.01 inch/ton	-------	-------
d. 300% Design Load (2 hrs.)	165	90*
Ultimate Capacity $\frac{a+b+c}{3}$ or d	165	90

* TOP OF THE TWO CONCRETE PILES CRUMBLED WHERE THE UPLIFT STRAP WAS FIXED DURING THE APPLICATION OF THE 300% LOAD. PILE DID NOT COME CLOSE TO ANY OF THE a, b, or c FAILURE CRITERIA AT THE END OF THE 24 HOUR HOLD UNDER 200% LOAD.





THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX:

$$K_h = \frac{0.2222qu(C)(D)}{(B)}$$

SEE PLATE 61 FOR TABLE OF REDUCTION FACTORS AND ALLOWABLE CAPACITY NOTE.

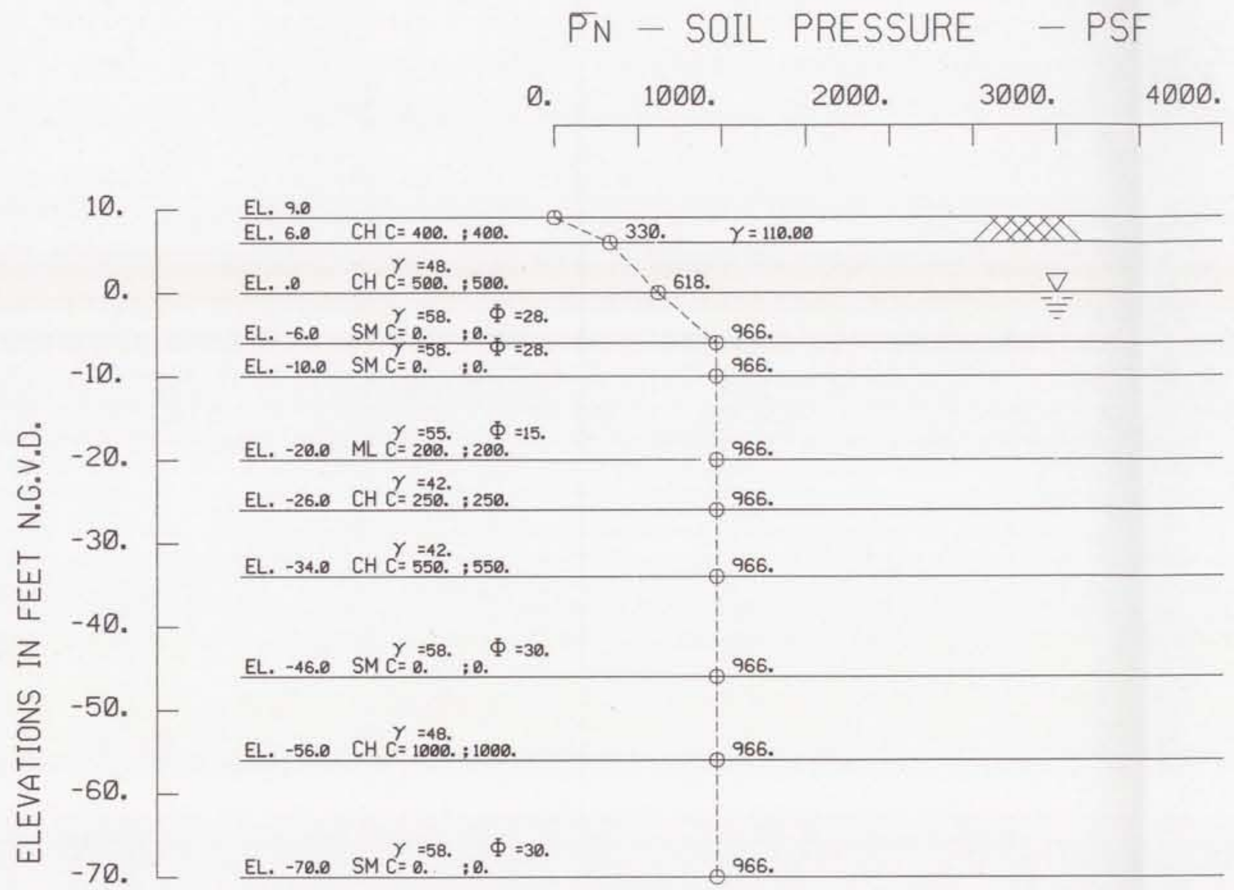
NOTES:
- KH = a K1/B=(0.2222qu/B)(C)(D) COHESIVE
- a = 0.4 = Factor of material properties of soil and pile
- k1 = Modulue of subgrade reaction for test plate (pci)
- B1 = Width or diameter of test plate (in)
- K1 = k1B1 = 80qu(pcf) = 0.5556qu(psi)
- qu = 2 c = Unconfined compressive strength (psf)
- C = Reduction for cyclic loading-not applicable
- D = Group effect reduction factor
- B = Width of pile measured at right angles to the direction of displacement (in)
- KH = (nh)(Z/B)(C)(D) COHESIONLESS
- nh = Coeficient of horizontal subgrade reaction (pci)
- Z = Depth below equivalent ground surface (in)

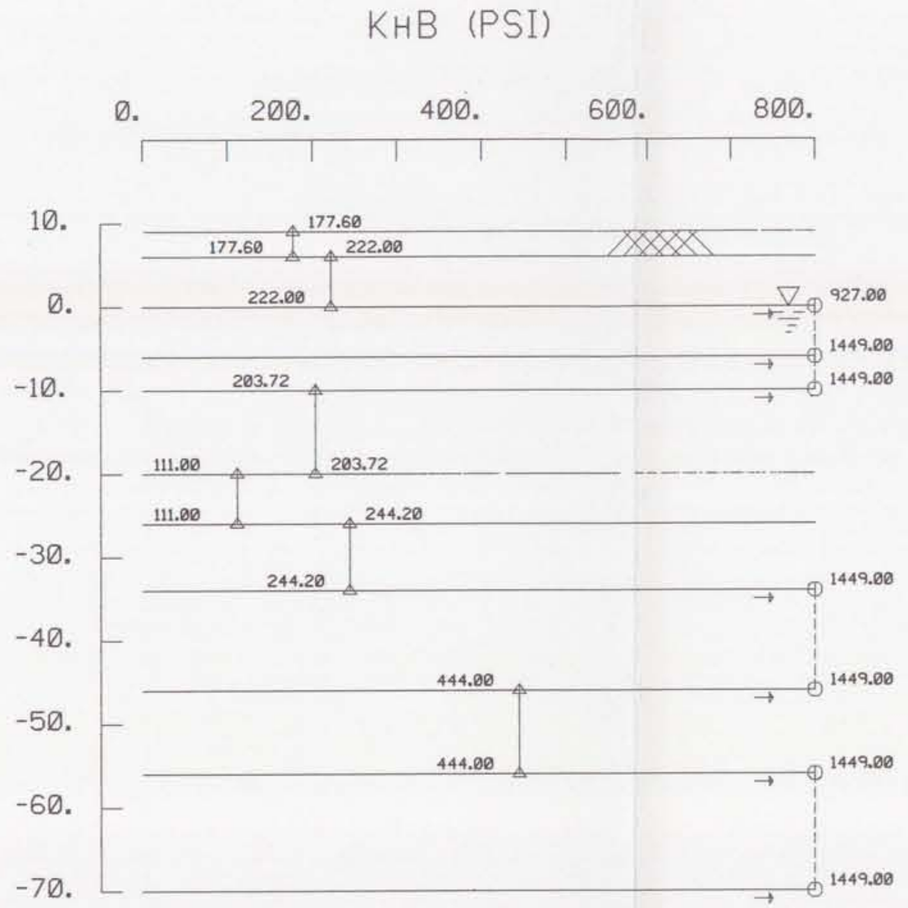
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

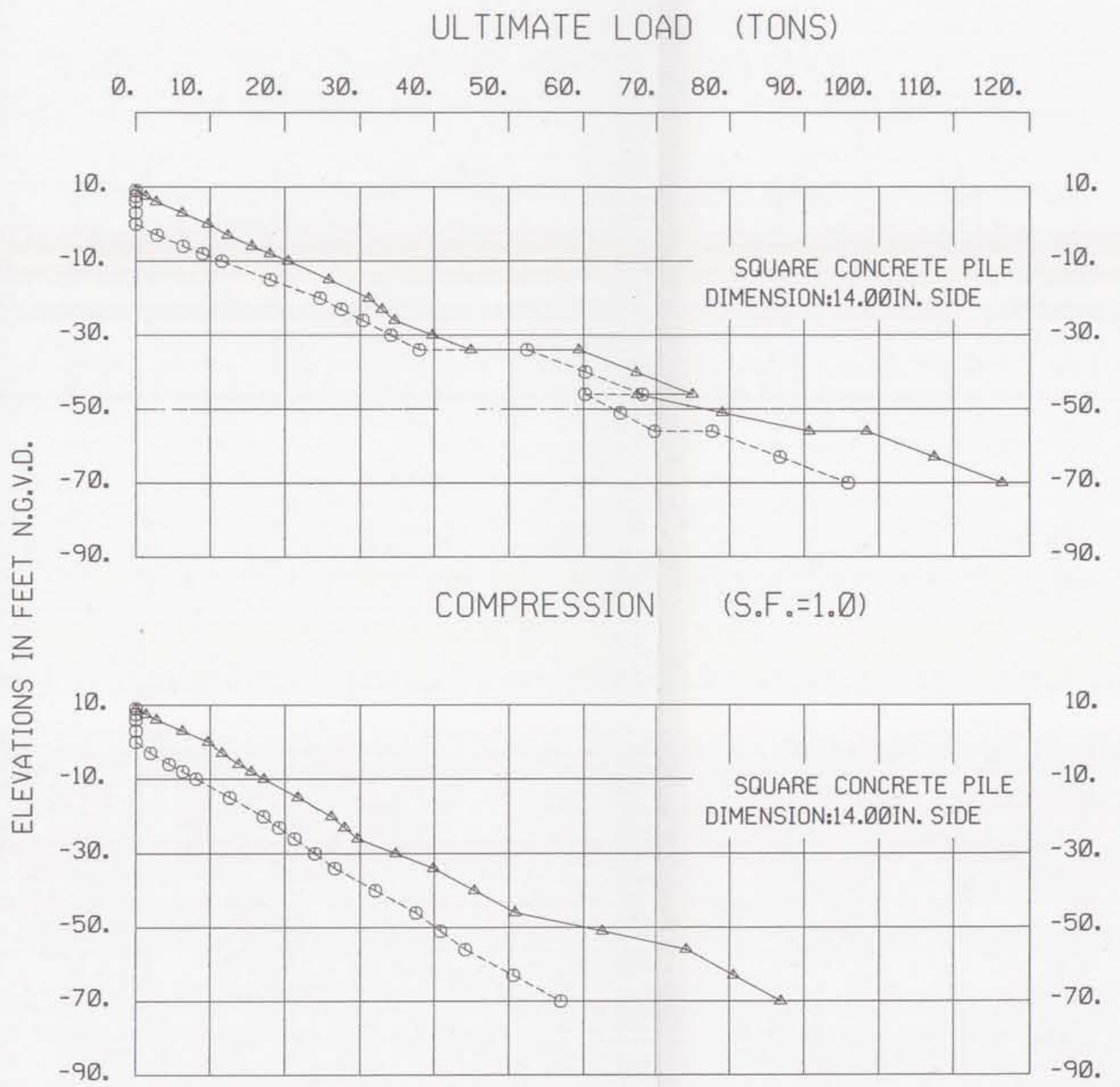
PILE LOAD TEST RESULTS
LINCOLN BEACH AND BAYOU ST JOHN

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: PILE2.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962







COMPRESSION (S.F.=1.0)

TENSION (S.F.=1.0)

TYPICAL SOIL PROFILE

SOIL STRATIFICATION, SHEAR STRENGTH AND WET DENSITIES SEE PLATE 58

S-CASE
CH,CL- Φ=23°
ML- Φ=30°
SM,SP- Φ=30°

D	PILE SPACING IN DIRECTION OF LOADING
1.00	8B
.85	7B
.70	6B
.55	5B
.40	4B
.25	3B

C	LOADING CONDITION
1.00	INITIAL LOADING
0.30	CYCLIC LOADING

NOTES:
- KH = a K1/B=(0.2222qu/B)(C)(D) COHESIVE
- a = 0.4 = Factor of material properties of soil and pile
- k1 = Modulue of subgrade reaction for test plate (pci)
- B1 = Width or diameter of test plate (in)
- K1 = k1B1 = 80qu(pcf) = 0.5556qu(psi)
- qu = 2 c = Unconfined compressive strength (psf)
- C = Reduction for cyclic loading-not applicable
- D = Group effect reduction factor
- B = Width of pile measured at right angles to the direction of displacement (in)
- KH = (nh)(Z/B)(C)(D) COHESIONLESS
- nh = Coeficient of horizontal subgrade reaction (pci)
- Z = Depth below equivalent ground surface (in)

THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX:

$$K_h = \frac{0.2222qu(C)(D)}{(B)}$$

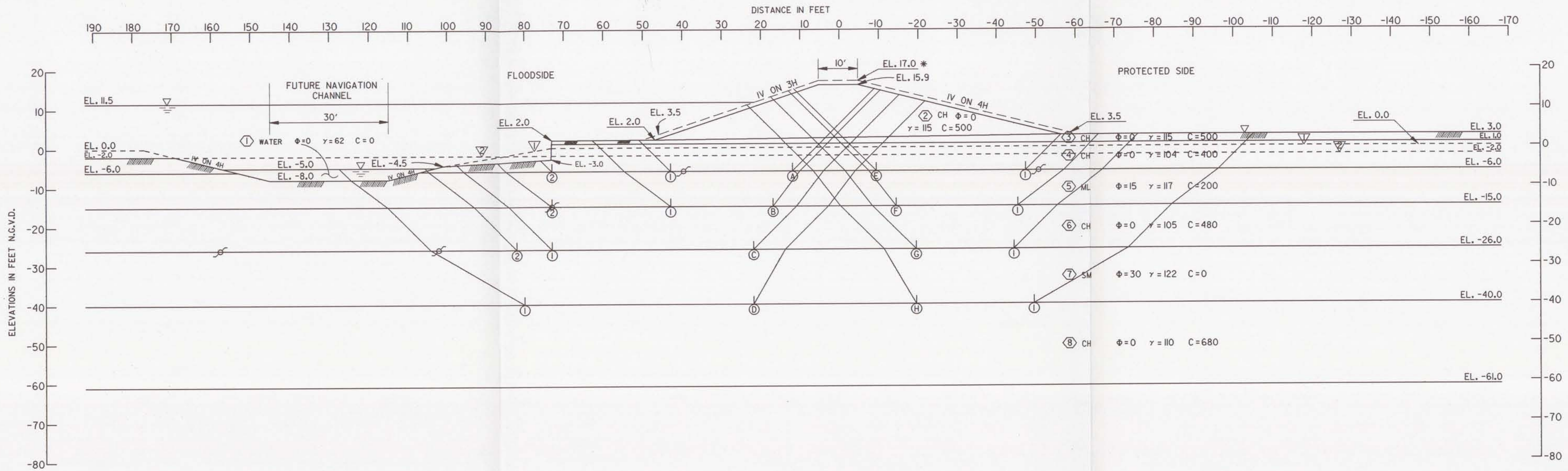
NOTE: ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING F.S. = 2.0 WITH PILE TEST OR F.S. = 3.0 WITHOUT PILE TEST

- - - - - S-CASE
———— Q-CASE

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
PONTCHARTRAIN BEACH FLOODGATES 1, 2 & 3
PILE CAPACITY CURVES — 14" CONCRETE PILES

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

DESIGNED BY: PINNER
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE			RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.		ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A	1	-6.0	19460	12345	6586	26132	3714	38391	22418	1.71
A	2	-6.0	19460	22153	2285	26132	511	43898	25621	1.71
B	1	-15.0	29457	12480	16271	50147	15924	58208	34223	1.70
B	2	-15.0	29457	26880	7868	50147	7587	64205	42560	1.51
C	1	-26.0	39653	24480	17900	91293	27963	82033	63330	1.30
C	2	-26.0	39653	28800	16813	91293	26677	85266	64616	1.32
D	1	-40.0	67121	39440	51815	162470	68349	158376	94121	1.68
E	1	-6.0	20601	15065	7600	28749	5552	43266	23197	1.87
F	1	-15.0	29010	14880	17028	54038	19082	60918	34956	1.74
G	1	-26.0	38566	12000	26866	96674	48287	77432	48387	1.60
H	1	-40.0	67284	20400	85997	169516	102905	173681	66611	2.61

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

* PROTECTED SIDE STABILITY ANALYSIS WAS PERFORMED WITH LEVEE CROWN EL. 17.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.

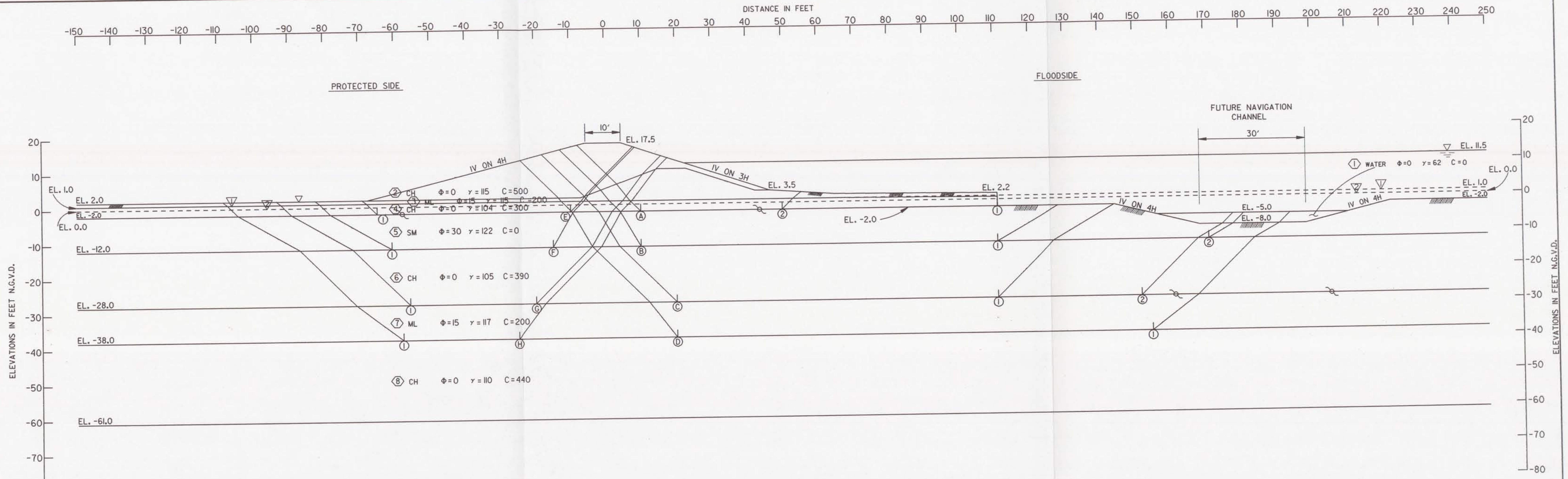
1 1 PH LINE IN STRATUM 5 FLOODSIDE ANALYSIS

2 2 PH LINE IN STRATUM 7 FLOODSIDE ANALYSIS

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
BAYOU ST JOHN
STA 6+43 TO 13+11 EAST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUELAZ.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	-2.0	17550	20887	58	21081	20	38495	21061	1.83
Ⓐ ②	-2.0	17550	11659	2927	21081	1426	32136	19655	1.63
Ⓑ ①	-12.0	31320	39390	2223	48044	6111	72933	41933	1.74
Ⓑ ②	-12.0	31320	48977	0	48044	2007	80297	46037	1.74
Ⓒ ①	-28.0	43250	35490	14677	110942	39077	93417	71865	1.30
Ⓒ ②	-28.0	43250	51480	12480	110942	28435	107210	82507	1.30
Ⓓ ①	-38.0	57504	59400	24559	163199	56713	141463	106486	1.33
Ⓔ ①	-2.0	17221	16076	2362	21226	968	35659	20258	1.76
Ⓕ ①	--12.0	31262	17940	13823	47544	11602	63025	35942	1.75
Ⓖ ①	-28.0	41372	14040	25581	111832	52965	80993	58867	1.38
Ⓗ ①	-38.0	56081	14520	44419	163902	91166	115020	72736	1.58

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

① ① PH LINE IN STRATA ③ & ⑤ FLOODSIDE ANALYSIS

② ② PH LINE IN STRATUM ⑦ FLOODSIDE ANALYSIS

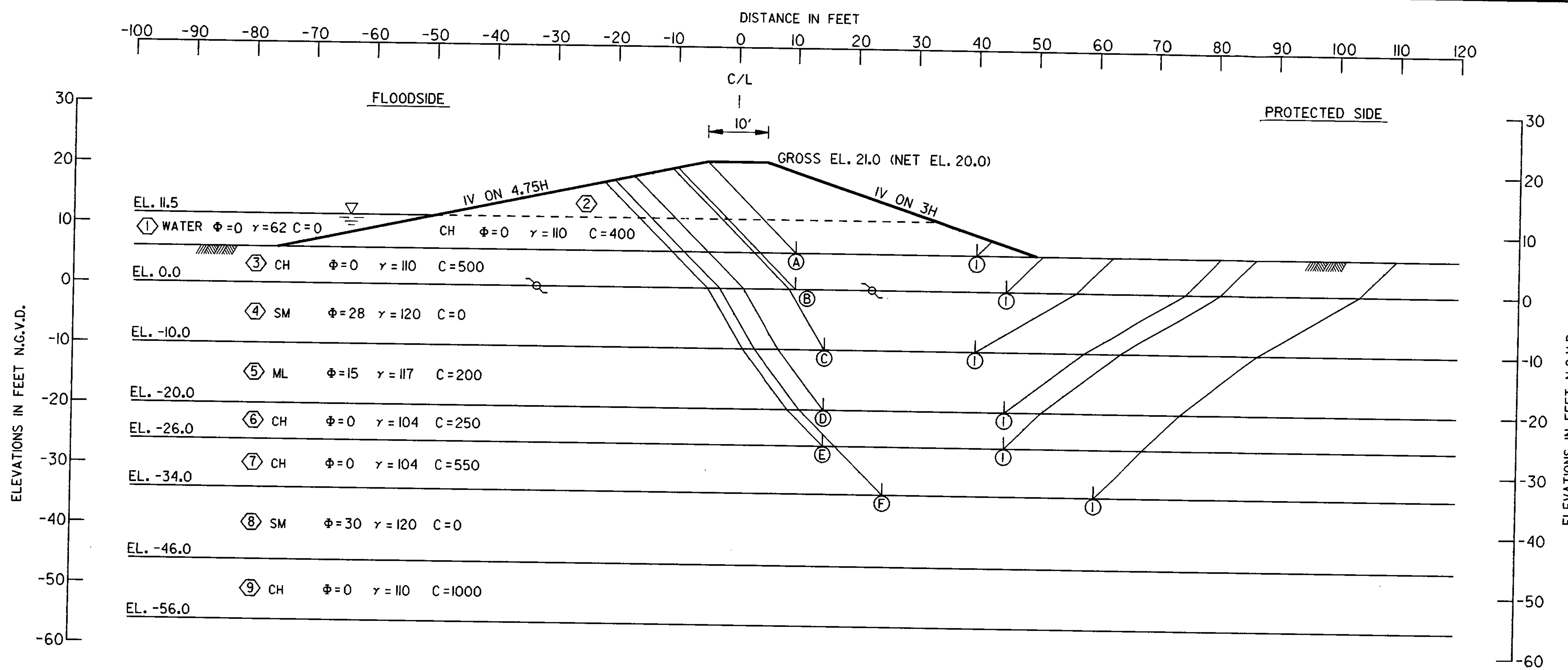
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
BAYOU ST JOHN
STA 3+80 TO STA 9+18 WEST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUWL.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE NO.	ELEV.	RESISTING FORCES R_A	R_B	R_P	DRIVING FORCES D_A	$-D_P$	SUMMATION OF FORCES RESISTING	DRIVING	FACTOR OF SAFETY
Ⓐ Ⓘ	6.0	12000	12000	1999	11913	458	25999	11455	2.27
Ⓑ Ⓘ	.0	17165	13404	6000	23448	2438	36569	21010	1.74
Ⓒ Ⓘ	-10.0	27388	14100	16238	50020	15680	57726	34340	1.68
Ⓓ Ⓘ	-20.0	40021	7500	29135	89809	39380	76656	50429	1.52
Ⓔ Ⓘ	-26.0	43065	7500	32253	118235	59538	82818	58697	1.41
Ⓕ Ⓘ	-34.0	51946	19250	41052	159132	91638	112248	67494	1.66

SEEPAGE ANALYSIS IS BASED ON LANE'S WEIGHTED CREEP RATIO.
ASSUME UPPER LAYER IS A SILTY FINE SAND, THEREFORE
LWCR $\geq$ 8.

$$LWCR = \frac{\text{WEIGHTED CREEP DISTANCE}}{\Delta \text{ HEAD}}$$

$$= \frac{(71' + 10 + 45) \div 3}{11.5 - 6} = 7.6 \approx 8 \quad \text{OK.}$$

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 58.

NOTES

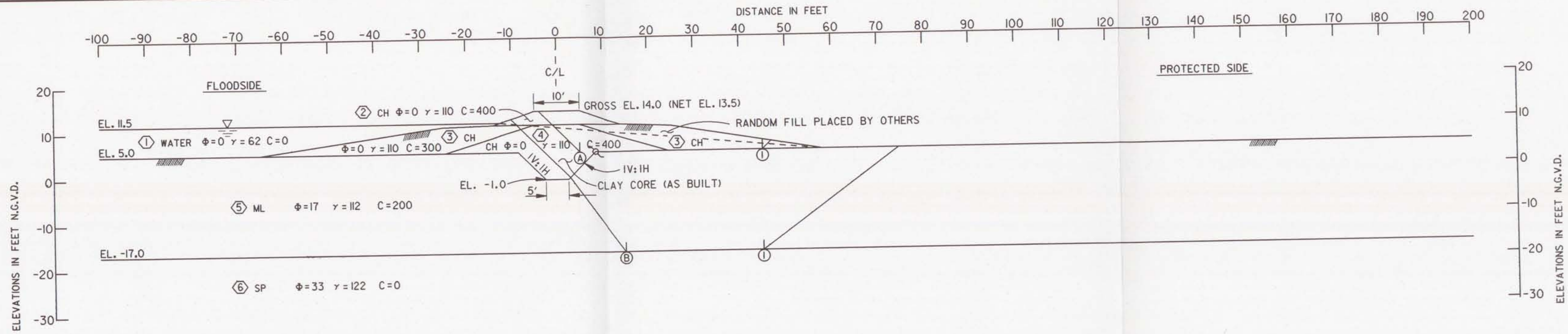
- Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
- C -- UNIT COHESION, P.S.F.
- ∇ -- STATIC WATER SURFACE
- D -- HORIZONTAL DRIVING FORCE IN POUNDS
- R -- HORIZONTAL RESISTING FORCE IN POUNDS
- A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
- B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
- P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
PONTCHARTRAIN BEACH
B/L 'C' STAS 43+59 TO 46+02, & 50+50 TO 58+13

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

DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: PB21.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	5.0	7200	12693	1114	4455	221	21007	4234	4.96
Ⓑ ①	-17.0	24192	19008	22055	50181	28249	65255	21932	2.98

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
   SEE SOIL PARAMETER PLATE 60.

2. UNDERSEEPAGE WAS CHECKED BY THE LANE'S WEIGHTED CREEP RATIO METHOD AND THE SECTION WAS DETERMINED TO BE ADEQUATE AGAINST PIPING.

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

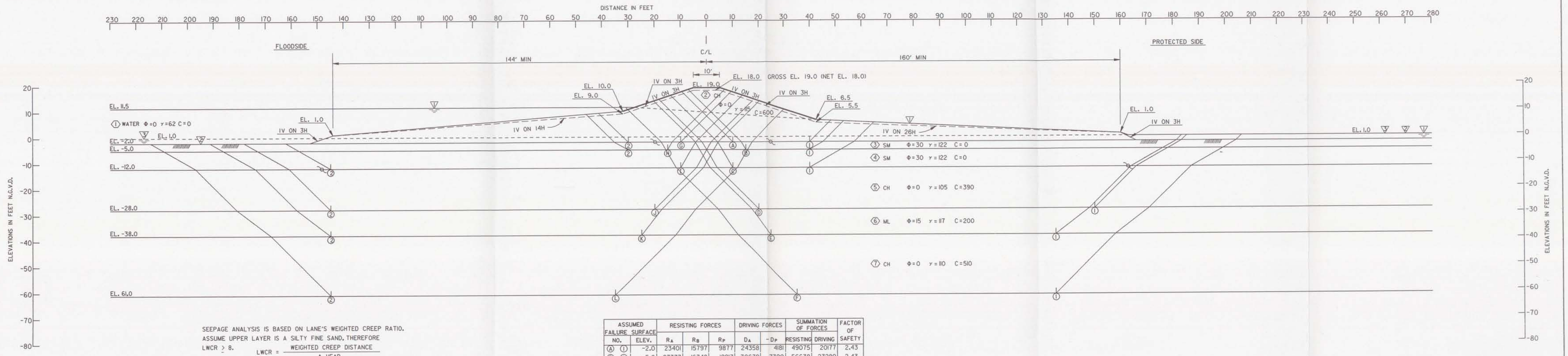
$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
NEW ORLEANS AIRPORT
W/L STA 32+75 TO W/L STA 33+21

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

DESIGNED BY: PINNER
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
CADD FILE: NOA33.DGN
FILE NO. H-2-30962
DATE: APRIL 1993

PLATE 69



SEEPAGE ANALYSIS IS BASED ON LANE'S WEIGHTED CREEP RATIO. ASSUME UPPER LAYER IS A SILTY FINE SAND, THEREFORE LWCR $\geq$ 8.

$$LWCR = \frac{\text{WEIGHTED CREEP DISTANCE}}{\Delta \text{ HEAD}} = \frac{(153 + 169) \div 3}{11.5 - (-2)} = 8 \text{ OK.}$$

ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	-2.0	23401	15797	9877	24358	4181	49075	20177	2.43
Ⓑ ①	-5.0	27373	16348	12917	30679	7390	56638	23289	2.43
Ⓒ ①	-12.0	34602	11700	23610	52780	18948	69912	33832	2.07
Ⓓ ①	-28.0	45659	50700	18429	118347	45464	114788	72883	1.57
Ⓔ ①	-38.0	59016	55550	35923	171081	85281	150489	85800	1.75
Ⓕ ①	-61.0	77324	50500	57984	329376	211610	185808	117766	1.58
Ⓖ ②	-2.0	23400	12000	13506	24358	7928	48906	16430	2.98
Ⓗ ②	-5.0	28438	15567	21141	30678	12044	65146	18634	3.50
Ⓘ ②	-12.0	38362	52650	6489	52780	6807	97501	45973	2.12
Ⓙ ②	-28.0	49598	48750	18429	118346	40284	116777	78062	1.50
Ⓚ ②	-38.0	65097	61200	34233	171080	74848	160530	96232	1.67
Ⓛ ②	-61.0	84259	56100	57035	329412	197834	197394	131578	1.50

▽1 ▽1 PH LINE IN ALL STRATA PROTECTED SIDE ANALYSIS

▽2 ▽2 PH LINE IN STRATA ① THRU ④ FLOODSIDE ANALYSIS

▽3 ▽3 PH LINE IN STRATA ⑤ THRU ⑦ FLOODSIDE ANALYSIS

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57 AND APPENDIX B. THE STRENGTH PARAMETERS FOR STRATUM NO. 7 SHOWN ON PLATE 57 WERE MODIFIED BASED ON THE TESTS OF BORINGS SHOWN IN APPENDIX B.

NOTES

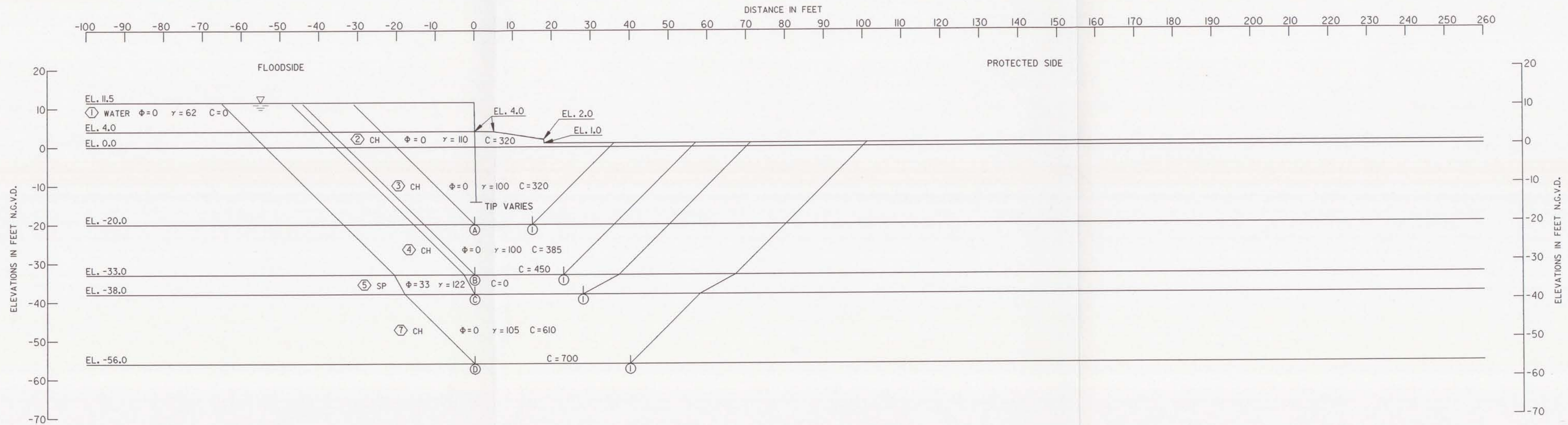
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
BAYOU ST JOHN
EARTHEN CLOSURE
STABILITY ANALYSIS

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

DESIGNED BY: WAGUESPACK DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: LPBSJUE.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A I	-20.0	15360	4800	13440	41561	22639	33600	18922	1.78
B I	-33.0	25370	10350	23450	87476	58133	59170	29343	2.02
C I	-38.0	30779	14560	40597	109885	76708	85936	33177	2.59
D I	-56.0	52676	28000	62467	213309	166075	143143	47234	3.03

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

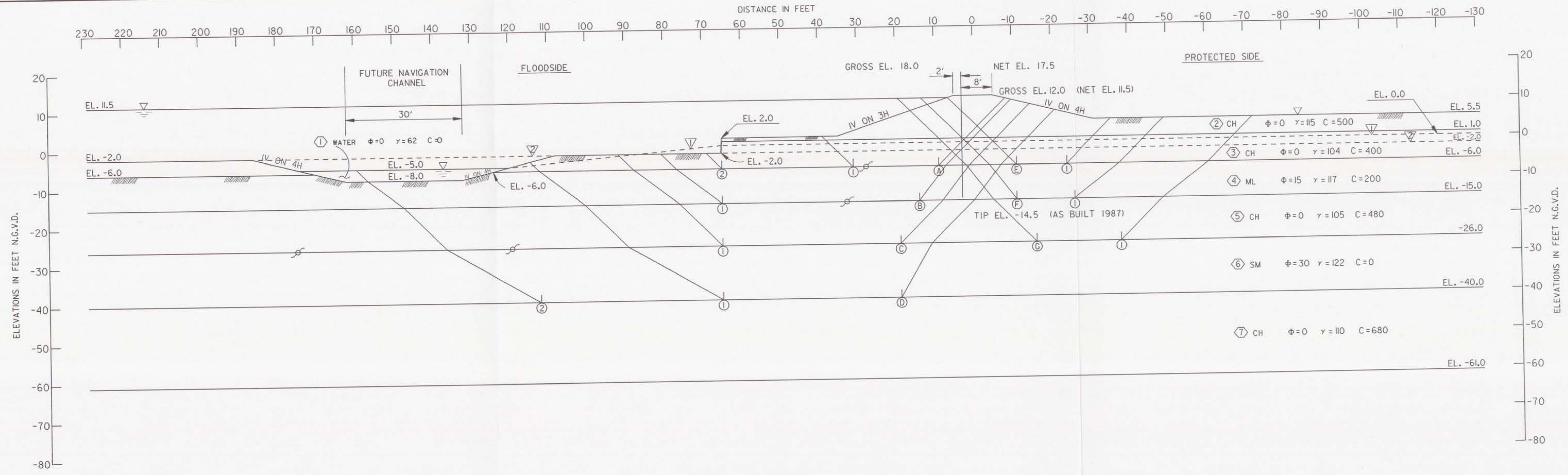
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 56.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
ORLEANS MARINA
STABILITY ANALYSIS
W/L STA 0+31.6 TO W/L STA 12+95.29

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE:
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	-6.0	15800	8745	6588	17867	3714	31133	14153	2.20
Ⓐ ②	-6.0	15800	19849	3200	17867	884	38849	16983	2.29
Ⓑ ①	-15.0	24289	23717	9928	38631	9354	57934	29277	1.98
Ⓒ ①	-26.0	34344	22080	20852	75448	31876	77276	43572	1.77
Ⓓ ①	-40.0	58321	31280	63520	141028	79927	153121	61101	2.51
Ⓓ ②	-40.0	58321	63240	48776	141028	65826	170337	75202	2.27
Ⓔ ①	-6.0	16102	5144	10100	17783	8039	31346	9744	3.22
Ⓕ ①	-15.0	21616	7200	19679	39592	23558	48495	16034	3.02
Ⓖ ①	-26.0	30731	10560	30203	77260	54917	71494	22343	3.20

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.

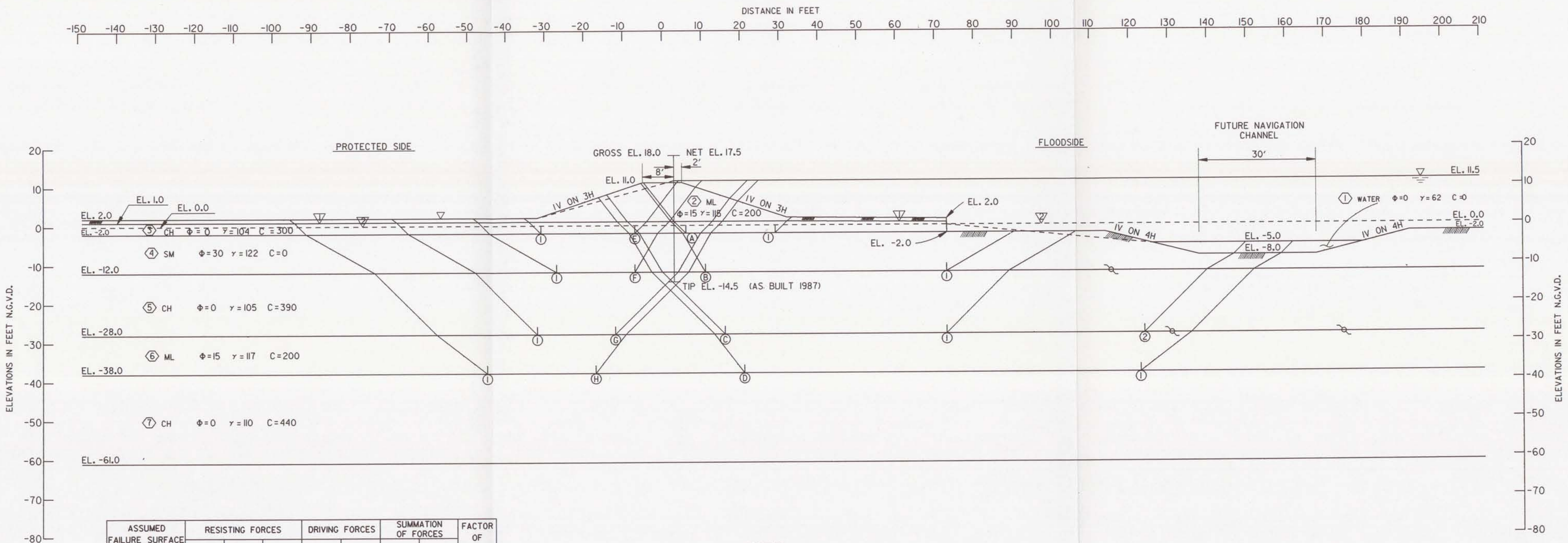
1 1 PH LINE IN STRATUM ④ FLOODSIDE ANALYSIS

2 2 PH LINE IN STRATUM ⑥ FLOODSIDE ANALYSIS

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
BAYOU ST JOHN
STA 2+02 TO 5+25 EAST LEVEE

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: BYUELA2.DGN
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A 1	-2.0	7233	6821	2355	9646	1042	16409	8604	1.91
B 1	-12.0	17294	24180	4493	29183	6111	45967	23072	1.99
C 1	-28.0	28739	22230	18765	81882	39076	69734	42806	1.63
C 2	-28.0	28739	42120	13432	81882	27743	84291	54139	1.56
D 1	-38.0	41006	44880	25695	126320	57003	111581	69317	1.61
E 1	-2.0	6075	5805	2340	9623	890	14220	8733	1.63
F 1	-12.0	12349	7800	11535	30340	11517	31684	18823	1.68
G 1	-28.0	22645	7800	24309	84399	51031	54754	33368	1.64
H 1	-38.0	35662	12320	42437	130525	90149	90419	40376	2.24

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.

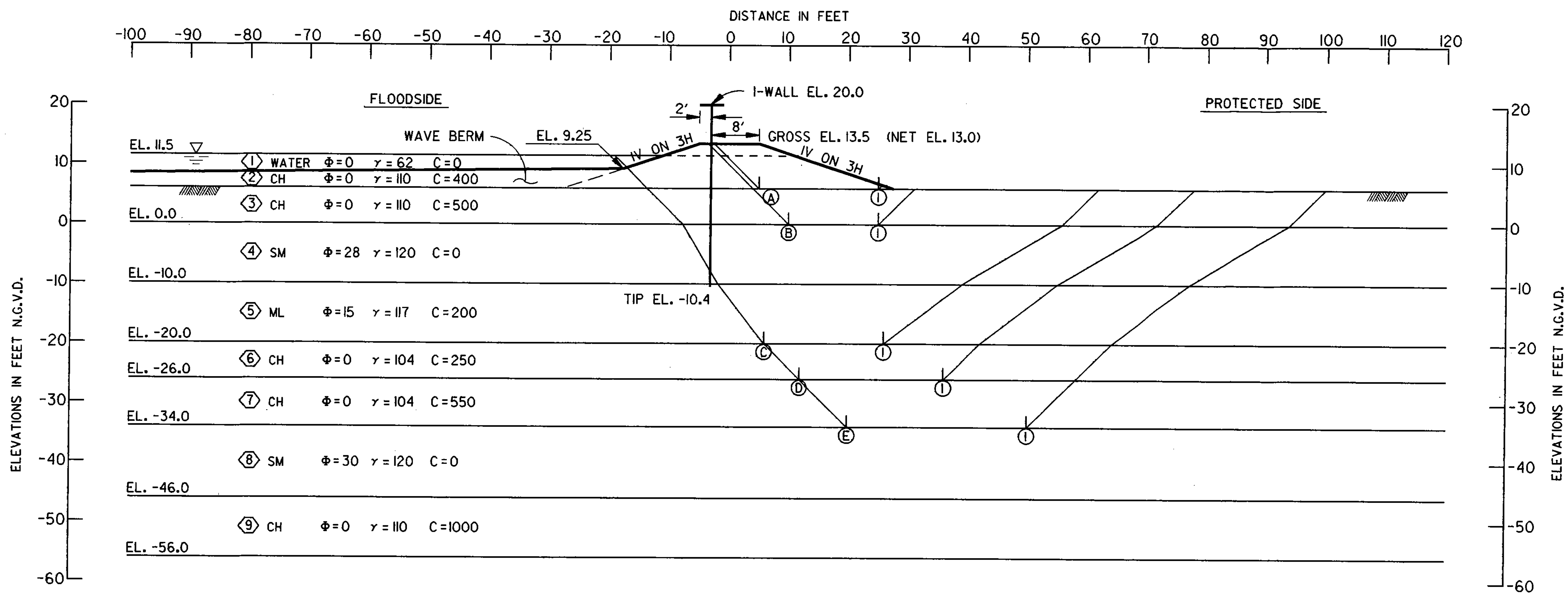
1 1 PH LINE IN STRATA 2 & 4 FLOODSIDE ANALYSIS

2 2 PH LINE IN STRATUM 6 FLOODSIDE ANALYSIS

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
BAYOU ST JOHN
STA 1+31 TO 2+61 WEST LEVEE

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: BYUWL2.DGN
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A I	6.0	5999	8000	500	3092	29	14499	3063	4.73
B I	.0	12000	3540	6000	9562	2094	21540	7468	2.88
C I	-20.0	25052	5000	29166	60383	39060	59218	21323	2.78
D I	-26.0	28052	6000	32252	84502	59080	66304	25422	2.61
E I	-34.0	36852	16500	41052	120434	91638	94404	28796	3.28

SEEPAGE ANALYSIS IS BASED ON LANE'S WEIGHTED CREEP RATIO.
ASSUME UPPER LAYER IS A SILTY FINE SAND, THEREFORE
$LWCR \geq 8.$

$$LWCR = \frac{\text{WEIGHTED CREEP DISTANCE}}{\Delta \text{ HEAD}}$$

1) ALONG WALL

$$LWCR = \frac{21.9 + 16.4 + 29/3}{11.5 - 6} = 8.7 \quad \text{OK.}$$

2) ALONG BASE OF LEVEE

$$LWCR = \frac{23/3 + 2(16.4) + 29/3}{11.5 - 6} = 9.1 \quad \text{OK.}$$

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

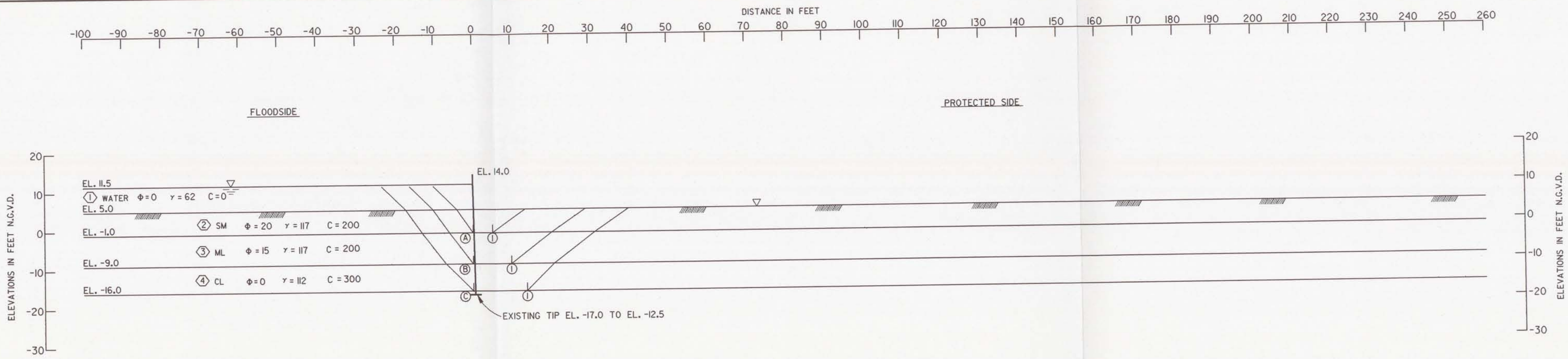
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 58.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
PONTCHARTRAIN BEACH
W/L STAS 10+03 TO 18+63, 21+07 TO 26+77, & 34+10 TO 39+78

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

DESIGNED BY: PINNER
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
CADD FILE: pb11.DGN
FILE NO. H-2-30962
DATE: APRIL 1993



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A 1	-1.0	2070	1443	4447	5432	2106	7960	3326	2.39
B 1	-9.0	6207	3000	11662	17783	11466	20869	6317	3.30
C 1	-16.0	10423	4200	15862	34638	25675	30485	8963	3.40

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

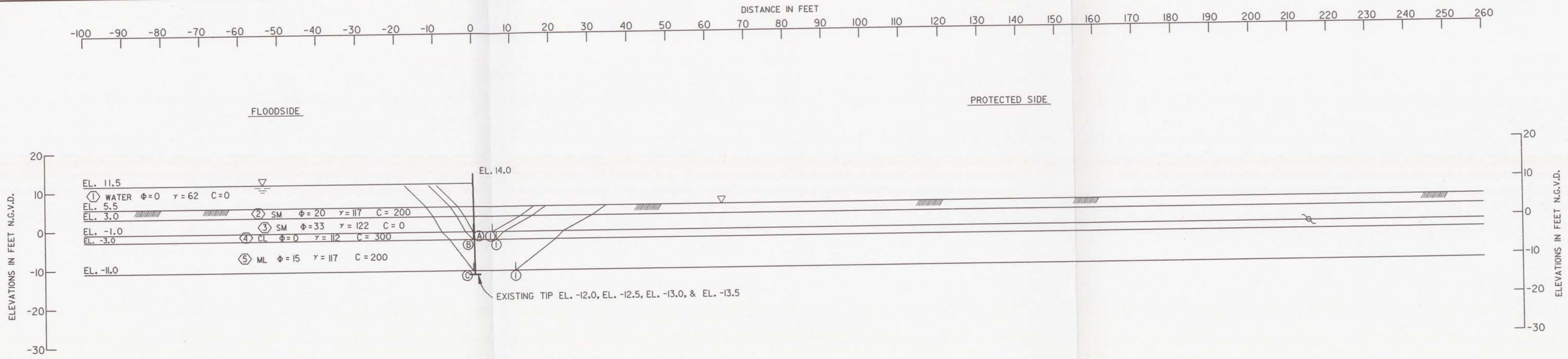
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
SEE SOIL PARAMETER PLATE 59.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
NEW ORLEANS AIRPORT
W/L STA 10+13.20 TO W/L STA 18+43.20

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: NOA10T.DGN
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A 1	-1.0	1369	1227	4047	5673	2512	6643	3161	2.10
B 1	-3.0	2572	1800	5247	8148	4297	9619	3851	2.50
C 1	-11.0	7201	4891	13280	22693	16076	25372	6617	3.83

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

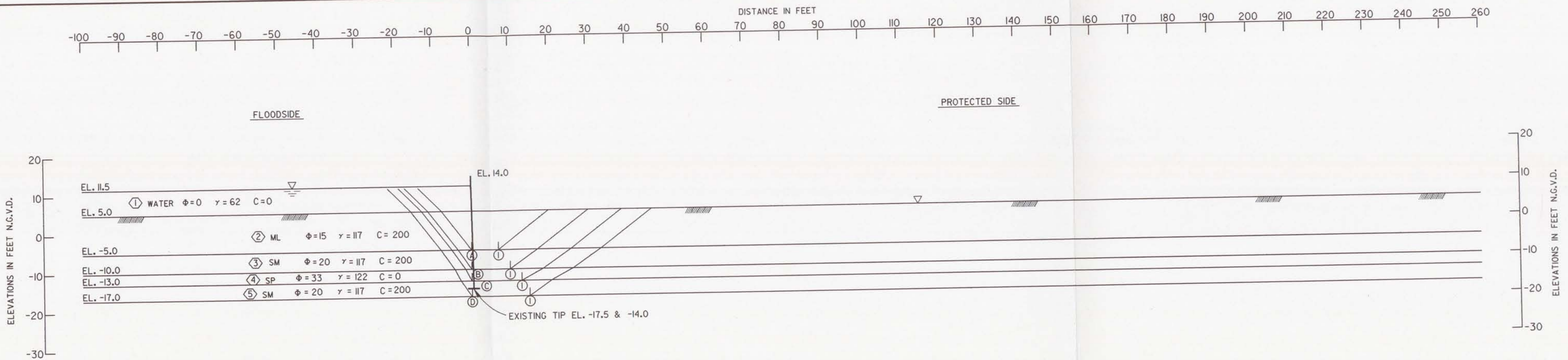
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
SEE SOIL PARAMETER PLATE 59.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
NEW ORLEANS LAKEFRONT AIRPORT
STABILITY ANALYSIS
W/L STA 18+43.20 TO W/L STA 26+88

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: NOA26T.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	-5.0	4043	2430	7116	10670	5850	13589	4820	2.82
Ⓑ ①	-10.0	7093	4991	13513	19853	13162	25597	6691	3.83
Ⓒ ①	-13.0	8937	7333	20020	26788	18976	36290	7812	4.65
Ⓓ ①	-17.0	12245	9651	26899	37712	28395	48795	9317	5.24

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

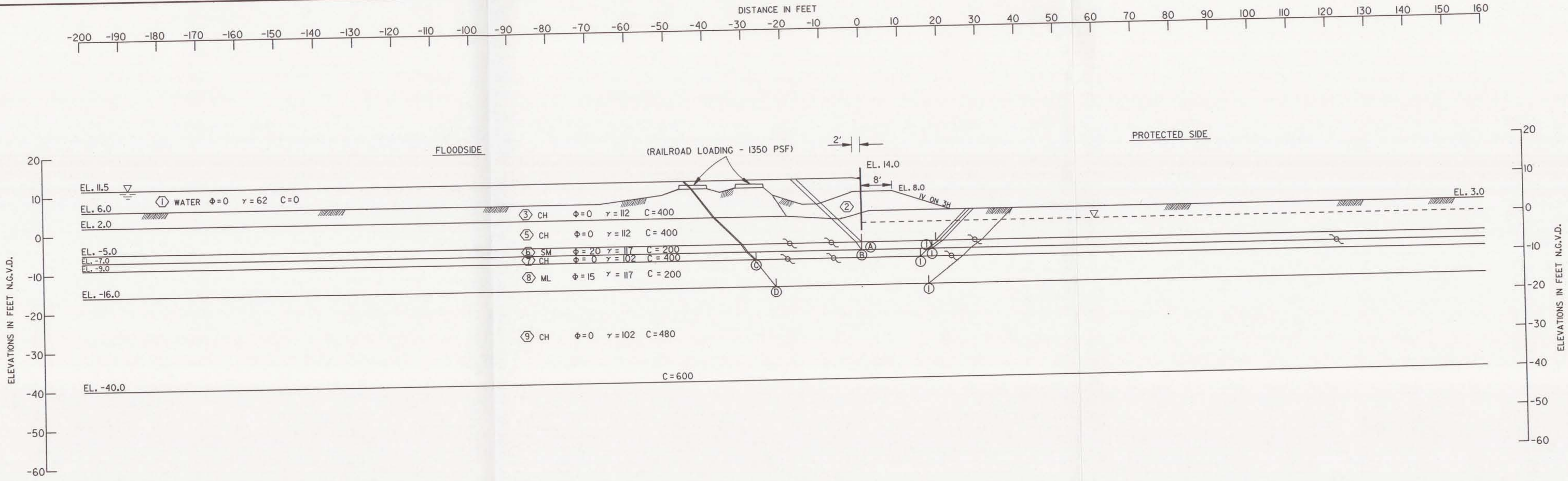
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
SEE SOIL PARAMETER PLATES 59 AND 60.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
NEW ORLEANS AIRPORT
W/L STAS 26+88 TO 31+06.27 & 32+58 TO 32+75

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: NOA27T.DGN
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
A I	-5.0	8202	7600	6400	11923	3882	22202	8041	2.76
B I	-7.0	9261	7200	9099	15297	5962	25560	9335	2.74
C I	-9.0	15226	16667	10779	35676	9122	42672	26554	1.61
D I	-16.0	22406	14040	18987	57947	20793	55433	37154	1.49

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

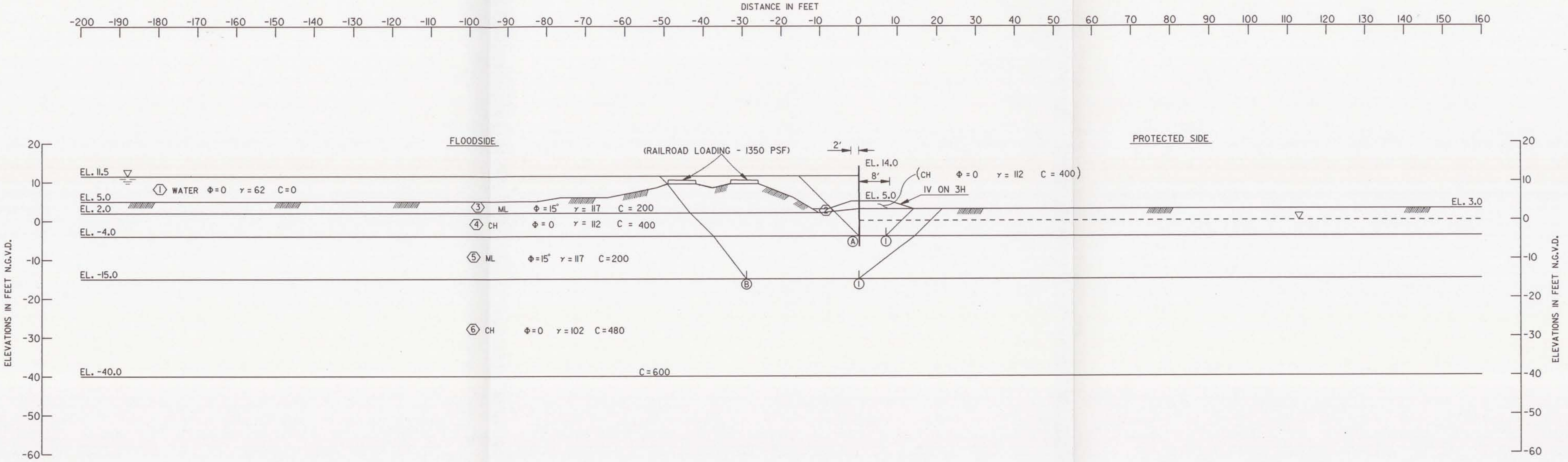
GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
SEE SOIL PARAMETER PLATE 60.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
LINCOLN BEACH
W/L STAS 100+00 TO 101+20 & 114+31.81 TO 116+41.81

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: L1100T.DGN
FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ ①	-4.0	5802	2796	5600	9172	3639	14198	5533	2.57
Ⓑ ①	-15.0	22189	10440	16307	55427	20349	48936	35078	1.40

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

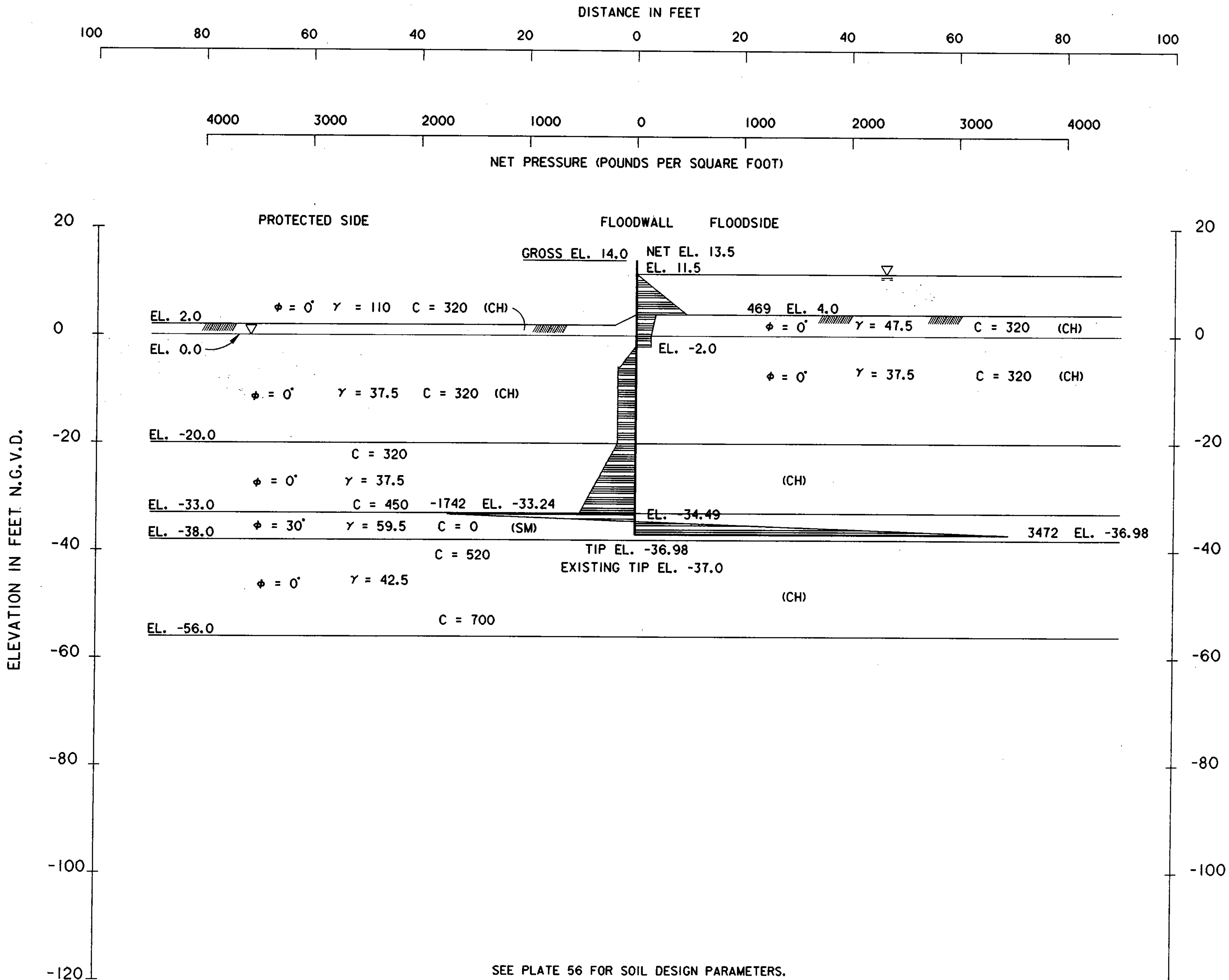
CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A.
SEE SOIL PARAMETER PLATE 60.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
STABILITY ANALYSIS
LINCOLN BEACH
W/L STA 101+20 TO W/L STA 114+31.81

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: L1101T.DGN
FILE NO. H-2-30962

PLATE 79



ELEVATION	PRESSURE
11.50	0.0
4.00	468.8
4.00	182.4
0.00	139.1
-2.00	137.4
-2.00	0.0
-2.00	-5.8
-5.74	-146.0
-5.74	-170.3
-20.00	-170.3
-33.00	-519.3
-33.00	-1718.0
-33.24	-1742.0
-34.49	0.0
-36.98	3471.6
-36.98	0.0

SEE PLATE 56 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 71 FOR STABILITY ANALYSIS.

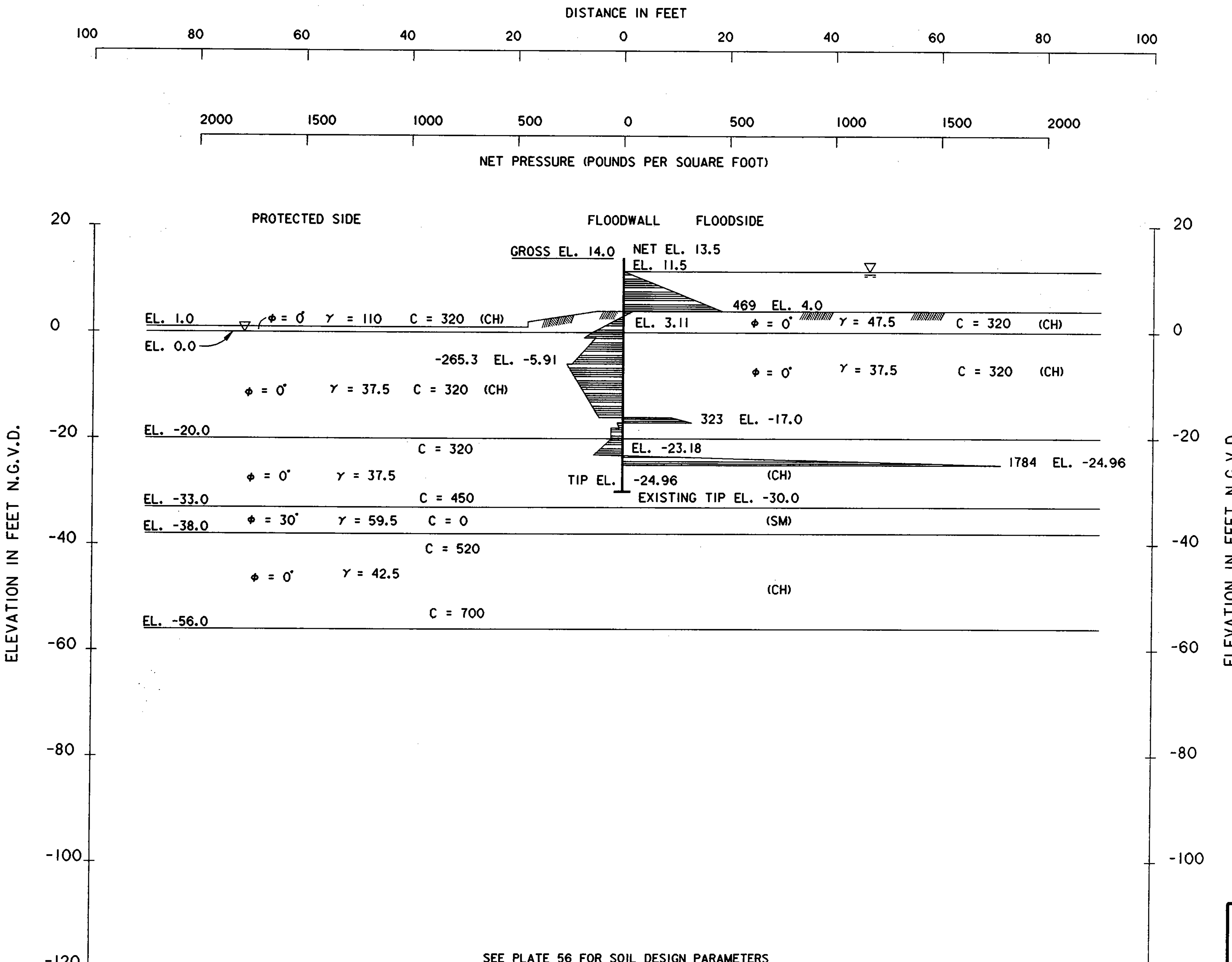
NET DIAGRAM

(Q) CASE F.S. = 1.5

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS-ORLEANS MARINA
W/L STAS 0+31.60 TO 0+59.96, 0+78.96 TO 4+14.31, 5+06.47 TO 7+22.73 & 8+14.89 TO 10+67.0

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1 DATE: APRIL 1993	PLOT DATE: 30 MAR 93	CADD FILE: GOON.DGN FILE NO. H-2-30962



SEE PLATE 56 FOR SOIL DESIGN PARAMETERS
SEE PLATE 71 FOR STABILITY ANALYSIS.

NET DIAGRAM

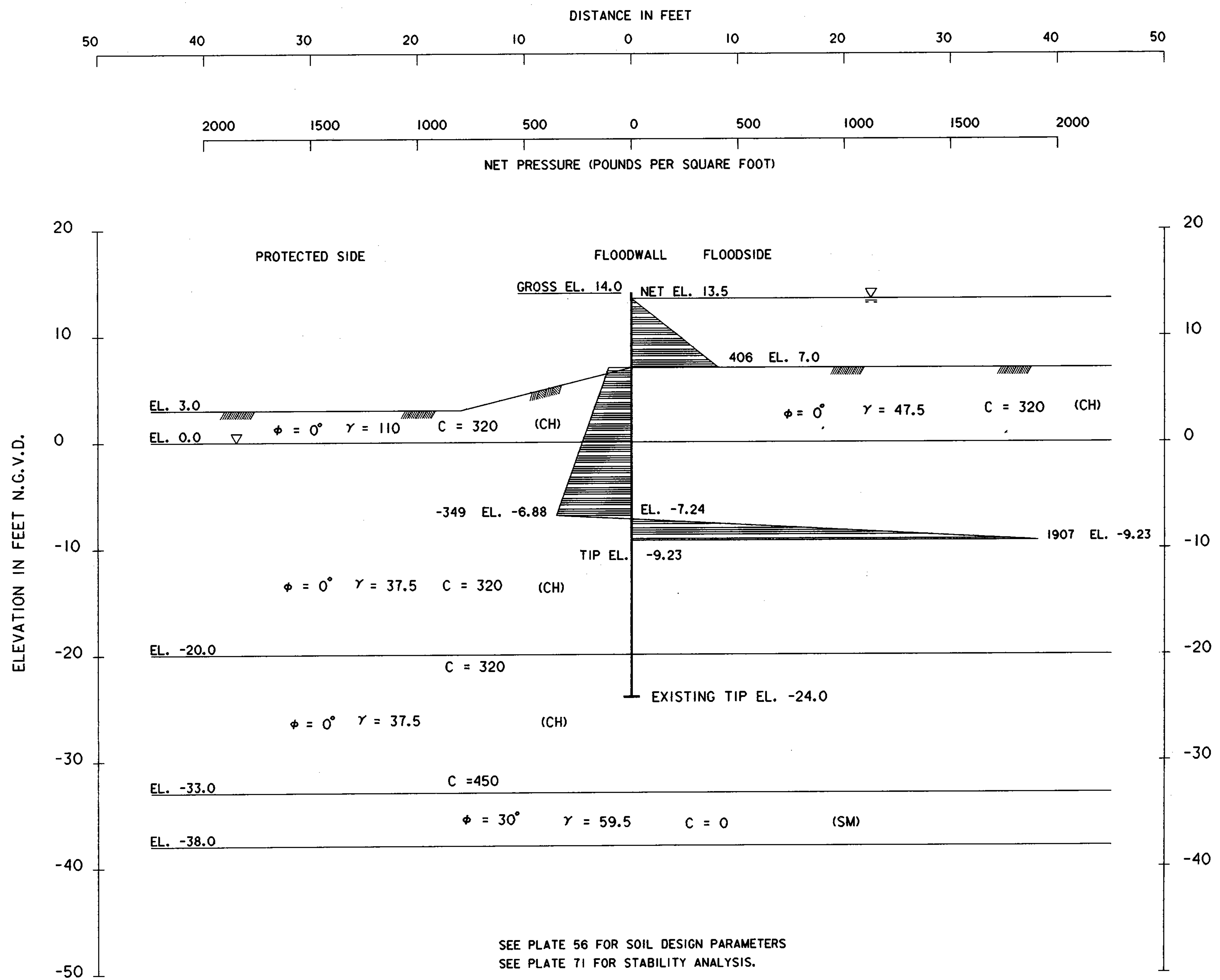
(Q) CASE F.S. = 1.5

ELEVATION	PRESSURE
11.50	0.0
4.00	468.8
4.00	42.1
3.11	0.0
0.00	-147.9
-1.00	-185.4
-1.00	-128.5
-5.91	-240.7
-5.91	-265.3
-16.00	-112.2
-16.00	223.3
-17.00	323.3
-17.00	-25.8
-18.00	-15.8
-18.00	-54.6
-20.00	-54.6
-23.05	-135.9
-23.18	0.0
-24.96	1784.4
-24.96	0.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS-ORLEANS MARINA
W/L STAS 4+26.39 TO 4+51.39, 4+84.39 TO 4+94.39,
7+34.81 TO 7+59.81 AND 7+92.81 TO 8+02.81

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 20:1
PLOT DATE: 30 MAR 93
CADD FILE: GDOM4.DGN
DATE: APRIL 1993
FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
7.00	406.3
7.00	0.0
7.00	-105.8
-6.88	-348.6
-7.24	0.0
-9.23	1906.6
-9.23	0.0

SEE PLATE 56 FOR SOIL DESIGN PARAMETERS
SEE PLATE 71 FOR STABILITY ANALYSIS.

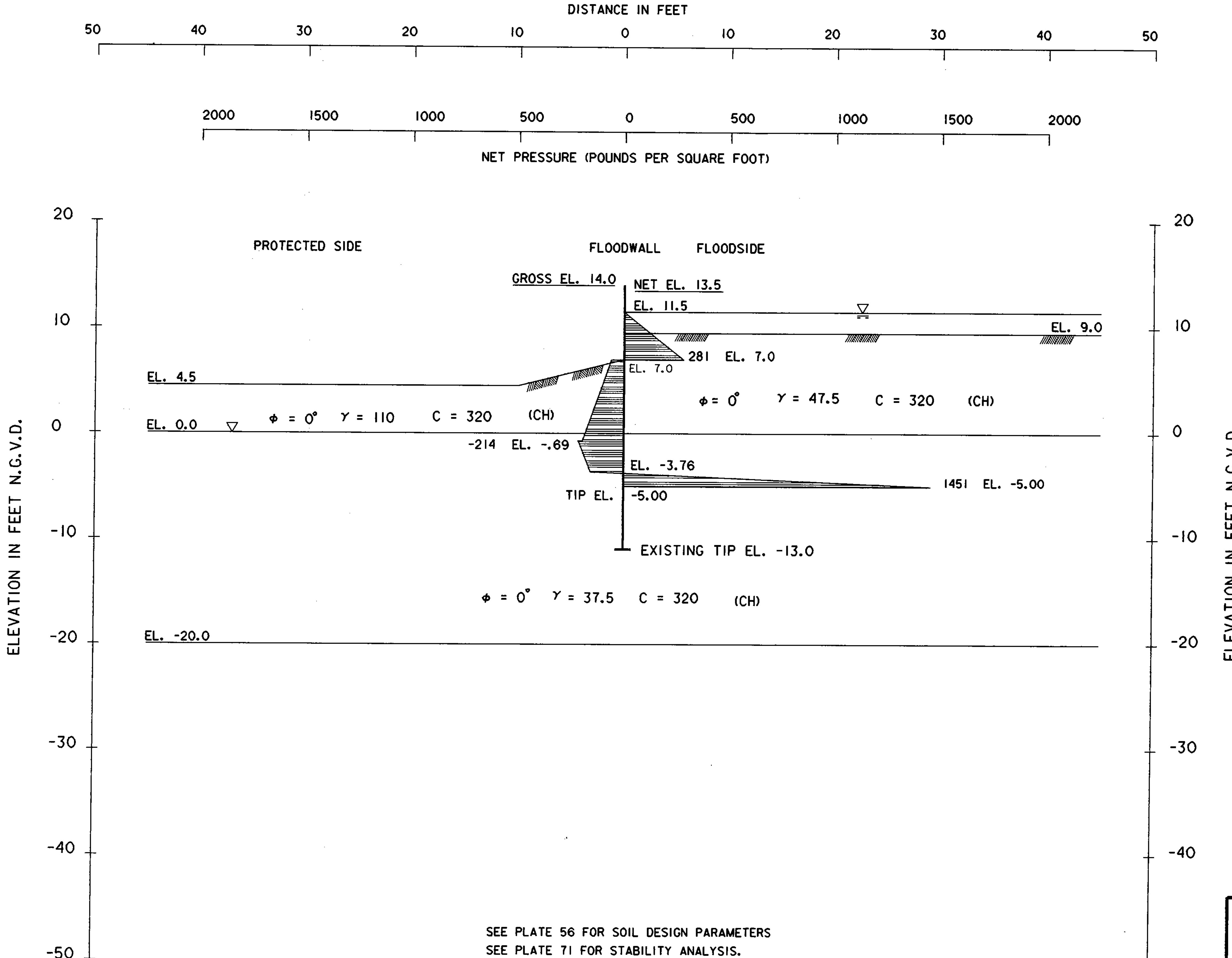
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
ORLEANS MARINA
W/L STA 11+78.02 TO W/L STA 12+66.10

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: ODOM7.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
11.50	0.0
7.00	291.3
7.00	0.0
7.00	-60.1
-0.69	-194.6
-0.69	-214.3
-3.63	-155.5
-3.76	0.0
-5.00	1450.7
-5.00	0.0

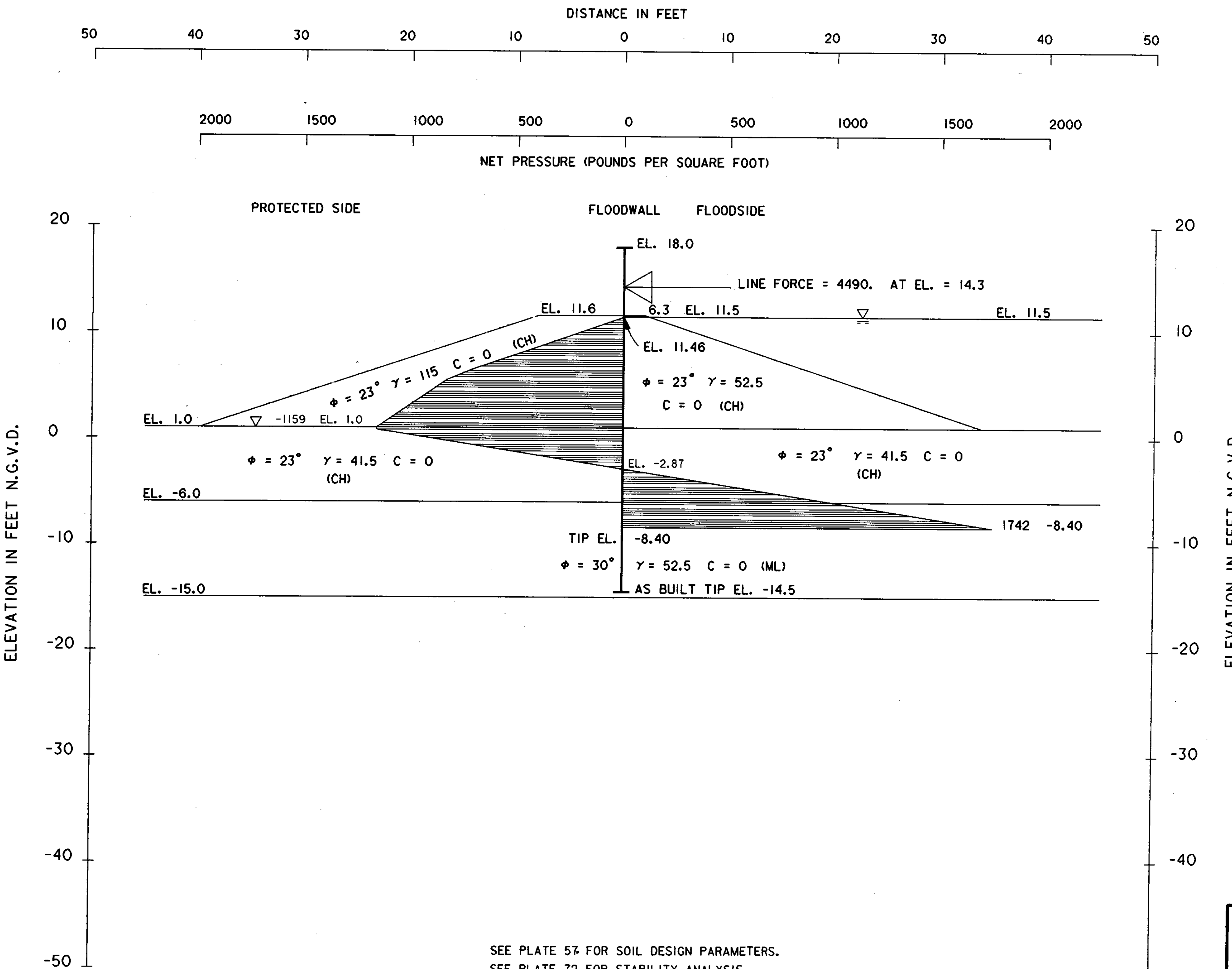
NET DIAGRAM

(Q) CASE F.S. = 1.5

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
ORLEANS MARINA
W/L STA 12+66.10 TO W/L STA 12+95.29

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: G00M3.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
11.60	0.0
11.50	6.3
11.46	0.0
8.50	-418.6
6.50	-711.3
5.50	-832.3
1.00	-1159.1
0.80	-1167.0
-2.87	0.0
-8.40	1742.5
-8.40	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 72 FOR STABILITY ANALYSIS.

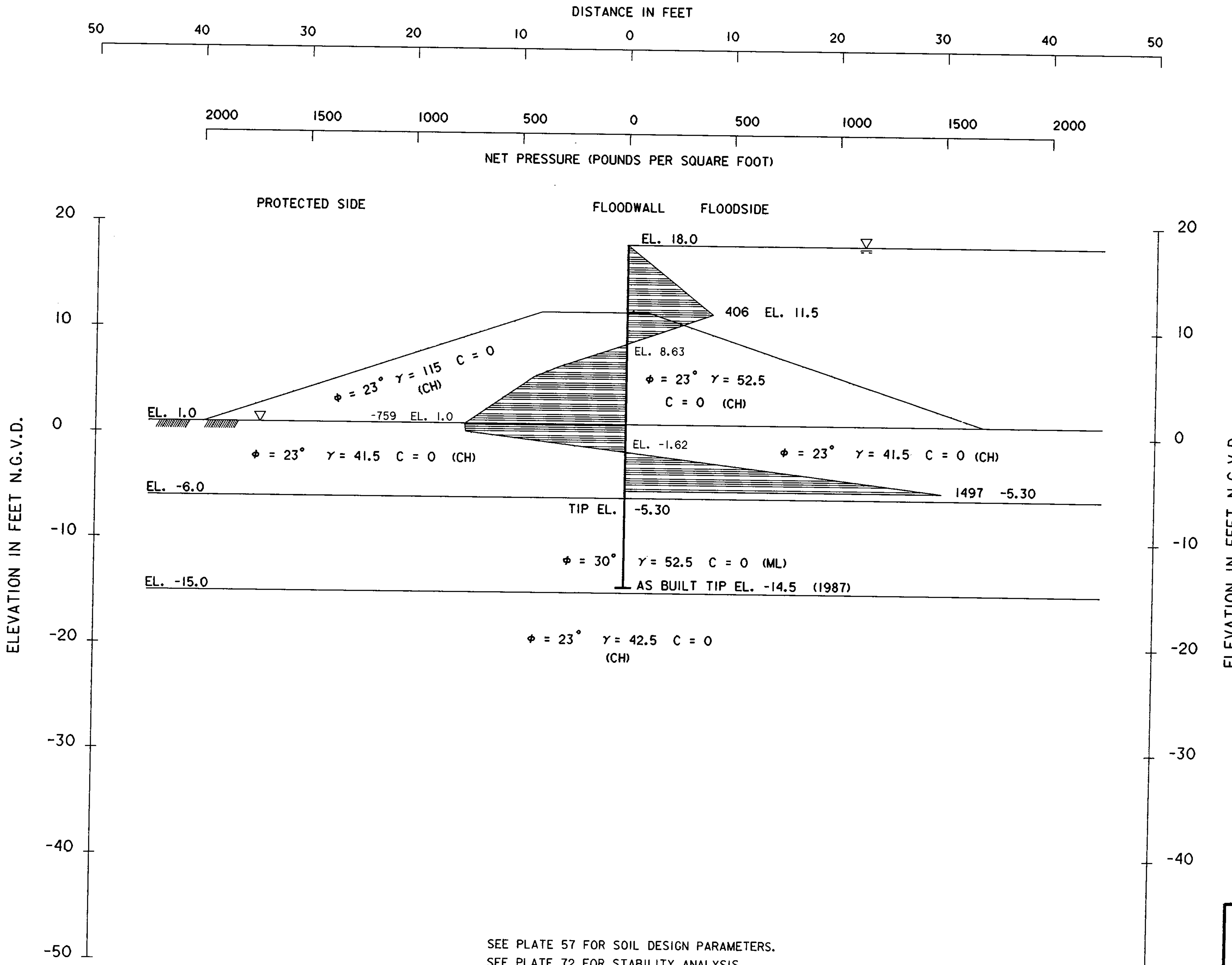
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 2+02 TO STA 5+25 EAST LEVEE

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 10:1
PLOT DATE: 30 MAR 93
CADD FILE: BYUES.DGN
DATE: APRIL 1993
FILE NO. H-2-30962



ELEVATION	PRESSURE
18.00	0.0
11.50	406.3
8.63	0.0
8.50	-18.6
6.50	-311.3
5.50	-432.3
1.00	-759.1
0.24	-754.1
-1.62	0.0
-5.30	1496.7
-5.30	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 72 FOR STABILITY ANALYSIS.

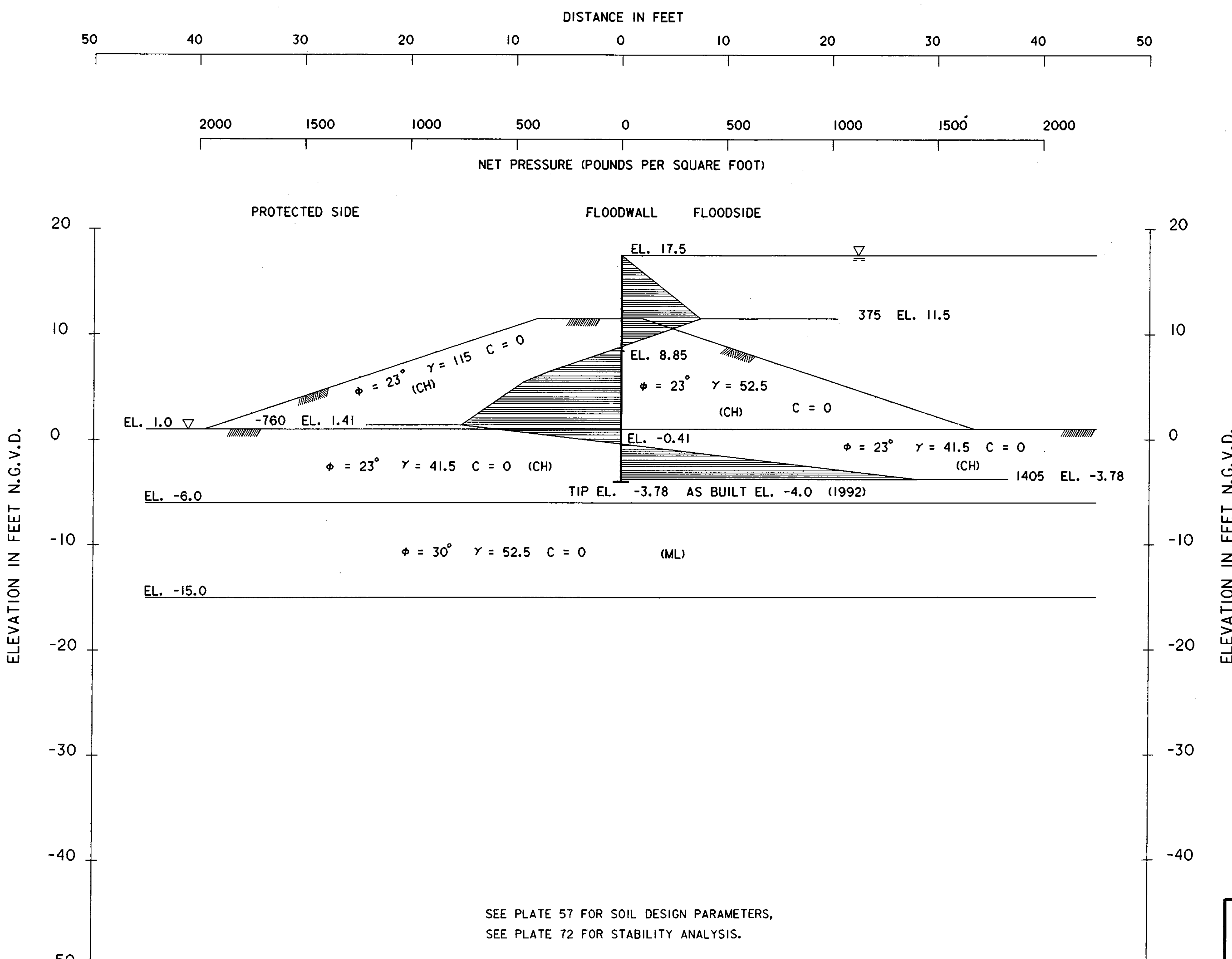
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 6+43 TO STA 8+61 EAST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS: CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUEI.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
17.50	0.0
11.50	375.5
8.85	0.0
8.50	-49.9
6.50	-342.5
5.50	-463.5
1.41	-760.5
-0.41	0.0
-3.78	1405.2
-3.78	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS,
SEE PLATE 72 FOR STABILITY ANALYSIS.

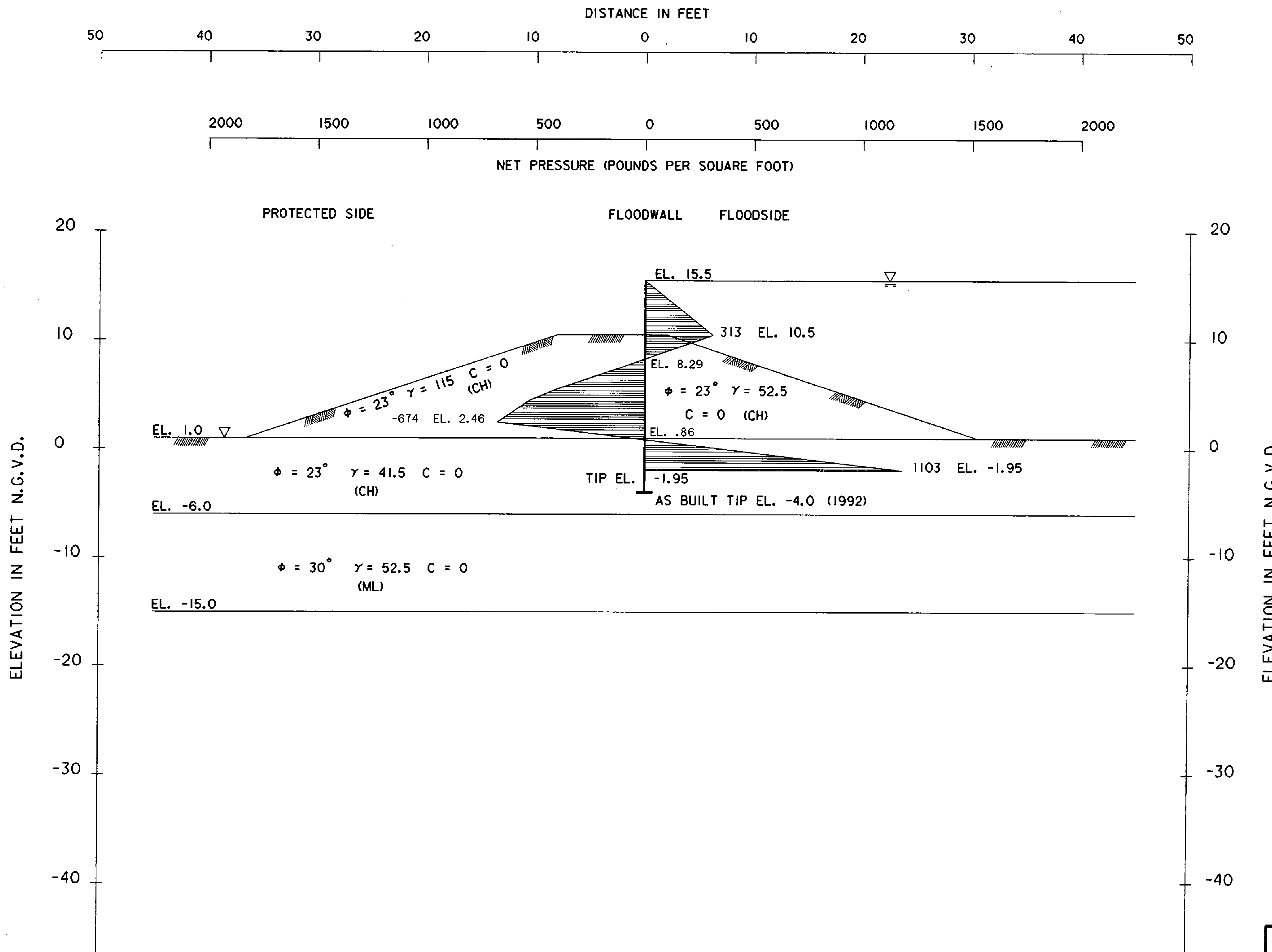
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 8+61 TO STA 9+63 EAST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUE2.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
15.50	0.0
10.50	312.5
8.29	0.0
7.50	-112.4
5.50	-405.0
4.50	-526.0
2.46	-674.0
0.86	0.0
-1.95	1182.8
-1.95	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 72 FOR STABILITY ANALYSIS.

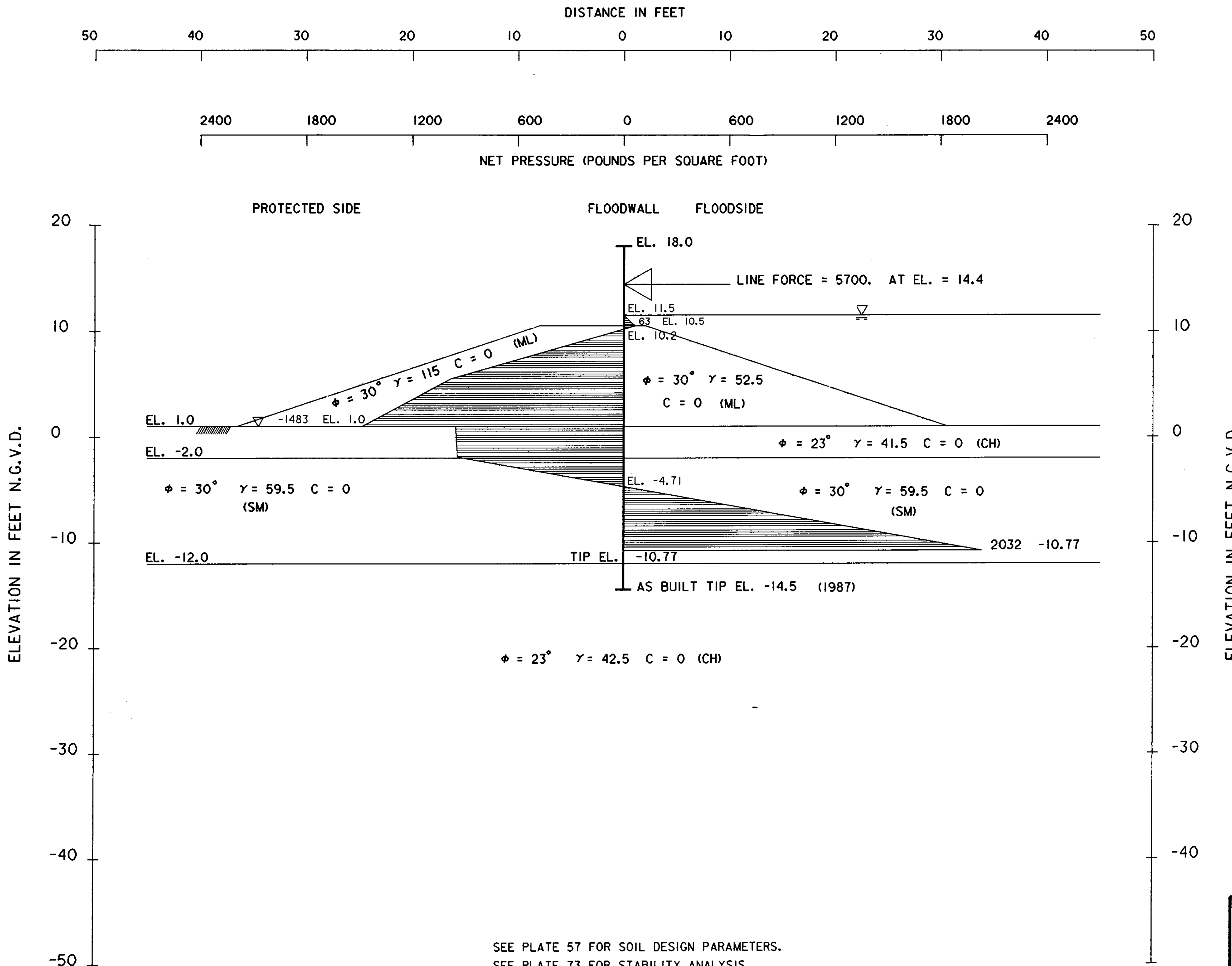
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 12+50 TO STA 13+11 EAST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUE4.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 73 FOR STABILITY ANALYSIS.

NET DIAGRAM

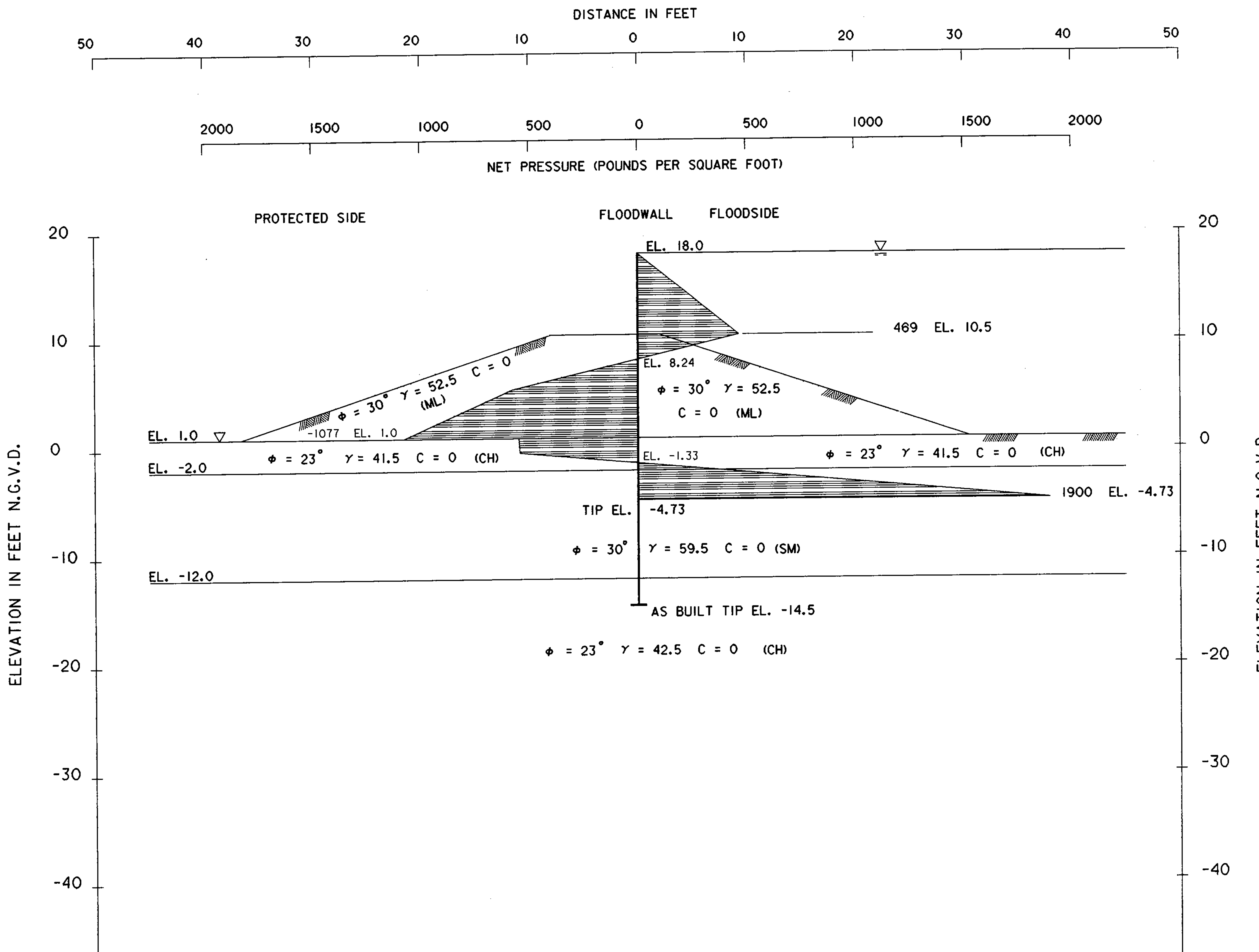
(S) CASE F.S. = 1.2

ELEVATION	PRESSURE
11.50	0.0
10.50	62.5
10.20	0.0
5.50	-983.0
1.00	-1483.3
1.00	-952.4
-1.90	-942.3
-4.71	0.0
-10.77	2031.6
-10.77	0.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 1+31 TO STA 2+61 WEST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUW7.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 73 FOR STABILITY ANALYSIS.

NET DIAGRAM

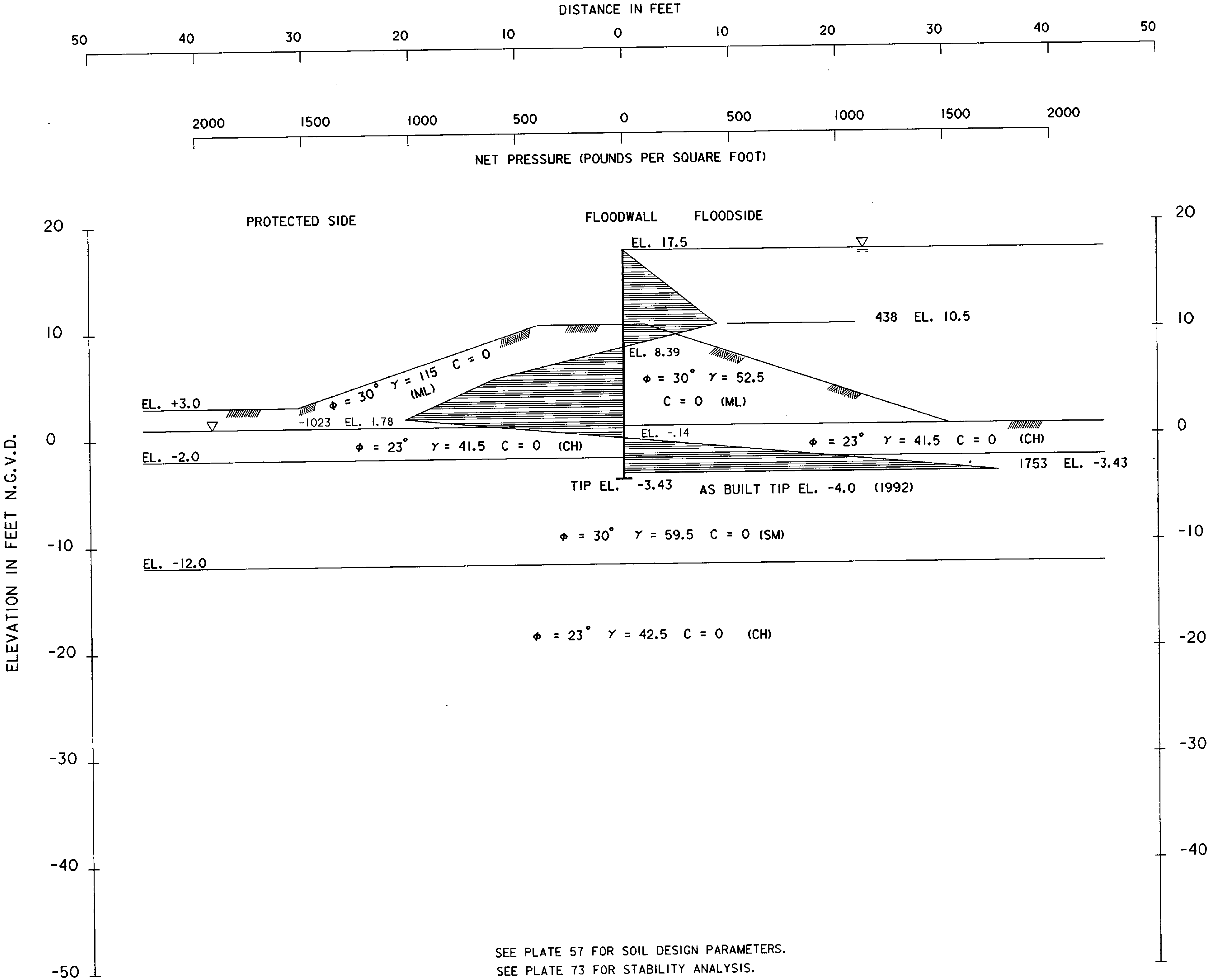
(S) CASE F.S. = 1.2

ELEVATION	PRESSURE
18.00	0.0
10.50	468.8
8.24	0.0
5.50	-576.8
1.00	-1077.1
1.00	-546.2
-0.36	-541.4
-1.33	0.0
-4.73	1900.5
-4.73	0.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 3+80 TO 5+08 WEST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUW2.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
17.50	0.0
10.50	437.5
8.39	0.0
5.50	-608.0
1.78	-1022.6
1.00	-608.8
1.00	-577.4
0.94	-577.2
-0.14	0.0
-3.43	1753.3
-3.43	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 73 FOR STABILITY ANALYSIS.

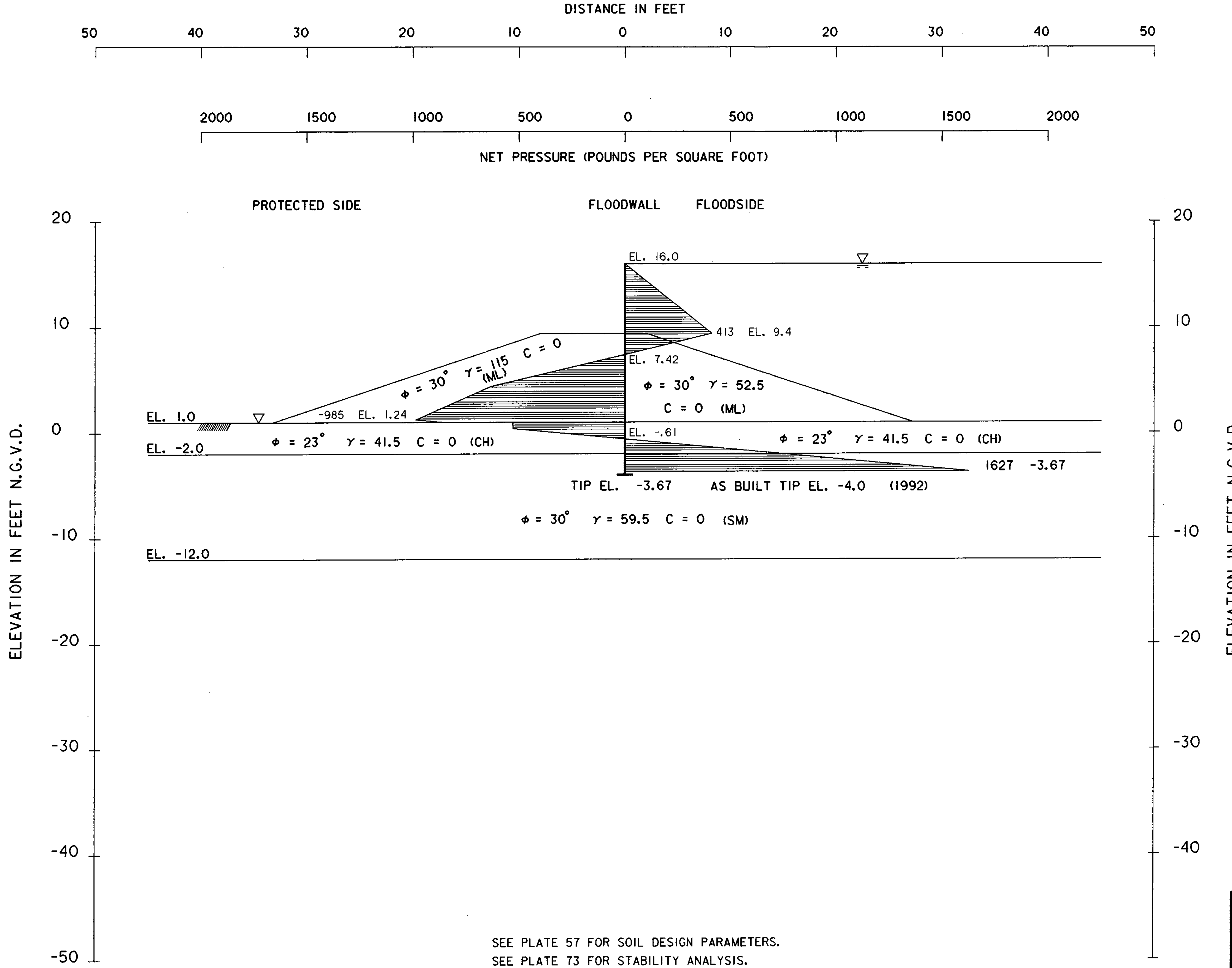
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 5+08 TO 5+73 WEST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUW5.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
16.00	0.0
9.40	412.5
7.41	0.0
4.40	-633.0
1.24	-984.9
1.00	-856.1
1.00	-529.7
0.38	-527.5
-0.61	0.0
-3.67	1627.2
-3.67	0.0

SEE PLATE 57 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 73 FOR STABILITY ANALYSIS.

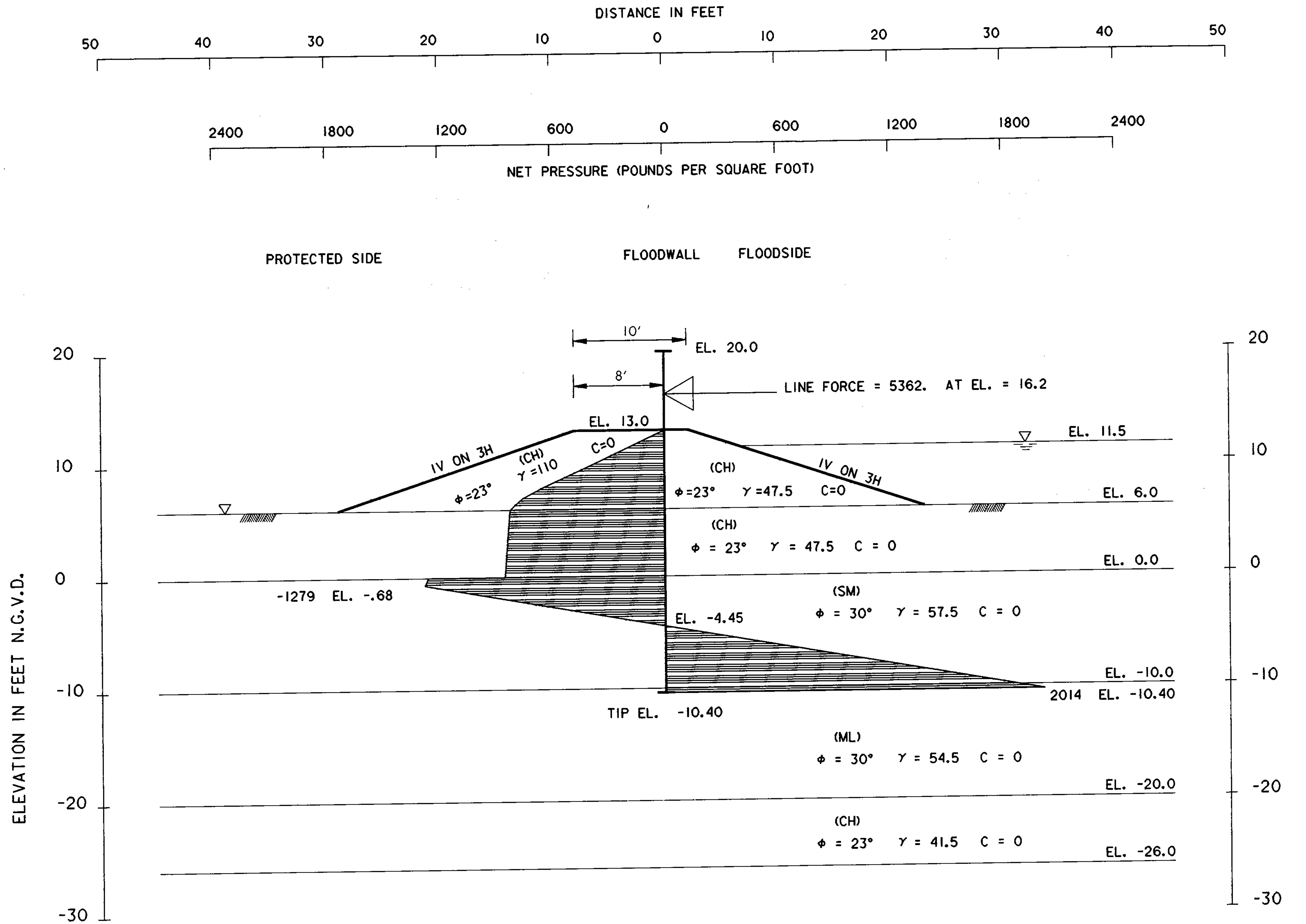
NET DIAGRAM

(S) CASE F.S. = 1.2

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
BAYOU ST. JOHN
STA 7+90 TO STA 9+18 WEST LEVEE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: BYUW6.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.00	0.0
10.00	-382.5
8.00	-646.7
7.00	-760.5
6.00	-824.6
0.00	-853.4
0.00	-1262.1
-0.68	-1278.6
-4.45	0.0
-10.40	2014.5
-10.40	0.0

SEE PLATE 58 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 74 FOR STABILITY ANALYSIS.

NET DIAGRAM

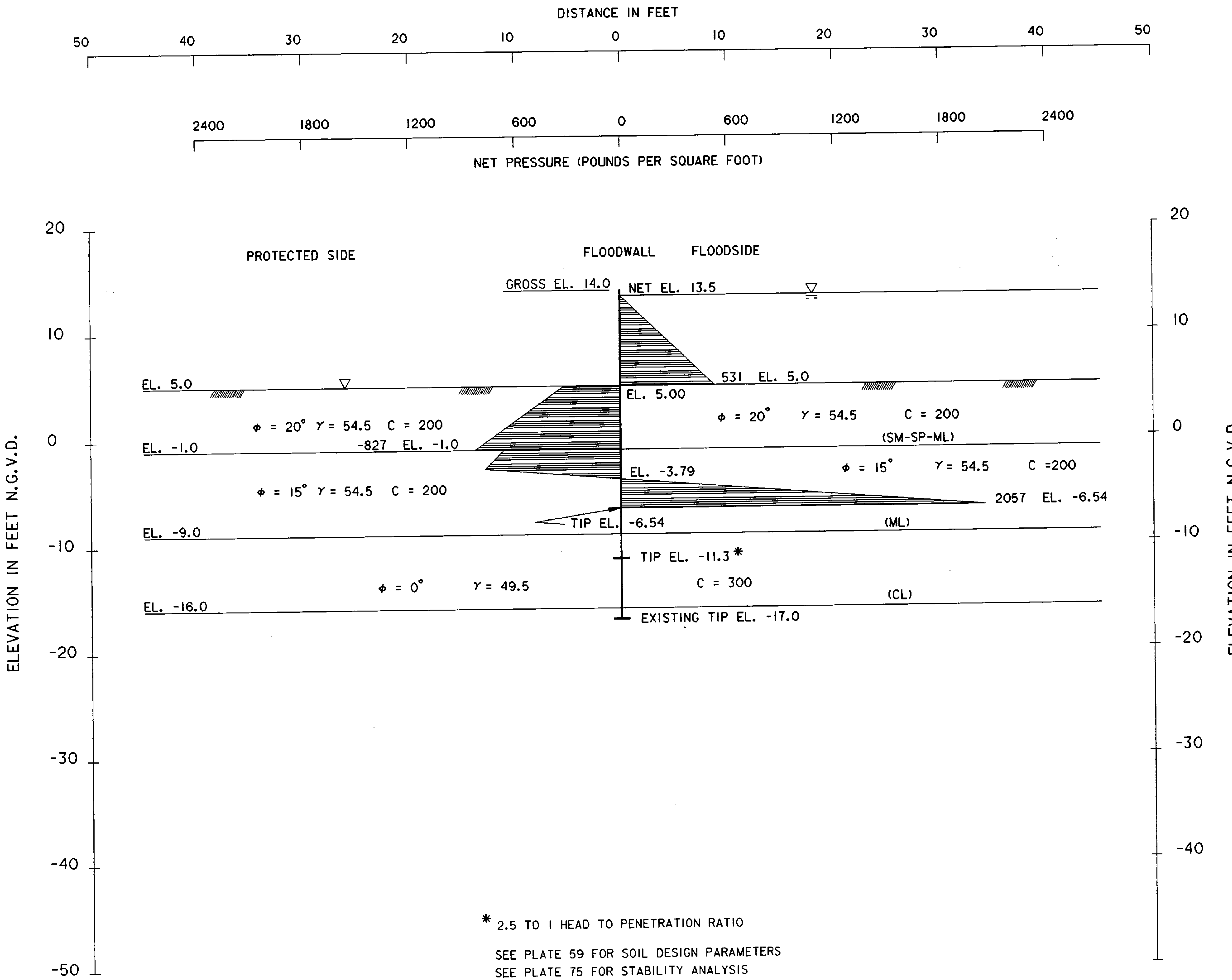
(S) CASE F.S. = 1.25

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
PONTCHARTRAIN BEACH
W/L STAS 10+03 TO 18+63, 21+07 TO 26+77 & 34+10 TO 39+78

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

DESIGNED BY: PINNER
DRAWN BY: WOODS
CHECKED BY: RICHARDSON

PLOT SCALE: 10:1 | PLOT DATE: 30 MAR 93 | CADD FILE: PBIWS.DGN | FILE NO. H-2-30962
DATE: APRIL 1993



ELEVATION	PRESSURE
13.50	0.0
5.00	531.2
5.00	0.0
5.00	-320.1
-1.00	-826.7
-1.00	-659.8
-2.76	-766.4
-3.79	0.0
-6.54	2057.5
-6.54	0.0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS
SEE PLATE 75 FOR STABILITY ANALYSIS

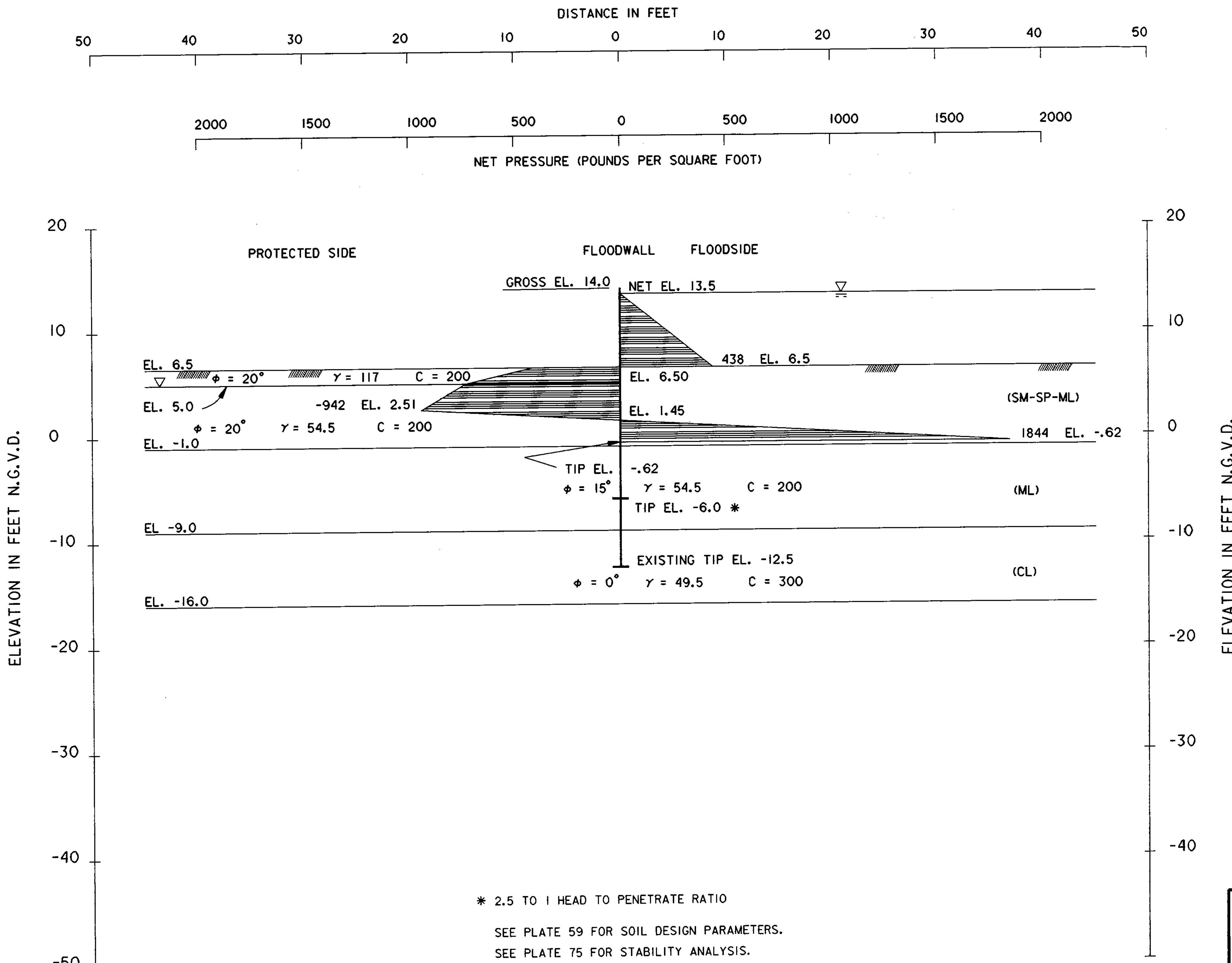
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STA 10+13.20 TO W/L STA 17+53.20

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

DESIGNED BY: VOJKOVICH | PLOT SCALE: 10:1 | PLOT DATE: 30 MAR 93 | CADD FILE: NOAIOA.DGN
DRAWN BY: WOODS
CHECKED BY: RICHARDSON | DATE: APRIL 1993 | FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
6.50	437.5
6.50	0.0
6.50	-413.8
5.00	-731.7
2.51	-941.9
1.45	0.0
-0.62	1844.0
-0.62	0.0

* 2.5 TO 1 HEAD TO PENETRATE RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 75 FOR STABILITY ANALYSIS.

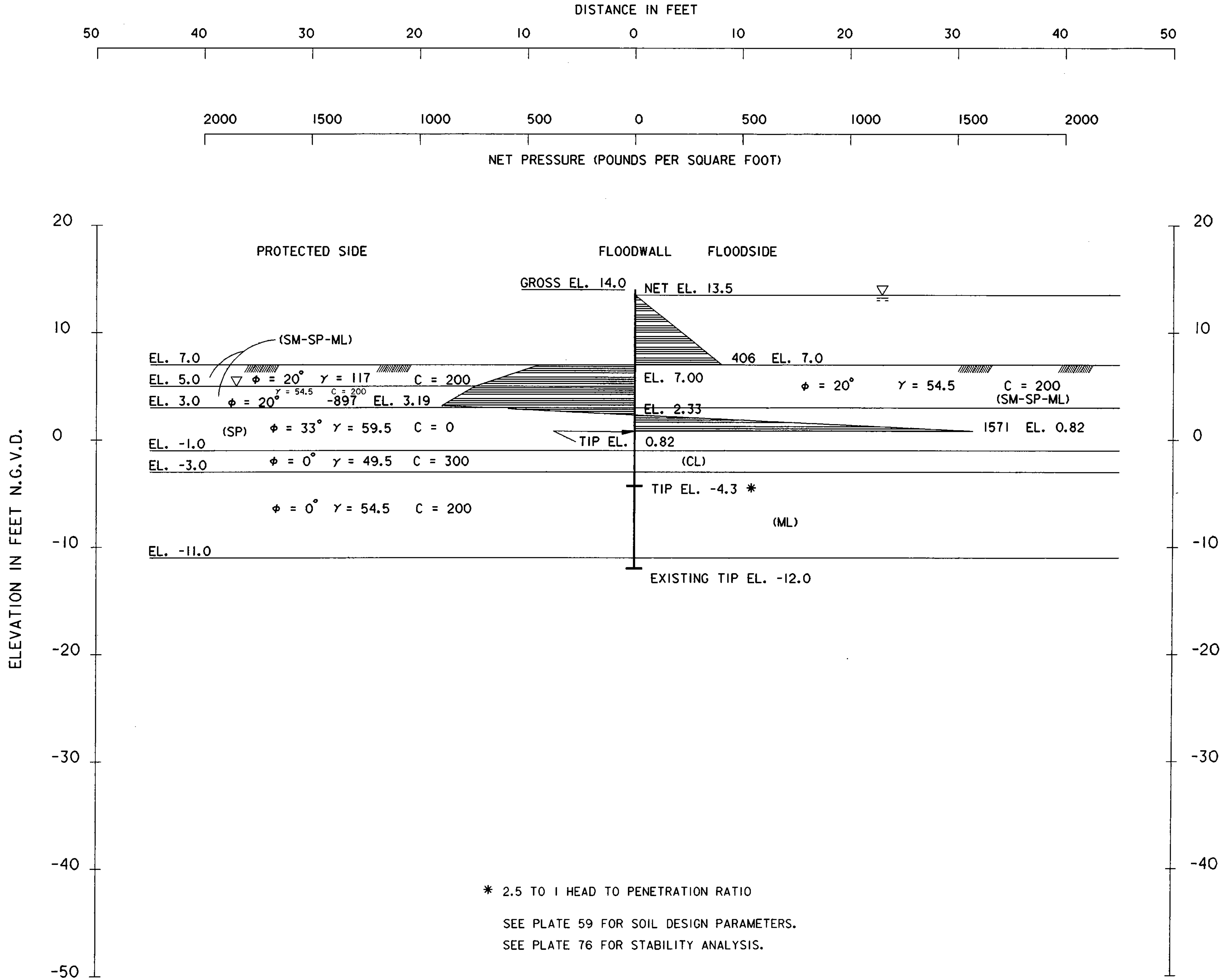
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STA 17+53.20 TO W/L STA 18+43.20

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: NOAITA.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
7.00	406.3
7.00	0.0
7.00	-445.1
5.00	-743.9
3.19	-896.6
3.00	-696.7
3.00	-568.0
2.89	-587.3
2.33	0.0
0.82	1571.0
0.82	0.0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.

SEE PLATE 76 FOR STABILITY ANALYSIS.

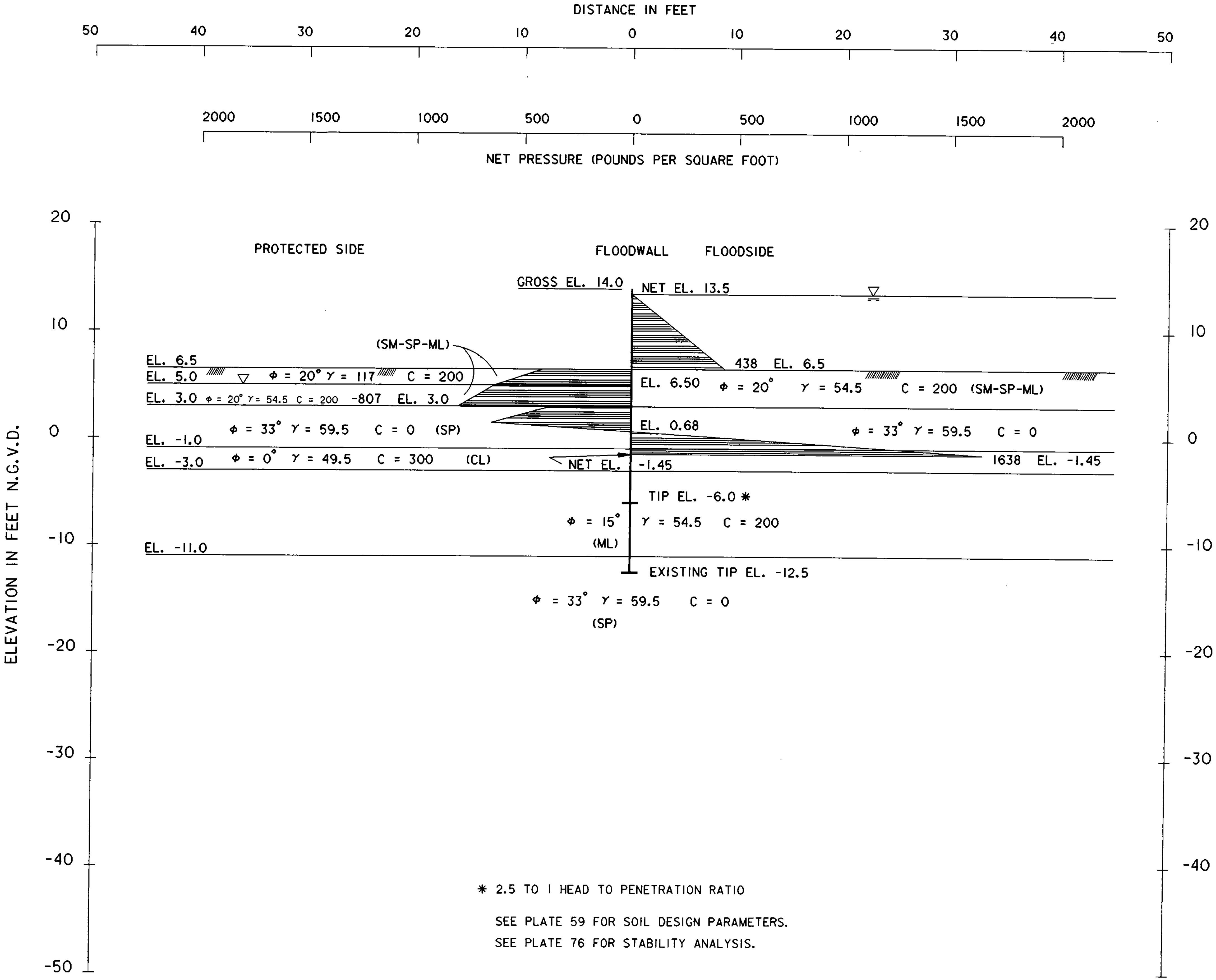
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STA 18+43.20 TO W/L STA 22+09.5

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON
PLOT SCALE: 10:1
PLOT DATE: 30 MAR 93
CADD FILE: NOAI8A.DGN
FILE NO. H-2-30962
DATE: APRIL 1993



* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 76 FOR STABILITY ANALYSIS.

NET DIAGRAM

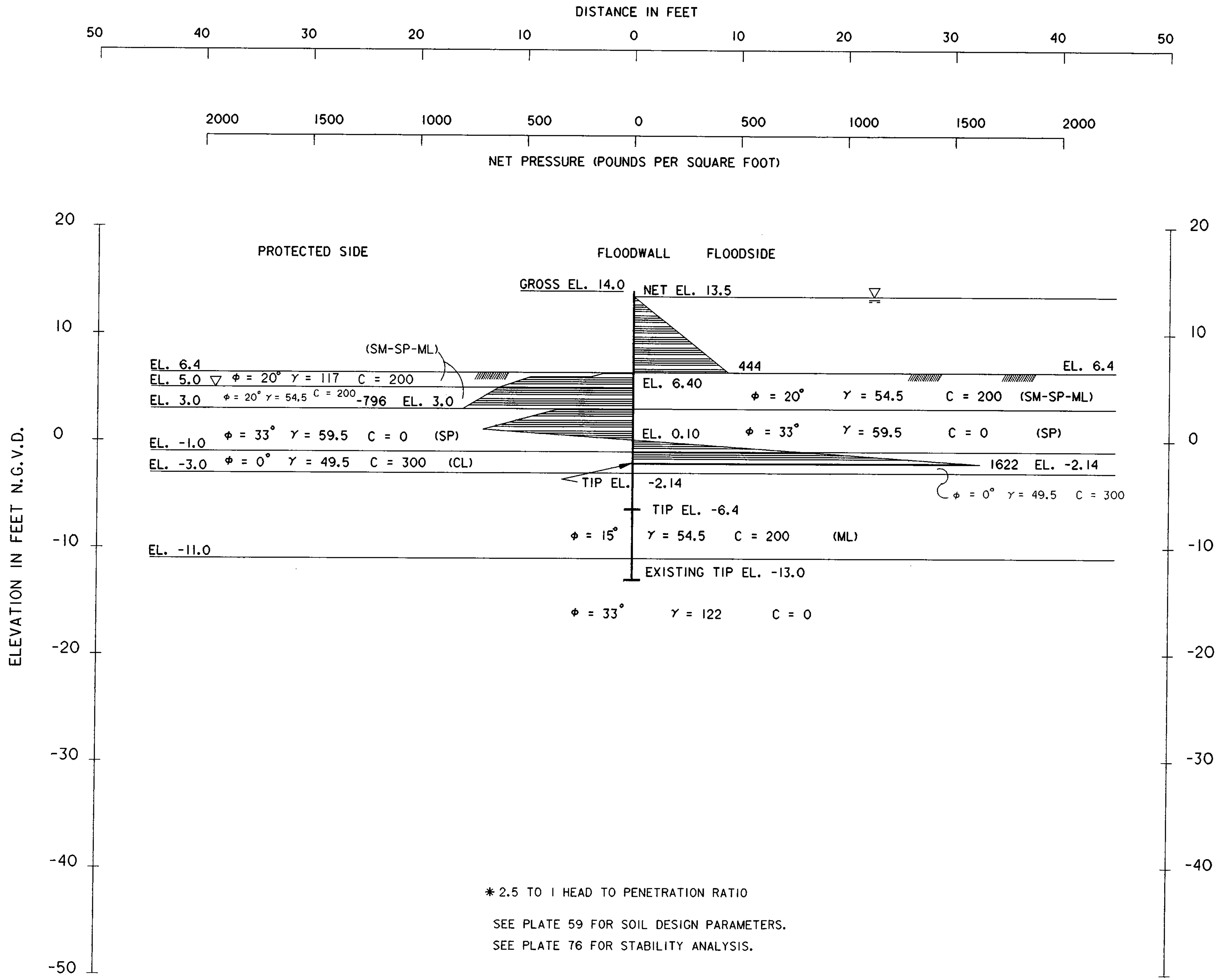
(Q) CASE F.S. = 1.0

ELEVATION	PRESSURE
13.50	0.0
6.50	437.5
6.50	0.0
6.50	-413.8
5.00	-638.0
3.00	-806.8
3.00	-377.6
1.52	-660.6
0.68	0.0
-1.45	1637.5
-1.45	0.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STA 22+09 TO W/L STA 23+89

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

DESIGNED BY: VOJKOVICH | PLOT SCALE: 10:1 | PLOT DATE: 30 MAR 93 | CADD FILE: NOA22A.DGN
DRAWN BY: WOODS | DATE: APRIL 1993 | FILE NO. H-2-30962
CHECKED BY: RICHARDSON



ELEVATION	PRESSURE
13.50	0.0
6.40	443.8
6.40	0.0
6.40	-127.5
6.00	-198.0
6.00	-478.0
5.00	-627.5
3.00	-796.3
3.00	-345.9
1.07	-701.7
0.10	0.0
-2.14	1621.9
-2.14	0.0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 76 FOR STABILITY ANALYSIS.

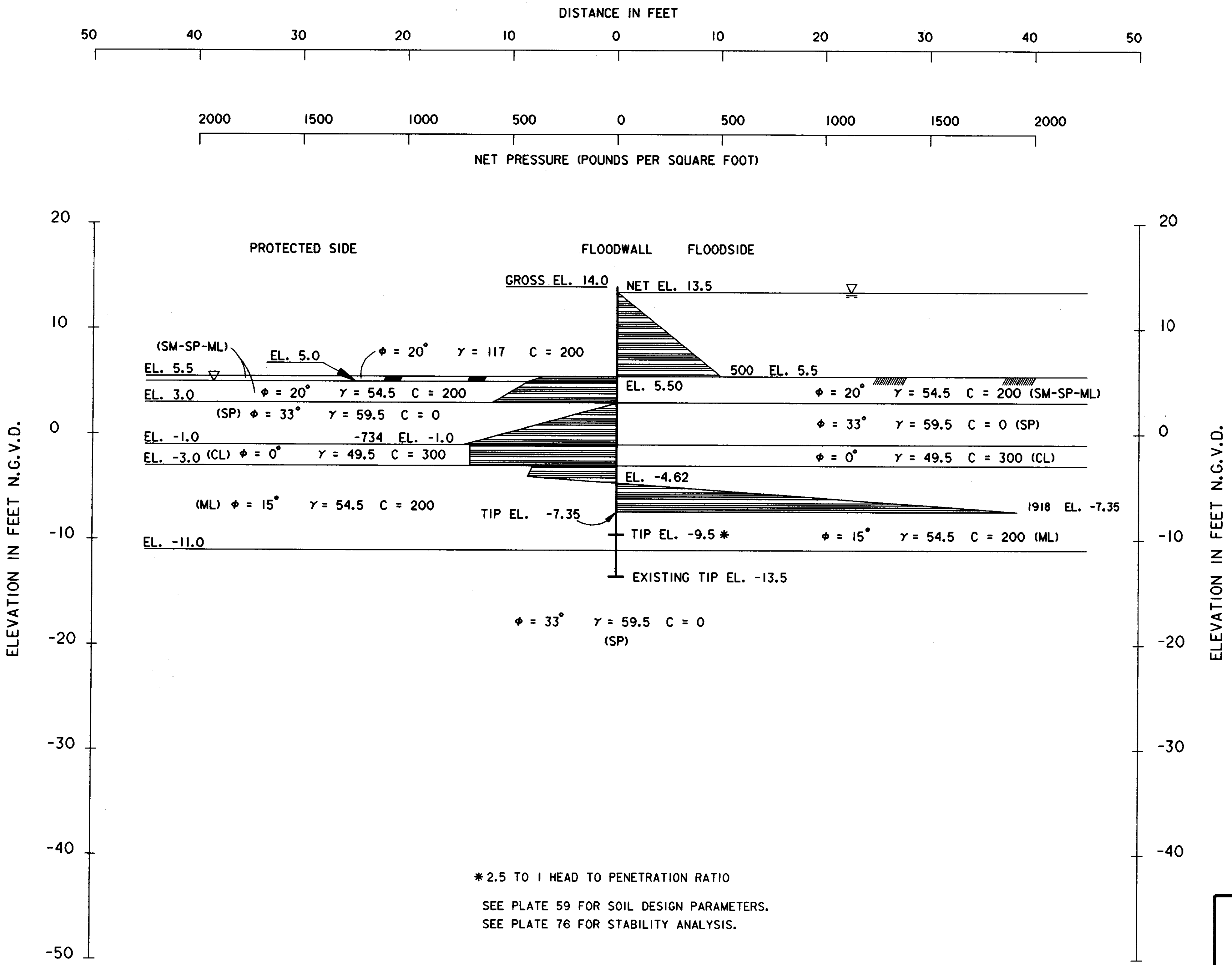
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STA 23+89 TO W/L STA 26+03

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: NOA24A.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
5.50	500.0
5.50	0.0
5.50	-351.3
5.00	-426.0
3.00	-594.9
3.00	3.2
-1.00	-733.9
-1.00	-700.0
-3.00	-700.0
-3.00	-401.5
-4.01	-424.2
-4.62	0.0
-7.35	1917.5
-7.35	0.0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 76 FOR STABILITY ANALYSIS.

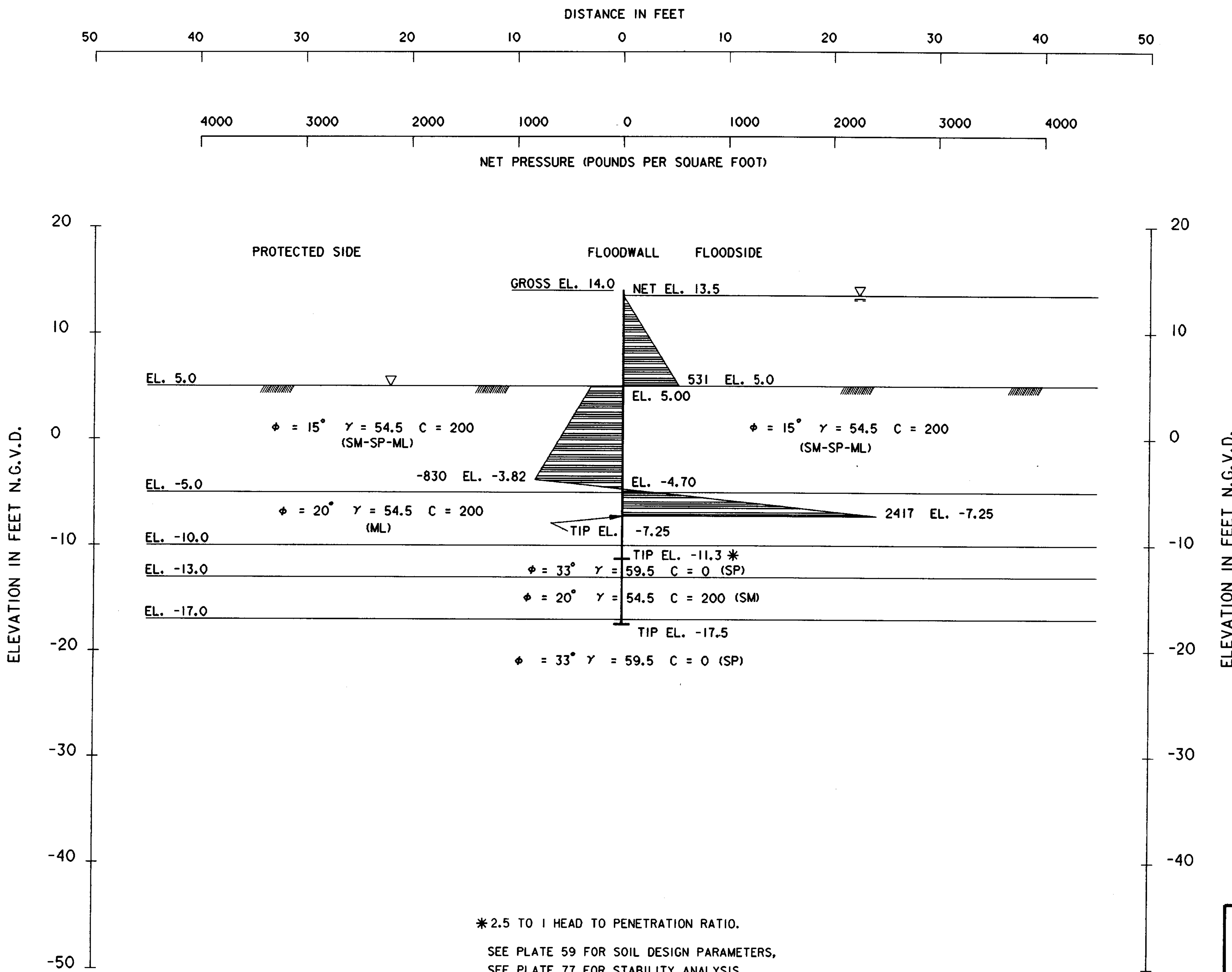
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS AIRPORT
W/L STA 26+03 TO W/L STA 26+88

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: NOA26A.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
5.00	531.2
5.00	0.0
5.00	-297.0
-3.82	-830.5
-4.70	0.0
-7.25	2416.8
-7.25	0.0

✳2.5 TO 1 HEAD TO PENETRATION RATIO.

SEE PLATE 59 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 77 FOR STABILITY ANALYSIS.

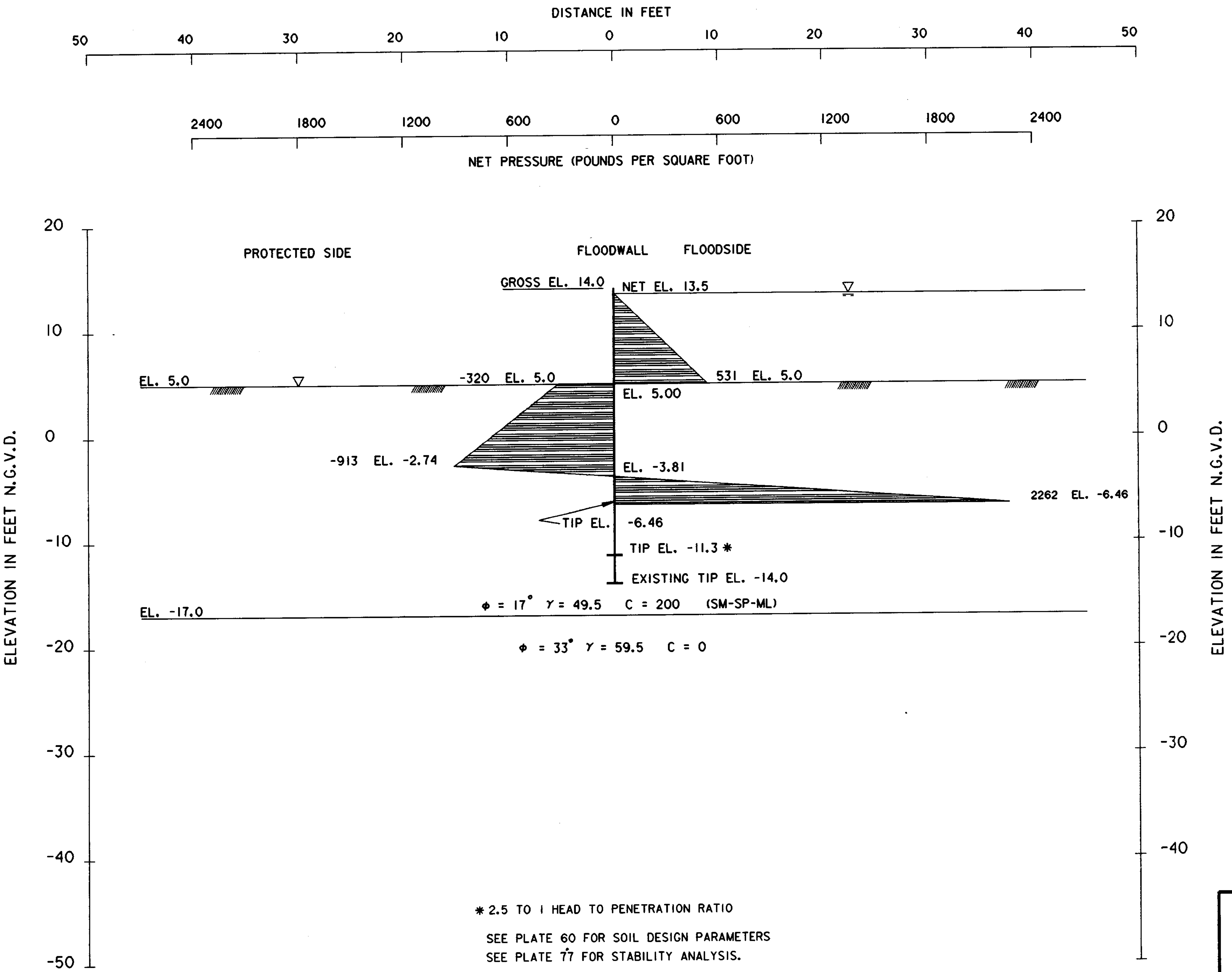
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STAS 26+88 TO 28+95.27 AND 29+26.27 TO 31+06.27

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: NOA27A.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
5.00	531.2
5.00	0.0
5.00	-320.1
-2.74	-913.0
-3.81	0.0
-6.46	2262.0
-6.46	0.0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 60 FOR SOIL DESIGN PARAMETERS

SEE PLATE 77 FOR STABILITY ANALYSIS.

NET DIAGRAM

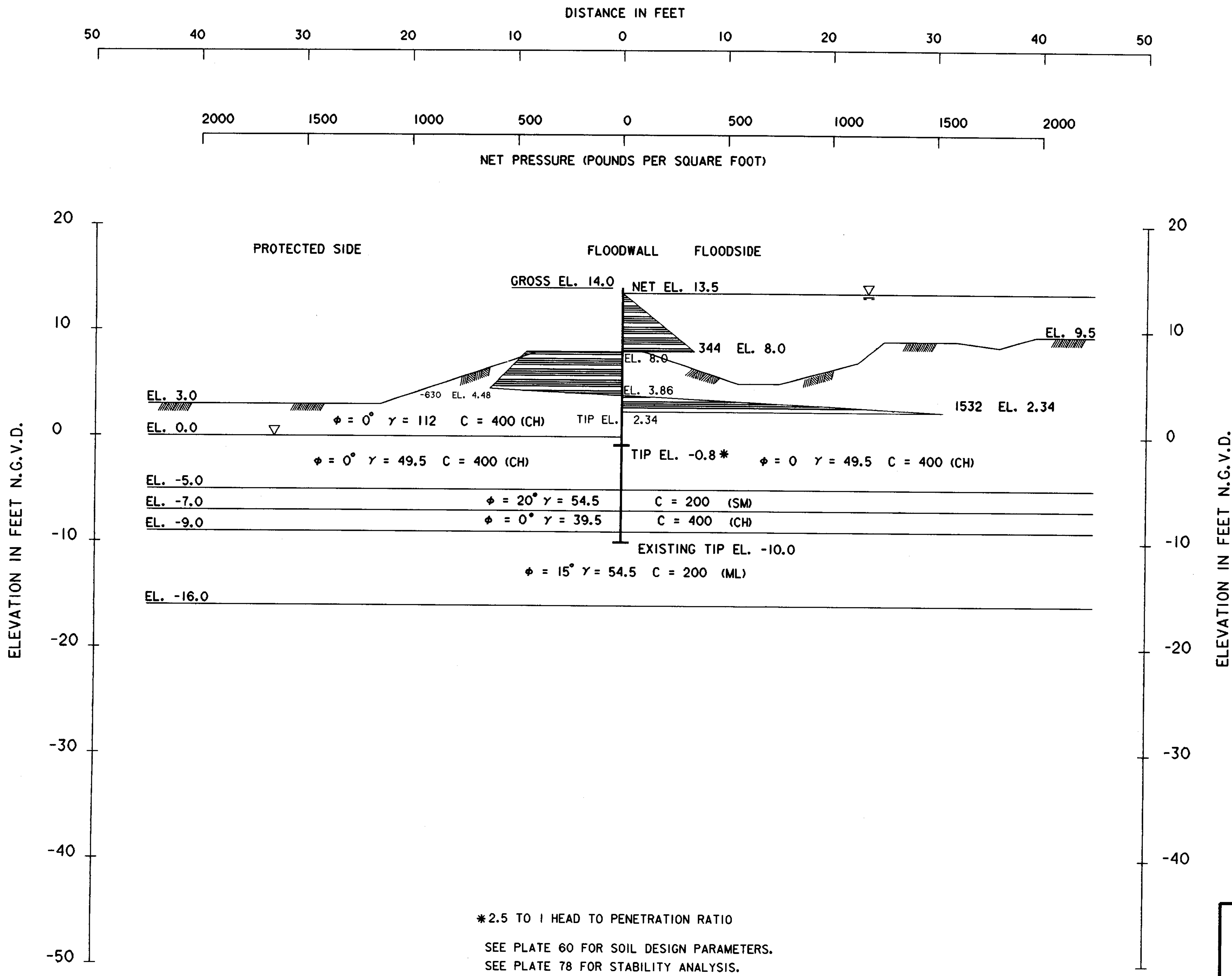
(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
NEW ORLEANS LAKEFRONT AIRPORT
W/L STAS 31+06.27 TO 31+42 AND 32+58 TO 32+80

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

DESIGNED BY: VOJKOVICH
DRAWN BY: WOODS
CHECKED BY: RICHARDSON

PLOT SCALE: 10:1
PLOT DATE: 30 MAR 93
DATE: APRIL 1993
CADD FILE: NOA31A.DGN
FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
8.00	343.8
8.00	0.0
8.00	-456.3
4.48	-630.3
3.86	0.0
2.34	1532.1
2.34	0.0

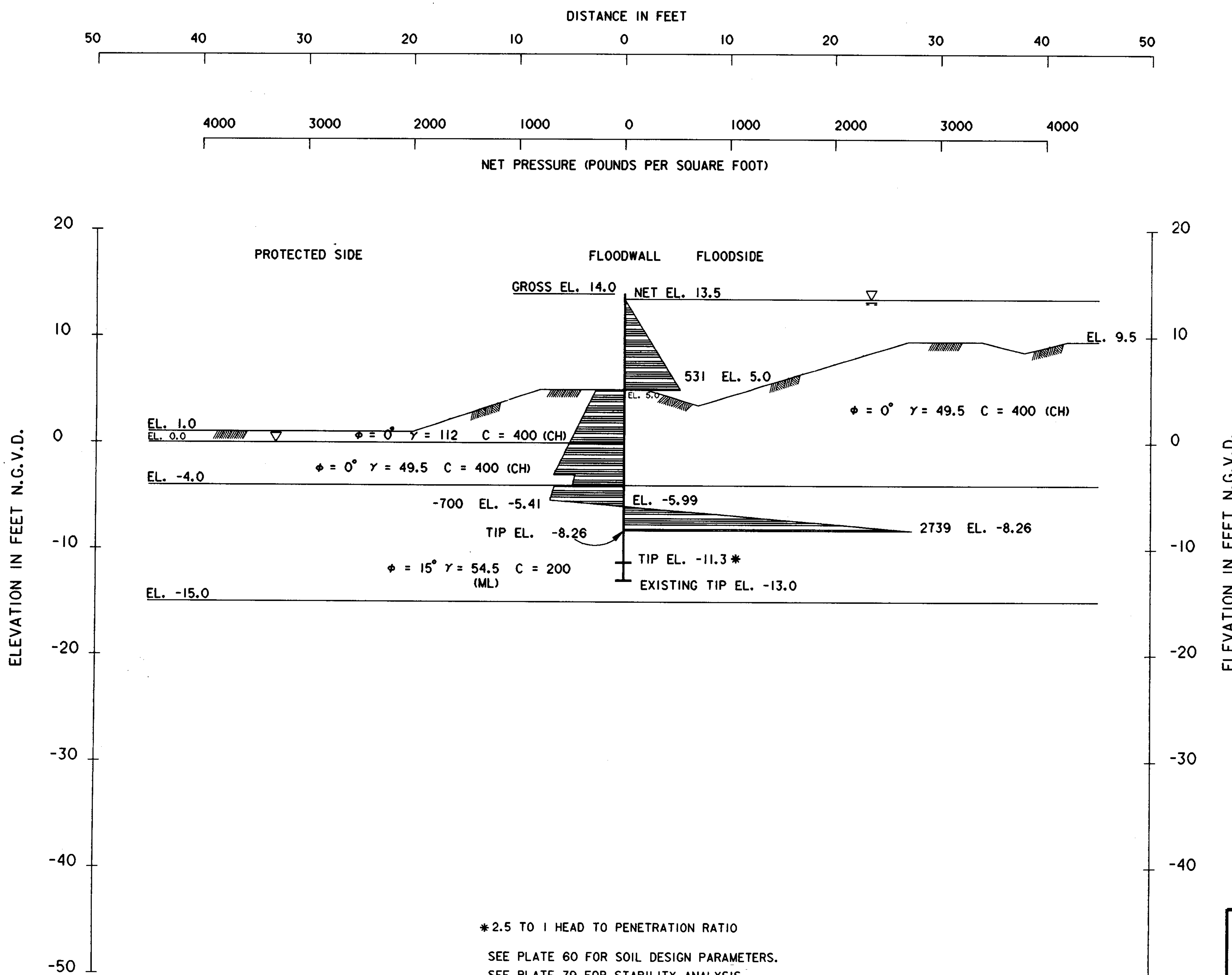
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
LINCOLN BEACH
W/L STAS 100+00 TO 101+20 AND 114+31.81 TO 116+41.81

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: LI100WA.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ELEVATION	PRESSURE
13.50	0.0
5.00	531.2
5.00	0.0
5.00	-268.8
-3.00	-664.7
-3.00	-464.8
-4.00	-486.3
-4.00	-656.7
-5.41	-699.9
-5.99	0.0
-8.26	2739.2
-8.26	0.0

*2.5 TO 1 HEAD TO PENETRATION RATIO

SEE PLATE 60 FOR SOIL DESIGN PARAMETERS.
SEE PLATE 79 FOR STABILITY ANALYSIS.

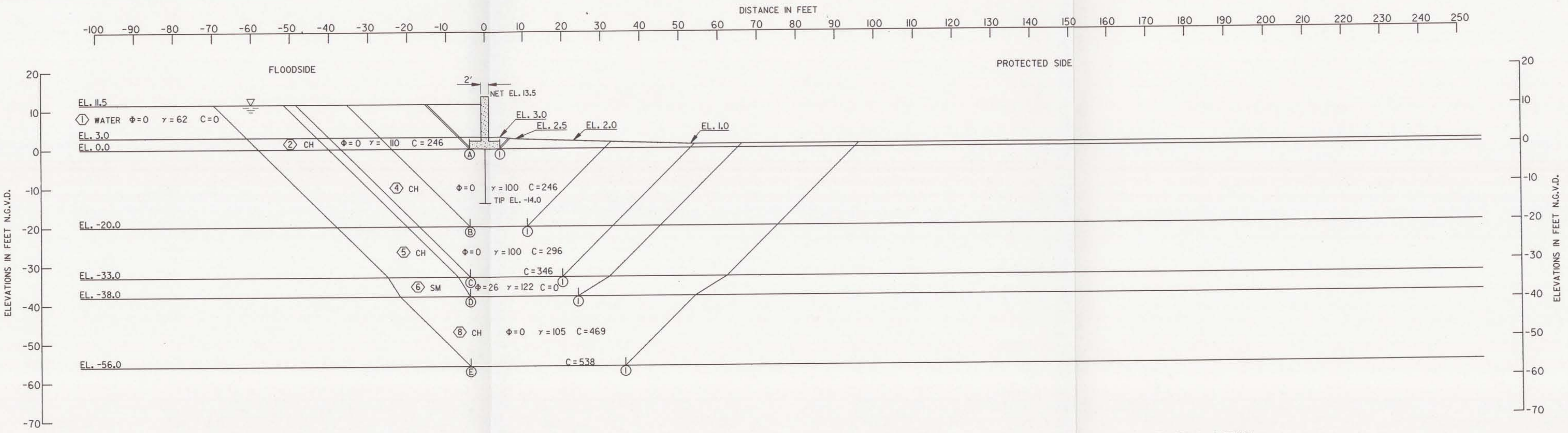
NET DIAGRAM

(Q) CASE F.S. = 1.0

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
I - WALL ANALYSIS
LINCOLN BEACH
W/L STAS 101+20 TO 106+92.91 AND 109+18.91 TO 114+31.81

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 10:1	PLOT DATE: 30 MAR 93	CADD FILE: L1101WA.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
BASE	.5	3442	1230	0	1093	305	2212	1398	+814
A I	.0	3837	1476	1968	1312	440	2361	3720	-1359
B I	-20.0	40295	11316	3690	10665	24705	28979	39060	-10081
C I	-33.0	85547	19012	8304	18028	60129	66535	86461	-19926
D I	-38.0	107706	23581	11200	29897	77967	84125	119064	-34939
E I	-56.0	210231	40423	21520	46394	166606	169808	234520	-64712

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

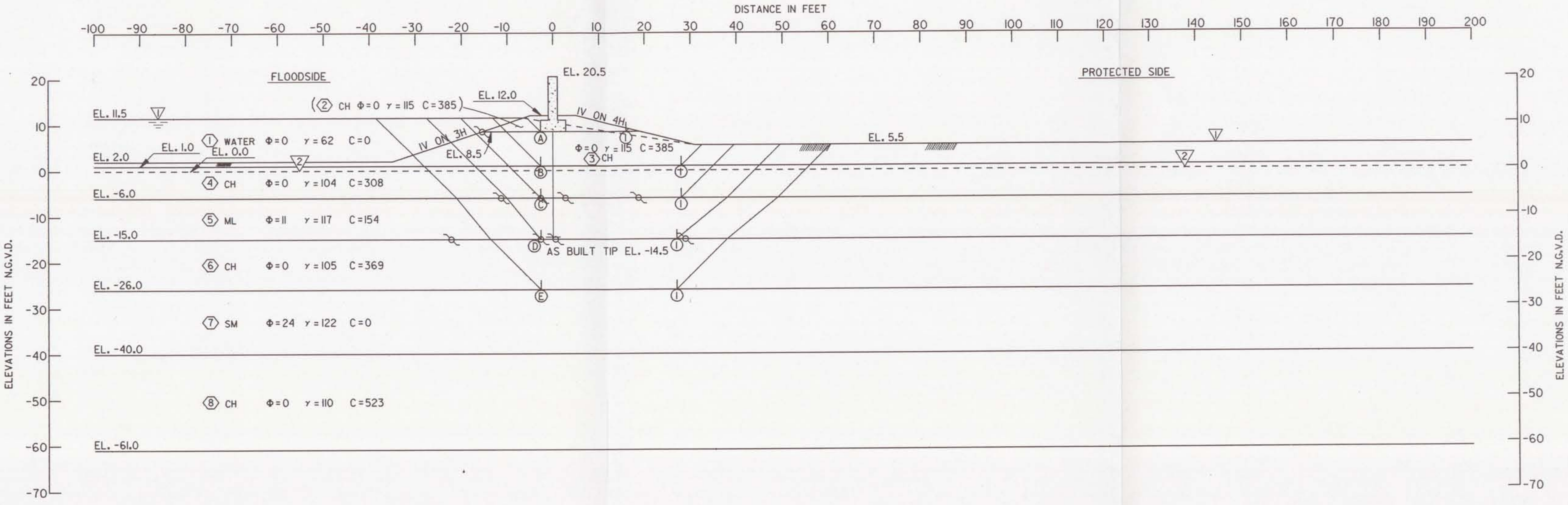
1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM ORLEANS PARISH LAKEFRONT LEVEES, ORLEANS MARINA, GENERAL DESIGN SUPPLEMENT NO. 5D SEE SOIL PARAMETER PLATE 56.
2. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND $\phi = \text{ARCTAN}\left(\frac{\text{TAN } \phi_{available}}{1.3}\right)$).
3. UNDERSEEPAGE WAS CHECKED BY THE LANE'S WEIGHTED CREEP RATIO METHOD AND THE SECTION WAS DETERMINED TO BE ADEQUATE AGAINST PIPING.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

DEEP SEATED STABILITY ANALYSIS
ORLEANS MARINA FLOODGATES

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: DOMI.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
Ⓐ Ⓘ	8.5	683	2464	5120	461	26	-1781	5607	-7388
Ⓑ Ⓘ	-1.0	6211	6796	9457	3465	1294	-575	14216	-14791
Ⓒ Ⓘ	-6.0	16285	9761	9079	7777	7464	6524	24320	-17796
Ⓓ Ⓘ	-15.0	36781	13946	10951	14634	23470	22835	49055	-26220
Ⓔ Ⓘ	-26.0	71845	19294	10960	22748	55147	52551	88855	-36304

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.

2. ▽2—▽2 = PH GRADE LINE USED FOR THE SOIL STRATUMS BELOW EL. -15.0.

3. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND $\phi = \text{ARCTAN}\left(\frac{\text{TAN } \phi_{available}}{1.3}\right)$).

4. UNDERSEEPAGE WAS CHECKED BY THE LANE'S WEIGHTED CREEP RATIO METHOD AND THE SECTION WAS DETERMINED TO BE ADEQUATE AGAINST PIPING.

NOTES

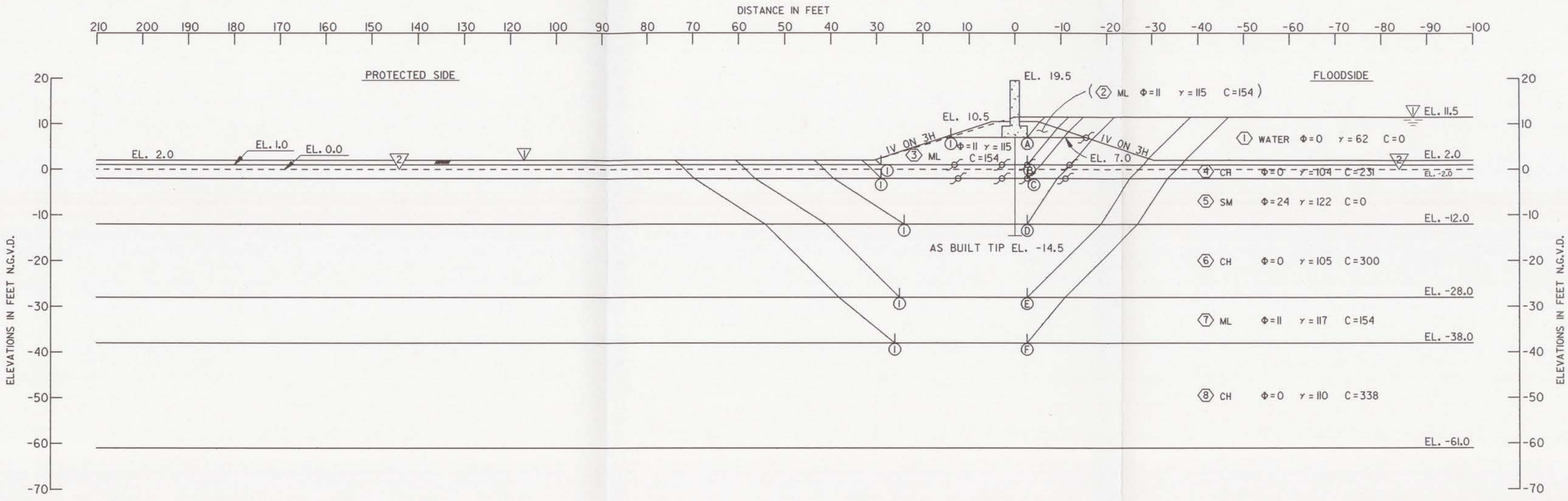
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED ANALYSIS
BAYOU ST JOHN
EAST BRIDGE ABUTMENT

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

DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BYRELA4.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
Ⓐ ①	7.0	951	950	0	138	10	1	148	-147
Ⓑ ①	1.0	5563	2735	6481	423	92	2828	6996	-4168
Ⓒ ①	-2.0	9146	3808	5327	1776	914	5338	8017	-2679
Ⓓ ①	-12.0	28653	8324	8011	8136	11766	20329	27913	-7584
Ⓔ ①	-28.0	78899	14968	8311	17882	51611	63931	77804	-13873
Ⓕ ①	-38.0	124251	26094	9702	31020	90467	98157	131189	-33032

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.
2. ②—② = PH GRADE LINE USED FOR THE SOIL STRATUMS BELOW EL. -12.0.
3. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND ϕ = ARCTAN $\left(\frac{\tan \phi_{available}}{1.3}\right)$).
4. UNDERSEEPAGE WAS CHECKED BY THE HARR'S METHOD AND THE SECTION WAS DETERMINED TO BE ADEQUATE AGAINST PIPING.

NOTES

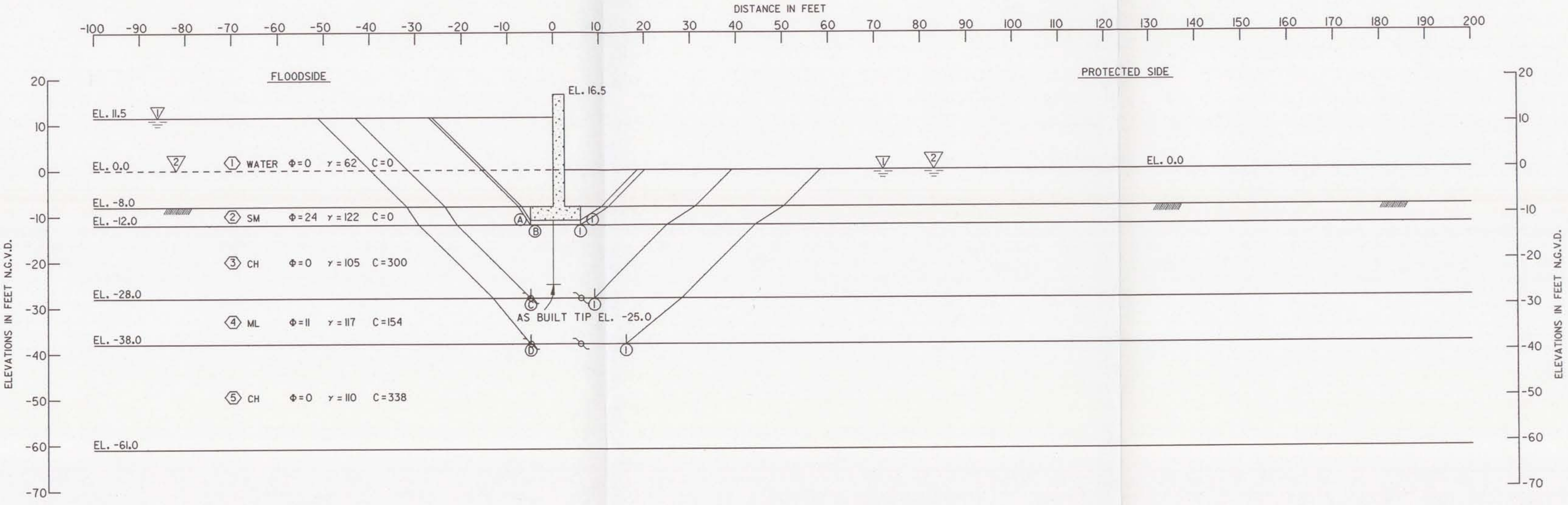
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED ANALYSIS
BAYOU ST JOHN
WEST BRIDGE ABUTMENT

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

DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BYRWL4.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
(A) (1)	-11.0	16086	154	0	332	4023	15932	4355	11577
(B) (1)	-12.0	17732	275	2	618	4950	17457	5570	11887
(C) (1)	-28.0	58479	9875	2660	10253	34223	48604	47136	1468
(D) (1)	-38.0	98196	18738	6415	19951	66752	79458	93118	-13660

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 57.
2. ▽2—▽2 = PH GRADE LINE USED FOR THE SOIL STRATUMS BELOW EL. -12.0.
3. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND $\phi = \text{ARCTAN} \left(\frac{\tan \phi_{available}}{1.3}\right)$).
4. SINCE THE CRITICAL SLIP PLANE UNBALANCED LOAD AT EL. -12.0 IS LESS THAN THE NET AT-REST FORCE OF 12039 lb/LIN FT. ON THE STRUCTURE, THE STRUCTURE IS ASSUMED TO BE STABLE AND NO ADDITIONAL LOAD IS TRANSFERRED TO THE STRUCTURE.
5. UNDERSEEPAGE WAS CHECKED BY THE HARR'S METHOD AND THE SECTION WAS DETERMINED TO BE ADEQUATE AGAINST PIPING.

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

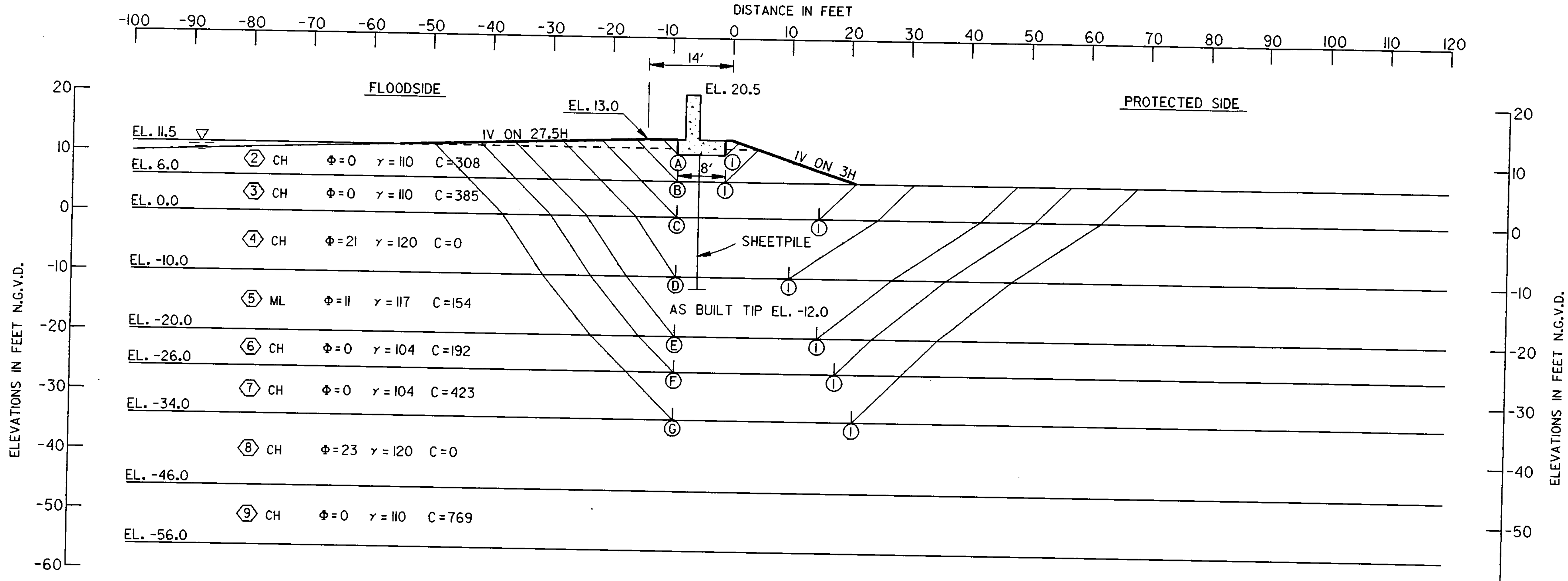
$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED ANALYSIS
BAYOU ST JOHN
T - WALL AT SECTOR GATE

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

DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: BYRDS.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

PLATE 106



* GATE MONOLITH AT RAMP 2

ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
A I	10.5	334	1540	0	1308	312	-1206	1620	-2826
B I	6.0	2678	4269	2464	3387	2198	-1591	8049	-9640
C I	.0	9162	8760	4687	4620	2640	402	11947	-11545
D I	-10.0	29156	13958	7143	11666	16089	15198	34898	-19700
E I	-20.0	60630	21341	4608	20611	39568	39289	64787	-25498
F I	-26.0	84596	23332	5184	22957	59245	61264	87386	-26122
G I	-34.0	122141	29651	12690	29725	91639	92490	134054	-41564

* GATE MONOLITH AT RAMPS 1 & 3 ARE NOT SHOWN.
DEEP-SEATED ANALYSES FOR RAMPS 1 & 3 ARE VERY SIMILAR

SEEPAGE CALCULATED BASED ON LANE'S WEIGHTED CREEP RATIO.
ASSUME UPPER LAYER IS A SILTY FINE SAND, THEREFORE
LWCR $\geq$ 8.

$$LWCR = \frac{\text{WEIGHTED CREEP DISTANCE}}{\Delta \text{ HEAD}}$$

MINIMUM TIP EL. FOR SEEPAGE:

$$8 = \frac{(8 + 7 \times 3) \div 3 + d + (d - 5.5)}{5.5}$$

d = 19.92' OR EL. -9.42

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

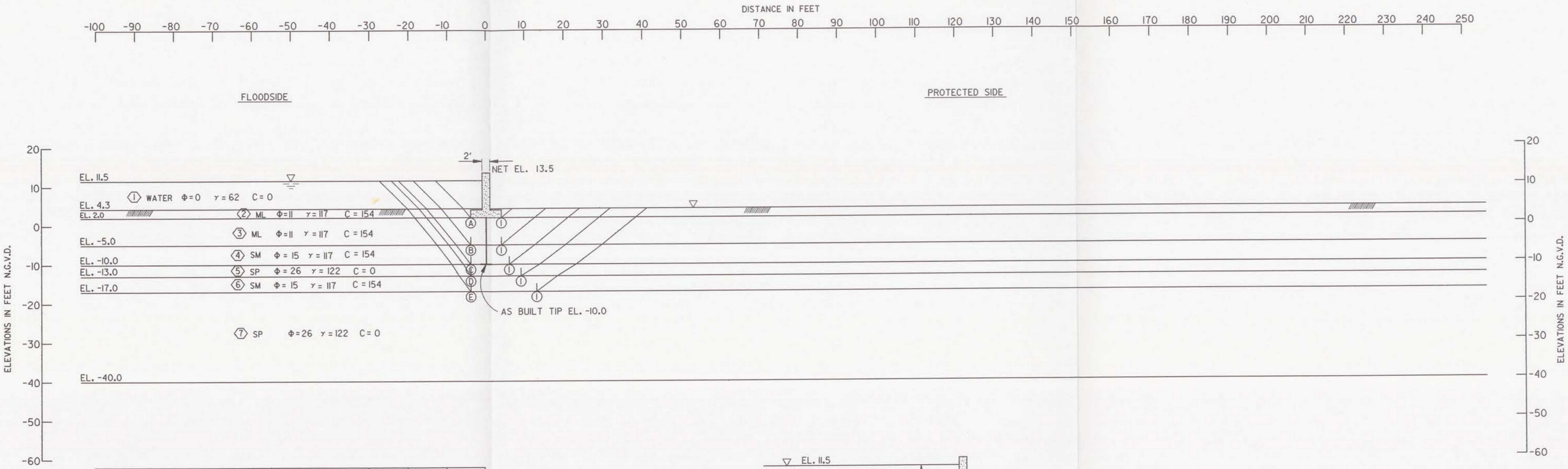
GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE SOIL PARAMETER PLATE 58.
2. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND Φ = ARCTAN $\left(\frac{\tan \Phi_{available}}{1.3}\right)$).

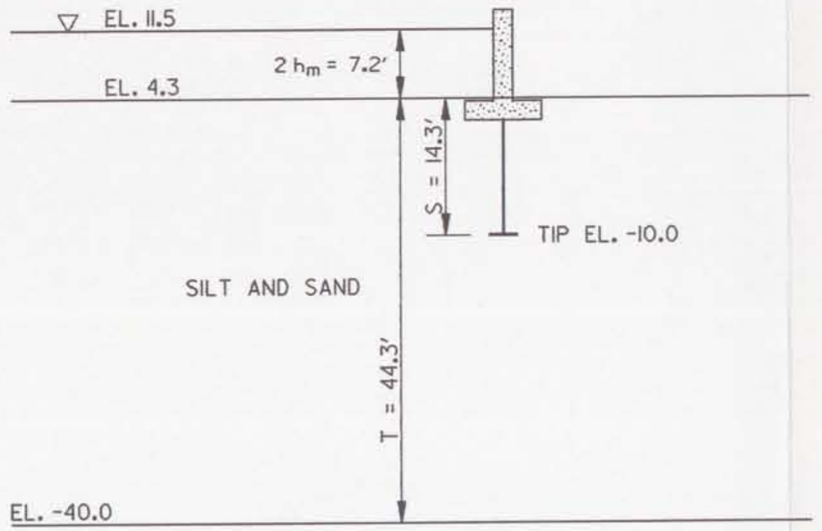
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED ANALYSIS
PONTCHARTRAIN BEACH
GATES 1, 2, AND 3

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

DESIGNED BY: PINNER DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: GATE1.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
A I	2.0	2603	596	0	939	309	2007	1248	+759
B I	-5.0	10245	3002	2064	4679	5059	7243	11802	-4559
C I	-10.0	19222	5449	3714	9050	11962	13733	24726	-10993
D I	-13.0	26034	6986	5472	13249	17530	19048	36251	-17203
E I	-17.0	36795	9663	8184	17981	26622	27132	52787	-25655



SEEPAGE CALCULATED BASED ON HARR'S METHOD

$S = 14.3'$ $T = 44.3'$ $2h_m = 7.2'$

$\therefore S/T = 14.3'/44.3' = 0.32$

$\frac{I_e S}{h_m} = 0.62$ FROM HARR'S CHART

$\therefore I_e = \frac{0.62\ h_m}{S} = \frac{0.62\ (3.6')}{14.3'} = 0.156$

$I_{cr} = 54.5\ pcf/62.5\ pcf = 0.87$

$FS = \frac{I_{cr}}{I_e} = \frac{0.87}{0.156} = 5.6$

$5.6 > 4.0$ FOR SILT (OK)

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

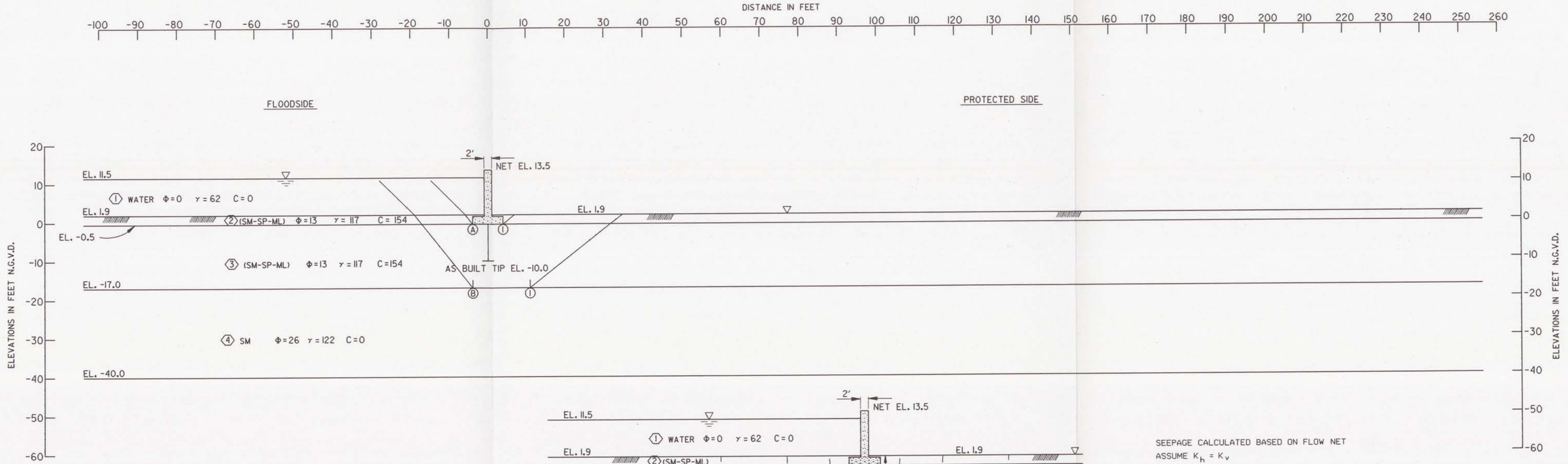
GENERAL NOTES:

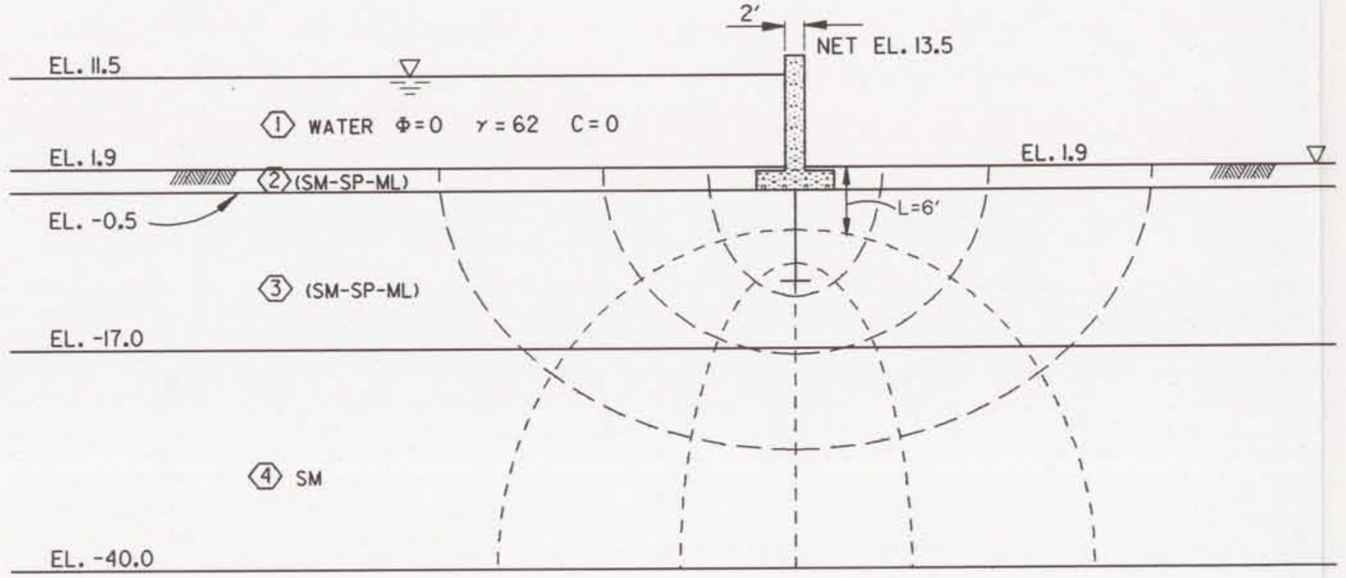
1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A. SEE SOIL PARAMETER PLATE 59.
2. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND ϕ = ARCTAN $\left(\frac{\tan \phi_{available}}{1.3}\right)$).

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED STABILITY ANALYSIS
NEW ORLEANS AIRPORT
FLOODGATE 4

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: NODS4Z.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962





ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
A 1	-.5	4042	593	0	1012	323	3449	1335	-2114
B 1	-17.0	32860	7526	5571	12450	20003	25334	38024	-12690

NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A. SEE SOIL PARAMETER PLATE 60.
2. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND ϕ = ARCTAN $\left(\frac{\text{TAN } \phi_{available}}{1.3}\right)$).

SEEPAGE CALCULATED BASED ON FLOW NET
ASSUME $K_h = K_v$

$N_f = 4$ $N_d = 6$ $H = 11.5' - 1.9' = 9.6'$

$\Delta H = 9.6'/6' = 1.6'$ $L = 6'$

$I_e = \Delta H/L = 1.6'/6' = 0.27$

$I_{cr} = \frac{\gamma_m}{\gamma_w} = \frac{54.5}{62.5} = 0.87$

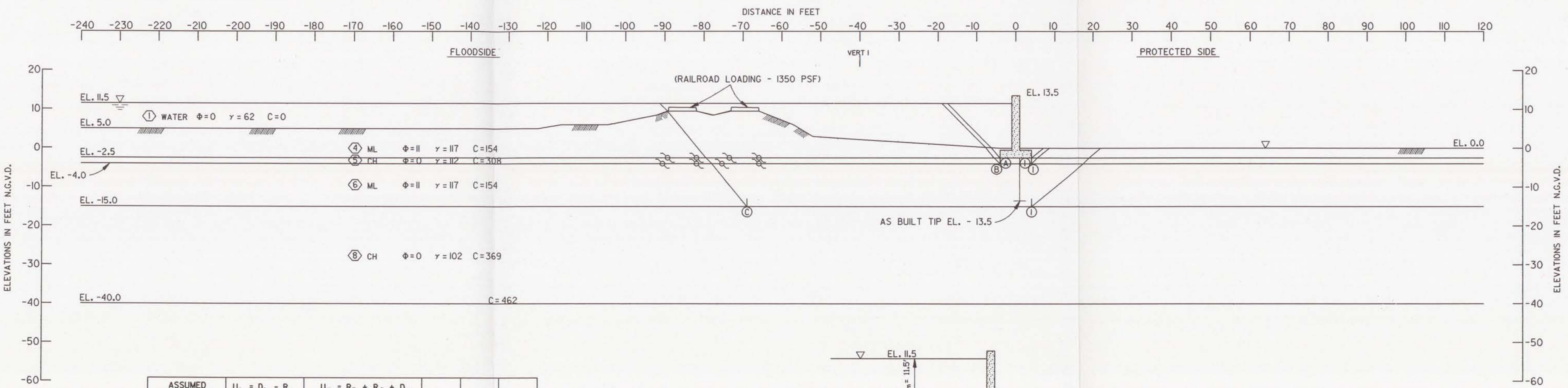
$FS = \frac{I_{cr}}{I_e} = \frac{0.87}{0.27} = 3.2 > 2.5$ (OK)

ALSO HYDRAULIC LOADING CONDITION IS A SHORT TERM CONDITION.

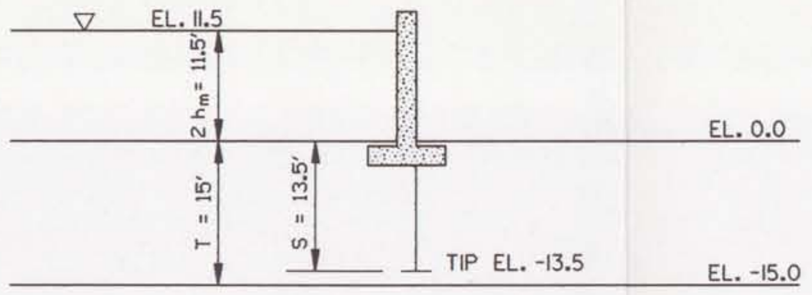
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED STABILITY ANALYSIS
NEW ORLEANS AIRPORT
FLOODGATE 4A

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: NODS4A.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962



ASSUMED FAILURE SURFACE		$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
NO.	ELEV.	D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
(A) (I)	-2.5	5569	667	0	1027	366	4902	1393	+3509
(B) (I)	-4.0	7169	1621	1586	1951	930	5548	4467	+1081
(C) (I)	-15.0	55184	17423	20221	8893	13074	37761	42188	-4427



NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

GENERAL NOTES:

1. CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL FROM "CITRUS LAKEFRONT LEVEE IHNC TO PARIS ROAD" DM NO. 2 GENERAL DESIGN SUPPLEMENT NO. 5A. SEE SOIL PARAMETER PLATE 60.
2. DEEP-SEATED STABILITY ANALYSIS UTILIZED A FACTOR OF SAFETY 1.3 INCORPORATED INTO THE SOIL PARAMETERS (C=COHESION AVAILABLE/1.3 AND ϕ = ARCTAN $(\frac{\text{TAN } \phi_{available}}{1.3})$).
3. SINCE THE CRITICAL ~~SLIP~~ PLANE UNBALANCED LOAD AT EL. -12.0 IS LESS THAN THE NET AT-REST FORCE OF 4133 lb/LIN FT. ON THE STRUCTURE, THE STRUCTURE IS ASSUMED TO BE STABLE AND NO ADDITIONAL LOAD IS TRANSFERRED TO THE STRUCTURE.

SEEPAGE CALCULATED BASED ON HARR'S METHOD
ASSUME SILT EXTENDS TO THE SURFACE

S = 13.5' T = 15' $2h_m$ = 11.5'

$\therefore$ S/T = 13.5'/15' = 0.9

$\frac{I_e S}{h_m}$ = 0.44 FOR S/T = 0.9 FROM HARR'S CHART

$\therefore I_e = \frac{0.44\ h_m}{S} = \frac{0.44\ (5.75')}{13.5'} = 0.19$

I_{cr} = 54.5 pcf/62.5 pcf = 0.87

$FS = \frac{I_{cr}}{I_e} = \frac{0.87}{0.19} = 4.6$

4.6 > 4.0 FOR SILT (OK)

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK
DEEP SEATED ANALYSIS
LINCOLN BEACH
FLOODGATE

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

DESIGNED BY: VOJKOVICH DRAWN BY: WOODS CHECKED BY: RICHARDSON	PLOT SCALE: 20:1	PLOT DATE: 30 MAR 93	CADD FILE: L110ITD.DGN
	DATE: APRIL 1993		FILE NO. H-2-30962

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION		TYPE	LETTER SYMBOL	SYMBOL	TYPICAL NAMES
COARSE - GRAINED SOILS More than half of material is larger than No. 200 sieve size.	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.		GW		GRAVEL,Well Graded,gravel-sand mixtures,little or no fines
			GP		GRAVEL,Poorly Graded,gravel-sand mixtures,little or no fines
		GRAVEL WITH FINES (Appreciable Amount of Fines)	GM		SILTY GRAVEL,gravel-sand-silt mixtures
			GC		CLAYEY GRAVEL,gravel-sand-clay mixtures
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size.	CLEAN 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			NS		No Sample Retrieved

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

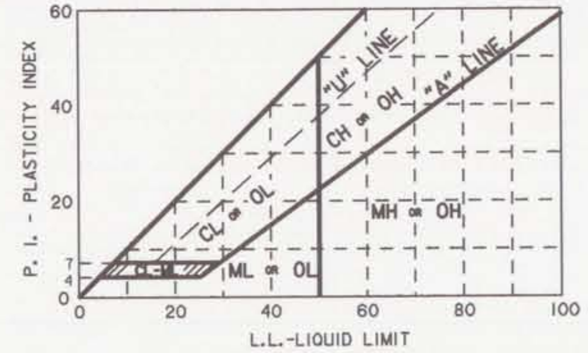
DESCRIPTIVE SYMBOLS

COLOR

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

CONSISTENCY FOR COHESIVE SOILS

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



PLASTICITY CHART

For classification of fine-grained soils in accordance with ASTM D 2487

MODIFICATIONS

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

NOTES:

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

Are natural water contents in percent dry weight

When underlined denotes D_{10} size in mm*

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

Are liquid and plastic limits, respectively

SYMBOLS TO LEFT OF BORING

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

FIGURES TO RIGHT OF BORING

Are values of cohesion in lbs./sq.ft. from unconfined compression tests

In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler (1 3/8" I.D., 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remoulded to the estimated natural void ratio

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

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

TYPICAL NOTES:

1. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially within the purview of the contract clause entitled "Differing Site Conditions".
2. Ground-water elevations shown on the boring logs represent ground-water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground-water data are available from the boring but does not necessarily mean that ground-water will not be encountered at the locations or within the vertical reaches of such borings.
3. Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.
4. Unless otherwise noted:
   a. Undisturbed borings, indicated by the letter "U", are taken with a 5" I.D. Piston Type Sampler.
   b. General type borings are taken with a 1 7/8" I.D. Tube Sampler and/or a 1 3/8" I.D. Split Spoon Sampler.

Safety is a Part of Your Contract

VALUE ENGINEERING INCENTIVE CLAUSES — YOUR KEY TO HIGHER PROFITS

C-A-D

REVISED 25 JUNE 92

SOIL BORING LEGEND

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

DESIGNED BY: VOJKOVICH	DATE: APRIL 1993	CADD FILE: BORLEGA1.DGN
DRAWN BY: WOODS	PLOT DATE: 30 MAR 93	FILE NO. H-2-30962
CHECKED BY: RICHARDSON	SCALE: 20:1	

PLATE A

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY
HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

APPENDIX A

PERTINENT CORRESPONDENCE

246-4000

OFF 58-33.3

The Board of Levee Commissioners

OF THE

Orleans Levee District

SUITE 202 — ADMINISTRATION BUILDING
NEW ORLEANS LAKEFRONT AIRPORT

New Orleans, La.

70126

PROTECTING YOU AND YOUR FAMILY

December 11, 1985

Eugene S. Witherspoon
Colonel, Corps of Engineers
District Engineer
Department of the Army
New Orleans District
Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Re: Bayou St. John Flood Control Project

Dear Colonel Witherspoon:

The Orleans Levee Board has recently instructed our consultant to revise the design of the roadway and bridge for the above captioned project. In doing so, the levee and floodwall location and alignment has been slightly revised and will be coordinated with your staff. We have also instructed our consultant to prepare a comparative cost estimate for varying types of navigable gated structures in Bayou St. John.

Your letter dated July 2, 1985 stated that you had "no objections to the construction of the navigable sector gated structure; however, this is considered a betterment and the additional cost will be the responsibility of the Orleans Levee Board."

The Board at its August 21, 1985 meeting discussed this subject and passed the enclosed resolution No. 5-82185.

In keeping with the wishes of the Board, it is requested that a meeting be arranged with you and your staff to pursue the reconsideration of your position on flood protection at Bayou St. John.

Yours very truly,

Emile ~~W.~~ Schneider
President

EWS:EJM:gmb

Enclosure: Resolution #5-82185

xc: Mr. H. B. Lansden
Mr. C. E. Bailey
Mr. Richard J. McGinity
Design Engineering, Inc.

MOTION: #6-82185

RESOLUTION: #5-82185

BY: Commissioner Hammond
Engineering Committee
Commissioner Barthelemy

August 21, 1985

RESOLUTION

WHEREAS, the U. S. Army Corps of Engineers has advised the Orleans Levee Board, by letter dated July 2, 1985, that the Federal plan to be detailed in the General Design Memorandum will be an earthen closure with gated culverts, since this plan would accomplish the project objectives at minimum cost, and by letter dated May 23, 1985, that there is no objection to the construction of the navigable sector gated structure, however, this is considered a betterment and the additional cost will be the responsibility of the Orleans Levee District, and

WHEREAS, the Louisiana State Legislature in its Regular Session, 1982, passed House Bill No. 384, which placed Bayou St. John under the Natural and Scenic River System, and

WHEREAS, the Board may be prohibited from constructing the original project, which was the earthen closure with gated culverts, as this plan may violate State law, which places Bayou St. John under the Natural and Scenic River System, and

WHEREAS, the Board was denied a permit for the construction of the original project by the Louisiana Wildlife and Fisheries

Commission, who has been given permitting authority over the Bayou when it was designated a scenic river.

BE IT HEREBY RESOLVED, That the Board pursue through legal avenues with the U. S. Army Corps of Engineers the reconsideration of its position on flood protection at Bayou St. John.

AYES: Commissioners Barthelemy, Hammond, Ross, Talbot & Uddo

NAYS: none

ABSENT: Commissioner Ducote

RESOLUTION ADOPTED: yes

THE FOREGOING IS CERTIFIED TO BE A TRUE AND CORRECT COPY.

H. B. LANSDEN, SECRETARY
THE BOARD OF LEVEE COMMISSIONERS
OF THE ORLEANS LEVEE DISTRICT

July 2, 1985

Engineering Division
Projects Engineering Section

Mr. Earl J. Magner, Jr.
Chief Engineer
The Board of Levee Commissioners
Orleans Levee District
Suite 202 - Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Dear Mr. Magner:

Reference is made to your June 11, 1985, letter concerning the schedule for the General Design Memorandum (GDM) for the Bayou St. John Flood Control Project, a feature of the authorized Lake Pontchartrain Louisiana & Vicinity Hurricane Protection project.

Our current program at Bayou St. John calls for submitting a GDM supplement for this project feature in October 1988. Considering your previously expressed intent to accomplish all designs and proceed to construction without waiting for a formal definition of credit in the GDM, it was deemed appropriate to emphasize designs for other features. Should you now desire instead that we document the Federal designs for providing hurricane protection in the Bayou St. John area, we would, since this is a critical location, want to review our priorities and possibly advance the GDM at the expense of other item(s). The Federal plan to be detailed in the GDM will be as set forth in my letter of May 23, 1985, i.e., an earthen closure with gated culverts, since this plan would accomplish the project objectives at minimum cost.

Please let me know if you intend to proceed with the Bayou St. John work as you previously indicated.

Sincerely,

Frederic M. Chatry
Chief, Engineering Division

246-4000

The Board of Levee Commissioners

OF THE

Orleans Levee District

SUITE 202 — ADMINISTRATION BUILDING
NEW ORLEANS LAKEFRONT AIRPORT

New Orleans, La.

70126

PROTECTING YOU
AND YOUR FAMILY

June 11, 1985

Mr. Frederic M. Chatry
Chief, Engineering Division
Department of the Army
New Orleans District
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Re: Bayou St. John Flood
Control Project

Dear Mr. Chatry:

Reference is made to your letter dated May 23, 1985 regarding the above referenced project. Your letter states that "the creditable amount for this work can not be established until the General Design Memorandum for this work is prepared". Please advise this office as to your date for preparation of this General Design Memorandum.

The Board may elect to opt for you to develop a plan which is acceptable and within present laws concerning Bayou St. John.

We await your early reply.

Very truly yours,

Earl J. Magner, Jr.
Chief Engineer

EJM:dab

xc: Mr. Emile W. Schneider
Mr. H. B. Lansden
Mr. Ed Bailey

Pepper and Associates
3012 26th Street
Metairie, Louisiana 70002

Design Engineering, Inc.
3330 West Esplanade, Suite 205
Metairie, Louisiana 70002

LMVED-TD (LMNED-DD/27 Nov 84) 3d End Mr. Bardwell/dk/5925
SUBJECT: Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project - Proposed Flood Protection Crossing at Bayou St. John, Orleans Parish Lakefront Levee West of I.H.N.C., New Orleans, Louisiana

DA, Lower Mississippi Valley Division, CE, Vicksburg, MS 39180-0080

20 MAY '85

TO: Commander, New Orleans District, ATTN: LMNED-DD

1. We have concluded that the additional cost of the proposed navigable sector gated structure is beyond a reasonable contemplation of the Government's cost sharing agreement. The navigable sector gated structure is equivalent, from a flood control standpoint, to the earthen closure dam with the gated culverts. There is no objection to the construction of the navigable sector gated structure; however, this is considered to be a betterment and the additional cost will be a local interest responsibility.

2. During our review it was learned that there was no suit in Louisiana State Courts regarding the issuance of a permit under the Louisiana Scenic River Act with conditions. The issue became a matter of negotiations between the levee board and the permitting agency. The settlement was an agreement to grant a permit upon the condition that a navigable sector gated structure be built. The settlement prevented a judicial determination by the state courts.

3. For the reasons stated above, we concur that the credit to local interest should be based on the cost of an earthen closure dam with gated culverts. The amount to be allowed should be established in the alternative plan studies in the General Design Memorandum for this work.

FOR THE COMMANDER:

6 Encl
nc

James R Tuttle
for ROBERT I. KAUFMAN, P.E.
Acting Chief, Engineering Division

1-EXECUTIVE ASSISTANT
~~2-DEPUTY~~
~~3-DEPUTY~~
4-COMMANDER

LMNED-DD (NOD 27 Nov 84) 2nd End Mr. Guizerix & Mr. Romero/ds/ 2692 & 2645

SUBJECT: Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project - Proposed Flood Protection Crossing at Bayou St. John, Orleans Parish Lakefront Levee West of I.H.N.C., New Orleans, Louisiana

DA, New Orleans District, Corps of Engineers, P. O. Box 60267, New Orleans, LA 70160-0267 13 Mar 85

TO: Commander, Lower Mississippi Valley Division, ATTN: LMVED-T

Responses to your 1st endorsement comments are furnished below in like designated paragraphs:

b. The first two sentences of paragraph 4 identify in principle the type of commitment the Corps has made to OLD relative to credits. Knowing that project credits can be granted only when the work is contained in an approved General Design Memorandum (GDM), we have clearly stated to local interests in each and every instance of credit discussion that any judgment made by us relative to credits is dependent upon confirmation in an approved GDM. Furthermore, we have clearly documented to local interests that our credit determinations are based on the least costly workable solution.

c. At the time input for the Reevaluation Study was prepared (roughly 1979 to 1982), the OLD had proposed a levee closure at the mouth of Bayou St. John with gated culverts to permit limited tidal interchange between the lake and bayou. Since the levee closure with culverts appeared at that time to be the least costly workable solution (see paragraph 4a of basic letter), the Reevaluation Study estimates allowed for that solution. Neither the Reevaluation Study nor the supplemental assurances are in sufficient detail to describe the hurricane protection at Bayou St. John. In the Reevaluation Study, the construction cost is included in the item called Clay Embankment.

d. Concur. As stated in the basic letter and in paragraph b above, we have clearly stated to local interests that credit cannot be allowed until the work is included in an approved GDM. The GDM will reflect high level plan grades and the least costly workable solution.

a. Your suggestion that the gate proposed by OLD could be a creditable item implies that anything required by a local permitting authority as a precondition to the issuance of a permit may properly be incorporated into the Federal project irrespective of its merits and costs. We do not believe that such a position is tenable. A navigable floodgate which will be operated rarely, if ever, preserves neither the "openness" of this short reach of Bayou St. John nor its navigability. We believe the requirement that the gate be provided as a quid pro quo to issuance of the permit is unreasonable; and we do not believe that Federal investment should be made to meet an unreasonable requirement.

FOR THE COMMANDER:

FREDERIC M. CHATRY
Chief, Engineering Division

LMVED-TD (NOD 27 Nov 84) 1st Ind
SUBJECT: Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project - Proposed Flood Protection Crossing at Bayou St. John, Orleans Parish Lakefront Levee - West of I.H.N.C., New Orleans, Louisiana

DA, Lower Mississippi Valley Division, Corps of Engineers, Vicksburg, MS 39180-0080

28 FEB '85

TO: Commander, New Orleans District, ATTN: LMNED-DD

We concur in the plan of action outlined in para 6 of the basic letter subject to resolution of the following:

a. Current planning guidance as expressed in the Principles and Guidelines (P&G) generally requires the Corps to recommend the alternative with the greatest net economic benefit consistent with protecting the Nation's environment, and further requires that Federal water resources planning be responsive to State and local concerns. The plan for completing flood protection works at Bayou St. John should be fully responsive to the needs and requirements of Louisiana's wild and scenic river law, within the applicable Corps policies and national laws. In view of this, if the gated navigable structure as proposed by the State is required as a condition of permit for work on the scenic waterway, credit could be allowed for the gates, as well as for levees and floodwalls.

b. The type of commitment the Corps has previously made to OLD for credit for flood protection at Bayou St. John should be identified.

c. The type crossing and cost thereof envisioned in the Reevaluation Study, and used as a basis of obtaining the supplemental assurances for the High Level Plan should be discussed. This is of major concern as it impacts on the supplemental assurances and also on our defense of subsequent litigation over this issue.

d. The design of a closure has never been documented in a design memorandum by the Corps as mentioned in the next to last sentence of para 4a. It is our understanding that during the permit action discussed in para 4b OLD submitted a design which was reviewed by your office. The design of the closure should be documented in a design document and approved by this office prior to allowing credit for this work. The design should reflect the high level plan grades and the appropriate closure plan, i.e., either the earth closure with a modest water control structure or the gated navigable structure.

FOR THE COMMANDER:

wd incl

R. H. RESTA, P.E.
Chief, Engineering Division

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

LMNED-DD

27 November 1984

SUBJECT: Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project - Proposed Flood Protection Crossing at Bayou St. John, Orleans Parish Lakefront Levee - West of I.H.N.C., New Orleans, Louisiana

Commander, Lower Mississippi Valley Division
ATTN: LMVED-T

1. When the Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project was authorized, the existing levees along both banks of Bayou St. John to and including the existing closure dam located just north of Robert E. Lee Boulevard were sufficient to meet the needs for protection under the Standard Project Hurricane (SPH) parameters. Consequently, no work at that location was identified in the project. Shortly after authorization, the U.S. Weather Service issued new parameters for the SPH, which rendered the existing flood protection along Bayou St. John inadequate, both in section and in elevation.

2. The Board of Levee Commissioners of the Orleans Levee District (OLD) is presently involved in designing hurricane protection work at Bayou St. John. The need for the flood protection at Bayou St. John is critical, inasmuch as this bayou provides a potential route for a tidal surge to flood some of the lowest lying lands in Orleans Parish. Enclosure 1 shows the bayou location on the New Orleans Lakefront.

3. For obvious reasons, the OLD would hope that much of their construction will ultimately be incorporated into the subject project. In October 1984, the OLD's consultant, Pepper and Associates, Inc., submitted for our review the preliminary plans for their latest proposal for providing hurricane protection at Bayou St. John. The OLD requested that we review the plan and identify the features that would be creditable contributions to the Lake Pontchartrain project. Enclosure 2 depicts the plan view of their proposal.

4. We are agreeable to making a tentative determination of the creditable features contained in the OLD's proposal with the understanding that the actual determination can only be made after the general design memorandum is prepared and approved. We have reviewed the OLD's plan and have no objection to the levees and floodwalls contained in their proposal. We are concerned, however, that the navigable sector gated structure could ever be creditable under the Lake Pontchartrain, Louisiana and Vicinity project. The only navigation which now exists is for very shallow draft boats (less than 2 feet), and then, navigation is only possible from the lake to the existing dam structure at Robert E. Lee Boulevard. During 1982, the State Legislature included Bayou St. John in the state's "Historic and Scenic Rivers System", by Acts 1982, No. 267. The requirement for the navigable structure was imposed by the Louisiana Department of Wildlife and Fisheries, administrators for the "Scenic Rivers System", as a condition for granting a permit to the OLD to construct the hurricane protection crossing of Bayou St. John. To help explain our concerns, we summarize below the events which have led the OLD to its selection of a plan.

a. Under the changed parameters of the Lake Pontchartrain Barrier Plan, the flood protection at Bayou St. John was envisioned as some plan for raising the levee system along the bayou. The plan was never developed. In March 1976, the OLD suggested the construction of an earthen dam closure at the mouth of the bayou. The closure would have a roadway crossing on the protected side, with culverts provided to maintain the tidal interchange between the lake and the bayou. At that time, NOD concurred with OLD's recommendation, since the proposed plan appeared to be the least costly workable solution. We pointed out that credit would be contingent upon preparation and approval of a general design memorandum by the Corps. Enclosure 3 depicts an artist's rendition of this plan.

b. In January 1979, the OLD submitted a permit request for the closure dam. After the appropriate public meetings were held, on 2 May 1980, this office issued a permit to the OLD, authorizing discharging of dredged and fill material into Bayou St. John. The permit was issued under authority of Section 404 of the Clean Water Act only. Section 10 of the River and Harbor Act of 1899 was not applicable since Bayou St. John was declared to be a non-navigable waterway by Congress in 1936. Our action in issuing the permit was subsequently challenged in U. S. District Court by the Bayou St. John Improvement Association. This Association also filed a lawsuit in state court to stop the ongoing OLD construction contract. The Federal court ruled in favor of the Corps and OLD; the state court, however, halted construction by OLD.

c. As a result of strong public involvement, the State Legislature added Bayou St. John into the state's "Natural and Scenic Rivers System" during 1982. To satisfy the requirements of this act, the OLD submitted a permit application for the earthen closure dam proposal to the Louisiana Department of Wildlife and Fisheries. The permit was denied on 22 December 1983, on the basis that the earthen closure dam proposal violated the Act's guidelines. (Enclosure 4).

d. During January 1984, the OLD submitted a new permit application to the Wildlife and Fisheries, presenting a different plan for crossing the bayou. This plan included levees and floodwalls on both sides of the bayou, a navigable sector gated structure located approximately 1,100 feet from the lake, removal of the existing closure dam at Robert E. Lee Boulevard and twin mid-rise bridges at the Lakeshore Drive crossing. A permit was subsequently issued by the Wildlife and Fisheries (Enclosure 5). As stated in paragraph 4, the navigable sector gated structure was included in the OLD's plan as a condition by the state to satisfy the requirements of the state's "Scenic Rivers" Act. In an interoffice memo dated 20 March 1984, (enclosure 6) Mr. Earl Magner indicated that the floodgate would be closed at all times except when the lake elevation is lower than 0.0 N.G.V.D. during daylight hours. Records indicate that on the average, this would permit the gate to be open only 6 days per year and then only in daylight hours. To all intents and purposes, this would represent a permanent closure of the bayou, since, after protracted periods of gate closure, removal of sand deposits would be required before the gate could be operated. Thus, the gate is without physical significance and becomes only a quid pro quo for the approval of the plan by the administrators of the Natural and Scenic Rivers System.

5. The OLD argues that an earthen closure at the bayou's mouth is not practicable of implementation, and hence should be disregarded in evaluating the credit which should properly accrue under the Federal project. We feel obligated to base credit on the plan which meets the objectives of hurricane protection, and appropriate peripheral requirements, at minimum cost. We do not find a great deal of merit in the argument that the Federal project should underwrite maintaining the "openness" of the bayou, since such "openness" now only exists for approximately 2,000 feet between the mouth of the bayou and the waterfall structure, and we are even less persuaded by the specifics of the OLD plan, which would not, in fact, maintain such "openness." We are, accordingly of the opinion that credit should be limited to the cost of a simple earthen closure with a modest water control structure at the bayou's mouth.

6. The OLD reaction to such a conclusion is not easy to predict, since the strong commitment to their plan derives from an earlier administration. Legal action would likely be brought against both the OLD and the Corps, if OLD accepted our view and an attempt was made, either by them or us, to implement the simple closure. The result could be a standoff under which this gap in the lakefront protective system might persist for years. Despite this dreary possibility, we can find no basis for supporting a credit in excess of the cost of the simple embankment, and we propose to inform OLD that we intend to limit credit under their plan to the costs for that embankment.

LMNED-DD 27 November 1984
SUBJECT: Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project - Proposed Flood Protection Crossing at Bayou St. John, Orleans Parish Lakefront Levee - West of I.H.N.C., New Orleans, Louisiana

7. Approval of the foregoing course of action is recommended.

Eugene S Witherspoon

6 Encls

EUGENE S. WITHERSPOON
Colonel, CE
Commanding

May 23, 1985

Engineering Division
Structural Design Section

Mr. Earl J. Magner, Jr.
Chief Engineer
Board of Levee Commissioners
Orleans Levee District
Suite 202 Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Dear Mr. Magner:

Reference is made to your letters, dated October 23, 1984 and February 13, 1985, concerning your proposal for providing flood control at Bayou St. John. In your letter of October 23, you requested that we determine the elements of this work which would be eligible for credits under the Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection project.

In our letter, dated December 4, 1984, we informed you that we were agreeable to making a tentative credit determination for this work prior to completion of our General Design Memorandum. However, because this process required the approval of our higher authority, we presented your proposal to our Division Engineer for his approval.

We have concluded that the plan for providing an earthen closure dam with gated culverts, presented earlier by your office, would fully meet the requirements of the project. There is no objection to the construction of the navigable sector gated structure; however, this is considered a betterment and the additional cost will be the responsibility of the Orleans Levee District. The creditable amount for this work can not be established until the General Design Memorandum for this work is prepared.

I am forwarding a copy of this letter to Mr. Jerome Pepper of Pepper and Associates, Inc.

Sincerely,

Frederic M. Chatry
Chief, Engineering Division

12 March 1985

Engineering Division
Structural Design Section

Mr. Earl J. Magner, Jr.
Chief Engineer
Board of Commissioners
Orleans Levee District
Suite 202 - Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Dear Mr. Magner:

Reference is made to your letter dated February 13, 1985, inquiring about the status of our credit determination for the work you propose at the Bayou St. John Flood Control Project.

We regret that the subject matter has not been completed sooner. We are in the process of furnishing our Division Engineer with additional information on this work.

We expect to communicate further with you on this matter within the next month.

Sincerely,

Frederic M. Chatry
Chief, Engineering Division

246-4000

The Board of Levee Commissioners

OF THE

Orleans Levee District

SUITE 202 — ADMINISTRATION BUILDING
NEW ORLEANS LAKEFRONT AIRPORT

New Orleans, La.

70126

PROTECTING YOU
AND YOUR FAMILY

February 13, 1985

Mr. Frederic Chatry
Chief, Engineering Division
Department of the Army
New Orleans District
Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Re: Bayou St. John Flood Control Project

Dear Mr. Chatry:

Reference is made to your letter dated December 4, 1985, stating that you have presented your Division Engineer with the facts which led you in selecting your proposed plan, along with your tentative credit determination for his approval. It has been in excess of two months since your submittal to higher authority and almost four months since we provided you with our detailed input by letter dated October 23, 1984.

Please advise as to when we might expect an answer regarding eligible credits for this most needed project so that our consultant can proceed with the Final Plans for the structure.

Yours very truly,

Earl J. Magner

Earl J. Magner, Jr.
Chief Engineer

EJM:gmb

xc: Mr. Emile Schneider
Mr. H. B. Lansden
Mr. Ed Bailey
Mr. Jerome Pepper
Design Engineering, Inc.

~~November 19~~ December 4, 1984

Engineering Division
Structural Design Section

Mr. Earl J. Magner, Chief Engineer
Board of Levee Commissioners
Orleans Levee District
Suite 202, Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Dear Mr. Magner:

Reference is made to your letter, dated October 23, 1984, concerning your proposal for providing flood control at Bayou St. John. In your letter, you requested that we determine the elements of this work which would be eligible for credits under the Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project.

As we stated in our letter of October 16, 1984, the process of evaluating credit under the "Lake Pontchartrain, Louisiana and Vicinity" project is normally accomplished in our General Design Memorandum (GDM). However, in an effort to expedite the credit determination for this work, we are agreeable to making a tentative credit determination prior to completion of the GDM. Because this process requires the approval of our higher authority, we have presented our Division Engineer with the facts which have led you in selecting your proposed plan, along with our tentative credit determination for his approval. As soon as this issue is resolved, we will inform you of our decision.

Sincerely,

Frederic M. Chatry
Chief, Engineering Division

246-4000

The Board of Levee Commissioners

OF THE

Orleans Levee District

SUITE 202 — ADMINISTRATION BUILDING
NEW ORLEANS LAKEFRONT AIRPORT

New Orleans, La.

70126

PROTECTING YOU AND YOUR FAMILY

October 23, 1984

Mr. Frederic Chatry
Chief, Engineering Division
Department of the Army
New Orleans District
Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Re: Bayou St. John Flood Control Project

Dear Mr. Chatry:

Reference is made to your letter dated October 16, 1984, concerning the above captioned subject.

We are aware of your process of evaluating credit and the key word is workable plan which is in accordance with current State law. As stated in Mr. Pepper's letter the original plan could not be constructed because of the Natural and Scenic River System Act. A copy of Wildlife and Fisheries permit denial for the original project is attached as proof. Therefore, the only other alternative the Orleans Levee Board was left with was to satisfy the requirements of the newly created State Law as stated in the permit denial.

The Natural and Scenic River System permit that has been obtained from the Department of Wildlife and Fisheries, copy attached for ready reference, requires that "the sector gate shall normally be kept in an open position with closures only during the hurricane season and at other times when there is a threat of flooding along Bayou St. John". The Orleans Levee Board has agreed to this requirement and will establish rigorous controls on the gate operations. A copy of memorandum dated March 20, 1984 from the undersigned to then President of the Orleans Levee Board Mr. William Slatten verifies these statements.

It is our intention to construct the most cost effective and workable plan for meeting project purposes and have proceeded in that manner by first obtaining the necessary approval from the State. With this in hand we then directed our Consultant, Pepper and Associates, to design the most cost effective structure but conform to the permit in hand. It is our objective at this time to have you advise us regarding credits due this Board for work accomplished in accordance with State law.

1757

Since our plan is in strict conformance with the requirements of the Louisiana Department of Wildlife and Fisheries permit, the Levee enlargement from Lakeshore Drive to the Sector gate location, the Sector gate as well as the pro-rata share of the combination bridge abuttment and floodwall should all be eligible elements for credits from the Lake Pontchartrain and Vicinity Hurricane Protection Project. It was the intent of Mr. Pepper's letter for the Corps of Engineers to identify for the record that these items will receive credit.

However, your letter of October 16, 1984, failed to respond to the above items and to the specific question which was asked by Mr. Pepper regarding the type of gate which would be eligible for credit and/or preferred by the Corps of Engineers. Three different types of gates were suggested, all in conformance with the permit approved by the Louisiana Department of Wildlife and Fisheries. It is essential that we have a response from your office with respect to the type of gate so that our consultant can continue the preparation of construction plans.

You mention in your letter that you ordinarily accomplish the most effective and workable plan in your General Design Memorandum, however the General Design Memorandum being developed does not address this very controversial and highly susceptible to flooding reach of hurricane protection and states that it is a "no work area".

It is necessary at this time for you to provide us with your decision on what type of protection <u>you</u> would construct at this location and conform to the Natural and Scenic River System Act. Your cooperation in providing us with this information will be appreciated and will enable us to maintain our current construction schedule.

Yours very truly,

Earl J. Magner

Earl J. Magner, Jr.
Chief Engineer

EJM:gmb

Attachments

xc: Mr. Emile Schneider
Mr. H. B. Lansden
Mr. Ed Bailey
Mr. Jerome Pepper

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
POST OFFICE BOX 15570
BATON ROUGE, LA. 70895

JESSE J. GUIDRY
SECRETARY
(504) 925-3617

DAVID C. TREEN
GOVERNOR

March 9, 1984

MAR 1 2 1984

Mr. William Slatten, President
Orleans Levee Board
Suite 202, Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Re: "Class B Use" Permit #185
Louisiana Natural and Scenic Rivers System
Construction of Mid-Rise Bridges and
Sector Gate
Bayou St. John

Dear Mr. Slatten:

The Administrator of the Louisiana Natural and Scenic Rivers System is in receipt of a request for a permit by Pepper and Associates, Inc. acting as Agent for the Board of Levee Commissioners, Orleans Levee District, New Orleans dated January, 1984, together with drawings and photographs, to construct twin mid-rise bridges and a sector gate on Bayou St. John. Bayou St. John is in Orleans Parish.

The above request has been examined by personnel of the State Planning Office, the Louisiana Department of Culture, Recreation and Tourism, the Department of Natural Resources, and the Louisiana Department of Wildlife and Fisheries. A public notice of this proposed project has been circulated in the areas of interest and to interested individuals known to the Administrator. Whereas there has been no substantial objection to the proposed project, this permit for the construction of twin mid-rise bridges at Lakeshore Drive and a sector gate approximately 650 feet south of the Lakeshore Drive crossing is issued to the Board of Levee Commissioners, Orleans Levee District subject to the following conditions:

1) The construction of twin mid-rise bridges and sector gate is carried out in accordance with plans and drawings presented to the Administrator.

Mr. William Slatten
"Class B Use" Permit No. 185
March 9, 1984

2) All other appropriate permits from state and federal agencies are acquired.

3) Should changes or removal of the proposed project be required in the future, in the public interest, the applicant shall make such changes in the project concerned or arrangement thereof as may be necessary to satisfactorily meet the situation and shall bear the cost thereof.

4) If the contractor's excavation operations should encounter an archaeological site, operations shall be temporarily discontinued and the permit holder shall contact the Administrator to determine the disposition thereof.

5) The sector gate shall normally be kept in an open position with closures only during the hurricane season and at other times when there is a threat of flooding along Bayou St. John.

Sincerely yours,

Jesse J. Guidry JBK

Jesse J. Guidry
Secretary

JJG/CJK/fsb

cc: State Planning Office
Louisiana Dept. of Culture, Recreation and Tourism
Louisiana Dept. of Natural Resources, Office of Environmental Affairs
Louisiana Dept. of Wildlife & Fisheries, Ecological Studies Section
Louisiana Dept. of Transportation and Development, Office of Public Works
United States Corps of Engineers, New Orleans District

OLBXC: Mr. H. B. Lansden
Mr. Earl Magner, Jr.
Mr. Jerome Pepper
Mr. Robert A. Peyroux, City Park Improvement Asso.

OFFICE MEMO

March 20, 1984

TO: Mr. William Slatten
President

FROM: Earl J. Magner, Jr.
Chief Engineer

RE: Bayou St. John Flood Protection Project
"Class B Use" Permit #185 - Louisiana Natural and Scenic Rivers System
Construction of Mid-rise Bridges and Sector Gate

Reference is made to the letter dated March 9, 1984, addressed to you from Mr. Jesse J. Guidry, Secretary, Department of Wildlife and Fisheries, State of Louisiana, which letter grants the permit to construct the above mentioned project.

The permit was granted subject to five provisos.

Provisos one, two and four will be covered in the contract plans and specifications. Proviso number three could have far reaching effects on the project some time in the future, however the Orleans Levee Board would be a party to any changes in the "public interest". Proviso number five would have a detrimental effect on the tidal flood protection for the City of New Orleans unless specific guidelines are established and religiously followed by the Orleans Levee Board upon completion of the structure. The guidelines required are as follows:

1. Sector gate will be kept closed during hurricane season (June 1 thru November 30).
2. Sector gate will be closed every evening when normal Orleans Levee Board work crews "knock off".
3. Sector gate can remain in open position during daylight hours only and when the elevation of the Lake is 0.0 mean sea level or below.

To open the gate at any other time would create a threat of flooding along Bayou St. John since the controlling elevation of the levees along Bayou St. John are at elevation +2.5 mean sea level.

Earl J. Magner, Jr.
Chief Engineer

EJM:gmb

xc: Mr. H. B. Lansden
Mr. Ed Bailey
Mr. Jerome Pepper

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
POST OFFICE BOX 15570
BATON ROUGE, LA. 70895

JESSE J. GUIDRY
SECRETARY
(504) 925-3617

DAVID C. TREEN
GOVERNOR

December 22, 1983

Board of Levee Commissioners
Orleans Levee District
Suite 202, Administration Building
New Orleans Lakefront Airport
New Orleans, LA 70126

Gentlemen:

The request from the Board of Levee Commissioners which seeks a "Class B Use" permit to provide a crossing for Lakeshore Drive over Bayou St. John by constructing an earthfill across the Bayou is hereby denied. This decision is based upon evaluations as required by the Guidelines and Procedures for Administration of the Natural and Scenic Rivers Act. The Scenic Rivers Administrator has determined that the type of structure proposed would essentially act as a dam by blocking free access between Bayou St. John and Lake Pontchartrain, creating a barrier to migratory species and other interchanges between the Bayou and Lake, thereby severing the historical connection between the two waterbodies. Therefore, the proposal would constitute a "Class A Use" of the Bayou and is prohibited under Act 398 as amended.

The petition is remanded to the petitioner with the recommendation that suitable project alternatives be developed which would eliminate or minimize detrimental effects to the scenic, historic, and recreational values and ecological regime of Bayou St. John, and which would be compatible with its designation as a historic and scenic river.

Sincerely,

Jesse J. Guidry

Jesse J. Guidry
Secretary
JBG

JJG:CJK:scn

cc: Pepper and Associates, Inc.

DEC 28 1983

Orig: Mr. Earl Magner, Jr. FOR HANDLING
OLBXC: President's Office
" Lansden

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY
HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

APPENDIX B

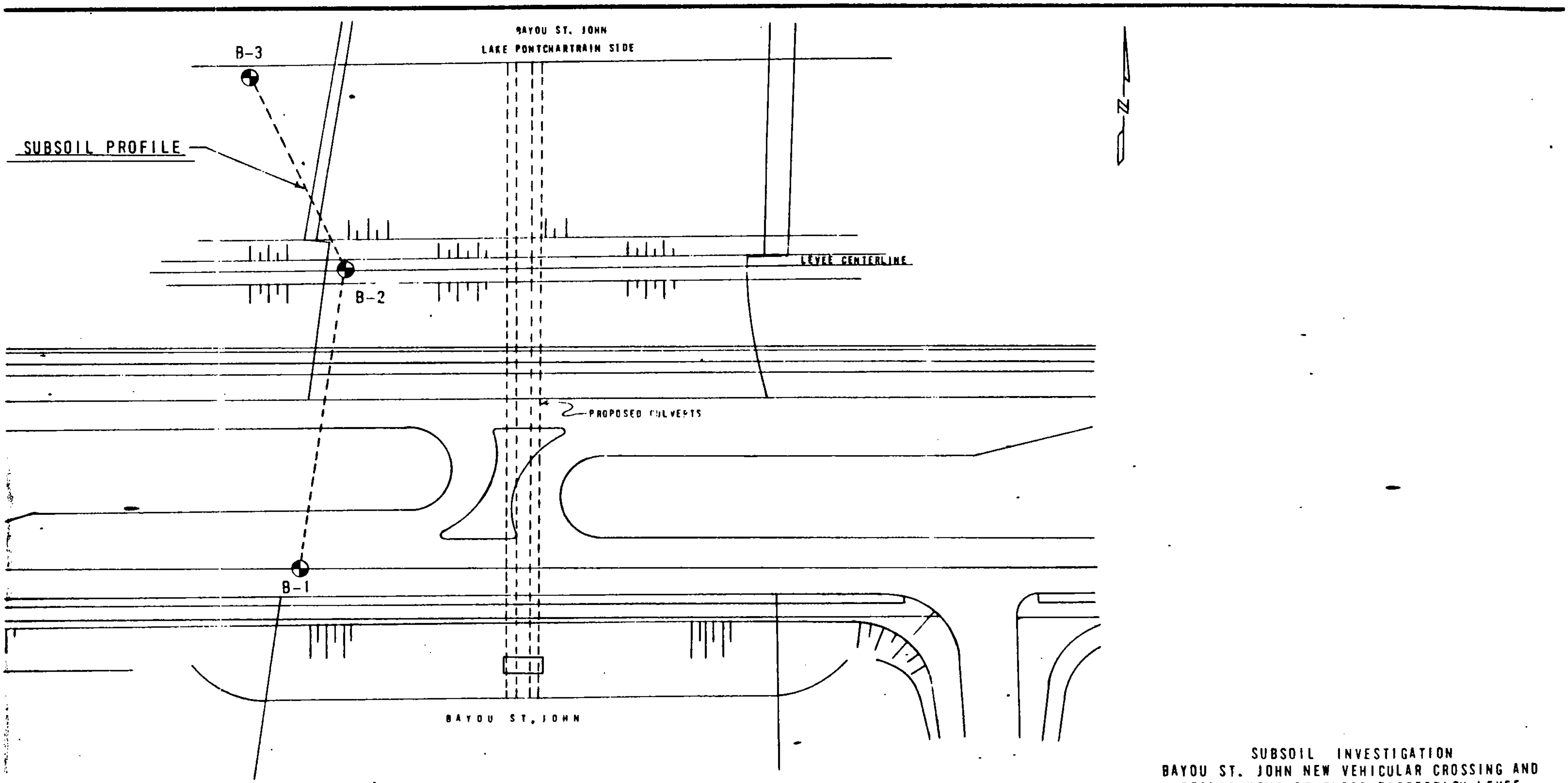
A-E BORING LOCATIONS, BORING LOGS AND TEST RESULTS

APPENDIX F

BAYOU ST.JOHN

A-E BORING LOCATIONS, BORING LOGS AND TEST RESULTS

Appendix contains excerpts from the Subsoil Investigation Report on the Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, dated 29 November 1977, prepared by Eustis Engineering Co. for Pepper and Associates, Inc.



LOCATION OF BORINGS

SCALE: 1" = 40'

BORINGS DRILLED 15-21 SEPTEMBER, 1977

SUBSOIL INVESTIGATION
BAYOU ST. JOHN NEW VEHICULAR CROSSING AND
REALIGNMENT OF FLOOD PROTECTION LEVEE
ORLEANS LEVEE BOARD
NEW ORLEANS, LOUISIANA

LOCATION OF BORINGS

FOR
PEPPER & ASSOCIATES, INC.
CONSULTING ENGINEERS METAIRIE, LA.

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
NOVEMBER, 1977 METAIRIE, LA.

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana

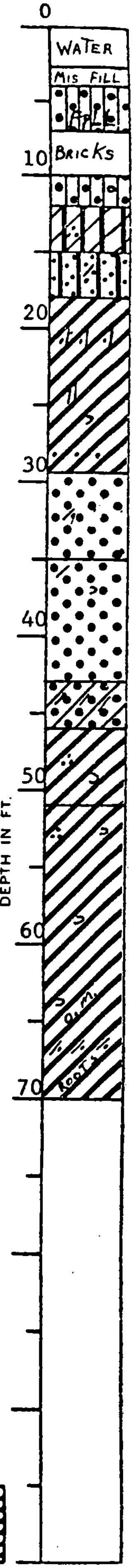
Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 1 Soil Technician George Hardee Date 21 September 1977

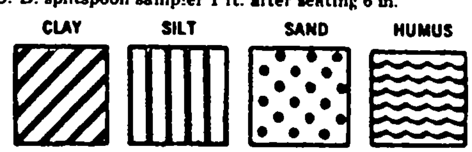
Water Elev. 2.15 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
			0.0	2.8	Water		
			2.8	4.0	Miscellaneous fill (Bricks, shells, concrete pieces, etc.)		
1	4.0	5.5	4.0		Loose gray silty sand	4	9
2	6.0	7.5		7.0	Loose gray silty sand w/bricks, wood & trace of clay	1	9
			7.0	10.0	Bricks		
3	10.0	11.5	10.0	12.0	Medium dense gray silty sand	2	19
4	12.5	14.0	12.0	15.0	Loose gray clayey silt w/trace of fine sand	1	8
5	15.0	16.5	15.0	18.0	Medium compact gray sandy silt w/trace of clay	4	14
6	18.5	20.0	18.0		Soft gray clay w/sandy silt lenses & layers	1	2
7	23.0	24.0			Soft gray clay w/silt pockets & shell fragments		
8	28.0	29.0		29.5	Soft gray clay w/sand lenses & pockets		
9	30.0	31.5	29.5		Loose gray fine sand w/clayey sand pockets	3	8
10	32.5	34.0		35.0	Loose gray fine sand	1	6
11	35.0	36.5	35.0		Medium dense gray fine sand w/clay pockets & shell fragments	3	16
12	38.5	40.0		43.0	Medium dense gray fine sand	8	29
13	43.5	45.0	43.0	46.0	Loose gray clayey sand w/clay layers	2	5
14	48.0	49.0	46.0	51.0	Soft gray clay w/many sand pockets & shell fragments		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 3
(Sheet #1)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana
Orleans Levee Board, New Orleans, Louisiana
For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 1 (Cont'd) Soil Technician George Hardee Date 21 September 1977
Water Elev. 2.15 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
15	53.0	54.0	51.0		Medium stiff to stiff gray clay w/shell fragments & sand pockets		
16	58.0	59.0			Medium stiff to stiff gray clay w/shell fragments		
17	63.0	64.0			Medium stiff to stiff gray clay w/trace of organic matter & shell fragments		
18	68.0	69.0		70.0	Medium stiff to stiff gray clay with many roots & clayey sand layers		

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 3
(Sheet #2)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana

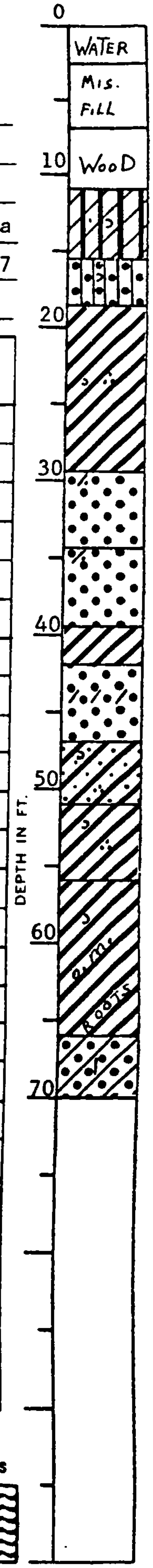
Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 2 Soil Technician George Hardee Date 20 September 1977

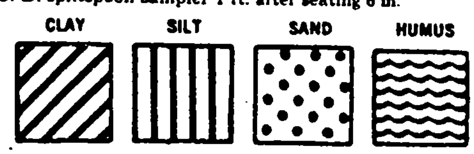
Water Elev. 2.15 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
			0.0	2.7	Water		
			2.7	7.0	Miscellaneous fill (Concrete boulders, bricks, shells & sand)		
1	8.0	9.5	7.0	11.0	Wood	2	10
2	13.0	14.5	11.0	15.5	Loose gray clayey silt w/trace of sand & shells	2	6
3	16.5	18.0	15.5	18.5	Medium dense gray silty sand w/few shells	3	14
4	19.0	20.5	18.5		Soft gray clay	1	3
5	23.0	24.0			Soft gray clay w/shell fragments & sand pockets		
6	28.0	29.0		29.5	Soft gray clay		
7	30.0	31.5	29.5		Loose gray fine sand w/clayey sand pockets	3	6
8	32.5	34.0		34.5	Loose gray fine sand	3	8
9	35.0	36.5	34.5		Medium dense gray fine sand w/clayey sand pockets	4	15
10	37.5	39.0		39.5	Medium dense gray fine sand	4	18
11	40.0	41.5	39.5	42.0	Soft gray clay	2	7
12	43.0	44.0	42.0	47.0	Loose gray fine sand w/clay layers		
13	48.0	49.0	47.0	51.0	Medium stiff gray sandy clay w/shell fragments & sand pockets		
14	53.0	54.0	51.0	56.0	Medium stiff gray clay w/shell fragments & sand pockets		
15	58.0	59.0	56.0		Stiff gray clay w/shell fragments & trace of organic matter		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 4
(Sheet #1)

LOG OF BORING

EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

METAIRIE, LA.

Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 2 (Cont'd) Soil Technician George Hardee Date 20 September 1977

Water Elev. 2.15 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
16	63.0	64.0		66.0	Stiff gray clay w/roots		
17	68.0	69.0	66.0	70.0	Medium dense greenish-gray clayey sand w/silt		

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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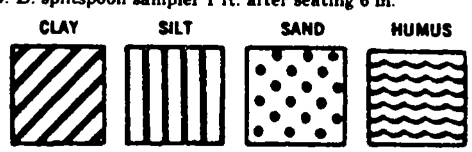


Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 4
(Sheet #2

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

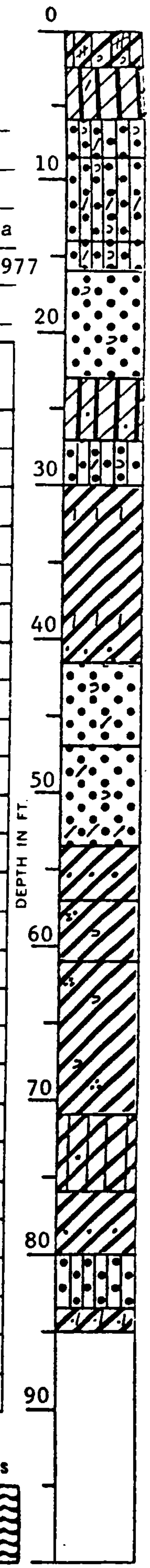
Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana
Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 3 Soil Technician G. Hardee & J. St. Phillip Date 15-16 September 1977

Ground Elev. 12.25 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	1.5	2.5	0.0	2.5	Stiff tan & gray silty clay w/clayey silt layers & shells (Fill)		
2	5.5	6.0	2.5	6.0	Medium compact tan & gray clayey silt w/clay pockets (Crumbly)		
3	6.5	8.0	6.0	8.5	Medium dense tan silty sand w/shells & clay pockets	7	15
4	13.0	14.0	8.5	14.0	Loose to medium dense gray silty sand w/shells & clay layers		
5	14.0	15.5	14.0	16.0	Very loose gray silty sand w/clay & shell fragments	1	3
6	17.0	18.0	16.0		Loose gray fine sand w/shell fragments		
7	18.0	19.5			Ditto	3	12
8	20.5	22.0		23.0	Ditto	3	7
9	23.5	25.0	23.0	27.0	Loose gray clayey silt w/fine sand	1	5
10	28.5	29.5	27.0	30.0	Loose gray silty sand w/clay pockets & shells		
11	30.0	31.5	30.0		Soft gray clay w/silt lenses	1	2
12	33.0	34.0			Ditto		
13	38.0	39.0		41.5	Soft gray clay w/sand lenses		
14	43.0	44.0	41.5	47.0	Loose gray sand w/shell fragments & trace of clay		
15	48.5	49.0	47.0		Loose gray fine sand w/clay pockets & shell fragments		
16	49.0	50.5			Ditto	1	9
17	51.5	53.0		53.5	Loose gray fine sand w/clay layers	2	6
18	54.0	55.5	53.5	57.0	Medium stiff gray clay w/sand layers	2	4



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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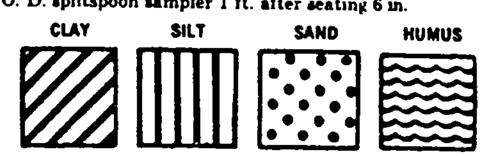


Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 5
(Sheet #1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John New Vehicular Crossing and Realignment of Flood Protection Levee, New Orleans, Louisiana
Orleans Levee Board, New Orleans, Louisiana
For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

Boring No. 3 (Cont'd) Soil Technician G. Hardee & J. St. Phillip Date 15-16 September 1977
Ground Elev. 12.25 Datum MSL Gr. Water Depth

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
19	58.0	59.0	57.0	61.0	Soft gray clay w/sand pockets & shell fragments		
20	63.0	64.0	61.0		Stiff gray clay w/sand pockets & shell fragments		
21	68.0	69.0		71.0	Ditto		
22	73.0	74.0	71.0	76.0	Stiff greenish-gray silty clay w/trace of fine sand		
23	78.0	79.0	76.0	80.0	Very stiff greenish-gray & tan clay w/sand lenses & layers		
24	81.5	83.0	80.0	83.5	Medium dense greenish-gray silty sand	8	26
25	83.5	85.0	83.5	85.0	Very stiff tan & gray clay w/sandy silt lenses & layers	5	30

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 5
(Sheet #2)

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 1

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
7	23.0	Soft gray clay w/silt pockets & shell fragments	58.2	64.5	102.1	665			
8	28.0	Soft gray clay w/sand lenses	67.9	58.9	98.9	610	89	27	62
14	48.0	Soft gray clay w/sand pockets & shell fragments	47.9	71.9	106.4	785	57	20	37
15	53.0	Medium stiff gray clay w/sand pockets & shell fragments	59.2	64.0	102.0	1390	74	25	49
16	58.0	Stiff gray clay with shell fragments	52.2	69.5	105.7	2075			
17	63.0	Medium stiff gray clay w/shell fragments & trace organic matter	58.6	64.0	101.6	1160			
18	68.0	Stiff gray clay with clayey sand layers & roots	50.4	68.0	102.4	2265	77	25	52

BORING 2

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
5	23.0	Soft gray clay w/sand pockets & shell fragments	57.3	65.6	103.2	700	71	23	48
6	28.0	Soft gray clay	73.8	55.7	96.8	945			
12	43.0	Loose gray fine sand w/clay layers	41.2	----	-----	----			
13	48.0	Medium stiff gray sandy clay w/sand pockets & shell fragments	43.0	75.4	107.9	1125	37	19	18
14	53.0	Medium stiff gray clay w/shell fragments & sand pockets	52.1	67.8	103.1	1805			
15	58.0	Stiff gray clay with shell fragments & trace organic matter	44.9	75.6	109.5	2350	72	21	51
16	63.0	Stiff gray clay with roots & organic matter	93.6	46.2	89.4	3295			

Fig. 6

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 3

12.3

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft
12	33.0	Soft gray clay w/silt lenses	56.3	66.3	103.6	750
13	38.0	Soft gray clay w/sand lenses	71.6	57.0	97.8	880
19	58.0	Medium stiff gray clay w/sand pockets & shell fragments	46.7	71.9	104.3	1110
20	63.0	Stiff gray clay w/sand pockets & shell fragments	46.1	74.5	108.8	2060
21	68.0	Stiff gray clay	39.6	81.0	113.1	2235
22	73.0	Stiff greenish-gray silty clay w/trace of sand	17.3	111.1	130.3	3005
23	78.0	Soft greenish-gray clay w/many sand pockets	27.4	93.8	119.5	950

Fig. 7

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 1

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Shear Values Lb/sq ft	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
8a	28.0 - 29.0	Soft gray clay w/sand lenses & pockets (CH)	68.6	59.6	100.0	$\emptyset=0^{o}$ c=376	89	27	62
8b	Ditto	Ditto	71.7	58.1	99.8				
8c	Ditto	Ditto	67.9	59.8	100.5				
14a	48.0 - 49.0	Soft gray clay w/sand layers & shells (CH)	44.7	75.6	109.4	$\emptyset=0^{o}$ c=533	57	20	37
14b	Ditto	Ditto	48.8	72.8	108.3				
14c	Ditto	Ditto	37.4	82.9	113.9				
15a	53.0 - 54.0	Medium stiff gray clay w/shells (CH)	55.5	67.6	105.4	$\emptyset=0^{o}$ c=835	74	25	49
15b	Ditto	Ditto	55.1	67.8	105.3				
15c	Ditto	Ditto	57.2	65.4	102.8				
18a	68.0 - 69.0	Medium stiff gray clay w/sand pockets & decayed wood (CH)	51.8	68.8	104.4	$\emptyset=0^{o}$ c=1051	77	25	52
18b	Ditto	Ditto	50.6	69.1	104.0				
18c	Ditto	Ditto	55.0	64.9	100.7				

Note: Unconsolidated-undrained triaxial compression tests sheared at confining pressures of 0.5, 1.5 and 3.0 tsf.

Fig. 8

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 2

Sample No.	Depth in Ft.	Classification	Water Content Percent	Density Lb/cu ft		Shear Values Lb/sq ft	Atterberg Limits		
				Dry	Wet		LL	PL	PI
5a	23.0 - 24.0	Soft gray clay w/sand pockets (CH)	70.7	57.6	98.3	$\emptyset=0^{o}$ c=418	71	23	48
5b	Ditto	Ditto	58.9	65.6	104.3				
5c	Ditto	Ditto	56.1	68.2	106.5				
13a	48.0 - 49.0	Medium stiff gray sandy clay w/shell fragments (CL)	37.7	83.8	115.4	$\emptyset=0^{o}$ c=662	37	19	18
13b	Ditto	Ditto	35.8	83.9	113.9				
13c	Ditto	Ditto	41.2	80.5	113.7				
15a	58.0 - 59.0	Stiff gray clay w/sand lenses (CH)	45.9	74.2	108.2	$\emptyset=0^{o}$ c=1152	72	21	51
15b	Ditto	Ditto	45.0	75.1	108.9				
15c	Ditto	Ditto	45.8	75.5	110.1				

Note: Unconsolidated-undrained triaxial compression tests sheared at confining pressures of 0.5, 1.5 and 3.0 tsf.

Fig. 9

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

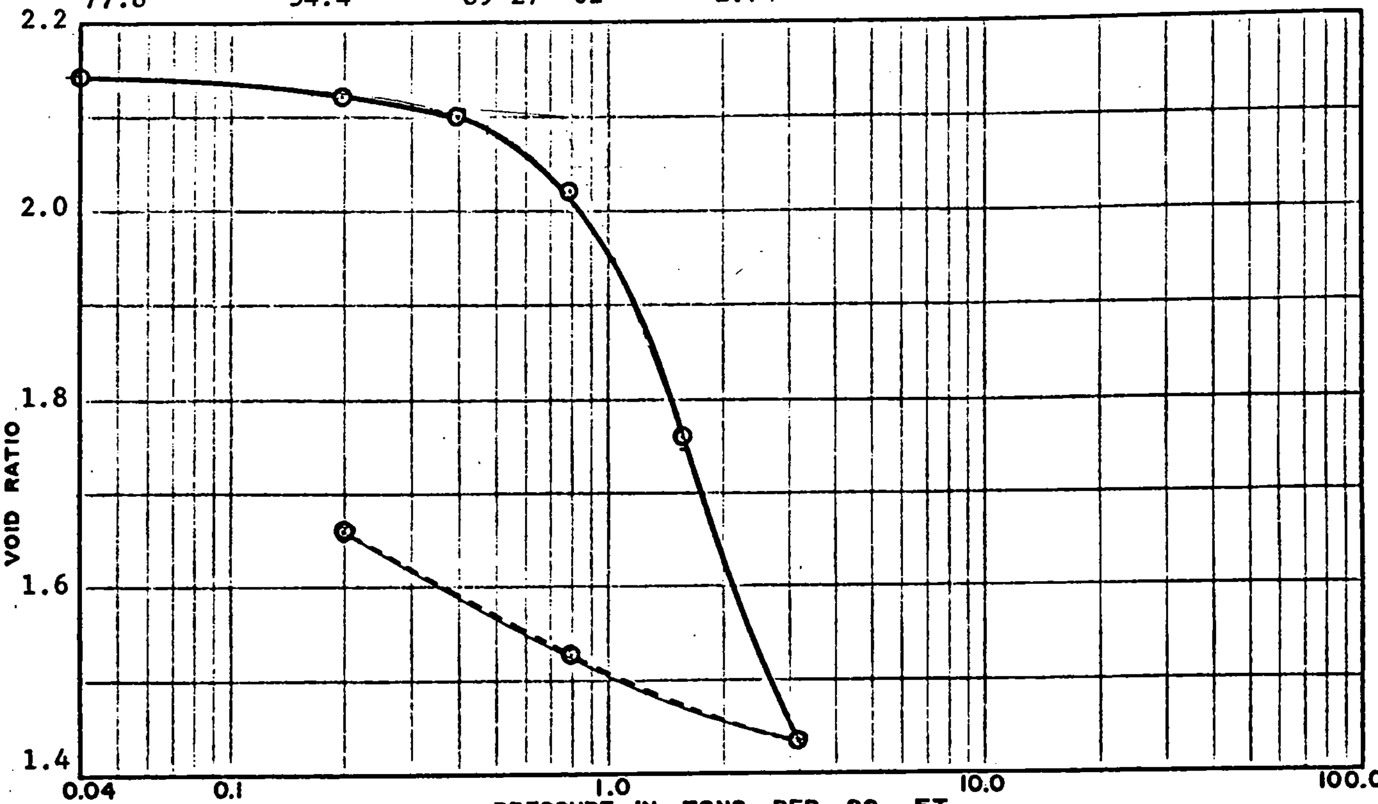
For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

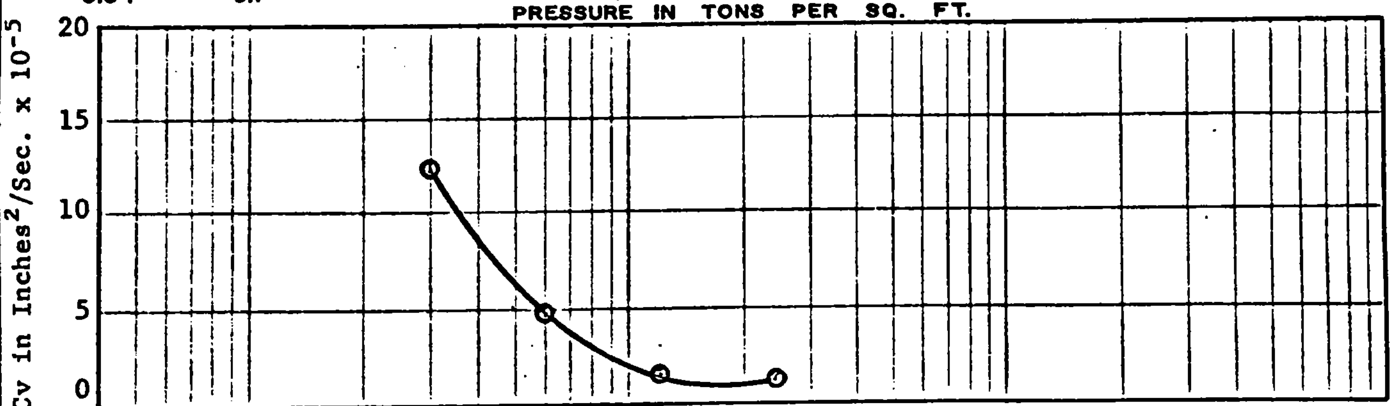
CONSOLIDATION TEST DATA - VOID RATIO VERSUS PRESSURE CURVE

Boring No. 1 Sample No. 8 Depth - Feet 28.0

Classification Soft gray clay (CH)

Water Content Percent	Dry Density Lbs./Cu.Ft.	Atterberg Limits LL	PL	PI	Specific Gravity	Estimated Preconsolidation Pressure Tons/Sq.Ft.	Compression Index
77.8	54.4	89	27	62	2.74	0.95	1.290





COEFFICIENT OF CONSOLIDATION (Cv) VERSUS LOG PRESSURE CURVE

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

Fig. 12

Subsoil Investigation
Bayou St. John New Vehicular Crossing and
Realignment of Flood Protection Levee
New Orleans, Louisiana

Orleans Levee Board, New Orleans, Louisiana

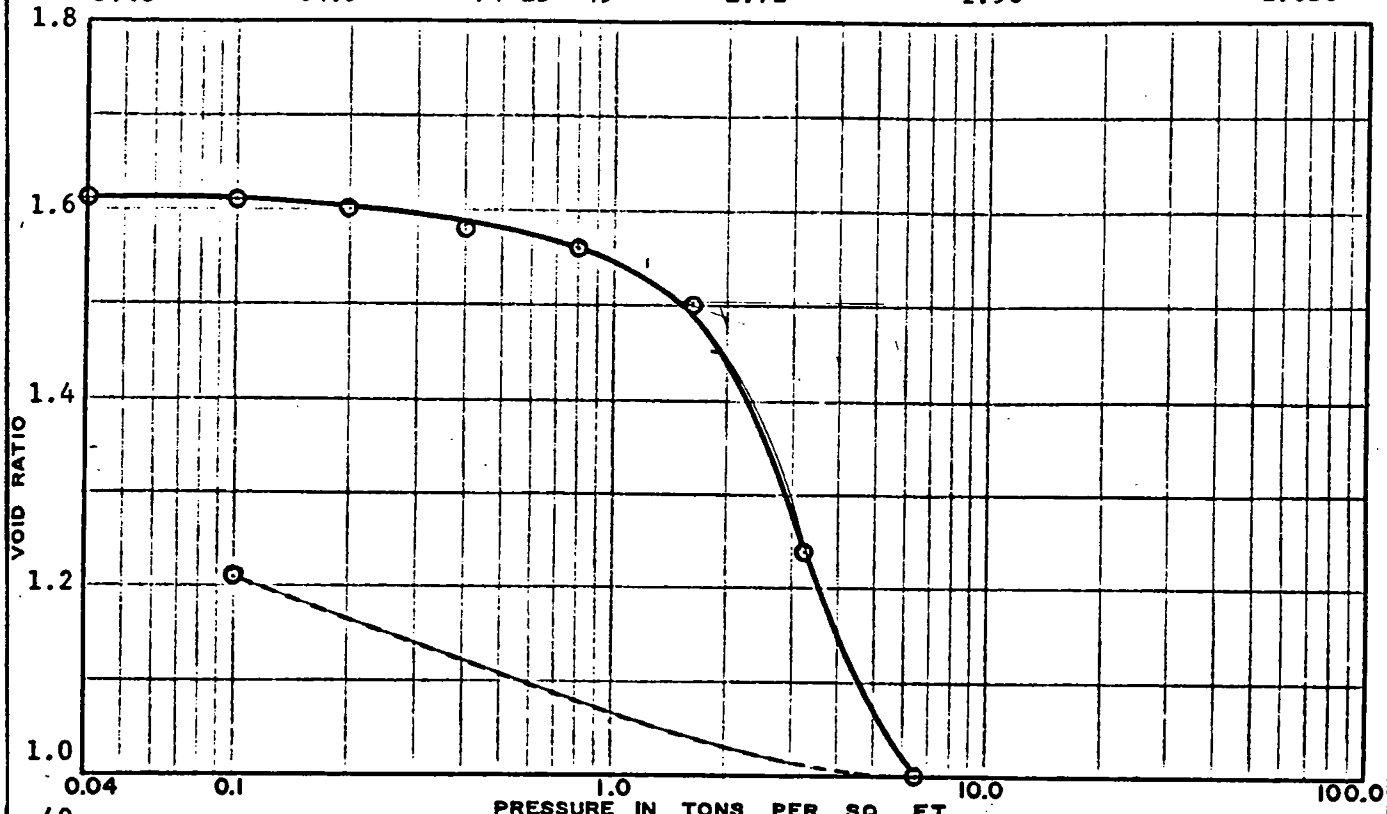
For: Pepper & Associates, Inc., Consulting Engineers, Metairie, Louisiana

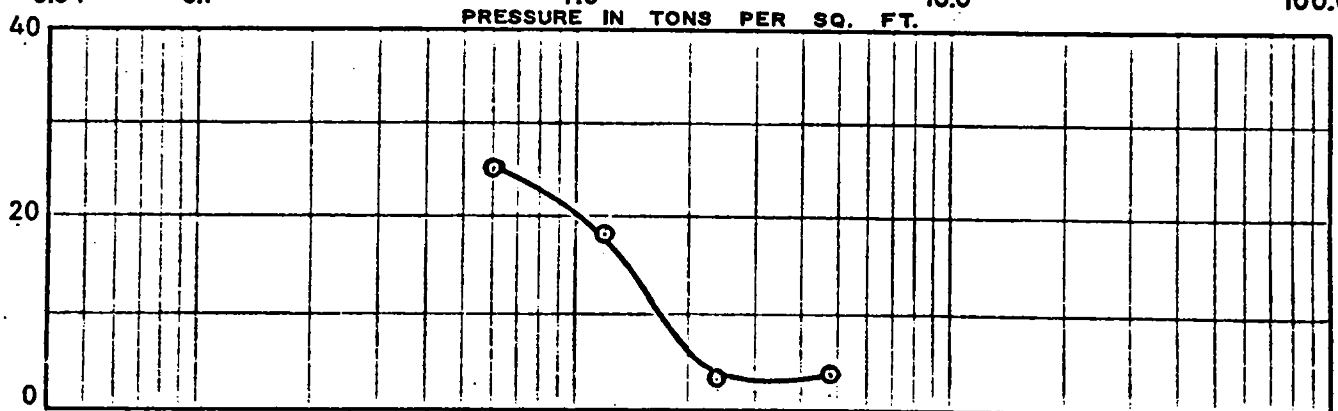
CONSOLIDATION TEST DATA - VOID RATIO VERSUS PRESSURE CURVE

Boring No. 1 Sample No. 15 Depth - Feet 53.0

Classification Medium stiff gray clay w/sand pockets & shell fragments (CH)

Water Content Percent	Dry Density Lbs./Cu. Ft.	Atterberg Limits LL	PL	PI	Specific Gravity	Estimated Preconsolidation Pressure Tons/Sq. Ft.	Compression Index
57.5	64.9	74	25	49	2.72	1.90	1.050





COEFFICIENT OF CONSOLIDATION (Cv) VERSUS LOG PRESSURE CURVE

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

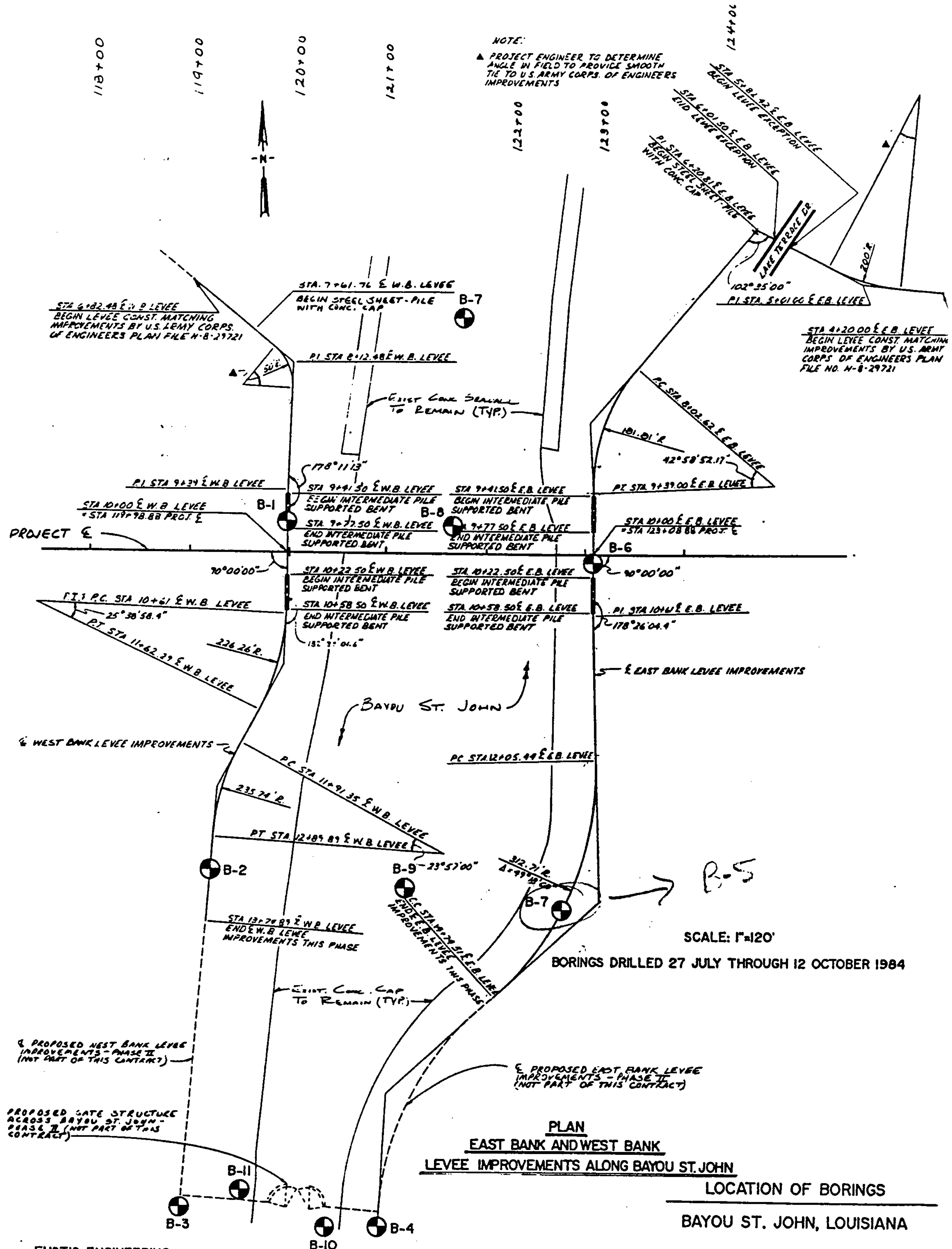
Fig. 13

APPENDIX ___

BAYOU ST.JOHN

A-E BORING LOCATIONS, BORING LOGS AND TEST RESULTS

Appendix contains excerpts from the Geotechnical Investigation Report on the Bayou St. John Bridge and Floodgate, dated 26 February 1987, prepared by Eustis Engineering Co. for Pepper and Associates, Inc.



PLAN
EAST BANK AND WEST BANK
LEVEE IMPROVEMENTS ALONG BAYOU ST. JOHN

LOCATION OF BORINGS

BAYOU ST. JOHN, LOUISIANA

EUSTIS ENGINEERING

FIGURE 1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

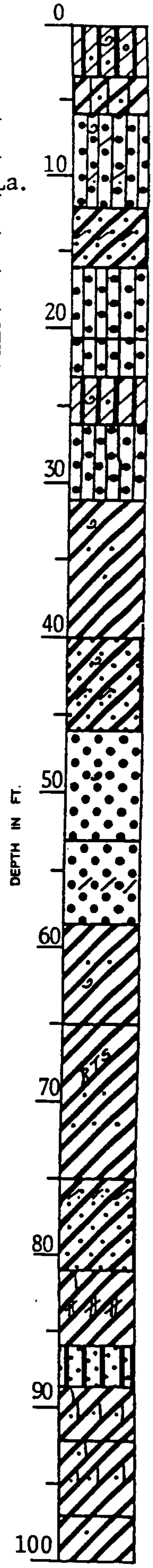
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 1 Soil Technician George Hardee Date 27 July 1984

Ground Elev. 11.1 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	3.5	Compact tan & gray clayey silt w/shells, gravel & sand pockets		
2	5.0	5.5	3.5	6.0	Stiff tan & gray silty clay w/sand pockets		
3	8.5	9.0	6.0		Loose to medium dense gray & tan silty sand w/shells & trace of clay		
4	11.0	11.5		12.0	Loose to medium dense gray & tan silty sand w/shells & clayey sand pockets		
5	14.0	14.5	12.0	16.0	Soft gray sandy clay w/clay layers		
6	18.0	18.5	16.0		Medium dense gray silty sand w/few bricks		
7	18.5	20.0		20.5	Medium dense gray silty sand	3	14
8	21.0	22.5	20.5	23.0	Loose gray silty sand	2	7
9	23.5	25.0	23.0	26.0	Very loose gray clayey silt w/shells & trace of fine sand	1	2
10	28.5	29.0	26.0	31.0	Loose gray silty sand		
11	33.5	34.0	31.0		Soft gray clay w/shells & sand pockets		
12	38.5	39.0		40.0	Soft gray clay w/sand lenses & shells		
13	43.5	44.0	40.0	46.0	Very soft gray sandy clay w/shells & clayey sand pockets		
14	48.0	48.5	46.0	-34.9	Medium dense gray fine sand w/shells		
15	48.5	50.0			Medium dense gray fine sand	6	28
16	51.0	52.5	-41.9	53.0	Ditto	10	22
17	53.5	55.0	53.0		Loose gray fine sand	2	8
18	57.0	58.5		58.5	Loose gray fine sand w/clay layers	2	6



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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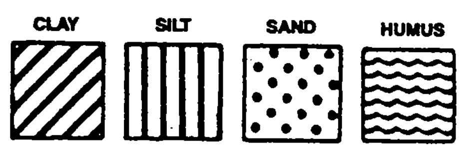
Remarks:



Predominant type shown heavy. Modifying type shown light.

Fig. 2
(Sheet #1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 1 (Cont'd) Soil Technician George Hardee Date 27 July 1984

Ground Elev. 11.1 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
19	59.0	60.5	58.5		Soft gray clay w/sand pockets & shells	1	6
20	63.5	64.0		65.0	Ditto		
21	68.5	69.0	65.0		Medium stiff gray clay		
22	73.5	74.0		75.0	Medium stiff gray clay w/roots, sand pockets & layers		
23	78.5	79.0	75.0	81.0	Soft greenish-gray sandy clay w/clayey sand layers		
24	83.5	84.0	81.0	86.0	Stiff greenish-gray clay w/silt lenses & clayey silt layers		
25	86.0	87.5	86.0	88.5	Compact tan sandy silt	15	38
26	88.5	90.0	88.5	92.0	Very stiff tan & gray clay w/silt lenses & sandy silt layers	5	18
27	93.5	94.0	92.0	97.0	Medium stiff tan & gray clay w/sandy silt lenses & layers		
28	98.5	99.0	97.0		Medium stiff gray clay w/sand lenses		
29	103.5	104.0		105.0	Ditto		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

Remarks:

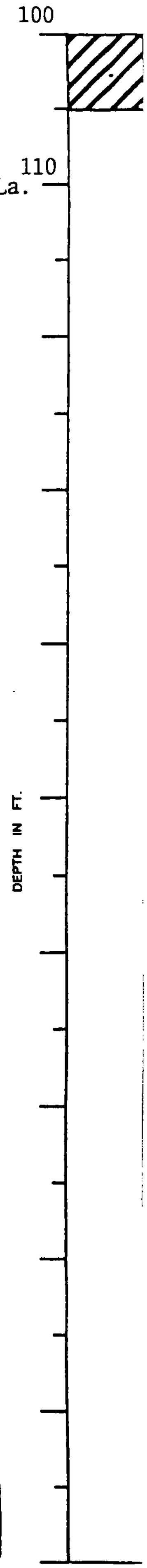


Fig.
(Sheet

LOG OF BORING

EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

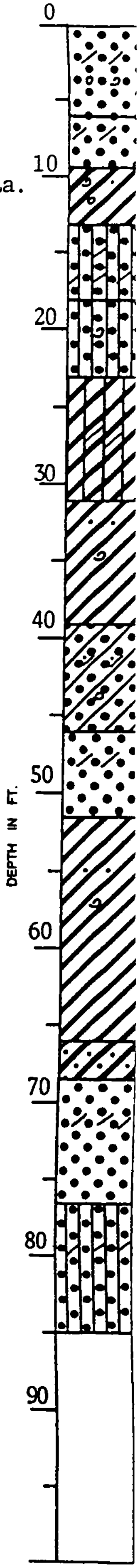
Boring No. 2 Soil Technician George Hardee Date 30 July 1984

Ground Elev. 10.9 Datum MSL Gr. Water Depth See Text

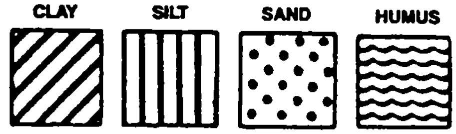
Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0		Medium dense tan fine sand w/clay		
					pockets		
2	5.5	6.0		6.0	Medium dense tan fine sand w/clay		
					pockets, gravel, shells & bricks		
3	6.0	7.5	6.0		Loose tan fine sand	2	9
4	8.5	10.0		9.5	Loose tan fine sand w/clay pockets	2	6
5	12.0	12.5	9.5	13.0	Soft tan & gray clay w/shells, sand,		
					gravel & cinder layers		
6	15.0	15.5	13.0		Medium dense gray silty sand w/clay		
					lenses & layers		
7	16.0	17.5		18.0	Medium dense gray silty sand	8	16
8	18.5	20.0	18.0		Loose gray silty sand w/shells	2	9
9	21.0	22.5		23.0	Loose gray silty sand	2	5
10	23.5	25.0	23.0		Soft gray silty clay	1	2
11	28.5	29.0		31.0	Soft gray silty clay w/clay pockets		
12	33.5	34.0	31.0	39.0	Soft gray clay w/sand pockets & shells		
13	39.0	39.5	39.0	46.0	Very loose gray clayey sand w/sandy		
					clay pockets & shells		
14	46.5	47.0	46.0		Medium dense gray fine sand w/clay		
					pockets		
15	47.0	48.5			Medium dense gray fine sand	6	15
16	49.5	51.0		51.5	Ditto	6	10
17	52.0	53.5	51.5		Medium stiff gray & tan clay	2	3
18	58.5	59.0			Medium stiff gray & tan clay w/sand		
					pockets & shells		
19	63.5	64.0		66.0	Ditto		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



CLAY SILT SAND HUMUS



Predominant type shown heavy. Modifying type shown light.

Remarks:

Fig.
(Sheet

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 2 (Cont'd) Soil Technician George Hardee Date 30 July 1984

Ground Elev. 10.9 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
20	67.5	68.0	66.0	68.5	Stiff greenish-gray & tan sandy clay		
21	68.5	70.0	68.5		Dense gray fine sand w/clay layers	6	38
22	71.0	72.5			Dense gray fine sand	9	42
23	73.5	75.0		76.5	Ditto	12	45
24	78.5	80.0	76.5		Medium dense tan & gray silty sand	6	20
					w/clay layers		
25	83.0	85.0		85.0	Ditto	9	30

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks:

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

DEPTH IN FT.

Fig.

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 3 Soil Technician A. J. Mayeux Date 30 July 1984

Ground Elev. 2.8 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	4.0	Medium stiff gray & tan silty clay w/sand & shells		
2	5.0	5.5	4.0	6.5	Very soft gray & tan clay w/some organic matter		
3	8.0	8.5	6.5		Soft gray clay w/organic matter & sandy silt lenses		
4	11.0	11.5		11.5	Ditto		
5	14.0	14.5	11.5	16.0	Soft gray sandy clay w/shells		
6	19.0	19.5	16.0	20.0	Soft gray silty clay w/some organic matter		
7	24.0	24.5	20.0		Soft gray clay w/silt lenses		
8	29.0	29.5		31.0	Ditto		
9	34.0	34.5	31.0	37.0	Very soft gray sandy clay w/shell fragments		
10	37.5	39.0	37.5	39.5	Medium dense gray sand w/shell fragments	7	26
11	40.0	41.5	39.5	41.5	Loose gray sand w/shell fragments	3	5
12	44.0	44.5	41.5	46.5	Soft gray clay w/shell fragments & sand pockets		
13	49.0	49.5	46.5	52.0	Medium stiff gray clay w/sand pockets & shell fragments		
14	54.0	54.5	52.0	58.0	Medium stiff gray & tan clay		
15	59.0	59.5	58.0		Stiff gray & tan clay		
16	62.5	63.0		63.5	Stiff gray & tan clay w/silty sand layers		
17	63.5	65.0	63.5	66.0	Medium dense tan silty sand	4	25
18	66.0	67.5	66.0	68.5	Dense tan silty sand	14	47

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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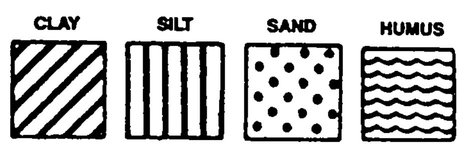

Predominant type shown heavy. Modifying type shown light.

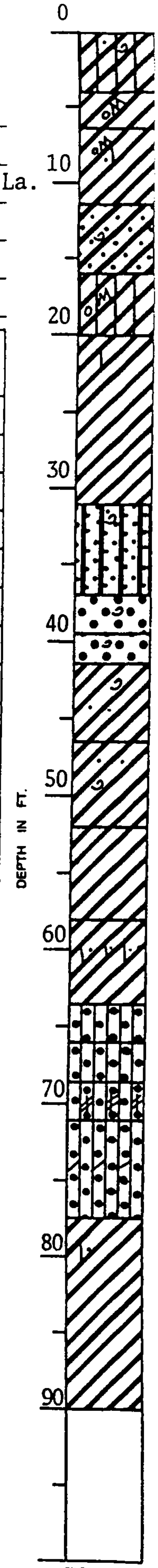

Fig. 4
(Sheet #1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate

New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 3 (Cont'd) Soil Technician A. J. Mayeux Date 30 July 1984

Ground Elev. 2.8 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
19	68.5	70.0	68.5	71.0	Medium dense tan silty sand w/silty clay layers	5	23
20	71.0	72.5	71.0		Dense tan silty sand w/clay layers	8	36
21	73.5	75.0		77.5	Ditto	10	37
22	78.5	80.0	77.5		Very stiff tan & gray clay w/silty sand lenses	8	31
23	84.0	84.5			Ditto		
24	89.0	89.5		90.0	Ditto		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks:

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

DEPTH IN FT.

Fig. 4
(Sheet #

LOG OF BORING

EUSTIS ENGINEERING COMPANY Sheet 1 of 2
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana
or: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 4 Soil Technician George Hardee Date 1 August 1984

Ground Elev. 10.3 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
1	2.0	2.5	0.0	3.0	Compact brown, gray & tan clayey silt		
					w/organic matter & clay pockets		
2	5.0	5.5	3.0	6.0	Very stiff brown & gray clay w/silt		
					pockets & partings		
3	8.0	8.5	6.0	9.5	Medium stiff brown & gray silty clay		
					w/clay layers & shells		
4	11.0	11.5	9.5	13.5	Soft gray silty clay w/organic matter		
					& clayey silt layers		
5	14.0	14.5	13.5	16.0	Soft gray clay w/silty sand layers &		
					bricks		
6	18.5	19.0	16.0	21.0	Medium dense gray silty sand w/silty		
					clay & clayey silt layers		
7	23.5	24.0	21.0	26.0	Loose gray clayey silt w/shells,		
					organic clay & silty sand layers		
8	28.5	29.0	26.0		Soft gray clay w/silt lenses		
9	33.5	34.0		36.0	Ditto		
10	38.5	39.0	36.0	42.0	Loose gray silty sand w/sandy clay		
					pockets		
11	43.5	44.0	42.0	46.0	Very loose gray silty sand w/shells		
					& clay pockets		
12	46.0	47.5	46.0	48.0	Dense gray fine sand	10	39
13	48.5	50.0	48.0	51.0	Loose gray fine sand w/clay layers	7	9
14	51.0	52.0	51.0		Soft gray clay w/sand pockets & shells	5	5
15	53.5	54.0		56.0	Ditto		
16	58.5	59.0	56.0		Medium stiff gray clay w/sand pockets		
					& shells		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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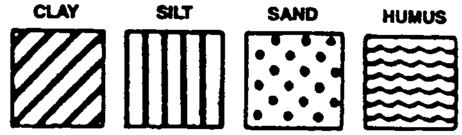
Remarks:



Predominant type shown heavy. Modifying type shown light.

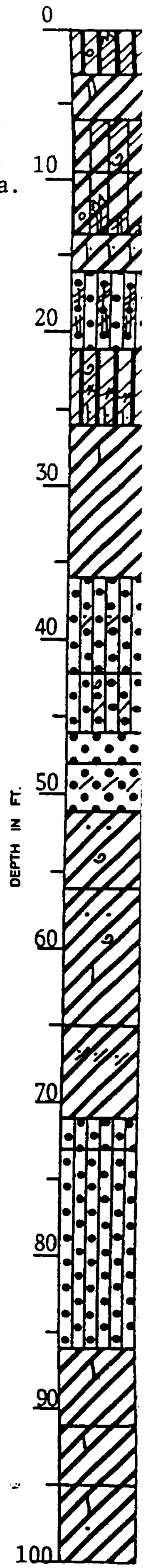


Fig. 5
(Sheet #

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

100

110

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 4 (Cont'd) Soil Technician George Hardee Date 1 August 1984

Ground Elev. 10.3 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
17	63.5	64.0		65.0	Medium stiff gray clay w/trace of silt		
18	68.5	69.0	65.0	71.0	Stiff greenish-gray & tan clay w/sandy clay layers		
19	71.0	72.5	71.0	73.0	Dense tan silty sand	8	33
20	73.5	75.0	73.0		Medium dense tan silty sand	10	20
21	76.0	77.5			Ditto	5	23
22	78.5	80.0			Ditto	5	21
23	81.0	82.5			Ditto	8	30
24	83.5	85.0		86.0	Ditto	10	27
25	88.5	89.0	86.0	91.0	Stiff tan & gray clay w/silt lenses		
26	93.5	94.0	91.0	95.0	Stiff gray & tan clay w/silt lenses		
27	98.5	99.0	95.0		Medium stiff to stiff gray clay w/silt lenses		
28	103.5	104.0		105.0	Medium stiff to stiff gray clay w/sand lenses		

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks:

CLAY SILT SAND HUMUS

100

Predominant type shown heavy. Modifying type shown light.

Fig. 5
(Sheet #

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

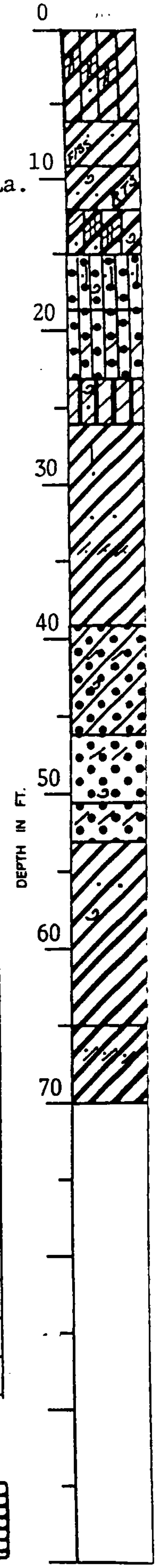
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 5 Soil Technician George Hardee Date 2 August 1984

Ground Elev. 11.1 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
1	2.0	2.5	0.0		Very stiff tan & gray silty clay		
					w/clayey silt layers		
2	5.0	5.5		6.0	Very stiff tan & gray silty clay		
					w/clayey silt layers & fine sand		
3	8.0	8.5	6.0	9.0	Stiff tan & gray clay w/sand layers		
					& fissures		
4	11.0	11.5	9.0	12.0	Medium stiff gray & tan clay w/shells,		
					sand pockets & roots		
5	14.0	14.5	12.0	15.0	Soft tan & gray silty clay w/clay,		
					clayey silt & sand pockets & shells		
6	18.0	18.5	15.0	18.5	Loose gray silty sand w/sandy silt		
					layers & shells		
7	18.5	20.0	18.5		Loose to medium dense gray silty sand	7	17
8	21.0	22.5		23.0	Loose to medium dense gray silty sand	2	11
					w/clay layers		
9	23.5	25.0	23.0	26.0	Loose gray clayey silt w/shells & trace	3	6
					of sand		
10	28.5	29.0	26.0		Soft to medium stiff gray clay w/silt		
					& sand lenses		
11	33.5	34.0			Ditto		
12	38.5	39.0		39.0	Soft to medium stiff gray clay w/sand		
					lenses, pockets & clayey sand layers		
13	43.5	44.0	39.0	46.0	Loose gray clayey sand w/clay pockets		
					& shells		
14	48.0	48.5	46.0		Medium dense gray fine sand w/clay		
					pockets & shells		



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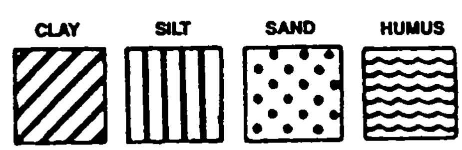

Remarks:

Predominant type shown heavy. Modifying type shown light.

Fig. 6

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 5 (Cont'd) Soil Technician George Hardee Date 2 August 1984

Ground Elev. 11.1 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
15	48.5	50.0		50.5	Medium dense gray fine sand	8	30
16	51.0	52.5	50.5	53.0	Loose gray fine sand w/clay layers	2	8
17	53.5	55.0	53.0		Medium stiff gray clay	1	5
18	58.5	59.0			Medium stiff gray clay w/sand pockets		
					& shells		
19	63.5	64.0		65.0	Ditto		
20	68.5	69.0	65.0	70.0	Stiff greenish-gray & tan clay w/sandy		
					clay layers		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks:

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

DEPTH IN FT.

Fig. 6 (Sheet #

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Sheet 1 of 2

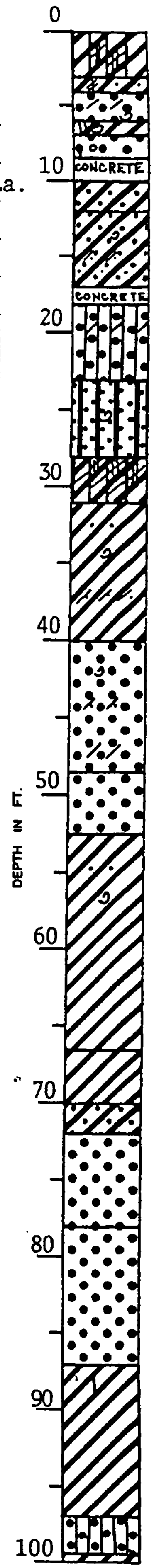
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 6 Soil Technician George Hardee Date 31 July 1984

Ground Elev. 12.3 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	3.0	Stiff gray & tan silty clay w/clayey		
					silt pockets		
2	3.5	4.0	3.0	4.0	Stiff gray & tan clay w/silty clay &		
					fine sand pockets		
3	4.0	5.5	~~3.0~~ 4.0	6.0	Medium dense tan & gray fine sand	15	17
					w/clay pockets & shells		
4	6.5	7.0	6.0	7.0	Medium stiff gray clay w/silt pockets		
					& shells		
5	7.0	8.5	7.0	8.5	Dense tan & gray fine sand w/gravel	20	43
			8.5	10.0	Concrete w/gypsum pockets		
6	11.5	12.0	10.0	12.0	Very soft gray & tan sandy clay		
					w/partings		
7	12.0	13.5	12.0		Soft gray sandy clay w/shells & clayey	1	3
					sand pockets		
8	14.5	16.0		17.0	Soft gray sandy clay w/sand layers	1	4
			17.0	18.0	Concrete		
9	18.5	20.0	18.0		Loose gray silty sand w/clay layers	3	10
10	21.0	22.5		23.0	Ditto	4	7
11	23.5	25.0	23.0		Loose gray sandy silt w/shells	3	9
12	26.0	27.5		28.0	Loose gray sandy silt	1	10
13	28.5	30.0	28.0	31.0	Soft gray silty clay w/clayey silt	1	5
					& clay layers		
14	33.5	34.0	31.0		Soft gray clay w/sand pockets & shells		
15	38.5	39.0		40.0	Soft gray clay w/clayey sand layers		
16	43.5	44.0	40.0		Very loose to loose gray fine sand		
					w/shells & clayey sand pockets		



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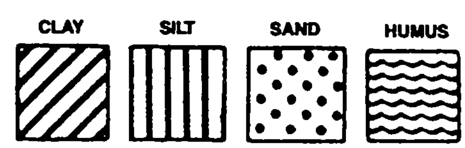


Predominant type shown heavy. Modifying type shown light.

Remarks:

Fig. 7

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

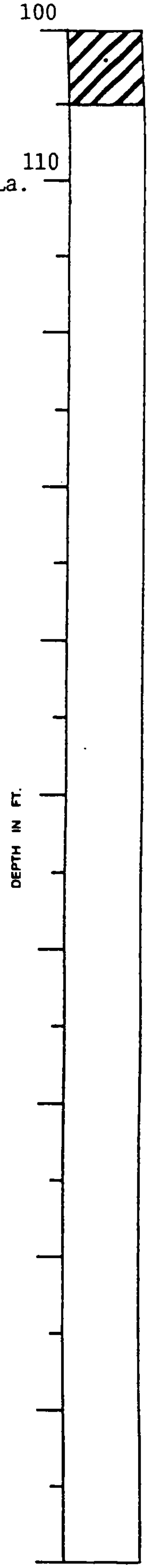
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 6 (Cont'd) Soil Technician George Hardee Date 31 July 1984

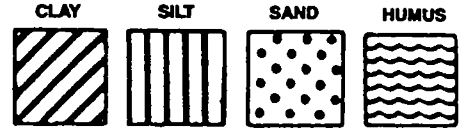
Ground Elev. 12.3 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
17	48.0	48.5		48.5	Loose gray fine sand w/shells & clay		
					pockets		
18	48.5	50.0	48.5	52.5	Dense gray fine sand	8	49
19	53.5	55.0	52.5		Medium stiff gray clay	2	10
20	58.5	59.0			Medium stiff gray clay w/sand pockets		
					& shells		
21	63.5	64.0		66.5	Ditto		
22	68.5	69.0	66.5	70.0	Stiff greenish-gray & tan clay		
23	71.5	72.0	70.0	72.0	Stiff greenish-gray & tan sandy clay		
24	72.0	73.5	72.0		Dense gray fine sand	4	31
25	75.0	76.5		78.0	Ditto	14	38
26	78.5	80.0	78.0		Medium dense tan & gray fine sand	5	26
27	83.5	85.0		87.0	Ditto	6	20
28	88.5	90.0	87.0		Stiff tan & gray clay w/silt lenses	8	21
29	93.5	94.0			Ditto		
30	96.5	97.0		97.0	Ditto		
31	97.0	98.5	97.0	99.5	Medium dense gray & tan silty sand	9	22
32	100.0	101.5	99.5		Medium stiff gray clay	4	5
33	103.5	105.0		105.0	Medium stiff gray clay w/sand lenses	3	8



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Predominant type shown heavy. Modifying type shown light.

Remarks:

Fig. 7
(Sheet #

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

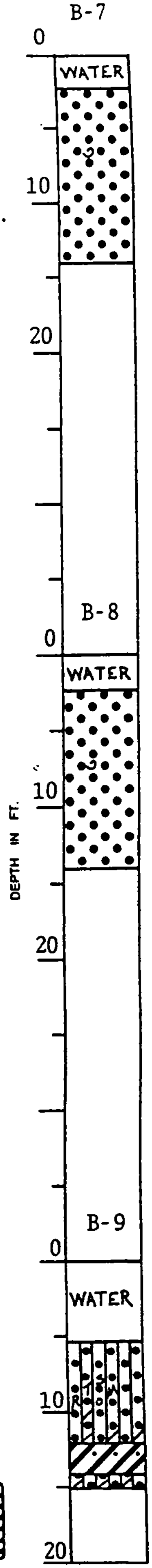
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. ________ Soil Technician George Hardee Date 3 August 1984

Water Elev. 2.0 Datum MSL Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
					BORING 7		
			0.0	2.1	Water		
			2.1	14.0	Loose to medium dense gray fine sand		
					w/shells		
					BORING 8		
			0.0	2.2	Water		
			2.2	14.0	Loose to medium dense gray fine sand		
					w/shells		
					BORING 9		
			0.0	5.2	Water		
1	6.5	7.0	5.2		Very loose to extremely loose gray silty		
					sand w/roots & organic matter		
2	8.5	9.0			Ditto		
3	10.5	11.0		12.0	Very loose to extremely loose gray silty		
					sand w/clay lenses & layers		
4	12.5	13.0	12.0	14.0	Extremely soft gray clay w/sand layers		
5	14.5	15.0	14.0	15.0	Loose gray silty sand w/clay layers		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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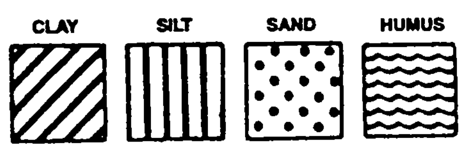


Remarks: ______________________

Predominant type shown heavy. Modifying type shown light.

Fig. 8

LOG OF BORING

EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate

New Orleans, Louisiana

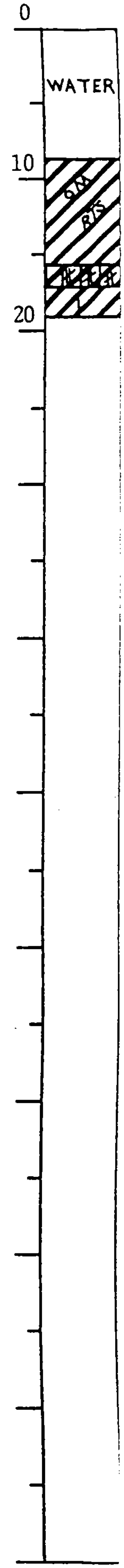
For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 10 Soil Technician George Hardee Date 3 August 1984

Water Elev. 2.0 Datum MSL Gr. Water Depth See Text

Sample No.	Sample Depth — Feet		Depth Stratum Feet		Visual Classification	*Standard Penetration Test	
	From	To	From	To			
			0.0	8.6	Water		
1	9.5	10.0	8.6		Extremely soft gray clay w/organic		
					matter & roots		
2	10.5	11.0			Ditto		
3	12.5	13.0			Ditto		
4	14.5	15.0		15.5	Ditto		
5	16.5	17.0	15.5	17.0	Soft gray silty clay w/clayey silt		
					layers		
6	18.5	19.0	17.0	19.0	Very soft gray clay w/silt lenses		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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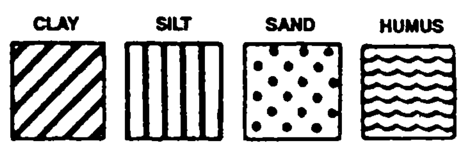
Remarks:



Predominant type shown heavy. Modifying type shown light.

Fig. 9

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

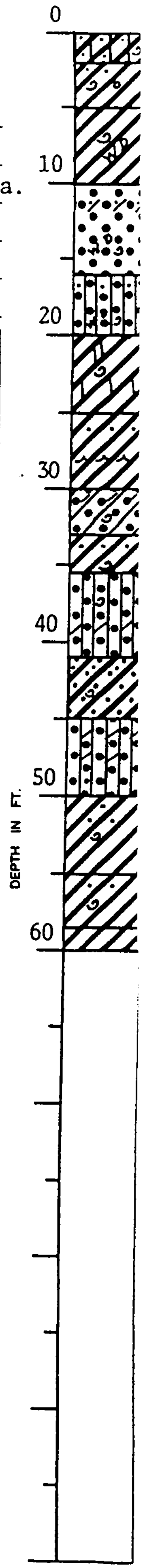
Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 11 Soil Technician R. Elkins Date 12 October 1984

Ground Elev. 3.0 (Est.) Datum ______ Gr. Water Depth See Text

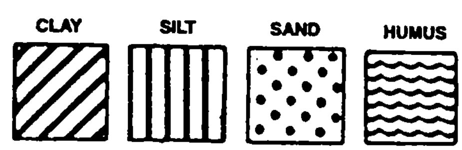
Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
1	1.5	2.0	0.0	2.0	Soft gray & tan silty clay w/sand		
					layers, pockets & shell fragments		
2	4.0	4.5	2.0	5.0	Very soft gray clay w/sand pockets,		
					shell fragments & gravel		
3	6.5	7.0	5.0		Extremely soft to very soft gray clay		
					w/brick, shells & wood		
4	9.0	9.5		10.0	Ditto		
5	11.5	12.0	10.0		Loose gray fine sand w/sandy clay		
					layers, wood & shells		
6	13.5	15.0		16.0	Ditto	2	9
7	16.0	17.5	16.0		Very soft gray silty clay w/sand layers,	0	2
					wood & shells		
8	19.0	19.5		20.0	Very soft gray silty clay w/shells		
9	21.5	22.0	20.0		Soft to medium stiff gray clay w/silt		
					pockets & shells		
10	24.0	24.5		25.0	Soft to medium stiff gray clay w/silt		
					layers		
11	26.5	27.0	25.0		Very soft to medium stiff gray clay		
					w/sand layers		
12	29.0	29.5		30.0	Very soft to medium stiff gray clay		
					w/sand layers & humus layers		
13	31.5	32.0	30.0	33.0	Loose gray clayey sand w/clay layers		
					& shells		
14	34.0	34.5	33.0	35.5	Very soft to medium stiff gray clay		
					w/sand layers & shells		
					(Continued)		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ______



Predominant type shown heavy. Modifying type shown light.

Fig. 10
(Sheet #1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
Pepper and Associates, Consulting Engineers, Metairie, Louisiana

Boring No. 11 (Cont'd) Soil Technician R. Elkins Date 12 October 1984

Ground Elev. Datum Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
15	36.5	37.0	35.5		Loose to medium dense gray silty sand		
					w/shells & clay layers		
16	38.5	40.0		41.0	Ditto	6	13
17	41.0	42.5	41.0		Soft gray sandy clay w/sand layers	1	2
					& shell fragments		
18	44.0	44.5		45.0	Ditto		
19	46.5	47.0	45.0		Very loose gray silty sand w/clay		
					layers & pockets & sand		
20	49.0	49.5		50.0	Ditto		
21	51.5	52.0	50.0		Soft gray clay w/sand lenses, pockets		
					& shell fragments		
22	54.0	54.5		55.0	Soft gray clay		
23	56.5	57.0	55.0	58.5	Medium stiff gray clay w/sand pockets		
					& trace of shell fragments		
24	59.0	59.5	58.5	60.0	Medium stiff light gray clay		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks:

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

DEPTH IN FT.

Fig. 1(

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 1

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
1	2.0	Compact tan & gray clayey silt w/shells, gravel & sand pockets	14.4	----	-----	----
2	5.0	Stiff tan & gray silty clay w/sand pockets	16.0	104.8	121.6	2405*
4	11.0	Loose gray & tan silty sand w/clay lenses	25.4	98.6	123.6	605*
5	14.0	Soft gray sandy clay w/shell fragments	28.7	95.9	123.5	547
10	28.5	Loose gray silty sand	25.7	93.4	117.4	950*
11	33.5	Soft gray clay w/sand lenses & shells	52.6	70.6	107.8	630
12	38.5	Soft gray clay w/sand lenses & pockets	59.2	65.7	104.6	515
13	43.5	Very soft gray sandy clay w/shell fragments	28.6	93.0	119.6	295
20	63.5	Soft gray clay w/shell fragments	54.8	67.5	104.5	990
21	68.5	Medium stiff gray clay w/sand pockets	44.8	75.8	109.7	1925
22	73.5	Ditto	50.9	69.2	104.1	1760
23	78.5	Soft greenish-gray sandy clay w/clayey sand layers	23.9	101.2	125.3	690
24	83.5	Stiff greenish-gray clay w/silt lenses & pockets	36.3	85.1	116.1	2290
27	93.5	Medium stiff tan & gray clay w/silt lenses & trace of fine sand	33.5	88.9	118.7	1610
28	98.5	Medium stiff gray clay w/silt lenses & trace of sand	38.8	83.9	116.5	1960
29	103.5	Medium stiff gray clay w/silty sand lenses	41.0	80.5	113.6	1725

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 11

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 2

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
5	12.0	Soft tan & gray clay w/silt pockets	42.1	72.8	103.4	500	56	22	34
11	28.5	Soft gray silty clay w/shells	39.5	81.4	113.6	705	36	23	13
12	33.5	Soft gray clay w/shell fragments	57.6	66.1	104.1	780			
13	39.0	Very loose gray clayey sand w/shell fragments	29.5	91.5	118.6	375*			
18	58.5	Medium stiff gray & tan clay w/sand pockets & shell fragments	52.0	69.2	105.3	1320	72	26	46
19	63.5	Medium stiff gray & tan clay w/shell fragments	49.7	72.2	108.0	1575			
20	67.5	Stiff greenish-gray & tan sandy clay	23.3	102.4	126.2	3820			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 12

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 3

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
1	2.0	Medium stiff gray & tan silty clay w/clayey sand layers & shells	35.4	----	-----	----
2	5.0	Very soft gray & tan clay w/silty clay layers & organic matter	68.4	58.9	99.1	310
3	8.0	Soft gray clay w/sandy silt lenses, organic matter & shell fragments	57.1	66.9	105.1	330
4	11.0	Ditto	51.3	70.3	106.3	315
5	14.0	Soft gray sandy clay w/shells	33.6	----	-----	----
6	19.0	Soft gray silty clay w/trace of sand	34.5	84.5	113.6	795
7	24.0	Soft gray clay w/shells	58.2	65.3	103.2	710
8	29.0	Soft gray clay	74.7	56.0	97.9	505
9	34.0	Very soft gray sandy clay w/shell fragments	29.2	93.0	120.1	320
12	44.0	Soft gray clay w/sand pockets	43.2	73.8	105.6	695
13	49.0	Medium stiff gray clay w/sand pockets & shell fragments	41.1	73.8	104.1	1585
14	54.0	Medium stiff gray & tan clay w/silt pockets	47.6	72.5	107.0	1195
15	59.0	Stiff gray & tan clay w/trace of sand	24.3	101.4	126.0	2835
16	62.5	Stiff gray & tan clay w/silty sand layers	35.6	85.1	115.4	----
23	84.0	Very stiff tan & gray clay w/silt lenses	30.2	91.2	118.7	4255
24	89.0	Very stiff tan & gray clay w/silty sand lenses	40.9	81.3	114.6	----

Fig. 13

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 4 Sheet 1 of 2

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
1	2.0	Compact brownish-gray & tan clayey silt w/clay pockets & roots	17.4	----	-----	----
2	5.0	Very stiff brown & gray clay w/silt pockets & brick fragments	30.8	86.3	112.9	4535
3	8.0	Medium stiff brown & gray silty clay w/clay pockets & shells	30.8	83.0	108.6	1707
4	11.0	Soft gray silty clay w/clayey silt layers	54.4	65.1	100.5	695
5	14.0	Soft gray clay	84.7	51.7	95.5	870
6	18.5	Medium dense gray silty sand w/trace of clay	32.7	85.4	113.3	Ø=23° c=420**
7	23.5	Loose gray clayey silt w/shells & silty clay layers	57.2	----	-----	----
8	28.5	Soft gray clay w/silt lenses	57.1	65.8	103.4	940
9	33.5	Ditto	65.7	61.8	102.3	990
10	38.5	Loose gray silty sand w/clay pockets & shells	29.8	91.9	119.3	Ø= 4° c= 0**
11	43.5	Very loose gray silty sand w/trace of clay	30.3	92.2	120.2	235
15	53.5	Soft gray clay w/clayey sand layers, pockets & shells	47.2	73.1	107.7	662
16	58.5	Medium stiff gray clay w/sand pockets & shell fragments	52.6	69.2	105.6	1795
17	63.5	Ditto	46.5	74.8	109.6	1395
18	68.5	Stiff greenish-gray & tan clay w/sand pockets	36.6	85.7	117.0	2710

**Unconsolidated Undrained Triaxial Compression Test - Multiple Stage;
Ø = Angle of internal friction; c = Cohesion is psf.

Fig. 14
(Sheet #1)

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 4
(Cont'd)

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
25	88.5	Stiff tan & gray clay w/trace of silt, organic matter & fissures	41.2	81.5	115.1	2000
26	93.5	Stiff gray & tan clay w/clayey silty layers & lenses	32.6	89.6	118.7	2480
27	98.5	Stiff gray clay w/trace of silt	32.6	90.7	120.2	2375
28	103.5	Medium stiff gray clay w/sand lenses & pockets	38.3	83.6	115.6	1815

Fig. 14
(Sheet #2)

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 5

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
2	5.0	Very stiff tan & gray silty clay w/fine sand pockets	18.4	----	-----	----
3	8.0	Stiff tan & gray clay w/sand pockets & fissures	47.8	70.9	104.8	2155
4	11.0	Medium stiff gray & tan clay w/shells, sand pockets & layers	38.8	----	-----	----
5	14.0	Soft gray & tan silty clay w/shells, roots & sand pockets	44.2	----	-----	----
10	28.5	Soft gray clay w/silt & sand pockets	66.3	60.8	101.1	850
11	33.5	Soft gray clay w/silt pockets	61.6	63.5	102.6	990
12	38.5	Medium stiff gray clay w/sand pockets	65.5	62.1	102.8	1040
18	58.5	Medium stiff gray clay w/shell fragments & sand pockets	54.6	67.5	104.3	1235
19	63.5	Ditto	46.1	75.4	110.2	1615
20	68.5	Stiff greenish-gray & tan clay	35.8	86.8	117.8	2440

Fig. 15

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 6

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
1	2.0	Stiff gray & tan silty clay w/roots	26.6	96.8	122.5	3120
2	3.5	Stiff gray & tan clay w/silty clay layers, sand pockets & roots	36.2	84.7	115.4	2270
4	6.5	Medium stiff gray clay w/silt lenses, pockets & trace of sand (fill)	27.9	94.0	120.3	1240
6	11.5	Very soft gray & tan sandy clay w/clayey sand pockets, lenses & shells (fill)	27.1	96.5	122.6	340*
15	38.5	Soft gray clay	75.3	56.3	98.7	870
16	43.5	Very loose gray fine sand w/clayey sand layers, shells & trace of silt	26.6	95.9	121.3	Ø=4° c=160**
17	48.5	Loose gray fine sand w/clay lenses, pockets & shells	30.1	90.7	118.0	650*
20	58.5	Medium stiff gray clay w/many sand pockets & shells	43.1	77.4	110.8	1135
21	63.5	Medium stiff gray clay w/sand pockets	52.9	69.2	105.8	1635
22	68.5	Stiff greenish-gray & tan clay	33.2	90.0	120.0	2125
23	71.5	Stiff greenish-gray & tan sandy clay w/clay pockets	28.1	95.5	122.3	2400
29	93.5	Stiff tan & gray clay w/thick silt lenses	37.8	92.5	113.8	3695*

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

**Unconsolidated Undrained Triaxial Compression Test - Multiple Stage; Ø = Angle of internal friction; c = Cohesion in psf.

Fig. 16

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 9

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
1	6.5	Very loose gray silty sand	26.9	92.7	117.6	300*
3	10.5	Extremely loose gray silty sand w/clay layers & roots	75.7	53.3	93.6	100*
4	12.5	Extremely soft gray clay w/silty sand layers & roots	62.5	62.5	101.6	125
5	14.5	Loose gray silty sand w/decayed shells	34.2	----	-----	----

BORING 10

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
2	10.5	Extremely soft gray clay w/roots	113.8	40.6	86.7	----
4	14.5	Extremely soft gray clay w/sandy silt pockets	70.7	57.6	98.4	115
6	18.5	Very soft gray clay w/silt lenses	76.5	56.7	100.0	310

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 17

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 11 (Sheet 1 of 2)

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	PL	PI
1	1.5	Soft gray & tan silty clay w/shells & sand layers (fill)	32.0	86.7	114.5	575			
2	4.0	Very soft gray clay w/sand lenses, pockets & shells	47.0	74.3	109.2	455*			
3	6.5	Extremely soft gray clay w/silt pockets & shell fragments	60.5	64.4	103.4	155	66	19	47
4	9.0	Very soft gray clay w/sand pockets & miscellaneous fill	58.5	63.6	100.8	290	77	24	53
4	9.0	Extremely soft gray clay w/large sandy silt pockets	54.8	66.8	103.4	210*			
8	19.0	Very soft gray silty clay w/trace of fine sand	46.5	72.5	106.2	490*			
9	21.5	Soft gray clay w/silt pockets & shell fragments	43.9	75.8	109.1	540*	56	21	35
9	21.5	Medium stiff gray clay w/silt pockets & shell fragments	45.6	75.1	109.4	1045**			
10	24.0	Soft gray clay w/silt pockets	53.4	68.9	105.7	765*			
11	26.5	Very soft gray clay	74.5	56.1	97.8	410	101	26	75
11	26.5	Medium stiff gray clay	78.7	53.8	96.2	1095**			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

**Consolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 18
(Sheet #1)

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Bayou St. John Bridge and Floodgate
New Orleans, Louisiana

For: The Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

Pepper and Associates, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 11
(Cont'd)

(Sheet 2 of 2)

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	PL	PI
12	29.0	Soft gray clay w/silt lenses	76.2	55.5	97.8	825*			
13	31.5	Loose gray clayey sand w/clay pockets & shell fragments		----	-----	Ø=32.5° c=0***	Non-Plastic		
14	34.0	Very soft gray clay w/trace of silt & shells	69.4	57.9	98.1	295	84	25	59
14	34.0	Medium stiff gray clay w/trace of silt & shells	73.2	56.0	97.0	1470**			
15	36.5	Loose gray silty sand w/shells, clay layers & pockets	30.0	89.5	116.3	----			
18	44.0	Soft gray sandy clay w/large silty sand pockets & layers	40.0	78.9	110.4	540*	42	18	24
19	46.5	Very loose gray silty sand w/clay layers, pockets & shells	38.6	80.0	110.9	485*			
21	51.5	Soft gray clay w/sand pockets	64.2	59.4	97.6	805*			
23	56.5	Medium stiff gray clay w/shell fragments	54.2	68.1	105.0	1175*			
24	59.0	Medium stiff light gray clay w/silt pockets	25.7	98.0	123.2	1615			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

**Consolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

***Consolidated Undrained Triaxial Compression Test - Three Specimens; Confined at the approximate overburden pressure.

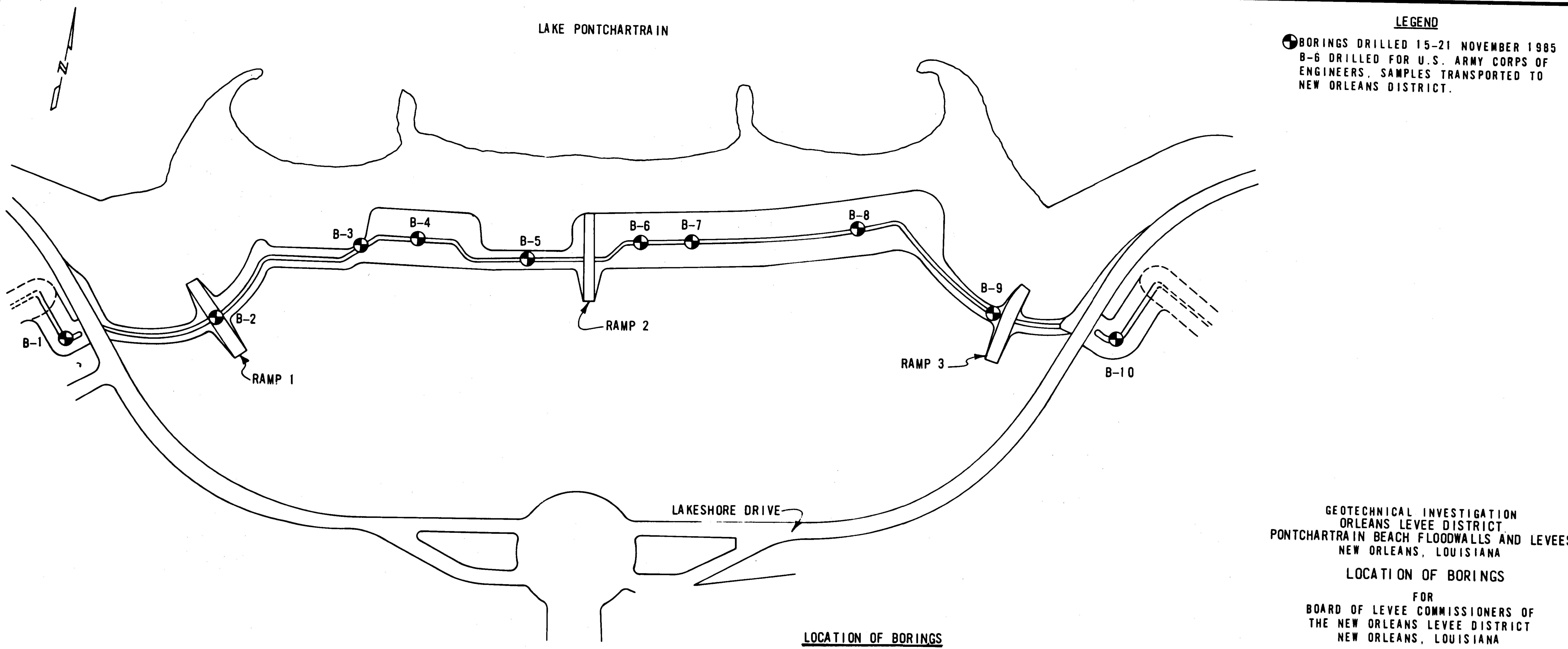
Fig. 18
(Sheet #2)

APPENDIX B

PONTCHARTRAIN BEACH

A-E BORING LOCATIONS, BORING LOGS AND TEST RESULTS

Appendix contains excerpts from the Geotechnical Investigations Report on the Pontchartrain Beach Floodwalls and Levees, dated 6 December 1985, prepared by Eustis Engineering Co. for URS Engineers



LOCATION OF BORINGS

SCALE : 1"=200'

GEOTECHNICAL INVESTIGATION
ORLEANS LEVEE DISTRICT
PONTCHARTRAIN BEACH FLOODWALLS AND LEVEES
NEW ORLEANS, LOUISIANA

LOCATION OF BORINGS

FOR

BOARD OF LEVEE COMMISSIONERS OF
THE NEW ORLEANS LEVEE DISTRICT
NEW ORLEANS, LOUISIANA

URS ENGINEERS
METAIRIE, LOUISIANA

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
DECEMBER 1985 METAIRIE, LA.

FIGURE 1

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

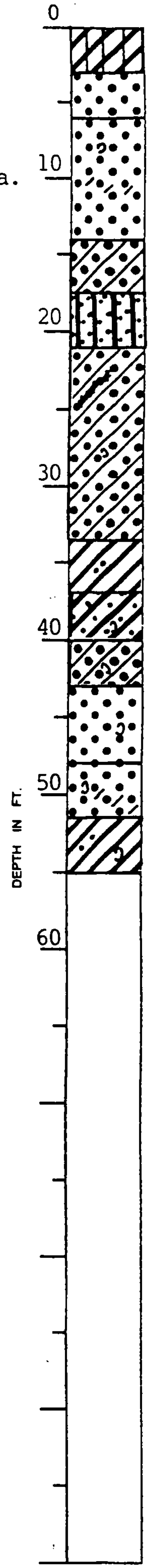
Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 1 Soil Technician A. J. Mayeux Date 22 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

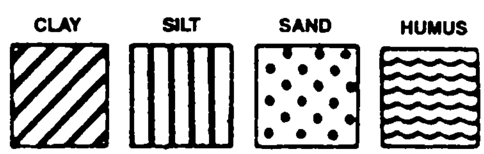
Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	3.0	Medium stiff gray & tan silty clay		
					(fill)		
2	3.5	5.0	3.0	6.0	Medium dense tan fine sand	4	11
3	6.0	7.5	6.0		Very loose gray sand w/shell fragments	1	2
					& clay layers		
4	8.5	10.0			Very loose gray sand w/clay layers	0	2
5	11.0	12.5		14.0	Ditto	0	2
6	14.5	15.0	14.0	17.5	Very loose gray clayey sand		
7	19.0	19.5	17.5	21.0	Very loose gray sandy silt		
8	24.0	24.5	21.0		Very loose gray clayey sand w/silty		
					clay layers & shell fragments		
9	29.0	29.5		33.5	Very loose gray clayey sand		
10	34.0	34.5	33.5	37.0	Medium stiff gray clay w/sand pockets		
11	39.0	39.5	37.0	40.0	Soft gray sandy clay w/shell fragments		
12	40.0	41.5	40.0	43.0	Loose gray clayey sand w/shell	2	7
					fragments		
13	43.5	45.0	43.0	48.0	Medium dense gray sand w/shell	3	11
					fragments		
14	48.5	50.0	48.0	51.5	Loose gray sand w/shell fragments	1	5
					& clay layers		
15	54.5	55.0	51.5	55.0	Medium stiff gray clay w/sand pockets		
					& shell fragments		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ______



Predominant type shown heavy. Modifying type shown light.

Fig. 2

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Sheet 1 of 2

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana
For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 2 Soil Technician A. J. Mayeux Date 21-22 November 1985

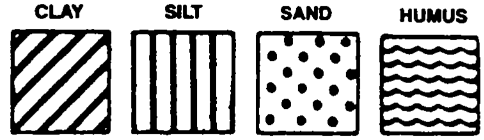
Ground Elev. ____ Datum ____ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	To	DEPTH STRATUM Feet From	To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	2.5	Medium stiff gray & tan clay w/sand		
					layers, shells, etc. (fill)		
2	3.5	5.0	2.5	5.0	Loose tan fine sand	2	7
3	6.0	7.5	5.0		Very loose gray sand w/shell fragments	1	4
					& clay layers		
4	8.5	10.0			Ditto	2	3
4	11.0	12.5			Ditto	1	3
6	13.5	15.0		16.5	Ditto	1	1
7	17.5	18.0	16.5	20.0	Loose gray sandy silt		
8	20.5	21.0	20.0	22.5	Very loose gray clayey silt w/silty		
					sand layers & shells		
9	23.5	24.0	22.5	26.0	Very loose gray clayey sand w/shell		
					fragments		
10	26.5	27.0	26.0		Very soft gray sandy clay w/sand		
					pockets & shell fragments		
11	29.5	30.0		31.0	Very soft gray sandy clay w/silty sand		
					layers & shells		
12	32.5	33.0	31.0	35.5	Medium stiff gray clay w/sand pockets		
					& shell fragments		
13	35.5	36.0	35.5		Soft gray sandy clay w/shell fragments		
14	38.5	39.0		40.0	Ditto		
15	40.0	41.5	40.0	43.5	Very loose gray clayey sand w/shell	0	3
					fragments		
16	43.5	45.0	43.5		Medium dense gray sand w/shell	3	11
					fragments & clay layers		
17	48.5	50.0		51.0	Ditto	4	13

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ____



Predominant type shown heavy. Modifying type shown light.

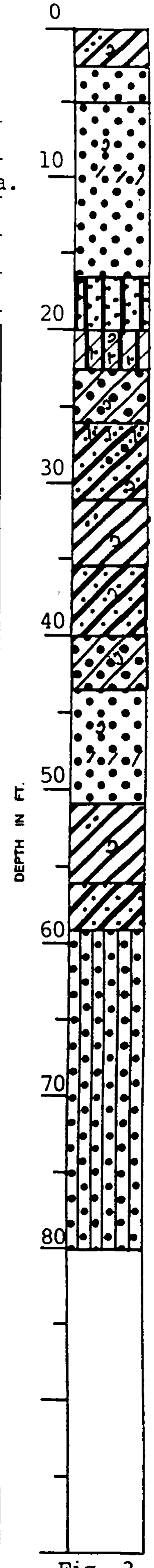


Fig. 3
(Sheet 1)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 2 (Cont'd) Soil Technician A. J. Mayeux Date 21-22 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
18	54.0	54.5	51.0	56.0	Medium stiff gray clay w/sand pockets		
					& shell fragments		
19	58.0	58.5	56.0	59.0	Very stiff greenish-gray & tan sandy		
					clay		
20	59.0	60.5	59.0		Medium dense greenish-gray & tan silty	3	13
					sand		
21	63.5	65.0			Ditto	3	11
22	68.5	70.0			Ditto	3	12
23	73.5	75.0			Ditto	4	21
24	78.5	80.0		80.0	Ditto	4	16

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Remarks: ______

Predominant type shown heavy. Modifying type shown light.

Fig. 3
(Sheet ...)

LOG OF BORING

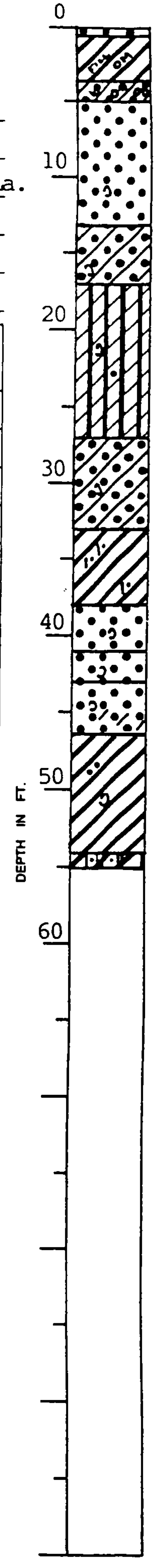
EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana
For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 3 Soil Technician A. J. Mayeux Date 15 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

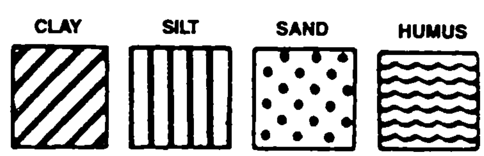
Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
			0.0	0.5	Loose tan fine sand		
1	2.0	2.5	0.5	3.5	Stiff gray & tan clay w/fill & organic		
					matter		
2	3.5	5.0	3.5	5.0	Medium dense gray clayey sand & wood	3	22
3	6.0	7.5	5.0		Loose gray sand w/shell fragments	1	5
4	8.5	10.0			Ditto	1	5
5	11.0	12.5		13.0	Ditto	2	5
6	13.5	15.0	13.0	17.0	Very loose dark gray clayey sand	0	1
					w/shells		
7	19.0	19.5	17.0		Loose gray clayey silt w/shell		
					fragments & sand		
8	24.0	24.5		27.0	Ditto		
9	29.0	29.5	27.0	33.0	Very loose gray clayey sand w/shell		
					fragments		
10	34.0	34.5	33.0	38.0	Medium stiff gray clay w/silty sand		
					pockets & lenses		
11	38.5	40.0	38.0	41.0	Loose gray sand w/shell fragments	2	8
12	41.0	42.5	41.0	43.0	Medium dense gray sand w/shell	4	13
					fragments		
13	43.5	45.0	43.0	46.5	Loose gray sand w/shell fragments &	2	5
					clay layers		
14	49.0	49.5	46.5	54.0	Stiff gray clay w/sand pockets & shell		
					fragments		
15	54.0	54.5	54.0	55.0	Stiff greenish-gray silty clay w/sandy		
					silt pockets		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ______



Predominant type shown heavy. Modifying type shown light.

Fig. 4

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 4 Soil Technician A. J. Mayeux Date 15 & 18 November 1985

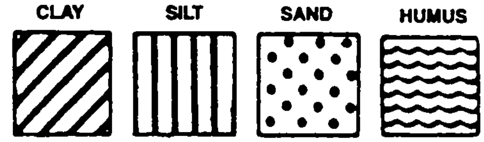
Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	0.5	2.0	0.0	2.0	Very loose tan sand	1	3
2	3.5	4.0	2.0	4.0	Stiff gray & tan clay w/sand pockets		
					& shells		
3	5.5	6.0	4.0	7.0	Very loose gray fine sand w/clay		
					pockets & shell fragments		
4	8.5	9.0	7.0	9.0	Very loose gray clayey sand w/shells		
5	9.0	10.5	9.0	11.0	Very loose gray sand w/shells	0	2
6	11.0	12.5	11.0	13.0	Medium dense gray sand w/shell	4	13
					fragments		
7	13.5	15.0	13.0	17.0	Loose gray clayey sand w/shells	2	6
8	19.0	19.5	17.0		Very loose gray clayey sand w/shells		
9	24.0	24.5		26.0	Ditto		
10	29.0	29.5	26.0		Very soft gray clay w/sand lenses &		
					pockets & shell fragments		
11	34.0	34.5		36.0	Ditto		
12	38.0	38.5	36.0	39.0	Very loose gray clayey sand w/shell		
					fragments		
13	39.0	40.5	39.0	41.0	Loose gray sand w/shell fragments	2	6
14	41.0	42.5	41.0		Medium dense gray sand w/shell	2	13
					fragments		
15	43.5	45.0		48.0	Ditto	1	11
16	48.5	50.0	48.0	51.0	Medium stiff gray sandy clay w/shell	1	4
					fragments		
17	52.0	52.5	51.0	54.0	Stiff gray clay w/sand pockets		
18	54.0	54.5	54.0	55.0	Stiff greenish-gray silty clay w/trace		
					of organic matter		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

ILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS ESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ______



Predominant type shown heavy. Modifying type shown light.

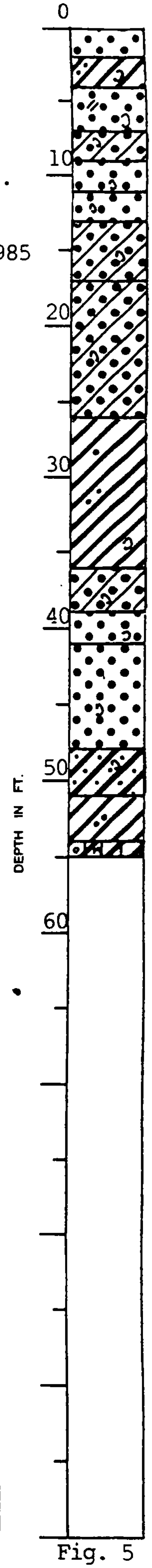


Fig. 5

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District

Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

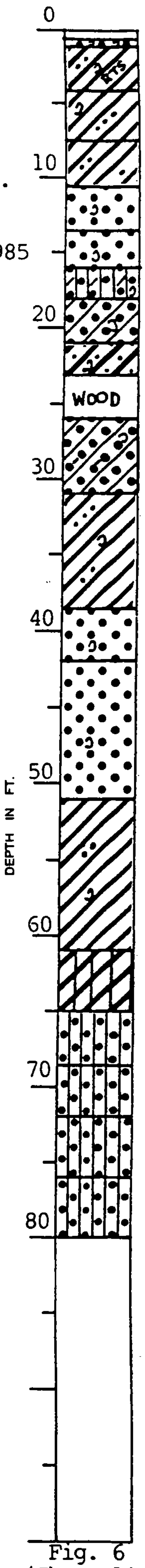
For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.

URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 5 Soil Technician A. J. Mayeux Date 18 & 19 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

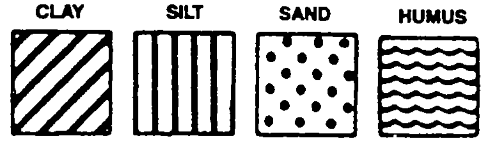
Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
			0.0	0.5	Concrete		
			0.5	1.0	Shells & sand		
1	2.0	3.0	1.0	4.0	Medium stiff gray & tan clay w/sand		
					pockets & some shells & roots		
2	5.0	6.0	4.0	7.5	Soft gray clay w/shells & sand layers		
3	8.0	9.0	7.5	10.5	Soft gray clay w/sand pockets & lenses		
4	11.0	12.5	10.5	13.5	Very loose gray sand w/shell fragments	0	3
5	13.5	15.0	13.5	16.0	Medium dense gray sand w/shell	4	17
					fragments		
6	16.0	17.5	16.0	18.0	Very loose gray silty sand w/clay	1	3
					layers & shell fragments		
7	18.5	20.0	18.0	21.0	Loose gray clayey sand w/shell	3	4
					fragments		
8	21.0	22.5	21.0	23.0	Very soft gray sandy clay w/shell	0	2
					fragments		
			23.0	26.0	Wood w/some sandy clay & shells		
9	26.0	27.0	26.0		Loose gray clayey sand w/clay pockets		
					& shell fragments		
10	29.0	30.0		31.0	Ditto		
11	32.0	33.0	31.0		Soft gray clay w/sand layers, pockets		
					& shell fragments		
12	35.0	36.0		38.5	Ditto		
13	38.5	40.0	38.5	42.0	Loose gray sand w/shells	1	5
14	43.5	45.0	42.0		Medium dense gray sand w/shell	3	17
					fragments		
15	48.5	50.0		51.0	Ditto	2	9



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ______



Predominant type shown heavy. Modifying type shown light.

Fig. 6
(Sheet 1)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 5 (Cont'd) Soil Technician A. J. Mayeux Date 18 & 19 November 1985

Ground Elev. ________ Datum ________ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
16	54.0	55.0	51.0		Stiff gray clay w/sand pockets & shell fragments		
17	59.0	60.0		61.0	Ditto		
18	64.0	65.0	61.0	65.0	Stiff greenish-gray silty clay		
19	67.0	68.0	65.0	68.5	Very loose greenish-gray silty sand		
20	68.5	70.0	68.5	72.0	Loose greenish-gray silty sand	2	7
21	73.5	75.0	72.0	76.0	Medium dense greenish-gray silty sand	6	21
22	78.5	80.0	76.0	80.0	Medium dense gray & tan silty sand	4	22

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

CLAY SILT SAND HUMUS

Remarks: ________

Predominant type shown heavy. Modifying type shown light.

Fig. 6
(Sheet 2)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

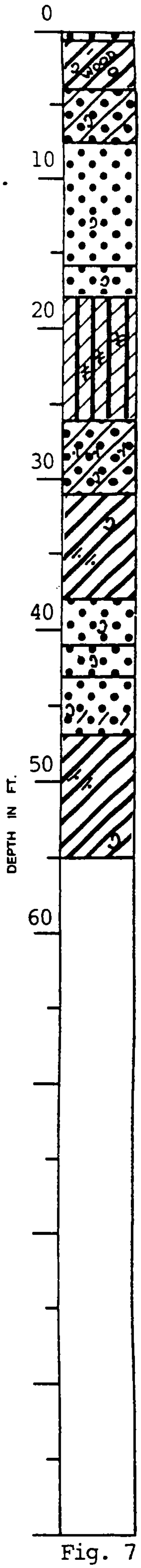
Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 7 Soil Technician A. J. Mayeux Date 19 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
			0.0	0.5	Loose tan sand		
1	2.0	2.5	0.5	4.0	Medium compact gray & tan clay w/shells,		
					clay, gravel & wood		
2	5.0	5.5	4.0	7.5	Loose gray & tan clayey sand w/shell		
					fragments		
3	8.5	10.0	7.5		Medium dense gray sand w/shells	3	11
4	11.0	12.5			Ditto	3	17
5	13.5	15.0		16.0	Ditto	5	24
6	16.0	17.5	16.0	18.0	Loose gray sand w/shells	2	7
7	18.5	20.0	18.0		Very loose gray clayey silt	1	3
8	24.0	24.5		26.0	Very loose gray clayey silt w/silty		
					clay layers		
9	29.0	29.5	26.0	31.0	Loose gray clayey sand w/sandy silt		
					layers & shell fragments		
10	34.0	34.5	31.0		Medium stiff gray clay w/clayey sand		
					pockets & shell fragments		
11	37.5	38.0		38.0	Ditto		
12	38.5	40.0	38.0	41.0	Loose gray sand w/shell fragments	2	9
13	41.0	42.5	41.0	43.0	Medium dense gray sand w/shell	3	13
					fragments		
14	43.5	45.0	43.0	47.0	Loose gray sand w/shell fragments &	2	8
					clay layers		
15	48.5	50.0	47.0		Medium stiff gray clay w/clayey sand	1	4
					pockets & shell fragments		
16	54.0	54.5		55.0	Ditto		



*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second lumn indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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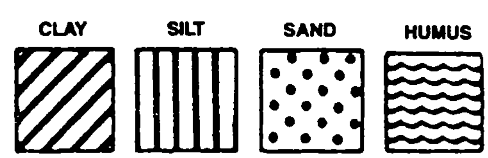
Remarks: ______



Predominant type shown heavy. Modifying type shown light.

Fig. 7

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 8 Soil Technician A. J. Mayeux Date 20 November 1985

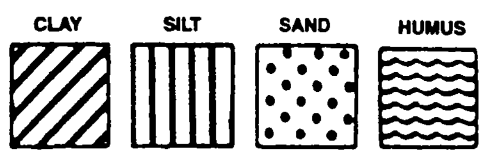
Ground Elev. ________ Datum ________ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
			0.0	0.5	Concrete		
			0.5	1.0	Shells & sand		
1	2.0	2.5	1.0	3.0	Loose tan sand w/shells & clay		
2	3.5	5.0	3.0	5.0	Very loose tan sand	0	2
3	8.0	8.5	5.0	10.0	Medium dense gray silty sand w/clay		
					lenses, pockets & shell fragments		
4	10.0	11.5	10.0	12.0	Very loose gray sand w/shell fragments	0	2
5	12.5	14.0	12.0		Medium dense gray sand w/shell	4	24
					fragments		
6	15.0	16.5			Ditto	6	22
7	18.5	20.0		20.0	Medium dense gray sand w/sandy silt	7	11
					layers		
8	24.0	24.5	20.0		Soft gray silty clay w/sand pockets &		
					decayed shells		
9	29.0	29.5		31.5	Ditto		
10	34.0	34.5	31.5		Loose gray clayey sand w/clay layers		
11	39.0	39.5		40.0	Ditto		
12	40.0	41.5	40.0	43.0	Very loose gray sand w/shell fragments	1	3
13	43.5	45.0	43.0	48.0	Medium dense gray sand w/shell	4	14
					fragments		
14	48.5	50.0	48.0	54.0	Medium stiff gray sandy clay w/shell	1	5
					fragments		
15	54.0	54.5	54.0	55.0	Stiff greenish-gray & tan sandy clay		

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

WHILE THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN, IT IS NOT WARRANTED THAT IT IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Remarks: ________



Predominant type shown heavy. Modifying type shown light.

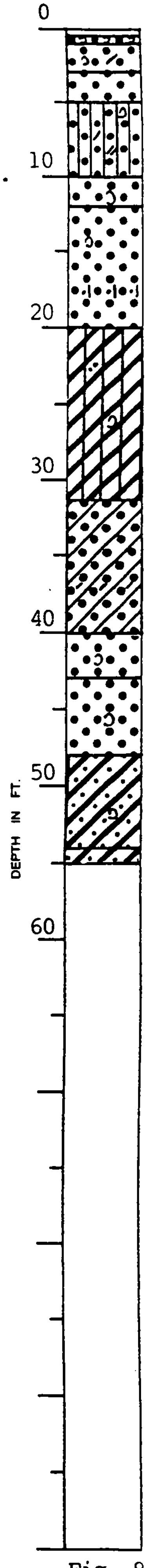


Fig. 8

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

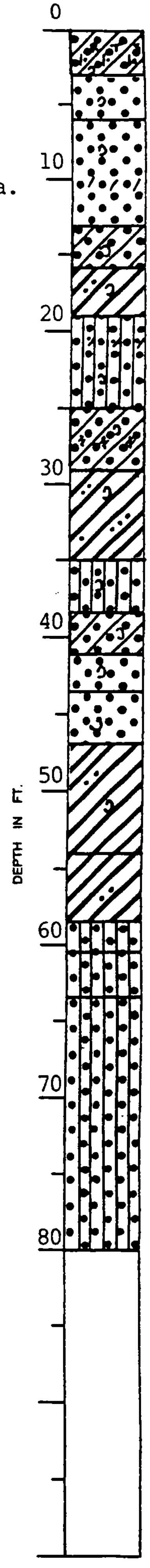
Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 9 Soil Technician A. J. Mayeux Date 20-21 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet From	SAMPLE Depth — Feet To	DEPTH STRATUM Feet From	DEPTH STRATUM Feet To	VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
1	2.0	2.5	0.0	3.0	Medium dense brown & gray clayey sand		
					w/silty sand layers, roots & shells		
					(fill)		
2	3.5	5.0	3.0	6.0	Loose tan sand w/shell fragments	1	5
3	6.0	7.5	6.0		Very loose gray sand w/shell fragments	1	2
					& clay layers		
4	8.5	10.0			Ditto	0	2
5	11.0	12.5		13.0	Ditto	1	2
6	13.5	15.0	13.0	16.0	Very loose gray clayey sand w/shell	0	1
					fragments		
7	17.5	18.0	16.0	19.0	Soft gray clay w/sand pockets & shell		
					fragments		
8	20.5	21.0	19.0		Loose gray silty sand w/sandy clay		
					layers & shells		
9	23.5	24.0		25.0	Loose gray silty sand w/silty clay		
					lenses, layers & shell fragments		
10	26.5	27.0	25.0	29.0	Very loose gray clayey sand w/silty		
					clay layers & shell fragments		
11	29.5	30.0	29.0		Soft gray clay w/sand pockets, lenses		
					& layers & shell fragments		
12	32.5	33.0		35.0	Ditto		
13	35.5	36.0	35.0	38.5	Loose gray silty sand w/shell fragments		
14	38.5	40.0	38.5	41.0	Very loose gray clayey sand w/shell	0	1
					fragments		
15	41.0	42.5	41.0	43.5	Very loose gray sand w/shell fragments	1	3
16	43.5	45.0	43.5	47.0	Loose gray sand w/shell fragments	2	5



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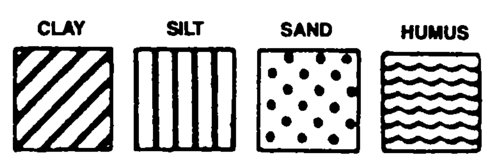

Predominant type shown heavy. Modifying type shown light.

Remarks: ______

Fig. 9
(Sheet 1)

LOG OF BORING

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Orleans Levee District
Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 9 (Cont'd) Soil Technician A. J. Mayeux Date 20-21 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
17	48.5	50.0	47.0	54.0	Medium stiff gray clay w/sand pockets	0	3
					& shell fragments		
18	54.0	54.5	54.0	58.5	Stiff greenish-gray & tan clay w/sand		
					pockets		
19	58.5	60.0	58.5	60.5	Very loose greenish-gray silty sand	1	3
20	61.0	62.5	60.5	63.5	Loose greenish-gray & tan silty sand	2	8
21	63.5	65.0	63.5		Medium dense greenish-gray & tan silty	2	13
					sand		
22	68.5	70.0			Ditto	3	18
23	73.5	75.0			Ditto	4	24
24	78.5	80.0		80.0	Ditto	4	26

DEPTH IN FT.

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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Remarks: ______

CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

Fig. 9
(Sheet 2)

LOG OF BORING

EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

METAIRIE, LA.

Name of Project: Orleans Levee District

Pontchartrain Beach Floodwalls and Levees, New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District, New Orleans, La.

URS Engineers, Consulting Engineers, New Orleans, Louisiana

Boring No. 10 Soil Technician A. J. Mayeux Date 21 November 1985

Ground Elev. ______ Datum ______ Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
1	2.0	2.5	0.0	3.0	Medium stiff gray & tan clay w/sand,		
					shells, gravel, etc. (fill)		
2	3.0	4.5	3.0	4.5	Medium dense gray & tan sand w/shell	3	14
					fragments		
3	6.0	7.5	4.5		Very loose gray sand w/clay layers &	0	3
					shell fragments		
4	8.5	10.0			Ditto	0	4
5	11.0	12.5		13.0	Ditto	1	4
6	13.5	15.0	13.0	16.5	Very loose gray silty sand	1	4
7	19.0	19.5	16.5		Loose gray silty sand w/many clay		
					layers & lenses		
8	24.0	24.5			Loose gray silty sand		
9	29.0	29.5		31.5	Loose gray silty sand w/alternating clay		
					layers & lenses		
10	34.0	34.5	31.5	35.0	Medium stiff gray clay w/sand pockets		
11	35.0	36.5	35.0	38.5	Very loose gray clayey sand w/shell	0	3
					fragments		
12	38.5	40.0	38.5		Loose gray sand w/shell fragments	2	7
13	43.5	45.0		47.0	Ditto	2	5
14	48.5	50.0	47.0	54.5	Soft gray clay w/sand pockets & shell	0	2
					fragments		
15	54.0	54.5	54.5	55.0	Stiff greenish-gray & tan sandy clay		

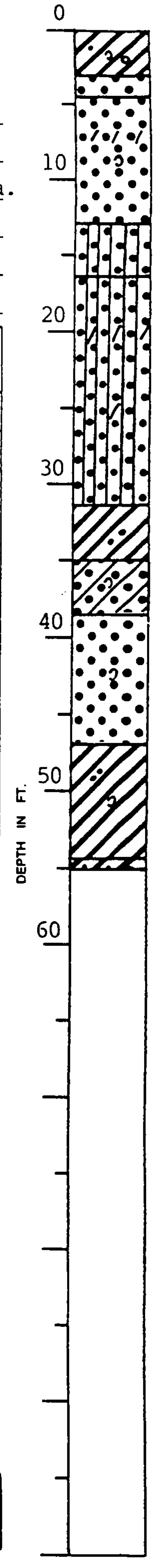

Fig. 10

*Number in first column indicates number of blows of 140-lb. hammer dropped 30 in. required to seat 2-in. O. D. splitspoon sampler 6 in. Number in second column indicates number of blows of 140-lb. hammer dropped 30 in. required to drive 2-in. O. D. splitspoon sampler 1 ft. after seating 6 in.

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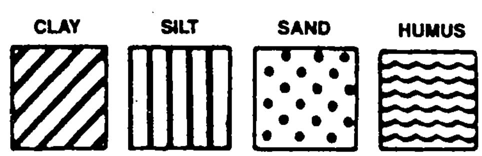
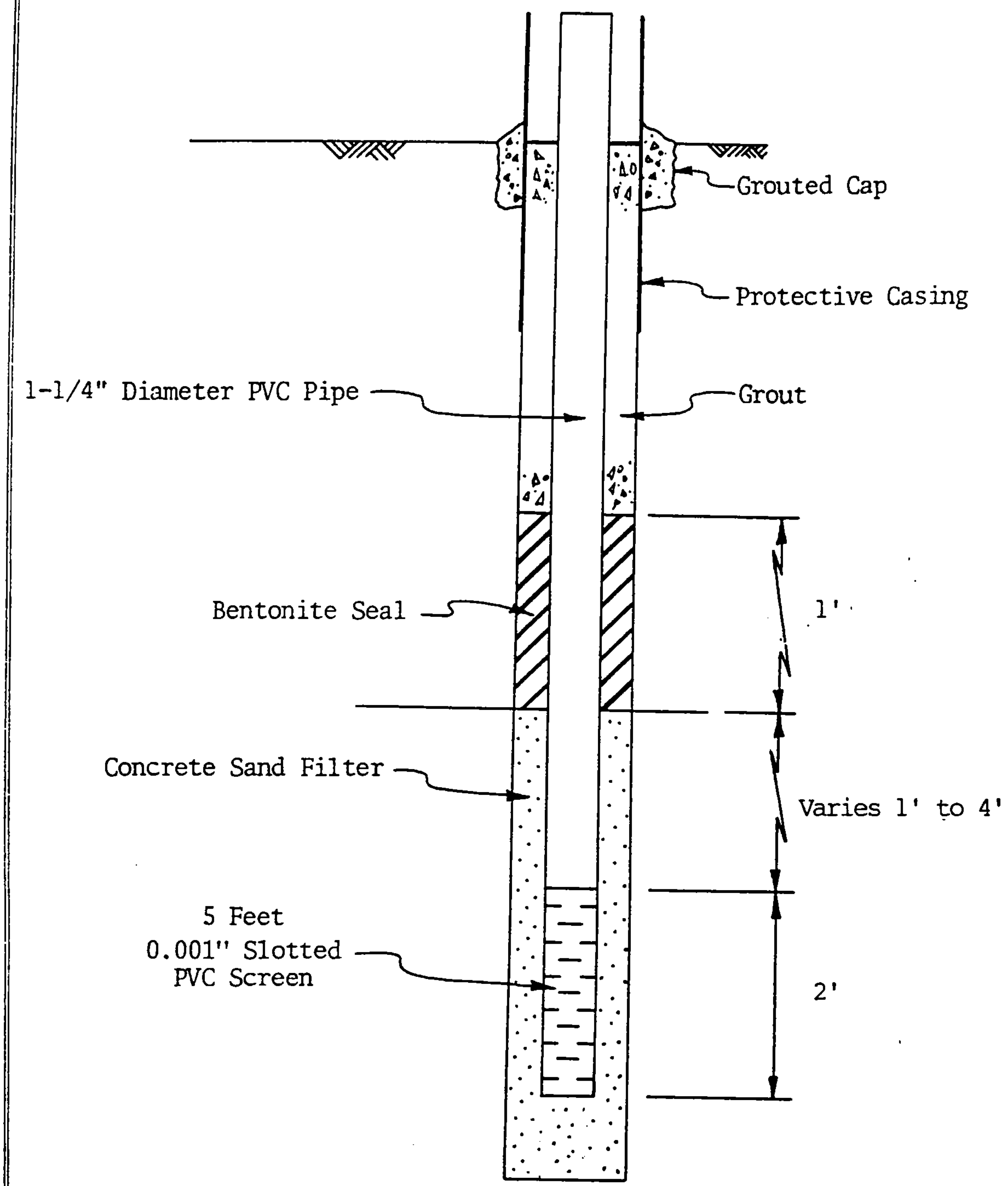


Predominant type shown heavy. Modifying type shown light.

Remarks: ______



NOT TO SCALE

TYPICAL PIEZOMETER DETAIL

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

Fig. 11

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 1

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	PL	PI
8	24.0	Loose gray clayey sand w/silty clay layers & shell fragments	32.9	----	-----	----			
10	34.0	Medium stiff gray clay w/sand pockets	36.5	82.7	112.9	1065*			

BORING 2

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	PL	PI
8	20.5	Very loose gray clayey silt with silty sand layers & few shells	37.5	83.7	115.0	485*			
9	23.5	Very loose gray clayey sand w/shell fragments	30.6	88.5	115.5	360*			
11	29.5	Very soft gray sandy clay with silty sand layers & shells	26.5	96.7	122.3	435*			
12	32.5	Medium stiff gray clay w/sand pockets & shell fragments	48.2	----	-----	----	72	18	54

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 12

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 3

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
6	13.5	Loose dark gray clayey sand w/few shells	37.0	----	-----	----	30	20	10
8	24.0	Loose gray clayey silt w/shell fragments & some sand	34.5	83.9	112.9	790*			
9	29.0	Very loose gray clayey sand w/shell fragments	28.0	95.8	122.7	360*			
10	34.0	Medium stiff gray clay w/silty sand lenses & pockets	52.7	68.8	105.0	1140	81	19	62
14	49.0	Stiff gray clay w/sand pockets & shell fragments	50.7	70.1	105.6	2010			
15	54.0	Stiff greenish-gray silty clay with sandy silt pockets	23.8	101.9	126.2	2365*			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 13

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 4

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
3	5.5	Very sand w/clay pockets, layers & many shell fragments	18.0	103.2	121.8	455*	19	15	4
9	24.0	Very loose gray clayey sand w/shells	30.7	90.1	117.8	370*			
10	29.0	Very soft gray clay w/shells & many sand lenses & pockets	31.0	89.6	117.4	480			
17	52.0	Stiff gray clay w/sand pockets	41.0	79.3	111.9	2240			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 5

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
1	2.0	Medium stiff gray & tan clay w/sand pockets, some shells & roots	25.1	86.5	108.2	1600*			
2	5.0	Soft gray clay with sand layers & shells	54.1	----	-----	----			
3	8.0	Very soft gray clay w/sand pockets & lenses	55.0	66.9	103.8	----	51	19	32
10	29.0	Loose gray clayey sand w/clay pockets & much shell	29.7	----	-----	----			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 7

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
2	5.0	Loose gray & tan clayey sand w/many shells	22.7	----	-----	----
8	24.0	Very loose gray clayey silt w/silty clay layers	45.6	74.2	108.0	475*
9	29.0	Loose gray clayey sand w/sandy silt layers & shell fragments	30.3	89.9	117.1	720*
10	34.0	Medium stiff gray clay w/clayey silt & sand pockets	55.7	66.6	103.7	1040
16	54.0	Medium stiff gray clay w/clayey sand pockets & few shell fragments	43.6	76.1	109.3	1735

BORING 8

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF
3	8.0	Medium dense gray silty sand w/clay lenses, pockets & shell fragments	22.2	103.0	125.9	1470*
9	29.0	Soft gray silty clay w/sand pockets & decayed shells	41.2	76.6	108.1	905*
11	39.0	Loose gray clayey sand w/clay layers	32.9	88.3	117.3	635*

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 16

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 9

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
1	2.0	Medium dense brown & gray clayey sand w/silty sand layers, roots & shells (fill)	14.4	----	-----	----			
7	17.5	Soft gray clay w/sand pockets & shell fragments	49.1	71.4	106.5	575	32	21	11
8	20.5	Loose gray silty sand w/sandy clay layers & shells	31.2	----	-----	----			
10	26.5	Very loose gray clayey sand w/silty clay layers & shell fragments	35.5	84.4	114.3	330*			
11	29.5	Soft gray clay w/sand pockets & shell fragments	42.5	77.5	110.4	595*			
13	35.5	Loose gray silty sand w/shell fragments	25.3	----	-----	----			
18	54.0	Stiff greenish-gray clay w/sand pockets	21.0	104.4	126.4	3145			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 17

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana

URS Engineers, Consulting Engineers, Metairie, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

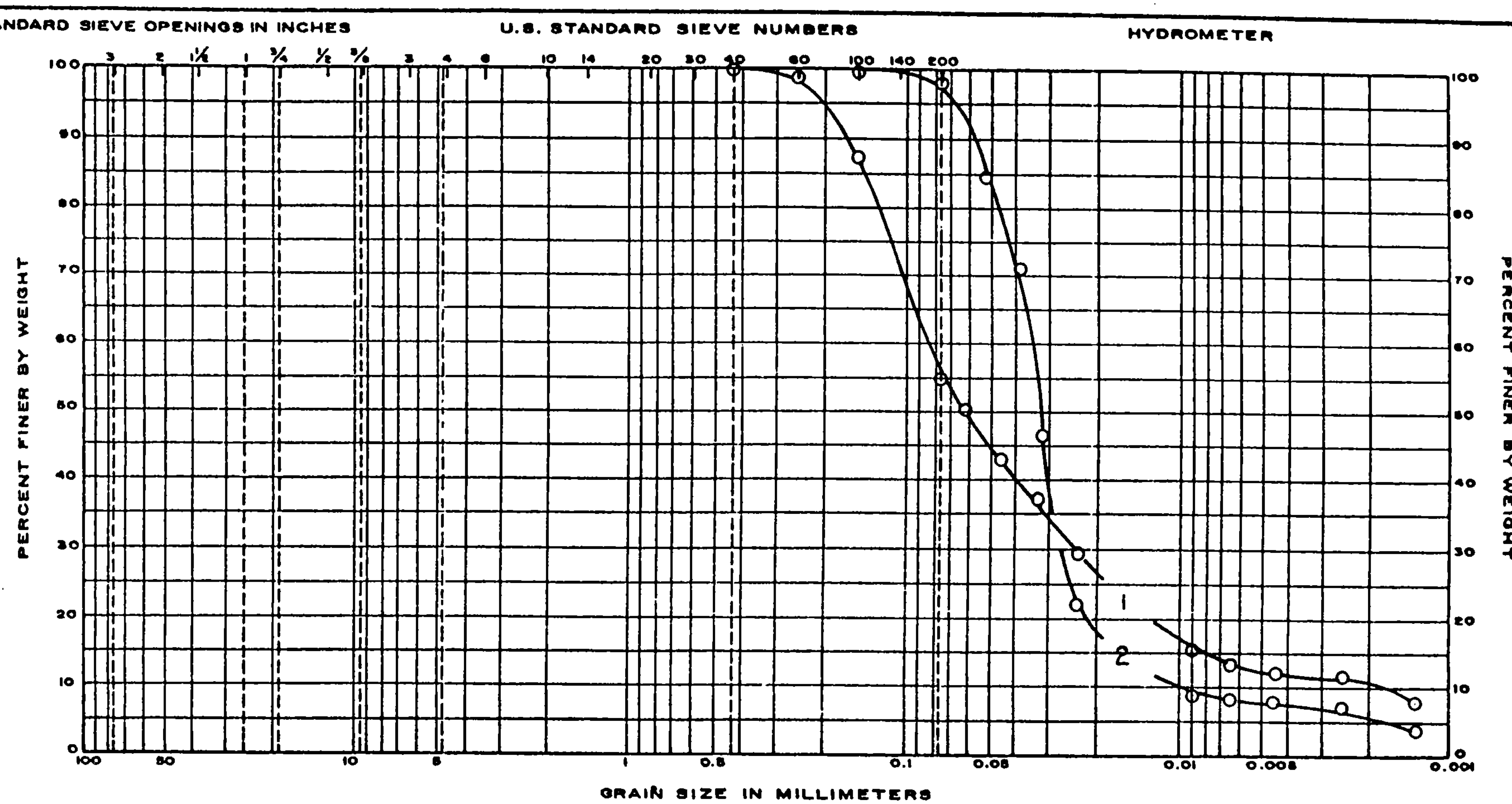
BORING 10

Sample No.	Depth In Feet	Classification	Water Content Percent	Density PCF Dry	Density PCF Wet	Unconfined Compressive Strength PSF	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
8	24.0	Loose gray silty sand w/trace of clay	30.6	91.6	119.7	320*			
10	34.0	Medium stiff gray clay w/sand pockets	45.6	74.6	108.7	1070	56	21	35
14	48.5	Soft gray clay w/shell fragments & sand pockets	44.4	----	-----	----			

*Unconsolidated Undrained Triaxial Compression Test - One Specimen; Confined at the approximate overburden pressure.

Fig. 18

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND		SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE	FINE		

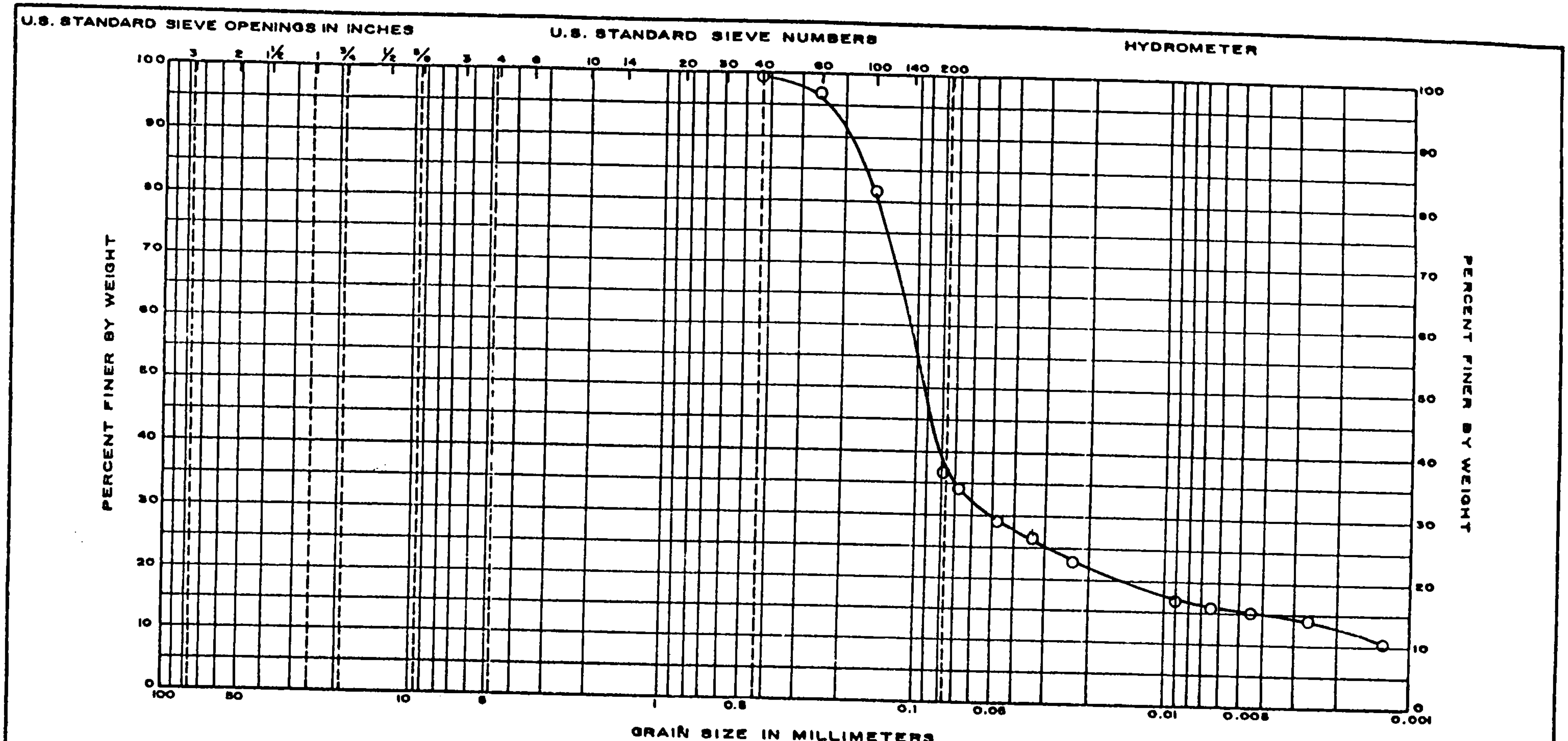
GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	1	3	6.0	D_{10} Size = 0.0020 mm			
2	1	7	19.0	D_{10} Size = 0.0100 mm			

PROJECT Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwall & Levees, New Orleans, La.
For: Board of Levee Commissioners
of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 19



UNIFIED	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT OR CLAY

AASHO	GRAVEL: COARSE	GRAVEL: MEDIUM	GRAVEL: FINE	SAND: COARSE	SAND: FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
	2	4	8.5	D_{10} Size	= 0.0012 mm		

PROJECT Geotechnical Investigation
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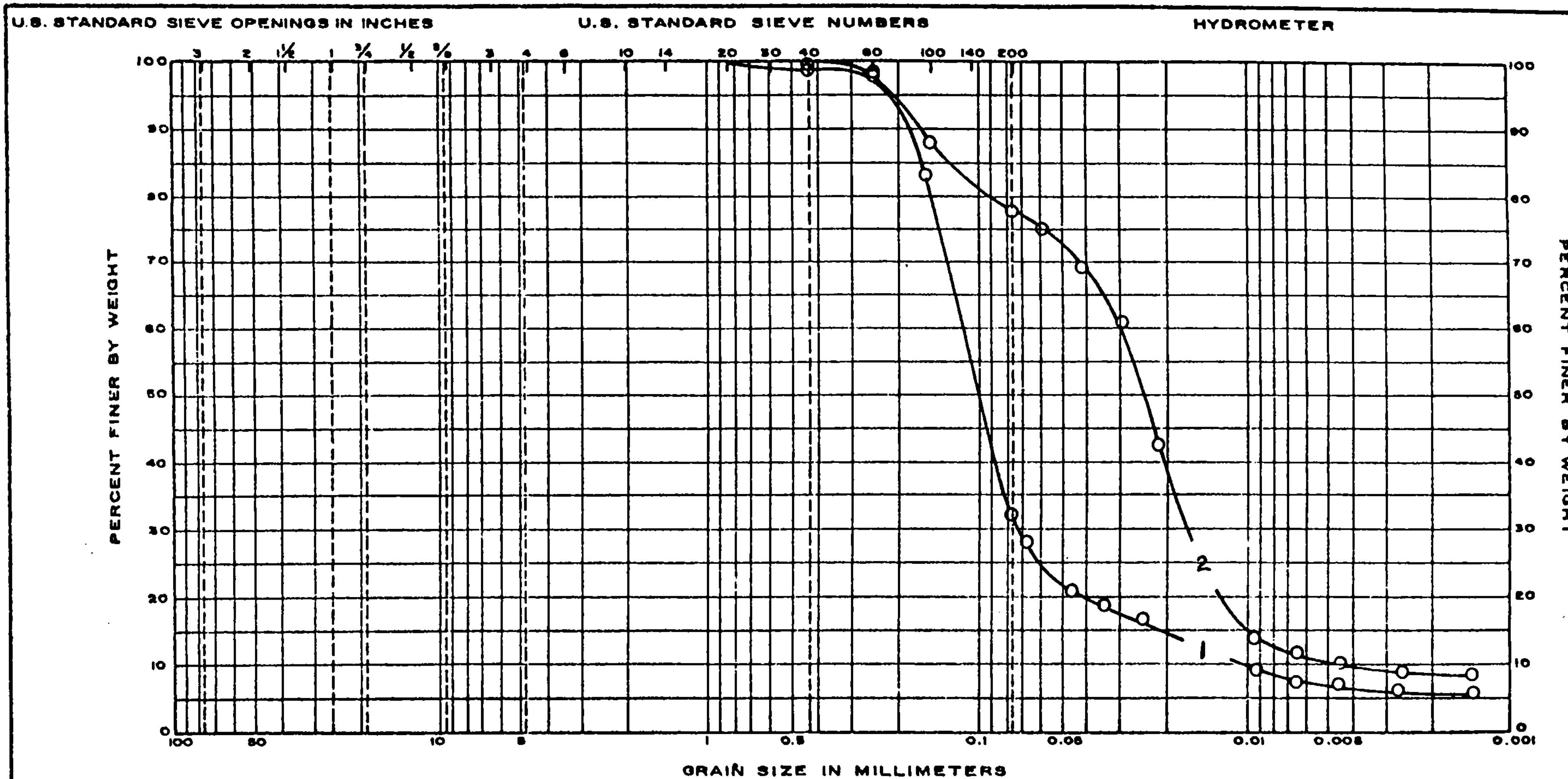
EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 20



	GRAVEL		SAND			SILT OR CLAY	
UNIFIED	COARSE	FINE	COARSE	MEDIUM	FINE	SILT OR CLAY	

	GRAVEL			SAND			
AASHO	COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	3	3	6.0	D_{10} Size = 0.0120 mm			
2	3	8	24.0	D_{10} Size = 0.0045 mm			

PROJECT Geotechnical Investigation
Orleans Levee District
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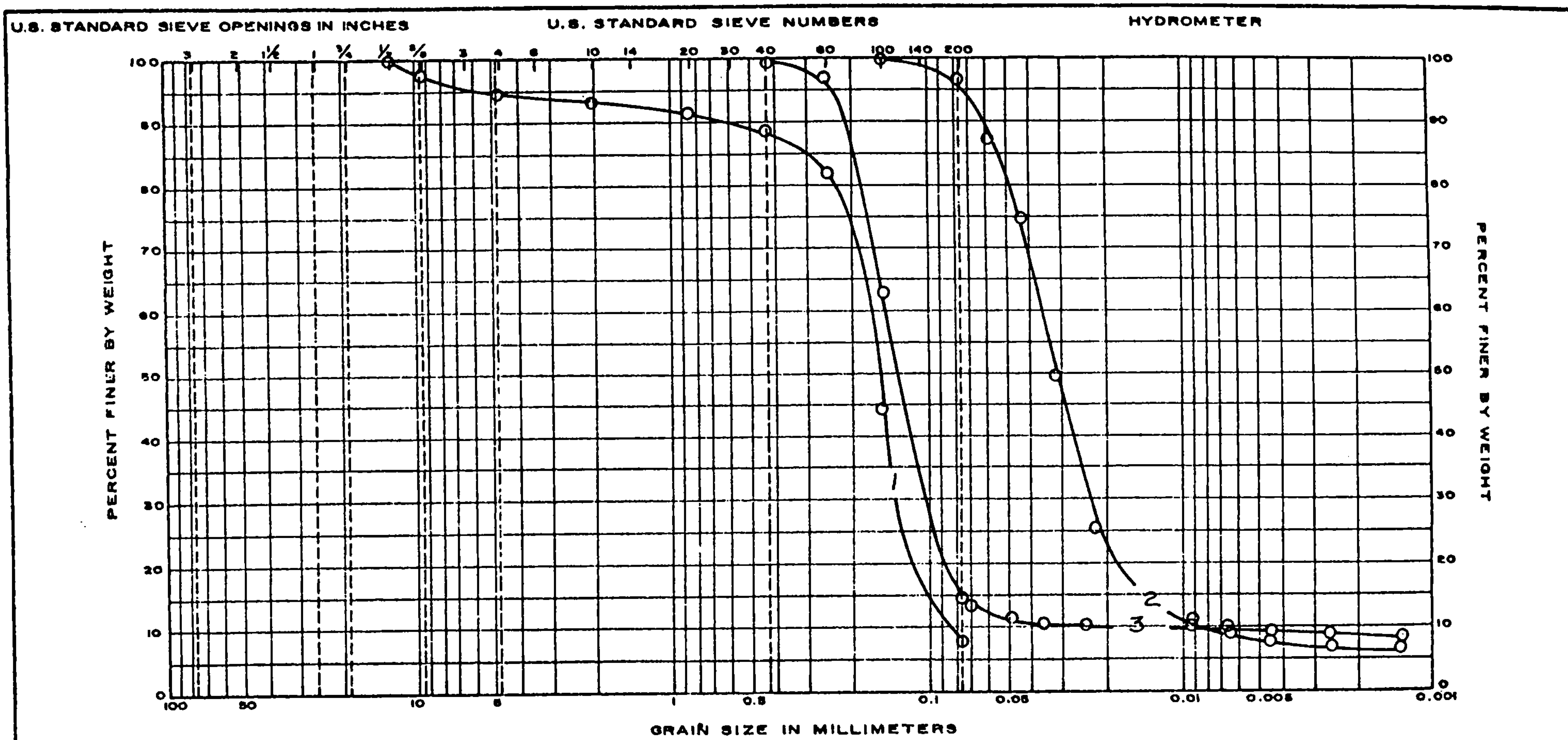
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 21



	GRAVEL		SAND			SILT OR CLAY	
UNIFIED	COARSE	FINE	COARSE	MEDIUM	FINE		
	GRAVEL			SAND			
AASHO	COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	4	5	9.0	D_{10} Size = 0.083 mm			
2	5	6	16.0	D_{10} Size = 0.0080 mm			
3	5	13	38.5	D_{10} Size = 0.0065 mm			

PROJECT Geotechnical Investigation
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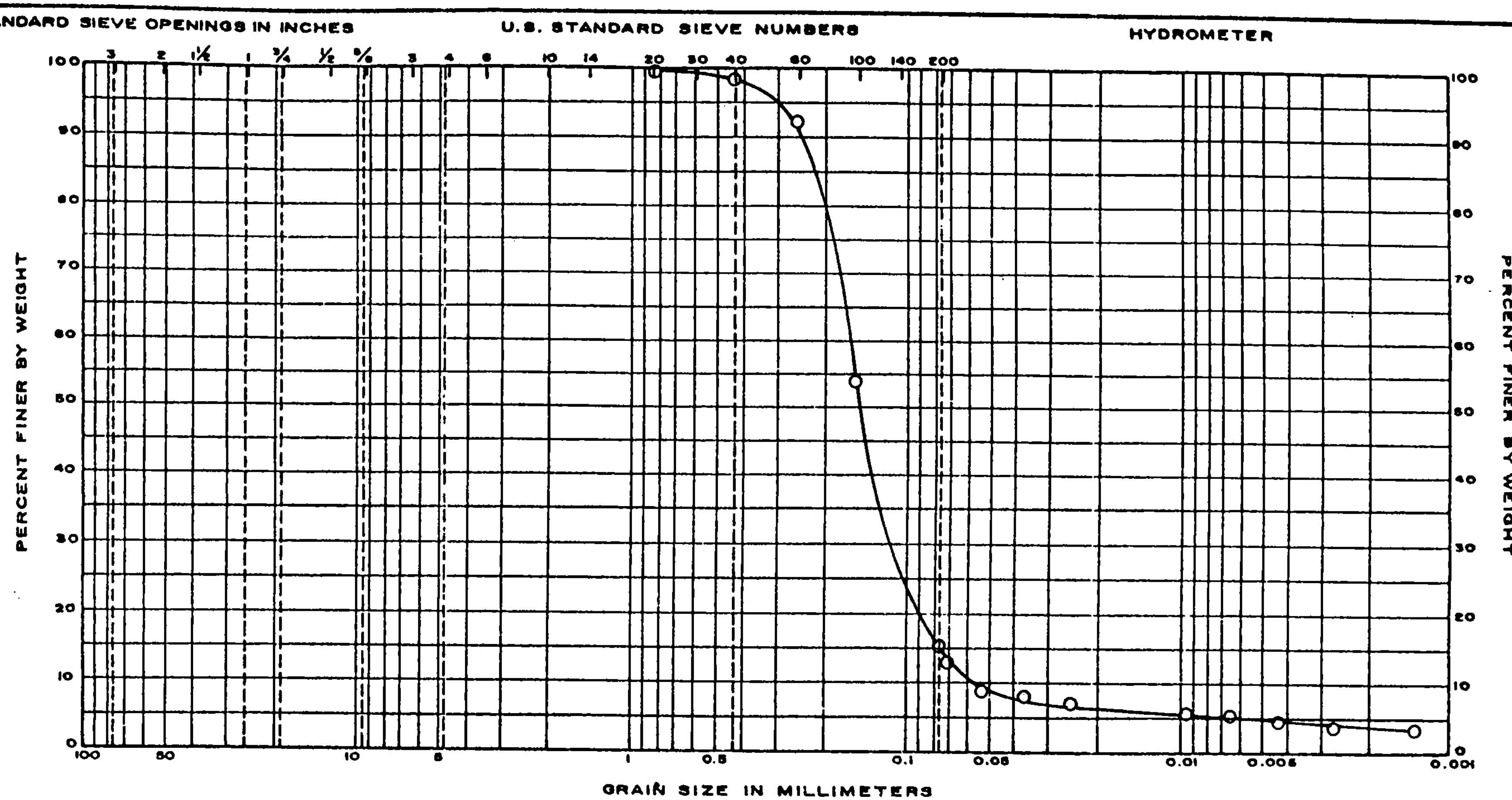
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 22



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			
	COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
	7	3	8.5	D_{10} Size = 0.056 mm			

PROJECT Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwall & Levees, New Orleans, La
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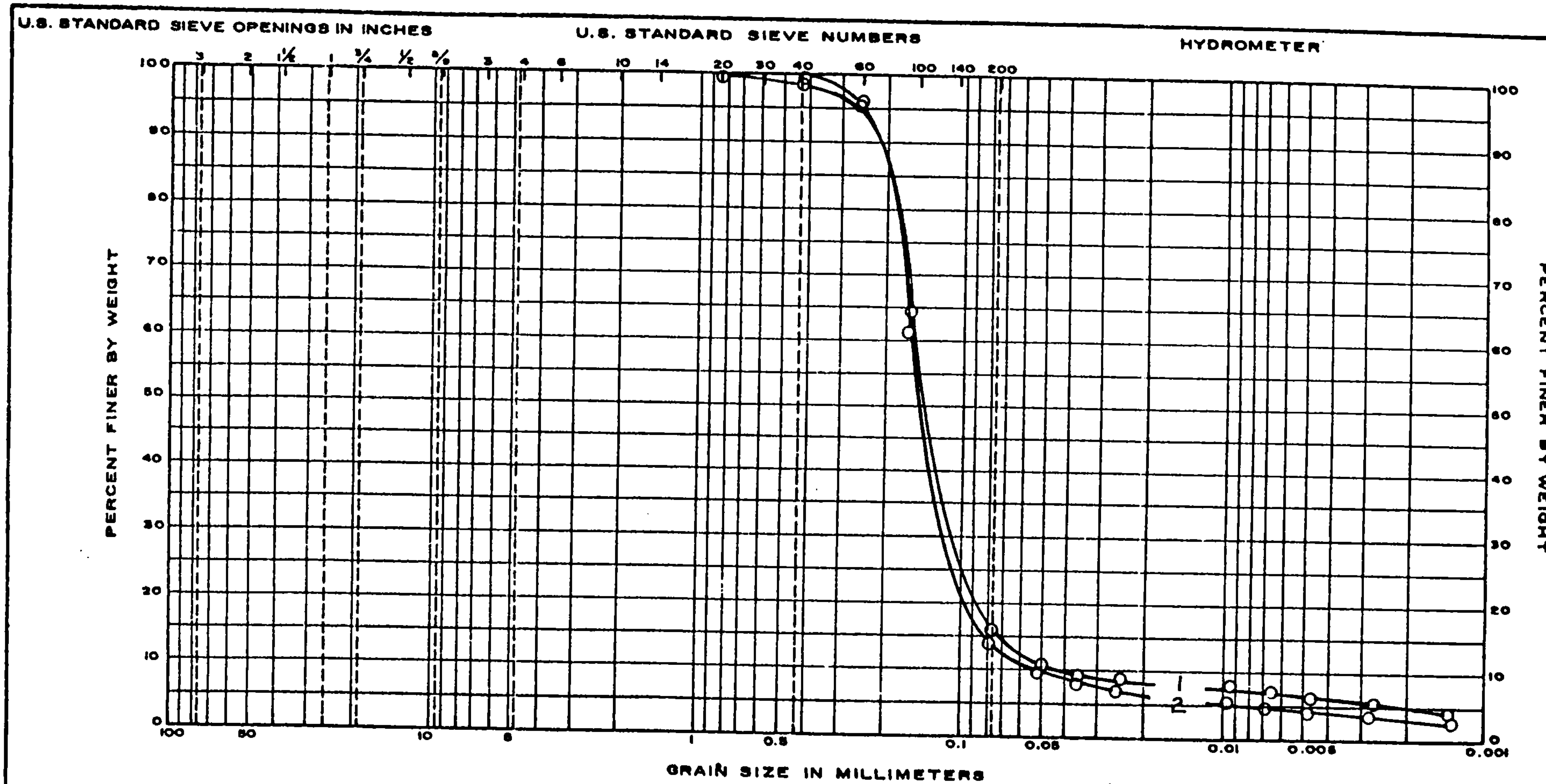
of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 23



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		

AASHO	GRAVEL			SAND			
	COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	8	2	3.5	D_{10} Size = 0.047 mm			
2	8	5	12.5	D_{10} Size = 0.050 mm			

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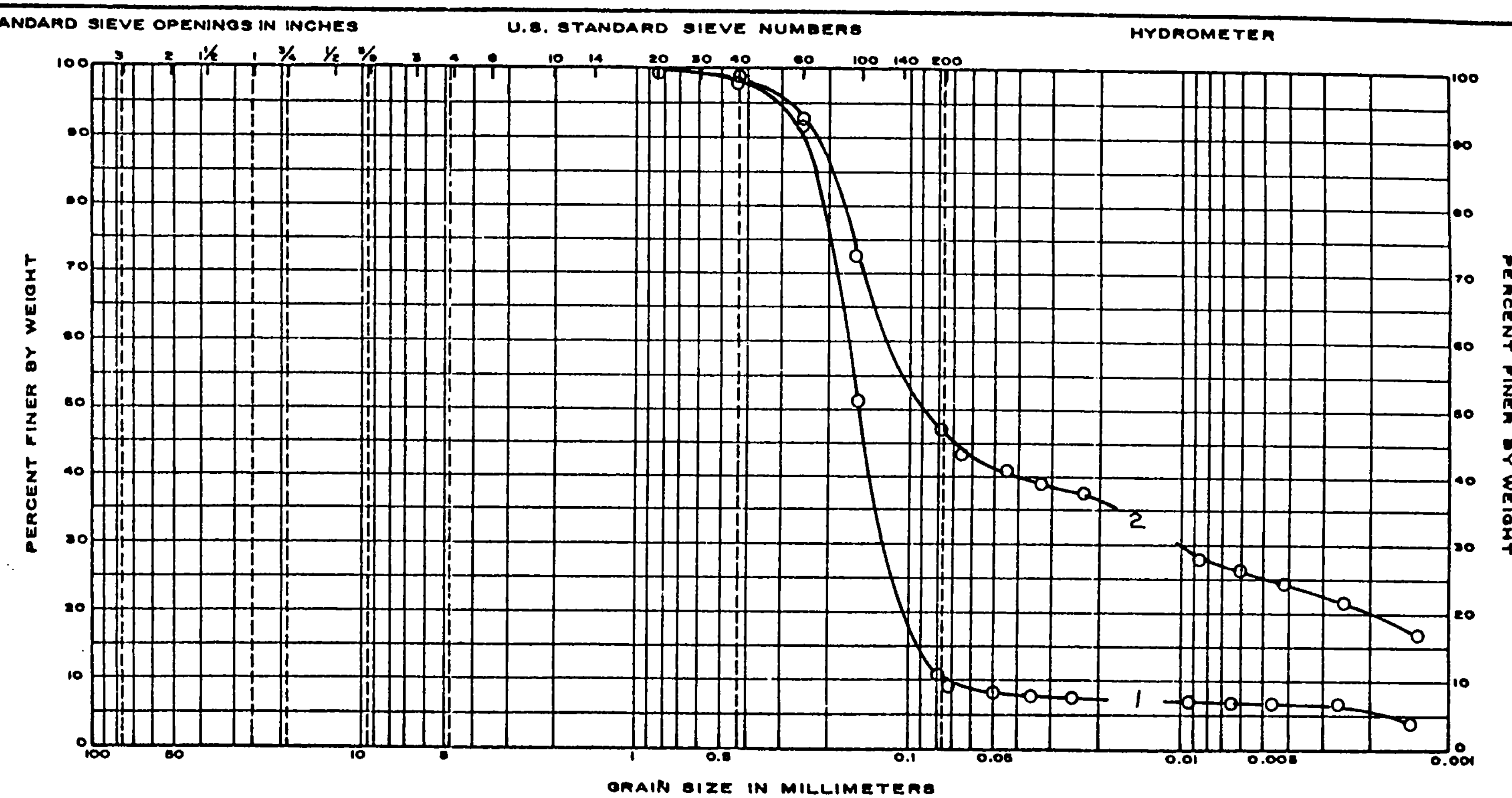
of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 24



UNIFIED	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			
	COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS LL	PL	PI
1	9	2	3.5	D_{10} Size	= 0.072 mm		
2	10	3	6.0				

PROJECT Geotechnical Investigation
Orleans Levee District
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of the Orleans Levee District, New Orleans, La.
URS Engineers, Consulting Engineers, Metairie, La.

EUSTIS ENGINEERING COMPANY
CONSULTING FOUNDATION ENGINEERS
METAIRIE, LA.

Fig. 25

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana
URS Engineers, Consulting Engineers, Metairie, Louisiana

CONSOLIDATION TEST RESULTS

BORING NO. 5 SAMPLE NO. 3 DEPTH IN FEET 8.0

CLASSIFICATION Very soft gray clay w/many silt & sand lenses

TEST CONDITION Specimen was inundated at the approximate overburden pressure.

Water Content Percent	Unit Weight Lb/cu ft Dry	Unit Weight Lb/cu ft Wet	Initial Percent Saturation	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Specific Gravity Est.	Initial Void Ratio
45.2	75.5	109.6	99	51	19	32	2.70	1.23

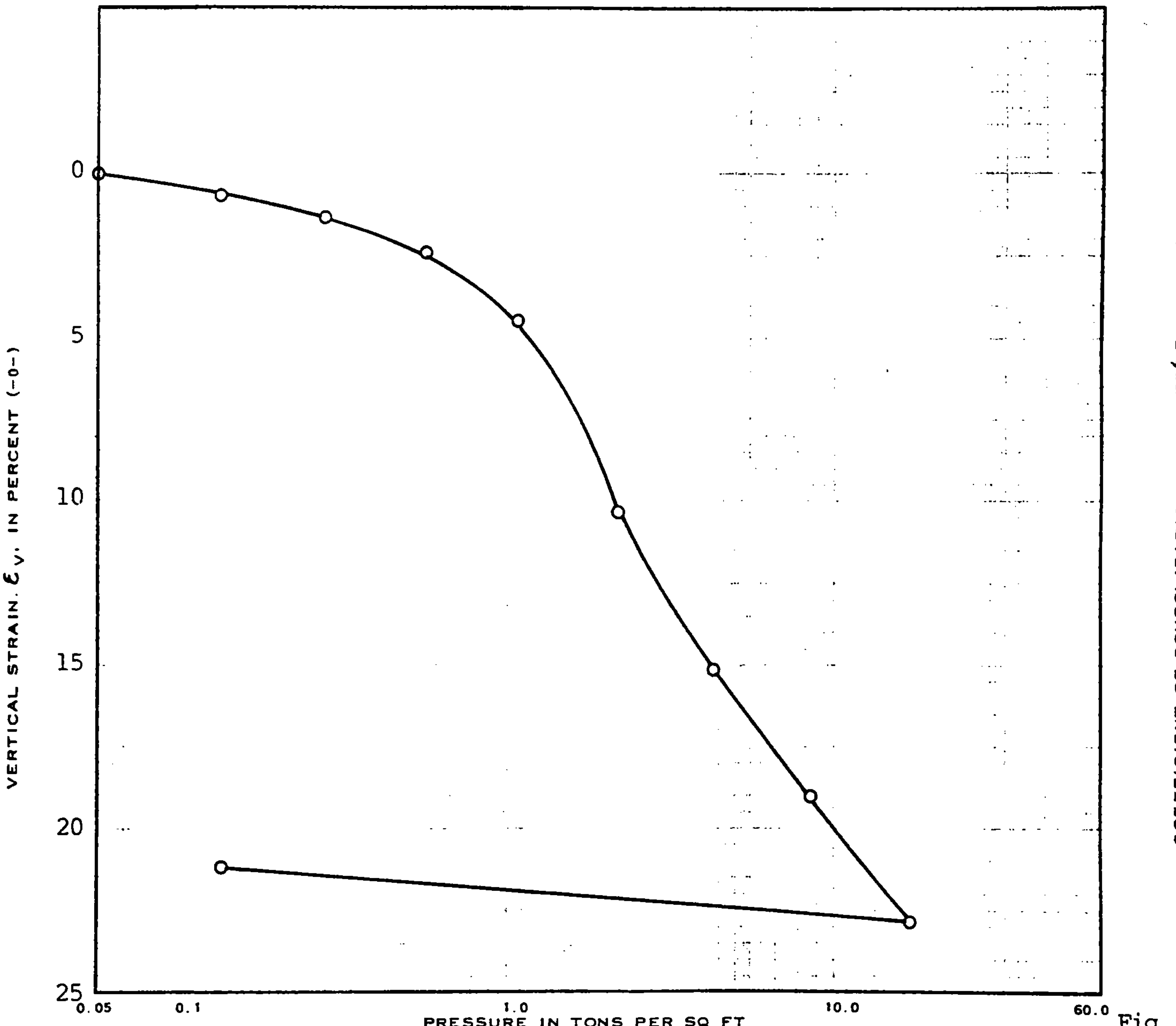


Fig. 26

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Orleans Levee District
Pontchartrain Beach Floodwalls and Levees
New Orleans, Louisiana

For: Board of Levee Commissioners of the Orleans Levee District
New Orleans, Louisiana
URS Engineers, Consulting Engineers, Metairie, Louisiana

CONSOLIDATION TEST RESULTS

BORING NO. 5 SAMPLE NO. 9 DEPTH IN FEET 26.0

CLASSIFICATION Soft gray silty clay w/clay layers, sand lenses, pockets & shell fragments

TEST CONDITION Specimen was inundated at the approximate overburden pressure.

Water Content Percent	Unit Weight Lb/cu ft Dry	Unit Weight Lb/cu ft Wet	Initial Percent Saturation	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Specific Gravity Est.	Initial Void Ratio
38.6	79.9	110.7	94	60	21	39	2.70	1.11

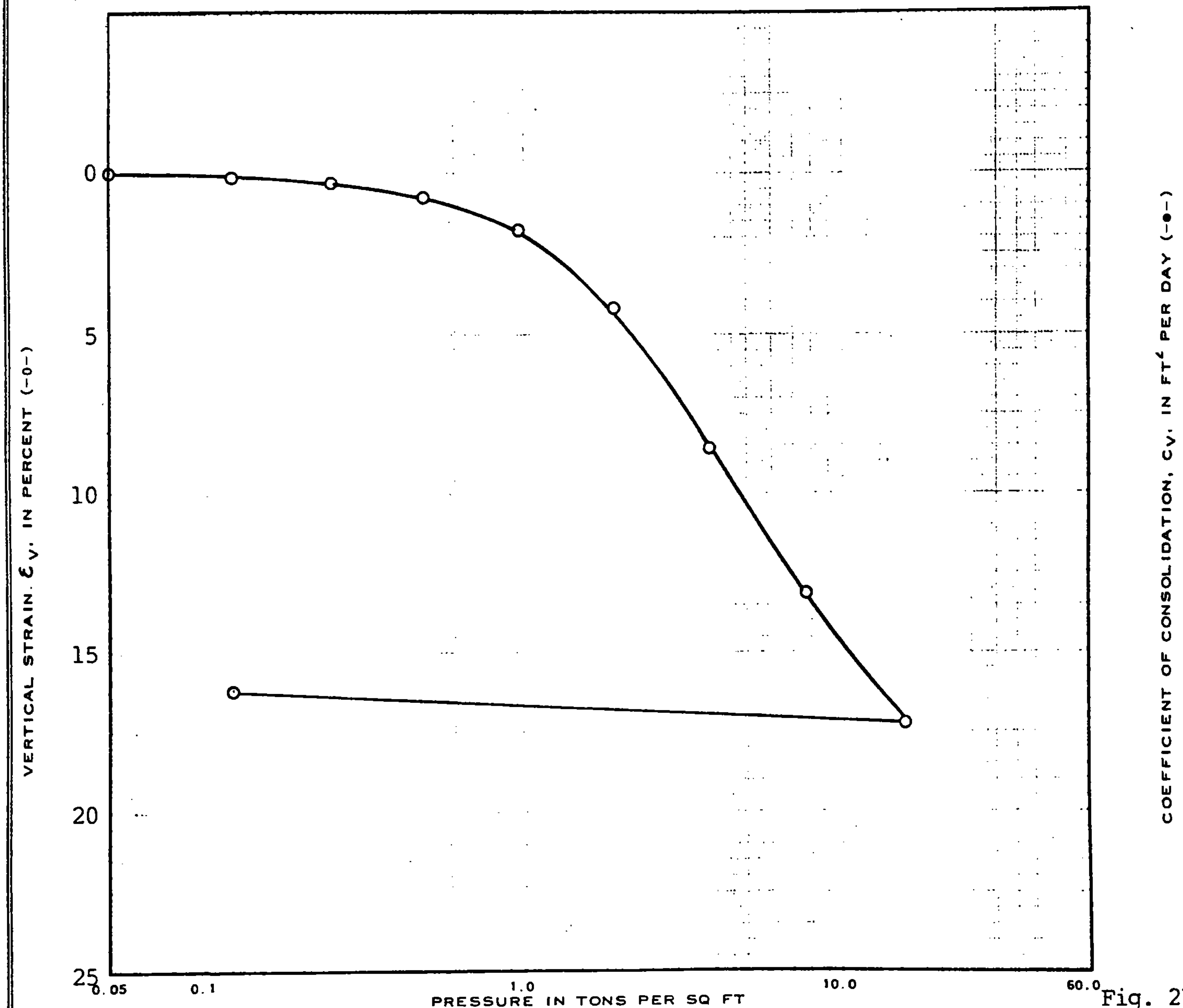


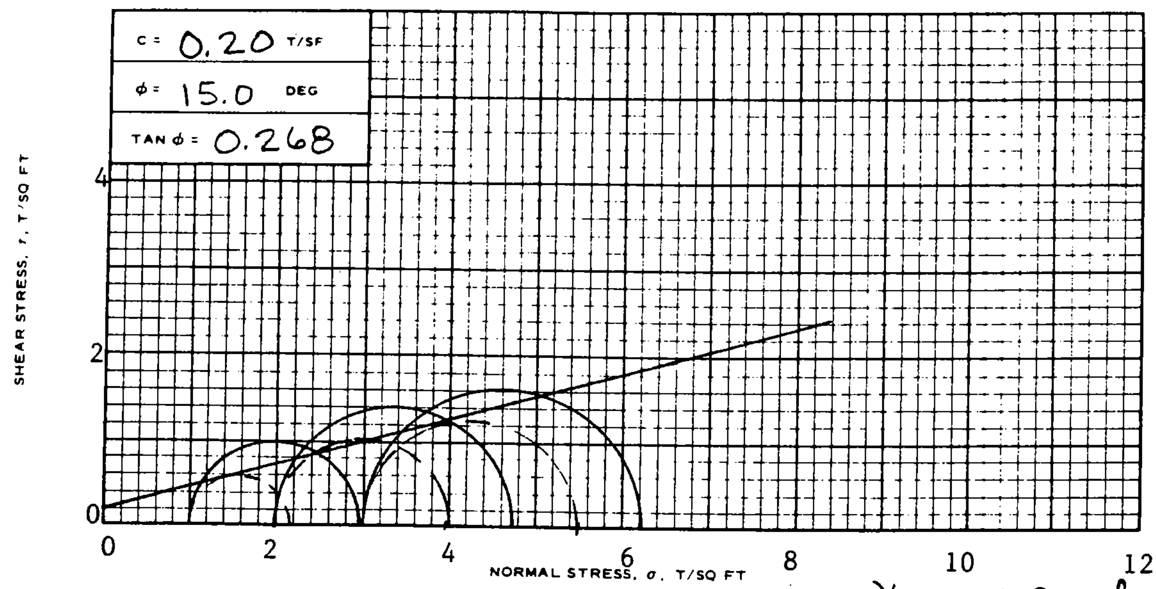
Fig. 27

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

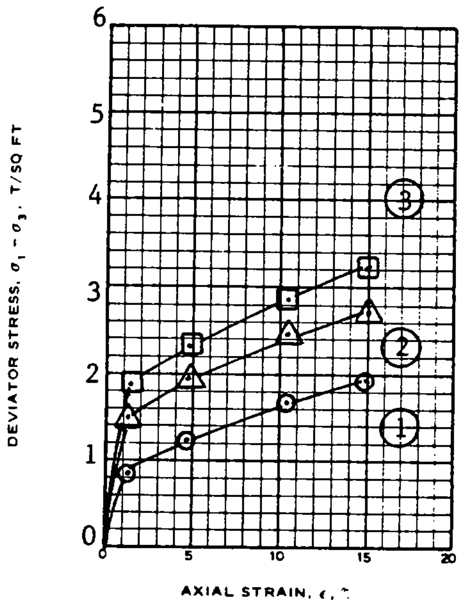
APPENDIX B

PONTCHARTRAIN BEACH

BORING 6-PBU SOIL TEST DATA SHEETS



$\gamma_{SAT} = 109\ pcf$



SPECIMEN NO.			1	2	3
INITIAL	WATER CONTENT, %	w_o	44.2	44.5	44.4
INITIAL	DRY DENSITY LB/CU FT	γd_o	74.1	74.2	74.8
INITIAL	SATURATION, %	S_o	93.9	94.8	95.9
INITIAL	VOID RATIO	e_o	1.266	1.263	1.245
BEFORE SHEAR	WATER CONTENT, %	w_c	45.3	43.9	42.6
BEFORE SHEAR	DRY DENSITY LB/CU FT	γd_c	76.5	76.5	78.8
BEFORE SHEAR	SATURATION, %	S_c	100+	98.8	100+
BEFORE SHEAR	VOID RATIO	e_c	1.193	1.196	1.130
BEFORE SHEAR	FINAL BACK PRESSURE, T/SQ FT	u_o	4.32	4.32	4.32
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.0	2.0	3.0
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	1.96	2.73	3.21
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f	938	938	938
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$	1.15	1.95	2.50
INITIAL DIAMETER, IN.		D_o	1.38	1.37	1.37
INITIAL HEIGHT, IN.		H_o	3.00	3.00	3.00

CONTROLLED- STRAIN TEST

DESCRIPTION OF SPECIMENS CLAYEY SILT (ML), GRAY

LL	PL	PI	G_s 2.69 (EST)	TYPE OF SPECIMEN UNDISTURBED	TYPE OF TEST $\overline{R}$

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT BEACH FLOODWALL

BORING NO. 6-PBU SAMPLE NO. 7-B

DEPTH/ELEV 19.7

LABORATORY USAEWES DATE 25 MAR 86

SHEET 1 OF 2

JMS **TRIAXIAL COMPRESSION TEST REPORT**

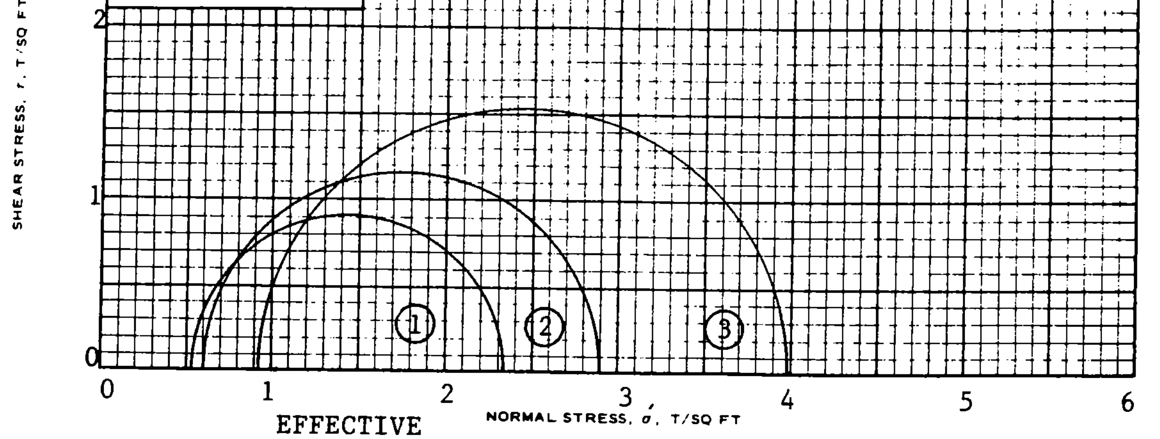
ENG FORM NO. 2089
REV JUNE 1970

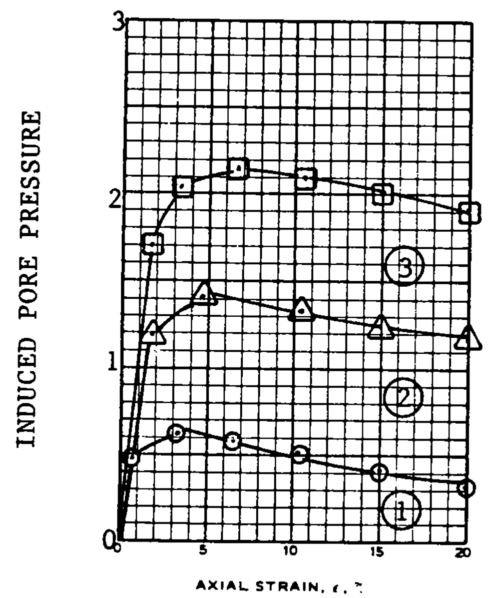
GPO : 1982 O - 375-356

Incl 2

BASED ON MAX σ_1'/σ_3'

c' =	T/SF
ϕ' =	DEG
TAN ϕ' =	





SPECIMEN NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o				
	DRY DENSITY LB/CU FT	γd_o				
	SATURATION, %	S_o				
	VOID RATIO	e_o				
BEFORE SHEAR	WATER CONTENT, %	w_c				
	DRY DENSITY LB/CU FT	γd_c				
	SATURATION, %	S_c				
	VOID RATIO	e_c				
	FINAL BACK PRESSURE, T/SQ FT	u_o				
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	0.53	0.61	0.93	
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	1.81	2.30	3.04	
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f				
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$				
INITIAL DIAMETER, IN.		D_o				
INITIAL HEIGHT, IN.		H_o				

CONTROLLED- TEST

DESCRIPTION OF SPECIMENS

LL	PL	PI	Gs	TYPE OF SPECIMEN	TYPE OF TEST

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT BEACH FLOODWALL

BORING NO. 6-PBU SAMPLE NO. 7-B

DEPTH/ELEV 19.7

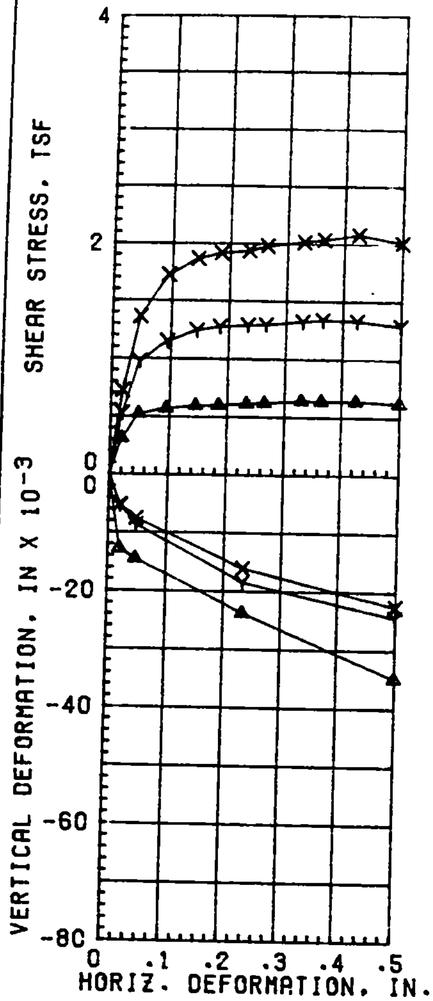
LABORATORY USAEWES DATE 25 MAR 86

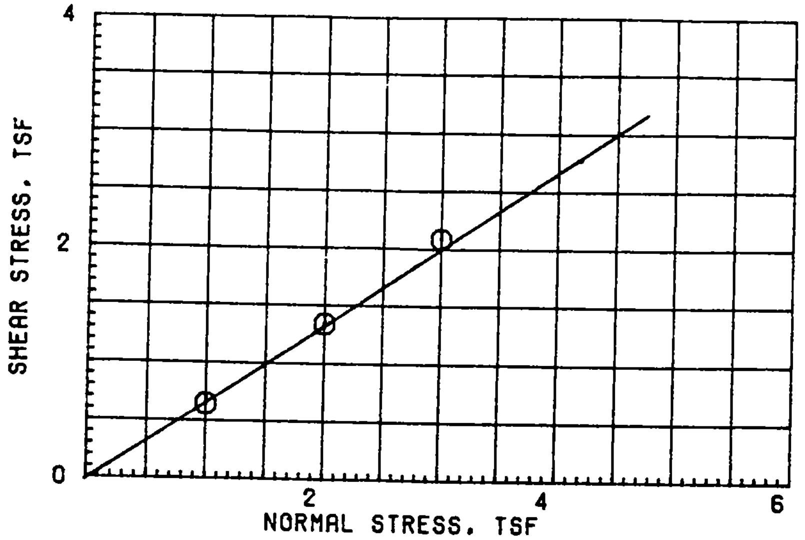
SHEET 2 OF 2

JMS **TRIAXIAL COMPRESSION TEST REPORT**

ENG FORM NO. 2089
REV JUNE 1970

GPO : 1982 O - 375-356





$\gamma_{SAT} = 123$ pcf

	TEST NO.	1 ▲	2 Y	3 X	
INITAL	WATER CONTENT, %	24.4	25.1	24.7	
	VOID RATIO	0.713	0.735	0.732	
	SATURATION, %	91.4	91.1	90.0	
	DRY DENSITY, PCF	97.3	96.0	96.2	
VOID RATIO AFTER CONSOL					
FIFTY PERCENT CONSOL, MIN		< 1	< 1	< 1	
FINAL	WATER CONTENT, %	23.3	21.9	22.0	
	VOID RATIO				
	SATURATION, %				
NORMAL STRESS, TSF		1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, TSF		0.64	1.34	2.08	
TIME TO FAILURE, MIN		1846	2042	2378	
RATE OF STRAIN, IN/MIN		.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, TSF					

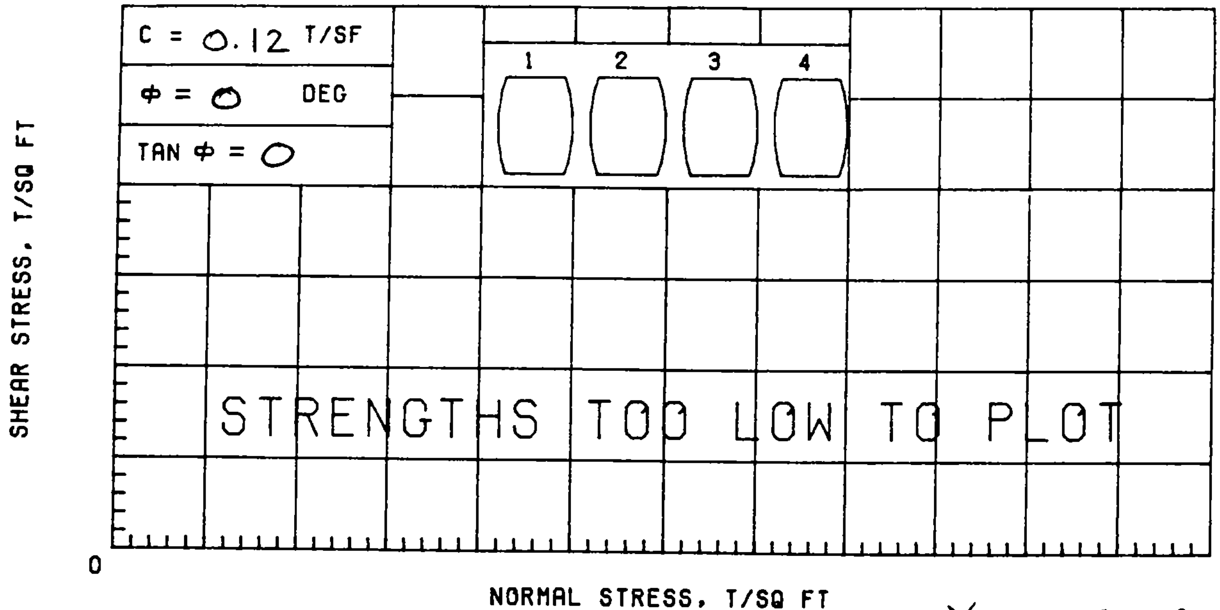
Φ = 33.5°

TAN Φ = 0.66

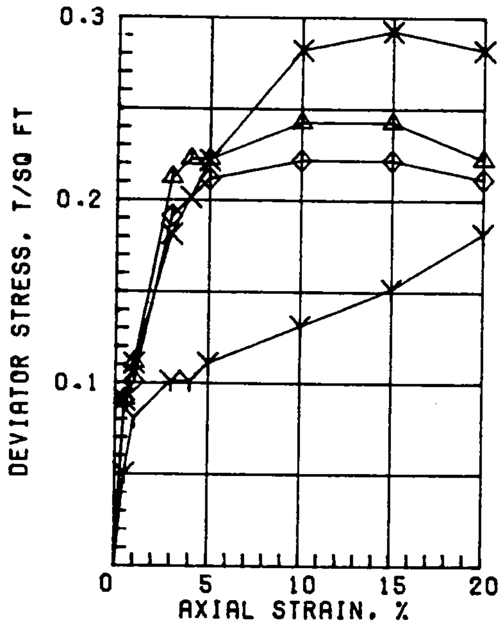
C = 0

TYPE SPECIMEN UNDISTURBED		3.00 IN. SQUARE		0.553 IN. THICK
CLASSIFICATION SANDY SILT (ML), GRAY				
LL	PL	PI		GS 2.67 (EST)

REMARKS:	PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN	
	HURR. PROT. PONT BEACH FLOODWALL	
	BORING NO. 6-PBU	SAMPLE 8-B
	DEPTH/ELEV 24.0	DATE 06 MAR 86
	DIRECT SHEAR TEST REPORT	



γ_{SAT} = 119 pcf



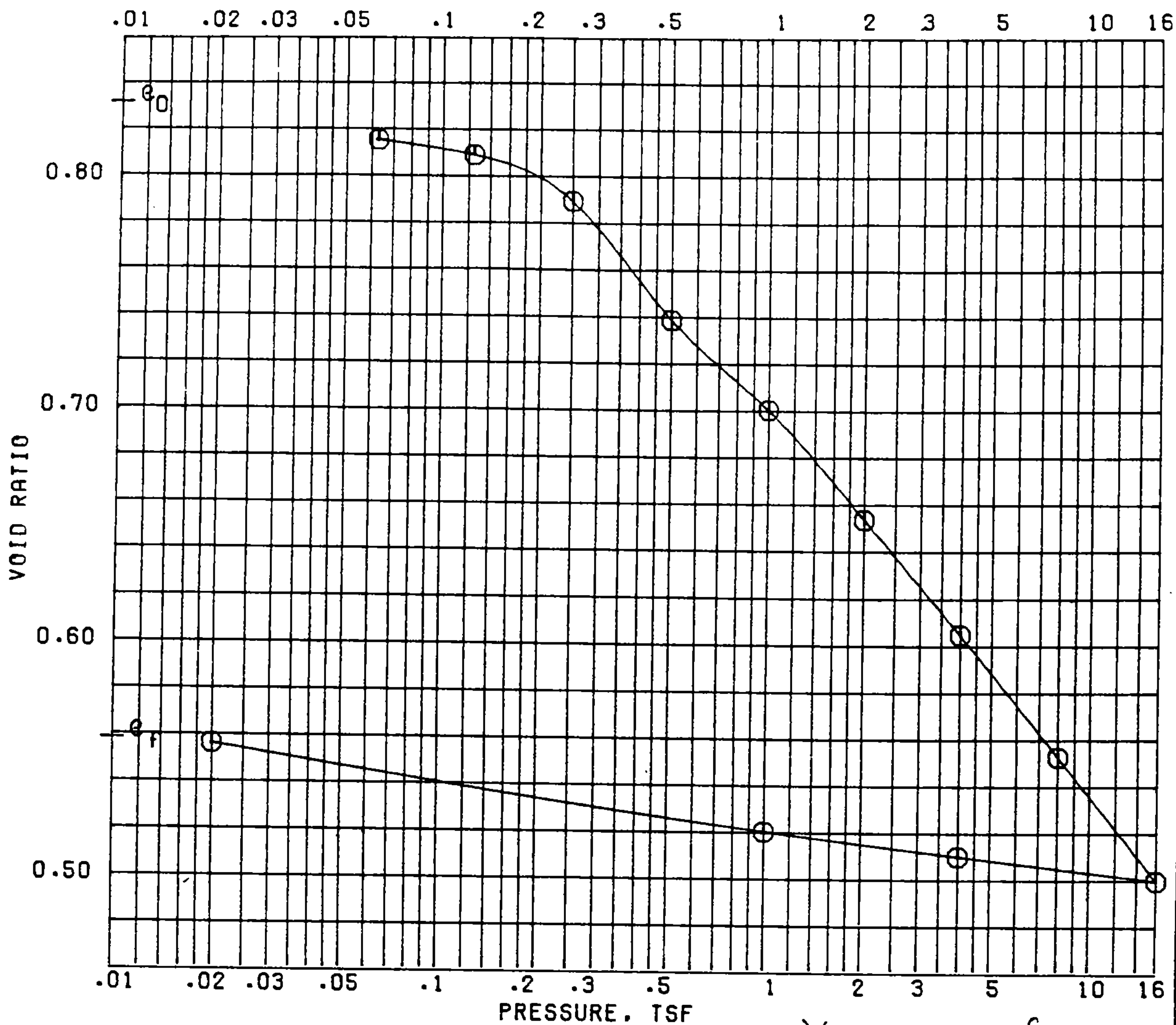
	SPECIMEN NO.	△1	Y2	X3	◇4
INITIAL	WATER CONTENT, %	31.9	32.3	29.3	30.5
	DRY DENSITY, PCF	87.3	87.5	91.4	92.1
	SATURATION, %	93.0	94.6	94.1	99.6
	VOID RATIO	0.923	0.918	0.838	0.824
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESS., TSF				
	MIN PRIN. STRESS, TSF	0.5	1.5	3.0	1.5
	MAX. DEV. STRESS, TSF	0.22	0.10	0.29	0.22
	TIME TO FAILURE, MIN.	8	6	30	20
	RATE OF STRAIN INCR.%				
	INITIAL DIAMETER, IN.	1.39	1.39	1.39	1.39
	INITIAL HEIGHT, IN.	3.00	3.00	3.00	3.00

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: SILTY CLAY (CL), GRAY; SHELLS

LL 25	PL 16	PI 9	GS 2.69 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:	PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN HURR. PROT. PONT. BEACH FLOODWALL	
	BORING NO. 6-PBU	SAMPLE NO. 9-B
	DEPTH/ELEV 27.3	TECH. KOC
	LABORATORY USAE WES	DATE 04 FEB 86
	TRIAXIAL COMPRESSION TEST REPORT	



$\gamma_{SAT} = 122$ pcf

			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	32.2	21.3
PRECONSOL. PRESSURE, TSF	0.40	DRY DENSITY, PCF	92.1	108.2
COMPRESSION INDEX	0.18	SATURATION, %	100 +	100 +
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	0.831	0.558
DIA. IN 4.44	HT. IN 1.127	BACK PRESSURE, TSF		

CLASSIFICATION SANDY CLAY (CL), GRAY; SHELL PARTICLES		
LL 26	PL 15	PI 11
GS 2.70 (EST)	D_{10}	

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT. BEACH FLOODWALL

REMARKS

BORING NO. 6-PBU	SAMPLE NO. 9-C
DEPTH/ELEV 28.1	DATE 21 FEB 86

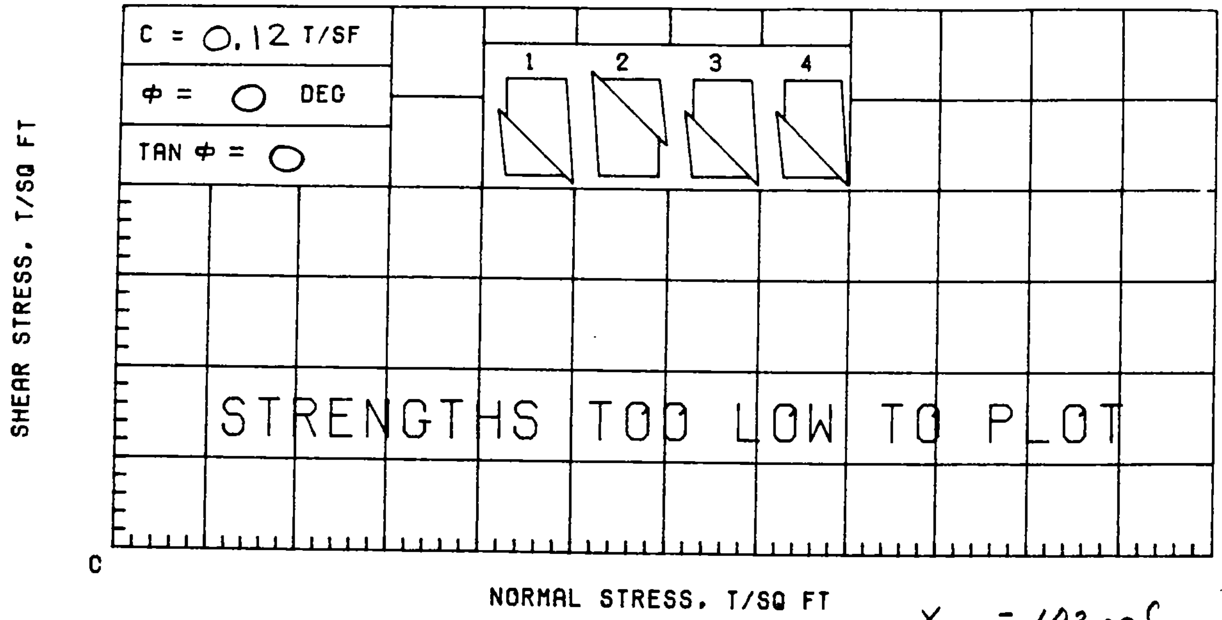
CONSOLIDATION TEST REPORT

SHEET 1 OF 13

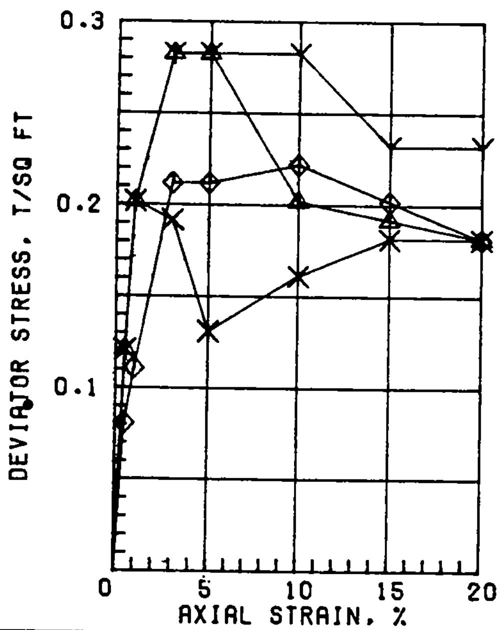
C = 0.12 T/SF

Φ = 0 DEG

TAN Φ = 0



γ_{SAT} = 102 pcf



SPECIMEN NO.	△1	Y2	X3	◇4
INITIAL — WATER CONTENT, %	66.4	64.1	63.9	62.9
INITIAL — DRY DENSITY, PCF	61.C	62.2	61.8	61.8
INITIAL — SATURATION, %	100+	100+	99.9	98.2
INITIAL — VOID RATIO	1.761	1.712	1.726	1.729
BEFORE SHEAR — WATER CONTENT, %				
BEFORE SHEAR — DRY DENSITY, PCF				
BEFORE SHEAR — SATURATION, %				
BEFORE SHEAR — VOID RATIO				
BEFORE SHEAR — BACK PRESS., TSF				
MIN PRIN. STRESS, TSF	0.5	1.5	3.C	3.0
MAX. DEV. STRESS, TSF	0.28	0.28	0.20	0.21
TIME TO FAILURE, MIN.	6	18	6	18
RATE OF STRAIN INCR.%		6	6	6
INITIAL DIAMETER, IN.	1.39	1.39	1.39	1.39
INITIAL HEIGHT, IN.	3.00	3.CC	3.00	3.00

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: PLASTIC CLAY (CH), GRAY; SILT POCKETS

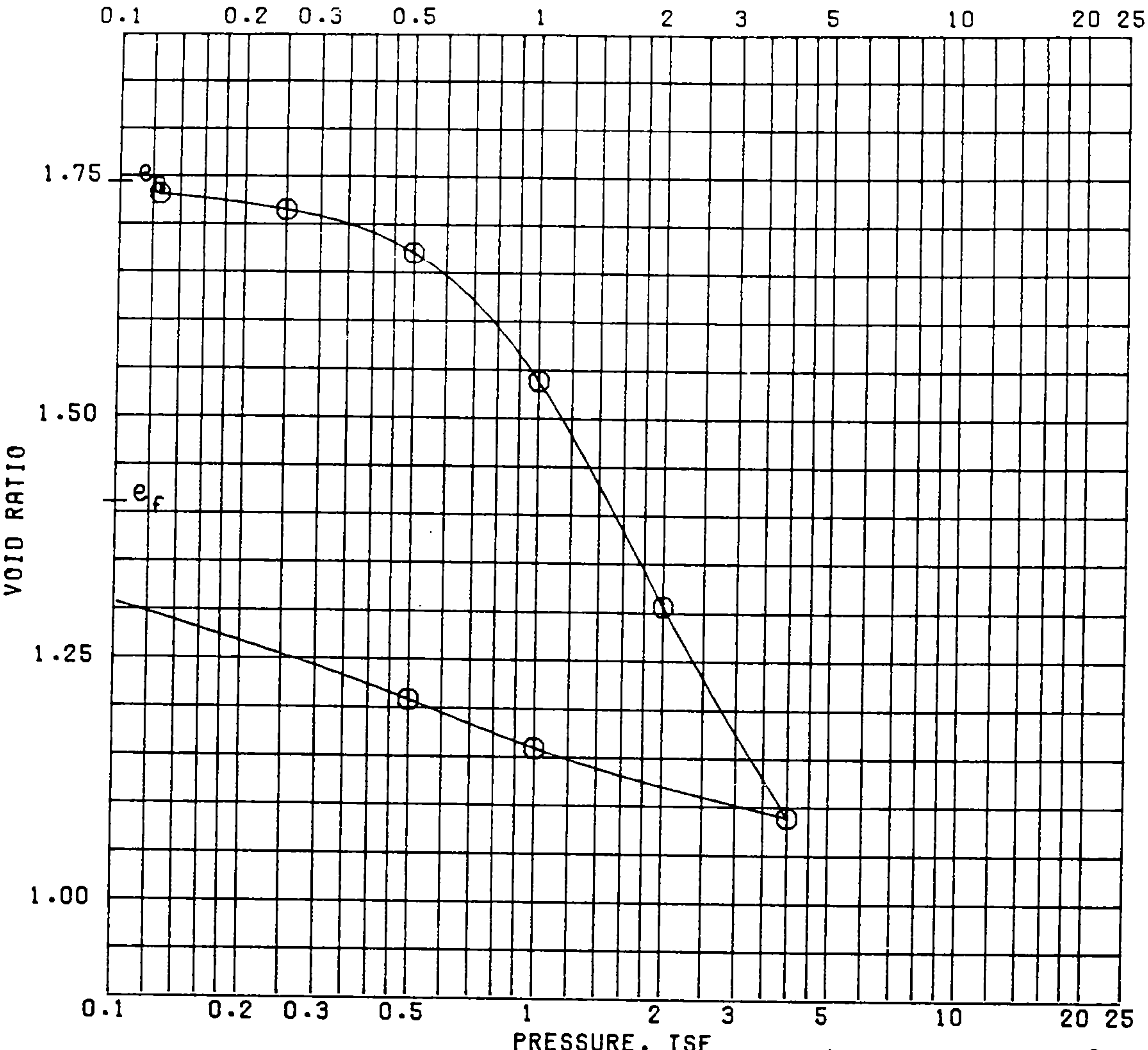
LL 72	PL 19	PI 53	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT. BEACH FLOODWALL

BORING NO. 6-PBU	SAMPLE NO. 10-B
DEPTH/ELEV 31.7	TECH. KOC
LABORATORY USAE WES	DATE 04 FEB 86

TRIAXIAL COMPRESSION TEST REPORT

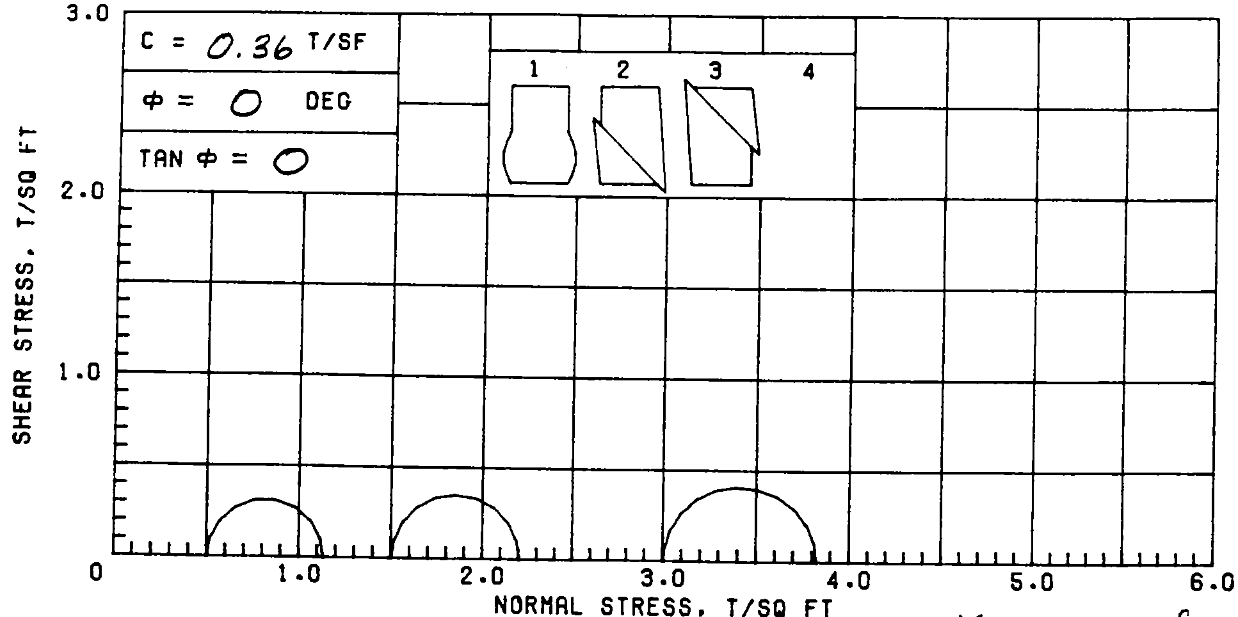


$\gamma_{SAT} = 101$ pcf

			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE, TSF		WATER CONTENT, %	60.3	51.3
PRECONSOL. PRESSURE, TSF	0.75	DRY DENSITY, PCF	61.5	70.0
COMPRESSION INDEX	0.79	SATURATION, %	93.4	98.3
TYPE SPECIMEN	UNDISTURBED	VOID RATIO	1.742	1.409
DIA. IN 4.44	HT. IN 1.150	BACK PRESSURE, TSF		

CLASSIFICATION PLASTIC CLAY (CH), GRAY; FINE SAND LENSES		
LL 85	PL 22	PI 63
GS 2.70 (EST)	D_{10}	

REMARKS	PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN HURR. PROT. PONT. BEACH FLOODWALL	
	BORING NO. 6-PBU	SAMPLE NO. 10-C
	DEPTH/ELEV 32.6	DATE 21 FEB 86
	CONSOLIDATION TEST REPORT	



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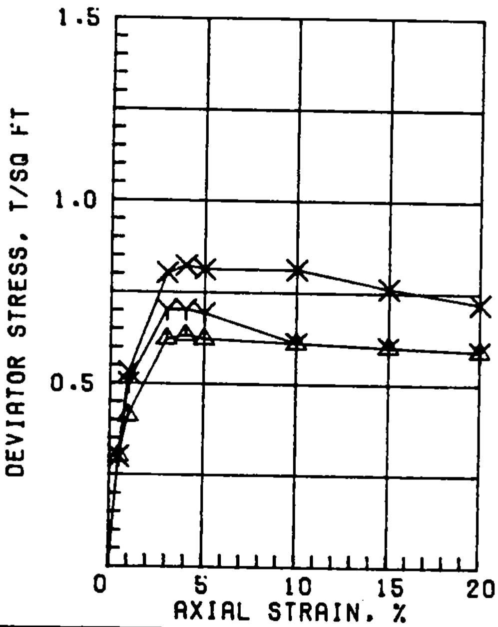


	SPECIMEN NO.	△1	Y2	X3	4
INITIAL	WATER CONTENT, %	41.6	43.1	41.9	
	DRY DENSITY, PCF	77.2	75.8	76.8	
	SATURATION, %	94.9	95.1	94.8	
	VOID RATIO	1.184	1.223	1.194	
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESS., TSF				
	MIN PRIN. STRESS, TSF	0.5	1.5	3.0	
	MAX. DEV. STRESS, TSF	0.63	0.71	0.82	
	TIME TO FAILURE, MIN.	8	18	27	
	RATE OF STRAIN INCR.,%		6	6	
	INITIAL DIAMETER, IN.	1.39	1.39	1.40	
	INITIAL HEIGHT, IN.	3.00	3.00	3.00	

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: PLASTIC CLAY (CH), GRAY; SILT SEAMS & POCKETS

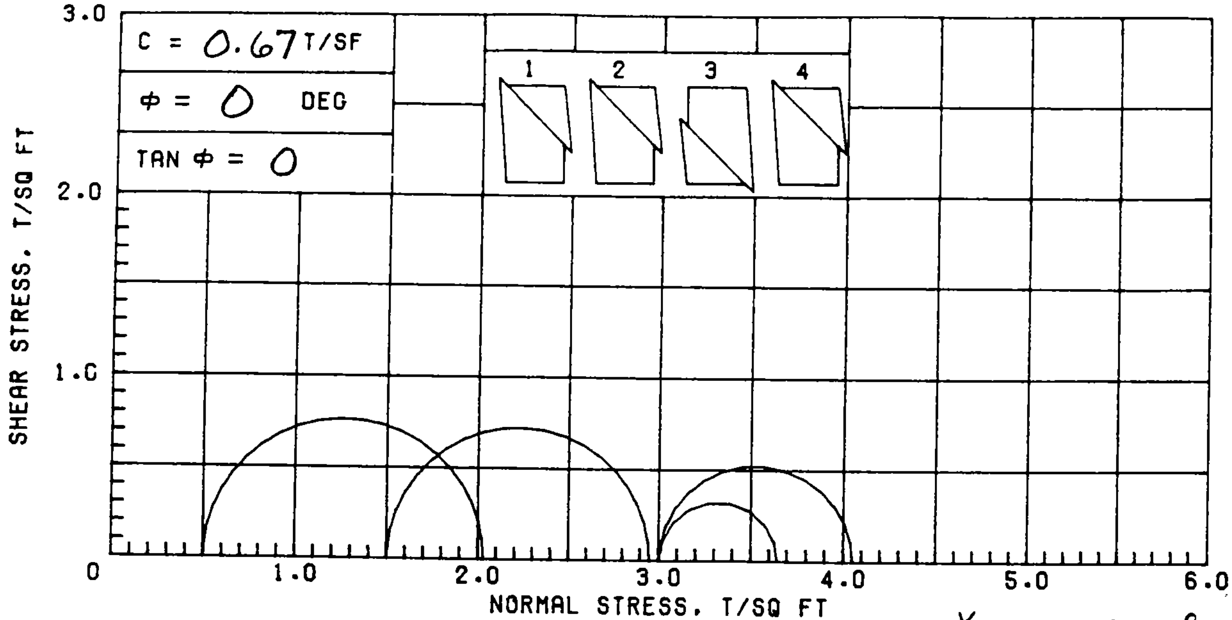
LL 49	PL 14	PI 35	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

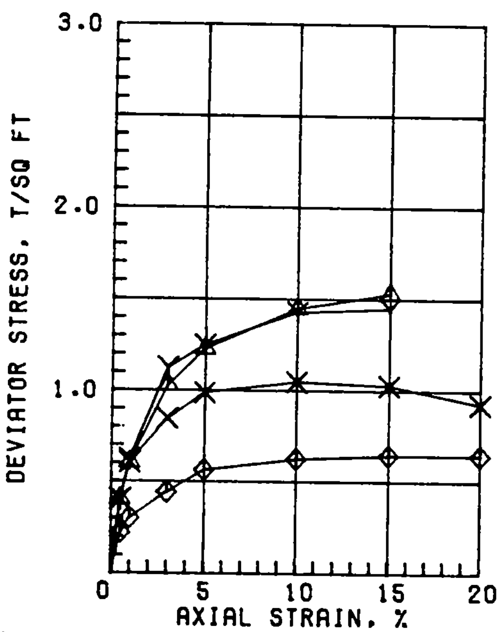
LIMITS ON MIXTURE OF MATERIAL.

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN	
HURR. PROT. PONT. BEACH FLOODWALL	
BORING NO. 6-PBU	SAMPLE NO. 18-C
DEPTH/ELEV 52.5	TECH. KOC
LABORATORY USAE WES	DATE 05 FEB 86

TRIAXIAL COMPRESSION TEST REPORT



γ_{SAT} = 127 pcf



	SPECIMEN NO.	△1	Y2	X3	◇4
INITIAL	WATER CONTENT, %	20.2	21.0	22.7	26.8
	DRY DENSITY, PCF	106.6	104.7	102.5	95.7
	SATURATION, %	93.9	92.9	95.0	95.0
	VOID RATIO	0.581	0.610	0.645	0.762
BEFORE SHEAR	WATER CONTENT, %				
	DRY DENSITY, PCF				
	SATURATION, %				
	VOID RATIO				
	BACK PRESS., TSF				
	MIN PRIN. STRESS, TSF	0.5	1.5	3.0	3.0
	MAX. DEV. STRESS, TSF	1.53	1.45	1.05	0.65
	TIME TO FAILURE, MIN.	30	30	20	30
	RATE OF STRAIN INCR,%				
	INITIAL DIAMETER, IN.	1.39	1.39	1.39	1.39
	INITIAL HEIGHT, IN.	3.00	3.00	3.00	3.00

CONTROLLED-STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CL), GRAY; SILT POCKETS

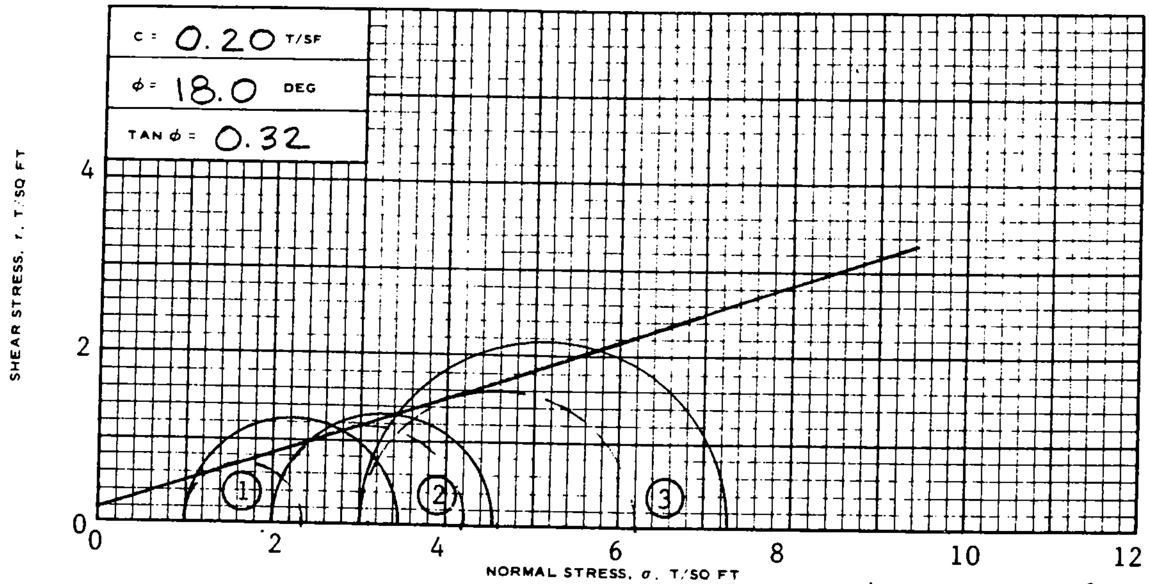
LL 40	PL 13	PI 27	GS 2.70 (ESTIMATED)	UNDISTURBED SPECIMEN	Q TEST

REMARKS:

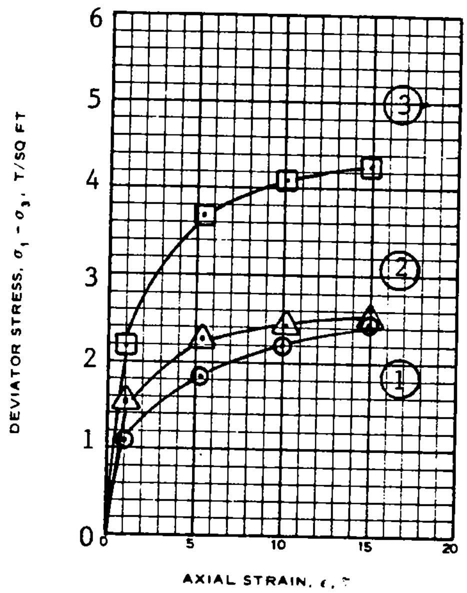
PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT. BEACH FLOODWALL

BORING NO. 6-PBU	SAMPLE NO. 19-B
DEPTH/ELEV 55.7	TECH. KOC
LABORATORY USAE WES	DATE 05 FEB 86

TRIAXIAL COMPRESSION TEST REPORT



$\gamma_{SAT} = 125\ pcf$



			SPECIMEN NO.	1	2	3
INITIAL	WATER CONTENT, %	w_o		24.4	23.9	23.7
	DRY DENSITY LB/CU FT	γd_o		100.3	98.9	100.3
	SATURATION, %	S_o		96.7	91.6	93.9
	VOID RATIO	e_o		0.681	0.704	0.681
BEFORE SHEAR	WATER CONTENT, %	w_c		25.9	25.3	23.7
	DRY DENSITY LB/CU FT	γd_c		106.4	103.8	101.7
	SATURATION, %	S_c		100+	100+	100+
	VOID RATIO	e_c		0.657	0.658	0.630
	FINAL BACK PRESSURE, T/SQ FT	u_o		5.76	5.76	5.76
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3		1.0	2.0	3.0
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$		2.44	2.53	4.27
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f		938	938	938
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$		1.35	2.2	3.2
INITIAL DIAMETER, IN.		D_o		1.38	1.38	1.38
INITIAL HEIGHT, IN.		H_o		3.00	3.00	3.00

CONTROLLED- STRAIN TEST

DESCRIPTION OF SPECIMENS SILTY CLAY (CL), LIGHT GRAY; WITH SAND

LL | PL | PI | Gs 2.70 (EST)

TYPE OF SPECIMEN UNDISTURBED | TYPE OF TEST $\overline{R}$

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN HURR. PROT. PONT BEACH FLOODWALL

BORING NO. 6-PBU | SAMPLE NO. 20-B

DEPTH/ELEV 59.8

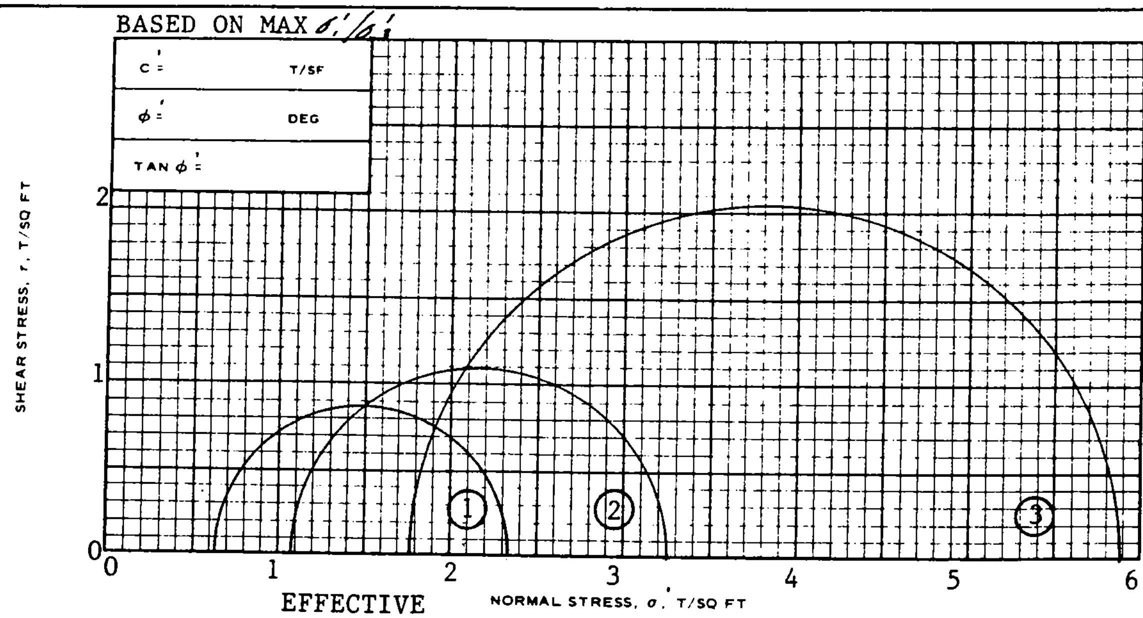
LABORATORY USAEWES | DATE 27 MAR 86

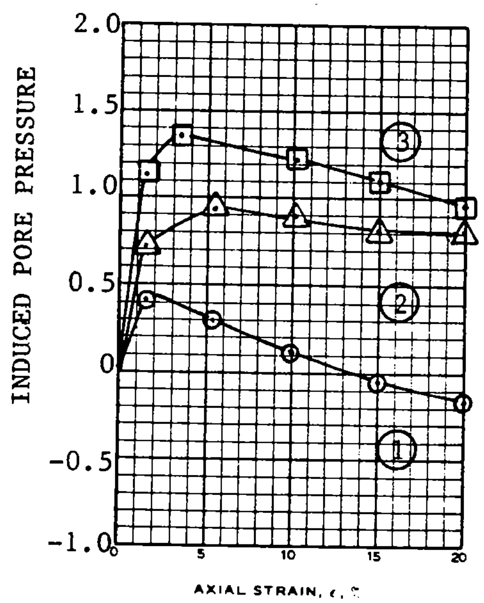
SHEET 1 OF 2

JMS **TRIAXIAL COMPRESSION TEST REPORT**

ENG FORM NO. 2089
REV JUNE 1970

GPO : 1982 O - 375-356





SPECIMEN NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o				
	DRY DENSITY LB/CU FT	γd_o				
	SATURATION, %	S_o				
	VOID RATIO	e_o				
BEFORE SHEAR	WATER CONTENT, %	w_c				
	DRY DENSITY LB/CU FT	γd_c				
	SATURATION, %	S_c				
	VOID RATIO	e_c				
	FINAL BACK PRESSURE, T/SQ FT	u_o				
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	0.64	1.08	1.78	
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	1.68	2.38	4.10	
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f				
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$				
INITIAL DIAMETER, IN.		D_o				
INITIAL HEIGHT, IN.		H_o				

CONTROLLED- TEST

DESCRIPTION OF SPECIMENS

LL	PL	PI	Gs	TYPE OF SPECIMEN	TYPE OF TEST

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT BEACH FLOODWALL

BORING NO. 6-PBU SAMPLE NO. 20-B

DEPTH/ELEV 59.8

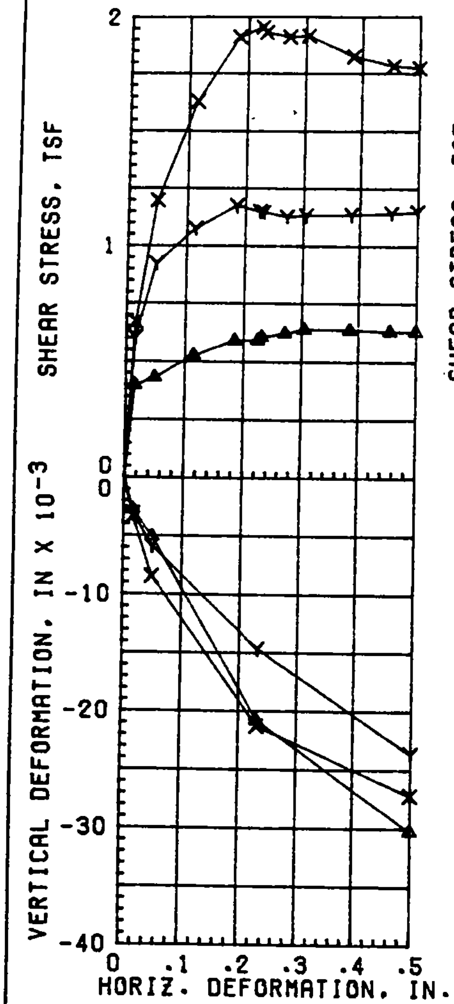
LABORATORY USAEWES DATE 27 MAR 86

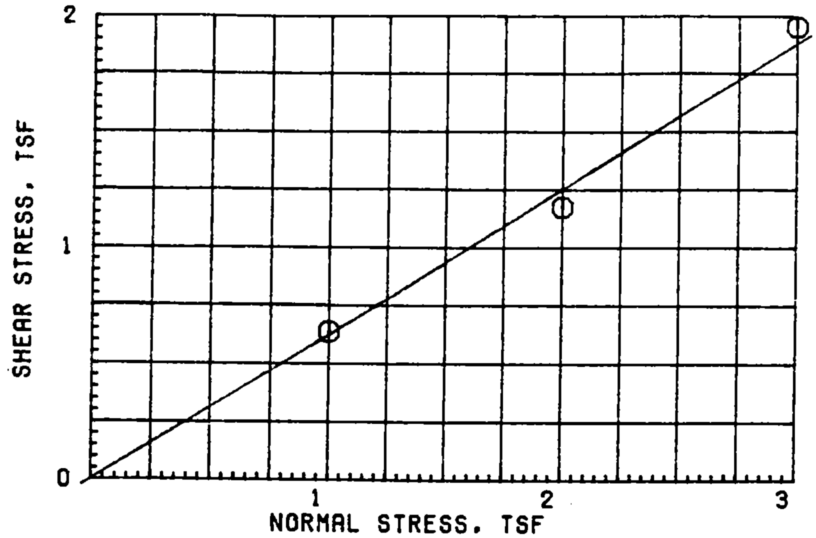
SHEET 2 OF 2

JMS **TRIAXIAL COMPRESSION TEST REPORT**

ENG FORM NO. 2089
REV JUNE 1970

GPO : 1982 0 - 375-356





$\gamma_{SAT} = 120\,pcf$

Φ = 32°

TAN Φ = 0.625

C = 0

		TEST NO.	1 ▲	2 Y	3 X	
INITAL	WATER CONTENT, %		27.2	28.0	29.2	
	VOID RATIO		0.780	0.807	0.833	
	SATURATION, %		93.3	92.9	93.9	
	DRY DENSITY, PCF		94.0	92.6	91.2	
VOID RATIO AFTER CONSOL						
FIFTY PERCENT CONSOL, MIN			< 1	< 1	< 1	
FINAL	WATER CONTENT, %		26.7	25.4	25.9	
	VOID RATIO					
	SATURATION, %					
NORMAL STRESS, TSF			1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, TSF			0.64	1.18	1.95	
TIME TO FAILURE, MIN			1705	1034	1258	
RATE OF STRAIN, IN/MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, TSF						

TYPE SPECIMEN UNDISTURBED	3.00 IN. SQUARE	0.553 IN. THICK
CLASSIFICATION SILT (ML), LIGHT GRAY		

LL	PL	PI		GS 2.68 (EST)

REMARKS:

PROJECT LAKE PONT LA & VIC HIGH LEVEL PLAN
HURR. PROT. PONT BEACH FLOODWALL

BORING NO. 6-PBU | SAMPLE 21-B

DEPTH/ELEV 63.7 | DATE 17 MAR 86

DIRECT SHEAR TEST REPORT

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY
HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

APPENDIX C

STRUCTURAL CALCULATIONS

PROJECT	Page 1	of 7	Computed	Date	10:09 AM
Lake Pontchartrain Hurricane Protection			rjgr	22-Apr-92	
GDM 22 - Remaining Work, Marina Floodwall			Checked	Date	
Floodgate at Lake Marina Ave. Ramp			xxxx	22-Apr-92	

SWING GATE ANALYSIS

CLEAR SPAN OPENING =	29.50	FT
TOP ELEVATION =	13.50	FT
BOTTOM ELEVATION =	4.50	FT
SPAN =	30.29	FT

LOCATION OF R1 = Top Elev. - of flange width
LOCATION OF R2 = Bottom Elev. - (of flange width + 1-7/8 inches)

EL 13.5
R1 = 0.87 EL 13.48

H = 8.49

< Water Load, P = 2.592 kips
3.00 FT

R2 = 1.73 EL 4.99

EL 4.50

MATERIAL PROPERTIES:

TOP GIRDER : Try a W21X62

SECTION	WEIGHT	AREA	DEPTH	T-WEB	B-FLANGE	T-FLANGE
W21X62	62	18.3	20.99	0.4	8.24	0.615

I-XX	S-XX	R-XX	I-YY	S-YY	R-YY
1330	127	8.54	57.5	13.9	1.77

b/2t =	6.70		d/t =	52.50		d/Af =	4.14	
Fy' =		ksi	Fy''' =	24.00	ksi	r =	2.10	in

BOTTOM GIRDER : Try a W21X62

SECTION	WEIGHT	AREA	DEPTH	T-WEB	B-FLANGE	T-FLANGE
W21X62	62	18.3	20.99	0.4	8.24	0.615

I-XX	S-XX	R-XX	I-YY	S-YY	R-YY
1330	127	8.54	57.5	13.9	1.77

b/2t =	6.70		d/t =	52.50		d/Af =	4.14	
Fy' =		ksi	Fy''' =	24.00	ksi	r =	2.10	in

TOP GIRDER :

Moment = w*l /8 = 1,191.76 in-kips

EM 1110-1-2101 Sx (reqd) = Mom. / Fb = 59.59 in3

Fb = 20 ksi Sx (prov) = 127

use

W21X62

BOTTOM GIRDER :

Moment = w*l /8 = 2,375.82 in-kips

EM 1110-1-2101 Sx (reqd) = Mom. / Fb = 118.79 in3

Fb = 20 ksi Sx (prov) = 127.00

use

W21X62

SKINPLATE :

Thickness of skinplate limited to 0.3125 in.

Ix = b(t**3)/12 = 0.031 in4 Sx = 2*Ix/t = 0.195 in3

Moment-x = Sx * Fb = 3.90625 in-lbs

Load = W = w * H = 0.530036 kips/ft

Spacing of vertical stiffeners

(Interior Spans) Mx = W * 12 * l / 12 =

l = 2.71 ft, use 2.33 ft

Interior spans spaces = 11

fs = W * l(int) /12*Sx = 14.73 ksi

(Exterior Spans) Mx = W * 12 * l / 10 =

l = 2.48 ft, use 2.33 ft

fs = Mx*l(ext) /10*Sx = 17.69 ksi

VERTICAL STIFFENERS :

EM 1110-1-2101 Find point of zero shear, where P' = R1,

Fb =

18 ksi P' = *0.0624*y = 0.87 kips/ft

y = 5.27 ft

y/3 = 1.76 ft, EL 9.99 or 3.51 ft from the top

M' = P'* (y - bf) - (0.0624 * y**3)/6 = 36,318.00 in-lbs/ft

For an interior vertical spacing of 2.33 ft,

M" = M' * spacing = 84,620.94 in-lbs

Sx(reqd) = M"/ Fb = 4.70 in3

For a vertical stiffener, try a 0.375 inch plate.

A plate depth of 4 inches is required to satisfy min. Sx.

The effective flange width is governed by AISC specifications, Section 1.9.1.2.

be/2t 95/ Fy = 16 < 195/ Fy = 32.5

be = 32t + tw = 10.375 in

Using the 0.375 in. plate as a web or stem of a t-section, and as per

AISC Section 1.9.1.2, to be fully effective

b/t 127 / Fy = 21.17

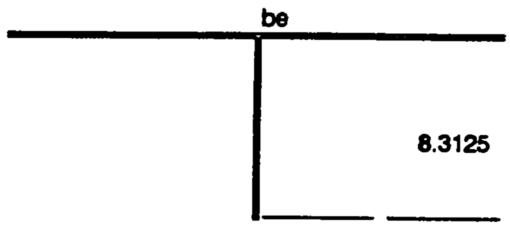
b = 7.94 in, use 8 in

actual b/t = 21.33 21.2

When the actual width to thicknesss ratio (b/t) is greater than the values given AISC Section 1.9.1.2, then a reduction factor, Qs, must be used.

b/t = 21.33 < 176/ Fy = 29.33

therefore no reduction need be applied.



Item	Area	y	Ay	Ay	Ix
Skinplate					
0.375	3.89	0.1875	0.73	0.14	0.05
Web					
0.375	3.00	4.375	13.13	57.42	32.00
x 8					
	6.89	4.56	13.85	57.56	32.05

y' = Ay / y = 3.04 in, from outside edge of skinplate

I(tot) = Ay + Ix = 89.60 in4

Sx(tot) = I(tot) / y' = 29.51 in3

Sx(reqd) = Mom /fb = 4.70 in3

UNSUPPORTED LENGTH OF BEAMS(GIRDERS) :

A36
Fy = 36 ksi

The unsupported length of a W21X62 with 99.31 ft-kips of moment
is the smaller of

76*bf/ Fy or 20000 /(d/Af)*Fy

76*bf/ Fy = 104.37 in

20000 /(d/Af)*Fy = 134.19 in

For a W21X62 , the maximum unsupported length is

104.37 in or 8.70 ft.

The unsupported length of a W21X62 with 197.98 ft-kips of moment
is the smaller of

76*bf/ Fy or 20000 /(d/Af)*Fy

76*bf/ Fy = 104.37 in

20000 /(d/Af)*Fy = 134.19 in

For a W21X62 , the maximum unsupported length is

104.37 in or 8.70 ft.

Using a 2.33 foot interior spacing,

Unsupported length = 83.88 in < 104.37333 in.

USE 83.88 in or every 6.99 ft

PROJECT	Page 6 of 7	Computed	Date
Lake Pontchartrain Hurricane Protection		rjgr	22-Apr-92
GDM 22 - Remaining Work, Marina Floodwall		Checked	Date
Floodgate at Lake Marina Ave. Ramp		xxxx	22-Apr-92

QUANTITY TAKEOFF :

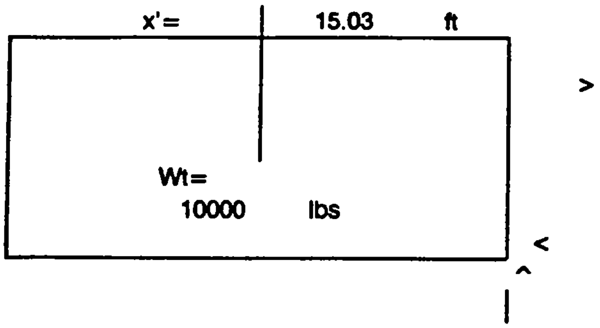
Item	Size	No.	Wt/ft	Length	Wt	y	Wt * y	x	Wt * x
Top Beam	W21X62	1	62	30.29	1,878.09	8.55	16,062.33	15.81	29,697.88
Bot Beam	W21X62	1	62	30.29	1,878.09	0.93	1,741.92	15.81	29,697.88
5/16" Skin pl	8.85	1	113.33	30.29	3,433.06	0.16	536.42	15.81	54,286.45
Vert stif	8.00	13	7.47	8.49	824.50	3.81	3,143.41	15.81	13,037.70
Gusset pl	7.00	4	4.34		121.52	4.43	538.64	7.00	850.64
	7.00	4	4.34		121.52	4.43	538.64	17.00	2,065.84
Bot seal angle	L 5x5x	1	16.2	30.29	490.73	0.93	456.37	0.67	327.31
									0.00
Side seal	P 2x5/16	1	2.13	8.85	18.86	(0.16)	(2.95)	0.88	16.50
bar	P 2x5/16	1	2.13	8.85	18.86	(0.16)	(2.95)	30.96	583.86
									0.00
Bot seal bar	P 2x5/16	1	2.13	30.29	64.52	2.75	177.43	15.81	1,020.27
									0.00
									0.00
Bearing bar	P1.5x1.5	1	7.65	8.85	67.73	0.75	50.80	30.96	2,096.97
									0.00
									0.00
End pl	P x14.31	1	24.33	8.85	215.43	7.16	1,541.69	0.67	143.69
									0.00
End pl	P x14.31	1	24.33	8.85	215.43	7.16	1,541.69	30.96	6,669.52
					9,348.34		26,323.45		140,494.53

y' = Wt * y' / Wt = 2.82 in

x' = Wt * x' / Wt = 15.03 ft

use 10000 lbs

HINGE CHECK :



R1 = -18.79 kips

R2 = 18.79 kips

Rv = Wt = 10 kips

Water Forces -

Rw1 = 0.87 kips

Rw2 = 1.73 kips

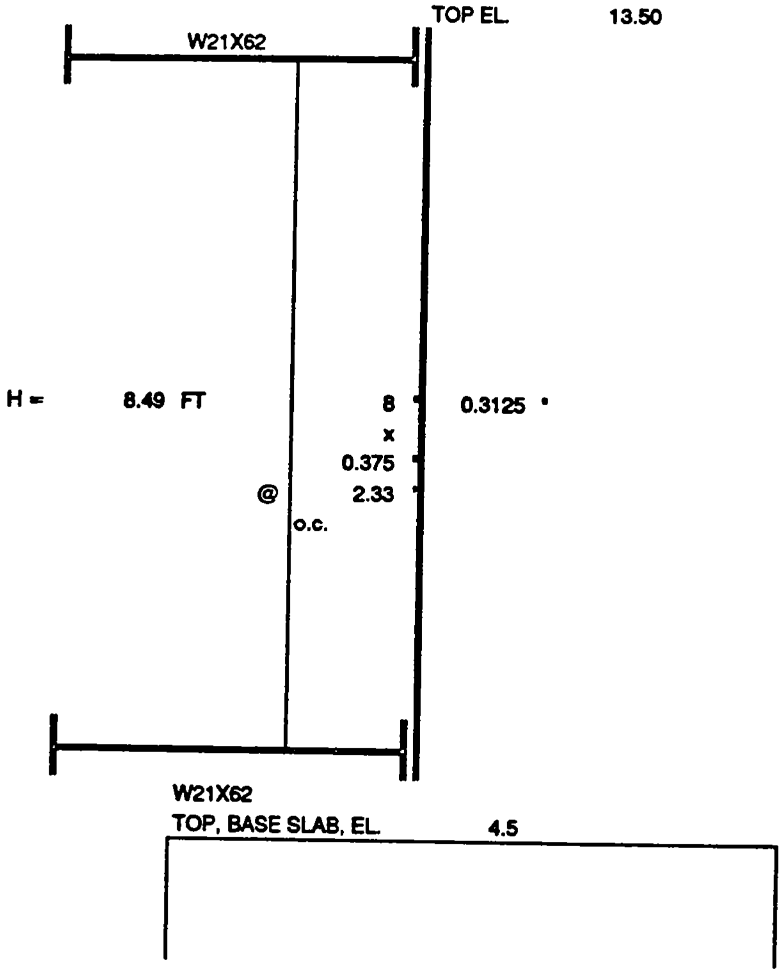
Water Forces on top hinge = Rw1 * L/2 = RWT = 10,823.31 lbs

Water Forces on bottom hinge = Rw2 * L/2 = RWB = 21,576.69 lbs

Resultant Forces on top hinge = (RWT) +(R1) = 10.82 kips < allowable of 20 kips

Resultant Forces on bottom hinge = (RWB) +(R2) = 21.58 kips < allowable of 40 kips

Date 10:09 AM
22-Apr-92



SWING GATE - SECTION

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY
HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

APPENDIX D

REAL ESTATE ESTIMATES

IDENTIFICATION
NUMBER 20729

REAL ESTATE COST ESTIMATE
LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
NEW ORLEANS, (ORLEANS PARISH), LOUISIANA

Plan: Vicinity Orleans Marina

ESTIMATE OF COSTS (Date of Value - July 1992)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Commercial/Potential Residential	.46	$653,400	$300,564
	Temporary Construction Easement (Within existing R/W)	1.1	-	-
	Improvements			0
	Severance Damage			0
	Total (R)			$301,000
(b)	Contingencies 25% (R)			75,000
(c)	Total LERRD's			$376,000

IDENTIFICATION
NUMBER 20729

Plan: Vicinity New Basin Canal

ESTIMATE OF COSTS (Date of Value - July 1992)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Within New Basin Canal	.066	-	-
	Temporary Construction Easement			
	Commercial/Potential Residential	.057	653,400 x .10	3,724
	Within New Basin Canal and Road R/W	.128	-	-
	Improvements			0
	Severance Damage			0
	Total (R)			$ 4,000
(b)	Contingencies 25% (R)			1,000
(c)	Total LERRD's			$ 5,000

IDENTIFICATION
NUMBER 20729

Plan: Vicinity Bayou St. John-Earthen Levee/Dike

ESTIMATE OF COSTS (Date of Value - July 1992)

	Acres	Unit Value	Total Value
(a) Lands and Damages			
Perpetual Levee/Floodwall Easement			
Potential Residential	1.13	$653,400	$738,342
Waterbottom-Bayou St. John	1.54	-	-
Temporary Construction Easement		-	-
Potential Residential	.50	653,400 x .10	32,670
Waterbottom-Bayou St. John	.58	-	-
Improvements			0
Severance Damage			0
Total (R)			$771,000
(b) Contingencies 25% (R)			193,000
(c) Total LERRD's			$964,000

IDENTIFICATION
NUMBER 20729

Plan: Vicinity Bayou St. John-Sector Gate

ESTIMATE OF COSTS (Date of Value - July 1992)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement			
	Potential Residential	2.0	$653,400	$1,306,800
	Within Existing R/W	4.0	-	-
	Improvements			0
	Severance Damage			0
	Total (R)			$1,307,000
(b)	Contingencies 25% (R)			327,000
(c)	Total LERRD's			$1,634,000

IDENTIFICATION
NUMBER 20729

Plan: Vicinity Pontchartrain Beach - Lakeward Alignment

ESTIMATE OF COSTS (Date of Value - February 1987)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Potential Residential	8.38	$566,280	$4,745,426
	Improvements			0
	Severance Damage			0
	Total (R)			$4,745,000
(b)	Contingencies 25% (R)			1,186,000
(c)	Total LERRD's			$5,931,000

NOTE: This estimate is effective prior to construction of the existing levee.

IDENTIFICATION
NUMBER 20729

Plan: Vicinity Pontchartrain Beach - DM 13 Alignment

ESTIMATE OF COSTS (Date of Value - February 1987)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Potential Residential	1.98	$566,280	$1,121,234
	Temporary Construction Easement Potential Residential	4.25	$566,280 x .10	240,669
	Improvements			0
	Severance Damage			0
	Total (R)			$1,362,000
(b)	Contingencies 25% (R)			341,000
(c)	Total LERRD's			$1,703,000

NOTE: This estimate is effective prior to construction of the existing levee.

IDENTIFICATION
NUMBER 20729

Plan: Vicinity New Orleans Lakefront Airport

ESTIMATE OF COSTS (Date of Value - July 1992)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Within Existing R/W	1.4	-	-
	Temporary Construction Easement Industrial/Commercial	1.0	$130,680 x .10	13,068
	Improvements			0
	Severance Damage			0
	Total (R)			$13,000
(b)	Contingencies 25% (R)			3,000
(c)	Total LERRD's			$16,000

IDENTIFICATION
NUMBER 20729

Plan: Lincoln Beach Floodwall

ESTIMATE OF COSTS (Date of Value - July 1992)

		Acres	Unit Value	Total Value
(a)	Lands and Damages			
	Perpetual Levee/Floodwall Easement Within Existing R/W	1.94	$ -	-
	Temporary Construction Easement Commercial	1.32	87,120	$114,998
	Improvements			0
	Severance Damage			0
	Total (R)			$115,000
(b)	Contingencies 25% (R)			29,000
(c)	Total LERRD's			$144,000

IDENTIFICATION
NUMBER 20729

This estimate is based on mapping and acreage calculation as provided by CELMN-ED-SP and DD. The Map File Numbers are H-2-30962 dated April 1992, and H-4-40086 dated November 1991.

The right-of-way needed for this project reportedly is all owned by the Orleans Levee District, the local sponsor. Real Estate costs shown in these eight estimates are for NEW right of way required for the various plans. No cost is shown for right-of-way (perpetual or temporary) located over existing streets or waterways.

The cost estimates show only the costs of lands, easements, relocations, right-of-way and damages. No estimates are shown for Acquisition costs. Total real estate costs are contained in the Chart of Accounts estimate.

NOTE: Temporary construction easement costs are shown on a per year basis.

No cost is shown for value of private roads or parking areas located in the temporary construction areas. Per information from CELMN-ED, any private roads or parking areas damaged as a result of project construction will be repaired by the Corps.

Barnie L. McDonald
BARNIE L. McDONALD
Appraiser
29 July 1992

Approved By:

Joseph G Kopec
JOSEPH G. KOPEC
Chief, Appraisal Branch
29 July 1992

LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY
HIGH LEVEL PLAN

DESIGN MEMORANDUM NO. 22, GENERAL DESIGN
ORLEANS PARISH LAKEFRONT
REMAINING WORK

APPENDIX E

COST ESTIMATES

ORLEANS MARINA FLOODWALL
(Oct 92 Price Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01A--	Project Planning				200		200
01B--	Acquisitions						
01B1-	By Govt				2,685	671	3,356
01B2-	By Local Sponsor (LS)				3,998	1,000	4,998
01B3-	Review of LS				212	53	265
01E--	Appraisals						
01E3-	By LS				1,000	250	1,250
01E5-	Review of LS				569	142	711
01G--	Temporary Permits						
01G2-	By LS				53	13	66
01G4-	Review of LS				26	7	33
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS				301,000	75,271	376,271
01R9-	Other				1,480	370	1,850
01RX-	Contingencies						
01---	Lands And Damages						311,223
	Contingencies						77,777
01---	LANDS AND DAMAGES						389,000
08---	ROADS, RAILROADS, AND BRIDGES						
082--	ROADS						
082A-	Mobilization, Demob, and Prep Work:	LUMPSUM	LS	30,000.00	30,000	7,500	37,500
0822-	Construct Roadbed to Subgrade						
0822B	Site Work						
	Remove East/West Bound Lane Remove & Dispose	200	CY	6.00	1,200	362	1,562
	Clearing	LUMPSUM	LS	10,000.00	10,000	3,020	13,020
	Embankment:						
	Random Backfill	27	CY	10.00	267	81	347
	Sub Base Course 3/4" Gravel	36	CY	30.00	1,067	322	1,389

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
082G-	Drainage						
082GC	Concrete Gutters	80	LF	7.00	560	169	729
0823-	Road Surfacing						
0823B	Base Course, 12" sand-gravel	36	CY	25.00	889	268	1,157
	Concrete Pavement, 12"	36	CY	200.00	7,111	2,151	9,262
	Striping	50	LF	0.50	25	8	33
082--	Subtotal: Roads, Railroads and Bridges						51,118
082Z--	Contingencies						13,881
082--	TOTAL: ROADS, RAILROADS AND BRIDGES						65,000
11---	FLOODWALLS AND LEVEES						
110A-	Mobilization, Demobilization and Prep Work:	LUMPSUM	LS	50,000.00	50,000	12,508	62,508
110B-	Care and Diversion of Water:						
110BQ	Mechanical						
	Unwatering Pumps (1 to 1-1/2 hp pumps)	LUMPSUM	LS	30,000.00	30,000	7,505	37,505
1102-	Floodwalls:						
1102B	Site Work						
	Excavation, Common	896	CY	2.50	2,240	560	2,800
	Steel Sheet Piling, PZ-22	9,000	SF	14.50	130,500	32,645	163,145
	Bearing Piling, 12X12 PPC Piles	16,670	LF	18.00	300,060	75,062	375,122
	Random Backfill	768	CY	10.00	7,684	1,922	9,606
1102C	Concrete						
	Concrete, In-place Incl. Cement and Reinforcement						
	Footing,Base Slab	255	CY	200.00	51,000	12,758	63,758
	Walls, T-wall	6	CY	330.00	1,956	489	2,445
	Walls, I-wall	267	CY	330.00	88,110	22,041	110,151
	Waterstops, L-type	30	LF	15.00	450	113	563
	Waterstops, 3-bulb	225	LF	10.00	2,250	563	2,813
	Joint filler	2,133	SF	2.00	4,266	1,067	5,333
	#5 Rebar Dowel Concrete Anchors	2,157	EA	7.00	15,099	3,777	18,876
1104-	Floodgates:						
	Metals						
	Swing	20,000	LBS	2.50	50,000	12,508	62,508
	Embedded Items	1,500	LBS	1.25	1,875	469	2,344
	Floodgate extensions	2,256	LBS	1.25	2,820	705	3,525

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
11---	Subtotal: Levees And Floodwalls						738,310
110Z-	Contingencies						184,690
11---	TOTAL: LEVEES AND FLOODWALLS						923,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM				67,000		67,000
30H--	P&S						
30HL-	BCO Review				4,500	700	5,200
30HY-	All Other				89,000	13,200	102,200
						0	
30J--	Engineering During Construction				10,000	1,500	11,500
						0	
30M--	Cost Engineering				25,200	3,800	29,000
						0	
30N--	Construction And Supply Contract Award Activities					0	
	Contracting Office Activities				17,800	2,700	20,500
30T--	Project Management				8,900	1,100	10,000
						0	
30Z--	Misc. Activities					0	
	PMO				2,400	400	2,800
	LMV				2,400	400	2,800
30---	SUBTOTAL: Planning, Engineering And Design						227,200
300Z-	Contingencies						23,800
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						251,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments				3,980	580	4,560
31B4-	Contract Modifications				18,600	2,720	21,320
31B5-	Progress And Completion Reports				10,320	1,510	11,830
31B9-	All Other				10,000	1,460	11,460
31D--	Review Of Shop Drawings						
31D0-	Review Of Shop Drawings				2,600	380	2,980
31E--	Inspection And Quality Assurance						
31E1-	Schedule Compliance				1,470	210	1,680
31E2-	Compliance Sampling And Testing				2,940	430	3,370
31E3-	Quality Surveys				820	120	940
31E4-	Title II Services				1,590	230	1,820

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
31E9-	All Other				36,680	5,360	42,040
31---	SUBTOTAL: Construction Management						89,000
310Z-	Contingencies						13,000
31---	TOTAL: CONSTRUCTION MANAGEMENT						102,000
	TOTAL: ORLEANS MARINA FLOODWALL						1,730,000

NEW BASIN CANAL FLOODGATE
(Oct 92 Pricel Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01A--	Project Planning				200		200
01B--	Acquisitions						
01B1-	By Govt				145	32	177
01B2-	By Local Sponsor (LS)				4,211	928	5,139
01B3-	Review of LS				424	94	518
01E--	Appraisals						
01E3-	By LS				1,000	221	1,221
01E5-	Review of LS				570	126	696
01G--	Temporary Permits						
01G2-	By LS				53	12	65
01G4-	Review of LS				26	6	32
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS				4,000	883	4,883
01R9-	Other				58	13	71
01RX-	Contingencies						
01---	Lands And Damages						10,687
	Contingencies						2,313
01---	LANDS AND DAMAGES						13,000
15---	FLOODWAY CONTROL AND DIVERSION STRUCTURES						
150A-	MOB & DEMOB	LUMPSUM	LS	50,000.00	50,000.00	12,355	62,355
150B-	CARE AND DIVERSION OF WATER						
150BB	COFFERDAM						
	Steel sheet piling, PZ-22 (Drive, pull & redrive)	6655	SF	17.50	116,462.50	28,778	145,240
	Dewatering System (2 HP Engine, est. duration-24 Mon)	LUMPSUM	LS	30,000.00	30,000.00	7,413	37,413
150D-	EARTHWORK FOR STRUCTURE						

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
150DB	SITE WORK (EXCAVATION)						
	Foundation Excavation, Structural	137	CY	7.00	958.65	237	1,196
	12" Riprap(wet)	153	TONS	25.00	3,819.44	944	4,763
	9" Gravel Bedding, Foundation	105	CY	30.00	3,150.00	778	3,928
150E-	FOUNDATION WORK						
150EB	SITE WORK (PILING)						
	Timber, Class B, 12" Min. Butt	4770	LF	12.00	57,240.00	14,144	71,384
	Pile Tests (H-Piles)	6	EA	20,000.00	120,000.00	29,652	149,652
1501-	STRUCTURE, Sluice gate						
1501C	Concrete, in-place, includes cement, reinforcement						
	Base Slab	134	CY	200.00	26,825.00	6,628	33,453
	Walls	175	CY	330.00	57,750.00	14,270	72,020
	Walkway, Slab	50	CY	200.00	10,000.00	2,471	12,471
	Walkway, Steps	20	CY	250.00	5,000.00	1,236	6,236
	Unreinforced Concrete, Stabilization Slab	22	CY	70.00	1,564.79	387	1,951
	Expansion Joint Filler	426	SF	2.00	852.00	211	1,063
1501N	Special Construction						
	Instrumentation	LUMPSUM	LS	10,000.00	10,000.00	2,471	12,471
1503-	MISCELLANEOUS METAL WORK						
1503E	Embedded Metal Work						
	Handrail	142	LF	30.00	4,260.00	1,053	5,313
	Grating	1426	LBS	12.00	17,116.31	4,229	21,346
	Corner Protection (CRS) End piers	146	LBS	2.00	292.80	72	365
	Corner Protection (CRS) center piers	691	LBS	2.00	1,382.40	342	1,724
1503R	Embedded Conduit	250	LF	7.00	1,750.00	432	2,182
1504-	GATES AND ASSOC. EQUIPMENT						
1504E	METALS (SERVICE GATES)						
	Gates, Sluice Pre-manufactured Cast Iron and Appurtenances, 11' X 10'	4	EACH	110,000.00	440,000.00	108,745	548,745
	Embedded Items	610	LBS	1.25	762.50	188	951
1504F	Wood, Stoplogs						
	Nom. 8x8 Timbers, 12' long	4.6	MBF	1,200.00	5,520.00	1,364	6,884
1504Q	Mechanical						
	Service Gate Operating Machinery	4	EACH	30,000.00	120,000.00	29,652	149,652
150R-	ASSOCIATED GENERAL ITEMS						
150RR	Electrical						

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
	Power and Lighting	LUMPSUM	LS	50,000.00	50,000.00	12,355	62,355
	Emergency Elec. Generator	LUMPSUM	LS	30,000.00	30,000.00	7,413	37,413
15---	Subtotal: Flood Control And Diversion Structures						646,283
1502-	CONTINGENCIES						159,717
15---	TOTAL: FLOOD CONTROL AND DIVERSION STRUCTURES						806,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM				67000		67,000
30H--	P&S						
30HL-	BCO Review				4,500	700	5,200
30HY-	All Other				90,000	13,400	103,400
30J--	Engineering During Construction				10,000	1,500	11,500
30M--	Cost Engineering				25,200	3,700	28,900
30N--	Construction And Supply Contract Award Activities						
	Contracting Office Activities				17,800	2,600	20,400
30T--	Project Management				6,900	1,100	8,000
30Z--	Misc. Activities						
	PMO				2,400	400	2,800
	LMV				2,400	400	2,800
30---	SUBTOTAL: Planning, Engineering And Design						226,200
300Z-	Contingencies						23,800
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						250,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments				4,030	620	4,650
31B4-	Contract Modifications				18,750	2,900	21,650
31B5-	Progress And Completion Reports				12,910	1,990	14,900
31B9-	All Other				15,280	2,360	17,640
31D--	Review Of Shop Drawings						
31D0-	Review Of Shop Drawings				3,860	600	4,460
31E--	Inspection And Quality Assurance						

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
31E1-	Schedule Compliance				2,120	330	2,450
31E2-	Compliance Sampling And Testing				4,240	660	4,900
31E3-	Quality Surveys				980	150	1,130
31E4-	Title II Services				1,590	250	1,840
31E9-	All Other				32,390	4,990	37,380
31---	SUBTOTAL: Construction Management						96,150
310Z-	Contingencies						14,850
31---	TOTAL: CONSTRUCTION MANAGEMENT						111,000
	TOTAL: NEW BASIN CANAL FLOODGATE						1,180,000

BAYOU ST. JOHN CLOSURE
(Oct 92 Price Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01A--	Project Planning						
					200		200
01B--	Acquisitions						
01B1-	By Govt						
01B2-	By Local Sponsor (LS)				4,635	1,161	5,796
01B3-	Review of LS				0		0
					424	106	530
01E--	Appraisals						
01E3-	By LS						
01E5-	Review of LS				1,000	250	1,250
					570	143	713
01G--	Temporary Permits						
01G2-	By LS						
01G4-	Review of LS				53	13	66
					26	7	33
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS						
01R9-	Other				771,000	193,061	964,061
01RX-	Contingencies				2,680	671	3,351
01---	Lands And Damages						
	Contingencies						780,588
01---	LANDS AND DAMAGES						195,412
							976,000
11---	LEVEES AND FLOODWALLS						
110A-	Mobilization, Demobilization and Prep Work:	LUMPSUM	LS	50,000.00	50,000	12,744	62,744
110B-	Care and Diversion of Water:						
110BQ	Dewatering System	LUMPSUM	LS	40,000.00	40,000	10,195	50,195
	Cofferdam						
	Steel Sheet Piling, PZ-22	4,800	SF	8.40	40,320	10,276	50,596
	Uncompacted fill	200	CY	12.50	2,500	637	3,137
1101-	Levees:						
1101B	Clearing	1	AC	400	400	102	502
	Embankment from borrow, Impervious	22,658	CY	13.5	305,883	77,960	383,843

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
	Seeding, Fertilization, Mulching	1	AC	1200	1,200	306	1,506
	Riprap, 30"	3578	TN	25	89,450	22,798	112,248
	Geotextile Material	3267	SY	1.5	4,901	1,249	6,149
1102-	Floodwalls:						
1102B	Site Work						
	Excavation, Common	100	CY	2.50	250	64	314
	Steel Sheet Piling, PZ-22	6,413	SF	12.50	80,163	20,431	100,594
	Random Backfill	67	CY	10.00	670	171	841
1102C	Concrete						
	Concrete, In-place Incl. Cement and Reinforcement						
	Stab. Slab, Unreinforced	11	CY	200.00	2,200	561	2,761
	Walls, I-wall	1,750	CY	330.00	577,500	147,178	724,678
	Waterstops, L-type	20	LF	15.00	300	76	376
	Waterstops, 3-bulb	50	LF	10.00	500	127	627
	Joint filler	190	SF	2.00	380	97	477
1104-	Floodgates:						
	Metals						
	Sluice, manufactured						
	2-3X3 Sluice Gates with all Appurtances & Accessories with 25 CY reinf concrete in base	2	EA	40,000.00	80,000	20,390	100,390
	36" CM Pipe	528	LF	50	26,400	6,729	33,129
	Concrete Sand around CMP	913	CY	6	5,478	1,396	6,874
	Embedded Items	2,000	LBS	1.25	2,500	637	3,137
110GE	Misc. Metals:						
	Hand rails, Aluminum, 3.5' high	50	LF	30	1500	382	1,882
	Grating, Non-skid, Aluminum	80	SF	10	800	204	1,004
11---	Subtotal: Levees And Floodwalls						1,312,494
110Z-	Contingencies						334,506
11---	TOTAL: LEVEES AND FLOODWALLS						1,647,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM				67,000		67,000
30H--	P&S						
30HL-	BCO Review				5,740	870	6,610
30HY-	All Other				75,400	11,420	86,820
30J--	Engineering During Construction				10,000	1,520	11,520

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
30M--	Cost Engineering				25,200	3,820	29,020
30N--	Construction And Supply Contract Award Activities						
	Contracting Office Activities				17,800	2,700	20,500
30T--	Project Management				13,900	2,110	16,010
30Z--	Misc. Activities						
	PMO				2,400	360	2,760
	LMV				2,400	360	2,760
30---	SUBTOTAL: Planning, Engineering And Design						219,840
300Z-	Contingencies						23,160
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						243,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments				2,070	310	2,380
31B4-	Contract Modifications				25,908	3,870	29,778
31B5-	Progress And Completion Reports				9,890	1,480	11,370
31B9-	All Other				10,875	1,630	12,505
31D--	Review Of Shop Drawings						
31D0-	Review Of Shop Drawings				4,845	720	5,565
31E--	Inspection And Quality Assurance						
31E1-	Schedule Compliance				1,606	240	1,846
31E2-	Compliance Sampling And Testing				5,197	780	5,977
31E3-	Quality Surveys				12,078	1,810	13,888
31E4-	Title II Services				3,772	560	4,332
31E9-	All Other				49,029	7,330	56,359
31---	SUBTOTAL: Construction Management						125,270
310Z-	Contingencies						18,730
31---	TOTAL: CONSTRUCTION MANAGEMENT						144,000
	TOTAL: BAYOU ST. JOHN CLOSURE						3,010,000

LAKEFRONT AIRPORT FLOODWALL
AND FLOOD GATES
(Oct 92 Price Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01A--	Project Planning				200		200
01B--	Acquisitions						
01B1-	By Govt				145	38	183
01B2-	By Local Sponsor (LS)				3,681	972	4,653
01B3-	Review of LS				291	77	368
01E--	Appraisals						
01E3-	By LS				1,000	264	1,264
01E5-	Review of LS				570	150	720
01G--	Temporary Permits						
01G2-	By LS				53	14	67
01G4-	Review of LS				26	7	33
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS				13,000	3,432	16,432
01R9-	Other				63	17	80
01RX-	Contingencies						
01---	Lands And Damages						19,029
	Contingencies						4,971
01---	LANDS AND DAMAGES						24,000
11---	LEVEES AND FLOODWALLS						
110A-	Mobilization, Demobilization and Prep Work:	LUMPSUM	LS	30,000.00	30,000	12,123	42,123
1102-	Floodwalls:						
1102C	Concrete						
	Concrete, In-place Incl. Cement and Reinforcement						
	Walls, T-wall	50	CY	330.00	16,500	6,668	23,168
	Walls, I-wall	146	CY	330.00	48,259	19,503	67,762
	Waterstops, L-type	20	LF	15.00	300	121	421
	Waterstops, 3-bulb	172	LF	10.00	1,715	693	2,408
	Joint filler	283	SF	2.00	566	229	795
	#5 Rebar Dowel Concrete Anchors	3,068	EA	7.00	21,473	8,677	30,151

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
1104-	Floodgates:						
	Metals						
	Flap, Aluminum	15,158	LBS	2.50	37,895	15,313	53,208
	Embedded Items	1,516	LBS	1.25	1,895	766	2,660
	Gate Extensions	4,820	LBS	3.00	14,460	5,843	20,303
11---	Subtotal: Levees and Floodwalls						
110Z-	Contingencies						173,063
11---	TOTAL: LEVEES AND FLOODWALLS						69,936
							243,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM						
					67,000		67,000
30H--	P&S						
30HL-	BCO Review						
30HY-	All Other				4,100	600	4,700
					98,800	14,900	113,700
30J--	Engineering During Construction					0	
					10,500	1,600	12,100
30M--	Cost Engineering					0	
					19,500	2,900	22,400
30N--	Construction And Supply Contract Award Activities					0	
	Contracting Office Activities					0	
					17,800	2,700	20,500
30T--	Project Management					0	
					2,600	400	3,000
30Z--	Misc. Activities					0	
	PMO					0	
	LMV				2,400	400	2,800
					2,400	400	2,800
30---	SUBTOTAL: Planning, Engineering And Design						
300Z-	Contingencies						225,100
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						23,900
							249,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments						
31B4-	Contract Modifications				1,580	240	1,820
31B5-	Progress And Completion Reports				5,970	920	6,890
31B9-	All Other				6,410	990	7,400
					7,250	1,120	8,370
31D--	Review Of Shop Drawings						

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
31D0-	Review Of Shop Drawings				1,910	290	2,200
31E--	Inspection And Quality Assurance						
31E1-	Schedule Compliance				1,370	210	1,580
31E2-	Compliance Sampling And Testing				820	130	950
31E4-	Title II Services				400	60	460
31E9-	All Other				12,420	1,910	14,330
31---	SUBTOTAL: Construction Management						38,130
310Z-	Contingencies						5,870
31---	TOTAL: CONSTRUCTION MANAGEMENT						44,000
	TOTAL: LAKEFRONT AIRPORT FLOODWALL AND FLOODGATES						560,000

LINCOLN BEACH FLOODWALL
(Oct 92 Price Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01A--	Project Planning				200		200
01B--	Acquisitions						
01B1-	By Govt				145	36	181
01B2-	By Local Sponsor (LS)				3,681	924	4,605
01B3-	Review of LS				291	73	364
01E--	Appraisals						
01E3-	By LS				1,000	251	1,251
01E5-	Review of LS				570	143	713
01G--	Temporary Permits						
01G2-	By LS				53	13	66
01G4-	Review of LS				26	7	33
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS				115,000	28,861	143,861
01R9-	Other				580	146	726
01RX-	Contingencies						
01---	Lands And Damages						121,546
	Contingencies						30,454
01---	LANDS AND DAMAGES						152,000
11---	LEVEES AND FLOODWALLS						
110A-	Mobilization, Demob. & Prep. Work:	LUMPSUM	LS	20,000.00	20,000	8,070	28,070
1102-	Floodwalls(I-wall)						
1102C	Concrete						
	Concrete, in Place Including Cement reinforcemnt						
	Stab. Slab, unreinforced	41	CY	70.00	2,870	1,158	4,028
	Walls	665	CY	330.00	219,450	88,567	308,017
	Waterstop	335	LF	5.00	1,675	676	2,351
	Joint Filler	520	SF	2.00	1,040	420	1,460
1102N	Special Construction						
	Aestethic Treatment (Sack rub Finish)	17,850	SF	0.70	12,495	5,042	17,537

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
1102X	Metals:						
	Floodgate Extensions	2,160	LBS	3.00	6,480	2,615	9,095
	Floodwall Extensions	1,688	LBS	3.00	5,063	2,043	7,105
	Misc. Metals	192	LBS	1.25	240	97	337
11---	Subtotal: Levees And Floodwalls						269,313
110Z-	Contingencies						108,687
11---	TOTAL: LEVEES AND FLOODWALLS						378,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM				67,000		67,000
30H--	P&S						
30HL-	BCO Review				3,800	600	4,400
30HY-	All Other				84,000	12,900	96,900
30J--	Engineering During Construction				10,500	1,600	12,100
30M--	Cost Engineering				19,500	3,000	22,500
30N--	Construction And Supply Contract Award Activities						
	Contracting Office Activities				17,800	2,700	20,500
30T--	Project Management				3,500	500	4,000
30Z--	Misc. Activities						
	PMO				2,400	400	2,800
	LMV				2,400	400	2,800
30---	SUBTOTAL: Planning, Engineering And Design						210,900
300Z-	Contingencies						22,100
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						233,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments				1,580	240	1,820
31B4-	Contract Modifications				6,500	1,000	7,500
31B5-	Progress And Completion Reports				6,400	990	7,390
31B9-	All Other				8,400	1,300	9,700
31D--	Review Of Shop Drawings						
31D0-	Review Of Shop Drawings				1,910	300	2,210

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
31E--	Inspection And Quality Assurance						
31E1-	Schedule Compliance				1,370	210	1,580
31E2-	Compliance Sampling And Testing				820	130	950
31E4-	Title II Services				200	30	230
31E9-	All Other				13,530	2,090	15,620
31---	SUBTOTAL: Construction Management						40,710
310Z-	Contingencies						6,290
31---	TOTAL: CONSTRUCTION MANAGEMENT						47,000
	TOTAL: LINCOLN BEACH FLOODWALL						810,000

PONTCHARTRAIN BEACH FLOODWALL
(Oct 87 Price Level)

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
01---	LANDS AND DAMAGES						
01R--	Real Estate Payments						
01R1-	Land Payments						
01R1B	By LS				1,362,000	341,000	1,703,000
01---	SUBTOTAL: Lands And Damages						1,362,000
	Contingencies						341,000
01---	TOTAL: LANDS AND DAMAGES						1,703,000
02---	RELOCATIONS						
021--	Ramp No. 3 at east end of Pontchartrain Beach	Lump Sum	LS	290,600.00	290,600	72,809	363,409
021--	Ramp No. 4 at west end of Pontchartrain Beach	Lump Sum	LS	221,800.00	221,800	55,568	277,368
0232R	Underground electric cable thru sheet piling	2	EA	2,000.00	4,000	1,002	5,002
0232Q	12" Dia. water line thru I-wall	1	EA	3,000.00	3,000	752	3,752
0232Q	21" Dia drainage line thru I-wall	1	EA	4,000.00	4,000	1,002	5,002
0232Q	6" Dia. water line thru I-wall	1	EA	3,000.00	3,000	752	3,752
0232Q	18" Dia. drainage line thru I-wall	1	EA	4,000.00	4,000	1,002	5,002
0232Q	10" Dia sewer line thru I-wall	1	EA	3,000.00	3,000	752	3,752
0232Q	3" Dia gas line thru I-wall	1	EA	3,000.00	3,000	752	3,752
0232R	Underground electric cable thru I-wall	2	EA	3,000.00	6,000	1,503	7,503
0232Q	6" Dia. water line thru I-wall	1	EA	3,000.00	3,000	752	3,752
0232Q	6" Dia. water line thru steel sheet piling	1	EA	2,500.00	2,500	626	3,126
0232Q	24" Knife gate valve and structure	1	EA	6,600.00	6,600	1,653	8,253
0232Q	18" Knife gate valve and structure	1	EA	4,900.00	4,900	1,228	6,128
0232Q	10" Knife gate valve and structure	1	EA	3,500.00	3,500	877	4,377
0232Q	Relocate drainage collector line	3,400	LF	40.00	136,000	34,072	170,072
02---	SUBTOTAL: Relocations						698,900
020Z-	Contingencies						175,100
02---	TOTAL: RELOCATIONS						874,000

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
11---	LEVEES AND FLOODWALLS						
1102B	PZ-27 Steel sheet piling	16,936	SF	13.00	220,168	55,308	275,476
1102B	PZ-22 Steel sheet piling	56,714	SF	12.00	680,568	170,965	851,533
1102B	PSA-23 Steel sheet piling	345	SF	14.50	5,003	1,257	6,259
1102B	12"x12" Prestressed concrete piling	1,200	LF	18.00	21,600	5,426	27,026
1102B	12" Diameter timber piles	840	LF	12.00	10,080	2,532	12,612
1102C	Concrete in stabilization slab	20	CY	70.00	1,400	352	1,752
1102C	Concrete in T-wall base	110	CY	200.00	22,000	5,527	27,527
1102C	Concrete in walls and columns	2,740	CY	330.00	904,200	227,154	1,131,354
1102C	Structural steel	30,250	LB	2.50	75,625	18,998	94,623
1102C	Gate seals	105	LF	30.00	3,150	791	3,941
1102C	Waterstops, L-type	20	LF	30.00	600	151	751
1102C	Waterstops, 3-bulb type	1,170	LF	10.00	11,700	2,939	14,639
1102C	Architectural finish	32,875	SF	3.25	106,844	26,840	133,684
1102C	Waterproof finish	32,875	SF	1.00	32,875	8,259	41,134
1102B	Levee fill, semi-compacted	240	CY	4.50	1,080	271	1,351
1102B	Structural excavation	1,960	CY	7.00	13,720	3,447	17,167
1102B	Structural backfill	1,260	CY	6.00	7,560	1,899	9,459
1102C	Expansion joint filler	2,710	SF	2.00	5,420	1,362	6,782
1102C	Miscellaneous metal	1	EA	45,500.00	45,500	11,430	56,930
11---	SUBTOTAL: Levees and Floodwalls						2,169,092
110Z-	Contingencies						544,908
11---	TOTAL: LEVEES AND FLOODWALLS						2,714,000
30---	PLANNING, ENGINEERING AND DESIGN						
30F--	DM				65,000		65,000
30H--	P&S						
30HL-	BCO Review				5,600	800	6,400
30HY-	All Other				267,500	40,100	307,600
30J--	Engineering During Construction				10,000	1,500	11,500
30M--	Cost Engineering				19,500	2,900	22,400
30N--	Construction And Supply Contract Award Activities Contracting Office Activities				17,800	2,700	20,500
30T--	Project Management				18,900	1,100	20,000
30Z--	Misc. Activities						

Account Number	Item	Estimated Quantity	Unit	Unit Price	Amount	Contingency	Project Cost
	PMO				2,400	400	2,800
	LMV				2,400	400	2,800
30---	SUBTOTAL: Planning, Engineering And Design						409,100
300Z-	Contingencies						49,900
30---	TOTAL: PLANNING ENGINEERING AND DESIGN						459,000
31---	CONSTRUCTION MANAGEMENT						
31B--	Contract Administration						
31B3-	Review And Approval Of Contract Payments				5,400	810	6,210
31B4-	Contract Modifications				26,100	3,910	30,010
31B5-	Progress And Completion Reports				13,820	2,070	15,890
31B9-	All Other				19,080	2,860	21,940
31D--	Review Of Shop Drawings						
31D0-	Review Of Shop Drawings				3,760	560	4,320
31E--	Inspection And Quality Assurance						
31E1-	Schedule Compliance				2,030	300	2,330
31E2-	Compliance Sampling And Testing				3,430	510	3,940
31E3-	Quality Surveys				820	120	940
31E4-	Title II Services				7,150	1,070	8,220
31E9-	All Other				74,970	11,230	86,200
31---	SUBTOTAL: Construction Management						156,560
310Z-	Contingencies						23,440
31---	TOTAL: CONSTRUCTION MANAGEMENT						180,000
	TOTAL: PONTCHARTRAIN BEACH FLOODWALL						5,930,000
	TOTAL PROJECT COST						13,220,000

The above construction cost estimate was prepared by Cost Engineering Branch
The above reasl estate estimate was prepared by Real Estate Division

CHARLES E. SETTOON
Chief, Cost Engineering Branch
Date: 1 Apr 93

T.J. BROWN
Chief, Real Estate Divison
Date:

TERRAL J. BROUSSARD
Project Manager
Date: