US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

DESIGN MEMORANDUM NO. 20

GENERAL DESIGN
SUPPLEMENT NO. 1

ORLEANS PARISH
JEFFERSON PARISH

17TH STREET OUTFALL CANAL
(Metairie Relief)

LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

January 15, 1996

URS
CONSULTANTS, INC.
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EXECUTIVE SUMMARY

This Supplement presents the history, design, engineering analysis, cost estimates and analysis for improvements to the Fronting Protection at Pump Station No. 6, 17th Street Outfall Canal. This Supplement will also serve as the basis for preparing the Plans and Specifications (P&S) for the project construction.

Pumping Station No. 6 was originally constructed some 80 years ago and has been modified several times throughout the years. Many of the older sections of the station itself do not meet the design height, design sectional stability requirements, or provide backflow prevention for predicted hurricane stages. This Supplement will serve as a basis for preparing plans and specifications for the construction of sluice gate monoliths (with motorized sluice gates) at nine (9) discharge tubes associated with the horizontal pumps at this station that presently do note have a back flow prevention system with some of the existing tubes also not meeting the current requirements for predicted hurricane stage (S.W.L. elevation 12.6' NGVD), and for providing I-wall sections for fronting protection closing all other sections of the station where required.

Additionally, the Supplement serves to document the existing protection that presently does meet the predicted hurricane stages and the cost associated with their construction.

The estimated cost for the project is $8,479,606.88. This consists of $5,686,289.70 for proposed improvements and $2,793,317.18 for previously existing protection as documented herein.

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PERTINENT DATA

Location of Project:	Southeast Louisiana between the Jefferson Parish and Orleans Parish line and just south of Lake Pontchartrain at the 17th Street Canal.	
Project Purpose:	To provide hurricane protection to the elevations provided herein for the 17th Street Canal pumping station, Pumping Station No. 6.	
Datum Plane:	National Geodetic Vertical Datum	
Hydrologic Data:	Temperature (°F)	
	Average Maximum Monthly	90.60
	Average Minimum Monthly	45.30
	Average Annual	69.50
	Precipitation Annual	
	Maximum	83.54
	Minimum	40.11
	Average	61.55
Hydraulic Design Criteria-Tidal:	Design Hurricane	
	Standard Project Hurricane (SPH)	
	Frequency	300 years
	Central Pressure Index (CPI)	27.6" of mercury
	Maximum 5-min. avg. wind speed	100 mph
	Radius of Maximum Winds	30 miles
	Average Forward Speed	6 Knots
	Still Water Level	12.6'
Rights-of-Way:	Permanent Rights-of-Way (Existing prior to 1965)	Approx. 50 Acres
	Permanent New Rights-of-Way Permitted (R.R. Property)	Approx. 0.20 Acres

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Estimated Cost:	Existing Structures (Flood Protection)	$2,793,317.18
	New Structures (Flood Protection)	$5,686,289.70
	Total	$8,479,606.88
Pump Station:	Gates	
	Number	18
	Size	Varies-See Plates
	Type	Conventional/ Slide Gate
	Invert	Varies-See Plates
	Top of Wall Elevation	14.6 Min.

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

PROJECT AUTHORIZATION

1. Authority

A. Project Location

The existing project area, as shown on Plate 2, is located in southeast Louisiana between the Jefferson Parish and Orleans Parish line. Specifically, the area is located south of Lake Pontchartrain at the 17th Street Canal just south of Interstate Ten (I-10). The proposed improvements are to Pumping Station No. 6 at the discharge basin on the north side of the station and north of Metairie Road.

B. 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.

C. 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 Carré Spillway guide levee to and along the Jefferson Parish line; extension upward of the existing rip-rap 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 Navigational Canal in New Orleans."

D. 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

The existing New Orleans Sewerage & Water Board (NOS&WB) Pumping Station No. 6 is located south of Lake Pontchartrain at the 17th Street Outfall Canal between the Orleans Parish line and Jefferson Parish line (See Figures I & II, Pages 8 & 9). Pumping Station No. 6 discharges into the 17th Street Outfall Canal and ultimately into Lake Pontchartrain. The pumping station as previously stated was originally constructed about 80 years ago in 1913 and has been modified several times throughout the years. Some of the older sections of the pumping station and appurtenant structures do not meet the design height or design sectional stability requirements for the predicted hurricane stages of 12.6' NGVD (still water level) and 14.6' NGVD (still water level plus 2').

The purpose of this Supplement is to propose improvements that will allow the station and its appurtenant structures to meet the design height for predicted hurricane stages; where they currently do not meet the USACE's criteria. Additionally, the improvements proposed in this Supplement are to meet the design sectional stability requirements for predicted hurricane stages. However, please note that no existing structure was analyzed for sectional stability in this Supplement, but according to the USACE have been analyzed in previous DM's including DM No. 20, Orleans Parish, Jefferson Parish, 17th Street Outfall Canal (Metairie Relief). Many of these original stability analyses from DM No. 20 are presented in the attached plates for reference.

Also, this Supplement documents the existing protection that does meet the design height for predicted hurricane stages or is acceptable to the USACE and the cost associated with their construction. This cost will be the basis for the USACE to develop credits for the previously constructed improvements to those sponsoring agencies.

The specific project area reviewed for this Supplement included frontage protection for the pumping station and parallel protection from the fronting protection to station 669+35.00 (±) (USACE Baseline) along the west bank of the 17th Street Canal and to station 670+60.00 (±) (USACE Baseline) along the east bank of the 17th Street Canal.

The proposed fronting protection at the station is generally parallel to the north wall of the existing pump station and due consideration was given to pile installation, constructability, impact on pump station operations during construction, maintaining current pump station capacity subsequent to construction, disposition of the existing line of protection, concrete canal lining, topography, and economics. The proposed fronting protection is also tied into the existing protection on the east and west sides of the 6 east horizontal pumps (See Figure III, Page 9).

The proposed fronting protection sluice gate structures and adjoining parallel structures have been developed in accordance with the technical requirements specified herein and are included in the section titled "Structural Design, Reference Information and Design Criteria". Surveys; structural, mechanical, and electrical designs; geotechnical design to the limits specified hereafter; and cost estimating was required to complete this Supplement. Hydrology and hydraulic engineering was by the USACE as well as geology. The design was also coordinated with the requirements of the NOS&WB for design and construction of the structures.

Minimum top elevation for fronting protection from predicted hurricane stages are 14.6' NGVD for pile founded monoliths and for I-walls parallel to the station. I-walls parallel to the canal were required to have a minimum top elevation of 15.1 NGVD.

Descriptions of utility relocations required as a result of the project are shown on the rights-of-way drawings. Methods for accomplishing relocations, together with statements reflecting the utility owner's comments, and costs are also presented in this Supplement. The Orleans and East Jefferson Levee Boards were also given the opportunity to comment on utility relocations. However, other than the rerouting of some electrical feeders and minor instrumentation there are no other known utilities requiring relocation.

Approval of local, State, and Federal authorities were also required. The following is a list of agencies that were given an opportunity to review and comment on the Supplement.

US Army Corps of Engineers (USACE)
Orleans Levee Board (OLB)
East Jefferson Levee District (EJLD)
New Orleans Sewerage and Water Board (NOS&WB)
Louisiana Department of Transportation and Development (LaDOTD)
Office of Public Works, Parish of Jefferson (OPW)

This Supplement also presents the essential data, assumptions and criteria for developing plans, designs and cost estimates for the existing Fronting Protection at Pump Station No. 6, 17th Street Outfall Canal, and will serve as the basis for preparing construction plans and specifications.

3. Recommended Plan

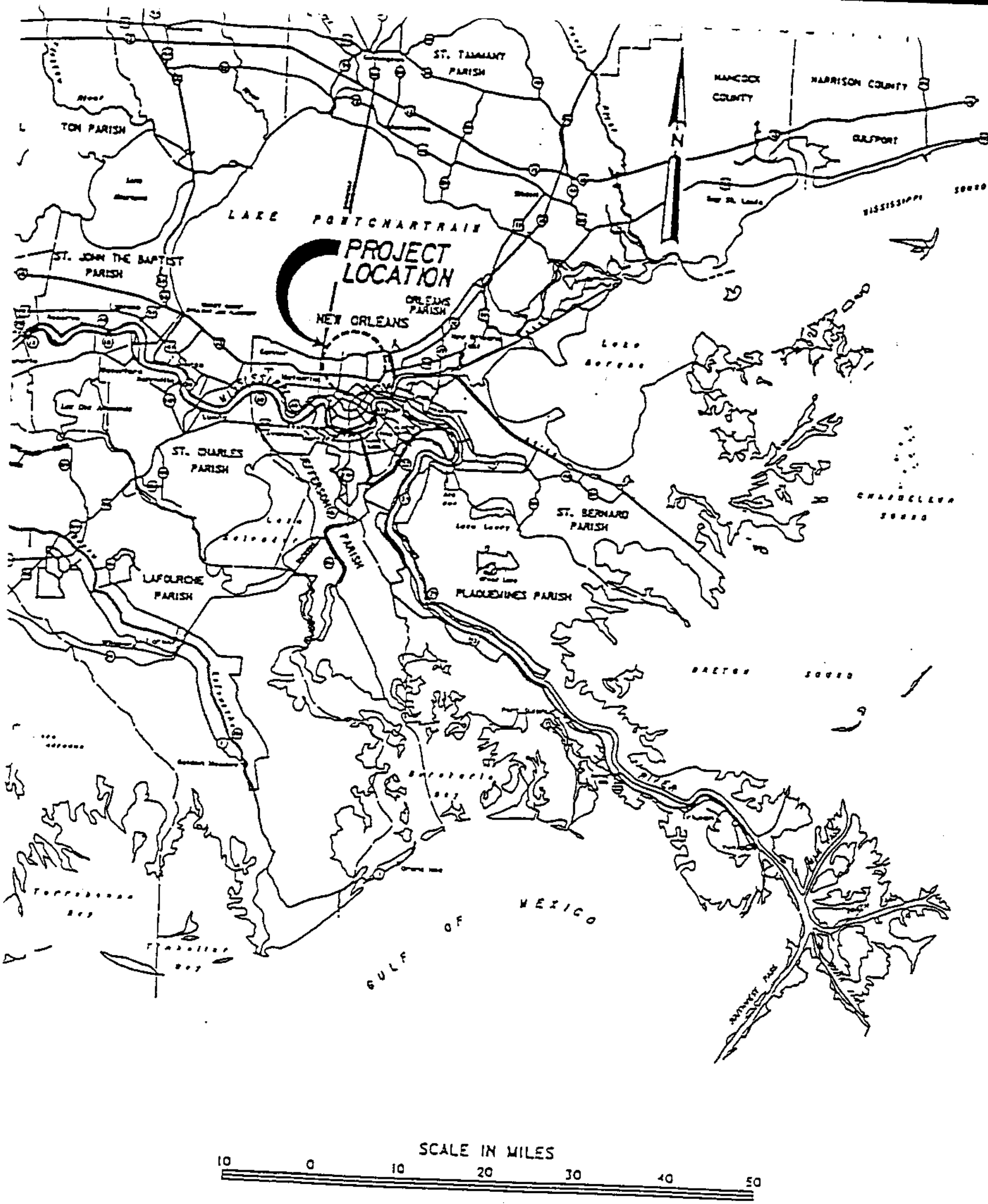
The proposed improvements, as previously stated are to provide fronting protection for Pump Station No. 6 up to the requirements for currently predicted hurricane stages (still water level =12.6' NGVD, still water level plus 2' = 14.6' NGVD). This is to be accomplished by utilizing concrete monolith structures with sluice gates at all of the existing concrete discharge tubes associated with the existing horizontal pumps. These horizontal pumps include three (3) 1100 CFS pumps built between 1967 - 1986 on the west side of the original pump station, and two (2) 590 CFS and four (4) 1080 CFS pumps on the east side of the original station built between 1914 - 1928 (see figure III and plate 2).

Additionally, I-walls are proposed to provide closure east and west of the two (2) 590 CFS and four (4) 1080 CFS pumps. The I-walls will complete the closure of the east side pumps. An existing earthen berm and retaining wall at this location does not meet the USACE's required design height or sectional stability (see plate 2 and Appendix B) and cannot economically be modified to provide adequate protection.

No flood protection is required at the proposed concrete monoliths on the west side of the station except for backflow prevention. The flood walls at this location were improved in 1982 - 1986 under the NOS&WB Project Nos. 5097 and 5103. However, it should be noted that these elevations, from the current survey reflected on Plate No. 2, vary from 14.2' to 14.33' and are not at the level originally required by the USACE (14.6'). The difference between these elevations (14.2' - 14.33') and that required (14.6'), after discussion between the local agencies and the USACE, was attributed to the numerous elevations assigned to the bench mark used in the survey. Prior discussions between the local agencies and the USACE have concluded that the approximate difference in these elevations (datums) is as much as 1.0'. Therefore, the USACE has accepted these varying elevations (14.2' to 14.33') as meeting the USACE's required design.

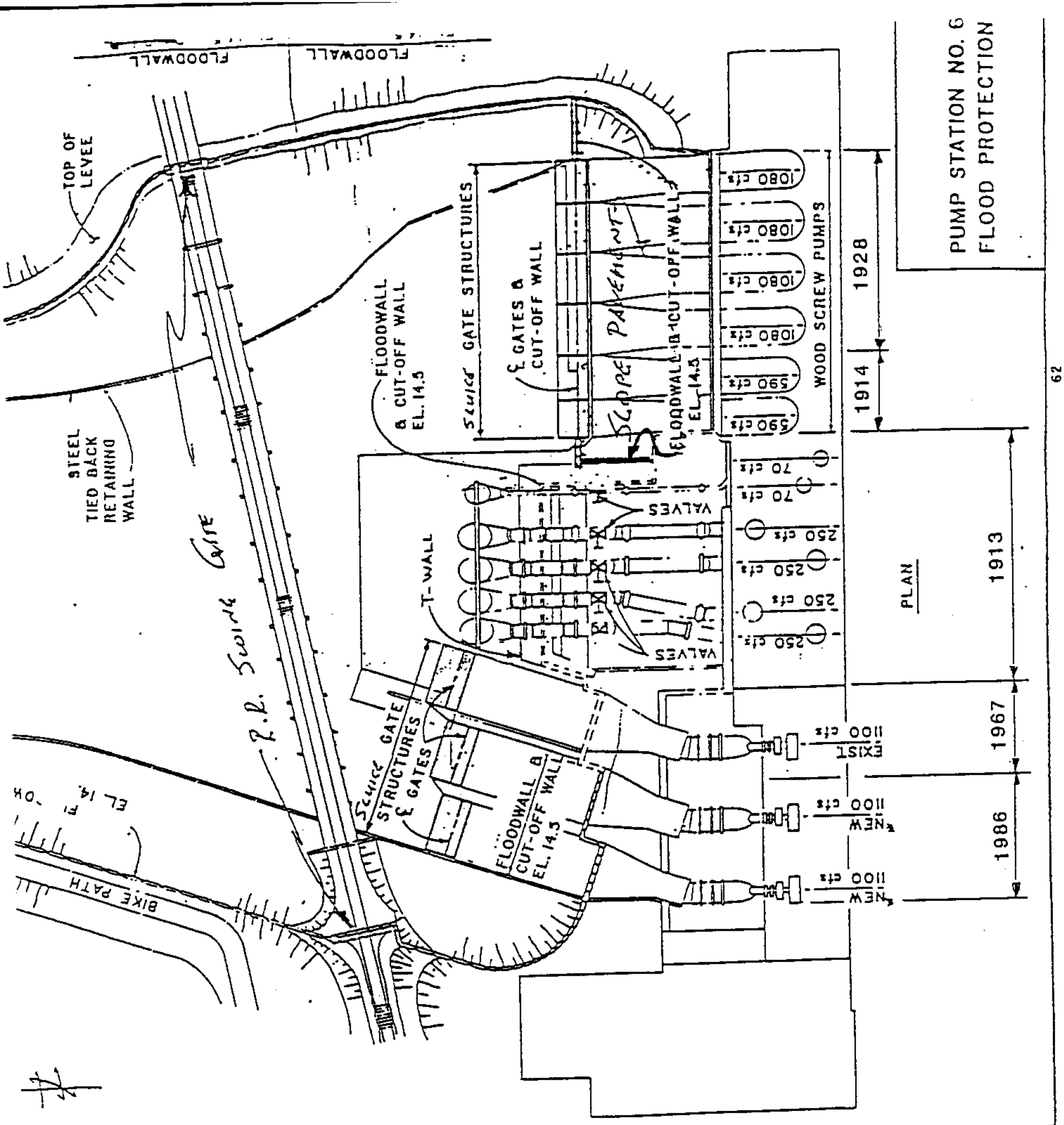
Additionally, there is a similar situation at the existing I-walls running parallel to the 17th Street Canal just north of the station. These top of wall elevations also vary, but from 14.2' to 14.55'. The USACE has specified that these walls be at a minimum height of 15.1', but due to the same reasoning the USACE has accepted these varying elevations (14.2' to 14.55') as meeting the

USACE's required design height (15.1'). However, even though the USACE has accepted the above varying elevations at existing structural elements parallel and adjacent to the station, all new structures proposed herein are required to be constructed to those specified by the USACE (14.6' min. for monoliths and I-walls & 15.1' min. for I-Walls parallel to the canal).



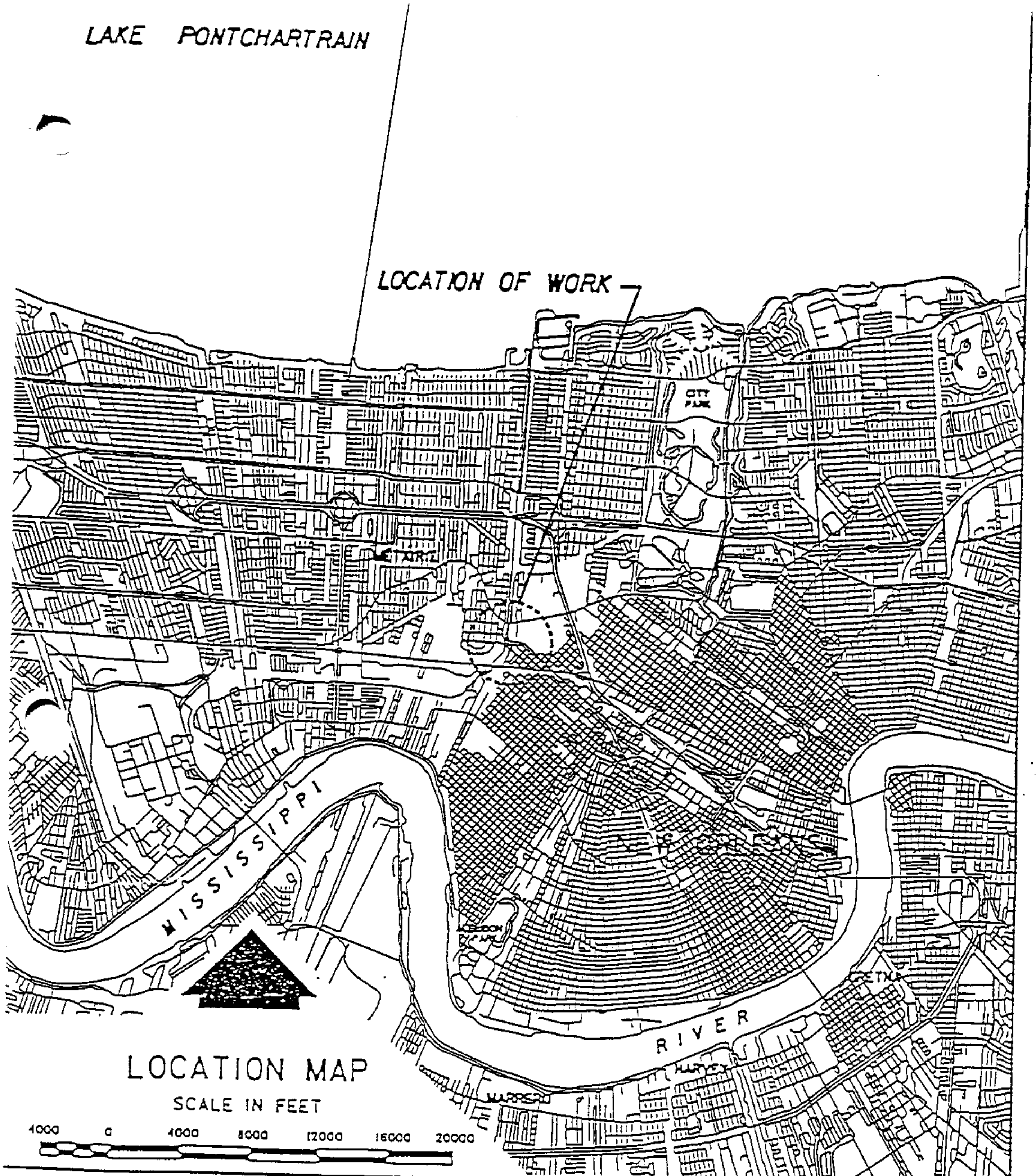
VICINITY MAP
FRONTING PROTECTION AT NOS&WB PUMP STA. NO. 6
17TH. STREET OUTFALL CANAL

FIG. 1



PUMP STATION NO. 6
FLOOD PROTECTION
FLOODWALL
FLOODWALL
TOP OF LEVEE
STEEL TIED BACK RETAINING WALL
FLOODWALL & CUT-OFF WALL EL. 14.5
SLUICE GATE STRUCTURES
℄ GATES & CUT-OFF WALL
FLOODWALL & CUT-OFF WALL EL. 14.5
SLOPE PAVEMENT
WOOD SCREW PUMPS
1080 cfs
1080 cfs
1080 cfs
1080 cfs
590 cfs
590 cfs
70 cfs
70 cfs
250 cfs
250 cfs
250 cfs
250 cfs
VALVES
VALVES
T-WALL
PLAN
SLUICE GATE STRUCTURES ℄ GATES
FLOODWALL & CUT-OFF WALL EL. 14.5
EXIST 1100 cfs
NEW 1100 cfs
NEW 1100 cfs
1928
1914
1913
1967
1986
BIKE PATH
62

FIG. III



LOCATION MAP
FRONTING PROTECTION AT NOS&WB PUMP STA. NO. 6
17TH. STREET OUTFALL CANAL

FIG. II

LOCAL COOPERATION

4. Local Cooperation

A. General

There are several agencies involved in the coordination of this project. They include the following:

- The New Orleans Sewerage and Water Board (NOS&WB)
- The East Jefferson Levee District (EJLD)
- The Orleans Levee Board (OLB)
- The Louisiana Department of Transportation and Development (LaDOTD)
- Office of Public Works, Parish of Jefferson (OPW)

The above agencies in cooperation with the U.S. Army Corps of Engineers (USACE) are developing and funding the proposed improvements described herein.

B. 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 interest 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 cash contribution previously estimated at $14,384,000.00 in DM No. 20 (Orleans Parish Jefferson Parish, 17th St. Outfall Canal [Metairie Relief] 1990) for the barrier plan which was 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, previously estimated at $4,092,000 in DM No. 20 (Orleans Parish Jefferson Parish, 17th St. Outfall Canal [Metairie Relief] 1990), 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..."

C. Water Resources Development Act of 1974 (Public Law 93-2521)

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

INVESTIGATIONS

5. Investigations

A. Investigations Prior to Project Authorization

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.

B. Investigations 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 Study", dated July 1984. The reevaluation report recommended a "tentatively selected" high level plan of protection. This recommendation necessitated the preparation of the Orleans Parish Lakefront Levee West of IHNC report and this report as part of the Lake Pontchartrain Hurricane Protection Project, and the engineering and environmental studies discussed herein. Surveys and studies accomplished in preparing the 1984 DM included the following:

1) Alternative plan studies to develop alternative methods of construction required to optimize the proposed plan of protection;

2) Aerial and hydrographic surveys;

3) Soils investigations including general and undisturbed type borings and associated laboratory investigations;

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

5) 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;

6) Real Estate requirements;

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

A design memorandum titled Design Memorandum No. 20, General Design, Orleans Parish-Jefferson Parish, 17th Street Canal (Metairie Relief), was developed in 1990 by the U.S. Army Corps of Engineers. This design memorandum is used as a basis for geotechnical, hydrology and hydraulics, geology and foundation design; and is incorporated by reference herein as part of this Supplement.

Surveys and investigations performed in preparing this Supplement include:

1) Field surveys.

2) Geotechnical design analyses of new structures based on geotechnical information and borings taken from Design Memorandum No. 20. Analyses and computations including overall stability, sheetpile penetrations and under seepage analyses (see Appendix B).

3) Analyses and design for the new sluice gate monoliths and closure structures.

4) Determination of real estate requirements and costs.

5) Relocation analysis.

6) Detailed cost estimates.

ALTERNATIVES INVESTIGATED

6. General

Pumping Station No. 6 and its adjacent structures were investigated to determine if they provide protection against predicted hurricane flood stages (SWL elevation 12.6', SWL + 2' = elevation 14.6') in accordance with the USACE's required elevations (14.6' for fronting protection and 15.1' for I-wall parallel to the canal) and the results documented herein. While floodwalls parallel to the 17th Street Canal and portions of the station provided protection for the current predicted stages required by the USACE or had elevations that were reviewed and accepted by the USACE, others did not. The investigation showed that the concrete tubes associated with the horizontal pumps on the west side of the original station, as well as the tubes at the horizontal pumps east of the original station do not provide backflow prevention for predicted flood stages. Floodwalls associated with the west side horizontal pumps meet the aforementioned criteria for predicted hurricane stages. However, fronting protection at the east horizontal pumps is inadequate and does not provide protection from predicted hurricane flood stages. The existing protection east of the original station consists of a retaining wall with an earthen dam elevated to elevation 13.7'. Documentation for the above is presented in later paragraphs and in greater detail under the section titled "Description of Existing Structures" and also in Appendix B titled "Geotechnical information for Proposed Improvements at Pumping Station No. 6 by Eustis Engineers". The following alternatives reference different scenarios investigated to provide adequate frontage protection and backflow prevention.

7. Alternate No. 1

A system was proposed (by both URS and previously by the USACE) to use air suppression at the station pumps for backflow prevention. This system would create a pressure barrier inside each of the concrete tubes to prevent predicted flood stages from syphoning back through the horizontal pumps. This system would have been integrated into each of the horizontal pumps both east and west of the original station. Due to opposition from the New Orleans Sewerage and Water Board (NOS&WB) this alternate was abandoned. NOS&WB was concerned that this system might reduce the efficiency of the pumps and detract from the stations ability to pump its designed capacities. Additionally, the NOS&WB did not feel that an air suppression system was a fail safe option.

8. Alternate No. 2

This alternate proposed the use of concrete monoliths with motorized sluice gates at the discharge end of each concrete tube associated with the horizontal pumps on both the east and west sides of the original station. A positive cut-off from tidal surges syphoning back to the protected side of the station would be provided. Additionally, I-wall structures were to be added east and west of the sluice gated monoliths located on the east side of the station, providing complete fronting protection and backflow prevention where only an earthen dam currently exists.

9. Alternate No. 3

Alternate No.3 is the same as Alternate No. 2 with the exception that there are no I-walls proposed east and west of the most easterly located sluice gate monoliths. Sloped paving would be added to the existing earthen flood protection at this location to improve the earthen section and prevent erosion and seepage.

10. The Selected Alternate

Alternate No. 1 was not selected because of the NOS&WB's objections. Alternate No. 3 was not selected because the existing earthen flood protection will not provide the required fronting protection and modifications to upgrade it will be functionally and fiscally impractical. Alternate No. 2 was selected because the sluice gated structures do not greatly impact the pumps design capacity, yet provide the pumps with a positive cut-off from the syphoning effect previously noted, and the I-walls provide the necessary fronting protection along the east section of the station.

11. Cost

No cost comparison was made since Alternate No. 1 and No. 3 were deemed unconstructable and abandoned. However, a final cost was developed for the construction of Alternate No. 2.

The estimated construction cost, including construction contingencies, is $5,472,278.00.

HYDROLOGY AND HYDRAULICS

12. General

The hydrology and hydraulic analysis and design for the proposed construction is presented in Appendix A of this Supplement. The Appendix contains the methods and procedures used in the design of protection, as well as climatological and hydrological data for the project area. This information was taken from its original source-Design Memorandum No. 20 titled "Design Memorandum No. 20, General Design, Orleans Parish-Jefferson Parish, 17th Street Canal (Metairie Relief)" and was developed in 1990 by the USACE. Although, it should be noted that data retrieved from DM No. 20 (Appendix A) in-turn refers to a previous DM, DM No. 13.

13. Design Elevations

The design grades for the pumping station are also based upon the previously noted Design Memorandum No. 20.

The design elevation required for the top of flood walls is 14.6' (NGVD). The design elevation required for the tops of I-walls parallel to the canal is 15.1' (NGVD). However, it should be noted that the top of the proposed concrete monoliths vary and are at elevations 14.65' to 16.0' (NGVD). This elevation will facilitate the size, equipment and future maintenance of sluice gates within the monoliths.

The design elevations that are developed below are for a number of conditions that correspond to various loading cases. These elevations, along with an explanation of their development, are as follows (F.S. denotes flood side, P.S.1 denotes water level on protected side, P.S.2 elevation indicates water level inside discharge tube due to head pressure at it's highest invert elevation when gate is closed, and all elevations are in feet NGVD.)

A. East Sluice Gate Monolith

Case I (Construction)

F.S. Dewatered   P.S.1 Dewatered   P.S.2 Dewatered

Case II & III (Still Water Level)

F.S. 12.6' P.S.1 * P.S.2 3.9'

Case IV (Normal Operating)

F.S. 2.0' P.S.1 * P.S.2 Gate Open

Case V (Maintenance)

F.S. 2.0' P.S.1 * P.S.2 Dewatered

Case VI & VII (2' Above Still Water Level)

F.S. 14.6' P.S.1 * P.S.2 3.9'

Case VIII (Flood on Protected Side)

F.S. -5.0' P.S.1 14.6' P.S.2 Gate Open

* Groundwater elevation on protected side is below invert of structure for east monolith.

B. West Sluice Gate Monoliths

Case I (Construction)

F.S. Dewatered P.S.1 Dewatered P.S.2 Dewatered

Case II (Still Water Level)

F.S. 12.6' P.S.1 12.6' P.S.2 5.0'

* Groundwater elevation on protected side is below invert of structure for east monolith.

Case III (Normal Operating)

F.S. 2.0' P.S.1 2.0' P.S.2 Gate Open

Case IV (Maintenance)

F.S. 2.0' P.S.1 2.0' P.S.2 Dewatered

Case V (2' Above Still Water Level)

F.S. 14.6' P.S.1 14.6' P.S.2 5.0'

The ground water elevation causing uplift at the west monoliths shall be the same as the flood side since flood waters are allowed to surround these monoliths.

C. East I-wall @ East Monolith

F.S. 14.6' P.S.1 3.8' Ground Elevation 3.8'

D. West I-wall @ East Monolith

F.S. 3.0' P.S.1 * Ground Elevation 14.0'

E. East Cofferdam

F.S. 4.0' P.S.1 -12.0' Mudline -12.0'

F. West Cofferdam

F.S. 4.0' P.S.1 -14.0' Mudline -14.0'

* Groundwater elevation on protected side is below invert of structure for east monolith.

14. Monolith Design

The concrete sluice gate monoliths were configured to facilitate maintenance and to accommodate the adjoining sluice gate frames as well as provide fronting protection at the east discharge tubes. The monoliths include center columns and side wall enlargements at the ends of the discharge tubes. Existing narrow common walls (12" ±) between pump tubes are to be widened at the monoliths to accommodate adjoining sluice gate frames. Additionally, center columns are to be installed in each monolith which facilitated the use of two (2) gates at each pump. Due to the large size of the tubes, a single gate could not be utilized. The size of a single gate at each pump would have been impractical and uneconomical to lift and maintain.

These enlargements and center columns cause some unavoidable minor and frictional head losses. Extensive consideration was given to minimizing these losses. To this end each monolith was increased in height effecting an increased exit area at each tube. These heights were preliminarily determined with calculations shown in Appendix D (Hydraulic Calculations). These preliminary calculations also demonstrated an order of magnitude of the losses expected and increases in heads at each pump. It is approximated that each pump would incur 0.08 feet of increased head as a worst case. Based on this information, the USACE performed detailed calculations which demonstrated that the head at each pump would be 0.10 feet or less. This increase in head according to the USACE was well within acceptable limits.

GEOLOGY

15. Scope

The geology presented is based on regional surface and subsurface information. It is intended to present a general project overview of the pertinent geological data and interpretations. Much of the information presented was taken from the original foundation investigation done for Design Memorandum No. 20 titled "Design Memorandum No. 20, General Design, Orleans Parish-Jefferson Parish, 17th Street Canal (Metairie Relief)"..

16. Physiography

The project site is located on the Deltaic Plain portion of the Mississippi River Alluvial Plain. Specifically, the project is located on the southern edge of the Lake Pontchartrain Basin and east of the Mississippi River. Dominant physiographic features include natural levee ridges, crevasse-splay deposits, marsh, swamps and lakes. Elevations vary from approximately +10' to +15' NGVD along the natural levee of the Mississippi River to 0 feet NGVD in the back swamp and marsh areas.

17. General Geology

Only the geologic history since the end of the Pleistocene Era is pertinent to the project. At the close of the Pleistocene Era, sea level was approximately 360 to 400 feet below present sea level and the Mississippi River was entrenched into the older Pleistocene sediments west of the project area. As sea level rose to its present stand, the entrenched valley was filled with sediment by the Mississippi River, resulting in an increase in meandering and channel migration. This meandering and channel migration has resulted in a series of deltas extending into the Gulf of Mexico. Seven Holocene deltas are recognized in the lower Mississippi River Valley, however, only four are relevant to the project area. The oldest of the four deltas in the vicinity of the project was the Cocodrie Delta whose distal ends extended across the New Orleans area from west to east.

Following the Cocodrie Delta in the vicinity of the project was the St. Bernard Delta which followed the same general course as the Cocodrie Delta but extended further to the east. It was during this period that maximum sedimentation into the project area occurred via the Metairie/Bayou Savage Distributary. A shifting of the river course upstream in response to a shorter route to the Gulf resulted in the formation of the Lafourche Delta southwest of the project. A final shift of the river brought the flow into its present course, forming the Plaquemine Delta just south of New Orleans and the present Balize Delta below the Plaquemine Delta. Development of the deltas below New Orleans coupled with the restriction of flood waters, resulted in the gradual degradation of the study area through subsidence and shoreline retreat.

18. Investigation

Preliminary investigation of the project area consisted of the utilization of aerial photographs, topographic maps, geologic maps, engineering and geologic reports and other literature. An actual on-site subsurface investigation was conducted along the proposed centerline of the project for the original DM No. 20 and previous DM's. During these subsurface investigations, ninety-three total borings were drilled at various stations along the proposed construction route. Fourteen 5 inch undisturbed borings and two 1-7/8 inch I.D. general type borings were drilled by the USACE. Nineteen 5 inch undisturbed borings and fifty-eight 3 inch undisturbed borings were drilled by an A-E for the New Orleans Sewerage and Water Board. Nine of these borings extracted from the previous tests in the vicinity of the new structures were used to determine the soil parameters for this Supplement. These borings are presented in Appendix B and shown in the attached design plates.

19. Subsidence and Seismic Activity

The project area is located in a region of active subsidence. Although actual subsidence rates for the area vary considerably, estimated long-term relative subsidence rates in the vicinity of the project average 0.42 ft./100 yrs., and increase towards the south of the project area. Seismically, the site is located in an area of low seismicity.

20. Groundwater Resources

Shallow freshwater aquifers are found in the vicinity of the project and extend to depths of up to 700 to 800 feet below sea level. Below these freshwater aquifers, brackish and saline water aquifers occur. The project will have no effect on these shallow aquifers and will not adversely affect their water quality or yields.

21. Mineral Resources

Several hydrocarbon reservoirs are located in the region. However, no reservoirs are near the project. Additionally, sand dredging in the Mississippi River will also not be affected by the project.

22. Foundation Conditions

The geotechnical properties of the sediment beneath the project vary greatly. Generally, the subsurface strata consists of Holocene deposits varying in depth to approximately 60 feet and underlain by Pleistocene deposits. Specifically from station 670+00 to Station 540+00 the surface is comprised of marsh-swamp deposits which vary in thickness between 5 and 10 feet. The marsh-swamp deposits area characterized by high wood and organic material contents and high water contents. Beneath the marsh-swamp deposits is a sequence of deposits which include bay sound, lacustrine, beach and prodelta deposits. From Station 672+00 to Station 660+00, the marsh-swamp deposits are underlain by prodelta deposits which vary in thickness to 10 feet. The prodelta deposits are comprised predominantly of fat clays. Between Station 617+00 and Station 540+00 the marsh-swamp deposits are underlain by lacustrine deposits which vary in thickness to 20 feet. These lacustrine deposits are comprised predominantly of fat clays. Underlying the marsh-swamp deposits from Station 660+00 to Station 617+00 are beach deposits which vary in thickness to 40 feet or more. These beach deposits consist of sands and silty sands and extend beneath the prodelta deposits to the south and the lacustrine deposits to the north. The thickness of the beach deposits remains constant towards the south; however, the thickness of the beach deposits decrease to the north until they terminate near Station 540+00. Underlying the beach deposits throughout the project are bay-sound deposits which vary in thickness from 15 to 20 feet. The bay-sound deposits consist generally of fat clays with some lean clays. Underlying the Holocene deposits in the project area are the Pleistocene lean clays, fat clays, silty sands and sands. These Pleistocene deposits are oxidized and exhibit a marked decrease in water content when compared to the overlying Holocene deposits. Moreover, the Pleistocene deposits, which vary in consistency from stiff to very stiff, normally yield unconfined compressive strengths that exceed those in the Holocene.

FOUNDATION INVESTIGATION AND DESIGN

23. Field Investigations

Soil borings and surveys were taken for the design area and were performed under previous Design Memorandums and used for this Supplement. These borings were documented in Design Memorandum No. 20, however, only 9 borings in the vicinity of the pumping station were utilized for the new structures. A boring log profile is shown on plate 21 which contains borings and the dates they were obtained. The borings utilized were those drilled in August 1982 (B1, B2, B3, B4 & B5) and October 1982 (B6 & B7) by Eustis Engineers and as previously stated, were documented in Design Memorandum No. 20. Additionally, two borings drilled by the Corps of Engineers (1-MOE & 2-MOE) in 1971 were also utilized

Surveys in the area consisted of cross-sections of the existing adjoining floodwall of the pump station and canal.

24. Laboratory Tests

Consolidation (C), unconfined compression (UC), unconsolidated-undrained triaxial compression (Q), consolidated-undrained triaxial compression (R) and consolidated-drained direct shear (S) tests were performed on representative soil samples from the 9 undisturbed borings in the vicinity of the station. Other related tests, such as natural water content, unit weight, and Atterberg limits were performed on selected samples. All of this information was previously presented in the aforementioned Design Memorandum No. 20. No actual testing was done for this report; however, new analyses performed by Eustis Engineers is incorporated into this Supplement and includes analyses for all new structures (see Appendix B).

25. Soil Conditions

The foundation soils for the area consist of recent deposits of silt just below the canal bottom in the discharge basin covered with and mixed with rip-rap and/or existing concrete slabs. Below this surface is primarily soft to medium stiff gray and gray & tan clay and silty clay with organic material and sand and silt lenses, pockets, and layers. Beneath this is a stratum of interbedded layers of very loose to very dense gray sand, silty sand, and clayey sand with clay lenses and layers, silt lenses, and shell fragments that continues to depths of 21 to 30 feet. Following this are strata of soft to medium stiff gray clay and sandy clay and very loose gray cloggy sand to depths of 47 to 51 feet. Beginning at depths of 67 to 74 feet is the Pleistocene formation which consist primarily of medium stiff to very stiff greenish-gray, tan and gray clay, silty clay and sandy clay interpressed with strata's of loose to medium compact tan and gray cloggy silt. All 9 borings terminated in the Pleistocene formation.

26. Soil Design Parameters

Soil shear strengths and unit weights from 9 borings were plotted versus depth in feet to develop soil design parameters for the project. A total of 16 shear tests were utilized from the borings. These included 5 one-point compression shear tests, 1 multiple stage triaxial compression shear test, and 11 thre-point triaxial compression shear test. The soil design parameters are enclosed in Appendix B.

27. Stability Analyses

Stability analyses performed on the existing structures were presented in the previous DM, Design Memorandum No. 20, but are also included in the attached design plates for reference. No stability analyses utilizing the Method of Planes were performed or the proposed structure improvements. Evaluation of the stability analyses for the existing fronting protection structures included in the GDM (plates 34 through 39, 47 and 48) indicate by inspection that no stability analyses are required for the proposed structures.

28. Sheet Pile Penetration Analyses

Sheet pile penetration was determined using the USACE's program CWALSHT. A F.S. of 1.5' was used for permanent I-walls and temporary cofferdams. Analyses included both braced and cantilevered retaining wall sections for temporary cofferdams. A total of 7 different analyses were performed and are included in Appendix B. Tip elevations vary and are shown in the attached design plates. Those areas requiring analysis were the temporary cofferdam for both east and west monoliths, use of the existing retaining walls east and west as part of the cofferdam, the cut-off wall at the existing T-wall for use in the east monolith cofferdam and proposed I-walls east and west of the east monolith.

29. Underseepage Analyses

Underseepage analyses for the monoliths and I-walls were performed utilizing Harr's Method with a minimum required factor of safety of 4.0 for SP and SM soils.

Analyses were performed for the temporary cofferdams, I-walls and seepage cut-off walls below and adjacent to the east monolith. No cut-off wall was required at the west monoliths because cut-off walls at this location already exist. Tip elevations vary and are shown in the attached design plates.

30. Pile Capacity Computations

Pile capacities for the structures were provided by the USACE. Pile capacity curves for H-piles are attached and presented on Plate 23D. These curves indicate predicted ultimate pile capacities in tons for a 1.0 factor of safety. These capacities should be divided by the following minimum factors of safety to determine the design pile capacity for axial loading:

	Minimum Factor of Safety	
Loading Condition	W/ Pile Load Test	W/Out Pile Load Test
Construction Case	1.5	2.25
Water to Still Water Level	2.0	3.0
Normal Operating Case	2.0	3.0
Maintenance Case	1.5	2.25
Water to 2' Above Still Water Level	1.5	2.25
Flood Water on Protected Side (For East Monolith Only)	1.5	2.25

31. Settlement

The proposed pile layout for the monoliths are shown in the attached plates. Piles will be driven to approximate tip elevation -101.0' NGVD. At this tip elevation, piles will be embedded approximately 37 feet into the underlying Pleistocene formation and settlement of the sluice gate structure will be ¼ to ½ of an inch.

32. Pressure Relief

A. General

Pressure relief will be required to relieve excess hydrostatic heads in beach ridge sands that underlie the project site. Two cofferdams are proposed for construction.

An east cofferdam will be installed to construct the east sluice gate monolith. This excavation will be approximately 135' x 38' in plan dimension and will be completed to elevation -12.0'. A west cofferdam will be installed to construct the west sluice gate monolith. This excavation will be approximately 100' x 50' in plan dimension and will be completed to elevation -14.0'. Each cofferdam will utilize driven sheet piles penetrating the beach ridge sands. These sheet piles will provide protection of the downstream (north) side of the pump station, and will tie into existing floodwalls and the pump station to complete excavation support.

Pressure relief requirements for the excavation were developed on the basis of the procedures outlined in TM5-8-18-5, "Dewatering and Ground Water Control for Deep Excavations", and supplemental information available to Eustis Engineering. Design parameters and stratigraphy are based on borings and laboratory tests included in this report and in past reports completed for the project. Computations are included in the geotechnical appendix.

B. Requirements

Pressure relief was evaluated assuming the beach ridge sands are hydraulically cut-off by cofferdam sheet piles on the north side of the two proposed excavations. Therefore, one-half of the computed flow within the beach ridge sands was used to estimate pressure relief requirements.

The assumed piezometric head in the beach ridge sands is at elevation 0.0'. It was assumed that the hydrostatic pressure relief will be to elevation -15.0' in these beach ridge sands. The estimated coefficient of permeability of the beach ridge sands is 0.05' per minute minimum and the effective thickness of the beach ridge aquifer is 24' (elevation -22.0' to -46.0')

The computed flow to each excavation is approximately 216 gpm. A factor of safety of 1.3 is recommended to provide a contingency for design. Therefore, the design flow to each cofferdam is 281 gpm assuming no sheet pile cut-off. If the sheet pile cut-off is installed on one-half of the excavation, the anticipated flow to the excavation is approximately 140 gpm. This flow can be controlled by three wells.

The wells should be comprised of minimum 12 inch diameter casing that are pumped by submersible pumps. Individual Gould 48LE15 submersible pumps, with a total dynamic head of 80' and discharge capacity of 48 gpm, will be sufficient for each well. It is recommended that the casing be screened between elevation -22.0' and -46.0'. The screen should be a No. 40 slot. The wells should be equally spaced along the south side of the excavation and extend to elevation -50.0'.

33. Rip-Rap

A. General

Erosion control requirements for rip-rap were developed on the basis of the procedures outlined in EM111-2-1601, "Hydraulic Design of Flood Control Channels". The hydraulic design assumes a velocity against the stone of 6.5' per second and a specific weight of rock of 165 pcf.

B. Requirements

Based on a 6.5' per second velocity, the stone should be in pieces weighing not less than 6 pounds each and not more than 200 pounds each. The stone should be graded according to the following tabulation.

WEIGHT OF STONE PIECES (POUNDS)	PERCENT OF TOTAL WEIGHT
150 - 200	5 max.
125 - 150	5 - 15
75 - 125	15 - 40
25 - 75	40 - 55
Under 25	10 max.

STRUCTURAL DESIGN

34. Scope

The analysis and design concepts of the structural components are presented in the following text. A general layout of the structure is presented on plates 4 through 10.

35. References

The structural components are in compliance with the applicable portions of the following United States Corps of Engineers (USACE) manuals for engineering and design and other reference materials.

A. COE Publications

EM 1110-2-2101 Working Stresses for Structural Design (Nov 63 and amended Jan 72)
EM 1110-2-2102 Standard Practice for Concrete (Sep 85)
EM 1110-2-2102 Waterstops and Other Joint Materials
EM 1110-2-2104 Strength Design Criteria for Reinforced Concrete Hydraulic Structures (Jan 90)
EM 1110-2-2502 Retaining and Floodwalls (Sep 89)
EM 1110-2-2701 Vertical Lift Crest Gates (Dec 62)
EM 1110-2-2902 Conduits, Culverts, and Pipes (Mar 69)
EM 1110-2-2906 Design of Pile Foundations

EM 1110-2-3104 Structural and Architectural Design of Pumping Stations (Jun 89)
ER 1110-2-1806 Earthquake Design and Analysis for Corps of Engineers Projects (May 83)
ETL 1110-2-215 Concrete Culverts and Conduits (May 76)
EM 385-1-1 Safety Manual (Apr 81)(Revised Oct 87)

B. Technical Publications

(1) American Concrete Institute, Building Code Requirements for Reinforced Concrete, (ACI 318-89).

(2) American Institute of Steel Construction (AISC), Manual of Steel Construction, Allowable Stress Design, 9th Edition, 1989.

(3) American Welding Society, Structural Welding Code, Steel, (AWS D-1.1-89).

C. Computer Programs

(1) "CWALSHT", WES Program No. X0031.

(2) "Pile Group Analysis (CPGA)", WES Program No. X0080.

(3) "Pile Group Graphics Display (CPGG)", WES Program No. X0081.

(4) "C-Frame", WES Program No. X0030.

(5) "A Three Dimensional Stability Analysis/Design Program (3DSAD)", WES Program No. X8100.

36. Design Criteria

A. General

The structural design presented herein complies with standard engineering practice and criteria set forth in Engineering Manuals and Engineering Technical Letters for civil works construction published by the office of the USACE, chief of Engineers and applicable technical publications.

B. Material Weights

The following material weights were used in the calculations:

Item	Lbs. per Cubic Foot
Water (Brackish)	64.0
Concrete	150.0
Steel	490.0
Rip-rap	165.0
Saturated Sand	122.0
Saturated Clay	110.0
Saturated Random Backfill	120.0

C. Equipment Weights

The following equipment weights were used in the calculations:

Item	Gate Size	Net Weight (lbs)	Operational Load (lbs)
Sluice Gate	144" x 132"	44,230	92,300
	114" x 114"	25,000	59,100
	108" x 114"	24,750	57,000
	108" x 90"	20,200	45,900
	102" x 90"	18,900	43,200

D. Design Stresses

(1) Structural Steel. The basic stresses for structural steel are according to the 9th Edition of the AISC Manual of Steel Construction as modified by EM 1110-2-2101.

This EM requires that all AISC allowable stresses be reduced by 17%, as a basis for design.

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

(3) Reinforced Concrete. The design of concrete is in accordance with the strength design methods and criteria established in EM 1110-2-2104 including a durability factor of 1.3(H_f).

f'c	3,000 psi
Maximum flexural reinforcement	0.25 x balance ratio
Minimum flexural reinforcement	200/fy OR 1.3 x Design Requirement
Temperature Reinforcement	.0028(Ag)

(4) Reinforcement. The design strength of reinforcement is based on the use of ASTM A-615 Grade 60 steel, having a yield strength of 60,000 psi. Strength design is based on a yield strength of 48,000 psi according to EM 1110-2-2104. Development lengths are based on the full yield strength of 60,000 psi.

(5) Steel H-Piles. The allowable stress used for H-piling is 18 ksi for A-36 which is in accordance with EM1110-2-2906.

(6) Sheet Piling. Allowable stresses for sheet piling used is based on an allowable stress of 18,000 psi plus allowable over stress if applicable.

(7) Over stresses.

Loading Conditions	Factors of Safety for Pile Foundations	All. Over stress for Structure
Construction	1.5	33-1/3%
Still Water Condition	2.0	0
Normal Operating	2.0	0
Maintenance	1.5	33-1/3%

2' Above Still Water Condition	1.5	33-1/3%
Flood on Protected Side (Only for East Monolith)	1.5	33-1/3%

E. Uniform Live Loads

The following uniform live loads are used in the calculations:

Item	Lbs. per Sq. Ft.
Construction LL	20
Operating Floor	60
Walkways	60

37. Loading Conditions

The following load cases were considered when designing the structural components of the proposed structures. Headwater (H.W.) represents stages on the flood side of the structure and tailwater (TW1) represents stages on the protected side of the structure. TW2 indicates water level inside discharge tube equal to the highest invert elevation of the tube when gate is closed.

It should be noted that the east monolith and I-walls are isolated from the water stages on the suction side of the station via the pump station structure. Hence, the monoliths and I-walls were designed for the appropriate hydrostatic heads within the discharge tubes and the external backfill and water stages imposed at the various loading conditions.

A. East Sluice Gate Monolith

Case I (Construction)

Site Dewatered Dead Load, Construction Live Load, Wind Load, Backfill on Monolith (75% forces used).

Case II (Still Water Level)

HW Elevation = 12.6', Gate Closed with Water in Tube , TW2 Elevation = 3.9', Dead Load, Live Load, Wind Load, Backfill on Monolith, Impervious Cut-Off Wall (100% forces used).

Case III (Still Water Level)

HW Elevation = 12.6', Gate Closed with Water in Tube, TW2 Elevation = 3.9', Dead Load, Live Load, Wind Load, Backfill on Monolith, Impervious Cut-Off Wall (100% forces used).

Case IV (Normal Operating)

HW Elevation = 2.0', Gate Open, Dead Load, Live Load, Backfill on Monolith, Impervious Cut-off Wall (100% force used).

Case V (Maintenance)

HW Elevation = 2.0, Stop Logs in Place, Monolith Dewatered, Dead Load, Live Load, Backfill on Monolith, Impervious Cut-Off Wall (75% forces used).

Case VI (2' Above Still Water Level)

HW Elevation = 14.6', Gate Closed with Water in Tube, TW2 Elevation = 3.9', Dead Load, Live Load, Wind Load, Backfill on Monolith, Pervious Cut-Off Wall (75% forces used).

Case VII (2' Above Still Water Level)

HW Elevation = 14.6', Gate Closed with Water in Tube, TW2 Elevation = 3.9', Dead Load, Live Load, Wind Load, Backfill on Monolith Impervious Cut-Off Wall (75% forces used).

Case VIII (Flood on Protected Side)

HW Elevation = -5.0', TW1 Elevation = 14.6', Dead Load, Live Load, Backfill on Monolith, Impervious Cut-Off Wall (75% forces used).

Groundwater elevation on protected side is below invert of structure for east monolith.

B. West Sluice Gate Monoliths

Case I (Construction)

Site Dewatered, Dead Load, Construction Live Load, Wind Load, Backfill on Monolith, Uniform Uplift Pressure (75% forces used).

Case II (Still Water Level)

HW Elevation = 12.6', TW1 Elevation = 12.6', Gate Closed with Water in Tube, TW2 Elevation = 5.0', Dead Load, Live Load, Wind Load, Backfill on Monolith, Uniform Uplift Pressure (100% forces used).

Case III (Normal Operating)

HW Elevation = 2.0', TW1 Elevation = 2.0', Gate Open, Dead Load, Live Load, Backfill on Monolith, Uniform Uplift Pressure (100% force used).

Case IV (Maintenance)

HW Elevation = 2.0', TW1 Elevation = 2.0', Stop Logs in Place, Monolith Dewatered, Dead Load, Live Load, Backfill on Monolith, Uniform Uplift Pressure (75% forces used).

Case V (2' Above Still Water Level)

HW Elevation = 14.6', TW1 Elevation = 14.6', Gate Closed with Water in Tube, TW2 Elevation = 5.0', Dead Load, Live Load, Wind Load, Backfill on Monolith, Uniform Uplift Pressure (75% forces used).

The ground water elevation causing uplift at the west monoliths shall be the same as the flood side since flood waters are allowed to surround these monoliths.

C. East I-wall @ East Monolith (2' Above SWL)

HW = 14.6' TW1 = 3.8' Ground Elevation 3.8' on FS & PS

D. West I-wall @ East Monolith (Min. Water with Backfill)

HW = 3.0' TW1 = * Ground Elevation 3.0' on FS
Ground Elevation 14.0 on PS

E. East Cofferdam

HW = 4.0' TW1 = -12.0' Mudline Elevation -12.0'

F. West Cofferdam

HW = 4.0' TW1 = -14.0' Mudline Elevation -14.0'

38. General Method of Construction

All construction will be performed in dry conditions behind the temporary cofferdam. The Contractor will have to vacate the work area during all rain events in which the pumps are operating (loaded). Only one pump may be taken out of service at a time during the entire construction process. The Contractor will have a construction staging area as shown on Plate 3A. All electrical relocations will be coordinated with the proper agencies.

39. Suggested Construction Sequence

A. 1. Remove all rip-rap and concrete from the area where the temporary cofferdam will be built.

2. Construct a cantilevered steel sheeting cofferdam for the east monolith, between the existing east retaining wall and the existing constant duty pump as shown on Plate 3A. The cofferdam will have seven (7) 48" sq. butterfly gates; then dewater area between the cofferdam and Drainage Pump Station No. 6.

B. 1. Break out bottom slab of existing discharge tubes to allow construction of the sluice gate structure across the full width of the new monolith. Also, remove exist steel sheet pile as needed.

2. Drive all foundation piling, place reinforcing steel and cast reinforcing concrete base slab of sluice gate structure.

C. 1. Construct walls of sluice gate structure across full width of discharge tubes.

2. Install sluice gates for the east monolith one pump at a time where only one pump would be out of service.

3. After all work is done at the east monolith, remove the temporary cofferdam.

D. Construct a cantilevered steel sheeting cofferdam for the west monolith(s), between the existing west retaining wall and the east side of discharge tube "G" as shown on Plate 3A. The cofferdam will have three (3) 48" sq. butterfly gates, then dewater area between cofferdam and Drainage Pump Station No. 6.

E. 1. Break out the bottom slab of existing discharge tubes to allow construction of sluice gate structure across the full width of new monolith(s) (three separate monoliths).

2. Break out and remove existing concrete wall between discharge tube "H" and "G". Also, remove existing steel sheet piling as needed.

3. Drive all foundation piling, place reinforcing steel and cast reinforcing concrete base slab of sluice gate structure.

F. 1. Construct walls of sluice gate structure across full width of discharge tubes.

2. Install sluice gates for the west monolith one pump at the time where only one pump would be out of service.

3. After all work is done at the west monolith remove the temporary cofferdam.

40. Method of Construction for Cofferdams

Construction will be sequenced in two (2) phases. The first phase will be on the six (6) horizontal pumps to the east within a cofferdam fronting the pumps and between the east bank retaining wall of the canal and the T-wall of the original station to the west. The cofferdam will be installed to an elevation that will allow for operation of the horizontal pumps after flooding of the cofferdam (elevation 4.0). The flooding of the cofferdam would be accomplished by the opening of butterfly valves installed along the cofferdam's wall that would be opened during emergency situations. These valves are sized such that the cofferdam can be flooded and all pumps primed and put into operation within 32 minutes. It was assumed and verified that all of the butterfly valves could be opened at one time to flood the cofferdam, but that only one pump at a time could be primed. A sample calculation with the above parameters is shown in the calculations included in Appendix D (Hydraulic Calculations). Also, the mechanical section of the supplement includes a description of the butterfly valves which demonstrates why they can be opened rapidly.

Access to these valves will also be provided via a walkway atop the cofferdam. This allows both the contractor and station operator access to valves at all times with foot lights attached to the walk if access is desired during night hours.

All valves within the cofferdam will be able to be controlled from a remote location by the contractor or the station operator at any time. Flooding may also be accomplished without assistance from the contractor, if necessary during off hours. Additionally, locks will be placed at both the remote location in operations and at each valve so that the cofferdam is not accidentally flooded.

A system of interconnected floating pontoons may be used as a floating deck to support the equipment necessary to conduct pile during operations. Use of a trestle system was also considered for the aforementioned purposes; however, numerous problems such as available space and conflicts arising from trying to drive piling adjacent to the railroad and/or adjacent to proposed piling proved unfeasible and uneconomical.

It is envisioned to remove a 15' (±) portion of the I-wall on the west side of the station to allow access for a crane and other construction equipment, with the ability to use this equipment for placing the floating pontoon system in the canal; noting that the contractor shall be required to have 70' long temporary steel sheet piles on site to replace the section of the I-wall removed in an emergency situation such as an inbound hurricane. Once the floating pontoons are placed in the canal, they would be connected and moved to the east side of the canal. The floating pontoon system utilized would also be required to have temporary mooring dolphins used to secure the system in-place or to allow the system to fall and rise with changing canal conditions or if pumping at the station is required. During an emergency situation, such as an inbound hurricane, the floating pontoon will be required to be removed and all equipment at the site secured. However, once the pontoon system is at the east side of the station, pile driving operations could thus commence for placement of both temporary and permanent sheet piling, and steel-H piles within the dewatered cofferdam. This would take place after excavation operations to remove rip-rap and/or concrete for placement of the piling.

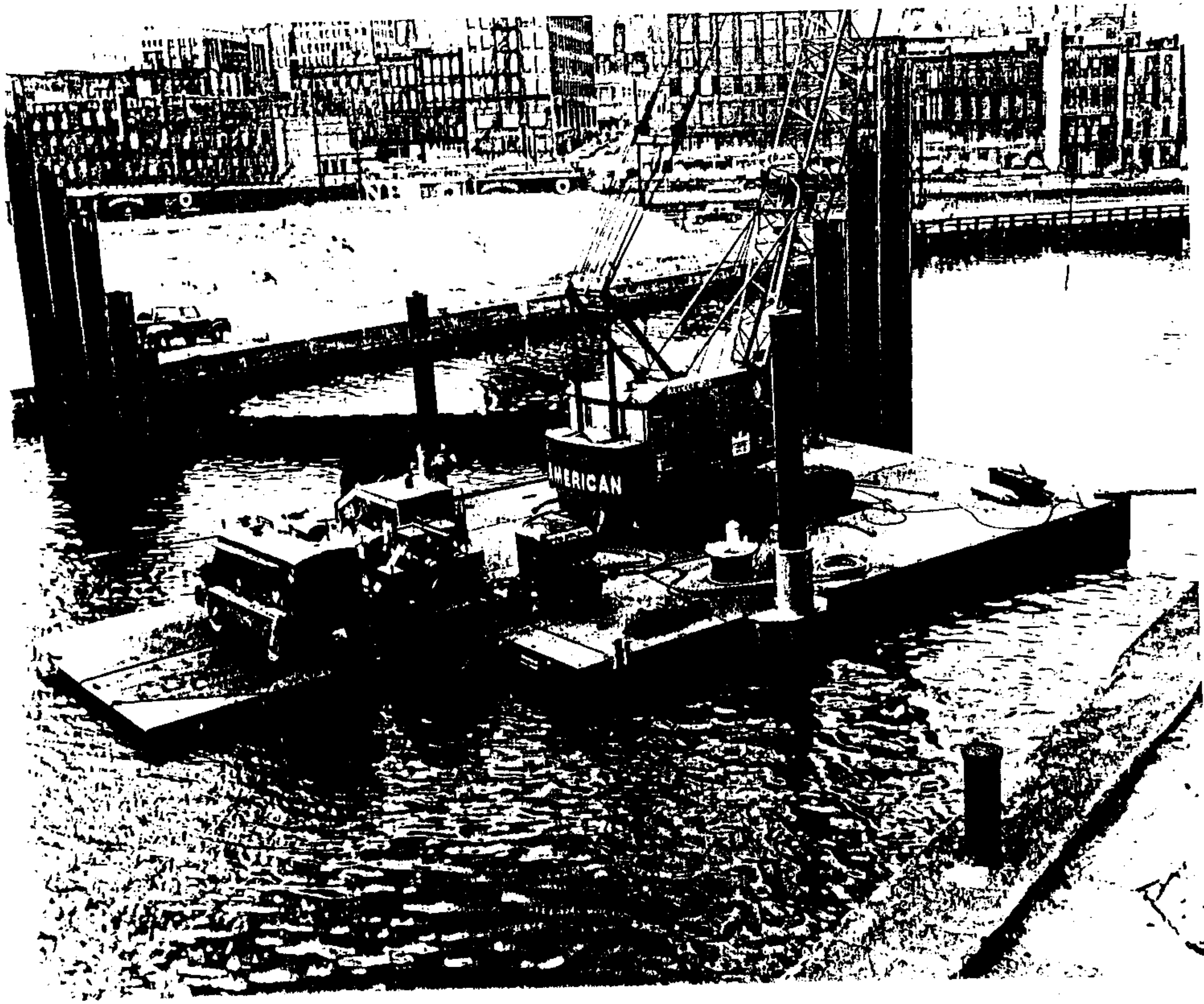
Upon completion of these operations, the sluice gate monoliths and I-walls would be constructed. Installation of the actual sluice gates will be phased such that only one (1) pump at a time is out of service. Portions of the existing retaining walls and I-walls along the east bank of the canal and sheet pile walls at the original station would be removed and rebuilt prior to the removal of the cofferdam, but after final grading at the monoliths are complete to facilitate a final tie-in and completion of the fronting protection at this location. Rip-rap will then be placed at the east monolith after removal of the temporary cofferdam. The access route for the pontoon system and tie-in points described above can be seen in the attached design plates for the proposed work. Once construction of the monolith is complete at the east side of the station, the cofferdam would be removed utilizing the floating pontoon system. This system would then be removed from the canal and placement of the cofferdam, permanent steel sheet piles and H-piles for the west monolith would take place from land at the same location where the crane and pontoon system accessed the canal. It should also be noted that a section of the existing retaining wall at this location would be pulled and relocated since it conflicts with the proposed monolith. Eustis Engineering, the geotechnical engineer for this supplement, has considered stability of the adjacent I-wall at this location after the retaining wall has been removed. They are of the opinion that only a minor amount of sloughing will occur. Phase II construction will then take place along the three (3) horizontal pumps on the west side of the original station similar to the east side.

Construction will continue in a similar fashion to the east monolith, except that no tie-ins will be required beyond the sluice gate monoliths, with the only exception being a connection between the existing relocated retaining wall described above and the proposed monolith, since the fronting protection on the west side exist and only backflow prevention is needed. Upon completion of phase II, all temporary sheeting will be removed and rip-rap placed where required. Additionally, the access area will be repaired and the I-wall at this location that was removed will be replaced with a permanent I-wall.

At no time will more than one (1) pump remain out of service and all other pumps will be operational within 32 minutes by flooding the cofferdam during emergency situations.

For cost estimating, a preliminary design of the cofferdam is shown in the Appendix labeled "Structural Calculations". Additionally, moments and pile capacities used in the design of these structures are presented in the geotechnical information for proposed improvements under Appendix B. Also, Figure 4 shows a typical section of a type of pontoon system that could be utilized.

Multipurpose Attachments -- Available ramps used for purposes of loading, flotation, deck area, and counterweight in a rectangular assembly of floats. Counterweighting with ramps and positioning of on-deck machinery permits operation of the crane at a location near the working edge. (Interstate Highway 35 Project, Duluth, Minn. — 1967)



Foundation Pile Driving Assemblies

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Figure 4

DESCRIPTION OF EXISTING STRUCTURES

41. General

The existing structural components comprising the flood protection for Pumping Station No. 6 are composed of many individual sections constructed throughout the last 80 years and during different phases for improvements to the station. Since so many different projects were utilized over the years, two different approaches were used to document the components of the station that meet the USACE's elevation requirements or have been accepted by the USACE for predicted hurricane stages. The first was the use of a field topographic survey and the second was the research and documentation of existing record drawings and files available through the NOS&WB.

42. Topographic Survey

A topographic survey was performed at the project site to document all of the stations existing structural components that meet the USACE's elevation requirements for predicted hurricane stages. The survey was started just north of the station and south of the flood wall contracted by the USACE and constructed after improvements to the station made between 1982 and 1986. These mid 1980 improvements were designed by Burk and Associates and constructed by Atlas Construction for the NOS&WB.

The survey was tied to a base line on the west bank of the 17th Street Canal originally used during the construction of the USACE contracted floodwalls north of the station. The surveyed area began on the west bank of the 17th Street Canal from survey station 669+35.00(±) and on the east bank of the canal from survey station 670+60.00(±) and all of the protection south from these survey stations to the pumping station. The survey used newly established base lines set in the field, with equations at the two aforementioned survey stations which establish a relationship between the new baselines and the USACE's baseline. Vertical control was based upon a bench mark provided by the USACE tied to the 1964 EPIC. The survey established what portions of the existing protection are to the elevations required to provide protection from predicted hurricane stages. A site plan and cross sections were developed using the surveying information and are shown in the attached design plates.

43. Research and Documentation

The documentation of the existing protection was also based on an extensive research of existing record documents obtained from the NOS&WB. Brief descriptions of this documentation and their components providing flood protection are presented in later paragraphs. These components are also shown in the attached design plates. The elements selected as providing flood protection are based upon the USACE's criteria that the element must directly and actively provide flood protection as it's primary function. This criteria generally is for establishing what components of the existing protection either meets, or can be used in part with improvements, to provide protection from predicted hurricane stages. In more specific terms, any component not providing "flood protection" per USACE criteria and/or does not meet the required elevations, has not been documented in this Supplement.

The components considered documented as "flood protection" are the I-walls and retaining walls on the east and west banks of the canal north of the pump station up to the flood walls built by the USACE at survey station 669+35.00 (±) (USACE Baseline) on the west bank and survey station 670+60.00(±) (USACE Baseline) on the east bank; the T-wall, piling and foundation and pumping discharge tubes with valves at the original station; the parapet wall atop the horizontal concrete tubes on the three most westerly pumps and its associated sheet pile walls; and the I-walls connecting both the east and west additions to the original stations. Those components not considered as flood protection were the concrete tubes and piling associated with the most westerly horizontal pumps; the concrete horizontal tubes and piling for the most easterly pumps, pumps, and the main building and its appurtenances. Components not considered are either used for the purposes of pumping flood waters or do not provide protection from predicted hurricane stages (i.e. the concrete tubes and foundations associated with the horizontal pumps).

Below, please find a brief description of the documentation researched, the associated dates, and those components considered as "flood protection".

Year	Description of Project	"Flood Protection" Provided	Justifications
1913	Original Pump Station Four (4) 250 CFS Pumps Two (2) 70 CFS Pumps	None	Does not provide protection to required elevation for predicted hurricane stages.
1914	The addition of two (2) 590 CFS Horizontal Pumps east of the original station.	None	Does not provide protection to required standards for predicted hurricane stages.
1928	The addition of four (4) 1080 CFS Horizontal Pumps east of the 1914 project.	None	Does not provide protection to required elevation standards for predicted hurricane stages.
1967	The addition of one (1) 1100 CFS Horizontal Pump west of the existing pump.	None	Does not provide protection to required elevation for predicted hurricane stages.
1982 Thru 1986	The addition of two (2) 1100 CFS Horizontal Pumps west of the 1967 addition. This project is in several phases under NOS&WB project No's. 5097 and 5103. It also upgrades the wall and discharges at the original 1913 station, as well as upgrades the walls east and west of the 1967 addition. I-walls and retaining walls on the east and west banks of the canal are also added in 1986.	Full Protection: I-walls and retaining walls on east and west banks of the canal. Parapet walls and sheet pile walls at the 1967 and 1986 horizontal pumps. T-walls, discharge tubes valves and adjacent walls to the original station. R.R. Flood gates built in 1986.	These components meet the required top of wall elevation, provide seepage protection from predicted hurricane stages or have top of wall elevations that have been accepted by the USACE (see Recommended Plan, paragraph 3)..

The following is a brief description of each one of the components listed in the above table as providing "flood protection". These components can also be seen on plates 22 through 29. Please note that the elevations reflected in these plates were the original proposed elevations which have been revised from their original datum to NGVD (20.43' CD = 0' NGVD). Additionally, it should be noted that the actual as-built elevations are only shown on plate 2 (Existing Site Plan).

44. T-Wall Monoliths and Backflow Prevention

Fronting the original 1913 station, there exists a reinforced concrete T-wall structure with a top elevation varying from 14.20' - 14.33' NGVD (accepted by USACE, see paragraph 3 and the existing site plan on plate 2) founded on Class "B" timber piles. Steel sheet piling with a tip elevation -51' (±) NGVD is also provided for seepage protection. Supported by these monoliths are steel discharge tubes and valves tied to the 1913 original station vertical pumps. These discharges extended the original pumps discharge locations further north closer to Lake Pontchartrain. Again, as shown in paragraph 3, the recommended plan, of this supplement the actual top of wall elevations of these structures varied from that originally specified by the USACE. But, as also previously shown, these differences in elevations was attributed to the numerous elevations assigned to the bench mark used in the current topographic survey. Prior discussions between the local agencies and the USACE have approximated this difference in elevation to be as much as 1.0'. Therefore, the USACE has accepted these varying elevations as meeting the USACE's required design.

45. Parapet Wall

Fronting the station and atop the horizontal pumps west of the original station are reinforced vertical concrete walls to elevation 14.3' (±) NGVD (accepted by USACE, see paragraph 3 and the existing site plan on plate 2). Steel sheet piling with a tip elevation -43.93'(±) NGVD which provides seepage protection below the concrete tubes. Currently the concrete tubes have no backflow prevention from predicted hurricane stages and are not considered as flood protection. Again, as shown in paragraph 3, the recommended plan of this supplement the actual top of wall elevations of these structures varied from that originally specified by the USACE. But, as also previously shown, this difference in elevation was attributed to the numerous elevations assigned to the bench mark used in the current topographic survey. Prior discussions between the local agencies and the USACE have approximated this difference in elevations to be as much as 1.0'. Therefore, the USACE has accepted these varying elevations as meeting the USACE's required design.

46. I-Wall Monoliths and Railroad Gates

I-type floodwalls consisting of steel sheet piles capped with reinforced concrete exist between the original station and the 1914 east additions, and along the east and west banks of the 17th Street Canal. The I-type floodwalls fronting the station have a top of wall elevation of 14.3'(±) NGVD (accepted by USACE, see paragraph 3 and the existing site plan on plate 2). The I-type floodwalls on the east and west banks of the canal were original thought to have a top of wall elevation of 15.1' NGVD and are inclusive of railroad gates and foundations. However, the current survey shown in plate 2 reflects elevations which vary from 14.20' to 14.55' NGVD. Again, as shown in paragraph 3, the recommended plan of this supplement, the actual top of wall elevations of these structures varied from that originally specified by the USACE. But, as also previously shown, this difference in elevation was attributed to the numerous elevations assigned to the bench mark used in the current topographic survey. Prior discussions between the local agencies and the USACE have approximated this difference in elevation to be as much as 1.0'. Therefore, the USACE has accepted these varying elevations as meeting the USACE's required design. Steel sheet piles were also placed at these locations for seepage with tip elevations varying from -5.0'(±) NGVD at the railroad gates and -23.0'(±) beyond.

47. Retaining Wall

Reinforced concrete retaining walls supported by steel piling are located just inside of the I-type flood walls along the east and west banks of the 17th Street Canal. Steel sheet piling for canal embankment and seepage are also provided at this location to a tip elevation of -22.0'(±) NGVD along westbank and -17.0'(±) NGVD along the eastbank.

DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

48. General

The proposed structural components will compliment and complete the existing protection at each of the concrete horizontal tubes associated with the horizontal pumps. Additionally, the proposed components will provide both fronting protection and backflow prevention at the most easterly horizontal pumps built in 1914 and 1928 and provide backflow protection at the westerly pumps built in 1967 - 1986. I-walls will also be constructed at the east pumps (see figure 3). Only monoliths with motorized sluice gates will be provided at the 3 most westerly horizontal pumps providing backflow prevention; frontage protection currently exist at these pumps. Typical sections and plans are shown on the attached plates.

49. Sluice Gate Monoliths

There will be monolith structures, one (1) on each of the concrete horizontal tubes associated with each horizontal pump on the west side of the station built in 1967 - 1986 for a total of three (3); one (1) combined monolith for the two (2) horizontal pumps built in 1914 and the four (4) horizontal pumps built in 1928 on the east side of the original station. The openings at each of the structures for the proposed monoliths will match that of the existing concrete tubes less a center wall, and sidewall enlargements. Each monolith will also be provided with motorized sluice gates that can be closed during certain predicted hurricane stages. A concrete walkway for access and maintenance will also be provided at each structure. The foundation will consist of W14 x 73H-piles with a sheet pile cut-off to elevation -34.0' NGVD for seepage protection at the east monolith. No cut-off walls are required at the west monoliths since existing cut-off walls and flood walls currently exist at this location. There will be a total of 18 sluice gates, two (2) for each pump; larger single gates are not economically feasible due to weight. Additionally, a single monolith for multiple pumps are required where narrow common walls between discharges are constructed at the east pumps. These common walls would not allow for a single monolith design at each pump discharge; to accommodate the sluice gates, the common walls were widened at the monoliths. Also, center walls are being added at each discharge to accommodate adjoining the two (2) gates required for each tube. The top elevation of these structures will vary from 14.65' to 16.0' (±) NGVD (see plates). This elevation exceeds the minimum required USACE recommendation of 14.6'; however, it facilitates the height required to completely open the new sluice gates.

50. I-Wall

I-walls will close the gap between the original station and the proposed monoliths just east of the original station. T-walls were deemed impractical here because connection to the existing T-walls at the original station would require demolition of the existing slab destroying the integrity of the existing T-wall. The sheet pile cut-off elevation for this wall shall be -34.0' NGVD and will also provide for seepage protection. A rectangular reinforced concrete cap similar to that currently existing will also be provided atop this I-wall. An I-wall transition is also provided to accommodate connection between the proposed most east monolith and the existing east I-wall parallel to the canal. The tip elevation for the sheet pile at this location will vary from elevation -34.0' NGVD west of the existing retaining wall to match the existing retaining wall tip elevation and -22.0' NGVD east of the existing retaining wall.

MECHANICAL EQUIPMENT

51. General

Generally, the structures proposed for the improvements to Pumping Station No. 6 will be subject to high predicted water surface elevations (12.6' NGVD) on the unprotected side of the station. The high water surface elevations will create a positive head that will have to be resisted by motorized sluice gates at the culvert monoliths described under the proposed structural components section of this Supplement. Additionally, nominal hydrostatic pressure on the pump side will also have to be resisted since pumping operations will be terminated when the gates are closed and some water may be present in the submerged discharge tubes.

52. Motorized Sluice Gates

A. Sluice Gates

Each concrete discharge tube associated with each horizontal pump will be fitted with two (2) cast iron sluice gates which will vary in width from approximately 8.5' to 12' (see plates 5 & 6). Two (2) sluice gates are required at each discharge tube because the existing large widths of each tube does not facilitate the placement of a single gate. A single gate would be so massive it could not economically be lifted. Additionally, a concrete center column is also required at each discharge to facilitate the installation of both gates. In some cases, the side walls of the discharge tubes will also have to be widened into the area of discharge to facilitate installation of the sluice gates. The center piece and the side wall widenings will be rounded to minimize the minor loses realized at the pumps.

The height of the tubes at the gate monoliths will also be increased to lessen velocity differences and create a larger area of discharge. However, due to the extension in length of the tubes, minimal head losses will exist. An order of magnitude calculation of minor losses, frictional losses and the assumptions used are shown in Appendix D for reference only. Also, these cases are explained in more detail in the Hydraulics Section of this Supplement.

Additionally, the sluice gates will be motorized and within a wall thimble installed to match the existing inside invert of each existing concrete tube less the extensions and center columns described above. Each sluice gate will be able to withstand the maximum and minimum heads required for the varying head conditions. Each sluice gate will also be supplied with an exterior gear box with a gear ratio able to provide for smooth opening and closing by electric motors.

B. Operators

The sluice gates shall be operated by electric motors and low torque type gear drives mounted at the tops of the gate monoliths. The power required for these gates will be provided via existing power in the station and back-up systems in the result of a power failure. Hand wheels will also be provided as a mechanical back-up on each of the operators; however, it should be noted that these hand wheels would take much too long to operate in an emergency situation.

53. Butterfly Valves

Butterfly valves are utilized at the temporary cofferdam for purposes of flooding the dewatered area for emergency use of the pumps. The valves would be provided with square butterfly gates used to control the flow into the cofferdam. They shall be operated by a manual actuator and have an electrically activated gear unit installed that can be operated from a remote location. Since the butterfly valve opens and closes via the leaf rotator about its vertical centerline, the force created by the water on the flood side is nearly balanced. This greatly reduces the torque needed to operate the gate. Therefore, opening and closing the butterfly gate requires minimum mechanical force and results in faster gate operation.

The valves shall be HYDRO type butterfly valves or equal and shall have vertical shafts manufactured of Type 304 stainless steel solid bars. Bearing assemblies shall be self lubricating to minimize friction and deter any possibility of corrosion. Additionally, the manual activator shall consist of a worm gear and shaft keyed for a 90° rotation.

As previously noted, the valves shall be required to be electrically driven using the same activators. Locks are also provided at the remote station operation to prevent accidental use. A locking device at each butterfly valve is also provided to prevent vandalism.

ELECTRICAL EQUIPMENT

54. Electrical Equipment

General

The design of the electrical system for the eighteen gate motors and controllers will include provisions for power and control. The design is based on criteria provided by the Sewerage and Water Board, concerning space, conduit routing and power source availability, and on the use of equipment and material that are available as standard products of the electrical industry. Gate operation procedures will require that two gates can be operated at a time. In the selection of materials and equipment, consideration is given to ease of operation, reliability, and ease of maintenance. The Standards of the National Electrical Manufacturers Association (NEMA), the Institute of Electrical and Electronic Engineers (IEEE), and the American National Standards Institute (ANSI) is used as guides in the selection of electrical equipment. The design of circuits and conduit system will conform to the 1993 National Electrical Code (NEC) and the National Electrical Safety Code.

55. Power Sources & Distribution

A. General

The station power supply for pumps A-F on the east side and pump G on the west side is 6600 V, 3 ø, 25 Hz. The station power supply for pumps H and I on the west side is 4160 V, 3 ø, 60 Hz. Lighting and convenience outlets are supplied with the usual 120 V, 60 Hz electrical service. The Sewerage and Water Board request that power to all new gate motors be 480 V, 3 ø, 25 Hz.

B. Loads

1. Sluice Gate Operators

a. Power for the 12 sluice gate operators on the east side shall come from MCC 4. A spare 100 Ampere fusible switch is available for the feeder which will be common to all gate operators. This feeder has been sized based upon a load diversity of 50%, which means that the feeder has been sized to handle 6 sluice gates in operation at one time.

b. Power for the 6 sluice gate operators on the west side shall come from MCC 2. A 60 Amp fusible switch shall be installed in a spare cubicle of MCC 2 to provide protection for the feeder which will be common to all gate operators. This feeder has been sized based upon a load diversity of 50%, which means that the feeder has been sized to handle 3 sluice gates in operation at one time.

c. All sluice gate operators shall be powered by 480 V, 3-phase, 25 Hz motors.

d. Remote control circuits for each sluice gate operator shall run from the existing spare section of the control console in the control room to each operator. There shall be a remote control circuit for all 12 sluice gates on the east side and all 6 sluice gates on the west side. Also there shall be a remote control circuit for each existing butterfly valve associated with the vertical pumps in the original 1913 pumping station. Control wiring shall be extended from each existing valve operator to the control console.

2. <u>Temporary Butterfly Gates</u>

a. Power for the eight temporary butterfly gates shall be 480 V, 3 ø, 25 Hz. The 7 gates on the east side shall be powered from MCC 4. The feeder being installed to provide permanent power to the east side sluice gates shall be extended to pick up the five butterfly gates. The three butterfly gates on the west side shall be powered from MCC 2 and the new feeder for the west side sluice gates shall be extended to pick up the three butterfly gates.

b. Power for the lighting of the service catwalks across the temporary sheet-pile dam shall be 120 V, 60 Hz, and controlled by a photo-cell contract arrangement.

3. <u>Voltage Drop Requirements</u>

Conductors will be sized to prevent voltage drops from exceeding three (3%) percent at the furtherest utilization point of each circuit.

56. Conduit and Boxes

A. Conduit

All above ground and interior wiring shall be installed in rigid metal conduit except that motors and other electrical equipment subject to vibration will be connected with liquid-tight flexible metal conduit.

All conduit buried below grade will be in a steel reinforced red concrete envelope of 3" minimum thickness. In some areas, as requested by the Sewerage and Water Board, feeder cables will run in concrete duct banks.

B. Pull and Junction Boxes

All pull and junction boxes will be of cast metal of sufficient thickness, with bosses to accommodate the required threads for the conduit connectors and meet NEC requirements.

57. Gate Motor Operator Control Push Buttons

A. Control for all gate motors shall be open/close Push buttons and end of travel pilot lights.

B. Local control on the operators will include stop-open-close Push buttons with pilot lights.

C. Remote control will be located on the existing spare section #12 of the control console in the control room and will consists of only open-close Push buttons and pilot lights for each operator.

ACCESS ROADS AND STAGING AREA

58. Access Roads and Staging Area

Vehicular access to the project area for the purpose of transporting construction personnel and equipment is available via the I-10 at the Metairie Road exit and west along Metairie Road to Orpheum Street and North on Orpheum Street to Pumping Station No. 6. Once at Pumping Station No. 6, equipment can be staged from the west bank of the canal just north of the station and railroad tracks, where the NOS&WB owns a large fenced lot that was used for staging construction in the 1982 and 1986 improvements. Site access can be seen on plates 1 & 2. Additionally, pile driving rigs and larger equipment can access the site from Carrollton Street to Pink Street northwest of the station. At the end of Pink Street, the previously mentioned staging area has entrance gates that can be used for access.

Also, just east of the station from Metairie Road, the Contractor can access the east part of the station from Maryland Avenue. However, low power lines restrict the transport of large construction equipment in this area.

59. Coordination with Norfolk Southern Railroad

In general, the Contractor will be specifically prohibited from protruding beyond his easement and into the right-of-way in the vicinity of the Southern Railroad tracks and bridge. Additionally, the Contractor will need to prohibit all activities and traffic from the vicinity of the track crossing at the west right-of-way, crane and pile driving operations may need to cease when a train is crossing the bridge. Project specifications will specify railroad clearance requirements, construction activity termination criteria, special insurance requirements, and a preconstruction conference with the Norfolk Southern Railroad.

In speaking with Mr. Dave Orrison of Norfolk Southern Railroad, the specific concerns of the Norfolk Southern Railroad are as follows:

- No walking on trestle;
- Acquire easement where staging area and new construction fall within railroad's rights-of-way;

- Provide fencing between work area and track; and

- Provide railroad supervision where crane equipment booms towards track.

Additionally, the Railroad did express their wishes to eliminate the at-grade crossing of the track; however, talks are underway between the USACE Realestate Section and the Railroad for determining what permits, insurance, etc. are needed to accomplish all work as shown in this Supplement.

ESTIMATE OF COST

60. General

Based on December 1982 price levels contained in NOS&WB contract 5103, an estimated cost for construction of the existing station "flood protection" is presented. The cost of the existing station components was developed in order to facilitate crediting the sponsoring agencies. This cost estimate totals $2,793,317.18, which consist of $753,546.70 for the eastbank "flood protection" along the 17th Street Canal, $1,000,741.84 for the west bank "flood protection" along the 17th Street Canal and $1,039,028.64 for "flood protection" fronting to the stations.

Additionally, an estimated cost for construction of proposed improvements to the station is developed. This cost is based on 1996 predicted price levels provided by USACE and totals $5,686,289.70, or $4,454,448.00 for Construction, $209,000.00 Engineering for Supplement No. 1, $202,000.00 Engineering for P&S, and $820,841.70 for Construction Management. The total cost for "flood protection" at this station is $8,479,606.88 for the previously constructed improvements and the proposed improvements. These estimates are shown in Appendix C.

61. Basis of Estimate for Existing Flood Protection

The cost estimate for the existing protection is based on 1982 price levels when the existing improvements were generally constructed. Costs associated with other improvements made to the station in 1986 are not available from the NOS&WB due to a pending lawsuit. Quantities for these improvements are based on extensive review of record documents provided by the NOS&WB who sponsored the improvements to this station in 1982 and 1986 under several phases of construction. A detailed quantity take-off is contained in Appendix C for reference. Also, a brief description of the existing improvements and the criteria deeming what items are considered "flood protection" is shown in this Supplement under the section titled "Description of Existing Structural Components". Also, these components are shown on attached plates.

62. Basis of Estimate for Proposed Flood Protection

The cost estimate for the proposed improvements is based on 1996 predicted price levels provided by the USACE and a detailed quantity take-off, see Appendix C. Brief descriptions of each of the components proposed can be found in this Supplement under "Proposed Structural Components".

Additionally, the attached plates depict the plan and typical sections of the proposed improvements. Also, a 20% contingency is added to the cost for the risk of market fluctuations. Contingencies are based on uncertainties involved in the preparation of P&S, proposed systems and market conditions.

63. Unit Prices

Unit prices were provided by the USACE for the 1986 and 1996 predicted price levels and by the NOS&WB from previously constructed phases during 1982.

SCHEDULE FOR DESIGN AND CONSTRUCTION

64. Schedule for Design and Construction

This work is presently not budgeted by the USACE. However, funds will be made available so that the contract can be awarded in August 1996.

Design Start	Design Compl	Adver.	Award	Compl	Est. Const. Cost
May 95	May 96	June 96	Aug 96	Jan 98	$4,454,448.00

65. Setting

The biological, cultural and recreational resources are presented in a previous design memorandum DM No. 20 and is included in the Supplement by reference.

66. Impacts

A. Biological Resources

The effects of the closure are documented in the previous design memorandum DM No. 20 which is included by reference.

B. Cultural Resources

The effects of the closure are documented in the previous design memorandum DM No. 20 which are included by reference.

C. Recreational Resources

The effects of the closure are documented in the previous design memorandum DM No. 20 which are included by reference.

67. Status of Environmental Impact Statement

The impacts for the proposed closure is documented in a previous design memorandum DM No. 20 titled "Design Memorandum No. 20, General Design, Orleans Parish-Jefferson Parish, 17th Street Canal (Metairie Relief)", as developed in 1990 for the USACE and is included in this Supplement by reference.

REAL ESTATE REQUIREMENTS

68. Source of Information

Real estate information presented in this memorandum is based on field reconnaissance, abstracts, surveys, aerial photographs and engineering design.

69. General

The majority of rights-of-way needed to construct the new monoliths and closure structures are within the existing rights-of-way owned by New Orleans Sewerage and Water Board which will require their approval. However, some portions of the project will involve areas owned by the Southern Railroad. These areas are shown in the attached plate labeled "Rights-of-Way" and a permit will be required from the railroad prior to the commencement of construction.

Although, it does not appear that major construction activities will take place on any levee board property, both Orleans and Jefferson Parish entities as well as the State are afforded an opportunity to comment on this Supplement. Additionally, letters of no objection are required from the aforementioned to facilitate ingress and egress to the site should it be deemed necessary for minor construction activities such as construction layout and equipment transport to be accessed through their property.

UTILITY RELOCATIONS

70. General

There are no utilities in the area of proposed improvement that are anticipated to require relocating, except that some NOS&WB owned utilities (i.e. electrical) will require minor rerouting to facilitate the new motorized equipment for the sluice gates, temporary butterfly valves, and lighting.

71. Estimate of Relocation Cost

Cost associated with relocating the aforementioned electrical components is included in the cost of the proposed improvements.

OPERATION AND MAINTENANCE FOR PROPOSED IMPROVEMENTS

72. Annual Costs

All operation and maintenance (O&M) cost for this project will be local responsibility. The estimated O&M costs are as follows:

Sluice Gate Maintenance	$ 9,200.00/year
Gated Monolith Maintenance	3,000.00/year
I-wall Maintenance	2,200.00/year
SubTotal	$14,400.00/year
Contingency	2,880.00
Total	**$17,280.00/year**

RECOMMENDATIONS

73. Recommendations

The plan presented in this Supplement is recommended for approval as a basis for preparing plans and specifications for this project.

APPENDIX A

HYDROLOGY AND HYDRAULICS

(From DM No. 20)

HYDROLOGY AND HYDRAULICS

13. General. Design Memorandum No. 13, General Design Orleans Parish Lakefront Levee West of I.H.N.C. presents the essential data, assumptions, and computations for developing the plan design. Tidal hydraulic criteria applicable to the High Level Plan is provided in Appendix A of that document.

Construction of the proposed levee/floodwall system and/or Butterfly Gates will not significantly affect existing surface drainage patterns. Minor modifications to existing area storm and sanitary utilities are required.

14. Water Surface Elevations Using Nominal Pump Capacities. A hydraulic analysis was performed for the 17th Street Outfall Canal to determine the required levee/floodwall height for hurricane protection. Water surface profiles were computed using the HEC-2 Computer Program. For flow through the bridges, HEC-2's special bridge routine was implemented. The existing bridges crossing the canal are at elevations lower than the existing levee grades. Therefore, under existing conditions, pressure flow or both pressure and weir flow is probable under design conditions. It was assumed that flow would be contained within the levee cross sections at the bridge sites.

Cross section information was taken from Modjeski and Masters drawings dated December 1981, which were used in a study for the Orleans Levee Board. Values used for Manning's "n" were as follows:

n=.024 main channel
n=.060 channel overbank

Dredging of the canal, as well as the modification of the levees to meet existing levels of flood protection, is considered to be the New Orleans Sewerage and Water Board Base Project (since dredging of the canal is considered necessary to alleviate flooding in portions of Orleans and Jefferson Parishes). Therefore the existing conditions flowline, Profile 1, is based on a HEC-2 computer model that assumes the canal dredged according to the Base Project, with the exception of areas under the bridges.

Flow rates in the canal were based on nominal pump capacities. Sewerage and Water Board Pump Station No. 6 consists of four vertical pumps; two, twelve-foot pumps; four, fourteen-foot pumps; and one single 1,000 cfs pump resulting in a 6650 cfs capacity. Computer runs were also made for 9,630 cfs (future flow) as well as 6,650 cfs (existing flow).

A starting water surface elevation of 11.5 ft. NGVD was used at the lake. This is the still water surface elevation of Lake Pontchartrain for the Standard Project Hurricane.

Various alternatives were developed to prevent the flow of water onto the bridge decks and into residential areas during periods of extreme high water. Raising bridges, floodproofing and road gates were all considered. The following profiles show the water surface elevations for the various bridge conditions for both existing and future pump nominal capacities. The computed water surface elevations at the upstream side of the bridges and the respective bridge head losses are shown in Table 1.

The optimum alternative for reductions in stage is the plan which raises all the bridges above the flowline, Profile 2, Plate 129. The resulting water surface elevation at the railroad is 11.71 NGVD for existing pumping capacity and 11.94 ft. NGVD for future pumping capacity.

The current state of deterioration of the I-10/610 bridge decks has become critical to the Department of Transportation and Development. Since replacement is being planned, consideration was given to raising the I-10/610 bridges with various conditions for the other bridges. Profile 3, Plate 130, raises I-10/610, while the other bridges remain in existing conditions.

Consideration was given to the alternative of floodproofing the bridges by extending solid guardrails to a height above the anticipated water surface elevation. This modification prevents storm water from escaping into residential areas via the bridge and allows the passage of traffic in hurricane situations. Profiles 4, 5 and 6, Plates 131, 132 and 133, respectively, show flowlines for three floodproofing alternatives. The model for Profile 4 raise the I-10/610 to a low chord elevation of 11.1 ft. NGVD (which provides clearances of the 100-year event) and also floodproofs above that. Due to the open-deck type construction of the Southern Railway Bridge, floodproofing is not a practical solution at that location.

Floodproofing of a bridge causes all the flow to pass under the bridge deck, i.e., pressure flow. The inundation, as well as any entrapment of air under the deck, reduces the effective weight of the bridge. The horizontal forces due to unbalanced hydrostatic pressure, plus the energy from the moving mass of water, increases the dynamic forces acting on the bridge deck. The likelihood of the structure being lifted or pushed off the abutments and piers is greatly increased. Therefore, any floodproofed bridge must be sufficiently anchored.

TAB [illegible]

17TH STREET OUTFALL CANAL
DESIGN FLOWLINES AND BRIDGE HEAD LOSSES
FOR HIGH LAKE LEVEL (11.5 FT. NGVD)
WITH CHANNEL DREDGED

Bridge Condition	Canal Flow (cfs)	Lake Pont.	CANAL WATER SURFACE ELEVATION (FT. NGVD) Bucktown	Hammond Highway	Veterans (2 bridges)	I-10/610 (3 bridges)	Railroad
1) Existing-Gated Openings Dredged except under Bridges Bridge Head Loss	6650	11.5	11.53 0.03	11.61 0.08	12.09 0.36	12.57 0.46	12.80 0.15
Bridge Head Loss	9630	11.5	11.56 0.07	11.73 0.18	12.64 0.67	13.54 0.86	13.92 0.24
2) All Bridges Raised Bridge Head Loss	6650	11.5	11.50 0.00	11.51 0.00	11.62 0.00	11.65 0.01	11.71 0.00
Bridge Head Loss	9630	11.5	11.49 0.00	11.52 0.00	11.75 0.00	11.81 0.01	11.94 0.00
3) I-10/610 Raised Others = Existing Bridge Head Loss	6650	11.5	11.53 0.03	11.57 0.04	11.83 0.14	11.87 0.01	12.07 0.17
Bridge Head Loss	9630	11.5	11.56 0.07	11.65 0.09	12.16 0.16	12.22 0.01	12.62 0.33
4) All Bridges Flood Proofed Except Railroad = Existing Bridge Head Loss	6650	11.5	11.53 0.03	11.58 0.05	11.92 0.22	12.01 0.06	12.21 0.16
Bridge Head Loss	9630	11.5	11.56 0.07	11.66 0.10	12.39 0.48	12.59 0.15	12.95 0.30
5) I-10/610 Raised Hammond = Flood Proofed Vets & RR = Existing Bridge Head Loss	6650	11.5	11.53 0.03	11.58 0.05	11.84 0.14	11.87 0.00	12.07 0.16
Bridge Head Loss	9630	11.5	11.56 0.07	11.66 0.10	12.16 0.25	12.23 0.01	12.63 0.33
6) I-10/610 Raised Hammond & Vets = Flood Proofed Railroad = Existing Bridge Head Loss	6650	11.5	11.53 0.03	11.58 0.05	11.92 0.22	11.95 0.00	12.15 0.16
Bridge Head Loss	9630	11.5	11.56 0.07	11.66 0.10	12.39 0.48	12.45 0.01	12.82 0.30

15. <u>Structure Analysis</u>. The U. S. Army Engineer Waterways Experiment Station (WES) conducted a model study on the use of butterfly gates on the London Avenue Outfall Canal. The butterfly gates were designed to remain open during pumping to the lake and close with an incoming surge due only to the direction of flow. The model test results showed head losses through the structure were very small and for hydraulic analysis were considered to be insignificant. With the butterfly gates in place, levees/floodwalls are required on the lake side of the structure to contain an 11.5 ft. NGVD stage and would allow the water surface between the structure and the pumping station to be maintained within the existing levee height by shutting down the pumps. If, however, the gates remained open, nominal pump capacities were maintained and flow was confined to the channel, the water surface profiles would be represented by profiles 2 through 6 since head losses through the structure were insignificant.

APPENDIX B

GEOLOGY AND GEOTECHNICAL

INDEX OF SHEETS

1. **Geology**

2. **Geotechnical Report from DM No. 20**

3. **Geotechnical Information for Proposed Improvements**

1. Geology

GEOLOGICAL CROSS-SECTION LEGEND

U.S. ARMY CORPS OF ENGINEERS
FRONTING PROTECTION AT PUMP STATION No. 6
17th STREET OUTFALL CANAL
NEW ORLEANS, LOUISIANA

GROUP	GEOLOGICAL FORMATION	DESCRIPTION OF SUBGROUP	DEPTH TO TOP OF STRATUM IN FEET
1	Fill	Loose to compact shells, sand, brick fragments and cinders, and stiff to very stiff gray & tan clays.	Ground Surface
2	Swamp/Marsh	Soft to medium stiff gray and gray & tan clay and silty clay with organic material and sand and silt lenses, pockets, and layers.	1 - 8.5
3	Beach Ridge Sand	Interbedded layers of very loose to very dense gray sand, silty sand, and clayey sand with clay lenses and layers, silt lenses, and shell fragments.	21 - 30
4	Bay Sound/Nearshore Gulf	Soft to medium stiff gray clay and greenish-gray sandy clay with sand lenses, pockets and layers and shell fragments.	47 - 51
5	Pleistocene	Medium stiff to very stiff tan and gray or greenish-gray clay, silty clay and sandy clay and loose to medium compact gray and tan clayey silt.	67 - 74+

2. Geotechnical Reports from DM No. 20

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EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

BORINGS • TESTS • ANALYSES

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LLOYD A. HELD, JR.

1 December 1982

Burk and Associates, Inc.
Engineers, Planners and Environmental Scientists
4176 Canal Street
New Orleans, Louisiana 70119

Attention Mr. Jens Nielsen

Gentlemen:

Geotechnical Investigation
Sewerage and Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

Transmitted is our engineering report covering the geotechnical investigation performed in connection with the subject project.

Thank you for asking us to perform this investigation.

Yours very truly,

EUSTIS ENGINEERING COMPANY

By [signature]
Lloyd A. Held, Jr.

GEOTECHNICAL INVESTIGATION

SEWERAGE AND WATER BOARD OF NEW ORLEANS

PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO. 6

NEW ORLEANS, LOUISIANA

FOR
BURK AND ASSOCIATES, INC.
ENGINEERS, PLANNERS AND ENVIRONMENTAL SCIENTISTS
NEW ORLEANS, LOUISIANA

By
Eustis Engineering Company
Metairie, Louisiana

1 December 1982

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DESCRIPTION OF SUBSOIL CONDITIONS	4
Ground Water Conditions	5
FOUNDATION ANALYSIS	5
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Pile Foundations	9
Dewatering	12

FIGURES 1 THROUGH 26

GEOTECHNICAL INVESTIGATION

SEWERAGE AND WATER BOARD OF NEW ORLEANS

PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO. 6

NEW ORLEANS, LOUISIANA

INTRODUCTION

1. This report contains the results of a geotechnical investigation performed for proposed additions to Drainage Pumping Station No. 6 located in New Orleans, Louisiana. Written authorization to proceed with the investigation was received on 9 August 1982 from Mr. Jens Nielsen representing Burk and Associates, Engineers for the project. The scope of work was modified in October and authorization for the additional scope of work was received on 7 October 1982 by Mr. Thomas L. Jackson.

2. This report has been prepared in accordance with generally accepted soil and foundation engineering practice for the exclusive use of the Sewerage and Water Board of New Orleans and their representatives for specific application to the proposed additions to Drainage Pumping Station No. 6 located in New Orleans, Louisiana. In the event that any changes in the nature, design or location of the structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed

and conclusions of this report are modified or verified in writing.

3. The analyses and recommendations submitted in this report are based in part on data obtained from the soil borings. The nature and extent of variations that may exist between boring locations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations contained in this report.

SCOPE

4. The scope of the investigation included the drilling of undisturbed soil borings to determine the subsoil conditions and stratification and to obtain samples of the various strata encountered. Soil mechanics laboratory tests were performed on selected samples to evaluate the physical properties of the subsoils. Engineering analyses were made to determine estimated allowable capacities for Class "B" timber piles and steel "H" piles, the recommended sheetpile penetration, required anchor force and maximum bending moments for the various proposed bulkheads, and estimates of settlement.

SOIL BORINGS

5. Five (5) undisturbed sample type soil test borings were drilled during the period 16-19 August 1982. Subsequently, the scope of work was expanded to include construction on the

intake side of the pumping station and two (2) additional borings were drilled during the period 14-19 October 1982. All of the borings were drilled using a truck mounted rotary type drill rig to depths ranging between 60 and 100 feet below the existing ground surface at the location shown on Figure 1. The results of the borings are shown graphically in the form of subsoil profiles on Figures 2 and 3 and detailed descriptive logs of the individual borings are shown in both tabular and graphical form on Figures 4 through 10.

6. Undisturbed samples of all cohesive and semi-cohesive soils were obtained at close intervals or at a change in stratum using a 3-in. diameter Shelby tube sampling barrel. The samples were extruded in the field, inspected and visually classified by Eustis Engineering Company's soil technician. Representative portions were placed in moisture proof containers and sealed with paraffin for preservation prior to laboratory testing.

7. Cohesionless or semi-cohesive soils that could not be satisfactorily recovered with a Shelby tube sampling barrel were sampled during the performance of in situ Standard Penetration Tests. This test provides a measure of the relative density of cohesionless soils and gives an indication of the consistency of semi-cohesive soils. The Standard Penetration Test consists of counting the number of blows required to drive a 2-in. diameter sampler one foot after first seating it six inches using a 140-lb weight dropped 30 inches. The results of these tests are shown on the individual boring logs under

the column headed "Standard Penetration Test," and are shown on the subsoil profiles at the depths these tests were performed. Samples obtained during the performance of these tests were placed in glass jars for preservation.

LABORATORY TESTS

8. Soil mechanics laboratory tests consisting principally of natural water content, unit weight and either unconfined compression or unconsolidated undrained triaxial compression shear were performed on selected undisturbed samples. Atterberg liquid and plastic limit tests were performed on selected representative samples of cohesive and semi-cohesive soils. Results of all these tests are summarized and shown in tabular form on Figures 11 through 16.

DESCRIPTION OF SUBSOIL CONDITIONS

9. The natural ground surface is covered by 3.5 to 17 feet of fill material consisting primarily of medium stiff to very stiff gray and tan clay with pockets of sand and miscellaneous fill which is overlain with sand and shells at some locations. The natural subsoils consist primarily of soft to stiff gray and tan clay and very soft to medium stiff gray clay to depths ranging between 21 and 35 feet below ground surface. Beneath this is a stratum of very loose to very dense gray sand, silty sand and clayey sand that continues to depths

of 48 to 58 feet. Following this are strata of soft to medium stiff gray clay and sandy clay and very loose gray clayey sand to depths of 67 and 76 feet, except at Borings 2 and 4 which are terminated at the 60-ft depth. Beginning at depths of 67 to 76 feet at Borings 1, 3, 5, 6 and 7 is the Pleistocene formation which consists primarily of medium stiff to very stiff greenish-gray and tan and gray clay, silty clay and sandy clay interspersed with strata of loose to medium compact tan and gray clayey silt. All of these borings are terminated in the Pleistocene formation at depths of 85 to 100 feet below the existing ground surface.

Ground Water Conditions

10. Because the borings were filled after drilling operations, no ground water measurements were made for this investigation. However, recent measurements taken for a nearby project indicate the ground water surface may vary between 10 and 12 feet below the existing ground surface. The depth to ground water will vary due to climatic conditions and other factors. Therefore, it should be verified immediately prior to initiation of construction operations.

FOUNDATION ANALYSIS

11. Furnished information indicates that the proposed additions to Pumping Station No. 6 will include:

a) Installation of new discharge pipes at Pumps 1 through 4;

b) Installation of a new pump ("H") and discharge tube, and construction of foundations for a future pump ("I") and discharge tube;

c) Enlargement of the intake basin on the east and west sides of the canal and;

d) Enlargement of the discharge basin on the west side of the canal.

Sheetpile Analyses

12. Analyses to determine recommended sheetpile penetrations, required anchor forces and maximum bending moments in the sheets considered of using both short-term and long-term soil shear strengths. A factor of safety of 1.5 was applied to the estimated soil shear strengths to determine recommended sheetpile penetrations. Considering that building codes require an adequate factor of safety in the working stresses of all structural members, a factor of safety was not applied to the estimated soil shear strengths to determine the required anchor force and maximum bending moment in the sheetpiles. The computations were performed using drawings, conditions and cross-sections furnished by representatives of Burk and Associates.

13. <u>Cofferdam for New Discharge Pipes.</u> Furnished plans for installation of new discharge pipes at Pumps 1 through 4 include construction of a cofferdam in the discharge basin. Because the sequence of construction operations is important to the stability of the sheetpiles and new concrete floodwall, a three-stage construction operation is recommended as shown on Figure 17.

14. A granular material such as river sand should be used for the initial backfill behind the inner row of sheetpiles. After the area between the pump station and inner row of sheetpiles is dewatered, a cohesive soil may be used to complete the backfilling operations. It may be necessary to place a 6-inch layer of shells on the surface of the backfill to provide a stable working platform. The sheetpiles will extend into the clay beneath the sand stratum. Therefore, it may not be necessary to install a well point dewatering system to provide stability. If a well point dewatering system is used, the tip elevation of the sheetpile can be reduced. Additional analyses can be performed to determine the sheetpile penetration if necessary.

15. After completion of the new concrete floodwall, a strut should be intalled between the base of the floodwall and the outer row of sheetpiles. Design of the strut, floodwall and outer row of sheetpiles should be based on a horizontal force of 2.6 kips per linear foot. The water level between the inner and outer rows of sheetpiles can then be lowered to el 16.0 C.D. to complete installation of the discharge pipes.

16. After the water level is allowed to equalize, the strut can be removed and the outer row of sheetpiles can be driven to a deeper depth. This additional driving may cause vibrations and jetting may be required. It is important that the design of the concrete floodwall for hurricane conditions include a horizontal force of 1 kip per linear foot applied at el 22.5, due to the water pressure acting on the inner row of sheetpiles.

17. New/Future Pumps and Discharge Tubes. Furnished plans show that, on the west side of the pump station, a new pump and discharge tube will be installed and provisions will be made for a future pump and discharge tube. Excavation for construction of these foundations will require installation of a sheetpile bulkhead and a well point dewatering system for stability of the excavation. It is understood that the ground surface behind the bulkhead will be degraded to el 24 C.D. for a distance of at least 40 feet from the bulkhead and a temporary sheetpile floodwall will be installed to provide flood protection during the construction period. Results of the bulkhead and floodwall analyses are shown on Figures 18 and 19, respectively. It should be noted that a concrete slab placed at the bottom of the excavation should be designed to resist a horizontal force of 2.5 kips per linear foot that may be subsequently imposed by the sheetpiles.

18. Enlargement of the Intake Basin. Planned enlargement of the intake basin will require construction of new

bulkheads on the east and west sides of the basin and extension of the pile-supported concrete bottom slab. A well point dewatering system should be installed behind the new bulkheads to prevent a blow-out and/or heaving of the bottom of the basin. Results of the analyses of the bulkhead along the east side of the intake basin are shown on Figure 20. Results of analyses for two alternate configurations of the bulkhead along the west side of the intake basin are shown on Figures 21 and 22. It should be noted that the sheetpiles may impose a horizontal force against the bottom slab and, therefore, the slab should be designed to resist this horizontal force.

19. Enlargement of the Discharge Basin. Plans for enlargement of the discharge basin show that construction is confined to the west side. Considering that the normal water level will be maintained during installation of the new bulkhead, dewatering of the underlying sand stratum is not required. Results of the computations are shown on Figure 23.

Pile Foundations

20. Treated Class "B" timber piles may be used to support the new concrete floodwall (see Figure 17) and untreated Class "B" timber piles may be used to support the extension of the concrete bottom in the intake basin. A minimum butt and tip diameter of 12 and 7 inches, respectively, should be specified for timber piles. Steel "H" piles should be selected as anchor piles for support of all new bulkheads (see Figures 18 through 23).

21. Estimated allowable pile load capacities are based on a soil-pile relationship. The structural capacity of piles and/or connections to transmit the loads must be determined by others. Particular consideration should be given to the connection between steel "H" anchor piles and the sheet-piles (or walers) to transmit the required tension loads.

22. Allowable Pile Load Capacity. It is understood that treated Class "B" timber piles driven vertically and on a batter will be used to support the new concrete floodwall (see Figure 17). An allowable axial pile load capacity of 15 tons may be used for piles driven vertically and an allowable vertical component of 15 tons may be used for piles driven on a batter. Assuming these piles can be driven without the aid of jeeting to reduce vibrations, they should be driven to a resistance of 25 to 30 blows per foot in the underlying dense sand. It is estimated that the required driving resistance may be encountered at approximately el -8 C.D. If jetting is necessary to reduce vibrations during driving operations, vertical and battered timber piles should be driven to a tip embedment to el -13 C.D., to compensate for the effects of jetting. Estimated allowable pile load capacities for various lengths of untreated Class "B" timber piles for support of the new bottom slab are shown in the form of pile capacity curves on Figure 24. The estimated allowable vertical component of steel "H" piles driven on a batter are shown in the form of pile capacity curves on Figure 25. Steel "H" piles should be

used to provide the necessary anchor force to support the new bulkheads shown on Figures 18 through 23. All estimated pile load capacities include a factor of safety of approximately 2 against actual failure of the pile through the soil.

23. Capacity and Spacing of Pile Groups. Except for treated Class "B" timber piles supporting the new concrete floodwall, all piles will derive a majority of their supporting capacity through skin friction. When skin friction piles are driven in groups or clusters, a reduction of the single pile load capacity for group action may be necessary. The supporting value of individual piles in a group can be determined by use of the group perimeter shear formula shown on Figure 26. The maximum center to center spacing between piles in a group should be determined by the formula shown on Figure 26 but should not be less than 3 pile diameters. Greater spacing than the minimum may be required to satisfy group perimeter shear.

24. Estimated Settlement. It is estimated that settlement of pile supported foundations should be small and should not exceed 0.25 to 0.5 of an inch.

25. Pile Driving. Timber piles, steel "H" piles and steel sheetpiles should be driven with a steam or air hammer delivering 15,000 ft-lb of energy per blow. Timber piles should not be driven to a resistance greater than 25 to 30 blows per foot to minimize the possibility of damage to the piles. Preboring and/or jetting will probably be required to reduce the level of vibration transmitted during driving operations.

It is important that monitoring devices be established on all adjacent structures to monitor the intensity and effect of vibrations throughout all pile driving operations.

26. It will be necessary to prebore all untreated timber piles for support of the bottom slab constructed in the intake basin to reduce vibrations and to obtain the required embedment. Preboring should be accomplished using a "fishtail" bit and wet rotary methods. The diameter of the prebored hole should not exceed 6 inches and the hole should extend only to the elevation necessary to penetrate the underlying sand stratum.

27. The contractor should be prepared to "jet" all treated timber piles for support of the new concrete floodwall, all steel "H" anchor piles and all steel sheetpiles to reduce the intensity of vibrations during driving operations. If required, jetting operations should be concurrent with pile driving and should be only that which is necessary to reduce the intensity of vibrations to a permissible level. Jetting and/or the effects of jetting should not extend below the pile tip elevation at any time during or after completion of pile driving operations.

Dewatering

28. A well point dewatering system is required to prevent heaving and/or a blowout of the excavation adjacent to the new sheetpiles along the intake basin and pump station (see Figures 18, 20, 21 and 22). The system should be designed

and installed by a contractor qualified and experienced in the field.

EUSTIS ENGINEERING COMPANY

By [signature]
Lloyd A. Held, Jr.

L. J. Napolitano:ea

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE LA

Name of Project: Sewerage & Water Board of New Orleans

Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.

For: Burk & Associates, Inc.

Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 1 Soil Technician George Hardee Date 18 August 1982

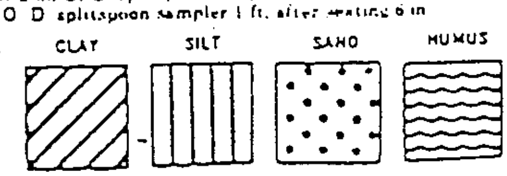
Ground Elev. 22.5 (est.) Datum Cairo Gr. Water Depth See Text

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	1.0	Loose gray fine sand		
1	2.0	2.5	1.0	3.0	Stiff to very stiff gray & tan clay		-7.5
					w/shells, organic matter & sand		
					pockets		
2	5.0	5.5	3.0	5.5	Miscellaneous fill (Shells, cinders,		
					clay pockets, silt, etc.)		
3	8.0	8.5	5.5	9.0	Stiff gray & tan clay w/silty clay		
					layers		
4	11.0	11.5	9.0	13.0	Medium stiff gray & tan clay w/decayed		
					roots		
5	14.0	14.5	13.0	15.0	Medium stiff gray & tan clay w/trace of		
					silt		
6	18.5	19.0	15.0	22.5	Very soft gray flocculated clay		
7	23.5	24.0	22.5	25.0	Medium compact gray clayey silt w/silty		
					clay layers		
8	28.5	29.0	25.0	30.0	Soft gray clay w/silt & clayey silt		
					lenses		
9	31.0	32.5	7.5 30.0		Dense gray fine sand	8	37
10	33.5	35.0			Ditto	9	42
11	36.0	37.5			Ditto	8	37
12	38.5	40.0		43.0	Dense gray fine sand w/silt	12	39
13	43.5	45.0	43.0	48.0	Very dense gray fine sand	18	50=6"
14	48.5	50.0	48.0	-25.5 52.0	Medium stiff gray clay	1	5
15	53.5	54.0	52.0		Medium stiff gray clay w/sand pockets		
					& shell fragments		
16	58.5	59.0		62.0	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.

Remarks:



Predominant type shown heavy Modifying type shown light

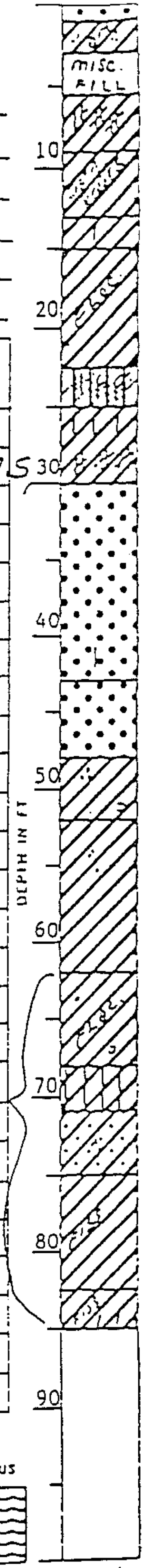


Fig. 4

SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. I (Cont'd) Soil Technician George Hardee Date 18 August 1982
Ground Elev. 22.5 (est.) Datum Cairo 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	63.5	64.0	62.0	68.0	Medium stiff gray flocculated clay		
					w/trace of sand & shell fragments		
18	68.5	69.0	68.0	71.0	Medium stiff greenish-gray silty clay		
19	73.5	74.0	71.0	75.0	Very stiff greenish-gray & tan sandy		
					clay w/sand pockets		
20	78.5	79.0	75.0	82.5	Very stiff tan & gray fissured clay		
21	83.5	84.0	82.5	85.0	Stiff gray & tan fissured clay w/silt		
					lenses		

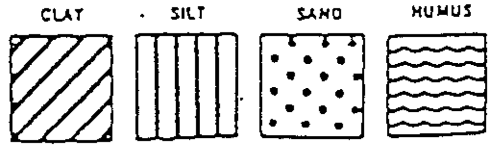
DEPTH IN FT

*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 2nd 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.

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:

CLAY SILT SAND HUMUS



Predominant type shown heavy. Modifying type shown light.

Fig. 4

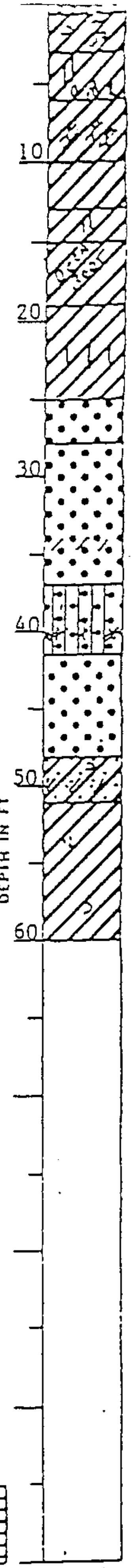
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 2 Soil Technician George Hardee Date 19 August 1982

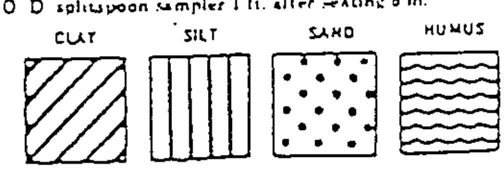
Ground Elev. 22.5 (est.) Datum Cairo Gr. Water Depth See Text

Sample No.	SAMPLE Depth — Feet		DEPTH STRATUM Feet		VISUAL CLASSIFICATION	*STANDARD PENETRATION TEST	
	From	To	From	To			
			0.0	0.7	Compact shells w/sand & clay pockets		
1	2.5	3.0	0.7	3.0	Stiff gray clay w/bricks, shells,		
					humus & wood		
2	5.0	5.5	3.0	6.0	Medium stiff gray clay w/silt pockets		
					& organic matter		
3	8.0	8.5	6.0	10.0	Medium stiff gray & tan flocculated		
					clay w/silty clay layers		
4	11.0	11.5	10.0	13.0	Medium stiff gray & tan clay w/roots		
5	14.0	14.5	13.0	15.0	Stiff gray & tan clay w/silt pockets		
6	18.5	19.0	15.0	19.0	Medium stiff gray clay w/decayed roots		
	23.5	24.0	19.0	25.0	Soft gray clay w/silt lenses		
8	25.0	26.5	25.0 (-2.5)	28.0	Loose gray fine sand	2	8
9	27.5	29.0	28.0		Dense gray fine sand	6	32
10	30.0	31.5			Ditto	8	42
11	32.5	34.0			Ditto	10	45
12	35.0	36.5		37.0	Dense gray fine sand w/clay layers	5	37
13	38.5	40.0	37.0	41.5	Loose gray silty sand w/clay & clayey	3	10
				-25.5	silt layers		
14	43.5	45.0	41.5	48.0	Dense gray fine sand	15	46
15	48.5	50.0	48.0	51.0	Soft gray sandy clay w/clayey sand	1	2
					layers & shell fragments		
16	53.5	54.0	51.0		Medium stiff gray clay w/sand pockets		
					& shell fragments		
17	58.5	59.0		60.0	Ditto		



...ber 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 ...d 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.

THIS LOG OF BORING IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CON...S AT ITS RESPECTIVE LOCATION ON THE DATE SHOWN. IT IS NOT WARRANTED THAT ...IS REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.



Remarks: ______

Predominant type shown heavy   Modifying type shown light

Fig. 5

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 3 Soil Technician George Hardee Date 17 August 1982
Ground Elev. 22.5 (est.) Datum Cairo 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	1.0	Medium compact shells w/sand & clay pockets		
1	2.0	2.5	1.0	3.5	Stiff tan & gray clay w/silt pockets, brick fragments & organic matter		
2	5.0	5.5	3.5	7.0	Soft gray & tan clay w/silt pockets & roots		
3	8.0	8.5	7.0	10.0	Medium stiff gray & tan clay w/silt pockets, roots & concretions		
4	11.0	11.5	10.0		Medium stiff gray & tan clay w/silt pockets		
5	14.0	14.5		16.0	Medium stiff gray & tan clay w/large roots		
6	18.5	19.0	16.0	21.0	Soft gray clay w/roots & silt pockets		
7	21.0	22.5	21.0 [handwritten: −1.5]	23.0	Very loose gray fine sand	2	4
8	23.5	25.0	23.0		Loose gray fine sand	4	7
9	26.0	27.5		28.0	Ditto	3	9
10	28.5	30.0	28.0	32.0	Medium dense gray fine sand	7	21
11	33.5	35.0	32.0	38.0	Loose gray fine sand w/clay layers	4	9
12	38.5	40.0	38.0		Medium dense gray fine sand w/clay layers	5	12
13	43.5	45.0		48.0	Medium dense gray fine sand	12	30
14	48.5	50.0	48.0 [handwritten: −25.5]	51.5	Soft gray sandy clay w/clayey sand layers	1	2
15	53.5	54.0	51.5		Medium stiff gray flocculated clay w/sand pockets & shell fragments		
16	58.5	59.0		63.0 [handwritten: −40.5]	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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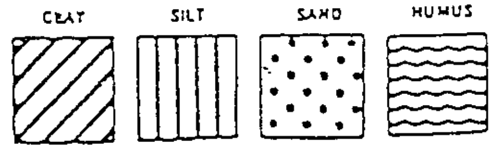

Predominant type shown heavy. Modifying type shown light.

Remarks:

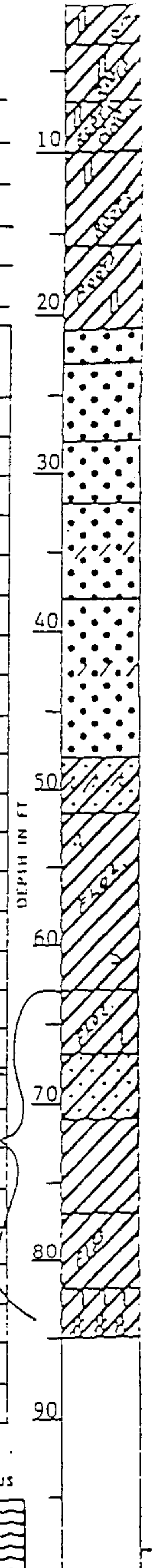

Fig. 6
(Sheet 81)

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 3 Soil Technician George Hardee Date 17 August 1982
Ground Elev. (Cont'd) 22.5 (est.) Datum Cairo 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	63.0	67.0	Medium stiff gray flocculated clay w/trace of silt		
18	68.5	69.0	67.0	71.0	Stiff greenish-gray & tan sandy clay		
19	73.5	74.0	71.0	77.0	Very stiff tan & gray clay		
20	78.5	79.0	77.0	82.0	Stiff reddish-brown & gray fissured clay		
21	83.5	84.0	82.0	85.0	Very stiff tan & gray clay w/silt lenses & clayey silt 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.

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CLAY SILT SAND HUMUS

Predominant type shown heavy. Modifying type shown light.

Remarks:

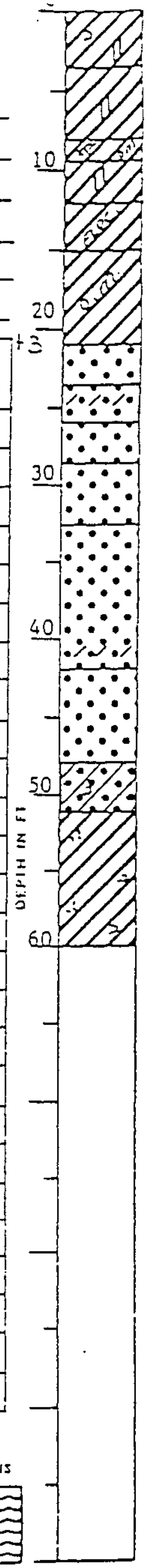
Fig. 6

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

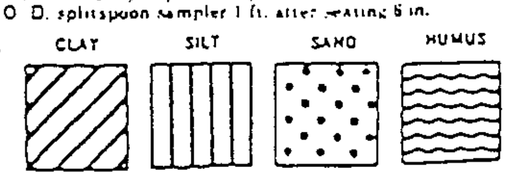
Boring No. 4 Soil Technician George Hardee Date 17 August 1982
Ground Elev. 24.0 (est.) Datum Cairo Gr. Water Depth See Text

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	Stiff tan & gray clay w/shells & silt pockets		
2	5.0	5.5	3.5	8.0	Medium stiff gray & tan clay w/silt pockets		
3	8.0	8.5	8.0	9.5	Medium stiff gray clay w/roots & organic matter		
4	11.0	11.5	9.5	12.0	Medium stiff gray & tan clay w/silt pockets		
5	14.0	14.5	12.0	15.0	Stiff gray & tan flocculated clay		
6	18.5	19.0	15.0	21.0	Medium stiff gray clay w/organic matter		
	21.0	22.5	+3.0 21.0	23.5	Loose gray fine sand	3	6
8	23.5	25.0	23.5	26.0	Very loose gray fine sand w/clay layers	2	2
9	26.0	27.5	26.0	28.5	Loose gray fine sand	2	6
10	28.5	30.0	28.5	32.0	Dense gray fine sand	3	44
11	33.5	35.0	32.0		Medium dense gray fine sand	5	15
12	38.5	40.0		42.0	Medium dense gray fine sand w/clay layers	3	29
13	43.5	45.0	42.0	-24.0 48.0	Very dense gray fine sand	18	50=9"
14	48.5	50.0	48.0	51.0	Very loose gray clayey sand w/shell fragments	2	3
15	53.5	54.0	51.0		Medium stiff gray clay w/sand pockets & shell fragments		
16	58.5	59.0		-56.0 60.0	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.

NOTE: 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. 7

SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA

Name of Project: Sewerage & Water Board of New Orleans

Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.

For: Burk & Associates, Inc.

Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 5 Soil Technician George Hardee Date 16 August 1982

Ground Elev. 32.0 (est.) Datum Cairo 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	Stiff gray & tan clay w/sand pockets,		
					shells & gravel		
2	5.0	5.5	2.5	7.0	Medium stiff gray & tan clay w/silt		
					pockets		
3	8.0	8.5	7.0		Medium stiff gray & tan clay w/trace		
					of organic matter		
4	11.0	11.5		13.0	Ditto		
5	14.0	14.5	13.0	17.0	Medium stiff gray & tan clay w/shell		
					fragments & silt pockets		
6	18.5	19.0	17.0	21.0	Medium stiff gray & tan clay w/decayed		
					roots		
7	23.5	24.0	21.0	25.0	Medium stiff gray & tan flocculated		
					clay		
8	28.5	29.0	25.0		Soft gray silty clay w/roots		
9	33.5	34.0		35.0	Soft gray silty clay w/sand lenses		
10	35.0	36.5	-3.0 35.0		Medium dense gray fine sand	6	22
11	37.5	39.0		39.5	Ditto	8	20
12	40.0	41.5	39.5		Very dense gray fine sand	19	50=9"
13	42.5	44.0			Ditto	15	50=9"
14	45.0	46.5		48.0	Very dense gray fine sand w/clay layers	5	50=10"
15	48.5	50.0	48.0	51.0	Loose gray fine sand w/clay layers	2	10
16	53.5	55.0	51.0	58.0	Very dense gray fine sand	24	50=6"
17	58.5	60.0	58.0	-26.0 62.0	Soft gray sandy clay w/shell fragments	1	6
18	63.5	64.0	62.0		Medium stiff gray clay w/sand pockets &		
					shell fragments		
9	68.5	69.0	-37.0		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 2nd 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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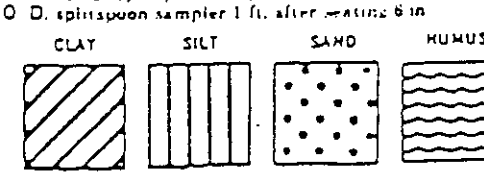
Remarks: ______



Predominant type shown heavy. Modifying type shown light.

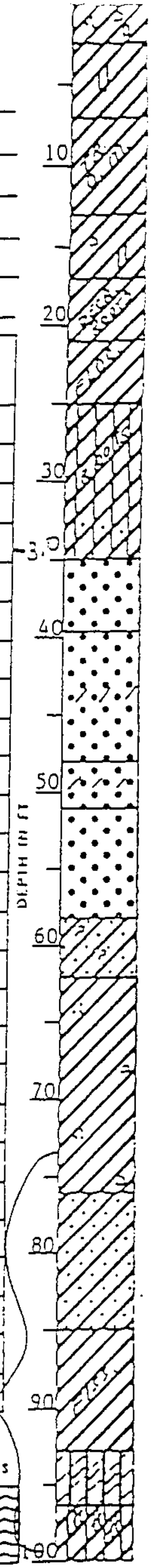


Fig. 8
(Sheet 1 of 2)

LOG OF BORING

EUSTIS ENGINEERING COMPANY

SOIL AND FOUNDATION CONSULTANTS

METAIRIE, LA

Name of Project: Sewerage & Water Board of New Orleans

Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.

For: Burk & Associates, Inc.

Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 5 (Cont'd) Soil Technician George Hardee Date 16 August 1982

Ground Elev. 32.0 (est.) Datum Cairo 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	-41.5 73.5	74.0		76.0	Medium stiff gray clay		
21	78.5	79.0	76.0		Very stiff greenish-gray & tan sandy clay		
22	83.5	84.0		85.0	Ditto		
23	88.5	89.0	85.0	92.5	Stiff tan & gray fissured clay		
24	93.5	94.0	92.5	96.0	Medium compact tan & gray clayey silt w/clay layers		
25	98.5	99.0	96.0	100.0	Stiff tan & gray silty clay w/clayey silt layers		

DEPTH IN FT

* ... 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 ... 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.

... 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:

SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 6 Soil Technician A. Croal, Jr. Date 14 October 1982

Ground Elev. 27.0 (est.) Datum Cairo 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	0.6	Bituminous sand surface		
1	0.5	1.0	0.6		Very loose to loose tan sand w/few		
					shells		
2	4.0	4.5		5.5	Ditto		
3	6.5	7.0	5.5		Stiff gray & tan clay w/shell pockets		
					(Fill)		
4	8.5	9.0		10.0	Stiff gray & tan clay		
5	11.0	11.5	10.0		Medium stiff gray & tan clay		
6	14.0	14.5		16.5	Medium stiff gray & tan clay		
7	18.5	19.0	16.5	21.5	Medium stiff gray fissured clay with		
			-5.5		organic matter		
—	22.5	23.0	21.5	23.5	Very loose to loose gray silty sand		
					w/sandy silt layers		
9	23.5	25.0	23.5		Medium dense gray silty sand	6	21
10	26.0	27.5		28.0	Ditto	9	25
11	28.5	30.0	28.0	31.0	Loose gray silty sand	2	9
12	31.0	32.5	31.0	32.5	Soft gray clay	3	3
13	32.5	34.0	32.5	37.5	Medium dense gray silty sand	6	24
14	37.5	39.0	37.5		Dense gray silty sand	10	30
15	42.5	44.0		47.5	Ditto	3	33
15A	47.5	49.0	47.5	50.0	Very loose gray clayey sand	2	2
16	53.5	54.0	50.0		Medium stiff gray fissured clay w/silty		
					sand pockets & shell fragments		
17	58.5	59.0	-32.0		Medium stiff gray fissured clay w/few		
					fine sand pockets & shell fragments		
					(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.

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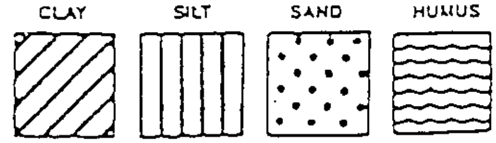
Remarks:



Predominant type shown heavy. Modifying type shown light.

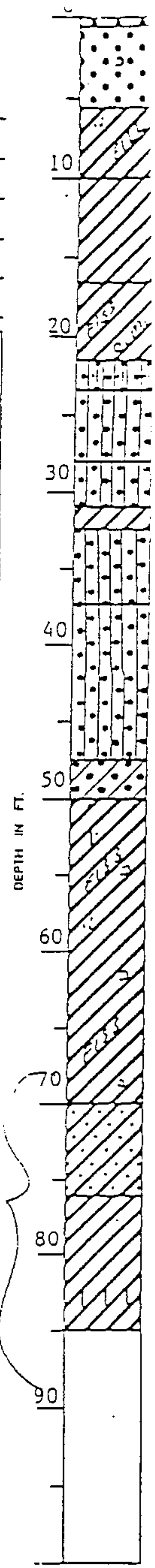


Fig. 9

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 6 (Cont'd) Soil Technician A. Croal, Jr. Date 14 October 1982
Ground Elev. 27.0 (est.) Datum Cairo 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	63.5	64.0			Medium stiff gray fissured clay w/shell		
-	-41.5				fragments		
19	68.5	69.0		70.0	Medium stiff gray fissured clay		
					w/few shell fragments		
20	73.5	74.0	70.0	76.0	Stiff greenish-gray sandy clay		
21	-50.0 77.0	77.5	76.0		Very stiff tan-brown & gray clay		
22	82.0	82.5		85.0	Very stiff tan-brown & gray clay w/silt		
				-58	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.

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. 9

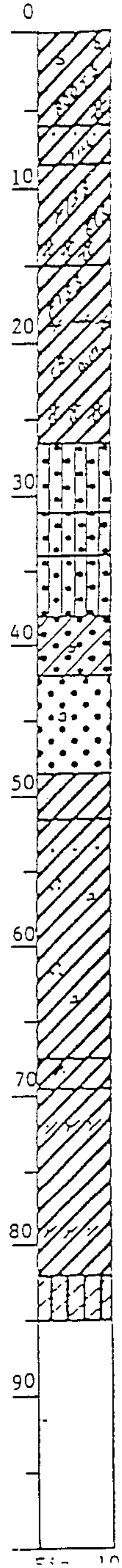
LOG OF BORING
EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 7 Soil Technician A. Croal, Jr. Date 19 October 1982

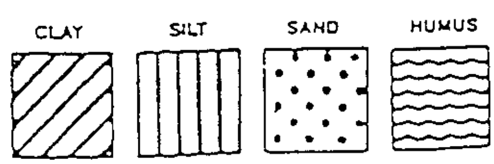
Ground Elev. 22.5 (est.) Datum Cairo Gr. Water Depth See Text

Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
1	0.0	0.5	0.0		Medium stiff gray & tan clay w/shell		
-					fragments & grass roots		
2	2.0	2.5			Medium stiff gray & tan clay w/shell		
					fragments, clayey silt pockets, etc.		
3	5.0	5.5		6.0	Medium stiff gray & tan clay w/clayey		
					silt pockets & trace of gravel		
4	8.0	8.5	6.0	8.5	Soft gray & tan clay w/fine sand layers		
					(Fill)		
5	11.0	11.5	8.5		Medium stiff gray & tan fissured clay		
					w/clayey silt layers & roots		
[illegible]	14.0	14.5		15.0	Medium stiff gray & tan fissured clay		
7	18.5	19.0	15.0		Soft gray fissured clay w/thin		
					organic clay layers, trace of organic		
					matter, clay pockets & layers		
8	23.5	24.0		26.5	Soft gray fissured clay w/many clayey		
					silt lenses		
9	28.5	30.0	-4.0 26.5	31.0	Medium dense gray silty sand	5	23
10	31.0	32.5	31.0	34.0	Dense gray silty sand	7	34
11	33.5	35.0	34.0		Very dense gray silty sand	8	50
12	36.0	37.5		38.0	Ditto	9	50=10"
13	38.5	40.0	38.0	42.0	Loose gray clayey sand w/shell fragments	4	8
14	43.5	45.0	42.0	-26.0 48.5	Dense gray fine sand w/shell fragments	11	41
14A	48.5	50.0	48.5	51.5	Soft gray clay	2	8
15	53.5	54.0	51.5		Medium stiff gray clay w/fine sand		
					layers, pockets & shell fragments		
					(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.

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:

SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

Name of Project: Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6, New Orleans, La.
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Boring No. 7 (Cont'd) Soil Technician A. Croal, Jr. Date 19 October 1982
Ground Elev. 22.5 (est.) Datum Cairo Gr. Water Depth See Text

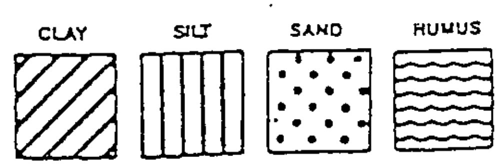
Sample No.	Sample Depth — Feet From	Sample Depth — Feet To	Depth Stratum Feet From	Depth Stratum Feet To	Visual Classification	*Standard Penetration Test	
16	59.5	60.0			Medium stiff gray clay w/shell fragments		
17	63.5	64.0		67.5	Ditto		
18	68.5	69.0	67.5	69.5	Medium stiff tan & gray clay w/clayey		
					sand pockets		
19	72.0	72.5	69.5		Very stiff tan & gray clay w/sandy clay		
					layers		
20	77.0	77.5		82.0	Very stiff tan & gray clay		
21	82.0	82.5	82.0	85.0	Loose to medium compact tan & gray		
				-62.5	clayey 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.

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 4

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 1 22.5

Sample No.	Depth in Feet	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft		Atterberg Limits LL	PL	PI
4	11.0	Medium stiff gray & tan clay with decayed roots	31.1	86.8	113.9	1190	595			
5	14.0	Medium stiff gray & tan clay with trace of silt	30.2	88.0	114.5	1965	980			
6	18.5	Very soft gray flocculated clay	57.3	64.2	101.0	490	245			
7	23.5	Medium compact gray clayey silt w/silty clay layers	34.8	88.4	119.2	1355*	675			
8	28.5	Soft gray clay with many silt lenses & clayey silt layers	37.8	84.9	116.9	525	260	32	19	13
15	53.5	Medium stiff gray clay w/sand pockets & shell fragments	48.5	70.4	104.5	1690	845			
17	63.5	Medium stiff gray flocculated clay w/trace of sand & shell fragments	52.8	68.4	104.5	1820	910			
19	73.5	Very stiff greenish-gray & tan sandy clay w/sand pockets	19.3	99.2	118.4	4160*	2080			
21	83.5	Stiff gray, tan & yellow fissured clay w/silt lenses	35.6	83.8	113.6	2875	1437			

*Unconsolidated-Undrained Triaxial Compression Test - One Specimen. Confined at the approximate overburden pressure.

Fig. 11

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 2 2.5

Sample No.	Depth in Feet	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
2	5.0	Medium stiff gray clay w/silt pockets & organic matter	56.4	63.7	99.6	1375 685			
4	11.0	Medium stiff gray & tan clay with roots	39.3	80.0	111.4	1415 705			
6	18.5	Medium stiff gray clay w/decayed roots	79.9	52.2	93.9	1335 665			
7	23.5	Soft gray clay w/many silt lenses	51.6	70.8	107.3	855 425	60	19	41
15	48.5	Soft gray sandy clay w/clayey sand layers & shell fragments	40.1	----	-----	----	39	16	23
16	53.5	Medium stiff gray clay w/sand pockets & shell fragments	47.0	71.4	104.9	1175 585			
17	58.5	Ditto	49.1	69.9	104.2	1910 950	73	19	54

Fig. 12

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 3 22.5

Sample No.	Depth in Feet	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
1	2.0	Stiff gray & tan clay w/silt pockets, concretions & decayed roots (Fill)	29.8	86.1	111.7	3835 1915			
2	5.0	Soft gray & tan clay w/large silty sand pockets & roots	38.9	78.6	109.2	960 480			
3	8.0	Medium stiff gray & tan clay with silt pockets, roots & concretions	38.4	81.5	112.7	1235 615			
4	11.0	Medium stiff gray & tan clay w/silt pockets	32.8	87.2	115.8	1530 765			
6	18.5	Soft gray clay with silt pockets, lenses & roots	45.0	74.6	108.2	915 455	54	20	34
15	53.5	Medium stiff gray flocculated clay w/sand pockets, shell fragments & roots	52.3	67.0	102.1	1530 765			
17	63.5	Medium stiff gray flocculated clay w/trace of silt	52.2	68.9	104.9	1615 805			
18	68.5	Stiff greenish-gray & tan sandy clay	18.1	107.8	127.4	3880 1940			
20	78.5	Stiff reddish-brown & gray fissured clay	35.2	84.9	114.8	2395 1200			

Fig. 13

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 4 2X

Sample No.	Depth in Feet	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft	Atterberg Limits LL	PL	PI
2	5.0	Medium stiff gray & tan clay w/silt pockets	38.0	80.2	110.7	1205 600			
3	8.0	Medium stiff gray clay w/roots & organic clay layers	63.1	59.9	97.7	1150 575	112	26	86
4	11.0	Medium stiff gray & tan clay w/silt pockets	31.0	89.8	117.7	1860 930			
6	18.5	Medium stiff gray clay w/organic matter	67.5	58.7	98.3	1100 550			
16	58.5	Medium stiff gray clay w/sand pockets & shells	52.1	67.9	103.3	1540 770			

Fig. 14

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

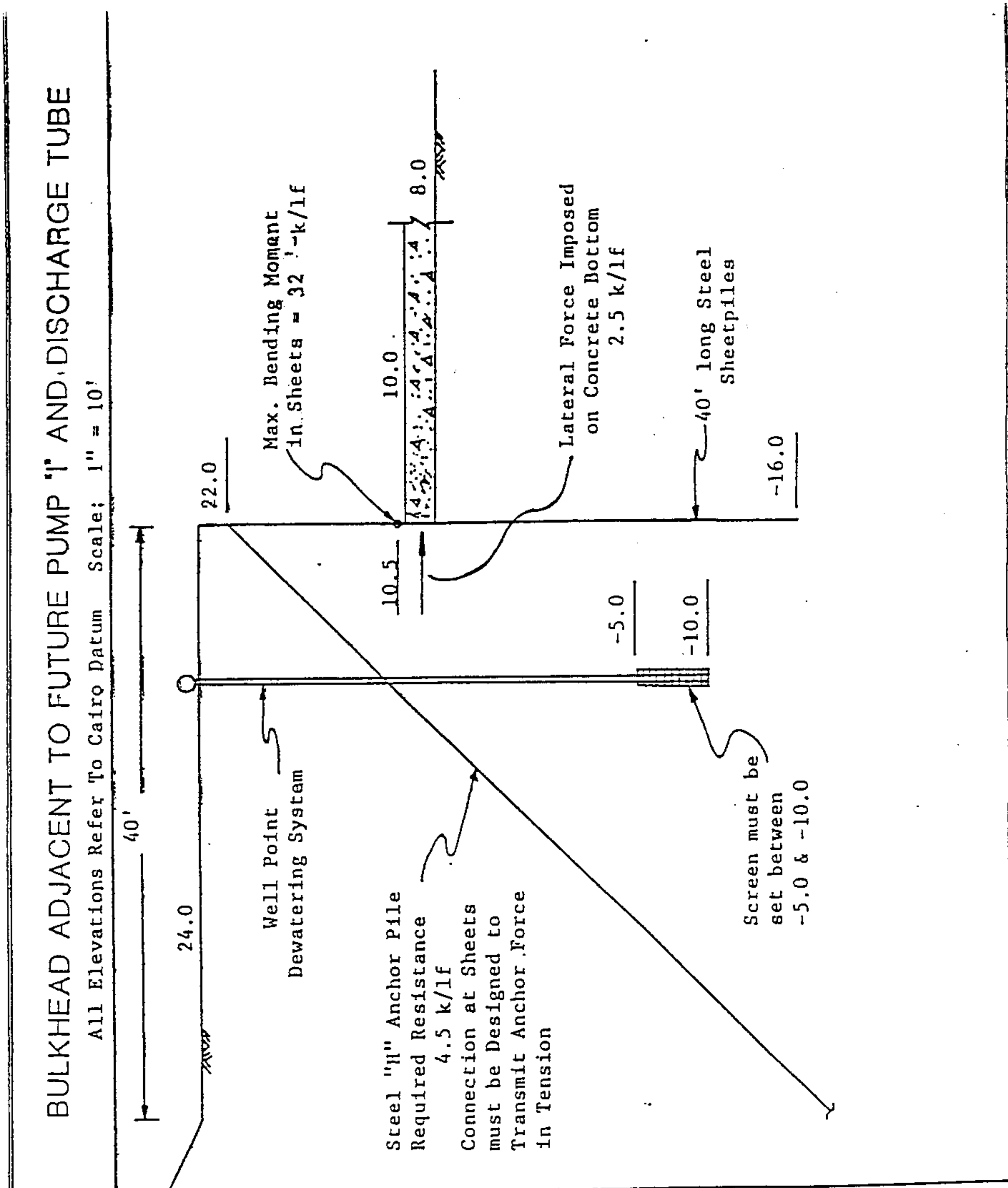
For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 5 32

Sample No.	Depth in Feet	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	
2	5.0	Medium stiff gray & tan clay with silt pockets	33.5	85.7	114.4	1795 900				
3	8.0	Medium stiff gray & tan clay with trace of organic matter	36.5	81.6	111.4	1625 810				
5	14.0	Medium stiff gray & tan clay with silt pockets & shell fragments	29.0	89.8	115.9	1040 520				
6	18.5	Medium stiff gray & tan clay with decayed roots	36.9	81.7	111.9	1700 850				
7	23.5	Medium stiff gray & tan flocculated clay	37.6	81.8	112.6	1105 550	71	24	47	
8	28.5	Soft gray silty clay w/roots	39.6	80.9	112.9	920 460	45	19	26	EL 5.0 S+WB
17	58.5	Soft gray sandy clay w/shell fragments	37.4	----	-----	----				
19	68.5	Medium stiff gray clay w/sand pockets & shell fragments	55.7	66.2	103.1	1265 630				EL -35.0 S+WB
21	78.5	Very stiff greenish-gray & tan sandy clay	17.8	109.2	128.6	4505 2250				EL -45 S+W
23	88.5	Stiff tan & gray fissured clay	35.0	85.3	115.2	3685 1840				EL - 55 S
25	98.5	Stiff tan & gray silty clay with clayey silt layers	24.3	96.8	120.2	2195 1100				EL - 65 S

Fig. 15

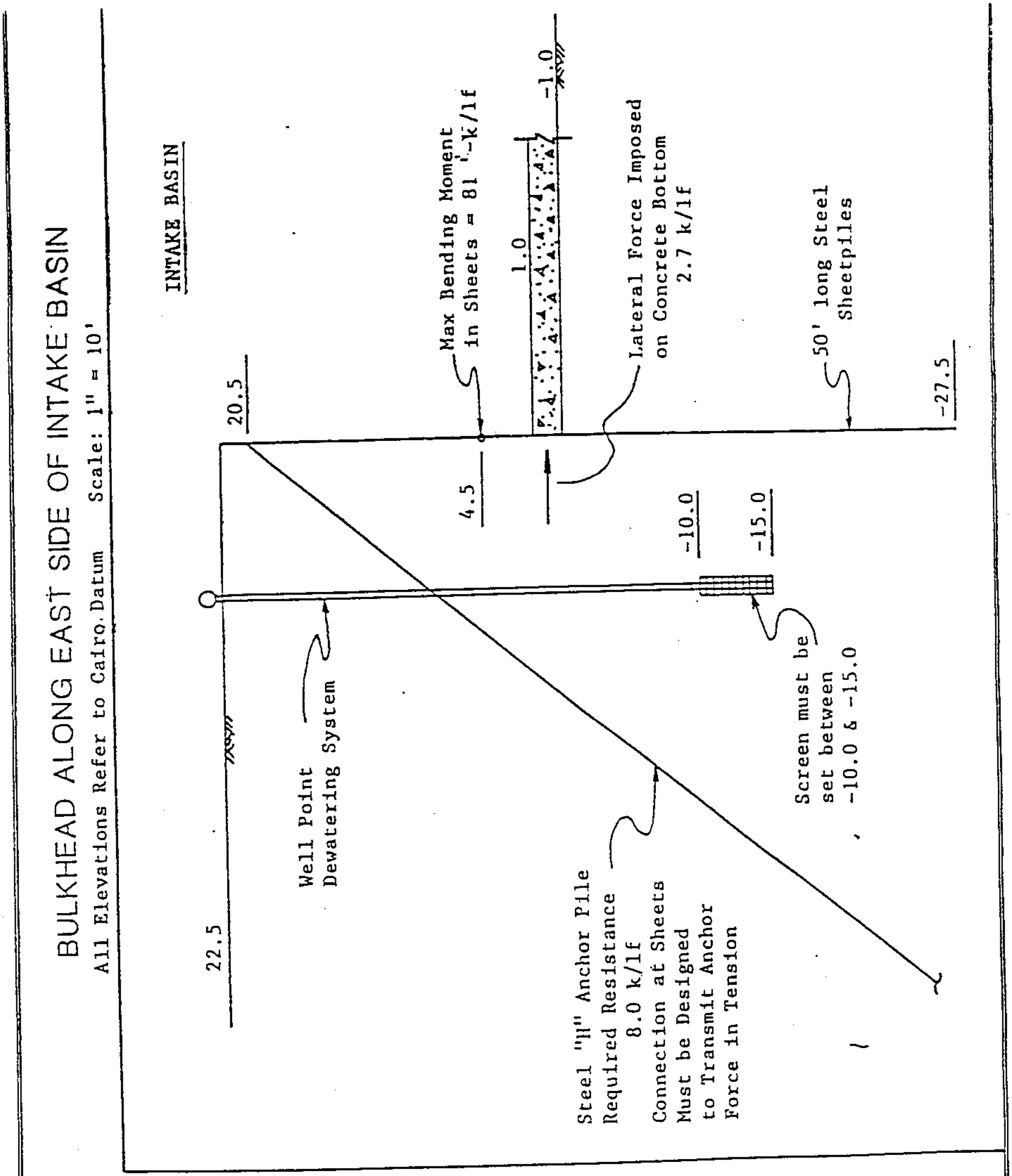


Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Fig. 18

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA



Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

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Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Fig. 20

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LOUISIANA

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

SUMMARY OF LABORATORY TEST RESULTS

BORING 6

Sample No.	Depth in Feet	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft
3	6.5	Stiff gray & tan clay w/shells	29.4	92.8	120.1	2355
5	11.0	Medium stiff gray & tan clay w/silt pockets	31.0	91.1	119.3	1755
7	18.5	Medium stiff gray fissured clay w/trace of organic matter	60.8	63.8	102.6	1030
16	53.5	Medium stiff gray fissured clay w/sand lenses, pockets & shells	43.1	76.8	109.9	1130
18	63.5	Medium stiff gray fissured clay w/shells	58.0	65.6	103.6	1895*
20	73.5	Stiff greenish-gray sandy clay	17.4	111.4	130.7	3200

BORING 7

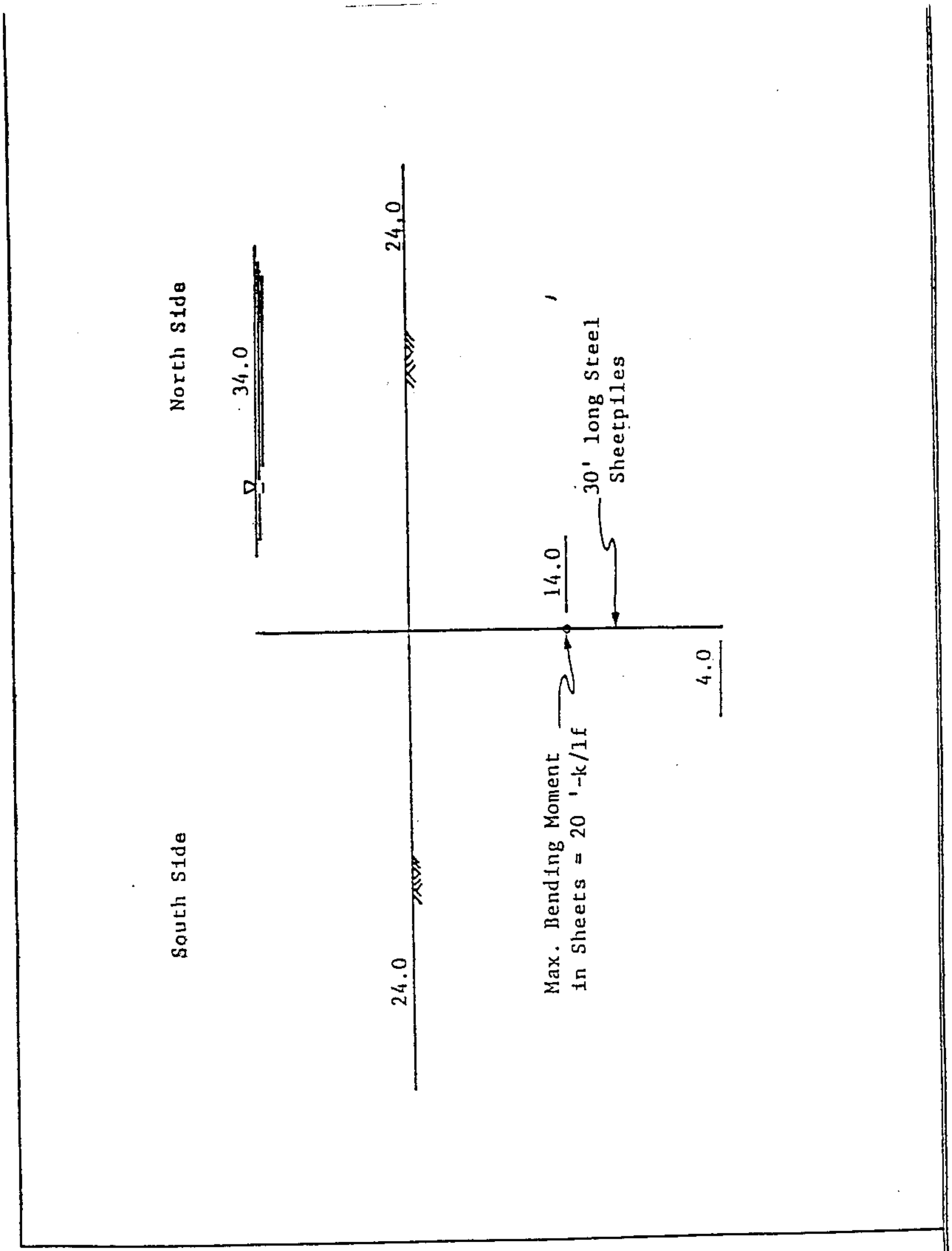
Sample No.	Depth in Feet	Classification	Water Content Percent	Density Lb/cu ft Dry	Density Lb/cu ft Wet	Unconfined Compressive Strength Lb/sq ft
2	2.0	Medium stiff gray & tan clay w/decayed wood	33.7	82.7	110.6	1355
4	8.0	Soft gray & tan clay w/sand pockets & lenses	27.4	87.5	111.5	645*
6	14.0	Medium stiff gray & tan fissured clay	45.3	76.2	110.8	1280
8	23.5	Soft gray clay w/silt lenses	50.2	72.9	109.6	910
15	53.5	Medium stiff gray clay w/sand pockets & shell fragments	46.1	73.2	106.9	1340
17	63.5	Medium stiff gray fissured clay w/trace of sand	52.6	69.1	105.4	1190*
19	72.0	Very stiff tan & gray clay w/sand pockets	29.6	93.3	120.9	4280

*Unconsolidated-Undrained Triaxial Compression Test - One Specimen. Confined at the approximate overburden pressure.

Fig. 16

TEMPORARY SHEETPILE FLOODWALL ADJACENT TO FUTURE PUMP 'I'

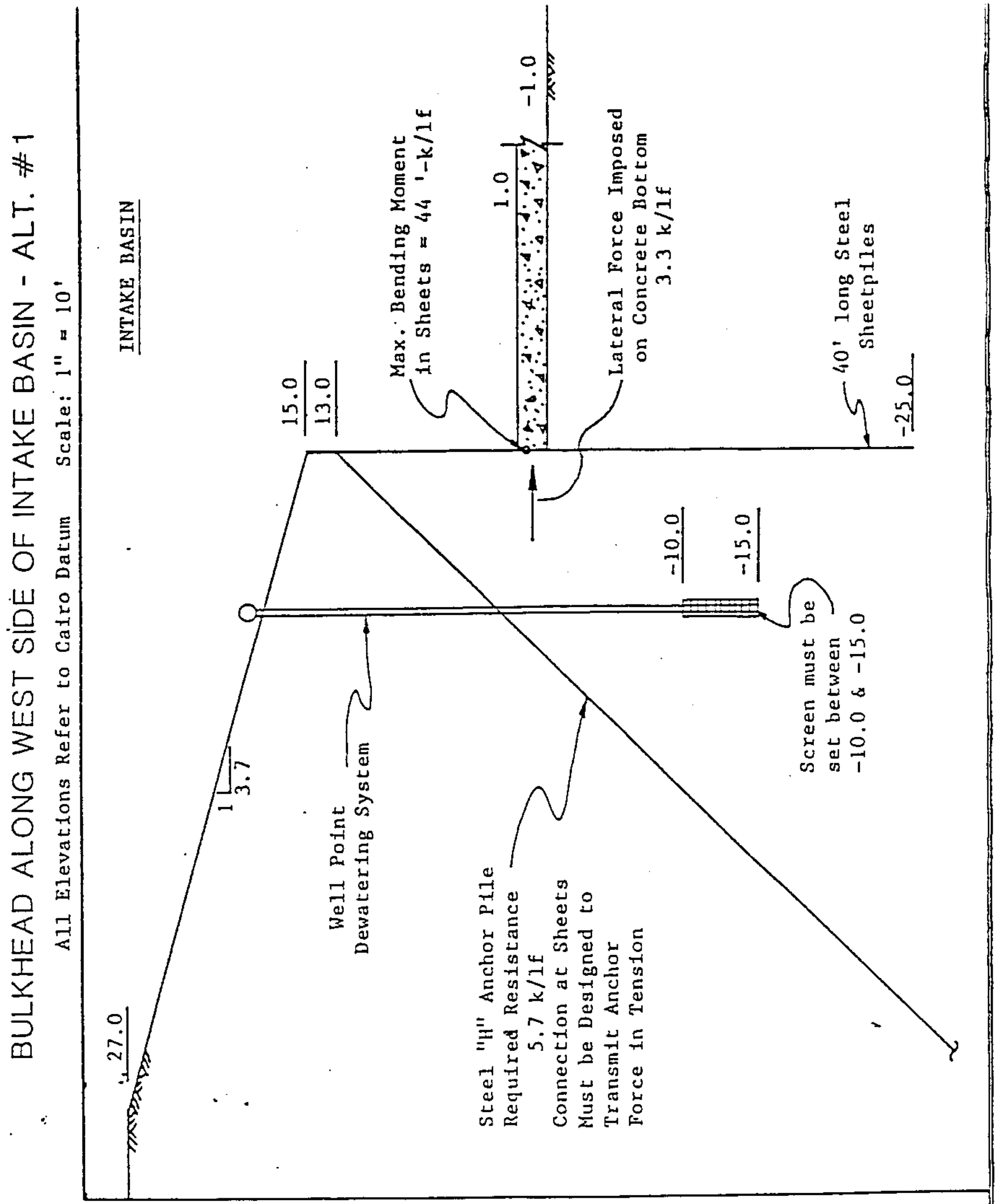
All Elevations Refer To Cairo Datum   Scale: 1" = 10'



Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Fig. 19



Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
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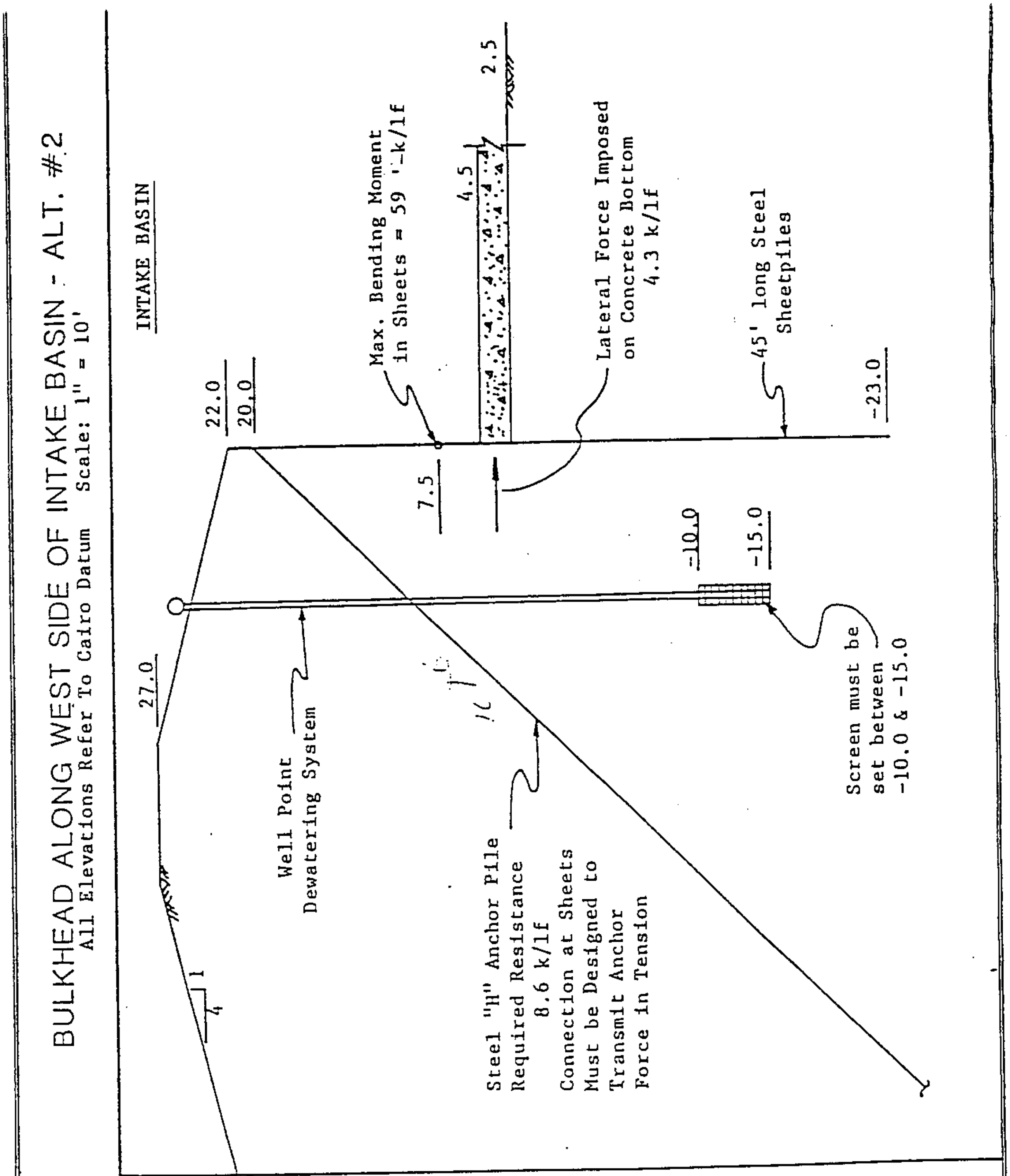
Fig. 21

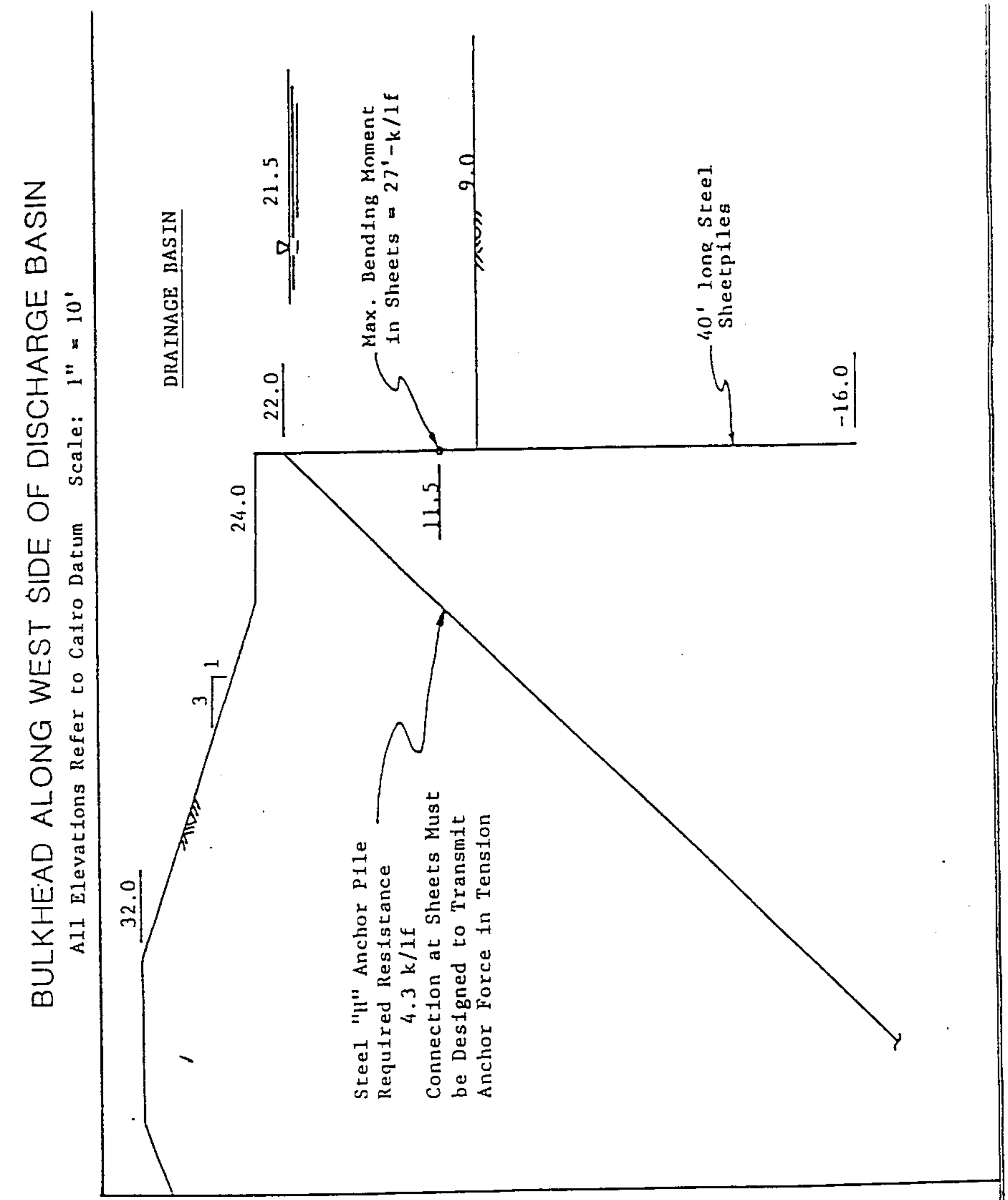


Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Fig. 22

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE LOUISIANA



Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

Fig. 23

ALLOWABLE PILE LOAD CAPACITY

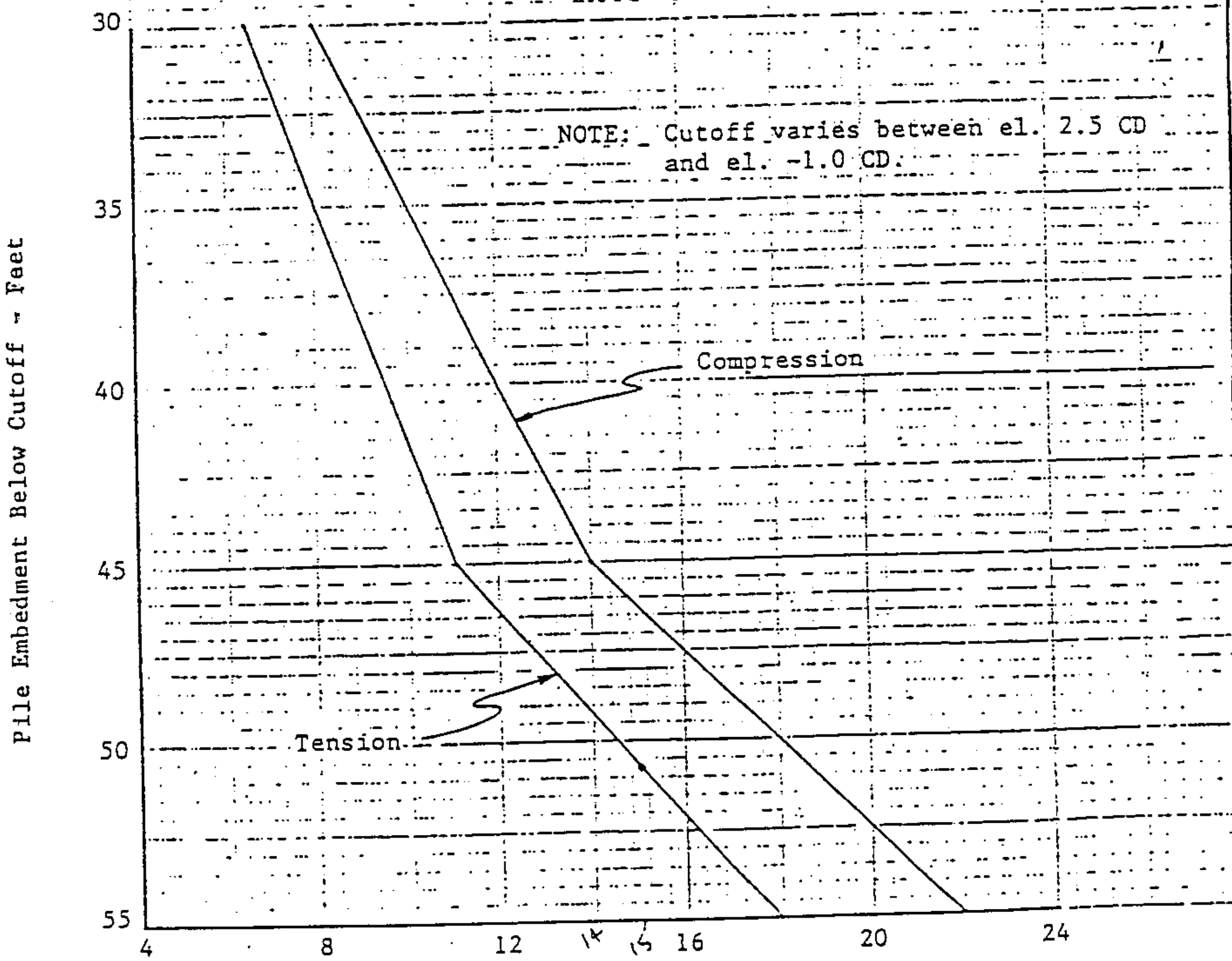
VS

PILE EMBEDMENT

For

Untreated Class "B" Timber Piles

Supporting Intake Basin Bottom Slab



Allowable Pile Load Capacity - Tons
Factor of Safety = 2

Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

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EUSTIS ENGINEERING COMPANY Fig
SOIL AND FOUNDATION CONSULTANTS

ALLOWABLE VERTICAL COMPONENT

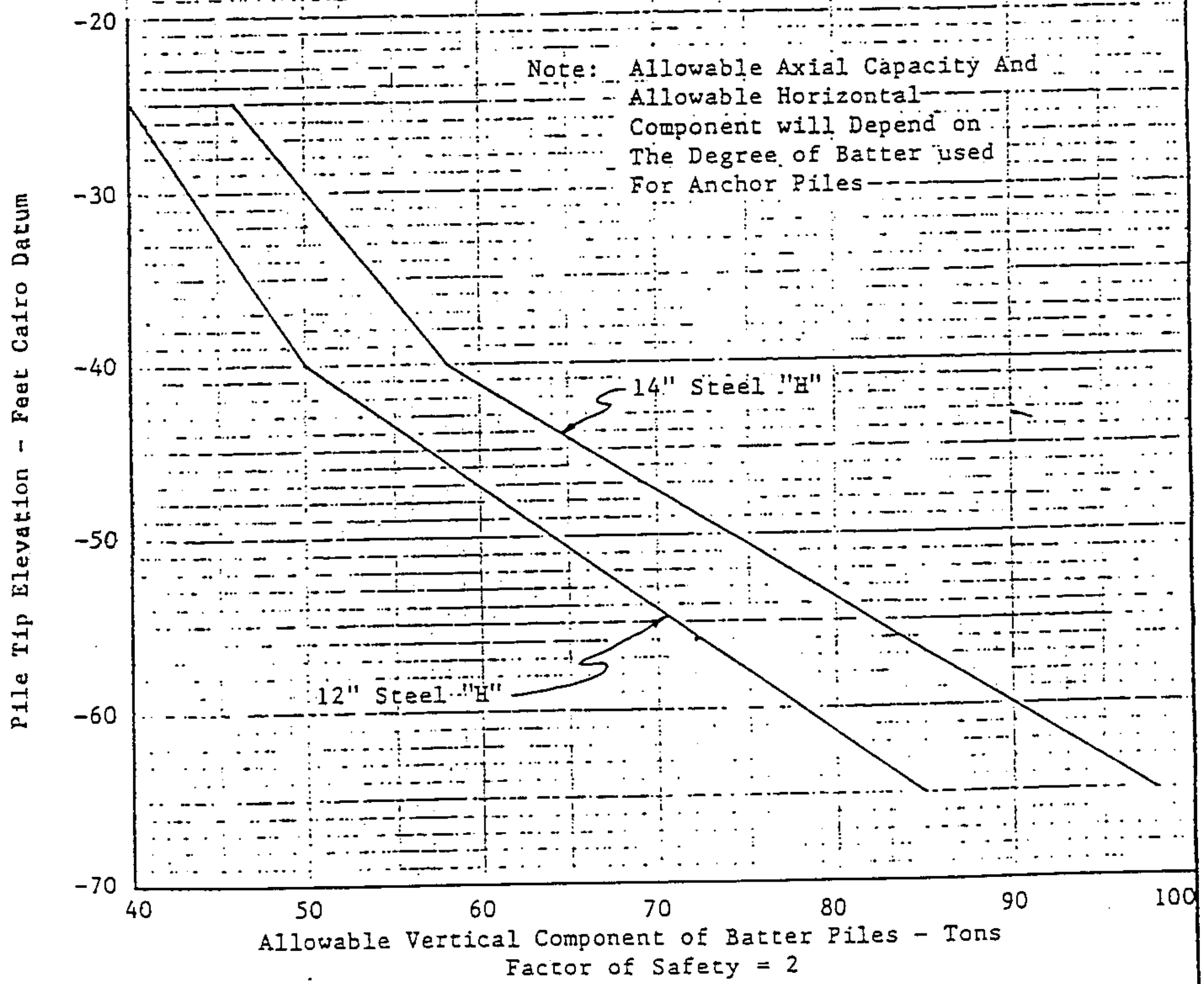
VS

PILE TIP ELEVATION

For

ANCHOR PILES SUPPORTING SHEETPILE BULKHEADS
(Refer to Figures: 18 through 23)

PILES LOADED IN TENSION



Geotechnical Investigation
Sewerage & Water Board of New Orleans
Proposed Additions to Drainage Pumping Station No. 6
New Orleans, Louisiana

For: Burk & Associates, Inc.
Engineers, Planners & Environmental Scientists, New Orleans, Louisiana

EUSTIS ENGINEERING COMPANY Fig
SOIL AND FOUNDATION CONSULTANTS

CAPACITY OF PILE GROUPS

$$Q_a = \frac{P \times L \times c}{(FSF)} + \frac{2.6\, q_u \left(1 + 0.2 \frac{w}{b}\right) A}{(FSB)}$$

In Which:

Q_a = Allowable load carrying capacity of pile group, lb

P = Perimeter distance of pile group, ft

L = Length of pile, ft

c = Average (weighted) cohesion or shear strength of material between surface and depth of pile tip, psf (c = one-half the unconfined compressive strength)

q_u = Average unconfined compressive strength of material in the zone immediately below pile tips, psf

w = Width of base of pile group, ft

b = Length of base of pile group, ft

A = Base area of pile group, sq ft

(FSF) = Factor of safety for the friction area = 2

(FSB) = Factor of safety for the base area = 3

The values of c and q_u used in this formula should be based on applicable soil data shown on the Summary of Laboratory Test Results tabulations and logs of soil borings for this report. In the application of this formula, the weight of the piles, pile caps and mats, considering the effect of buoyancy, should be included.

SPACING OF PILE GROUPS

$$SPAC = 0.05\,(L_1) + 0.025\,(L_2) + 0.0125\,(L_3)$$

In Which:

SPAC = Center to center of piles, ft

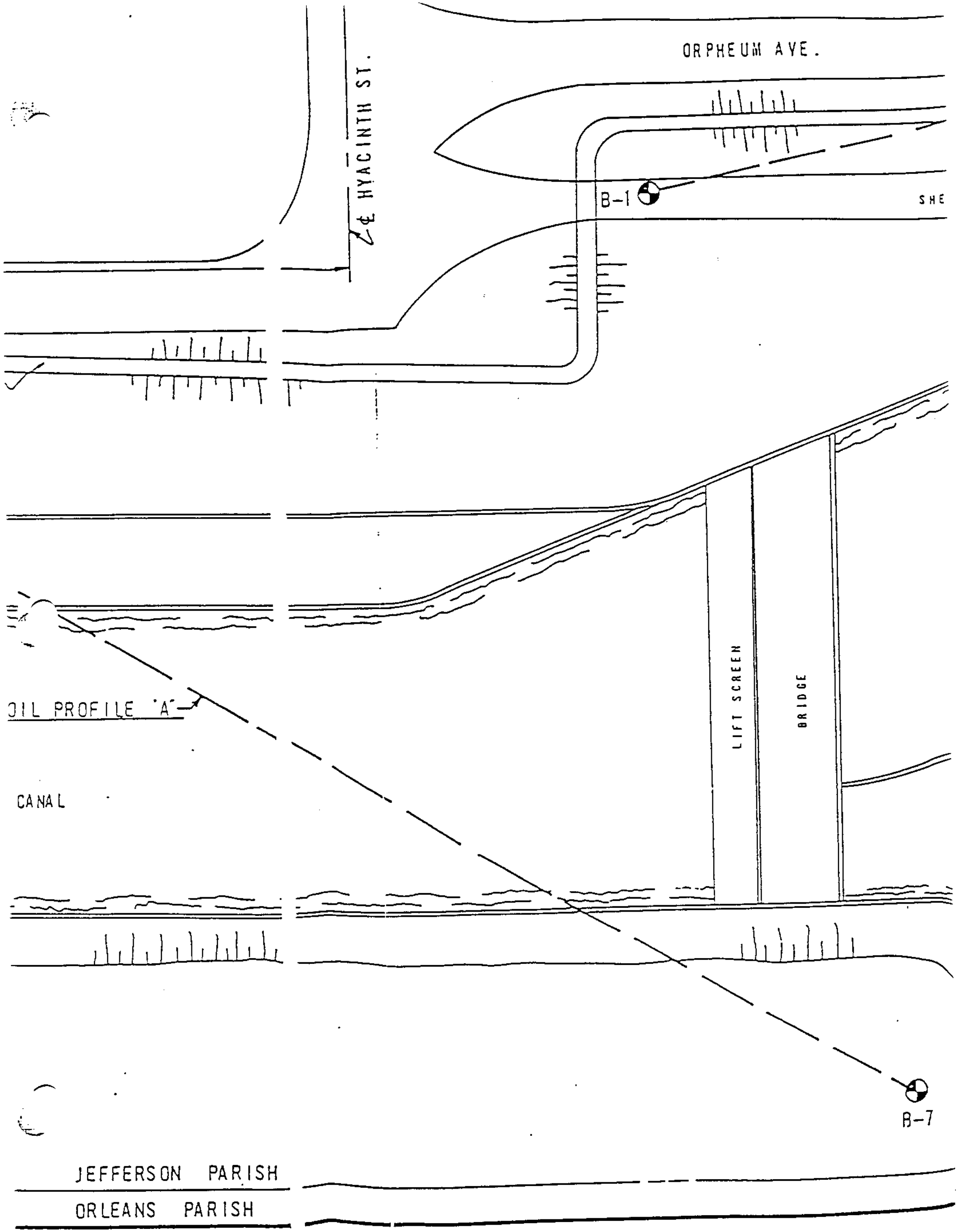
L_1 = Pile penetration up to 100 feet

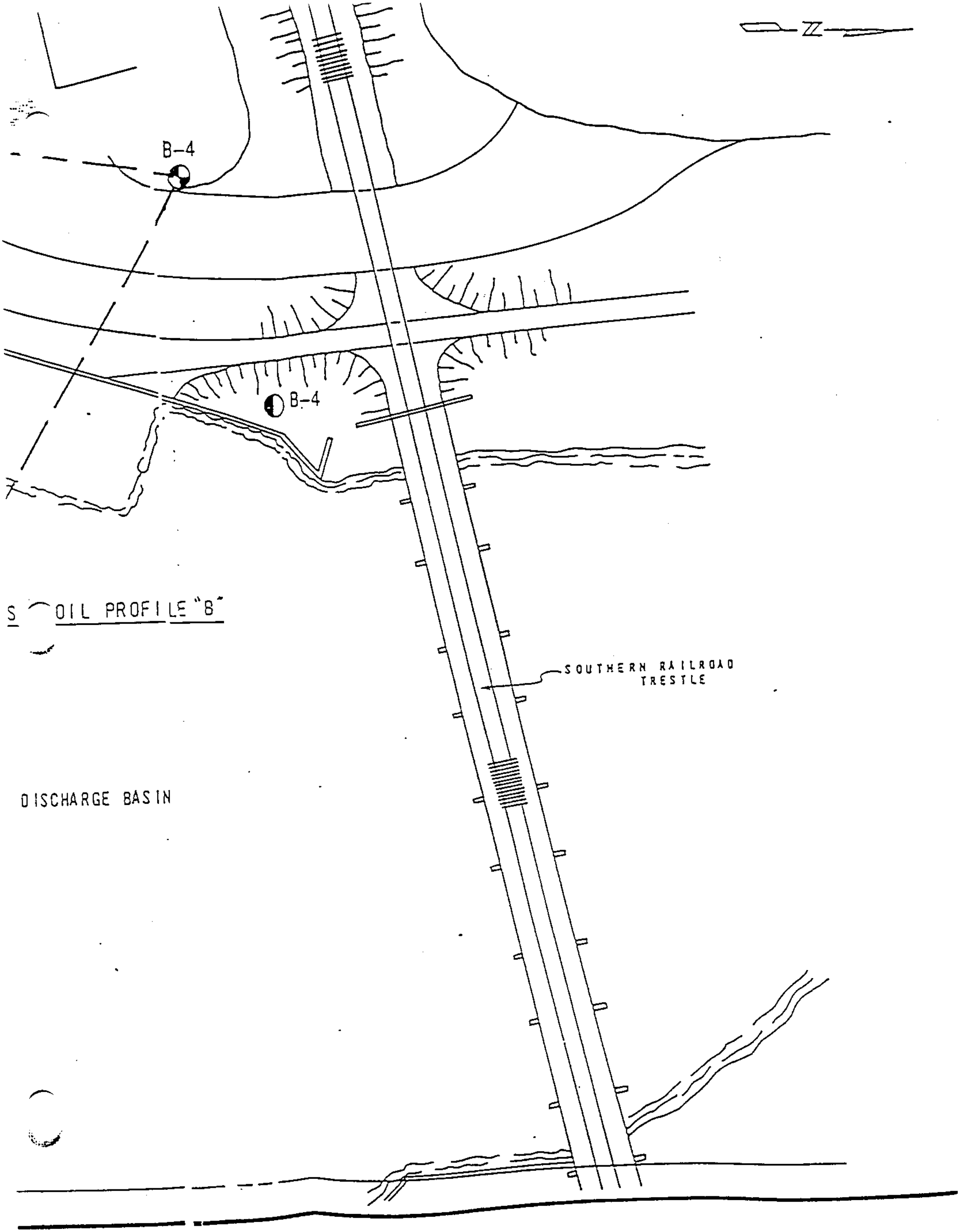
L_2 = Pile penetration from 101 to 200 feet

L_3 = Pile penetration beyond 200 feet

Note: Minimum pile spacing = 3 pile diameters (center to center)

Fig. 26


ORPHEUM AVE.
℄ HYACINTH ST.
B-1
SHE
OIL PROFILE "A"
CANAL
LIFT SCREEN
BRIDGE
B-7
JEFFERSON PARISH
ORLEANS PARISH



N
B-4
B-4
SOIL PROFILE "B"
SOUTHERN RAILROAD TRESTLE
DISCHARGE BASIN

SCALE: 1" = 30'

LEGEND

◕ DENOTES BORINGS DRILLED 16-19 AUGUST & 14-19 OCTOBER 1982.

◐ DENOTES BORINGS DRILLED PREVIOUS INVESTIGATION.

GEOTECHNICAL INVESTIGATION
SEWERAGE AND WATER BOARD OF NEW ORLEANS
PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO.6
ORLEANS PARISH, LOUISIANA

LOCATION OF BORINGS

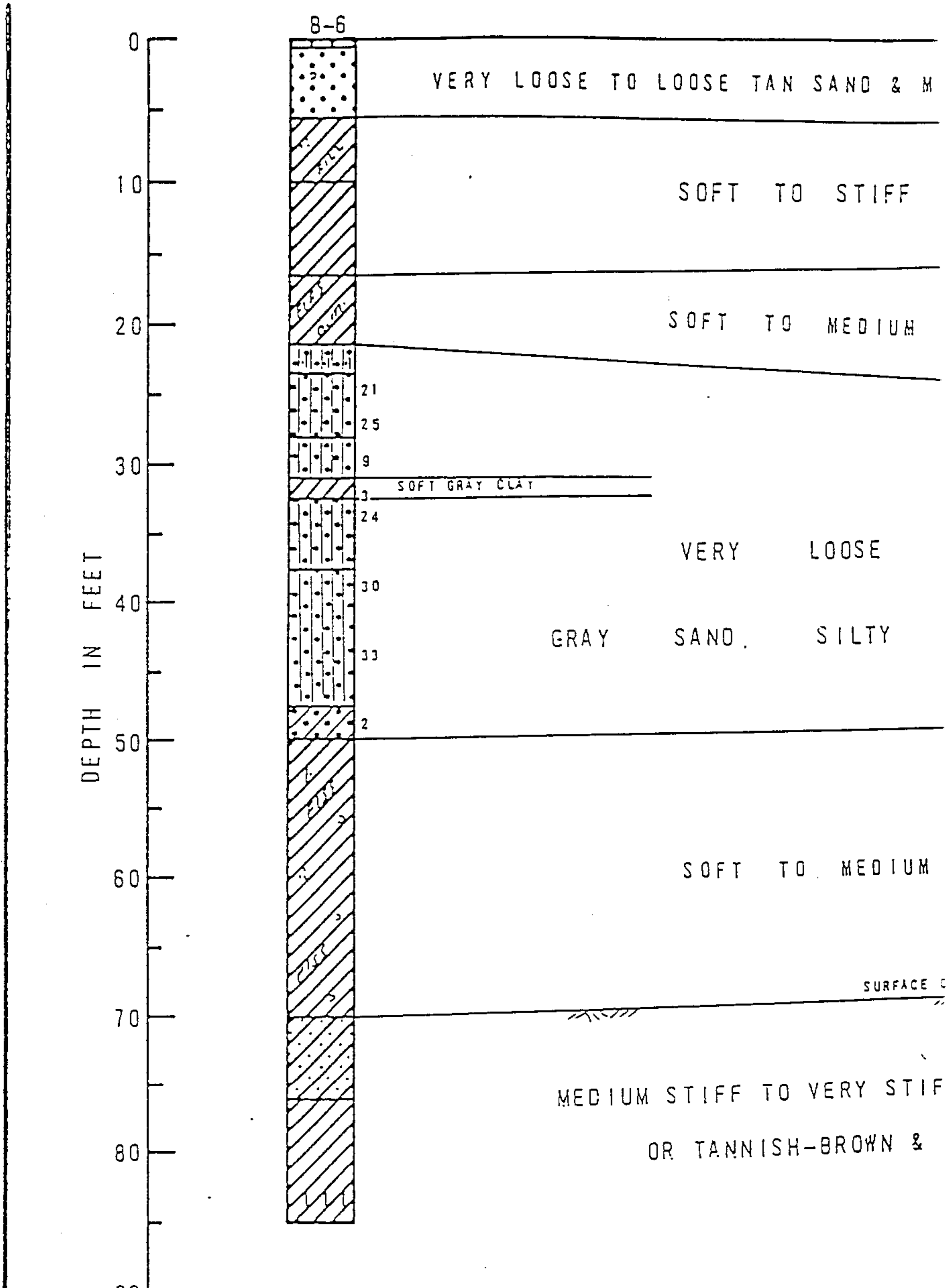
FOR

BURK & ASSOCIATES, INC.
ENGINEERS, PLANNERS, ENVIRONMENTAL SCIENTISTS
NEW ORLEANS, LOUISIANA

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

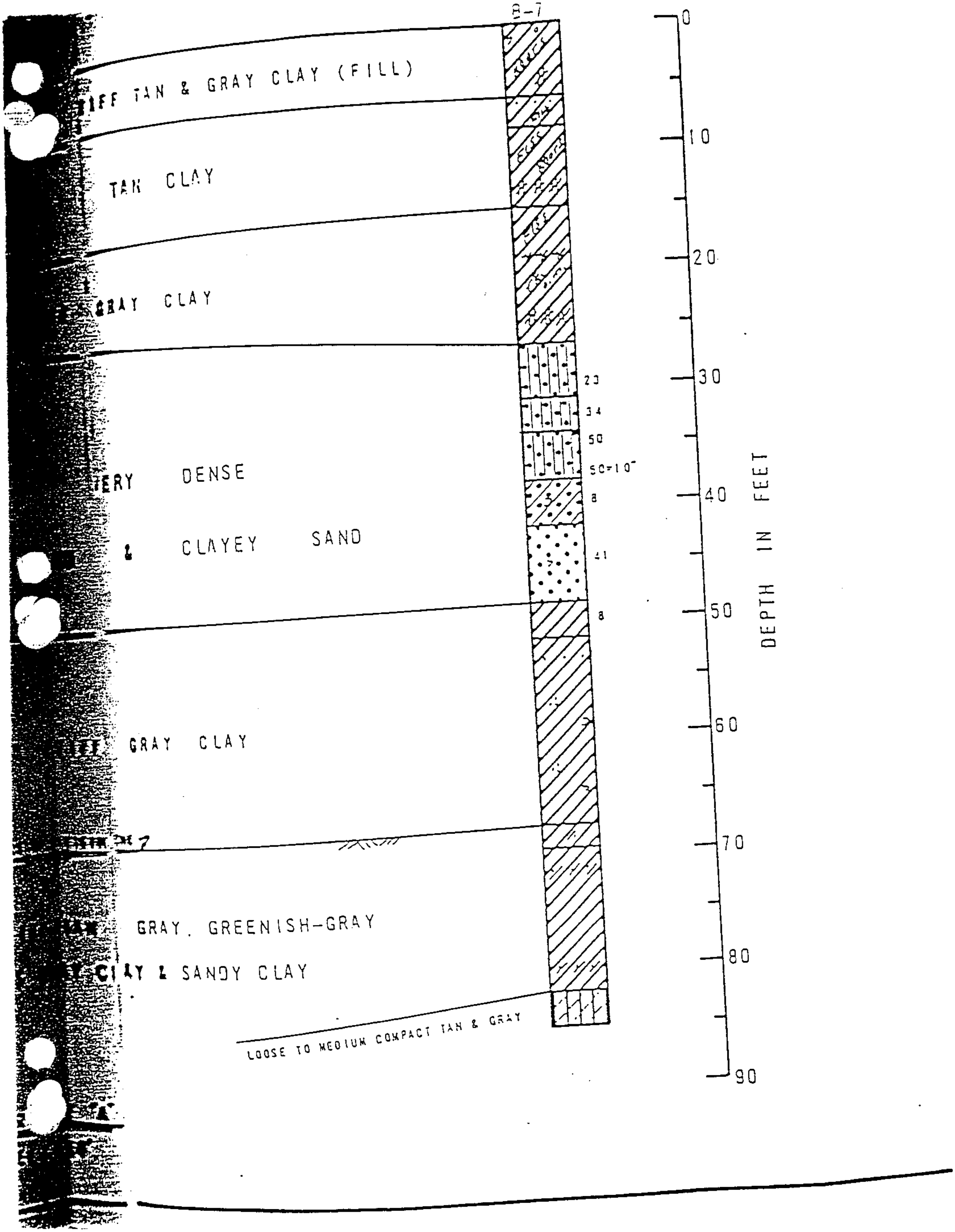
NOVEMBER 1982

FIGURE 1



SUBSOIL PROF

HOR. SCALE: I



B-7
TAN & GRAY CLAY (FILL)
TAN CLAY
CLAY
DENSE
CLAYEY SAND
GRAY CLAY
GRAY, GREENISH-GRAY
SANDY CLAY
LOOSE TO MEDIUM COMPACT TAN & GRAY
23
34
50
50=10"
8
41
8
0
10
20
30
40
50
60
70
80
90
DEPTH IN FEET

GENERAL NOTES

WHILE THE INDIVIDUAL LOGS OF BORINGS ARE CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS ON THE DATES SHOWN, IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUB SURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES. THEREFORE, THE SUBSOIL STRATIFICATION SHOWN ON THIS PROFILE IS NOT WARRANTED BUT IS ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND PRACTICES.

LEGEND

CLAY SILT SAND HUMUS OR ORGANIC

PREDOMINATE TYPE SHOWN HEAVY.
MODIFYING TYPE SHOWN LIGHT

FIGURES BESIDE BORINGS INDICATE NUMBER OF BLOWS OF 140-LB. HAMMER DROPPED 30-INCHES REQUIRED TO DRIVE A 2-INCH DIA. SPLIT-SPOON SAMPLER 1-FOOT AFTER FIRST BEING SEATED 6-INCHES (STANDARD PENETRATION TEST)

GEOTECHNICAL INVESTIGATION
SEWERAGE AND WATER BOARD OF NEW ORLEANS
PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO.6
ORLEANS PARISH, LOUISIANA

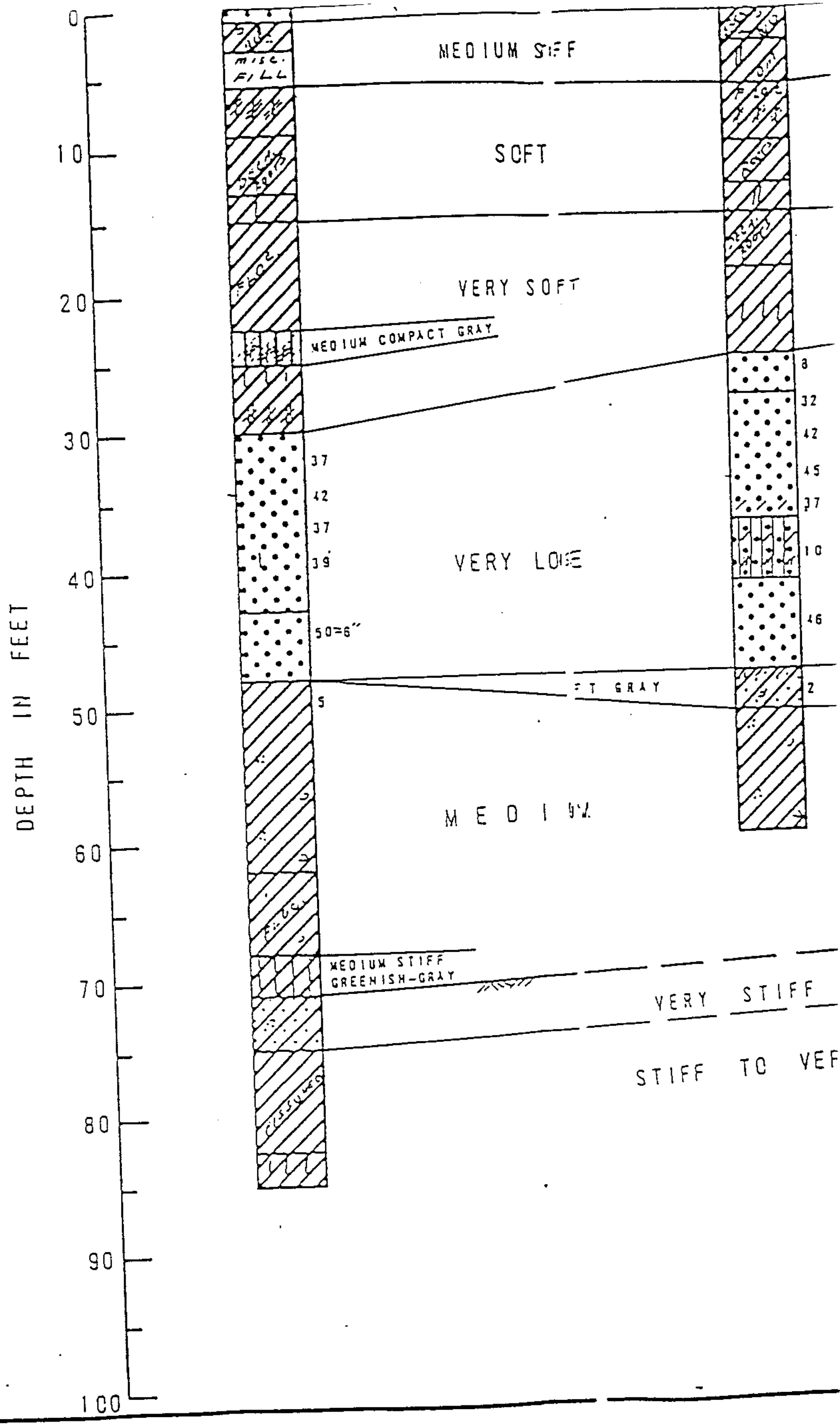
SUBSOIL PROFILE

FOR

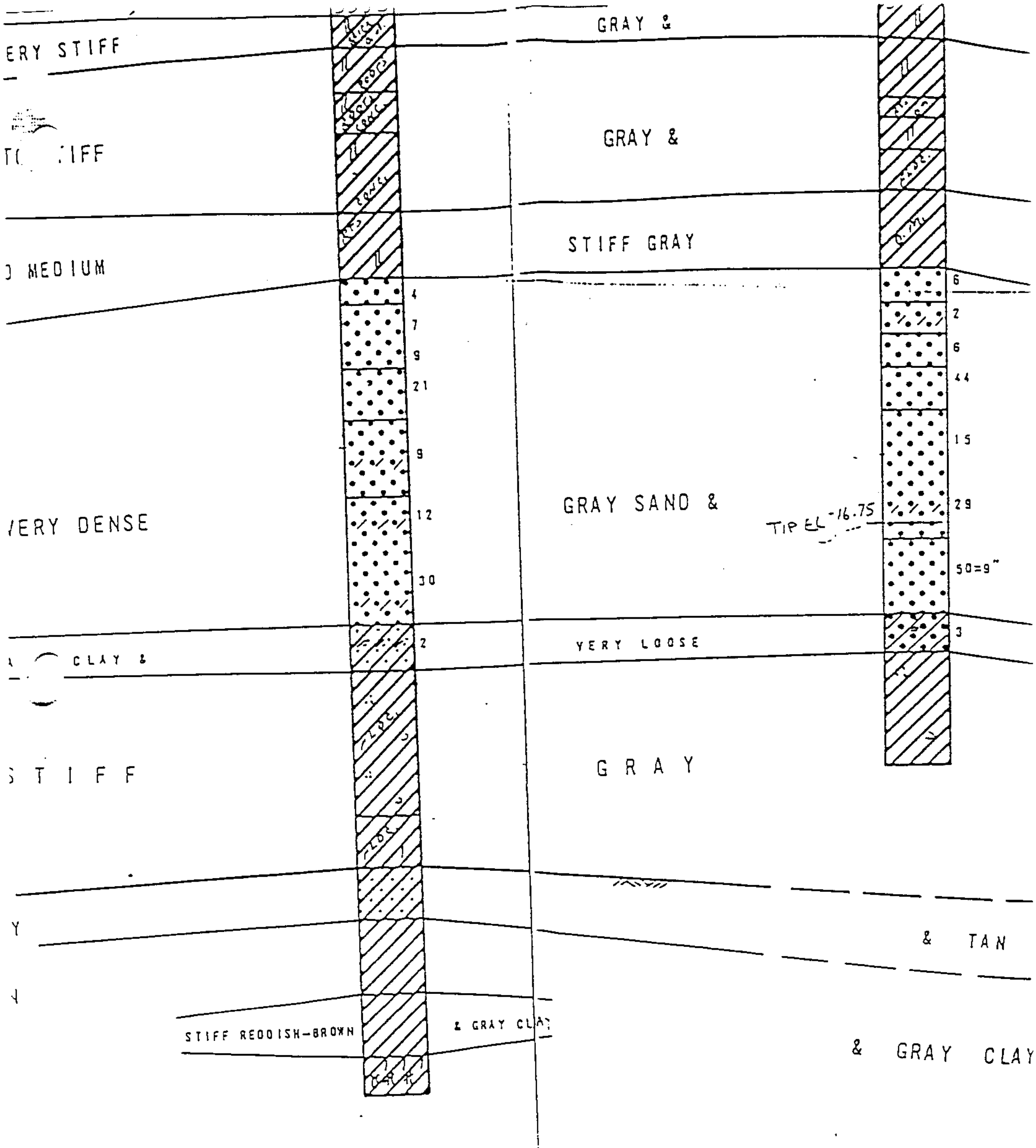
BURK & ASSOCIATES, INC.
ENGINEERS, PLANNERS, ENVIRONMENTAL SCIENTISTS
NEW ORLEANS, LOUISIANA

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
NOVEMBER 1982 METAIRIE, LA.

FIGURE 2

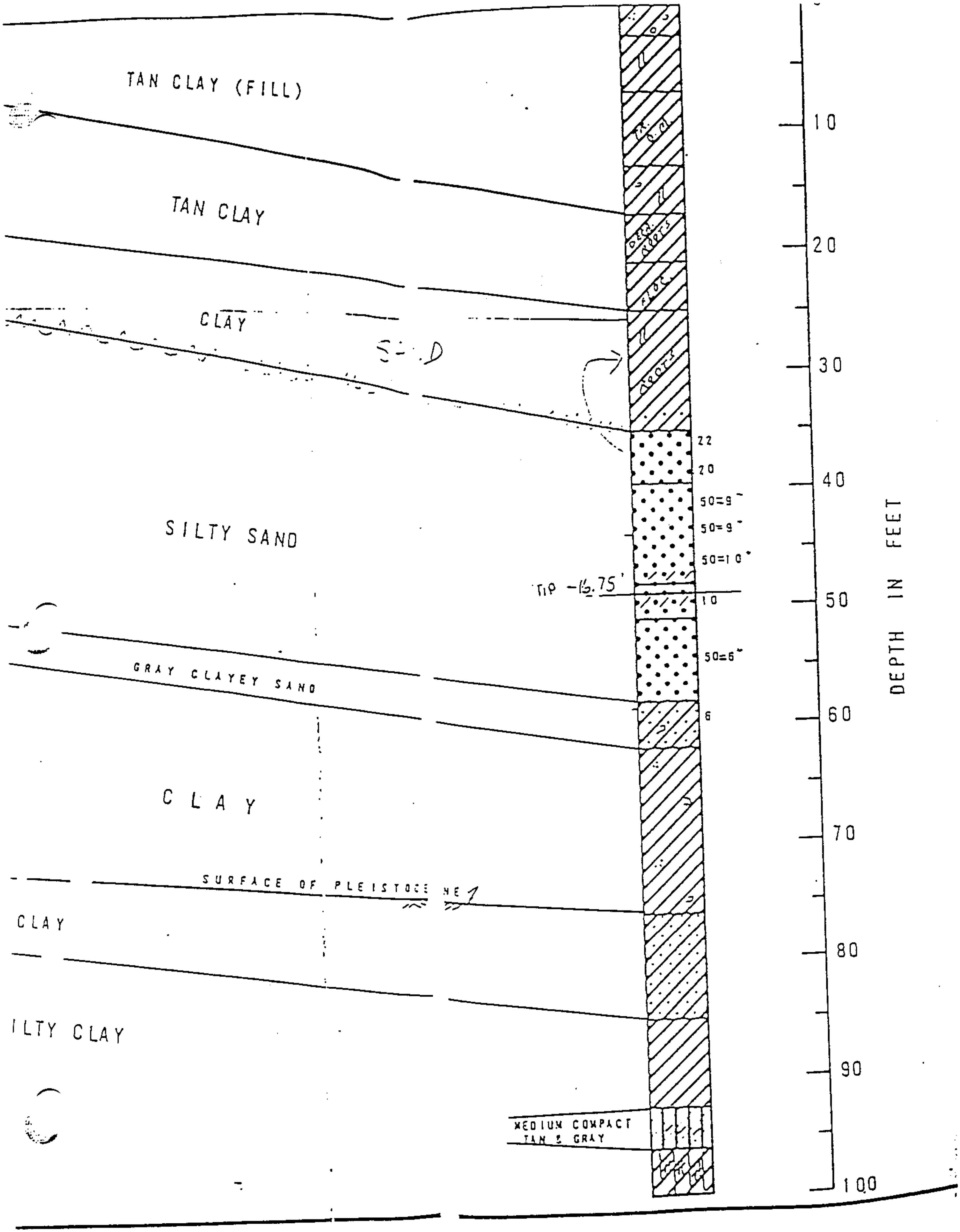


DEPTH IN FEET
0
10
20
30
40
50
60
70
80
90
100
misc. FILL
MEDIUM STIFF
SOFT
VERY SOFT
MEDIUM COMPACT GRAY
37
42
37
39
50=6"
5
VERY
8
32
42
45
37
10
46
2
GRAY
MEDIUM STIFF
GREENISH-GRAY
VERY STIFF
STIFF TO VE



SUBSOIL PROFILE "B"

HOR. SCALE: 1" = 30'


TAN CLAY (FILL)
TAN CLAY
CLAY
SILTY SAND
GRAY CLAYEY SAND
CLAY
SURFACE OF PLEISTOCENE
CLAY
ILTY CLAY
MEDIUM COMPACT
TAN & GRAY
Tip -16.75'
22
20
50=9"
50=9"
50=10"
10
50=6"
6
10
20
30
40
50
60
70
80
90
100
DEPTH IN FEET

GENERAL NOTES

WHILE THE INDIVIDUAL LOGS OF BORINGS ARE CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS ON THE DATES SHOWN, IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES. THEREFORE, THE SUBSOIL STRATIFICATION SHOWN ON THIS PROFILE IS NOT WARRANTED BUT IS ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND PRACTICES.

LEGEND

CLAY | SILT | SAND | HUMUS OR ORGANIC

PREDOMINATE TYPE SHOWN HEAVY.
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FIGURES BESIDE BORINGS INDICATE NUMBER OF BLOWS OF 140-LB. HAMMER DROPPED 30-INCHES REQUIRED TO DRIVE A 2-INCH DIA. SPLIT-SPOON SAMPLER 1-FOOT AFTER FIRST BEING SEATED 6-INCHES (STANDARD PENETRATION TEST)

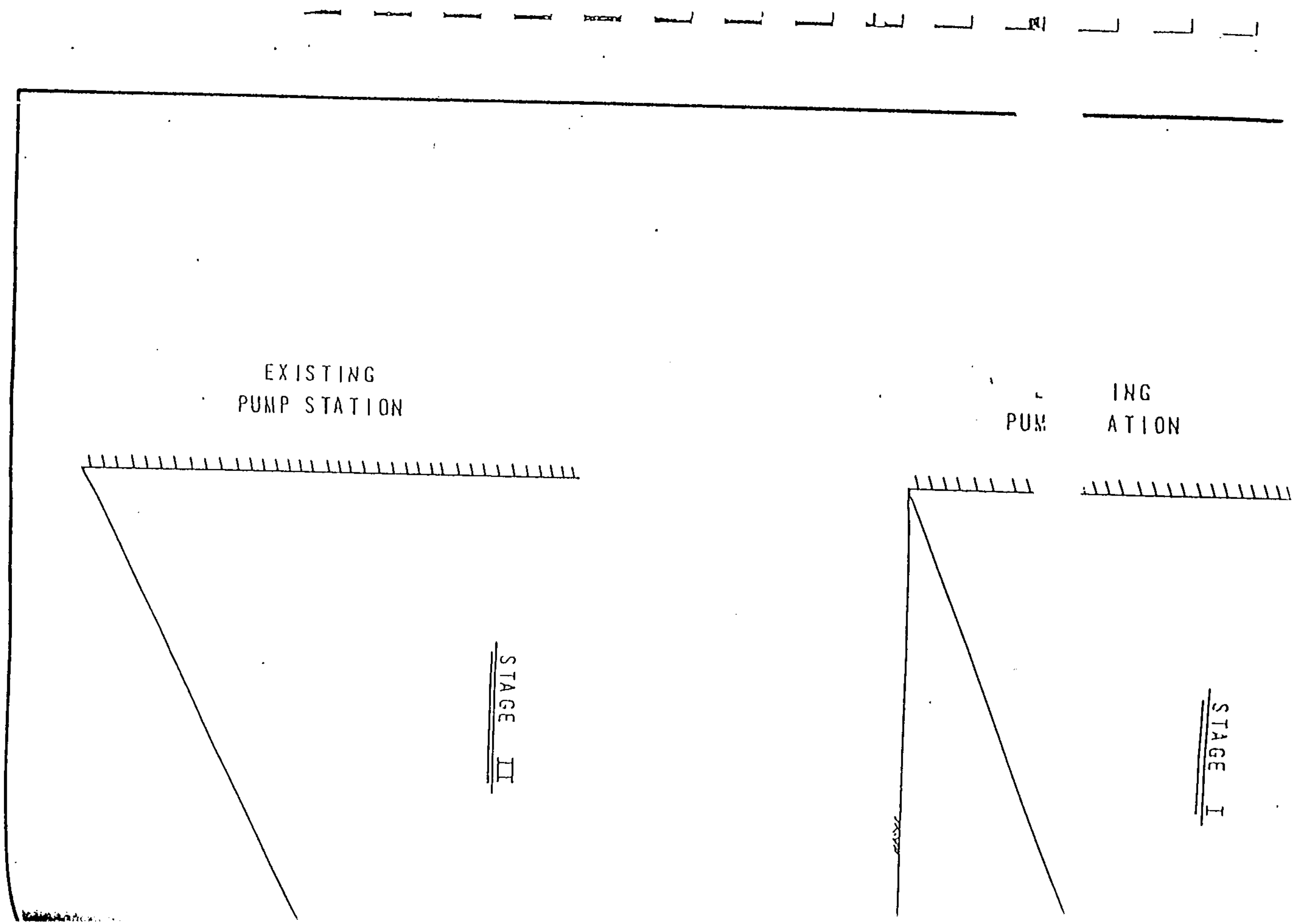
GEOTECHNICAL INVESTIGATION
SEWERAGE AND WATER BOARD OF NEW ORLEANS
PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO.6
ORLEANS PARISH, LOUISIANA

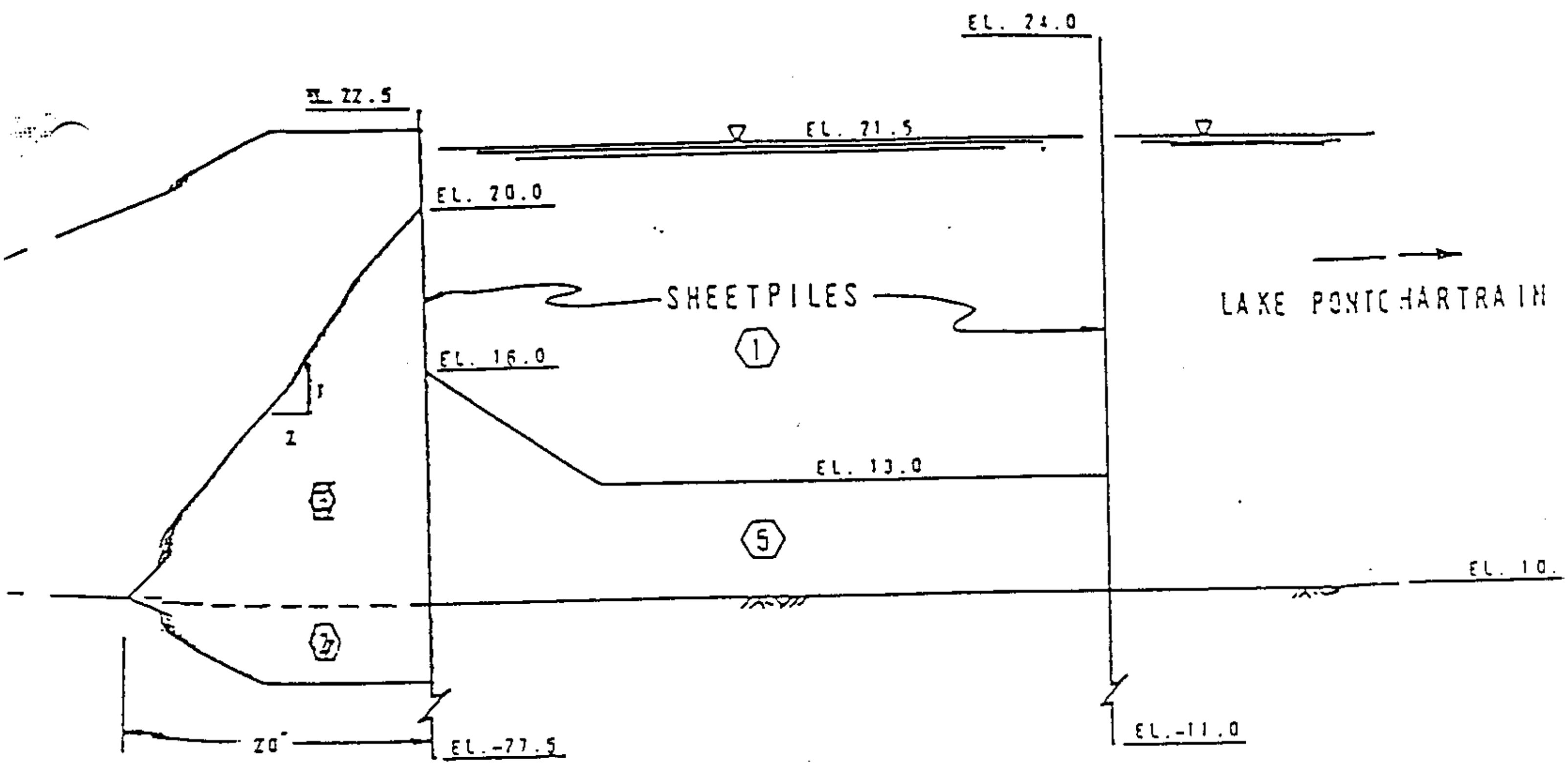
SUBSOIL PROFILE

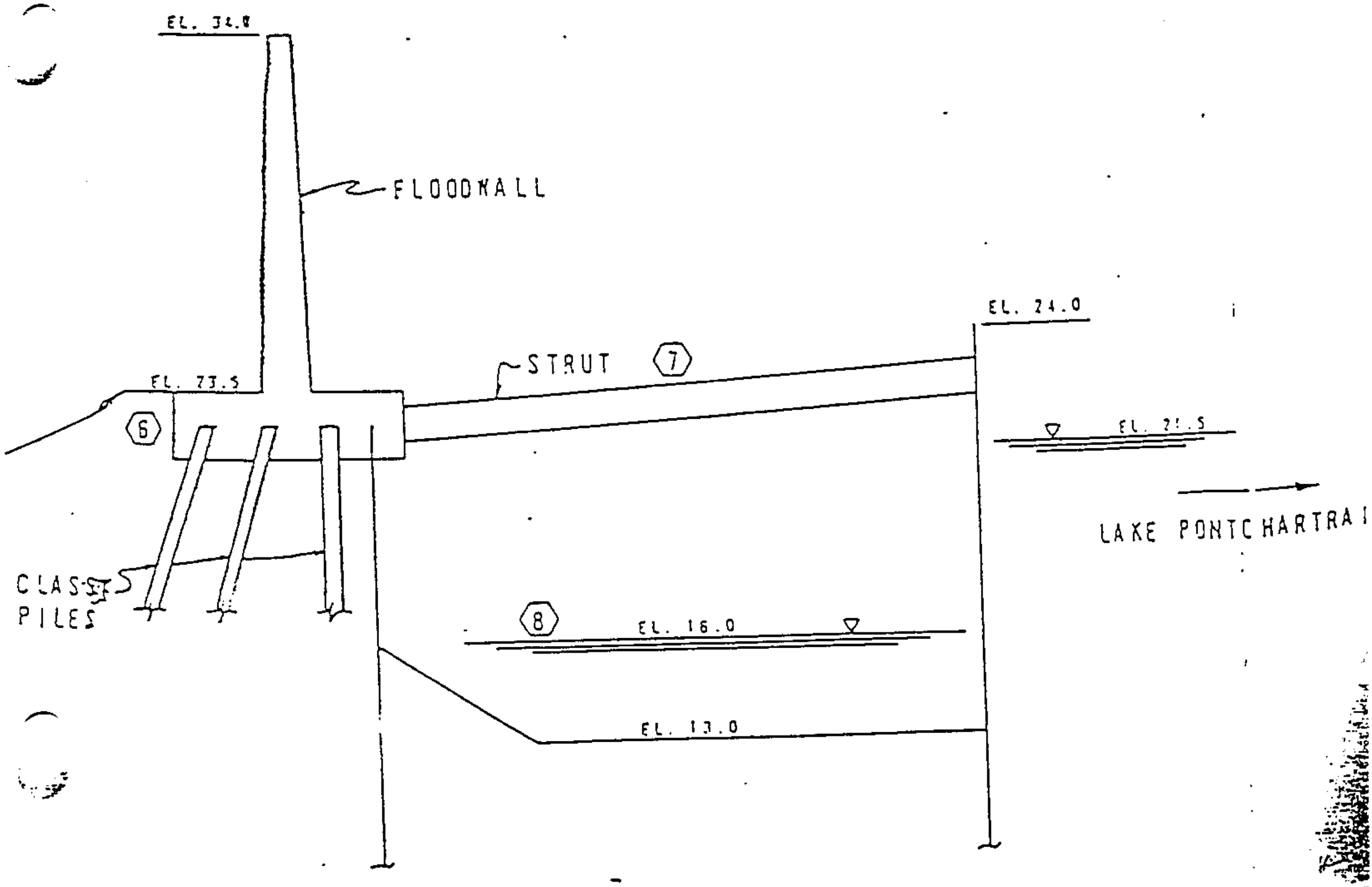
FOR
BURK & ASSOCIATES, INC.
ENGINEERS, PLANNERS, ENVIRONMENTAL SCIENTISTS
NEW ORLEANS, LOUISIANA

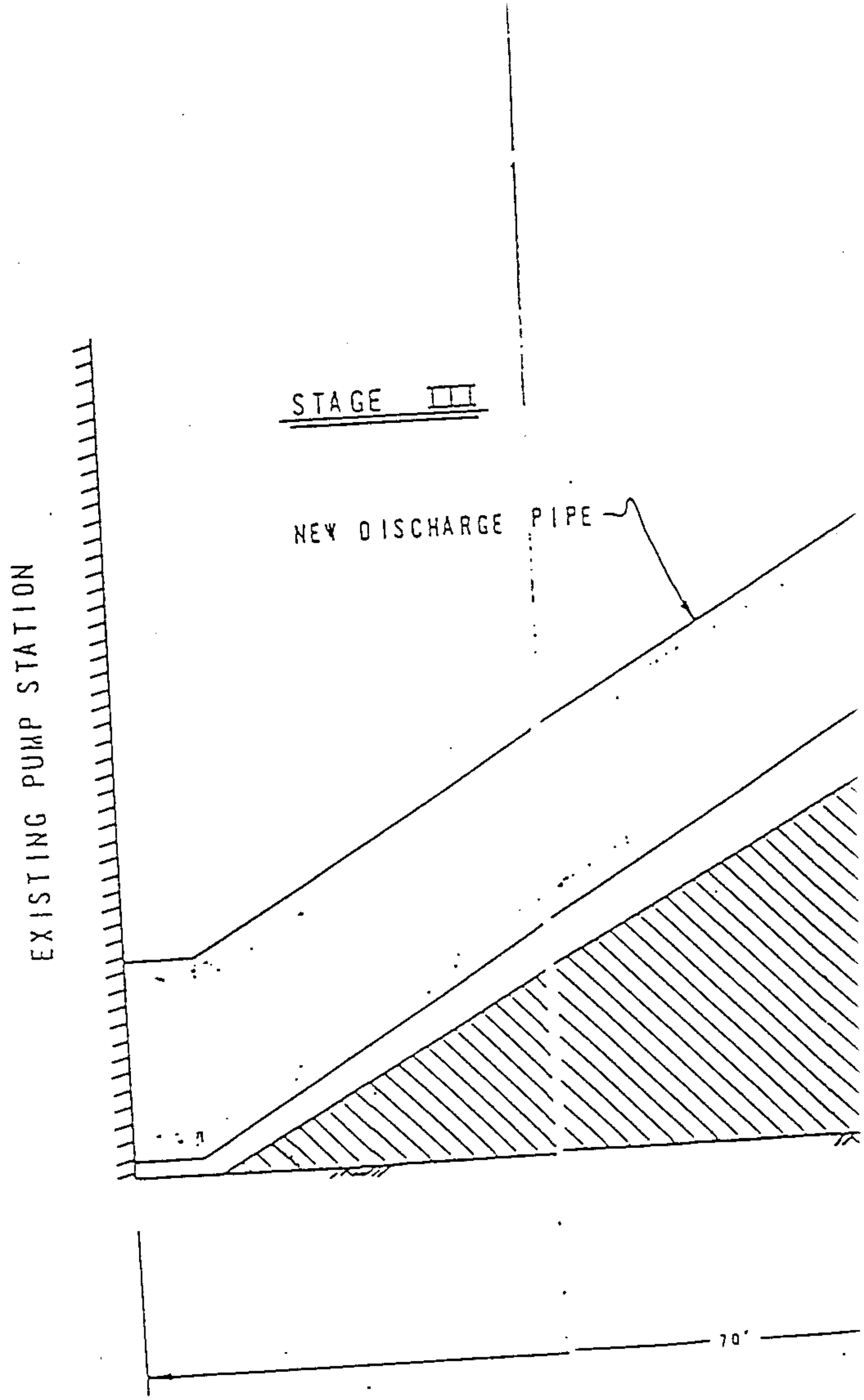
EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE, LA.

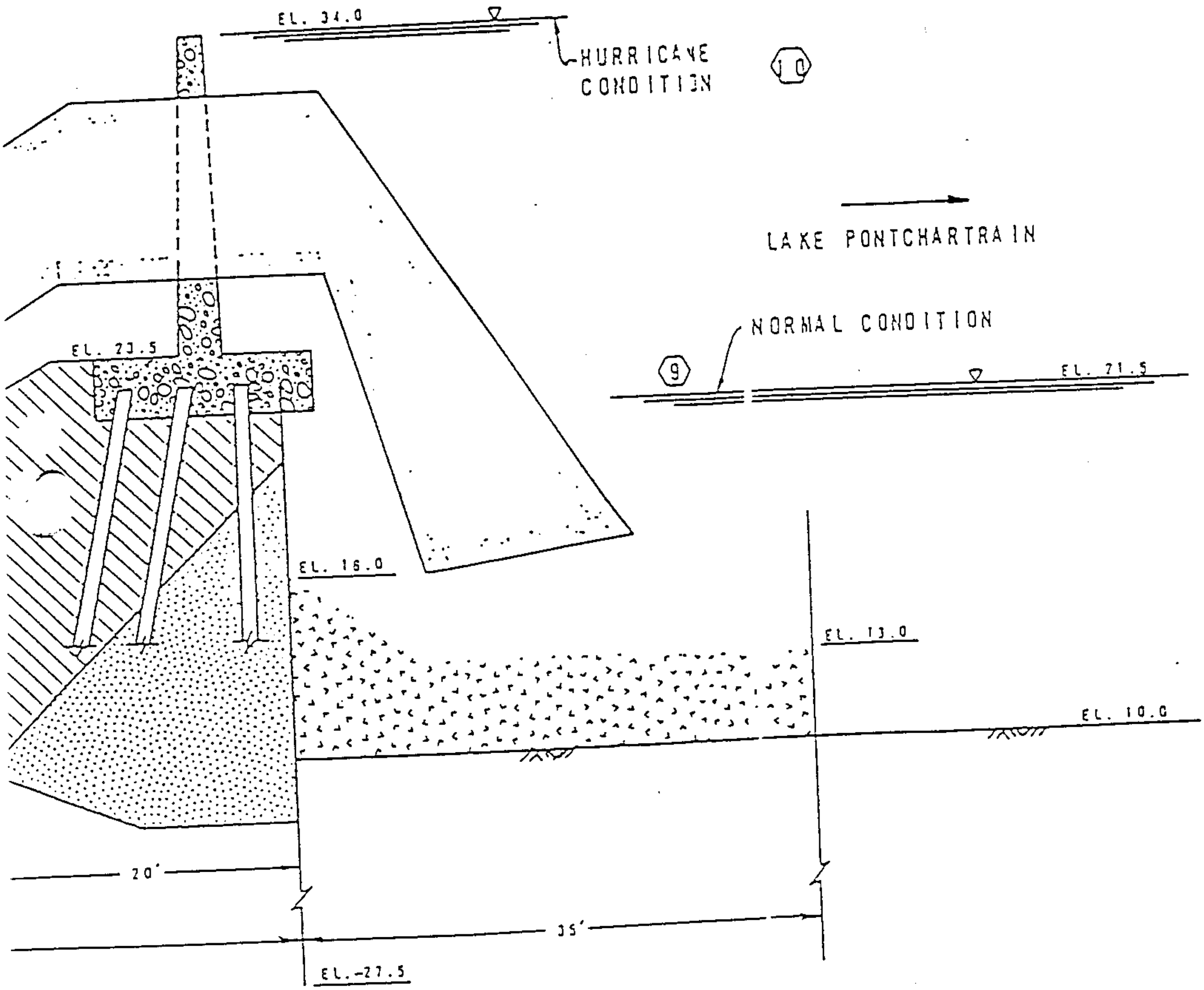
NOVEMBER 1982


EXISTING
PUMP STATION
STAGE II
ING
PUM ATION
STAGE I


EL. 24.0
22.5
EL. 21.5
EL. 20.0
SHEETPILES
LAKE PONTCHARTRAIN
1
EL. 16.0
EL. 13.0
5
EL. 10.
20'
EL.-27.5
EL.-11.0


FLOODWALL
EL. 24.0
STRUT
7
EL. 23.5
6
EL. 21.5
LAKE PONTCHARTRA
CLASS
PILES
8
EL. 16.0
EL. 13.0


STAGE III
NEW DISCHARGE PIPE
EXISTING PUMP STATION
70'


EL. 34.0
HURRICANE CONDITION
10
LAKE PONTCHARTRAIN
NORMAL CONDITION
9
EL. 71.5
EL. 23.5
EL. 16.0
EL. 13.0
EL. 10.0
20'
35'
EL.-27.5

NOTES

STAGE I

1. INNER ROW OF SHEET PILES SHOULD BE DRIVEN TO AT LEAST EL.-27.5
SHOULD BE DESIGNED TO SUSTAIN A MAXIMUM BENDING MOMENT OF 60 FT-
PER LINEAR FOOT. OUTER ROW OF SHEET PILES SHOULD BE DRIVEN TO AT
LEAST EL.-11.0 AND SHOULD BE DESIGNED TO SUSTAIN A MAXIMUM BENDING
MOMENT OF 21 FT-KIPS PER LINEAR FOOT.

2. CANAL BOTTOM SHOULD BE MUCKED TO THE DEPTH NECESSARY TO REMOVE
SEDIMENT ADJACENT TO INNER SHEET PILES.

3. INNER SHEET PILES SHOULD BE BACKFILLED WITH RIVER SAND AS SHOWN
PRIOR TO DEWATERING AREA BETWEEN SHEET PILES AND EXISTING PUMP STATION.

4. IMMEDIATELY AFTER DEWATERING, BACKFILLING OF THE WORK AREA BETWEEN
THE SHEET PILES AND PUMP STATION SHOULD BE COMPLETED. COHESIVE
SOIL MAY BE USED FOR BACKFILL. COMPACTION OF THE FILL MATERIAL IS
NOT REQUIRED.

5. PLACE RIP-RAP AS REQUIRED BETWEEN INNER AND OUTER ROWS OF SHEET PILES.

STAGE II

6. DRIVE TREATED CLASS B TIMBER PILES AND CONSTRUCT CONCRETE FLOODWALL.
TIMBER PILES SHOULD BE DRIVEN TO A RESISTANCE OF 25 TO 30 BLOWS PER
FOOT AT A TIP EMBEDMENT OF APPROXIMATELY EL.-13 , USING A STEAM
AIR-HAMMER DELIVERING 15000 FT-LB PER BLOW. A MAXIMUM ALLOWABLE
(FACTOR OF SAFETY = 2) AXIAL CAPACITY OF 15 TONS PER PILE SHOULD
BE USED FOR DESIGN.

7. INSTALL STRUT BETWEEN OUTER ROW OF SHEET PILES AND BASE OF CONCRETE
FLOODWALL. STRUT AND FLOODWALL SHOULD BE DESIGNED TO SUSTAIN A
HORIZONTAL FORCE OF 2.6 KIPS PER LINEAR FOOT.

8. DEWATER AREA BETWEEN INNER AND OUTER ROWS OF SHEET PILES TO EL.
AND COMPLETE INSTALLATION OF DISCHARGE PIPES.

STAGE III

9. ALLOW WATER LEVEL BETWEEN INNER AND OUTER ROWS OF SHEET PILES TO
EQUALIZE. REMOVE STRUT AND DRIVE OUTER ROW OF SHEET PILES TO FINAL
TIP ELEVATION.

10. DESIGN OF THE CONCRETE FLOODWALL SHOULD INCLUDE A HORIZONTAL FORCE
OF 1 KIP PER LINEAR FOOT APPLIED AT EL. 22.5 DUE TO WATER PRESSURE
ON INNER ROW OF SHEET PILES.

ALL ELEVATIONS REFER TO CAIRO DATUM.

GEOTECHNIACL INVESTIGATION
SEWERAGE AND WATER BOARD OF NEW ORLEANS
PROPOSED ADDITIONS TO DRAINAGE PUMPING STATION NO.6
ORLEANS PARISH, LOUISIANA

PROPOSED COFFERDAM

FOR

BURK & ASSOCIATES, INC.
ENGINEERS, PLANNERS, ENVIRONMENTAL SCIENTISTS
NEW ORLEANS, LOUISIANA

EUSTIS ENGINEERING COMPANY
SOIL AND FOUNDATION CONSULTANTS
METAIRIE LA.
NOVEMBER 1982

FIGURE 17

3. Geotechnical Information for Proposed Improvements

(by Eustis Engineers)

U.S. Army Corps of Engineers
Fronting Protection at Pump Station No. 6
17th Street Outfall Canal
New Orleans, Louisiana

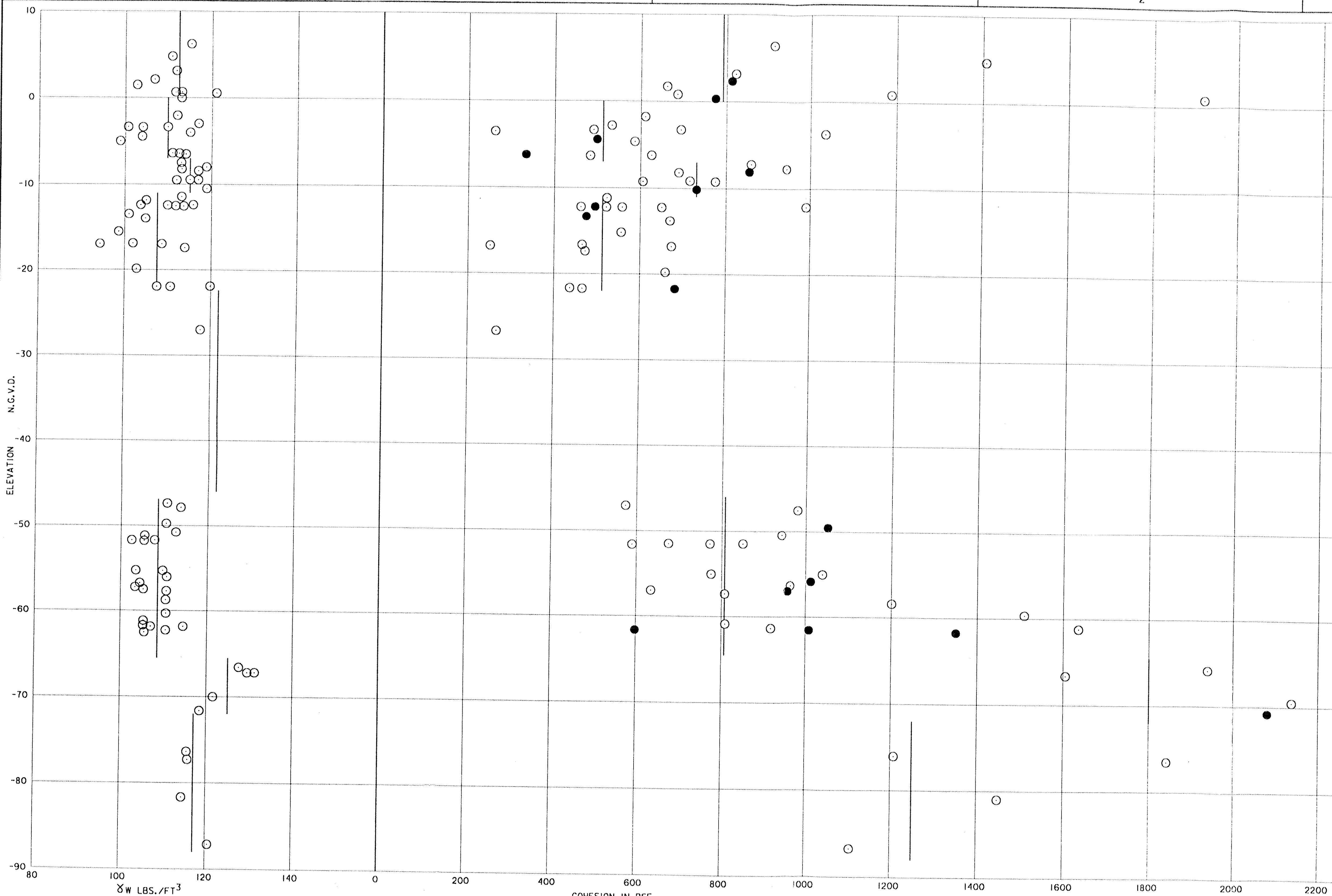
Soil Design Parameters

Soil shear strengths and unit weights from nine borings were plotted versus depth in feet to develop soil design parameters for the project. A total of 78 shear tests were utilized from the borings. These included 72 unconfined compression shear tests, 5 unconsolidated-undrained triaxial compression shear tests, and 1 unconsolidated-undrained multiple stage triaxial compression shear test. The soil design parameters are enclosed.

U.S. ARMY CORPS OF ENGINEERS
FRONTING PROTECTION AT PUMP STATION No. 6
17TH STREET OUTFALL CANAL
NEW ORLEANS, LOUISIANA

SOIL DESIGN PARAMETERS

ELEVATION NGVD	UNIT WEIGHT PCF	(Q) UNDRAINED SHEAR STRENGTH		EFFECTIVE (S) SHEAR STRENGTH
		COESHION PSF	ANGLE OF INTERNAL FRICTION DEGREES	ANGLE OF INTERNAL FRICTION DEGREES
12 to 0	111	780	0	23
0 to -7	109	500	0	23
-7 to -11	114	720	0	23
-11 to -22	107	500	0	23
-22 to -46	122	0	30	30
-46 to -64.5	108	800	0	23
-64.5 to -72	125	1,800	0	23
-72 to -88	116	1,250	0	23



Safety is a Part of Your Contract

KEY:

⊙ UNCONFINED COMPRESSION TEST

● TRIAXIAL TEST

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SOIL PARAMETERS

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

DESIGNED BY: J.R.E.	PLOT SCALE: 5	PLOT DATE: NOV. 1995	CADD FILE: PLATE23C.DGN
DRAWN BY: K.L.L.			FILE NO.
CHECKED BY: J.R.E.	DATE: NOV. 1995		H-2-30300

PLATE 23C

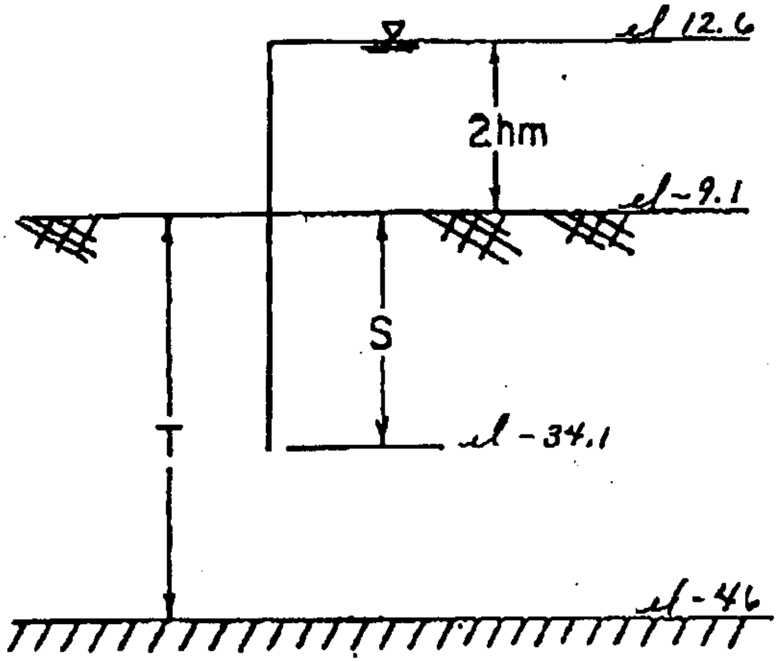
SEEPAGE CUT-OFF FOR EAST MONOLITH

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No.
Made By:	Date:	P.S. # 6	
Checked By:	Date:		

SEEPAGE CUTOFF

FOR

EAST MONOLITH



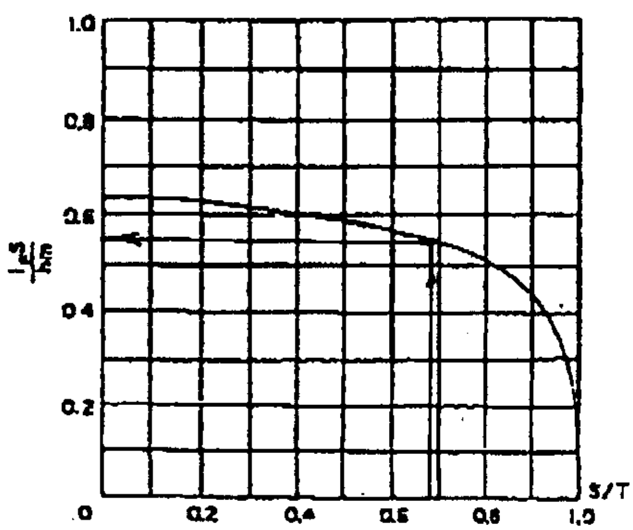
S = 25'   T = 36.9   S/T = 0.68   hm = 10.85'

I_E S/hm   FOR   S/T = 0.55 I_E = 0.24

FOR $I_{cr.} = \gamma_{sub}/\gamma_w = 60/62.4 = 0.96$

F. S. = $I_{cr}/I_E = 0.96/0.24 = 4.0$

FOR SP   REC.   F.S. = 4.0   OK



EAST MONOLITH
P. S. #6

CUTOFF WALL ANALYSIS

BY: HARR METHOD

U. S. ARMY ENGINEERING DISTRICT   NEW ORLEANS
CORPS OF ENGINEERS

PLATE

PRESSURE RELIEF, SETTLEMENTS, RIP-RAP AND EXISTING EARTHEN BEAM

U.S. ARMY CORPS OF ENGINEERS
~~FRONTING~~ PROTECTION PUMP STATION No.6
17th STREET OUTFALL CANAL
NEW ORLEANS, LOUISIANA

Existing Earth Section

A sloping earth section exists above the discharge tubes for Pumps A through F on the flood side of Pumping Station No. 6. Available information and drawings from 1914 and 1928 indicate the discharge tubes are pile supported on timber piles driven or jetted to el -18 with cutoffs at el 24.63 to 11.75 (Furnished Datum). A retaining wall separates the earth section from the pumping station building. A void space is located behind the retaining wall with struts between the wall and building. Wood sheeting, 6" x 12" x 20', appears to be installed to tip el 15.0. After reviewing this information with URS Consultants, we conclude there is not sufficient information to analyze this wall and earth section for improved flood protection.

Settlement

The proposed pile layout for the monoliths are shown in the FDM. Piles will be driven to approximate tip el -80 NGVD. At this tip elevation, piles will be embedded approximately 16 feet into the underlying Pleistocene formation and settlement of the sluice gate structure will be ¼ to ½ of an inch.

Pressure Relief

General. Pressure relief will be required to relieve excess hydrostatic heads in beach ridge sands that underlie the project site. Two cofferdams are proposed for construction.

An east cofferdam will be installed to construct the east sluice gate monolith. This excavation will be approximately 135′ x 38′ in plan dimension and will be completed to el -12.0. A west cofferdam will be installed to construct the west sluice gate monolith. This excavation will be approximately 100′ x 50′ in plan dimension and will be completed to el -13.0. Each cofferdam will utilize driven sheetpiles penetrating the beach ridge sands. These sheetpiles will provide protection on the downstream (north) side of the pump station, and will tie into existing floodwalls and the pump station to complete excavation support.

Pressure relief requirements for the excavation were developed on the basis of the procedures outlined in TM5-8-18-5, "Dewatering and Ground Water Control for Deep Excavations," and supplemental information available to Eustis Engineering. Design parameters and stratigraphy are based on borings and laboratory tests included in this report and in past reports completed for the project. Computations are included in the geotechnical appendix.

Requirements. Pressure relief was evaluated assuming the beach ridge sands are hydraulically cutoff by cofferdam sheetpiles on the north side of the two proposed excavations. Therefore, one-half of the computed flow within the beach ridge sands was used to estimate pressure relief requirements.

The assumed piezometric head in the beach ridge sands is at el 0.0. It was assumed that the hydrostatic pressure relief will be to el -15.0 in these beach ridge sands. The estimated coefficient of permeability of the beach ridge sands is 0.05 ft/min and the effective thickness of the beach ridge aquifer is 24 feet (el -22.0 to -46.0).

The computed flow to each excavation is approximately 216 gpm. A factor of safety of 1.3 is recommended to provide a contingency for design. Therefore, the design flow to each cofferdam is 281 gpm assuming no sheetpile cutoff. If the sheetpile cutoff is installed on one-half of the excavation, the anticipated flow to the excavation is approximately 140 gallons per minute. This flow can be controlled by three wells.

The wells should be comprised of minimum 12-in. diameter casing that are pumped by submersible pumps. Individual Gould 48LE15 submersible pumps, with a total dynamic head of 80 feet and discharge capacity of 48 gallons per minute, will be sufficient for each well. We recommend that the casing be screened between el -22.0 and -46.0. The screen should be a No. 40 slot. The wells should be equally spaced along the south side of the excavation and extend to el -50.

Riprap

General. Erosion control requirements for riprap were developed on the basis of the procedures outlined in EM1110-2-1601, "Hydraulic Design of Flood Control Channels." The hydraulic design assumes a velocity against the stone of 6.5 ft/sec and a specific weight of rock of 165 pcf.

Requirements. Based on a 6.5 ft/sec velocity against the stone, the average weight of the riprap should be 10 pounds. This corresponds to an equivalent stone diameter of 0.5 of a foot. Graded "C" stone should be sufficient for this purpose. The recommended gradation for Graded "C" stone is tabulated below.

STONE WEIGHT (POUNDS)	CUMULATIVE PERCENT FINER BY WEIGHT
400	100
250	70 - 100
100	50 - 80
30	32 - 58
10	22 - 42
5	15 - 34
1	2 - 20
0.1	0 - 10
½" max dimension	5

The minimum thickness of riprap should not be less than 1.0 times the maximum stone size or less than 1.5 times the average stone size. The maximum size of Grade "C" stone is 24 inches and the average size is 15 inches. Therefore, we recommend a minimum thickness of 24 inches. This stone should be placed on a minimum 6-in. thick bedding. The bedding should be crushed limestone meeting the following gradation.

U. S. STANDARD SIEVE	PERCENT PASSING BY WEIGHT
1½"	100
1"	90 - 100
½"	25 - 60
No. 4	0 - 10
No. 8	0 - 5
No. 200	0 - 1

NEW I-WALL B.T.W., EAST ANCHOR BULKHEAD AND EAST I-WALL

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No.
Made By:	Date:	P.S. # 6	
Checked By:	Date:		

NEW I WALL

BTW.

EAST ANCHOR BULKHEAD

AND

EAST I WALL

EUSTIS ENGINEERING COMPANY, INC.
Geotechnical Engineers
Metairie, Louisiana

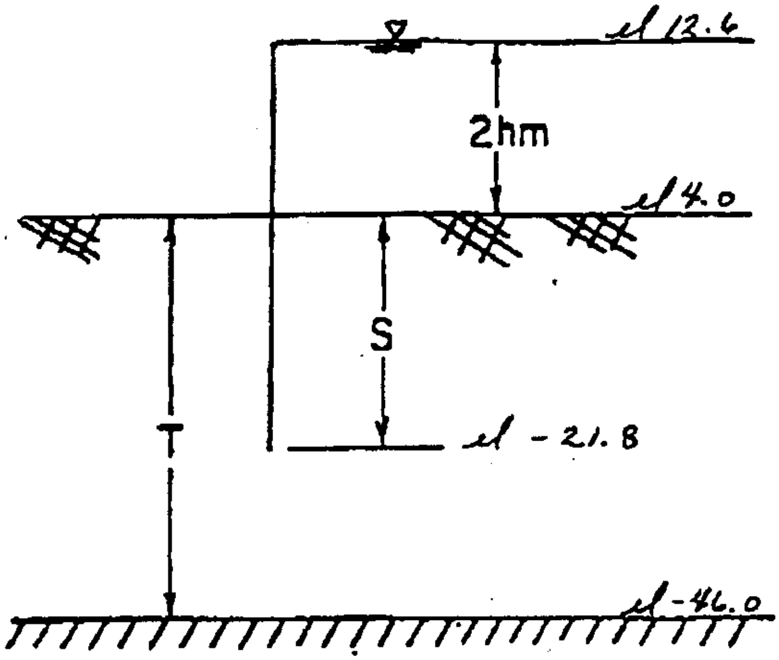
Date 10-23-95
Job 13491
By JRE
Checked By

oject P.S. #6 New I-Wall Detail "A"
Subject East I-Wall Adjacent To East Monolith

Q-Case F.S. = 1.5 SWL el 12.6 NGVD
Ground el 4.0
tip el -8.09

Q-Case F.S. = 1.0 SWL + 2' FB el 14.6
Ground el 4.0
tip el -8.20 ✓ Controls Pressure Diagram
M_{max} = 18,865 '*

enetration To Head Ratio (Using SWL & 3 to 1 Ratio)
Head = 12.6 - 4.0 = 8.6'
3 * 8.6' = 25.8'
tip el -21.8 ✓ Controls Embedment



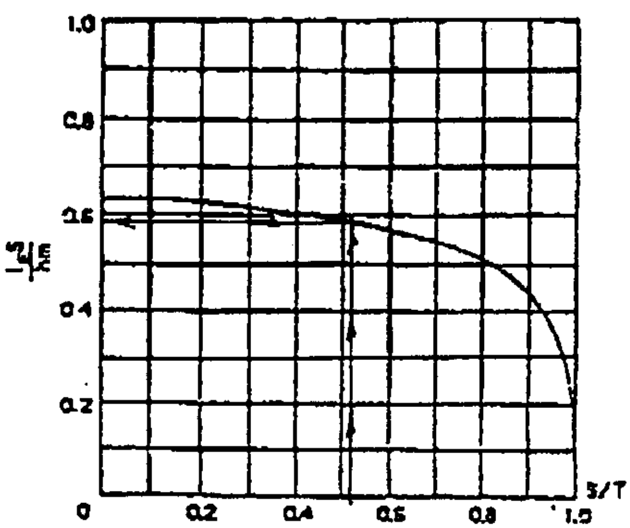
S = 25.8' T = 50' S/T = 0.52 hm = 4.3'

I_E S/hm FOR S/T = 0.59 I_E = 0.10

FOR Icr. = γ_{sub}/γ_w = 47/62.4 = 0.75

F. S. = I_{cr}/I_E = 7.5 > 4.0 OK

FOR SP REC. F.S. = 4.0



Pump Station No. 6
East I-Wall

CUTOFF WALL ANALYSIS

BY: HARR METHOD

U. S. ARMY ENGINEERING DISTRICT NEW ORLEANS
CORPS OF ENGINEERS

PLATE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 23-OCT-1995 TIME: 10.02.22

INPUT DATA

I.--HEADING:
'EAST I-WALL PUMP STATION NO. 6 JOB 13491
'Q-CASE F.S=1.0 WITH WATER TO SWL PLUS 2'FB

II.--CONTROL
CANTILEVER WALL DESIGN

LEVEL 1 FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
LEVEL 1 FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

III.--WALL DATA
ELEVATION AT TOP OF WALL = 14.60 (FT)

IV.--SURFACE POINT DATA

IV.A--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	4.00
200.00	4.00

IV.B-- LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	4.00
200.00	4.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE LAYER DATA
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
111.00	111.00	.00	780.0	.00	.0	.00	.00	DEF	DEF
09.00	109.00	.00	500.0	.00	.0	-7.00	.00	DEF	DEF
114.00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF

107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF
108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
125.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
116.00	116.00	.00	1250.0	.00	.0			DEF	DEF

V.B.-- LEFTSIDE LAYER DATA

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
111.00	111.00	.00	780.0	.00	.0	.00	.00	DEF	DEF
109.00	109.00	.00	500.0	.00	.0	-7.00	.00	DEF	DEF
114.00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF
108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
125.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
116.00	116.00	.00	1250.0	.00	.0			DEF	DEF

VI.--WATER DATA

UNIT WEIGHT = 62.50 (PCF)
RIGHTSIDE ELEVATION = 14.60 (FT)
LEFTSIDE ELEVATION = .00 (FT)
NO SEEPAGE

VII.--SURFACE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 23-OCT-1995 TIME: 10.02.33

SOIL PRESSURES FOR
CANTILEVER WALL DESIGN

I.--HEADING

'EAST I-WALL PUMP STATION NO. 6 JOB 13491
'Q-CASE F.S=1.0 WITH WATER TO SWL PLUS 2'FB

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

	<-LEFTSIDE PRESSURES->		<---NET PRESSURES----> (SOIL PLUS WATER)		<RIGHTSIDE PRESSURES->	
ELEV. (FT)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
14.60	.00	.00	.000	.000	.00	.00
13.60	.00	.00	62.500	62.500	.00	.00
12.60	.00	.00	125.000	125.000	.00	.00
11.60	.00	.00	187.500	187.500	.00	.00
10.60	.00	.00	250.000	250.000	.00	.00
9.60	.00	.00	312.500	312.500	.00	.00
8.60	.00	.00	375.000	375.000	.00	.00
7.60	.00	.00	437.500	437.500	.00	.00
6.60	.00	.00	500.000	500.000	.00	.00
5.60	.00	.00	562.500	562.500	.00	.00
4.60	.00	.00	625.000	625.000	.00	.00
4.00+	.00	.00	662.500	662.500	.00	.00
4.00-	1560.00	.00	-897.500	2222.500	.00	1560.00
3.80	1582.20	.00	-907.200	2244.700	.00	1569.70
3.60	1604.40	.00	-916.900	2266.900	.00	1579.40
3.00	1671.00	.00	-946.000	2333.500	.00	1608.50
2.60	1715.40	.00	-965.400	2377.900	.00	1627.90
1.60	1832.94	.00	-1020.436	2495.364	.00	1682.86
.60	1872.93	.00	-997.932	2535.420	.00	1660.42
.00	1716.78	.00	-804.285	2387.320	.00	1474.82
-.40	1578.81	.00	-666.314	2241.852	.00	1329.35
-1.40	1502.22	.00	-589.721	2164.604	.00	1252.10
-2.40	1555.60	.00	-643.100	2218.100	.00	1305.60
-3.40	1602.10	.00	-689.600	2264.600	.00	1352.10
-4.40	1648.60	.00	-736.100	2311.100	.00	1398.60
-5.40	1690.02	.00	-777.517	2352.517	.00	1440.02
-6.40	1792.26	.00	-879.762	2454.762	.00	1542.26
-7.00	1989.30	.00	-1076.797	2651.797	.00	1739.30
-7.40	2138.40	.00	-1225.896	2800.896	.00	1888.40
-8.40	2287.09	.00	-1374.591	2949.591	.00	2037.09
-9.40	2338.19	.00	-1425.685	3000.685	.00	2088.18
-10.40	2333.94	.00	-1421.438	2996.438	.00	2083.94
-11.00	2195.45	.00	-1282.946	2857.946	.00	1945.45
-11.40	2084.99	3.25	-1172.487	2744.238	.00	1834.99
-12.40	2032.31	34.55	-1119.813	2660.259	.00	1782.31
-13.40	2082.30	81.27	-1169.800	2663.530	.00	1832.30
-14.40	2126.80	126.93	-1214.300	2662.374	.00	1876.80
-15.40	2171.30	171.30	-1258.800	2662.500	.00	1921.30
-16.40	2215.80	215.80	-1303.300	2662.500	.00	1965.80
-17.40	2260.30	260.30	-1347.800	2662.500	.00	2010.30
-18.40	2304.80	304.80	-1392.300	2662.500	.00	2054.80

-19.40	2349.30	349.30	-1436.800	2662.500	.00	2099.30
-20.40	2371.38	393.56	-1458.876	2646.086	.00	2127.15
-21.40	2660.50	440.99	-1707.633	2824.437	40.37	2352.93
22.00	3443.52	473.45	-2333.006	3383.526	198.01	2944.48
-22.40	4065.12	491.19	-2823.962	3840.687	328.65	3419.38
-23.40	4668.77	516.44	-3318.482	4308.586	437.79	3912.52
-24.40	4823.40	535.93	-3458.300	4449.967	452.60	4073.40
-25.40	5001.90	555.77	-3616.967	4608.633	472.43	4251.90
-26.40	5180.40	575.60	-3775.633	4767.300	492.27	4430.40
-27.40	5358.90	595.43	-3934.300	4925.967	512.10	4608.90
-28.40	5537.40	615.27	-4092.967	5084.633	531.93	4787.40

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 23-OCT-1995 TIME: 10.02.42

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¤ SUMMARY OF RESULTS FOR ¤
¤ CANTILEVER WALL DESIGN ¤
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I.--HEADING

'EAST I-WALL PUMP STATION NO. 6 JOB 13491
'Q-CASE F.S=1.0 WITH WATER TO SWL PLUS 2'FB

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

WALL BOTTOM ELEV. (FT) : -8.20
PENETRATION (FT) : 12.20

MAX. BEND. MOMENT (LB-FT) : 18865.
AT ELEVATION (FT) : .39

MAX. SCALED DEFL. (LB-IN3) : 4.5757E+09
AT ELEVATION (FT) : 14.60

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA
IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 23-OCT-1995 TIME: 10.02.42

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¤ COMPLETE RESULTS FOR ¤
¤ CANTILEVER WALL DESIGN ¤
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I.--HEADING

'EAST I-WALL PUMP STATION NO. 6 JOB 13491
'Q-CASE F.S=1.0 WITH WATER TO SWL PLUS 2'FB

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN3)	NET PRESSURE (PSF)
14.60	0.	0.	4.5757E+09	.00
13.60	10.	31.	4.2513E+09	62.50
12.60	83.	125.	3.9269E+09	125.00
11.60	281.	281.	3.6027E+09	187.50
10.60	667.	500.	3.2790E+09	250.00
9.60	1302.	781.	2.9565E+09	312.50
8.60	2250.	1125.	2.6363E+09	375.00
7.60	3573.	1531.	2.3200E+09	437.50
6.60	5333.	2000.	2.0100E+09	500.00
5.60	7594.	2531.	1.7092E+09	562.50
4.60	10417.	3125.	1.4216E+09	625.00
4.00	12406.	3511.	1.2574E+09	662.50
4.00	12406.	3511.	1.2574E+09	-897.50
3.80	13091.	3331.	1.2044E+09	-907.20
3.60	13739.	3148.	1.1522E+09	-916.90
3.00	15461.	2590.	1.0015E+09	-946.00
2.60	16420.	2207.	9.0635E+08	-965.40
1.60	18136.	1214.	6.8874E+08	-1020.44
.60	18844.	205.	5.0233E+08	-997.93
.00	18799.	-336.	4.0604E+08	-804.28
-.40	18604.	-630.	3.4834E+08	-666.31
-1.40	17654.	-1258.	2.2640E+08	-589.72
-2.40	16092.	-1874.	1.3488E+08	-643.10
-3.40	13889.	-2540.	7.1068E+07	-689.60
-4.40	10996.	-3253.	3.1161E+07	-736.10
-4.87	9392.	-3602.	1.9324E+07	-755.49
-5.40	7396.	-3848.	1.0150E+07	-168.43
-6.40	3648.	-3465.	1.8957E+06	935.36
-7.00	1777.	-2705.	3.9288E+05	1597.63
-7.40	835.	-1977.	7.9785E+04	2039.15
-8.20	0.	0.	0.0000E+00	2919.49

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

III.--SOIL PRESSURES

ELEVATION (FT)	< LEFTSIDE PRESSURE (PSF) > PASSIVE	ACTIVE	<RIGHTSIDE PRESSURE (PSF) > ACTIVE	PASSIVE
14.60	0.	0.	0.	0.
13.60	0.	0.	0.	0.
12.60	0.	0.	0.	0.
11.60	0.	0.	0.	0.
10.60	0.	0.	0.	0.
9.60	0.	0.	0.	0.
8.60	0.	0.	0.	0.
7.60	0.	0.	0.	0.
6.60	0.	0.	0.	0.
5.60	0.	0.	0.	0.
4.60	0.	0.	0.	0.
4.00+	0.	0.	0.	0.
4.00-	1560.	0.	0.	1560.
3.80	1582.	0.	0.	1570.
3.60	1604.	0.	0.	1579.
3.00	1671.	0.	0.	1609.
2.60	1715.	0.	0.	1628.
1.60	1833.	0.	0.	1683.
.60	1873.	0.	0.	1660.
.00	1717.	0.	0.	1475.
-.40	1579.	0.	0.	1329.
-1.40	1502.	0.	0.	1252.
-2.40	1556.	0.	0.	1306.
-3.40	1602.	0.	0.	1352.
-4.40	1649.	0.	0.	1399.
-4.87	1668.	0.	0.	1418.
-5.40	1690.	0.	0.	1440.
-6.40	1792.	0.	0.	1542.
-7.00	1989.	0.	0.	1739.
-7.40	2138.	0.	0.	1888.
-8.20	2287.	0.	0.	2037.
-9.40	2338.	0.	0.	2088.

```
1000 'EAST I-WALL   PUMP STATION NO. 6   JOB 13491
1010 'Q-CASE F.S=1.0 WITH WATER TO SWL PLUS 2'FB
1020 CONTROL  C  D    1.0    1.0
1030 WALL        14.60
1040 SURFACE RIGHTSIDE   2
1050         .00      4.00     200.00       4.00
1060 SURFACE  LEFTSIDE   2
1070         .00      4.00     200.00       4.00
1080 SOIL RIGHTSIDE  STRENGTH    8       .00       .00
1090  111.00  111.00    .00  780.00     .00       .00       .00     .00   .00   .00
1100  109.00  109.00    .00  500.00     .00       .00     -7.00     .00   .00   .00
1110  114.00  114.00    .00  720.00     .00       .00    -11.00     .00   .00   .00
1120  107.00  107.00    .00  500.00     .00       .00    -22.00     .00   .00   .00
1130  122.00  122.00  30.00     .00     .00       .00    -46.00     .00   .00   .00
1140  108.00  108.00    .00  800.00     .00       .00    -64.50     .00   .00   .00
1150  125.00  125.00    .00 1800.00     .00       .00    -72.00     .00   .00   .00
1160  116.00  116.00    .00 1250.00     .00       .00       .00     .00
1170 SOIL  LEFTSIDE  STRENGTH    8       .00       .00
1180  111.00  111.00    .00  780.00     .00       .00       .00     .00   .00   .00
1190  109.00  109.00    .00  500.00     .00       .00     -7.00     .00   .00   .00
1200  114.00  114.00    .00  720.00     .00       .00    -11.00     .00   .00   .00
1210  107.00  107.00    .00  500.00     .00       .00    -22.00     .00   .00   .00
1220  122.00  122.00  30.00     .00     .00       .00    -46.00     .00   .00   .00
1230  108.00  108.00    .00  800.00     .00       .00    -64.50     .00   .00   .00
1240  125.00  125.00    .00 1800.00     .00       .00    -72.00     .00   .00   .00
1250  116.00  116.00    .00 1250.00     .00       .00       .00     .00
1260 WATER ELEVATIONS      62.50     14.60     0.00
1270 FINISH
```

WEST WALL OF EAST COFFERDAM

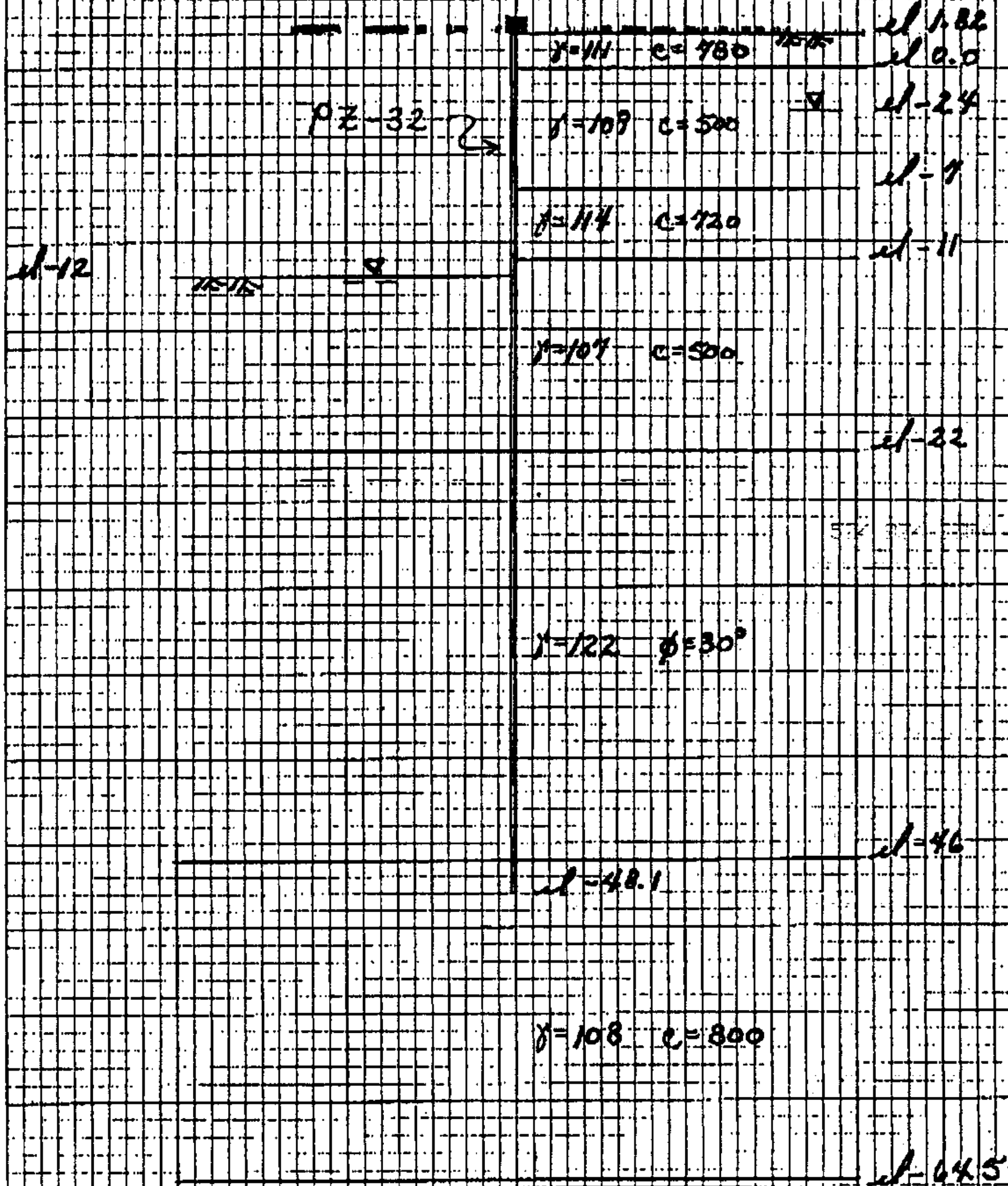
URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No.
Made By:	Date:	P.S. #6	
Checked By:	Date:		

WEST WALL

OF

EAST COFFERDAM

EXISTING WALL ON WEST SIDE OF EAST COFFERDAM - DETAIL "B"



F.S. = 1.0 M_{max} = 17,975 '# tip el -27.13

F.S. = 1.43 tip el -48.1

F.S. = 1.3 tip el -41.49

P.S. #6
JOB 13491
10-24-95
JRE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 15.36.01

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¤ INPUT DATA ¤
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I.--HEADING:
'PUMP STATION NO. 6 JOB 13491 JRE
'EXISTING WALL ON WEST SIDE OF EAST COFFERDAM DETAIL B

II.--CONTROL
CANTILEVER WALL ANALYSIS
SAME FACTOR OF SAFETY APPLIED TO ACTIVE AND PASSIVE PRESSURES.

III.--WALL DATA
ELEVATION AT TOP OF WALL = 1.82 (FT)
ELEVATION AT BOTTOM OF WALL = -27.13 (FT)
WALL MODULUS OF ELASTICITY = 2.90E+07 (PSI)
WALL MOMENT OF INERTIA = 220.40 (IN**4/FT)

IV.--SURFACE POINT DATA

IV.A--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	1.82
200.00	1.82

IV.B-- LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	-12.00
200.00	-12.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE LAYER DATA

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH- ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH- ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
111.00	111.00	.00	780.0	.00	.0	.00	.00		
09.00	109.00	.00	500.0	.00	.0	-7.00	.00		
14.00	114.00	.00	720.0	.00	.0	-11.00	.00		
07.00	107.00	.00	500.0	.00	.0	-22.00	.00		

122.00	122.00	30.00	.0	.00	.0	-46.00	.00
108.00	108.00	.00	800.0	.00	.0		

V.B.-- LEFTSIDE LAYER DATA

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
107.00	107.00	.00	500.0	.00	.0	-22.00	.00		
122.00	122.00	30.00	.0	.00	.0	-46.00	.00		
108.00	108.00	.00	800.0	.00	.0				

VI.--WATER DATA

UNIT WEIGHT = 62.50 (PCF)
RIGHTSIDE ELEVATION = -2.40 (FT)
LEFTSIDE ELEVATION = -12.00 (FT)
NO SEEPAGE

VII.--SURFACE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 15.36.19

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¤ SUMMARY OF RESULTS FOR ¤
¤ CANTILEVER WALL ANALYSIS ¤
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I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'EXISTING WALL ON WEST SIDE OF EAST COFFERDAM DETAIL B

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

FACTOR OF SAFETY : 1.00

MAX. BEND. MOMENT (LB-FT) : 17975.
AT ELEVATION (FT) : -17.92

MAXIMUM DEFLECTION (IN) : 1.1381E+00
AT ELEVATION (FT) : 1.82

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 15.36.19

COMPLETE RESULTS FOR
CANTILEVER WALL ANALYSIS

I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'EXISTING WALL ON WEST SIDE OF EAST COFFERDAM DETAIL B

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	DEFLECTION (IN)	NET PRESSURE (PSF)
1.82	0.	0.	1.1381E+00	.00
.82	0.	0.	1.0796E+00	.00
.00	0.	0.	1.0316E+00	.00
-.18	0.	0.	1.0211E+00	.00
-1.18	0.	0.	9.6252E-01	.00
-2.18	0.	0.	9.0398E-01	.00
-2.40	0.	0.	8.9110E-01	.00
-3.18	5.	19.	8.4544E-01	48.75
-4.18	59.	99.	7.8691E-01	111.25
-5.18	224.	242.	7.2839E-01	173.75
-6.18	563.	447.	6.6994E-01	236.25
-7.00	1014.	661.	6.2212E-01	287.50
-7.18	1138.	714.	6.1165E-01	298.75
-8.18	2011.	1044.	5.5367E-01	361.25
-9.18	3247.	1437.	4.9624E-01	423.75
-10.18	4905.	1892.	4.3970E-01	486.25
-11.00	6626.	2311.	3.9431E-01	537.50
-11.18	7050.	2409.	3.8449E-01	548.75

-12.00	9216.	2880.	3.4062E-01	600.00
-12.00	9216.	2880.	3.4062E-01	-400.00
-12.09	9474.	2844.	3.3590E-01	-404.01
-12.18	9728.	2807.	3.3121E-01	-408.01
-13.00	11889.	2458.	2.8944E-01	-444.50
-13.18	12324.	2377.	2.8055E-01	-452.51
-14.18	14467.	1902.	2.3321E-01	-497.01
-15.18	16115.	1388.	1.8977E-01	-532.41
-16.18	17238.	860.	1.5068E-01	-522.85
-17.18	17843.	356.	1.1623E-01	-484.26
-18.18	17959.	-121.	8.6600E-02	-470.17
-19.18	17603.	-592.	6.1813E-02	-471.98
-20.18	16775.	-1065.	4.1774E-02	-473.21
-21.18	15476.	-1533.	2.6260E-02	-463.60
-22.00	14071.	-1884.	1.6673E-02	-391.82
-22.18	13725.	-1953.	1.4920E-02	-378.52
-23.18	11569.	-2374.	7.2815E-03	-462.63
-24.18	8938.	-2916.	2.7602E-03	-623.22
-25.18	5683.	-3619.	6.4113E-04	-781.89
-25.45	4686.	-3834.	3.7278E-04	-824.36
-26.18	1899.	-3448.	4.2732E-05	1879.59
-27.13	-1.	0.	0.0000E+00	5384.56

III.--SOIL PRESSURES

ELEVATION (FT)	< LEFTSIDE PRESSURE (PSF)> PASSIVE	ACTIVE	<RIGHTSIDE PRESSURE (PSF)> ACTIVE	PASSIVE
1.82	0.	0.	0.	1560.
.82	0.	0.	0.	1648.
.00	0.	0.	0.	1484.
-.18	0.	0.	0.	1417.
-1.18	0.	0.	0.	1326.
-2.18	0.	0.	0.	1438.
-2.40	0.	0.	0.	1457.
-3.18	0.	0.	0.	1500.
-4.18	0.	0.	0.	1546.
-5.18	0.	0.	0.	1590.
-6.18	0.	0.	0.	1658.
-7.00	0.	0.	0.	1896.
-7.18	0.	0.	0.	1974.
-8.18	0.	0.	0.	2182.
-9.18	0.	0.	0.	2233.
-10.18	0.	0.	0.	2263.
-11.00	0.	0.	0.	2099.
-11.18	0.	0.	0.	2033.
-12.00+	0.	0.	0.	1927.
-12.00-	1000.	0.	0.	1927.
-12.09	1004.	0.	0.	1931.
-12.18	1008.	0.	0.	1936.
-13.00	1045.	0.	0.	1973.
-13.18	1053.	0.	0.	1981.
-14.18	1097.	0.	0.	2025.
-15.18	1142.	0.	9.	2070.
-16.18	1186.	0.	63.	2114.
-17.18	1231.	0.	146.	2159.
-18.18	1275.	0.	205.	2203.
-19.18	1320.	0.	248.	2248.
-20.18	1365.	0.	291.	2281.

-21.18	1404.	6.	340.	2409.
-22.00	1404.	75.	412.	3253.
-22.18	1410.	101.	431.	3547.
-23.18	1544.	173.	482.	4344.
-24.18	1724.	192.	501.	4508.
-25.18	1903.	211.	521.	4687.
-25.45	1950.	217.	526.	4734.
-26.18	2081.	231.	541.	4865.
-27.13	2260.	251.	560.	5044.
-28.18	2438.	271.	580.	5222.

```
1000 'PUMP STATION NO. 6   JOB 13491   JRE
1010 'EXISTING WALL ON WEST SIDE OF EAST COFFERDAM   DETAIL B
1020 CONTROL  C  A
1030 WALL        1.82     -27.13   2.900E+07    220.40
1040 SURFACE RIGHTSIDE   2
1050         .00      1.82    200.00      1.82
1060 SURFACE  LEFTSIDE   2
1070         .00    -12.00    200.00    -12.00
1080 SOIL RIGHTSIDE  STRENGTH    6     .00
1090  111.00  111.00   .00  780.00    .00      .00      .00     .00
1100  109.00  109.00   .00  500.00    .00      .00    -7.00     .00
1110  114.00  114.00   .00  720.00    .00      .00   -11.00     .00
1120  107.00  107.00   .00  500.00    .00      .00   -22.00     .00
1130  122.00  122.00 30.00     .00    .00      .00   -46.00     .00
1140  108.00  108.00   .00  800.00    .00      .00
1150 SOIL  LEFTSIDE  STRENGTH    3     .00
1160  107.00  107.00   .00  500.00    .00      .00   -22.00     .00
1170  122.00  122.00 30.00     .00    .00      .00   -46.00     .00
1180  108.00  108.00   .00  800.00    .00      .00
1190 WATER ELEVATIONS    62.50    -2.40   -12.00
1200 FINISH
```

NEW I-WALL AT WEST SIDE OF EAST MONOLITH

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By:	Date:	Job No.	Sheet No.
Checked By:	Date:	P.S. #6	

NEW I WALL

AT

WEST SIDE OF EAST

MONOLITH

OCT-27-1995 15:02

Page

EUSTIS ENGINEERING COMPANY, INC.
Geotechnical Engineers
Metairie, Louisiana

Date 10-24-95

Job 13491

Project P.S. #6

By JRE

Subject NEW I-WALL ON WEST SIDE OF EAST MONOLITH

Checked By

ASSUME: GROUND EL. 14.0 NGVD } PROTECTED SIDE
WATER EL. -2.4

GROUND ACTUALLY VARIES FROM EL. 6.0 UP TO EL. 14.0 ALONG EARTH BERM ABOVE HORIZONTAL PUMPS ON EAST SIDE OF P.S. #6

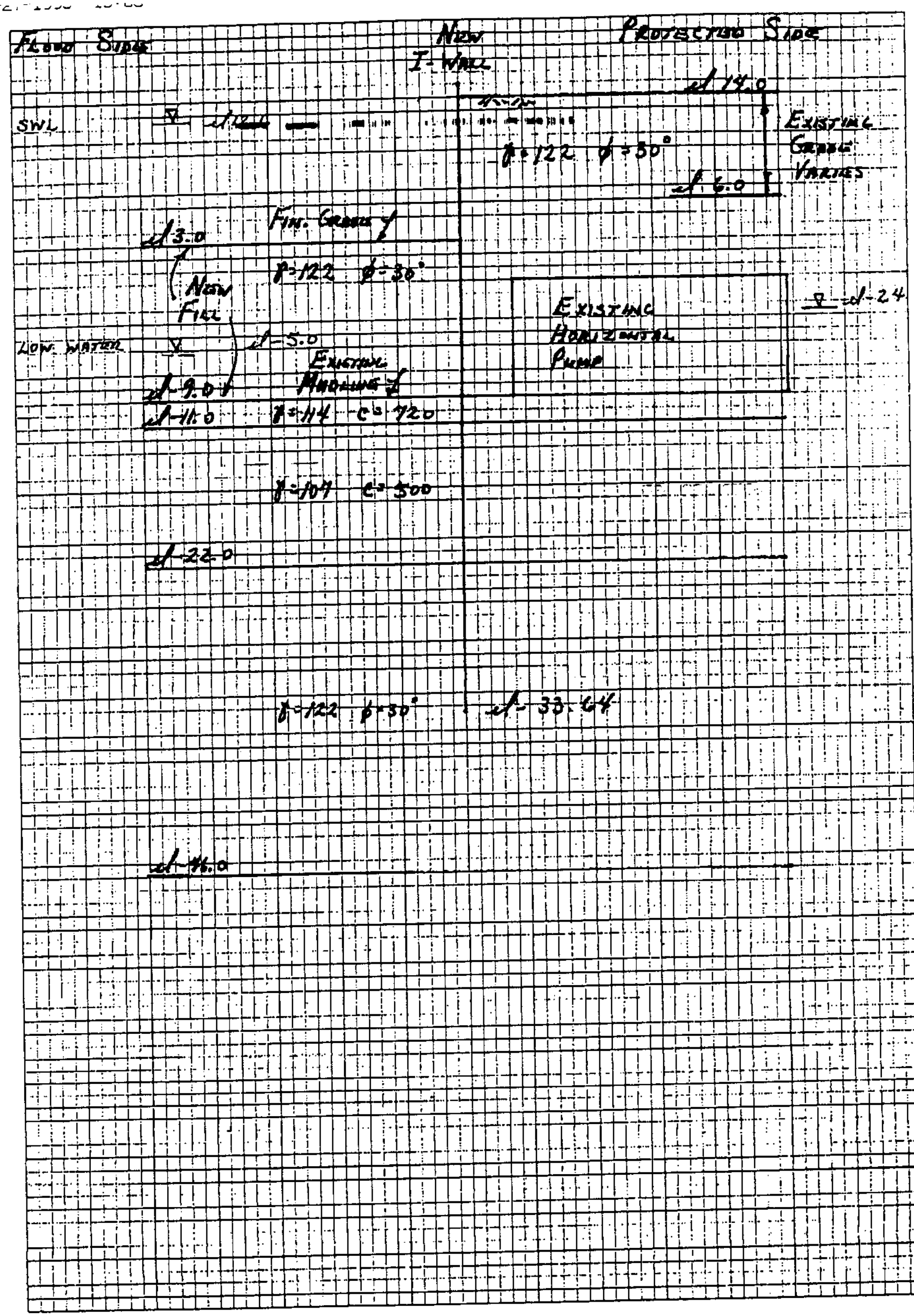
CHECK FAILURE OF I-WALL TOWARD FLOOD SIDE DUE TO GROUNDLINE CONFIGURATION.

LOW WATER EL. -5.0	F.S. = 1.0	M_{max} = 20,298'#	TIP EL. -8.30
	F.S. = 1.5		TIP EL. -23.52
WATER EL. 3.0	F.S. = 1.0	M_{max} = 26,068'# ✓	TIP EL. -12.94
	F.S. = 1.5		TIP EL. -33.64

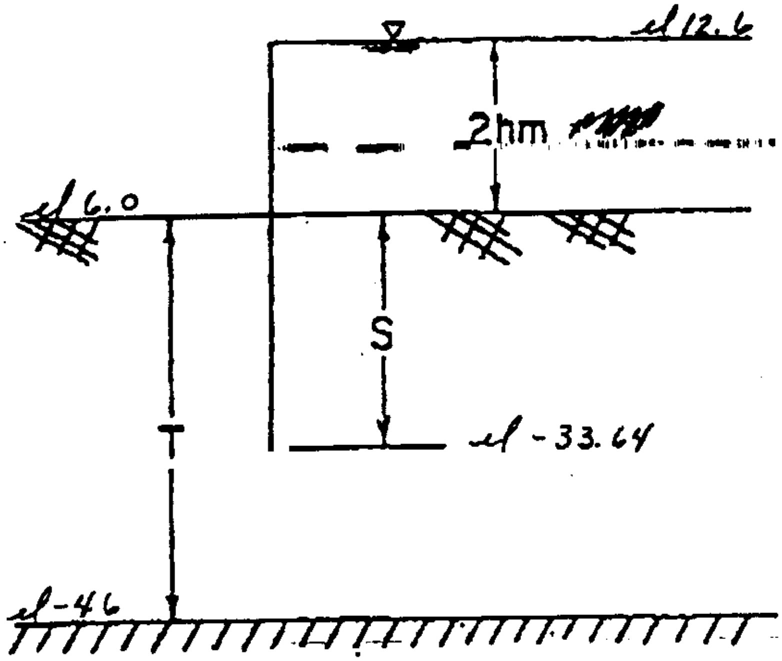
SWL EL. 12.6 ↻ CLOCKWISE ROTATION, DRIVING FORCES = φ

∴ PRESSURE DIAGRAM & EMBEDMENT CONTROLLED BY WATER @ el 3.0

Q-CASE



FLOOD SIDE
NEW
I-WALL
PROTECTED SIDE
el 14.0
SWL
el 12.0
γ=122 ϕ=30°
EXISTING
GRADE
VARIES
el 6.0
FIN. GRADE
el 3.0
γ=122 ϕ=30°
NEW
FILL
EXISTING
HORIZONTAL
PUMP
el -2.4
LOW WATER
el -5.0
EXISTING
MUDLINE
el -9.0
el -11.0
γ=114 c=720
γ=107 c=500
el -22.0
γ=122 ϕ=30°
el -33.64
el -46.0



ASSUME HORIZONTAL GROUND SURFACE AT EL. 6.0

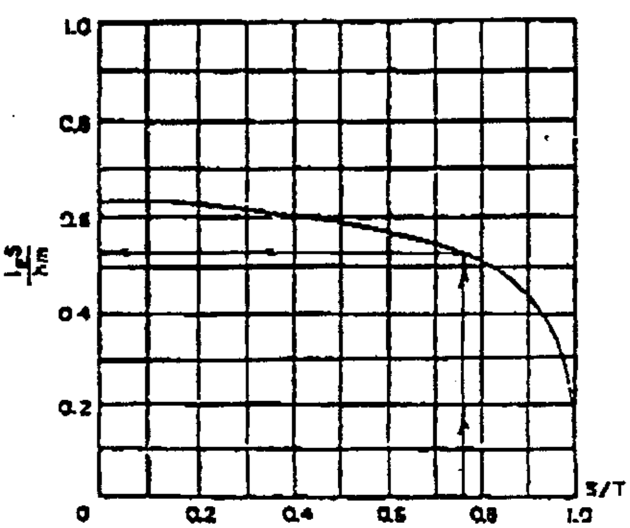
S = 39.64' T = 52' S/T = 0.76 hm = 3.3'

$I_E S/hm$ FOR S/T = 0.53 I_E = 0.04

FOR Icr. = $\gamma sub/\gamma w$ = 55/62.4 = 0.88

F.S. = Icr/I_E = 22 OK

FOR SP REC. F.S. = 4.0



NEW I-WALL ON WEST SIDE of EAST MONOLITH

CUTOFF WALL ANALYSIS

BY: HARR METHOD

U.S. ARMY ENGINEERING DISTRICT NEW ORLEANS
CORPS OF ENGINEERS

PLATE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 18.36.33

èëëëëëëëëëëëëëëë£
¤ INPUT DATA ¤
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I.--HEADING:
'PUMP STATION NO. 6 JOB 13491 JRE
'NEW I-WALL ON WEST SIDE OF EAST MONOLITH water el 3.0

II.--CONTROL
CANTILEVER WALL DESIGN

LEVEL 1 FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
LEVEL 1 FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

III.--WALL DATA
ELEVATION AT TOP OF WALL = 14.00 (FT)

IV.--SURFACE POINT DATA

IV.A--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	14.00
200.00	14.00

IV.B-- LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	3.00
200.00	3.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE LAYER DATA
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
[illegible]2.00	122.00	30.00	.0	.00	.0	-9.00	.00	DEF	DEF
4.00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF

122.00	122.00	30.00	.0	.00	.0			DEF	DEF

V.B.-- LEFTSIDE LAYER DATA
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
122.00	122.00	30.00	.0	.00	.0	-9.00	.00	DEF	DEF
114.00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0			DEF	DEF

VI.--WATER DATA

UNIT WEIGHT = 62.50 (PCF)
RIGHTSIDE ELEVATION = -2.40 (FT)
LEFTSIDE ELEVATION = 3.00 (FT)
NO SEEPAGE

VII.--SURFACE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 24-OCT-1995 TIME: 18.36.41

SOIL PRESSURES FOR
CANTILEVER WALL DESIGN

I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'NEW I-WALL ON WEST SIDE OF EAST MONOLITH

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

	<-LEFTSIDE PRESSURES->		<---NET PRESSURES----> (SOIL PLUS WATER)		<RIGHTSIDE PRESSURES->	
ELEV. (FT)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
14.00	.00	.00	.000	.000	.00	.00
13.00	.00	.00	40.667	366.000	40.67	366.00
12.00	.00	.00	81.333	732.000	81.33	732.00
11.00	.00	.00	122.000	1098.000	122.00	1098.00
10.00	.00	.00	162.667	1464.000	162.67	1464.00
9.00	.00	.00	203.333	1830.000	203.33	1830.00
8.00	.00	.00	244.000	2196.000	244.00	2196.00
7.00	.00	.00	284.667	2562.000	284.67	2562.00
6.00	.00	.00	325.333	2928.000	325.33	2928.00
5.00	.00	.00	366.000	3294.000	366.00	3294.00
4.00	.00	.00	406.667	3660.000	406.67	3660.00
3.00	.00	.00	447.333	4026.000	447.33	4026.00
2.00	178.50	19.83	247.000	4309.667	488.00	4392.00
1.00	357.00	39.67	46.667	4593.333	528.67	4758.00
.77	398.58	44.29	.000	4659.412	538.14	4843.26
.38	467.04	51.89	-76.833	4768.206	553.74	4983.63
.00	535.50	59.50	-153.667	4877.000	569.33	5124.00
-1.00	714.00	79.33	-353.961	5161.018	610.04	5490.35
-2.00	892.50	99.17	-554.513	5442.718	650.49	5854.39
-2.40	963.90	107.10	-637.145	5533.695	664.26	5978.30
3.00	1071.00	119.00	-729.662	5653.038	678.84	6109.54
-4.00	1249.50	138.83	-888.309	5811.883	698.69	6288.22
-5.00	1428.00	158.67	-1047.000	5970.333	718.50	6466.50
-6.00	1606.50	178.50	-1205.667	6129.000	738.33	6645.00
-7.00	1785.31	213.27	-1367.198	6325.521	755.61	6876.29
-8.00	1964.63	127.79	-1509.531	6222.927	792.59	6688.22
-8.34+	2122.16	.00	-1586.361	5934.600	821.69	6272.10
-8.34-	2018.93	.00	-1586.361	5934.600	821.69	6272.10
-9.00	2122.16	.00	-1582.677	5143.660	876.98	5481.16
-10.00	2163.12	.00	-1468.969	3820.031	1031.66	4157.53
-11.00	2035.88	.00	-1096.375	3325.395	1277.00	3662.89
-12.00	1902.75	.00	-740.500	3244.750	1499.75	3582.25
-13.00	1899.15	.00	-644.250	3241.152	1592.40	3578.65
-14.00	1950.50	.00	-658.000	3292.500	1630.00	3630.00
-15.00	1995.00	.00	-658.000	3337.000	1674.50	3674.50
-16.00	2039.50	.00	-658.000	3381.500	1719.00	3719.00
-17.00	2084.00	.00	-658.000	3426.000	1763.50	3763.50
-18.00	2128.50	25.97	-658.000	3444.531	1808.00	3808.00
-19.00	2173.00	115.81	-658.000	3399.186	1852.50	3852.50
-20.00	2191.77	209.11	-616.698	3272.177	1912.58	3818.79
-21.00	2413.22	275.40	-902.094	3794.721	1848.63	4407.63
-22.00	3147.55	364.64	-2000.740	5804.406	1484.31	6506.55
-23.00	3946.78	443.24	-3176.240	7889.635	1108.04	8670.38
-24.00	4301.18	477.28	-3619.063	8577.385	1019.62	9392.16
-25.00	4455.00	495.00	-3737.667	8661.000	1054.83	9493.50
-26.00	4633.50	514.83	-3896.333	8819.667	1074.67	9672.00
-27.00	4812.00	534.67	-4055.000	8978.333	1094.50	9850.50
-28.00	4990.50	554.50	-4213.667	9137.000	1114.33	10029.00
-29.00	5169.00	574.33	-4372.333	9295.667	1134.17	10207.50

-30.00	5347.50	594.17	-4531.000	9454.333	1154.00	10386.00
-31.00	5526.00	614.00	-4689.667	9613.000	1173.83	10564.50

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 18.36.48

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¤ SUMMARY OF RESULTS FOR ¤
¤ CANTILEVER WALL DESIGN ¤
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I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'NEW I-WALL ON WEST SIDE OF EAST MONOLITH

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

```
WALL BOTTOM ELEV. (FT)      :      -12.94
     PENETRATION (FT)       :       15.94

MAX. BEND. MOMENT (LB-FT)   :      26068.
     AT ELEVATION (FT)      :       -4.77

MAX. SCALED DEFL. (LB-IN3)  :  8.7557E+09
     AT ELEVATION (FT)      :       14.00
```

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA
IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS

BY CLASSICAL METHODS

DATE: 24-OCT-1995 TIME: 18.36.48

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¤ COMPLETE RESULTS FOR ¤
¤ CANTILEVER WALL DESIGN ¤
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I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'NEW I-WALL ON WEST SIDE OF EAST MONOLITH

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN3)	NET PRESSURE (PSF)
14.00	0.	0.	8.7557E+09	.00
13.00	7.	20.	8.2502E+09	40.67
12.00	54.	81.	7.7448E+09	81.33
11.00	183.	183.	7.2395E+09	122.00
10.00	434.	325.	6.7344E+09	162.67
9.00	847.	508.	6.2302E+09	203.33
8.00	1464.	732.	5.7275E+09	244.00
7.00	2325.	996.	5.2273E+09	284.67
6.00	3470.	1301.	4.7312E+09	325.33
5.00	4941.	1647.	4.2411E+09	366.00
4.00	6778.	2033.	3.7596E+09	406.67
3.00	9021.	2460.	3.2899E+09	447.33
2.00	11672.	2807.	2.8358E+09	247.00
1.00	14569.	2954.	2.4020E+09	46.67
.77	15258.	2960.	2.3043E+09	.00
.38	16392.	2945.	2.1467E+09	-76.83
.00	17514.	2901.	1.9933E+09	-153.67
-1.00	20304.	2647.	1.6149E+09	-353.96
-2.00	22741.	2193.	1.2715E+09	-554.51
-2.40	23572.	1954.	1.1449E+09	-637.14
-3.00	24624.	1544.	9.6727E+08	-729.66
-4.00	25777.	735.	7.0552E+08	-888.31
-5.00	26042.	-232.	4.8820E+08	-1047.00
-6.00	25260.	-1359.	3.1572E+08	-1205.67
-7.00	23271.	-2645.	1.8672E+08	-1367.20
-8.00	19919.	-4083.	9.7740E+07	-1509.53
-8.07	19642.	-4185.	9.3073E+07	-1524.49
-8.34	18424.	-4571.	7.5361E+07	-1253.08
-9.00	15206.	-5182.	4.2970E+07	-612.53
-10.00	9881.	-5306.	1.4388E+07	365.01
-11.00	4921.	-4452.	2.9325E+06	1342.56
-12.00	1303.	-2621.	1.7351E+05	2320.10
-12.94	0.	0.	0.0000E+00	3241.36

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

III.--SOIL PRESSURES

ELEVATION (FT)	< LEFTSIDE PRESSURE (PSF) > PASSIVE	ACTIVE	<RIGHTSIDE PRESSURE (PSF) > ACTIVE	PASSIVE
14.00	0.	0.	0.	0.
13.00	0.	0.	41.	366.
12.00	0.	0.	81.	732.
11.00	0.	0.	122.	1098.
10.00	0.	0.	163.	1464.
9.00	0.	0.	203.	1830.
8.00	0.	0.	244.	2196.
7.00	0.	0.	285.	2562.
6.00	0.	0.	325.	2928.
5.00	0.	0.	366.	3294.
4.00	0.	0.	407.	3660.
3.00	0.	0.	447.	4026.
2.00	179.	20.	488.	4392.
1.00	357.	40.	529.	4758.
.77	399.	44.	538.	4843.
.38	467.	52.	554.	4984.
.00	536.	59.	569.	5124.
-1.00	714.	79.	610.	5490.
-2.00	892.	99.	650.	5854.
-2.40	964.	107.	664.	5978.
-3.00	1071.	119.	679.	6110.
-4.00	1250.	139.	699.	6288.
-5.00	1428.	159.	719.	6466.
-6.00	1607.	178.	738.	6645.
-7.00	1785.	213.	756.	6876.
-8.00	1965.	128.	793.	6688.
-8.07	1995.	103.	798.	6607.
-8.34+	2122.	0.	822.	6272.
-8.34-	2019.	0.	822.	6272.
-9.00	2122.	0.	877.	5481.
-10.00	2163.	0.	1032.	4158.
-11.00	2036.	0.	1277.	3663.
-12.00	1903.	0.	1500.	3582.
-12.94	1899.	0.	1592.	3579.
-14.00	1951.	0.	1630.	3630.

```
1000 'PUMP STATION NO. 6   JOB 13491   JRE
1010 'NEW I-WALL ON WEST SIDE OF EAST MONOLITH
020 CONTROL  C  D    1.00     1.00
030 WALL       14.00
1040 SURFACE RIGHTSIDE    2
1050         .00      14.00     200.00      14.00
1060 SURFACE  LEFTSIDE    2
1070         .00       3.00     200.00       3.00
1080 SOIL RIGHTSIDE  STRENGTH     4       .00      .00
1090  122.00  122.00 30.00       .00      .00      .00     -9.00    .00   .00   .00
1100  114.00  114.00   .00   720.00       .00      .00    -11.00    .00   .00   .00
1110  107.00  107.00   .00   500.00       .00      .00    -22.00    .00   .00   .00
1120  122.00  122.00 30.00       .00      .00      .00       .00    .00
1130 SOIL  LEFTSIDE  STRENGTH     4       .00      .00
1140  122.00  122.00 30.00       .00      .00      .00     -9.00    .00   .00   .00
1150  114.00  114.00   .00   720.00       .00      .00    -11.00    .00   .00   .00
1160  107.00  107.00   .00   500.00       .00      .00    -22.00    .00   .00   .00
1170  122.00  122.00 30.00       .00      .00      .00       .00    .00
1180 WATER ELEVATIONS     62.50    -2.40    3.0
1190 FINISH
```

TEMPORARY COFFERDAM
(CANTILEVER ANALYSIS)
EAST AND WEST

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No.: | Sheet No.:

Made By: | Date:

Checked By: | Date:

P.S. #6

TEMPORARY COFFERDAM

(CANTILEVER ANALYSIS)

EAST AND WEST

Page

EUSTIS ENGINEERING COMPANY, INC.
Geotechnical Engineers
Metairie, Louisiana

Date 10-19-95
Job 13491
By QRE
Checked By

Project P.S. #6 Cantilever Analyses
Subject Temporary Cofferdams

East Side

Water El.	Mudline El.	Max. Bending Moment F.S. = 1.0	Tip El. F.S. = 1.5		"Revised" Tip El. F.S. = 1.3
2	-12	82,167 ft-lbs	-54	NGVD	-48
4	-12	141,349	-62		-56

West Side

Water El.	Mudline El.	Max. Bending Moment F.S. = 1.0	Tip El. F.S. = 1.5		"Revised" Tip El. F.S. = 1.3
2	-14	144,110 ft-lbs	-64	NGVD	-58
4	-14	224,056	-74		-64

TOTAL P.01

OF 'ANCHORED OR CANTILEVER SHEET PILE WALLS
ASSICAL METHODS

TIME: 12.52.52

šêêêêêêêêêêêêêêêêêêêê£
¤ COMPLETE RESULTS FOR ¤
¤ CANTILEVER WALL DESIGN ¤
âêêêêêêêêêêêêêêêêêêêêêêêêê¥

[redacted]

I.--HEADING

'PUMP STATION NO. 6 TEMPORARY COFFERDAM ON EAST SIDE OF CANAL
'JOB 13491

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN3)	NET PRESSURE (PSF)
4.00	0.	0.	1.6494E+11	.00
3.00	10.	31.	1.5946E+11	62.40
2.00	83.	125.	1.5398E+11	124.80
1.00	281.	281.	1.4851E+11	187.20
.00	666.	499.	1.4303E+11	249.60
-1.00	1300.	780.	1.3755E+11	312.00
-2.00	2246.	1123.	1.3208E+11	374.40
-3.00	3567.	1529.	1.2661E+11	436.80
-4.00	5325.	1997.	1.2115E+11	499.20
-5.00	7582.	2527.	1.1569E+11	561.60
-6.00	10400.	3120.	1.1025E+11	624.00
-7.00	13842.	3775.	1.0483E+11	686.40
-8.00	17971.	4493.	9.9429E+10	748.80
-9.00	22849.	5273.	9.4061E+10	811.20
-10.00	28538.	6115.	8.8733E+10	873.60
-11.00	35100.	7020.	8.3454E+10	936.00
-12.00	42598.	7987.	7.8236E+10	998.40
-12.00	42598.	7987.	7.8236E+10	-1.60
-12.50	46591.	7981.	7.5653E+10	-23.90
-13.00	50577.	7963.	7.3091E+10	-46.20
-14.00	58510.	7895.	6.8034E+10	-90.80
-15.00	66352.	7782.	6.3078E+10	-135.40
-16.00	74059.	7624.	5.8237E+10	-180.00
-17.00	81585.	7422.	5.3524E+10	-224.60
-18.00	88887.	7175.	4.8951E+10	-269.20
-19.00	95920.	6883.	4.4532E+10	-313.80
-20.00	102639.	6547.	4.0279E+10	-359.56
-21.00	109002.	6177.	3.6203E+10	-378.94
-22.00	114995.	5812.	3.2316E+10	-351.14
-23.00	120628.	5450.	2.8627E+10	-373.93
-24.00	125869.	5011.	2.5146E+10	-504.34
-25.00	130600.	4425.	2.1883E+10	-667.73
-26.00	134664.	3677.	1.8846E+10	-826.67
-27.00	137902.	2771.	1.6041E+10	-985.60
-28.00	140154.	1706.	1.3474E+10	-1144.53
-29.00	141261.	482.	1.1150E+10	-1303.47
-30.00	141065.	-901.	9.0688E+09	-1462.40
-31.00	139407.	-2443.	7.2316E+09	-1621.33
-32.00	136127.	-4143.	5.6350E+09	-1780.27

-33.00	131067.	-6003.	4.2733E+09	-1939.20
-34.00	124068.	-8022.	3.1379E+09	-2098.13
-35.00	114971.	-10199.	2.2166E+09	-2257.07
-36.00	103616.	-12536.	1.4936E+09	-2416.00
-36.29	99885.	-13242.	1.3186E+09	-2462.02
-37.00	89915.	-14740.	9.4933E+08	-1754.82
-38.00	74463.	-15997.	5.6017E+08	-759.40
-39.00	58252.	-16259.	2.9958E+08	236.01
-40.00	42277.	-15525.	1.3967E+08	1231.42
-41.00	27534.	-13796.	5.3006E+07	2226.84
-42.00	15017.	-11071.	1.4237E+07	3222.25
-43.00	5723.	-7352.	1.8812E+06	4217.66
-44.00	646.	-2636.	2.1907E+04	5213.08
-44.48	0.	0.	0.0000E+00	5694.23

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 12.56.34

COMPLETE RESULTS FOR
CANTILEVER WALL DESIGN

I.--HEADING

'PUMP STATION NO. 6 TEMPORARY COFFERDAM ON WEST SIDE OF CANAL
'JOB 13491

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN3)	NET PRESSURE (PSF)
4.00	0.	0.	3.4682E+11	.00
3.00	10.	31.	3.3689E+11	62.40
2.00	83.	125.	3.2697E+11	124.80
1.00	281.	281.	3.1704E+11	187.20
.00	666.	499.	3.0712E+11	249.60
-1.00	1300.	780.	2.9720E+11	312.00
-2.00	2246.	1123.	2.8728E+11	374.40
-3.00	3567.	1529.	2.7736E+11	436.80
-4.00	5325.	1997.	2.6745E+11	499.20
-5.00	7582.	2527.	2.5755E+11	561.60
-6.00	10400.	3120.	2.4766E+11	624.00
-7.00	13842.	3775.	2.3779E+11	686.40
-8.00	17971.	4493.	2.2794E+11	748.80
-9.00	22849.	5273.	2.1813E+11	811.20
-10.00	28538.	6115.	2.0835E+11	873.60
-11.00	35100.	7020.	1.9863E+11	936.00
-12.00	42598.	7987.	1.8896E+11	998.40
-13.00	51095.	9017.	1.7937E+11	1060.80
-14.00	60653.	10109.	1.6987E+11	1123.20
-14.00	60653.	10109.	1.6987E+11	123.20
-15.00	70816.	10210.	1.6047E+11	78.60
-16.00	81057.	10266.	1.5119E+11	34.00
-16.76	88890.	10279.	1.4422E+11	.00
-16.88	90111.	10279.	1.4314E+11	-5.30
-17.00	91333.	10278.	1.4206E+11	-10.60
-18.00	101598.	10245.	1.3308E+11	-55.20
-19.00	111808.	10167.	1.2428E+11	-99.80
-20.00	121917.	10043.	1.1567E+11	-148.35
-21.00	131886.	9894.	1.0727E+11	-151.00
-22.00	141718.	9787.	9.9100E+10	-62.35
-23.00	151480.	9743.	9.1175E+10	-25.20
-24.00	161192.	9661.	8.3511E+10	-139.35
-25.00	170755.	9439.	7.6125E+10	-305.07
-26.00	180015.	9054.	6.9035E+10	-464.00
-27.00	188810.	8511.	6.2256E+10	-622.93
-28.00	196983.	7808.	5.5803E+10	-781.87
-29.00	204374.	6947.	4.9690E+10	-940.80
-30.00	210824.	5927.	4.3930E+10	-1099.73
-31.00	216174.	4747.	3.8534E+10	-1258.67

-32.00	220266.	3409.	3.3512E+10	-1417.60
-33.00	222940.	1912.	2.8870E+10	-1576.53
-34.00	224037.	256.	2.4613E+10	-1735.47
-35.00	223399.	-1559.	2.0743E+10	-1894.40
-36.00	220867.	-3533.	1.7259E+10	-2053.33
-37.00	216281.	-5665.	1.4156E+10	-2212.27
-38.00	209483.	-7957.	1.1427E+10	-2371.20
-39.00	200314.	-10408.	9.0590E+09	-2530.13
-39.56	194104.	-11845.	7.8886E+09	-2618.88
-40.00	188624.	-12953.	7.0370E+09	-2398.31
-41.00	174555.	-15102.	5.3406E+09	-1898.89
-42.00	158587.	-16751.	3.9455E+09	-1399.47
-43.00	141219.	-17901.	2.8243E+09	-900.05
-44.00	122952.	-18551.	1.9470E+09	-400.63
-45.00	104284.	-18702.	1.2820E+09	98.79
-46.00	85714.	-18353.	7.9731E+08	598.21
-47.00	67743.	-17506.	4.6079E+08	1097.63
-48.00	50870.	-16158.	2.4150E+08	1597.05
-49.00	35593.	-14311.	1.1033E+08	2096.47
-50.00	22413.	-11965.	4.0978E+07	2595.89
-51.00	11829.	-9120.	1.0726E+07	3095.31
-52.00	4340.	-5775.	1.3609E+06	3594.73
-53.00	446.	-1930.	1.3564E+04	4094.15
-53.46	0.	0.	0.0000E+00	4323.20

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

EAST ANCHORED BULKHEAD

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No.
Made By:	Date:	P.S. #6	
Checked By:	Date:		

EAST ANCHORED

BULKHEAD

Page

EUSTIS ENGINEERING COMPANY, INC.
Geotechnical Engineers
Metairie, Louisiana

Date 10-26-95

Job 13491

Project P.S. #6

By JRE

Subject EAST ANCHORED BULKHEAD

Checked By

TOP OF WALL EL. 5.37 NGVD

ANCHOR EL. 4.0

MUDLINE EL. -12.0

F.S. = 1.0 M_{max} = 28,066 FOOT POUNDS

ANCHOR FORCE = 2,739 POUNDS/FOOT

F.S. = 1.32 TIP EL. -35.63 (EXISTING)

∴ TIP ELEVATION OKAY FOR TEMPORARY COFFERDAM

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.05.52

INPUT DATA

I.--HEADING:
'PUMP STATION NO. 6 JOB 13491 JRE
'EAST ANCHORED BULKHEAD DETAIL "A" PZ-27

II.--CONTROL
ANCHORED WALL DESIGN

LEVEL 1 FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
LEVEL 1 FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

III.--WALL DATA
ELEVATION AT TOP OF WALL = 5.37 (FT)
ELEVATION AT ANCHOR = 4.00 (FT)

IV.--SURFACE POINT DATA

IV.A--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	5.30
15.00	8.00
30.00	5.30
250.00	5.00

IV.B-- LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	-12.00
250.00	-12.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE LAYER DATA
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
111.00	111.00	.00	780.0	.00	.0	.00	.00	DEF	DEF
9.00	109.00	.00	500.0	.00	.0	-7.00	.00	DEF	DEF
[illegible].00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF

122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF
108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
25.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
16.00	116.00	.00	1250.0	.00	.0			DEF	DEF

V.B.-- LEFTSIDE LAYER DATA

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF
108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
125.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
116.00	116.00	.00	1250.0	.00	.0			DEF	DEF

VI.--WATER DATA

UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = .00 (FT)
LEFTSIDE ELEVATION = -12.00 (FT)
NO SEEPAGE

VII.--SURFACE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.12.00

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¤ SUMMARY OF RESULTS FOR ¤
¤ ANCHORED WALL DESIGN ¤
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I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE

'EAST ANCHORED BULKHEAD DETAIL "A" PZ-27

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

METHOD	:	FREE EARTH	EQUIV. BEAM	FIXED EARTH
WALL BOTTOM ELEV. (FT)	:	-26.77 ✓	-36.78	-32.44
PENETRATION (FT)	:	14.77	24.78	20.44
MAX. BEND. MOMENT (LB-FT)	:	-28066. ✓	51061.	-21876.
AT ELEVATION (FT)	:	-9.37	-28.51	-8.51
MAX. SCALED DEFL. (LB-IN3)	:	4.1704E+09	1.1598E+10	2.8243E+09
AT ELEVATION (FT)	:	-10.63	-36.78	-9.63
ANCHOR FORCE (LB)	:	2739. ✓	1127.	2261.

(NOTE: PENETRATION FOR EQUIVALENT BEAM METHOD DOES NOT INCLUDE INCREASE PRESCRIBED BY DRAFT EM 1110-2-2906.)

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.12.00

COMPLETE RESULTS FOR
ANCHORED WALL DESIGN
BY FREE EARTH METHOD

I.--HEADING

'PUMP STATION NO. 6 JOB 13491 JRE
'EAST ANCHORED BULKHEAD DETAIL "A" PZ-27

II.--RESULTS (ANCHOR FORCE = 2739. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN3)	NET PRESSURE (PSF)
5.37	0.	0.	-6.1043E+08	.00
5.30	0.	0.	-5.7924E+08	.00
4.37	0.	0.	-1.6486E+08	.00
4.00	0.	0.	0.0000E+00	.00
4.00	0.	-2739.	0.0000E+00	.00
3.37	-1726.	-2739.	2.8051E+08	.00
2.37	-4465.	-2739.	7.2286E+08	.00
1.37	-7204.	-2739.	1.1575E+09	.00
.37	-9943.	-2739.	1.5797E+09	.00
.00	-10956.	-2739.	1.7318E+09	.00
-.63	-12680.	-2727.	1.9847E+09	39.31
-1.63	-15376.	-2656.	2.3678E+09	101.71
-2.63	-17971.	-2523.	2.7243E+09	164.11
-3.63	-20402.	-2328.	3.0499E+09	226.51
-4.63	-22606.	-2070.	3.3402E+09	288.91
-5.63	-24522.	-1750.	3.5914E+09	351.31
-6.63	-26086.	-1368.	3.8004E+09	413.71
-7.00	-26563.	-1210.	3.8664E+09	436.80
-7.63	-27236.	-923.	3.9643E+09	476.11
-8.63	-27911.	-415.	4.0812E+09	538.51
-9.63	-28046.	154.	4.1500E+09	600.91
-10.63	-27581.	786.	4.1704E+09	663.31
-11.00	-27243.	1046.	4.1659E+09	738.66
-11.63	-26428.	1558.	4.1433E+09	887.30
-12.00	-25790.	1895.	4.1215E+09	934.28
-12.00	-25790.	1895.	4.1215E+09	-65.72
-12.32	-25196.	1875.	4.0982E+09	-59.43
-12.63	-24608.	1857.	4.0706E+09	-53.13
-13.00	-23924.	1839.	4.0327E+09	-45.74
-13.63	-22774.	1814.	3.9553E+09	-32.90
-14.63	-20972.	1792.	3.8007E+09	-11.08
-15.63	-19182.	1792.	3.6099E+09	11.06
-16.63	-17380.	1814.	3.3859E+09	32.49
-17.63	-15546.	1857.	3.1319E+09	53.91
-18.63	-13658.	1922.	2.8510E+09	75.34
-19.63	-11695.	2008.	2.5466E+09	97.33
-20.63	-9634.	2118.	2.2219E+09	122.96
-21.63	-7449.	2254.	1.8806E+09	148.80
-22.00	-6609.	2279.	1.7509E+09	-14.55
-22.63	-5195.	2176.	1.5265E+09	-313.08
-23.63	-3189.	1825.	1.1634E+09	-388.12
-24.63	-1577.	1377.	7.9463E+08	-509.46
-25.63	-476.	807.	4.2311E+08	-630.01
-26.63	-7.	106.	5.0671E+07	-771.10
-26.77	0.	0.	0.0000E+00	-792.14

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

III.--SOIL PRESSURES

ELEVATION (FT)	< LEFTSIDE PRESSURE (PSF) > PASSIVE	ACTIVE	<RIGHTSIDE PRESSURE (PSF) > ACTIVE	PASSIVE
5.37	0.	0.	0.	0.

5.30+	0.	0.	0.	0.
5.30-	0.	0.	0.	1560.
4.37	0.	0.	0.	1988.
4.00	0.	0.	0.	2036.
3.37	0.	0.	0.	2118.
2.37	0.	0.	0.	2248.
1.37	0.	0.	0.	2378.
.37	0.	0.	0.	2508.
.00	0.	0.	0.	2336.
-.63	0.	0.	0.	2024.
-1.63	0.	0.	0.	2090.
-2.63	0.	0.	0.	2154.
-3.63	0.	0.	0.	2213.
-4.63	0.	0.	0.	2272.
-5.63	0.	0.	0.	2336.
-6.63	0.	0.	0.	2400.
-7.00	0.	0.	0.	2594.
-7.63	0.	0.	0.	2925.
-8.63	0.	0.	0.	2994.
-9.63	0.	0.	0.	3063.
-10.63	0.	0.	0.	1102.
-11.00	0.	0.	52.	1121.
-11.63	0.	0.	162.	1998.
-12.00+	0.	0.	185.	2006.
-12.00-	1000.	0.	185.	2006.
-12.32	1014.	0.	206.	2011.
-12.63	1028.	0.	226.	2015.
-13.00	1045.	0.	250.	2011.
-13.63	1073.	0.	291.	2010.
-14.63	1117.	0.	357.	2032.
-15.63	1162.	0.	424.	2121.
-16.63	1206.	0.	490.	2212.
-17.63	1251.	0.	556.	2275.
-18.63	1296.	0.	622.	2361.
-19.63	1340.	0.	689.	2438.
-20.63	1385.	0.	759.	2508.
-21.63	1429.	0.	829.	2592.
-22.00	1523.	57.	760.	3665.
-22.63	1696.	161.	635.	5460.
-23.63	1804.	181.	667.	5541.
-24.63	1950.	201.	692.	5708.
-25.63	2098.	221.	719.	5914.
-26.63	2257.	240.	737.	6114.
-27.63	2427.	260.	752.	6301.

EA1.IN October 26, 1995 Page 1

```
1000 'PUMP STATION NO. 6      JOB 13491      JRE
1010 'EAST ANCHORED BULKHEAD   DETAIL "A"   PZ-27
1020 CONTROL  A  D    1.00     1.00
1030 WALL         5.37      4.00
1040 SURFACE RIGHTSIDE   4
1050        .00      5.30     15.00       8.00      30.00       5.30
1060    250.00      5.00
1070 SURFACE  LEFTSIDE   2
1080        .00    -12.00    250.00     -12.00
1090 SOIL RIGHTSIDE  STRENGTH     8       .00        .00
1100  111.00  111.00   .00  780.00     .00        .00        .00    .00   .00   .00
1110  109.00  109.00   .00  500.00     .00        .00      -7.00    .00   .00   .00
1120  114.00  114.00   .00  720.00     .00        .00     -11.00    .00   .00   .00
1130  107.00  107.00   .00  500.00     .00        .00     -22.00    .00   .00   .00
1140  122.00  122.00 30.00     .00     .00        .00     -46.00    .00   .00   .00
1150  108.00  108.00   .00  800.00     .00        .00     -64.50    .00   .00   .00
1160  125.00  125.00   .00 1800.00     .00        .00     -72.00    .00   .00   .00
1170  116.00  116.00   .00 1250.00     .00        .00        .00    .00
1180 SOIL  LEFTSIDE  STRENGTH     5       .00        .00
1190  107.00  107.00   .00  500.00     .00        .00     -22.00    .00   .00   .00
1200  122.00  122.00 30.00     .00     .00        .00     -46.00    .00   .00   .00
1210  108.00  108.00   .00  800.00     .00        .00     -64.50    .00   .00   .00
1220  125.00  125.00   .00 1800.00     .00        .00     -72.00    .00   .00   .00
1230  116.00  116.00   .00 1250.00     .00        .00        .00    .00
1240 WATER ELEVATIONS     62.40      .00  -12.00
1250 FINISH
```

WEST ANCHORED BULKHEAD

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No.
Made By:	Date:	P. S. # 6	
Checked By:	Date:		

WEST ANCHORED BULKHEAD

Page

EUSTIS ENGINEERING COMPANY, INC.
Geotechnical Engineers
Metairie, Louisiana

Date 10-26-95
Job 13491
By JRE
Checked By

Project P. S. #6

Subject WEST ANCHORED BULKHEAD

TOP OF WALL EL. 3.5B NGVD

ANCHOR EL. 2.0

MUDLINE EL. -14.0

F.S. = 1.0 M_{max} = 36,758 FOOT POUNDS

ANCHOR FORCE = 3,892 POUNDS / FOOT

F.S. > 1.5 TIP EL. -46.52 (EXISTING)

F.S. = 1.5 TIP EL. -43.22

∴ TIP ELEVATION OKAY FOR TEMPORARY COFFERDAM

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.58.27

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¤ INPUT DATA ¤
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I.--HEADING:
'PUMP STATION NO. 6 JOB 13491
'WEST ANCHORED BULKHEAD

II.--CONTROL
ANCHORED WALL DESIGN

LEVEL 1 FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
LEVEL 1 FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

III.--WALL DATA
ELEVATION AT TOP OF WALL = 3.58 (FT)
ELEVATION AT ANCHOR = 2.00 (FT)

IV.--SURFACE POINT DATA

IV.A--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	3.50
15.00	5.00
250.00	5.00

IV.B-- LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
.00	-14.00
250.00	-14.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE LAYER DATA
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
111.00	111.00	.00	780.0	.00	.0	.00	.00	DEF	DEF
109.00	109.00	.00	500.0	.00	.0	-7.00	.00	DEF	DEF
14.00	114.00	.00	720.0	.00	.0	-11.00	.00	DEF	DEF
07.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF

108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
125.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
116.00	116.00	.00	1250.0	.00	.0			DEF	DEF

V.B.-- LEFTSIDE LAYER DATA

LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURES = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURES = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
107.00	107.00	.00	500.0	.00	.0	-22.00	.00	DEF	DEF
122.00	122.00	30.00	.0	.00	.0	-46.00	.00	DEF	DEF
108.00	108.00	.00	800.0	.00	.0	-64.50	.00	DEF	DEF
125.00	125.00	.00	1800.0	.00	.0	-72.00	.00	DEF	DEF
116.00	116.00	.00	1250.0	.00	.0			DEF	DEF

VI.--WATER DATA

UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = .00 (FT)
LEFTSIDE ELEVATION = -14.00 (FT)
NO SEEPAGE

VII.--SURFACE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.58.50

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¤ SUMMARY OF RESULTS FOR ¤
¤ ANCHORED WALL DESIGN ¤
àêêêêêêêêêêêêêêêêêêêêêêêêêêêêê¥

I.--HEADING

'PUMP STATION NO. 6 JOB 13491
'WEST ANCHORED BULKHEAD

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

METHOD	FREE EARTH ✓	EQUIV. BEAM	FIXED EARTH
WALL BOTTOM ELEV. (FT) :	-30.02 ✓	-41.00	-36.03
PENETRATION (FT) :	16.02	27.00	22.03
MAX. BEND. MOMENT (LB-FT) :	-36758. ✓	69641.	-29278.
AT ELEVATION (FT) :	-11.17	-31.98	-10.29
MAX. SCALED DEFL. (LB-IN3) :	5.8886E+09	1.9012E+10	4.0453E+09
AT ELEVATION (FT) :	-12.42	-41.00	-11.42
ANCHOR FORCE (LB) :	3892. ✓	1784.	3304.

(NOTE: PENETRATION FOR EQUIVALENT BEAM
METHOD DOES NOT INCLUDE INCREASE
PRESCRIBED BY DRAFT EM 1110-2-2906.)

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA
IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 26-OCT-1995 TIME: 16.58.50

COMPLETE RESULTS FOR
ANCHORED WALL DESIGN
BY FREE EARTH METHOD

I.--HEADING

'PUMP STATION NO. 6 JOB 13491
'WEST ANCHORED BULKHEAD

II.--RESULTS (ANCHOR FORCE = 3892. (LB))

BENDING SCALED NET

ELEVATION (FT)	MOMENT (LB-FT)	SHEAR (LB)	DEFLECTION (LB-IN3)	PRESSURE (PSF)
3.58	0.	0.	-9.8433E+08	.00
3.50	0.	0.	-9.3449E+08	.00
2.58	0.	0.	-3.6134E+08	.00
2.00	0.	0.	0.0000E+00	.00
2.00	0.	-3892.	0.0000E+00	.00
1.58	-1634.	-3892.	2.6158E+08	.00
.58	-5526.	-3892.	8.8144E+08	.00
.00	-7783.	-3892.	1.2370E+09	.00
-.42	-9417.	-3886.	1.4918E+09	26.21
-1.42	-13279.	-3829.	2.0858E+09	88.61
-2.42	-17053.	-3709.	2.6569E+09	151.01
-3.42	-20676.	-3527.	3.1986E+09	213.41
-4.42	-24086.	-3282.	3.7046E+09	275.81
-5.42	-27220.	-2975.	4.1690E+09	338.21
-6.42	-30015.	-2606.	4.5864E+09	400.61
-7.00	-31457.	-2363.	4.8050E+09	436.80
-7.42	-32410.	-2174.	4.9520E+09	463.01
-8.42	-34342.	-1680.	5.2616E+09	525.41
-9.42	-35749.	-1123.	5.5120E+09	587.81
-10.42	-36567.	-504.	5.7007E+09	650.21
-11.00	-36748.	-116.	5.7813E+09	686.40
-11.42	-36736.	177.	5.8263E+09	712.61
-12.42	-36192.	921.	5.8886E+09	775.01
-13.42	-34869.	1736.	5.8884E+09	855.46
-14.00	-33714.	2257.	5.8605E+09	939.16
-14.00	-33714.	2257.	5.8605E+09	-60.84
-14.21	-33241.	2245.	5.8455E+09	-49.16
-14.42	-32771.	2236.	5.8281E+09	-37.49
-15.00	-31479.	2218.	5.7669E+09	-26.69
-15.42	-30550.	2207.	5.7111E+09	-22.44
-16.42	-28352.	2190.	5.5414E+09	-11.34
-17.42	-26165.	2185.	5.3226E+09	-.24
-18.42	-23979.	2190.	5.0587E+09	10.86
-19.42	-21782.	2206.	4.7533E+09	21.96
-20.42	-19563.	2232.	4.4102E+09	29.80
-21.42	-17308.	2287.	4.0334E+09	80.31
-22.00	-15962.	2361.	3.8009E+09	175.22
-22.42	-14954.	2444.	3.6267E+09	219.07
-23.42	-12416.	2617.	3.1942E+09	125.61
-24.42	-9763.	2662.	2.7402E+09	-35.19
-25.42	-7145.	2548.	2.2694E+09	-191.99
-26.42	-4719.	2278.	1.7861E+09	-348.78
-27.42	-2642.	1851.	1.2947E+09	-505.52
-28.42	-1070.	1267.	7.9866E+08	-662.66
-29.42	-161.	525.	3.0065E+08	-821.29
-30.02	0.	0.	0.0000E+00	-917.89

(NOTE: DIVIDE SCALED DEFLECTION BY MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN**4 TO OBTAIN DEFLECTION IN INCHES.)

WA.IN October 26, 1995 . Page 1

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1000 'PUMP STATION NO. 6      JOB 13491
1010 'WEST ANCHORED BULKHEAD
1020 CONTROL   A  D    1.00    1.00
1030 WALL        3.58       2.00
1040 SURFACE RIGHTSIDE    3
1050         .00      3.50       15.00      5.00     250.00     5.00
1060 SURFACE  LEFTSIDE    2
1070         .00    -14.00      250.00    -14.00
1080 SOIL RIGHTSIDE  STRENGTH      8       .00      .00
1090   111.00   111.00    .00   780.00     .00      .00       .00    .00   .00   .00
1100   109.00   109.00    .00   500.00     .00      .00     -7.00    .00   .00   .00
1110   114.00   114.00    .00   720.00     .00      .00    -11.00    .00   .00   .00
1120   107.00   107.00    .00   500.00     .00      .00    -22.00    .00   .00   .00
1130   122.00   122.00  30.00      .00     .00      .00    -46.00    .00   .00   .00
1140   108.00   108.00    .00   800.00     .00      .00    -64.50    .00   .00   .00
1150   125.00   125.00    .00  1800.00     .00      .00    -72.00    .00   .00   .00
1160   116.00   116.00    .00  1250.00     .00      .00       .00    .00
1170 SOIL  LEFTSIDE  STRENGTH      5       .00      .00
1180   107.00   107.00    .00   500.00     .00      .00    -22.00    .00   .00   .00
1190   122.00   122.00  30.00      .00     .00      .00    -46.00    .00   .00   .00
1200   108.00   108.00    .00   800.00     .00      .00    -64.50    .00   .00   .00
1210   125.00   125.00    .00  1800.00     .00      .00    -72.00    .00   .00   .00
1220   116.00   116.00    .00  1250.00     .00      .00       .00    .00
1230 WATER ELEVATIONS     62.40       .00   -14.00
1240 FINISH
```

APPENDIX C

COST ESTIMATES AND QUANTITY TAKE-OFFS

COST ESTIMATES

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
EXISTING ORIGINAL VERTICAL PUMP GROUP FRONTING PROTECTION

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE		AMOUNT	CNTGNCY 20%	PROJECT COST
02.1	T-WALL							
	Structural Concrete	430	CY	$310.58		$133,549.40	$26,709.88	$160,259.28
	Sheet Pile	8,712	SF	17.00		148,104.00	29,620.80	177,724.80
	Timber Piles	8,576	LF	8.60		73,753.60	14,750.72	88,504.32
02.1.1.-	I-WALL (Tie into 1914/1928 Retaining Wall)							
	Structural Concrete	3	CY	310.58		931.74	186.35	1,118.09
	Sheet Pile	294	SF	17.00		4,998.00	999.60	5,997.60
	DISCHARGE TUBE EXTENSION (1984)							
	Tubing							
	84" dia. Steel Tubing	414	LF	350.00	*	144,900.00	28,980.00	173,880.00
	84" dia., 10 deg. Cone (3)	63	LF	350.00	*	22,050.00	4,410.00	26,460.00
	84" dia., 6 deg. Cone (1)	21	LF	350.00	*	7,350.00	1,470.00	8,820.00
	84" dia. Dresser Coupling	8	EA	10,000.00	*	80,000.00	16,000.00	96,000.00
	48" dia. Steel Tubing	112	LS	111,218.00		111,218.00	22,243.60	133,461.60
	48" dia. Cone (1)	21	LF	100.00	*	2,100.00	420.00	2,520.00
	48" dia. Dresser Coupling	3	EA	6,000.00	*	18,000.00	3,600.00	21,600.00
	Valves							
	84" Butterfly Valve	4	EA	16,000.00	*	64,000.00	12,800.00	76,800.00
	48" Butterfly Valve	1	EA	5,000.00	*	5,000.00	1,000.00	6,000.00
	Supports							
	Structural Concrete	98	CY	310.58		30,436.84	6,087.37	36,524.21
	Piles	1,139	LF	8.60		9,795.40	1,959.08	11,754.48
	Suspension System (Hanger)							
	Structural Concrete	9	CY	310.58		2,795.22	559.04	3,354.26
	Concrete Piles (14" x 14")	263	LF	25.00		6,575.00	1,315.00	7,890.00
	2" dia. Galvanized Pipe	30	LF	10.00	*	300.00	60.00	360.00
02.1.-.-	SUBTOTAL:							
	Item Cost					$865,857.20		
	Contingencies (20%)						$173,171.44	
02.1.2.-	Project Cost (East Horizontal Pump)							$1,039,028.64

NOTE: All unit prices shown obtained from NOS&WB
* Unit Price Unavailable and Estimated

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
EXISTING WEST PUMPING STATION FRONTAGE

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE	AMOUNT	CNTGNCY 20%	PROJECT COST
02.1	PARAPET ON DISCHARGE TUBES						
	Structural Concrete	14	CY	$310.58	$4,348.12	$869.62	$5,217.74
02.1.1.-	TIE-IN WALL BETWEEN TUBES						
	Structural Concrete	10	CY	310.58	3,105.80	621.16	3,726.96
	Sheet Pile	5,813	SF	17.00	98,821.00	19,764.20	118,585.20
02.1.-.-	SUBTOTAL:						
	Item Cost				$106,274.92		
	Contingencies (20%)					$21,254.98	
02.1.2.-	Project Cost (West Flood Wall)						$127,529.90

NOTE: All unit prices shown obtained from NOS&WB

PS6MONOS.WB2

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
EXISTING WEST FLOOD WALL

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE		AMOUNT	CNTGNCY 20%	PROJECT COST
02.1	I-WALL							
	Structural Concrete	258	CY	$310.58		$80,129.64	$16,025.93	$96,155.57
	Sheet Pile	12,876	SF	17.00		218,892.00	43,778.40	262,670.40
02.1.1.-	RETAINING WALL							
	Structural Concrete	177	CY	310.58		54,972.66	10,994.53	65,967.19
	Sheet Pile	10,699	SF	17.00		181,883.00	36,376.60	218,259.60
	H-Piles 12 x 53	106,848	LB	0.58	*	61,971.84	12,394.37	74,366.21
02.1.2.-	FLOOD GATE FOR R.R.							
	Structural Concrete	56	CY	310.58		17,392.48	3,478.50	20,870.98
	Sheet Pile	1,080	SF	17.00		18,360.00	3,672.00	22,032.00
	Concrete Piles 12" Prestressed	1,155	LF	25.00		28,875.00	5,775.00	34,650.00
	Steel Gate	1	EA	15,000.00	*	15,000.00	3,000.00	18,000.00
02.1.J.-	SITE WORK							
	Excavation	5,000	CY	5.00	*	25,000.00	5,000.00	30,000.00
	Fill	2,800	CY	9.00	*	25,200.00	5,040.00	30,240.00
02.1.-.-	SUBTOTAL:							
	Item Cost					$727,676.62		
	Contingencies (20%)						$145,535.32	
02.1.2.-	Project Cost (West Flood Wall)							$873,211.94

NOTE: All unit prices shown obtained from NOS&WB
* Unit Price Unavailable and Estimated

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
EXISTING EAST HORIZONTAL PUMP GROUP FRONTING PROTECTION

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE	AMOUNT	CNTGNCY 20%	PROJECT COST
02.1	EARTHEN LEVEE						
	Earth - Front & Rear Retaining	526	CY	$9.00 *	$4,734.00	$946.80	$5,680.80
	Structural Concrete	51	CY	310.58	15,839.58	3,167.92	19,007.50
02.1.1.-	SHEET PILE						
	Timber (6" x 12")	3,246	SF	8.60	27,915.60	5,583.12	33,498.72
	Timber (6" x 12") -(Piling @ Discharge End of Tube)	2,070	SF	8.60	17,802.00	3,560.40	21,362.40
02.1.-.-	SUBTOTAL:						
	Item Cost				$66,291.18		
	Contingencies (20%)					$13,258.24	
02.1.2.-	Project Cost (East Horizontal Pump)						$79,549.42

NOTE: All unit prices shown obtained by NOS&WB

* Unit Price Unavailable and Estimated

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
EXISTING EAST FLOODWALL

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE		AMOUNT	CNTGNCY 20%	PROJECT COST
02.1	I-WALL							
	Structural Concrete	72	CY	$310.58		$22,361.76	$4,472.35	$26,834.11
	Sheet Pile	4,273	SF	17.00		72,641.00	14,528.20	87,169.20
02.1.1.-	RETAINING WALL							
	Structural Concrete	230	CY	310.58		71,433.40	14,286.68	85,720.08
	Sheet Pile	12,129	SF	17.00		206,193.00	41,238.60	247,431.60
	H-Piles 12 x 53	194,775	LB	0.58	*	112,969.50	22,593.90	135,563.40
	PVC Pipe 6"	179	LF	20.00		3,580.00	716.00	4,296.00
02.1.2.-	FLOOD GATE FOR R.R.							
	Structural Concrete	53	CY	310.58		16,460.74	3,292.15	19,752.89
	Sheet Pile	250	SF	17.00		4,250.00	850.00	5,100.00
	Concrete Piles 12" Prestressed	1,155	LF	25.00		28,875.00	5,775.00	34,650.00
	Steel Gate	1	EA	15,000.00	*	15,000.00	3,000.00	18,000.00
02.1.J.-	SITE WORK							
	Excavation	500	CY	5.00	*	2,500.00	500.00	3,000.00
	Fill	600	CY	9.00	*	5,400.00	1,080.00	6,480.00
02.1.-.-	SUBTOTAL:							
	Item Cost					$561,664.40		
	Contingencies (20%)						$112,332.88	
02.1.2.-	Project Cost (East Flood Wall)							$673,997.28

NOTE: All unit prices shown obtained from NOS&WB

* Unit Price Unavailable and Estimated

PS6MONOS.WB2

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
PROPOSED CONSTRUCTION

ACCOUNT CODE	ITEM	QTY	UNIT	UNIT PRICE	AMOUNT	CNTGNCY 20%	PROJECT COST
02.0	MOBALIZATION	1.00	LS	$200,000.00	$200,000.00	$40,000.00	$240,000.00
02.1	EAST MONOLITH						
	Structural Concrete	810	CY	$350.00	$283,500.00	$56,700.00	$340,200.00
	Steel Piles (H14 X 73)	9,200	LF	$30.00	$276,000.00	$55,200.00	$331,200.00
	Sheet Pile	5,100	SF	$15.00	$76,500.00	$15,300.00	$91,800.00
	Removal of Structural Concrete	75	CY	$100.00	$7,500.00	$1,500.00	$9,000.00
	Removal of Sheet Pile	2,300	SF	$5.00	$11,500.00	$2,300.00	$13,800.00
	Removal of Retaining Wall	3	LF	$20.00	$60.00	$12.00	$72.00
	Excavation	400	CY	$7.00	$2,800.00	$560.00	$3,360.00
	Fill	325	CY	$6.00	$1,950.00	$390.00	$2,340.00
	Rip Rap	350	TON	$35.00	$12,250.00	$2,450.00	$14,700.00
	Sluice Gate (114" X 114")*	6	EA	$90,000.00	$540,000.00	$108,000.00	$648,000.00
	Sluice Gate (108" X 114")*	2	EA	$85,000.00	$170,000.00	$34,000.00	$204,000.00
	Sluice Gate (108" X 90")*	2	EA	$85,000.00	$170,000.00	$34,000.00	$204,000.00
	Sluice Gate (102" X 90")*	2	EA	$85,000.00	$170,000.00	$34,000.00	$204,000.00
	Aluminum Handrail & Posts (1-1/2" dia.)	900	LF	$50.00	$45,000.00	$9,000.00	$54,000.00
	Grate	475	SF	$9.00	$4,275.00	$855.00	$5,130.00
	L 3 X 3 X 1/4"	150	LF	$7.00	$1,050.00	$210.00	$1,260.00
02.2	EAST COFFERDAM						
	Sheet Pile	12,000	SF	$15.00	$180,000.00	$36,000.00	$216,000.00
	Butterfly Valve (4' X 4')	7	EA	$10,000.00	$70,000.00	$14,000.00	$84,000.00
	Lamps	16	EA	$500.00	$8,000.00	$1,600.00	$9,600.00
	Aluminum Handrail & Posts (1-1/2" dia.)	1,025	LF	$50.00	$51,250.00	$10,250.00	$61,500.00
	Grate	575	SF	$9.00	$5,175.00	$1,035.00	$6,210.00
	L 3 X 3 X 1/4"	675	LF	$7.00	$4,725.00	$945.00	$5,670.00
02.3	I-WALLS						
	Sheet Pile	2,850	SF	$13.50	$38,475.00	$7,695.00	$46,170.00
	Structural Concrete	20	CY	$350.00	$7,000.00	$1,400.00	$8,400.00
	Removal of Structural Concrete	10	CY	$100.00	$1,000.00	$200.00	$1,200.00
	Removal of Sheet Pile	250	SF	$5.00	$1,250.00	$250.00	$1,500.00
	Excavation	60	CY	$20.00	$1,200.00	$240.00	$1,440.00
	Fill	60	CY	$6.00	$360.00	$72.00	$432.00
	PVC Pipe 24" dia.	40	LF	$75.00	$3,000.00	$600.00	$3,600.00
	Catch Basin (CB 01)	1	EA	$2,500.00	$2,500.00	$500.00	$3,000.00
02.4	WEST MONOLITH						
	Structural Concrete	550	CY	$350.00	$192,500.00	$38,500.00	$231,000.00
	Steel Piles (H14 X 73)	4,900	LF	$30.00	$147,000.00	$29,400.00	$176,400.00
	Removal of Structural Concrete Slabs	210	CY	$100.00	$21,000.00	$4,200.00	$25,200.00
	Removal of Sheet Pile	1,025	SF	$5.00	$5,125.00	$1,025.00	$6,150.00
	Removal of Retaining Wall	20	LF	$50.00	$1,000.00	$200.00	$1,200.00
	Excavation	375	CY	$7.00	$2,625.00	$525.00	$3,150.00
	Rip Rap	525	TON	$35.00	$18,375.00	$3,675.00	$22,050.00
	Sluice Gate (144" X 132")*	6	EA	$120,000.00	$720,000.00	$144,000.00	$864,000.00
	Aluminum Handrail & Posts (1-1/2" dia.)	1,250	LF	$50.00	$62,500.00	$12,500.00	$75,000.00
	Grate	825	SF	$9.00	$7,425.00	$1,485.00	$8,910.00
	L 3 X 3 X 1/4"	375	LF	$7.00	$2,625.00	$525.00	$3,150.00
02.5	WEST COFFERDAM						
	Sheet Pile	7,650	SF	$15.00	$114,750.00	$22,950.00	$137,700.00
	Butterfly Valve (4' X 4')	3	EA	$10,000.00	$30,000.00	$6,000.00	$36,000.00
	Lamps	10	EA	$500.00	$5,000.00	$1,000.00	$6,000.00
	Aluminum Handrail & Posts (1-1/2" dia.)	600	LF	$50.00	$30,000.00	$6,000.00	$36,000.00
	Grate	325	SF	$9.00	$2,925.00	$585.00	$3,510.00
	L 3 X 3 X 1/4"	410	LF	$7.00	$2,870.00	$574.00	$3,444.00
02.6	SUBTOTAL:						
	Item Cost				$3,712,040.00		
	Contingencies (20%)					$742,408.00	
02.7	Project Cost						$4,454,448.00

NOTE: All unit prices shown obtained by NOS&WB

* Includes all mechanical accessories.

PS6MONOS.WB2

COST ESTIMATE
DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONCHATRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN
PRICING SUMMARY

2.1	EXISTING FLOOD PROTECTION	
	EAST BANK FLOOD PROTECTION	$753,546.70
	WEST BANK FLOOD PROTECTION	$1,000,741.84
	PUMP STATION FLOOD PROTECTION	$1,039,028.64
	TOTAL EXISTING FLOOD PROTECTION	$2,793,317.18
2.2	PROPOSED FLOOD PROTECTION	
	CONSTRUCTION COST	$4,454,448.00
	ENGINEERING FOR SUPPLEMENTAL No. 1	$209,000.00
	ENGINEERING FOR P & S	$202,000.00
	CONSTRUCTION MANAGEMENT	$820,841.70
	TOTAL PROPOSED CONSTRUCTION COST	$5,686,289.70
2.3	**TOTAL COST FOR FLOOD PROTECTION**	**$8,479,606.88**

QUANTITY CALCULATIONS

INDEX OF SHEETS

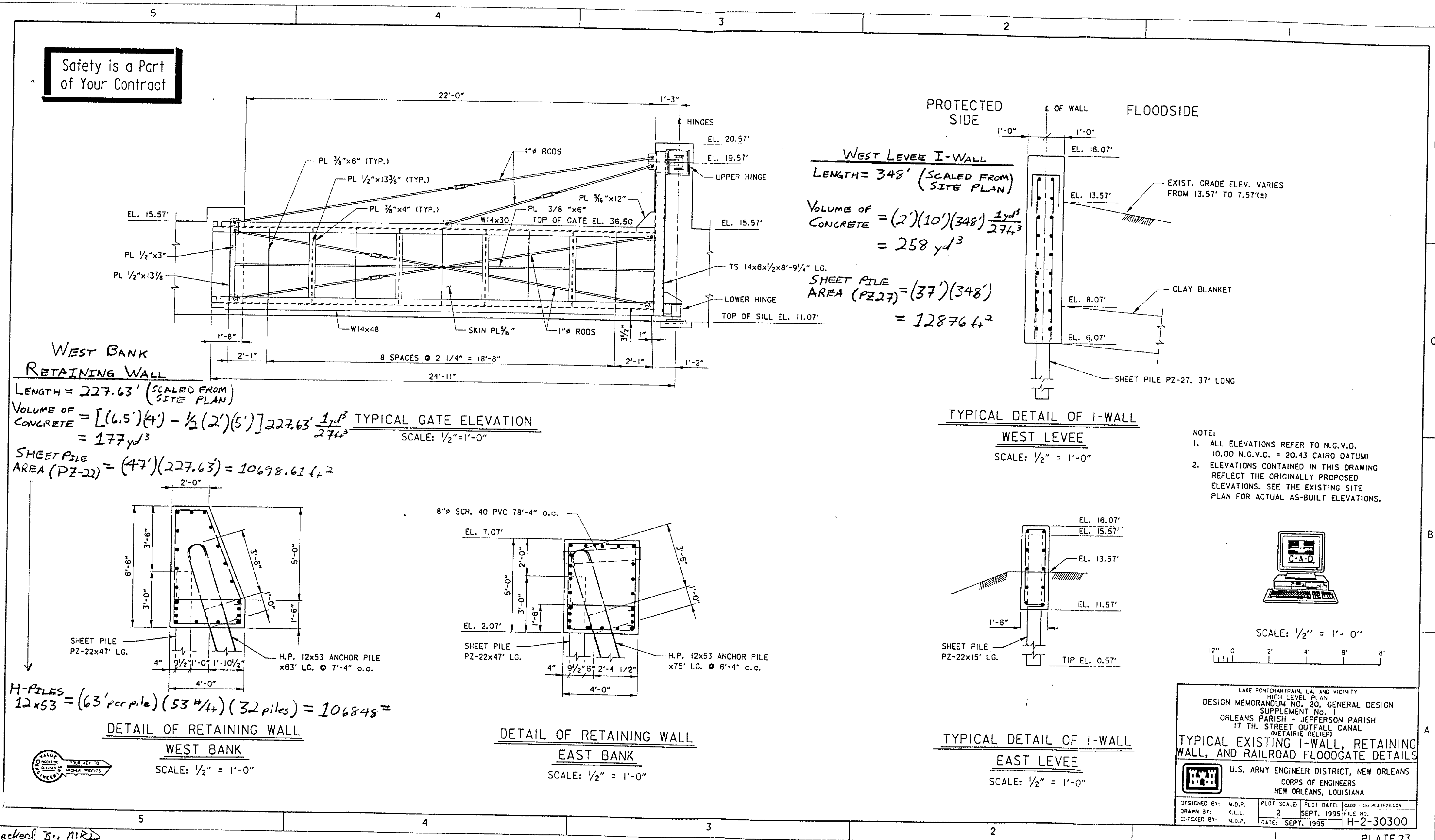
A. EXISTING FLOOD PROTECTION

1. West Flood Wall
2. East Flood Wall
3. West Horizontal Pumps
4. East Horizontal Pumps
5. Original Vertical Pumps

B. PROPOSED FLOOD PROTECTION

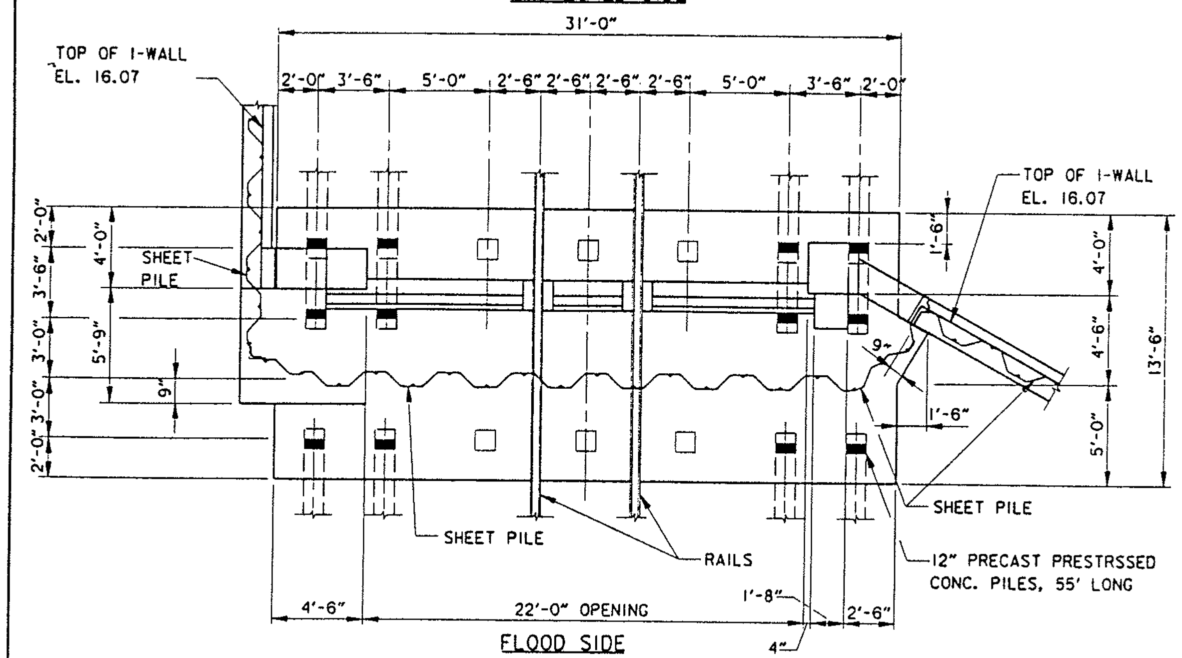
C. EXISTING COST DATA FROM NOS&WB

1. West Flood Wall



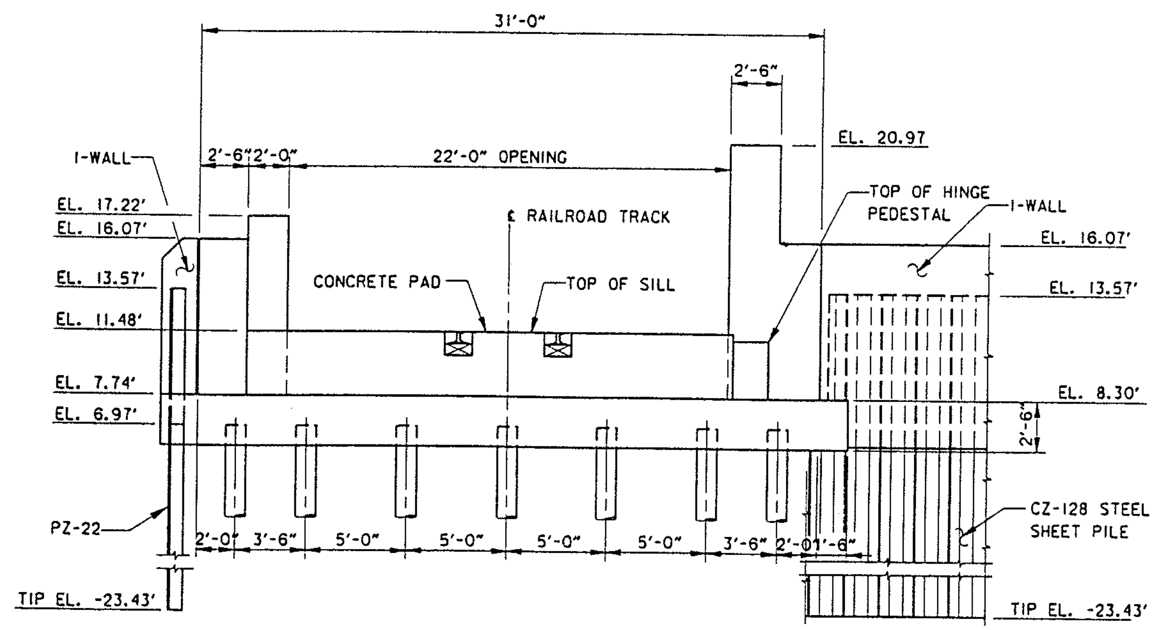
checked By MRD

PLATE 23



PLAN - RAILROAD FLOODGATE FOUNDATION - WEST LEVEE

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



FLOOD SIDE ELEVATION - WEST LEVEE

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

WEST R.R. FLOODGATE

- VOLUME OF CONCRETE

BASE SLAB: [(31')(13.5') + ½(3')(1.5833) + (5.25')(2.25')] · 2.5' · 1 yd³/27 ft³

= 40.064 yd³

SILL: [(3.74')(24.33')(2') + (22')(.5')(3.74) − 2'(1.67)(1.375')] 1 yd³/27 ft³

= 8.093 yd³

NORTH COLUMN: [(1.67')(1.67')(3.407') + (2.5')(2.5')(13.23') + (1.5)([illegible].33')(3.167')] 1 yd³/27 ft³

= 4.879 yd³

SOUTH COLUMN: [(4.5')(2')(8.33') + (2')(2')(1.15')] 1 yd³/27 ft³

= 2.947 yd³

TOTAL CONCRETE VOLUME = 55.98 yd³

- PILES

9 – 12" PRESTRESSED CONCRETE PILES × 55' (Vertical)

12 – 12" PRESTRESSED CONCRETE PILES × 55' (Battered)

- SHEET PILES

DISTANCE = 35.5'

AREA (PZ-22) = (30.4')(35.5') = 1079.2 ft²

Safety is a Part of Your Contract

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

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

12" 0 5' 10' 15' 20'

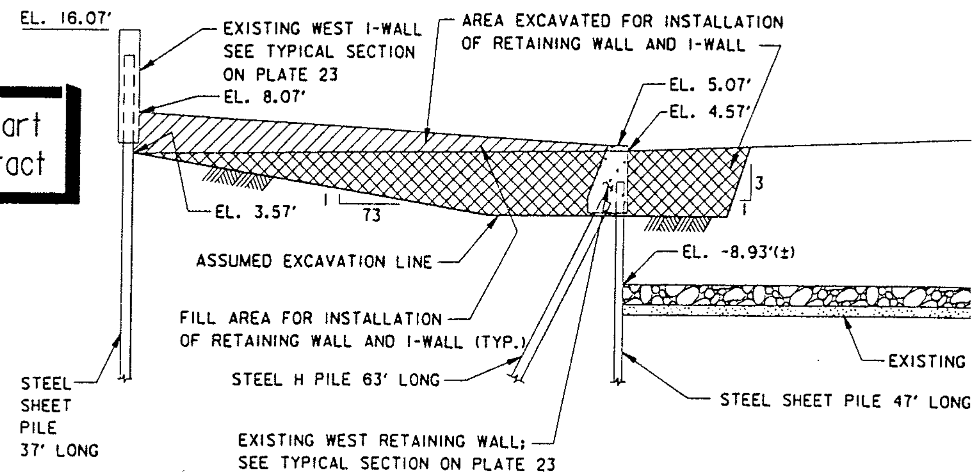
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

RAILROAD FLOODGATE FOUNDATION
PLAN & ELEVATIONS

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

DESIGNED BY:	M.O.P.	PLOT SCALE: 4	PLOT DATE: AUGUST 95	CADD FILE: PLATE29.DGN
DRAWN BY:	K.L.L.			FILE NO.
CHECKED BY:	M.O.P.	DATE: SEPT. 1995		H-2-30300

Checked By MBD



SECTION THRU CANAL DISCHARGE BASIN NORTH OF RAILROAD TRACKS

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

North Section

Estimated Length = 115'

Excavation Volume = $(250ft^2)(115')\frac{1 yd^3}{27 ft^3}$

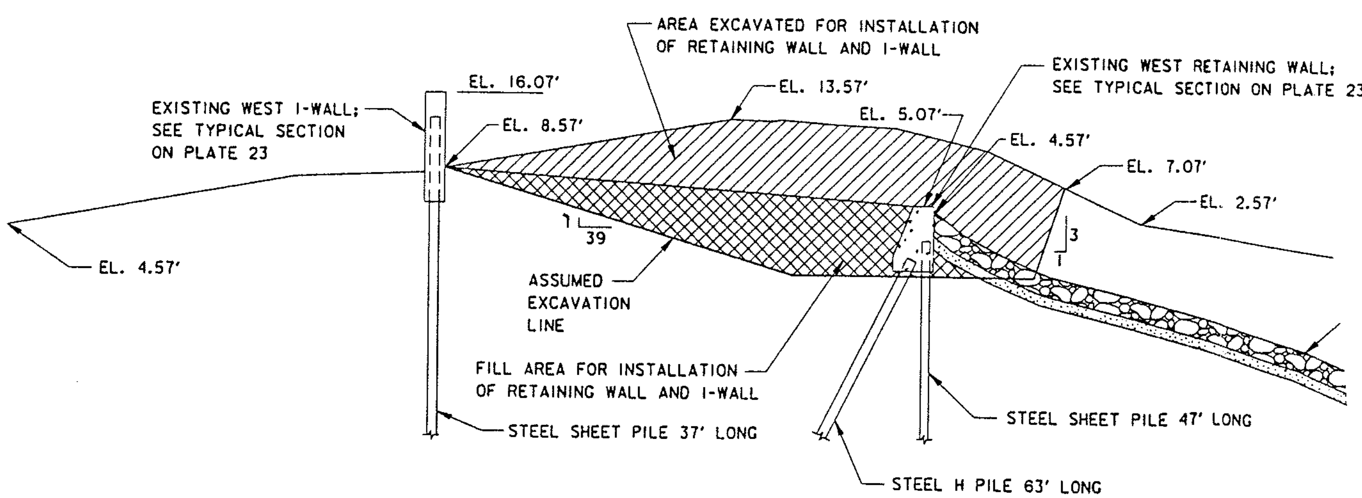
$= 1065 yd^3$

Fill Volume = $(256 ft^2)(115')\frac{1 yd^3}{27 ft^3}$

$= 1090 yd^3$

Total Excavation = $5007 yd^3$

Total Fill = $2750 yd^3$



South Section

Estimated Length = 163'

Excavation Volume = $(653 ft^2)(163')\frac{1 yd^3}{27 ft^3}$

$= 3942 yd^3$

Fill Volume = $(275 ft^2)(163')\frac{1 yd^3}{27 ft^3}$

$= 1660 yd^3$

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

0 5' 10' 15' 20' 25'

SECTION THRU CANAL DISCHARGE BASIN SOUTH OF RAILROAD TRACKS

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

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

Note: Excavation Depth Estimated as no Dimensions were found. Also Estimated is the Length of Excavation since only Two (2) X-Sections were found. Excavation Lengths scaled from Shop Dwg.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

TYPICAL EXISTING SECTIONS
SHOWING I-WALLS & RETAINING WALLS

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

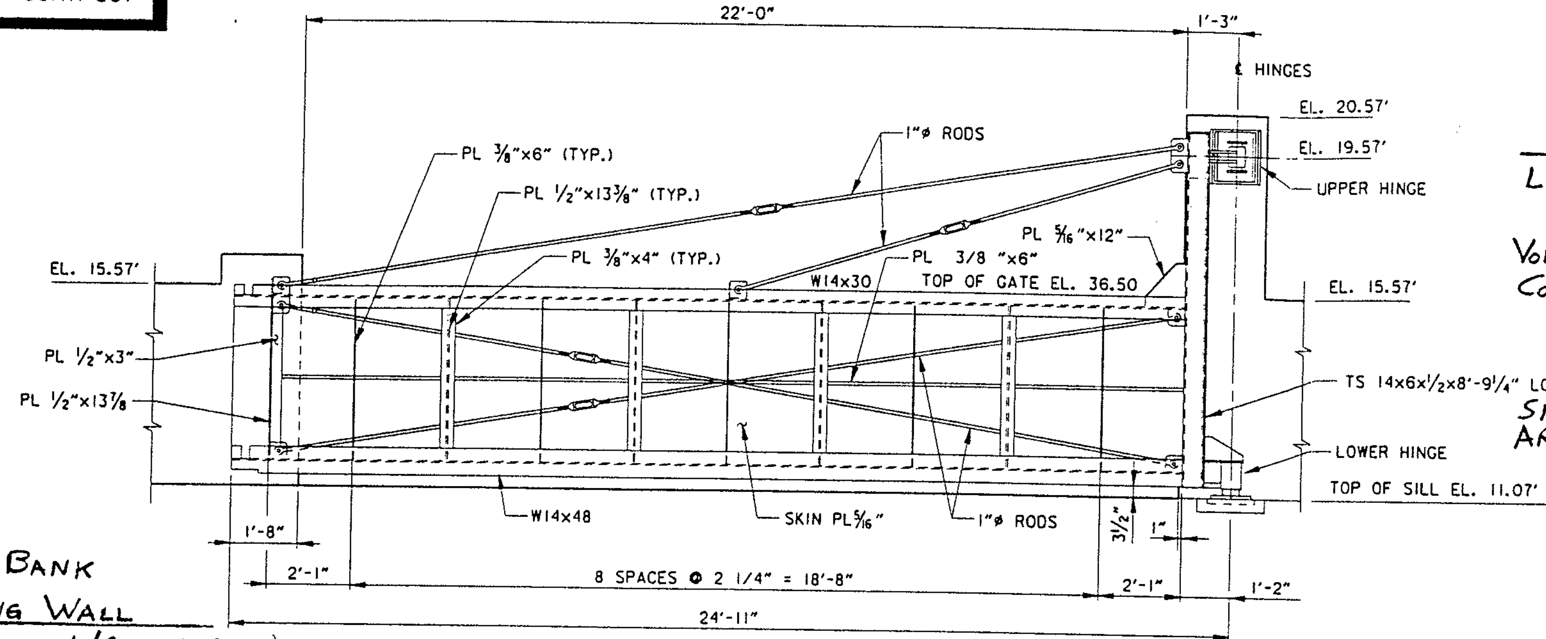
DESIGNED BY: M.D.P.	PLOT SCALE: 8	PLOT DATE: SEPT. 1995	CADD FILE: PLATE22.DGN
DRAWN BY: K.L.L.			FILE NO.
CHECKED BY: M.D.P.	DATE: SEPT. 1995		H-2-30300

PLATE 22

Checked By MRD

2. East Flood Wall

Safety is a Part of Your Contract



TYPICAL GATE ELEVATION

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

WEST LEVEE I-WALL

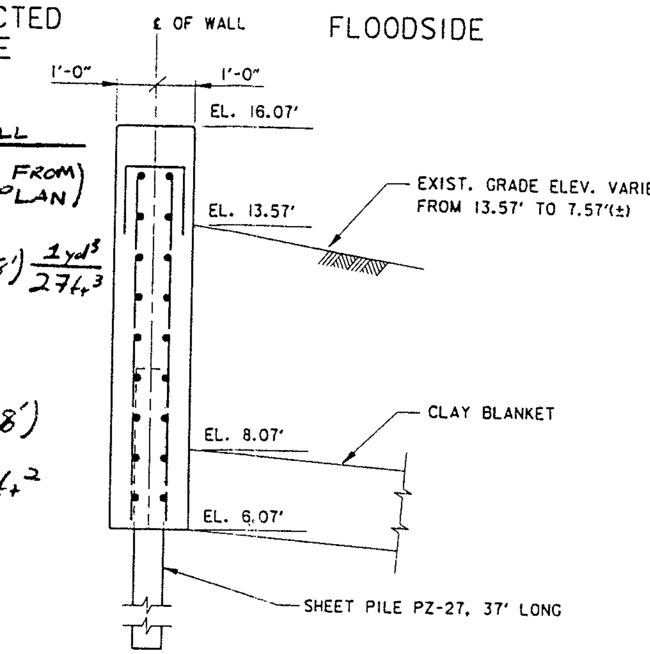
LENGTH = 348' (SCALED FROM SITE PLAN)

VOLUME OF CONCRETE $= (2')(10')(348')\frac{1\,yd^3}{27\,ft^3}$

$= 258\ yd^3$

SHEET PILE AREA (PZ27) $= (37')(348')$

$= 12876\ ft^2$



TYPICAL DETAIL OF I-WALL

WEST LEVEE

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

WEST BANK RETAINING WALL

LENGTH = 227.63' (SCALED FROM SITE PLAN)

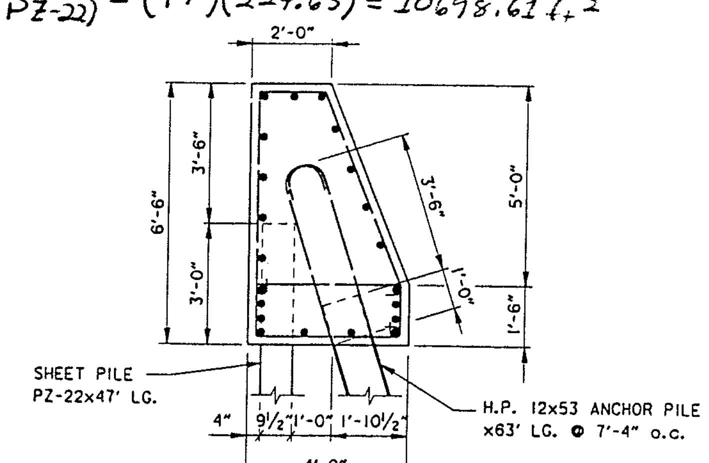
VOLUME OF CONCRETE $= [(6.5')(4') - \frac{1}{2}(2')(5')]\,227.63'\,\frac{1\,yd^3}{27\,ft^3}$

$= 177\ yd^3$

SHEET PILE AREA (PZ-22) $= (47')(227.63') = 10698.61\ ft^2$

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

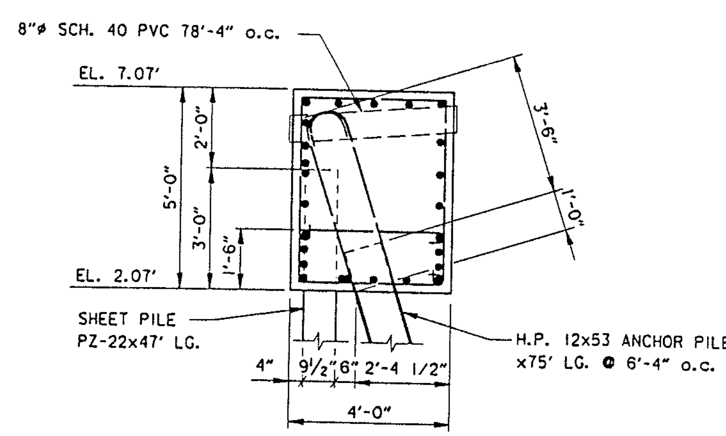


H-PILES 12x53 $= (63'\ \text{per pile})(53\ \#/ft)(32\ \text{piles}) = 106848\#$

DETAIL OF RETAINING WALL

WEST BANK

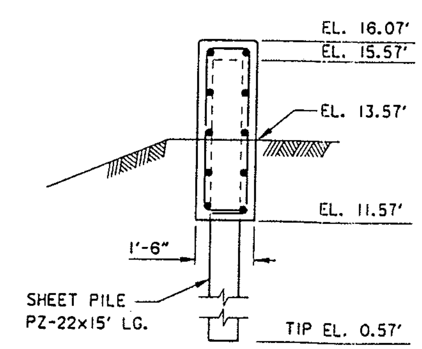
SCALE: 1/2" = 1'-0"



DETAIL OF RETAINING WALL

EAST BANK

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



TYPICAL DETAIL OF I-WALL

EAST LEVEE

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

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

12" 0 2' 4' 6' 8'

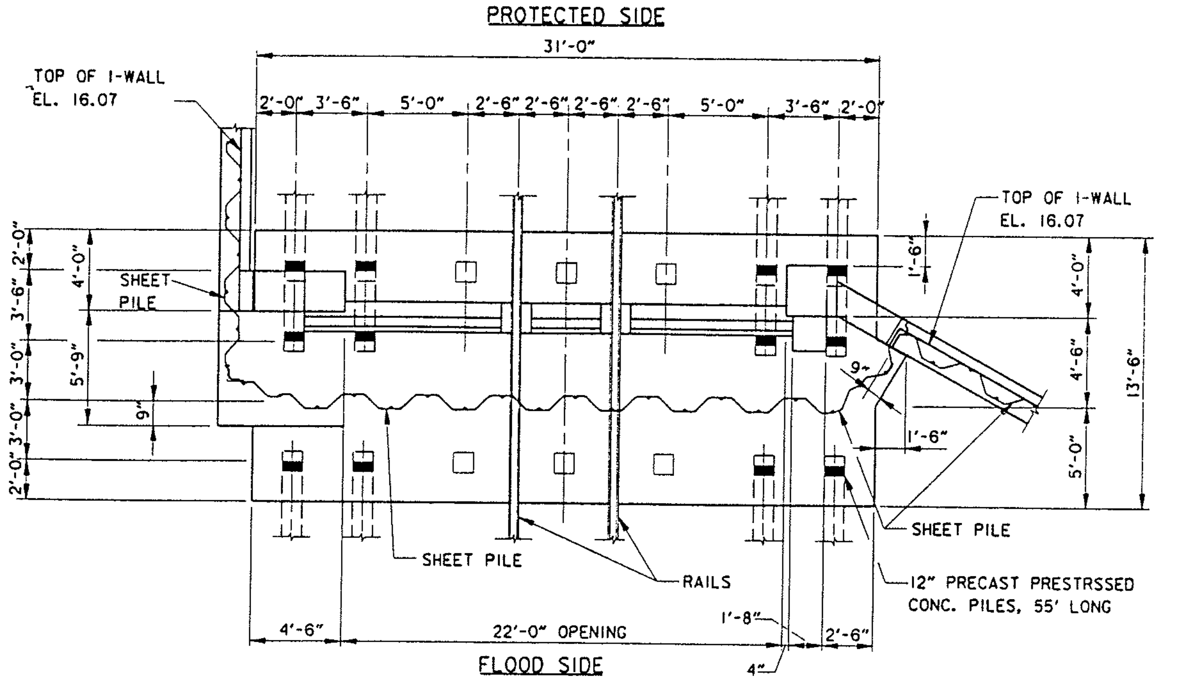
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

TYPICAL EXISTING I-WALL, RETAINING WALL, AND RAILROAD FLOODGATE DETAILS

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

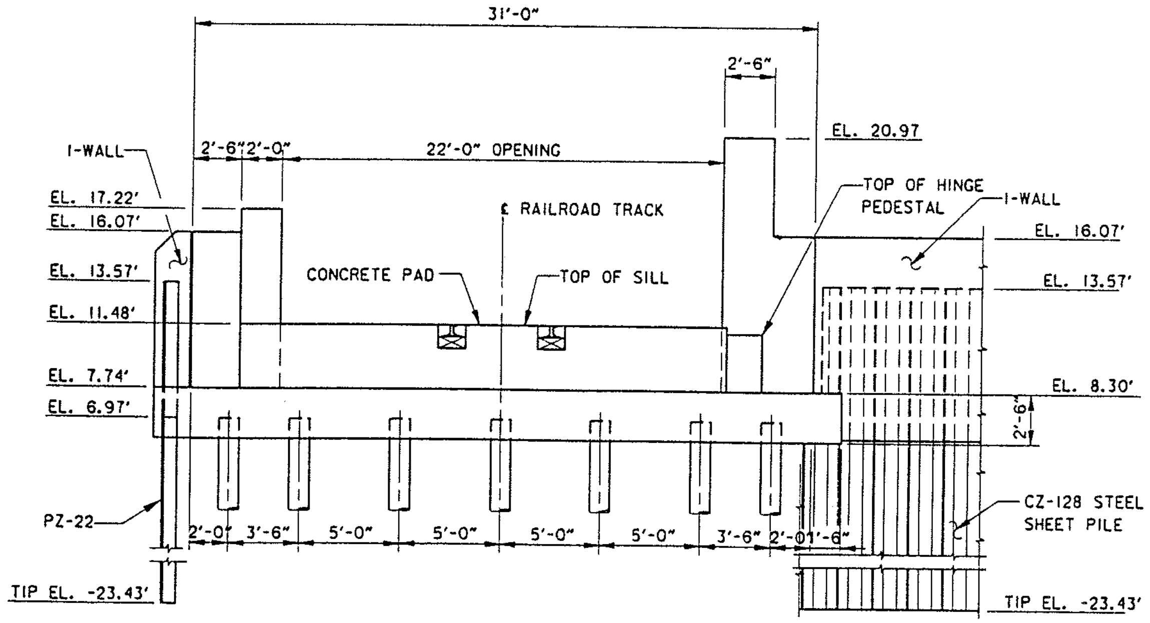
DESIGNED BY: M.D.P.	PLOT SCALE: 2	PLOT DATE: SEPT. 1995	CADD FILE: PLATE23.DGN
DRAWN BY: K.L.L.			FILE NO.
CHECKED BY: M.D.P.	DATE: SEPT. 1995		H-2-30300

checked By MRD



PLAN - RAILROAD FLOODGATE FOUNDATION - WEST LEVEE

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



FLOOD SIDE ELEVATION - WEST LEVEE

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

WEST R.R. FLOODGATE

- VOLUME OF CONCRETE

BASE SLAB: $[(31')(13.5') + \frac{1}{2}(3')(1.5833) + (5.25')(2.25')] \cdot 2.5' \cdot \frac{1\ yd^3}{27ft^3}$

$= 40.064\ yd^3$

SILL: $[(3.74')(24.33')(2') + (22')(.5')(3.74) - 2'(1.67)(1.375')] \frac{1\ yd^3}{27ft^3}$

$= 8.093\ yd^3$

NORTH COLUMN: $[(1.67')(1.67')(3.407') + (2.5')(2.5')(13.23') + (1.5)(.33')(3.167')] \frac{1\ yd^3}{27ft^3}$

$= 4.879\ yd^3$

SOUTH COLUMN: $[(4.5')(2')(8.33') + (2')(2')(1.15')] \frac{1\ yd^3}{27ft^3}$

$= 2.947\ yd^3$

TOTAL CONCRETE VOLUME = $55.98\ yd^3$

- PILES

9 – 12" PRESTRESSED CONCRETE PILES × 55' (Vertical)

12 - 12" PRESTRESSED CONCRETE PILES × 55' (Battered)

- SHEET PILES

DISTANCE = 35.5'

AREA (PZ-22) = $(30.4')(35.5') = 1079.2\ ft^2$

Safety is a Part of Your Contract

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

C·A·D

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

12" 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

RAILROAD FLOODGATE FOUNDATION
PLAN & ELEVATIONS

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

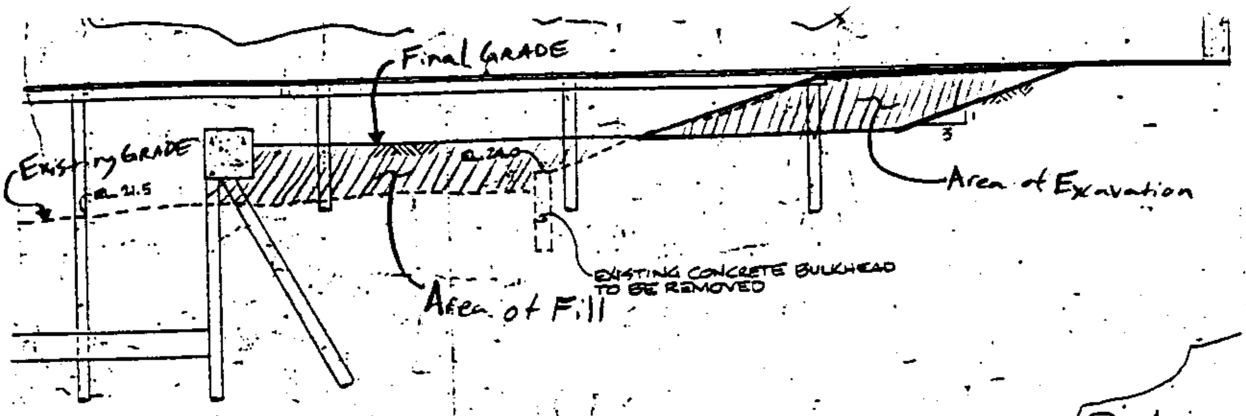
DESIGNED BY: M.D.P.	PLOT SCALE: 4	PLOT DATE: AUGUST 95	CADD FILE: PLATE29.DGN
DRAWN BY: K.L.L.			FILE NO.
CHECKED BY: M.D.P.	DATE: SEPT. 1995		H-2-30300

VALUE INCENTIVE ENGINEERING — YOUR KEY TO HIGHER PROFITS

5 4 3 2 1

checked By MBD

PLATE29



B&A
DwgNo 11563-W-41
Sheet C-7
Date 5/31/84

SECTION THRU LEVEE @ STA 53+00
ALONG RAILROAD (EAST SIDE)

EAST

Volume of Excavation

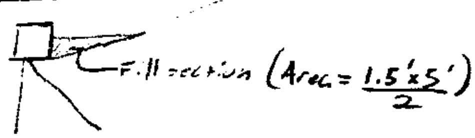
$Vol_{Ex} = (104\ ft^2)(85\ ft) = 8840\ ft^3 = 327\ yd^3$

Volume of Fill

$Vol_{Fill} = (134\ ft^2)(85\ ft) = 11390\ ft^3 = 422\ yd^3$

Fill Along Replaced "Destroyed" Wall.

Typical section



$Vol_{Fill} = (1.5')(5')\frac{1}{2}(139') = 521.25\ ft^3 = 19.31\ yd^3$

Assumed cut & fill along remainder of wall to be 50% of cut and fill as diagram above,

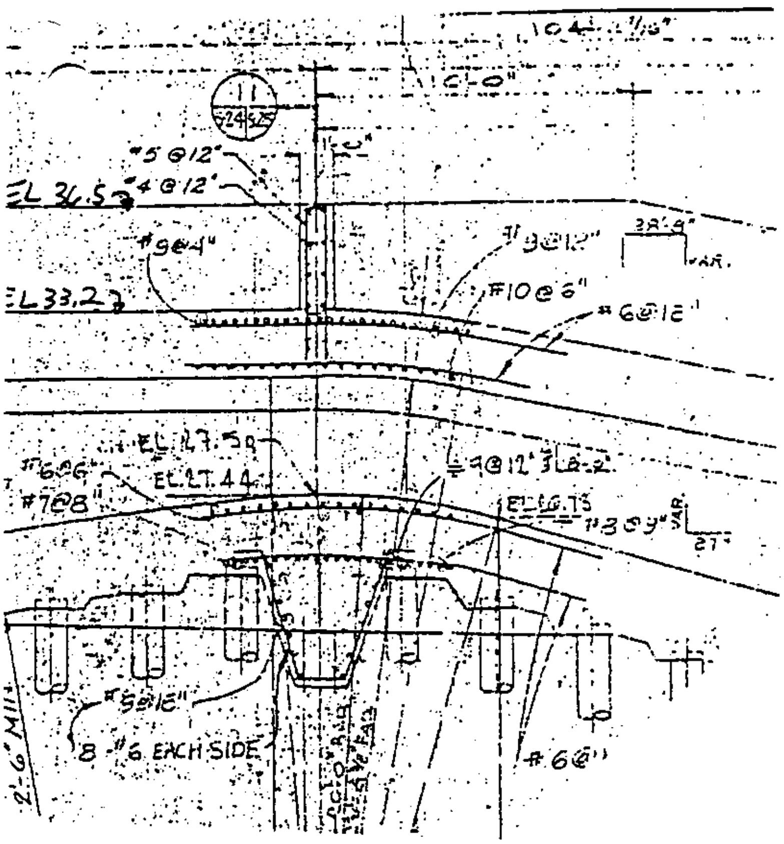
$\therefore\ Vol\ Ex = \frac{327\ yd^3}{85\ ft}\left(\frac{1}{2}\right)(311 - 85 - 139) = 167\ yd^3$

$\therefore\ Vol\ Fill = \frac{422\ yd^3}{85}\left(\frac{1}{2}\right)(311' - 85' - 139') = 216\ yd^3$

Total Excav = 494 yd^3
Total Fill = 657 yd^3

3. West Horizontal Pumps

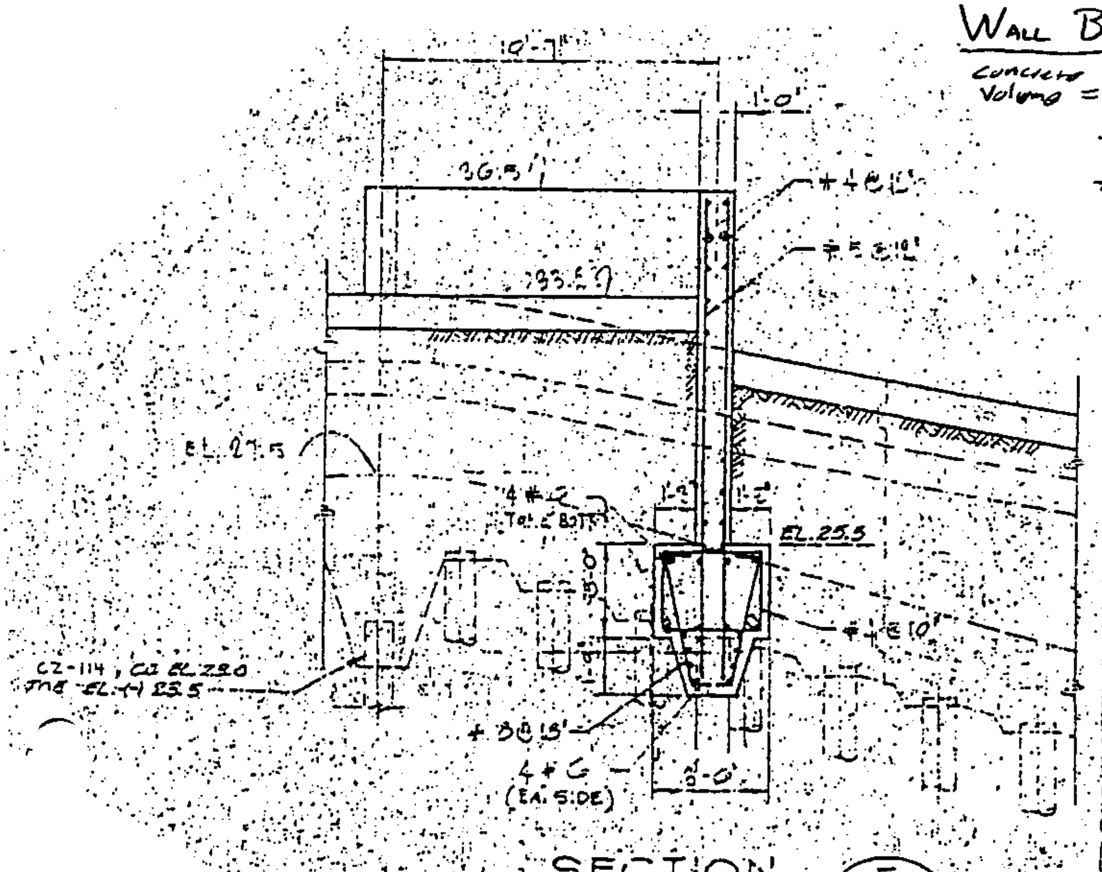
West Horizontal Pumps



Parapet on Discharge Tubes

Concrete Volume $= (1')(3.3')(29')(3)$
$+ (1')(3.3')(10.583')(2)$
$+ (1')(1.5')(9')\frac{1}{2}(2)$
$+ (1')(1.5')(4.5)\frac{1}{2} = 373.82 ft^3$
$= 13.85 yd^3$

B&A
Dwg No. 11563-W-41
Sheet S-24
Date 5/31/84



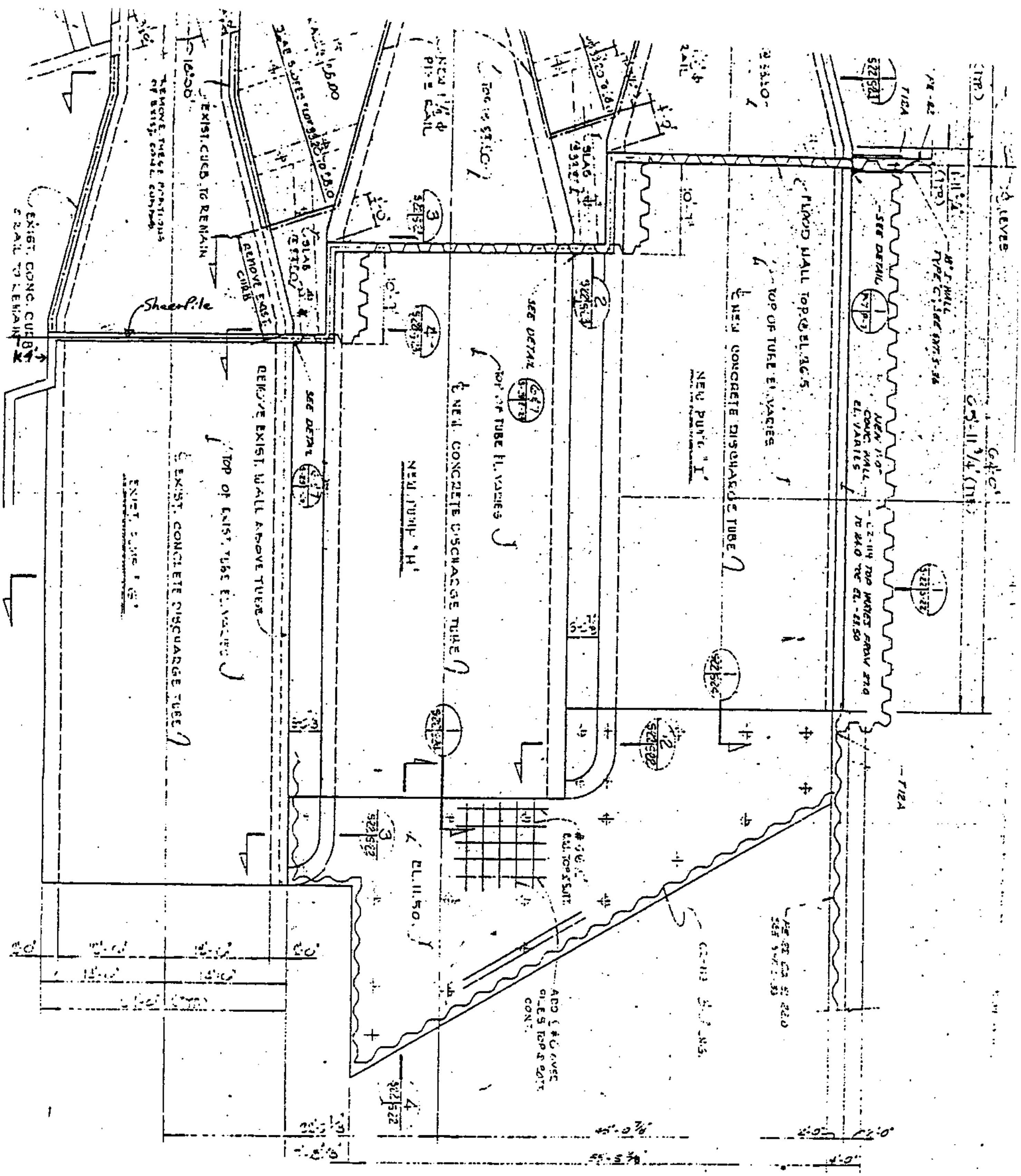
SECTION 5
SCALE: 1/4" = 1'-0"

Wall Between Discharge Tubes

Concrete Volume $= (1')(10')(3.573')(3)$
$+ (3)(3.5')(3.573')(3)$
$+ (1.75')(2.167')(3.573')(3)$
$= 271.11 ft^3$
$= 10.04 yd^3$

Note: Lengths taken from plan view

B&A
Dwg No 11563-W-41
Sheet S-23
Date 5/31/84



Sheet Pile

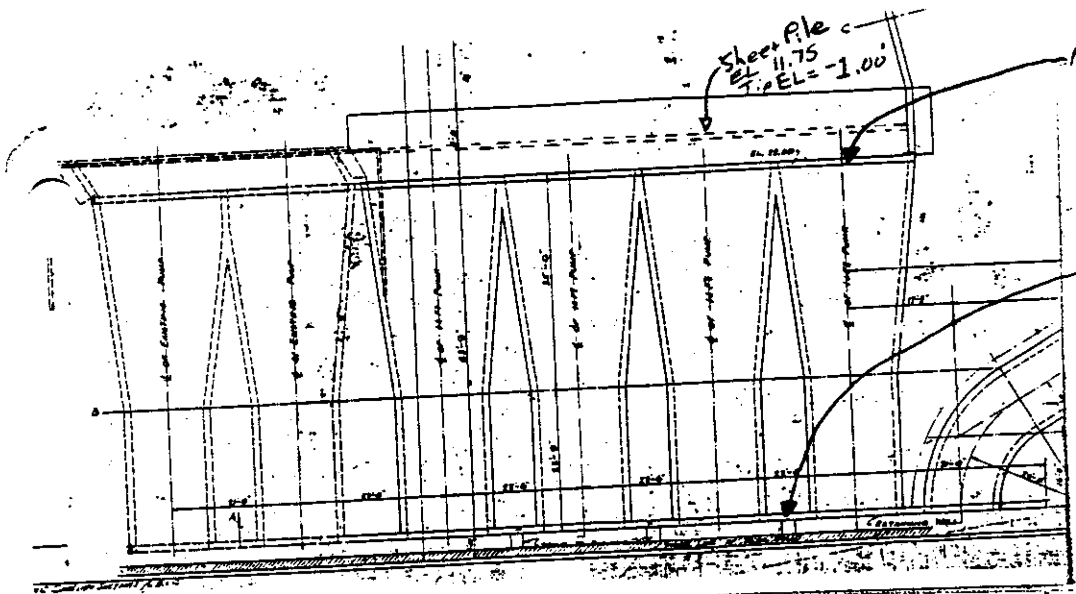
distance along sheet pile from I-wall to Vertical/Pump Station protection = 124.67'

EL = 23.00 Tip EL = -23.50

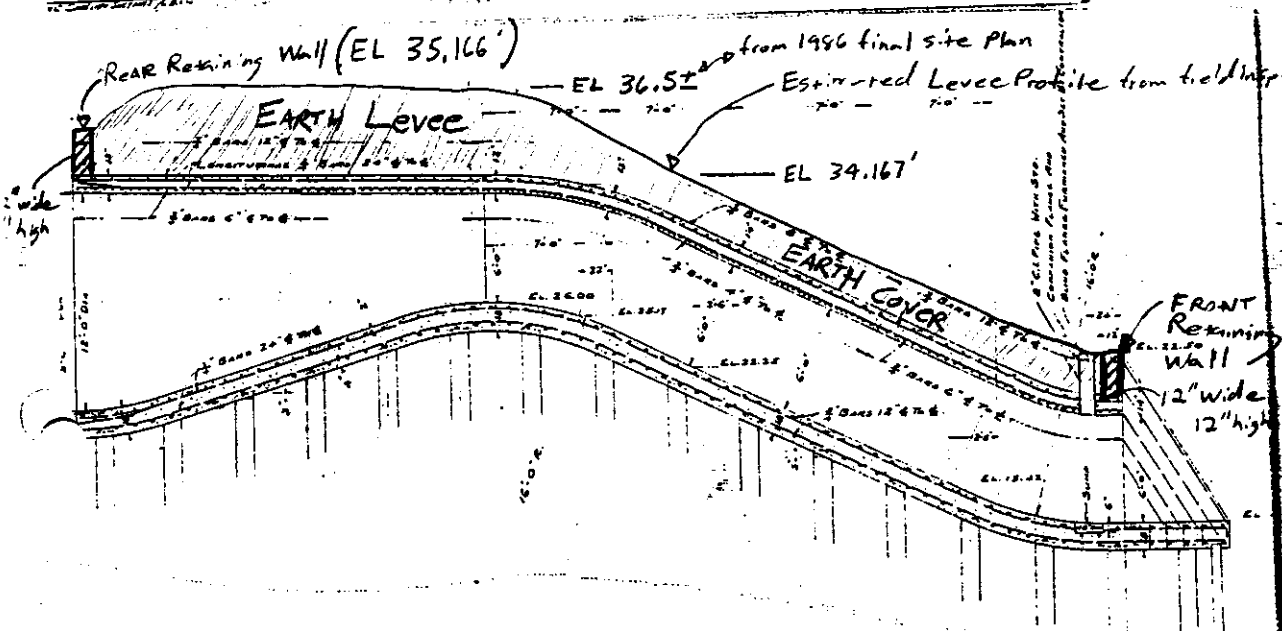
∴ Sheet Pile AREA PZ-22 = (46.5')(125') = 5812.5 ft^2

B&A
Dwg No. 11563-W-41
Sheet S-22
Date 5/31/94

4. East Horizontal Pumps

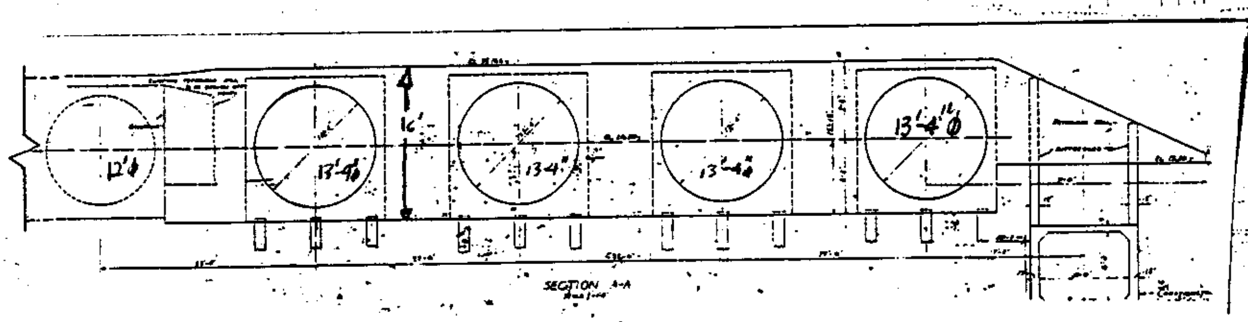


NOS&WB
Dwg Nº 5856-W-18
Date: Dec 13, 192



NOTE: Retaining wall length & other dimensions not called out are scaled from original Dwgs.

NOS&WB
Dwg No. 5361-W-
Date: May 7 1914



NOS&WB
Dwg Nº 5876 W-18
Date: Dec 13, 192

East Horizontal Pump Group (1914 & 1928)

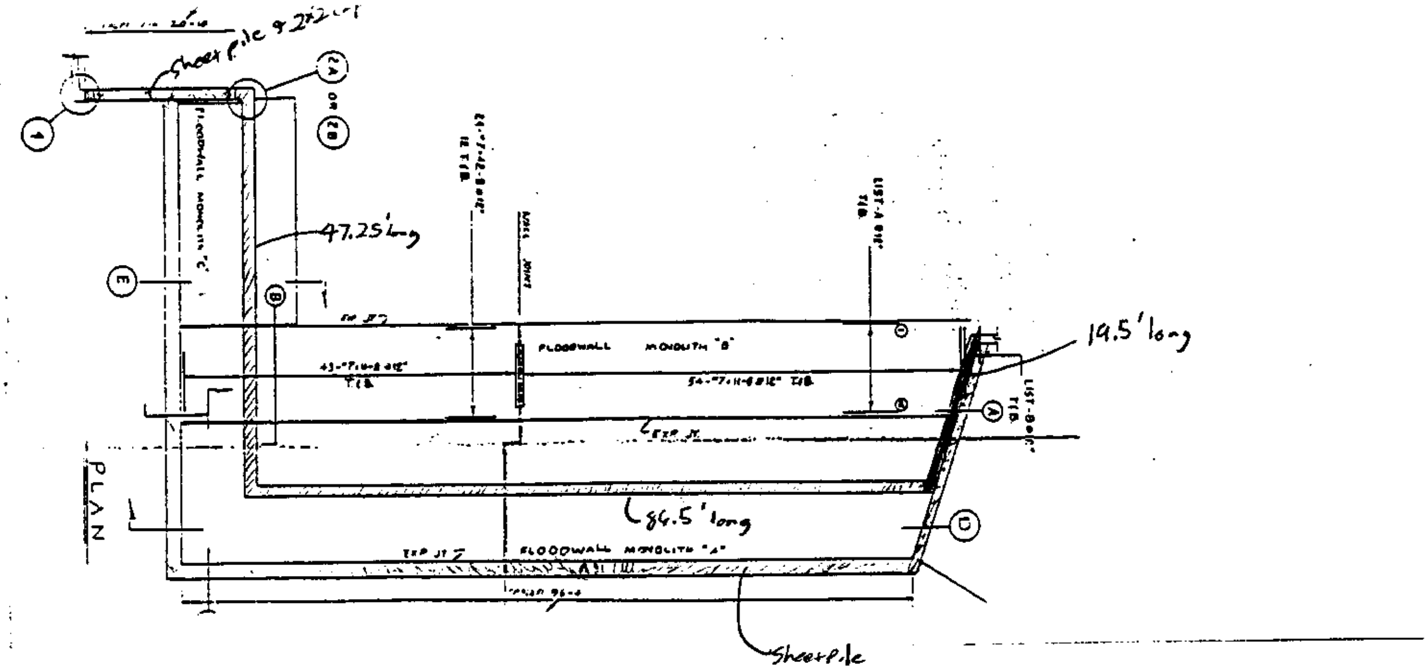
$$\text{Concrete} = (134.25')(1')(1') + \left[(127')(1')(16') - 4\left(\frac{\pi\, 13.33'^2}{4}\right)1' - 2\left(\frac{\pi\, 12'^2}{4}\right)1'\right] = 1381.58\ ft^3 = 51.2\ yd^3 \checkmark$$

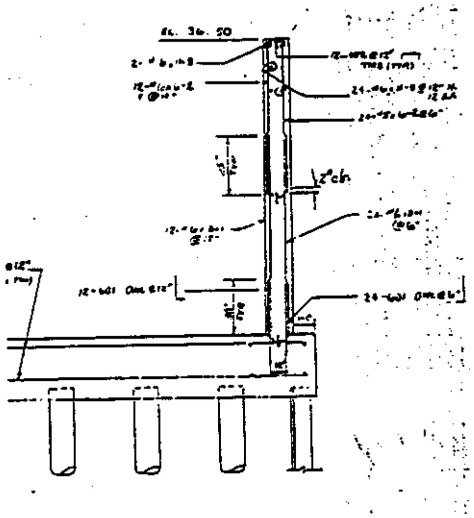
$$[illegible] = \left[(2.33')(23')(125')\right] + \left[\left(\frac{125+132.25}{2}\right)\left(\frac{2.33'+1'}{2}\right)(35')\right] = 14194.37\ ft^3 = 525.7\ yd^3 \checkmark$$

$$\text{Sheet Pile Timber, } 6"\times 12" = \left[(84.33') + (55.17) + (22.83')\right](12.75') = 2069.7\ ft^2$$ (piling at discharge end of tube) ✓

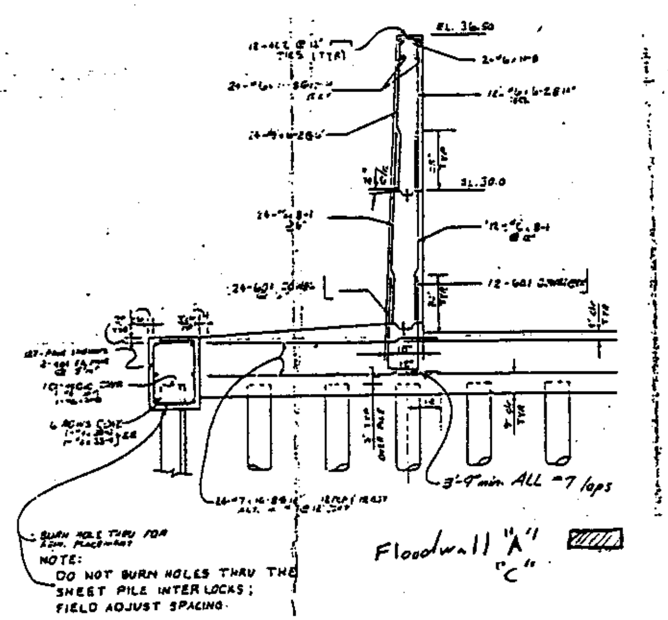
$$\text{Sheet Pile Timber, } 6"\times 12" = (83')(20') + 61'(26') = 3246\ ft^2$$ (piling under bldg close to Retaining wall) ✓

5. Original Vertical Pump





FLOODWALL MONOLITH "B"



Floodwall "A" "C"

Floodwalls

$$\text{Concrete Volume} = \frac{(1'+1.5')}{2}(12.5')(133.75') + (1')(12.5')(47.25') - \left(\frac{1'+1.5}{2}\right)\left[4\left(\frac{\pi 7^2}{4}\right) + \left(\frac{\pi 4^2}{4}\right)\right]$$

Wall "A" & "C" ↗ Wall "B" ↗

Concrete Volume $= 2472.39 ft^3 = \underline{91.57 yd^3}$ ✓

Note: Wall lengths scaled from B&A dwg 11578-W-41 sht 8 of 8

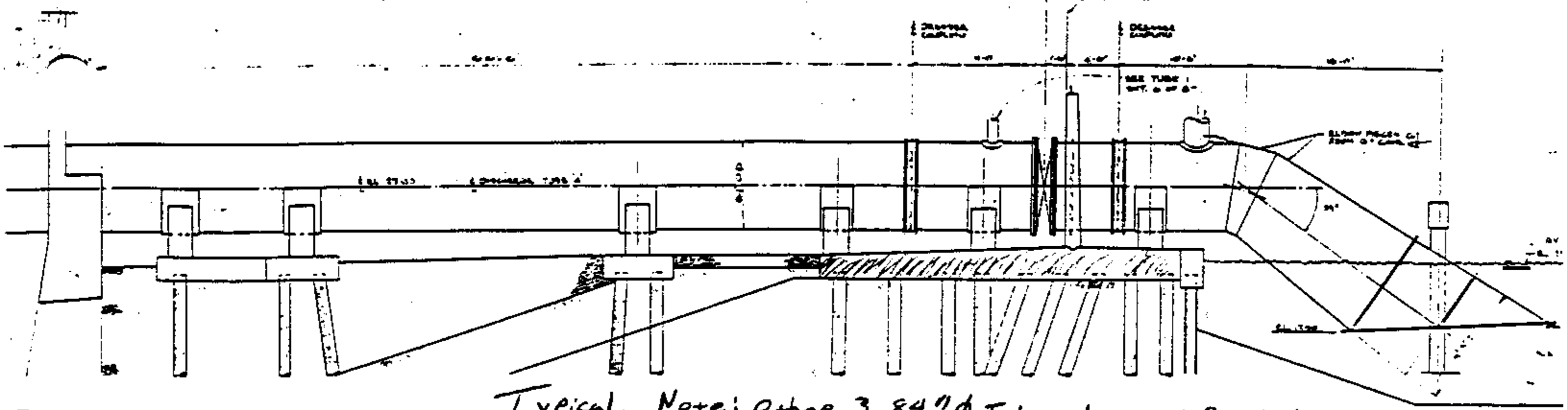
Dwgs. Lulich Steel Corp
Contract # 8311016273
Dwg # R-4
Date: 1/5/83

Slab

Concrete Volume $= \left[20'\left(\frac{2'+2.75'}{2}\right) + 1.5'(2.75') + 8.167'\left(\frac{2.75+2.58}{2}\right)\right] \times 80.75'$

All values scaled where dimensions were not found.

$= 5926.25 ft^3 = 219.5 yd^3$ ✓



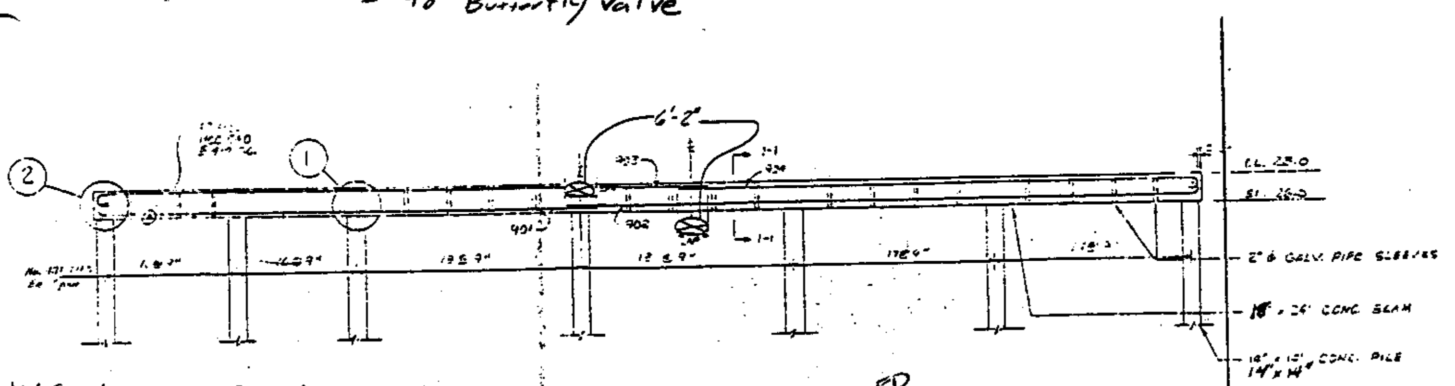
Typical, Note: Other 3 84"Ø Tubes have 10° conical End.

Dwg B&A
11578-W-41
7 of 8 June 1985

Typical 4 tubes
84"Ø tube length = 103.5' (excluding conical end)
84"Ø conical end section = 21' (3@ 10°, 1@ 6°)
2- Dresser Couplings
1- 84" Butterfly Valve

This ...

From drawing shop dimensions →
48"Ø tube length = 112' (excluding conical end)
48"Ø conical end section = 21' (7°)
3- Dresser Couplings
1- 48" Butterfly valve



Dwg Lulich Steel
8311010273
R-1
Date: 1/4/83

Discharge Tube Suspension System

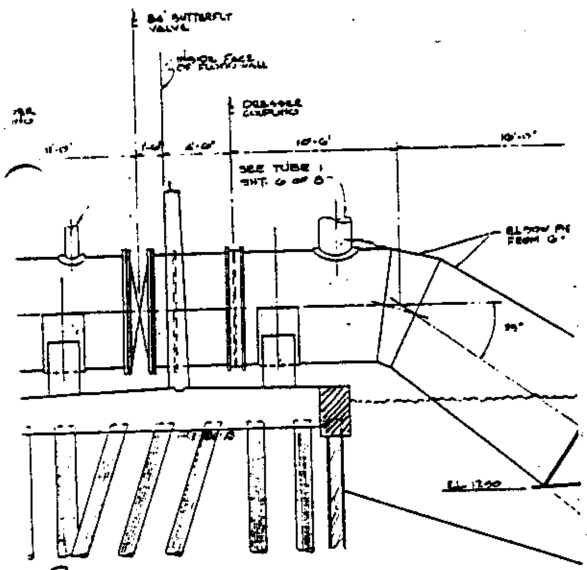
Volume of Concrete in beam $= (1.5')(2')(77.75') = 233.25 ft^3 = 8.64 yd^3$ ✓ (SCALED)

2"Ø Galvanized Pipe Sleeves = (2')(15) = 30'

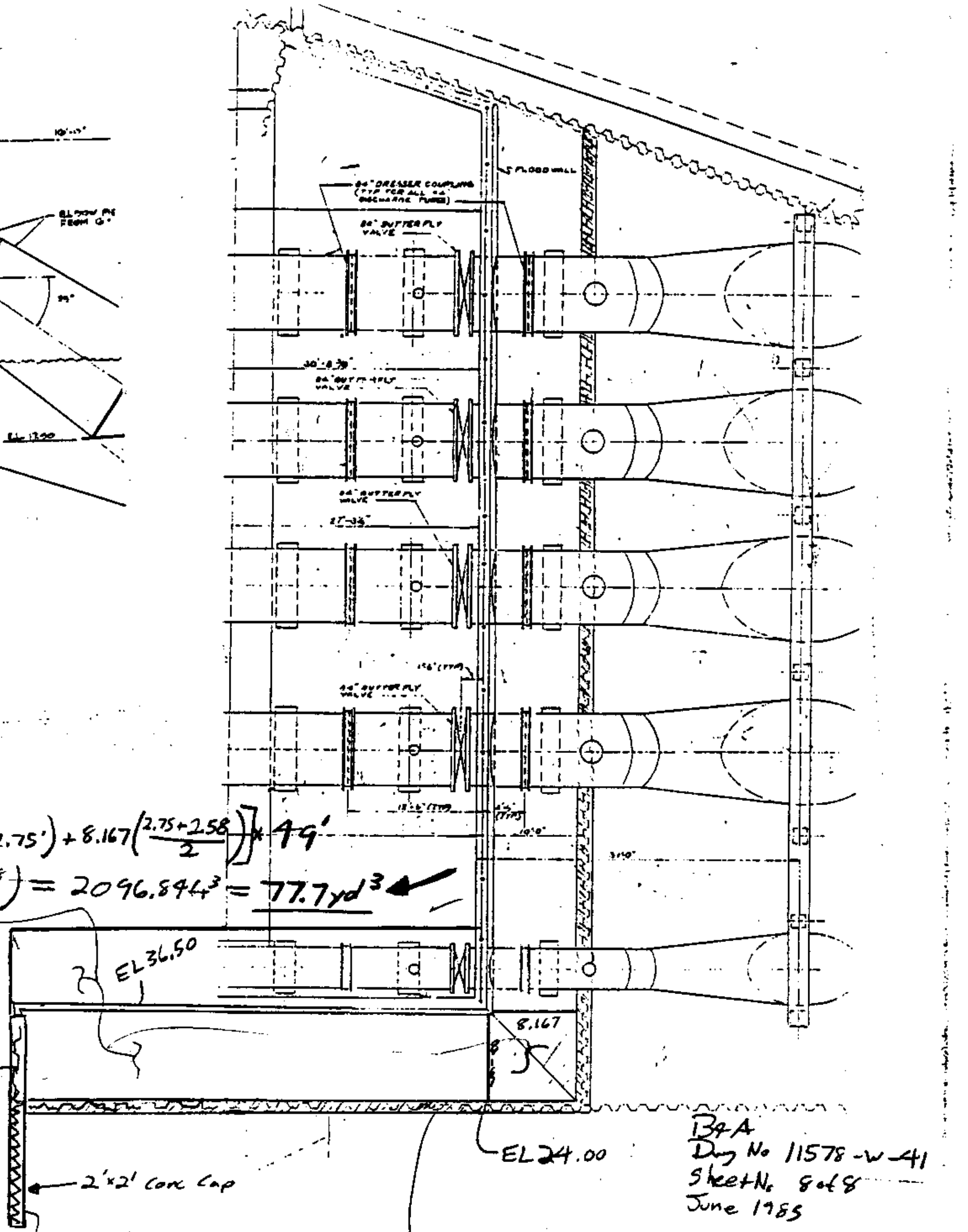
Piles

14"x14" Concrete Piles EL=26.0' Tip EL= -11.5'

7 @ 37.5' = 262.5'



B&A
Dwg No. 11578-W-41
Sheet 7 of 8
June 1985



B&A
Dwg No 11578-W-41
Sheet No 8 of 8
June 1985

SLAB

Concrete Volume $= \left[5'\left(\frac{2.56+2.75}{2}\right) + 1.5'(2.75') + 8.167\left(\frac{2.75+2.58}{2}\right)\right] \times 49' + (8.167)^2\left(\frac{2.75+2.58}{2}\right) = 2096.84\,ft^3 = 77.7\,yd^3$

Concrete Volume $= (2')(2')(20.25') = 81\,ft^3 = 3\,yd^3$

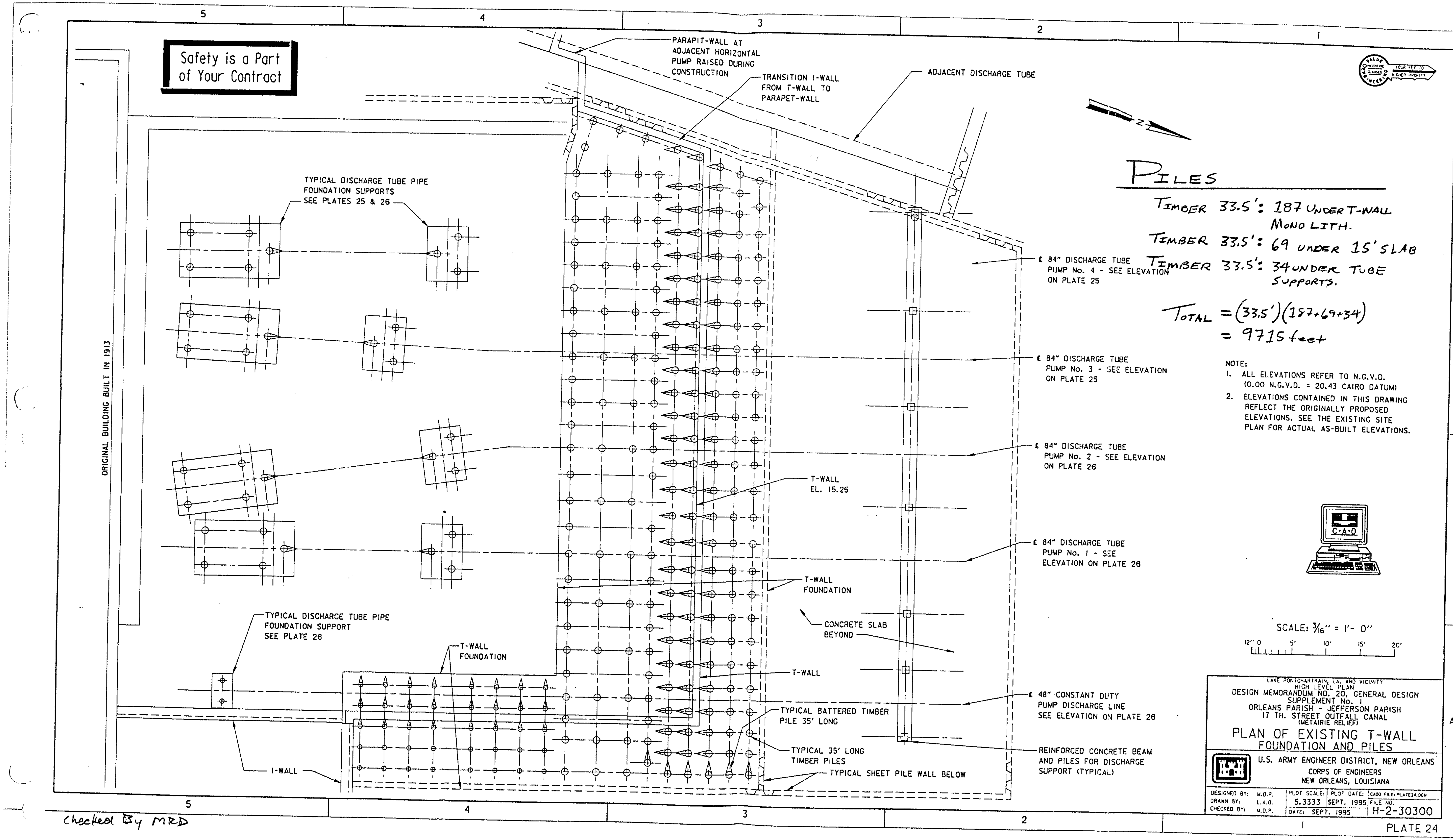
Sheet Pile PZ 32.4 $= (14'?)(21') = 294\,ft^2$

shop drawing says "EL = 35.5, Tip EL = 21.5"

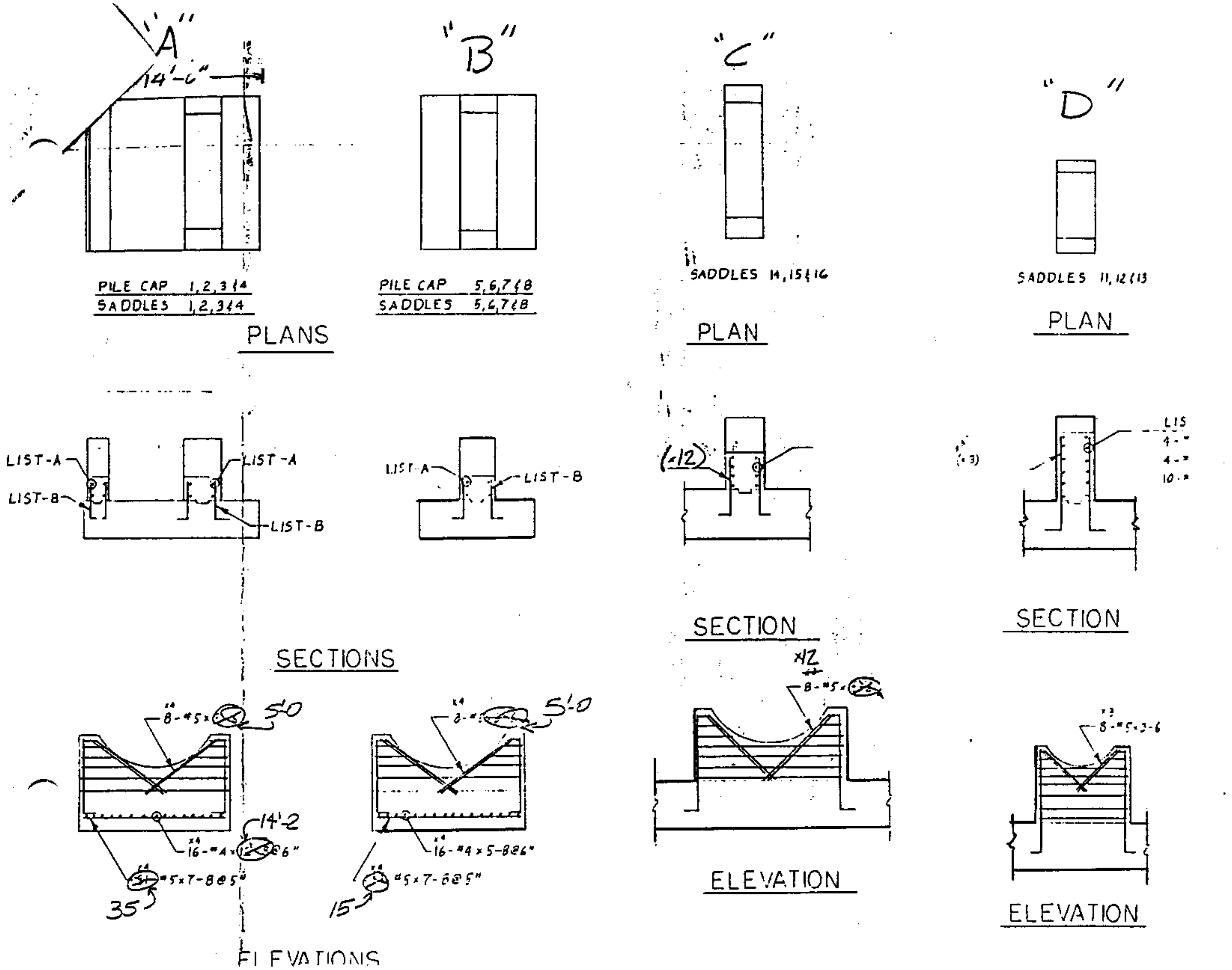
Concrete Volume $= (2')(3')(181.5') = 1089\,ft^3 = 40.3\,yd$

Sheet Pile PZ 32-8 $= (48')(181.5') = 8712\,ft^2$

Note: Wall lengths scaled from original dwg. No lengths were called out.



Checked By MRD



Pile Cap "A"

Conc Vol $= (8')(14.5')(2') = 232\,ft^3 = 8.6\,yd^3$ ✓

Saddle "A"

Conc Vol $= (3.25')(2'+1')(8') - \left(\frac{\pi 7^2}{4}\right)(25\%)(2'+1') = 49.14\,ft^3 = 1.8\,yd^3$ ✓

(25% estimated)

Pile Cap "B"

Conc Vol $= (8')(6')(2') = 96\,ft^3 = 3.6\,yd^3$ ✓

Saddle "B"

Conc Vol $= (3.25')(2)(8') - \frac{\pi 7^2}{4}(25\%)(2') = 32.76\,ft^3 = 1.2\,yd^3$

(25% estimated)

Saddle "C"

Conc Vol $= (3')(3.75')(8') - \left(\frac{\pi 7^2}{4}\right)(.25)(2) = 70.76\,ft^3$ $2.62\,yd$

Saddle "D"

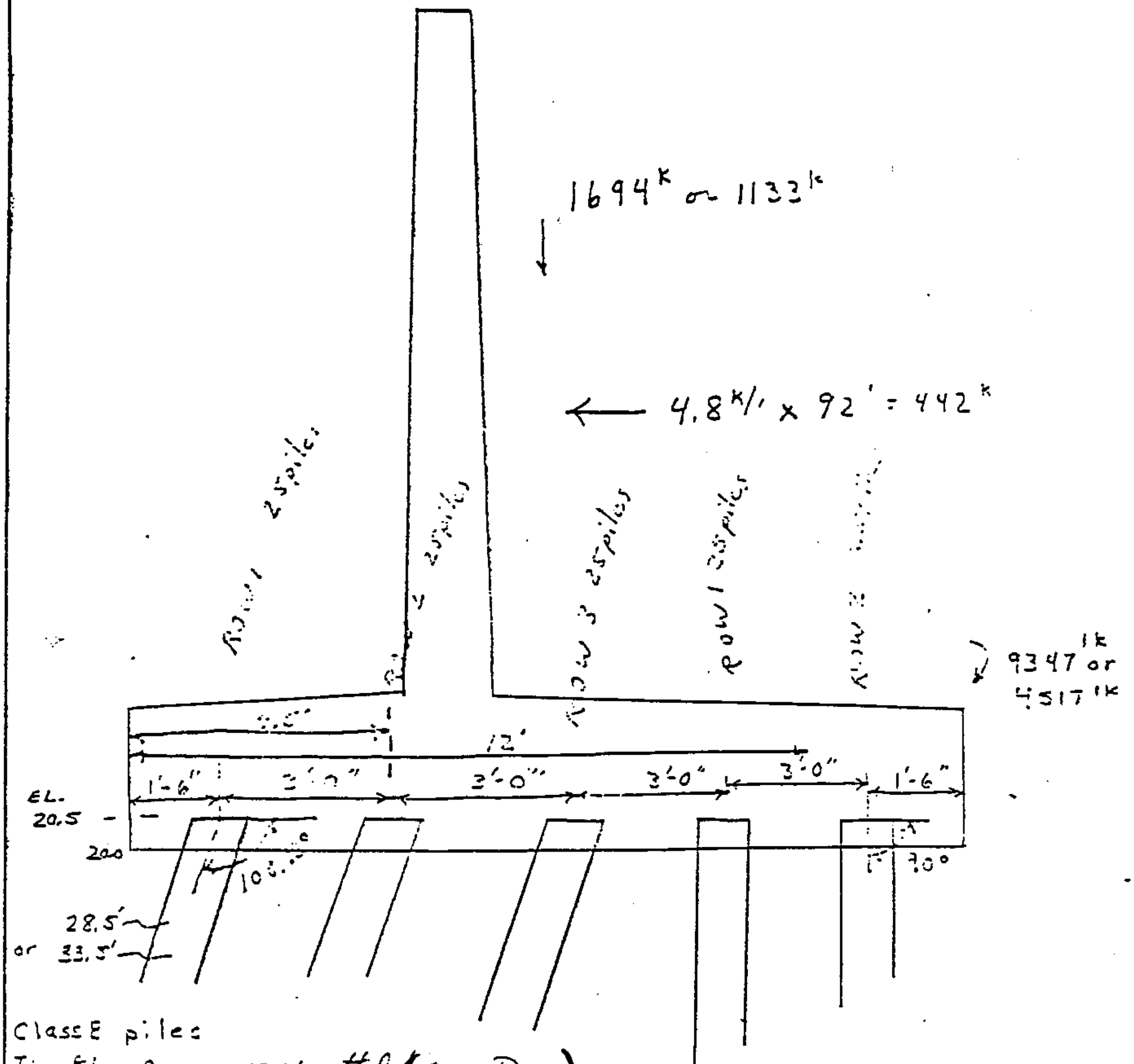
Conc Vol $= (2')(4.5')(5') - \left(\frac{\pi 4^2}{4}\right)(.25)(2) = 38.72\,ft^3$ $1.43\,yd$

Note: Plan dimensions from pile plan. Elev dimensions scaled from original Dwg.

Dwg from Lulich Steel Corp.
Cont#: 8311016273
Dwg No. R6
Date: 1/3/85

Caps & Saddles = 4A + 4B + 4(3)C + 4D — 97 [illegible] yd^3

BURK & ASSOCIATES, INC.	T-Wall 1				
ENGINEERS 4176 CANAL ST NEW ORLEANS, LA	JOB NO. 8133	DESIGN BY DDK	DATE 3-83	CHECKED BY	PAGE 20 OF 26



Class E piles
Tip El. −8.0 or −13 if jetted (Cairo Datum)

Bearing piles

Group 1

Group 2

Centroid group 1

A	x	Ax
.78	1.5	1.17
.78	4.5	3.51
.78	7.5	5.85
2.34		Σ 10.53

$\bar{x}_1 = 10.53/2.34 = 4.5'$

centroid $\bar{x}_2 = 12'$

Assume
∴ Piles are 33.5' long Timber

Tip EL = −13 + 1.5 = −11.5 S&WB datum

COMPUTATION SHEET

B. PROPOSED FLOOD PROTECTION

QUANTITY CALCULATIONS
NEW FRONTAGE PROTECTION

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No.
Made By: DANIEL D. MARSALONE	Date: OCTOBER 27 1998	PUMPING STATION #6	
Checked By:	Date:		

QUANTITY CALCS

NEW FRONTAGE PROTECTION

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 1 of 7
Made By: DANIEL D. MARSALONE	Date: OCTOBER 27, 1995	P.S. #6	
Checked By: Mike Duryea	Date: 11/3/95		

QUANTITY TAKE OFF

- WEST MONOLITH COFFERDAM

SHEET PILE: Pile Length = 55

PERIMETER = 97.5' + 42'

AREA = 7672.5 ft^2

VALVE AREA = 3(16 ft^2) = 48 ft^2

∴ AREA = 7624.5 ft^2

BUTTERFLY VALVE (4'x4'): 3 VALVES AND APPARATI

ALUMINUM HANDRAIL & POSTS 1½"ϕ: (97.5' + 2.5' + 4')(2)(2) + (4')2
+ 4'(22)(2)
= 600'

LIGHTING: 10 LIGHTS
5 - 10' LIGHT POLES

WALKWAY: GRATE → (98.5')(3) = 295.5 ft^2

STEPS → (5')(3') 1.5 = 22.5 ft^2
overlap

2L → 100' + 4' = 104'

L 3x3x¼" BRACKETS = 34 $\sqrt{(3)^2 + (3')^2}$ = 144.25 ft

L = (100/4)(1')(2) = 50'

TOTAL = 402.25 feet

QUANTITY TAKE OFF

- EAST MONOLITH COFFERDAM

SHEET PILE AREA: PILE LENGTH = 55'
PERIMETER = 160' + 32.5' + 18' + 6'
AREA = 11907.5 ft² − VALVE AREA
VALVE AREA = 7 valves (16 ft²/valve) = 112 ft²
∴ AREA = 11795.5 ft²

BUTTERFLY VALVE (4'x4'): 7 VALVES AND APPARATI

ALUMINUM HANDRAIL + POSTS 1½"φ: LENGTH = (29' + 150')(2)(2) + (4')(2) + (4')(39)(2)

Length = 1014.64 feet

LIGHTING: 16 LIGHTS
8 - 10' LIGHT POLES

WALKWAY: GRATE → 150'(3') = 450 ft²
STEPS → 24.5'(3') 1.5 = 110.25 ft²
(1.5 = overlap)

2L → 29' + 150' = 179'
L 3x3x¼" BRACKETS = 50 · $\sqrt{(3)^2 + (3)^2}$ = 212.13 feet
L = (175/4)(1')(2) = 87.5
TOTAL = 657.63

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.00	Sheet No. 3 of 7
Made By: Daniel J. Marsalone		Date: October 30, 1995	P.S. #6	
Checked By: mike Duryea		Date: 11/3/95		

QUANTITY TAKE OFF

- WEST MONOLITHS

VOLUME OF CONCRETE: (178.057 yd³ PER TUBE)(3 TUBES) = 534.170 yd

NOTE: CONCRETE VOLUME TAKEN FROM DEAD LOAD CALCULATIONS BY SFC.

WEIGHT OF PILES: (14×73)

PILE LENGTH = (1821′+20′)+(1473′+16′)+(1473′+16′)
= 4819 Feet

NOTE: PILE LENGTHS TAKEN FROM COMPUTER RUN. 1 Foot ADDED TO EACH PILE FOR EMBEDMENT.

PILE WEIGHT = (4819′)(73#/ft)
= 351787#

VOLUME OF CONCRETE: REMOVED

1984 LIP = 2·[(25′)((1.5′)(3′)−(.5)(1.33′))]
= 192 ft³ = 7.111 yd³

1984 SLAB = [10.67′·7.70′ + 25.3·(18.5+30.17)/2 + 31.5·(29.17+…)/2
× 1.333′ = 1790.37 ft³ = 66.310 yd³

RIM 1984 = [(1.5)(1.75′) + ½(1.75′)²] 83.70′
= 347 ft³ = 12.88 yd³

1967 LIP = (1.5′)(4′)(29′) = 174 ft³ = 6.44 yd³

1967 WALL = (34′)[(1′)(13.5′) + ½(1.5)(11) + ½(1)(5.5…
= 833 feet³ = 30.85 yd³

1967 WALL FOUNDATION = [(6.5′)(4′) + (9′)(2.5′) + (1′)((1′+1.5833′)/2)]
× 46.625′ = 2321.54 ft³ = 85.983 yd³

SHEET PILE: REMOVED (55′ + 5′* + 22′* + 8′ + 25′ + 13′*)(8′) = 1024 ft²

WEST BANK RETAINING WALL: 17 feet
REMOVED & REPLACED

EXCAVATION: EXCAVATION LINE IS EL −14.25′   SLAB EL = −11.00
SLAB THICKNESS = 1.33′

Volume UNDER SLAB = (1343.11 □′)(14.25 − 12.33) = 2578.77 ft
= 95.510 yd³

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: Daniel D. Marsalone	Date: October 30, 1995	Job No. 46229.00	Sheet No. 4 of 7
Checked By: Mike Duryea	Date: 11/3/95	P.S. #6	

QUANTITY TAKE OFF

- WEST MONOLITHS (CONTINUED)

EXCAVATION: (CONTINUED) Volume Not UNDER SLAB '64 = (14.25 - 11.00)(1200 □') = 3900 ft³
= 144.444 yd³

Volume Not UNDER SLAB '67 = (14.25 - 11.00)(1050) = 3412.5 ft³
= 126.389 yd³

FILL/RIP RAP: FILL TO EL -11.00' FROM EL -14.25' AREA WITHIN CONFINES OF COFFER DAM.
= (3.25')(1050 □' + 1200 □' + 1343.11 □' + (46.625')(15.5'))
= 14026.34 ft³ = 519 yd³

SLUICE GATE (144" x 132") and Mechanism - 6

- GRATING: AREA = (3)[(4.33')(29') + (1.5')(28')] + 78'(4')
= 814.71 □'

- RAIL Aluminum: (168')(6) + (4')(168/6)2 = 1232'

L = 2 · 78' = 156'

L 3x3x1/4 = 2 · 78' = 156'

L = (1')(2)(168/6) = 58'

TOTAL = 370

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.00	Sheet No. 5 of 7
Made By: DANIEL D. MARSALONE	Date: October 31, 1995	P.S. #6	
Checked By: Mike Duryea	Date: 11/3/95		

QUANTITY TAKE OFF

• EAST MONOLITH

VOLUME OF CONCRETE: TOTAL WEIGHT OF MONOLITH = 3532k INCLUDING STRUCTURAL CONCRETE AND SLUICE GATES.

$$\text{STRUCTURAL CONCRETE} = 3532^k - [8(25^k) + 4(20^k)] = 3252^k \text{ of CONCRETE}$$

$$\text{VOL OF CONCRETE} = \frac{3252^k}{.150^k/ft^3} = 21680\,ft^3 = 802.96\,yd^3$$

WEIGHT OF PILES: (14x73)

PILE LENGTH = (9045' + 96') = 9151'

WEIGHT = (9151')(73#/ft) = 668023#

NOTE: PILE LENGTH TAKEN FROM COMPUTER RUN. Also NOTE 1' per PILE ADDED TO EACH PILE FOR EMBEDMENT. (96 PILES)

VOLUME OF CONCRETE REMOVED:

1928 SLAB = (11')(1.5')(96') = 1584 ft³ = 58.67 yd³

1914 SLAB = (6')(1.5')(43') = 387 ft³ = 14.33 yd³

TOTAL = 73 yd³

SHEET PILE REMOVED:

1928 TOE = (16')(93') = 1488 □'

1914 TOE = (14')(55') = 770 □'

TOTAL = 2258 □'

EAST BANK RETAINING WALL REMOVED & REPLACED: 3 ft (Assume 3 ft Needed to TIE IN)

EXCAVATION: EXCAVATION LINE IS EL -12.43'

SLAB EL = -9.10'
SLAB THICKNESS = 1.5

VOLUME UNDER SLAB = (12.43 - 10.6)[(96')(11') + (43')(6')] = 2404.62 ft³ = 89.06 yd³

REMAINDER = [(38' x 140') - [(96')(11') + (43')(6')]](12.43 - 10.5) = 7731.58 ft³ = 286.35 yd³

ESTIMATED AVG EL -10.5

TOTAL = 375.41 yd³

QUANTITY TAKEOFF

- EAST MONOLITH (CONTINUED)

FILL: TO EL -9.10' FROM -12.43' Δ = 3.33'
AREA WITHIN COFFERDAM – RIP RAP AREA

(38')(140') – 20'(140) = 2520 □'
Vol = (3.33')(2520 □') = 8391.6 ft³
Vol = 310.8 yd³

RIP RAP: (20')(140')(3.33') = 9324 ft³
= 345.33 yd³

SLUICE GATE (114"x114") and Mechanism – 6

SLUICE GATE (108"x114") and Mechanism – 2

SLUICE GATE (108"x90") and Mechanism – 2

SLUICE GATE (102"x90") and Mechanism – 2

SHEETPILE: (35')(145') = 5075 □'

GRATING = (6')(90') + 4'(25') = 460 □'

Aluminum Rail = (120')(6) + 4(120/6) 2 = 880'

L = 2 · 25' = 50'
L 3x3x1/4" = 2 · 25' = 50'
L = 2 (120' / 6 per foot) (1') = 40'

TOTAL = 140'

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 | Sheet No. 7 of 7

P.S. #6

Made By: DANIEL D. MARSALONE | Date: NOVEMBER 1 1995
Checked By: Mike Duryea | Date: 11/3/95

QUANTITY TAKE OFF

• I-WALL

– Type I   LENGTH = 22'
SHEET PILE = (22')(35') = 770 ft² ✓
CONCRETE = (2')(2')(22') = 88 ft³ = 3.26 yd³ ✓
East bank I wall Removed & Replaced – 9' = CONC = (1')(2')(10') = 6.7 yd³ sheet pile = 5' x 17.5 = 88'
East bank Retaining Wall Removed – 12' = CONC = (2')(2')(12) = 1.8 yd³
East bank Retaining Wall Removed & Replaced – 8' = CONC = (2')(2')(8') = 1.2 yd³ Sheet Pile = 41.5'
EXCAVATION – [(6')(6')·2·9'] + [(5')(5') + (5')(15)(½)] 12' = 51.78 yd³
FILL = 51.78 yd³

– TYPE II   Length = 44'
SHEET PILE = (44')(47') = 2068 ft² ✓
Concrete = (2'x2')(44') = 176 ft³ = 6.52' ✓
SHEET PILE REMOVED = 5'·20' = 100'

I-WALL SUMMARY
- Sheet Pile – 2838 ft² ✓
- STRUCTURAL CONCRETE – 17.68 yd³ ✓
- Removal Concrete – 9.7 yd³ ✓
- EXCAVATION – 51.8 yd³
- FILL – 51.8 yd³
- 24" PVC DRAIN PIPE = 25 feet
- DROP INLET CB01 = 1 EA @ $2500   CB-01
- SHEET PILE REMOVED = 230'

C. EXISTING COST DATA FROM NOS&WB

PARTIAL PAYMENT ESTIMATE NO. 11

CONSTRUCTION OF FLOODWALL AT
PUMPING STATION NO. 6 - PHASE I
NEW ORLEANS SEWERAGE & WATER BOARD
CONTRACT NO. 5103
B&A JOB NO. 8133

Unit cost from MOS SUB

CONTRACTOR: ATLAS CONSTRUCTION CO., INC.

% Complete 67.3 Period Ending March 22, 1985

LUMP SUM

Item No.	Description	Contract	QUANTITIES Current	Previous	Total	Unit Price	Total
1.	Bond, Insurance & Notary Fee	Lump Sum	0%	100%	100%	16,000.00	16,000.0
2.	Mobilization	Lump Sum	0%	100%	100%	109,000.00	109,000.0
3.	Temp. Trestle	Lump Sum	0%	98%	98%	150,000.00	147,000.0
4.	Clearing & Demolition	Lump Sum	0%	100%	100%	22,918.00	22,918.0
5.	Earthwork	Lump Sum	0%	98%	98%	73,063.00	71,601.
6.	Filter Cloth	Lump Sum	0%	100%	100%	892.00	892.0
7.	Rip Rap	Lump Sum	0%	100%	100%	28,730.00	28,730.0
8.	Concrete (500 cy)	Lump Sum	5%	85%	90%	123,500.00	111,150.0
	Reinforcing Steel (34 tons)	Lump Sum	5%	85%	90%	31,790.00	28,611.0
10.	Structural & Misc. Steel	Lump Sum				65,135.00	
11.	PILING						
	a) Steel Sheet Pile (13,884 sf) 17/SF	Lump Sum	0%	98%	98%	236,028.00	231,307.4
	b) Brace Sheet Pile	Lump Sum	0%	100%	100%	10,878.00	10,878.0
	c) Treated Timber Pile (9915 lf) 8.60/LF	Lump Sum	0%	100%	100%	85,269.00	85,269.0
	d) Concrete Pile (280 lf)	Lump Sum	0%	100%	100%	7,000.00	7,000.0
	e) Test Pile (2 ea.)	Lump Sum	0%	100%	100%	24,000.00	24,000.0
12.	Brick Sump	Lump Sum	0%	100%	100%	2,476.00	2,476.0
13.	Dewater	Lump Sum	0%	100%	100%	29,810.00	29,810.0
14.	PAINTING						
	a) Pipe & Misc.	Lump Sum				10,000.00	
	b) Sheet Pile	Lump Sum	0%	100%	100%	11,000.00	11,000.0
15.	MECHANICAL						
	a) 84" Discharge Tube	Lump Sum				328,400.00	

8133 PAGE 2 Peri... Ending 03/22/85

No.	Description	Contract	QUANTITIES Current	Previous	Total	Unit Price	Total
	b) 48" Discharge Tube (1 ea.)	Lump Sum	56%	32.6%	88.6%	111,218.00	98,539.15
	c) Vacuum Piping	Lump Sum				56,500.00	
	d) Butterfly Valves at Vacuum Piping	Lump Sum				43,000.00	
	e) Barometric Tank	Lump Sum				13,000.00	
	f) Sump Pump Piping	Lump Sum				14,100.00	
	g) Install 84" Butterfly Valves	Lump Sum				17,000.00	
	h) Install 48" Butterfly Valves (1 ea.)	Lump Sum	100%	0%	100%	3,500.00	3,500.00
	i) Testing	Lump Sum				1,793.00	
16.	ELECTRICAL						
	a) Electric Service	Lump Sum				1,100.00	
	b) Conduits, Boxes & Switches	Lump Sum	0%	25.067%	25.067%	11,800.00	2,957.91
	c) Lighting Fixtures	Lump Sum	0%	39.604%	39.604%	10,100.00	4,000.00
	d) Underground Conduits	Lump Sum				1,000.00	
17.	Furnish 60" X 48" Steel Reducer	Lump Sum	0%	100%	100%	6,763.00	6,763.00
18.	Sandblast & Coat Interior & Delete Finish Coat On Exterior of Barometric Tank	Lump Sum				402.00	
19.	Install 60" X 48" Reducer & Owner Furnished 48" Butterfly Valve	Lump Sum	0%	100%	100%	28,104.00	28,104.00
20.	Furnish & Install 78 LF Of 6' High Cedar Fence At 100 Hyacinth	Lump Sum	0%	100%	100%	1,846.00	1,846.00
21.	Remove, Modify, & Encase In Concrete The Sluice Gate For The Constant Duty Pump	Lump Sum	0%	100%	100%	6,398.00	6,398.00
22	Pile Caps & Pipe Paddles 1 Thru 8 With The Additional Piles Required	Lump Sum	75%	25%	100%	26,501.00	26,501.00

	SCRIPTION	CONTRACT	QUANTITIES CURRENT	PREVIOUS	TOTAL	UNIT PRICE	TOTAL
	Furnish & Install 84" Discharge Pipe (Including Four 84" Dresser Couplings And Pipe Stiffner Rings) From ThePoints Of Termination Of The Base Contract To The Following Points: Pump No. 1 10'-1 3/16" North Of Inside Face Of Pump Housewall Pump No. 2 6'-3 1/4" North Of Inside Face Of Pump Housewall Pump No. 3 6'-3 1/4" North Of Inside Face Of Pump Housewall Pump No. 4 6'-10" North Of Inside Face Of Pump Housewall	Lump Sum				362,884.00	
24.	Clam Shell Fill To Elevation 23.5	Lump Sum	20%	75%	95%	41,488.00	39,413.60
25.	Extend Height Of Pump Sump	Lump Sum	0%	100%	100%	3,760.00	3,760.00
26.	Provide Saddle Expansion Seats	Lump Sum	100%	0%	100%	39,234.00	39,234.00
7	Add Weighted Operator For 8" Butterfly Valves	Lump Sum				11,818.00	
8.	Relocate Electrical Junction Box	Lump Sum	0%	100%	100%	1,156.00	1,156.00
).	Extended Field Overhead	Lump Sum	25%	50%	75%	72,000.00	54,000.00
).	Provide Concrete Plug Between The New 48" Discharge Line And The Abandoned 60" Discharge Line	Lump Sum	100%	0%	100%	3,517.00	3,517.00
.	Progress Photographs	Lump Sum	25%	75%	100%	612.00	612.00
.	Treated Class "B" Timber Piles Up To 10' Longer Or Shorter Than Design Length	10.00/LF	0 LF	1,415 LF	1,415 LF	10.00/LF	14,150.00
.	Remove Sluice Gate Stem And Operator	Lump Sum	0%	100%	100%	3,318.00	3,318.00
	Perform Extra Test Pile ork Per Atlas' Letter ated 12/27/84	Lump Sum	0%	100%	100%	17,633.00	17,633.00

JOB NO. 8133 PAGE 4 PERIOD ENDING 03/22/8

	...RIPTION	CONTRACT	QUANTITIES CURRENT	PREVIOUS	TOTAL	UNIT PRICE	TOTAL
	CUTTING OUT 60" LINE AND CHIPPING AWAY WALL TO ALIGN 48" PIPE	LUMP SUM	0%	100%	100%	13,340.00	13,340.00
36.	FURNISH AND INSTALL CONCRETE PLUG FOR FOUR EXISTING 96" DISCHARGE TUBES	LUMP SUM	0%	100%	100%	5,707.00	5,707.00
37.	SANDBLASTING SHEET PILE WALL 32-1 AND COATING WITH MADEWELL 1103 EPOXY AND ADD CONCRETE CAP	LUMP SUM	75%	0%	75%	5,609.00	4,206.75
38.	FIT NEW 48" DISCHARGE LINE TO BOARD FURNISHED 48" BUTTERFLY VALVE AND MISCELLANEUOS IRON WORK	LUMP SUM	100%	0%	100%	9,505.00	9,505.00

RECAPITULATION

Value of Construction Completed to Date	$ 1,325,804.59
Material Inventory	63,086.00
Total Value Completed	1,388,890.59
LESS: 5% Retainage	69,444.53
Total Amount Due	1,319,446.06
LESS: Previous Payments	1,150,418.61
Total This Estimate	169,027.45

Henry B. Shepard
Atlas Construction Co., Inc.

APPROVED FOR PAYMENT:

BURK AND ASSOCIATES, INC.
Engineers

By: [signature]

Date: 3/26/85

Geoffrey Nordgren
Resident Project Representative
BURK AND ASSOCIATES, INC.

9 APRIL '85
CORRECT: J Howell

APPROVED: [signature]
for GEN'L. SUPT. 4/9/85

DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

APPENDIX D

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS FOR SLUICE GATE MONOLITHS

PUMPING STATION #6

HYDRAULIC CALCULATIONS

FOR SLUICE GATE MONOLITHS

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.00	Sheet No. 2 of 8
Made By: DANIEL D. MARSALONE	Date: JUNE 5, 1995	PUMPING STATION #6	
Checked By: mike Duryea	Date: NOV 1 1995		

HEAD LOSSES DUE TO ADDITION OF SLUICE GATE STRUCTURE

• SUMMARY OF HEAD LOSS

TUBE HEIGHT UNCHANGED	TUBE HEIGHT INCREASED	Δ height
1914 Loss = 0.049'	1914 Loss = 0.027'	1.29'
1928 Loss = 0.078'	1928 Loss = 0.046'	1.56'
1967/86 Loss = 0.023'	1967/86 Loss = 0.017'	1.48'

• ASSUMPTIONS

1) TUBE LENGTH EXTENDS ALONG ENTIRE SLUICE GATE APPENDAGE LENGTH (15'). NOTE: TUBE ONLY EXTENDS 4'-2" AFTER WHICH THERE IS NO TOP, ie OPEN CHANNEL FLOW. THE 15' ASSUMPTION TREATS THIS "SUBMERGED OPEN CHANNEL" AS IF IT WERE A CONTINUATION OF THE FIRST 4'-2".

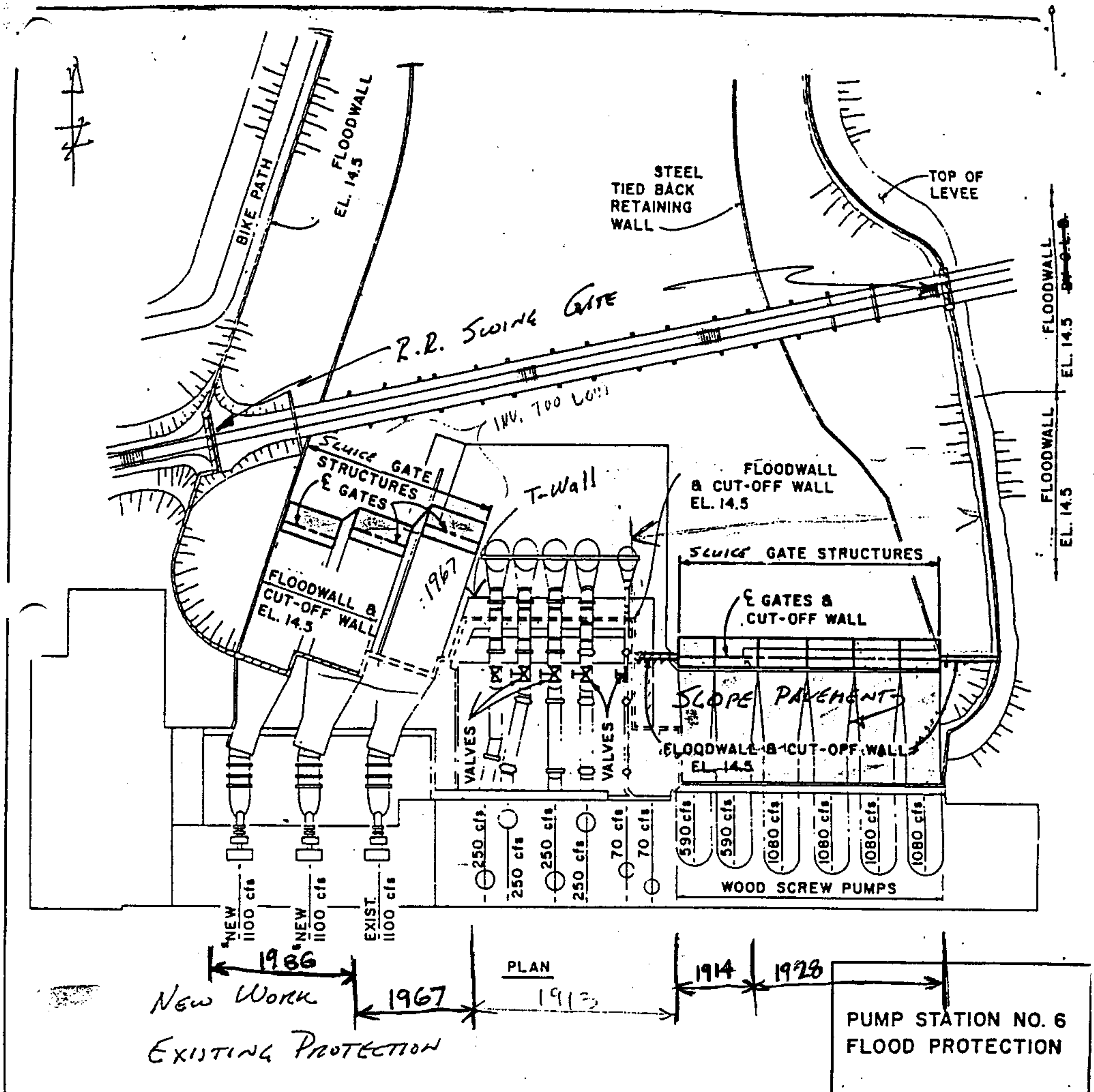
2) STEADY FLOW (Q = CONSTANT)

3) FLOW IS UNIFORM, TURBULENT, AND INCOMPRESSIBLE

4) ϵ = .004 AND "f" IS THE SAME FOR ALL TUBES.

5) PUMP OUTPUT (CFS) DOESN'T CHANGE DUE TO THE INCREASED HEAD.

NOTE: THE ABOVE LOSSES WERE DETERMINED USING THE DARCY - WEISBACH FORMULA. RESULTS OBTAINED USING MANNING'S EQUATION, AS A CHECK, YIELDED SIMILAR RESULTS.



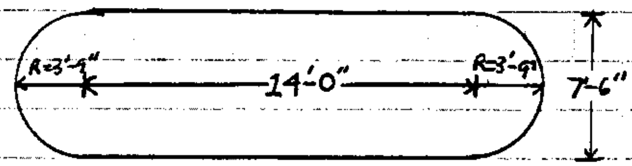
PUMP STATION NO. 6
FLOOD PROTECTION

PLAN SHOWING LOCATIONS OF PUMPS

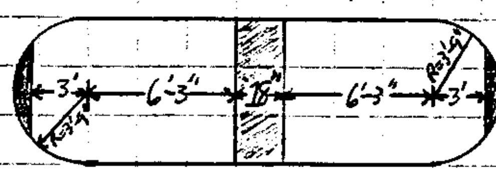
CONTRACTION LOSSES

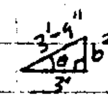
• 1928 HORIZONTAL PUMPS

EXISTING END SECTION



PROPOSED END SECTION





$\theta = 36.87$

$90 - \theta = 53.13$

$b = 2.25$

$AREA = (14')(7.5') + \pi(3.75')^2$

$A = 149.18\ ft^2$

$Q = 1080\ cfs$

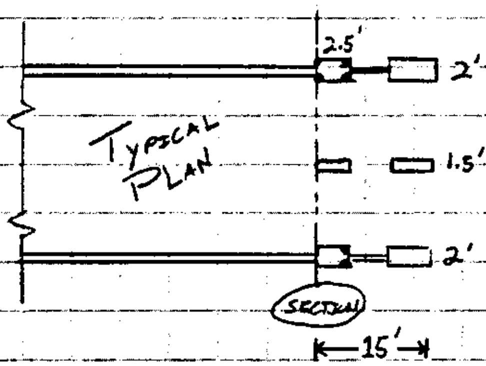
$V = Q/A = 7.24\ ft/s$

$AREA = 2\left[6.25(7.5) + \pi(3.75)^2 \frac{106.26^\circ}{360^\circ} + (3')(2.25')\right]$

$A = 133.33\ ft^2$

$Q = 1080\ cfs$

$V = Q/A = 8.10\ ft/s$



$$h^*_{CONTRACTION} = \left(\frac{1}{C_c} - 1\right)^2 \frac{V_2^2}{2g}$$

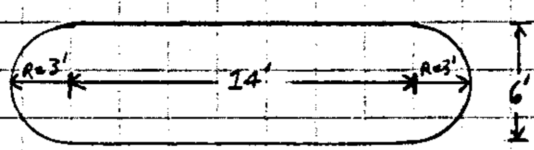
$\frac{A_1}{A_0} = \frac{133.33\ ft^2}{149.18\ ft^2} = 0.894 \therefore C_c = 0.887$

$V_2 = 8.10\ ft/s$ & $g = 32.2\ ft/s^2$

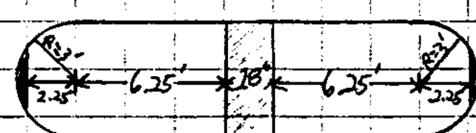
$\therefore$ $h_c = 0.017$ feet 1928 Tubes

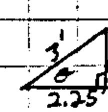
• 1914 HORIZONTAL PUMPS

EXISTING END SECTION



PROPOSED END SECTION





$\theta = 41.41$

$90^\circ - 41.41' = 48.59^\circ$

$b = 1.98$

$AREA = (14')(6') + \pi(3')^2$

$A = 112.27\ ft^2$

$Q = 590\ cfs$

$V = Q/A = 5.26\ ft/s$

$\frac{A_1}{A_0} = \frac{99.17\ ft^2}{112.27\ ft^2} = 0.883$

$AREA = 2\left[(6')(6.25') + \left(\frac{97.18^\circ}{360^\circ}\right)\pi 3^2 + 2.25(1.98)\right]$

$A = 99.17\ ft^2$

$Q = 590\ cfs$

$V = Q/A = 5.95\ ft/s$

$C_c = 0.879$, $V_2 = 5.95\ ft/s \therefore h^*_c = 0.010$ feet 1914 TUBES

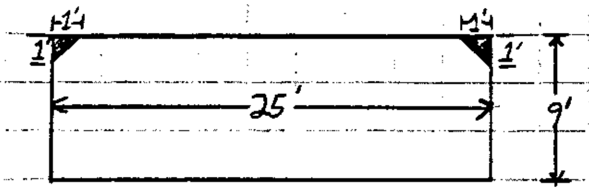
URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00		Sheet No. 4 of 8	
Made By: Daniel D. Marsalone	Date: June 5, 1995	PS #6	
Checked By: Mike Duryea	Date: Nov 1 1995		

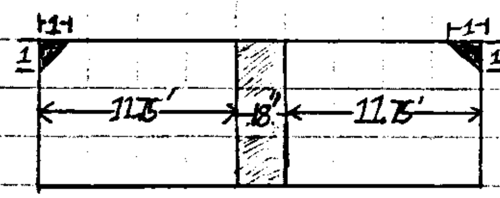
CONTRACTION LOSSES

- 1967/86 HORIZONTAL PUMPS

EXISTING END SECTION



PROPOSED END SECTION



AREA = $25'(9') - 2(1')(1')\frac{1}{2}$

$A = 224\ ft^2$

$Q = 1100$ CFS

$V = Q/A = 4.91\ ft/s$

AREA = $224 - 1.5(9')$

$A = 210.5\ ft^2$

$Q = 1100$ CFS

$V = Q/A = 5.23\ ft/s$

$$\frac{A_1}{A_0} = \frac{210.5}{224} = 0.94 \qquad h_c^* = \left(\frac{1}{C_c} - 1\right)^2 \frac{V_2^2}{2g}$$

$\therefore C_c = 0.935,\ V_2 = 5.23\ ft/s \ \therefore \ h_c^* = 0.002$ feet 1967/86 TUBES

URS — URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 | Sheet No. 5 of 8

P.S. #6

Made By: DANIEL D. MARSALONE — Date: JUNE 5, 1995
Checked By: Mike Duryea — Date: NOV 1 1995

SLUICE GATE MONOLITH
FRICTION LOSSES

$$h^*_{friction} = \lambda \frac{LV^2}{R_h(2g)}$$

where: $R_h = A/P$, $\lambda = f/4$

$f = 0.017$ (from Graph)

1914 TUBE MONOLITH

$V = 5.95$ ft/s

$L = 15'$ (Assume Tube Extends to End of Structure)

$A = 49.585 \text{ ft}^2$ (2@)

$P = 2(6.25) + \frac{97.18°}{360°}\pi 6 + 2(1.98) + 6$

$P = 27.548$ (2@)

$\therefore$

$h^*_f = 2\left(\frac{.017}{4} \; \frac{15'(5.95)^2}{1.80(64.4)}\right)$

$h_f = 0.0389$ feet

1928 TUBE MONOLITH

$V = 8.10$ ft/s

$L = 15'$

$A = 66.665 \text{ ft}^2$ (2@)

$P = 6.25 + \frac{106.26°}{360°}\pi(7.5) + 4.5 + 6.25 + 7.5$

$P = 31.455'$ (2@)

$\therefore$

$h^*_f = 2\left(\frac{.017}{4} \; \frac{15'(8.10)^2}{2.12(64.4)}\right)$

$h_f = 0.0613$ feet

1967/86 TUBE MONOLITH

$V = 5.23$ ft/s

$L = 15'$

$A = 105.25 \text{ ft}^2$ (2@)

$P = 9 + 11.75 + 8 + 1.414 + 10.75$

$P = 40.914'$

$\therefore$

$h^*_f = 2\left(\frac{0.12}{4} \; \frac{15(5.23)^2}{2.57(64.4)}\right)$

$h_f = 0.0211$ feet

* From FLUID MECHANICS by Streeter and Wylie, 1979. Equ. 5.8.7 "Darcy-Weisbach". see attachment

TOTAL LOSSES DUE TO SLUICE GATE MONOLITH
TUBE HEIGHT UNCHANGED

- 1914 Tube Loss $= h_c + h_f = 0.010' + 0.0389' = 0.049'$
- 1928 Tube Loss $= h_c + h_f = 0.017' + 0.0613' = 0.078'$
- 1967/86 Tube Loss $= h_c + h_f = 0.002' + 0.0211' = 0.023'$

Made By: DANIEL D. MARSALONE | Date: JUNE 5, 1995
Checked By: Mike Duryea | Date:

DETERMINATION OF NEW TUBE HEIGHT TO ACCOMODATE SLUICE GATES AND KEEP FRICTIONAL LOSSES OF TUBE ADDITION EQUIVALENT TO LOSSES IN THE EXISTING DISCHARGE TUBES. ie HYDRAULIC GRADIENT REMAINS CONSTANT.

ASSUMPTIONS
1) FLOW IS STEADY, UNIFORM, TURBULENT, AND INCOMPRESSIBLE.
2) CROSS-SECTION IS CONSTANT
3) ASSUME λ IS CONSTANT

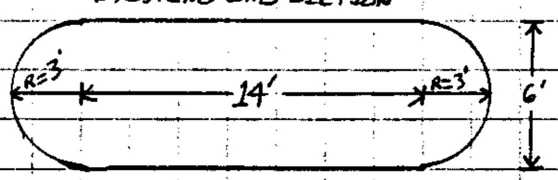
$$S^* = \frac{h_f}{L} = \left(\frac{\lambda}{R_h}\right)\left(\frac{V^2}{2g}\right)$$

: LOSSES PER UNIT WEIGHT PER LENGTH OF CHANNEL.

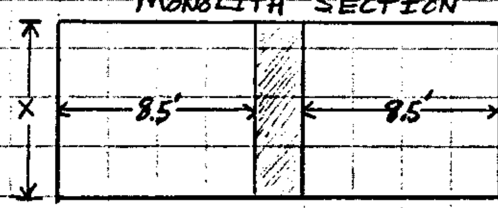
R_h = Hydraulic Radius = $\frac{A_w}{P_w}$

• 1914 DISCHARGE TUBES

EXISTING END SECTION



MONOLITH SECTION



$Q_0 = 590$ cfs
$Area_0 = 112.27 ft^2$
$Perimeter_0 = 46.85$ ft
$R_{h_0} = A/P = 2.396$ feet
$Velocity_0 = Q_0/A_0 = 5.26$ ft/s

Q_1 (one side) $= 590/2 = 295$ cfs
$Area_1 = 8.5'x$
$Perimeter_1 = 2x + 17'$
$R_{h_1} = A/P_1 = (8.5'x)/(2x+17')$
$Velocity_1 = Q_1/A_1 = 295/8.5x$

$$S_0 = S_1$$

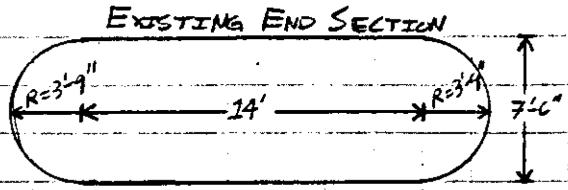
$$\frac{\lambda}{2.396}\,\frac{(5.26)^2}{2g} = \frac{\lambda}{\left(\frac{8.5x}{2x+17}\right)}\,\frac{\left(\frac{295}{8.5x}\right)^2}{2g}$$

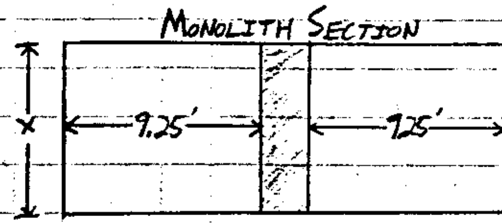
$$X = 7.29 \text{ feet}$$

∴ NEW TUBE DIMENSIONS ARE 8.5' x 7.29' **1914 TUBES**

PS #6

- 1928 DISCHARGE TUBES





$Q_0 = 1080$ cfs

$AREA_0 = 149.18$ ft^2

$Perimeter_0 = 51.56$ feet

$Rh_0 = A_0/P_0 = 2.89$ feet

$Velocity_0 = 7.24$ ft/s

Q_1 (one side) $= \frac{1080}{2} = 540$ cfs

$AREA_1 = 9.25' x$

$Perimeter_1 = 18.5' + 2x$

$Rh_1 = A_1/P_1 = (9.25' x) / (18.5' + 2x)$

$Velocity_1 = 540/9.25x$

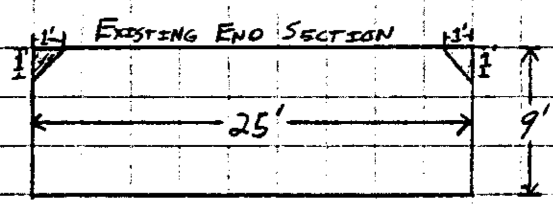
$$S_0 = S_1$$

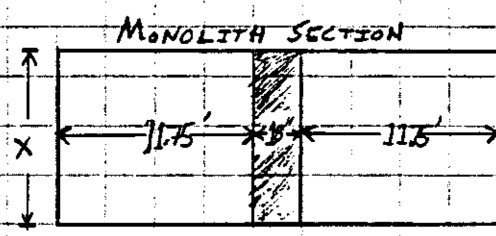
$$\frac{\lambda}{2.89}\,\frac{(7.24)^2}{2g} = \frac{\lambda}{\left(\frac{9.25x}{18.5+2x}\right)}\,\frac{\left(\frac{540}{9.25x}\right)^2}{2g}$$

$$x = 9.06'$$

∴ NEW TUBE DIMENSIONS ARE 9.25' x 9.06' — 1928 TUBES

- 1967/86 DISCHARGE TUBES





$Q_0 = 1100$ CFS

$Area_0 = 224$ ft^2

$Perimeter_0 = 66.83$ feet

$Rh_0 = A_0/P_0 = 3.35$ feet

$Velocity_0 = 4.91$ ft/s

Q_1 (ONE SIDE) $= \frac{1100}{2} = 550$ cfs

$AREA_1 = 11.75' x$

$Perimeter_1 = 23.5' + 2x$

$Rh_1 = (11.75x) / (23.5 + 2x)$

$Velocity_1 = 550/11.75x$

$$S_0 = S_1$$

$$\frac{\lambda}{3.35}\,\frac{(4.91)^2}{2g} = \frac{\lambda}{\left(\frac{9.25x}{18.5+2x}\right)}\,\frac{\left(\frac{550}{11.75x}\right)^2}{2g}$$

$$x = 10.48'$$

∴ NEW TUBE DIMENSIONS ARE 11.75' x 10.48' — 1967/86

HEAD LOSSES DUE TO MONOLITH
DISCHARGE TUBE HEIGHTENED

- FRICTION LOSS

$$h^*_{friction} = \lambda \frac{LV^2}{R_h 2g}$$

$\lambda = f/4$ $f = 0.017$ (FROM Graph*) L = Length
$R_h = A/P$ $g = 32.2$ ft/s² V = Velocity

1914 MONOLITH	1928 MONOLITH	1967/86 MONOLITH
$V = 4.76$ ft/s	$V = 6.44$ ft/s	$V = 4.47$ ft/s
$L = 15'$	$L = 15'$	$L = 15'$
$R_h = 1.96'$	$R_h = 2.29'$	$R_h = 2.77'$
$h^*_f = \left(\frac{.017}{4} \frac{15(4.76)^2}{1.96(64.4)}\right)(2)$ ↑ sections per tube	$h^*_f = \left(\frac{.017}{4} \frac{15(6.44)^2}{2.29(64.4)}\right)(2)$ ↑ sections per tube	$h^*_f = \left(\frac{.017}{4} \frac{15(4.47)^2}{2.77(64.4)}\right)(2)$ ↑ section per tu
$h_f = 0.0229'$	$h_f = 0.0359'$	$h_f = 0.0143'$

ENTRANCE/EXPANSION LOSSES

$$h^*_e = \frac{(V_o - V_1)^2}{2g}$$

V_o = Velocity IN Discharge TUBE
V_1 = Velocity IN Monolith
$g = 32.2$ ft/s²

1914 MONOLITH	1928 MONOLITH	1967/86 MONOLITH
$V_o = 5.26$ ft/s	$V_o = 7.24$ ft/s	$V_o = 4.91$ ft/s
$V_1 = 4.76$ ft/s	$V_1 = 6.44$ ft/s	$V_1 = 4.47$ ft/s
∴	∴	∴
$h^*_e = 0.0039'$	$h^*_e = 0.0099'$	$h^*_e = 0.0030'$

TOTAL LOSSES ($h_f + h_e$)

1914 MONOLITH LOSS = 0.027'
1928 MONOLITH LOSS = 0.046'
1967/86 MONOLITH LOSS = 0.017'

*FROM FLUID MECHANICS by Streeter & Wylie 1979
Eqv. 3.11.22 derivation of energy equation
See attachment

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No. Attachment
Made By: DDM	Date:	P.S. #6	
Checked By:	Date:		

ATTACHMENT:

FORMULAS USED IN HYDRAULIC

COMPUTATIONS FOR PUMPING STA. #6

SLUICE GATE MONOLITHS

from section 1 to the *vena contracta*† is small compared with the loss from section 0 to section 2, where velocity head is being reconverted into pressure head. By applying Eq. (3.11.22) to this expansion, the head loss is computed to be

$$h_c = \frac{(V_0 - V_2)^2}{2g}$$

With the continuity equation $V_0 C_c A_2 = V_2 A_2$, in which C_c is the contraction coefficient, i.e., the area of jet at section 0 divided by the area of section 2, the head loss is computed to be

$$h_c = \left(\frac{1}{C_c} - 1\right)^2 \frac{V_2^2}{2g} \qquad (5.10.21)$$

The contraction coefficient C_c for water, determined by Weisbach,‡ is presented in the tabulation.

A_2/A_1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
C_c	0.624	0.632	0.643	0.659	0.681	0.712	0.755	0.813	0.892	1.00

The head loss at the entrance to a pipeline from a reservoir is usually taken as $0.5V^2/2g$ if the opening is square-edged. For well-rounded entrances, the loss is between $0.01V^2/2g$ and $0.05V^2/2g$ and may usually be neglected. For re-entrant openings, as with the pipe extending into the reservoir beyond the wall, the loss is taken as $1.0V^2/2g$ for thin pipe walls, Fig. 5.34.

The head loss due to gradual expansions (including pipe friction over the length of the expansion) has been investigated experimentally by Gibson,§ whose results are given in Fig. 5.35.

A summary of representative head loss coefficients K for typical fittings, published by the Crane Company,¶ is given in Table 5.3.

† The *vena contracta* is the section of greatest contraction of the jet.
‡ Julius Weisbach, "Die Experimental-Hydraulik," p. 133, Englehardt, Freiburg, 1855.
§ A. H. Gibson, The Conversion of Kinetic to Pressure Energy in the Flow of Water through Passages Having Divergent Boundaries, *Engineering*, vol. 93, p. 205, 1912.
¶ Crane Company, Flow of Fluids, *Tech. Pap.* 409, May 1942.

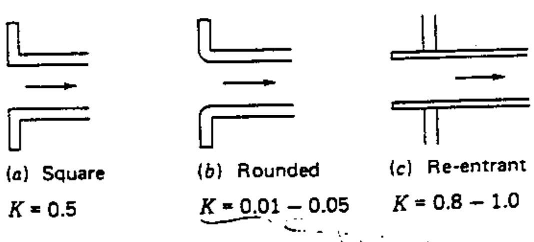


Figure 5.34 Head loss coefficient K, in number of velocity heads, $V^2/2g$, for a pipe entrance.

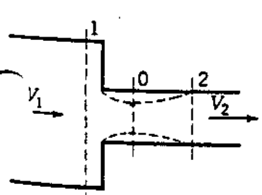


Figure 5.33 Sudden contraction in a pipeline.

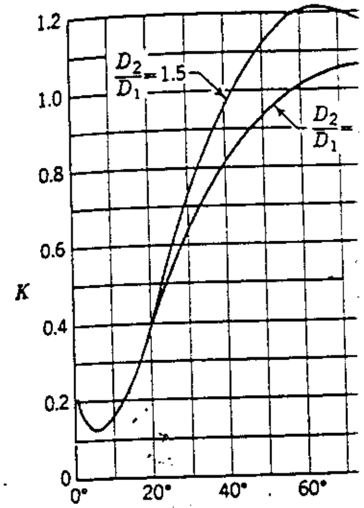


Figure 5.35 Loss coefficients for con

Minor losses may be exp
that has the same head loss in
for the same discharge; thus

in which K may refer to or
Solving for L_e gives

Table 5.3 Head-loss coeffici
for various fittings

Fitting
Globe valve (fully open)
Angle valve (fully open)
Swing check valve (fully open)
Gate valve (fully open)
Close return bend
Standard tee
Standard elbow
Medium sweep elbow
Long sweep elbow

After solving for V,

$$V = \sqrt{\frac{2g}{\lambda}}\sqrt{RS} = C\sqrt{RS} \tag{5.8.6}$$

The *coefficient* λ, or coefficient C, must be found by experiment. This is the Chézy formula, in which originally the Chézy coefficient C was thought to be a constant for any size conduit or wall-surface condition. Various formulas for C are now generally used.

For pipes, when $\lambda = f/4$ and $R = D/4$, the Darcy-Weisbach equation is obtained:

$$h_f = f\,\frac{L}{D}\frac{V^2}{2g} \tag{5.8.7}$$

in which D is the pipe inside diameter. This equation may be applied to open channels in the form

$$V = \sqrt{\frac{8g}{f}}\sqrt{RS} \tag{5.8.8}$$

with values of f determined from pipe experiments.

EXERCISES

5.8.1 The hydraulic radius is given by (*a*) wetted perimeter divided by area; (*b*) area divided by square of wetted perimeter; (*c*) square root of area; (*d*) area divided by wetted perimeter; (*e*) none of these answers.

5.8.2 The hydraulic radius of a 60-mm-wide by 120-mm-deep open channel is, in millimeters, (*a*) 20; (*b*) 24; (*c*) 40; (*d*) 60; (*e*) none of these answers.

5.9 STEADY UNIFORM FLOW IN OPEN CHANNELS

For incompressible, steady flow at constant depth in a prismatic open channel, the *Manning* formula is widely used. It can be obtained from the Chézy formula [Eq. (5.8.6)] by setting

$$C = \frac{C_m}{n}R^{1/6} \tag{5.9.1}$$

so that

$$V = \frac{C_m}{n}R^{2/3}S^{1/2} \tag{5.9.2}$$

which is the Manning formula.

The value of C_m is 1.49 and 1.0 for U.S. customary and SI units, respectively; V is the average velocity at a cross section; R is the hydraulic radius (Sec. 5.8); and S is the losses per unit weight per unit length of channel or the slope of the bottom

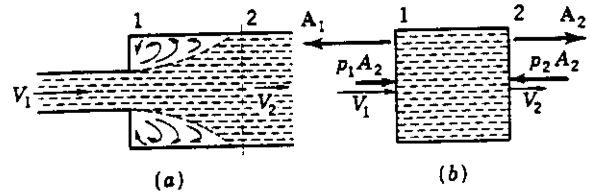


Figure 3.38 Sudden expansion in a pipe.

the section. The energy equation (3.10.1) applied to sections 1 and 2, with the loss term h_l, is (for $\alpha = 1$)

$$\frac{V_1^2}{2g} + \frac{p_1}{\gamma} = \frac{V_2^2}{2g} + \frac{p_2}{\gamma} + h_l$$

Solving for $(p_1 - p_2)/\gamma$ in each equation and equating the results give

$$\frac{V_2^2 - V_2 V_1}{g} = \frac{V_2^2 - V_1^2}{2g} + h_l$$

As $V_1 A_1 = V_2 A_2$,

$$h_l = \frac{(V_1 - V_2)^2}{2g} = \frac{V_1^2}{2g}\left(1 - \frac{A_1}{A_2}\right)^2 \tag{3.11.22}$$

which indicates that the losses in turbulent flow are proportional to the square of the velocity.

Hydraulic Jump

The hydraulic jump is the second application of the basic equations to determine losses due to a turbulent flow situation. Under proper conditions a rapidly flowing stream of liquid in an open channel suddenly changes to a slowly flowing stream with a larger cross-sectional area and a sudden rise in elevation of liquid surface. This phenomenon, known as the *hydraulic jump*, is an example of steady nonuniform flow. In effect, the rapidly flowing liquid jet expands (Fig. 3.39) and converts kinetic energy into potential energy and losses or irreversibilities. A roller develops on the inclined surface of the expanding liquid jet and draws air into the liquid. The surface of the jump is very rough and turbulent, the losses being greater as the jump height is greater. For small heights, the form of the jump changes to a standing wave (Fig. 3.40). The jump is discussed further in Sec. 11.4.

The relations between the variables for the hydraulic jump in a horizontal rectangular channel are easily obtained by use of the continuity, momentum, and

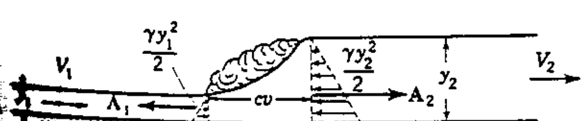


Figure 3.39 Hydraulic jump in a rectangular channel.

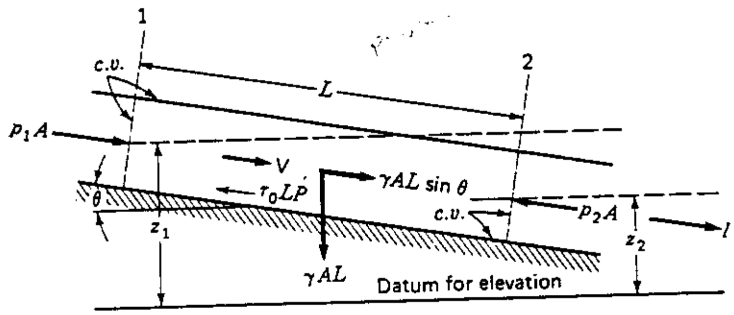


Figure 5.26 Axial forces on control volume in a conduit.

We may write the energy equation (3.10.1) to relate losses to available energy reduction

$$\frac{p_1}{\gamma} + \frac{V_1^2}{2g} + z_1 = \frac{p_2}{\gamma} + \frac{V_2^2}{2g} + z_2 + \text{losses}_{1-2}$$

Since the velocity head $V^2/2g$ is the same,

$$\text{Losses}_{1-2} = \frac{p_1 - p_2}{\gamma} + z_1 - z_2 \qquad (5.8.2)$$

Owing to the uniform assumption, the linear-momentum equation (3.11.2) applied in the l direction yields

$$\Sigma F_l = 0 = (p_1 - p_2)A + \gamma AL \sin\theta - \tau_0 LP$$

in which P is the *wetted perimeter* of the conduit, i.e., the portion of the perimeter where the wall is in contact with the fluid (free-liquid surface excluded). Since $L \sin\theta = z_1 - z_2$,

$$\frac{p_1 - p_2}{\gamma} + z_1 - z_2 = \frac{\tau_0 LP}{\gamma A} \qquad (5.8.3)$$

From Eqs. (5.8.2) and (5.8.3), using Eq. (5.8.1)

$$\text{Losses}_{1-2} = \frac{\tau_0 LP}{\gamma A} = \lambda \frac{\rho}{2} V^2 \frac{LP}{\gamma A} = \lambda \frac{L}{R}\frac{V^2}{2g} \qquad (5.8.4)$$

in which $R = A/P$ has been substituted. R, called the *hydraulic radius* of the conduit, is most useful in dealing with open channels. For a pipe $R = D/4$.

The loss term in Eq. (5.8.4) is in units of meter-newtons per newton or foot-pounds per pound. It is given the name h_f, *head loss due to friction*. By defining S as the losses per unit weight per unit length of channel,

$$S = \frac{h_f}{L} = \frac{\lambda}{R}\frac{V^2}{2g} \qquad (5.8.5)$$

After solving for V,

The *coefficient* λ, or coefficien
formula, in which originally
for any size conduit or wall
generally used.

For pipes, when $\lambda = f$
obtained:

in which D is the pipe insi
channels in the form

with values of f determined

EXERCISES

5.8.1 The hydraulic radius is giver
of wetted perimeter; (*c*) square r
answers.

5.8.2 The hydraulic radius of a
(*a*) 20; (*b*) 24; (*c*) 40; (*d*) 60; (*e*) n

5.9 STEADY UNIFOR

For incompressible, steady
Manning formula is wide
[Eq. (5.8.6)] by setting

so that

which is the Manning for
The value of C_m is 1.4
V is the average velocity a
S is the losses per unit wei

HYDRAULIC CALCULATIONS FOR BUTTERFLY VALVES

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 1 of 4
Made By: Daniel D. Marsalone	Date: October 27, 1995	P.S. #6	
Checked By: Mike Duryea	Date: Nov 1, 1995		

BUTTERFLY VALVES

- UTILIZE STANDARD ORIFICE EQUATION

$$Q = C_d A_o \sqrt{2gh}$$

WHERE:

Q = FLOW IN CFS

h = DIFFERENTIAL HEAD

A_o = AREA OF OPENING

g = 32.2 ft/s^2 (ACCELERATION FROM GRAVITY)

C_d = 0.62 (SEE ATTACHMENT A)

A_o = GATE AREA − CENTER POST AREA

$$A_o = \left[(48'')(48'') - (3'')(48'')\right] \frac{1 ft^2}{144 in^2}$$

$$= 15 ft^2$$

$$A_o/2 = 7.5 ft^2$$

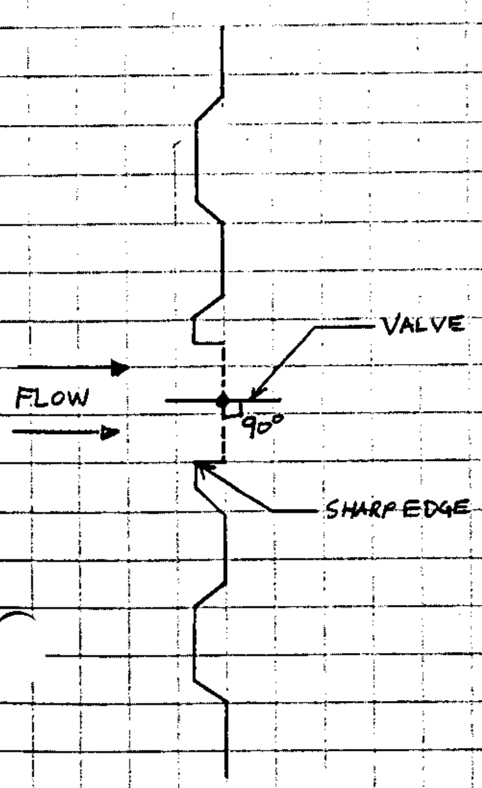


FIGURE 1
PLAN (EAST PUMPS)

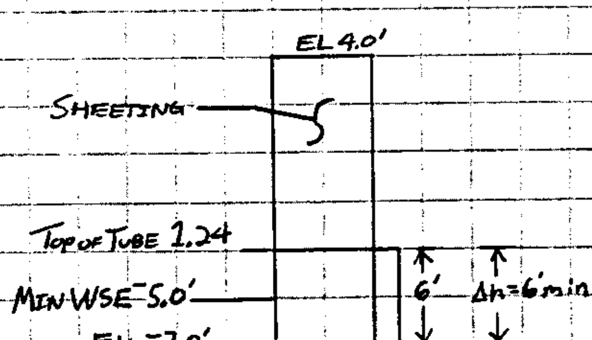
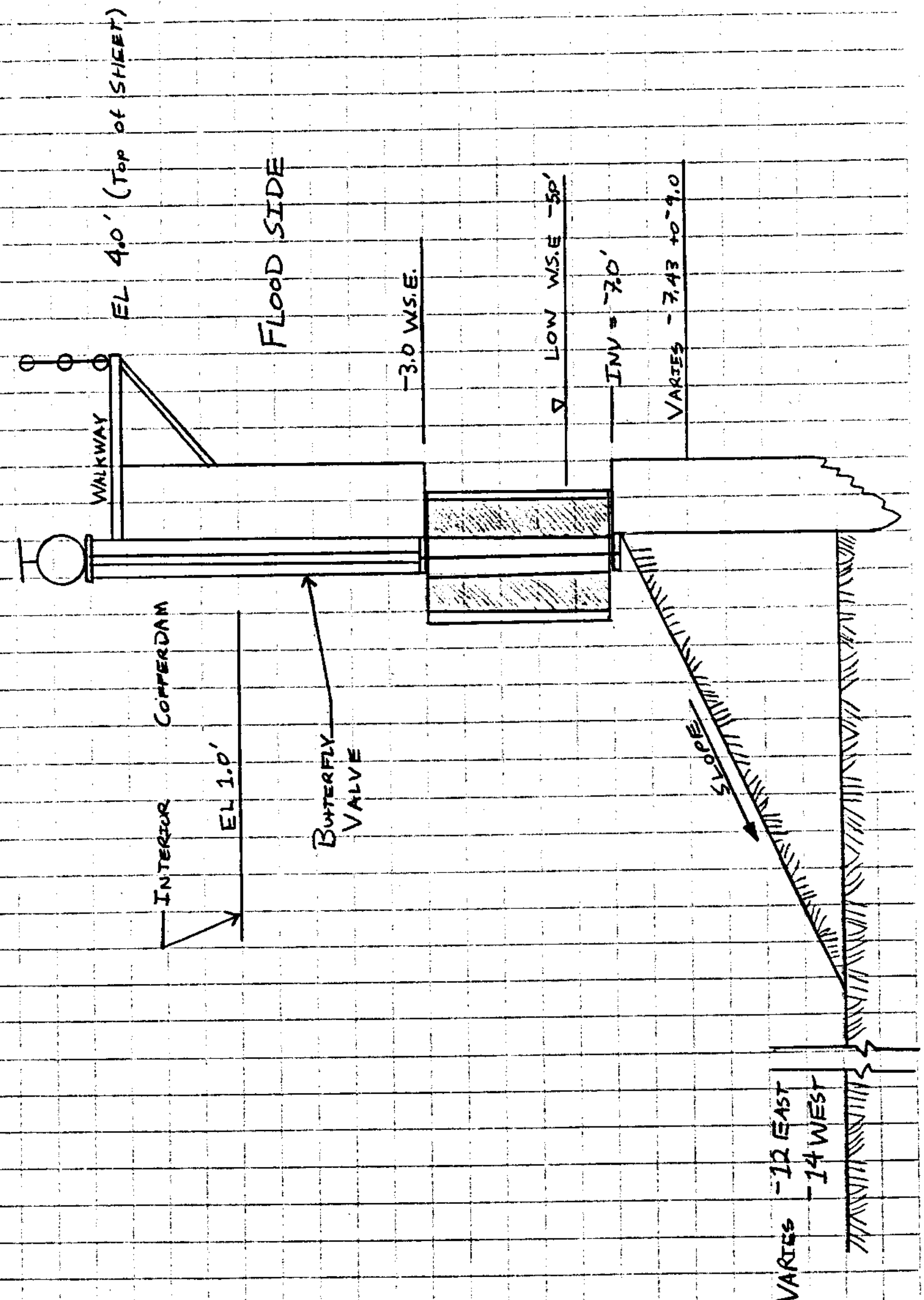


FIGURE 2 ELEVATION
(EAST PUMPS)

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 2 of 4
Made By: DANIEL D. MARSALONE	Date: OCTOBER 27, 1995	P.S. #6	
Checked By:	Date:		



FOR MINIMUM W.S.E.

$\Delta h = 2'$; EL $^-7.0'$ TO $^-5.0'$

$Q = (.62)(7.5)\sqrt{64.4(2)} = 52.77$ CFS

ASSUMING A 30 SECOND OPEN TIME FOR VALVES AND 2 MINUTE MAX FILL TIME, EACH VALVE WILL ALLOW 6332 ft^3 INTO COFFERDAM.

TOTAL VOLUME REQ'D AT EAST PUMPS

$\Delta EL = {}^-12$ TO $^-5 = 7'$

AREA OF COFFER DAM = $38' \times 140' = 5320\ ft^2$

USE A 20% SAFETY FACTOR.

$VOLUME_{EAST} = (7')(5320\ ft^2)$

$= 37240\ ft^3$

OF VALVES REQ'D = $\frac{37240\ ft^3}{6332}(1.20) = 7.05$ VALVES

7 VALVES REQ'D ←

+ 2.5 MINUTES MORE FOR PUMPS TO PRIME

PUMP 590 CFS TO FLOOD REMAINDER OF COFFER DAM.

$\Delta EL = {}^-5'$ to $4' = 9'$

VOLUME = $(9')(5320\ ft^2) = 47880\ ft^3$

TIME = $\frac{47880\ ft^3}{590\ ft^3/s} = 81.15$ seconds OR Approx. 1.5 min

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 4 of 4
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Checked By: Mike Duryea	Date: Nov 1, 1995		

+ 5 more minutes to prime all pumps.

Total time to have all east pumps pumping

2.5 min – open valves and flood to EL -5
2.5 min – prime 1st pump
1.5 min – pump flood to EL 4.0'
25 min – prime 5 other pumps, 5 min each
31.5 minutes OK ✓

* If we delete the priming pool since low lake waters will exist even without construction.

$$\text{Time for Total Volume} = \frac{37240\ ft^3 + 47880\ ft^3}{7\ \text{valves}\ (52.77\ cfs/valve)} \cdot \frac{1m}{60s}$$
$$= 3.84\ \text{minutes}$$

~~3.84~~ min – flood coffer dam   use 2 min if 4' head
∴ 2 min
30 min – prime 6 pumps @ 5 minutes each
32 minutes OK

- Checking west side

$$\text{Volume} = \left[\left(\frac{41'+48'}{2} + \frac{50'+40'}{2} + 40\right)(31')\right] 13'$$
$$= 52189\ ft^3$$
$$\text{Time} = \frac{52189'}{3(159)} \cdot \frac{1\ min}{60s} = 1.83\ min \approx 2\ min$$

Total

2 min – flood dam
15 min – prime 3 pumps @ 5 minutes ea.
17 minutes

DRAIN LINE
(EAST MONOLITH)

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By:	Date:	Job No.	Sheet No.
Checked By:	Date:		

DRAIN LINE
(EAST MONOLITH)

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 1
Made By: [signature]	Date: 10/31/95		
Checked By: Daniel D. Marsalone	Date: November 1, 1995		

CALCULATION TO SIZE
DRAIN LINE.

RATIONAL METHOD.

$Q = CIA$

ASSUME $C = \underline{1.0}$ FOR AREA AT
CONC. TUBES

$A = 160 \times 60 / 43,560 = .22$ ACRES

$i = 9''/hr$ For 10 year Storm
For $t_c = \underline{<1 \text{ min}}$

$Q = 1.0(9.0)(.22) = 1.98$ Say 2 CFS

$A = \pi r^2 = 2$

$r = \sqrt{2/\pi} = .8$ FT or 1.6' DIAM
Say 24" DIAM.

check Inlet size.

24"x36" grate.

$2 \times 3 = 6\ FT^2 \times .75$ (FACTOR) $\times 4''/12$ (head)
$\underline{= 1.50 \text{ CFS}}$
Try 3 x 3 grate

$9 \times .75 \times 4/12 = 2.25 \text{ CFS} > 2$ OK ✓

DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

APPENDIX E

STRUCTURAL CALCULATIONS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No.
Made By: SPC	Date: 11/6/95	P.S. No. 6	
Checked By:	Date:		

INDEX

DESCRIPTION	SHEET NUMBER
COFFERDAM DESIGN	1 - 11
LOAD CASES FOR WEST SLUICE GATE MONOLITH	12 - 14
WEST MONOLITH DEAD LOADS	15 - 21
WEST MONOLITH WATER LOADS	22 - 24
WEST MONOLITH LOADING DIAGRAMS	25 - 29
WEST MONOLITH ADDITIONAL LOADS	30 - 31
WEST MONOLITH SUMMARY SHEET OF LOADINGS	32
PILE CAPACITY	33
PILE CURVES	34
CPGA INPUT	35
CPGA OUTPUT	36
LOAD CASES FOR EAST SLUICE GATE MONOLITH	37 - 39
EAST MONOLITH DEAD LOADS	40 - 52
EAST MONOLITH WATER LOADS	53 - 84

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No.
Made By: SPC	Date: 11/6/95	P.S. No. 6	
Checked By:	Date:		

INDEX

DESCRIPTION	SHEET NUMBER
EAST MONOLITH LOADING DIAGRAMS	85 - 93
LOADINGS FOR SLAB EXTENSIONS	94 - 100
TOTAL LOADINGS FOR EAST MONOLITH AND SLAB EXTENSIONS	101 - 105
CPGA INPUT	106
CPGA OUTPUT	107

COFFERDAM DESIGN

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 1
Made By: SPC	Date: 11/3/95	P.S. No. 6	
Checked By:	Date:		

COFFERDAM DESIGN

COFFERDAM DESIGN (TEMPORARY COFFERDAM)

EAST COFFERDAM: (NEW TEMPORARY WALL)

WATER EL.	MUDLINE EL.	MAX. BENDING MOM.	TIP (E.S. -1.3) EL.
* 4	-12	141,349 ft.Lbs	-56

* SEE EUSTIS ENGR. "CANTILEVER WALL ANALYSIS" OUTPUT

USING A COMBINED WALL: PIPE $\phi = 36''$ $t_w = 1/2''$
GRADE 252 GR.3, $F_Y = 45$ KSI
SHEET AZ 18 (ARBED)
GRADE A 328 $F_Y = 39$ KSI

$I^{x-x}_{COMBINED} = 1345 \text{ in}^4/\text{ft}$
$S^{xx}_{COMBINED} = 74.77 \text{ in}^3/\text{ft}$
(SEE ATTACHED TABLES & CALC. SHT 4)

$F_b = .5 F_y + 17\% = .585 F_y = 26.32$ Ksi

$M_{Allow} = \frac{S_{xx} \times F_b}{12} = \frac{74.77 \times 26.32}{12} = 164,026$ ft.lbs > 141,349 ft.lb O.K

CHECK DEFLECTION: FROM EUSTIS ANALYSIS

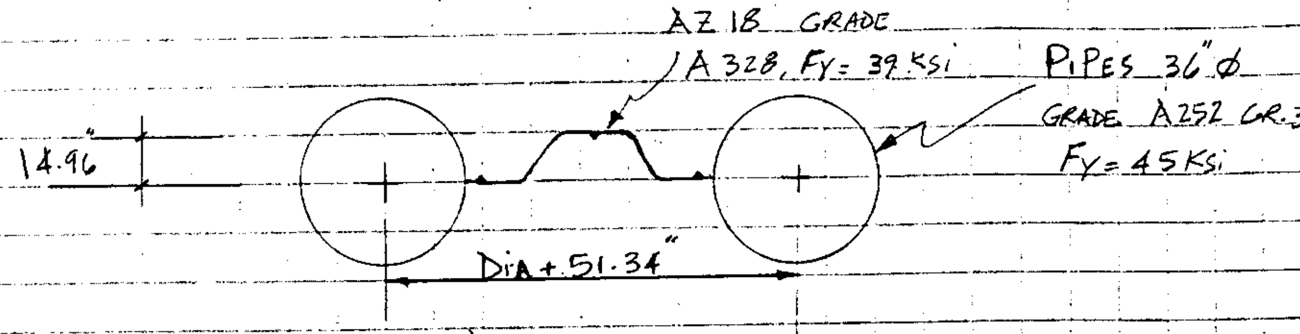
SCALED DEFLECTION (MAX) = 1.6494×10^{11}

$\Delta = \frac{1.6494 \times 10^{11}}{29,000,000 \times 1345} = 4.22''$ O.K.

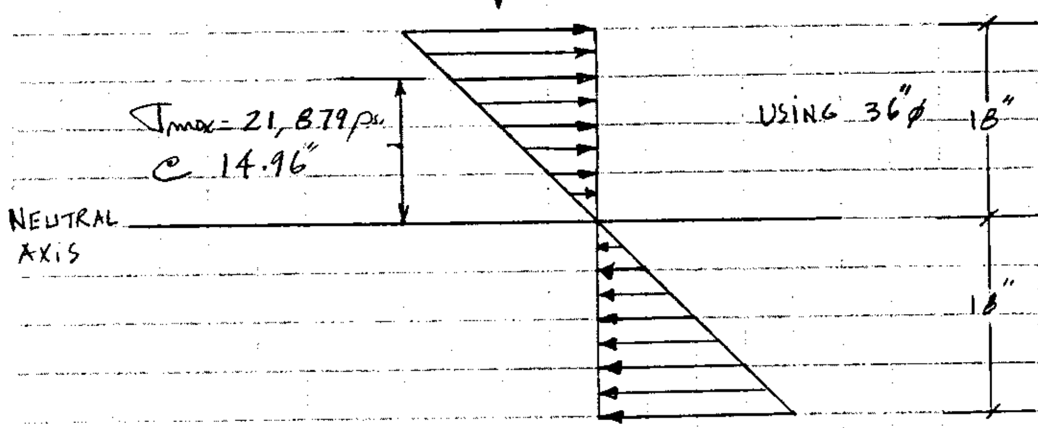
SEE DETAIL OF COMBINED WALL

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: LAK	Date: 10/27/95	Job No. 46229.00	Sheet No. 3
Checked By: MFL	Date: 11/6/95	P.S. #6	



$\sigma_{ALLOW} = 0.585\,(45000) = 26{,}325$ Psi



* WHEN SYSTEM IS LOADED TO MAX ALLOWABLE STRESS OF 26,325 PSI,

MAX STRESS IN AZ 18 = 21,879 Psi ✓

σ_{ALLOW} FOR AZ 18 = 0.585 (39 000)

= 22,815 Psi ✓

$\sigma_{max} < \sigma_{ALLOW}$ **O.K.**

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No. 4
Made By: LAK	Date: 10/30/95	P.S. #6	
Checked By: MFL	Date: 11/6/95		

WEST COFFERDAM: (NEW TEMPORARY WALL)

WATER EL.	MUDLINE EL.	MAX. BENDING MOM. ft-Lbs	TIP (F.S.=1.3) EL.
* 4	-14	224,056	-64

* SEE EUSTIS ENGR. "CANTL WALL ANALYSIS" OUTPUT.

USING A COMBINED WALL: PIPE $\phi = 48''$ $t_w = \frac{1}{2}''$
GRADE 252 GR. 3, $F_Y = 45$ Ksi

SHEET AZ 18 (ARBED)
GRADE A 328, $F_Y = 39$ KSI

I_{xx} COMBINED = 2,661 in^4/ft
S_{xx} COMBINED = 110.89 in^3/ft.
} SEE ATTACHED TABLES

$F_b = 0.5 F_y + 17\% = 0.585 F_y = 26.32$ KSi

$M_{allow} = \frac{S_x \times F_b}{12} = \frac{110.89 \times 26.32}{12} = 243,218$ ft-Lb $> 224,056$ O.K.

CHECK DEFLECTION: FROM EUSTIS ANALYSIS

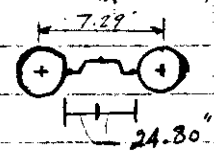
SCALED DEFLECTION (MAX) = 3.468×10^{11}

$\Delta = \frac{3.468 \times 10^{11}}{29{,}000{,}000 \times 2{,}661} = 4.49''$ O.K.

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. X6229.00	Sheet No. 5
Made By: LAK	Date: 10/31/95	P. S. # 6	
Checked By: MFL	Date: 11/6/95		

PROPERTIES OF COMBINED WALLS : (36"Ø PIPE + AZ18 SHT.)

36"Ø PIPE t = 0.5" $I_{xx} = 8786.2\ in^4$



2 AZ-18 (INTERMEDIATE)

$\frac{250\ in^4}{ft} \times 2\left(\frac{24.80}{12}\right)$ $I_{xx} = 1033.3\ in^4$

$I_{COMBINED\ WALL} = \frac{I_{pipe} + I_{AZ}}{L} = \frac{8786.2 + 1033.3}{7.297} = 1345.7\ in^4/ft$

L = SYSTEM WIDTH

P.S. = I OF interlock WELDED TO PIPE WAS NEGLECTED in ABOVE ANALYSIS

$S_{xx} = \frac{I_{WALL}}{\phi_{pipe}/2} = \frac{1345.7}{18"} = 74.7\ in^3/ft$

ABOVE CALCULATIONS ARE BASED ON THE FACT THAT THE THRUST OF THE WATER (SOIL) IS TAKEN UP BY THE PIPES AND THE INTEMEDIARY AZ in FUNCTION OF THEIR MOMENT OF INERTIA

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: LAK	Date: 10/31/95	Job No.	Sheet No. 6
Checked By: MFL	Date: 11/6/95	P.S. # 6	

EXISTING STEEL SHEETING (BULKHEAD) | CZ-114 shown in AS-builts

WEST MONOLITH (RETAINING WALL)

WEST ANCHORED BULKHEAD (~~PZ~~22, 47' & HP 12X53 ANCHOR PILE)

USING EUSTIS ENGR OUTPUT $M_{max} = 36{,}758$ ft. Lbs

$F_b^* = .585\ F_y = .585\ (39) = 22.82$ KSi $* F_b = .5 F_y + 17\% = .585 F_y$

$M_{ALL} = \frac{S_x \times F_b}{12} = \frac{18.1 \times 22.82}{12} = 34.41$ ft. K ⇒ ANALYSIS FROM EUSTIS ENGR. SHOWS THE WALL IS O.K FROM GEOTECH. STRUCTURELY, CONTRACTOR WILL HAVE TO PUT 5' TO 6' OF BACKFILL AFTER THE COFFERDAM IS DEWATERE[D]

MAX DEFL. $= \frac{5.888 \times 10^9}{29{,}000{,}000 \times 154.7} = 1.31''$ O.K

Allowable Stresses are sim. For CZ-114. AS Section Modu[lus]

EAST ANCHORED BULKHEAD (PZ 22, 39' & HP 12X53 ANCHOR PILE)

AT EAST MONOLITH (RETAINING WALL)

USING EUSTIS ENGR OUTPUT $M_{max} = 28{,}066$ ft Lbs

$F_b = .50\ (F_y) = .50\ (39) = 19.5$ KSi

$M_{ALLOW} = \frac{S \times F_b}{12} = \frac{18.1 \times 19.50}{12} = 29.41$ K.ft > 28.06 O.K

MAX DEFL. $= \frac{4.17 \times 10^9}{29{,}000{,}000 \times 154.7} = 0.93''$ O.K

WEST SIDE OF EAST COFF (DETAIL "B") (PZ 32, 48')

USING EUSTIS ENGR OUT PUT $M_{max} = 17{,}975$ ft#

$F_b = .50\ (39) = 19.5$ KSi

$M_{ALLOW} = \frac{19.50 \times 38.3}{12} = 62.24 > 17.97$ O.K

$\Delta_{max} = 1.14''$ O.K

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 22900	Sheet No. 7
Made By: LAK	Date: 10/31/95	PS # 6	
Checked By: MFL	Date: 11/6/95		

NEW I-WALL ON WEST SIDE OF EAST MONOLITH

USING EUSTIS ENGR OUTPUT $M_{max} = 26,068$ ft-lb

$F_b = .50 F_y = .5(39) = 19.5$ ksi

USING PZ 22 $S_x = 18.1 \text{ in}^3$

$M_{ALLOW} = \frac{18.1 \times 19.5}{12} = 29.41 > 26.068$ O.K

$DEFL = \frac{8.755 \times 10^9}{29,000,000 \times 154.7} = 1.95''$ O.K.

MAX DEFL @ EL 14.0 USE PZ 22, 50'-0"

NEW I-WALL ON EAST SIDE OF EAST MONOLITH (DET. A.)

USING EUSTIS ENGR OUTPUT $M_{max} = 18.865$ ft-k

$M_{ALLOW} = \frac{18.1 \times 19.5}{12} = 29.41 > 18.65$

$DEFL = \frac{4.575 \times 10^9}{29,000,000 \times 154.7} = 1.02''$ O.K.

USE PZ 22, 40'-0"

EAST WALL

```
*****************************************************************
   Physical caracteristics of Pipe - C 5 - AZ 18 walls (ASTM A252-88)
*****************************************************************
*                                            D/t =  72.00
* DATA
*
*   1. Diameter :          36.00   <inches>    (    914.40 mm   )
*   2. Pipe thickness :     0.500  <inches>    (     12.70 mm   )
*
* RESULTS
*
*   Cross section :        85.143  <in2>       (    549.31 cm2  )
*   Inertia moment :     1345.831  <in4/ft>    ( 183784.17 cm4/m)
*   Section modulus :      74.768  <in3/ft>    (   4019.78 cm3/m)
*   Weight :               40.602  <lbs/ft2>   (    198.23 kg/m2)
*
*   System width :          7.297  <feet>      (   2224.27 mm   )
*   Coating area :         10.516  <ft2/ft>    ( 320204.23 cm2/m)
*  Bend. cap. (Gr2) :     145.383  <ft*kips/ft> (   646.92 kNm/m)
*  Bend. cap. (Gr3) :     186.921  <ft*kips/ft> (   831.75 kNm/m)
*  Bend. cap. (Gr55) :    228.459  <ft*kips/ft> (  1016.58 kNm/m)
*
*****************************************************************
*  Exit <0> - New DATA <1> or <2> :
*****************************************************************
```

COMBINED PIPE+AZ

```
*****************************************************************
         Physical caracteristics of Pipe Piles (ASTM A252-88)
*****************************************************************
*                                            D/t =  72.00
* DATA
*
*   1. Diameter :          36.00   <inches>    (    914.40 mm   )
*   2. Pipe thickness :     0.500  <inches>    (     12.70 mm   )
*
* RESULTS
*
*   Cross section :        55.763  <inches2>   (    359.76 cm2  )
*   Inertia moment :     8786.200  <inches4>   ( 365706.73 cm4  )
*   Section modulus :     488.122  <inches3>   (   7998.85 cm3  )
*   Weight per foot :     189.570  <lbs/ft>    (   282.112 kg/m )
*
*   Radius of giration :   12.552  <inches>    (    318.83 mm   )
*   Coating area :          9.425  <ft2/ft>    (  28726.67 cm2/m)
*   Inside area :         962.113  <inches2>   (   6207.17 cm2  )
*   Inside volume :         6.681  <ft3/ft>    (    620.72 dm3/m)
*
*
*****************************************************************
*  Exit <0> - New DATA <1> or <2> :
*****************************************************************
```

WEST WALL

Physical caracteristics of Pipe - C 5 - AZ 18 walls (ASTM A252-88)

D/t = 96.00

DATA

1. Diameter :	48.00	<inches>	(1219.20 mm)
2. Pipe thickness :	0.500	<inches>	(12.70 mm)

RESULTS

Cross section :	103.993	<in2>	(670.92 cm2)
Inertia moment :	2661.100	<in4/ft>	(363394.96 cm4/m)
Section modulus :	110.879	<in3/ft>	(5961.21 cm3/m)
Weight :	43.431	<lbs/ft2>	(212.05 kg/m2)
System width :	8.297	<feet>	(2529.07 mm)
Coating area :	12.087	<ft2/ft>	(368031.83 cm2/m)
Bend. cap. (Gr2) :	215.598	<ft*kips/ft>	(959.36 kNm/m)
Bend. cap. (Gr3) :	277.198	<ft*kips/ft>	(1233.46 kNm/m)
Bend. cap. (Gr55) :	338.797	<ft*kips/ft>	(1507.56 kNm/m)

COMBINED PIPE+AZ

Exit <0> - New DATA <1> or <2> :

Physical caracteristics of Pipe Piles (ASTM A252-88)

D/t = 96.00

DATA

1. Diameter :	48.00	<inches>	(1219.20 mm)
2. Pipe thickness :	0.500	<inches>	(12.70 mm)

RESULTS

Cross section :	74.613	<inches2>	(481.37 cm2)
Inertia moment :	21045.480	<inches4>	(875972.95 cm4)
Section modulus :	876.895	<inches3>	(14369.66 cm3)
Weight per foot :	253.650	<lbs/ft>	(377.474 kg/m)
Radius of giration :	16.795	<inches>	(426.59 mm)
Coating area :	12.566	<ft2/ft>	(38302.23 cm2/m)
Inside area :	1734.945	<inches2>	(11193.17 cm2)
Inside volume :	12.048	<ft3/ft>	(1119.32 dm3/m)

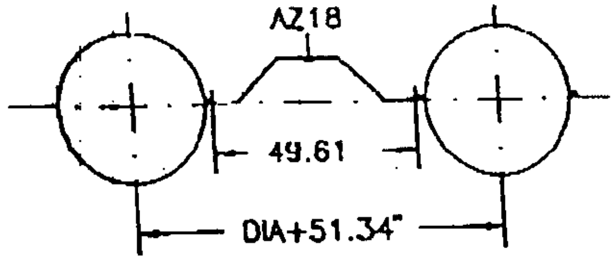
Exit <0> - New DATA <1> or <2> :

10/27/95

Denis Guimond.

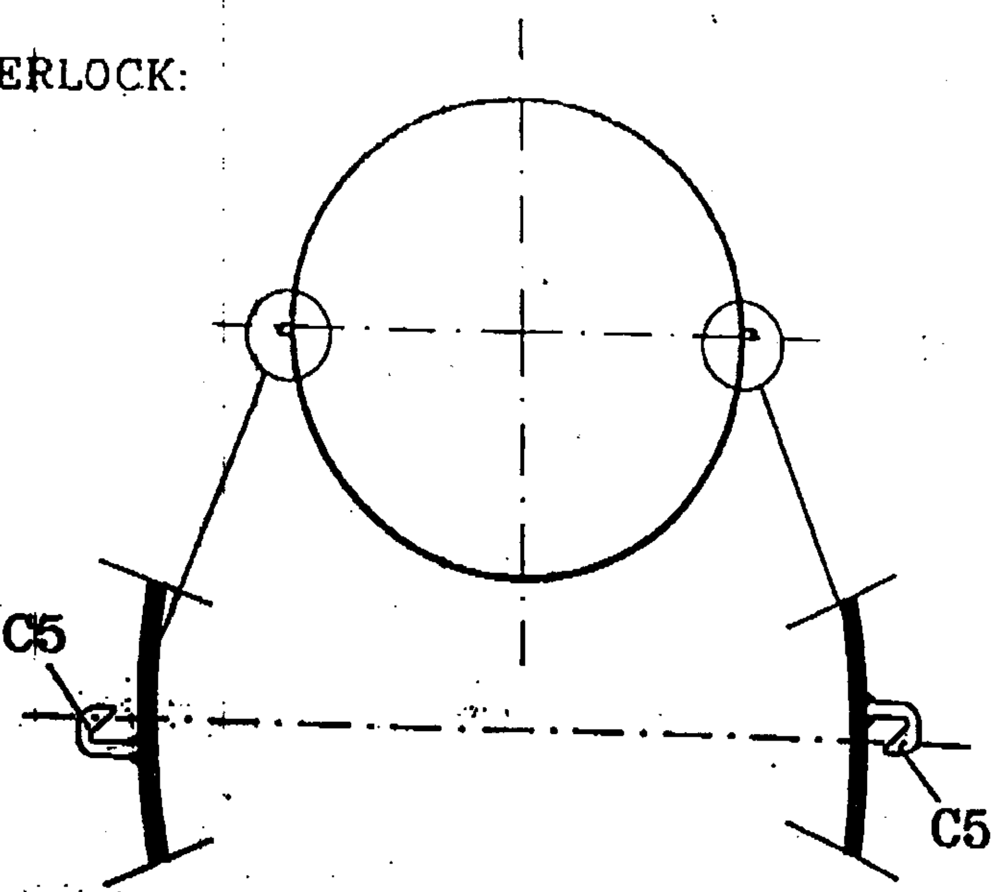
2 pages.

PROPERTIES OF COMBINED WALL



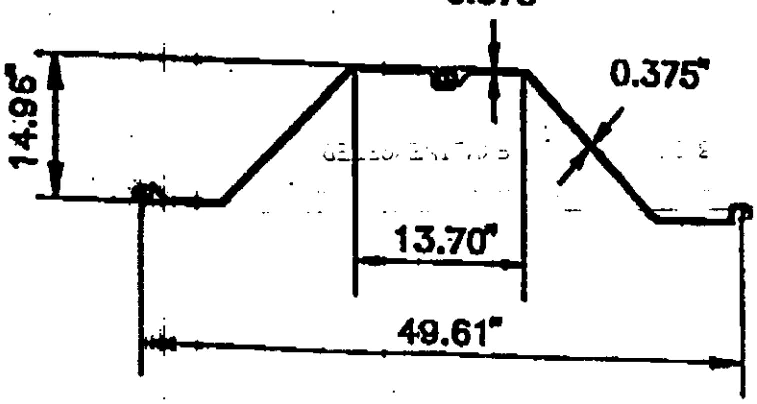
SECTION	PILE SPACING (C.T.C.) (IN)	PIPE THICKNESS (IN)	MOMENT OF INERTIA (IN4/FT)	SECTION MODULUS (IN3/FT)	WEIGHT (LB/FT2)	
					100% INTERM.SHEET	60% INTERM.SHEET
PA 36/18	87.34	0.37	1045.25	58.07	34.03	28.16
		0.41	1139.54	63.31	36.10	30.23
PA 38/18	89.34	0.39	1233.49	64.92	35.40	29.86
		0.43	1341.93	70.63	37.53	31.80
PA 40/18	91.34	0.41	1448.65	72.43	36.82	31.21
		0.45	1572.38	78.62	39.02	33.41
PA 42/18	93.34	0.43	1692.68	80.60	38.29	32.80
		0.47	1832.88	87.28	40.55	35.06
PA 44/18	95.34	0.45	1967.57	89.43	39.80	34.43
		0.49	2125.42	96.61	42.12	36.75
PA 46/18	97.34	0.47	2275.31	98.93	41.36	36.10
		0.51	2452.00	106.61	43.73	38.47
PA 48/18	99.34	0.49	2617.93	109.08	42.95	37.80
		0.53	2814.67	117.28	45.38	40.23
PA 50/18	101.34	0.51	2997.44	119.90	44.59	39.53
		0.55	3215.46	128.62	47.07	42.01
PA 52/18	103.34	0.53	3415.89	131.38	46.26	41.30
		0.57	3656.43	140.63	48.78	43.83
PA 54/18	105.34	0.55	3876.34	143.63	47.98	43.10
		0.59	4139.63	153.32	50.53	45.67
PA 56/18	107.34	0.57	4377.84	156.35	49.69	44.92
		0.61	4667.14	166.68	52.31	47.54
PA 58/18	109.34	0.59	4925.47	169.84	51.45	46.77
		0.63	5241.04	180.73	54.12	49.43
PA 60/18	111.34	0.61	5520.31	184.01	53.24	48.64
		0.65	5863.43	195.45	55.95	51.35
PA 62/18	113.34	0.63	6164.45	198.85	55.08	50.54
		0.67	6536.39	210.85	57.81	53.29

INTERLOCK:



C5:		WEIGHT (LB/FT)	3.36

AZ18:



SECTION	WIDTH (IN)	HEIGHT (IN)	CROSS SECTION (IN2)	MOMENT OF INERTIA (IN4)	SECTION MODULUS (IN3)	WEIGHT (LB/FT)
AZ 18	49.61	14.96	29.38	1035.00	138.6	100.00

Data contained in this document are liable to change and are given without obligation.

LOAD CASES FOR WEST SLUICE GATE MONOLITH

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 12
Made By: SPC	Date: 11/3/95	P.S. No. 6	
Checked By:	Date:		

LOAD CASES FOR

WEST SLUICE GATE MONOLITH

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 13
Made By: SCB	Date: 9/22/95	P.S. #6	
Checked By: MFL	Date: 11/2/95		

LOAD CASES

(ALL ELEVATIONS REFER TO N.G.V.D.)

West Sluice Gate Monolith

(WEST Monolith does not provide Flood Protection so WATER EL. IS The SAME ON Both SIDES)

1. Construction CASE

- Site dewatered
- Dead Loads
- Earth Pressure (Horizontal Force on 3' Base Slab)
- Storm Wind Ld. (50 psf on North Side)
- Construction Live Load (20 psf)

2. Still Water Level (SWL) Condition

- Water EL. 12.6'
- Water in Exist. Tube acting on Closed Sluice Gate
- Uplift Pressure
- Storm Wind Load (50 psf on North Side)
- Live Load on top of Monolith (60 psf)
- Dead Loads
- Earth Pressure (Horizontal Force on 3' Base Slab)

3. Normal Operating Condition

- Water EL. 2.0'
- Uplift Pressure
- Live Load on top of Monolith (60 psf)
- Dead Loads
- Earth Pressure (Horizontal Force on 3' Base Slab)

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 14
Made By: SCB	Date: 9/22/95	PS #6	
Checked By: MFL	Date: 11/2/95		

(WEST CONT.)

4. Maintenance Condition (Stop Logs in Place)

- Water EL. 2.0'
- Uplift Pressure
- Storm Wind Load (50psf on South Side)
- Live Load on top of Monolith (60 psf)
- Dead Loads
- Earth Pressure (Hor. Force on 3' Base Slab)
- Monolith Dewatered

5. 2' Above SWL Condition

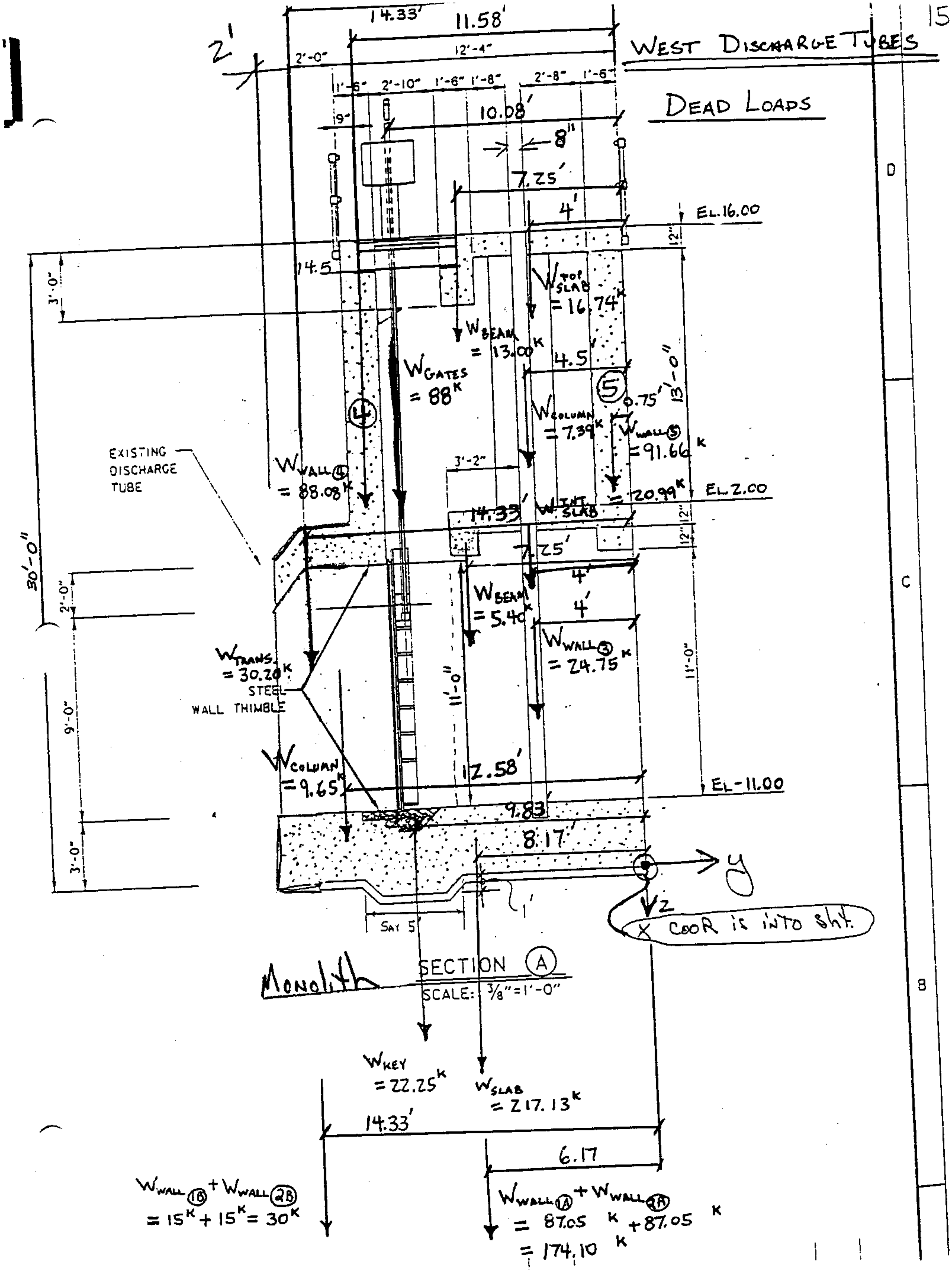
- Water EL. 14.6
- Water in Exist. Tube Acting on Closed Sluice Gate.
- Uplift Pressure
- Storm Wind Load (50psf on North Side)
- Live Load on top of Monolith (60psf)
- Dead Loads
- Earth Pressure (Horizontal Force on 3' Base Slab)

WEST Monoliths #1 & #2 have Identical Loadings
WEST Monolith #3 has the same loading as
Monolith #1 & #2 but it has additional Loadings
Due to Soil Pressure where the existing
Retaining Wall is being Removed (see sht 30-31)

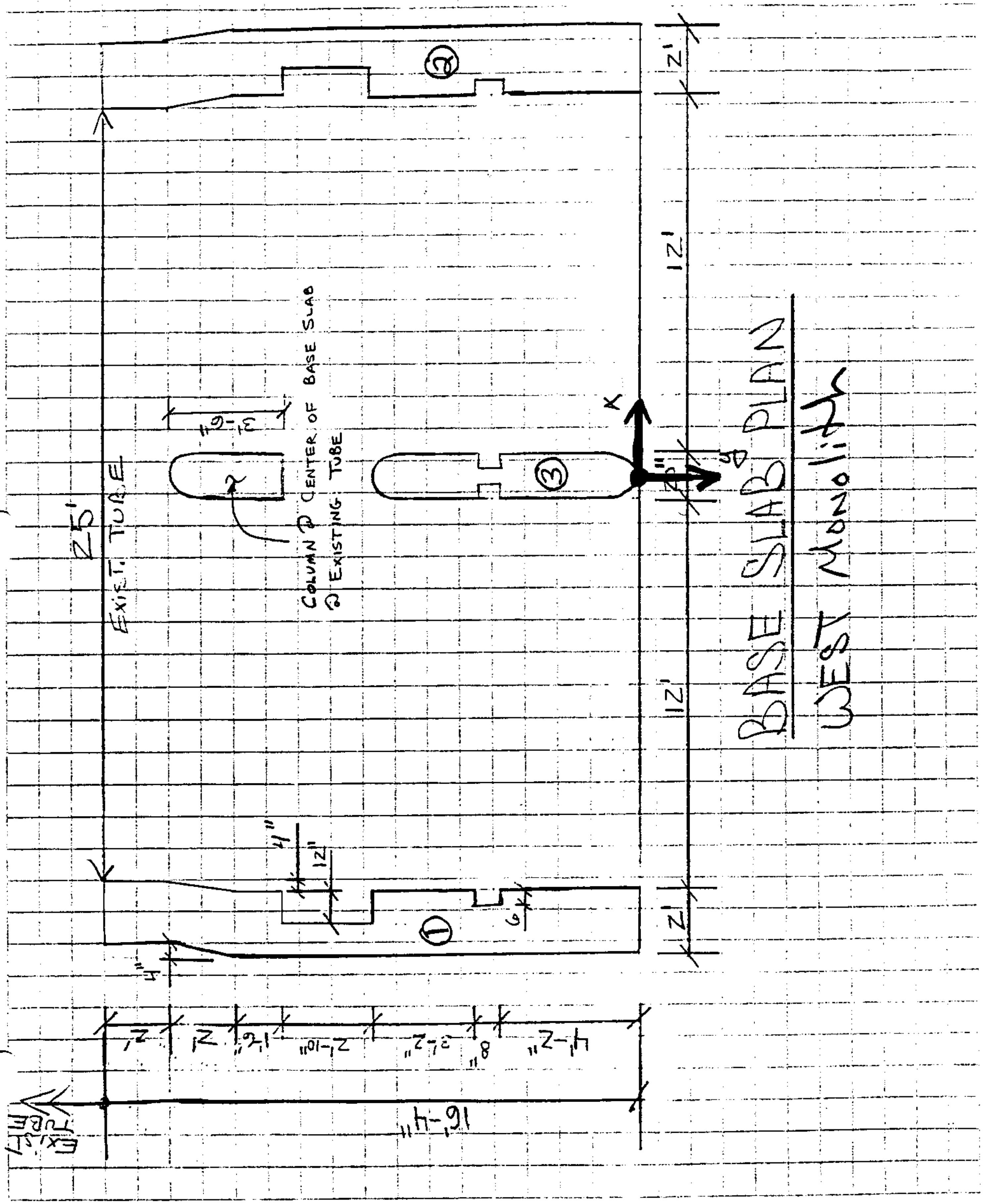
WEST MONOLITH DEAD LOADS

West Discharge Tubes

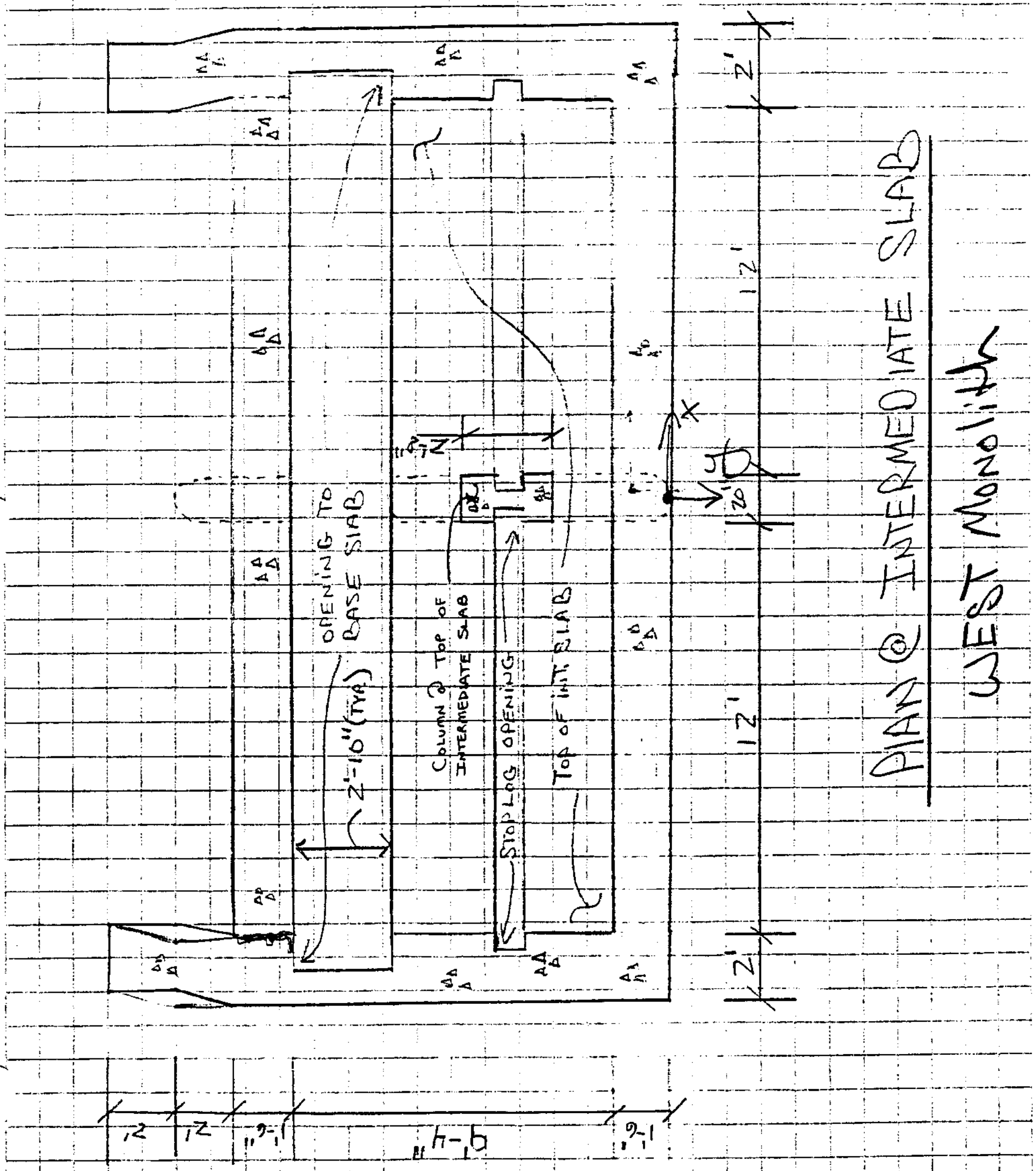
Dead Loads



URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 16
Made By: SCB	Date: 8/95	P.S No 6	
Checked By: MFL	Date: 11/2/95		



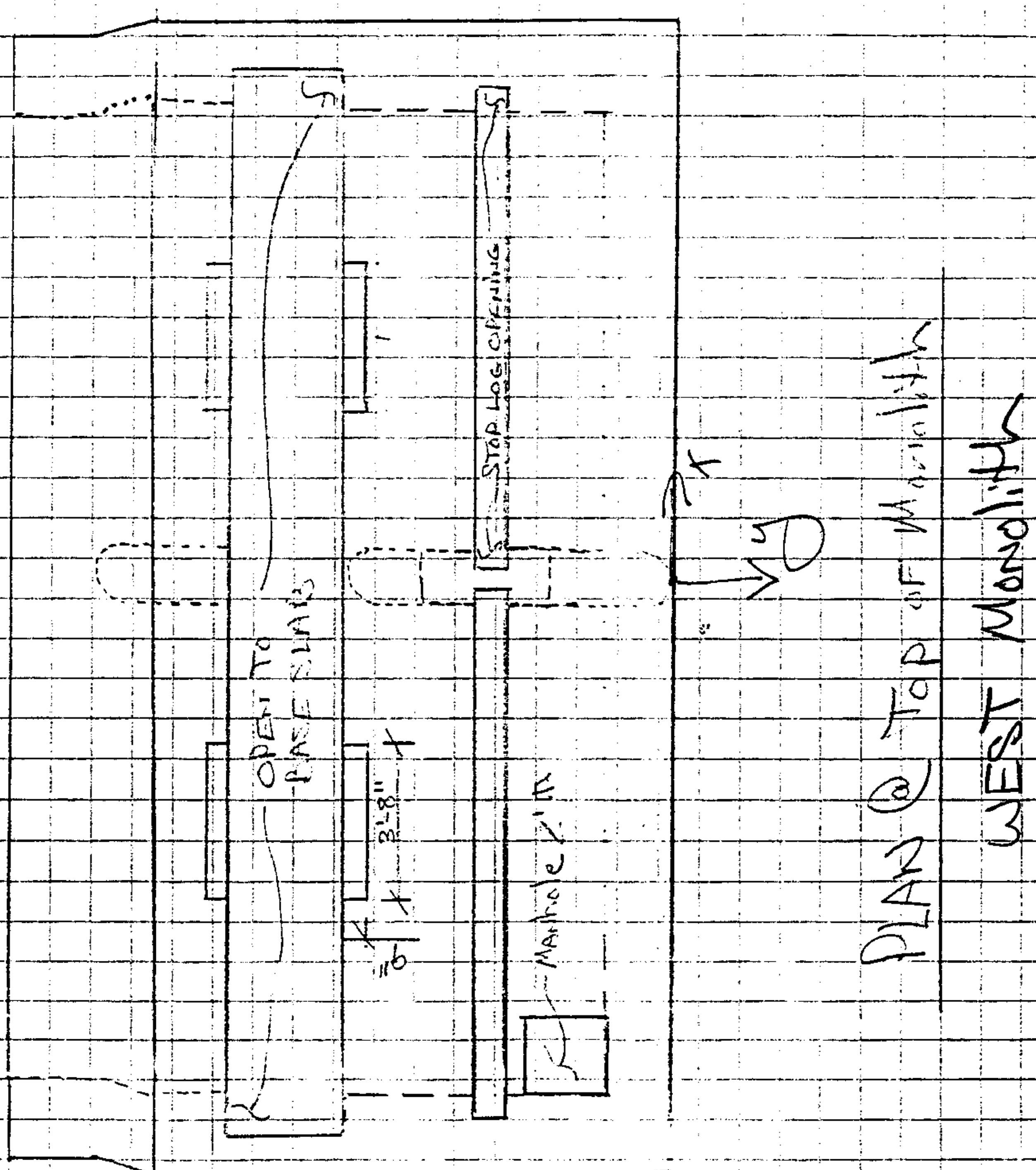
URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 17
Made By: SCB	Date: 8/95	P.S. #6	
Checked By: MFL	Date: 11/2/95		



URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: SCB	Date: 8/95	Job No. 46229.00	Sheet No. 18
Checked By: MFL	Date: 11/2/95	PS #6	



URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 19
Made By: SPC	Date: 8/22/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

West Discharge Tubes

Weights (Dead Load) (SEE Sht. 15 FOR DL Location)

✓ Base Slab = [(3')(12.33')(29.67') (Slab) + (1')(5')(29.67') (Key) + (3')(2')(29.34') + (3')(2')(29.00')] (0.150 K/FT³) = (1,595.88 FT³)(0.150 K/FT³) = 239.38 K

✓ * Wall ① = [(2')(12.33')(27.00') + (2')(2')(13') + (2')(2')(12') − (0.5')(0.67')(27.00') − (1')(2.83')(27.00')] (0.150 K/FT³) = 102.05 K : Wall ①A = 87.05 K, Wall ①B = 15.00 K

✓ * Wall ② = Wall ① = 102.05 K
Wall ②A = 87.05 K, Wall ②B = 15.00 K

✓ Wall ③ = [(1.67')(8')(13') − (2)(0.67')(0.5')(13')] (0.150 K/FT³) = (164.97 FT³)(0.150 K/FT³) = 24.75 K

✓ Wall ④ = [(1.5')(16')(25.67') − (0.75')(1.5')(25.67')] (0.150 K/FT³) = (587.20 FT³)(0.150 K/FT³) = 88.08 K

– Wall ⑤ = [(1.5')(16')(25.67' − 1.67') + (1.5')(14')(1.67')] (0.150 K/FT³) = (611.07 FT³)(0.150 K/FT³) = 91.66 K

✓ Intermediate Slab w/ Inner Beam =
= [(1')(6.5')(25.67' − 1.67') + (1')(1.5')(24') − (1')(0.67')(24')] (0.150 K/FT³)
= (175.92 FT³)(0.150 K/FT³) = 26.39 K

Column @ Top of Intermediate Slab and @ Center of Base Slab @ Existing Tube
= [(2.67')(1.67')(13') − (2)(0.5')(0.67')(13')] (0.150 K/FT³)
+ [(3.5')(1.67')(11')] (0.150 K/FT³)
= (49.26 FT³)(0.150 K/FT³) + (64.30 FT³)(0.150 K/FT³) = 17.03 K

Top Slab w/ Inner Beam
= [(1')(5')(25.67') + (3')(1.5')(25.67') − (1')(0.67')(25') − (0.75')(1.5')(25.67')] (0.150 K/FT³)
= (198.24 FT³)(0.150 K/FT³) = 29.74 K

* Seperate wall into portions A & B for ease of finding centroid. "A" represents taller portion of wall.

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 20
Made By: SPC	Date: 10/3/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

WEST DISCHARGE TUBES

WEIGHTS (DEAD LOAD) CON'T.

TRANSITION @ EXISTING DISCHARGE TUBE

$= [(2')(2')(25') + (2')(2')(25.33')](0.150^{K}/FT.^3)$

$= (201.32\ FT.^3)(0.150^{K}/FT.^3) = 30.20^{K}$

MOTORS, GEARS, SLUICE GATES, AND ACCESSORIES

$= (44^{K})(2)$

$= 88^{K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 21
Made By: SPC	Date: 10/4/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/12/95		

West Discharge Tubes

Forces Due To Dead Load

$$+\downarrow \Sigma P_z = 88.08^K + 88^K + 13^K + 16.74^K + 7.39^K + 91.66^K + 30.20^K + 5.40^K$$
$$+ 24.75^K + 9.65^K + 22.25^K + 217.13^K + 174.10^K + 20.99^K + 30^K$$
$$= 839.34^K$$

$$\circlearrowleft + \Sigma M_x = -[(11.58')(88.08^K) + (10.08')(88^K) + (7.25')(13^K) + (4')(16.74^K)$$
$$+ (4.5')(7.39^K) + (0.75')(91.66^K) + (14.33')(30.20^K) + (7.25')(5.40^K)$$
$$+ (4')(24.75^K) + (12.58')(9.65^K) + (9.83')(22.25^K) + (8.17')(217.13^K)$$
$$+ (6.17')(174.10^K) + (4')(20.99^K) + (14.33')(30^K)]$$
$$= -6{,}443.26^{'-K}$$

WEST MONOLITH WATER LOADS

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.01	Sheet No. 22
Made By: SPC	Date: 10/3/95	PUMPING STATION No. 6	
Checked By: MFL	Date: 11/2/95		

WEST DISCHARGE TUBES

WEIGHTS (WATER)

WATER TO EL. 12.60

WATER IN MONOLITH @ EL. 12.60

$= [(10.60')(9.33')(25.67') + (2)(0.5)(0.67')(23.6') + (10.60')(1')(2.83')(2)$
$- (2.67')(1.67')(10.60') + (2.83')(13')(27.67') + (1')(5')(24') + (11')(8')(24')$
$+ (3.5')(11')(23.67') + (10')(2')(25') + (2)(0.5')(0.67')(23.60')](0.064^{K}/FT.^3)$
$= (7244.34)(0.064^{K}/FT.^3)$
$= 463.34^{K}$

WATER OUTSIDE OF MONOLITH @ EL. 12.60

$= [(10.60')(2')(29.67') + (11.6')(2')(29.67')](0.064^{K}/FT.^3)$
$= (1,317.35\ FT.^3)(0.064^{K}/FT.^3)$
$= 84.31^{K}$

WATER TO EL. 14.60

WATER IN MONOLITH @ EL. 14.60

$= [(1.60')(5')(25.67') + (11')(6.5')(25.67') + (25.60')(2.83')(27.67')$
$+ (1')(5')(24') + (11')(8')(24') + (3.5')(11')(23.67') + (10')(2')(25')$
$+ (2)(0.5')(0.67')(25.60') - (2.67')(1.67')(12.60') + (2)(0.5')(0.67')(12.60')]$
$\times (0.064^{K}/FT.^3)$
$= (7,658.11\ FT.^3)(0.064^{K}/FT.^3)$
$= 490.12^{K}$

WATER OUTSIDE OF MONOLITH @ EL. 14.60

$= [(12.60')(2')(29.67') + (13.60')(2')(29.67')](0.064^{K}/FT.^3)$
$= (1,554.71\ FT.^3)(0.064^{K}/FT.^3)$
$= 99.50^{K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No.	Sheet No. 23
Made By: SCB	Date: 10/24/95	P.S. #6	
Checked By: MFL	Date: 11/2/95		

Centroid of Water inside Monolith

At EL 12.6'

(SEE Sht. 24 FOR Location OF WATER AREAS)

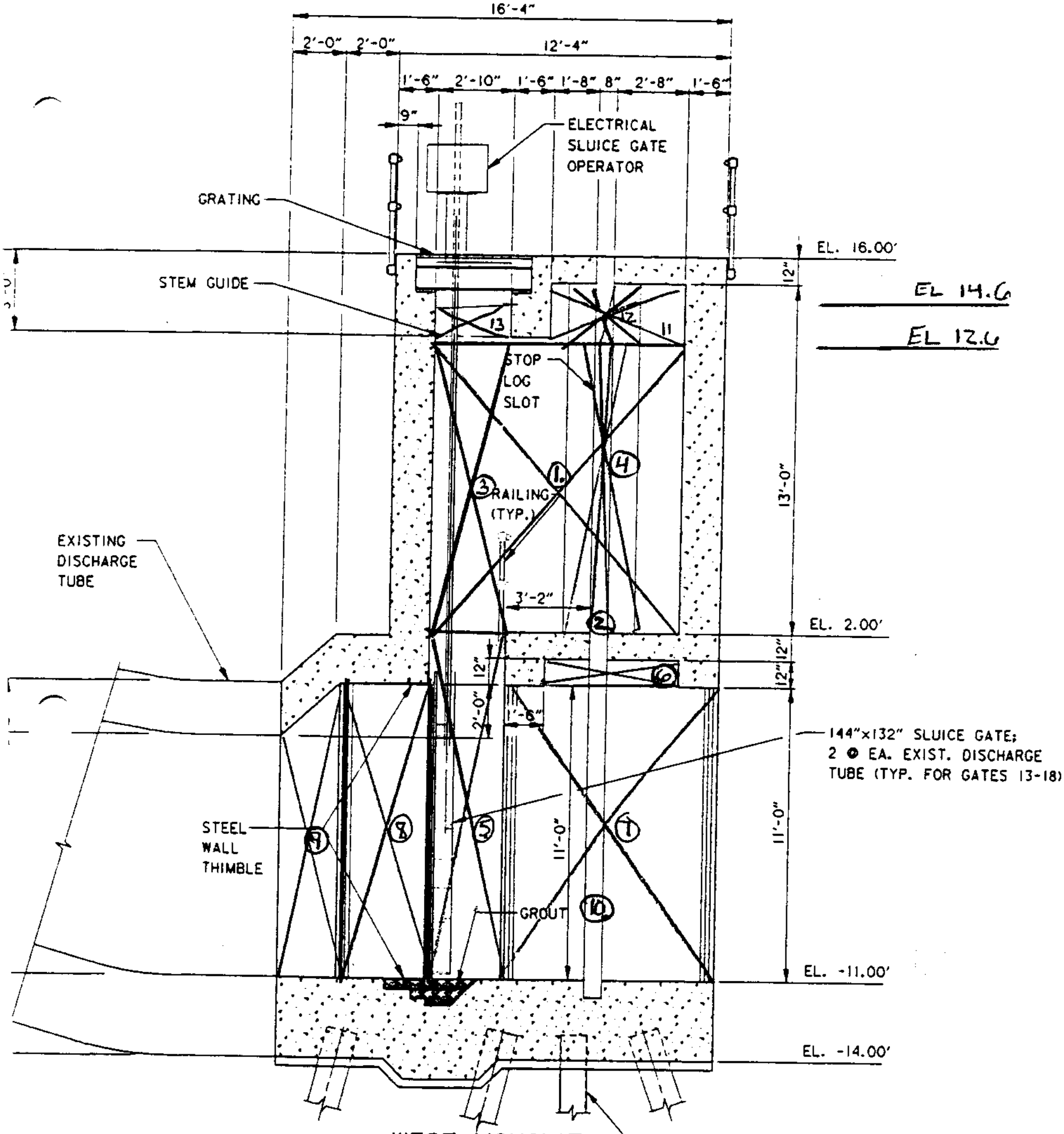
AREA	WEIGHT (kips)	MOM. ARM (Ft)	MOMENT (1-k)
1	162.48	6.17	1002.5
2	1.01	4.5	4.5
3	3.84	9.42	36.2
4	-3.02	4.5	-13.6
5	65.15	9.42	613.7
6	7.68	4.0	30.7
7	135.17	4.0	540.7
8	58.32	12.58	733.7
9	32.0	15.33	490.6
10	1.01	4.5	4.5
	Σ 463.34		Σ 3443.5

$\bar{Y} = \frac{3443.5}{463.64} = 7.42'$

At EL. 14.6'

AREA	WEIGHT	MOM. ARM	MOMENT
1-10	463.64	7.42	3443.5
11	(5)(25.67)(2)(.064)	4.0	65.72
12	-(1.67)(2.67)(2')(.064)	4.5	-2.6
13	(2.83)(27.83)(2')(.064)	9.42	94.96
	Σ 490.12		Σ 3601.58

$\bar{Y} = \frac{3601.58}{490.12} = 7.35'$



WEST MONOLITH

SECTION B

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

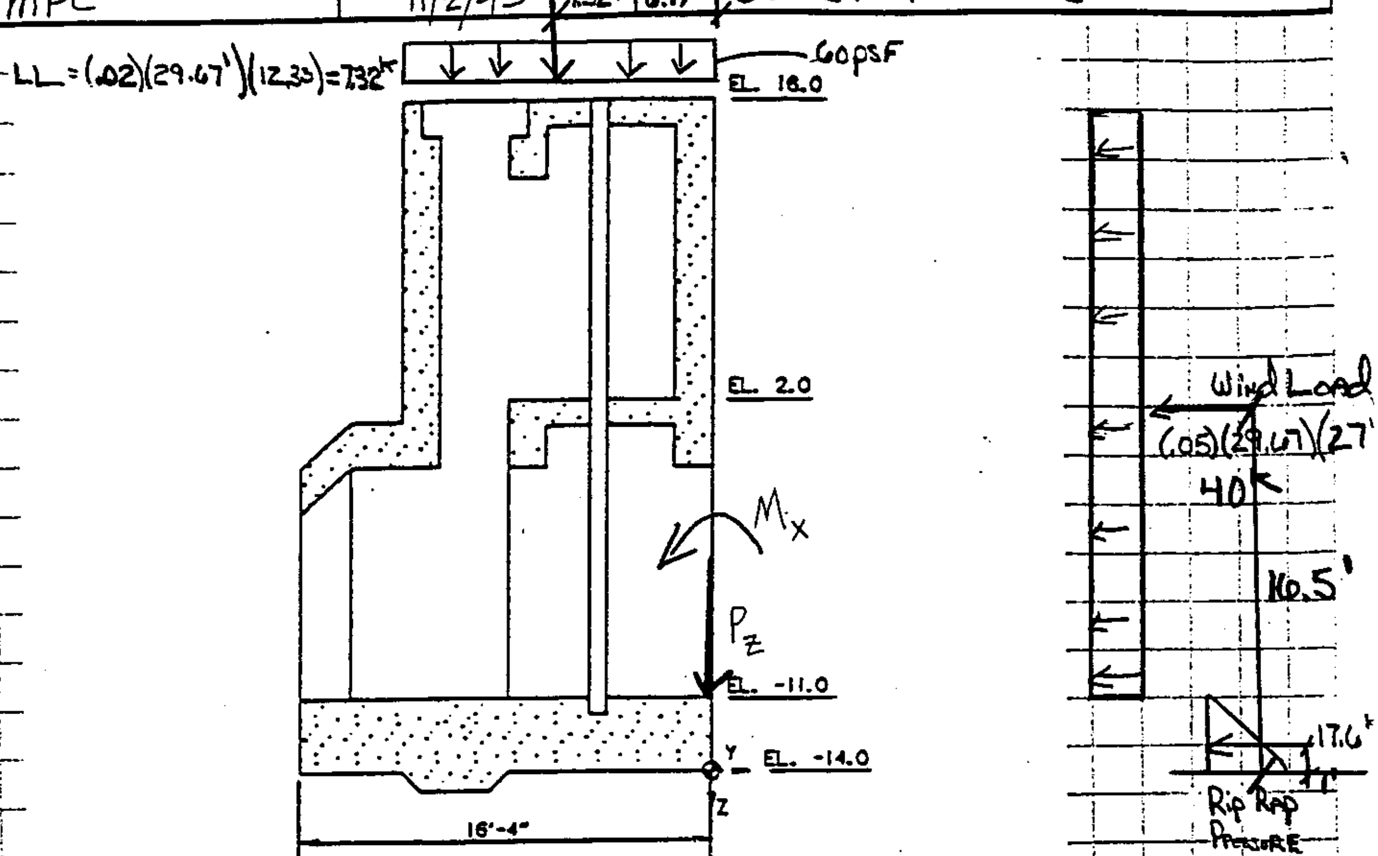
LOCATION OF WATER AREAS

SYMBOL	DESCRIPTION
	REVISIO

U.S. ARMY ENGINEE
CORPS
NEW ORL

WEST MONOLITH LOADING DIAGRAMS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.	Sheet No. 25
Made By: SPC	Date: 9/28/95	P.S. #6 (Loading Diagram)	
Checked By: MFL	Date: 11/2/95	WEST Monoliths	



$= (29.67)(.132)(3')(\frac{3}{2}) =$
$= 17.6^k$

Rip Rap (0.132 k/Ft³ To 0.165 k/Ft³)
USE 0.132 k/Ft³

CASE 1 Construction Case

(All Loads)

Reduction for allow. overstress

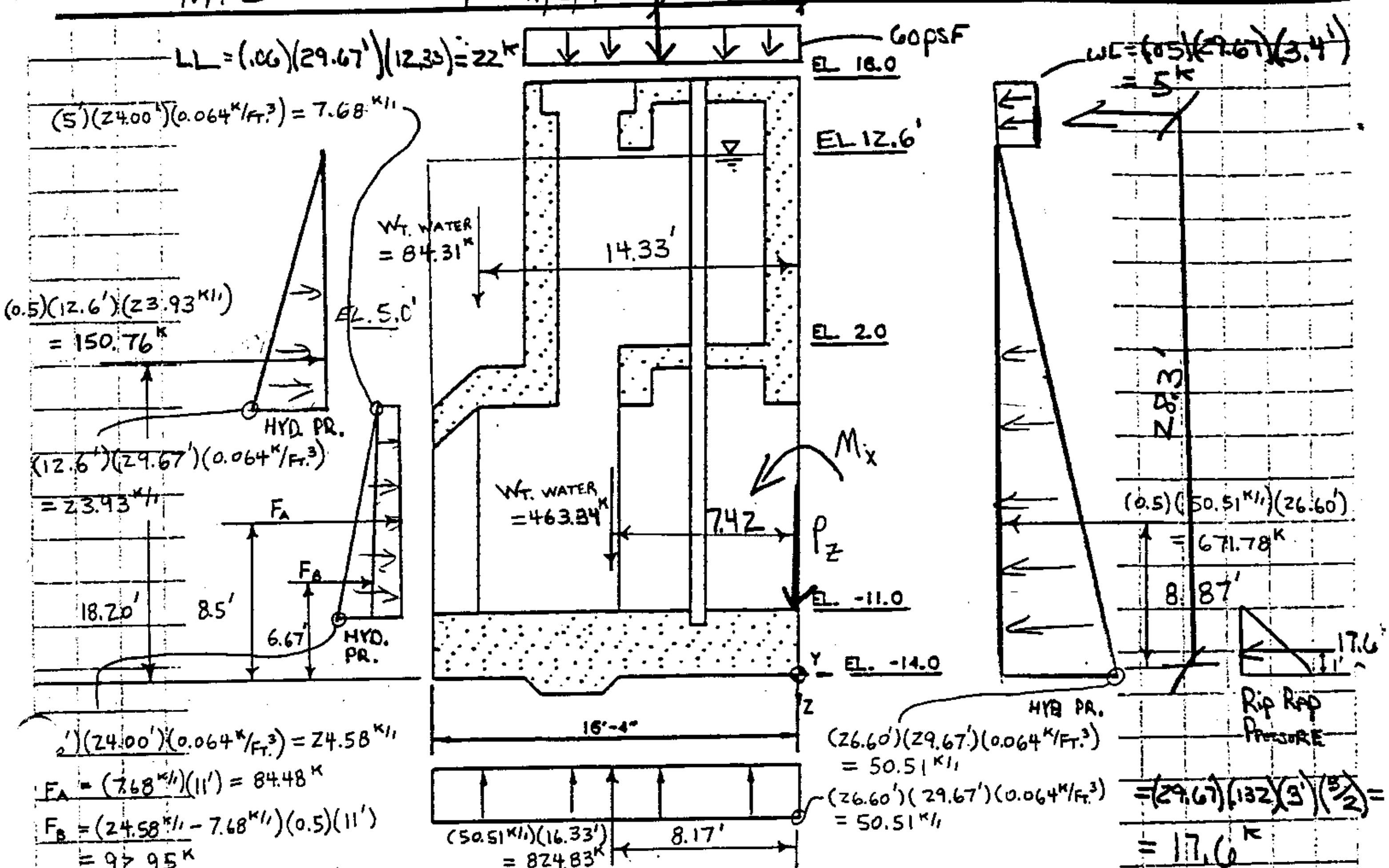
$+\downarrow \Sigma P_z = \underset{(LL)}{7.32^k} + \underset{(DL)\ \text{Sht. 21}}{839.34^k} = 846.66^k\ (0.75) = \underline{635^k} \downarrow$

$\overset{+}{\leftarrow} \Sigma P_y = -\underset{(\text{RIP RAP})}{17.6^k} - \underset{(WL)}{40^k} = -57.6^k(.75) = \underline{-43.2^k} \leftarrow$

$\circlearrowleft + \Sigma M_x = -\underset{(DL)\ \text{Sht. 21}}{6{,}443.26^{\prime\text{-}k}} - \underset{(LL)}{(6.17')(7.32^k)} - \underset{(\text{Rip Rap})}{(1')(17.6^k)} - \underset{(WL)}{40^k(16.5')} = -7166.02^{\prime\text{-}k}(.75) = \underline{-5374.5^{\prime\text{-}k}}$

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: SPC	Date: 9/28/95	Job No. 46229.	Sheet No. 26
Checked By: MFL	Date: 11/2/95	P.S. #6 (Loading Diagram) WEST Monoliths	



CASE 2 (SWL)

Uplift

(WATER ONLY)

$+\downarrow \sum P_z = 84.31^K + 463.34^K - 824.83^K = -277.18^K \uparrow$

$\xrightarrow{+} \sum P_y = 150.76^K + 84.48^K + 92.95^K - 671.78^K = -343.59^K \leftarrow$

$\circlearrowleft^{+} \sum M_x = (18.20')(150.76^K) + (8.5')(84.48^K) + (6.67')(92.95^K) + (8.17')(824.83^K)$
$- (14.33')(84.31^K) - (7.42)(463.34^K) - (8.87')(671.78^K)$
$= -215.9^{1-K} \curvearrowright$

(ALL LOADS)

$+\downarrow \sum P_z = \underset{(WATER)}{-277.44^K} + \underset{(DL)}{839.34^K} + \underset{(LL)}{22^K} = 583.90^K \downarrow$

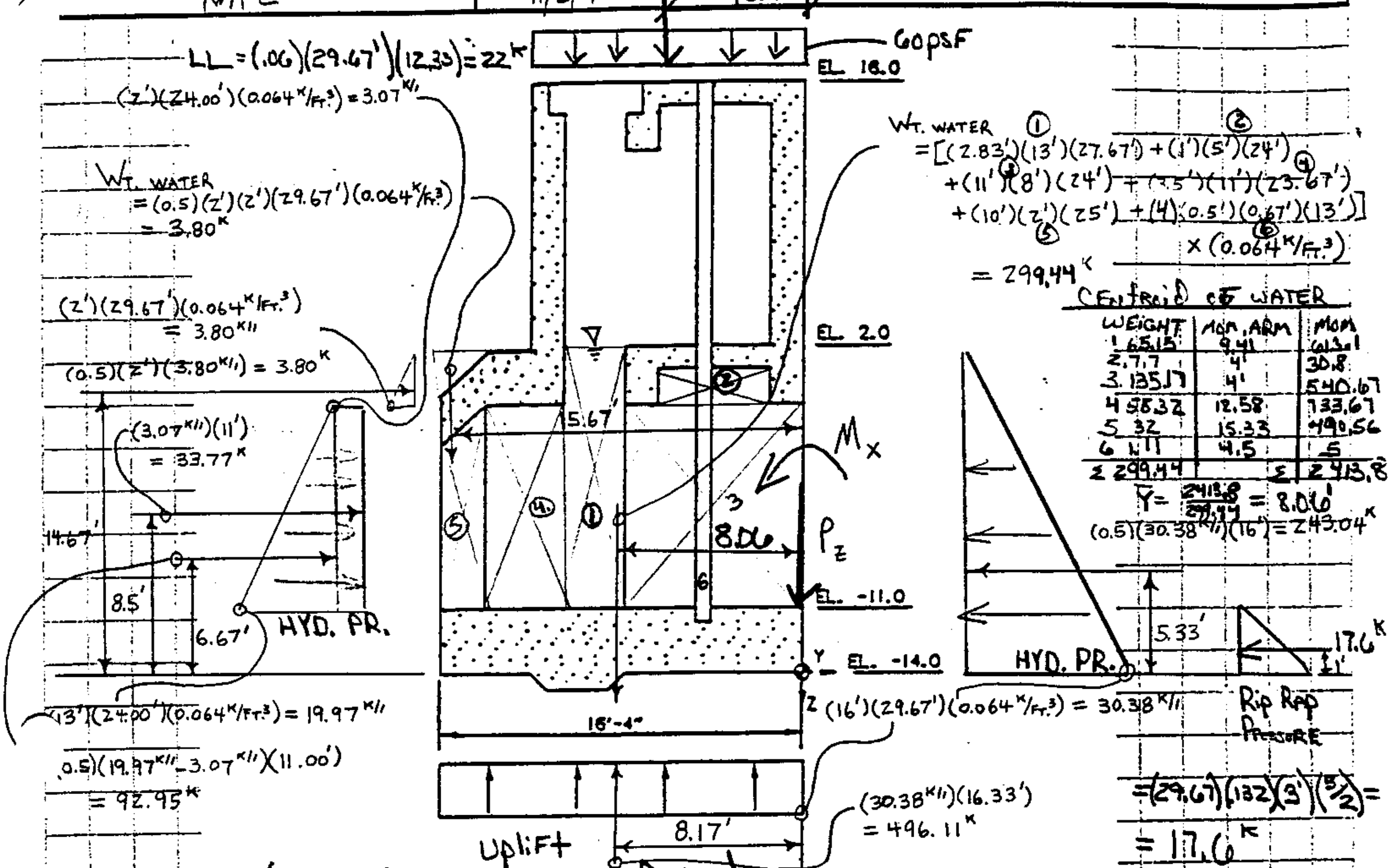
$\xrightarrow{+} \sum P_y = \underset{(WATER)}{-343.59^K} - \underset{(RIP\ RAP)}{17.6^K} - \underset{(WIND)}{5^K} = -366.19^K \leftarrow$

$\circlearrowleft^{+} \sum M_x = \underset{(WATER)}{-215.9^{1-K}} - \underset{(DL)}{6{,}443.26^{1-K}} - \underset{(LL)}{(6.17')(22^K)} - \underset{(WIND)}{(28.3')(5^K)} - \underset{(RIP\ RAP)}{(1')(17.6^K)} = -6522.2^{1-K}$

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: SPC	Date: 9/28/95	Job No. 46229.	Sheet No. 27
Checked By: MFL	Date: 11/2/95		

P.S. #6 (Loading Diagram) WEST Monoliths



CASE 3 (Normal Operating Condition)

(WATER ONLY)

$+\downarrow\ \Sigma P_z = 3.80^K + 299.44^K - 496.11^K = -192.87^K \uparrow$

$\overset{+}{\rightarrow}\ \Sigma P_y = 3.80^K + 33.77^K + 92.95^K - 243.04^K = -112.52^K \leftarrow$

$\circlearrowright^{+}\ \Sigma M_x = (14.67')(3.80^K) + (8.5')(33.77^K) + (6.67')(92.95^K) + (8.17')(496.11^K) - (15.67')(3.80^K) - (8.06)(299.44^K) - (5.33')(243.04^K)$

$= 1{,}247.55^{l\text{-}K} \circlearrowright$

(ALL LOADS)

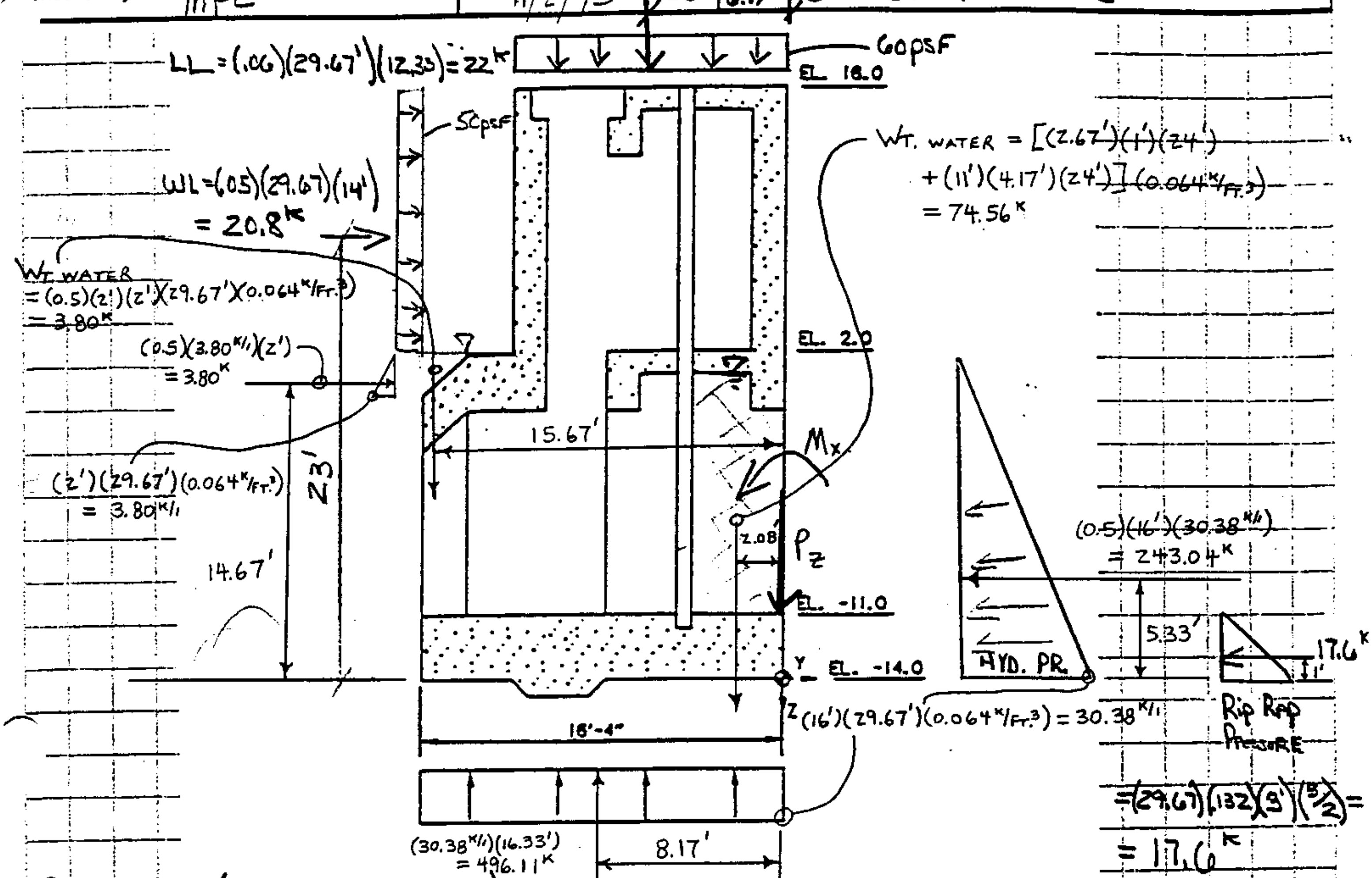
$+\downarrow\ \Sigma P_z = -192.87^K_{(WATER)} + 22^K_{(LL)} + 839.34^K_{(DL)} = 668.47^K \downarrow$

$\overset{+}{\rightarrow}\ \Sigma P_y = -112.52^K_{(WATER)} - 17.6^K_{(RIP\ RAP)} = -130.12^K \leftarrow$

$\circlearrowright^{+}\ \Sigma M_x = 1{,}250.6^{l\text{-}K}_{(WATER)} - 6{,}443.26^{l\text{-}K}_{(DL)} - (6.17')(22^K)_{(LL)} - (1')(17.6^K)_{(Rip\ Rap)} = -5346.0^{l\text{-}K} \circlearrowleft$

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: SPC	Date: 9/28/95	Job No. 46229.	Sheet No. 28
Checked By: MFL	Date: 11/2/95	P.S. #6 (Loading Diagram) WEST Monoliths	



CASE 4 (Maintenance Condition) uplift

(WATER ONLY)

$+\downarrow \Sigma P_z = 3.80^K + 74.56^K - 496.11^K = -417.75^K \uparrow$

$\overset{+}{\rightarrow} \Sigma P_y = 3.80^K - 243.04^K = -239.24^K \leftarrow$

$\circlearrowleft\!+ \Sigma M_x = (14.67')(3.80^K) + (8.17')(496.11^K) - (2.08')(74.56^K) - (5.33')(243.04^K) - (15.67')(3.80^K)$

$= 2{,}598.93^{\text{'-K}} \curvearrowright$

(ALL LOADS)

REDUCTION FOR ALLOW. OVERSTRESS

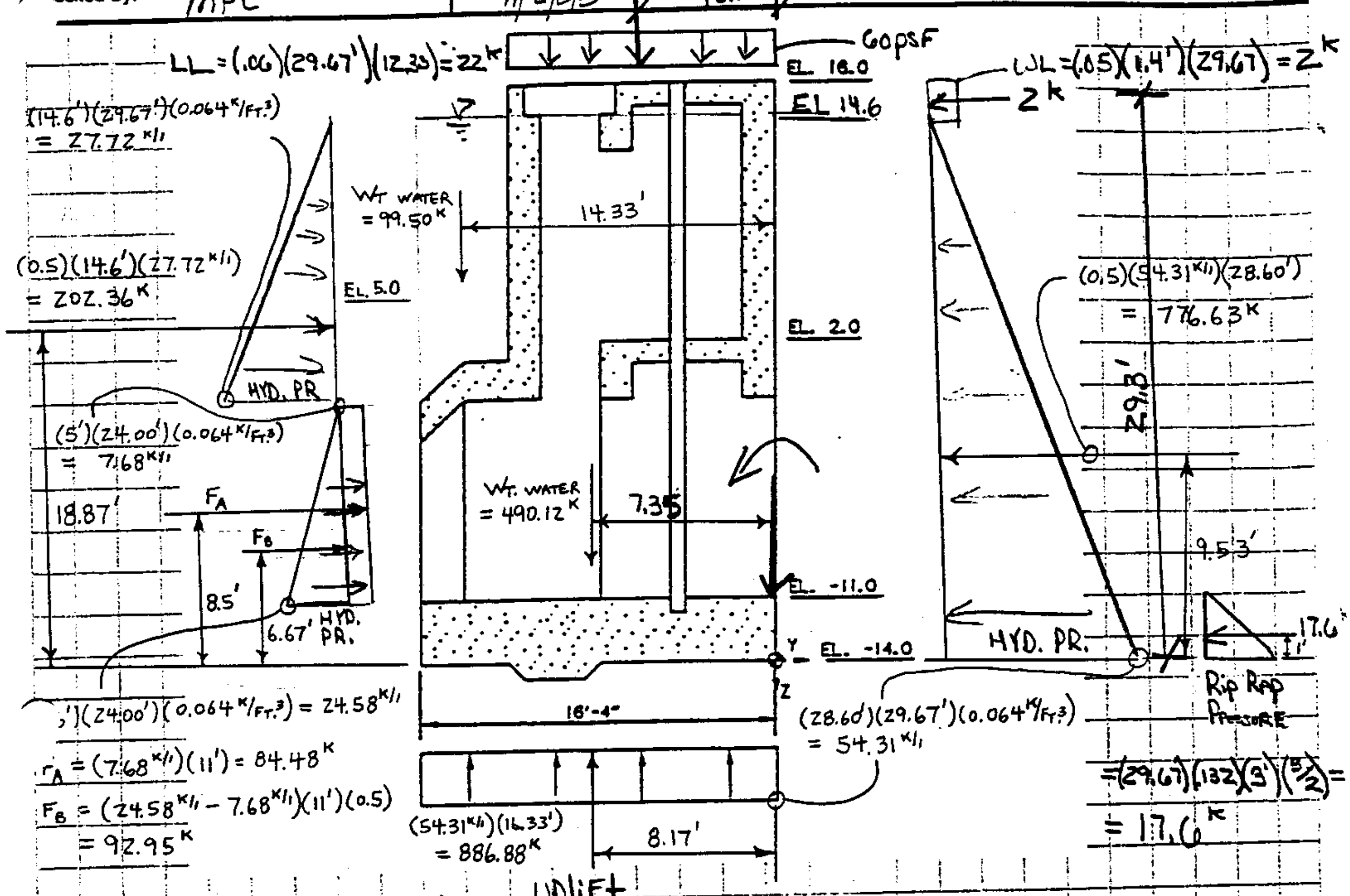
$+\downarrow \Sigma P_z = \underset{(WATER)}{-417.75^K} + \underset{(LL)}{22^K} + \underset{(DL)}{839.34^K} = 443.59^K(0.75) = \underline{332.69^K} \downarrow$

$\overset{+}{\rightarrow} \Sigma P_y = \underset{(WATER)}{-239.24^K} - \underset{(RIP\ RAP)}{17.6^K} + \underset{(WIND)}{20.8^K} = -236.04^K(0.75) = \underline{-177.03^K} \leftarrow$

$\circlearrowleft\!+ \Sigma M_x = \underset{(WATER)}{2{,}598.93^{\text{'-K}}} - \underset{(DL)}{6{,}443.26^{\text{'-K}}} - (6.17')\underset{(LL)}{(22^K)} - (1')\underset{(Rip\ Rap)}{(17.6^K)} + (23')\underset{(WIND)}{(20.8^K)}$

$= -3{,}519.27^{\text{'-K}}(0.75) = \underline{-2{,}639.45^{\text{'-K}}} \circlearrowleft$

P.S. #6 (Loading Diagram) WEST Monoliths



CASE 5 (2' Above SWL)

(Water Only)

$+\downarrow \Sigma P_z = 99.50^K + 490.12^K - 886.88^K = -297.26^K \uparrow$

$\overset{+}{\rightarrow} \Sigma P_y = 202.36^K + 84.48^K + 92.95^K - 776.63^K = -396.84^K \leftarrow$

$\circlearrowleft^{+} \Sigma M_x = (18.87')(202.36^K) + (8.5')(84.48^K) + (6.67')(92.95^K) + (8.17')(886.88^K)$
$- (14.33')(99.50^K) - (7.35')(490.12^K) - (9.53')(776.63^K)$
$= -27.1^{1\text{-}K}$ ↺

(All Loads)

Reduction for Allow. Overstress

$+\downarrow \Sigma P_z = -297.26^K \text{ (WATER)} + 22^K \text{ (LL)} + 839.34^K \text{ (DL)} = 564.08^K(0.75) = 423.06^K \downarrow$

$\overset{+}{\rightarrow} \Sigma P_y = -396.84^K \text{ (WATER)} - 2^K \text{ (WIND)} - 17.6^K \text{ (RIP RAP)} = -416.44^K(0.75) = -312.33^K \leftarrow$

$\circlearrowleft^{+} \Sigma M_x = -27.1^{1\text{-}K} \text{ (WATER)} - 6{,}443.26^{1\text{-}K} \text{ (DL)} - (6.17')(22^K) \text{ (LL)} - (1')(17.6^K) \text{ (Rip Rap)} - (29.3')(2^K) \text{ (WIND)} = -6682.3^{1\text{-}K}(0.75)$
$= -5011.7^{1\text{-}K}$ ↺

WEST MONOLITH ADDITIONAL LOADS

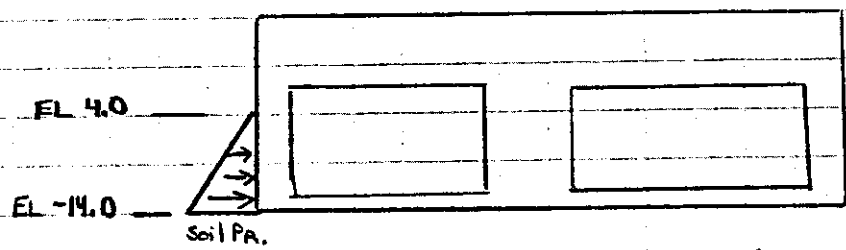
URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Made By: SCB	Date: 10/95	Job No. 46229.00	Sheet No. 30
Checked By: MFL	Date: 11/2/95	P.S. #6	

West Monolith # 3 (Additional Loads)

Soil Pressure on Monolith due to Removal of Ret. Wall
(Soil to EL 4.0')

Case 1 Construction



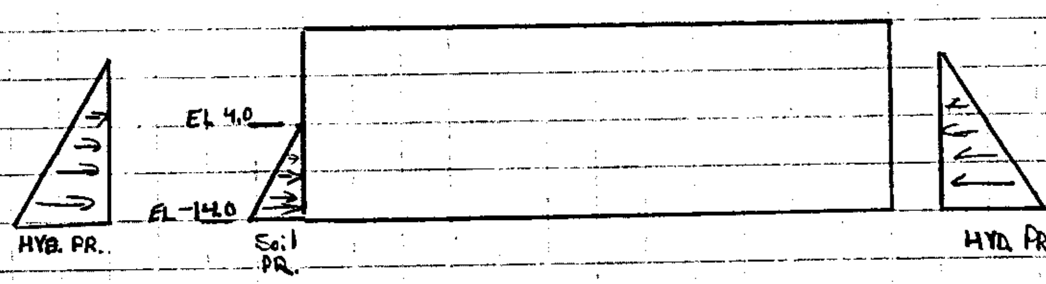
Load reduction factor

$P_x = (.120^{k}/_{ft^3})(18')(16.33')(\frac{18}{2})(.75) = -238.1^{k} \rightarrow$

$M_y = (.120^{k}/_{ft^3})(18)(16.33')(\frac{18}{2})(\frac{18}{3})(.75) = 1428.8^{'-k}$ (+)

$M_z = (.120^{k}/_{ft^3})(18)(16.33)(\frac{18}{2})(\frac{16.33}{2})(.75) = -1944.1^{'-k}$

Case 2



$P_x = (.120-.064)(18')(16.33)(\frac{18}{2}) = -148.1^{k}$

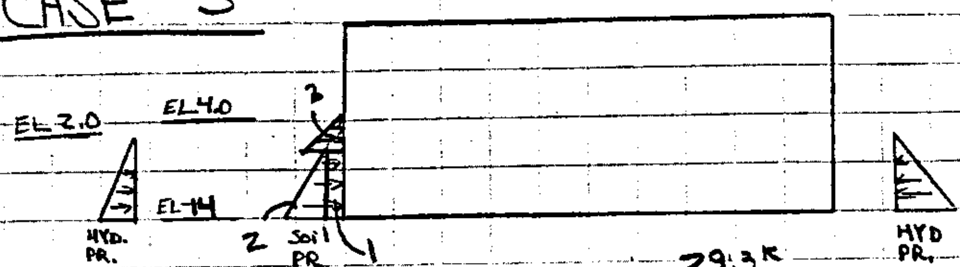
$M_y = (148.1^{k})(\frac{18}{3}) = 888^{'-k}$ (+)

$M_z = (148.1^{k})(\frac{16.33}{2}) = 1209.2^{'-k}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 31
Made By: SCB	Date: 10/95	P.S #6	
Checked By: MFL	Date: 11/2/95		

WM #3 (Additional Loadings)
Soil pressure on Monolith due to Removal of Ret. Wall

CASE 3



3.91 (③: h, w) 29.3k (①: h, w) 117k (②: h, w)

$P_x = (.120\,^{k}/_{ft^2})(2')(16.33')\left(\frac{2}{2}\right) + (.120-.064)(2)(16.33')(16') + (.120-.064)(16')(16.33)\left(\frac{16}{2}\right) =$

$= -150.17^{k}$

$M_y = 3.91^{k}(16.67') + 29.3^{k}\left(\frac{16}{2}\right) + 117\left(\frac{16}{3}\right) = \underline{923.6^{'-k}}$ ✓

$M_z = 150.17^{k}\left(\frac{16.33}{2}\right) = \underline{-1226.13^{'-k}}$ ✓

CASE 4

SAME LOADING AS CASE 3 FOR SOIL & WATER, but LOADING CAN be REDUCED due to MAINTENANCE Condition

$P_x = 150.17(.75) = \underline{112.63^{k}}$ ✓ $M_y = 923.6(.75) = \underline{692.7^{'-k}}$ ✓

$M_z = -1226.13^{'-k}(.75) = \underline{-919.6^{'-k}}$ ✓

CASE 5

SAME Loading AS CASE 2 FOR Soil & Water but Loading can be Reduced due to unusual condition

$P_x = -148.1(.75) = \underline{111.1^{k}}$ ✓ $M_y = 888(.75) = 666^{'-k}$ $M_z = -1209.2^{'-k}(.75) = \underline{906.9}$ ✓

WEST MONOLITH SUMMARY SHEET OF LOADINGS

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 | Sheet No. 32

Made By: SCB | Date: 10/95
Checked By: MFL | Date: 11/2/95

P.S. #6

WEST Monoliths

Summary Sht. of Loadings

Monolith #1 & 2

CASE	P_x	P_y	P_z	M_x	M_y	M_z
1	0	-43.2k	635k	-5374.5 1-k	0	0
2	0	-366.19k	583.9k	-6522.2 1-k	0	0
3	0	-130.12k	668.47k	-5346.0 1-k	0	0
4	0	-177.03k	332.69k	-2639.45 1-k	0	0
5	0	-312.33	423.06	-5011.7 1-k	0	0

Monolith #3

CASE	P_x	P_y	P_z	M_x	M_y	M_z
1	-238.1k	-43.2k	635k	-5374.5 1-k	1428.8 1-k	-1944.1 1-k
2	-148.1k	-366.19k	583.9k	-6522.2 1-k	888 1-k	-1209.2 1-k
3	-150.17k	-130.12k	668.47k	-5346.0 1-k	923.6 1-k	-1226.13 1-k
4	-112.63k	-177.03k	332.69k	-2639.45 1-k	692.7 1-k	-919.6 1-k
5	-111.1k	-312.33k	423.06k	-5011.7 1-k	666 1-k	-906.9 1-k

PILE CAPACITY

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 33
Made By: SCB	Date: 10/26/95	P.S. #6	
Checked By: MFL	Date: 11/2/95		

Pile Capacity (HP14×73)

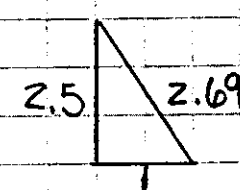
Vertical Pile

Tip EL. = -101.0' (F.S. = 2.0)

Compression Cap. = 115^k

Tension Cap. = 77.5^k

Batter Pile 2.5V to 1H



Tip EL = -101.0 (F.S. = 2.0)

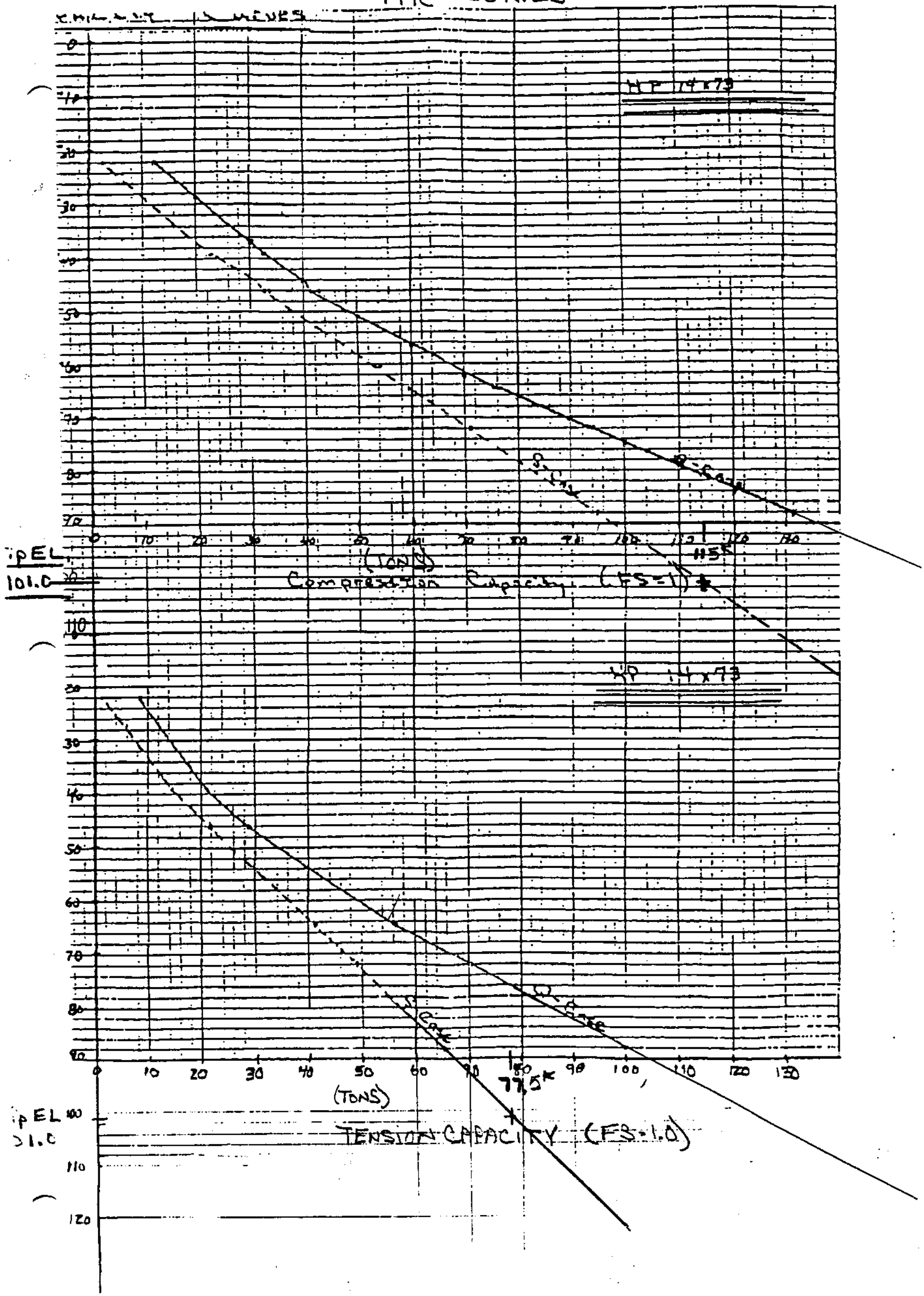
INCREASE CAP. BEC. LENGTH IS INCREASED DUE TO BATTER

$$\text{Compression Cap.} = 115^k\left(\frac{2.692}{2.5}\right) = 123.9^k$$

$$\text{Tension Cap} = 77.5^k\left(\frac{2.69}{2.5}\right) = 83.5^k$$

PILE CURVES

Pile Curves


HP 14x73
Compression Capacity (FS=1)
(TONS)
115K
Tip EL 101.0
HP 14x73
Tension Capacity (FS=1.0)
(TONS)
77.5K
Tip EL 101.0

CPGA INPUT

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 35
Made By: SCB	Date: 10/95	P.S. #6	
Checked By: MC	Date: 11/95		

CPGA Input

H Pile HP14×73 $I_x = 729 in^4$ $S_x = 107 in^3$

$I_y = 261 in^4$ $S_x = 35.8 in^3$

A = 21.4

C33 = 1.5

B66 = 0

Subgrade Modulus = .1 k/in²

Tip EL = -101.0' NGVD

Bott. of Monolith = -14.0 West monoliths
-12.0 East monoliths

Tip EL = (-101.0) - (-14.0) = -87.0 (West monolith)

Tip EL = (-101.0) - (-12.0) = -89.0' (East monolith)

Allow. Soil Cap. (SEE sht 33)

Allow. Pile Loading — FROM EM 1110-2-2906 Design of Pile Foundations

ACC = Allow. Axial Comp. = (18 ksi)(21.4 AREA) = 385.2 k

ATT = Allow Axial Tension = (18 ksi)(21.4) = 385.2 k

AM1 = Allow. Moment about 1 Axis = (18 ksi)(35.8 in³) = 644.4 in-k

AM2 = Allow Moment about 2 axis = (18 ksi)(107 in³) = 1926 in-k

CPGA OUTPUT

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 36
Made By: SPC	Date: 11/5/95	P.S. No. 6	
Checked By:	Date:		

CPGA OUTPUT

West Monolith # 1

36A

```
1000 WM1.IN (WEST MONOLITH) PS#6
1010 PRO 29000 729 261 21.4 1.5 0 13 to 16
1015 PRO 29000 261 729 21.4 1.5 0 1 TO 12
1020 SOI ES .1 TIP -87 0 ALL
103   N ALL
1(     LOW H 115 77.5 385.2 385.2 1926 644.4 13 TO 16
104  ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 1 TO 12
1060 BATTER 2.5 1 TO 4
1061 BATTER 2.5 9 TO 12
1062 BATTER 2.5 5 TO 8
1070 ANG 90 1 TO 4
1080 ANG 270 5 TO 12
1090 PIL 1 -9.167 -2.0 0.
1091 PIL 2 -3.167 -2.0 0.
1092 PIL 3 3.167 -2.0 0.
1093 PIL 4 9.167 -2.0 0.
1098 PIL 5 -9.167 -7.33 0.
1099 PIL 6 -3.167 -7.33 0.
1110 PIL 7 3.167 -7.33 0.
1112 PIL 8 9.167 -7.33 0.
1114 PIL 9 -9.167 -14.33 0.
1116 PIL 10 -3.167 -14.33 0.
1118 PIL 11 3.167 -14.33 0.
1119 PIL 12 9.167 -14.33 0.
1120 PIL 13 -12.83 -5.5 0.
1121 PIL 14 12.83 -5.5 0.
1122 PIL 15 -12.83 -13.00 0.
1123 PIL 16 12.83 -13.00 0.
1200 LOA 1 0. -43.2 635 -5374.5 0. 0.
1210 LOA 2 0. -366.19 583.9 -6522.2 0. 0.
1220 LOA 3 0. -130.12 668.47 -5346.0 0. 0.
1230 LOA 4 0. -177.03 332.69 -2639.45 0. 0.
1240   5 0. -312.33 423.06 -5011.7 0. 0.
12     1 2 3 4 5 6 7
126  U 1 2 3 4 5 6 7 WM1.OUT
1270 PSO
1280 PFO ALL
```

```
***********************************
* CORPS PROGRAM  #  X0080        *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 1993/03/29    *  RUN DATE 31-OCT-1995   RUN TIME 16.26.08
***********************************


WM...N (WEST MONOLITH) PS#6


THERE ARE   16 PILES AND
             5 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX
                                     X          Y          Z
                                   -----      -----      -----
WITH DIAGONAL COORDINATES = (     -12.83 ,   -14.33 ,      .00 )
                            (      12.83 ,    -2.00 ,      .00 )


*********************************************************************************

        PILE PROPERTIES AS INPUT


     E            I1            I2            A            C33          B66
    KSI          IN**4         IN**4        IN**2
 .29000E+05   .72900E+03   .26100E+03   .21400E+02   .15000E+01   .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

  13   14   15   16


     E            I1            I2            A            C33          B66
    KSI          IN**4         IN**4        IN**2
 .29000E+05   .26100E+03   .72900E+03   .21400E+02   .15000E+01   .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

   1    2    3    4    5    6    7    8    9   10   11   12


*********************************************************************************

        SOIL DESCRIPTIONS AS INPUT


   ES     ESOIL      LENGTH        L             LU
         K/IN**2                   FT            FT
        .10000E+00     T      -.87000E+02   .00000E+00

THIS SOIL DESCRIPTION APPLIES TO THE FOLLOWING PILES -

    ALL


*********************************************************************************

        PILE STIFFNESSES AS CALCULATED FROM PROPERTIES


      4E+01   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
      .0E+00   .65955E+01   .00000E+00   .00000E+00   .00000E+00   .00000E+00
 .00000E+00   .00000E+00   .82789E+03   .00000E+00   .00000E+00   .00000E+00
 .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
 .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
```

.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

****

PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-9.17	-2.00	.00	2.50	90.00	93.70	P
2	-3.17	-2.00	.00	2.50	90.00	93.70	P
3	3.17	-2.00	.00	2.50	90.00	93.70	P
4	9.17	-2.00	.00	2.50	90.00	93.70	P
5	-9.17	-7.33	.00	2.50	270.00	93.70	P
6	-3.17	-7.33	.00	2.50	270.00	93.70	P
7	3.17	-7.33	.00	2.50	270.00	93.70	P
8	9.17	-7.33	.00	2.50	270.00	93.70	P
9	-9.17	-14.33	.00	2.50	270.00	93.70	P
10	-3.17	-14.33	.00	2.50	270.00	93.70	P
11	3.17	-14.33	.00	2.50	270.00	93.70	P
12	9.17	-14.33	.00	2.50	270.00	93.70	P
13	-12.83	-5.50	.00	V	.00	87.00	P
14	12.83	-5.50	.00	V	.00	87.00	P
15	-12.83	-13.00	.00	V	.00	87.00	P
16	12.83	-13.00	.00	V	.00	87.00	P

						1472.42	

****

APPLIED LOADS

LOAD CASE	PX K	PY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	.0	-43.2	635.0	-5374.5	.0	.0
2	.0	-366.2	583.9	-6522.2	.0	.0
3	.0	-130.1	668.5	-5346.0	.0	.0
4	.0	-177.0	332.7	-2639.5	.0	.0
5	.0	-312.3	423.1	-5011.7	.0	.0

****

ORIGINAL PILE GROUP STIFFNESS MATRIX

.10553E+03	-.14069E-03	.24700E-03	-.37335E-01	.00000E+00	.10419E+05
-.14069E-03	.14926E+04	-.11302E+04	.26663E+06	.00000E+00	-.16154E-01
.24700E-03	-.11302E+04	.12145E+05	-.12078E+07	.00000E+00	.37335E-01
-.37335E-01	.26663E+06	-.12078E+07	.15949E+09	.00000E+00	-.55006E+01
.00000E+00	.36380E-11	.00000E+00	.00000E+00	.14264E+09	.76541E+07
.10419E+05	-.16154E-01	.37335E-01	-.55006E+01	.76541E+07	.12064E+08

L[illegible] ASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

LOAD CASE 3. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

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PILE CAP DISPLACEMENTS

LOAD CASE	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	-.1025E-06	.2701E-01	.4088E-01	-.1400E-03	.3647E-11	-.6797E-10
2	-.3596E-06	-.2971E+00	.8512E-01	.6505E-03	.3002E-11	-.5595E-10
3	-.1793E-06	-.9830E-01	.9004E-01	.4439E-03	.2944E-11	-.5486E-10
4	-.1826E-06	-.1935E+00	.8830E-01	.7935E-03	.7151E-12	-.1333E-10
5	-.2986E-06	-.2581E+00	.6570E-01	.5519E-03	.2190E-11	-.4081E-10

****

PILE FORCES IN LOCAL GEOMETRY

$ALF = F3/AC \text{ or } F3/AT$

$CBF = FB/(ACC \text{ or } ATT) + M_1/AM1 + M_2/AM2$

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO (F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

LOAD CASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	.1	.0	42.3	.0	-4.1	.0	.34	.11
2	.1	.0	42.3	.0	-4.1	.0	.34	.11
3	.1	.0	42.3	.0	-4.1	.0	.34	.11
4	.1	.0	42.3	.0	-4.1	.0	.34	.11
5	-.4	.0	32.6	.0	21.0	.0	.26	.10
6	-.4	.0	32.6	.0	21.0	.0	.26	.10
7	-.4	.0	32.6	.0	21.0	.0	.26	.10
8	-.4	.0	32.6	.0	21.0	.0	.26	.10
9	-.4	.0	41.6	.0	23.0	.0	.34	.12
10	-.4	.0	41.6	.0	23.0	.0	.34	.12
11	-.4	.0	41.6	.0	23.0	.0	.34	.12
12	-.4	.0	41.6	.0	23.0	.0	.34	.12
13	.0	.2	44.7	12.6	.0	.0	.39	.12
14	.0	.2	44.7	12.6	.0	.0	.39	.12
15	.0	.2	55.9	12.6	.0	.0	.49	.15
16	.0	.2	55.9	12.6	.0	.0	.49	.15

LOAD CASE - 2

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
	-2.6	.0	-37.9	.0	141.2	.0	.45	.17
	-2.6	.0	-37.9	.0	141.2	.0	.45	.17
3	-2.6	.0	-37.9	.0	141.2	.0	.45	.17
4	-2.6	.0	-37.9	.0	141.2	.0	.45	.17
5	2.3	.0	112.8	.0	-124.3	.0	.91	.36

— Values used in Loading Table

6	2.3	.0	112.8	.0	-124.3	.0	.91	.36
7	2.3	.0	112.8	.0	-124.3	.0	.91	.36
8	2.3	.0	112.8	.0	-124.3	.0	.91	.36
9	2.4	.0	70.8	.0	-133.8	.0	.57	.25
	2.4	.0	70.8	.0	-133.8	.0	.57	.25
	2.4	.0	70.8	.0	-133.8	.0	.57	.25
	2.4	.0	70.8	.0	-133.8	.0	.57	.25
13	.0	-2.5	37.6	-139.1	.0	.0	.33	.17
14	.0	-2.5	37.6	-139.1	.0	.0	.33	.17
15	.0	-2.5	-14.6	-139.1	.0	.0	.19	.11
16	.0	-2.5	-14.6	-139.1	.0	.0	.19	.11

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-1.0	.0	30.8	.0	56.5	.0	.25	.11
2	-1.0	.0	30.8	.0	56.5	.0	.25	.11
3	-1.0	.0	30.8	.0	56.5	.0	.25	.11
4	-1.0	.0	30.8	.0	56.5	.0	.25	.11
5	.6	.0	69.4	.0	-33.9	.0	.56	.20
6	.6	.0	69.4	.0	-33.9	.0	.56	.20
7	.6	.0	69.4	.0	-33.9	.0	.56	.20
8	.6	.0	69.4	.0	-33.9	.0	.56	.20
9	.7	.0	40.8	.0	-40.3	.0	.33	.13
10	.7	.0	40.8	.0	-40.3	.0	.33	.13
11	.7	.0	40.8	.0	-40.3	.0	.33	.13
12	.7	.0	40.8	.0	-40.3	.0	.33	.13
13	.0	-.8	54.2	-46.0	.0	.0	.47	.16
14	.0	-.8	54.2	-46.0	.0	.0	.47	.16
	.0	-.8	18.5	-46.0	.0	.0	.16	.07
	.0	-.8	18.5	-46.0	.0	.0	.16	.07

$$ALF_5 = \frac{69.4}{123.9} = .56$$

$$CBF = \frac{69.4}{385.2} + \frac{0}{644.4} + \frac{33.9}{1926} = .20$$

$$ALF_{16} = \frac{18.5}{115} = .16$$

$$CBF_{16} = \frac{18.5}{385.2} + \frac{46}{1926} + \frac{0}{644.4} = .07$$

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-1.8	.0	-6.3	.0	96.2	.0	.07	.07
2	-1.8	.0	-6.3	.0	96.2	.0	.07	.07
3	-1.8	.0	-6.3	.0	96.2	.0	.07	.07
4	-1.8	.0	-6.3	.0	96.2	.0	.07	.07
5	1.5	.0	73.7	.0	-80.9	.0	.59	.23
6	1.5	.0	73.7	.0	-80.9	.0	.59	.23
7	1.5	.0	73.7	.0	-80.9	.0	.59	.23
8	1.5	.0	73.7	.0	-80.9	.0	.59	.23
9	1.7	.0	22.5	.0	-92.5	.0	.18	.11
10	1.7	.0	22.5	.0	-92.5	.0	.18	.11
11	1.7	.0	22.5	.0	-92.5	.0	.18	.11
12	1.7	.0	22.5	.0	-92.5	.0	.18	.11
13	.0	-1.6	32.0	-90.6	.0	.0	.28	.13
14	.0	-1.6	32.0	-90.6	.0	.0	.28	.13
15	.0	-1.6	-31.6	-90.6	.0	.0	.41	.13
16	.0	-1.6	-31.6	-90.6	.0	.0	.41	.13

LOAD CASE - 5

PIL	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-2.2	.0	-39.0	.0	121.3	.0	.47	.16
2	-2.2	.0	-39.0	.0	121.3	.0	.47	.16

3	-2.2	.0	-39.0	.0	121.3	.0	.47	.16
4	-2.2	.0	-39.0	.0	121.3	.0	.47	.16
5	2.0	.0	92.5	.0	-109.2	.0	.75	.30
6	2.0	.0	92.5	.0	-109.2	.0	.75	.30
	2.0	.0	92.5	.0	-109.2	.0	.75	.30
	2.0	.0	92.5	.0	-109.2	.0	.75	.30
	2.1	.0	56.9	.0	-117.3	.0	.46	.21
10	2.1	.0	56.9	.0	-117.3	.0	.46	.21
11	2.1	.0	56.9	.0	-117.3	.0	.46	.21
12	2.1	.0	56.9	.0	-117.3	.0	.46	.21
13	.0	-2.2	26.1	-120.8	.0	.0	.23	.13
14	.0	-2.2	26.1	-120.8	.0	.0	.23	.13
15	.0	-2.2	-18.2	-120.8	.0	.0	.23	.11
16	.0	-2.2	-18.2	-120.8	.0	.0	.23	.11

****

PILE FORCES IN GLOBAL GEOMETRY

LOAD CASE - 1

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	15.8	39.3	.0	.0	.0
2	.0	15.8	39.3	.0	.0	.0
3	.0	15.8	39.3	.0	.0	.0
4	.0	15.8	39.3	.0	.0	.0
5	.0	-11.7	30.4	.0	.0	.0
	.0	-11.7	30.4	.0	.0	.0
	.0	-11.7	30.4	.0	.0	.0
	.0	-11.7	30.4	.0	.0	.0
9	.0	-15.1	38.8	.0	.0	.0
10	.0	-15.1	38.8	.0	.0	.0
11	.0	-15.1	38.8	.0	.0	.0
12	.0	-15.1	38.8	.0	.0	.0
13	.0	.2	44.7	.0	.0	.0
14	.0	.2	44.7	.0	.0	.0
15	.0	.2	55.9	.0	.0	.0
16	.0	.2	55.9	.0	.0	.0

LOAD CASE - 2

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-16.5	-34.2	.0	.0	.0
2	.0	-16.5	-34.2	.0	.0	.0
3	.0	-16.5	-34.2	.0	.0	.0
4	.0	-16.5	-34.2	.0	.0	.0
5	.0	-44.0	103.9	.0	.0	.0
6	.0	-44.0	103.9	.0	.0	.0
7	.0	-44.0	103.9	.0	.0	.0
8	.0	-44.0	103.9	.0	.0	.0
9	.0	-28.6	64.8	.0	.0	.0
10	.0	-28.6	64.8	.0	.0	.0
	.0	-28.6	64.8	.0	.0	.0
	.0	-28.6	64.8	.0	.0	.0
	.0	-2.5	37.6	.0	.0	.0
14	.0	-2.5	37.6	.0	.0	.0
15	.0	-2.5	-14.6	.0	.0	.0
16	.0	-2.5	-14.6	.0	.0	.0

LOAD CASE - 3

PI	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	10.5	29.0	.0	.0	.0
2	.0	10.5	29.0	.0	.0	.0
3	.0	10.5	29.0	.0	.0	.0
4	.0	10.5	29.0	.0	.0	.0
5	.0	-26.4	64.2	.0	.0	.0
6	.0	-26.4	64.2	.0	.0	.0
7	.0	-26.4	64.2	.0	.0	.0
8	.0	-26.4	64.2	.0	.0	.0
9	.0	-15.8	37.6	.0	.0	.0
10	.0	-15.8	37.6	.0	.0	.0
11	.0	-15.8	37.6	.0	.0	.0
12	.0	-15.8	37.6	.0	.0	.0
13	.0	-.8	54.2	.0	.0	.0
14	.0	-.8	54.2	.0	.0	.0
15	.0	-.8	18.5	.0	.0	.0
16	.0	-.8	18.5	.0	.0	.0

LOAD CASE - 4

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-4.0	-5.2	.0	.0	.0
2	.0	-4.0	-5.2	.0	.0	.0
	.0	-4.0	-5.2	.0	.0	.0
	.0	-4.0	-5.2	.0	.0	.0
	.0	-28.7	67.9	.0	.0	.0
6	.0	-28.7	67.9	.0	.0	.0
7	.0	-28.7	67.9	.0	.0	.0
8	.0	-28.7	67.9	.0	.0	.0
9	.0	-9.9	20.2	.0	.0	.0
10	.0	-9.9	20.2	.0	.0	.0
11	.0	-9.9	20.2	.0	.0	.0
12	.0	-9.9	20.2	.0	.0	.0
13	.0	-1.6	32.0	.0	.0	.0
14	.0	-1.6	32.0	.0	.0	.0
15	.0	-1.6	-31.6	.0	.0	.0
16	.0	-1.6	-31.6	.0	.0	.0

LOAD CASE - 5

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-16.5	-35.4	.0	.0	.0
2	.0	-16.5	-35.4	.0	.0	.0
3	.0	-16.5	-35.4	.0	.0	.0
4	.0	-16.5	-35.4	.0	.0	.0
5	.0	-36.2	85.2	.0	.0	.0
6	.0	-36.2	85.2	.0	.0	.0
7	.0	-36.2	85.2	.0	.0	.0
	.0	-36.2	85.2	.0	.0	.0
	.0	-23.1	52.0	.0	.0	.0
	.0	-23.1	52.0	.0	.0	.0
11	.0	-23.1	52.0	.0	.0	.0
12	.0	-23.1	52.0	.0	.0	.0
13	.0	-2.2	26.1	.0	.0	.0

14	.0	-2.2	26.1	.0	.0	.0
15	.0	-2.2	-18.2	.0	.0	.0
16	.0	-2.2	-18.2	.0	.0	.0

WEST Monolith # 2

36 B

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1000 WM2.IN (WEST MONOLITH) PS#6
1010 PRO 29000 729 261 21.4 1.5 0 13 to 16
1015 PRO 29000 261 729 21.4 1.5 0 1 TO 12
1020 SOI ES .1 TIP -87 0 ALL
10[illegible] IN ALL
1[illegible] [illegible]LLOW H 115 77.5 385.2 385.2 1926 644.4 13 TO 16
104[illegible] ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 1 TO 12
1060 BATTER 2.5 1 TO 4
1061 BATTER 2.5 9 TO 12
1062 BATTER 2.5 5 TO 8
1070 ANG 90 1 TO 4
1080 ANG 270 5 TO 12
1090 PIL 1 -9.167 -2.0 0.
1091 PIL 2 -3.167 -2.0 0.
1092 PIL 3 3.167 -2.0 0.
1093 PIL 4 9.167 -2.0 0.
1098 PIL 5 -9.167 -7.33 0.
1099 PIL 6 -3.167 -7.33 0.
1110 PIL 7 3.167 -7.33 0.
1112 PIL 8 9.167 -7.33 0.
1114 PIL 9 -9.167 -14.33 0.
1116 PIL 10 -3.167 -14.33 0.
1118 PIL 11 3.167 -14.33 0.
1119 PIL 12 9.167 -14.33 0.
1120 PIL 13 -12.83 -4.5 0.
1121 PIL 14 12.83 -4.5 0.
1122 PIL 15 -12.83 -11.83 0.
1123 PIL 16 12.83 -11.83 0.
1200 LOA 1 0. -43.2 635 -5374.5 0. 0.
1210 LOA 2 0. -366.19 583.9 -6522.2 0. 0.
1220 LOA 3 0. -130.12 668.47 -5346.0 0. 0.
1230 LOA 4 0. -177.03 332.69 -2639.45 0. 0.
12[illegible] [illegible]OA 5 0. -312.33 423.06 -5011.7 0. 0.
12[illegible] [illegible]U 1 2 3 4 5 6 7
12[illegible] [illegible]OU 1 2 3 4 5 6 7 WM2.OUT
1270 PSO
1280 PFO ALL
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***********************************
* CORPS PROGRAM  #  X0080       *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 1993/03/29   *  RUN DATE 25-OCT-1995    RUN TIME 12.53.45
***********************************


WM..IN (WEST MONOLITH) PS#6


THERE ARE   16 PILES AND
             5 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX
                                      X           Y           Z
                                    -----       -----       -----
WITH DIAGONAL COORDINATES = (     -12.83 ,    -14.33 ,      .00 )
                            (      12.83 ,     -2.00 ,      .00 )


********************************************************************************

        PILE PROPERTIES AS INPUT


      E            I1            I2            A            C33          B66
     KSI          IN**4         IN**4         IN**2
  .29000E+05   .72900E+03   .26100E+03   .21400E+02   .15000E+01   .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

  13   14   15   16


      E            I1            I2            A            C33          B66
     KSI          IN**4         IN**4         IN**2
  .29000E+05   .26100E+03   .72900E+03   .21400E+02   .15000E+01   .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

   1    2    3    4    5    6    7    8    9   10   11   12


********************************************************************************

        SOIL DESCRIPTIONS AS INPUT


   ES     ESOIL      LENGTH        L             LU
         K/IN**2                   FT            FT
         .10000E+00     T      -.87000E+02   .00000E+00

THIS SOIL DESCRIPTION APPLIES TO THE FOLLOWING PILES -

    ALL


********************************************************************************

        PILE STIFFNESSES AS CALCULATED FROM PROPERTIES


     4E+01   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
     0E+00   .65955E+01   .00000E+00   .00000E+00   .00000E+00   .00000E+00
  .00000E+00   .00000E+00   .82789E+03   .00000E+00   .00000E+00   .00000E+00
  .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
  .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00   .00000E+00
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.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

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PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-9.17	-2.00	.00	2.50	90.00	93.70	P
2	-3.17	-2.00	.00	2.50	90.00	93.70	P
3	3.17	-2.00	.00	2.50	90.00	93.70	P
4	9.17	-2.00	.00	2.50	90.00	93.70	P
5	-9.17	-7.33	.00	2.50	270.00	93.70	P
6	-3.17	-7.33	.00	2.50	270.00	93.70	P
7	3.17	-7.33	.00	2.50	270.00	93.70	P
8	9.17	-7.33	.00	2.50	270.00	93.70	P
9	-9.17	-14.33	.00	2.50	270.00	93.70	P
10	-3.17	-14.33	.00	2.50	270.00	93.70	P
11	3.17	-14.33	.00	2.50	270.00	93.70	P
12	9.17	-14.33	.00	2.50	270.00	93.70	P
13	-12.83	-4.50	.00	V	.00	87.00	P
14	12.83	-4.50	.00	V	.00	87.00	P
15	-12.83	-11.83	.00	V	.00	87.00	P
16	12.83	-11.83	.00	V	.00	87.00	P

						1472.42	

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APPLIED LOADS

LOAD CASE	PX K	PY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	.0	-43.2	635.0	-5374.5	.0	.0
2	.0	-366.2	583.9	-6522.2	.0	.0
3	.0	-130.1	668.5	-5346.0	.0	.0
4	.0	-177.0	332.7	-2639.5	.0	.0
5	.0	-312.3	423.1	-5011.7	.0	.0

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ORIGINAL PILE GROUP STIFFNESS MATRIX

.10553E+03	-.14069E-03	.24700E-03	-.37335E-01	.00000E+00	.10075E+05
-.14069E-03	.14926E+04	-.11302E+04	.26663E+06	.00000E+00	-.16154E-01
.24700E-03	-.11302E+04	.12145E+05	-.11613E+07	.00000E+00	.37335E-01
-.37335E-01	.26663E+06	-.11613E+07	.14947E+09	.37253E-08	-.55006E+01
.00000E+00	.36380E-11	.00000E+00	.00000E+00	.14264E+09	.76541E+07
.10075E+05	-.16154E-01	.37335E-01	-.55006E+01	.76541E+07	.11990E+08

LOAD CASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

LOAD CASE 3. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 6.

****

PILE CAP DISPLACEMENTS

LOAD CASE	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	-.1029E-06	.4293E-01	.2994E-01	-.2754E-03	.4185E-11	-.7800E-10
2	-.3554E-06	-.2991E+00	.8245E-01	.6506E-03	.3480E-11	-.6485E-10
3	-.1766E-06	-.9134E-01	.8201E-01	.3709E-03	.3327E-11	-.6201E-10
4	-.1781E-06	-.2000E+00	.8807E-01	.8292E-03	.7596E-12	-.1416E-10
5	-.2950E-06	-.2615E+00	.6471E-01	.5669E-03	.2548E-11	-.4749E-10

****

PILE FORCES IN LOCAL GEOMETRY

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO (F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

$ALF = F3/AC$ OR $F3/AT$

$CBF = F3/ACC$ (OR ATT) $+ M_1/AM1 + M_2/AM2$

L(ASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	.2	.0	41.3	.0	-12.3	.0	.33	.11
2	.2	.0	41.3	.0	-12.3	.0	.33	.11
3	.2	.0	41.3	.0	-12.3	.0	.33	.11
4	.2	.0	41.3	.0	-12.3	.0	.33	.11
5	-.5	.0	28.4	.0	28.1	.0	.23	.09
6	-.5	.0	28.4	.0	28.1	.0	.23	.09
7	-.5	.0	28.4	.0	28.1	.0	.23	.09
8	-.5	.0	28.4	.0	28.1	.0	.23	.09
9	-.6	.0	46.2	.0	32.1	.0	.37	.14
10	-.6	.0	46.2	.0	32.1	.0	.37	.14
11	-.6	.0	46.2	.0	32.1	.0	.37	.14
12	-.6	.0	46.2	.0	32.1	.0	.37	.14
13	.0	.4	40.0	20.1	.0	.0	.35	.11
14	.0	.4	40.0	20.1	.0	.0	.35	.11
15	.0	.4	61.6	20.1	.0	.0	.54	.17
16	.0	.4	61.6	20.1	.0	.0	.54	.17

LOAD CASE - 2

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
	-2.6	.0	-40.6	.0	141.7	.0	.49	.18
-	-2.6	.0	-40.6	.0	141.7	.0	.49	.18
3	-2.6	.0	-40.6	.0	141.7	.0	.49	.18
4	-2.6	.0	-40.6	.0	141.7	.0	.49	.18
5	2.3	.0	111.4	.0	-125.6	.0	.90	.35

$ALF_1 = \frac{40.6}{83.5} = .49$

$CBF_1 = \frac{40.6}{385.2} + \frac{0}{644.4} + \frac{141.7}{1926} = .18$

[illegible]

6	2.3	.0	111.4	.0	-125.6	.0	.90	.35
7	2.3	.0	111.4	.0	-125.6	.0	.90	.35
8	2.3	.0	111.4	.0	-125.6	.0	.90	.35
9	2.5	.0	69.4	.0	-135.1	.0	.56	.25
	2.5	.0	69.4	.0	-135.1	.0	.56	.25
	2.5	.0	69.4	.0	-135.1	.0	.56	.25
	2.5	.0	69.4	.0	-135.1	.0	.56	.25
13	.0	-2.6	42.2	-140.0	.0	.0	.37	.18
14	.0	-2.6	42.2	-140.0	.0	.0	.37	.18
15	.0	-2.6	-8.8	-140.0	.0	.0	.11	.10
16	.0	-2.6	-8.8	-140.0	.0	.0	.11	.10

$ALF_{13} = \frac{42.2}{115.0} = .37$

$CBF_{13} = \frac{42.2}{385.2} + \frac{140}{1926} + \frac{0}{644.H} = .18$

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-1.0	.0	28.1	.0	52.4	.0	.23	.10
2	-1.0	.0	28.1	.0	52.4	.0	.23	.10
3	-1.0	.0	28.1	.0	52.4	.0	.23	.10
4	-1.0	.0	28.1	.0	52.4	.0	.23	.10
5	.6	.0	66.0	.0	-31.1	.0	.53	.19
6	.6	.0	66.0	.0	-31.1	.0	.53	.19
7	.6	.0	66.0	.0	-31.1	.0	.53	.19
8	.6	.0	66.0	.0	-31.1	.0	.53	.19
9	.7	.0	42.1	.0	-36.5	.0	.34	.13
10	.7	.0	42.1	.0	-36.5	.0	.34	.13
11	.7	.0	42.1	.0	-36.5	.0	.34	.13
12	.7	.0	42.1	.0	-36.5	.0	.34	.13
13	.0	-.8	55.3	-42.8	.0	.0	.48	.17
14	.0	-.8	55.3	-42.8	.0	.0	.48	.17
	.0	-.8	26.2	-42.8	.0	.0	.23	.09
	.0	-.8	26.2	-42.8	.0	.0	.23	.09

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-1.8	.0	-9.1	.0	98.8	.0	.11	.07
2	-1.8	.0	-9.1	.0	98.8	.0	.11	.07
3	-1.8	.0	-9.1	.0	98.8	.0	.11	.07
4	-1.8	.0	-9.1	.0	98.8	.0	.11	.07
5	1.5	.0	73.1	.0	-84.3	.0	.59	.23
6	1.5	.0	73.1	.0	-84.3	.0	.59	.23
7	1.5	.0	73.1	.0	-84.3	.0	.59	.23
8	1.5	.0	73.1	.0	-84.3	.0	.59	.23
9	1.8	.0	19.6	.0	-96.4	.0	.16	.10
10	1.8	.0	19.6	.0	-96.4	.0	.16	.10
11	1.8	.0	19.6	.0	-96.4	.0	.16	.10
12	1.8	.0	19.6	.0	-96.4	.0	.16	.10
13	.0	-1.7	38.6	-93.7	.0	.0	.34	.15
14	.0	-1.7	38.6	-93.7	.0	.0	.34	.15
15	.0	-1.7	-26.4	-93.7	.0	.0	.34	.12
16	.0	-1.7	-26.4	-93.7	.0	.0	.34	.12

LOAD CASE - 5

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-2.2	.0	-41.1	.0	122.6	.0	.49	.17
2	-2.2	.0	-41.1	.0	122.6	.0	.49	.17

3	-2.2	.0	-41.1	.0	122.6	.0	.49	.17
4	-2.2	.0	-41.1	.0	122.6	.0	.49	.17
5	2.0	.0	91.8	.0	-111.1	.0	.74	.30
6	2.0	.0	91.8	.0	-111.1	.0	.74	.30
	2.0	.0	91.8	.0	-111.1	.0	.74	.30
	2.0	.0	91.8	.0	-111.1	.0	.74	.30
	2.2	.0	55.2	.0	-119.4	.0	.45	.21
10	2.2	.0	55.2	.0	-119.4	.0	.45	.21
11	2.2	.0	55.2	.0	-119.4	.0	.45	.21
12	2.2	.0	55.2	.0	-119.4	.0	.45	.21
13	.0	-2.2	30.4	-122.4	.0	.0	.26	.14
14	.0	-2.2	30.4	-122.4	.0	.0	.26	.14
15	.0	-2.2	-14.1	-122.4	.0	.0	.18	.10
16	.0	-2.2	-14.1	-122.4	.0	.0	.18	.10

****

PILE FORCES IN GLOBAL GEOMETRY

LOAD CASE - 1

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	15.5	38.3	.0	.0	.0
2	.0	15.5	38.3	.0	.0	.0
3	.0	15.5	38.3	.0	.0	.0
4	.0	15.5	38.3	.0	.0	.0
5	.0	-10.1	26.6	.0	.0	.0
	.0	-10.1	26.6	.0	.0	.0
	.0	-10.1	26.6	.0	.0	.0
	.0	-10.1	26.6	.0	.0	.0
9	.0	-16.6	43.1	.0	.0	.0
10	.0	-16.6	43.1	.0	.0	.0
11	.0	-16.6	43.1	.0	.0	.0
12	.0	-16.6	43.1	.0	.0	.0
13	.0	.4	40.0	.0	.0	.0
14	.0	.4	40.0	.0	.0	.0
15	.0	.4	61.6	.0	.0	.0
16	.0	.4	61.6	.0	.0	.0

LOAD CASE - 2

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-17.5	-36.7	.0	.0	.0
2	.0	-17.5	-36.7	.0	.0	.0
3	.0	-17.5	-36.7	.0	.0	.0
4	.0	-17.5	-36.7	.0	.0	.0
5	.0	-43.5	102.5	.0	.0	.0
6	.0	-43.5	102.5	.0	.0	.0
7	.0	-43.5	102.5	.0	.0	.0
8	.0	-43.5	102.5	.0	.0	.0
9	.0	-28.0	63.5	.0	.0	.0
10	.0	-28.0	63.5	.0	.0	.0
11	.0	-28.0	63.5	.0	.0	.0
	.0	-28.0	63.5	.0	.0	.0
	.0	-2.6	42.2	.0	.0	.0
14	.0	-2.6	42.2	.0	.0	.0
15	.0	-2.6	-8.8	.0	.0	.0
16	.0	-2.6	-8.8	.0	.0	.0

LOAD CASE - 3

P[illegible]	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	9.6	26.5	.0	.0	.0
2	.0	9.6	26.5	.0	.0	.0
3	.0	9.6	26.5	.0	.0	.0
4	.0	9.6	26.5	.0	.0	.0
5	.0	-25.1	61.1	.0	.0	.0
6	.0	-25.1	61.1	.0	.0	.0
7	.0	-25.1	61.1	.0	.0	.0
8	.0	-25.1	61.1	.0	.0	.0
9	.0	-16.3	38.8	.0	.0	.0
10	.0	-16.3	38.8	.0	.0	.0
11	.0	-16.3	38.8	.0	.0	.0
12	.0	-16.3	38.8	.0	.0	.0
13	.0	-.8	55.3	.0	.0	.0
14	.0	-.8	55.3	.0	.0	.0
15	.0	-.8	26.2	.0	.0	.0
16	.0	-.8	26.2	.0	.0	.0

LOAD CASE - 4

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-5.1	-7.8	.0	.0	.0
2	.0	-5.1	-7.8	.0	.0	.0
[illegible]	.0	-5.1	-7.8	.0	.0	.0
[illegible]	.0	-5.1	-7.8	.0	.0	.0
[illegible]	.0	-28.6	67.3	.0	.0	.0
6	.0	-28.6	67.3	.0	.0	.0
7	.0	-28.6	67.3	.0	.0	.0
8	.0	-28.6	67.3	.0	.0	.0
9	.0	-8.9	17.5	.0	.0	.0
10	.0	-8.9	17.5	.0	.0	.0
11	.0	-8.9	17.5	.0	.0	.0
12	.0	-8.9	17.5	.0	.0	.0
13	.0	-1.7	38.6	.0	.0	.0
14	.0	-1.7	38.6	.0	.0	.0
15	.0	-1.7	-26.4	.0	.0	.0
16	.0	-1.7	-26.4	.0	.0	.0

LOAD CASE - 5

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.0	-17.3	-37.4	.0	.0	.0
2	.0	-17.3	-37.4	.0	.0	.0
3	.0	-17.3	-37.4	.0	.0	.0
4	.0	-17.3	-37.4	.0	.0	.0
5	.0	-36.0	84.5	.0	.0	.0
6	.0	-36.0	84.5	.0	.0	.0
7	.0	-36.0	84.5	.0	.0	.0
[illegible]	.0	-36.0	84.5	.0	.0	.0
[illegible]	.0	-22.5	50.5	.0	.0	.0
[illegible]	.0	-22.5	50.5	.0	.0	.0
11	.0	-22.5	50.5	.0	.0	.0
12	.0	-22.5	50.5	.0	.0	.0
13	.0	-2.2	30.4	.0	.0	.0

14	.0	-2.2	30.4	.0	.0	.0
15	.0	-2.2	-14.1	.0	.0	.0
16	.0	-2.2	-14.1	.0	.0	.0

WEST Monolith #3

36C

```
1000 WM3.IN (WEST MONOLITH) PS#6
1010 PRO 29000 261 729 21.4 1.5 0 1 TO 12
1015 PRO 29000 261 729 21.4 1.5 0 13 TO 20
1020 SOI ES .1 TIP -87 0 ALL
103[illegible] N ALL
1[illegible] .LOW H 123.9 83.5 385.2 385.2 644.4 1926 1 TO 12
104[illegible] ALLOW H 115 77.5 385.2 385.2 644.4 1926 13 TO 20
1060 BATTER 2.5 1 TO 4
1061 BATTER 2.5 9 TO 12
1062 BATTER 2.5 5 TO 8
1070 ANG 90 1 TO 4
1080 ANG 270 5 TO 12
1090 PIL 1 -10.0 -2.0 0.
1091 PIL 2 -3.33 -2.0 0.
1092 PIL 3 3.33 -2.0 0.
1093 PIL 4 10.0 -2.0 0.
1098 PIL 5 -10.0 -7.33 0.
1099 PIL 6 -3.33 -7.33 0.
1110 PIL 7 3.33 -7.33 0.
1112 PIL 8 10.0 -7.33 0.
1114 PIL 9 -10.0 -14.33 0.
1116 PIL 10 -3.33 -14.33 0.
1118 PIL 11 3.33 -14.33 0.
1119 PIL 12 10.0 -14.33 0.
1120 PIL 13 -12.83 -4.5 0.
1121 PIL 14 -6.67 -4.5 0.
1122 PIL 15 6.67 -4.5 0.
1123 PIL 16 12.83 -4.5 0.
1124 PIL 17 -12.83 -11.83 0.
1125 PIL 18 -6.67 -11.83 0.
1126 PIL 19 6.67 -11.83 0.
1127 PIL 20 12.83 -11.83 0.
120[illegible] A 1 -238.1 -43.2 635 -5374.5 1428.8 -1944.1
12[illegible] A 2 -148.1 -366.19 583.9 -6522.2 888.0 -1209.2
122[illegible] LOA 3 -150.17 -130.12 668.47 -5346.0 923.6 -1226.13
1230 LOA 4 -112.63 -177.03 332.69 -2639.45 692.7 -919.6
1240 LOA 5 -111.1 -312.33 423.06 -5011.7 666.0 -906.9
1250 TOU 1 2 3 4 5 6 7
1260 FOU 1 2 3 4 5 6 7 WM3.OUT
1270 PSO
1280 PFO ALL
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***********************************
* CORPS PROGRAM  #  X0080      *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 1993/03/29  *  RUN DATE 25-OCT-1995   RUN TIME 12.13.42
***********************************


WA...N (WEST MONOLITH) PS#6


THERE ARE   20 PILES AND
             5 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX
                                        X          Y          Z
                                      -----      -----      -----
WITH DIAGONAL COORDINATES = (     -12.83 ,   -14.33 ,       .00 )
                            (      12.83 ,    -2.00 ,       .00 )


********************************************************************************

         PILE PROPERTIES AS INPUT


     E           I1           I2           A            C33          B66
    KSI         IN**4        IN**4        IN**2
 .29000E+05  .26100E+03  .72900E+03  .21400E+02  .15000E+01  .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

   1    2    3    4    5    6    7    8    9   10   11   12


     E           I1           I2           A            C33          B66
    KSI         IN**4        IN**4        IN**2
 .29000E+05  .26100E+03  .72900E+03  .21400E+02  .15000E+01  .00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

  13   14   15   16   17   18   19   20


********************************************************************************

         SOIL DESCRIPTIONS AS INPUT


   ES     ESOIL       LENGTH        L              LU
         K/IN**2                    FT             FT
         .10000E+00     T      -.87000E+02    .00000E+00

THIS SOIL DESCRIPTION APPLIES TO THE FOLLOWING PILES -

    ALL


********************************************************************************

         PILE STIFFNESSES AS CALCULATED FROM PROPERTIES


      44E+01  .00000E+00  .00000E+00  .00000E+00  .00000E+00  .00000E+00
      0E+00   .65955E+01  .00000E+00  .00000E+00  .00000E+00  .00000E+00
 .00000E+00  .00000E+00  .82789E+03  .00000E+00  .00000E+00  .00000E+00
 .00000E+00  .00000E+00  .00000E+00  .00000E+00  .00000E+00  .00000E+00
 .00000E+00  .00000E+00  .00000E+00  .00000E+00  .00000E+00  .00000E+00
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.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

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PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-10.00	-2.00	.00	2.50	90.00	93.70	P
2	-3.33	-2.00	.00	2.50	90.00	93.70	P
3	3.33	-2.00	.00	2.50	90.00	93.70	P
4	10.00	-2.00	.00	2.50	90.00	93.70	P
5	-10.00	-7.33	.00	2.50	270.00	93.70	P
6	-3.33	-7.33	.00	2.50	270.00	93.70	P
7	3.33	-7.33	.00	2.50	270.00	93.70	P
8	10.00	-7.33	.00	2.50	270.00	93.70	P
9	-10.00	-14.33	.00	2.50	270.00	93.70	P
10	-3.33	-14.33	.00	2.50	270.00	93.70	P
11	3.33	-14.33	.00	2.50	270.00	93.70	P
12	10.00	-14.33	.00	2.50	270.00	93.70	P
13	-12.83	-4.50	.00	V	.00	87.00	P
14	-6.67	-4.50	.00	V	.00	87.00	P
15	6.67	-4.50	.00	V	.00	87.00	P
16	12.83	-4.50	.00	V	.00	87.00	P
17	-12.83	-11.83	.00	V	.00	87.00	P
	-6.67	-11.83	.00	V	.00	87.00	P
	6.67	-11.83	.00	V	.00	87.00	P
	12.83	-11.83	.00	V	.00	87.00	P

						1820.42	

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APPLIED LOADS

LOAD CASE	PX K	PY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	-238.1	-43.2	635.0	-5374.5	1428.8	-1944.1
2	-148.1	-366.2	583.9	-6522.2	888.0	-1209.2
3	-150.2	-130.1	668.5	-5346.0	923.6	-1226.1
4	-112.6	-177.0	332.7	-2639.5	692.7	-919.6
5	-111.1	-312.3	423.1	-5011.7	666.0	-906.9

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ORIGINAL PILE GROUP STIFFNESS MATRIX

.14736E+03	-.14069E-03	.24700E-03	-.37335E-01	.00000E+00	.14174E+05
-.14069E-03	.15113E+04	-.11302E+04	.26663E+06	-.72760E-11	-.16154E-01
.24700E-03	-.11302E+04	.15712E+05	-.15108E+07	.00000E+00	.37335E-01
335E-01	.26663E+06	-.15108E+07	.19061E+09	.37253E-08	-.55006E+01
00E+00	.00000E+00	.00000E+00	.00000E+00	.17601E+09	.90395E+07
.74E+05	-.16154E-01	.37335E-01	-.55006E+01	.90395E+07	.14246E+08

LOAD CASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 7.

LOAD CASE 3. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 8.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 8.

****

PILE CAP DISPLACEMENTS

LOAD CASE	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	-.1606E+01	.1642E-01	.2881E-01	-.1330E-03	.1028E-03	-.1053E-03
2	-.9988E+00	-.2809E+00	.6416E-01	.4909E-03	.6390E-04	-.6543E-04
3	-.1013E+01	-.9376E-01	.6748E-01	.3295E-03	.6644E-04	-.6752E-04
4	-.7595E+00	-.1753E+00	.6797E-01	.6178E-03	.4983E-04	-.5062E-04
5	-.7493E+00	-.2434E+00	.4969E-01	.4188E-03	.4792E-04	-.4888E-04

****

PILE FORCES IN LOCAL GEOMETRY

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO (F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

$$ALF = F3/AC$$

$$CBF = F3/Acc + M_1/AM1 + M_2/AM2$$

LOAD CASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	.1	10.6	43.0	450.5	-4.9	.0	.35	.81
2	.0	10.6	34.1	450.5	-2.7	.0	.28	.79
3	.0	10.6	25.2	450.5	-.5	.0	.20	.76
4	.0	10.6	16.3	450.5	1.8	.0	.13	.74
5	-.4	-10.7	31.7	-452.4	21.8	.0	.26	.80
6	-.3	-10.7	28.0	-452.4	16.7	.0	.23	.78
7	-.2	-10.7	24.2	-452.4	11.6	.0	.20	.77
8	-.1	-10.7	20.5	-452.4	6.5	.0	.17	.76
9	-.4	-10.7	40.3	-454.9	23.8	.0	.33	.82
10	-.3	-10.7	36.5	-454.9	18.7	.0	.29	.81
11	-.2	-10.7	32.8	-454.9	13.6	.0	.26	.80
12	-.2	-10.7	29.1	-454.9	8.5	.0	.23	.79
13	-13.7	.2	46.2	9.1	754.4	.0	.40	.53
14	-13.7	.2	39.4	7.0	754.4	.0	.34	.50
15	-13.7	.1	24.8	2.2	754.4	.0	.22	.46
16	-13.7	.0	18.0	.1	754.4	.0	.16	.44
17	-13.8	.2	56.6	9.1	758.8	.0	.49	.56
18	-13.8	.2	49.9	7.0	758.8	.0	.43	.53
	-13.8	.1	35.2	2.2	758.8	.0	.31	.49
	-13.8	.0	28.4	.1	758.8	.0	.25	.47

$$ALF_4 = \frac{16.3}{123.9} = .13$$

$$CBF_4 = \frac{16.3}{385.2} + \frac{450.5}{644.4} + \frac{1.8}{1926} = .74$$

$$ALF_{17} = \frac{56.6}{115} = .49$$

$$CBF_{17} = \frac{56.6}{386.2} + \frac{9.1}{644.4} + \frac{758.8}{1926} = .56$$

LOAD CASE - 2

— VALUES USED IN LOADING TABLE

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-2.4	6.6	-37.8	280.2	129.2	.0	.45	.60
	-2.4	6.6	-43.4	280.2	130.5	.0	.52	.62
	-2.4	6.6	-48.9	280.2	131.9	.0	.59	.63
	-2.4	6.6	-54.4	280.2	133.3	.0	.65	.65
5	2.1	-6.6	106.0	-281.4	-113.7	.0	.86	.77
6	2.1	-6.6	103.7	-281.4	-116.9	.0	.84	.77
7	2.2	-6.6	101.3	-281.4	-120.1	.0	.82	.76
8	2.2	-6.6	99.0	-281.4	-123.2	.0	.80	.76
9	2.2	-6.7	74.3	-282.9	-120.9	.0	.60	.69
10	2.3	-6.7	72.0	-282.9	-124.1	.0	.58	.69
11	2.3	-6.7	69.6	-282.9	-127.2	.0	.56	.69
12	2.4	-6.7	67.3	-282.9	-130.4	.0	.54	.68
13	-8.5	-1.8	42.3	-75.9	469.3	.0	.37	.47
14	-8.5	-1.8	38.1	-77.2	469.3	.0	.33	.46
15	-8.5	-1.9	29.0	-80.2	469.3	.0	.25	.44
16	-8.5	-1.9	24.8	-81.5	469.3	.0	.22	.43
17	-8.6	-1.8	3.8	-75.9	471.9	.0	.03	.37
18	-8.6	-1.8	-.4	-77.2	471.9	.0	.00	.37
19	-8.6	-1.9	-9.5	-80.2	471.9	.0	.12	.39
20	-8.6	-1.9	-13.7	-81.5	471.9	.0	.18	.41

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-.9	6.7	25.6	284.1	49.0	.0	.21	.53
2	-.9	6.7	19.8	284.1	50.4	.0	.16	.52
	-.9	6.7	14.1	284.1	51.8	.0	.11	.50
	-1.0	6.7	8.3	284.1	53.3	.0	.07	.49
	.5	-6.7	62.1	-285.3	-29.2	.0	.50	.62
6	.6	-6.7	59.6	-285.3	-32.4	.0	.48	.61
7	.7	-6.7	57.2	-285.3	-35.7	.0	.46	.61
8	.7	-6.7	54.8	-285.3	-39.0	.0	.44	.61
9	.6	-6.8	40.8	-286.9	-34.0	.0	.33	.57
10	.7	-6.8	38.4	-286.9	-37.2	.0	.31	.56
11	.7	-6.8	35.9	-286.9	-40.5	.0	.29	.56
12	.8	-6.8	33.5	-286.9	-43.8	.0	.27	.55
13	-8.7	-.5	53.4	-23.4	475.8	.0	.46	.42
14	-8.7	-.6	49.0	-24.8	475.8	.0	.43	.41
15	-8.7	-.7	39.6	-27.8	475.8	.0	.34	.39
16	-8.7	-.7	35.2	-29.2	475.8	.0	.31	.38
17	-8.7	-.5	27.6	-23.4	478.6	.0	.24	.36
18	-8.7	-.6	23.2	-24.8	478.6	.0	.20	.35
19	-8.7	-.7	13.7	-27.8	478.6	.0	.12	.33
20	-8.7	-.7	9.3	-29.2	478.6	.0	.08	.32

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-1.5	5.0	-6.6	213.1	83.8	.0	.08	.39
2	-1.5	5.0	-10.9	213.1	84.9	.0	.13	.40
3	-1.6	5.0	-15.2	213.1	86.0	.0	.18	.41
	-1.6	5.0	-19.5	213.1	87.0	.0	.23	.43
	1.3	-5.0	67.1	-214.0	-70.2	.0	.54	.54
	1.3	-5.0	65.3	-214.0	-72.6	.0	.53	.54
7	1.4	-5.0	63.5	-214.0	-75.1	.0	.51	.54
8	1.4	-5.0	61.7	-214.0	-77.5	.0	.50	.53
9	1.4	-5.1	27.2	-215.2	-79.2	.0	.22	.45

10	1.5	-5.1	25.4	-215.2	-81.6	.0	.20	.44
11	1.5	-5.1	23.6	-215.2	-84.1	.0	.19	.44
12	1.6	-5.1	21.8	-215.2	-86.5	.0	.18	.44
13	-6.5	-1.1	37.7	-46.9	356.9	.0	.33	.36
	-6.5	-1.1	34.4	-48.0	356.9	.0	.30	.35
	-6.5	-1.2	27.3	-50.2	356.9	.0	.24	.33
	-6.5	-1.2	24.0	-51.3	356.9	.0	.21	.33
17	-6.5	-1.1	-10.8	-46.9	358.9	.0	.14	.29
18	-6.5	-1.1	-14.0	-48.0	358.9	.0	.18	.30
19	-6.5	-1.2	-21.2	-50.2	358.9	.0	.27	.32
20	-6.5	-1.2	-24.4	-51.3	358.9	.0	.32	.33

LOAD CASE - 5

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-2.0	4.9	-38.1	210.2	111.1	.0	.46	.48
2	-2.0	4.9	-42.3	210.2	112.2	.0	.51	.49
3	-2.1	4.9	-46.4	210.2	113.2	.0	.56	.51
4	-2.1	4.9	-50.6	210.2	114.2	.0	.61	.52
5	1.8	-5.0	87.3	-211.1	-100.0	.0	.70	.61
6	1.9	-5.0	85.6	-211.1	-102.4	.0	.69	.60
7	1.9	-5.0	83.8	-211.1	-104.8	.0	.68	.60
8	2.0	-5.0	82.1	-211.1	-107.1	.0	.66	.60
9	1.9	-5.0	60.3	-212.2	-106.1	.0	.49	.54
10	2.0	-5.0	58.5	-212.2	-108.5	.0	.47	.54
11	2.0	-5.0	56.8	-212.2	-110.9	.0	.46	.53
12	2.1	-5.0	55.1	-212.2	-113.2	.0	.44	.53
13	-6.4	-1.6	30.7	-66.1	352.0	.0	.27	.37
14	-6.4	-1.6	27.6	-67.1	352.0	.0	.24	.36
	-6.4	-1.6	20.7	-69.3	352.0	.0	.18	.34
	-6.4	-1.7	17.6	-70.3	352.0	.0	.15	.34
	-6.4	-1.6	-2.1	-66.1	354.0	.0	.03	.29
18	-6.4	-1.6	-5.3	-67.1	354.0	.0	.07	.30
19	-6.4	-1.6	-12.1	-69.3	354.0	.0	.16	.32
20	-6.4	-1.7	-15.3	-70.3	354.0	.0	.20	.33

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PILE FORCES IN GLOBAL GEOMETRY

LOAD CASE - 1

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-10.6	16.1	39.9	.0	.0	.0
2	-10.6	12.7	31.6	.0	.0	.0
3	-10.6	9.4	23.4	.0	.0	.0
4	-10.6	6.0	15.1	.0	.0	.0
5	-10.7	-11.4	29.6	.0	.0	.0
6	-10.7	-10.1	26.1	.0	.0	.0
7	-10.7	-8.8	22.6	.0	.0	.0
8	-10.7	-7.5	19.1	.0	.0	.0
9	-10.7	-14.6	37.6	.0	.0	.0
	-10.7	-13.3	34.1	.0	.0	.0
	-10.7	-12.0	30.6	.0	.0	.0
	-10.7	-10.7	27.1	.0	.0	.0
13	-13.7	.2	46.2	.0	.0	.0
14	-13.7	.2	39.4	.0	.0	.0
15	-13.7	.1	24.8	.0	.0	.0

16	-13.7	.0	18.0	.0	.0	.0
17	-13.8	.2	56.6	.0	.0	.0
18	-13.8	.2	49.9	.0	.0	.0
19	-13.8	.1	35.2	.0	.0	.0
[illegible]	-13.8	.0	28.4	.0	.0	.0

LOAD CASE - 2

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-6.6	-16.2	-34.2	.0	.0	.0
2	-6.6	-18.3	-39.4	.0	.0	.0
3	-6.6	-20.4	-44.5	.0	.0	.0
4	-6.6	-22.5	-49.6	.0	.0	.0
5	-6.6	-41.3	97.6	.0	.0	.0
6	-6.6	-40.5	95.5	.0	.0	.0
7	-6.6	-39.7	93.3	.0	.0	.0
8	-6.6	-38.9	91.1	.0	.0	.0
9	-6.7	-29.6	68.2	.0	.0	.0
10	-6.7	-28.8	66.0	.0	.0	.0
11	-6.7	-28.0	63.8	.0	.0	.0
12	-6.7	-27.2	61.6	.0	.0	.0
13	-8.5	-1.8	42.3	.0	.0	.0
14	-8.5	-1.8	38.1	.0	.0	.0
15	-8.5	-1.9	29.0	.0	.0	.0
16	-8.5	-1.9	24.8	.0	.0	.0
17	-8.6	-1.8	3.8	.0	.0	.0
18	-8.6	-1.8	-.4	.0	.0	.0
19	-8.6	-1.9	-9.5	.0	.0	.0
20	-8.6	-1.9	-13.7	.0	.0	.0

LOAD CASE - 3

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-6.7	8.7	24.1	.0	.0	.0
2	-6.7	6.5	18.8	.0	.0	.0
3	-6.7	4.4	13.4	.0	.0	.0
4	-6.7	2.2	8.1	.0	.0	.0
5	-6.7	-23.5	57.4	.0	.0	.0
6	-6.7	-22.7	55.2	.0	.0	.0
7	-6.7	-21.9	52.9	.0	.0	.0
8	-6.7	-21.0	50.6	.0	.0	.0
9	-6.8	-15.7	37.6	.0	.0	.0
10	-6.8	-14.9	35.4	.0	.0	.0
11	-6.8	-14.0	33.1	.0	.0	.0
12	-6.8	-13.2	30.8	.0	.0	.0
13	-8.7	-.5	53.4	.0	.0	.0
14	-8.7	-.6	49.0	.0	.0	.0
15	-8.7	-.7	39.6	.0	.0	.0
16	-8.7	-.7	35.2	.0	.0	.0
17	-8.7	-.5	27.6	.0	.0	.0
18	-8.7	-.6	23.2	.0	.0	.0
19	-8.7	-.7	13.7	.0	.0	.0
20	-8.7	-.7	9.3	.0	.0	.0

LOAD CASE - 4

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K

1	-5.0	-3.9	-5.5	.0	.0	.0
2	-5.0	-5.5	-9.5	.0	.0	.0
3	-5.0	-7.1	-13.5	.0	.0	.0
4	-5.0	-8.7	-17.5	.0	.0	.0
	-5.0	-26.1	61.8	.0	.0	.0
	-5.0	-25.5	60.1	.0	.0	.0
	-5.0	-24.8	58.4	.0	.0	.0
8	-5.0	-24.2	56.7	.0	.0	.0
9	-5.1	-11.4	24.7	.0	.0	.0
10	-5.1	-10.8	23.0	.0	.0	.0
11	-5.1	-10.2	21.3	.0	.0	.0
12	-5.1	-9.5	19.6	.0	.0	.0
13	-6.5	-1.1	37.7	.0	.0	.0
14	-6.5	-1.1	34.4	.0	.0	.0
15	-6.5	-1.2	27.3	.0	.0	.0
16	-6.5	-1.2	24.0	.0	.0	.0
17	-6.5	-1.1	-10.8	.0	.0	.0
18	-6.5	-1.1	-14.0	.0	.0	.0
19	-6.5	-1.2	-21.2	.0	.0	.0
20	-6.5	-1.2	-24.4	.0	.0	.0

LOAD CASE - 5

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-4.9	-16.0	-34.7	.0	.0	.0
2	-4.9	-17.6	-38.5	.0	.0	.0
3	-4.9	-19.2	-42.4	.0	.0	.0
4	-4.9	-20.7	-46.2	.0	.0	.0
5	-5.0	-34.1	80.4	.0	.0	.0
	-5.0	-33.5	78.8	.0	.0	.0
	-5.0	-32.9	77.1	.0	.0	.0
	-5.0	-32.3	75.5	.0	.0	.0
9	-5.0	-24.2	55.3	.0	.0	.0
10	-5.0	-23.6	53.6	.0	.0	.0
11	-5.0	-23.0	52.0	.0	.0	.0
12	-5.0	-22.4	50.4	.0	.0	.0
13	-6.4	-1.6	30.7	.0	.0	.0
14	-6.4	-1.6	27.6	.0	.0	.0
15	-6.4	-1.6	20.7	.0	.0	.0
16	-6.4	-1.7	17.6	.0	.0	.0
17	-6.4	-1.6	-2.1	.0	.0	.0
18	-6.4	-1.6	-5.3	.0	.0	.0
19	-6.4	-1.6	-12.1	.0	.0	.0
20	-6.4	-1.7	-15.3	.0	.0	.0

LOAD CASES FOR EAST SLUICE GATE MONOLITH

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 37
Made By: SPC	Date: 11/3/95	P.S. No. 6	
Checked By:	Date:		

LOAD CASES FOR

EAST SLUICE GATE MONOLITH

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229	Sheet No. 38
Made By: SCB	Date: 9/22/95	PS #6	
Checked By: SPC	Date: 11/4/95		

P.S. = Protected Side
F.S. = Flood Side

Load Cases

East Sluice Gate Monolith

1. Construction Case (33⅓% Allow. Overstress)
   - Site Dewatered
   - Dead Loads
   - Earth Pressure (Horz. Force on 3' Base Slab)
   - Storm Wind Load (50psf on FS)
   - Construction LL (20psf)
   - Backfill on P.S. (2' Avg.)

2. Still Water Level (SWL) Condition
   - F.S. EL. = 12.6' P.S. EL. Bott. of Base Slab
   - Water in tube Acting on Closed Sluice Gate
   - Storm Wind Load (50psf on F.S.)
   - L.L. on Top of Monolith (60psf)
   - Dead Loads
   - Earth Pressure (Horiz. Force on 3' Base Slab)
   - Backfill on P.S. 2' Avg
   - Uplift Pressure Pervious Cut-off Wall

3. Same as Case 2, But with Impervious Cut-off Wall

4. Normal Operating Condition
   - F.S. EL = 2.0' P.S. EL = Bott. of Base Slab
   - LL on top of Monolith (60psf)
   - Dead Loads
   - Earth Pressure (Horz. Force on 3' Base Slab)
   - Backfill on P.S. 2' Avg.
   - Uplift – Impervious Cut-off Wall

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 39
Made By: SCB	Date: 9/22/95	P.S. #6	
Checked By: SPC	Date: 11/4/95		

(EAST CONT.)

5. Maintenance Condition (Stop Logs in Place) (33 1/3 Allow. overstress)

- FS EL = 2.0'   P.S. EL = Bott of Base Slab
- Live Load on Top of Monolith (60psf)
- Dead Loads
- Earth Pressure (Horiz Force on 3' Base Slab)
- Uplift – Impervious Cutoff Wall
- Backfill on P.S. (2' AVG.)

✓ 6. Water 2' Above SWL (33 1/3 Allow. Overstress)

- FS EL = 14.6   P.S. EL. = Bott of Base Slab
- Water in tube acting on closed sluice Gate
- Backfill on P.S. (2')
- Live Load on Top of Monolith (60psf)
- Dead Loads
- Earth Pressure (Horiz Force on 3' Base Slab)
- Uplift Pressure   Pervious Cutoff Wall

7. Same as Case 6, But with Impervious Cut-off Wall

✓ 8. Water Ponding on P.S. (33 1/3 Allow. Over Stress)

- FS EL = -5.0   P.S. EL = -2.0
- Water Ponding on P.S. on top of Tubes to Top of New Monolith
- Live Load on top of Monolith (60psf)
- Dead Load
- Uplift – Impervious Cutoff Wall
- Earth Pressure (Horiz. Force on 3' Base Slab)
- Backfill on P.S. (2')

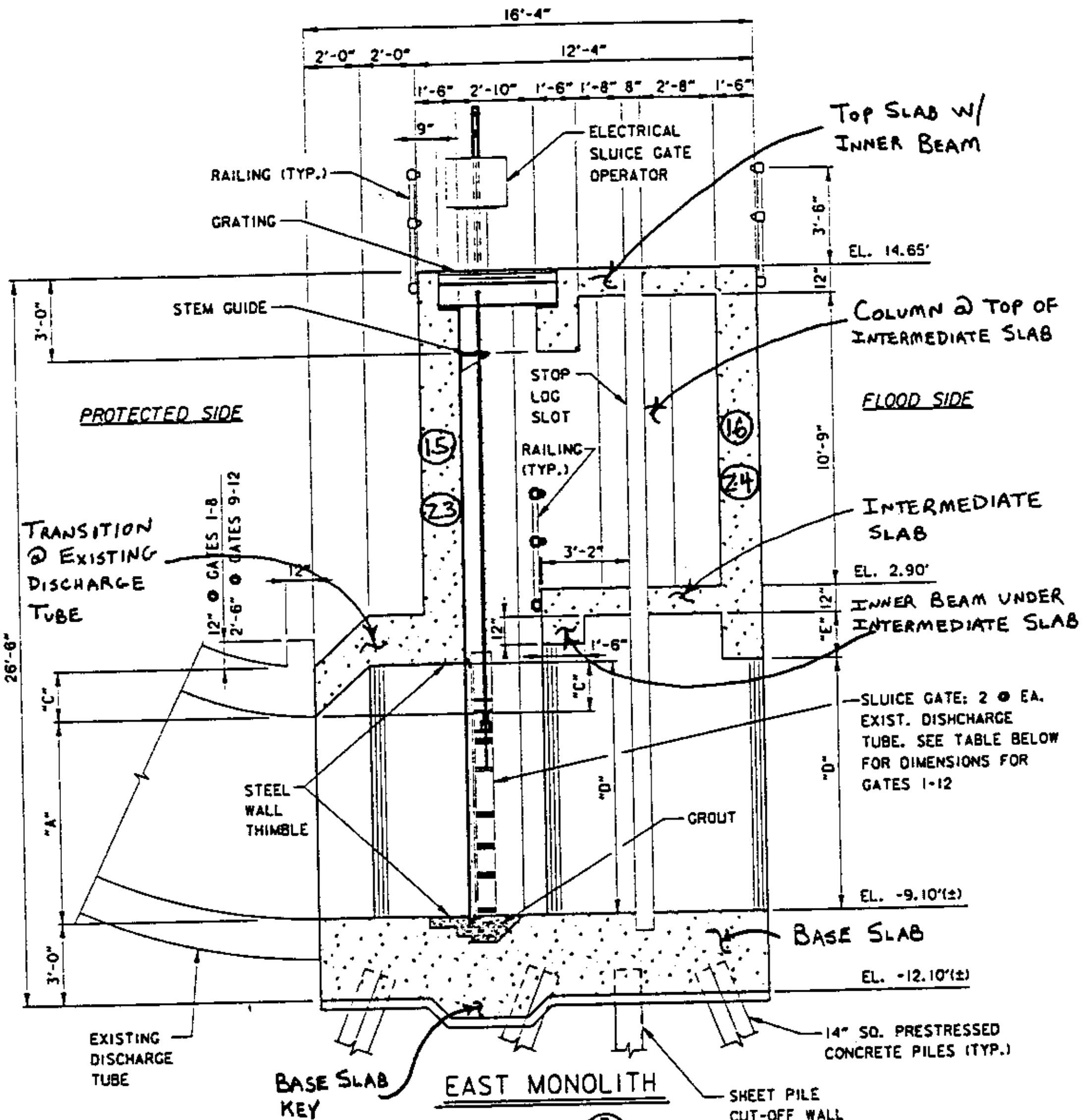
EAST MONOLITH DEAD LOADS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 40
Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By:	Date:		

EAST MONOLITH

DEAD LOADS

CALL-OUTS FOR EAST MONOLITH DEAD LOADS



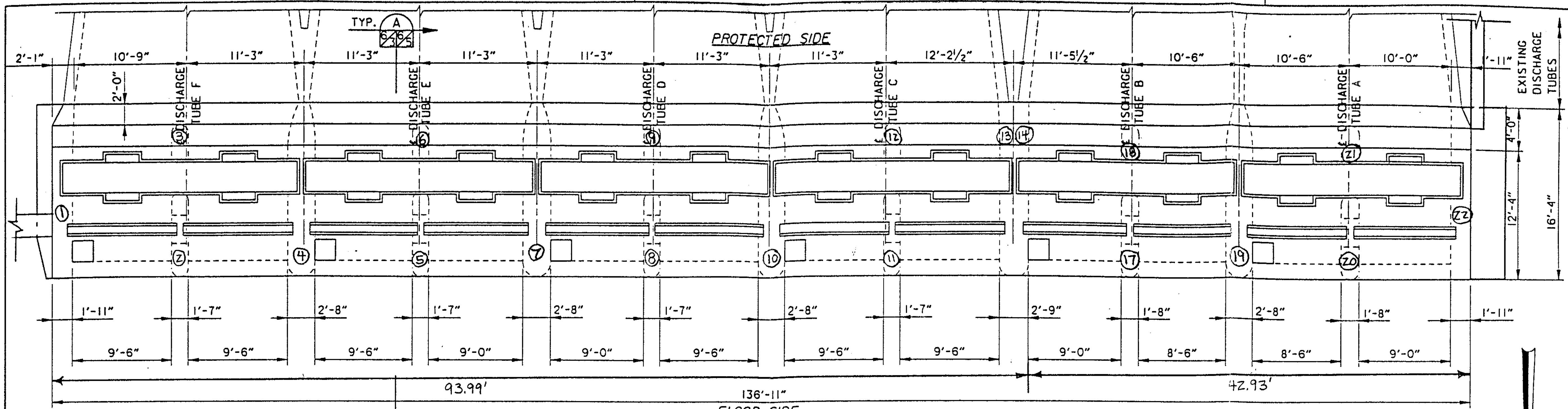
EAST MONOLITH

SECTION B

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

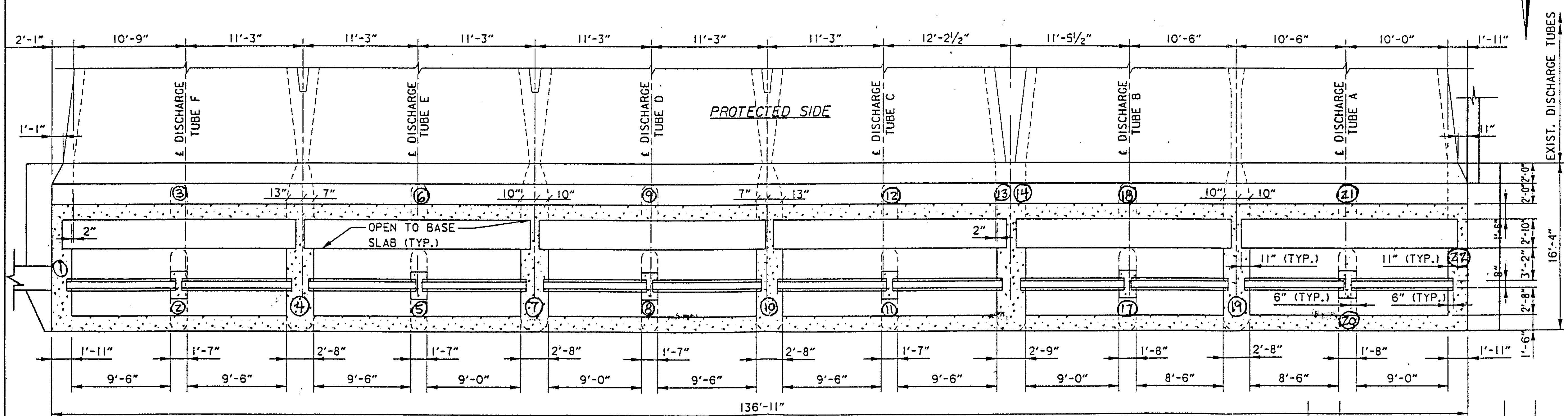
GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

42



PLAN @ EL. 14.65'

SCALE: ¼"=1'-0"



PLAN @ EL. 2.90' - EAST MONOLITH

SCALE: ¼"=1'-0"

Call-Outs For East Monolith Dead Loads

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

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

LAKE PONTCHARTRAIN, LA. AND VACINITY HURRICANE PROTECTION
HIGH LEVEL PLAN
FRONTING PROTECTION
AT PUMP STATION #6
ORLEANS PARISH - JEFFERSON PARISH
17th STREET OUTFALL CANAL
(METAIRIE RELIEF)

STRUCTURAL PLANS
EAST MONOLITHS

DESIGNED BY: S.C.B.
DRAWN BY: C.L.L.
CHECKED BY: M.D.P.
SUBMITTED BY:
DESIGN ENGINEER

DATE: X | PLOT SCALE: X | PLOT DATE: X

CADD FILE: PS6-6-3.DGN

SOLICITATION NO. DACW29-95-R-0005

FILE NO. H-2-30300

DWG. 6-3 OF X

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.00	Sheet No. 43
Made By: SPC	Date: 8/23/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

East Discharge Tubes

Weights ① → ⑧

Base Slab $= [(3')(14.33')(93.83') + (3')(2')(93.37')](0.150^{K}/FT^3)$
$= (4,593.97\ FT^3)(0.150^{K}/FT^3) = 689.10^{K}$

Base Slab Key $= [(1')(5')(93.83')](0.150^{K}/FT^3)$
$= (469.15\ FT^3)(0.150^{K}/FT^3) = 70.37^{K}$

* Wall ① $= [(1.92')(12.33')(23.75') + (1.92')(2')(11.5') + (1.46')(2')(10.5') - (0.92')(2.83')(23.75') - (0.5')(0.67')(23.75')](0.150^{K}/FT^3)$
$= (567.28\ FT^3)(0.150^{K}/FT^3) = 85.09^{K}$: Wall (1A) $= 73.87^{K}$
Wall (1B) $= 11.22^{K}$

Wall ② $= [(12')(1.58')(8') - (2)(0.67')(0.5')(12')](0.150^{K}/FT^3)$
$= (143.64\ FT^3)(0.150^{K}/FT^3)$
$= 21.55^{K}$

Wall ③ $= [(3.5')(1.58')(9.5')](0.150^{K}/FT^3)$
$= (52.54\ FT^3)(0.150^{K}/FT^3)$
$= 7.88^{K}$

* Wall ④ $= [(2.67')(12.33')(23.75') + (2.67')(2')(11.50') + (0.5)(2')(1.08')(10.5') + (1')(2')(10.5') + (0.5)(2')(0.58')(10.5') - (2)(2.83')(0.92')(23.75') - (2)(0.5')(0.67')(23.75')] \times (0.150^{K}/FT^3)$
$= (742.13\ FT^3)(0.150^{K}/FT^3)$
$= 111.32^{K}$: Wall (4A) $= 96.34^{K}$, Wall (4B) $= 14.98^{K}$

Wall ⑤ = Wall ② $= 21.55^{K}$

Wall ⑥ = Wall ③ $= 7.88^{K}$

* Wall ⑦ $= [(2.67')(12.33')(23.75') + (2.67')(2')(11.50') + (0.5)(2')(0.83')(10.5')(2) + (2')(1')(10.5') - (2)(2.83')(0.92')(23.75') - (2)(0.5')(0.67')(23.75')] \times (0.150^{K}/FT^3)$
$= (742.13\ FT^3)(0.150^{K}/FT^3)$
$= 111.32^{K}$: Wall (7A) $= 96.34^{K}$, Wall (7B) $= 14.98^{K}$

* Seperate wall into portions A & B for ease of finding centroid. "A" represents taller portion of wall.

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 44
Made By: SPC	Date: 8/24/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

EAST DISCHARGE TUBES

WEIGHTS ① → ⑧

$W_{ALL_{⑧}} = W_{ALL_{②}} = 21.55^K$

$W_{ALL_{⑨}} = W_{ALL_{③}} = 7.88^K$

* $W_{ALL_{⑩}} = W_{ALL_{④}} = 111.32^K$: $W_{ALL_{10A}} = 96.34^K$, $W_{ALL_{10B}} = 14.98^K$

$W_{ALL_{⑪}} = W_{ALL_{②}} = 21.55^K$

$W_{ALL_{⑫}} = W_{ALL_{③}} = 7.88^K$

* $W_{ALL_{⑬}} = [(1.38')(12.33')(23.75') + (2')(11.50')(1.38') + (2')(10.50')(1.46') - (2.83')(0.92')(23.75') - (0.5')(0.67')(23.75')]\,(0.150\ ^K/FT^3)$

$= (396.72\ FT^3)(0.150\ ^K/FT^3)$

$= 59.51^K$: $W_{ALL_{13A}} = 50.15^K$, $W_{ALL_{13B}} = 9.36^K$

* $W_{ALL_{⑭}} = [(1.38')(12.33')(23.75') + (2')(1.42')(9.5') + (2')(1.46')(8.5') - (2.83')(0.92')(23.75') - (0.5')(0.67')(23.75')]\,(0.150\ ^K/FT^3)$

$= (386.12\ FT^3)(0.150\ ^K/FT^3)$

$= 57.92^K$: $W_{ALL_{14A}} = 50.15^K$, $W_{ALL_{14B}} = 7.77^K$

$W_{ALL_{⑮}} = [(1.5')(14.25')(81.17') - (0.75')(1.5')(3.67')(8)]\,(0.150\ ^K/FT^3)$

$= (1,701.98\ FT^3)(0.150\ ^K/FT^3)$

✓ $= 255.30^K$

$W_{ALL_{⑯}} = [(1.5')(14.25')(75.00') + (1.5')(11.75')(6.33')]\,(0.150\ ^K/FT^3)$

$= (1,714.69\ FT^3)(0.150\ ^K/FT^3)$

✓ $= 257.20^K$

INTERMEDIATE SLAB $= [(1')(6.5')(93.83' - 19') - (1')(0.67')(74.83')]\,(0.150\ ^K/FT^3)$

$= (436.26\ FT^3)(0.150\ ^K/FT^3)$

$= 65.44^K$

INNER BEAM UNDER INTERMEDIATE SLAB $= [(1')(1.5')(74.83')]\,(0.150\ ^K/FT^3)$

$= (112.25\ FT^3)(0.150\ ^K/FT^3)$

$= 16.84^K$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 45
Made By: SPC	Date: 8/24/95	PUMPING STATION No. 6	
Checked By: MFL	Date: 11/2/95		

EAST DISCHARGE TUBES

WEIGHTS ① → ⑧

COLUMN @ TOP OF INTERMEDIATE SLAB

$$= (4)[(2.67')(1.58')(10.75') - (2)(0.5')(0.67')(10.75')](0.150^K/FT^3)$$
$$= (152.59\ FT^3)(0.150^K/FT^3)$$
$$= 22.89^K$$

TOP SLAB W/ INNER BEAM

$$= [(1')(5')(81.16') + (3')(1.5')(81.16') - (0.75')(1.5')(3.67')(8) - (1')(0.67')(79.41')] \times (0.150^K/FT^3)$$
$$= (684.79\ FT^3)(0.150^K/FT^3)$$
$$✓ = 102.72^K$$

TRANSITION @ EXISTING DISCHARGE TUBE

$$= [(2')(2')(81.42') + (2')(2')(83.83')](0.150^K/FT^3)$$
$$= (661.00\ FT^3)(0.150^K/FT^3)$$
$$= 99.15^K$$

MOTOR, GEARS, SLUICE GATES, AND ACCESSORIES

$= 25^K$ EA   8 total

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4, 5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9, 12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10, 11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

Find Moment Due To Dead Load:
(Exclude Gate)

$\curvearrowleft + \Sigma M_x = (7.25')(49.83^K) + (4')(52.89^K) + (0.75')(256.69^K) + (11.58')(255.30^K) + (4.5')(22.89^K) + (4.75')(65.44^K) + (7.25')(16.84^K) + (4')(86.20^K) + (12.58')(31.52^K) + (9.83')(70.37^K) + (8.17')(689.10^K) + (6.17')(463.19^K) + (14.33')(73.29^K) + (14.33')(99.15^K)$

$= 16{,}649.61^{\prime\text{-}K}$

$+\downarrow \Sigma P_z = 49.83^K + 52.89^K + 256.69^K + 255.30^K + 22.89^K + 65.44^K + 16.84^K + 86.20^K + 31.52^K + 70.37^K + 689.10^K + 463.19^K + 73.29^K + 99.15^K$

$= 2{,}232.70^K$

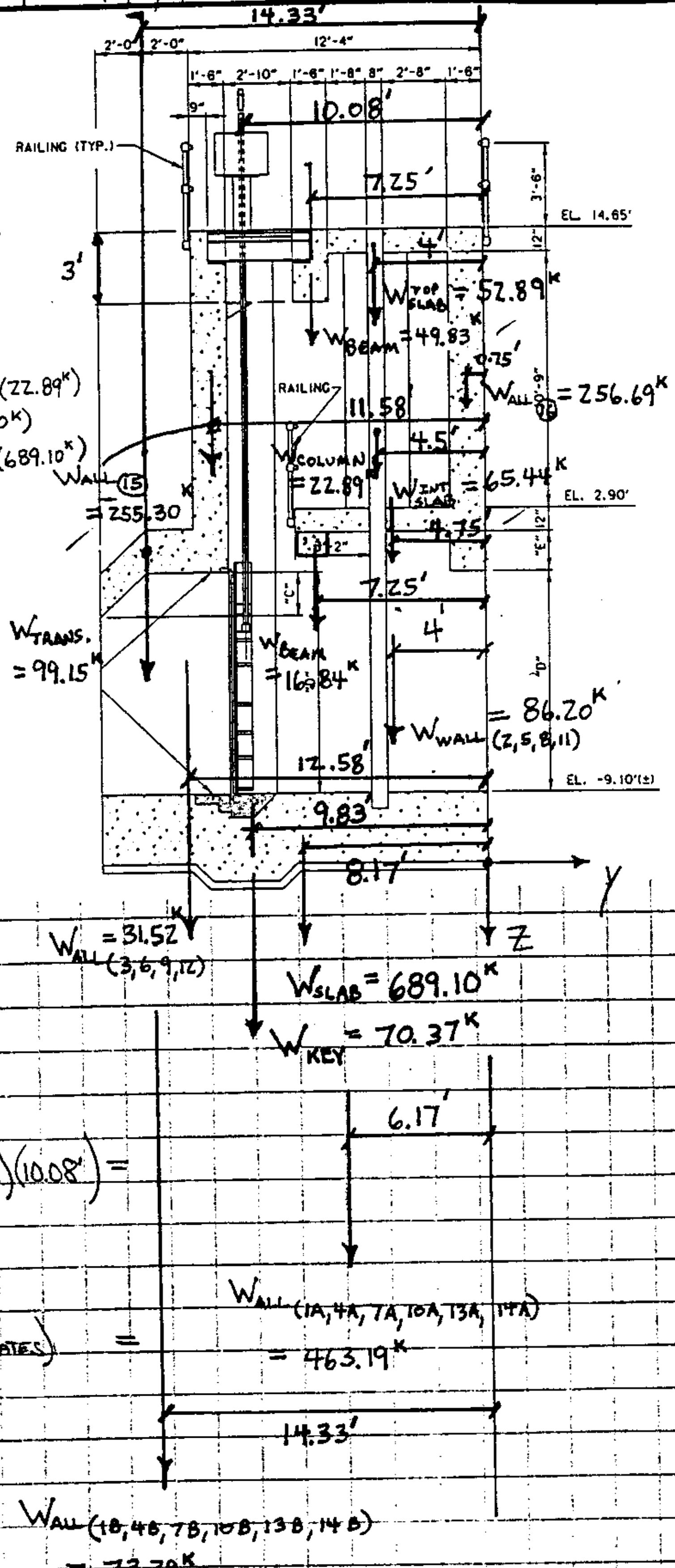
Including Gates

$\curvearrowleft + M_x = 16{,}649.61^{\prime\text{-}K} + 25^K(8_{gates})(10.08') =$

$= 18{,}665.61^{\prime\text{-}K}$

$+\downarrow \Sigma P_z = 2{,}232.70^K + 25^K(8_{gates}) =$

$2{,}432.70^K$



URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 47
Made By: SPC	Date: 8/25/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

EAST DISCHARGE TUBES

WEIGHTS (9) → (12)

BASE SLAB = [(3')(14.33')(42.92') + (3')(2')(42.46')] (0.150^K/FT.^3)
= (2,099.89 FT.^3)(0.150^K/FT.^3)
= 314.98^K

BASE SLAB KEY = [(1')(5')(42.92')] (0.150^K/FT.^3)
= (214.60 FT.^3)(0.150^K/FT.^3) = 32.19^K

WALL (17) = [(12')(1.67')(8') − (2)(0.67')(0.50')(12')] (0.150^K/FT.^3)
= (152.28 FT.^3)(0.150^K/FT.^3)
= 22.84^K

WALL (18) = [(3.5')(1.67')(7.5')] (0.150^K/FT.^3)
= (43.84 FT.^3)(0.150^K/FT.^3)
= 6.58^K

* WALL (19) = [(2.67')(12.33')(23.75') + (2.67')(2')(9.5') + (1')(2')(8.5')
+ (2)(0.5)(2')(0.83')(8.5') − (2)(2.83')(0.92')(23.75')
− (2)(0.5')(0.67')(23.75')] (0.150^K/FT.^3)
= (724.13 FT.^3)(0.150^K/FT.^3)
= 108.62^K : WALL (19A) = 96.34^K, WALL (19B) = 12.28^K

WALL (20) = WALL (17) = 22.84^K

WALL (21) = WALL (18) = 6.58^K

* WALL (22) = [(1.92')(12.33')(23.75') + (2')(1.92')(9.5') + (2')(1.46')(8.5')
− (0.92')(2.83')(23.75') − (0.5')(0.67')(23.75')] (0.150^K/FT.^3)
= (553.76 FT.^3)(0.150^K/FT.^3)
= 83.06^K : WALL (22A) = 73.87^K, WALL (22B) = 9.19^K

WALL (23) = [(1.5')(16.25')(38.33') − (0.75')(1.5')(3.67')(4)] (0.150^K/FT.^3)
= (917.78 FT.^3)(0.150^K/FT.^3)
✓ = 137.67^K

URS URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.00	Sheet No. 48
Made By: SPC	Date: 8/26/95	Pumping Station No. 6	
Checked By: MFL	Date: 11/2/95		

EAST DISCHARGE TUBES

WEIGHTS (9) → (12)

WALL (24)
$= [(1.5')(16.25')(35') + (1.5')(11.75')(3.33')](0.150^K/FT^3)$
$= (911.82\ FT^3)(0.150^K/FT^3)$
$= 136.77^K$

INTERMEDIATE SLAB w/ INNER BEAM
$= [(1')(6.5')(42.92' - 7.92) + (1')(1.5')(35') - (1')(0.67')(35')](0.150^K/FT^3)$
$= (256.55\ FT^3)(0.150^K/FT^3)$
$= 38.48^K$

COLUMN @ TOP OF INTERMEDIATE SLAB
$= (2)[(2.67')(1.67')(10.75') - (2)(0.5')(0.67')(10.75')](0.150^K/FT^3)$
$= (81.46\ FT^3)(0.150^K/FT^3)$
$= 12.22^K$

TOP SLAB w/ INNER BEAM
$= [(1')(5')(38.33') + (3')(1.5')(38.33') - (1')(0.67')(37')$
$- (0.75')(1.5')(3.67')(4)](0.150^K/FT^3)$
$= (322.83\ FT^3)(0.150^K/FT^3)$
✓ $= 48.42^K$

TRANSITION @ EXISTING DISCHARGE TUBE
$= [(2')(2')(38.33') + (2')(2')(40.17')](0.150^K/FT^3)$
$= (314\ FT^3)(0.150^K/FT^3)$
$= 47.10^K$

MOTOR, GEARS, SLUICE GATES, AND ACCESSORIES
$= 20^K$ EA 4 total

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 | Sheet No. 49

Made By: SPC | Date: 8/28/95
Checked By: MFL | Date: 11/2/95

PUMPING STATION NO. 6
EAST DISCHARGE TUBES
(9) → (12)

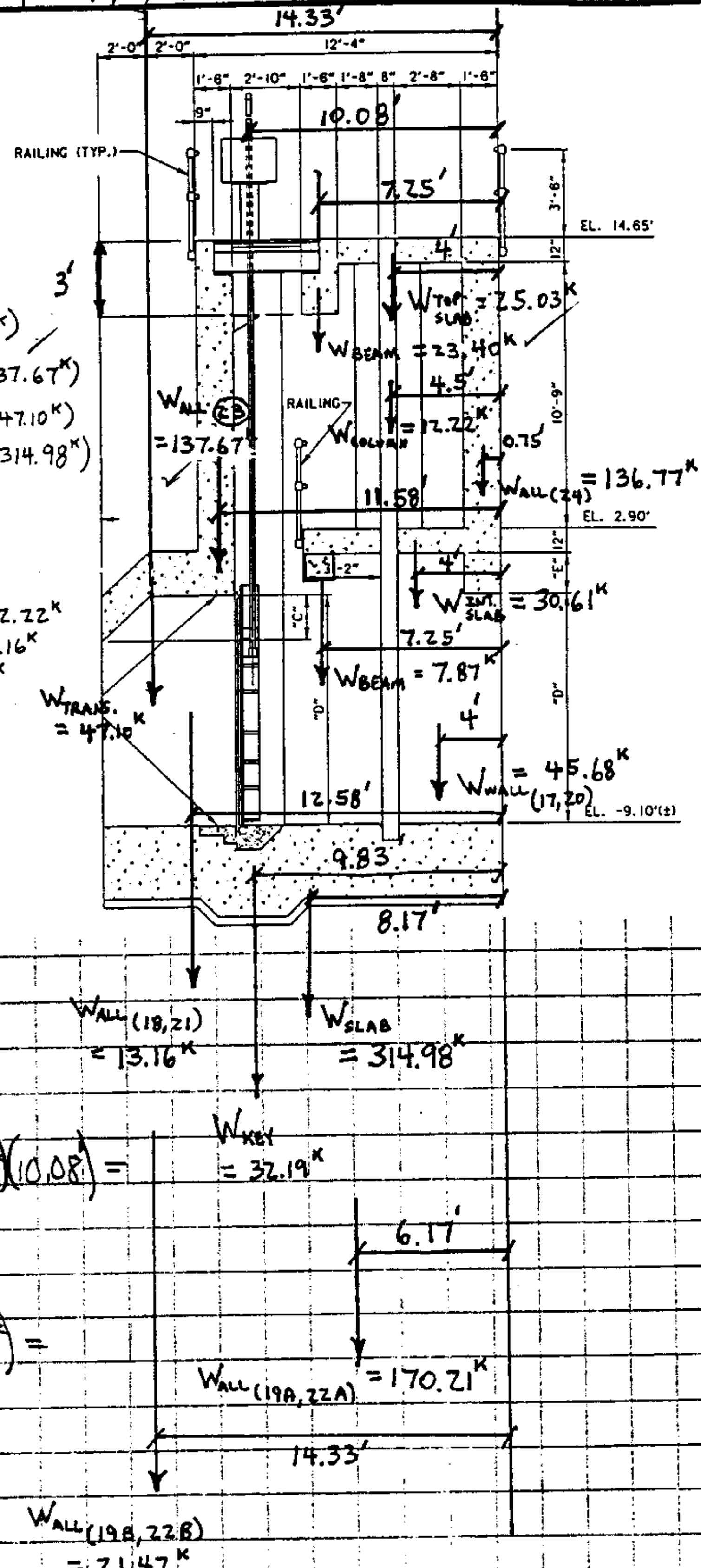
GATE TABLE

GATE	HEIGHT OF EXISTING TUBE "A"	WIDTH OF NEW TUBE "B"	HEIGHT EXTENSION "C"	HEIGHT OF NEW TUBE "D"	BEAM "E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

FIND MOMENT DUE TO DEAD LOAD:
(EXCLUDE GATE)

$\curvearrowleft + \; \Sigma M_x = (7.25')(23.40^K) + (4')(25.03^K) + (0.75')(136.77^K) + (4.5')(12.22^K) + (11.58')(137.67^K) + (4')(45.68^K) + (7.25')(7.87^K) + (14.33')(47.10^K) + (12.58')(13.16^K) + (9.83')(32.19^K) + (8.17')(314.98^K) + (6.17')(170.21^K) + (14.33')(21.47^K) + (4.75')(30.61^K)$
$= 7{,}494.90^{\prime\text{-}K}$

$+\downarrow \; \Sigma P_z = 23.40^K + 25.03^K + 136.77^K + 12.22^K + 137.67^K + 45.68^K + 7.87^K + 47.10^K + 13.16^K + 32.19^K + 314.98^K + 170.21^K + 21.47^K + 30.61^K$
$= 1{,}018.36^K$



Including Gates

$\curvearrowleft + \; \Sigma M = 7{,}494.90^{\prime\text{-}K} + 4(20^K)(10.08') =$
$= 8301.30^{\prime\text{-}K}$

$+\downarrow \Sigma P_z = 1{,}018.36 + 4(20^K) =$
$= 1098.36^K$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 50
Made By: SCB	Date: 10/19/95	P.S. #6	
Checked By: SPC	Date: 11/4/95		

DL Moments in Longitudinal Dir.

- Walls (North-South)

(WALL 11 & 12; WALL 13 & 14; WALL 17 & 18; WALL 19)

$$\Sigma M_y = -12.33(29.43^k) + (24.')(117.43^k) - (35.33')(29.42^k) - (46')(108.62^k)$$

(WALL 20 & 21; WALL 22; WALL 10)

$$-(56.75')(29.42^k) - (67.5')(83.06^k) + (.66')(111.32^k)$$

(WALL 8 & 9; WALL 7; WALLS 5 & 6)

$$+11'(29.43^k) + (22.17')(111.32^k) + (33.33')(29.43) +$$

(WALL 4; WALL 2 & 3; WALL 1)

$$(45')(111.32^k) + (56.66')(23.17^k) + (68')(85.09^k) = -685.8^{'-k}$$

- Columns @ Int. Slab

$$\Sigma M_y = -(12.33')(5.7^k) - (35.33')(6.1^k) - (56.75')(6.1^k) + (11')(5.7^k)$$

$$+(33.33')(5.7^k) + (56.67')(5.7^k) = -56.3^{'-k}$$

Sluice Gates

$$\Sigma M_y = -6.75'(25^k) - (17.75')(25^k) - (30')(20^k) - (40.25')(20^k)$$

$$-(51.75')(20^k) - (62')(20^k) + (5.25')(25^k) + 16.5'(25^k)$$

$$+(28')(25^k) + (43.5')(25^k) + (51.25)(25^k) + 62.25'(25^k) =$$

$$876.25^{'-k}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 51
Made By: SPC	Date: 11/1/95	P.S. No. 6	
Checked By: SCB	Date: 11/95		

DL MOMENTS IN LONGITUDINAL DIRECTION

– 2' INCREASE IN DEPTH OF BEAM UNDER INTERMEDIATE SLAB @ ⑨ → ⑫

$$\Sigma M_y = -\left[(2')(1.5')(35')(0.150^{K}/FT^3)\right](46.08')$$

$$= -725.76^{\prime\text{-}K}$$

TOTAL MOMENT IN Y-DIRECTION DUE TO DL $= -591.61^{\prime\text{-}K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 52
Made By: SPC	Date: 11/1/95	P.S. No. 6	
Checked By: SCB	Date: 11/95		

DEAD LOAD SUMMARY SHEET

TOTAL MOMENT ① → ⑫ (INCLUDING GATES)

(sht. 46) (sht. 49)

$$\overset{+}{\curvearrowleft} \Sigma M_x = -18{,}665.61^{\prime-K} - 8{,}301.30^{\prime-K} = \underline{-26{,}966.91^{\prime-K}}$$

(sht. 51)

$$\Sigma M_y = \underline{-591.61^{\prime-K}}$$

TOTAL VERTICAL LOAD ① → ⑫ (INCLUDING GATES)

(sht. 46) (sht. 49)

$$+\downarrow \Sigma P_z = 2{,}432.70^K + 1{,}098.36^K = \underline{3{,}531.06^K}$$

EAST MONOLITH WATER LOADS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 53
Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By:	Date:		

EAST MONOLITH

WATER LOADS

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No.

Sheet No. 54

Made By: SPC Date: 8/27/95

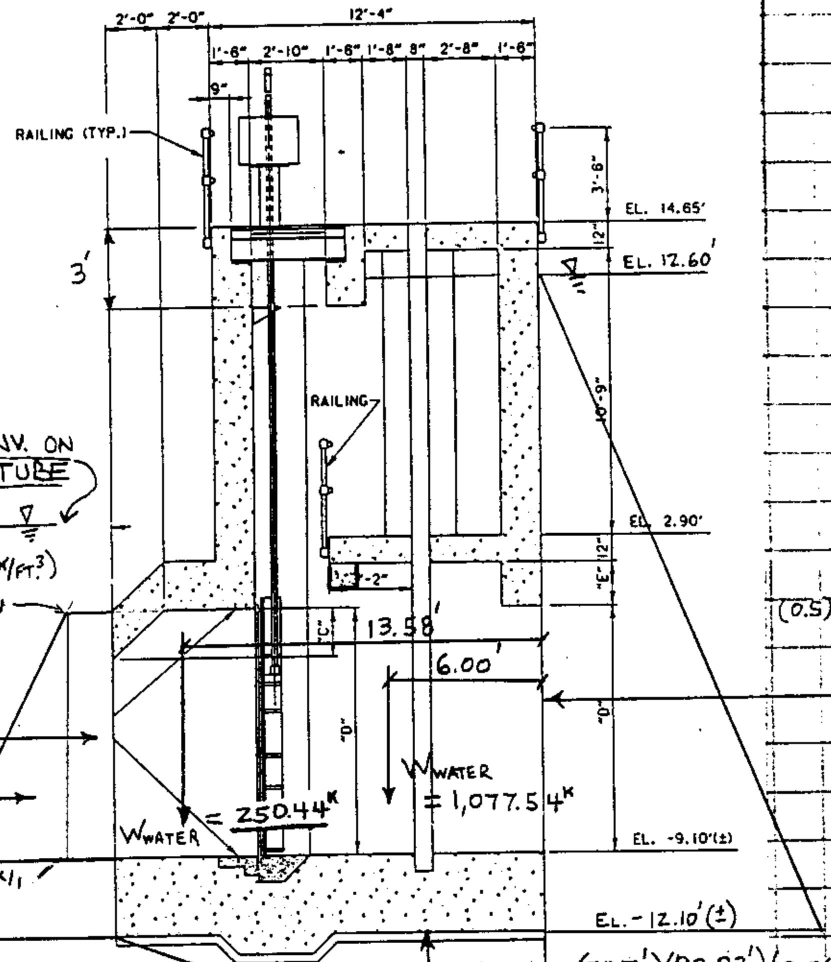
Checked By: MFL Date: 11/2/95

Pumping Station No. 6, ① → ⑧
Water at El. 12.60
Pervious Sheet Pile Wall

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

WATER LOADS
For El. 12.6'
Pervious Cut-off Wall
Load Case 2

(G)ATE WIDTHS
$6(9.5') + 2(9') = 75'$



$(3.5')(75.0')(0.064\ ^{K}/_{FT^3}) = 16.80^{K/l}$

$(16.80^{K/l})(9.5') = 159.60^K$

$(0.5)(62.4^{K/l} - 16.80^{K/l})(9.5') = 216.60^K$

4.75'   3.17'   3'

$(13')(75.0')(0.064\ ^{K}/_{FT^3}) = 62.4^{K/l}$

$(0.5)(148.33^{K/l})(24.7') = 1,831.88^K$

$(24.7')(93.83')(0.064\ ^{K}/_{FT^3}) = 148.33^{K/l}$

~~$(0.5)(148.33^{K/l})(16.33')$~~
$= 1,211.11^K$

(Rt. Portion of Monolith)
Water in Monolith @ El. 12.60

$= [(7.83')(0.95')(81.33') + (16)(0.5')(0.67')(21.70')$
$+ (8.75')(9.33')(81.33') - (4)(2.67')(1.58')(9.70')$
$+ (12')(2.83')(81.33') + (8')(11')(75.00')$
$- (1')(1.5')(75.00') - (1.5')(1.5')(75.00')$
$+ (0.92')(21.70')(2.83')(9) + (1')(0.67')(75.00')]$
$\times (0.064\ ^{K}/_{FT^3})$
$= 1,077.54^K$ ✓

(Lt. Portion of Monolith)
$= [(9.5')(3.5')(74.83') + (8.5')(2')(83.83')]$
$\times (0.064\ ^{K}/_{FT^3})$
$= 250.44^K$ ✓

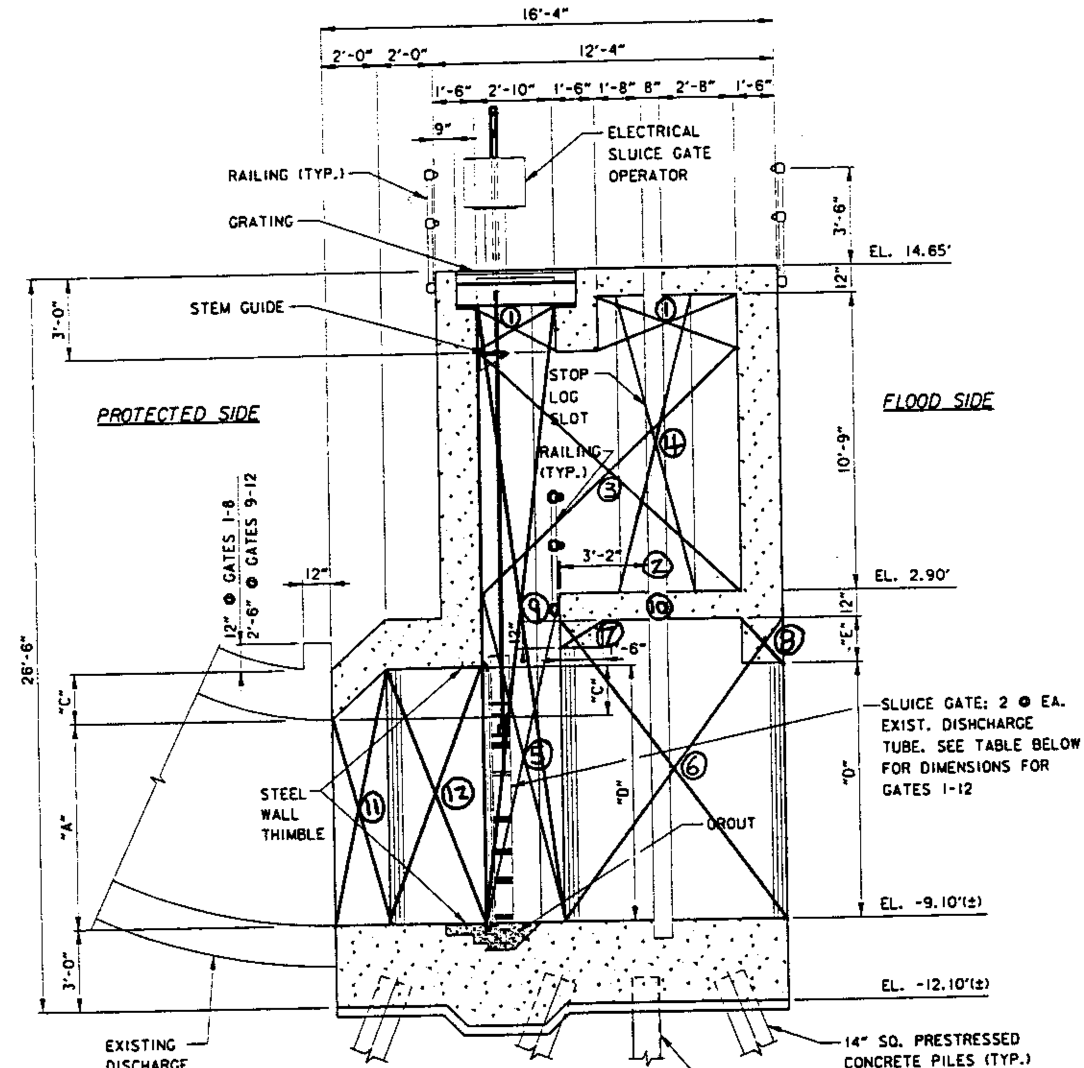
$\circlearrowleft \Sigma M_x = - \quad - (250.44^K)(13.58'')$
$- (6.00')(1,077.54^K) - (8.23')(1,831.88^K)$
$+ (5.44')(1,211.11^K) + (7.75')(159.60^K) + (6.17')(216.60^K)$
$= -15,780.83^{\,l\text{-}K}$

$+\downarrow \Sigma P_z = -1,211.11^K + 1,077.54^K + 250.44^K$
$= 116.87^K$

$\overset{+}{\rightarrow} \Sigma P_y = 159.60^K + 216.60^K - 1,831.88^K$
$= -1,455.68^K$

Safety is a Part of Your Contract

WATER AREAS (LOAD CASE 2 & 3)



EAST MONOLITH

SECTION B

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

WATER AT EL. 12.60 ① → ⑧ (LOAD CASE 2 & 3)

LT. PORTION OF MONOLITH

AREA	WT. (KIPS)	MOMENT ARM (FT.)	MOMENT (1-K)
⑫	(9.5')(3.5')(74.83')(0.064K/FT.³) = 159.24K	12.58	2,003.24
⑪	(8.5')(2')(83.83')(0.064K/FT.³) = 91.21K	15.33	1,398.25
	Σ = 250.45K		Σ = 3,401.49

$$\bar{Y} = \frac{\Sigma M}{\Sigma WT.} = \frac{3,401.49}{250.45} = 13.58'$$

RT. PORTION OF MONOLITH

AREA	WT. (KIPS)	MOMENT ARM (FT.)	MOMENT (1-K)
①	(7.83')(0.95')(81.33')(0.064K/FT³) = 38.72	5.96	230.77
②	(16)(0.5)(0.67)(21.70)(0.064) = 7.44	4.50	33.48
③	(8.75)(9.33)(81.33)(0.064) = 424.93	6.17	2,621.82
④	−(4)(2.67)(1.58)(9.70)(0.064) = −10.48	4.50	−47.16
⑤	(12)(2.83)(81.33)(0.064) = 176.77	9.42	1,665.17
⑥	(8)(11)(75)(0.064) = 422.40	4.00	1,689.60
⑦	−(1)(1.5)(75)(0.064) = −7.20	7.25	−52.20
⑧	−(1.5)(1.5)(75)(0.064) = −10.80	0.75	−8.10
⑨	(0.92)(21.70)(2.83)(9)(0.064) = 32.54	9.42	306.53
⑩	(1)(0.67)(75)(0.064) = 3.22	4.50	14.49
	Σ = 1,077.54		Σ = 6,463.40

$$\bar{Y} = \frac{\Sigma M}{\Sigma WT} = \frac{6,463.40}{1,077.54} = 6.00'$$

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

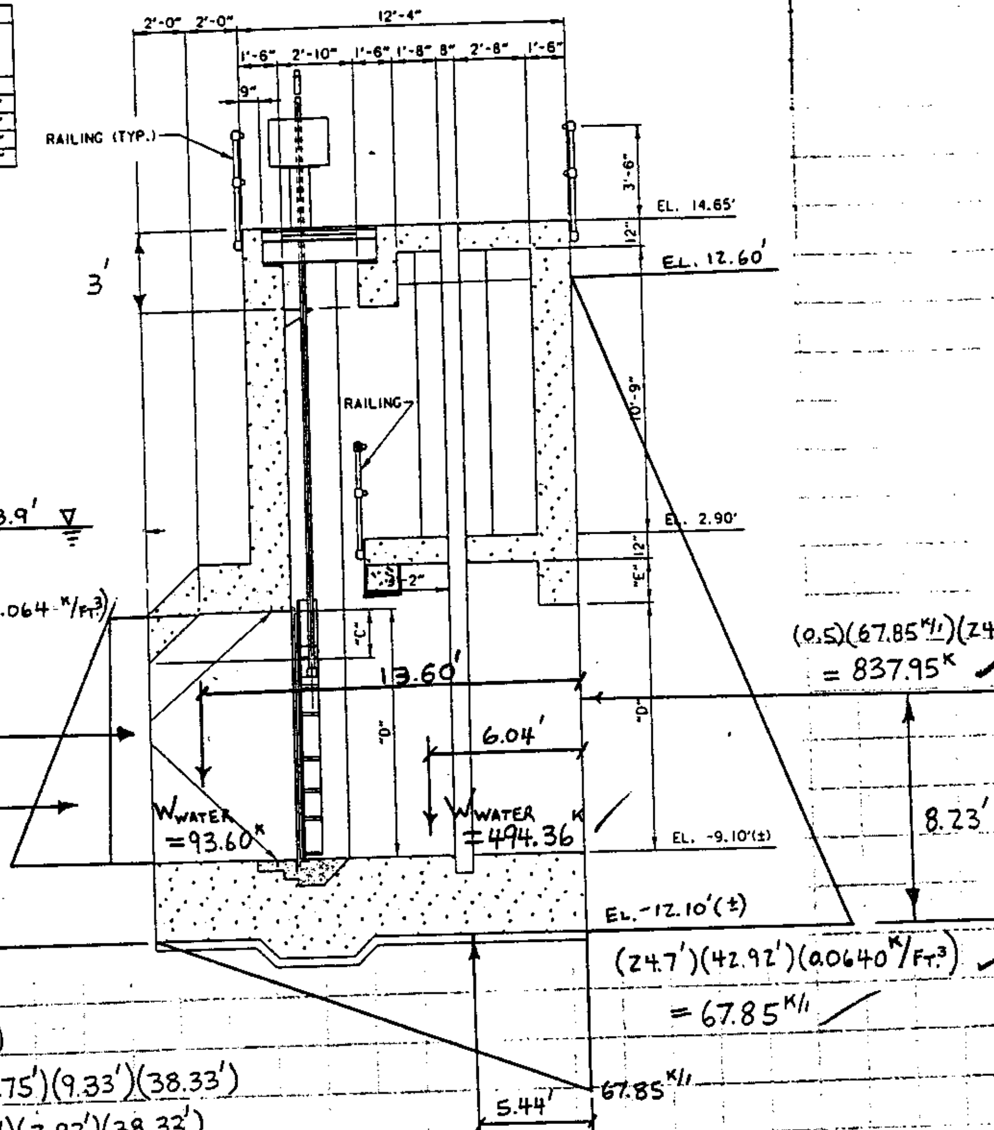
Job No. 46229.00 | Sheet No. 51

Made By: SPC | Date: 8/28/95
Checked By: MFL | Date: 11/2/95

Pumping Station No. 6, ⑨ → ⑫
Water at El. 12.60
Pervious Sheet Pile Wall

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

Water Loads For El. 12.6'
Pervious Cut-off Wall
Load Case 2



Gate widths
$2(9') + 2(8.5') = 35'$

$(5.5')(35')(0.064\ ^{K}/_{FT^3}) = 12.32\ ^{K}/_{l}$ ✓

$(12.32^{K/l})(7.5') = 92.4^K$

$(0.5)(29.12^{K/l} - 12.32^{K/l})(7.5') = 63.0^K$ ✓

6.75'

5.5' $(13')(35')(0.064\ ^{K}/_{FT^3}) = 29.12^{K/l}$ ✓

$(0.5)(67.85^{K/l})(24.7') = 837.95^K$ ✓

$(24.7')(42.92')(0.0640\ ^{K}/_{FT^3}) = 67.85^{K/l}$ ✓

$(0.5)(67.85^{K/l})(16.33') = 554.00^K$ ✓

(Rt. Portion of Monolith)

$W_{WATER} = [(7.83')(0.95')(38.33')$
$+ (8)(0.5')(0.67')(21.70') + (8.75')(9.33')(38.33')$
$- (2)(2.67')(1.67')(9.70') + (12')(2.83')(38.33')$
$+ (8')(11')(35') - (1')(1.5')(35') - (1.5')(3.5')(35')$
$+ (0.92')(21.70')(2.83')(3) + (1')(0.67')(35')]$
$\times (0.064\ ^{K}/_{FT^3})$
$= 494.36^K$ ✓ ✓

(Lt. Portion of Monolith)

$W_{WATER} = [(7.5')(3.5')(35') + (6.5')(2')(41.83')]$
$\times (0.064\ ^{K}/_{FT^3})$
$= 93.60^K$ ✓

$M_y = \underline{2,417.29^{1-K}}$ (See Sht. 61)

$\curvearrowleft + \Sigma M_x = +(5.44')(554.0^K) - (13.60')(93.60^K) - (6.04')(494.36^K)$
$- (8.23')(837.95^K) + (6.75')(92.4^K) + (5.5')(63.0^K)$
$= -7,171.26^{1-K}$

Total $M_x = -7,171.26^{1-K} - 15,780.83^{1-K}$
$= \underline{-22,952.09^{1-K}}$ ✓ ✓

$+\downarrow \Sigma P_z = -554.00^K + 93.60^K + 494.36^K = 33.96^K$

Total $P_z = 33.96^K + 116.87^K = \underline{150.83^K}$ ✓

$\overset{+}{\rightarrow} \Sigma P_y = 92.4^K + 63.0^K - 837.95^K = -682.55$

Total $P_y = -682.55^K - 1,455.68^K = \underline{-2,138.23}$

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

WATER AT EL. 12.60 (9) → (12) (LOAD CASE 2 & 3)

LT. PORTION OF MONOLITH

AREA	WT. (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
	(7.5')(3.5')(35')(0.064 K/FT.³) =	58.80	12.58	739.70
	(6.5)(2)(41.83)(0.064) =	34.80	15.33	533.48
		Σ = 93.60		Σ = 1,273.18

$$\bar{Y} = \frac{\Sigma M}{\Sigma WT.} = \frac{1,273.18}{93.60} = 13.60'$$

RT. PORTION OF MONOLITH

AREA	WT. (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
(1)	(7.83')(0.95)(38.33')(0.064 K/FT.³) =	18.25	5.96	108.77
(2)	(8)(0.5)(0.67)(21.70)(0.064) =	3.72	4.50	16.74
(3)	(8.75)(9.33)(38.33)(0.064) =	200.27	6.17	1,235.67
(4)	−(2)(2.67)(1.67)(9.70)(0.064) =	−5.54	4.50	−24.93
(5)	(12)(2.83)(38.33)(0.064) =	83.31	9.42	784.78
(6)	(8)(11)(35)(0.064) =	197.12	4.00	788.48
(7)	−(1)(1.5)(35)(0.064) =	−3.36	7.25	−24.36
(8)	−(1.5)(3.5)(35)(0.064) =	−11.76	0.75	−8.82
(9)	(0.92)(21.70)(2.83)(3)(0.064) =	110.85	9.42	102.21
(10)	(1)(0.67)(35)(0.064) =	1.50	4.50	6.75
		Σ = 494.36		Σ = 2,985.29

$$\bar{Y} = \frac{\Sigma M}{\Sigma WT.} = \frac{2,985.29}{494.36} = 6.04'$$

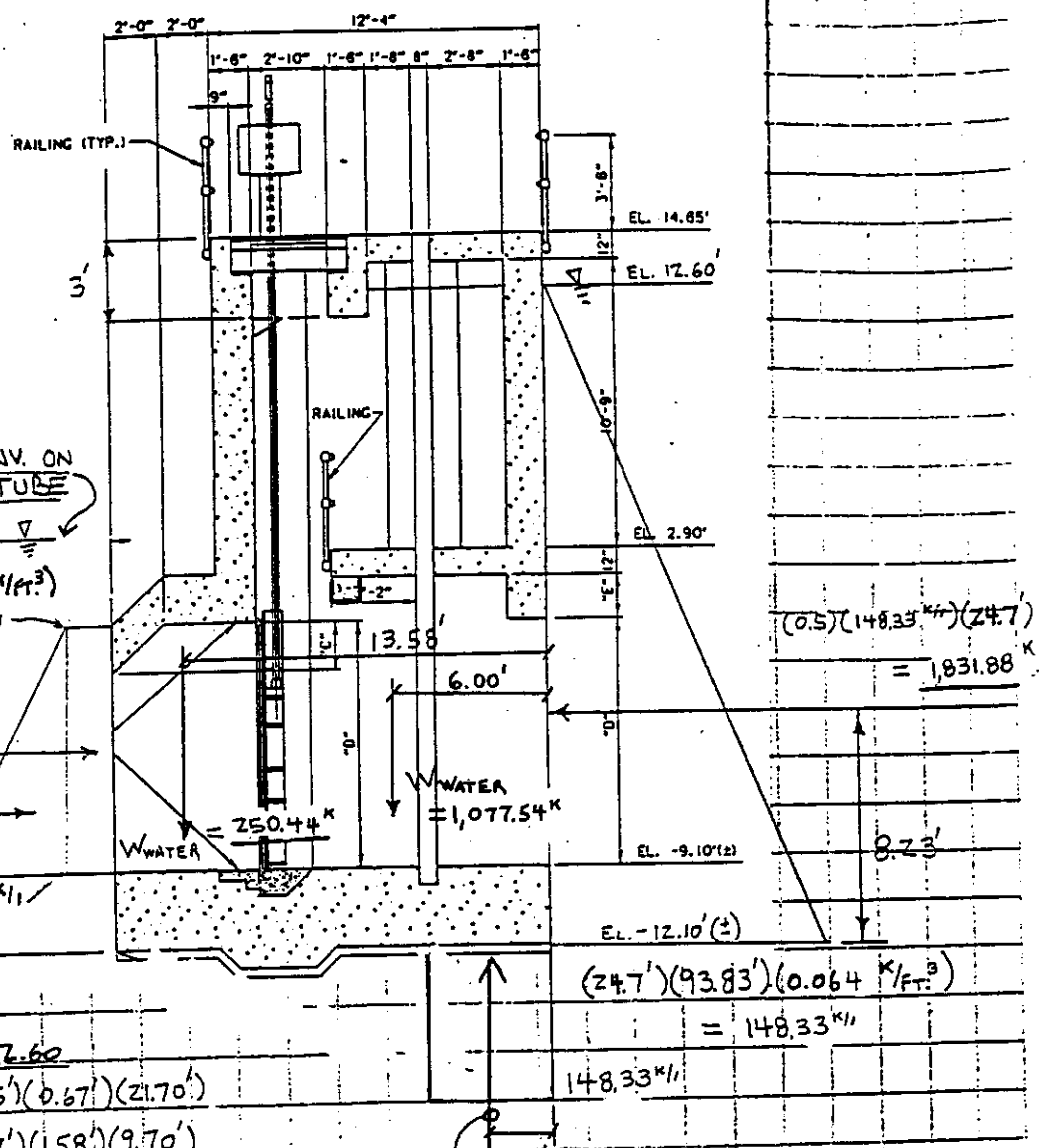
URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 59
Made By: SPC	Date: 8/27/95	Pumping Station No. 6, ① → ⑧ Water at El. 12.60	
Checked By: MFL	Date: 11/2/95	Impervious Sheet Pile Wall	

GATE TABLE

GATE	HEIGHT OF EXISTING TUBE "A"	WIDTH OF NEW TUBE "B"	HEIGHT EXTENSION "C"	HEIGHT OF NEW TUBE "D"	BEAM "E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9, 12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10, 11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

WATER LOADS
FOR EL. 12.6'
IMPervious Cut-off Wall
LOAD CASE 3

GATE WIDTHS
$6(9.5') + 2(9') = 75'$



$(3.5')(75.0')(0.064\ ^K/_{FT^3}) = 16.80\ ^K/_1$

$(16.80\ ^{K/1})(9.5') = 159.60^K$

$(0.5)(62.4^{K/1} - 16.80\ ^{K/1})(9.5') = 216.60^K$

$(13')(75.0')(0.064\ ^K/_{FT^3}) = 62.4\ ^K/_1$

$(0.5)(148.33^{K/1})(24.7') = 1{,}831.88^K$

$(24.7')(93.83')(0.064\ ^K/_{FT^3}) = 148.33^{K/1}$

$148.33^{K/1}$

$148.33^{K/1}(5') = 741.65^K$

(RT. PORTION OF MONOLITH)

WATER IN MONOLITH @ EL. 12.60

$= [(7.83')(0.95')(81.33') + (16)(0.5')(0.67')(21.70')$
$+ (8.75')(9.33')(81.33') - (4)(2.67')(1.58')(9.70')$
$+ (12')(2.83')(81.33') + (8')(11')(75.0')$
$- (1')(1.5')(75.0') - (1.5')(1.5')(75.0')$
$+ (0.92')(21.70')(2.83')(9) + (1')(0.67')(75.0')]$
$\times (0.064\ ^K/_{FT^3})$
$= 1{,}077.54^K$

(LT. PORTION OF MONOLITH)

$= [(9.5')(3.5')(74.83') + (8.5')(2')(83.83')]$
$\times (0.064\ ^K/_{FT^3})$
$= 250.44^K$

$\circlearrowleft + \Sigma M_x = -(250.44^K)(13.58')$
$- (6.00')(1{,}077.54^K) - (8.23')(1{,}831.88^K)$
$+ 741.65^K(2.5') + (7.75')(159.60^K) + (6.17')(216.60^K)$
$= -20{,}515.14^{'-K}$

$+\downarrow\ \Sigma P_z = -741.65 + 1{,}077.54^K + 250.44^K = 586.33^K$

$\overset{+}{\rightarrow}\ \Sigma P_y = 159.60^K + 216.60^K - 1{,}831.88^K$
$= -1{,}455.68^K$

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

WATER LOADS
FOR EL. 12.6'
IMPERVIOUS CUT-OFF WALL
LOAD CASE 3

EL. 3.9'

GATE WIDTHS
2(9') + 2(8.5') = 35'

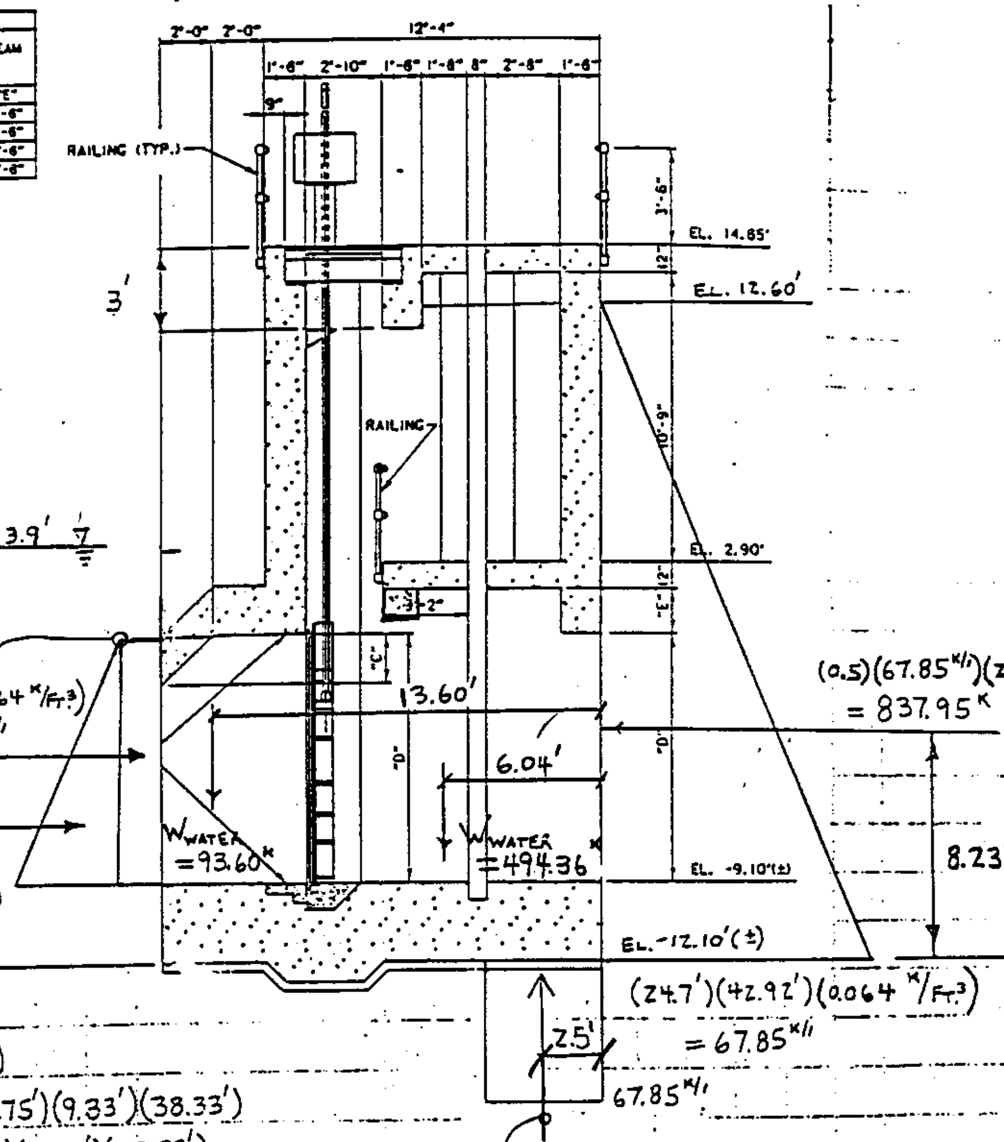
(12.32 K/') (7.5') = 92.4 K

(5.5')(35')(0.064 K/FT³) = 12.32 K/'

(0.5)(29.12 K/' − 12.32 K/')(7.5') = 63.0 K

15'

5.5' (13')(35')(0.064 K/FT³) = 29.12 K/'



(RT. PORTION OF MONOLITH)

W WATER = [(7.83')(0.95')(38.33')
+ (8)(0.5')(0.67')(21.70') + (8.75')(9.33')(38.33')
− (2)(2.67')(1.67')(9.70') + (12')(2.83')(38.33')
+ (8')(11')(35') − (1')(1.5')(35') − (1.5')(3.5')(35')
+ (0.92')(21.70')(2.83')(3) + (1')(0.67')(35')]
× (0.064 K/FT³)
= 494.36 K

(LT. PORTION OF MONOLITH)

W WATER = [(7.5')(3.5')(35') + (6.5')(2')(41.83')]
× (0.064 K/FT³)
= 93.60 K

M_y = 2,417.29 1-K (SEE SHT. 61)

⟲ ΣM_x = (2.5')(339.25 K) − (13.60')(93.60 K) − (6.04')(494.36 K) − (8.23')(837.95 K) + (6.75')(92.4 K) + (5.5')(63.0 K)
= −9,336.90 1-K

Total M_x = −9,336.90 1-K − 20,515.14 1-K = −29,852.04 1-K

+↓ ΣP_z = −339.25 K + 93.60 K + 494.36 K = 248.71 K

Total P_z = 248.71 K + 586.33 K = 835.04 K ✓

+→ ΣP_y = 63.0 K + 92.4 K − 837.95 K = −682.55 K

Total P_y = −682.55 K − 1,455.68 K = −2,138.23 K

Additional Loads due to eccentricity of Water in Monolith

Water EL 12.6 (Case 2 & 3)

Gates (1-8) Total Water Load = $1077.54^K + 250.44^K = 1{,}327.98^K$

Water Ld per Ft. = $1{,}327.98^K / 75' = 17.71^{K/'}$

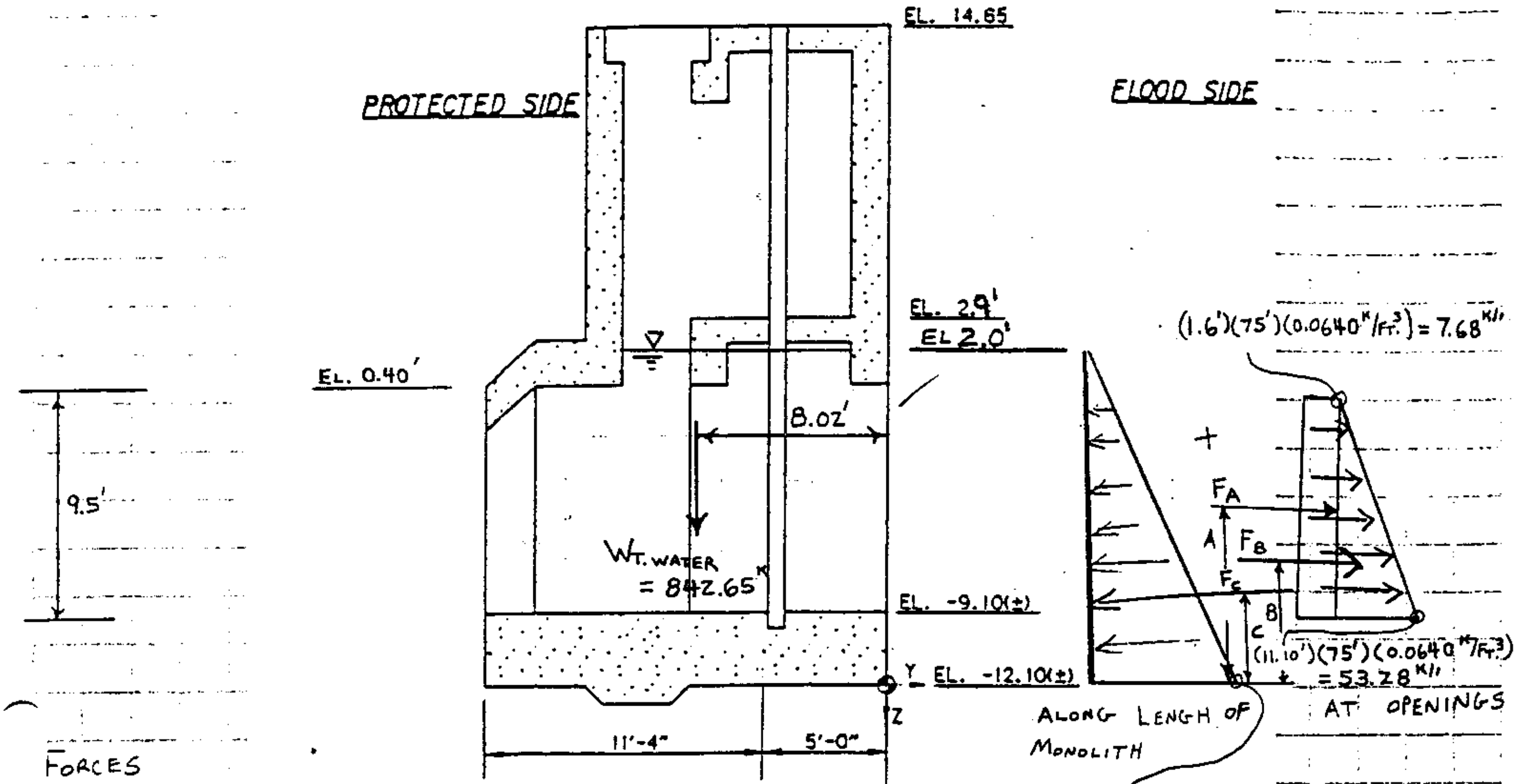
Gates (9-12) Total Water Load = $494.36^K + 93.60^K = 587.96^K$

Water Ld per Ft = $587.96^K / 35' = 16.80^{K/'}$

$$\Sigma M_y = -6.75'(17.71^{K/'})(9.5') - 17.75'(17.71^{K/'})(9.5') - 30'(16.80^{K/'})(9') -$$
$$- 40.25'(16.80^{K/'})(8.5') - 51.5'(16.80^{K/'})(8.5') - 62'(16.80^{K/'})(9')$$
$$+ (5.5')(17.71^{K/'})9.5' + 16.25'(17.71^{K/'})(9.0') + 28'(17.71^{K/'})(9')$$
$$+ 39'(17.71^{K/'})(9.5') + 51'(17.71^{K/'})(9.5') + 62'(17.71^{K/'})(9.5')$$
$$= 2{,}417.29^{'-K}$$

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.01	Sheet No. 62
Made By: SPC	Date: 9/28/95	Pumping Station No. 6, ① → ⑧	
Checked By: MFL	Date: 11/2/95	Impervious	

Load Case 4

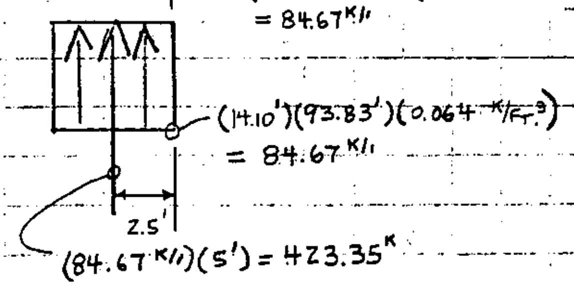


Forces

$F_A = (7.68^{K/'})(9.5') = 72.96^K$

$F_B = (0.5)(53.28^{K/'} - 7.68^{K/'})(9.5') = 216.60^K$

$F_C = (0.5)(14.10')(84.67^{K/'}) = 596.92^K$



Moment Arms

A = 7.75'

B = 6.17'

C = 4.70'

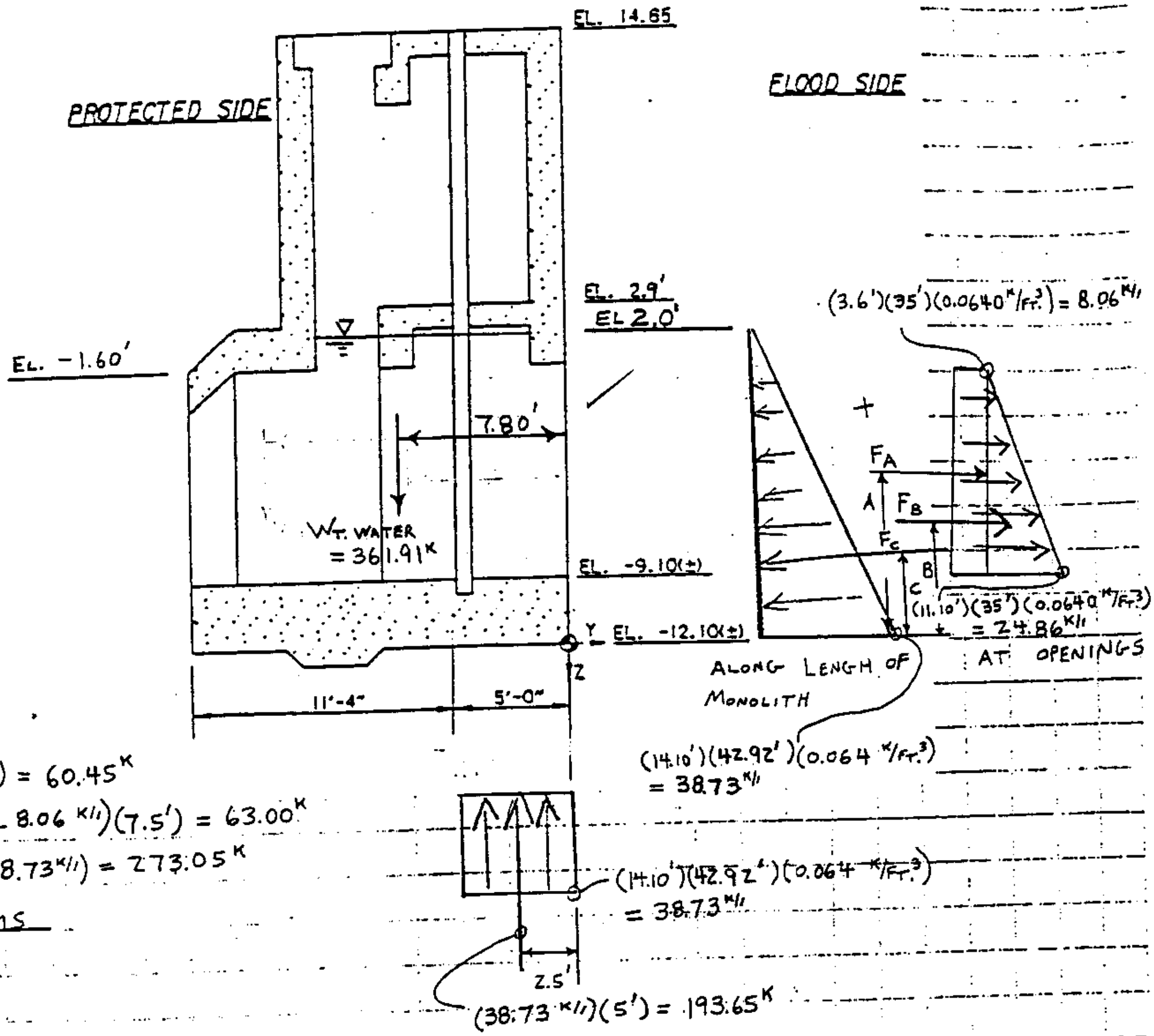
$$W_{T.\,WATER} = [(9.5')(3.5')(74.83') + (8.5')(2')(83.83') + (2.83')(11.10')(81.33') + (8')(11.10')(75.00') - (1')(1.5')(75.00') - (1.5')(1.5')(75.00') + (0.92')(11.10')(2.83')(9) + (16)(0.5')(0.67')(11.10')](0.064^{K}/Ft.^3) = 842.65^K$$

$$(\overset{+}{\curvearrowleft}) \Sigma M_x = (72.96^K)(7.75') + (216.60^K)(6.17') - (596.92^K)(4.70') - (842.65^K)(8.02') + (423.35^K)(2.5') = -6{,}603.34^{\,'-K}$$

$$+\downarrow \Sigma P_z = 842.65^K - 423.35^K = 419.30^K$$

$$\overset{+}{\rightarrow} \Sigma P_y = 72.96^K + 216.60^K - 596.92^K = -307.36^K$$

LOAD CASE 4



FORCES

$F_A = (8.06^{K/'})(7.5') = 60.45^K$

$F_B = (0.5)(24.86^{K/'} - 8.06^{K/'})(7.5') = 63.00^K$

$F_C = (0.5)(14.10')(38.73^{K/'}) = 273.05^K$

MOMENT ARMS

$A = 6.75'$

$B = 5.50'$

$C = 4.70'$

$W_{T.\ WATER} = [(7.5')(3.5')(35') + (6.5')(2')(41.83') + (2.83')(11.10')(38.33') + (8')(11.10')(35') - (1')(1.5')(35') - (1.5')(3.5')(35') + (0.92')(11.10')(2.83')(3) + (8)(0.5')(0.67')(11.10')](0.064^{K}/FT.^3) = 361.91^K$

$\circlearrowleft + \Sigma M_x = (60.45^K)(6.75') + (63.00^K)(5.50') - (273.05^K)(4.70') - (361.91^K)(7.80') + (193.65^K)(2.5') = -2{,}867.57^{'-K}$

TOTAL $M_x = -2{,}867.57^{'-K} - 6{,}603.34^{'-K} = \underline{-9{,}470.91^{'-K}}$, $M_y = \underline{2{,}052.64^{'-K}}$ (SEE SHT. 66)

$+\downarrow \Sigma P_z = 361.91^K - 193.65^K = 168.26^K$

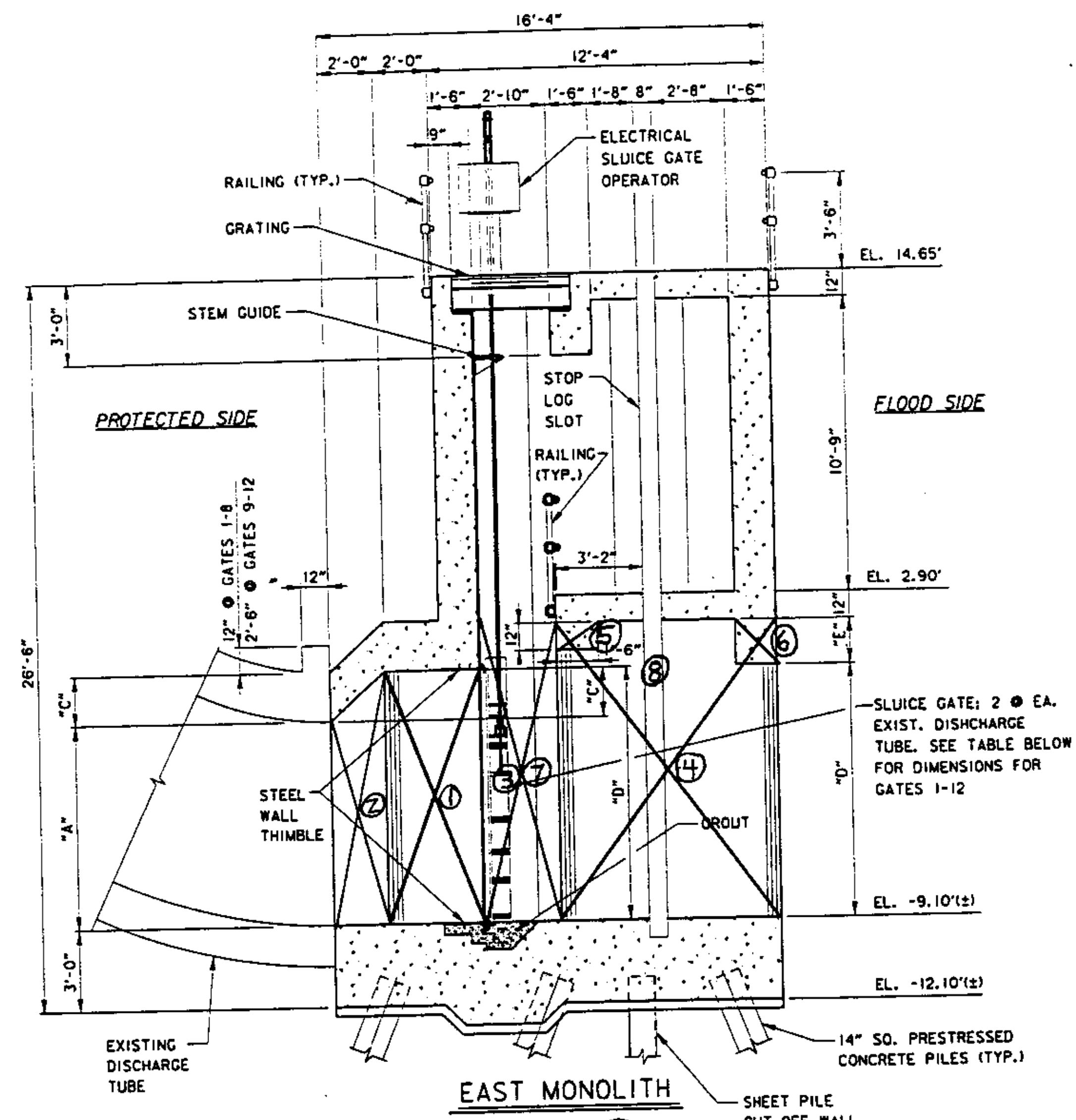
$\xrightarrow{+} \Sigma P_y = 60.45^K + 63.00^K - 273.05^K = -149.60^K$

TOTAL $P_z = 168.26^K + 419.30^K = \underline{587.56^K}$

TOTAL $P_y = -149.60^K - 307.36^K = \underline{-456.96^K}$

Safety is a Part of Your Contract

WATER AREAS (LOAD CASE 4)



EAST MONOLITH

SECTION B

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 65
Made By: SPC	Date: 10/31/95	P.S. No. 6	
Checked By: MFL	Date: 11/12/95		

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

WATER AT EL. 2.00 GATES ① → ⑧ (LOAD CASE 4)

AREAS	WT. (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
①	(9.5')(3.5')(74.83')(0.064 K/FT.³) =	159.24	12.58	2,003.24
②	(8.5)(2)(83.83)(0.064) =	91.21	15.33	1,398.25
③	(2.83)(11.10)(81.33)(0.064) =	163.51	9.42	1,540.26
④	(8)(11.10)(75)(0.064) =	426.24	4.00	1,704.96
⑤	−(1)(1.5)(75)(0.064) =	−7.20	7.25	−52.20
⑥	−(1.5)(1.5)(75)(0.064) =	−10.80	0.75	−8.10
⑦	(0.92)(11.10)(2.83)(9)(0.064) =	16.65	9.42	156.84
⑧	(16)(0.5)(0.67)(11.10)(0.064) =	3.81	4.50	17.15
		Σ = 842.66		Σ = 6760.40

$$Y = \frac{\Sigma M}{\Sigma Wt.} = \frac{6,760.40}{842.66} = 8.02'$$

WATER AT EL. 2.00 ⑨ → ⑫ (LOAD CASE 4)

AREAS	WT. (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
①	(7.5')(3.5')(35')(0.064 K/FT.³) =	58.80	12.58	739.70
②	(6.5)(2)(41.83)(0.064) =	34.80	15.33	533.48
③	(2.83)(11.10)(38.33)(0.064) =	77.06	9.42	725.91
④	(8)(11.10)(35)(0.064) =	198.91	4.00	795.64
⑤	−(1)(1.5)(35)(0.064) =	−3.36	7.25	−24.36
⑥	−(1.5)(3.5)(35)(0.064) =	−11.76	0.75	−8.82
⑦	(0.92)(11.10)(2.83)(3)(0.064) =	5.55	9.42	52.28
⑧	(8)(0.5)(0.67)(11.10)(0.064) =	1.90	4.50	8.55
		Σ = 361.90		Σ = 2,822.38

$$Y = \frac{\Sigma M}{\Sigma Wt.} = \frac{2,822.38}{361.90} = 7.80'$$

Additional Loads due to Eccentricity of Water in Monolith

Water EL. 2.0 (Load Case 4)

Gates (1-8) Total Water Load = 842.65^K

Water Load per Ft. = $842.65^K / 75' = 11.24^{K/l}$

Gates (9-12) Total Water Load = 361.91^K

Water Load per Ft. = $361.91^K / 35' = 10.34^{K/l}$

$$\Sigma M_y = -6.75'(11.24^{K/l})(9.5') - 17.75'(11.24^{K/l})(9.5') - 30'(10.34^{K/l})(9')$$

$$-40.25'(10.34^{K/l})(8.5') - 51.5'(10.34^{K/l})(8.5') - 62'(10.34^{K/l})(9')$$

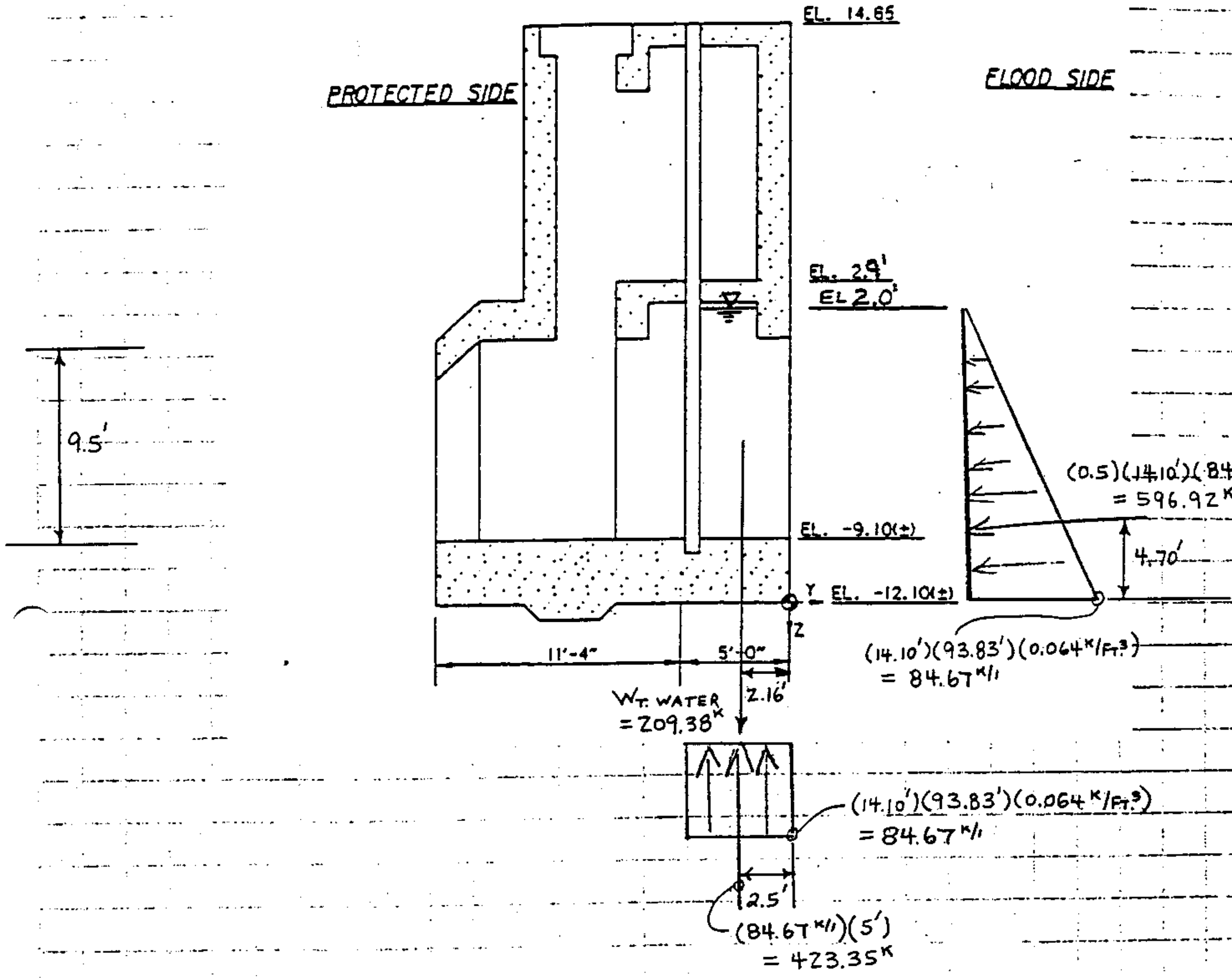
$$+5.5'(11.24^{K/l})(9.5') + 16.25'(11.24^{K/l})(9.0') + 28'(11.24^{K/l})(9')$$

$$+39'(11.24^{K/l})(9.5') + 51'(11.24^{K/l})(9.5') + 62'(11.24^{K/l})(9.5')$$

$$= 2{,}052.64^{1-K}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 67
Made By: SPC	Date: 9/29/95	Pumping Station No. 6, ① → ⑧	
Checked By: MFL	Date: 11/2/95	Impervious	

Load Case 5



$$W_{T.\ WATER} = [(4.17')(11')(75.00') - (1.5')(1.5')(75.00')](0.0640\ K/FT^3)$$
$$= (3{,}271.50\ FT^3)(0.064\ K/FT^3)$$
$$= 209.38^K$$

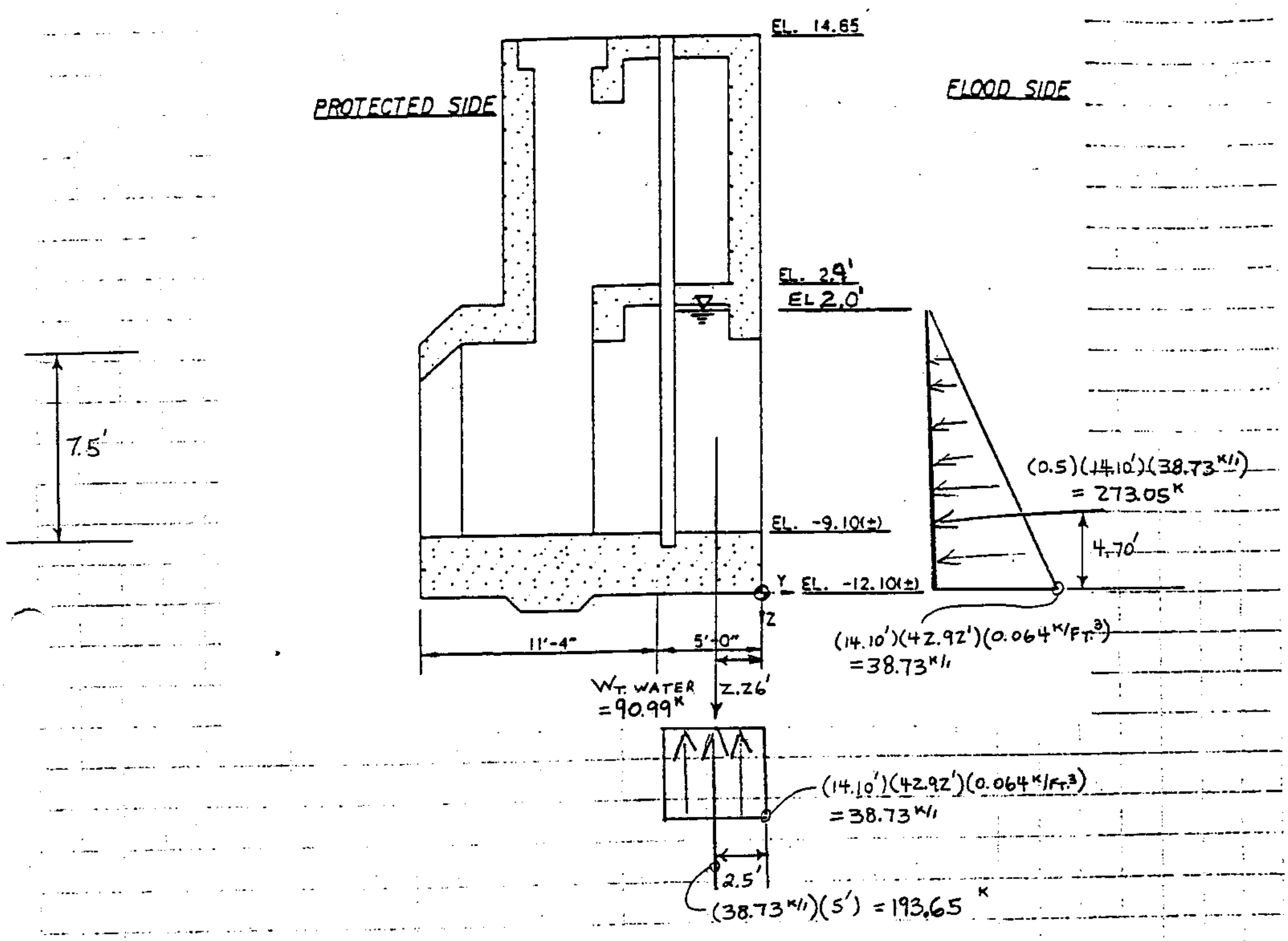
$$\circlearrowleft^{+} \Sigma M_x = (423.35^K)(2.5') - (209.38^K)(2.16') - (596.92^K)(4.70')$$
$$= -2{,}199.41^{\ 1\text{-}K}$$

$$+\downarrow \Sigma P_z = 209.38^K - 423.35^K = -213.97^K$$

$$\xrightarrow{+} \Sigma P_y = -596.92^K$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 68
Made By: SPC	Date: 9/29/95	Pumping Station No. 6, (9) → (12)	
Checked By: MFL	Date: 11/2/95	Impervious	

LOAD CASE 5



$$\text{Wt. water} = [(4.17')(11')(35.00') - (1.5')(3.5')(35.00')]\,(0.0640\ ^K/_{FT^3})$$
$$= (1{,}421.70\ FT^3)(0.064\ ^K/_{FT^3})$$
$$= 90.99^K$$

$$\circlearrowleft\!+\ \Sigma M_x = (193.65^K)(2.5') - (90.99^K)(2.26') - (273.05^K)(4.70')$$
$$= -1{,}004.85^{\ 1\text{-}K}$$

$$+\downarrow\ \Sigma P_z = 90.99^K - 193.65^K = -102.66^K$$

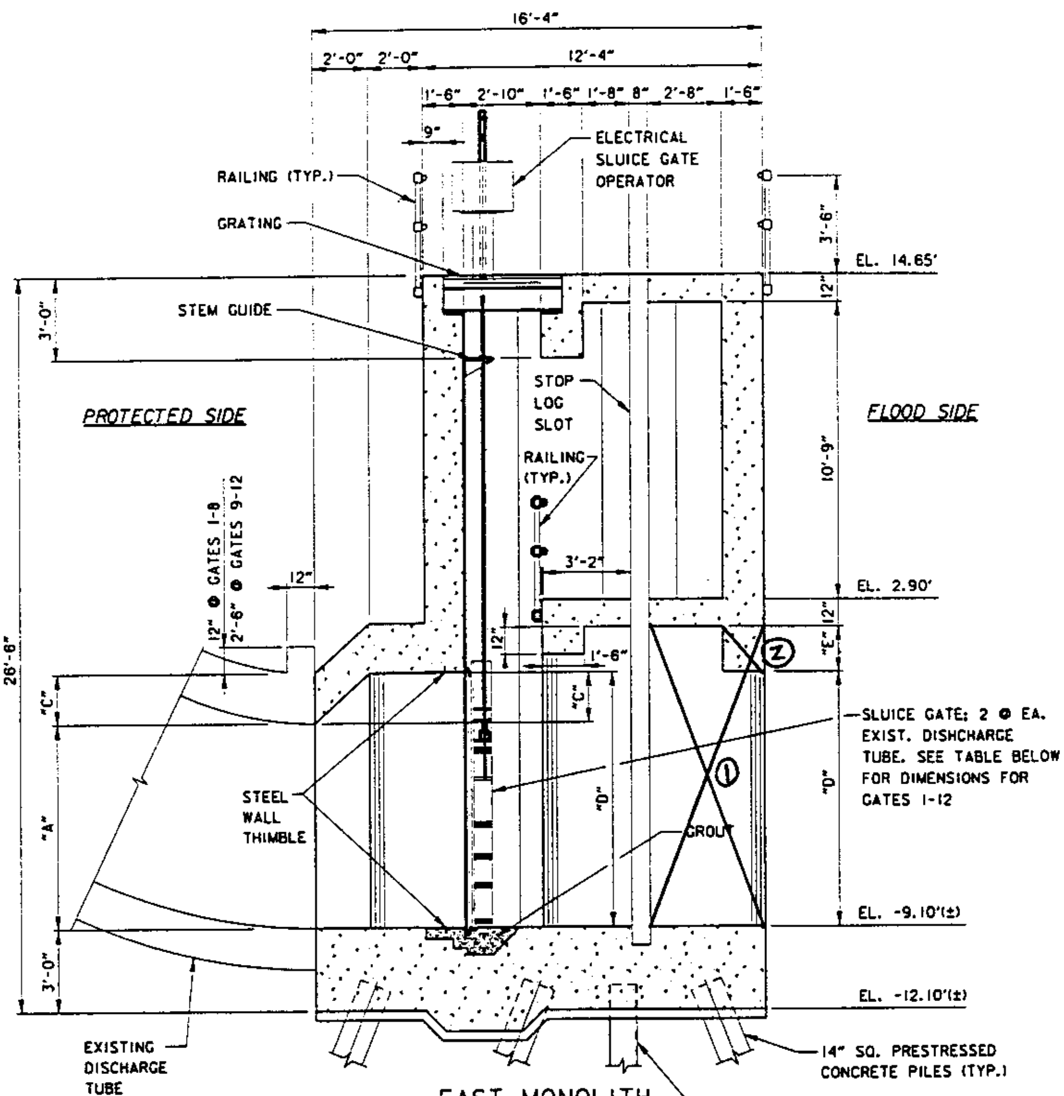
$$\xrightarrow{+}\ \Sigma P_y = -273.05^K$$

Total M_x = $-1{,}004.85^{1\text{-}K} - 2{,}199.41^{1\text{-}K}$ = $\underline{\underline{-3{,}204.26^{1\text{-}K}}}$, M_y = $\underline{\underline{455.81^{1\text{-}K}}}$ (SEE SHT. 71)

Total P_z = $-102.66^K - 213.97^K$ = $\underline{\underline{-316.63^K}}$

Total P_y = $-596.92^K - 273.05^K$ = $\underline{\underline{-869.97^K}}$

WATER AREAS (LOAD CASE 5)



EAST MONOLITH

SECTION B

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 70
Made By: SPC	Date: 10/31/95	P.S. No. 6	
Checked By: MFL	Date: 11/2/95		

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

LOAD CASE 5 ① → ⑧

AREA	WT. (KIPS)	MOMENT ARM (FT.)	MOMENT (1-K)
①	(4.17')(11')(75')(0.064 K/FT.³) = 220.18	2.09	460.18
②	−(1.5)(1.5)(75)(0.064) = −10.80	0.75	−8.10
	Σ = 209.38		452.08

$$\bar{Y} = \frac{\Sigma M}{\Sigma W_T} = \frac{452.08}{209.38} = 2.16'$$

LOAD CASE 5 ⑨ → ⑫

AREA	WT. (KIPS)	MOMENT ARM (FT.)	MOMENT (1-K)
①	(4.17')(11')(35')(0.064 K/FT.³) = 102.75	2.09	214.75
②	−(1.5)(3.5)(35)(0.064) = −11.76	0.75	−8.82
	Σ = 90.99		Σ = 205.93

$$\bar{Y} = \frac{\Sigma M}{\Sigma W_T} = \frac{205.93}{90.99} = 2.26'$$

ADDITIONAL LOADS DUE TO ECCENTRICITY OF WATER IN MONOLITH

WATER EL. 2.0 (LOAD CASE 5)

GATES (1-8) TOTAL WATER LOAD = 209.38^{K}

WATER LOAD PER FT. = $209.38^{K}/75' = 2.79^{K/'}$

GATES (9-12) TOTAL WATER LOAD = 90.99^{K}

WATER LOAD PER FT. = $90.99^{K}/35' = 2.60^{K/'}$

$$\Sigma M_y = -6.75'(2.79^{K/'})9.5' - 17.75'(2.79^{K/'})(9.5') - 30'(2.60^{K/'})(9')$$

$$- 40.25'(2.60^{K/'})(8.5') - 51.5'(2.60^{K/'})(8.5') - 62'(2.60^{K/'})(9')$$

$$+ 5.5'(2.79^{K/'})(9.5') + 16.25'(2.79^{K/'})(9.0') + 28'(2.79^{K/'})(9')$$

$$+ 39'(2.79^{K/'})(9.5') + 51'(2.79^{K/'})(9.5') + 62'(2.79^{K/'})(9.5')$$

$$= 455.81^{'-K}$$

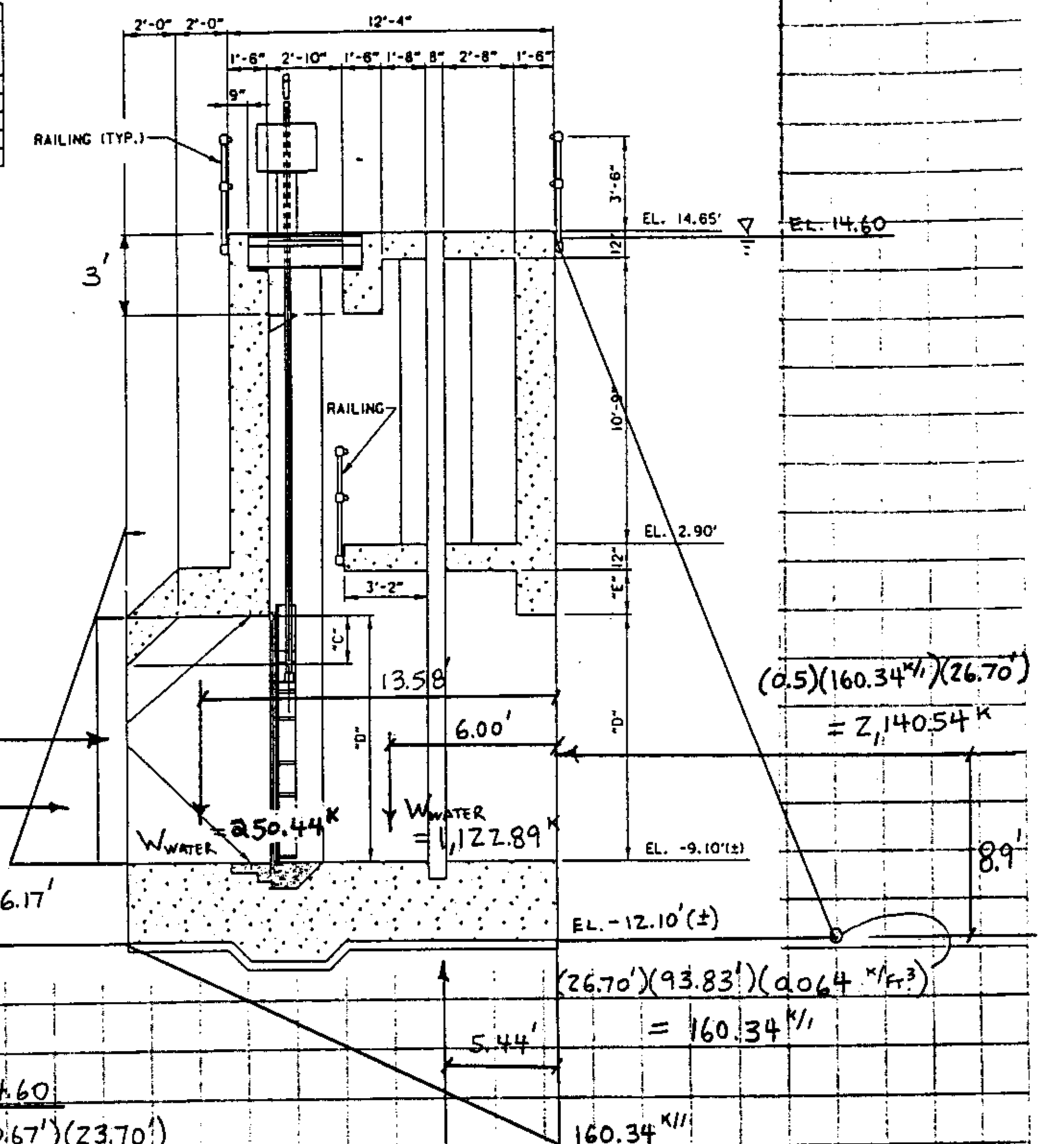
URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 72
Made By: SPC	Date: 8/27/95	Pumping Station No. 6, ① → ⑧	
Checked By: MFL	Date: 11/2/95	Water at El. 14.60	
		Pervious Sheet Pile Wall	

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

WATER LOADING FOR EL. 14.60'

Pervious Cutoff Wall

LOAD CASE 6



(Rt. Portion of Monolith)

Water in Monolith at El. 14.60

$W_{WATER} = [(7.83')(2')(81.33') + (16)(0.5)(0.67')(23.70')$
$+ (9.33')(8.75')(81.33') - (4)(2.67')(1.58')(10.75')$
$+ (12')(2.83')(81.33') + (8')(11')(75.00')$
$- (1')(1.5')(75.00') - (1.5')(1.5')(75.00')$
$+ (0.92')(23.70')(2.83')(9) + (1')(0.67')(75.00')]$
$\times (0.064\ ^K/_{FT.^3})$
$= 1,122.89^K$

(Lt. Portion of Monolith)

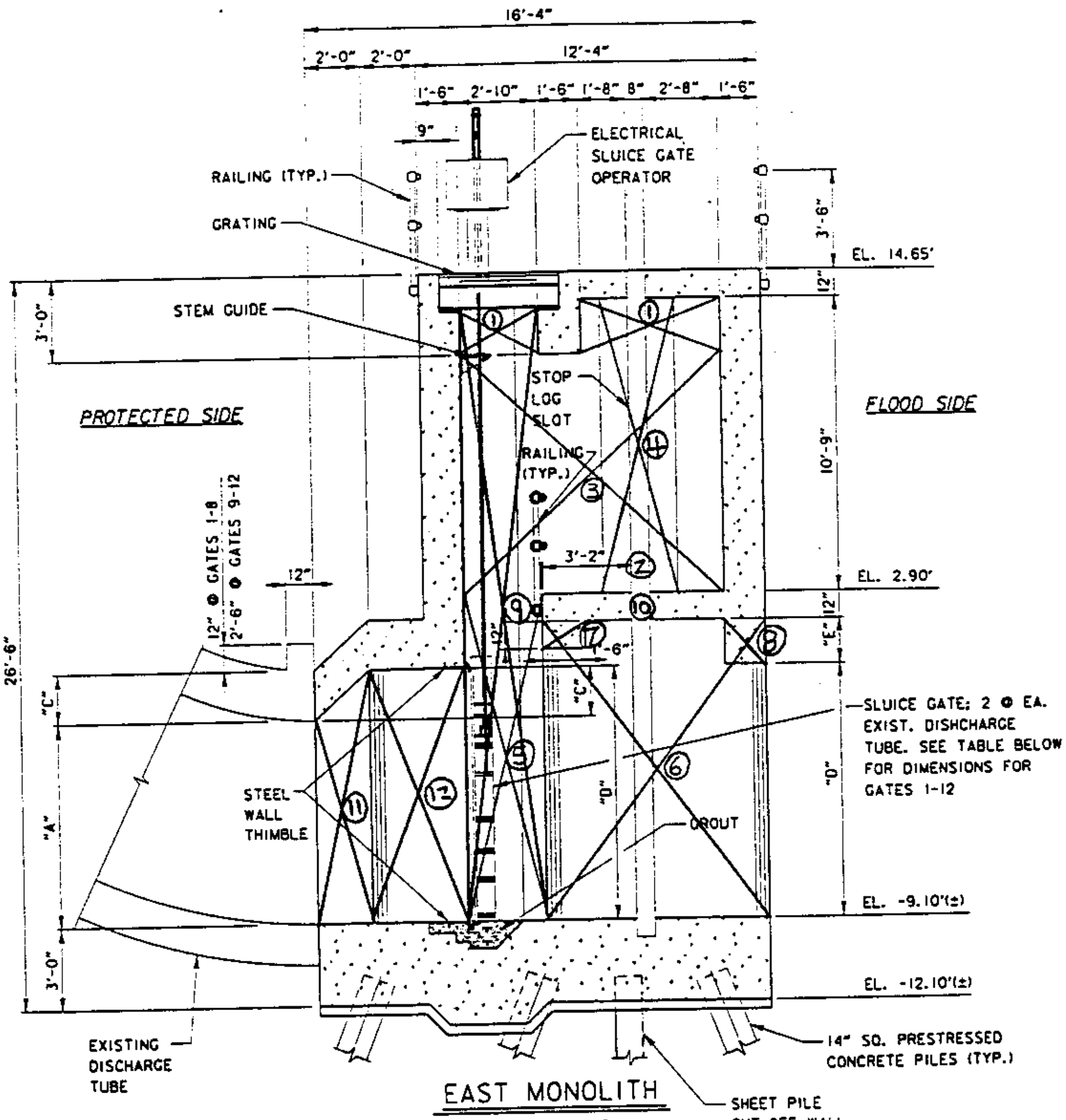
$W_{WATER} = 250.44^K$

$\curvearrowright + \Sigma M_x = -(13.58')(250.44^K) - (6.00')(1,122.89^K)$
$- (8.9')(2,140.54^K) + (7.75')(159.60^K) + (6.17')(216.60^K)$
$+ (5.44')(1,309.18^K)$
$= -19,493.86^{1-K}$

$+\downarrow \Sigma P_z = -1,309.18^K + 250.44^K + 1,122.89^K = 64.15^K$

$\overset{+}{\rightarrow} \Sigma P_y = 159.60^K + 216.60^K - 2,140.54^K = -1,764.34^K$

Water Areas (Load Case 6 & 7)



EAST MONOLITH

SECTION B

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002		Job No. 46229.01	Sheet No. 74
Made By: SPC	Date: 10/31/95	P.S. No. 6	
Checked By: MFL	Date: 11/2/95		

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

WATER AT EL. 14.60 ① → ⑧ (LOAD CASE 6 & 7)

LT. PORTION OF MONOLITH

$\bar{Y}$ = 13.58' (SAME AS FOR WATER AT 12.60)

RT. PORTION OF MONOLITH

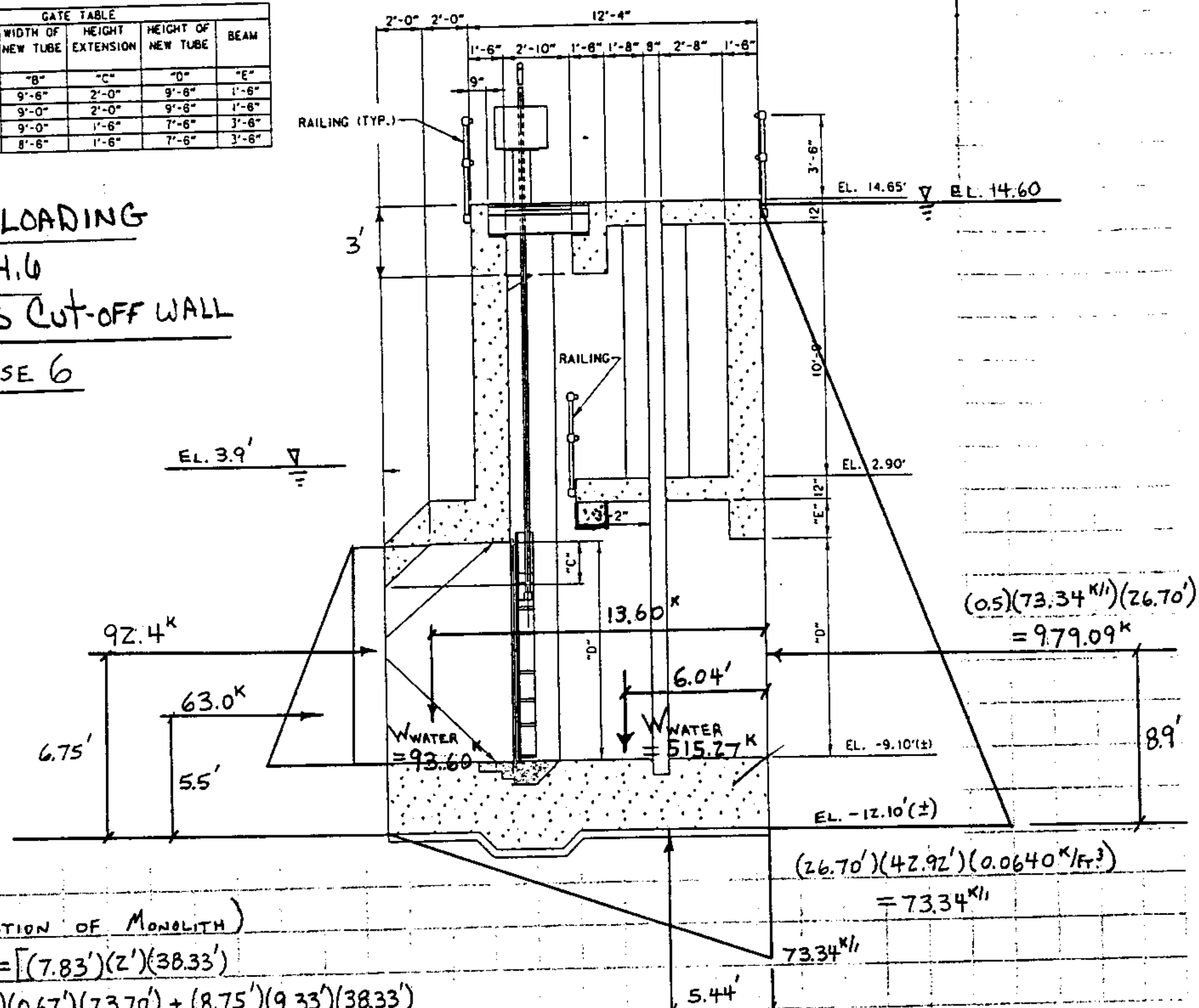
AREA	WT. (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
①	(7.83')(2')(81.33')(0.064 K/FT³) =	81.51	5.96	485.80
②	(16)(0.5)(0.67)(23.70)(0.064) =	8.13	4.50	36.59
③	(9.33)(8.75)(81.33)(0.064) =	424.93	6.17	2,621.82
④	−(4)(2.67)(1.58)(10.75)(0.064) =	−11.61	4.50	−52.25
⑤	(12)(2.83)(81.33)(0.064) =	176.77	9.42	1,665.17
⑥	(8)(11)(75)(0.064) =	422.40	4.00	1,689.60
⑦	−(1)(1.5)(75)(0.064) =	−7.20	7.25	−52.20
⑧	−(1.5)(1.5)(75)(0.064) =	−10.80	0.75	−8.10
⑨	(0.92)(23.70)(2.83)(9)(0.064) =	35.54	9.42	334.79
⑩	(1)(0.67)(75)(0.064) =	3.22	4.50	14.49
		Σ = 1,122.89		Σ = 6,735.71

$$\bar{Y} = \frac{\Sigma M}{\Sigma Wt.} = \frac{6,735.71}{1,122.89} = 6.00'$$

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE "A"	WIDTH OF NEW TUBE "B"	HEIGHT EXTENSION "C"	HEIGHT OF NEW TUBE "D"	BEAM "E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

WATER LOADING
FOR EL 14.6
PERVIOUS CUT-OFF WALL

LOAD CASE 6



(RT. PORTION OF MONOLITH)

$W_{WATER} = [(7.83')(2')(38.33')$
$+ (8)(0.5')(0.67')(23.70') + (8.75')(9.33')(38.33')$
$- (2)(2.67')(1.67')(10.75') + (12')(2.83')(38.33')$
$+ (8')(11')(35') - (1')(1.5')(35') - (1.5')(3.5')(35')$
$+ (0.92')(23.70')(2.83')(3) + (1')(0.67')(35')]$
$\times (0.0640^{K}/FT.^3)$
$= 515.27^{K}$

(LT. PORTION OF MONOLITH)

$W_{WATER} = 93.60^{K}$

$\Sigma M_x = 5.44'(598.82^K) - (13.60')(93.60^K) - (6.04')(515.27^K)$
$- (8.9')(979.09^K) + (6.75')(92.4^K) + (5.5')(63.0^K) = -8,871.31^{\,1-K}$

$\text{Total } M_x = -8,871.31^{\,1-K} - 19,493.86^{\,1-K} = \underline{-28,365.17^{\,1-K}}$

$+\downarrow \Sigma P_z = -598.82^K + 93.60^K + 515.27^K = 10.05^K$

$\text{Total } P_z = 10.05^K + 64.15^K = \underline{74.20^K}$

$M_y = \underline{\underline{2,449.62^{\,1-K}}}$ (SEE SHT. 79)

$\xrightarrow{+} \Sigma P_y = 92.4^K + 63.0^K - 979.09^K = -823.69^{\,1-K}$

$\text{Total } P_y = -823.69^K - 1,764.34^K = \underline{-2,588.03^K}$

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.01 | Sheet No. 76

P.S. No. 6

Made By: SPC | Date: 10/31/95
Checked By: MFL | Date: 11/2/95

EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

WATER AT EL. 14.60 (9) → (12) (LOAD CASE 6 & 7)

LT. PORTION OF MONOLITH

$\overline{Y} = 13.60'$ (SAME AS FOR WATER AT 12.60)

RT. PORTION OF MONOLITH

AREA	WT. (KIPS)	MOMENT ARM (FT.)	MOMENT (1-K)
①	(7.83')(2')(38.33')(0.064 K/FT³) = 38.42	5.96	228.98
②	(8)(0.5)(0.67)(23.70)(0.064) = 4.07	4.50	18.32
③	(8.75)(9.33)(38.33)(0.064) = 200.27	6.17	1,235.67
④	−(2)(2.67)(1.67)(10.75)(0.064) = −6.14	4.50	−27.63
⑤	(12)(2.83)(38.33)(0.064) = 83.31	9.42	784.78
⑥	(8)(11)(35)(0.064) = 197.12	4.00	788.48
⑦	−(1)(1.5)(35)(0.064) = −3.36	7.25	−24.36
⑧	−(1.5)(3.5)(35)(0.064) = −11.76	0.75	−8.82
⑨	(0.92)(23.70)(2.83)(3)(0.064) = 11.85	9.42	111.63
⑩	(1)(0.67)(35)(0.064) = 1.50	4.50	6.75
	Σ = 515.28		Σ = 3,113.80

$$\overline{Y} = \frac{\Sigma M}{\Sigma W_T} = \frac{3{,}113.80}{515.28} = 6.04'$$

URS

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 | Sheet No. 77

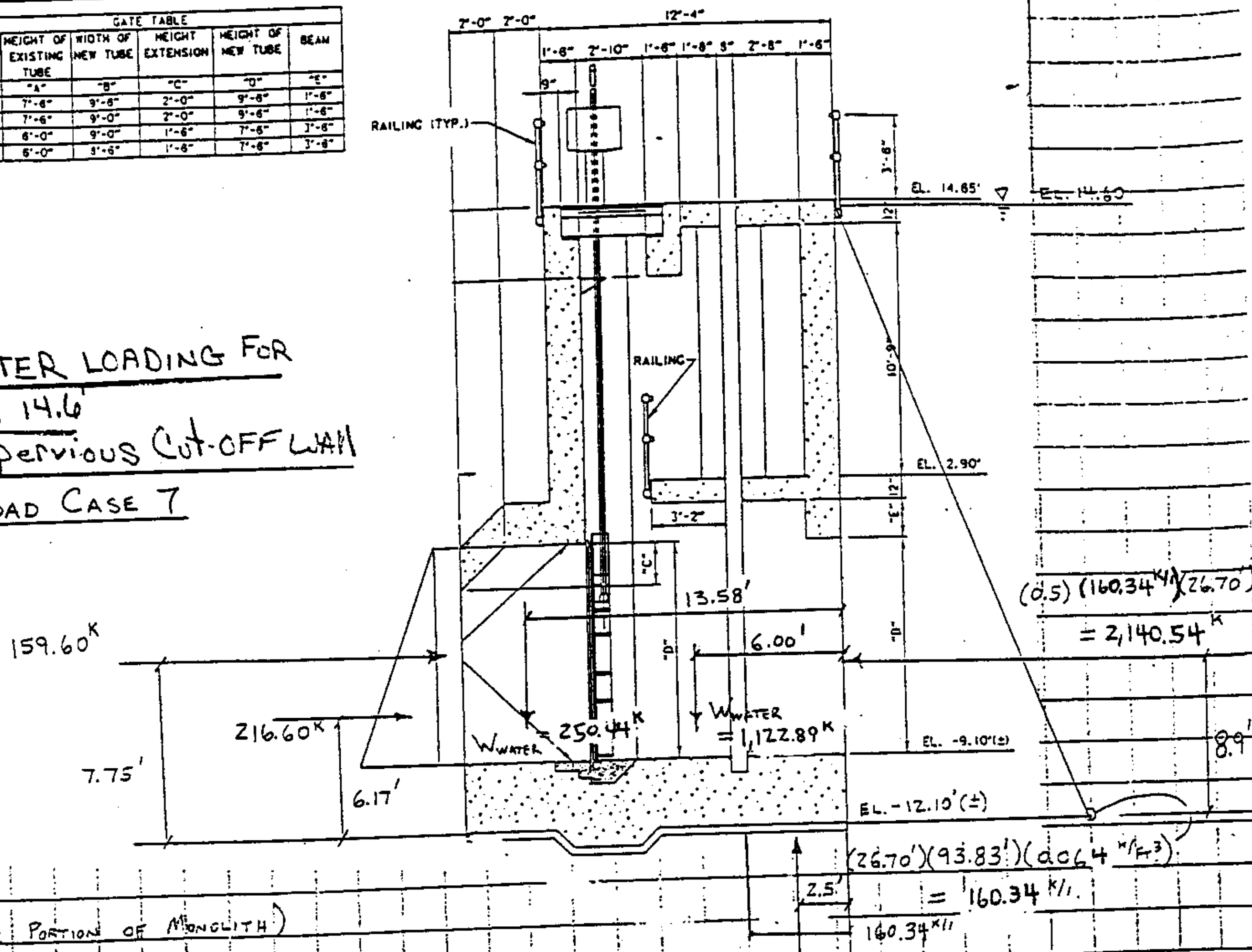
Made By: SFC | Date: 8/27/95

Checked By: MFL | Date: 11/2/95

PUMPING STATION No. 6, ① → ⑧
WATER AT EL 14.60
IMPERVIOUS SHEET PILE WALL

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	9'-6"	1'-6"	7'-6"	3'-6"

WATER LOADING FOR
EL. 14.6'
IMPERVIOUS CUT-OFF WALL
LOAD CASE 7



(RT. PORTION OF MONOLITH)

WATER IN MONOLITH AT EL. 14.60

$W_{WATER} = [(7.83')(2')(81.33') + (16)(0.5)(0.67')(23.70')$
$+ (9.33')(8.75')(81.33') - (4)(2.67')(1.58')(10.75')$
$+ (12')(2.83')(81.33') + (8')(11')(75.00')$
$- (1')(1.5')(75.00') - (1.5')(1.5')(75.00')$
$+ (0.92')(23.70')(2.83')(9) + (1')(0.67')(75.00')]$
$\times (0.064\ ^K/_{FT^3})$
$= 1,122.89^K$

$\circlearrowright \Sigma M_x = (2.5')(801.70^K) - (13.58')(250.44^K) + (6.00')(1,122.89^K)$
$- (8.9')(2,140.54^K) + (7.75')(159.60^K) + (6.17')(216.60^K) =$
$= -24,611.55^{1\text{-}K}$

(LT. PORTION OF MONOLITH)

$W_{WATER} = 250.44^K$

$+\downarrow \Sigma P_z = -801.70^K + 250.44^K + 1,122.89^K = 571.63^K$

$+\rightarrow \Sigma P_y = 159.60^K + 216.60^K - 2,140.54^K = -1,764.34^K$

URS URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00 — Sheet No. 78

Made By: SPC — Date: 8/29/95
Checked By: MFL — Date: 11/2/95

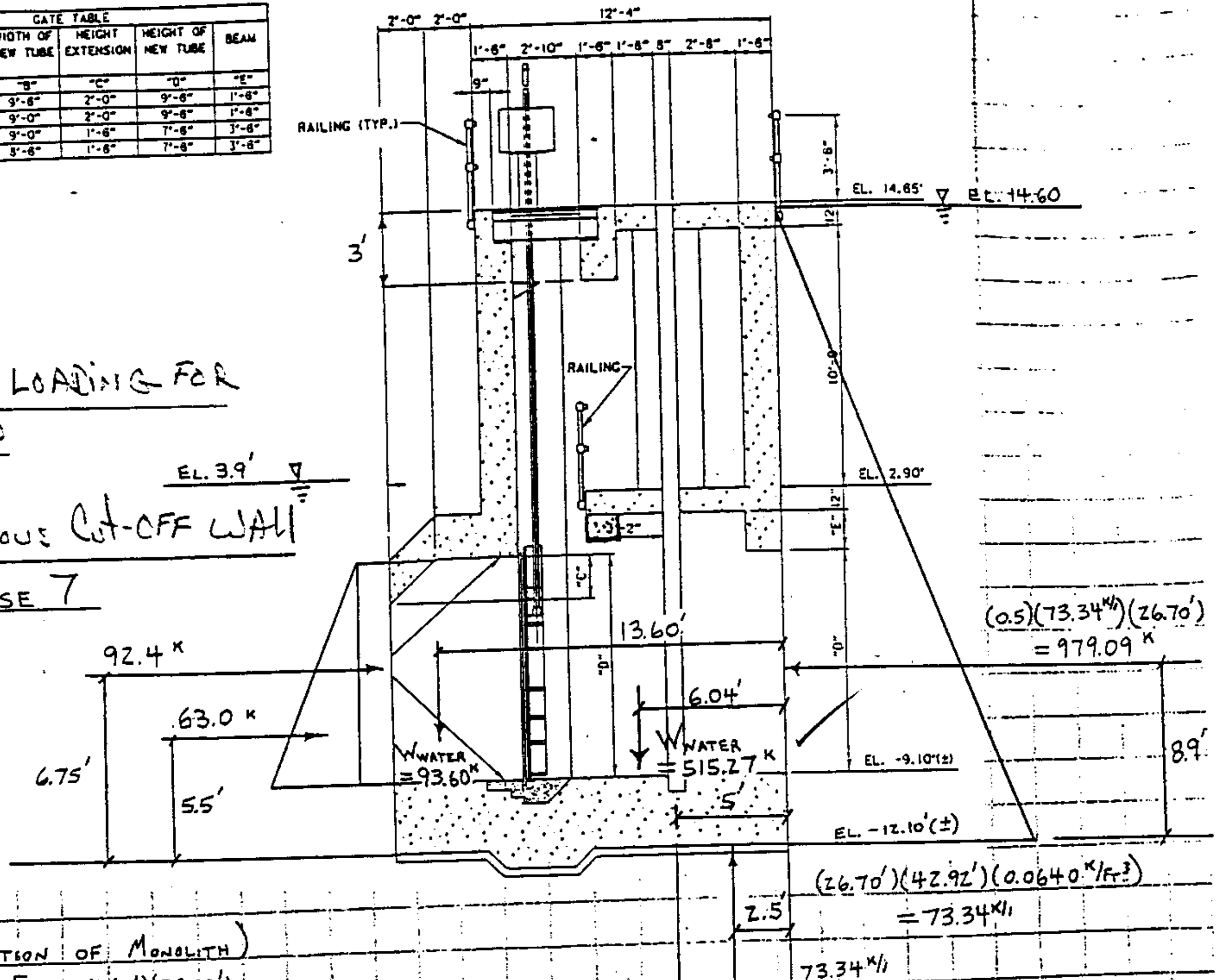
Pumping Station No. 6, (9) → (12)
Water at El. 14.60
Impervious Sheet Pile Wall

GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3, 6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4, 5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9, 12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10, 11	6'-0"	5'-6"	1'-6"	7'-6"	3'-6"

WATER LOADING FOR EL. 14.6

Impervious Cut-off Wall

LOAD CASE 7



(Rt. Portion of Monolith)

$W_{WATER} = [(7.83')(2')(38.33')$
$+ (8)(0.5')(0.67')(23.70') + (8.75')(9.33')(38.33')$
$- (2)(2.67')(1.67')(10.75') + (12')(2.83')(38.33')$
$+ (8')(11')(35') - (1')(1.5')(35') - (1.5')(3.5')(35')$
$+ (0.92')(23.70')(2.83')(3) + (1')(0.67')(35')]$
$\times (0.0640\ ^{K}/_{FT^3})$
$= 515.27^{K}$

$(73.34^{K/l})(5') = 366.70^{K}$

$\Sigma M_x = 2.5'(366.70^{K}) - (13.60')(93.60^{K}) - (6.04')(515.27^{K}) + (6.75')(92.4^{K}) + (5.5')(63.0^{K}) - (8.9')(979.09^{K}) = -11,212.14^{1-K}$

(Lt. Portion of Monolith)

$W_{WATER} = 93.60^{K}$

Total $M_x = -11,212.14^{1-K} - 24,611.55^{1-K} = \underline{-35,823.69^{1-K}}$

$+\downarrow \Sigma P_z = -366.70^{K} + 93.60^{K} + 515.27^{K} = 242.17^{K}$

Total P_z $242.17^{K} + 571.63^{K} = \underline{813.80^{K}}$

$M_y = \underline{2,449.62^{1-K}}$ (See Sht. 79)

$+\rightarrow \Sigma P_y = 92.4^{K} + 63.0^{K} - 979.09^{K} = -823.69^{K}$

Total $P_y = -823.69^{K} - 1,764.34^{K} = \underline{-2,588.03^{K}}$

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Checked By: SPC	Date: 11/4/95		

Additional Loads due to Eccentricity of Water in Monolith

Water EL. 14.6 (Load Case 6 & 7)

Gates (1-8) Total Water Load = 1,122.89ᵏ + 250.44ᵏ = 1,373.33ᵏ

Water Ld per Ft = 1,373.33ᵏ/75' = 18.31 ᵏ/'

Gates (9-12) Total Water Load = 515.27ᵏ + 93.60ᵏ = 608.87ᵏ

Water Ld. per Ft. = 608.87ᵏ /35' = 17.40 ᵏ/'

$$\Sigma M_y = -6.75'(18.31\ ^{k}/_{'})(9.5') - 17.75(18.31\ ^{k}/_{'})(9.5') - 30(17.40\ ^{k}/_{'})(9')$$
$$- 40.25'(17.40\ ^{k}/_{'})8.5' - 51.5(17.40\ ^{k}/_{'})(8.5') - 62'(17.40\ ^{k}/_{'})(9')$$
$$+ 5.5'(18.31\ ^{k}/_{'})(9.5') + 16.25'(18.31\ ^{k}/_{'})(9') + 28(18.31\ ^{k}/_{'})\ 9'$$
$$+ 39'(18.31\ ^{k}/_{'})(9.5) + 51'(18.31\ ^{k}/_{'})(9.5) + 62'(18.31\ ^{k}/_{'})(9.5') =$$
$$= 2,449.62\ ^{'-k}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 80
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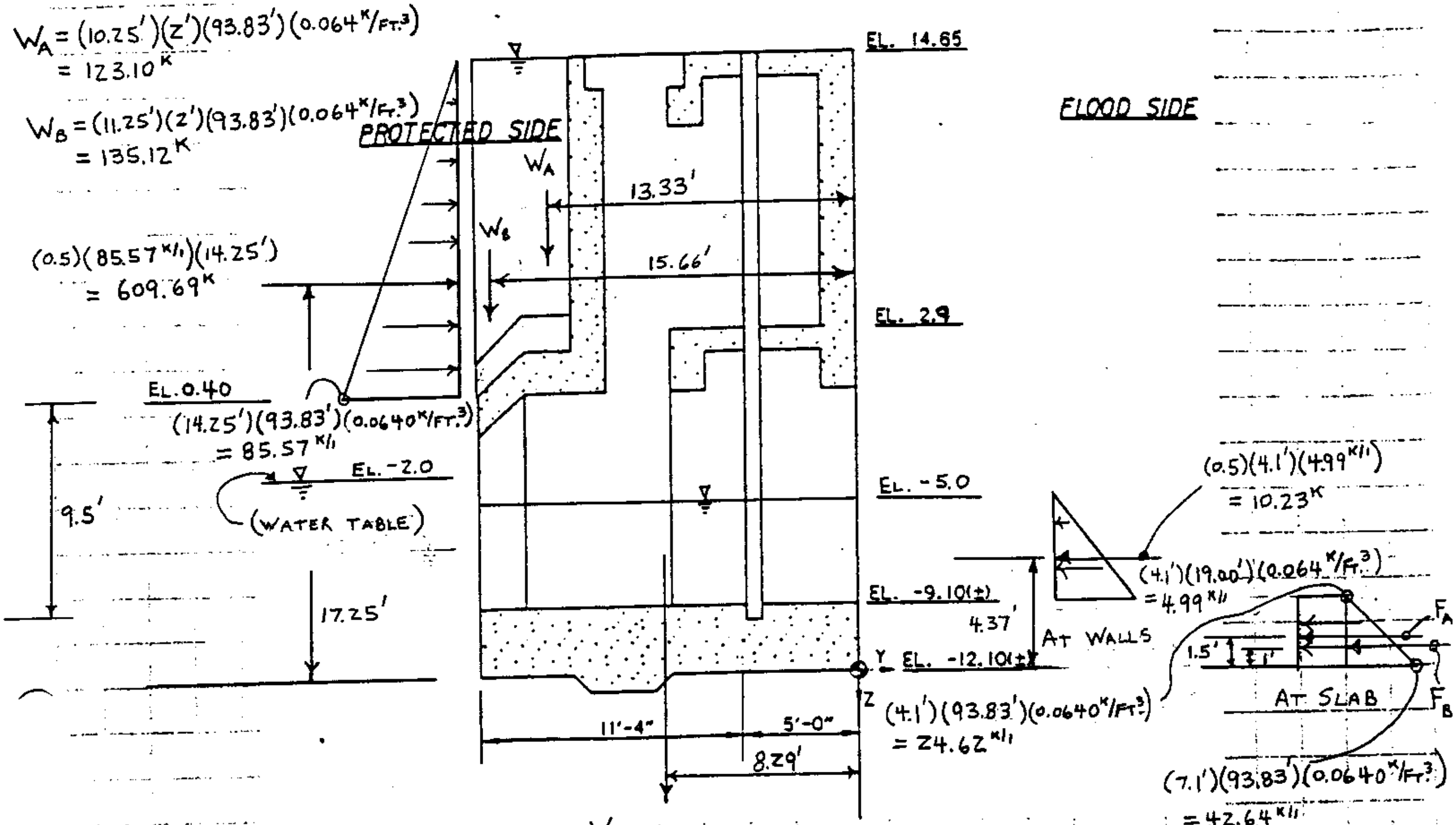
Checked By: MFL	Date: 11/2/95	Impervious	

LOAD CASE 8

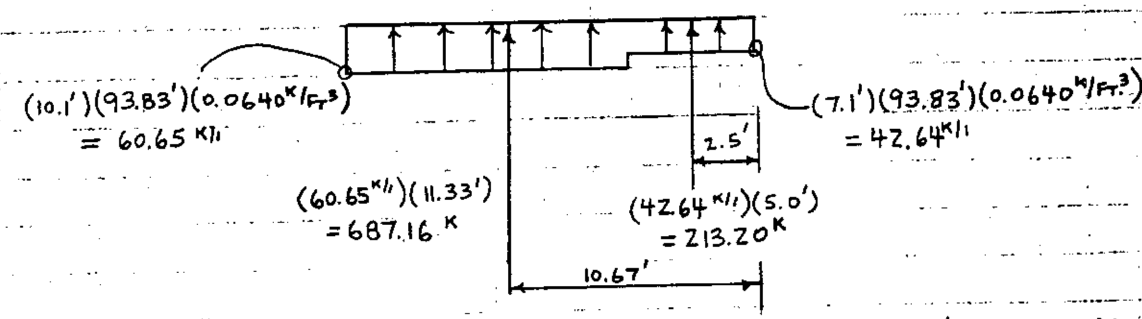


$W_{T.\ WATER}$

$= [(0.92')(4.1')(2.83')(9) + (8')(4.1')(75.00') + (2.83')(4.1')(81.33')$
$+ (16)(0.5')(0.67')(4.1') + (4.1')(3.5')(74.83') + (4.1')(2')(83.83')](0.0640^{K}/FT^3)$
$= 338.11^K$

$F_A = (24.62^{K/l})(3') = 73.86^K$

$F_B = (0.5)(42.64^{K/l} - 24.62^{K/l})(3')$
$= 27.03^K$



$\curvearrowleft + \Sigma M_x = (609.69^K)(17.25') - (135.12^K)(15.66') - (123.10^K)(13.33') - (338.11^K)(8.29') - (10.23^K)(4.37')$
$- (73.86^K)(1.5') - (27.03^K)(1') + (687.16^K)(10.67') + (213.20^K)(2.5')$
$= 11{,}639.79^{'-K}$

$\downarrow \Sigma P_z = 338.11^K + 123.10^K + 135.12^K - 687.16^K - 213.20^K = -304.03^K$

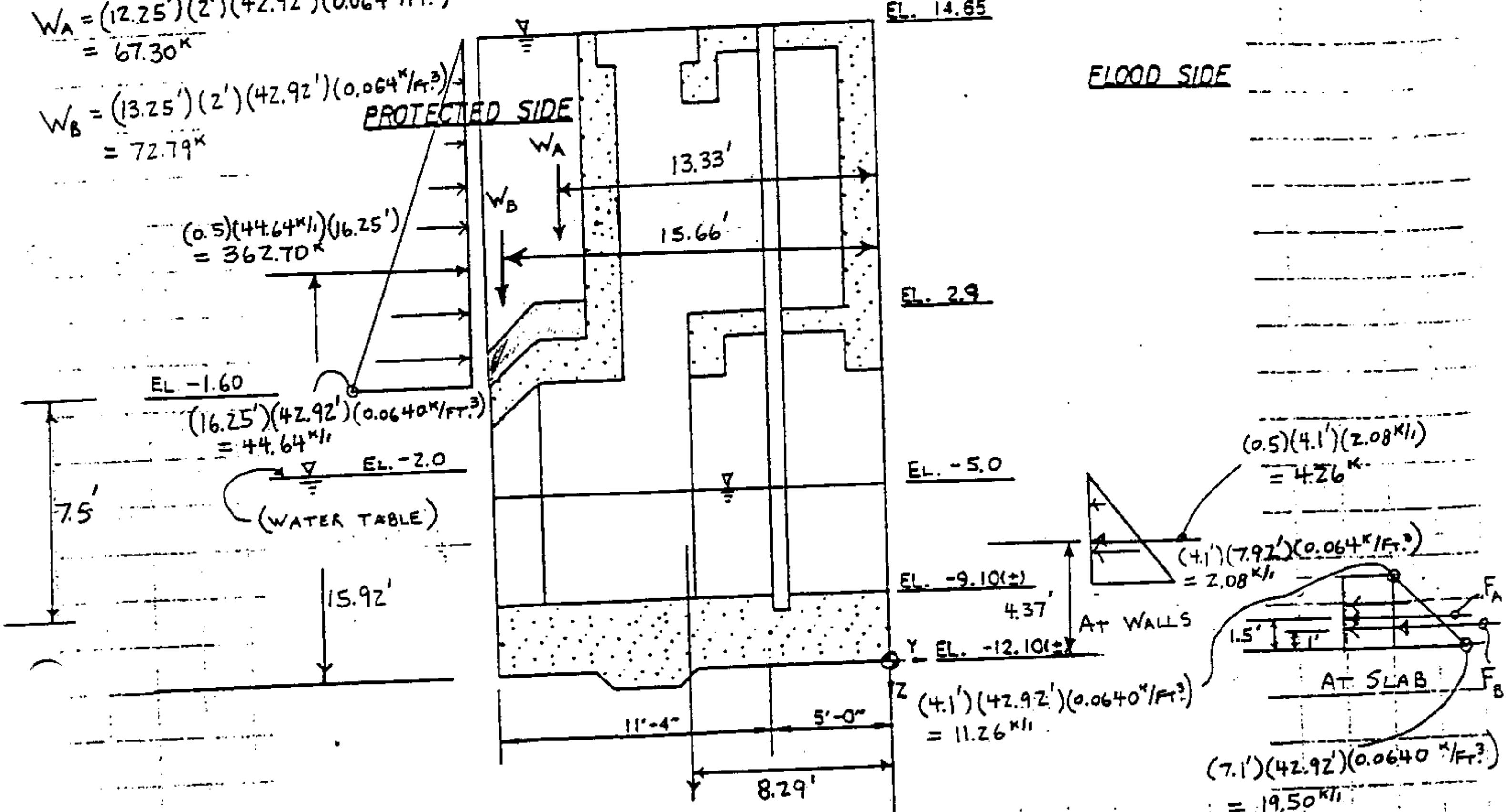
$\overset{+}{\rightarrow} \Sigma P_y = 609.69^K - 10.23^K - 73.86^K - 27.03^K = 498.57^K$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 81
Made By: SPC	Date: 9/28/95	Pumping Station No. 6, ⑨ → ⑫	
Checked By: MFL	Date: 11/2/95	Impervious	

Load Case 8

$W_A = (12.25')(2')(42.92')(0.064^{K}/FT.^3) = 67.30^K$

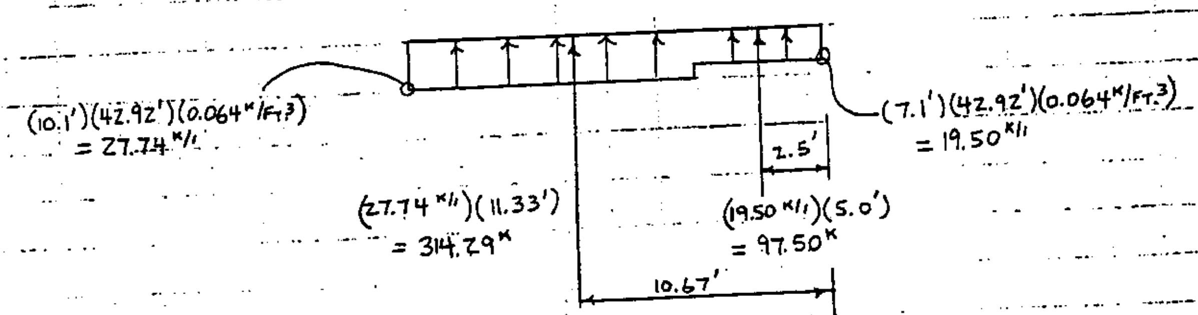
$W_B = (13.25')(2')(42.92')(0.064^{K}/FT.^3) = 72.79^K$



$$W_T \text{ WATER} = [(0.92')(4.1')(2.83')(3) + (8')(4.1')(35.00') + (2.83')(4.1')(38.33') + (8)(0.5')(0.67')(4.1') + (4.1')(3.5')(35.00') + (4.1')(2')(41.83')](0.0640^{K}/FT.^3) = 158.78^K$$

$F_A = (11.26^{K/l})(3') = 33.78^K$

$F_B = (0.5)(19.50^{K/l} - 11.26^{K/l})(3') = 12.36^K$



$$\curvearrowright + \Sigma M_x = (362.70^K)(15.92') - (67.30^K)(13.33') - (72.79^K)(15.66') - (158.78^K)(8.29') - (4.26^K)(4.37') - (33.78^K)(1.5') - (12.36^K)(1') + (314.29^K)(10.67') + (97.50^K)(2.5')$$

$$= 5{,}936.48^{'-K}$$

$+\downarrow \Sigma P_z = 67.30^K + 72.79^K + 158.78^K - 314.29^K - 97.50^K = -112.92^K$

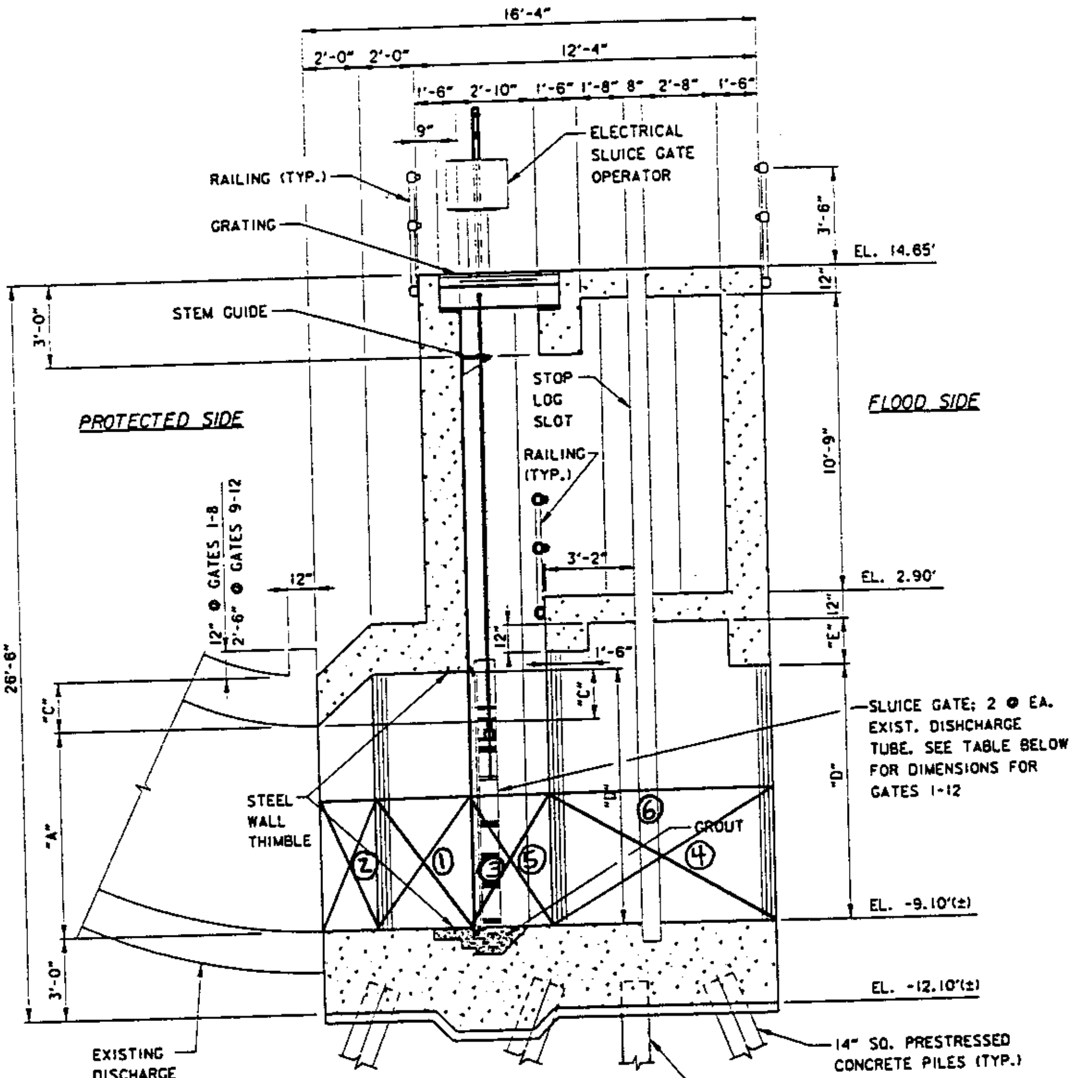
$\xrightarrow{+} \Sigma P_y = 362.70^K - 4.26^K - 33.78^K - 12.36^K = 312.30^K$

TOTAL $M_x = 5{,}936.48^{'-K} + 11{,}639.79^{'-K} = \underline{\underline{17{,}576.27^{'-K}}}$, $M_y = \underline{\underline{-559.11^{'-K}}}$ (See Sht. 84)

TOTAL $P_y = 312.30^K + 498.57^K = \underline{\underline{810.87^K}}$

TOTAL $P_z = -112.92^K - 304.03^K = \underline{\underline{-416.95^K}}$

WATER AREAS (LOAD CASE 8)



EAST MONOLITH

SECTION B

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	8'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	8'-0"	8'-6"	1'-6"	7'-6"	3'-6"

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 83
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EQUIVALENT CENTROIDS FOR WATER IN MONOLITHS

LOAD CASE 8 ① → ⑧

W_T (KIPS)		MOMENT ARM (FT.)	MOMENT (1-K)
$(4.1')(3.5')(74.83')(0.064^{K}/FT^3)$ =	68.72	12.58	864.50
(4.1)(2)(83.83)(0.064) =	43.99	15.33	674.37
(2.83)(4.1)(81.33)(0.064) =	60.40	9.42	568.97
(8)(4.1)(75.00)(0.064) =	157.44	4.00	629.76
(0.92)(4.1)(2.83)(9)(0.064) =	6.15	9.42	57.93
(16)(0.5)(0.67)(4.1)(0.064) =	1.41	4.50	6.35
	Σ = 338.11		Σ = 2,801.88

$$\bar{Y} = \frac{\Sigma M}{\Sigma W_T} = \frac{2,801.88}{338.11} = 8.29'$$

LOAD CASE 8 ⑨ → ⑫

BY INSPECTION, $\bar{Y}$ IS THE SAME AS FOR ① → ⑧ ABOVE.

$$\bar{Y} = 8.29'$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 84
Made By: SPC	Date: 11/1/95	P.S. No. 6	
Checked By: SCB	Date: 11/95		

ADDITIONAL LOADS DUE TO ECCENTRICITY OF WATER IN MONOLITH

WATER EL. -5.0 (LOAD CASE 8)

GATES (1-8) TOTAL WATER LOAD = 338.11^K

WATER LOAD PER FT. = $338.11^K / 75' = 4.51^{K/'}$

GATES (9-12) TOTAL WATER LOAD = 158.78^K

WATER LOAD PER FT. = $158.78^K / 35' = 4.54^{K/'}$

$$\Sigma M_y = -6.75'(4.51^{K/'})(9.5') - 17.75'(4.51^{K/'})(9.5') - 30'(4.54^{K/'})(9')$$
$$- 40.25'(4.54^{K/'})(8.5') - 51.5'(4.54^{K/'})(8.5') - 62'(4.54^{K/'})(9')$$
$$+ 5.5'(4.51^{K/'})(9.5') + 16.25'(4.51^{K/'})(9.0') + 28'(4.51^{K/'})(9')$$
$$+ 39'(4.51^{K/'})(9.5') + 51'(4.51^{K/'})(9.5') + 62'(4.51^{K/'})(9.5')$$
$$= 194.74^{'-K}$$

ADDITIONAL LOADS DUE TO ECCENTRICITY OF WATER ON MONOLITH

GATES (1-8) TOTAL WATER LOAD = $\overbrace{123.10^K + 135.12^K}^{\text{sht 80}} = 258.22^K$

DISTANCE TO CENTROID = 22.08'

GATES (9-12) TOTAL WATER LOAD = $\overbrace{67.30^K + 72.79^K}^{\text{sht 81}} = 140.09^K$

DISTANCE TO CENTROID = 46.08'

$$\Sigma M_y = (22.08')(258.22^K) - (46.08')(140.09^K) = -753.85^{'-K}$$

$$\text{TOTAL } M_y = 194.74^{'-K} - 753.85^{'-K} = -559.11^{'-K}$$

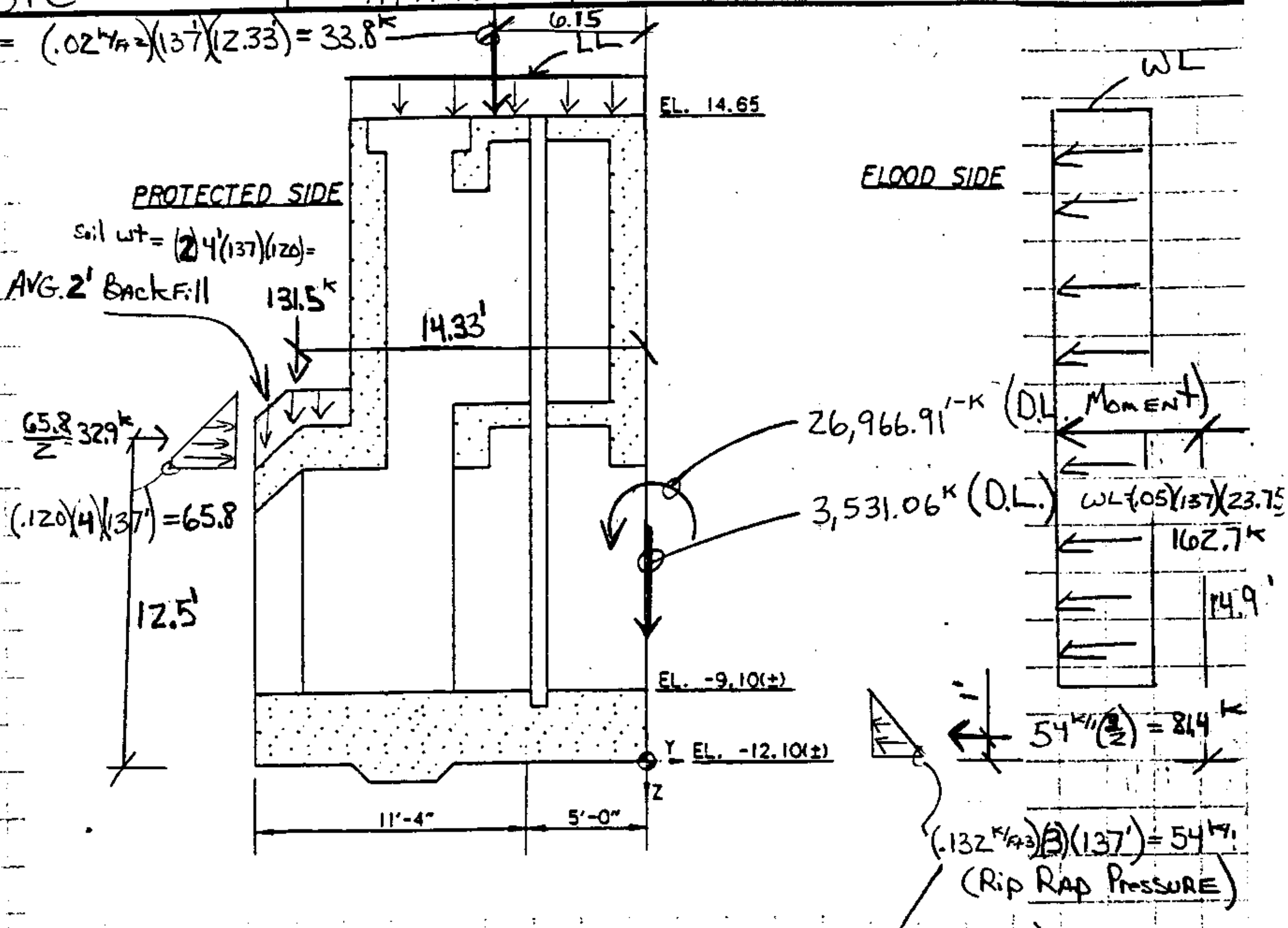
EAST MONOLITH LOADING DIAGRAMS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 85
Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By:	Date:		

EAST MONOLITH

LOADING DIAGRAMS

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 86
Made By: SCB	Date: 9/25/95	P.S. #6 (Loading Diagram) EAST Monolith	
Checked By: SPC	Date: 11/1/95		



RipRap (.132 k/ft³ to .165 k/ft³)
USE .132 k/ft³

CASE #1 Construction Case

Reduction FOR Allow. OVERSTRESS

$$\downarrow + \sum P_z = \underset{(DL)}{3{,}531.06^k} + \underset{(Soil\ wt.)}{131.5^k} + \underset{(LL)}{33.8^k} = 3{,}696.36^k (.75) = \underline{2{,}772.27^k}$$

$$\curvearrowright + \sum M_x = \underset{(DL)}{-26{,}966.91^{1-k}} - \underset{(LL)}{33.8^k(6.15')} - \underset{(Soil)}{131.5^k(14.33')} + \underset{(Soil)}{32.9^k(12.5')} - \underset{(Rip\ Rap)}{81.4^k(1')}$$

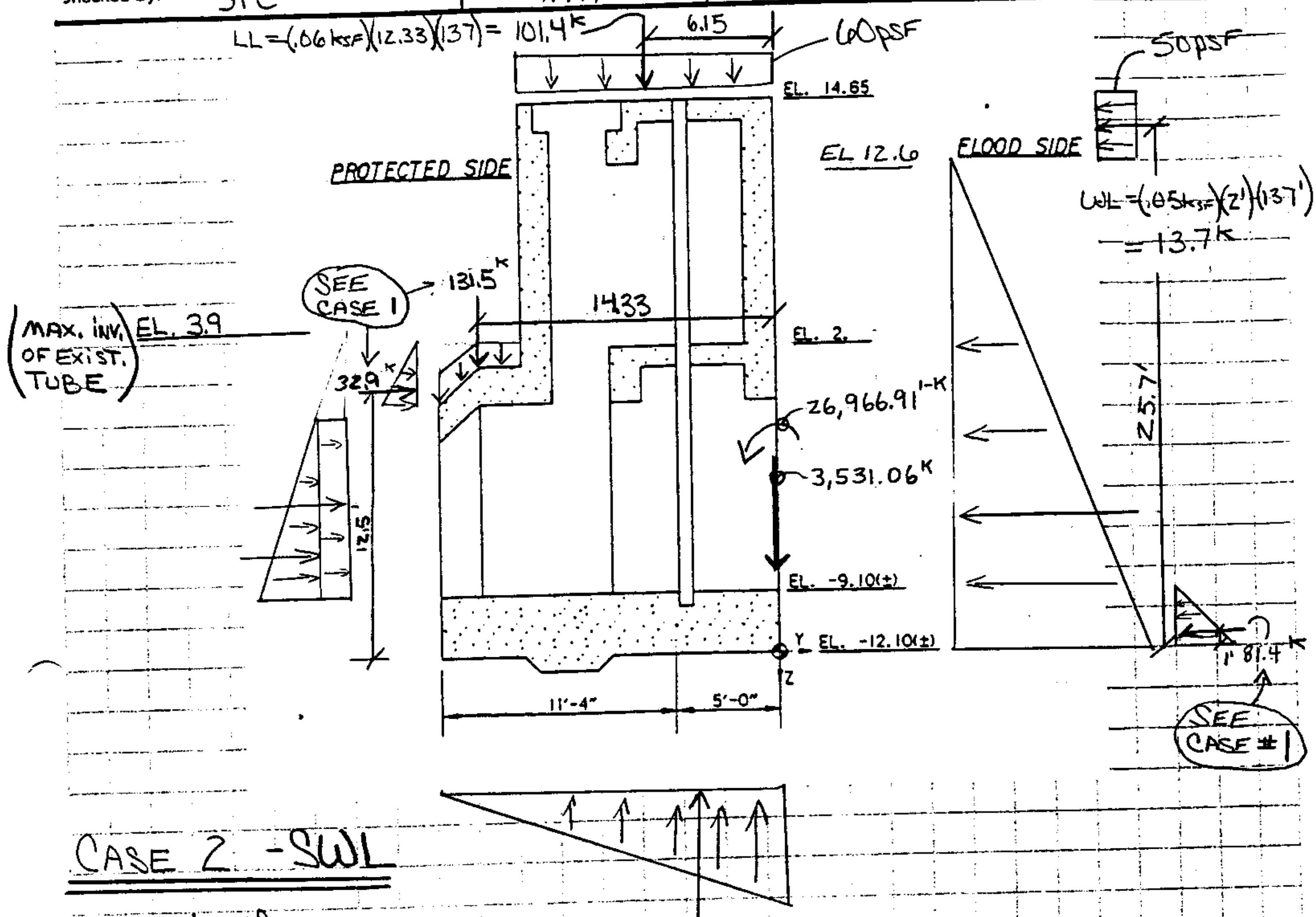
$$\underset{(WL)}{-162.7^k(14.9')} = -31{,}153.56^{1-k}(.75) = -23{,}365.17^{1-k}$$

$$\rightarrow + \sum P_{y'} = \underset{(SOIL)}{32.9^k} - \underset{(WL)}{162.7^k} - \underset{(RIP\ RAP)}{81.4^k} = -211.20^k (.75) = \underline{-158.40^k}$$

$$\sum M_y = \underset{(DL)}{-591.61^{1-k}}(0.75) = -443.71^{1-k}$$

URS CONSULTANTS
3500 N. CAUSEWAY BLVD.
METAIRIE, LOUISIANA 70002

Job No. 46229.00		Sheet No. 87	
Made By: SCB	Date: 9/26/95	P.S. #6 (LOADING DIAGRAM) EAST Monolith	
Checked By: SPC	Date: 11/1/95		



CASE 2 - SWL

For Water lds
SEE Sht. 57

Pervious Cut-off Wall

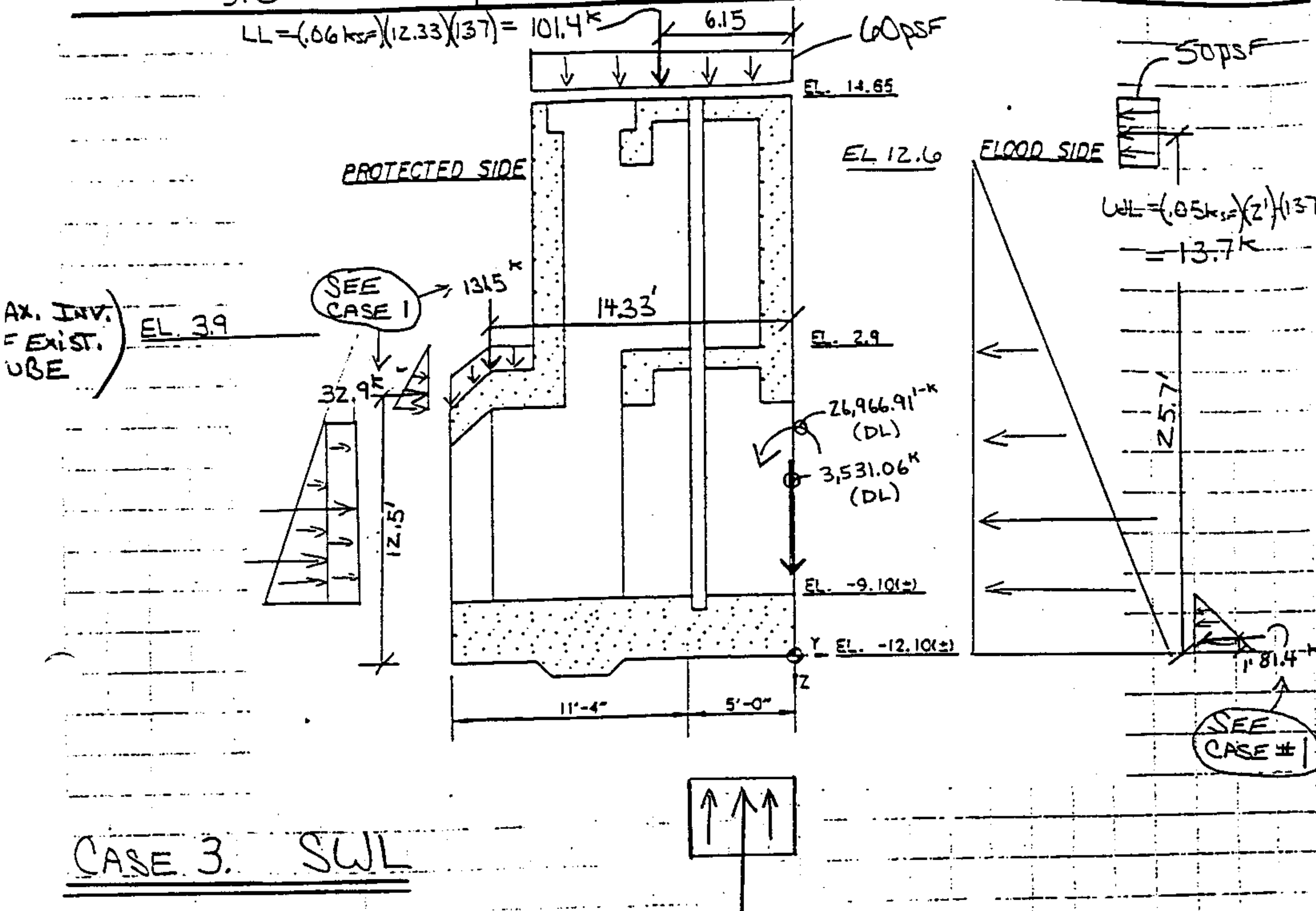
$$\Sigma M_y = \underset{(DL)}{-591.61^{1\text{-}K}} + \underset{(WATER)}{2{,}417.29^{1\text{-}K}} = \underline{1{,}825.68^{1\text{-}K}}$$

$$+\downarrow \Sigma P_z = \underset{(WATER\ LD.)}{150.83^K} + \underset{(DL)}{3{,}531.06^K} + \underset{(Soil\ WT.)}{131.5^K} + \underset{(LL)}{101.4^K} = \underline{3{,}914.79^K}$$

$$\xrightarrow{+} \Sigma P_y = \underset{(WATER\ LD)}{-2{,}138.23^K} \underset{(Rip\ Rap)}{-81.4^K} + \underset{(Soil)}{32.9^K} \underset{(WL)}{-13.7^K} = \underline{-2{,}200.43^K}$$

$$+\curvearrowright \Sigma M_x = \underset{(WATER)}{-22{,}952.09^{1\text{-}K}} \underset{(DL)}{-26{,}966.91^{1\text{-}K}} \underset{(LL)}{-101.4^K(6.15')} \underset{(SOIL)}{-131.5^K(14.33')} \underset{(WL)}{-13.7^K(25.7')}$$
$$\underset{(Rip\ Rap)}{-81.4^K(1')} + \underset{(soil)}{32.9^K(12.5')} = \underline{-52{,}449.25^{1\text{-}K}}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 88
Made By: SCB	Date: 9/26/95	P.S. #6 (LOADING DIAGRAM) EAST Monolith	
Checked By: SPC	Date: 11/1/95		



CASE 3. SWL

For Water lds
SEE sht. 60

Impervious Cut-off Wall

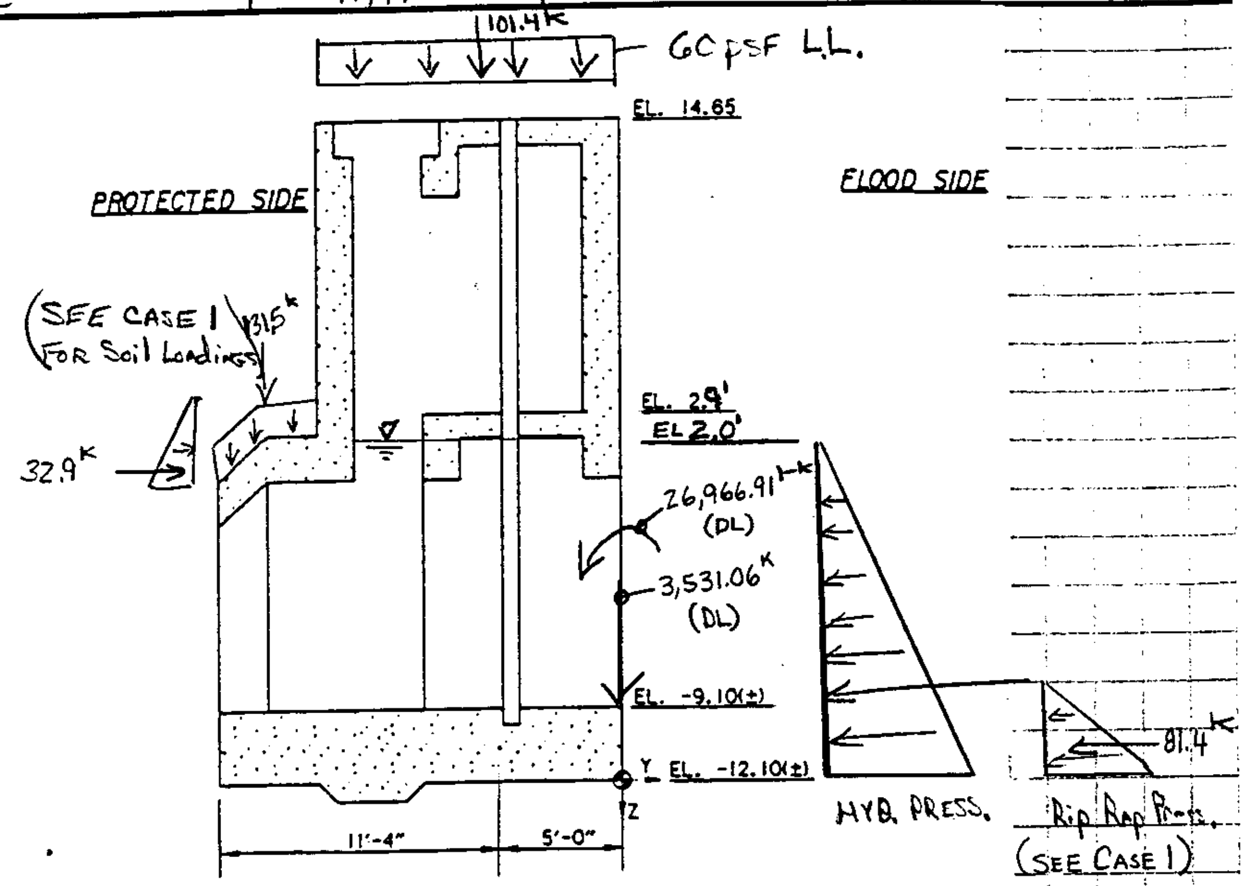
$$\Sigma M_y = \underset{(DL)}{-591.61^{1\text{-}k}} + \underset{(WATER)}{2{,}417.29^{1\text{-}k}} = \underline{1{,}825.68^{1\text{-}k}}$$

$$+\downarrow \Sigma P_z = \underset{(\text{WATER LD.})}{835.04^k} + \underset{(DL)}{3{,}531.06^k} + \underset{(\text{Soil WT.})}{131.5^k} + \underset{(LL)}{101.4^k} = \underline{4{,}599.00^k}$$

$$\xrightarrow{+} \Sigma P_y = \underset{(\text{WATER LD})}{-2{,}138.23^k} \underset{(\text{RipRap})}{-81.4^k} + \underset{(\text{Soil})}{32.9^k} \underset{(WL)}{-13.7^k} = \underline{-2{,}200.43^k}$$

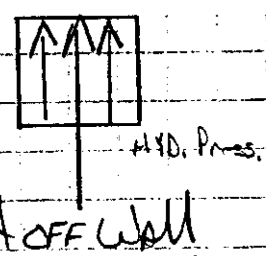
$$+\curvearrowright \Sigma M_x = \underset{(WATER)}{-29{,}852.04^{1\text{-}k}} \underset{(DL)}{-26{,}966.91^{1\text{-}k}} \underset{(LL)}{-101.4^k(6.15')} \underset{(SOIL)}{-131.5(14.33)} \underset{(WL)}{-13.7^k(25.7')}$$
$$\underset{(\text{RIP RAP})}{-(81.4^k)(1')} + \underset{(SOIL)}{32.9(12.5)} = \underline{-59{,}349.20^{1\text{-}k}}$$

PS #6 (LOADING DIAGRAM) EAST Monolith



CASE 4 (OPERATING Condition)

FOR Water LOADS SEE sht. 63



$$\Sigma M_y = \underset{(DL)}{-591.61^{1\text{-}K}} + \underset{(WATER)}{2{,}052.64^{1\text{-}K}} = 1{,}461.03^{1\text{-}K}$$

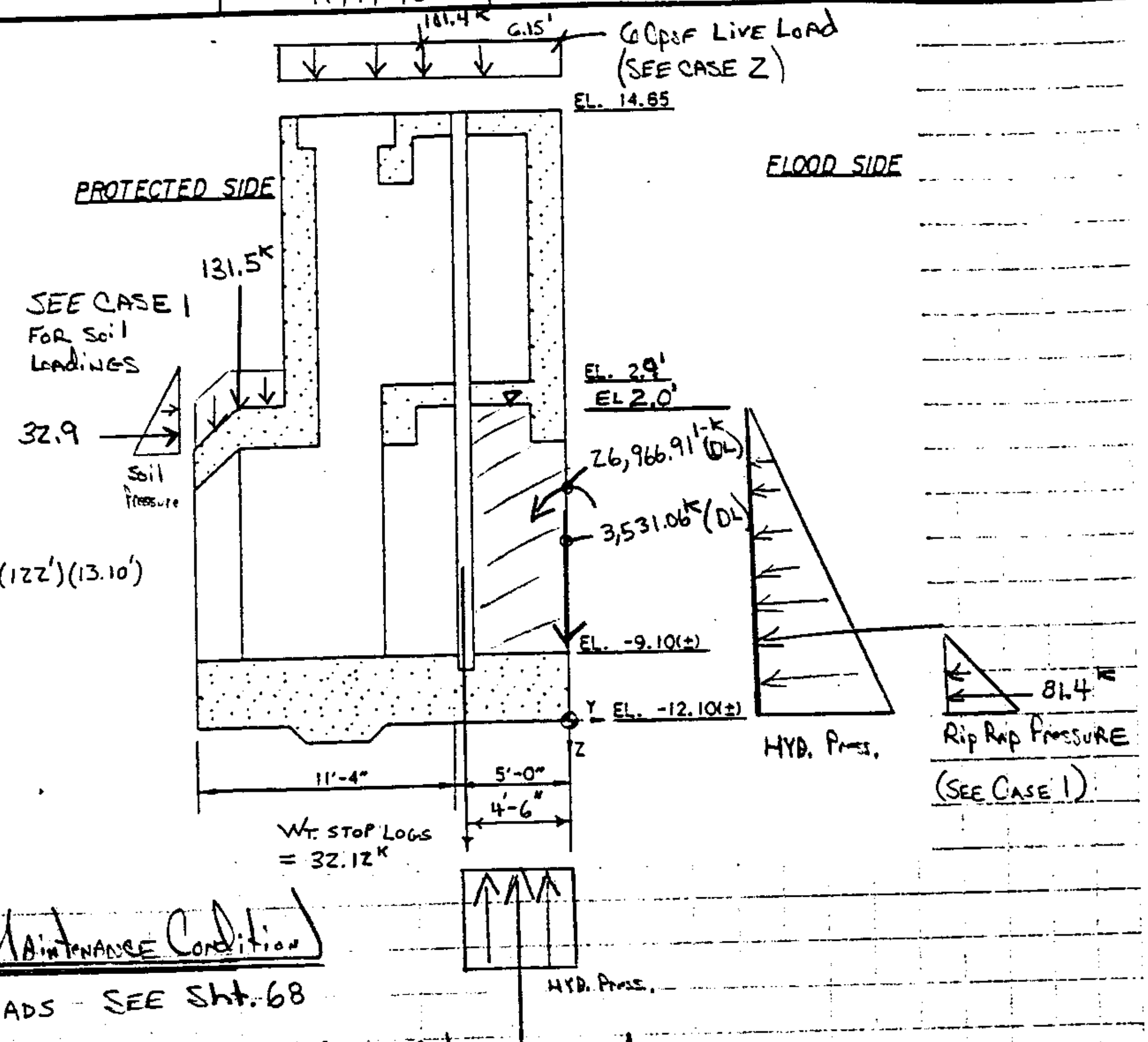
$$+\downarrow \Sigma P_z = \underset{(WATER)}{587.56^K} + \underset{(DL)}{3{,}531.06^K} + \underset{(Soil)}{131.5} + \underset{(LL)}{101.4} = 4{,}351.52^K$$

$$\overset{+}{\rightarrow} \Sigma P_y = \underset{(WATER)}{-456.96^K} \underset{Rip Rap}{-81.4^K} + \underset{(Soil)}{32.9^K} = -505.46^K$$

$$\Sigma M_x = \underset{(WATER)}{-9{,}470.91^{1\text{-}K}} - \underset{(DL)}{26{,}966.91^{1\text{-}K}} - \underset{(LL)}{101.4(6.15)} - \underset{(Soil)}{13.5^K(14.33)} \underset{(RipRap)}{-81.4^K(1')} + \underset{(Soil)}{32.9^K(12.5')} =$$

$$= -36{,}925.04^{1\text{-}K}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229	Sheet No. 90
Made By: SCB	Date: 9/28/95	P.S. #6 (LOADING Diagram) EAST MONOLITH	
Checked By: SPC	Date: 11/1/95		



Wt. Stop Logs
= $(0.030^{K}/Ft.^3)(0.67')(122')(13.10')$
= 32.12^{K}

CASE 5 (Maintenance Condition)

For Water Loads See Sht. 68

Impervious Cut-off Wall

$$\Sigma M_y = \underset{(DL)}{-591.61^{1-K}} + \underset{(WATER)}{455.81^{1-K}} = -135.80^{1-K}(0.75) = \underline{-101.85^{1-K}}$$

$$+\downarrow P_z = \underset{(WATER)}{-316.63^{K}} + \underset{(DL)}{3{,}531.06^{K}} + \underset{(Soil)}{131.5^{K}} + \underset{(LL)}{101.4^{K}} + \underset{(Stop\ Logs)}{32.12^{K}} = 3{,}479.45^{K}(0.75) = \underline{2{,}609.59^{K}}$$

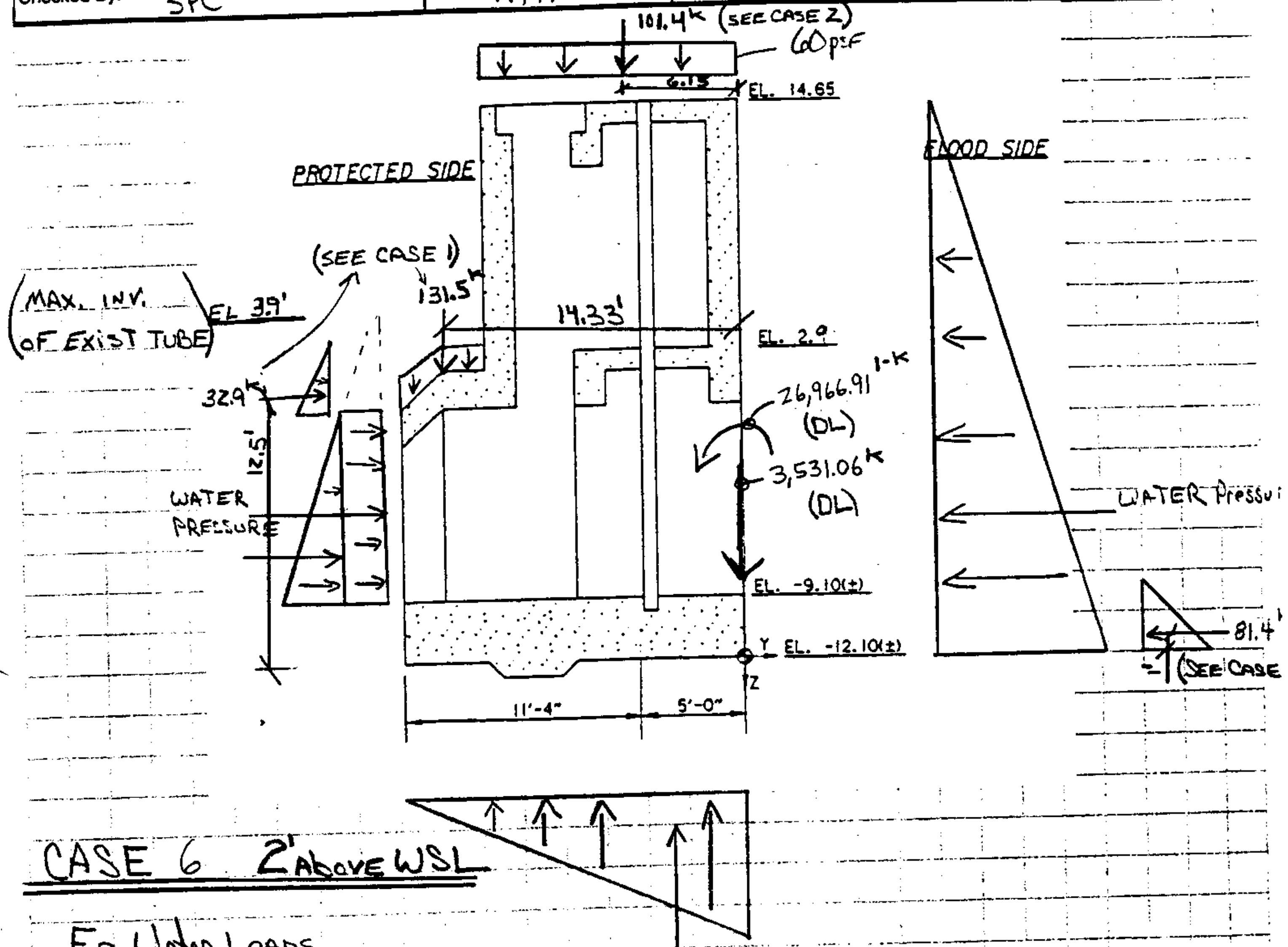
$$\xrightarrow{+} \Sigma P_y = \underset{(WATER)}{-869.97^{K}} \underset{(Rip\ Rap)}{-81.4^{K}} + \underset{(Soil)}{32.9^{K}} = -918.47^{K}(0.75) = \underline{-688.85^{K}}$$

$$\curvearrowright + \Sigma M_x = \underset{(WATER)}{-3{,}204.26^{1-K}} \underset{(DL)}{-26{,}966.91^{1-K}} - \underset{(LL)}{101.4}(6.15') - \underset{(SOIL)}{131.5}(14.33) - \underset{(RIP\ RAP)}{81.4^{K}}(1') + \underset{(SOIL)}{32.9^{K}}(12.5')$$

$$- \underset{(STOP\ LOGS)}{32.12^{K}}(4.5')$$

$$= -32{,}493.87^{1-K}(0.75) = \underline{-24{,}370.40^{1-K}}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.	Sheet No. 91
Made By: SCB	Date: 9/27/95	P.S. #6 Loading Diagram East Monolith	
Checked By: SPC	Date: 11/1/95		



CASE 6 2' Above WSL

For Water Loads
See Sht. 75

Pervious Cut-Off Wall

$$\Sigma M_y = \underset{(DL)}{-591.61^{1-K}} + \underset{(WATER)}{2{,}449.62^{1-K}} = 1{,}858.01^{1-K}(0.75) = \underline{1{,}393.51^{1-K}}$$

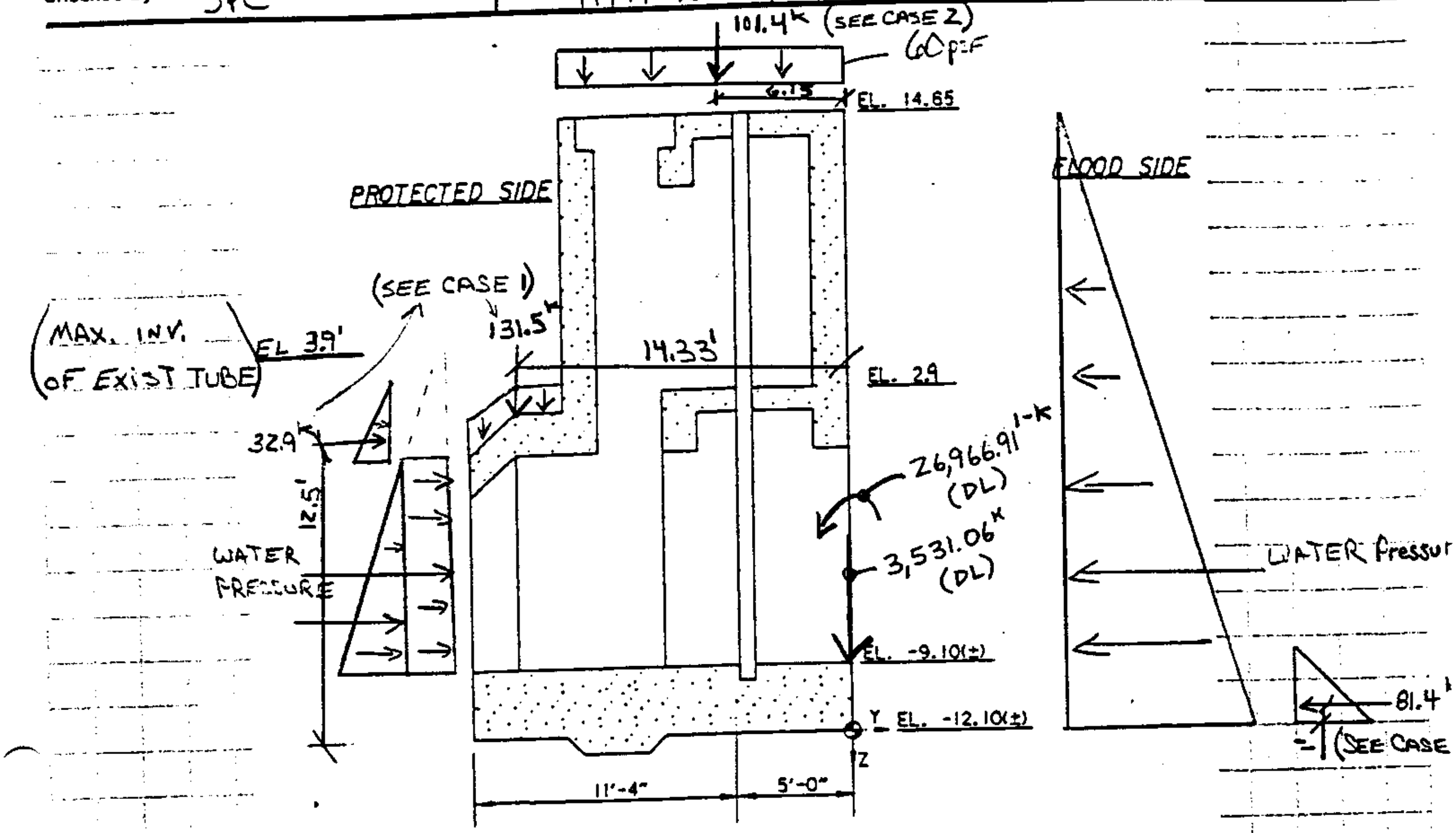
$$+\downarrow \Sigma P_z = \underset{(WATER)}{74.20^K} + \underset{(DL)}{3{,}531.06^K} + \underset{(soil)}{131.5^K} + \underset{(LL)}{101.4^K} = 3{,}838.16^K(0.75) = \underline{2{,}878.62^K}$$

$$\overset{+}{\rightarrow} \Sigma P_y = \underset{(WATER)}{-2{,}588.03^K} \underset{(RipRap)}{-81.4^K} + \underset{(soil)}{32.9^K} = -2{,}636.53^K(0.75) = \underline{-1{,}977.40^K}$$

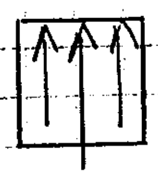
$$+\curvearrowright \Sigma M_x = \underset{(WATER)}{-28{,}365.17^{1-K}} - \underset{(DL)}{26{,}966.91^{1-K}} - \underset{(LL)}{101.4^K}(6.15') - \underset{(SOIL)}{131.5^K}(14.33') \underset{(Rip Rap)}{-81.4^K}(1') + \underset{(Soil)}{32.9^K}(12.5')$$

$$= -57{,}510.24^{1-K}(0.75) = \underline{-43{,}132.68^{1-K}}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.	Sheet No. 92
Made By: SCB	Date: 9/27/95	P.S. #6 Loading Diagram East Monolith	
Checked By: SPC	Date: 11/1/95		



CASE 7. 2' above WSL



For Water Loads
See Sht. 78

Impervious Cut off Wall

Reduction For Unusual Condition

$$+\downarrow \Sigma P_z = \underset{(WATER)}{813.80^k} + \underset{(DL)}{3,531.06^k} + \underset{(Soil)}{131.5^k} + \underset{(LL)}{101.4^k} = 4,577.76^k (.75) = \underline{3,433.32^k}$$

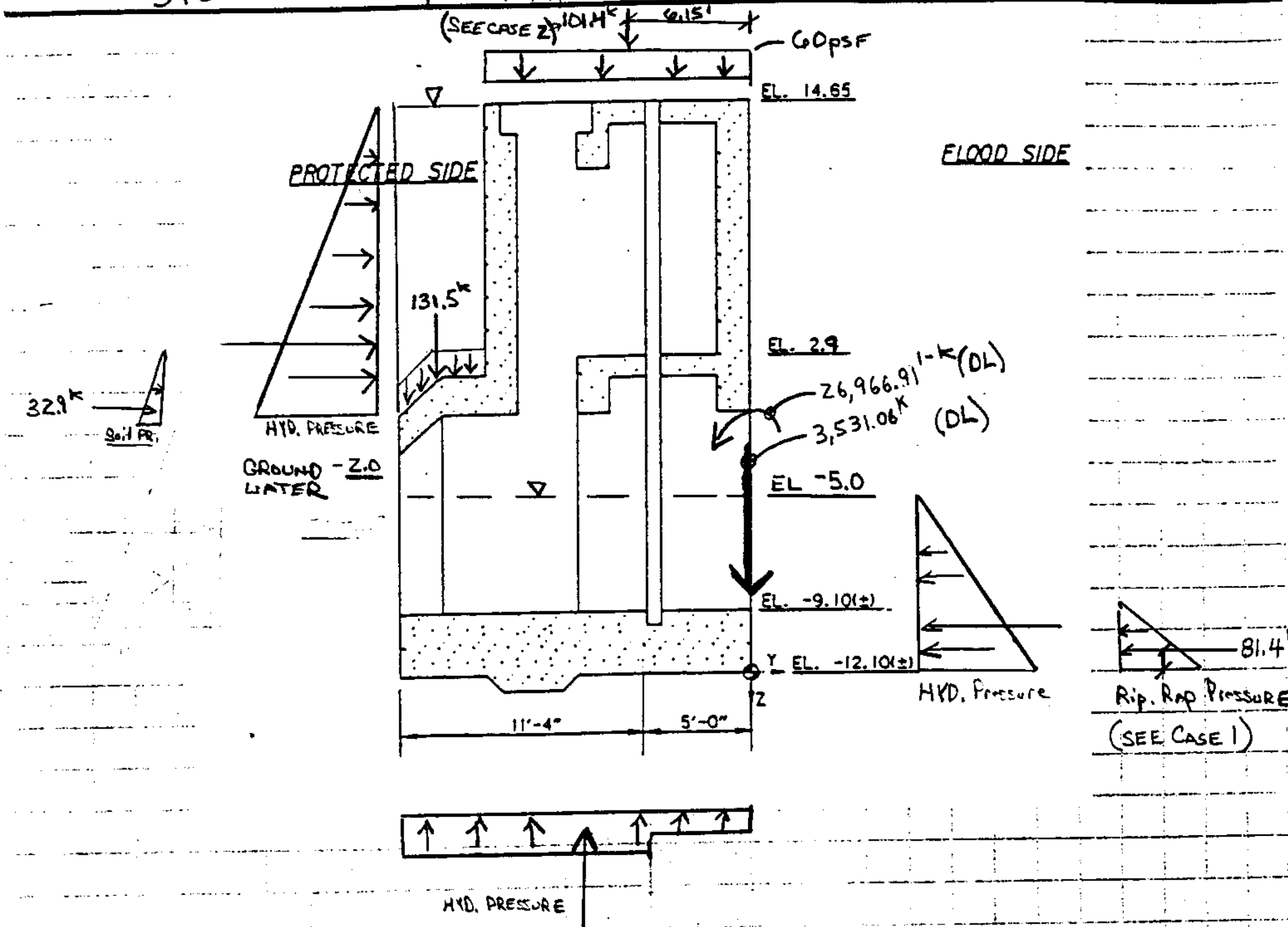
$$\overset{+}{\rightarrow} \Sigma P_y = \underset{(WATER)}{-2,588.03^k} - \underset{(Rip Rap)}{81.4^k} + \underset{(soil)}{32.9^k} = -2,636.53^k (.75) = \underline{-1,977.40^k}$$

$$\Sigma M_x = \underset{(WATER)}{-35,823.69^{1-k}} - \underset{(DL)}{26,966.91^{1-k}} - \underset{(LL)}{101.4(6.15)} - \underset{(Soil)}{131.5^k(14.33)} - \underset{(Rip Rap)}{81.4^k(1')} + \underset{(Soil)}{32.9^k(12.5')} =$$

$$= -64,968.76^{1-k} (0.75) = \underline{-48,726.57^{1-k}}$$

$$\Sigma M_y = \underset{(DL)}{-591.61^{1-k}} + \underset{(WATER)}{2,449.62^{1-k}} = 1,858.01^{1-k} (0.75) = \underline{1,393.51^{1-k}}$$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.	Sheet No. 93
Made By: SCB	Date: 9/28/95	PS #6 (LOADING DIAGRAM) EAST Monolith	
Checked By: SPC	Date: 11/1/95		



CASE 8 (Ponding on P.S) Impervious Cut-off wall

For Water Loads SEE Sht. 81

$$\Sigma M_y = \underset{(DL)}{-591.61^{1\text{-}K}} \underset{(WATER)}{-559.11^{1\text{-}K}} = -1150.72^{1\text{-}K}(0.75) = -863.04^{1\text{-}K}$$

$$+\downarrow \Sigma P_z = \underset{(WATER)}{-416.95^K} + \underset{(DL)}{3{,}531.06^K} + \underset{(Soil)}{131.5^K} + \underset{(LL)}{101.4} = 3{,}347.01^K (.75) = 2{,}510.26^K$$

$$\xrightarrow{+} \Sigma P_y = \underset{(WATER)}{810.87^K} \underset{(Rip\,Rap)}{-81.4^K} + \underset{(Soil)}{32.9^K} = 762.37^K (.75) = 571.78^K$$

$$\Sigma M_x = \underset{(WATER)}{17{,}576.27^{1\text{-}K}} - \underset{(DL)}{26{,}966.91^{1\text{-}K}} - \underset{(LL)}{101.4(6.15)} - \underset{(SOIL)}{131.5(14.33)} - \underset{(Rip\,Rap)}{81.4^K(1')} + \underset{(SOIL)}{32.9^K(12.5')} =$$

$$= -11{,}568.80^{1\text{-}K}(.75) = -8{,}676.60^{1\text{-}K}$$

LOADINGS FOR SLAB EXTENSIONS

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Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By:	Date:		

LOADINGS FOR SLAB EXTENSIONS

Loadings due Dead Load & Soil Pressure of Slab Extensions

Slab Extension @ West Side of East Monolith

$$\text{Slab Wt.} = (5.08')(16.33')(3')(.150\,^{\#}/_{Ft^3}) = 37.3^k$$

$$\text{Wall} = (2')(2')(\underset{\text{height}}{23.65})(.150\,^{k}/_{Ft^3}) = 14.19^k$$

$$M_y = -(\underset{\text{slab wt.}}{37.3^k})(\underset{d}{71.5'}) - (\underset{\text{wall}}{14.19^k})(\underset{d}{70'}) = -3{,}662.4'^{-k}$$

$$P_z = 37.3 + 14.19 = 51.5^k$$

$$M_x = -37.3^k\left(\frac{16.33}{2}\right) - 14.19^k(15.33') = -522.1'^{-k}$$

Slab Extension @ East Side of East Monolith

$$\text{Slab Wt.} = (3)(16.33)(3')(.15) = 22^k$$

$$\text{Wall Wt.} = (\underset{L}{3'})(\underset{\text{width}}{2'})(\underset{\text{height}}{23.65})(.15) = 21.3^k$$

$$\text{Soil Wt} = (3')(10.33')(\underset{\approx El\ 2.0}{11'.0})(.120\,^{k}/_{Ft^3}) = 41^k$$

$$M_y = 22^k(70') + 21.3^k(70') + 41^k(70') - \underbrace{(11)\left(\tfrac{11}{3}\right)\left(\tfrac{11}{2}\right)(10.33)(.120)}_{\text{soil pressure}} = 5626.0'^{-k}$$

$$M_x = -22^k\left(\frac{16.33}{2}\right) - (21.3^k)(5') - \underbrace{(11.2')(41^k)}_{\text{soil wt.}} + \underbrace{3'(11')\left(\tfrac{11}{3}\right)\left(\tfrac{11}{2}\right)(.12)}_{\text{soil pressure}} = -665$$

$$M_z = \underbrace{(10.33')(11)\left(\tfrac{11}{2}\right)(11.2')(.120)}_{\text{soil pressure}} - \underbrace{(3')(11)\left(\tfrac{11}{2}\right)(70')(.120)}_{\text{soil pr.}} = -684.6'^{-k}$$

$$P_z = \underset{(\text{slab})}{22^k} + \underset{(\text{wall})}{21.3} + \underset{(\text{soil})}{41}^{\,k} = 84.3^k, \quad P_y = \underset{\text{soil}}{3'(11)\left(\tfrac{11}{2}\right)(.120)} = 21.8^k$$

$$P_x = (11')(11'/2)(10.33')(0.120\,^{k}/_{Ft^3}) = 75.0^k\ (\text{soil})$$

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Checked By: SPC	Date: 11/4/95		

LOADING DUE TO CASES (1-8) ON SLAB EXTENSION

CASE 1

$M_x = -522.1^{'-K} - 665.5^{'-K} = -1{,}187.6^{'-K}(0.75) = -890.70^{'-K}$

$M_y = -3{,}662.4^{'-K} + 5{,}626.0^{'-K} = 1{,}963.6^{'-K}(0.75) = 1{,}472.70^{'-K}$

$M_z = -684.6^{'-K}(0.75) = -513.45^{'-K}$

$P_x = 75^K(0.75) = 56.25^K$

$P_y = 21.8^K(0.75) = 16.35^K$

$P_z = 51.5^K + 84.3^K = 135.80^K(0.75) = 101.85^K$

CASE 2 & 3 (WATER TO EL. 12.6')

(WATER PRES.)

$P_x = 75^K - (12.33' - 4')(24.7')(24.7'/2)(0.064^K/FT^3) = -87.6^K$

$P_y = 21.8^K - (4')(24.7')(24.7'/2)(0.064^K/FT^3) = -56.3^K$

0.150 − 0.064

WEST EXT.: $P_z = 51.5^K\left(\frac{0.086}{0.150}\right) = 29.5^K$ — BUOYANT WT. OF CONC. SINCE NO CUT-OFF WALL IS PRESENT

EAST EXT.: $P_z = 84.3^K$

} 113.8^K

$M_x = -37.3^K\left(\frac{16.33}{2}\right)\left(\frac{0.086}{0.150}\right) - (14.19^K)(15.33')\left(\frac{0.086}{0.150}\right) - 665.5^{'-K}$

$- (4)(24.7')(24.7'/2)(24.7'/3)(0.064^K/FT^3) = -1{,}607.8^{'-K}$

(DL WEST) (SOIL & DL EAST) (WATER PRES. EAST − WEST)

$M_y = -3{,}662.4^{'-K}\left(\frac{0.086}{0.015}\right) + 5{,}626.0^{'-K} + (8.33')(24.7')\left(\frac{24.7'}{2}\right)\left(\frac{24.7}{3}\right)(0.064^K/FT^3)$

(WATER LD. EAST) (WATER LD. WEST)

$+ (3')(4')(21.7')(70')(0.064^K/FT^3) - (5.08')(16.33')(21.7')(71.5')(0.064^K/FT^3)$

$= -2{,}205.7^{'-K}$

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Checked By: SPC	Date: 11/4/95		

LOADING DUE TO CASES (1-8) ON SLAB EXTENSION

CASE 2 & 3 (WATER TO EL. 12.6')

$$M_Z = \underset{\text{(SOIL PRES.)}}{-684.6^{1-K}} - (8.33')(24.7')(24.7'/2)(8.2')(0.064^{K}/FT.^3)$$

$$+ (70')(3')(24.7')(24.7'/2)(0.064^{K}/FT.^3) - (70')(1')\left(\frac{24.7'}{2}\right)(24.7')(0.064^{K}/FT.^3)$$

$$= 715.1^{1-K}$$

CASE 4 (WATER EL 2.0)

$P_z = 29.5^k$
$P_z = 84.3^k$ } 113.8^k

$P_y = 21.8^k - 4'(.064)(14.1)\left(\frac{14.1}{2}\right) = -3.65^k$

$P_x = 75^k - (8.33')(14.1)(.064)\left(\frac{14.1}{2}\right) = 22.0^k$

$M_x = -37.3\left(\frac{16.33}{2}\right)\left(\frac{.086}{.150}\right) - 14.19(15.33)\left(\frac{.086}{.150}\right) - 665.5 - 4(.064)\left(\frac{24.7^3}{6}\right) = -1607.8^{1-k}$

$M_y = -3662.4\left(\frac{.086}{.150}\right) + 5626.0^{1-k} + 8.33(.064)(14.1)^3/6 + .064(3)(4)(11.1)(70') -$
$-(.064)(5.08)(16.33)(11.1)(71.5) = +158.4^{1-k}$

$M_z = -684.6^{1-k} - (.064)(14.1)\left(\frac{14.1}{2}\right)(8.33)(9.2) + 70(.064)(3)(24.7)\left(\frac{24.7}{2}\right)$
$-70(.064)(1)(24.7)(24.7/2) = +1614.0^{1-k}$

CASE 5 (SAME LOADS AS CASE 4, BUT WITH 33 1/3 ALLOW. OVERSTRESS)

$P_x = 22.0^k\ (0.75) = 16.5^k$

$P_y = -3.65^k\ (0.75) = -2.74^k$

$P_z = 113.8^k\ (0.75) = 85.35^k$

$M_x = -1{,}607.8^{1-k}\ (0.75) = -1{,}205.85^{1-k}$

$M_y = 158.4^{1-k}\ (0.75) = 118.80^{1-k}$

$M_z = 1{,}614.0^{1-k}\ (0.75) = 1{,}210.50^{1-k}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 99
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Checked By: SPC	Date: 11/4/95		

<u>Case 6 & 7</u>

$P_z = \underline{113.8^K}(0.75) = 85.35^K$

$P_y = 21.8 - 4(.064)(26.7)\left(\frac{26.7}{2}\right) = \underline{-69.4^K}(0.75) = -52.05^K$

$P_x = 75^K - (8.33)(26.7)(.064)\left(\frac{26.7}{2}\right) = \underline{-115^K}(.75) = -86.25^K$

$M_x = -37.3\left(\frac{16.33}{2}\right)\left(\frac{.086}{.150}\right) - 14.9(15.33')\left(\frac{.086}{.150}\right) - 665.5 - 4(.064)\frac{(26.7)^3}{6} = \underline{-1,776.95^{1\text{-}k}}$

$\times 0.75 = -1,332.71^K$

$M_y = -36624\left(\frac{.086}{.150}\right) + 56260^{1\text{-}K} + (8.33)(.064)\frac{(26.7)^3}{6} + .064(3)(4)(23.7)(70')$

$-(.064)(5.08)(16.33)(23.7)(71.5') = \underline{-2505.1^{1\text{-}K}}(0.75) = -1,878.83^{1\text{-}K}$

$M_z = -684.6 - (.064)(26.7)(26.7/2)(8.33)(8.2) + 70(.064)(3)(26.7)(26.7/2)$

$-70(.064)(1')(26.7)(26.7/2) = \underline{950.9^{1\text{-}K}}(0.75) = 713.18^{1\text{-}K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 100
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Checked By: SPC	Date: 11/4/95		

CASE 8

$P_z = 113.8^k + (12.6)(3)(.064)(10.33) = \underline{138.8^k}$ (0.75) = 104.10^K

$P_y = 21.8 - 4'(.064)(7.1)(\frac{7.1}{2}) - 12.6(.064)(\frac{12.6}{2})(3) = \underline{0}$

$P_x = 75 - (8.33)(7.1)(.064)(\frac{7.1}{2}) + 12.6(.064)(\frac{12.6}{2})(10.33) = \underline{114.0^k}$ (0.75) = 85.50^K

$M_x = -37.3^k(\frac{16.33}{2})(\frac{.086}{.150}) - 14.19(15.33)(\frac{.086}{.150}) - 665.5 - 4(.064)(7.1^3)(\frac{1}{6})$

$+ 12.6(.064)(\frac{12.6}{2})(3)(\frac{12.6}{3} + 14.1) = \underline{-701.2^{1-k}}$ (0.75) = −525.90^{1-K}

$M_y = -3662.4(\frac{.086}{.150}) + 5626.0^{1-k} + (8.33)(.064)(7.1)^3/6 + (.064)(3)(4)(4.1)70'$

$-(.064)(5.08)(16.33)(4.1)(71.5') + 70(12.6)(3')(.064)(10.33') = \underline{3971.4^{1-k}}$

× 0.75 = 2,978.55^{1-K}

$M_z = -684.6^{1-k} - (.064)(7.1)(\frac{7.1}{2})(8.33)(8.2) + 70(.064)(3)(7.1)(\frac{7.1}{2}) -$

$-70'(.064)(1)(7.1)(\frac{7.1}{2}) + 12.6(.064)(\frac{12.6}{2})(10.33)(11.1) = \underline{13.6^{1-k}}$

× 0.75 = 10.20^K

TOTAL LOADINGS FOR EAST MONOLITH AND SLAB EXTENSIONS

TOTAL LOADINGS FOR EAST MONOLITH AND SLAB EXTENSIONS

TOTAL LOADINGS FOR MONOLITH AND SLAB EXTENSION

CASE 1 (SEE Sht. 86 & 96 FOR LOADINGS)

$P_x = 56.25^K$ ✓

$P_y = -158.40^K + 16.35^K$ ✓ $= -142.05^K$

$P_z = 2{,}772.27^K$ ✓ $+ 101.85^K$ ✓ $= 2{,}874.12^K$

$M_x = -23{,}365.17^{\prime\text{-}K}$ ✓ $- 890.70^{\prime\text{-}K}$ ✓ $= -24{,}255.87^{\prime\text{-}K}$

$M_y = -443.71^{\prime\text{-}K}$ ✓ $+ 1{,}472.70^{\prime\text{-}K}$ ✓ $= 1{,}028.99^{\prime\text{-}K}$

$M_z = -513.45^{\prime\text{-}K}$ ✓

CASE 2 (SEE Sht 87 & 96 FOR LOADINGS)

$P_x = -87.6^K$ ✓

$P_y = -2{,}200.43^K$ ✓ $- 56.3^K$ ✓ $= -2{,}256.73^K$

$P_z = 3{,}914.79^K$ ✓ $+ 113.8^K$ ✓ $= 4{,}028.59^K$

$M_x = -52{,}449.25^{\prime\text{-}K}$ ✓ $- 1{,}607.8^{\prime\text{-}K}$ ✓ $= -54{,}057.05^{\prime\text{-}K}$

$M_y = 1{,}825.68^{\prime\text{-}K}$ ✓ $- 2{,}205.7^{\prime\text{-}K}$ ✓ $= -380.02^{\prime\text{-}K}$

$M_z = 715.1^{\prime\text{-}K}$ ✓

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 103
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Checked By: SCB	Date: 11/95		

TOTAL LOADINGS FOR MONOLITH AND SLAB EXTENSION

CASE 3 (SEE Sht 88 & 97 FOR LOADINGS)

$P_x = -87.6^K$

$P_y = -2,200.43^K - 56.3^K = -2,256.73^K$

$P_z = 4,599.00^K + 113.8^K = 4,712.80^K$

$M_x = -59,349.20^{1-K} - 1,607.8^{1-K} = -60,957.00^{1-K}$

$M_y = 1,825.68^{1-K} - 2,205.7^{1-K} = -380.02^{1-K}$

$M_z = 715.1^{1-K}$

CASE 4 (See Sht 89 & 98 FOR LOADINGS)

$P_x = 22.0^K$

$P_y = -505.46^K - 3.65^K = -509.11^K$

$P_z = 4,351.52^K + 113.8^K = 4,465.32^K$

$M_x = -36,925.04^{1-K} - 1,607.8^{1-K} = -38,532.84^{1-K}$

$M_y = 1,461.03^{1-K} + 158.4^{1-K} = 1,619.43^{1-K}$

$M_z = 1,614.0^{1-K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 104
Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By: SCB	Date: 11 95		

TOTAL LOADINGS FOR MONOLITH AND SLAB EXTENSION

CASE 5 (SEE SHT. 90 & 98 FOR LOADINGS)

$P_x = 16.5^K$

$P_y = -688.85^K - 2.74^K = -691.59^K$

$P_z = 2{,}609.59^K + 85.35^K = 2{,}694.94^K$

$M_x = -24{,}370.40^{1\text{-}K} - 1{,}205.85^{1\text{-}K} = -25{,}576.25^{1\text{-}K}$

$M_y = -101.85^{1\text{-}K} + 118.80^{1\text{-}K} = 16.95^{1\text{-}K}$

$M_z = 1{,}210.50^{1\text{-}K}$

CASE 6 (SEE SHT 91 & 99 FOR LOADINGS)

$P_x = -86.25^K$

$P_y = -1{,}977.40^K - 52.05^K = -2{,}029.45^K$

$P_z = 2{,}878.62^K + 85.35^K = 2{,}963.97^K$

$M_x = -43{,}132.68^{1\text{-}K} - 882.75^{1\text{-}K} = -44{,}015.43^{1\text{-}K}$

$M_y = 1{,}393.51^{1\text{-}K} - 1{,}878.83^{1\text{-}K} = -485.32^{1\text{-}K}$

$M_z = 713.18^{1\text{-}K}$

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 105
Made By: SPC	Date: 11/2/95	P.S. No. 6	
Checked By: SCB	Date: 11/95		

TOTAL LOADINGS FOR MONOLITH AND SLAB EXTENSION

CASE 7 (SEE sht 92 & 99 FOR LOADINGS)

$P_x = -86.25^K$

$P_y = -1,977.40^K - 52.05^K = -2,029.45^K$

$P_z = 3,433.32^K + 85.35^K = 3,518.67^K$

$M_x = -48,726.57^{'-K} - 882.75^{'-K} = -49,609.32^{'-K}$

$M_y = 1,393.51^{'-K} - 1,878.83^{'-K} = -485.32^{'-K}$

$M_z = 713.18^{'-K}$

CASE 8 (SEE sht. 93 & 100)

$P_x = 85.50^K$

$P_y = 571.78^K$

$P_z = 2,510.26^K + 104.10^K = 2,614.36^K$

$M_x = -8,676.60^{'-K} - 525.90^{'-K} = -9,202.50^{'-K}$

$M_y = -863.04^{'-K} + 2,978.55^{'-K} = 2,115.51^{'-K}$

$M_z = 10.20^{'-K}$

CPGA INPUT

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.00	Sheet No. 106
Made By: SCB	Date: 10/95	P.S. #6	
Checked By: MC	Date: 11/95		

CPGA Input

H Pile HP14×73 $I_x = 729 in^4$ $S_x = 107 in^3$

$I_y = 261 in^4$ $S_x = 35.8 in^3$

A = 21.4

C33 = 1.5

B66 = 0

Subgrade Modulus = .1 k/in^2

Tip EL = -101.0' NGVD

Bott. of Monolith = -14.0 West Monoliths

-12.0 East Monoliths

Tip EL = (-101.0) - (-14.0) = -87.0 (West Monolith)

Tip EL = (-101.0) - (-12.0) = -89.0' (East Monolith)

Allow. Soil Cap. (SEE sht 33)

Allow. Pile Loading

FROM EM 1110-2-2906 Design of Pile Foundations

ACC = Allow. Axial Comp. = (18ksi)(21.4 AREA) = 385.2 k

ATT = Allow Axial Tension = (18ksi)(21.4) = 385.2 k

AM1 = Allow Moment about 1 Axis = (18ksi)(35.8 in^3) = 644.4 in-k

AM2 = Allow Moment about 2 Axis = (18ksi)(107 in^3) = 1926 in-k

CPGA OUTPUT

URS	URS CONSULTANTS 3500 N. CAUSEWAY BLVD. METAIRIE, LOUISIANA 70002	Job No. 46229.01	Sheet No. 107
Made By: SPC	Date: 11/5/95	P.S. No. 6	
Checked By:	Date:		

CPGA OUTPUT

EAST MONOLITH

107 A

```
1000 EM2.IN (EAST MONOLITH) PS#6
1010 PRO 29000 261 729 21.4 1.5 0 3 TO 6 8 TO 11 13 TO 16
1011 PRO 29000 261 729 21.4 1.5 0 18 TO 21 37 TO 40 42 TO 45
1012 PRO 29000 261 729 21.4 1.5 0 47 TO 50 52 TO 55 68 TO 71
1013 PRO 29000 261 729 21.4 1.5 0 73 TO 76 78 TO 81 83 TO 96
1014 PRO 29000 261 729 21.4 1.5 0 1 23 25 27 29 31 32 33 34 35
1015 PRO 29000 261 729 21.4 1.5 0 58 60 63 64 65
1016 PRO 29000 729 261 21.4 1.5 0 2 7 12 17 22 24 26 28
1017 PRO 29000 729 261 21.4 1.5 0 30 36 41 46 51
1018 PRO 29000 729 261 21.4 1.5 0 56 57 59 61 62 66 67 72 77 82
1020 SOI ES .1 TIP -89 0 ALL
1030 PIN ALL
1040 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 3 TO 6 8 TO 11
1041 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 13 TO 16 18 TO 21
1042 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 37 TO 40 42 TO 45
1043 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 47 TO 50 52 TO 55
1044 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 68 TO 71 73 TO 76
1046 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 78 TO 81 83 TO 96
1047 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 1 23 25 27 29 31
1048 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 32 33 34 35 58 60
1049 ALLOW H 123.9 83.5 385.2 385.2 644.4 1926 63 64 65
1050 ALLOW H 115 77.5 385.2 385.2 1926 644.4 2 7 12 17 22 24 26
1051 ALLOW H 115 77.5 385.2 385.2 1926 644.4 28 30 36 41 46 51
1052 ALLOW H 115 77.5 385.2 385.2 1926 644.4 56 57 59
1053 ALLOW H 115 77.5 385.2 385.2 1926 644.4 61 62 66 67 72 77 82
1060 BATTER 2.5 3 TO 6 8 TO 11 13 TO 16 18 TO 21 37 TO 40
1061 BATTER 2.5 42 TO 45 47 TO 50
1062 BATTER 2.5 52 TO 55 68 TO 71 73 TO 76 78 TO 81 83 TO 96
1063 BATTER 2.5 23 25 27 29 31 32 33 34 58 64 65 1 35 60 63
1070 ANG 90 68 TO 71 73 TO 76 78 TO 81 83 TO 96
1080 ANG 270 3 TO 6 8 TO 11 13 TO 16 18 TO 21 37 TO 40
1081 ANG 270 42 TO 45 47 TO 50 52 TO 55
1082 ANG 270 23 25 27 29 31 32 33 34
1083 ANG 270 58 60 63 64 65 1 35
1090 PIL 1 -69.46 -14.33 0.0
1092 PIL 2 -66.46 -14.33 0.0
1094 PIL 3 -63.13 -14.33 0.0
1096 PIL 4 -58.13 -14.33 0.0
1098 PIL 5 -53.13 -14.33 0.0
1100 PIL 6 -48.13 -14.33 0.0
1102 PIL 7 -44.38 -14.33 0.0
1104 PIL 8 -40.63 -14.33 0.0
1106 PIL 9 -35.63 -14.33 0.0
1108 PIL 10 -30.63 -14.33 0.0
1110 PIL 11 -25.63 -14.33 0.0
1112 PIL 12 -21.88 -14.33 0.0
1114 PIL 13 -18.13 -14.33 0.0
1116 PIL 14 -13.13 -14.33 0.0
1118 PIL 15 -8.13 -14.33 0.0
1120 PIL 16 -3.13 -14.33 0.0
1122 PIL 17 .625 -14.33 0.0
1124 PIL 18 4.38 -14.33 0.0
1126 PIL 19 9.38 -14.33 0.0
1128 PIL 20 14.38 -14.33 0.0
1130 PIL 21 19.38 -14.33 0.0
1132 PIL 22 24.0 -14.33 0.0
1134 PIL 23 29.8 -14.83 0.0
1136 PIL 24 35.5 -14.33 0.0
1138 PIL 25 42.5 -14.33 0.0
1140 PIL 26 46.0 -14.33 0.0
1142 PIL 27 49.5 -14.33 0.0
1144 PIL 28 56.5 -14.33 0.0
1146 PIL 29 62.0 -14.83 0.0
1148 PIL 30 66.5 -14.33 0.0
1150 PIL 31 71.5 -14.83 0.0
1152 PIL 32 29.8 -10.50 0.0
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1154 PIL 33 62.0 -10.50 0.0
1156 PIL 34 71.5 -10.50 0.0
1158 PIL 35 -69.46 -8.17 0.0
1160 PIL 36 -66.46 -8.17 0.0
11[illegible]IL 37 -63.13 -8.17 0.0
1[illegible] IL 38 -58.13 -8.17 0.0
11[illegible] PIL 39 -53.13 -8.17 0.0
1168 PIL 40 -48.13 -8.17 0.0
1170 PIL 41 -44.38 -8.17 0.0
1172 PIL 42 -40.63 -8.17 0.0
1174 PIL 43 -35.63 -8.17 0.0
1176 PIL 44 -30.63 -8.17 0.0
1178 PIL 45 -25.63 -8.17 0.0
1180 PIL 46 -21.88 -8.17 0.0
1182 PIL 47 -18.13 -8.17 0.0
1184 PIL 48 -13.13 -8.17 0.0
1186 PIL 49 -8.13 -8.17 0.0
1188 PIL 50 -3.13 -8.17 0.0
1190 PIL 51 .625 -8.17 0.0
1192 PIL 52 4.38 -8.17 0.0
1194 PIL 53 9.38 -8.17 0.0
1196 PIL 54 14.38 -8.17 0.0
1198 PIL 55 19.38 -8.17 0.0
1200 PIL 56 24.0 -8.17 0.0
1202 PIL 57 35.5 -8.17 0.0
1204 PIL 58 42.5 -8.17 0.0
1206 PIL 59 46.0 -8.17 0.0
1208 PIL 60 49.5 -8.17 0.0
1210 PIL 61 56.5 -8.17 0.0
1212 PIL 62 66.5 -8.17 0.0
1214 PIL 63 29.8 -4.17 0.0
1216 PIL 64 62.0 -4.17 0.0
12[illegible]IL 65 71.5 -4.17 0.0
1[illegible]IL 66 -69.46 -2.00 0.0
12[illegible]IL 67 -66.46 -2.00 0.0
1226 PIL 68 -63.13 -2.00 0.0
1228 PIL 69 -58.13 -2.00 0.0
1230 PIL 70 -53.13 -2.00 0.0
1232 PIL 71 -48.13 -2.00 0.0
1234 PIL 72 -44.38 -2.00 0.0
1236 PIL 73 -40.63 -2.00 0.0
1238 PIL 74 -35.63 -2.00 0.0
1240 PIL 75 -30.63 -2.00 0.0
1242 PIL 76 -25.63 -2.00 0.0
1244 PIL 77 -21.88 -2.00 0.0
1246 PIL 78 -18.13 -2.00 0.0
1248 PIL 79 -13.13 -2.00 0.0
1250 PIL 80 -8.13 -2.00 0.0
1252 PIL 81 -3.13 -2.00 0.0
1254 PIL 82 .625 -2.0 0.0
1256 PIL 83 4.38 -2.00 0.0
1258 PIL 84 9.38 -2.00 0.0
1260 PIL 85 14.38 -2.00 0.0
1262 PIL 86 19.38 -2.00 0.0
1264 PIL 87 24.0 -2.00 0.0
1266 PIL 88 29.8 -2.0 0.0
1268 PIL 89 35.5 -2.0 0.0
1270 PIL 90 40.75 -2.00 0.0
1272 PIL 91 46.0 -2.00 0.0
1274 PIL 92 51.25 -2.00 0.0
127[illegible]IL 93 56.5 -2.0 0.0
12[illegible]L 94 62.0 -2.00 0.0
12[illegible]L 95 66.5 -2.00 0.0
1279 PIL 96 71.5 -2.00 0.0
1400 LOA 1 56.25 -142.05 2874.12 -24255.87 1028.99 -513.45
1410 LOA 2 -87.6 -2256.73 4028.59 -54057.05 -380.02 715.1
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1420 LOA 3 -87.6 -2256.73 4712.80 -60957.0 -380.02 715.1
1430 LOA 4 22.0 -509.11 4465.32 -38532.84 1619.43 1614.0
1440 LOA 5 16.50 -691.59 2694.94 -25576.25 16.95 1210.5
1441 LOA 6 -86.25 -2029.45 2963.97 -44015.43 -485.32 713.18
144[illegible] A 7 -86.25 -2029.45 3518.67 -49609.32 -485.32 713.18
14[illegible] A 8 85.5 571.78 2614.36 -9202.5 2115.51 10.20
1450 TOU 1 2 3 4 5 6 7
1460 FOU 1 2 3 4 5 6 7 EM2.OUT
1470 PSO
1480 PFO ALL
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***********************************
* CORPS PROGRAM  #  X0080       *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 1993/03/29   *  RUN DATE 03-NOV-1995   RUN TIME 11.20.40
***********************************
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EM2.IN (EAST MONOLITH) PS#6

THERE ARE 96 PILES AND
8 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX

	X	Y	Z
WITH DIAGONAL COORDINATES = (	-69.46 ,	-14.83 ,	.00)
(	71.50 ,	-2.00 ,	.00)

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PILE PROPERTIES AS INPUT

E KSI	I1 IN**4	I2 IN**4	A IN**2	C33	B66
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

3 4 5 6 8 9 10 11 13 14 15 16

E KSI	I1 IN**4	I2 IN**4	A IN**2	C33	B66
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

18 19 20 21 37 38 39 40 42 43 44 45

E KSI	I1 IN**4	I2 IN**4	A IN**2	C33	B66
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

47 48 49 50 52 53 54 55 68 69 70 71

E KSI	I1 IN**4	I2 IN**4	A IN**2	C33	B66
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

73 74 75 76 78 79 80 81 83 84 85 86 87 88 89 90
91 92 93 94 95 96

E KSI	I1 IN**4	I2 IN**4	A IN**2	C33	B66
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

1 23 25 27 29 31 32 33 34 35

E	I1	I2	A	C33	B66
KSI	IN**4	IN**4	IN**2		
.29000E+05	.26100E+03	.72900E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

58 60 63 64 65

E	I1	I2	A	C33	B66
KSI	IN**4	IN**4	IN**2		
.29000E+05	.72900E+03	.26100E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

2 7 12 17 22 24 26 28

E	I1	I2	A	C33	B66
KSI	IN**4	IN**4	IN**2		
.29000E+05	.72900E+03	.26100E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

30 36 41 46 51

E	I1	I2	A	C33	B66
KSI	IN**4	IN**4	IN**2		
000E+05	.72900E+03	.26100E+03	.21400E+02	.15000E+01	.00000E+00

THESE PILE PROPERTIES APPLY TO THE FOLLOWING PILES -

56 57 59 61 62 66 67 72 77 82

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SOIL DESCRIPTIONS AS INPUT

ES	ESOIL	LENGTH	L	LU
	K/IN**2		FT	FT
	.10000E+00	T	-.89000E+02	.00000E+00

THIS SOIL DESCRIPTION APPLIES TO THE FOLLOWING PILES -

ALL

****

PILE STIFFNESSES AS CALCULATED FROM PROPERTIES

.85264E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
000E+00	.65955E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00
00E+00	.00000E+00	.80929E+03	.00000E+00	.00000E+00	.00000E+00
00E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

1

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PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-69.46	-14.33	.00	2.50	270.00	95.86	P
2	-66.46	-14.33	.00	V	.00	89.00	P
3	-63.13	-14.33	.00	2.50	270.00	95.86	P
4	-58.13	-14.33	.00	2.50	270.00	95.86	P
5	-53.13	-14.33	.00	2.50	270.00	95.86	P
6	-48.13	-14.33	.00	2.50	270.00	95.86	P
7	-44.38	-14.33	.00	V	.00	89.00	P
8	-40.63	-14.33	.00	2.50	270.00	95.86	P
9	-35.63	-14.33	.00	2.50	270.00	95.86	P
10	-30.63	-14.33	.00	2.50	270.00	95.86	P
11	-25.63	-14.33	.00	2.50	270.00	95.86	P
12	-21.88	-14.33	.00	V	.00	89.00	P
13	-18.13	-14.33	.00	2.50	270.00	95.86	P
14	-13.13	-14.33	.00	2.50	270.00	95.86	P
15	-8.13	-14.33	.00	2.50	270.00	95.86	P
16	-3.13	-14.33	.00	2.50	270.00	95.86	P
17	.63	-14.33	.00	V	.00	89.00	P
18	4.38	-14.33	.00	2.50	270.00	95.86	P
19	9.38	-14.33	.00	2.50	270.00	95.86	P
	14.38	-14.33	.00	2.50	270.00	95.86	P
	19.38	-14.33	.00	2.50	270.00	95.86	P
	24.00	-14.33	.00	V	.00	89.00	P
23	29.80	-14.83	.00	2.50	270.00	95.86	P
24	35.50	-14.33	.00	V	.00	89.00	P
25	42.50	-14.33	.00	2.50	270.00	95.86	P
26	46.00	-14.33	.00	V	.00	89.00	P
27	49.50	-14.33	.00	2.50	270.00	95.86	P
28	56.50	-14.33	.00	V	.00	89.00	P
29	62.00	-14.83	.00	2.50	270.00	95.86	P
30	66.50	-14.33	.00	V	.00	89.00	P
31	71.50	-14.83	.00	2.50	270.00	95.86	P
32	29.80	-10.50	.00	2.50	270.00	95.86	P
33	62.00	-10.50	.00	2.50	270.00	95.86	P
34	71.50	-10.50	.00	2.50	270.00	95.86	P
35	-69.46	-8.17	.00	2.50	270.00	95.86	P
36	-66.46	-8.17	.00	V	.00	89.00	P
37	-63.13	-8.17	.00	2.50	270.00	95.86	P
38	-58.13	-8.17	.00	2.50	270.00	95.86	P
39	-53.13	-8.17	.00	2.50	270.00	95.86	P
40	-48.13	-8.17	.00	2.50	270.00	95.86	P
41	-44.38	-8.17	.00	V	.00	89.00	P
42	-40.63	-8.17	.00	2.50	270.00	95.86	P
43	-35.63	-8.17	.00	2.50	270.00	95.86	P
44	-30.63	-8.17	.00	2.50	270.00	95.86	P
45	-25.63	-8.17	.00	2.50	270.00	95.86	P
46	-21.88	-8.17	.00	V	.00	89.00	P
47	-18.13	-8.17	.00	2.50	270.00	95.86	P
	-13.13	-8.17	.00	2.50	270.00	95.86	P
	-8.13	-8.17	.00	2.50	270.00	95.86	P
	-3.13	-8.17	.00	2.50	270.00	95.86	P
51	.63	-8.17	.00	V	.00	89.00	P
52	4.38	-8.17	.00	2.50	270.00	95.86	P
53	9.38	-8.17	.00	2.50	270.00	95.86	P

54	14.38	-8.17	.00	2.50	270.00	95.86	P
55	19.38	-8.17	.00	2.50	270.00	95.86	P
56	24.00	-8.17	.00	V	.00	89.00	P
57	35.50	-8.17	.00	V	.00	89.00	P
[illegible]	42.50	-8.17	.00	2.50	270.00	95.86	P
[illegible]	46.00	-8.17	.00	V	.00	89.00	P
[illegible]	49.50	-8.17	.00	2.50	270.00	95.86	P
61	56.50	-8.17	.00	V	.00	89.00	P
62	66.50	-8.17	.00	V	.00	89.00	P
63	29.80	-4.17	.00	2.50	270.00	95.86	P
64	62.00	-4.17	.00	2.50	270.00	95.86	P
65	71.50	-4.17	.00	2.50	270.00	95.86	P
66	-69.46	-2.00	.00	V	.00	89.00	P
67	-66.46	-2.00	.00	V	.00	89.00	P
68	-63.13	-2.00	.00	2.50	90.00	95.86	P
69	-58.13	-2.00	.00	2.50	90.00	95.86	P
70	-53.13	-2.00	.00	2.50	90.00	95.86	P
71	-48.13	-2.00	.00	2.50	90.00	95.86	P
72	-44.38	-2.00	.00	V	.00	89.00	P
73	-40.63	-2.00	.00	2.50	90.00	95.86	P
74	-35.63	-2.00	.00	2.50	90.00	95.86	P
75	-30.63	-2.00	.00	2.50	90.00	95.86	P
76	-25.63	-2.00	.00	2.50	90.00	95.86	P
77	-21.88	-2.00	.00	V	.00	89.00	P
78	-18.13	-2.00	.00	2.50	90.00	95.86	P
79	-13.13	-2.00	.00	2.50	90.00	95.86	P
80	-8.13	-2.00	.00	2.50	90.00	95.86	P
81	-3.13	-2.00	.00	2.50	90.00	95.86	P
82	.63	-2.00	.00	V	.00	89.00	P
83	4.38	-2.00	.00	2.50	90.00	95.86	P
84	9.38	-2.00	.00	2.50	90.00	95.86	P
85	14.38	-2.00	.00	2.50	90.00	95.86	P
[illegible]	19.38	-2.00	.00	2.50	90.00	95.86	P
[illegible]	24.00	-2.00	.00	2.50	90.00	95.86	P
[illegible]	29.80	-2.00	.00	2.50	90.00	95.86	P
89	35.50	-2.00	.00	2.50	90.00	95.86	P
90	40.75	-2.00	.00	2.50	90.00	95.86	P
91	46.00	-2.00	.00	2.50	90.00	95.86	P
92	51.25	-2.00	.00	2.50	90.00	95.86	P
93	56.50	-2.00	.00	2.50	90.00	95.86	P
94	62.00	-2.00	.00	2.50	90.00	95.86	P
95	66.50	-2.00	.00	2.50	90.00	95.86	P
96	71.50	-2.00	.00	2.50	90.00	95.86	P

						9044.48	

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APPLIED LOADS

LOAD CASE	PX K	PY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	56.3	-142.1	2874.1	-24255.9	1029.0	-513.5
2	-87.6	-2256.7	4028.6	-54057.1	-380.0	715.1
3	-87.6	-2256.7	4712.8	-60957.0	-380.0	715.1
4	22.0	-509.1	4465.3	-38532.8	1619.4	1614.0
5	16.5	-691.6	2694.9	-25576.3	17.0	1210.5
6	-86.3	-2029.5	2964.0	-44015.4	-485.3	713.2
[illegible]	-86.3	-2029.5	3518.7	-49609.3	-485.3	713.2
[illegible]	85.5	571.8	2614.4	-9202.5	2115.5	10.2

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ORIGINAL PILE GROUP STIFFNESS MATRIX

.63316E+03	-.82036E-03	.13880E-02	-.21668E+00	.91111E-01	.61773E+05
-.82036E-03	.88814E+04	-.57986E+04	.15375E+07	-.99027E+06	-.45639E+05
880E-02	-.57986E+04	.71063E+05	-.69859E+07	.35429E+06	.99027E+06
668E+00	.15375E+07	-.69859E+07	.94553E+09	-.81737E+07	-.11209E+09
111E-01	-.99027E+06	.35429E+06	-.81737E+07	.19001E+11	.16017E+10
.61773E+05	-.45639E+05	.99027E+06	-.11209E+09	.16017E+10	.22652E+10

LOAD CASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 26.

LOAD CASE 3. NUMBER OF FAILURES = 1. NUMBER OF PILES IN TENSION = 26.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 6. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 26.

LOAD CASE 7. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 26.

LOAD CASE 8. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 22.

****

PILE CAP DISPLACEMENTS

LOAD CA	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	.9147E-01	.2729E-01	.2957E-01	-.1369E-03	.3739E-05	-.2701E-04
2	-.1376E+00	-.2075E+00	.2027E-01	-.1999E-03	-.1087E-04	-.7706E-05
3	-.1369E+00	-.1832E+00	.1708E-01	-.3514E-03	-.9024E-05	-.1464E-04
4	.3679E-01	-.1129E-01	.5732E-01	-.4961E-04	.1113E-05	-.2098E-04
5	.2672E-01	-.6635E-01	.4106E-01	.8580E-04	-.3602E-05	-.6809E-05
6	-.1360E+00	-.1906E+00	.6401E-02	-.2018E-03	-.1029E-04	-.1860E-05
7	-.1355E+00	-.1708E+00	.3809E-02	-.3246E-03	-.8790E-05	-.7482E-05
8	.1371E+00	.5089E-01	.7804E-01	.3745E-03	.4500E-05	-.2143E-04

****

PILE FORCES IN LOCAL GEOMETRY

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO
(F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

ALF = F3/AC or F3/AT

CBF = F3/ACC or ATT + M1/AM1 + M2/AMZ

LOAD CASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
	-.6	.6	27.3	24.3	31.4	.0	.22	.12
2	.6	.4	48.9	22.9	-24.3	.0	.43	.18
3	-.6	.6	27.7	24.3	30.5	.0	.22	.13
4	-.5	.6	28.0	24.3	29.7	.0	.23	.13

5	-.5	.6	28.3	24.3	29.0	.0	.23	.13
6	-.5	.6	28.6	24.3	28.3	.0	.23	.13
7	.6	.4	48.0	19.5	-24.3	.0	.42	.17
8	-.5	.6	29.1	24.3	27.1	.0	.24	.13
	-.5	.6	29.4	24.3	26.4	.0	.24	.13
	-.5	.6	29.8	24.3	25.7	.0	.24	.13
[illegible]	-.5	.6	30.1	24.3	24.9	.0	.24	.13
12	.6	.3	47.1	16.1	-24.3	.0	.41	.17
13	-.4	.6	30.6	24.3	23.8	.0	.25	.13
14	-.4	.6	30.9	24.3	23.0	.0	.25	.13
15	-.4	.6	31.2	24.3	22.3	.0	.25	.13
16	-.4	.6	31.5	24.3	21.6	.0	.25	.13
17	.6	.2	46.3	12.7	-24.3	.0	.40	.16
18	-.4	.6	32.0	24.3	20.4	.0	.26	.13
19	-.4	.6	32.3	24.3	19.7	.0	.26	.13
20	-.3	.6	32.6	24.3	19.0	.0	.26	.13
21	-.3	.6	32.9	24.3	18.2	.0	.27	.13
22	.6	.2	45.4	9.1	-24.3	.0	.39	.16
23	-.3	.6	34.2	24.3	16.8	.0	.28	.14
24	.6	.1	44.9	7.4	-24.3	.0	.39	.16
25	-.3	.6	34.4	24.3	14.8	.0	.28	.13
26	.6	.1	44.5	5.8	-24.3	.0	.39	.16
27	-.3	.6	34.9	24.3	13.7	.0	.28	.14
28	.6	.1	44.1	4.2	-24.3	.0	.38	.15
29	-.2	.6	36.3	24.3	12.0	.0	.29	.14
30	.6	.0	43.7	2.7	-24.3	.0	.38	.15
31	-.2	.6	36.9	24.3	10.6	.0	.30	.14
32	-.3	.6	28.9	24.7	15.6	.0	.23	.12
33	-.2	.6	30.9	24.7	10.8	.0	.25	.12
34	-.2	.6	31.5	24.7	9.4	.0	.25	.13
35	-.5	.6	19.7	24.9	29.7	.0	.16	.11
36	.6	.4	40.1	22.9	-24.9	.0	.35	.15
	-.5	.6	20.1	24.9	28.7	.0	.16	.11
	-.5	.6	20.4	24.9	28.0	.0	.16	.11
	-.5	.6	20.7	24.9	27.2	.0	.17	.11
40	-.5	.6	21.0	24.9	26.5	.0	.17	.11
41	.6	.4	39.2	19.5	-24.9	.0	.34	.15
42	-.5	.6	21.5	24.9	25.4	.0	.17	.11
43	-.4	.6	21.8	24.9	24.6	.0	.18	.11
44	-.4	.6	22.2	24.9	23.9	.0	.18	.11
45	-.4	.6	22.5	24.9	23.1	.0	.18	.11
46	.6	.3	38.3	16.1	-24.9	.0	.33	.15
47	-.4	.6	22.9	24.9	22.0	.0	.19	.11
48	-.4	.6	23.3	24.9	21.3	.0	.19	.11
49	-.4	.6	23.6	24.9	20.5	.0	.19	.11
50	-.4	.6	23.9	24.9	19.8	.0	.19	.11
51	.6	.2	37.4	12.7	-24.9	.0	.33	.14
52	-.3	.6	24.4	24.9	18.7	.0	.20	.11
53	-.3	.6	24.7	24.9	17.9	.0	.20	.11
54	-.3	.6	25.0	24.9	17.2	.0	.20	.11
55	-.3	.6	25.3	24.9	16.5	.0	.20	.11
56	.6	.2	36.5	9.1	-24.9	.0	.32	.14
57	.6	.1	36.1	7.4	-24.9	.0	.31	.14
58	-.2	.6	26.8	24.9	13.0	.0	.22	.11
59	.6	.1	35.7	5.8	-24.9	.0	.31	.13
60	-.2	.6	27.3	24.9	12.0	.0	.22	.12
61	.6	.1	35.3	4.2	-24.9	.0	.31	.13
62	.6	.0	34.9	2.7	-24.9	.0	.30	.13
63	-.3	.6	21.1	25.2	13.8	.0	.17	.10
64	-.2	.6	23.1	25.2	9.0	.0	.19	.10
	-.1	.6	23.7	25.2	7.6	.0	.19	.10
	.6	.4	31.4	23.3	-25.4	.0	.27	.13
	.6	.4	31.2	22.9	-25.4	.0	.27	.13
68	.3	-.6	41.2	-25.4	-14.6	.0	.33	.15
69	.3	-.6	40.5	-25.4	-13.9	.0	.33	.15
70	.2	-.6	39.9	-25.4	-13.2	.0	.32	.15

$$ALF_{35} = \frac{19.7}{123.9} = .16$$

$$CBF_{35} = \frac{19.7}{385.2} + \frac{24.9}{644.4} + \frac{29.7}{1926} = .11$$

71	.2	-.6	39.2	-25.4	-12.6	.0	.32	.15
72	.6	.4	30.4	19.5	-25.4	.0	.26	.13
73	.2	-.6	38.2	-25.4	-11.6	.0	.31	.14
74	.2	-.6	37.6	-25.4	-10.9	.0	.30	.14
	.2	-.6	36.9	-25.4	-10.2	.0	.30	.14
	.2	-.6	36.3	-25.4	-9.6	.0	.29	.14
77	.6	.3	29.5	16.1	-25.4	.0	.26	.12
78	.2	-.6	35.3	-25.4	-8.6	.0	.28	.14
79	.1	-.6	34.6	-25.4	-7.9	.0	.28	.13
80	.1	-.6	34.0	-25.4	-7.2	.0	.27	.13
81	.1	-.6	33.3	-25.4	-6.6	.0	.27	.13
82	.6	.2	28.6	12.7	-25.4	.0	.25	.12
83	.1	-.6	32.3	-25.4	-5.6	.0	.26	.13
84	.1	-.6	31.7	-25.4	-4.9	.0	.26	.12
85	.1	-.6	31.0	-25.4	-4.2	.0	.25	.12
86	.1	-.6	30.3	-25.4	-3.6	.0	.24	.12
87	.1	-.6	29.7	-25.4	-3.0	.0	.24	.12
88	.0	-.6	29.0	-25.4	-2.2	.0	.23	.12
89	.0	-.6	28.2	-25.4	-1.4	.0	.23	.11
90	.0	-.6	27.5	-25.4	-.7	.0	.22	.11
91	.0	-.6	26.9	-25.4	.0	.0	.22	.11
92	.0	-.6	26.2	-25.4	.7	.0	.21	.11
93	.0	-.6	25.5	-25.4	1.4	.0	.21	.11
94	.0	-.6	24.8	-25.4	2.1	.0	.20	.10
95	.0	-.6	24.2	-25.4	2.7	.0	.20	.10
96	-.1	-.6	23.5	-25.4	3.4	.0	.19	.10

LOAD CASE - 2

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
	1.4	-.9	94.7	-38.9	-79.5	.0	.76	.35
2	-.9	-1.7	40.1	-94.3	38.9	.0	.35	.21
3	1.4	-.9	95.5	-38.9	-79.6	.0	.77	.35
4	1.5	-.9	96.1	-38.9	-79.7	.0	.78	.35
5	1.5	-.9	96.7	-38.9	-79.8	.0	.78	.35
6	1.5	-.9	97.4	-38.9	-79.9	.0	.79	.35
7	-.9	-1.7	42.6	-95.2	38.9	.0	.37	.22
8	1.5	-.9	98.3	-38.9	-80.0	.0	.79	.36
9	1.5	-.9	98.9	-38.9	-80.1	.0	.80	.36
10	1.5	-.9	99.6	-38.9	-80.2	.0	.80	.36
11	1.5	-.9	100.2	-38.9	-80.3	.0	.81	.36
12	-.9	-1.8	45.1	-96.2	38.9	.0	.39	.23
13	1.5	-.9	101.1	-38.9	-80.4	.0	.82	.36
14	1.5	-.9	101.8	-38.9	-80.5	.0	.82	.37
15	1.5	-.9	102.4	-38.9	-80.6	.0	.83	.37
16	1.5	-.9	103.0	-38.9	-80.7	.0	.83	.37
17	-.9	-1.8	47.7	-97.2	38.9	.0	.41	.23
18	1.5	-.9	104.0	-38.9	-80.8	.0	.84	.37
19	1.5	-.9	104.6	-38.9	-80.9	.0	.84	.37
20	1.5	-.9	105.2	-38.9	-81.0	.0	.85	.38
21	1.5	-.9	105.9	-38.9	-81.0	.0	.85	.38
22	-.9	-1.8	50.4	-98.2	38.9	.0	.44	.24
23	1.5	-.9	108.1	-38.9	-81.0	.0	.87	.38
24	-.9	-1.8	51.7	-98.7	38.9	.0	.45	.25
25	1.5	-.9	108.8	-38.9	-81.5	.0	.88	.39
26	-.9	-1.8	52.9	-99.1	38.9	.0	.46	.25
27	1.5	-.9	109.7	-38.9	-81.6	.0	.89	.39
	-.9	-1.8	54.0	-99.6	38.9	.0	.47	.25
	1.5	-.9	112.1	-38.9	-81.6	.0	.90	.39
	-.9	-1.8	55.2	-100.0	38.9	.0	.48	.26
31	1.5	-.9	113.3	-38.9	-81.8	.0	.91	.40
32	1.5	-.9	100.3	-38.8	-82.8	.0	.81	.36
33	1.5	-.9	104.3	-38.8	-83.4	.0	.84	.37

34	1.5	-.9	105.7	-38.8	-82.0	.0	.85	.38
35	1.5	-.9	83.7	-38.8	-80.6	.0	.68	.32
36	-.9	-1.7	27.1	-92.5	38.8	.0	.24	.18
37	1.5	-.9	84.5	-38.8	-80.7	.0	.68	.32
	1.5	-.9	85.2	-38.8	-80.8	.0	.69	.32
	1.5	-.9	85.8	-38.8	-80.8	.0	.69	.32
[illegible]	1.5	-.9	86.4	-38.8	-80.9	.0	.70	.33
41	-.9	-1.7	29.6	-93.5	38.8	.0	.26	.19
42	1.5	-.9	87.4	-38.8	-81.1	.0	.71	.33
43	1.5	-.9	88.0	-38.8	-81.1	.0	.71	.33
44	1.5	-.9	88.6	-38.8	-81.2	.0	.72	.33
45	1.5	-.9	89.3	-38.8	-81.3	.0	.72	.33
46	-.9	-1.7	32.2	-94.4	38.8	.0	.28	.19
47	1.5	-.9	90.2	-38.8	-81.4	.0	.73	.34
48	1.5	-.9	90.8	-38.8	-81.5	.0	.73	.34
49	1.5	-.9	91.5	-38.8	-81.6	.0	.74	.34
50	1.5	-.9	92.1	-38.8	-81.7	.0	.74	.34
51	-.9	-1.7	34.8	-95.3	38.8	.0	.30	.20
52	1.5	-.9	93.1	-38.8	-81.8	.0	.75	.34
53	1.5	-.9	93.7	-38.8	-81.9	.0	.76	.35
54	1.5	-.9	94.3	-38.8	-82.0	.0	.76	.35
55	1.5	-.9	94.9	-38.8	-82.1	.0	.77	.35
56	-.9	-1.8	37.4	-96.3	38.8	.0	.33	.21
57	-.9	-1.8	38.7	-96.8	38.8	.0	.34	.21
58	1.5	-.9	97.9	-38.8	-82.4	.0	.79	.36
59	-.9	-1.8	39.9	-97.2	38.8	.0	.35	.21
60	1.5	-.9	98.7	-38.8	-82.6	.0	.80	.36
61	-.9	-1.8	41.1	-97.7	38.8	.0	.36	.22
62	-.9	-1.8	42.3	-98.1	38.8	.0	.37	.22
63	1.5	-.9	89.2	-38.7	-83.8	.0	.72	.33
64	1.5	-.9	93.2	-38.7	-84.4	.0	.75	.35
65	1.5	-.9	94.4	-38.7	-84.5	.0	.76	.35
	-.9	-1.7	14.1	-92.4	38.6	.0	.12	.14
	-.9	-1.7	14.4	-92.5	38.6	.0	.13	.15
	-1.6	.9	-48.1	38.6	88.9	.0	.58	.23
69	-1.6	.9	-47.8	38.6	89.2	.0	.57	.23
70	-1.6	.9	-47.4	38.6	89.5	.0	.57	.23
71	-1.6	.9	-47.1	38.6	89.8	.0	.56	.23
72	-.9	-1.7	16.9	-93.5	38.6	.0	.15	.15
73	-1.6	.9	-46.5	38.6	90.3	.0	.56	.23
74	-1.7	.9	-46.2	38.6	90.6	.0	.55	.23
75	-1.7	.9	-45.8	38.6	90.9	.0	.55	.23
76	-1.7	.9	-45.5	38.6	91.2	.0	.54	.23
77	-.9	-1.7	19.5	-94.4	38.6	.0	.17	.16
78	-1.7	.9	-44.9	38.6	91.7	.0	.54	.22
79	-1.7	.9	-44.6	38.6	92.0	.0	.53	.22
80	-1.7	.9	-44.2	38.6	92.3	.0	.53	.22
81	-1.7	.9	-43.9	38.6	92.6	.0	.53	.22
82	-.9	-1.7	22.1	-95.3	38.6	.0	.19	.17
83	-1.7	.9	-43.3	38.6	93.1	.0	.52	.22
84	-1.7	.9	-43.0	38.6	93.4	.0	.51	.22
85	-1.7	.9	-42.6	38.6	93.7	.0	.51	.22
86	-1.7	.9	-42.3	38.6	94.0	.0	.51	.22
87	-1.7	.9	-41.9	38.6	94.3	.0	.50	.22
88	-1.7	.9	-41.5	38.6	94.6	.0	.50	.22
89	-1.7	.9	-41.1	38.6	95.0	.0	.49	.22
90	-1.7	.9	-40.8	38.6	95.3	.0	.49	.22
91	-1.7	.9	-40.4	38.6	95.6	.0	.48	.21
92	-1.7	.9	-40.0	38.6	95.9	.0	.48	.21
93	-1.8	.9	-39.6	38.6	96.2	.0	.47	.21
	-1.8	.9	-39.2	38.6	96.6	.0	.47	.21
	-1.8	.9	-38.9	38.6	96.9	.0	.47	.21
	-1.8	.9	-38.6	38.6	97.2	.0	.46	.21

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
	1.1	-.9	104.0	-39.1	-61.1	.0	.84	.36
	-.9	-1.4	61.0	-78.8	39.1	.0	.53	.26
3	1.1	-.9	104.8	-39.1	-61.5	.0	.85	.36
4	1.1	-.9	105.5	-39.1	-61.7	.0	.85	.37
5	1.1	-.9	106.2	-39.1	-62.0	.0	.86	.37
6	1.1	-.9	106.8	-39.1	-62.3	.0	.86	.37
7	-.9	-1.5	63.1	-80.6	39.1	.0	.55	.27
8	1.1	-.9	107.8	-39.1	-62.7	.0	.87	.37
9	1.1	-.9	108.5	-39.1	-63.0	.0	.88	.38
10	1.2	-.9	109.2	-39.1	-63.3	.0	.88	.38
11	1.2	-.9	109.9	-39.1	-63.6	.0	.89	.38
12	-.9	-1.5	65.3	-82.4	39.1	.0	.57	.27
13	1.2	-.9	110.9	-39.1	-64.0	.0	.89	.38
14	1.2	-.9	111.5	-39.1	-64.3	.0	.90	.38
15	1.2	-.9	112.2	-39.1	-64.5	.0	.91	.39
16	1.2	-.9	112.9	-39.1	-64.8	.0	.91	.39
17	-.9	-1.5	67.4	-84.2	39.1	.0	.59	.28
18	1.2	-.9	113.9	-39.1	-65.2	.0	.92	.39
19	1.2	-.9	114.6	-39.1	-65.5	.0	.92	.39
20	1.2	-.9	115.2	-39.1	-65.8	.0	.93	.39
21	1.2	-.9	115.9	-39.1	-66.1	.0	.94	.40
22	-.9	-1.6	69.6	-86.1	39.1	.0	.61	.29
23	1.2	-.9	118.9	-39.1	-66.3	.0	.96	.40
24	-.9	-1.6	70.7	-87.0	39.1	.0	.61	.29
25	1.2	-.9	119.0	-39.1	-67.4	.0	.96	.40
26	-.9	-1.6	71.7	-87.8	39.1	.0	.62	.29
27	1.2	-.9	120.0	-39.1	-67.8	.0	.97	.41
28	-.9	-1.6	72.7	-88.7	39.1	.0	.63	.30
	1.2	-.9	123.2	-39.1	-68.1	.0	.99	.42
	-.9	-1.6	73.6	-89.5	39.1	.0	.64	.30
	1.3	-.9	124.5	-39.1	-68.6	.0	1.00	.42
32	1.3	-.9	105.3	-38.9	-69.4	.0	.85	.37
33	1.3	-.9	109.6	-38.9	-71.2	.0	.88	.38
34	1.3	-.9	110.9	-38.9	-71.7	.0	.89	.39
35	1.2	-.9	84.6	-38.8	-65.5	.0	.68	.31
36	-.9	-1.4	38.6	-78.8	38.8	.0	.34	.20
37	1.2	-.9	85.4	-38.8	-65.8	.0	.69	.32
38	1.2	-.9	86.1	-38.8	-66.1	.0	.70	.32
39	1.2	-.9	86.8	-38.8	-66.4	.0	.70	.32
40	1.2	-.9	87.5	-38.8	-66.7	.0	.71	.32
41	-.9	-1.5	40.7	-80.6	38.8	.0	.35	.21
42	1.2	-.9	88.5	-38.8	-67.1	.0	.71	.32
43	1.2	-.9	89.1	-38.8	-67.4	.0	.72	.33
44	1.2	-.9	89.8	-38.8	-67.7	.0	.72	.33
45	1.2	-.9	90.5	-38.8	-67.9	.0	.73	.33
46	-.9	-1.5	42.8	-82.4	38.8	.0	.37	.21
47	1.2	-.9	91.5	-38.8	-68.4	.0	.74	.33
48	1.3	-.9	92.2	-38.8	-68.6	.0	.74	.34
49	1.3	-.9	92.8	-38.8	-68.9	.0	.75	.34
50	1.3	-.9	93.5	-38.8	-69.2	.0	.75	.34
51	-.9	-1.5	44.9	-84.2	38.8	.0	.39	.22
52	1.3	-.9	94.5	-38.8	-69.6	.0	.76	.34
53	1.3	-.9	95.2	-38.8	-69.9	.0	.77	.34
54	1.3	-.9	95.9	-38.8	-70.2	.0	.77	.35
55	1.3	-.9	96.5	-38.8	-70.5	.0	.78	.35
56	-.9	-1.6	47.1	-86.1	38.8	.0	.41	.23
	-.9	-1.6	48.2	-87.0	38.8	.0	.42	.23
	1.3	-.9	99.6	-38.8	-71.8	.0	.80	.36
	-.9	-1.6	49.2	-87.8	38.8	.0	.43	.23
60	1.3	-.9	100.6	-38.8	-72.1	.0	.81	.36
61	-.9	-1.6	50.2	-88.7	38.8	.0	.44	.24
62	-.9	-1.6	51.2	-89.5	38.8	.0	.44	.24

OK

63	1.3	-.9	85.4	-38.6	-73.9	.0	.69	.32
64	1.4	-.9	89.7	-38.6	-75.7	.0	.72	.33
65	1.4	-.9	91.0	-38.6	-76.2	.0	.73	.34
66	-.9	-1.4	15.8	-78.6	38.5	.0	.14	.14
	-.9	-1.4	16.1	-78.8	38.5	.0	.14	.14
	-1.4	.9	-37.8	38.5	76.6	.0	.45	.20
69	-1.4	.9	-37.7	38.5	77.1	.0	.45	.20
70	-1.4	.9	-37.5	38.5	77.5	.0	.45	.20
71	-1.4	.9	-37.4	38.5	78.0	.0	.45	.20
72	-.9	-1.5	18.1	-80.6	38.5	.0	.16	.15
73	-1.4	.9	-37.2	38.5	78.7	.0	.45	.20
74	-1.4	.9	-37.0	38.5	79.2	.0	.44	.20
75	-1.5	.9	-36.9	38.5	79.6	.0	.44	.20
76	-1.5	.9	-36.7	38.5	80.1	.0	.44	.20
77	-.9	-1.5	20.3	-82.4	38.5	.0	.18	.16
78	-1.5	.9	-36.5	38.5	80.8	.0	.44	.20
79	-1.5	.9	-36.4	38.5	81.3	.0	.44	.20
80	-1.5	.9	-36.2	38.5	81.7	.0	.43	.20
81	-1.5	.9	-36.1	38.5	82.2	.0	.43	.20
82	-.9	-1.5	22.4	-84.2	38.5	.0	.19	.16
83	-1.5	.9	-35.9	38.5	82.9	.0	.43	.20
84	-1.5	.9	-35.7	38.5	83.4	.0	.43	.20
85	-1.5	.9	-35.6	38.5	83.8	.0	.43	.20
86	-1.5	.9	-35.4	38.5	84.3	.0	.42	.20
87	-1.5	.9	-35.3	38.5	84.7	.0	.42	.20
88	-1.6	.9	-35.1	38.5	85.3	.0	.42	.20
89	-1.6	.9	-35.0	38.5	85.8	.0	.42	.19
90	-1.6	.9	-34.8	38.5	86.3	.0	.42	.19
91	-1.6	.9	-34.7	38.5	86.8	.0	.41	.19
92	-1.6	.9	-34.5	38.5	87.2	.0	.41	.19
93	-1.6	.9	-34.3	38.5	87.7	.0	.41	.19
94	-1.6	.9	-34.2	38.5	88.2	.0	.41	.19
	-1.6	.9	-34.1	38.5	88.7	.0	.41	.19
	-1.6	.9	-33.9	38.5	89.1	.0	.41	.19

$$ALF_{68} = \frac{-37.8}{83.5} = .45$$

$$CBF_{68} = \frac{-37.8}{385.2} + \frac{38.5}{644.4} + \frac{76.6}{1926} = .20$$

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-.3	.2	48.3	9.3	14.0	.0	.39	.15
2	.2	.0	58.2	2.5	-9.3	.0	.51	.17
3	-.2	.2	48.7	9.3	13.3	.0	.39	.15
4	-.2	.2	49.1	9.3	12.8	.0	.40	.15
5	-.2	.2	49.4	9.3	12.2	.0	.40	.15
6	-.2	.2	49.7	9.3	11.7	.0	.40	.15
7	.2	.0	57.9	.0	-9.3	.0	.50	.16
8	-.2	.2	50.2	9.3	10.8	.0	.41	.15
9	-.2	.2	50.5	9.3	10.3	.0	.41	.15
10	-.2	.2	50.9	9.3	9.7	.0	.41	.15
11	-.2	.2	51.2	9.3	9.2	.0	.41	.15
12	.2	.0	57.7	-2.6	-9.3	.0	.50	.17
13	-.2	.2	51.7	9.3	8.4	.0	.42	.15
14	-.1	.2	52.0	9.3	7.8	.0	.42	.15
15	-.1	.2	52.3	9.3	7.3	.0	.42	.15
16	-.1	.2	52.7	9.3	6.7	.0	.43	.15
17	.2	-.1	57.4	-5.2	-9.3	.0	.50	.17
18	-.1	.2	53.2	9.3	5.9	.0	.43	.16
19	-.1	.2	53.5	9.3	5.4	.0	.43	.16
	-.1	.2	53.8	9.3	4.8	.0	.43	.16
	-.1	.2	54.2	9.3	4.3	.0	.44	.16
	.2	-.1	57.1	-7.9	-9.3	.0	.50	.17
23	-.1	.2	55.1	9.3	3.2	.0	.44	.16
24	.2	-.2	57.0	-9.3	-9.3	.0	.50	.17
25	.0	.2	55.7	9.3	1.7	.0	.45	.16

26	.2	-.2	56.9	-10.5	-9.3	.0	.49	.17
27	.0	.2	56.1	9.3	1.0	.0	.45	.16
28	.2	-.2	56.7	-11.7	-9.3	.0	.49	.17
29	.0	.2	57.2	9.3	-.4	.0	.46	.16
	.2	-.2	56.6	-12.9	-9.3	.0	.49	.17
	.0	.2	57.8	9.3	-1.4	.0	.47	.17
32	.0	.2	53.1	9.6	2.7	.0	.43	.15
33	.0	.2	55.2	9.6	-.8	.0	.45	.16
34	.0	.2	55.9	9.6	-1.8	.0	.45	.16
35	-.2	.2	45.6	9.7	13.4	.0	.37	.14
36	.2	.0	55.0	2.5	-9.7	.0	.48	.16
37	-.2	.2	46.0	9.7	12.7	.0	.37	.14
38	-.2	.2	46.3	9.7	12.1	.0	.37	.14
39	-.2	.2	46.6	9.7	11.6	.0	.38	.14
40	-.2	.2	47.0	9.7	11.0	.0	.38	.14
41	.2	.0	54.7	.0	-9.7	.0	.48	.16
42	-.2	.2	47.5	9.7	10.2	.0	.38	.14
43	-.2	.2	47.8	9.7	9.7	.0	.39	.14
44	-.2	.2	48.1	9.7	9.1	.0	.39	.14
45	-.2	.2	48.4	9.7	8.6	.0	.39	.15
46	.2	.0	54.5	-2.6	-9.7	.0	.47	.16
47	-.1	.2	48.9	9.7	7.8	.0	.39	.15
48	-.1	.2	49.3	9.7	7.2	.0	.40	.15
49	-.1	.2	49.6	9.7	6.7	.0	.40	.15
50	-.1	.2	49.9	9.7	6.1	.0	.40	.15
51	.2	-.1	54.2	-5.2	-9.7	.0	.47	.16
52	-.1	.2	50.4	9.7	5.3	.0	.41	.15
53	-.1	.2	50.7	9.7	4.7	.0	.41	.15
54	-.1	.2	51.1	9.7	4.2	.0	.41	.15
55	-.1	.2	51.4	9.7	3.6	.0	.41	.15
56	.2	-.1	53.9	-7.9	-9.7	.0	.47	.16
57	.2	-.2	53.8	-9.3	-9.7	.0	.47	.16
	.0	.2	52.9	9.7	1.1	.0	.43	.15
	.2	-.2	53.7	-10.5	-9.7	.0	.47	.16
	.0	.2	53.4	9.7	.3	.0	.43	.15
61	.2	-.2	53.5	-11.7	-9.7	.0	.47	.16
62	.2	-.2	53.4	-12.9	-9.7	.0	.46	.16
63	.0	.2	50.3	10.0	2.1	.0	.41	.15
64	.0	.2	52.4	10.0	-1.4	.0	.42	.15
65	.0	.2	53.0	10.0	-2.5	.0	.43	.15
66	.2	.1	51.8	2.8	-10.2	.0	.45	.15
67	.2	.0	51.8	2.5	-10.2	.0	.45	.15
68	-.1	-.2	46.0	-10.2	8.1	.0	.37	.14
69	-.2	-.2	45.6	-10.2	8.6	.0	.37	.14
70	-.2	-.2	45.1	-10.2	9.2	.0	.36	.14
71	-.2	-.2	44.7	-10.2	9.7	.0	.36	.14
72	.2	.0	51.5	.0	-10.2	.0	.45	.15
73	-.2	-.2	44.1	-10.2	10.5	.0	.36	.14
74	-.2	-.2	43.6	-10.2	11.0	.0	.35	.13
75	-.2	-.2	43.2	-10.2	11.5	.0	.35	.13
76	-.2	-.2	42.8	-10.2	12.1	.0	.35	.13
77	.2	.0	51.3	-2.6	-10.2	.0	.45	.15
78	-.2	-.2	42.1	-10.2	12.8	.0	.34	.13
79	-.2	-.2	41.7	-10.2	13.4	.0	.34	.13
80	-.3	-.2	41.3	-10.2	13.9	.0	.33	.13
81	-.3	-.2	40.8	-10.2	14.4	.0	.33	.13
82	.2	-.1	51.0	-5.2	-10.2	.0	.44	.15
83	-.3	-.2	40.2	-10.2	15.2	.0	.32	.13
84	-.3	-.2	39.8	-10.2	15.7	.0	.32	.13
85	-.3	-.2	39.3	-10.2	16.3	.0	.32	.13
	-.3	-.2	38.9	-10.2	16.8	.0	.31	.13
	-.3	-.2	38.5	-10.2	17.3	.0	.31	.12
	-.3	-.2	38.0	-10.2	17.9	.0	.31	.12
89	-.3	-.2	37.5	-10.2	18.5	.0	.30	.12
90	-.3	-.2	37.1	-10.2	19.0	.0	.30	.12
91	-.4	-.2	36.6	-10.2	19.6	.0	.30	.12

92	-.4	-.2	36.2	-10.2	20.1	.0	.29	.12
93	-.4	-.2	35.7	-10.2	20.7	.0	.29	.12
94	-.4	-.2	35.2	-10.2	21.3	.0	.28	.12
95	-.4	-.2	34.9	-10.2	21.7	.0	.28	.12
	-.4	-.2	34.4	-10.2	22.3	.0	.28	.12

LOAD CASE - 5

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	.4	.2	35.7	7.2	-21.9	.0	.29	.12
2	.2	-.5	20.3	-28.0	-7.2	.0	.18	.08
3	.4	.2	36.1	7.2	-22.1	.0	.29	.12
4	.4	.2	36.4	7.2	-22.3	.0	.29	.12
5	.4	.2	36.7	7.2	-22.4	.0	.30	.12
6	.4	.2	37.0	7.2	-22.5	.0	.30	.12
7	.2	-.5	21.2	-28.8	-7.2	.0	.18	.08
8	.4	.2	37.4	7.2	-22.7	.0	.30	.12
9	.4	.2	37.7	7.2	-22.9	.0	.30	.12
10	.4	.2	38.0	7.2	-23.0	.0	.31	.12
11	.4	.2	38.2	7.2	-23.1	.0	.31	.12
12	.2	-.5	22.0	-29.7	-7.2	.0	.19	.08
13	.4	.2	38.7	7.2	-23.3	.0	.31	.12
14	.4	.2	39.0	7.2	-23.5	.0	.31	.12
15	.4	.2	39.2	7.2	-23.6	.0	.32	.13
16	.4	.2	39.5	7.2	-23.8	.0	.32	.13
17	.2	-.6	22.9	-30.5	-7.2	.0	.20	.09
18	.4	.2	40.0	7.2	-24.0	.0	.32	.13
19	.4	.2	40.2	7.2	-24.1	.0	.32	.13
20	.4	.2	40.5	7.2	-24.2	.0	.33	.13
	.4	.2	40.8	7.2	-24.4	.0	.33	.13
	.2	-.6	23.8	-31.4	-7.2	.0	.21	.09
	.5	.2	41.0	7.2	-24.7	.0	.33	.13
24	.2	-.6	24.2	-31.8	-7.2	.0	.21	.09
25	.5	.2	42.1	7.2	-25.0	.0	.34	.13
26	.2	-.6	24.6	-32.2	-7.2	.0	.21	.09
27	.5	.2	42.5	7.2	-25.2	.0	.34	.13
28	.2	-.6	25.0	-32.6	-7.2	.0	.22	.09
29	.5	.2	42.9	7.2	-25.6	.0	.35	.14
30	.2	-.6	25.4	-33.0	-7.2	.0	.22	.09
31	.5	.2	43.4	7.2	-25.9	.0	.35	.14
32	.4	.2	44.4	7.2	-24.0	.0	.36	.14
33	.5	.2	46.3	7.2	-24.9	.0	.37	.14
34	.5	.2	46.8	7.2	-25.1	.0	.38	.15
35	.4	.2	40.6	7.3	-20.9	.0	.33	.13
36	.2	-.5	25.9	-28.0	-7.3	.0	.23	.09
37	.4	.2	40.9	7.3	-21.0	.0	.33	.13
38	.4	.2	41.2	7.3	-21.2	.0	.33	.13
39	.4	.2	41.5	7.3	-21.3	.0	.33	.13
40	.4	.2	41.8	7.3	-21.4	.0	.34	.13
41	.2	-.5	26.8	-28.8	-7.3	.0	.23	.10
42	.4	.2	42.2	7.3	-21.6	.0	.34	.13
43	.4	.2	42.5	7.3	-21.8	.0	.34	.13
44	.4	.2	42.8	7.3	-21.9	.0	.35	.13
45	.4	.2	43.1	7.3	-22.1	.0	.35	.13
46	.2	-.5	27.6	-29.7	-7.3	.0	.24	.10
47	.4	.2	43.5	7.3	-22.3	.0	.35	.14
48	.4	.2	43.8	7.3	-22.4	.0	.35	.14
	.4	.2	44.1	7.3	-22.5	.0	.36	.14
	.4	.2	44.4	7.3	-22.7	.0	.36	.14
	.2	-.6	28.5	-30.5	-7.3	.0	.25	.10
52	.4	.2	44.8	7.3	-22.9	.0	.36	.14
53	.4	.2	45.1	7.3	-23.0	.0	.36	.14
54	.4	.2	45.4	7.3	-23.1	.0	.37	.14

55	.4	.2	45.6	7.3	-23.3	.0	.37	.14
56	.2	-.6	29.3	-31.4	-7.3	.0	.26	.10
57	.2	-.6	29.8	-31.8	-7.3	.0	.26	.11
58	.4	.2	47.0	7.3	-23.9	.0	.38	.15
	.2	-.6	30.2	-32.2	-7.3	.0	.26	.11
	.4	.2	47.4	7.3	-24.1	.0	.38	.15
61	.2	-.6	30.6	-32.6	-7.3	.0	.27	.11
62	.2	-.6	31.0	-33.0	-7.3	.0	.27	.11
63	.4	.2	49.4	7.4	-22.9	.0	.40	.15
64	.4	.2	51.2	7.4	-23.7	.0	.41	.16
65	.4	.2	51.7	7.4	-24.0	.0	.42	.16
66	.2	-.5	31.4	-27.9	-7.4	.0	.27	.11
67	.2	-.5	31.5	-28.0	-7.4	.0	.27	.11
68	-.6	-.2	8.8	-7.4	32.3	.0	.07	.05
69	-.6	-.2	8.9	-7.4	32.5	.0	.07	.05
70	-.6	-.2	8.9	-7.4	32.7	.0	.07	.05
71	-.6	-.2	8.9	-7.4	32.9	.0	.07	.05
72	.2	-.5	32.4	-28.8	-7.4	.0	.28	.11
73	-.6	-.2	9.0	-7.4	33.2	.0	.07	.05
74	-.6	-.2	9.0	-7.4	33.4	.0	.07	.05
75	-.6	-.2	9.1	-7.4	33.6	.0	.07	.05
76	-.6	-.2	9.1	-7.4	33.9	.0	.07	.05
77	.2	-.5	33.2	-29.7	-7.4	.0	.29	.11
78	-.6	-.2	9.2	-7.4	34.2	.0	.07	.05
79	-.6	-.2	9.2	-7.4	34.4	.0	.07	.05
80	-.6	-.2	9.3	-7.4	34.6	.0	.07	.05
81	-.6	-.2	9.3	-7.4	34.8	.0	.08	.05
82	.2	-.6	34.1	-30.5	-7.4	.0	.30	.12
83	-.6	-.2	9.4	-7.4	35.1	.0	.08	.05
84	-.6	-.2	9.4	-7.4	35.3	.0	.08	.05
85	-.6	-.2	9.4	-7.4	35.5	.0	.08	.05
86	-.7	-.2	9.5	-7.4	35.8	.0	.08	.05
	-.7	-.2	9.5	-7.4	35.9	.0	.08	.05
	-.7	-.2	9.6	-7.4	36.2	.0	.08	.06
	-.7	-.2	9.6	-7.4	36.4	.0	.08	.06
90	-.7	-.2	9.7	-7.4	36.6	.0	.08	.06
91	-.7	-.2	9.7	-7.4	36.9	.0	.08	.06
92	-.7	-.2	9.7	-7.4	37.1	.0	.08	.06
93	-.7	-.2	9.8	-7.4	37.3	.0	.08	.06
94	-.7	-.2	9.8	-7.4	37.5	.0	.08	.06
95	-.7	-.2	9.9	-7.4	37.7	.0	.08	.06
96	-.7	-.2	9.9	-7.4	37.9	.0	.08	.06

$$ALF_{57} = \frac{29.8}{115} = .26$$

$$CBF_{57} = \frac{29.8}{385.2} + \frac{-31.8}{1926} + \frac{-7.3}{644.4} = .11$$

LOAD CASE - 6

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	1.4	-.9	81.2	-38.2	-75.2	.0	.66	.31
2	-.9	-1.6	28.4	-86.9	38.2	.0	.25	.18
3	1.4	-.9	81.9	-38.2	-75.1	.0	.66	.31
4	1.4	-.9	82.4	-38.2	-75.0	.0	.66	.31
5	1.4	-.9	82.9	-38.2	-75.0	.0	.67	.31
6	1.4	-.9	83.4	-38.2	-74.9	.0	.67	.31
7	-.9	-1.6	30.8	-87.1	38.2	.0	.27	.18
8	1.4	-.9	84.1	-38.2	-74.8	.0	.68	.32
9	1.4	-.9	84.6	-38.2	-74.7	.0	.68	.32
10	1.4	-.9	85.1	-38.2	-74.7	.0	.69	.32
11	1.4	-.9	85.6	-38.2	-74.6	.0	.69	.32
	-.9	-1.6	33.2	-87.3	38.2	.0	.29	.19
	1.4	-.9	86.4	-38.2	-74.5	.0	.70	.32
	1.4	-.9	86.9	-38.2	-74.5	.0	.70	.32
15	1.4	-.9	87.4	-38.2	-74.4	.0	.71	.32
16	1.4	-.9	87.9	-38.2	-74.4	.0	.71	.33
17	-.9	-1.6	35.7	-87.5	38.2	.0	.31	.20

18	1.4	-.9	88.6	-38.2	-74.3	.0	.72	.33
19	1.4	-.9	89.1	-38.2	-74.2	.0	.72	.33
20	1.4	-.9	89.6	-38.2	-74.2	.0	.72	.33
21	1.3	-.9	90.1	-38.2	-74.1	.0	.73	.33
	-.9	-1.6	38.2	-87.8	38.2	.0	.33	.20
	1.3	-.9	92.0	-38.2	-73.8	.0	.74	.34
24	-.9	-1.6	39.4	-87.9	38.2	.0	.34	.21
25	1.3	-.9	92.4	-38.2	-73.8	.0	.75	.34
26	-.9	-1.6	40.6	-88.0	38.2	.0	.35	.21
27	1.3	-.9	93.1	-38.2	-73.7	.0	.75	.34
28	-.9	-1.6	41.7	-88.1	38.2	.0	.36	.21
29	1.3	-.9	95.2	-38.2	-73.4	.0	.77	.34
30	-.9	-1.6	42.8	-88.2	38.2	.0	.37	.22
31	1.3	-.9	96.2	-38.2	-73.3	.0	.78	.35
32	1.4	-.9	84.3	-38.2	-75.5	.0	.68	.32
33	1.4	-.9	87.5	-38.2	-75.1	.0	.71	.33
34	1.4	-.9	88.4	-38.2	-75.0	.0	.71	.33
35	1.4	-.9	70.2	-38.2	-77.7	.0	.57	.28
36	-.9	-1.6	15.6	-86.9	38.2	.0	.14	.14
37	1.4	-.9	70.8	-38.2	-77.6	.0	.57	.28
38	1.4	-.9	71.3	-38.2	-77.5	.0	.58	.28
39	1.4	-.9	71.8	-38.2	-77.5	.0	.58	.29
40	1.4	-.9	72.3	-38.2	-77.4	.0	.58	.29
41	-.9	-1.6	18.0	-87.1	38.2	.0	.16	.15
42	1.4	-.9	73.1	-38.2	-77.3	.0	.59	.29
43	1.4	-.9	73.6	-38.2	-77.2	.0	.59	.29
44	1.4	-.9	74.1	-38.2	-77.2	.0	.60	.29
45	1.4	-.9	74.6	-38.2	-77.1	.0	.60	.29
46	-.9	-1.6	20.4	-87.3	38.2	.0	.18	.16
47	1.4	-.9	75.3	-38.2	-77.0	.0	.61	.29
48	1.4	-.9	75.8	-38.2	-77.0	.0	.61	.30
49	1.4	-.9	76.3	-38.2	-76.9	.0	.62	.30
	1.4	-.9	76.8	-38.2	-76.9	.0	.62	.30
	-.9	-1.6	22.8	-87.5	38.2	.0	.20	.16
[illegible]	1.4	-.9	77.5	-38.2	-76.8	.0	.63	.30
53	1.4	-.9	78.0	-38.2	-76.7	.0	.63	.30
54	1.4	-.9	78.5	-38.2	-76.7	.0	.63	.30
55	1.4	-.9	79.0	-38.2	-76.6	.0	.64	.30
56	-.9	-1.6	25.4	-87.8	38.2	.0	.22	.17
57	-.9	-1.6	26.6	-87.9	38.2	.0	.23	.17
58	1.4	-.9	81.3	-38.2	-76.3	.0	.66	.31
59	-.9	-1.6	27.7	-88.0	38.2	.0	.24	.18
60	1.4	-.9	82.0	-38.2	-76.2	.0	.66	.31
61	-.9	-1.6	28.9	-88.1	38.2	.0	.25	.18
62	-.9	-1.6	30.0	-88.2	38.2	.0	.26	.18
63	1.4	-.9	72.9	-38.1	-78.1	.0	.59	.29
64	1.4	-.9	76.1	-38.1	-77.7	.0	.61	.30
65	1.4	-.9	77.1	-38.1	-77.6	.0	.62	.30
66	-.9	-1.6	2.4	-86.8	38.1	.0	02	11
67	-.9	-1.6	2.7	-86.9	38.1	.0	.02	.11
68	-1.5	.9	-54.4	38.1	81.3	.0	.65	.24
69	-1.5	.9	-54.0	38.1	81.4	.0	.65	.24
70	-1.5	.9	-53.5	38.1	81.6	.0	.64	.24
71	-1.5	.9	-53.1	38.1	81.7	.0	.64	.24
72	-.9	-1.6	5.1	-87.1	38.1	.0	.04	.12
73	-1.5	.9	-52.4	38.1	82.0	.0	.63	.24
74	-1.5	.9	-52.0	38.1	82.1	.0	.62	.24
75	-1.5	.9	-51.6	38.1	82.3	.0	.62	.24
76	-1.5	.9	-51.1	38.1	82.4	.0	.61	.23
77	-.9	-1.6	7.6	-87.3	38.1	.0	.07	.12
	-1.5	.9	-50.5	38.1	82.7	.0	.60	.23
	-1.5	.9	-50.1	38.1	82.8	.0	.60	.23
	-1.5	.9	-49.6	38.1	83.0	.0	.59	.23
81	-1.5	.9	-49.2	38.1	83.1	.0	.59	.23
82	-.9	-1.6	10.0	-87.5	38.1	.0	.09	.13
83	-1.5	.9	-48.5	38.1	83.3	.0	.58	.23

84	-1.5	.9	-48.1	38.1	83.5	.0	.58	.23
85	-1.5	.9	-47.7	38.1	83.6	.0	.57	.23
86	-1.5	.9	-47.2	38.1	83.8	.0	.57	.23
87	-1.5	.9	-46.8	38.1	83.9	.0	.56	.22
	-1.5	.9	-46.3	38.1	84.1	.0	.55	.22
	-1.5	.9	-45.8	38.1	84.3	.0	.55	.22
[illegible]	-1.5	.9	-45.4	38.1	84.4	.0	.54	.22
91	-1.5	.9	-44.9	38.1	84.6	.0	.54	.22
92	-1.5	.9	-44.5	38.1	84.7	.0	.53	.22
93	-1.5	.9	-44.0	38.1	84.9	.0	.53	.22
94	-1.5	.9	-43.5	38.1	85.1	.0	.52	.22
95	-1.6	.9	-43.2	38.1	85.2	.0	.52	.22
96	-1.6	.9	-42.7	38.1	85.4	.0	.51	.21

LOAD CASE - 7

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	1.1	-.9	88.8	-38.3	-61.4	.0	.72	.32
2	-.9	-1.4	45.6	-75.7	38.3	.0	.40	.22
3	1.1	-.9	89.4	-38.3	-61.5	.0	.72	.32
4	1.1	-.9	90.0	-38.3	-61.6	.0	.73	.33
5	1.1	-.9	90.5	-38.3	-61.7	.0	.73	.33
6	1.1	-.9	91.0	-38.3	-61.8	.0	.73	.33
7	-.9	-1.4	47.7	-76.7	38.3	.0	.41	.22
8	1.1	-.9	91.8	-38.3	-61.9	.0	.74	.33
9	1.1	-.9	92.4	-38.3	-62.0	.0	.75	.33
10	1.1	-.9	92.9	-38.3	-62.1	.0	.75	.33
11	1.1	-.9	93.4	-38.3	-62.2	.0	.75	.33
12	-.9	-1.4	49.8	-77.6	38.3	.0	.43	.23
	1.1	-.9	94.2	-38.3	-62.4	.0	.76	.34
	1.1	-.9	94.8	-38.3	-62.5	.0	.76	.34
	1.1	-.9	95.3	-38.3	-62.6	.0	.77	.34
16	1.1	-.9	95.8	-38.3	-62.7	.0	.77	.34
17	-.9	-1.4	51.8	-78.5	38.3	.0	.45	.23
18	1.1	-.9	96.6	-38.3	-62.8	.0	.78	.34
19	1.1	-.9	97.2	-38.3	-62.9	.0	.78	.34
20	1.1	-.9	97.7	-38.3	-63.0	.0	.79	.35
21	1.1	-.9	98.2	-38.3	-63.1	.0	.79	.35
22	-.9	-1.4	54.0	-79.4	38.3	.0	.47	.24
23	1.1	-.9	100.8	-38.3	-63.0	.0	.81	.35
24	-.9	-1.5	55.1	-79.9	38.3	.0	.48	.24
25	1.2	-.9	100.7	-38.3	-63.6	.0	.81	.35
26	-.9	-1.5	56.0	-80.3	38.3	.0	.49	.25
27	1.2	-.9	101.4	-38.3	-63.7	.0	.82	.36
28	-.9	-1.5	57.0	-80.8	38.3	.0	.50	.25
29	1.2	-.9	104.2	-38.3	-63.7	.0	.84	.36
30	-.9	-1.5	57.9	-81.2	38.3	.0	.50	.25
31	1.2	-.9	105.2	-38.3	-63.9	.0	.85	.37
32	1.2	-.9	88.2	-38.2	-65.9	.0	.71	.32
33	1.2	-.9	91.6	-38.2	-66.5	.0	.74	.33
34	1.2	-.9	92.6	-38.2	-66.7	.0	.75	.33
35	1.2	-.9	70.9	-38.2	-65.4	.0	.57	.28
36	-.9	-1.4	24.9	-75.7	38.2	.0	.22	.16
37	1.2	-.9	71.5	-38.2	-65.5	.0	.58	.28
38	1.2	-.9	72.1	-38.2	-65.6	.0	.58	.28
39	1.2	-.9	72.6	-38.2	-65.7	.0	.59	.28
40	1.2	-.9	73.1	-38.2	-65.8	.0	.59	.28
	-.9	-1.4	26.9	-76.7	38.2	.0	.23	.17
	1.2	-.9	73.9	-38.2	-66.0	.0	.60	.29
	1.2	-.9	74.5	-38.2	-66.1	.0	.60	.29
44	1.2	-.9	75.0	-38.2	-66.2	.0	.61	.29
45	1.2	-.9	75.5	-38.2	-66.3	.0	.61	.29
46	-.9	-1.4	29.0	-77.6	38.2	.0	.25	.17

$$ALF_{31} = \frac{105.2}{123.9} = .85$$

$$CBF_{31} = \frac{105.2}{3852} + \frac{-38.3}{644.4} + \frac{-63.9}{1926} = .3$$

47	1.2	-.9	76.3	-38.2	-66.4	.0	.62	.29
48	1.2	-.9	76.9	-38.2	-66.5	.0	.62	.29
49	1.2	-.9	77.4	-38.2	-66.6	.0	.62	.29
50	1.2	-.9	77.9	-38.2	-66.7	.0	.63	.30
	-.9	-1.4	31.1	-78.5	38.2	.0	.27	.18
	1.2	-.9	78.7	-38.2	-66.9	.0	.64	.30
53	1.2	-.9	79.3	-38.2	-67.0	.0	.64	.30
54	1.2	-.9	79.8	-38.2	-67.1	.0	.64	.30
55	1.2	-.9	80.3	-38.2	-67.2	.0	.65	.30
56	-.9	-1.4	33.2	-79.4	38.2	.0	.29	.19
57	-.9	-1.5	34.3	-79.9	38.2	.0	.30	.19
58	1.2	-.9	82.8	-38.2	-67.7	.0	.67	.31
59	-.9	-1.5	35.3	-80.3	38.2	.0	.31	.19
60	1.2	-.9	83.5	-38.2	-67.8	.0	.67	.31
61	-.9	-1.5	36.2	-80.8	38.2	.0	.32	.20
62	-.9	-1.5	37.2	-81.2	38.2	.0	.32	.20
63	1.3	-.9	69.8	-38.1	-70.0	.0	.56	.28
64	1.3	-.9	73.2	-38.1	-70.7	.0	.59	.29
65	1.3	-.9	74.3	-38.1	-70.9	.0	.60	.29
66	-.9	-1.4	3.8	-75.6	38.0	.0	.03	.11
67	-.9	-1.4	4.1	-75.7	38.0	.0	.04	.11
68	-1.3	.9	-46.1	38.0	71.3	.0	.55	.22
69	-1.3	.9	-45.8	38.0	71.6	.0	.55	.22
70	-1.3	.9	-45.5	38.0	71.9	.0	.55	.21
71	-1.3	.9	-45.3	38.0	72.2	.0	.54	.21
72	-.9	-1.4	6.1	-76.7	38.0	.0	.05	.11
73	-1.3	.9	-44.9	38.0	72.6	.0	.54	.21
74	-1.3	.9	-44.6	38.0	72.9	.0	.53	.21
75	-1.3	.9	-44.3	38.0	73.1	.0	.53	.21
76	-1.3	.9	-44.1	38.0	73.4	.0	.53	.21
77	-.9	-1.4	8.2	-77.6	38.0	.0	.07	.12
78	-1.3	.9	-43.7	38.0	73.8	.0	.52	.21
	-1.3	.9	-43.4	38.0	74.1	.0	.52	.21
	-1.4	.9	-43.1	38.0	74.4	.0	.52	.21
[illegible]	-1.4	.9	-42.9	38.0	74.7	.0	.51	.21
82	-.9	-1.4	10.3	-78.5	38.0	.0	.09	.13
83	-1.4	.9	-42.5	38.0	75.1	.0	.51	.21
84	-1.4	.9	-42.2	38.0	75.4	.0	.51	.21
85	-1.4	.9	-42.0	38.0	75.7	.0	.50	.21
86	-1.4	.9	-41.7	38.0	75.9	.0	.50	.21
87	-1.4	.9	-41.5	38.0	76.2	.0	.50	.21
88	-1.4	.9	-41.1	38.0	76.5	.0	.49	.21
89	-1.4	.9	-40.8	38.0	76.8	.0	.49	.20
90	-1.4	.9	-40.6	38.0	77.1	.0	.49	.20
91	-1.4	.9	-40.3	38.0	77.4	.0	.48	.20
92	-1.4	.9	-40.0	38.0	77.7	.0	.48	.20
93	-1.4	.9	-39.7	38.0	78.0	.0	.48	.20
94	-1.4	.9	-39.4	38.0	78.3	.0	.47	.20
95	-1.4	.9	-39.2	38.0	78.6	.0	.47	.20
96	-1.4	.9	-38.9	38.0	78.8	.0	.47	.20

LOAD CASE - 8

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF
1	-.6	.9	-7.6	37.4	32.3	.0	.09	.09
2	.9	.6	15.1	31.2	-37.4	.0	.13	.11
3	-.6	.9	-7.4	37.4	31.5	.0	.09	.09
	-.6	.9	-7.2	37.4	30.9	.0	.09	.09
	-.6	.9	-7.0	37.4	30.3	.0	.08	.09
	-.5	.9	-6.8	37.4	29.8	.0	.08	.09
7	.9	.5	14.0	28.6	-37.4	.0	.12	.11
8	-.5	.9	-6.5	37.4	28.9	.0	.08	.09
9	-.5	.9	-6.4	37.4	28.3	.0	.08	.09

10	-.5	.9	-6.2	37.4	27.7	.0	.07	.09
11	-.5	.9	-6.0	37.4	27.1	.0	.07	.09
12	.9	.5	13.0	26.0	-37.4	.0	.11	.11
13	-.5	.9	-5.7	37.4	26.2	.0	.07	.09
	-.5	.9	-5.5	37.4	25.6	.0	.07	.09
	-.5	.9	-5.4	37.4	25.0	.0	.06	.08
16	-.4	.9	-5.2	37.4	24.4	.0	.06	.08
17	.9	.4	11.9	23.3	-37.4	.0	.10	.10
18	-.4	.9	-4.9	37.4	23.5	.0	.06	.08
19	-.4	.9	-4.7	37.4	22.9	.0	.06	.08
20	-.4	.9	-4.5	37.4	22.3	.0	.05	.08
21	-.4	.9	-4.3	37.4	21.7	.0	.05	.08
22	.9	.4	10.8	20.5	-37.4	.0	.09	.10
23	-.4	.9	-5.6	37.4	20.1	.0	.07	.08
24	.9	.3	10.3	19.2	-37.4	.0	.09	.09
25	-.3	.9	-3.5	37.4	19.0	.0	.04	.08
26	.9	.3	9.8	17.9	-37.4	.0	.08	.09
27	-.3	.9	-3.2	37.4	18.1	.0	.04	.08
28	.9	.3	9.3	16.7	-37.4	.0	.08	.09
29	-.3	.9	-4.5	37.4	16.3	.0	.05	.08
30	.9	.3	8.8	15.5	-37.4	.0	.08	.09
31	-.3	.9	-4.1	37.4	15.2	.0	.05	.08
32	-.4	.9	9.0	37.7	23.4	.0	.07	.09
33	-.4	.9	10.1	37.7	19.6	.0	.08	.09
34	-.3	.9	10.5	37.7	18.5	.0	.08	.10
35	-.7	.9	13.2	37.8	37.0	.0	.11	.11
36	.9	.6	39.2	31.2	-37.8	.0	.34	.18
37	-.7	.9	13.4	37.8	36.2	.0	.11	.11
38	-.6	.9	13.6	37.8	35.6	.0	.11	.11
39	-.6	.9	13.8	37.8	35.0	.0	.11	.11
40	-.6	.9	13.9	37.8	34.4	.0	.11	.11
41	.9	.5	38.1	28.6	-37.8	.0	.33	.17
	-.6	.9	14.2	37.8	33.6	.0	.11	.11
	-.6	.9	14.4	37.8	33.0	.0	.12	.11
44	-.6	.9	14.6	37.8	32.4	.0	.12	.11
45	-.6	.9	14.8	37.8	31.8	.0	.12	.11
46	.9	.5	37.1	26.0	-37.8	.0	.32	.17
47	-.6	.9	15.0	37.8	30.9	.0	.12	.11
48	-.6	.9	15.2	37.8	30.3	.0	.12	.11
49	-.5	.9	15.4	37.8	29.7	.0	.12	.11
50	-.5	.9	15.6	37.8	29.1	.0	.13	.11
51	.9	.4	36.0	23.3	-37.8	.0	.31	.16
52	-.5	.9	15.9	37.8	28.2	.0	.13	.11
53	-.5	.9	16.1	37.8	27.6	.0	.13	.11
54	-.5	.9	16.2	37.8	27.0	.0	.13	.11
55	-.5	.9	16.4	37.8	26.4	.0	.13	.12
56	.9	.4	34.9	20.5	-37.8	.0	.30	.16
57	.9	.3	34.4	19.2	-37.8	.0	.30	.16
58	-.4	.9	17.3	37.8	23.7	.0	.14	.12
59	.9	.3	33.9	17.9	-37.8	.0	.29	.16
60	-.4	.9	17.5	37.8	22.8	.0	.14	.12
61	.9	.3	33.4	16.7	-37.8	.0	.29	.15
62	.9	.3	32.9	15.5	-37.8	.0	.29	.15
63	-.5	.9	30.3	38.1	28.2	.0	.24	.15
64	-.4	.9	31.5	38.1	24.4	.0	.25	.15
65	-.4	.9	31.8	38.1	23.3	.0	.26	.15
66	.9	.6	63.4	31.6	-38.3	.0	.55	.24
67	.9	.6	63.3	31.2	-38.3	.0	.55	.24
68	.3	-.9	74.7	-38.3	-16.3	.0	.60	.26
69	.3	-.9	74.1	-38.3	-15.8	.0	.60	.26
	.3	-.9	73.5	-38.3	-15.3	.0	.59	.26
	.3	-.9	72.9	-38.3	-14.8	.0	.59	.26
	.9	.5	62.2	28.6	-38.3	.0	.54	.24
73	.3	-.9	72.0	-38.3	-14.1	.0	.58	.25
74	.2	-.9	71.4	-38.3	-13.5	.0	.58	.25
75	.2	-.9	70.8	-38.3	-13.0	.0	.57	.25

76	.2	-.9	70.2	-38.3	-12.7	.0	.57	.25
77	.9	.5	61.2	26.5	-38.3	.0	.53	.23
78	.2	-.9	69.3	-38.3	-12.0	.0	.56	.25
79	.2	-.9	68.7	-38.3	-11.5	.0	.55	.24
	.2	-.9	68.1	-38.3	-10.9	.0	.55	.24
	.2	-.9	67.5	-38.3	-10.4	.0	.55	.24
[illegible]	.9	.4	60.2	23.7	-38.3	.0	.52	.23
83	.2	-.9	66.7	-38.3	-9.7	.0	.54	.24
84	.2	-.9	66.1	-38.3	-9.2	.0	.53	.24
85	.2	-.9	65.5	-38.3	-8.6	.0	.53	.23
86	.1	-.9	64.9	-38.3	-8.1	.0	.52	.23
87	.1	-.9	64.3	-38.3	-7.7	.0	.52	.23
88	.1	-.9	63.7	-38.3	-7.1	.0	.51	.23
89	.1	-.9	63.0	-38.3	-6.5	.0	.51	.23
90	.1	-.9	62.4	-38.3	-5.9	.0	.50	.22
91	.1	-.9	61.8	-38.3	-5.4	.0	.50	.22
92	.1	-.9	61.1	-38.3	-4.9	.0	.49	.22
93	.1	-.9	60.5	-38.3	-4.3	.0	.49	.22
94	.1	-.9	59.9	-38.3	-3.8	.0	.48	.22
95	.1	-.9	59.3	-38.3	-3.3	.0	.48	.22
96	.1	-.9	58.8	-38.3	-2.8	.0	.47	.21

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PILE FORCES IN GLOBAL GEOMETRY

LOAD CASE - 1

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
	.6	-9.6	25.5	.0	.0	.0
2	.6	.4	48.9	.0	.0	.0
3	.6	-9.8	25.9	.0	.0	.0
4	.6	-9.9	26.2	.0	.0	.0
5	.6	-10.0	26.5	.0	.0	.0
6	.6	-10.2	26.8	.0	.0	.0
7	.6	.4	48.0	.0	.0	.0
8	.6	-10.4	27.2	.0	.0	.0
9	.6	-10.5	27.5	.0	.0	.0
10	.6	-10.6	27.8	.0	.0	.0
11	.6	-10.7	28.1	.0	.0	.0
12	.6	.3	47.1	.0	.0	.0
13	.6	-10.9	28.5	.0	.0	.0
14	.6	-11.1	28.8	.0	.0	.0
15	.6	-11.2	29.1	.0	.0	.0
16	.6	-11.3	29.4	.0	.0	.0
17	.6	.2	46.3	.0	.0	.0
18	.6	-11.5	29.8	.0	.0	.0
19	.6	-11.7	30.1	.0	.0	.0
20	.6	-11.8	30.4	.0	.0	.0
21	.6	-11.9	30.7	.0	.0	.0
22	.6	.2	45.4	.0	.0	.0
23	.6	-12.4	31.9	.0	.0	.0
24	.6	.1	44.9	.0	.0	.0
25	.6	-12.5	32.1	.0	.0	.0
26	.6	.1	44.5	.0	.0	.0
	.6	-12.7	32.5	.0	.0	.0
	.6	.1	44.1	.0	.0	.0
	.6	-13.3	33.8	.0	.0	.0
30	.6	.0	43.7	.0	.0	.0
31	.6	-13.5	34.3	.0	.0	.0
32	.6	-10.5	26.9	.0	.0	.0

33	.6	-11.3	28.8	.0	.0	.0
34	.6	-11.6	29.3	.0	.0	.0
35	.6	-6.8	18.5	.0	.0	.0
36	.6	.4	40.1	.0	.0	.0
	.6	-7.0	18.8	.0	.0	.0
	.6	-7.1	19.1	.0	.0	.0
39	.6	-7.2	19.4	.0	.0	.0
40	.6	-7.4	19.7	.0	.0	.0
41	.6	.4	39.2	.0	.0	.0
42	.6	-7.6	20.1	.0	.0	.0
43	.6	-7.7	20.4	.0	.0	.0
44	.6	-7.8	20.7	.0	.0	.0
45	.6	-8.0	21.0	.0	.0	.0
46	.6	.3	38.3	.0	.0	.0
47	.6	-8.2	21.5	.0	.0	.0
48	.6	-8.3	21.7	.0	.0	.0
49	.6	-8.4	22.0	.0	.0	.0
50	.6	-8.5	22.3	.0	.0	.0
51	.6	.2	37.4	.0	.0	.0
52	.6	-8.7	22.8	.0	.0	.0
53	.6	-8.9	23.1	.0	.0	.0
54	.6	-9.0	23.3	.0	.0	.0
55	.6	-9.1	23.6	.0	.0	.0
56	.6	.2	36.5	.0	.0	.0
57	.6	.1	36.1	.0	.0	.0
58	.6	-9.7	25.0	.0	.0	.0
59	.6	.1	35.7	.0	.0	.0
60	.6	-9.9	25.4	.0	.0	.0
61	.6	.1	35.3	.0	.0	.0
62	.6	.0	34.9	.0	.0	.0
63	.6	-7.6	19.7	.0	.0	.0
64	.6	-8.4	21.5	.0	.0	.0
	.6	-8.7	22.1	.0	.0	.0
	.6	.4	31.4	.0	.0	.0
	.6	.4	31.2	.0	.0	.0
68	.6	15.5	38.1	.0	.0	.0
69	.6	15.3	37.5	.0	.0	.0
70	.6	15.0	36.9	.0	.0	.0
71	.6	14.8	36.3	.0	.0	.0
72	.6	.4	30.4	.0	.0	.0
73	.6	14.4	35.4	.0	.0	.0
74	.6	14.1	34.8	.0	.0	.0
75	.6	13.9	34.2	.0	.0	.0
76	.6	13.6	33.6	.0	.0	.0
77	.6	.3	29.5	.0	.0	.0
78	.6	13.2	32.7	.0	.0	.0
79	.6	13.0	32.1	.0	.0	.0
80	.6	12.7	31.5	.0	.0	.0
81	.6	12.5	30.9	.0	.0	.0
82	.6	.2	28.6	.0	.0	.0
83	.6	12.1	30.0	.0	.0	.0
84	.6	11.8	29.4	.0	.0	.0
85	.6	11.6	28.8	.0	.0	.0
86	.6	11.3	28.2	.0	.0	.0
87	.6	11.1	27.6	.0	.0	.0
88	.6	10.8	26.9	.0	.0	.0
89	.6	10.5	26.2	.0	.0	.0
90	.6	10.2	25.6	.0	.0	.0
91	.6	10.0	24.9	.0	.0	.0
92	.6	9.7	24.3	.0	.0	.0
	.6	9.4	23.7	.0	.0	.0
	.6	9.2	23.0	.0	.0	.0
	.6	8.9	22.5	.0	.0	.0
96	.6	8.7	21.9	.0	.0	.0

LOAD CASE - 2

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
	-.9	-36.5	87.4	.0	.0	.0
2	-.9	-1.7	39.8	.0	.0	.0
3	-.9	-36.8	88.1	.0	.0	.0
4	-.9	-37.0	88.7	.0	.0	.0
5	-.9	-37.3	89.3	.0	.0	.0
6	-.9	-37.5	89.9	.0	.0	.0
7	-.9	-1.7	42.3	.0	.0	.0
8	-.9	-37.8	90.8	.0	.0	.0
9	-.9	-38.1	91.3	.0	.0	.0
10	-.9	-38.3	91.9	.0	.0	.0
11	-.9	-38.5	92.5	.0	.0	.0
12	-.9	-1.7	44.9	.0	.0	.0
13	-.9	-38.9	93.4	.0	.0	.0
14	-.9	-39.1	94.0	.0	.0	.0
15	-.9	-39.4	94.6	.0	.0	.0
16	-.9	-39.6	95.1	.0	.0	.0
17	-.9	-1.7	47.4	.0	.0	.0
18	-.9	-40.0	96.0	.0	.0	.0
19	-.9	-40.2	96.6	.0	.0	.0
20	-.9	-40.4	97.2	.0	.0	.0
21	-.9	-40.7	97.8	.0	.0	.0
22	-.9	-1.8	50.1	.0	.0	.0
23	-.9	-41.5	99.8	.0	.0	.0
24	-.9	-1.8	51.4	.0	.0	.0
25	-.9	-41.8	100.5	.0	.0	.0
26	-.9	-1.8	52.6	.0	.0	.0
27	-.9	-42.1	101.3	.0	.0	.0
	-.9	-1.8	53.8	.0	.0	.0
	-.9	-43.0	103.6	.0	.0	.0
[illegible]	-.9	-1.8	55.0	.0	.0	.0
31	-.9	-43.4	104.7	.0	.0	.0
32	-.9	-38.7	92.7	.0	.0	.0
33	-.9	-40.2	96.4	.0	.0	.0
34	-.9	-40.6	97.5	.0	.0	.0
35	-.9	-32.5	77.2	.0	.0	.0
36	-.9	-1.7	27.1	.0	.0	.0
37	-.9	-32.8	78.0	.0	.0	.0
38	-.9	-33.0	78.5	.0	.0	.0
39	-.9	-33.2	79.1	.0	.0	.0
40	-.9	-33.5	79.7	.0	.0	.0
41	-.9	-1.7	29.6	.0	.0	.0
42	-.9	-33.8	80.6	.0	.0	.0
43	-.9	-34.1	81.2	.0	.0	.0
44	-.9	-34.3	81.8	.0	.0	.0
45	-.9	-34.5	82.3	.0	.0	.0
46	-.9	-1.7	32.2	.0	.0	.0
47	-.9	-34.9	83.2	.0	.0	.0
48	-.9	-35.1	83.8	.0	.0	.0
49	-.9	-35.4	84.4	.0	.0	.0
50	-.9	-35.6	85.0	.0	.0	.0
51	-.9	-1.7	34.8	.0	.0	.0
52	-.9	-35.9	85.8	.0	.0	.0
53	-.9	-36.2	86.4	.0	.0	.0
54	-.9	-36.4	87.0	.0	.0	.0
55	-.9	-36.6	87.6	.0	.0	.0
	-.9	-1.8	37.4	.0	.0	.0
	-.9	-1.8	38.7	.0	.0	.0
	-.9	-37.7	90.3	.0	.0	.0
59	-.9	-1.8	39.9	.0	.0	.0
60	-.9	-38.1	91.1	.0	.0	.0
61	-.9	-1.8	41.1	.0	.0	.0

62	-.9	-1.8	42.3	.0	.0	.0
63	-.9	-34.5	82.2	.0	.0	.0
64	-.9	-36.0	86.0	.0	.0	.0
65	-.9	-36.5	87.1	.0	.0	.0
	-.9	-1.7	14.1	.0	.0	.0
	-.9	-1.7	14.4	.0	.0	.0
68	-.9	-19.4	-44.1	.0	.0	.0
69	-.9	-19.2	-43.7	.0	.0	.0
70	-.9	-19.1	-43.4	.0	.0	.0
71	-.9	-19.0	-43.1	.0	.0	.0
72	-.9	-1.7	16.9	.0	.0	.0
73	-.9	-18.8	-42.6	.0	.0	.0
74	-.9	-18.7	-42.3	.0	.0	.0
75	-.9	-18.6	-41.9	.0	.0	.0
76	-.9	-18.4	-41.6	.0	.0	.0
77	-.9	-1.7	19.5	.0	.0	.0
78	-.9	-18.2	-41.1	.0	.0	.0
79	-.9	-18.1	-40.8	.0	.0	.0
80	-.9	-18.0	-40.4	.0	.0	.0
81	-.9	-17.9	-40.1	.0	.0	.0
82	-.9	-1.7	22.1	.0	.0	.0
83	-.9	-17.7	-39.6	.0	.0	.0
84	-.9	-17.5	-39.3	.0	.0	.0
85	-.9	-17.4	-38.9	.0	.0	.0
86	-.9	-17.3	-38.6	.0	.0	.0
87	-.9	-17.2	-38.3	.0	.0	.0
88	-.9	-17.0	-37.9	.0	.0	.0
89	-.9	-16.9	-37.5	.0	.0	.0
90	-.9	-16.7	-37.2	.0	.0	.0
91	-.9	-16.6	-36.8	.0	.0	.0
92	-.9	-16.5	-36.5	.0	.0	.0
93	-.9	-16.3	-36.2	.0	.0	.0
	-.9	-16.2	-35.8	.0	.0	.0
	-.9	-16.1	-35.5	.0	.0	.0
	-.9	-16.0	-35.2	.0	.0	.0

LOAD CASE - 3

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-.9	-39.7	96.1	.0	.0	.0
2	-.9	-1.4	61.1	.0	.0	.0
3	-.9	-40.0	96.9	.0	.0	.0
4	-.9	-40.2	97.5	.0	.0	.0
5	-.9	-40.5	98.2	.0	.0	.0
6	-.9	-40.7	98.8	.0	.0	.0
7	-.9	-1.5	63.2	.0	.0	.0
8	-.9	-41.1	99.7	.0	.0	.0
9	-.9	-41.4	100.3	.0	.0	.0
10	-.9	-41.6	101.0	.0	.0	.0
11	-.9	-41.9	101.6	.0	.0	.0
12	-.9	-1.5	65.3	.0	.0	.0
13	-.9	-42.3	102.5	.0	.0	.0
14	-.9	-42.5	103.1	.0	.0	.0
15	-.9	-42.8	103.8	.0	.0	.0
16	-.9	-43.0	104.4	.0	.0	.0
17	-.9	-1.5	67.4	.0	.0	.0
18	-.9	-43.4	105.3	.0	.0	.0
	-.9	-43.7	105.9	.0	.0	.0
	-.9	-43.9	106.5	.0	.0	.0
	-.9	-44.2	107.2	.0	.0	.0
22	-.9	-1.6	69.6	.0	.0	.0
23	-.9	-45.3	109.9	.0	.0	.0
24	-.9	-1.6	70.7	.0	.0	.0

25	-.9	-45.3	110.0	.0	.0	.0
26	-.9	-1.6	71.7	.0	.0	.0
27	-.9	-45.7	110.9	.0	.0	.0
28	-.9	-1.6	72.7	.0	.0	.0
	-.9	-46.9	113.9	.0	.0	.0
	-.9	-1.6	73.6	.0	.0	.0
31	-.9	-47.4	115.1	.0	.0	.0
32	-.9	-40.3	97.3	.0	.0	.0
33	-.9	-41.9	101.3	.0	.0	.0
34	-.9	-42.4	102.4	.0	.0	.0
35	-.9	-32.5	78.1	.0	.0	.0
36	-.9	-1.4	38.6	.0	.0	.0
37	-.9	-32.9	78.9	.0	.0	.0
38	-.9	-33.1	79.5	.0	.0	.0
39	-.9	-33.4	80.1	.0	.0	.0
40	-.9	-33.6	80.8	.0	.0	.0
41	-.9	-1.5	40.7	.0	.0	.0
42	-.9	-34.0	81.7	.0	.0	.0
43	-.9	-34.2	82.3	.0	.0	.0
44	-.9	-34.5	82.9	.0	.0	.0
45	-.9	-34.8	83.6	.0	.0	.0
46	-.9	-1.5	42.8	.0	.0	.0
47	-.9	-35.1	84.5	.0	.0	.0
48	-.9	-35.4	85.1	.0	.0	.0
49	-.9	-35.6	85.7	.0	.0	.0
50	-.9	-35.9	86.4	.0	.0	.0
51	-.9	-1.5	44.9	.0	.0	.0
52	-.9	-36.3	87.3	.0	.0	.0
53	-.9	-36.5	87.9	.0	.0	.0
54	-.9	-36.8	88.5	.0	.0	.0
55	-.9	-37.0	89.1	.0	.0	.0
56	-.9	-1.6	47.1	.0	.0	.0
	-.9	-1.6	48.2	.0	.0	.0
	-.9	-38.2	92.0	.0	.0	.0
[illegible]	-.9	-1.6	49.2	.0	.0	.0
60	-.9	-38.6	92.9	.0	.0	.0
61	-.9	-1.6	50.2	.0	.0	.0
62	-.9	-1.6	51.1	.0	.0	.0
63	-.9	-32.9	78.7	.0	.0	.0
64	-.9	-34.6	82.7	.0	.0	.0
65	-.9	-35.1	83.9	.0	.0	.0
66	-.9	-1.4	15.8	.0	.0	.0
67	-.9	-1.4	16.1	.0	.0	.0
68	-.9	-15.3	-34.6	.0	.0	.0
69	-.9	-15.3	-34.4	.0	.0	.0
70	-.9	-15.2	-34.3	.0	.0	.0
71	-.9	-15.2	-34.2	.0	.0	.0
72	-.9	-1.5	18.2	.0	.0	.0
73	-.9	-15.1	-34.0	.0	.0	.0
74	-.9	-15.1	-33.8	.0	.0	.0
75	-.9	-15.0	-33.7	.0	.0	.0
76	-.9	-15.0	-33.5	.0	.0	.0
77	-.9	-1.5	20.3	.0	.0	.0
78	-.9	-14.9	-33.3	.0	.0	.0
79	-.9	-14.9	-33.2	.0	.0	.0
80	-.9	-14.8	-33.1	.0	.0	.0
81	-.9	-14.8	-32.9	.0	.0	.0
82	-.9	-1.5	22.4	.0	.0	.0
83	-.9	-14.7	-32.7	.0	.0	.0
84	-.9	-14.7	-32.6	.0	.0	.0
	-.9	-14.6	-32.5	.0	.0	.0
	-.9	-14.6	-32.3	.0	.0	.0
	-.9	-14.5	-32.2	.0	.0	.0
88	-.9	-14.5	-32.0	.0	.0	.0
89	-.9	-14.4	-31.9	.0	.0	.0
90	-.9	-14.4	-31.8	.0	.0	.0

91	-.9	-14.3	-31.6	.0	.0	.0
92	-.9	-14.3	-31.5	.0	.0	.0
93	-.9	-14.3	-31.3	.0	.0	.0
94	-.9	-14.2	-31.2	.0	.0	.0
	-.9	-14.2	-31.1	.0	.0	.0
	-.9	-14.1	-30.9	.0	.0	.0

LOAD CASE - 4

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.2	-17.7	44.9	.0	.0	.0
2	.2	.0	58.2	.0	.0	.0
3	.2	-17.9	45.3	.0	.0	.0
4	.2	-18.0	45.6	.0	.0	.0
5	.2	-18.1	45.9	.0	.0	.0
6	.2	-18.3	46.2	.0	.0	.0
7	.2	.0	57.9	.0	.0	.0
8	.2	-18.5	46.7	.0	.0	.0
9	.2	-18.6	47.0	.0	.0	.0
10	.2	-18.7	47.3	.0	.0	.0
11	.2	-18.9	47.6	.0	.0	.0
12	.2	.0	57.7	.0	.0	.0
13	.2	-19.1	48.0	.0	.0	.0
14	.2	-19.2	48.3	.0	.0	.0
15	.2	-19.3	48.7	.0	.0	.0
16	.2	-19.4	49.0	.0	.0	.0
17	.2	-.1	57.4	.0	.0	.0
18	.2	-19.6	49.4	.0	.0	.0
19	.2	-19.8	49.7	.0	.0	.0
	.2	-19.9	50.0	.0	.0	.0
	.2	-20.0	50.3	.0	.0	.0
	.2	-.1	57.1	.0	.0	.0
23	.2	-20.4	51.1	.0	.0	.0
24	.2	-.2	57.0	.0	.0	.0
25	.2	-20.6	51.7	.0	.0	.0
26	.2	-.2	56.9	.0	.0	.0
27	.2	-20.8	52.1	.0	.0	.0
28	.2	-.2	56.7	.0	.0	.0
29	.2	-21.2	53.1	.0	.0	.0
30	.2	-.2	56.6	.0	.0	.0
31	.2	-21.5	53.7	.0	.0	.0
32	.2	-19.7	49.3	.0	.0	.0
33	.2	-20.5	51.3	.0	.0	.0
34	.2	-20.8	51.9	.0	.0	.0
35	.2	-16.7	42.4	.0	.0	.0
36	.2	.0	55.0	.0	.0	.0
37	.2	-16.9	42.8	.0	.0	.0
38	.2	-17.0	43.1	.0	.0	.0
39	.2	-17.1	43.4	.0	.0	.0
40	.2	-17.3	43.7	.0	.0	.0
41	.2	.0	54.7	.0	.0	.0
42	.2	-17.5	44.1	.0	.0	.0
43	.2	-17.6	44.4	.0	.0	.0
44	.2	-17.7	44.7	.0	.0	.0
45	.2	-17.8	45.0	.0	.0	.0
46	.2	.0	54.5	.0	.0	.0
47	.2	-18.0	45.5	.0	.0	.0
	.2	-18.2	45.8	.0	.0	.0
	.2	-18.3	46.1	.0	.0	.0
	.2	-18.4	46.4	.0	.0	.0
51	.2	-.1	54.2	.0	.0	.0
52	.2	-18.6	46.8	.0	.0	.0
53	.2	-18.8	47.1	.0	.0	.0

54	.2	-18.9	47.4	.0	.0	.0
55	.2	-19.0	47.8	.0	.0	.0
56	.2	-.1	53.9	.0	.0	.0
57	.2	-.2	53.8	.0	.0	.0
	.2	-19.6	49.1	.0	.0	.0
	.2	-.2	53.7	.0	.0	.0
60	.2	-19.8	49.6	.0	.0	.0
61	.2	-.2	53.5	.0	.0	.0
62	.2	-.2	53.4	.0	.0	.0
63	.2	-18.6	46.7	.0	.0	.0
64	.2	-19.5	48.7	.0	.0	.0
65	.2	-19.7	49.2	.0	.0	.0
66	.2	.1	51.8	.0	.0	.0
67	.2	.0	51.8	.0	.0	.0
68	.2	16.9	42.8	.0	.0	.0
69	.2	16.8	42.4	.0	.0	.0
70	.2	16.6	42.0	.0	.0	.0
71	.2	16.4	41.6	.0	.0	.0
72	.2	.0	51.5	.0	.0	.0
73	.2	16.2	41.0	.0	.0	.0
74	.2	16.0	40.6	.0	.0	.0
75	.2	15.9	40.2	.0	.0	.0
76	.2	15.7	39.8	.0	.0	.0
77	.2	.0	51.3	.0	.0	.0
78	.2	15.4	39.2	.0	.0	.0
79	.2	15.3	38.8	.0	.0	.0
80	.2	15.1	38.4	.0	.0	.0
81	.2	14.9	38.0	.0	.0	.0
82	.2	-.1	51.0	.0	.0	.0
83	.2	14.7	37.4	.0	.0	.0
84	.2	14.5	37.0	.0	.0	.0
85	.2	14.3	36.6	.0	.0	.0
	.2	14.2	36.2	.0	.0	.0
	.2	14.0	35.9	.0	.0	.0
	.2	13.8	35.4	.0	.0	.0
89	.2	13.6	35.0	.0	.0	.0
90	.2	13.4	34.5	.0	.0	.0
91	.2	13.3	34.1	.0	.0	.0
92	.2	13.1	33.7	.0	.0	.0
93	.2	12.9	33.3	.0	.0	.0
94	.2	12.7	32.9	.0	.0	.0
95	.2	12.6	32.5	.0	.0	.0
96	.2	12.4	32.1	.0	.0	.0

LOAD CASE - 5

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.2	-13.6	33.0	.0	.0	.0
2	.2	-.5	20.3	.0	.0	.0
3	.2	-13.8	33.4	.0	.0	.0
4	.2	-13.9	33.6	.0	.0	.0
5	.2	-14.0	33.9	.0	.0	.0
6	.2	-14.1	34.2	.0	.0	.0
7	.2	-.5	21.2	.0	.0	.0
8	.2	-14.3	34.6	.0	.0	.0
9	.2	-14.4	34.8	.0	.0	.0
10	.2	-14.5	35.1	.0	.0	.0
	.2	-14.6	35.4	.0	.0	.0
	.2	-.5	22.0	.0	.0	.0
	.2	-14.8	35.8	.0	.0	.0
14	.2	-14.9	36.0	.0	.0	.0
15	.2	-15.0	36.3	.0	.0	.0
16	.2	-15.1	36.5	.0	.0	.0

17	.2	-.6	22.9	.0	.0	.0
18	.2	-15.2	36.9	.0	.0	.0
19	.2	-15.4	37.2	.0	.0	.0
20	.2	-15.5	37.5	.0	.0	.0
	.2	-15.6	37.7	.0	.0	.0
	.2	-.6	23.8	.0	.0	.0
	.2	-15.7	37.9	.0	.0	.0
24	.2	-.6	24.2	.0	.0	.0
25	.2	-16.1	39.0	.0	.0	.0
26	.2	-.6	24.6	.0	.0	.0
27	.2	-16.2	39.3	.0	.0	.0
28	.2	-.6	25.0	.0	.0	.0
29	.2	-16.4	39.6	.0	.0	.0
30	.2	-.6	25.4	.0	.0	.0
31	.2	-16.6	40.1	.0	.0	.0
32	.2	-16.9	41.1	.0	.0	.0
33	.2	-17.6	42.8	.0	.0	.0
34	.2	-17.8	43.3	.0	.0	.0
35	.2	-15.4	37.5	.0	.0	.0
36	.2	-.5	25.9	.0	.0	.0
37	.2	-15.6	37.9	.0	.0	.0
38	.2	-15.7	38.1	.0	.0	.0
39	.2	-15.8	38.4	.0	.0	.0
40	.2	-15.9	38.6	.0	.0	.0
41	.2	-.5	26.8	.0	.0	.0
42	.2	-16.0	39.0	.0	.0	.0
43	.2	-16.2	39.3	.0	.0	.0
44	.2	-16.3	39.6	.0	.0	.0
45	.2	-16.4	39.8	.0	.0	.0
46	.2	-.5	27.6	.0	.0	.0
47	.2	-16.5	40.2	.0	.0	.0
48	.2	-16.6	40.5	.0	.0	.0
	.2	-16.7	40.8	.0	.0	.0
	.2	-16.9	41.0	.0	.0	.0
	.2	-.6	28.5	.0	.0	.0
52	.2	-17.0	41.4	.0	.0	.0
53	.2	-17.1	41.7	.0	.0	.0
54	.2	-17.2	42.0	.0	.0	.0
55	.2	-17.3	42.2	.0	.0	.0
56	.2	-.6	29.3	.0	.0	.0
57	.2	-.6	29.8	.0	.0	.0
58	.2	-17.8	43.4	.0	.0	.0
59	.2	-.6	30.2	.0	.0	.0
60	.2	-18.0	43.8	.0	.0	.0
61	.2	-.6	30.6	.0	.0	.0
62	.2	-.6	31.0	.0	.0	.0
63	.2	-18.7	45.7	.0	.0	.0
64	.2	-19.4	47.4	.0	.0	.0
65	.2	-19.6	47.9	.0	.0	.0
66	.2	-.5	31.4	.0	.0	.0
67	.2	-.5	31.5	.0	.0	.0
68	.2	2.7	8.4	.0	.0	.0
69	.2	2.7	8.4	.0	.0	.0
70	.2	2.8	8.5	.0	.0	.0
71	.2	2.8	8.5	.0	.0	.0
72	.2	-.5	32.4	.0	.0	.0
73	.2	2.8	8.6	.0	.0	.0
74	.2	2.8	8.6	.0	.0	.0
75	.2	2.8	8.7	.0	.0	.0
76	.2	2.8	8.7	.0	.0	.0
	.2	-.5	33.2	.0	.0	.0
	.2	2.8	8.8	.0	.0	.0
	.2	2.8	8.8	.0	.0	.0
80	.2	2.9	8.8	.0	.0	.0
81	.2	2.9	8.9	.0	.0	.0
82	.2	-.6	34.1	.0	.0	.0

83	.2	2.9	8.9	.0	.0	.0
84	.2	2.9	9.0	.0	.0	.0
85	.2	2.9	9.0	.0	.0	.0
86	.2	2.9	9.0	.0	.0	.0
	.2	2.9	9.1	.0	.0	.0
	.2	2.9	9.1	.0	.0	.0
89	.2	3.0	9.2	.0	.0	.0
90	.2	3.0	9.2	.0	.0	.0
91	.2	3.0	9.3	.0	.0	.0
92	.2	3.0	9.3	.0	.0	.0
93	.2	3.0	9.3	.0	.0	.0
94	.2	3.0	9.4	.0	.0	.0
95	.2	3.0	9.4	.0	.0	.0
96	.2	3.0	9.5	.0	.0	.0

LOAD CASE - 6

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-.9	-31.4	74.9	.0	.0	.0
2	-.9	-1.6	28.4	.0	.0	.0
3	-.9	-31.7	75.5	.0	.0	.0
4	-.9	-31.9	76.0	.0	.0	.0
5	-.9	-32.0	76.4	.0	.0	.0
6	-.9	-32.2	76.9	.0	.0	.0
7	-.9	-1.6	30.8	.0	.0	.0
8	-.9	-32.5	77.6	.0	.0	.0
9	-.9	-32.7	78.1	.0	.0	.0
10	-.9	-32.9	78.5	.0	.0	.0
11	-.9	-33.1	79.0	.0	.0	.0
	-.9	-1.6	33.2	.0	.0	.0
	-.9	-33.3	79.7	.0	.0	.0
[illegible]	-.9	-33.5	80.1	.0	.0	.0
15	-.9	-33.7	80.6	.0	.0	.0
16	-.9	-33.9	81.1	.0	.0	.0
17	-.9	-1.6	35.7	.0	.0	.0
18	-.9	-34.2	81.8	.0	.0	.0
19	-.9	-34.3	82.2	.0	.0	.0
20	-.9	-34.5	82.7	.0	.0	.0
21	-.9	-34.7	83.2	.0	.0	.0
22	-.9	-1.6	38.2	.0	.0	.0
23	-.9	-35.4	85.0	.0	.0	.0
24	-.9	-1.6	39.4	.0	.0	.0
25	-.9	-35.6	85.3	.0	.0	.0
26	-.9	-1.6	40.6	.0	.0	.0
27	-.9	-35.8	85.9	.0	.0	.0
28	-.9	-1.6	41.7	.0	.0	.0
29	-.9	-36.6	87.9	.0	.0	.0
30	-.9	-1.6	42.8	.0	.0	.0
31	-.9	-37.0	88.8	.0	.0	.0
32	-.9	-32.6	77.7	.0	.0	.0
33	-.9	-33.8	80.7	.0	.0	.0
34	-.9	-34.1	81.6	.0	.0	.0
35	-.9	-27.4	64.6	.0	.0	.0
36	-.9	-1.6	15.6	.0	.0	.0
37	-.9	-27.6	65.2	.0	.0	.0
38	-.9	-27.8	65.7	.0	.0	.0
39	-.9	-28.0	66.2	.0	.0	.0
	-.9	-28.2	66.6	.0	.0	.0
	-.9	-1.6	18.0	.0	.0	.0
	-.9	-28.4	67.3	.0	.0	.0
43	-.9	-28.6	67.8	.0	.0	.0
44	-.9	-28.8	68.2	.0	.0	.0
45	-.9	-29.0	68.7	.0	.0	.0

46	-.9	-1.6	20.4	.0	.0	.0
47	-.9	-29.3	69.4	.0	.0	.0
48	-.9	-29.5	69.9	.0	.0	.0
49	-.9	-29.6	70.3	.0	.0	.0
	-.9	-29.8	70.8	.0	.0	.0
	-.9	-1.6	22.8	.0	.0	.0
52	-.9	-30.1	71.5	.0	.0	.0
53	-.9	-30.3	71.9	.0	.0	.0
54	-.9	-30.5	72.4	.0	.0	.0
55	-.9	-30.7	72.9	.0	.0	.0
56	-.9	-1.6	25.4	.0	.0	.0
57	-.9	-1.6	26.6	.0	.0	.0
58	-.9	-31.5	75.0	.0	.0	.0
59	-.9	-1.6	27.7	.0	.0	.0
60	-.9	-31.8	75.7	.0	.0	.0
61	-.9	-1.6	28.9	.0	.0	.0
62	-.9	-1.6	30.0	.0	.0	.0
63	-.9	-28.4	67.2	.0	.0	.0
64	-.9	-29.6	70.1	.0	.0	.0
65	-.9	-29.9	71.0	.0	.0	.0
66	-.9	-1.6	2.4	.0	.0	.0
67	-.9	-1.6	2.7	.0	.0	.0
68	-.9	-21.6	-50.0	.0	.0	.0
69	-.9	-21.4	-49.6	.0	.0	.0
70	-.9	-21.3	-49.1	.0	.0	.0
71	-.9	-21.1	-48.7	.0	.0	.0
72	-.9	-1.6	5.1	.0	.0	.0
73	-.9	-20.9	-48.1	.0	.0	.0
74	-.9	-20.7	-47.7	.0	.0	.0
75	-.9	-20.5	-47.3	.0	.0	.0
76	-.9	-20.4	-46.9	.0	.0	.0
77	-.9	-1.6	7.6	.0	.0	.0
	-.9	-20.2	-46.3	.0	.0	.0
	-.9	-20.0	-45.9	.0	.0	.0
[illegible]	-.9	-19.8	-45.5	.0	.0	.0
81	-.9	-19.7	-45.1	.0	.0	.0
82	-.9	-1.6	10.0	.0	.0	.0
83	-.9	-19.4	-44.5	.0	.0	.0
84	-.9	-19.3	-44.1	.0	.0	.0
85	-.9	-19.1	-43.7	.0	.0	.0
86	-.9	-19.0	-43.3	.0	.0	.0
87	-.9	-18.8	-42.9	.0	.0	.0
88	-.9	-18.6	-42.5	.0	.0	.0
89	-.9	-18.5	-42.0	.0	.0	.0
90	-.9	-18.3	-41.6	.0	.0	.0
91	-.9	-18.1	-41.1	.0	.0	.0
92	-.9	-18.0	-40.7	.0	.0	.0
93	-.9	-17.8	-40.3	.0	.0	.0
94	-.9	-17.6	-39.9	.0	.0	.0
95	-.9	-17.5	-39.5	.0	.0	.0
96	-.9	-17.3	-39.1	.0	.0	.0

LOAD CASE - 7

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	-.9	-34.0	82.0	.0	.0	.0
2	-.9	-1.4	45.6	.0	.0	.0
	-.9	-34.3	82.6	.0	.0	.0
	-.9	-34.5	83.1	.0	.0	.0
	-.9	-34.7	83.6	.0	.0	.0
6	-.9	-34.9	84.1	.0	.0	.0
7	-.9	-1.4	47.7	.0	.0	.0
8	-.9	-35.2	84.9	.0	.0	.0

9	-.9	-35.4	85.3	.0	.0	.0
10	-.9	-35.6	85.8	.0	.0	.0
11	-.9	-35.8	86.3	.0	.0	.0
12	-.9	-1.4	49.8	.0	.0	.0
	-.9	-36.1	87.1	.0	.0	.0
	-.9	-36.3	87.6	.0	.0	.0
15	-.9	-36.5	88.1	.0	.0	.0
16	-.9	-36.7	88.6	.0	.0	.0
17	-.9	-1.4	51.8	.0	.0	.0
18	-.9	-37.0	89.3	.0	.0	.0
19	-.9	-37.2	89.8	.0	.0	.0
20	-.9	-37.3	90.3	.0	.0	.0
21	-.9	-37.5	90.8	.0	.0	.0
22	-.9	-1.4	54.0	.0	.0	.0
23	-.9	-38.5	93.2	.0	.0	.0
24	-.9	-1.5	55.1	.0	.0	.0
25	-.9	-38.5	93.1	.0	.0	.0
26	-.9	-1.5	56.0	.0	.0	.0
27	-.9	-38.7	93.7	.0	.0	.0
28	-.9	-1.5	57.0	.0	.0	.0
29	-.9	-39.8	96.3	.0	.0	.0
30	-.9	-1.5	57.9	.0	.0	.0
31	-.9	-40.2	97.3	.0	.0	.0
32	-.9	-33.9	81.5	.0	.0	.0
33	-.9	-35.2	84.6	.0	.0	.0
34	-.9	-35.5	85.6	.0	.0	.0
35	-.9	-27.4	65.4	.0	.0	.0
36	-.9	-1.4	24.9	.0	.0	.0
37	-.9	-27.7	66.0	.0	.0	.0
38	-.9	-27.9	66.5	.0	.0	.0
39	-.9	-28.1	67.0	.0	.0	.0
40	-.9	-28.3	67.5	.0	.0	.0
	-.9	-1.4	26.9	.0	.0	.0
	-.9	-28.6	68.2	.0	.0	.0
[illegible]	-.9	-28.8	68.7	.0	.0	.0
44	-.9	-29.0	69.2	.0	.0	.0
45	-.9	-29.2	69.7	.0	.0	.0
46	-.9	-1.4	29.0	.0	.0	.0
47	-.9	-29.5	70.4	.0	.0	.0
48	-.9	-29.7	70.9	.0	.0	.0
49	-.9	-29.9	71.4	.0	.0	.0
50	-.9	-30.1	71.9	.0	.0	.0
51	-.9	-1.4	31.1	.0	.0	.0
52	-.9	-30.4	72.7	.0	.0	.0
53	-.9	-30.6	73.1	.0	.0	.0
54	-.9	-30.8	73.6	.0	.0	.0
55	-.9	-31.0	74.1	.0	.0	.0
56	-.9	-1.4	33.2	.0	.0	.0
57	-.9	-1.5	34.3	.0	.0	.0
58	-.9	-31.9	76.4	.0	.0	.0
59	-.9	-1.5	35.3	.0	.0	.0
60	-.9	-32.2	77.1	.0	.0	.0
61	-.9	-1.5	36.2	.0	.0	.0
62	-.9	-1.5	37.2	.0	.0	.0
63	-.9	-27.1	64.4	.0	.0	.0
64	-.9	-28.4	67.5	.0	.0	.0
65	-.9	-28.8	68.5	.0	.0	.0
66	-.9	-1.4	3.8	.0	.0	.0
67	-.9	-1.4	4.1	.0	.0	.0
68	-.9	-18.3	-42.3	.0	.0	.0
	-.9	-18.2	-42.0	.0	.0	.0
	-.9	-18.1	-41.8	.0	.0	.0
	-.9	-18.0	-41.5	.0	.0	.0
72	-.9	-1.4	6.1	.0	.0	.0
73	-.9	-17.9	-41.2	.0	.0	.0
74	-.9	-17.8	-40.9	.0	.0	.0

75	-.9	-17.7	-40.7	.0	.0	.0
76	-.9	-17.6	-40.4	.0	.0	.0
77	-.9	-1.4	8.2	.0	.0	.0
78	-.9	-17.5	-40.1	.0	.0	.0
	-.9	-17.4	-39.8	.0	.0	.0
	-.9	-17.3	-39.6	.0	.0	.0
81	-.9	-17.2	-39.3	.0	.0	.0
82	-.9	-1.4	10.3	.0	.0	.0
83	-.9	-17.0	-38.9	.0	.0	.0
84	-.9	-17.0	-38.7	.0	.0	.0
85	-.9	-16.9	-38.4	.0	.0	.0
86	-.9	-16.8	-38.2	.0	.0	.0
87	-.9	-16.7	-38.0	.0	.0	.0
88	-.9	-16.6	-37.7	.0	.0	.0
89	-.9	-16.5	-37.4	.0	.0	.0
90	-.9	-16.4	-37.1	.0	.0	.0
91	-.9	-16.3	-36.9	.0	.0	.0
92	-.9	-16.2	-36.6	.0	.0	.0
93	-.9	-16.1	-36.4	.0	.0	.0
94	-.9	-16.0	-36.1	.0	.0	.0
95	-.9	-15.9	-35.9	.0	.0	.0
96	-.9	-15.8	-35.6	.0	.0	.0

LOAD CASE - 8

PILE	PX K	PY K	PZ K	MX IN-K	MY IN-K	MZ IN-K
1	.9	3.4	-6.8	.0	.0	.0
2	.9	.6	15.1	.0	.0	.0
3	.9	3.3	-6.6	.0	.0	.0
	.9	3.2	-6.5	.0	.0	.0
	.9	3.1	-6.3	.0	.0	.0
[illegible]	.9	3.0	-6.1	.0	.0	.0
7	.9	.5	14.0	.0	.0	.0
8	.9	2.9	-5.9	.0	.0	.0
9	.9	2.8	-5.7	.0	.0	.0
10	.9	2.8	-5.5	.0	.0	.0
11	.9	2.7	-5.4	.0	.0	.0
12	.9	.5	13.0	.0	.0	.0
13	.9	2.6	-5.1	.0	.0	.0
14	.9	2.5	-5.0	.0	.0	.0
15	.9	2.4	-4.8	.0	.0	.0
16	.9	2.3	-4.6	.0	.0	.0
17	.9	.4	11.9	.0	.0	.0
18	.9	2.2	-4.4	.0	.0	.0
19	.9	2.1	-4.2	.0	.0	.0
20	.9	2.1	-4.0	.0	.0	.0
21	.9	2.0	-3.9	.0	.0	.0
22	.9	.4	10.8	.0	.0	.0
23	.9	2.4	-5.1	.0	.0	.0
24	.9	.3	10.3	.0	.0	.0
25	.9	1.6	-3.1	.0	.0	.0
26	.9	.3	9.8	.0	.0	.0
27	.9	1.5	-2.9	.0	.0	.0
28	.9	.3	9.3	.0	.0	.0
29	.9	1.9	-4.0	.0	.0	.0
30	.9	.3	8.8	.0	.0	.0
31	.9	1.8	-3.7	.0	.0	.0
	.9	-2.9	8.5	.0	.0	.0
	.9	-3.4	9.5	.0	.0	.0
[illegible]	.9	-3.6	9.9	.0	.0	.0
35	.9	-4.3	12.5	.0	.0	.0
36	.9	.6	39.2	.0	.0	.0
37	.9	-4.4	12.7	.0	.0	.0

38	.9	-4.4	12.8	.0	.0	.0
39	.9	-4.5	13.0	.0	.0	.0
40	.9	-4.6	13.2	.0	.0	.0
	.9	.5	38.1	.0	.0	.0
	.9	-4.7	13.4	.0	.0	.0
	.9	-4.8	13.6	.0	.0	.0
44	.9	-4.9	13.8	.0	.0	.0
45	.9	-4.9	13.9	.0	.0	.0
46	.9	.5	37.1	.0	.0	.0
47	.9	-5.1	14.2	.0	.0	.0
48	.9	-5.1	14.3	.0	.0	.0
49	.9	-5.2	14.5	.0	.0	.0
50	.9	-5.3	14.7	.0	.0	.0
51	.9	.4	36.0	.0	.0	.0
52	.9	-5.4	14.9	.0	.0	.0
53	.9	-5.5	15.1	.0	.0	.0
54	.9	-5.6	15.3	.0	.0	.0
55	.9	-5.7	15.4	.0	.0	.0
56	.9	.4	34.9	.0	.0	.0
57	.9	.3	34.4	.0	.0	.0
58	.9	-6.0	16.2	.0	.0	.0
59	.9	.3	33.9	.0	.0	.0
60	.9	-6.1	16.4	.0	.0	.0
61	.9	.3	33.4	.0	.0	.0
62	.9	.3	32.9	.0	.0	.0
63	.9	-10.8	28.3	.0	.0	.0
64	.9	-11.3	29.4	.0	.0	.0
65	.9	-11.4	29.7	.0	.0	.0
66	.9	.6	63.4	.0	.0	.0
67	.9	.6	63.3	.0	.0	.0
68	.9	28.0	69.2	.0	.0	.0
	.9	27.8	68.7	.0	.0	.0
	.9	27.6	68.1	.0	.0	.0
	.9	27.3	67.6	.0	.0	.0
72	.9	.5	62.2	.0	.0	.0
73	.9	27.0	66.8	.0	.0	.0
74	.9	26.8	66.2	.0	.0	.0
75	.9	26.5	65.7	.0	.0	.0
76	.9	26.3	65.1	.0	.0	.0
77	.9	.5	61.2	.0	.0	.0
78	.9	26.0	64.3	.0	.0	.0
79	.9	25.7	63.8	.0	.0	.0
80	.9	25.5	63.2	.0	.0	.0
81	.9	25.3	62.7	.0	.0	.0
82	.9	.4	60.1	.0	.0	.0
83	.9	24.9	61.9	.0	.0	.0
84	.9	24.7	61.3	.0	.0	.0
85	.9	24.5	60.8	.0	.0	.0
86	.9	24.2	60.2	.0	.0	.0
87	.9	24.0	59.7	.0	.0	.0
88	.9	23.8	59.1	.0	.0	.0
89	.9	23.5	58.5	.0	.0	.0
90	.9	23.3	57.9	.0	.0	.0
91	.9	23.0	57.3	.0	.0	.0
92	.9	22.8	56.7	.0	.0	.0
93	.9	22.6	56.2	.0	.0	.0
94	.9	22.3	55.6	.0	.0	.0
95	.9	22.1	55.1	.0	.0	.0
96	.9	21.9	54.5	.0	.0	.0

APPENDIX F

MECHANICAL

DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

Structure Loads and Manufacturer's Data

RODNEY HUNT SLUICE GATES

MANUFACTURER'S DATA

GEARING AND LIFTS BY LIMITORQUE

GATE SIZE	144"x132"	114"X144"	108"X114"	108"X90"	102"X90"
DISC WEIGHT	23000#	13000#	12800#	10500#	9850#
STEM SIZE	4.5"	4"	4"	3.5"	3"
MAX OPER LOAD	92300#	59100#	57000#	45900#	43200#
LIMITORQURE MODEL NO.	L-120/420 150	L-120/420 100	L-120/420 100	L-120/190 60	L-120/190 60
STEM FACTOR	0.042	0.038	0.038	0.034	0.029
THREADS PER INCH	2"	2"	2"	2"	2.5"
HORSEPOWER MAX.	15	10	10	6	6
STARTING TORQUE	3877 '#	2246 '#	2166 '#	1561 '#	1253 '#
RUNNING TORQUE	1551 '#	899 '#	867 '#	625 '#	502 '#
LOCKED ROTOR TORQU	8610 '#	4249 '#	4249 '#	2980 '#	2980 '#
LOCKED ROTOR THRUST	205,000 #	111,816 #	111,816 #	87,648 #	102759 #

GATE SIZE	144"x132"	114"x114"	108"x114"	108"x90"	102"x90"
DISC WEIGHT	23,000#	13,000#	12,800#	10,500#	9,850#
STEM SIZE	4½"	4"	4"	3½"	3"
MAX OPER LOAD	92,300#	59,100#	57,000#	45,900#	43,200#
LIMITORQUE MODEL NUMBER	L-120-800/200	L-120-420/150	L-120-420/150	L-120-420/100	L-120-190/80
EST PRICING	$101,000	$67,500	$63,000	$56,500	$54,000

waterman INDUSTRIES SALES, INC.

RED TOP WATER CONTROL GATES, VALVES and EQUIPMENT

2866 HANGAR ROAD • MEMPHIS, TENNESSEE 38118
P.O. DRAWER 30635 • MEMPHIS, TENNESSEE 38130-0635
TELEPHONE (901) 365-8682 • FAX (901) 365-7192

QUOTATION No. SQ 95-X-039

Date July 12, 1995

Page 1, of 6

To: URS Consultants, Inc.
3500 N. Causeway Blvd.
Suite 900
Metairie, LA 70002

Attn: Steve Bourg

Subject to the terms and conditions on the reverse of this sheet, or as modified in writing, we are pleased to offer this quotation.

PLEASE REFER TO THE ABOVE QUOTATION NUMBER ON ALL CORRESPONDENCE.

WATERMAN INDUSTRIES SALES, INC.

By Ray Evans

Ray Evans
Manager

QUOTATION No. SQ 95-X-039

Date JULY 12, 1995

waterman INDUSTRIES SALES, INC.

RED TOP WATER CONTROL GATES, VALVES and EQUIPMENT

2866 HANGAR ROAD • MEMPHIS, TENNESSEE 38118
P.O. DRAWER 30635 • MEMPHIS, TENNESSEE 38130-0635
TELEPHONE (901) 366-8652 • FAX (901) 366-7192

Quotation for: BUDGET PRICES: SLUICE GATES
URS CONSULTANTS
METAIRIE, LOUISIANA

Bid Opens:

Date ASAP

Place

This quotation is subject to the Conditions of Sale contained herein, and can be amended only in writing by an authorized agent of Waterman Industries Sales, Inc.

PRICES for furnishing only are offered f.o.b. Exeter, California with full freight allowed to jobsite yard if access is available via scheduled common carrier, or f.a.s. U.S. Port if outside continental U.S. for one order, one shipment*, for total quotation and are firm for 60 days.

TAXES, if applicable are NOT included in this quotation.

SHIPMENT will be made via most economical way.

TERMS: XXXXXXXXXX (Net 30 days) % Cash discount for prompt payment 0 % if payment received within

When early shipments are required, or the size of shipments require more than one shipment, invoicing will be made on the items shipped and the discount period figured on each individual shipment. Retention will not be allowed unless negotiated into a material contract or purchase order to Waterman Industries Sales, Inc.

COMPLETE SHIPMENTS can be made 180 to 240 days after receipt of order and approval of any submittal drawings required, subject to unavoidable delays as noted on Conditions of Sale, paragraph No. 5.

Estimated best time for embedded items is 120 to 150 days after drawing approval.

If submittal drawings are required, please allow 21 to 35 days.

WATERMAN allows 45 days for return of submittal drawings. Delays caused by slow return of submittals or other manufacturing delays caused by the contractor, owner, owner's agent or engineer may subject the order to an additional charge of 2% per month.

*On freight prepaid quotations where embedded items are required, one early shipment of embedded items will be made prepaid. If split shipments are required by customer, additional shipments will be made at customer expense.

REVISED PAGE 3

Waterman INDUSTRIES, INC.

QUOTATION No. SQ95-X-039

Item	Description	Quantity	Price	Total
1.	MONOLITH #1 144" x 132" Waterman Heavy Duty cast iron Sluice Gate with naval bronze seats, manganese bronze thrust nut, top/side wedges, flushbottom closure and standard flangeback frame. 144" x 132" rectangular flange, rectangular opening, cast iron "F" section wall thimble x 16" deep with mastic gasket. Type 304 stainless steel stem with limit nut. Bronze bushed, fully adjustable fabricated steel stem guide. Electric motor operator*, pedestal mounted with galvanized steel stem cover. Type 304 stainless steel anchor bolts and attaching studs. Clean and shop paint ferrous metals with a polyamide epoxy paint system.	1 @	$118,865.00	$118,865.0C

NOTES: *1. 460 volt/3 phase/60 Hz self-contained unit with Nema 4 enclosure, torque and limit switches, space heater, starter, transformer, local controls (3 button/ 2 light push button station and (3) position selector switch), mechanical dial type position indicator, and manufacturer's standard paint (typical).

Motor data: HP = 5.2, FLA = 10.6, LRA = 60. Lifting loads (in pounds of thrust - typical): Operating =76,000; breakaway = 114,000. ← Revision

Gate travel time - 33 minutes per stroke.

2. Lift pedestal support is by others (typical).

Item	Description	Quantity	Price	Total
2.	MONOLITH #2, GATES #1 THRU 8 132" x 120" similar to item #1.	1 @	$103,200.00	$103,200.(

NOTE: Motor data: HP - 7.8, FLA - 11.4, LRA = 94.3. Lifting loads: Operating - 60,620 lbs., breakaway = 90,930 lbs.

Gate travel time - 15 minutes per stroke.

Waterman INDUSTRIES, INC.

QUOTATION No. SQ95-X-039

Item	Description	Quantity	Price	Total
3.	MONOLITH #2, GATES #9 THRU 12			
	108" x 96" similar to Item #1.	1 @	$75,200.00	$75,200.00
NOTE:	Motor date: HP-5.2, FLA = 10.6, LRA = 60. Lifing loads: Operating = 42,050 lbs, breakaway = 63,075 lbs.		Total	$297,265.00
	Gate travel time - 16 minutes per stroke.			

4. If a factory representative is required, a charge of $1,300.00 will be made for the first day on any one trip, plus $600.00 for each additional day including any travel days, holidays, weekends or other layovers made at the convenience of the contractor or engineer. Waterman will make every effort to provide a representative to meet your schedule, but due to conflicting requirements a request should be made no later than 14 days before a representative is required. Where previous committments have been made, some flexibility in your schedule should be anticipated.

Waterman INDUSTRIES, INC.

QUOTATION No. SQ95-X-039

Item	Description	Quantity	Price	Total

GENERAL NOTES:

1. Quotation reflects no addenda. Should additional addenda be issued, please check for possible variations.

2. Spare parts are not required.

3. Waterman cannot hold prices firm for an extended period when such a delay is caused by untimely return of submittals or other causes in direct control of the purchaser, engineer or owner. We are unable to secure firm prices on out-sourced items over a longer than normal delivery expectation. Any order which Waterman is unable to ship before 6/30/96 would be subject to escalation if caused by purchaser, engineer, owner due to untimely returned submittal drawings or other delay within their control.

4. A suitable alternate paint system will be used where Governmental restrictions prohibit application of specified system.

5. Cost of any inspection or material certifications performed by non-Waterman personnel, if required, are not included and are to be paid by purchaser or by issuance of a separate purchase order.

6. Waterman will provide its STANDARD FORMAT operation and maintenance manual if required by the specification in quantities of up to four units at no additional charge. Additional Standard O & M's can be furnished at a unit cost of $35.00 each. Custom manuals can be furnished on a time and materials cost basis with a minimum $50.00 each unit charge being made.

7. If an electric motor operator lift manufacturer's representative is required at the jobsite for installation, startup, etc., charges will be made at the manufacturer's standard published rate.

The electric actuator includes only those electrical controls mounted integrally within the unit or mounted to the pedestal.

waterman INDUSTRIES SALES, INC.

QUOTATION No. SQ 95-X-039

CONDITIONS OF SALE

1. All orders are subject to acceptance at Seller's Offices at the address shown on the face hereof.

2. Title to the products sold hereunder shall pass upon delivery to the carrier at the point of shipment, or at point of delivery when delivery is made by Seller's truck.

3. If shipments are delayed by the Purchaser, payment shall become due on date when the Company is prepared to make shipment. If all the material and equipment shall not be forwarded on the same date, pro rata payment for partial shipments are to be made. Payments are to be made in accordance with the agreed "Terms" and are not contingent on performances of equipment.

4. If Buyer shall fail to comply with any provision or to make payments in accordance with the terms of this quotation or any other contract between Buyer and Seller, Seller may at its option defer further shipments or, without waiving any other rights it may have, terminate this contract. All deliveries shall be subject to the approval of Seller's Credit Department. Seller reserves the right before making any delivery to require payment in cash or security for payment, and if Buyer fails to comply with such requirement, Seller may terminate this contract.

5. Seller shall not be liable for failure or delay in delivery due to acts of God, the prior performance of government orders, orders bearing priority rating or orders placed under any allocation program (mandatory or voluntary) established pursuant to law, differences with workmen, local labor shortage, fire, flood or other casualty, government regulation or requirements, shortage or failure of raw material, supplies, fuel, power or transportation, breakdown of equipment, or any other cause beyond Seller's reasonable control, whether of similar or dissimilar nature than those enumerated. In no event shall Seller be liable for any consequential damages or claims for labor resulting from failure or delay in delivery.

6. Installation and erection of the material and equipment herein specified shall be under the control and at the sole risk of the Purchaser. If required and ordered, the Company will furnish a competent foreman at the expense of the Purchaser at the Company's prevailing rates to superintend and help erect the specified material and equipment on foundations furnished by the Purchaser.

7. Claims by Buyer must be made promptly upon receipt of shipments and Seller given an opportunity to investigate. Seller shall incur no liability for damage, shortages, or other cause, alleged to have occurred or existed at or prior to delivery to the carrier unless Buyer shall have entered full detail thereof on its receipt to the carrier.

8. There are no understandings, terms or conditions not fully expressed herein. There is no implied warranty or condition except an implied warranty of title to, and freedom from encumbrance of, the products sold hereunder, and in respect of products bought by description that they are of merchantable quality. For a period of one year from the date of delivery thereof, the Company guarantees that the materials and equipment shall be free from defects of material and workmanship and agrees to replace, F.O.B. the Company's factory, any part or parts breaking within such one year, provided the Purchaser gives immediate notice of such breakage, and such breakage, in the opinion of the Company, shows unmistakable evidence of defective materials or workmanship. The liability of the Company shall not in any case exceed the cost of repairing or replacing defective parts and in no event shall the Company be liable for loss of income or any other expense or consequential damage. At the end of said one year, all liability of the Company shall cease and terminate.

The company reserves the right to make such changes in design and construction as it deems advisable for the purpose of improving the material or equipment or meeting any special condition.

Illustrations are a fair representation but are not binding in detail.

The Company guarantees equipment of other manufacturers only insofar as such equipment is guaranteed to it.

9. The products sold hereunder shall be subject to Seller's standard manufacturing variations, tolerances and classifications.

10. Any tax imposed in respect to the sale of the products sold hereunder shall be added to and paid as part of the purchase price.

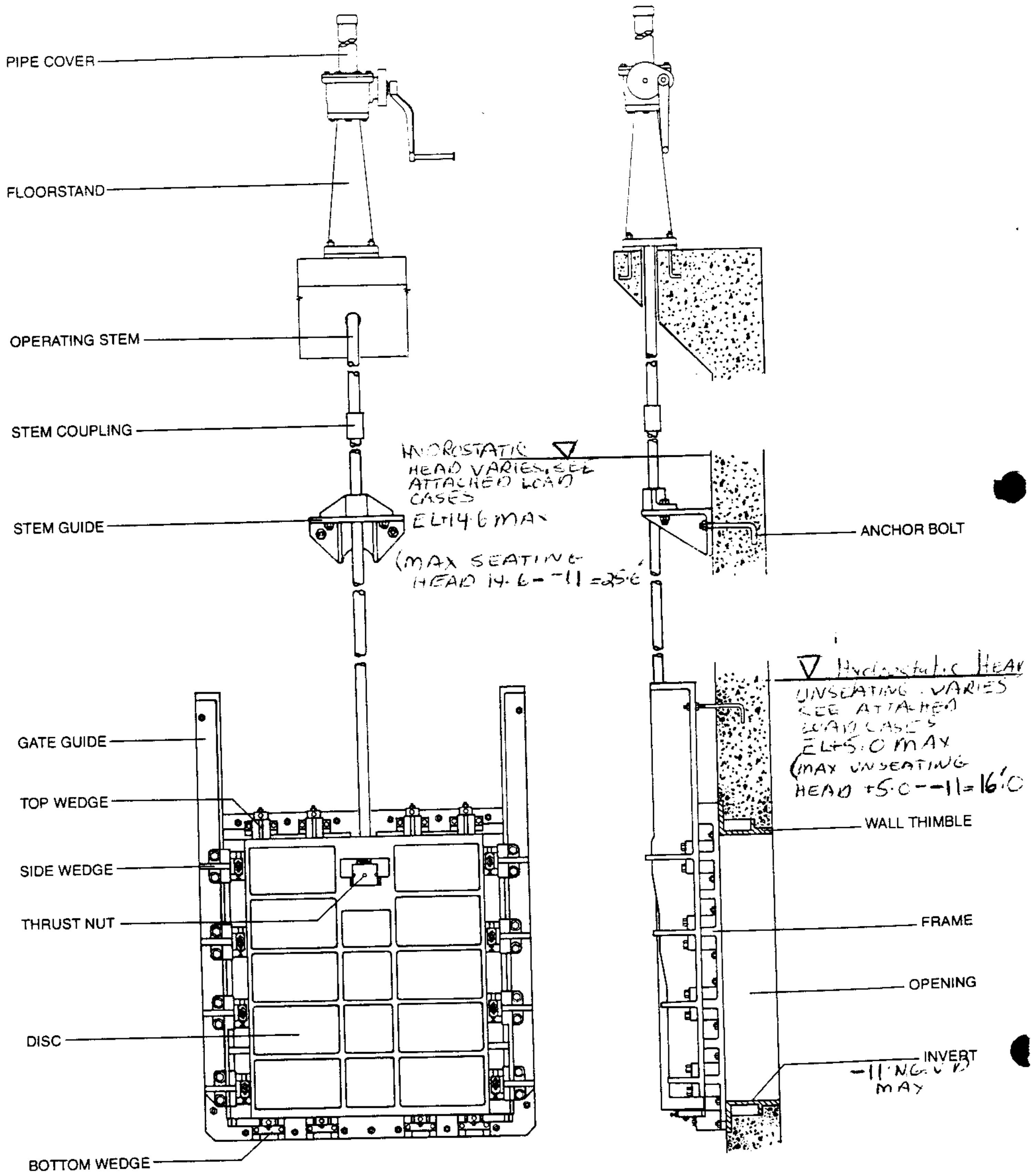
11. Buyer may terminate this contract in whole or in part upon notice in writing to Seller. Seller shall thereupon, as directed cease work and transfer to Buyer title to all completed and partially completed products and to any raw materials or supplies acquired by Seller especially for the purpose of performing this contract and Buyer shall pay Seller as follows: (1) the contract price for all products which have been completed prior to termination; (2) the cost to Seller of the material or work in process as shown on the books of Seller in accordance with the accounting practice consistently maintained by Seller plus a reasonable profit thereon, but in no event more than the contract price; (3) the cost F.O.B. Seller's plant of materials and supplies acquired especially for the purpose of performing this contract; and (4) reasonable cancellation charges, if any, paid by Seller on account of commitments made hereunder. The provisions of this paragraph shall be without prejudice to the rights of either party for failure on the part of other party to comply with the provisions of this contract.

12. If this contract is made in compliance with any governmental rule or regulation, plan, order or other directive, upon the termination thereof Seller shall have the option of cancelling this contract in whole or in part.

13. Failure of either party to enforce any right hereunder shall not waive any right of other or future occurrences.

DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

Static Head (Load Cases)


PIPE COVER
FLOORSTAND
OPERATING STEM
STEM COUPLING
HYDROSTATIC
HEAD VARIES, SEE
ATTACHED LOAD
CASES
EL+14.6 MAX
(MAX SEATING
HEAD 14.6 - -11 = 25.6'
STEM GUIDE
ANCHOR BOLT
Hydrostatic HEAD
UNSEATING VARIES
SEE ATTACHED
LOAD CASES
EL+5.0 MAX
(MAX UNSEATING
HEAD +5.0 - -11 = 16'.0
GATE GUIDE
TOP WEDGE
WALL THIMBLE
SIDE WEDGE
THRUST NUT
FRAME
OPENING
DISC
INVERT
-11' N.G.V.D.
MAX
BOTTOM WEDGE

HYDROLOGY AND HYDRAULICS

12. General

The hydrology and hydraulic analysis and design for the proposed construction is presented in Appendix A of this Supplement. The Appendix contains the methods and procedures used in the design of protection, as well as climatological and hydrological data for the project area. This information was taken from its original source-Design Memorandum No. 20 titled "Design Memorandum No. 20, General Design, Orleans Parish-Jefferson Parish, 17th Street Canal (Metairie Relief)" and was developed in 1990 by the USACE. Although, it should be noted that data retrieved from DM No. 20 (Appendix A) in-turn refers to a previous DM, DM No. 13.

13. Design Elevations

The design grades for the pumping station are also based upon the previously noted Design Memorandum No. 20.

The design elevation required for the top of flood walls is 14.6' (NGVD). The design elevation required for the tops of I-walls parallel to the canal is 15.1' (NGVD). However, it should be noted that the top of the proposed concrete monoliths vary and are at elevations 14.65' to 16.0' (NGVD). This elevation will facilitate the size, equipment and future maintenance of sluice gates within the monoliths.

The design elevations that are developed below are for a number of conditions that correspond to various loading cases. These elevations, along with an explanation of their development, are as follows (F.S. denotes flood side, P.S.1 denotes water level on protected side, P.S.2 elevation indicates water level inside discharge tube due to head pressure at it's highest invert elevation when gate is closed, and all elevations are in feet NGVD.)

A. East Sluice Gate Monolith

Case I (Construction)

F.S. Dewatered P.S.1 Dewatered P.S.2 Dewatered

Case II & III (Still Water Level)

F.S. 12.6' P.S.1 * P.S.2 3.9'

Case IV (Normal Operating)

F.S. 2.0' P.S.1 * P.S.2 Gate Open

Case V (Maintenance)

F.S. 2.0' P.S.1 * P.S.2 Dewatered

Case VI & VII (2' Above Still Water Level)

F.S. 14.6' P.S.1 * P.S.2 3.9'

Case VIII (Flood on Protected Side)

F.S. -5.0' P.S.1 14.6' P.S.2 Gate Open

* Groundwater elevation on protected side is below invert of structure for east monolith.

B. West Sluice Gate Monoliths

Case I (Construction)

F.S. Dewatered P.S.1 Dewatered P.S.2 Dewatered

Case II (Still Water Level)

F.S. 12.6' P.S.1 12.6' P.S.2 5.0'

* Groundwater elevation on protected side is below invert of structure for east monolith.

Case III (Normal Operating)

F.S. 2.0' P.S.1 2.0' P.S.2 Gate Open

Case IV (Maintenance)

F.S. 2.0' P.S.1 2.0' P.S.2 Dewatered

Case V (2' Above Still Water Level)

F.S. 14.6' P.S.1 14.6' P.S.2 5.0'

The ground water elevation causing uplift at the west monoliths shall be the same as the flood side since flood waters are allowed to surround these monoliths.

C. East I-wall @ East Monolith

F.S. 14.6' P.S.1 3.8' Ground Elevation 3.8'

D. West I-wall @ East Monolith

F.S. 3.0' P.S.1 * Ground Elevation 14.0'

E. East Cofferdam

F.S. 4.0' P.S.1 -12.0' Mudline -12.0'

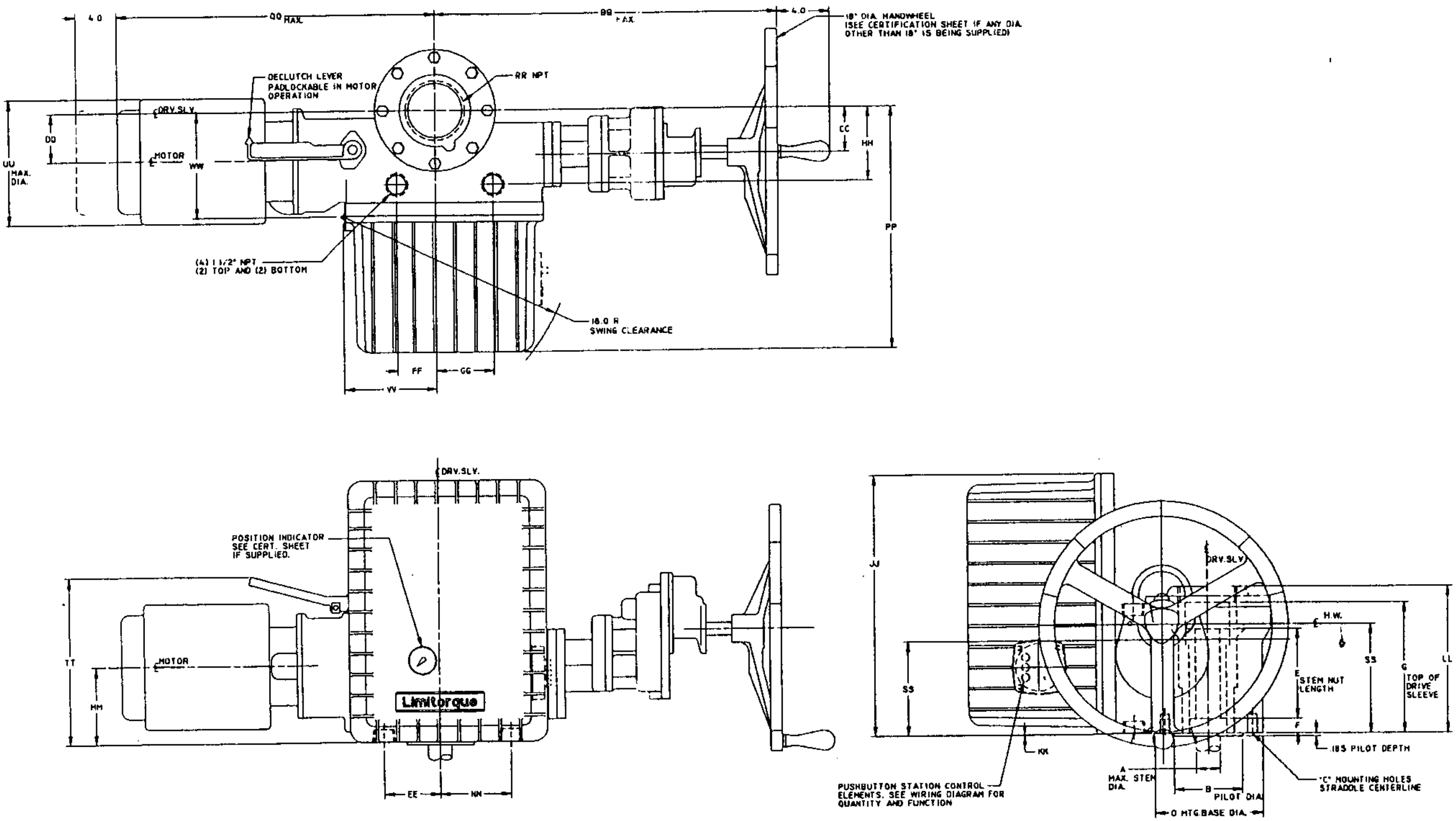
F. West Cofferdam

F.S. 4.0' P.S.1 -14.0' Mudline -14.0'

* Groundwater elevation on protected side is below invert of structure for east monolith.

DESIGN MEMORANDUM NO. 20
GENERAL DESIGN SUPPLEMENT NO. 1
AT 17TH STREET OUTFALL CANAL
LAKE PONTCHARTRAIN, LOUISIANA AND
VICINITY HURRICANE PROTECTION PROJECT
HIGH LEVEL PLAN

Limitorque Information



MOUNTING BASE AND DRIVE SLEEVE DIMENSIONS								
UNIT SIZE	A MAXIMUM STEM DIA. THREADED	A MAXIMUM STEM DIA. BORE & KEYWAY	B	C	D	E	F	G
L120-190	3.5	2.88 W/ 3/4 X 1/4	7.000/6.998	(8)3/4-10X1.13 DEEP.11.75 B.C.	13.5	8.25	1.00	11.13

Ⓐ

ACTUATOR OUTLINE DIMENSIONS																				
UNIT SIZE	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU	VV	WW
L120-190	27.8	4.4	4.4	5.1	5.1	5.5	8.2	21.0	+.7	13.3	6.6	5.5	21.2	32.2	5"	9.8	14.7	12.5	8.0	12.1

Ⓐ

REVISIONS						
Ⓐ	DELETED L120-80 4:1 WAS 0.1	CCR	10-89	[initials]		

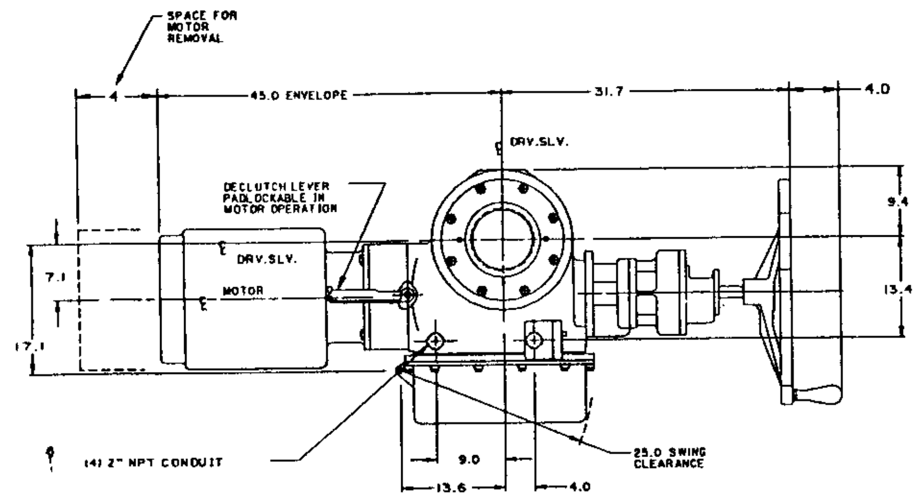
DWN. CCR
CHKD. RA
APPD. RGP
DATE 10-25-88

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LIMITORQUE CORPORATION

DESCRIPTION Ⓐ
L120-190 UNIT WITH MAXIMUM INTEGRAL COMPARTMENT AND 4:1 HANDWHEEL SPUR GEAR ASSEMBLY

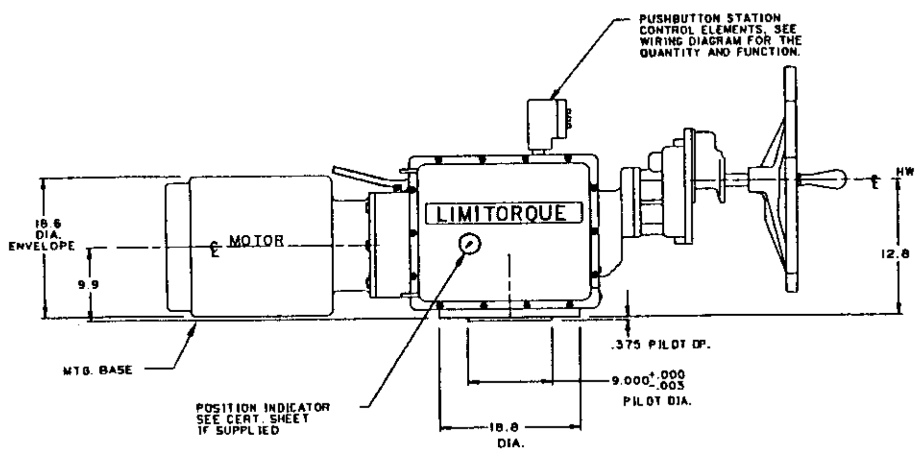
DWG. NO. 03-612-0054-3 REV. A

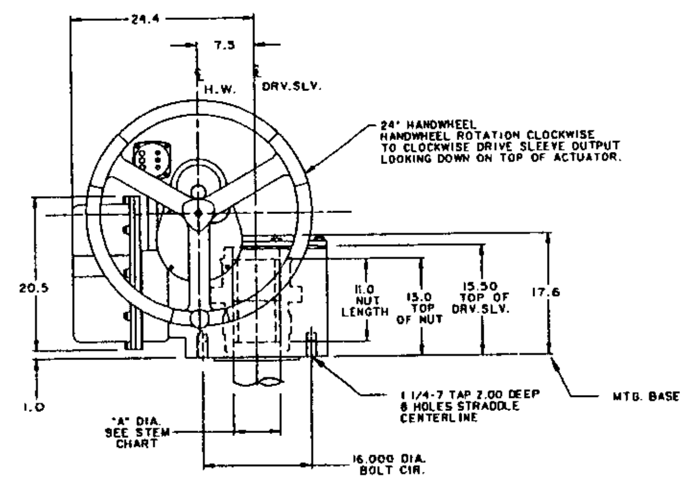


MAX. STEM DIA. "A"

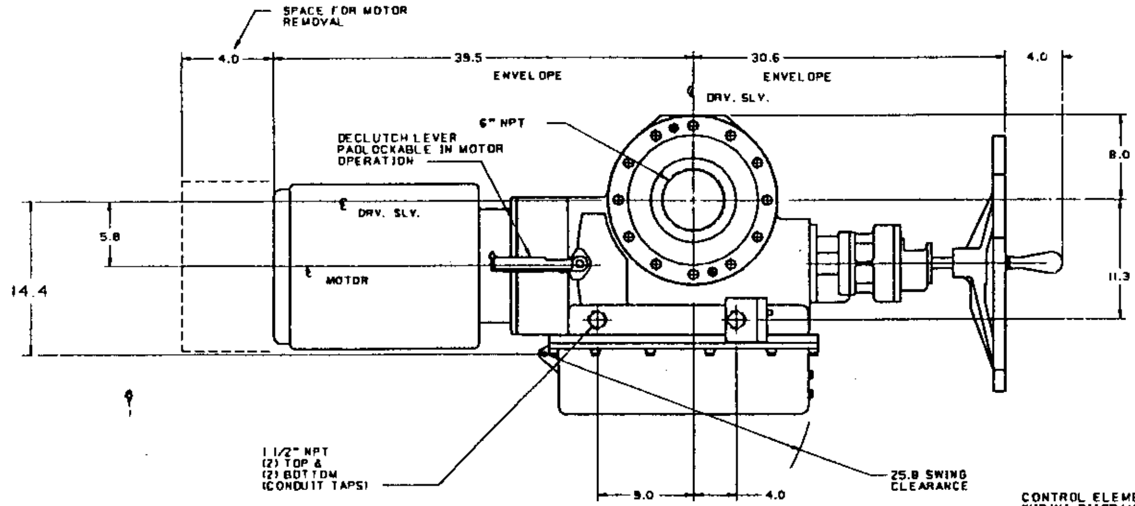
	STEM NUT		DRIVE SLEEVE	
	THREADED	BORE & KEY	THREADED	BORE & KEY
MAXIMUM STEM DIAMETER	5	4.5 BORE 1 X 1/2 KEYWAY	6.75	6.00 BORE 1 1/2 X 1/2 KEYWAY

NOTE 1
THE ACTUATOR IS DESIGNED FOR CLOCKWISE TO CLOSE (LEFT HAND THREAD). IF OTHER ROTATION IS REQUIRED, IT MUST BE SPECIFICALLY REQUESTED. (SEE CERT. IF OPPOSITE ROTATION IS REQUIRED)





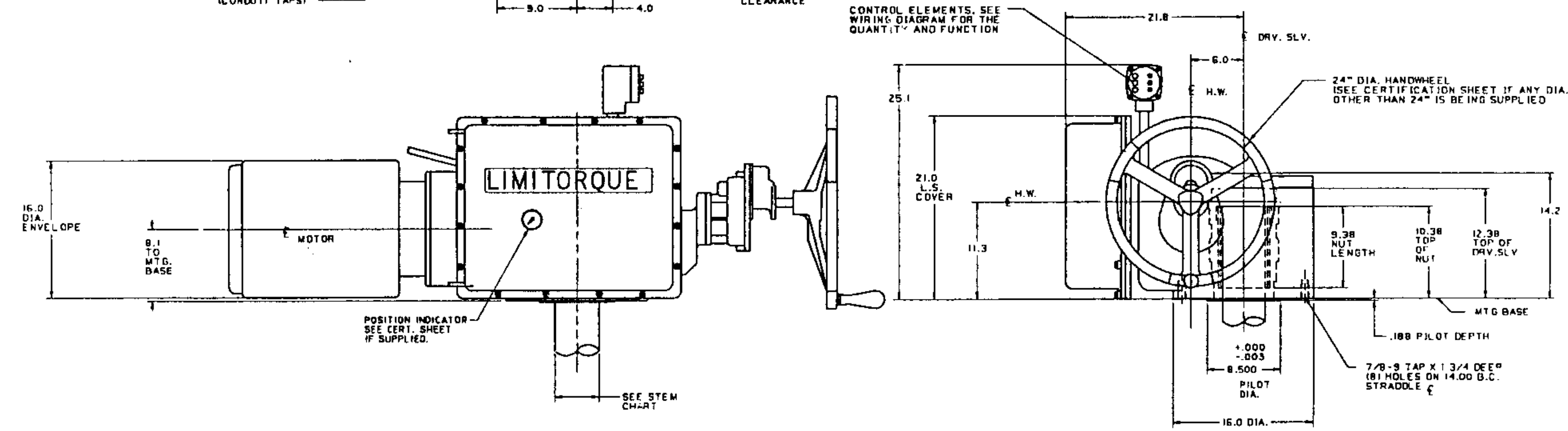
REVISIONS	DWN. CCR	LIMITORQUE CORPORATION	
	CHKD.	DESCRIPTION L120-800 UNIT WITH: A) MAXIMUM INTEGRAL COMPARTMENT B) 6:1 HANDWHEEL SPUR GEAR ASSEMBLY C) CLOSE COUPLED 'SW' PUSHBUTTON STATION D) BASE FORM 2	
	APPD. RGP		
	DATE 1-23-90		
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	DWG. NO. 03-6[illegible] 0185-3	REV.



MAX. STEM DIA. "A"

	STEM NUT		DRIVE SLEEVE	
	THREADED	BORE & KEY	THREADED	BORE & KEY
MAXIMUM STEM DIAMETER	5	4 1/4 BORE 1 X 3/8 KEYWAY	5 3/4	4 3/4 BORE 1 1/4 X 7/16 KEYWAY

NOTE
1. THE ACTUATOR IS DESIGNED FOR CLOCKWISE TO CLOSE (LEFT HAND THREAD). IF OTHER ROTATION IS REQUIRED IT MUST BE SPECIFICALLY REQUESTED (SEE CERT. IF OPPOSITE ROTATION IS SUPPLIED).



DWN	CCR
CHKD	[illegible]
APPVD	[illegible]
DATE	12-1-88
MFG ORDER NO	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	

REVISIONS

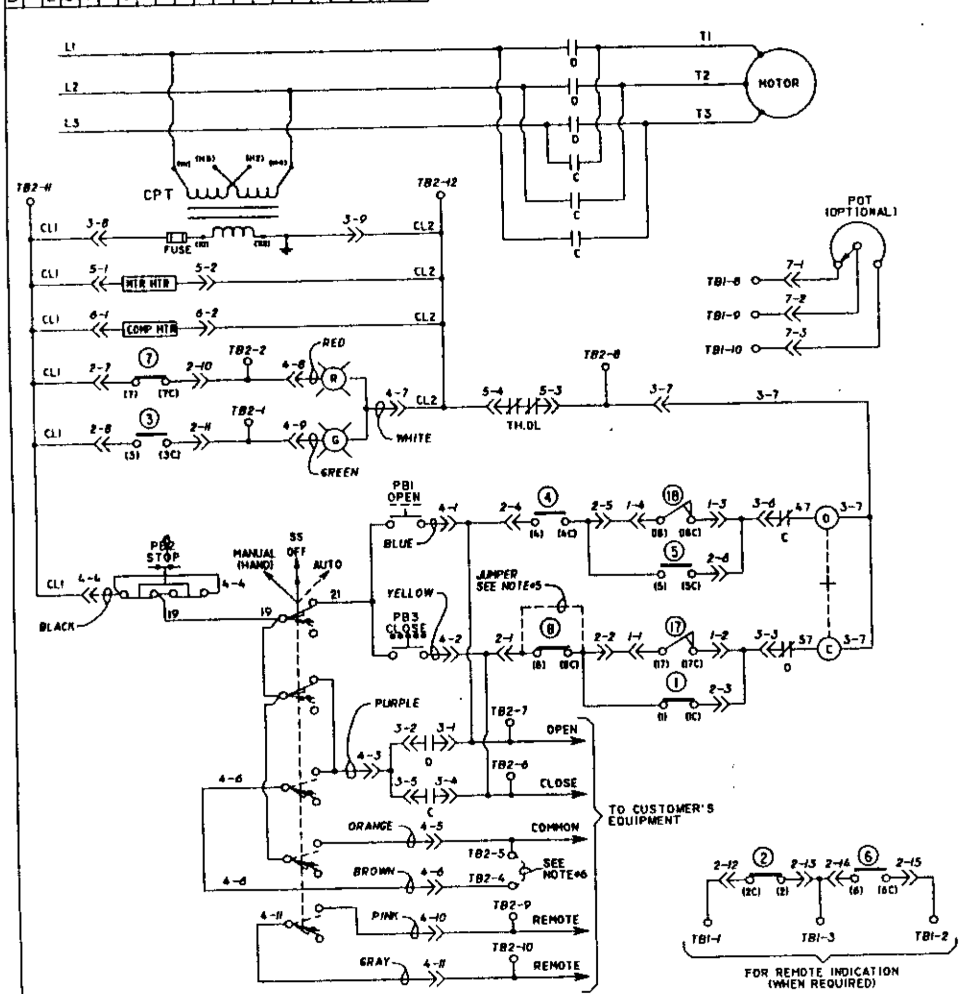
LIMITORQUE CORPORATION

DESCRIPTION

L120-420 UNIT WITH:
A) MAXIMUM INTEGRAL COMPARTMENT
B) 6:1 HANDWHEEL SPUR GEAR ASSY
C) CLOSE COUPLED "SW" PUSHBUTTON STATION

DWG. NO. 03-612-0060-3 REV.

B-261701-2005600-00030



VALVE SHOWN IN FULL OPEN POSITION

LIMIT SWITCH CONTACT DEVELOPMENT

ROTOR	CONTACT	FUNCTION
OPEN	1	BY-PASS CIR.
	2	INDICATION
	3	IND LIGHT
	4	OPEN LIMIT
CLOSE	5	BY-PASS CIR
	6	INDICATION
	7	IND LIGHT
	8	CLOSE LIMIT
INT.1	9	SPARE
	10	SPARE
	11	SPARE
	12	SPARE
INT.2	13	SPARE
	14	SPARE
	15	SPARE
	16	SPARE

VALVE POSITION: FULLY OPEN — A — B — FULLY CLOSED

(17) CLOSING TORQUE SWITCH INTERRUPTS CONTROL CIRCUIT IF MECHANICAL OVERLOAD OCCURS DURING CLOSING CYCLE

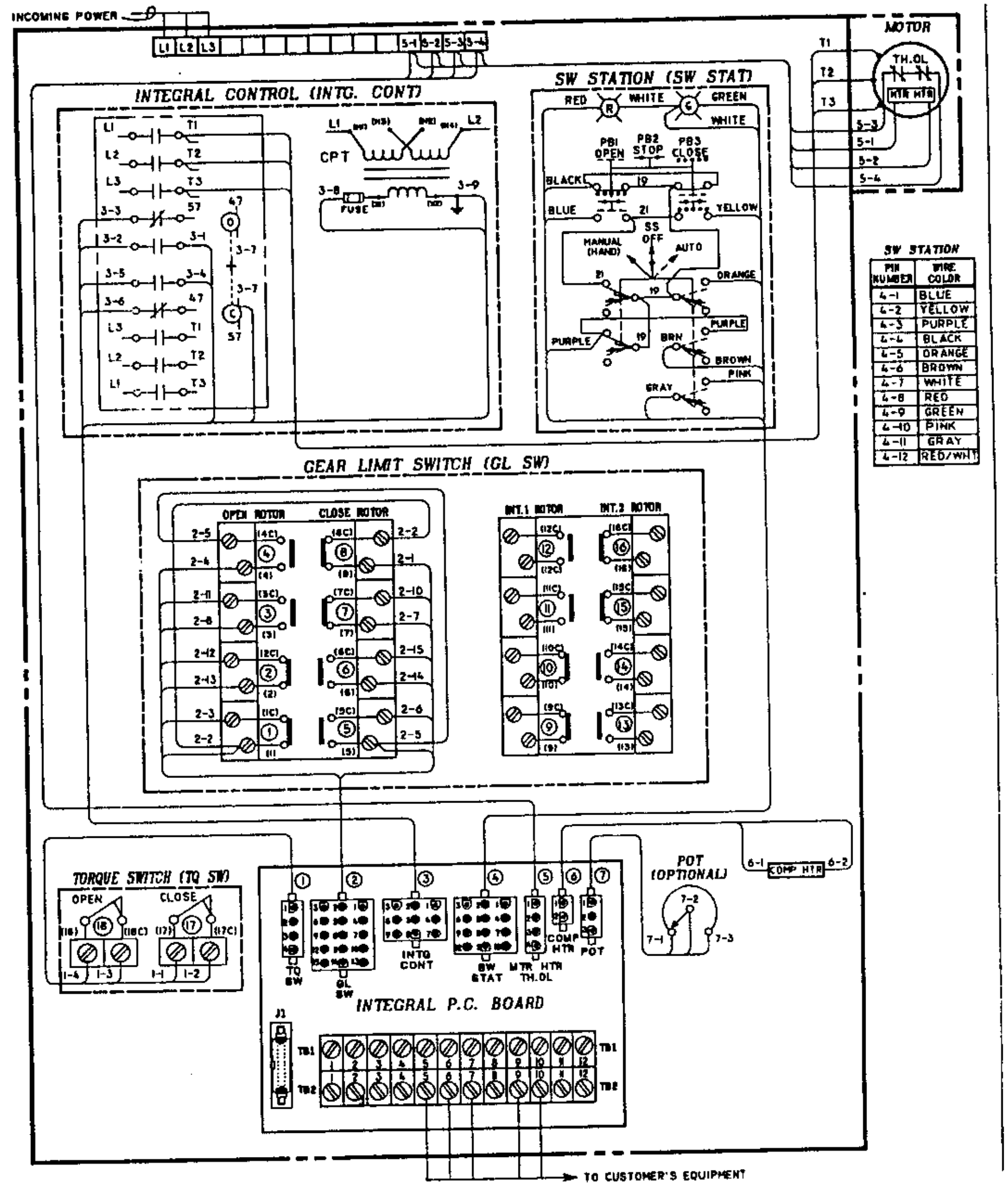
(18) OPENING TORQUE SWITCH INTERRUPTS CONTROL CIRCUIT IF MECHANICAL OVERLOAD OCCURS DURING OPENING CYCLE

NOTES

1. ---- OPEN CONTACT
2. ▬▬ CLOSE CONTACT
3. ROTORS INT.1 & INT.2 CAN BE SET AT VALVE POSITION FULL OPEN, FULL CLOSED OR ANY POSITION IN BETWEEN AS INDICATED BY POINT A AND B.
4. TRANSFORMER CONNECTION FOR HIGH VOLTAGE CONNECT H3 TO H2, H1 TO L1 & H4 TO L2. FOR LOW VOLTAGE CONNECT H1 & H3 TO L1 AND H2 & H4 TO L2.
5. ADD JUMPER ON LS#8 BETWEEN TERMINALS (8) & (8C) FOR TORQUE SEATING VALVES
6. IF A REMOTE SEAL-IN CIRCUIT IS REQUIRED ADD JUMPER BETWEEN TB2-4 & TB2-5 ON PC BOARD

LEGEND

O-OPEN CONTACT
C-CLOSE CONTACT
Ⓞ-OPENING COIL
Ⓒ-CLOSING COIL
CPT-CONTROL POWER TRANSFORMER
+-MECHANICAL INTERLOCK
TH.OL-THERMAL OVERLOAD CONTACTS
Ⓡ-RED INDICATING LIGHT
Ⓖ-GREEN INDICATING LIGHT
SS-SELECTOR SWITCH (MANUAL (HAND)-OFF-AUTO)
PB1-OPEN PUSHBUTTON
PB2-STOP PUSHBUTTON
PB3-CLOSE PUSHBUTTON
COMP HTR-COMPARTMENT HEATER
MTR HTR-MOTOR HEATER
POT-SLIDEWIRE TRANSMITTER (SEE CERTIFICATION SHEET IF REQUIRED)
J1-CONNECTOR FOR MODUTRONIC 20 UNITS

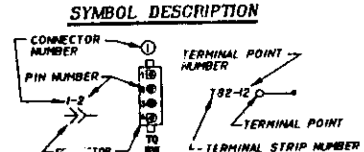


SW STATION

PIN NUMBER	WIRE COLOR
4-1	BLUE
4-2	YELLOW
4-3	PURPLE
4-4	BLACK
4-5	ORANGE
4-6	BROWN
4-7	WHITE
4-8	RED
4-9	GREEN
4-10	PINK
4-11	GRAY
4-12	RED/WHT

ELECTRICAL COMPARTMENT

SYMBOL DESCRIPTION



NO.	DESCRIPTION	DATE

REVISION

K.Horton
ML
3-31-88

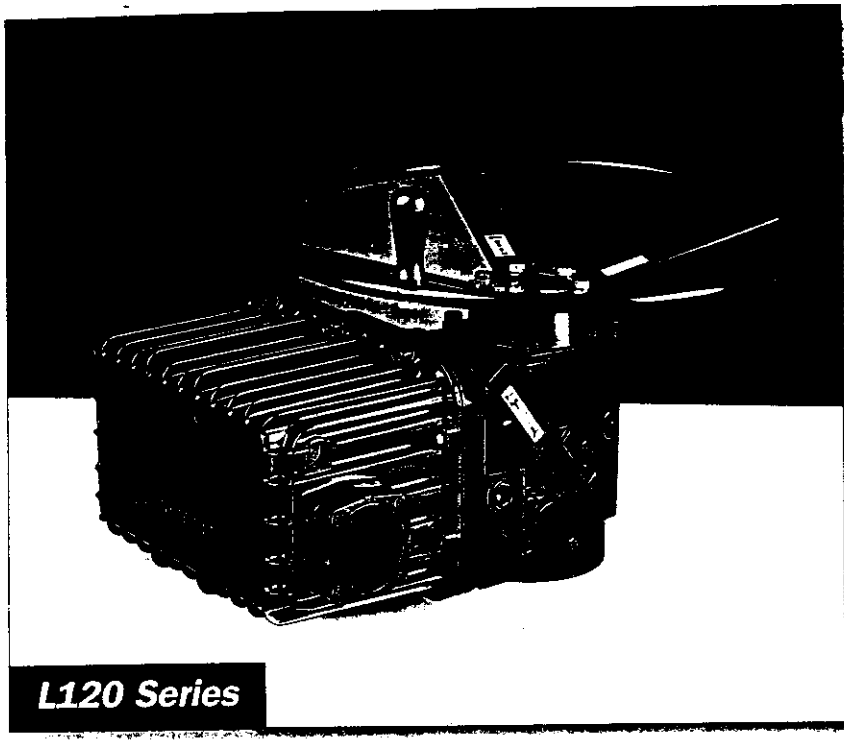
LIMITORQUE CORPORATION

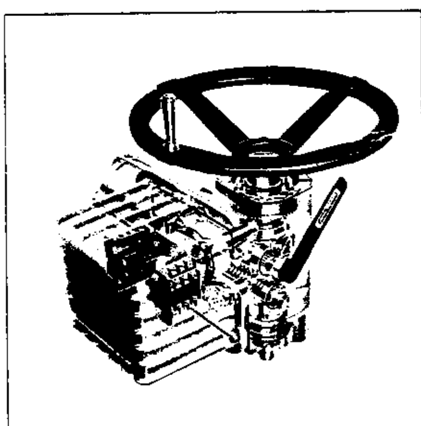
WIRING DIAGRAM

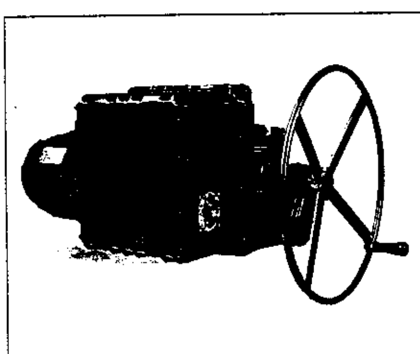
STANDARD

03-10-88

16-476-1017-3







Limitorque's L120 is the ideal choice for any valve requiring either rotary or linear power. Gate and globe valves, sluice gates and pen stocks—any mechanism requiring positive, dependable actuation. The L120 can be used without modification in any rising or non-rising stem application for linear-action valves.

When combined with a Limitorque T-series quarter-turn gear operator, the L120 can be used to control butterfly, ball, and plug valves, as well as damper drives, flop gates, or any other device which requires 90° movement. L120 units can also be coupled to other gearheads such as Limitorque's WTR, HBC, or B320 units for motorized operation of valves requiring increased torque and/or thrust.

All of the L120 actuators are factory lubricated and weather-proofed for service in temperatures ranging from -20°F to 150°F. Submersible and explosion-proof versions of all L120 models are available for particularly demanding applications. Weatherproof enclosures meet NEMA 1, II, IV, and VI standards, as well as IP68. Explosionproof enclosures fully conform to and are certified by the following:

- Factory Mutual (F.M.) for Class I (Groups B,C,D/Division 1,2) and Class II (Groups E,F,G/Division 1,2)
- Canadian Standards Association (C.S.A.) for Class I (Groups C,D/Division 1,2) and Class II (Groups E,F, G/Division 1,2)
- CENELEC for EExd.IIB.T4 and CENELEC Norm EN50018
- Japanese Industry Standards (J.I.S.) for JISd2G4
- Australian SAA EExd.IIB.T4 (sizes 10-40)

For further information, request bulletin #120-10000.

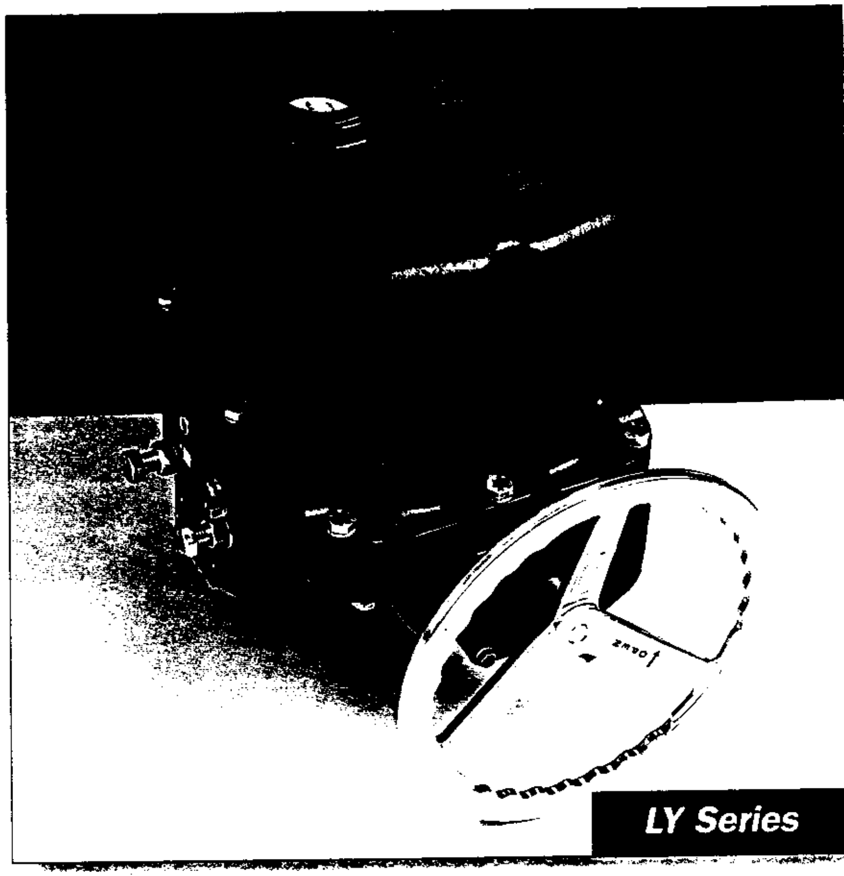
	Torque				Thrust				Output Speed	
	Ft-Lbs		Nm		Lbs		Nm		RPM	
L120 Series	from 50	to 60000	from 68	to 81600	from 10000	to 500000	from 44	to 2224	from 12	to 250

Limitorque's LY series actuators provide quarter-turn valve and damper operation in a compact, lightweight, and easy-to-mount unit. The LY incorporates mechanical adjustable stops for 90° rotation with + 10° adjustment, and can easily be modified for rotation of up to 360°. The LY is the most positive self-locking actuator on the market today, requiring no motor brakes or complex locking mechanisms.

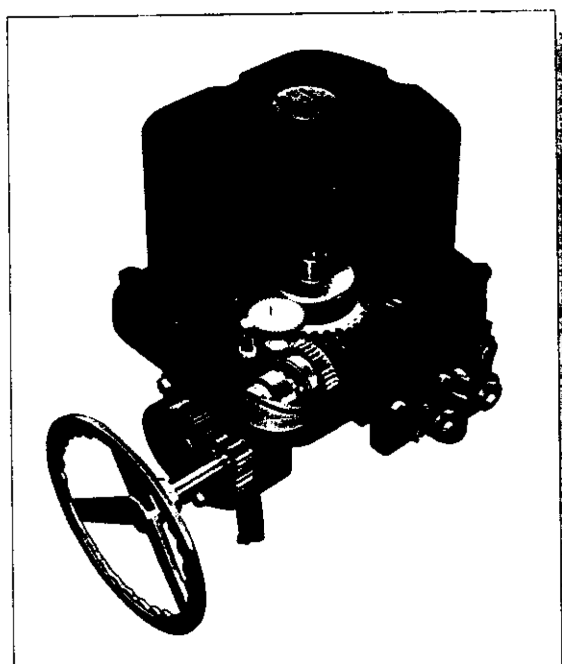
Standard features include steel-on-bronze worm gear sets, anti-friction bearings throughout, and durable epoxy coating. Torque switches are interchangeable, double-acting, and fully adjustable. Declutch levers allow handwheel operation. Control compartment heaters prevent corrosion damage due to moisture caused by condensation. Motors can be 3-phase or single-phase, and are thermally protected with class-F insulation.

LY units meet all AWWA C504-87 and C540-93 requirements, and are available in submersible, weatherproof, or explosion-proof configurations.

For additional information, request bulletin # 150-11000.

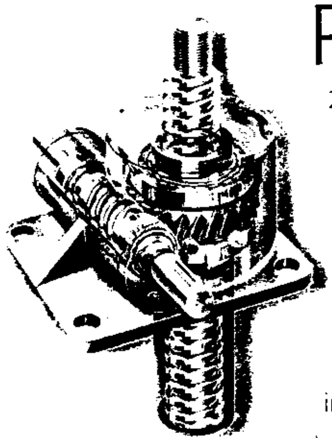


LY Series



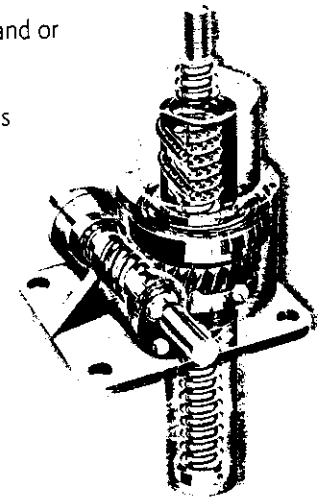
LY Series

	Torque				Output Speed	
	Ft-Lbs		Nm		Operating Time	
	from	to	from	to	from	to
LY Series	200	1200	272	1632	15 sec.	60 sec



Pow-R-Jac, a division of the Limitorque Corporation, designs and manufactures linear positioning systems to lift, lower, push and pull—in any direction—loads of up to 250 tons with a single-point lift (and even more with multipoint lifts.) Pow-R-Jac provides both the mechanical and electrical components required for a turnkey system.

Pow-R-Jac machine and ball screw jacks prove themselves every day in an astonishing array of applications throughout the world. Serving any industry demanding pinpoint accuracy and maximum reliability, Pow-R-Jac has lifted and positioned loads ranging from industrial furnaces to the space shuttle. Pow-R-Jacs are precise enough to track satellites on telecommunication antennas or position automobiles in exacting assembly applications, and tough enough to withstand the punishments of applications like coal crushers, hammermills, and railroad bridges. From Alaska to the South Pacific and the Middle East, on land or sea, Pow-R-Jacs perform in all environments.



Most importantly, Limitorque's Pow-R-Jac division offers standard products as well as complete, custom-engineered systems, allowing Pow-R-Jac to handle jobs ranging from simple applications to the most highly specialized projects. Be it mechanical equipment, worm and bevel gear jacks, reducers, couplings or position limit switches, electronics, motors and controllers, position indication, solid-state controls and computer-operated systems, on/off or modulating service, Pow-R-Jac has the solution for you.

Pow-R-Jac: precise, responsive equipment, engineered according to your specific requirements, and backed by worldwide sales and service.

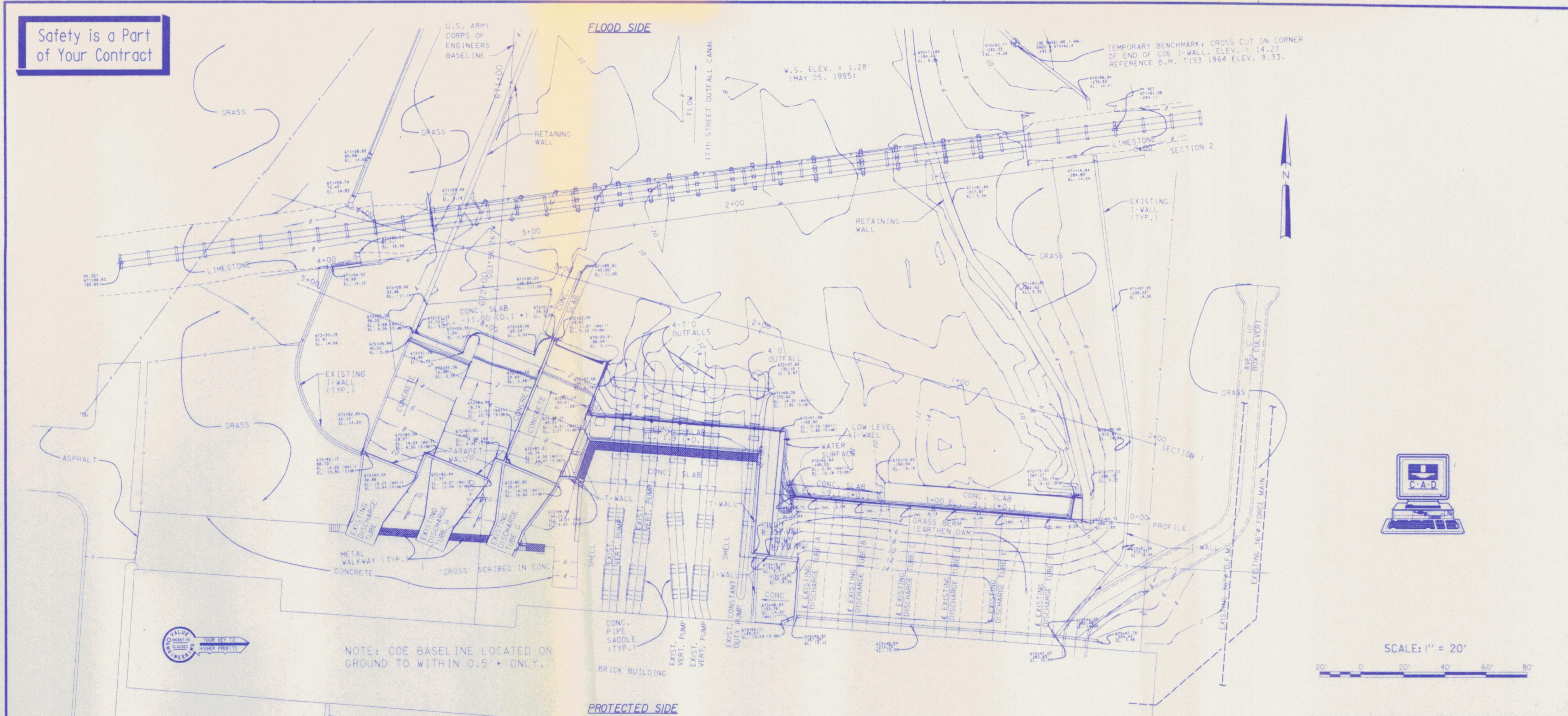
Machine Screw Technical Specifications

Pow-R-Jac Size	1 MSJ	2 1/2 MSJ	5 MSJ	10 MSJ	15 MSJ	20 MSJ	30 MSJ	50 MSJ	75 MSJ	100 MSJ
Capacity in tons	1	2 1/2	5	10	15	20	30	50	75	100
Dia. of lifting screw	.79	1	1 1/2	2	2 1/4	2 1/2	3 3/8	4 1/2	5	6
Gear Centers	1.250	1.750	2.188	2.598	2.598	2.875	3.750	5.313	6.000	7.500
Gear Ratio — Standard	5:1	6:1	6:1	8:1	8:1	8:1	10 2/3:1	10 2/3:1	10 2/3:1	12:1
Turns of worm for 1" raise — Standard ratio	25.4	24	16	16	16	16	16	16	16	16
Maximum allowable input horsepower	1/2	1	2	3	3.5	5	8	13	16	18

Ball Screw Technical Specifications

Pow-R-Jac Size	2 1/2 MSJ	5 MSJ	10 MSJ	20 MSJ	30 MSJ	50 MSJ	75 MSJ	100 MSJ
Capacity in tons	21/2	5	10	20	30	50	75	100
Dia. of lifting screw	1	1 1/2	2	2 1/2	3 3/8	4 1/2	5	6
Gear Centers	1.750	2.188	2.598	2.875	3.750	5.313	6.000	7.500
Gear Ratio — Standard	6:1	6:1	8:1	8:1	10 2/3:1	10 2/3:1	10 2/3:1	12:1
Turns of worm for 1" raise — Standard ratio	24	16	16	16	16	16	16	16
Maximum allowable input horsepower	1	2	3	5	8	13	16	18

LEGEND
LIMITS OF CONSTRUCTION
CONSTRUCTION STAGING AREAS
TEMPORARY CONSTRUCTION AND PERMANENT MAINTENANCE AREA REQUIRING PERMIT FROM RAILROAD
TEMPORARY EQUIPMENT AND MATERIAL ACCESS ALLEY REQUIRING PERMIT FROM RAILROAD
Safety is a Part of Your Contract
SEWERAGE AND WATER BOARD OF NEW ORLEANS
ORLEANS LEVEE BOARD
WARREN M. ORR (NOW OR FORMERLY)
SOUTHERN RAILWAY
PARISH LINE
JEFFERSON PARISH
ORLEANS PARISH
FLOOD SIDE
PROTECTED SIDE
STA. 671+75.46
STA. 672+95.31
EXISTING 36"ø D.F.M.
AVE. "C" 10' BOX CANAL
EXISTING 36"ø FORCE MAIN
GENERAL NOTES:
1. REFERENCE MAPS BY:
A) GUY J. SEGHERS; MAP DATED 9/17/38
B) M.T. DUCROS; MAP DATED 5/13/41
C) SEWERAGE AND WATER BOARD PROPERTY MAP; NOT DATED; MARKED 7825-E-2.
D) GUY J. SEGHERS; MAP DATED 9/17/48.
E) GUY J. SEGHERS; MAP DATED MAY 1966.
2. AZIMUTHS ARE MEASURED FROM NORTH.
3. PROPERTY LINES ARE LOCATED WITHIN ±10' DUE TO A DISCREPANCY BETWEEN THE ABSTRACTED TITLE DESCRIPTION AND ITS ASSOCIATED DRAWING.
SCALE: 1" = 20'
C·A·D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
RIGHT OF WAY
PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: M.D.P.
DRAWN BY: L.A.C.
CHECKED BY: M.D.P.
PLOT SCALE: 20
PLOT DATE: JAN. 1996
DATE: JAN. 1996
FILE NO. H-2-44679
PLATE 1



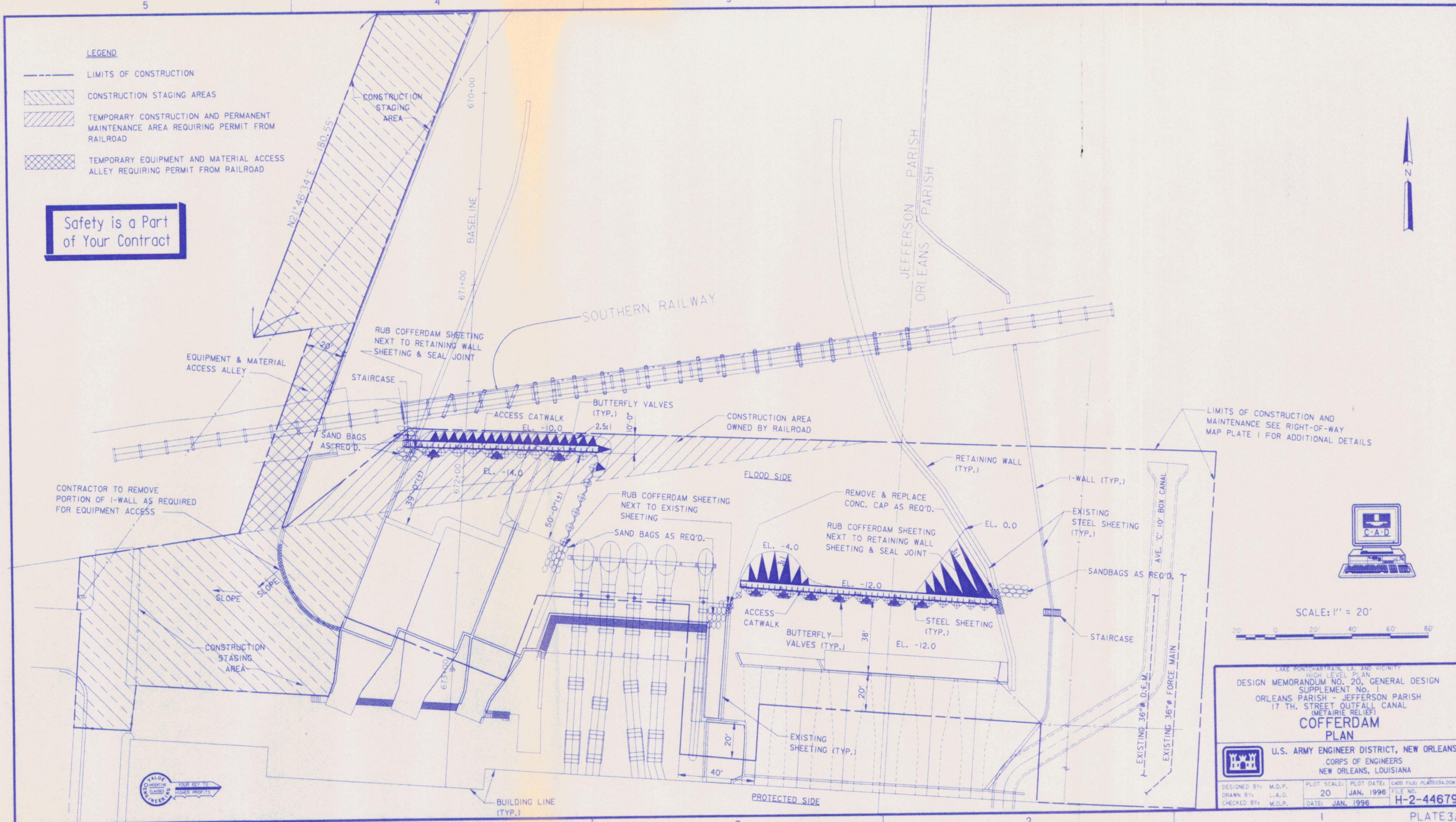
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

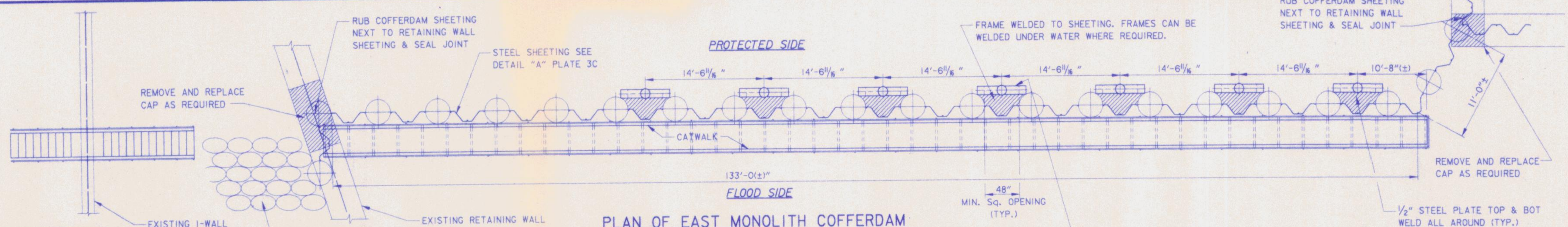
EXISTING SITE PLAN

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

DESIGNED BY: S.C.B.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE02.DGN
DRAWN BY: K.L.L.	20	JAN. 1996	FILE NO.
CHECKED BY: M.D.P.	DATE: JAN. 1996		H-2-44679

PLATE 2

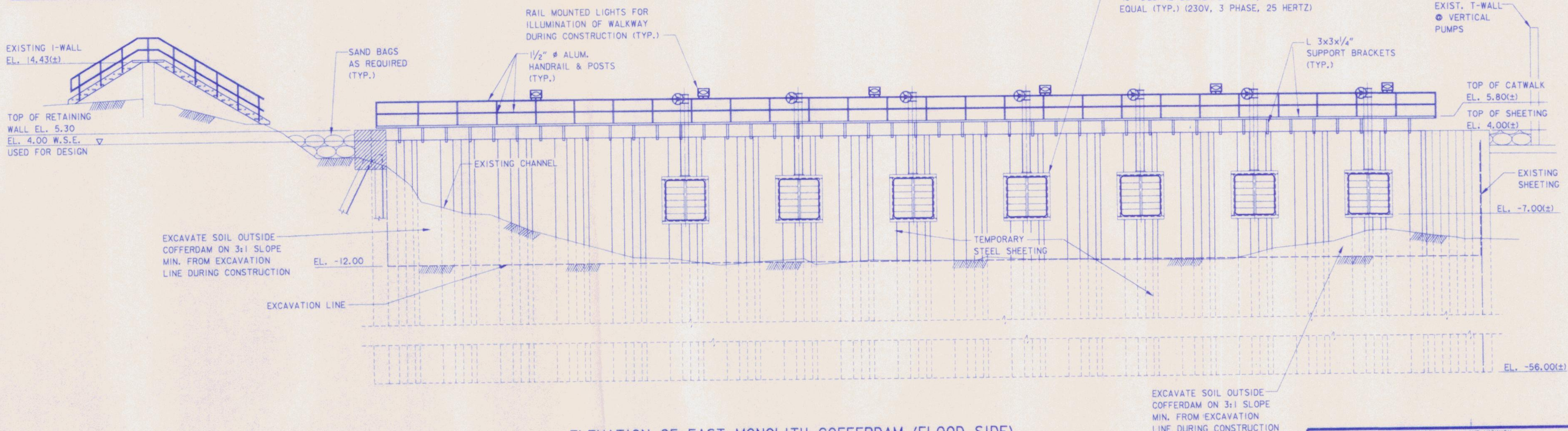

LEGEND
LIMITS OF CONSTRUCTION
CONSTRUCTION STAGING AREAS
TEMPORARY CONSTRUCTION AND PERMANENT MAINTENANCE AREA REQUIRING PERMIT FROM RAILROAD
TEMPORARY EQUIPMENT AND MATERIAL ACCESS ALLEY REQUIRING PERMIT FROM RAILROAD
Safety is a Part of Your Contract
N21°46'34"E 180.55'
CONSTRUCTION STAGING AREA
BASELINE
670+00
671+00
672+00
673+00
SOUTHERN RAILWAY
JEFFERSON PARISH
ORLEANS PARISH
RUB COFFERDAM SHEETING NEXT TO RETAINING WALL SHEETING & SEAL JOINT
EQUIPMENT & MATERIAL ACCESS ALLEY
20'
STAIRCASE
BUTTERFLY VALVES (TYP.)
ACCESS CATWALK
EL. -10.0
2.5:1
10'-0"
SAND BAGS AS REQ'D.
CONSTRUCTION AREA OWNED BY RAILROAD
EL. -14.0
39'-0"(±)
50'-0"(±)
LIMITS OF CONSTRUCTION AND MAINTENANCE SEE RIGHT-OF-WAY MAP PLATE I FOR ADDITIONAL DETAILS
RETAINING WALL (TYP.)
FLOOD SIDE
I-WALL (TYP.)
CONTRACTOR TO REMOVE PORTION OF I-WALL AS REQUIRED FOR EQUIPMENT ACCESS
RUB COFFERDAM SHEETING NEXT TO EXISTING SHEETING
REMOVE & REPLACE CONC. CAP AS REQ'D.
EXISTING STEEL SHEETING (TYP.)
EL. 0.0
SAND BAGS AS REQ'D.
RUB COFFERDAM SHEETING NEXT TO RETAINING WALL SHEETING & SEAL JOINT
EL. -4.0
3:1
EL. -12.0
SANDBAGS AS REQ'D.
AVE. 'C' 10' BOX CANAL
SLOPE
ACCESS CATWALK
BUTTERFLY VALVES (TYP.)
38'
STEEL SHEETING (TYP.)
EL. -12.0
STAIRCASE
SCALE: 1" = 20'
20' 0 20' 40' 60' 80'
CONSTRUCTION STAGING AREA
20'
EXISTING SHEETING (TYP.)
20'
40'
EXISTING 36"ø D.F.M.
EXISTING 36"ø FORCE MAIN
BUILDING LINE (TYP.)
PROTECTED SIDE
VALUE ENGINEERING INCENTIVE CLAUSES YOUR KEY TO HIGHER PROFITS
C-A-D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
COFFERDAM
PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: M.D.P.
DRAWN BY: L.A.O.
CHECKED BY: M.D.P.
PLOT SCALE: 20
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE03A.DGN
FILE NO. H-2-44679
PLATE3A



PLAN OF EAST MONOLITH COFFERDAM

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

Safety is a Part of Your Contract



ELEVATION OF EAST MONOLITH COFFERDAM (FLOOD SIDE)

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

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

12" 0 5' 10' 15' 20'

C·A·D

VALUE ENGINEERING INCENTIVE CLAUSES YOUR KEY TO HIGHER PROFITS

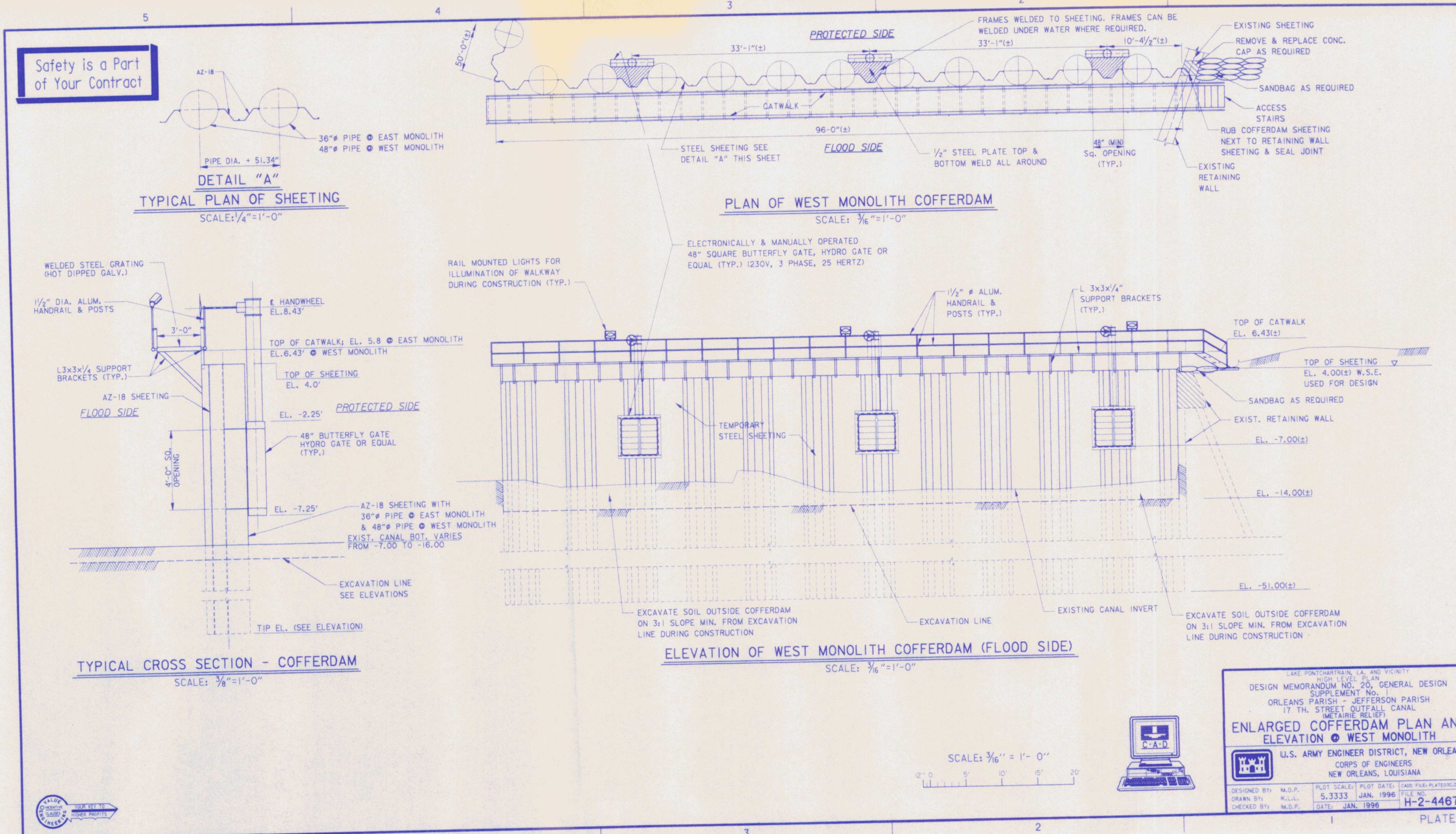
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

ENLARGED COFFERDAM PLAN AND ELEVATION @ EAST MONOLITH

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

DESIGNED BY: M.D.P.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE03B.DGN
DRAWN BY: L.A.O			FILE NO. H-2-44679
CHECKED BY: M.D.P.	DATE: JAN. 1996		

PLATE 3B



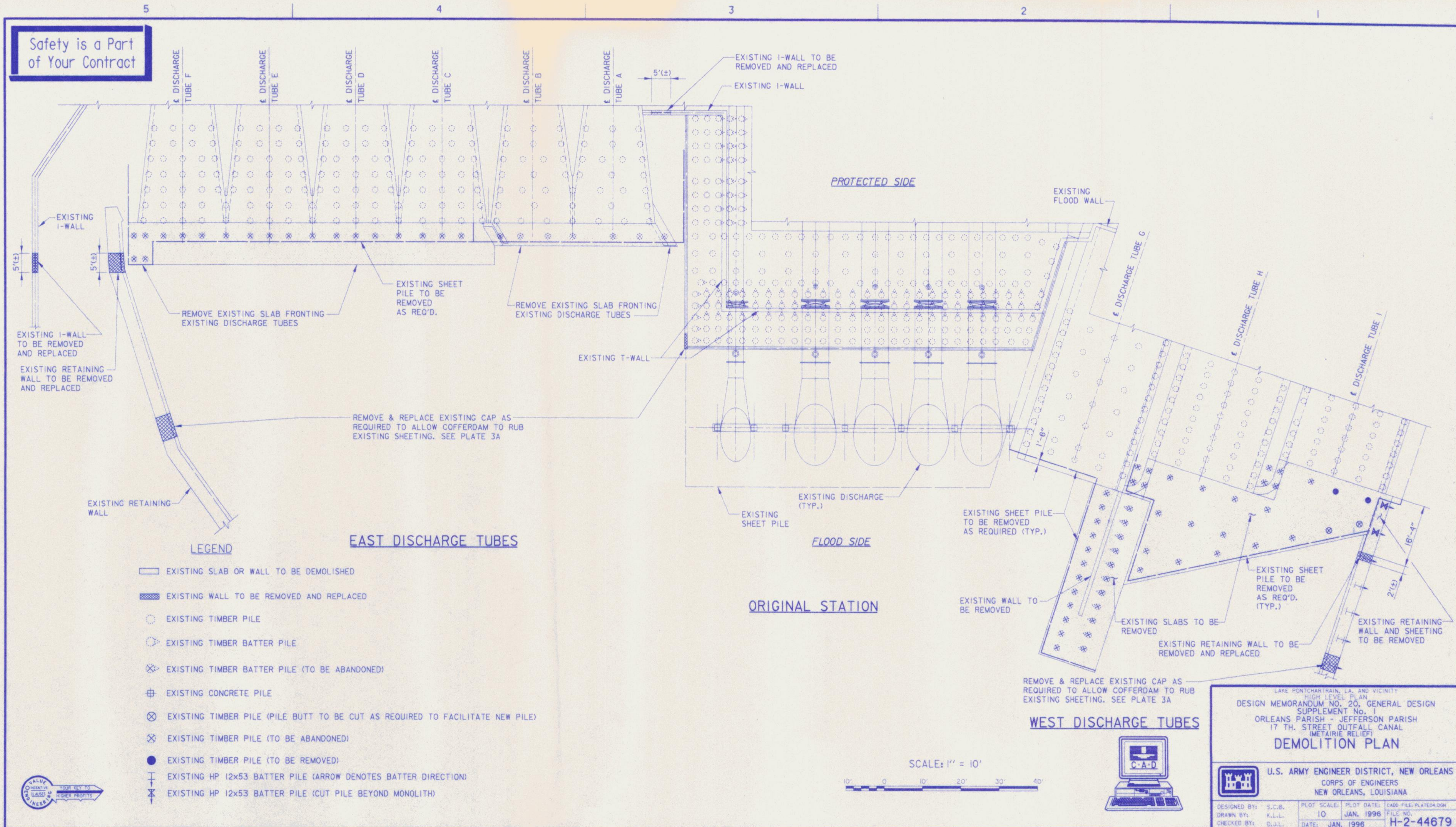
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

ENLARGED COFFERDAM PLAN AND ELEVATION @ WEST MONOLITH

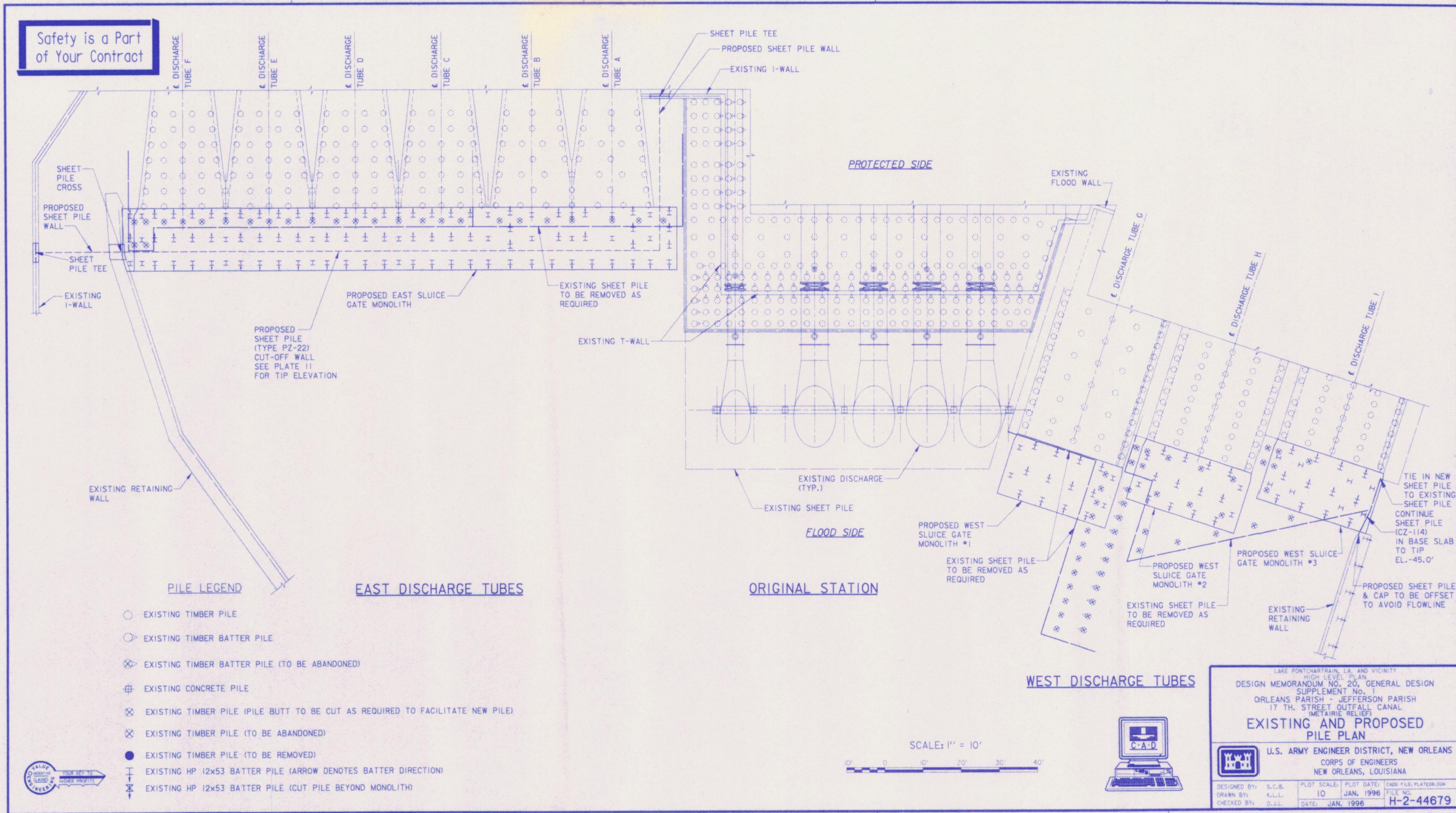
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: M.D.P.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE03C.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: M.D.P.	DATE: JAN. 1996			

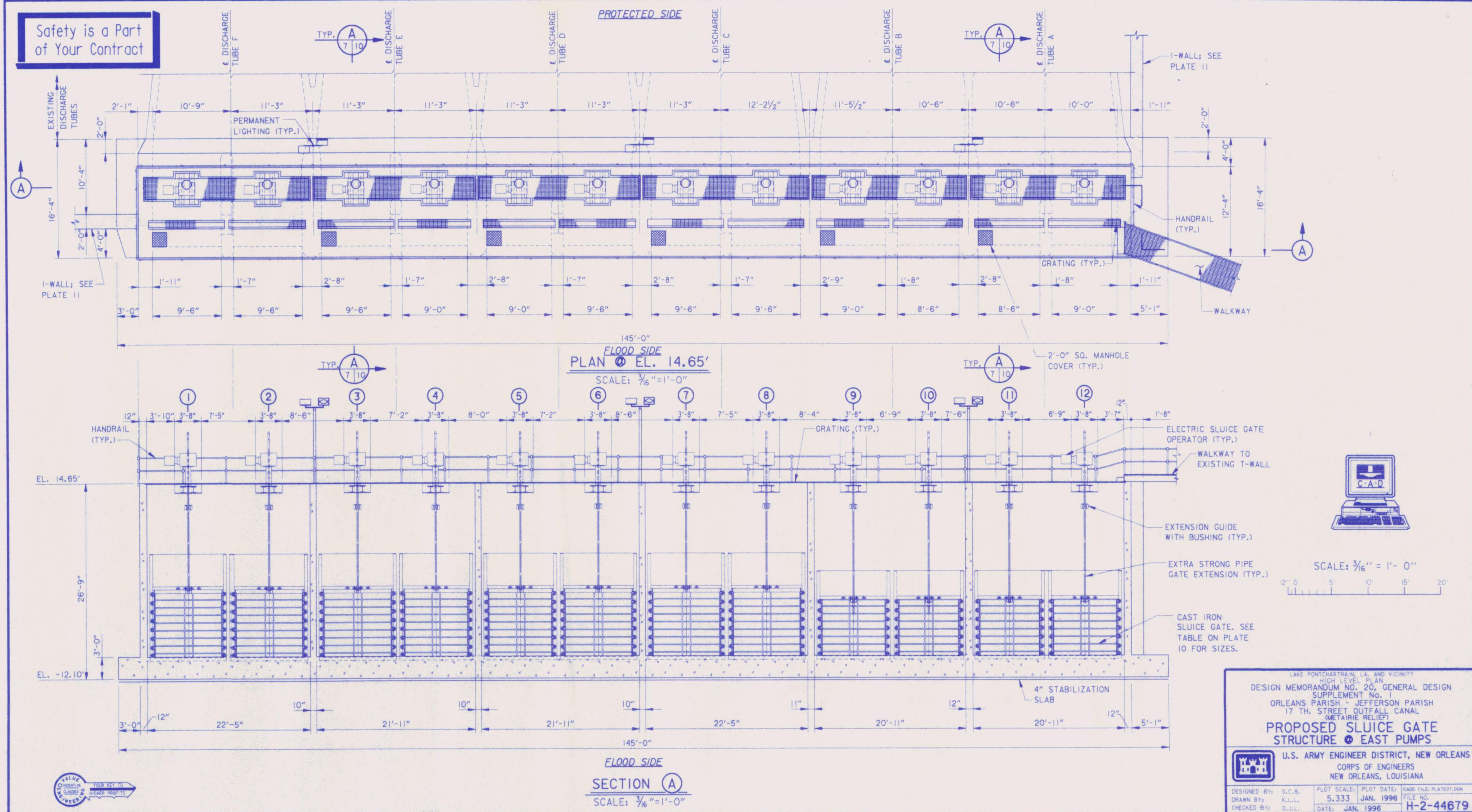
PLATE 3C


Safety is a Part of Your Contract
℄ DISCHARGE TUBE F
℄ DISCHARGE TUBE E
℄ DISCHARGE TUBE D
℄ DISCHARGE TUBE C
℄ DISCHARGE TUBE B
℄ DISCHARGE TUBE A
5'(±)
EXISTING I-WALL TO BE REMOVED AND REPLACED
EXISTING I-WALL
PROTECTED SIDE
EXISTING FLOOD WALL
EXISTING I-WALL
5'(±)
5'(±)
EXISTING SHEET PILE TO BE REMOVED AS REQ'D.
REMOVE EXISTING SLAB FRONTING EXISTING DISCHARGE TUBES
REMOVE EXISTING SLAB FRONTING EXISTING DISCHARGE TUBES
EXISTING I-WALL TO BE REMOVED AND REPLACED
EXISTING RETAINING WALL TO BE REMOVED AND REPLACED
EXISTING T-WALL
℄ DISCHARGE TUBE G
℄ DISCHARGE TUBE H
℄ DISCHARGE TUBE I
REMOVE & REPLACE EXISTING CAP AS REQUIRED TO ALLOW COFFERDAM TO RUB EXISTING SHEETING. SEE PLATE 3A
1'-6"
EXISTING RETAINING WALL
EXISTING DISCHARGE (TYP.)
EXISTING SHEET PILE
EXISTING SHEET PILE TO BE REMOVED AS REQUIRED (TYP.)
EAST DISCHARGE TUBES
FLOOD SIDE
16'-4"
EXISTING SHEET PILE TO BE REMOVED AS REQ'D. (TYP.)
2'(±)
ORIGINAL STATION
EXISTING WALL TO BE REMOVED
EXISTING SLABS TO BE REMOVED
EXISTING RETAINING WALL AND SHEETING TO BE REMOVED
EXISTING RETAINING WALL TO BE REMOVED AND REPLACED
REMOVE & REPLACE EXISTING CAP AS REQUIRED TO ALLOW COFFERDAM TO RUB EXISTING SHEETING. SEE PLATE 3A
WEST DISCHARGE TUBES
LEGEND
EXISTING SLAB OR WALL TO BE DEMOLISHED
EXISTING WALL TO BE REMOVED AND REPLACED
EXISTING TIMBER PILE
EXISTING TIMBER BATTER PILE
EXISTING TIMBER BATTER PILE (TO BE ABANDONED)
EXISTING CONCRETE PILE
EXISTING TIMBER PILE (PILE BUTT TO BE CUT AS REQUIRED TO FACILITATE NEW PILE)
EXISTING TIMBER PILE (TO BE ABANDONED)
EXISTING TIMBER PILE (TO BE REMOVED)
EXISTING HP 12x53 BATTER PILE (ARROW DENOTES BATTER DIRECTION)
EXISTING HP 12x53 BATTER PILE (CUT PILE BEYOND MONOLITH)
VALUE ENGINEERING INCENTIVE CLAUSES YOUR KEY TO HIGHER PROFITS
SCALE: 1" = 10'
10' 0 10' 20' 30' 40'
C-A-D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
DEMOLITION PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: S.C.B.
DRAWN BY: K.L.L.
CHECKED BY: D.J.L.
PLOT SCALE: 10
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE04.DGN
FILE NO. H-2-44679


LEGEND
LIMITS OF CONSTRUCTION
CONSTRUCTION STAGING AREAS
TEMPORARY CONSTRUCTION AND PERMANENT MAINTENANCE AREA REQUIRING PERMIT FROM RAILROAD
TEMPORARY EQUIPMENT AND MATERIAL ACCESS ALLEY REQUIRING PERMIT FROM RAILROAD
CONSTRUCTION STAGING AREA
Safety is a Part of Your Contract
BASELINE
670+00
671+00
613+00
FLOOD SIDE
SOUTHERN RAILROAD
CONSTRUCTION ACCESS ALLEY
RIPRAP
PROPOSED CONNECTING WALKWAY (TYP.)
PROPOSED CONNECTING WALKWAY
20'
19'-7"
22'-2"
5'
PROPOSED WEST SLUICE GATE MONOLITH (TYP.) SEE PLATE 8
EXISTING WALKWAY
PROPOSED WALKWAY
PROPOSED WALKWAY
PROPOSED EAST SLUICE GATE MONOLITH SEE PLATE 7
RIPRAP
5.0'
20.0'
CONSTRUCTION STAGING AREA
EXISTING DISCHARGE TUBE I
EXISTING DISCHARGE TUBE H
EXISTING DISCHARGE TUBE G
EXISTING WALKWAY
EXISTING CONSTANT DUTY PUMP
PROPOSED I-WALL SEE PLATE 11
SLOPE SOIL 2' OF FILL TO NATURAL GRADE
PROPOSED CATCH BASIN (TYP.) SEE PLATE 12
PROPOSED I-WALL SEE PLATE 11
24"⌀ PVC
℄ EXISTING DISCHARGE TUBE A
℄ EXISTING DISCHARGE TUBE B
℄ EXISTING DISCHARGE TUBE C
℄ EXISTING DISCHARGE TUBE D
℄ EXISTING DISCHARGE TUBE E
℄ EXISTING DISCHARGE TUBE F
EXISTING VERTICAL PUMP
EXISTING BUILDING LINE
PROTECTED SIDE
TYPICAL PIPE THRU WALL PENETRATION SEE PLATE 12
LIMITS OF CONSTRUCTION AND MAINTENANCE. SEE R.O.W. PLAN PLATE 1 FOR ADDITIONAL DETAILS
EXISTING 36"⌀ O.F.M. LOCATION TO BE FIELD VERIFIED
EXISTING AVE. 'C' 10' BOX CANAL
EXISTING 36"⌀ FORCE MAIN
MOUNT PROPOSED CATCH BASIN ATOP EXIST. CANAL BOX CULVERT
SCALE: 1" = 20'
20' 0 20' 40' 60' 80'
N
VALUE ENGINEERING
INCENTIVE CLAUSES
YOUR KEY TO HIGHER PROFITS
C-A-D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROPOSED SITE PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: M.D.P.
DRAWN BY: L.A.O.
CHECKED BY: M.D.P.
PLOT SCALE: 20
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE05.DGN
FILE NO. H-2-44679
5
4
3
2
1
D
C
B
A



Safety is a Part of Your Contract
℄ DISCHARGE TUBE F
℄ DISCHARGE TUBE E
℄ DISCHARGE TUBE D
℄ DISCHARGE TUBE C
℄ DISCHARGE TUBE B
℄ DISCHARGE TUBE A
SHEET PILE TEE
PROPOSED SHEET PILE WALL
EXISTING I-WALL
PROTECTED SIDE
EXISTING FLOOD WALL
SHEET PILE CROSS
PROPOSED SHEET PILE WALL
SHEET PILE TEE
EXISTING I-WALL
PROPOSED EAST SLUICE GATE MONOLITH
EXISTING SHEET PILE TO BE REMOVED AS REQUIRED
PROPOSED SHEET PILE (TYPE PZ-22) CUT-OFF WALL SEE PLATE 11 FOR TIP ELEVATION
EXISTING T-WALL
℄ DISCHARGE TUBE G
℄ DISCHARGE TUBE H
℄ DISCHARGE TUBE I
EXISTING RETAINING WALL
EXISTING DISCHARGE (TYP.)
EXISTING SHEET PILE
FLOOD SIDE
PROPOSED WEST SLUICE GATE MONOLITH #1
EXISTING SHEET PILE TO BE REMOVED AS REQUIRED
PROPOSED WEST SLUICE GATE MONOLITH #2
PROPOSED WEST SLUICE GATE MONOLITH #3
EXISTING SHEET PILE TO BE REMOVED AS REQUIRED
TIE IN NEW SHEET PILE TO EXISTING SHEET PILE
CONTINUE SHEET PILE (CZ-114) IN BASE SLAB TO TIP EL.-45.0'
PROPOSED SHEET PILE & CAP TO BE OFFSET TO AVOID FLOWLINE
EXISTING RETAINING WALL
PILE LEGEND
EAST DISCHARGE TUBES
ORIGINAL STATION
WEST DISCHARGE TUBES
EXISTING TIMBER PILE
EXISTING TIMBER BATTER PILE
EXISTING TIMBER BATTER PILE (TO BE ABANDONED)
EXISTING CONCRETE PILE
EXISTING TIMBER PILE (PILE BUTT TO BE CUT AS REQUIRED TO FACILITATE NEW PILE)
EXISTING TIMBER PILE (TO BE ABANDONED)
EXISTING TIMBER PILE (TO BE REMOVED)
EXISTING HP 12x53 BATTER PILE (ARROW DENOTES BATTER DIRECTION)
EXISTING HP 12x53 BATTER PILE (CUT PILE BEYOND MONOLITH)
SCALE: 1" = 10'
10' 0 10' 20' 30' 40'
VALUE ENGINEERING INCENTIVE CLAUSES YOUR KEY TO HIGHER PROFITS
C·A·D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING AND PROPOSED
PILE PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: S.C.B.
DRAWN BY: K.L.L.
CHECKED BY: D.J.L.
PLOT SCALE: 10
PLOT DATE: JAN. 1996
DATE: JAN. 1996
FILE NO. H-2-44679
PLATE 6



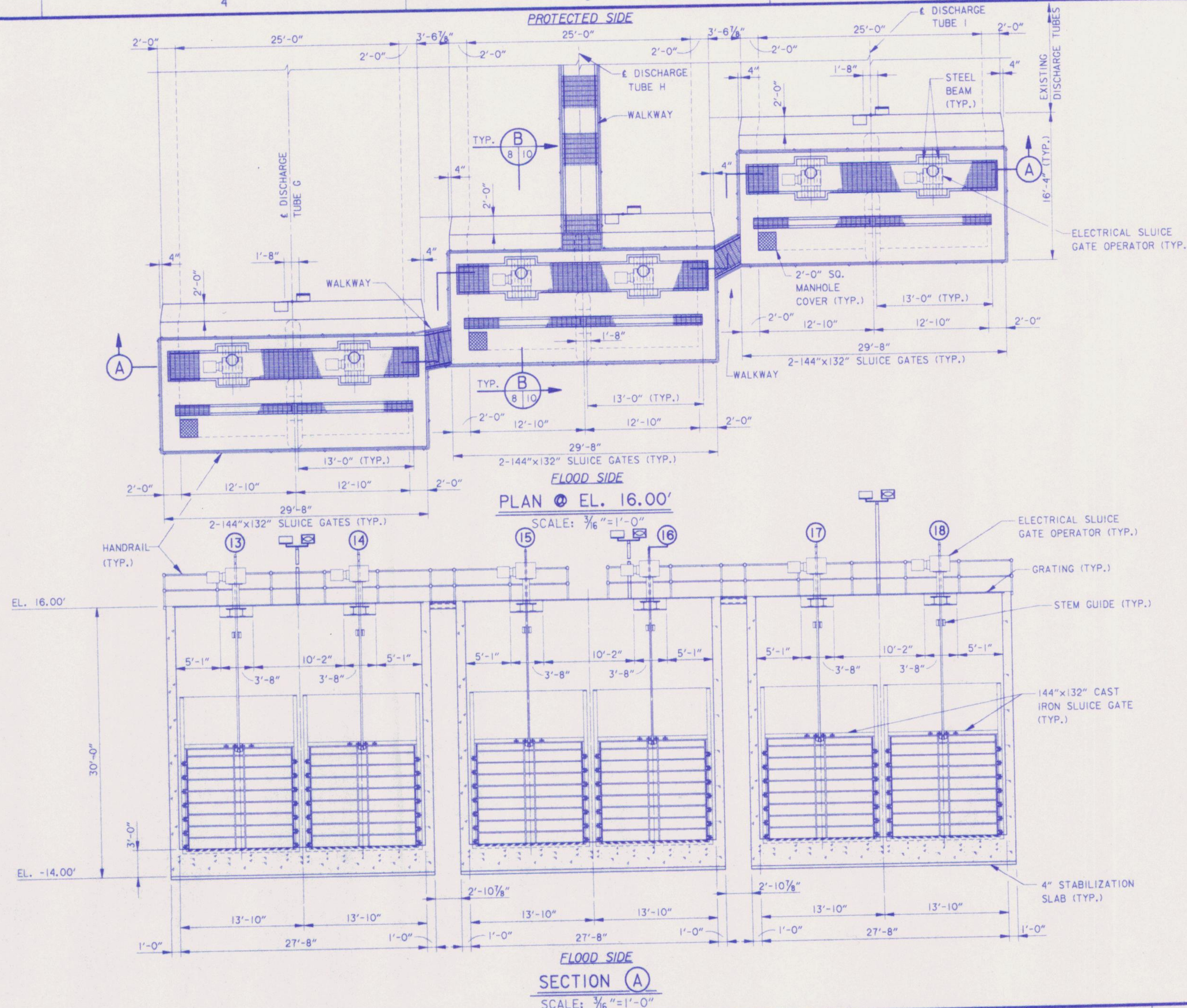
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PROPOSED SLUICE GATE STRUCTURE @ EAST PUMPS

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

DESIGNED BY: S.C.B.	PLOT SCALE: 5.333	PLOT DATE: JAN. 1996
DRAWN BY: K.L.L.	DATE: JAN. 1996	CADD FILE: PLATE07.DGN
CHECKED BY: D.J.L.		FILE NO. H-2-44679

Safety is a Part of Your Contract



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

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PROPOSED SLUICE GATE STRUCTURE @ WEST PUMPS

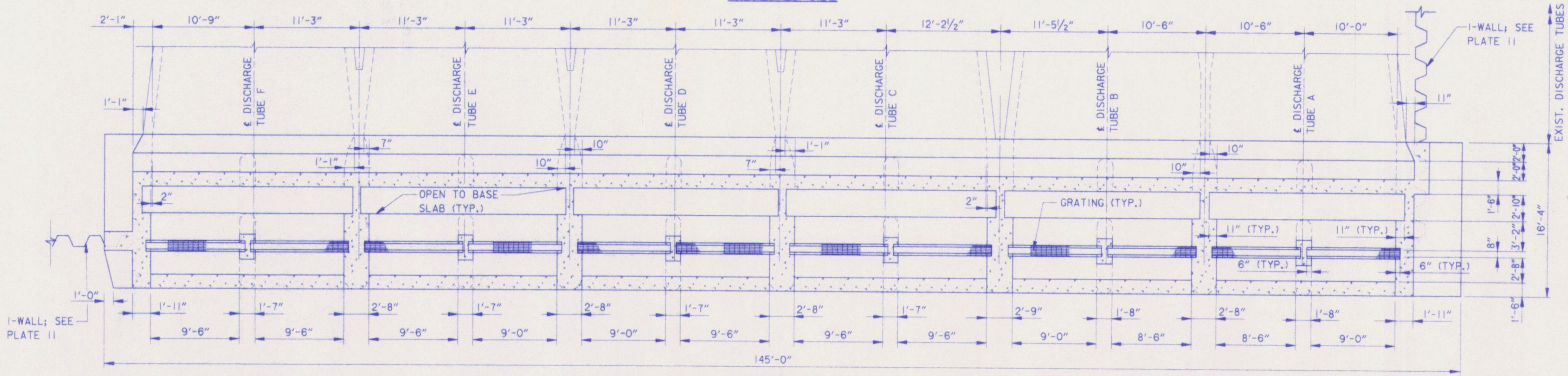
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: S.C.B.	PLOT SCALE: 5.333	PLOT DATE: JAN. 1996	CADD FILE: PLATE08.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: D.J.L.	DATE: JAN. 1996			

PLATE 8

VALUE ENGINEERING INCENTIVE CLAUSES — YOUR KEY TO HIGHER PROFITS

PROTECTED SIDE



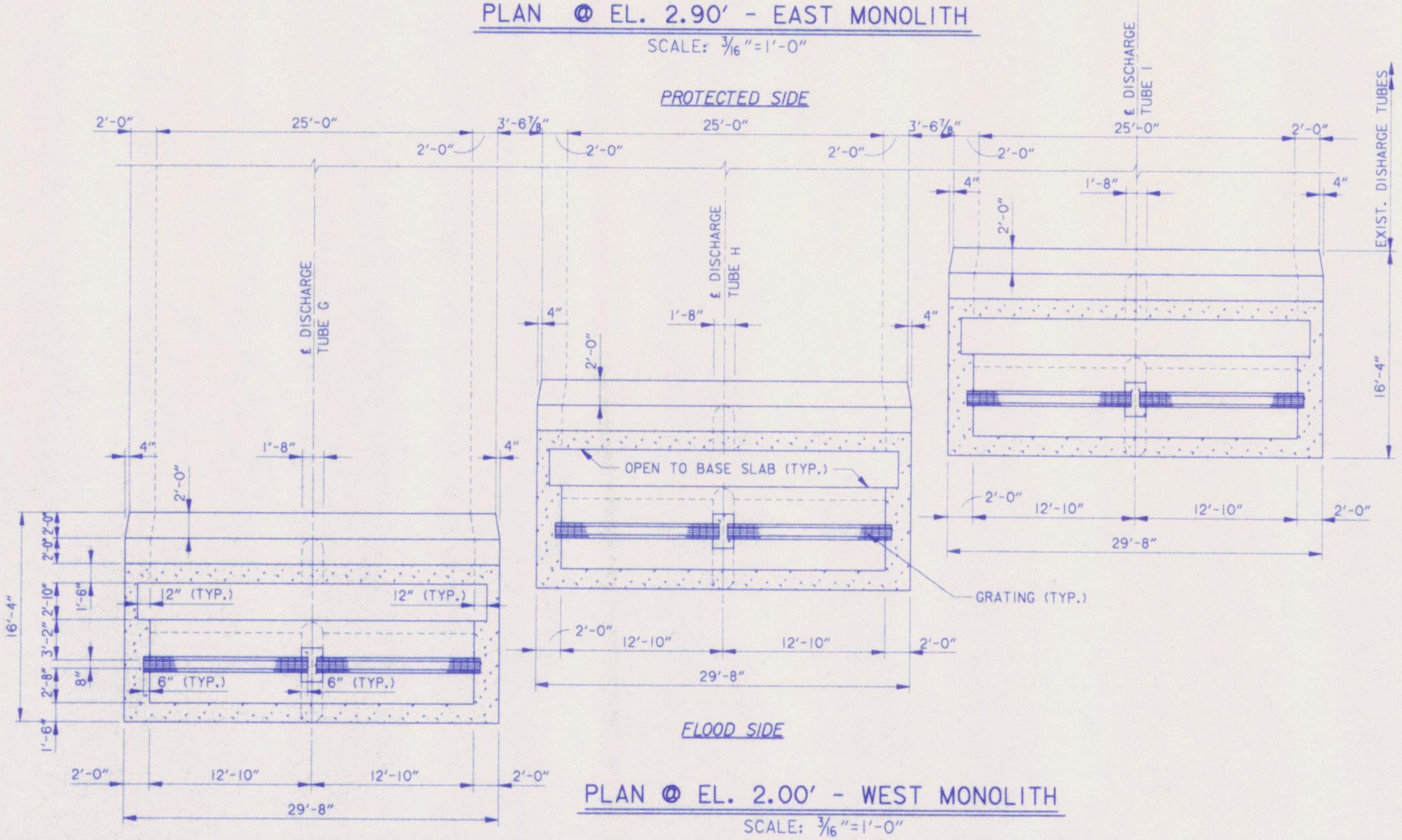
FLOOD SIDE

PLAN @ EL. 2.90' - EAST MONOLITH

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

Safety is a Part of Your Contract

PROTECTED SIDE



FLOOD SIDE

PLAN @ EL. 2.00' - WEST MONOLITH

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

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

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PROPOSED SLUICE GATE STRUCTURE
INTERMEDIATE LEVEL PLANS

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

DESIGNED BY: S.C.B.	PLOT SCALE: 8	PLOT DATE: JAN. 1996	CADD FILE: PLATE09.DGN
DRAWN BY: K.L.L.			FILE NO. H-2-44679
CHECKED BY: D.J.L.	DATE: JAN. 1996		

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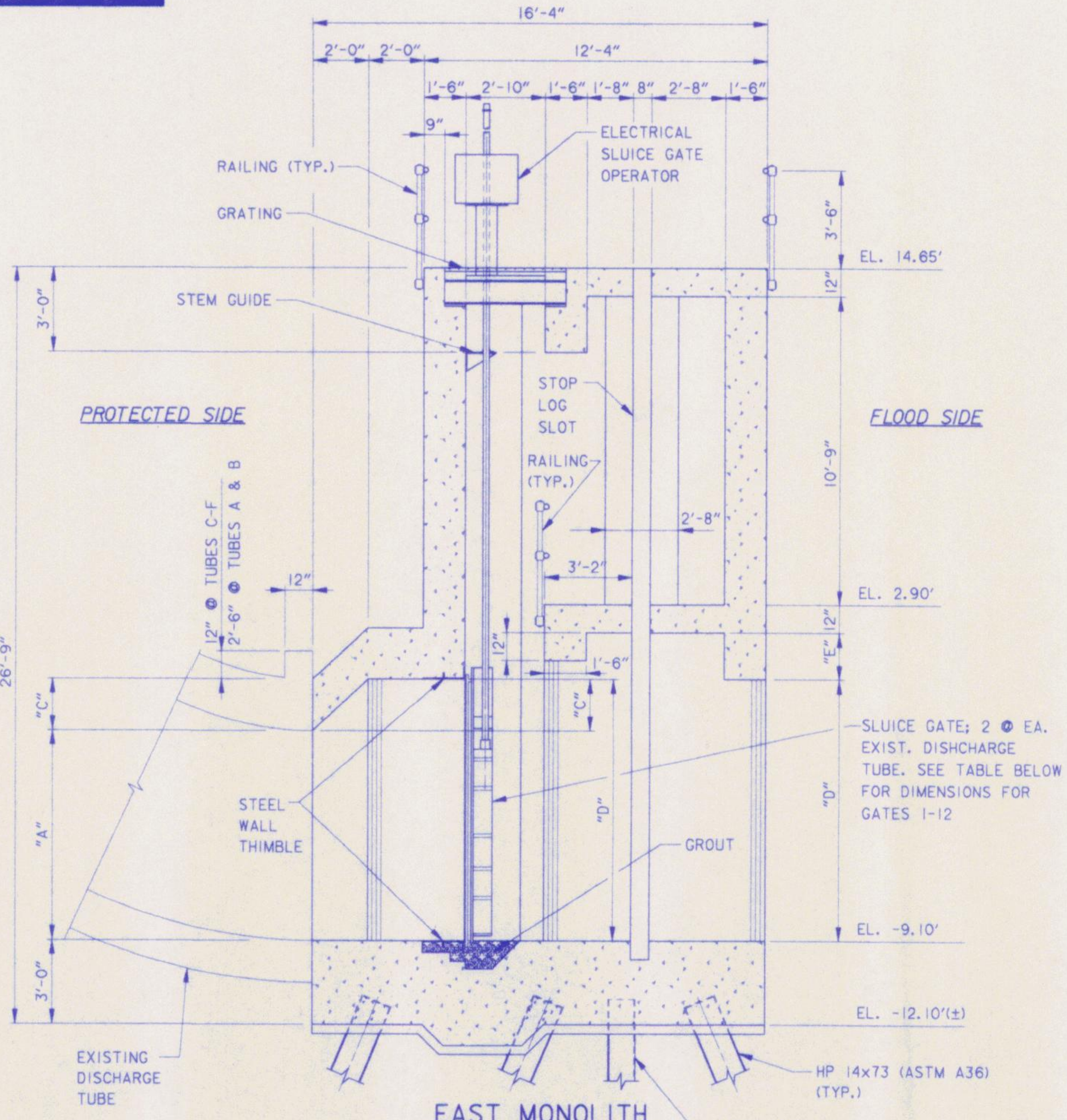
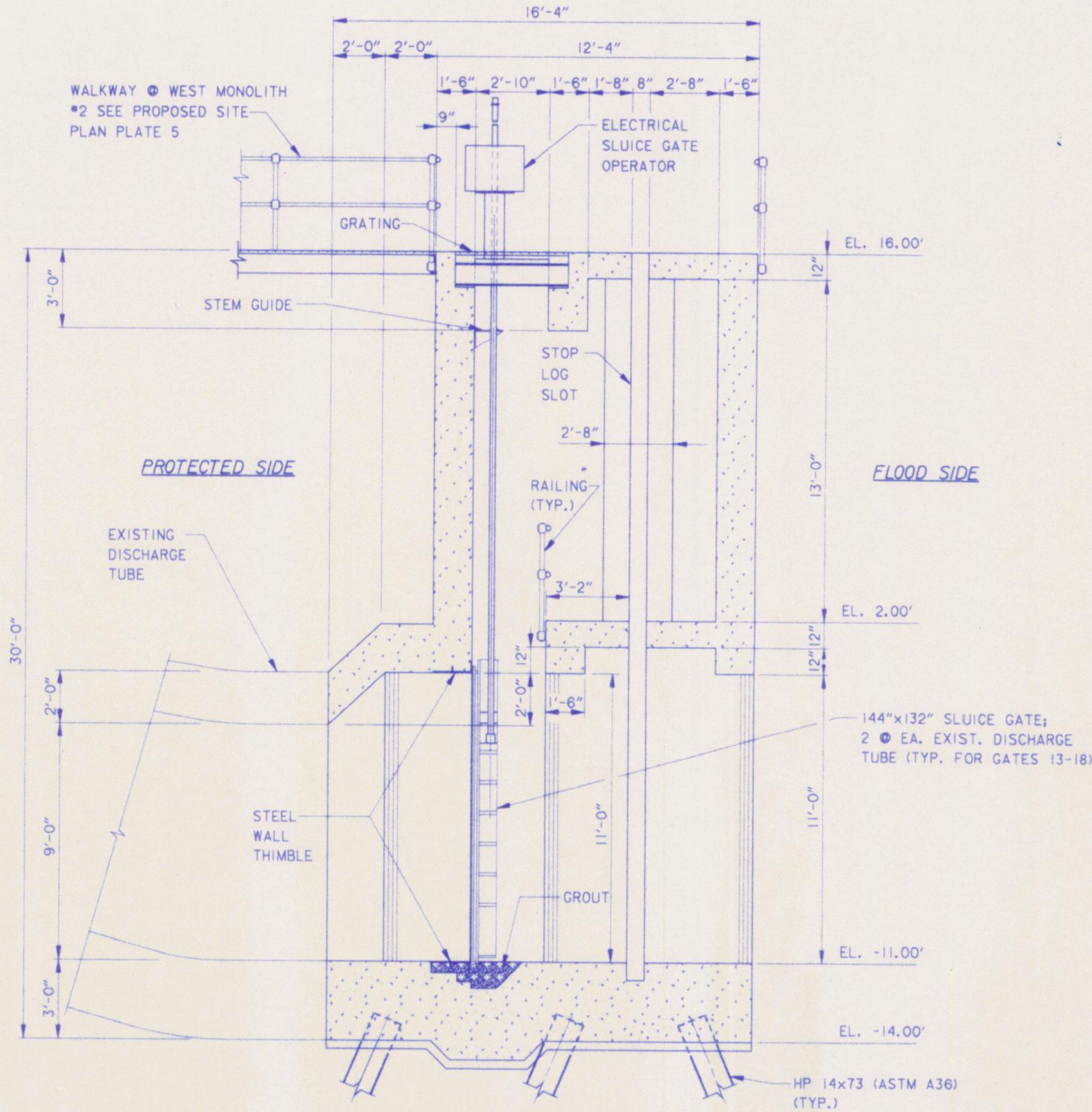


EAST MONOLITH

SECTION A (7 | 10)

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



WEST MONOLITH

SECTION B (8 | 10)

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

GATE TABLE					
GATE	HEIGHT OF EXISTING TUBE	WIDTH OF NEW TUBE	HEIGHT EXTENSION	HEIGHT OF NEW TUBE	BEAM
	"A"	"B"	"C"	"D"	"E"
1-3,6-8	7'-6"	9'-6"	2'-0"	9'-6"	1'-6"
4,5	7'-6"	9'-0"	2'-0"	9'-6"	1'-6"
9,12	6'-0"	9'-0"	1'-6"	7'-6"	3'-6"
10,11	6'-0"	8'-6"	1'-6"	7'-6"	3'-6"

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

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

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PROPOSED SLUICE GATE SECTIONS

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

DESIGNED BY: S.C.B.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE10.DGN	
DRAWN BY: B.M.M.	2.6667	JAN. 1996	FILE NO.	
CHECKED BY: D.J.L.	DATE: JAN. 1996		H-2-44679	

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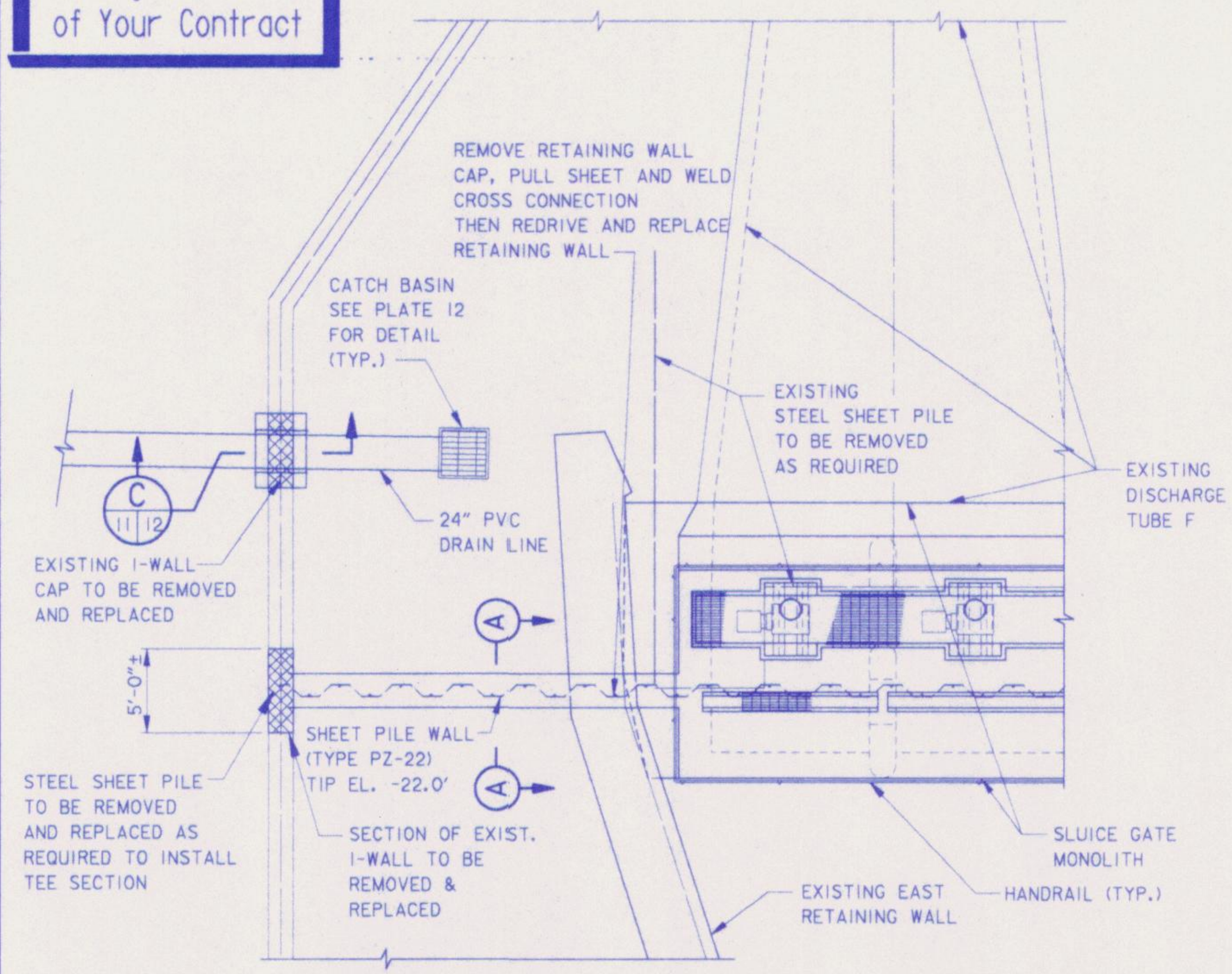
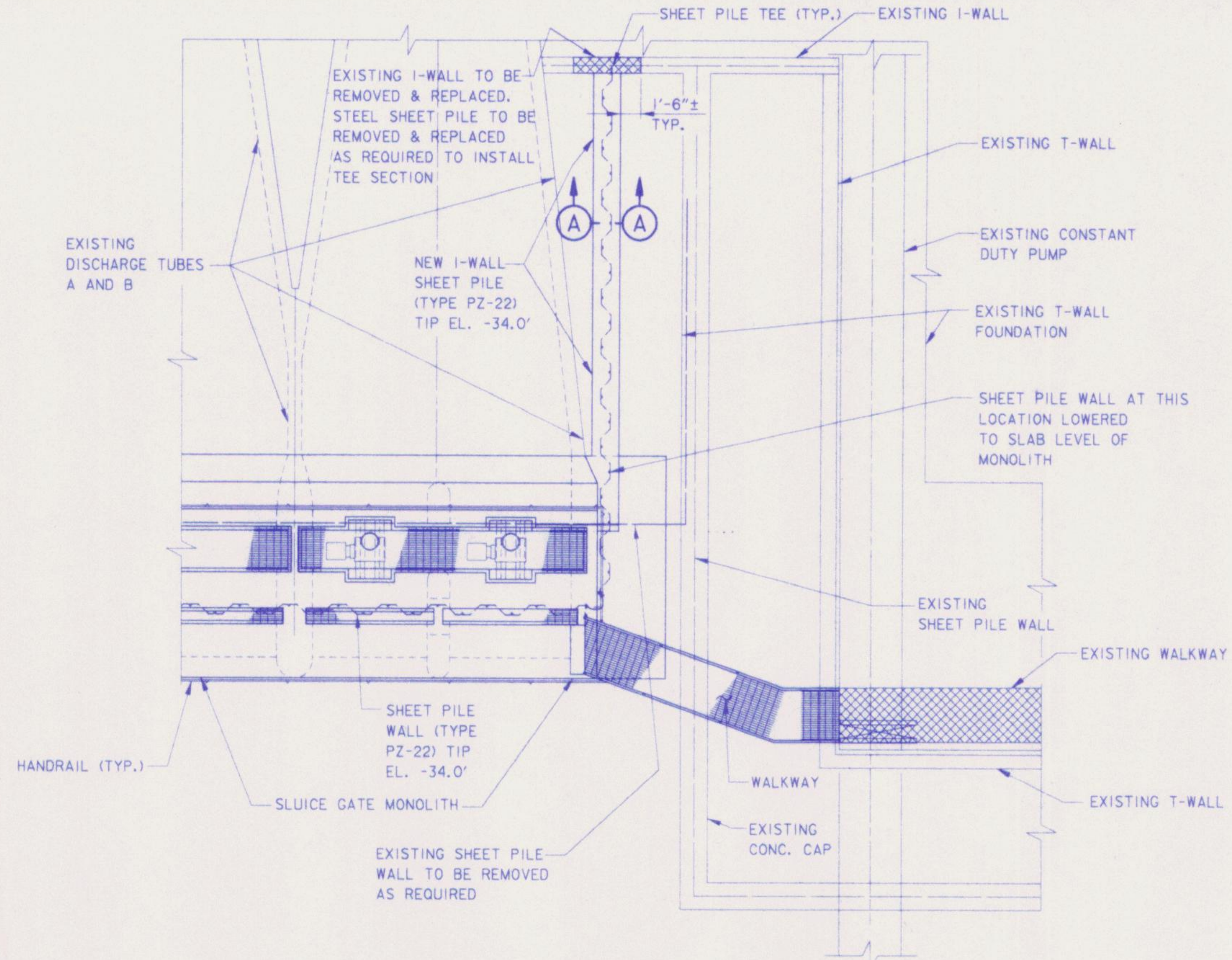


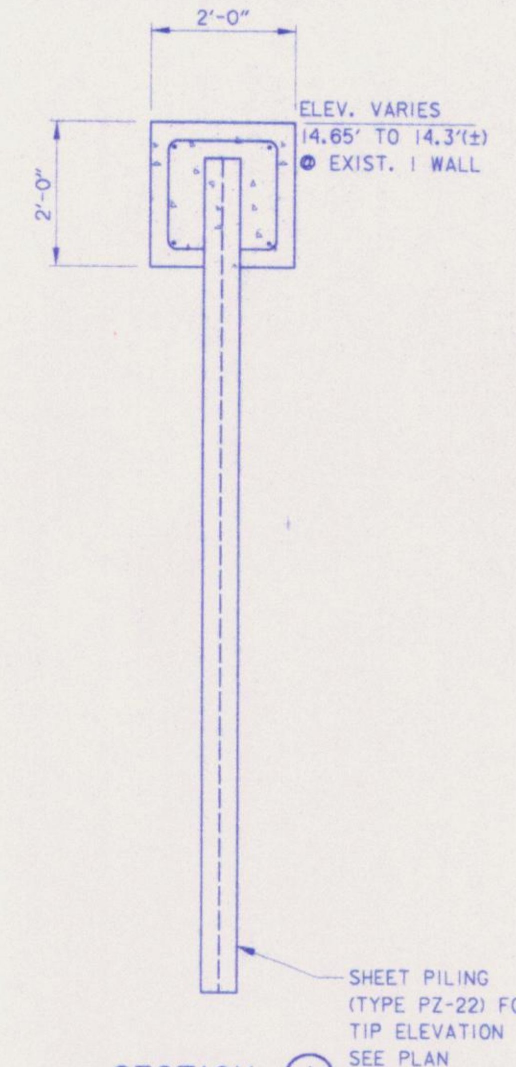
PART PLAN OF I-WALL @ EAST OF EAST MONOLITH

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



PART PLAN OF I-WALL @ WEST OF EAST MONOLITH

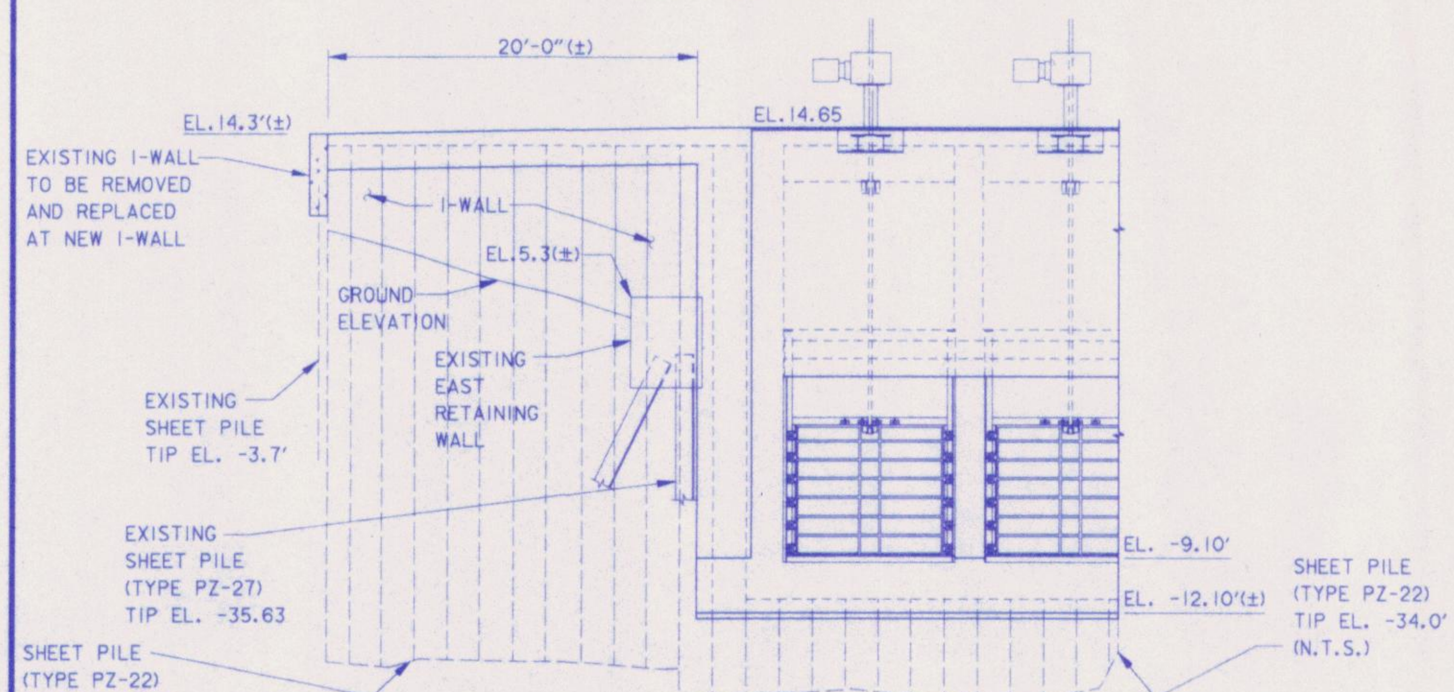
SCALE: 3/16"= 1'-0"



SECTION (A)

I-WALL

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



PART FLOOD SIDE ELEVATION @ EAST OF EAST MONOLITH

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

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

12" 0 5' 10' 15' 20'

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

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

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

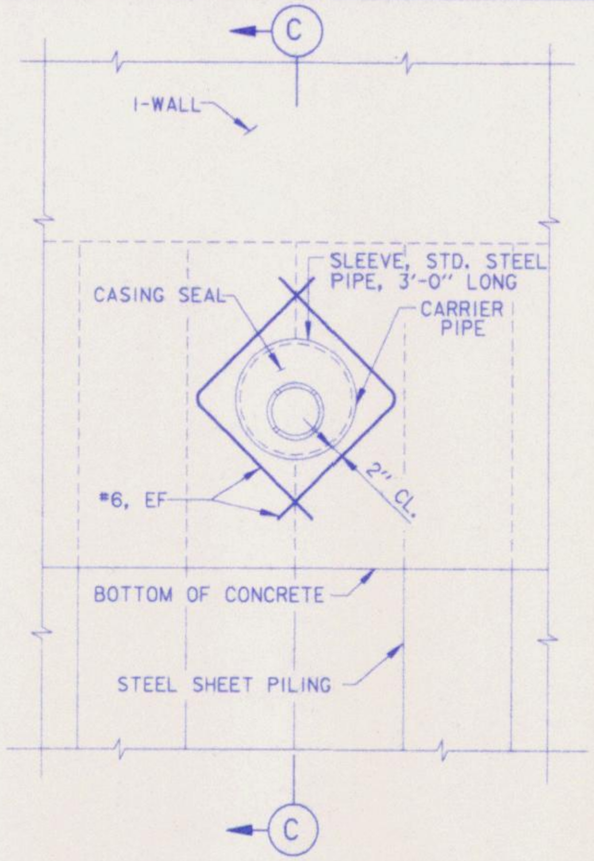
PROPOSED I-WALLS
@ EAST MONOLITH

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

DESIGNED BY: S.C.B.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE11.DGN
DRAWN BY: L.A.O.			FILE NO. H-2-44679
CHECKED BY: M.D.P.	DATE: JAN. 1996		

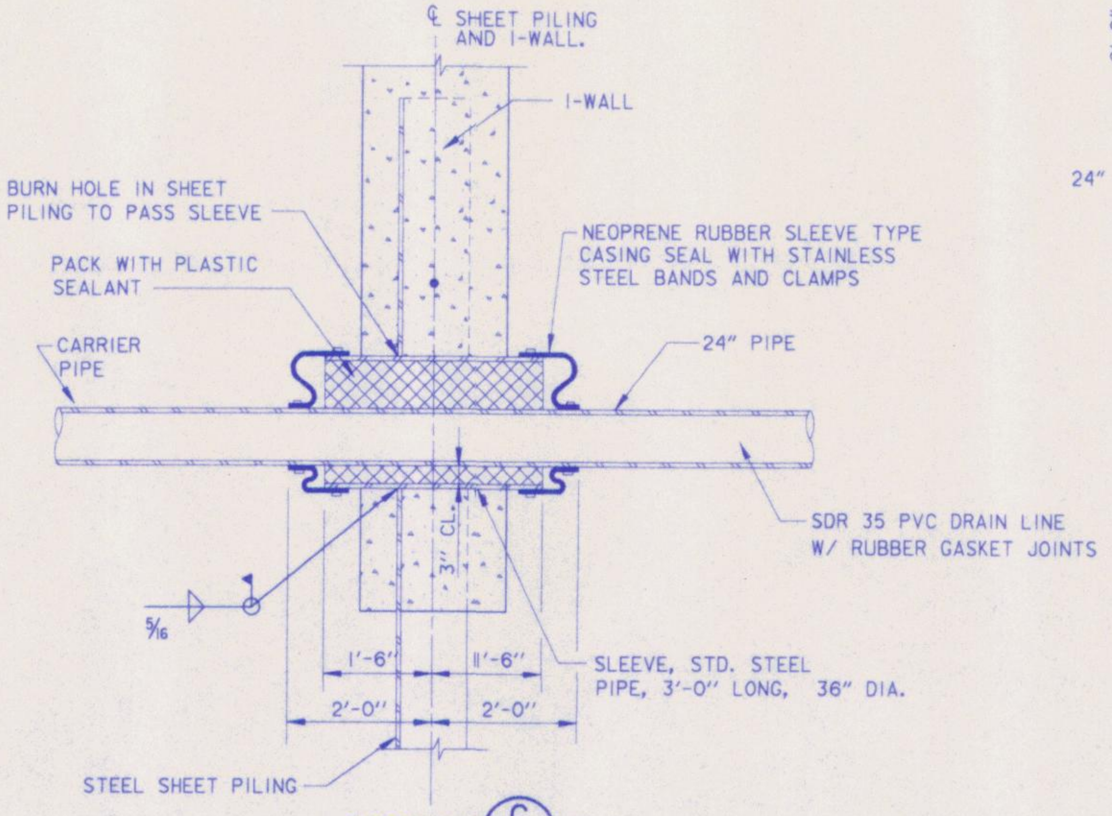
PLATE 11

Safety is a Part of Your Contract



ELEVATION

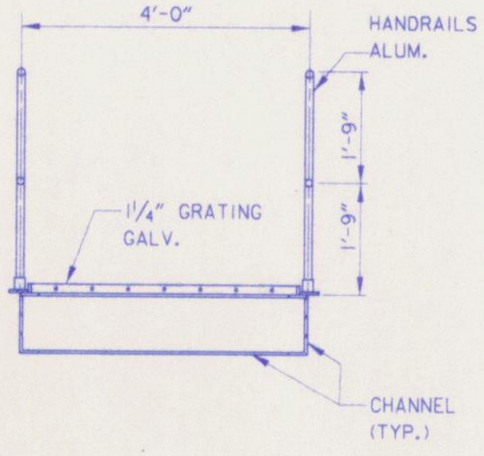
SCALE: 3/4"= 1'-0"



SECTION C (11/12 12)

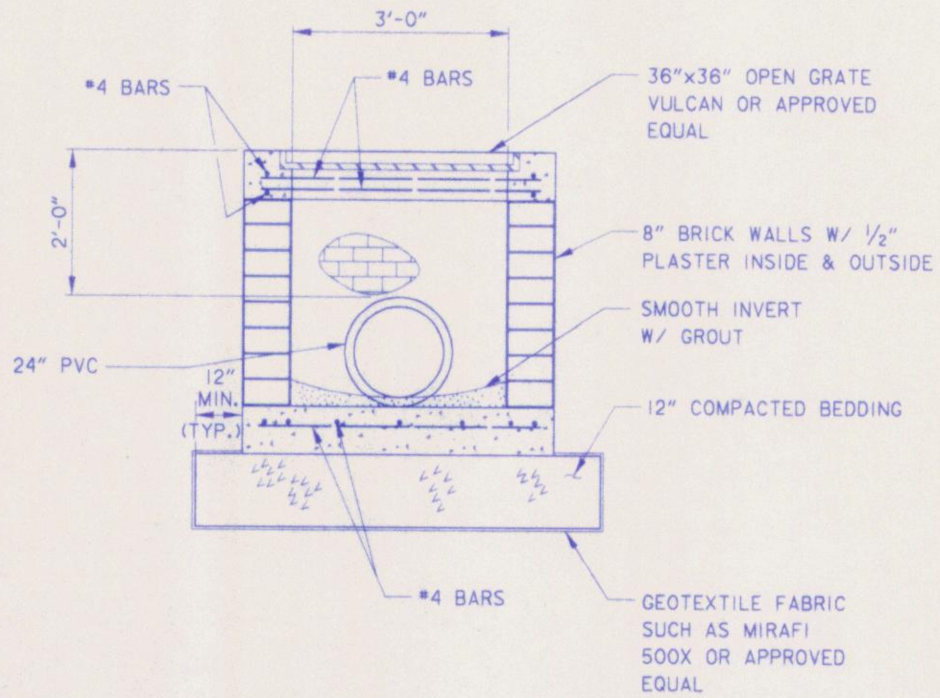
DRAINAGE PIPE THRU EXISTING I-WALL

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



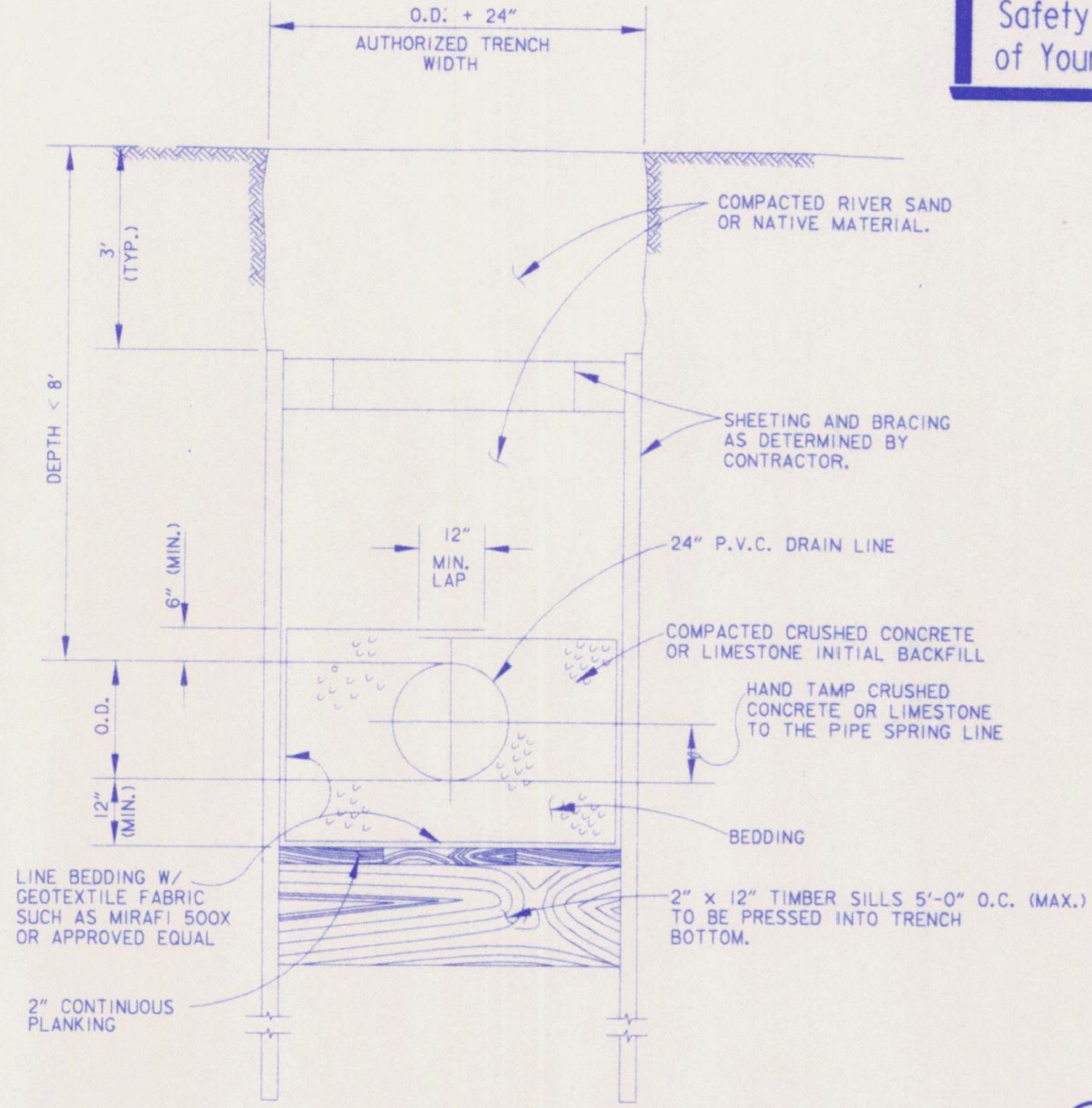
TYPICAL WALKWAY SECTION

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



CATCH BASIN DETAIL

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



DRAINAGE PIPE BEDDING DETAIL

SCALE: N.T.S.

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

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

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

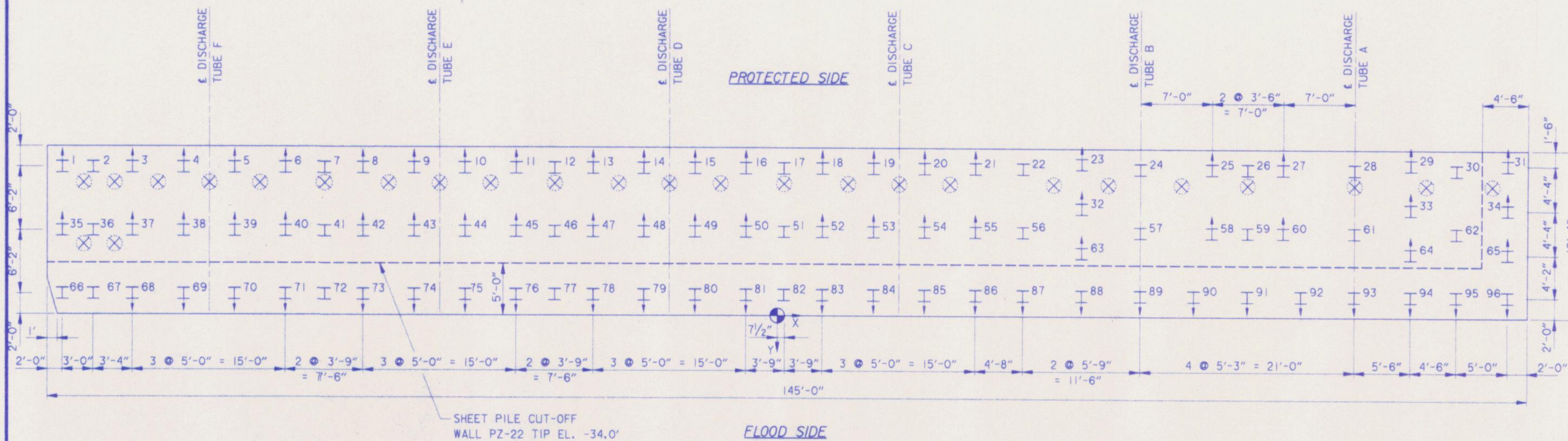
MISCELLANEOUS DETAILS

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

DESIGNED BY: S.C.B.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE12.DGN	
DRAWN BY: B.M.M.	1.3333	JAN. 1996	FILE NO.	
CHECKED BY: D.J.L.	DATE: JAN. 1996		H-2-44679	

PLATE 12

Safety is a Part of Your Contract

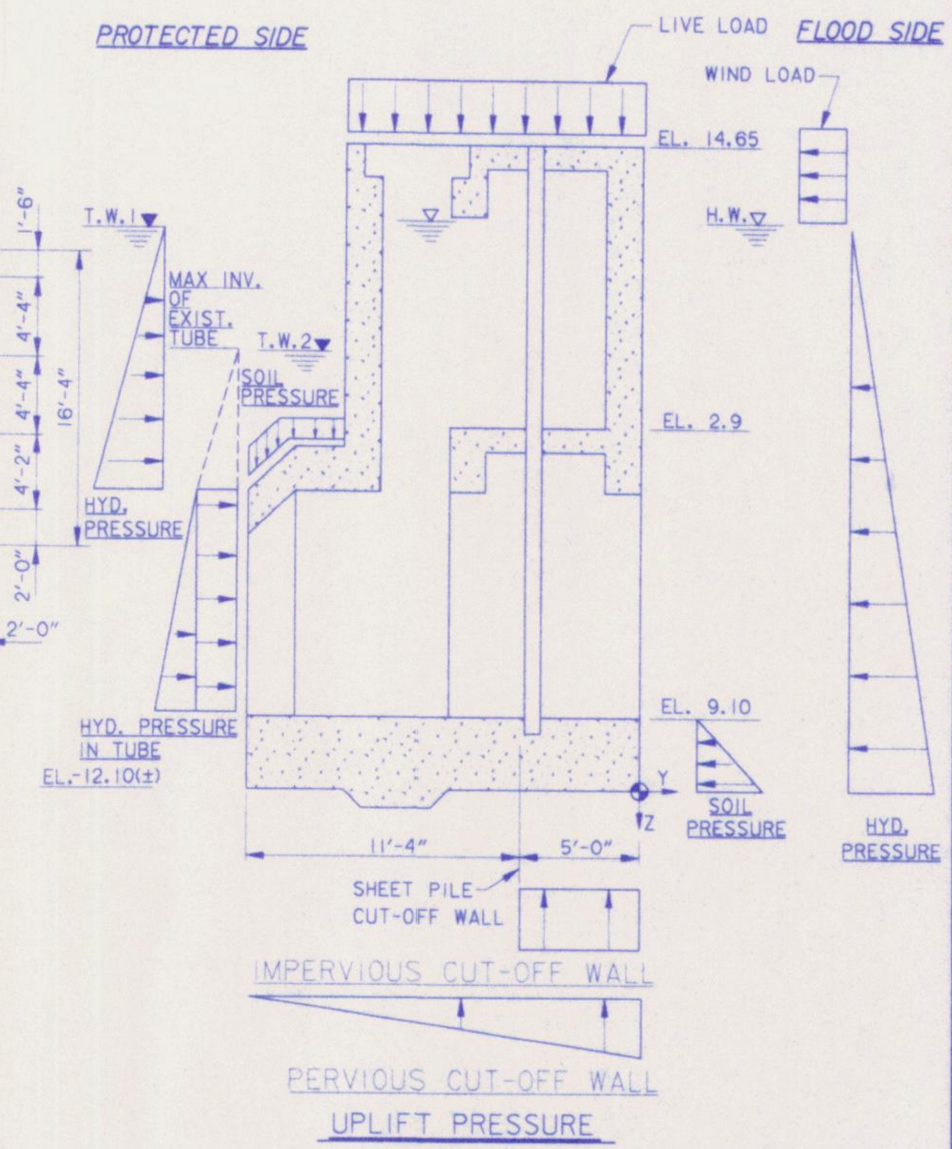


PILE PLAN @ EAST MONOLITH

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

LEGEND:

- HP14x73 (ASTM A36) VERTICAL PILE
- HP14x73 (ASTM A36) (2.5V ON 1H BATTER ; ARROW DENOTES BATTER DIRECTION)
- EXISTING TIMBER PILE (TO BE ABANDONED)



LONGITUDINAL LOADING

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

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

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

LOADING AND PILE DATA FOR EAST SLUICE GATE MONOLITH

CASE	CONDITION	MONOLITH LOADINGS Px KIPS	Py KIPS	Pz KIPS	Mx FT-KIPS	My FT-KIPS	Mz FT-KIPS	SINGLE PILE LOADINGS PILE NUM	MAX. P KIPS	% OF ALLOWABLE ALF	% OF ALLOWABLE CBF	PILE NUM	MIN. P KIPS	% OF ALLOWABLE ALF	% OF ALLOWABLE CBF
1	CONSTRUCTION •	56.3	142.0	2874.1	-24255.9	1029.0	-513.5	2	48.9	.43	.18	35	19.7	.16	.11
2	SWL (HW EL.=12.6'; TW2 EL.=3.9') PERVIOUS CUT-OFF WALL	-87.6	-2256.7	4028.6	-54057.1	-380.0	715.1	31	113.3	.91	.40	68	-48.1	.58	.23
3	SWL (HW EL.=12.6';TW2 EL.=3.9') IMPERVIOUS CUT-OFF WALL	-87.6	-2256.7	4712.8	-60957.0	-380.0	715.1	31	124.5	1.00	.42	68	-37.8	.45	.20
4	NORMAL OPERATING (HW EL.=2.0') IMPERVIOUS CUT-OFF WALL	22.0	-509.1	4465.3	-38532.8	1619.4	1614.0	2	58.2	.51	.17	96	34.4	.28	.12
5	MAINTENANCE (HW EL.=2.0') IMPERVIOUS • CUT-OFF WALL	16.5	-691.6	2694.9	-25576.3	17.0	1210.5	65	51.7	.42	.16	68	8.8	.07	.05
6	2' ABOVE SWL(HW EL.=14.6';TW2 EL.=3.9') • PERVIOUS CUT-OFF WALL	-86.3	-2029.5	2964.0	-44015.4	-485.3	713.2	31	96.2	.78	.35	68	-54.4	.65	.24
7	2' ABOVE SWL (HW EL.=14.6';TW2 EL.=3.9') • IMPERVIOUS CUT-OFF WALL	-86.3	-2029.5	3518.7	-49609.3	-485.3	713.2	31	105.2	.85	.37	68	-46.1	.55	.22
8	FLOOD ON PROTECTED SIDE (TW1 EL.=14.6')• (HW EL.-5.0') IMPERVIOUS CUT-OFF WALL	85.5	571.8	2614.4	-9202.5	2115.5	10.2	68	74.7	.60	.26	1	-7.6	.09	.09

NOTES:

1. FOR DESCRIPTION OF LOADING AND UPLIFT CONDITIONS, SEE REPORT TEXT.
2. ALLOWABLE PILE CAPACITIES IN KIPS (FS=2.0): PILE TIP EL. -101.0'(±)

   BATTER PILE:
   a. COMPRESSION 123.9K
   b. TENSION -83.5K

   VERTICAL PILE:
   a. COMPRESSION 115K
   b. TENSION -77.5K

   • LOADS REDUCED TO 75% OF ACTUAL LOAD FOR 33 1/3% INCREASE IN ALLOWABLE STRESS FOR CONSTRUCTION, MAINTENANCE, AND UNUSUAL CASES
3. ALL ELEVATIONS ARE IN FEET N.G.V.D.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

EAST SLUICE GATE MONOLITH DESIGN

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

DESIGNED BY: S.C.B.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE13.DGN
DRAWN BY: B.M.M.			FILE NO. H-2-44679
CHECKED BY: D.J.L.	DATE: JAN. 1996		

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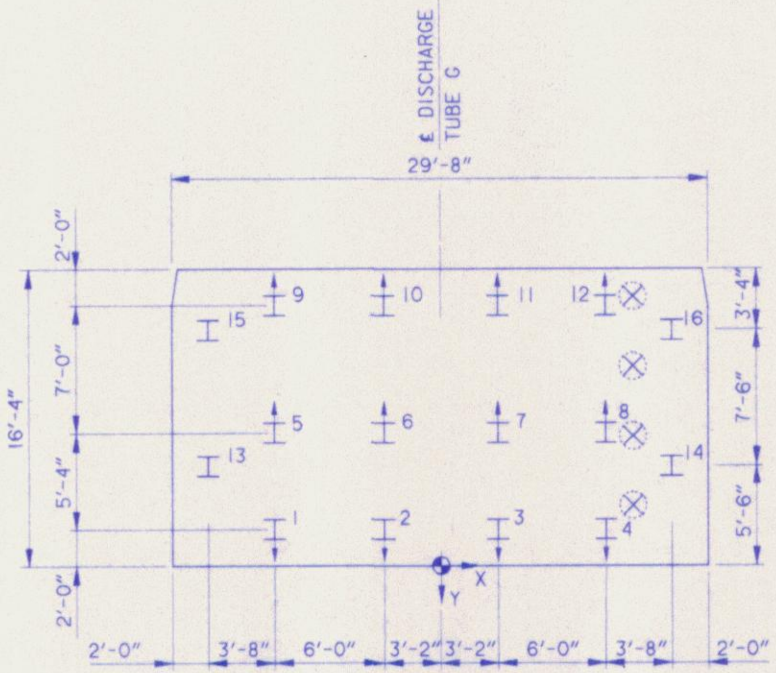
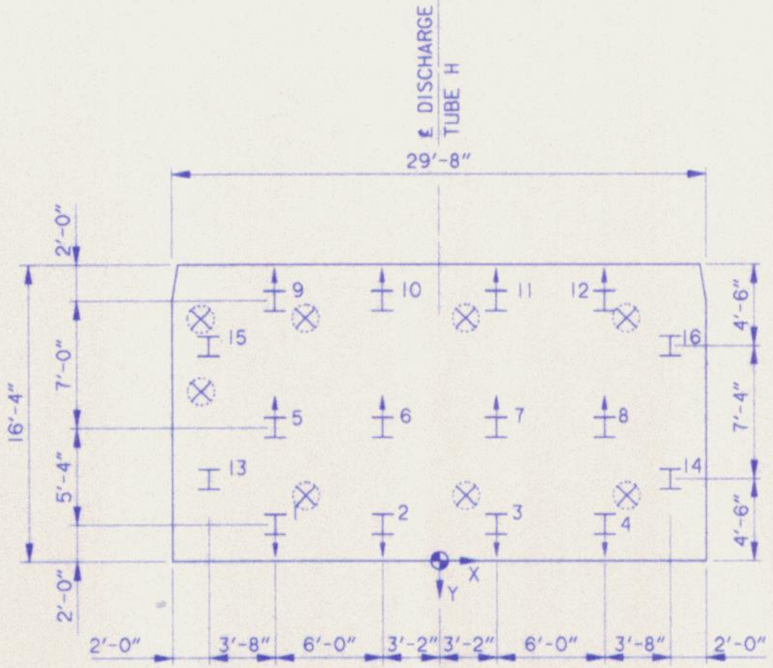
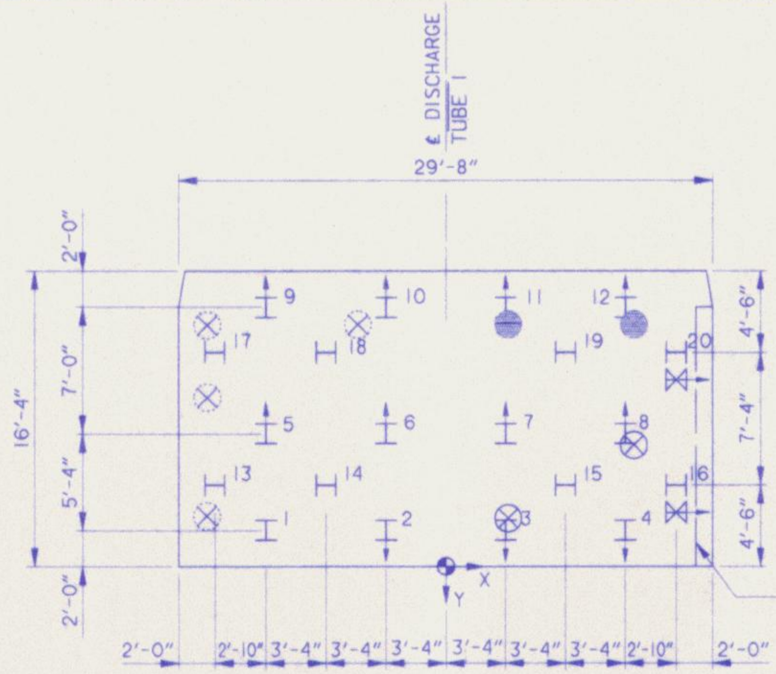


WEST MONOLITH #1



WEST MONOLITH #2

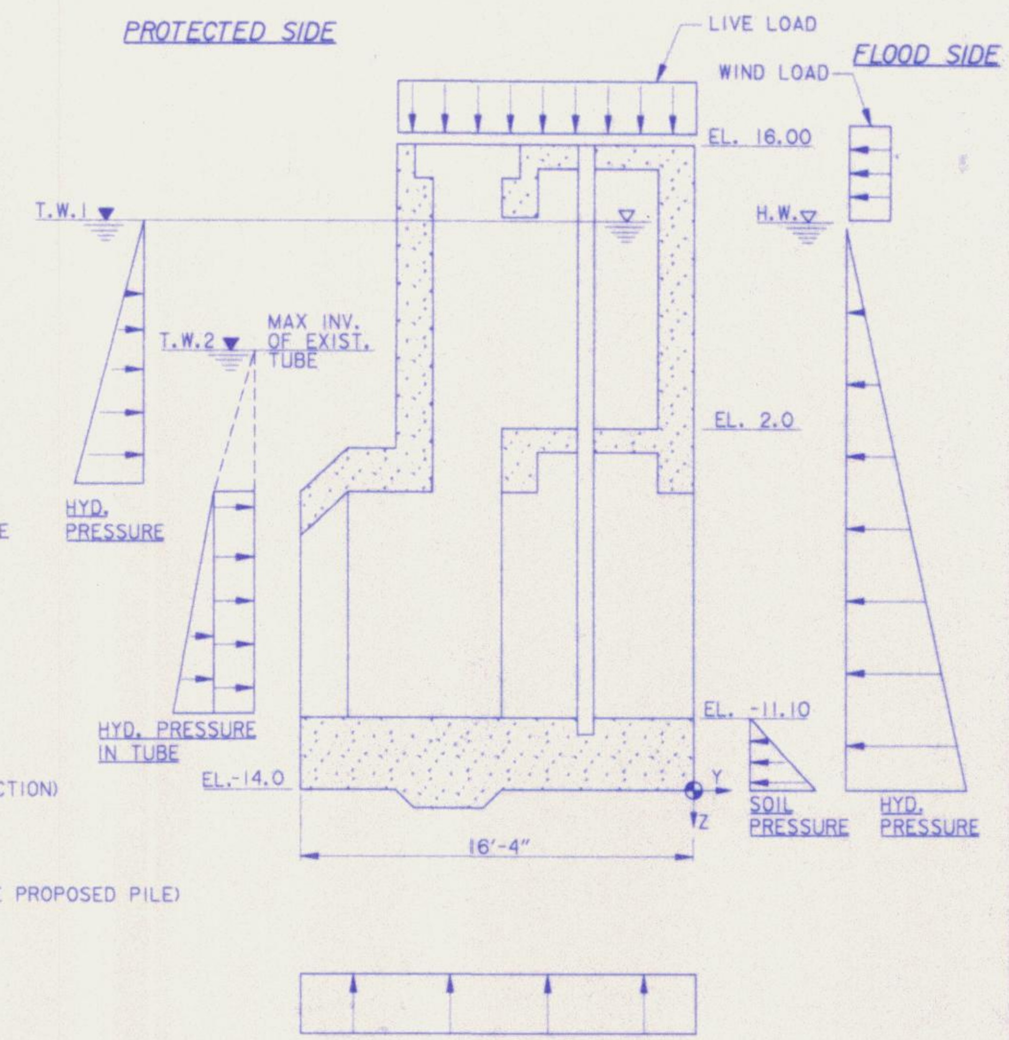


WEST MONOLITH #3

PILING PLAN @ WEST MONOLITH

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

- HP 14x73 (ASTM A36) (VERTICAL)
- HP 14x73 (ASTM A36) (2.5V ON 1H BATTER ARROW INDICATES BATTER DIRECTION)
- EXISTING HP 12x53 (2V ON 1H BATTER) (CUT PILE BEYOND MONOLITH)
- EXISTING TIMBER PILE (PILE BUTT TO BE CUT AS REQUIRED TO FACILITATE PROPOSED PILE)
- EXISTING TIMBER PILE (TO BE ABANDONED)
- EXISTING TIMBER PILE (TO BE REMOVED)



UPLIFT PRESSURE

LONGITUDINAL LOADING

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

LOADING AND PILE DATA FOR WEST SLUICE GATE MONOLITHS

MONOLITH	CASE CONDITION		MONOLITH LOADINGS Px KIPS	Py KIPS	Pz KIPS	Mx FT-KIPS	My FT-KIPS	Mz FT-KIPS	SINGLE PILE LOADINGS PILE NUM.	MAX. P KIPS	% OF ALLOWABLE ALF	% OF ALLOWABLE CBF	PILE NUM.	MIN. P KIPS	% OF ALLOWABLE ALF	% OF ALLOWABLE CBF
1	1	CONSTRUCTION •	0	-43.2	635.0	-5374.5	0	0	16	55.9	.49	.15	5	32.6	.26	.10
	2	SWL (HW EL.=12.6; TW1 EL.=12.6'; TW2 EL.=5.0')	0	-366.2	583.9	-6522.2	0	0	8	112.8	.91	.36	1	-37.9	.45	.17
	3	NORMAL OPERATING (HW EL.=2.0; TW1 EL.=2.0')	0	-130.1	668.5	-5346.0	0	0	5	69.4	.56	.20	16	18.5	.16	.07
	4	MAINTENANCE (HW EL.=2.0; TW1 EL.=2.0') •	0	-177.0	332.7	-2639.5	0	0	5	73.7	.59	.23	16	-31.6	.41	.13
	5	2' ABOVE SWL (HW EL.=14.6'; TW1 EL.=14.6'; TW2 EL.=5.0') •	0	-312.3	423.1	-5011.7	0	0	5	92.5	.75	.30	1	-39.0.	.47	.16
2	1	CONSTRUCTION •	0	-43.2	635.0	-5374.5	0	0	16	61.6	.54	.17	5	28.4	.23	.09
	2	SWL (HW EL.=12.6; TW1 EL.=12.6'; TW2 EL.=5.0')	0	-366.2	583.9	-6522.2	0	0	5	111.4	.90	.35	1	40.6	.49	.18
	3	NORMAL OPERATING (HW EL.=2.0; TW1 EL.=2.0')	0	-130.1	668.5	-5346.0	0	0	5	66.0	.53	.19	16	26.2	.23	.09
	4	MAINTENANCE (HW EL.=2.0; TW1 EL.=2.0') •	0	-177.0	332.7	-2639.5	0	0	5	73.1	.59	.23	16	-26.4	.34	.12
	5	2' ABOVE SWL (HW EL.=14.6'; TW1 EL.=14.6'; TW2 EL.=5.0') •	0	-312.3	423.1	-5011.7	0	0	8	91.8	.74	.30	1	-41.1	.49	.17
3	1	CONSTRUCTION •	-238.1	-43.2	635.0	-5374.5	1428.8	-1944.1	17	56.6	.49	.56	4	16.3	.13	.74
	2	SWL (HW EL.=12.6; TW1 EL.=12.6'; TW2 EL.=5.0')	-148.1	-366.2	583.9	-6522.2	888.0	-1209.2	5	106.0	.86	.77	4	-54.4	.65	.65
	3	NORMAL OPERATING (HW EL.=2.0; TW1 EL.=2.0')	-150.2	-130.1	668.5	-5346.0	923.6	-1226.1	5	62.1	.50	.62	4	8.3	.07	.49
	4	MAINTENANCE (HW EL.=2.0; TW1 EL.=2.0') •	-112.6	-177.0	332.7	-2639.5	692.7	-919.6	5	67.1	.54	.54	20	-24.4	.32	.33
	5	2' ABOVE SWL (HW EL.=14.6'; TW1 EL.=14.6'; TW2 EL.=5.0') •	-111.1	-312.3	423.1	-5011.7	666.0	-906.9	5	87.3	.70	.61	4	-50.6	.61	.52

VALUE ENGINEERING — YOUR KEY TO HIGHER PROFITS

NOTES:

1. FOR DESCRIPTION OF LOADING AND UPLIFT CONDITIONS, SEE REPORT TEXT.
2. ALLOWABLE PILE CAPACITIES IN KIPS (FS=2.0): PILE TIP EL. -101.0'(±)
   BATTER PILE:
   a. COMPRESSION 123.9K
   b. TENSION -83.5K
   VERTICAL PILE:
   a. COMPRESSION 115K
   b. TENSION -77.5K
   • LOADS REDUCED TO 75% OF ACTUAL LOAD FOR 33 1/3% INCREASE IN ALLOWABLE STRESS FOR CONSTRUCTION, MAINTENANCE, AND UNUSUAL CASES
3. ALL ELEVATIONS ARE IN FEET N.G.V.D.
4. A PILE DRIVING ANALYZER SHALL BE REQUIRED TO BE UTILIZED DURING CONSTRUCTION.

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

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

C·A·D

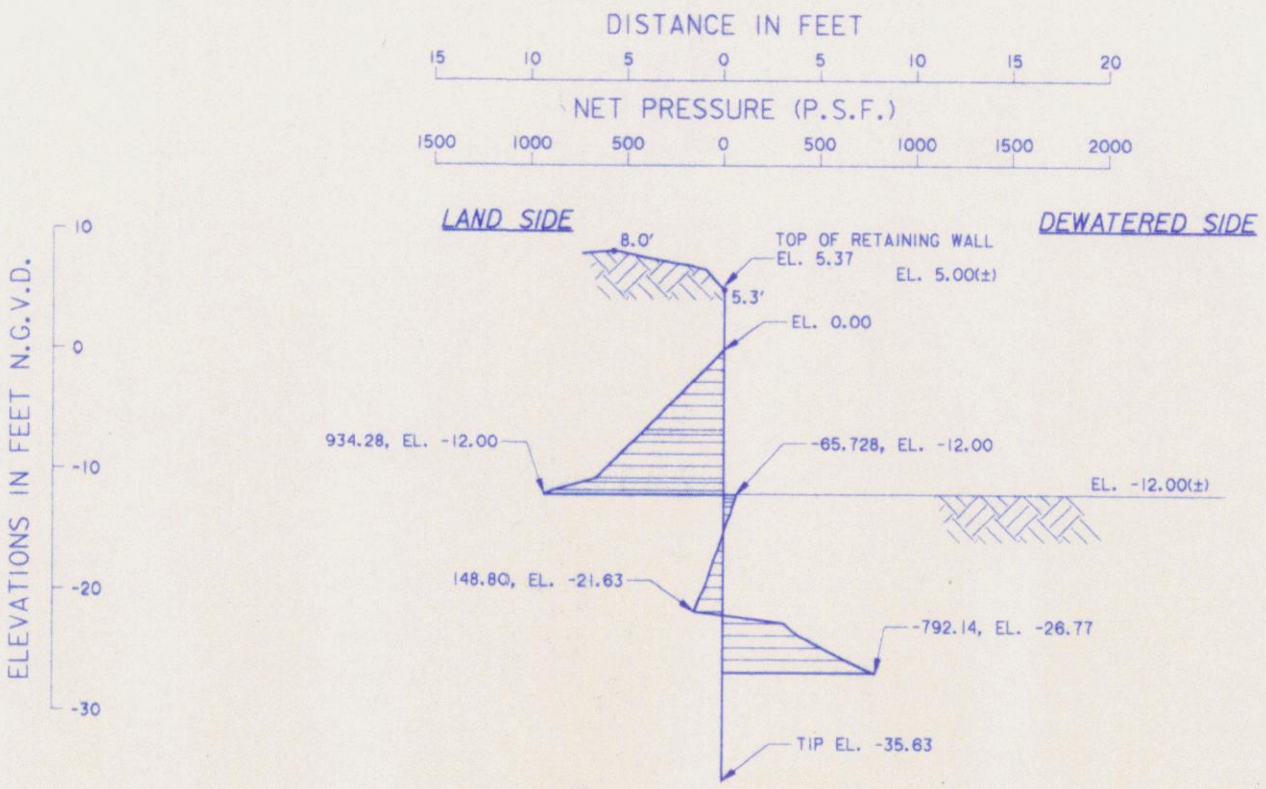
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

WEST SLUICE GATE MONOLITH DESIGN

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

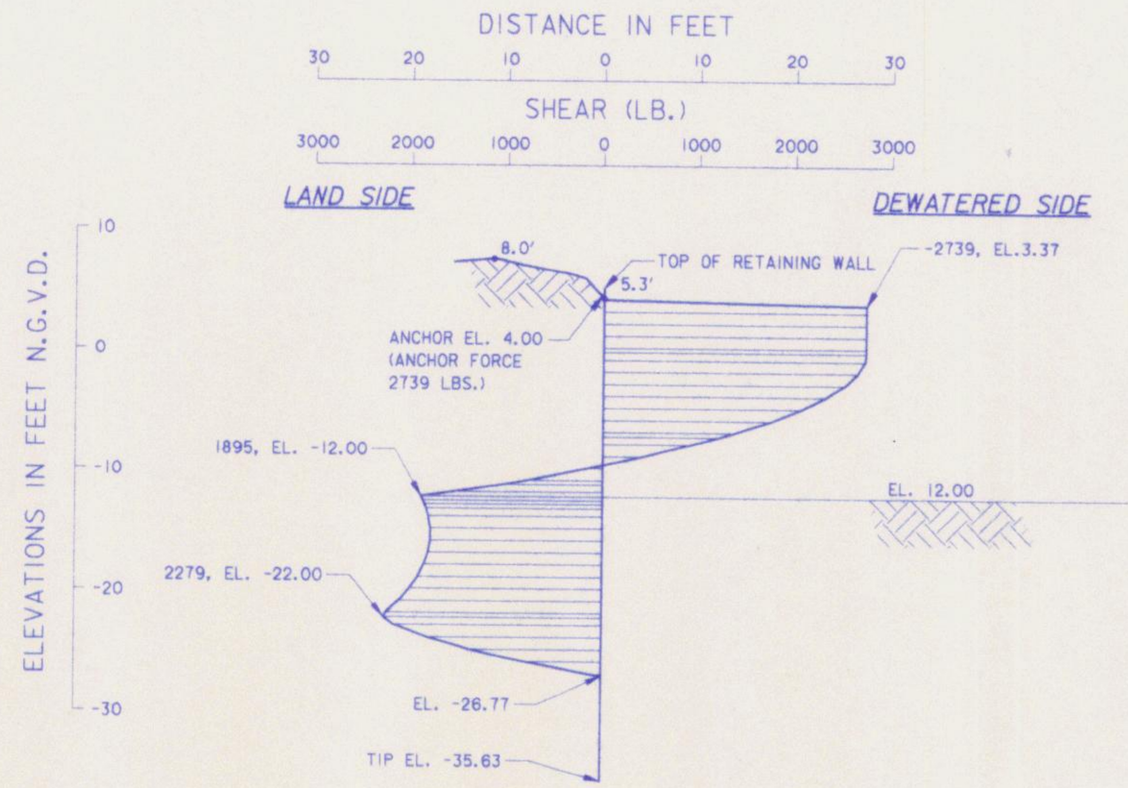
DESIGNED BY: S.C.B.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE14.DGN	
DRAWN BY: B.M.M.			FILE NO. H-2-44679	
CHECKED BY: D.J.L.	DATE: JAN. 1996			

PLATE 14



PRESSURE DIAGRAM

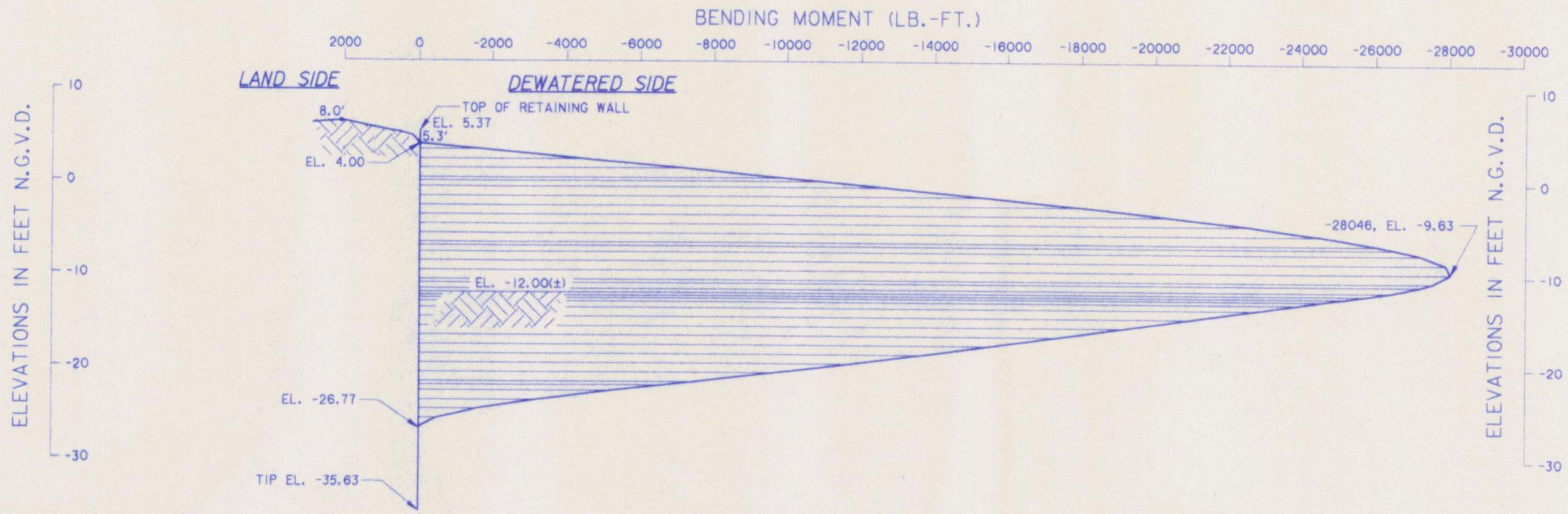
N.T.S.



SHEAR DIAGRAM

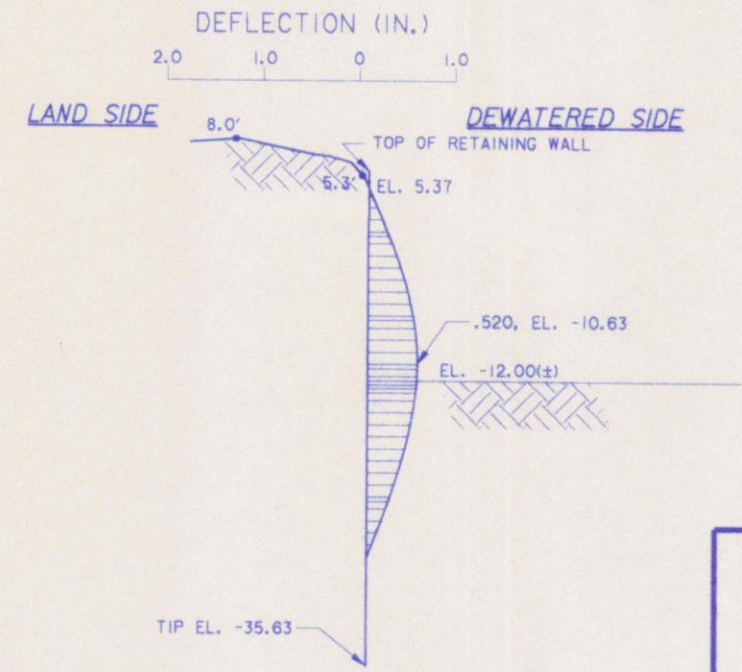
N.T.S.

PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)5.37
TIP ELEVATION = (-)35.63
LENGTH OF PILE = 41.00
PILE TYPE = PZ-27



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

NOTE: GOVERNING CASE: Q CASE; F.S.=1.32 FOR PENETRATION

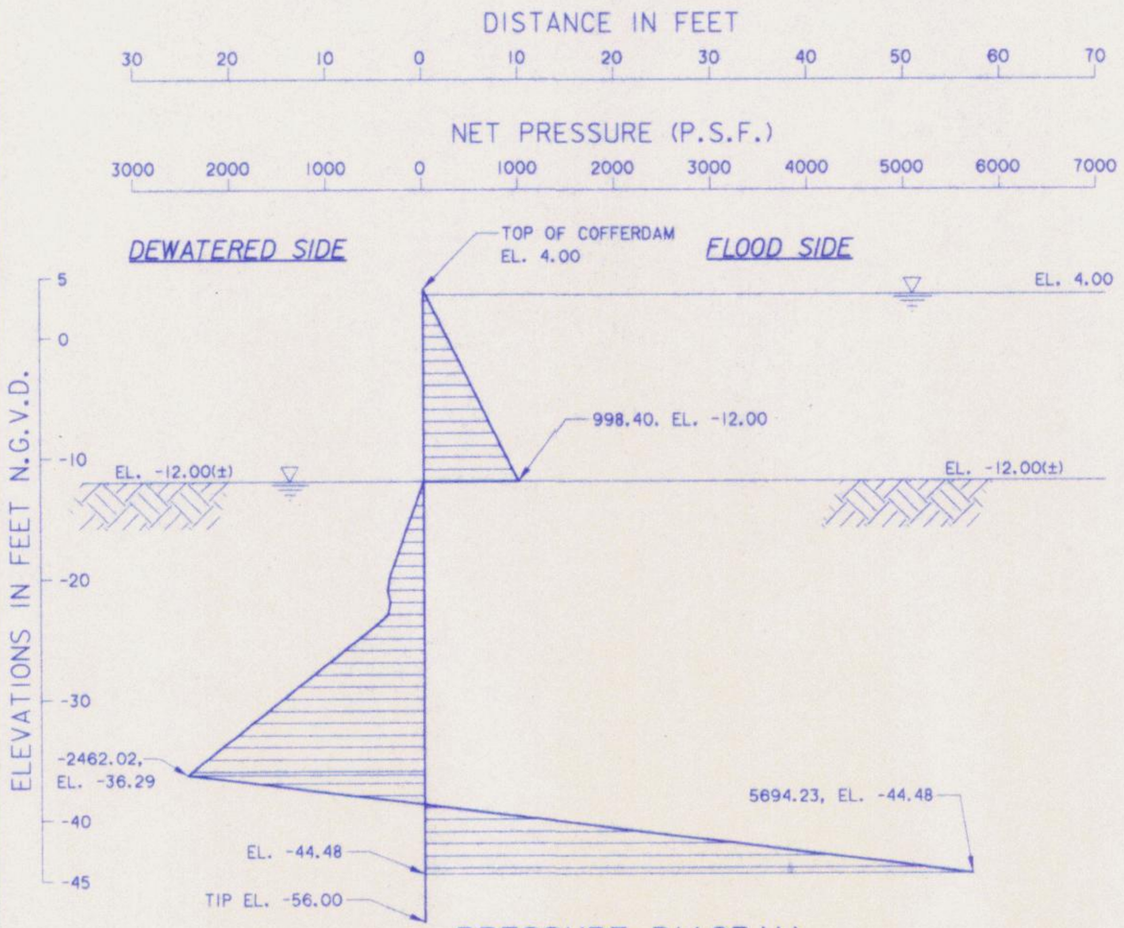
Safety is a Part of Your Contract

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS AT EXISTING EAST RETAINING WALL

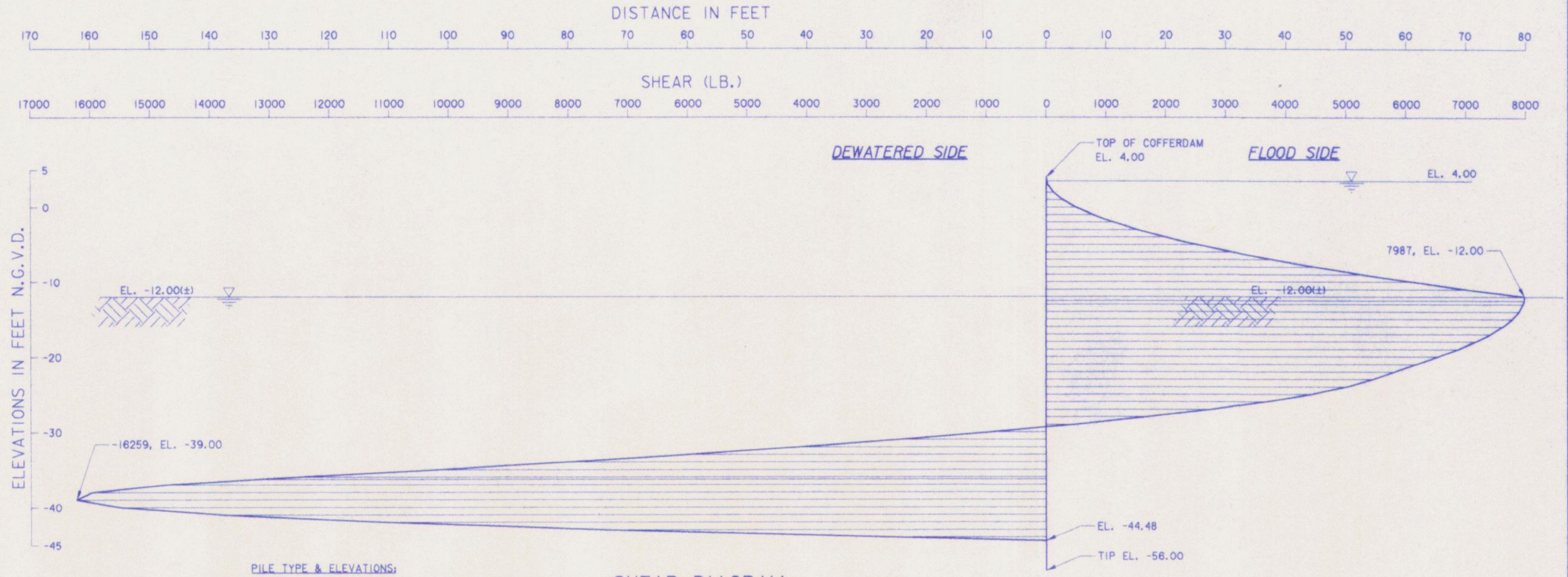
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:	J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE15.DGN
DRAWN BY:	K.L.L.			FILE NO. H-2-44679
CHECKED BY:	J.R.E.	DATE: JAN. 1996		



PRESSURE DIAGRAM

N.T.S.

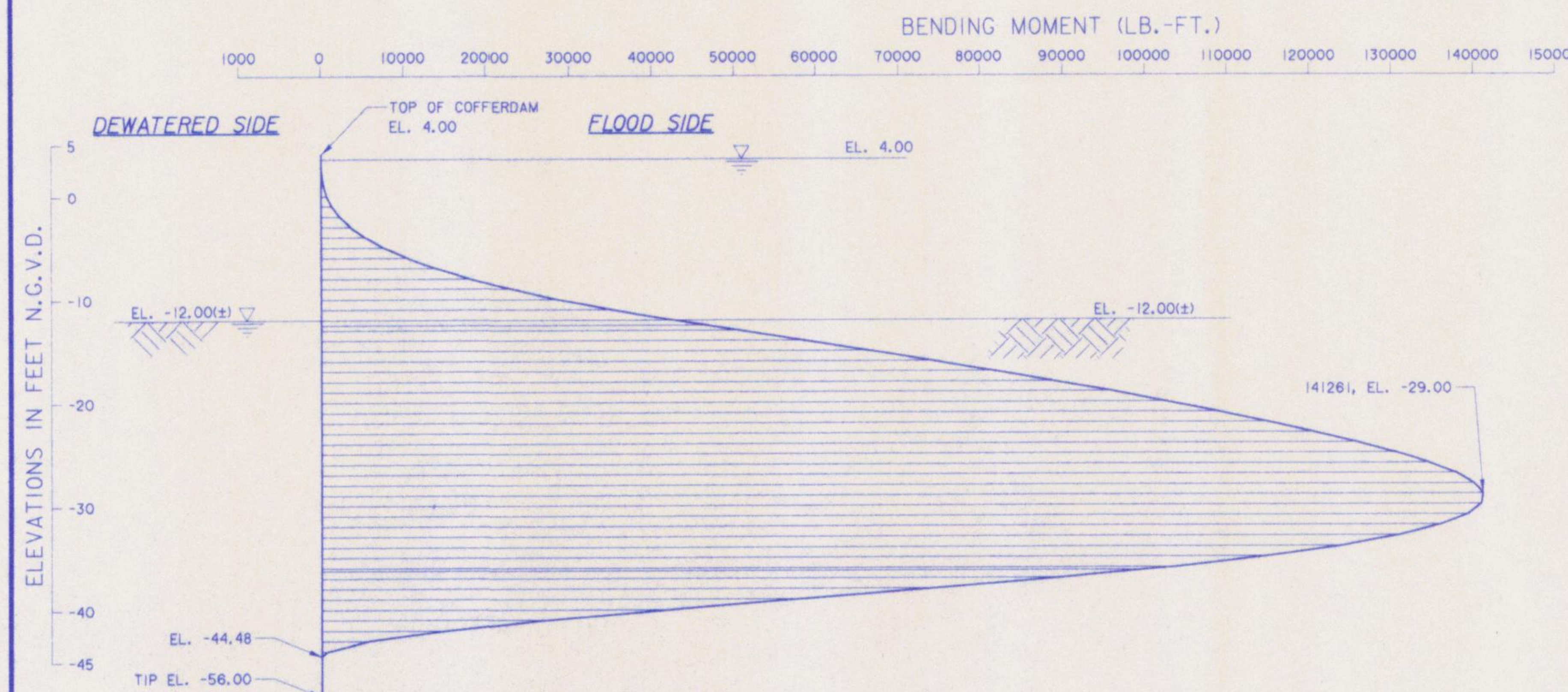


SHEAR DIAGRAM

N.T.S.

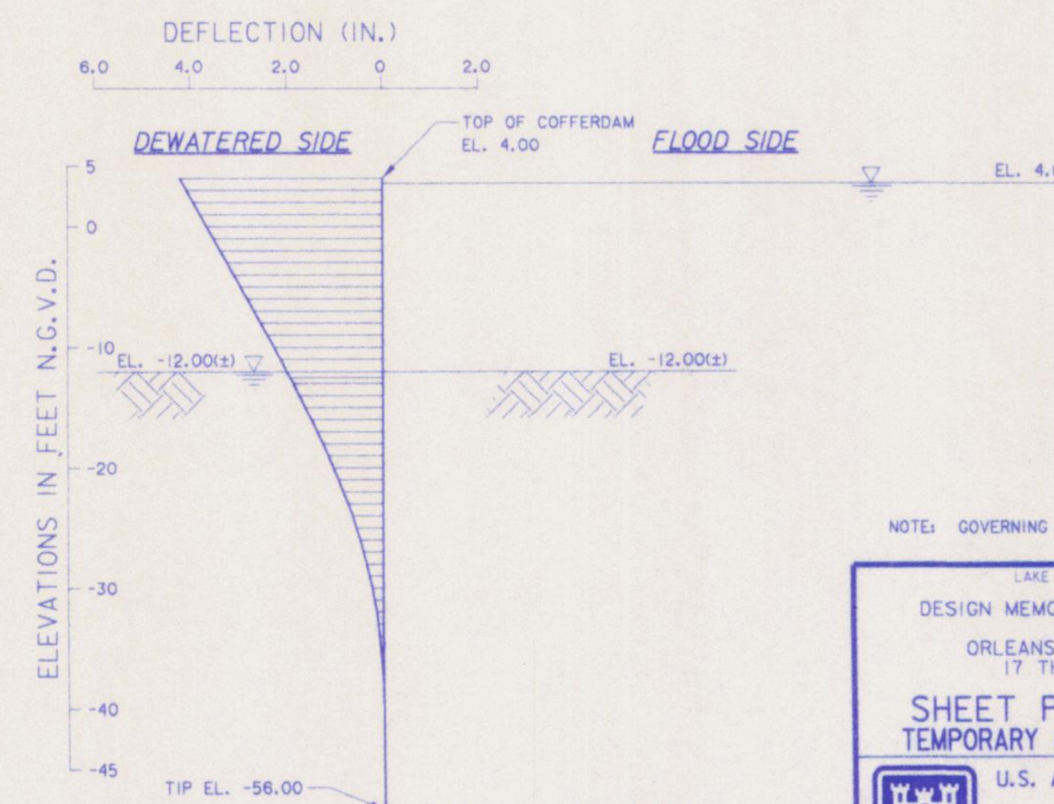
PILE TYPE & ELEVATIONS:

TOP ELEVATION = (+)4.0
TIP ELEVATION = (-)56.00
LENGTH OF PILE = 60.00 FT.
PILE TYPE = 36"ø PIPE W/ AZ18



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

Safety is a Part of Your Contract

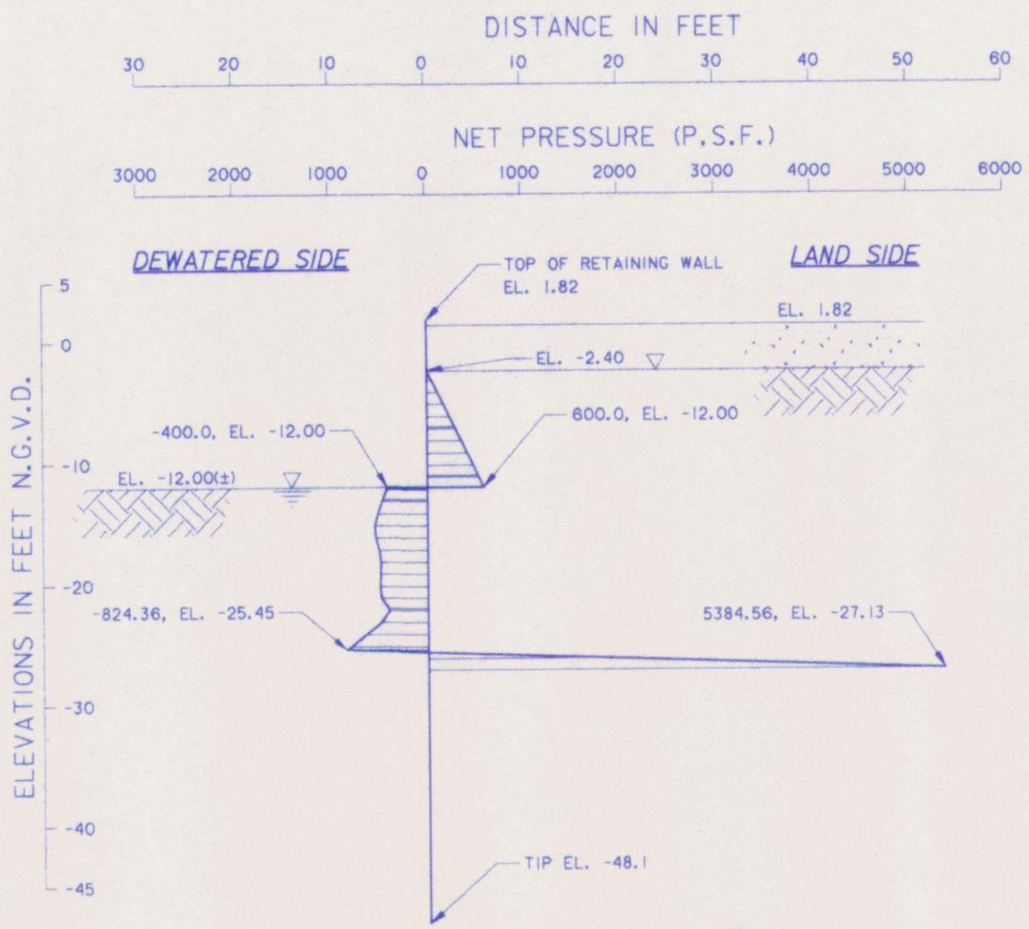
NOTE: GOVERNING CASE: Q CASE; F.S.=1.5 FOR PENETRATION

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS FOR TEMPORARY COFFERDAM AT EAST MONOLITH

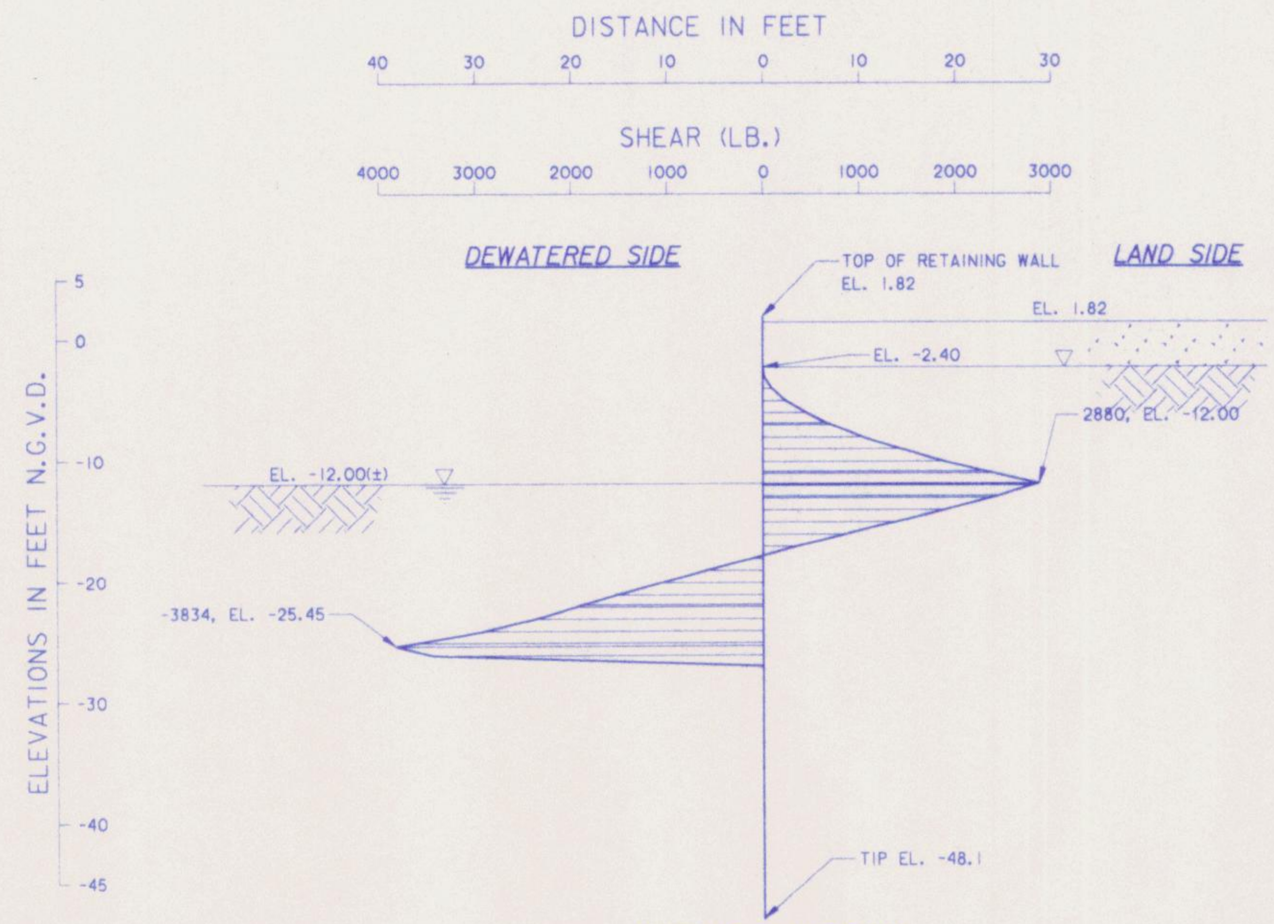
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE16.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: J.R.E.	DATE: JAN. 1996			



PRESSURE DIAGRAM

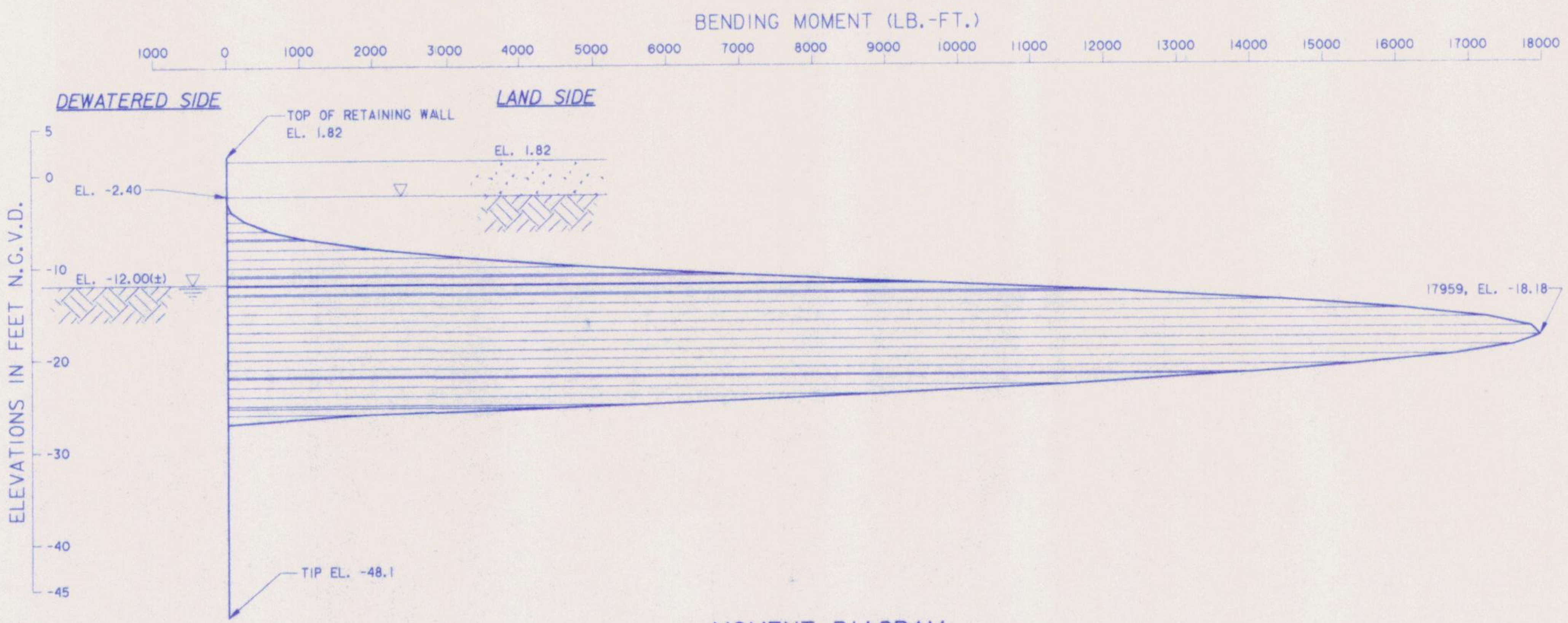
N.T.S.



SHEAR DIAGRAM

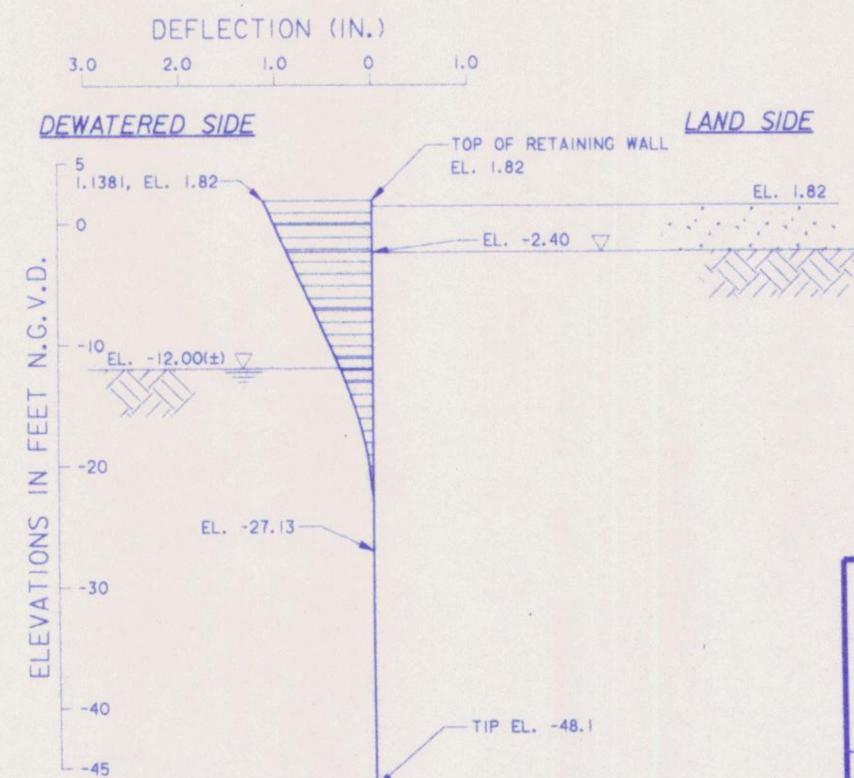
N.T.S.

PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)1.82
TIP ELEVATION = (-)48.1
LENGTH OF PILE = 49.92 FT.
PILE TYPE = PZ-32



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

Safety is a Part of Your Contract

NOTE: GOVERNING CASE: Q CASE: F.S.=1.5 FOR PENETRATION

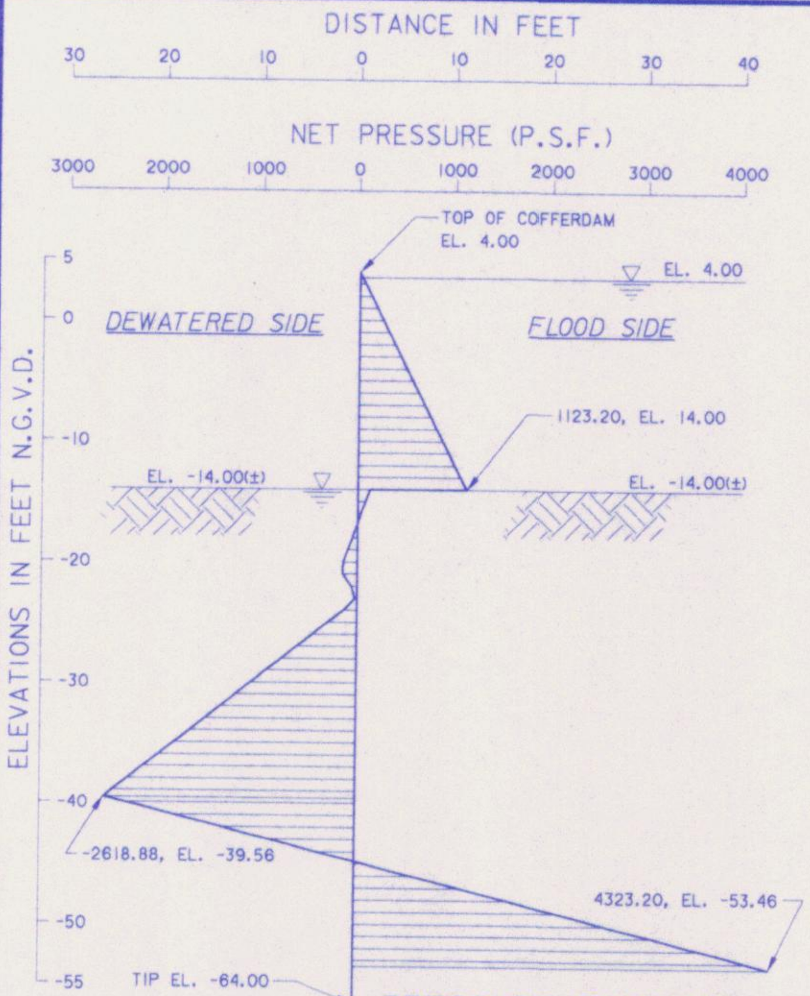
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS AT EXISTING WEST WALL AT EAST COFFERDAM

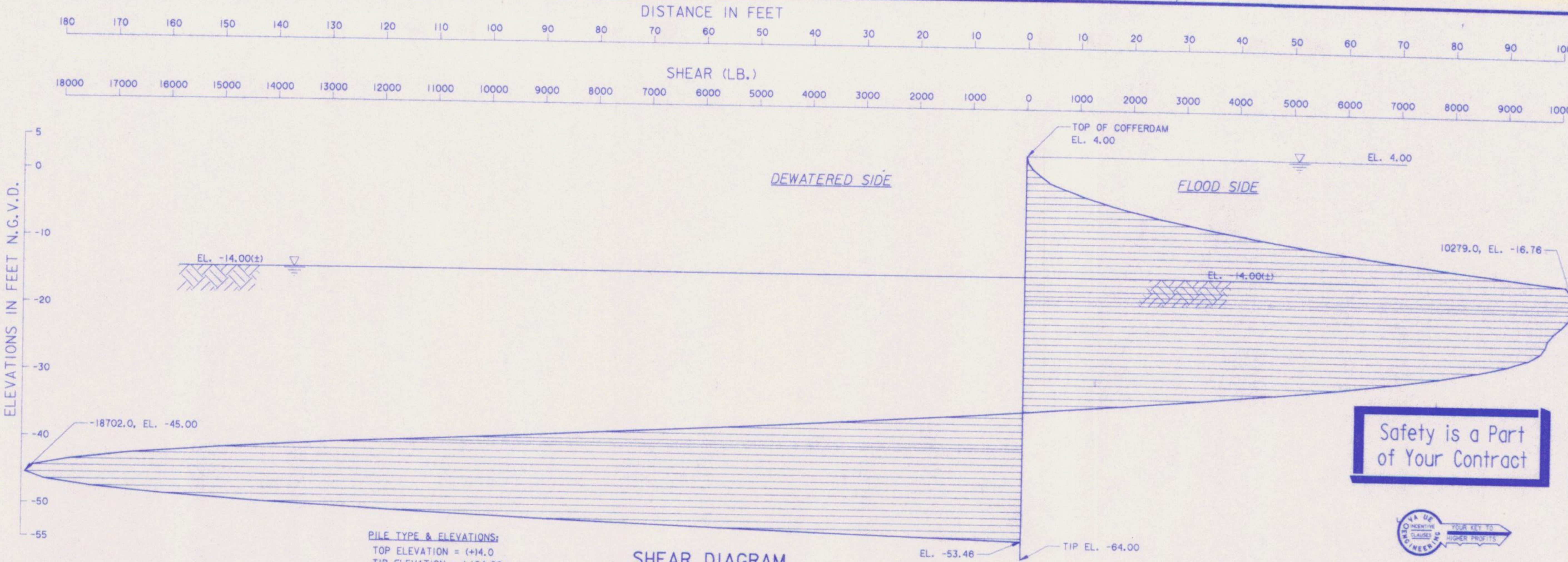
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE17.DGN
DRAWN BY: K.L.L.			FILE NO. H-2-44679
CHECKED BY: J.R.E.	DATE: JAN. 1996		

PLATE 17



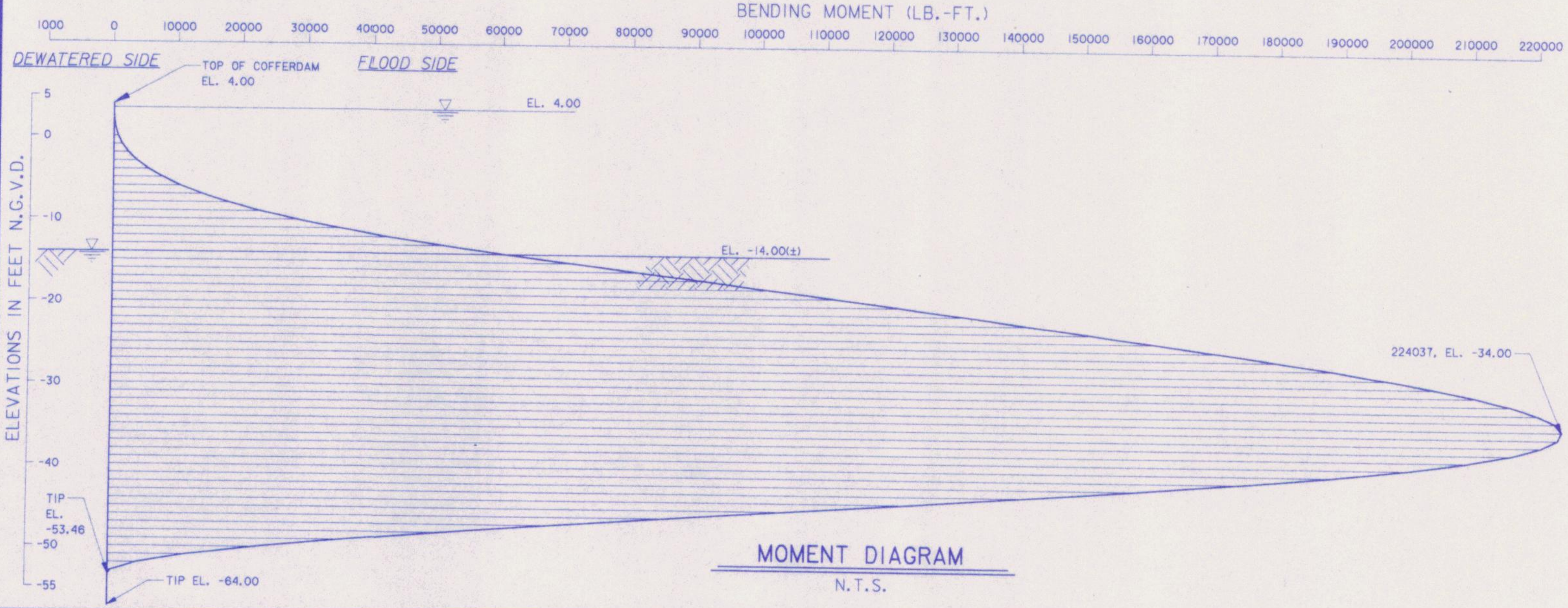
PRESSURE DIAGRAM
N.T.S.



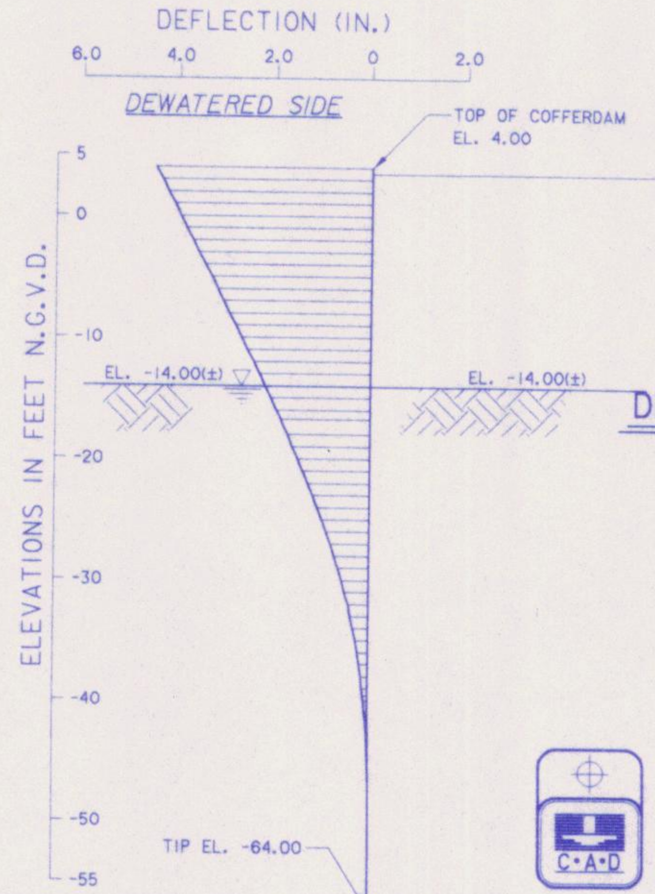
PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)4.0
TIP ELEVATION = (-)64.00
LENGTH OF PILE = 68.00 FT.
PILE TYPE = 48"ø W/ AZ18

SHEAR DIAGRAM
N.T.S.

Safety is a Part of Your Contract



MOMENT DIAGRAM
N.T.S.



STRUCTURAL DEFLECTION DIAGRAM
N.T.S.

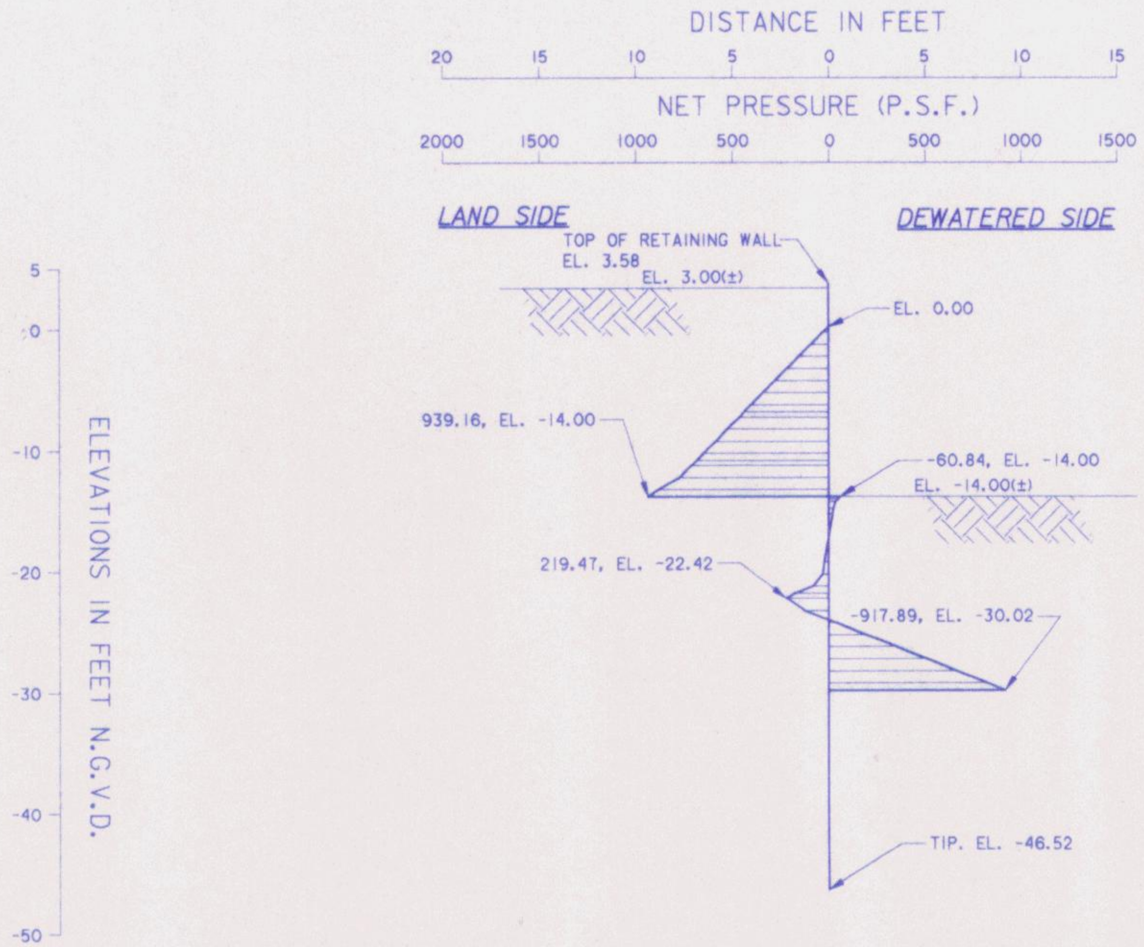
NOTE: GOVERNING CASE: Q CASE; F.S.=1.5 FOR PENETRATION

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS FOR TEMPORARY COFFERDAM AT WEST MONOLITH

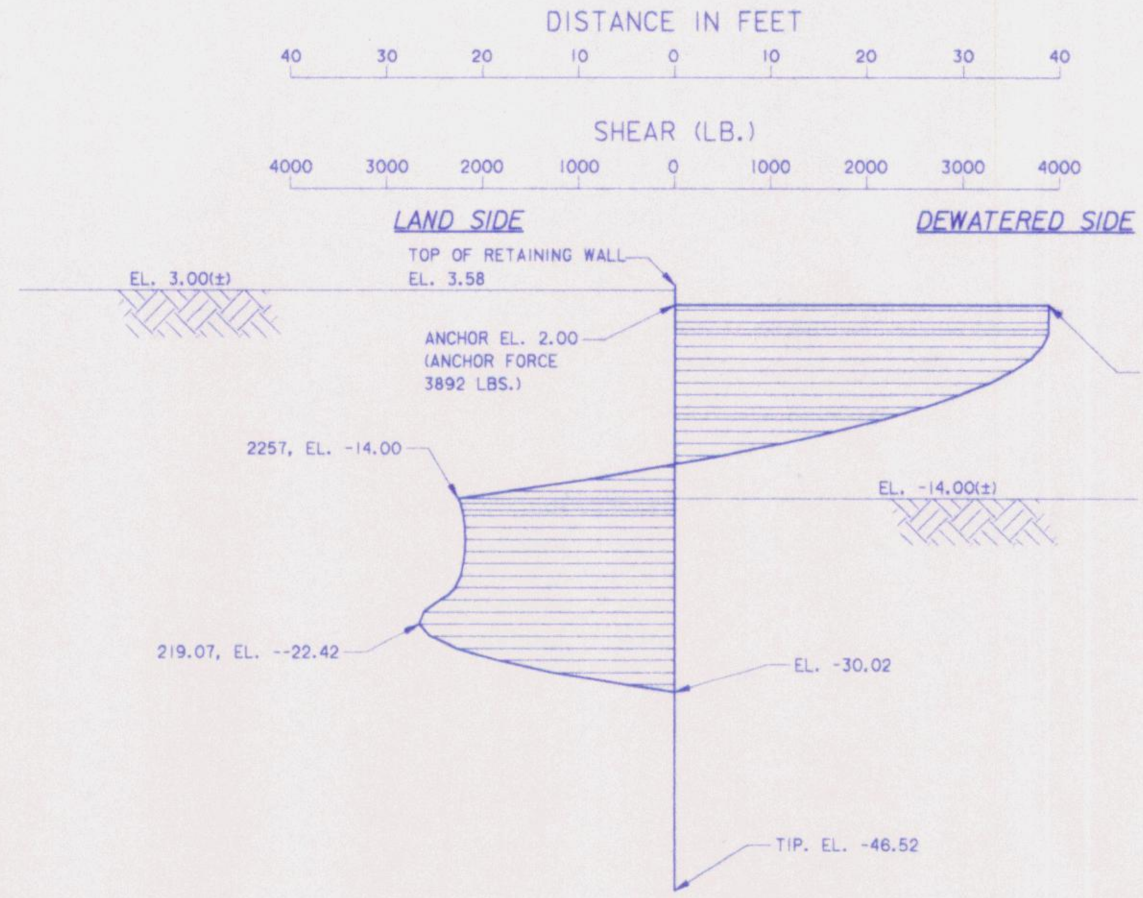
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE18.DGN	
DRAWN BY: K.L.L.	DATE: JAN. 1996		FILE NO. H-2-44679	
CHECKED BY: J.R.E.				



PRESSURE DIAGRAM

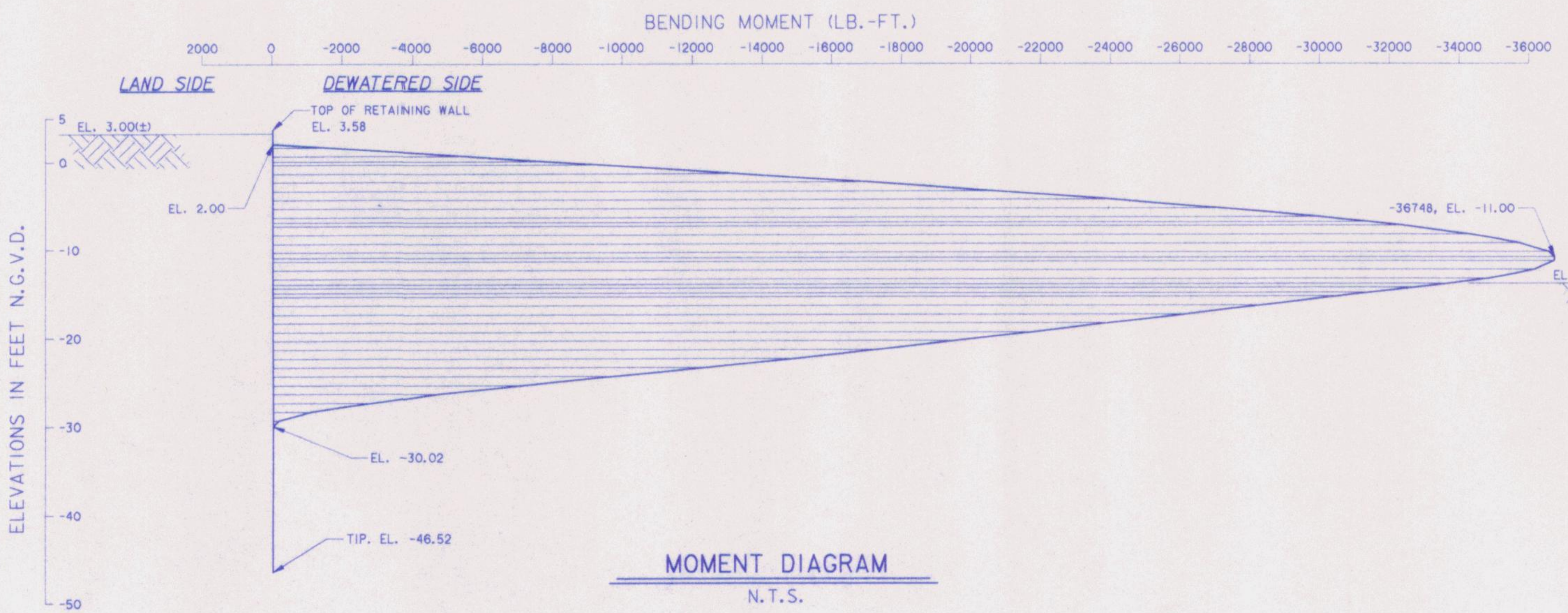
N.T.S.



SHEAR DIAGRAM

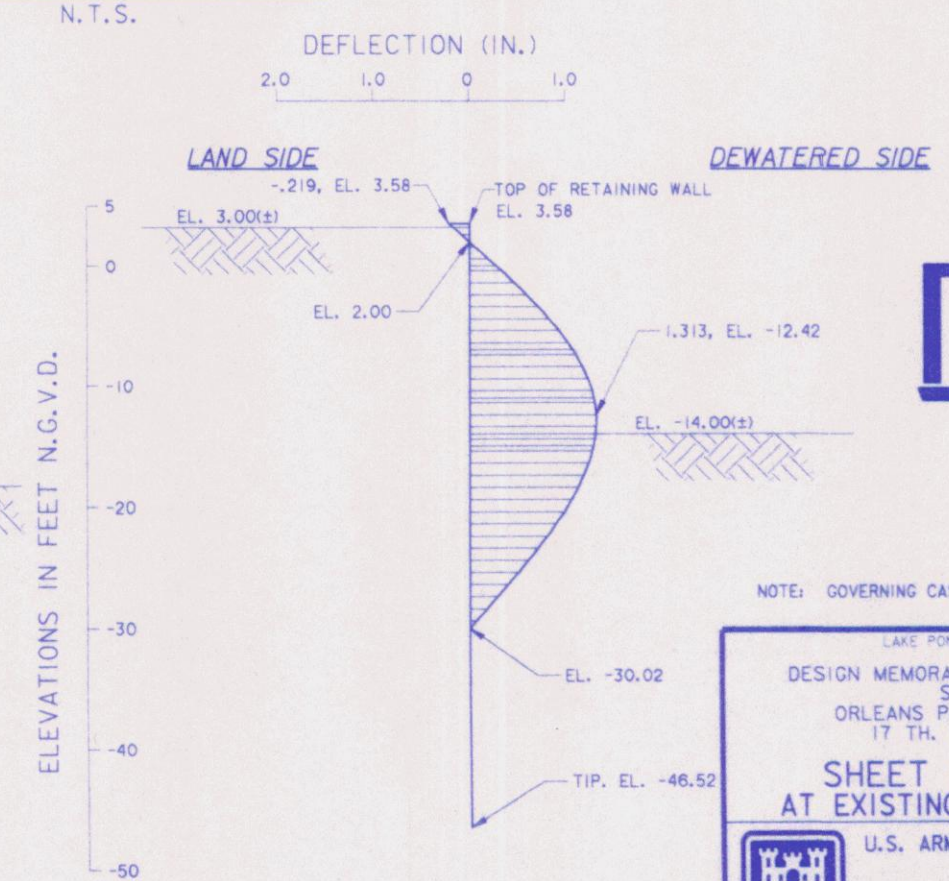
N.T.S.

PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)3.58
TIP ELEVATION = (-)50.10
LENGTH OF PILE = 52.10'
PILE TYPE = PZ-22



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

Safety is a Part of Your Contract

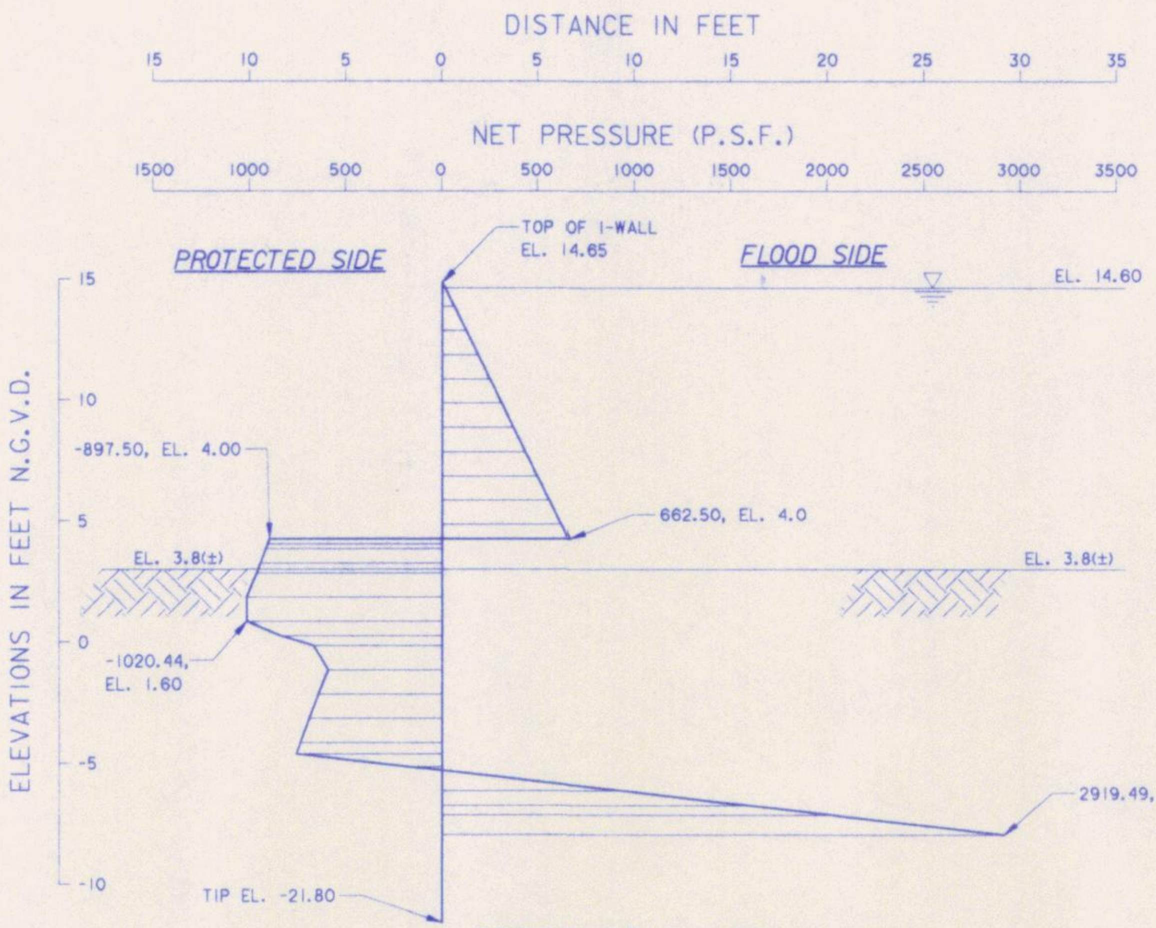
NOTE: GOVERNING CASE: Q CASE; F.S.=1.5 FOR PENETRATION

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS AT EXISTING WEST RETAINING WALL

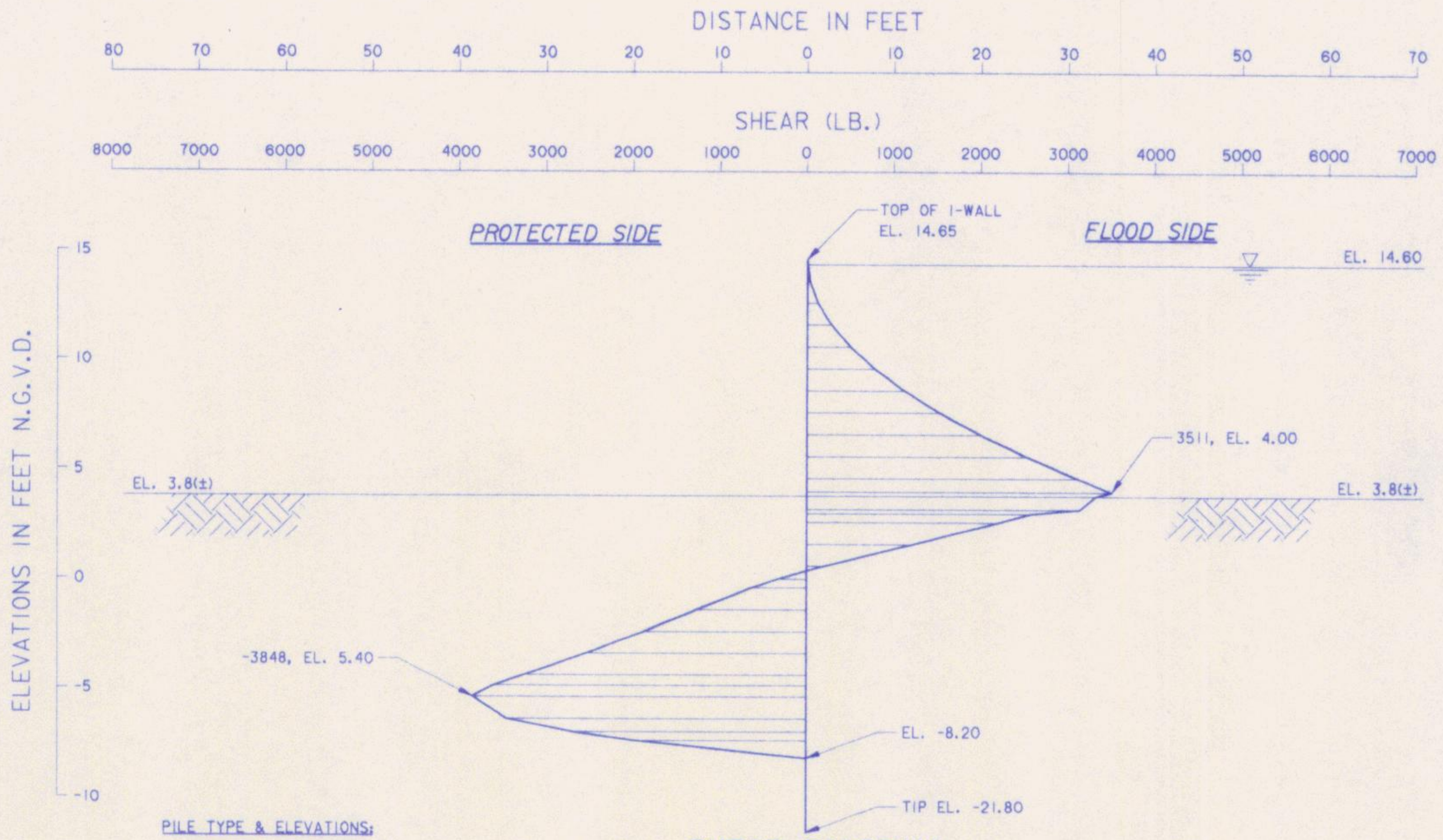
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: R.E.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE19.DGN
DRAWN BY: K.L.L.	.0833	JAN. 1996	FILE NO.
CHECKED BY: M.D.P.	DATE: JAN. 1996		H-2-44679



PRESSURE DIAGRAM

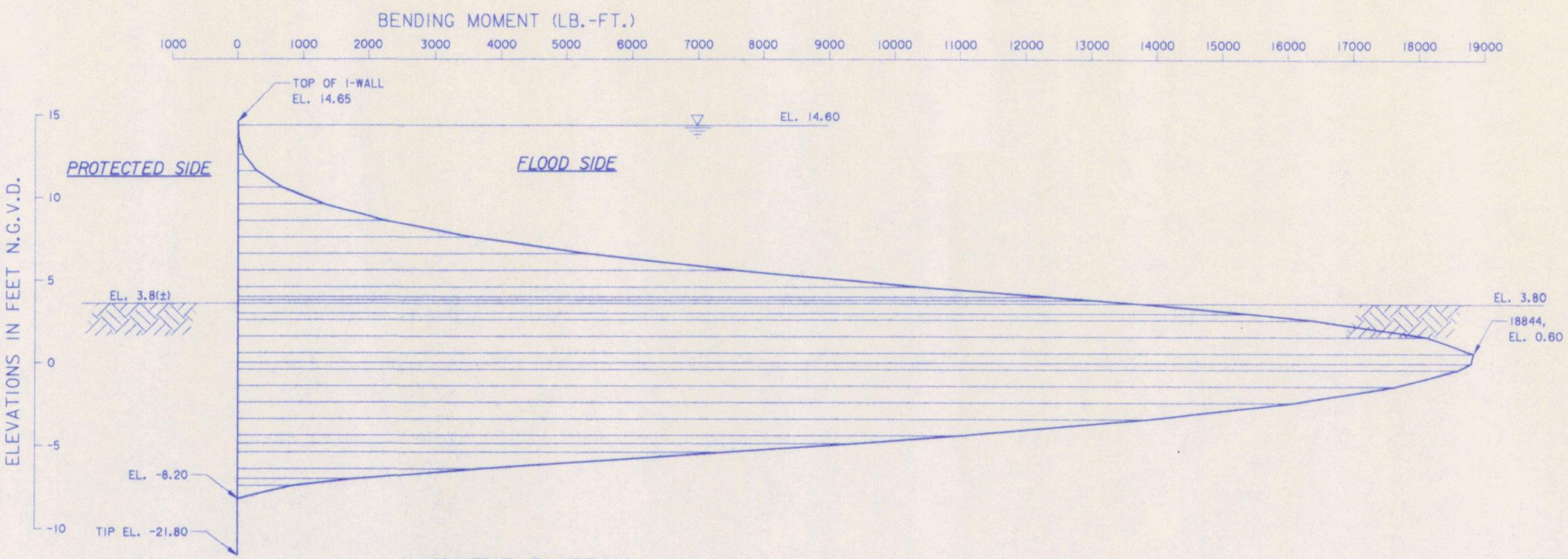
N.T.S.



PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)14.65
TIP ELEVATION = (-)21.80
LENGTH OF PILE = 36.45
PILE TYPE = PZ-22

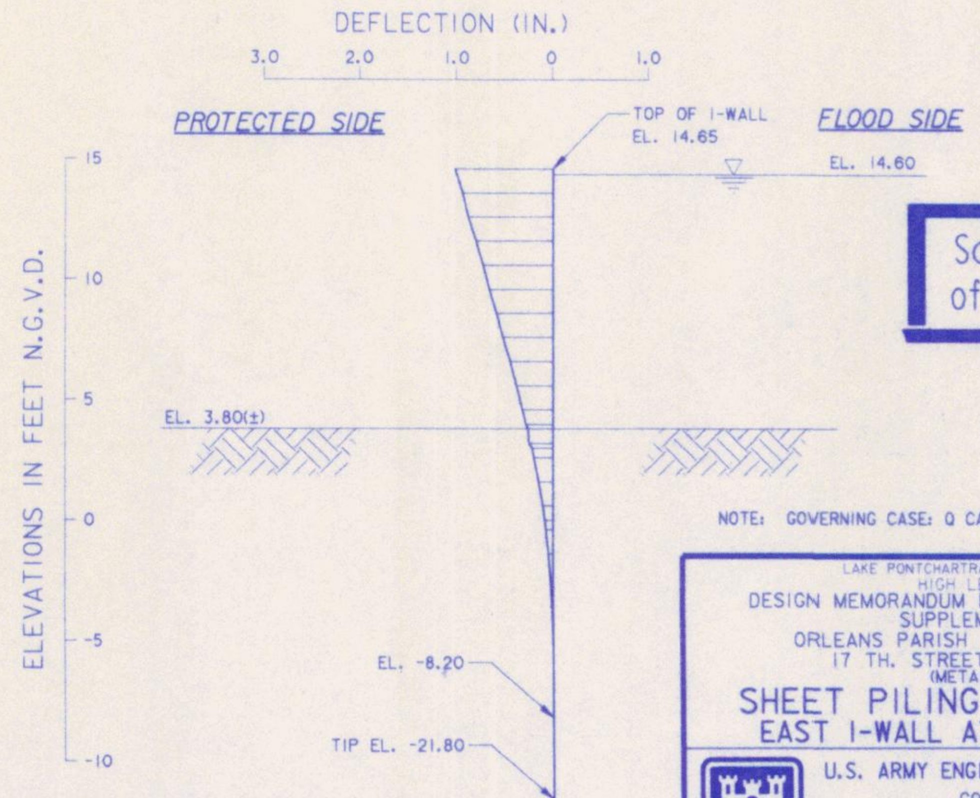
SHEAR DIAGRAM

N.T.S.



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

Safety is a Part of Your Contract

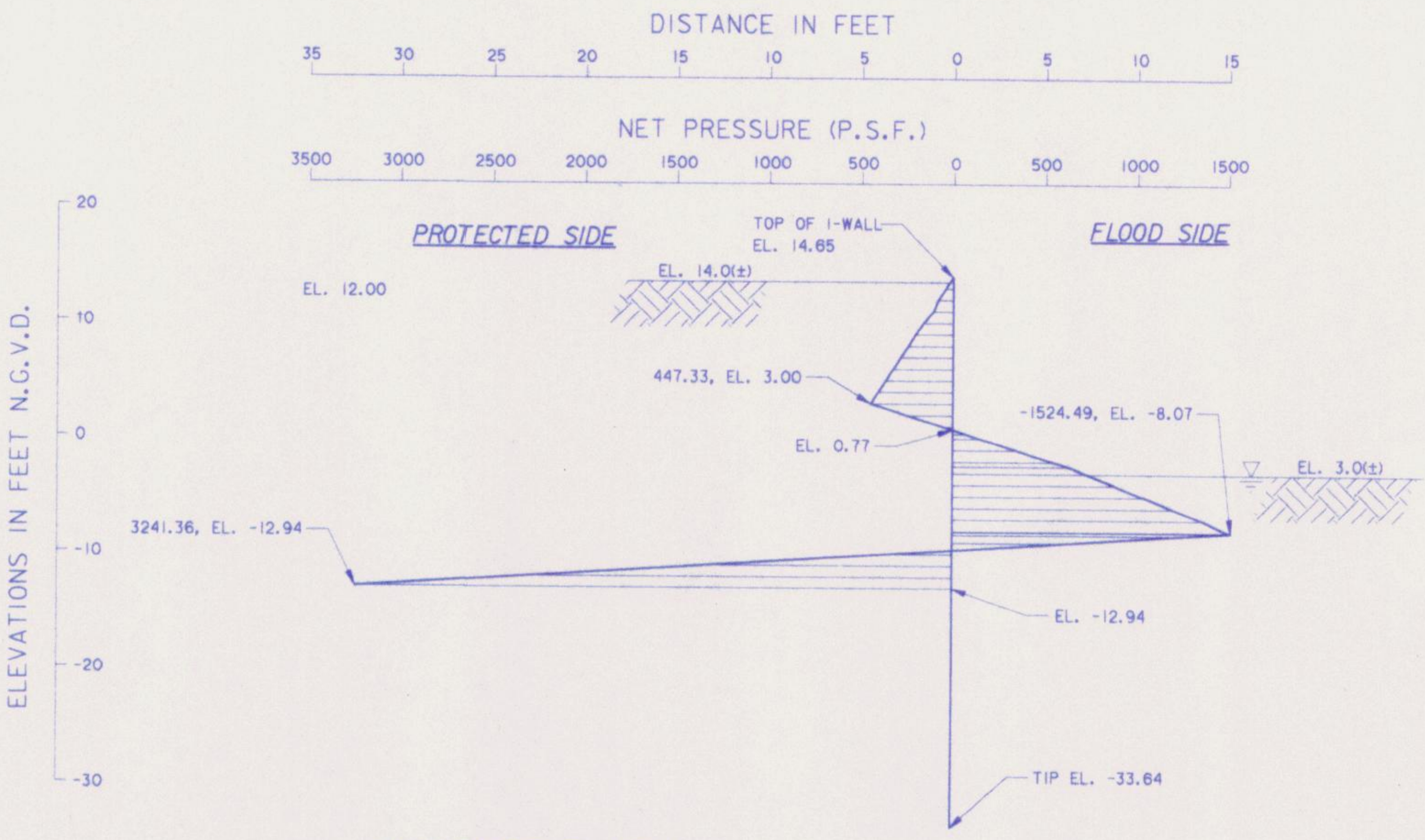
NOTE: GOVERNING CASE: Q CASE; F.S.=1.5 FOR PENETRATION

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS FOR
EAST I-WALL AT EAST MONOLITH

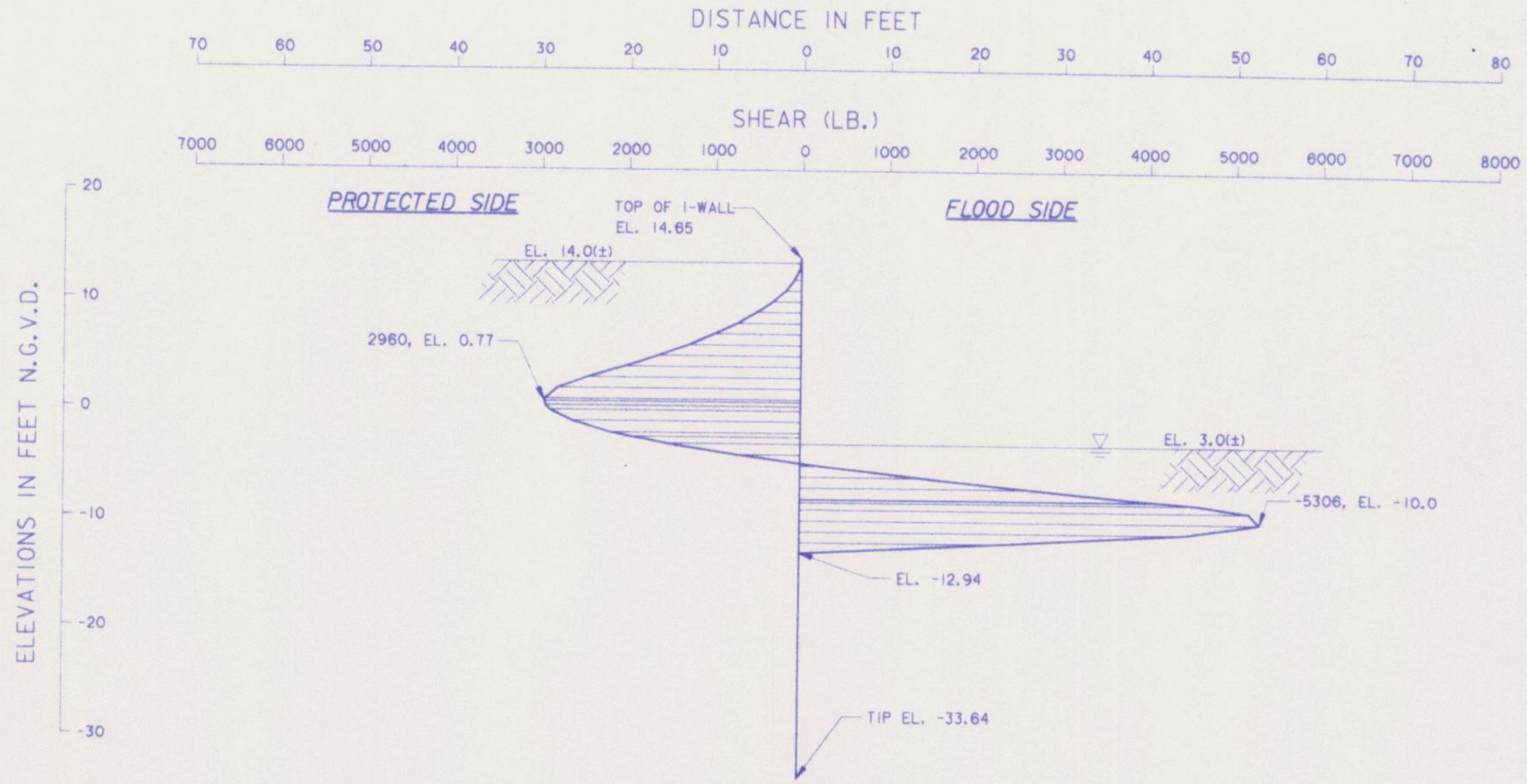
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE20.DGN
DRAWN BY: K.L.L.			FILE NO. H-2-44679
CHECKED BY: J.R.E.	DATE: JAN. 1996		



PRESSURE DIAGRAM

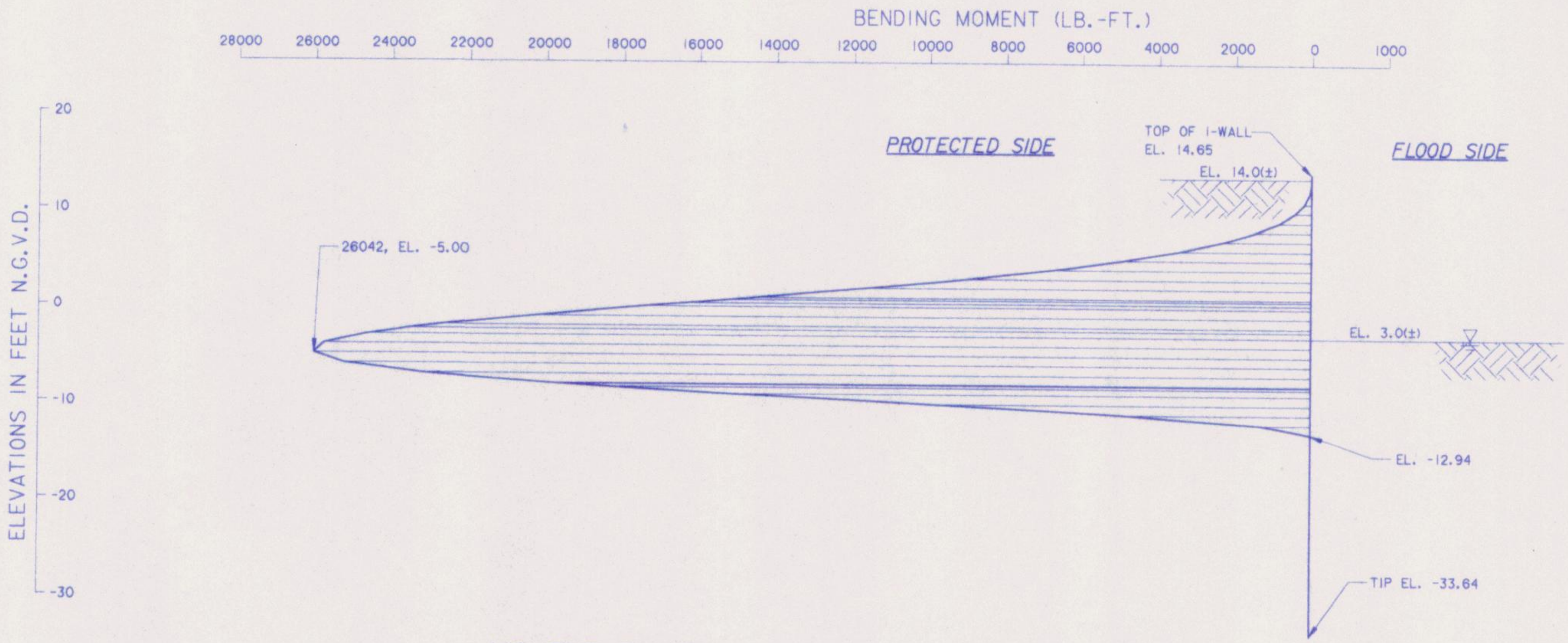
N.T.S.



SHEAR DIAGRAM

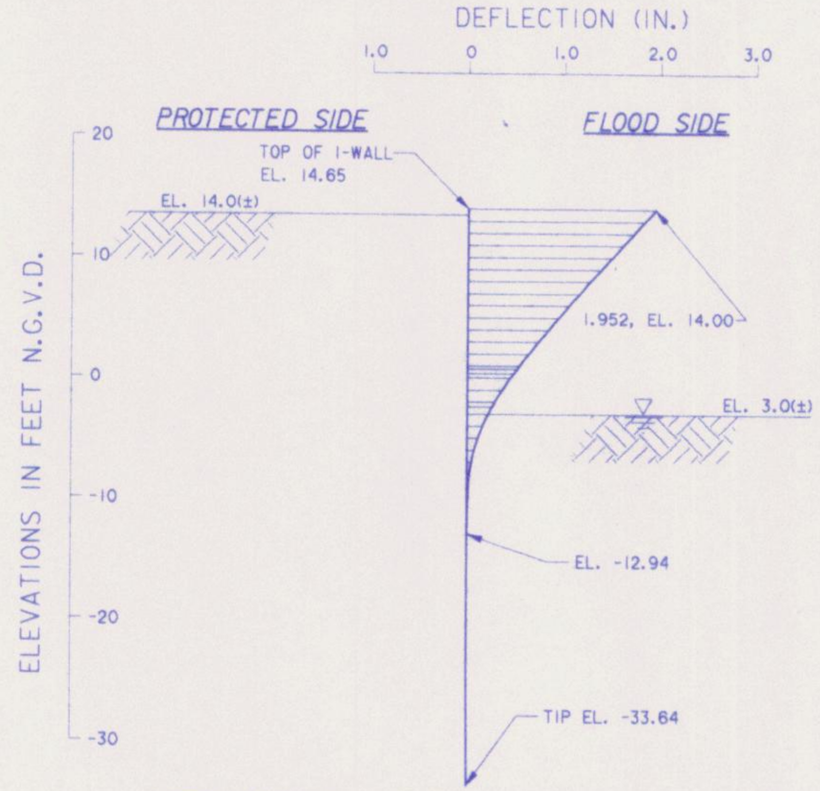
N.T.S.

PILE TYPE & ELEVATIONS:
TOP ELEVATION = (+)14.65
TIP ELEVATION = (-)33.64
LENGTH OF PILE = 48.29
PILE TYPE = PZ-22



MOMENT DIAGRAM

N.T.S.



STRUCTURAL DEFLECTION DIAGRAM

N.T.S.

Safety is a Part of Your Contract

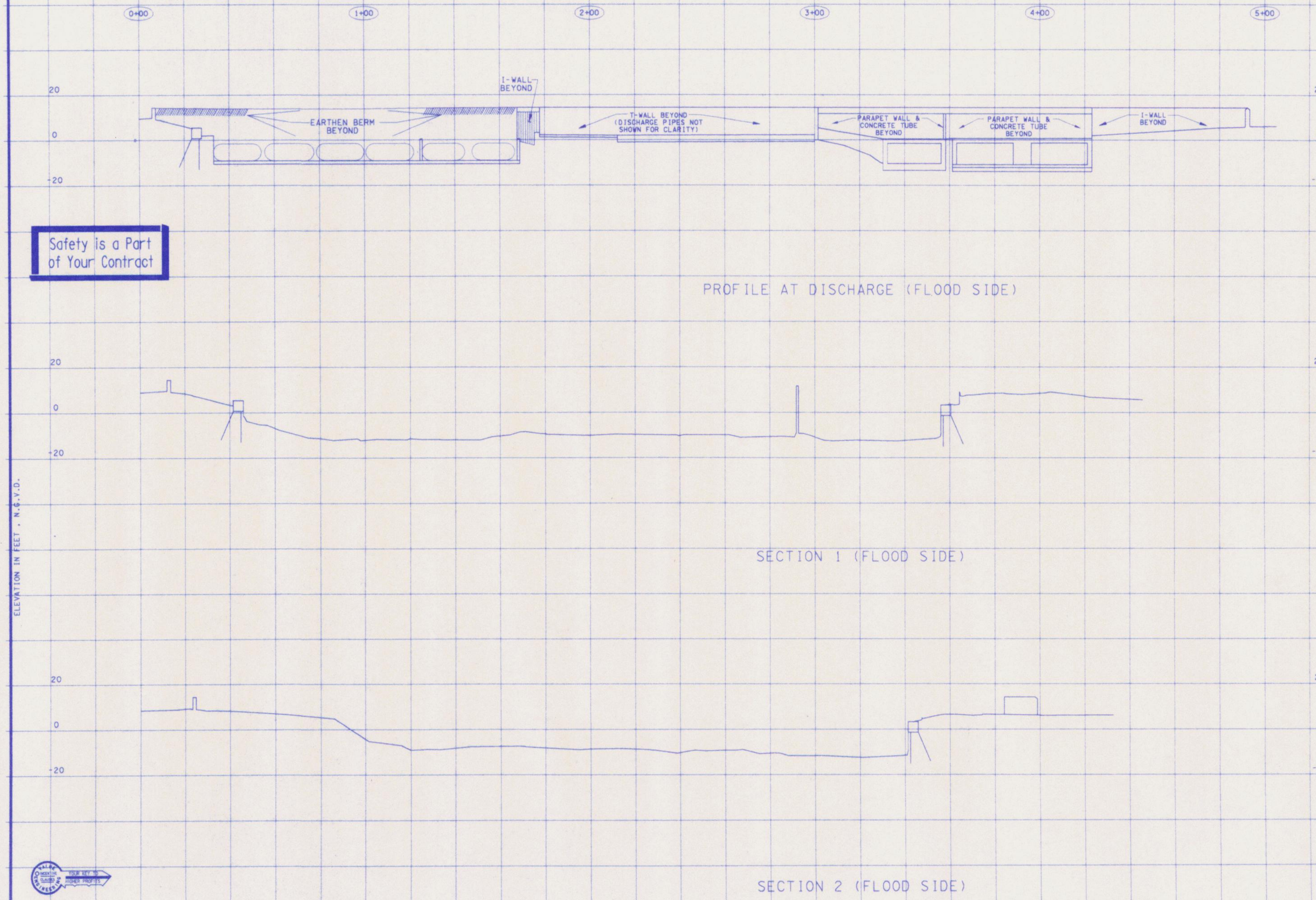
NOTE: GOVERNING CASE: Q CASE; F.S.=1.5 FOR PENETRATION

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SHEET PILING ANALYSIS FOR WEST I-WALL AT EAST MONOLITH

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

DESIGNED BY:	J.R.E.	PLOT SCALE: .0833	PLOT DATE: JAN. 1996	CADD FILE: PLATE21.DGN
DRAWN BY:	K.L.L.			FILE NO.
CHECKED BY:	M.D.P.	DATE: JAN. 1996		H-2-44679



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LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

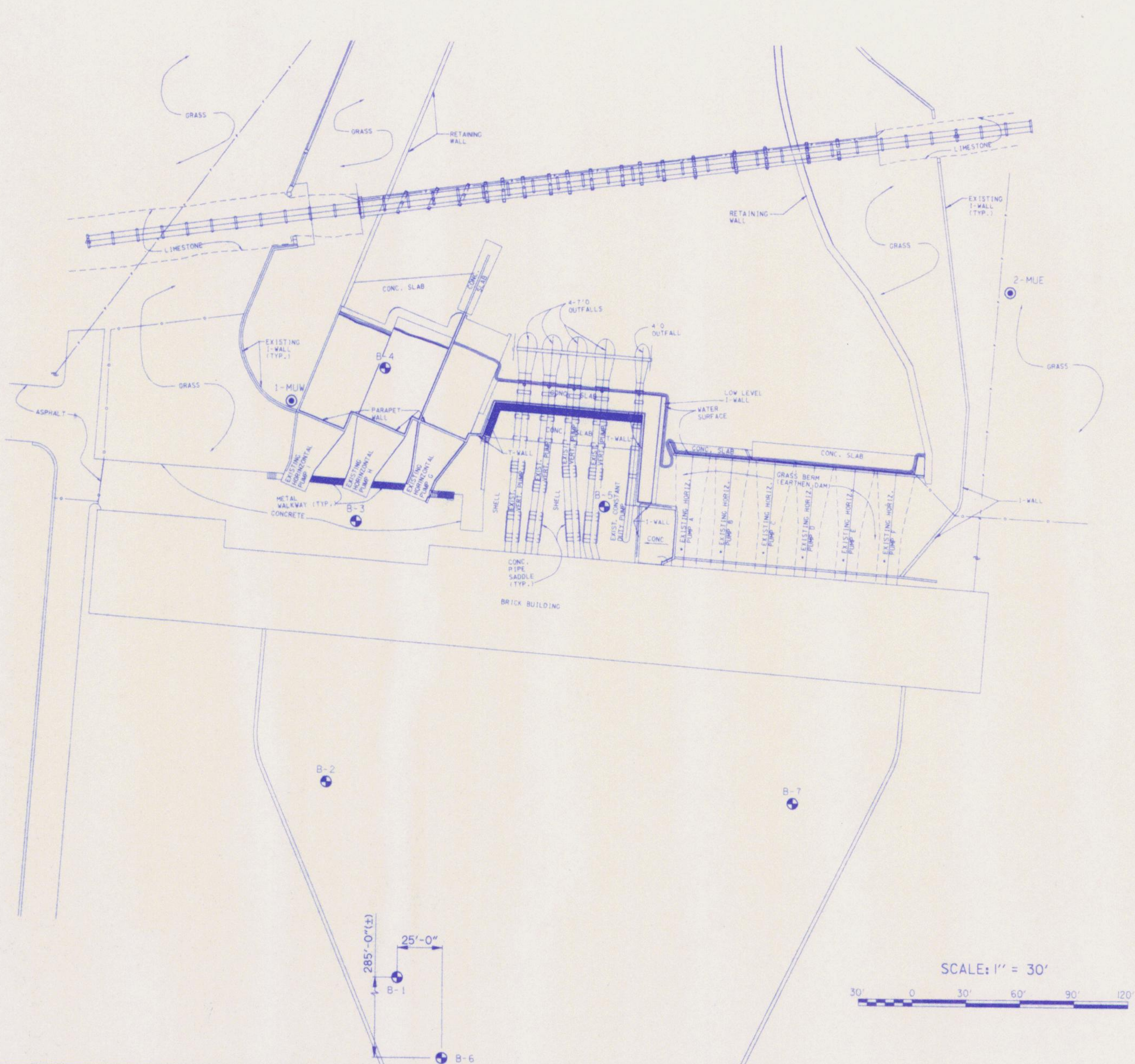
CROSS SECTIONS

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

DESIGNED BY: M.D.P.	PLOT SCALE: 20	PLOT DATE: JAN. 1996	CADD FILE: PLATE22.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: M.D.P.	DATE: JAN. 1996			

PLATE 22

Safety is a Part of Your Contract



LEGEND

DENOTES BORINGS DRILLED 16-19 AUGUST & 14-19 OCTOBER 1982

DENOTES BORINGS DRILLED JANUARY 1971

SCALE: 1" = 30'

30' 0 30' 60' 90' 120'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

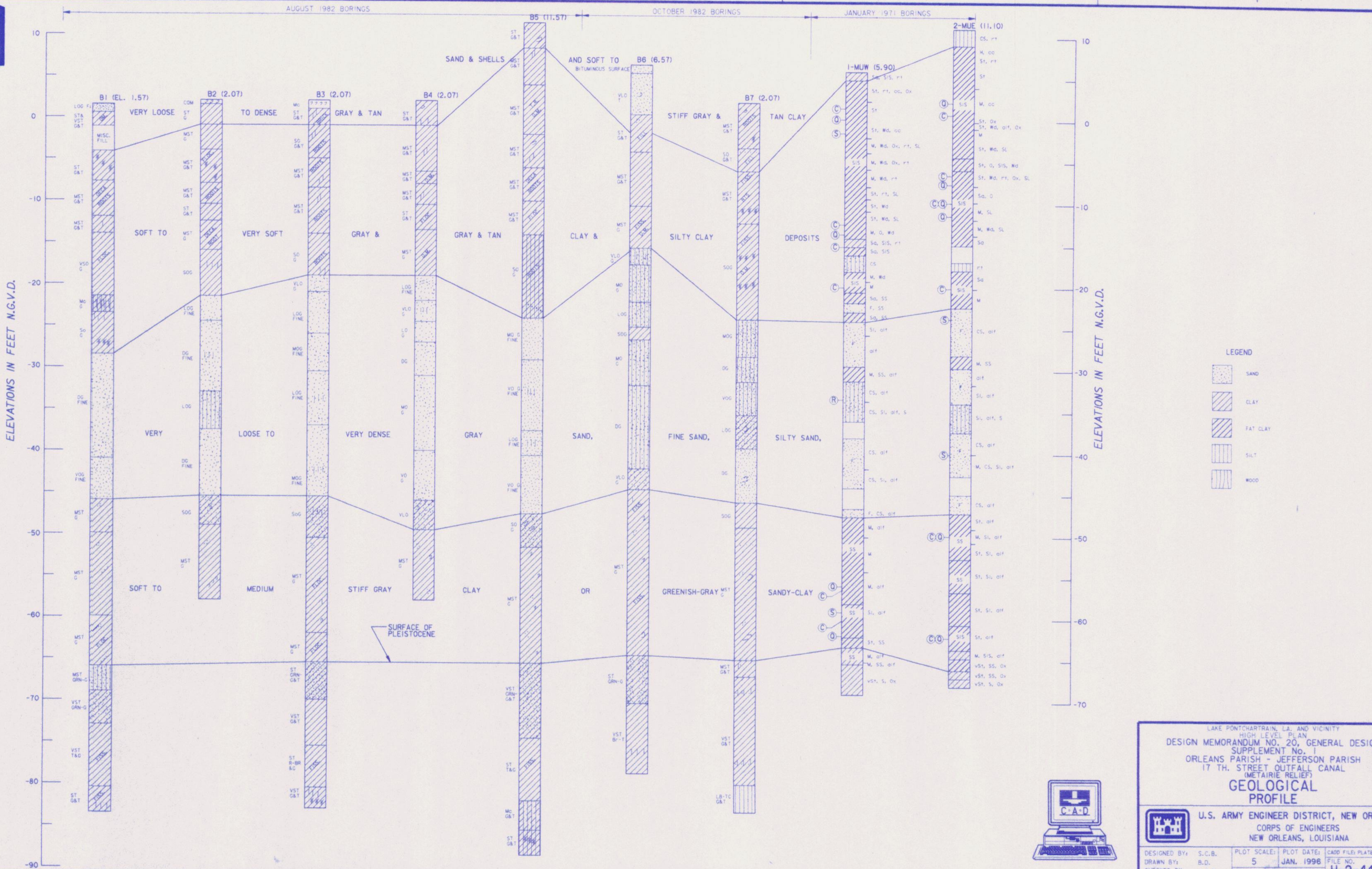
SOIL BORING PLAN

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

DESIGNED BY: M.D.P.	PLOT SCALE: 30	PLOT DATE: JAN. 1996	CADD FILE: PLATE23A.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: M.D.P.	DATE: JAN. 1996			

PLATE 23A

Safety is a Part of Your Contract



VALUE ENGINEERING — INCENTIVE CLAUSES — YOUR KEY TO HIGHER PROFITS

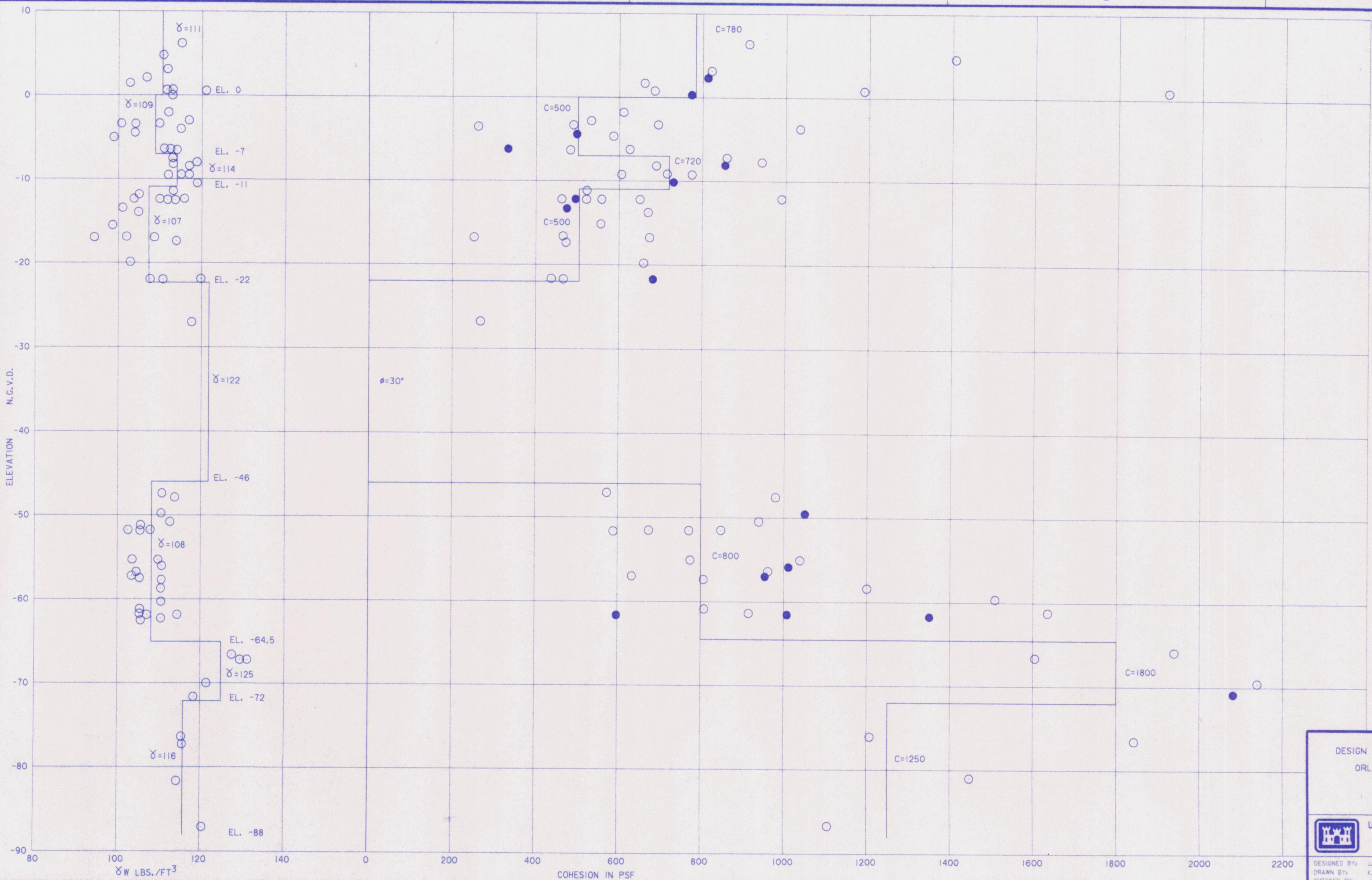
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

GEOLOGICAL PROFILE

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

DESIGNED BY: S.C.B.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE23B.DGN	
DRAWN BY: B.D.	5	JAN. 1996	FILE NO.	
CHECKED BY: M.D.P.	DATE:	JAN. 1996	H-2-44679	

PLATE 23B



PLOT OF TEST RESULTS FROM NINE SOIL BORINGS. THESE INCLUDE BORINGS 1-7 (AUGUST & OCTOBER 1982) BY EUSTIS ENGINEERING CO., INC. & BORINGS 1-MUW & 2-MUE (JANUARY 1971) BY CORPS OF ENGINEERS.

KEY:

○ UNCONFINED COMPRESSION TEST

● TRIAXIAL TEST

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LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

SOIL PARAMETERS

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

DESIGNED BY: J.R.E.	PLOT SCALE: 5	PLOT DATE: JAN. 1996	CADD FILE: PLATE23C.DGN
DRAWN BY: K.L.L.			FILE NO.
CHECKED BY: J.R.E.	DATE: JAN. 1996		H-2-44679

PLATE 23C

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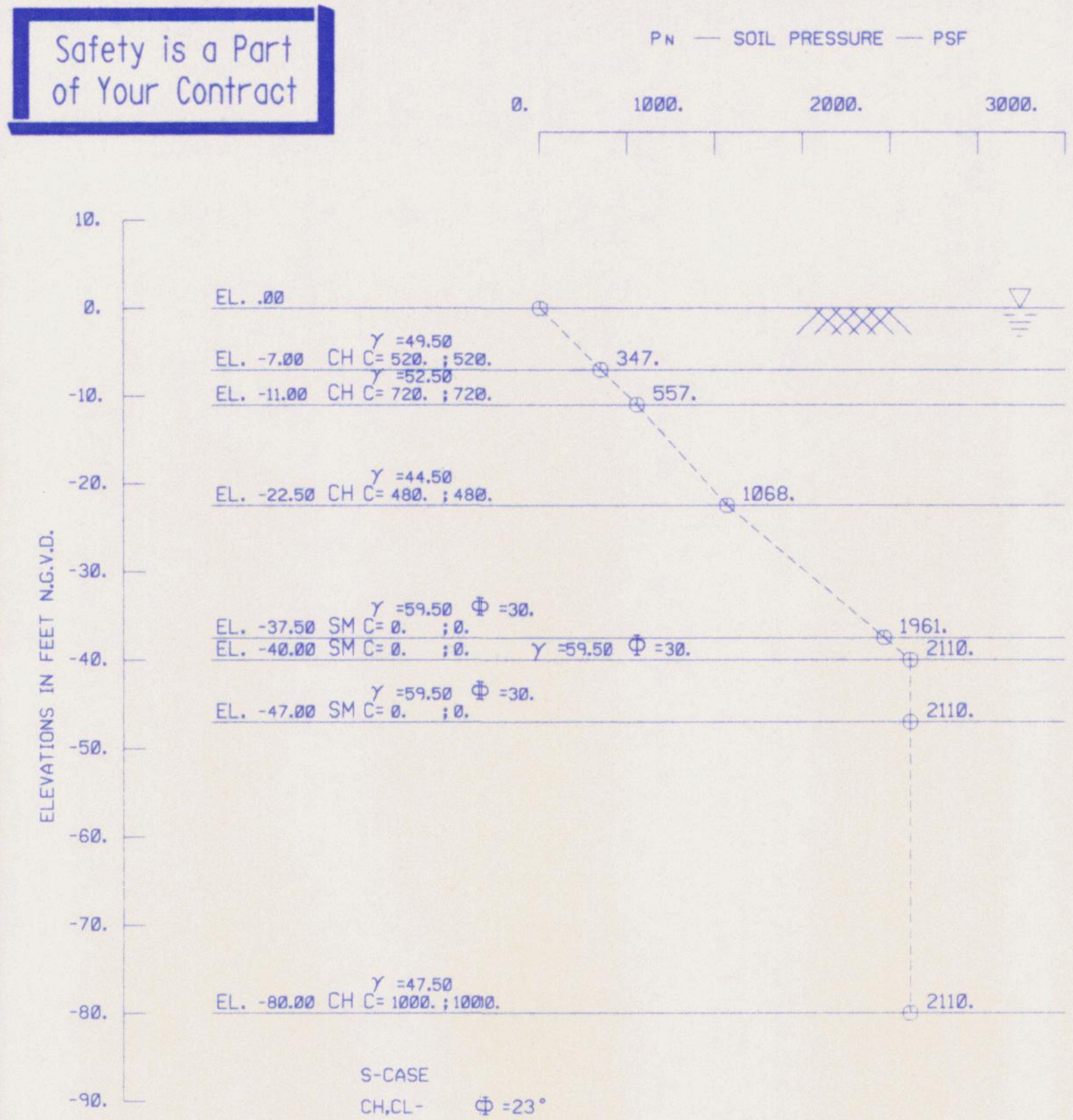
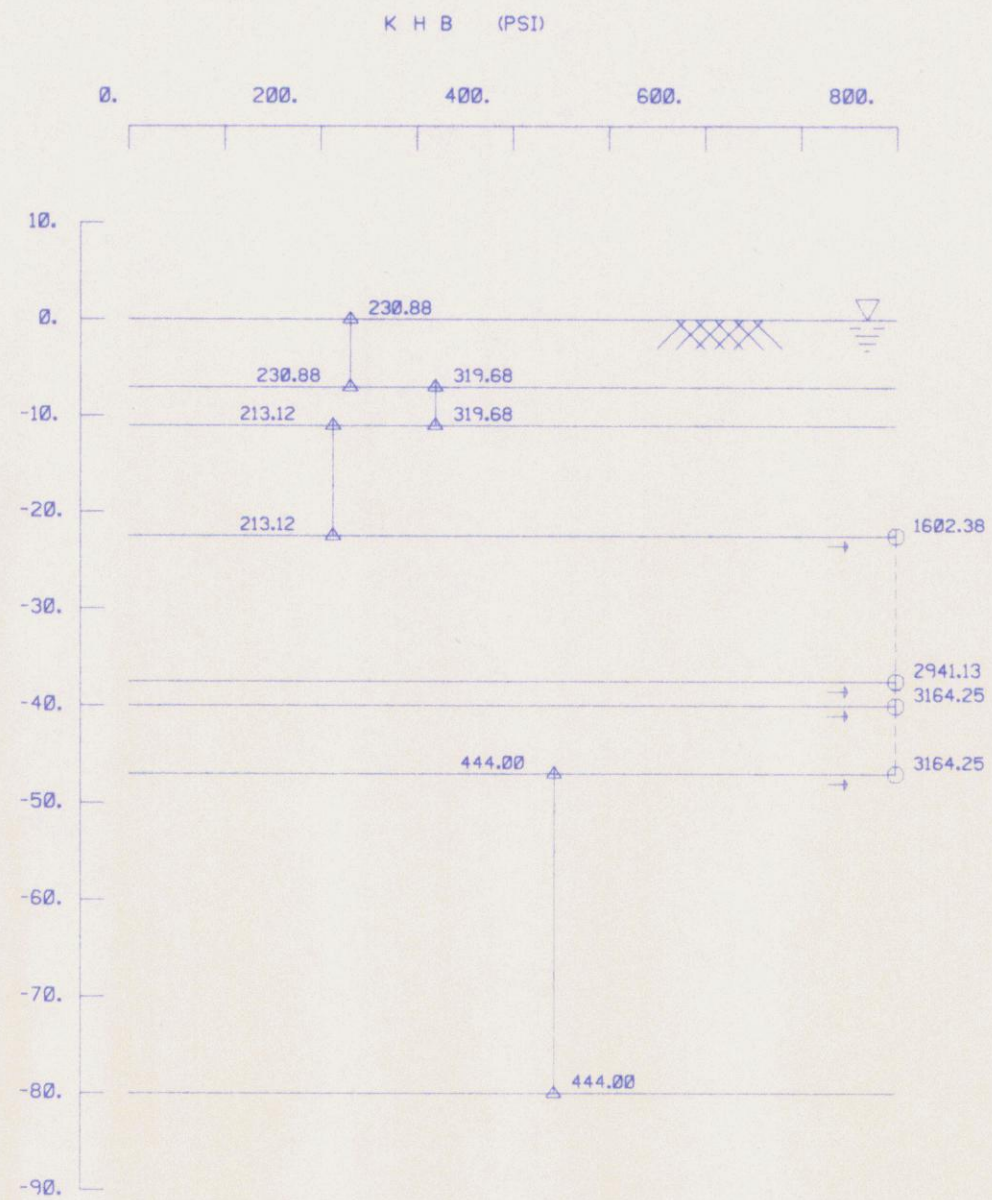


S-CASE
CH,CL- Φ =23°
SP- Φ =30°



TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

NOTES:

1. ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING F.S. = 2.0 WITH PILE TEST OR F.S. = 3.0 WITHOUT PILE TEST.
2. PILE CAPACITIES ARE BASED ON NO JETTING AND NO PREDRILLING.
3. PAST PILE TESTS AT THE SITE HAVE THE FOLLOWING RESULTS:
   A. CLASS B TIMBER PILES ULTIMATE CAPACITY 30 TONS TIP EL. -39 (JETTING IN SAND TO EL. -34.0)
   B. 12" CONCRETE PILES ULTIMATE CAPACITY 30 TONS AT TIP EL. -49.5 (NOT LOADED TO FAILURE) PREDRILLED 35 FT.

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 = Modulus of subgrade reaction for test plate (pci)

B1 = Width or diameter of test plate (in)

K1 = k B1 = 180qu(pcf) = 0.5556qu(psi)

qu = 2 c = Unconfined compressive strength (psf)

C = Reduction for cyclic loading-not applicable

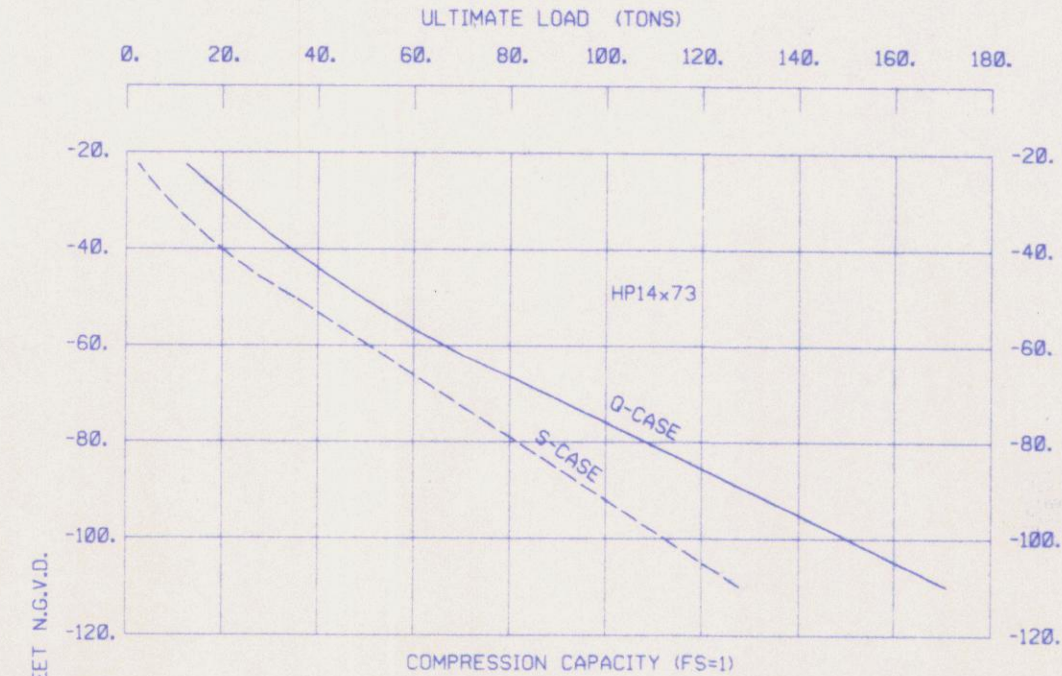
D = Group effect reduction factor

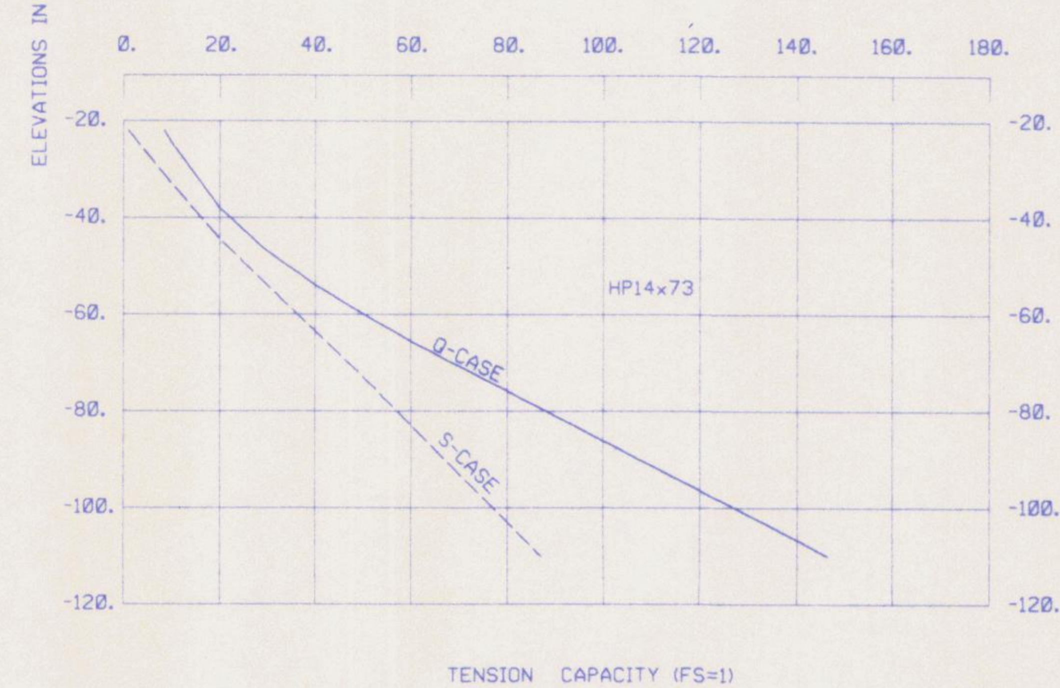
B = Width of pile measured at right angles to the direction of displacement (in)

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

- - - - - - - S-CASE
———— Q-CASE

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PILE CAPACITY CURVES

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

DESIGNED BY: J.R.E.	PLOT SCALE: 20	PLOT DATE: JAN. 1996	CADD FILE: PLATE23D.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: J.R.E.	DATE: JAN. 1996			

PLATE 23D

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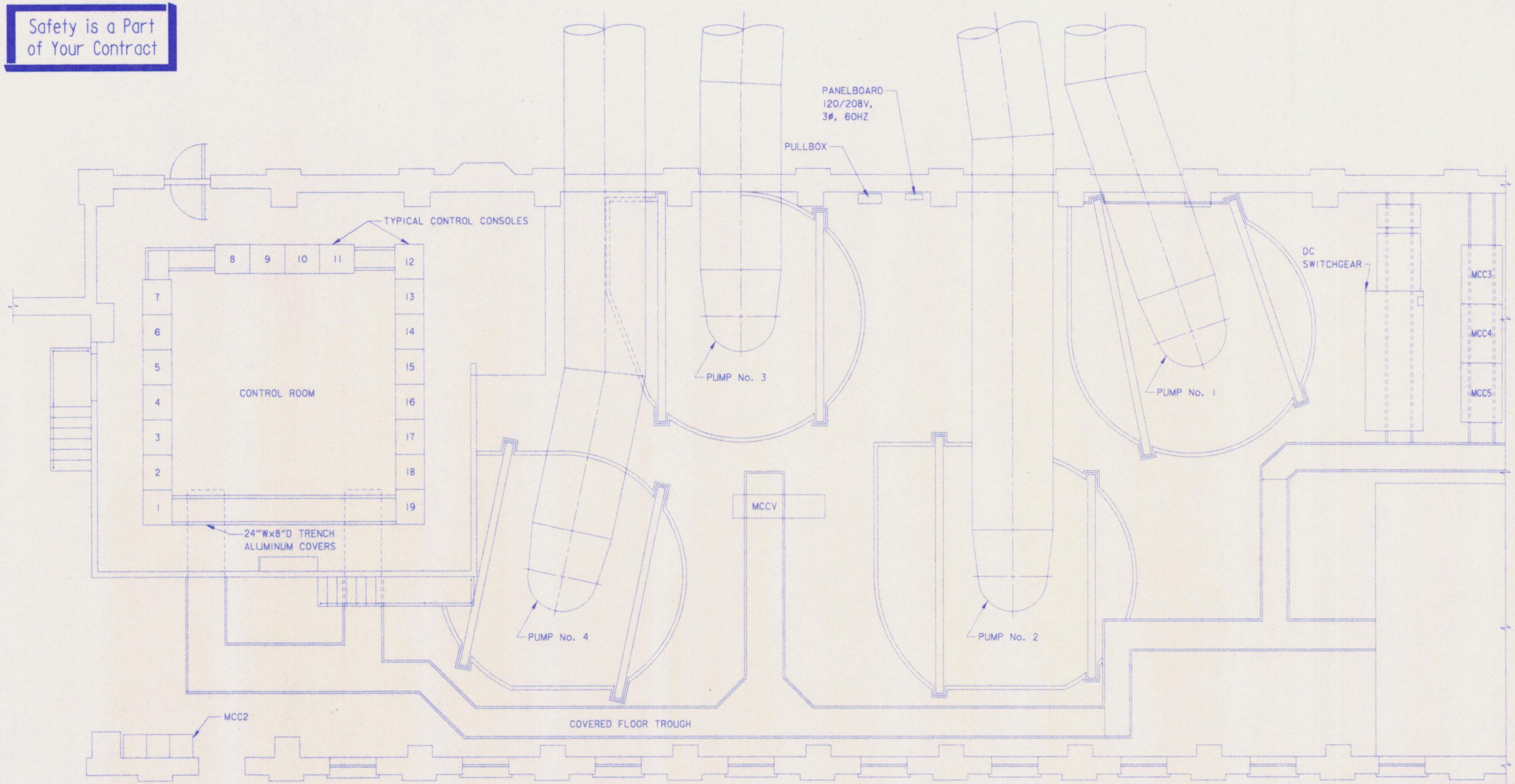

PARTIAL STATION FLOOR PLAN
CONTROL ROOM AND VERTICAL PUMP

SCALE 1/4"=1'-0"

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

ELECTRICAL CONTROL ROOM LOCATION PLAN

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

DESIGNED BY: R.E.N.	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE24.DGN
DRAWN BY: K.L.L.			FILE NO. H-2-44679
CHECKED BY: R.E.N.	DATE: JAN. 1996		

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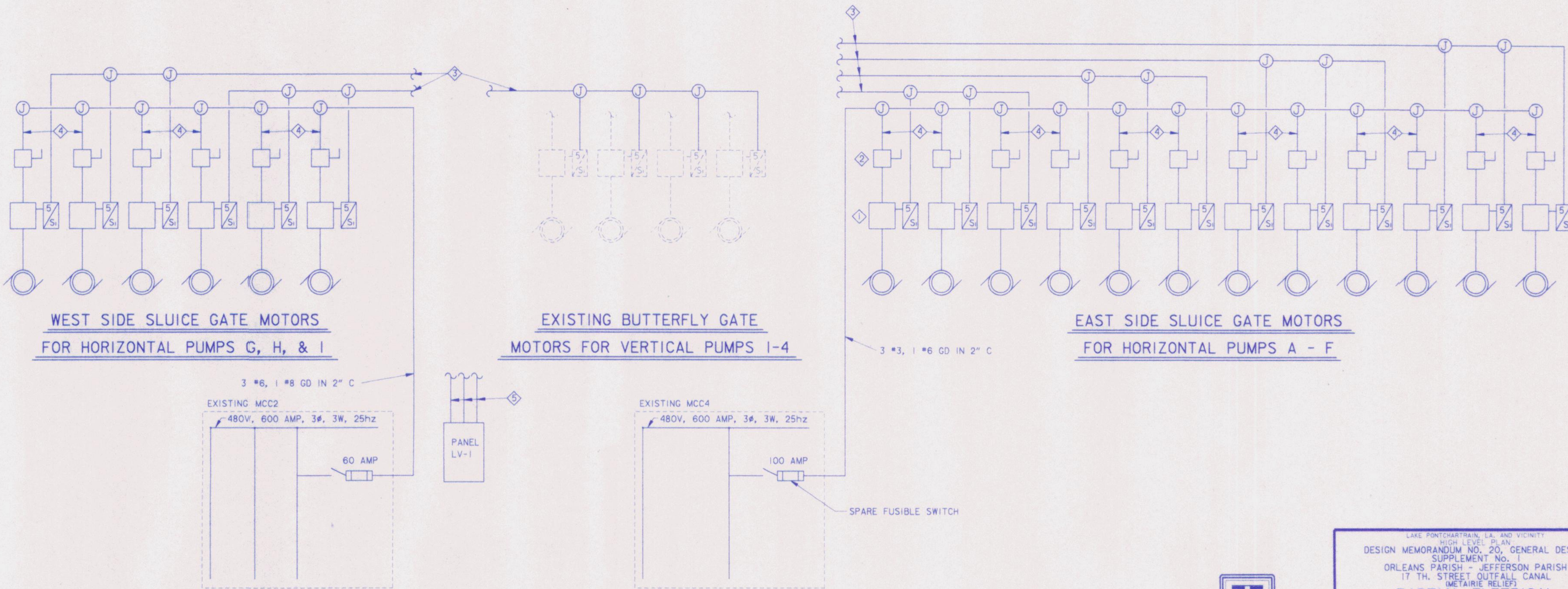
LEGEND:

- - - - - - DENOTES EXISTING EQUIPMENT

———— DENOTES NEW EQUIPMENT

SPECIFIC NOTES:

1. NEW SLUICE GATE OPERATORS WITH OPEN/CLOSE PUSHBUTTON STATION SUPPLIED UNDER DIVISION 15000 (TYPICAL).
2. NEW 30 AMP, 3 POLE, 480V, FUSED DISCONNECT SWITCH (TYPICAL).
3. ROUTE 2" CONDUITS FOR CONTROL CABLES TO EXISTING CONTROL CONSOLE CABINET #12 IN CONTROL ROOM.
4. AT EACH JUNCTION BOX TAP MAIN FEEDER CONDUCTOR WTH 3 #12, 1 #12 GD. AND ROUTE IN 3/4" C TO DISCONNET SWITCH.
5. ROUTE BRANCH CIRCUITS TO NEW LIGHTS AND RECEPTACLES.
6. TEMPORARY SERVICE TO BE PROVIDED FOR CONSTRUCTION LIGHTING AND COFFERDAM BUTTERFLY VALVES.



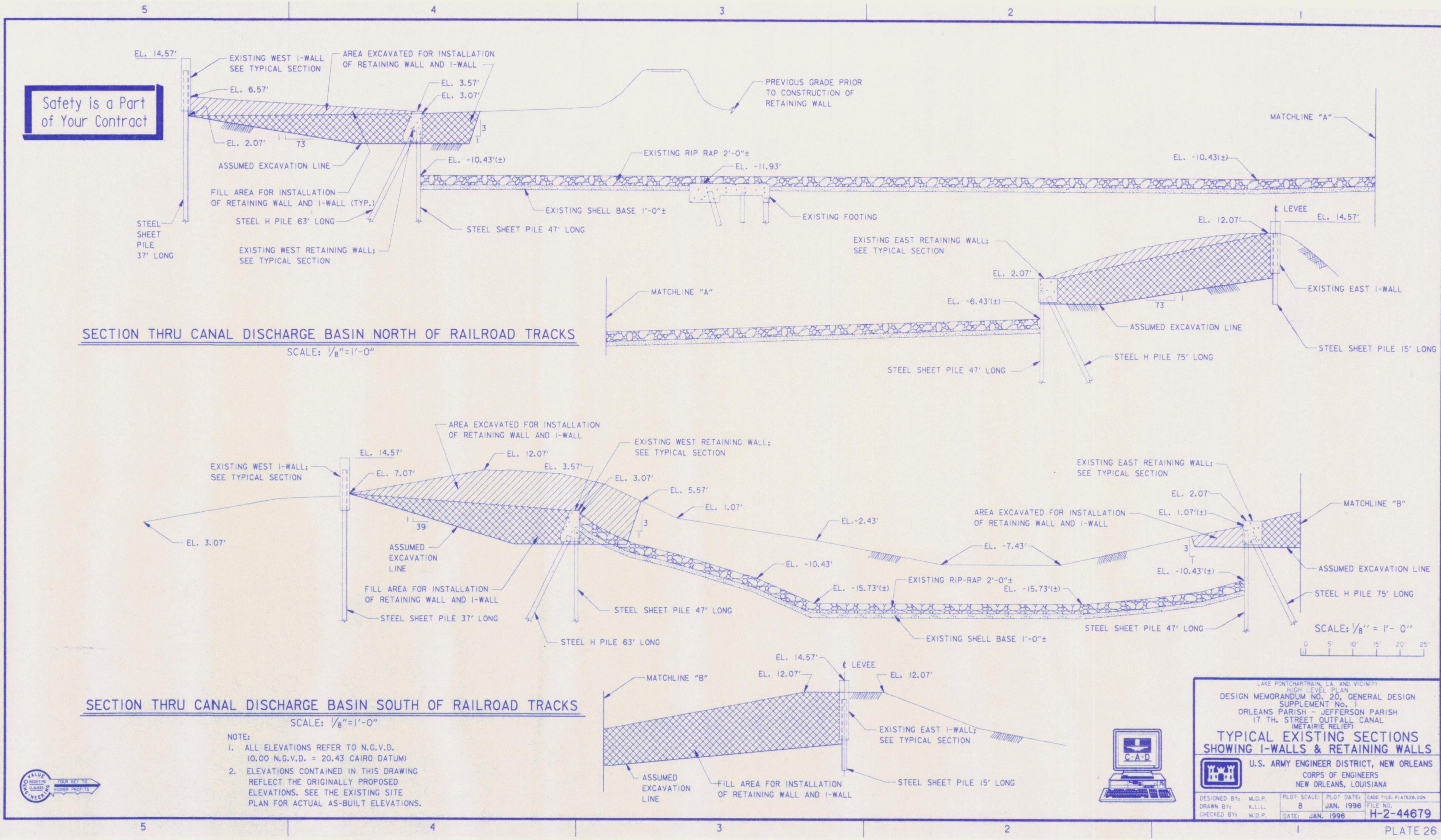
PARTIAL ELECTRICAL ONE LINE DIAGRAM

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PARTIAL ELETRICAL
ONE LINE DIAGRAM

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

DESIGNED BY: R.E.N.	PLOT SCALE:	PLOT DATE:	CADD FILE: PLATE25.DGN	
DRAWN BY: K.L.L.	.0833	JAN. 1996	FILE NO.	
CHECKED BY: R.E.N.	DATE: JAN. 1996		H-2-44679	


Safety is a Part of Your Contract
EL. 14.57'
EXISTING WEST I-WALL SEE TYPICAL SECTION
AREA EXCAVATED FOR INSTALLATION OF RETAINING WALL AND I-WALL
EL. 3.57'
EL. 3.07'
EL. 6.57'
PREVIOUS GRADE PRIOR TO CONSTRUCTION OF RETAINING WALL
MATCHLINE "A"
EL. 2.07'
73
3
ASSUMED EXCAVATION LINE
EL. -10.43'(±)
EXISTING RIP RAP 2'-0"±
EL. -11.93'
FILL AREA FOR INSTALLATION OF RETAINING WALL AND I-WALL (TYP.)
EXISTING SHELL BASE 1'-0"±
EXISTING FOOTING
STEEL SHEET PILE 37' LONG
STEEL H PILE 63' LONG
STEEL SHEET PILE 47' LONG
EXISTING WEST RETAINING WALL; SEE TYPICAL SECTION
¢ LEVEE
EL. 12.07'
EL. 14.57'
EXISTING EAST RETAINING WALL; SEE TYPICAL SECTION
EL. 2.07'
EXISTING EAST I-WALL
MATCHLINE "A"
EL. -6.43'(±)
73
ASSUMED EXCAVATION LINE
SECTION THRU CANAL DISCHARGE BASIN NORTH OF RAILROAD TRACKS
SCALE: 1/8"=1'-0"
STEEL SHEET PILE 15' LONG
STEEL H PILE 75' LONG
STEEL SHEET PILE 47' LONG
AREA EXCAVATED FOR INSTALLATION OF RETAINING WALL AND I-WALL
EXISTING WEST RETAINING WALL; SEE TYPICAL SECTION
EL. 14.57'
EL. 12.07'
EXISTING WEST I-WALL; SEE TYPICAL SECTION
EL. 7.07'
EL. 3.57'
EL. 3.07'
EL. 5.57'
EL. 1.07'
EXISTING EAST RETAINING WALL; SEE TYPICAL SECTION
EL. 2.07'
MATCHLINE "B"
AREA EXCAVATED FOR INSTALLATION OF RETAINING WALL AND I-WALL
EL. 1.07'(±)
39
3
EL. 3.07'
ASSUMED EXCAVATION LINE
EL.-2.43'
EL. -7.43'
ASSUMED EXCAVATION LINE
EL. -10.43'
EL. -10.43'(±)
FILL AREA FOR INSTALLATION OF RETAINING WALL AND I-WALL
EXISTING RIP-RAP 2'-0"±
EL. -15.73'(±)
EL. -15.73'(±)
STEEL H PILE 75' LONG
STEEL SHEET PILE 47' LONG
STEEL SHEET PILE 37' LONG
STEEL H PILE 63' LONG
EXISTING SHELL BASE 1'-0"±
STEEL SHEET PILE 47' LONG
SCALE: 1/8" = 1'- 0"
0 5' 10' 15' 20' 25'
EL. 14.57'
¢ LEVEE
EL. 12.07'
EL. 12.07'
MATCHLINE "B"
SECTION THRU CANAL DISCHARGE BASIN SOUTH OF RAILROAD TRACKS
SCALE: 1/8"=1'-0"
EXISTING EAST I-WALL; SEE TYPICAL SECTION
STEEL SHEET PILE 15' LONG
ASSUMED EXCAVATION LINE
FILL AREA FOR INSTALLATION OF RETAINING WALL AND I-WALL
NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.
VALUE ENGINEERING
YOUR KEY TO HIGHER PROFITS
C-A-D
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
TYPICAL EXISTING SECTIONS
SHOWING I-WALLS & RETAINING WALLS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: M.D.P.
DRAWN BY: K.L.L.
CHECKED BY: M.D.P.
PLOT SCALE: 8
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE26.DGN
FILE NO. H-2-44679
PLATE 26

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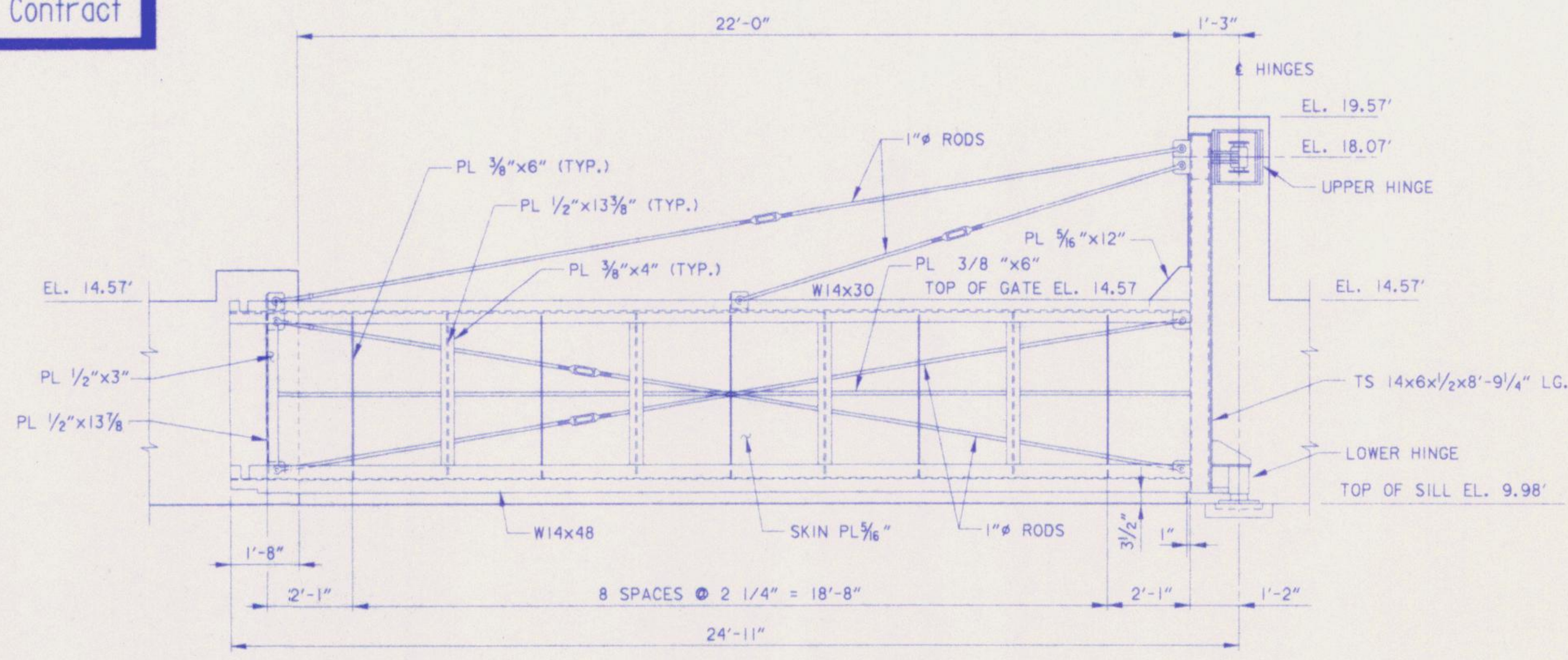
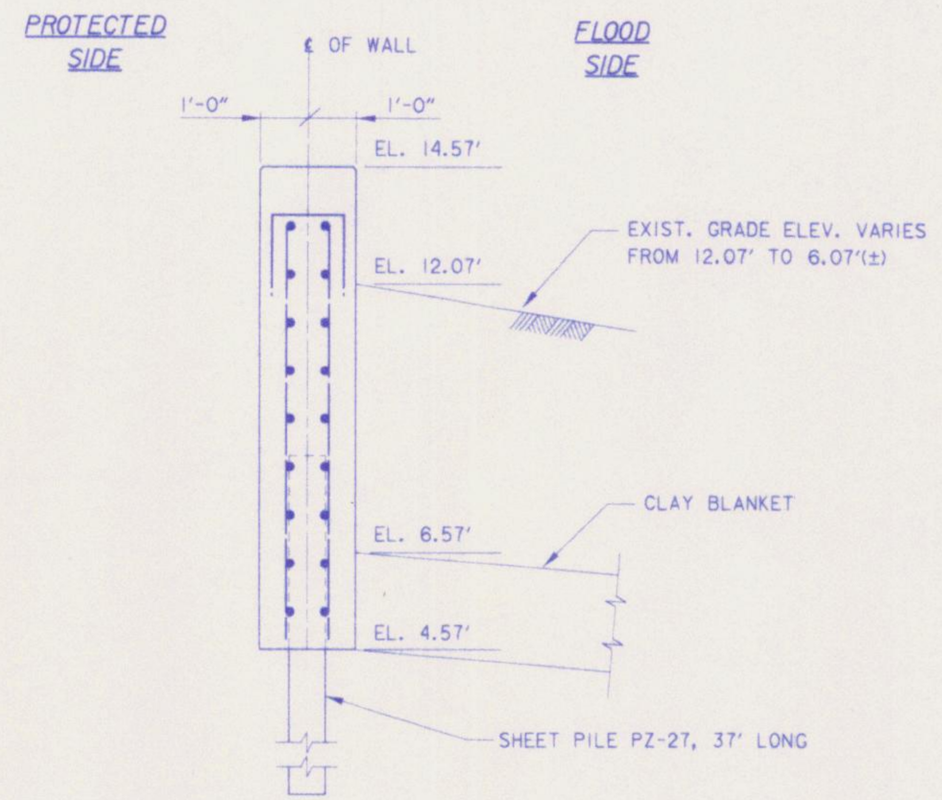


TYPICAL GATE ELEVATION

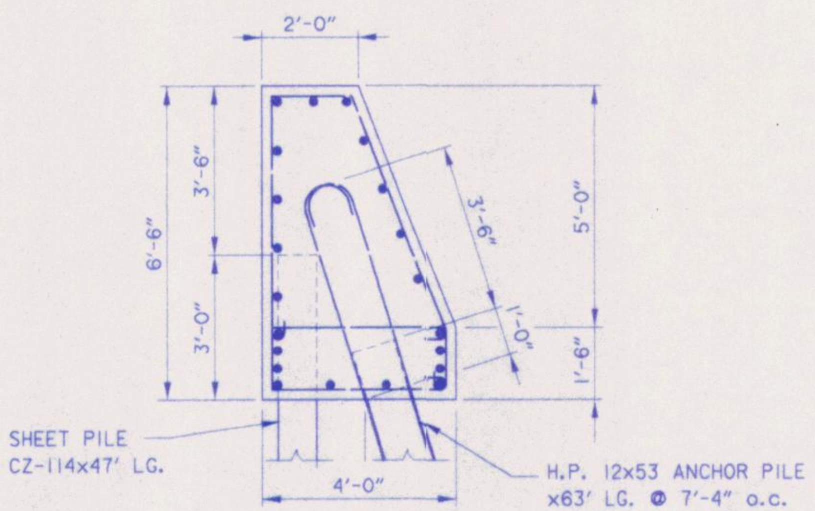
SCALE: 1/2"=1'-0"



TYPICAL DETAIL OF I-WALL WEST LEVEE

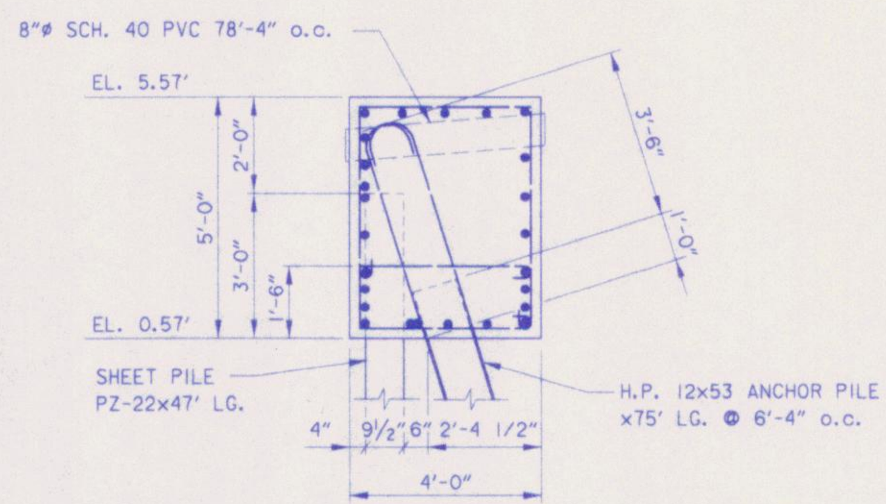
SCALE: 1/2" = 1'-0"

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.



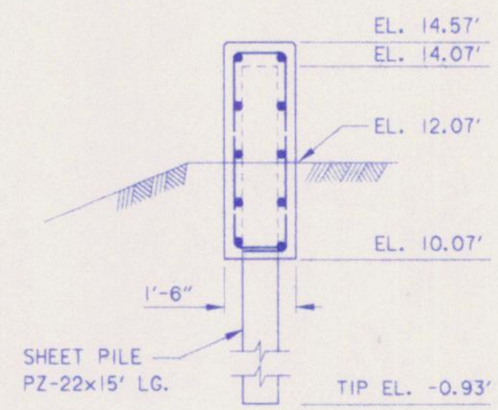
DETAIL OF RETAINING WALL WEST BANK

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



DETAIL OF RETAINING WALL EAST BANK

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



TYPICAL DETAIL OF I-WALL EAST LEVEE

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

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

12" 0 2' 4' 6' 8'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

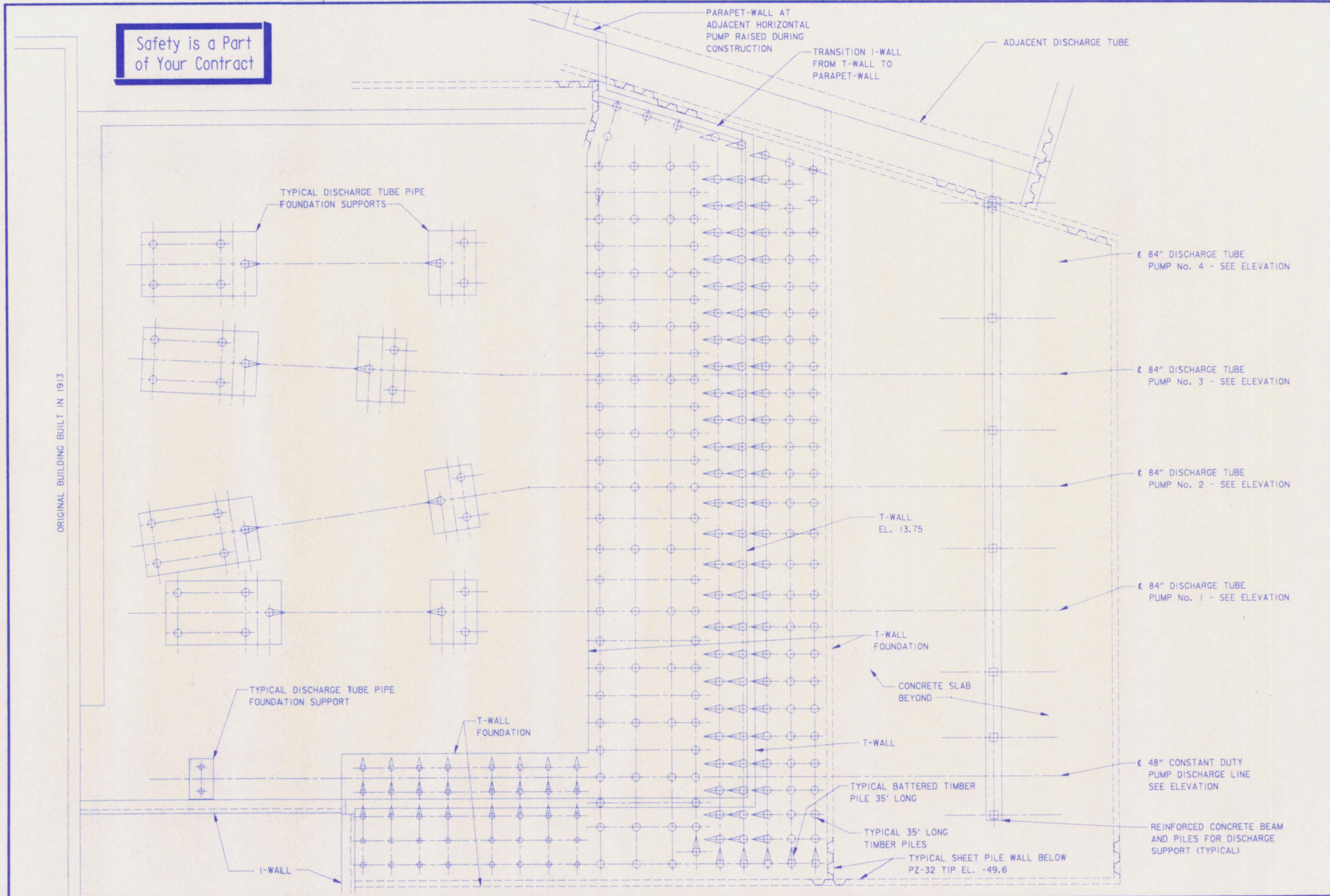
TYPICAL EXISTING I-WALL, RETAINING WALL, AND RAILROAD FLOODGATE DETAILS

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

DESIGNED BY:	M.D.P.	PLOT SCALE: 2	PLOT DATE: JAN. 1996	CADD FILE: PLATE27.DGN
DRAWN BY:	K.L.L.			FILE NO. H-2-44679
CHECKED BY:	M.D.P.	DATE: JAN. 1996		

VALUE ENGINEERING INCENTIVE CLAUSES — YOUR KEY TO HIGHER PROFITS

PLATE 27



NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

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

12" 0 5' 10' 15' 20'

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PLAN OF EXISTING T-WALL FOUNDATION AND PILES

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

DESIGNED BY: M.D.P.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE28.DGN
DRAWN BY: L.A.O.	DATE: JAN. 1996		FILE NO. H-2-44679
CHECKED BY: M.D.P.			

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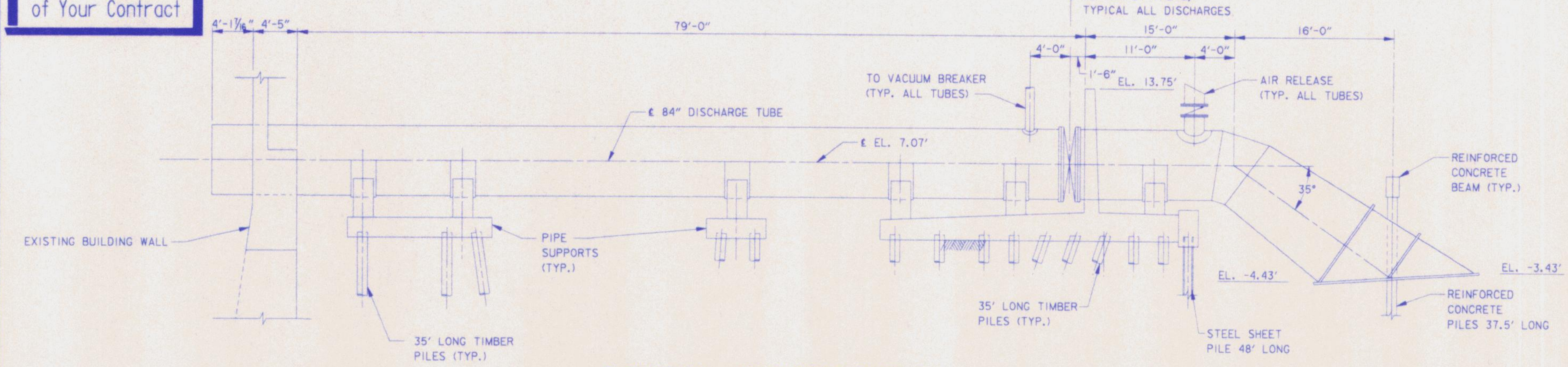
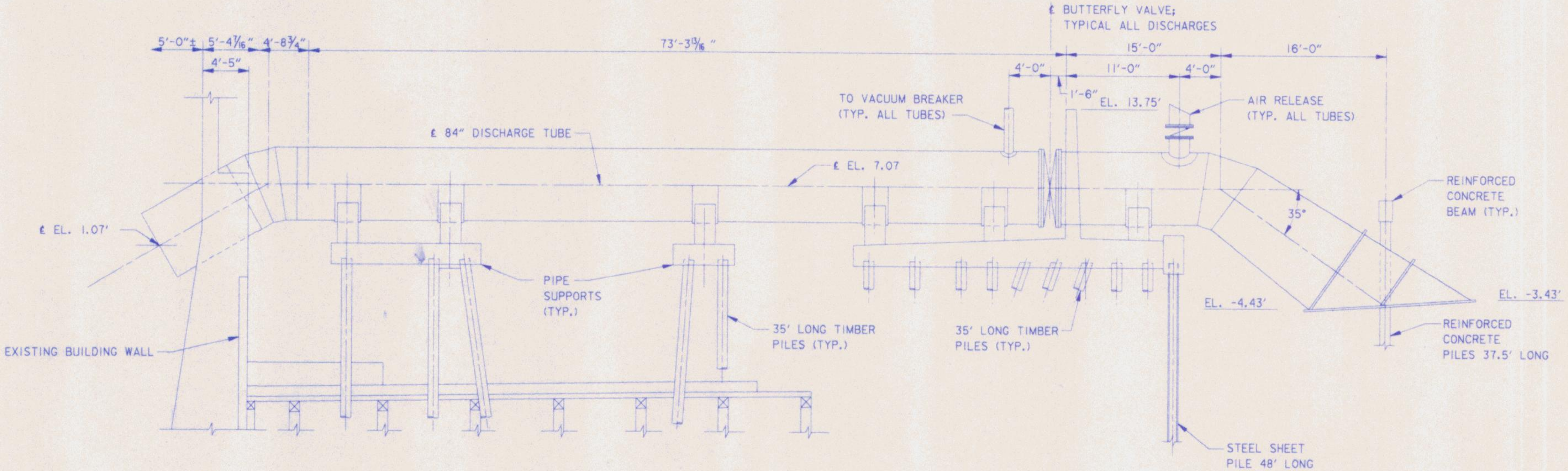


ELEVATION - DISCHARGE TUBE "4"

3/16" = 1'-0"



ELEVATION - DISCHARGE TUBE "3"

3/16" = 1'-0"

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

* TUBES CONSTRUCTED UNDER N.O.S.&W.B. CONTRACT No. 5103.1982

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

12" 0 5' 10' 15' 20'

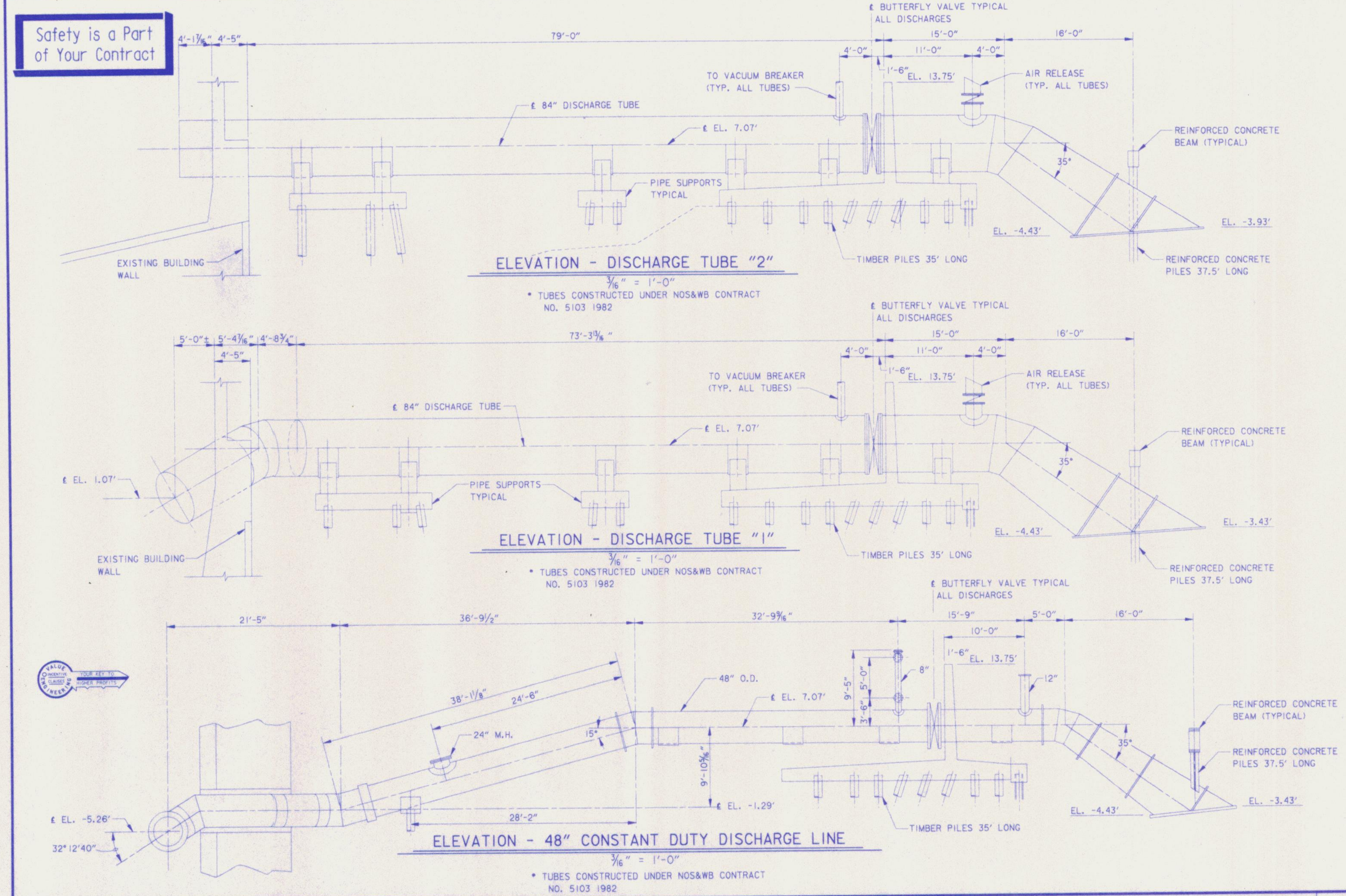
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

ELEVATION OF EXISTING DISCHARGE TUBES AT ORIGINAL STATION

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

DESIGNED BY:	M.D.P.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE29.DGN
DRAWN BY:	K.L.L.			FILE NO.
CHECKED BY:	M.D.P.	DATE: JAN. 1996		H-2-44679

PLATE 29



NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

C.A.D

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

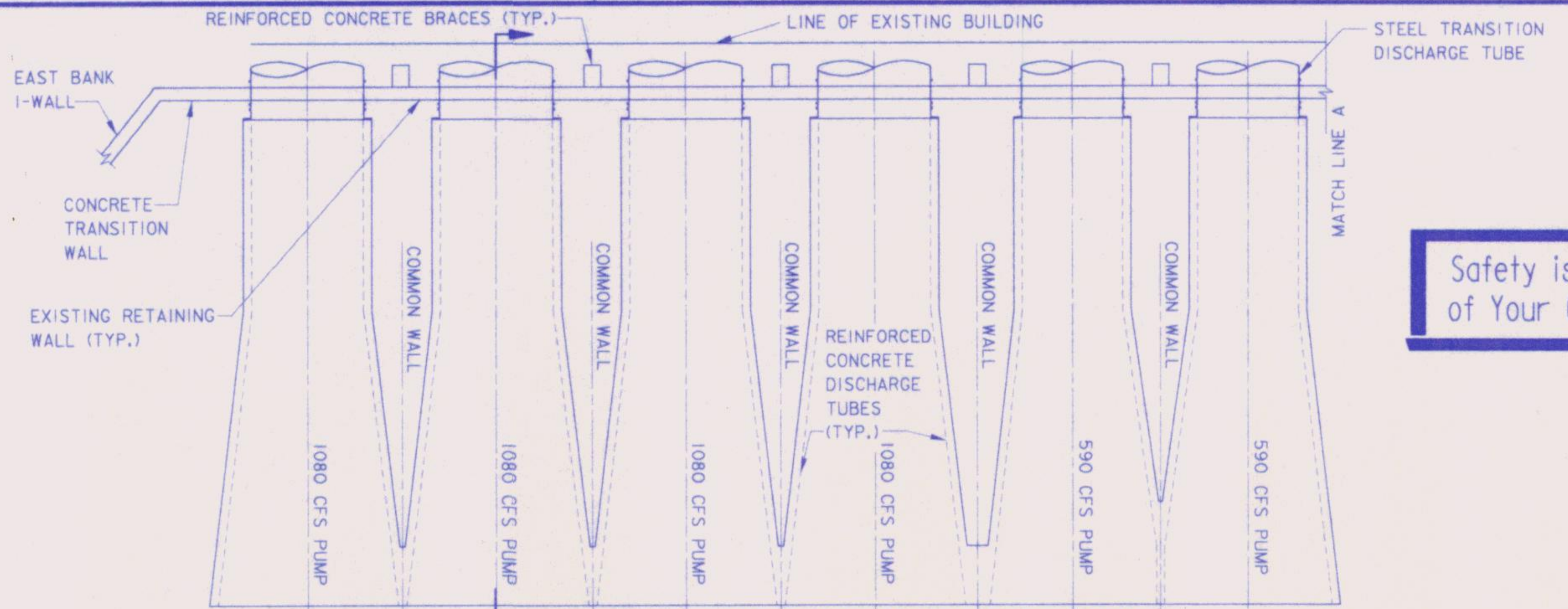
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

ELEVATION OF EXISTING DISCHARGE TUBES AT ORIGINAL STATION

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

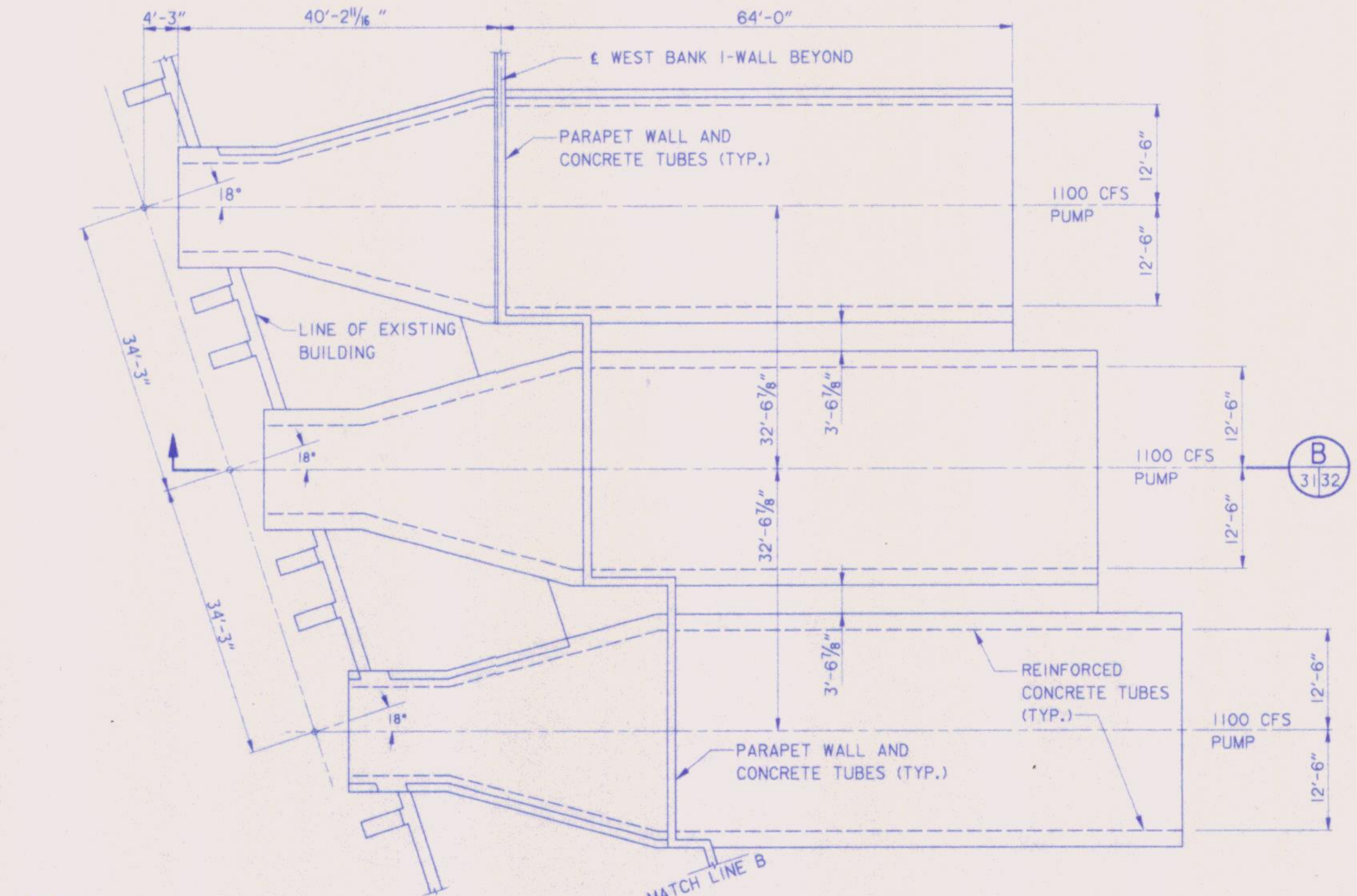
DESIGNED BY: M.D.P.	PLOT SCALE: 5.3333	PLOT DATE: JAN. 1996	CADD FILE: PLATE30.DGN
DRAWN BY: L.A.D.			FILE NO. H-2-44679
CHECKED BY: M.D.P.	DATE: JAN. 1996		

PLATE30



PLAN OFF EAST DISCHARGE TUBES

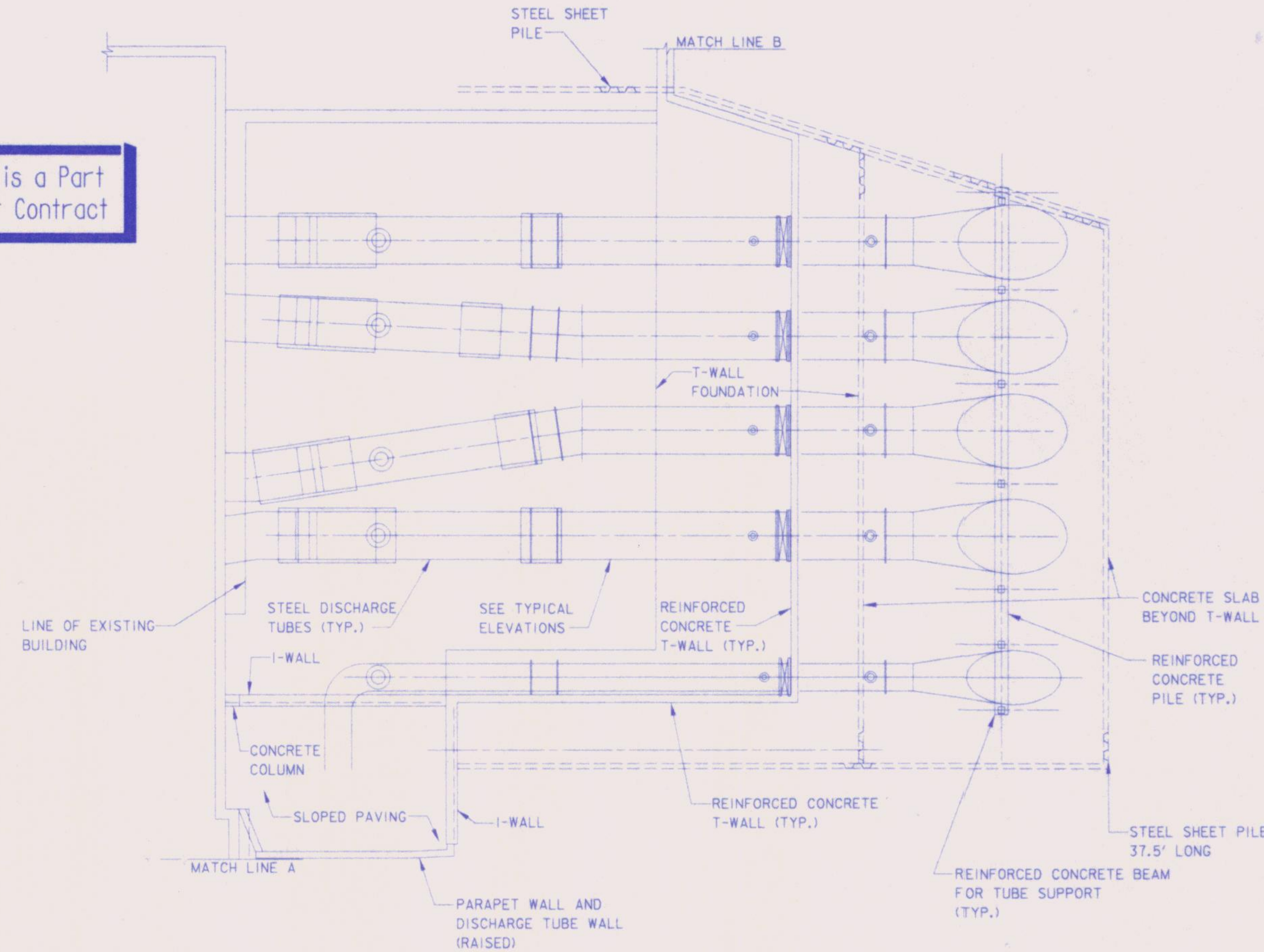
SCALE: 1" = 10'
(BUILT IN 1914 AND 1928)



PLAN OF WEST DISCHARGE TUBES

SCALE: 1" = 10'
(BUILT IN 1967 AND 1986)

Safety is a Part of Your Contract



NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

(ORIGINAL STATION BUILT IN 1913. T-WALL AND DISCHARGE EXTENSIONS BUILT IN 1982)

PLAN OF T-WALL AND DISCHARGE TUBES AT ORIGINAL STATION

SCALE: 1" = 10'

SCALE: 1" = 10'
10' 0 10' 20' 30' 40'

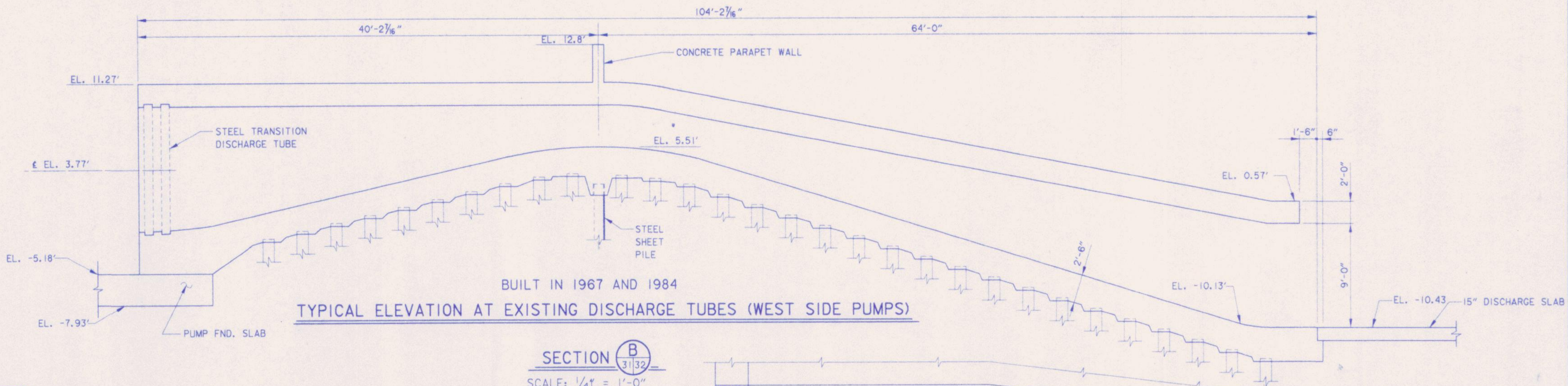
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PLANS OF EXISTING FRONTING PROTECTION PARALLEL TO THE STATION

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

DESIGNED BY: S.C.B.	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE31.DGN	
DRAWN BY: B.M.M.			FILE NO.	
CHECKED BY: M.D.P.	DATE: JAN. 1996		H-2-44679	

PLATE 31



BUILT IN 1967 AND 1984

TYPICAL ELEVATION AT EXISTING DISCHARGE TUBES (WEST SIDE PUMPS)

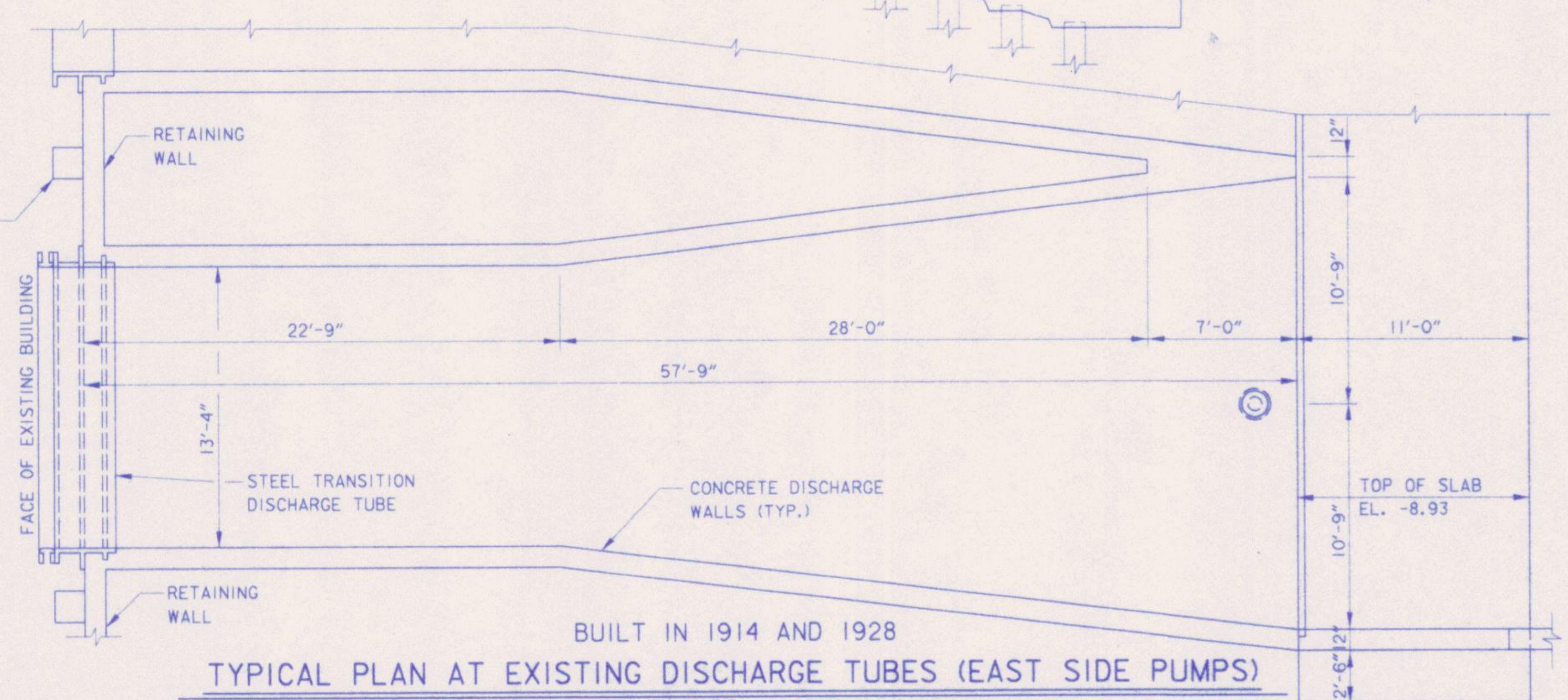
SECTION B (31|32)

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

Safety is a Part of Your Contract

NOTE:

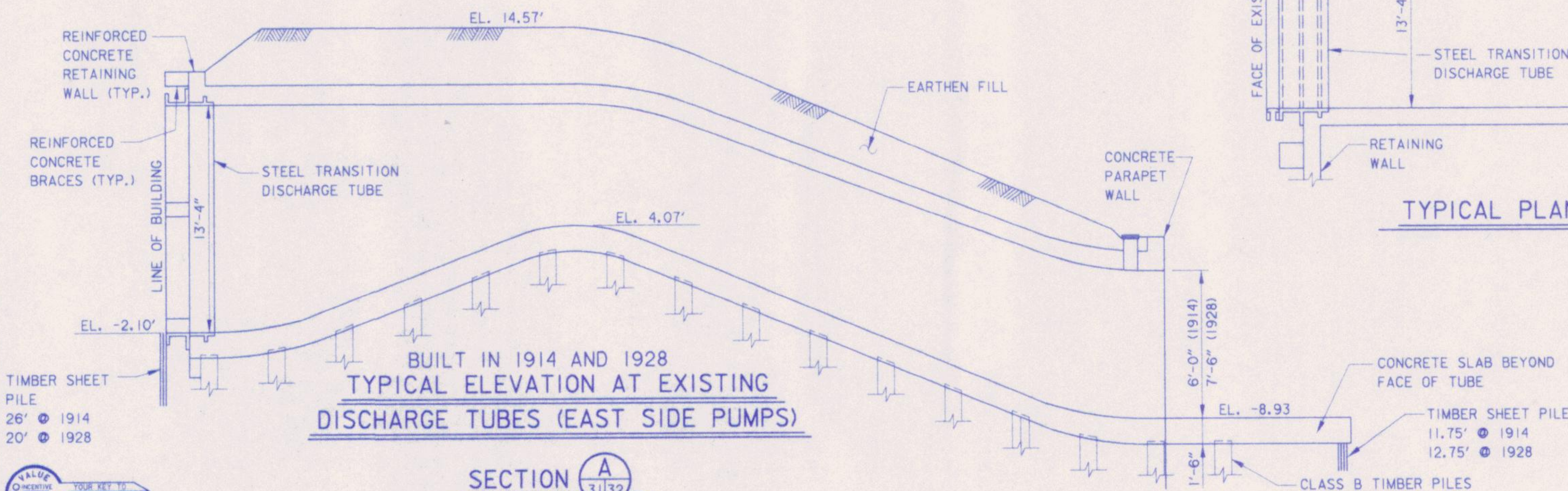
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.



BUILT IN 1914 AND 1928

TYPICAL PLAN AT EXISTING DISCHARGE TUBES (EAST SIDE PUMPS)

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



BUILT IN 1914 AND 1928

TYPICAL ELEVATION AT EXISTING DISCHARGE TUBES (EAST SIDE PUMPS)

SECTION A (31|32)

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

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

12" 0 5' 10' 15' 20'

C·A·D

VALUE ENGINEERING INCENTIVE CLAUSES YOUR KEY TO HIGHER PROFITS

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

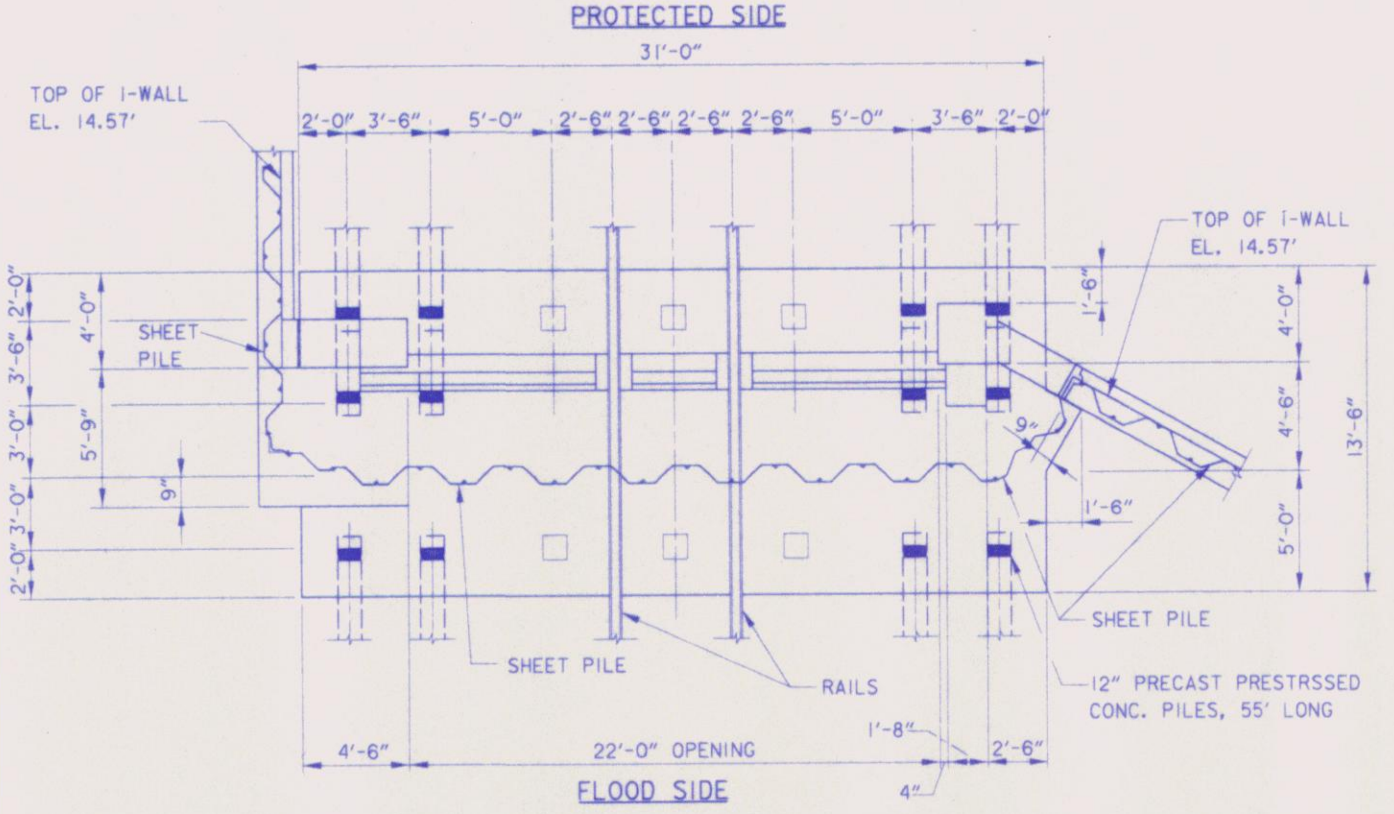
TYPICAL SECTIONS OF EXISTING FLOOD PROTECTION

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

DESIGNED BY:	M.D.P.	PLOT SCALE: 4	PLOT DATE: JAN. 1996	CADD FILE: PLATE32.DGN
DRAWN BY:	K.L.L.			FILE NO. H-2-44679
CHECKED BY:	M.D.P.	DATE: JAN. 1996		

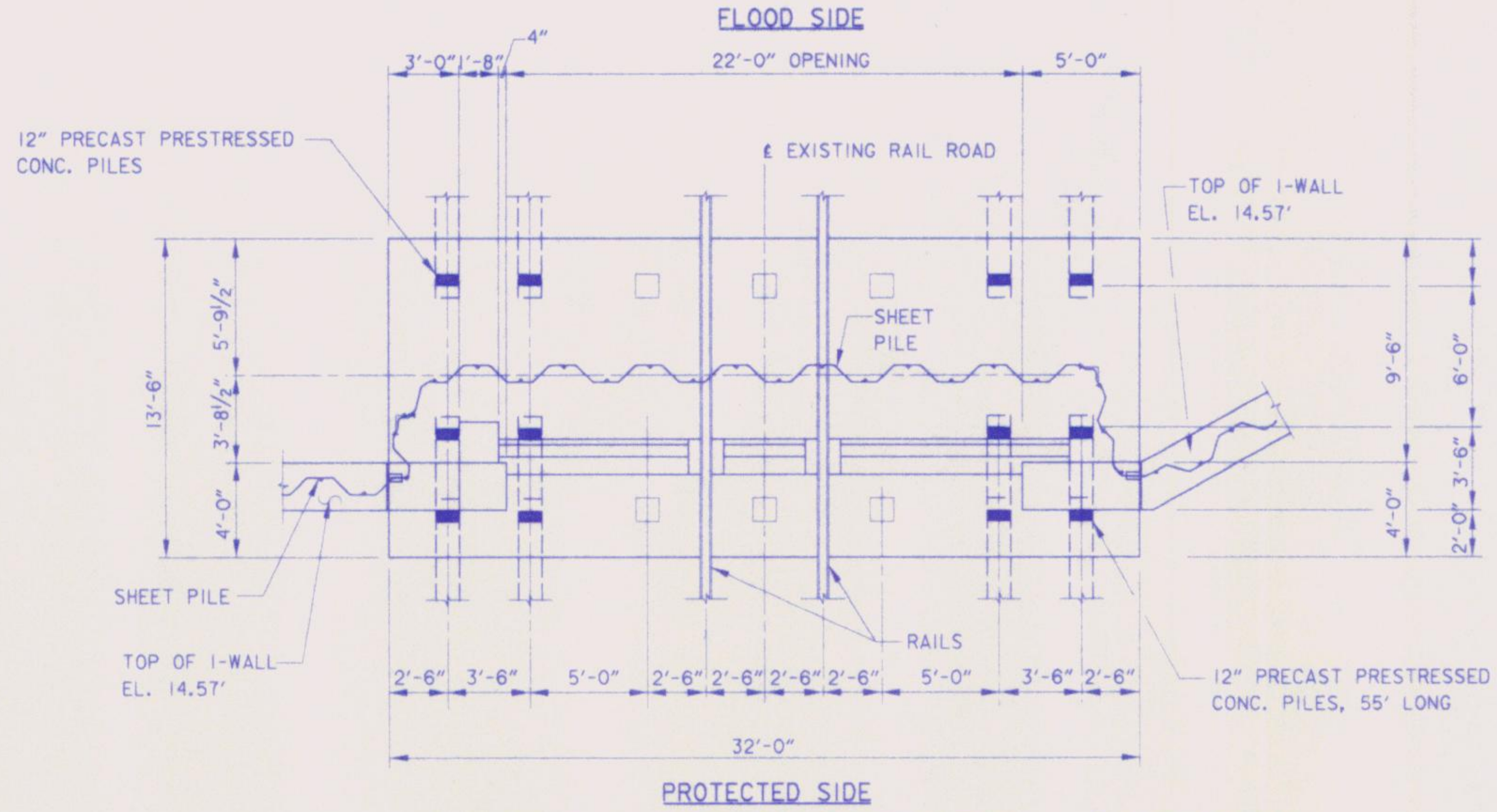
PLATE 32

Safety is a Part of Your Contract



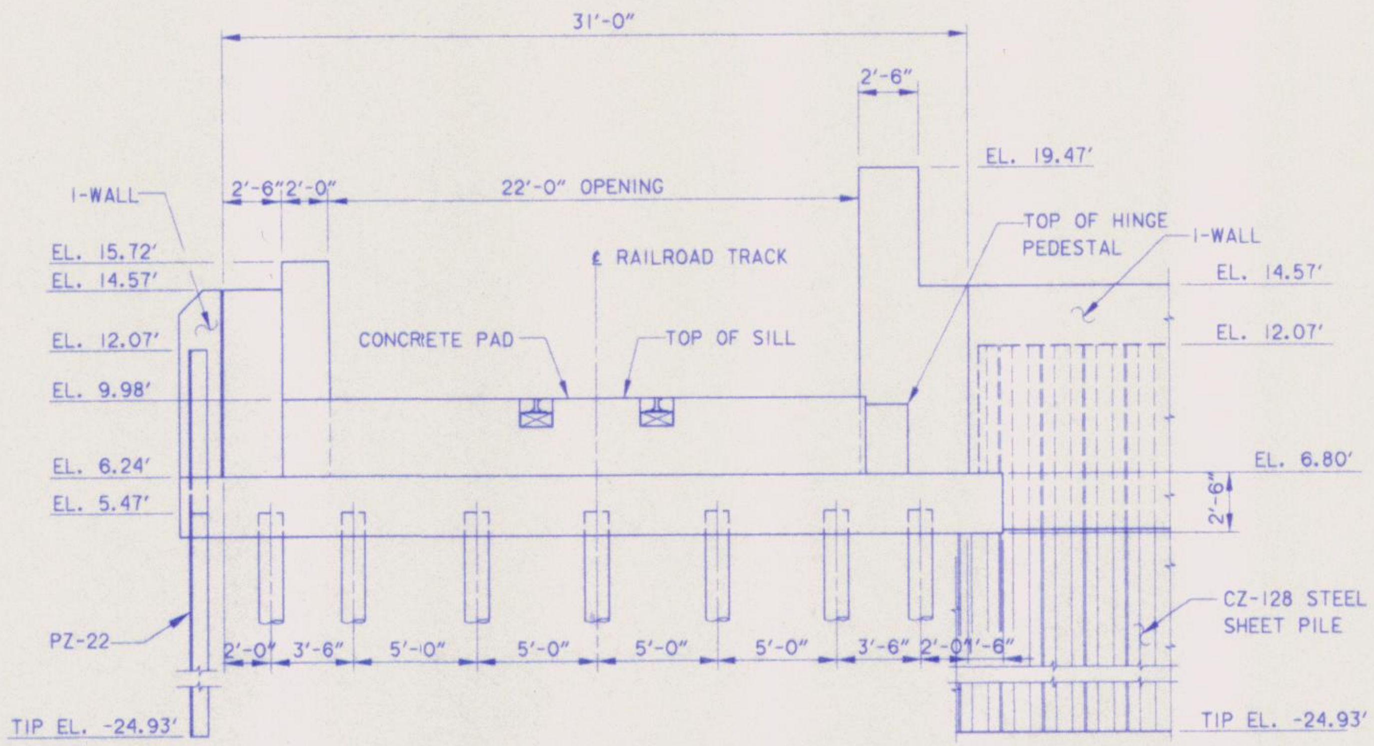
PLAN - RAILROAD FLOODGATE FOUNDATION - WEST LEVEE

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



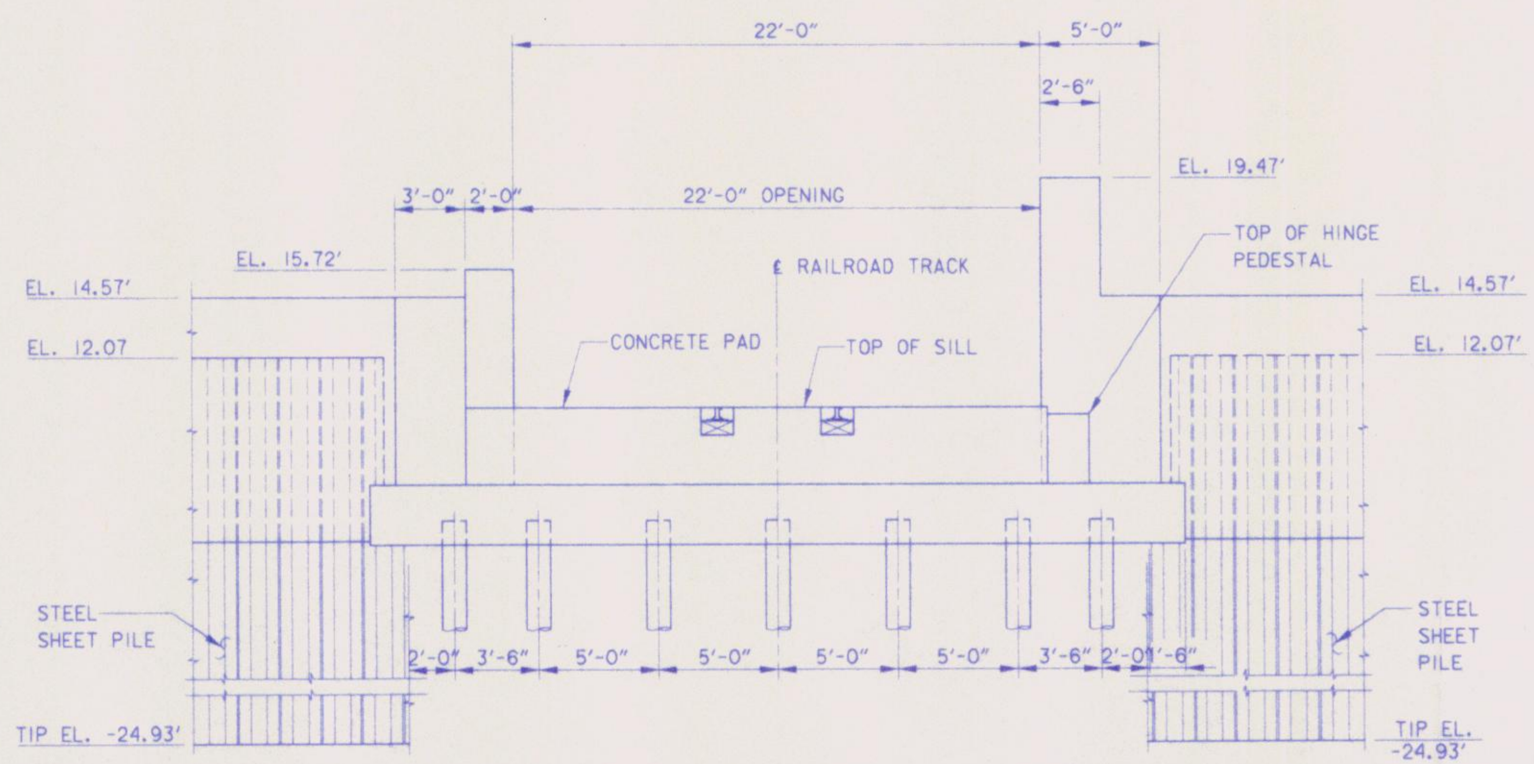
PLAN - RAILROAD FLOODGATE FOUNDATION - EAST LEVEE

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



FLOOD SIDE ELEVATION - WEST LEVEE

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



FLOOD SIDE ELEVATION - EAST LEVEE

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

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

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

12" 0 5' 10' 15' 20'

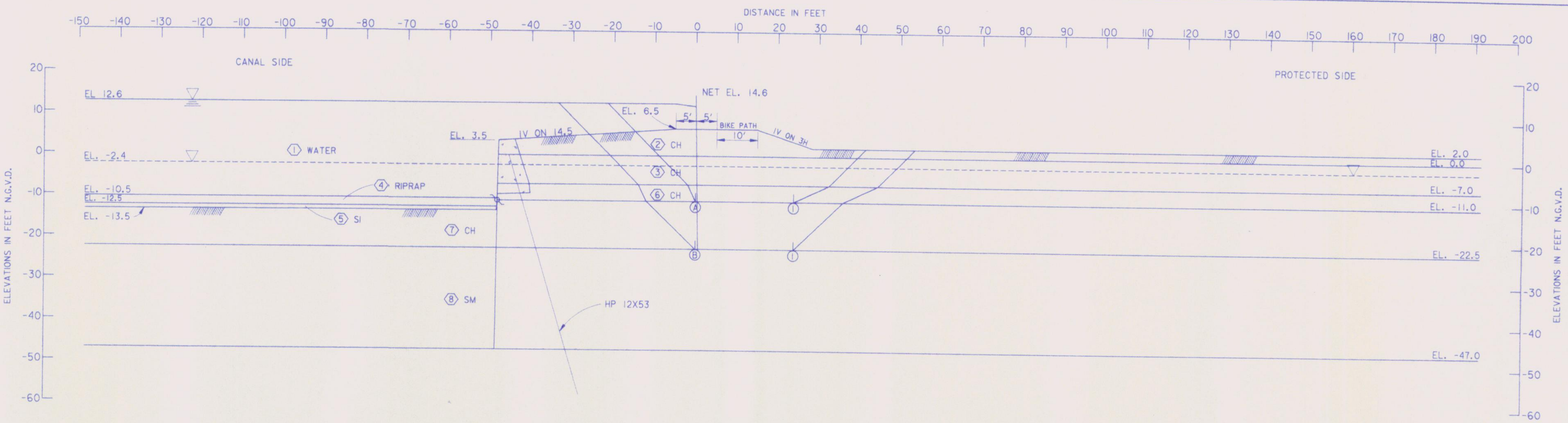
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

RAILROAD FLOODGATE FOUNDATION
PLAN & ELEVATIONS

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

DESIGNED BY: M.D.P.	PLOT SCALE: 4	PLOT DATE: JAN. 1996	CADD FILE: PLATE33.DGN	
DRAWN BY: K.L.L.			FILE NO. H-2-44679	
CHECKED BY: M.D.P.	DATE: JAN. 1996			

VALUE ENGINEERING INCENTIVE CLAUSES — YOUR KEY TO HIGHER PROFITS



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UINIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STIRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VEIRT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	700	700	700	700	0
3	CH	112	112	520	520	520	520	0
4	RIPRAP	132	132	0	0	0	0	40
5	SI	92	92	0	0	0	0	40
6	CH	115	115	720	720	720	720	0
7	CH	107	107	480	480	480	480	0
8	SM	122	122	0	0	0	0	30

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	-11.0	20556	11520	21934	24503	9480	54010	15023	3.60
B 1	-22.5	20556	11520	32340	56990	32580	74415	24410	3.05

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

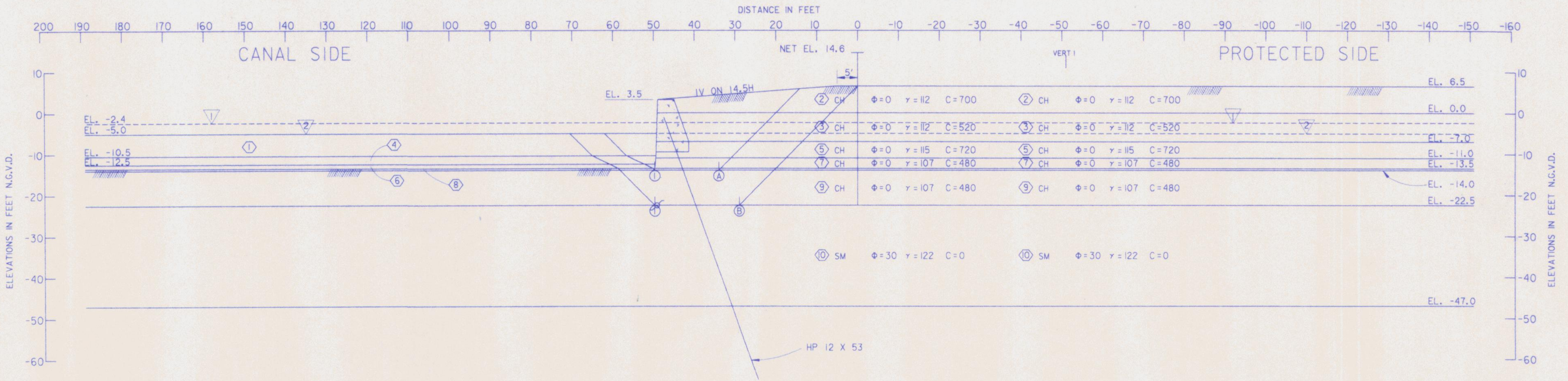
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE 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. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING PROTECTED SIDE LEVEE
STABILITY ANALYSIS
W/L STA. 0+00 TO W/L STA. 4+15 JEFFERSON

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
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE34.DGN
FILE NO. H-2-44679



PH LINE IN STRATUM ⑩

PH LINE IN STRATA ④ AND ⑥

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	700	700	700	700	0
3	CH	112	112	520	520	520	520	0
4	RIPRAP	132	132	0	0	0	0	40
5	CH	115	115	720	720	720	720	0
6	SI	92	92	0	0	0	0	40
7	CH	107	107	480	480	480	480	0
8	CH	107	107	480	480	480	480	0
9	CH	107	107	480	480	480	480	0
10	SM	122	122	0	0	0	0	30

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

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	-14.0	24095	7536	1534	20398	2914	33165	17484	1.90
Ⓑ ①	-22.5	33180	9824	9694	44567	13181	52698	31386	1.68

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

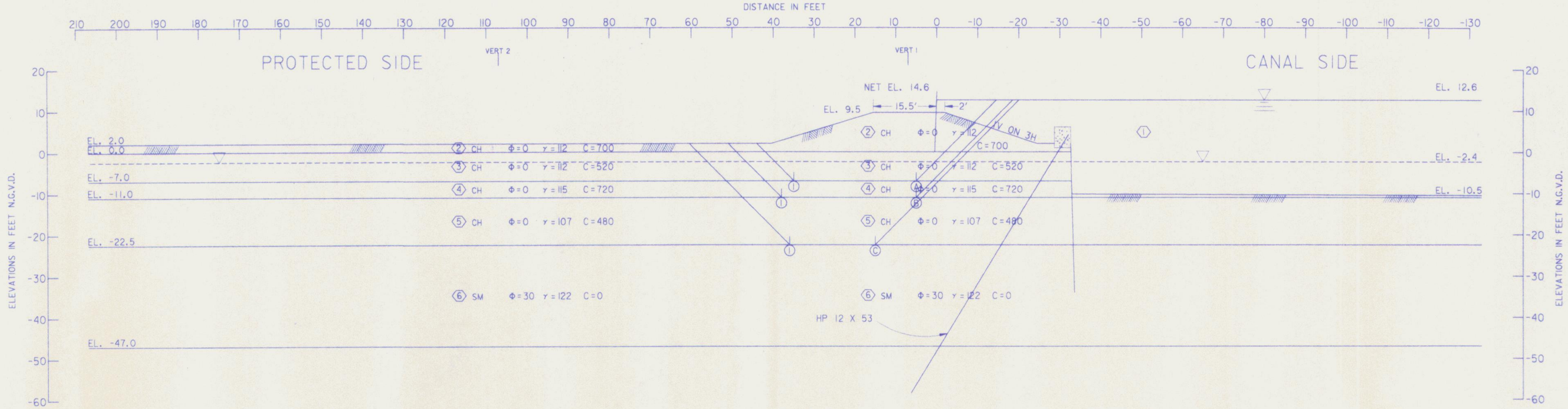
ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE 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. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING FLOOD SIDE LEVEE
STABILITY ANALYSIS
W/L STA. 0+00 TO W/L STA. 4+15 JEFFERSON

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20	PLOT DATE: JAN. 1996	CADD FILE: PLATE35.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		



AS BUILT 1988-1989

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	-7.0	17256	15600	10080	17222	5044	42936	12178	3.53
Ⓑ ①	-11.0	21617	15840	15840	25740	9593	53297	16147	3.30
Ⓒ ①	-22.5	32132	10080	26880	59382	33785	69092	25597	2.70

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
①	WATER	62.5	62.5	0	0	0	0	0
②	CH	112	112	700	700	700	700	0
③	CH	112	112	520	520	520	520	0
④	CH	115	115	720	720	720	720	0
⑤	CH	107	107	480	480	480	480	0
⑥	SM	122	122	0	0	0	0	30

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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

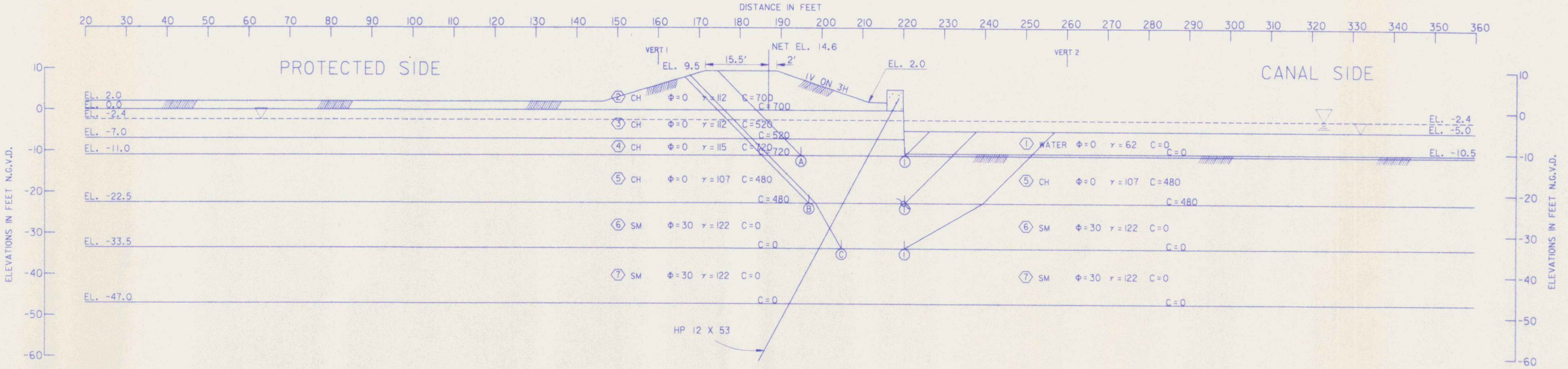
$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING PROTECTED SIDE LEVEE
STABILITY ANALYSIS
ORLEANS SIDE OF PUMP STA. TO SOUTH OF SOUTHERN R.R.

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	PLOT DATE: JAN. 1996	CADD FILE: PLATE36.DGN
	DATE: JAN. 1996		FILE NO. H-2-44679



AS BUILT 1988-1989

ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
Ⓐ ①	-11.0	26339	12240	720	22881	1132	39299	21749	1.81
Ⓑ ①	-22.5	35282	11217	11760	55428	12821	58259	42607	1.37
Ⓒ ①	-33.5	51437	18963	27219	96161	38150	97619	58011	1.68

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F. VERT. 1	TOTAL UNIT WEIGHT P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	CENTER OF STRATUM VERT. 2	BOTTOM OF STRATUM VERT. 1	BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	700	700	700	700	0
3	CH	112	112	520	520	520	520	0
4	CH	115	115	720	720	720	720	0
5	CH	107	107	480	480	480	480	0
6	SM	122	122	0	0	0	0	30
7	SM	122	122	0	0	0	0	30

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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

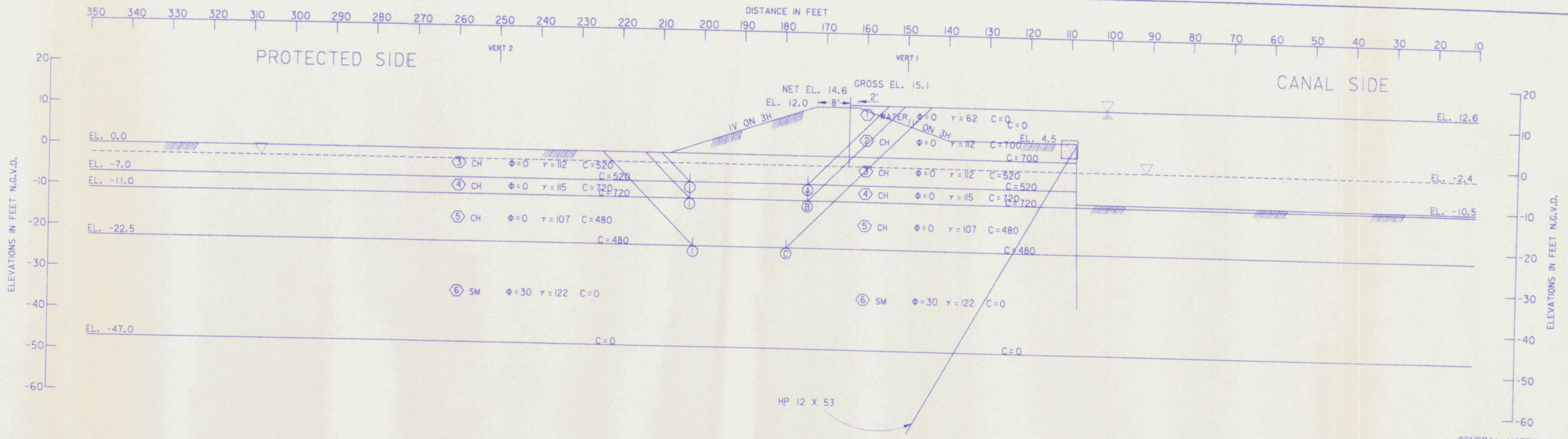
$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING FLOOD SIDE LEVEE
STABILITY ANALYSIS
ORLEANS SIDE OF PUMP STA. TO SOUTH OF SOUTHERN R.R.

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20	PLOT DATE: JAN. 1996	CADD FILE: PLATE37.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		



AS BUILT 1988-1989

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)	-7.0	21632	15080	7280	20185	3210	43992	16975	2.59
(B) (1)	-11.0	25992	13920	13040	29321	7266	52952	22055	2.40
(C) (1)	-22.5	34759	11040	24080	64415	28852	69879	35563	1.96

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	700	700	700	700	0
3	CH	112	112	520	520	520	520	0
4	CH	115	115	720	720	720	720	0
5	CH	107	107	480	480	480	480	0
6	SM	122	122	0	0	0	0	30

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

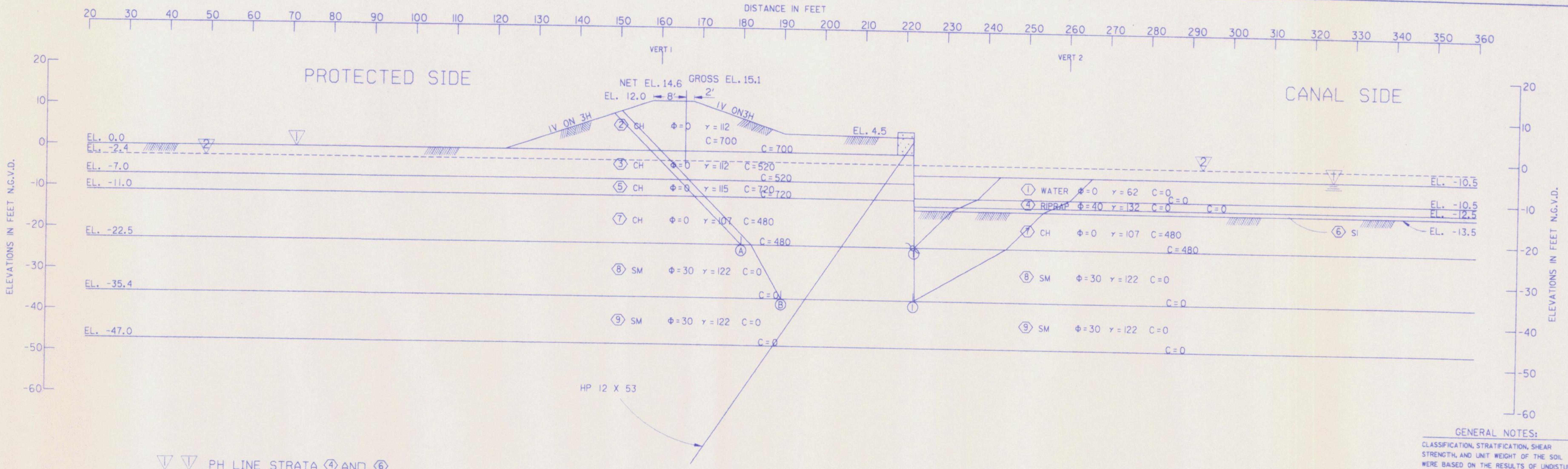
- Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
- C -- UNIT COHESION, P.S.F.
- ∇ -- STATIC WATER SURFACE
- D -- HORIZONTAL DRIVING FORCE IN POUNDS
- R -- HORIZONTAL RESISTING FORCE IN POUNDS
- A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
- B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
- P -- AS A SUBSCRIPT, 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. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING PROTECTED SIDE LEVEE
STABILITY ANALYSIS
SOUTH OF SOUTHERN R.R. TO B/L STA. 670+63 ORLEANS

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 20	PLOT DATE: JAN. 1996	CADD FILE: PLATE38.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		



PH LINE STRATA ④ AND ⑥

PH LINE STRATA ⑧ AND ⑨

AS BUILT 1988-1989

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	-22.5	36506	20340	9694	61605	13181	66540	48424	1.37
Ⓑ ①	-35.5	57031	46142	30317	112247	45105	133490	67142	1.99

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	700	700	700	700	0
3	CH	112	112	520	520	520	520	0
4	RIPRAP	132	132	0	0	0	0	40
5	CH	115	115	720	720	720	720	0
6	SI	92	92	0	0	0	0	40
7	CH	107	107	480	480	480	480	0
8	SM	122	122	0	0	0	0	30
9	SM	122	122	0	0	0	0	30

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

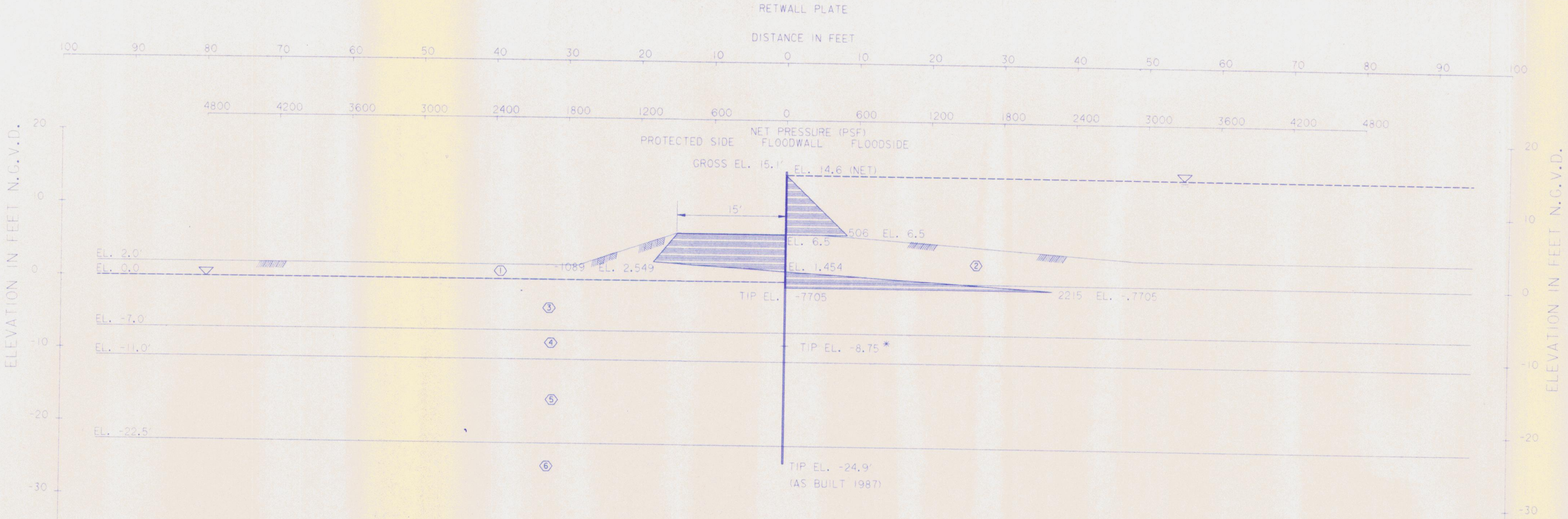
- Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
- C -- UNIT COHESION, P.S.F.
- ▽ -- STATIC WATER SURFACE
- D -- HORIZONTAL DRIVING FORCE IN POUNDS
- R -- HORIZONTAL RESISTING FORCE IN POUNDS
- A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
- B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
- P -- AS A SUBSCRIPT, 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. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING FLOOD SIDE LEVEE
STABILITY ANALYSIS
SOUTH OF SOUTHERN R.R. TO B/L STA. 670+63 ORLEANS

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	PLOT DATE: JAN. 1996	CADD FILE: PLATE39.DGN
	DATE: JAN. 1996		FILE NO. H-2-44679



ELEVATION	PRESSURE
14.60	.00
6.50	506.25
6.50	.00
6.50	-893.75
2.55	-1089.35
1.45	0.0
-.77	2214.82
-.77	.00

STRATUM NO.	SOIL TYPE	FRICTION ANGLE	UNIT WEIGHT (PCF)	COHESIVE TOP	STRENGTH BOTTOM
1	CH	0	112.00	700	700
2	CH	0	49.5	700	700
3	CH	0	49.5	520	520
4	CH	0	52.5	720	720
4	CH	0	44.5	480	480
4	SM	30	59.5	0	0

* 2.5 TO 1 HEAD TO PENETRATION RATIO

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

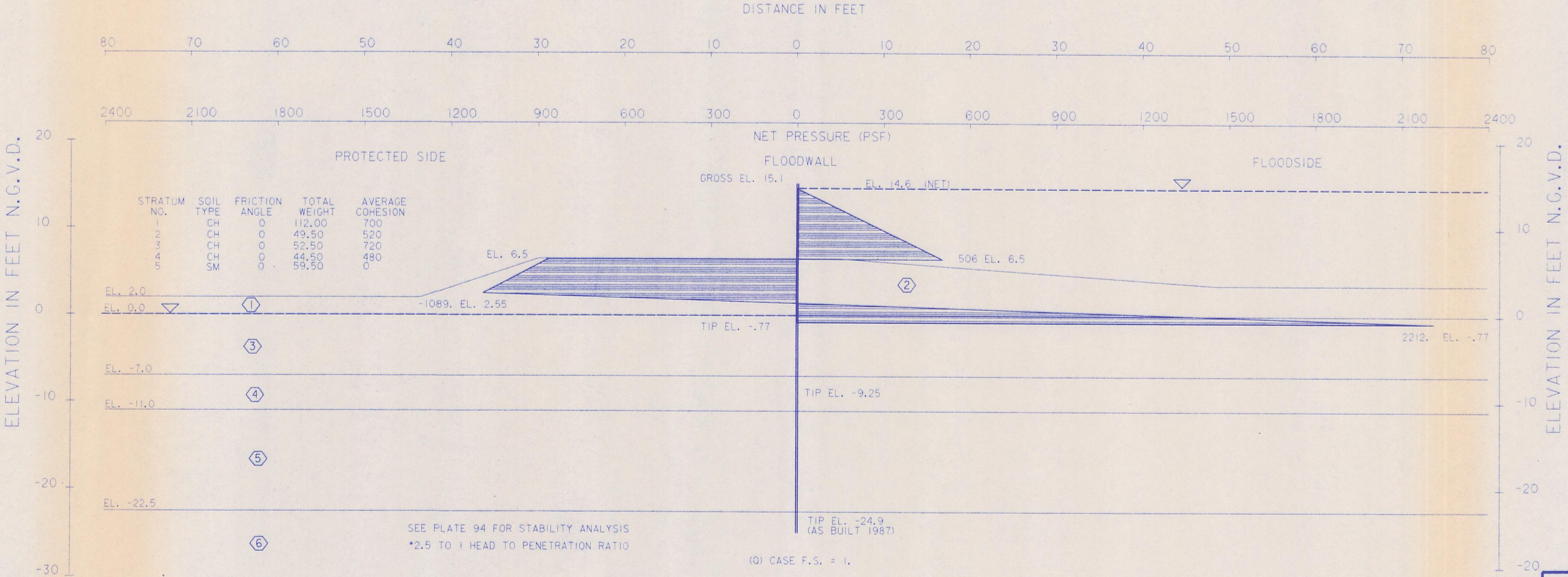
NET DIAGRAM

(Q) CASE F.S.=1

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING I-WALL ANALYSIS
W/L STA. 0+00 TO
W/L STA. 2+75 JEFFERSON

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
PLOT DATE: JAN. 1996
DATE: JAN. 1996
CADD FILE: PLATE40.DGN
FILE NO. H-2-44679



STRATUM NO.	SOIL TYPE	FRICTION ANGLE	TOTAL WEIGHT	AVERAGE COHESION
1	CH	0	112.00	700
2	CH	0	49.50	520
3	CH	0	52.50	720
4	CH	0	44.50	480
5	SM	0	59.50	0

ELEVATION	PRESSURE
14.60	.00
6.50	506.25
6.50	.00
6.50	-893.75
2.55	-1089.23
-.77	2211.65
-.77	.00

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

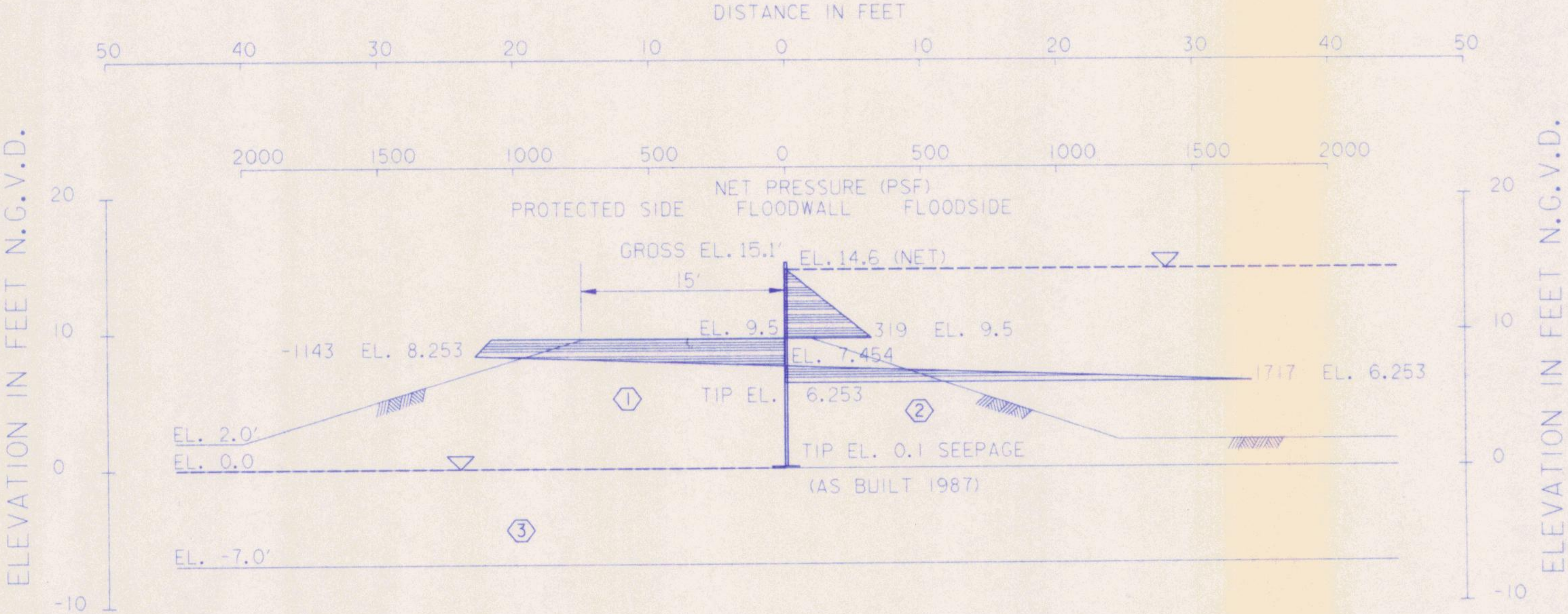
EXISTING I - WALL ANALYSIS
W/L STA. 3 + 05 TO
W/L STA. 4 + 15 JEFFERSON

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE41.DGN
DRAWN BY: WOODS			FILE NO.
CHECKED BY: RICHARDSON	JAN. 1996		H-2-44679

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

RETWALL PLATE



ELEVATION	PRESSURE
14.60	.00
9.50	318.8
9.50	.00
9.50	-1081.3
8.25	-1143.0
7.45	.00
6.25	1716.9
6.25	.00

STRATUM NO.	SOIL TYPE	FRICTION ANGLE	UNIT WEIGHT (PCF)	COHESIVE TOP	STRENGTH BOTTOM
1	CH	0	112.00	700	700
2	CH	0	49.5	700	700
2	CH	0	49.5	520	520

SEE PLATE 96 FOR STABILITY ANALYSIS

NET DIAGRAM

(Q) CASE F.S.=1.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

EXISTING ORLEANS SIDE OF PUMPING STATION TO SOUTH OF SOUTHERN R.R.

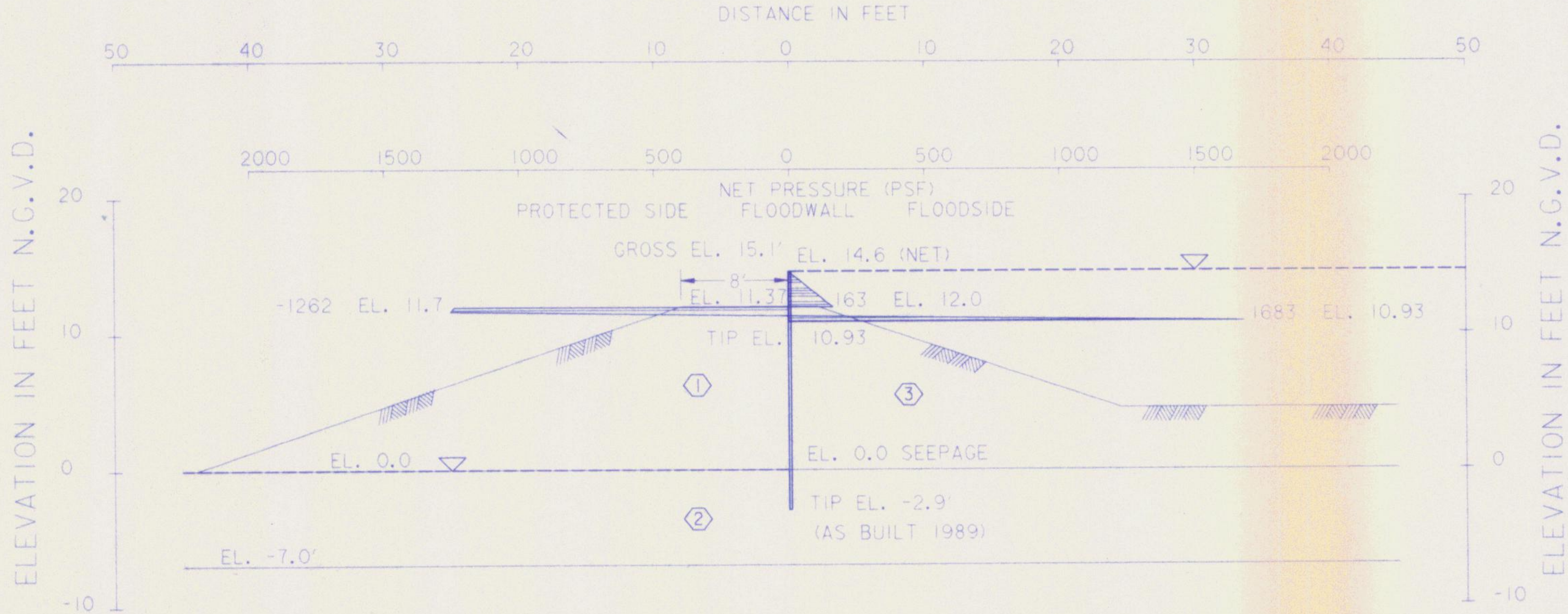
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: VOJKOVICH	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE42.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

RETWALL PLATE



ELEVATION	PRESSURE
14.60	.00
12.00	162.50
12.00	.00
12.00	-1237.50
11.70	-1252.50
11.37	.00
10.93	1682.60
10.93	.00

LEFT PROPERTIES

STRATUM NO.	SOIL TYPE	FRICTION ANGLE	UNIT WEIGHT (PCF)	COHESIVE STRENGTH TOP	COHESIVE STRENGTH BOTTOM
1	CH	0	112.00	700	700
2	CH	0	49.500	700	700
3	CH	0	49.500	520	520

SEE PLATE 98 FOR STABILITY ANALYSIS

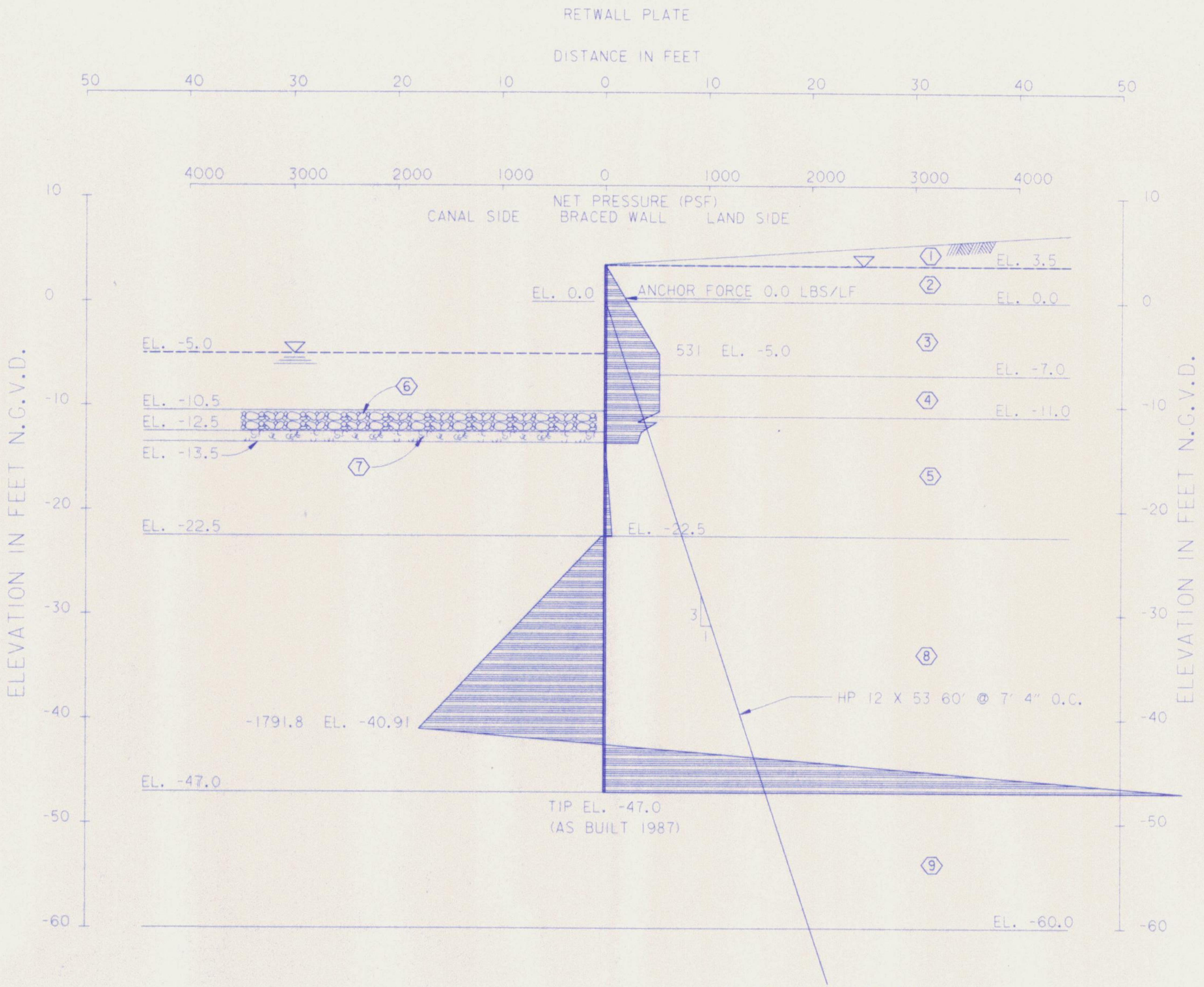
NET DIAGRAM

(Q) CASE F.S.=1.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING SOUTH OF SOUTHERN R.R. TO
B/L STA. 670+63 ORLEANS

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE43.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		



NET DIAGRAM

(Q) CASE F.S.=1.5

NOTE: FOR A F.S. =1.0 THE CORRESPONDING ANCHOR FORCE IS 0.0 LBS/LF

ELEVATION	PRESSURE
3.60	.00
-5.00	531.20
-10.50	531.20
-11.51	327.40
-11.51	505.20
-12.50	356.90
-13.50	323.60
-13.50	5.10
-22.50	77.10
-22.50	.00
-22.50	-32.40
-40.91	-1791.80
-42.39	.00
-47.00	5603.90
-47.00	.00

STRATUM NO.	SOIL TYPE	FRICTION ANGLE	UNIT WEIGHT (PCF)	COHESIVE TOP	STRENGTH BOTTOM
1	CH	0	112	700	700
2	CH	0	49.5	700	700
3	CH	0	49.5	520	520
4	CH	0	52.5	720	720
5	CH	0	44.5	480	480
6	RIPRAP	40	69.5	0	0
7	SI	40	29.5	0	0
8	SM	30	59.5	0	0
9	CH	0	47.5	1000	1000

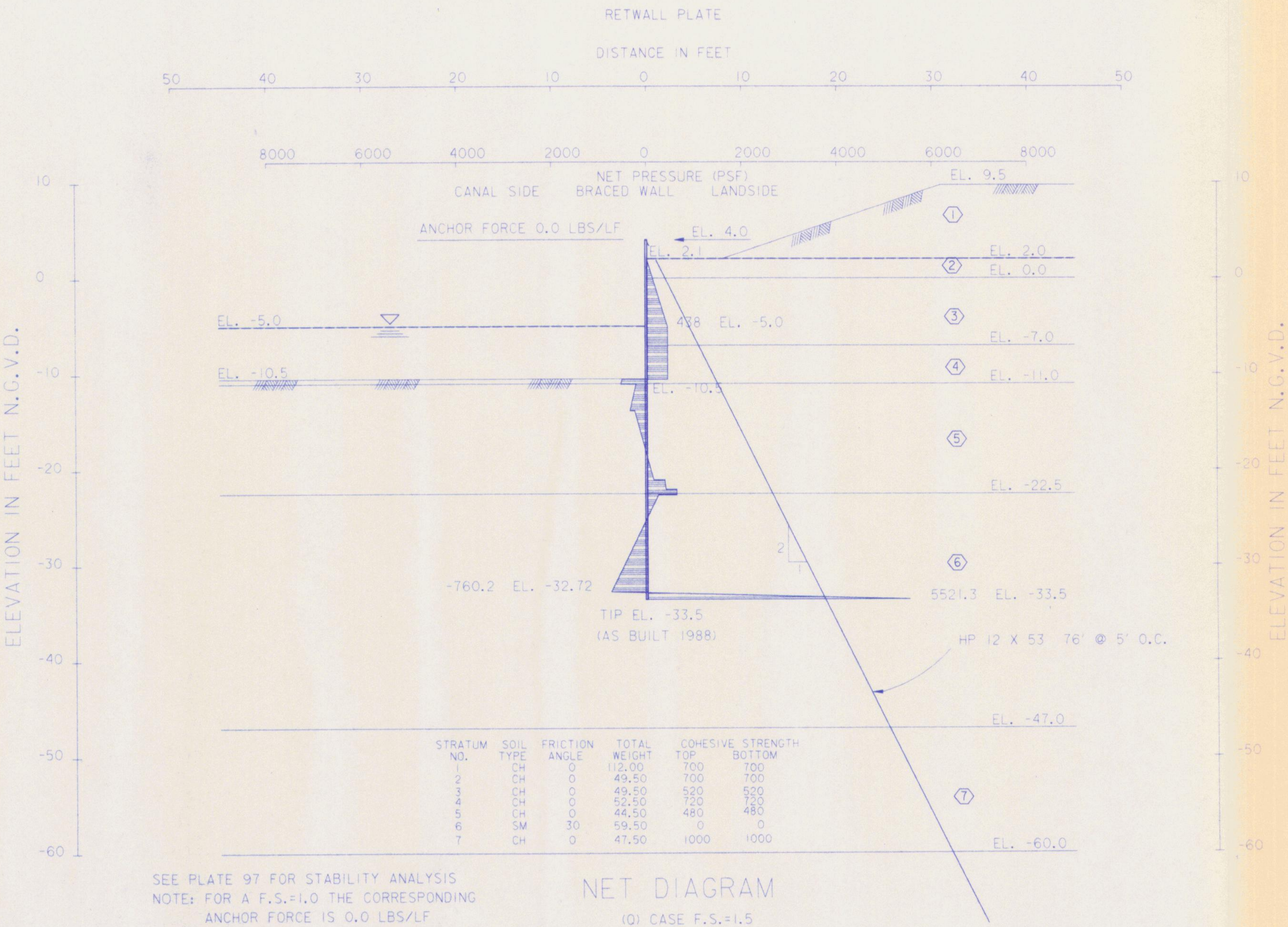
NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING BRACED WALL ANALYSIS
W/L STA. 0+00 TO W/L
STA. 4+15 JEFFERSON

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

DESIGNED BY: VOJKOVICH	PLOT SCALE: 10	PLOT DATE: JAN. 1996	CADD FILE: PLATE44.DGN
DRAWN BY: WOODS			FILE NO. H-2-44679
CHECKED BY: RICHARDSON	DATE: JAN. 1996		



STRATUM NO.	SOIL TYPE	FRICTION ANGLE	TOTAL WEIGHT	COHESIVE STRENGTH TOP	BOTTOM
1	CH	0	112.00	700	700
2	CH	0	49.50	700	700
3	CH	0	49.50	520	520
4	CH	0	52.50	720	720
5	CH	0	44.50	480	480
6	SM	30	59.50	0	0
7	CH	0	47.50	1000	1000

SEE PLATE 97 FOR STABILITY ANALYSIS
NOTE: FOR A F.S.=1.0 THE CORRESPONDING ANCHOR FORCE IS 0.0 LBS/LF

NET DIAGRAM

(Q) CASE F.S.=1.5

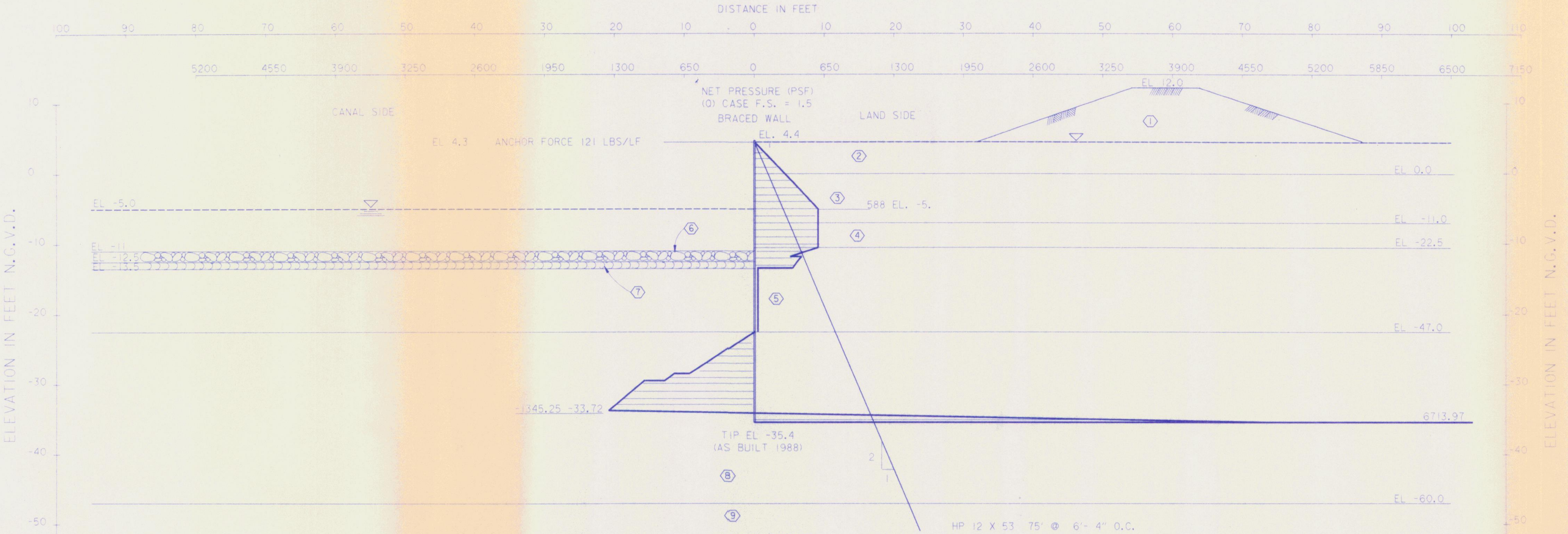
ELEVATION	PRESSURE
2.10	.0
-5.00	437.5
-10.50	437.5
-10.50	0.0
-10.50	-522.6
-11.00	-548.7
-11.00	-228.8
-13.81	-353.6
-13.81	-253.0
-21.00	141.9
-21.00	370.6
-22.00	398.1
-22.00	626.7
-22.60	626.7
-22.60	242.6
-32.72	-760.2
-32.81	0.0
-33.50	5521.0
-33.50	0.0

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING ORLEANS SIDE OF PUMPING STATION TO SOUTH OF SOUTHERN RAILROAD

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 JAN. 1996	PLOT DATE: JAN. 1996	CADD FILE: PLATE45.DGN FILE NO. H-2-44679



NOTE: FOR A F.S. = 1.0 THE CORRESPONDING ANCHOR FORCE IS 121 LBS/LF

STRATUM NO.	SOIL TYPE	RIGHT PROPERTIES FRICTION ANGLE	TOTAL WEIGHT	COHESIVE TOP	STRENGTH BOTTOM
1	CH	0	112.00	700	700
2	CH	0	49.5	700	700
3	CH	0	49.5	520	520
4	CH	0	52.5	720	720
5	CH	0	44.5	480	480
6	RIPRAP	40	69.5	0	0
7	SI	40	29.5	0	0
8	SM	30	59.5	0	0
9	CH	0	47.5	1000	1000

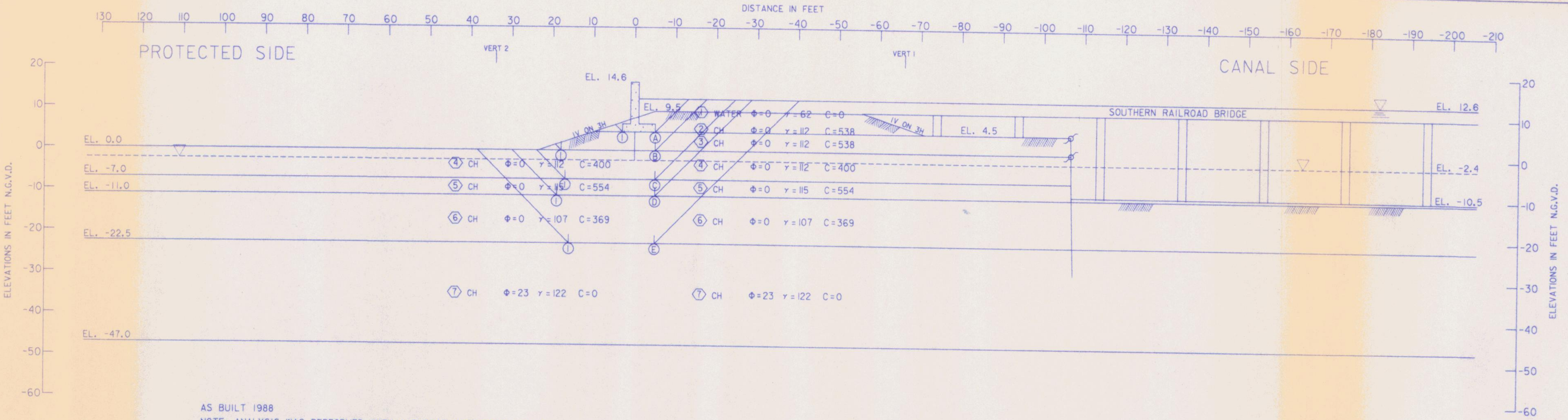
ELEVATION	PRESSURE
4.50	0.0
-5.00	0.0
-10.50	587.5
-11.78	587.5
-11.78	329.0
-12.50	509.2
-13.50	354.3
-13.50	35.8
-22.50	35.8
-22.50	0.0
-22.50	-7.9
-28.50	-596.8
-28.50	-739.7
-29.50	-829.0
-29.50	-1007.3
-33.72	-1345.25
-34.00	0.0
-35.40	6713.97
-35.40	0.0

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
EXISTING SOUTH OF SOUTHERN R.R.
TO B/L STA. 673 + 63 ORLEANS

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
PLOT DATE: JAN. 1996
JAN. 1996
CADD FILE: PLATE46.DGN
FILE NO. H-2-44679



AS BUILT 1988
NOTE: ANALYSIS WAS PERFORMED WITH A FACTOR OF SAFETY OF 1.3 INCORPORATED INTO THE SOIL PARAMETERS.
SKEWED SECTION

NO	ELEV.	$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
		D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
BASE	4.5	2664	5380	8070	0	0	-2716	8070	-10786
1	8.0	7187	10222	9248	1447	135	-3035	10830	-13865
2	-7.0	18733	15822	8795	5600	3535	2911	17930	-15019
3	-11.0	27818	20254	8748	10032	7232	7564	26004	-18440
4	-22.5	63660	28741	7904	18519	29116	34919	55539	-20620

NOTE:
1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

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)	4.5	5380	4304	1881	2664	230	11565	2434	4.75
(B) (1)	.0	10222	9200	1479	7187	141	20901	7046	2.97
(C) (1)	-7.0	15822	8800	5600	18733	3532	30222	15201	1.99
(D) (1)	-11.0	20254	8856	10032	27818	7178	39142	20640	1.90
(E) (1)	-22.5	28741	7749	18519	63660	29230	55009	34430	1.60

GENERAL NOTES:
CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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

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

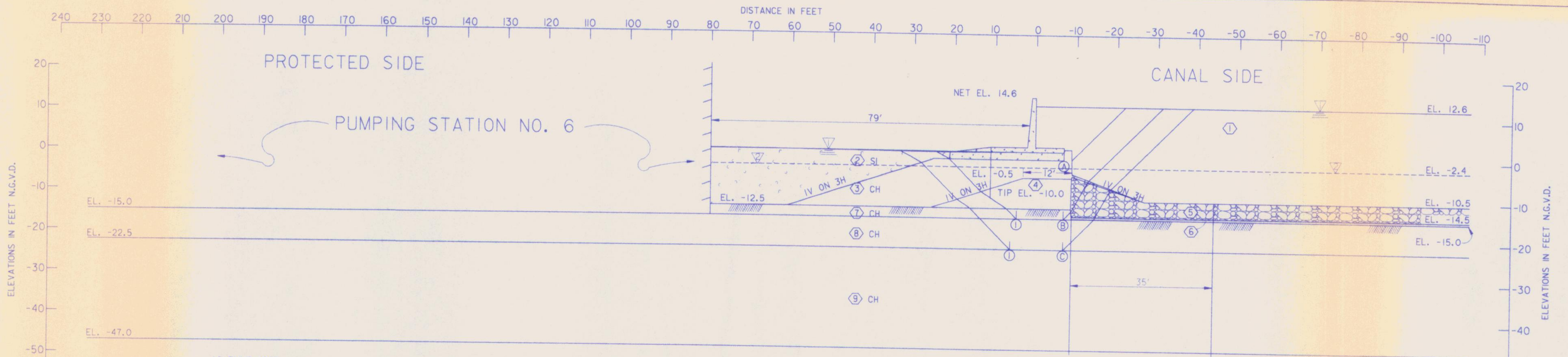
STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	CH	112	112	538	538	538	538	0
3	CH	112	112	538	538	538	538	0
4	CH	112	112	400	400	400	400	0
5	CH	115	115	554	554	554	554	0
6	CH	107	107	369	369	369	369	0
7	CH	122	122	0	0	0	0	23

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

EXISTING DEEP SEATED ANALYSIS
SOUTHERN RAILROAD 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	PLOT DATE: JAN. 1996	CADD FILE: PLATE47.DGN
	DATE: JAN. 1996		FILE NO. H-2-44679



AS BUILT 1985

▽ ▽ PH LINE IN STRATA 2,4,5 AND 6

▽ ▽ PH LINE IN STRATUM 8

NOTE: ANALYSIS WAS PERFORMED WITH A FACTOR OF SAFETY OF 1.3 INCORPORATED INTO THE SOIL PARAMETERS.

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	-15.0	3307	4244	10179	27890	15069	17730	12821	1.38
Ⓒ ①	-22.5	7316	4797	14934	47577	31514	27047	16063	1.68

NO	ELEV.	$U_A = D_A - R_A$		$U_P = R_B + R_P + D_P$					
		D_A	R_A	R_B	R_P	D_P	U_A	U_P	$U_A - U_P$
BASE	-0.5	5363	0	0	0	0	5363	0	5363
1	-15.0	27890	3307	4243	10179	15069	24583	29491	-4908
2	-22.5	47577	7316	4797	14934	31514	40261	51245	-10984

NOTE:

1. ALL ELEVATIONS REFER TO N.G.V.D. (0.00 N.G.V.D. = 20.43 CAIRO DATUM)
2. ELEVATIONS CONTAINED IN THIS DRAWING REFLECT THE ORIGINALLY PROPOSED ELEVATIONS. SEE THE EXISTING SITE PLAN FOR ACTUAL AS-BUILT ELEVATIONS.

STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	WATER	62.5	62.5	0	0	0	0	0
2	SI	92	92	0	0	0	0	32
3	CH	110	110	308	308	308	308	0
4	SM	122	122	0	0	0	0	23
5	RIPRAP	132	132	0	0	0	0	32
6	SI	92	92	0	0	0	0	32
7	CH	107	107	369	369	369	369	0
8	CH	107	107	369	369	369	369	0
9	SM	122	122	0	0	0	0	23

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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. 20, GENERAL DESIGN
SUPPLEMENT No. 1
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

EXISTING DEEP SEATED ANALYSIS
T-WALL FRONTING PUMPING STA. NO. 6

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

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