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**WEST BANK ~~OF THE MISSISSIPPI RIVER~~ AND**
**~~IN THE~~ VICINITY, ~~OF~~ NEW ORLEANS, LOUISIANA**
**WEST OF ALGIERS CANAL HURRICANE PROTECTION**

# DESIGN MEMORANDUM NO. 1

# SECTOR GATE COMPLEX

(Draft Report)

## IN TWO VOLUMES
## VOLUME I

**DEPARTMENT OF THE ARMY**
**NEW ORLEANS DISTRICT, CORPS OF ENGINEERS**
**NEW ORLEANS, LOUISIANA**
**MARCH 2000**

WEST BANK ~~OF THE MISSISSIPPI RIVER IN THE~~ AND VICINITY,
~~OF~~ NEW ORLEANS, LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
DESIGN MEMORANDUM NO. 1
SECTOR GATE COMPLEX

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## PROJECT AUTHORIZATION

1. Authority. The Westbank of the Mississippi River in the Vicinity of New Orleans (East of Harvey Canal), Louisiana project was authorized by Section 101(a)(17) of the Water Resources Development Act of 1996 (Public Law 104-303). WRDA 99 (Public Law 106-53) combined the Westwego to Harvey Canal project, the East of Harvey Canal project, and the Lake Cataouatche modifications as a single project, to be known as the West Bank and Vicinity, New Orleans, Louisiana, Hurricane Protection project.

2. Purpose and Scope. This memorandum presents the essential data, assumptions, criteria and computations for developing the plan, design and cost estimates for constructing the Sector Gate Complex portion of the East of Harvey Canal Hurricane Protection features of the West Bank ~~of the Mississippi River in the~~ and Vicinity, ~~of~~ New Orleans, Louisiana Project to SPH standards. The basis for the recommended plan is detailed in the "West Bank of the Mississippi River in the Vicinity of New Orleans, LA (East of the Harvey Canal) Feasibility Report and Environmental Impact Statement" dated August 1994.

3. Other Pertinent Projects.

a. Mississippi River Levees. The Mississippi River levees below New Orleans, Louisiana are included in the comprehensive plan for the protection of the alluvial valley of the river between the Head of Passes, Louisiana and Cape Girardeau, Missouri, as authorized by the Flood Control Act of 15 May 1928 and subsequent acts.

b. Algiers Lock and Canal. The Algiers Lock and Canal Project was authorized by the River and Harbor Act of 2 March 1945, Public Law No. 14, 79th Congress, lst Session. The project recommended modification of the existing project for the Gulf Intracoastal Waterway between Apalachee Bay, Florida and the Mexican Border to provide an alternate waterway connection with the Mississippi River in the vicinity of Algiers, La.

c. Westwego to Harvey. The Westwego to Harvey project provides for SPH hurricane protection to the west bank of the Mississippi River in Jefferson Parish between Westwego and the Harvey Canal. The project was authorized by the Water Resources Development Act of 1986 (Public Law 99-662). East of Harvey Canal was authorized as a modification to this project.

4. Local Cooperation. In accordance with the cost sharing and financing concepts reflected in the Water Resources Development Act of 1986 (Public Law 99-662) and the authorizing documents, the non-Federal Sponsor must comply with the following requirements.

a. Provide lands, easements, rights-of-way, and borrow and excavated material disposal area.

b. Accomplish all alterations and relocations to utilities and facilities (other than railroad bridges) necessary for construction of the project.

c. Pay 34.75 percent of the first cost allocated to hurricane protection. Funds provided by non-Federal interests for the interim hurricane protection may be considered beneficial expenditures and may be credited as part of the non-Federal contribution of the project pursuant to the Water Resources Development Act of 1986.

d. Bear all costs of operation, maintenance and replacement of all features of hurricane protection facilities.

5. Status of Local Cooperation. The Louisiana Department of Transportation and Development is the non-Federal Sponsor for construction of this project, with West Jefferson Levee District serving as their Executive Agent.

6. Project Document Investigations.

a. General. A Feasibility Report, entitled "West Bank of the Mississippi River in the Vicinity of New Orleans, La. (East of the Harvey Canal)" dealing with providing hurricane protection for the west bank of the Mississippi River in the vicinity of New Orleans for the area east of Harvey Canal was completed in August 1994. This study recommended SPH level protection consisting of a navigable floodgate in the Harvey Canal, a 1,000 cfs increase in capacity at the Cousins Pumping Station, a combination of levees and floodwalls on the east side of Harvey Canal from the floodgate to Hero Pumping Station and raising the existing protection along the east and west sides of Algiers Canal and Hero Canal. Studies, investigations and planning made for this DM include the following:

1) surveys,

2) soils investigations including general and undisturbed type borings,

3) detail design studies for construction of the sector gate, discharge channel and tie-in levees and floodwalls.

4) determination of real estate requirements and costs,

5) determination of required relocations and coordination with affected facility owners; determination of relocation costs,

6) cost estimates for the sector gate, tie-in floodwalls and discharge channel.

b. Future investigations required. Future investigations to be performed include field surveys and soil borings in connection with the Plans and Specifications for the project.

## LOCATION OF PROJECT AND TRIBUTARY AREA

7. Project Locations. The Sector Gate Complex portion of the West of Algiers Hurricane Protection is a feature of the West Bank ~~of the Mississippi River in the~~ and Vicinity, ~~of~~ New Orleans, Louisiana Project (Plate 1). The Sector Gate Complex is located in Harvey Canal 250 feet downstream of the Lapalco Bridge.

## PROJECT PLAN

8. General. A sector gated structure with a 125 foot opening and a sill elevation of –16.0 will be constructed in Harvey Canal 250 feet south of Lapalco Bridge. The east side of the structure will be tied in by a floodwall to a floodwall running along the east side of Harvey Canal. On the west side the structure will be tied by a T-wall to a concrete flume located under Lapalco Bridge. An I-wall will be constructed along the west side of Harvey Canal and will tie into the west side of the concrete flume under Lapalco Bridge. The sector gate structure and tie-in floodwalls will be built to elevation 11.5.

An outfall canal will be constructed directly south of the concrete flume under Lapalco and will serve as part of the discharge channel for Cousins Pumping Station. The canal will have a 100 foot bottom width and an invert of –9.0 at the concrete flume and will transition to a 100 foot bottom width channel with an invert of –15.0 where it ties in to Harvey Canal 250 feet past the end of the sector gate structure.

9. Departure From Project Document Plan. The plan presented in the West Bank of the Mississippi in the Vicinity of New Orleans , LA (East of the Harvey Canal) Feasibility Report called for a 110' wide sector gate located approximately 3,600 feet south of Lapalco Boulevard with a navigation bypass channel to accommodate Harvey Canal traffic during construction of the floodgate. During preparation of the DM it was determined that the use of a float-in structure would decrease the interruption of navigation in the canal enough to eliminate the need for the navigation bypass channel. This allowed the placement of the sector gate closer to Lapalco Boulevard. The local sponsor coordinated with the landowners and business owners along the canal and, along with the COE determined the most acceptable new location for the floodgate.

## HYDROLOGY AND HYDRAULICS

10. General. The hydrology and hydraulic analyses and design for the proposed works are presented in Appendix A of this memorandum. The appendix contains detailed descriptions of the hydraulic analyses, methods and procedures used in the design of the protection features of the proposed plan.

11. Design Elevations. The design hurricane is the Standard Project Hurricane (SPH). The SPH represents the most severe combination of hurricane parameters that is reasonably characteristic of the area, excluding extremely rare combinations. The hurricane would approach at such a rate of movement to produce the maximum hurricane surge at the gate. The SPH has a central pressure index of 27.4 inches of mercury, a maximum 5 minute average wind velocity offshore (in the Gulf of Mexico) of 100 knots 30 feet above the surface at a radius of 30 nautical miles, and a forward speed of 11 knots along a path critical to this location.

For project conditions, levee heights of the protective structures were designed to an elevation sufficient to prevent overflow from wave runup during the SPH. The hurricane-generated significant wave was used to determine wave runup. Waves larger than the significant wave may overtop the protective structures, but, due to the limited number of waves larger than the significant wave, such overtopping will not endanger the security of the structure or cause significant interior flooding. For this study 1-foot waves with small periods, 2.7 seconds, were used to compute runup for the reaches of limited fetch along the Harvey Canal. Methods used for computing wave runup are explained in the Shore Protection Manual, published by the Coastal Engineering Research Center in 1984. Wave runup of 2 feet determined the design elevation for the floodgate of 9.5.

Historical evidence of sea level rise and subsidence indicates the need for a projection of storm surge stages and their effect on this project's effectiveness. Sea level rise of .4 feet per century along the Gulf Coast is recommended by the latest Corps' guidance. Estimates of subsidence in coastal Louisiana were developed by COE geologists from radio carbon dating of buried marsh deposits. This data was compiled on quadrangle maps for coastal Louisiana. Using the projected sea level rise of 0.2 feet in the next 50 years and the appropriate subsidence rate in the coastal zones bordering the project area, the WIFM model was employed to compute the hurricane surge heights which could be expected in the year 2040. The projected future stage for the SPH in the Harvey Canal is 9.3.

Heights for protective structures for future conditions were determined by adding runup from the appropriate wave condition to the design stillwater level. Where protective structures will be sheltered against significant wave runup, wave runup from the small locally generated wave climate was used to determine levee height. Design elevation for the floodgate is 11.3. The sector gate is being constructed to elevation 11.5.

12. Surveillance Plan. To assure the proper performance, operation and maintenance of the entire project, several gages will be included in the plan to allow monitoring of stages in and around the project and to provide sufficient advance warning for gate closures. Gages will be located on both sides of the proposed gate site to allow advance warning of stage abnormalities. The gate in the Harvey Canal will be closed when monitoring gages indicate that the stage in the Canal will rise beyond 3 feet. The gates will remain closed until such time as tides in Bayou Barataria/Harvey Canal are equal to or lower than the water elevation in Harvey Canal north of the floodgate.

13. Hydraulic Design

a. General. The recommended plan combines a float in-place precast Concrete Gravity Flood Control Structure across the Harvey Canal just south of Lapalco Blvd. with an outfall canal (New Discharge Channel) below a diverted Cousins Pumping Station. The floodgate would be equipped with Buoyant Steel Sector Gates. The purpose of the floodgate is to allow navigation of Harvey Canal during normal conditions and to prevent hurricane surges from flooding the developed areas when hurricanes occur.

The floodgate would provide a 125-foot opening with a sill elevation of –16.0 feet NGVD, approximately the existing bottom elevation of the canal. The location and details of the floodgate are depicted on Plates 1 through 2. The 125-foot opening will allow navigation of large oil and gas drilling equipment manufactured along the Harvey Canal on the north side of the Lapalco Bridge.

b. Hydraulics of Structure.

(1) Tabulated information. Hydraulic design criteria for the Harvey Canal floodgate are summarized in Table 1.

(2) Hurricane design conditions. For the purpose of structural design, the floodgate is assumed to be closed when the inside protected area draws down to a water level of -1.0 ft. NGVD. The direct head on the Harvey floodgate will be 12.3 feet. After the hurricane has receded it is assumed that the inside elevation within the protected area is 4.0 ft. NGVD. Hurricane winds blowing away from the structure will give an estimated outside stage of –1.0 ft. NGVD at Harvey. The above combination of water elevations will give a reverse head of 5.0 feet at Harvey.

(3) Design wave criteria. Wave heights at the Harvey Canal structure are not considered significant due to limited fetches.

(4) Non-hurricane conditions. During maintenance or other test periods when hurricanes are not a threat to the project area, differential heads against the structure will be less. The above situation would occur if gates were closed for maintenance or other reasons and a moderate storm occurred. Such a storm would cause outside stages of 3.0 ft. NGVD at Harvey.

(5) Design criteria for gate operation. In order to design the gate machinery, a maximum direct head at which the gates will be operated is assumed to be 3.0 ft. NGVD at Harvey. The elevation within the protected area is –1.0 ft. NGVD. The above criteria considers a situation when the inside protected area is drawn down from a Standard Project Hurricane not on the critical path, the floodgate is closed, and it has to be reopened momentarily because of a emergency situation. Normally, these differentials would not occur because the usual case is that the water elevation within the protected area would rise very quickly as hurricane approaches. The maximum reverse head at

which the floodgate will be operated is 5.0 feet (4.0 ft. NGVD on the protected side and –1.0 ft. NGVD on the unprotected side). This allows for 1.0 feet of additional rise due to rainfall and gate operation to occur within the protected area assuming that the gates will be closed when the outside stage reaches 3.0 ft. NGVD. This situation could cause some flooding in the industrial area north of Lapalco Blvd. should additional intense rainfall be predicted; therefore the gates should be opened during low tide for drainage relief.

TABLE 1
HARVEY CANAL SECTOR GATE STRUCTURE
DIFFERENTIAL DESIGN HEADS

| | Condition | Water Surface Elevation (ft. NGVD) Outside | Inside | Head (ft.) |
|---|---|---|---|---|
| 1 | Maximum direct head from hurricane (includes sea level rise and subsidence) | 9.3 | -1.0 | 10.3 |
| 2 | Maximum direct head plus freeboard | 11.3 | -1.0 | 12.3 |
| 3 | Maximum reverse head from hurricane | -1.0 | 4.0 | 5.0 |
| 4 | Maximum direct head - no hurricane | 5.0 | 0.0 | 5.0 |
| 5 | Maximum direct head under which gates will be operated | 3.0 | -1.0 | 4.0 |
| 6 | Maximum reverse head under which gates will be operated | -1.0 | 4.0 | 5.0 |
| 7 | Normal operation level | 1.3 | 1.3 | 0.0 |
| 8 | Maintenance dewatering | 5.0 | 4.0 | N/A |

c. Cousins Pumping Station Outfall Canal. The recommended plan also requires an outfall canal (New Discharge Channel) directly south of the concrete flume under the Lapalco Bridge. This feature is part of the discharge channel for the Cousins Pumping Station Complex. The discharge from the station will be diverted into Harvey Canal via the outfall canal as shown on Plate 2. The new outfall canal was designed to accept future expanded discharges from the Cousins Pumping Station.

The new outfall canal will have a 100 foot bottom width channel with an invert of –9.0 ft. NGVD and side slopes of 1V on 3H at the concrete flume under the Laplaco Bridge, transitioning to a 100 foot bottom width channel with an invert of –15.0 ft. NGVD and side slopes of 1V on 3H at the Harvey Canal. The new outfall canal will follow the alignment shown on Plate 2 and extend only 250 feet past the downstream end of the Sector Gated Structure. The 100-foot bottom width channel centerline at the concrete flume is the same as the centerline of the flume. As the new outfall canal gets away from the Lapalco Bridge it will merge with the existing west bank and bottom of Harvey Canal.

d. Riprap Protection For Approach Channels.

(1) General. The riprap for the approach channels was designed using the guidance in EM 1110-2-1601 "HYDRAULIC DESIGN OF FLOOD CONTROL CHANNELS", Hydraulic Design Chart 712-1 "VELOCITY VS STONE DIAMETER", and the Standard Riprap Gradation Tables. Since the unprotected side approach channel side slopes will be subject to wind, wave action, and propwash above elevation –5.0 ft. NGVD; that riprap was designed using the methodology outlined in the "Shore Protection Manual". Riprap layout and details are shown on Plates 2 thru 5.

(2) Protected side riprap. Because the Harvey Canal is a wide open channel (it width is greater than 10 times its depth of flow) and because the critical design condition is Harvey Pumping Station discharging nominal capacity (960 cfs); design velocity for the protected side riprap will be less than 1.0 fps. Accordingly, a 12-inch minimum layer thickness of riprap with a specific gravity of the stone of 155 pound per cubic feet will be sufficient for both bottom and side slopes of the protected side approach channel. Side slope protection will extend 5-feet past top of bank. Length of riprap will be 320 feet from the north side of the Flood Control Structure, past the Lapalco Bridge, to just past the guidewalls. Stone gradations for the 12-inch layer blanket are shown below in Table 2.

TABLE 2
RIPRAP DESIGN
"12-Inch Layer"

| PERCENT LIGHTER BY WEIGHT (SSD) | LIMITS OF STONE WEIGHT - LBS |
|---|---|
| 100 | 90 - 40 |
| 50 | 40 - 20 |
| 15 | 20 - 5 |

(3) Unprotected side riprap. Bottom riprap and side slope riprap up to elevation –5.0 ft. NGVD for the unprotected side approach channel and the Cousins outfall canal will be a 21-inch layer thickness at a specific gravity of stone of 155 pounds per cubic feet extending 250 feet from the south side of the Flood Control Structure. This is based on a design velocity of 6.0 fps exiting from the concrete flume under the Lapalco Bridge, at future expanded capacity of Cousins Pumping Station (5000 cfs).

The side slopes and banks of the channels on the unprotected side above elevation –5.0 ft. NGVD will be affected greatly by propwash, and somewhat by wind and wave action. Accordingly, barges pushing tows through the Control Structure will cause adverse velocities on the side slopes and banks past the south side guidewalls. For this reason side slopes and banks on the unprotected side above elevation –5.0 ft. NGVD will have a 24-inch layer thickness at a specific gravity of stone of 155 pounds per cubic feet extending to 250 feet from the south side of the Flood Control Structure. Side slope protection will extend 5-feet past top of bank. Stone gradations for the 21-inch and 24-inch layer blankets are shown below on Tables 3 and 4.

TABLE 3
RIPRAP DESIGN
"21-Inch Layer"

| PERCENT LIGHTER BY WEIGHT (SSD) | LIMITS OF STONE WEIGHT - LBS | | |
|---|---|---|---|
| 100 | 400 | - | 160 |
| 50 | 160 | - | 80 |
| 15 | 80 | - | 30 |

TABLE 4
RIPRAP DESIGN
"24-Inch Layer"

| PERCENT LIGHTER BY WEIGHT (SSD) | LIMITS OF STONE WEIGHT - LBS | | |
|---|---|---|---|
| 100 | 650 | - | 260 |
| 50 | 260 | - | 130 |
| 15 | 130 | - | 40 |

## GEOLOGY

14. General Geology In The Area Of Harvey Canal And Lapalco Boulevard. The study area is located approximately 250 feet south of Lapalco Boulevard at Harvey Canal in Harvey, Jefferson Parish, Louisiana. This is an area of low relief ranging from near sea level to +2 feet* in elevation.

The entire study area is overlain by swamp deposits except in Borings B-1 and HCL-1 which have fill and artificial levee at the surface. The fill in Boring B-1 averages 2 feet thick. Swamp deposits consist of interbedded medium to very soft, organic, fat clay with occasional sand strata, roots, and wood. Swamp deposits average 14 feet thick and range in elevation from +2 to –22 feet in elevation. Beach and interdistributary deposits underlie swamp deposits; interdistributary deposits also are interbedded with and underlie beach deposits. Beach deposits consist of silty sand interbedded with occasional layers and lenses of clayey sand and medium, lean clay. Beach deposits average 9 feet thick and range in elevation from –17 to –36 feet. Interdistributary deposits consist of interbedded medium to very soft, fat clay. These deposits average 21 feet thick and range in elevation from –18 to –62 feet. Prodelta deposits underlie interdistributary deposits from approximately distance 0 to 518 feet and consist of homogeneous, medium, fat clay with occasional sand strata. Prodelta deposits average 9 feet thick and range in elevation from –51 to –63 feet. Bay-sound deposits underlie prodelta and interdistributary deposits and consist of interbedded silty sand and clayey sand with occasional lenses of sand and soft to stiff lean clay and shell fragments. These deposits average 16 feet thick and range in elevation from –60 to –77 feet. Nearshore gulf deposits underlie bay-sound deposits and consist of silty sand with occasional sand lenses and shell fragments. Where the borings penetrate completely through nearshore gulf deposits, these deposits average 11 feet thick and range from –77 to –88 feet in elevation. Pleistocene deposits underlie nearshore gulf deposits and consist of highly oxidized, stiff to very stiff, fat clay interbedded with occasional lenses of silty sand. The surface of Pleistocene deposits averages –88 feet in elevation and these deposits extend to an unknown depth. Ground water is at or near the surface in the study area. Long-term relative subsidence rates in the study area average 0.5 foot/century. The geologic profile is shown as Plate G 1.

* All elevations are NGVD.

GEOTECHNICAL INVESTIGATION AND FOUNDATION DESIGN

15. General. This section includes the soils investigations and foundation design for the sector floodgate. The sector floodgate complex consists of I-walls, levees, T-walls and pile supported sector gates.

16. Field Exploration. Five continuous undisturbed and one general type soil boring were used in the design of this project. Boring HCSG-1U was taken near the centerline of the sector gate at the centerline of the channel. It was continuously sampled with a 5" diameter steel tube for a depth of 100 feet from the bottom of the channel. Boring HCSG-2U was taken near the centerline of the sector gate near the east bank of the channel. It was continuously sampled with a 5" diameter steel tube for a depth of 80 feet from the bottom of the mudline. These borings were used to define the design soil properties under the canal. Boring HCL-1, HCL-2 and HCL-3 were taken along the existing levee alignment on the west bank. HCL-1 and HCL-3 were taken in the centerline of the existing levee. They were continuouly sampled for 50 feet with a 3" diameter steel tube. HCL-2 was taken at the protected side toe of the existing levee. It was continuouly sampled for 50 feet with a 5" diameter steel tube. Boring B-1 was taken in conjunction with the installation of a piezometer installed near the project site at the protected side toe of the levee on the west bank. The piezometer tip was installed in the sand stratum to elevation –67. Boring B-1 was taken with a truck mounted rotary type drill rig and samples were obtained with a 3" diameter sampling barrel. The individual logs of these 6 borings are shown on plates G 2 through G 7. The locations of the undisturbed and general type borings are shown on plate

17. Laboratory Tests.

a. General. All samples obtained from the borings were visually classified. Water content determinations were made on all cohesive soil samples. Unconfined compression (UC) shear tests and Atterberg tests were made on selected samples of cohesive soils. Water content determinations, (UC) test results and the $D_{10}$ determined from standard penetration tests performed as the boring was drilled are shown adjacent to the logs on the boring logs presented on Plates G 2 through G 7. Unconsolidated - Undrained (Q) shear tests and Consolidation (C) tests were made on representative soil samples. The location of these tests are summarized on the boring logs shown on plates G 2 through G 7. The individual shear strength data sheets are shown in Appendix B.

b. Design Shear Strengths. Design shear strength and weight parameters are shown on plate G 8. Three design shear strength profiles are used for the site. The defining attribute was where the feature is to be located: (1) inside Harvey Canal, (2) the existing levee centerline on the west bank and (3) the toe strength of the levee and the banks on the east and west banks.

18. Design Problems. Design problems considered are:

a. Stability of the existing west bank levee into the new pumping station drainage channel.
b. Stability of the existing west bank levee into the graving site excavation.
c. Stability of the existing east bank bulkhead into the floodgate excavation.
d. Stability of the reconstructed west bank levee into the new pumping station drainage channel.
e. Stability of the reconstructed west bank levee into the graving site excavation.
f. Pile capacities for the sector gate, T-wall and needle storage rack.
g. Stability of the I-wall bulkhead walls.
h. Underseepage for the structure and walls.

19. Hydrostatic Pressure Relief and Underseepage.

a. Hydrostatic Pressure Relief. The structure will be constructed in a graving site at the protected side of the levee on the west bank. The structure will be floated into place in the canal through a breach cut in the existing levee. The structure will be placed in the wet. The structural excavation will be performed in the wet. Therefore, no dewatering or pressure relief will be required in the canal. The graving site will be excavated to El –11.5. This will require pressure relief in the graving site to prevent foundation damage due to the sand at El –20 to –36. The sand at El –62 to –87 is deep enough to withstand the hydrostatic pressure of high water in Harvey Canal with a satisfactory factor of safety. Installation of temporary construction piezometers tipped in the sand at El –20 to –36 should be required of the contractor to monitor pressures in the graving site while dewatered. Pressure relief of this sand is necessary not only for high water in Harvey Canal but also ambient ground water levels. The method of lowering the groundwater to dry working conditions in the graving site and pressure relief in the foundation sand is to be left to the construction contractor with performance specifications being prepared on an "end-result" basis. The specifications will allow the use of wells, sumps, pumps, etc., as well as wellpoints. The groundwater at the site will be tested both for mineral and biological sources to determine the potential for clogging the dewatering systems. At this time, it is not known whether the deep sands are connected to the Mississippi River. Piezometer B-1 was installed for this purpose. In the high water season of 2000, we expect to determine the answer to this issue. A piezometric headline of El 7.5 was used for the hydrostatic pressure analysis of the sands. The calculations showing the need for pressure relief in the shallow sand is presented in Appendix B. The Contractor should determine the appropriate method of pressure relief and submit his plan for approval.

b. Underseepage - Sector Gate Structure and T-Wall. A sheet pile cutoff will be placed below the sector gate structure and T-wall that separates the pumping station discharge channel from the protected side of Harvey Canal. Lane's weighted creep ratio method was used to determine the sheet pile tip penetrations. Analyses are shown in Appendix B.

20. Pile Foundations. Ultimate compression and tension pile capacities versus tip elevation were developed for 48-inch diameter steel pipe piles for the sector gate structure. Ultimate compression and tension pile capacities versus tip elevation were developed for 14-inch square concrete piles for the T-wall on the west bank. Ultimate compression and tension pile capacities versus tip elevation were developed for 12-inch square concrete piles for the needle storage rack. The ultimate pile capacities are presented on plates G 9 to G 11. Values of soil to pile frictional resistance, lateral earth pressure coefficients for compression and tension, and bearing capacity factors used to compute pile capacities are shown in Table 5. The vertical pressure of the overburden used to determine the frictional resistance on the pile shaft and tip bearing resistance was limited to the greater of 15 pile diameters of depth or 1,000 psf. The tip elevations for cost estimating purposes are based on applying the factors of safety shown in Table 6.

Subgrade moduli curves for estimating lateral resistance of the soil beneath the sector gate structure, T-walls and storage rack are shown on plates G 9 to G 11.

TABLE 5

PILE CAPACITIES FOR Q AND S CASES - 48" Dia. Steel Pipe Piles

| | Q-CASE | | | | | | S-CASE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\phi$ | $K_c$ | $K_t$ | $N_c$ | Nq | $\delta$ | $\phi$ | $K_c$ | $K_t$ | $N_c$ | Nq | $\delta$ |
| Clay | 0° | 1 | 0.7 | 9 | 1 | 0° | 23° | 1 | 0.7 | 9 | 10 | 17.3° |
| Sand | 30° | 1 | 0.7 | 0 | 22 | 22.5° | 30° | 1 | 0.7 | 0 | 22 | 22.5° |

PILE CAPACITIES FOR Q AND S CASES - 12" and 14" Square Concrete Piles

| | Q-CASE | | | | | | S-CASE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\phi$ | $K_c$ | $K_t$ | $N_c$ | Nq | $\delta$ | $\phi$ | $K_c$ | $K_t$ | $N_c$ | Nq | $\delta$ |
| Clay | 0° | 1 | 0.7 | 9 | 1 | 0° | 23° | 1 | 0.7 | 9 | 10 | 21.9° |
| Sand | 30° | 1 | 0.7 | 0 | 22 | 28.5° | 30° | 1 | 0.7 | 0 | 22 | 28.5° |

TABLE 6

RECOMMENDED FACTORS OF SAFETY
FOR PILE CAPACITY CURVES

| WITH PILE LOAD TEST | | WITHOUT PILE LOAD TEST | |
|---|---|---|---|
| Q-CASE | 2.0 | Q-CASE | 3.0 |
| S-CASE | 2.0 | S-CASE | 3.0 |

21. Shear Stability

a. Levees. Stability was determined by the LMVD Method of Planes analysis for a minimum factor of safety of 1.3 with respect to the design shear strength. The borings used to develop design shear strength profiles for the project features are shown on plates G 2 to G 7. Three strength lines were developed for the various features. The design strength lines and weights are shown on plate G 8. Plate G 12 shows the structure excavation cut in the wet in Harvey Canal along the longitudinal direction. Plates G 13 and G 14 show stability analyses of the east bank into the construction structure excavation. Plates G 15 to G 17 show the stability of the existing west bank levee into the construction cuts for the pumping station discharge channel and the structure excavation. Plates G 18 and G 19 show the existing west bank levee into the graving site excavation before and after placing of the 2 foot rock layer respectively. Plate G 20 shows the stability of the restored levee into the completed pumping station discharge channel. Plate G 21 shows the restored levee into the rewatered graving site.

b. I-Walls. The required penetration for stability of the steel sheet piling below ground surface was determined by the method of planes using "Q" shear case design strengths based on data shown on Plate G 8. The factors-of-safety were applied to the design shear strengths as follows:

$\phi$ developed = arctan $\phi$ (tan $\phi$ available/factor-of-safety) and cohesion/factor-of-safety.

Using the resulting shear strengths, net lateral soil and water pressure diagrams were developed for movement toward each side of the sheet pile. With these pressure distributions, the summation of horizontal forces was equated to zero for various tip penetrations and the overturning moments about the tip of the sheet pile were determined. The required depth of penetration to satisfy the stability criteria was determined where the summation of moments was equal to zero. Following is sheet pile wall design criteria used for the tie-in walls and the temporary excavation sheet pile wall for the gate bay excavations:

TIP PENETRATIONS

DIRECT HEAD CASES

Q-CASE

F.S. = 1.5 with water to SWL

F.S. = 1.0 with water to SWL plus freeboard

S-CASE

F.S. = 1.2 with water to SWL

F.S. = 1.0 with water to SWL plus freeboard

BULKHEAD Q AND S CASES

F.S. = 1.5 with low water on passive side

If the penetration to head ratio is less than 3 to 1, it is increased to 3 to 1. The SWL is used to calculate head, for penetration to head ratio determination.

Appendix B shows I-wall stability analyses for the east and west bulkhead I-walls. The bulkhead condition was the critical case for both walls.

22. Levee Settlement. The restored west bank levee will have sand backfill under the clay levee to El –9.5. That the sand backfill is heavier than the replaced clay will induce settlement of the levee and I-wall. The levee will contain a steel sheet pile cutoff which will extend from El 11 to El –19 at time of installation. It is expected that the sheet pile will settle 1.5' from El 11 to El 9.5. The levee will settle 2' from El 7 to El 5. The settlement and seepage analysis for the restored levee is presented in Appendix B.

23. Graving Site Bearing Capacity. The bearing capacity of the bottom of the excavation was examined to insure that it is capable of supporting the load of the completed structure prior to rewatering the area and floating the structure out. This analysis is presented in Appendix B.

24. Dolphin. A new sheet pile cellular mooring dolphin will be constructed at the end of the west guidewall. The design of the dolphin is presented in Appendix B.

STRUCTURAL DESIGN

25. GENERAL.

a. Floodgate Structure Description. The structural design is in accordance with Corps engineering guidance and applicable industry standards. The concrete structure will be float-in construction. The concrete shell will be built similar to barge type construction. A graving site will be provided adjacent to the project site, however, the Contractor may elect to use his own site. The float-in design eliminates the need for cofferdams, dewatering systems and bypass channels. The structure is situated on a pile foundation. The piles shall be 48"pipe piles. The piles and pile connections were designed to provide vertical and lateral resistance. All of the concrete shell will be constructed with low density concrete; the unit weight will be approximately 120 pcf. The base will be post-tensioned in two directions. The base walls are precast concrete. The hollow structure was designed for transportation and installation conditions. Naval architecture methods were employed to design for the transport conditions. The concrete in-fill will act compositely to resist the hydraulic load cases. Upper walls will be reinforced concrete; the top 9.15' will remain voided. The floodgate is a welded sector type gate. The current gate design includes buoyant chambers. The buoyant chambers were added at the request of the local sponsor to assist in gate removal for maintenance. The guidewalls are located on the West Side. Guidewalls and guardwalls are conventional timber fenders. The structure will be tied into adjacent hurricane protection with conventional pile founded T-walls and cantilever I-walls.

b. Marine Closures. The excavation, pile foundation, and structure installation can be accomplished within two four-week closures. During these brief closures all marine traffic can be diverted through the Algiers Lock.

26. References.

a. COE Publications.

(1) EM 1110-2-2000, Standard Practice for Concrete for Civil Works, Jul 94

(2) EM 1110-2-2104, Strength Design for Reinforced Concrete Hydraulic Structures, June 92

(3) EM 1110-2-2502, Retaining and Flood Walls, Sept. 89

(4) EM 1110-2-2504, Design of Sheet Pile Walls, Mar. 94

(5) EM 1110-2-2906, Design of Pile Foundations, Jan. 91

(6) EM 1110-2-2105, Design of Hydraulic Steel Structures, Mar 93

(7) EM 1110-2-2703, Lock Gates and Operating Equipment, Jun 94

(8) ETL 1110-2-307, Flotation, Aug 87

(9) DRAFT EC for Structural Design of Precast and Prestressed Hydraulic Concrete Structures.

(10) DRAFT State of the Art Report on High-Strength, high Durability Structural Low-Density Concrete for Applications in Severe Marine Enviornments. TR INP-SL-104.

b. Technical Publications

(1) American Concrete Institute, Building Code and Commentary, ACI 318-95

(2) American Concrete Institute, Guide for the Design and Construction of Fixed Offshore Concrete Structures, ACI 357R-84.

(3) American Institute of Steel Construction, Manual of Steel Construction, Allowable Stress Design, Ninth Edition, 1989.

(4) American Association of State Highway and Transportation Officials, Standard Specifications for Highway Bridges, AASHTO, Sixteenth Edition,1996

(5) American Welding Society, Structural Welding Code, (AWS D1.1-96)

(6) Post-Tensioning Institute, Post-Tensioning Manual, Fifth Edition, 1995

(7) American Petroleum Institute, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – LRFD, API RP 2A-LRFD

c. Computer Programs

(1) CE Structural Analysis Program, "C-Frame", CASE Program No. X0030

(2) Structural Analysis and Design Software, "STAAD-III", release 23W, Research Engineers

(3) CE Pile Group Analysis Program, "CPGA", CASE Program No. X0080

(4) CE Strength Analysis of Concrete Structural Elements, "CGSI", CASE Program No. X0061.

27. Basic Data. Basic data relevant to the elevations of the water surface, structure elevations and dimensions are shown on plates and in the following:

a. Design Water Elevations (Feet, NGVD).

| LOAD CASE | GULF SIDE | PROTECTED SIDE |
|---|---|---|
| I-1. Construction(Graving Site) | - | - |
| I-2. Transport Loading | 1.3 | 1.3 |
| I-3 Setting Condition (No Backfill) | 1.3 | 1.3 |

| | | | |
|---|---|---|---|
| II-1 | Normal Operation | 1.3 | 1.3 |
| II-2 | Max. Direct Gate Operation | 3.0 | -1.0 |
| II-3 | Max. Reverse Gate Operation | -1.0 | 4.0 |
| II-4 | Max.Direct Head – No Hurricane | 5.0 | 0.0 |
| II-5 | Max. Reverse Head - Hurricane | -1.0 | 4.0 |
| II-6 | Direct Head - Hurricane (includes 2' for subsidence) | 9.5 | -1.0 |
| II-7 | Direct Head - Hurricane Plus Freeboard | 11.5 | -1.0 |
| II-8 | Maintanance Dewatering | 5.0 | 4.0 |

b. <u>Structure Elevations (NGVD)</u>

| | |
|---|---|
| Top of Floodgate | 11.5 |
| Top of Fender and Guidewalls | 10.5 ( 9 Ft. above Normal Stage) |
| Sill | -16.0 |

c. <u>Structure Dimensions</u>

Width of Opening 125'

Length of West Side Guidewall
Gulf Side 200'
Protected Side 300'
(Extend past bridge)

d. <u>Unit Weights</u>

| Item | LBS/CY |
|---|---|
| Water | 63 |
| Steel | 490 |
| Granular Fill(saturated) | 120 |

| | |
|---|---|
| Cohesive Fill (saturated) | 110 |
| Stone | 132 |
| Normal Weight Concrete | 150 |
| Semi-Lightweight Concrete | 120 |

e. Design Loads

Lateral Pressures (At-Rest Ko)
Sand Ko = 0.50
Semi-Compacted Cohesive Soil Ko = 0.80
Stone & Bedding Material Ko = 0.50
Uniform Live Loads
Walkways 150 psf

Wind Load in accordance w/ the latest edition of ASCE 7, but not less than

28. Structure And Foundation Loadings.

a. Loadings. The loads are described in Section 3, of ETL 1110-2-355 and modified as follows:

(1) Dead Loads. For draft and buoyancy analysis added 3% to the concrete unit weight to account for swelling and construction tolerances. Final designs shall be based on specific design mix weights.

(2) Uplift. In lieu of accurate flow nets to determine seepage rates, a limit approach was used for this structure. Relief drains were not considered. Cutoff sheet piling walls are on both sides. The structure was designed for the three uplift conditions:

Uplift Condition A assumes-uniformly varying pressure between the gulfside and protected side sheet piling cutoffs.

Uplift Condition B assumes the gulf side sheet pile cutoff is impervious; the uplift pressure equals the protected side pressure head.

Uplift Condition C assumes the protected side sheet pile cutoff is impervious; the uplift pressure equals the gulf side pressure head.

(3) Thermal. The use of a Nonlinear, Incremental Structural Analysis (NISA) to determine stress concentrations created during construction will be accomplished in the Materials DM.

(4) Wave Loads. The wave load refers to loads induced from a design wave when the module is buoyant. Two wave sizes are typically considered; a significant wave and a storm wave. The significant wave is anticipated within the one year construction period. The storm wave is a 50 year event and not considered. The structure shell is designed for inland waterway conditions. The total wave height observed by H&H Br. along the GIWW is 3 Ft (trough to crest).

(5) Soil Drag. In lieu of more accurate analysis drag shall be calculated as :

$(P_{soil\text{-}at\text{-}rest})$ X 0.5 X (Tangent of Internal Angle of Friction)

(6) Impact. Boat impact on the gate is a 125 kip point load. This impact is applied to the gates and impact zone of the concrete walls.

b. Load Case Description

(1) Construction Case. Thermal stresses will be investigated as part of the Material DM. The design assumes construction in a graving site.

(2) Transportation Load Case. The construction period will exceed one year, the significant wave of 3' (crest to trough) will be considered. A conservative 4' wave was used in the design. The monolith was designed by combining the static load moment and wave induced stresses. The design was limited to the hogging and sagging conditions about both axes. For Ultimate Strength Design (USD) the Hydraulic Load Factor is 1.0.

(3) Setting Load Condition. This load case addresses the sinking of the module onto the prepared foundation. The dead load of the structural frame and permanent ballast shall not exceed 95% of buoyancy. The additional weight needed to sink the structure shall be temporary ballast (water); the structure will be re-floated if proper positioning is not obtained on the first pass. Sinking will require the entire base be ballasted. The structure chamber will be dry during installation. Temporary ballast will add sufficient weight to provide a flotation factor of 1.05 with the water stage at EL 3.0. The setting piles shall resist the load applied should the water stage drop to El. 1.3. For Ultimate Strength Design (USD) the Hydraulic Load Factor is 1.0.

(4) Normal Operation. The gates are open; water stage is at El. 1.3. This is a usual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor equal to 1.3.

(5) Maximum Differential Head W/ Gate Operational. The gates are designed to operate with a 4' head. The maximum stage is at El. 3.0 and the minimum stage is El. –1.0. This is a usual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor equal to 1.3.

(6) Maximum Reverse Head. The gates are designed to operate with a 5' reverse head. The Protected Side stage is at El. 4.0 and the minimum Gulfside stage is El. –1.0. This is a usual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor equal to 1.3. This is also the maximum reverse operating head.

(7) Maximum Direct Head – No Hurricane. Gates closed with Gulfside at El.5.0
and the Protected side at El. 0.0. This is a usual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor equal to 1.3.

(8*) Maximum Direct Head – Hurricane Condition. Design hurricane, the gates are closed. The Gulfside water stage is at El. 9.3 and the Protected side is at El. -1.0. The El 9.3 includes an allowance for future ground subsidence and sea level rise. This is a usual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor equal to 1.3.

(9*) Maximum Direct Head Plus Freeboard- Hurricane Condition. Design hurricane, the gates are closed. The Gulfside water stage is at El. 11.3 and the Protected side is at El. -1.0. Two feet of freeboard are included. This is an unusual load case with the Ultimate Strength Design (USD) Hydraulic Load Factor reduced to 1.0.

(10) Maintenance Dewatering. Maintenance dewatering condition with the
Gulfside needle dam experiencing a water stage at El. 5.0 and the Protected side water stage at El. 4.0. This is a short term loading; the USD Hydraulic Load Factor is reduced to 1.0.

*Note that in order to match adjacent floodwall projects, the hurricane and hurricane with freeboard stages have been rounded to El. 9.5 and El. 11.5 respectively.

29. Pile Foundation.

a. General. The design Factors of Safety comply with EM 1110-2-2906. The pile capacity used considered that a pile test shall be performed. Large diameter piles are recommended when driving piles in-the wet. Concrete and pipe piles were considered, the 48' dia. pipe pile was selected based on capacity, economics, and ease of driving. Minimizing canal closures was a concern. In order to reduce the compressive load, a light structure was designed. The lighter gravity load resulted in the need to make some of the piles act in tension for the maintenance dewatering. The piles are classified as compression only, tension, and setting. The compression piles are cutoff within the sand strata to take advantage of end bearing. The piles requiring tension capacity were driven into cohesive material. In order to assure uniform resistance the tension piles were driven to a depth at which the compression capacity would match that of the compression only piles. The pile loads and stresses were determined using the rigid base analysis program CPGA, the results are shown on Plate14. The pile layout is on Plate 12.

b. Setting Piles. The setting piles resist the setting load condition described in para. 4.b.3 above. The maximum applied load of 650 kips equals the available capacity with the applicable 1.5 short term Factor of Safety equal. A reaction beam and hydraulic flat jacks are installed above each pile for leveling. The setting piles also act as tension piles for the dewatered load case and are included in the piles considered to develop lateral resistance. The pile lengths are 100'; the pile tip is at El. -126.

c. Tension Piles. A minimum dead load over buoyancy was not a requirement. The dead load of the structure was based on the weight required to sink the buoyant structure. The actual dead load to buoyancy ratio for the Dewatered Load case is 1.08. ETL 1110-2-307 requires a minimum 1.3 Factor of Safety(FS). To achieve the FS, 24 tension piles were required. With a FS equal to 1.5, each pile provides a tension force of 480 kips. The outer two rows of piles (including the setting piles) were driven into the cohesive materials. The pile lengths are 100'; the pile tip is at El. -126.

d. Compression Only Piles. The sleeve and connection are not required. The compression piles rest on the base slab. The pile lengths are 50'; the pile tip is at El. -77.

e. Lateral Resistance. The piles provide all of the lateral resistance. The amount of lateral deflection permitted was limited to 2". The horizontal subgrade modulus in the top ten pile diameters is 0.3 kip/in; in order to provide the needed lateral resistance 48 piles must be embedded into the base slab. Therefore, the number of piles embedded into the base was increased by 24 over the number needed for tension. The second 24, however, did not require the deeper tip to attain a tension capacity.

f. Connections and Installation. The number of piles requiring positive connections was dictated by the need for lateral resistance. Forty eight piles require a connection into the base. The connection is shown on Plate 13. The connection details are similar to those designed for the Braddock Dam, which is currently under construction. Grout lines will run directly to all of the 72 piles. The piles will be installed with the assistance of a steel template. Piles driven in-the-wet in the pile test for the IHNC Lock Replacement Project were only 1 1/2 in. out of position, this is well within the area of the provided base sleeve.

g. Cutoff Piling. To facilitate grout containment, the cutoff pilings will encompass the structure base. The containment piling also provides the cutoff on each side. The tip is driven to El. –46, 14' above the sand strata.

30. Concrete Analysis And Design.

a. Base Design. The base shell will be constructed of low density (semi-light weight) concrete to minimize the required float-in draft. The concrete compressive strength (fc') is 5,000 psi. The Materials DM will dictate the design mix. Industry literature and the Corps State of the Art Report on High Strength, High Durability Structural Low Density Concrete indicate that durability is comparable to that of normal weight concrete. As specified in ACI 318, a 15% reduction in design values is applied to the shear and torsion strength, the embeddment lengths are increased and the tension permitted in prestressed concrete is reduced.

The hollow base shell was designed as a prestressed box girder. The analysis combines local and global effects induced by the marine conditions specified in para. 5.b.2 above. Each individual panel was analyzed as a plate fixed on four sides for water loads occurring during transport and when set on the bottom. Adding in-fill concrete to the center voids reduced the moments in the transverse direction. The vertical walls were also checked with the hydrostatic head from the concrete in-fill placement. AASHTO Section 9 restricted minimum member properties.

The in-fill is structural, all hydraulic loadings act on a composite base section. The interface will be intentionally roughened to assure bond. The compatibility of the two concretes will be addressed in the Materials DM, additional doweling will be added if needed. The compressive strength of the normal weight in-fill (fc') is 5000 psi. The prestress will resist the global stress in the shell for marine loadings and provide all of the tension in the composite section for the hydraulic conditions. Conventional rebar was added in both directions for local stresses on the shell and act as temperature steel for 10' composite section. The precast vertical panel reinforcement meets ACI requirements for temperature steel, min. reinforcement for deep beams(ACI 318-10.6.7) and minimum shear reinforcement. In the base shear stresses were low.

b. Analysis in Transverse Direction (272'). The base was analyzed as a 1' strip with all loads uniformly distributed across the 99' width. Moments at critical sections are shown in TABLE 7. Maximum moments for the normal operation and hurricane load cases are shown on Plates 23 and 24. The base was analyzed by considering the piles as pinned supports and with the reactions from CPGA results. For the dewatering condition, only the pinned condition was considered. The base was pinned at the piles with tension type connections. The support reactions were kept below the tension capacity of the pile(soil controlling). For the analysis utilizing the pile reactions from CPGA, the loads were balanced by fixing the base as follows:

- 1' strip across the full 272' base width; the monolith ends pinned.
  Unbalanced loads supported at pinned ends.
- 1' strip across the full 272' base width; the monolith ends pinned. Redistributed the unbalanced loads uniformly across the 272' base width.
- Fix base at the thrust block wall face and apply loads across the 125' (opening) width.
- Fix base at center

c. Analysis in Longitudinal Direction (99'). The base is analyzed as a 1' strip for the 99' length similar to the transverse direction. The loads are uniformly distributed across the 272' width. The long direction was also divided into sections and analyzed separately. The center section and end section (see diagram below) are isolated since loadings are significantly different and the base is less than rigid over a 272' width. Moments at critical sections are shown in TABLE 8. Maximum moments for the normal operation and hurricane load cases are shown on Plates 23 and 24.

d. Upper Wall and Thrust Block. The upper walls are constructed with reinforced concrete. The walls will be transported and set as a hollow box girder. The lower portion of the wall height will be filled with structural in-fill during installation. Composite action was considered in all hydraulic loadings. The top half of the wall will remain voided, only the box girder design is applicable. Local and global stresses were combined similar to the base. The wall was designed as cantilevered off the base; vertical edge restraints were conservatively ignored. Details are shown on Plate 20.

The trust block is also constructed as a box girder; however, the entire height will be in-filled with structural concrete. Loads from the adjacent wall were included on the more rigid block. The contribution was approximated by taking the greater result of the Yield-Line theory and coefficients developed for rectangular plates. The rectangular plate was considered fixed on three sides. Without in-fill the design was controlled with the structure set in place and the loads from the dewatering needle girder acting at El. 9.5. The gate dead load is not considered until after composite action is achieved. The composite block receives the greatest loading from the gate reaction due to a reverse head.

e. Reinforced Concrete. The structural design is in accordance with Corps engineering guidance and applicable industry standards. The strength of reinforced concrete is determined using Ultimate Strength Design (USD) in accordance with EM 1110-2-2104. A minimum 21/2'' clear cover will be held which equals the maximum required for offshore concrete structures as specified in ACI 357. The cover is reduced to 1" where structural infill will be placed against the wall face. To minimize cracking the tension stress at service loads will be controlled by limits specified in Table 4.1 of ACI 357. The shear and torsional strength of the lightweight concrete shall be reduced by 15% and required embedment lengths increased as prescribed by ACI 318.

f. Prestressed Concrete. The structural design is in accordance with Corps engineering guidance and applicable industry standards. Prestress members were designed to satisfy both Ultimate Strength Design (USD) and Working Stress Design (WSD) in accordance with the draft EC, reference 9. Where Corps criteria was lacking, the more conservative requirements of ACI and AASHTO was used. All prestress will be accomplished by post-tensioning. The tendons are Grade 270 low-lax 0.6" strands, all strands are straight. The tendons are fully grouted in galvanized steel ducts. Minimum clear cover to the duct is 3" as dictated by ACI 357R. Stresses at service load were limited to reduce cracking as specified in Table 4.1 of ACI 357R. When calculating losses, the loss due to elastic shortening was increased due to the lower Ec value of lightweight concrete. With WSD, the permitted tension was reduced by 67% to account for the lower tensile strength of lightweight aggregates. For Normal Operation load cases tension was not permitted. The tendons shall be tensioned from both ends in the 272' direction and only one end in the shorter direction.

**TABLE 7**
**MOMENTS IN BASE SLAB**
**TRANSVERSE DIRECTION**

NORMAL OPERATING (LOAD CASE 1)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -1401.44 |
| B | 3611.28 | |
| C | 4816.75 | |
| D | 5929.17 | |

HURRICANE OPERATING (LOAD CASE 1)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -3917.74 |
| B | 1459.03 | |
| C | 1935.17 | |
| D | 2572.79 | |

DEWATERED (LOAD CASE 1)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 2.63 | |
| B | 11934.32 | |
| C | 17885.99 | |
| D | 22659.14 | |

NORMAL OPERATING (LOAD CASE 2)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -784.99 |
| B | 5199.39 | |
| C | 6750.23 | |
| D | 8204.63 | |

HURRICANE OPERATING (LOAD CASE 2)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -2968.28 |
| B | 3789.53 | |
| C | 4697.24 | |
| D | 5680.12 | |

DEWATERED (LOAD CASE 2)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | NO ADJUSTMENT NEEDED | |
| B | | |
| C | | |
| D | | |

NORMAL OPERATING (LOAD CASE 3)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | |
| B | | -1697.76 |
| C | 65.54 | |
| D | 653.3 | |

HURRICANE OPERATING (LOAD CASE 3)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | |
| B | | -853.13 |
| C | | -60 |
| D | 204 | |

DEWATERED (LOAD CASE 3)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | |
| B | 6241.49 | |
| C | 760.47 | |
| D | 3094.45 | |

NORMAL OPERATING (LOAD CASE 4)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -705.95 |
| B | 5697.8 | |
| C | 8570.5 | |
| D | 10102.32 | |

HURRICANE OPERATING (LOAD CASE 4)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -2871.75 |
| B | 4597 | |
| C | 7035.24 | |
| D | 8848.72 | |

DEWATERED (LOAD CASE 4)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 765.46 | |
| B | 14222.84 | |
| C | 23448.35 | |
| D | 27236.28 | |

NORMAL OPERATING (LOAD CASE 5)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -736.09 |
| B | 6161.87 | |
| C | 9456.85 | |
| D | 11410.96 | |

HURRICANE OPERATING (LOAD CASE 5)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -2272.44 |
| B | 4766.56 | |
| C | 6837.6 | |
| D | 8283.87 | |

DEWATERED (LOAD CASE 5)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 440.35 | |
| B | 14542.35 | |
| C | 24318.65 | |
| D | 28657.37 | |

DEWATERED (LOAD CASE 1 WITH PEN PILES)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -1253.23 |
| B | 123.78 | |
| C | | -120 |
| D | 100 | |

LOAD CONDITIONS

| | |
|---|---|
| FULL SECTION | 1 |
| FULL SECTION WITH ADJUSTED UNBALA | 2 |
| CENTER SECTION | 3 |
| WEST HALF SECTION | 4 |
| EAST HALF SECTION | 5 |

LOCATIONS

| | |
|---|---|
| A | CENTER LINE OF STRUCTURE |
| B | ABOUT 34 FT FROM CENTER LINE |
| C | ABOUT 62 FT FROM CENTER LINE |
| D | ABOUT 102 FT FROM CENTER LINE |

+ MOMENTS DENOTES TENSION ON TOP
- MOMENTS DENOTES TENSION ON BOTTOM

**TABLE 8**
**MOMENTS IN BASE SLAB**
**LONGITUDINAL DIRECTION**

NORMAL OPERATING (LOAD CASE 1)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -7875.93 |
| B | | -8337.28 |
| C | | -5310.61 |

HURRICANE OPERATING (LOAD CASE 1)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | -4871.25 |
| B | | -5625.97 |
| C | | -4536.56 |

NORMAL OPERATING (LOAD CASE 2)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 2856.16 | |
| B | 1202.36 | |
| C | | -689.84 |

HURRICANE OPERATING (LOAD CASE 2)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 4319.54 | |
| B | 3057.4 | |
| C | | -625 |

NORMAL OPERATING (LOAD CASE 3)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 1975.08 | |
| B | 2100 | |
| C | 1276.43 | |

HURRICANE OPERATING (LOAD CASE 3)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 4244.13 | |
| B | 3930 | |
| C | 1373.5 | |

NORMAL OPERATING (LOAD CASE 4)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 2391 | |
| B | 2694 | |
| C | 1673 | |

HURRICANE OPERATING (LOAD CASE 4)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | NO ADJUSTMENT NEEDED | |
| B | | |
| C | | |

NORMAL OPERATING (LOAD CASE 5)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | 5048 | |
| B | 4427 | |
| C | 247 | |

HURRICANE OPERATING (LOAD CASE 5)

| LOCATION | + MOMENT (IN-KIPS) | - MOMENT (IN-KIPS) |
|---|---|---|
| A | | 1375 |
| B | | 1044 |
| C | | 1555 |

LOAD CONDITIONS

| | |
|---|---|
| FULL SECTION | 1 |
| FULL SECTION WITH ADJUSTED UNBALANCED LOAD | 2 |
| END SECTION | 3 |
| FULL SECTION WITH ADJUSTED UNBALANCED LOAD | 4 |
| END HALF SECTION | 5 |
| CENTER SECTION | 6 |

MOMENTS FOR LOAD CASE 6 WERE TO SMALL TO LIST

LOCATIONS

A CENTER LINE OF STRUCTURE
B SPOT WERE END WALL MEETS SIDE WALL (ABOUT 17 FT FROM CENTER)
C EDGE OF THRUST BLOCK (ABOUT 36 FT FROM CENTER LINE)

+ MOMENTS DENOTES TENSION ON TOP
- MOMENTS DENOTES TENSION ON BOTTOM

31. Sector Gates.

a. General. The structural design is in accordance with Corps engineering guidance and applicable industry standards. The Corp criterion is specified in EM1110-2-2105 and EM 1110-2-2703. The local sponsors requested a buoyant gate to ease the expense of maintenance removals. We complied. The burden of additional weight, higher machinery forces and additional maintenance in confined quarters appears to outweigh the benefits. We will meet with the locals and discuss the use of removal flotation bags, as used in marine salvage operations, or possibly provide the use of Corp cranes to assist in removal as an alternative to a buoyant gate.

b. Description. The sector type gates are welded construction. The gate will include buoyant chambers at the skin plate. The gates have a central angle of 70°. The radius to the outside of the skin plate is 68' – 11 3/8"( 5/8" less than the distance to the miter working point). The height of the gate is 27.5'. Each gate has three vertical trusses that carry the loads to the hinge and pintle. The vertical dead load, reduced by the inclusion of buoyant chambers, is carried only by the pintle. A gear will operate the Gate; the gear rack cable is located 18" below the top of gate.

c. Method of Analysis. This Hydraulic Steel Structure (HSS) was designed by the WSD Method. The allowable stresses are in accordance with Chapter 4 of EM1110-2-2105. The gate is classified as Type B; stresses shall be 0.83 times that allowed by AISC. A 33% stress increase is permitted for Group II loads. Loads falling in the Group II classification are; hurricane plus freeboard, maintenance dewatering and boat impact loads. Hydraulic loadings are shown on Plates 52 through 57. Air chambers will be constructed at the skin plate to account for most of the buoyancy. Additionally, a flotation tank will be installed in the bay nearest the hinge column. For gate dead loads, as shown on Plate 51, the chord stresses shall be analyzed as follows:

A-1. The gate operating weight includes 4' negative buoyancy. The negative buoyancy prevents fluctuation due to wave action.

A-2. The buoyant chambers at the skin plate are 50% flooded.

A-3. Full dead load, the gate members were analyzed with all buoyant chambers flooded. The condition is unusual; a 33% overstress was used. The maintenance dewatering case is considered a short term and is also permitted a 33% overstress.

Additional Loads:

Boat Impact. A 125 kip point load is applied at the truss joints in the top horizontal frame along the skin plate and canal side truss. Half of the boat impact (62.5 kips) is applied to the same points in the middle horizontal frame. The top two horizontal curved girders were designed to resist the same impact force anywhere along the arc. See Plates 41 through 44.

Siltation is negligible.

d. Materials. The skin plate thickness was increased 1/16" for corrosion. The skin plate will be constructed from material conforming to ASTM A-572 Grade 50 steel. All rolled sections shall also be constructed with Grade 50 material. The chords will be constructed from steel pipe conforming to ASTM A-500 Grade B. Pipe was used because it has higher radius of gyration values than the W-sections typically used in sector gate construction. To prevent internal corrosion, as done on offshore pipe structures, all pipe ends are sealed and the inside surface coated. Pipe fabrication and detailing is common in the New Orleans area. The pipe connections were designed as simple joints in accordance with API criteria. A minimum thickness of 3/8" was applied to all plate and shapes. Chord governing loads and stresses are shown on Plate 46.

32. Hinge And Pintle. The gate frames are supported at the top by a hinge and at the bottom by a pintle. In order to assure good pintle and hinge alignment, a spherical pin is used in the hinge to compliment the sperical pintle. Horizontal reactions are transferred to the lock wall through the bronze bushings. All vertical loads are transferred to the concrete base through the pintle. Reactions are shown on Plates 51 through 58. The critical loadings and design of the hinge are shown on Plates 59 through 61. Loads and design of the pintle are shown on Plates 62 and 63. Anchor bolts for the hinge anchorage are designed for a maximum tensile stress of 33,500 psi using a steel with a minimum yield of 60,000 psi. In order to insure firm contact between the movable and the fixed hinge castings under all normal conditions, the anchor bolts will be pretensioned by tightening the nuts sufficiently to induce a stress of approximately 30,000 psi in the bolts. The pretension force is based on the pretension stress acting on the bolt root area. The amount of torque to be applied was determined by formulas given on page 25 of the "Fasteners Data Book", published by the Industrial Fasteners Institute of Cleveland, Ohio. The actual amount of pretension stress will be determined in the field by measuring the torque applied in tightening the nuts with the contact surface between nut, bolt and casting well lubricated and assuming a coefficient of friction equal to 0.10.

33. Miscellaneous.

a. Guidewalls and Dolphins. Timber fenders are provided at each end of the floodgate. At the north end, guidewalls extends through the Lapalco Bridge and are located in front of the existing bridge fender system. Demolition of the existing fender and dolphins is not required. On the south end, a 200' long timber guidewall is provided on the West Side to align barge traffic. A sheet pile dolphin cell protects the West Side guidewall. The guidewall and dolphin also protect the needle beam storage rack as shown on Plate 2. The southeast side has an eighty-foot long timber guardwall. A seven pile cluster protects the remaining three fender corners. The pile clusters are constructed from the more durable reinforced composite piles. Plan views of the fenders are shown on Plates 64 and 65, fender details are shown on Plate 66.

b. Needle Dam and Storage Rack. The steel needle beams are constructed from Gr. 50 plate and shapes. Twenty needles are required to close both sides. The needle dam is designed for a maximum water stage of El. 5.0. The supporting needle girder is designed as a built-up member. Member plates are Gr. 50 steel. The girder is supported by three pipe stands located at the quarter points to reduce dead load moments about the weak axis. The entire needle dam is stored behind the southwest guidewalls on pile bents supported by precast, prestressed concrete piles. The precast piles are 12" X 12". The needle beam and girder are shown on Plates 47 and 48. The storage rack is shown on Plates 49 and 50.

c. Materials DM. The mix design for lightweight concrete will be developed in a separate DM. The mix will use a lightweight aggregate and natural sand. In southern Louisiana the common lightweight aggregate is expanded clay. The DM will investigate the available materials and recommend a specific mix. The DM will also address compatibility (i.e. differing creep and shrinkage rates) of the lightweight shell and normal weight in-fill. Thermal loads and the effects of the mass in-fill on the thin shell will be determined by a nonlinear incremental stress analysis (NISA). The NISA will be conducted in accordance with ETL 1110-2-324.

d. Installation and Construction Sequence. A graving site is provided adjacent to the floodgate. The Contractor may elect to use a differing graving site or construction procedure. However, the hollow shell structure is only designed for 3' waves found in the GIWW. Any design and additional section property required for differing conditions shall be done at the Contractor's expense. The structure will be installed as follows:

-Excavate structure.
-Construct template and install the containment sheet piling to a +/- 1 " vertical tolerance. Install H-Beam along sheet pile top with underwater welding. Beam acts as a skid for the leveling screed.
-Place 3' of crushed stone base and level with screed running along top of the sheet piling. Sound stone base and re-grade if needed.
- Using a template, drive all pipe piles including two spud piles used for alignment purposes. The spud piles are located at the center of the east and west walls. The spud piles will extend 10' above the water surface.
-Install end dams and flood graving site, remove levee plug and tow concrete shell to site. The needle dam will be bolted together and used as the end dam.
-Align structure on spud piles and ballast base compartments and walls onto setting piles at the specified weight. Fill upper wall voids with water to achieve final position on setting piles.
- Level structure at setting piles and grout 8 setting piles with high-early concrete. Grout remaining tension connections while concurrently tremeing base void.
- Fill upper wall voids with in-fill and adjust sector gates. Remove closure dams.

e. Tie-In Floodwalls. A T-Wall connects the floodgate and the concrete culvert beneath Lapalco Bridge. The T-Wall is pile founded on 14" prestressed precast concrete piles. The pile foundation was analyzed using CPGA. The floodwalls west of the concrete culvert and at the east tie-in are cantilever I-Walls. The analysis of the I-Walls was done with CWALSHEET

## MECHANICAL DESIGN

34. Gate Operation. Gate operation will be two speeds with a time dependent speed ramp at start, stop and speed changes. A slow gate speed of 7 degrees per minute will be used for ends of travel and prior to gate stop and start in the mid travel areas.

35. Gate Operating Loads. The gate operating loads consist of friction from hinge, pintle and seal and hydrodynamic loads. The hydrodynamic loads were based on differential hydrostatic head applied over the gate 4' wide end beams. Three load cases were considered. Case 1 is a maximum direct head of 5' and gate operating speed of 7 degrees per minute. Case 2 is a maximum reverse head of 5 feet and a gate operating speed of 7 degrees per minute. Case 3: is a balance head with a gate operating speed of 20 degree per minute. Calculated loads for the three cases are as follows

Case 1 = 395.5 Ft-Kip,
Case 2 = 1015.4 Ft-Kip,
Case 3 = 276 Ft-Kip.

36. Gate Operating Machinery. The gate operating machinery will be a rack and pinion gear drive. The rack will be attached to the gate along the outside radius of the gate's skin plate. The pinion will be attached to and driven by a low speed high torque hydraulic motor mounted on the lock wall. A Series 64 Hagglunds hydraulic motor operating at 2500 psi was used for design purposes. The motor can provide 1352 Ft-Kip about the gate hinge and pintle at an operating pressure of 2500 psi with a 40" pitch diameter pinion and a rack radius of 69.5 feet. Each gate will be equipped with its own hydraulic power supply. The hydraulic power supply for the motor will consist of a variable delivery pressure compensated pump driven by an electric motor. A second smaller motor and pump will be provided as an auxiliary supply.

## ELECTRICAL DESIGN

37. Electrical Design. Electric service for the Structure will be provided by Entergy Power Company and backed up by a diesel or natural gas engine generator set.

The electrical service will be rated 150 amps, three phase, four wires, 277/480 volts. Emergency Power will be derived from a 100 kW diesel or natural gas engine generator set installed in the control house. The unit will be of sufficient capacity to operate the gates, to supply essential power to the control house and maintain site lighting. The service will include a manual transfer switch to control the emergency generator in the event the structure's commercial power supply fails. The control house worksheet shows the service computations.

The site grounding electrode system will include a combination of driven electrodes and connection to the embedded re-enforcing mat in the floor slab of the control structure.

The services disconnect and overcurrent protection will be provided by a 150 amp, 3-pole, circuit breaker disconnect switch. A 150 amp, 3-pole, fused disconnect switch will provide overcurrent protection for the generator. The manual transfer switch will be rated 200 amps. A one-line diagram of the proposed electric service is shown on the electrical drawings.

A motor control center will be used to house sector gate control equipment, Site lighting control equipment, and light panelboard and transformer. The unit will be NEMA class 1b gasketed construction, and equipped with strip heaters and thermostat for condensation control.

The control building panelboard will include space for up to 30 single pole circuit breakers and be rated 120/208 volts, 3- phase, 4-wire, 125 amps main lugs only. Circuit breakers will be of the "bolt-on" design. The panelboard will be equipped with a UL listed surge arrestor for added protection.

Electrical enclosures installed indoors will be the manufacturer's standard, NEMA 1 design. Enclosures installed in outdoor locations will be NEMA 3R or NEMA 4X construction.

The electrical distribution system will include insulated copper conductors installed in electrical metallic tubing (EMT) indoors and rigid galvanized steel (RGS) conduit outdoors.

All wire and cable will be specified in accordance with the Corp's standard guide specification for hydraulic structures, 16120- Insulated wire and cable.

Five pole-mounted 150 watt, high-pressure sodium light fixtures will be mounted on the structure for general site lighting. The lights will be controlled with a lighting contractor, photocell and Hand-off-automatic switch located in the motor control center inside the control building.

Navigation lights will be installed, as required, on dolphins, guide walls, and the floodgate structure. Details of navigational aids and lighting are shown on the electrical dwgs.

Interior light level for the control building operating room will be slightly greater or equal to 30 foot-candles. This is in accordance with recommendations of the Illuminating Engineering Society of North America (IES). Two-tube industrial fluorescent light fixtures with F32T8 lamps and solid-state ballast will be used. Receptacles rated 15/20 amps, 120 Volts will be provided for use with hand power tools. Each Receptacle will include integral ground-fault protection.

## ENVIRONMENTAL EFFECTS

38. Environmental Assessment.

a. General. The sector gate was a featured described in the West Bank of the Mississippi River in the Vicinity of New Orleans, La. (East of the Harvey Canal) Feasibility Report and Environmental Impact Statement (EIS). Resources described as significant in the EIS included bottomland hardwoods; swamps; aquatic resources; wildlife; endangered species; recreation; National Register of Historic Places; hazardous, toxic, and radiological wastes (HTRW); and socio-economic resources. Because of the concern for aquatic resources and contaminants that may be released during excavation and disposal deposition required in construction of the sector gate, a commitment was made in the EIS to haul the top two feet of material that is excavated from the bottom and the banks of the Harvey Canal to an industrial landfill. Bottomland hardwoods and wooded swamp would be impacted by construction of the project. The project, as originally designed, would impact 233 acres of bottomland hardwoods and 46 acres of wooded swamp. Changes are currently underway in design of the project on the west side of the proposed sector gate in the Harvey Canal that will result in significant reduction of impacts to wooded lands. Project mitigation needs will be recomputed with finalization of design changes.

b. Recreation. The land use of the area within the project boundaries is largely urban and industrial. Very little water-oriented recreation exists within the project zone of influence. Recreation activities within the area can be categorized as non-consumptive or passive: walking, driving, and sightseeing. Pedestrian access to the levee in the vicinity of the Gulf Intercoastal Waterway and Hero Canal is limited due to its isolation from roadways and areas of public access. Minimal recreational sport fishing and boating occur in the GIWW due to the presence of large vessel traffic and more desirable fishing and boating areas in the vicinity.

c. Mitigation. The approved habitat mitigation feature in the authorized plan consists of the acquisition of 312 acres of bottomland hardwood forest in the Bayou Piquant finger ridge area of St. Charles Parish. Mitigation would include habitat development to develop the required habitat value and would include operation and maintenance of that area to maintain the required habitat value. Changes are underway to relocate the mitigation area to within the guide levees of the Davis Pond Freshwater Diversion Project area that is currently under construction. The mitigation for the East of Harvey project would be accomplished in the same general area as the mitigation for the Westwego to Harvey Hurricane Protection project.

39. Status of Environmental Compliance.

a. National Environmental Policy Act. A final Environmental Impact Statement was filed for the project on 30 September 1994. An Environmental Assessment and probable Finding of No Significant Impact, as well as related documents, will be prepared for the project design changes of the sector gate and any change in the location of the dredged material disposal, as well as the relocation of the mitigation area.

b. Clean Water Act. A Section 404(b)(1) evaluation was completed on 19 August 1994. Section 401, State Water Quality Certification, was granted by letter, dated 30 August 1994, from the State of Louisiana Department of Environmental Quality. The design changes of the sector gate changes including any changes of dredged material handling and disposal, will be documented in a renewed Section 401 (State Water Quality Certification) and a supplemental Section 404(b)(1) evaluation.

c. Coastal Zone Management Act. A letter from the Louisiana Department of Natural Resources, dated 1 August 1994, granted consistency with the State of Louisiana's approved Coastal Resources Program. The design changes of the sector gate and any relocation of the dredged material disposal, as well as the relocation of the mitigation area documented in the EA will be included in the application for Consistency with the State of Louisiana's Coastal Resources Program.

d. National Historic Preservation Act. Cultural resources investigations were completed as part of the feasibility study. The results of the investigations were included in the report entitled West Bank of the Mississippi River in the Vicinity of New Orleans, La. (East of the Harvey Canal) Feasibility Report and Environmental Impact Statement, dated August 1994. Cultural resources investigations for the 312-acre Bayou Bois Piquant mitigation area were completed during 1994 as part of the Davis Pond Freshwater Diversion Project, St. Charles Parish, Louisiana. Cultural resources efforts were coordinated with Louisiana's State Historic Preservation Officer (SHPO). Construction of the design changes of the sector gate will not impact National Register of Historic Places properties or significant cultural resources and no further cultural resources investigations are warranted. The SHPO has concurred with these recommendations.

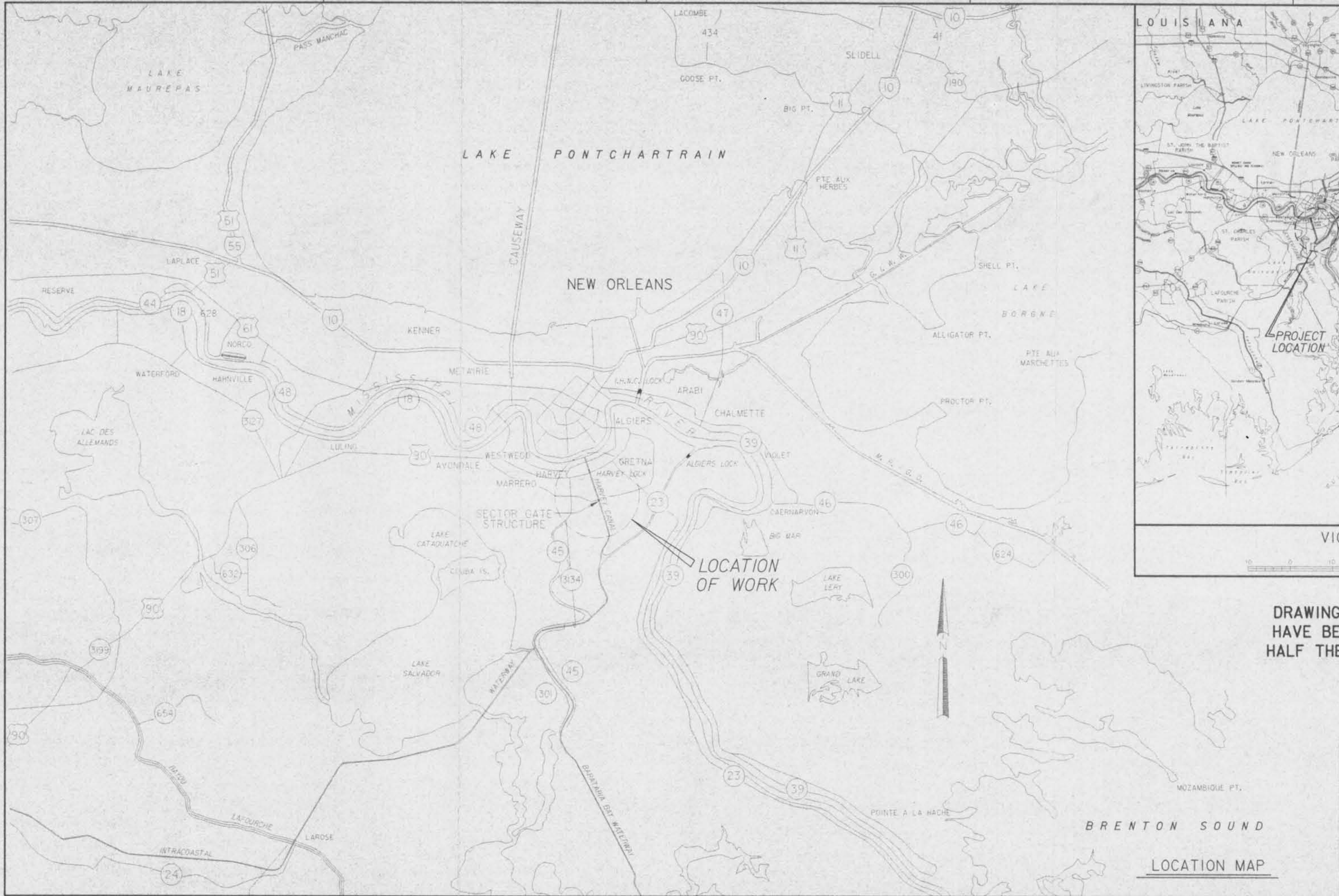
e. Hazardous, Toxic, and Radioactive Wastes. An initial assessment for HTRW was completed on 9 August 1994. The assessment concluded that the risk of encountering HTRW sites along the Harvey Canal, Algiers Canal, and Hero canal levee segments is minimal. The 1994 report recommends that upon final selection of an alignment, a meeting should be arranged with appropriate offices of the Louisiana Department of Environmental Quality (LDEQ) to evaluate the selected alignment and construction methods, to insure implementation of a safe project. Current 2000 protocol would first subject the final feature or selected alignment to an in-house review and, if necessary, a contract Certified Industrial Hygienist investigation, after which the necessity of any further action, including additional coordination with LDEQ and other agencies, would be determined.

## ESTIMATE OF INCREMENTAL COSTS

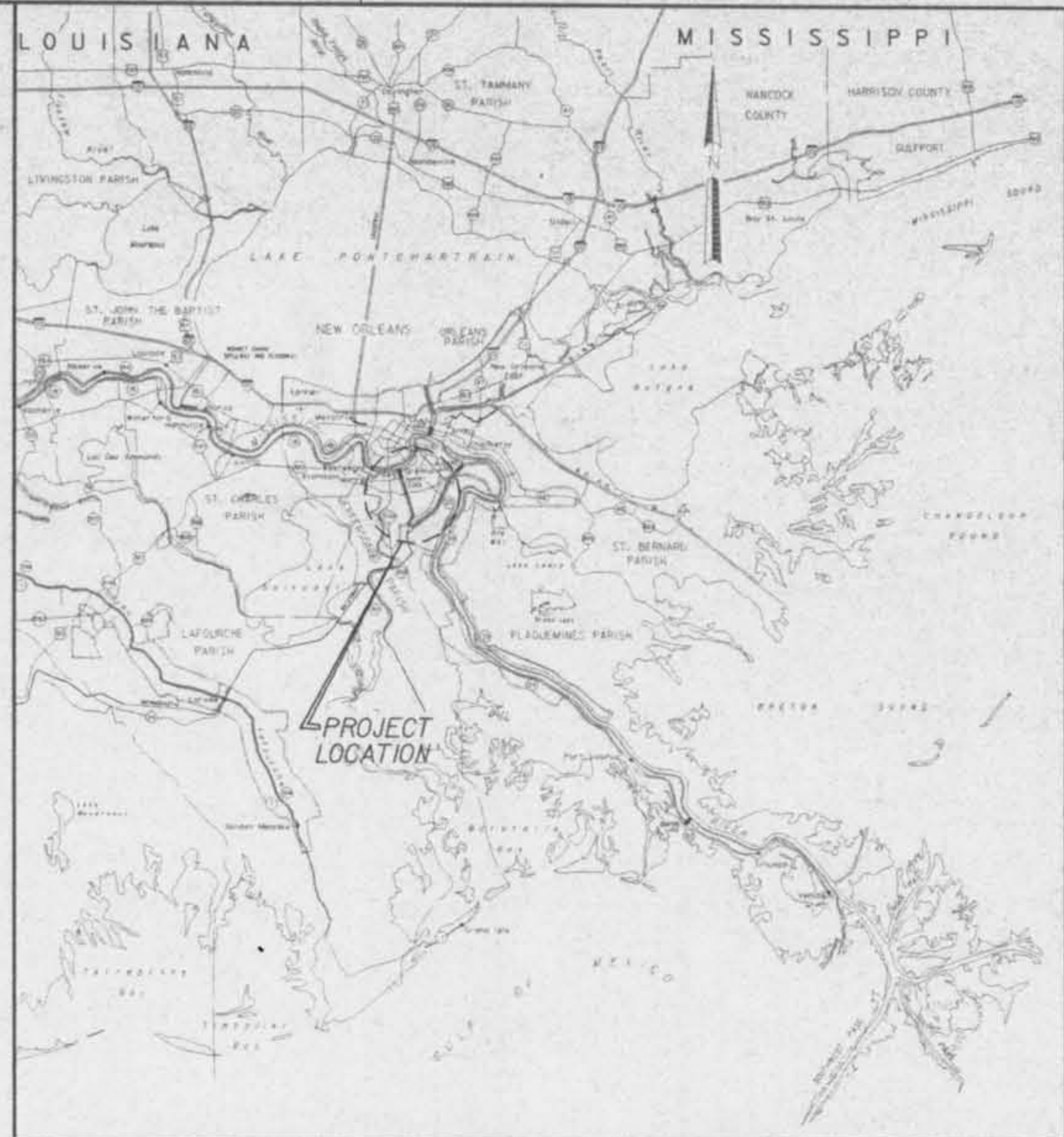
$120,007.

40. General. Based on March 00 price levels, the estimated first cost for construction of the Sector Gate Complex is $18, 634,000. Of this cost, $ is for real estate, $14,390,000 is for the Sector Gate, $973,000 is for levees and floodwalls, $1,385,000 is for engineering and design, and $1,766,000 is for construction management.

missing page 32
page 41 & 42




LOCATION MAP




VICINITY MAP

SCALE IN MILES

10 0 10 20 30 40 50

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

SCALE OF MILES

5 0 5 10 15 20 MILES

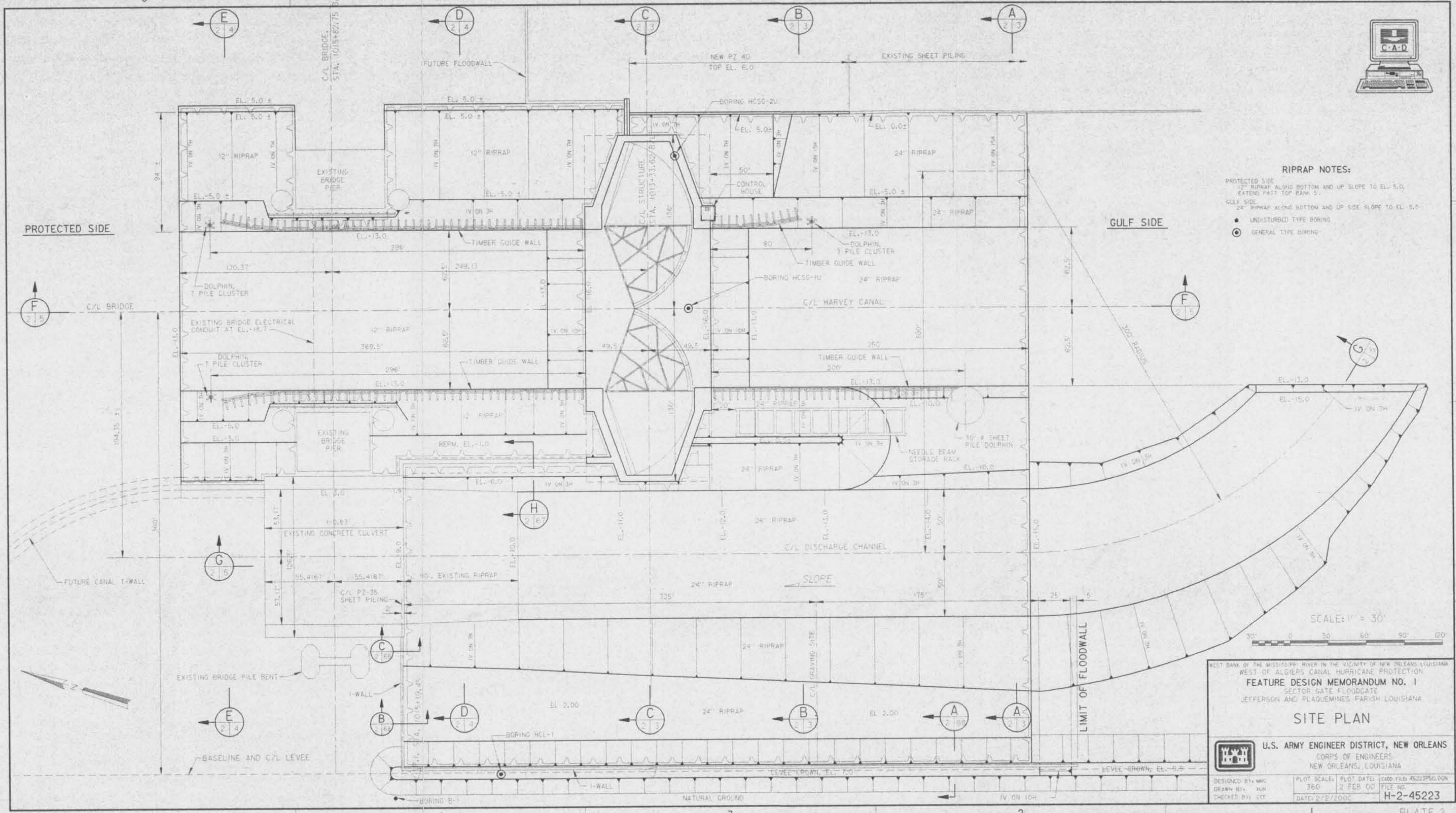
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

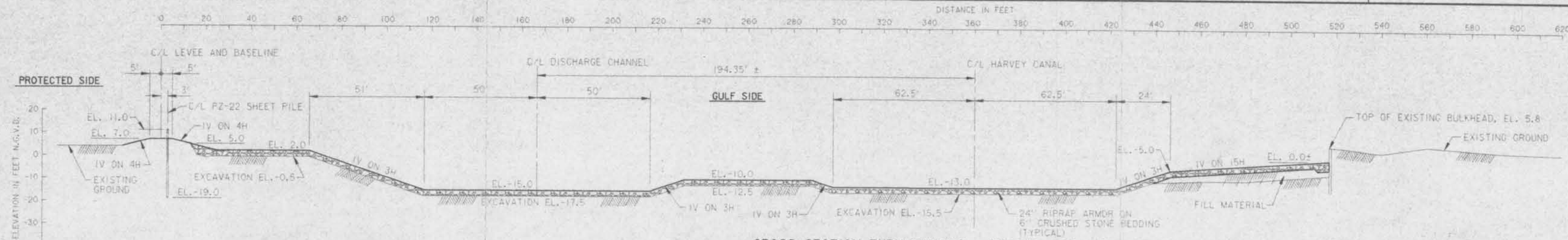
# LOCATION AND VICINITY MAPS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: MJH<br>CHECKED BY: MHE | PLOT SCALE: 1 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223VIC.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |

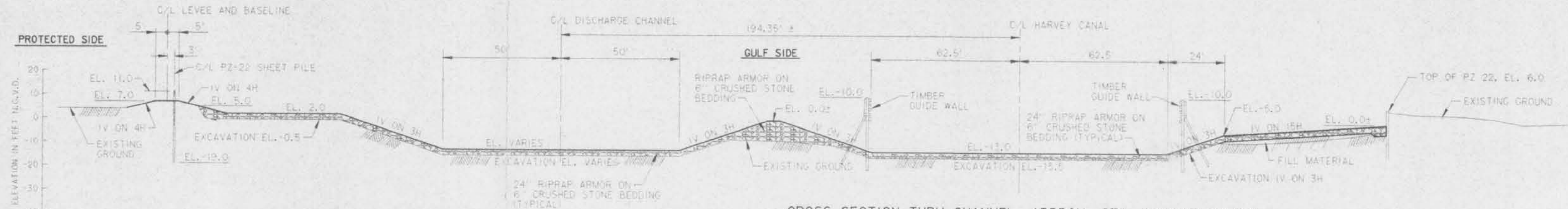
PLATE 1


PROTECTED SIDE
GULF SIDE
C/L BRIDGE
STA. 1015+82.75 B/L
FUTURE FLOODWALL
NEW PZ 40
TOP EL. 6.0
EXISTING SHEET PILING
BORING HCSG-2U
C/L STRUCTURE
STA. 1013+33.62 B/L
CONTROL HOUSE
12" RIPRAP
24" RIPRAP
EXISTING BRIDGE PIER
TIMBER GUIDE WALL
DOLPHIN, 7 PILE CLUSTER
BORING HCSG-1U
C/L HARVEY CANAL
EXISTING BRIDGE ELECTRICAL CONDUIT AT EL.-18.7
300' RADIUS
30' Ø SHEET PILE DOLPHIN
NEEDLE BEAM STORAGE RACK
BERM, EL.-1.0
EXISTING CONCRETE CULVERT
C/L DISCHARGE CHANNEL
SLOPE
90' EXISTING RIPRAP
C/L PZ-35 SHEET PILING
FUTURE CANAL T-WALL
EXISTING BRIDGE PILE BENT
I-WALL
C/L GRAVING SITE
LIMIT OF FLOODWALL
BORING HCL-1
BASELINE AND C/L LEVEE
LEVEE CROWN, EL. 7.0
LEVEE CROWN, EL. 9.5
NATURAL GROUND
BORING B-1
IV ON 10H
IV ON 3H
EL. 2.00
RIPRAP NOTES:
PROTECTED SIDE
12" RIPRAP ALONG BOTTOM AND UP SLOPE TO EL. 5.0, EXTEND PAST TOP BANK 5'.
GULF SIDE
24" RIPRAP ALONG BOTTOM AND UP SIDE SLOPE TO EL. 5.0
UNDISTURBED TYPE BORING
GENERAL TYPE BORING
SCALE: 1" = 30'
C·A·D
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
SITE PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: MHC
DRAWN BY: HJH
CHECKED BY: CCF
PLOT SCALE: 360
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223
PLATE 3




CROSS SECTION THRU CHANNEL, APPROX. STA. 1010+33.43 B/L

SECTION A 2|3

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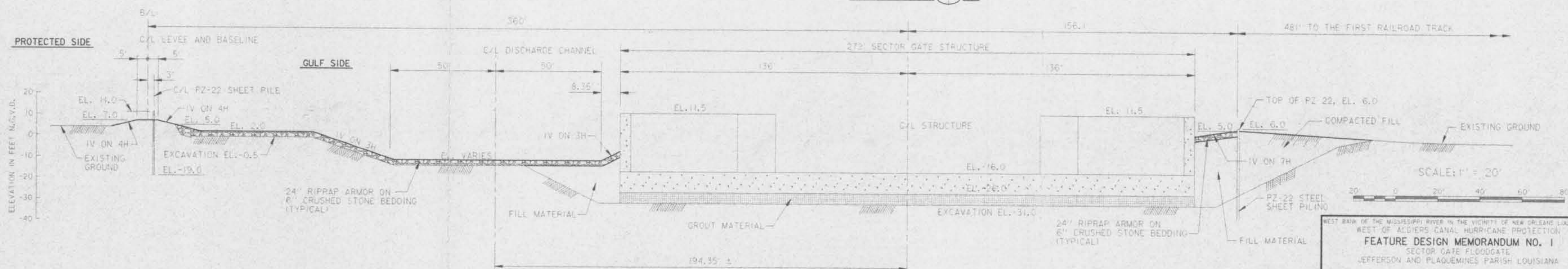
SECTION B 2|3




CROSS SECTION THRU CHANNEL, APPROX. STA. 1013+33.62 B/L

SECTION C 2|3

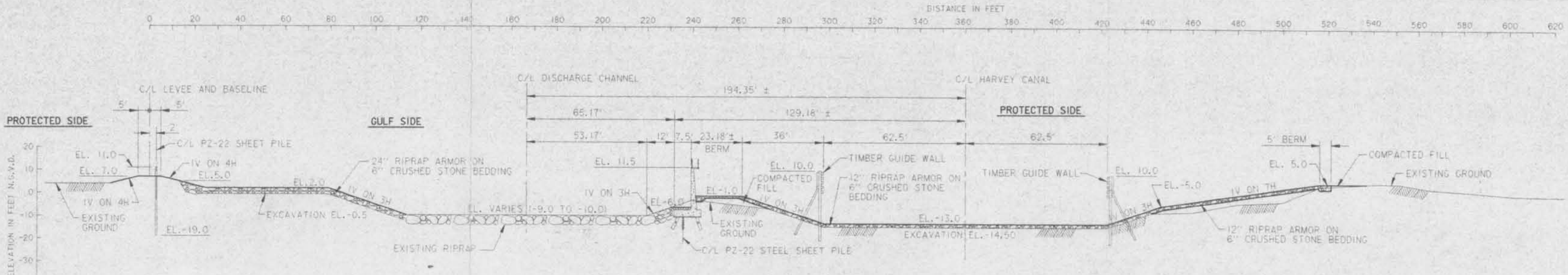
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## TYPICAL CROSS SECTIONS

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

| | | |
|---|---|---|
| DESIGNED BY: MHC<br>DRAWN BY: HJH<br>CHECKED BY: CCC | PLOT SCALE: 240 | PLOT DATE: 2 FEB 00 |
| DATE: 2/2/2000 | CADD FILE: 45223F03.DGN | FILE NO. H-2-45223 |

PLATE 3

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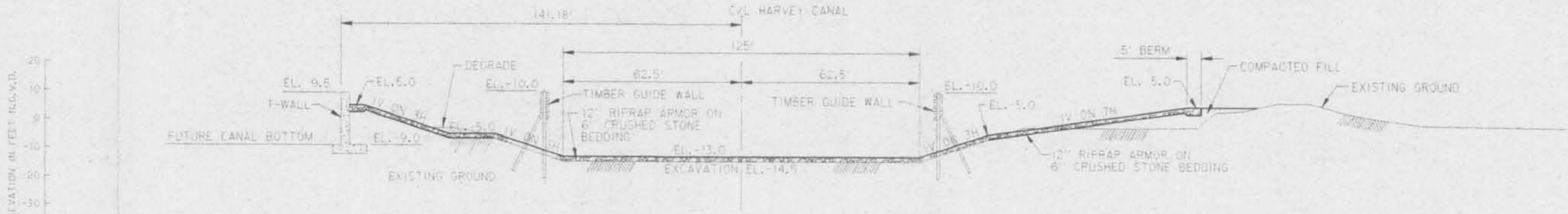
SECTION D 2 4




CROSS SECTION THRU CHANNEL, APPROX. STA. 1016+33.43 B/L

SECTION E 2 4

SCALE: 1'' = 20'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

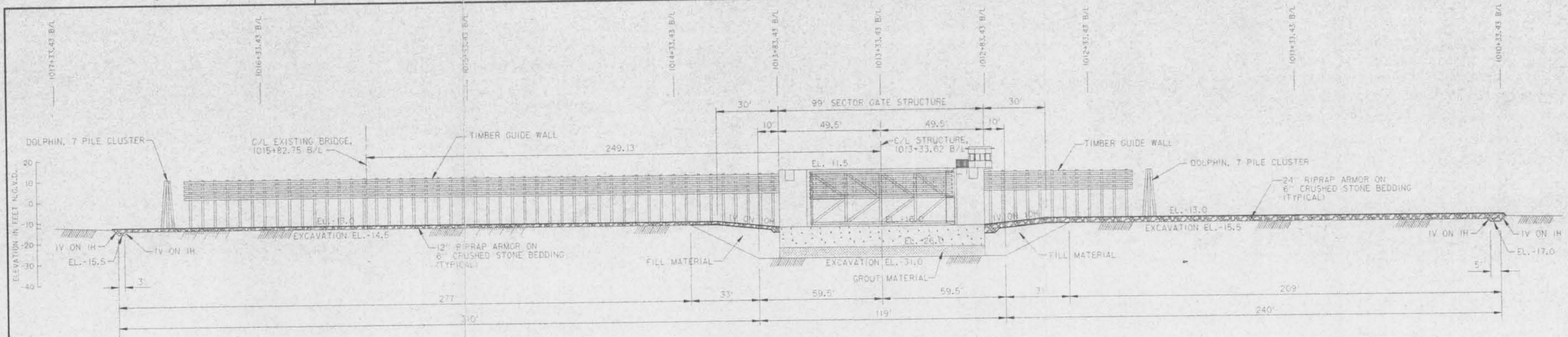
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## TYPICAL CROSS SECTIONS

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

DESIGNED BY: MHG
DRAWN BY: HJH
CHECKED BY: CCE
PLOT SCALE: 240
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223




LONGITUDINAL SECTION THRU HARVEY CANAL

SECTION F (2/5)


LONGITUDINAL SECTION THRU DISCHARGE CHANNEL

SECTION G (2/5)

SCALE: 1" = 20'

20' 0 20' 40' 60' 80'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

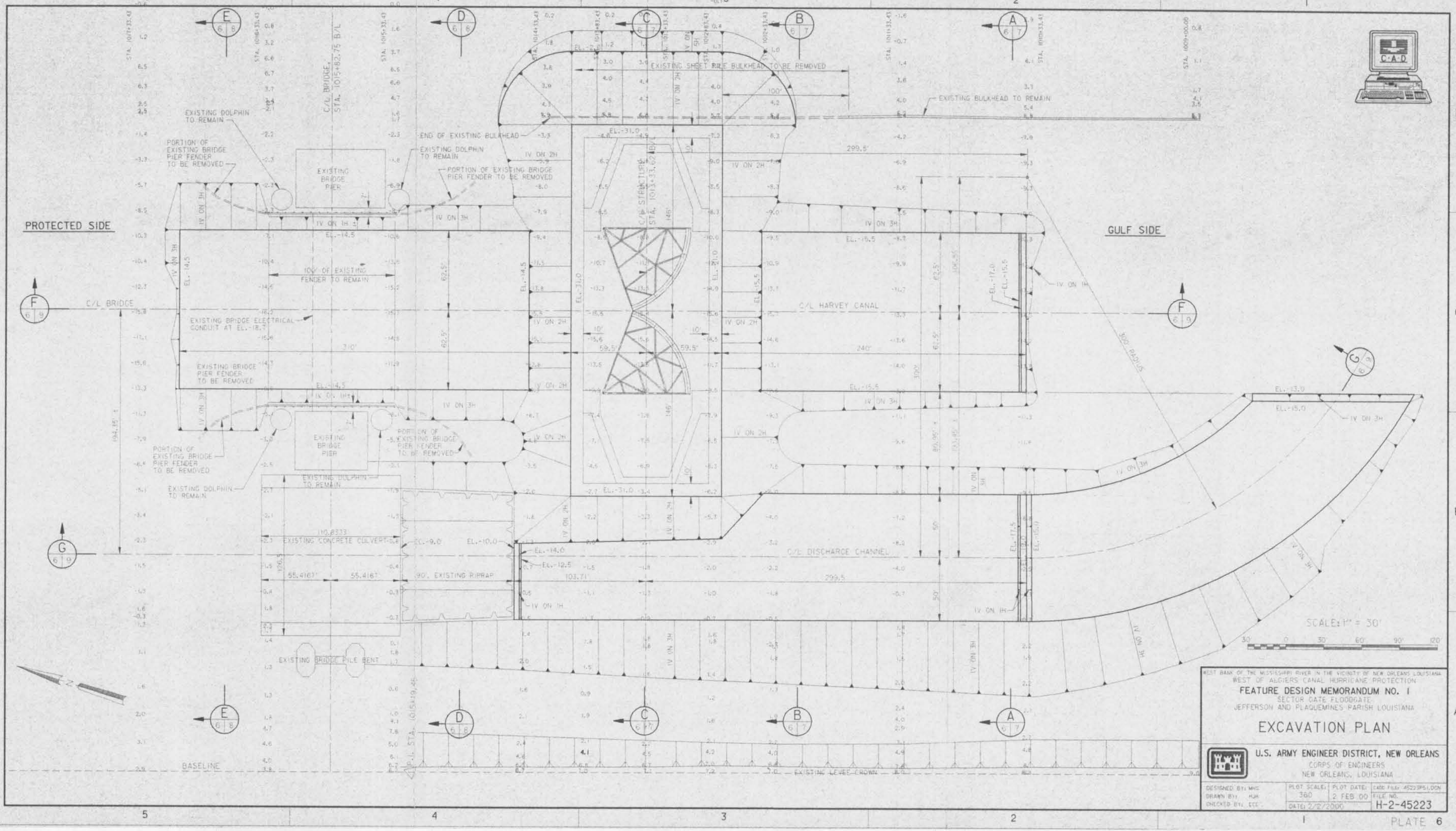
## TYPICAL CROSS SECTIONS

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

DESIGNED BY: MHS
DRAWN BY: HJH
CHECKED BY: SCE

| PLOT SCALE: | PLOT DATE: | CADD FILE: 45223F05.DGN |
|---|---|---|
| 240 | 2 FEB 00 | FILE NO. H-2-45223 |
| DATE: 2/2/2000 | | |

PLATE 5


PROTECTED SIDE
GULF SIDE
C/L BRIDGE
C/L HARVEY CANAL
C/L DISCHARGE CHANNEL
C/L STRUCTURE STA. 1013+33.62 B/L
C/L BRIDGE, STA. 1015+82.75 B/L
EXISTING SHEET PILE BULKHEAD TO BE REMOVED
EXISTING BULKHEAD TO REMAIN
END OF EXISTING BULKHEAD
EXISTING DOLPHIN TO REMAIN
PORTION OF EXISTING BRIDGE PIER FENDER TO BE REMOVED
EXISTING BRIDGE PIER
100' OF EXISTING FENDER TO REMAIN
EXISTING BRIDGE ELECTRICAL CONDUIT AT EL.-18.7
EXISTING CONCRETE CULVERT
90' EXISTING RIPRAP
EXISTING BRIDGE PILE BENT
300' RADIUS
BASELINE
EXISTING LEVEE CROWN
SCALE: 1" = 30'
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
EXCAVATION PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: MHS
DRAWN BY: HJH
CHECKED BY: CCC
PLOT SCALE: 360
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223
PLATE 6

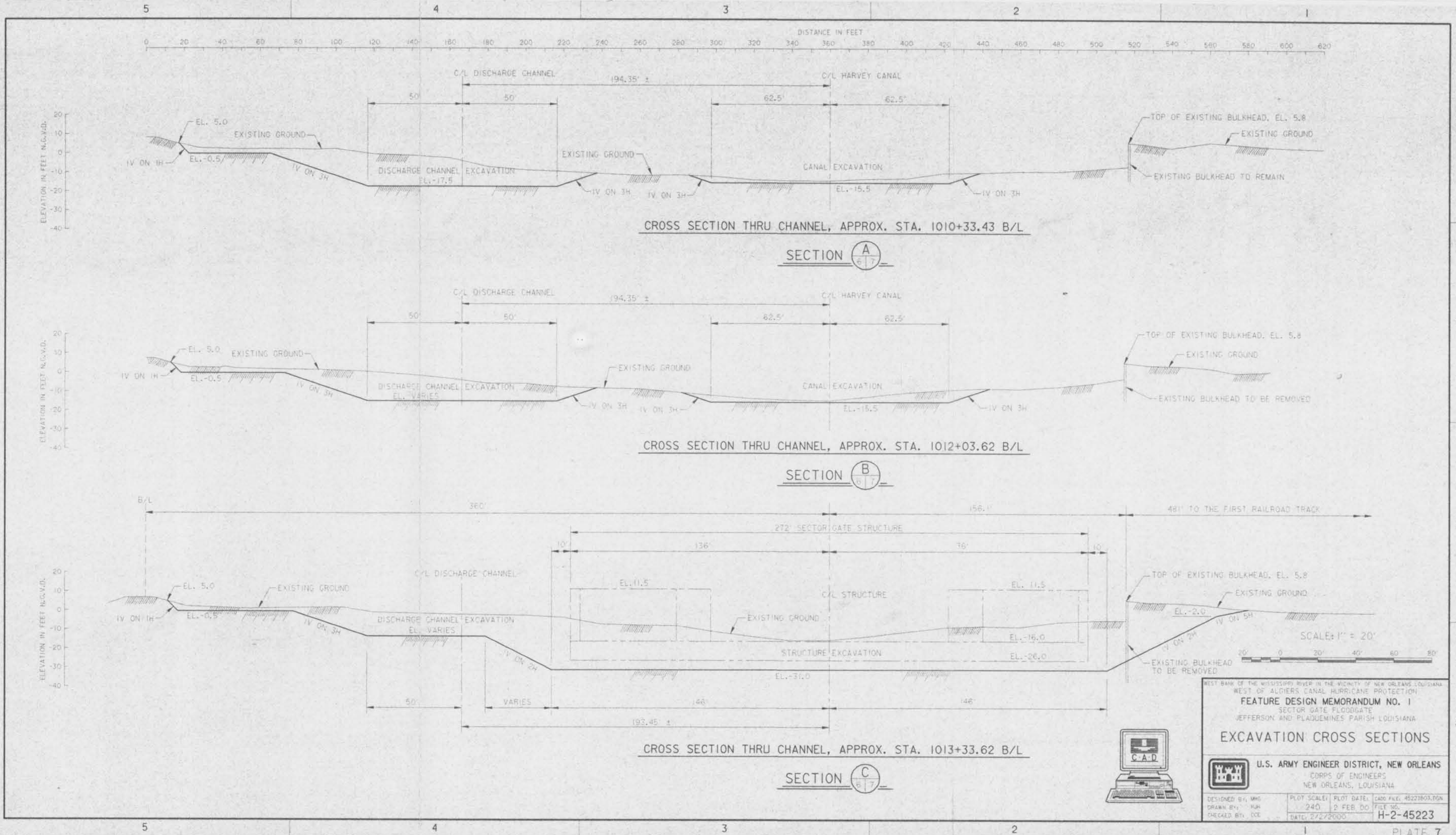
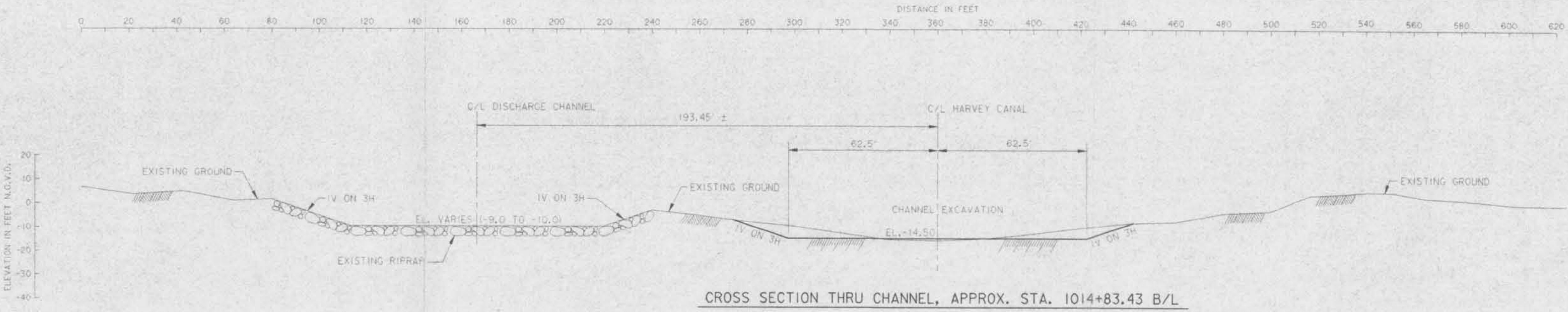
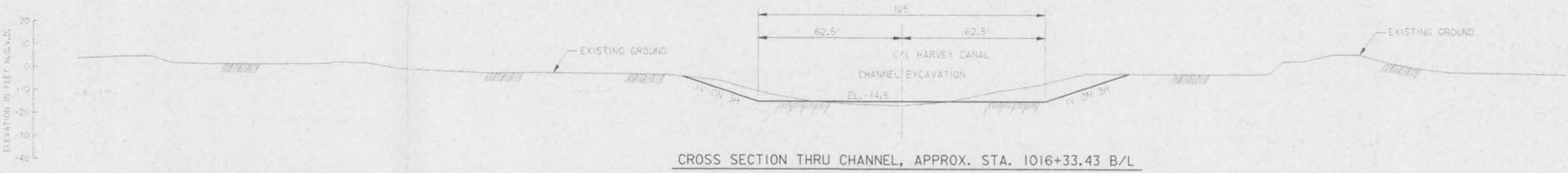

DISTANCE IN FEET
C/L DISCHARGE CHANNEL
C/L HARVEY CANAL
194.35' ±
50'
62.5'
EL. 5.0
EXISTING GROUND
1V ON 1H
EL. -0.5
1V ON 3H
DISCHARGE CHANNEL EXCAVATION
EL. -17.5
CANAL EXCAVATION
EL. -15.5
TOP OF EXISTING BULKHEAD, EL. 5.8
EXISTING BULKHEAD TO REMAIN
ELEVATION IN FEET N.G.V.D.
CROSS SECTION THRU CHANNEL, APPROX. STA. 1010+33.43 B/L
SECTION A 6 7
EL. VARIES
EXISTING BULKHEAD TO BE REMOVED
CROSS SECTION THRU CHANNEL, APPROX. STA. 1012+03.62 B/L
SECTION B 6 7
B/L
360'
156.1'
481' TO THE FIRST RAILROAD TRACK
272' SECTOR GATE STRUCTURE
10'
136'
EL. 11.5
C/L STRUCTURE
1V ON 2H
1V ON 5H
EL. -2.0
EL. -16.0
EL. -26.0
STRUCTURE EXCAVATION
EL. -31.0
VARIES
146'
193.45' ±
SCALE: 1" = 20'
CROSS SECTION THRU CHANNEL, APPROX. STA. 1013+33.62 B/L
SECTION C 6 7
C.A.D.
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
EXCAVATION CROSS SECTIONS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: MHS
DRAWN BY: RJH
CHECKED BY: DCE
PLOT SCALE: 240
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223

PLATE 7




CROSS SECTION THRU CHANNEL, APPROX. STA. 1014+83.43 B/L

SECTION D 6 8




CROSS SECTION THRU CHANNEL, APPROX. STA. 1016+33.43 B/L

SECTION E 6 8

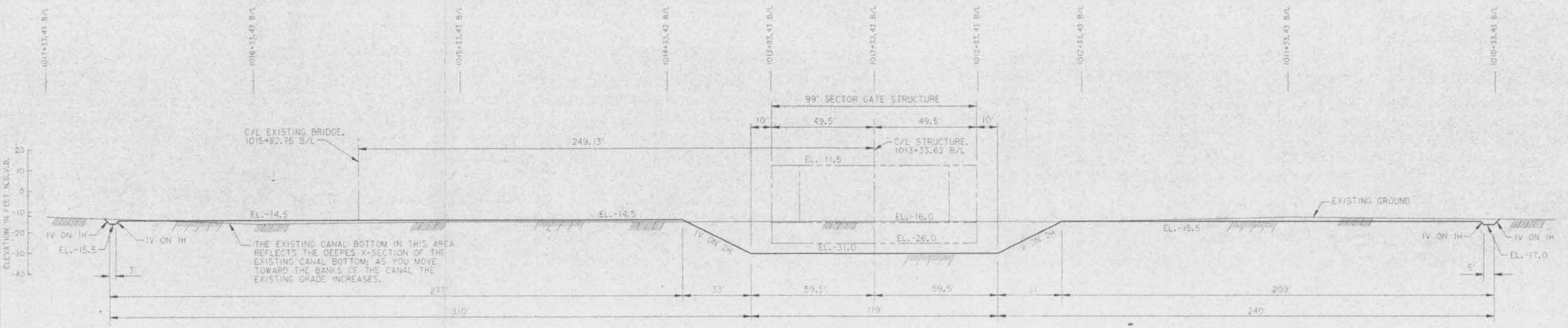
SCALE: 1" = 20'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

EXCAVATION CROSS SECTIONS

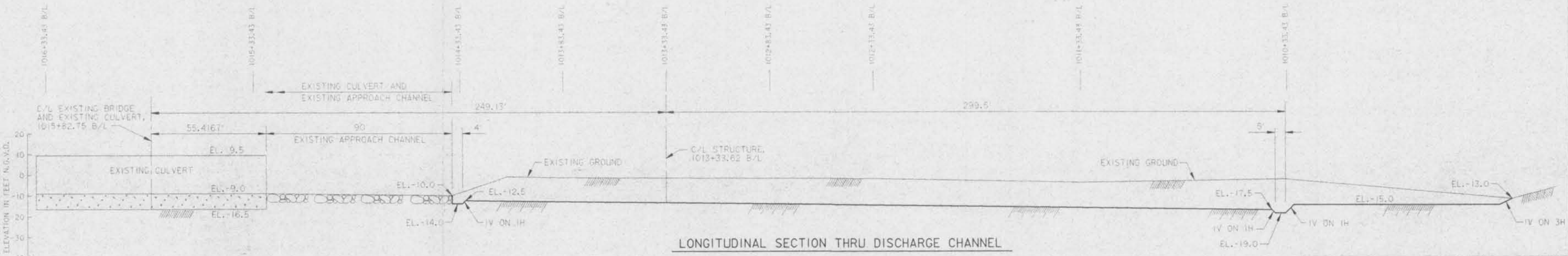
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG | PLOT SCALE: 240 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B04.DGN |
| DRAWN BY: MJH | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: CCE | | | |




LONGITUDINAL SECTION THRU HARVEY CANAL

SECTION F 6 9




LONGITUDINAL SECTION THRU DISCHARGE CHANNEL

SECTION G 6 9

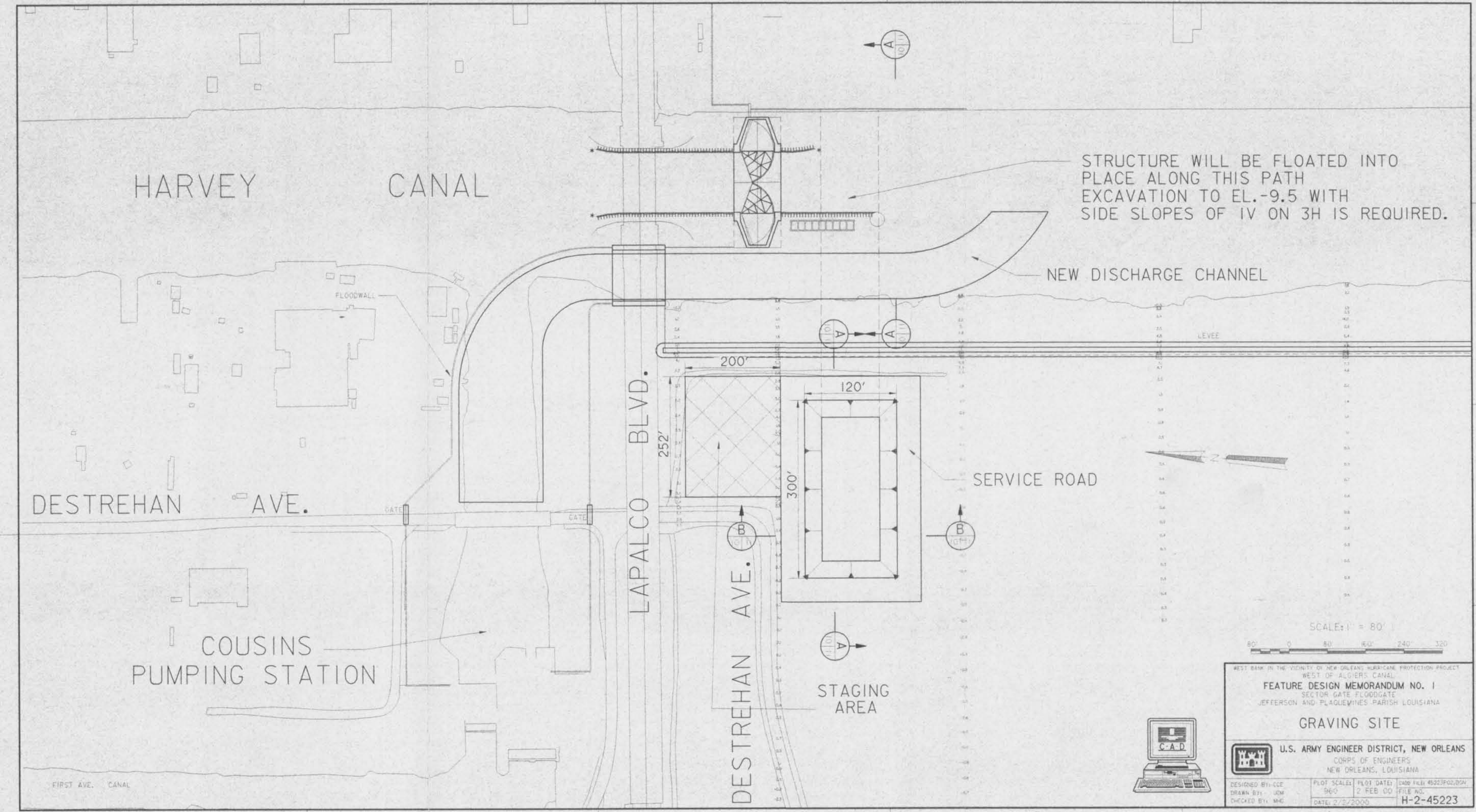
SCALE: 1" = 20'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

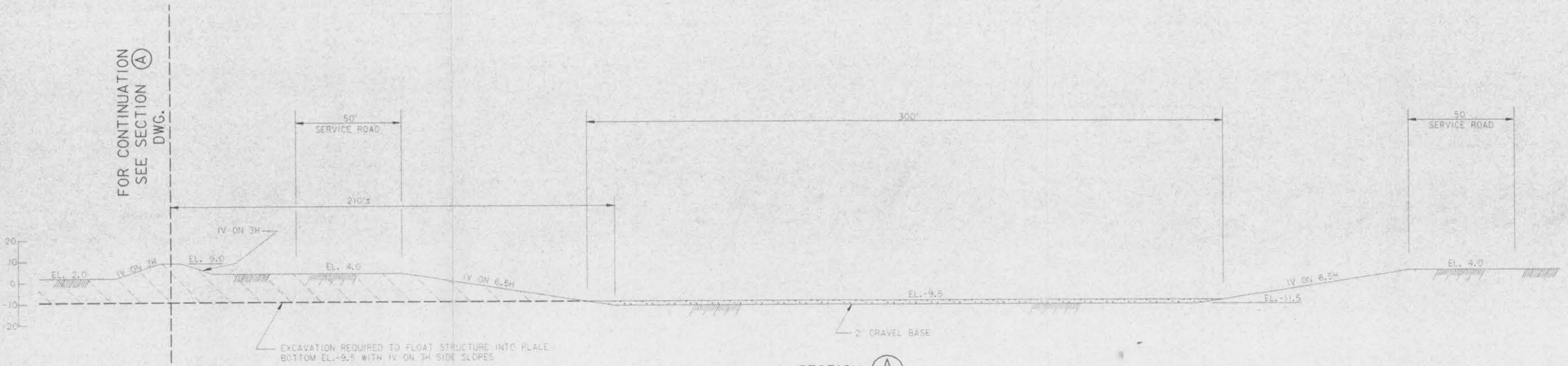
EXCAVATION CROSS SECTIONS

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

DESIGNED BY: MHD
DRAWN BY: HJH
CHECKED BY: CCE
PLOT SCALE: 240
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
CADD FILE: 45223S05.DGN
FILE NO. H-2-45223

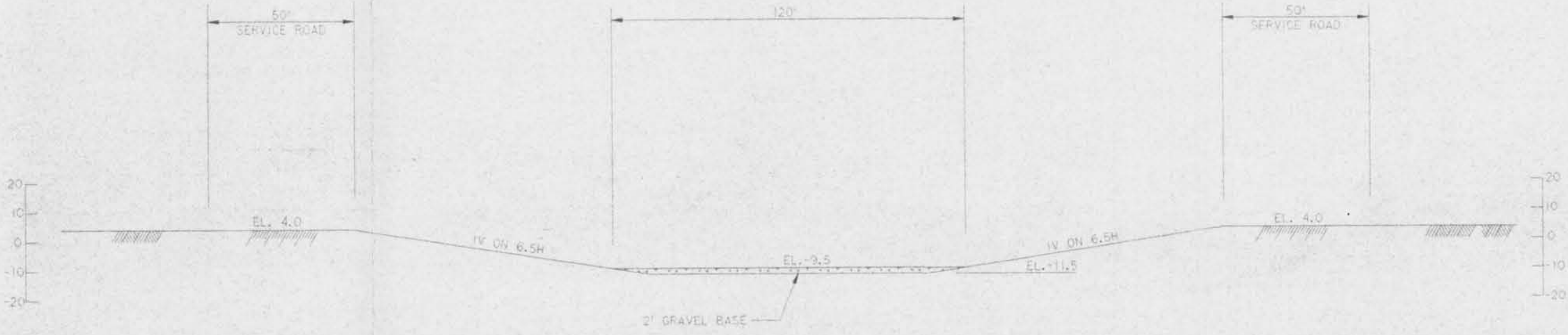


HARVEY CANAL
STRUCTURE WILL BE FLOATED INTO PLACE ALONG THIS PATH
EXCAVATION TO EL.-9.5 WITH SIDE SLOPES OF 1V ON 3H IS REQUIRED.
NEW DISCHARGE CHANNEL
FLOODWALL
LEVEE
200'
120'
252'
300'
LAPALCO BLVD.
SERVICE ROAD
DESTREHAN AVE.
GATE
GATE
DESTREHAN AVE.
COUSINS PUMPING STATION
STAGING AREA
FIRST AVE. CANAL
SCALE: 1" = 80'
80' 0 80' 160' 240' 320
WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
GRAVING SITE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: CCE
DRAWN BY: JCM
CHECKED BY: MHG
PLOT SCALE: 960
PLOT DATE: 2 FEB 00
CADD FILE: 45223P02.DGN
DATE: 2/2/2000
FILE NO. H-2-45223




SECTION A (10 | 11)

SCALE: 1"=20'-00




SECTION B (10 | 11)

SCALE: 1"=20'-00

SCALE: 1" = 20'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

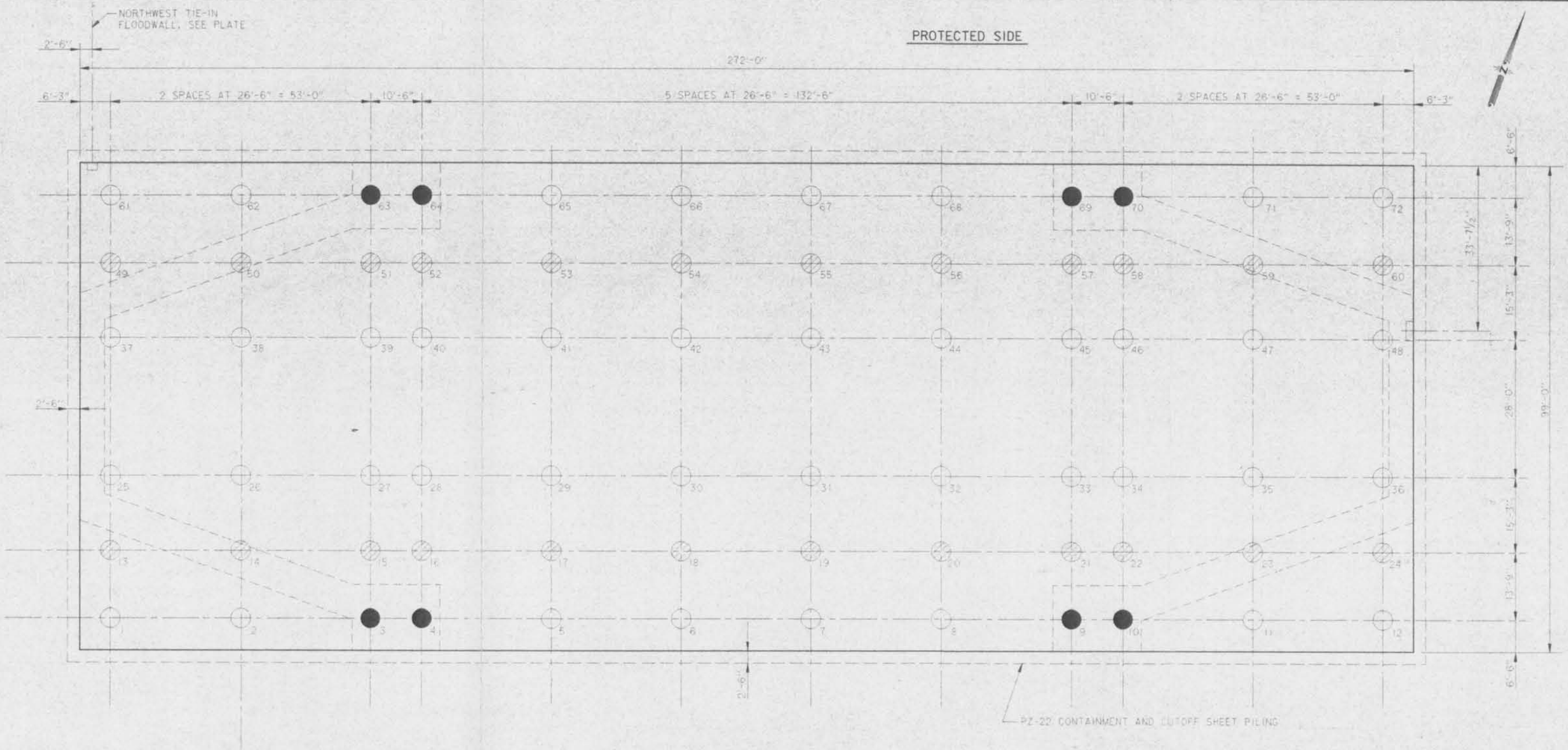
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# GRAVING SITE SECTIONS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: JCM<br>CHECKED BY: MHG | PLOT SCALE: 240 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F12.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |

PLATE 11




PLAN

NOTES

1. ALL PIPE PILES SHALL BE ASTM A252 GRADE 3 ($F_{ymin}$ = 45 ksi)

2. ALLOWABLE PILE CAPACITIES

| | FS = 2.0 | FS = 1.5 |
|---|---|---|
| LENGTH = 50' | | |
| COMP | 480 k | 640 k |
| TENSION | 130 k | 170 k |
| LENGTH = 100' | | |
| COMP | 480 k | 640 k |
| TENSION | 365 k | 480 k |

| PILES | TIP ELEVATION |
|---|---|
| 1 - 12 & 61 - 72 | -126.00 |
| 13 - 60 | -76.00 |

PILE LEGEND
48" STEEL PIPE PIPES

VERTICAL - PINNED PILES (40 REQUIRED)

VERTICAL - COMPRESSION PILES (24 REQUIRED)

VERTICAL - PINNED SETTING PILES (8 REQUIRED)

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

FEATURE DESIGN MEMORANDUM NO. 1

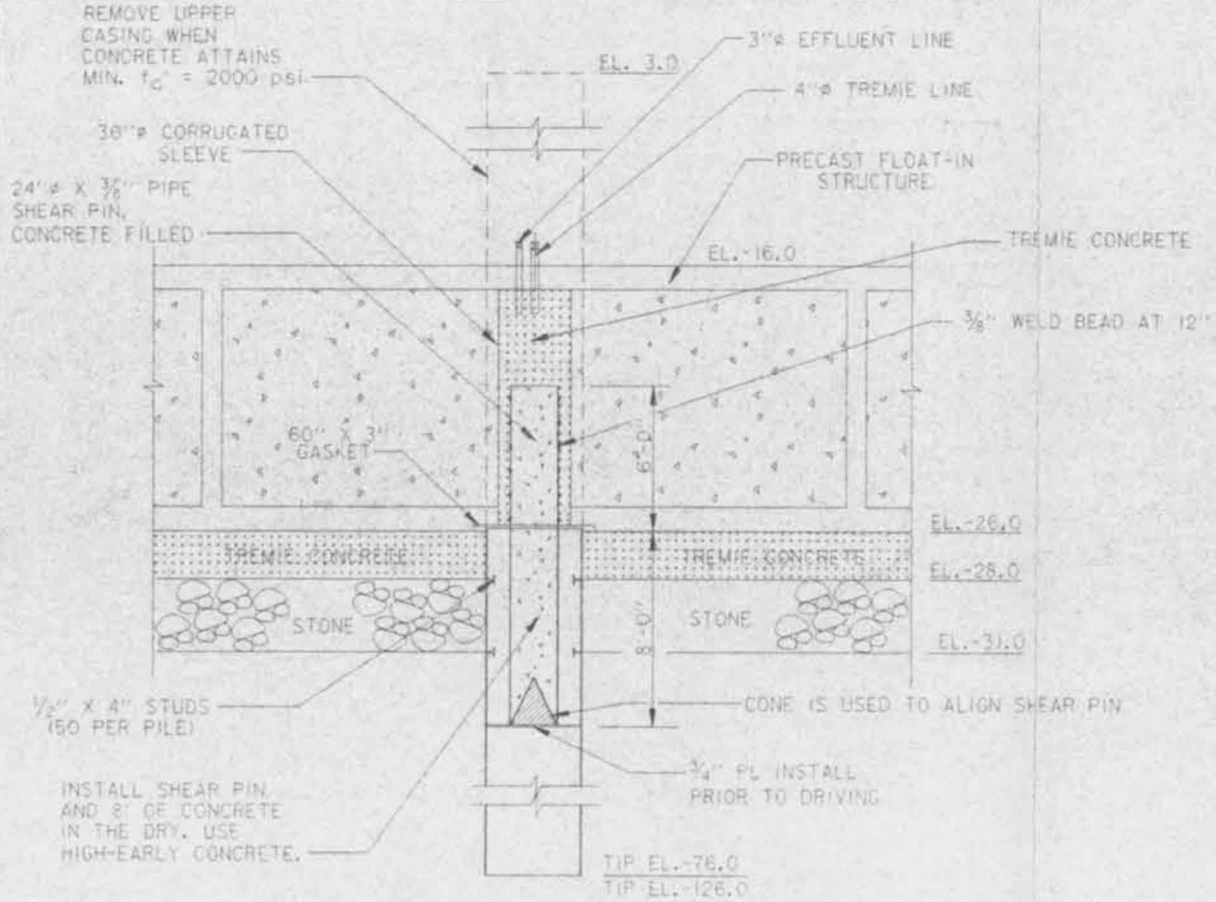
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# PILING LAYOUT
## 48" DIAMETER PIPE PILES

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

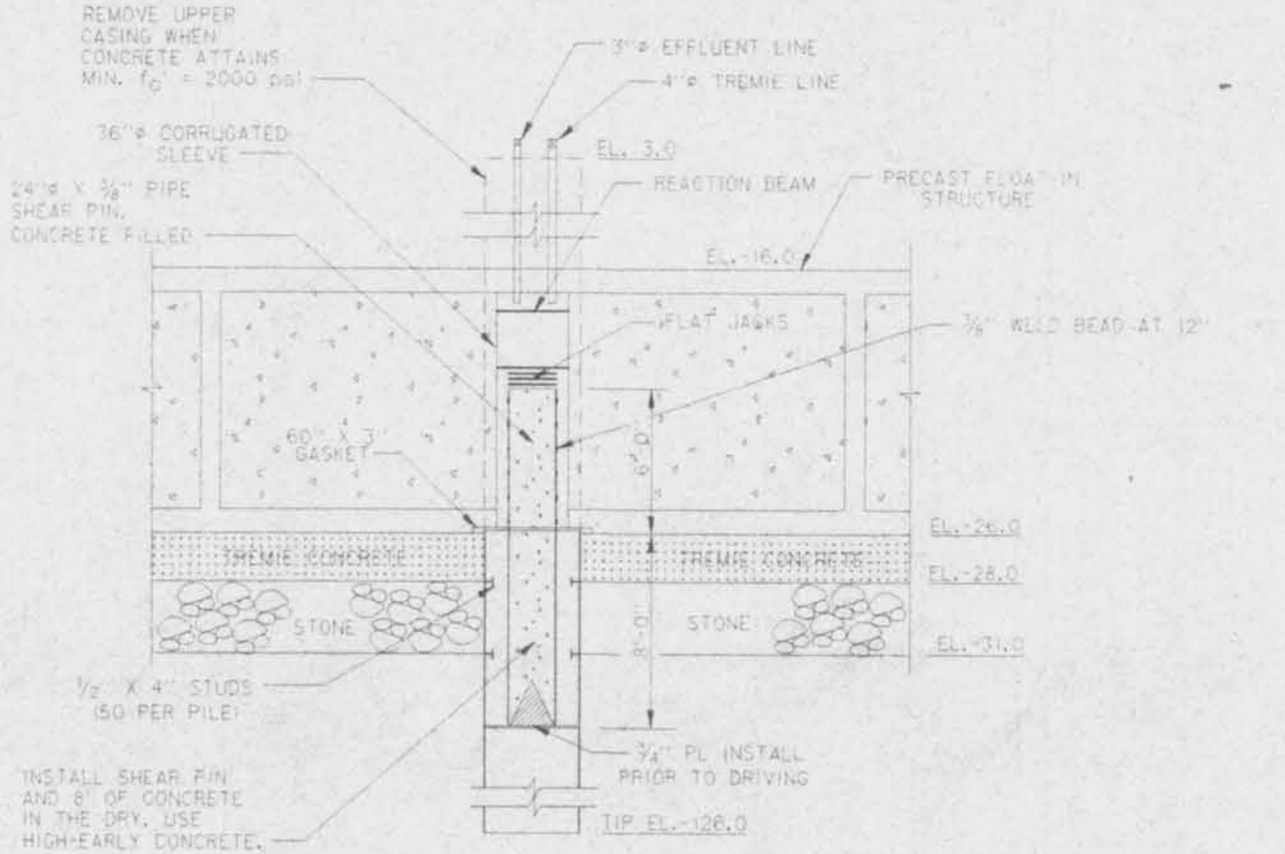
DESIGNED BY: MHG
DRAWN BY: JCM
CHECKED BY: CCE

PLOT SCALE: 120
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
CADD FILE: 45223P08.DGN
FILE NO. H-2-45223



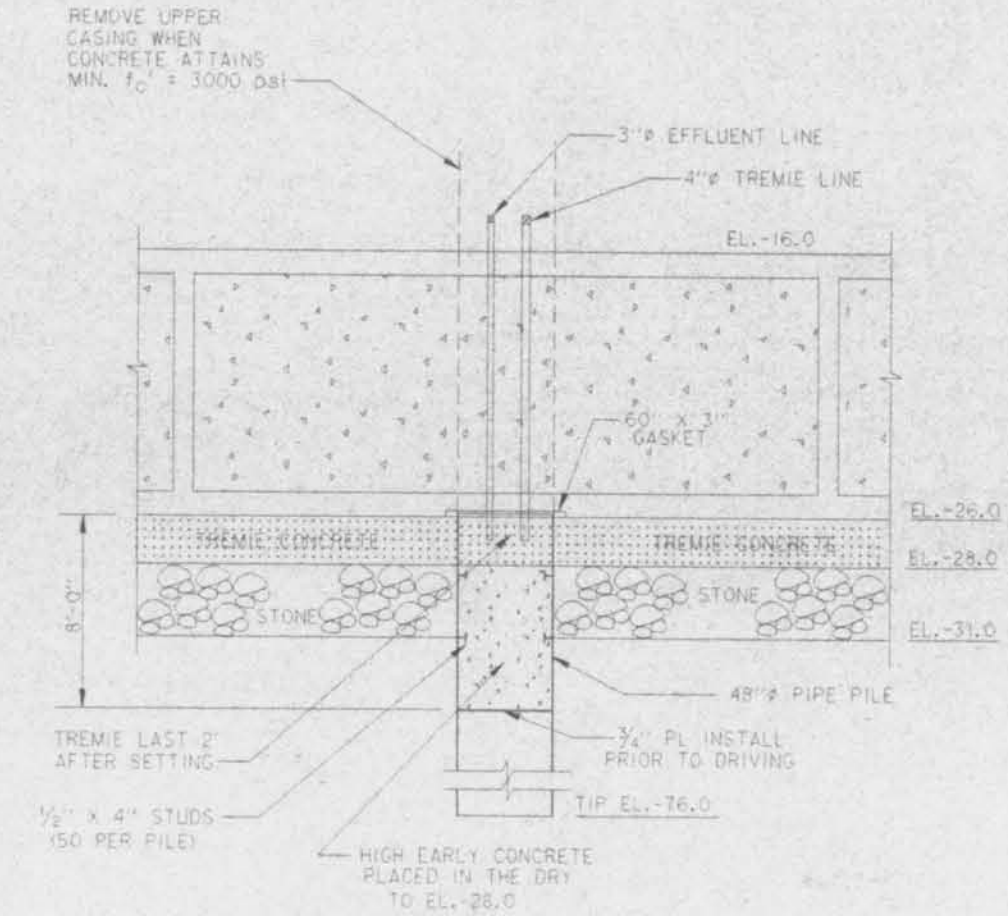

48"ø PINNED CONNECTION PILES (40 REQ'D.)

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




48"ø PINNED CONNECTION SETTING PILES (8 REQ'D.)

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




48"ø COMPRESSION ONLY PILES (24 REQ'D.)

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

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## PILE CONNECTION DETAILS

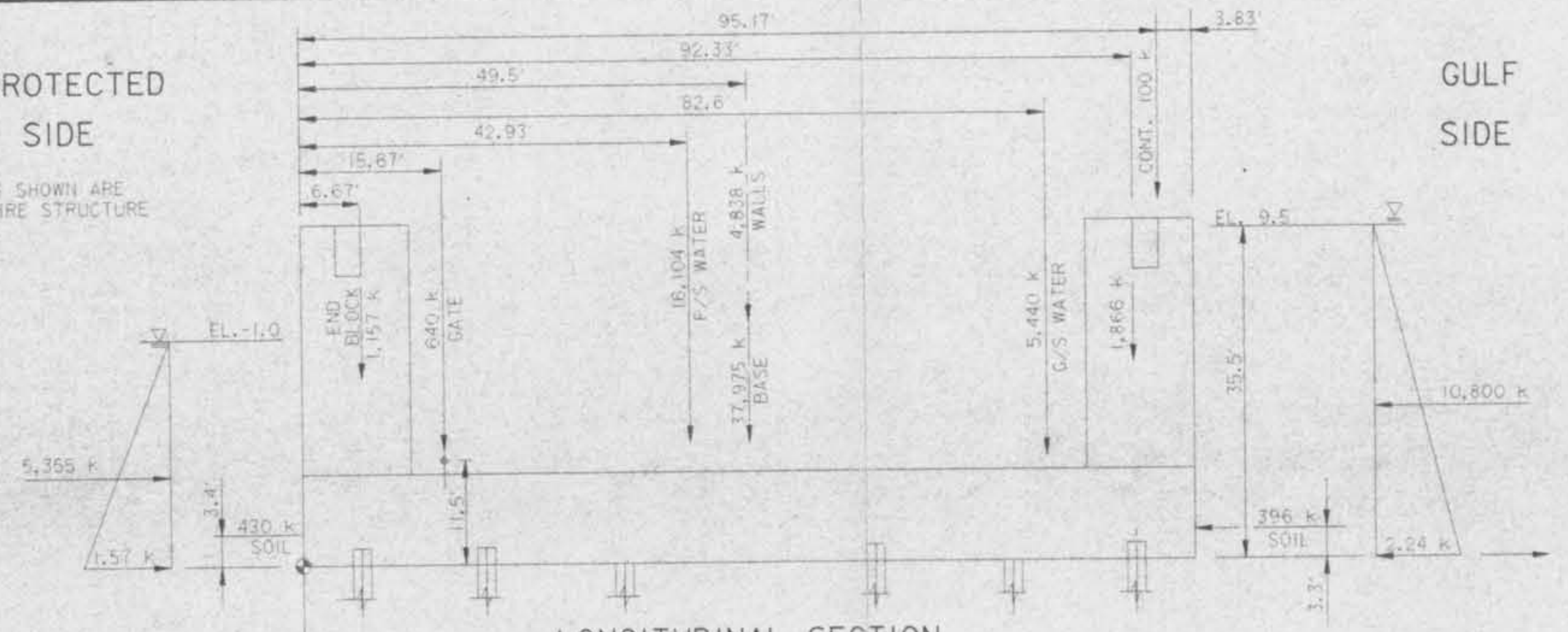
**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | |
|---|---|---|
| DESIGNED BY: MHG | PLOT SCALE: 48 | PLOT DATE: 2 FEB 00 |
| DRAWN BY: JCM | DATE: 2/2/2000 | CADD FILE: 45223F11.DGN |
| CHECKED BY: CEE | | FILE NO. H-2-45223 |

PROTECTED SIDE

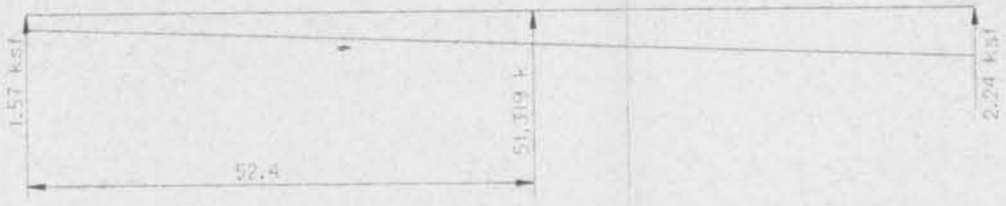
GULF SIDE

LOADS SHOWN ARE FOR ENTIRE STRUCTURE




## LONGITUDINAL SECTION
## LOAD CASE NO. 6
HURRICANE AT EL. 9.5

## UPLIFT A
UNIFORMLY VARYING




## UPLIFT B
GULF SIDE CUTOFF IMPERVIOUS


## LOADING AND PILE DATA

| | | LOADINGS | | | | | | PILE LOADINGS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | PINNED PILES | | | | COMPRESSION ONLY PILES | | | |
| CASE | CONDITION | $F_X$ (KIPS) | $F_Y$ (KIPS) | $F_Z$ (KIPS) | $M_{XX}$ (FT-KIPS) | $M_{YY}$ (FT-KIPS) | $M_{ZZ}$ (FT-KIPS) | PILE NO. | MAX COMP (KIPS) | ALF | CBF | PILE NO. | MAX COMP (KIPS) | ALF | CBF |
| 1A | NORMAL; UPLIFT A | 0 | 34 | 28,375 | 1,379,905 | 0 | 0 | 61 | 409.30 | 0.82 | 0.18 | 49 | 404.50 | 0.81 | 0.17 |
| 3A | MAX. REVERSE HEAD, UPLIFT A | 0 | 557 | 26,525 | 1,325,607 | 0 | 0 | 1 | 376.20 | 0.75 | 0.20 | 13 | 373.70 | 0.75 | 0.16 |
| 3B | MAX. REVERSE HEAD, UPLIFT B | 0 | 557 | 27,374 | 1,381,591 | 0 | 0 | 1 | 396.60 | 0.79 | 0.21 | 13 | 391.40 | 0.78 | 0.17 |
| 4A | MAX. HIGH WATER, UPLIFT A | 0 | -2,408 | 26,005 | 1,216,388 | 0 | 0 | 61 | 405.00 | 0.81 | 0.33 | 49 | 391.00 | 0.78 | 0.17 |
| 4B | MAX. HIGH WATER, UPLIFT B | 0 | -2,408 | 30,246 | 1,496,305 | 0 | 0 | 61 | 420.60 | 0.84 | 0.34 | 49 | 420.40 | 0.84 | 0.18 |
| 5A | HURRICANE REVERSE, UPLIFT A | 0 | 2,391 | 22,007 | 1,060,869 | 0 | 0 | 61 | 323.40 | 0.65 | 0.30 | 49 | 317.70 | 0.64 | 0.14 |
| 5B | HURRICANE REVERSE, UPLIFT B | 0 | 2,391 | 26,248 | 1,340,586 | 0 | 0 | 1 | 390.10 | 0.78 | 0.32 | 13 | 381.90 | 0.76 | 0.17 |
| 6A | HURRICANE + FREEBOARD; UPLIFT A | 0 | -5,409 | 23,321 | 971,972 | 0 | 0 | 61 | 436.60 | 0.87 | 0.54 | 49 | 400.60 | 0.80 | 0.18 |
| 6B | HURRICANE + FREEBOARD; UPLIFT B | 0 | -5,409 | 32,227 | 1,559,798 | 0 | 0 | 61 | 469.50 | 0.94 | 0.55 | 49 | 462.50 | 0.92 | 0.20 |
| 7A | HURR + FREE + SUBSIDENCE, UP. A | 0 | -4,995 | 16,709 | 655,868 | 0 | 0 | 61 | 337.80 | 0.68 | 0.47 | 49 | 304.00 | 0.61 | 0.14 |
| 7B | HURR + FREE + SUBSIDENCE, UP. B | 0 | -4,995 | 24,661 | 1,180,712 | 0 | 0 | 61 | 367.20 | 0.73 | 0.48 | 49 | 359.00 | 0.72 | 0.16 |
| 7C | HURR + FREE + SUBSIDENCE, UP. C | 0 | -4,995 | 8,756 | 393,446 | 0 | 0 | 61 | 146.30 | 0.29 | 0.39 | 49 | 138.40 | 0.28 | 0.07 |
| 8A | DEWATERED; UPLIFT A | 0 | -469 | 3,816 | 187,534 | 0 | 0 | 61 | 53.80 | 0.11 | 0.06 | 49 | 53.60 | 0.11 | 0.02 |

NOTE:
LOADS 7A, 7B, AND 7C WERE REDUCED BY 0.75

## PILE LEGEND
ALL PILING 48" Ø x ¾

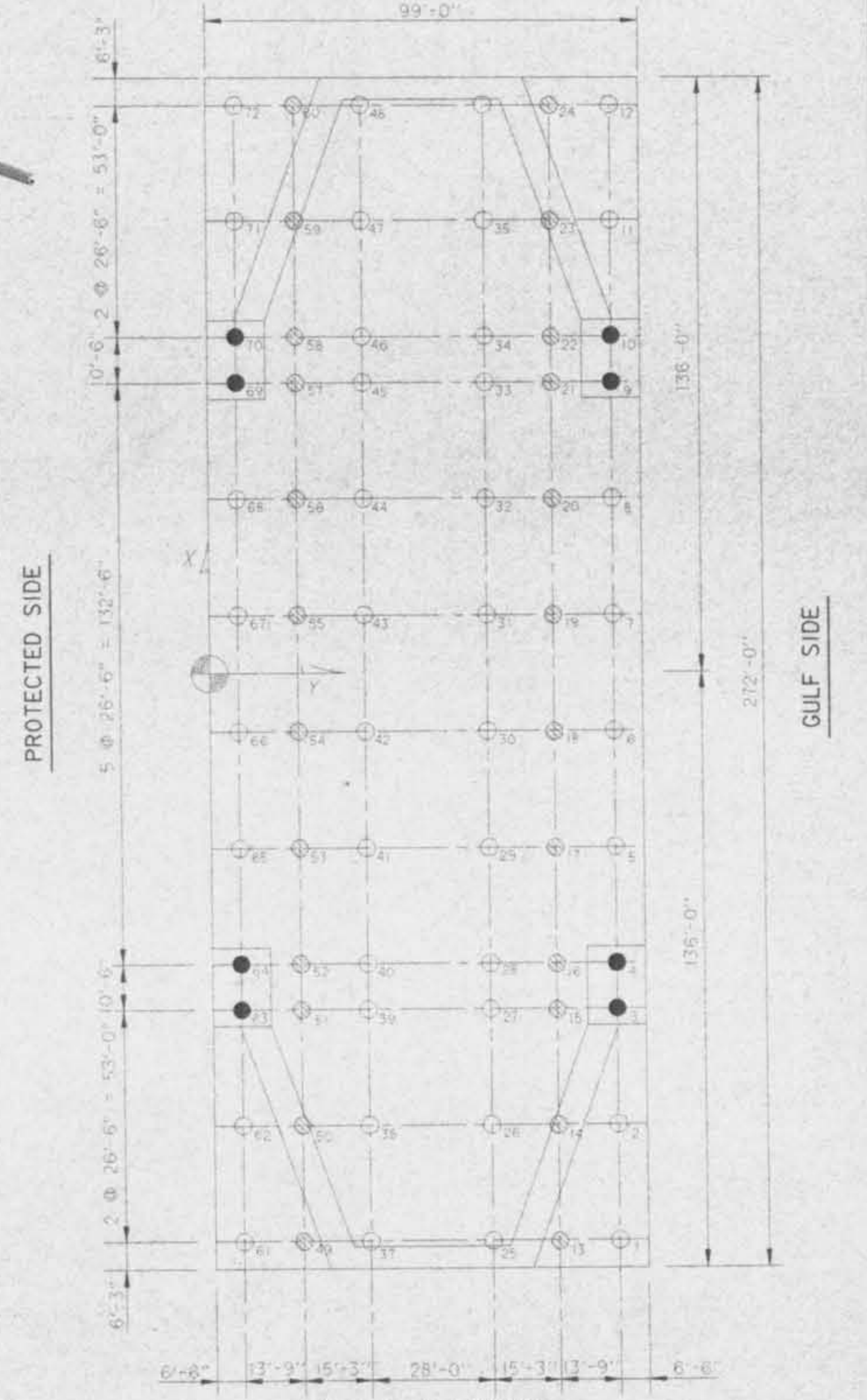
● VERTICAL - PINNED SETTING PILE

○ VERTICAL - PINNED PILE

◎ VERTICAL - COMPRESSION PILE

SCALE: 1" = 20'

20' 0 20' 40' 60' 80'




## PILING LAYOUT

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

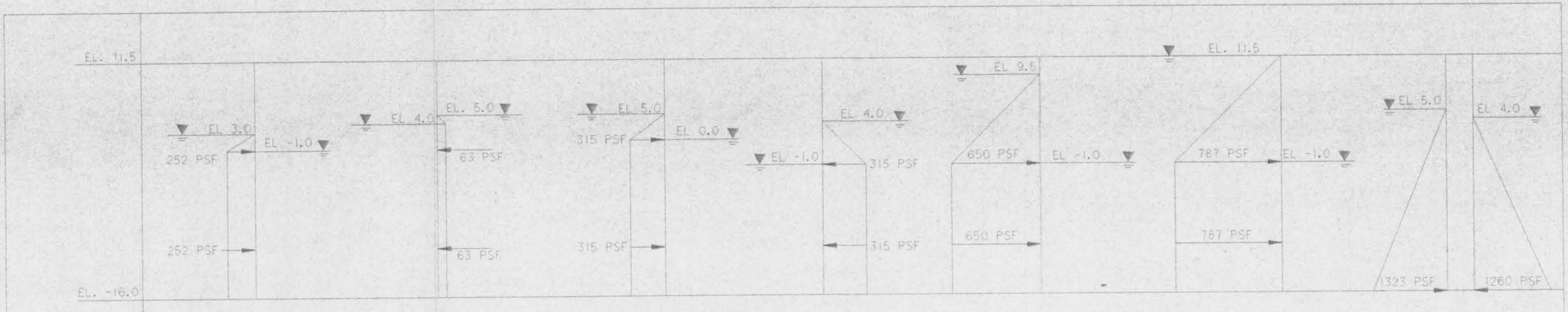
# PILING LAYOUT AND ANALYSIS
## LOAD CASE II - 7

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

DESIGNED BY: CCE
DRAWN BY: JCM
CHECKED BY: MHG
PLOT SCALE: 240
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
CADD FILE: 45223F08.DGN
FILE NO. H-2-45223

GULF SIDE PROTECTED SIDE

TYPICAL ALL CASES




GATE PERCENT OVERSTRESS

| LOAD CASE | II-2 | II-3 | II-4 | II-5 | II-6 | II-7 | II-8 |
|---|---|---|---|---|---|---|---|
| A-1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.33 | --- |
| A-2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | --- | --- |
| A-3 | 1.33 | 1.33 | 1.33 | 1.33 | 1.33 | 1.33 | 1.33 |

A-3 FULL DEAD LOAD OF GATE

A-2 DEAD LOAD + 50% OF THE BUOYANT CHAMBER FLOODED

A-1 4' NEGATIVE BUOYANCE

WATER LOADING DIAGRAMS

NOTES

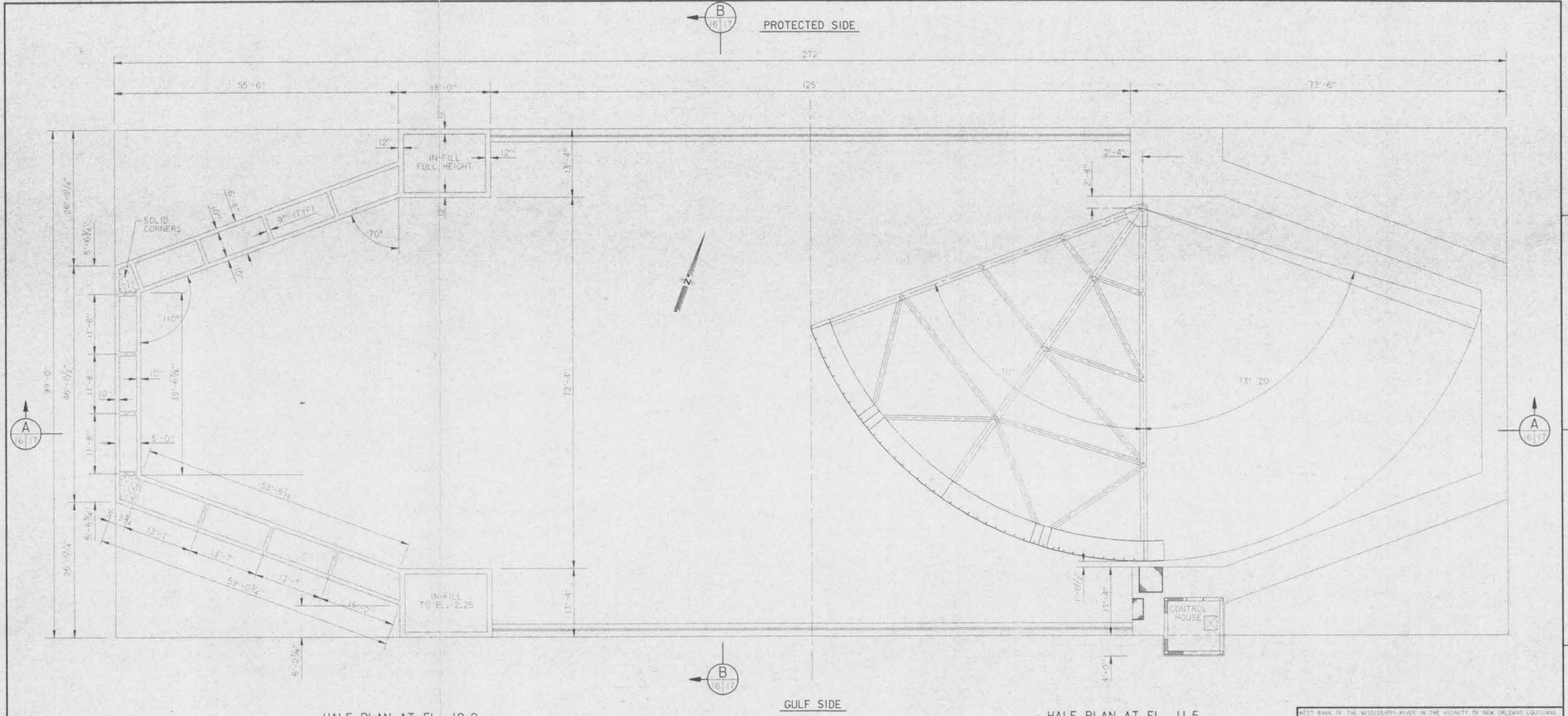
1. LOAD CASE II-2 AND II-3 WERE DEVELOPED FOR THE SECTOR GATE MACHINERY DESIGN.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

WATER LOADING
SECTOR GATE DESIGN

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

DESIGNED BY: MHO
DRAWN BY: CCE
CHECKED BY: CCE
PLOT SCALE: 60
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223




HALF PLAN AT EL. 10.0
SHOWING WALLS

PLAN

HALF PLAN AT EL. 11.5
SHOWING GATE

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

C-A-D

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

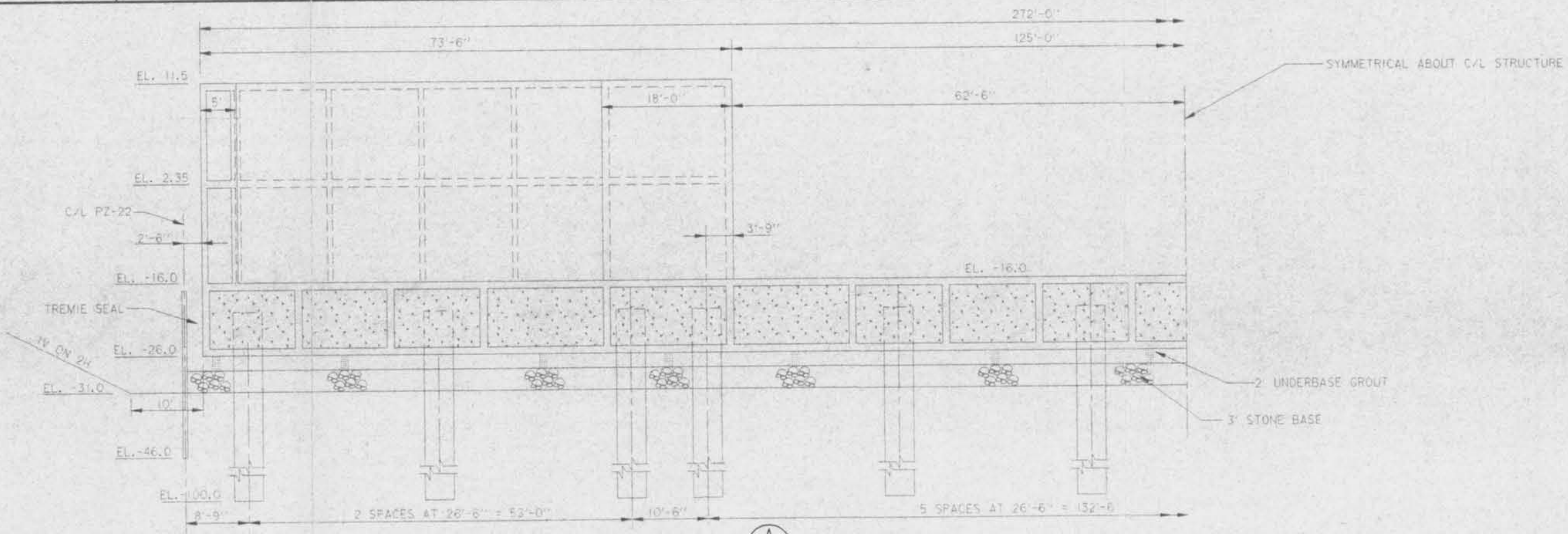
**FEATURE DESIGN MEMORANDUM NO. I**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

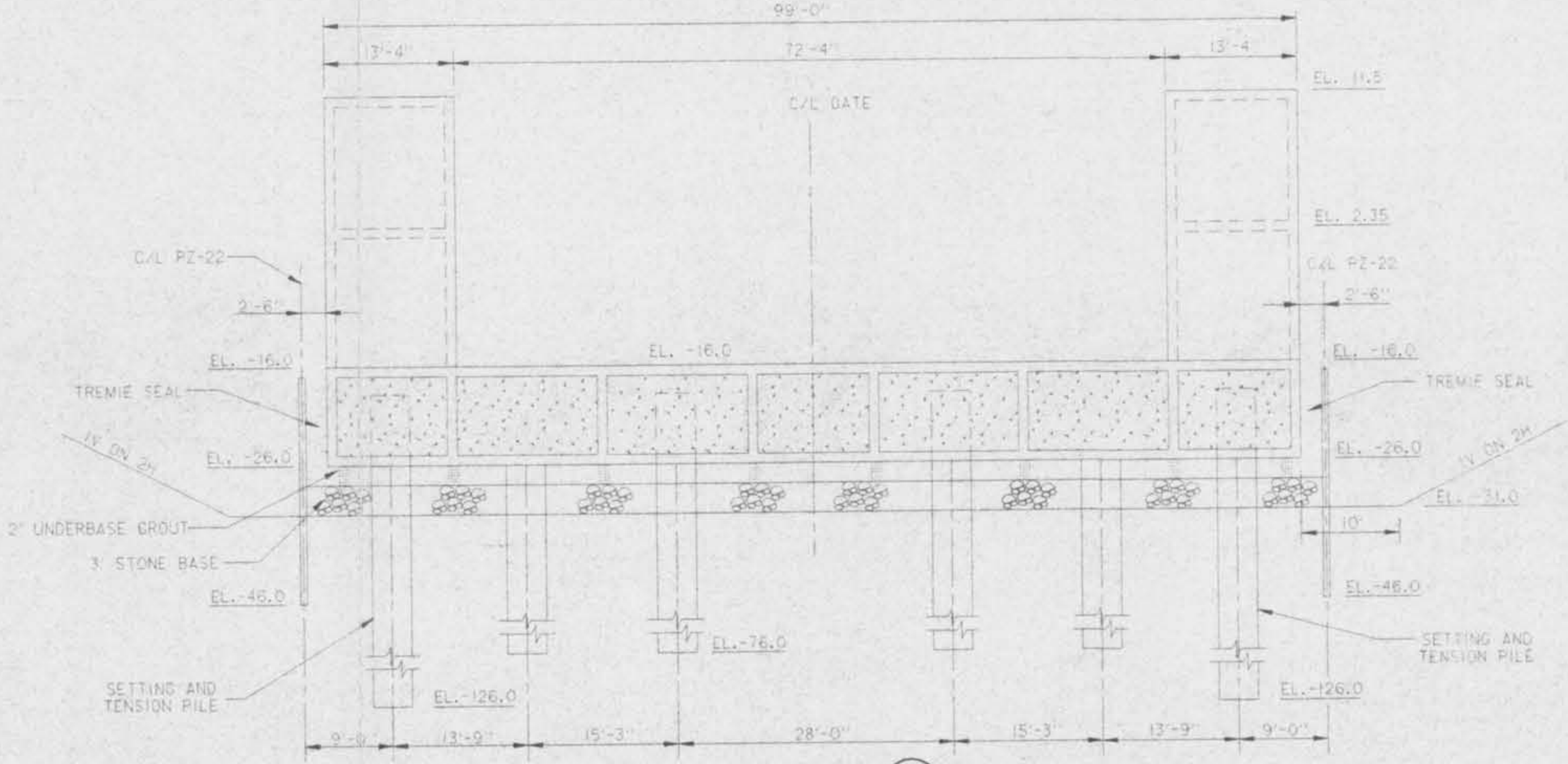
## STRUCTURE - HALF PLAN

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG<br>DRAWN BY: HJH<br>CHECKED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F/S.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




SECTION A 16/17




SECTION B 16/17

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

0 5' 10' 15' 20' 25'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

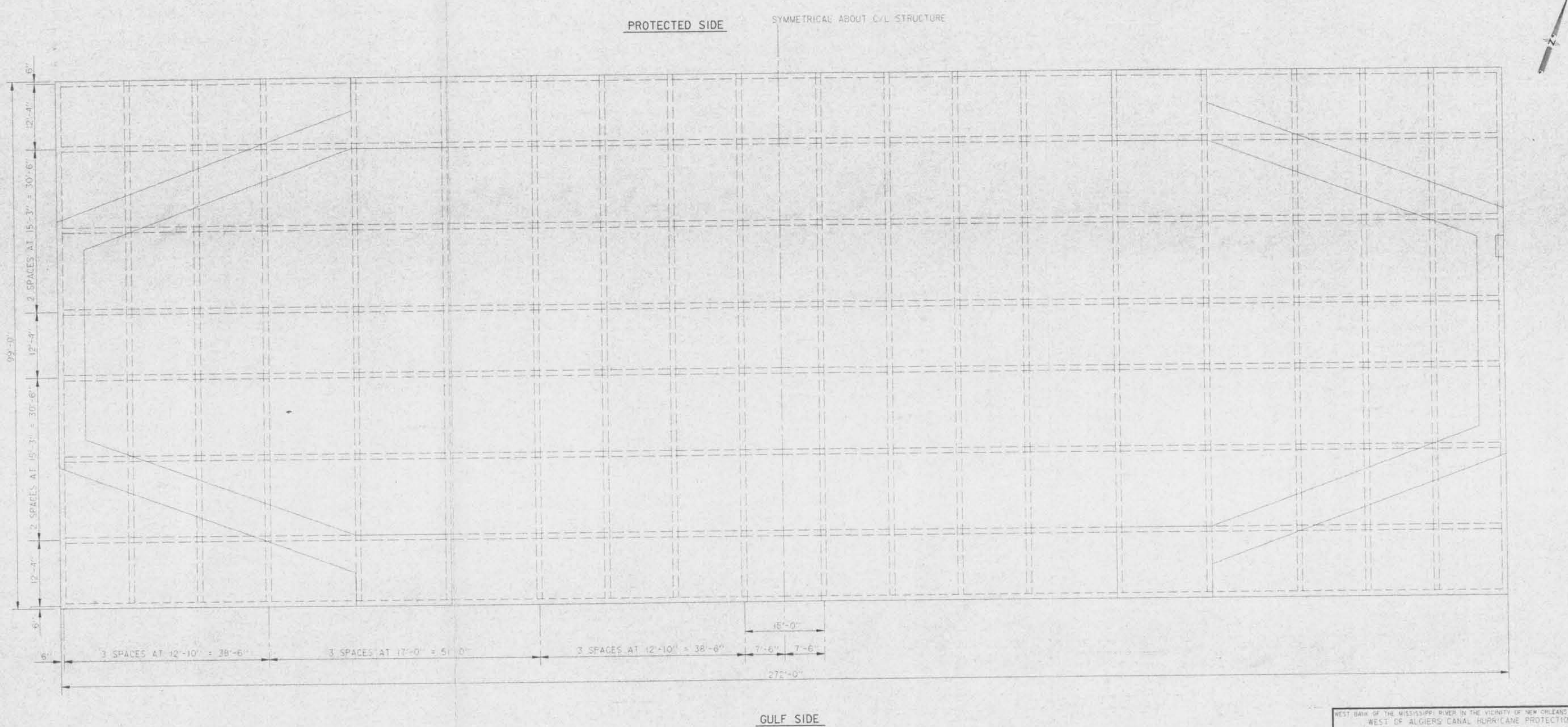
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## STRUCTURE - SECTIONS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG<br>DRAWN BY: JCM<br>CHECKED BY: DEE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223E34.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




PLAN

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

0 5' 10' 15' 20' 25'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

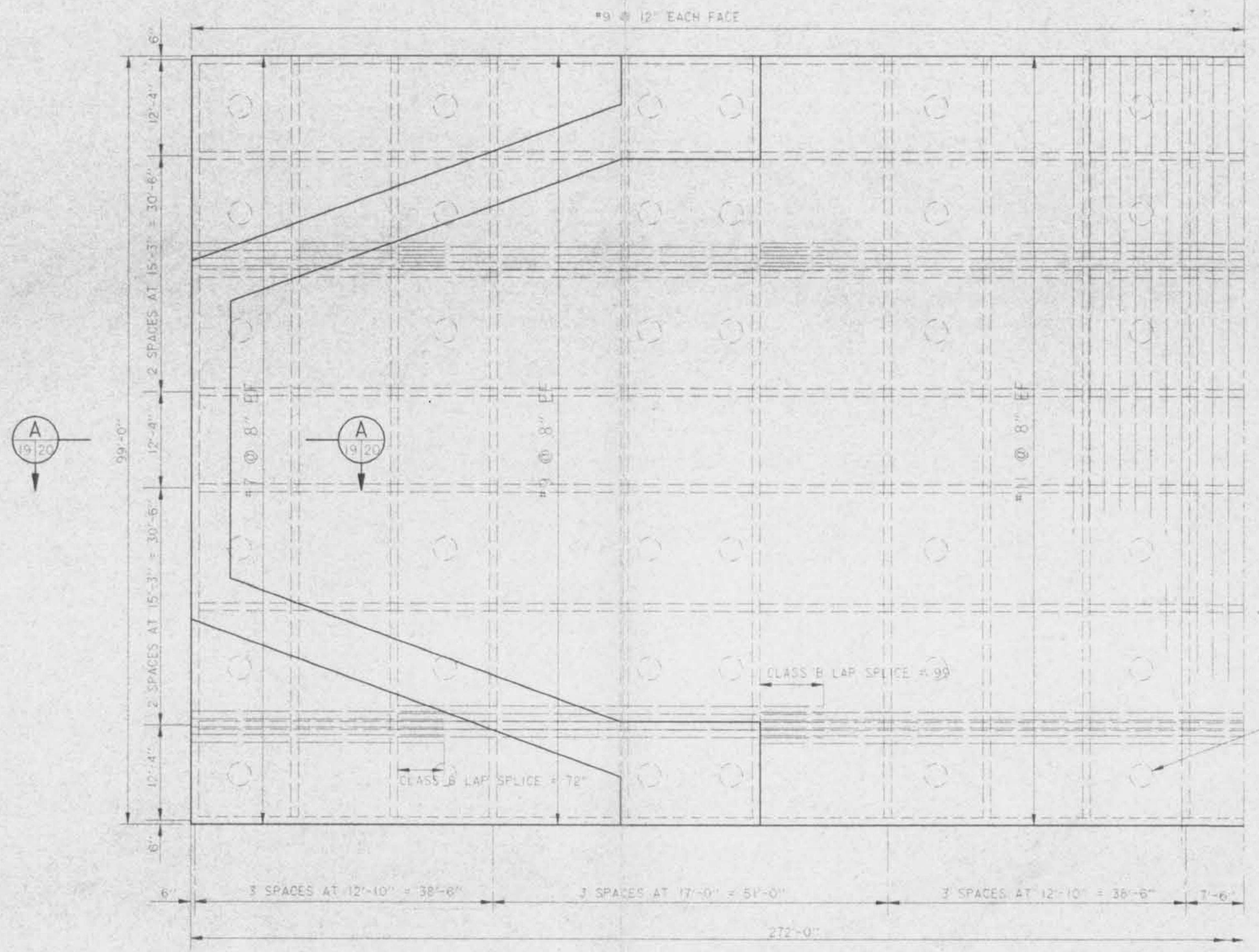
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STRUCTURE - BASE PLAN

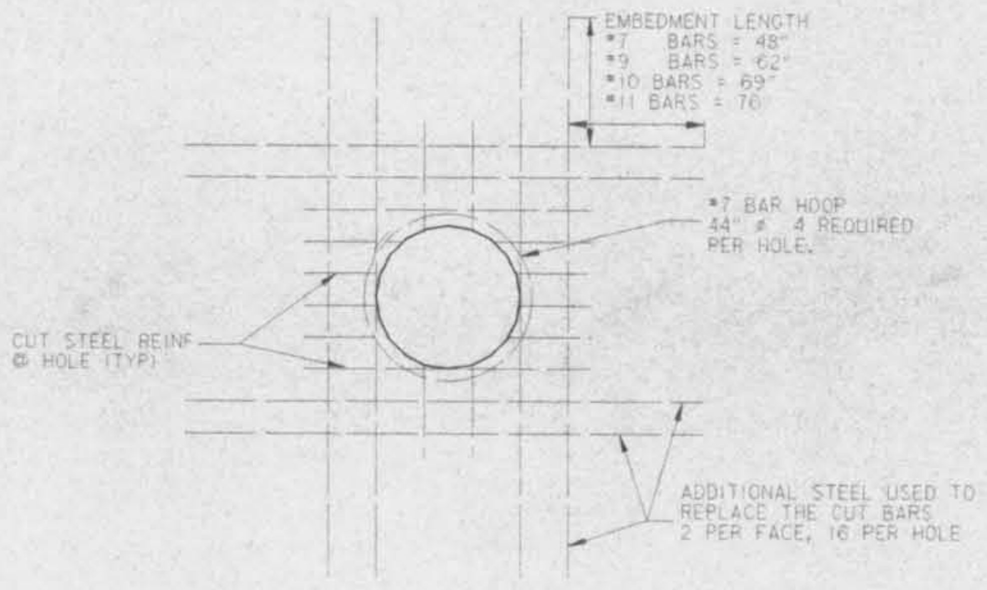
**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG<br>DRAWN BY: HJH<br>CHECKED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F13.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




BOTTOM SLAB REINFORCEMENT

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




TYPICAL PILE SLEEVE HOLE REINFORCEMENT DETAIL

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

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

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

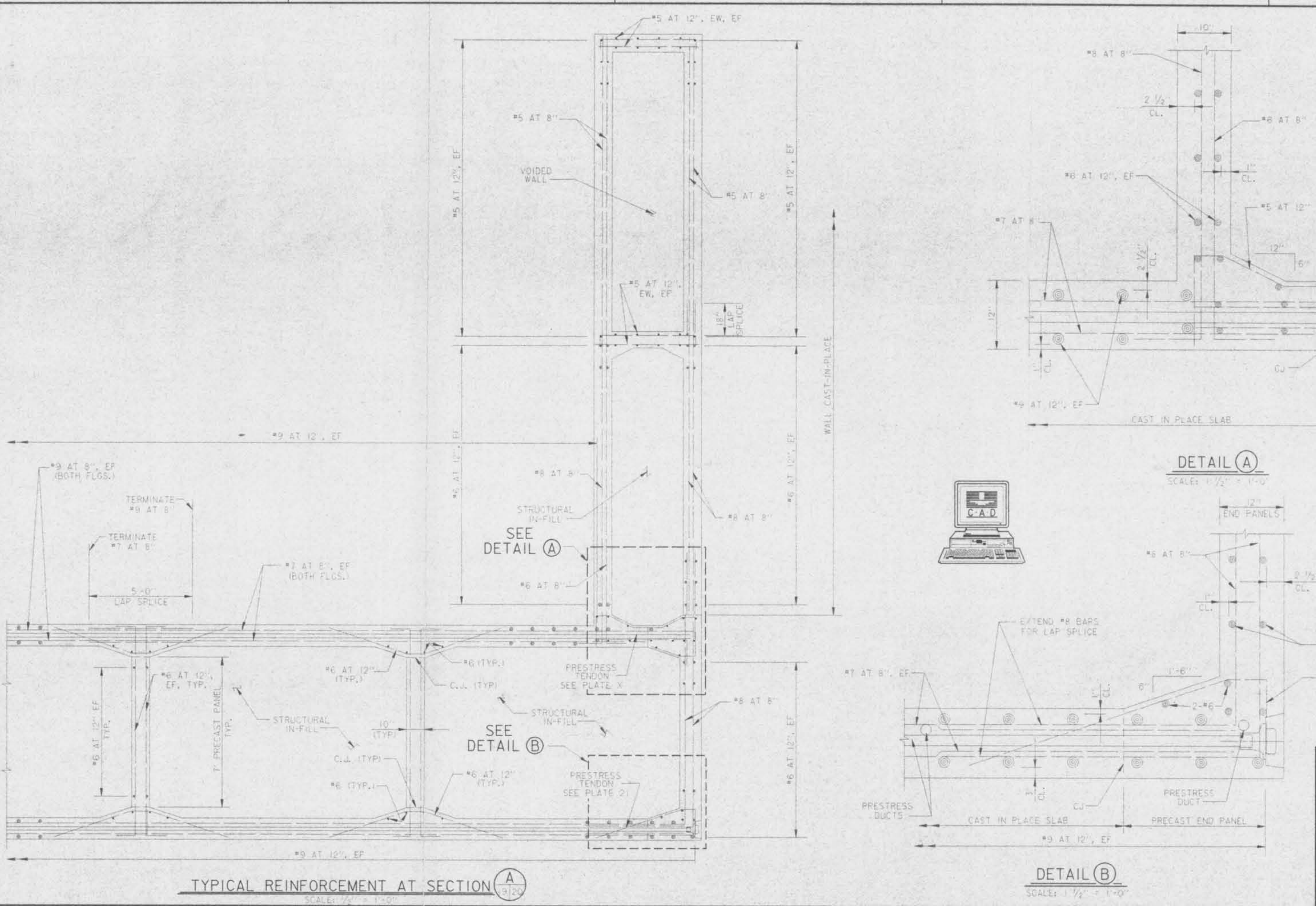
FEATURE DESIGN MEMORANDUM NO. 1

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

STRUCTURE
BASE REINFORCEMENT

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

DESIGNED BY: MHG
DRAWN BY: CCE
CHECKED BY: MHG
PLOT SCALE: 96
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
CADD FILE: 45223P04.DGN
FILE NO. H-2-45223




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

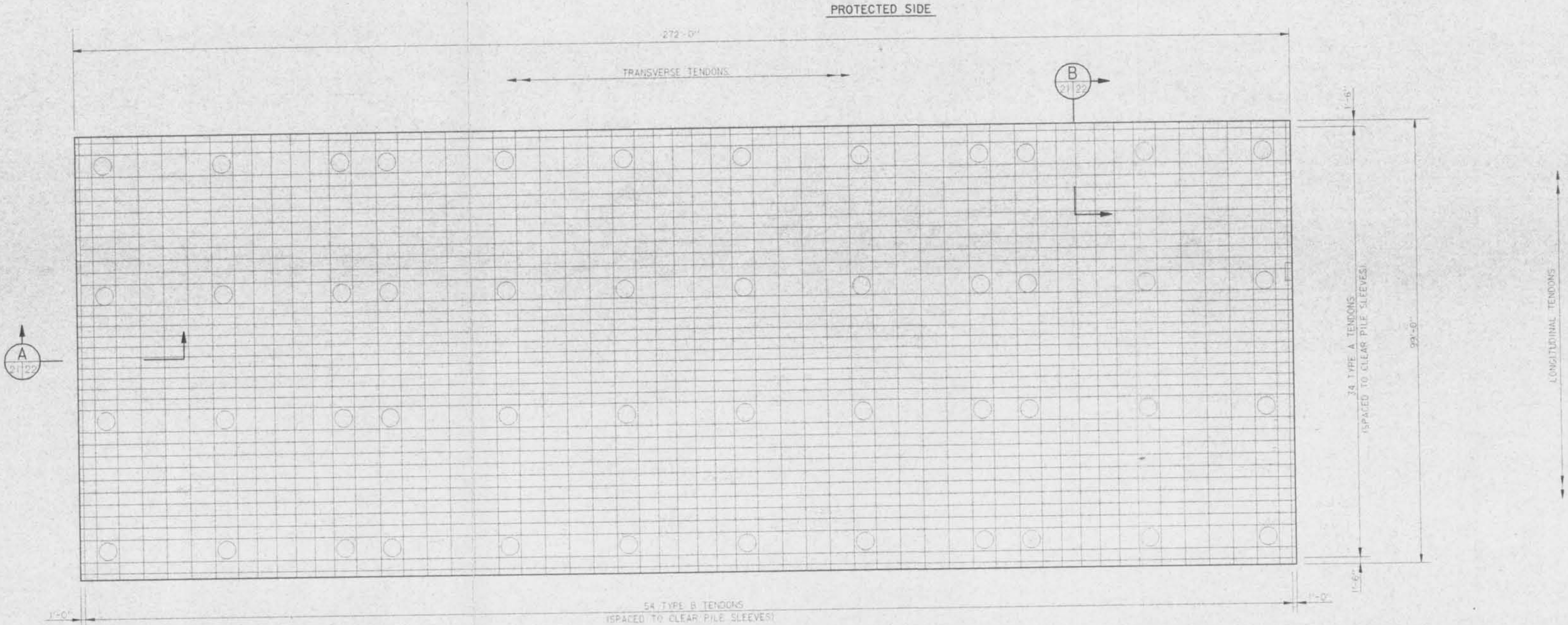
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## STRUCTURE
## TYPICAL REINFORCEMENT

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHC | PLOT SCALE: 24 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P05.DGN |
| DRAWN BY: JCM | | | FILE NO. H-2-45223 |
| CHECKED BY: CCE | DATE: 2/2/2000 | | |




## BASE POST TENSION TENDON LAYOUT

(BOTTOM SLAB SHOWN, TOP SLAB SIMILAR)
SCALE: 1/32 " = 1'-0"

## PRESTRESSING NOTES:

1. PRESTRESSING STEEL SHALL BE SEVEN-WIRE LOW RELAXATION STRANDS MANUFACTURED ACCORDING TO ASTM A415, GRADE 270.
2. MINIMUM COMPRESSIVE STRENGTH OF BOTTOM SLAB CONCRETE SHALL BE 4,000 PSI AT TIME OF PRESTRESSING.
3. PRESTRESS TENDONS:
   TYPE A 5-0.6" Ø STRAND AREA = 1.035"
   TYPE B 3-0.6" Ø STRAND AREA = 0.65"
4. PRESTRESS DESIGN ASSUMPTION:
   WOBBLE COEFFICIENT K/FT = 0.0002
   CURVATURE COEFFICIENT = 0.25
   ANCHOR SET = 1/4 INCH
5. CONTRACTOR IS TO PROPOSE PRESTRESS SEQUENCE FOR APPROVAL. THE MAXIMUM ECCENTRIC FORCE INDUCED BY THE PROPOSED PRESTRESS SEQUENCE SHALL BE NO MORE THAN THE ECCENTRIC FORCE INDUCED BY THE FOLLOWING PRESTRESS SEQUENCE:
   "PRESTRESS EVERY SECOND TENDON FROM ONE END TO THE OTHER END, FOLLOWED BY A SECOND PASS TO PRESTRESS THE REMAING TENDONS."
6. ALL LONGITUDINAL TENDONS SHALL BE RE-STRESSED FROM THE OPPOSITE END. AFTER INITIAL STRESSING AND ANCHOR SEATING.
7. TENDONS SHALL BE FULLY GROUTED IN ROUND DUCTS MADE OF STEEL.

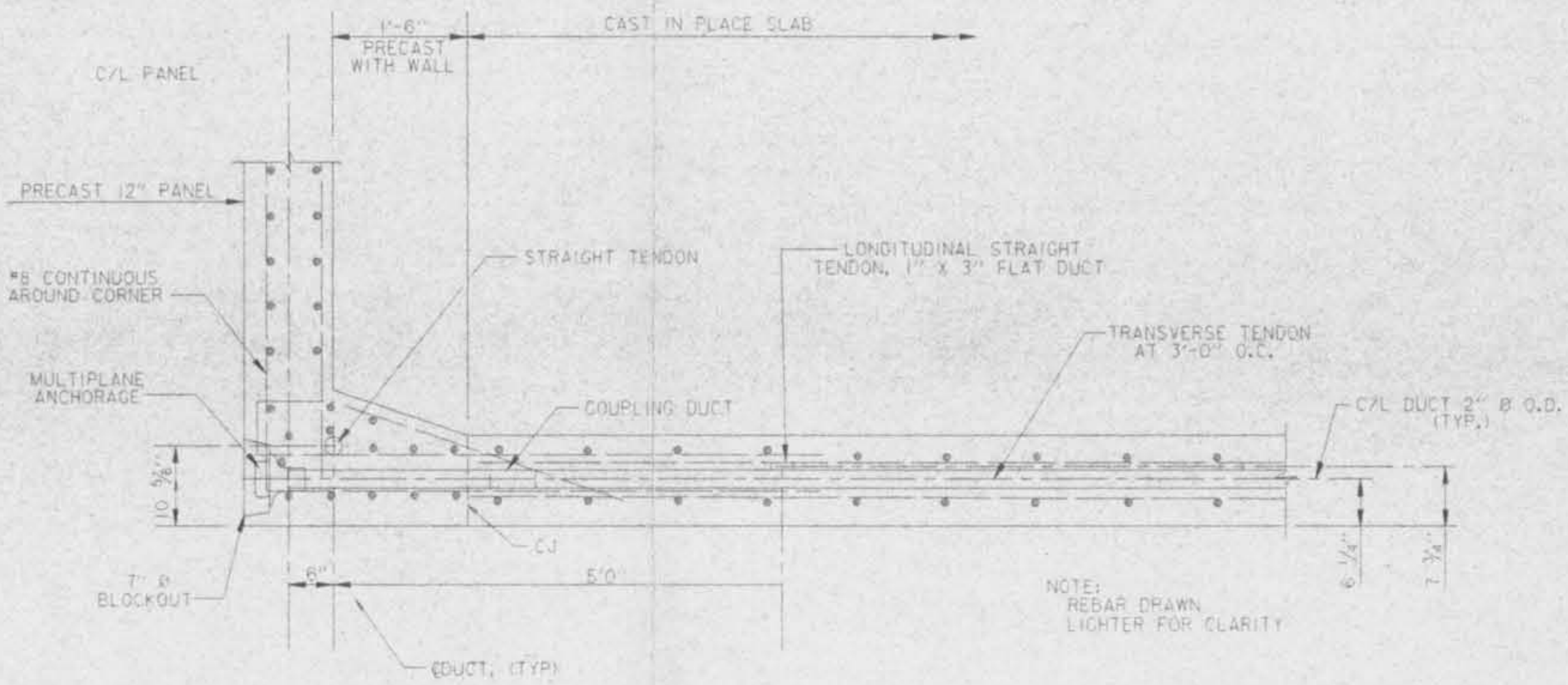
SCALE: 1/32 " = 1'-0"
0 5' 10' 20' 30' 40'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

BASE POST TENSIONING LAYOUT

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHD<br>DRAWN BY: JCM<br>CHECKED BY: CCE | PLOT SCALE: 128 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223f24.dgn |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |



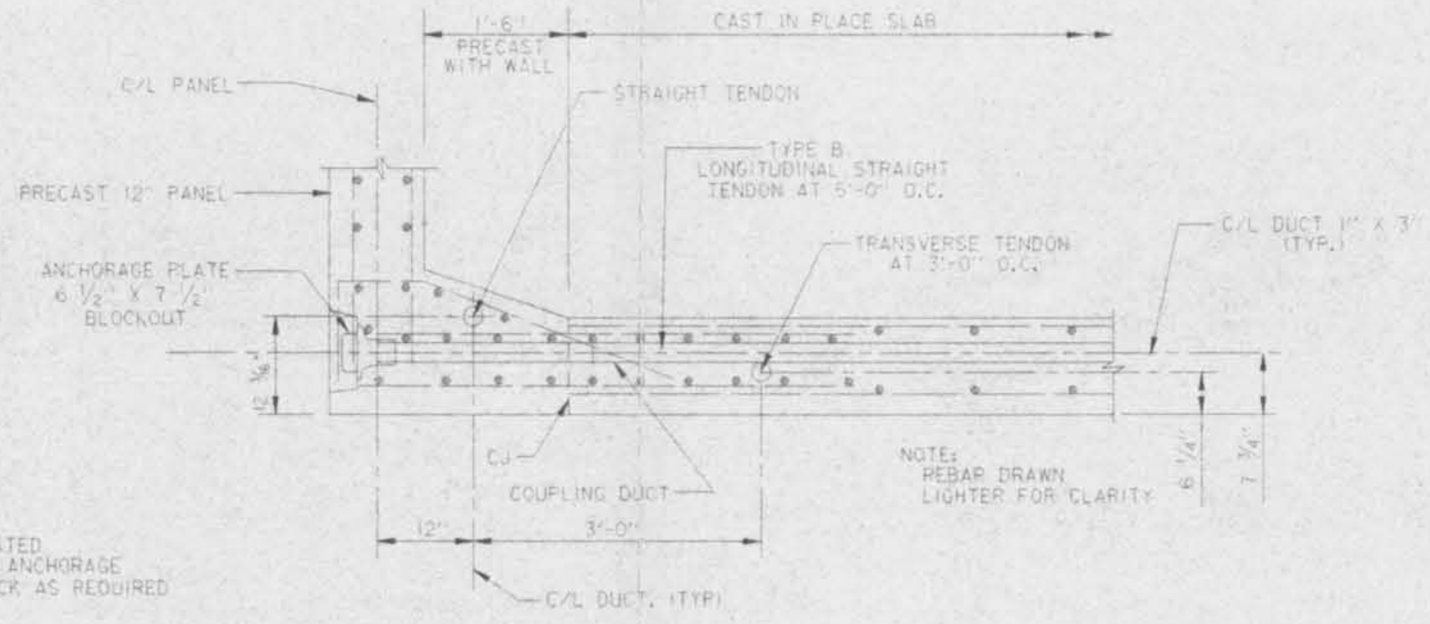

NOTE:
REBAR MAY BE RELOCATED
TO ACCOMMODATE THE ANCHORAGE
AND POST-TENSION JACK AS REQUIRED

BOTTOM SLAB - POST- TENSIONING - STRESSING END

SECTION A (21/22)

SCALE: 1"=1'-0"

NOTES:
FOR TENDON SPECIFICATIONS AND LAYOUT, SEE PLATE 21




NOTE:
REBAR MAY BE RELOCATED
TO ACCOMMODATE THE ANCHORAGE
AND POST-TENSION JACK AS REQUIRED

BOTTOM SLAB - POST- TENSIONING

SECTION B (21/22)

SCALE: 1"=1'-0"

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

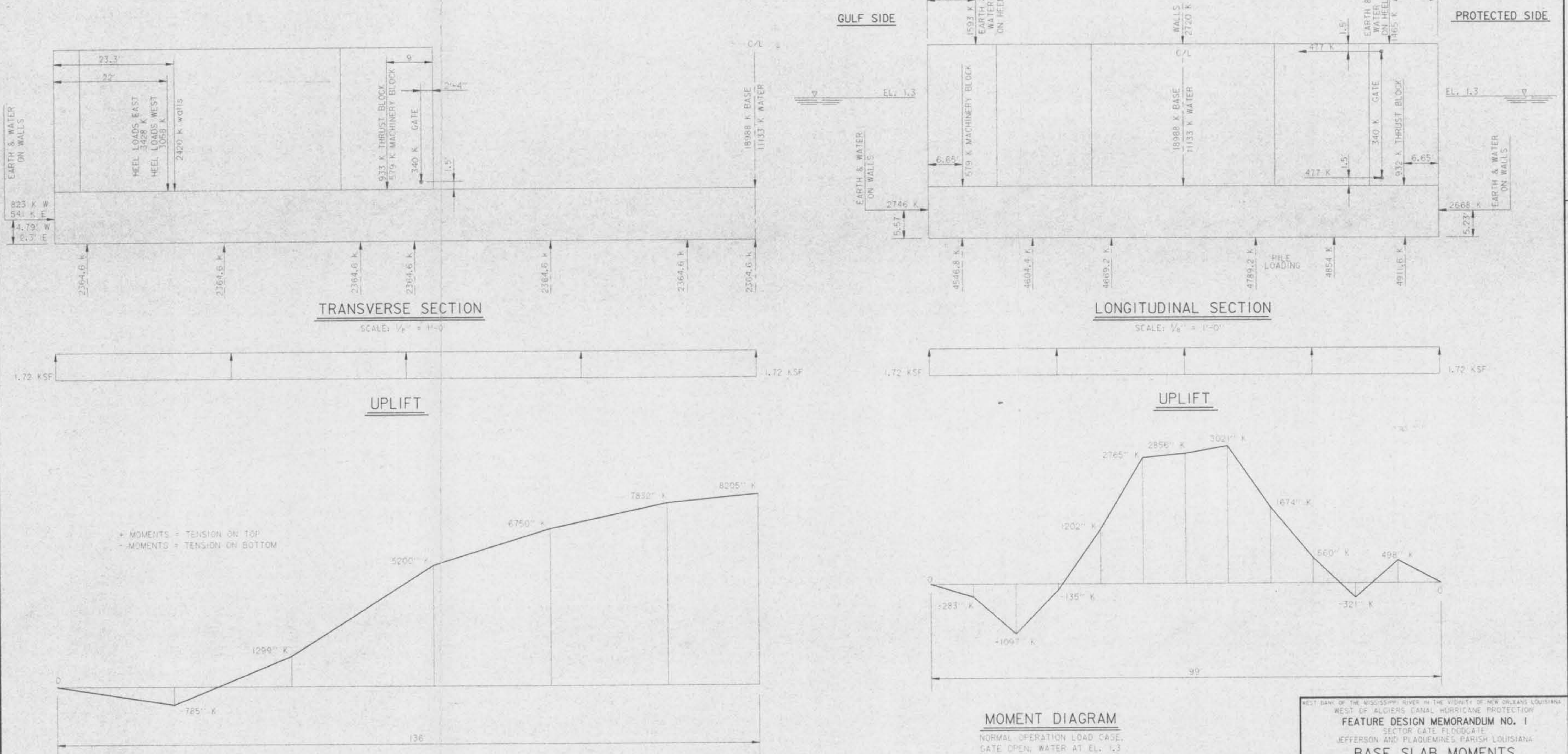
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# BASE POST TENSIONING DETAILS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHC | PLOT SCALE: 12 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223f23.dgn |
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: CCE | | | |




## MOMENT DIAGRAM

THE CENTROID OF THE LOADS ARE SHOWN ON THIS PLATE. FOR THE ACTUAL LOAD DISTRIBUTION SEE CALCULATIONS.

## MOMENT DIAGRAM

NORMAL OPERATION LOAD CASE. GATE OPEN; WATER AT EL. 1.3

NOTES:

MOMENTS SHOWN ARE FOR A ONE FOOT STRIP.

LOADS SHOWN ARE FOR HALF THE STRUCTURE EXCEPT FOR THE EARTH AND WATER LOADS ACTING ON WALL AND THE PILES. THEY ARE FOR THE FULL STRUCTURE.

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

0 5' 10' 15' 20' 25'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

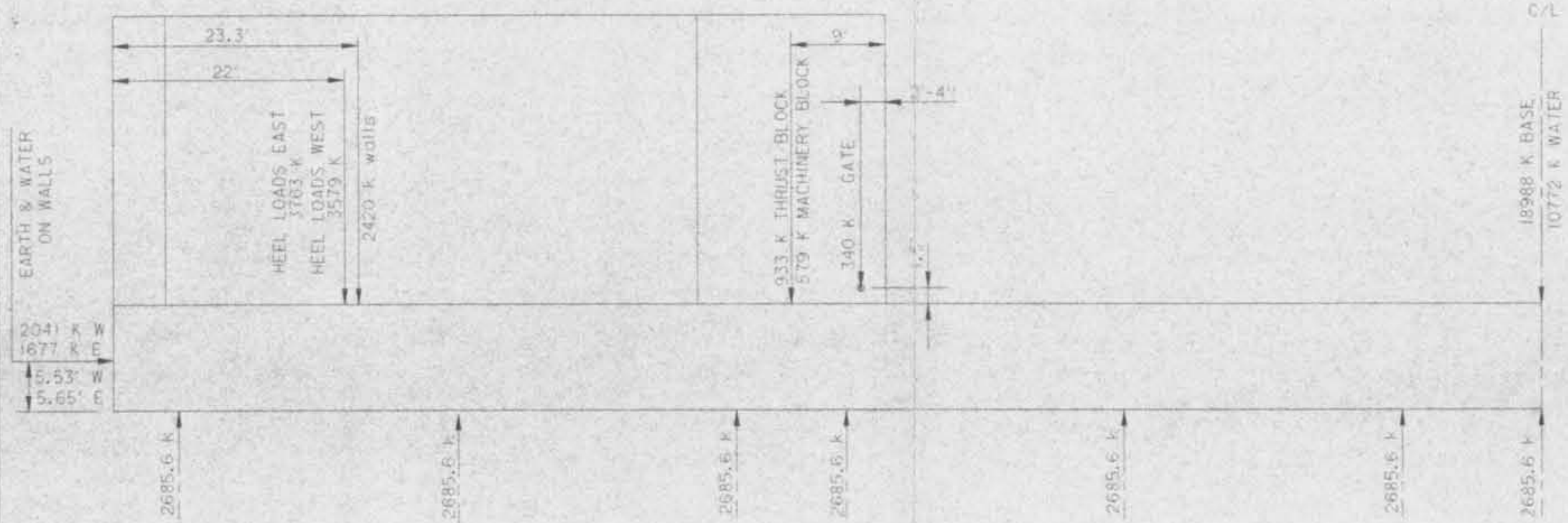
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# BASE SLAB MOMENTS NORMAL OPERATION

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F23.DGN |
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHS | | | |

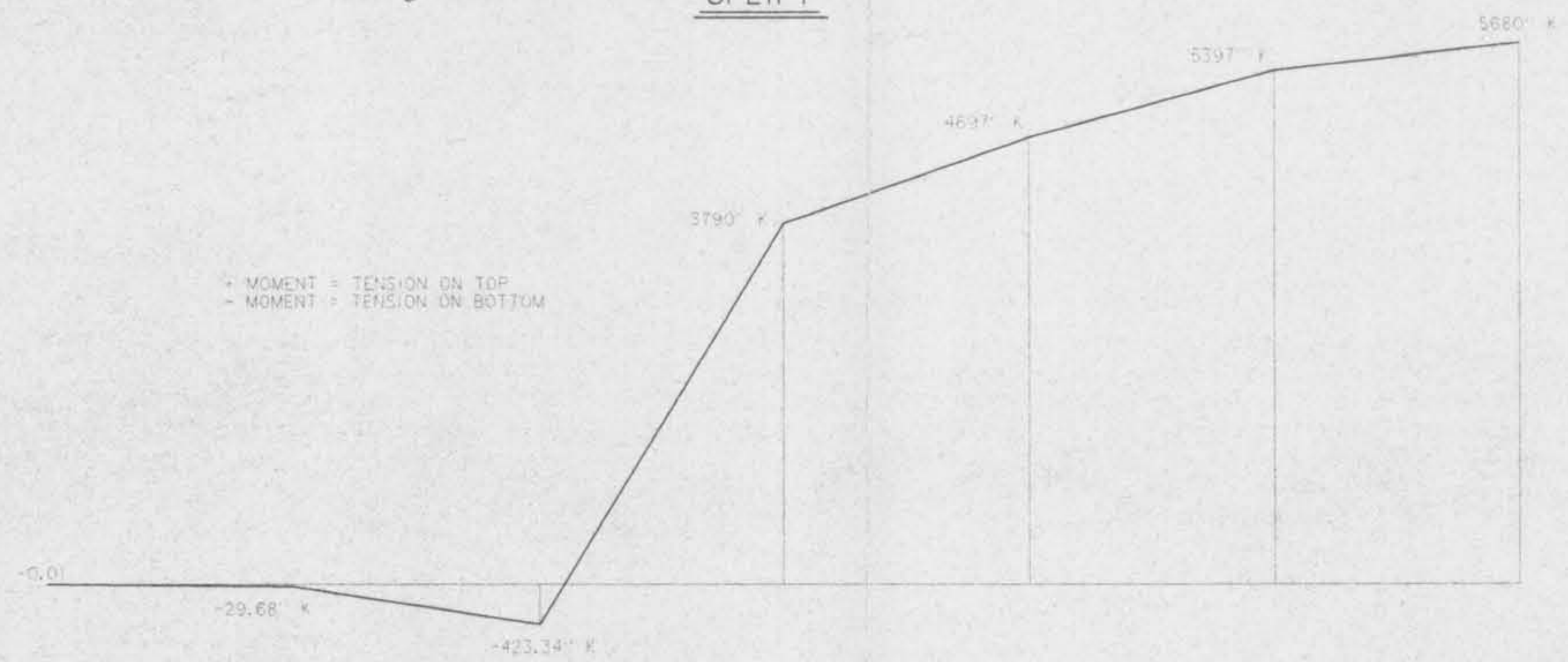
PLATE 23




## TRANSVERSE SECTION

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


## UPLIFT



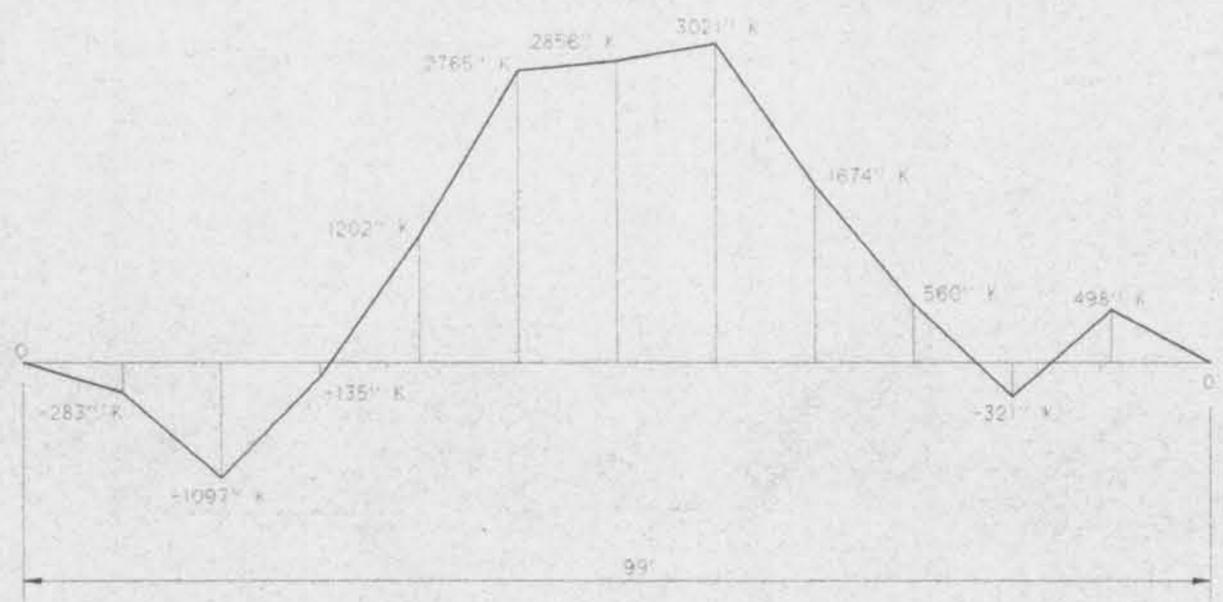

## MOMENT DIAGRAM

THE CENTROID OF THE LOADS ARE SHOWN ON THIS PLATE FOR THE ACTUAL LOAD DISTRIBUTION. SEE CALCULATIONS.


## LONGITUDINAL SECTION

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


## UPLIFT




## MOMENT DIAGRAM

HURRICANE LOAD CASE,
GATE CLOSED, WATER AT EL. -1.0 PROTECTED SIDE,
EL. 9.5 GULF SIDE

NOTES:

MOMENTS SHOWN ARE FOR A ONE FOOT STRIP.

LOADS SHOWN ARE FOR HALF THE STRUCTURE EXCEPT FOR THE EARTH AND WATER LOADS ACTING ON WALL AND THE PILES. THEY ARE FOR THE FULL STRUCTURE.

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

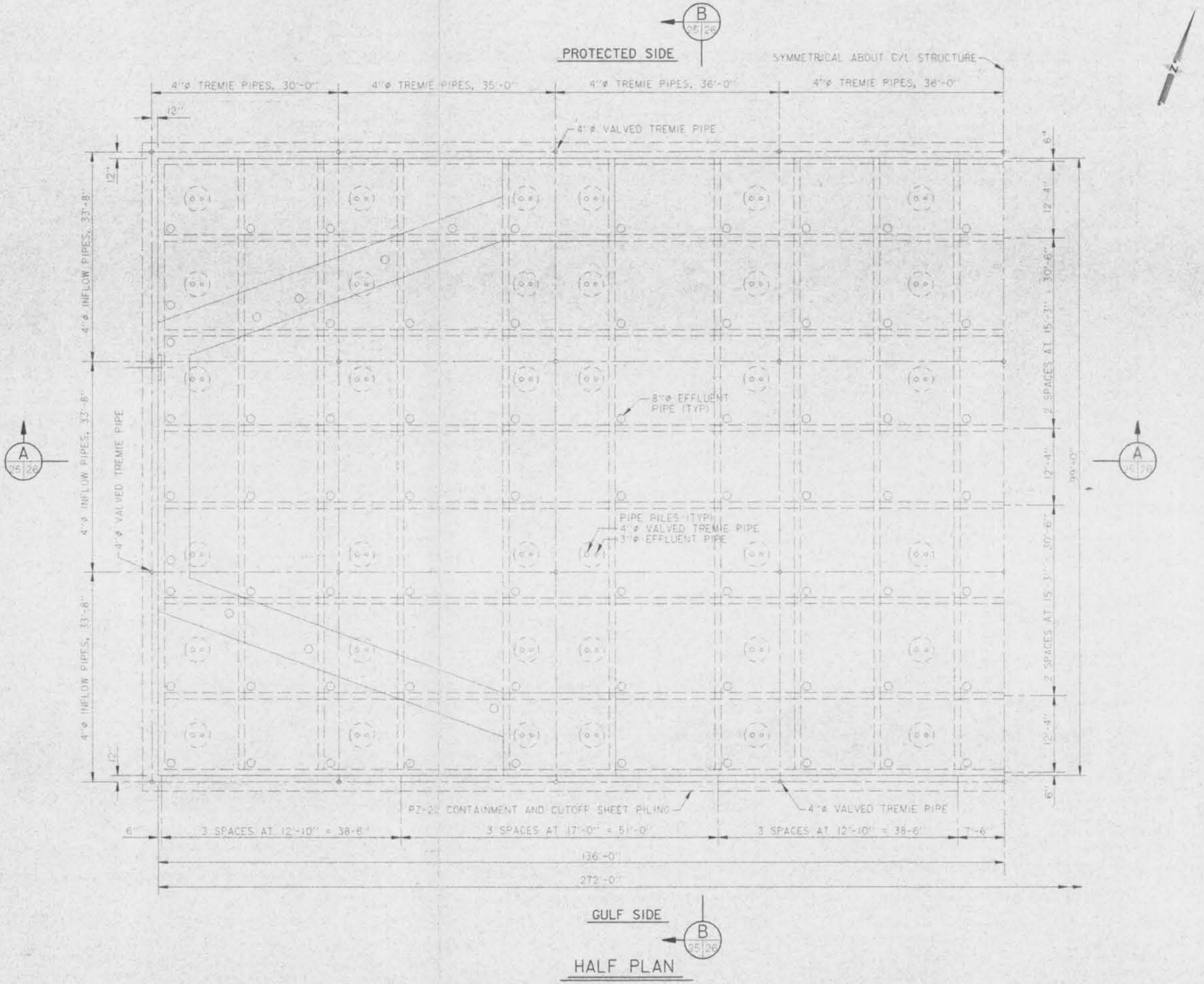
0 5' 10' 15' 20' 25'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# BASE SLAB MOMENTS HURRICANE LOAD CASE

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F20.DGN |
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHG | | | |




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

0 5' 10' 15' 20' 25'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

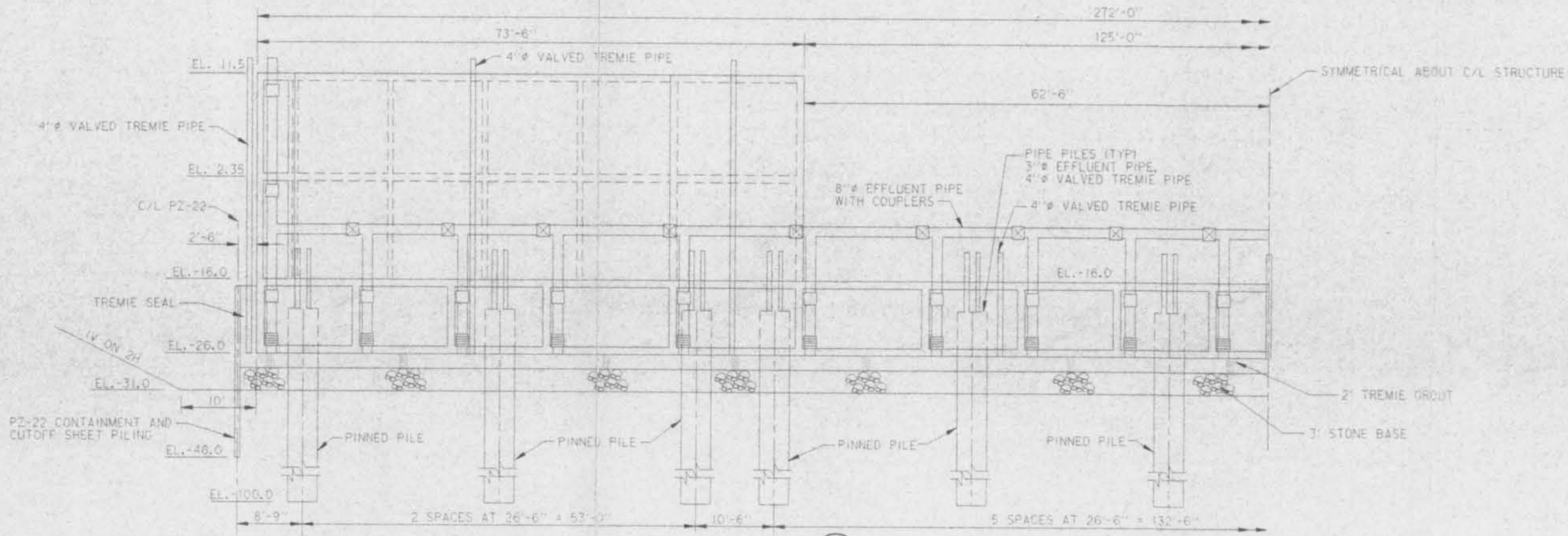
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE STRUCTURE
## TREMIE PIPING LAYOUT

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

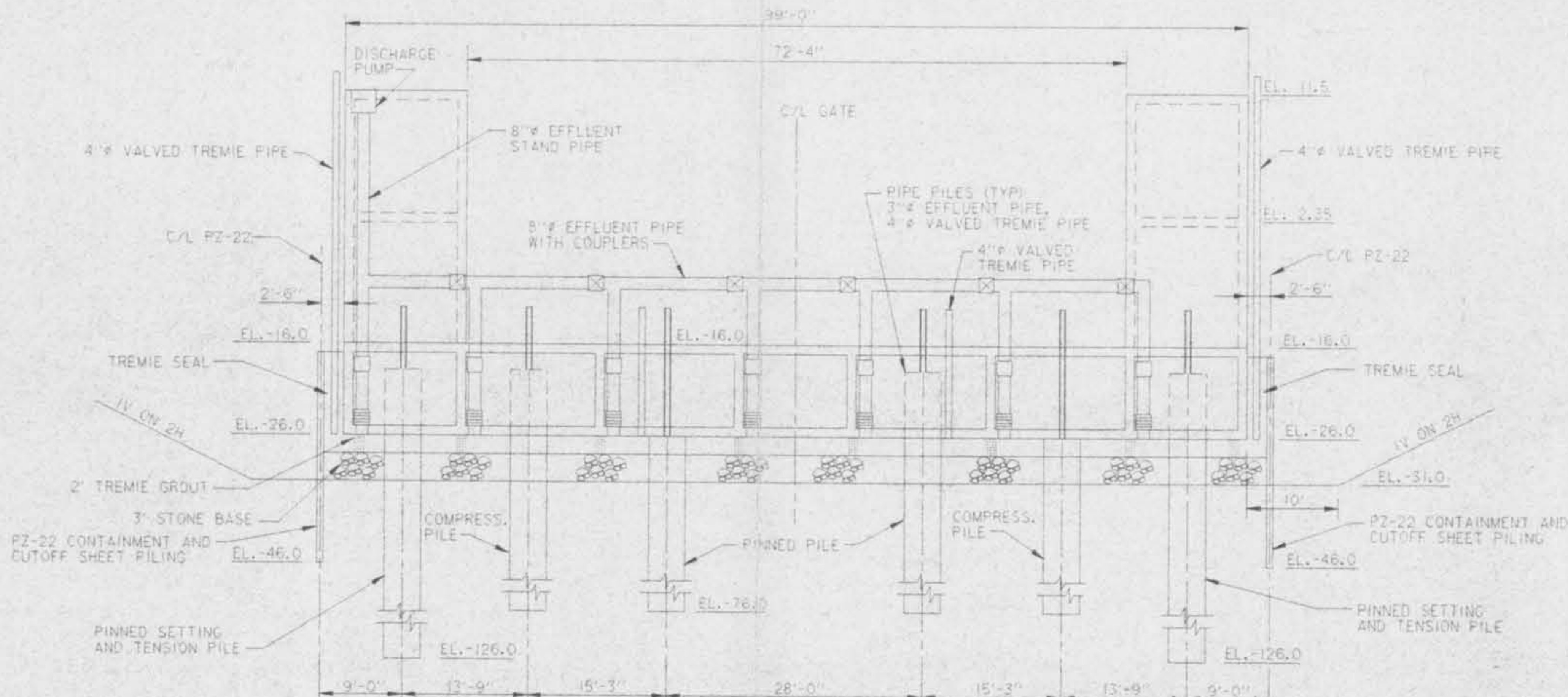
| | | | |
|---|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B02.DGN |
| DRAWN BY: HJH | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: CCE | | | |




SECTION A 25|26

## LEGEND

- ☒ DENOTES VALVE
- ☐ DENOTES COUPLER
- ▤ DENOTES CLEAR INSPECTION COUPLER




SECTION B 25|26

## PIPING SYSTEM

1. PIPING SYSTEM SHALL BE INSTALLED AT THE GRAVING SITE. EACH PIPE SHALL BE VALVED.
2. ALL PIPING SHALL BE SCHEDULED 40 STEEL PIPE.
3. EACH PILE SHALL HAVE A SEPERATE GROUT TUBE THAT EXTENDS INTO THE PILE CENTER. ANCHOR AND GROUT PLACEMENT CAN BE ACCOMPLISHED IMMEDIATELY AFTER SETTING.
4. DELIVERY PIPING SHALL BE CONNECTED TO THE VALVED 4"ø PIPES. CONCRETE PLACEMENT SHALL BE VERIFIED BY VOLUME CHECKS AND INSPECTING MATERIAL FLOW THROUGH THE CLEAR COUPLER IN THE 8"ø EFFLUENT PIPE.
5. ONCE TREMIE OPERATION IS COMPLETED, THE 8"ø EFFLUENT PIPE SHALL BE UNCOUPLED AND USED TO PLACE BALLAST CONCRETE.

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

0 5 10' 15 20' 25

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

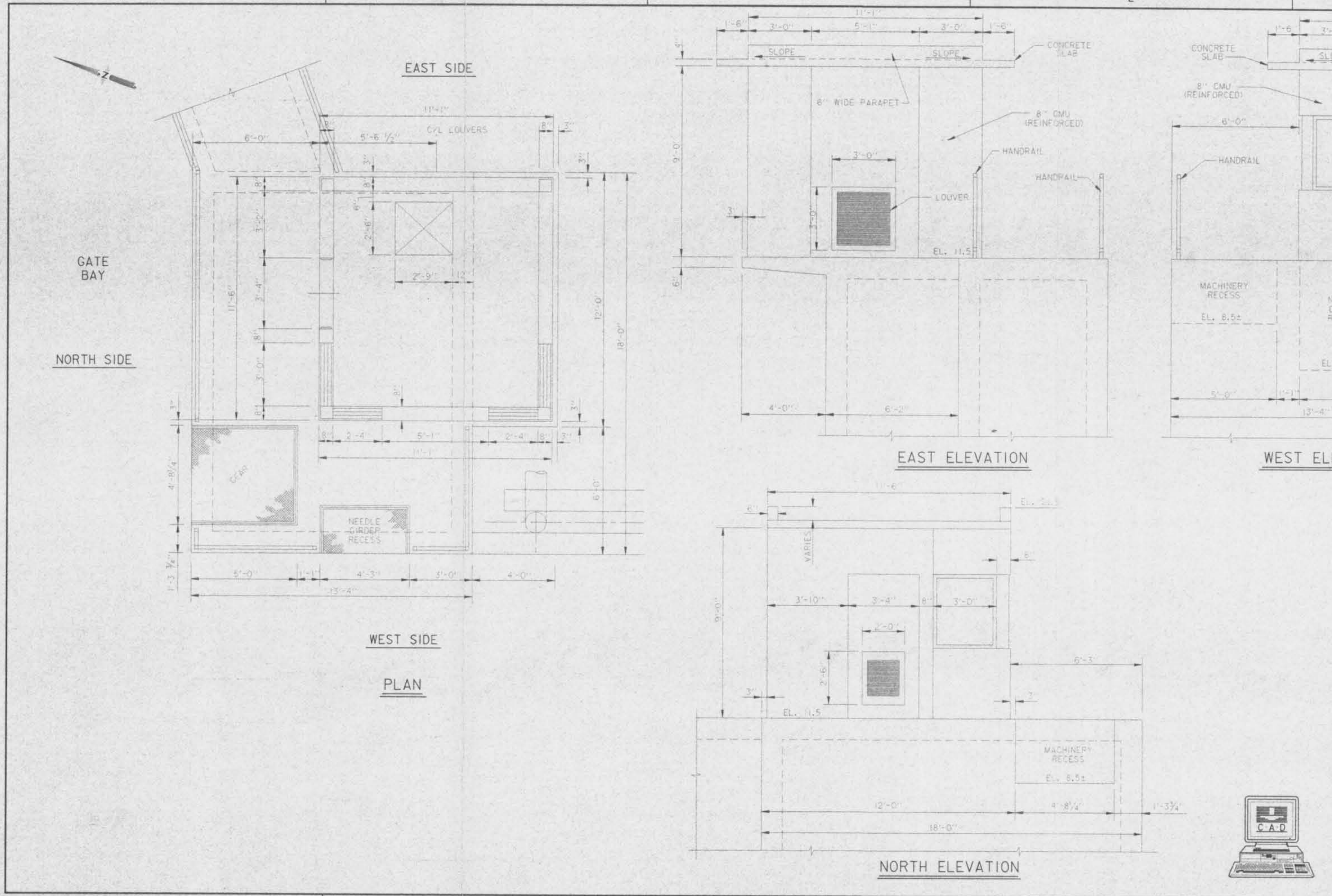
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE STRUCTURE
## TREMIE PIPING SECTIONS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P01.DGN |
| DRAWN BY: HJH | | | FILE NO. |
| CHECKED BY: CCE | DATE: 2/2/2000 | | H-2-45223 |

PLATE 26

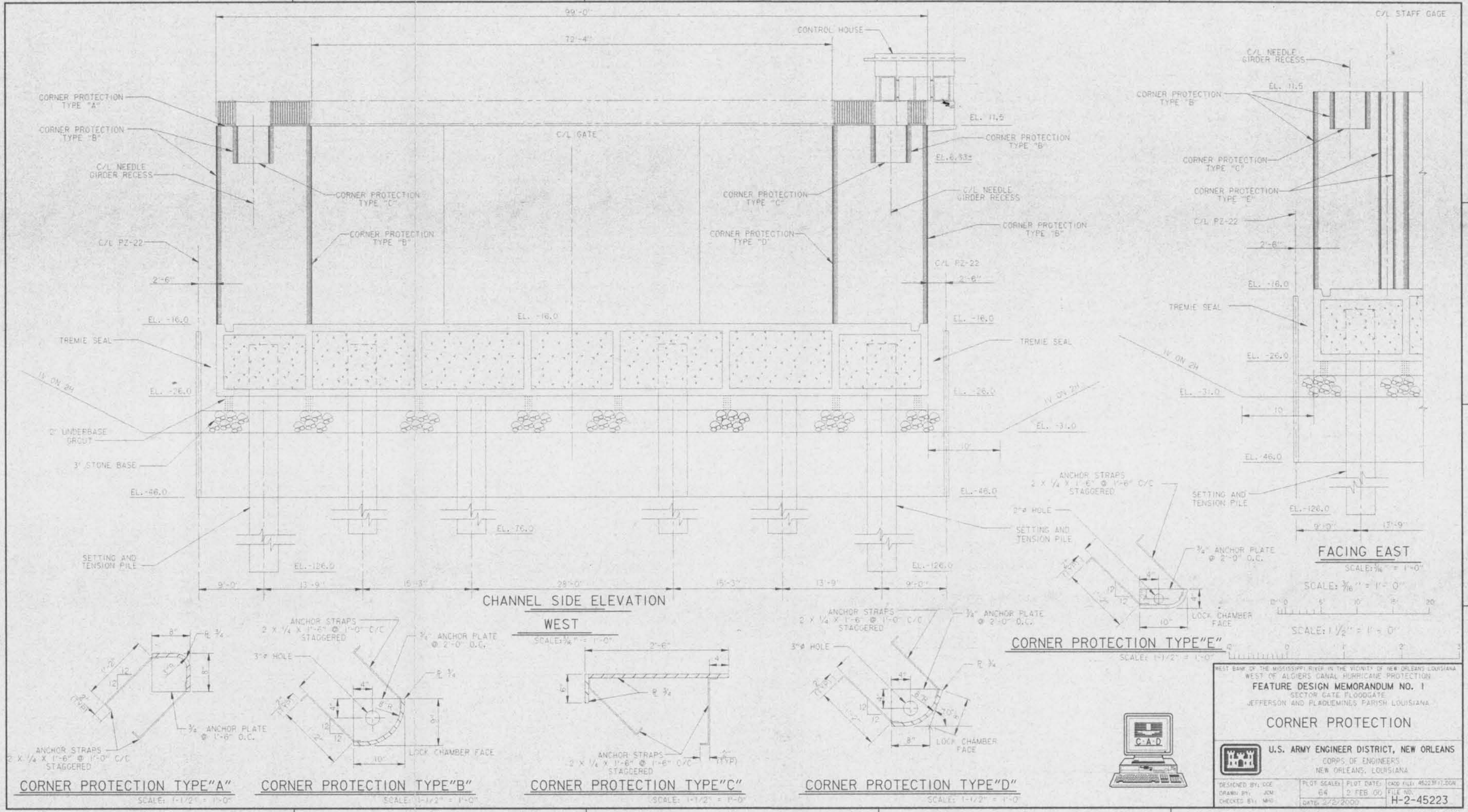


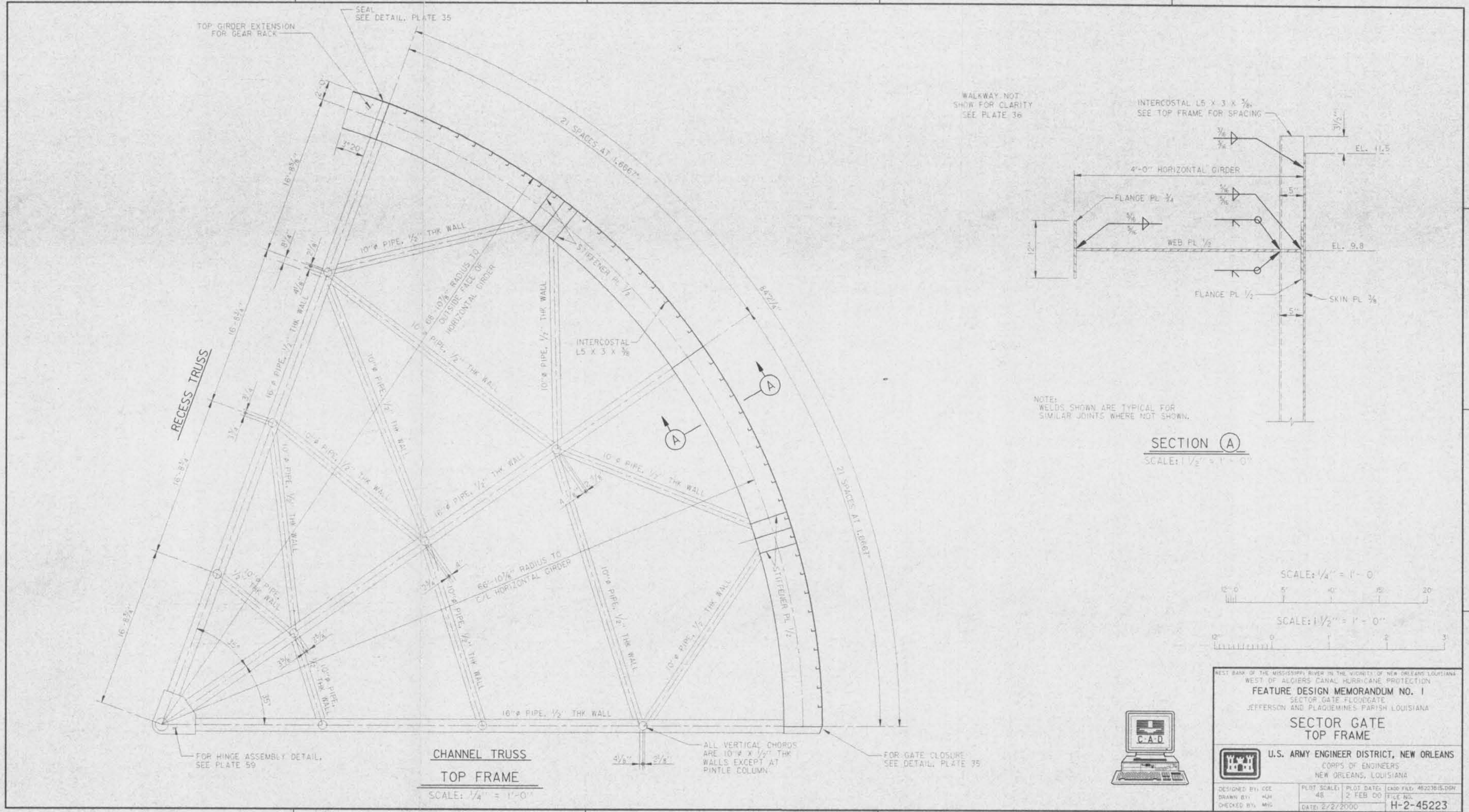

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

CONTROL HOUSE

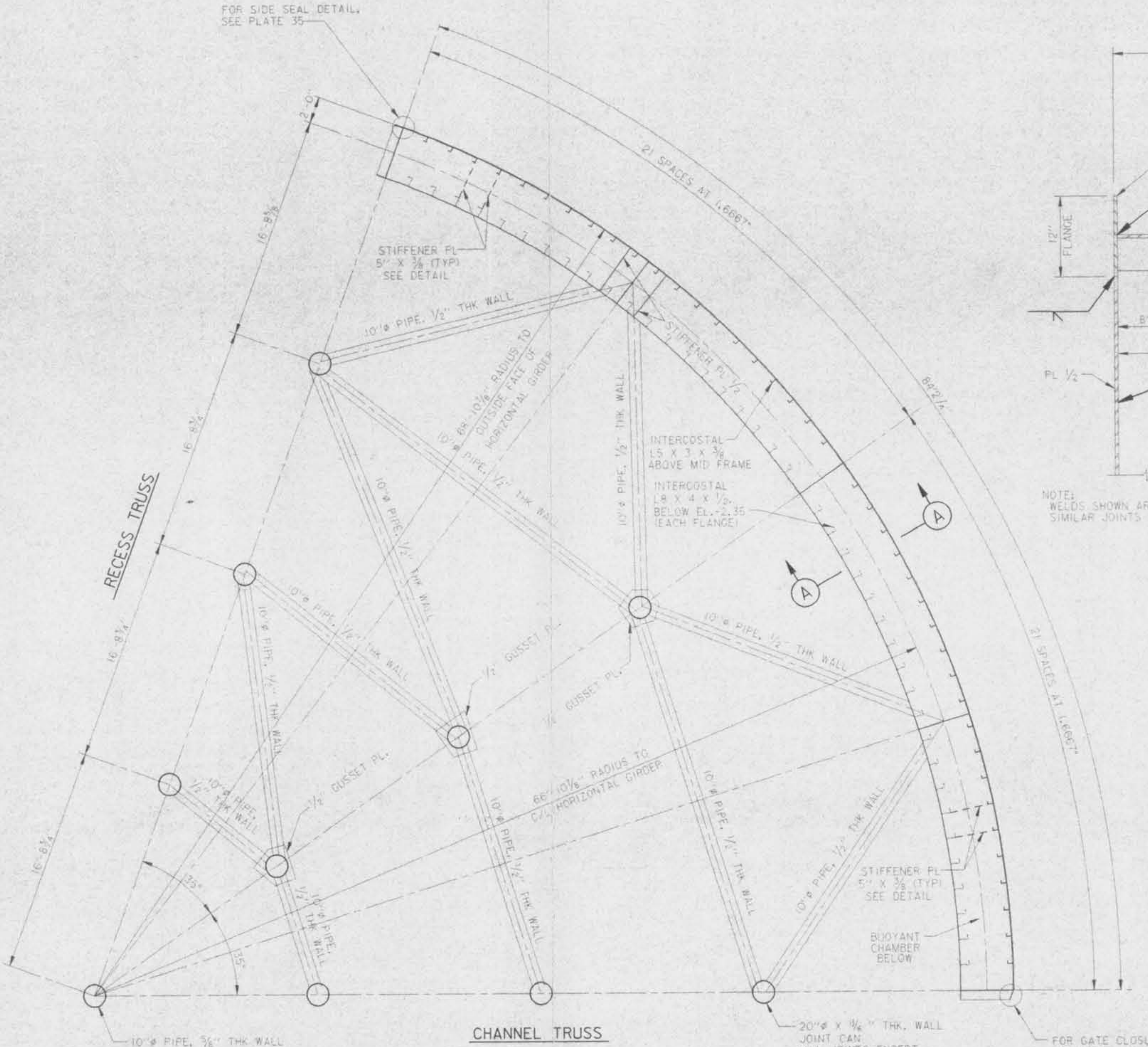
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: MHG
DRAWN BY: JCM
CHECKED BY: DDS
PLOT SCALE: 24
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223


CHANNEL SIDE ELEVATION
WEST
SCALE: 3/16" = 1'-0"
99'-0"
72'-4"
CONTROL HOUSE
C/L GATE
EL. 11.5
EL. 6.83±
EL. -16.0
EL. -26.0
EL. -31.0
EL. -46.0
EL. -76.0
EL. -126.0
CORNER PROTECTION TYPE "A"
CORNER PROTECTION TYPE "B"
CORNER PROTECTION TYPE "C"
CORNER PROTECTION TYPE "D"
CORNER PROTECTION TYPE "E"
C/L NEEDLE GIRDER RECESS
C/L PZ-22
2'-6"
TREMIE SEAL
1V ON 2H
2" UNDERBASE GROUT
3' STONE BASE
SETTING AND TENSION PILE
10'
9'-0"
13'-9"
15'-3"
28'-0"
C/L STAFF GAGE
FACING EAST
SCALE: 3/16" = 1'-0"
SCALE: 1 1/2" = 1'-0"
ANCHOR STRAPS 2 X 1/4 X 1'-6" @ 1'-0" C/C STAGGERED
ANCHOR STRAPS 2 X 1/4 X 1'-6" @ 1'-6" C/C STAGGERED
3/4" ANCHOR PLATE @ 2'-0" O.C.
3/4 ANCHOR PLATE @ 1'-6" O.C.
3"⌀ HOLE
2"⌀ HOLE
PL 3/4
LOCK CHAMBER FACE
CORNER PROTECTION TYPE"A"
SCALE: 1-1/2" = 1'-0"
CORNER PROTECTION TYPE"B"
SCALE: 1-1/2" = 1'-0"
CORNER PROTECTION TYPE"C"
SCALE: 1-1/2" = 1'-0"
CORNER PROTECTION TYPE"D"
SCALE: 1-1/2" = 1'-0"
CORNER PROTECTION TYPE"E"
SCALE: 1-1/2" = 1'-0"
C·A·D
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
CORNER PROTECTION
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
PLOT SCALE: 64
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223



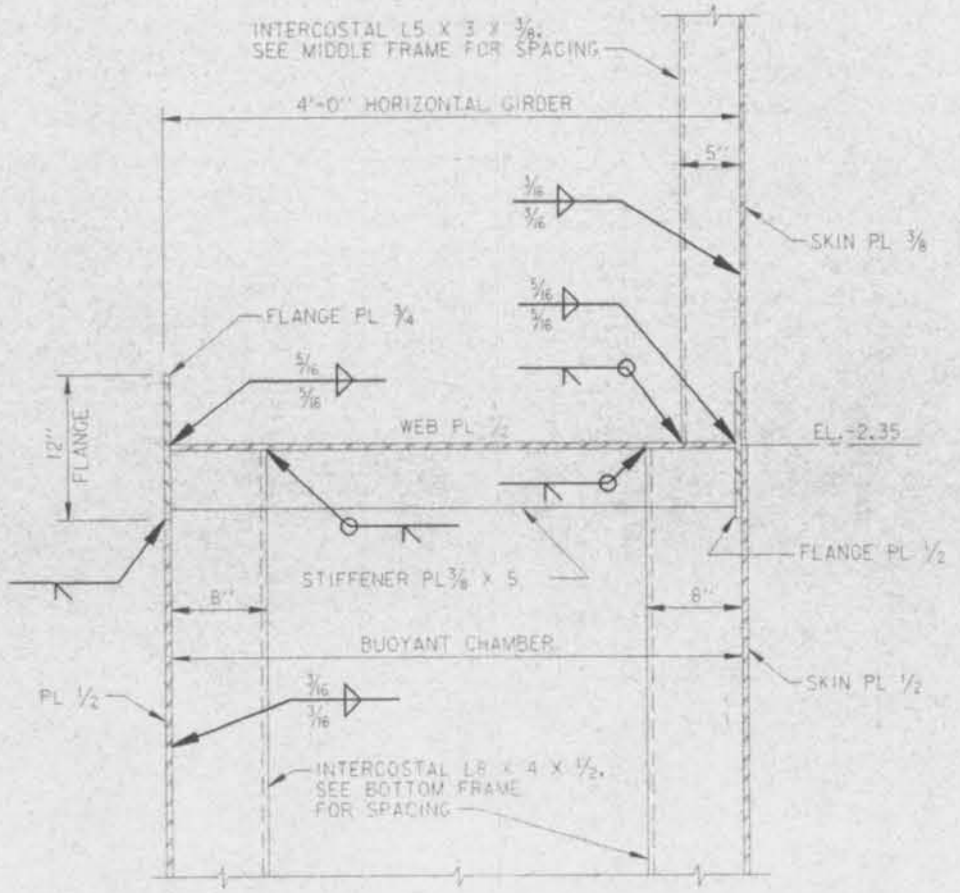
SEAL
SEE DETAIL, PLATE 35
TOP GIRDER EXTENSION
FOR GEAR RACK
21 SPACES AT 1.6667'
STIFFENER PL 1/2
10"ø PIPE, 1/2" THK WALL
16"ø PIPE, 1/2" THK WALL
66'-10 7/8" RADIUS TO OUTSIDE FACE OF HORIZONTAL GIRDER
66'-10 7/8" RADIUS TO C/L HORIZONTAL GIRDER
INTERCOSTAL L5 X 3 X 3/8
RECESS TRUSS
16'-8 3/4"
21 SPACES AT 1.6667'
FOR HINGE ASSEMBLY DETAIL,
SEE PLATE 59
CHANNEL TRUSS
TOP FRAME
SCALE: 1/4" = 1'-0"
ALL VERTICAL CHORDS
ARE 10"ø X 1/2" THK
WALLS EXCEPT AT
PINTLE COLUMN
FOR GATE CLOSURE
SEE DETAIL, PLATE 35
WALKWAY NOT
SHOW FOR CLARITY
SEE PLATE 36
INTERCOSTAL L5 X 3 X 3/8,
SEE TOP FRAME FOR SPACING
EL. 11.5
4'-0" HORIZONTAL GIRDER
FLANGE PL 3/4
WEB PL 1/2
EL. 9.8
FLANGE PL 1/2
SKIN PL 3/8
NOTE:
WELDS SHOWN ARE TYPICAL FOR
SIMILAR JOINTS WHERE NOT SHOWN.
SECTION (A)
SCALE: 1 1/2" = 1'-0"
SCALE: 1/4" = 1'-0"
SCALE: 1 1/2" = 1'-0"
C-A-D
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
SECTOR GATE
TOP FRAME
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: CCE
DRAWN BY: HJH
CHECKED BY: MHG
PLOT SCALE: 48
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
H-2-45223




CHANNEL TRUSS

MIDDLE FRAME

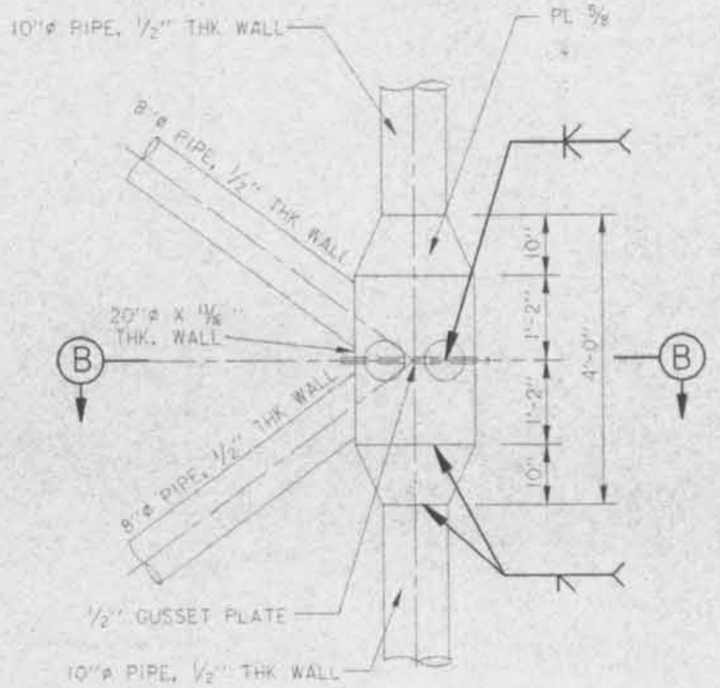
SCALE: ¼" = 1'-0"




NOTE:
WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.

SECTION (A)

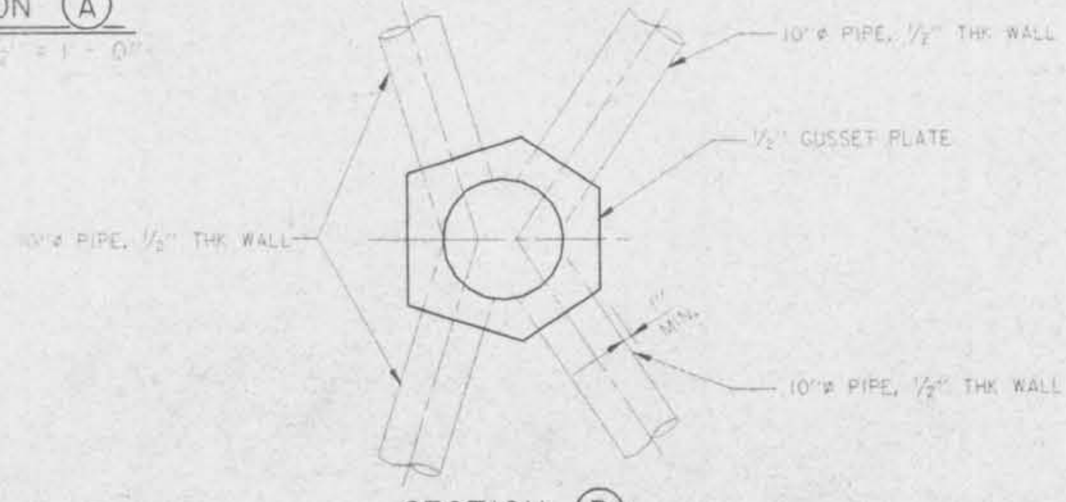
SCALE: 1½" = 1'-0"




CENTER TRUSS JOINT CAN DETAIL

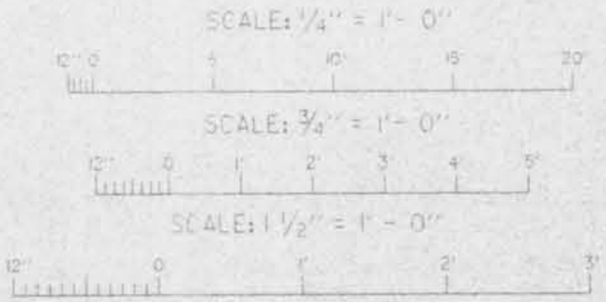
(3 PER TRUSS)

SCALE: ¾" = 1'-0"




SECTION (B)

SCALE: ¾" = 1'-0"




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

FEATURE DESIGN MEMORANDUM NO. 1

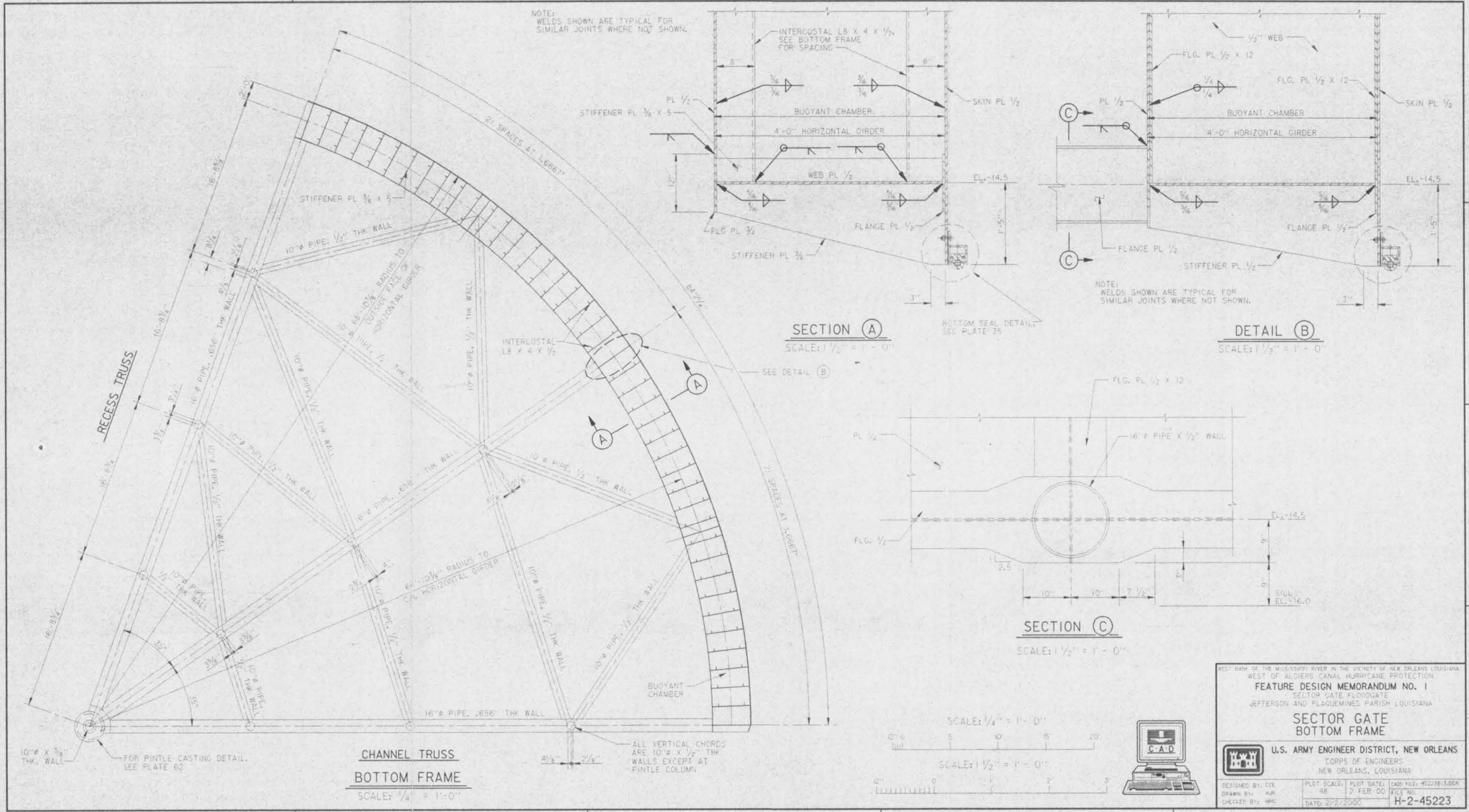
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE
## MIDDLE FRAME JOINT DETAILS

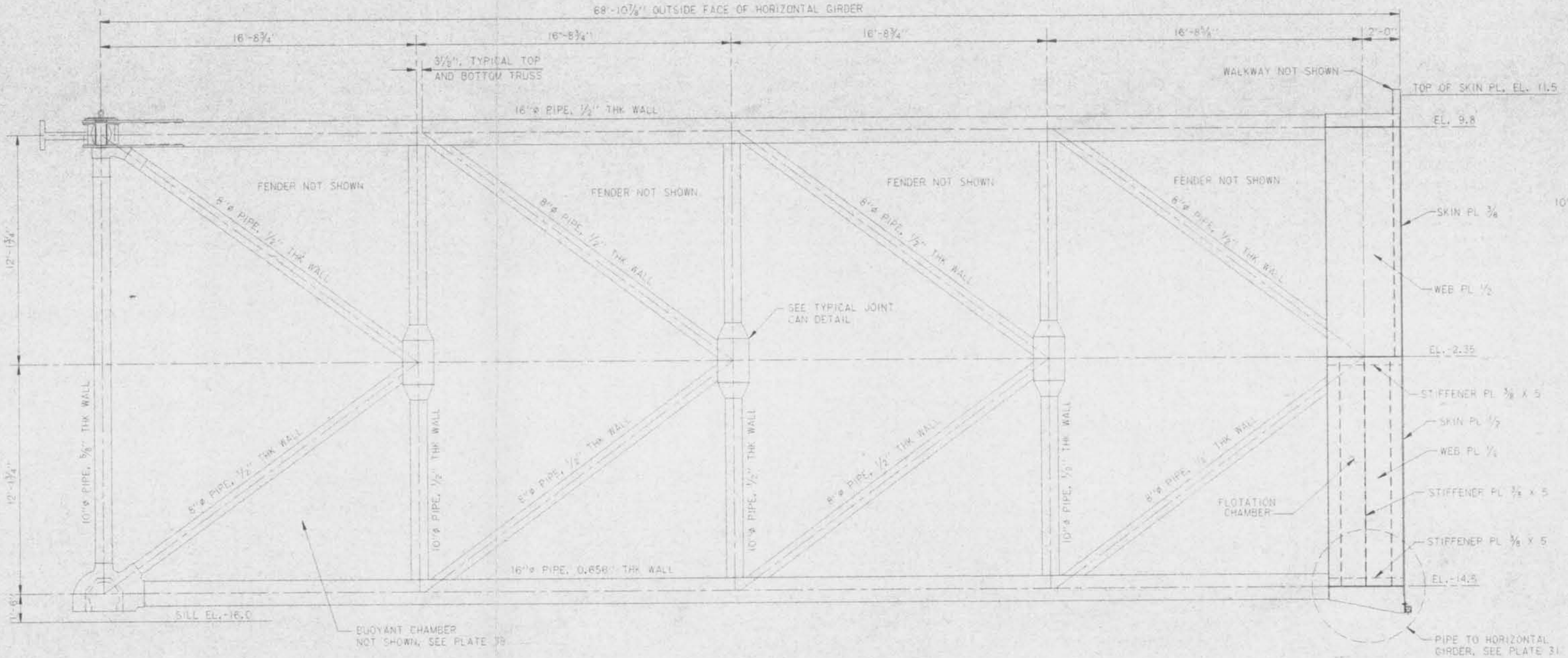
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: CCE
DRAWN BY: HJH
CHECKED BY: MHG

PLOT SCALE: 48 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B-HLDDN
DATE: 2/2/2000 | FILE NO. H-2-45223

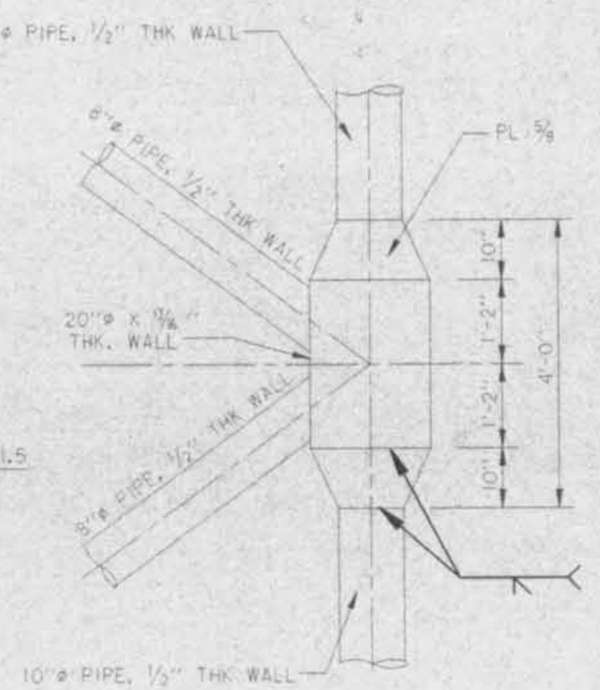


NOTE:
WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.
RECESS TRUSS
STIFFENER PL 3/8 X 5
21 SPACES AT 1.6667'
10"ø PIPE, 1/2" THK WALL
16"ø PIPE, .656" THK WALL
10"ø PIPE, 1/2" THK WALL
68'-10 7/8" RADIUS TO OUTSIDE FACE OF HORIZONTAL GIRDER
64'-10 7/8" RADIUS TO C/L HORIZONTAL GIRDER
INTERCOSTAL L8 X 4 X 1/2
SEE DETAIL (B)
BUOYANT CHAMBER
16"ø PIPE, .656" THK WALL
10"ø X 5/8" THK. WALL
FOR PINTLE CASTING DETAIL, SEE PLATE 62
ALL VERTICAL CHORDS ARE 10"ø X 1/2" THK WALLS EXCEPT AT PINTLE COLUMN
CHANNEL TRUSS
BOTTOM FRAME
SCALE: 1/4" = 1'-0"
INTERCOSTAL L8 X 4 X 1/2, SEE BOTTOM FRAME FOR SPACING
PL 1/2
STIFFENER PL 3/8 X 5
BUOYANT CHAMBER
4'-0" HORIZONTAL GIRDER
WEB PL 1/2
SKIN PL 1/2
EL. -14.5
FLG PL 3/4
FLANGE PL 1/2
STIFFENER PL 3/8
BOTTOM SEAL DETAIL, SEE PLATE 35
SECTION (A)
SCALE: 1 1/2" = 1'-0"
1/2" WEB
FLG. PL 1/2 X 12
FLANGE PL 1/2
STIFFENER PL 1/2
NOTE:
WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.
DETAIL (B)
SCALE: 1 1/2" = 1'-0"
16"ø PIPE X 1/2" WALL
FLG. 1/2
SILL EL. -16.0
SECTION (C)
SCALE: 1 1/2" = 1'-0"
SCALE: 1/4" = 1'-0"
SCALE: 1 1/2" = 1'-0"
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
SECTOR GATE
BOTTOM FRAME
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
PLOT SCALE: 48
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
H-2-45223




CHANNEL TRUSS ELEVATION

SCALE: ⅜'' = 1'- 0''




TYPICAL JOINT CAN DETAIL

(3 PER TRUSS)

SCALE: ¾'' = 1'-0''

SCALE: ¾'' = 1'- 0''

SCALE: ⅜'' = 1'- 0''

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA

WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE

JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE CHANNEL TRUSS

**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**

CORPS OF ENGINEERS

NEW ORLEANS, LOUISIANA

DESIGNED BY: CCE
DRAWN BY: HJH
CHECKED BY: MHG

| | | |
|---|---|---|
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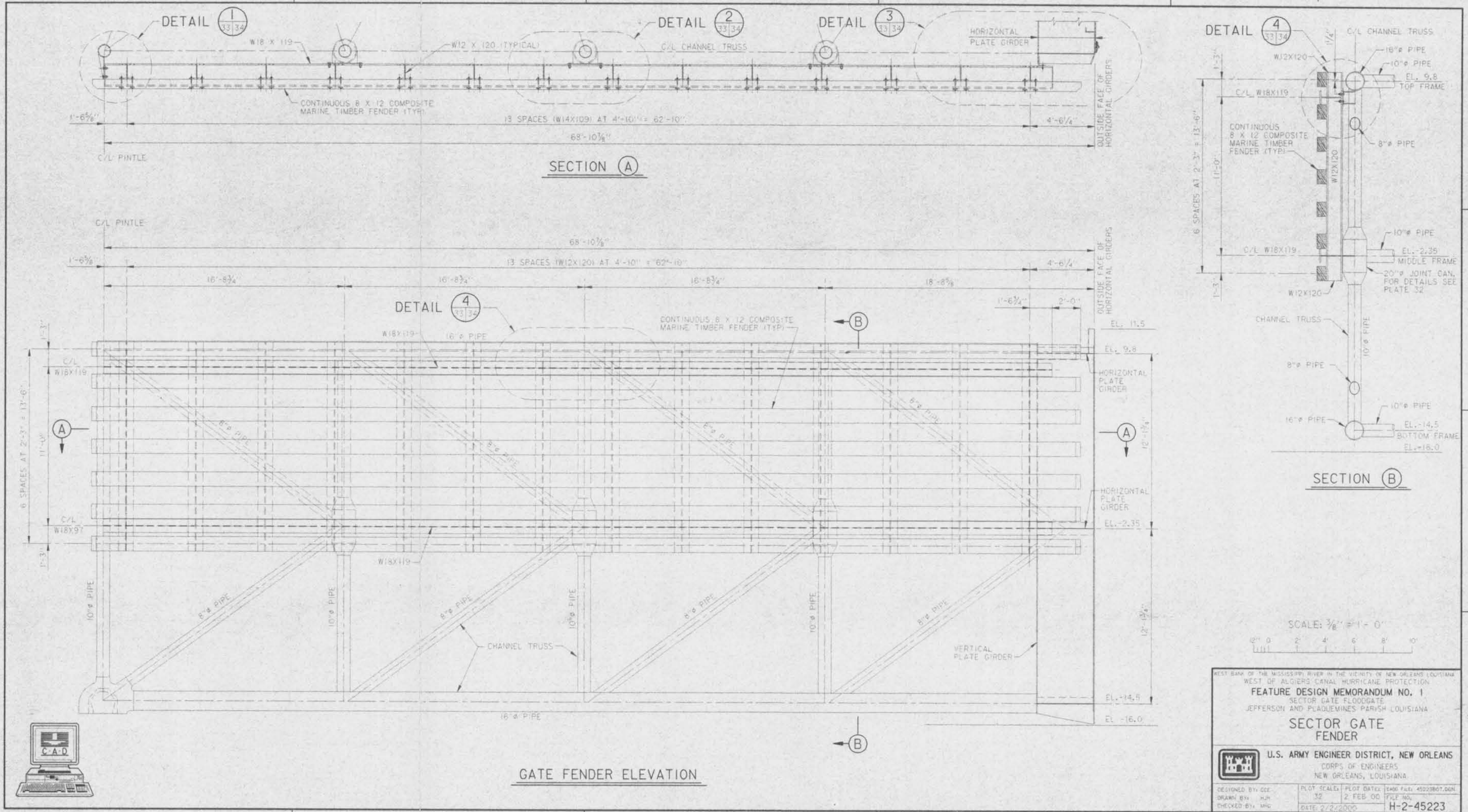
| DATE: 2/2/2000 | | FILE NO. H-2-45223 |



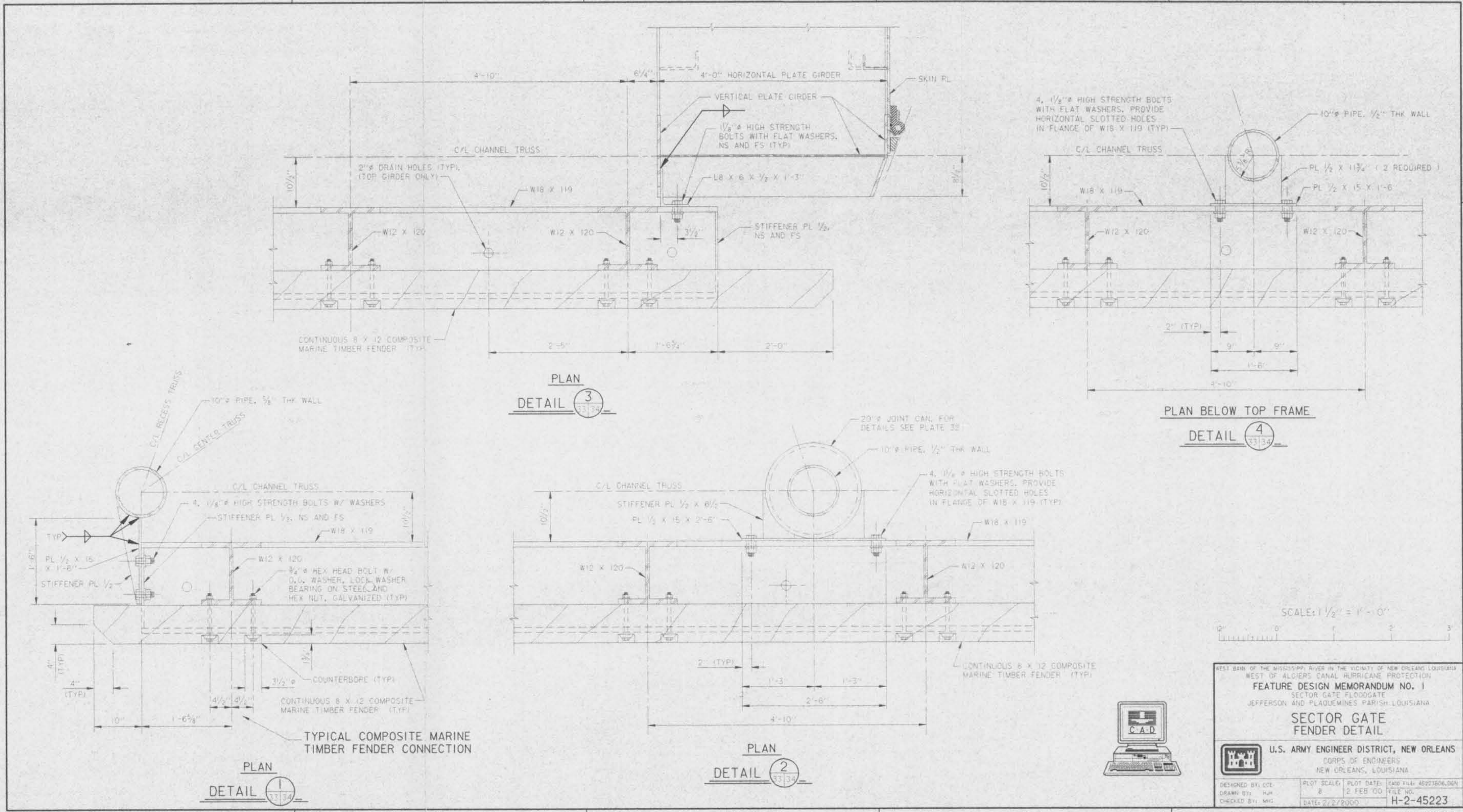

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE FENDER

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

DESIGNED BY: CCE
DRAWN BY: HJH
CHECKED BY: MHG
PLOT SCALE: 32
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223

PLATE 33




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

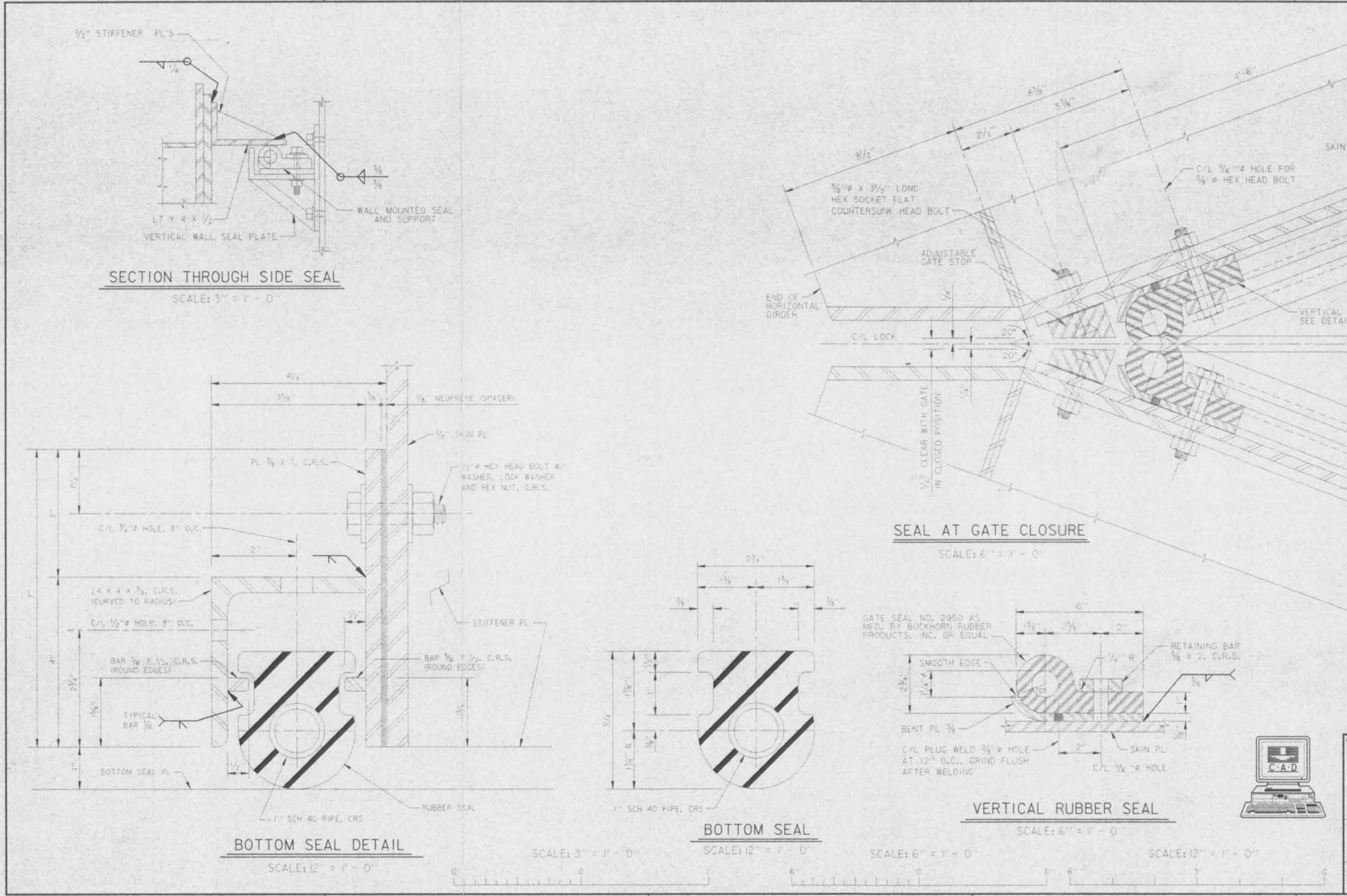
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH, LOUISIANA

**SECTOR GATE FENDER DETAIL**

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

DESIGNED BY: CCE | PLOT SCALE: 8 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B06.DGN
DRAWN BY: HJH | DATE: 2/2/2000 | FILE NO. H-2-45223
CHECKED BY: MHG




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

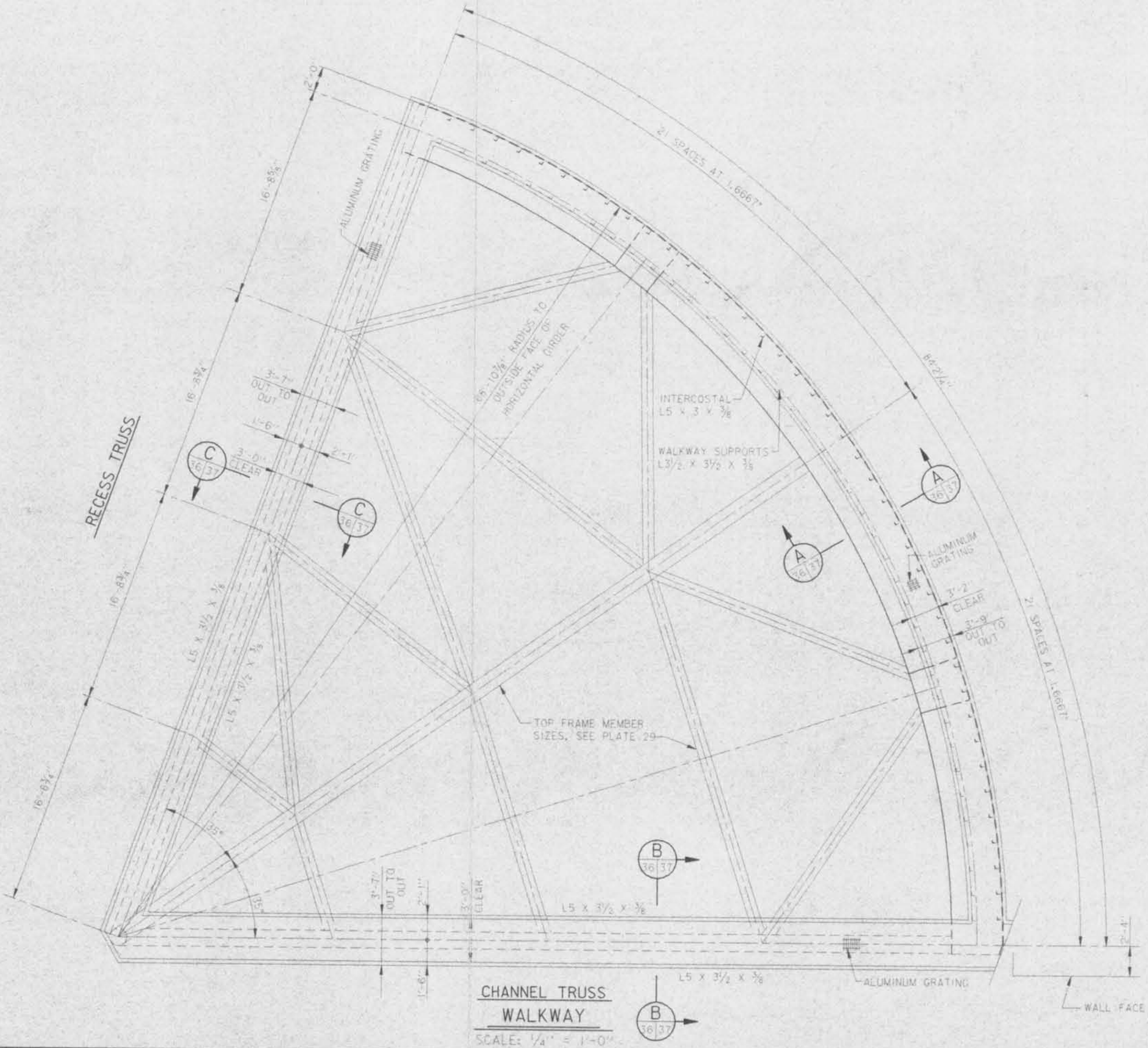
FEATURE DESIGN MEMORANDUM NO. 1

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE
## RUBBER SEALS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG<br>DRAWN BY: HJM<br>CHECKED BY: GEE | PLOT SCALE: 2 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223R16.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




CHANNEL TRUSS WALKWAY

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

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

FEATURE DESIGN MEMORANDUM NO. 1

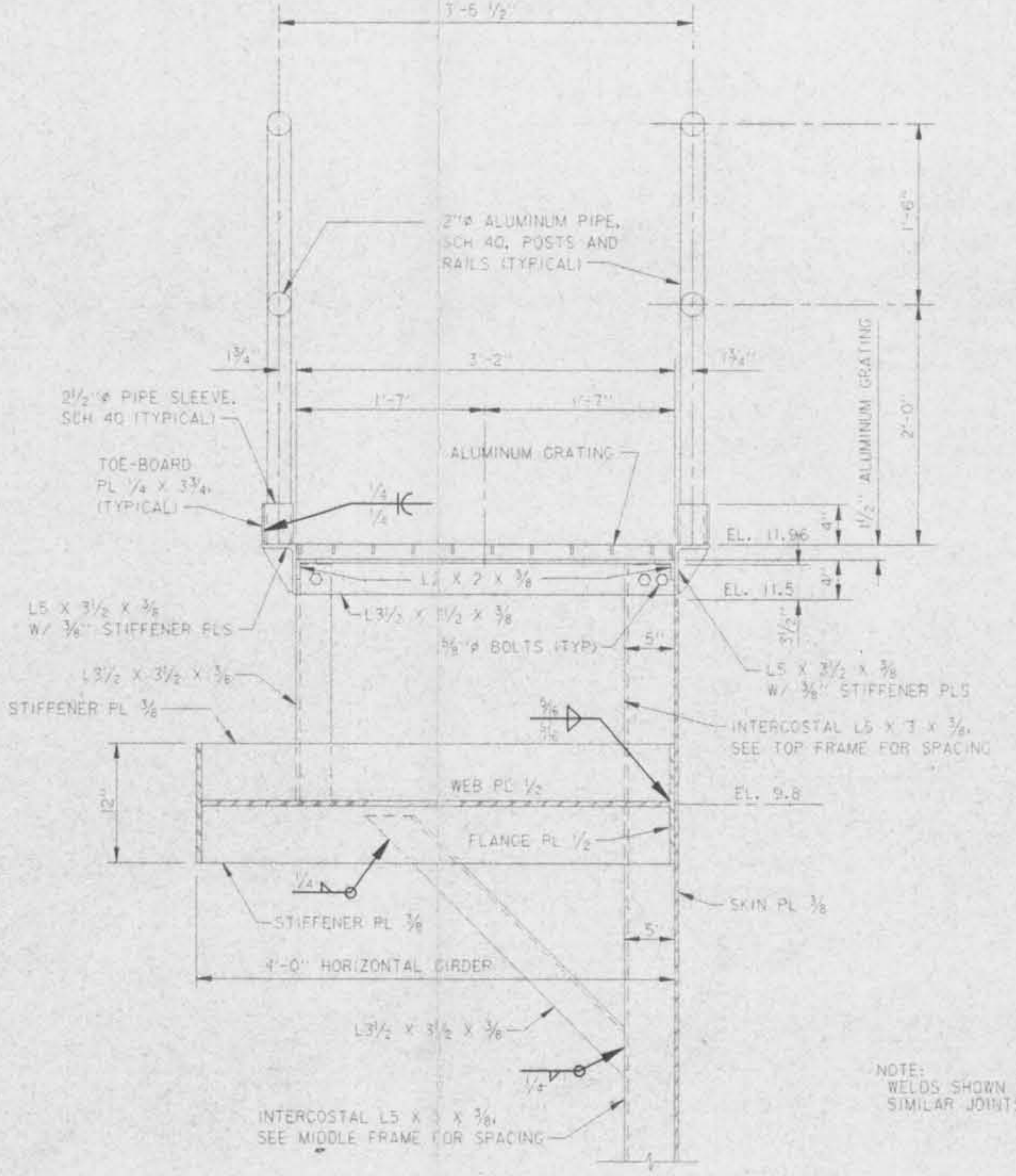
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

SECTOR GATE
WALKWAY

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

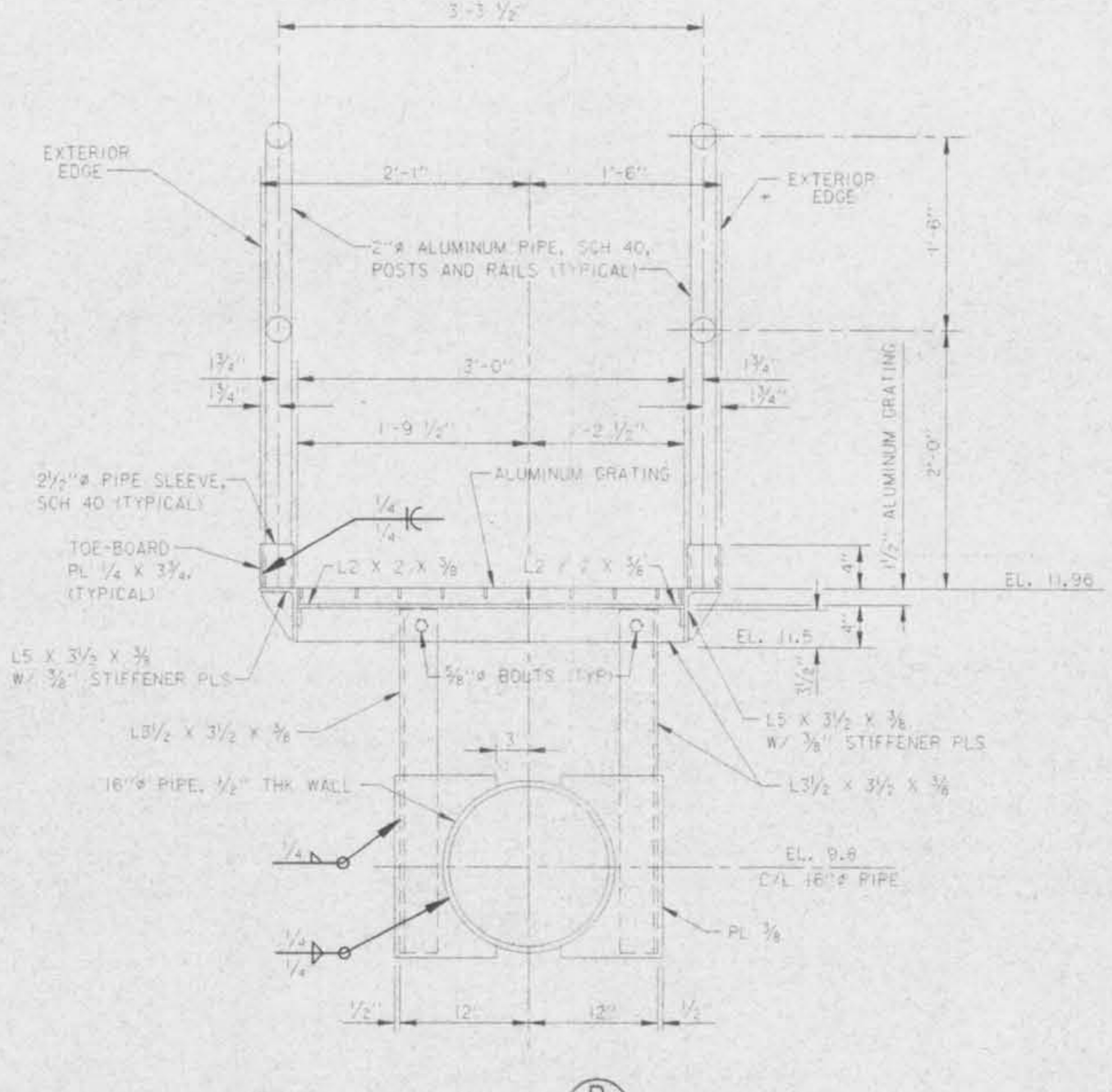
DESIGNED BY: CCE
DRAWN BY: KJH
CHECKED BY: MHG

PLOT SCALE: 48
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223




SECTION A (36|37)

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




SECTION B (36|37)

SECTION C (36|37)

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

NOTE:
WELDS SHOWN ARE TYPICAL FOR SIMILAR JOINTS WHERE NOT SHOWN.

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

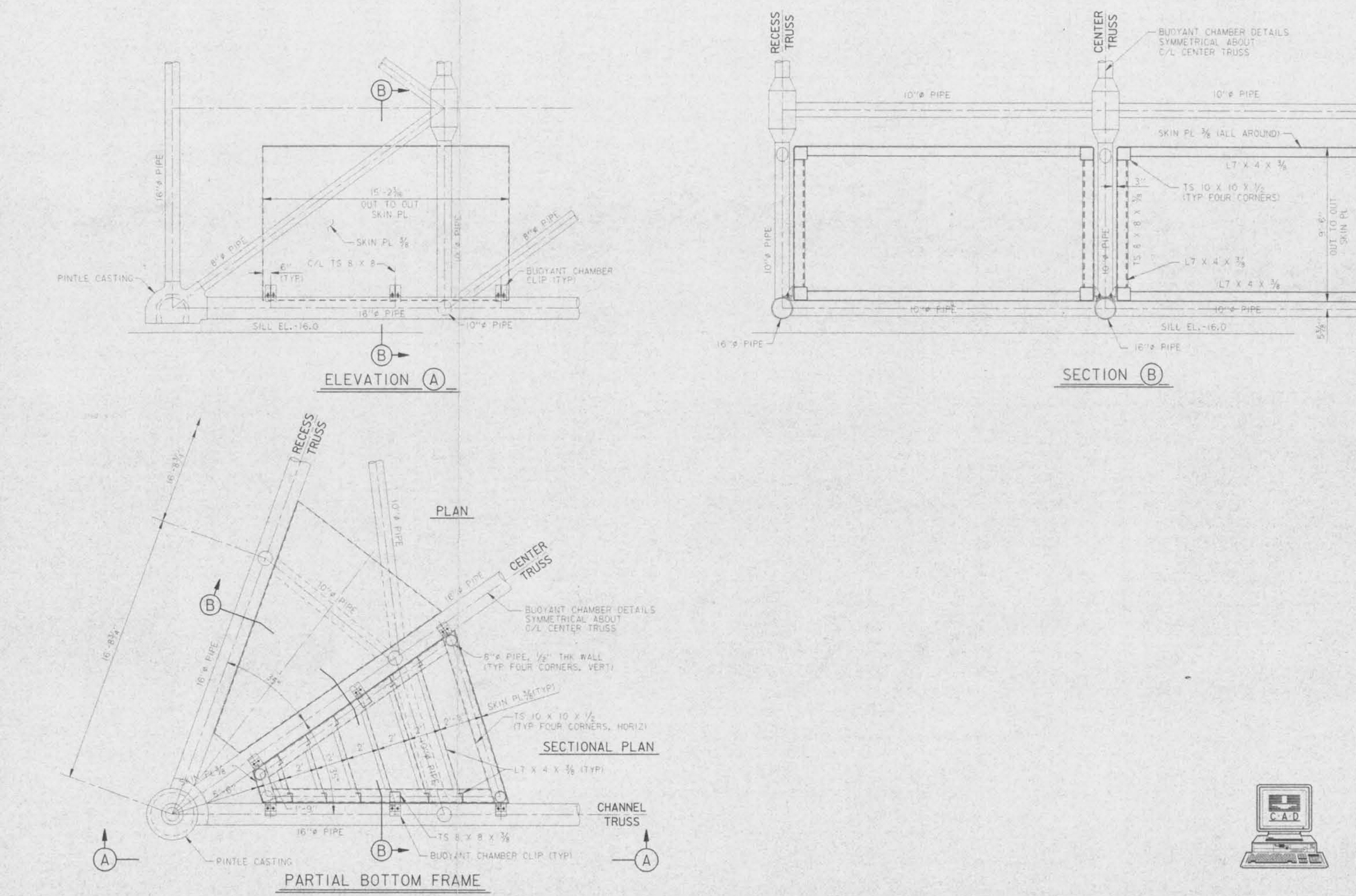
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE
## WALKWAY SECTIONS

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

| DESIGNED BY: CCE | PLOT SCALE: 8 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B17.DGN |
|---|---|---|---|
| DRAWN BY: HJH | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHG | | | |



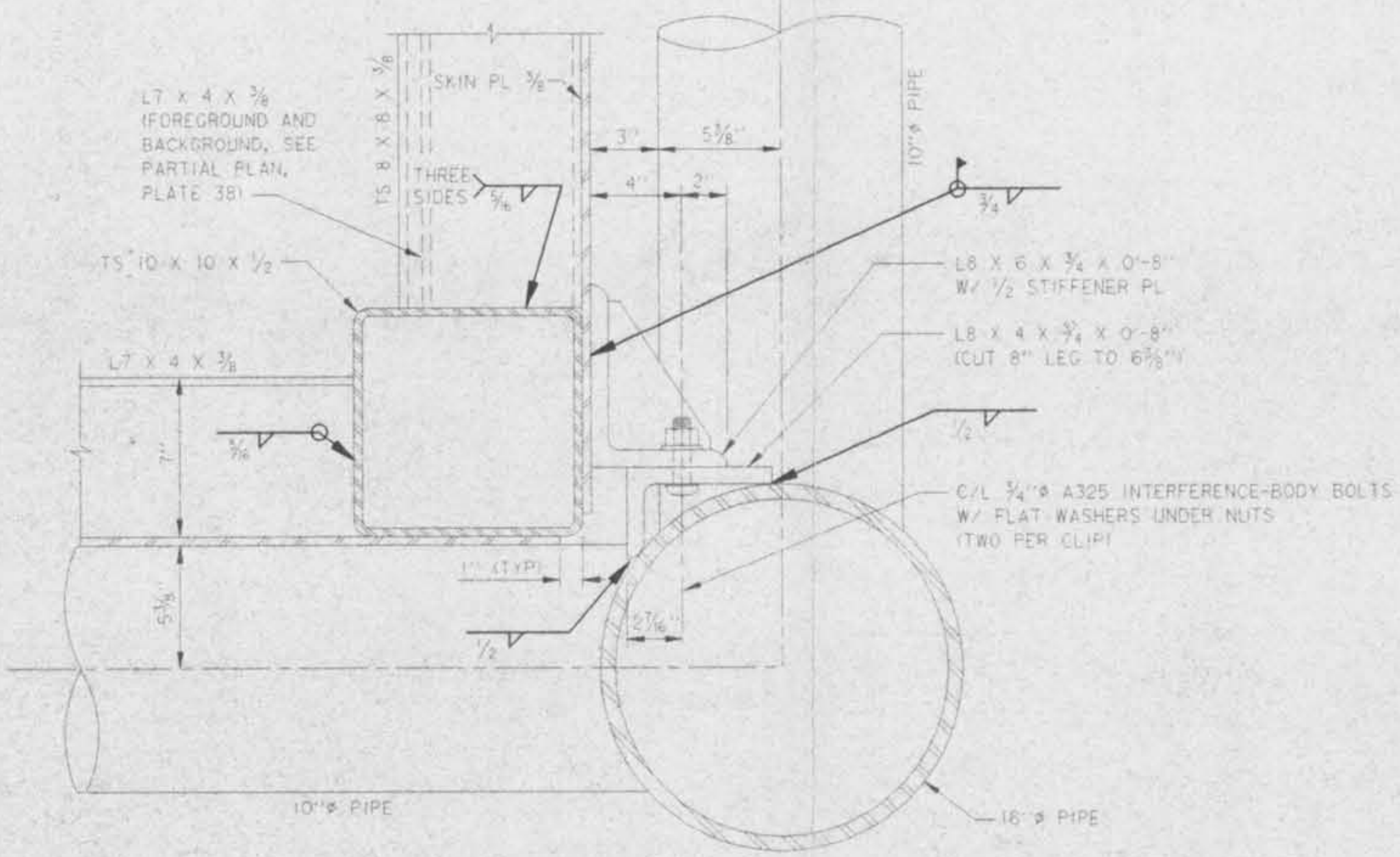

SCALE: 3/8" = 1'- 0"

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE
## BUOYANT CHAMBER

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: MJH<br>CHECKED BY: MHC | PLOT SCALE: 32 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B12.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




DETAIL 1 (38 | 39)

SCALE: 3" = 1' - 0"

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

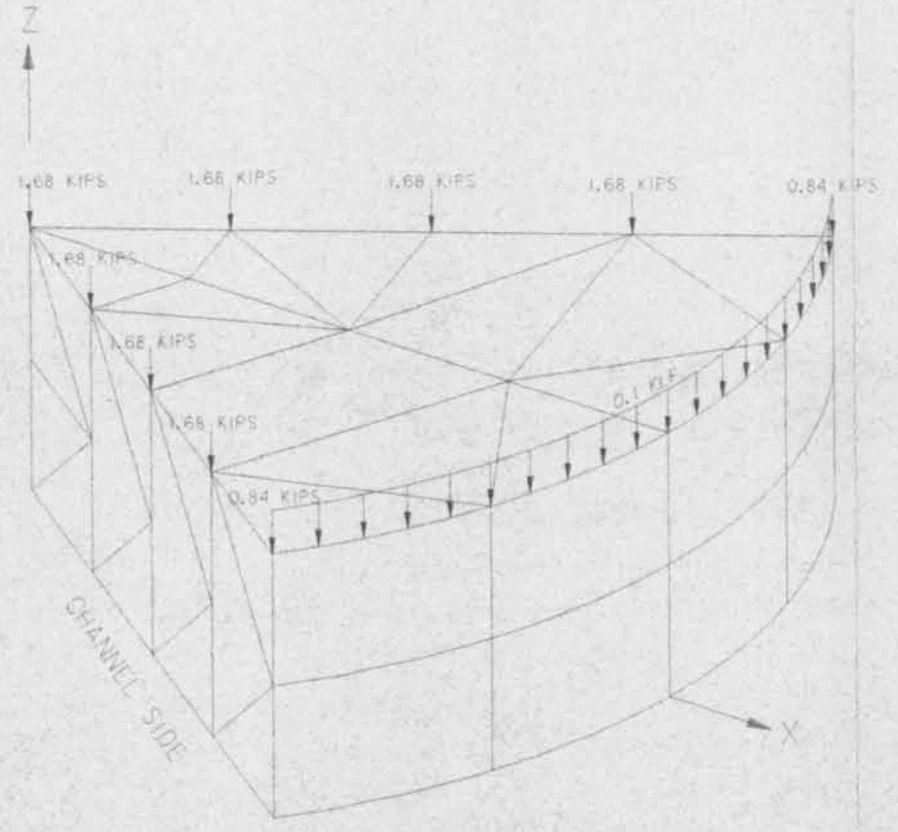
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE
# BUOYANT CHAMBER DETAILS

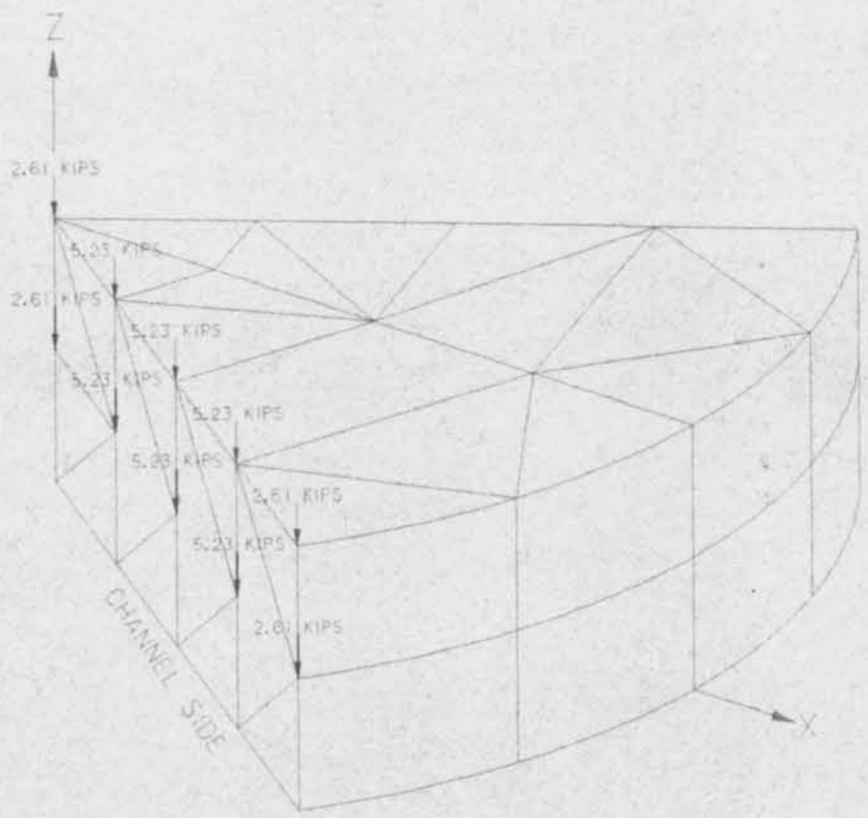
**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: COE
DRAWN BY: HJH
CHECKED BY: MHG

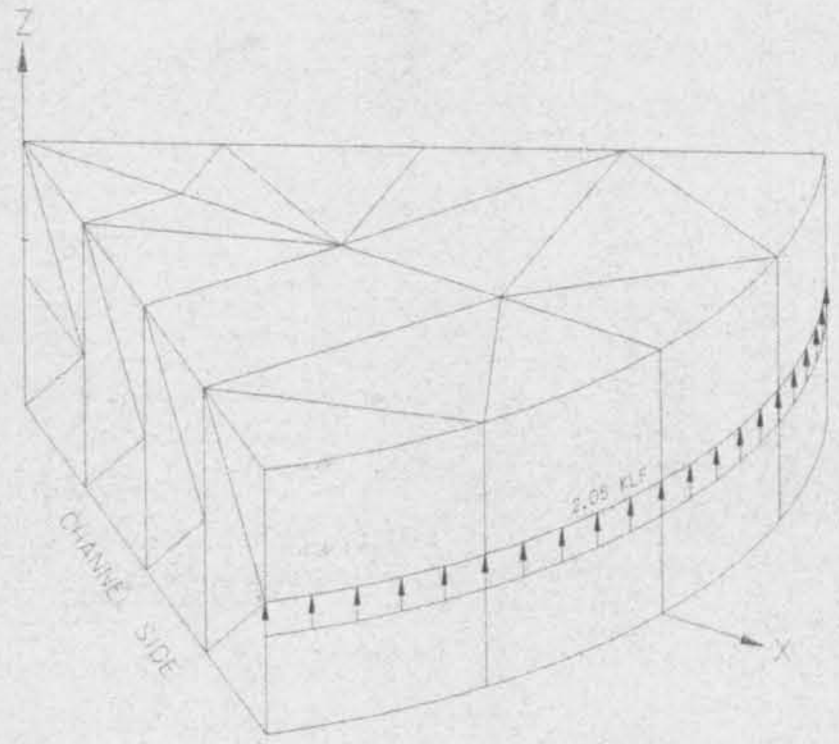
PLOT SCALE: 4 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B08.DGN
DATE: 2/2/2000 | FILE NO. H-2-45223



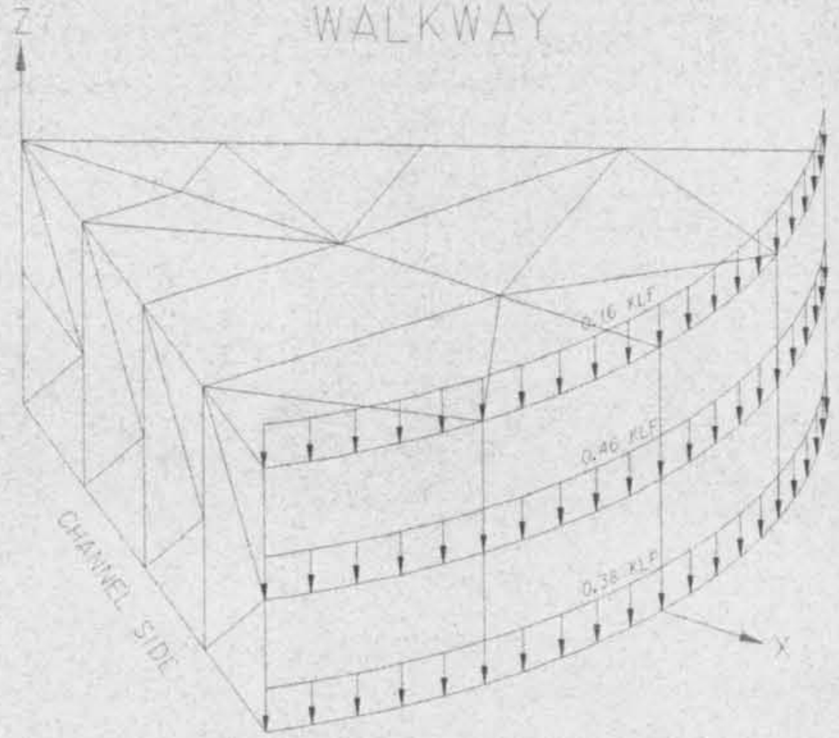

WALKWAY



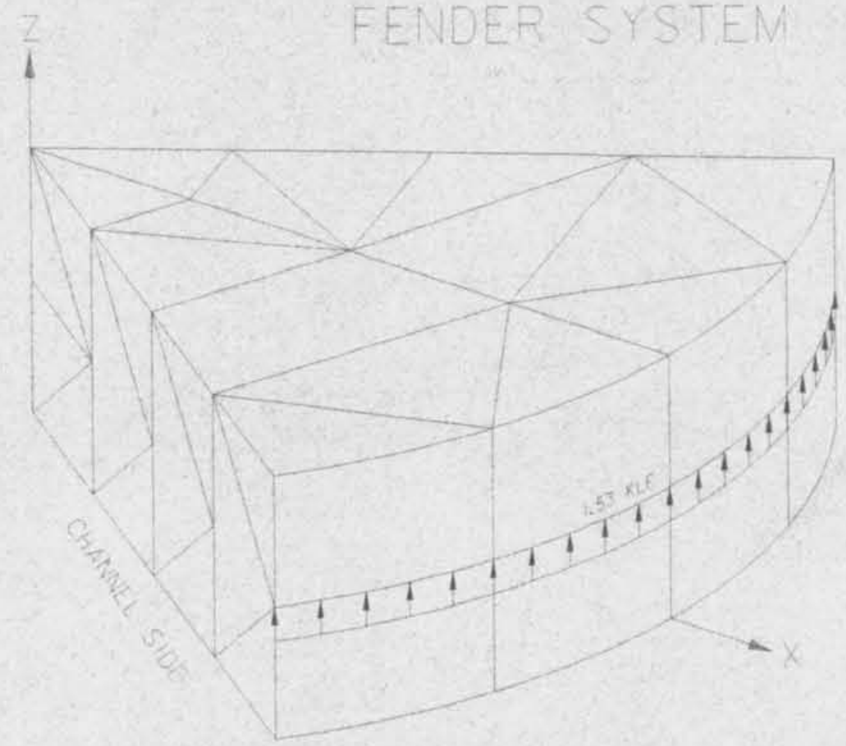

FENDER SYSTEM




BUOYANT CHAMBER FILLED WITH 4FT OF WATER




RIBS AND SKIN PLATE




BUOYANT CHAMBER 50% FLOODED

NOTE:

THE WEIGHT OF THE GATE IS 317.8 KIPS

THIS WEIGHT INCLUDES THE MEMBERS SELFWEIGHT, THE BUOYANT CHAMBER LOCATED BY THE PINTLE, THE BUOYANT CHAMBER LOCATED AT THE SKIN PLATE, THE WALK WAY AND FENDER SECTION.

WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL

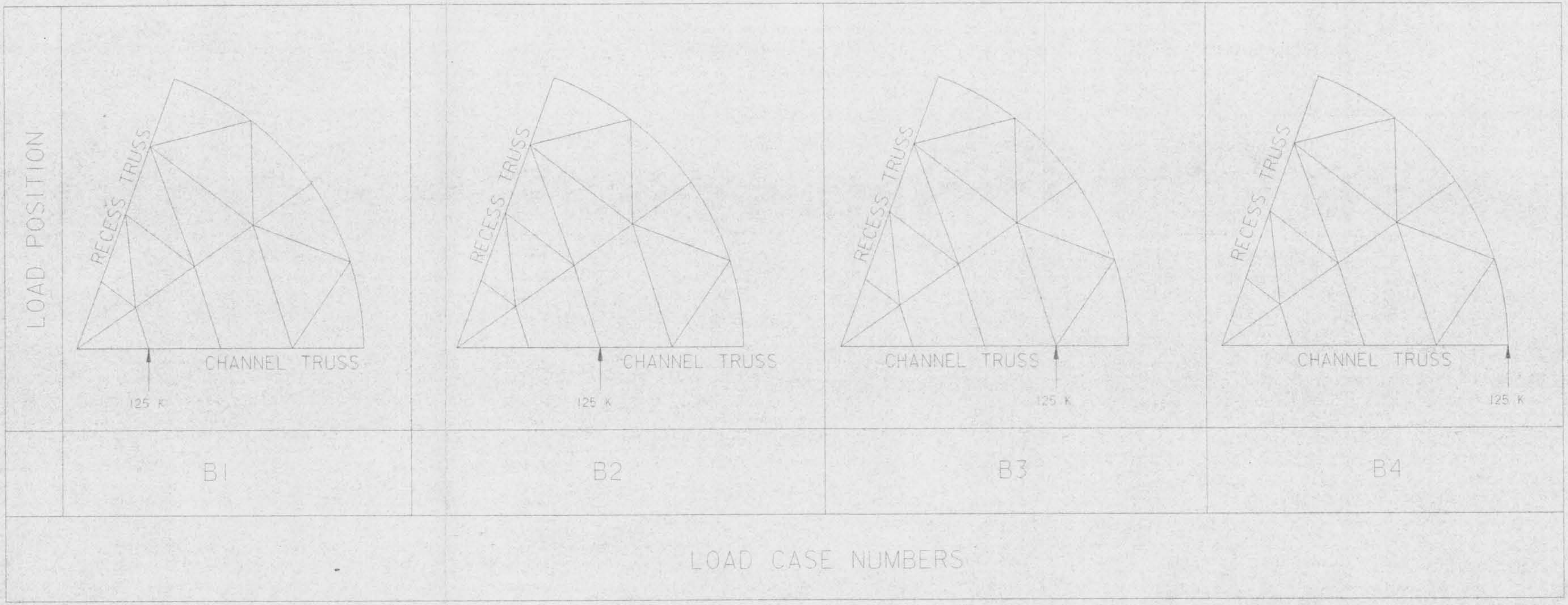
**FEATURE DESIGN MEMORANDUM NO. I**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# DEAD LOADS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MOH/CCE<br>DRAWN BY: CCE<br>CHECKED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P165.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




# TOP FRAME

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

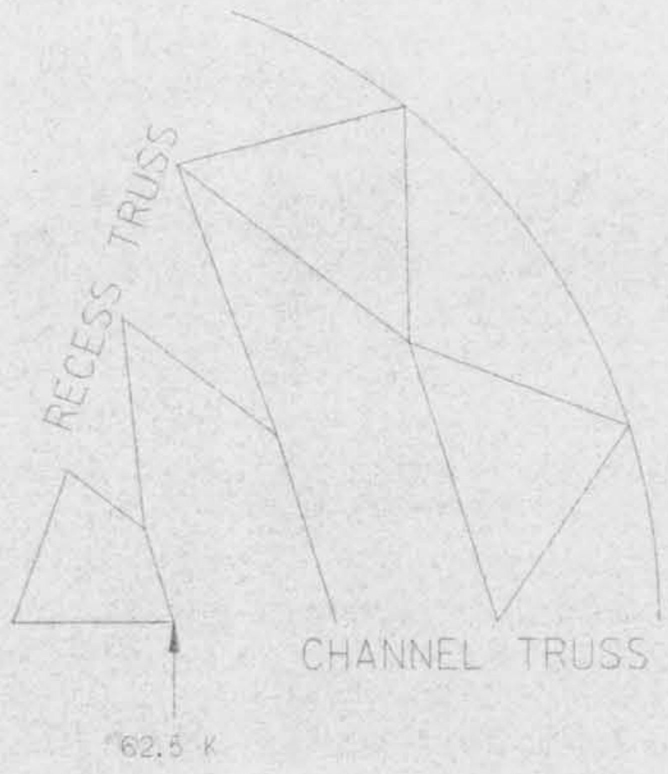
## BOAT LOADS

GATE OPEN (LOADS B1-B4)

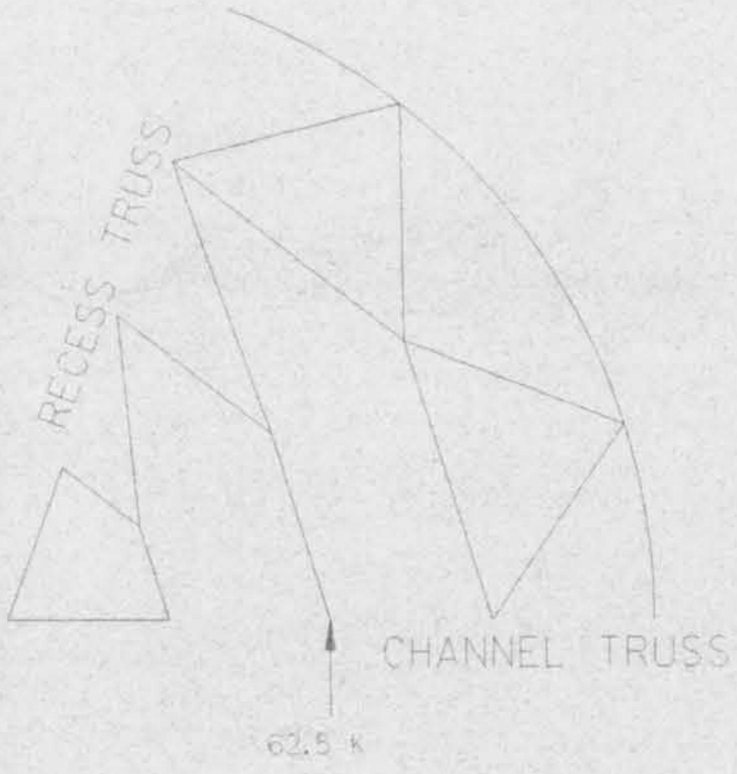
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG/CCE | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P150.DGN |
| DRAWN BY: CCE | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: CCE | | | |

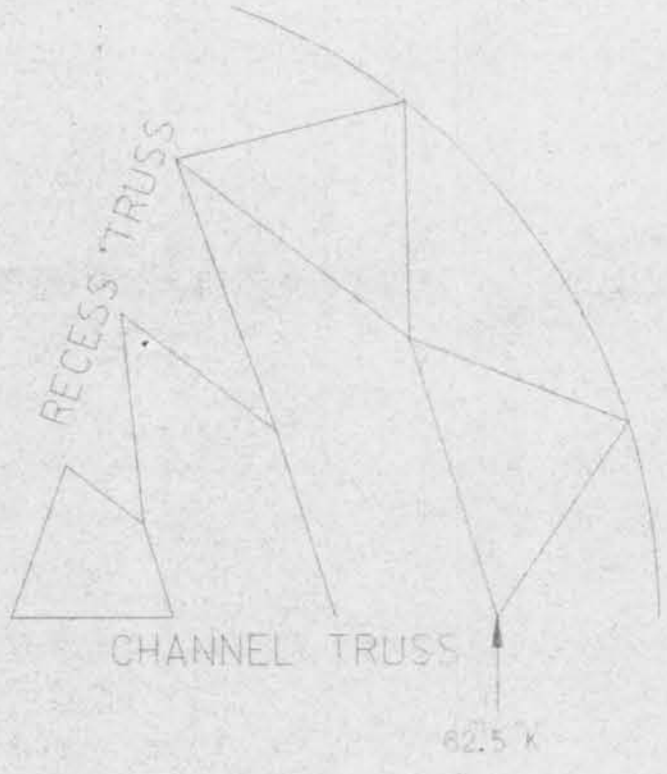
LOAD POSITION



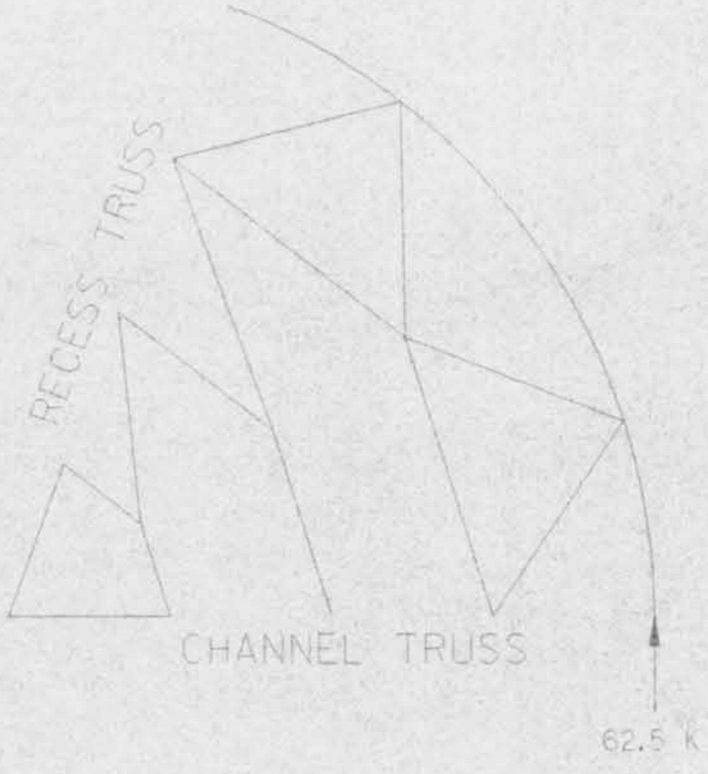

B5




B6




B7




B8

LOAD CASE NUMBERS

# CENTER FRAME

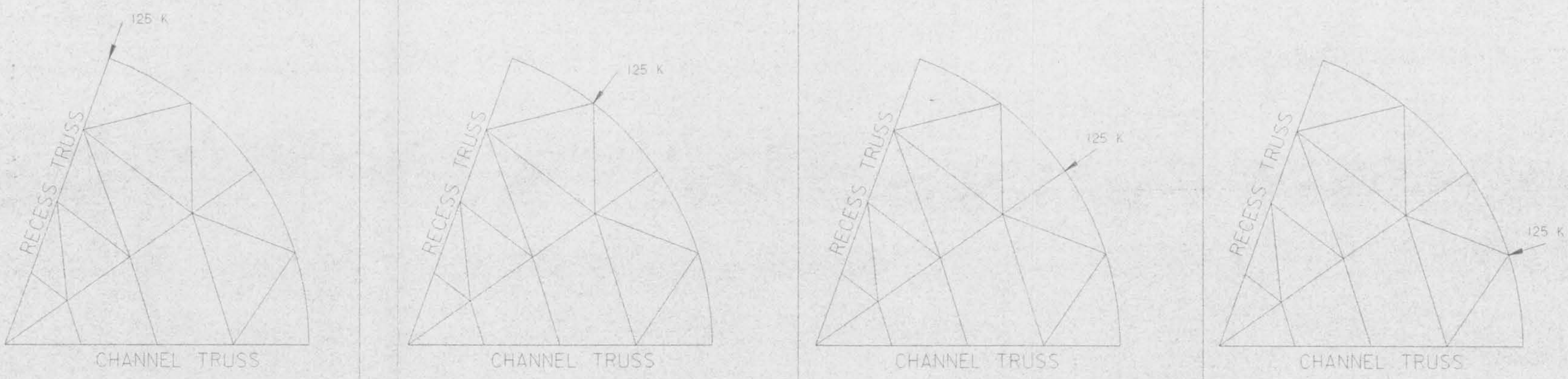
WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL
FEATURE DESIGN MEMORANDUM NO. I
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## BOAT LOAD
GATE OPEN (LOADS B5-B8)

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MMG/CCE<br>DRAWN BY: CCE<br>CHECKED BY: CCE | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F153.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |

LOAD POSITION




| B9 | B10 | B11 | B12 |
|---|---|---|---|

LOAD CASE NUMBERS

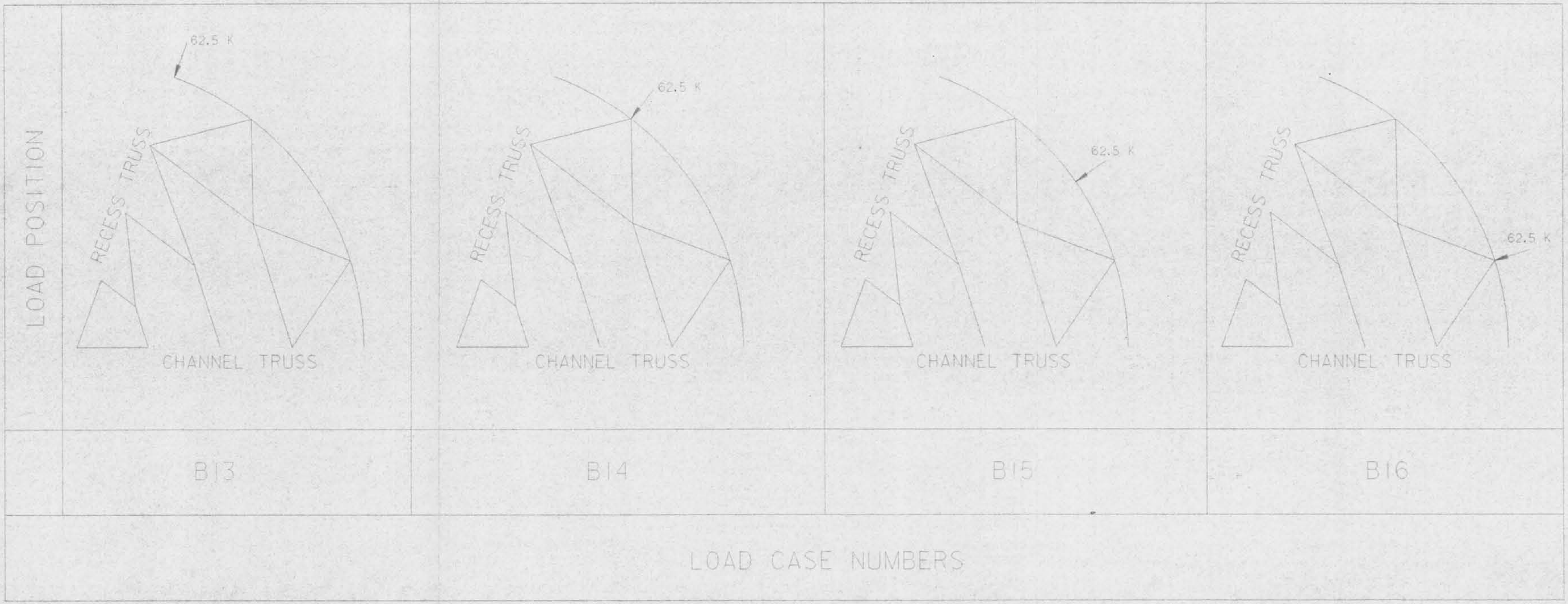
# CENTER FRAME

WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL
FEATURE DESIGN MEMORANDUM NO. I
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## BOAT LOADS
GATE CLOSED (LOADS B9-B12)

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

| DESIGNED BY: MHG/CCE<br>DRAWN BY: CCE<br>CHECKED BY: CCE | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P149.DGN |
|---|---|---|---|
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




CENTER FRAME

WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL

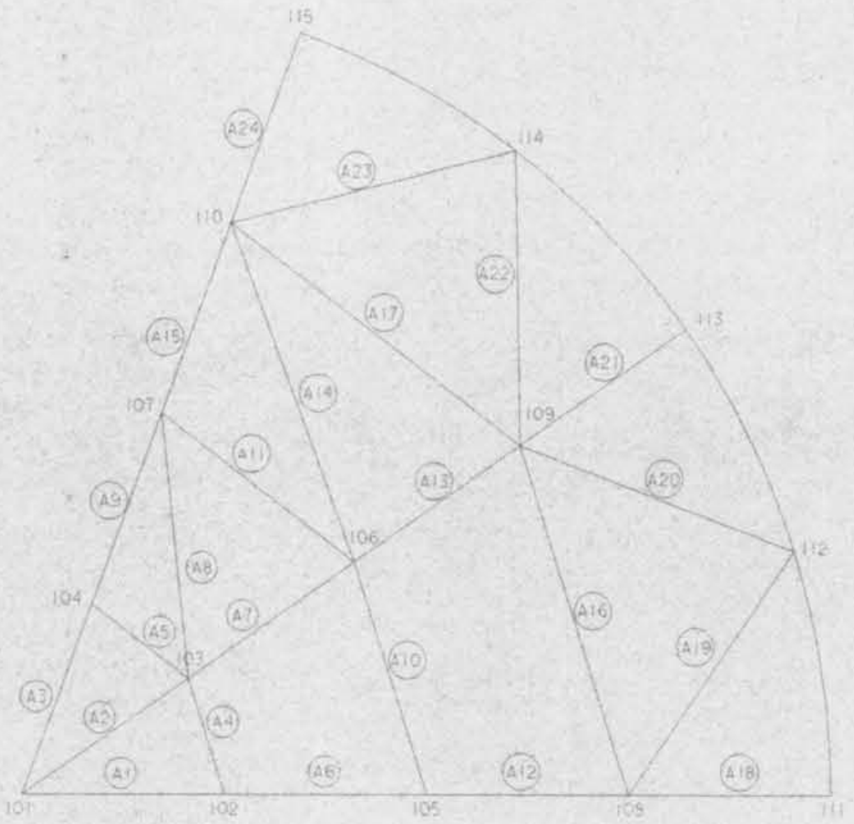
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

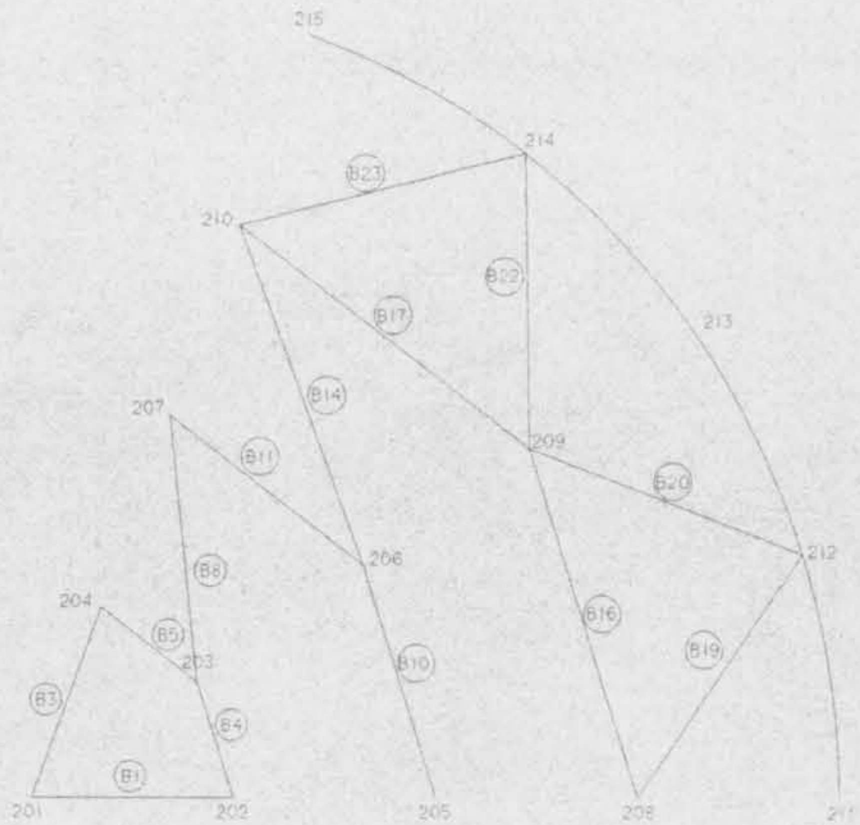
## BOAT LOADS
## GATE CLOSED (LOADS B13 - B16)

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

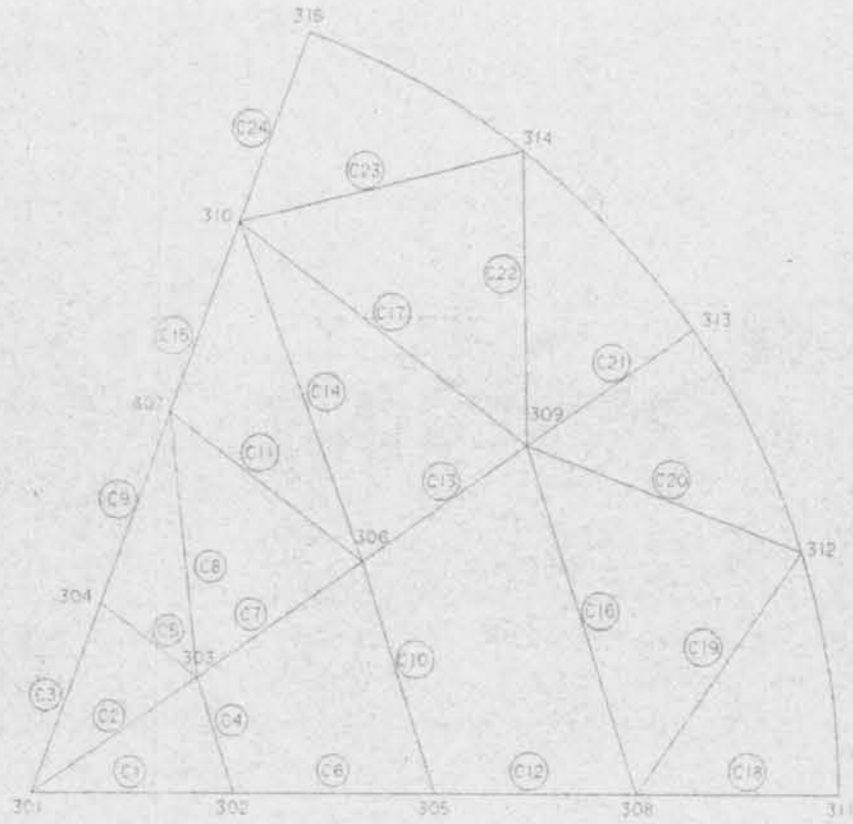
| | | | |
|---|---|---|---|
| DESIGNED BY: MHG/CCE<br>DRAWN BY: CCE<br>CHECKED BY: CCE | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P154.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |



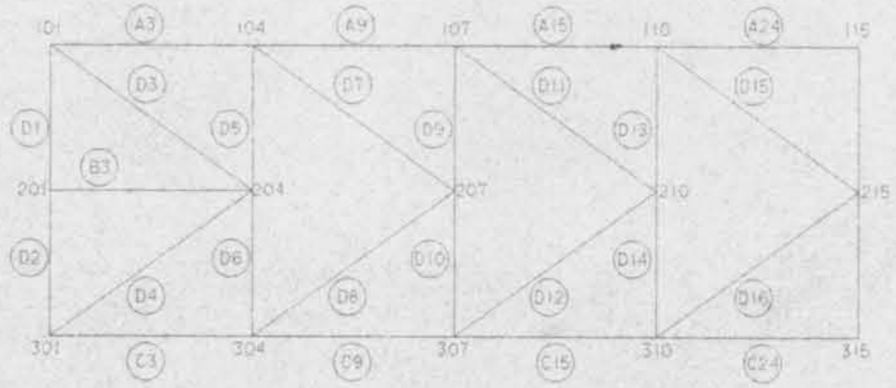
TOP FRAME
PLANE AT EL. 9.80



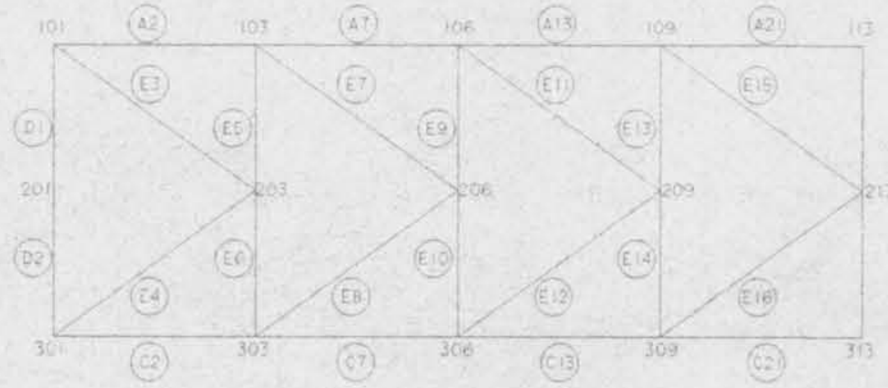
MIDDLE FRAME
PLANE AT EL. -2.35



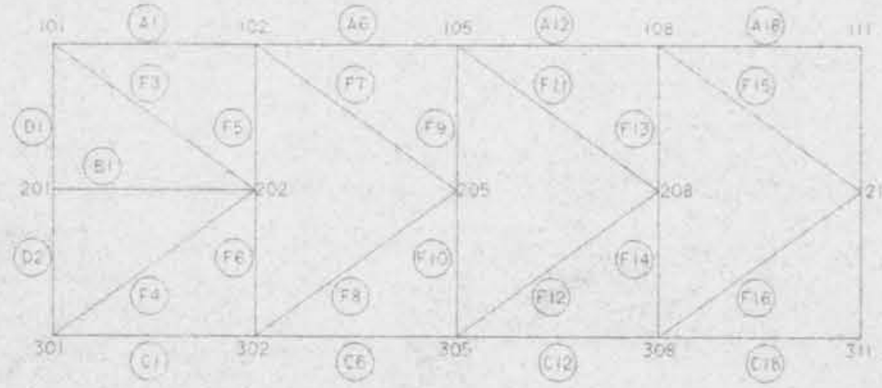
BOTTOM FRAME
PLANE AT EL. -14.5



RECESS TRUSS ELEVATION



CENTER TRUSS ELEVATION



CHANNEL TRUSS ELEVATION

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# JOINT AND MEMBER NUMBERS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: CCE<br>CHECKED BY: CCE | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P100.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |

| MEMBER NO. | PIPE SIZE | MEMBER LENGTH (FT) | MAX COMPRESSION LOAD (KIPS) | LOAD CASE | Fa (KSI) | fa (KSI) | MAX TENSION LOAD (KIPS) | LOAD CASE | Ft (KSI) | ft (KSI) |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 16"ø , ½" WALL | 16.73 | 75.41 | A-1+II-7 | 15.61 | 3.10 | 147.46 | A-3 | 20.92 | 6.60 |
| A2 | 16"ø , ½" WALL | 16.73 | 189.03 | A-1+II-7 | 18.62 | 7.76 | 193.29 | A-3+II-5 | 20.92 | 7.94 |
| A3 | 16"ø , ½" WALL | 16.73 | 97.54 | A-1+II-4+B9 | 18.62 | 4.01 | 121.52 | A-3 | 20.92 | 4.99 |
| A4 | 10"ø , ½" WALL | 10.06 | 98.30 | A-1+B1 | 18.89 | 6.11 | 0.00 | - | 20.92 | 0.00 |
| A5 | 10"ø , ½" WALL | 10.06 | 0.00 | - | 18.89 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| A6 | 16"ø , ½" WALL | 16.73 | 100.18 | A-1+II-7 | 18.62 | 4.11 | 92.70 | A-3+II-5 | 20.92 | 3.81 |
| A7 | 16"ø , ½" WALL | 16.73 | 200.56 | A-1+II-7 | 18.62 | 8.24 | 139.21 | A-3+II-5 | 20.92 | 5.72 |
| A8 | 10"ø , ½" WALL | 21.95 | 107.29 | A-3+B1 | 15.04 | 6.68 | 0.00 | - | 20.92 | 0.00 |
| A9 | 16"ø , ½" WALL | 16.73 | 112.08 | A-1+II-4+B9 | 18.62 | 4.60 | 85.10 | A-3+II-5 | 20.93 | 3.49 |
| A10 | 10"ø , ½" WALL | 20.12 | 98.30 | A-3+B2 | 15.72 | 6.11 | 0.00 | - | 20.92 | 0.00 |
| A11 | 10"ø , ½" WALL | 20.12 | 0.00 | - | 15.72 | 0.00 | 49.15 | A-1+B1 | 20.92 | 3.05 |
| A12 | 16"ø , ½" WALL | 16.73 | 75.58 | A-1+II-7 | 18.62 | 3.10 | 65.52 | A-3+B4 | 20.92 | 2.69 |
| A13 | 16"ø , ½" WALL | 16.73 | 141.67 | A-1+II-7 | 16.62 | 5.82 | 70.55 | A-3+II-5 | 20.92 | 2.90 |
| A14 | 10"ø , ½" WALL | 29.78 | 97.00 | A-3+B2 | 11.77 | 6.02 | 0.00 | - | 20.92 | 0.00 |
| A15 | 16"ø , ½" WALL | 16.73 | 106.59 | A-1+II-4+B9 | 18.62 | 4.38 | 42.49 | A-3+II-5 | 20.92 | 1.74 |
| A16 | 10"ø , ½" WALL | 30.17 | 78.95 | A-3+B3 | 18.62 | 4.90 | 52.06 | A-1+II-4+B12 | 20.92 | 3.23 |
| A17 | 10"ø , ½" WALL | 30.17 | 37.36 | A-3+B3 | 11.59 | 2.32 | 51.90 | A-1+II-4+B10 | 20.92 | 3.22 |
| A18 | 16"ø , ½" WALL | 16.73 | 12.63 | A-1+II-4+B9 | 18.62 | 0.52 | 12.78 | A-1+B4 | 20.92 | 0.52 |
| A19 | 10"ø , ½" WALL | 24.30 | 59.98 | A-1+II-4+B12 | 14.12 | 3.73 | 38.20 | A-3+B4 | 20.92 | 2.37 |
| A20 | 10"ø , ½" WALL | 24.30 | 49.65 | A-3+II-4+B12 | 14.12 | 3.08 | 26.30 | A-1+B3 | 20.92 | 1.63 |
| A21 | 16"ø , ½" WALL | 16.73 | 85.53 | A-3+II-4+B11 | 18.62 | 3.51 | 6.24 | A-1+II-5 | 20.92 | 0.26 |
| A22 | 10"ø , ½" WALL | 24.30 | 49.81 | A-3+II-4+B10 | 14.12 | 3.09 | 14.09 | A-1+II-4+B11 | 20.92 | 0.88 |
| A23 | 10"ø , ½" WALL | 24.30 | 59.79 | A-1+II-4+B10 | 14.12 | 3.71 | 14.26 | A-3+II-5 | 20.92 | 0.89 |
| A24 | 16"ø , ½" WALL | 16.73 | 90.67 | A-3+II-+B9 | 18.62 | 3.72 | 0.00 | - | 20.92 | 0.00 |
| B1 | 10"ø , ½" WALL | 16.72 | 0.00 | - | 16.90 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| B3 | 10"ø , ½" WALL | 16.72 | 0.00 | - | 16.90 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| B4 | 10"ø , ½" WALL | 10.06 | 49.15 | A-1+B5 | 18.89 | 3.05 | 0.00 | - | 20.92 | 0.00 |
| B5 | 10"ø , ½" WALL | 10.06 | 0.00 | - | 18.89 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| B8 | 10"ø , ½" WALL | 21.95 | 56.64 | A-1+B5 | 15.04 | 3.52 | 0.00 | - | 20.92 | 0.00 |
| B10 | 10"ø , ½" WALL | 20.12 | 49.15 | A-3+B6 | 15.72 | 3.05 | 0.00 | - | 20.92 | 0.00 |
| B11 | 10"ø , ½" WALL | 20.12 | 0.00 | - | 15.72 | 0.00 | 24.57 | A-1+B5 | 20.92 | 1.53 |
| B14 | 10"ø , ½" WALL | 29.78 | 48.50 | A-1+B6 | 11.77 | 3.01 | 0.00 | - | 20.92 | 0.00 |
| B16 | 10"ø , ½" WALL | 30.17 | 36.17 | A-1+II-5 | 11.59 | 2.25 | 87.25 | A-2+II-6 | 20.92 | 5.42 |
| B17 | 10"ø , ½" WALL | 30.17 | 36.36 | A-1+II-5 | 11.59 | 2.26 | 87.44 | A-2+II-6 | 20.92 | 5.43 |
| B19 | 10"ø , ½" WALL | 24.3 | 100.51 | A-1+II-6 | 14.12 | 6.24 | 41.67 | A-1+II-5 | 20.92 | 2.59 |
| B20 | 10"ø , ½" WALL | 24.3 | 74.71 | A-1+II-6 | 14.12 | 4.64 | 31.16 | A-2+II-5 | 20.92 | 1.94 |
| B22 | 10"ø , ½" WALL | 24.3 | 74.94 | A-1+II-6 | 14.12 | 4.65 | 31.38 | A-2+II-5 | 20.92 | 1.95 |
| B23 | 10"ø , ½" WALL | 24.3 | 100.73 | A-1+II-6 | 14.12 | 6.26 | 41.89 | A-2+II-5 | 20.92 | 2.60 |
| C1 | 16"ø, 0.656" WALL | 16.72 | 290.32 | A-3+II-7 | 18.59 | 9.18 | 40.80 | A-1+II-5 | 20.92 | 1.29 |
| C2 | 16"ø, 0.656" WALL | 16.72 | 463.32 | A-3+II-7 | 18.59 | 14.65 | 142.94 | A-1+II-5 | 20.92 | 4.52 |
| C3 | 16"ø, 0.656" WALL | 16.72 | 268.52 | A-3+II-7 | 18.59 | 8.49 | 62.54 | A-1+II-5 | 20.92 | 1.98 |
| C4 | 10"ø , ½" WALL | 10.06 | 0.00 | - | 18.89 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C5 | 10"ø , ½" WALL | 10.06 | 0.00 | - | 18.89 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C6 | 16"ø, 0.656" WALL | 16.72 | 243.53 | A-3+II-7 | 18.59 | 7.70 | 73.42 | A-1+II-5 | 20.92 | 2.32 |
| C7 | 16"ø, 0.656" WALL | 16.72 | 409.03 | A-3+II-7 | 18.59 | 12.94 | 158.02 | A-1+II-5 | 20.92 | 5.00 |
| C8 | 10"ø , ½" WALL | 21.95 | 0.00 | - | 15.04 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C9 | 16"ø, 0.656" WALL | 16.72 | 233.03 | A-3+II-7 | 18.59 | 7.37 | 81.69 | A-1+II-5 | 20.92 | 2.58 |
| C10 | 10"ø , ½" WALL | 20.12 | 0.00 | - | 15.72 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C11 | 10"ø , ½" WALL | 20.12 | 0.00 | - | 15.72 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C12 | 16"ø, 0.656" WALL | 16.72 | 168.69 | A-3+II-7 | 18.59 | 5.33 | 74.70 | A-3+II-7 | 20.92 | 2.36 |
| C13 | 16"ø, 0.656" WALL | 16.72 | 297.85 | A-3+II-7 | 18.59 | 9.42 | 135.64 | A-1+II-5 | 20.92 | 4.29 |
| C14 | 10"ø , ½" WALL | 29.78 | 0.00 | - | 11.77 | 0.00 | 0.00 | - | 20.92 | 0.00 |
| C15 | 16"ø, 0.656" WALL | 16.72 | 165.05 | A-3+II-7 | 18.59 | 5.22 | 75.22 | A-1+II-5 | 20.92 | 2.38 |
| C16 | 10"ø , ½" WALL | 30.17 | 39.56 | A-1+II-5 | 11.59 | 2.46 | 76.58 | A-2+II-6 | 20.92 | 4.76 |
| C17 | 10"ø , ½" WALL | 30.17 | 39.80 | A-1+II-5 | 11.59 | 2.47 | 76.47 | A-2+II-6 | 20.92 | 4.75 |
| C18 | 16"ø, 0.656" WALL | 16.72 | 45.46 | A-1+II-6 | 18.59 | 1.44 | 25.61 | A-2+II-5 | 20.92 | 0.81 |
| C19 | 10"ø , ½" WALL | 24.30 | 88.22 | A-2+II-6 | 14.12 | 5.48 | 45.58 | A-1+II-5 | 20.92 | 2.83 |
| C20 | 10"ø , ½" WALL | 24.30 | 53.58 | A-1+II-6 | 14.12 | 3.33 | 22.83 | A-2+II-5 | 20.92 | 1.42 |
| C21 | 16"ø, 0.656" WALL | 16.72 | 109.74 | A-1+II-6 | 18.59 | 3.47 | 53.56 | A-2+II-5 | 20.92 | 1.69 |
| C22 | 10"ø , ½" WALL | 24.30 | 53.41 | A-1+II-6 | 14.12 | 3.32 | 23.06 | A-2+II-5 | 20.92 | 1.43 |
| C23 | 10"ø , ½" WALL | 24.30 | 88.09 | A-2+II-6 | 14.12 | 5.47 | 45.85 | A-1+II-5 | 20.92 | 2.85 |
| C24 | 16"ø, 0.656" WALL | 16.72 | 47.57 | A-1+II-6 | 18.59 | 1.50 | 24.34 | A-2+II-5 | 20.92 | 0.77 |

| MEMBER NO. | PIPE SIZE | MEMBER LENGTH (FT) | MAX COMPRESSION LOAD (KIPS) | LOAD CASE | Fa (KSI) | fa (KSI) | MAX TENSION LOAD (KIPS) | LOAD CASE | Ft (KSI) | ft (KSI) |
|---|---|---|---|---|---|---|---|---|---|---|
| D1 | 10"ø , ⅝" WALL | 12.15 | 165.78 | A-3 | 18.28 | 8.34 | 0.00 | - | 20.92 | 0.00 |
| D2 | 10"ø , ⅝" WALL | 12.15 | 169.94 | A-3 | 18.28 | 8.51 | 0.00 | - | 20.92 | 0.00 |
| D3 | 8"ø , ½" WALL | 20.67 | 0.00 | - | 13.40 | 0.00 | 67.92 | A-3 | 20.92 | 5.32 |
| D4 | 8"ø , ½" WALL | 20.67 | 67.92 | A-3 | 13.40 | 5.32 | 0.00 | - | 20.92 | 0.00 |
| D5 | 10"ø , ½" WALL | 12.15 | 39.61 | A-3 | 18.31 | 2.46 | 0.00 | - | 20.92 | 0.00 |
| D6 | 10"ø , ½" WALL | 12.15 | 0.00 | - | 18.31 | 0.00 | 37.71 | A-3 | 20.92 | 2.34 |
| D7 | 8"ø , ½" WALL | 20.67 | 0.00 | - | 13.40 | 0.00 | 59.41 | A-3 | 20.92 | 4.66 |
| D8 | 8"ø , ½" WALL | 20.67 | 59.41 | A-3 | 13.40 | 4.66 | 0.00 | - | 20.92 | 0.00 |
| D9 | 10"ø , ½" WALL | 12.15 | 35.21 | A-3+II-5 | 18.31 | 2.16 | 18.83 | A-1+II-7 | 20.92 | 1.17 |
| D10 | 10"ø , ½" WALL | 12.15 | 1.23 | A-1+II-5 | 18.31 | 0.08 | 52.38 | A-3+II-7 | 20.92 | 3.25 |
| D11 | 8"ø , ½" WALL | 20.67 | 39.08 | A-1+II-6 | 13.40 | 3.06 | 52.95 | A-3+II-5 | 20.92 | 4.15 |
| D12 | 8"ø , ½" WALL | 20.67 | 84.3 | A-3+II-7 | 13.40 | 6.61 | 8.37 | A-1+II-5 | 20.92 | 0.66 |
| D13 | 10"ø , ½" WALL | 12.15 | 28.00 | A-3+II-5 | 18.31 | 1.74 | 17.71 | A-1+II-6 | 20.92 | 1.10 |
| D14 | 10"ø , ½" WALL | 12.15 | 5.12 | A-1+II-5 | 18.31 | 0.32 | 40.64 | A-3+II-7 | 20.92 | 2.52 |
| D15 | 8"ø , ½" WALL | 20.67 | 41.46 | A-1+II-6 | 13.40 | 3.25 | 39.03 | A-3+II-5 | 20.92 | 3.06 |
| D16 | 8"ø , ½" WALL | 20.67 | 62.68 | A-3+II-7 | 13.40 | 4.91 | 17.17 | A-1+II-5 | 20.92 | 1.35 |
| E3 | 8"ø , ½" WALL | 20.67 | 0.00 | - | 13.40 | 0.00 | 105.47 | A-3 | 20.92 | 8.27 |
| E4 | 8"ø , ½" WALL | 20.67 | 105.47 | A-3 | 13.40 | 8.27 | 0.00 | - | 20.92 | 0.00 |
| E5 | 10"ø , ½" WALL | 12.15 | 56.46 | A-3 | 18.31 | 3.51 | 0.00 | - | 20.92 | 0.00 |
| E6 | 10"ø , ½" WALL | 12.15 | 0.00 | - | 18.31 | 0.00 | 64.54 | A-3 | 20.92 | 4.01 |
| E7 | 8"ø , ½" WALL | 20.67 | 0.00 | - | 13.40 | 0.00 | 89.64 | A-3 | 20.92 | 7.03 |
| E8 | 8"ø , ½" WALL | 20.67 | 89.64 | A-3 | 13.40 | 7.03 | 0.00 | - | 20.92 | 0.00 |
| E9 | 10"ø , ½" WALL | 12.15 | 53.62 | A-3+II-5 | 18.31 | 3.33 | 40.65 | A-1+II-6* | 20.92 | 2.52 |
| E10 | 10"ø , ½" WALL | 12.15 | 11.94 | A-1+II-5 | 18.31 | 0.74 | 84.4 | A-3+II-7 | 20.92 | 5.24 |
| E11 | 8"ø , ½" WALL | 20.67 | 76.88 | A-1+II-6 | 13.40 | 6.03 | 85.14 | A-3+II-5 | 20.92 | 6.67 |
| E12 | 8"ø , ½" WALL | 20.67 | 137.70 | A-3+II-7 | 13.40 | 10.79 | 28.03 | A-1+II-5 | 20.92 | 2.20 |
| E13 | 10"ø , ½" WALL | 12.15 | 46.58 | A-3+II-5 | 18.31 | 3.00 | 49.38 | A-1+II-6 | 20.92 | 3.07 |
| E14 | 10"ø , ½" WALL | 12.15 | 19.64 | A-1+II-5 | 18.31 | 1.22 | 79.82 | A-3+II-7 | 20.92 | 4.96 |
| E15 | 8"ø , ½" WALL | 20.67 | 93.71 | A-3+II-6 | 13.40 | 7.34 | 75.22 | A-3+II-5 | 20.92 | 5.89 |
| E16 | 8"ø , ½" WALL | 20.67 | 128.37 | A-3+II-7 | 13.40 | 10.06 | 43.16 | A-1+II-5 | 20.92 | 3.38 |
| F3 | 8"ø , ½" WALL | 20.67 | 42.76 | A-1+II-4+B11 | 13.40 | 3.35 | 94.41 | A-3 | 20.92 | 7.40 |
| F4 | 8"ø , ½" WALL | 20.67 | 94.41 | A-3 | 13.40 | 7.40 | 42.76 | A-1+II-4+B11 | 20.92 | 3.35 |
| F5 | 10"ø , ½" WALL | 12.15 | 55.07 | A-3 | 18.31 | 3.42 | 24.75 | A-1+II-4+B11 | 20.92 | 1.54 |
| F6 | 10"ø , ½" WALL | 12.15 | 19.57 | A-1+II-4+B11 | 18.31 | 1.22 | 48.16 | A-3 | 20.92 | 2.99 |
| F7 | 8"ø , ½" WALL | 20.67 | 0.00 | - | 13.40 | 0.00 | 77.18 | A-3 | 20.92 | 6.05 |
| F8 | 8"ø , ½" WALL | 20.67 | 77.18 | A-3 | 13.40 | 6.05 | 0.00 | - | 20.92 | 0.00 |
| F9 | 10"ø , ½" WALL | 12.15 | 44.99 | A-3 | 18.31 | 2.79 | 10.60 | A-1+II-7 | 20.92 | 0.66 |
| F10 | 10"ø , ½" WALL | 12.15 | 0.00 | - | 18.31 | 0.00 | 56.86 | A-3+II-7 | 20.92 | 3.53 |
| F11 | 8"ø , ½" WALL | 20.67 | 30.69 | A-1+II-7 | 13.40 | 2.41 | 60.44 | A-3+II-5 | 20.92 | 4.74 |
| F12 | 8"ø , ½" WALL | 20.67 | 92.77 | A-3+II-7 | 13.40 | 7.27 | 0.00 | - | 20.92 | 0.00 |
| F13 | 10"ø , ½" WALL | 12.15 | 34.01 | A-3 | 18.31 | 2.11 | 13.37 | A-1+II-7 | 20.92 | 0.83 |
| F14 | 10"ø , ½" WALL | 12.15 | 4.71 | A-1+II-5 | 18.31 | 0.29 | 43.35 | A-3+II-7 | 20.92 | 2.69 |
| F15 | 8"ø , ½" WALL | 20.67 | 39.76 | A-1+II-6 | 13.40 | 3.12 | 42.16 | A-3+II-5 | 20.92 | 3.30 |
| F16 | 8"ø , ½" WALL | 20.67 | 68.45 | A-3+II-7 | 13.40 | 5.36 | 14.93 | A-1+II-5 | 20.92 | 1.17 |

NOTES:
ALL LOAD COMBINATIONS WERE REDUCED BY 33%

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO. 1**

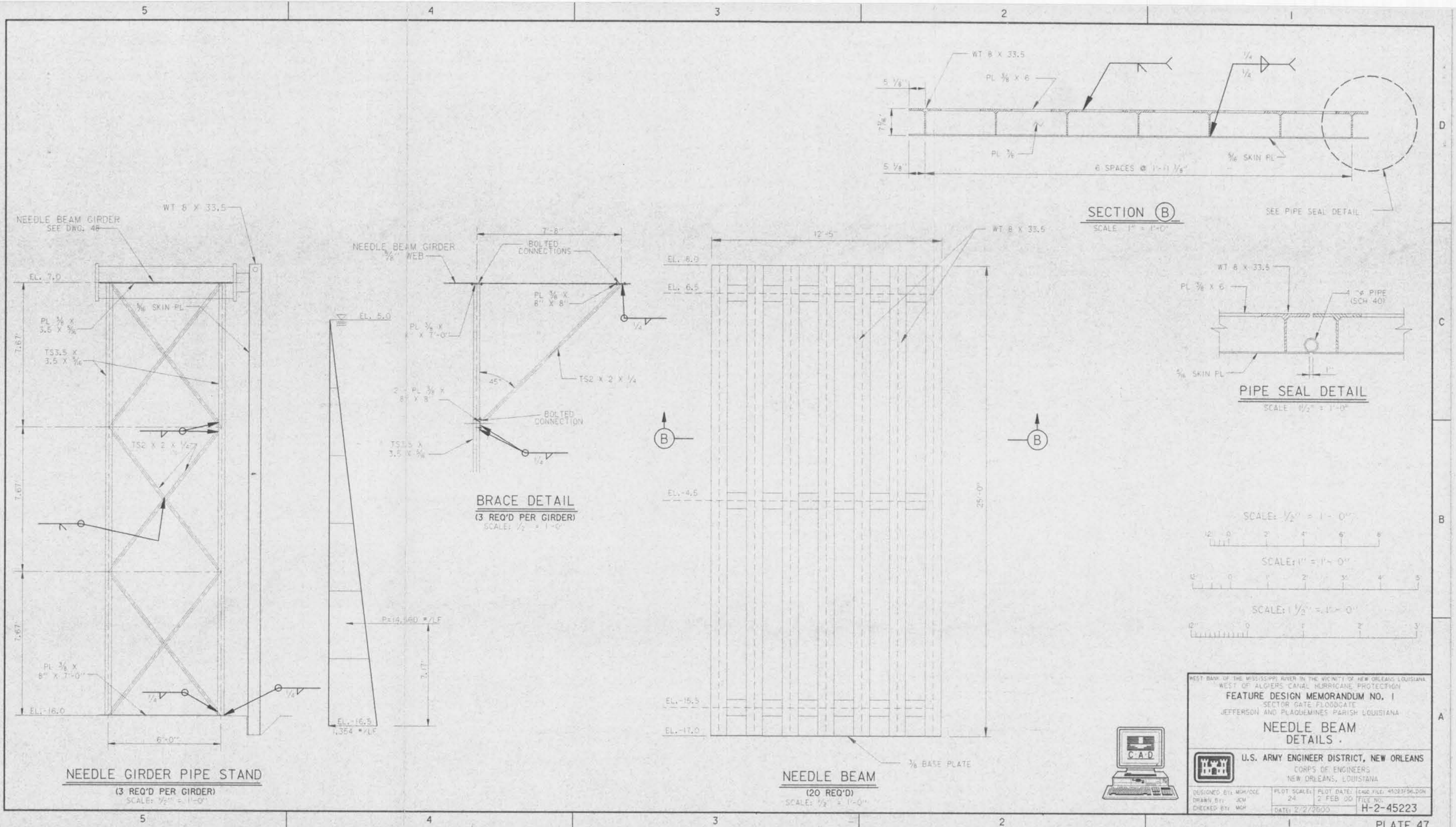
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE MEMBER STRESS

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

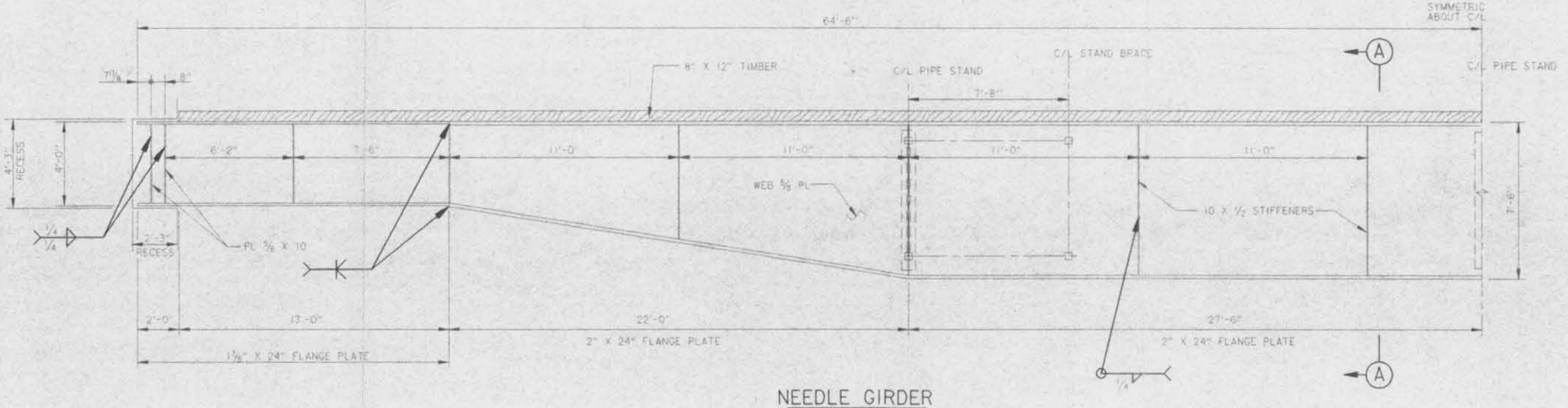
DESIGNED BY: CCE
DRAWN BY: HJH
CHECKED BY: MHC

PLOT SCALE: 1 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B10.DGN
DATE: 2/2/2000 | FILE NO. H-2-45223

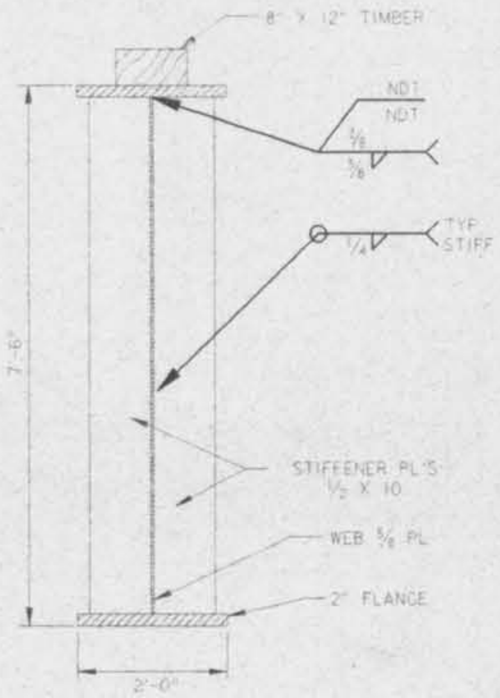


WT 8 X 33.5
PL 3/8 X 6
5 1/8"
7 1/16"
PL 3/8
5/16 SKIN PL
6 SPACES @ 1'-11 1/8"
SEE PIPE SEAL DETAIL
SECTION B
SCALE 1" = 1'-0"
NEEDLE BEAM GIRDER
SEE DWG. 48
WT 8 X 33.5
EL. 7.0
5/16 SKIN PL
PL 3/8 X 3.5 X 5/16
TS3.5 X 3.5 X 3/16
TS2 X 2 X 1/4
PL 3/8 X 8" X 7'-0"
EL. -16.0
6'-0"
7.67'
NEEDLE GIRDER PIPE STAND
(3 REQ'D PER GIRDER)
SCALE: 1/2" = 1'-0"
EL. 5.0
P=14,560 #/LF
EL. -16.5
1,354 #/LF
NEEDLE BEAM GIRDER
5/8" WEB
7'-8"
BOLTED CONNECTIONS
PL 3/8 X 8" X 8"
PL 3/4 X 8" X 7'-0"
45°
TS2 X 2 X 1/4
2 - PL 3/8 X 8" X 8"
BOLTED CONNECTION
TS3.5 X 3.5 X 3/16
BRACE DETAIL
(3 REQ'D PER GIRDER)
SCALE: 1/2" = 1'-0"
12'-5"
WT 8 X 33.5
EL. 8.0
EL. 6.5
EL. -4.5
EL. -15.5
EL. -17.0
25'-0"
3/8 BASE PLATE
NEEDLE BEAM
(20 REQ'D)
SCALE: 1/2" = 1'-0"
WT 8 X 33.5
PL 3/8 X 6
4" ϕ PIPE (SCH 40)
5/16 SKIN PL
1"
PIPE SEAL DETAIL
SCALE 1 1/2" = 1'-0"
SCALE: 1/2" = 1'-0"
SCALE: 1" = 1'-0"
SCALE: 1 1/2" = 1'-0"
C·A·D
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
NEEDLE BEAM
DETAILS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
DESIGNED BY: MGH/CCE
DRAWN BY: JCM
CHECKED BY: MGH
PLOT SCALE: 24
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223


PLATE 47




NEEDLE GIRDER
(2 REQ'D)
SCALE 3/8" = 1'-0"




SECTION (A)
SCALE 3/4" = 1'-0"

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

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

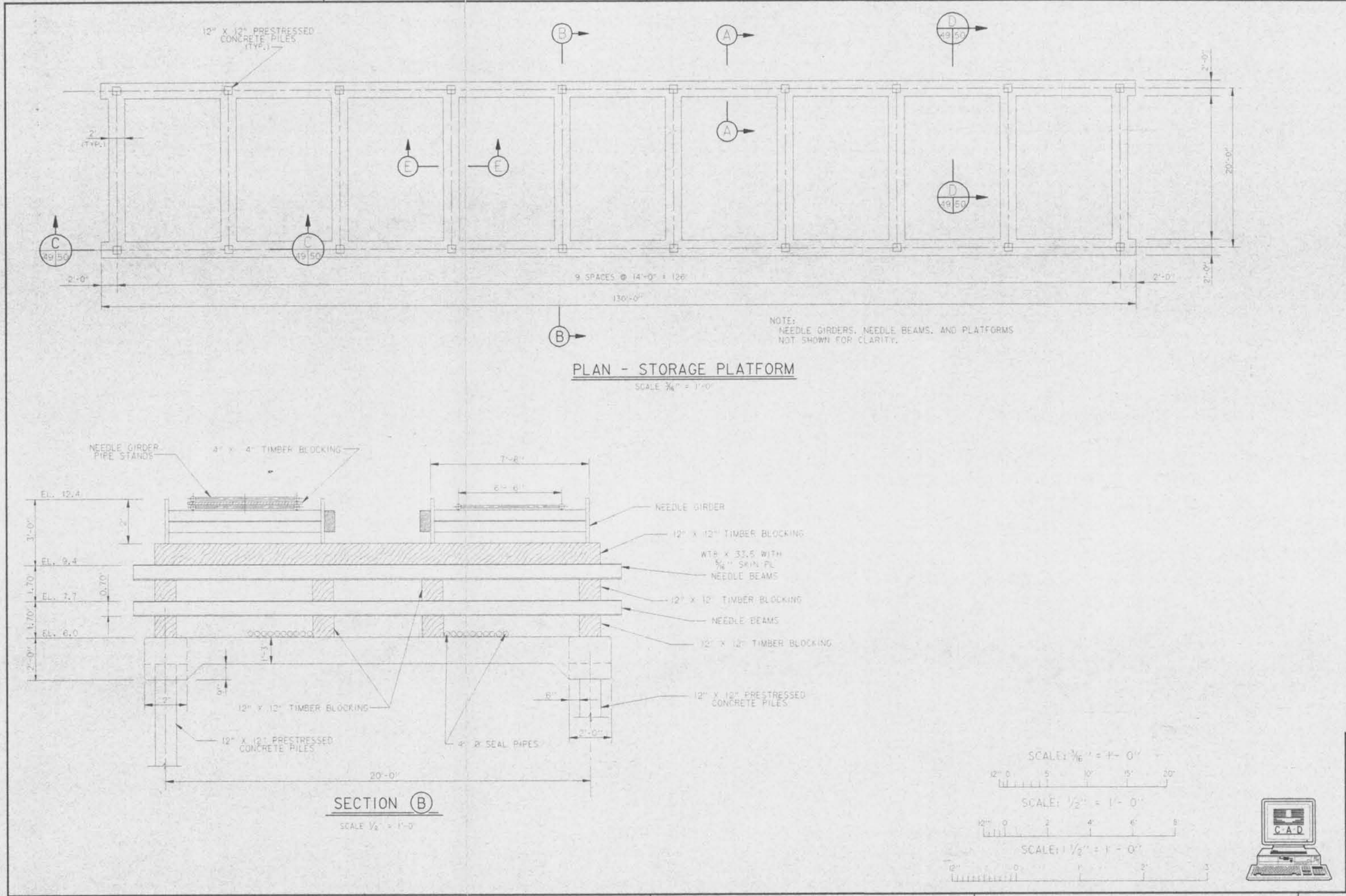
C·A·D

WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL
FEATURE DESIGN MEMORANDUM NO. I
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

NEEDLE GIRDER

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MGH/CCE<br>DRAWN BY: JCM<br>CHECKED BY: MGH | PLOT SCALE: 32 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P56.dgn |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS, LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

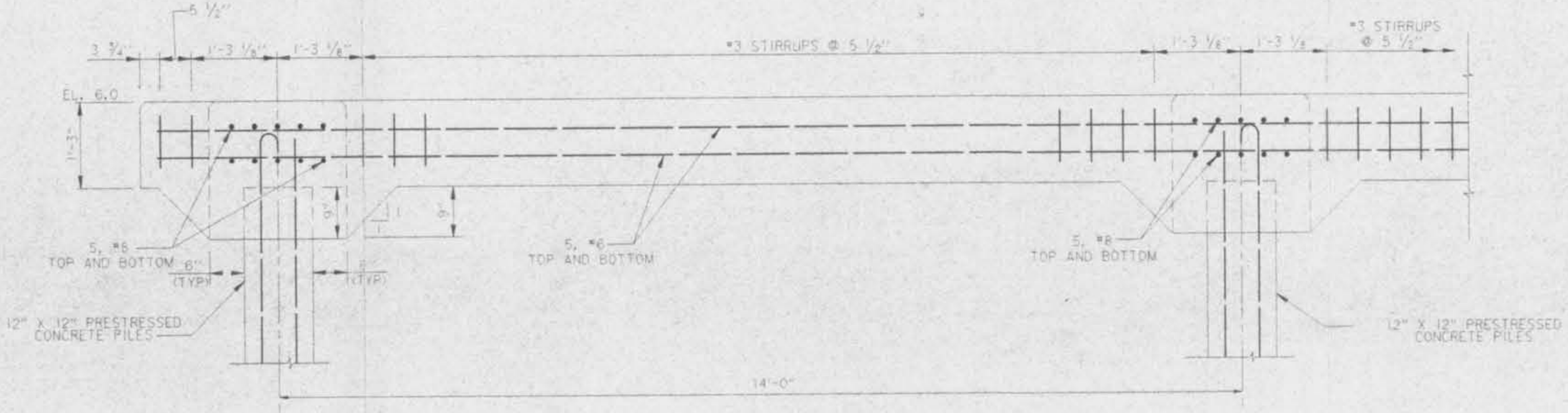
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH, LOUISIANA

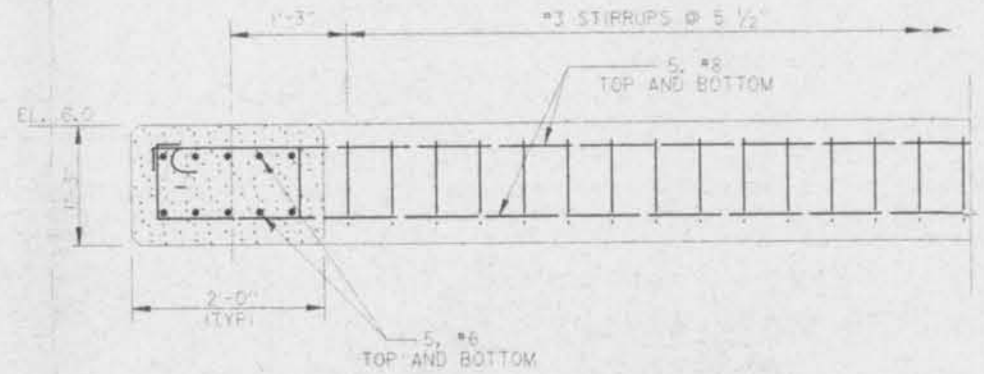
## NEEDLE GIRDER STORAGE PLATFORM

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

| | | |
|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 64 | PLOT DATE: 2 FEB 00 |
| DRAWN BY: JGM | DATE: 2/2/2000 | FILE NO. H-2-45223 |
| CHECKED BY: MHG | | CADD FILE: 45223F64.DGN |




SECTION C 49 50




SECTION D 49 50

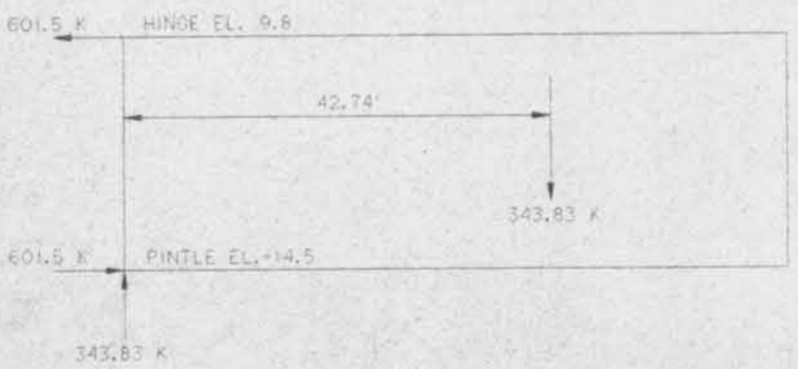
SCALE: 1" = 1'-0"

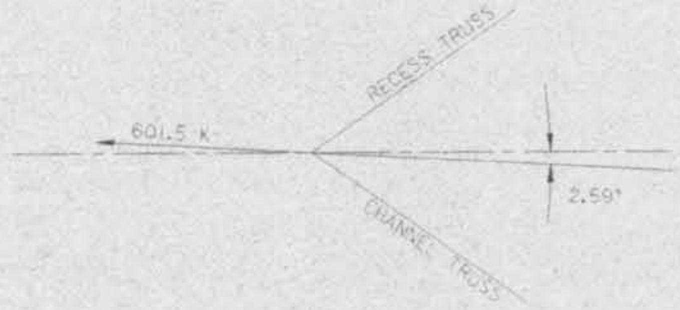
WEST BANK IN THE VICINITY OF NEW ORLEANS HURRICANE PROTECTION PROJECT
WEST OF ALGIERS CANAL
FEATURE DESIGN MEMORANDUM NO.1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

NEEDLE GIRDER
STORAGE PLATFORM DETAILS

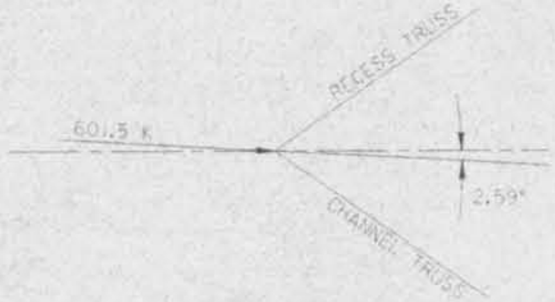
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: CCE
DRAWN BY: CCE
CHECKED BY: MFC
PLOT SCALE: 12
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
FILE NO. H-2-45223



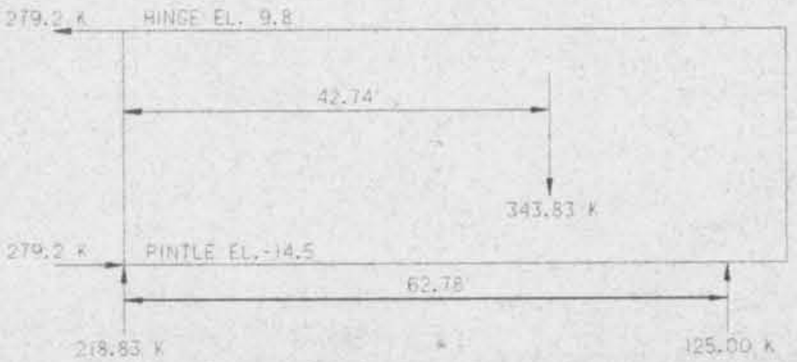



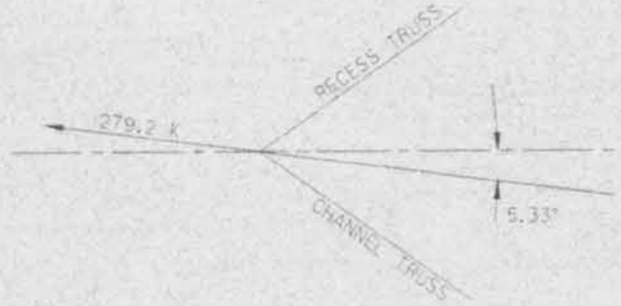

HINGE REACTION



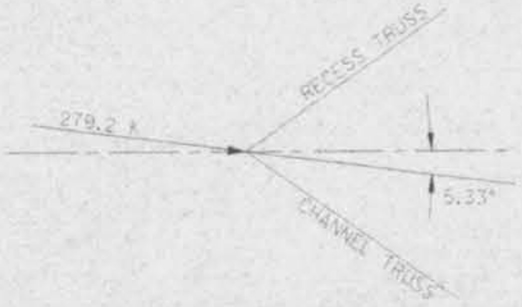

PINTLE REACTION

LOAD CASE A-3



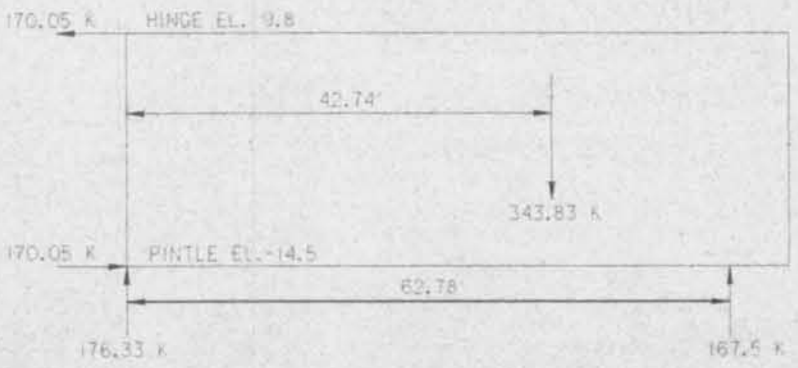



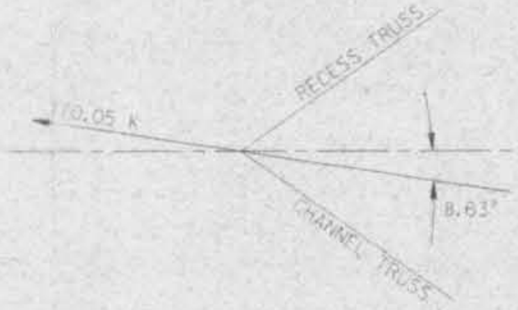

HINGE REACTION



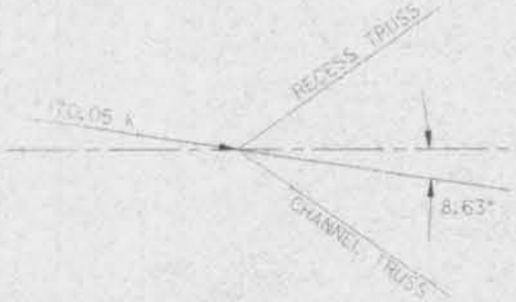

PINTLE REACTION

LOAD CASE A-2




HINGE REACTION




PINTLE REACTION

LOAD CASE A-1

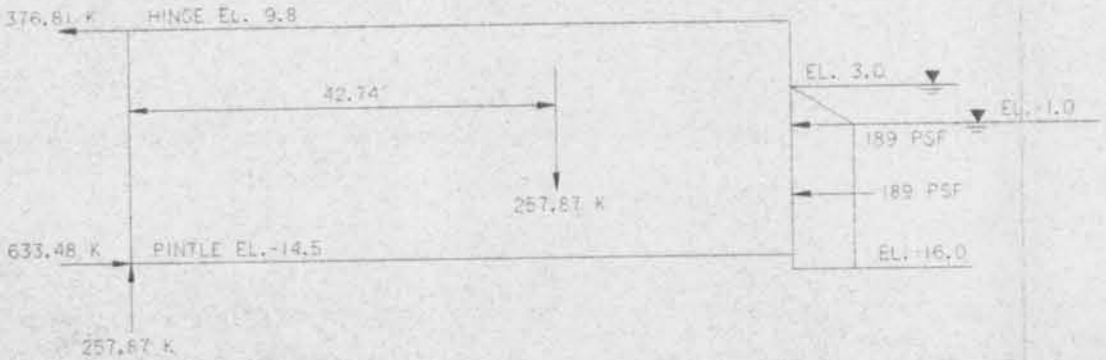
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

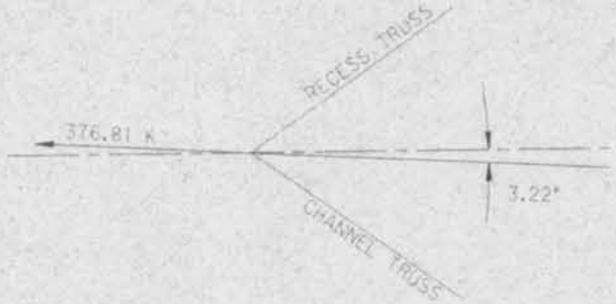
# SECTOR GATE REACTIONS
## DEAD LOAD CONDITION

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

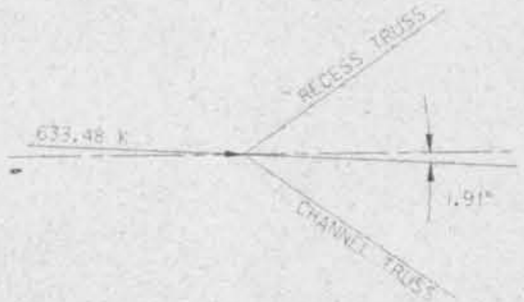
DESIGNED BY: CCE
DRAWN BY: CCE
CHECKED BY: MHC

PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P107.DGN
DATE: 2/2/2000 | FILE NO. H-2-45223



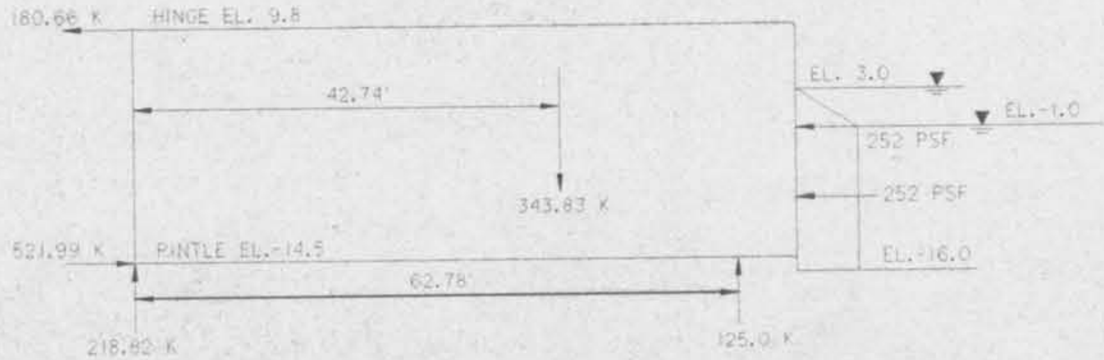

HINGE REACTION

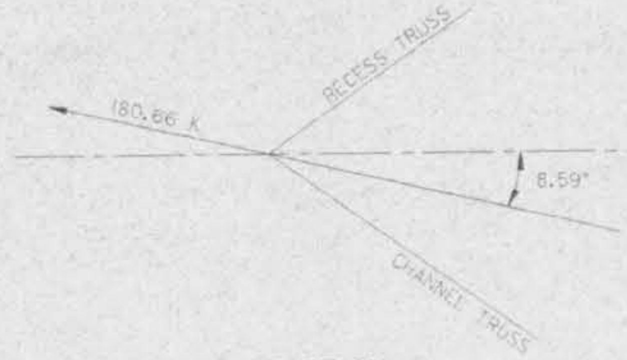



PINTLE REACTION

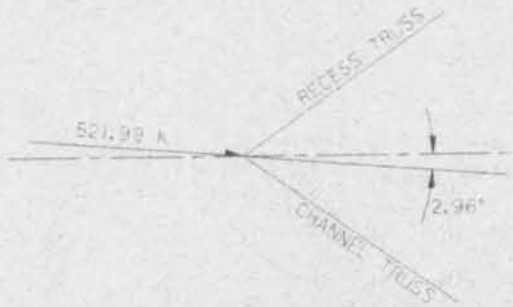
LOAD CASES A-3 AND 11-2

NOTE:
ALL LOADS REDUCED BY 33%.



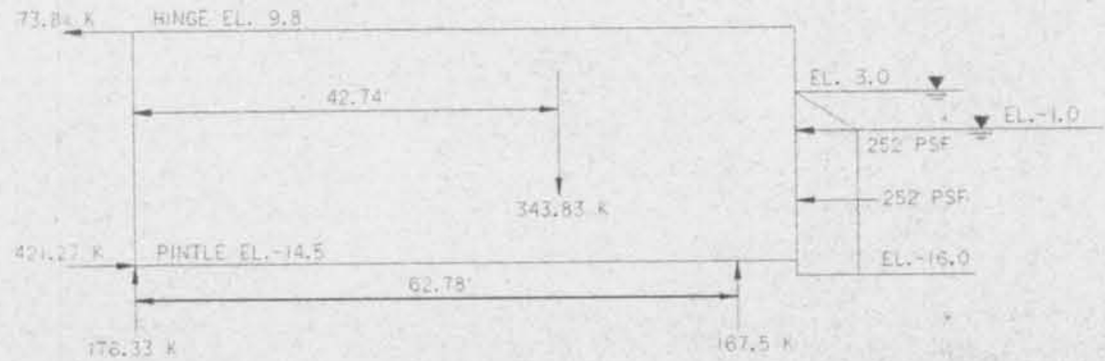



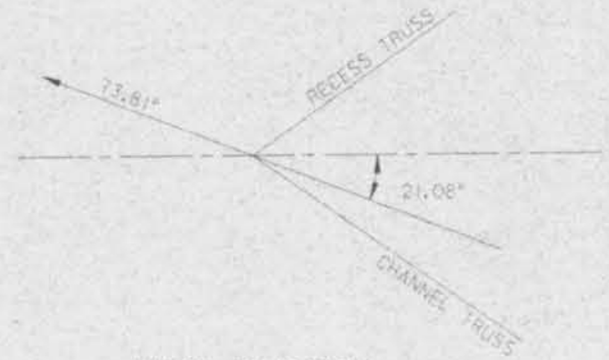

HINGE REACTION



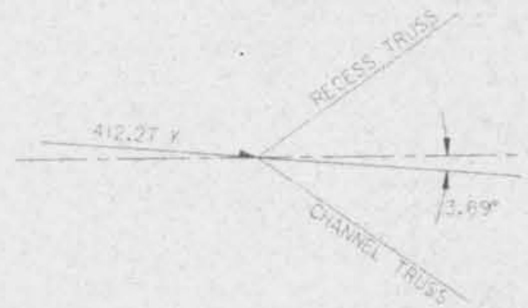

PINTLE REACTION

LOAD CASES A-2 AND 11-2




HINGE REACTION




PINTLE REACTION

LOAD CASES A-1 AND 11-2

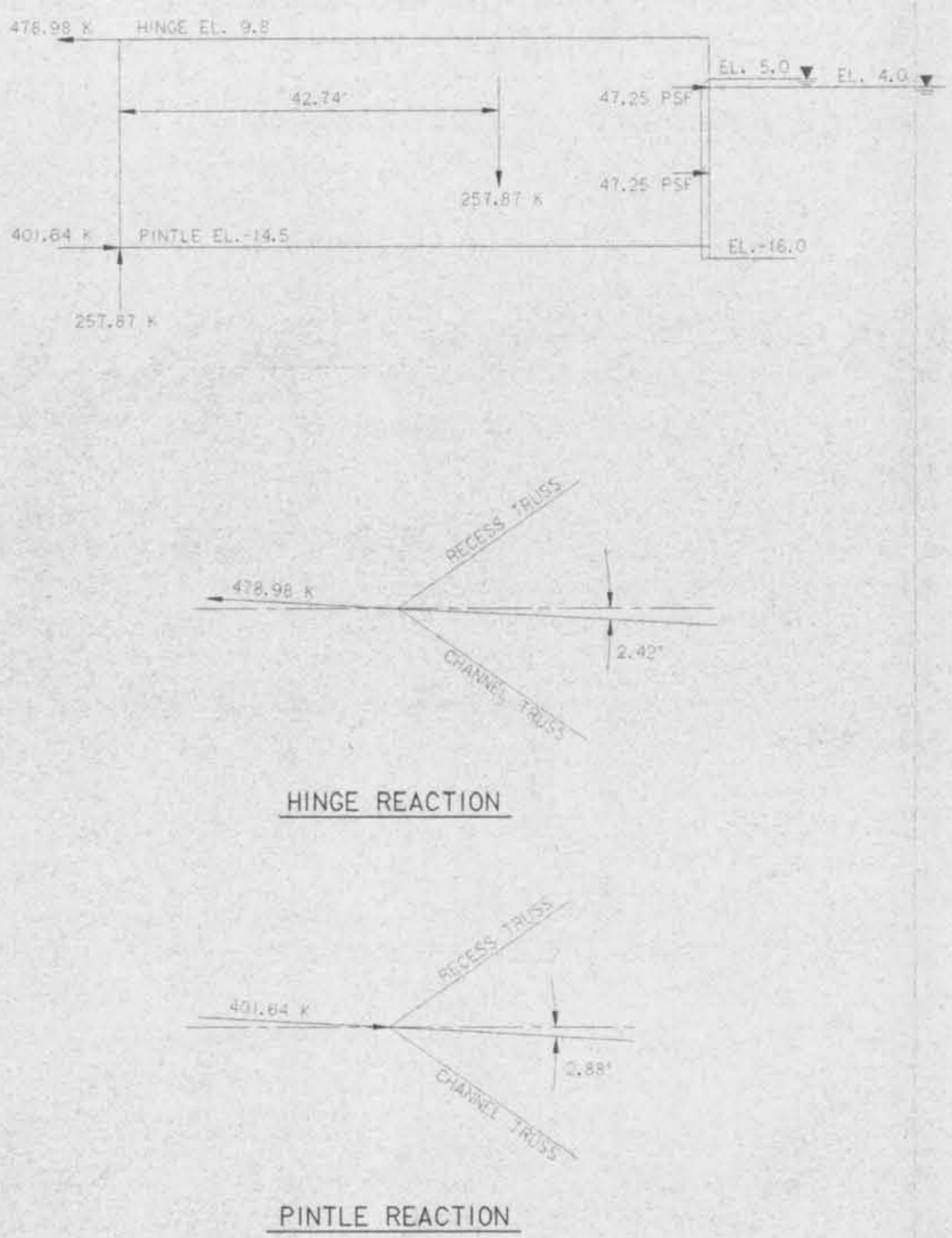
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

SECTOR GATE REACTIONS
LOAD CASE 11-2

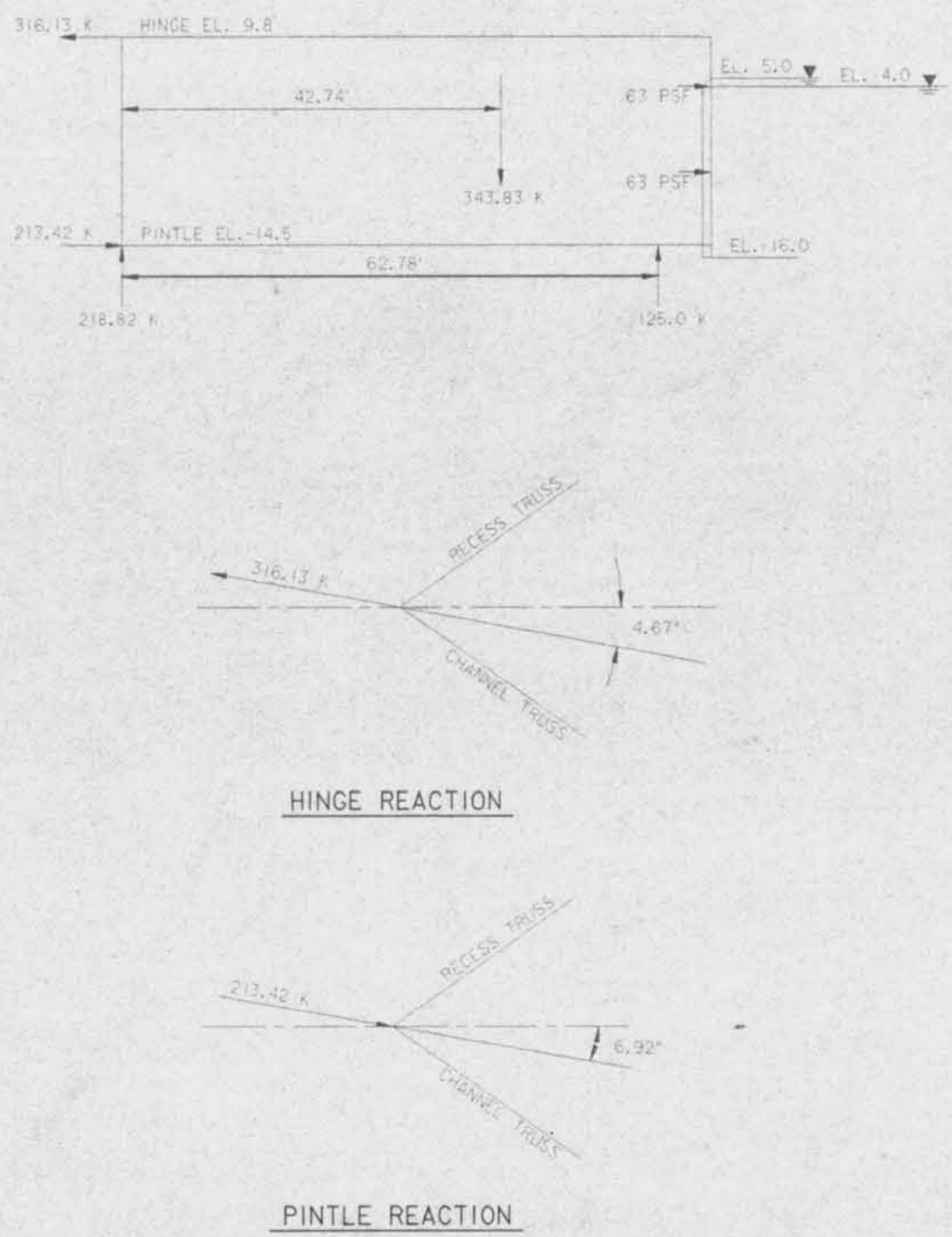
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: CCE
DRAWN BY: CCE
CHECKED BY: MHG

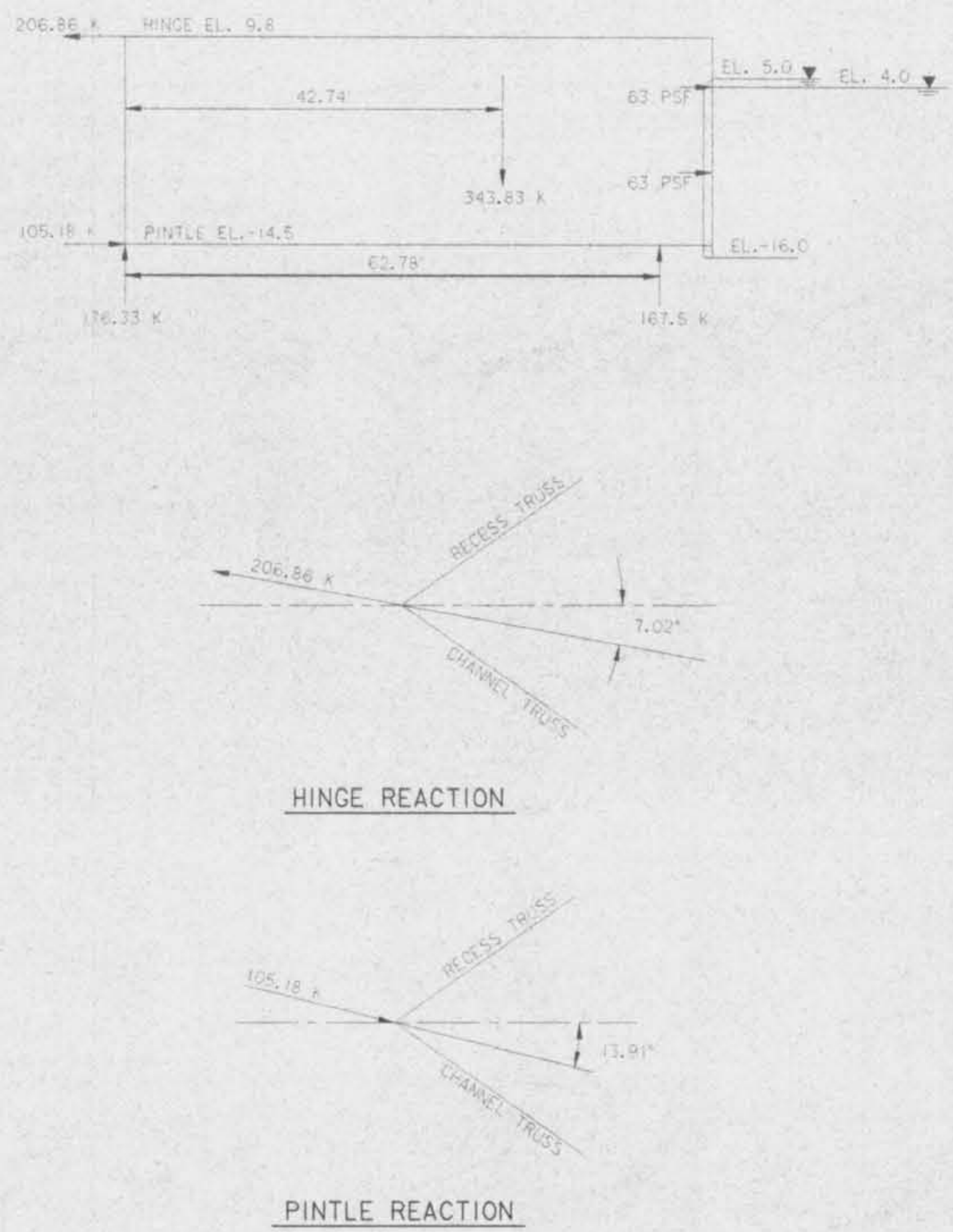
| PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P108.DGN |
|---|---|---|
| DATE: 2/2/2000 | | FILE NO. H-2-45223 |




## LOAD CASES A-3 AND 11-3




## LOAD CASES A-2 AND 11-3




## LOAD CASES A-1 AND 11-3

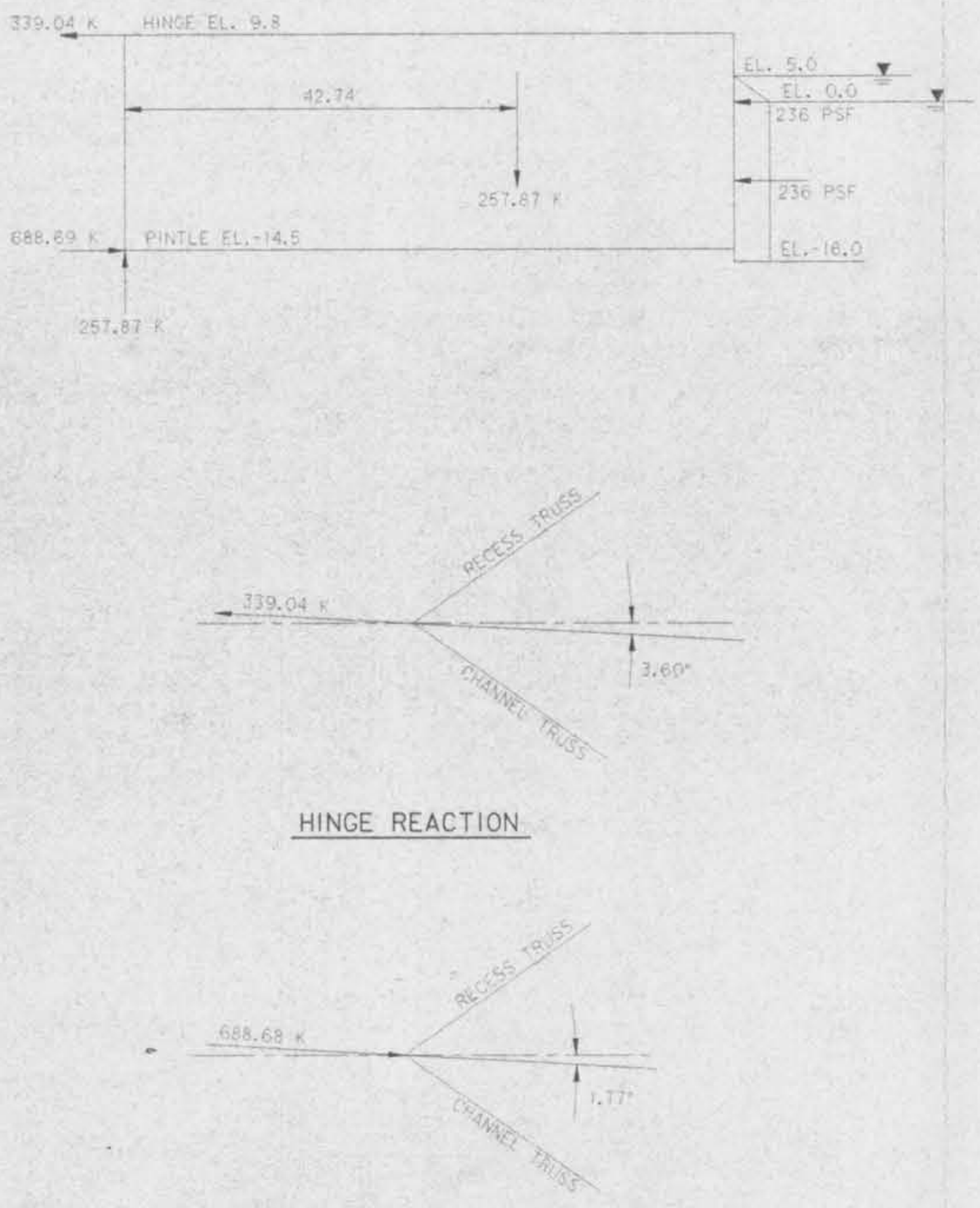
NOTE:
ALL LOADS REDUCED BY 33%.

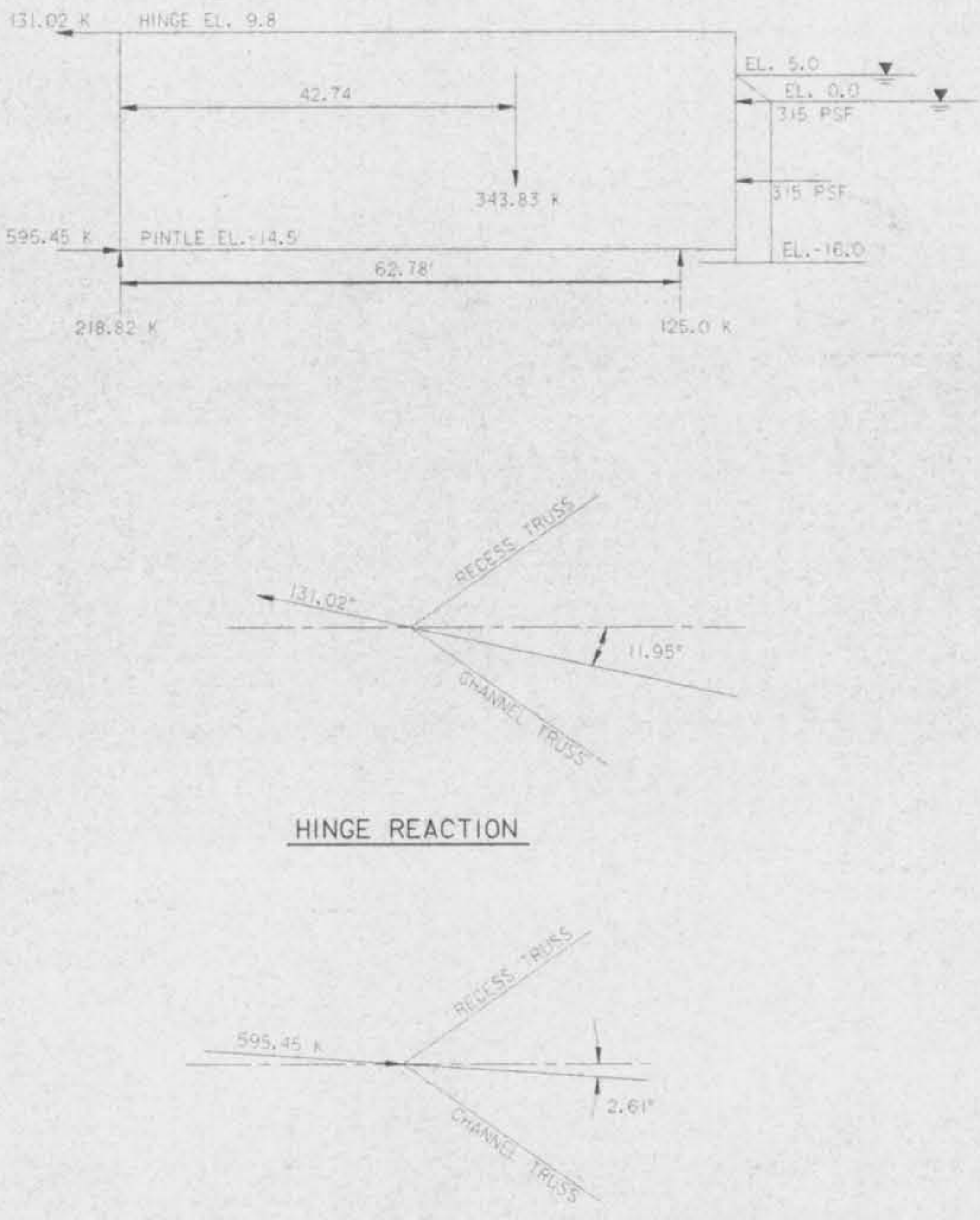
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

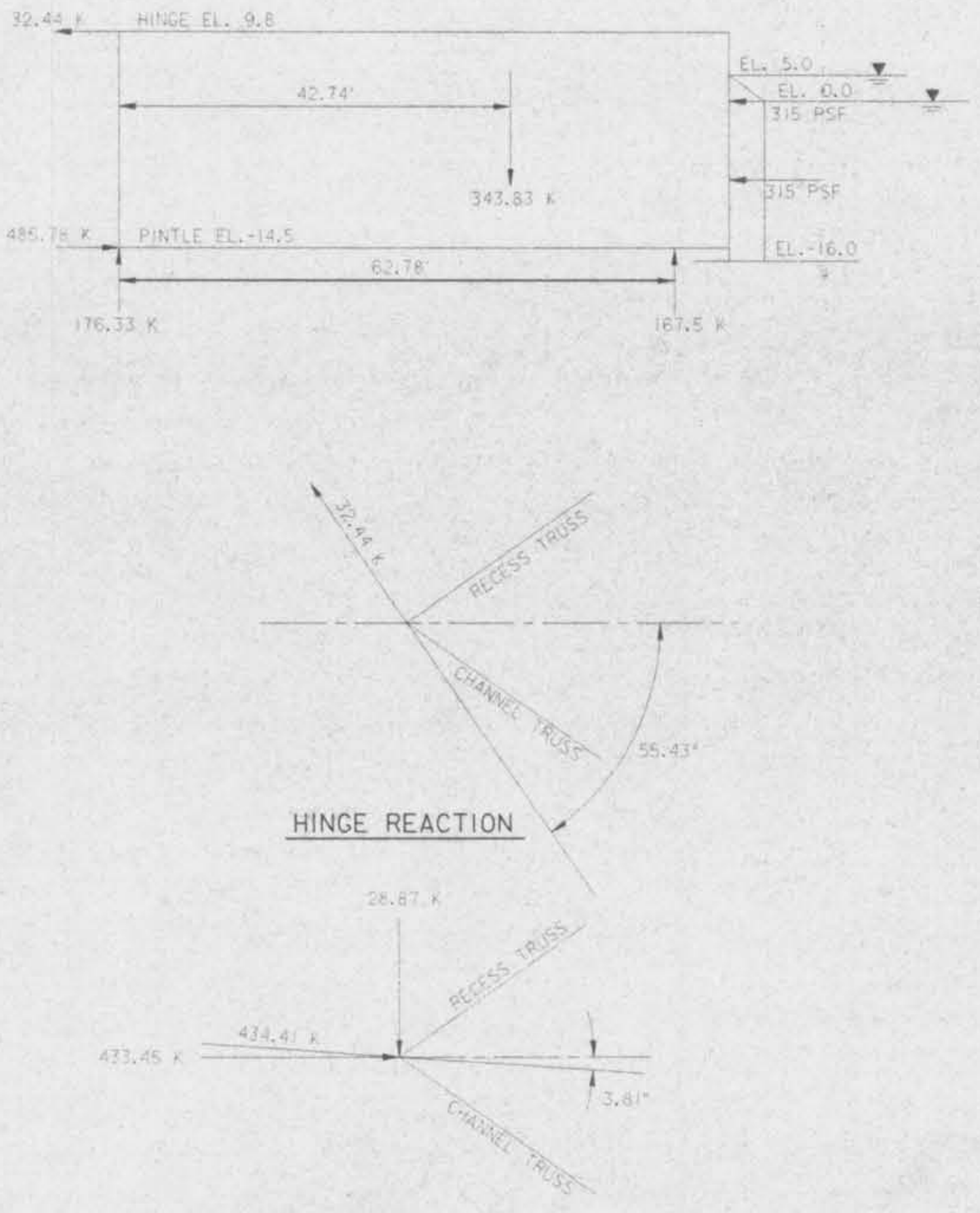
SECTOR GATE REACTIONS
LOAD CASE 11-3

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: CCE<br>CHECKED BY: MHC | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P109.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




LOAD CASES A-3 AND II-4

NOTE:
ALL LOADS ARE REDUCED BY 33%.

LOAD CASES A-2 AND II-4

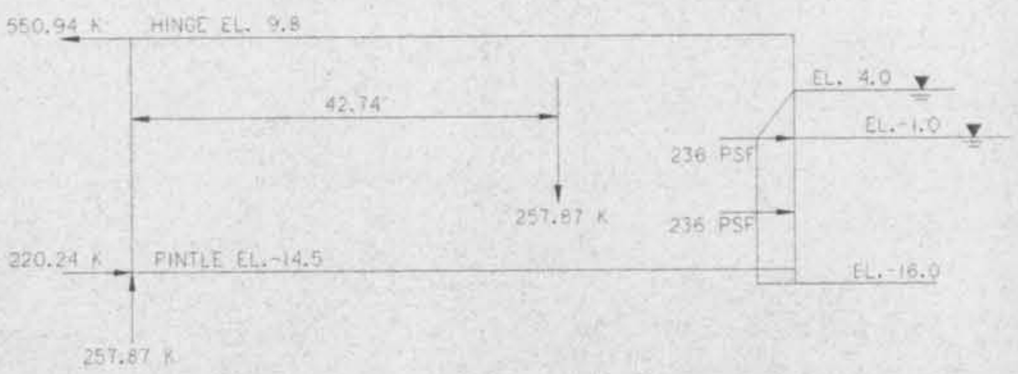
LOAD CASES A-1 AND II-4

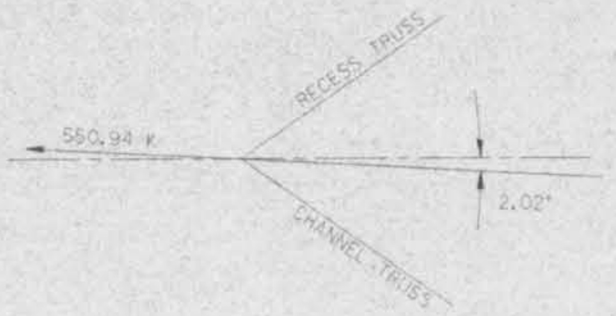
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

SECTOR GATE REACTIONS
LOAD CASE II-4

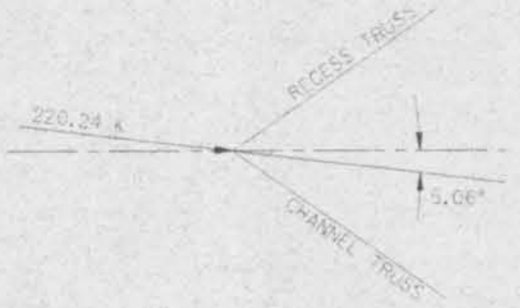
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: CCE<br>CHECKED BY: MHS | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P110.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |



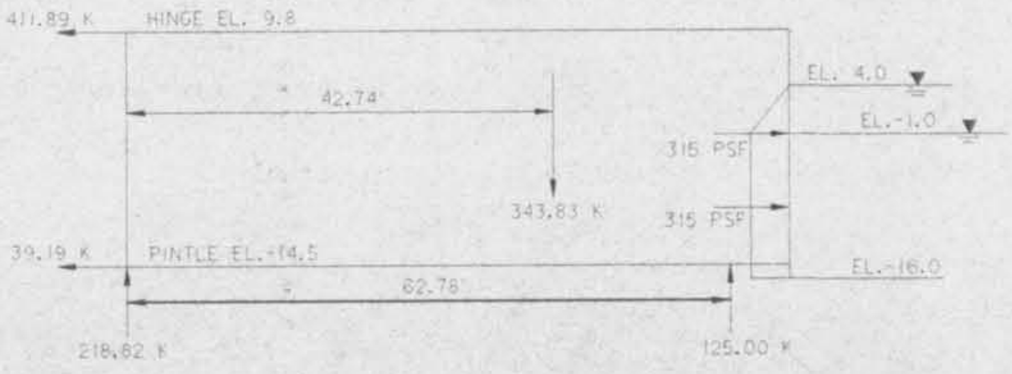

HINGE REACTION

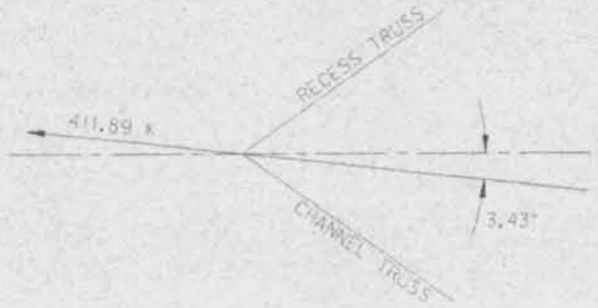



PINTLE REACTION

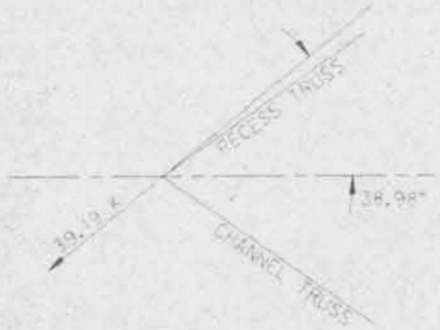
LOAD CASES A-3 AND 11-5

NOTE:
ALL LOADS REDUCED BY 33%.



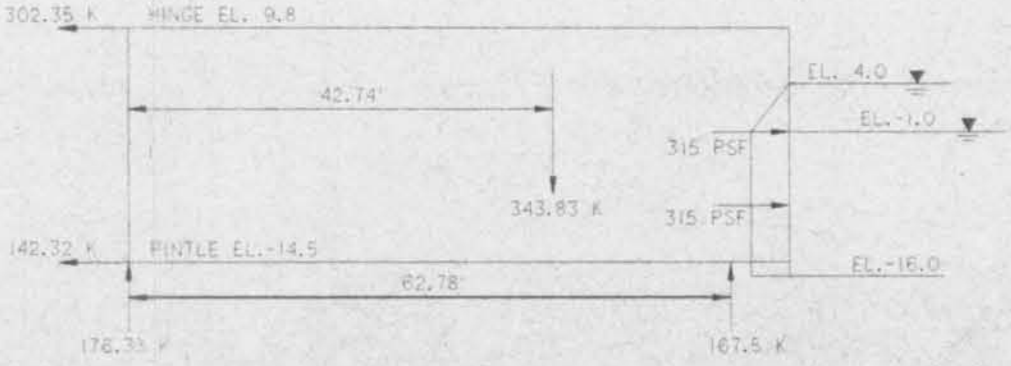



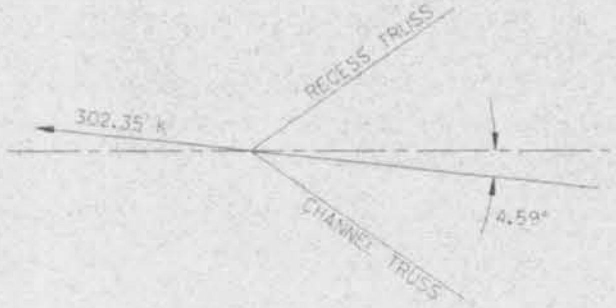

HINGE REACTION



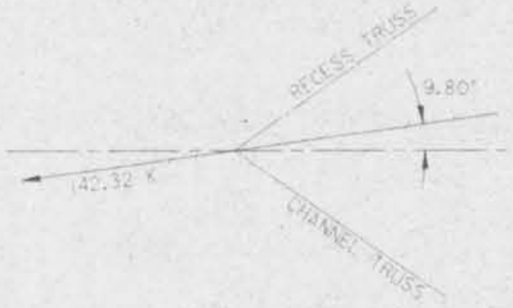

PINTLE REACTION

LOAD CASES A-2 AND 11-5




HINGE REACTION




PINTLE REACTION

LOAD CASES A-1 AND 11-5

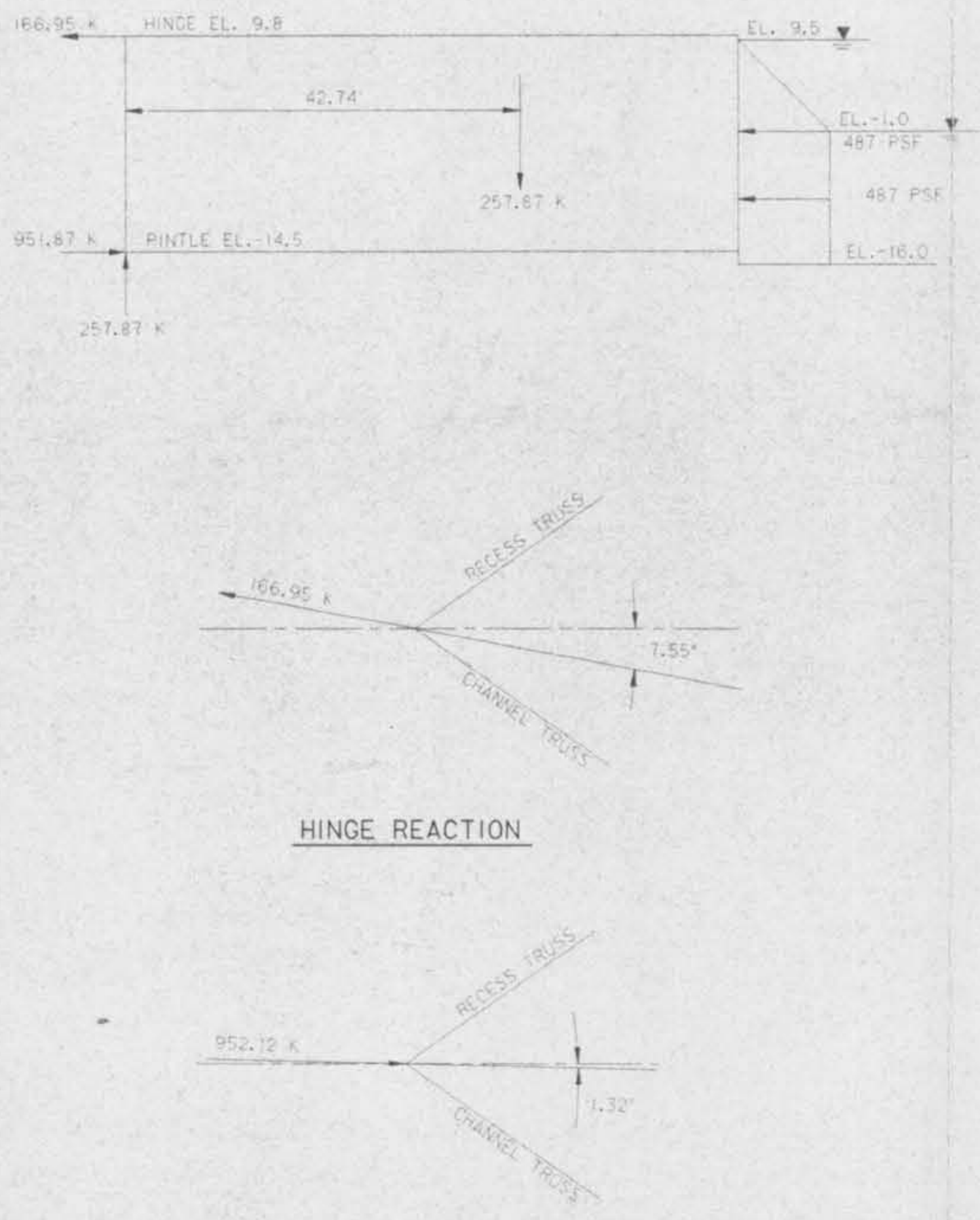
LOAD CASE 11-5

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

SECTOR GATE REACTIONS
LOAD CASE 11-5

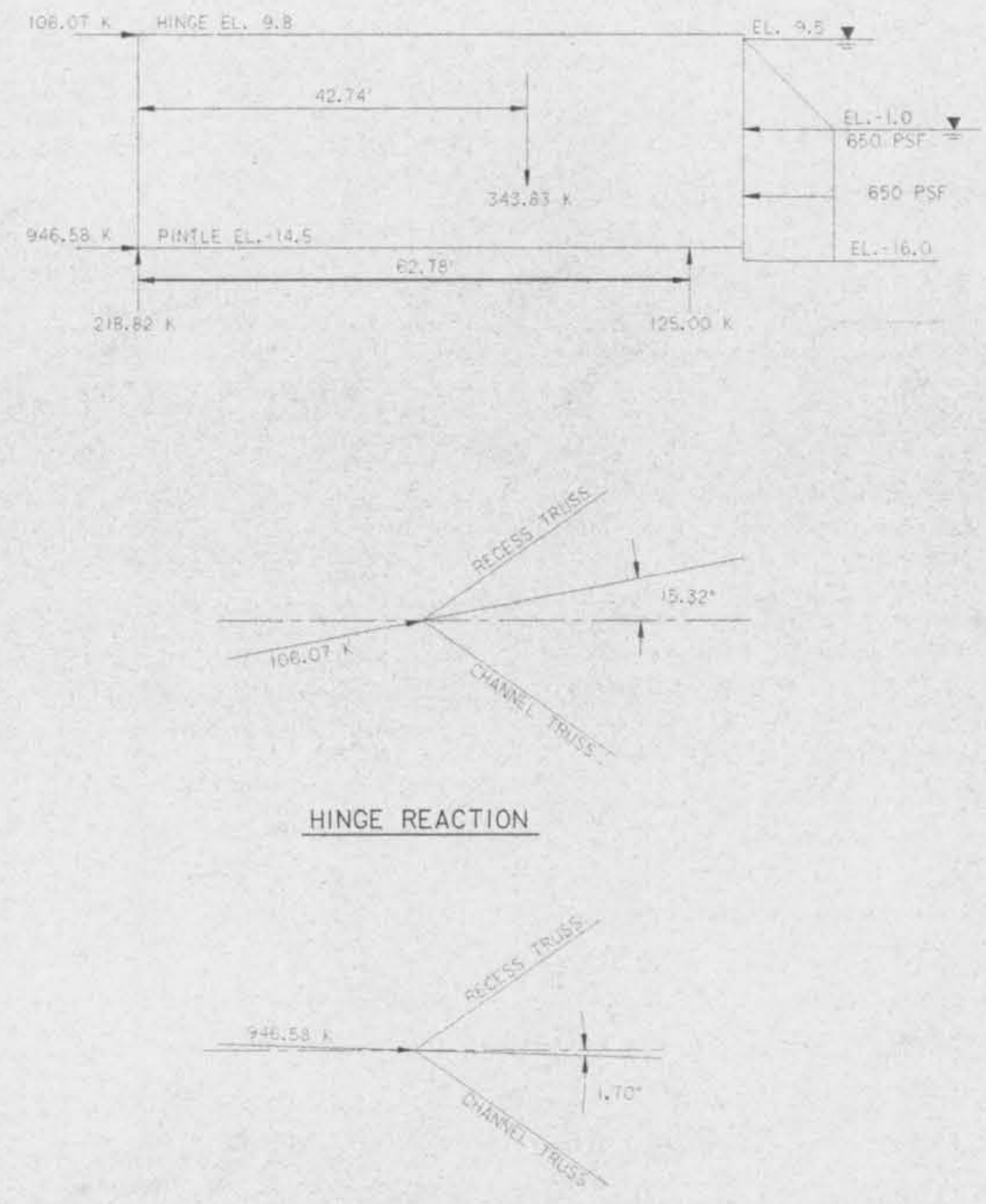
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | |
|---|---|---|
| DESIGNED BY: CCE | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 |
| DRAWN BY: CCE | DATE: 2/2/2000 | FILE NO. H-2-45223 |
| CHECKED BY: MHC | | |

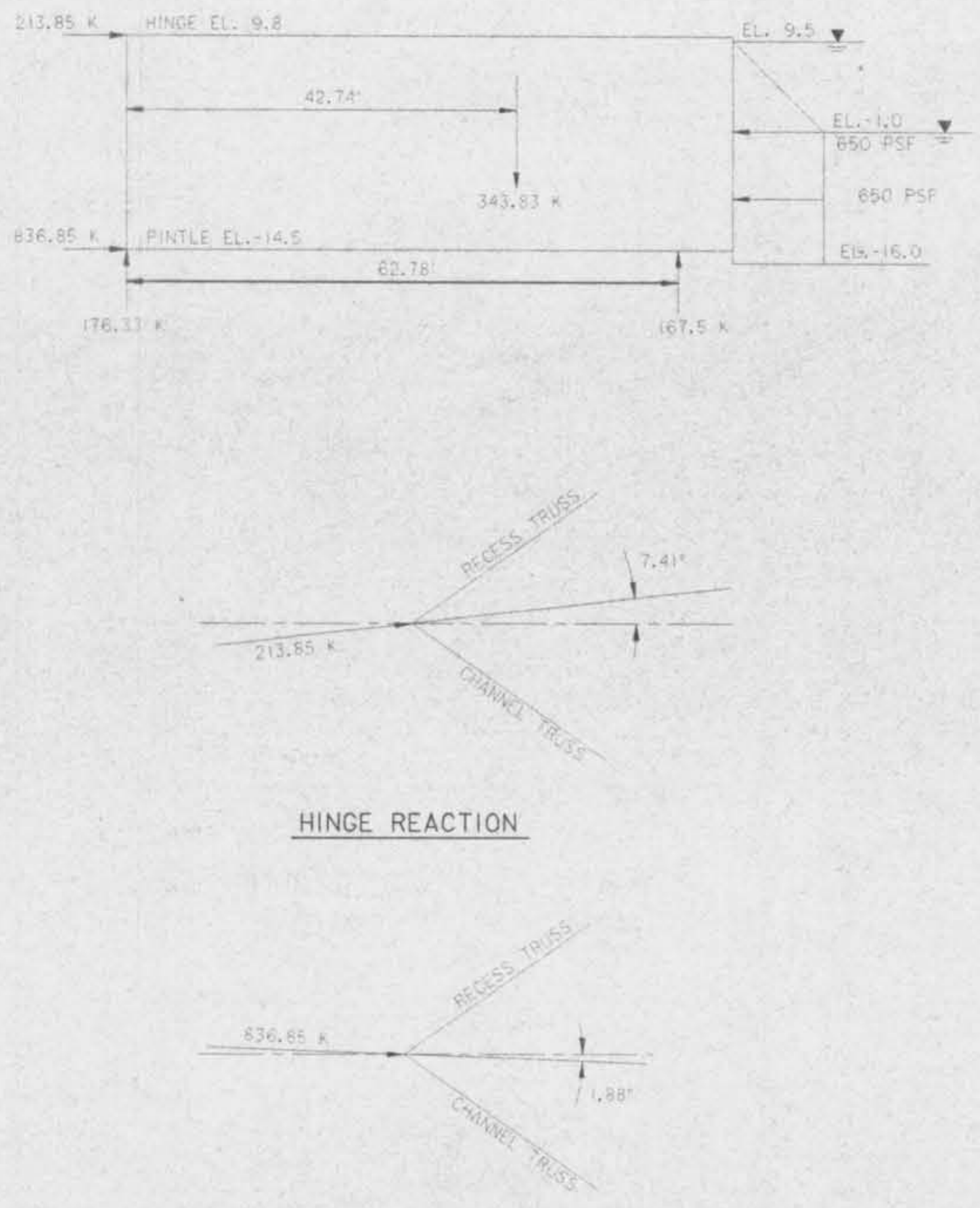



LOAD CASES A-3 AND 11-6

NOTE:
ALL LOADS REDUCED BY 33%.




LOAD CASES A-2 AND 11-6



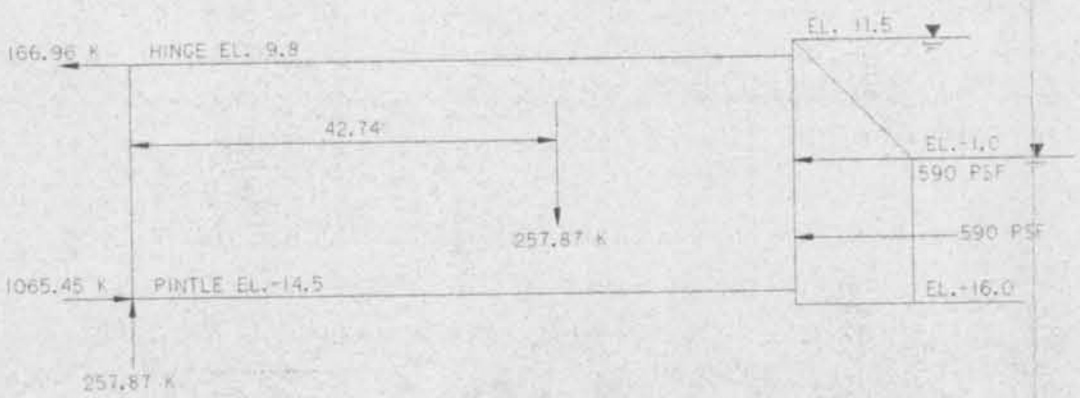

LOAD CASES A-1 AND 11-6

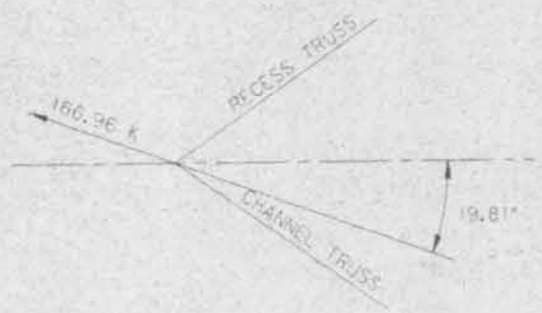
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE REACTIONS
## LOAD CASE 11-6

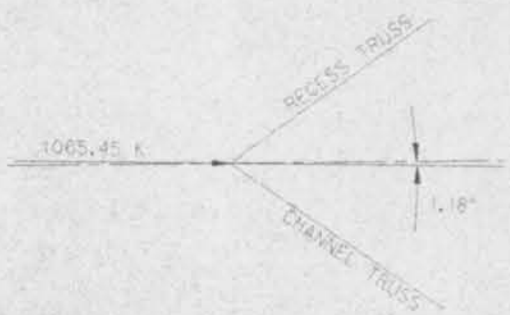
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: CCE<br>CHECKED BY: MHG | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P12.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |



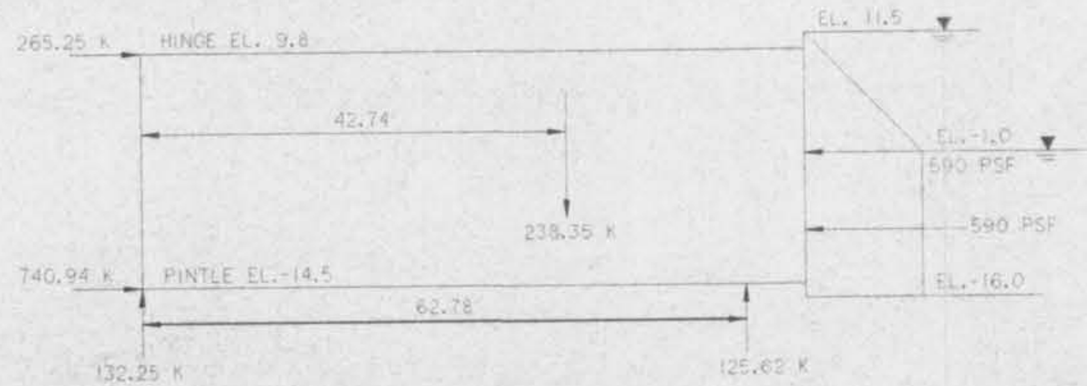

HINGE REACTION

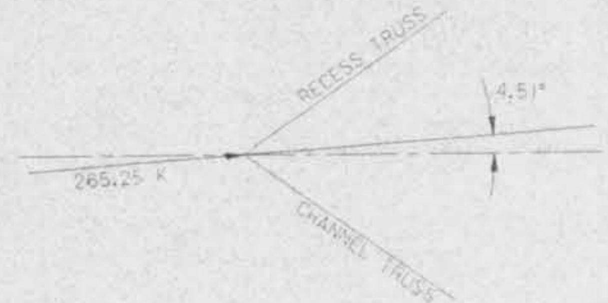



PINTLE REACTION

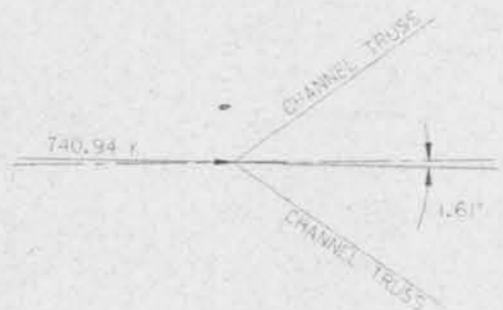
LOAD CASES A-3 AND 11-7

NOTE:
ALL LOADS REDUCED BY 33%.




HINGE REACTION




PINTLE REACTION

LOAD CASES A-1 AND 11-7

NOTE:
ALL LOADS REDUCED BY 33%.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

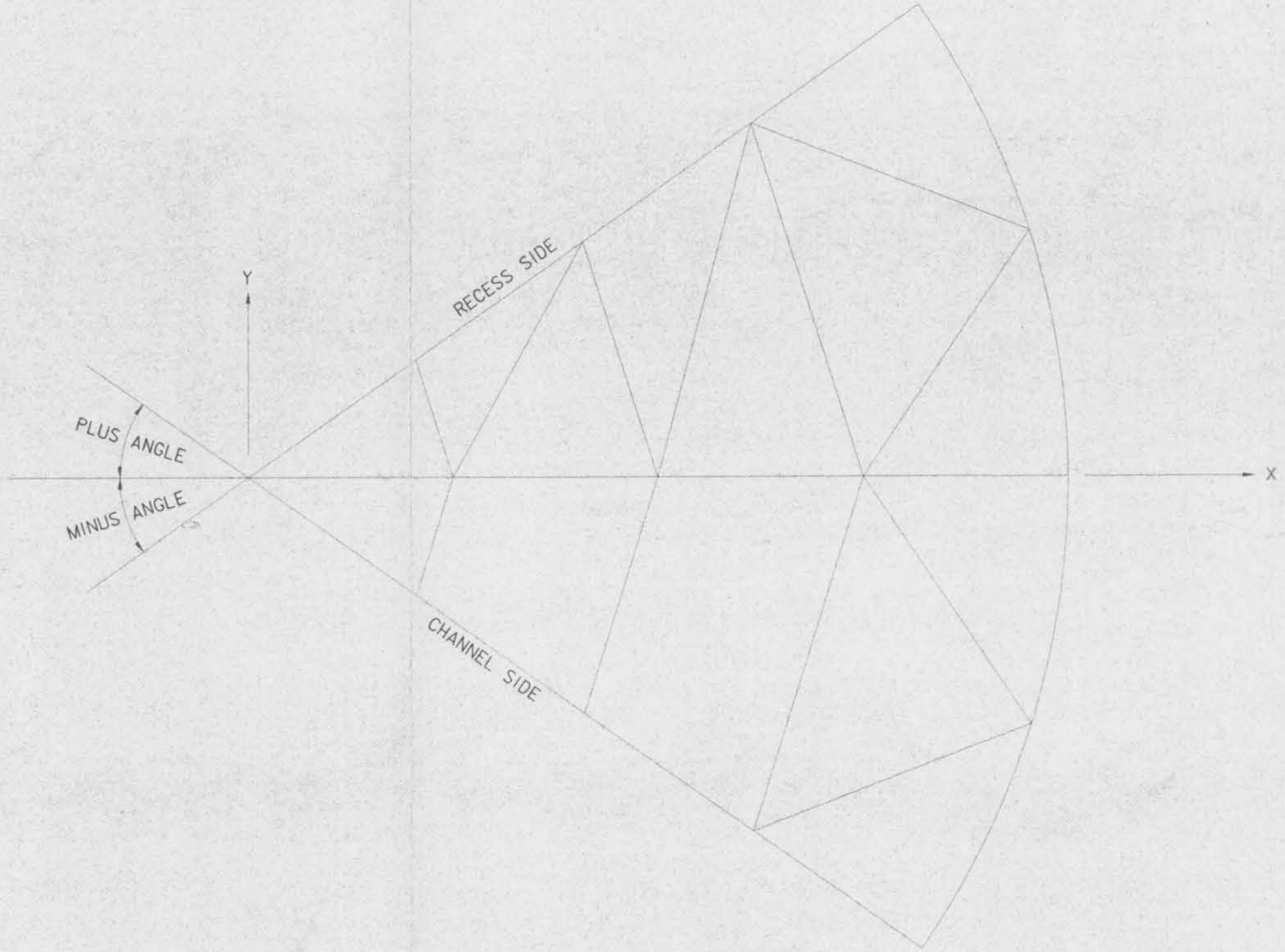
**FEATURE DESIGN MEMORANDUM NO. 1**

SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## SECTOR GATE REACTIONS
LOAD CASE 11-7

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: CCE<br>CHECKED BY: MHG | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223P113.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




## SECTOR GATE REACTIONS BOAT LOAD CASES

| LOAD CASE | HINGE (KIPS) | ANGLE (DEG) | PINTEL (KIPS) | ANGLE (DEG) |
|---|---|---|---|---|
| B1 + A-1 | -181.67 | -8.07 | 128.12 | 10.70 |
| B2 + A-1 | -179.87 | 0.0 | 127.78 | 9.31 |
| B3 + A-1 | -181.64 | 8.01 | 127.14 | 7.35 |
| B4 + A-1 | -187.04 | 15.91 | 126.83 | 6.17 |
| B1 + A-3 | -505.15 | -3.04 | 451.17 | 2.72 |
| B2 + A-3 | -504.44 | 0.0 | 451.08 | 2.46 |
| B3 + A-3 | -505.01 | 2.73 | 450.91 | 1.90 |
| B4 + A-3 | -506.91 | 5.66 | 450.83 | 1.57 |
| B9 + A-1 + 11-4 | 94.95 | -48.44 | 364.20 | 2.72 |
| B10 + A-1 + 11-4 | 88.58 | -31.42 | 364.23 | 2.83 |
| B11 + A-1 + 11-4 | 82.21 | -13.49 | 364.29 | 3.02 |
| B12 + A-1 + 11-4 | 75.99 | 5.87 | 364.36 | 3.21 |
| B9 + A-3 + 11-4 | -271.38 | 15.45 | 688.61 | 1.54 |
| B10 + A-3 + 11-4 | -253.45 | 13.79 | 688.63 | 1.60 |
| B11 + A-3 + 11-4 | -245.47 | 4.77 | 688.66 | 1.70 |
| B12 + A-3 + 11-4 | -249.05 | -1.5 | 688.70 | 1.80 |

NOTES:

1. BOAT LOADS B5 - B8 AND B13 - B16 ARE NOT SHOWN. LOADS WERE FOUND TO BE SMALL IN COMPARISON TO THE OTHER BOAT LOADS.
2. BOAT LOADS B1 - B4 WERE CONSIDERED ONLY WHEN THE GATE WAS OPEN, THEREFORE NO WATER LOAD.
3. BOAT LOADS B9 - B12 WERE CONSIDERED ONLY WHEN THE GATE WAS CLOSED WITH WATER AT NORMAL OPERATION (11-4).
4. ALL LOADS WERE REDUCED BY 33%.
5. (-) NEGATIVE DENOTES TENSION.

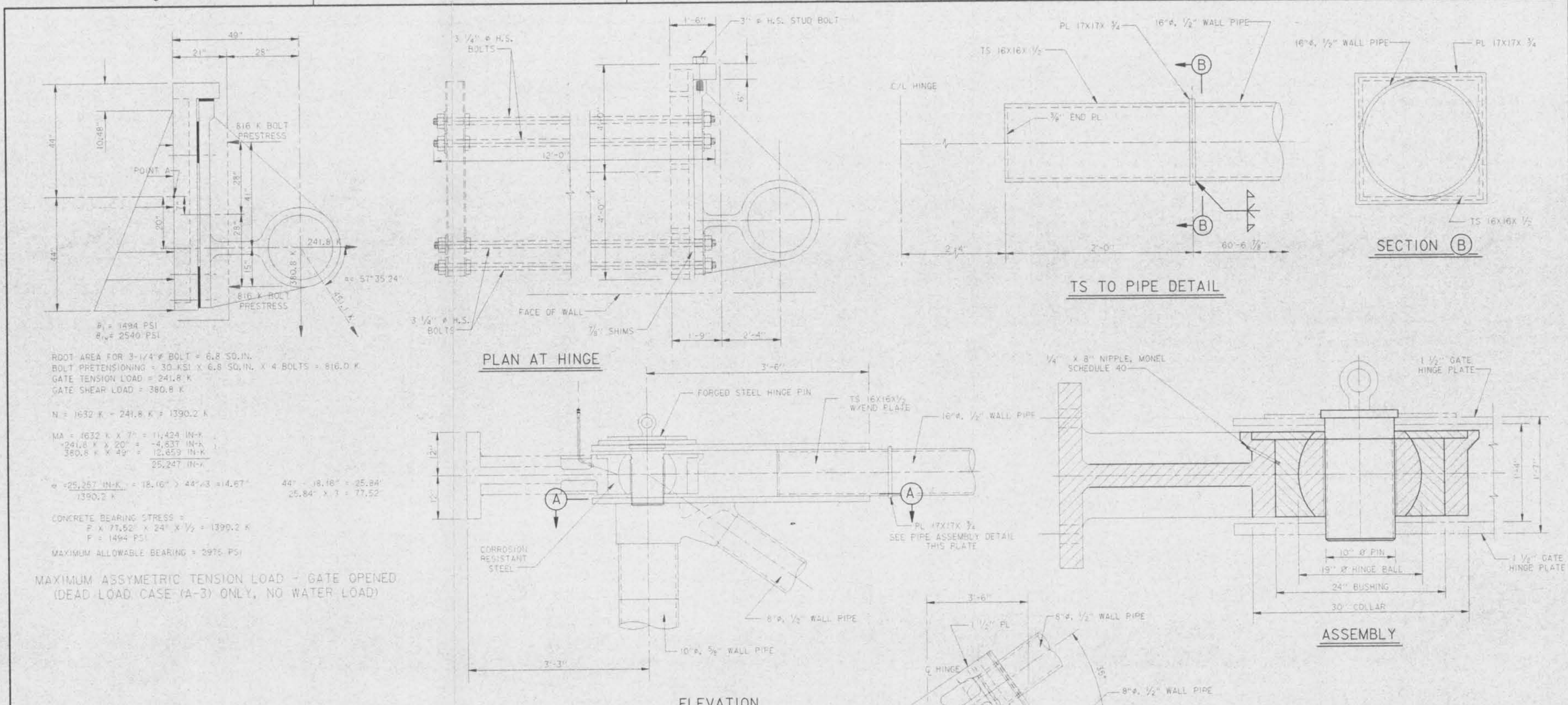
C·A·D

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# SECTOR GATE REACTIONS
## BOAT LOAD

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

| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: HJH<br>CHECKED BY: MHG | PLOT SCALE: 60 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223B01.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




$B_1$ = 1494 PSI
$B_{1w}$ = 2540 PSI

ROOT AREA FOR 3-1/4"ø BOLT = 6.8 SQ.IN.
BOLT PRETENSIONING = 30 KSI X 6.8 SQ.IN. X 4 BOLTS = 816.0 K
GATE TENSION LOAD = 241.8 K
GATE SHEAR LOAD = 380.8 K

N = 1632 K − 241.8 K = 1390.2 K

MA = 1632 K X 7" = 11,424 IN-K
−241.8 K X 20" = −4,837 IN-K
380.8 K X 49" = 12,659 IN-K
25,247 IN-K

$e = \frac{25,257 \text{ IN-K}}{1390.2 \text{ K}}$ = 18.16" > 44"/3 = 14.67"

44" − 18.16" = 25.84"
25.84" X 3 = 77.52"

CONCRETE BEARING STRESS =
P X 77.52" X 24" X 1/2 = 1390.2 K
F = 1494 PSI

MAXIMUM ALLOWABLE BEARING = 2975 PSI

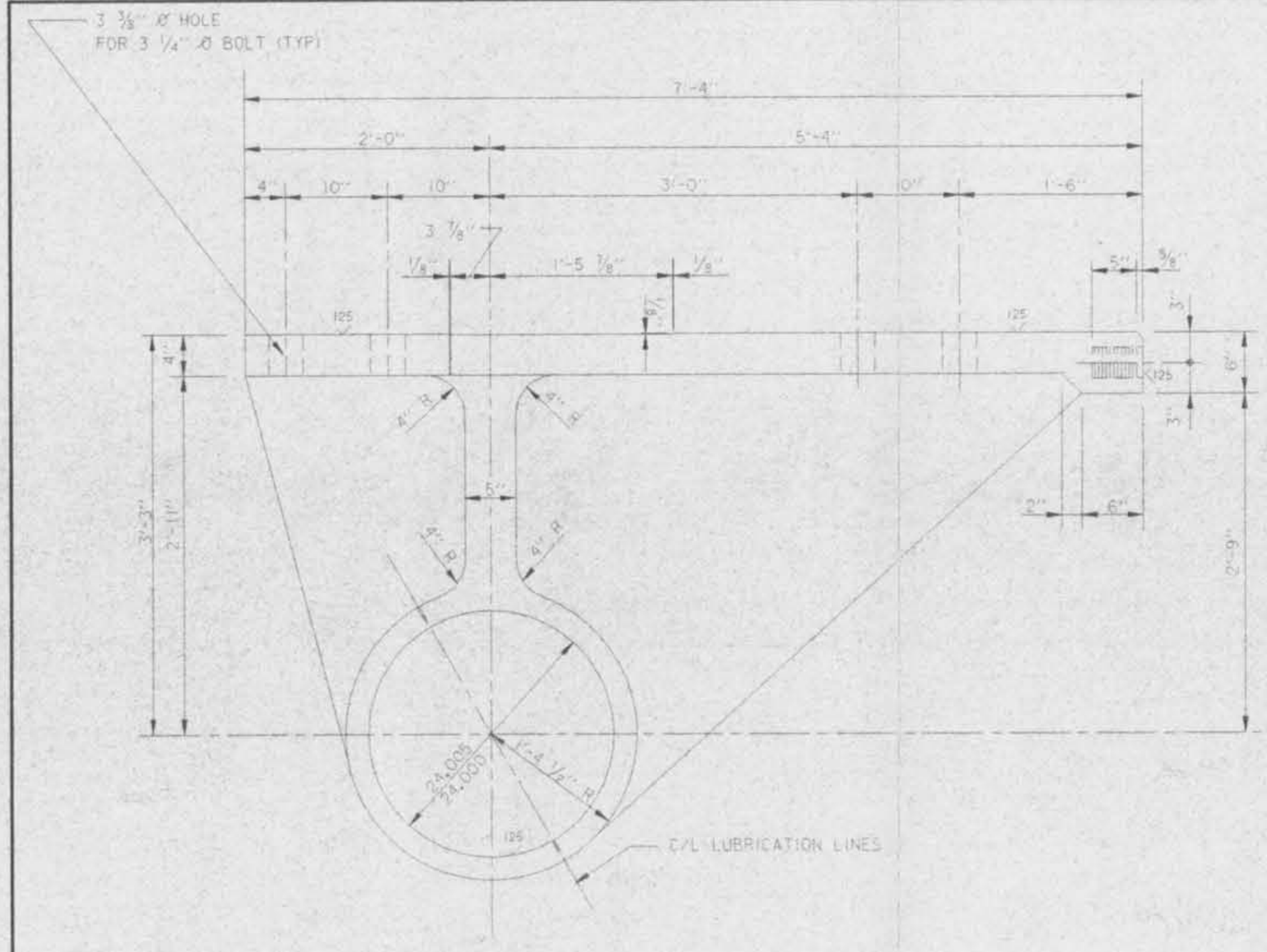
MAXIMUM ASSYMETRIC TENSION LOAD - GATE OPENED
(DEAD LOAD CASE (A-3) ONLY, NO WATER LOAD)

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

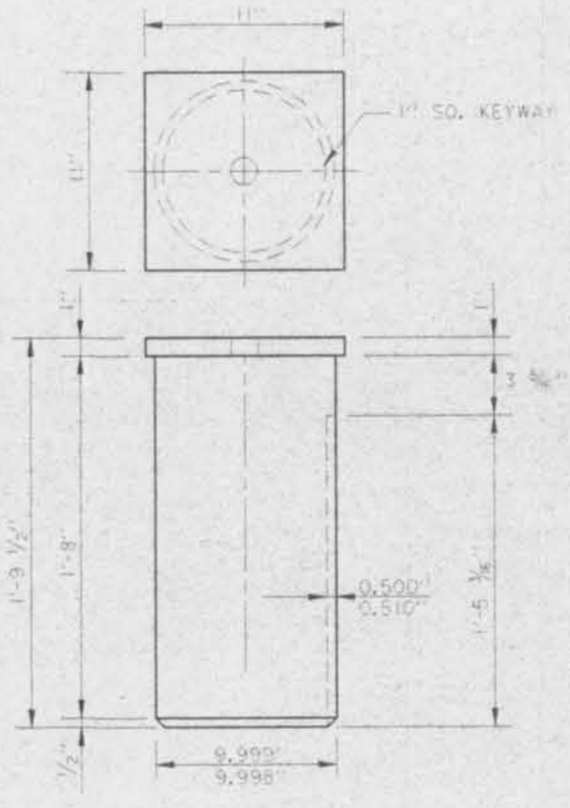
# HINGE ASSEMBLY

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

DESIGNED BY: MHC
DRAWN BY: JCM
CHECKED BY: MHC
PLOT SCALE: 16
PLOT DATE: 10 FEB 00
DATE: 2/10/2000
CADD FILE: 45223K02.DGN
FILE NO. H-2-45223

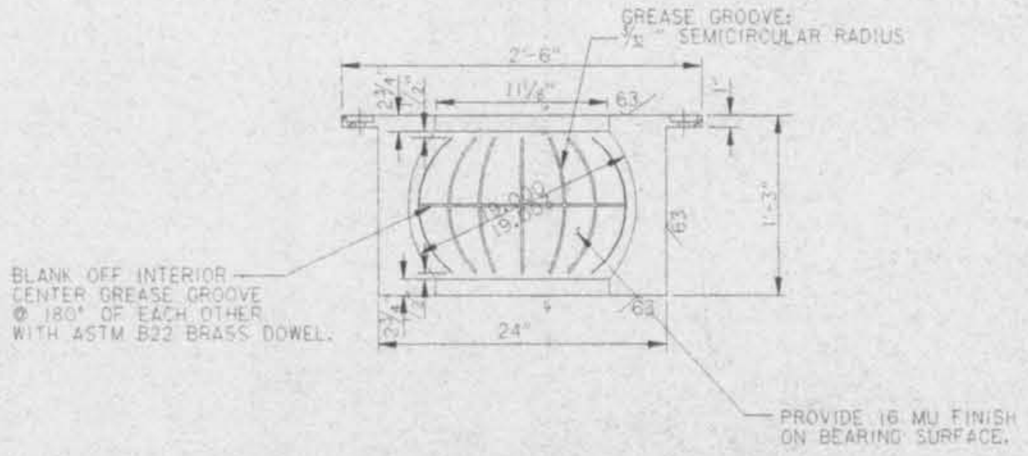



## HINGE PLAN

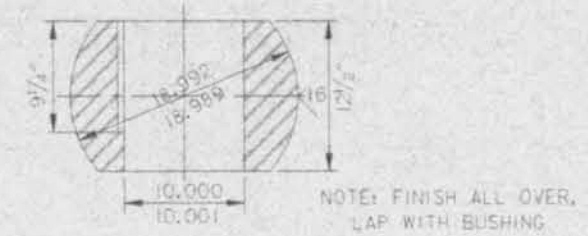



## HINGE PIN

MAT'L: ASTM A 668
CLASS F FORGED STEEL



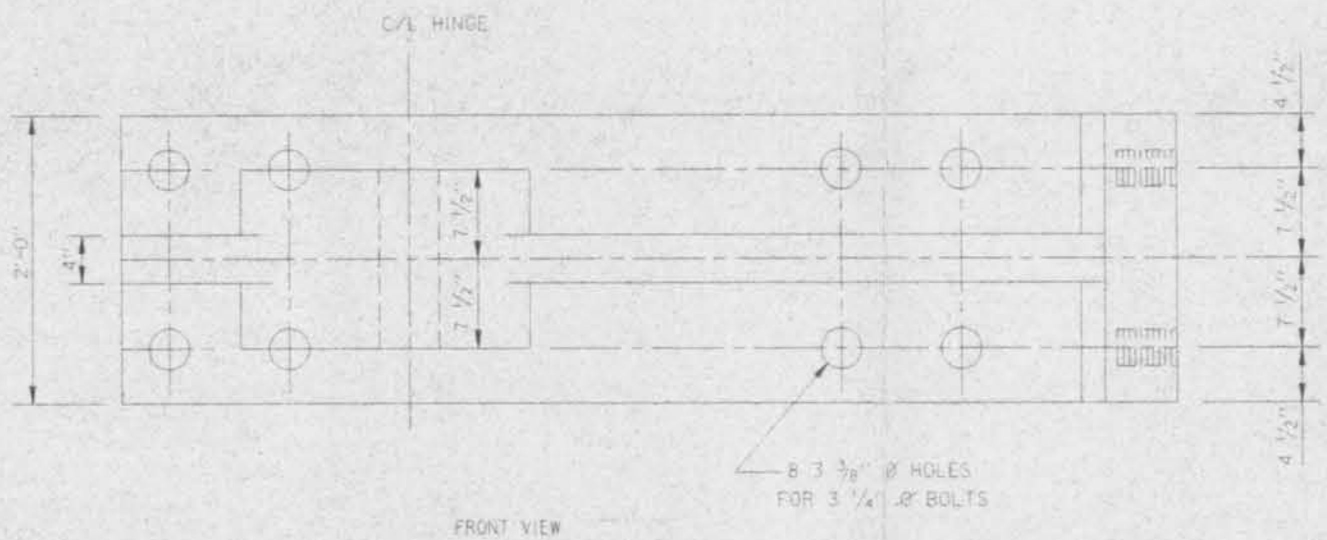

## HINGE BALL BUSHING




NOTE: FINISH ALL OVER,
LAP WITH BUSHING

## HINGE BALL

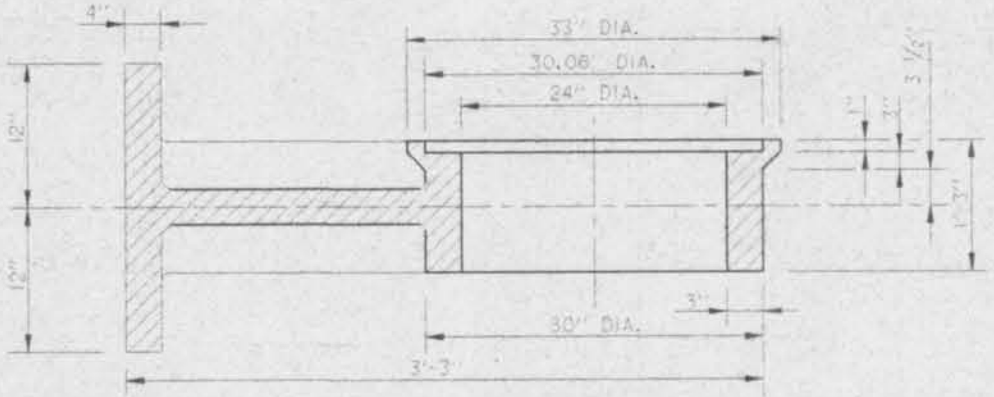
MAT'L: ASTM A314 & A473
TYPE 420, BHN 350-400




FRONT VIEW

## HINGE BASE CASTING

(CAST STEEL)



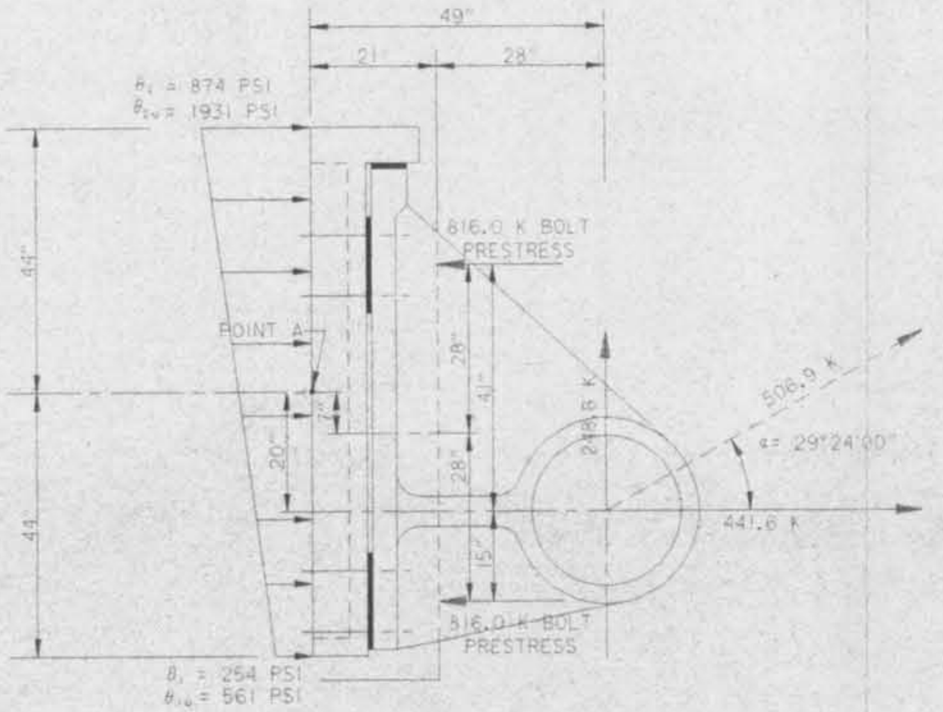

## COLLAR

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# HINGE DETAILS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: SOB<br>DRAWN BY: JOM<br>CHECKED BY: MHC | PLOT SCALE: 16 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F21.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |



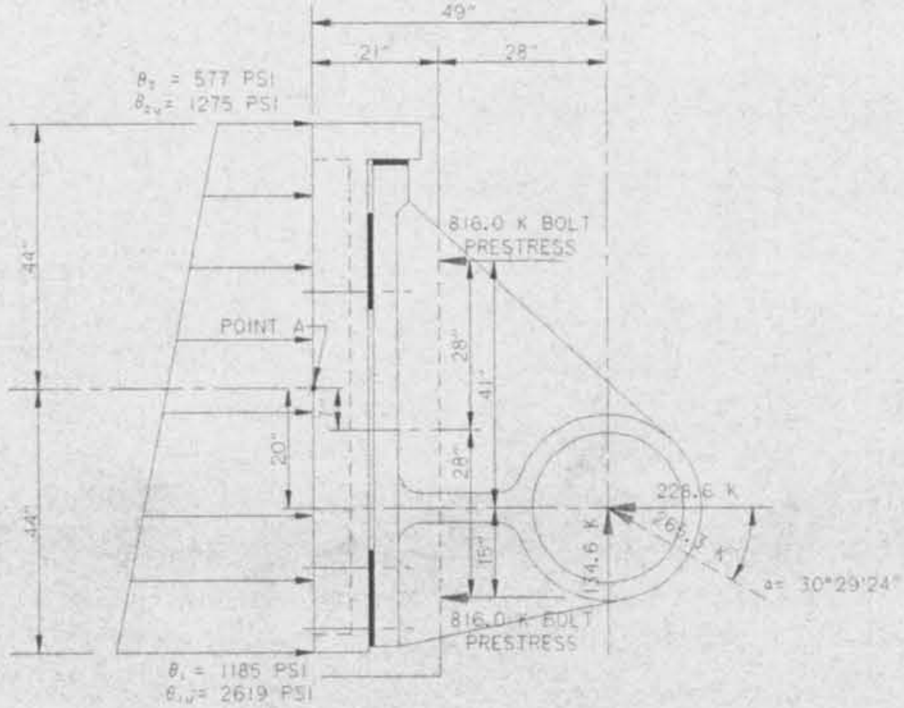

BOLT PRETENSIONING = 816.0 K
GATE TENSION LOAD = 441.6 K
GATE SHEAR LOAD = 248.8 K

N = 1632 K - 441.6 K = 1190.4 K

MA = 1632 K X 7" = 11,424 IN-K
-441.6 K X 20" = -8,832 IN-K
-549.9 K X 49" = -26945.1 IN-K
-9,599 IN-K

CONCRETE BEARING STRESS =

$\frac{1190.4\ K}{2112.0\ SQ.\ IN.} \pm \frac{-9599\ IN\text{-}K}{30976.0\ IN3} = 564 \pm 310$



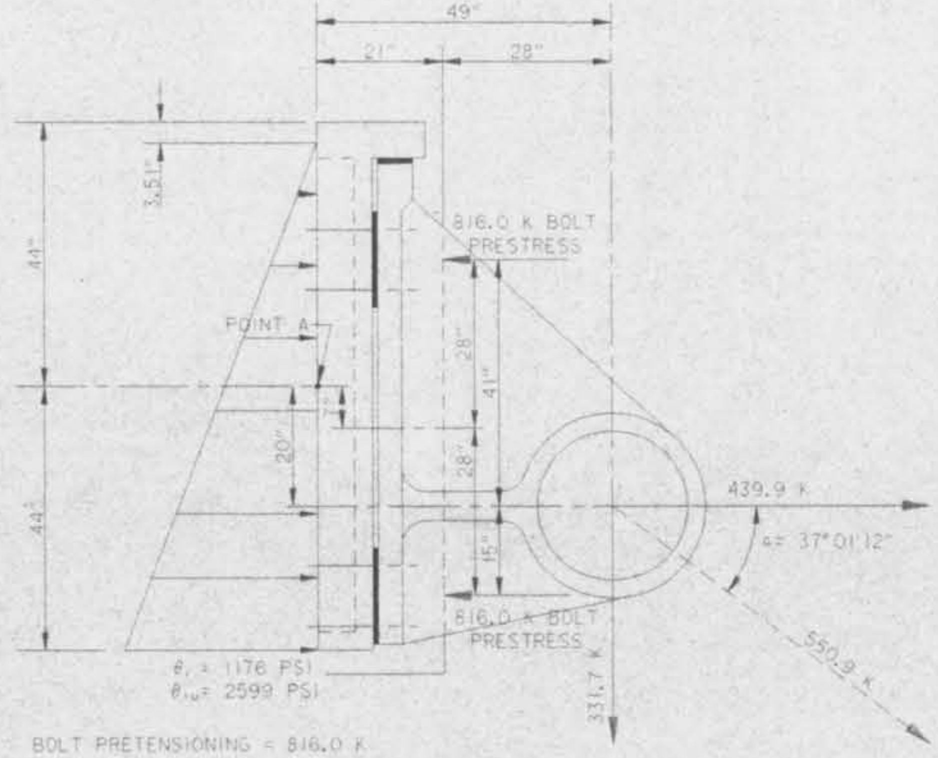

BOLT PRETENSIONING = 816.0 K
GATE COMPRESSION LOAD = 228.6 K
GATE SHEAR LOAD = 134.6 K

N = 1632 K + 228.6 K = 1860.6 K

MA = 1632 K X 7" = 11,424 IN-K
228.6 K X 20" = 4,572 IN-K
-134.6 K X 49" = -6,596 IN-K
9,401 IN-K

CONCRETE BEARING STRESS =

$\frac{1860.6\ K}{2112.0\ SQ.\ IN.} \pm \frac{9401\ IN\text{-}K}{30976.0\ IN3} = 881 \pm 304$




BOLT PRETENSIONING = 816.0 K
GATE TENSION LOAD = 439.9 K
GATE SHEAR LOAD = 331.7 K

N = 1632 K - 439.9 K = 1192.1 K

MA = 1632 K X 7" = 11,424 IN-K
-439.9 K X 20" = -8,798 IN-K
331.7 K X 49" = 16,253 IN-K
18,879 IN-K

$e = \frac{18{,}879\ IN\text{-}K}{1192.1\ K} = 15.84" > 44"/3 = 14.67"$

44" - 15.84" = 28.16"
28.16" X 3 = 84.48"

CONCRETE BEARING STRESS =
P X 84.48" X 24" X ½ = 1192.1 K
P = 1176 PSI

DEAD LOAD CASE (A-3) WITH BOAT LOAD CASE (B-4)

MAXIMUM COMPRESSION LOAD
(DEAD LOAD CASE (A-1) + WATER LOAD CASE (I1-7))

MAXIMUM TENSION LOAD
(DEAD LOAD CASE (A-3) + WATER LOAD CASE (I1-5))

SCALE: ¾" = 1'- 0"

MAXIMUM ALLOWABLE BEARING STRESS = Ø (0.85 X $f_c$') [ ACI 318-95 ]
= 0.70 (0.85 X 5000)
= 2975 PSI

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
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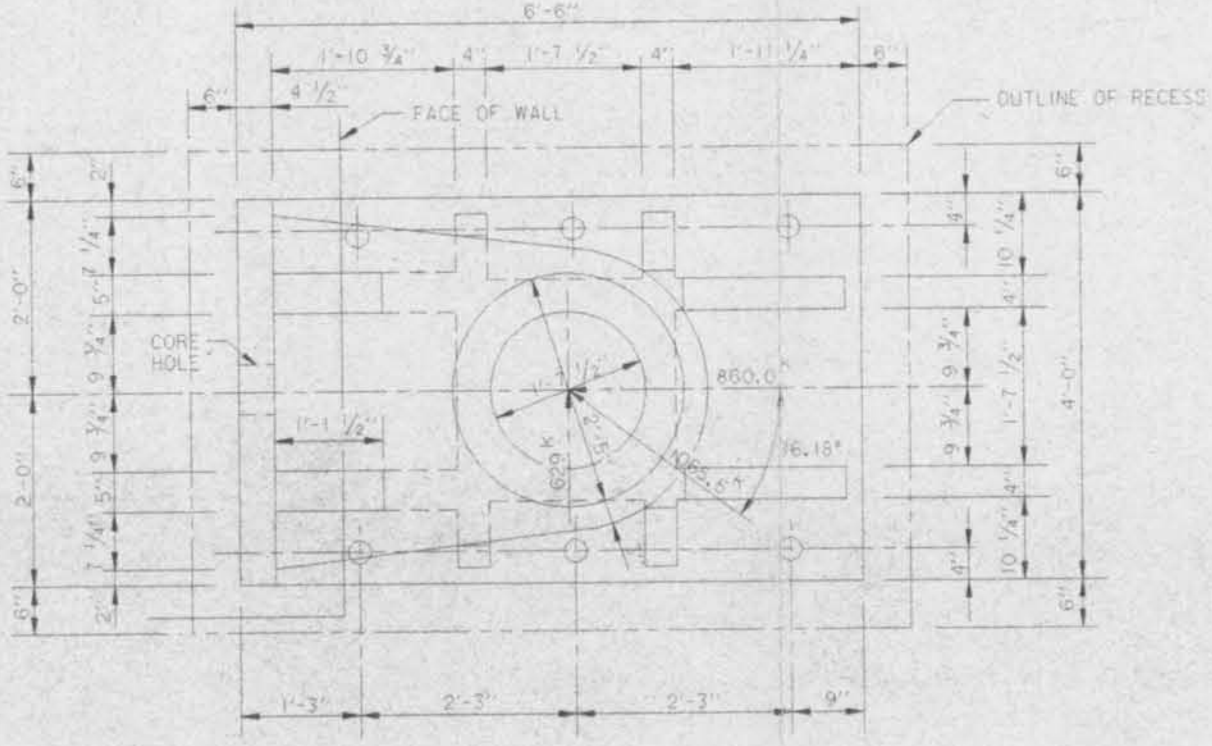
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

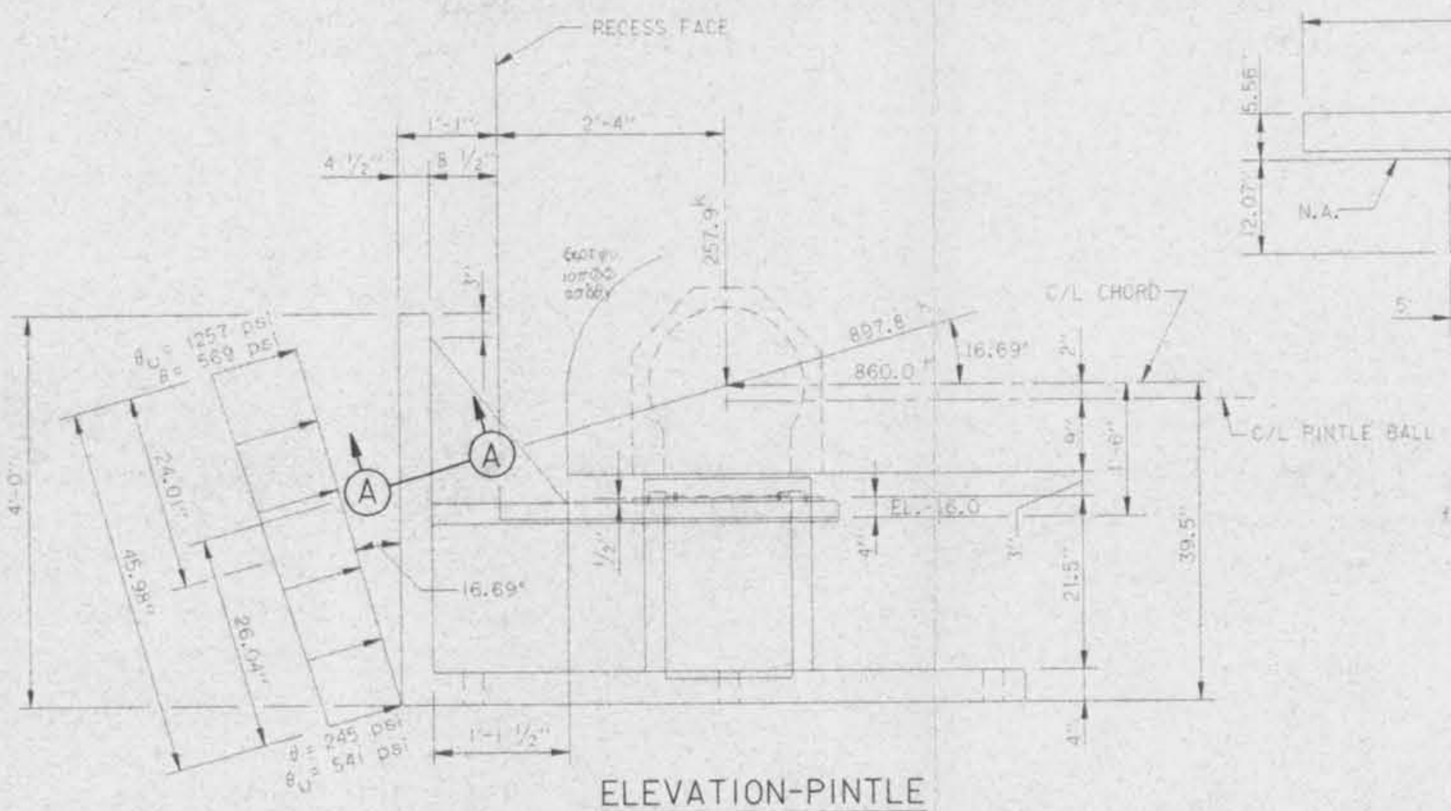
# HINGE DESIGN

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

| | | | |
|---|---|---|---|
| DESIGNED BY: MHG<br>DRAWN BY: JCM<br>CHECKED BY: MHG | PLOT SCALE: 16 | PLOT DATE: 10 FEB 00 | CADD FILE: H5223K01.DGN |
| | DATE: 2/10/2000 | | FILE NO. H-2-45223 |




PLAN-PINTLE



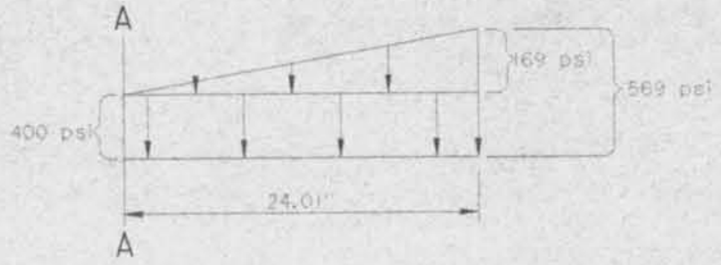

ELEVATION-PINTLE

MAXIMUM BEARING STRESS = 2975 psi (ACI 318.95)

CONCRETE BEARING STRESS

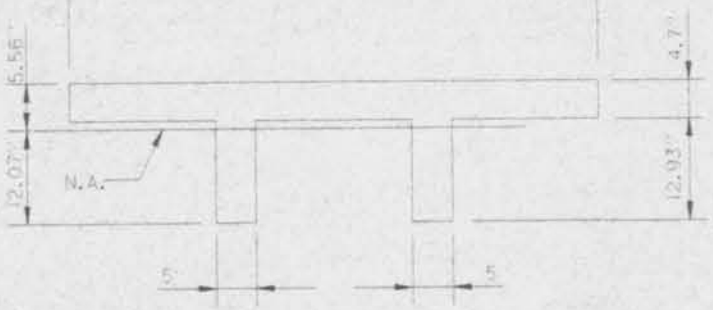
$= P/A \pm \frac{Mc}{I}$

BENDING AT SECTION A-A




$M_{A-A} = \frac{1}{2} \times 0.169\ (24.01")^2 \times 2/3 \times 48" = 1559.6"^k$

$\frac{0.40\ (24.01")^2 \times 48"}{2} = \Sigma M = \frac{5534"^k}{7093.6"^k}$

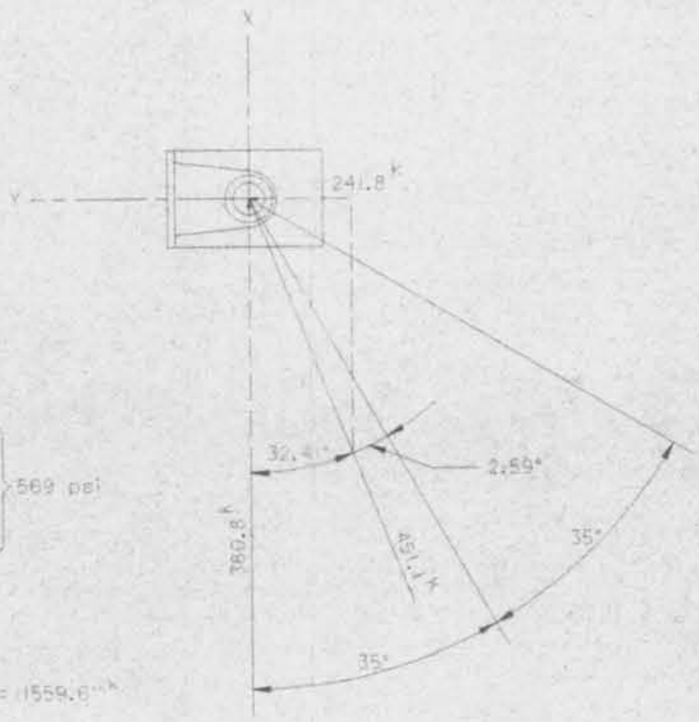



$I = 8610\ in^4$

$f_b = \frac{7094"^k \times 12.07\ in}{8610\ in^4} = 7.94\ ksi < 18\ ksi$

# MAXIMUM COMPRESSIVE LOAD

(DEAD LOAD + LOAD CASE II-7
REDUCED BY 75%)
FOR OVERSTRESSED CONDITION




$451.1^k \times \cos 32.41° = 380.8^k$

$V = 257.8 + {}^*20 = 277.8$ * D.L. OF PINTLE AND CASTING

$M_y = 380.8 \times 39.5^k = 15{,}041.6"^k$

$I_y = \frac{bh^3}{12} = \frac{78"(48^3)}{12} = 718{,}848\ in^4$

$P = \frac{277.8^k}{66" \times 48"} \pm \frac{15{,}041.6"^k\ (24)}{718{,}848\ in^4}$

$P = 87.7^{psi} \pm 502$

$P = 589.7^{psi}$ COMPRESSION

$P = -414.3^{psi}$ TENSION

NOTE:
HORIZONTAL LOAD NORMAL TO X-X AXIS ASSUMED BEARING ON WALL.

REPLACE CONC. STRESS W/BOLT STRESSES:

$\frac{414.3}{1004} \times 48 = 19.31"$

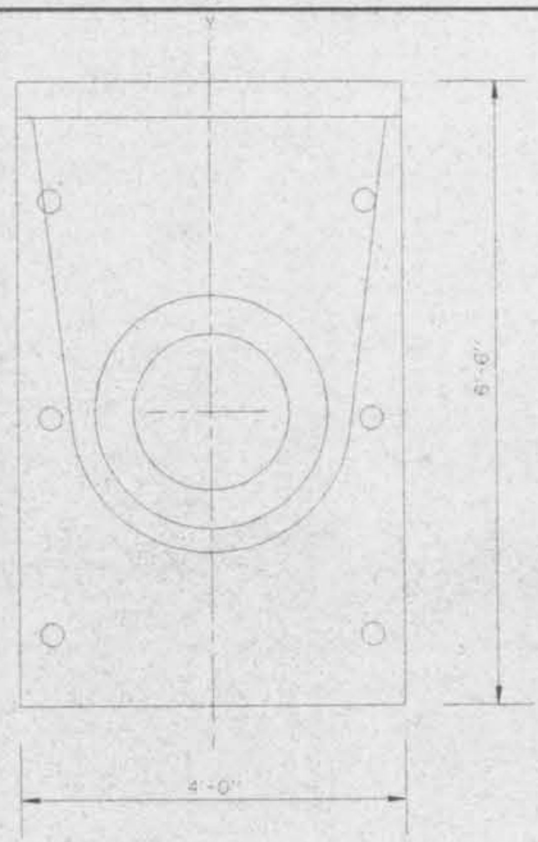
$\frac{\frac{1}{2} \times .414 \times 19.81" \times 78"}{3\ BOLTS} = 106.6^k$ /BOLT

USE 2 1/2" BOLTS, ROOT AREA = 3.72 $in^2$

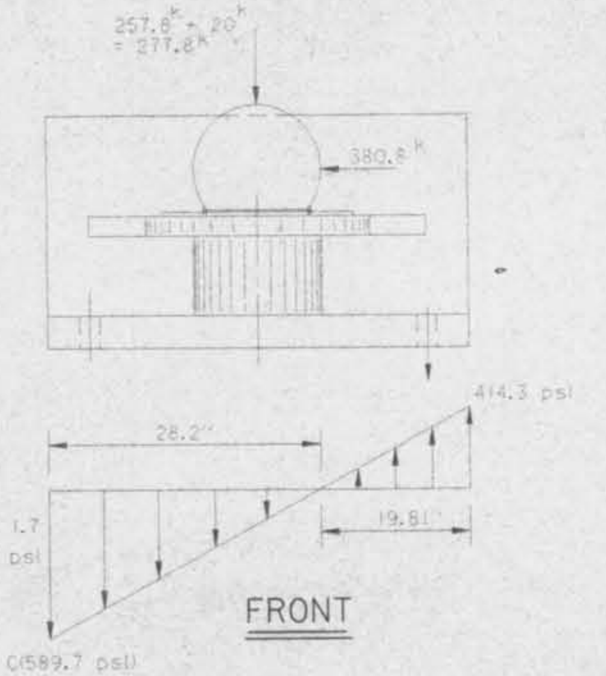
$\frac{106.6^k}{3.72\ in^2} = 28.7\ ksi < 35\ ksi$

# MAXIMUM ASYMMETRIC LOAD

(DEAD LOAD ONLY-NOT IN OPERATION)
(LOADS REDUCED BY 75%)




TOP




$C_U = 1.3 \times 1.7 \times 589.7 = 1{,}303$ psi

FRONT

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
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PINTLE BASE DESIGN

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

| | | | |
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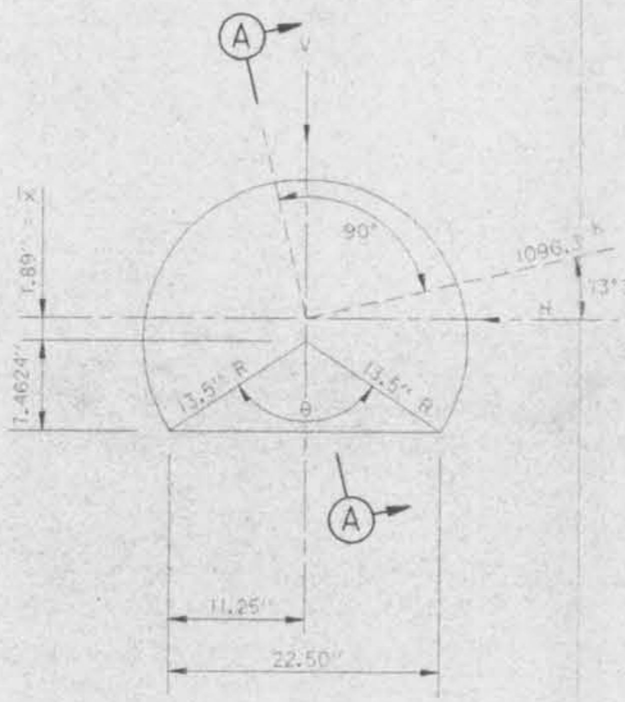
| DESIGNED BY: MHG | PLOT SCALE: 1 : 24 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F18.DGN |
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHG | | | |




## ELEVATION

$V = 258^k$

$H = 1065.5^k$

$R = 1096.3^k$

$\sin \theta/2 = \frac{11.25}{13.5} = 0.8333$

$\theta = 112.8854°$

CENTER OF GRAVITY OF BEARING AREA:

$(A)\,\bar{x} + \frac{1}{2} R (\alpha - \sin\alpha)(4/3 \frac{R \sin^3 \alpha/2}{(\alpha - \sin\alpha)}) = 0$

$481.86\,\bar{x} \times + \frac{1}{2} \times 13.5^2 \times 4/3 \times 13.5 \times 10.8224^3 = 0$

$\bar{x} = \frac{912.12}{481.86} = 1.893''$ USE $\bar{x} = 2.0''$

$\bar{x} = 1.893/\cos 13.612° = 1.95''$

LET RESULTANT PASS THRU CENTER OF GRAVITY OF BEARING AREA
USE 27" DIAMETER PINTLE BALL

PINTLE SHAFT (STAINLESS STEEL, TYPE 420, $F_y = 50$ ksi)

BENDING IN SHAFT = 1065.5" × (2"+9"+3") = 14,917 in-k

$S = \frac{\pi d^3}{32} = \frac{\pi (19.5)^3}{32} = 727.95 \text{ in}^3$

$f_b = \frac{14{,}917 \text{ in-k}}{727.95 \text{ in}^3} = 20.50 < 27.5 \text{ ksi}$

$\text{SHEAR} = \frac{1065.5^k \times 1000}{\pi \times (9.75 \text{ in})^2} \times 4/3 = 4.76 \text{ ksi O.K.} < 16.5 \text{ KSI}$

BEARING

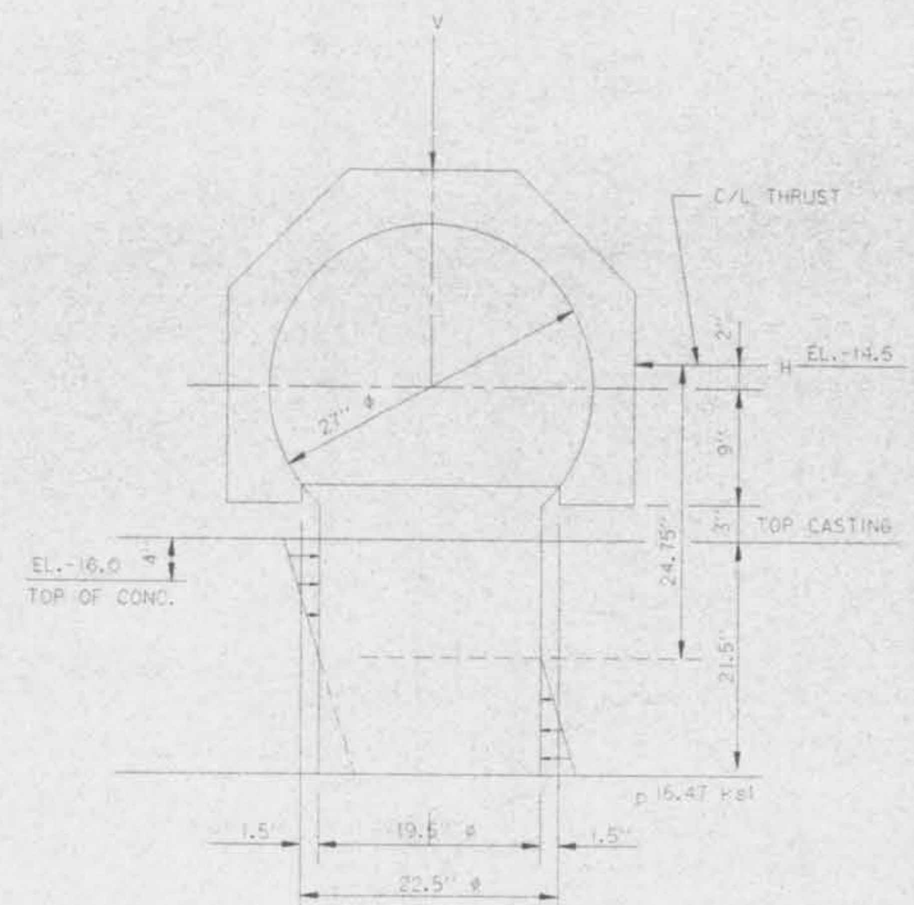
$I$ OF EMBEDDED SHAFT = 1/12 × 19.5" × 21.5$^3$ = 16,150 in$^4$

M = 1065.5" × 24.75" = 26,371 in-k

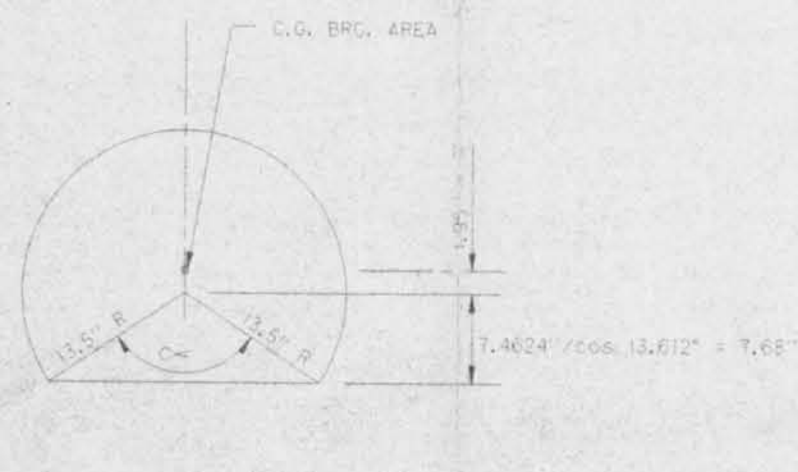
$P = \frac{1027.28''}{19.5 \times 21.5''} \pm \frac{26{,}371'' \times 10.75''}{16{,}150 \text{ in}^4}$

$= 2.54 \pm 17.55 = 20.09 \text{ ksi} < 37.5 \text{ ksi}$
$-15.01$ ksi

BEARING ON PINTLE ANCHORAGE CASTING CONTROLS




## PINTLE DIMENSIONS




## SECTION (A)

(PERPENDICULAR TO RESULTANT R)

$\cos \frac{\alpha}{2} = \frac{7.68}{13.5} = 0.569$

$\frac{\alpha}{2} = 55.327°$

$\alpha = 110.659°$

$= 1.931$ RADIANS

$\sin \alpha = 0.9357$

## MAXIMUM COMPRESSIVE LOAD

(DEAD LOAD + LOAD CASE (I-7)
LOADS HAVE BEEN REDUCED 75%
FOR OVERSTRESSED CONDITION

BUSHING

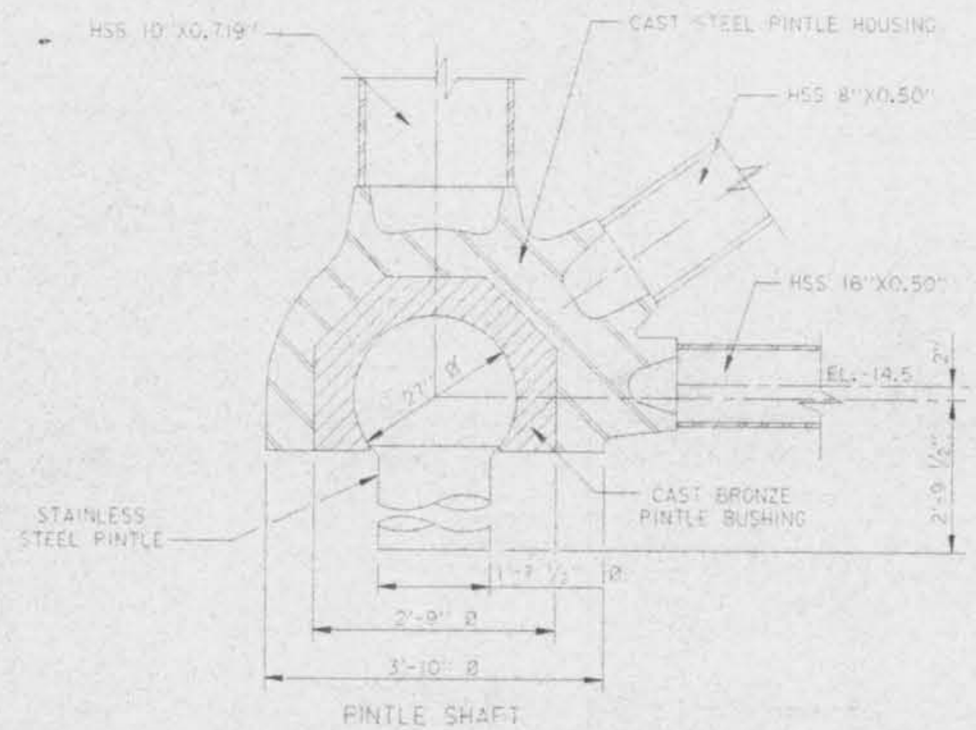
BEARING AREA $= \pi \times R^2 - \frac{1}{2} \times R^2 \times (\alpha - \sin\alpha)$

$= \pi \times 13.5^2 - \frac{1}{2} \times 13.5^2 \times (1.931 - 0.9357)$

$= 572.56 - 90.7 = 481.86$

BEARING STRESS $= \frac{1096.3^K \times 1000}{481.86 \text{ in}^2} = 2275$ psi (NOT MOVING)

NOTE:
BUSHING MATERIAL (BRONZE SAE 550 ALLOY, ALLOW. BR. STR. 4000 psi)




## PINTLE DETAIL

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

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JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# PINTLE DESIGN

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| | | | |
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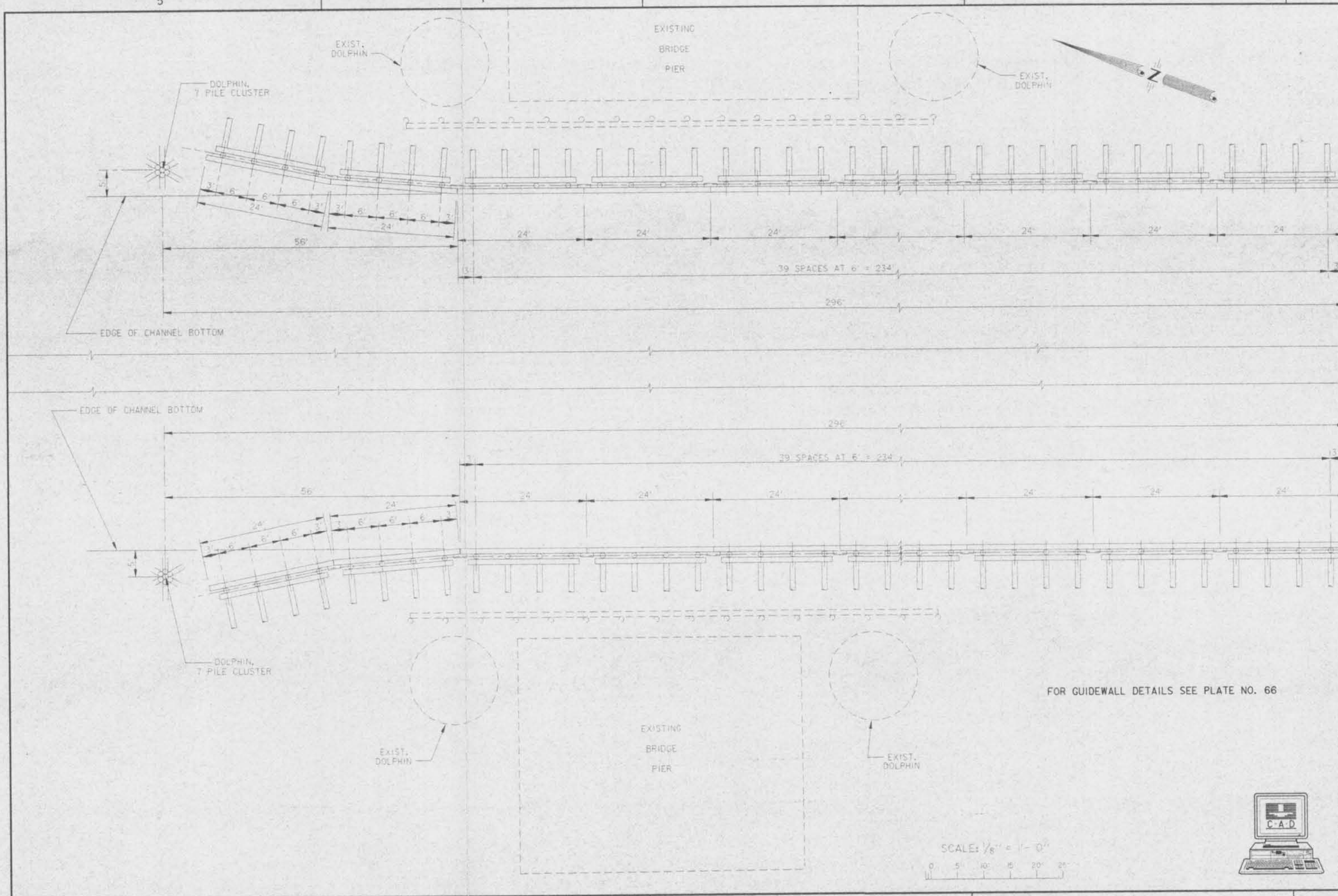
| DESIGNED BY: MHO | PLOT SCALE: 8 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F19.DGN |
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHO | | | |




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

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# NORTH GUIDE WALL PLAN

**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**
CORPS OF ENGINEERS
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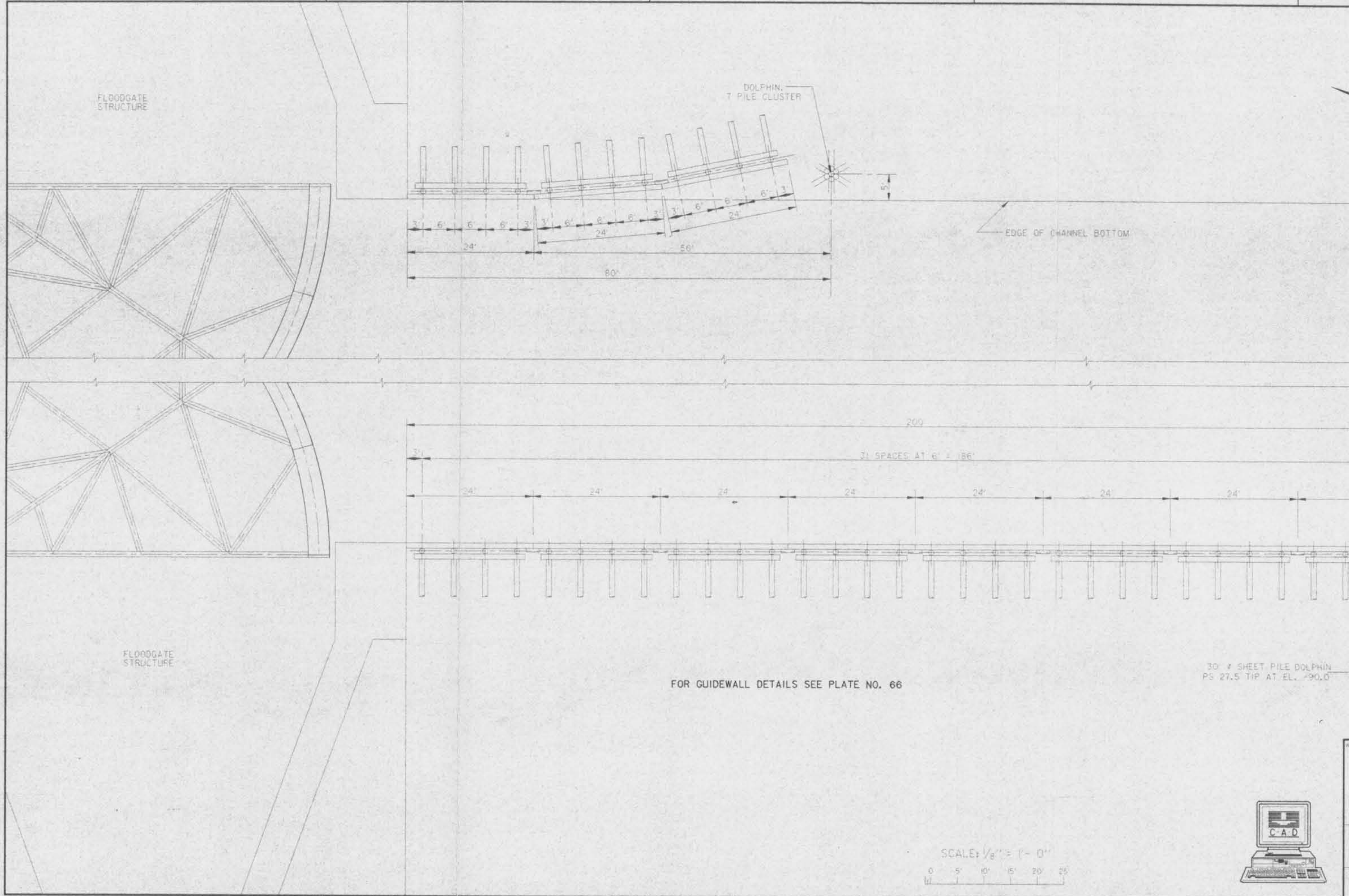
| | | | |
|---|---|---|---|
| DESIGNED BY: CCE<br>DRAWN BY: JCM<br>CHECKED BY: MHN | PLOT SCALE: 96 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223F08.DGN |
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |

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WEST OF ALGIERS CANAL HURRICANE PROTECTION
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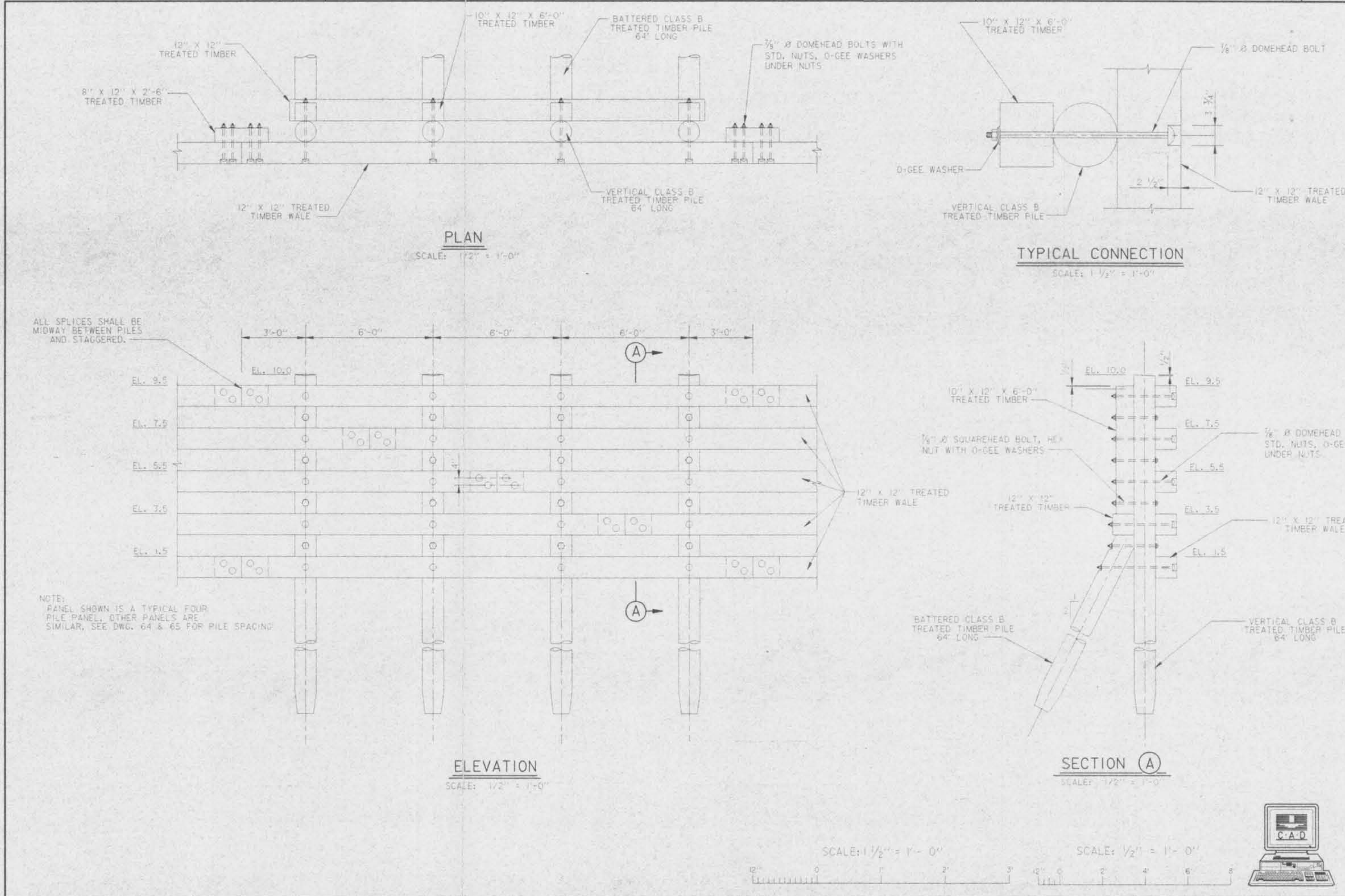
SOUTH GUIDE WALL PLAN

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

DESIGNED BY: CCE
DRAWN BY: JCM
CHECKED BY: MHG
PLOT SCALE: 96
PLOT DATE: 2 FEB 00
DATE: 2/2/2000
CADD FILE: 45223F07.DGN
FILE NO. H-2-45223




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

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# GUIDE WALL DETAILS

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|---|---|---|---|
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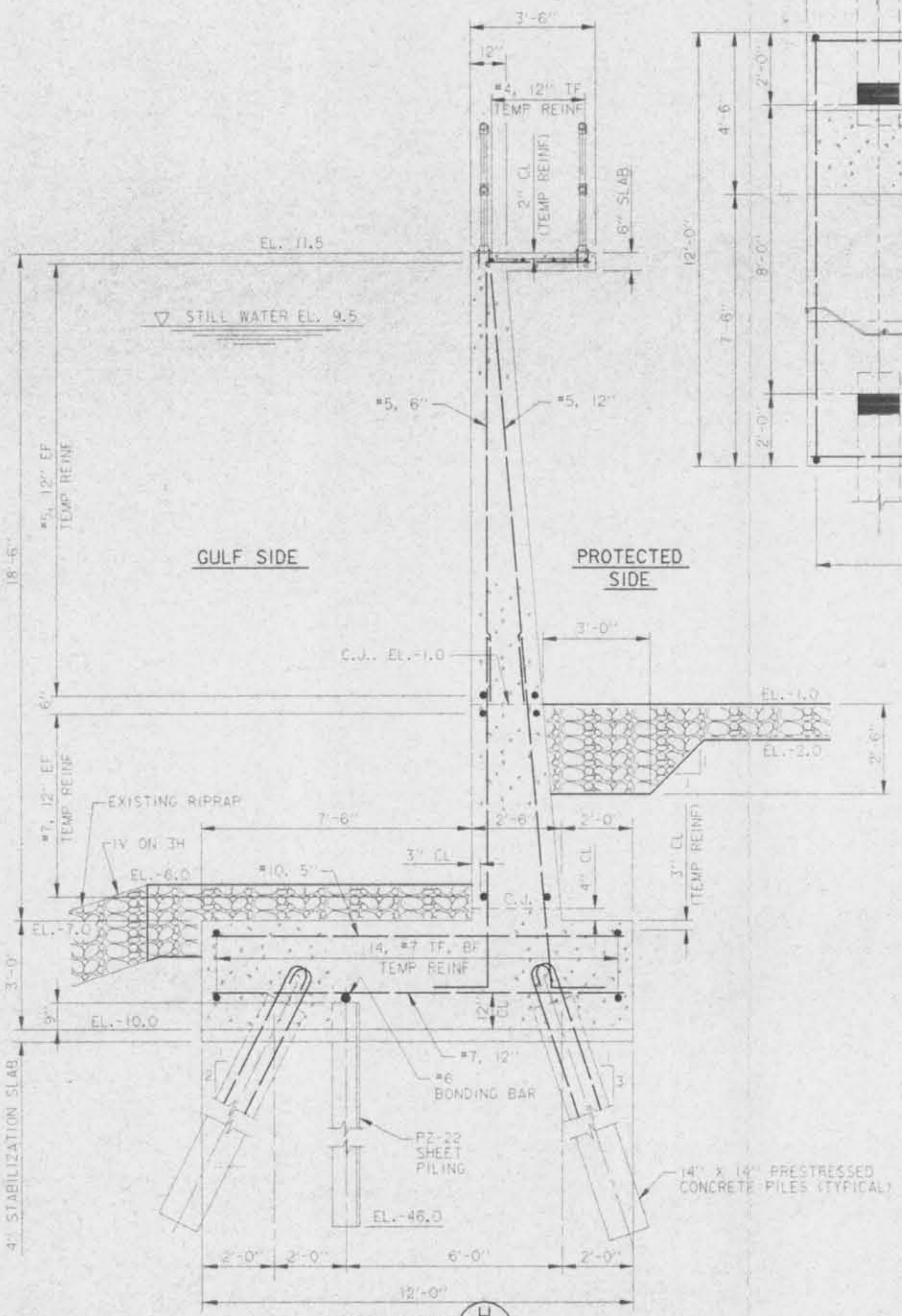
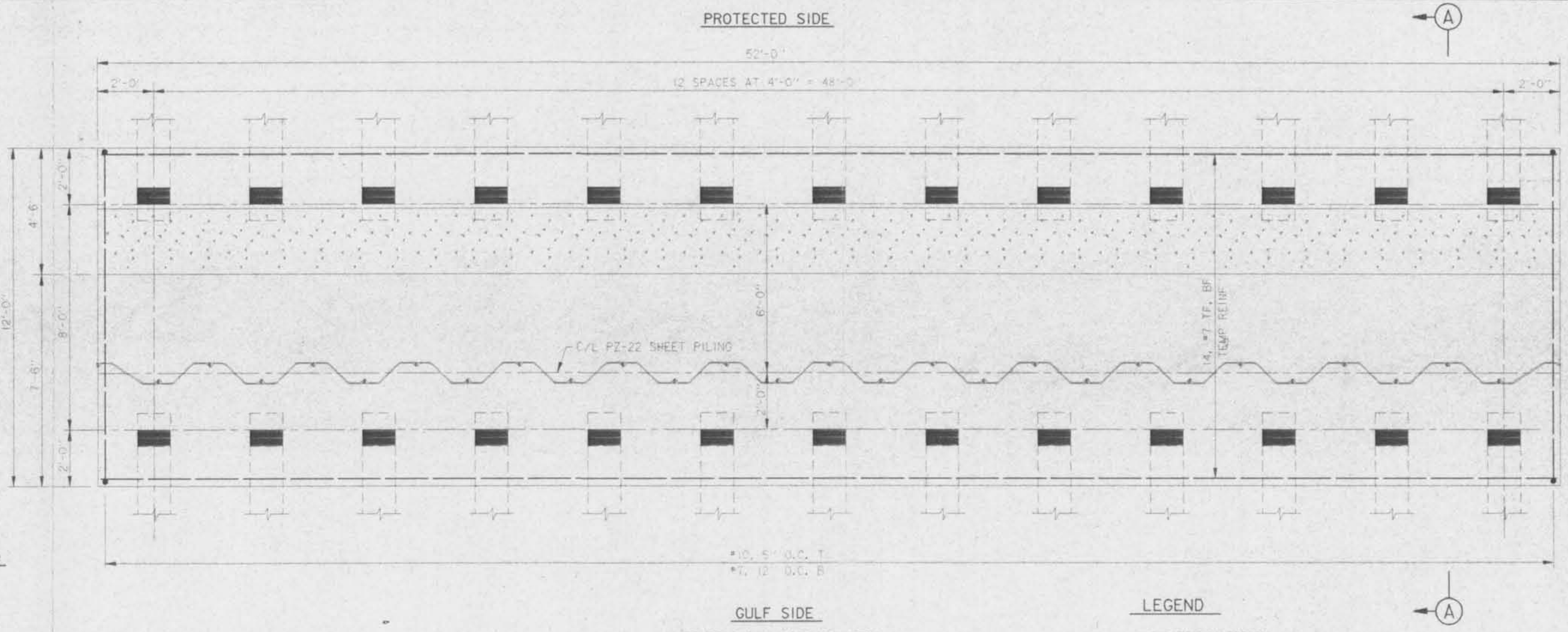
| DRAWN BY: JCM | DATE: 2/2/2000 | | FILE NO. H-2-45223 |
| CHECKED BY: MHC | | | |

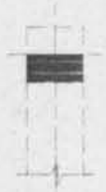



SECTION H 2/67




TYPICAL MONOLITH

LEGEND



INDICATES DIRECTION OF BATTER, 3V ON 1H, 14" X 14" PRESTRESSED CONCRETE PILES

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
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JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# FLOOD PROTECTION T-WALL
# FLOODGATE TO EXISTING CULVERT

**U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS**
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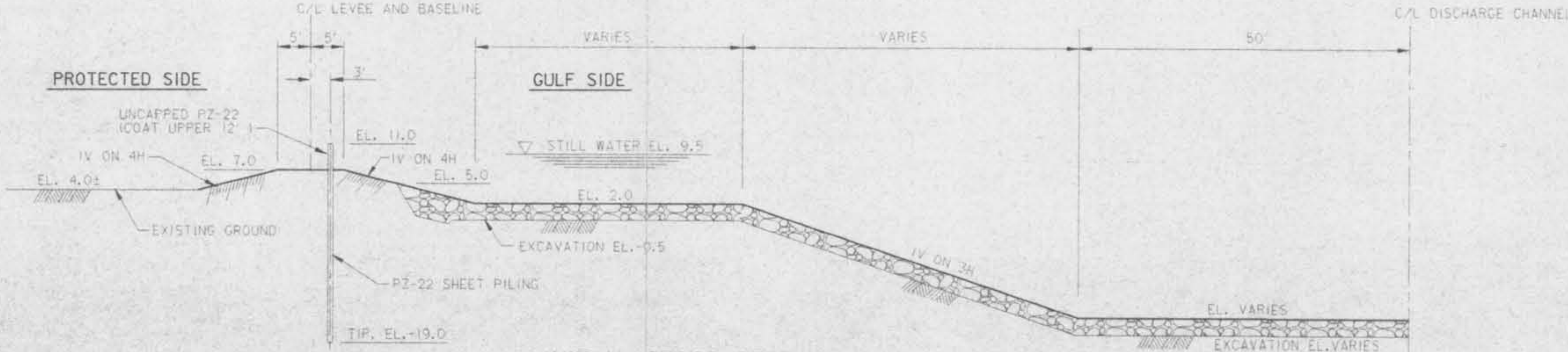
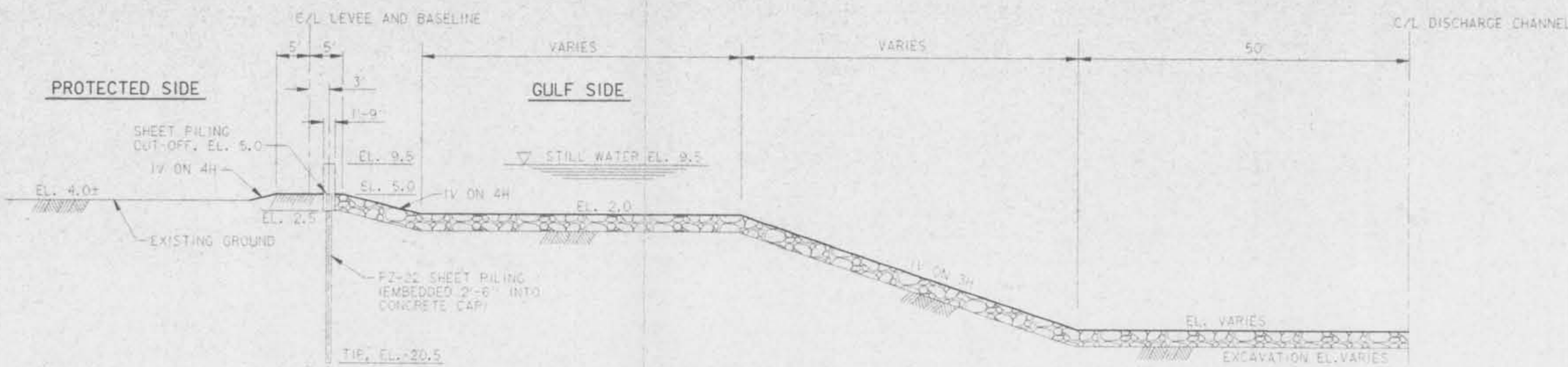
| | | | |
|---|---|---|---|
| DESIGNED BY: MHG | PLOT SCALE: 24 | PLOT DATE: 2 FEB 00 | CADD FILE: 45923B09.DGN |
| DRAWN BY: HJH | | | FILE NO. H-2-45223 |
| CHECKED BY: MHG | DATE: 2/2/2000 | | |



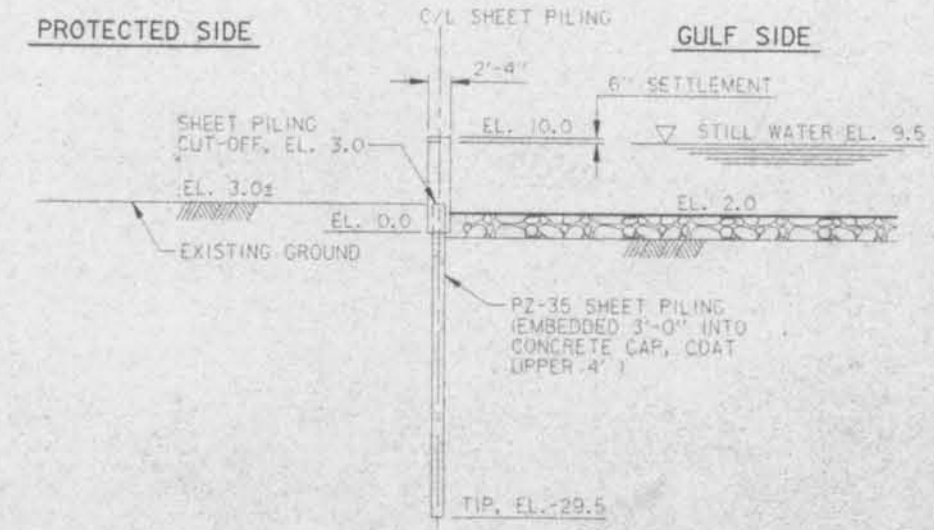

INITIAL GROSS SECTION




FINAL SECTION AFTER SETTLEMENT

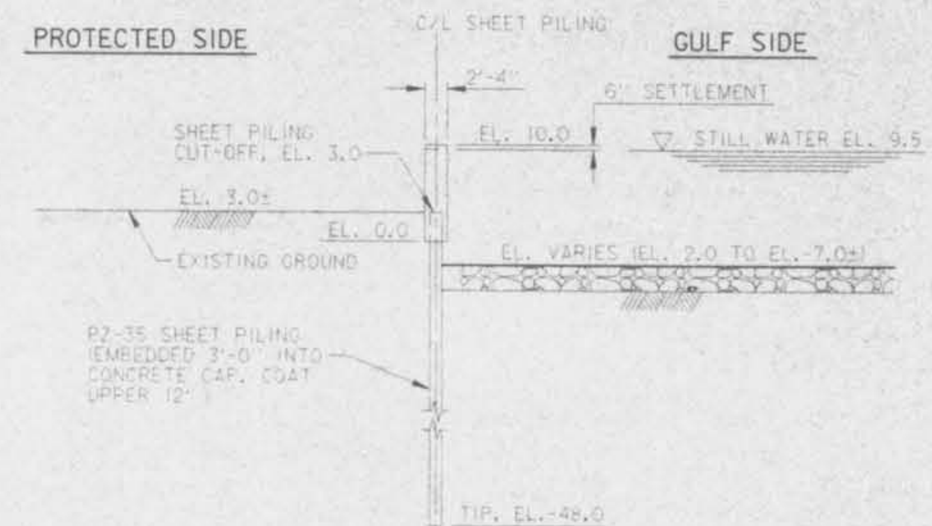
SECTION A 2/68

TOTAL LENGTH = 500 LF




SECTION B 2/68

TWO MONOLITHS REQUIRED, LENGTH = 34.5' EACH




SECTION C 2/68

ONE MONOLITH REQUIRED, LENGTH = 26.3'

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

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# TYPICAL I-WALL CROSS SECTIONS

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
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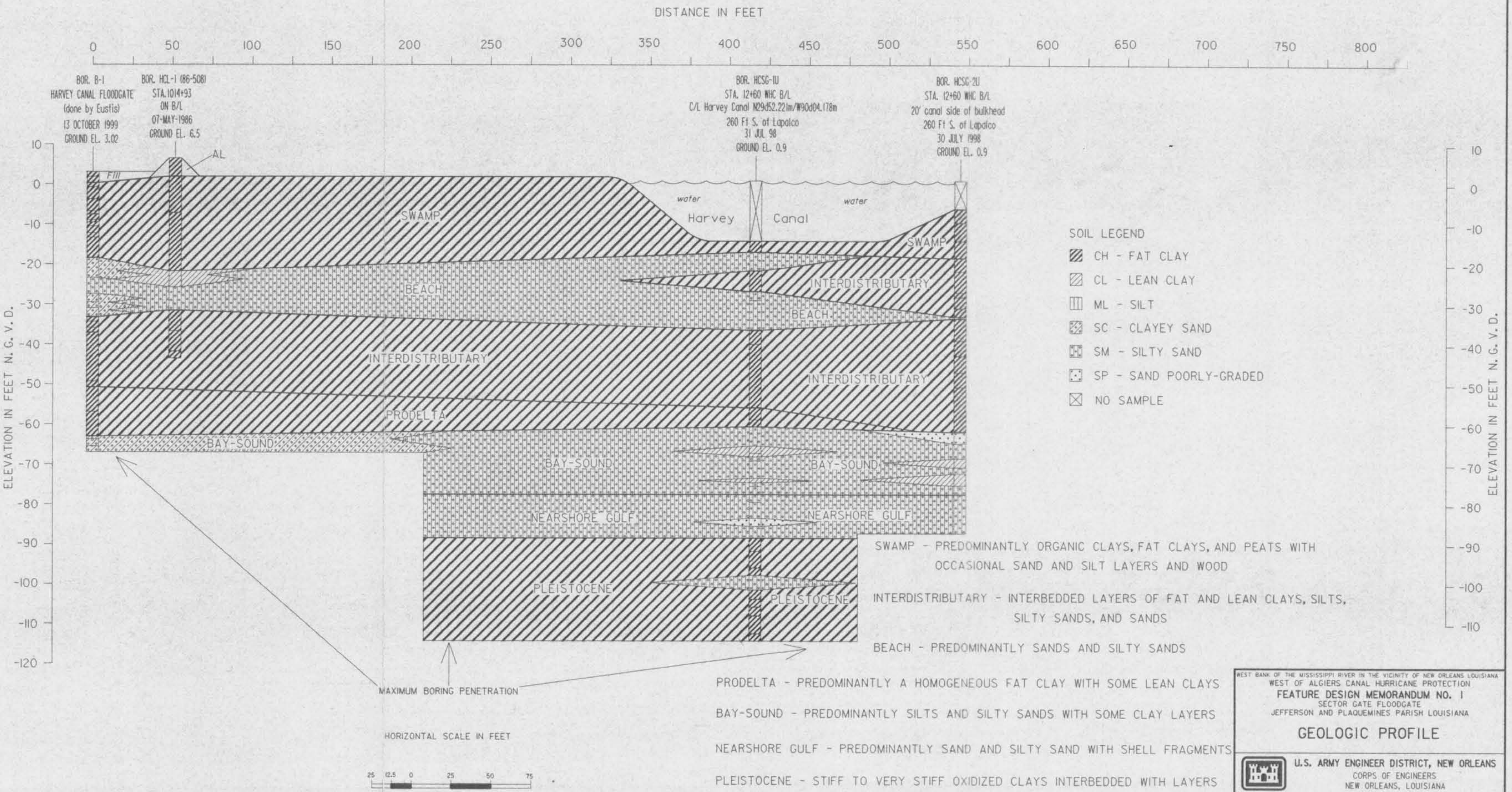
NEW ORLEANS, LOUISIANA

| DESIGNED BY: MHC<br>DRAWN BY: HJR<br>CHECKED BY: MHC | PLOT SCALE: 120 | PLOT DATE: 2 FEB 00 | CADD FILE: 45223R16.DGN |
|---|---|---|---|
| | DATE: 2/2/2000 | | FILE NO. H-2-45223 |




SWAMP - PREDOMINANTLY ORGANIC CLAYS, FAT CLAYS, AND PEATS WITH OCCASIONAL SAND AND SILT LAYERS AND WOOD

INTERDISTRIBUTARY - INTERBEDDED LAYERS OF FAT AND LEAN CLAYS, SILTS, SILTY SANDS, AND SANDS

BEACH - PREDOMINANTLY SANDS AND SILTY SANDS

PRODELTA - PREDOMINANTLY A HOMOGENEOUS FAT CLAY WITH SOME LEAN CLAYS

BAY-SOUND - PREDOMINANTLY SILTS AND SILTY SANDS WITH SOME CLAY LAYERS

NEARSHORE GULF - PREDOMINANTLY SAND AND SILTY SAND WITH SHELL FRAGMENTS

PLEISTOCENE - STIFF TO VERY STIFF OXIDIZED CLAYS INTERBEDDED WITH LAYERS AND LENSES OF SILTS AND SANDS

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
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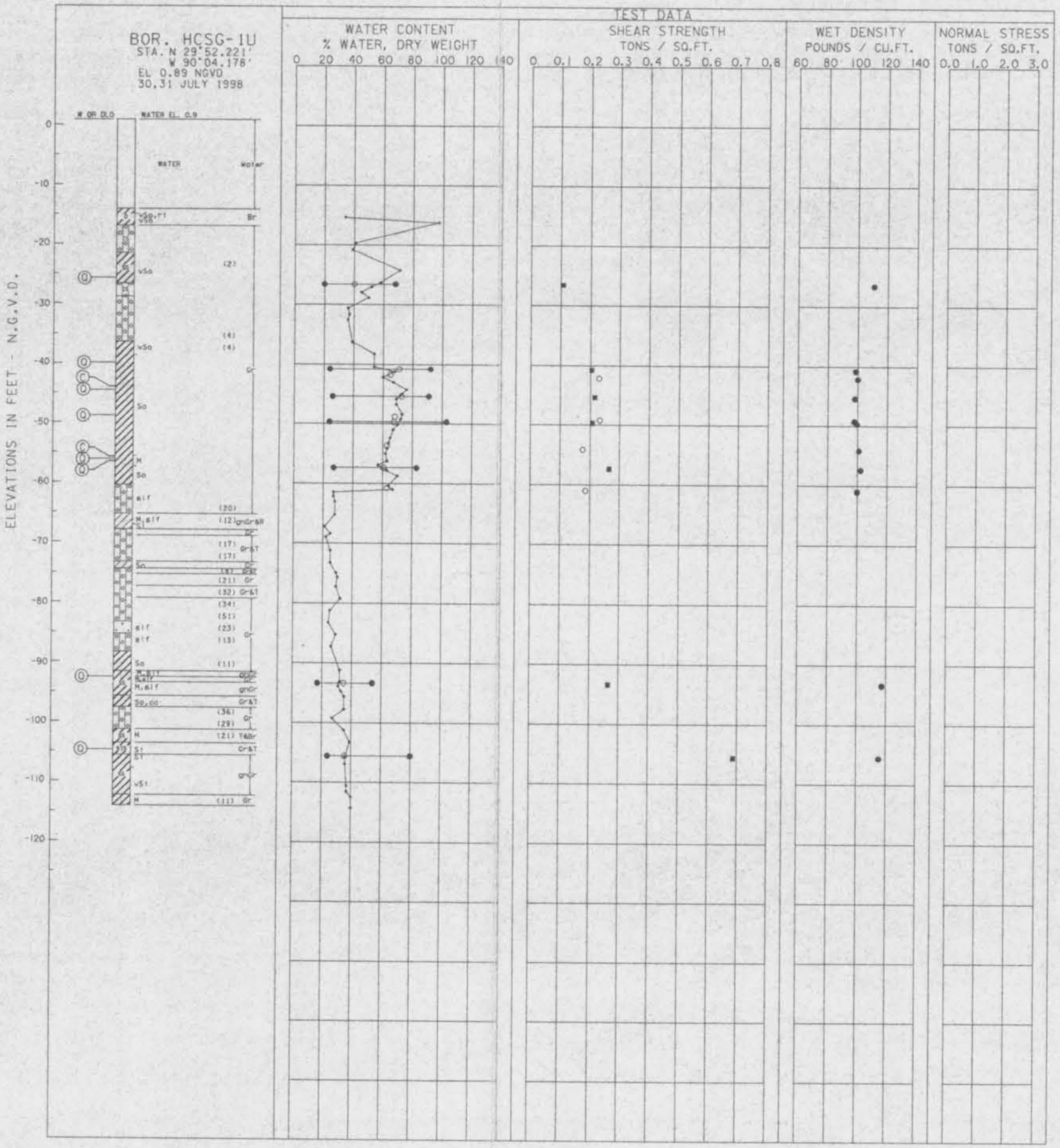
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## GEOLOGIC PROFILE

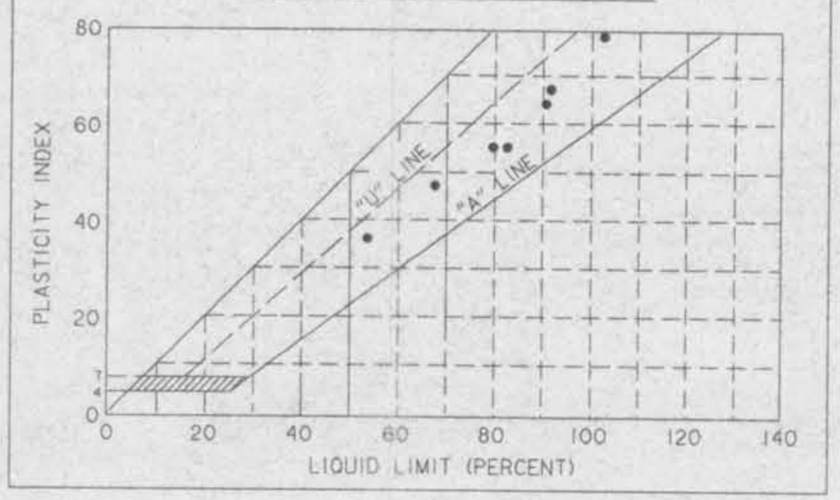
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 1<br>FILE NO. H-2-45223 |
| | DATE: X | | |

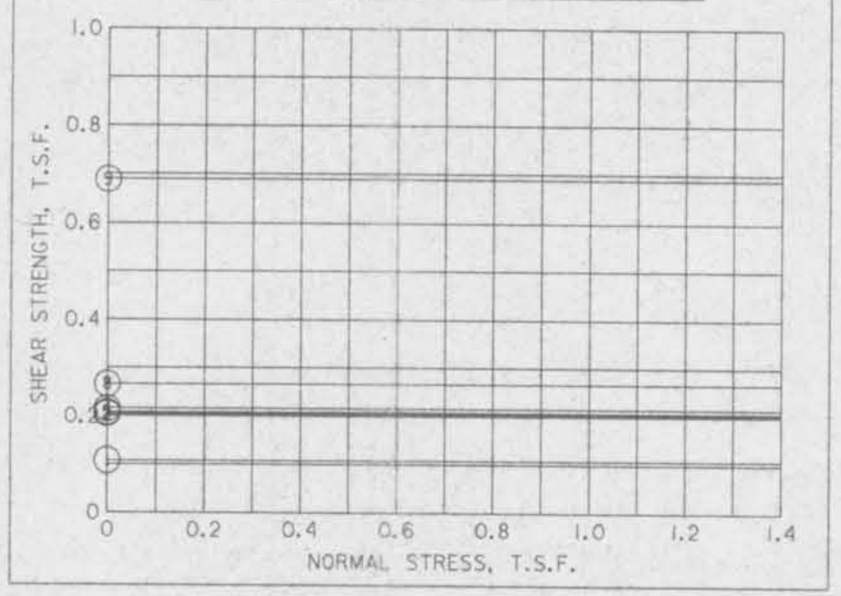
PLATE G 1




## PLASTICITY CHART




## SHEAR STRENGTH DATA




## TABULAR TEST DATA

| ENVELOPE | | TYPE | STRENGTH | | CLASS |
|---|---|---|---|---|---|
| NO. | EL. | | Φ | C - TSF | |
| 1 | -26.6 | Q | 0 | 0.108 | CH |
| 2 | -40.8 | Q | 0 | 0.205 | CH |
| 3 | -44.0 | C | | | CH |
| 4 | -45.4 | Q | 0 | 0.216 | CH |
| 5 | -49.7 | Q | 0 | 0.208 | CH |
| 6 | -56.0 | C | | | CH |
| 7 | -57.4 | Q | 0 | 0.266 | CH |
| 8 | -93.4 | Q | 0 | 0.266 | CH |
| 9 | -105.6 | Q | 0 | 0.689 | CH |

## NOTES

○ - (UC) UNCONFINED COMPRESSION TEST
■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
$\omega_P$ $\omega_N$ $\omega_L$ ATTERBERG LIMITS

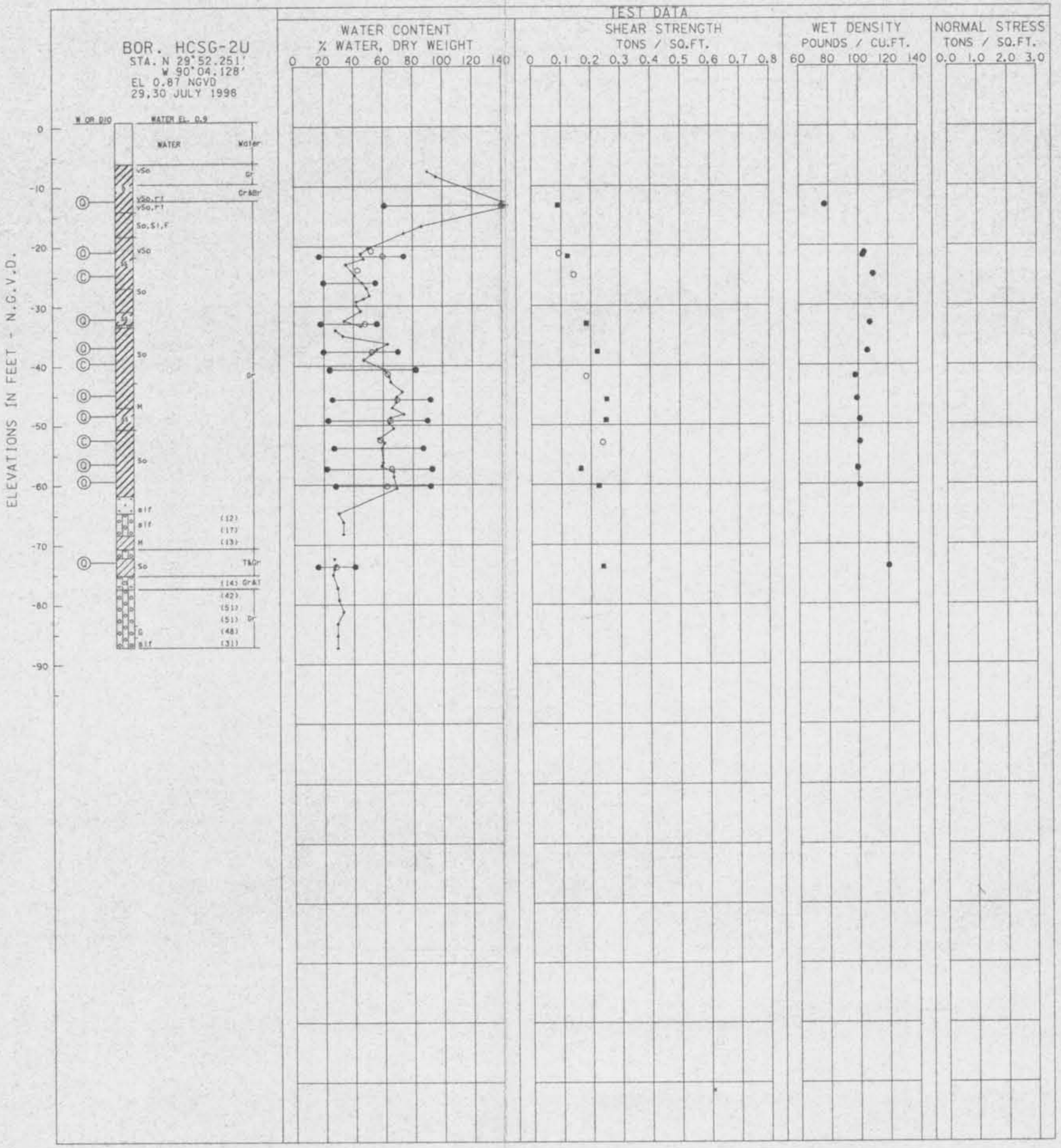
BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE APPENDIX G.

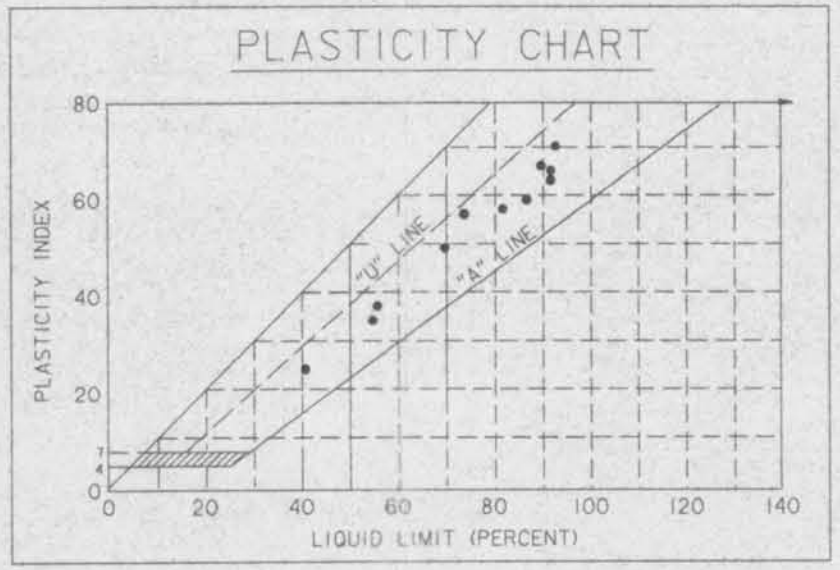
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. I**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

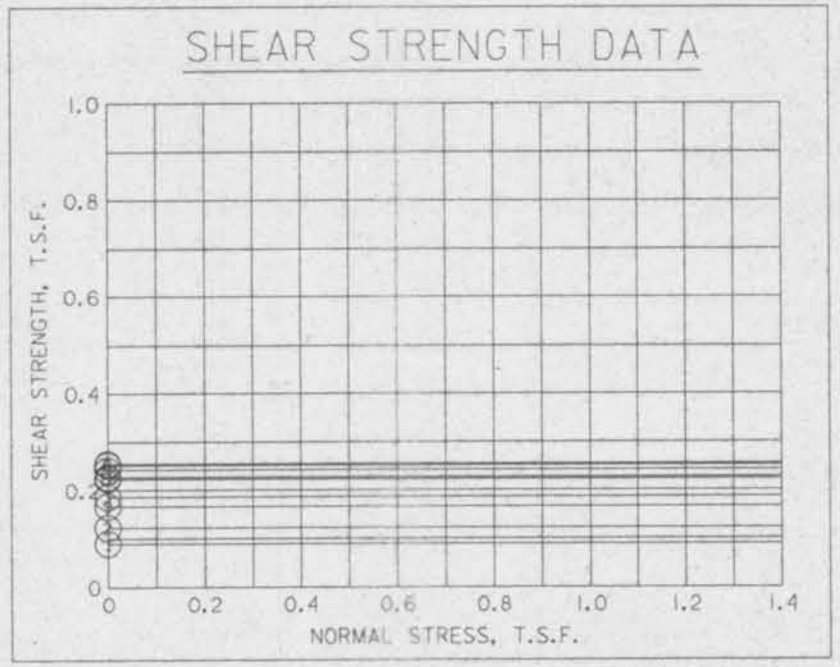
# UNDISTURBED BORING HCSG-IU

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 2 |
| | DATE: X | | FILE NO. H-2-45223 |




# TABULAR TEST DATA

| ENVELOPE NO. | ENVELOPE EL. | TYPE | STRENGTH Φ | STRENGTH C - TSF | CLASS |
|---|---|---|---|---|---|
| 1 | -13.2 | Q | 0 | 0.090 | CH |
| 2 | -21.7 | Q | 0 | 0.123 | CH |
| 3 | -33.0 | Q | 0 | 0.186 | CH |
| 4 | -34.0 | C | | | CH |
| 5 | -37.7 | Q | 0 | 0.223 | CH |
| 6 | -45.7 | Q | 0 | 0.255 | CH |
| 7 | -49.0 | C | | | CH |
| 8 | -49.2 | Q | 0 | 0.252 | CH |
| 9 | -57.3 | Q | 0 | 0.167 | CH |
| 10 | -60.2 | Q | 0 | 0.227 | CH |
| 11 | -62.0 | C | | | CH |
| 12 | -73.7 | Q | 0 | 0.242 | CL |

# NOTES

○ - (UC) UNCONFINED COMPRESSION TEST
■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
$\omega_P$ — $\omega_N$ — $\omega_L$ ATTERBERG LIMITS

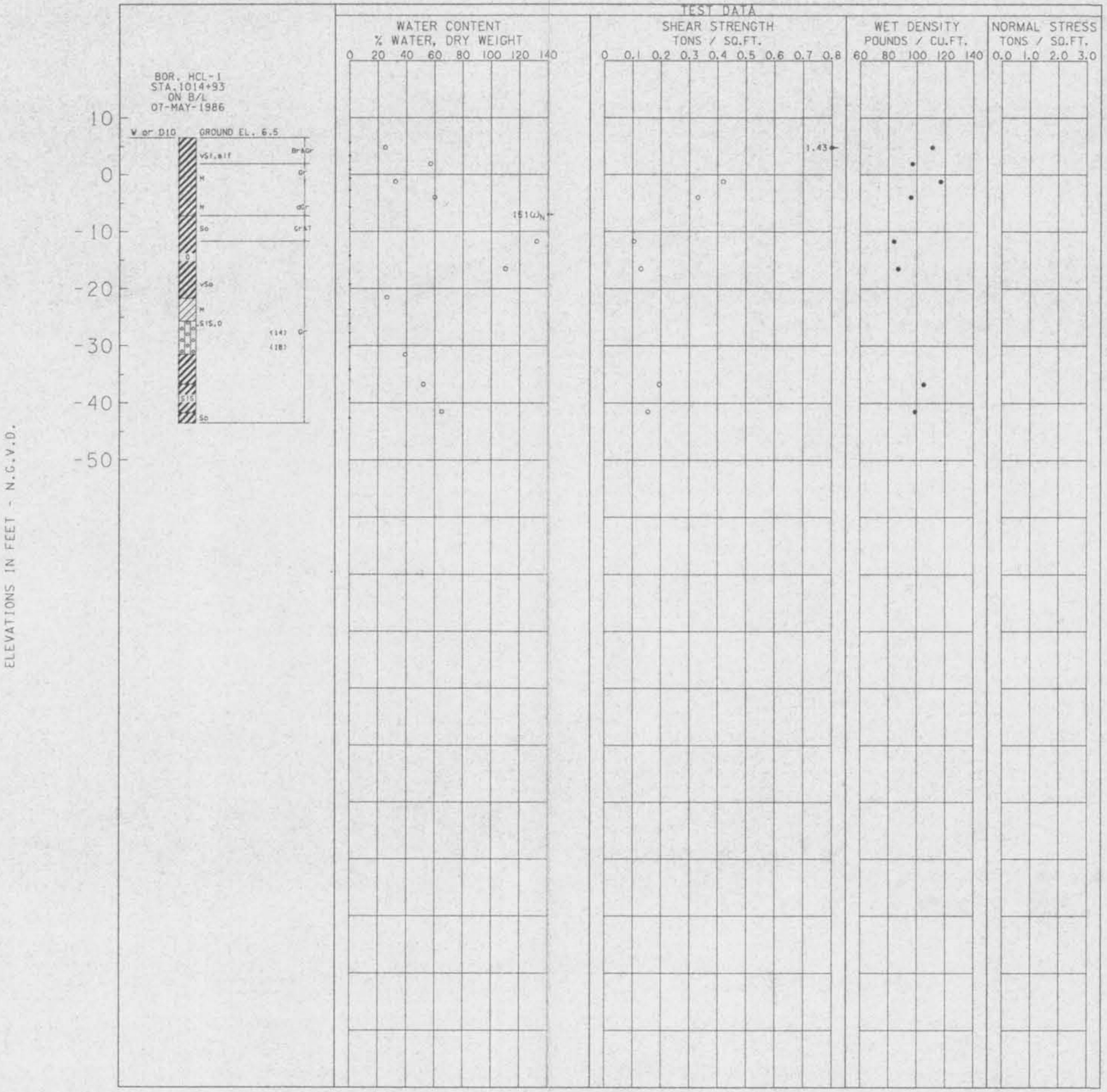
BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE APPENDIX G.

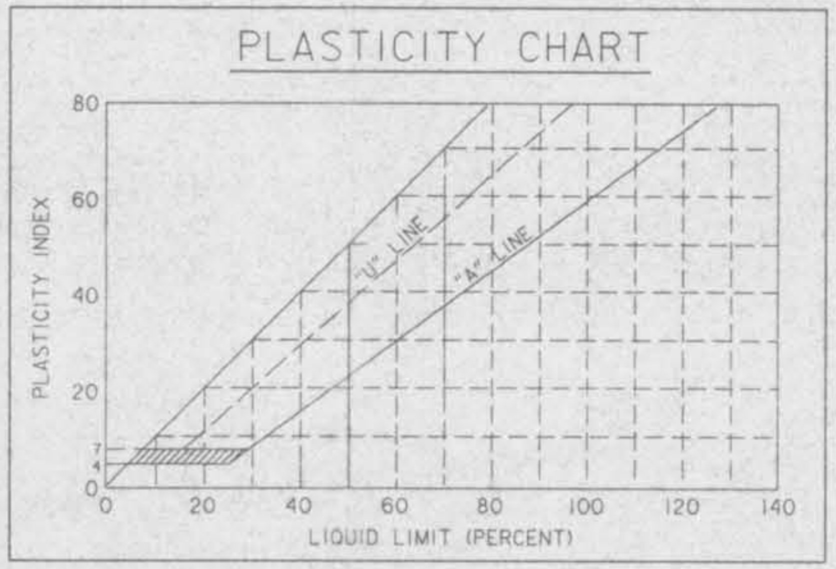
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

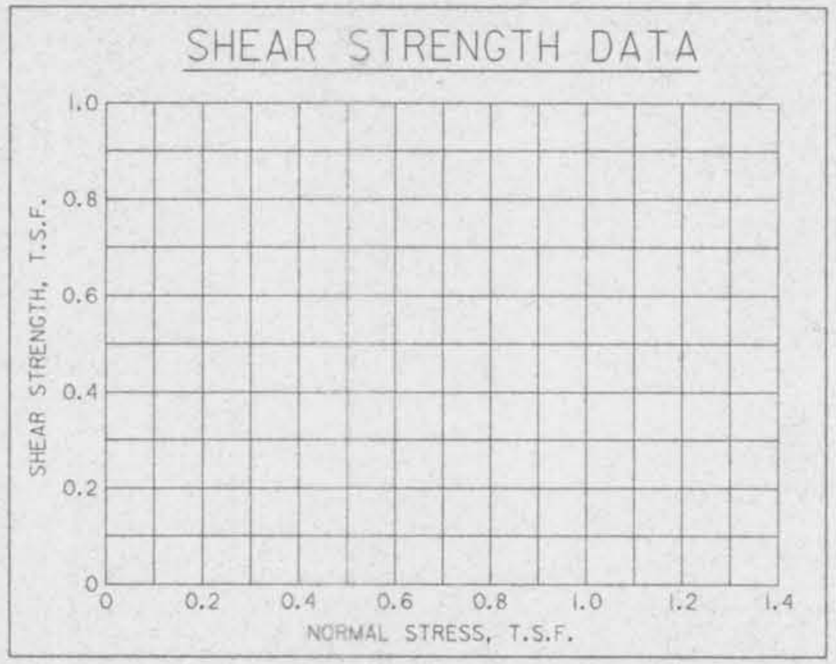
## UNDISTURBED BORING
## HCSG-2U

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
DATE: X
CADD FILE: G 3
FILE NO. H-2-45223




## TABULAR TEST DATA

| ENVELOPE | | TYPE | STRENGTH | | CLASS |
|---|---|---|---|---|---|
| NO. | EL. | | Φ | C - TSF | |

## NOTES

○ - (UC) UNCONFINED COMPRESSION TEST
■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
$\omega_P$ $\omega_N$ $\omega_L$ ATTERBERG LIMITS

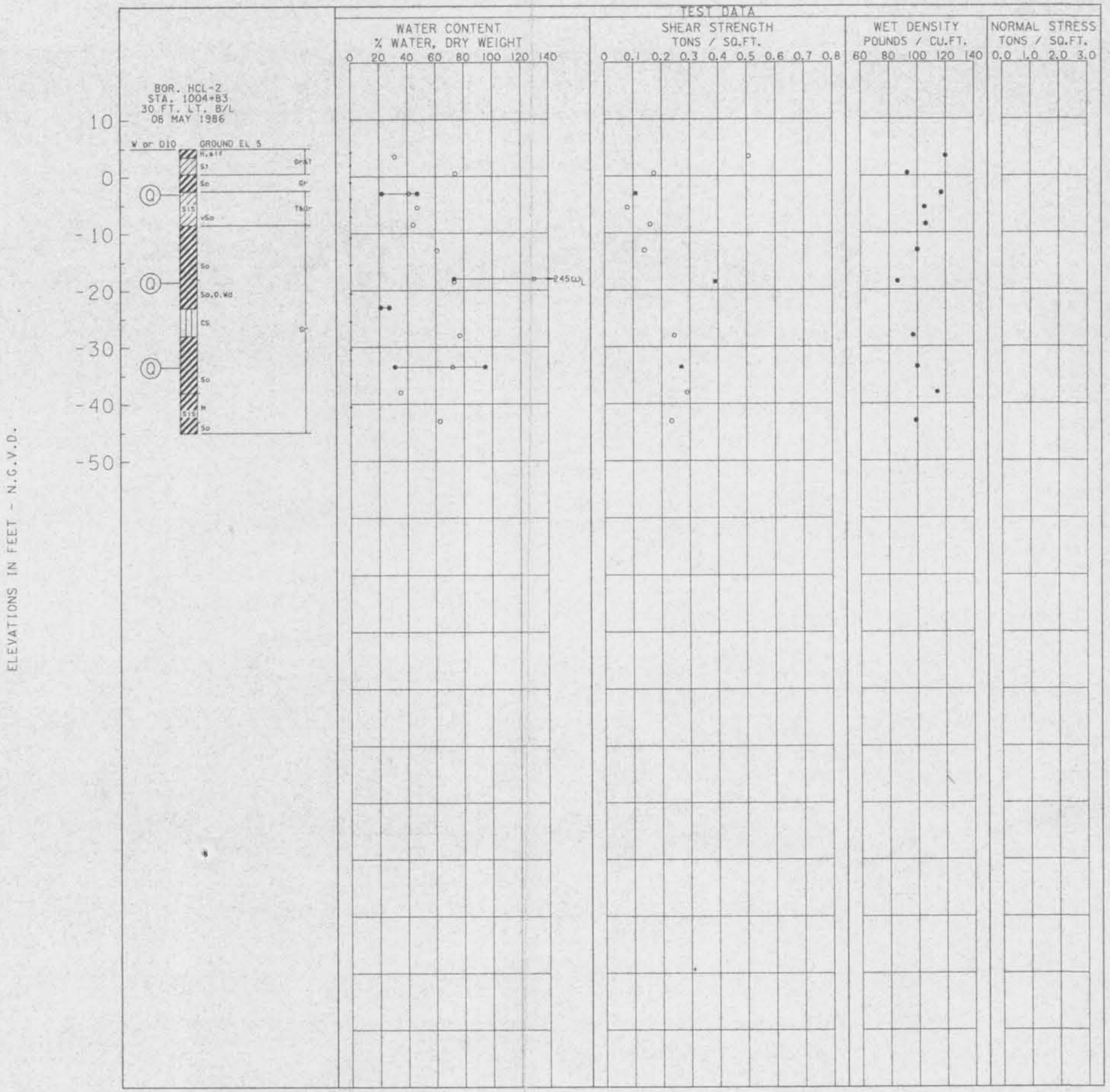
BORING WAS TAKEN WITH A 3 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE APPENDIX C.

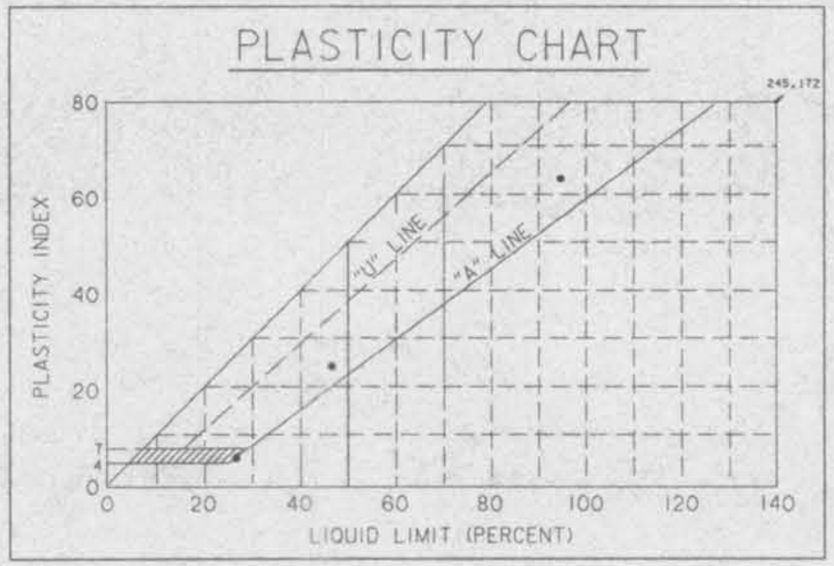
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# UNDISTURBED BORING HCL-1

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

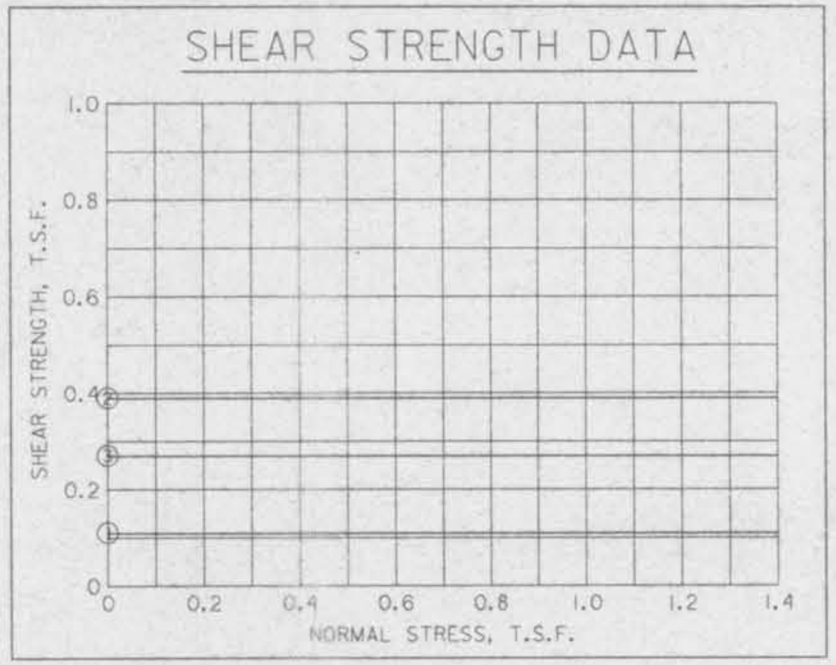
| | | | |
|---|---|---|---|
| DESIGNED BY: LSD | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 4 |
| DRAWN BY: LSD | | | FILE NO. |
| CHECKED BY: SKC | DATE: X | | H-2-45223 |




# TABULAR TEST DATA

| ENVELOPE | | TYPE | STRENGTH | | CLASS |
|---|---|---|---|---|---|
| NO. | EL. | | Φ | C - TSF | |
| 1 | -3.0 | Q | 0.0 | 0.110 | CL |
| 2 | -18.5 | Q | 0.0 | 0.390 | CH |
| 3 | -33.5 | Q | 0.0 | 0.270 | CH |




# NOTES

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

$\omega_P$ — $\omega_N$ — $\omega_L$ ATTERBERG LIMITS

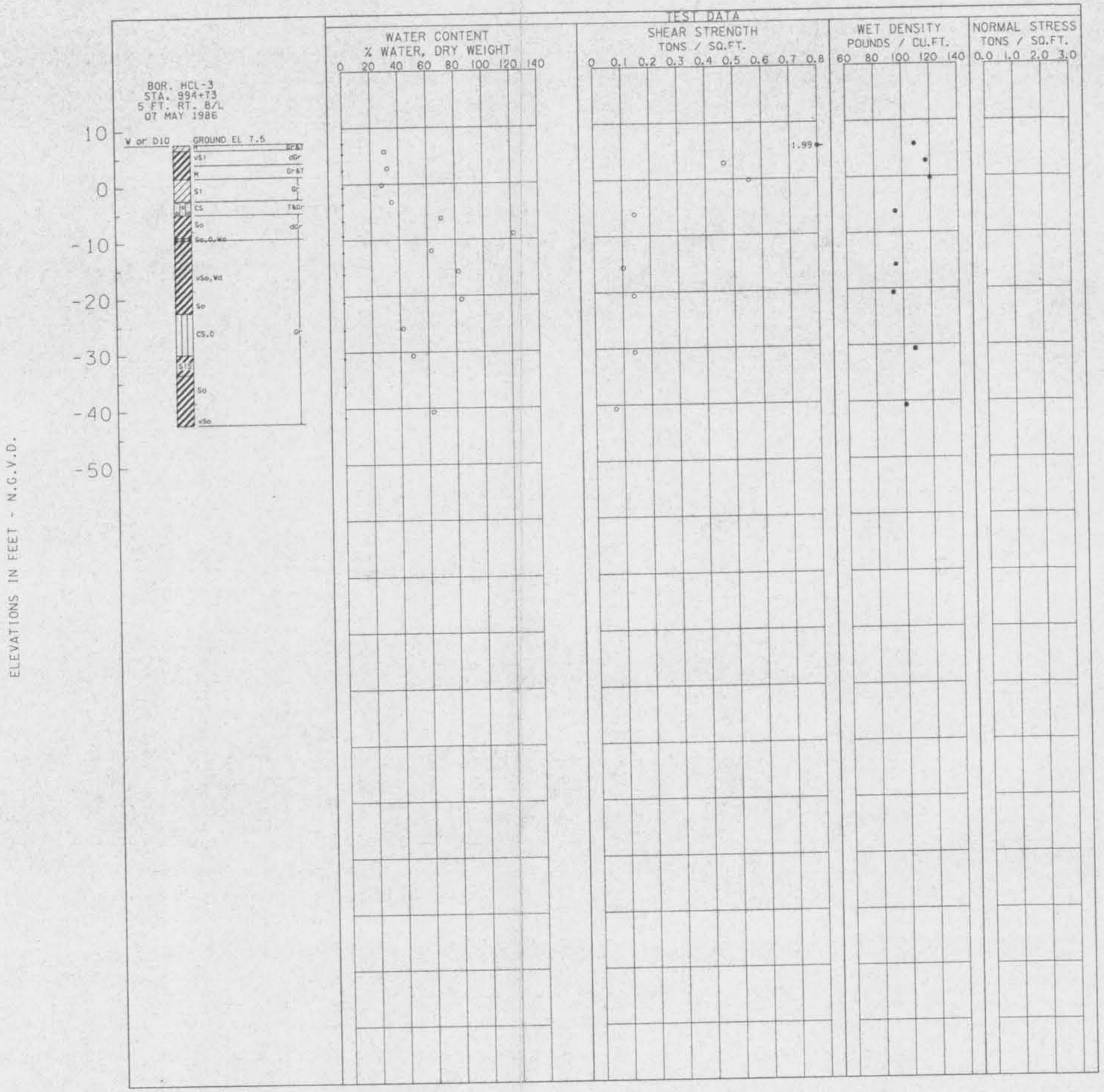
BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE DWG
FOR DETAILED TEST DATA SEE APPENDIX G.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

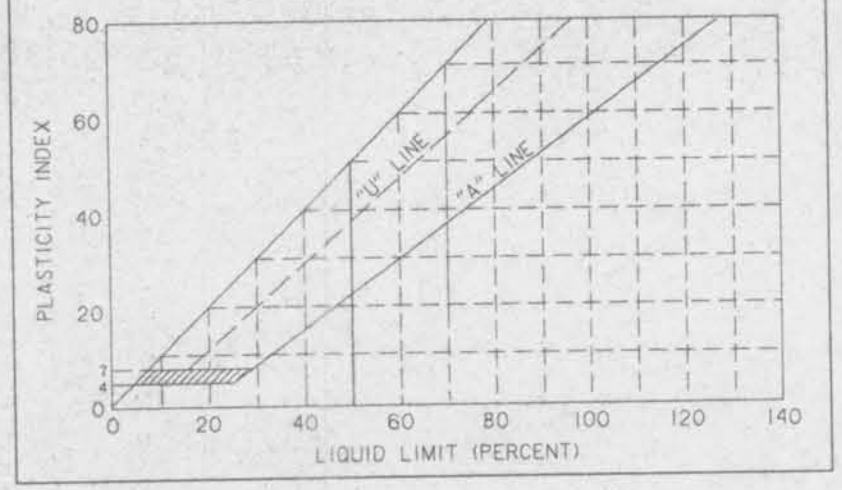
## UNDISTURBED BORING
## HCL-2

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

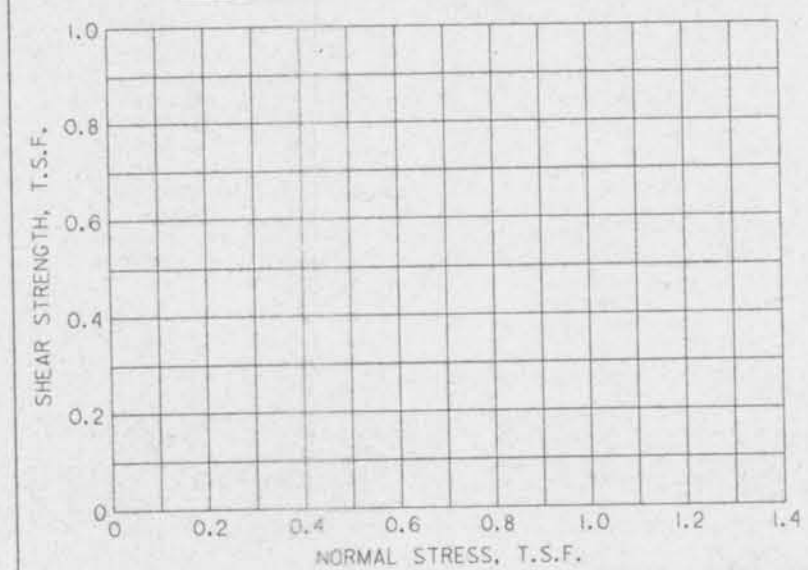
| | | | |
|---|---|---|---|
| DESIGNED BY: LSD | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 5 |
| DRAWN BY: LSD | | | FILE NO. H-2-45223 |
| CHECKED BY: SKC | DATE: X | | |




## PLASTICITY CHART




## SHEAR STRENGTH DATA




## TABULAR TEST DATA

| ENVELOPE NO. | ENVELOPE EL. | TYPE | STRENGTH Φ | STRENGTH C - TSF | CLASS |
|---|---|---|---|---|---|
| | | | | | |

## NOTES

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

$\omega_P$ — $\omega_N$ — $\omega_L$ ATTERBERG LIMITS

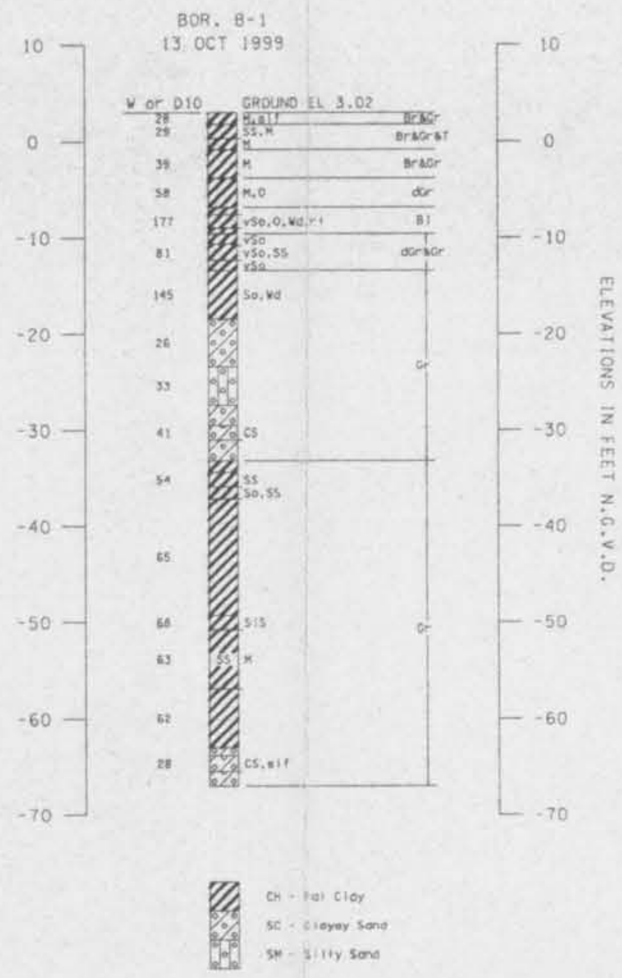
BORING WAS TAKEN WITH A 3 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE DWG
FOR DETAILED TEST DATA SEE APPENDIX G.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# UNDISTURBED BORING HCL-3

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1<br>DATE: X | PLOT DATE: 07 FEB 00 | CADD FILE: G 6<br>FILE NO. H-2-45223 |




## NOTES

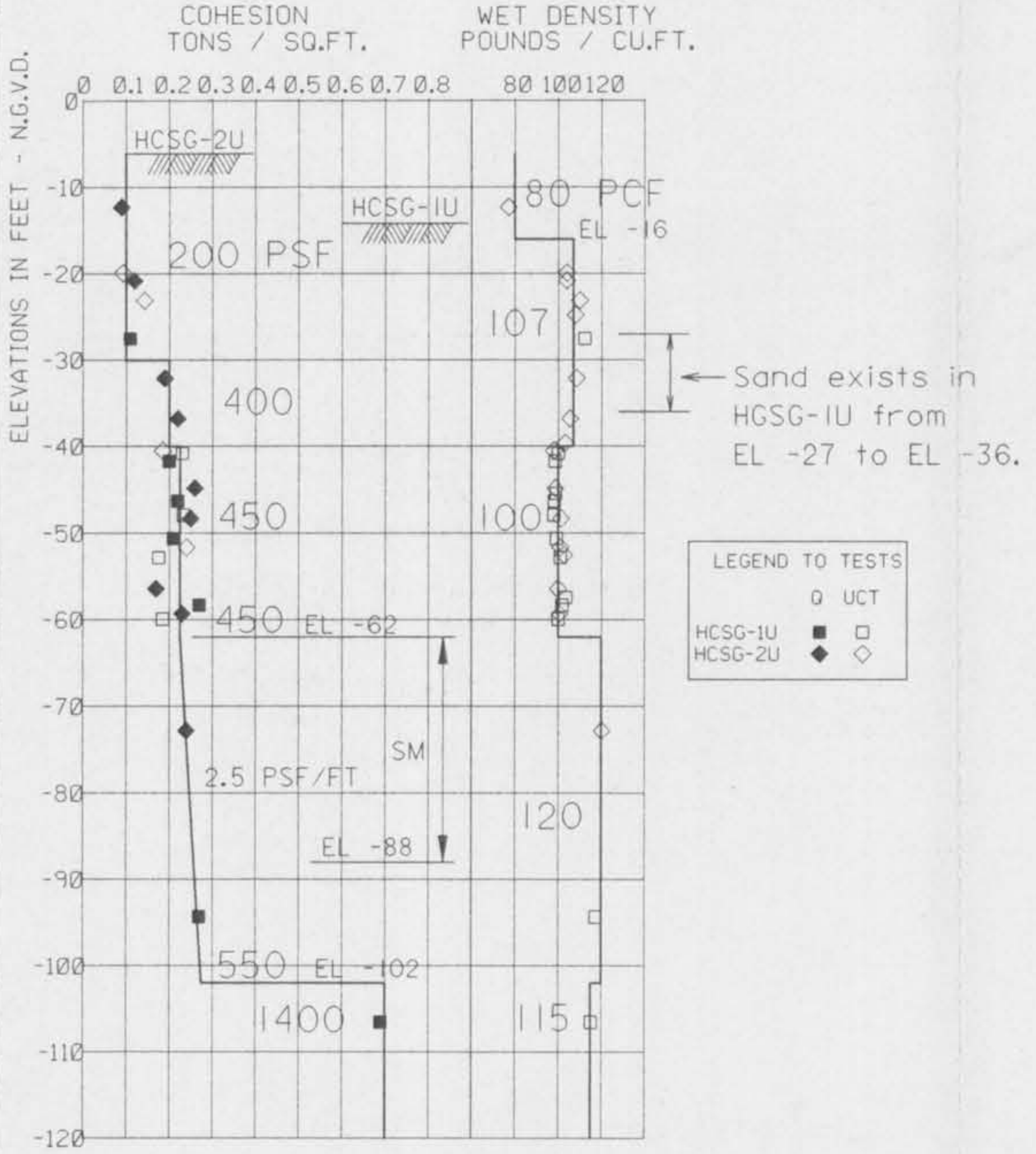
FOR SOIL BORING LEGEND SEE PLATE G 22.
FOR LOCATION OF BORINGS SEE DWG

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

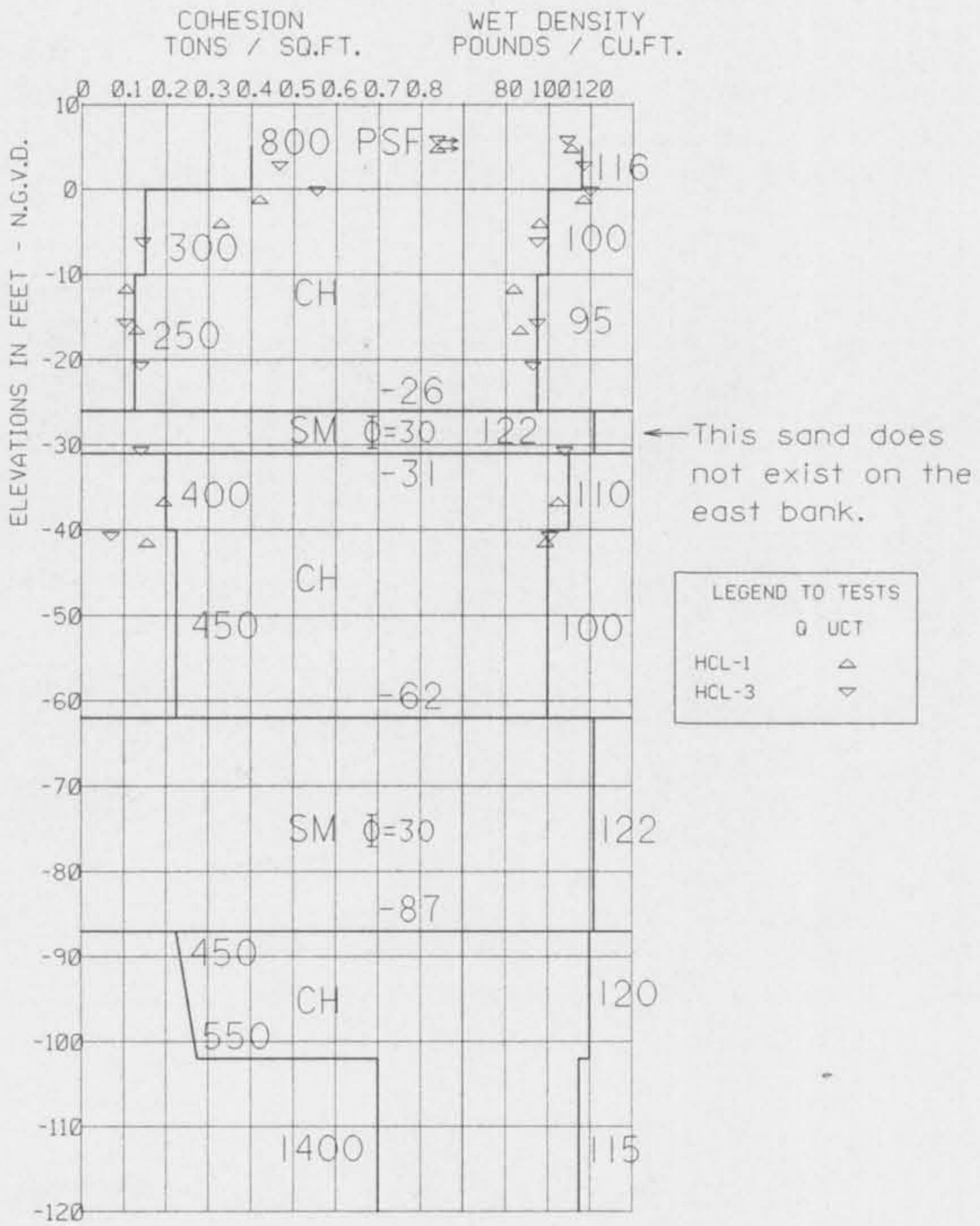
# GENERAL TYPE BORING
# B-1

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

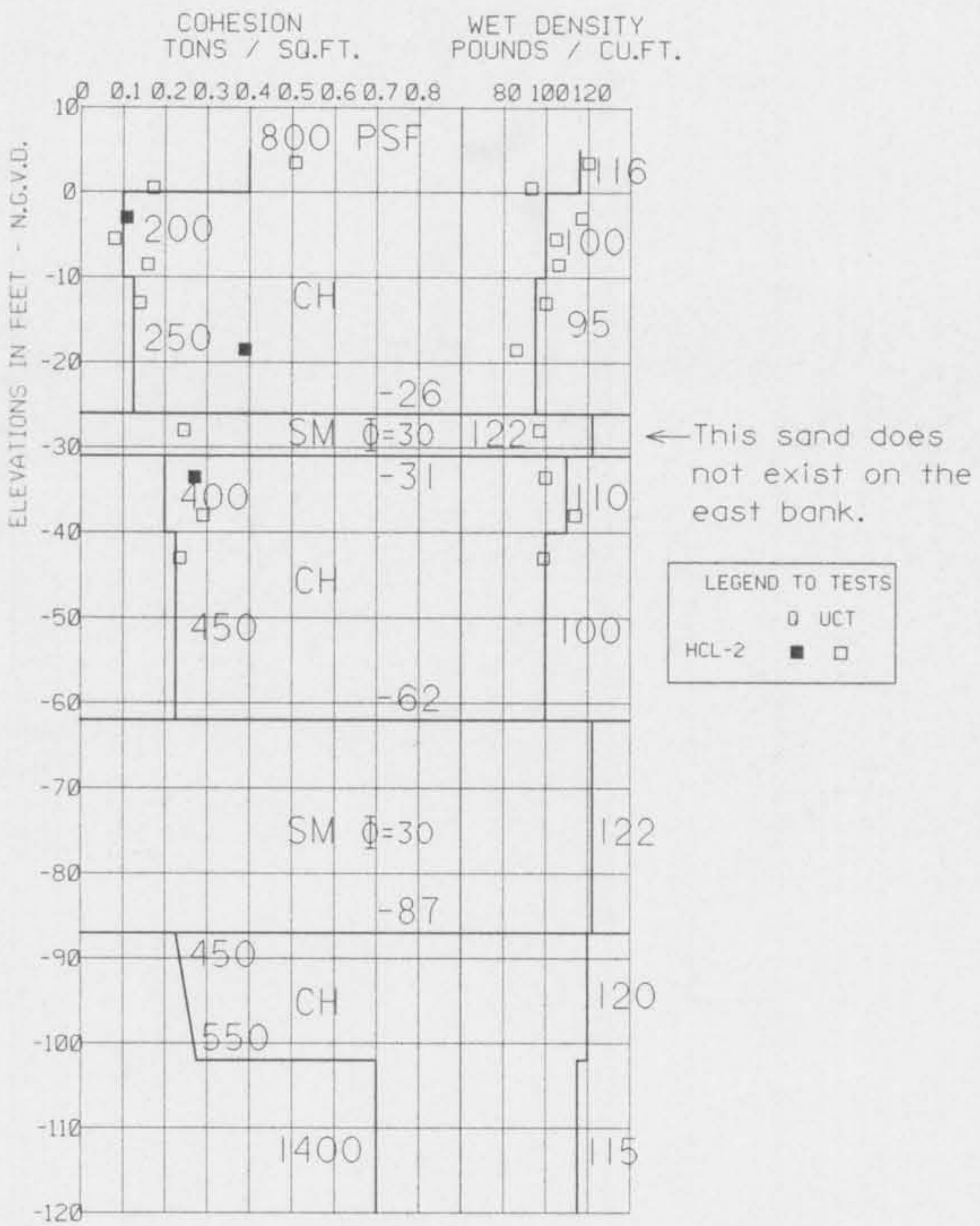
| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 7 |
| | DATE: X | | FILE NO. H-2-45223 |




HARVEY CANAL
BORINGS HCSG-1U AND HCSG-2U




C/L LEVEE
BORINGS HCL-1 AND HCL-3



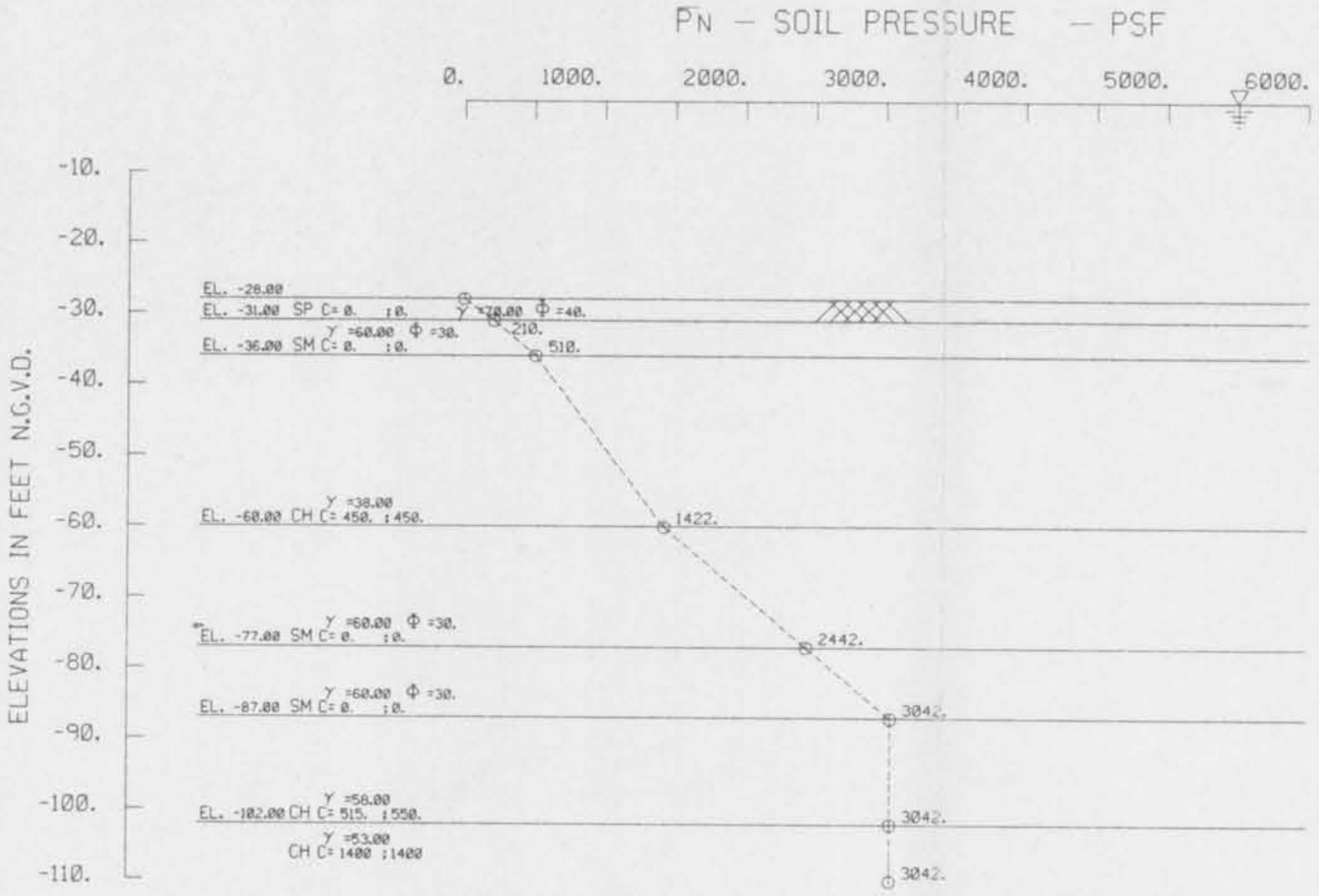

LEVEE TOE AND BANKS
BORING HCL-2

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

SOIL STRENGTHS AND WEIGHTS

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 8 |
| | DATE: X | | FILE NO. H-2-45223 |




S-CASE
CH,CL- Φ=23°
ML- Φ=28°
SM,SP- Φ=30°

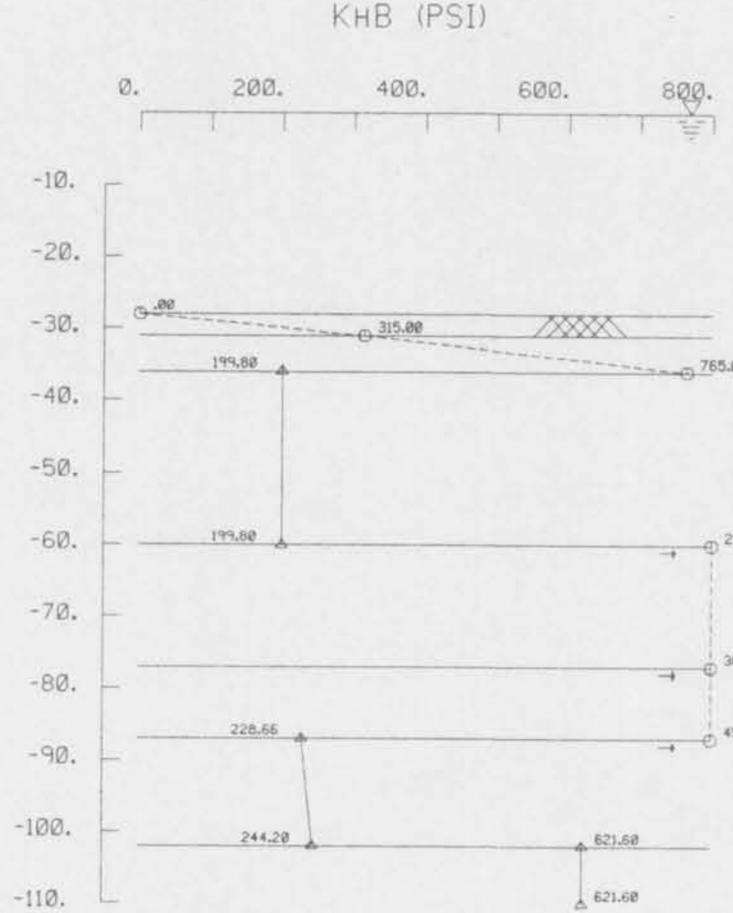
TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

SHEAR STRENGTH AND WET DENSITIES SEE PLATE

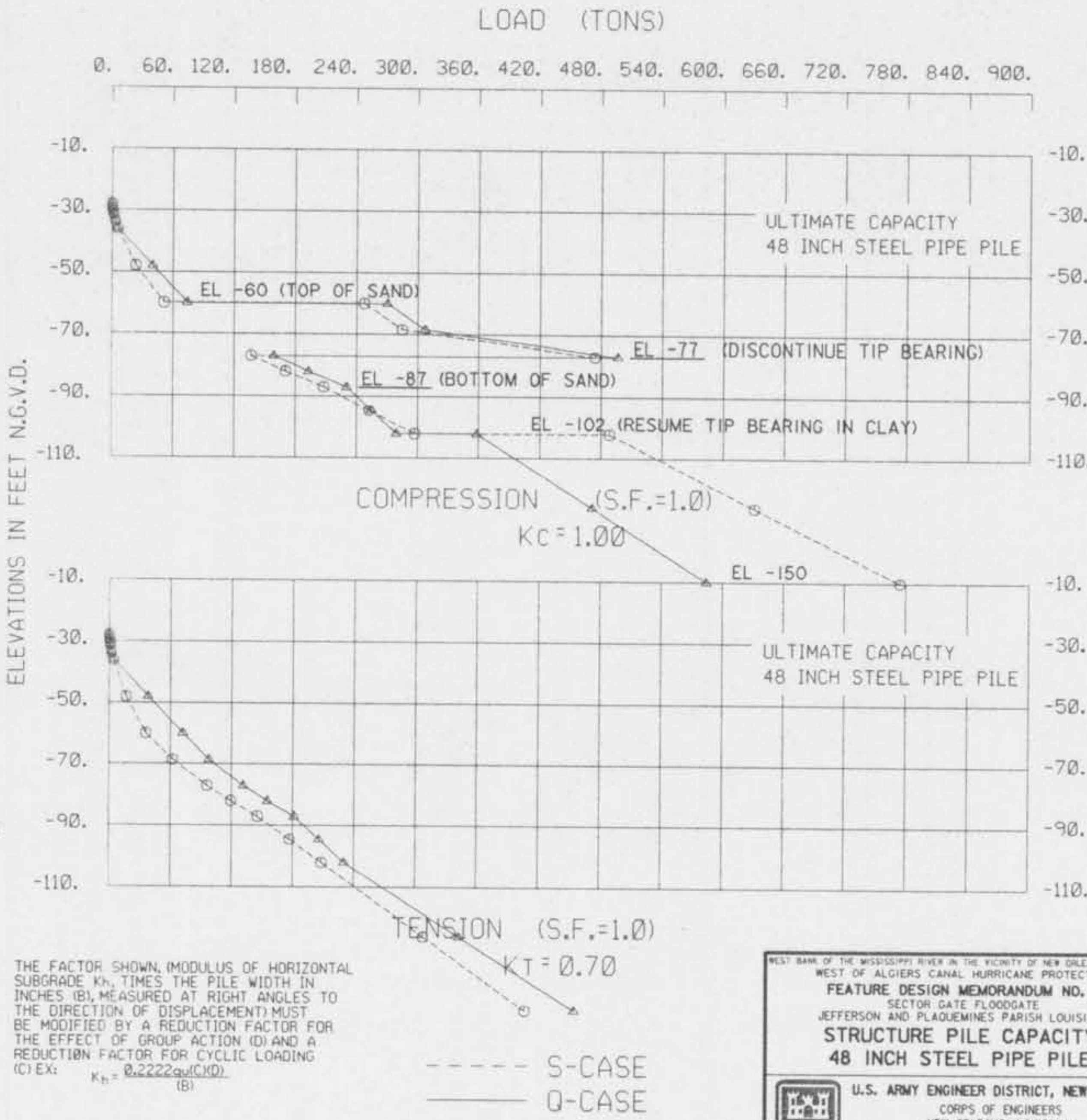
SECOND ORDER STATIONS

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




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

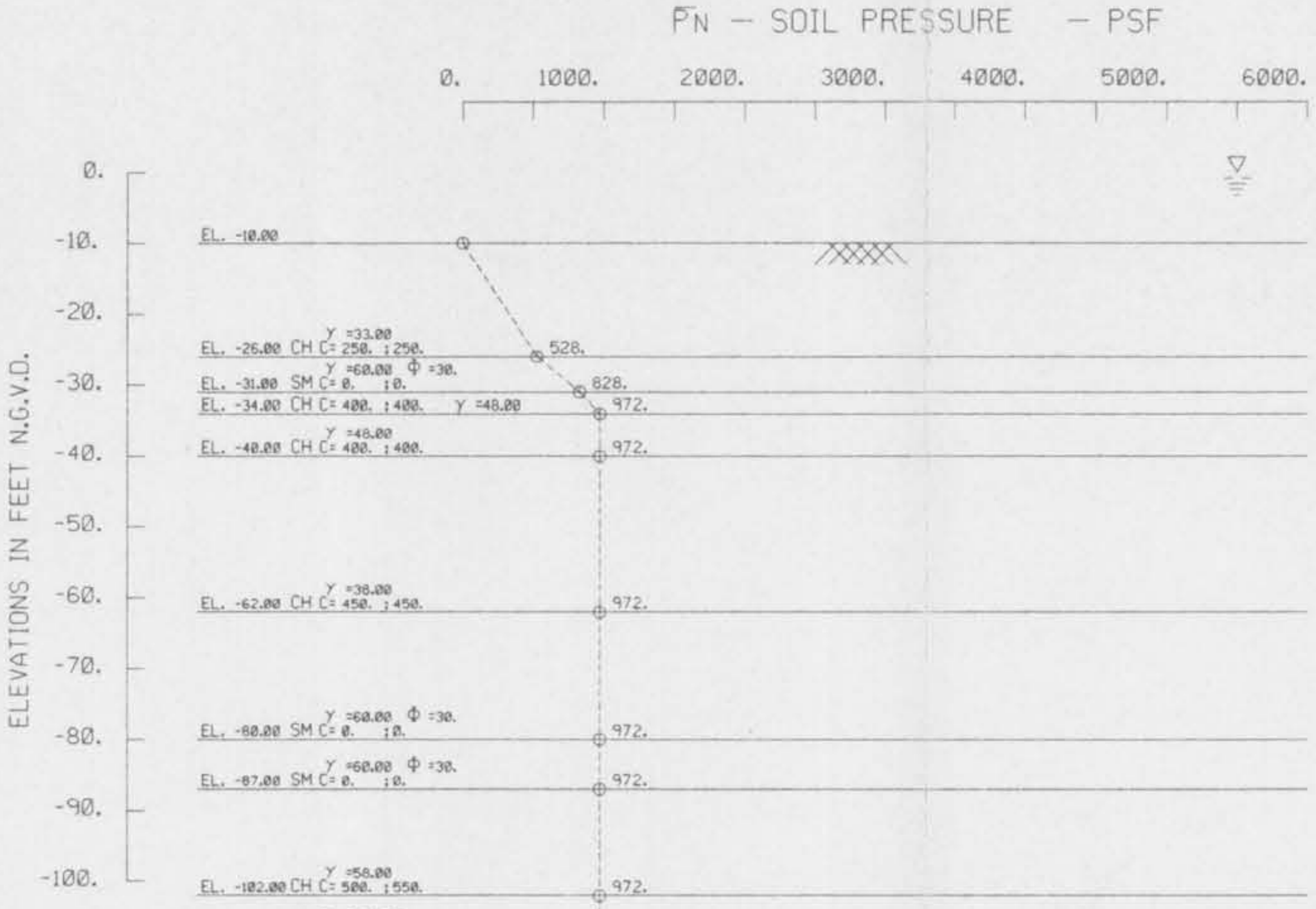
THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE $K_h$, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222qu(C)(D)}{(B)}$




WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. I**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
**STRUCTURE PILE CAPACITY**
**48 INCH STEEL PIPE PILE**

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 9 |
| | DATE: X | | FILE NO. H-2-45223 |




S-CASE
CH,CL- Φ=23°
ML- Φ=28°
SM,SP- Φ=30°

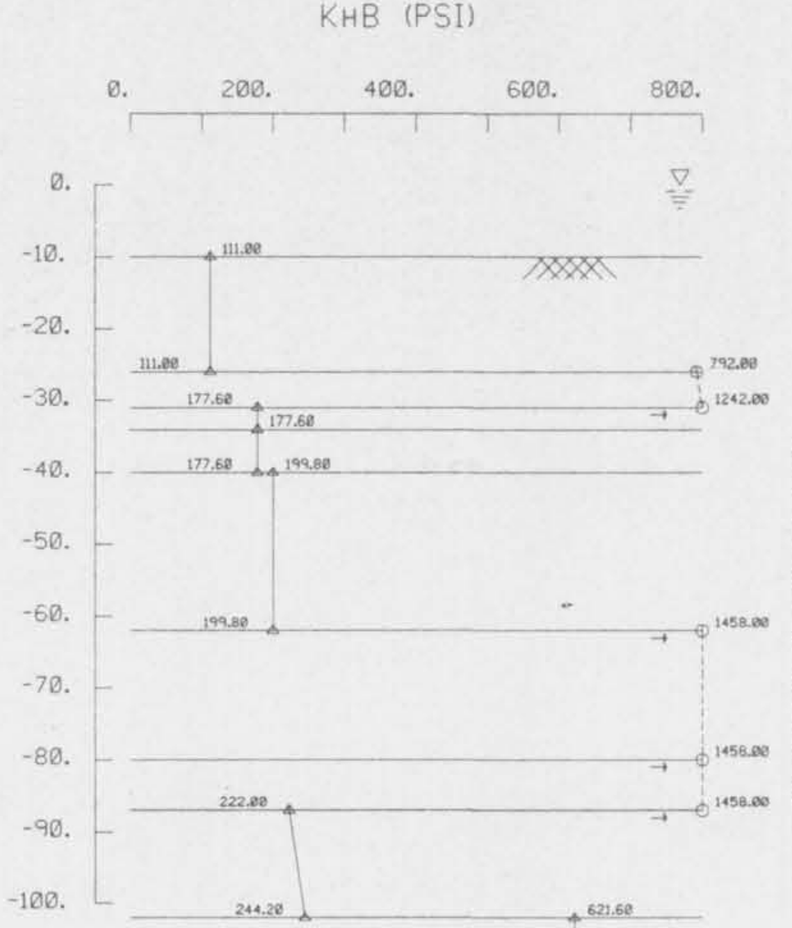
## TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE
SHEAR STRENGTH AND WET DENSITIES SEE PLATE
SECOND ORDER STATIONS

EL. -150.00 CH C= 1400. ;1400. Y=53.00 972.

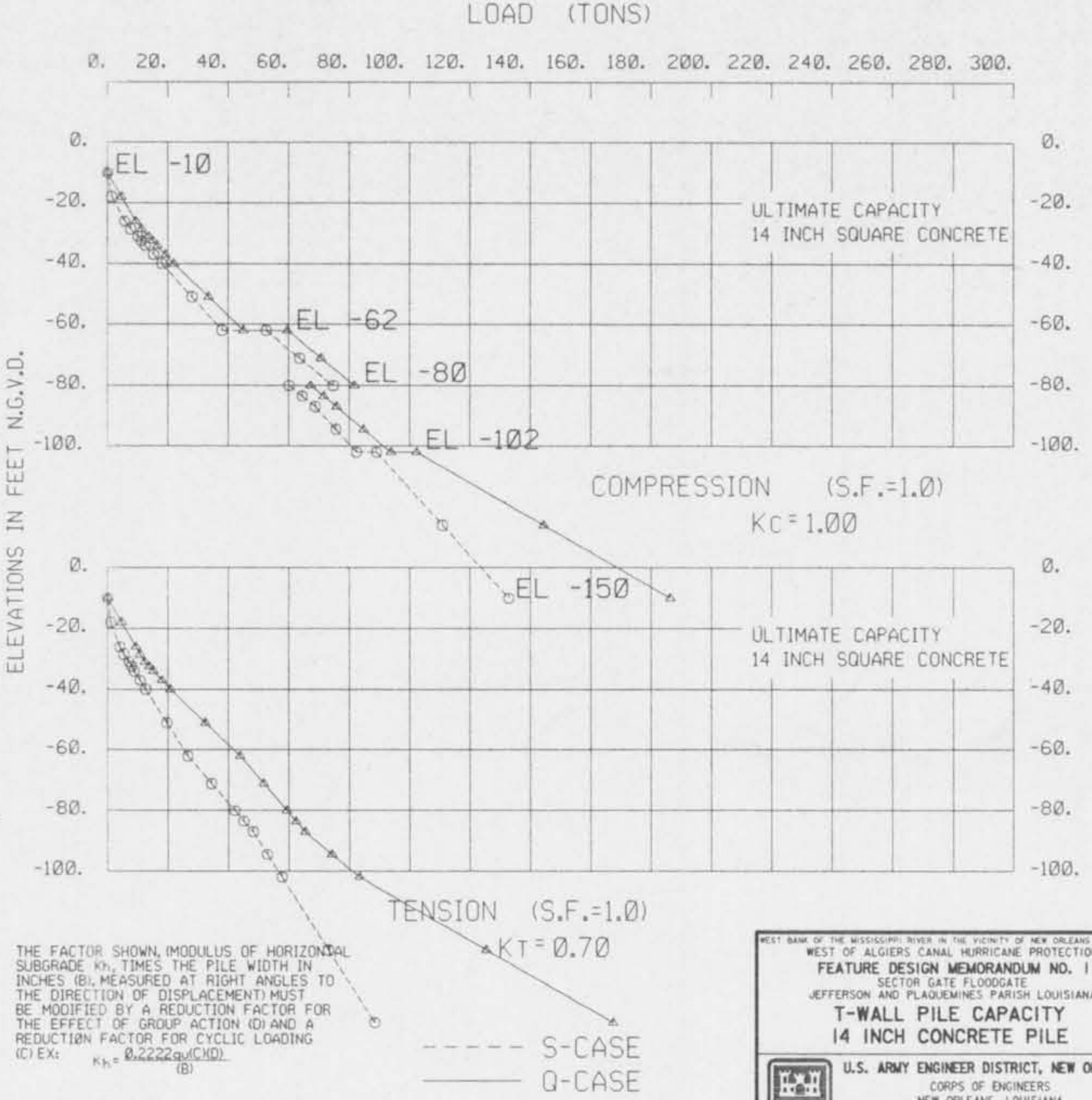
| D | PILE SPACING IN DIRECTION OF LOADING |
|---|---|
| 1.00 | 8B |
| .85 | 7B |
| .70 | 6B |
| .55 | 5B |
| .40 | 4B |
| .25 | 3B |

| C | LOADING CONDITION |
|---|---|
| 1.00 | INITIAL LOADING |
| 0.30 | CYCLIC LOADING |




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

621.60

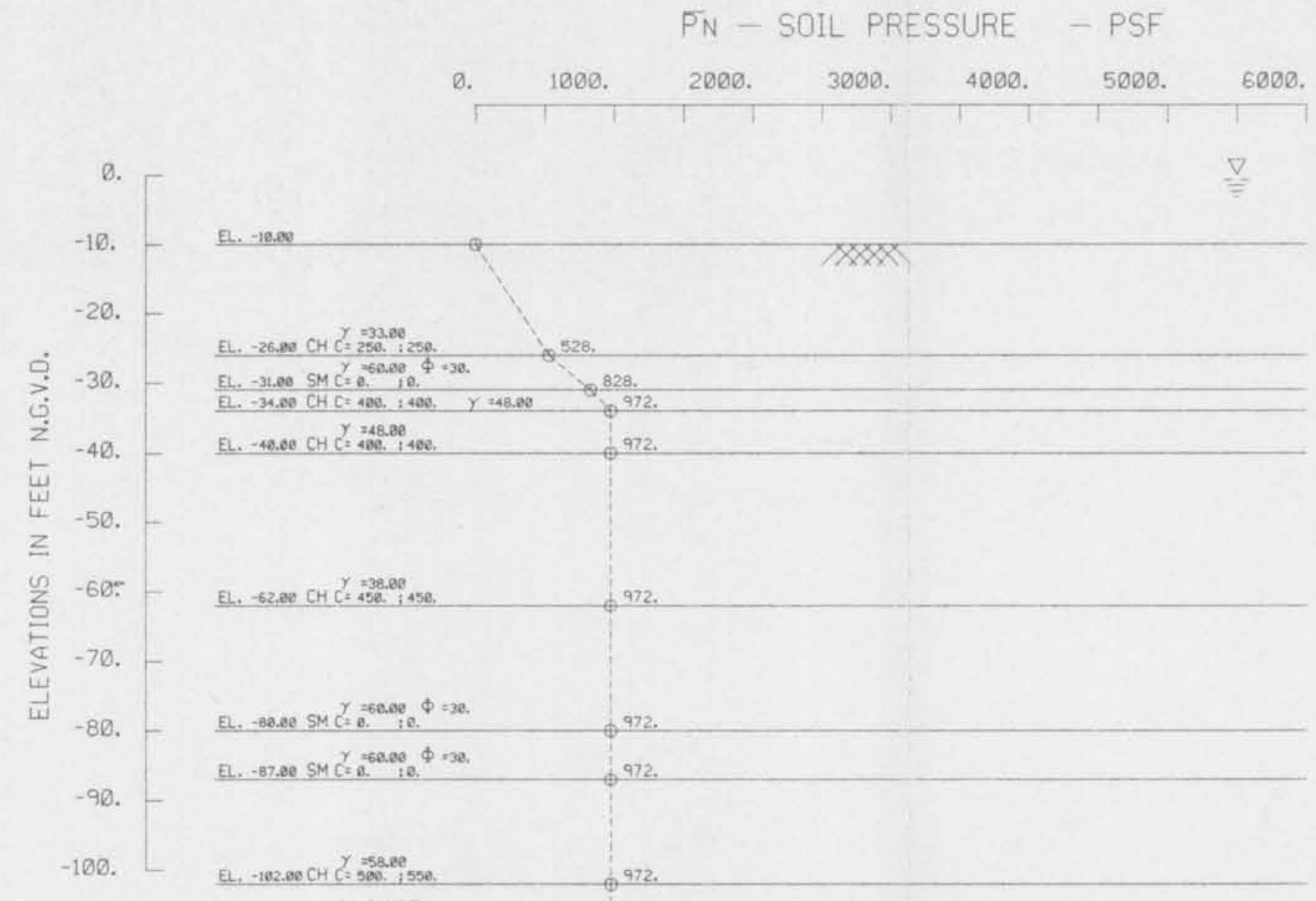


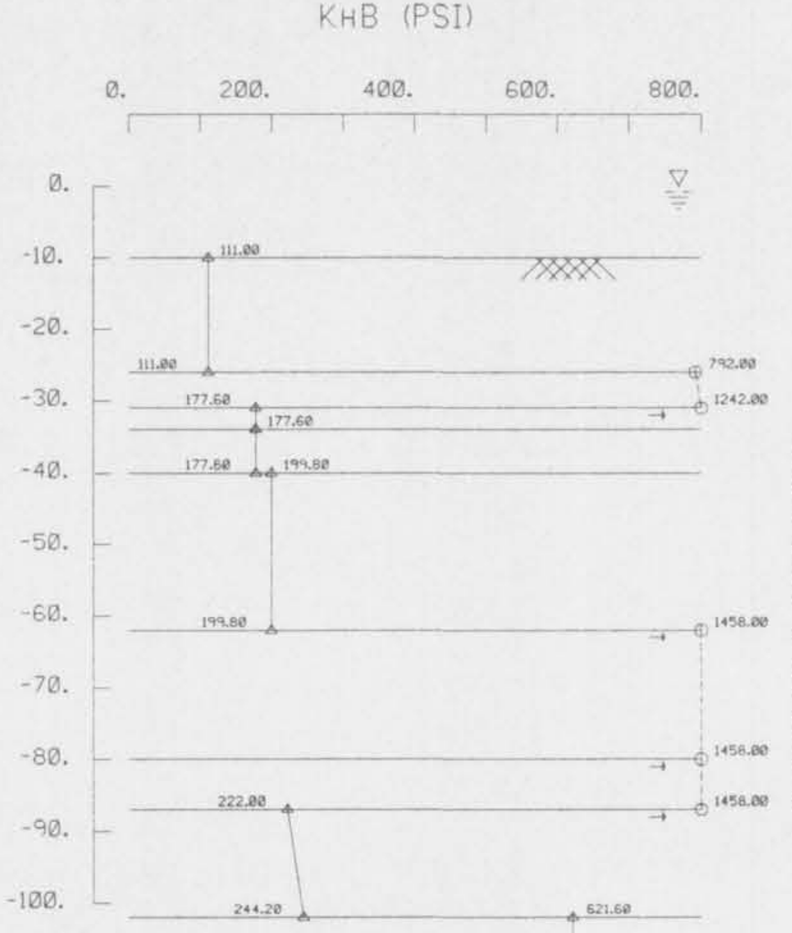

THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222qu(C)(D)}{(B)}$

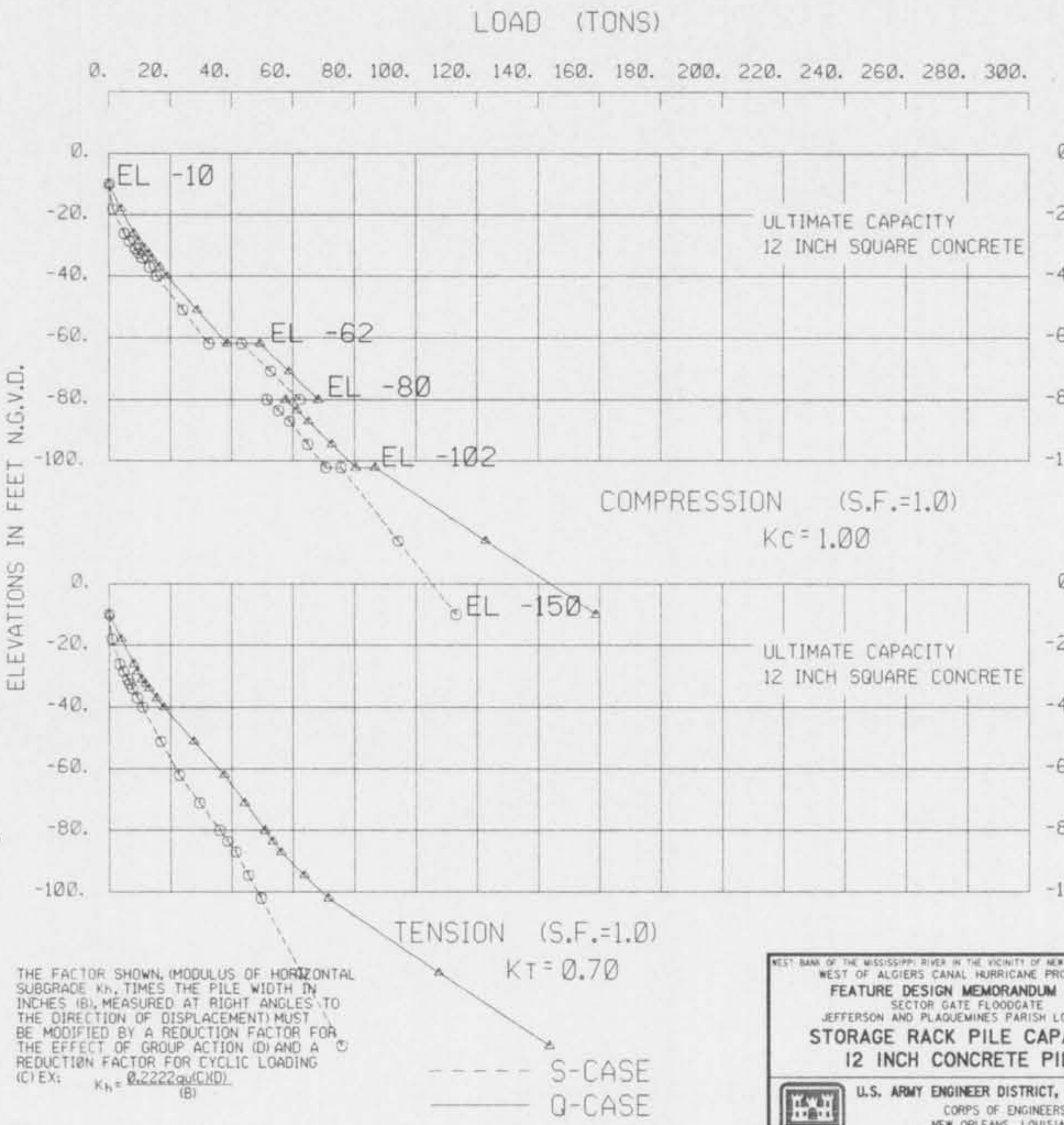
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. I**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
**T-WALL PILE CAPACITY**
**14 INCH CONCRETE PILE**

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 10 |
| DRAWN BY: LSD | DATE: X | | FILE NO. H-2-45223 |
| CHECKED BY: SKC | | | |




EL. -150.00 CH C= 1400. ;1400. γ =53.00 972.

S-CASE
CH,CL- Φ=23°
ML- Φ=28°
SM,SP- Φ=30°

## TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

SHEAR STRENGTH AND WET DENSITIES SEE PLATE

SECOND ORDER STATIONS

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

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

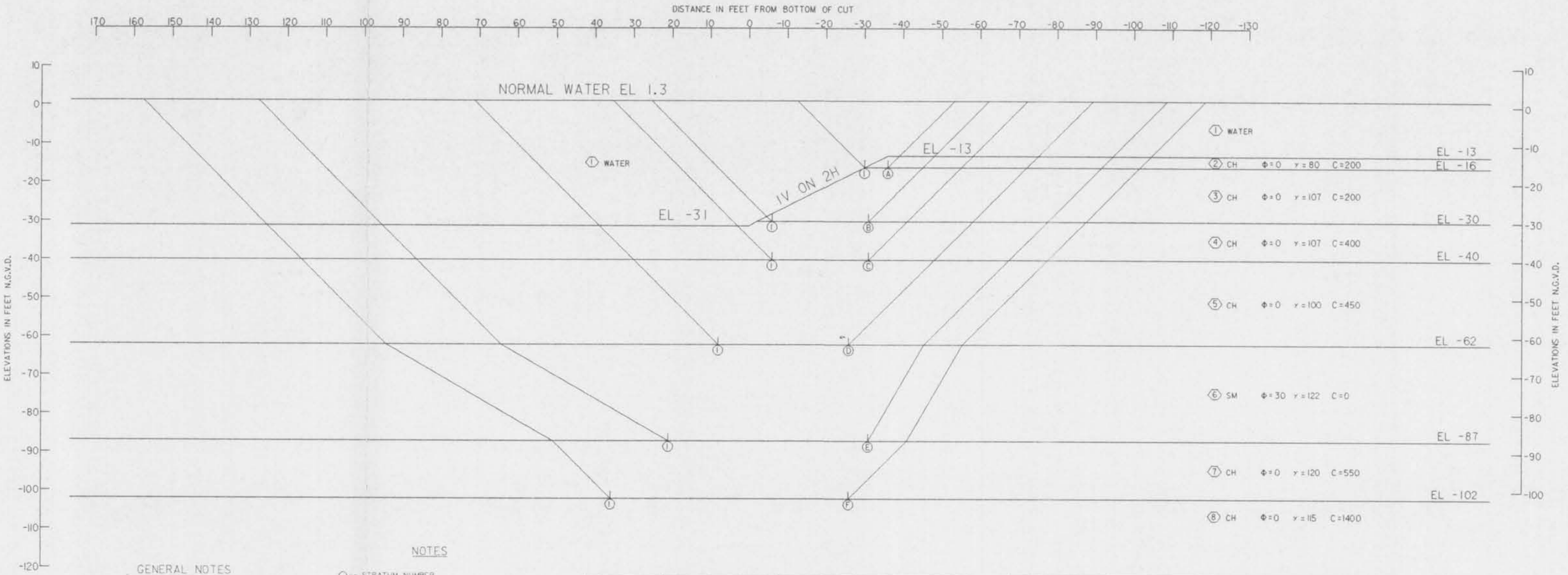
THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE Kh, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222qu(C)(D)}{(B)}$

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STORAGE RACK PILE CAPACITY 12 INCH CONCRETE PILE

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

| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 11 |
|---|---|---|---|
| | DATE: X | | FILE NO. H-2-45223 |




## 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

⬡ -- STRATUM NUMBER
○ -- WEDGE NUMBER
-- CROSSOVER POINT
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

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

| 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 | -16.0 | 1198 | 1200 | -1 | 9431 | 9353 | 2397 | 78 | 30.55 |
| Ⓑ ① | -30.0 | 6798 | 5000 | 532 | 35678 | 30674 | 12330 | 5004 | 2.46 |
| Ⓒ ① | -40.0 | 14799 | 10000 | 7200 | 67344 | 55503 | 31999 | 11841 | 2.70 |
| Ⓓ ① | -62.0 | 34599 | 15300 | 27000 | 172543 | 144899 | 76899 | 27644 | 2.78 |
| Ⓔ ① | -87.0 | 79288 | 28600 | 125454 | 358561 | 312562 | 233342 | 45999 | 5.07 |
| Ⓕ ① | -102.0 | 95916 | 34100 | 141953 | 505977 | 449533 | 271969 | 56444 | 4.82 |

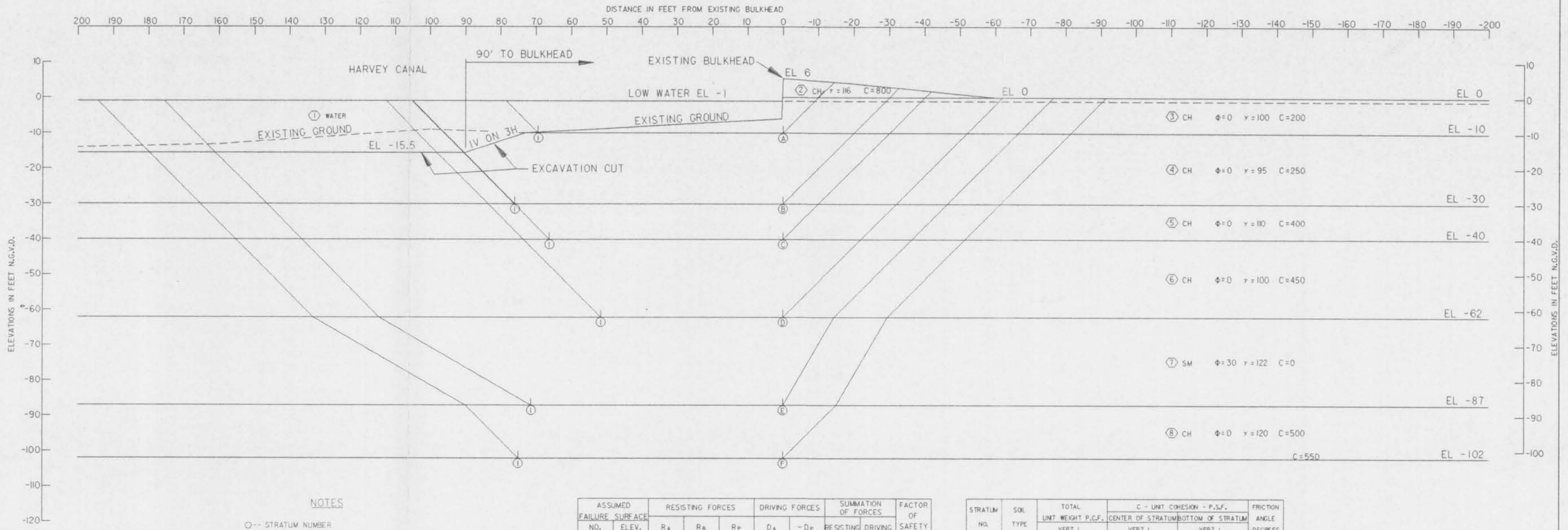
| STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT P.C.F. | C - UNIT COHESION - P.S.F. | | FRICTION ANGLE DEGREES |
|---|---|---|---|---|---|
| | | | CENTER OF STRATUM | BOTTOM OF STRATUM | |
| | | VERT.1 | VERT.1 | VERT.1 | |
| ① | WATER | 62.5 | 0 | 0 | 0 |
| ② | CH | 80 | 200 | 200 | 0 |
| ③ | CH | 107 | 200 | 200 | 0 |
| ④ | CH | 107 | 400 | 400 | 0 |
| ⑤ | CH | 100 | 450 | 450 | 0 |
| ⑥ | SM | 122 | 0 | 0 | 30 |
| ⑦ | CH | 120 | 550 | 550 | 0 |
| ⑧ | CH | 115 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STABILITY ANALYSIS - CONST. CASE
# LONGITUDINAL CUT ALONG C/L CANAL

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
DATE: X
CADD FILE: G 12
FILE NO. H-2-45223




## NOTES

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

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

## GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

| 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 | -10.0 | 11053 | 13869 | 75 | 12116 | 2532 | 24997 | 9584 | 2.61 |
| Ⓑ | ① | -30.0 | 18365 | 18979 | 7250 | 59505 | 30739 | 44594 | 28766 | 1.55 |
| Ⓒ | ① | -40.0 | 24911 | 26423 | 15250 | 96641 | 60843 | 66584 | 35798 | 1.86 |
| Ⓓ | ① | -62.0 | 41802 | 23218 | 35050 | 210950 | 162489 | 100070 | 48461 | 2.06 |
| Ⓔ | ① | -87.0 | 103518 | 39223 | 162895 | 410115 | 335439 | 305636 | 74676 | 4.09 |
| Ⓕ | ① | -102.0 | 116245 | 41250 | 175790 | 560921 | 478571 | 333285 | 82350 | 4.05 |

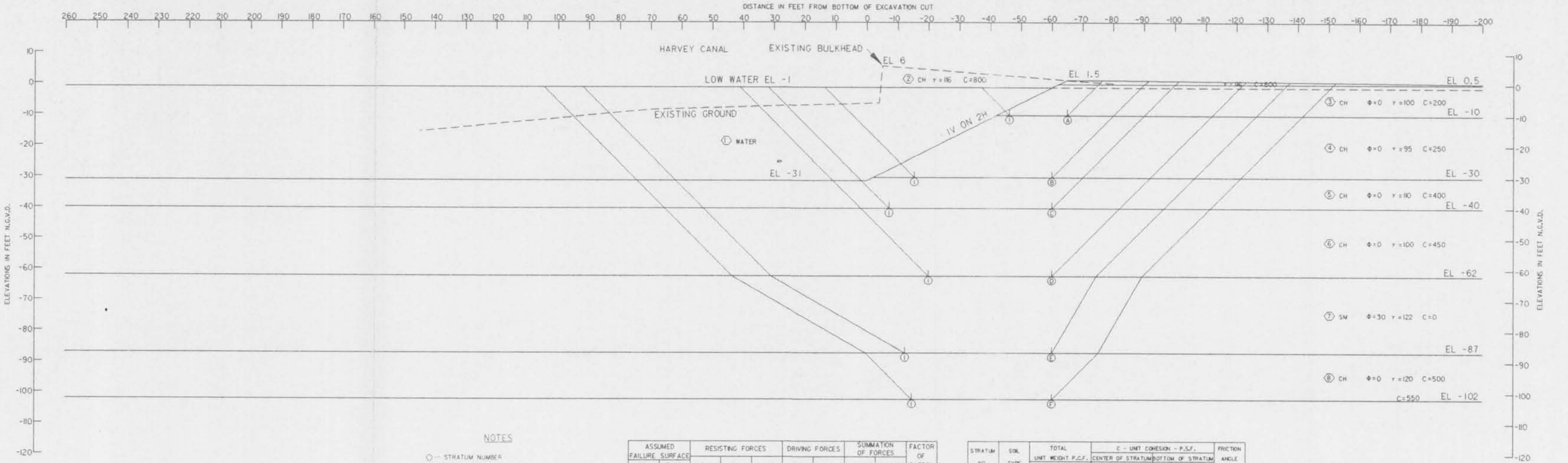
| STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT P.C.F. | C - UNIT COHESION - P.S.F. | | FRICTION ANGLE DEGREES |
|---|---|---|---|---|---|
| | | | CENTER OF STRATUM | BOTTOM OF STRATUM | |
| | | VERT. I | VERT. I | VERT. I | |
| ① | WATER | 62.5 | 0 | 0 | 0 |
| ② | CH | 116 | 800 | 800 | 0 |
| ③ | CH | 100 | 200 | 200 | 0 |
| ④ | CH | 95 | 250 | 250 | 0 |
| ⑤ | CH | 110 | 400 | 400 | 0 |
| ⑥ | CH | 100 | 450 | 450 | 0 |
| ⑦ | SM | 122 | 0 | 0 | 30 |
| ⑧ | CH | 120 | 500 | 550 | 0 |
| ⑨ | CH | 115 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STABILITY ANALYSIS - CONST. CASE
# EAST BANK STA. 1011+33

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
CADD FILE: G 13
DATE: X
FILE NO. H-2-45223




## 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

- ⬡ -- STRATUM NUMBER
- ◯ -- WEDGE NUMBER
- ⌀ -- CROSSOVER POINT
- 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

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

| 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 | -10.0 | 6263 | 3751 | 565 | 6810 | 2587 | 10579 | 4223 | 2.51 |
| Ⓑ ① | -30.0 | 16089 | 11138 | 2240 | 48335 | 26770 | 29467 | 21565 | 1.37 |
| Ⓒ ① | -40.0 | 23971 | 21127 | 7200 | 84305 | 49965 | 52298 | 34340 | 1.52 |
| Ⓓ ① | -62.0 | 43512 | 18021 | 27000 | 199440 | 140198 | 88533 | 59242 | 1.49 |
| Ⓔ ① | -87.0 | 97556 | 26157 | 128454 | 395549 | 302252 | 252167 | 93297 | 2.70 |
| Ⓕ ① | -102.0 | 113002 | 24918 | 141804 | 549770 | 438606 | 279724 | 111164 | 2.52 |

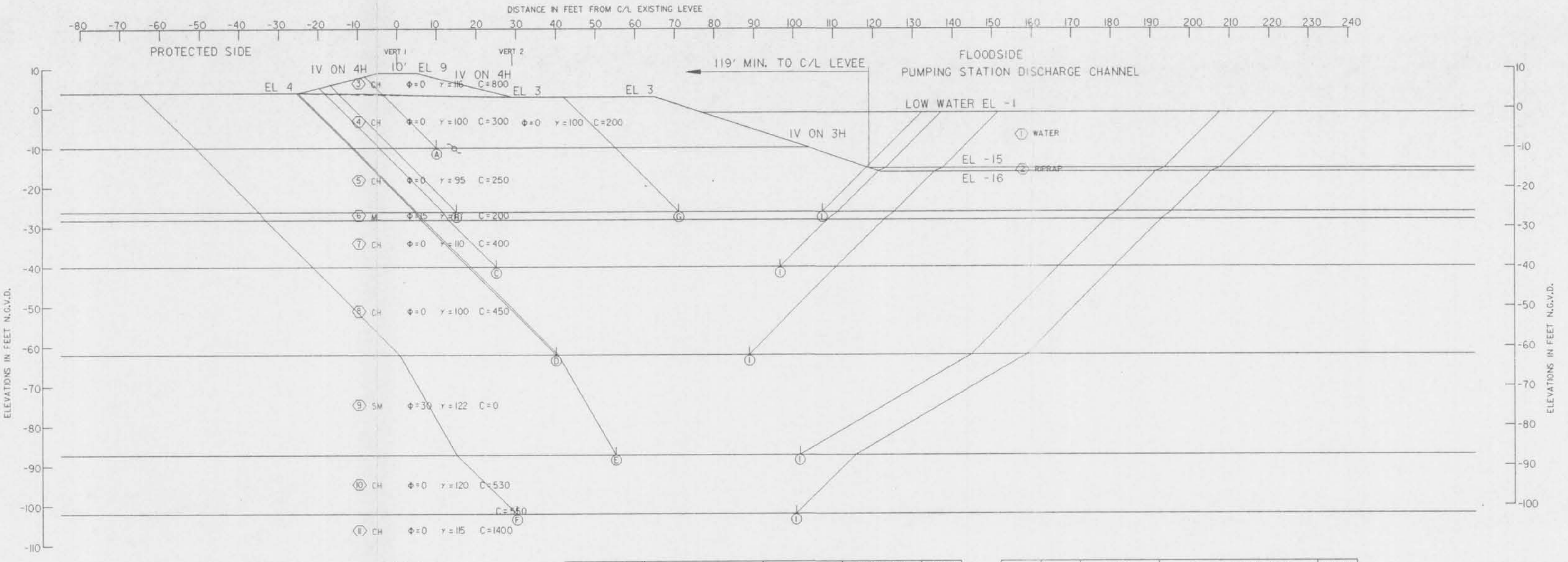
| STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT P.C.F. | C - UNIT COHESION - P.S.F. | | FRICTION ANGLE DEGREES |
|---|---|---|---|---|---|
| | | | CENTER OF STRATUM | BOTTOM OF STRATUM | |
| | | VERT. I | VERT. I | VERT. I | |
| 1 | WATER | 62.5 | 0 | 0 | 0 |
| 2 | CH | 116 | 800 | 800 | 0 |
| 3 | CH | 100 | 200 | 200 | 0 |
| 4 | CH | 95 | 250 | 250 | 0 |
| 5 | CH | 110 | 400 | 400 | 0 |
| 6 | CH | 100 | 450 | 450 | 0 |
| 7 | SM | 122 | 0 | 0 | 30 |
| 8 | CH | 120 | 500 | 550 | 0 |
| 9 | CH | 115 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## STABILITY ANALYSIS - CONST. CASE
## EAST BANK STA. 1013+33

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 14 |
| | DATE: X | | FILE NO. H-2-45223 |




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

○ -- STRATUM NUMBER
○ -- WEDGE NUMBER
ø -- CROSSOVER POINT
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

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

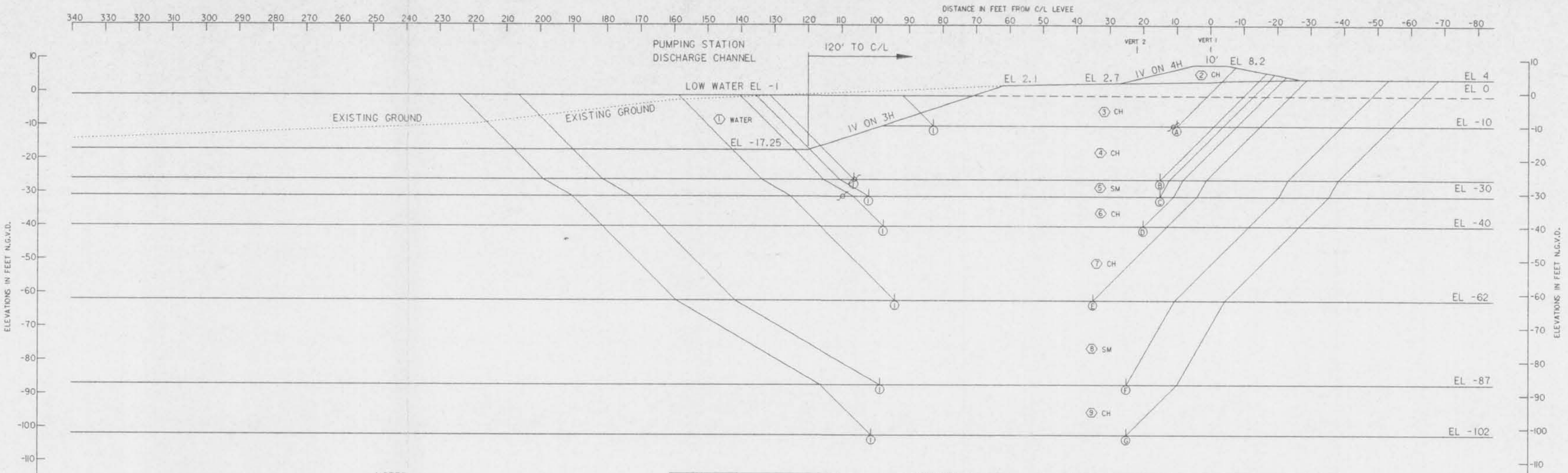
| ASSUMED FAILURE SURFACE | | RESISTING FORCES | | | DRIVING FORCES | | SUMMATION OF FORCES | | FACTOR OF SAFETY |
|---|---|---|---|---|---|---|---|---|---|
| NO. | ELEV. | $R_A$ | $R_B$ | $R_P$ | $D_A$ | $-D_P$ | RESISTING | DRIVING | |
| Ⓐ ① | -10.0 | 15217 | 15774 | 1806 | 18935 | 3041 | 32797 | 15894 | 2.06 |
| Ⓑ ① | -26.0 | 19791 | 23069 | 5589 | 59369 | 22240 | 48449 | 37129 | 1.30 |
| Ⓒ ① | -40.0 | 30060 | 28642 | 16535 | 113654 | 62088 | 75237 | 51566 | 1.46 |
| Ⓓ ① | -62.0 | 47827 | 21979 | 36195 | 235593 | 165629 | 106001 | 69964 | 1.52 |
| Ⓔ ① | -87.0 | 102074 | 25550 | 169415 | 437995 | 343137 | 297039 | 94858 | 3.13 |
| Ⓕ ① | -102.0 | 126879 | 38767 | 184061 | 605825 | 488666 | 349707 | 117159 | 2.98 |
| Ⓖ ① | -26.0 | 13200 | 9312 | 5469 | 40803 | 22124 | 27981 | 18679 | 1.50 |

| 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 | RIPRAP | 132 | 132 | 0 | 0 | 0 | 0 | 40 |
| 3 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 4 | CH | 100 | 100 | 300 | 200 | 300 | 200 | 0 |
| 5 | CH | 95 | 95 | 250 | 250 | 250 | 250 | 0 |
| 6 | ML | 117 | 117 | 200 | 200 | 200 | 200 | 15 |
| 7 | CH | 110 | 110 | 400 | 400 | 400 | 400 | 0 |
| 8 | CH | 100 | 100 | 450 | 450 | 450 | 450 | 0 |
| 9 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 10 | CH | 120 | 120 | 530 | 530 | 550 | 550 | 0 |
| 11 | CH | 115 | 115 | 1400 | 1400 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
STABILITY ANALYSIS - CONST. CASE
EXISTING LEVEE INTO DISCHARGE CHANNEL
STA. 1009+00

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
CADD FILE: G 15
FILE NO. H-2-45223
DATE: X




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

◇ -- STRATUM NUMBER
○ -- WEDGE NUMBER
$\phi$ -- CROSSOVER POINT
$\phi$ -- 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

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

| 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 | -10.0 | 14466 | 14866 | 1528 | 17343 | 2896 | 30860 | 14447 | 2.14 |
| B | 1 | -26.0 | 19776 | 22842 | 4980 | 56982 | 21674 | 47598 | 35308 | 1.35 |
| C | 1 | -31.0 | 24833 | 34795 | 10245 | 74223 | 32733 | 69873 | 41490 | 1.68 |
| D | 1 | -40.0 | 31290 | 31042 | 16876 | 111937 | 60430 | 79208 | 51507 | 1.54 |
| E | 1 | -62.0 | 50085 | 26595 | 35706 | 234793 | 161734 | 112386 | 73059 | 1.54 |
| F | 1 | -87.0 | 111883 | 40415 | 167465 | 442815 | 338852 | 319763 | 103963 | 3.08 |
| G | 1 | -102.0 | 132163 | 41861 | 179697 | 606213 | 483246 | 353721 | 122967 | 2.88 |

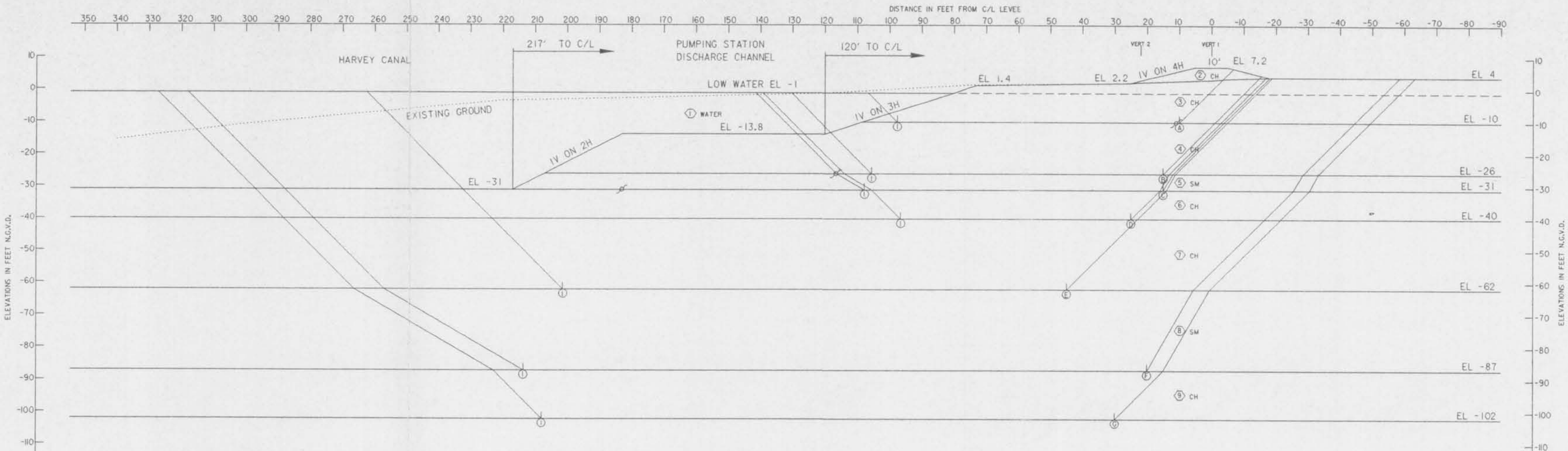
| STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT P.C.F. | | C - UNIT COHESION - P.S.F. CENTER OF STRATUM | | C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM | | FRICTION ANGLE DEGREES |
|---|---|---|---|---|---|---|---|---|
| | | VERT. 1 | VERT. 2 | VERT. 1 | VERT. 2 | VERT. 1 | VERT. 2 | |
| 1 | WATER | 62.5 | 62.5 | 0 | 0 | 0 | 0 | 0 |
| 2 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 3 | CH | 100 | 100 | 300 | 200 | 300 | 200 | 0 |
| 4 | CH | 95 | 95 | 250 | 250 | 250 | 250 | 0 |
| 5 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 6 | CH | 110 | 110 | 400 | 400 | 400 | 400 | 0 |
| 7 | CH | 100 | 100 | 450 | 450 | 450 | 450 | 0 |
| 8 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 9 | CH | 120 | 120 | 500 | 500 | 550 | 550 | 0 |
| 10 | CH | 115 | 115 | 1400 | 1400 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STABILITY ANALYSIS - CONST. CASE
# WEST BANK STA. 1010+33

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
CADD FILE: G 16
DATE: X
FILE NO. H-2-45223




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

- ◯ -- STRATUM NUMBER
- ◯ -- WEDGE NUMBER
- -- CROSSOVER POINT
- $\phi$ -- ANGLE OF INTERNAL FRICTION, DEGREES
- C -- UNIT COHESION, P.S.F.
- SZ -- 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

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

| 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 | -10.0 | 13035 | 17846 | 1052 | 15365 | 2702 | 31933 | 12663 | 2.52 |
| B 1 | -26.0 | 17482 | 22623 | 6388 | 53002 | 23071 | 46493 | 29931 | 1.55 |
| C 1 | -31.0 | 21945 | 37099 | 12410 | 69537 | 33768 | 71454 | 35769 | 2.00 |
| D 1 | -40.0 | 29410 | 28592 | 19861 | 105301 | 63505 | 77863 | 41796 | 1.86 |
| E 1 | -62.0 | 48999 | 70320 | 27000 | 225139 | 140143 | 146319 | 84996 | 1.72 |
| F 1 | -87.0 | 112038 | 106514 | 126996 | 437137 | 301523 | 345548 | 135614 | 2.55 |
| G 1 | -102.0 | 129070 | 97916 | 141805 | 597004 | 437845 | 368791 | 159159 | 2.32 |

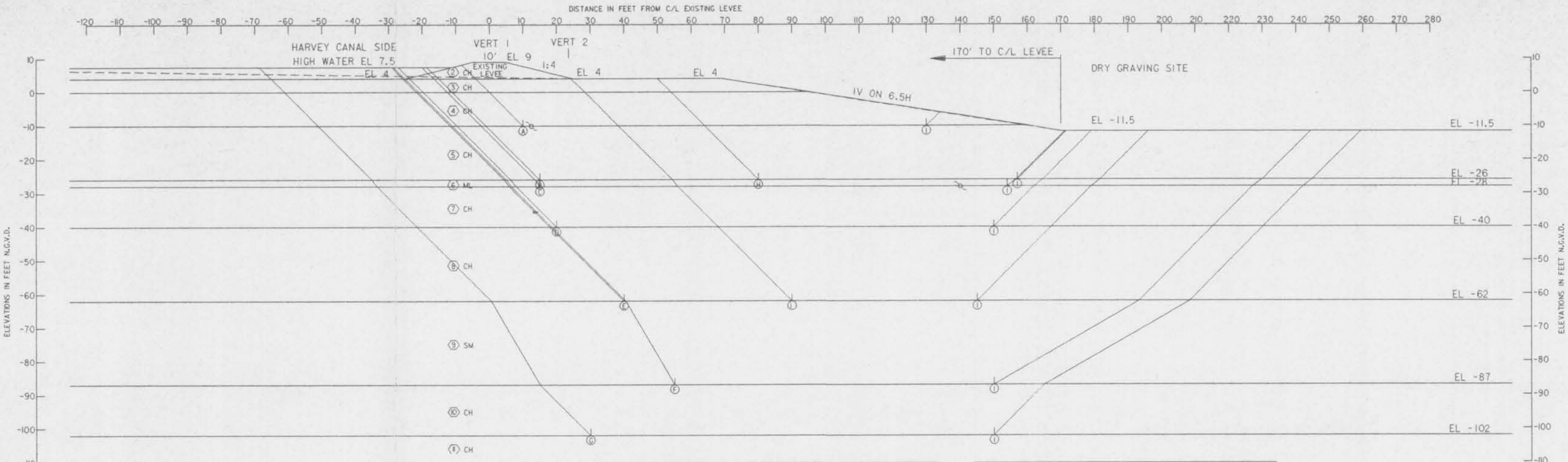
| STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT P.C.F. | | C - UNIT COHESION - P.S.F. | | | | FRICTION ANGLE DEGREES |
|---|---|---|---|---|---|---|---|---|
| | | | | CENTER OF STRATUM | | BOTTOM OF STRATUM | | |
| | | VERT. 1 | VERT. 2 | VERT. 1 | VERT. 2 | VERT. 1 | VERT. 2 | |
| 1 | WATER | 62.5 | 62.5 | 0 | 0 | 0 | 0 | 0 |
| 2 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 3 | CH | 100 | 100 | 300 | 200 | 300 | 200 | 0 |
| 4 | CH | 95 | 95 | 250 | 250 | 250 | 250 | 0 |
| 5 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 6 | CH | 110 | 110 | 400 | 400 | 400 | 400 | 0 |
| 7 | CH | 100 | 100 | 450 | 450 | 450 | 450 | 0 |
| 8 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 9 | CH | 120 | 120 | 500 | 500 | 550 | 550 | 0 |
| 10 | CH | 115 | 115 | 1400 | 1400 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# STABILITY ANALYSIS - CONST. CASE
# WEST BANK STA. 1013+33

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

| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 17 |
|---|---|---|---|
| | DATE: X | | FILE NO. H-2-45223 |




| ASSUMED FAILURE SURFACE | | | RESISTING FORCES | | | DRIVING FORCES | | SUMMATION OF FORCES | | FACTOR OF SAFETY |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | | ELEV. | $R_A$ | $R_B$ | $R_P$ | $D_A$ | $-D_P$ | RESISTING | DRIVING | |
| A | I | -10.0 | 18722 | 24438 | 1615 | 19588 | 941 | 44775 | 18647 | 2.40 |
| B | I | -26.0 | 23603 | 35500 | 7250 | 61292 | 11231 | 66353 | 50061 | 1.33 |
| C | I | -28.0 | 24931 | 55448 | 9136 | 68126 | 14735 | 89515 | 53391 | 1.68 |
| D | I | -40.0 | 32452 | 52000 | 18674 | 117746 | 43146 | 103126 | 74600 | 1.38 |
| E | I | -62.0 | 51828 | 47250 | 38427 | 242617 | 133593 | 137505 | 109024 | 1.26 |
| F | I | -87.0 | 107767 | 52250 | 172992 | 449053 | 297047 | 333009 | 152006 | 2.19 |
| G | I | -102.0 | 130158 | 66000 | 188378 | 623032 | 434444 | 384536 | 188588 | 2.04 |
| H | I | -26.0 | 18399 | 19250 | 7250 | 45125 | 11231 | 44899 | 33894 | 1.32 |
| I | I | -62.0 | 49654 | 24750 | 38427 | 219095 | 133593 | 112831 | 85502 | 1.32 |

| 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 | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 3 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 4 | CH | 100 | 100 | 300 | 200 | 300 | 200 | 0 |
| 5 | CH | 95 | 95 | 250 | 250 | 250 | 250 | 0 |
| 6 | ML | 117 | 117 | 200 | 200 | 200 | 200 | 15 |
| 7 | CH | 110 | 110 | 400 | 400 | 400 | 400 | 0 |
| 8 | CH | 100 | 100 | 450 | 450 | 450 | 450 | 0 |
| 9 | SM | 122 | 123 | 0 | 0 | 0 | 0 | 30 |
| 10 | CH | 120 | 120 | 500 | 500 | 550 | 550 | 0 |
| 11 | CH | 115 | 115 | 1400 | 1400 | 1400 | 1400 | 0 |

## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

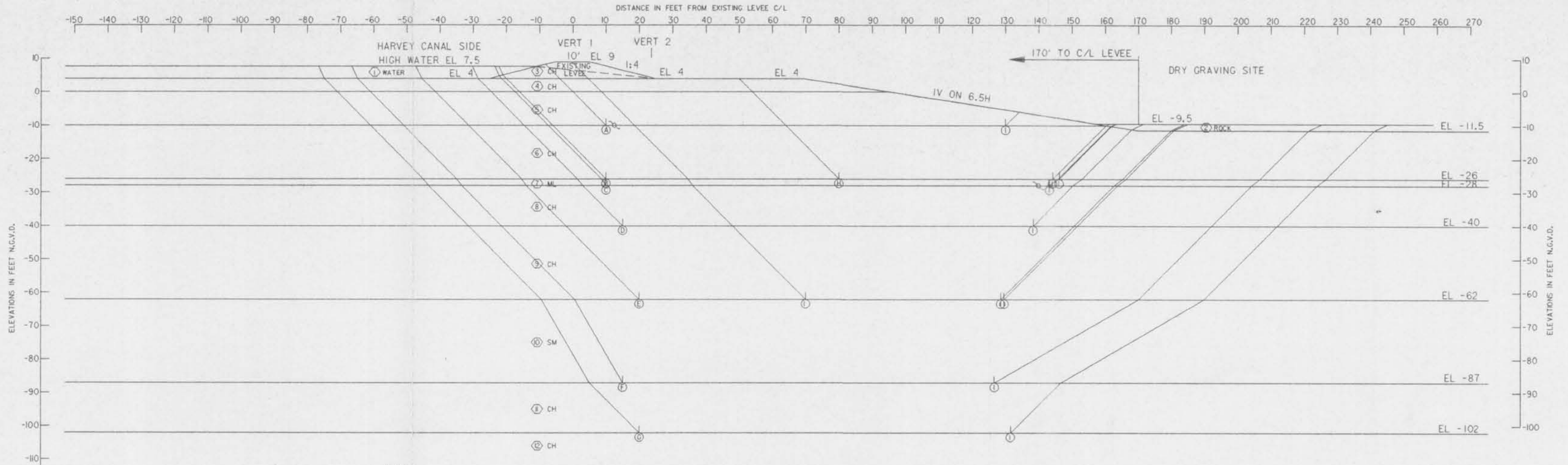
$\phi$ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
$\nabla$ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS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

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

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
**STABILITY ANALYSIS - CONST. CASE EXISTING LEVEE INTO GRAVING SITE BEFORE ROCK PLACEMENT**

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 18 |
| | DATE: X | | FILE NO. H-2-45223 |




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

⬡ -- STRATUM NUMBER
○ -- WEDGE NUMBER
$\phi$ -- CROSSOVER POINT
$\Phi$ -- 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

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

| 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 | -10.0 | 18722 | 24438 | 1614 | 19588 | 940 | 44774 | 18648 | 2.40 |
| B | 1 | -26.0 | 22326 | 34022 | 7948 | 62061 | 13956 | 64296 | 48105 | 1.34 |
| C | 1 | -28.0 | 23852 | 53263 | 9934 | 69164 | 17760 | 87049 | 51404 | 1.69 |
| D | 1 | -40.0 | 32648 | 49330 | 19280 | 120782 | 48902 | 101258 | 71880 | 1.41 |
| E | 1 | -62.0 | 52291 | 49317 | 39081 | 253681 | 145881 | 140689 | 107800 | 1.31 |
| F | 1 | -87.0 | 115942 | 61425 | 179836 | 473225 | 318083 | 357203 | 155142 | 2.30 |
| G | 1 | -102.0 | 132108 | 61344 | 194053 | 640102 | 458561 | 387505 | 181541 | 2.13 |
| H | 1 | -26.0 | 18399 | 16037 | 8036 | 45125 | 14272 | 42472 | 30853 | 1.38 |
| I | 1 | -62.0 | 58293 | 26380 | 39073 | 230468 | 146232 | 123746 | 84236 | 1.47 |

| 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 | RIPRAP | 132 | 132 | 0 | 0 | 0 | 0 | 40 |
| 3 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 4 | CH | 116 | 116 | 800 | 800 | 800 | 800 | 0 |
| 5 | CH | 100 | 100 | 300 | 200 | 300 | 200 | 0 |
| 6 | CH | 95 | 95 | 250 | 250 | 250 | 250 | 0 |
| 7 | ML | 117 | 117 | 200 | 200 | 200 | 200 | 15 |
| 8 | CH | 110 | 110 | 400 | 400 | 400 | 400 | 0 |
| 9 | CH | 100 | 100 | 450 | 450 | 450 | 450 | 0 |
| 10 | SM | 122 | 122 | 0 | 0 | 0 | 0 | 30 |
| 11 | CH | 120 | 120 | 500 | 500 | 550 | 550 | 0 |
| 12 | CH | 115 | 115 | 1400 | 1400 | 1400 | 1400 | 0 |

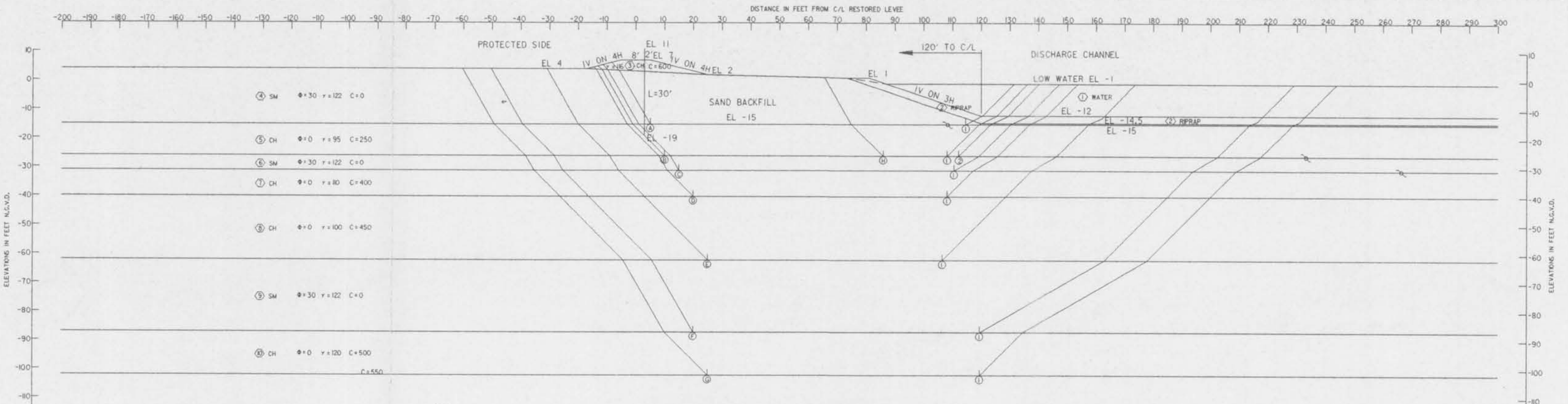
WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

**STABILITY ANALYSIS - CONST. CASE EXISTING LEVEE INTO GRAVING SITE AFTER ROCK PLACEMENT**

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC

PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 19
DATE: X | FILE NO. H-2-45223




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

○ -- STRATUM NUMBER
○ -- WEDGE NUMBER
$\not{\phi}$ -- CROSSOVER POINT
$\phi$ -- 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

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

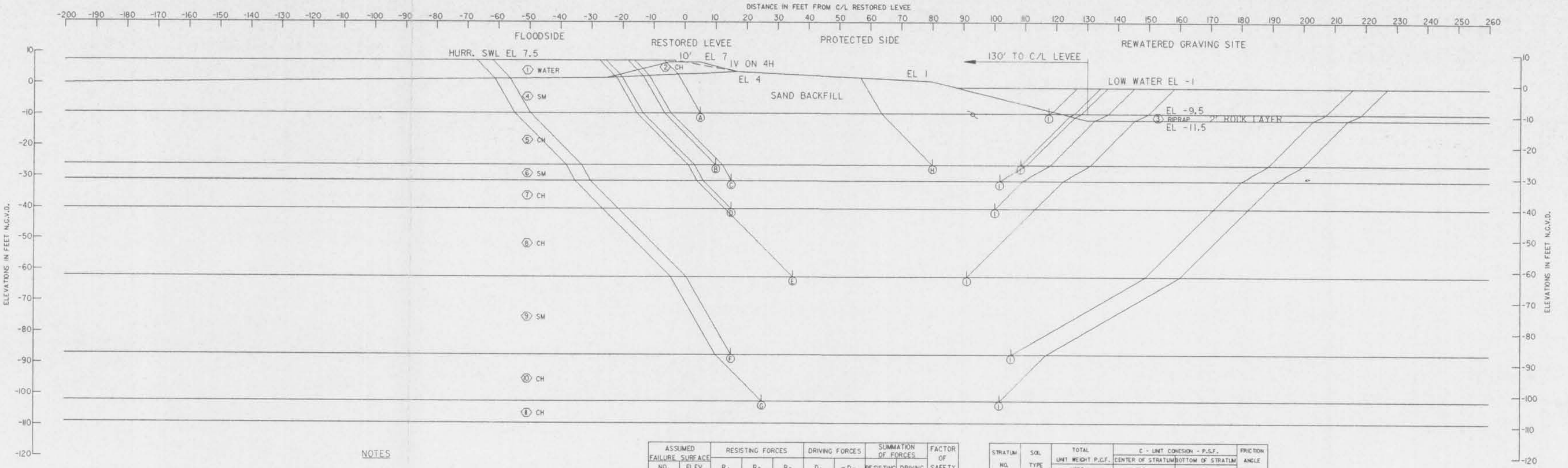
| ASSUMED FAILURE SURFACE | | | RESISTING FORCES | | | DRIVING FORCES | | SUMMATION OF FORCES | | FACTOR OF SAFETY |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | | ELEV. | $R_A$ | $R_B$ | $R_P$ | $D_A$ | $-D_P$ | RESISTING | DRIVING | |
| Ⓐ | ① | -15.0 | 15222 | 27199 | 1152 | 28855 | 6599 | 43573 | 22256 | 1.96 |
| Ⓑ | ② | -26.0 | 18065 | 25563 | 6401 | 62067 | 24615 | 50029 | 37452 | 1.34 |
| Ⓒ | ① | -31.0 | 25210 | 38250 | 14428 | 81171 | 36591 | 77888 | 44580 | 1.75 |
| Ⓓ | ① | -40.0 | 30577 | 35274 | 20633 | 121411 | 66379 | 86484 | 55032 | 1.57 |
| Ⓔ | ① | -62.0 | 46130 | 36701 | 39937 | 252257 | 172336 | 122768 | 79921 | 1.54 |
| Ⓕ | ① | -87.0 | 111516 | 54768 | 180456 | 470930 | 353141 | 346740 | 117789 | 2.94 |
| Ⓖ | ① | -102.0 | 129410 | 52018 | 194367 | 638917 | 499876 | 375795 | 139041 | 2.70 |
| Ⓗ | ① | -26.0 | 10691 | 5546 | 6450 | 42677 | 25420 | 22687 | 17257 | 1.31 |

| 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.1 | VERT.1 | |
| ① | WATER | 62.5 | 0 | 0 | 0 |
| ② | RIPRAP | 132 | 0 | 0 | 40 |
| ③ | CH | 116 | 600 | 600 | 0 |
| ④ | SM | 122 | 0 | 0 | 30 |
| ⑤ | CH | 95 | 250 | 250 | 0 |
| ⑥ | SM | 122 | 0 | 0 | 30 |
| ⑦ | CH | 110 | 400 | 400 | 0 |
| ⑧ | CH | 100 | 450 | 450 | 0 |
| ⑨ | SM | 122 | 0 | 0 | 30 |
| ⑩ | CH | 120 | 500 | 550 | 0 |
| ⑪ | CH | 115 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA
**STABILITY ANALYSIS - OPER. CASE**
**RESTORED LEVEE INTO DISCHARGE CHANNEL**

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 20 |
| | DATE: X | | FILE NO. H-2-45223 |




## 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.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

## NOTES

O -- STRATUM NUMBER
O -- WEDGE NUMBER
$\phi$ -- CROSSOVER POINT
$\phi$ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
$\nabla$ -- 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

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

| 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 | -9.5 | 8031 | 25524 | 52 | 16047 | 2284 | 33607 | 13763 | 2.44 |
| B 1 | -26.0 | 13865 | 24624 | 7995 | 60470 | 25345 | 46484 | 35125 | 1.32 |
| C 1 | -34.0 | 19837 | 34695 | 17099 | 78511 | 38249 | 71631 | 40262 | 1.78 |
| D 1 | -40.0 | 25225 | 34094 | 23055 | 119067 | 68418 | 82374 | 50649 | 1.63 |
| E 1 | -62.0 | 44475 | 25299 | 42017 | 248460 | 178778 | 111791 | 69682 | 1.60 |
| F 1 | -87.0 | 106094 | 49771 | 188116 | 467447 | 361917 | 343981 | 105530 | 3.26 |
| G 1 | -102.0 | 121024 | 42205 | 201974 | 632896 | 511921 | 365203 | 120975 | 3.02 |
| H 1 | -26.0 | 1139 | 7000 | 8031 | 42840 | 25436 | 26170 | 17404 | 1.50 |

| 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. I | VERT. I | VERT. I | |
| 1 | WATER | 62.5 | 0 | 0 | 0 |
| 2 | CH | 110 | 400 | 400 | 0 |
| 3 | RIPRAP | 132 | 0 | 0 | 40 |
| 4 | SM | 122 | 0 | 0 | 30 |
| 5 | CH | 95 | 250 | 250 | 0 |
| 6 | SM | 122 | 0 | 0 | 30 |
| 7 | CH | 110 | 400 | 400 | 0 |
| 8 | CH | 100 | 450 | 450 | 0 |
| 9 | SM | 122 | 0 | 0 | 30 |
| 10 | CH | 120 | 500 | 550 | 0 |
| 11 | CH | 115 | 1400 | 1400 | 0 |

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
**FEATURE DESIGN MEMORANDUM NO. 1**
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

**STABILITY ANALYSIS - OPER. CASE RESTORED LEVEE INTO GRAVING SITE**

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

DESIGNED BY: LSD
DRAWN BY: LSD
CHECKED BY: SKC
PLOT SCALE: 1
PLOT DATE: 07 FEB 00
DATE: X
CADD FILE: G 21
FILE NO. H-2-45223

# UNIFIED SOIL CLASSIFICATION

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

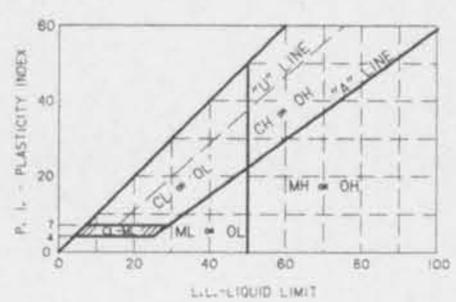
NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols.

# DESCRIPTIVE SYMBOLS

| COLOR | SYMBOL |
|---|---|
| TAN | T |
| YELLOW | Y |
| RED | R |
| BLACK | BK |
| GRAY | Gr |
| LIGHT GRAY | lGr |
| DARK GRAY | dGr |
| BROWN | Br |
| LIGHT BROWN | lBr |
| DARK BROWN | dBr |
| BROWNISH-GRAY | brGr |
| GRAYISH-BROWN | gyBr |
| GREENISH-GRAY | gnGr |
| GRAYISH-GREEN | gyGn |
| GREEN | Gn |
| BLUE | Bl |
| BLUE-GREEN | BlGn |
| WHITE | Wh |
| MOTTLED | Mot |

CONSISTENCY FOR COHESIVE SOILS

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




PLASTICITY CHART

For classification of fine-grained soils in accordance with ASTM D 2487

MODIFICATIONS

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

## NOTES:

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

Are natural water contents in percent dry weight

When underlined denotes $D_{10}$ size in mm*

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

Are liquid and plastic limits, respectively

**SYMBOLS TO LEFT OF BORING**

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

**FIGURES TO RIGHT OF BORING**

Are values of cohesion in lbs./sq.ft. from unconfined compression tests

In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler (1 3/8" I.D., 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remoulded to the estimated natural void ratio

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

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

## TYPICAL NOTES:

1. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially within the purview of the contract clause entitled "Differing Site Conditions".
2. Ground-water elevations shown on the boring logs represent ground-water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground-water data are available from the boring but does not necessarily mean that ground-water will not be encountered at the locations or within the vertical reaches of such borings.
3. Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.
4. Unless otherwise noted:

   a. Undisturbed borings, indicated by the letter "U", are taken with a 5" I.D. Piston Type Sampler.

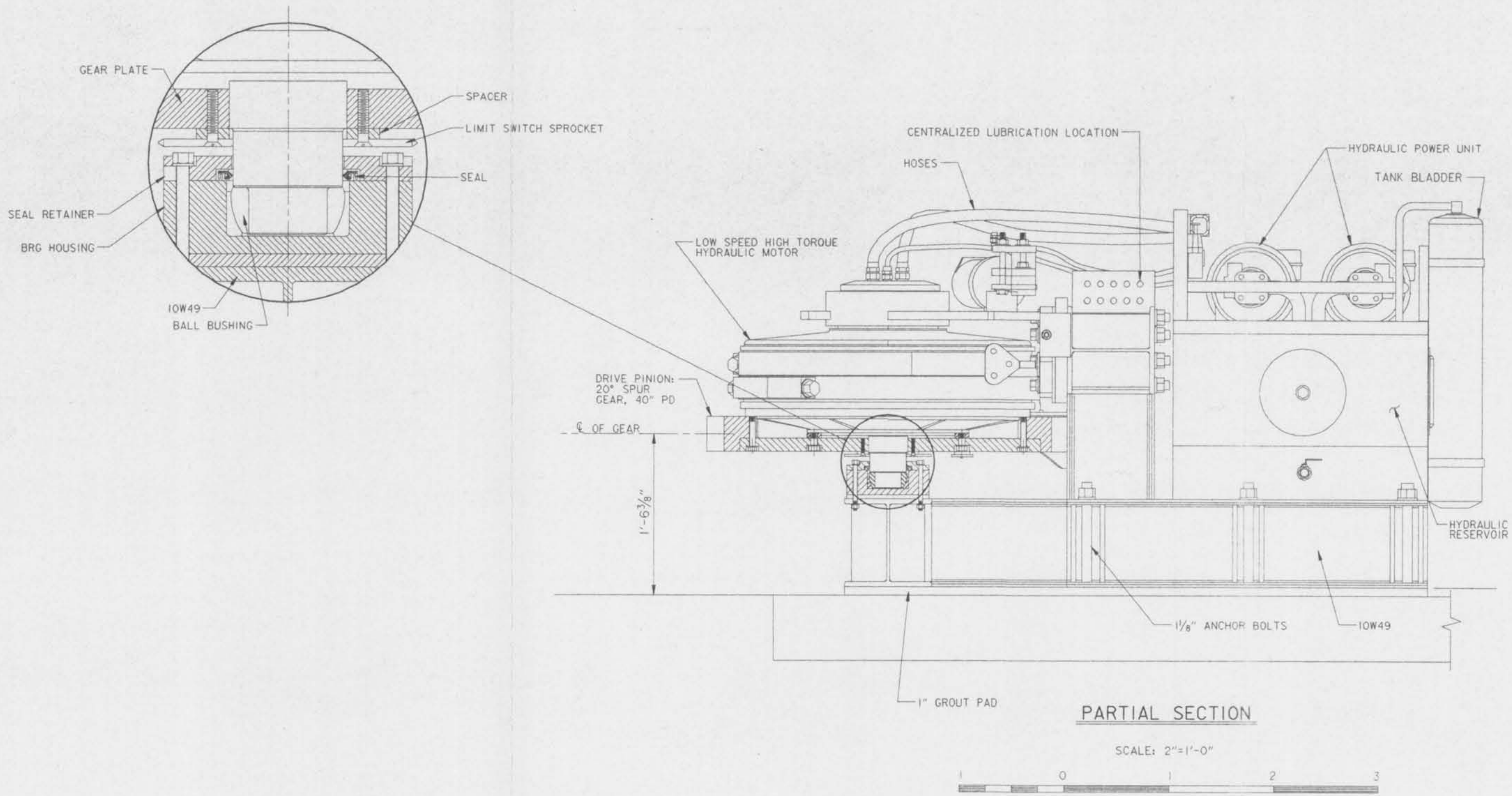
   b. General type borings are taken with a 1 7/8" I.D. Tube Sampler and/or a 1 3/8" I.D. Split Spoon Sampler.

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO. 1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

## BORING LOG LEGEND

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

| | | | |
|---|---|---|---|
| DESIGNED BY: LSD<br>DRAWN BY: LSD<br>CHECKED BY: SKC | PLOT SCALE: 1 | PLOT DATE: 07 FEB 00 | CADD FILE: G 22 |
| | DATE: X | | FILE NO. H-2-45223 |




PARTIAL SECTION

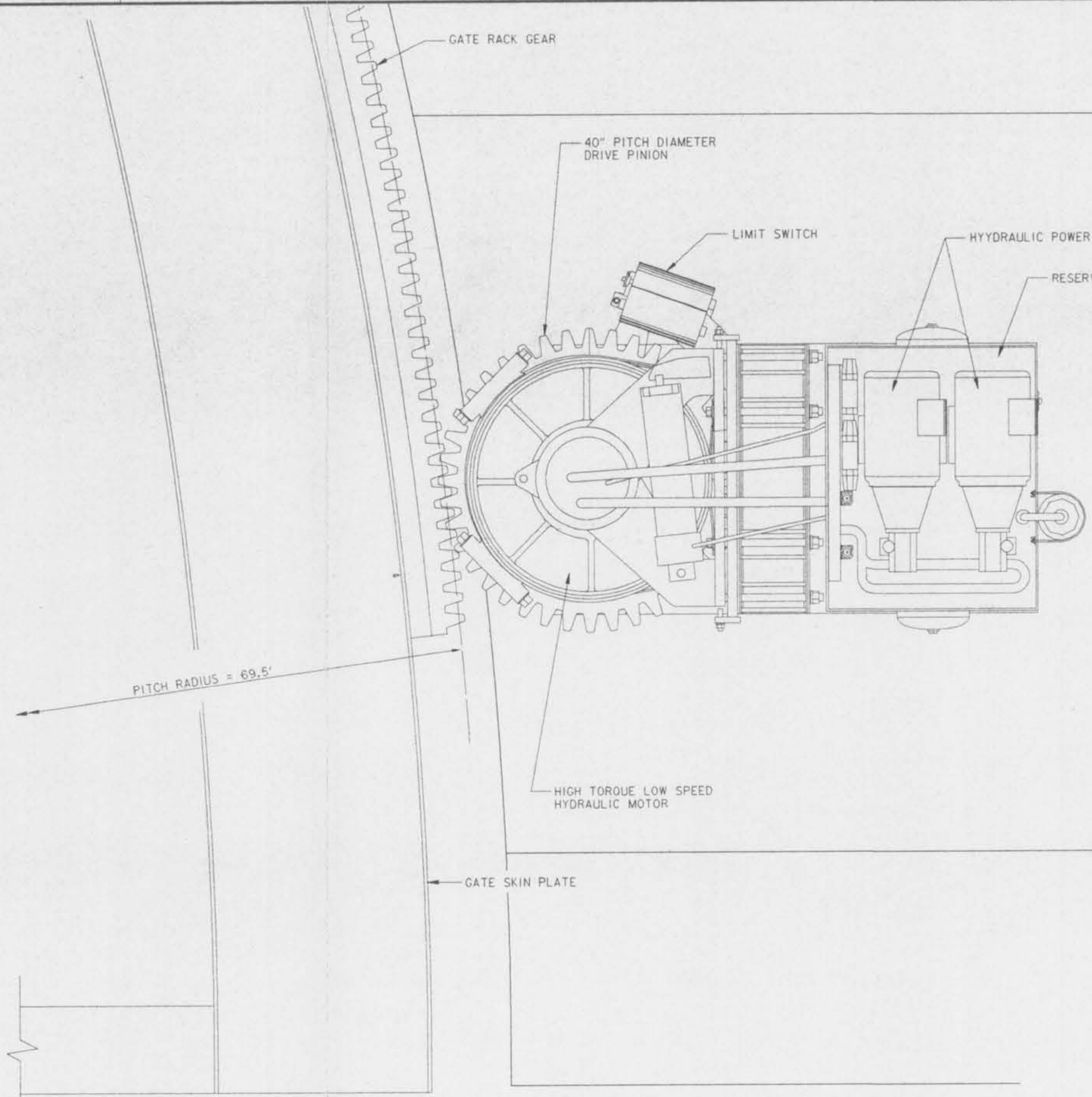
SCALE: 2"=1'-0"

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO 1
SECTOR GATE FLOODGATE,
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA.

SECTOR GATE MACHINERY
PARTIAL SIDE SECTIONAL VIEW

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

| | | | |
|---|---|---|---|
| DESIGNED BY: D.STRECKER | PLOT SCALE: 6 | PLOT DATE: 14 DEC 99 | CADD FILE: EOFHAR1.DGN |
| DRAWN BY: D.STRECKER | | | FILE NO. H-2-45223 |
| CHECKED BY: D.STRECKER | DATE: X | | |




LOCK CHAMBER

SCALE: $1\frac{1}{2}'' = 1' - 0''$

12" 0 1' 2' 3'

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION

**FEATURE DESIGN MEMORANDUM NO 1**

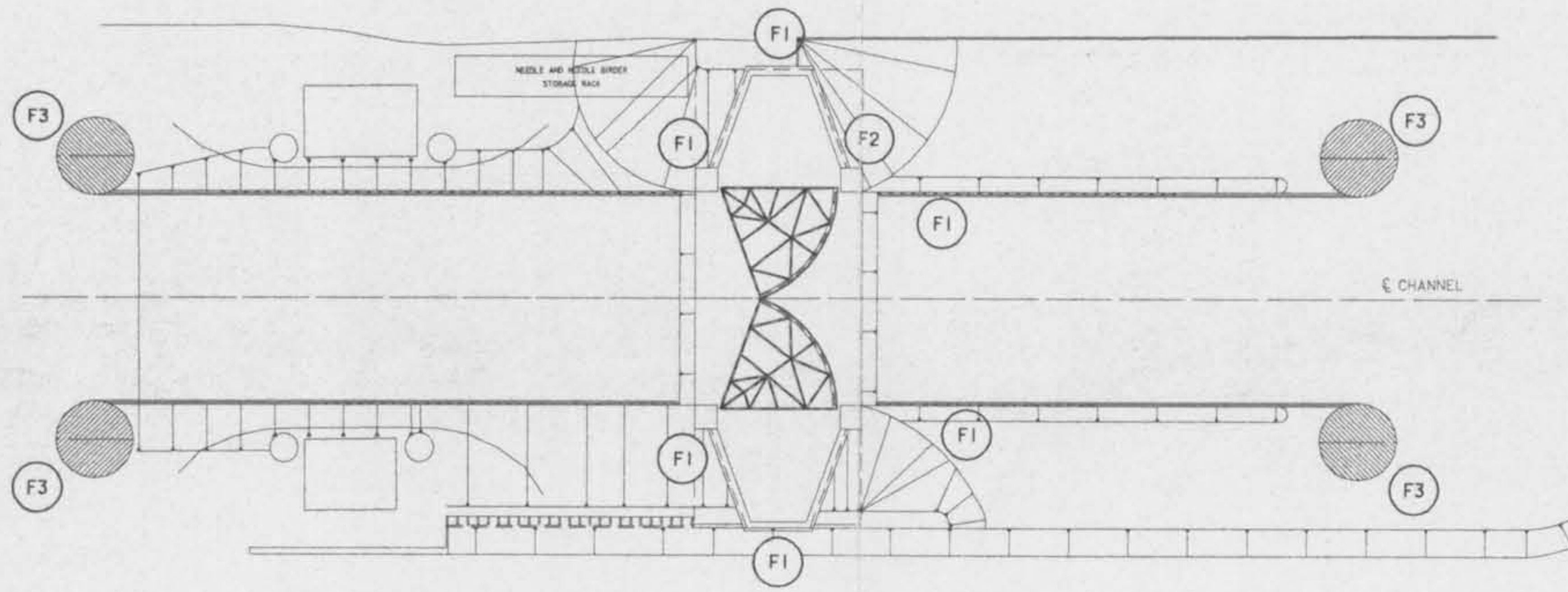
SECTOR GATE FLOODGATE.
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA.

# SECTOR GATE MACHINERY

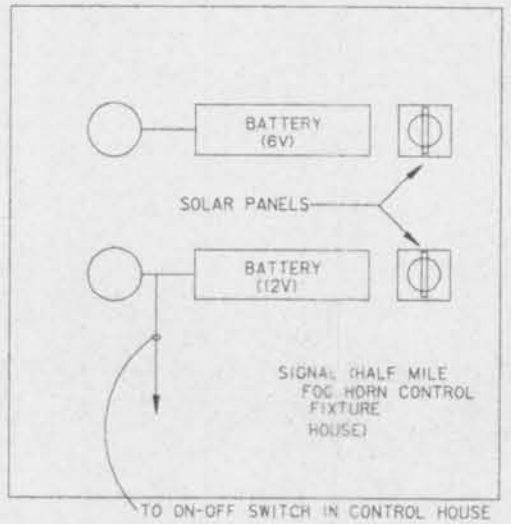
## PLAN VIEW-GATE OPERATING MACHINERY

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

| | | | |
|---|---|---|---|
| DESIGNED BY: D.STRECKER | PLOT SCALE: | PLOT DATE: | CADD FILE: EOFHAR2.DGN |
| DRAWN BY: D.STRECKER | 6 | 14 DEC 99 | FILE NO. |
| CHECKED BY: D.STRECKER | DATE: X | | H-2-45223 |



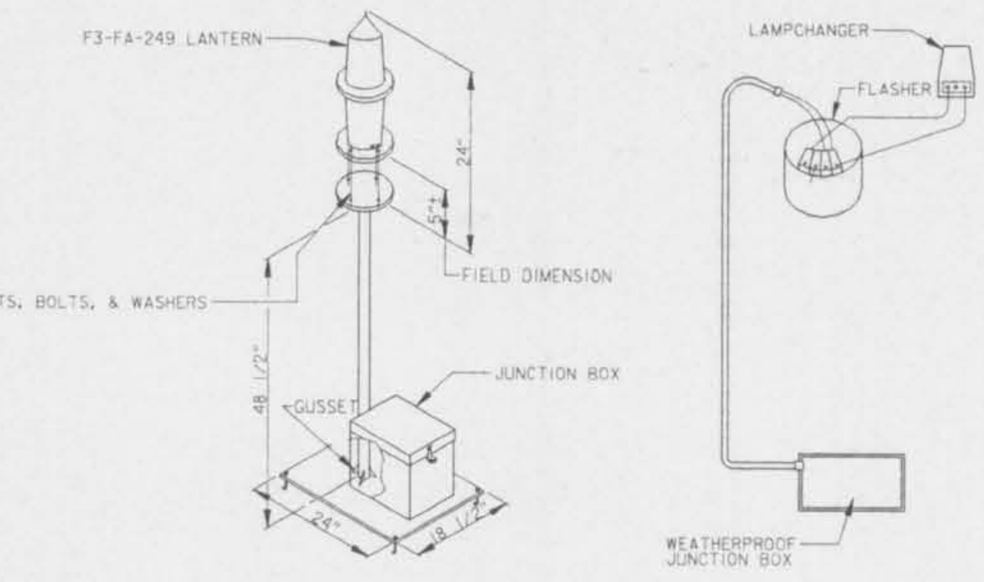

LIGHTING PLAN




FOG HORN AUXILIARY SERVICE
N.T.S.

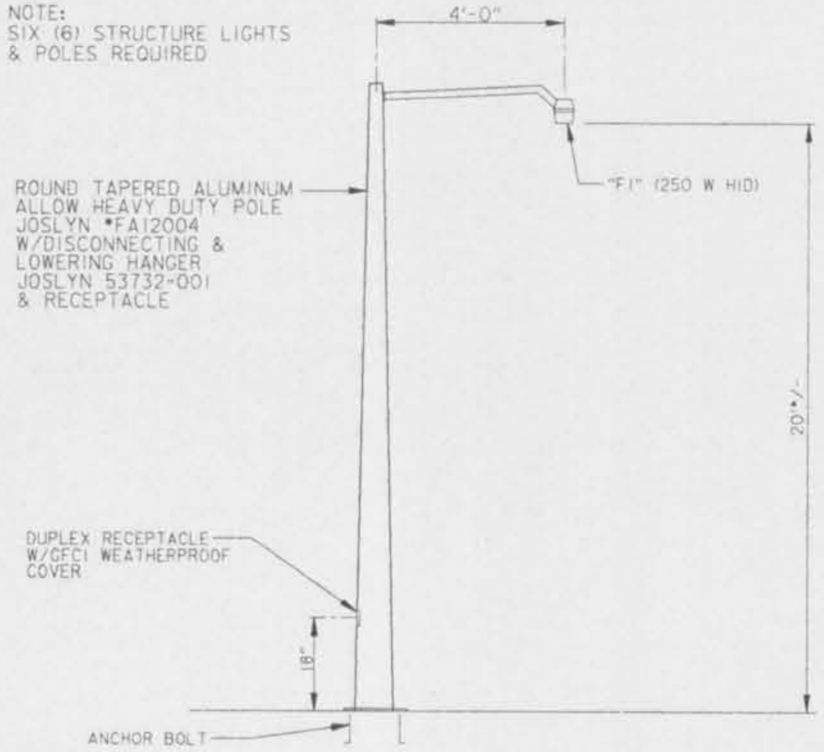
| LIGHTING LEGEND | | |
|---|---|---|
| FIXTURE SYMBOL NO. | DESCRIPTION | LAMP |
| F1 | PENDANT POLE MOUNTED ENCLOSED W/GASKET HOLOPHANE RPAK25012TLN | 250 W HPS |
| F2 | DIE CAST ALUMINUM SIGNAL | 12 VOLT |
| F3 | MARINE LANTERN FA-249 | 12 VOLT 3.5 A |

NOTE: PROVIDE LAMPS FOR ALL FIXTURES

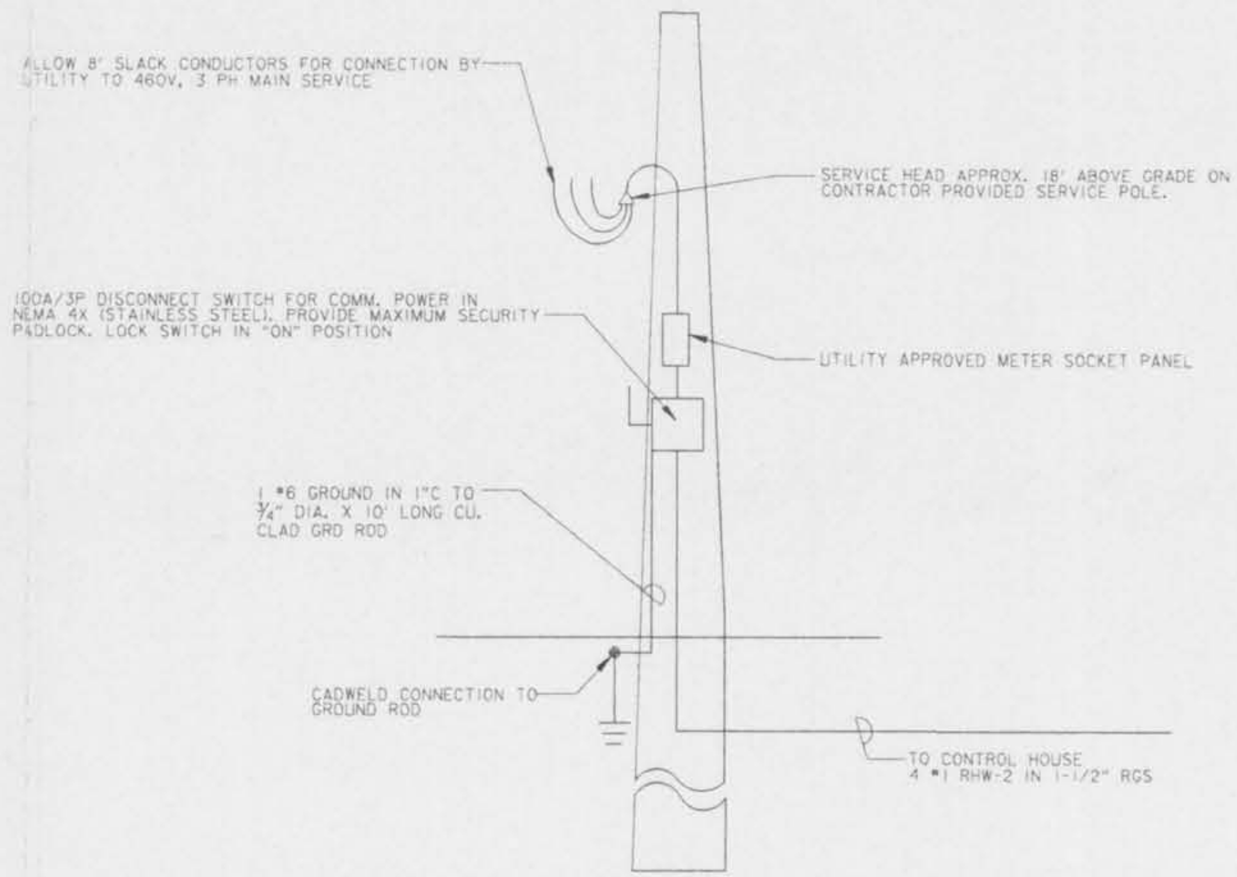



NAVIGATION LIGHT SUPPORT
N.T.S.

NOTE:
SIX (6) STRUCTURE LIGHTS & POLES REQUIRED




STRUCTURE LIGHT DETAIL
N.T.S.




ELECTRIC SERVICE POLE
N.T.S.

GENERAL NOTES

1. ELEC. & CONTROL WORK SHALL BE IN ACCORDANCE WITH THE NAT'L ELEC. CODE; APPLICABLE LOCAL AND REGULATORY CODES & ORDINANCES & THE REQUIREMENTS OF THE LOCAL UTILITY.
2. CONDUCTORS SHALL BE COPPER-STRANDED W/RHW-2 INSULATION
3. ELEC. CONDUIT SHALL BE GALV RIGID STEEL. EXCEPT AS OTHERWISE NOTED. ALL METALLIC CONDUIT SHALL BE GROUNDED. CONCRETE EMBEDDED CONDUIT SHALL BE 3/4" MIN. SIZE.
4. EQUIPMENT GROUND WIRES SHALL HAVE GREEN INSULATION.
5. SUPPORT HARDWOARE SHALL BE HOT DIPPED GALV STEEL UNLESS OTHERWISE NOTED.
6. ALL WIRING SHALL BE ROUTED AND TERMINATED FOR ACTUAL EQUIPMENT INSTALLED.

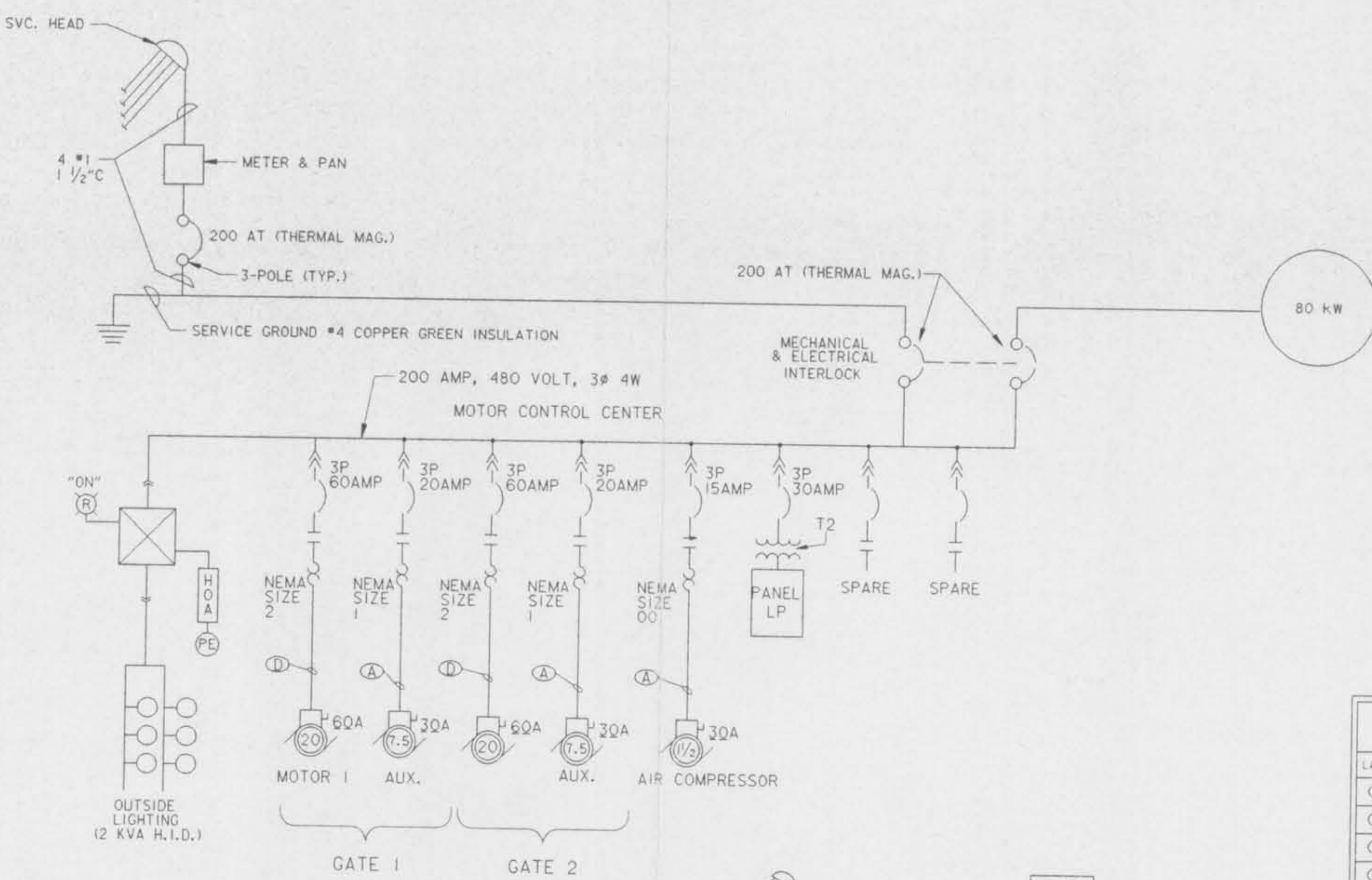
C·A·D

WEST BANK OF THE MISSISSIPPI RIVER IN THE VICINITY OF NEW ORLEANS LOUISIANA
WEST OF ALGIERS CANAL HURRICANE PROTECTION
FEATURE DESIGN MEMORANDUM NO.1
SECTOR GATE FLOODGATE
JEFFERSON AND PLAQUEMINES PARISH LOUISIANA

# LOCK LIGHTING PLAN AND MISC. ELECTRICAL DETAILS

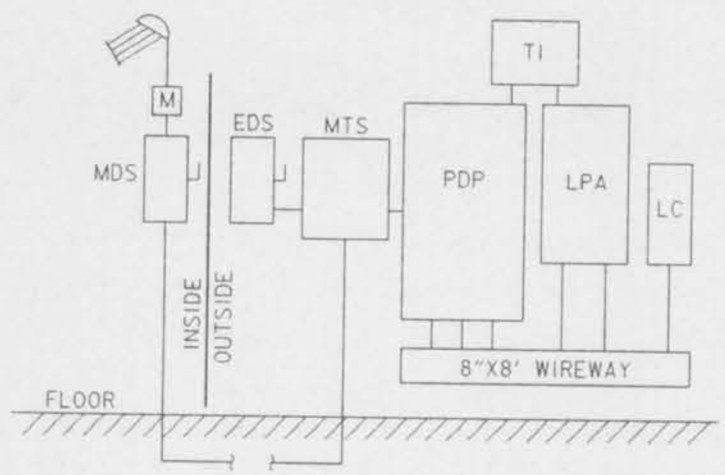
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

| | | | |
|---|---|---|---|
| DESIGNED BY: D.BRADLEY | PLOT SCALE: 600 | PLOT DATE: 20 AUG 99 | CADD FILE: EOH.1.DGN |
| DRAWN BY: M.MITCHELL | | | FILE NO. H-2-45223 |
| CHECKED BY: D.BRADLEY | DATE: SEPTEMBER 1999 | | |




LEGEND

1. MTS - MANUAL TRANSFER SWITCH
2. EDS - EMERGENCY DISCONNECT SWITCH
3. MDS - MAIN DISCONNECT SWITCH
4. PDP - POWER DISTRIBUTION PANEL




ELECTRICAL EQUIPMENT RISER
FRONT ELEVATION

| SURFACE MOUNTED | PANEL LP | 200 BUS |
|---|---|---|
| NEMA ONE | | 125A MAIN C.B. |
| 208/120 VOLTS | LPA | CONNECTED LOAD 13.52 K.V.A. |
| 3 PHASE 4 WIRE, 60 HZ. | | - MINIMUM INTERRUPTING RATING |

| CKT. NO. | SERVES | LOAD (VA) | TRIP AMPS | L1 L2 L3 | TRIP AMPS | LOAD (VA) | SERVES | CKT. NO. |
|---|---|---|---|---|---|---|---|---|
| 1 | RECEPTACLES CH No.1 | 900 | 20 | 1 — 2 | 20 | 900 | L.P. RECEPTACLES | 2 |
| 3 | RECEPTACLES CH NO.1 | 500 | 20 | 3 — 4 | 20 | 900 | L.P. RECEPTACLES | 4 |
| 5 | RECEPTACLES CH NO.1 | 720 | 20 | 5 — 6 | 20 | 500 | NAVIGATION HORN GATE OP WARNING | 6 |
| 7 | INSIDE LIGHTS CH NO.1 | 500 | 20 | 7 — 8 | 20 | 900 | BATTERY CHARGER - CH | 8 |
| 9 | SPACE HEATER MCC | 250 | 20 | 9 — 10 | 20 | 250 | SPACE HEATER GEN. | 10 |
| 11 | BATTERY CHARGER ENGINE | 200 | 20 | 11 — 12 | 20 | 1500 | ENGINE WATER JACKET HEATER | 12 |
| 13 | DRAIN PUMP CH No.1 - 1/3 | 900 | 20 | 13 — 14 | 20 | - | SPARE | 14 |
| 15 | SPARE | - | 20 | 15 — 16 | 20 | - | SPARE | 16 |
| 17 | SPARE | - | 20 | 17 — 18 | 20 | - | SPARE | 18 |

LP - LIGHT POLE
CH - CONTROL HOUSE

DRY TRANSFORMER SCHEDULE - 480Δ: 208Y/120 VOLT

| | PRIMARY SIDE 480 VOLTS Δ | | | | SECONDARY SIDE 208/120 VOLTS WYE | | | SERVICE GROUND CONDUCTOR (NOTE #1) |
|---|---|---|---|---|---|---|---|---|
| ITEM | KVA | FULL LOAD | C.B. (150%MIN.) | WIRING THWN/THHN | FULL LOAD | C.B. (125%MAX.) | WIRING THWN/THHN | GREEN THHN IN 3/4"C. |
| T1 | 15 | 18.0 | 40A. | 3-#8, #10 GRD., 1"C. | 41.7 | 50A. | 4-#4, #8 GRD., 1 1/4"C. | #6 |
| T2 | 25 | 36.1 | 45A. | 3-#8, #10 GRD., 1"C. | 83.3 | 100A. | 4-#3, #8 GRD., 1-1/4"C. | #8 |
| T3 | 75 | 90.4 | 150A. | 3-#1/0, #6 GRD., 1-1/2"C. | 208.4 | 225A. | 4-#4/0, #4 GRD., 2-1/2"C. | #2 |

NOTES:
1. TRANSFORMER "Xo" SHALL BE BONDED WITH SECONDARY NEUTRAL CONDUCTOR, AND FEEDER GROUND CONDUCTOR TO:
a) BUILDING STEEL
b) COLD WATER PIPE
c) 5/8"X10'-0" COPPER CLAD GROUND ROD ON BUILDING MAIN SERVICE ENTRANCE GROUND.

FEEDER SCHEDULE
(TYPICAL SCHEDULE - NOT ALL LABELS ARE NECESSARILY USED.)

| LABEL | NO. | SIZE | GND. | CONDUIT |
|---|---|---|---|---|
| A | 3 | #12 | #12 | 1/2" |
| A1 | 4 | #12 | #12 | 1/2" |
| B | 3 | #10 | #10 | 3/4" |
| B1 | 4 | #10 | #10 | 3/4" |
| C | 3 | #8 | #10 | 1" |
| C1 | 4 | #8 | #10 | 1" |
| D | 3 | #6 | #10 | 1" |
| D1 | 4 | #6 | #10 | 1" |
| E | 3 | #4 | #8 | 1-1/4" |
| E1 | 4 | #4 | #8 | 1-1/4" |
| F | 3 | #3 | #8 | 1-1/4" |
| F1 | 4 | #3 | #8 | 1-1/4" |
| G | 3 | #2 | #6 | 1-1/4" |
| G1 | 4 | #2 | #6 | 1-1/4" |
| H | 3 | #1 | #6 | 1-1/2" |
| H1 | 4 | #1 | #6 | 1-1/2" |
| I | 3 | #1/0 | #6 | 1-1/2" |
| I1 | 4 | #1/0 | #6 | 1-1/2" |
| J | 3 | #2/0 | #6 | 2" |
| J1 | 4 | #2/0 | #6 | 2" |
| K | 3 | #3/0 | #6 | 2" |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# ONE LINE DIAGRAM & SCHEDULES

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

| DESIGNED BY: D.BRADLEY<br>DRAWN BY: G.P.W.<br>CHECKED BY: D.BRADLEY | PLOT SCALE: 600 | PLOT DATE: 20 AUG 99 | CADD FILE: EOH_2.DGN |
|---|---|---|---|
| | DATE: SEPTEMBER 1999 | | FILE NO. H-2-45223 |