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Y, CORPS OF ENGINEERS

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 1

prepared by

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Consulting Engineers
New Orleans, Louisiana

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RIGOLETS

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LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

GENERAL DESIGN MEMORANDUM NO. 2
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prepared for

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

by

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS
NEW ORLEANS, LOUISIANA

March 1970

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LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
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PERTINENT DATA
RECOMMENDED PLAN

LOCATION OF PROJECT

Southeastern Louisiana in the vicinity of New Orleans; along the east shore of Lake Pontchartrain between the Chef Menteur Pass and the Rigolets in Orleans and St. Tammany Parishes.

PURPOSE OF PROJECT

The project presented herein is a segment of the Lake Pontchartrain Barrier Plan and will serve to protect areas contiguous to the shore of Lake Pontchartrain from flooding by limiting the uncontrolled entry of hurricane tides into the lake.

CONTROL STRUCTURE

Roadway Bridge

Reinforced concrete bridge with prestressed concrete stringers	
Total length between abutments	1,100 feet
Roadway width	12 feet
Top elevation	14.0*

Crane Bridge

Reinforced concrete framework with 16 gate openings, 50 feet on centers	
52 vertical lift gates, three per slot plus 4 spares	
Two - 80 ton gantry cranes on 19' - 1" travel way	
Top elevation	14.75

*Unless otherwise specified, all elevations herein are in feet and refer to mean sea level datum.

Foundation

Reinforced concrete slab footing supported by prestressed concrete piles	
Sill elevation	-30.0
Bottom elevation	-38.0

APPROACH CHANNEL

Width at structure	800 feet
Maximum bottom width - Gulf side	1,464 feet
Maximum bottom width - Lake side	877 feet
Bottom elevation - Gulf side	-30.0
Bottom elevation - Lake side	-30.0
Side slopes	1 on 3

CLOSURE DAM

Earth filled with riprap slope protection	
Crown width	20 feet
Crest elevation	14.0

Gulf Side

Side slope above el. 4.0	1 on 4
Side slope splash zone	1 on 20
Side slope below el. 2.0	1 on 6

Lake Side

Side slope above el. 5.0	1 on 4
Side slope splash zone	1 on 30
Side slope below el. 3.0	1 on 6

LEVEES

Earth filled embankments	
Crown elevation	9.0

Highway Levee

Crown Width	10 feet
Side slopes	1 on 4

Connecting Levee

Crown Width	20 feet
Side slopes above el. 5.0	1 on 4
Berm slopes	1 on 30
Side slopes below berm	1 on 10

RIGHTS-OF-WAY

Closure dam and control structure	135 acres
Levee	55 acres
Spoil disposal	60 acres

FIRST COST

Channels and canals	$ 122,000
Levees and floodwalls	7,110,000
Control structure	15,717,000
Engineering and design	2,178,000
Supervision and administration	1,490,000
Lands	224,000
Relocations	59,000
Total	$26,900,000

HYDRAULIC DATA

Gulf Side

Maximum stillwater level	12.8
Maximum head differential	15.8
Top of wave height accompanying max. SWL	17.7

Lake Side

Maximum stillwater level	11.5
Maximum head differential	14.5 feet
Top of wave height accompanying max. SWL	17.9

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
GENERAL DESIGN MEMORANDUM NO. 2
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

PROJECT AUTHORIZATION

1. Authority. The Lake Pontchartrain Barrier is a part of the Lake Pontchartrain Barrier Plan feature of the project "Lake Pontchartrain and Vicinity, Louisiana," which is described in House Document No. 231, 89th Congress, 1st. Session, and in the "Interim Survey Report, Lake Pontchartrain, La. and Vicinity," dated 21 November 1962, as modified by LMNED-PP letter dated 13 March 1967 subject "Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modification in the Alignment of the Lake Pontchartrain Barrier," and indorsement thereto. The project was authorized by the following laws: Public Law 298-89th Congress, 1st Session, approved 27 October 1965; and 10 U.S.C. 2304 (a) (4).

2. Purpose and scope. This supplement presents the essential data, assumptions, criteria, and computations for developing the plan, design, and cost for the protective works for that portion of the Lake Pontchartrain Barrier in the vicinity of the Rigolets. Three plans are investigated in this report with the recommended plan presented in the body of the supplement and with Plans 1 and 2 presented in the appendices. The recommended plan consists of a control structure with a sill elevation of -30.0 [1] and appurtenant channels located in the main channel of the Rigolets, an earth closure of the Rigolets, and new barrier embankments.

[1] Unless otherwise specified, all elevations herein are feet and refer to mean sea level datum.

Plan 1 consists of a control structure with a sill elevation of -20.0 and appurtenant channels south of the Rigolets, an earth closure of the Rigolets, new barrier embankments and the relocation of a portion of U. S. Highway 90. Plan 2 consists of a control structure with a sill elevation of -20.0 and appurtenant channels located in the main channel of the Rigolets, an earth closure of the Rigolets, and new barrier embankments. That portion of the Lake Pontchartrain Barrier described herein is located approximately 3.3 miles west of the west abutment of the existing bridge crossing at the Rigolets and 500 feet west of the authorized Rigolets Lock. The barrier embankment will be presented in sufficient detail to provide an adequate basis for preparing plans and specifications without additional design analyses.

3. Local cooperation. The conditions of local cooperation pertinent to the Lake Pontchartrain Barrier Plan, as specified in the report of the Board of Engineers for Rivers and Harbors and concurred in by the Chief of Engineers, are as follows:

> "... That the barrier plan for protection from hurricane floods of the shores of Lake Pontchartrain ... be authorized for construction, ... Provided that prior to construction of each separable independent feature local interests furnish assurance satisfactory to the Secretary of the Army that they will, without cost to the United States:
>
> "(1) Provide all lands, easements, and rights-of-way, including borrow and spoil-disposal areas, necessary for construction of the project;
>
> "(2) Accomplish all necessary alterations and relocations to roads, railroads, pipelines, cables, wharves, drainage structures, and other facilities made necessary by the construction work.
>
> "(3) Hold and save the United States free from damages due to the construction works;

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

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

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

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

"(8) Acquire adequate easements or other interests in land to prevent encroachment on existing ponding areas unless substitute storage capacity or equivalent pumping capacity is provided promptly;

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

4. Project document investigations. Studies and investigations made in connection with the report on which authorization is based include: research of information available from previous reports and existing projects in the area; extensive research into the history and records of hurricane and hurricane damages; extensive tidal hydraulics investigations involving both office and model studies relating to the ecological impact of the project on Lakes Pontchartrain and Maurepas; an economic survey; and preliminary design and cost studies. A public hearing was held in New Orleans on 13 March 1956 to determine the views of local interests.

5. Investigations subsequent to project authorization. Detailed investigations were undertaken as follows:

a. Aerial, topographic, and hydrographic surveys;

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

c. Detailed design studies for levee, including levee section stability determinations and design studies for floodwalls and stream closures.

d. Tidal hydraulic studies required for establishing design grades for protective works based on revised hurricane parameters furnished subsequent to project authorization by the U. S. Weather Bureau;

e. Real estate requirements and appraisals;

f. Cost estimates for levees, floodwalls, stream closures, relocations, and control structure;

g. Office studies evaluating alternate alignment for the Lake Pontchartrain Barrier.

6. Future investigations. The following investigations are planned:

a. Additional exploratory and undisturbed borings are necessary to provide engineering design information in critical areas and/or areas omitted by previous soils investigation programs for the preparation of the Detail Design Memorandum.

b. Additional survey and cross section information will be required along the proposed alignment for the preparation of the Detail Design Memorandum.

c. A pile testing program prior to construction is essential in order to confirm pile capacities and determine pile lengths more accurately.

LOCAL COOPERATION

7. Local cooperation requirements. The conditions of local cooperation as specified by the authorizing law are quoted in paragraph 3.

8. Status of local cooperation. On 2 November 1965, the Governor of the State of Louisiana designated the State of Louisiana, Department of Public Works, as "... the agency to coordinate the efforts of local interests and to see that the local commitments are carried out promptly ..."By State of Louisiana Executive Order dated 17 January 1966, the Board of Levee Commissioners of the Orleans Levee District was designated as the local agency to provide the required local cooperation for all portions of the "Lake Pontchartrain, La. and Vicinity", project in Orleans, Jefferson, St. Charles, and St. Tammany Parishes. Assurances covering all of the local cooperation required for the Lake Pontchartrain Barrier Plan were requested through the Department of Public Works from the Board of Levee Commissioners of the Orleans Levee District on 21 January 1966 and a satisfactory act of assurances, supported by a

resolution of the Board of Levee Commissioners of the Orleans Levee District dated 28 July 1966, was approved and accepted on behalf of the United States on 10 October 1966. The principal officers currently responsible for the fulfillment of the conditions of local cooperation are as follows:

Mr. C. H. Downs, Director
State of Louisiana
Department of Public Works
Baton Rouge, Louisiana 70804

Mr. Edward N. Lennox, President
Board of Levee Commissioners
Orleans Levee District
Room 200, Wild Life and Fisheries Building
418 Royal Street
New Orleans, Louisiana 70130

9. Views of local interests. The Board of Levee Commissioners of the Orleans Levee District represents local interests and is in agreement with the general plan.

LOCATION OF PROJECT AND TRIBUTARY AREA

10. Project location. The authorized project, shown on plates 1 and 2, is located in southeastern Louisiana in the general vicinity of New Orleans. The project area comprises the low land and water areas between the Mississippi River alluvial ridge and the Pleistocene escarpment to the north and west. The dominant topographic feature is Lake Pontchartrain, a shallow landlocked tidal basin approximately 640 square miles in area and averaging 12 feet in depth. It connects with lesser Lake Maurepas to the west and through Lake Borgne and Mississippi Sound to the Gulf of Mexico to the east. The project is located in the Parishes of Orleans and St. Tammany.

11. Tributary area. The tributary area varies in character from flat tidal marsh at or near sea level to upland areas of significant relief with natural ground elevations as high as 250 feet above mean sea level. Runoff

from within the project area is disposed of into either Lake Maurepas or Lake Pontchartrain, generally by pumping, although some developed areas located on alluvial ridges in St. Charles, Orleans, and St. Tammany Parishes are drained by gravity. In addition to runoff from the project area, Lake Pontchartrain receives the runoff of 4,700 square miles located to the north and west of the Lake. During major floods on the Mississippi River and its tributaries, floodflows may be diverted from the Mississippi River to Lake Pontchartrain through the Bonnet Carre Spillway, a controlled overbank floodway constructed under the Mississippi River and Tributaries project.

PROJECT PLAN

12. General. The project plan presented herein and indicated on plate 2 was selected from a study of three plans. The recommended plan consists of a control structure in the Rigolets with approach channels, closure dam, and new levee embankments. The alternate plans, Plans 1 and 2, are presented in appendix A. The protective works are located between a point approximately 3.3 miles west of the west abutment of the existing bridge crossing at the Rigolets and a point approximately 500 feet west of the authorized Rigolets Lock. The flood protective works presented herein comprise a major feature of the Lake Pontchartrain Barrier Plan which provides for construction of a hurricane barrier along the east side of Lake Pontchartrain to limit uncontrolled ingress of hurricane tides into the lake.

13. Protective works.

a. Control Structure. The gated control structure, as shown on plate 11 is 1,100 feet long and 50 feet wide with the sill at elevation -30.0. The controlling elevation of the structure is 14.0.

b. Approach Channel. The approach channel to the control structure, as shown on plate 14, will have a 800-foot bottom width at elevation -30.0 at the structure sill and will flare outward from the channel centerline at a 12.5° angle from each side of the structure. On the gulf

side, the channel will slope downward from the structure along a 1 on 10 slope to elevation -35.0 and remain level for a distance of 100 feet, thence slope upward along a 1 on 10 slope to elevation -30.0 and continue at this elevation for some 2900 feet, thence slope upward on a 1 on 10 slope to the existing channel bottom. On the lake side, the channel bottom will slope downward from the structure along a 1 on 10 slope to elevation -35.0 and remain level for a distance of 100 feet, thence slope upward along a 1 on 10 slope to elevation -30.0 and continue at this elevation for some 2300 feet, thence slope upward on a 1 on 10 slope to the existing channel bottom. The channel side slopes will be 1 on 3 from the bottom of the channel to the surface of the ground.

c. Closure Dam. The closure dam, as shown on plate 7, will be a hydraulic-filled structure with riprap slope protection. The closure dam consists of a west embankment 710 feet long and an east embankment 3965 feet long. The crest elevation will be 14.0.

d. Levees. The levee network, as shown on plates 3 through 6 consists of 2.4 miles of highway levee and 0.4 miles of connecting levee. The levee system will utilize the existing embankment of U. S. Highway 90 where its grade is equal to or greater than 9.0 which is some 3.3 miles west of the existing bridge crossing at the Rigolets. From this point, going east, the highway levee will be constructed on the south side and parallel to the existing highway embankment, and will terminate at the intersection of the connecting levee between the highway embankment and the closure dam. The controlling elevation of the levee system is 9.0.

DEPARTURES FROM PROJECT DOCUMENT

14. General. The plan presented herein is generally the same as that presented in the authorizing document. The following changes, which are within the discretionary authority of the Chief of Engineers, have been incorporated into the plan.

a. Rearrangement of barrier features. The location of the control structure and approach channel were changed to locate them in the main channel of the Rigolets. The control structure is incorporated into the closure dam. Construction of a new approach channel is virtually eliminated because advantage is taken of locating the control structure in the main channel of the existing pass. Relocation of U. S. Highway 90 is not necessary and is deleted. Justification for the rearrangement of the barrier features is based on an estimated reduction of the construction cost of approximately $7,000,000.

b. Modification in roadway width. Due to the rearrangement of the barrier features, U. S. Highway 90 is no longer routed over the control structure and the roadway width of the control structure was reduced from 28 feet to 12 feet.

HYDROLOGY AND HYDRAULICS

15. General. Prior tidal hydraulic analysis for the protective works covered herein are presented in "Design Memorandum No. 1., Lake Pontchartrain, Louisiana and Vicinity, Hydrology and Hydraulic Analysis, Part II - Barrier," dated 11 August 1967. That report includes the description and analysis of essential data, assumptions and criteria used for studies reported therein which provide the basis for determining surge heights, run-up, overtopping, and frequencies of the design hurricane on different tracks for the Lake Pontchartrain Barrier. In Part I - Chalmette, dated August, 1966, the climatology and hydrology for the entire Lake Pontchartrain, Louisiana and vicinity were presented. Additional hydraulic studies are reported below for the specific conditions of the recommended configuration of the Rigolets Barrier. These additional studies relate to the closure dam, the control structure and channel, and the effects of the barrier complex on natural flow velocities in the vicinity of the barrier.

16. Design hurricane characteristics. The design hurricane for the Rigolets protective works is the standard project hurricane (SPH) having a frequency of about once in

TABLE 1
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN - DESIGN WAVE DATA

Wave Characteristics		Gulf Side	Lake Side
SWL	-Maximum Still Water Level, feet msl	12.8	11.4
H_S	-Significant wave height, feet	5.8	7.60
T	-Wave period, Seconds	5.8	6.75
L	-Deepwater wave length, feet	172	233
d^o/L_o	-Relative Depth	0.08023	0.08584
H_S/H'_o	-Shoaling Coefficient	0.9545	0.9471
H'_o	-Deepwater wave height, feet	6.08	8.02
H'	-Avg. of 1% highest waves, feet	9.7	
w	-Wind speed, mph		90
d	-Avg. depth of fetch, feet		20
H_b	-Wave height on breaking, feet		7.48
d_b	-Depth of wave @ breaker's position, feet		9.59

TABLE 2
RIGOLETS COMPLEX
LAKE PONTCHARTAIN BARRIER PLAN
DESIGN DATA

CASE	WATER ELEVATIONS		STRUCTURAL DESIGN ALLOWABLE STRESS STEEL / CONCRETE		REMARKS
	GULFSIDE	LAKESIDE	DL+WL	DL+WL+WAVE	
1	+12.8	−3.0		$\frac{0.67\ F_y}{0.45\ f'_c}$	HURRICANE CONDITION — INCREASE ALLOWABLE STRESSES
2	+9.0	−4.5	$\frac{0.5\ F_y}{0.35\ f'_c}$		HURRICANE CONDITION — NORMAL ALLOWABLE STRESSES
3	+5.0	+2.5	$\frac{0.5\ F_y}{0.35\ f'_c}$		MAXIMUM DIRECT HEAD UNDER WHICH GATE WILL OPERATE — FOR MACHINERY DESIGN
4	−3.0	+11.5		$\frac{0.67\ F_y}{0.45\ f'_c}$	HURRICANE CONDITION — INCREASE ALLOWABLE STRESSES
5	−4.0	+9.0	$\frac{0.5\ F_y}{0.35\ f'_c}$		HURRICANE CONDITION — NORMAL ALLOWABLE STRESSES
6	−3.0	+2.5	$\frac{0.5\ F_y}{0.35\ f'_c}$		MAXIMUM DIRECT HEAD UNDER WHICH GATE WILL OPERATE — FOR MACHINERY DESIGN
7	+1.5	+1.5	$\frac{0.5\ F_y}{0.35\ f'_c}$		NORMAL WATER LEVEL

DL = DEAD LOAD WL = WATER LOAD

200 years, a central pressure index of 27.6 inches of mercury, a maximum 5 - minute average wind velocity of 100 m.p.h. at 30 feet above water surface and a radius of 30 nautical miles from the center, moving on a track critical to the Rigolets Pass Complex at a forward speed of 11 knots. Detailed information on the design hurricane is contained in the above referenced memoranda and in appendix D.

17. Design conditions. Hydraulic and hydrologic investigations indicate design conditions as shown in table 1 and design wave data as shown in table 2 can be expected. These conditions are based on the premise that when the water level on either side of the protection levee is greater than elevation 9.0, the overtopping will cause a water level build-up on the opposite side. For an occurance of the SPH on track 'F', the final elevation in Lake Pontchartrain induced by overtopping will be 2.2 (Paragraph 8B, Lake Pontchartrain, La. and Vic., Design Memorandum No. 1, Hydrologh and Hydraulic Analysis, Part III - Lakeshore). It is probable that this elevation will be increased by an additional 1.5 feet of rainfall over Lake Pontchartrain during the hurricane and by inflows from tributary streams during the period of closure of the structure to preclude hurricane flows. If reopening of the structure begins at low tide, the water level in Lake Borgne will be at elevation 0.7. Other preliminary considerations of the reopening are presented below in paragraph 19b. Flow velocities during construction of the closure dam are based on water level conditions that naturally exist for spring tides. The maximum water level difference between Lakes Borgne and Pontchartrain is 0.95 feet at that time. Preliminary tidal computations have been made which present additional detail on the hydraulic conditions during closure. These conditions are presented below in paragraph 18a.

18. Closure dam. The Rigolets Pass is one of two natural outlets of Lake Pontchartrain. This pass, which connects Lake Pontchartrain and Lake Borgne, is approximately 9 miles long, 3500 feet wide and 28 feet deep. The general plan of the project covered by this report includes the construction of a control structure, an approach channel to the control structure, and a closure dam adjacent

to that structure. Presented in this section are the results of preliminary studies on the hydraulics of closure, method of closure and the slope protection required to protect the dam against erosion by wave action, overtopping during the design hurricane and increased flow velocities near the control structure.

a. Hydraulics of closure. The flow velocities that will occur during closure depend on the energy available to the flow and on the way this energy is dissipated. The available energy is determined by the difference in water level between Lakes Borgne and Pontchartrain. This energy is naturally dissipated by friction loss along the Rigolets Pass and by loss of kinetic energy when the flow enters the downstream lake. Since natural maximum flow velocities in the Rigolets are about 2 fps (feet per second) the natural kinetic energy loss (. 07 feet) is a small part of the total available energy during spring tides (. 85 feet). When the closure takes place, the velocities of flow through the constricted opening of the control structure are much greater than 2 fps. Since there is a sudden expansion on the downstream side, at least half of the kinetic energy will be lost during the expansion. This energy loss is significant compared to the available energy so the flow rate during closure will be reduced as the closure proceeds. The reduced flow rate will cause a corresponding reduction in the tidal range in Lake Pontchartrain. Preliminary tidal computations accounting for these effects under different methods of closure have been made and are presented in paragraph 18b.

b. Method of closure. The maximum flow velocities to be expected during closure depend on the way the closure fill is placed. The first alternative, "A", to make the closure starting at one end (at the control structure) and proceed to the other end. The second alternative, "B", is to place the closure fill so that the top of the fill rises uniformly over the entire length of the fill. Other alternatives exist as combinations of A and B. Also, the maximum velocities depend on whether the control structure is opened or closed. Preliminary computations indicate the maximum velocities to be expected under each of these are as shown in table 3. In order to reduce the erosion of the

TABLE 3
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN
MAXIMUM VELOCITIES DURING CLOSURE

ALTERNATIVE A

Control Structure	Velocity (fps) and Width of Opening (ft.) 3500	1000	100
Open	2.9	6.4	8.6
Closed	3.8	8.4	10.4

ALTERNATIVE B

Control Structure	Velocity (fps) and Distance to Top of Dam Below Water Level (ft.) -5	-10	-15
Open	7.2	5.7	4.7
Closed	9.8	8.0	6.2

TABLE 4
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN
SLOPE PROTECTION

LOCATION	MATERIAL	SLOPE	THICKNESS (ft.)	MEAN WEIGHT (lbs.)
Lakeside	Derrick Stone	4:1	4.0	3000
Lakeside	Riprap	4:1	4.0	1500
Lakeside	Derrick Stone	6:1	3.0	2000
Lakeside	Riprap	6:1	2.0	1000
Gulfside	Riprap	4:1	2.0	400
Gulfside	Riprap	6:1	1.5	270

fill and adjacent channel bottom during closure, the control structure and approach channels will be constructed prior to making the closure. To further reduce erosion and to improve the stability of the closure dam, the sheet piling used for the cofferdam around the control structure will be placed in the center of the closure dam.

c. Slope protection. Slope protection of the closure dam must be provided to withstand wave action on both sides of the dam. Preliminary computations indicate the minimum requirements are as shown in table 4. This slope protection must extend one wave height below low water level or to elevation -12 on both the lakeside and the gulfside.

19. Channel at control structure. The bottom of the approach channel on either side of the control structure will drop away from the structure at elevation -30 to elevation -35 along a 1 on 10 slope, then remain level for 100 feet, thence slope upward along a 1 on 10 slope to elevation -30 and continue at this elevation.

a. Normal flow conditions. Under normal flow conditions, the flow velocity through the control structure may be expected to be about 5.5 fps during spring tides and with the structure completely open. Computer analysis of two dimensional flow patterns shows that velocities along the Lake Borgne side of the closure dam will be approximately 2 fps along the entire length of the dam. During periods when wind set-up on Lake Pontchartrain causes increased flows through the control structure, the velocities along the closure dam will be as great as 4 fps. To prevent erosion, a 12 inch layer of riprap on 6 inches of shell is required below elevation -12.

b. Subaqueous protection adjacent to control structure. The average velocity during reopening of the control structure under a 3 foot gradient across the structure will be about 11 fps. Strong winds could produce an equivalent gradient with the flow moving from the Gulf into the Lake. Accordingly, stone protection symmetrical about the centerline of the structure and channels will be required

for the earth channels on both sides of the structure as follows:

(1) 4 foot thick riprap with a maximum stone diameter at least of 2.5 feet on one foot of shell on the channel bottom 150 feet either side of the structure. Riprap will have the following gradation:

Stone Weight in Pounds	Percent Lighter by Weight
1100-1700	100
500-700	50
300-100	10

(2) 2.5 feet of riprap with a maximum stone diameter of at least 1.7 feet on one foot of shell should be placed as follows:

Location in Channel	Distance from Structure
Bottom	150 ft. - 250 ft.
Side Slopes	0 - 250 ft.

20. Flow velocities near Fort Pike and U. S. Highway 90 bridge piers. Preliminary computations from a computer analysis of two dimensional flow patterns indicate that the normal velocities near Fort Pike and the U. S. 90 Highway bridge will decrease slightly rather than increase. These velocities were generally less than 2 feet per second. Therefore, scour protection is not required in the areas adjacent to Fort Pike and the U. S. Highway 90 bridge.

GEOLOGY

21. Physiography. The proposed Lake Pontchartrain, Louisiana and vicinity (Hurricane Protection) project area is located within the central Gulf Coastal Plain. Specifically, this project area is located in an area on the eastern flank of the Mississippi River Deltaic Plain between the alluvial ridge of the present Mississippi River and the uplands to the north and west known as the

Pontchartrain Basin. The project area is located on the eastern rim of Lake Pontchartrain at a major tidal channel known as the Rigolets. Dominant physiographic features of the general area are marshes, natural levees, abandoned distributaries and lakes. Relief in the area is slight. A low remnant alluvial ridge with elevations of 2.0 to 4.0, marking the position of an ancient distributary of the Mississippi River, extends east - northeastward through New Orleans forming a smaller sub-basin between the present Mississippi River natural levee ridge and the remnant alluvial ridge.

22. Geologic history.

a. During the Braydan (Peorian) interglacial stage, the Pleistocene Prarie Formation was deposited by the Mississippi River over the area in the form of a huge delta. This delta was centered in southwest Louisiana and extended from the Texas border to the Mississippi border.

b. As sea level fell during the Late Wisconsin glacial stage, the Mississippi River and smaller streams entrenched into the Prairie Formation. By the end of the Pleistocene Epoch with sea level some 450 feet below its present level, the Mississippi River was deeply entrenched to the west of the project area. The surface of the Prairie in the project area remained relatively undissected as a shelf. During this period the Prairie deposits were weathered and desiccated.

c. As sea level rose, the Mississippi River began to aggrade its deep entrenchment. Alluvial sedimentation was confined to the alluvial valley and the Pontchartrain Basin became a shallow arm of the Gulf of Mexico, or a large bay. Concomitantly, downwarping of the Prairie surface and some faulting along the northern edge of Lake Pontchartrain occurred resulting in a gulfward dip of the Prairie surface of about 1.6 feet per mile. Two prominent beaches began to develop in the area as sea level approached its present level. One of these beaches developed along the south shore of Lake Pontchartrain from the vicinity of Pearl River to the vicinity of New Orleans (the Pine Island Beach

Trend); the second developed on the northern side of the lake 5 or 6 miles south of the present north shoreline (Mandeville).

d. After sea level attained its present stand and the Mississippi River filled its entrenchment, the river began to migrate laterally back and forth across the deltaic plain. Approximately 4,000 to 4,500 years ago, the first Recent deltaic and alluvial sediments of consequence were carried into the project area. When the river shifted its course westward some 3,500 years ago, the project area was subjected to erosion and subsidence. Several relic beaches were formed in the area, the most continuous one being a shell beach paralleling the south shore of Lake Pontchartrain between the shoreline and the relic Pine Island Beach Ridge. As the river again shifted to the east and occupied its most eastwardly course (St. Bernard Course), several distributaries of the system were located immediately west of the project area where several remnant alluvial ridges can be found. The most prominent of these ridges (Metairie - Bayou Sauvage Ridge) extends east - northeastward through New Orleans to the vicinity of Chef Menteur Pass. Several other shifts in the River's course have occurred until today when the present course has shifted the center of deposition southward of the area. With construction of the levees along the river, flood waters have been eliminated from the region and at present no sediments are being introduced into the project area. There is evidence that for the past century the lakes are enlarging.

23. Surface drainage. Drainage from most of Louisiana east of the Mississippi River and a considerable area in southwestern Mississippi is accomplished by relatively small streams which flow generally southward into the basin from the uplands on the north. At present the only water from the Mississippi River received by the basin is that discharged occasionally (1937, 1945, and 1950) into Lake Pontchartrain through Bonnet Carre Spillway. The alluvial ridges drain down-slope into the adjacent marsh or swamp lands which, under natural conditions, are underdrained. In the reclaimed areas of the marsh and swamp

lands, protection levees have been constructed and drainage is accomplished by large pumps that generally discharge into canals that connect with the lakes.

24. Subsidence. Progressive subsidence of the region in the vicinity of New Orleans has been recorded by many observers. The pleistocene surface has been downwarped towards the south and west from Zero at the Pleistocene outcrop north of Lake Pontchartrain, to a maximum of 350 feet near the present Breton Sound shoreline. It has been estimated that the rate of subsidence in the New Orleans area has been about 0.4 foot per century. In addition to the regional subsidence, large settlements of the ground surface have occurred in the marsh and swamp land areas that have been reclaimed and drained. These settlements were the results of the shrinking of the highly organic surface soils when they were drained.

25. Subsurface conditions. The subsurface consists of Recent deposits overlying the Pleistocene Prairie Formation. The Recent consists of marsh deposits, soft intra-delta clays and silts, beach sands, and prodelta clays. Underlying the Recent unconformably are Pleistocene deposits consisting of stiff to very stiff clays with local zones of silts and sands.

26. Ground water conditions. All of the sand and silt deposits in the area are water bearing, and the piezometric head in these deposits is generally equal to sea level.

27. Foundation problems. The very low shear strength and high compressibility of the peat and soft clays of the Recent deposits will result in stability and settlement problems. The existence of large sand and silt layers and their proximity to the surface will result in seepage and uplift problems and necessitate a relief system under the control structure. Detailed discussion of foundation problems are presented in the soils section of this report.

28. Mineral deposits. Oil and gas production are not found in the immediate vicinity of the project. However, future exploration and production of these natural resources may take place in the area but this will not be adversely affected by the project.

SOILS AND FOUNDATIONS
INVESTIGATIONS AND DESIGN

29. General. This part of the report covers the soils and foundation investigation and design for the levees and flood protecting structures adjoining the Rigolets Control Structure and Closure Dam. The recommended project plan is presented in the following paragraphs.

30. Field investigations. Four 5-inch diameter undisturbed soil borings were made along the highway levee alignment at intervals of approximately 2500 feet. Three 1-7/8 inch I. D. general type core borings were made at midintervals between the undisturbed borings, with a 1-3/8 inch I. D. standard split spoon sampler used in sandy soils. Ten 5-inch diameter undisturbed borings and seven general type borings were taken between station 195+49.05 B/L A and station 249+60.59 B/L A. In the area of the connecting levee between the closure dam and U. S. Highway 90, one 5-inch undisturbed boring and three 1-7/8 inch I. D. general type borings were taken. Six 5-inch diameter undisturbed borings were made in the Rigolets channel along the closure alignment and in the vicinity of the control structure. Eleven general type core borings were made in the area extending from Lake Pontchartrain into Sawmill Pass leading to Lake St. Catherine. In the Rigolets channel, four general type core borings were made between the proposed closure dam and the U. S. Highway 90 bridge, and six general type borings were made south of the closure and near the eastern bank of the Rigolets. These last ten borings were exploratory in quest of suitable borrow materials. The boring depths varied from 40 to 150 feet. The boring locations are shown on plates 3 through 7. Eighteen general type borings were made of the proposed borrow area on the bottom of Lake Pontchartrain along the north shore. The location of these borings is shown on plate 18.

31. Laboratory tests. Visual classifications were made on all samples obtained from the borings. Water content determinations were made on all soil

samples. Consolidation (C) tests, unconfined compression (UC), Unconsolidated-Undrained (Q), Consolidated-Undrained (R), and Consolidated-Drained (S) shear tests were performed on representative soil samples from the undisturbed borings. Grain size gradations were performed on silt and sand samples obtained from borings. The test results are shown on plates 26 through 69.

32. Soil conditions.

a. The subsurface at the project location consists of Recent deposits of very soft to medium fat clays with lenses and strata of fine sands and silts overlying the Pleistocene formation. The Recent deposits vary in thickness from about 140-150 feet between stations 105+00 B/L A and the general vicinity of station 36+00 B/L A, to approximately 80-85 feet between the general vicinity of station 36+00 B/L B and station 90+00 B/L B. The Rigolets has entrenched into the Recent deposits to an approximate elevation of -33.0, along the closure alignment. The portion of the subsurface soils which directly affects the design of that portion of the project covered herein consists generally of the following.

b. Highway levee station 100+00 (beginning of project) to highway levee station 107+00. This reach is predominately a 3 to 4 foot layer of very soft fat clay with organic matter overlying a soft to medium clay, extending to elevation -32 to -36 with a lense of silt occurring between elevation -9 to -14. Below elevation -36, the soil consists of predominately silty sands with lenses of silt and medium to stiff clays.

c. Highway levee station 107+00 to highway levee station 120+00. This reach is predominately a soft to medium fat clay approximately 30-feet in thickness underlying a 4-foot surface layer of very soft clay with organic matter. The soil below elevation -30 is a mixture of sands, silty sands and silts interspersed with clay lenses.

d. Highway levee station 120+00 to highway levee station 163+00. Soil conditions in this reach consist

predominately of a very soft to soft clay, extending from the surface to an approximate elevation of -22. Lenses of silts, silty sands and sands 3 to 4 feet in thickness occur at elevations between -5 to -13. Below elevation -22, another 3 to 4 foot stratum of silt, silty sand and sand overlies a 4 to 10 thick layer of medium clay. The medium clay is underlain by a thick layer of silty sand to fine sand covering the Pleistocene.

e. Highway levee station 163+00 to highway levee station 180+00. This reach is predominately a 10-foot thick surface layer of very soft organic clays and peat underlain by a 4 to 5 foot layer of silt. Between approximate elevations of -12 to -22, lies a soft to medium fat clay underlain by silts, silty sands and sands.

f. Highway levee station 180+00 to highway levee station 208+00. This reach consists predominately of 5 feet of very soft organic clay overlying 20 to 25 feet of very soft to medium clay underlain by silts, fine sands with clay lenses extending to the Pleistocene.

g. Highway levee station 208+00 to highway levee station 228+00. This reach consists predominately of a 5 to 6 foot layer of very soft organic clay underlain by 15 to 18 feet of soft to medium clay underlain by silts and fine sands extending some 130 feet to the Pleistocene formation.

h. Connecting levee station 1+45 to connecting levee station 8+85. This reach is predominately several feet of soft to medium clay fill to elevation 1 underlain by 4 to 5 feet of very soft to medium clay with silt lenses and extends to elevation -20. Below lie the silty sands and fine sands extending to the Pleistocene.

i. Connecting levee station 8+85 to connecting levee station 22+92.60. This reach is predominately 4 or 5 feet of very soft organic clay overlying some 15 feet of very soft to medium clay underlain by the fine sands covering the Pleistocene.

33. Design and construction problems. The low shear strengths of the Recent Clays, the high compressibility of the fat clays and organic deposits, and the underlying pervious strata of silts and sands combined with high storm tide levels produce problems of levee and embankment stability, uplift and seepage, permanent pressure relief, construction settlement, methods of construction, and erosion protection.

34. Stability analysis.

a. Highway levee. The design of the highway levee sections was based on existing topographic and soil conditions as determined from representative cross-sections and soil borings. The sections were designed for: ground water level at elevation 0.0; hurricane water condition at a still water level of elevation 9.0 on the gulf side and elevation 0.0 on the lake side. The still water level, elevation 9.0, was selected for determining the piezometric heads in the pervious strata because the net grade of the levee is elevation 9.0 and higher water levels will result in overtopping until a level of 9.0 is reached. The piezometric gradient in the pervious strata varies linearly from elevation 9.0 on the gulf side at the closest point to the highway levee where pervious stratum is exposed, to elevation 0.0 on the lake side at the closest exposure point. In determining the points of exposure of the pervious strata, the survey cross-sections and bottom contours in Lake Pontchartrain and Lake St. Catherine were used, and the stratum elevation was assumed to be invarient. The levee stability was analyzed by the method of planes for the end of construction case. Design shear strengths were based on (UC) and (Q) tests on clays and (S) tests on sands. The factors of safety were 1.3 greater. A levee slope not steeper than 1 on 4 was selected based on stability analysis of several sections, and also because a steeper slope would hamper grass cutting and other necessary maintenance operations. The stability analyses are shown on plates 20 through 23. Sufficient stability analyses using shear strengths based on (S) tests were performed to insure that the end-of-construction case was more critical than the long term loading case.

b. Connecting levee. The design procedure for the connecting levee sections is similar to that used for the highway levee. The stability for the end-of-construction case was determined by the method of planes using (Q) shear strengths for clays and (S) shear strengths for sands. Still water levels of elevation 9.0 and elevation 0.0 on opposite sides of the levee at the nearest points of exposure of the pervious strata were used to determine the piezometric heads in the sands and silts. The analyses are shown on plates 24 and 25. Again, the long term loading case was checked to verify that the end-of-construction case was critical.

35. Foundations for structures. The foundation for the Rigolets control structure consists of a concrete sill slab and piers supported by prestressed concrete piles (14-inch octagonals) driven at a 3 on 1 batter into the underlying Pleistocene. The batter is necessary to resist the horizontal loads due to water level differentials and wave forces. The anticipated maximum pile loads will approach 56 tons in compression and 35 tons in tension. Economic pile lengths to support these loads will be determined from a test pile program. Cost estimates are based on pile lengths of 95 feet. The foundation design is based on factors-of-safety of 1.5 for maximum hurricane conditions and 2.0 for other loading conditions.

36. Settlement. Based on soil conditions determined from the soil borings and consolidation test data from the undisturbed borings, estimates of settlement beneath the levees and embankments were made. Settlement estimates for the connecting levee and highway levee indicate maintenance will be required after construction to compensate for future settlement. Estimated settlements for the levees are shown in table 5.

37. Methods of construction.

a. Highway levee. From station 100+00 (beginning of construction) to station 163+00, the highway levee will be constructed with material transported by barges from the bottom of Lake Pontchartrain along the

TABLE 5
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN
SETTLEMENT DURING CONSTRUCTION

Lift		Time	Elev. (Ft. msl)		Settlement (Ft.)	
No.	Type	(Years)	Crown	Base	Crown	Base
		Connecting Levee				
		0		-4.0	0	0
1	hydraulic hauled	1 (end cons.)	9.0	-4.1	0	0.1
		2	8.4	-4.2	0.6	0.2
		5	8.3	-4.3	0.7	0.3
2	hauled	6 (end cons.)	9.0	-4.4	0.8	0.4
Maintenance thereafter						
		Highway Levee				
		0		1.0	0	0
1	hauled	1 (end cons.)	9.0	0.5	0	0.5
		2	7.2	0.0	1.8	1.0
		5	6.7	-1.5	2.3	2.5
2	hauled	6 (end cons.)	9.0	-2.0	2.8	3.0
Maintenance thereafter						
		Highway Levee				
		Sand Core Section				
		0		-4.0	0	0
1	hydraulic hauled	1 (end cons.)	9.0	-4.5	0	0.5
		2	7.4	-5.1	1.6	1.1
		5	7.2	-5.3	1.8	1.3
2	hauled	6 (end cons.)	9.0	-5.4	1.9	1.4
Maintenance thereafter						

north shore and trucked to the levee site. From station 163+00 to station 229+20 (end of highway levee) the extremely weak organic surface layer will be removed and replaced with sand pumped from the borrow areas in the Rigolets channel. Stability analysis indicates that the typical highway levee section would not be adequate. Solutions considered include: mucking out of weak material and replacing with stronger material; addition of stability berms using hauled material and requiring additional Right-of-Way. The necessity of maintaining the highway drainage ditch and the planned use of a sand core in the Fort Pike Canal closure and the connecting levee appears to justify the choice of a sand core. The excavated material will be placed in a spoil bank and used to construct a stability berm on the gulf side of the completed levee. The levee section will be completed with material transported by barge from the bottom of Lake Pontchartrain on the north shore and trucked to the levee site. Stage construction will be used to compensate for settlement. The sequence of construction shall be as follows: The organic matter will be stripped and wasted, excavation of weak surface materials and placing in adjacent spoil bank, replacement of excavated material with sand backfill to lines and grades shown; construction of levees to full net grade and section; and shaping of the excavated in the spoil bank to form the berm on the gulf side of the levee. Levees shall be maintained to design grade as settlement occurs.

b. Connecting levee. From the highway levee to the Fort Pike Canal, the levee will be constructed to the full net section with material from the borrow area on the bottom of Lake Pontchartrain along the north shore. The closure of the Fort Pike Canal is to be constructed in stages. The soft bottom layer is to be dredged and sand fill placed by pumping from borrow areas in the Rigolets channel. The protective clay cover will be cast from material barged from the borrow area on the bottom of Lake Pontchartrain along the north shore. The construction of the connecting levee from the Fort Pike Canal to the Rigolets closure will consist of: organic matter will be stripped and wasted; excavation of weak surface materials and placing in spoil banks on both sides of the levee;

backfill of excavation and construction of sand core; placement of protective clay cover; and shaping of the spoil banks to form the berms. All sections of the connecting levee will be constructed to full net section, and settlement will be compensated for by a second lift and maintained thereafter.

38. Control structure. A steel sheet pile cellular cofferdam with clear inside dimensions of 1850 feet by 300 feet is required to construct the control structure in the Rigolets channel. The sheet pile cells are to be 64 feet in diameter and are to extend from elevation 6.0 to elevation -70.0. The cells are to be filled with sand pumped from the borrow area in the Rigolets channel as shown on plate 15. The construction sequence consists of three major stages. The first stage is to be: mucking out of soft bottom silts and clays to an elevation of -47.0; construction of the cofferdam cells; backfill of excavation to elevation -38.0 with sand pumped from borrow area in Rigolets channel; shaping of stability berm on interior of cofferdam is to be performed simultaneously with the dewatering of the cofferdam; construction of surface runoff and ground water control system. The second stage consists of: driving of piling; construction of foundations, piers and end abutments; installation of gates, crane bridge, backfill, slope protection, and appurtenant structures. The final construction stage consists of: flooding the cofferdam; removal of cofferdam cells; and completion of approach channel. Ground water control is to be maintained by a well point system, and surface runoff is to be controlled by a ditching system utilizing the dewatering pumping system.

39. Approach channel. The approach channel will be hydraulically dredged to the grades and lines as shown on plate 14. Spoil areas for the excavated material are shown on plate 16.

40. Closure dam. Closure of the Rigolets as shown on plate 7 is to be accomplished by stage construction. The west embankment between the connecting levee and the control structure is to be constructed "in the dry" while the cofferdam is dewatered. Material for the sand

fill will be pumped from the borrow area in the Rigolets channel during the backfill of the cofferdam excavation and shaped after dewatering. The east embankment from the control structure to Baseline B, station 81+85.65 (end of contract), is to be constructed by stage construction consisting of: excavation of the soft bottom silts and clays by dredging; and construction of the sand embankment with material pumped from borrow areas in the Rigolets. Embankment construction is to begin on the shore and proceed across the channel. A steel pile barrier will be erected as a current deflector during construction of the sand embankment and incorporated into the final section as a seepage cutoff. The sheet pile barrier will be driven in sections several hundred feet in front of the head of the closure embankment as closure proceeds across the channel. The top of pile will be at elevation 6.0. The steel sheet piling used in the cofferdam construction will be pulled and reused to form the current deflector and seepage cutoff wall. The closure is to be protected by a plastic filter cloth layer covered by a shell bedding layer supporting riprap. The proposed plastic filter cloth is to be "poly-filter X" (manufactured by Carthage Mills Incorporated) or equal. Derrick stone will be provided in areas of maximum wave attack. The riprap will be extended to the bottom of the closure section and into the lock approach channel. A shell access road will be constructed along the crest of the closure. After settlement is substantially completed, the access road is to be paved with a bituminous pavement.

41. Erosion protection.

a. Embankments. The protection of highway levee and connecting levee from overtopping and wave wash is to be accomplished by seeding of the levees and the cohesive nature of the embankment soils.

b. Closure dam. The erosion protection of the closure dam will consist of riprap bedded on shell over a plastic cloth. In the areas of maximum wave attack, derrick stone is to be used in lieu of riprap.

c. Approach channel. The side slopes and bottom of the approach channel are to be protected by riprap in the vicinity of the control structure.

42. Additional soil borings and tests. Additional soil borings and tests for detailed design of the control structure and closure dam will be presented in Detail Design Memorandum No. 6. A test pile program is to be conducted to determine economical lengths of piling. Settlement plates will be installed at the bottom of the embankments, and grade measurements will be made on the plates before the start of backfill or filling operations, during construction, and after completion of construction. Locations and details of settlement plates will be shown on the construction drawings. Settlement observations will be made on all structures and levees at completion of construction and yearly thereafter until settlement is essentially complete. Observations will be made on all protective features approximately every 5 years thereafter.

OTHER PLANS INVESTIGATED

43. Other plans investigated. To determine the most economical solution for the project plan, three variations of the plan were investigated. The results of the studies are presented herein as the recommended plan. Complete investigations and design analyses were performed for the alternate solutions, Plans 1 and 2. The results of the studies of Plans 1 and 2 are presented in appendices A and B respectively.

a. Recommended plan versus Plan 1. The recommended plan reduces the estimated construction cost by $8,297,000 in comparison to Plan 1. In addition, the relocation of U. S. Highway 90 is not required, the control structure is incorporated in the closure dam and located in the main channel of the Rigolets and the construction of a new approach channel is virtually eliminated.

b. Recommended plan versus Plan 2. The recommended plan reduces the estimated construction cost by $1,440,000 in comparison to Plan 2. The recommended plan and Plan 2 are almost identical except for the length and sill elevation of the control structure.

DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

44. Recommended plan.

a. Control structure. The reinforced concrete structure, as shown on plate 11, consists of 16 bays, each 50 feet in width, with a sill elevation at -30.0 and a top elevation of 14.75. The overall length of the structure is 1100 feet. Each bay will have three vertical lift steel gates which will be operated by an overhead traveling gantry crane. The roadway and crane bridge pier is 50 feet wide and rests on a foundation slab 8 feet deep and 70 feet wide. The concrete slab footing will be supported by battered prestressed piles driven into the underlying clays. The typical section and elevation of the control structure are shown on plate 12.

b. Roadway bridge. The bridge is a reinforced concrete structure with prestressed I-beam stringers. The overall width of 16 feet - 7 inches consists of a 12 foot roadway with a 3 foot sidewalk on the gate side of the bridge and 1 foot - 7 - 1/2 inches safety curb.

c. Crane bridge. The crane runway is of reinforced concrete construction with provisions for gate storage at each bay. The transverse section consists of two closure walls acting as crane girders. The utilities will be located in the space between the crane bridge and the highway bridge.

d. Concrete pier and base slab. The typical section and elevation for the concrete pier and base slab is shown on plate 12. The piers are designed to carry the crane bridge and the roadway bridge, and also to function as a support for the horizontal reaction loads imposed on the vertical lift gates. The piers and base slab are of monolithic construction except for the isolated piers near the abutments which are bonded together by the strut and bulkhead walls. The structure is supported by prestressed concrete piles driven on a batter. The foundation plan

layout is shown on plate 13. A permanent pressure relief system consisting of a graded gravel filter with perforated collection pipes discharging into risers with outlets at elevation 2.0 will be provided beneath the base slab.

e. Gantry crane. For the handling of the vertical lift gates, two gantry type cranes will be provided. The gantry crane will meet the requirements as set forth in the Corps of Engineers Manual EM 1110-2701, and related guide specifications, titled, "Vertical Lift Crest Gates". The hoist crane will be designed for a minimum vertical lifting hook capacity of 80 tons. The vertical travel distance of the lifting blocks will be 40 feet with a horizontal trolley travel of 14 feet. The gantry crane travel speed will be such as to allow placing all 48 gates in 12 hours, with a 45 knot wind. The crane will be electric with two integrated mounted diesel engine - generator sets to provide power for the crane motors; one set is for standby power. The crane will be able to travel at 100 FPM, in an unloaded condition. There will be a minimum distance between the bottom of the gate, in the fully raised position, to the roadway of 4 feet - 0 inches. This will allow moving the crane over flat bed truck for the removal of a damaged gate. The crane will have provisions to be lashed down to withstand 150 knot winds and wave forces. The general arrangement of handling the gates with the crane is shown on plate 12. Suitable lighting will be provided on the crane to allow for night operation. A power plug will be available on the crane to connect a battery charger and crane lights to commercial power when the crane is not in use. Power for the lighting and all controls shall be in an integral part of the crane. To insure reasonable dependability, two cranes are proposed, one for general service and one in reserve. There will be a latching device at each crane to allow one crane to tow the other in case of breakdown.

f. Vertical lift gates. The gates as shown on plate 12 will be of welded structural steel construction and of the fixed wheel type. Structurally, each gate consists of vertical skin plates supported by a series of horizontal openweb expanded steel beams framed into vertical structural steel end posts. The skin plates are further

supported and stiffened by vertical structural steel diaphragms. Each gate section will be equipped with a pair of steel lifting hooks shaped for attachment to the lifting features of the handling crane. The gates will be protected against corrosion by a vinyl type protective coating system. The miscellaneous steel in the gate slots will use the same vinyl system in conjunction with a sacrificial anode. No provision has been made in the design for the dewatering of the gate slots. In order to minimize the size and capacity of handling equipment, to meet the problems of shipment and erection, and to adequately control discharge, the lift gates were subdivided into sections of 45 feet - 10 inches wide by 11 foot - 6 inches high by 3 feet - 3 inches thick. Storage slots for spare gates will be provided at Bays 3 and 19. At Bays 1 and 2 and Bays 21 and 22, areas will be provided where the gates may be maintained, repaired and/or loaded over flat bed trucks for removal.

g. Approach channel. The control structure approach channel, as shown on plate 14 and described in paragraph 13b, will vary in width from 800 feet at the structure sill to a maximum width at the extremities of 1,590 feet on the gulf side and 1,040 feet on the lake side. The channel will have a minimum elevation of -30 on the gulf and lake sides of the control structure. Erosion protection will be provided for a distance of 250 feet adjacent to the structure in the form of riprap and sheet piling as shown on plate 11. Spoil from the approach channel excavation will be used in the adjacent earthen embankments and closure dam. Spoil not used immediately will be placed in temporary spoil areas adjacent to the work sites for later use. Unsuitable soils will be deposited in permanent spoil areas.

h. Closure dam. The alignment, profile and section of the closure dam across the Rigolets is shown on plate 7. The construction will consist of a hydraulic sand fill built with material pumped from borrow areas located in the Rigolets channel and shown on plate 16. Above the hydraulic fill, the section will consist of a rolled earth fill built with materials transported from the borrow

area on the bottom of Lake Pontchartrain on the north shore. Erosion protection is accomplished with riprap as described in paragraph 18c. An access road of shell construction will initially traverse the closure. After settlement is essentially complete the access road is to be paved.

i. Highway levee. The location of the highway levee is shown on plates 3, 4, and 5. Typical sections of the levee are shown on plate 9. The stability analysis of representative section are shown on plates 20 through 23. The method of construction is descrived in paragraph 37a. Erosion protection is described in paragraph 41a.

j. Connecting levee. The alignment of the connecting levee is shown on plate 6. The typical section is shown on plate 9. The stability analysis of representative sections are shown on plates 24 and 25. The method of construction is described in paragraph 37b. Erosion protection is described in paragraph 41a.

45. Corrosion mitigation. The vertical lift gates will be protected against corrosion by a vinyl coating system. The miscellaneous steel in the gate slots will use the vinyl protective coating system in conjunction with a rectifier type cathodic protection system. The cathodic protection system will be designed to produce in the structure a potential of -850 millivolts.

ACCESS ROAD

46. Access road. Access roads for use during construction of the project are not required. After completion of the second lift of the connecting levee, a shell roadway will be constructed to provide access from U. S. Highway 90 to the closure dam and the control structure. This roadway has been described as the access road in the cost estimates.

SOURCES OF CONSTRUCTION MATERIALS

47. General. Information relative to material sources is contained in Design Memorandum No. 12, "Sources of Construction Materials", dated 27 June 1966, approved 30 August 1966. Sources of borrow are indicated on plate 16.

ENVIRONMENTAL QUALITY

48. Environmental quality.

a. General. The engineering treatment required for preserving and maintaining the environmental quality of the project has been considered during preparation of this memorandum. Specifically, erosion protection and corrosion mitigation for the control structure and closure dam are discussed herein in paragraphs 41 and 44 respectively. Further, as indicated in paragraph 47c, extensive coordination has been accomplished with the appropriate agencies relative to effects of the project on fish and wildlife resources and water quality control during and subsequent to construction.

b. Enhancement. Construction of the protective works covered herein will alter the existing terrain only to the extent of superimposing a hurricane protection levee. The closure dam and control structure will be located in the Rigolets. Additional beautification measures beyond those which are normally associated with levee construction, i. e., grading, seeding and fertilizing, are not warranted.

c. Coordination with other agencies. This study has been coordinated with Federal, State, and local agencies that are concerned with hurricane problems, or that are responsible for the protection of public and private property or fish and wildlife resources. They have been consulted during the course of the study to obtain technical data, pertinent information, or cooperation where mutual responsibilities were involved. Paragraph 3, of this

report states conditions of local cooperation pertinent to the Lake Pontchartrain Barrier Plan. Paragraph 8, describes the status of local cooperation, i. e., that the State of Louisiana Department of Public Works was appointed project coordinator for the State by the Governor. This agency has functioned to coordinate the needs, desires, and interest of the State agencies and the Corps of Engineers. The Orleans Levee District will provide the local cooperation for all features of the project. The authorized project plan, as presented herein, is acceptable to both these agencies.

REAL ESTATE REQUIREMENTS

49. General.

a. As quoted in paragraph 2 herein, local interests are required to "Provide all lands, easements, and rights-of-way, including borrow and spoil disposal areas, necessary for construction of the project". There will be no acquisition by the United States.

b. This provision contemplates conveyance to the United States by the local agency, or directed by the land owner, all lands, easements, and rights-of-way, supported by acceptable title evidence free and clear of title conflicts. Local interests have furnished satisfactory assurances that they will provide the necessary rights-of-way and other items of local cooperation required.

50. Requirements.

a. The total acreage required for the construction and operation of the project is 285 acres. This acreage, as shown on plate 16, consists of 135 acres for the closure dam and control structure, 90 acres for the levee, and 60 acres for the spoil disposal areas.

b. The improvements consist of relocating existing buildings outside the new right-of-way or the purchase of existing buildings where relocation is not feasible.

RELOCATIONS

51. General. As quoted in paragraph 3 herein, the project document specified that local interests agree to "accomplish all necessary alterations and relocations to roads, railroads, pipelines, cables, wharves, drainage structures, and other facilities made necessary by the Construction Works". The recommended plan will require alterations to the overhead service lines of South Central Bell Telephone Company and the New Orleans Public Service gas and electric service lines.

52. Recommended plan.

a. South Central Bell Telephone Company. The underground cable located in the shoulder of U. S. Highway 90 will not require relocating. However, the local overhead service will require relocation. The estimated cost of this relocation is $8,000.

b. New Orleans Public Service, Inc. - Gas Division. The existing 2-inch gas main requires relocation. The owner plans to abandon the existing 2-inch plastic pipe which will be located under the proposed highway levee. The estimated cost to replace the gas line and restore local service is $25,200.

c. New Orleans Public Service, Inc. - Electric Division. The proposed construction requires relocating the overhead service. The estimated cost for this relocation is $16,000.

COST ESTIMATES

53. Recommended plan. Based on January 1970 price levels, the estimated first cost of the Rigolets complex of the Lake Pontchartrain, La. and Vicinity project is $26,900,000. This estimate consists of $224,000 for Lands, $59,000 for Relocations, $22,949,000 for the Control structure, $7,110,000 for Levees and floodwalls, $122,000 for Channels and canals, $2,178,000 for

Engineering and design and $1,490,000 for Supervision and administration. Detailed estimates of the first cost are shown in table 6.

54. Comparison of estimates.

a. The current estimate of $26,900,000 for the Rigolets Control Structure, Closure Dam and Adjoining Levees represents a decrease of $460,000 when compared to the latest PB-3 (project cost estimate) effective 1 July 1969. The estimate presented in the PB-3 is based on escalating to July 1968 price levels, the estimate included in Lake Pontchartrain, Louisiana and Vicinity, Lake Pontchartrain Barrier Plan, General Design Memorandum No. 2, Citrus Back Levee, approved 29 December 1967. Table 7 shows a comparison of the project document, PB-3 and general design memorandum estimates. Reasons for the differences between the design memorandum and PB-3 estimates are as follows:

(1) Roads. The decrease of $465,000 reflects elimination of the need for relocating U. S. Highway 90 as a result of changing the location of the control structure as described in this memorandum.

(2) Channels and canals. The net decrease of $6,621,000 is comprised of (a) a decrease in cost due to elimination of the need for over 20 million cubic yards of approach channel excavation as a result of locating the control structure in the main channel of the Rigolets, and (b) an increase in cost which reflects increases in price level between July 1969 and January 1970.

(3) Levees and floodwalls. The net decrease of $518,000 is comprised of (a) a decrease in cost which reflects the need for a shorter closure dam as a result of locating the control structure in the main pass and (b) an increase in cost which reflects the need for a longer length of highway levee as a result of locating the control structure in the main pass and increases in price levels between July 1969 and January 1970.

(4) Control structure. The increase of $7,414,000 reflects the added costs for (a) increasing the pile foundation, (b) increasing the width and thickness of the base slab, (c) major increase in the unit prices of concrete, (d) inclusion of an additional gantry crane, (e) addition of cathodic protection, (f) addition of a cofferdam for construction purposes as a result of locating the structure in the main pass, (g) general refinements in the estimate based on the availability of more detailed information and, (h) the added costs for increases in price levels between July 1969 and January 1970.

(5) Engineering and design. The increase of $327,000 reflects the added E&D as a result of applying to the construction cost the E&D percentage determined by use of the 1962-1965 OCE curves plus 20 percent contingencies.

(6) Supervision and administration. The increase of $102,000 reflects the added S&A as a result of applying to the construction cost the S&A percentage determined by use of the 1962-65 OCE curves.

(7) Lands. The net decrease in cost of $558,000 is comprised of (a) a decrease in cost due to a reduction in rights-of-way requirements as a result of locating the control structure in the main pass and (b) an increase in cost as a result of the increased length of levee and increases in price levels between July 1969 and January 1970.

(8) Relocations. The net decrease of $141,000 is comprised of (a) a decrease in cost as a result of eliminating the need for relocating the Hattiesburg to New Orleans "A" toll cable (an 8 coaxial cable with 164 filler pairs), a 200 pair telephone distribution cable to the Rigolets, and a natural gas pipeline, and (b) an increase in cost as a result of increases in price levels between July 1969 and January 1970.

b. The estimate of $26,900,000 for the Rigolets Control Structure, Closure Dam and Adjoining

Levees also represents an increase of $11,381,000 over the project document estimate. Reasons for the differences between the design memorandum and the project document estimates are as follows:

(1) Roads. The decrease of $302,000 reflects elimination of the need for relocating U. S. Highway 90 as a result of modifying the control structure and closure dam as described in this memorandum.

(2) Channels and canals. The net decrease of $4,306,000 is comprised of (a) a decrease of $6,621,000 as described in paragraph 54a (2) above and (b) an increase of $2,315,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee, and subsequent escalation of price levels for preparation of the current PB-3.

(3) Levees and floodwalls. The net increase of $3,628,000 is comprised of (a) a decrease of $518,000 as described in paragraph 54a (3) above and (b) an increase of $4,146,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee and subsequent escalation of price levels for preparation of the current PB-3.

(4) Control structure. The increase of $10,613,000 is comprised of $7,414,000 as described in paragraph 54a (4) above and $3,199,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee, and subsequent escalation of price levels for preparation of the current PB-3.

(5) Engineering and design. The increase of $1,473,000 is comprised of $327,000 as described in paragraph 54a (5) above and $1,146,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee and subsequent escalation of price levels for preparation of the current PB-3.

(6) Supervision and administration. The increase of $518,000 is comprised of $102,000 as described in paragraph 54a (6) above and $416,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee and subsequent escalation of price levels for preparation of the current PB-3.

(7) Lands. The net decrease of $302,000 is comprised of (a) a decrease of $558,000 as described in paragraph 54a (7) above and (b) an increase of $256,000 as a result of updating the project document estimate as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee and subsequent escalation of price levels for preparation of the current PB-3.

(8) Relocations. The net increase of $59,000 is comprised of (a) a decrease of $141,000 as described in paragraph 54a (8) above and (b) an increase of $200,000 as a result of updating the project document, which did not realize the need for any relocations, as shown in General Design Memorandum No. 2, Lake Pontchartrain Barrier Plan, Citrus Back Levee and subsequent escalation of price levels for preparation of the current PB-3.

SCHEDULE OF DESIGN AND CONSTRUCTION

55. Recommended plan. It is estimated that the project will require 6years to construct. The initial construction will cover the levee embankments, first lift, will require 1 year to construct, and is scheduled to be completed by December 1971. Construction of the control structure and excavation of the channel will require 2-3/4 years and is scheduled to be completed by July 1974. The final construction phase will cover the closure dam, and levee embankments, second lift, will require 2-1/4 years and is scheduled to be completed by August 1976. The Schedule of Design is shown in table 8 and the Schedule of Contracts in table 9.

TABLE 6
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
ESTIMATE OF FIRST COST - RECOMMENDED PLAN
(January 1970 Price Level)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
RECOMMENDED PLAN - RIGOLETS COMPLEX					
09	Channels and canals				
	Approach channel	510,000	c.y.	0.20	$ 102,000
					$ 102,000
	Contingencies 20%				20,000
	Total - Channels and canals				$ 122,000
11	Levees and floodwalls				
	Highway levee				
	First lift				
	Excavation	123,000	c.y.	0.50	61,500
	Hydraulic fill	119,000	c.y.	0.75	89,250
	Select fill	161,000	c.y.	2.50	402,500
	Clam shell	5,200	c.y.	10.00	52,000
	Seeding & fertilizing	30	ac.	200.00	6,000
	Jack & bore 24" RC pipe	2,000	l.f.	25.00	50,000
	Second lift				
	Select fill	19,200	c.y.	4.00	76,800
	Seeding & fertilizing	17	ac.	250.00	4,250
	Connecting levee				
	First lift				
	Excavation	21,100	c.y.	0.50	10,550
	Hydraulic fill	30,300	c.y.	0.75	22,725
	Select fill	49,200	c.y.	2.50	123,000
	Clam shell	750	c.y.	10.00	7,500
	Bituminous mix	4,000	s.y.	0.76	3,040
	Seeding & fertilizing	7	ac.	200.00	1,400
	Second lift				
	Select fill	1,060	c.y.	4.00	4,240
	Seeding & fertilizing	4	ac.	250.00	1,000

NOTE: Estimated quantities are "in place" volumes.

TABLE 6 (Cont'd.)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
RECOMMENDED PLAN - RIGOLETS COMPLEX (Cont'd.)					
11	Levees & floodwalls (Cont'd.)				
	Closure dam				
	Derrick stone	239,000	tons	10.00	$2,390,000
	Riprap	78,700	tons	10.00	787,000
	Plastic filter cloth	2,025,000	s.f.	0.10	202,500
	Clam shell (over filter cloth)	40,100	c.y.	8.00	320,800
	Clam shell	9,100	c.y.	10.00	91,000
	Bituminous mix	9,700	s.y.	0.76	7,370
	Excavation	233,000	c.y.	0.18	41,940
	Hydraulic fill	2,100,000	c.y.	0.36	756,000
	Select fill	8,900	c.y.	2.50	22,250
	Redrive sheet piling	388,000	l.f.	1.00	388,000
					$5,922,615
	Contingencies 20%				1,187,385
	Total - Levees and floodwalls				$7,110,000
15	Floodway control and diversion structures				
	Control structure				
	Construction dewatering			L.S.	200,000
	Excavation	80,000	c.y.	0.80	64,000
	Backfill	35,000	c.y.	1.00	35,000
	Filter gravel	1,500	c.y.	10.00	15,000
	Filter sand	750	c.y.	10.00	7,500
	Filter cloth	172,500	s.f.	0.10	17,250
	Riprap	105,000	tons	12.50	1,312,500
	Clam shell	22,000	c.y.	10.00	220,000
	Steel sheet pile	11,500	s.f.	4.40	50,600
	Concrete				
	Bridge & crane bridge	2,900	c.y.	140.00	406,000
	Piers & curtain walls	5,000	c.y.	60.00	300,000
	Floor slab	17,500	c.y.	40.00	700,000
	Bents & abutments	3,700	c.y.	60.00	222,000
	Stab. slab	1,100	c.y.	40.00	44,000
	Ballast	260	c.y.	30.00	7,800

TABLE 6 (Cont'd.)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
RECOMMENDED PLAN - RIGOLETS COMPLEX (Cont'd.)					
15	Floodway control and diversion structures (Cont'd.)				
	Control Structure (Cont'd.)				
	Cement	38,700	bbls.	5.00	$ 193,500
	Reinforcing steel	4,400,000	lbs.	0.16	704,000
	Structural steel	5,007,000	lbs.	0.45	2,253,150
	Prestressed conc. piles	247,500	l.f.	6.00	1,485,000
	ASSHO II girder	3,300	l.f.	16.50	54,450
	Pipe rail	1,100	l.f.	9.40	10,340
	Gantry cranes (2)			L.S.	575,000
	Lighting			L.S.	9,000
	Conc. handrail	2,200	l.f.	12.00	26,400
	Crane rails	102,000	lbs.	0.40	40,800
	PVC water seals	12,000	l.f.	2.00	24,000
	Protective coating	77,800	s.f.	0.05	3,890
	Plastic membrane	59,500	s.f.	0.08	4,760
	Cathodic protection	1		L.S.	25,000
	Storage shed	1		L.S.	1,500
	Cofferdam				
	Steel sheet piling	763,000	l.f.	5.00	3,815,000
	Cell fill	395,700	c.y.	1.50	593,550
	Salvage sheet piling	375,000	l.f.	-0.90	-337,500
					$13,083,490
	Contingencies 20%				2,633,510
	Total - Floodway control & diversion structures				$15,717,000
	Total - Construction				$22,949,000
30	Engineering and design 9.5% +				2,178,000
31	Supervision and administration 6.5% +				1,490,000
	Total				$26,617,000

TABLE 6 (Cont'd.)

Item	Description	Estimated quantity	Unit	Unit price	Estimated price
RECOMMENDED PLAN - RIGOLETS COMPLEX (Cont'd.)					
01	Lands				
	Control structure & closure dam	135	ac.	500.00	$ 67,500
	Levees	90	ac.	500.00	45,000
	Spoil disposal	60	ac.	100.00	6,000
	Improvements			L.S.	68,000
					$ 186,500
	Contingencies 20%				37,500
	Total - Lands				$ 224,000
02	Relocations				
	SBT&T local service	1		L.S.	8,000
	NOPSI gas line	1		L.S.	25,200
	NOPSI electric power line	1		L.S.	16,000
					$ 49,200
	Contingencies 20%				9,800
	Total - Relocations				$ 59,000
	TOTAL PROJECT COST				$26,900,000

TABLE 7
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN - COMPARISON OF ESTIMATES

	Feature	Project document	PB-3 eff. 1 Jul 69	Design Memo No. 2 Supp. No. 1	Difference Supp. No. 1 - PB-3	Difference Supp. No. 1 - Project document
08	Roads	$ 302,000	$ 465,000	$ -	$ -465,000	$ -302,000
09	Channels and canals	4,428,000	6,743,000	122,000	-6,621,000	-4,306,000
11	Levees and floodwalls	3,482,000	7,628,000	7,110,000	-518,000	+3,628,000
15	Control structure	5,104,000	8,303,000	15,717,000	+7,414,000	+10,613,000
30	Engineering & design	705,000	1,851,000	2,178,000	+327,000	+1,473,000
31	Supervision & administration	972,000	1,388,000	1,490,000	+102,000	+518,000
	Subtotal	$14,993,000	$26,378,000	$26,617,000	$ +239,000	$+11,624,000
01	Lands and damages	526,000	782,000	224,000	-558,000	-302,000
02	Relocations	-	200,000	59,000	-141,000	+59,000
	Subtotal	$ 526,000	$ 982,000	$ 283,000	$ -699,000	$ -243,000
	TOTAL	$15,519,000	$27,360,000	$26,900,000	$ -460,000	$+11,381,000

TABLE 8
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN - SCHEDULE OF DESIGN

Design Sequence Number	Description	Time to Complete*	Completion Date
1	Plans & Specifications, Embankment 1st Lift	23 weeks	September 70
2	Plans & Specifications, Rigolets Control Structure	29 weeks	July 71
3	Plans & Specifications, Closure Dam	29 weeks	July 71
4	Plans & Specifications, Embankment 2nd Lift	12 weeks	April 75

*Includes time for review and approval by higher authority.

TABLE 9
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
RECOMMENDED PLAN - SCHEDULE OF CONTRACTS

Contract Sequence Number	Description	Advertisement Date	Award Date	Completion Date	Construction Cost*
1	Embankment 1st Lift	October 70	December 70	December 71	$ 995,700
2	Control Structure and Channel	August 71	October 71	July 74	15,822,000
3	Closure Dam	April 74	June 74	August 76	6,010,700
4	Embankment 2nd Lift	June 75	August 75	August 76	103,600
				Total	$22,932,000

*Construction cost includes 20% contingencies.

56. Funds required by fiscal year. To maintain the schedules for design and construction for the Rigolets Control Structure, Closure Dam and Adjoining Levees, funds[1] will be required by fiscal year as follows:

Funds required for FY	1970	$ 20,000[2]
	1971	1,083,000
	1972	5,077,000
	1973	6,042,000
	1974	6,285,000
	1975	2,911,000
Balance to complete		3,266,000
Total		$24,684,000

[1]Includes cost for construction (including contingencies), 5 percent supervision and inspection applied to the construction cost, preparation of detail design memorandum, lands, relocations, and plans and specifications.

[2]Includes only costs for preparation of detail design memorandum and plans and specifications.

OPERATION AND MAINTENANCE

57. General. As specified in the authorizing act, local interests will be required to maintain and operate the completed protective works in accordance with regulations prescribed by the Secretary of the Army. The estimated annual maintenance cost of the Rigolets complex levees is $17,300, the closure dam $35,200, and the approach channel $13,100. The estimated annual operation and maintenance cost of the control structure is $3,900. The total estimated annual cost to local interests for operation and maintenance of the protective works presented herein is $69,600.

PROJECT FORMULATION AND EVALUATION

58. Project formulation and evaluation. The project feature presented in this memorandum is not a separable unit of the Lake Pontchartrain Barrier Plan;

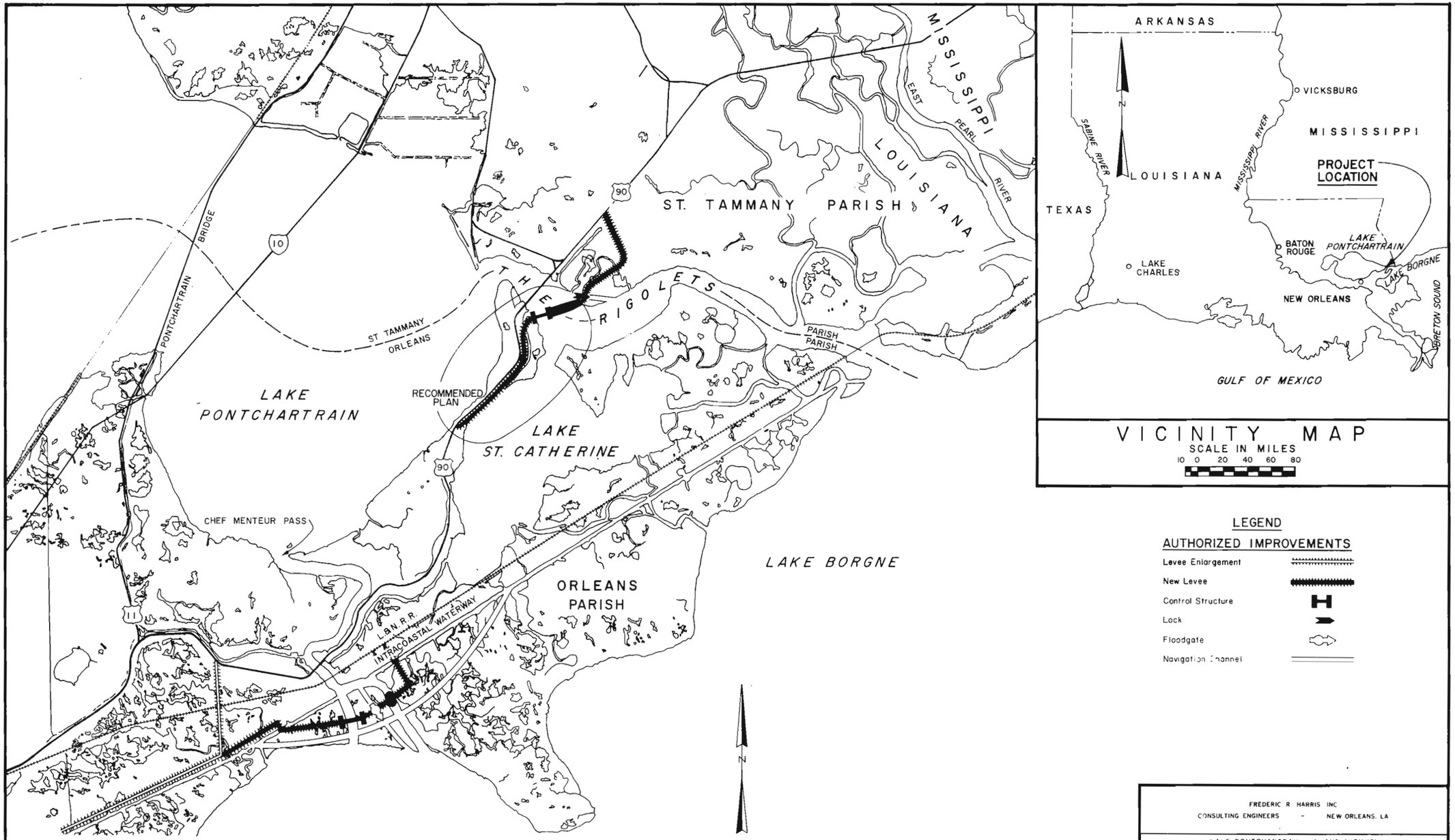
therefore, an incremental justification and independent economic analysis is not practicable.

ECONOMICS

59. General. The work covered herein is not a separable unit of the Lake Pontchartrain Barrier Plan; therefore, an economic analysis is not practicable. The current economic analysis for the entire Lake Pontchartrain, La. and Vicinity hurricane protection project, based on the July 1969 PB-3 cost, indicates a benefit-to-cost ratio of 12.4 to 1 for the overall project. The difference in cost of the flood protective works covered herein from that shown in the current PB-3 will not significantly change the approved benefit-to-cost ratio.

RECOMMENDATIONS

60. Recommendations. The plan of improvement presented herein as the recommended plan for the protective works in the vicinity of the Rigolets consists of a new protection levee along U. S. Highway 90, and a control structure, closure dam and appurtenant channels located in the channel of the Rigolets. This plan is considered the best means of accomplishing the project objectives and is recommended for approval.



GENERAL PLAN

SCALE IN MILES

1 0 1 2 3 4

VICINITY MAP

SCALE IN MILES

10 0 20 40 60 80

LEGEND

AUTHORIZED IMPROVEMENTS

- Levee Enlargement
- New Levee
- Control Structure
- Lock
- Floodgate
- Navigation Channel

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CONSULTING ENGINEERS - NEW ORLEANS, LA

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE CLOSURE DAM, AND ADJOINING LEVEES

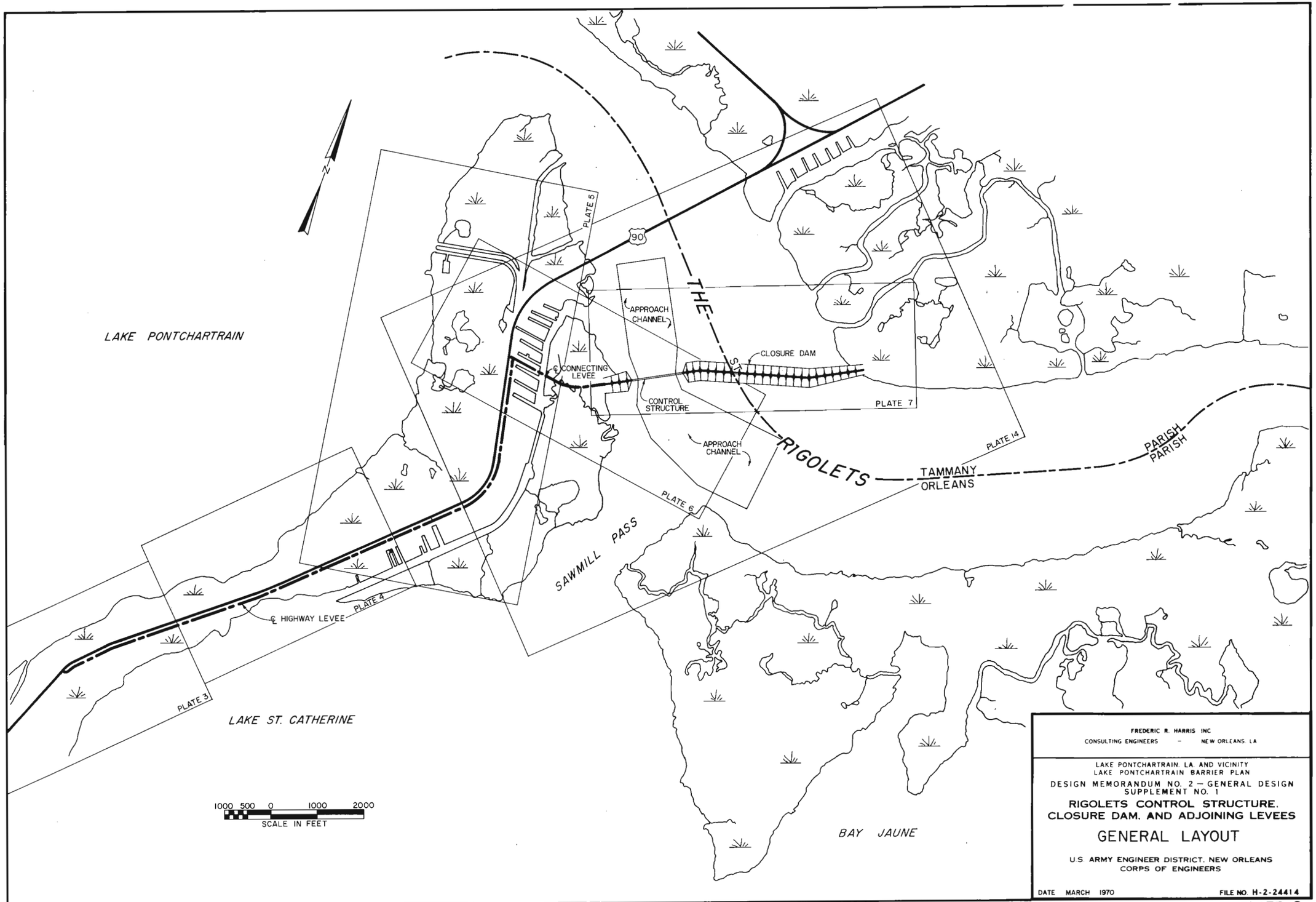
GENERAL PLAN AND VICINITY MAP

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

DATE MARCH 1970

FILE NO. H-2-24414

PLATE I



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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

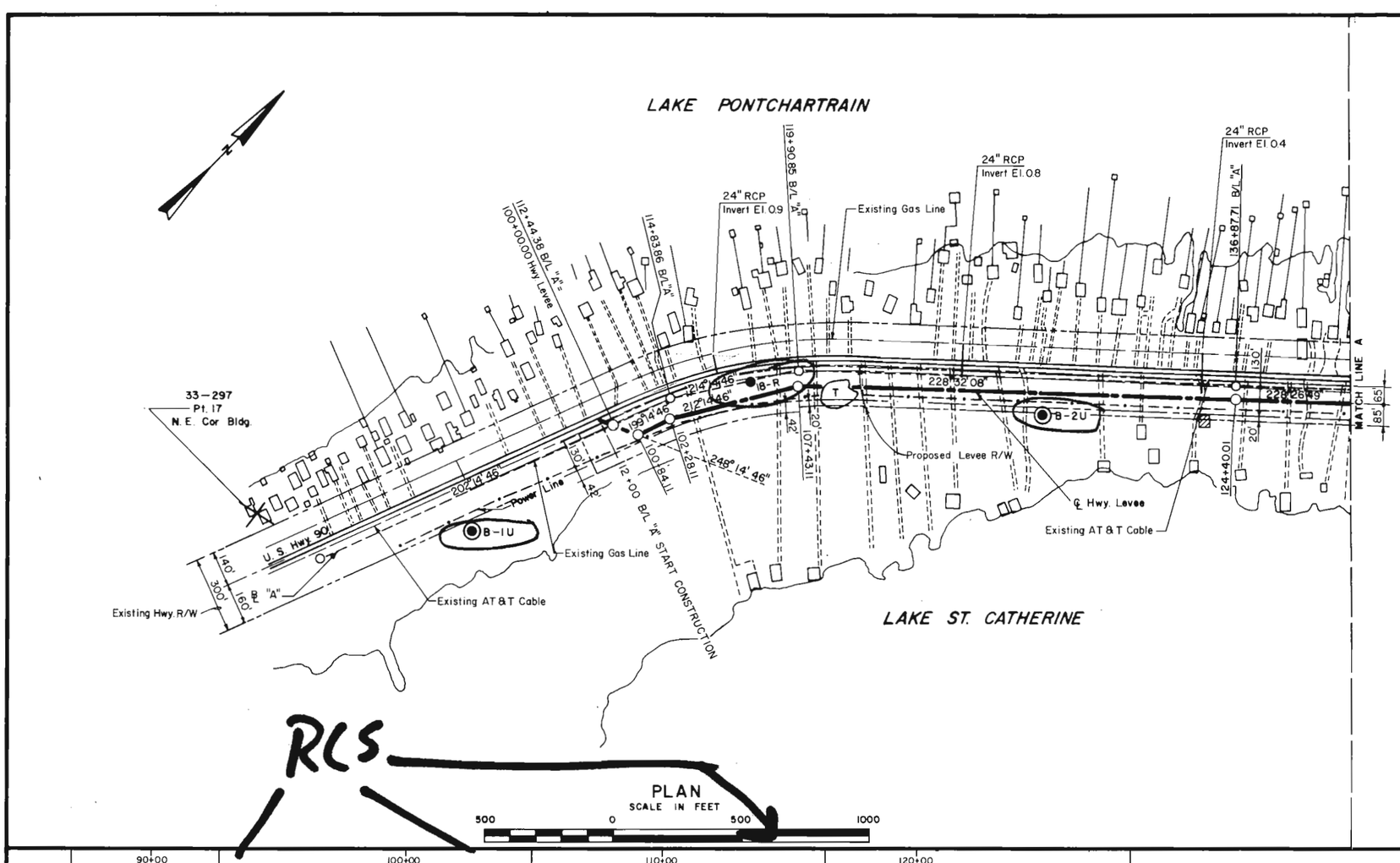
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

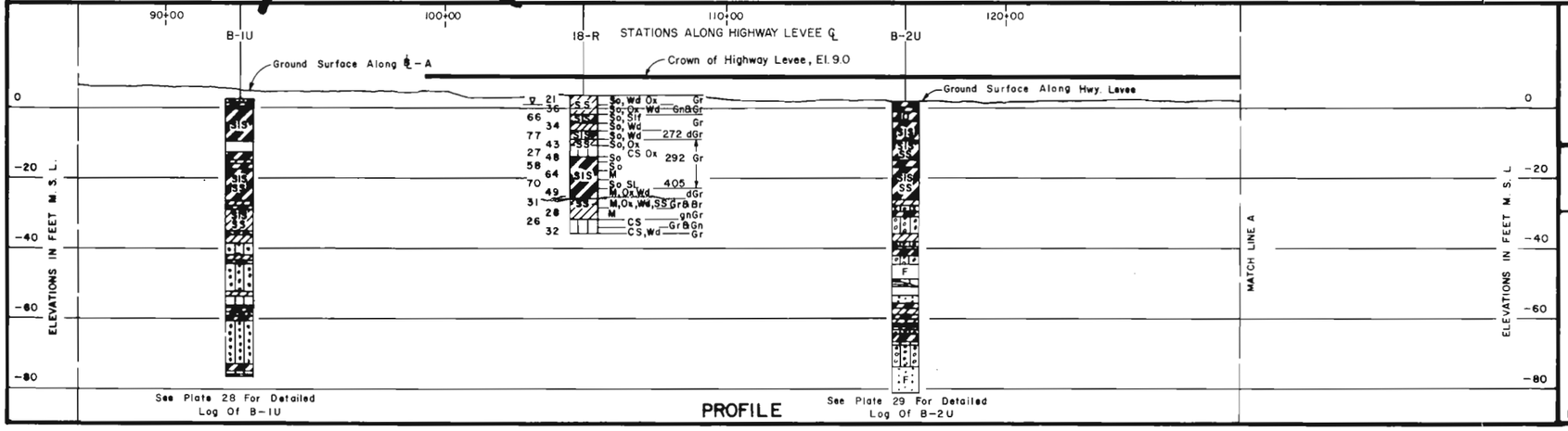
GENERAL LAYOUT

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

DATE MARCH 1970 FILE NO. H-2-24414

PLATE 2





GENERAL NOTES

See plate A for soil boring legend

● Indicates general type boring location

◉ Indicates undisturbed boring location

General type borings were taken with a $1\frac{7}{8}$ inch I.D. core barrel sampler.

Undisturbed borings were taken with a 5 inch diameter steel tube piston type sampler.

▨ Buildings to be relocated

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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM. AND ADJOINING LEVEES

HIGHWAY LEVEE

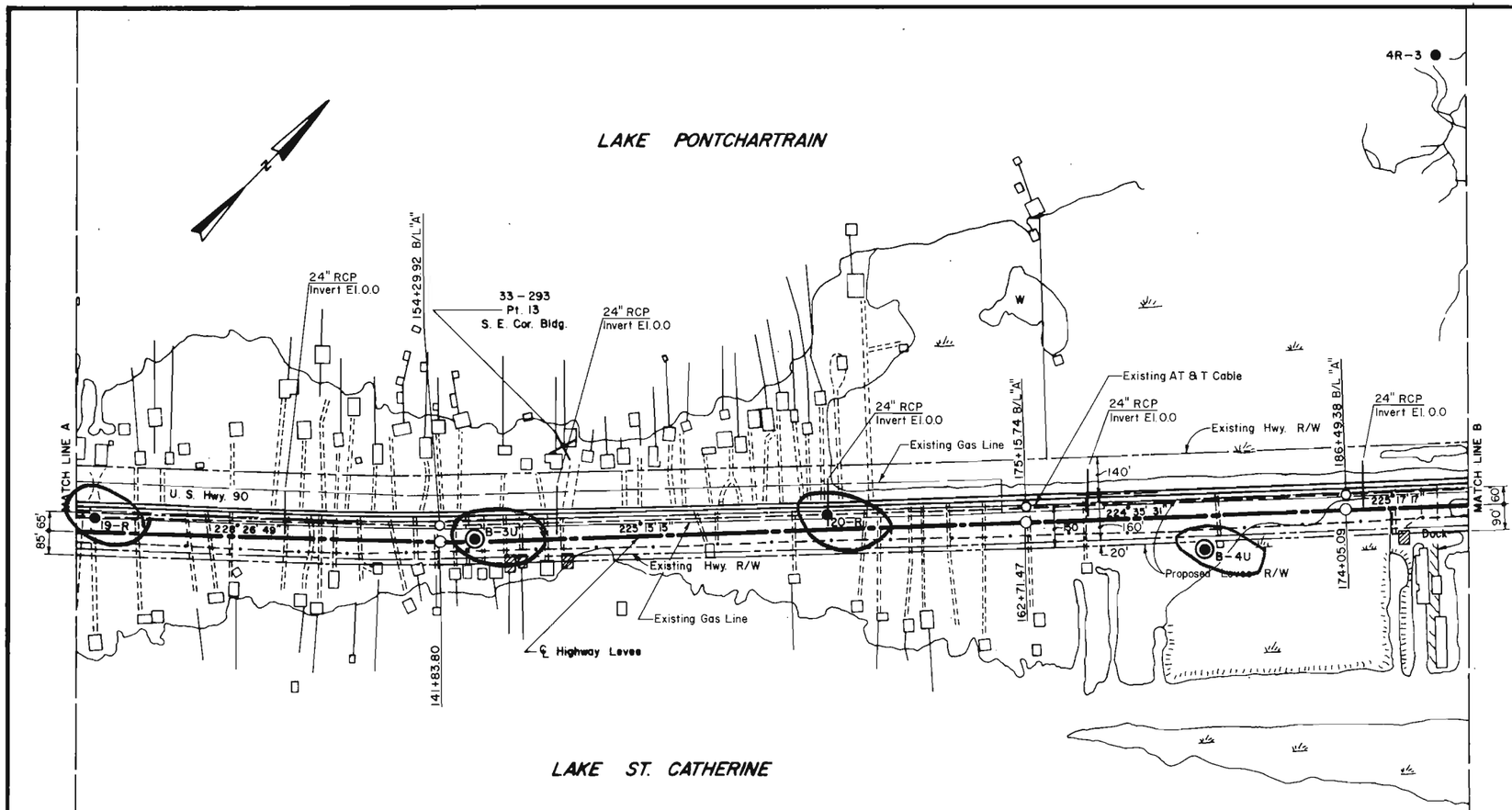
PLAN, PROFILE AND SOIL BORINGS

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

DATE MARCH 1970

FILE NO. M-2-24414

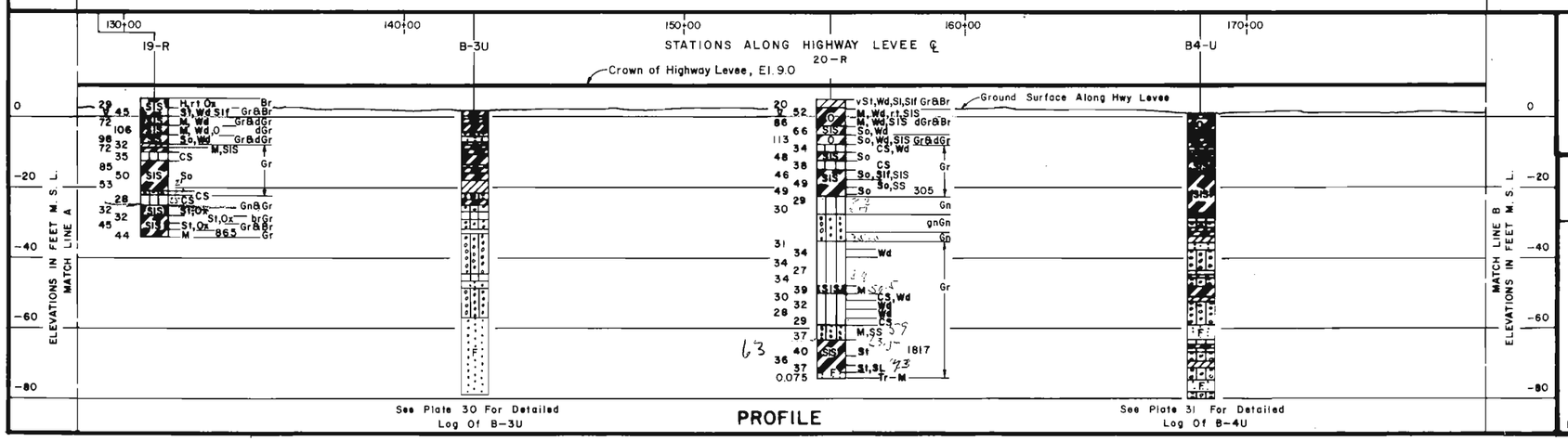
PLATE 3



PLAN

SCALE IN FEET

500 0 500 1000



PROFILE

See plate 3 for general notes

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

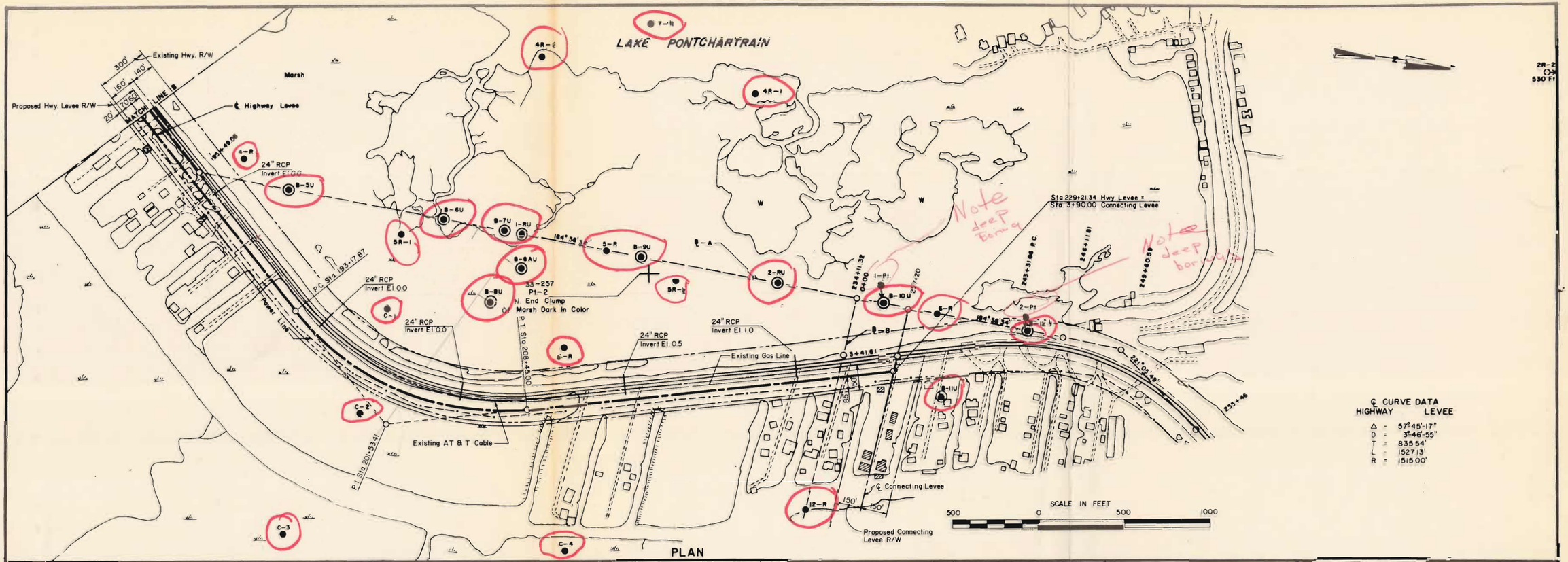
HIGHWAY LEVEE

PLAN, PROFILE AND SOIL BORINGS

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

DATE MARCH 1970 FILE NO H-2-24414

PLATE 4



See plate 3 for general notes

FREDERIC R HARRIS INC
CONSULTING ENGINEERS — NEW YORK-CUBA LA

LAKE PONTCHARTRAIN LEVEE AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 1 — GENERAL DESIGN
SUPPLEMENT NO. 1

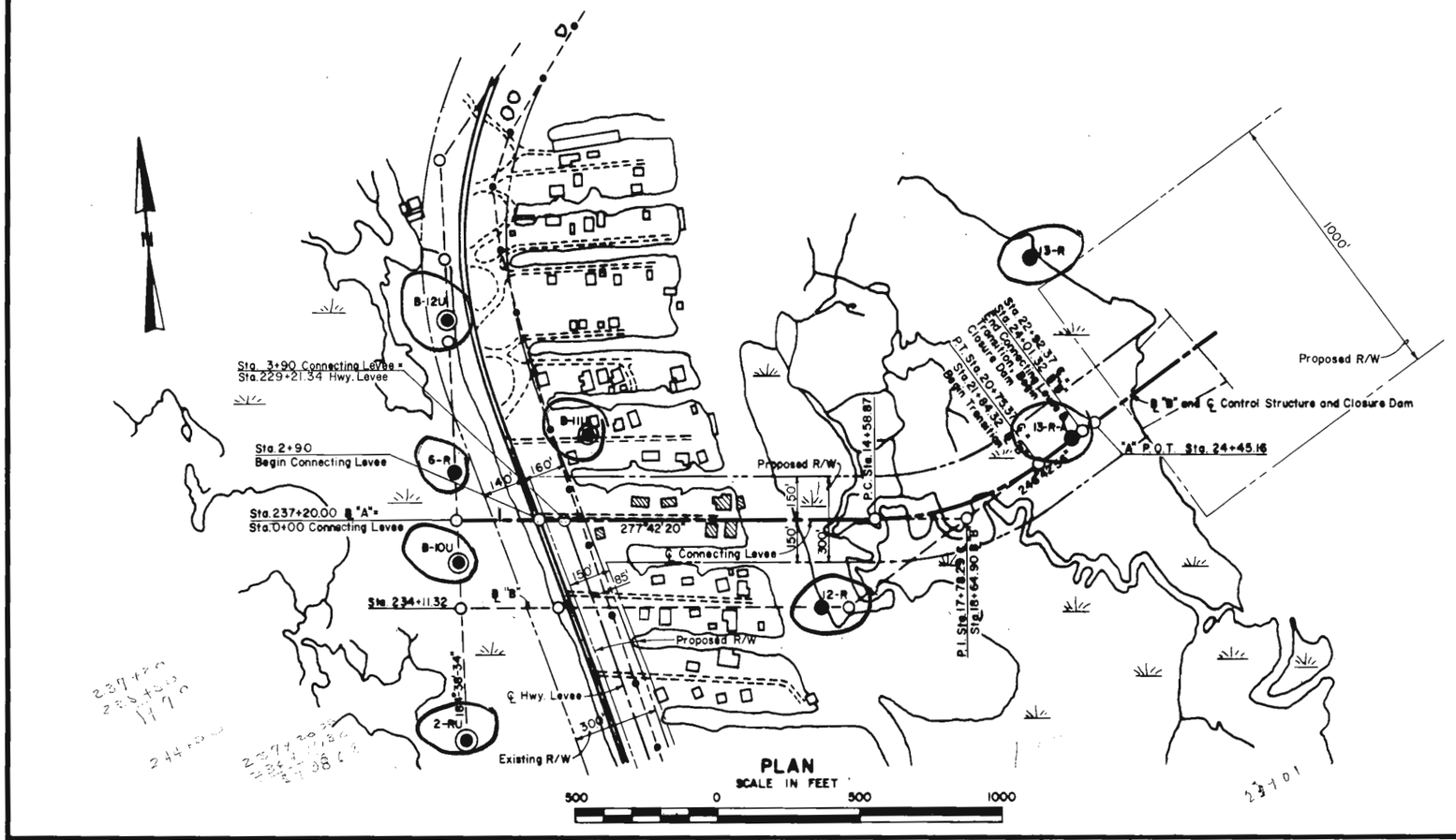
RIGOLETS CONTROL STRUCTURE
CLOSURE DAM AND ADJOINING LEVEES
HIGHWAY LEVEE
PLAN, PROFILE AND SOIL BORINGS

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

DATE MARCH 1960

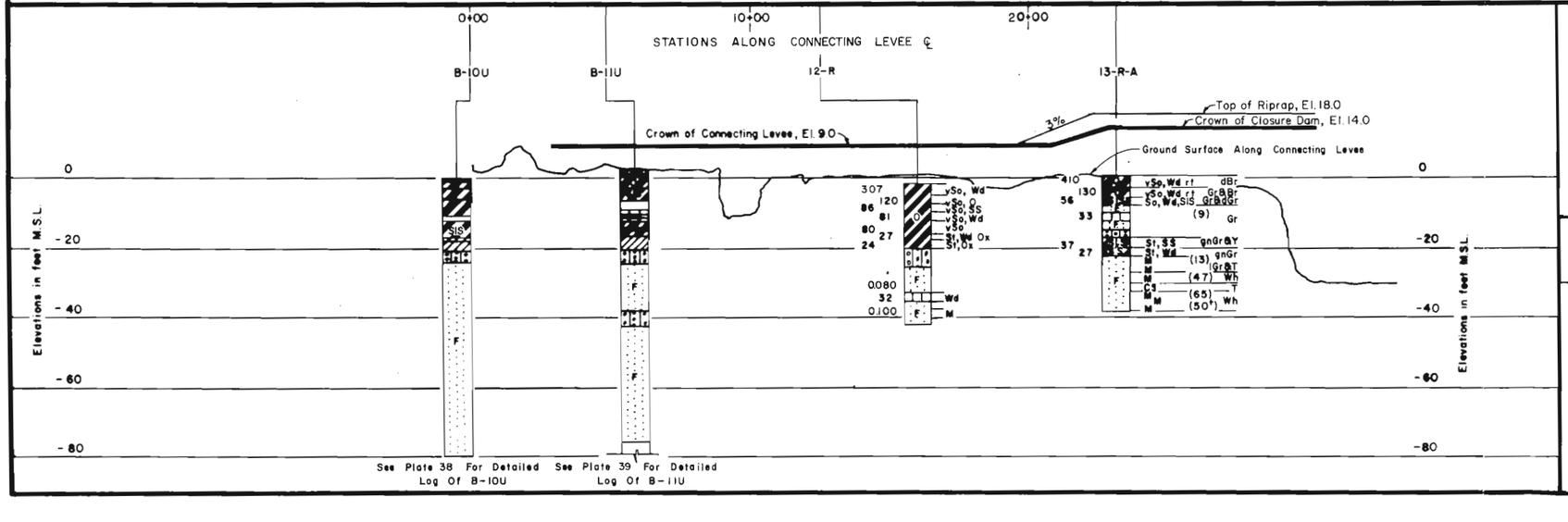
FILE NO. N-Z-24414

PLATE 5



℄ CURVE DATA CONNECTING LEVEE

Δ	36°38'24"
D	6°00'00"
T	319.42'
L	616.50'
R	954.93'



See plate 3 for general notes.

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

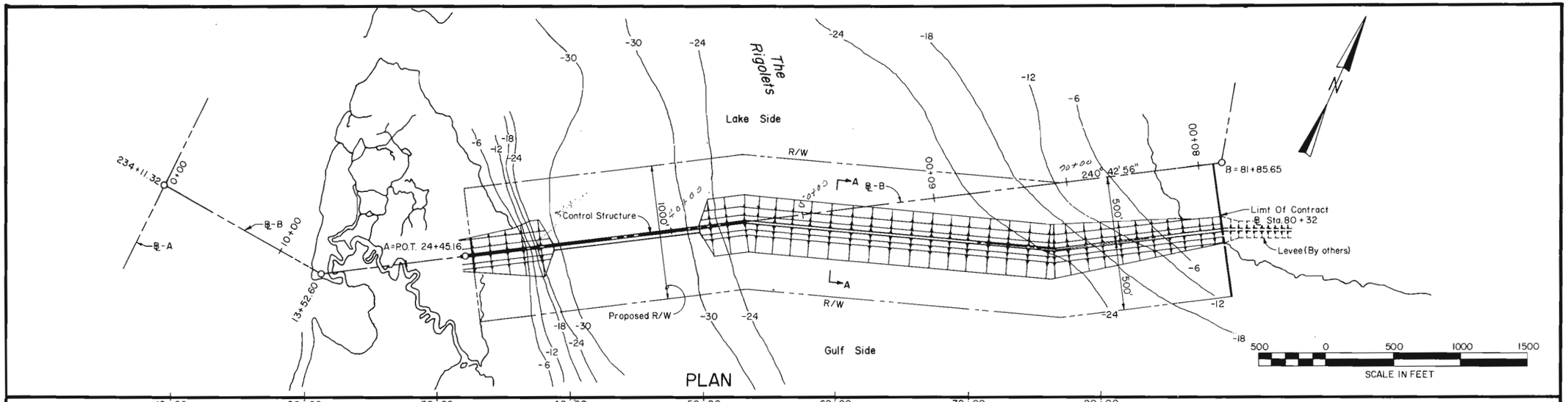
CONNECTING LEVEE

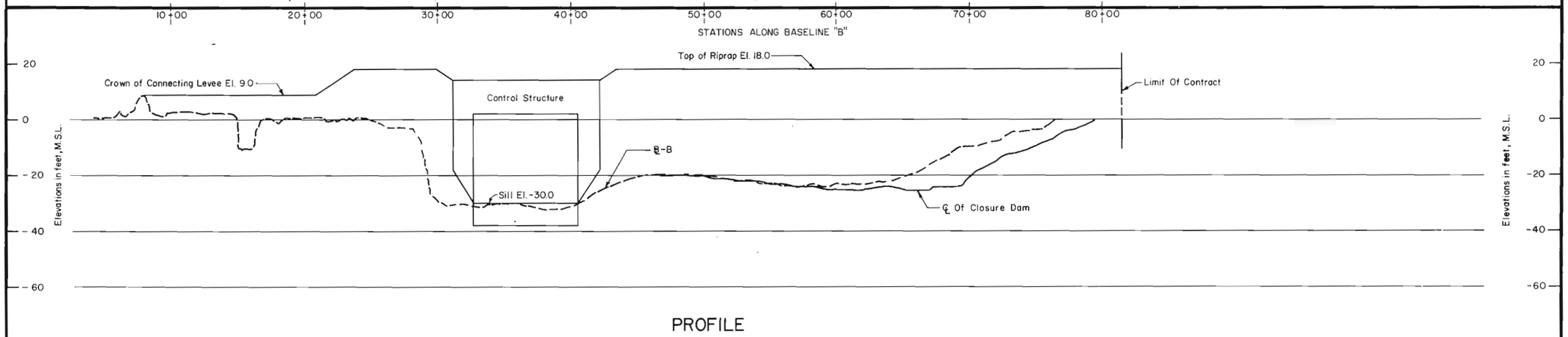
PLAN, PROFILE AND SOIL BORINGS

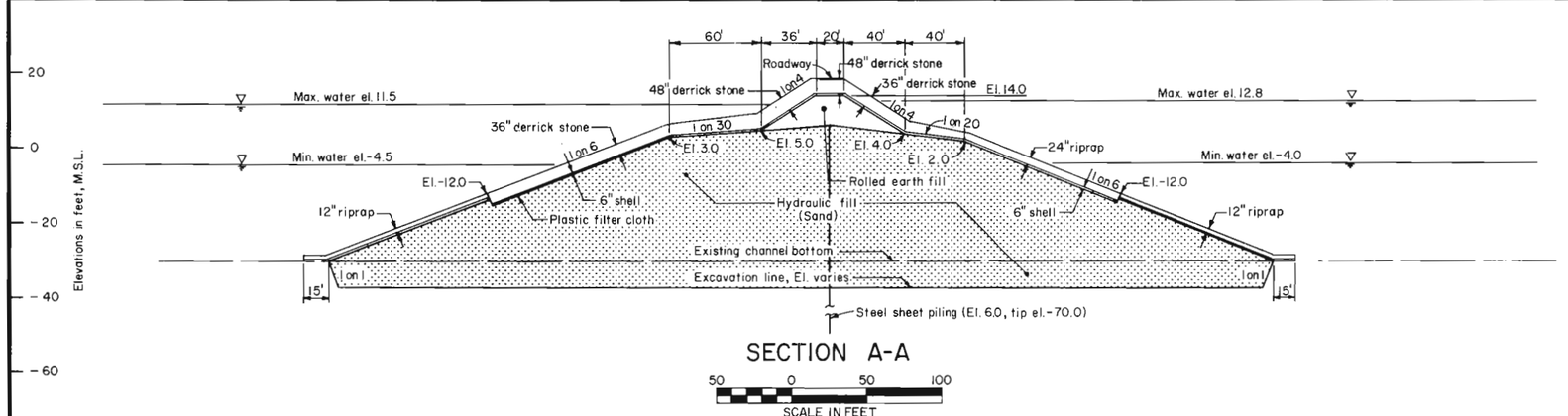
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO. H-2-24414







FREDERIC R HARRIS, INC
CONSULTING ENGINEERS – NEW ORLEANS, LA

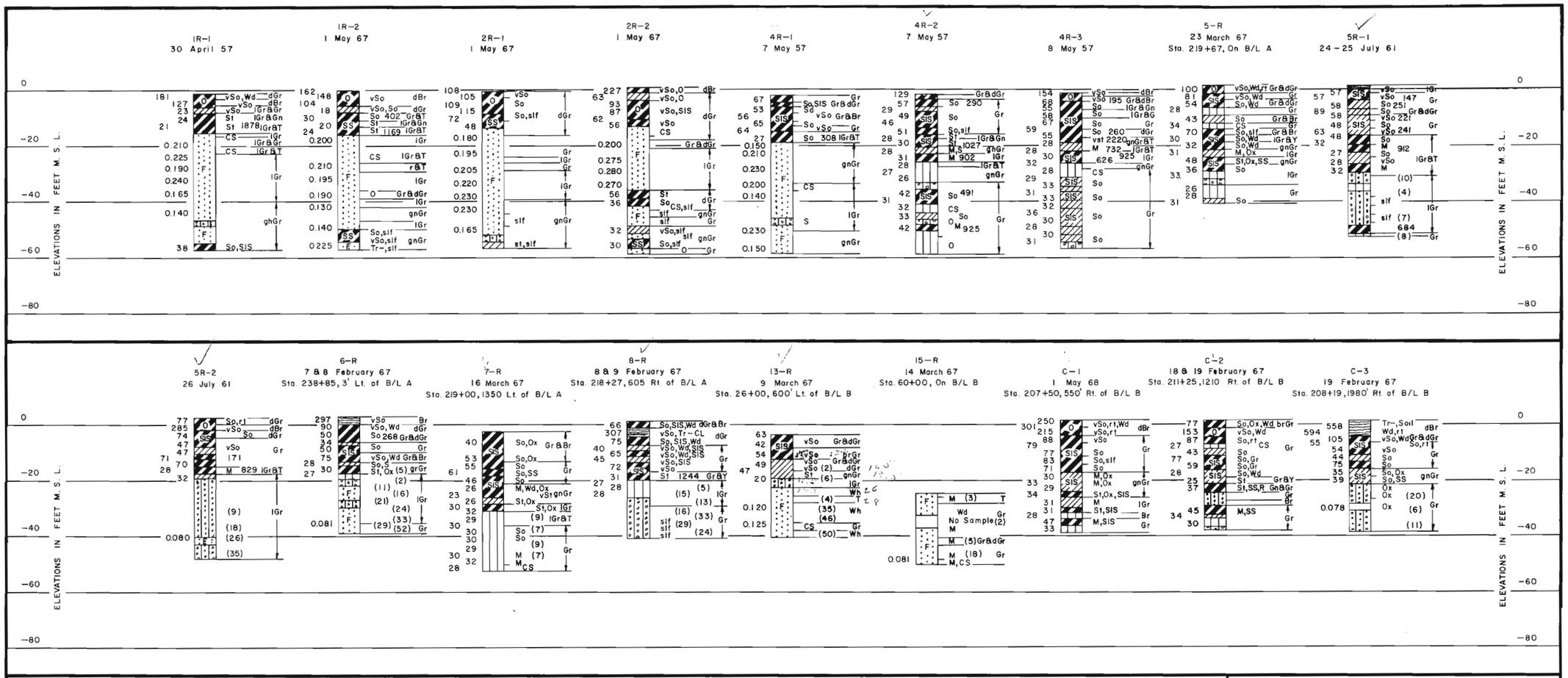
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
CLOSURE DAM
PLAN, PROFILE AND SECTION

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

DATE. MARCH 1970 FILE NO. H-2-24414

PLATE 7



See plate 3 for general notes.

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS LA

LAKE PONTCHARTRAIN LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

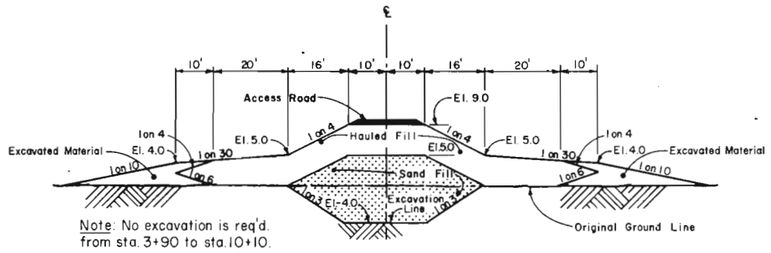
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

SOIL BORINGS

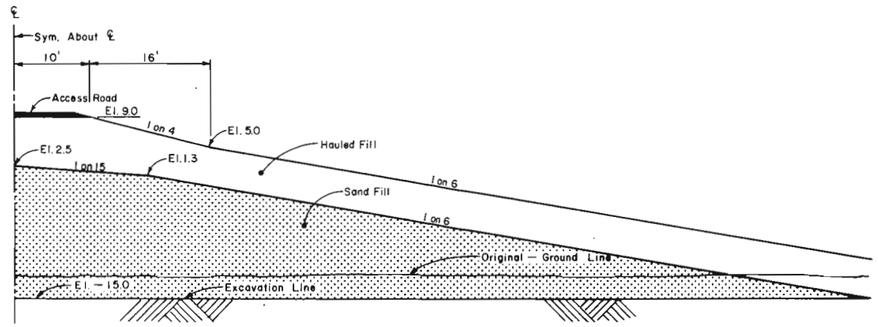
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE. MARCH 1970 FILE NO. H-2-24414

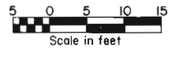
PLATE 8

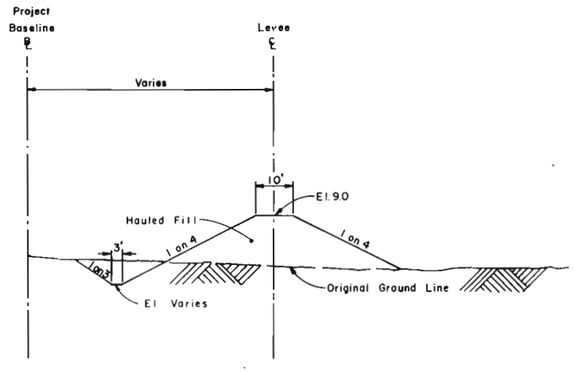


TYPICAL SECTION — CONNECTING LEVEE

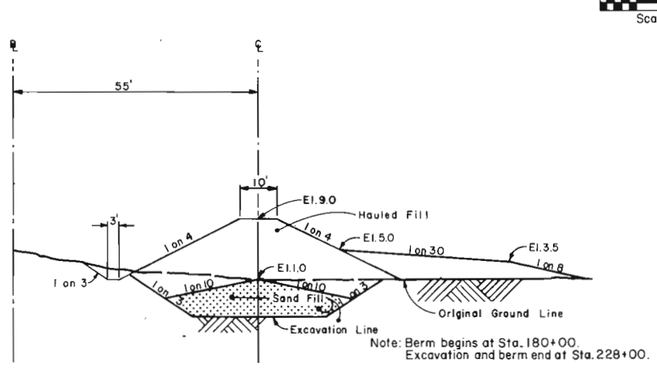


TYPICAL SECTION
CONNECTING LEVEE IN FORT PIKE CANAL
STA. 10+10 TO STA. 12+00

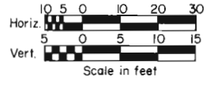




TYPICAL SECTION — HIGHWAY LEVEE
STA. 99+55.62 TO STA. 162+71.36



TYPICAL SECTION — HIGHWAY LEVEE
STA. 162+71.36 TO STA. 229+21.34



GENERAL NOTES

Elevations Are In Feet Referred To Mean Sea Level.

Organic Material To Be Removed From Levee Excavation Is To Be Wasted In Spoil Disposal Area Shown On Plate 16.

FREDERIC R. HARRIS, INC.
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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

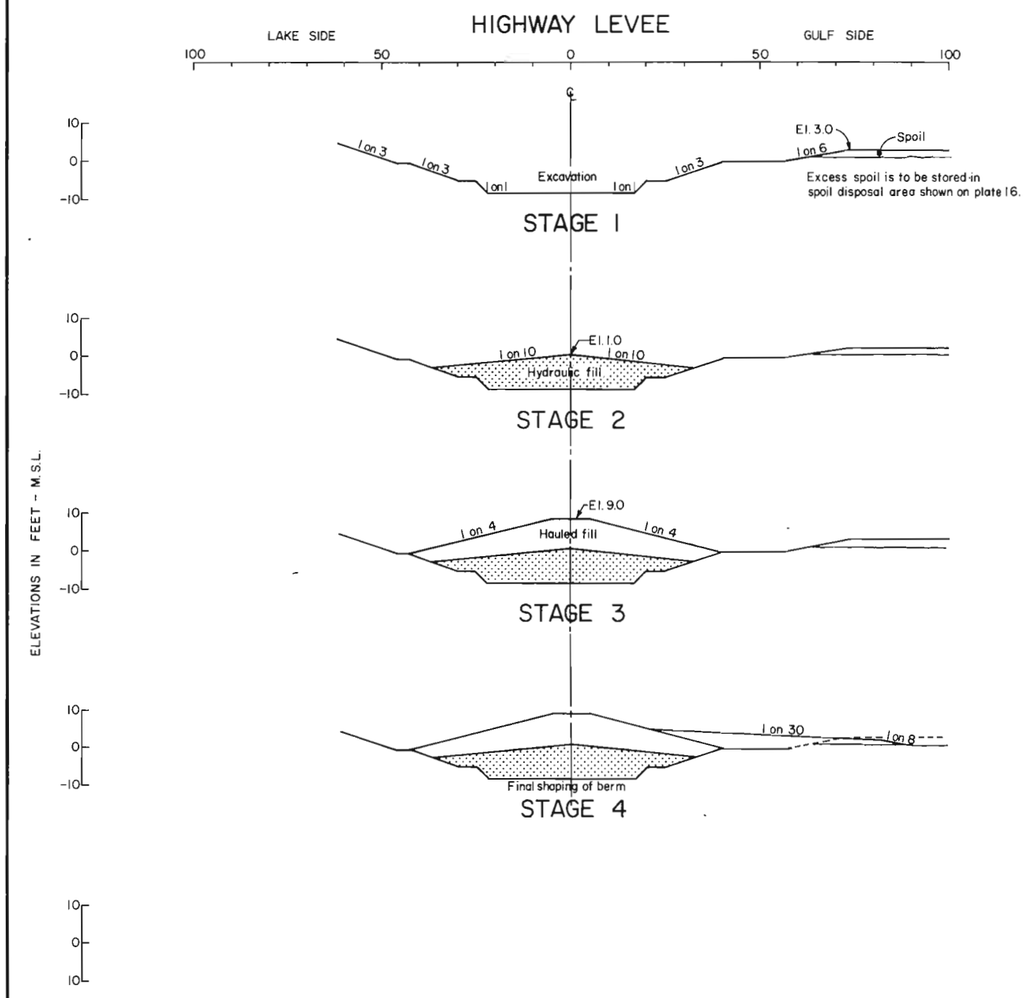
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
CONNECTING LEVEE AND HIGHWAY LEVEE TYPICAL SECTIONS

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

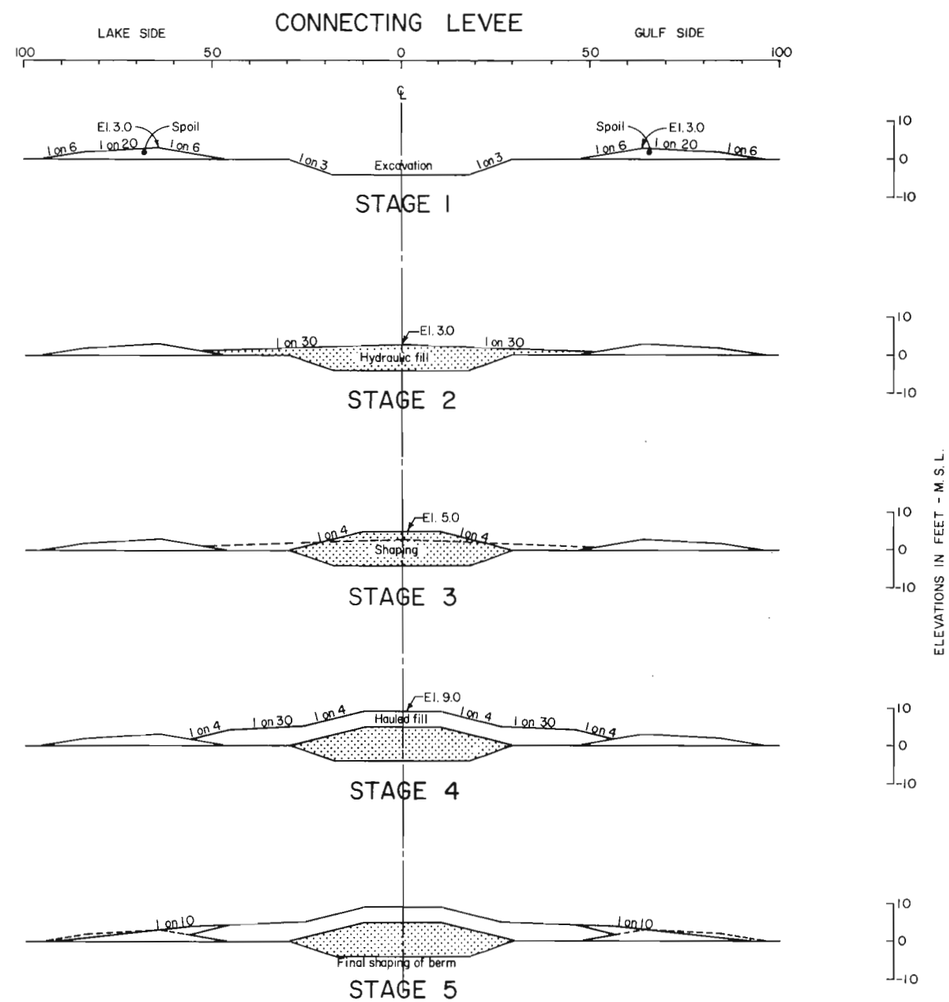
DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 9

HIGHWAY LEVEE



CONNECTING LEVEE



Note: Excavation is required only for certain portions of levees. See stability plates.

FREDERIC R HARRIS INC
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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

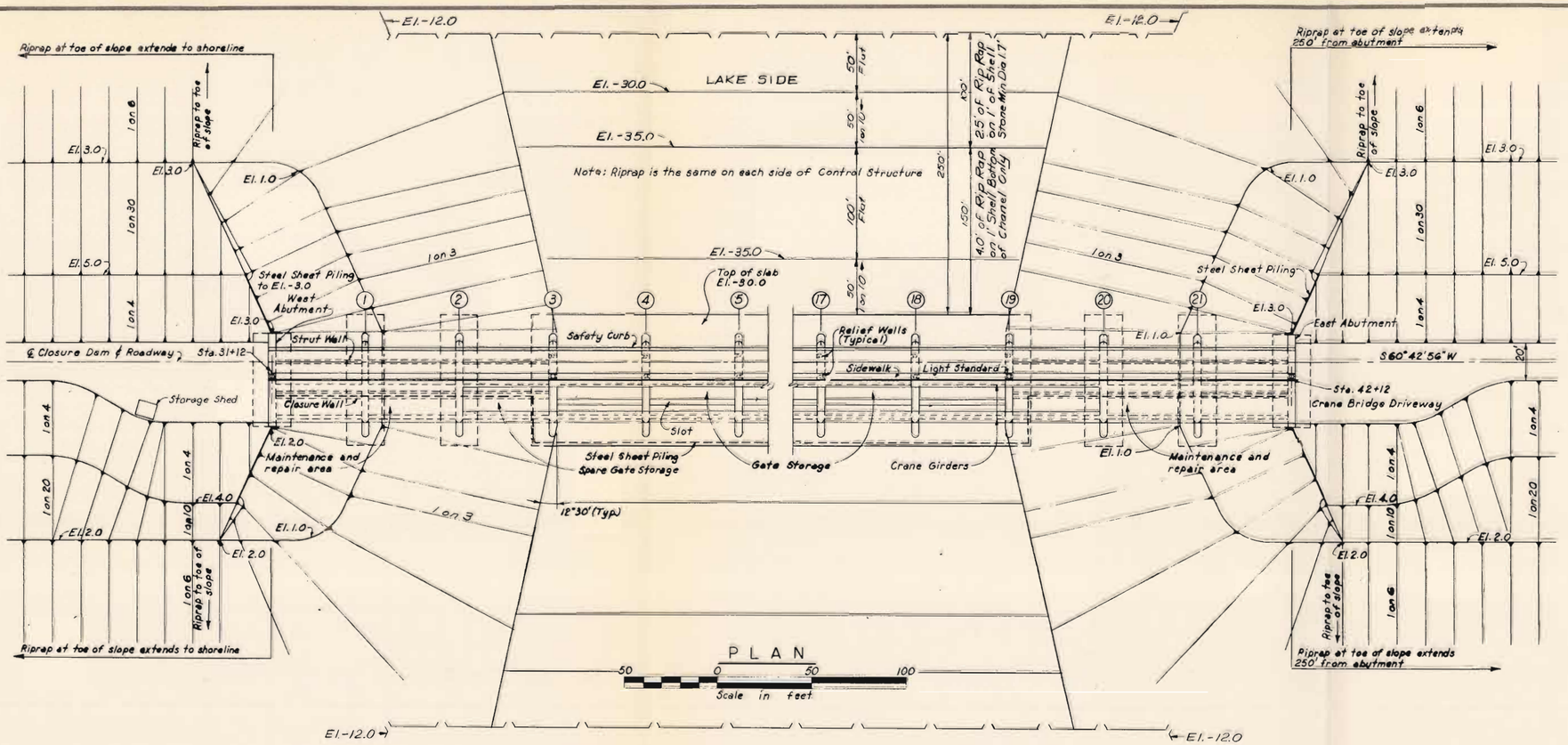
CONNECTING LEVEE & HIGHWAY LEVEE STAGES OF CONSTRUCTION

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 10



FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

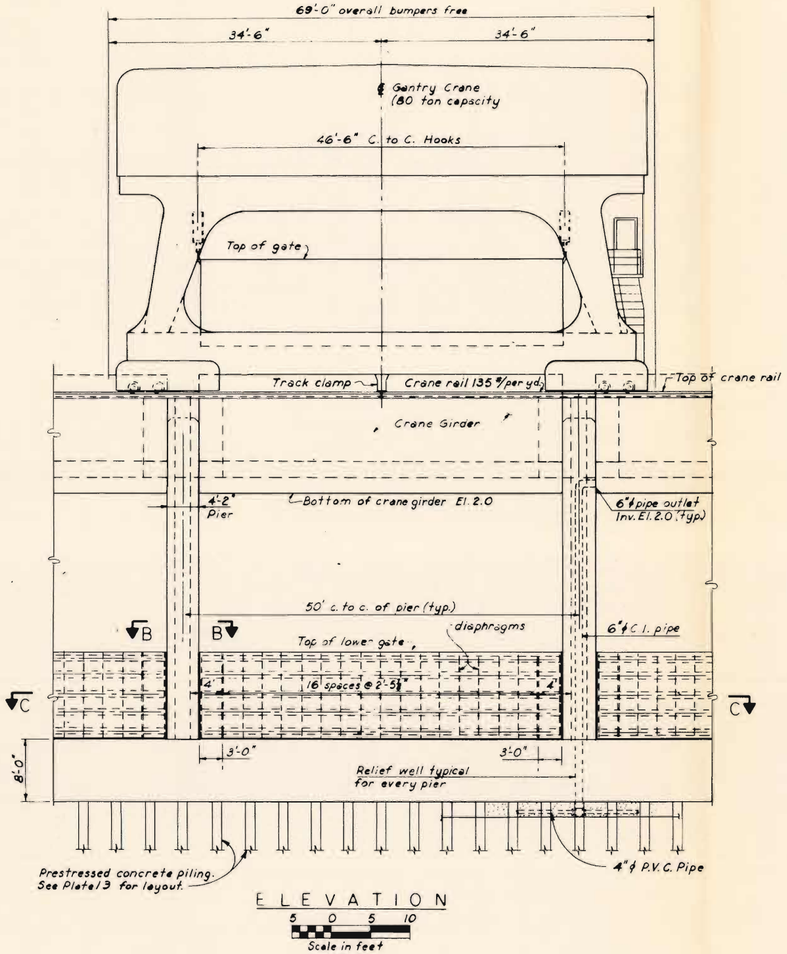
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

CONTROL STRUCTURE PLAN AND ELEVATION

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

DATE MARCH 1976 FILE NO. M-2-24414

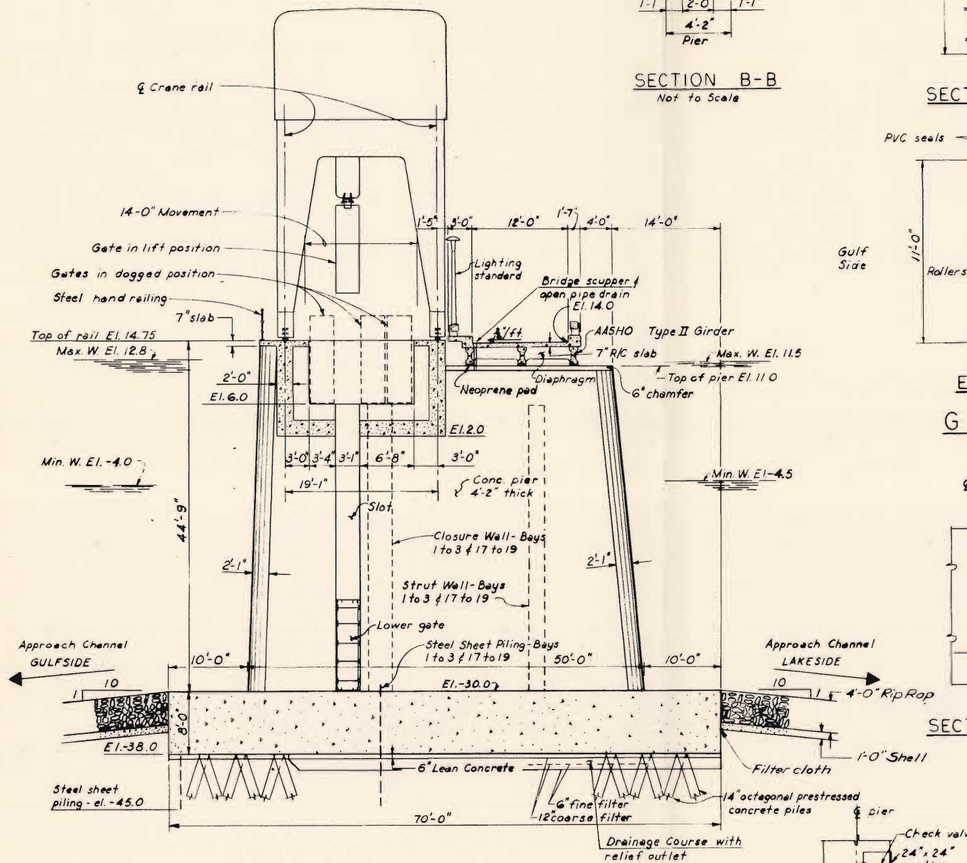
PLATE 11



ELEVATION

5 0 5 10

Scale in feet



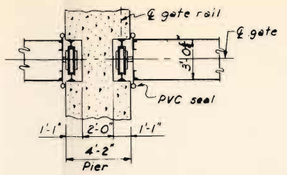
TYPICAL SECTION

5 0 5 10

Scale in feet

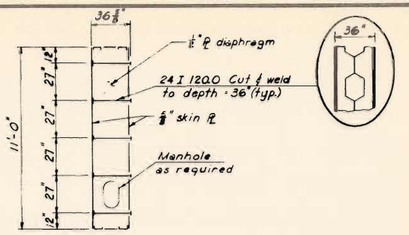
Note: Elevations are in feet and refer to mean sea level.

For pile cap detail see Plate 13

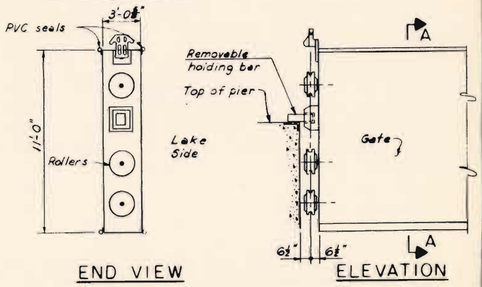


SECTION B-B

Not to Scale



SECTION A-A

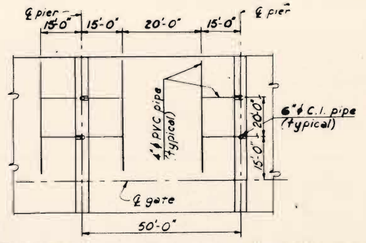


END VIEW

ELEVATION

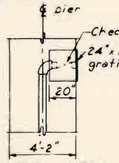
GATE DETAILS

Not to Scale



SECTIONAL PLAN C-C (RELIEF WELL LAYOUT)

Not to Scale



RELIEF WELL OUTLET DETAIL

Not to Scale

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

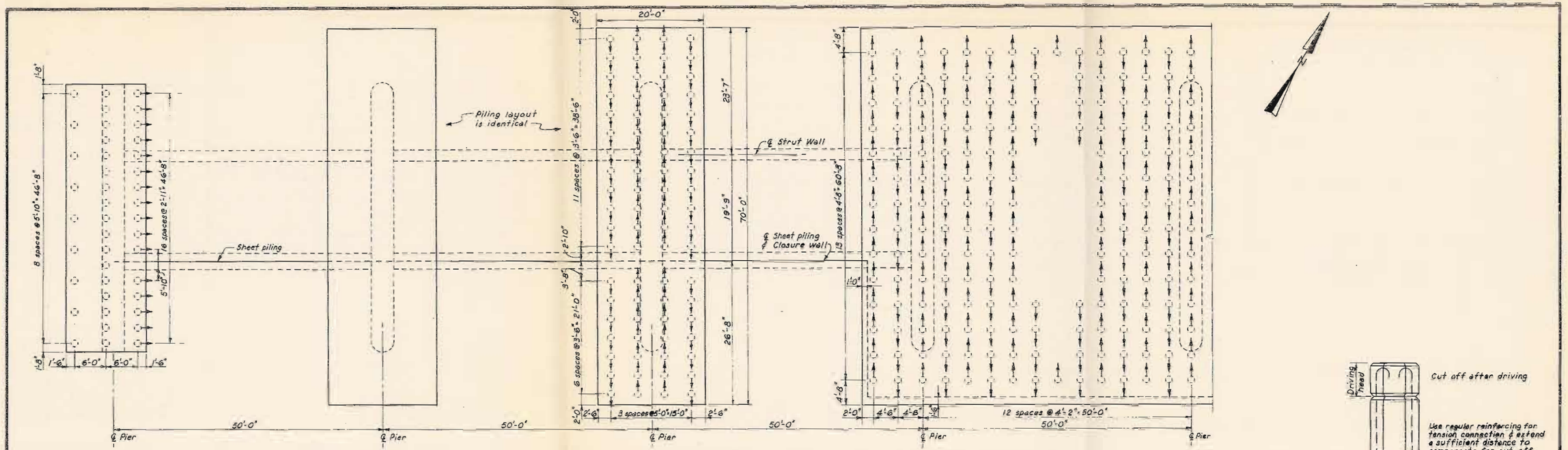
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

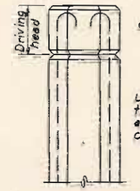
RIGOLETS CONTROL STRUCTURE.
CLOSURE DAM AND ADJOINING LEVEES
CONTROL STRUCTURE
TYPICAL SECTION AND ELEVATION

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

DATE MARCH 1970 FILE NO. H-2-24414

PLATE 12



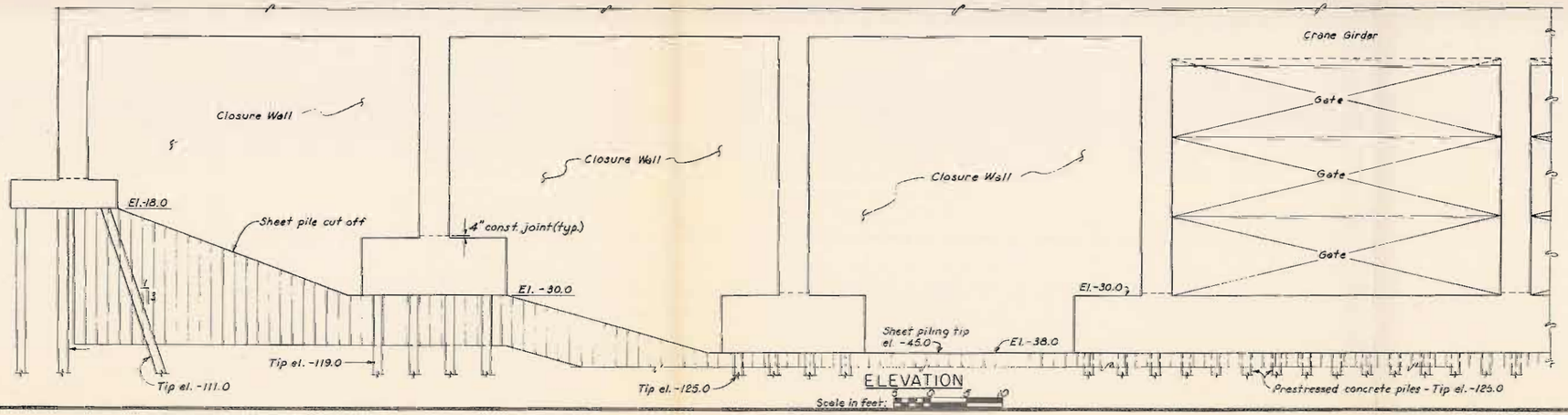


Cut off after driving

Use regular reinforcing for tension connection & extend a sufficient distance to compensate for cut off.

ELEVATIONS

TENSION PILE DETAIL



Note: Elevations are in feet and refer to mean sea level.

Indicates batter, 1:3 typical

FREDERIC R. HARRIS INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES

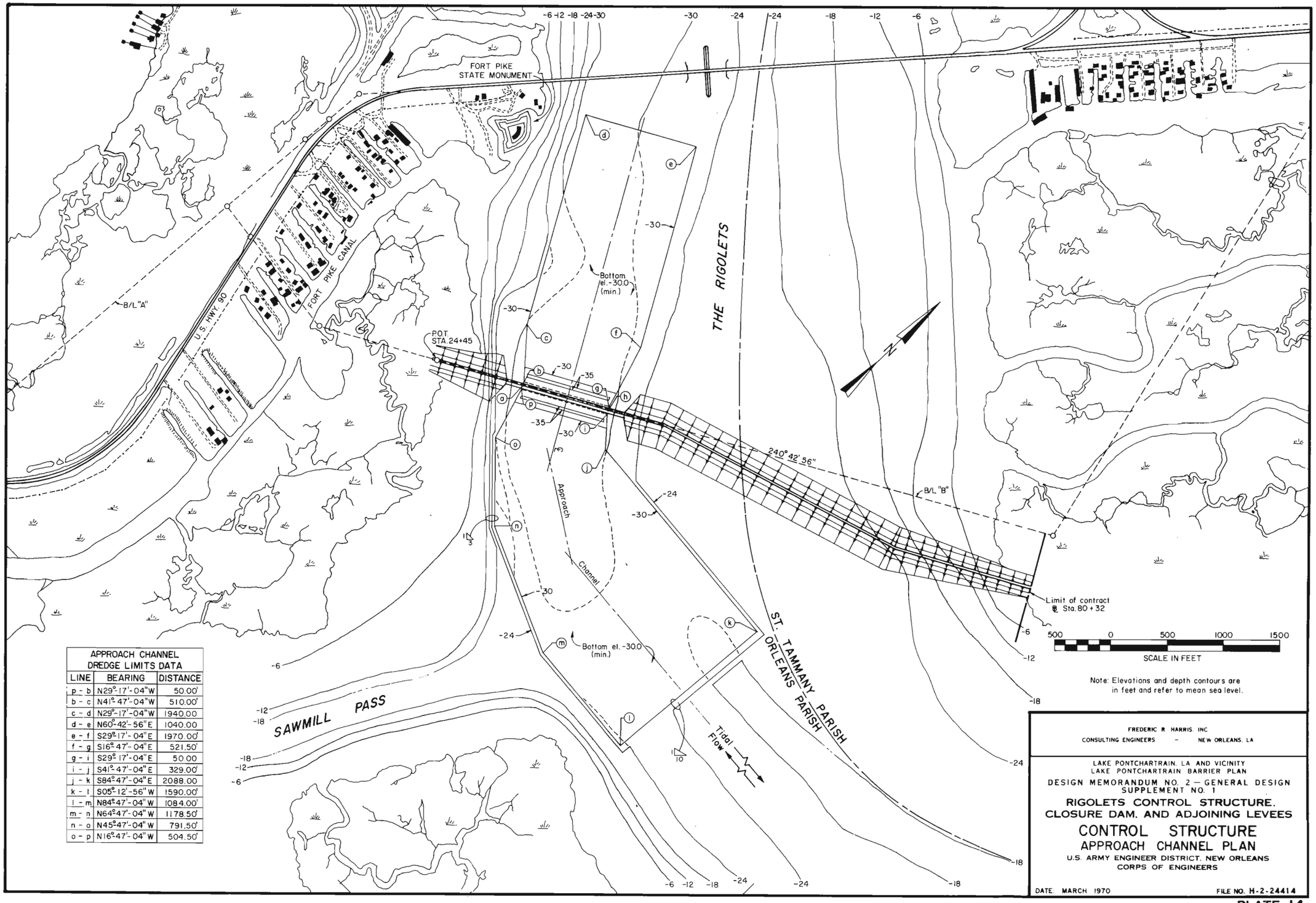
CONTROL STRUCTURE
FOUNDATION-PLAN AND ELEVATION

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 13



APPROACH CHANNEL DREDGE LIMITS DATA		
LINE	BEARING	DISTANCE
p - b	N29°-17'-04"W	50.00'
b - c	N41°-47'-04"W	510.00'
c - d	N29°-17'-04"W	1940.00
d - e	N60°-42'-56"E	1040.00
e - f	S29°-17'-04"E	1970.00'
f - g	S16°-47'-04"E	521.50'
g - i	S29°-17'-04"E	50.00
i - j	S41°-47'-04"E	329.00'
j - k	S84°-47'-04"E	2088.00
k - l	S05°-12'-56"W	1590.00'
l - m	N84°-47'-04"W	1084.00'
m - n	N64°-47'-04"W	1178.50'
n - o	N45°-47'-04"W	791.50'
o - p	N16°-47'-04"W	504.50'

Note: Elevations and depth contours are in feet and refer to mean sea level.

FREDERIC R HARRIS INC
CONSULTING ENGINEERS - NEW ORLEANS, LA

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

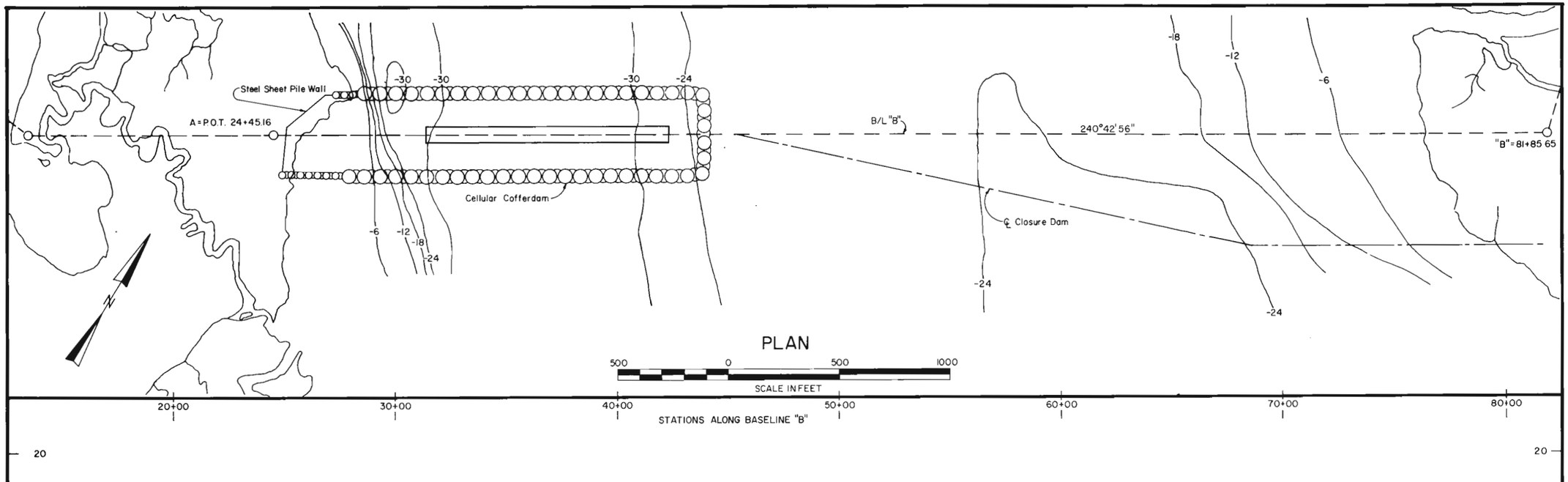
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

CONTROL STRUCTURE
APPROACH CHANNEL PLAN

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

DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 14



FREDERIC R HARRIS INC
CONSULTING ENGINEERS - NEW ORLEANS, LA

LAKE PONTCHARTRAIN LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE. CLOSURE DAM. AND ADJOINING LEVEES

COFFERDAM

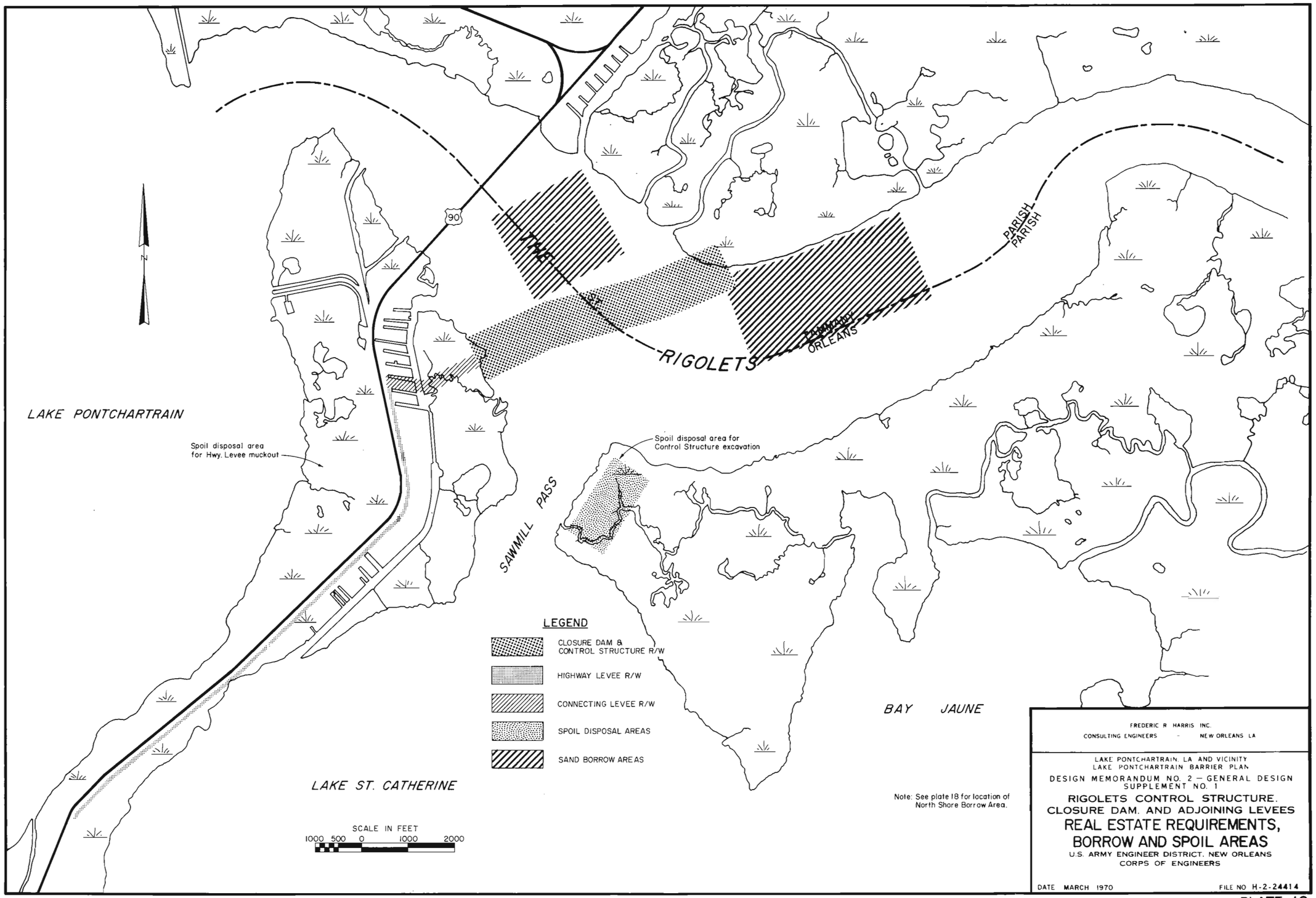
PLAN, PROFILE AND SECTION

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 15



Note: See plate 18 for location of North Shore Borrow Area.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS - NEW ORLEANS LA

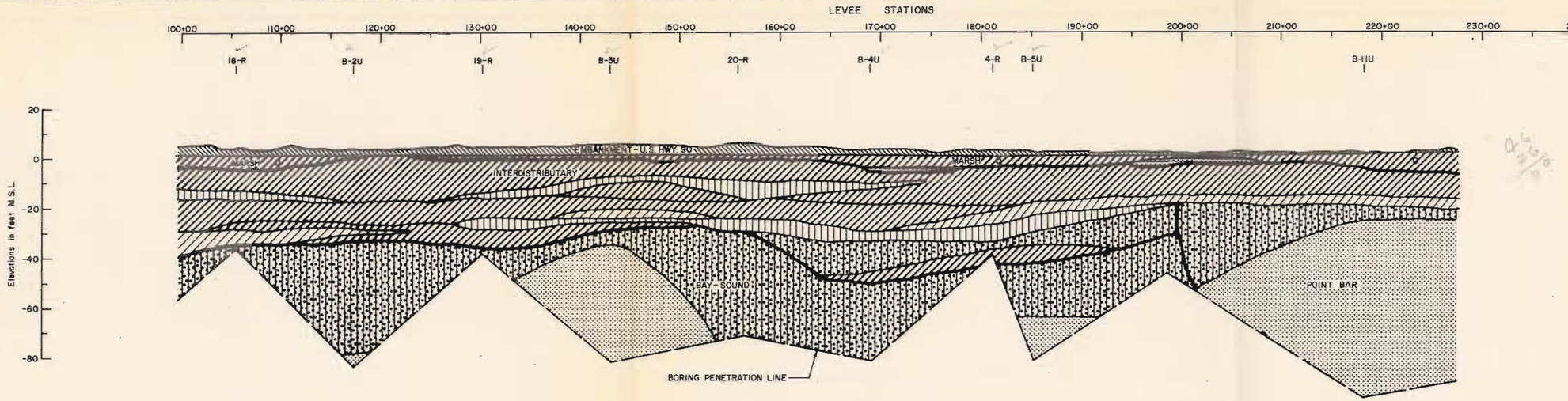
LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE. CLOSURE DAM. AND ADJOINING LEVEES
REAL ESTATE REQUIREMENTS, BORROW AND SPOIL AREAS

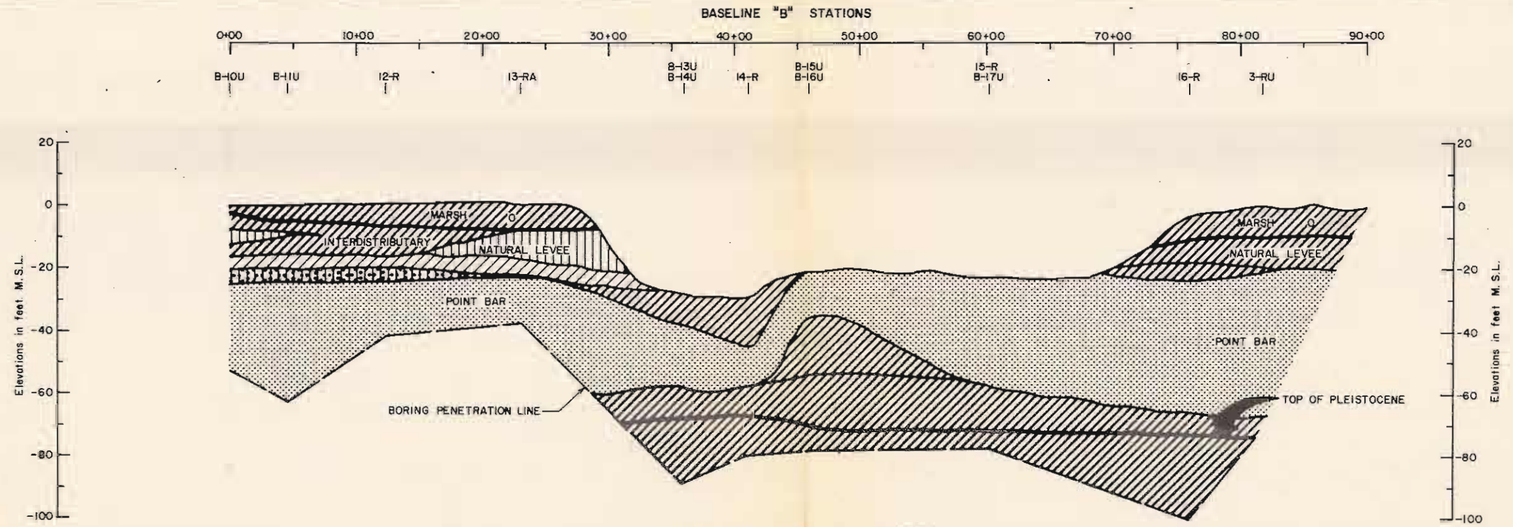
U.S. ARMY ENGINEER DISTRICT. NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO H-2-24414

PLATE 16



SECTION ALONG HIGHWAY LEVEE ℄



SECTION ALONG BASELINE "B"

LEGEND

- CH - Fat clay
- CHO - Fat clay with organic matter
- CL - Lean clay
- ML - Silt
- SM - Silty sand
- SP - Poorly graded fine sand
- Pt - Peat

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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

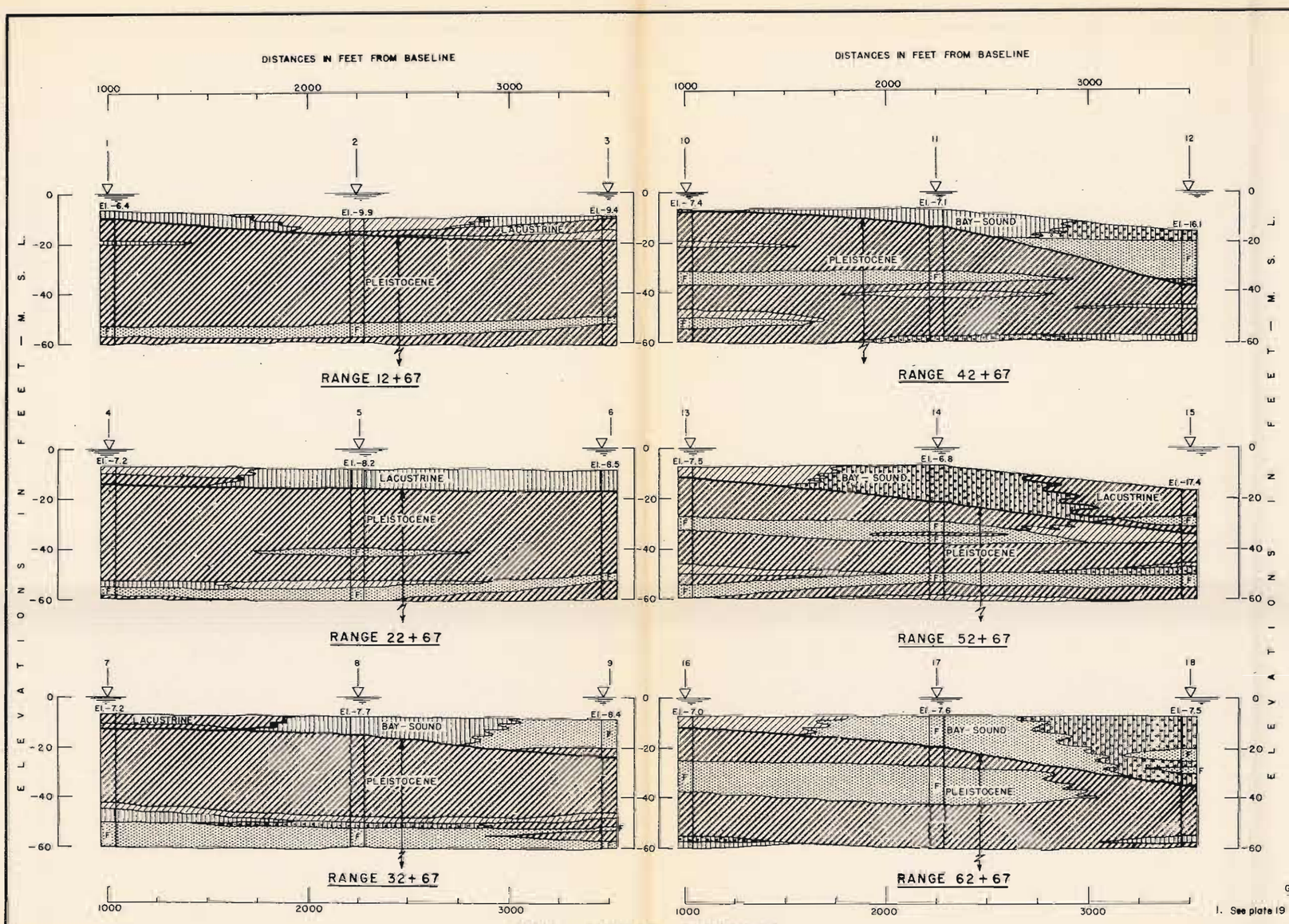
GENERALIZED SOIL AND GEOLOGIC PROFILE

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

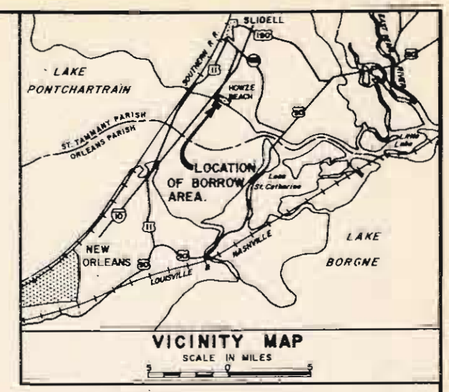
DATE: MARCH 1970

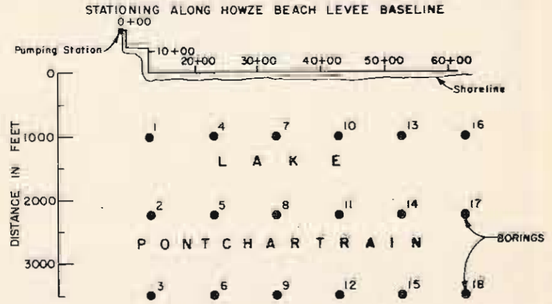
FILE NO. N-2-24414

PLATE 17



SOIL BORING SECTIONS





LOCATION PLAN

LEGEND

- CH – Fat Clay
- CL – Lean Clay
- ML – Silt
- SM – Silty Sand
- SP – Fine Sand

RECENT
- Lacustrine – soft to very soft lean clay and fat clay with silty sand and sand, and with shell and shell fragments.
- Bay-Sound – silt, silty sand and sand with shell and shell fragments

PLEISTOCENE – stiff to very stiff clays with layers and lenses silt and sand.

GENERAL NOTES

1. See plate 19 for detail logs of borings.
2. This drawing adapted from Plate III-60 File No. H-2-24111

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

BORROW AREA DATA

NORTH SHORE OF LAKE PONTCHARTRAIN

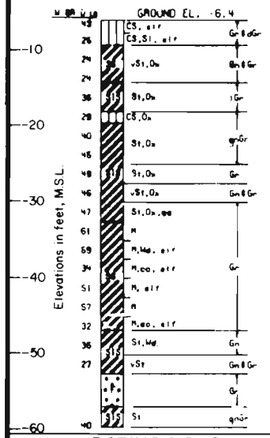
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

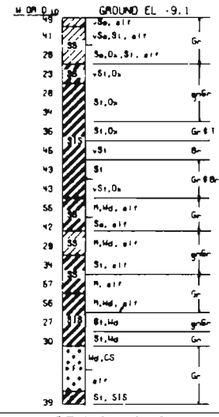
FILE NO. H-2-24414

PLATE 18

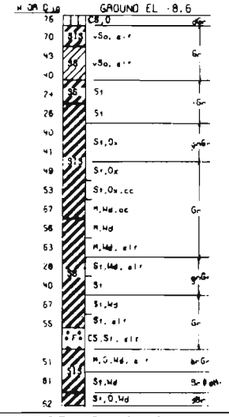
BORING NO. 1
STA. 12+67 - 1000 FT. RT OF B/L
WATER SURFACE = 0.03 M.S.L.
11-13-67



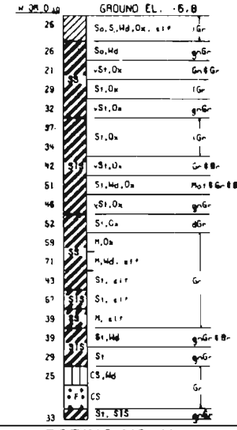
BORING NO. 2
STA. 12+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-09-67



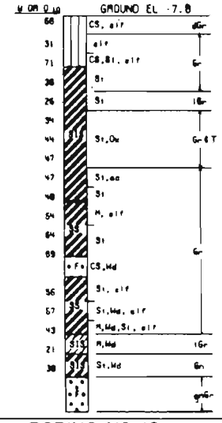
BORING NO. 3
STA. 12+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-09-67



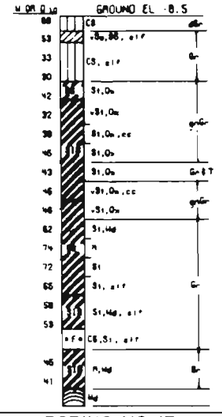
BORING NO. 4
STA. 22+67 - 1000 FT. RT OF B/L
11-14-67



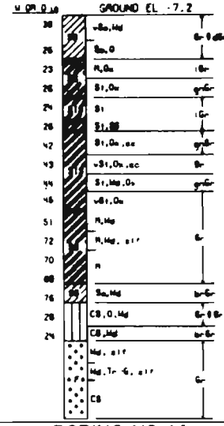
BORING NO. 5
STA. 22+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-14-67



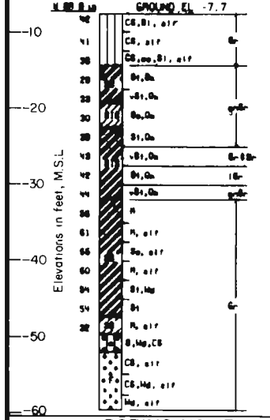
BORING NO. 6
STA. 22+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-14-67



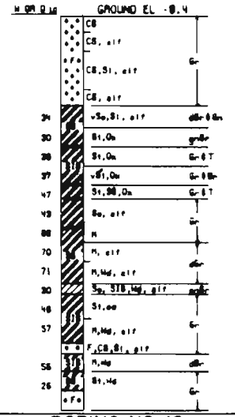
BORING NO. 7
STA. 32+67 - 1000 FT. RT OF B/L
WATER SURFACE = 0.1 M.S.L.
11-15-67



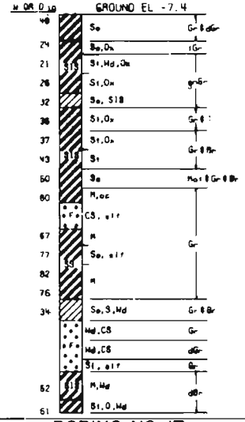
BORING NO. 8
STA. 32+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.5 M.S.L.
11-15-67



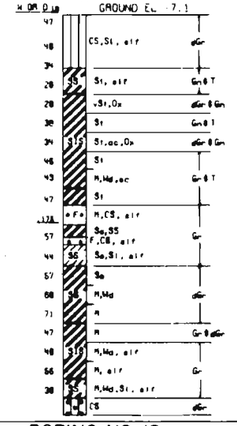
BORING NO. 9
STA. 32+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.1 M.S.L.
11-15-67



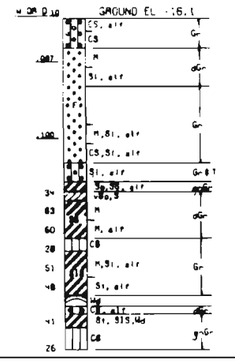
BORING NO. 10
STA. 42+67 - 1000 FT. RT OF B/L
WATER SURFACE = 0.5 M.S.L.
11-16-67



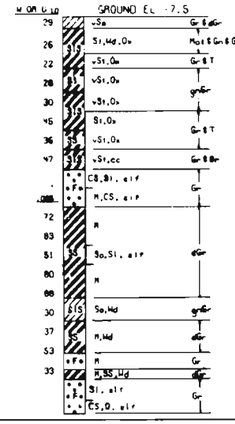
BORING NO. 11
STA. 42+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.6 M.S.L.
11-17-67



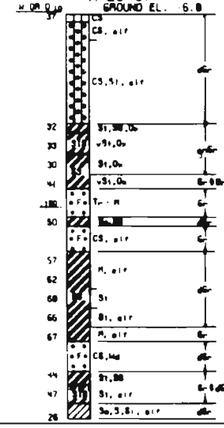
BORING NO. 12
STA. 42+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.6 M.S.L.
11-17-67



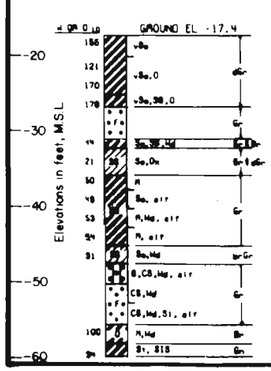
BORING NO. 13
STA. 52+67 - 1000 FT. RT OF B/L
WATER SURFACE = 0.7 M.S.L.
11-21-67



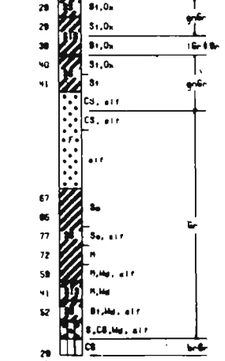
BORING NO. 14
STA. 52+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-20-67



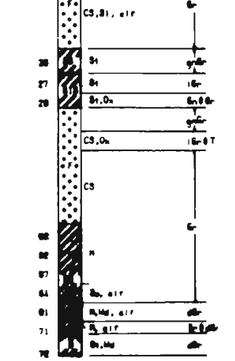
BORING NO. 15
STA. 52+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.4 M.S.L.
11-20-67



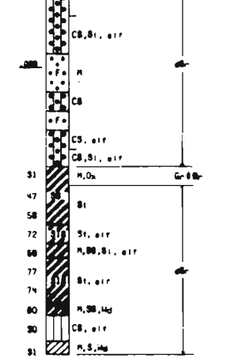
BORING NO. 16
STA. 62+67 - 1000 FT. RT OF B/L
WATER SURFACE = 0.7 M.S.L.
11-22-67



BORING NO. 17
STA. 62+67 - 2250 FT. RT OF B/L
WATER SURFACE = 0.7 M.S.L.
11-21-67



BORING NO. 18
STA. 62+67 - 3500 FT. RT OF B/L
WATER SURFACE = 0.7 M.S.L.
11-21-67



Note:
For soil boring legend see plate A.
For location plan of borings see plate 18.

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

BORING LOGS

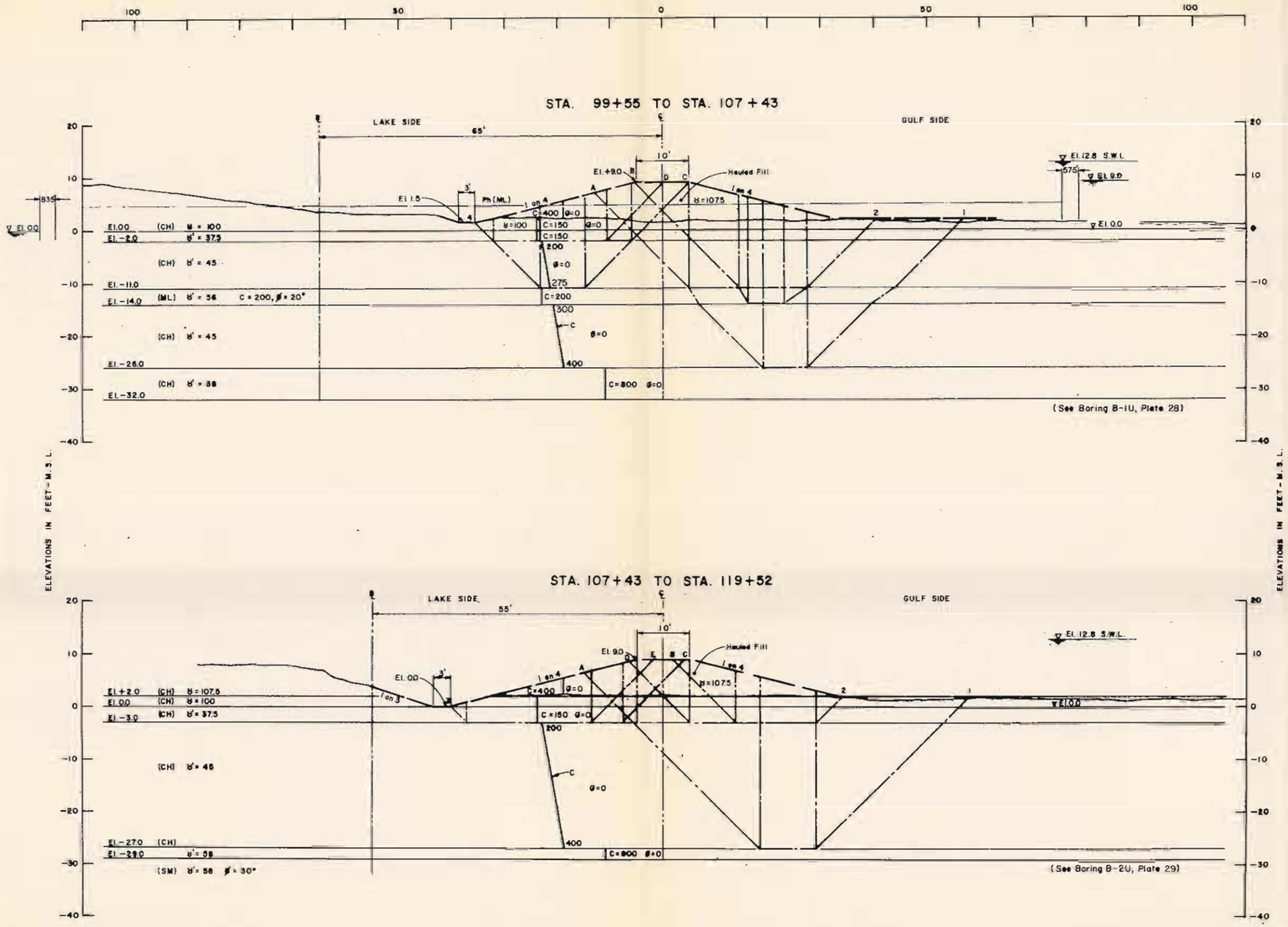
NORTH SHORE BORROW AREA

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 19



STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		EL.	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
105+52	A	1	−26	40,740	19,320	21,420	20,790	3,400	16,270	40,460	1.89
	B	2	−11	15,900	6,270	9,630	11,330	3,580	5,330	20,240	2.10
		2	−14	19,950	9,010	10,940	13,980	2,000	7,500	23,480	2.14
	C	4	−11	15,900	5,910	9,990	11,330	2,340	5,230	18,900	1.88
		4	−2	6,420	540	5,880	6,460	3,930	960	11,350	1.93
	D	4	−2	5,840	540	5,300	6,460	3,230	960	10,650	2.01
117+52	A	1	−27	48,310	21,620	26,690	19,300	4,200	15,900	39,400	1.82
	B	2	−3	6,400	1,310	5,090	6,360	2,250	1,500	10,850	2.14
	C	3	−3	7,280	280	7,000	6,700	4,420	910	12,090	1.73
	D	2	−3	7,330	1,310	6,020	6,660	3,560	1,500	11,720	1.95
	E	3	−3	6,400	280	6,120	6,360	3,520	910	10,790	1.76

GENERAL NOTES

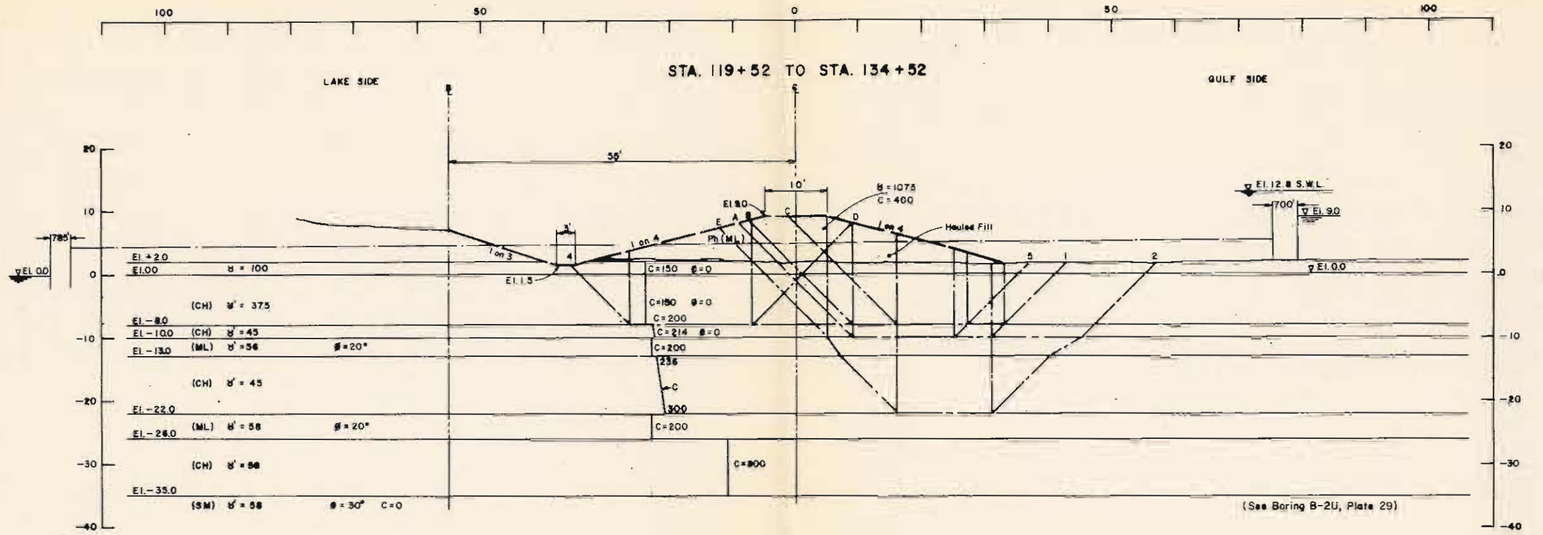
(Q) – Unconsolidated - undrained shear strength in lbs. per sq. ft.
(γ_s) – Unit weight of soil water system in lbs. per cu. ft.
(γ') – Submerged unit weight in lbs. per cu. ft.
(ϕ) – Angle of internal friction in degrees.
$\bar{D}$ – Horizontal driving force in lbs.
R – Horizontal resisting force in lbs.
F – Factor of safety with respect to (Q) shear strength.

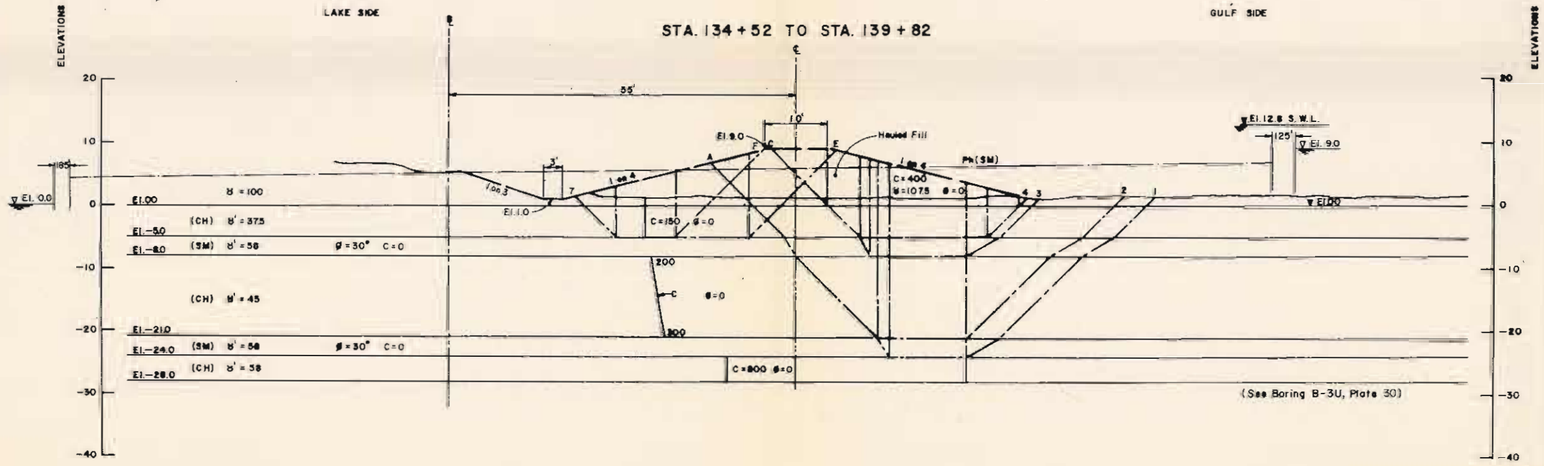
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
STABILITY ANALYSIS (Q)
HIGHWAY LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. N-2-24414

PLATE 20





STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		EL.	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
129+52	A	1	-10	15,430	4,120	11,310	8,680	4,970	3,880	17,530	1.55
		5	-10	15,430	5,080	10,350	8,680	3,420	3,880	15,980	1.55
	B	1	-8	12,910	2,910	10,000	8,180	3,600	3,000	14,780	1.48
		5	-8	12,910	3,480	9,430	8,180	2,700	3,000	13,880	1.47
	C	5	-8	11,300	3,480	7,850	8,260	1,850	3,000	12,910	1.65
	D	4	-8	12,780	3,560	9,220	7,820	2,980	2,860	13,600	1.47
	E	2 *	-22	35,290	17,010	18,280	14,710	4,500	11,700	30,910	1.69
		5	-10	15,040	5,080	9,960	7,320	4,280	3,860	15,460	1.55
139+52	A	1	-24	37,550	17,180	20,370	17,840	9,600	19,010	46,450	2.28
		2 *	-21	33,740	15,140	18,600	13,650	4,200	8,570	26,420	1.42
	C	3 *	-8	13,620	4,300	9,320	9,260	3,100	2,660	15,020	1.61
		4	-5	9,320	1,740	7,580	6,870	3,000	1,950	11,820	1.56
	E	7	-5	9,860	1,910	7,950	7,960	3,150	1,800	12,910	1.62
	F	7	-5	6,960	1,910	5,050	6,520	1,800	1,800	10,120	2.00

* Includes Uplift in ML Strata

See Plate 20 For General Notes.

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

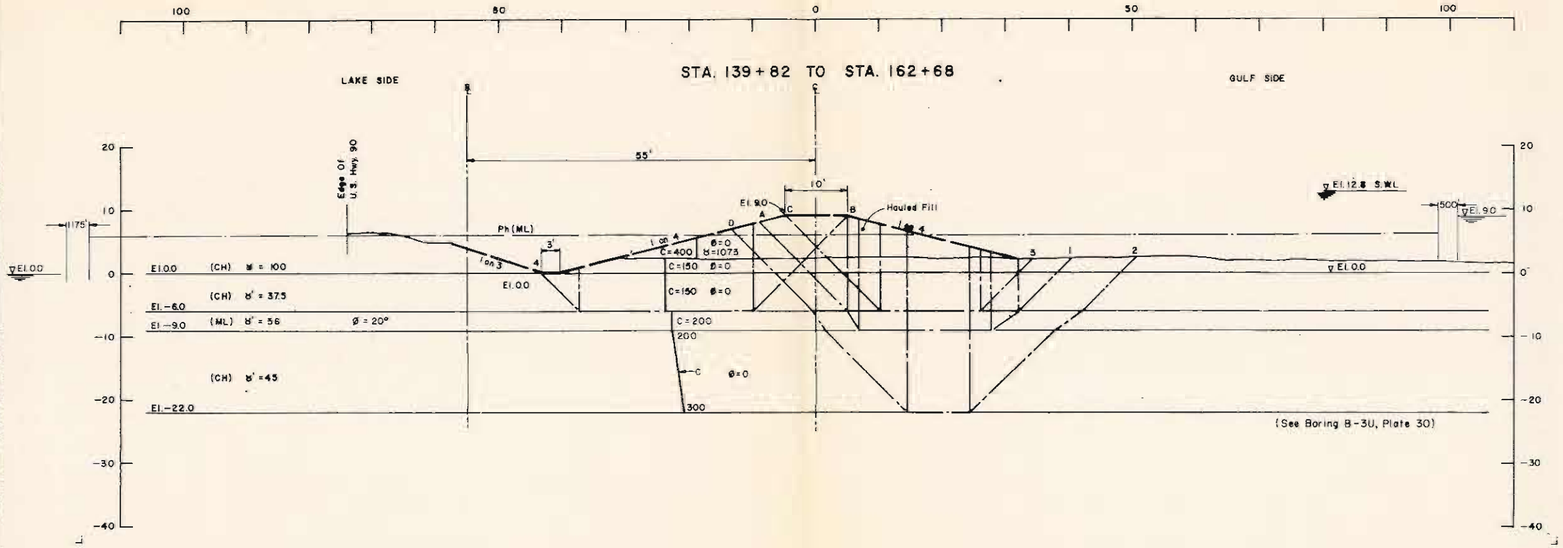
STABILITY ANALYSIS (Q)

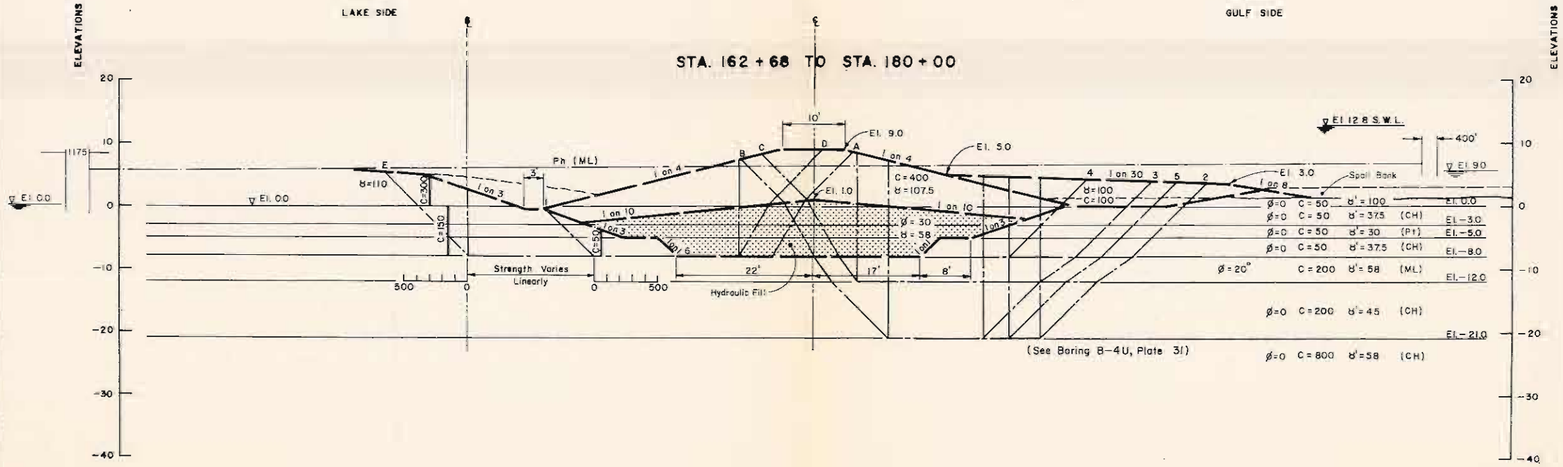
HIGHWAY LEVEE

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

DATE MARCH 1970 FILE NO. H-2-24414

PLATE 21





STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		EL.	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
151+52	A	1	-9	14,040	4,290	9,750	9,240	4,200	4,490	17,930	1.84
		1	-6	10,480	2,480	8,000	6,750	4,050	2,550	13,350	1.67
		5	-6	10,480	2,970	7,570	6,750	3,150	2,550	12,450	1.66
	B	4	-6	10,480	790	9,690	6,890	4,120	1,800	12,810	1.32
	C	5	-6	10,380	2,810	7,570	6,890	2,400	2,550	11,840	1.56
	D	2	-22	31,220	15,650	15,570	13,670	3,000	11,770	28,440	1.83
172+52	A	1 *	-8	17,720	1,650	16,070	11,840	8,470	1,050	21,360	1.33
	B	2	-21	36,890	16,180	18,710	20,820	4,800	10,820	36,440	1.95
		2 *	-21	41,313	20,490	20,820	17,940	4,800	8,870	31,610	1.76
		3	-21	36,080	20,810	16,080	20,820	3,000	10,900	34,720	2.16
		3 *	-21	41,310	23,360	17,950	17,940	3,000	9,150	30,090	1.67
		5	-21	41,310	22,560	18,750	17,940	3,800	9,050	30,790	1.64
		3**	-21	36,890	12,620	24,270	20,820	3,000	8,660	32,480	1.34
	C	3 *	-12	24,680	9,270	15,410	15,210	5,800	7,300	28,310	1.84
		4 *	-8	16,020	5,950	10,070	11,710	7,450	2,120	21,280	1.82
	D	1	-8	12,720	1,650	11,070	12,800	6,820	1,050	20,670	1.87
		1 *	-8	14,700	1,650	13,050	10,610	5,360	1,050	17,020	1.30
	E	6	-8	5,130	——	5,130	5,140	2,650	——	7,790	1.52

* Includes Uplift In ML Strata And Sand Backfill
** During Construction. Berm Not In Place

See Plate 20 For General Notes.

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

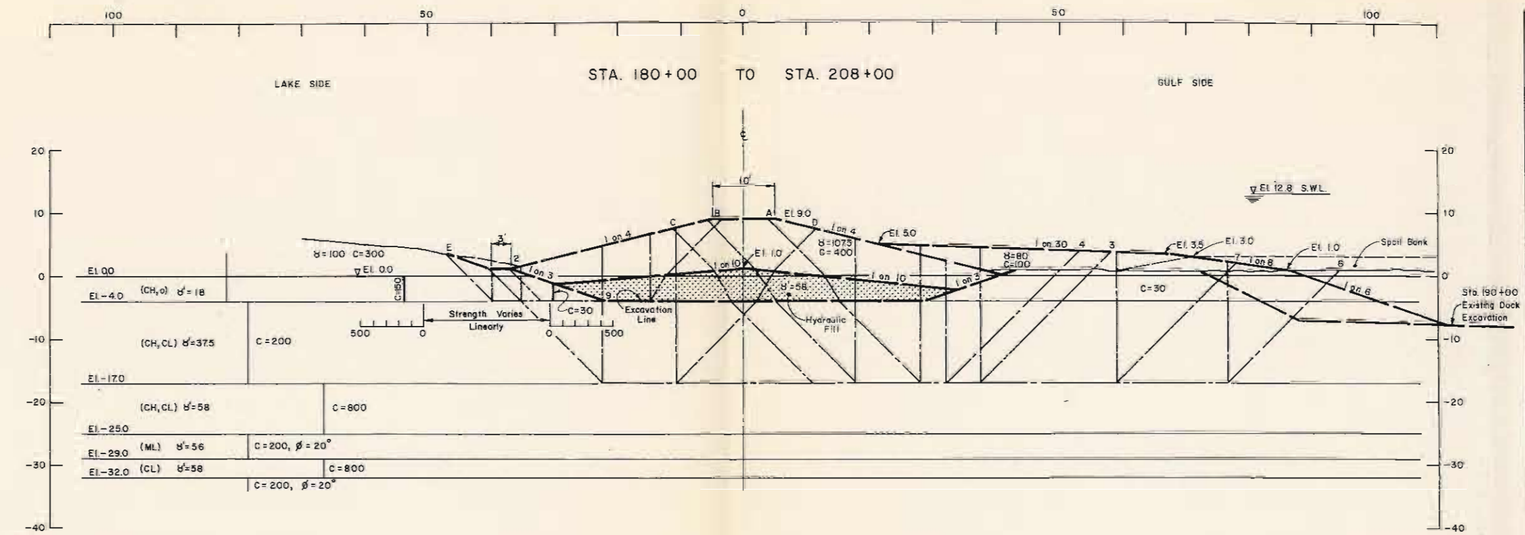
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

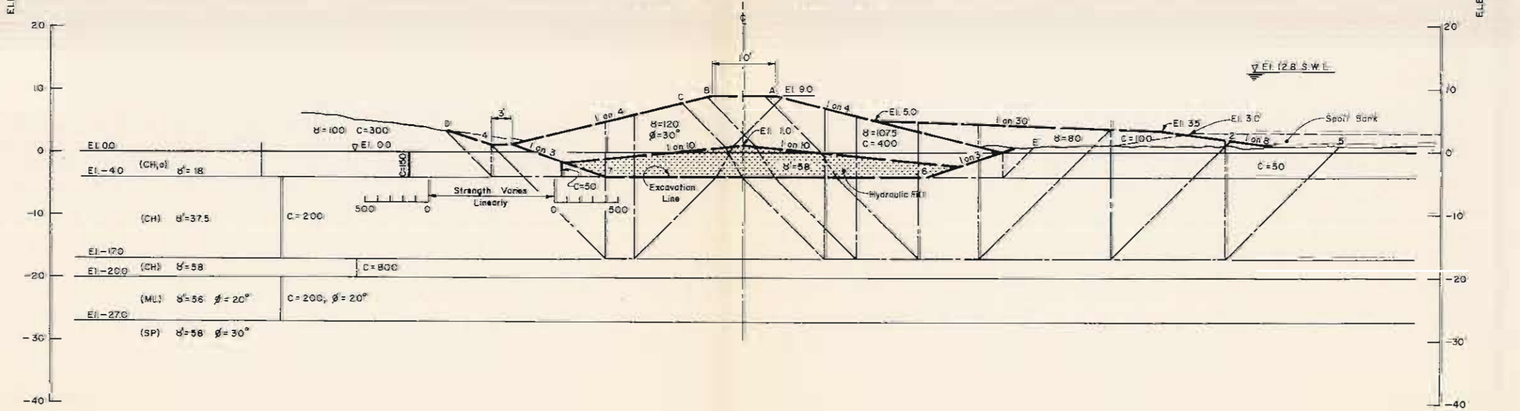
STABILITY ANALYSIS (Q)

HIGHWAY LEVEE

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

DATE: MARCH 1970 FILE NO. M-2-24414





STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO		EL	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
199+10	A	3	-17	20,900	10,400	10,500	14,370	1,940	6,000	22,310	2.12
		3**	-17	20,900	5,450	15,450	14,370	1,940	5,500	21,810	1.41
		4	-17	20,900	11,110	9,790	14,370	800	6,100	21,270	2.18
		4**	-17	20,900	6,130	14,770	14,370	800	5,500	20,670	1.40
		5	-17	20,900	5,900	15,000	14,370	9,800	5,500	29,670	1.98
	B	1	-4	6,600	740	5,860	5,170	2,310	1,160	12,640	2.16
		2	-4	6,600	890	5,710	8,110	1,960	1,080	12,610	2.14
		3	-17	24,710	10,890	14,310	1,500	3,900	6,000	24,900	1.74
		3**	-17	24,710	5,490	19,260	15,000	3,900	5,500	24,400	1.27
		4	-17	24,710	11,110	13,600	15,000	2,800	6,100	23,900	1.76
		4**	-17	24,710	6,130	18,580	15,000	2,800	5,500	23,300	1.26
		6	-17	24,710	5,900	18,810	15,000	10,800	5,500	31,300	1.66
		7	-17	24,710	8,580	16,130	15,000	8,200	5,700	28,900	1.79
	C	3	-17	25,110	10,400	14,710	14,310	5,300	6,000	25,610	1.74
		3**	-17	25,110	5,450	19,650	14,310	5,300	5,500	25,110	1.28
		4	-17	25,110	11,110	14,110	14,000	14,310	6,100	24,620	1.76
		4**	-17	25,110	6,130	18,980	14,310	4,200	5,500	24,020	1.26
		6	-17	25,110	5,900	19,210	14,310	13,200	5,500	33,010	1.72
	D	1	-17	25,110	9,470	15,370	14,310	2,340	6,400	23,050	1.50
	E	9	-4	1,230	——	1,230	1,520	1,150	——	2,670	2.17
190+00	A	6***	-17	20,900	2,690	18,210	14,370	9,800	4,120	28,290	1.55
	B	6***	-17	24,710	2,690	22,020	15,000	10,800	4,120	29,920	1.36
	C	6***	-17	25,110	2,690	22,420	14,310	13,200	4,120	31,630	1.41
223+00	A	1	-17	18,590	10,740	7,850	12,010	1,900	6,240	20,150	2.57
		1**	-17	18,590	5,360	13,235	12,010	1,900	5,700	19,610	1.48
		2	-17	18,590	8,760	9,830	12,010	6,100	5,900	24,010	2.44
		4	-17	24,630	9,170	15,460	14,780	900	6,360	22,040	1.42
		5	-17	18,590	5,020	13,570	12,010	9,740	5,700	27,450	2.02
	B	1	-17	24,630	10,740	13,809	14,780	3,800	6,240	24,820	1.78
		1**	-17	24,630	5,360	19,270	14,780	3,800	5,700	24,280	1.26
		2	-17	24,630	8,760	19,870	14,780	8,000	5,900	28,680	1.81
		5	-17	24,630	5,020	19,610	14,780	11,600	5,700	32,080	1.64
	C	1	-17	24,730	10,740	13,990	14,260	4,800	6,240	25,300	1.81
		1	-17	24,730	5,360	19,370	14,260	4,800	5,700	24,760	1.28
		2	-17	24,730	8,760	15,970	14,260	9,000	5,900	29,160	1.82
		5	-17	24,730	5,020	19,710	14,260	12,600	5,700	32,560	1.65
	D	7	-4	1,330	——	1,330	1,720	1,020	——	2,740	2.06
	E	6	-4	420	——	420	500	600	——	1,100	2.62

* Includes Uplift In ML Strata
** Stability Analysis Before Placement Of Gulf Side Berm
*** Stability Analysis Before Filling Boat Slip At Toe Of Berm. Section At 190+00 Is Typical Of Boat Slips In This Reach

See Plate 20 For General Notes.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
STABILITY ANALYSIS (Q)
HIGHWAY LEVEE

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

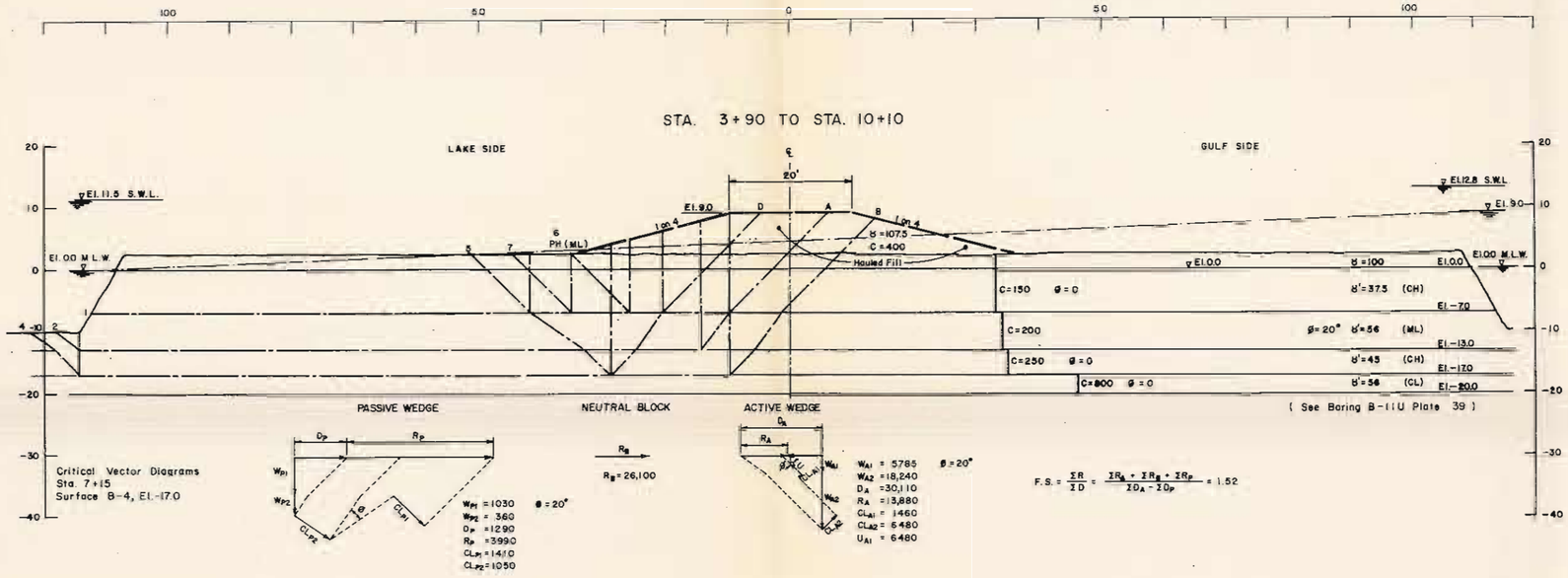
DATE MARCH 1970 FILE NO H-2-24414

PLATE 23

STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO		EL	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
7+15	A	1	-7	11,890	0	11,890	7,380	15,400	0	22,790	1.92
		2 *	-13	23,630	260	23,370	12,380	25,100	1,990	39,470	1.69
		5	-13	19,630	7,180	12,450	13,020	4,750	10,650	28,420	2.28
		5 *	-13	23,630	10,780	12,850	12,380	4,750	10,420	27,550	2.14
		6	-7	11,890	4,190	7,700	7,380	2,850	2,850	13,080	1.70
	B	5 *	-17	30,110	14,960	15,150	13,880	4,750	10,420	29,050	1.91
		4 *	-17	30,110	1,290	28,820	13,880	26,100	3,990	43,970	1.52
		4	-17	26,400	1,290	25,110	14,810	26,100	3,990	44,900	1.79
	D	6	-7	10,330	4190	6,140	7,380	780	2850	11,010	1.79
		7	-7	10,330	2,980	7,350	7,380	2,250	2,850	12,480	1.71
		4 *	-17	24,540	1,290	23,250	13,510	21,100	3,990	38,600	1.66
		4	-17	20,790	1,290	19,500	14,060	21,200	3,990	39,250	2.01

* Includes Uplift in ML Strata



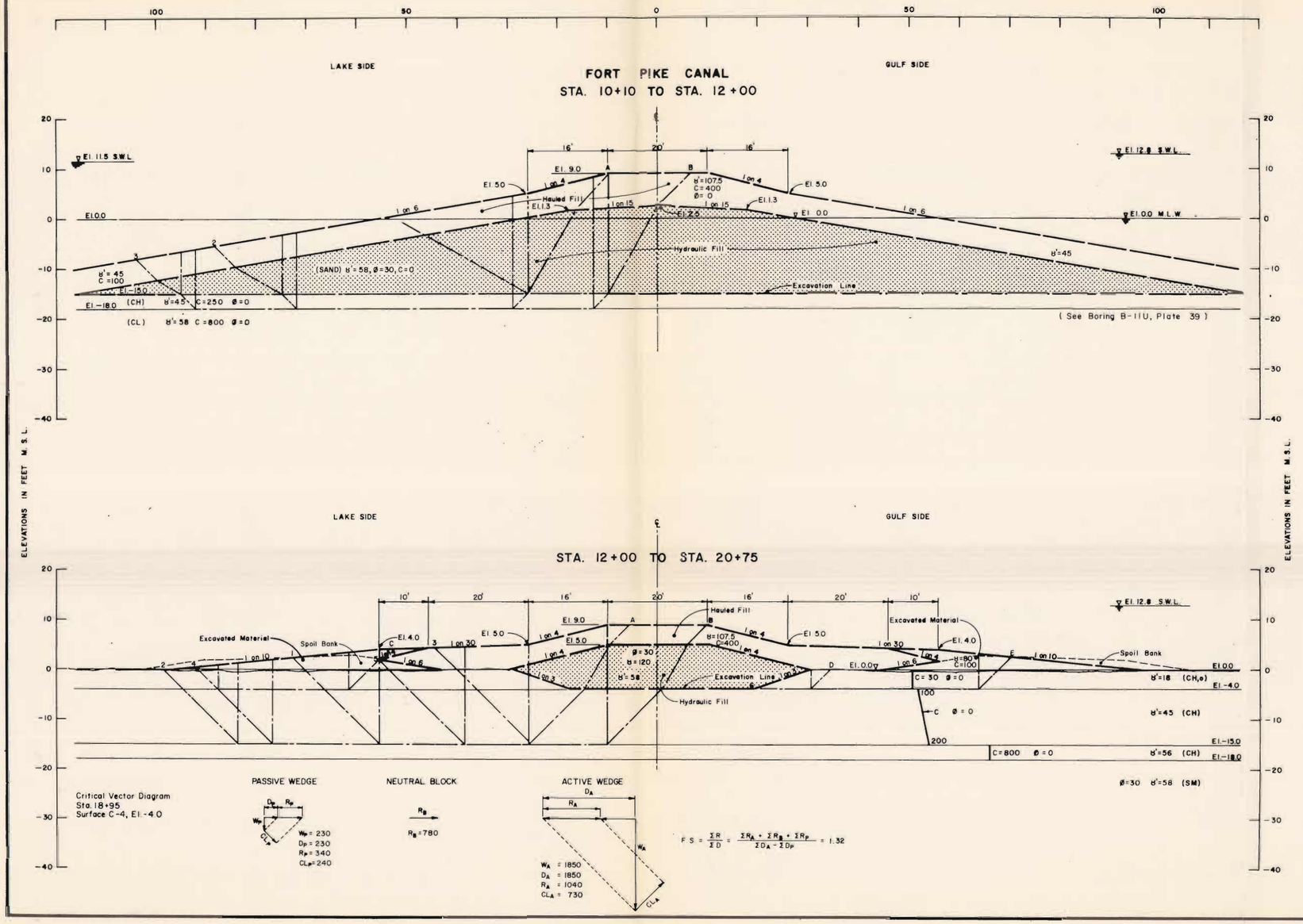
See Plate 20 For General Notes.

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM. AND ADJOINING LEVEES
STABILITY ANALYSIS (Q)
CONNECTING LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 24



STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		EL.	DRIVING $+\bar{D}_A$	DRIVING $-\bar{D}_P$	DRIVING $\Sigma\bar{D}$	RESISTING $+R_A$	RESISTING $+R_B$	RESISTING $+R_P$	RESISTING ΣR	FACTOR OF SAFETY $\Sigma R/\Sigma D$
FT. PIKE CANAL	A	2	-15	17,940	2,690	15,250	14,790	11,850	5,260	31,900	2.09
		2	-18	22,300	4,790	17,510	16,290	10,350	6,760	33,400	1.91
		3	-15	17,940	1,340	16,600	14,790	17,000	2,560	34,350	2.07
		3	-18	22,300	2,850	19,450	16,290	15,500	4,060	35,850	1.84
	B	2	-15	25,690	2,690	23,000	20,150	16,350	5,260	41,760	1.82
		2	-18	31,200	4,790	26,410	21,650	14,850	6,760	43,260	1.64
		3	-15	25,690	1,340	24,350	20,150	21,350	2,560	44,060	1.81
		3	-18	31,200	2,850	28,350	21,650	19,850	4,060	45,560	1.61
18+95	A	1	-15	20,660	7,860	12,800	9,360	6,000	4,000	19,360	1.51
		2	-15	20,660	4,230	16,430	9,360	11,800	3,540	24,700	1.50
		5	-15	20,660	4,230	16,430	9,360	11,800	3,540	24,700	1.50
	B	1	-15	25,460	7,860	17,600	10,350	9,200	4,000	23,550	1.34
		2	-15	25,460	4,230	21,230	10,350	14,800	3,540	28,690	1.35
		3	-15	25,460	12,520	12,940	10,350	3,100	6,980	20,430	1.58
		4	-15	25,460	5,160	20,300	10,350	13,400	3,640	27,390	1.35
		5	-15	25,460	9,870	15,590	10,350	5,800	3,880	20,030	1.28
	C	4	-4	1,850	230	1,620	1,040	780	340	2,160	1.32
	D	6	-4	140	0	140	240	360	0	600	4.31
	E	6	-4	1,420	0	1,420	820	1,350	0	2,170	1.53

See Plate 20 For General Notes

FREDERIC R HARRIS INC
CONSULTING ENGINEERS - NEW ORLEANS LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
STABILITY ANALYSIS (Q)
CONNECTING LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. H-2-24414

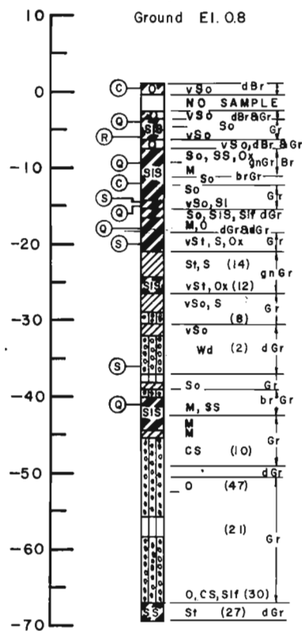
BORING NO. 1–RU

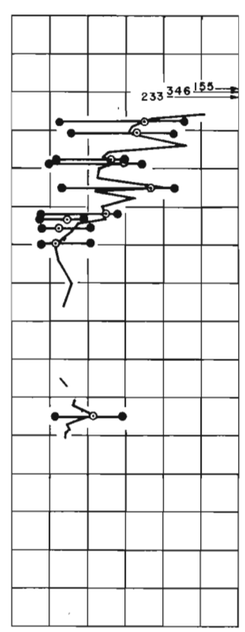
STA. 214+57

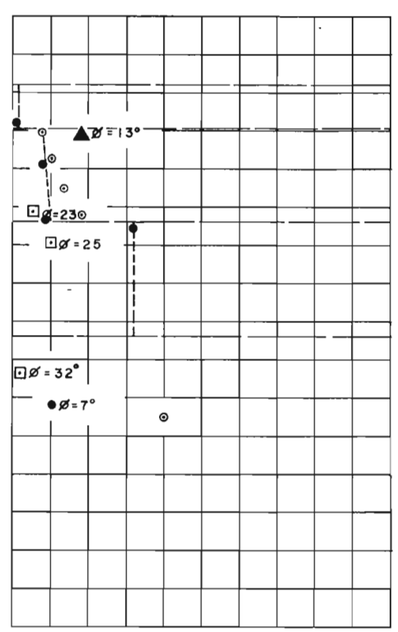
24–27 MAR. 1967

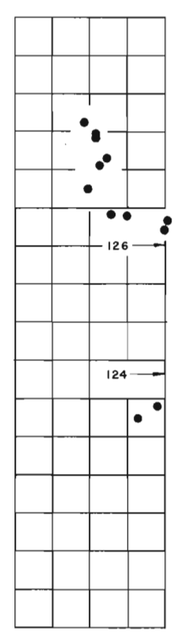
C/L Hwy Traverse

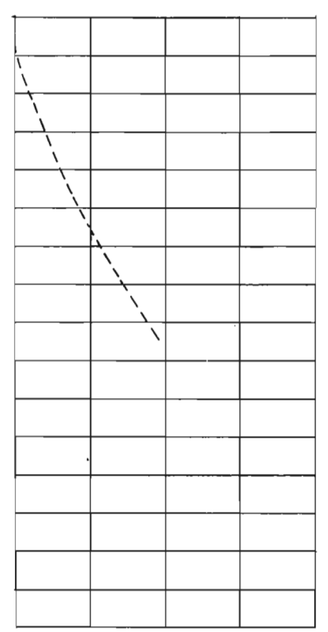
Ground El. 0.8

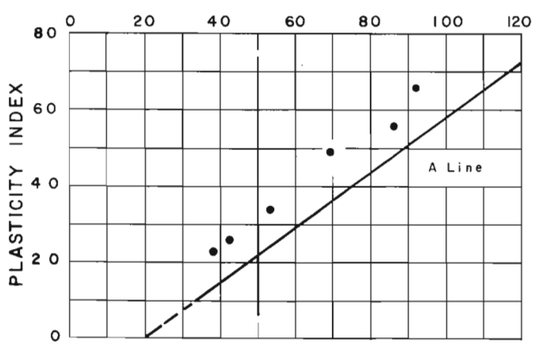




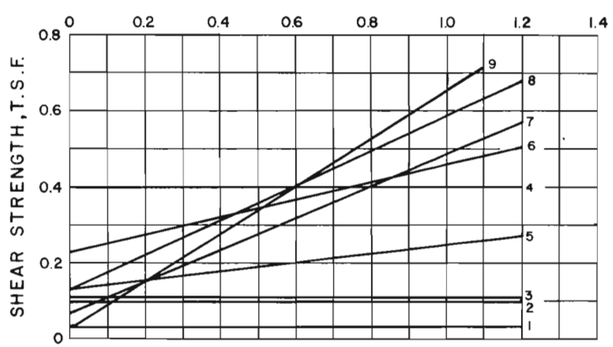








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-4.0	Q	0	0.03	C H
2	-9.6		0	0.10	C H
3	-16.8		0	0.11	C L
4	-18.0		0	0.40	C L
5	-41.1		7	0.13	M L
6	-5.8	R	13	0.23	C H
7	-16.0	S	23	0.07	C H
8	-19.9		25	0.13	C L
9	-36.9		32	0.03	S M

GENERAL NOTES

- O UC – Unconfined compression shear
- ● (Q) Unconsolidated undrained triaxial shear
- ▲ (R) Consolidated undrained triaxial shear
- ⊡ (S) Consolidated drained direct shear
- (C) Consolidatation test
- W – Natural water content
- L. L. – Liquid limit
- P. L. – Plastic limit
- c – Unit cohesion
- Ø – Angle of friction
- Y – Unit weight of soil – water system
- σ̄ – Normal stress
- O. B. – Overburden
- P̄c – Preconsolidation pressure
- e – Void ratio
- Cc – Compression index

See Plate A For Soil Boring Legend

For Consolidation Test Results See Plates 49, 50, 51 & 52.

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

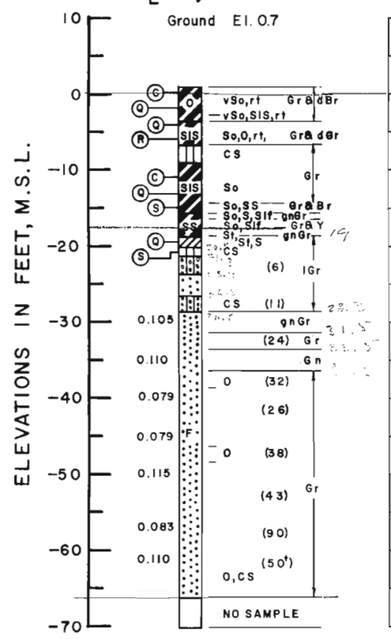
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. 1 –RU, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

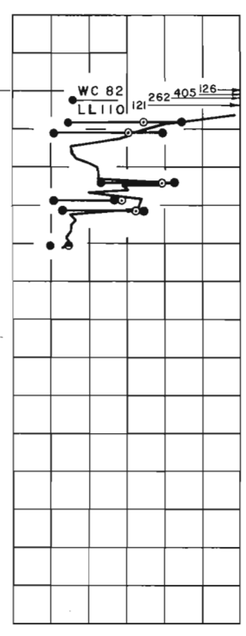
DATE: MARCH 1970 FILE NO. H-2-24414

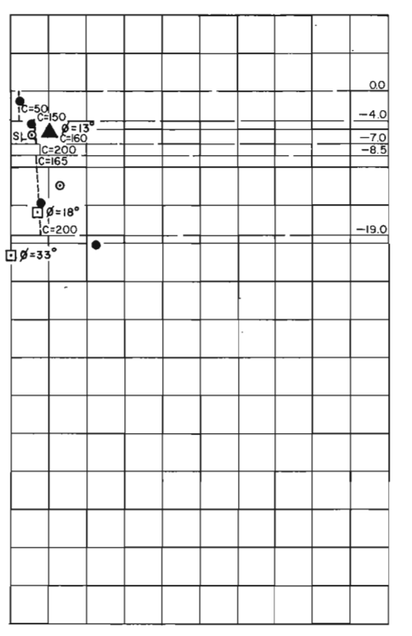
PLATE 26

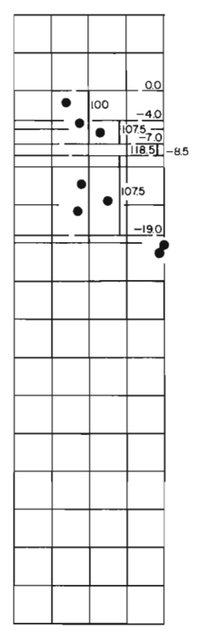
BORING NO. 2-RU

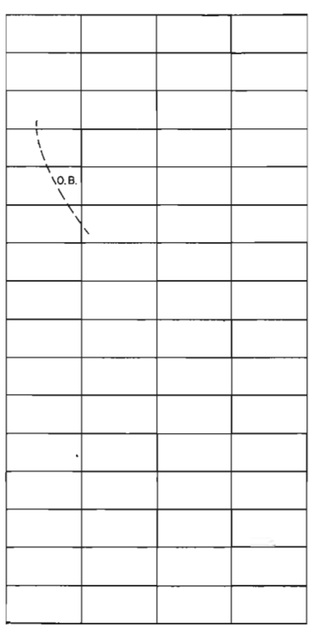
STA. 229+67
27-28 MAR. 1967
℄ Hwy Traverse
Ground El. 0.7



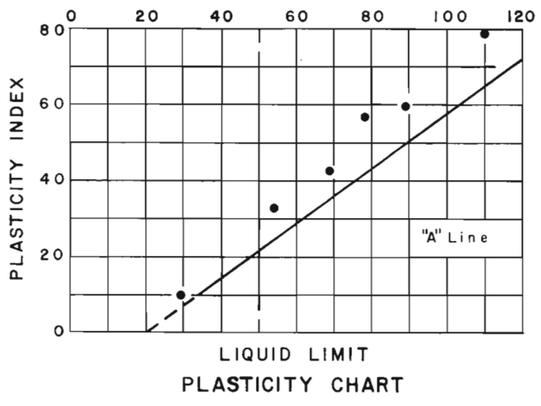




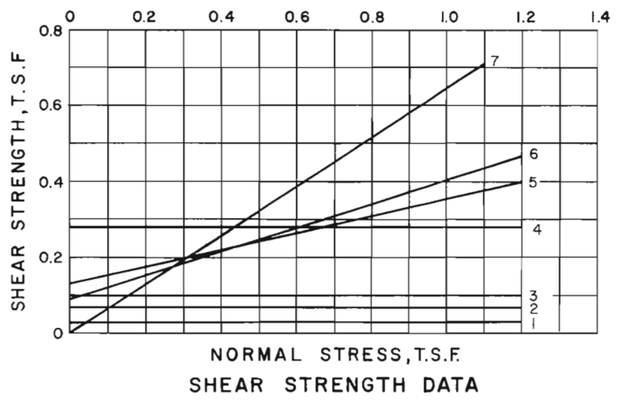




See Plate 26 For General Notes



PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F	CLASS
1	-1.2	Q	0	0.03	C H
2	-4.0		0	0.07	C H
3	-14.2		0	0.10	C H
4	-20.0		0	0.28	M L
5	-5.1	R	13	0.13	C H
6	-15.6	S	18	0.09	C H
7	-21.1		33	0	S M

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. 2-RU, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 27

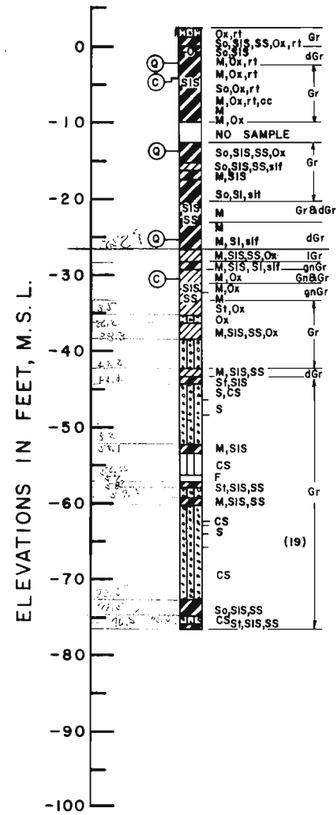
BORING NO. B-IU

STA. 105 +50

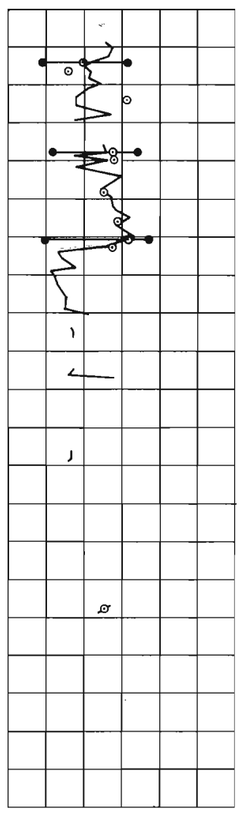
22-26 MAR. 1968

125' Rt. of B/L

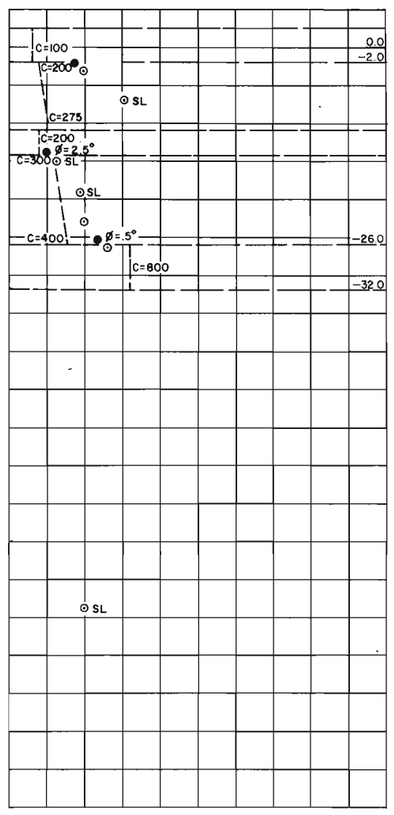
Ground El. 2.5



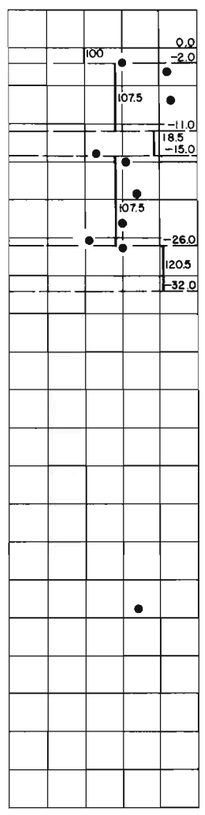
WATER CONTENT (% Dry Weight)



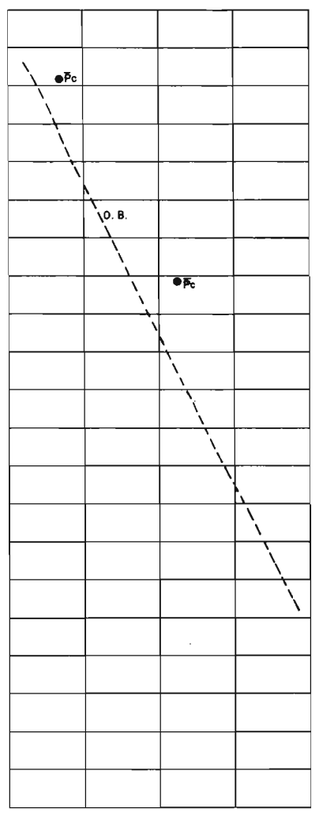
SHEAR STRENGTH "C" (Pounds / Sq. Ft.)

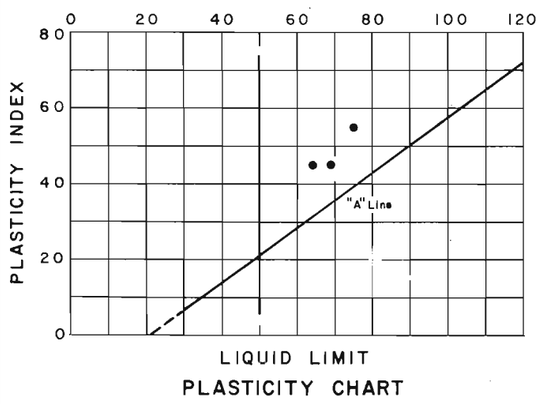


WET DENSITY (Pounds / Cu. Ft.)

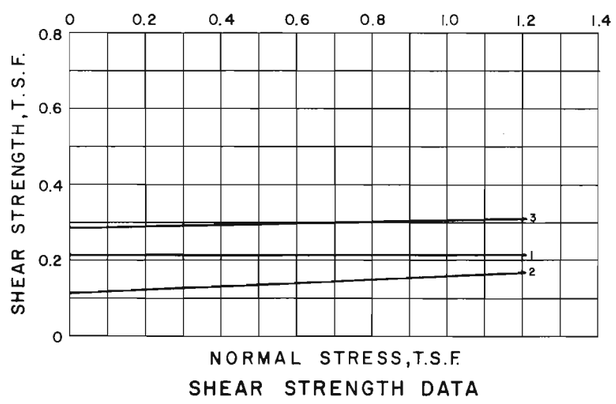


$\bar{\sigma}$ PRESSURE (Tons / Sq. Ft.)





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-2.1	Q	0	0.215	CH
2	-13.8		2.5	0.117	CH
3	-25.3		0.5	0.29	CH

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-IU, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 28

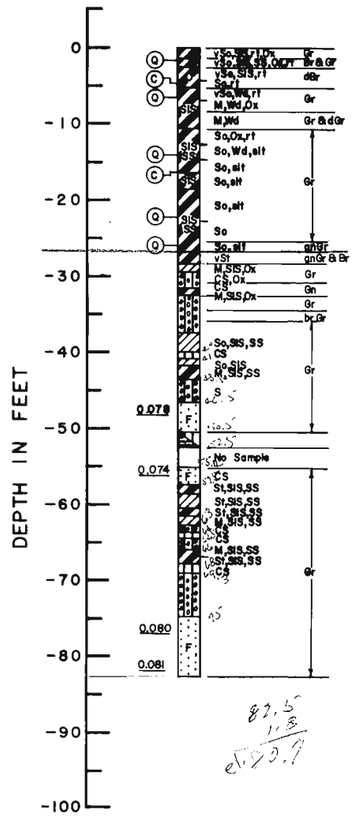
BORING NO. B-2U

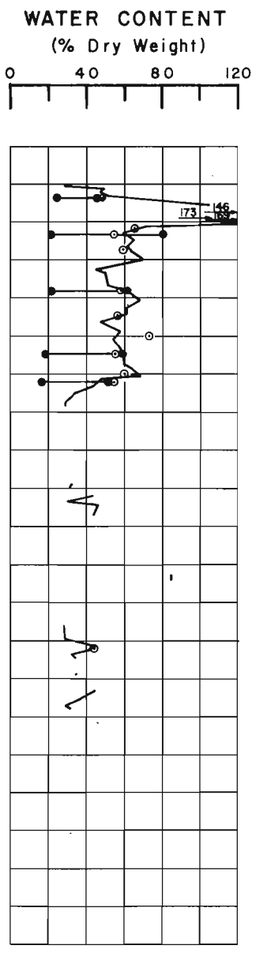
STA. 129 + 45

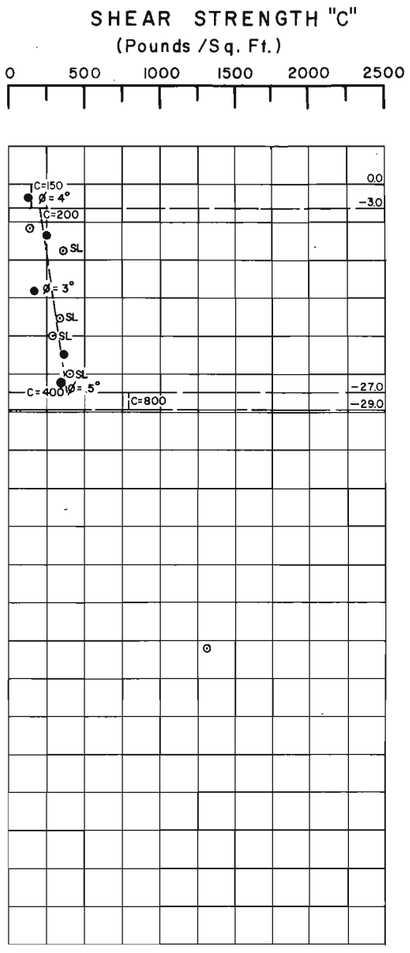
21 – 25 MAR. 1968

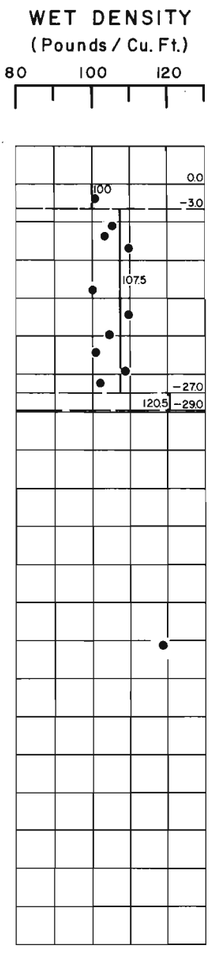
125' Rt. of B/L

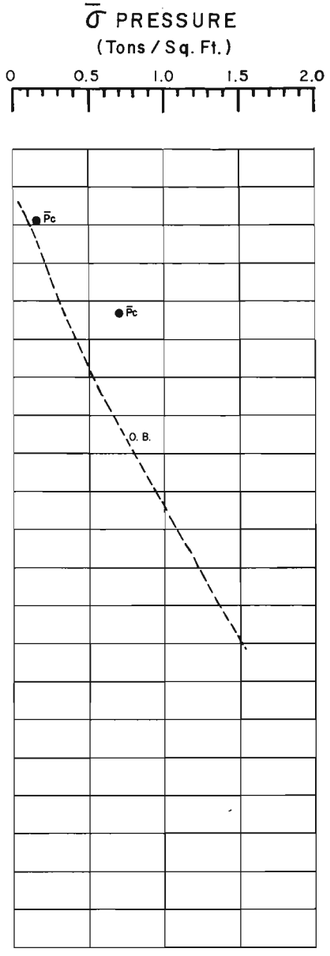
Ground El. 1.8

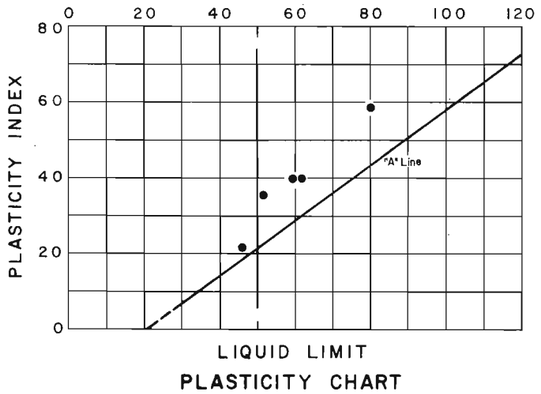




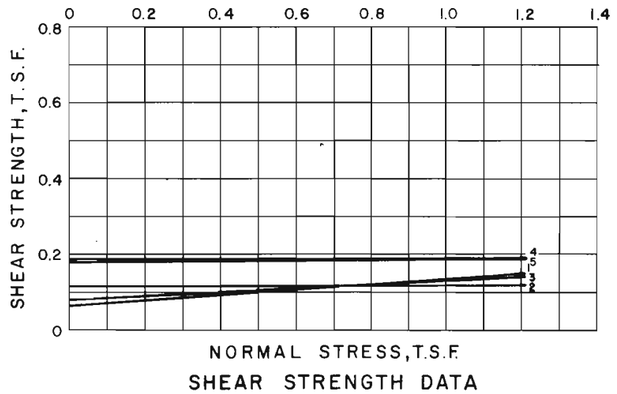








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Ø	STRENGTH C, T.S.F.	CLASS
1	+0.3	Q	4°	0.06	CH
2	-4.6		0°	0.12	CH
3	-12.2		3°	0.08	CH
4	-20.2		0°	0.18	CH
5	-24.2		0.5°	0.17	CH

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-2U, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE 29

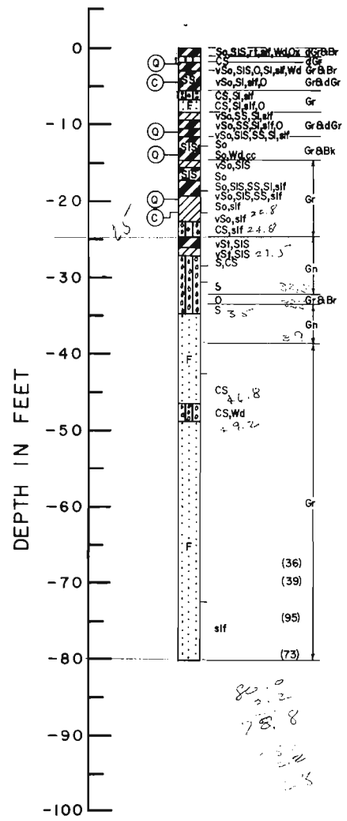
BORING NO. B-3U

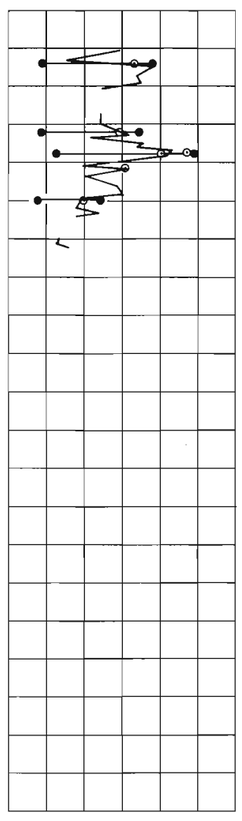
STA. 155 +40

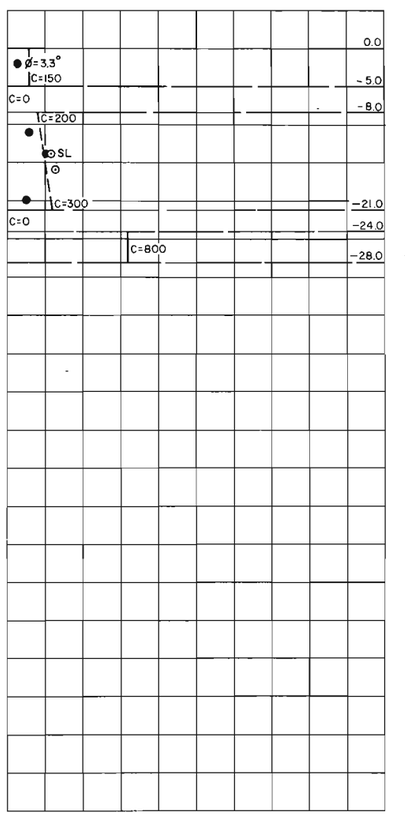
19 - 20 MAR. 1968

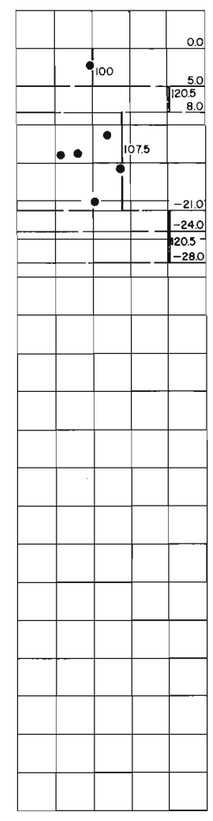
50' Rt. of B/L

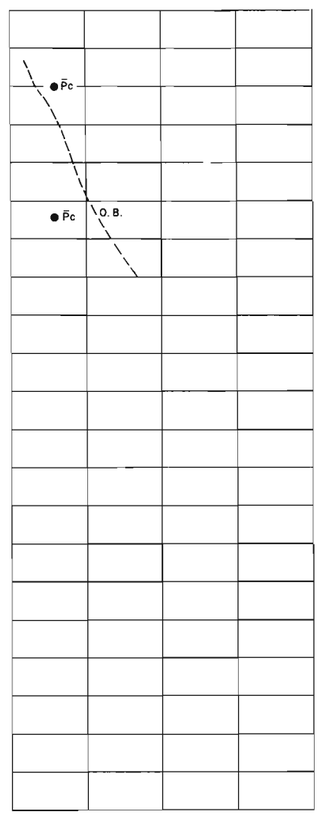
Ground El. 2.2

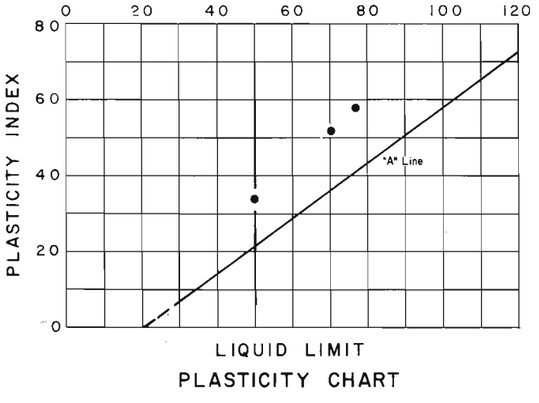




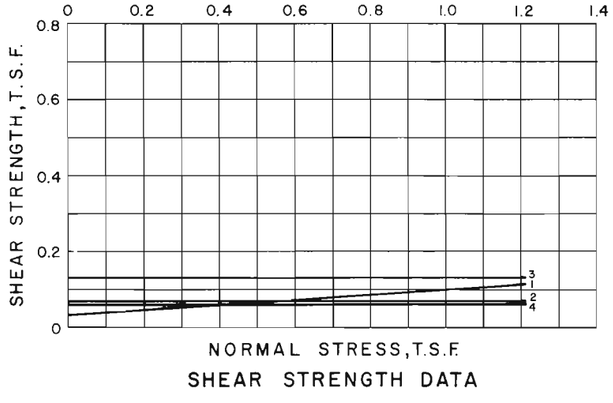








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-0.2	Q	3.3	0.035	C H
2	-9.0		0	0.07	C H
3	-11.8		0	0.130	C H
4	-17.8		0	0.065	C H

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES

UNDISTURBED SOIL BORING
NO. B-3U, SOIL TEST DATA

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

DATE: MARCH 1970

FILE NO. H-2-24414

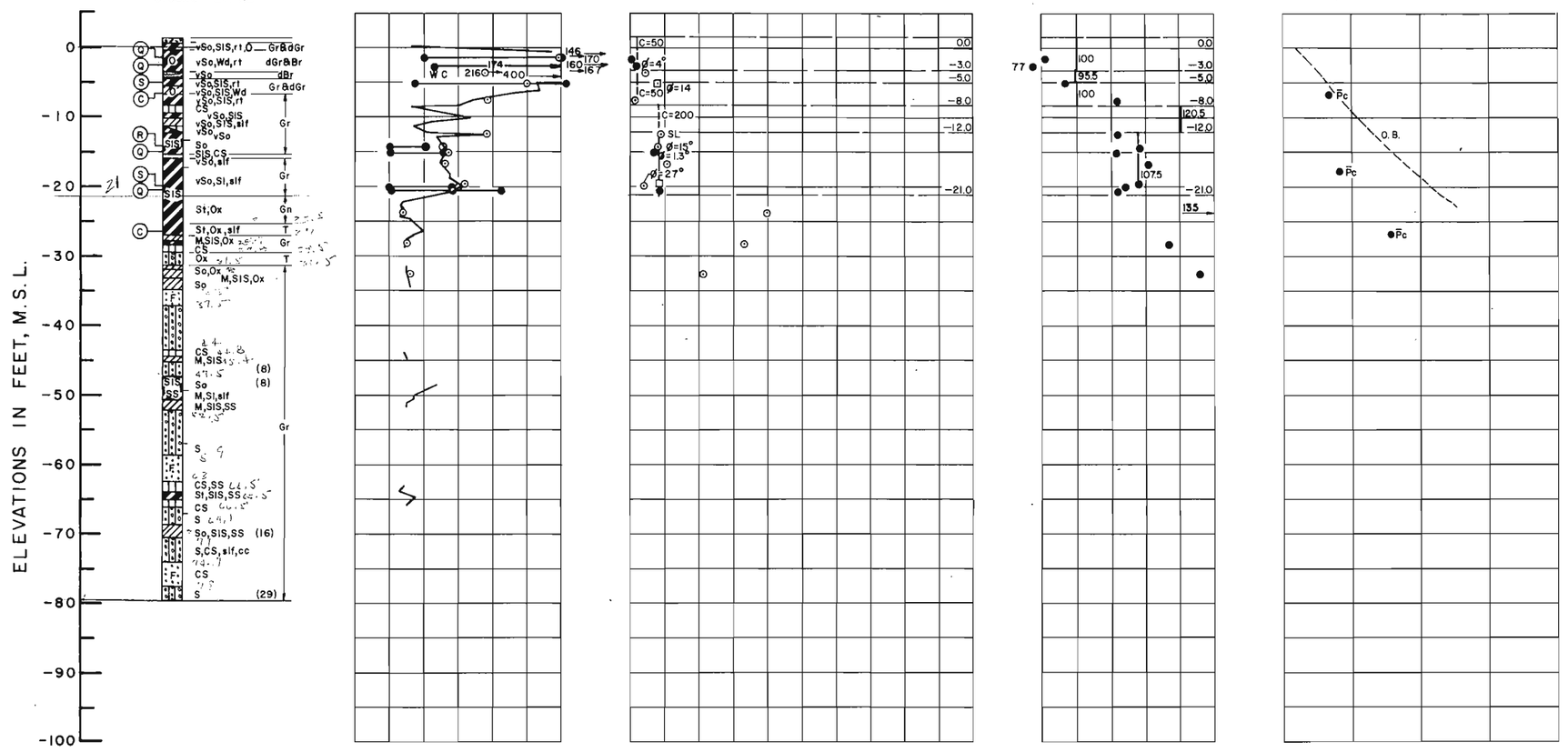
BORING NO. B-4U

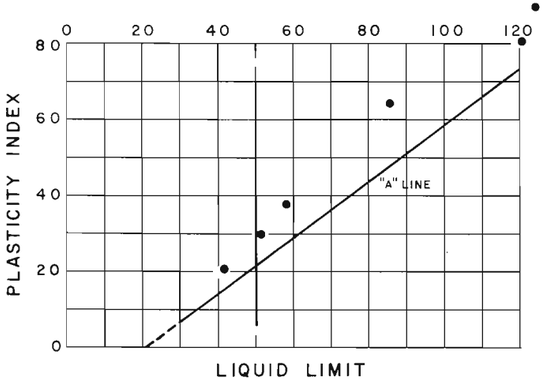
STA. 181 + 30

5–18 MAR. 1968

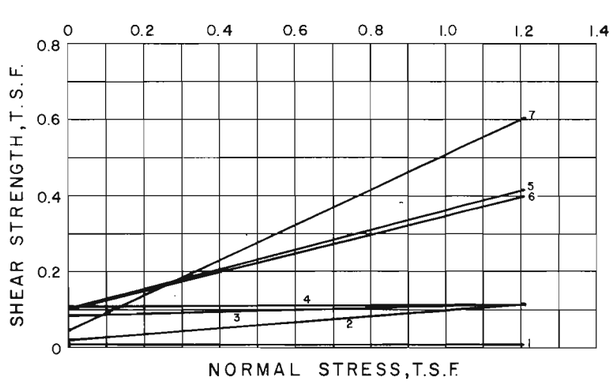
170' Rt. of B/L

Ground El. 1.2





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ϕ°	STRENGTH C, T.S.F.	CLASS
1	-1.7	Q	0	0.0075	CH
2	-2.6		4	0.023	CH
3	-15.2		1.3	0.083	CH
4	-20.6		0	0.108	CH
5	-14.5	R	15	0.10	CL
6	-5.1	S	14	0.10	CH
7	-20.0		27	0.05	CH

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

UNDISTURBED SOIL BORING NO. B-4U, SOIL TEST DATA

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

DATE: MARCH 1970

FILE NO. H-2-24414

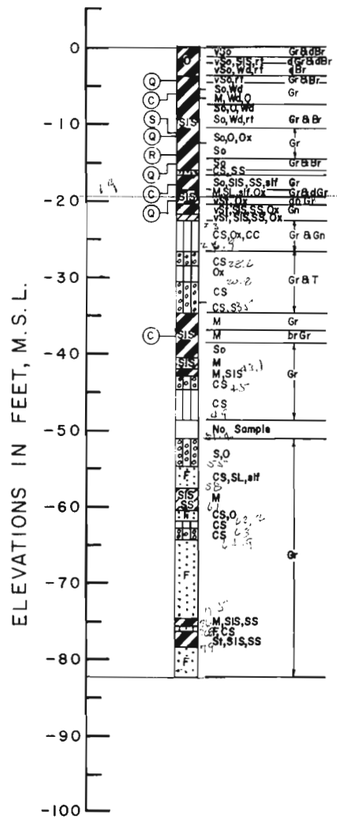
BORING NO. B-5U

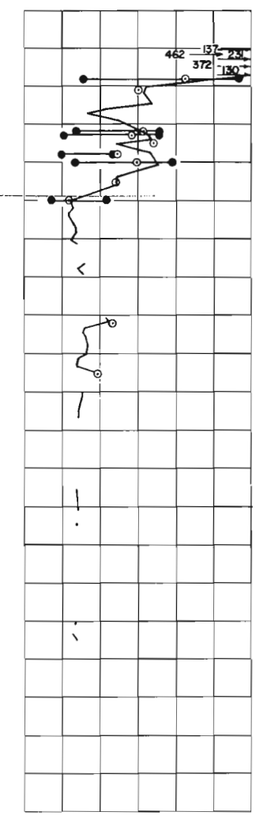
STA. 202 + 80

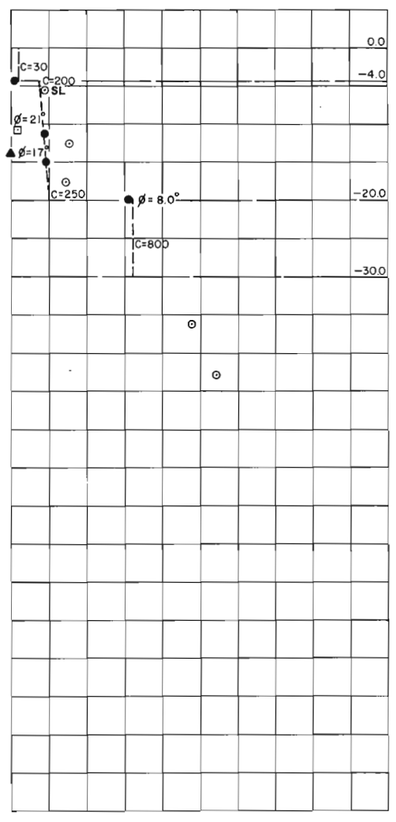
19-20 MAR. 1968

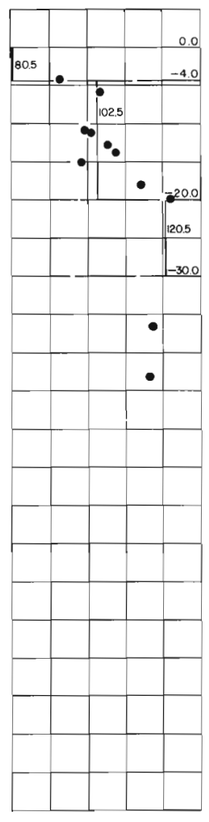
On B/L A

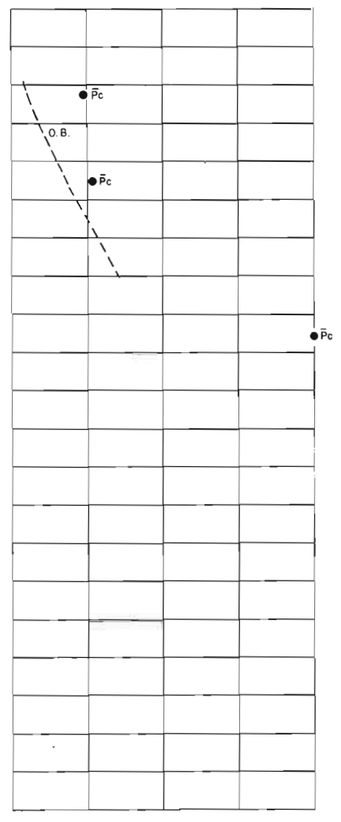
Ground El. 0.8

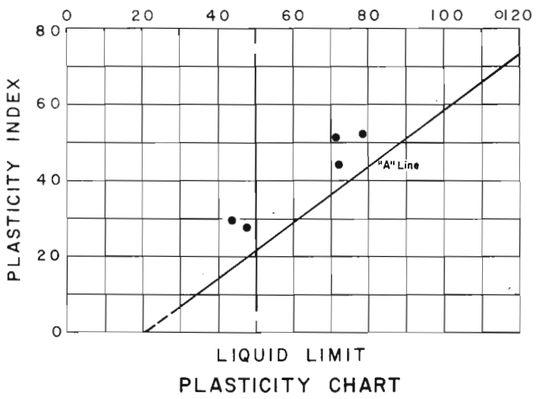


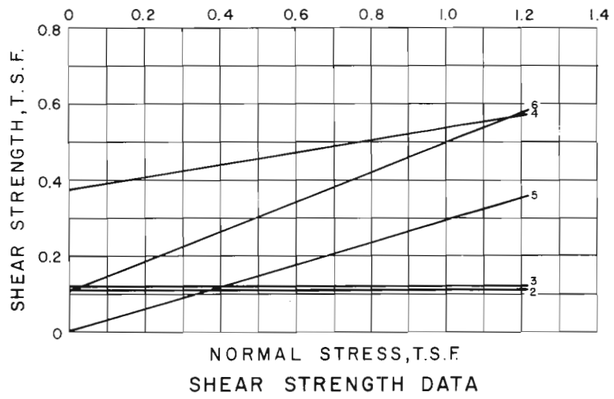












ENVELOPE NO.	EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-3.5	Q	0	0.008	CH
2	-11.0		0	0.110	CH
3	-14.4		0	0.120	CH
4	-19.2		8.0	0.380	CH
5	-13.2	R	17	0	CL
6	-10.5	S	21	0.12	CH

See Plate 26 For General Notes

FREDERIC R HARRIS, INC
CONSULTING ENGINEERS - NEW ORLEANS LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES

UNDISTURBED SOIL BORING
NO. B-5U, SOIL TEST DATA

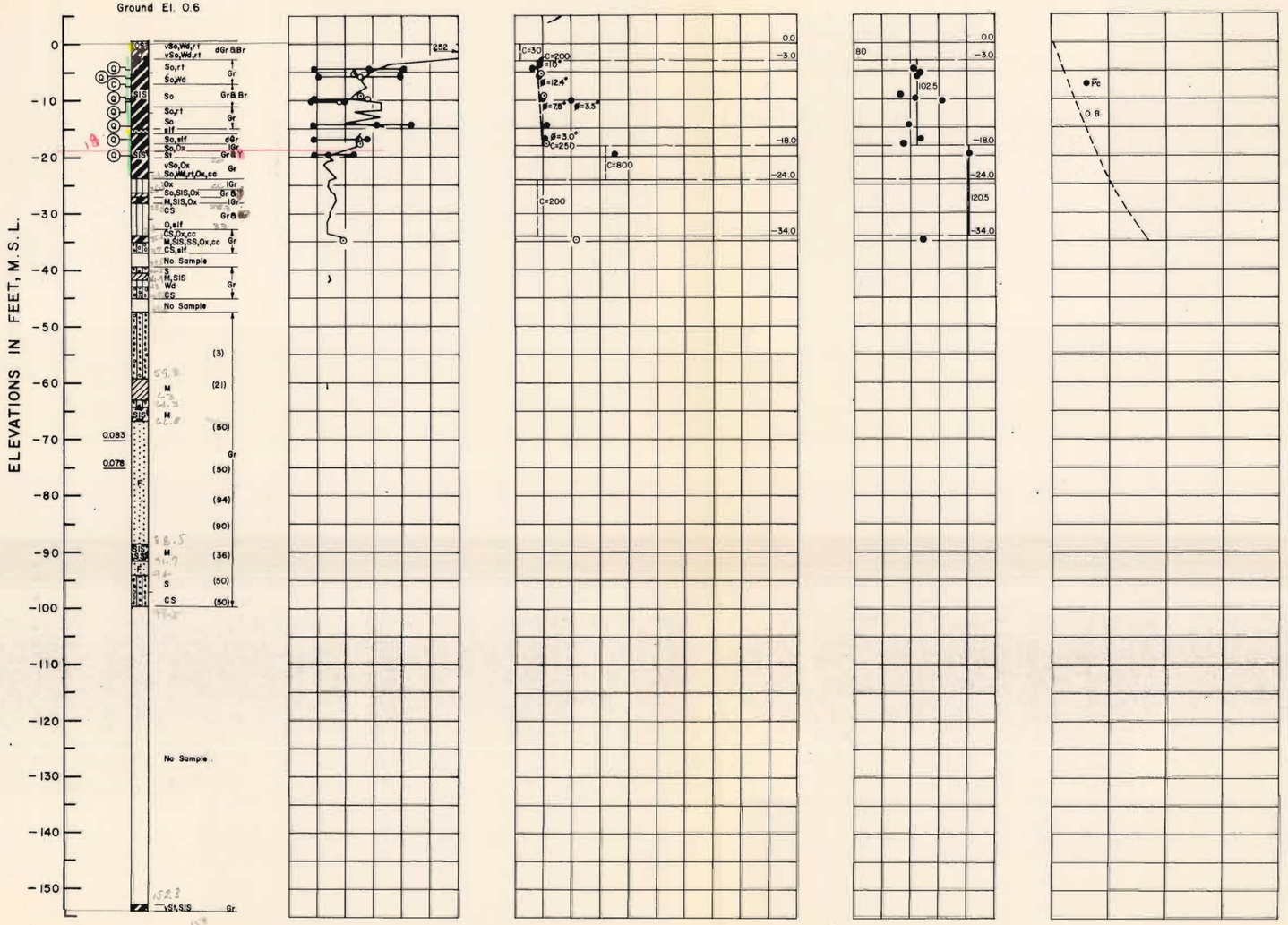
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

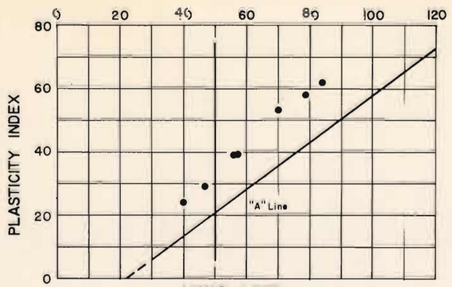
DATE. MARCH 1970

FILE NO. H-2-24414

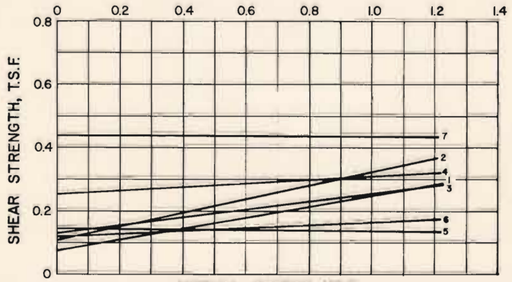
BORING NO. B-6U

STA. 210+30
2-7 MAY 1968
On B/L A
Ground El. 0.6





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	EL.	TYPE	STRENGTH ϕ°	STRENGTH C,T.S.F.	CLASS
1	-4.4	Q	10.0	0.075	C H
2	-5.8		12.4	0.105	C H
3	-9.8		7.5	0.125	C H
4	-10.1		3.5	0.250	C L
5	-14.4		0	0.140	C H
6	-16.9		3.0	0.115	C H
7	-19.7		0	0.435	C H

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

UNDISTURBED SOIL BORING NO. B-6U, SOIL TEST DATA

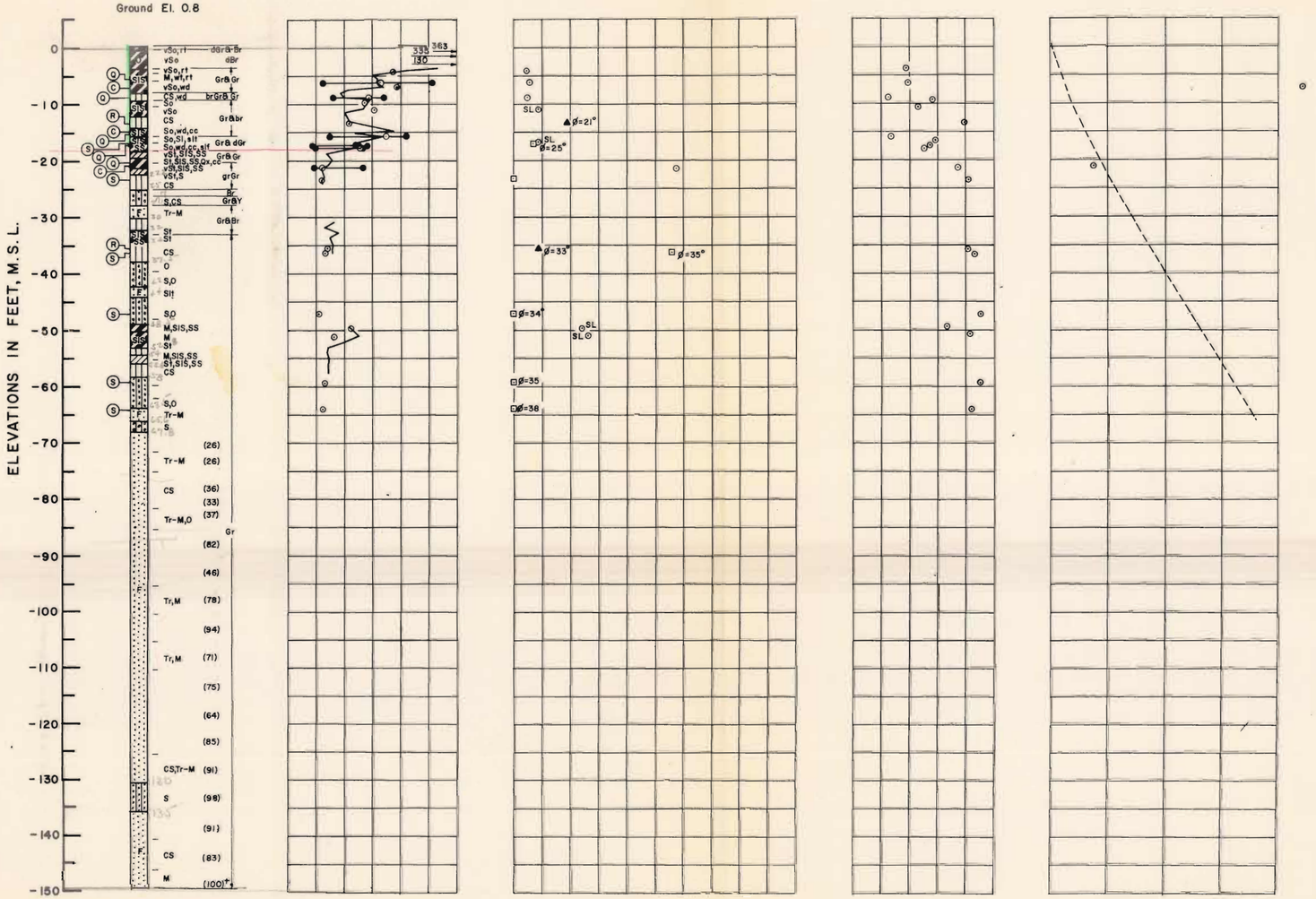
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

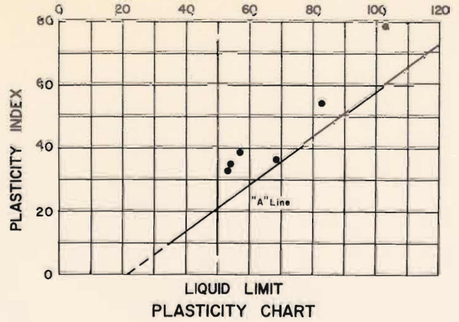
DATE: MARCH 1969 FILE NO. H-2-24414

PLATE 33

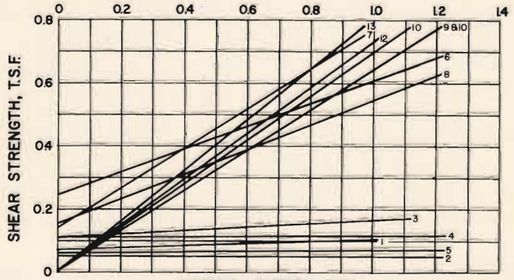
BORING NO. B-7U

STA. 217+50
29 FEB.– 5 MAR. 68
On B/L A
Ground El. 0.8





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C,T.S.F.	CLASS
1	5.7	Q	3.0	0.074	C H
2	8.9		0	0.055	C H
3	15.5		3.0	0.113	C H
4	17.4		0	0.105	C H
5	20.5		1.5	0.721	C H
6	-12.8	R	21	0.240	C L
7	-35.2		35	0.110	S M
8	-17.0	S	25	0.090	C H
9	-24.0		33	0	M L
10	-36.2		35	0	S M
11	-47.0		34	0	S M
12	-59.2		35	0	S M
13	-63.9		34.5	0	S M

See Plate 26 For General Notes

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-7U, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 34

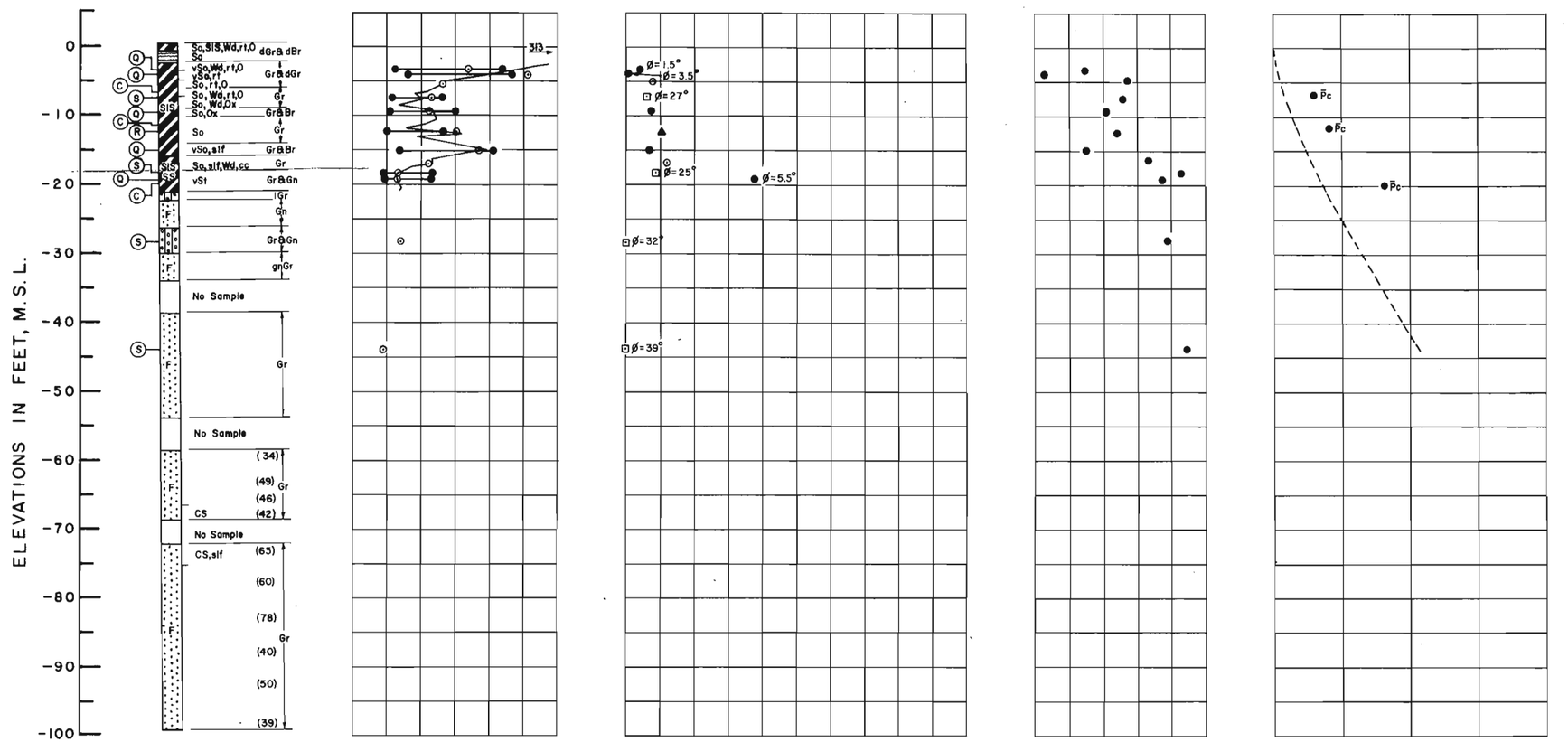
BORING NO. B-8U

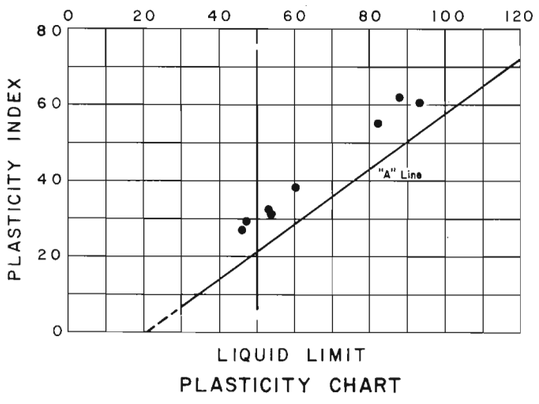
STA. 217+50

27-29 FEB. 1968

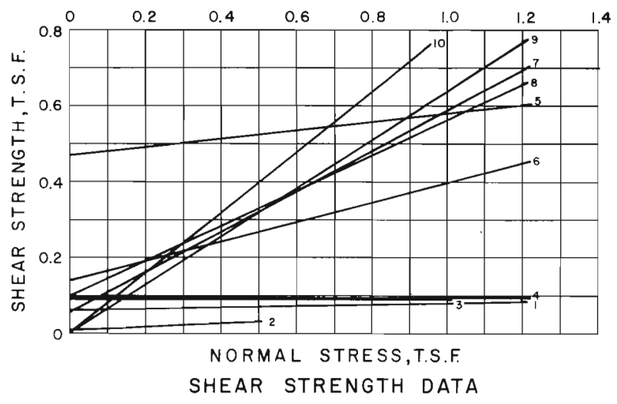
420' Rt. Of B/L

Ground El. 0.9





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	EL.	TYPE	STRENGTH Ø°	C, T.S.F.	CLASS
1	-2.6	Q	1.5	0.052	C H
2	-3.6		3.5	0.008	C H
3	-9.3		0	0.095	C H
4	-14.9		0	0.085	C H
5	-19.0		5.5	0.472	C H
6	-12.1	R	0.14	0.130	C H
7	-7.1	S	27	0.080	C H
8	-18.4		25	0.110	C L
9	-28.1		32	0	S M
10	-44.1		39	0	S M

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 - DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

UNDISTURBED SOIL BORING
NO. B-8U SOIL TEST DATA

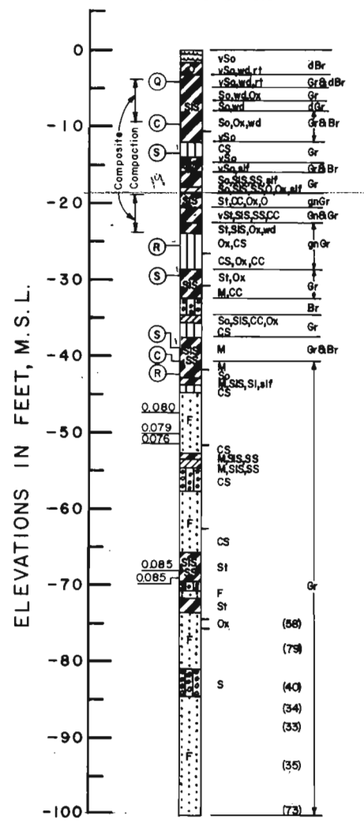
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

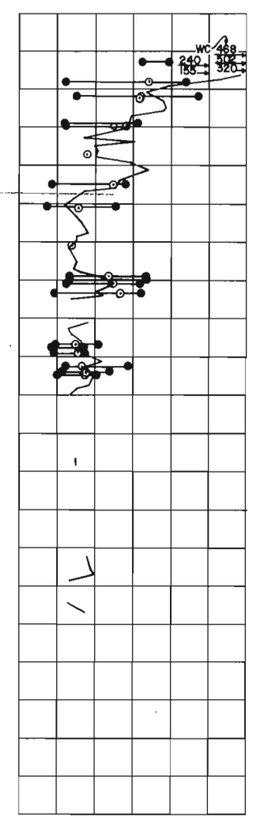
DATE: MARCH 1970

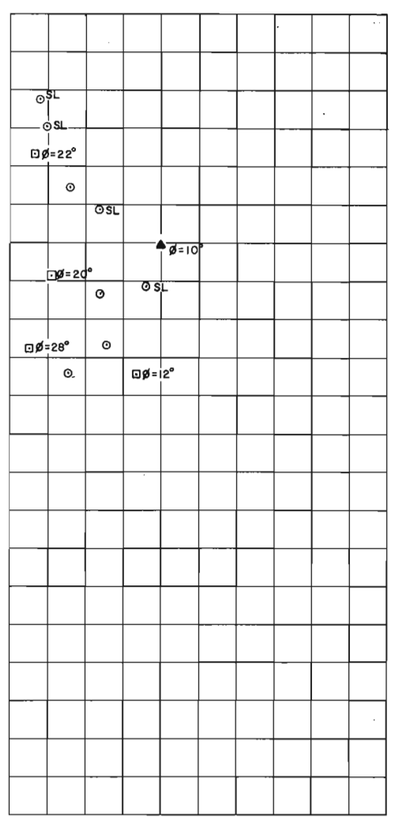
FILE NO. H-2-24417

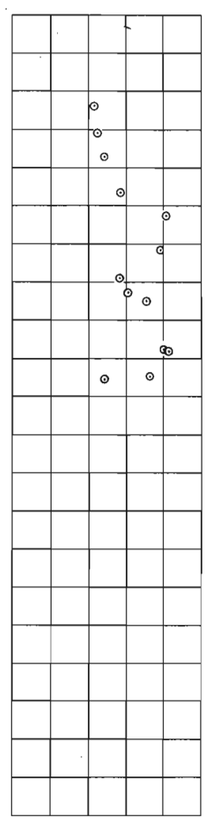
BORING NO. B-8AU

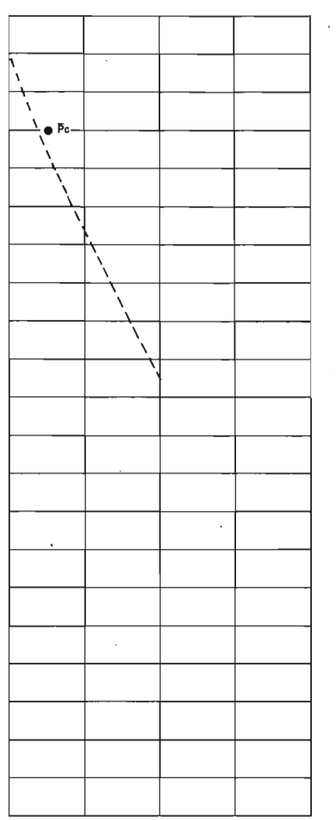
STA. 218 + 75
5–7 MAR. 1968
200' Lt. Of B/L
Ground El. 0.9

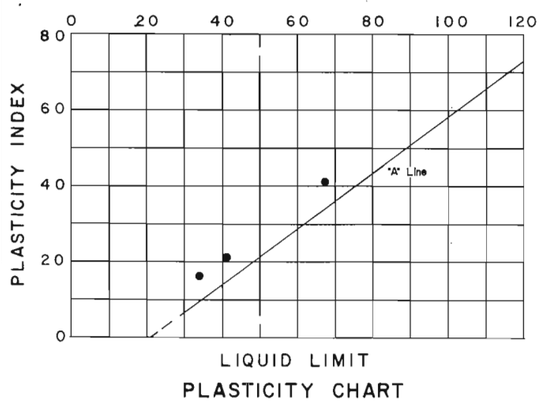




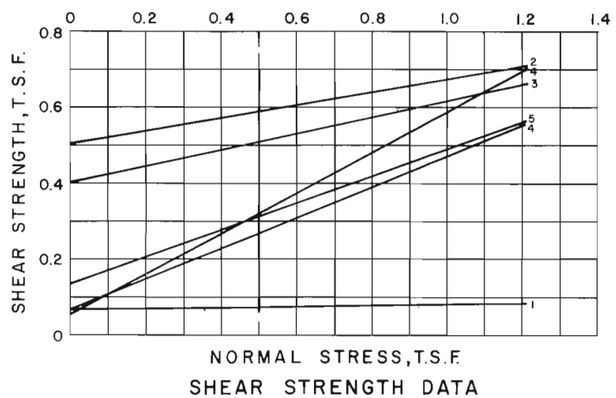








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-3.3	Q	1.5	0.052	C H
2	-24.8	R	10	0.500	M L
3	-41.4		12	0.410	C L
4	-12.8	S	22	0.070	C H
5	-28.9		20	0.130	C H
6	-38.4		28	0.060	C H

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 – DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM
UNDISTURBED SOIL BORING
NO. B-8AU SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24417

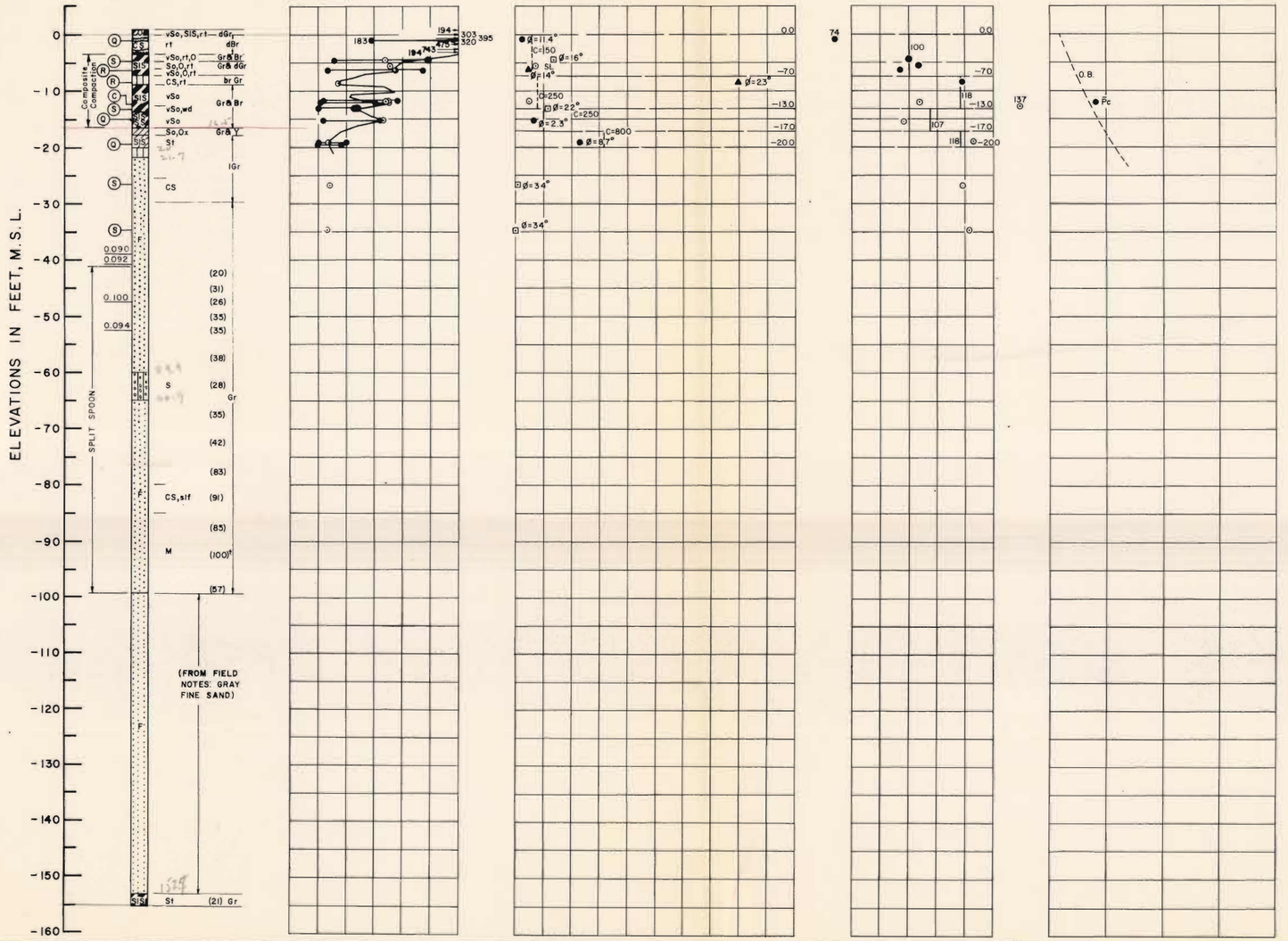
PLATE 36

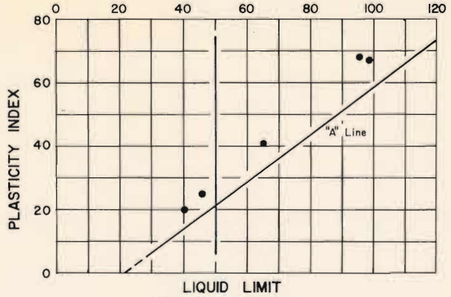
BORING NO. B-9U

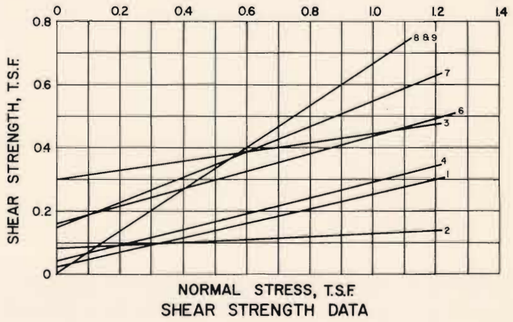
STA. 225+60

11-13 MARCH 1968

Ground El. 1.0







ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø	STRENGTH C, T.S.F.	CLASS
1	1.9	Q	-11.4°	0.031	C H
2	16.0	Q	-23°	0.080	C H
3	20.0	Q	-8.7°	0.290	C L
4	7.3	R	-14°	0.050	C H
5	9.6	R	-23°	1.000	M L
6	5.5	S	-16°	0.170	C H
7	14.0	S	-22°	0.140	C L
8	27.8	S	-34°	0.010	S M
9	35.8	S	-34°	0	S P

See Plate 26 For General Notes

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

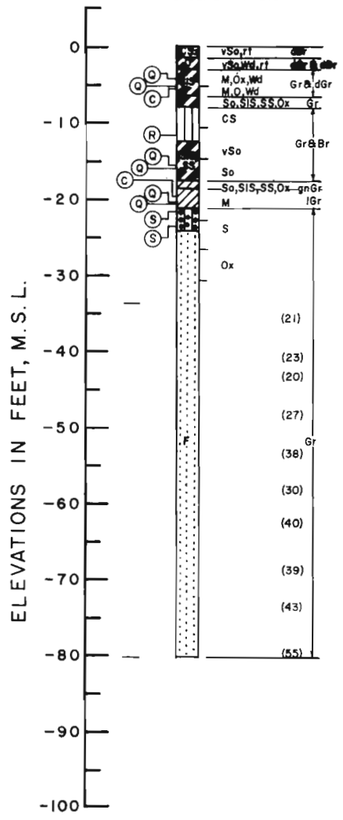
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-9U, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

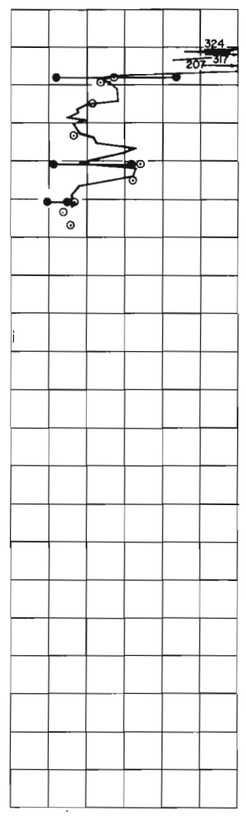
DATE MARCH 1970 FILE NO. H-2-24414

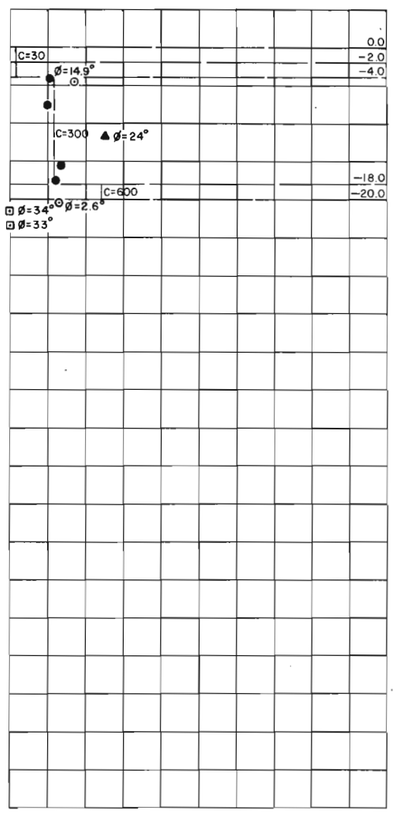
PLATE 37

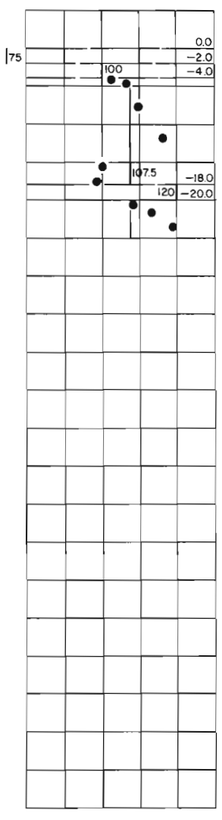
BORING NO. B-10U

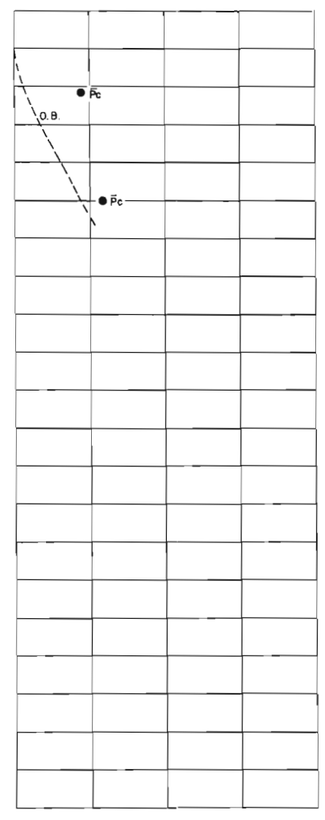
STA. 235+60
14-15 MAR. 1968
On B/L A
Ground El. 0.9



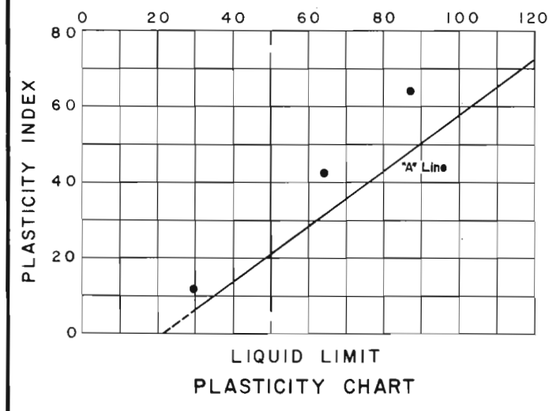


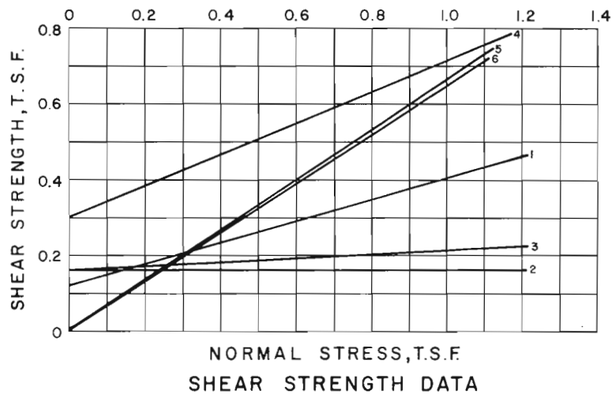






See Plate 26 For General Notes





ENVELOPE NO.	EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-4.5	Q	14.9	0.130	C H
2	-15.1		0	0.157	C H
3	-19.9		2.6	0.160	C L
4	-11.1	R	24	0.310	M L
5	-21.1	S	34	0	S M
6	-23.1		33	0	S P

FREDERIC R HARRIS INC
CONSULTING ENGINEERS - NEW ORLEANS LA

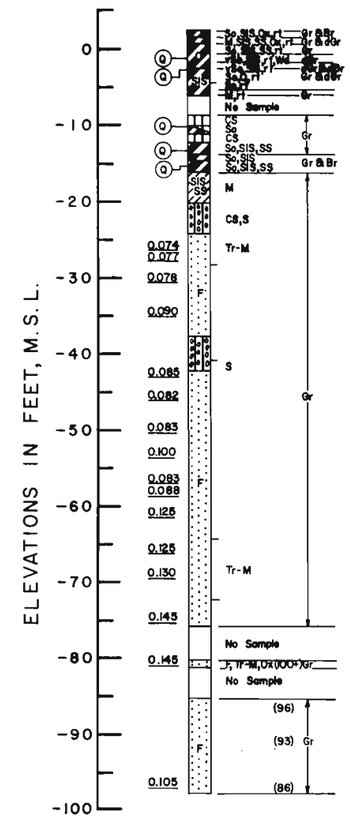
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-10U, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970
FILE NO. H-2-24414

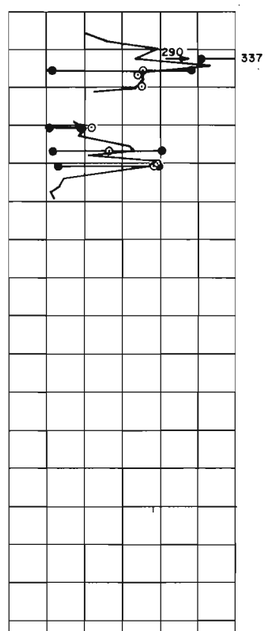
PLATE 38

BORING NO. B-IIU

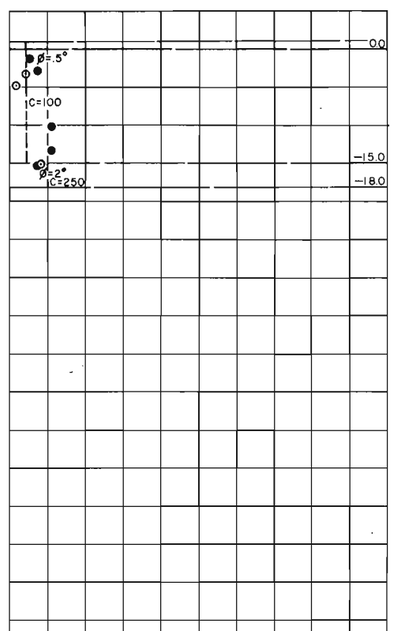
STA. 239 + 80
26 – 28 MAR. 1968
475' Rt. of B/L
Ground El. 2.1



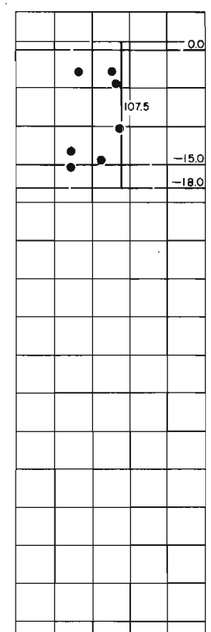
WATER CONTENT
(% Dry Weight)



SHEAR STRENGTH "C"
(Pounds /Sq. Ft.)

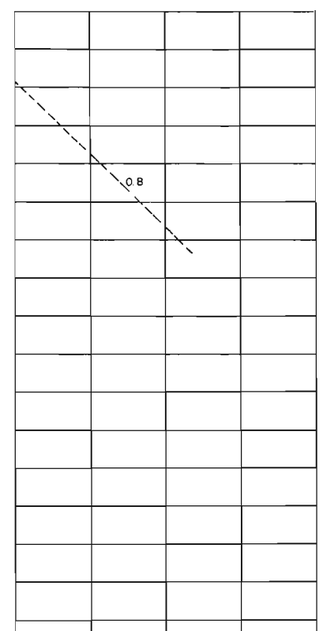


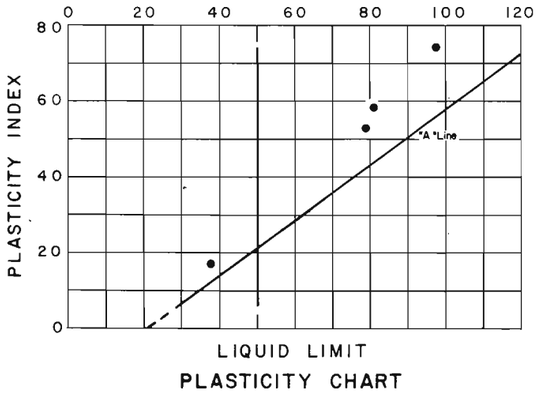
WET DENSITY
(Pounds / Cu. Ft.)



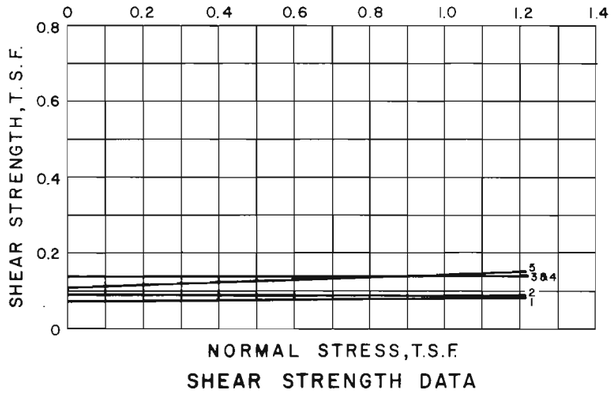
70

$\bar{\sigma}$ PRESSURE
(Tons / Sq. Ft.)





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-1.6	Q	0.5	0.071	C H
2	-3.1		0	.095	C H
3	-10.7		0	.14	C H
4	-13.9		0	.14	C H
5	-15.7		2	.094	C H

See Plate 26 for General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
UNDISTURBED SOIL BORING
NO. B-IIU, SOIL TEST DATA
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

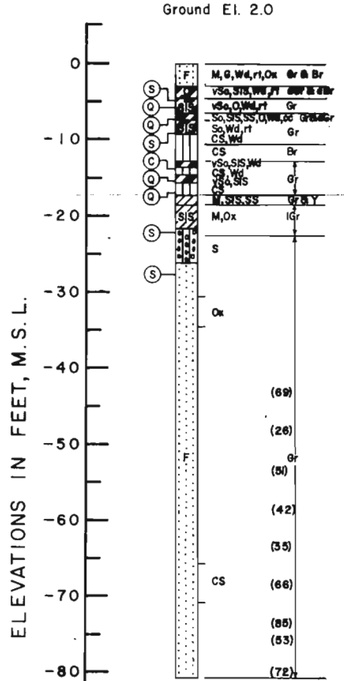
BORING NO. B-12U

STA. 244+11

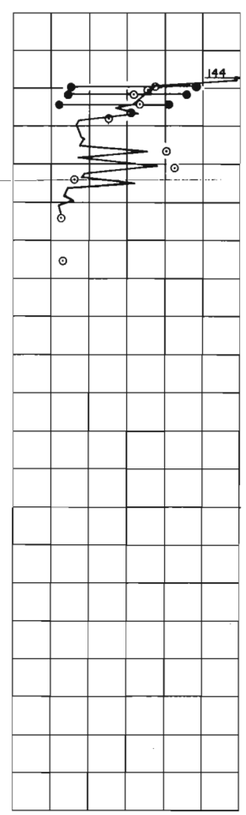
13-14 MAR. 1968

On B/L A

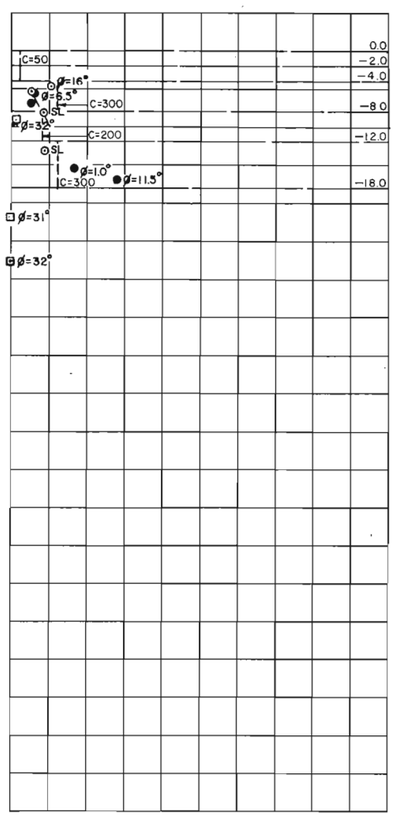
Ground El. 2.0



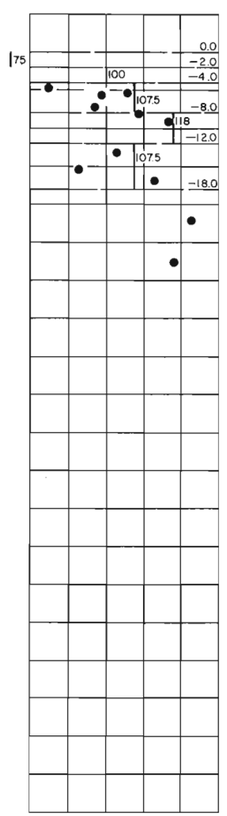
WATER CONTENT
(% Dry Weight)



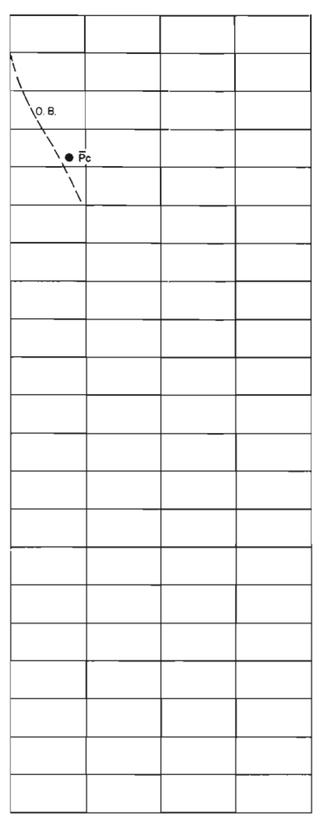
SHEAR STRENGTH "C"
(Pounds / Sq. Ft.)

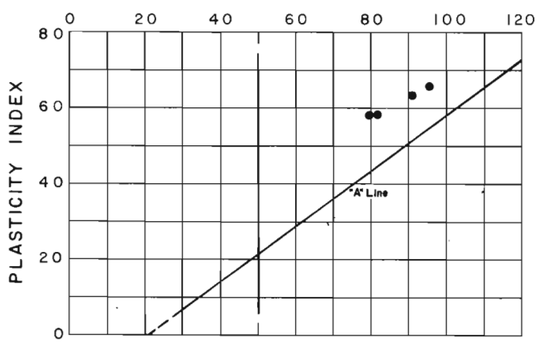


WET DENSITY
(Pounds / Cu. Ft.)

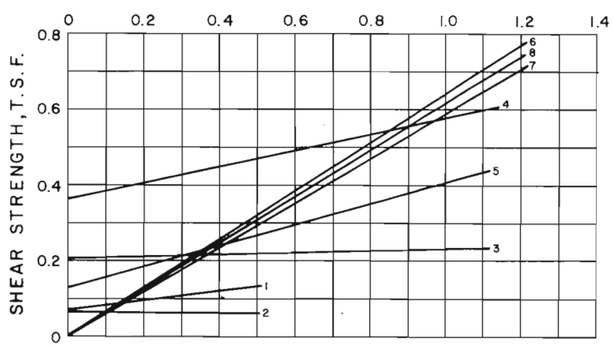


$\bar{\sigma}$ PRESSURE
(Tons / Sq. Ft.)





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-3.9	Q	6.5	0.075	C H
2	-5.2		0	0.070	C H
3	-13.3		1.0	0.21	C H
4	-15.0		11.5	0.35	M L
5	-2.9	S	16	0.13	C H
6	-7.1		32	0.02	M L
7	-20.0		31	0	S M
8	-25.8		32	0	S M

See Plate 26 for General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

UNDISTURBED SOIL BORING NO. B-12U, SOIL TEST DATA

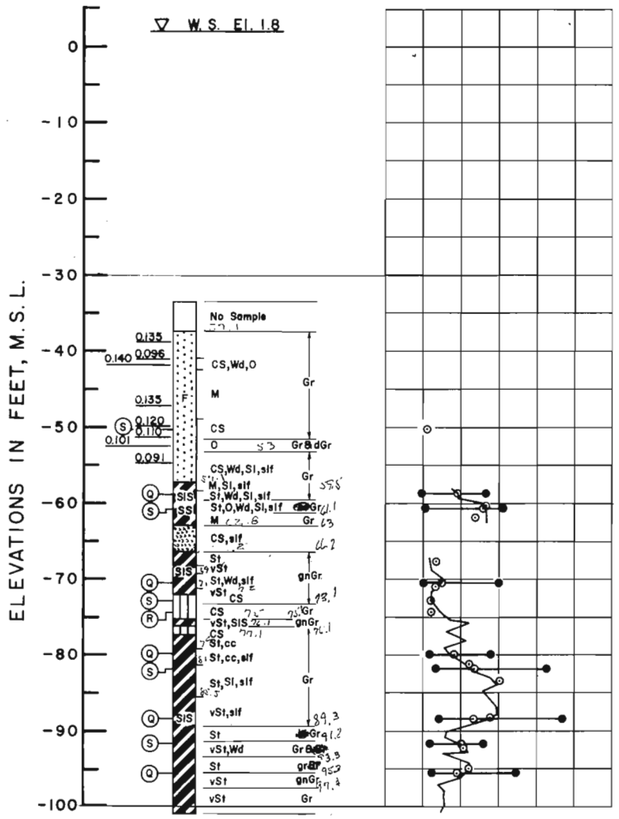
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO. H-2-24414

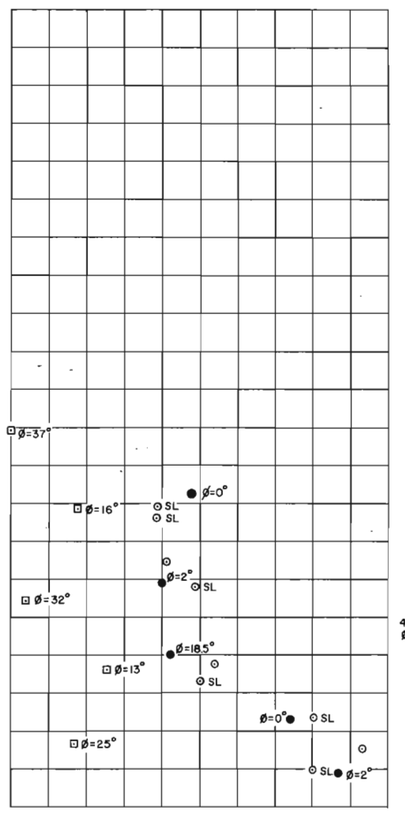
BORING NO. B-13U

STA. 36+00
8-13 MAY. 1968
600' Rt. Of B/L B
Ground El. -33.7
▽ W.S. El. 1.8

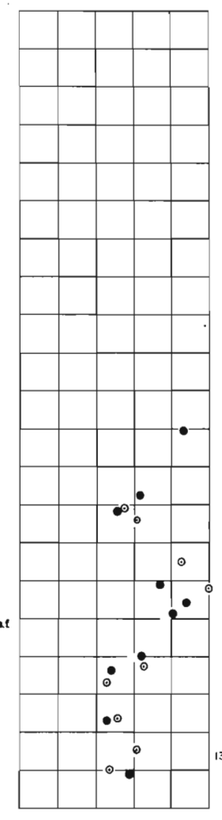


WATER CONTENT
(% Dry Weight)

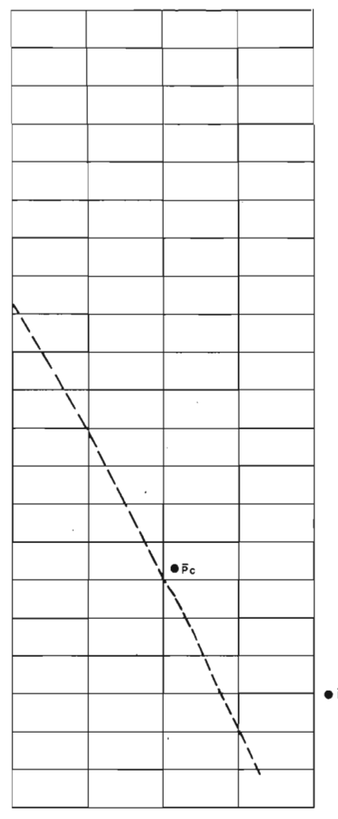
SHEAR STRENGTH
(Pounds / Sq. Ft.)

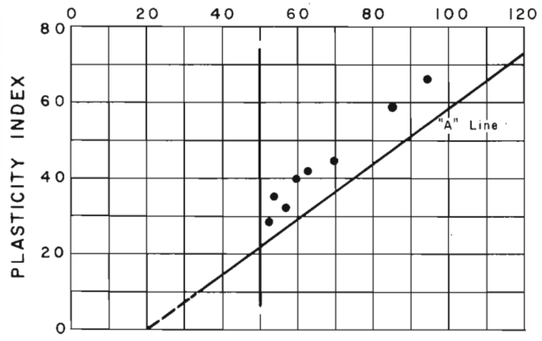


WET DENSITY
(Pounds / Cu. Ft.)

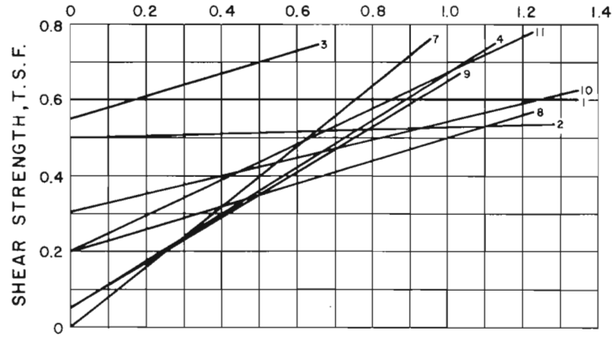


$\bar{\sigma}$ PRESSURE
(Tons / Sq. Ft.)





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-59.0	Q	0	0.600	C H
2	-70.5		2	0.500	C H
3	-80.0		18.5	0.530	C H
4	-88.5		0	0.930	C H
5	-95.2		2	1.090	C H
6	-74.1	R	29	2.400	M L
7	-50.2	S	37	0	S M
8	-60.8		16	0.220	C H
9	-72.7		32	0.050	C L
10	-82.0		13	0.320	C H
11	-91.5		25	0.210	C H

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 — DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

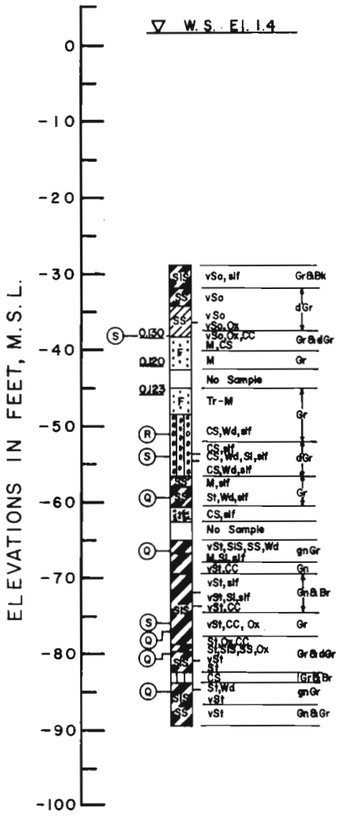
UNDISTURBED SOIL BORING
NO. B-13U SOIL TEST DATA

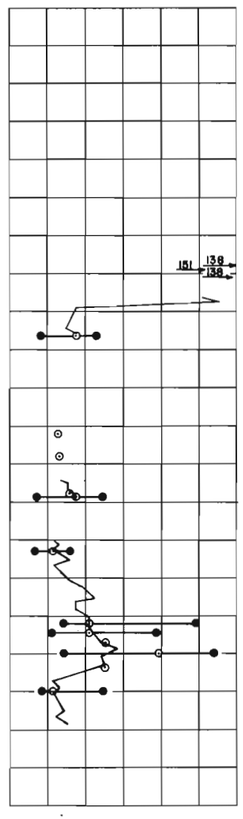
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

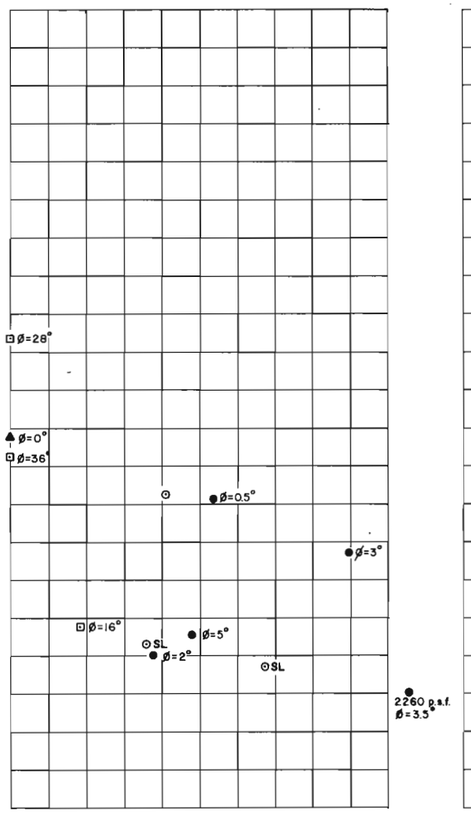
DATE: MARCH 1970 FILE NO. H-2-24417

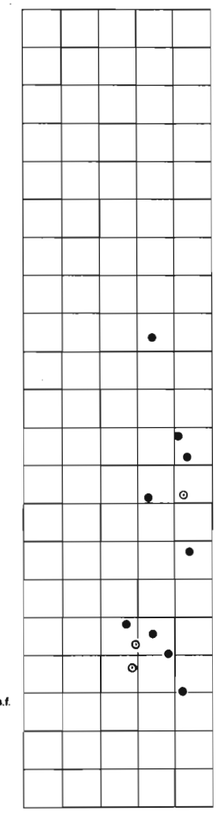
BORING NO. B-14U

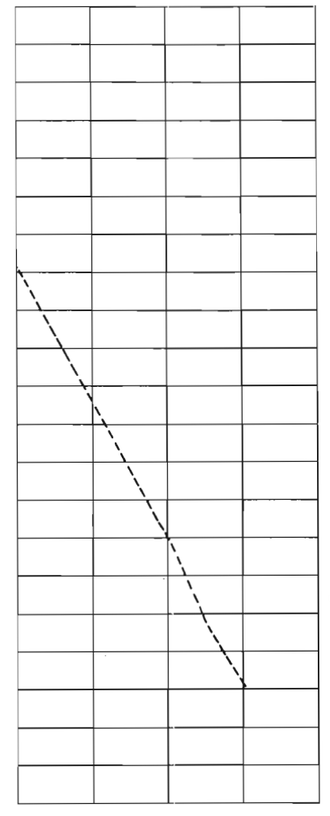
STA. 36+00
2-8 APR. 1968
200' Rt. Of B/L B
Ground El. -29.0
▽ W.S. El. 1.4

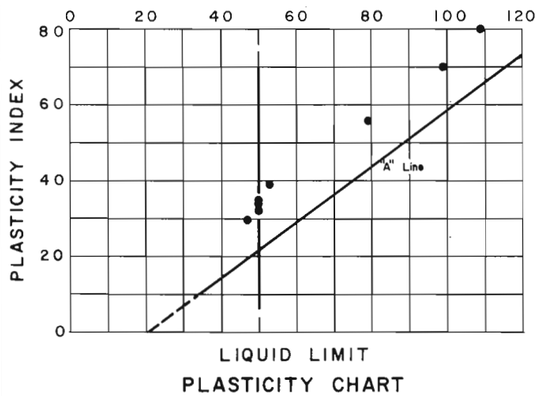




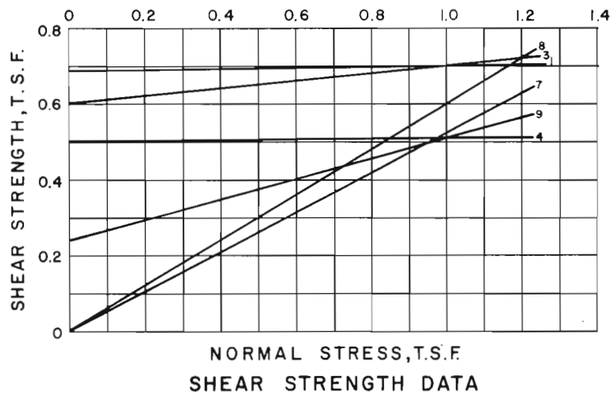








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-59.3		0.5	0.670	C H
2	-66.2		3.0	1.120	C H
3	-77.0	Q	5.0	0.600	C H
4	-80.0		2.0	0.470	C H
5	-85.0		3.5	1.130	C H
6	-51.0	R	0	0	S P
7	-38.0		28	0	C H
8	-54.0	S	36	0	S P
9	-76.0		16	0.230	C H

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 - DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

UNDISTURBED SOIL BORING
NO. B-14U SOIL TEST DATA

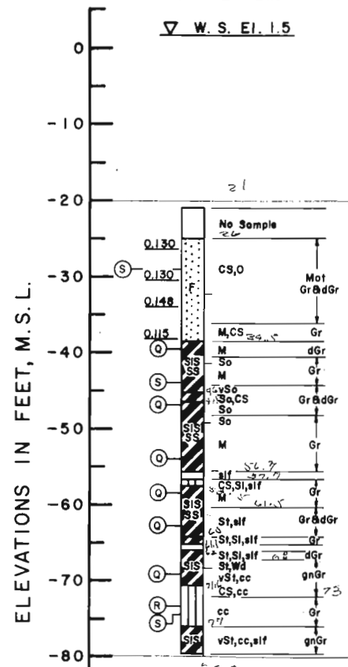
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

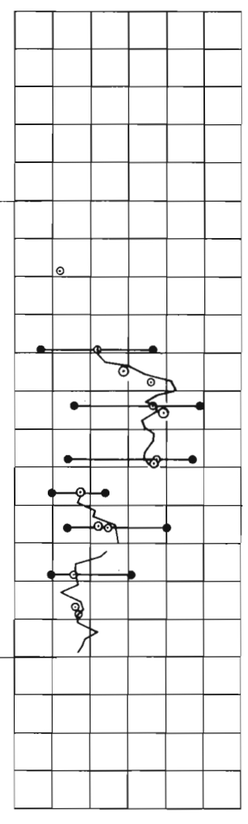
DATE: MARCH 1970 FILE NO. H-2-24417

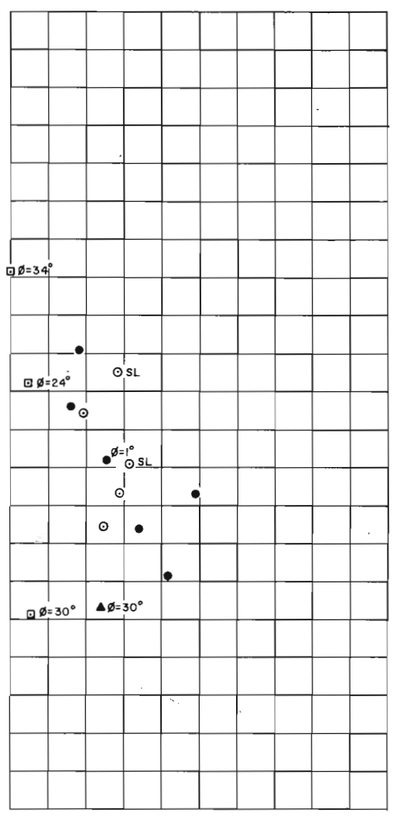
BORING NO. B-15U

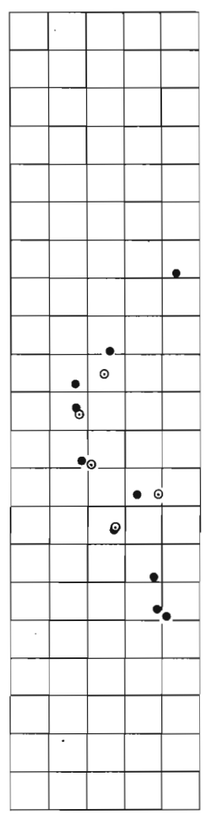
STA. 46+00
15-16 MAY, 1968
300' Rt. Of B/L B
Ground El. -21.0

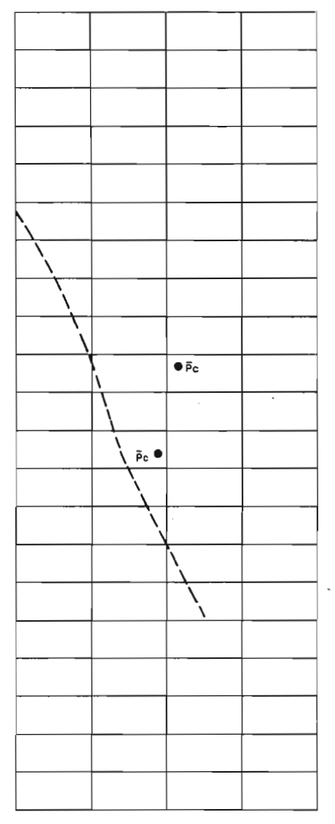
▽ W. S. El. 1.5

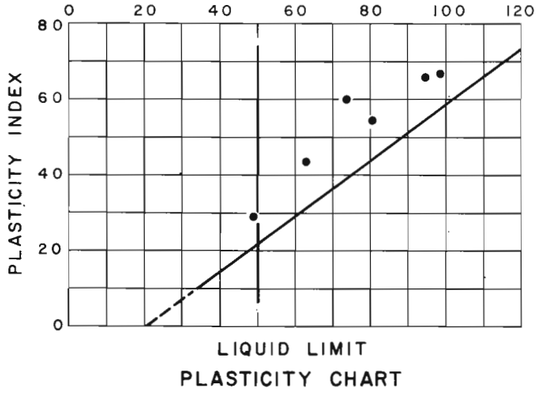




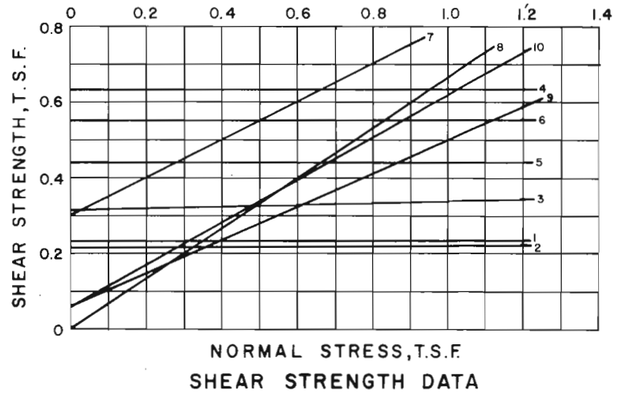








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-39.8	Q	0	0.230	C H
2	-47.0		0	0.205	C H
3	-54.0		1.0	0.320	C H
4	-58.9		0	0.615	C L
5	-63.0		0	0.430	C H
6	-69.0		0	0.525	C H
7	-73.5	R	30	0.300	M L
8	-29.2	S	34	0	S M
9	-44.0		24	0.060	C H
10	-74.5		30	0.070	C L

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 - DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

UNDISTURBED SOIL BORING
NO. B-15U SOIL TEST DATA

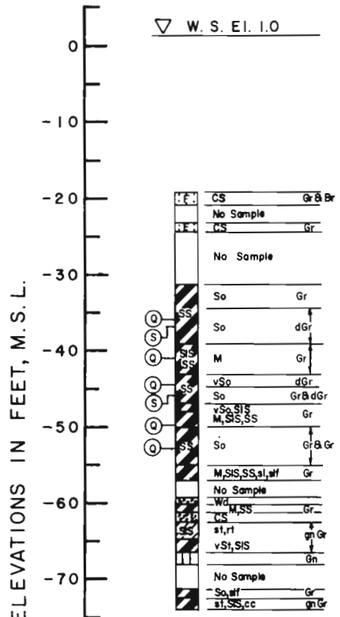
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE. MARCH 1970 FILE NO. H-2-24417

BORING NO. B-16U

STA. 46 + 00
11-15 APRIL 1968
400' Rt. of B/L A-B
Ground El.-19.5

▽ W. S. El. 1.0



ELEVATIONS IN FEET, M.S.L.

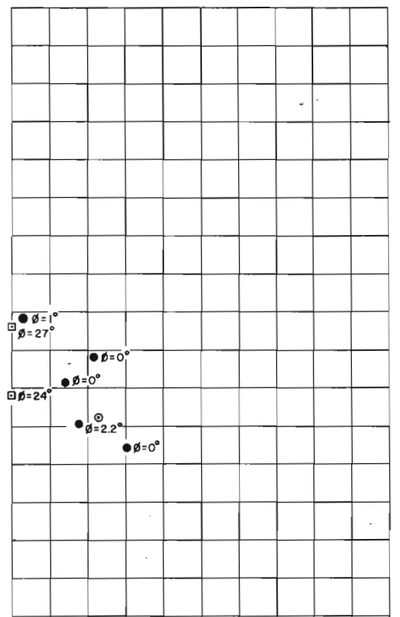
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100

WATER CONTENT
(% Dry Weight)

0 40 80 120

SHEAR STRENGTH
(Pounds / Sq. Ft.)

0 500 1000 1500 2000 2500

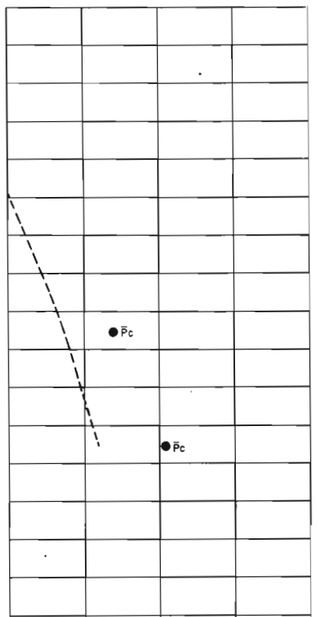


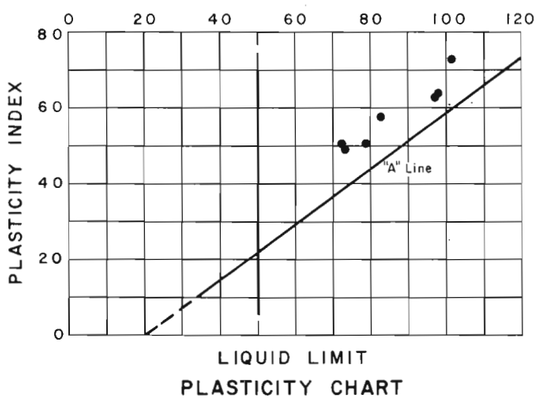
WET DENSITY
(Pounds / Cu. Ft.)

80 100 120

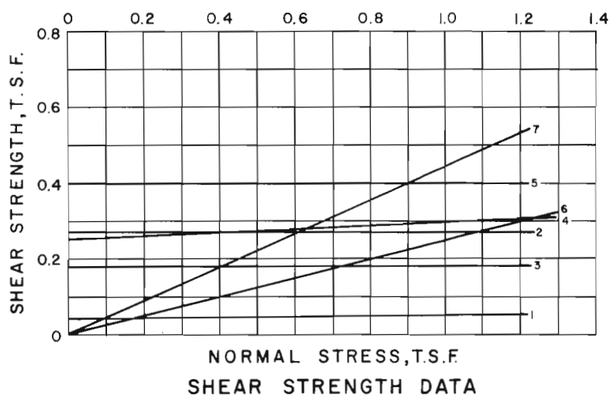
$\bar{\sigma}$ PRESSURE
(Tons / Sq. Ft.)

0 0.5 1.0 1.5 2.0





PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH ø°	STRENGTH C, T.S.F.	CLASS
1	-35.9	Q	1	0.037	CH
2	-40.8		0	0.275	CH
3	-44.5		0	0.180	CH
4	-49.7		2.2	0.225	CH
5	-52.8		0	0.380	CH
6	-36.6	S	27	0	CH
7	-45.6		24	0	CH

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 — DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

UNDISTURBED SOIL BORING
NO. B-16U, SOIL TEST DATA

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

DATE: MARCH 1970 FILE NO. H-2-24417

BORING NO. B-17U

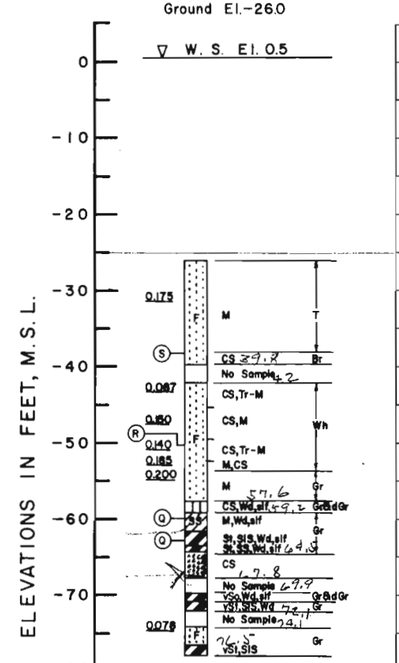
STA. 60+00

5-10 APRIL 1968

600' Rt. Of B/L B

Ground El.-26.0

▽ W. S. El. 0.5



ELEVATIONS IN FEET, M.S.L.

0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100

WATER CONTENT
(% Dry Weight)

0 40 80 120

SHEAR STRENGTH
(Pounds / Sq. Ft.)

0 500 1000 1500 2000 2500

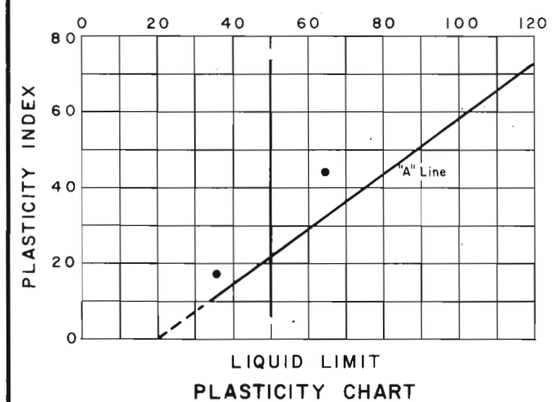
Ø=37°
Ø=0°
Ø=4°
Ø=7°

WET DENSITY
(Pounds / Cu. Ft.)

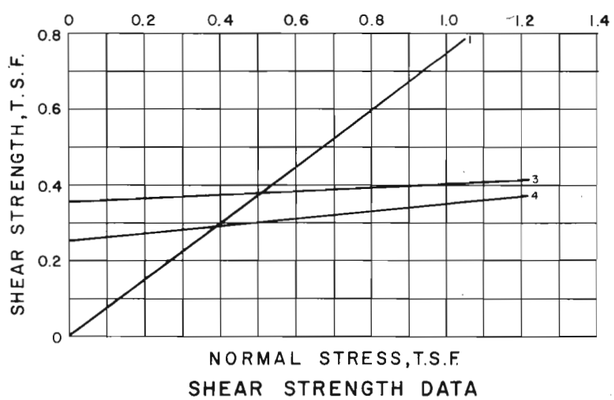
80 100 120

$\bar{\sigma}$ PRESSURE
(Tons / Sq. Ft.)

0 0.5 1.0 1.5 2.0



PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	-38.3	S	37	0	SM
2	-50.6	R	0	0	SP
3	-60.0	Q	4.0	0.35	CL4
4	-63.0		7.0	0.22	CL4

See Plate 26 For General Notes

FREDERIC R HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 - DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

UNDISTURBED SOIL BORING NO. B-17U, SOIL TEST DATA

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

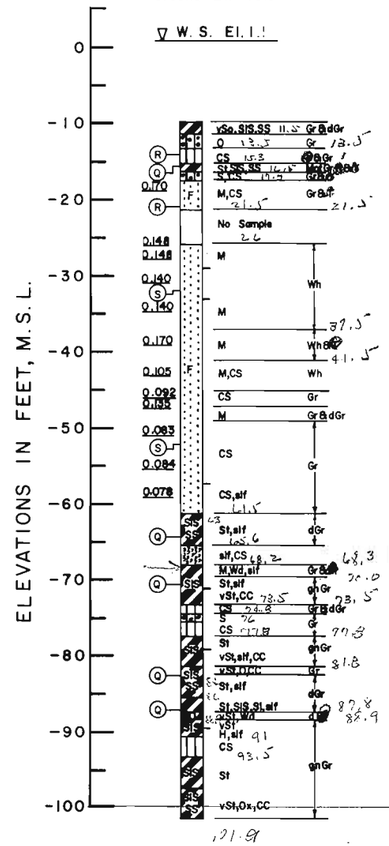
DATE MARCH 1970

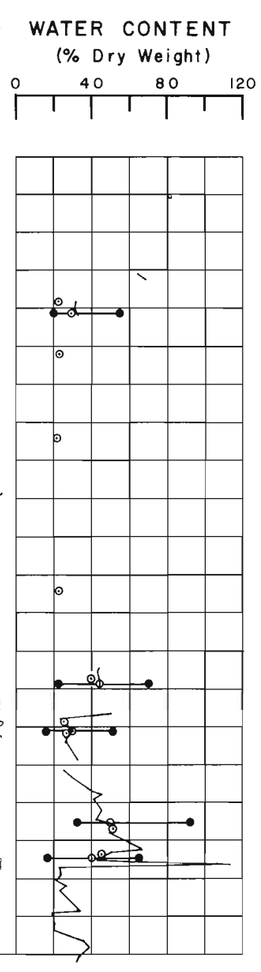
FILE NO. H-2-24417

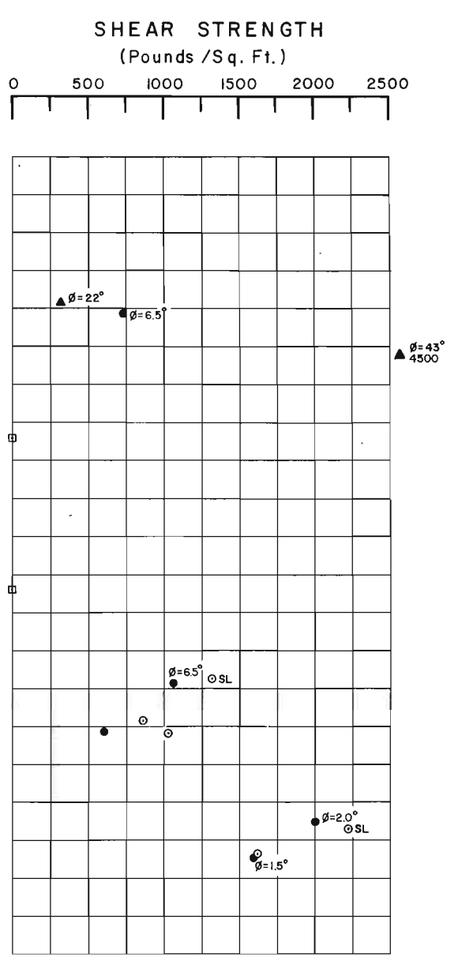
BORING NO. B-18U

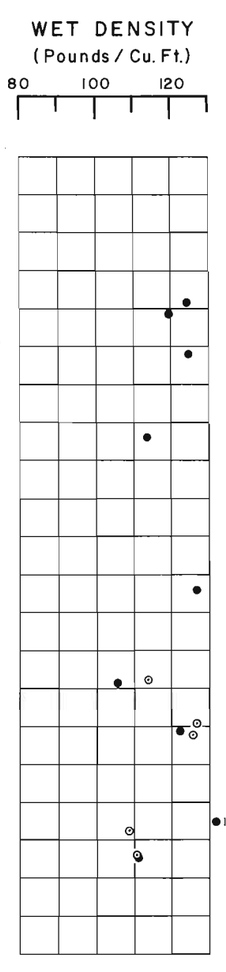
STA. 76+00
14–15 MAY 1968
700' Rt. Of B/L B
Ground El. –10.0

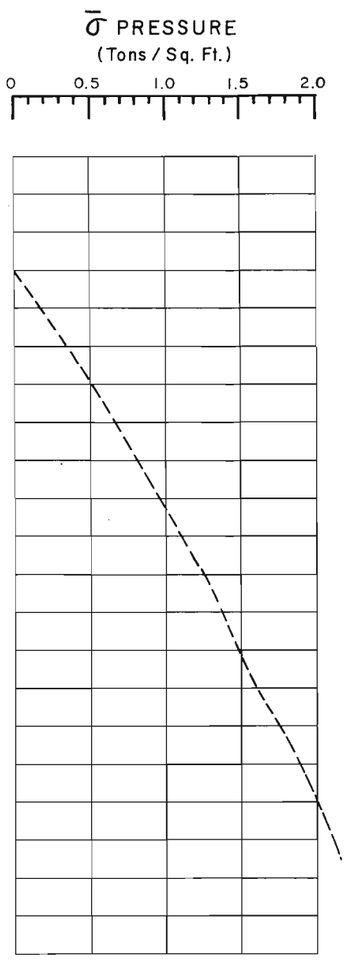
▽ W. S. El. 1.1

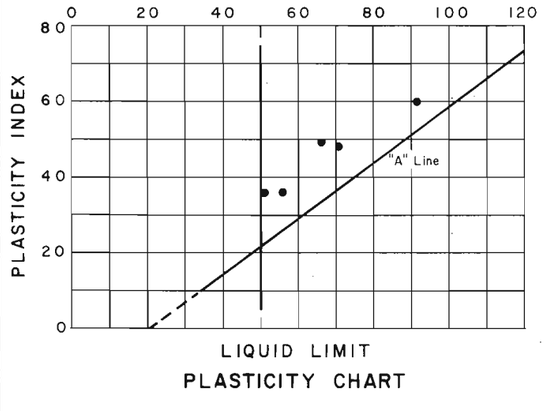




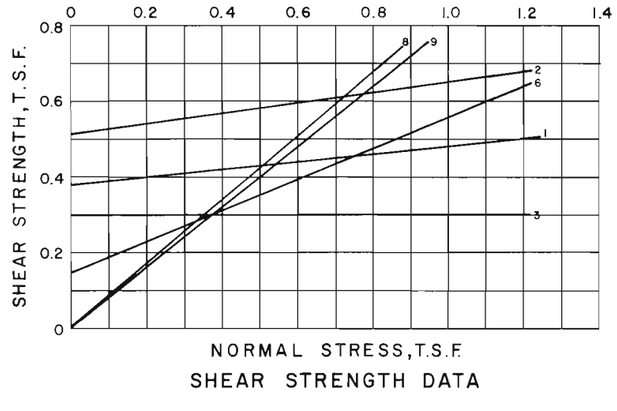








PLASTICITY CHART



SHEAR STRENGTH DATA

ENVELOPE NO.	EL.	TYPE	STRENGTH Ø°	STRENGTH C, T.S.F.	CLASS
1	–15.8	Q	6.5	0.370	C H
2	–64.5		6.5	0.530	C H
3	–70.6		0°	0.300	C H
4	–82.7		2.0	1.000	C H
5	–87.3		1.5	0.800	C H
6	–14.3	R	22	0.160	S M
7	–21.2		43	4.500	S P
8	–32.4	S	40	0	S P
9	–52.4		39	0	S P

See Plate 26 For General Notes

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 6 – DETAIL DESIGN
RIGOLETS CONTROL STRUCTURE AND CLOSURE DAM

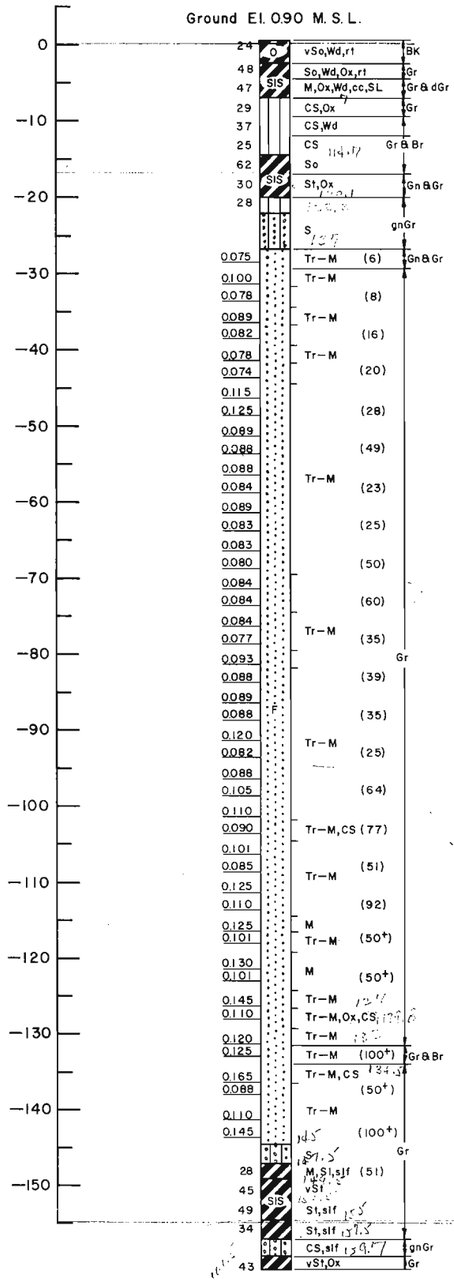
UNDISTURBED SOIL BORING NO. B-18U, SOIL TEST DATA

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

DATE: MARCH 1970 FILE NO. H-2-24417

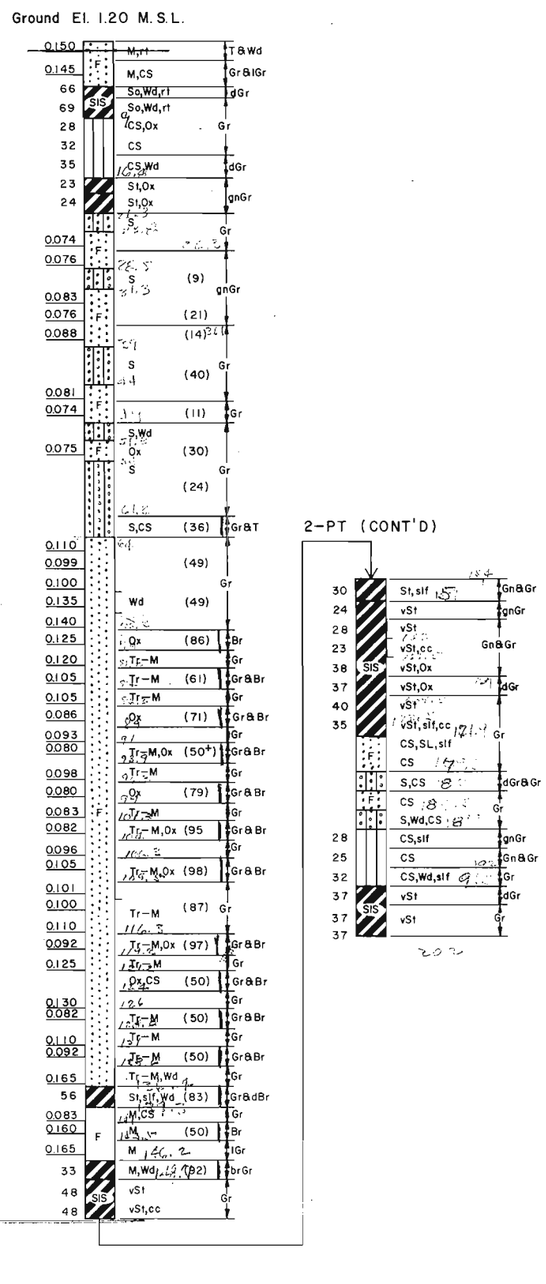
BORING NO. 1-PT

STA. 235+50, ON B/L A
18 JUNE 68



BORING NO. 2-PT

STA. 244+00, ON B/L A
12 JUNE 68



2-PT (CONT'D)

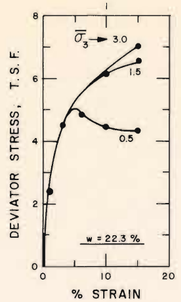
See Plate 26 For General Notes

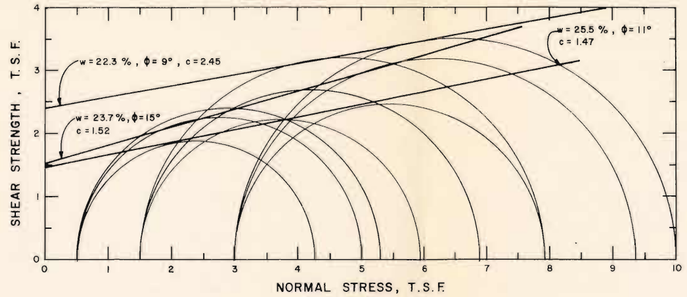
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
GENERAL SOIL BORINGS
NO. PT-1 AND PT-2
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

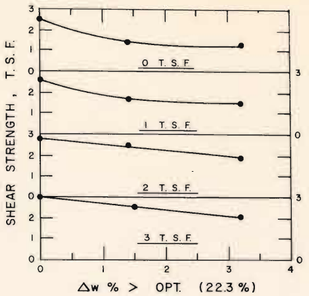
DATE: MARCH 1970 FILE NO. H-2-24414

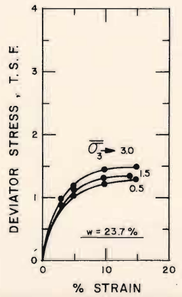
PLATE 47

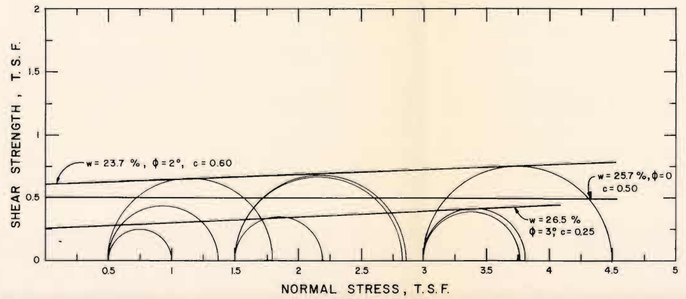




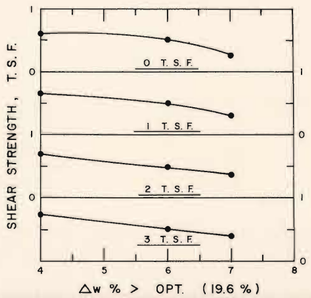
B-8AU, NO. 1

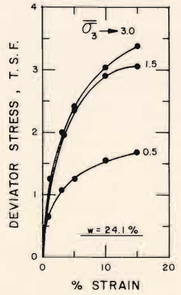


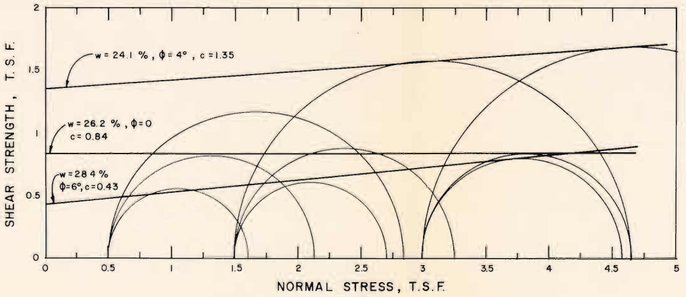




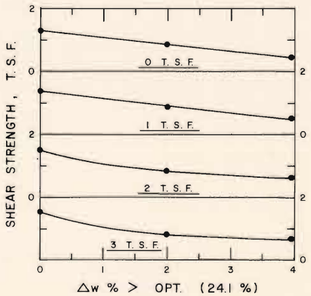
B-8AU, NO. 2



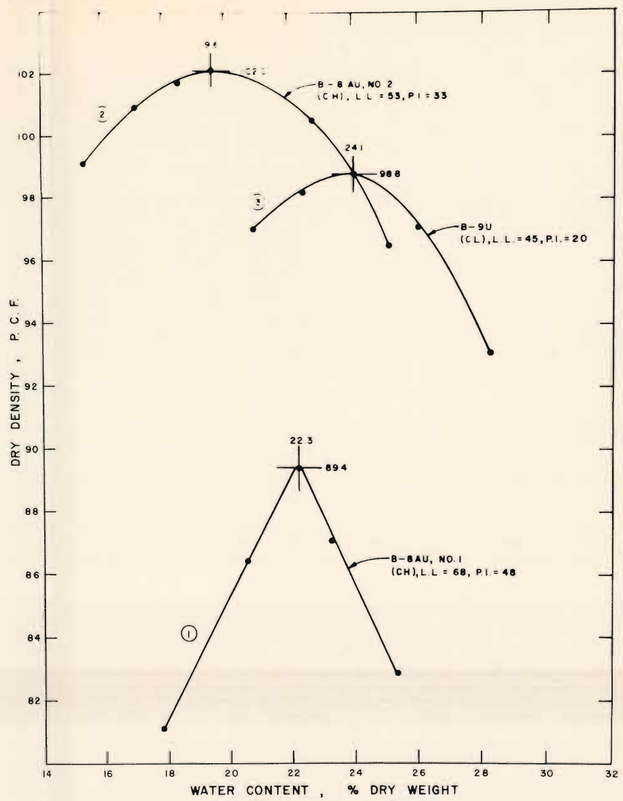




B-9U



SHEAR TEST DATA (Q)



COMPACTION CURVES

(Standard 25 Blow Proctor)

NOTES:

1. Compaction and shear tests (Q) performed on composite samples from undisturbed soil borings.
2. Boring B-8AU, Sta. 218+75; 200' l ft B/L,
   Curve NO. 1, Sample between els. −3.0 and −8.4
   Curve NO. 2, Sample between els. −18.0 and −22.8
3. Boring B-9U, Sta. 225+60; on B/L,
   Curve NO. 3, Sample between els. −3.2 and −16.4.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA

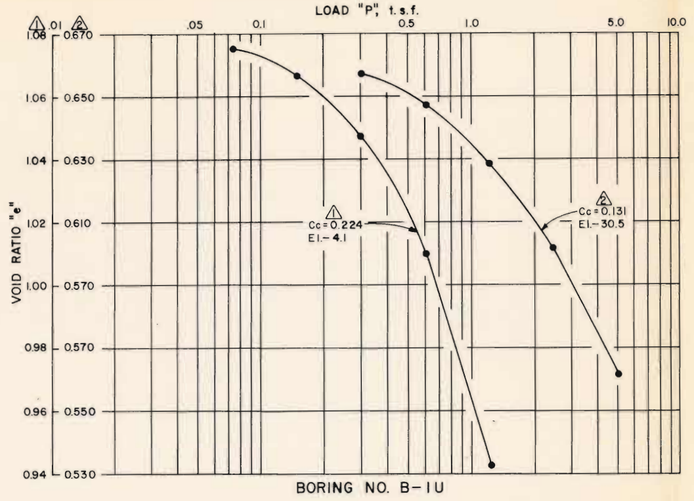
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
COMPOSITE SAMPLE TEST DATA
BORINGS B-8AU and B-9U

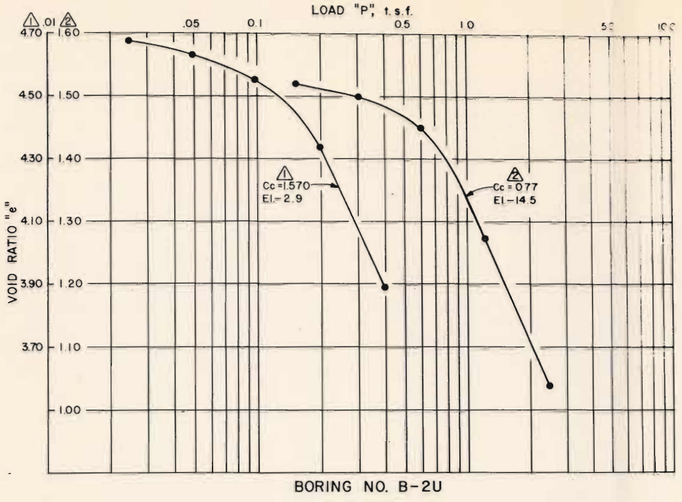
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

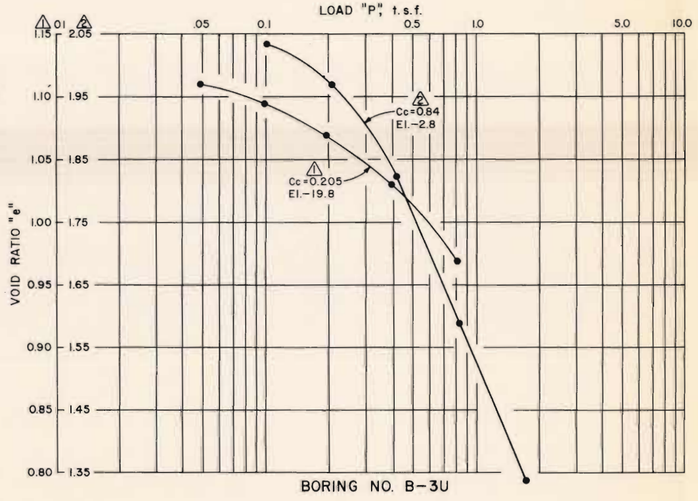
PLATE 48



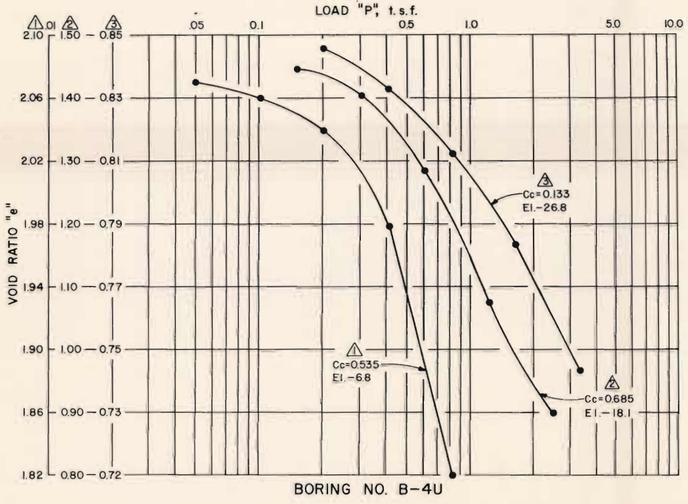
BORING NO. B-1U



BORING NO. B-2U



BORING NO. B-3U



BORING NO. B-4U

See Plate 26 for General Notes
Elevations are in feet referred to Mean Sea Level.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

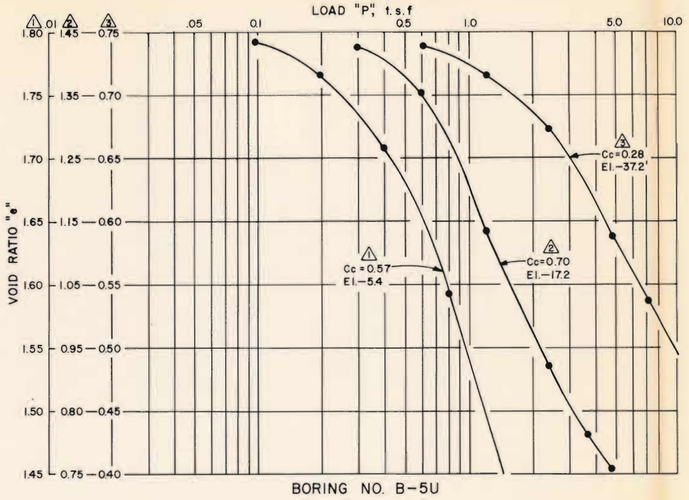
CONSOLIDATION TEST RESULTS

BORINGS B-1U, B-2U, B-3U & B-4U

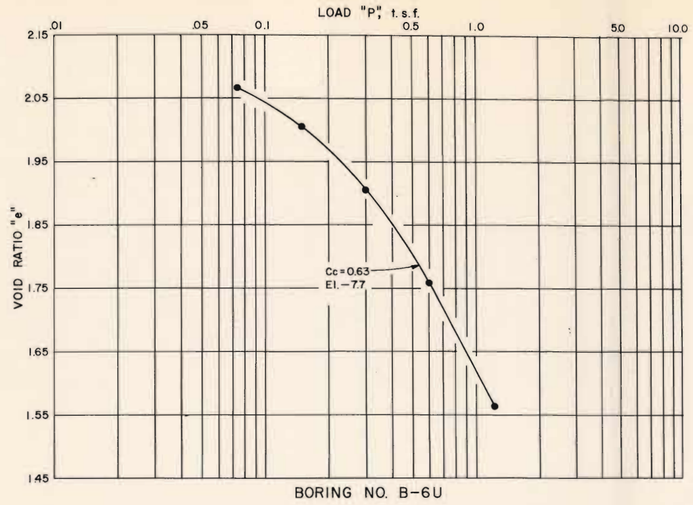
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

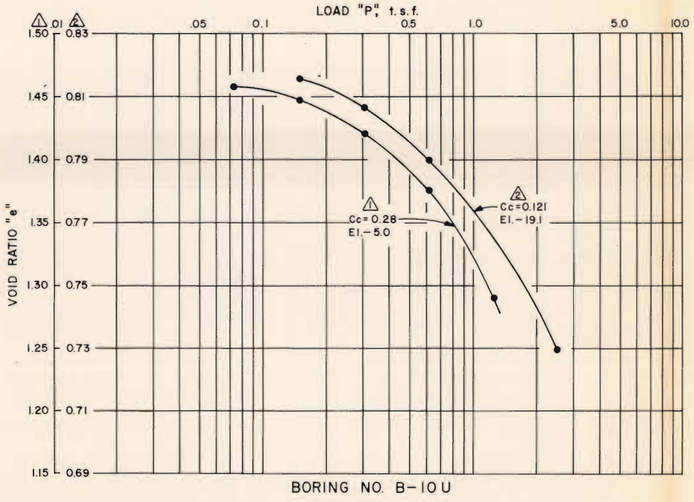
PLATE 49



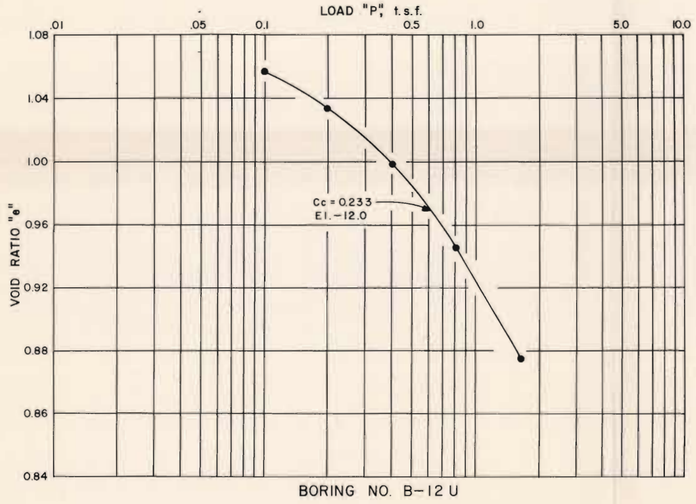
BORING NO. B-5U



BORING NO. B-6U



BORING NO. B-10 U



BORING NO. B-12 U

See Plate 26 for General Notes
Elevations are in feet referred to Mean Sea Level.

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

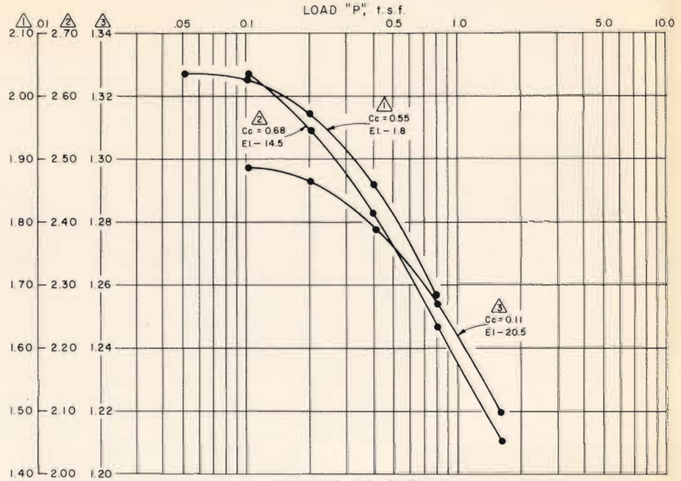
CONSOLIDATION TEST RESULTS

BORINGS B-5U, B-6U, B-10U & B-12U

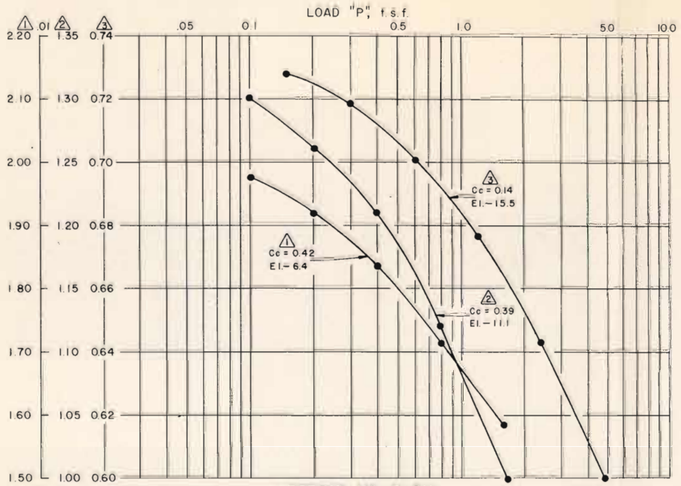
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24414

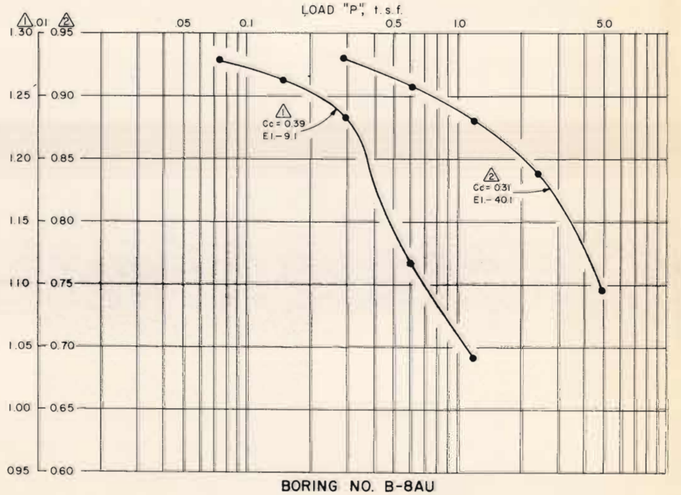
PLATE 50



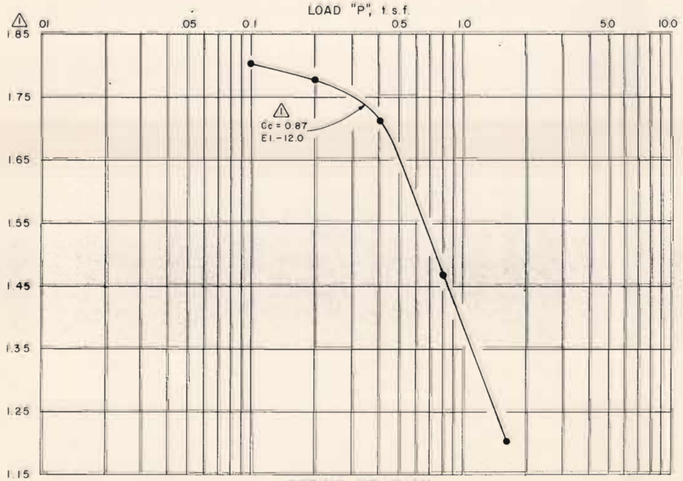
BORING NO. B-7U



BORING NO. B-8U



BORING NO. B-8AU



BORING NO. B-9U

See Plate 26 for General Notes
Elevations are in feet referred to Mean Sea Level

FREDERIC R HARRIS INC
CONSULTING ENGINEERS – NEW ORLEANS LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

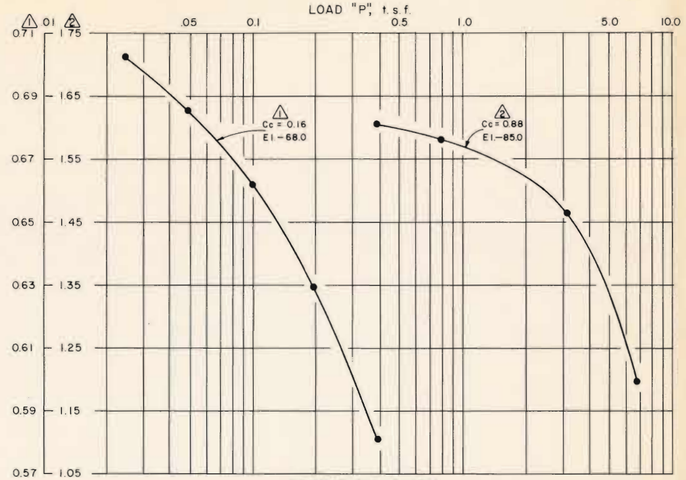
CONSOLIDATION TEST RESULTS

BORINGS B-7U, B-8U, B-8AU & B-9U

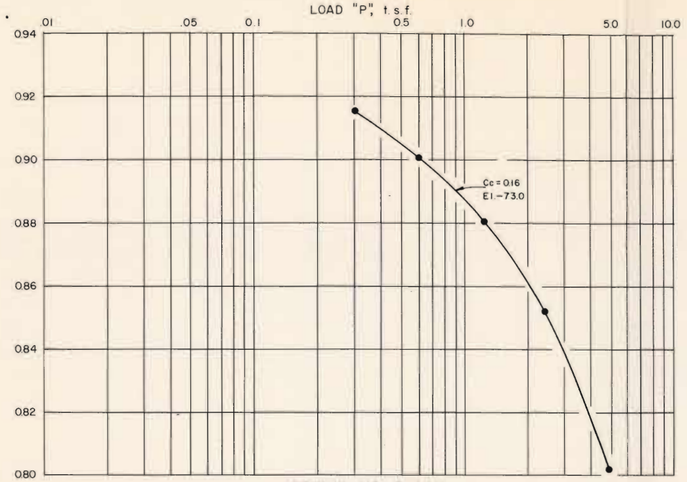
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-3-2-1-14

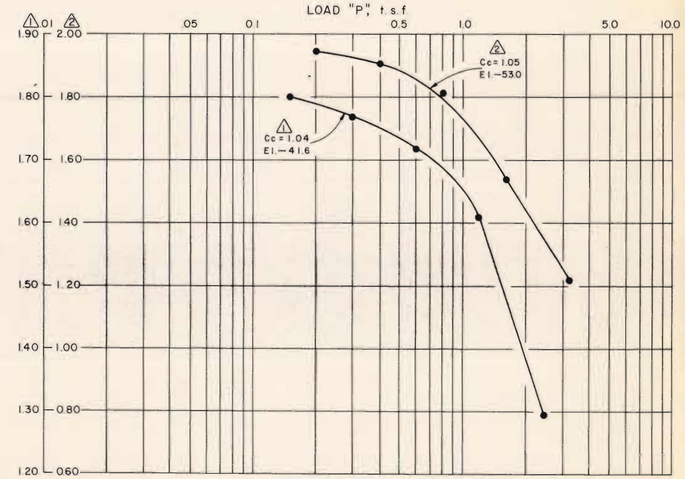
PLATE 51



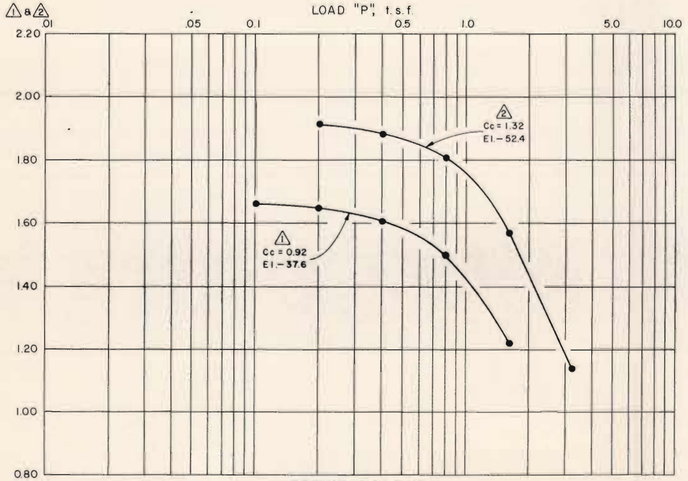
BORING NO. B-13U



BORING NO. B-14U



BORING NO. B-15U



BORING NO. B-16U

See Plate 26 for General Notes
Elevations are in feet referred to Mean Sea Level.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

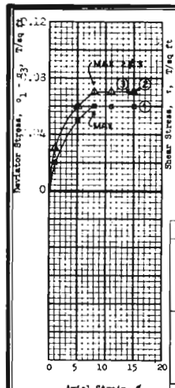
CONSOLIDATION TEST RESULTS

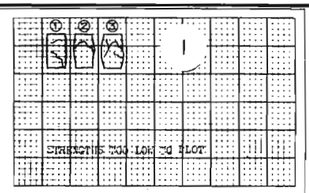
BORINGS B-13U, B-14U, B-15U & B-16U

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

DATE MARCH 1970 FILE NO. H-2-24414

PLATE 52





Test No.			1	2	3	
Initial	Water content	w_o	69.3 %	69.6 %	58.9%	%
	Void ratio	e_o	1.85	1.88	1.85	
	Saturation	S_o	100 %	99.6 %	98.9%	%
	Dry density, lb/cu ft	γ_d	59.0	58.2	58.9	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.06	0.07	0.07	
	Time to failure, min	t_f	14	11	15	
	Rate of strain, percent/min		0.55	0.73	0.52	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.06	0.07	0.07	
	Initial diameter, in.	D_o	1.39	1.40	1.39	
	Initial height, in.	H_o	3.00	3.00	3.00	

Axial Strain, %

Shear Strength Parameters

ϕ = 0 °

tan ϕ = 0

c = 0.03 T/sq ft

Method of saturation ____

☐ Controlled stress

☒ Controlled strain

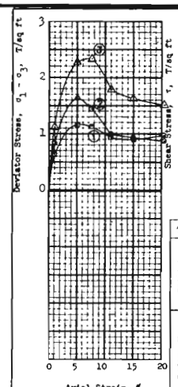
Type of test Q | Type of specimen UNDISTURBED

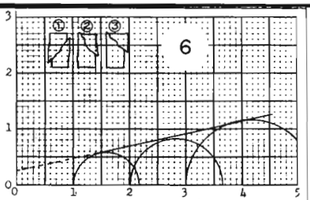
Classification CLAY (CH), gray, w/lignite

LL	PL	PI		G_s
92	26	66		2.69

Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 2-D
Depth 4.8 | Date 22 MAY 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	64.8 %	64.0 %	61.4 %	%
	Void ratio	e_o	1.68	1.66	1.59	
	Saturation	S_o	100+ %	100+ %	100+ %	%
	Dry density, lb/cu ft	γ_d	62.0	62.5	64.2	
Before Shear	Water content	w_c	53.9 %	51.0 %	45.3 %	%
	Void ratio	e_c	1.31	1.15	1.04	
	Saturation	S_c	100+ %	100+ %	100+ %	%
	Final back pressure, PSI	u_o	68	78	68	
Final	Dry Density lb/cu ft	γ_d	72.0	77.2	81.5	
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	1.0	2.0	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	1.16	1.64	2.33	
	Time to failure, min	t_f	45	45	68	
	Rate of strain, percent/min		0.11	0.11	0.11	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.90	0.94	1.62	
	Initial diameter, in.	D_o	1.38	1.38	1.39	
	Initial height, in.	H_o	3.00	3.00	3.00	

Axial Strain, %

Shear Strength Parameters

ϕ = 13 °

tan ϕ = 0.231

c = 0.23 T/sq ft

Method of saturation DP

☐ Controlled stress

☒ Controlled strain

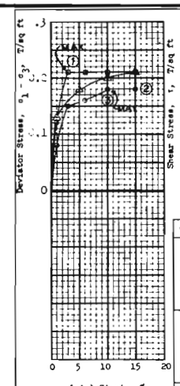
Type of test R | Type of specimen UNDISTURBED

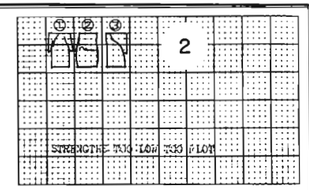
Classification CLAY (CH), gray, w/scattered decayed roots

LL	PL	PI		G_s
86	30	56		2.66

Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 2-D
Depth 6.6 | Date 7 JUNE 1967
TES TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	64.0 %	61.2 %	59.9%	%
	Void ratio	e_o	1.74	1.66	1.45	
	Saturation	S_o	100 %	100 %	93.7%	%
	Dry density, lb/cu ft	γ_d	61.9	63.9	64.1	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.21	0.18	0.21	
	Time to failure, min	t_f	9	77	75	
	Rate of strain, percent/min		0.33	0.13	0.20	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.21	0.18	0.21	
	Initial diameter, in.	D_o	1.38	1.38	1.38	
	Initial height, in.	H_o	3.00	3.00	3.00	

Axial Strain, %

Shear Strength Parameters

ϕ = 0 °

tan ϕ = 0

c = 0.10 T/sq ft

Method of saturation ____

☐ Controlled stress

☒ Controlled strain

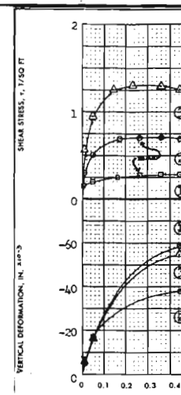
Type of test Q | Type of specimen UNDISTURBED

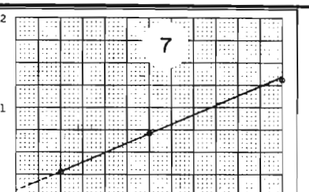
Classification CLAY (CH), gray, w/silty sand pockets and lenses

LL	PL	PI		G_s
69	20	49		2.72

Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 3-C
Depth 10.4 | Date 17 MAY 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_o	49.0%	51.5%	50.2%	%
	VOID RATIO	e_o	1.34	1.39	1.41	
	SATURATION	S_o	98.4%	99.7%	95.8%	%
	DRY DENSITY, LB/CU FT	γ_d	71.9	70.2	69.6	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	2	6	11	
FINAL	WATER CONTENT	w_f	38.3%	32.0%	28.0%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	0.5	1.5	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.28	0.71	1.31	
ACTUAL TIME TO FAILURE, MIN		t_f	2160	1620	1440	
RATE OF STRAIN, IN./MIN			.00017	.00016	.00016	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}	0.28	0.71	1.26	

SHEAR STRENGTH PARAMETERS

ϕ' = 23°

TAN ϕ' = 0.424

c' = 0.07 T/SQ FT

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED | 3.01 IN. SQUARE | 1&2-0.465 3-0.626 IN. THICK

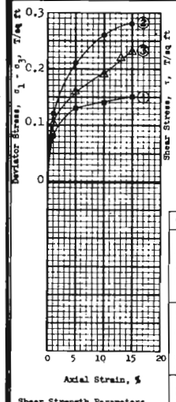
CLASSIFICATION SILTY CLAY (CH), gray, homogeneous

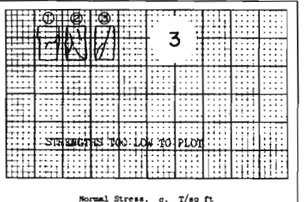
LL	PL	PI		G_s
53	19	34		2.69

REMARKS ____

PROJECT LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
AREA RIGOLETS COMPLEX
BORING NO. 1-RU | SAMPLE NO. 5-B2
DEPTH 16.8 | DATE 29 May 1967
GDA DIRECT SHEAR TEST REPORT

ENG FORM 1 JUN 68 2092 (EAE 1110-2-1906) PREVIOUS EDITIONS ARE OBSOLETE (TRANSLUCENT) PLATE IX-3





Test No.			1	2	3	
Initial	Water content	w_o	35.4 %	29.3 %	28.9 %	%
	Void ratio	e_o	0.966	0.779	0.806	
	Saturation	S_o	98.6 %	100 %	96.4 %	%
	Dry density, lb/cu ft	γ_d	85.4	94.4	93.0	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.15	0.28	0.23	
	Time to failure, min	t_f	54	21	21	
	Rate of strain, percent/min		0.28	0.07	0.07	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.15	0.28	0.23	
	Initial diameter, in.	D_o	1.39	1.38	1.39	
	Initial height, in.	H_o	3.00	3.00	3.00	

Axial Strain, %

Shear Strength Parameters

ϕ = 0 °

tan ϕ = 0

c = 0.11 T/sq ft

Method of saturation ____

☐ Controlled stress

☒ Controlled strain

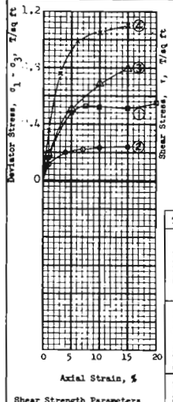
Type of test Q | Type of specimen UNDISTURBED

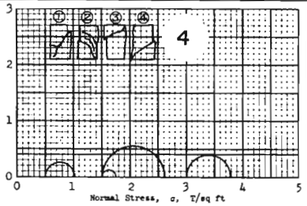
Classification CLAY (CL), gray, w/strata of silt (ML) and sand lenses, *

LL	PL	PI		G_s
38	15	23		2.69

Remarks *contained very soft clay pockets.

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 5-C1
Depth 17.6 | Date 18 MAY 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	4
Initial	Water content	w_o	26.3 %	28.2 %	25.0 %	23.7 %
	Void ratio	e_o	0.741	0.747	0.665	0.654
	Saturation	S_o	94.8 %	100 %	100 %	96.8 %
	Dry density, lb/cu ft	γ_d	87.5	95.4	100.1	100.8
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	1.5
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.53	0.24	0.79	1.10
	Time to failure, min	t_f	10	38	24	24
	Rate of strain, percent/min		0.74	0.39	0.62	0.63
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.51	0.24	0.79	1.10
	Initial diameter, in.	D_o	1.39	1.38	1.41	1.39
	Initial height, in.	H_o	3.00	3.00	3.00	3.00

Axial Strain, %

Shear Strength Parameters

ϕ = 0 °

tan ϕ = 0

c = 0.40 T/sq ft

Method of saturation ____

☐ Controlled stress

☒ Controlled strain

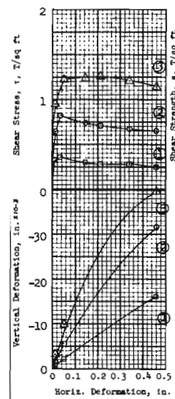
Type of test Q | Type of specimen UNDISTURBED

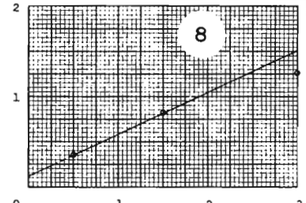
Classification SILTY CLAY (CL), gray, w/very soft clay pockets

LL	PL	PI		G_s
42	16	26		2.67

Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 5-D
Depth 18.8 | Date 18 MAY 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	23.1%	23.0%	23.4 %	%
	Void ratio	e_o	0.642	0.639	0.645	
	Saturation	S_o	96.4%	96.5%	97.2 %	%
	Dry density, lb/cu ft	γ_d	101.9	102.1	101.7	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}	< 1	< 1	1	
Final	Water content	w_f	25.1%	23.5%	22.6 %	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/sq ft		σ	0.5	1.5	3.0	
Maximum shear stress, T/sq ft		τ_{max}	0.36	0.82	1.26	
Actual time to failure, min		t_f	270	270	1260	
Rate of strain, in./min			.00014	.00014	.00017	
Ultimate shear stress, T/sq ft		τ_{ult}	0.25	0.65	1.14	

Shear Strength Parameters

ϕ' = 25 °

tan ϕ' = 0.466

c' = 0.13 T/sq ft

☐ Controlled stress

☒ Controlled strain

Type of specimen UNDISTURBED | 3.01 in. square | 0.465 in. thick

Classification SILTY CLAY (CL), gray, homogeneous

LL	PL	PI		G_s
42	16	26		2.68

Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU | Sample No. 6-B
Depth 20.7 | Date 29 May 1967
GDA DIRECT SHEAR TEST REPORT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

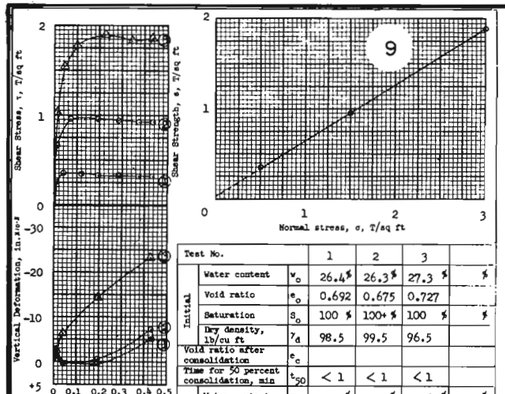
DETAIL SHEAR STRENGTH DATA

BORING 1-RU

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

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 53



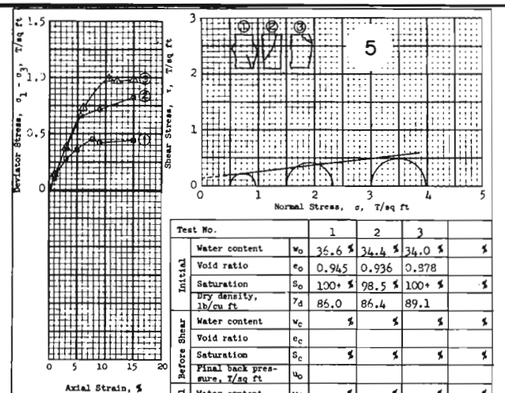
Test No.			1	2	3	
Initial	Water content	w_o	26.4%	26.3%	27.3%	%
	Void ratio	e_o	0.692	0.675	0.727	
	Saturation	S_o	100 %	100+ %	100 %	%
	Dry density, lb/cu ft	γ_d	98.5	99.5	96.5	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}	< 1	< 1	< 1	
Final	Water content	w_f	24.4%	22.5%	22.6 %	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/sq ft		σ	0.5	1.5	3.0	
Maximum shear stress, T/sq ft		τ_{max}	0.35	0.96	1.89	
Actual time to failure, min		t_f	360	540	1500	
Rate of strain, in./min			.00012	.00013	.00015	
Ultimate shear stress, T/sq ft		τ_{ult}	0.32	0.92	1.83	

Shear Strength Parameters
ϕ' = 32 °
tan ϕ' = 0.625
c' = 0.03 T/sq ft

☐ Controlled stress
☒ Controlled strain

Type of specimen UNDISTURBED — 3.01 in. square — 0.465 in. thick
Classification SILTY SAND (SM), gray
LL - PL - PI - G_s 2.67
Remarks

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU — Sample No. 13-C
Depth 37.7 — Date 31 May 1967
GDA ... DIRECT SHEAR TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	36.6 %	34.4 %	34.0 %	%
	Void ratio	e_o	0.945	0.936	0.878	
	Saturation	S_o	100+ %	98.5 %	100+ %	%
	Dry density, lb/cu ft	γ_d	86.0	86.4	89.1	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.5	1.5	3.0	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	0.45	0.82	0.99	
Time to failure, min		t_f	11	31	32	
Rate of strain, percent/min			0.69	0.48	0.33	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$	0.42	0.82	0.97	
Initial diameter, in.		D_o	1.39	1.39	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 7 °
tan ϕ = 0.123
c = 0.13 T/sq ft

Method of saturation ___

☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen UNDISTURBED
Classification SANDY SILT (ML), gray w/ clay (6H) strate
LL NP PL NP PI NP G_s 2.68
Remarks

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 1-RU — Sample No. 14-C
Depth 41.9 — Date 22 MAY 1967
GDA TRIAXIAL COMPRESSION TEST REPORT

Test No.			1	2	3	
Initial	Water content	w_o	46.8%	48.0%	47.8%	%
	Void ratio	e_o	1.38	1.41	1.41	
	Saturation	S_o	93.0%	93.8%	93.2%	%
	Dry density, lb/cu ft	γ_d	68.04	68.02	68.02	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.07	.21	.42	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	.12	.16	.19	
Time to failure, min		t_f	22.68	18.96	21.50	
Rate of strain, percent/min			.66	.66	.66	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 4 °
tan ϕ = .070
c = 0.06 T/sq ft

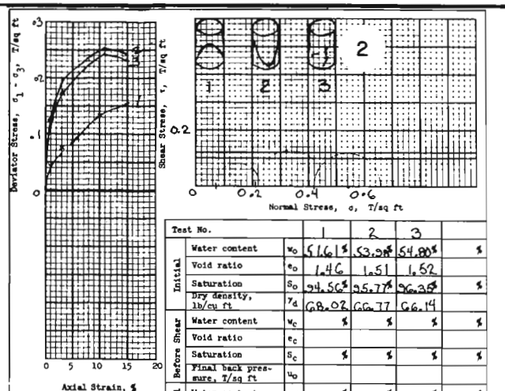
Method of saturation ___

☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen 5" Undisturbed
Classification vSo(Br&Gr)CH, lns & ars ML & SP. ox ars; org ars; rt
LL 46 PL 24 PI 22 G_s 2.6327
Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1
Add.Bor.-Rigolets Structure & Closure
Area Sta. 129+45 - 125" Rt of B/L
Boring No. B-2U — Sample No. 1-B
Depth 1.5 — Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	51.6%	53.2%	54.8%	%
	Void ratio	e_o	1.46	1.51	1.52	
	Saturation	S_o	94.5%	95.7%	96.3%	%
	Dry density, lb/cu ft	γ_d	68.02	66.77	66.14	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.07	.21	.42	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	.15	.25	.24	
Time to failure, min		t_f	22.36	16.00	15.94	
Rate of strain, percent/min			.67	.67	.68	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.12 T/sq ft

Method of saturation ___

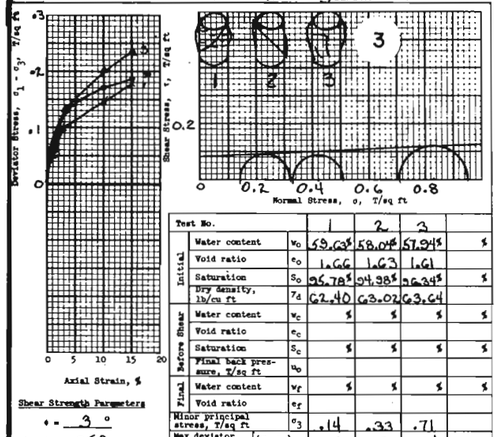
☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen 5" Undisturbed
Classification vSo(Gr)CH_2; lns & ars ML; dw; rt; org ars
LL 80 PL 22 PI 58 G_s 2.6757
Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.& Vic.-Barr.Plan-GSM Supp
#1-Add. Bor.-Rigolets Struc-Clos.
Area Sta. 129+45 - 125" Rt of B/L
Boring No. B-2U — Sample No. 2-D
Depth 6.4 — Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT

FORM 1 JUNE 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE
TRANSLUCENT



Test No.			1	2	3	
Initial	Water content	w_o	59.6%	58.0%	57.9%	%
	Void ratio	e_o	1.66	1.63	1.61	
	Saturation	S_o	96.7%	94.9%	96.3%	%
	Dry density, lb/cu ft	γ_d	62.40	63.02	63.64	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.14	.33	.71	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	.18	.18	.24	
Time to failure, min		t_f	22.17	22.33	22.28	
Rate of strain, percent/min			.68	.67	.67	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 3 °
tan ϕ = .052
c = .08 T/sq ft

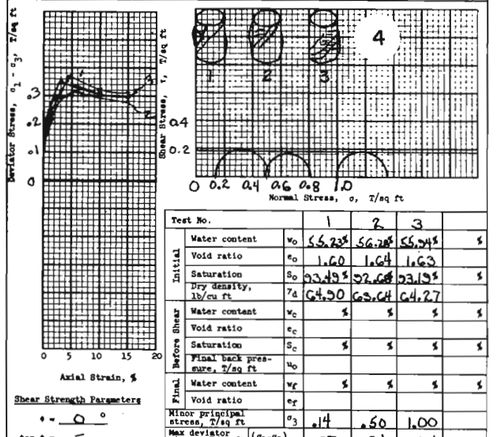
Method of saturation ___

☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen 5" Undisturbed
Classification So(Gr)CH_2; lns & lys ML & SP; dw; slf
LL 62 PL 22 PI 40 G_s 2.6710
Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp
#1-Add.Bor.-Rigolets Struc-Clos.
Area Sta. 129+45 - 125' Rt. of B/L
Boring No. B-2U — Sample No. 4-D
Depth 14.0 — Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	56.2%	56.2%	55.0%	%
	Void ratio	e_o	1.60	1.64	1.63	
	Saturation	S_o	93.4%	92.6%	93.1%	%
	Dry density, lb/cu ft	γ_d	64.90	63.64	64.27	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.14	.50	1.00	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	.37	.31	.35	
Time to failure, min		t_f	6.21	7.58	5.05	
Rate of strain, percent/min			.67	.66	.66	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.18 T/sq ft

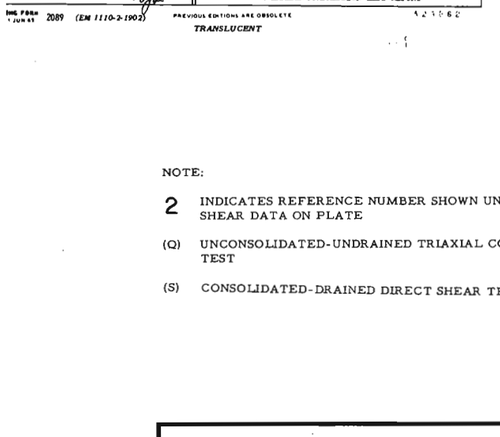
Method of saturation ___

☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen 5" Undisturbed
Classification So(Gr)CH_2;lns & lys ML; lns SP; few slf
LL 59 PL 19 PI 40 G_s 2.7044
Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp
#1-Add. Bor.- Rigolets Structure-Closure
Area Sta. 129+45 - 125' Rt. of B/L
Boring No. B-2U — Sample No. 6-D
Depth 22.9 — Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	53.1%	55.3%	43.6%	%
	Void ratio	e_o	1.48	1.53	1.24	
	Saturation	S_o	94.8%	95.4%	93.0%	%
	Dry density, lb/cu ft	γ_d	66.14	64.90	73.63	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.21	.64	1.29	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	.34	.23	.36	
Time to failure, min		t_f	3.90	7.20	6.13	
Rate of strain, percent/min			.66	.67	.67	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 0.5 °
tan ϕ = .009
c = 0.17 T/sq ft

Method of saturation ___

☐ Controlled stress
☒ Controlled strain

Type of test Q — Type of specimen 5" Undisturbed
Classification So(gnGr)CH_2; lns & lys ML & SP; few slf
LL 52 PL 16 PI 36 G_s 2.6391
Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp
#1-Add.Bor.-Rigolets Structure & Closure
Area Sta. 129+45 - 125' Rt. of B/L
Boring No. B-2U — Sample No. 7-D
Depth 26.0 — Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

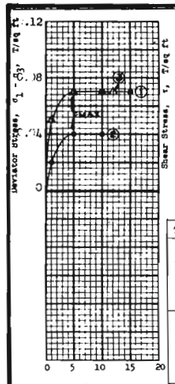
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

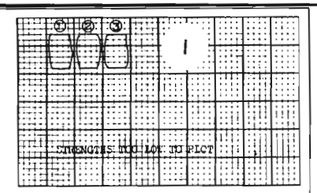
DETAIL SHEAR STRENGTH DATA
BORINGS 1-RU & B-2U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 54





Test No.		1	2	3	
Initial: Water content	w_o	91.9 %	121.5 %	92.3 %	%
Initial: Void ratio	e_o	2.40	3.32	2.45	
Initial: Saturation	S_o	100+ %	98.1 %	100+ %	%
Initial: Dry density, lb/cu ft	γ_d	49.1	38.7	43.5	
Before Shear: Water content	w_c	%	%	%	%
Before Shear: Void ratio	e_c				
Before Shear: Saturation	S_c	%	%	%	%
Before Shear: Final back pressure, T/sq ft	u_o				
Final: Water content	w_f	%	%	%	%
Final: Void ratio	e_f				
Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.07	0.04	0.07	
Time to failure, min	t_f	23	14	13	
Rate of strain, percent/min		0.22	0.36	0.39	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.07	0.04	0.07	
Initial diameter, in.	D_o	1.37	1.38	1.38	
Initial height, in.	H_o	3.00	3.00	3.00	

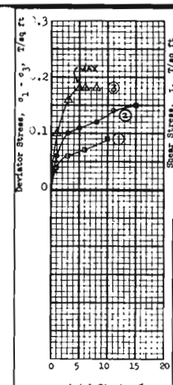
Shear Strength Parameters
ϕ = 0 °
tan ϕ = 0
c = 0.03 T/sq ft

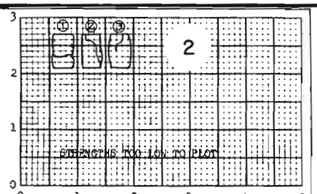
Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen UNDISTURBED
Classification CLAY (CH), gray, w/strata clay (OH)
LL 110 | PL 31 | PI 79 | G_s 2.68
Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 1-C_2
Depth 1.9 | Date 3 JUNE 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.		1	2	3	
Initial: Water content	w_o	69.4 %	64.2 %	68.6 %	%
Initial: Void ratio	e_o	1.89	1.74	1.86	
Initial: Saturation	S_o	99.1 %	99.6 %	99.6 %	%
Initial: Dry density, lb/cu ft	γ_d	50.4	61.6	59.0	
Before Shear: Water content	w_c	%	%	%	%
Before Shear: Void ratio	e_c				
Before Shear: Saturation	S_c	%	%	%	%
Before Shear: Final back pressure, T/sq ft	u_o				
Final: Water content	w_f	%	%	%	%
Final: Void ratio	e_f				
Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.09	0.15	0.18	
Time to failure, min	t_f	18	42	20	
Rate of strain, percent/min		0.55	0.36	0.25	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.09	0.15	0.18	
Initial diameter, in.	D_o	1.37	1.38	1.38	
Initial height, in.	H_o	3.00	3.00	3.00	

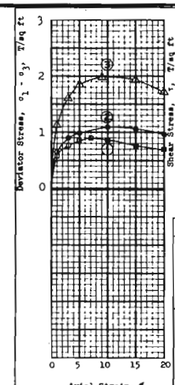
Shear Strength Parameters
ϕ = 0 °
tan ϕ = 0
c = 0.07 T/sq ft

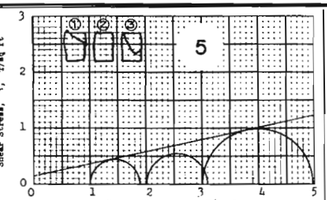
Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen UNDISTURBED
Classification CLAY (CH), gray, w/thin (OH) lense and small roots
LL 89 | PL 29 | PI 60 | G_s 2.70
Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 2-B
Depth 4.7 | Date 3 JUNE 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.		1	2	3	
Initial: Water content	w_o	74.7 %	60.7 %	62.7 %	%
Initial: Void ratio	e_o	1.97	1.61	1.65	
Initial: Saturation	S_o	100+ %	100+ %	100+ %	%
Initial: Dry density, lb/cu ft	γ_d	56.4	64.2	63.1	
Before Shear: Water content	w_c	55.3 %	41.3 %	40.9 %	%
Before Shear: Void ratio	e_c	1.39	0.989	0.943	
Before Shear: Saturation	S_c	100+ %	100+ %	100+ %	%
Before Shear: Final back pressure, PSI	u_o	70	70	70	
Before Shear: Dry Density, lb/cu ft	γ_d	70.1	84.1	86.2	
Before Shear: Void ratio	e_f				
Minor principal stress, T/sq ft	σ_3	1.0	2.0	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.89	1.09	1.99	
Time to failure, min	t_f	64	125	128	
Rate of strain, percent/min		0.11	0.08	0.07	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.77	1.04	1.92	
Initial diameter, in.	D_o	1.38	1.38	1.39	
Initial height, in.	H_o	3.00	3.00	3.00	

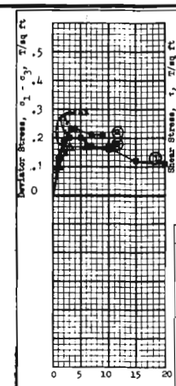
Shear Strength Parameters
ϕ = 13 °
tan ϕ = 0.231
c = 0.13 T/sq ft

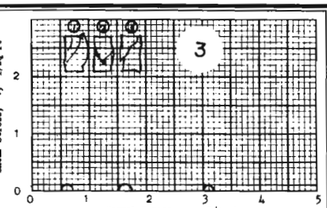
Method of saturation BP

☐ Controlled stress
☒ Controlled strain

Type of test R | Type of specimen UNDISTURBED
Classification CLAY (CH), gray, fissured
LL 78 | PL 21 | PI 57 | G_s 2.68
Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 2-C_2
Depth 5.8 | Date 8 JUNE 1967
JL TRIAXIAL COMPRESSION TEST REPORT





Test No.		1	2	3	
Initial: Water content	w_o	57.7 %	55.2 %	57.0 %	%
Initial: Void ratio	e_o	1.46	1.39	1.43	
Initial: Saturation	S_o	100+ %	100+ %	100+ %	%
Initial: Dry density, lb/cu ft	γ_d	66.0	67.9	66.8	
Before Shear: Water content	w_c	%	%	%	%
Before Shear: Void ratio	e_c				
Before Shear: Saturation	S_c	%	%	%	%
Before Shear: Final back pressure, T/sq ft	u_o				
Final: Water content	w_f	%	%	%	%
Final: Void ratio	e_f				
Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.20	0.23	0.17	
Time to failure, min	t_f	13	14	12	
Rate of strain, percent/min		0.23	0.22	0.25	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.20	0.23	0.17	
Initial diameter, in.	D_o	1.37	1.38	1.39	
Initial height, in.	H_o	3.00	3.00	3.00	

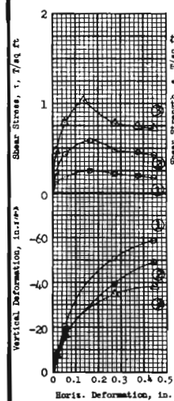
Shear Strength Parameters
ϕ = 0 °
tan ϕ = 0
c = 0.10 T/sq ft

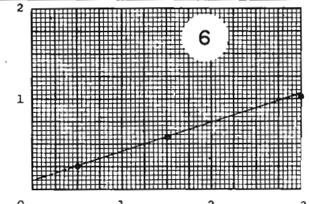
Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen UNDISTURBED
Classification CLAY (CH), gray, w/silty sand (SM) lenses and pockets small
LL 54 | PL 21 | PI 33 | G_s 2.60
Remarks seam of clay (CL)

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 4-D
Depth 14.9 | Date 10 JUNE 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





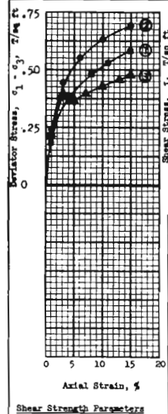
Test No.		1	2	3	
Initial: Water content	w_o	66.3 %	64.7 %	64.1 %	%
Initial: Void ratio	e_o	1.75	1.82	2.12	
Initial: Saturation	S_o	100+ %	97.0 %	82.5 %	%
Initial: Dry density, lb/cu ft	γ_d	61.9	60.5	54.7	
Void ratio after consolidation	e_c				
Time for 50 percent consolidation, min	t_{50}	1	4	8	
Final: Water content	w_f	49.8 %	44.0 %	40.2 %	%
Final: Void ratio	e_f				
Final: Saturation	S_f	%	%	%	%
Normal stress, T/sq ft	σ	0.5	1.5	3.0	
Maximum shear stress, T/sq ft	τ_{max}	0.25	0.58	1.02	
Actual time to failure, min	t_f	1050	1050	870	
Rate of strain, in./min		.00016	.00016	.00016	
Ultimate shear stress, T/sq ft	τ_{ult}	0.17	0.43	0.73	

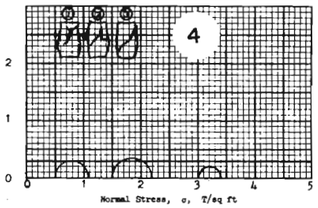
Shear Strength Parameters
ϕ' = 18 °
tan ϕ' = 0.325
c' = 0.09 T/sq ft

☐ Controlled stress
☒ Controlled strain

Type of specimen UNDISTURBED | 3.01 in. square | 0.465 in. thick
Classification CLAY (CH), gray, w/thin vertical seams and beams throughout
LL 69 | PL 26 | PI 43 | G_s 2.73
Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 5-A
Depth 16.3 | Date 2 June 1967
GDA DIRECT SHEAR TEST REPORT





Test No.		1	2	3	
Initial: Water content	w_o	29.4 %	29.9 %	30.5 %	%
Initial: Void ratio	e_o	0.766	0.772	0.786	
Initial: Saturation	S_o	100+ %	100+ %	100+ %	%
Initial: Dry density, lb/cu ft	γ_d	93.7	92.3	91.6	
Before Shear: Water content	w_c	%	%	%	%
Before Shear: Void ratio	e_c				
Before Shear: Saturation	S_c	%	%	%	%
Before Shear: Final back pressure, T/sq ft	u_o				
Final: Water content	w_f	%	%	%	%
Final: Void ratio	e_f				
Minor principal stress, T/sq ft	σ_3	0.5	1.5	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.58	0.69	0.40	
Time to failure, min	t_f	65	24	4	
Rate of strain, percent/min		0.23	0.62	0.71	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$	0.58	0.69	0.37	
Initial diameter, in.	D_o	1.38	1.37	1.38	
Initial height, in.	H_o	3.00	3.00	3.00	

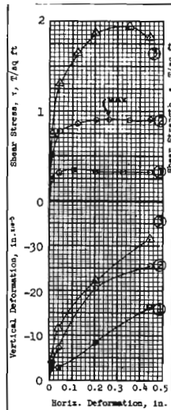
Shear Strength Parameters
ϕ = 0 °
tan ϕ = 0
c = 0.28 T/sq ft

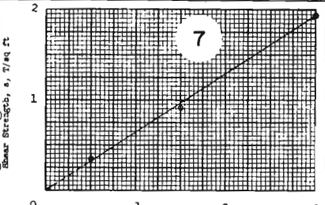
Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen UNDISTURBED
Classification SANDY CLAYEY SILT (ML), gray, w/very soft clay pockets
LL 29 | PL 19 | PI 10 | G_s 2.62
Remarks Insufficient material for further testing.

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 6B
Depth 20.7 | Date 10 JUNE 1967
JMS TRIAXIAL COMPRESSION TEST REPORT





Test No.		1	2	3	
Initial: Water content	w_o	27.1 %	28.8 %	29.4 %	%
Initial: Void ratio	e_o	0.760	0.785	0.798	
Initial: Saturation	S_o	94.5 %	97.2 %	97.6 %	%
Initial: Dry density, lb/cu ft	γ_d	94.0	92.7	92.0	
Void ratio after consolidation	e_c				
Time for 50 percent consolidation, min	t_{50}	< 1	< 1	< 1	
Final: Water content	w_f	26.1 %	19.1 %	26.4 %	%
Final: Void ratio	e_f				
Final: Saturation	S_f	%	%	%	%
Normal stress, T/sq ft	σ	0.5	1.5	3.0	
Maximum shear stress, T/sq ft	τ_{max}	0.34	0.91	1.94	
Actual time to failure, min	t_f	750	1680	2220	
Rate of strain, in./min		.00014	.00016	.00016	
Ultimate shear stress, T/sq ft	τ_{ult}	0.32	0.90	1.82	

Shear Strength Parameters
ϕ' = 33 °
tan ϕ' = 0.649
c' = 0 T/sq ft

☐ Controlled stress
☒ Controlled strain

Type of specimen UNDISTURBED | 3.01 in. square | 0.465 in. thick
Classification SILTY SAND (SM), gray
LL - | PL - | PI - | G_s 2.65
Remarks ____

Project LAKE PONTCHARTRAIN & VICINITY
HURRICANE PROTECTION
Area RIGOLETS COMPLEX
Boring No. 2-RU | Sample No. 6-C
Depth 21.8 | Date 31 May 1967
GDA DIRECT SHEAR TEST REPORT

NC FORM JUN 65 2089 — PREVIOUS EDITIONS ARE OBSOLETE — D41437 — PLATE X-3

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

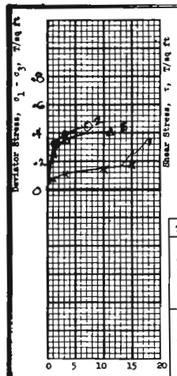
(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

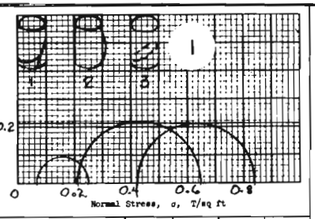
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
DETAIL SHEAR STRENGTH DATA
BORING 2-RU
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 55





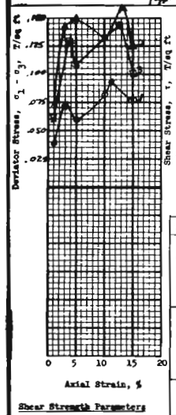
Test No.			1	2	3	
Initial	Water content	w_o	45.32%	38.71%	39.38%	%
	Void ratio	e_o	1.30	1.13	1.14	
	Saturation	S_o	93.96%	91.37%	93.31%	%
	Dry density, lb/cu ft	γ_d	73.01	79.26	78.62	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.42	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.17	0.44	0.41	
Time to failure, min		t_f	55.66	24.84	40.99	
Rate of strain, percent/min			.26	.26	.26	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

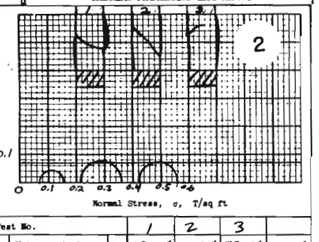
Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.215 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification M(dGr)CH_2; lns & ars ML; ox ars; org ars; rt
LL 64 | PL 19 | PI 45 | σ_a 2.7039
Remarks —
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barr.Plan -GDM Supp#1
Add.Bor.- Rigolets Structure & Closure
Area Sta. 105+50 - 125' Rt. of B/L
Boring No. B-1U | Sample No. 2-B
Depth 4.6 | Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT





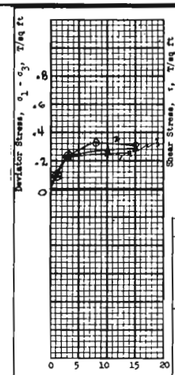
Test No.			1	2	3	
Initial	Water content	w_o	59.35%	62.68%	58.37%	%
	Void ratio	e_o	1.70	1.80	1.66	
	Saturation	S_o	94.13%	93.70%	94.89%	%
	Dry density, lb/cu ft	γ_d	62.40	59.97	63.02	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.42	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.09	0.15	0.14	
Time to failure, min		t_f	16.92	19.33	18.38	
Rate of strain, percent/min			0.66	0.68	0.68	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

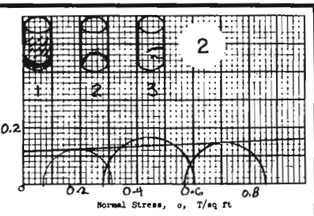
Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.07 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification vSo(Gr&dGr)CH_3; lns & lys ML & SP; org ars; sl & slf
LL 70 | PL 18 | PI 52 | σ_a 2.6876
Remarks —
TESTING SECTION NOD
Project Lake Pont.La.&Vic-Barrier Plan-GDM Supp #1-Rigolets Structure & Closure
Area Sta. 155+40 - 50' Rt of B/L
Boring No. B-3U | Sample No. 4-A
Depth 11.2 | Date 20 JAN 68
Rt - 9.0
TRIAXIAL COMPRESSION TEST REPORT





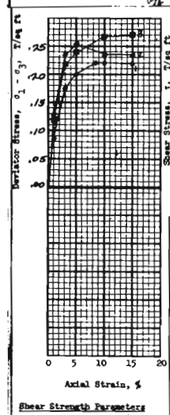
Test No.			1	2	3	
Initial	Water content	w_o	55.68%	53.08%	55.03%	%
	Void ratio	e_o	1.53	1.48	1.52	
	Saturation	S_o	97.40%	96.82%	96.91%	%
	Dry density, lb/cu ft	γ_d	66.14	67.39	66.14	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.07	.28	.57	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		.26	.33	.29	
Time to failure, min		t_f	20.89	12.32	22.12	
Rate of strain, percent/min			.67	.67	.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

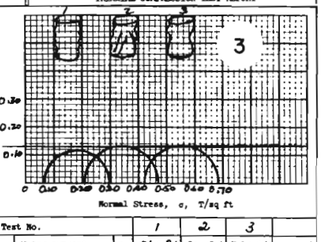
Shear Strength Parameters
ϕ = 2.5 °
tan ϕ = .048
c = 0.117 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr)CH_3;lns & lys ML&SP; ox ars
LL 69 | PL 24 | PI 45 | σ_a 2.6720
Remarks —
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1
Add. Bor.-Rigolets Structure & Closure
Area Sta. 105+50-125" Rt. of B/L
Boring No. B-1U | Sample No. 5-B_2
Depth 16.3 | Date JUNE 68
TRIAXIAL COMPRESSION TEST REPORT





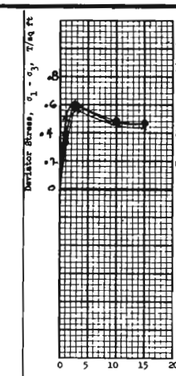
Test No.			1	2	3	
Initial	Water content	w_o	81.28%	81.08%	86.00%	%
	Void ratio	e_o	2.20	2.19	2.29	
	Saturation	S_o	95.32%	95.62%	91.76%	%
	Dry density, lb/cu ft	γ_d	50.84	50.54	48.67	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.42	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.22	0.26	0.27	
Time to failure, min		t_f	12.30	7.32	13.72	
Rate of strain, percent/min			0.67	0.67	0.66	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

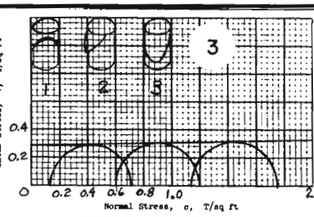
Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.130 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr&Bk)CH_3;lns&lys ML;lys dw;cc;strong odor petroleum prod.
LL 99 | PL 26 | PI 73 | σ_a 2.5763
Remarks —
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1-Add.Bor.-Rigolets Structure & Closure
Area Sta. 155+40 - 50' Rt. of B/L
Boring No. B-3U | Sample No. 4-D
Depth 14.0 | Date 28 MAY 68
ERK TRIAXIAL COMPRESSION TEST REPORT





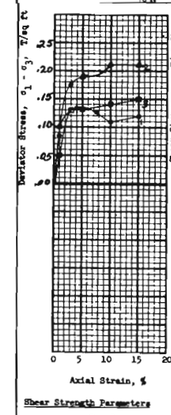
Test No.			1	2	3	
Initial	Water content	w_o	65.48%	70.11%	63.66%	%
	Void ratio	e_o	1.81	1.79	1.75	
	Saturation	S_o	97.21%	98.17%	97.66%	%
	Dry density, lb/cu ft	γ_d	60.90	60.90	61.16	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.14	.60	1.14	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		.59	.60	.61	
Time to failure, min		t_f	2.31	5.10	3.84	
Rate of strain, percent/min			.67	.67	.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

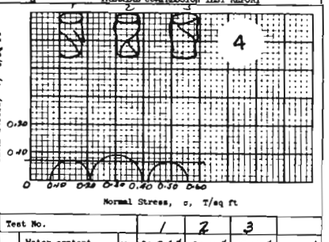
Shear Strength Parameters
ϕ = 0.5 °
tan ϕ = .009
c = 0.29 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification M(dGr)CH_2;lns & ars ML & SP; few slf
LL 75 | PL 20 | PI 55 | σ_a 2.6779
Remarks —
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1
Add.Bor.-Rigolets Struc.-Closure
Area Sta. 105+50 - 125' Rt. of B/L
Boring No. B-1U | Sample No. 8-B
Depth 27.8 | Date
TRIAXIAL COMPRESSION TEST REPORT





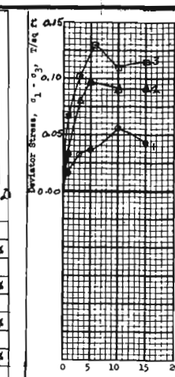
Test No.			1	2	3	
Initial	Water content	w_o	40.24%	40.01%	38.18%	%
	Void ratio	e_o	1.123	1.104	1.051	
	Saturation	S_o	96.1%	97.1%	94.7%	%
	Dry density, lb/cu ft	γ_d	78.62	79.24	80.50	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.42	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.13	0.19	0.13	
Time to failure, min		t_f	5.96	7.15	6.96	
Rate of strain, percent/min			0.68	0.68	0.68	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

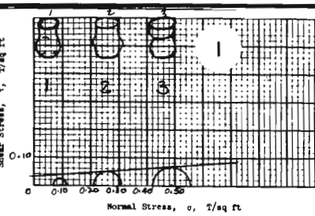
Shear Strength Parameters
ϕ = 0 °
tan ϕ = 0
c = 0.065 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr)CH_2;lns & ars SP; dw; sl & slf
LL 50 | PL 16 | PI 34 | σ_a 2.6762
Remarks —
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1-Add.Bor.-Rigolets Structure & Closure
Area Sta. 155+40 - 50' Rt. of B/L
Boring No. B-3U | Sample No. 6-B
Depth 20.0 | Date 14 JAN 68
ERK TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	68.86%	67.69%	66.57%	%
	Void ratio	e_o	1.87	2.01	1.81	
	Saturation	S_o	99.33%	94.87%	99.04%	%
	Dry density, lb/cu ft	γ_d	58.66	55.54	59.28	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.42	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.04	0.10	0.13	
Time to failure, min		t_f	7.42	6.90	8.14	
Rate of strain, percent/min			0.69	0.69	0.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 3.3 °
tan ϕ = .0582
c = 0.035 T/sq ft

Method of saturation —

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification vSo(Gr&Br)CH_2; lns ML; ars S+; sl & slf; dw; lge org ars
LL 77 | PL 19 | PI 58 | σ_a 2.6918
Remarks —
TESTING SECTION NOD
Project Lake Pont.La. & Vic.-Barrier Plan - GDM Supp #1- Rigolets Structure & Closure
Area Sta. 155+40 - 50' Rt of B/L
Boring No. B-3U | Sample No. 1-C
Depth 2.4 | Date 19 JAN 68
Rt - 0.2
TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 1 JAN 65 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE
TRANSLUCENT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

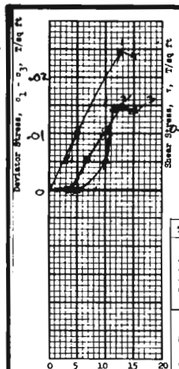
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

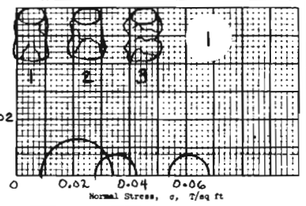
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

DETAIL SHEAR STRENGTH DATA
BORINGS B-1U & B-3U
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 56





Test No.			1	2	3	
Initial	Water content	w_o	111.2%	118.8%	116.3%	%
	Void ratio	e_o	2.97	3.14	3.14	
	Saturation	S_o	93.7%	99.3%	92.7%	%
	Dry density, lb/cu ft	γ_d	93.31	87.44	87.44	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	.009	.028	.054	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	.026	.015	.016	
	Time to failure, min	t_f	17.90	18.73	17.04	
	Rate of strain, percent/min		.72	.67	.68	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$				
	Initial diameter, in.	D_o	1.4	1.4	1.4	
	Initial height, in.	H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 0°
tan ϕ = —
c = 0.0075 T/sq ft

Method of saturation

☐ Controlled stress
☐ Controlled strain

Type of test UQ Type of specimen 5" Undisturbed

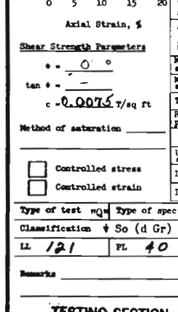
Classification ∜ So (d Gr) CH_4-OA; dw; rt

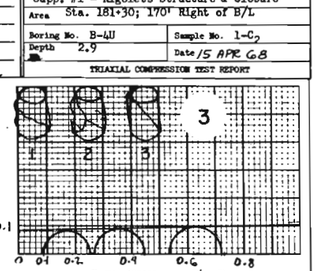
LL 121 PL 40 PI 81 G_s 2.5013

Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barrier Plan-GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 181+30; 170' Right of B/L
Boring No. B-4U Sample No. $1-C_2$
Depth 2.9 Date 15 APR 68
TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	55.7%	54.9%	57.0%	%
	Void ratio	e_o	1.50	1.49	1.56	
	Saturation	S_o	97.8%	97.3%	97.3%	%
	Dry density, lb/cu ft	γ_d	66.14	66.77	64.30	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	.083	.268	.536	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	.16	.18	.19	
	Time to failure, min	t_f	21.63	21.47	16.44	
	Rate of strain, percent/min		.68	.68	.69	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$				
	Initial diameter, in.	D_o	1.4	1.4	1.4	
	Initial height, in.	H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 13°
tan ϕ = 0.233
c = 0.083 T/sq ft

Method of saturation

☐ Controlled stress
☒ Controlled strain

Type of test Q Type of specimen 5" Undisturbed

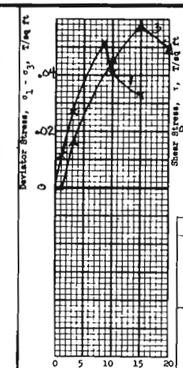
Classification So (Gr) CH2; lns & lyrs ML; org strks

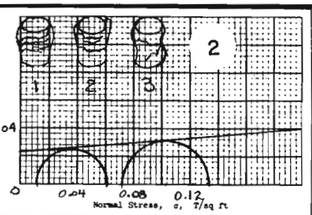
LL 52 PL 22 PI 30 G_s 2.6643

Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barrier Plan - GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 181+30; 170' Right of B/L
Boring No. B-4U Sample No. $5-C_3$
Depth 16.4 Date 16 APR 68
TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	174.2%	174.0%	169.2%	%
	Void ratio	e_o	4.99	4.45	4.43	
	Saturation	S_o	96.2%	96.8%	95.1%	%
	Dry density, lb/cu ft	γ_d	28.08	28.08	28.70	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	.012	.036	.072	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	.05	.00	.06	
	Time to failure, min	t_f	10.39	—	11.37	
	Rate of strain, percent/min		.88	—	.67	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$				
	Initial diameter, in.	D_o	1.4	1.4	1.4	
	Initial height, in.	H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 4°
tan ϕ = .070
c = 0.073 T/sq ft

Method of saturation

☐ Controlled stress
☒ Controlled strain

Type of test UQ Type of specimen 5" Undisturbed

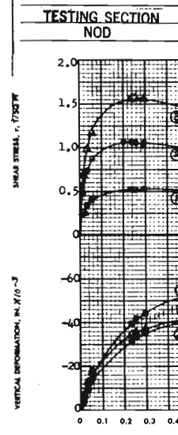
Classification ∨ So (d Gr) CH3-OB; rts; rt; pcs wd

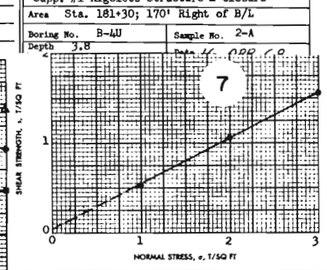
LL 161 PL 43 PI 118 G_s 2.4795

Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barrier Plan-GDM
Supp. #1-Rigolets Structure & Closure
Area Sta. 181+30; 170' Right of B/L
Boring No. B-4U Sample No. 2-A
Depth 3.8 Date 4 APR 68
TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	50.9%	59.5%	60.2%	%
	Void ratio	e_o	1.44	1.59	1.59	
	Saturation	S_o	95.4%	100+%	100+%	%
	Dry density, lb/cu ft	γ_d	69.2	65.1	65.1	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	38.4%	33.5%	29.9%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	1.0	2.0	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.53	1.06	1.56	
	Time to failure, min	t_f	1680	1140	1410	
	Rate of strain, in./min		.00018	.00018	.00018	
	Ultimate shear stress, T/sq ft	τ_{ult}			3.01 IN. SQUARE	0.551 IN. THICK

Shear Strength Parameters
ϕ' = 27°
tan ϕ' = 0.510
c' = 0.05 T/sq ft

☐ Controlled stress
☒ Controlled strain

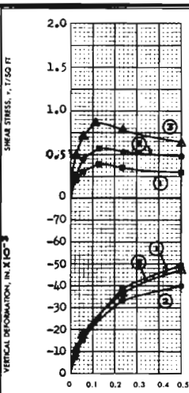
Type of specimen UNDISTURBED

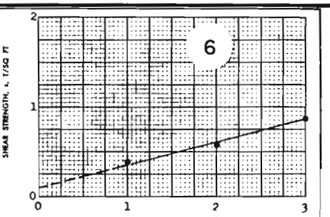
Classification PLASTIC CLAY (CH), gray, contains shell fragments & trace of *

LL 58 PL 20 PI 38 G_s 2.70

Remarks * organic matter

PROJECT LAKE PONTCHARTRAIN, LA, & VICINITY
BARRIER PLAN GDM - SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-4U SAMPLE NO. 6-C
DEPTH 21.2 DATE 9 May 1968
JHMc DIRECT SHEAR TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	102.0%	100.6%	100.9%	%
	Void ratio	e_o	2.98	2.94	2.85	
	Saturation	S_o	93.1%	93.1%	95.5%	%
	Dry density, lb/cu ft	γ_d	42.7	43.1	44.1	
Before Shear	Void ratio after consolidation	e_c				
	Time for 50 percent consolidation, min	t_{50}	5	14	14	
Final	Water content	w_f	71.2%	62.5%	54.2%	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
	Normal stress, T/sq ft	σ	1.0	2.0	3.0	
	Maximum shear stress, T/sq ft	τ_{max}	0.38	0.57	0.87	
	Actual time to failure, min	t_f	720	750	660	
	Rate of strain, in./min		.00019	.00019	.00019	
	Ultimate shear stress, T/sq ft	τ_{ult}				

Shear Strength Parameters
ϕ' = 14°
tan ϕ' = 0.249
c' = 0.10 T/sq ft

☐ Controlled stress
☒ Controlled strain

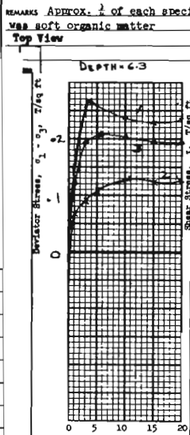
Type of specimen UNDISTURBED 1-3.01 IN. SQUARE 2,3-3.00 2,3-0.626 IN. THICK

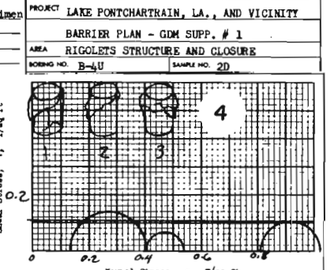
Classification PLASTIC CLAY (CH), gray,

LL 124 PL 34 PI 90 G_s 2.72

Remarks Approx. ½ of each specimen was soft organic matter
Top View

PROJECT LAKE PONTCHARTRAIN, LA., AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-4U SAMPLE NO. 2D





Test No.			1	2	3	
Initial	Water content	w_o	50.58%	55.24%	63.79%	%
	Void ratio	e_o	1.38	1.53	1.76	
	Saturation	S_o	97.17%	96.44%	97.04%	%
	Dry density, lb/cu ft	γ_d	63.89	66.14	60.53	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	.136	.406	.812	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	.27	.13	.21	
	Time to failure, min	t_f	2.65	15.29	7.05	
	Rate of strain, percent/min		.67	.69	.69	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$				
	Initial diameter, in.	D_o	1.4	1.4	1.4	
	Initial height, in.	H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 0°
tan ϕ = —
c = 0.108 T/sq ft

Method of saturation

☐ Controlled stress
☒ Controlled strain

Type of test Q Type of specimen 5" Undisturbed

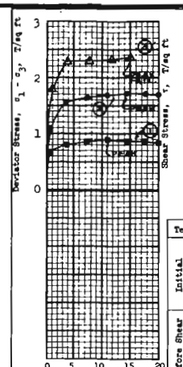
Classification ∨ So (Gr) CH-2; lns & lyrs ML; org strks; Sl & slf

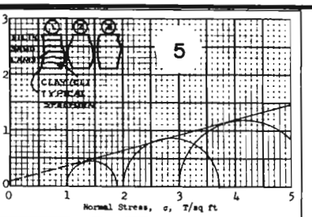
LL 86 PL 22 PI 64 G_s 2.6719

Remarks

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic. - Barrier Plan - GDM Supp.#1 - Rigolets Structure & Closure
Area Sta. 181+30; 170' Right of B/L
Boring No. B-4U Sample No. 6-D
Depth 21.8 Date
TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	50.1%	48.6%	52.1%	%
	Void ratio	e_o	1.35	1.31	1.38	
	Saturation	S_o	100+%	100+%	100+%	%
	Dry density, lb/cu ft	γ_d	71.6	73.0	70.7	
Before Shear	Water content	w_c	39.3%	35.4%	35.6%	%
	Void ratio	e_c	0.969	0.946	0.648	
	Saturation	S_c	100+%	100+%	100+%	%
	Final back pressure, PSI	u_o	50	50	50	
Final	Dry density, lb/cu ft	γ_d	85.6%	86.6%	102.3%	%
	Void ratio	e_f				
	Minor principal stress, T/sq ft	σ_3	1.0	2.0	3.0	
	Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$	0.89	1.72	2.35	
	Time to failure, min	t_f	119	157	153	
	Rate of strain, percent/min		0.09	0.09	0.10	
	Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$				
	Initial diameter, in.	D_o	1.40	1.40	1.40	
	Initial height, in.	H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 15°
tan ϕ = 0.268
c = 0.10 T/sq ft

Method of saturation BP

☐ Controlled stress
☒ Controlled strain

Type of test R Type of specimen UNDISTURBED

Classification LEAN CLAY (CL), gray, contains silty sand laminations

LL 42 PL 21 PI 21 G_s 2.70

Remarks

Project LAKE PONTCHARTRAIN, LA., AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
Area RIGOLETS STRUCTURE AND CLOSURE
Boring No. B-4U Sample No. 5-B
Depth 15.7 Date 30 April 1968
BH TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE
TRANSLUCENT
USAEWES SOILS TEST SECTION

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

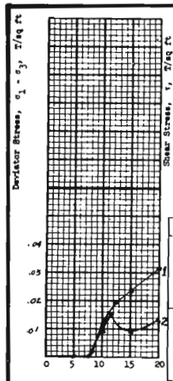
DETAIL SHEAR STRENGTH DATA

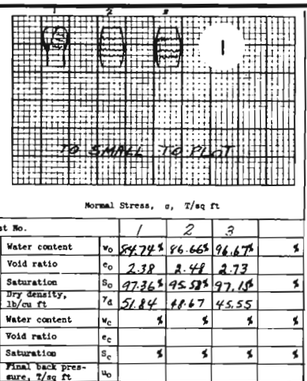
BORING B-4U

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

DATE: MARCH 1970 FILE NO. H-2-24414

PLATE 57





Test No.			1	2	3	
Initial	Water content	w_o	84.74%	86.66%	96.67%	%
	Void ratio	e_o	2.38	2.44	2.73	
	Saturation	S_o	97.36%	95.58%	97.18%	%
	Dry density, lb/cu ft	γ_d	51.84	49.67	45.55	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.07	0.14	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.02	0.01	0.00	
Time to failure, min		t_f	21.71	17.02	—	
Rate of strain, percent/min			0.71	0.67	—	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0°
tan ϕ = 0
c = 0.008 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

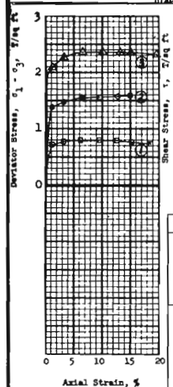
Classification w So (Gr&Br) CH4; lns & ars ML; rt & rts thru-out

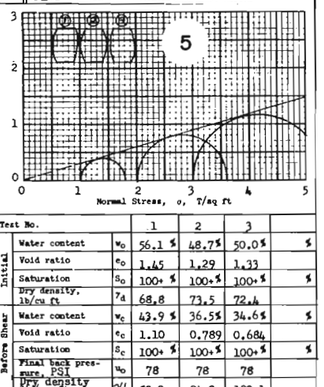
LL 115 | PL 32 | PI 83 | G_s 2.73

Remarks ____

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic.-Barrier Plan - GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 202+80; on C/L
Boring No. B-5-U | Sample No. 2-B
Depth 4.3 | Date 17 APR 68
JER TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	56.1 %	48.7%	50.0%	%
	Void ratio	e_o	1.45	1.29	1.33	
	Saturation	S_o	100+ %	100+%	100+%	%
	Dry density, lb/cu ft	γ_d	68.8	73.5	72.4	
Before Shear	Water content	w_c	43.9 %	36.5%	34.6%	%
	Void ratio	e_c	1.10	0.789	0.684	
	Saturation	S_c	100+ %	100+%	100+%	%
	Final back pressure, PSI	u_o	78	78	78	
	Dry density lb/cu ft	γ_d	80.3	94.2	100.1	
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	1.0	2.0	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.79	1.59	2.35	
Time to failure, min		t_f	103	250	108	
Rate of strain, percent/min			0.06	0.06	0.06	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.39	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 17°
tan ϕ = 0.306
c = 0 T/sq ft

Method of saturation BP

☐ Controlled stress
☒ Controlled strain

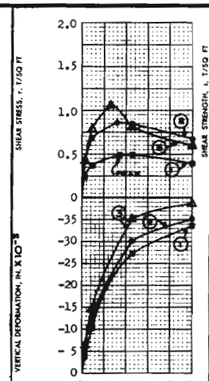
Type of test R | Type of specimen UNDISTURBED

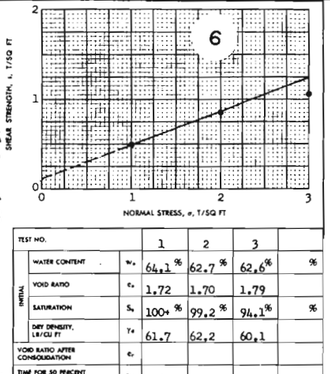
Classification LEAN CLAY (CL), gray, contains silt lenses 1/4" thick

LL 48 | PL 20 | PI 28 | G_s 2.70

Remarks ____

Project LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
Area RIGOLETS STRUCTURE & CLOSURE
Boring No. B-5U | Sample No. 4-D
Depth 14.0 | Date 30 April 1968
TES TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	64.1 %	62.7 %	62.6%	%
	Void ratio	e_o	1.72	1.70	1.79	
	Saturation	S_o	100+ %	99.2 %	94.1%	%
	Dry density, lb/cu ft	γ_d	61.7	62.2	60.1	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}	6	3	3	
Final	Water content	w_f	43.3 %	37.0 %	43.3%	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/sq ft		σ	1.0	2.0	3.0	
Maximum shear stress, T/sq ft		τ_{max}	0.49	0.86	1.06	
Actual time to failure, min		t_f	960	900	720	
Rate of strain, in./min			.00019	.00019	.00019	
Ultimate shear stress, T/sq ft		τ_{ult}				

Shear Strength Parameters
ϕ' = 21°
tan ϕ' = 0.394
c' = 0.12 T/sq ft

☐ Controlled stress
☒ Controlled strain

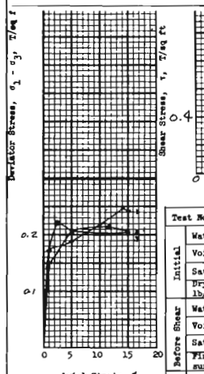
Type of specimen UNDISTURBED | 3.01 IN. SQUARE | 0.626 IN. THICK

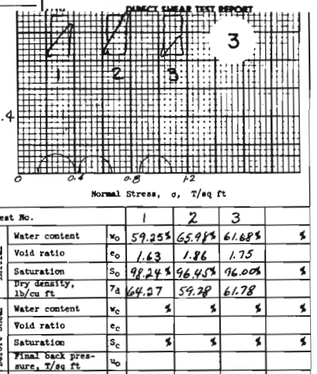
Classification PLASTIC CLAY (CH), light & dark gray, contains pocket of silt, *

LL 72 | PL 28 | PI 44 | G_s 2.69

Remarks Small roots and organic matter

Project LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
Area RIGOLETS STRUCTURE AND CLOSURE
Boring No. B-5U | Sample No. 4-A
Depth 11.3 | Date 9 May 1968





Test No.			1	2	3	
Initial	Water content	w_o	59.25%	65.91%	61.68%	%
	Void ratio	e_o	1.63	1.86	1.75	
	Saturation	S_o	98.24 %	96.45%	96.00%	%
	Dry density, lb/cu ft	γ_d	64.27	59.38	61.78	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.43	0.86	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.25	0.22	0.22	
Time to failure, min		t_f	19.90	16.60	3.47	
Rate of strain, percent/min			0.71	0.70	0.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0°
tan ϕ = 0
c = 0.120 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

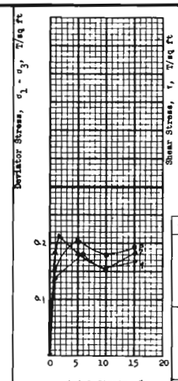
Classification So (Gr&Br) CH4; lns & thin lyrs ML; few org strks

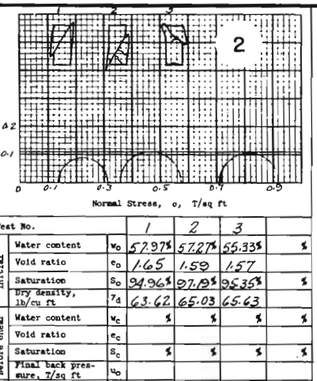
LL 79 | PL 27 | PI 52 | G_s 2.72

Remarks ____

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic. - Barrier Plan - GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 202 + 80; On C/L
Boring No. B-5U | Sample No. 5-A
Depth ~~15.0~~ 15.2 | Date 23 APR 68
JER TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	57.97%	57.27%	55.33%	%
	Void ratio	e_o	1.65	1.59	1.57	
	Saturation	S_o	94.96%	97.19%	95.35%	%
	Dry density, lb/cu ft	γ_d	63.62	65.03	65.63	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.36	0.71	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.18	0.21	0.21	
Time to failure, min		t_f	19.10	2.36	6.91	
Rate of strain, percent/min			0.69	0.70	0.69	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0°
tan ϕ = 0
c = 0.110 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

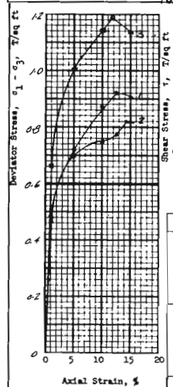
Classification So (Gr) CH4; lns & thin lyrs ML; lg org ars; few ox ars

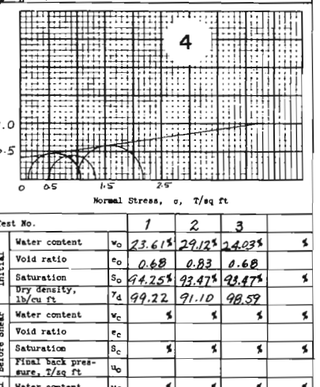
LL 72 | PL 21 | PI 51 | G_s 2.70

Remarks ____

TESTING SECTION NOD

Project Lk.Pont.,La.&Vic. - Barrier Plan - GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 202+80; On C/L
Boring No. B-5U | Sample No. 4-B
Depth 11.8 | Date 22 APR 68
JER TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	23.61%	29.12%	24.03%	%
	Void ratio	e_o	0.68	0.83	0.68	
	Saturation	S_o	94.25%	93.47%	98.87%	%
	Dry density, lb/cu ft	γ_d	99.22	91.10	98.58	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.50	1.00	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.92	0.82	1.19	
Time to failure, min		t_f	46.51	52.84	46.27	
Rate of strain, percent/min			0.27	0.27	0.25	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 8.0°
tan ϕ = 0.141
c = 0.380 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification w St (gn Gr) CH2; lns & ars ML; org strks; ox ars

LL 44 | PL 15 | PI 29 | G_s 2.6550

Remarks ____

TESTING SECTION NOD

Project Lk. Pont.,La.&Vic.-Barrier Plan - GDM
Supp. #1 - Rigolets Structure & Closure
Area Sta. 202 + 80; On C/L
Boring No. B-5U | Sample No. 6-B
Depth 20.0 | Date 24 APR 68
JER TRIAXIAL COMPRESSION TEST REPORT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

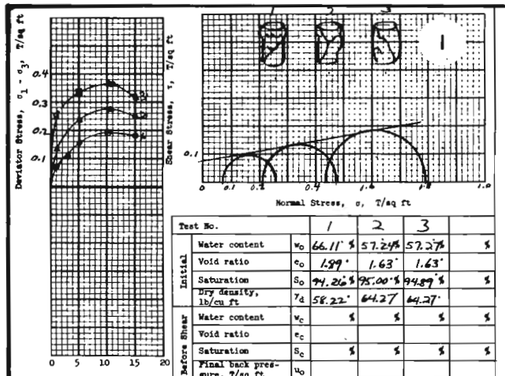
DETAIL SHEAR STRENGTH DATA

BORING B-5U

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

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 58



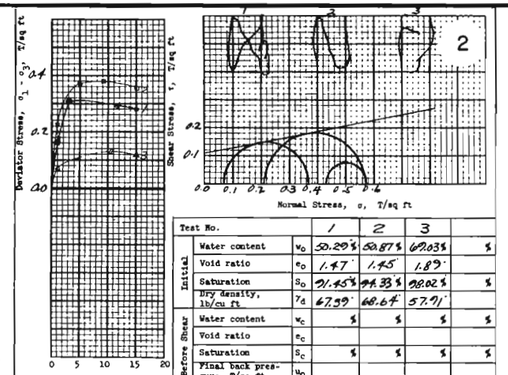
Test No.			1	2	3	
Initial	Water content	w_o	66.11 %	57.24 %	57.27 %	%
	Void ratio	e_o	1.89	1.63	1.63	
	Saturation	S_o	94.26 %	95.00 %	94.89 %	%
	Dry density, lb/cu ft	γ_d	58.22	64.27	64.27	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.43	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.19	0.27	0.36	
Time to failure, min		t_f	14.80	15.76	16.20	
Rate of strain, percent/min			0.67	0.68	0.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 18.0 °
tan ϕ = 0.3763
c = 0.075 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr)CH_h; lns & ars ML; org ars; rt
LL 82 | PL 18 | PI 64 | G_s 2.6981
Remarks
TESTING SECTION NOD
Project LAKE PONT.,LA. & VIC. BARRIER GDM SUPP #1 RIGOLETS COMPLEX
Area Sta. 210+30 - on C/L (add. bor.)
Boring No. B-6U | Sample No. 2-B
Depth 5.0 | Date 18 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT



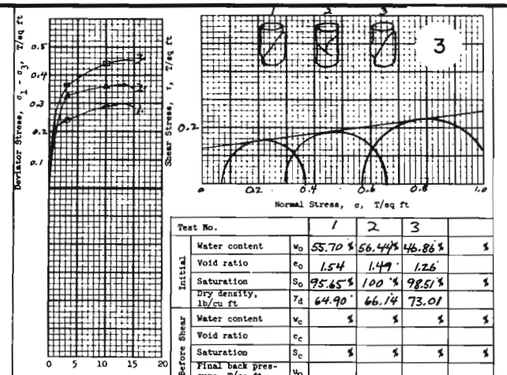
Test No.			1	2	3	
Initial	Water content	w_o	50.29 %	50.87 %	49.03 %	%
	Void ratio	e_o	1.47	1.45	1.89	
	Saturation	S_o	91.45 %	94.33 %	98.02 %	%
	Dry density, lb/cu ft	γ_d	67.99	68.64	57.91	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.43	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.30	0.38	0.13	
Time to failure, min		t_f	16.39	13.13	15.26	
Rate of strain, percent/min			0.70	0.68	0.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 12.4 °
tan ϕ = 0.21986
c = 0.105 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr)CH_h; lns & ars ML; org ars; rts
LL 79 | PL 21 | PI 58 | G_s 2.6844
Remarks
TESTING SECTION NOD
Project LAKE PONT.,LA. & VIC. - BARRIER GDM SUPP #1 - RIGOLETS COMPLEX ADD. BORINGS
Area Sta 210+30 - on C/L
Boring No. B-6U | Sample No. 2-C
Depth 6.4 | Date 18 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT



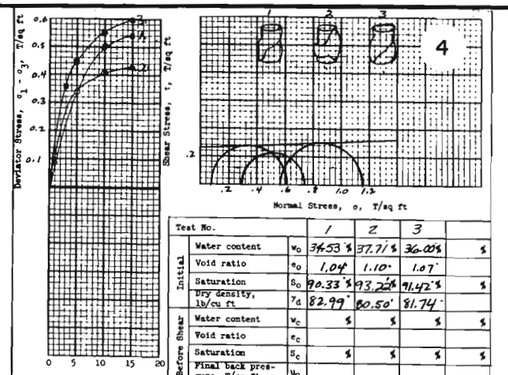
Test No.			1	2	3	
Initial	Water content	w_o	55.70 %	56.44 %	46.86 %	%
	Void ratio	e_o	1.54	1.49	1.26	
	Saturation	S_o	95.65 %	100 %	98.1 %	%
	Dry density, lb/cu ft	γ_d	64.90	66.14	73.01	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.29	0.57	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.30	0.37	0.46	
Time to failure, min		t_f	20.43	19.15	21.91	
Rate of strain, percent/min			0.69	0.69	0.68	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 7.5 °
tan ϕ = 0.1317
c = 0.125 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So (Gr & Br) CH; lns , lyrs & ars ML; org ars
LL 57 | PL 18 | PI 39 | G_s 2.6925
Remarks
TESTING SECTION NOD
Project Lk.Pont.,La.&Vic.-Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)
Area Sta. 210 + 30; On B/L
Boring No. B-6U | Sample No. 3-C
Depth 10.4 | Date 24 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	34.53 %	37.71 %	36.09 %	%
	Void ratio	e_o	1.04	1.10	1.07	
	Saturation	S_o	90.33 %	93.22 %	91.42 %	%
	Dry density, lb/cu ft	γ_d	82.99	80.50	81.74	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.29	0.57	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.54	0.44	0.60	
Time to failure, min		t_f	22.36	22.45	22.28	
Rate of strain, percent/min			0.67	0.67	0.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

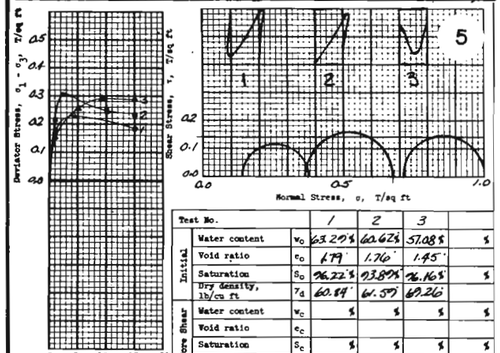
Shear Strength Parameters
ϕ = 3.5 °
tan ϕ = 0.0611
c = 0.230 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr&Br)CL_s; lns,lys & ars ML; org ars
LL 40 | PL 16 | PI 24 | G_s 2.7107
Remarks
TESTING SECTION NOD
Project LAKE PONT.,LA. &VIC.-BARRIER GDM SUPP #1 - RIGOLETS COMPLEX ADDITIONAL BORINGS
Area Sta. 210+30 - on C/L
Boring No. B-6U | Sample No. 3-D_2
Depth 10.7 | Date 18 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT

ENG FORM 1 JUN 65 2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE
TRANSLUCENT



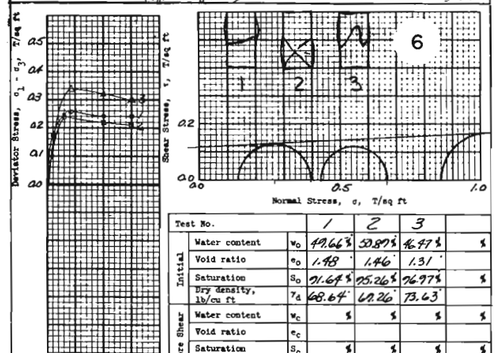
Test No.			1	2	3	
Initial	Water content	w_o	63.29 %	60.67 %	57.08 %	%
	Void ratio	e_o	1.79	1.76	1.45	
	Saturation	S_o	96.22 %	93.89 %	96.16 %	%
	Dry density, lb/cu ft	γ_d	60.89	61.59	69.26	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.36	0.71	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.23	0.31	0.29	
Time to failure, min		t_f	5.60	3.59	13.20	
Rate of strain, percent/min			0.72	0.70	0.69	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.140 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(Gr)CH_h; lns & lys ML; few org stks
LL 70 | PL 17 | PI 53 | G_s 2.7225
Remarks
TESTING SECTION NOD
Project LAKE PONT.,LA.& VIC.-BARRIER GDM SUPP #1-RIGOLETS COMPLEX -ADDITIONAL BORINGS
Area Sta. 210+30 - on C/L
Boring No. B-6U | Sample No. 4-D_2
Depth 15.0 | Date 19 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT



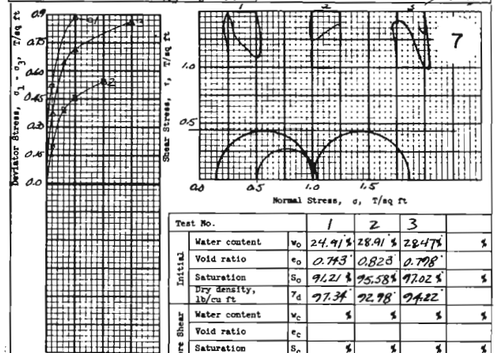
Test No.			1	2	3	
Initial	Water content	w_o	49.66 %	50.87 %	46.47 %	%
	Void ratio	e_o	1.48	1.46	1.31	
	Saturation	S_o	91.64 %	95.26 %	96.97 %	%
	Dry density, lb/cu ft	γ_d	68.64	69.26	73.63	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.43	0.86	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.26	0.29	0.34	
Time to failure, min		t_f	5.96	4.60	5.92	
Rate of strain, percent/min			0.69	0.69	0.69	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 30 °
tan ϕ = 0.0524
c = 0.115 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So(dGr)CH_s; lns and ars ML; org ars; slf
LL 56 | PL 17 | PI 39 | G_s 2.7329
Remarks
TESTING SECTION NOD
Project LAKE PONT.,LA. & VIC.- BARRIER GDM SUPP #1 - RIGOLETS COMPLEX ADDITIONAL BORING
Area Sta 210+30 - on C/L
Boring No. B-6U | Sample No. 5-C
Depth 17.5 | Date 19 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT



Test No.			1	2	3	
Initial	Water content	w_o	24.91 %	28.91 %	28.47 %	%
	Void ratio	e_o	0.743	0.823	0.798	
	Saturation	S_o	91.21 %	95.58 %	97.02 %	%
	Dry density, lb/cu ft	γ_d	97.34	92.98	94.22	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.50	1.00	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.88	0.54	0.86	
Time to failure, min		t_f	18.77	36.29	55.97	
Rate of strain, percent/min			.27	.28	.27	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = —
c = 0.435 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification St(Gr&Y)CH_o; lns & ars ML; org ars
LL 47 | PL 18 | PI 29 | G_s 2.7241
Remarks
TESTING SECTION NOD
Project LK. PONT.,LA. & VIC.-BARRIER GDM SUPP #1 RIGOLETS COMPLEX - ADDITIONAL BORINGS
Area Sta 210+30 - on C/L
Boring No. B-6U | Sample No. 6-A
Depth 20.3 | Date 20 JUN 1968
El
TRIAXIAL COMPRESSION TEST REPORT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

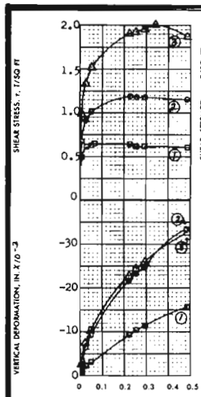
DETAIL SHEAR STRENGTH

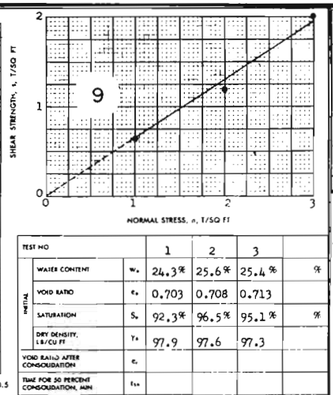
BORING B-6U

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

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 59





TEST NO			1	2	3	
INITIAL	WATER CONTENT	w_c	24.3%	25.6%	25.4%	%
	VOID RATIO	e_o	0.703	0.708	0.713	
	SATURATION	S_o	92.3%	96.5%	95.1%	%
	DRY DENSITY, LB/CU FT	γ_d	97.9	97.6	97.3	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	25.2%	24.3%	23.1%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.64	1.19	2.01	
ACTUAL TIME TO FAILURE, MIN		t_f	420	1320	1950	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 33°$

$\tan \phi' = 0.649$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

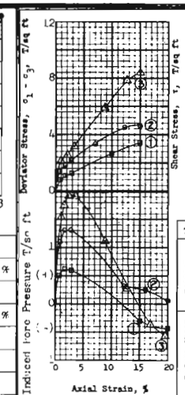
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

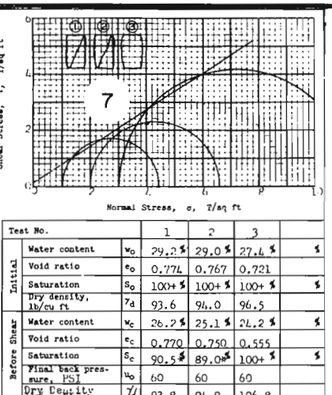
CLASSIFICATION SANDY SILT (ML), gray

LL – PL – PI – G_s 2.67

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-7U — SAMPLE NO. 7-B
DEPTH ft -24.0 — DATE 14 May 1968





Test No.			1	2	3	
Initial	Water content	w_o	29.2%	29.0%	27.4%	%
	Void ratio	e_o	0.771	0.767	0.721	
	Saturation	S_o	100+%	100+%	100+%	%
	Dry density, lb/cu ft	γ_d	93.6	94.0	96.5	
Before Shear	Water content	w_c	26.2%	25.1%	24.2%	%
	Void ratio	e_c	0.770	0.750	0.655	
	Saturation	S_c	90.5%	89.0%	100+%	%
	Final back pressure, PSI	u_o	60	60	60	
	Dry Density lb/cu ft	γ_f	93.8	94.9	106.8	
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	1.0	2.0	3.0	
Max deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{max}$	3.43	4.61	8.38	
Time to failure, min		t_f	100	94	115	
Rate of strain, percent/min			0.15	0.16	0.13	
Ult deviator stress, T/sq ft		$(\sigma_1-\sigma_3)_{ult}$				
Initial diameter, in.		D_o	1.34	1.39	1.39	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters **

$\phi = 33°$

$\tan \phi = 0.649$

$c = 0.11$ T/sq ft

Method of saturation BP

☐ Controlled stress
☒ Controlled strain

Type of test R — Type of specimen UNDISTURBED

Classification SILTY SAND (SM), gray, contains a small amount of organic ***

LL – PL – PI – G_s 2.66

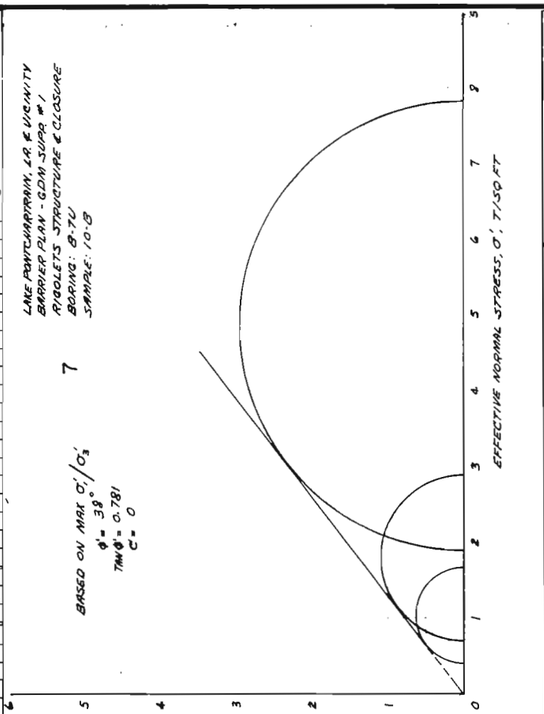
Remarks Portion of sample was allowed to drain before trimming* Pore pressure response indicated 100% saturation ** See attached plot for effective values *** matter

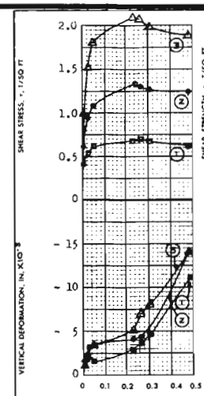
Project LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
Area RIGOLETS STRUCTURE & CLOSURE
Boring No. B-7U — Sample No. 10-B
Depth ft 36.0 — Date 8 APRIL 1968
JL TRIAXIAL COMPRESSION TEST REPORT

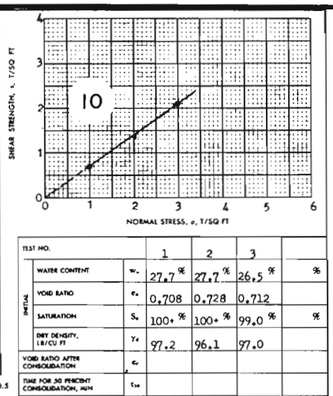
LAKE PONTCHARTRAIN, LA & VICINITY
BARRIER PLAN - GDM SUPP #1
RIGOLETS STRUCTURE & CLOSURE
BORING: B-7U
SAMPLE: 10-B

7

BASED ON MAX σ_1'/σ_3'
$\phi' = 38.0°$
$\tan\phi = 0.781$
$c = 0$







TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	27.7%	27.7%	26.5%	%
	VOID RATIO	e_o	0.708	0.728	0.712	
	SATURATION	S_o	100+%	100+%	99.0%	%
	DRY DENSITY, LB/CU FT	γ_d	97.2	96.1	97.0	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	24.4%	24.0%	24.8%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.69	1.34	2.10	
ACTUAL TIME TO FAILURE, MIN		t_f	1560	1440	1410	
RATE OF STRAIN, IN./MIN			.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 35°$

$\tan \phi' = 0.700$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

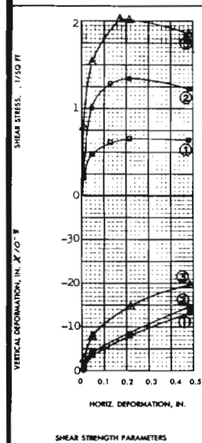
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

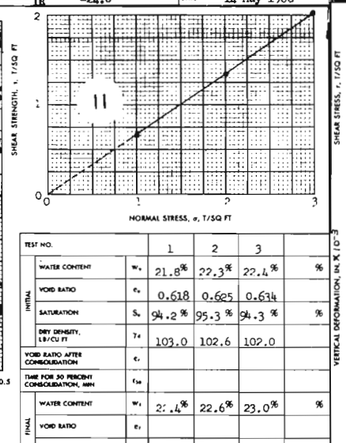
CLASSIFICATION SILTY SAND (SM), gray, contains a trace of organic matter

LL – PL – PI – G_s 2.66 From "R" 10-B

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-7U — SAMPLE NO. 10-C
DEPTH ft 37.0 — DATE 9 April 1968
JHMc DIRECT SHEAR TEST REPORT





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	21.8%	22.3%	22.4%	%
	VOID RATIO	e_o	0.618	0.625	0.634	
	SATURATION	S_o	94.2%	95.3%	94.3%	%
	DRY DENSITY, LB/CU FT	γ_d	103.0	102.6	102.0	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	21.4%	22.6%	23.0%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.65	1.34	2.02	
ACTUAL TIME TO FAILURE, MIN		t_f	1320	1320	1080	
RATE OF STRAIN, IN./MIN			.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 34°$

$\tan \phi' = 0.674$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

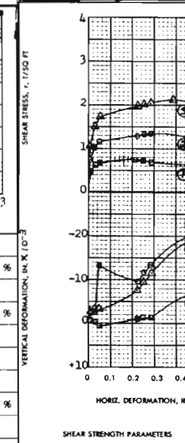
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

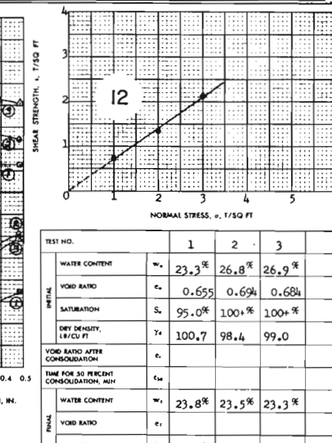
CLASSIFICATION SILTY SAND (SM), gray

LL – PL – PI – G_s 2.67

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN -GDM SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-7U — SAMPLE NO. 13-B
DEPTH ft 47.8 — DATE 8 APRIL 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	23.3%	26.8%	26.9%	%
	VOID RATIO	e_o	0.655	0.694	0.684	
	SATURATION	S_o	95.0%	100+%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	100.7	98.4	99.0	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	23.8%	23.5%	23.3%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.73	1.33	2.11	
ACTUAL TIME TO FAILURE, MIN		t_f	1260	1680	2220	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 35°$

$\tan \phi' = 0.700$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

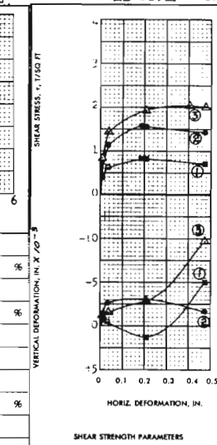
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

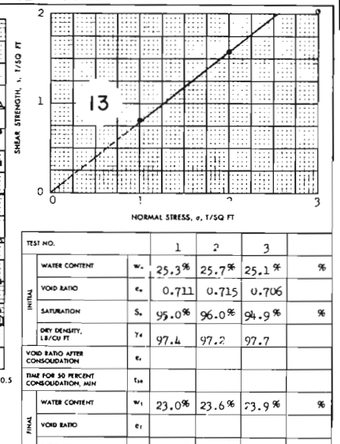
CLASSIFICATION SILTY SAND (SM), gray, contains a trace of organic matter

LL – PL – PI – G_s 2.67

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN -GDM SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-7U — SAMPLE NO. 16-B
DEPTH ft 60.0 — DATE 11 April 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	25.3%	25.7%	25.1%	%
	VOID RATIO	e_o	0.711	0.715	0.706	
	SATURATION	S_o	95.0%	96.0%	94.9%	%
	DRY DENSITY, LB/CU FT	γ_d	97.4	97.2	97.7	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	23.0%	23.6%	23.9%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.81	1.58	2.04	
ACTUAL TIME TO FAILURE, MIN		t_f	1110	1140	2340	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 38°$

$\tan \phi' = 0.781$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

CLASSIFICATION SILTY SAND (SM), gray

LL – PL – PI – G_s 2.67

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-7U — SAMPLE NO. 17-C
DEPTH ft 64.7 — DATE 10 APRIL 1968

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

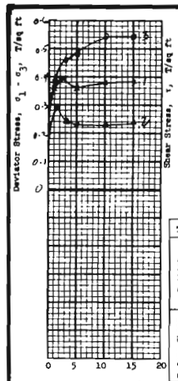
DETAIL SHEAR STRENGTH DATA

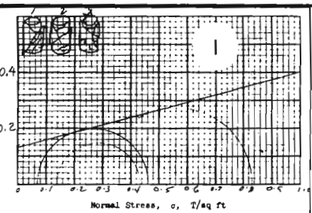
BORING B-7U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 60





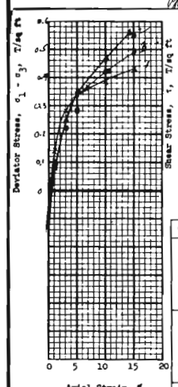
Test No.			1	2	3	
Initial	Water content	w_o	55.67%	53.78%	52.80%	%
	Void ratio	e_o	1.53	1.48	1.35	
	Saturation	S_o	98.52%	97.92%	105.44%	%
	Dry density, lb/cu ft	γ_d	66.14	67.39	71.14	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.07	.14	.29	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		.39	.29	.54	
Time to failure, min		t_f	3.64	1.96	15.15	
Rate of strain, percent/min			0.70	0.70	0.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.4	3.4	3.0	

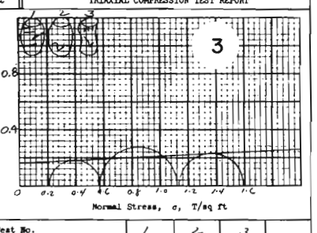
Shear Strength Parameters
ϕ = 14.9°
tan ϕ = 0.266
c = 0.13 T/sq ft
Method of saturation ____
☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification M (d Gr & Gr) CH4; lns & ars ML; dw; lg org ars
LL 87 | PL 23 | PI 64 | G_s 2.691
Remarks ____

Project Lk.Pont.,La.&Vic.-Barrier Plan - GDM Supp. #1 - Rigolets Structure & Closure
Area Sta. 235 + 60; On C/L
Boring No. B-10U | Sample No. 2-C
Depth 5.4 | Date May 68
TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION
NOD





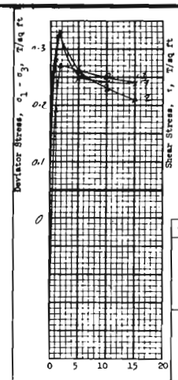
Test No.			1	2	3	
Initial	Water content	w_o	32.7%	31.53%	32.67%	%
	Void ratio	e_o	0.99	0.95	0.99	
	Saturation	S_o	88.44%	89.20%	88.19%	%
	Dry density, lb/cu ft	γ_d	82.99	84.86	82.99	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.21	0.57	1.14	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.36	0.56	0.44	
Time to failure, min		t_f	10.16	21.64	16.63	
Rate of strain, percent/min			0.67	0.67	0.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

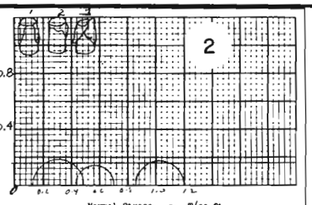
Shear Strength Parameters
ϕ = 2.6°
tan ϕ = 0.045
c = 0.14 T/sq ft
Method of saturation ____
☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification M (l Gr) CL6; ars ML
LL 30 | PL 19 | PI 11 | G_s 2.646
Remarks ____

Project Lk.Pont.,La.&Vic. - Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)
Area Sta. 235 + 60; On C/L
Boring No. B-10U | Sample No. 6-C
Depth 20.8 | Date May 68
TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION
NOD





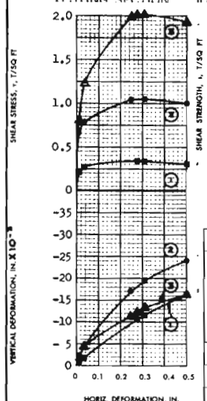
Test No.			1	2	3	
Initial	Water content	w_o	68.01%	66.14%	68.70%	%
	Void ratio	e_o	1.85	1.78	1.86	
	Saturation	S_o	98.11%	98.94%	99.29%	%
	Dry density, lb/cu ft	γ_d	58.66	59.90	58.66	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	.14	.43	.86	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		.33	.27	.33	
Time to failure, min		t_f	2.77	2.65	2.75	
Rate of strain, percent/min			.66	.66	.66	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o				
Initial height, in.		H_o				

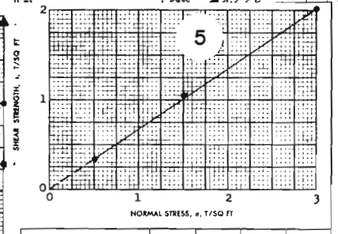
Shear Strength Parameters
ϕ = 0°
tan ϕ = —
c = 0.15 T/sq ft
Method of saturation ____
☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed
Classification So (Gr&Br) CH4; lns & lyrs ML; few lns SP
LL 64 | PL 22 | PI 42 | G_s 2.682
Remarks ____

Project Lk.Pont.,La.&Vic.-BarrierPlan-GDM Supp. No. 1 (Rigolets Structure & Closure)
Area Sta. 235 + 60; On C/L
Boring No. B-10U | Sample No. 5-B
Depth 16.0 | Date May 68
TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION



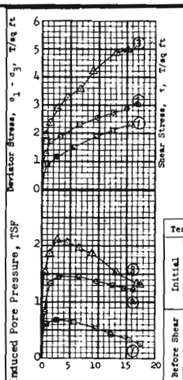


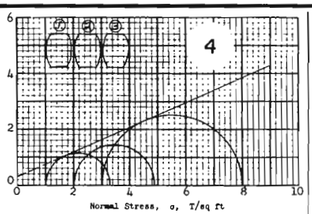
TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_o	28.6%	27.6%	26.9%	%
	VOID RATIO	e_o	0.788	0.768	0.734	
	SATURATION	S_o	96.2%	95.2%	97.1%	%
	DRY DENSITY, LB/CU FT	γ_d	92.5	93.6	95.4	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	28.6%	26.3%	24.1%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	0.5	1.5	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.34	1.05	2.01	
ACTUAL TIME TO FAILURE, MIN		t_f	1500	1680	1500	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
ϕ' = 32°
TAN ϕ' = 0.624
c' = 0 T/SQ FT
☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED | 3.01 IN. SQUARE | 0.551 IN. THICK
CLASSIFICATION SILTY SAND (SM), gray
LL — | PL — | PI — | G_s 2.65
REMARKS ____

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-10U | SAMPLE NO. 6-D
DEPTH 22.0 | DATE May 1968
DIRECT SHEAR TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	35.0%	38.1%	33.5%	%
	Void ratio	e_o	0.944	1.02	0.910	
	Saturation	S_o	99.7%	100+%	99.0%	%
	Dry density, lb/cu ft	γ_d	86.4	83.0	87.9	
Before Shear	Water content	w_c	30.2%	32.0%	29.4%	%
	Void ratio	e_c	0.816	0.770	0.733	
	Saturation	S_c	99.6%	100+%	100+%	%
	Final back pressure, PSI	u_o	58	58	58	
Final	Dry density lb/cu ft	γ_d	92.5	94.9	96.9	
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	1.0	2.0	3.0	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		2.32	2.87	4.99	
Time to failure, min		t_f	115	136	115	
Rate of strain, percent/min			0.13	0.11	0.13	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.36	1.36	1.36	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters *
ϕ = 24°
tan ϕ = 0.445
c = 0.31 T/sq ft
Method of saturation BP
☐ Controlled stress
☒ Controlled strain

Type of test R | Type of specimen UNDISTURBED
Classification SILT (ML), gray, contains layers of fine sand ¼" thick and **
LL — | PL — | PI — | G_s 2.69
Remarks * See attached plot for effective values
** layers of clay (CL) ½" thick
Portion of sample was allow-

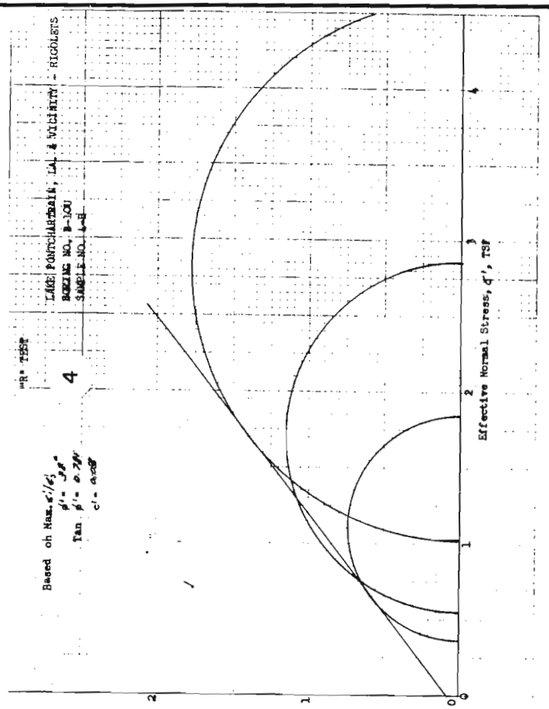
Project LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN -GDM SUPP. #1
Area RIGOLETS STRUCTURE & CLOSURE
Boring No. B-10U | Sample No. 4-B
Depth 12.0 | Date 1 May 1968
TRIAXIAL COMPRESSION TEST REPORT

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_o	31.2%	31.1%	30.8%	%
	VOID RATIO	e_o	0.817	0.825	0.821	
	SATURATION	S_o	100+%	100+%	99.8%	%
	DRY DENSITY, LB/CU FT	γ_d	91.4	91.0	91.2	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	27.4%	27.1%	26.9%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.67	1.24	1.97	
ACTUAL TIME TO FAILURE, MIN		t_f	690	1620	1800	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
ϕ' = 33°
TAN ϕ' = 0.649
c' = 0 T/SQ FT
☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED | 3.00 IN. SQUARE | 0.551 IN. THICK
CLASSIFICATION SAND (SP), light gray, contains a pocket of silt
LL — | PL — | PI — | G_s 2.66
REMARKS ____

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-10U | SAMPLE NO. 7-B
DEPTH 24.0 | DATE 13 May 1968
DIRECT SHEAR TEST REPORT



NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

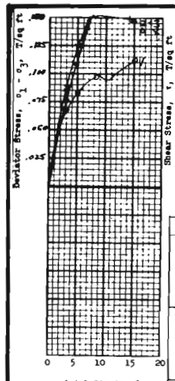
(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

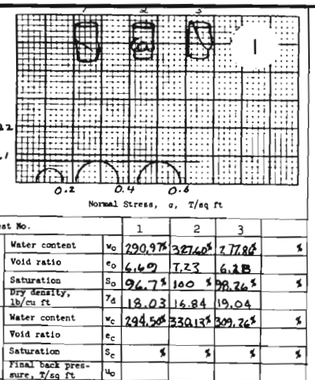
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
DETAIL SHEAR STRENGTH DATA
BORING B-10U
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 61





Test No.			1	2	3	
Initial	Water content	w_o	290.9%	387.6%	277.8%	%
	Void ratio	e_o	6.60	7.23	6.28	
	Saturation	S_o	96.7%	100 %	98.7%	%
	Dry density, lb/cu ft	γ_d	18.03	16.84	19.04	
Before Shear	Water content	w_c	294.5%	330.1%	309.7%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	286.1%	326.8%	273.1%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.21	0.43	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.10	0.15	0.15	
Time to failure, min		t_f	12.31	11.86	11.70	
Rate of strain, percent/min			0.67	0.69	0.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0.5 °
tan ϕ = 0.0087
c = 0.071 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification vSo(dBr)CH_2-OC;lns&ars silt;rts & rt thru-out;dw

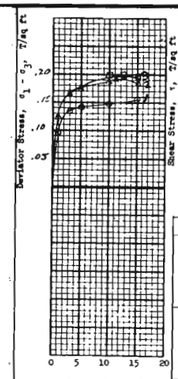
LL 337 | PL 101 | PI 236 | G_s 2.2223

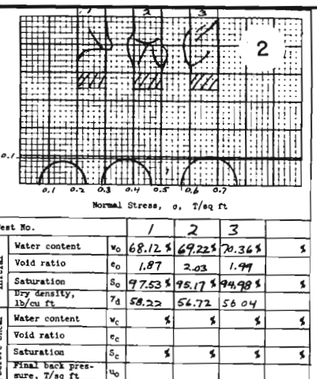
Remarks ____

Project Lk.Pont., La. & Vic.-Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)
Area Sta. 239 + 80 - 457' Rt. of B/L
Boring No. B-11U | Sample No. 2-A
Depth 3.7 El ____ | Date ____

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD





Test No.			1	2	3	
Initial	Water content	w_o	68.12%	69.22%	70.36%	%
	Void ratio	e_o	1.87	2.03	1.99	
	Saturation	S_o	97.53%	95.17%	94.98%	%
	Dry density, lb/cu ft	γ_d	58.22	56.72	56.04	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.29	0.57	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.16	0.19	0.20	
Time to failure, min		t_f	21.96	16.78	17.94	
Rate of strain, percent/min			.69	.69	.69	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = ____
c = 0.095 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification So(Gr & dGr)CH_4;lns & ars ML; lge org ars; rt

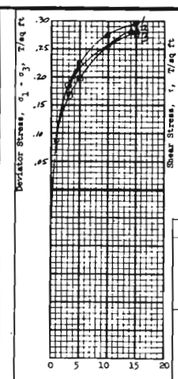
LL 97 | PL 23 | PI 74 | G_s 2.6759

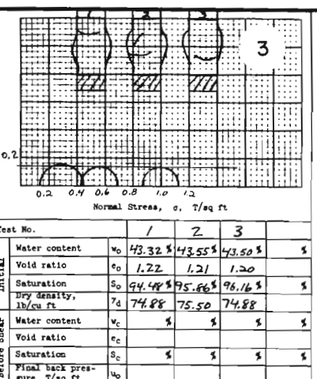
Remarks ____

Project Lk.Pont., La. & Vic.-Barr.Plan-GDM Supp #1- Add. Bor.-Rigolets Structure-Closure
Area Sta. 239+80 - 457' Rt. of B/L
Boring No. B-11U | Sample No. 2-C
Depth 5.2 El ____ | Date 10 July 1968

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD





Test No.			1	2	3	
Initial	Water content	w_o	43.32%	43.55%	43.50%	%
	Void ratio	e_o	1.22	1.21	1.20	
	Saturation	S_o	94.48%	95.86%	96.16%	%
	Dry density, lb/cu ft	γ_d	74.88	75.50	74.88	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.42	0.86	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.30	0.28	0.28	
Time to failure, min		t_f	22.50	20.96	22.10	
Rate of strain, percent/min			0.67	0.71	0.68	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = ____
c = 0.14 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification So(Gr)Alt lys CH & ML

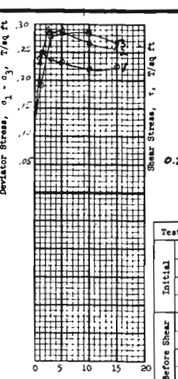
LL 38 | PL 21 | PI 17 | G_s 2.6574

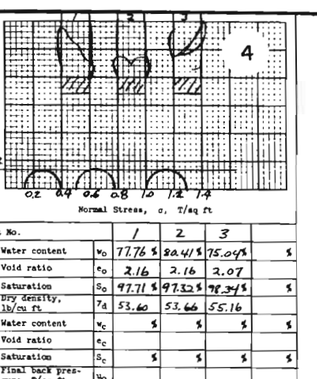
Remarks ____

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM Supp #1-Add.Bor.-Rigolets Structure&Clos.
Area Sta. 239+80 - 457' Rt. of B/L
Boring No B-11U | Sample No. 4-C
Depth 12.8 El ____ | Date 10 July 1968

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD





Test No.			1	2	3	
Initial	Water content	w_o	77.76%	80.41%	75.04%	%
	Void ratio	e_o	2.16	2.16	2.07	
	Saturation	S_o	97.71%	97.32%	98.34%	%
	Dry density, lb/cu ft	γ_d	53.60	53.66	55.16	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.50	1.00	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.25	0.29	0.28	
Time to failure, min		t_f	1.96	7.00	13.18	
Rate of strain, percent/min			.69	.69	.70	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 0 °
tan ϕ = ____
c = 0.14 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification So(Gr)CH_4;lns & thin lys ML & SP

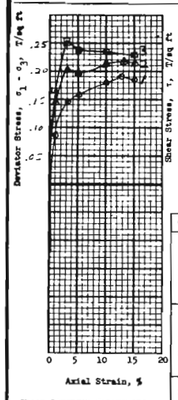
LL 81 | PL 23 | PI 58 | G_s 2.7161

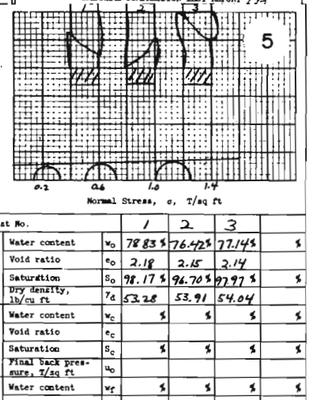
Remarks ____

Project Lk.Pont.,La.&Vic.-Barr.Plan-GDM SUpp#1 Add.Bor.-Rigolets Structure & Closure
Area Sta. 239+80 - 457' Rt. of B/L
Boring No. B-11U | Sample No. 5-B_1
Depth 16.0 El ____ | Date 10 July 1968

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD





Test No.			1	2	3	
Initial	Water content	w_o	78.83%	76.42%	77.14%	%
	Void ratio	e_o	2.18	2.15	2.14	
	Saturation	S_o	98.17%	96.70%	97.97%	%
	Dry density, lb/cu ft	γ_d	53.28	53.91	54.04	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.50	1.00	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.19	0.22	0.25	
Time to failure, min		t_f	17.96	18.96	4.72	
Rate of strain, percent/min			.69	.70	.69	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.40	1.40	1.40	
Initial height, in.		H_o	3.00	3.00	3.00	

Shear Strength Parameters
ϕ = 2.0 °
tan ϕ = 0.03492
c = 0.094 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification So (Gr&Br) CH4; lns & lyrs ML; lns SP

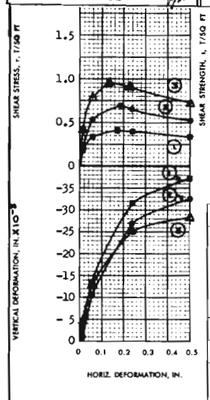
LL 79 | PL 26 | PI 53 | G_s 2.7201

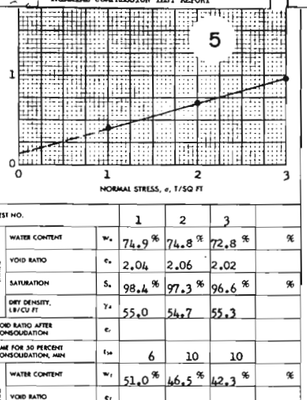
Remarks ____

Project Lk.Pont.,La.&Vic.-Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)
Area Sta. 239 + 80; 457' Right of B/L
Boring No. B-11U | Sample No. 5-D
Depth 17.8 El ____ | Date 10 July 1968

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD





SHEAR STRENGTH PARAMETERS
ϕ = 16°
TAN ϕ = 0.287
c = 0.13 T/SQ FT

☐ CONSOLIDATED STRESS
☒ CONSOLIDATED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_o	74.9%	74.8%	72.8%	%
	VOID RATIO	e_o	2.04	2.06	2.02	
	SATURATION	S_o	98.4%	97.3%	96.6%	%
	DRY DENSITY, LB/CU FT	γ_d	55.0	54.7	55.3	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	6	10	10	
FINAL	WATER CONTENT	w_f	51.0%	46.5%	42.3%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.41	0.69	0.96	
ACTUAL TIME TO FAILURE, MIN		t_f	960	1020	750	
RATE OF STRAIN, IN./MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

TYPE OF SPECIMEN UNDISTURBED | 3.01 IN. SQUARE | 0.626 IN. THICK

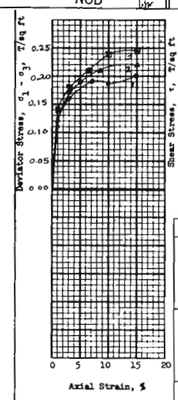
CLASSIFICATION PLASTIC CLAY (CH), gray, contains organic matter

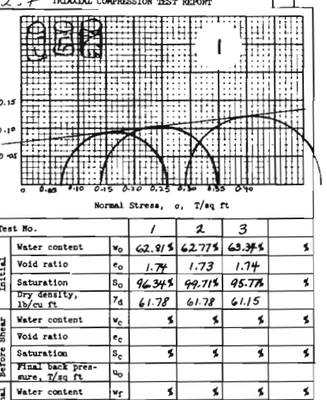
LL 96 | PL 30 | PI 66 | G_s 2.68

REMARKS ____

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-12U | SAMPLE NO. 2-B
DEPTH 4.9 | DATE 14 May 1968

W.H. DIRECT SHEAR TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	62.81%	62.77%	63.37%	%
	Void ratio	e_o	1.74	1.73	1.74	
	Saturation	S_o	96.34%	99.71%	95.77%	%
	Dry density, lb/cu ft	γ_d	61.78	61.78	61.15	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.14	0.29	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.19	0.21	0.24	
Time to failure, min		t_f	9.67	12.45	14.93	
Rate of strain, percent/min			0.67	0.67	0.67	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters
ϕ = 6.5 °
tan ϕ = 0.114
c = 0.075 T/sq ft

Method of saturation ____

☐ Controlled stress
☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification v So (Gr) CH4; lns ML; dw; rts; lg org ars

LL 91 | PL 28 | PI 63 | G_s 2.6982

Remarks ____

Project Lk.Pont.,La.&Vic. - Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)
Area Sta. 244 + 11; On B/L
Boring No. B-12U | Sample No. 2-C
Depth 5.9 | Date JUN 68

TRIAXIAL COMPRESSION TEST REPORT

TESTING SECTION NOD

2089 (EM 1110-2-1902) PREVIOUS EDITIONS ARE OBSOLETE
TRANSLUCENT

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

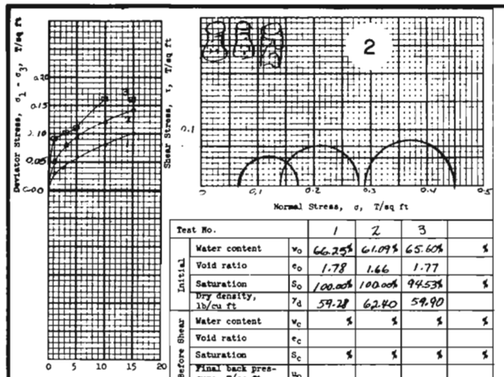
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

DETAIL SHEAR STRENGTH DATA
BORINGS B-11U & B-12U

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

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 62



Test No.			1	2	3	
Initial	Water content	w_o	66.25%	61.09%	65.60%	%
	Void ratio	e_o	1.78	1.66	1.77	
	Saturation	S_o	100.00%	100.00%	94.53%	%
	Dry density, lb/cu ft	γ_d	59.28	62.40	59.90	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.07	0.14	0.29	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.10	0.14	0.16	
Time to failure, min		t_f	22.21	22.35	22.11	
Rate of strain, percent/min			0.69	0.67	0.68	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters

ϕ = — °

$\tan \phi$ = —

c = 0.070 T/sq ft

Method of saturation —

☐ Controlled stress

☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification Sp (Gr & d Gr) CH4; lns ML; lns SP; dw; cc; lg org ars

LL 82 | PL 24 | PI 58 | G_s 2.6460

Remarks —

TESTING SECTION NOD

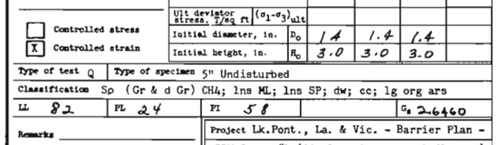
Project Lk.Pont., La. & Vic. - Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)

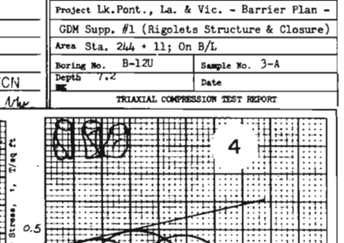
Area Sta. 244 + 11; On B/L

Boring No. B-12U | Sample No. 3-A

Depth 7.2 | Date —

TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	31.44%	32.09%	32.57%	%
	Void ratio	e_o	0.92	0.95	0.94	
	Saturation	S_o	95.51%	89.66%	90.15%	%
	Dry density, lb/cu ft	γ_d	89.23	85.49	85.49	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.36	0.71	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.66	0.78	0.72	
Time to failure, min		t_f	11.36	22.96	20.46	
Rate of strain, percent/min			0.66	0.65	0.65	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	8.0	8.0	8.0	

Shear Strength Parameters

ϕ = 11.5 °

$\tan \phi$ = .20345

c = 0.35 T/sq ft

Method of saturation —

☐ Controlled stress

☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification — (Gr) ML-2; few thin lyrs CL; org ars

LL — | PL — | PI — | G_s 2.6700

Remarks —

TESTING SECTION NOD

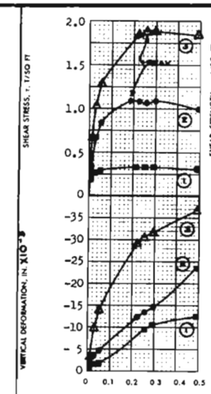
Project Lk.Pont., La. & Vic. - Barrier Plan - GDM Supp.#1 (Rigolets Structure & Closure)

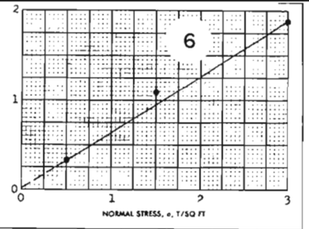
Area Sta. 244 + 11; On B/L

Boring No. B-12U | Sample No. 5-C

Depth 17.0 | Date JUNE 68

TRIAXIAL COMPRESSION TEST REPORT





Test No.			1	2	3	
Initial	Water content	w_o	51.9%	49.8%	34.7%	%
	Void ratio	e_o	1.16	1.08	0.902	
	Saturation	S_o	100+%	100+%	100+%	%
	Dry density, LB/CU FT	γ_d	76.8	80.0	87.3	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}				
Final	Water content	w_f	29.6%	27.6%	28.8%	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/SQ FT		σ	0.5	1.5	3.0	
Maximum shear stress, T/SQ FT		τ_{max}	0.33	1.09	1.88	
Actual time to failure, min		t_f	1260	1080	1500	
Rate of strain, IN./MIN			.00018	.00018	.00018	
Ultimate shear stress, T/SQ FT		τ_{ult}				

Shear Strength Parameters

ϕ' = 32°

$\tan \phi'$ = 0.625

c' = 0 T/SQ FT

☐ Controlled stress

☒ Controlled strain

Type of specimen UNDISTURBED | 3.01 IN. SQUARE | 0.551 IN. THICK

Classification CLAYEY SILT (ML), gray, contains trace of fine sand *

LL — | PL — | PI — | G_s 2.66

Remarks * Plastic clay (CH), with pockets of sandy silt; silty clay (CL); clayey silt (ML); TOTAL SAMPLE

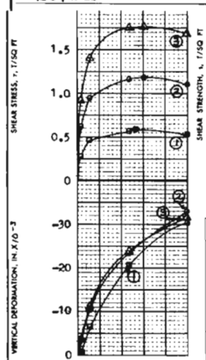
PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY

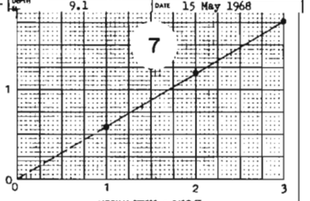
BARRIER PLAN - GDM SUPP. # 1

AREA RIGOLETS STRUCTURE AND CLOSURE

Boring No. B-12U | Sample No. 3-C

Depth 9.1 | Date 15 May 1968





Test No.			1	2	3	
Initial	Water content	w_o	28.1%	25.9%	25.1%	%
	Void ratio	e_o	0.722	0.690	0.676	
	Saturation	S_o	100%	99.5%	98.4%	%
	Dry density, LB/CU FT	γ_d	96.1	97.9	98.7	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}				
Final	Water content	w_f	25.4%	23.9%	22.9%	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/SQ FT		σ	1.0	2.0	3.0	
Maximum shear stress, T/SQ FT		τ_{max}	0.58	1.18	1.76	
Actual time to failure, min		t_f	1500	1680	1680	
Rate of strain, IN./MIN			.00018	.00018	.00018	
Ultimate shear stress, T/SQ FT		τ_{ult}				

Shear Strength Parameters

ϕ' = 31°

$\tan \phi'$ = 0.601

c' = 0 T/SQ FT

☐ Controlled stress

☒ Controlled strain

Type of specimen UNDISTURBED | 3.00 IN. SQUARE | 0.551 IN. THICK

Classification SILTY SAND (SM), light gray

LL — | PL — | PI — | G_s 2.65

Remarks —

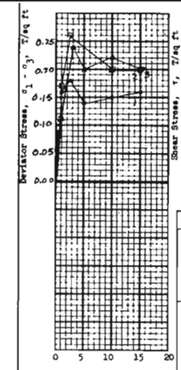
PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY

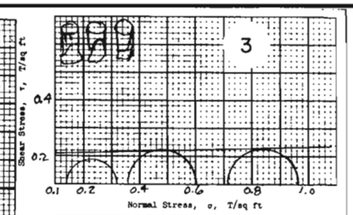
BARRIER PLAN - GDM SUPP. #1

AREA RIGOLETS STRUCTURE & CLOSURE

Boring No. B-12U | Sample No. 6-D

Depth 22.0 | Date 15 May, 1968





Test No.			1	2	3	
Initial	Water content	w_o	84.23%	83.43%	84.02%	%
	Void ratio	e_o	2.34	2.33	2.31	
	Saturation	S_o	93.74%	94.39%	95.4%	%
	Dry density, lb/cu ft	γ_d	50.54	51.17	51.17	
Before Shear	Water content	w_c	%	%	%	%
	Void ratio	e_c				
	Saturation	S_c	%	%	%	%
	Final back pressure, T/sq ft	u_o				
Final	Water content	w_f	%	%	%	%
	Void ratio	e_f				
Minor principal stress, T/sq ft		σ_3	0.14	0.36	0.71	
Max deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{max}$		0.18	0.24	0.26	
Time to failure, min		t_f	3.75	5.00	3.91	
Rate of strain, percent/min			.67	.67	.64	
Ult deviator stress, T/sq ft	$(\sigma_1-\sigma_3)_{ult}$					
Initial diameter, in.		D_o	1.4	1.4	1.4	
Initial height, in.		H_o	3.0	3.0	3.0	

Shear Strength Parameters

ϕ = 1.0 °

$\tan \phi$ = .01746

c = 0.21 T/sq ft

Method of saturation —

☐ Controlled stress

☒ Controlled strain

Type of test Q | Type of specimen 5" Undisturbed

Classification v So (Gr) CH4; lns & few thin lyrs ML; org strks

LL 80 | PL 22 | PI 58 | G_s 2.7154

Remarks —

TESTING SECTION NOD

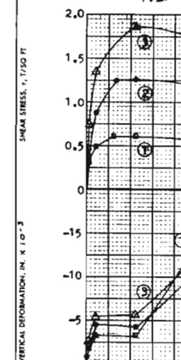
Project Lk. Pont., La. & Vic. - Barrier Plan - GDM Supp. #1 (Rigolets Structure & Closure)

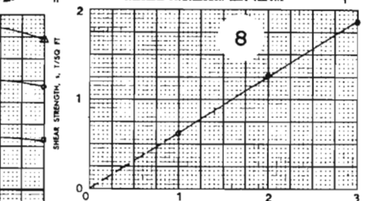
Area Sta. 244 + 11; On B/L

Boring No. B-12U | Sample No. 5-A

Depth 15.3 | Date JUN 68

TRIAXIAL COMPRESSION TEST REPORT





Test No.			①	②	③	
Initial	Water content	w_o	26.5%	26.6%	25.4%	%
	Void ratio	e_o	0.713	0.720	0.692	
	Saturation	S_o	99.2%	98.6%	98.0%	%
	Dry density, LB/CU FT	γ_d	97.3	96.9	98.5	
Void ratio after consolidation		e_c				
Time for 50 percent consolidation, min		t_{50}				
Final	Water content	w_f	26.7%	26.2%	26.1%	%
	Void ratio	e_f				
	Saturation	S_f	%	%	%	%
Normal stress, T/SQ FT		σ	1.0	2.0	3.0	
Maximum shear stress, T/SQ FT		τ_{max}	0.61	1.26	1.87	
Actual time to failure, min		t_f	720	1260	1230	
Rate of strain, IN./MIN			.00019	.00019	.00019	
Ultimate shear stress, T/SQ FT		τ_{ult}				

Shear Strength Parameters

ϕ' = 32°

$\tan \phi'$ = 0.625

c' = 0 T/SQ FT

☐ Controlled stress

☒ Controlled strain

Type of specimen UNDISTURBED | 3.00 IN. SQUARE | 0.551 IN. THICK

Classification SILTY SAND (SM), light gray, contains organic matter

LL — | PL — | PI — | G_s 2.67

Remarks —

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY

BARRIER PLAN - GDM SUPP. #1

AREA RIGOLETS STRUCTURE & CLOSURE

Boring No. B-12U | Sample No. 8-B

Depth 27.8 | Date 16 May, 1968

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.

CONSULTING ENGINEERS — NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY

LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

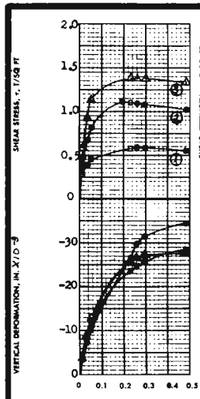
DETAIL SHEAR STRENGTH DATA

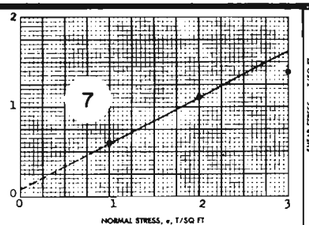
BORING B-12U

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

DATE: MARCH 1970 | FILE NO. H-2-24414

PLATE 63





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	47.3%	45.8%	49.8%	%
	VOID RATIO	e_c	1.31	1.24	1.31	
	SATURATION	S_c	97.8%	100+%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	73.1	75.5	73.1	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	40.1%	33.9%	32.4%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.59	1.11	1.39	
ACTUAL TIME TO FAILURE, MIN		t_f	1500	1140	1320	
RATE OF STRAIN, IN./MIN			.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 27°$

TAN $\phi' = 0.510$

$c' = 0.08$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

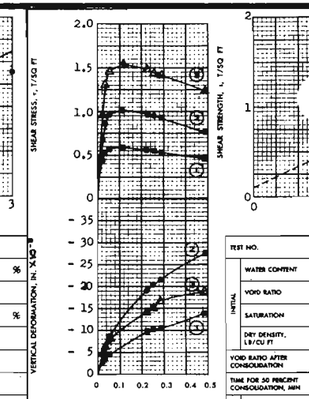
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

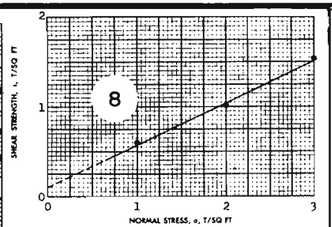
CLASSIFICATION PLASTIC CLAY (CH), gray, contains organic matter

LL 54 | PL 23 | PI 31 | G. 2.71

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-8U | SAMPLE NO. 3-B1
DEPTH IN FT. 8.0 | DATE 15 April 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	26.5%	25.7%	25.5%	%
	VOID RATIO	e_c	0.697	0.704	0.696	
	SATURATION	S_c	100+%	97.5%	97.8%	%
	DRY DENSITY, LB/CU FT	γ_d	98.2	97.8	98.3	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	< 1	< 1	< 1	
FINAL	WATER CONTENT	w_f	25.8%	25.5%	24.0%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.59	1.01	1.53	
ACTUAL TIME TO FAILURE, MIN		t_f	720	720	690	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 25°$

TAN $\phi' = 0.466$

$c' = 0.11$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

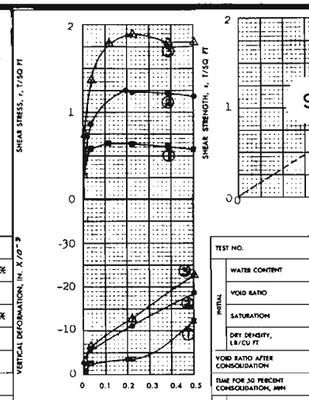
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

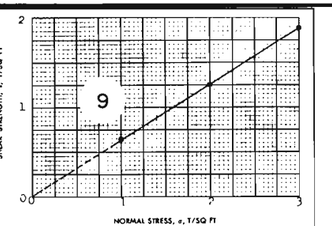
CLASSIFICATION LEAN CLAY (CL), gray, contains pockets of sand & silt, trace of *

LL 47 | PL 18 | PI 29 | G. 2.67

REMARKS * organic matter, slightly fissured & slightly slickensided

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-8U | SAMPLE NO. 6-A
DEPTH IN FT. 19.3 | DATE 17 April 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	29.0%	28.9%	28.4%	%
	VOID RATIO	e_c	0.783	0.783	0.730	
	SATURATION	S_c	98.1%	97.8%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	92.8	92.8	95.6	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	26.3%	25.6%	25.3%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.64	1.25	1.89	
ACTUAL TIME TO FAILURE, MIN		t_f	720	1440	1260	
RATE OF STRAIN, IN./MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 32°$

TAN $\phi' = 0.625$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

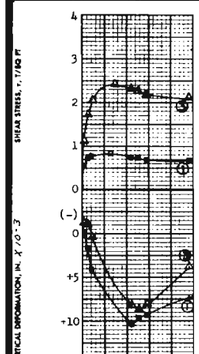
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

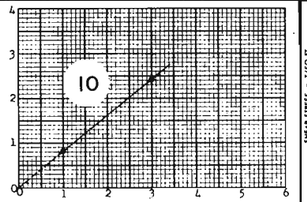
CLASSIFICATION SILTY SAND (SM), grayish green

LL - | PL - | PI - | G. 2.6?

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-8U | SAMPLE NO. 8-C
DEPTH IN FT. 29.0 | DATE 15 APRIL 1968





TEST NO.			1	2 *	3	
INITIAL	WATER CONTENT	w_c	18.4%	%	20.1%	%
	VOID RATIO	e_c	0.556		0.591	
	SATURATION	S_c	87.7%	%	90.1%	%
	DRY DENSITY, LB/CU FT	γ_d	106.3		104.0	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	20.8%	%	21.6%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0		3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.81		2.41	
ACTUAL TIME TO FAILURE, MIN		t_f	840		930	
RATE OF STRAIN, IN./MIN			.00017		.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 39°$

TAN $\phi' = 0.810$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

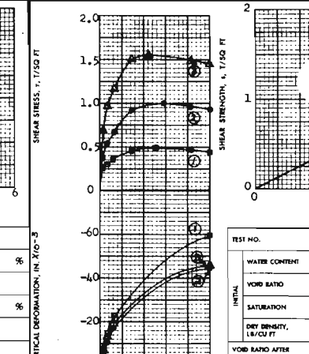
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

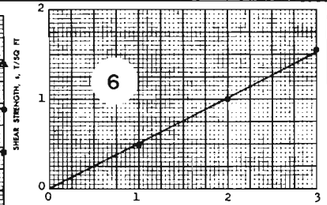
CLASSIFICATION SILTY SAND(SM), gray

LL - | PL - | PI - | G. 2.65

REMARKS * Test results were erratic and are not reported

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-8U | SAMPLE NO. 12-C
DEPTH IN FT. 45.0 | DATE 18 APRIL 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	67.7%	75.7%	68.7%	%
	VOID RATIO	e_c	1.88	1.87	1.58	
	SATURATION	S_c	94.7%	100+%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	57.1	57.2	63.7	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	6	5	<1	
FINAL	WATER CONTENT	w_f	57.1%	41.9%	28.9%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.49	1.00	1.55	
ACTUAL TIME TO FAILURE, MIN		t_f	1440	1620	1260	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 37°$

TAN $\phi' = 0.510$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

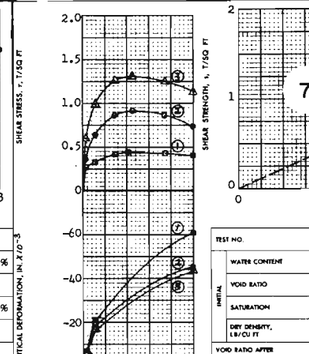
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

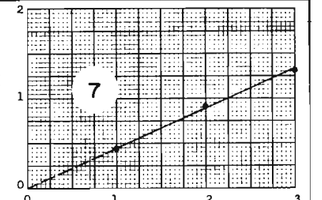
CLASSIFICATION PLASTIC CLAY (CH), grey, contains pockets of fine sand

LL 73 | PL 22 | PI 51 | G. 2.63

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-16U | SAMPLE NO. 5-B
DEPTH IN FT. -36.6 | DATE 2 July 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	80.6%	78.9%	70.1%	%
	VOID RATIO	e_c	2.21	2.18	1.99	
	SATURATION	S_c	97.0%	96.3%	93.7%	%
	DRY DENSITY, LB/CU FT	γ_d	51.7	52.2	55.6	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	1	9	3	
FINAL	WATER CONTENT	w_f	68.8%	55.0%	46.4%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.44	0.91	1.31	
ACTUAL TIME TO FAILURE, MIN		t_f	1140	1260	1260	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 24°$

TAN $\phi' = 0.445$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

CLASSIFICATION PLASTIC CLAY (CH), gray, contains sand lenses

LL 83 | PL 25 | PI 58 | G. 2.66

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-16U | SAMPLE NO. 7-C
DEPTH IN FT. -45.6 | DATE 3 July 1968

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

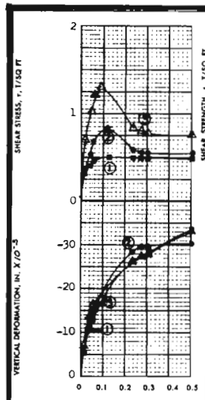
DETAIL SHEAR STRENGTH DATA

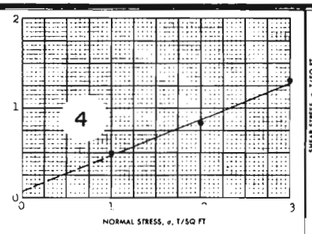
BORINGS B-8U & B-16U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 64





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	39.1%	36.4%	36.7%	%
	VOID RATIO	e_c	1.29	1.19	1.26	
	SATURATION	S_c	81.5%	82.9%	78.4%	%
	DRY DENSITY, LB/CU FT	γ_d	73.4	76.6	78.4	
VOID RATIO AFTER CONSOLIDATION		e_f				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	37.6%	40.8%	42.8%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.50	0.83	1.31	
ACTUAL TIME TO FAILURE, MIN		t_f	720	690	510	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' = 22°$
TAN $\phi' = 0.404$
$c' = 0.07$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

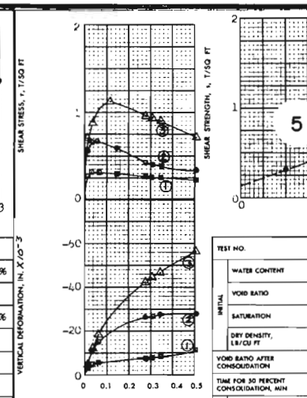
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

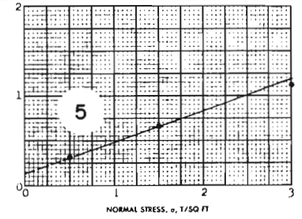
CLASSIFICATION PLASTIC CLAY (CH), gray, contains seams & pockets of sand & trace *

LL – PL – PI – G. 2.69

REMARKS * of organic matter

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B8-AU — SAMPLE NO. 4-D
DEPTH ft 13.7 — DATE 28 APRIL 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	47.1%	46.6%	47.6%	%
	VOID RATIO	e_c	1.32	1.29	1.28	
	SATURATION	S_c	97.4%	98.6%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	73.4	74.4	74.8	
VOID RATIO AFTER CONSOLIDATION		e_f				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	8	3	3	
FINAL	WATER CONTENT	w_f	53.2%	47.1%	42.0%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	0.5	1.5	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.31	0.66	1.12	
ACTUAL TIME TO FAILURE, MIN		t_f	210	330	600	
RATE OF STRAIN, IN./MIN			.00021	.00021	.00021	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' = 20°$
TAN $\phi' = 0.364$
$c' = 0.13$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

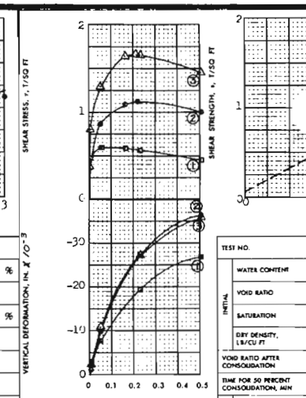
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

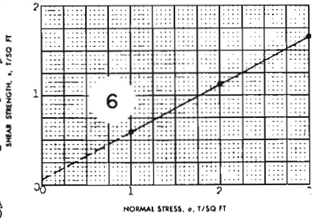
CLASSIFICATION PLASTIC CLAY (CH), gray, contains pockets of fine sand

LL 67 PL 26 PI 41 G. 2.73

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B8-AU — SAMPLE NO. 8-D
DEPTH ft 29.8 — DATE 6 MAY 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	32.5%	33.1%	31.5%	%
	VOID RATIO	e_c	0.905	0.844	0.858	
	SATURATION	S_c	97.0%	96.3%	99.1%	%
	DRY DENSITY, LB/CU FT	γ_d	88.5	91.4	90.7	
VOID RATIO AFTER CONSOLIDATION		e_f				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	33.1%	27.2%	25.1%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.59	1.12	1.66	
ACTUAL TIME TO FAILURE, MIN		t_f	390	1260	1230	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' = 28°$
TAN $\phi' = 0.532$
$c' = 0.06$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

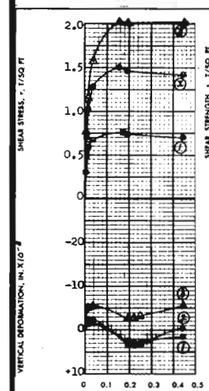
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

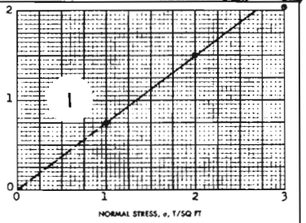
CLASSIFICATION SILTY CLAY (CL), gray

LL 34 PL 18 PI 16 G. 2.70

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B8-AU — SAMPLE NO. 11-A
DEPTH ft 39.3 — DATE 7 MAY 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	22.4%	22.7%	22.8%	%
	VOID RATIO	e_c	0.659	0.664	0.641	
	SATURATION	S_c	90.4%	90.9%	94.6%	%
	DRY DENSITY, LB/CU FT	γ_d	100.1	99.8	101.2	
VOID RATIO AFTER CONSOLIDATION		e_f				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	19.5%	20.3%	20.3%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.75	1.50	2.03	
ACTUAL TIME TO FAILURE, MIN		t_f	1200	1080	1110	
RATE OF STRAIN, IN./MIN			.00016	.00016	.00016	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' = 37°$
TAN $\phi' = 0.754$
$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

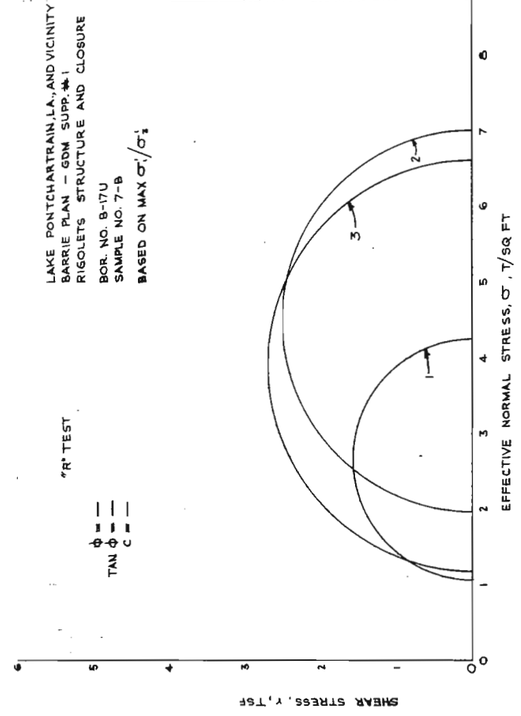
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

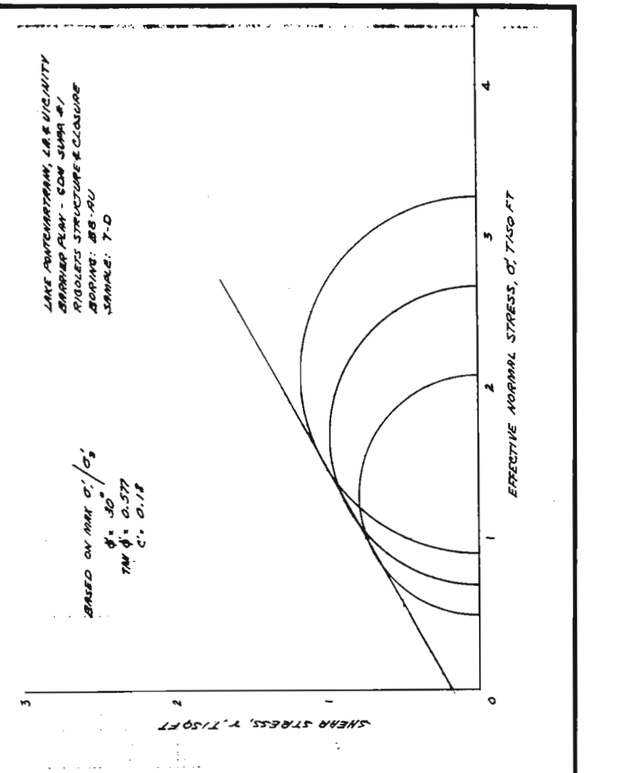
CLASSIFICATION SILTY SAND (SM), gray, contains a trace of organic matter

LL – PL – PI – G. 2.66

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-17U — SAMPLE NO. 4-A
DEPTH ft -38.3 — DATE 5 July 1968





NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS – NEW ORLEANS, LA.

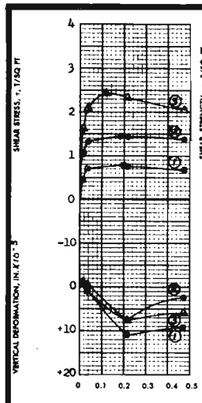
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

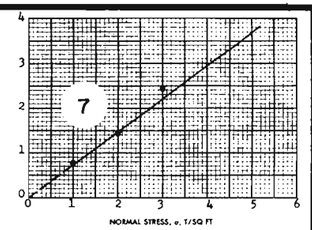
DETAIL SHEAR STRENGTH DATA
BORINGS B-8AU & B-17U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 65





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	22.9 %	22.7%	22.4%	%
	VOID RATIO	e_0	0.646	0.643	0.633	
	SATURATION	S_0	93.9 %	93.6%	93.8%	%
	DRY DENSITY, LB/CU FT	γ_d	100.5	100.7	101.3	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	24.1 %	24.1%	22.7%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.78	1.44	2.44	
ACTUAL TIME TO FAILURE, MIN		t_f	1170	1080	720	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' =$ 37°

TAN $\phi' =$ 0.754

$c' =$ 0 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

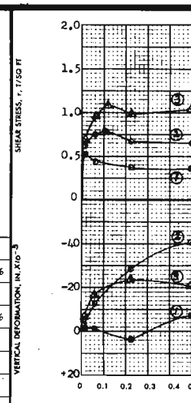
TYPE OF SPECIMEN: UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

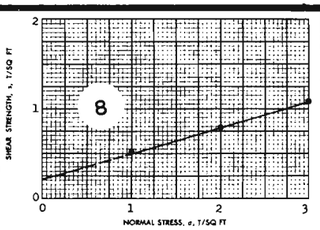
CLASSIFICATION: SILTY SAND (SM), gray, contains a trace of organic matter

LL — PL — PI — G. 2.65

REMARKS

PROJECT: LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA: RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-13U — SAMPLE NO. 5-B
ELEVATION ft. -50.2 — DATE 27 June 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	51.7%	52.0%	52.5 %	%
	VOID RATIO	e_0	1.41	1.41	1.44	
	SATURATION	S_0	99.7%	100+ %	99.2 %	%
	DRY DENSITY, LB/CU FT	γ_d	70.4	70.5	69.5	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	1	2	
FINAL	WATER CONTENT	w_f	51.8%	46.4%	46.4 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.52	0.79	1.08	
ACTUAL TIME TO FAILURE, MIN		t_f	150	690	720	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' =$ 16°

TAN $\phi' =$ 0.287

$c' =$ 0.22 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

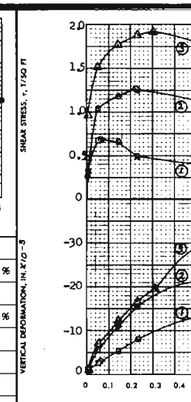
TYPE OF SPECIMEN: UNDISTURBED — 3.00 IN. SQUARE — 0.562 IN. THICK

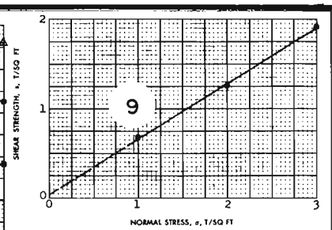
CLASSIFICATION: PLASTIC CLAY (CH), gray, contains small pockets of sand

LL 63 — PL 21 — PI 42 — G. 2.72

REMARKS

PROJECT: LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA: RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-13U — SAMPLE NO. 7-D
ELEVATION ft. -60.8 — DATE 28 June 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	24.1%	23.4%	23.8 %	%
	VOID RATIO	e_0	0.670	0.660	0.671	
	SATURATION	S_0	96.4%	95.0%	95.0 %	%
	DRY DENSITY, LB/CU FT	γ_d	100.2	100.8	100.1	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	25.4%	24.4%	23.3 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.68	1.26	1.92	
ACTUAL TIME TO FAILURE, MIN		t_f	420	1290	1680	
RATE OF STRAIN, IN./MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' =$ 32°

TAN $\phi' =$ 0.625

$c' =$ 0.05 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN: UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

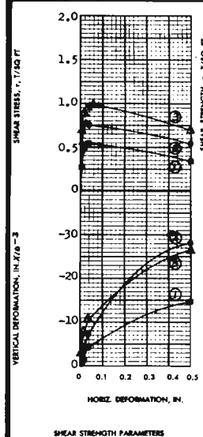
CLASSIFICATION: SILTY CLAY (CL), green, contains traces of sand & organic matter

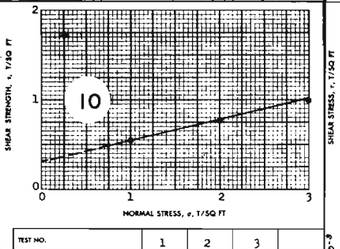
LL — PL — PI — G. 2.68

REMARKS

PROJECT: LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA: RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-13U — SAMPLE NO. 10-D
ELEVATION ft. -72.7 — DATE 28 June 1968

WJH — DIRECT SHEAR TEST REPORT





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	50.5%	48.5%	49.2 %	%
	VOID RATIO	e_0	1.43	1.40	1.43	
	SATURATION	S_0	96.8%	94.9%	94.2 %	%
	DRY DENSITY, LB/CU FT	γ_d	70.4	71.3	70.4	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	4	4	3	
FINAL	WATER CONTENT	w_f	50.8%	48.6%	47.7 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.54	0.77	0.99	
ACTUAL TIME TO FAILURE, MIN		t_f	360	270	450	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' =$ 19°

TAN $\phi' =$ 0.231

$c' =$ 0.32 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

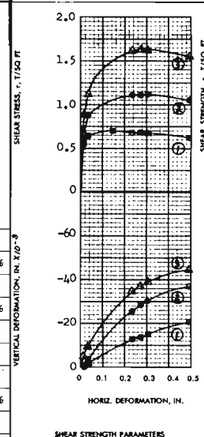
TYPE OF SPECIMEN: UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

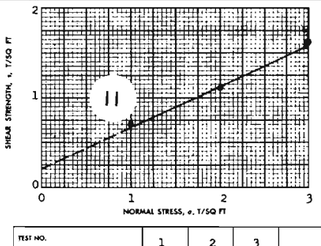
CLASSIFICATION: PLASTIC CLAY (CH), gray, contains small shells and shell fragments

LL 86 — PL 27 — PI 59 — O. 2.74

REMARKS

PROJECT: LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA: RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-13U — SAMPLE NO. 13-A
ELEVATION ft. -82.0 — DATE 28 June 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	40.3 %	41.0 %	40.7%	%
	VOID RATIO	e_0	1.08	1.09	1.09	
	SATURATION	S_0	96.3 %	97.0 %	96.3%	%
	DRY DENSITY, LB/CU FT	γ_d	77.4	77.1	77.1	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	40.4 %	36.3 %	34.4%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.70	1.11	1.63	
ACTUAL TIME TO FAILURE, MIN		t_f	810	1320	1500	
RATE OF STRAIN, IN./MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' =$ 25°

TAN $\phi' =$ 0.466

$c' =$ 0.21 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

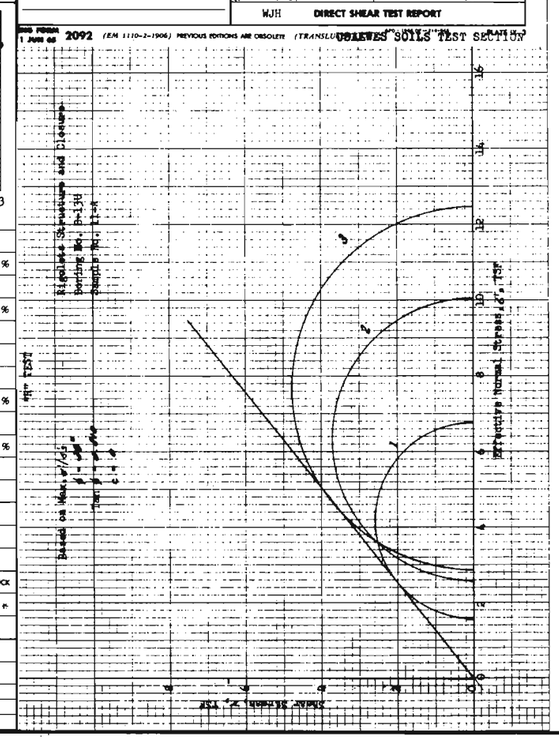
TYPE OF SPECIMEN: UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

CLASSIFICATION: PLASTIC CLAY (CH), tan, contains a trace of small sand pockets & a

LL 53 — PL 24 — PI 29 — G. 2.58

REMARKS * trace of organic matter

PROJECT: LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA: RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-13U — SAMPLE NO. 15-C
ELEVATION ft. -91.5 — DATE 1 July 1968



NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

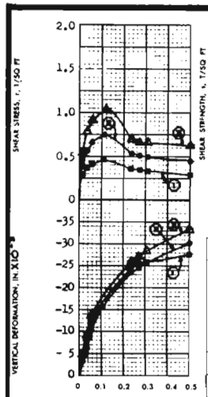
DETAIL SHEAR STRENGTH DATA

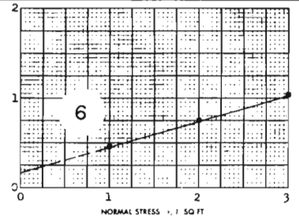
BORING B-13U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 66





TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	66.3 %	67.8 %	68.7 %	%
INITIAL: VOID RATIO	e_c	1.85	1.89	1.92	
INITIAL: SATURATION	S_c	98.2 %	98.3 %	98.0 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	60.0	59.1	58.6	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}	2	3	1	
FINAL: WATER CONTENT	w_f	54.2 %	50.9 %	48.7 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.46	0.75	1.04	
ACTUAL TIME TO FAILURE, MIN	t_f	630	660	630	
RATE OF STRAIN, IN./MIN		.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 16°$

TAN $\phi' = 0.287$

$c' = 0.17$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

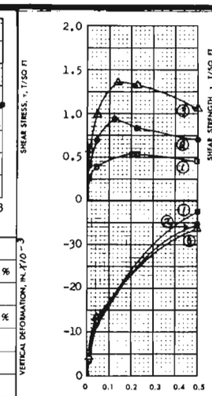
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

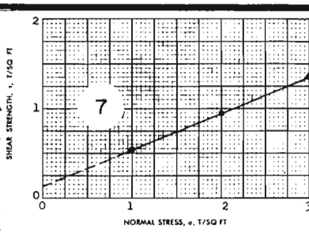
CLASSIFICATION PLASTIC CLAY (CH), gray, contains trace of organic matter

LL 98 | PL 31 | PI 67 | G. 2.74

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. AND VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-9U | SAMPLE NO. 2-C
DEPTH ft. 5.5 | DATE 7 May 1968





TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	47.8 %	44.7 %	45.0 %	%
INITIAL: VOID RATIO	e_c	1.33	1.27	1.28	
INITIAL: SATURATION	S_c	96.7 %	94.7 %	94.6 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	72.1	73.9	73.6	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}	<1	<1	<1	
FINAL: WATER CONTENT	w_f	37.9 %	35.8 %	33.5 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.54	0.94	1.36	
ACTUAL TIME TO FAILURE, MIN	t_f	1170	750	810	
RATE OF STRAIN, IN./MIN		.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 22°$

TAN $\phi' = 0.404$

$c' = 0.14$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

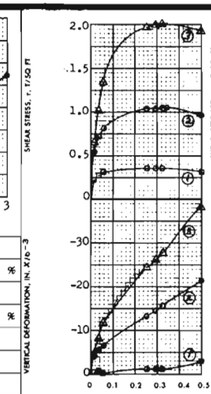
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.626 IN. THICK

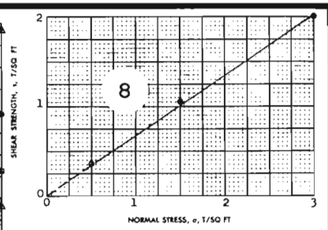
CLASSIFICATION LEAN CLAY (CL), dark gray, contains seams & pockets of silt & *

LL 45 | PL 20 | PI 25 | G. 2.69

REMARKS * trace of organic matter

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-9U | SAMPLE NO. 4-D
DEPTH ft. 14.0 | DATE 29 May 1968





TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	28.3 %	28.5 %	27.8 %	%
INITIAL: VOID RATIO	e_c	0.764	0.787	0.771	
INITIAL: SATURATION	S_c	98.2 %	96.0 %	95.6 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	93.8	92.6	93.4	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}				
FINAL: WATER CONTENT	w_f	24.6 %	26.4 %	25.3 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	0.5	1.5	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.36	1.05	2.01	
ACTUAL TIME TO FAILURE, MIN	t_f	1500	1770	1680	
RATE OF STRAIN, IN./MIN		.00020	.00020	.00020	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 34°$

TAN $\phi' = 0.674$

$c' = 0.01$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

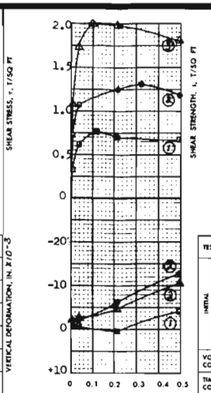
TYPE OF SPECIMEN UNDISTURBED — 3.01 IN. SQUARE — 0.551 IN. THICK

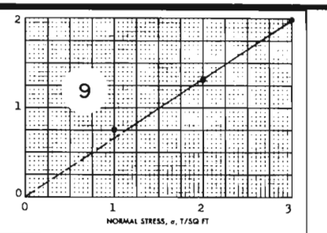
CLASSIFICATION SILTY SAND (SM), gray, contains a trace of organic matter

LL - | PL - | PI - | G. 2.65

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-9U | SAMPLE NO. 8-B
DEPTH ft. 27.8 | DATE 8 May 1968





TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	26.2 %	25.6 %	25.6 %	%
INITIAL: VOID RATIO	e_c	0.728	0.712	0.703	
INITIAL: SATURATION	S_c	95.7 %	95.6 %	96.9 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	96.1	97.0	97.5	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}				
FINAL: WATER CONTENT	w_f	25.2 %	25.1 %	24.3 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.76	1.31	1.99	
ACTUAL TIME TO FAILURE, MIN	t_f	720	1800	600	
RATE OF STRAIN, IN./MIN		.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 34°$

TAN $\phi' = 0.674$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

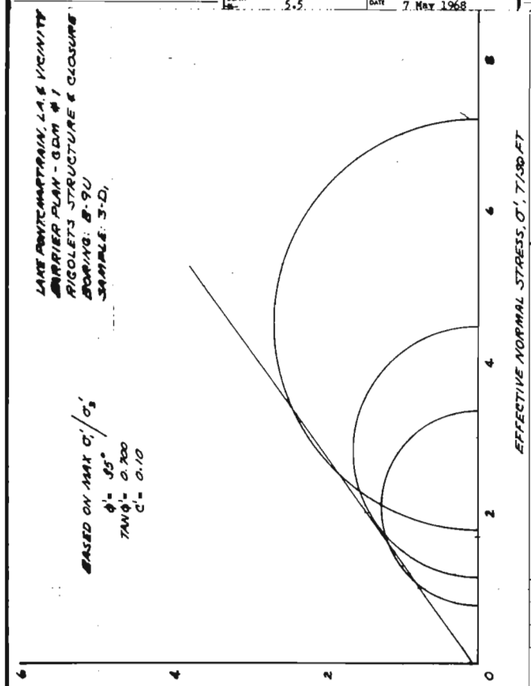
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

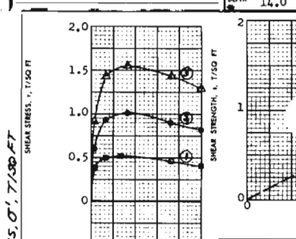
CLASSIFICATION SAND (SP), gray

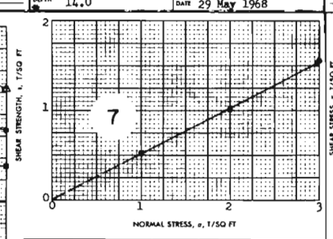
LL - | PL - | PI - | G. 2.66

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE & CLOSURE
BORING NO. B-9U | SAMPLE NO. 10-B
DEPTH ft. 35.8 | DATE 8 May 1968







TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	35.8 %	38.0 %	32.6 %	%
INITIAL: VOID RATIO	e_c	1.00	1.04	0.954	
INITIAL: SATURATION	S_c	97.0 %	99.0 %	92.6 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	84.6	83.1	86.6	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}	<1	<1	<1	
FINAL: WATER CONTENT	w_f	32.7 %	34.5 %	30.9 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.52	1.01	1.56	
ACTUAL TIME TO FAILURE, MIN	t_f	780	960	960	
RATE OF STRAIN, IN./MIN		.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 28°$

TAN $\phi' = 0.533$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

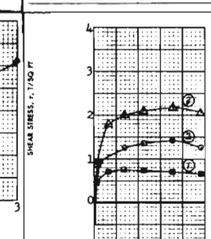
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

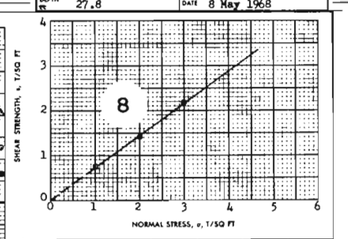
CLASSIFICATION SANDY CLAY (CH), brown & gray

LL 47 | PL 17 | PI 30 | G. 2.71

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-14U | SAMPLE NO. 3-B1
DEPTH ft. -38.0 | DATE 29 June 1968





TEST NO.		1	2	3	
INITIAL: WATER CONTENT	w_c	26.8 %	26.8 %	26.6 %	%
INITIAL: VOID RATIO	e_c	0.720	0.723	0.732	
INITIAL: SATURATION	S_c	99.8 %	99.3 %	97.4 %	%
INITIAL: DRY DENSITY, LB/CU FT	γ_d	97.3	97.1	96.6	
VOID RATIO AFTER CONSOLIDATION	e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN	t_{50}				
FINAL: WATER CONTENT	w_f	25.7 %	25.5 %	25.2 %	%
FINAL: VOID RATIO	e_f				
FINAL: SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT	σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT	τ_{max}	0.75	1.41	2.18	
ACTUAL TIME TO FAILURE, MIN	t_f	840	1920	2100	
RATE OF STRAIN, IN./MIN		.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT	τ_{ult}				

SHEAR STRENGTH PARAMETERS

$\phi' = 36°$

TAN $\phi' = 0.726$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.562 IN. THICK

CLASSIFICATION SAND (SP), gray, contains shell fragments

LL - | PL - | PI - | G. 2.68

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-14U | SAMPLE NO. 7-B
DEPTH ft. -54.0 | DATE 1 July 1968

NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

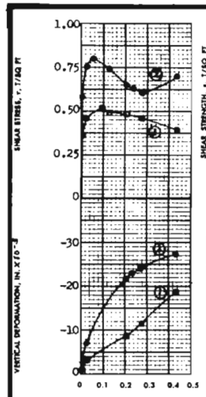
DETAIL SHEAR STRENGTH DATA

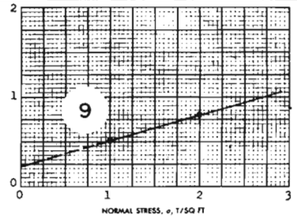
BORINGS B-9U & B-14U

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

DATE. MARCH 1970 — FILE NO. H-2-24414

PLATE 67





SHEAR STRENGTH PARAMETERS

$\phi' = 16°$

TAN $\phi' = 0.287$

$c' = 0.23$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	41.6%	40.1%	45.1%	%
	VOID RATIO	e_c	1.26	1.26	1.37	
	SATURATION	S_c	90.8%	87.5%	90.5%	%
	DRY DENSITY, LB/CU FT	γ_d	75.8	75.8	72.4	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	2	4	
FINAL	WATER CONTENT	w_f	51.9%	50.6%	50.4%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.52	0.80		
ACTUAL TIME TO FAILURE, MIN		t_f	660	450		
RATE OF STRAIN, IN/MIN			.00015	.00015		
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

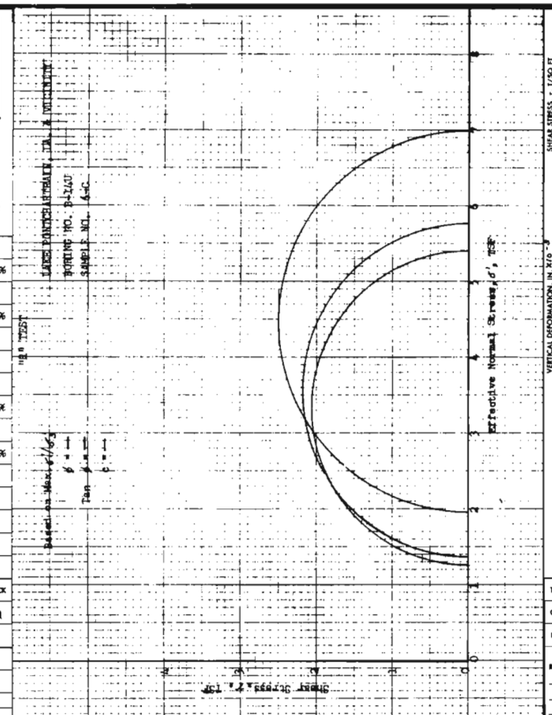
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

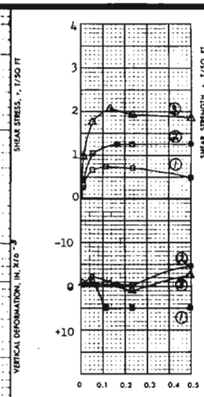
CLASSIFICATION PLASTIC CLAY (CH), gray, contains a trace of fine sand, slickensided

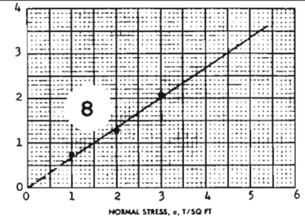
LL 99 — PL 29 — PI 70 — G. 2.75

REMARKS Test on specimen No. 3 voided - Technician error

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-14-U — SAMPLE NO. 14-B
DEPTH ft -76.0 — DATE 2 July 1968







SHEAR STRENGTH PARAMETERS

$\phi' = 34°$

TAN $\phi' = 0.674$

$c' = 0$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	23.7%	24.4%	23.9%	%
	VOID RATIO	e_c	0.656	0.667	0.664	
	SATURATION	S_c	96.1%	97.3%	95.7%	%
	DRY DENSITY, LB/CU FT	γ_d	100.3	99.6	99.8	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	24.2%	24.9%	23.8%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.73	1.27	2.08	
ACTUAL TIME TO FAILURE, MIN		t_f	690	960	780	
RATE OF STRAIN, IN/MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

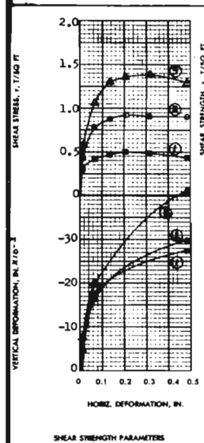
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

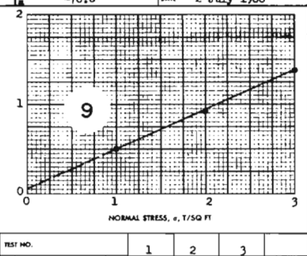
CLASSIFICATION SILTY SAND (SM), gray, contains traces of organic matter

LL — — PL — — PI — — G. 2.66

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. #1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-15U — SAMPLE NO. 3-A
DEPTH ft -29.2 — DATE 2 July 1968





SHEAR STRENGTH PARAMETERS

$\phi' = 24°$

TAN $\phi' = 0.445$

$c' = 0.06$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	71.7%	69.0%	74.6%	%
	VOID RATIO	e_c	1.97	1.77	1.92	
	SATURATION	S_c	95.7%	100+%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	55.2	59.3	56.2	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	2	1	5	
FINAL	WATER CONTENT	w_f	68.6%	44.5%	41.1%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.50	0.92	1.38	
ACTUAL TIME TO FAILURE, MIN		t_f	1260	1230	1860	
RATE OF STRAIN, IN/MIN			.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

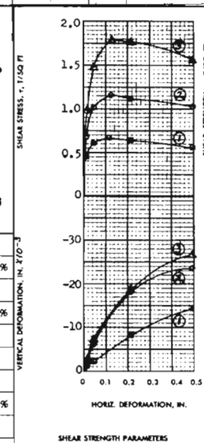
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.562 IN. THICK

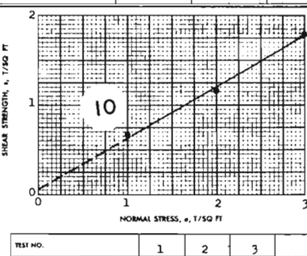
CLASSIFICATION PLASTIC CLAY (CH), gray, contains 1/16" seams of silty sand

LL 87 — PL 29 — PI 58 — G. 2.63

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN-GDM SUPP. #1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-15U — SAMPLE NO. 6-D
DEPTH ft -44.0 — DATE 3 July 1968





SHEAR STRENGTH PARAMETERS

$\phi' = 30°$

TAN $\phi' = 0.577$

$c' = 0.07$ T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	32.6%	34.0%	35.5%	%
	VOID RATIO	e_c	0.860	0.880	0.900	
	SATURATION	S_c	100+%	100+%	100+%	%
	DRY DENSITY, LB/CU FT	γ_d	90.3	89.3	88.4	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	30.9%	30.8%	28.9%	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.67	1.16	1.79	
ACTUAL TIME TO FAILURE, MIN		t_f	690	780	780	
RATE OF STRAIN, IN/MIN			.00018	.00018	.00018	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

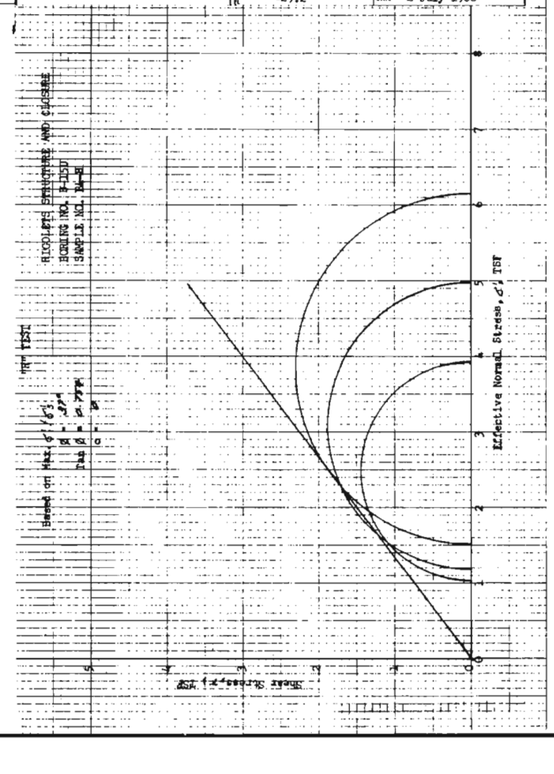
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

CLASSIFICATION SILTY CLAY (CL), gray,

LL — — PL — — PI — — G. 2.69

REMARKS Sample contained a ½" layer of brown clay & a 1" layer of hard crumbly gray clay in unused portion of sample.

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-15U — SAMPLE NO. 14-C
DEPTH ft -74.5 — DATE 1 July 1968



NOTE:

2 INDICATES REFERENCE NUMBER SHOWN UNDER SHEAR DATA ON PLATE

(Q) UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(R) CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

(S) CONSOLIDATED-DRAINED DIRECT SHEAR TEST

FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

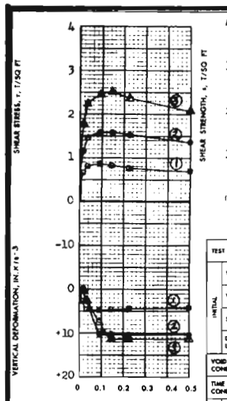
DETAIL SHEAR STRENGTH DATA

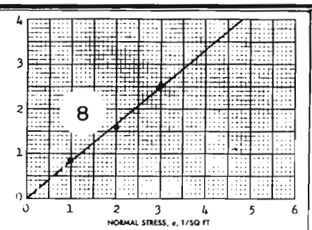
BORINGS B-14U & B-15U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 68





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	21.7 %	22.4 %	22.1 %	%
	VOID RATIO	e_c	0.628	0.636	0.633	
	SATURATION	S_c	91.9 %	93.7 %	92.9 %	%
	DRY DENSITY, LB/CU FT	γ_d	102.0	101.5	101.7	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT	w_f	21.9 %	23.2 %	22.7 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.85	1.59	2.51	
ACTUAL TIME TO FAILURE, MIN		t_f	540	540	840	
RATE OF STRAIN, IN./MIN			.00019	.00019	.00019	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' =$ 40°
TAN $\phi' =$ 0.839
$c' =$ 0 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

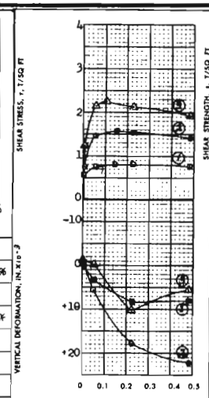
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.551 IN. THICK

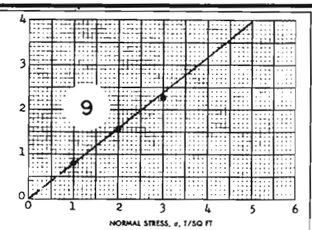
CLASSIFICATION SAND (SP), white

LL — PL — PI — G. 2.66

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN - GDM SUPP. # 1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-18U — SAMPLE NO. 6-C
ELEVATION EL -32.4 — DATE 5 July 1968





TEST NO.			1	2	3	
INITIAL	WATER CONTENT	w_c	23.5 %	22.7 %	22.7 %	%
	VOID RATIO	e_c	0.647	0.639	0.658	
	SATURATION	S_c	97.0 %	94.8 %	92.1 %	%
	DRY DENSITY, LB/CU FT	γ_d	101.2	101.7	100.5	
VOID RATIO AFTER CONSOLIDATION		e_c				
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}	<1	<1	<1	
FINAL	WATER CONTENT	w_f	22.9 %	22.9 %	23.3 %	%
	VOID RATIO	e_f				
	SATURATION	S_f	%	%	%	%
NORMAL STRESS, T/SQ FT		σ	1.0	2.0	3.0	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.80	1.58	2.25	
ACTUAL TIME TO FAILURE, MIN		t_f	930	960	660	
RATE OF STRAIN, IN./MIN			.00017	.00017	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}				

SHEAR STRENGTH PARAMETERS
$\phi' =$ 39°
TAN $\phi' =$ 0.810
$c' =$ 0 T/SQ FT

☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

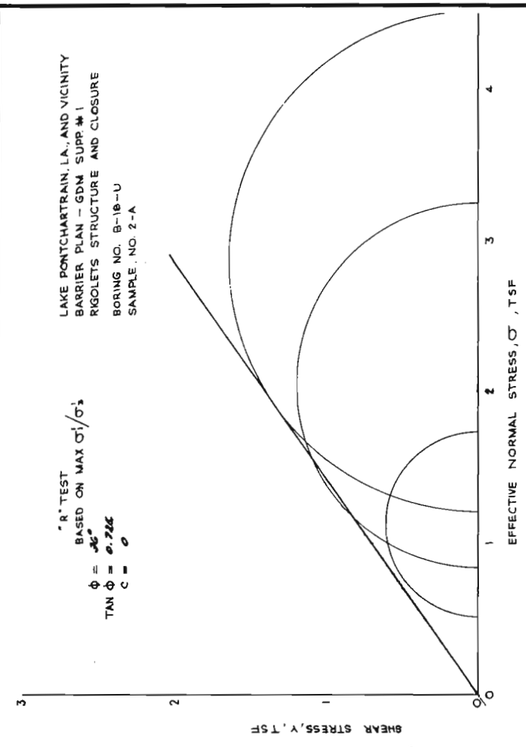
TYPE OF SPECIMEN UNDISTURBED — 3.00 IN. SQUARE — 0.562 IN. THICK

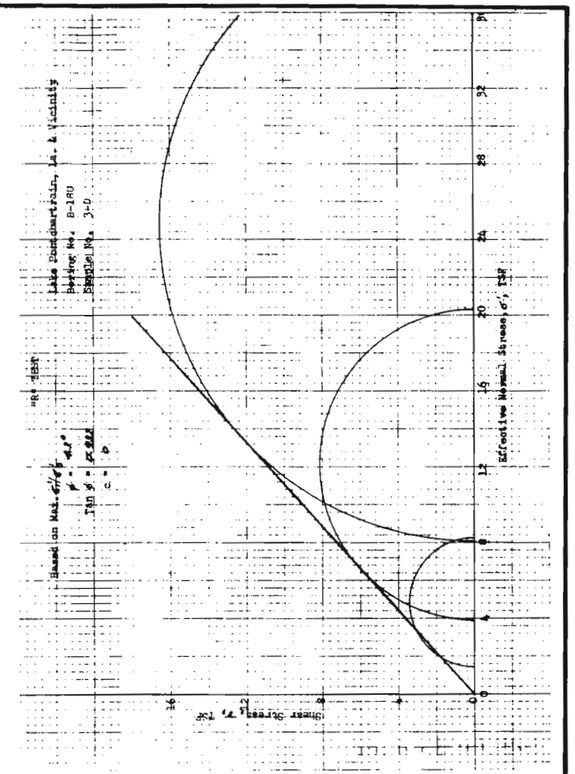
CLASSIFICATION SAND (SP), gray, contains small pockets of clay

LL — PL — PI — G. 2.67

REMARKS

PROJECT LAKE PONTCHARTRAIN, LA. & VICINITY
BARRIER PLAN-GDM SUPP. #1
AREA RIGOLETS STRUCTURE AND CLOSURE
BORING NO. B-18-U — SAMPLE NO. 11-C
ELEVATION EL -52.4 — DATE 5 July 1968





NOTE:

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FREDERIC R. HARRIS, INC.
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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

DETAIL SHEAR STRENGTH DATA
BORING B-18U

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

DATE: MARCH 1970 — FILE NO. H-2-24414

PLATE 69