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

APPENDIX A

PLAN 1
ALTERNATE PLAN OF IMPROVEMENT

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY
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DAM, AND ADJOINING LEVEES

APPENDIX A

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PERTINENT DATA
PLAN 1

CONTROL STRUCTURE

Highway Bridge

Reinforced concrete highway bridge with prestressed concrete stringers	
Total length between abutments	1,450 feet
Roadway width	44 feet
Top elevation	14.0*

Crane Bridge

Reinforced concrete framework with 23 gate openings, 50 feet on centers	
50 - Vertical lift gates, two per slot plus 4 spares	
Two - 80 ton gantry cranes on 15'-9" travel way	
Top elevation	14.75

Foundation

Reinforced concrete slab footing supported by steel piles	
Sill elevation	-20.0
Bottom elevation	-26.0

APPROACH CHANNEL

Width at structure	1,150 feet
Maximum bottom width	2,600 feet
Maximum bottom elevation - Gulf side	- 32.5
Maximum bottom elevation - Lake side	- 20.0
Side slopes	1 on 3

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

HIGHWAY RELOCATION

Two 12 foot lanes with 10 foot shoulders	
Crown elevation, minimum	9.0

CLOSURE DAM

Earth fill with steel sheet pile cutoff and 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	135 acres
Approach channel	220 acres
Levee	35 acres
U. S. Highway 90 relocation	40 acres
Spoil disposal	1,300 acres

FIRST COST

Roads	$ 666,000
Channels and canals	5,040,000
Levees and floodwalls	9,155,000
Floodway control and diversion structures	14,945,000
Engineering and design	2,712,000
Supervision and administration	1,878,000
Lands	516,000
Relocations	285,000
Total	$35,197,000

RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
PLAN 1

PROJECT PLAN

1. General. The project plan presented herein consists of a control structure located on land with approach channels, closure dam, highway relocation and new levee embankments. 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.

2. Plan 1.

a. Control structure. The gated control structure as shown on plate A18 is 1,450 feet long and 68 feet wide with the sill at elevation -20.0. During the threat of a hurricane, the gates will be closed and the structure will act as a barrier to prevent hurricane tides from entering Lake Pontchartrain. The controlling elevation of the structure is 14.0.

b. Approach channel. The approach channel to the control structure, as shown on plate A21, will have a 1,150-foot bottom width at elevation -20.0 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 bottom will slope downward from the structure along a 1 on 10 slope to elevation -32.5 and continue at this elevation toward the Rigolets, until the centerline of the channel converges with the centerline of the Rigolets, thence slope upward along a 1 on 10 slope to the natural bottom at elevation -18.0. On the lake side, the channel bottom will slope downward from the structure along a 1 on 10 slope to

elevation -30.0 and remain level for a distance of 100 feet, thence slope upward along a 1 on 10 slope to elevation -20.0 and continue at this elevation for some 5,000 feet, thence slope upward on a 1 on 10 slope to the natural lake bottom at elevation -6.0. 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 A14, will be a hydraulic-filled structure with riprap slope protection. The purpose of the closure dam is to eliminate the Rigolets Pass as a route of entry for the hurricane tides into Lake Pontchartrain. The structure is approximately 6,000 feet long with a controlling crest elevation of 14.0.

d. Levees. The proposed levee network, as shown on plates A10 through A13 are necessary to bond together the project structures to minimize the inflow of gulf water and protect the structures against flanking and attendant damage. The barrier levee will utilize the existing embankment of U. S. Highway 90 where its grade is equal to or greater than 9.0 which is approximately 3.3 miles west of the existing bridge crossing at the Rigolets. From this point, a new levee will be constructed east of the existing highway embankment for the U. S. Highway 90 relocation. The length of the highway levee is 1.6 miles. The highway embankment will serve as the barrier to the end of the relocation. The 0.4 miles of connecting levee will be constructed between the highway embankment and the closure dam. The controlling elevation of the levee system will be 9.0.

e. Highway relocation. U. S. Highway 90 will be relocated and incorporated into the control structure as shown on plates A2 through A9. The profile grade ascends from an elevation of 6.2 at the start of relocation to a maximum level of 14.0 at the control structure and descends to 9.3 at the end of relocation.

DEPARTURES FROM PROJECT DOCUMENT

3. General. The plan presented herein as Plan 1 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. Modification in roadway width. For the relocation of U. S. Highway 90, the roadway width on the control structure was increased from 28 to 44 feet and on the highway embankment from 40 to 44 feet. The changes were made to comply with the latest standards of the State of Louisiana Department of Highways.

SOIL AND FOUNDATIONS INVESTIGATION AND DESIGN

4. General. The soil and foundation investigation and design for the levees and flood protecting structure in Plan 1 is similar to the recommended project plan, and the differences between Plan 1 and the recommended project plan are presented in the following paragraphs.

5. Soil conditions.

a. The general soil conditions are the same as for the recommended project plan. The portion of the subsurfact 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 181+00 (end of highway levee). This reach is described in the recommended project plan, paragraphs 32b to 32c.

c. Highway station 189+28.03 to station 211+50 (Begin control structure). This reach consists predominately of 4 to 6 feet of very soft organic clay overlying

20 to 27 feet of very soft to medium clay underlain by a mixture of silts, silty sands and fine sands with clay lenses.

d. Highway station 226+00 (End of control structure) to station 232+00. This reach consists of 5 to 6 feet of very soft organic clay underlain by soft clay, extending to elevation -20 with a 1 to 2 thick silt layer occurring at approximate elevation -7. From elevation -20 extends the silty sands and fine sands covering the Pleistocene formation.

e. Highway station 232+00 to station 239+75. This reach consists of 3 to 4 feet of peat overlying 18 to 20 feet of very soft to medium clay, containing a 4-foot silt lense at elevation -8. The underlying soil consists of the fine sands extending to the Pleistocene formation.

f. Highway station 239+75 to station 246+00 (End of highway relocation). This reach consists predominately of a surface layer of 2 or 3 feet of very soft organic clay overlying a very soft to medium clay with silt lenses. Below elevation -20 extends the silty sands and fine sands covering the Pleistocene formation.

g. Connecting levee station 0+00 to station 1+45. The soil conditions for this reach are similar to those described in paragraph 5e for highway station 232+00 to station 239+75.

h. Connecting levee station 1+45 to station 22+92.60 (beginning of closure). This reach is described in the recommended plan, paragraphs 32h and 32i.

6. Stability analysis.

a. The stability analysis of the highway levee and connecting levee are described in the recommended plan.

b. Highway relocation. The design of the highway embankment for the relocation of U. S. Highway 90 utilized the soil conditions as shown in the borings. The stability of the embankment was determined for the end of

construction case using the method of planes. Design shear strengths were based on (UC) and (Q) tests on clays and (S) tests on sands and minimum factors of safety of 1.3 were utilized. The analyses are shown on plates A29 through A31.

7. Foundation for structures. The foundation for the Rigolets control structure consists of a concrete sill slab and piers supported by steel piles (12BP53) driven at a 3 on 1 batter into the underlying silts and sands. The batter is necessary to resist the horizontal loads due to water level differentials and wave forces. The anticipated maximum pile loads will approach 50 tons in compression and 20 tons in tension. Economic pile lengths to support these loads will be determined from a test pile program. Piling cost estimates are based on pile lengths of 70 feet. The foundation design is based on factors-of-safety of 1.5 for maximum hurricane conditions and 2.0 for other loading conditions. A detailed description of the control structure will be presented in Detail Design Memorandum No. 6.

8. Settlement. Based on soil conditions determined from the soil borings and consolidation test data of 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 compensat for future settlement. The settlement estimated for the highway relocation embankment indicates that the proposed construction grades are sufficient to maintain design net grade without additional lifts. Estimated settlements for the levees and the highway embankments are shown in table A1.

9. Methods of construction.

a. The method of construction of highway levee and connecting levee are as described in the recommended plan, paragraphs 37a and 37b.

b. Highway embankment. Stage method of construction will be used for highway relocation embankments and will consist of: organic matter will be stripped and wasted; excavation of weak surface material and placing

TABLE A1
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
PLAN 1 - SETTLEMENT DURING CONSTRUCTION

Lift		Time	Elev. (Ft. msl)		Settlement (Ft.)	
No.	Type	(Years)	Crown	Base	Crown	Base
		Highway Embankment				
		0		-5.0	0	0
1	hydraulic hauled	1 (end cons.)	13.8	-5.2	0	0.2
		2	12.2	-6.2	1.6	1.2
		5	12.1	-6.3	1.7	1.3
		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						

in spoil bank adjacent to the excavation; backfill of excavation and construction of sand core; placement of protective clay cover to within 3 feet of profile design grade; shaping of the spoil bank to form the berms; and completion of the clay cover. Construction of the section will be such that an excess embankment height of 16 inches will be provided to compensate for settlement and to provide sufficient material for shaping prior to placement of the highway pavement base course. Material for the sand core will be pumped from borrow areas in the Rigolets channel as shown on plate A22. Protective cover material will be transported by barge from the borrow area on the bottom of Lake Pontchartrain along the north shore and trucked to the embankment site.

c. Highway pavement. The design and construction of the relocation of U. S. Highway 90 shall be according to the Road Design Manual of the Department of Highways of the State of Louisiana. Typical sections are shown on plate A3. The typical section consists of a 10-inch portland cement concrete pavement on a 6-inch cement treated, sand-shell base course with sand-shell shoulders topped with a 1-inch bituminous mix, wearing course. The pavement crown is sloped 0.015 feet per foot. The shoulder is 10 feet wide and is on a 0.05 feet per foot slope. The side slopes are limited by the safety requirements of the highway department to a maximum of 1 on 6 within 30 feet of the edge of pavement.

d. Control structure. An open excavation of approximately 200 feet by 1500 feet will be required to construct the control structure. Ground water control during construction will be maintained by deep well pumps. The first stage of construction involves excavation, construction dewatering, pile driving, and constructing the concrete foundation slab. The second stage consists of constructing the piers and end abutments. The final stage involves constructing the highway bridge, crane bridge, cranes, gates, backfill, slope protection, and appurtenant structures.

e. Approach channel. The approach channel will be excavated by hydraulic dredging to the grades as shown on plate A21. Spoil areas for the excavated material are shown on plate A22. After the channel excavation is complete, slope protection will be provided.

10. Erosion protection.

a. Erosion protection of embankments and closure dam is same as the recommended project plan, paragraph 41.

b. Approach channel. The side slopes and bottom of the approach channel are to be protected by riprap in the vicinity of the control structure. Right-of-way is available along the sides of the channel to allow for bank erosion.

11. 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 pumping test along with deep borings will be made for design of the dewatering system. A test pile program is to be conducted to determine economical lengths of piling. Settlement observations shall be made along levees at completion of each construction stage and annually after final completion until subsidence is essentially complete.

DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

12. Plan 1.

a. Control structure. The reinforced concrete structure, as shown on plate A18, consists of 23 bays, each 50 feet in width, with a sill elevation at -20.0 and a top elevation of 14.75. The overall length of the structure is 1,450 feet. Each bay will have two vertical lift steel gates which will be operated by an overhead traveling gantry crane. The highway and crane bridge pier is 68 feet wide and rests on a foundation slab 6 feet deep and 84 feet wide. The concrete slab footing will be supported by battered steel piles driven into the underlying sands. The typical section and elevation of the control structure are shown on plate A19.

b. Highway bridge. The bridge is a reinforced concrete structure with prestressed I - beam girders. The overall width of 47 feet - 3 inches consists of two 12 foot lanes with full 10 foot shoulders and 1 foot - 7 - 1/2 inches safety curbs.

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 A19. The piers are designed to carry the crane bridge and the highway 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 steel H - piles driven on a batter. The foundation plan layout is shown on plate A20. 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 10 feet - 9 inches. The gantry crane travel speed will be such as to allow placing all 46 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 A18. 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 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 A18 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 open-web 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 27. At Bays 1 and 2 and Bays 28 and 29 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 A21, will vary in width from 1,150 feet at the structure sill to a maximum width of 2,600 feet at the extremities on the lake and gulf sides. The channel will have an elevation of -32.5 on the gulf side of the structure and an elevation of -20.0 on the lake side. 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 plates A18 and A19. 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 A14. 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 A22. 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. 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 A10, A11 and A12. Typical sections of the levee are shown on plate A15. The stability analysis of representative sections are shown on plates A26, A27, and A28. The method of construction and materials are described in paragraph 9a. The highway levee is built in successive stages of casting and shaping. The erosion protection for the levee is described in paragraph 10a.

j. Connecting levee. This levee is that section of the Lake Pontchartrain Barrier connecting the relocation of U. S. Highway 90 with the Rigolets Closure Dam. The alignment of the connecting levee is shown on plate A13. The typical section is shown on plate A15. The stability

analysis of representative sections are shown on plates A29, A30 and A31. The method of construction is described in paragraph 9b and the erosion protection is described in paragraph 10a.

REAL ESTATE REQUIREMENTS

13. Plan 1 - Requirements.

a. The total acreage required for the construction and operation of the project is 1730 acres. This acreage, as shown on plate A22, consists of 135 acres for the closure dam, 220 acres for the approach channel, 50 acres for the levee, 40 acres for U. S. Highway 90 relocation, and 1300 acres for 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

14. Plan 1.

a. American Telephone and Telegraph Company. As shown on plates A10, A11, and A12, the new proposed construction requires that the American Telephone and Telegraph Company's Hattiesburg - New Orleans "A" cable be relocated. The new cable shall be located in the shoulder of relocated U. S. Highway 90. As shown on plate A19, the cable will pass over the control structure through conduits located in the utility gallery. The owners of the facilities have submitted an estimated cost for relocating the co-axial cable of $82,000. The owners have requested that the same, 16 foot right-of-way, be obtained for them on the relocated highway, as now held in their present location.

b. South Central Bell Telephone Company. As shown on plates A 10, A11, and A12, the proposed

construction requires that South Central Bell relocate their local telephone service. A new cable shall be located in the shoulder of relocated U. S. Highway 90. As shown on plate A19, the cable will pass over the control structure through conduits located in the utility gallery. The cost for relocating their service is included in the American Telephone and Telegraph Company's estimated cost.

c. New Orleans Public Service, Inc. - Gas Division. As shown on plates A10, A11, and A12, the proposed construction requires that New Orleans Public Service, Inc. - Gas Division relocate their existing 2 inch gas main. The new gas main shall be located in the proposed right-of-way on the gulf side of the highway levee and as shown on plate A19, the gas main will pass over the control and will be located in the utility gallery. The owner plans to abandon the existing 2-inch plastic pipe located under the proposed highway levee. The owners of the facilities have submitted an estimated cost for replacing the gas main and restoring local service of $96,450.

d. New Orleans Public Service, Inc. - Electric Division. As shown on plates A10, A11, and A12, the proposed construction requires that New Orleans Public Service, Inc. - Electric Division rearrange their overhead electric system. The new service arrangement will require a cable to be buried in the shoulder of relocated U. S. Highway 90. As shown on plate A19, the power cable will pass over the control structure and will be located in the utility gallery. To avoid any interference with construction, the powerline poles which are located in the present right-of-way will require relocation. The owners of the facilities have submitted an estimated cost for rearranging their electrical system of $58,700.

COST ESTIMATES

15. Plan 1. Based on January 1970 price levels, the estimated first cost of the Rigolets complex of the Lake Pontchartrain, La. and Vicinity project is $35,197,000. This estimate consists of $516,000 for Lands, $285,000 for Relocations, $14,945,000 for the Control structure,

$9,155,000 for Levees and floodwalls, $5,040,000 for Channels and canals, $666,000 for Roads, $2,712,000 for Engineering and design and $1,878,000 for Supervision and administration. Detailed estimates of the first cost are shown in table A2.

OPERATION AND MAINTENANCE

16. 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 $12,500, the closure dam $60,000, and the approach channel $18,000. 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 $94,400.

TABLE A2
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
ESTIMATE OF FIRST COST - PLAN 1
(January 1970 Price Level)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 1 - RIGOLETS COMPLEX					
08	Roads				
	U. S. Highway 90 relocation				
	Clear & grub			L. S.	$ 3,000
	Excavation	92,000	c. y.	0.50	46,000
	Hydraulic fill	182,000	c. y.	0.75	136,500
	Select fill	108,000	c. y.	0.90	97,200
	Non-select fill	91,000	c. y.	0.50	45,500
	Conc. pavement	15,000	s. y.	7.55	113,250
	Clam shell	5,000	c. y.	10.00	50,000
	Base course	3,100	c. y.	4.00	12,400
	Bituminous mix	13,000	s. y.	0.76	9,880
	Riprap	2,700	c. y.	13.50	36,450
	Watering	100	M gal.	2.00	200
	Seeding & fertilizing	22	ac.	200.00	4,400
					$554,780
	Contingencies 20%				111,220
	Total - Roads				$666,000
09	Channels and canals				
	Approach channel	21,000,000	c. y.	0.20	$4,200,000
					$4,200,000
	Contingencies 20%				840,000
	Total - Channels and canals				$5,040,000
11	Levees & flood walls				
	Highway levee				
	First lift				
	Excavation	61,000	c. y.	0.50	$ 30,500
	Hydraulic fill	60,000	c. y.	0.75	45,000
	Select fill	95,000	c. y.	2.50	237,500
	Clam shell	6,800	c. y.	10.00	68,000

NOTE: Estimated quantities are "in place" volumes.

TABLE A2 (Cont'd.)

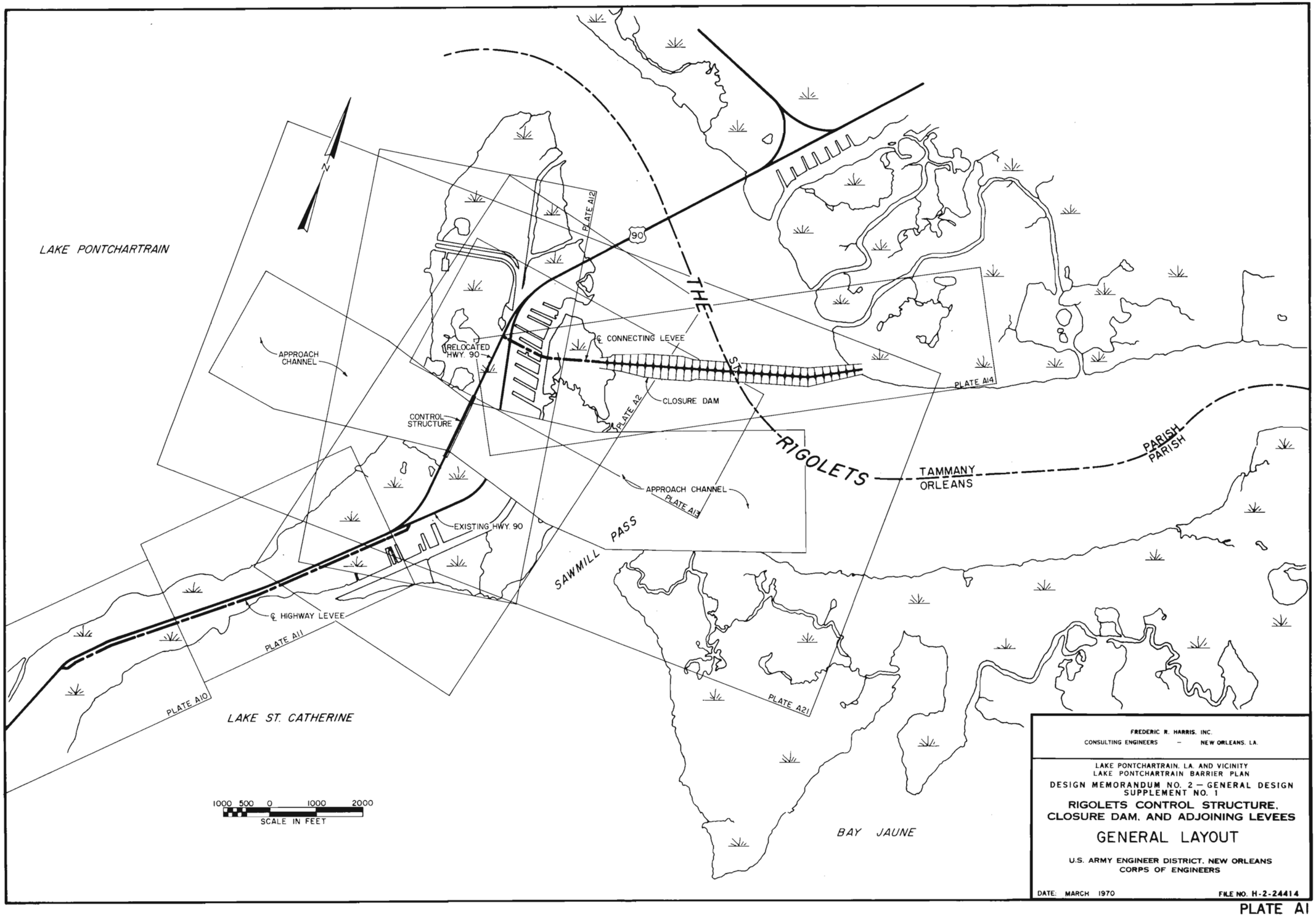
Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 1 - RIGOLETS COMPLEX (Cont'd.)					
11	Levees & flood walls (Cont'd.)				
	Highway levee (Cont'd.)				
	Seeding & fertilizing	20	ac.	200.00	$ 4,000
	Jack & bore 24" RC pipe	1,200	l.f.	25.00	30,000
	Second lift				
	Select fill	12,600	c.y.	4.00	50,400
	Seeding & fertilizing	12	ac.	250.00	3,000
	Connecting levee				
	First lift				
	Excavation	26,200	c.y.	0.50	13,100
	Hydraulic fill	34,000	c.y.	0.75	25,500
	Select fill	44,000	c.y.	2.50	110,000
	Clam shell	900	c.y.	10.00	9,000
	Bituminous mix	4,800	s.y.	0.76	3,650
	Seeding & fertilizing	8	ac.	200.00	1,600
	Second lift				
	Select fill	1,100	c.y.	4.00	4,400
	Seeding & fertilizing	3	ac.	250.00	750
	Closure dam				
	Derrick stone	319,000	tons	10.00	3,190,000
	Riprap	94,200	tons	10.00	942,000
	Plastic filter cloth	2,600,000	s.f.	0.10	260,000
	Clam shell (over filter cloth)	49,500	c.y.	8.00	396,000
	Clam shell	11,800	c.y.	10.00	118,000
	Bituminous mix	13,000	c.y.	0.76	9,880
	Excavation	832,000	c.y.	0.18	149,760
	Hydraulic fill	3,000,000	c.y.	0.36	1,080,000
	Select fill	11,100	c.y.	2.50	27,750
	Steel sheet piling	205,000	l.f.	4.00	820,000
					$7,629,790
	Contingencies 20%				1,525,210
	Total - Levees and flood walls				$9,155,000

TABLE A2 (Cont'd.)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 1 - RIGOLETS COMPLEX (Cont'd.)					
15	Floodway control and diversion structures				
	Control structure				
	Construction dewatering			L.S.	$ 400,000
	Excavation	300,000	c.y.	0.80	240,000
	Backfill	22,200	c.y.	1.00	22,200
	Filter gravel	2,200	c.y.	10.00	22,000
	Filter sand	1,100	c.y.	10.00	11,000
	Filter cloth	392,500	s.f.	0.10	39,250
	Riprap	143,500	tons	12.50	1,793,750
	Clam shell	33,200	c.y.	10.00	332,000
	Steel sheet piling	12,800	s.f.	4.40	56,320
	Concrete				
	Bridge & crane br.	5,000	c.y.	140.00	700,000
	Piers & curtain walls	6,300	c.y.	60.00	378,000
	Floor slab	18,600	c.y.	40.00	744,000
	Bent & abutments	3,050	c.y.	60.00	183,000
	Stab. slab	1,550	c.y.	40.00	62,000
	Ballast	260	c.y.	30.00	7,800
	Cement	44,900	bbls.	5.00	224,500
	Reinforcing steel	4,950,000	lbs.	0.16	792,000
	Structural steel	4,870,000	lbs.	0.45	2,191,500
	Steel H piling	307,600	l.f.	10.50	3,229,800
	ASSHO III girder	10,150	l.f.	18.50	187,775
	Pipe rail	1,450	l.f.	9.40	13,630
	Gantry cranes (2)			L.S.	550,000
	Lighting & utility conduits			L.S.	125,200
	Concrete handrail	2,900	l.f.	12.00	34,800
	Crane rail	134,000	lbs.	0.40	53,600
	PVC water seal	11,500	l.f.	2.00	23,000
	Protective coating	77,500	s.f.	0.05	3,875
	Plastic membrane	84,000	s.f.	0.08	6,720

TABLE A2 (Cont'd.)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 1 - RIGOLETS COMPLEX (Cont'd.)					
15	Floodway control and diversion structures (Cont'd.)				
	Control structure (Cont'd.)				
	Cathodic protection	1		L.S.	$ 25,000
	Storage shed	1		L.S.	1,500
					$12,454,220
	Contingencies 20%				2,490,780
	Total - Floodway control and diversion structures				$14,945,000
	Total - Construction				$29,806,000
30	Engineering and design 9.1% ±				2,712,000
31	Supervision and administration 6.3% ±				1,878,000
	Total				$34,396,000
01	Lands				
	Closure dam	135	ac.	500.00	$ 67,500
	Approach channel	220	ac.	500.00	110,000
	Levees	50	ac.	500.00	25,000
	Highway relocation	40	ac.	500.00	20,000
	Spoil disposal	1,300	ac.	100.00	130,000
	Improvements			L.S.	78,000
					$ 430,500
	Contingencies 20%				85,500
	Total - Lands				$ 516,000
02	Relocations				
	AT&T coaxial cable & SBT &T local service	1		L.S.	$ 82,000
	NOPSI gas line	1		L.S.	96,450
	NOPSI electric powerline	1		L.S.	58,700
					$ 237,150
	Contingencies 20%				47,850
	Total - Relocations				$ 285,000
	TOTAL PROJECT COST				$35,197,000



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LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

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

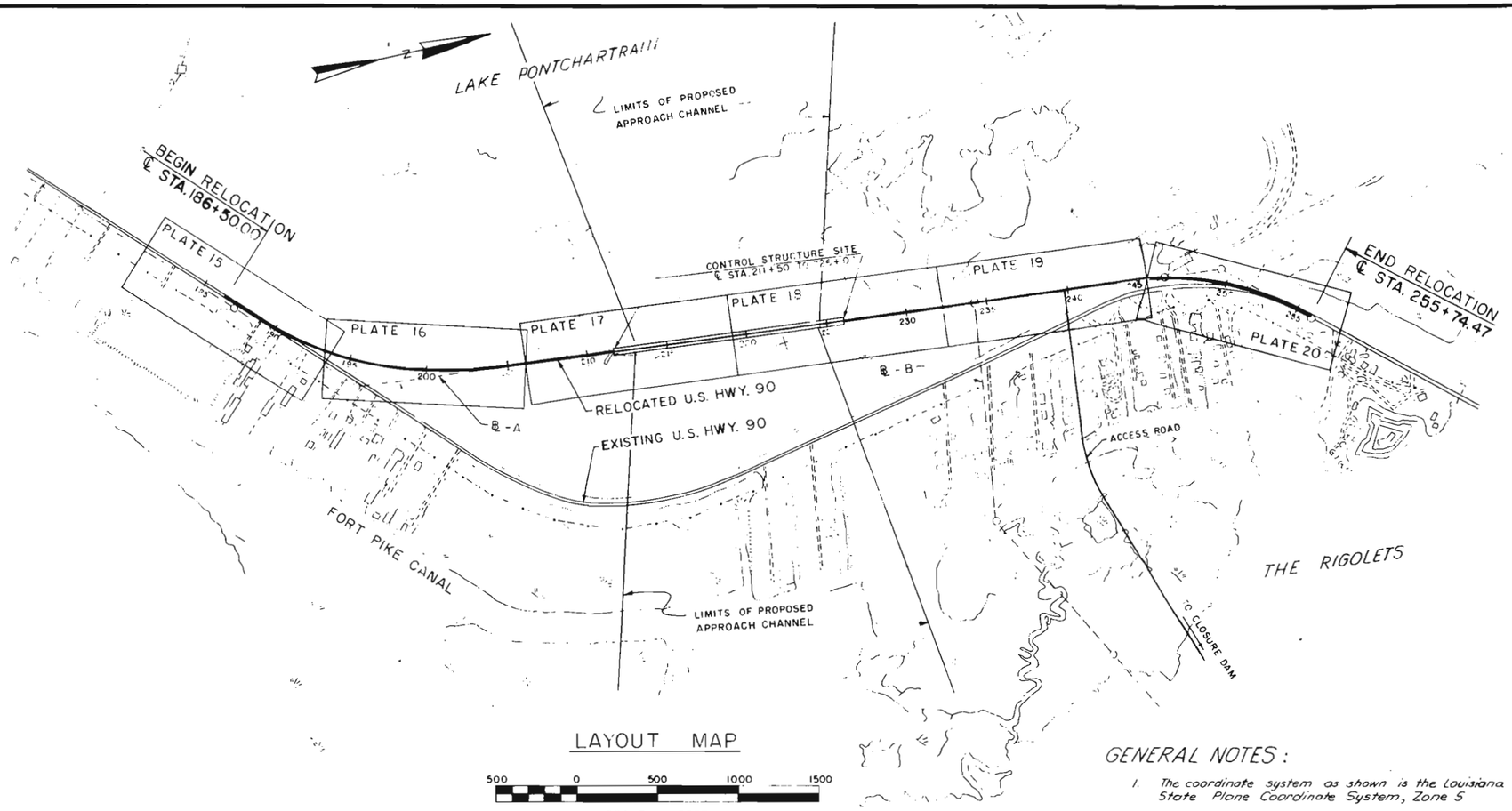
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

GENERAL LAYOUT

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

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

PLATE A1



LAYOUT MAP

500 0 500 1000 1500

SCALE IN FEET

U. S. HIGHWAY 90 BASELINE DATA

	POINT (℄ STA.)	LATITUDE Deg	Min	Ft	LONGITUDE Deg	Min	Ft	COORDINATES N.	E
℄ - A	175+15.74	30	08	4319.48	89	44	4092.84	541,163.557	2,501,524.617
	186+49.38	30	08	5126.92	89	44	3296.92	541,970.850	2,502,319.193
	195+49.05	30	08	5759.96	89	44	2657.52	542,603.806	2,502,959.245
	234+11.32	30	09	3548.66	89	44	2344.95	546,453.403	2,503,271.870
	246+11.81	30	09	4745.42	89	44	2247.94	547,649.954	2,503,369.041
	249+60.59	30	09	5093.06	89	44	2219.72	547,997.590	2,503,397.277
	255+46.80	30	09	5567.02	89	44	1806.36	548,439.356	2,503,782.606
℄ - B	0+00.00	30	09	3548.86	89	44	2344.95	546,453.403	2,503,271.870
	13+52.60	30	09	3379.23	89	44	1002.92	546,283.747	2,504,613.788
	"A"24+45.16	30	09	3913.73	89	44	49.96		
	"B"81+85.65	30	10	660.59	89	43	310.11	549,676.104	2,510,573.586

REMARK: "℄ - A" STA. 234 + 11.32 = "℄ - B" STA. 0 + 00.00

RELOCATED U. S. HIGHWAY CENTERLINE DATA

POINT	℄ STATION	COORDINATES N	E	CURVE DATA
POT-1	186 + 50.00	541,940.124	2,502,246.972	
CURVE 1				Δ = 40°21'56.4"
PC-1	189 + 28.03	542,136.690	2,502,443.506	D = 2°51'53.2"
PI		542,656.461	2,502,963.522	T = 735.177
CC		543,551.112	2,501,029.592	L = 1,409.028
PT-1	203 + 37.06	543,389.226	2,503,623.030	R = 2,000.000
CURVE 2				Δ = 36°27'15.0"
PC-2	243 + 01.36	547,341.136	2,503,343.961	D = 2°51'53.2"
PI		547,997.590	2,503,397.272	T = 656.914
CC		547,179.250	2,505,337.399	L = 1,272.464
PT-2	255 + 74.47	548,493.930	2,503,830.201	R = 2,000.000

GENERAL NOTES:

1. The coordinate system as shown is the Louisiana State Plane Coordinate System, Zone 5
2. The latitude and longitude as shown are based on Polyconic Projection, 1927 North American Datum.
3. Proposed elevations are based on the Louisiana Geodetic M.S.L., elevation 0.00'.
4. Specifications adopted by the Department of Highways, May 4, 1955, and approved by the Bureau of Public Roads, shall govern on this project. Except as amended by Special Provisions.
5. For Concrete Pavement Details, See Department of Highways Standard Plans.

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

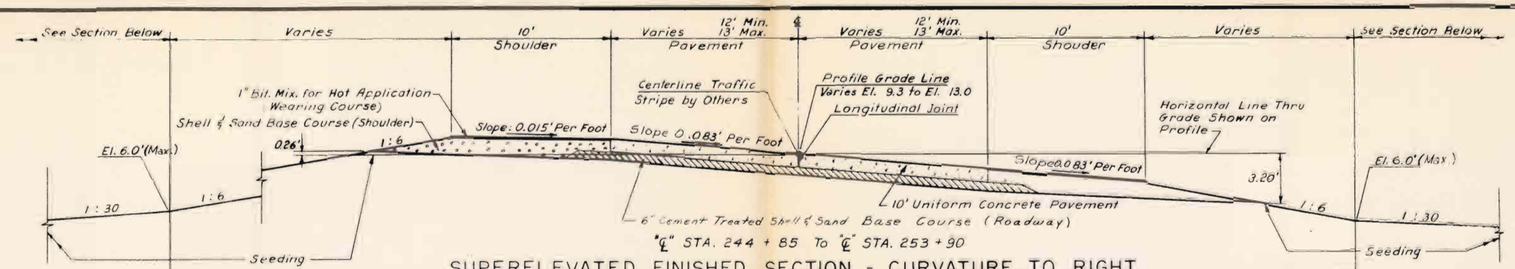
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN I – U. S. HIGHWAY 90 RELOCATION
LAYOUT MAP & BASELINE DATA

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

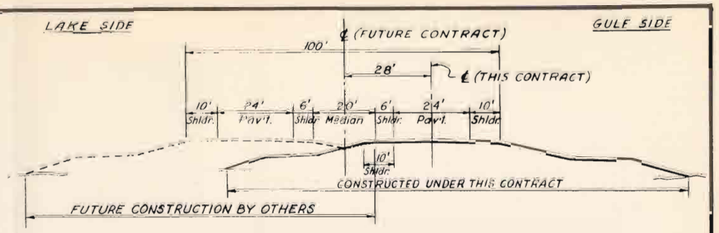
DATE: MARCH 1970 FILE NO. H-2-24414

PLATE A2



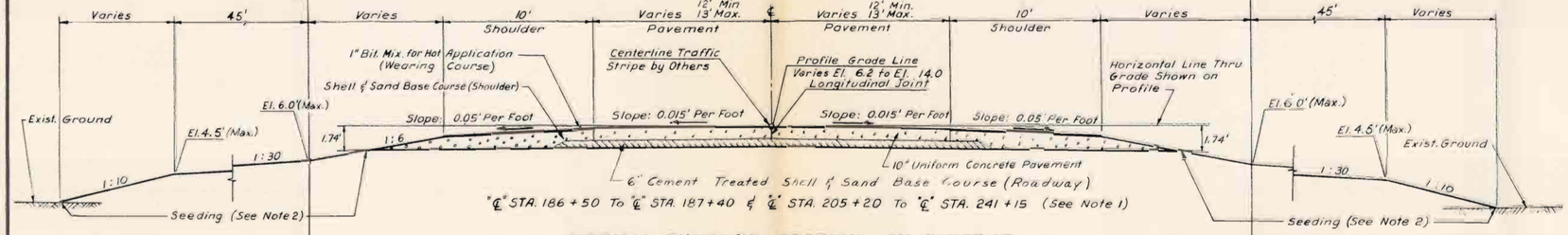
SUPERELEVATED FINISHED SECTION - CURVATURE TO RIGHT

Scale in feet



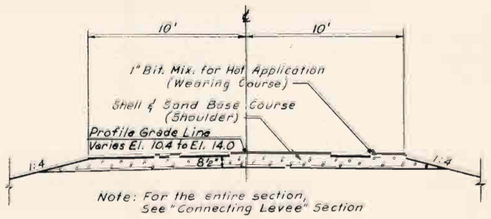
FUTURE U.S. HWY. 90

No Scale



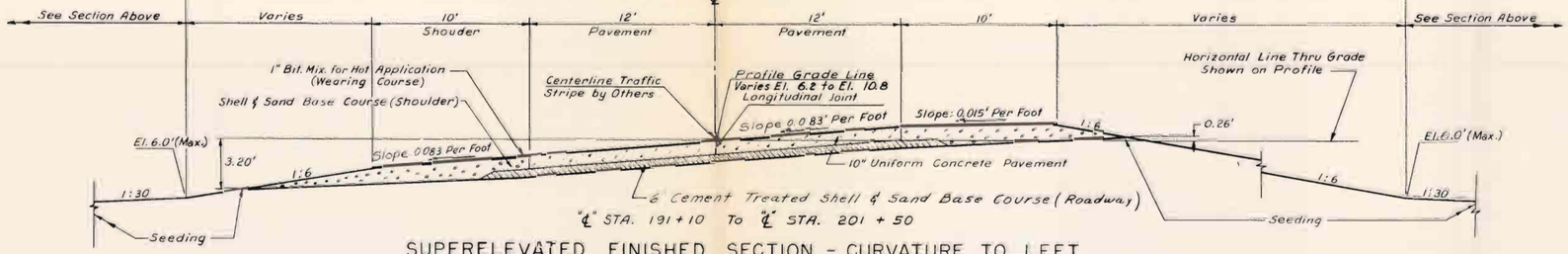
NORMAL FINISHED SECTION - ON TANGENT

Scale in feet



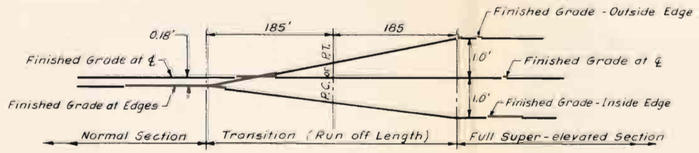
ACCESS ROAD

Scale in feet



SUPERELEVATED FINISHED SECTION - CURVATURE TO LEFT

Scale in feet



SUPERELEVATION TRANSITION

No Scale

TRANSITION STATIONS

"℄" STA. 187 + 40 To "℄" STA. 191 + 10
"℄" STA. 201 + 50 To "℄" STA. 205 + 20
"℄" STA. 241 + 15 To "℄" STA. 244 + 85
"℄" STA. 253 + 90 To "℄" STA. 255 + 74.47

NOTES:

1. ℄ Sta. 211 + 50 to ℄ Sta. 226 + 00 - Control Structure Sections.
2. ℄ Sta. 210 + 05 to ℄ Sta. 211 + 50 & ℄ Sta. 226 + 00 to ℄ Sta. 227 + 45 - Embankment to be ripraped.
3. Elevations are in feet and refer to mean sea level.

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

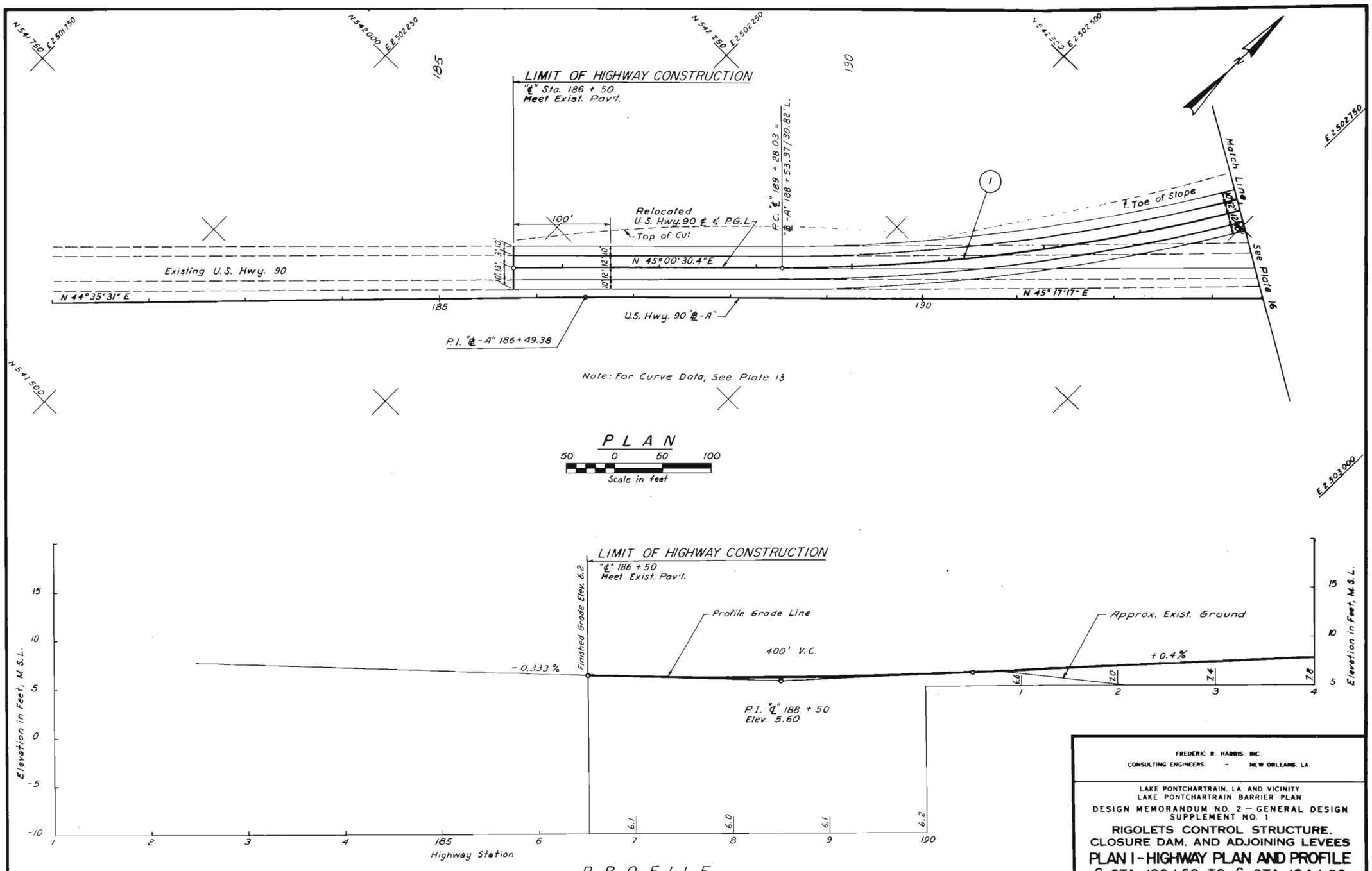
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN I - U. S. HIGHWAY 90 RELOCATION
TYPICAL SECTIONS

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE A3



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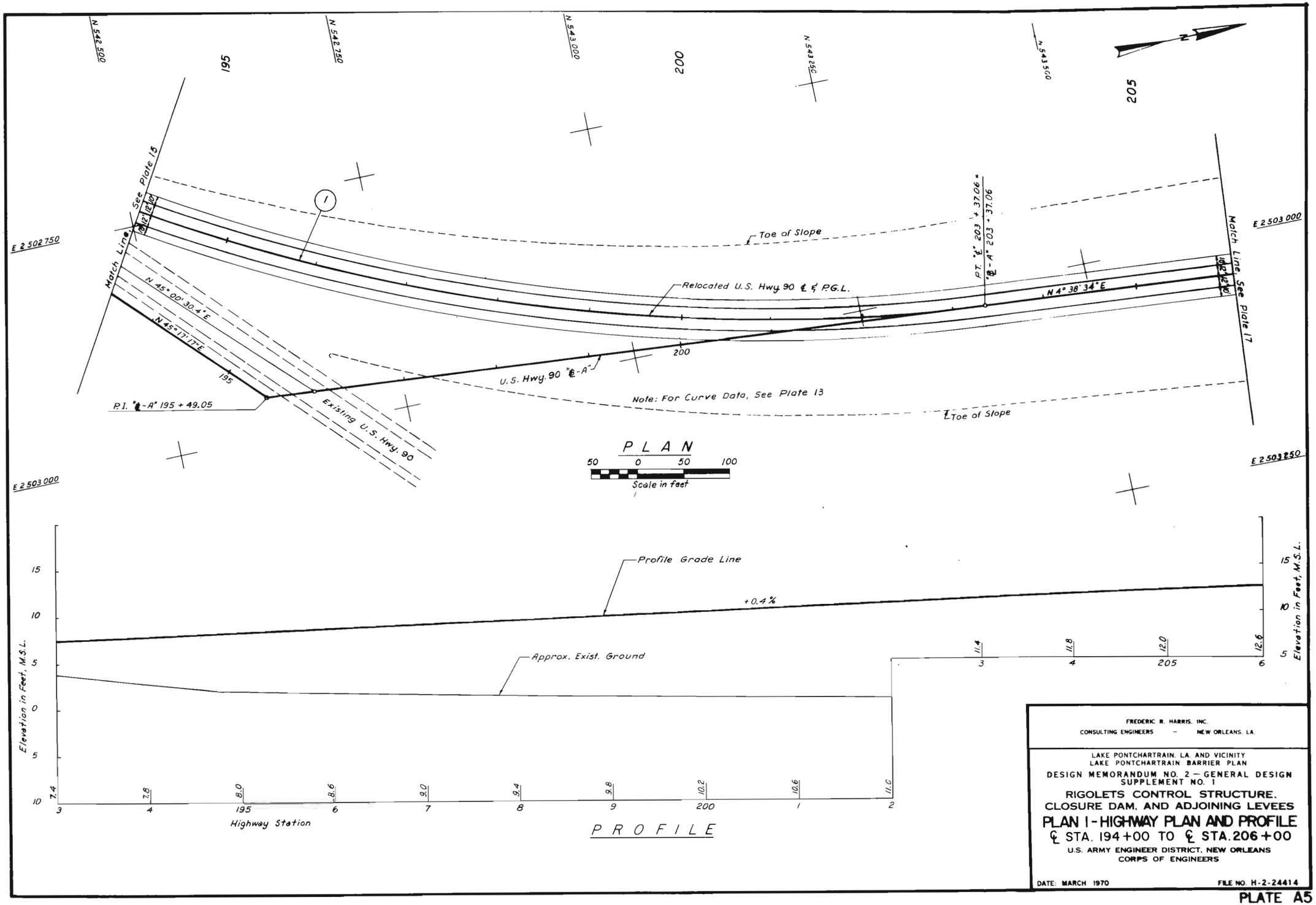
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
PLAN I - HIGHWAY PLAN AND PROFILE
℄ STA. 186+50 TO ℄ STA. 194+00
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

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

PLATE A4



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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

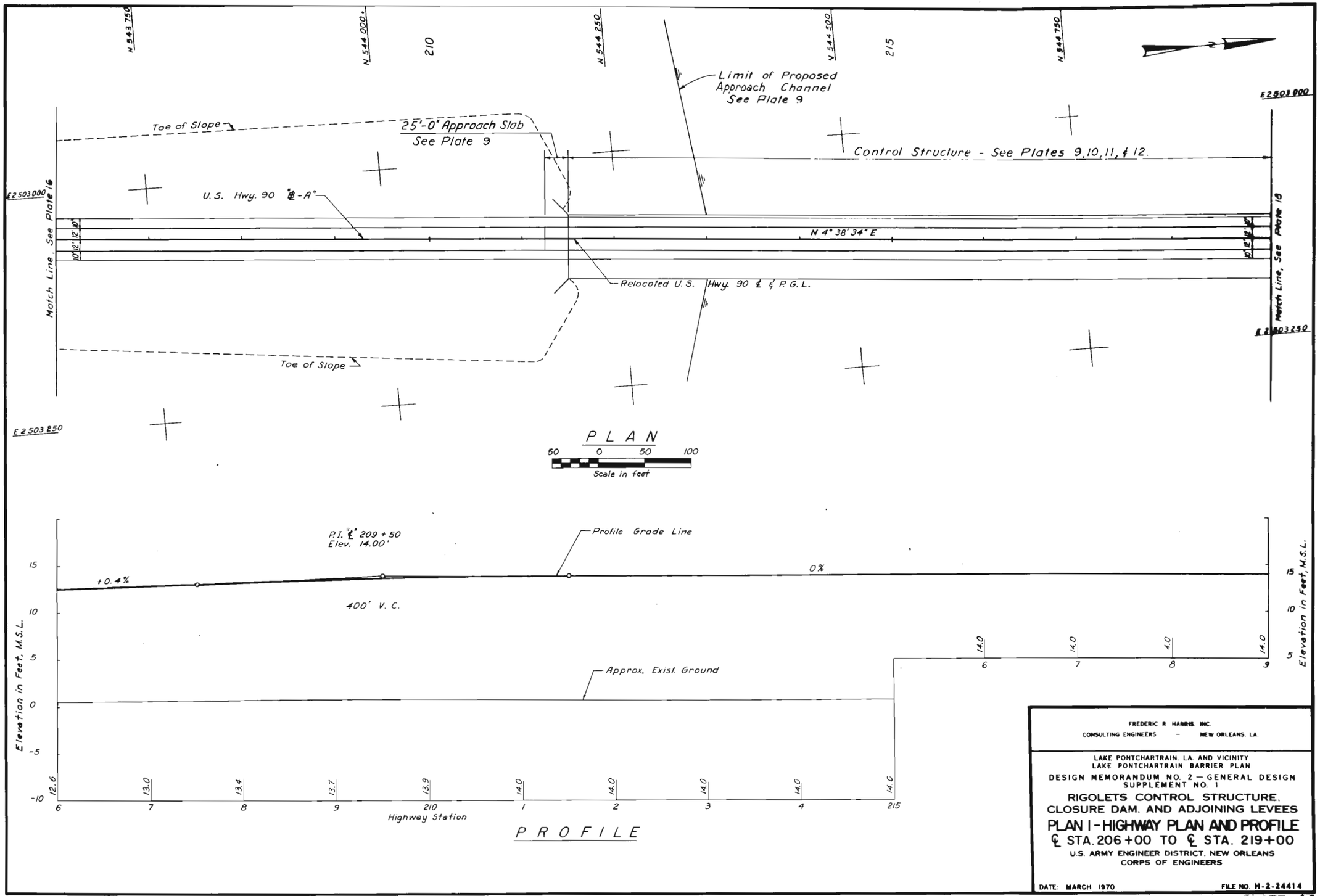
PLAN 1 - HIGHWAY PLAN AND PROFILE

℄ STA. 194+00 TO ℄ STA. 206+00

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

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

PLATE A5



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

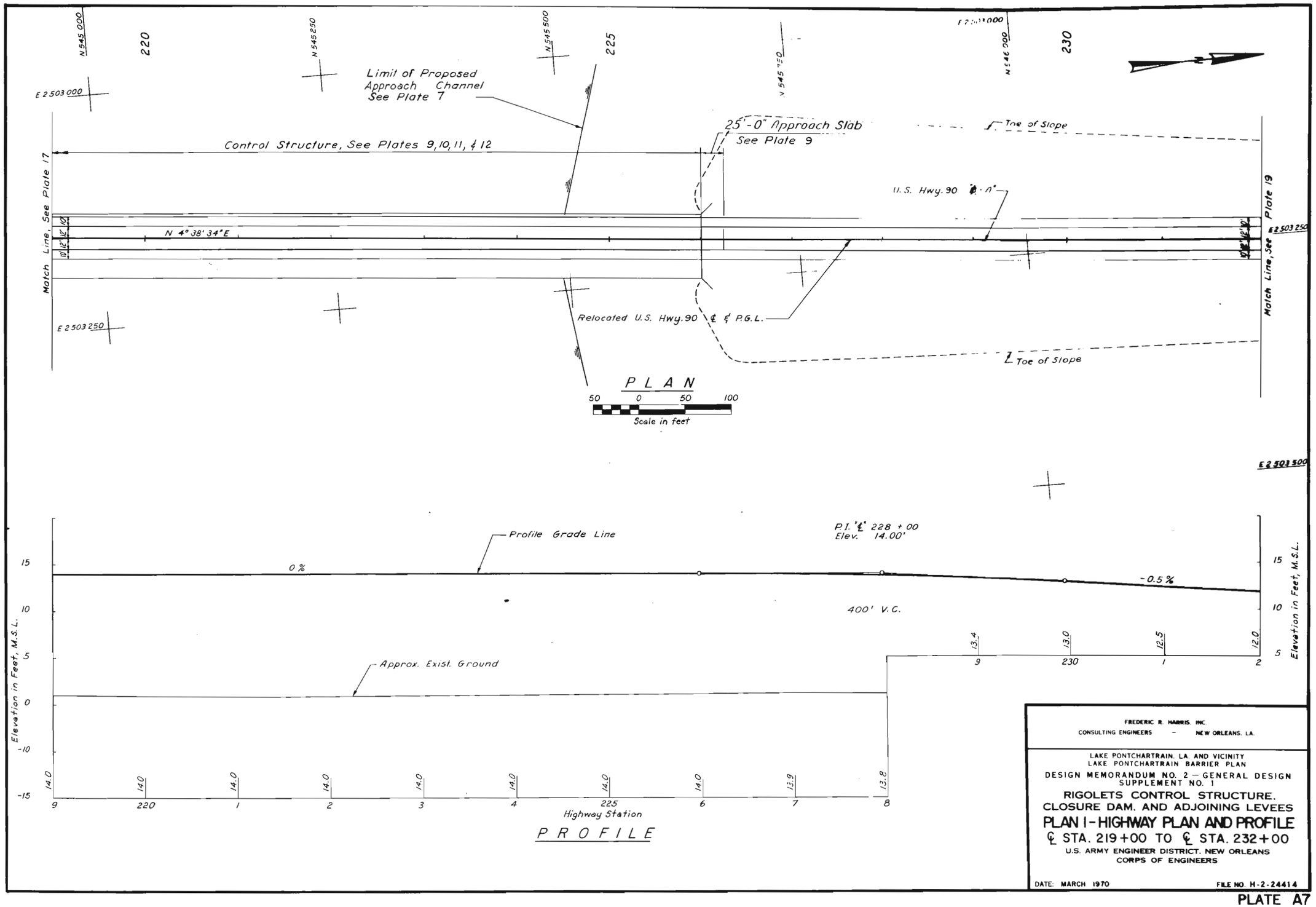
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

PLAN I - HIGHWAY PLAN AND PROFILE
℄ STA. 206+00 TO ℄ STA. 219+00

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

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

PLATE A6



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

PLAN I - HIGHWAY PLAN AND PROFILE

℄ STA. 219+00 TO ℄ STA. 232+00

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

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

PLATE A7

N 546 250 | N 546 500 | N 546 750 | N 547 000 | N 547 250 | N 547 500

235 | 240 | 245

N

"℄-A" 234 + 11.32 = "℄-B" 0 + 00.00

PC-2 "℄-A" 243 + 01.32 = "℄-A" 243 + 11.32

Plate 18

Match Line, See Plate 18

Match Line, See Plate 20

E 2 503 250

E 2 503 500

U.S. Hwy. 90 "℄-A"

Toe of Slope

N 4° 38' 34" E

+75

10' 12' 10'

Relocated U.S. Hwy. 90 ℄ & P.G.L.

Toe of Slope

S 82° 47' 40" E

℄-B

R = 45'

R = 45'

℄ Access Road

To Closure Dam

20'

Existing U.S. Hwy. 90

2

Note: For Curve Data See Plate 13

PLAN

50 0 50 100

Scale in feet

PROFILE

Elevation in Feet, M.S.L.

15 10 5 0 -5 -10

-0.5 %

400' V.C.

+0.5%

Profile Grade Line

P.I. "℄" 237 + 50
Elev. 9.25'

Approx. Exist. Ground

12.0 11.5 11.0 10.5 10.0 9.8 9.8 10.0 10.5 11.0 11.5

2 3 4 235 6 7 8 9 210 1 2

Highway Station

2' 12.5 13.0

3 4 245

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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

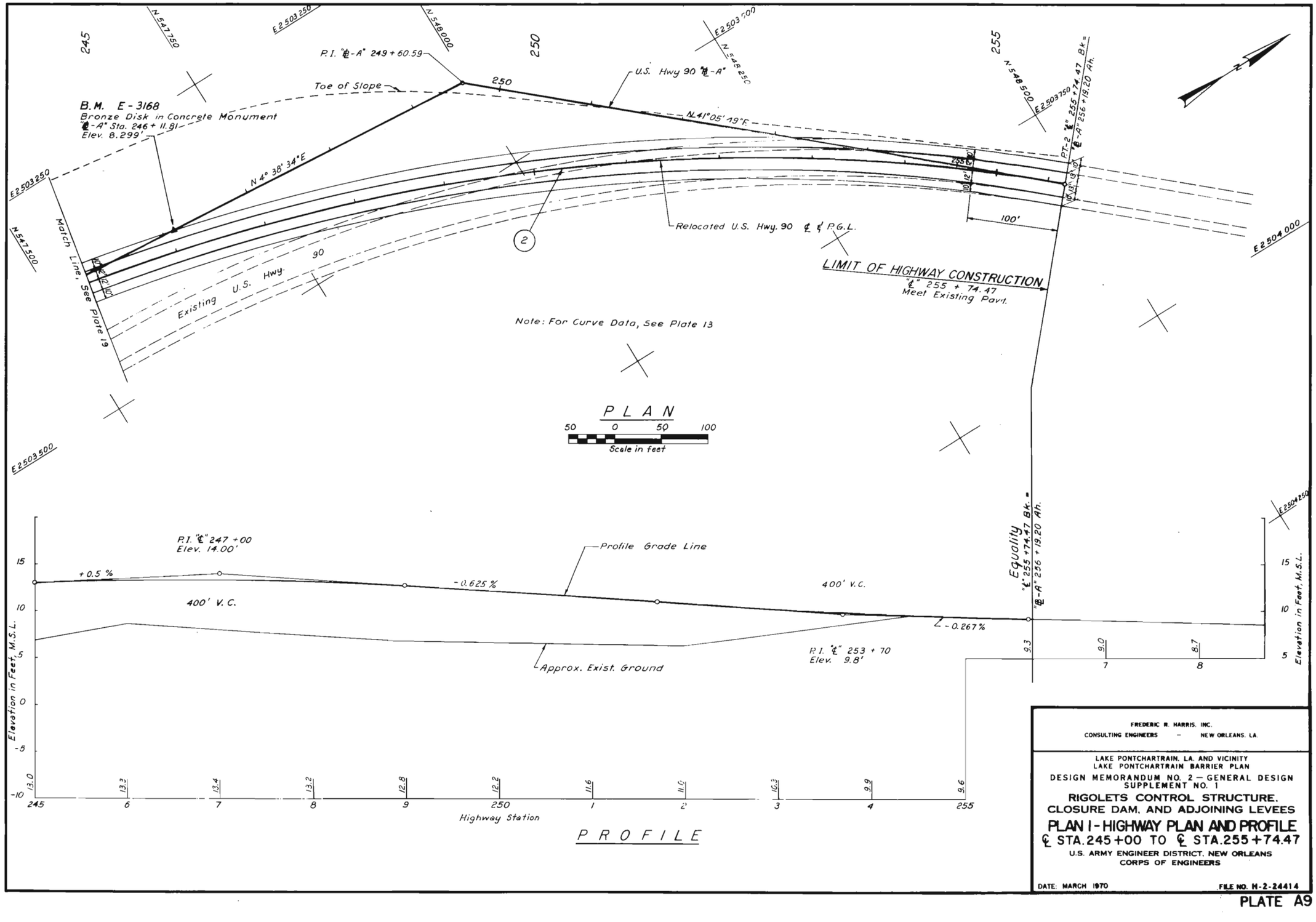
PLAN I - HIGHWAY PLAN AND PROFILE

℄ STA. 232+00 TO ℄ STA. 245+00

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

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

PLATE A8



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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

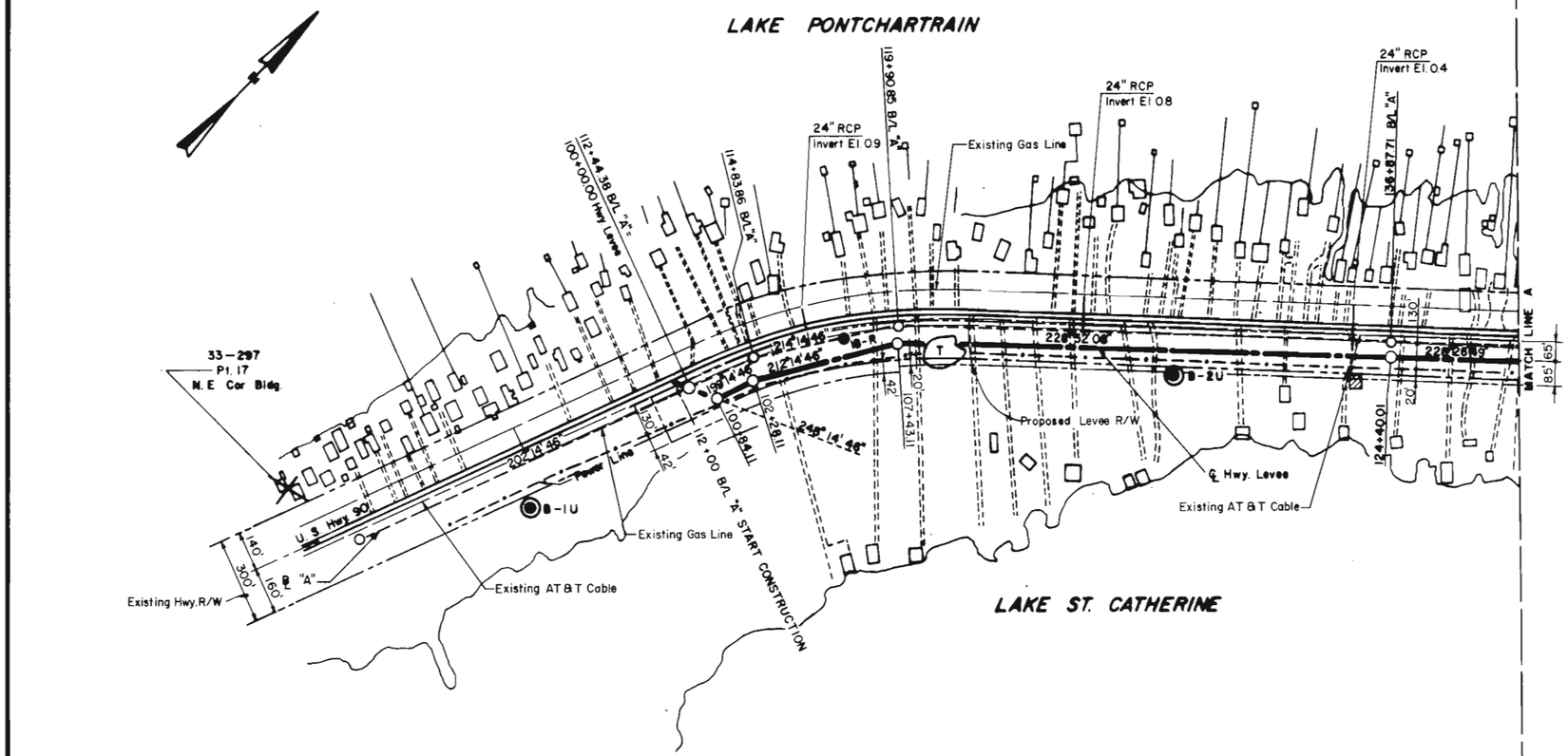
PLAN I - HIGHWAY PLAN AND PROFILE

℄ STA. 245+00 TO ℄ STA. 255+74.47

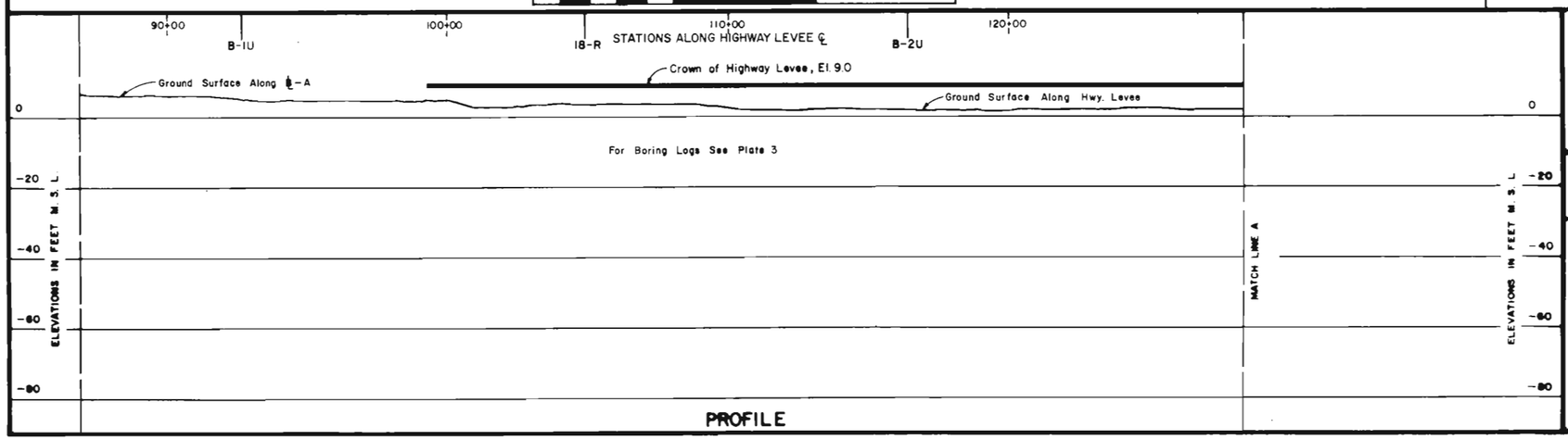
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

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

PLATE A9



PLAN
SCALE IN FEET
500 0 500 1000



PROFILE

GENERAL NOTES

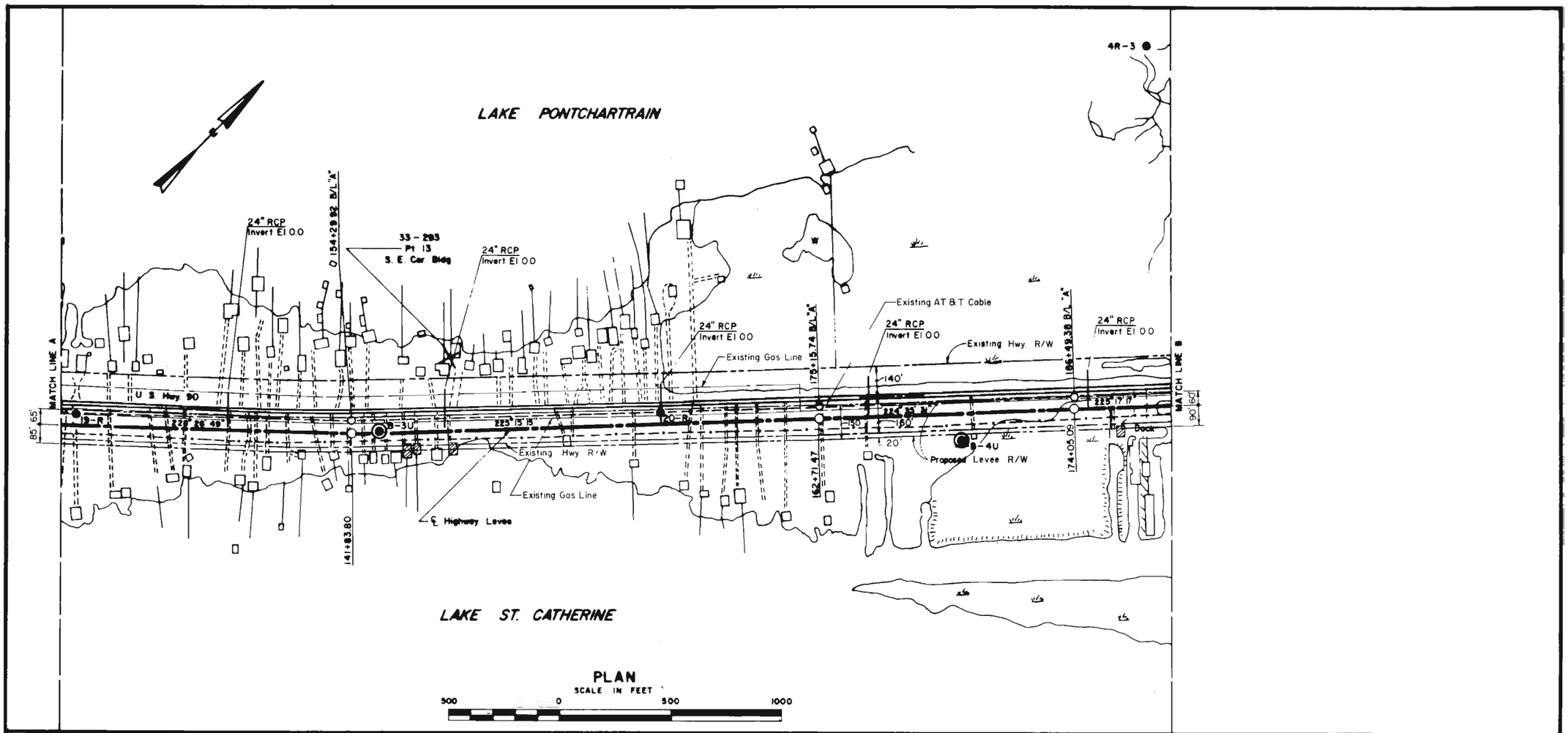
See plate A for soil boring legend
● Indicates general type boring location
◉ Indicates undisturbed boring location
General type borings were taken with a $1\frac{7}{8}$ inch I.D. core barrel sampler.
Undisturbed borings were taken with a 5 inch diameter steel tube piston type sampler.
▨ Buildings to be relocated

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
PLAN I – 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 A10



See note A10 for general notes

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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

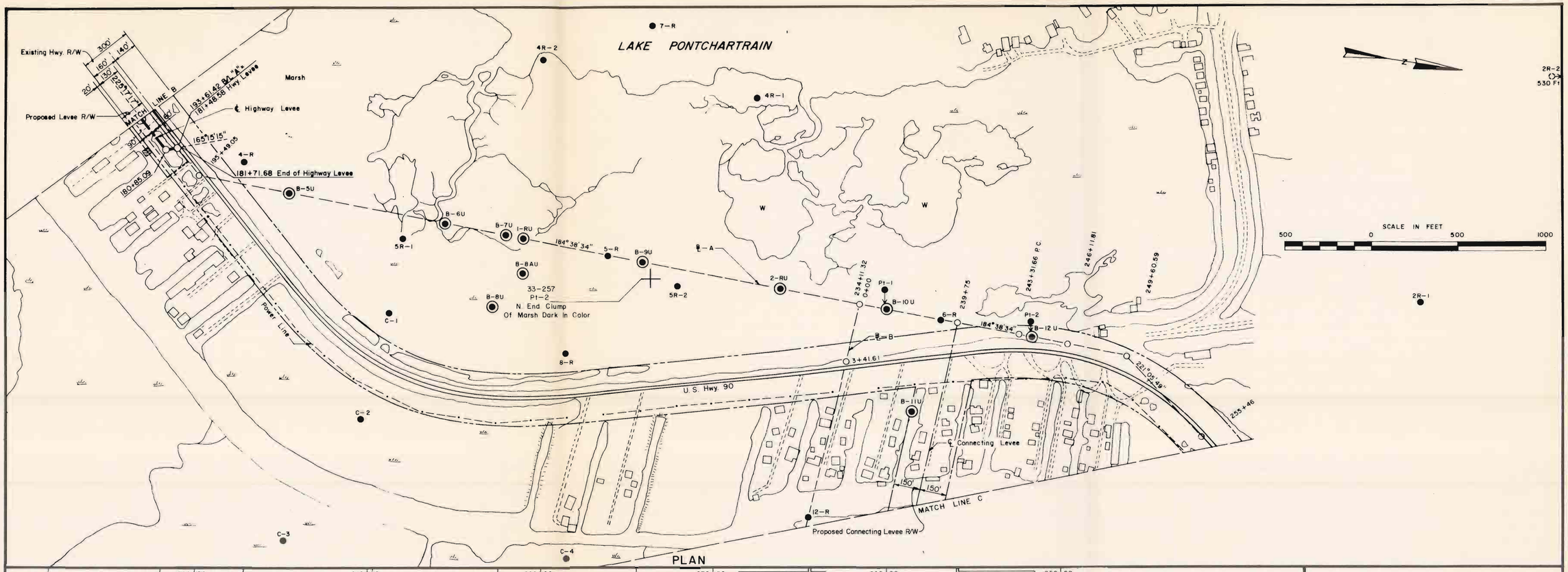
PLAN I — HIGHWAY LEVEE

PLAN, PROFILE AND SOIL BORINGS

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

DATE MARCH 1970 FILE NO H-2-24414

PLATE A11



See plate A10 for general notes.

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

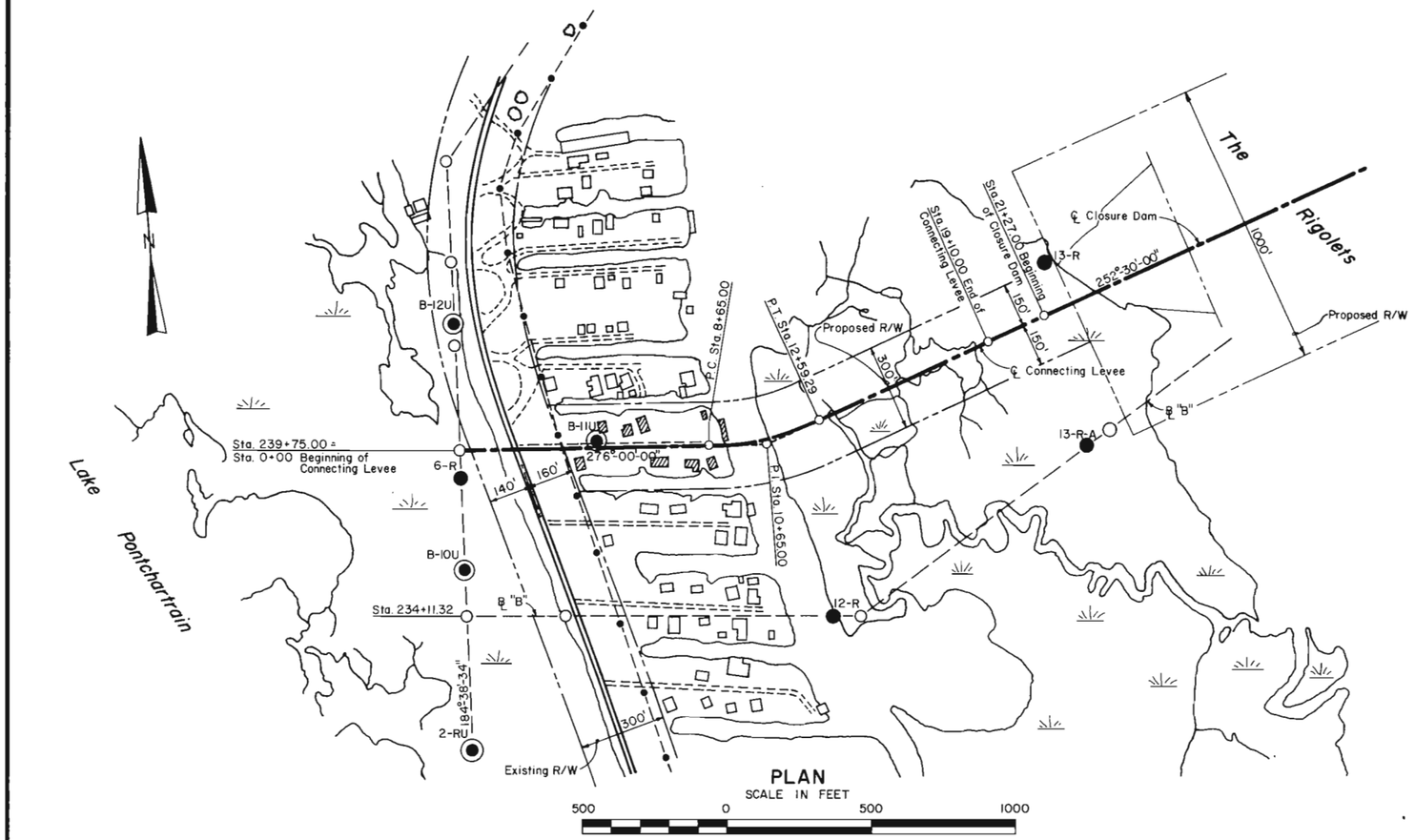
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN 1 - 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

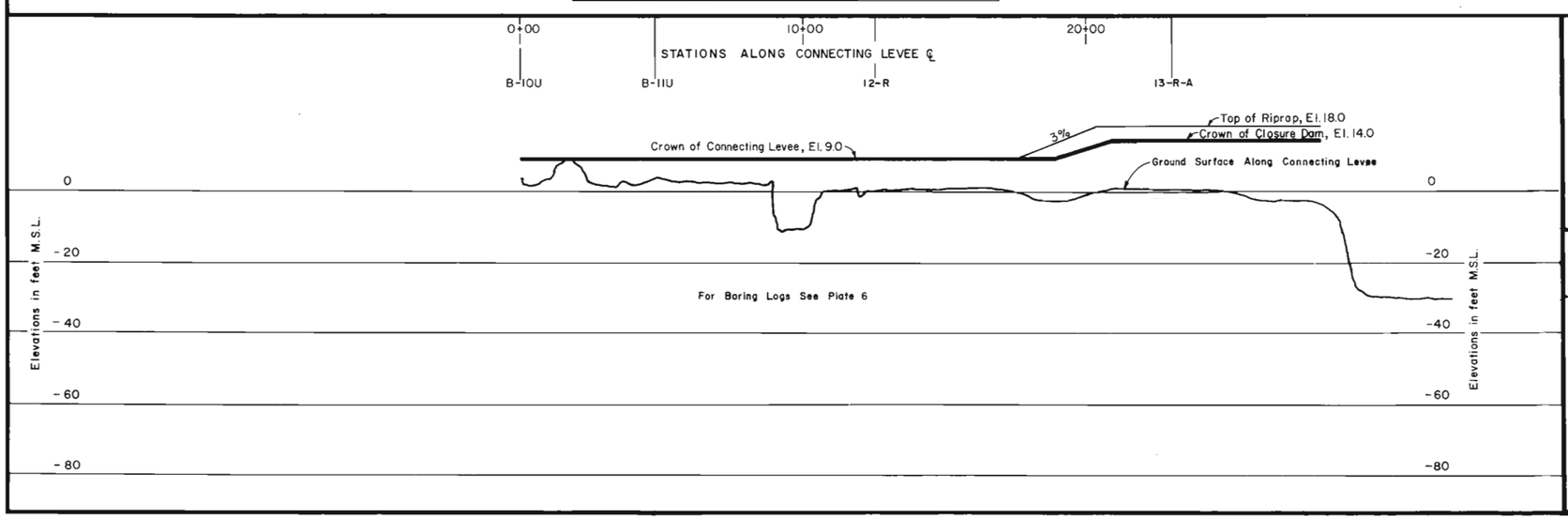
PLATE A12



PLAN
SCALE IN FEET
500 0 500 1000

℄ CURVE DATA
CONNECTING LEVEE

Δ = 23°-30'-00"
D = 5°-57'-36"
T = 200'
L = 394.29'
R = 961.54'



See plate A10 for general notes.

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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

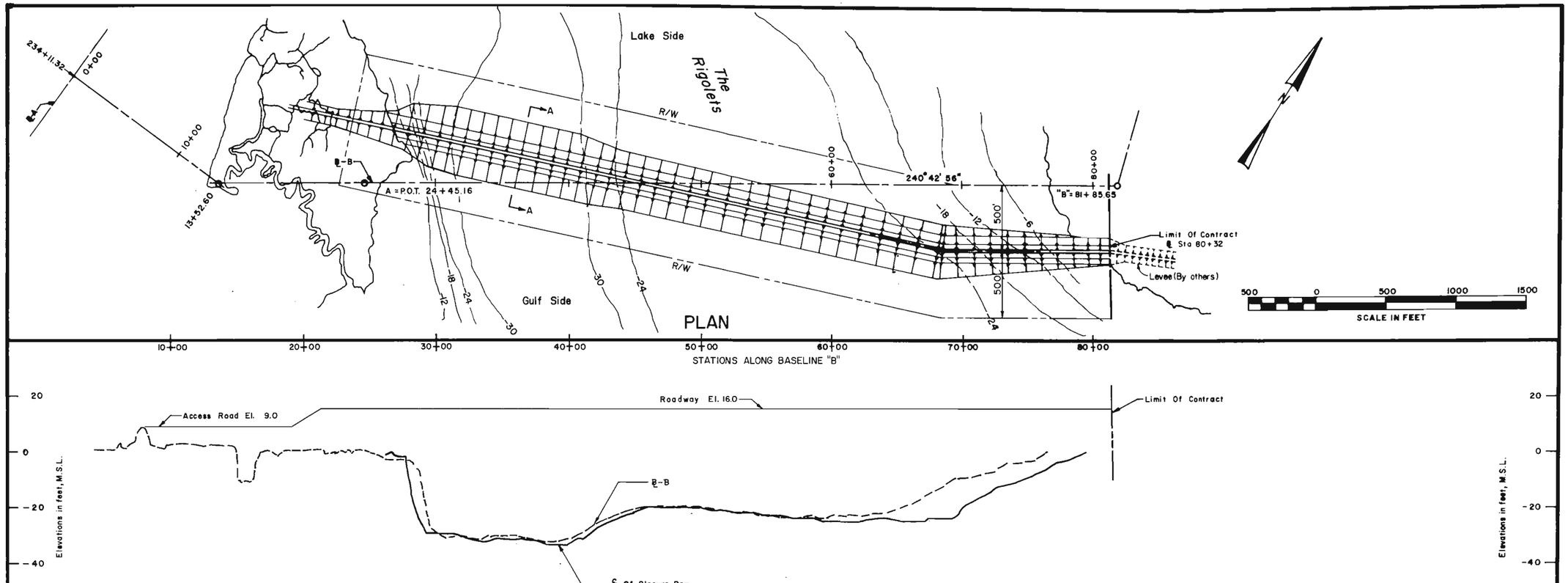
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN I - CONNECTING LEVEE
PLAN, PROFILE AND SOIL BORINGS

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE A13



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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

PLAN 1 - CLOSURE DAM

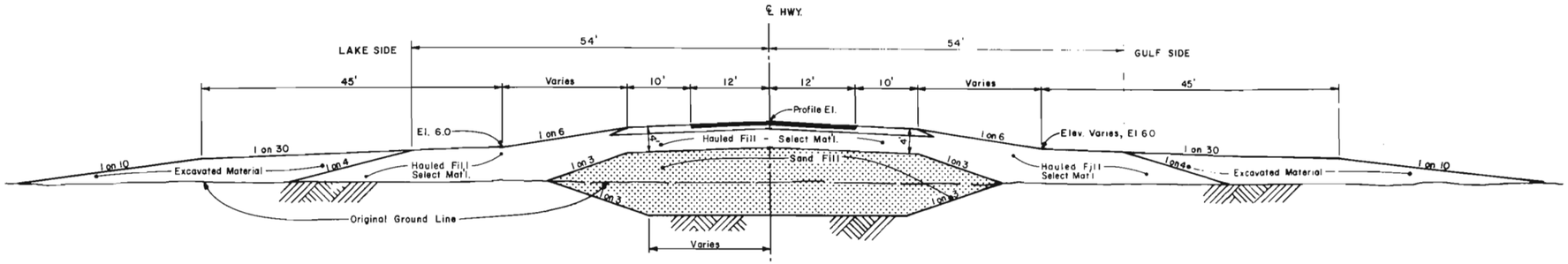
PLAN, PROFILE AND SECTION

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

DATE: MARCH 1970

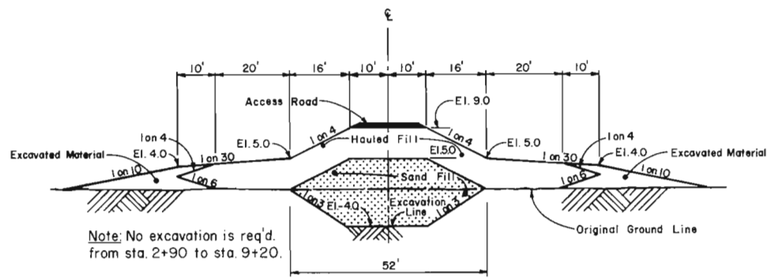
FILE NO. H-2-24414

PLATE A14



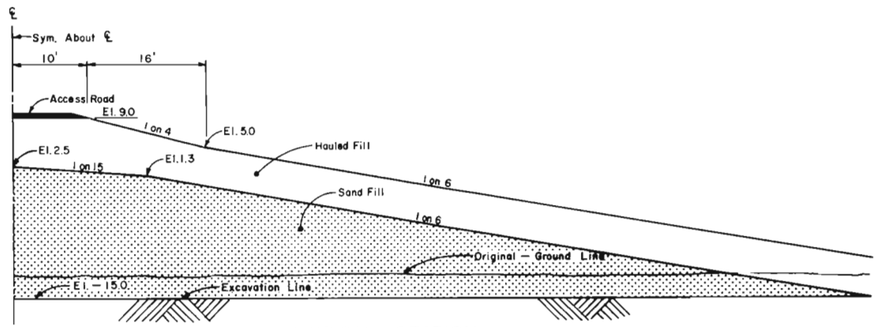
TYPICAL SECTIONS
EMBANKMENT — U. S. HIGHWAY 90
℄ STA 189+28.03 TO ℄ STA. 205+00

5 0 5 10 15
Scale in feet



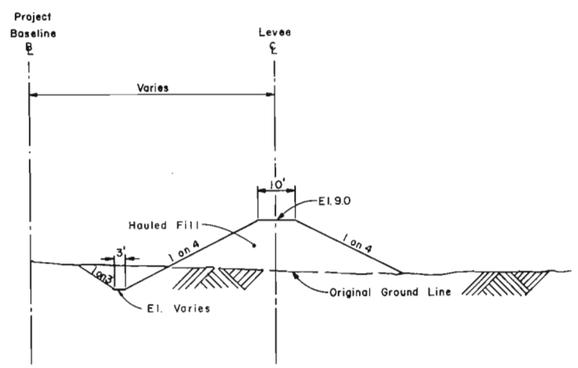
TYPICAL SECTION — CONNECTING LEVEE

10 5 0 10 20 30
Horiz.
5 0 5 10 15
Vert.
Scale in feet



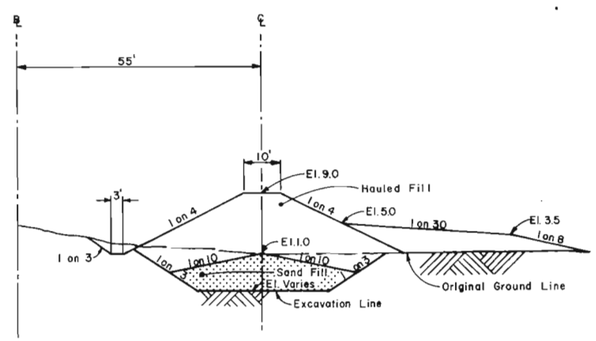
TYPICAL SECTION
CONNECTING LEVEE IN FORT PIKE CANAL
STA. 9+20 TO STA. 10+80

5 0 5 10 15
Scale in feet



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

10 5 0 10 20 30
Horiz.
5 0 5 10 15
Vert.
Scale in feet



TYPICAL SECTION — HIGHWAY LEVEE
STA. 162+71.36 TO STA. 180+85

10 5 0 10 20 30
Horiz.
5 0 5 10 15
Vert.
Scale in feet

GENERAL NOTES

Elevations Are In Feet Referred To Mean Sea Level.

Organic Material To Be Removed From Levee And Highway Excavation Is To Be Wasted In Spoil Disposal Area Shown On Plate A22.

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

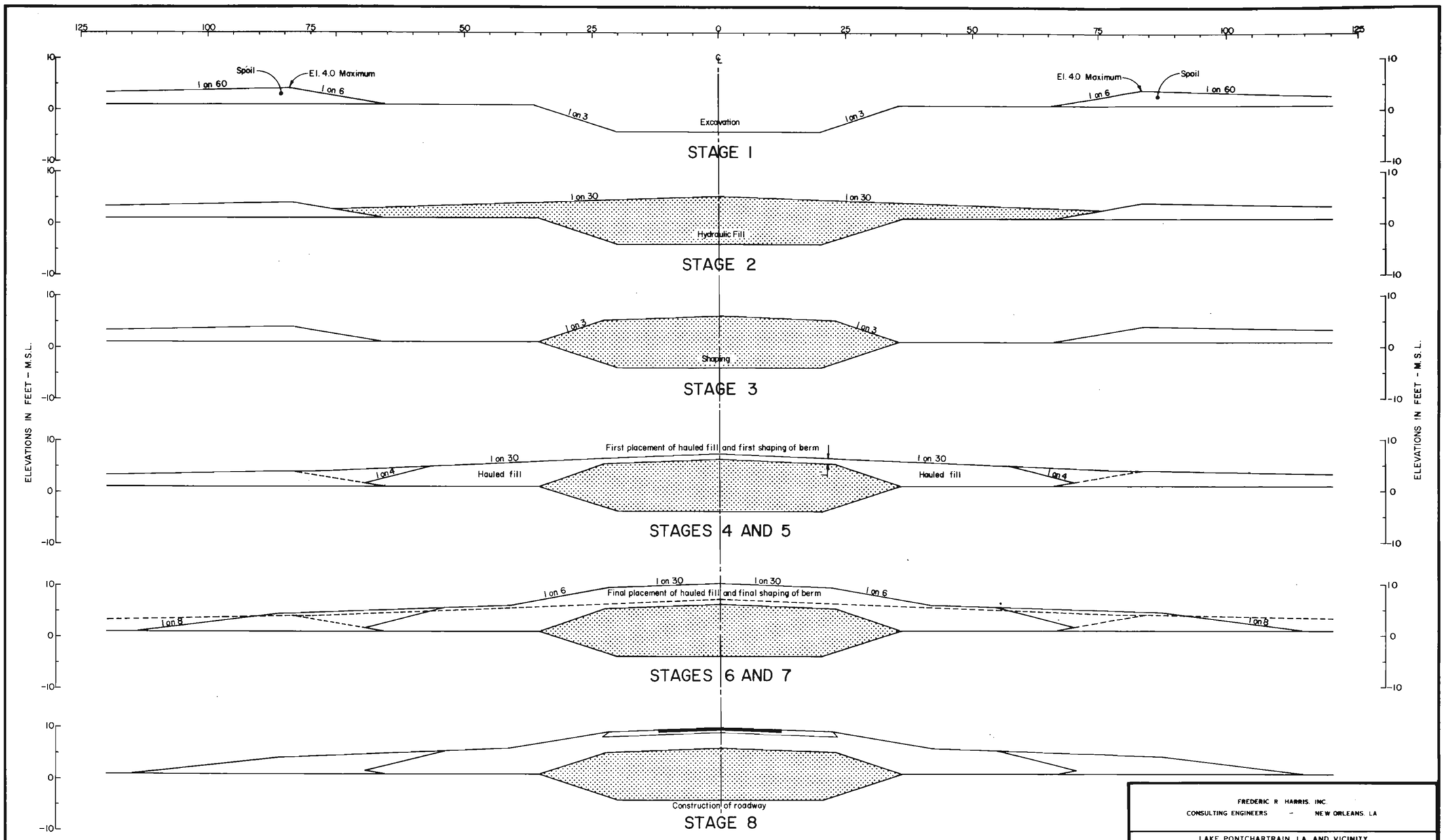
PLAN I - EMBANKMENT, CONNECTING LEVEE AND HIGHWAY LEVEE, TYPICAL SECTIONS

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

DATE. MARCH 1970

FILE NO. H-2-24414

PLATE A15



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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

PLAN I - U. S. HIGHWAY 90 RELOCATION

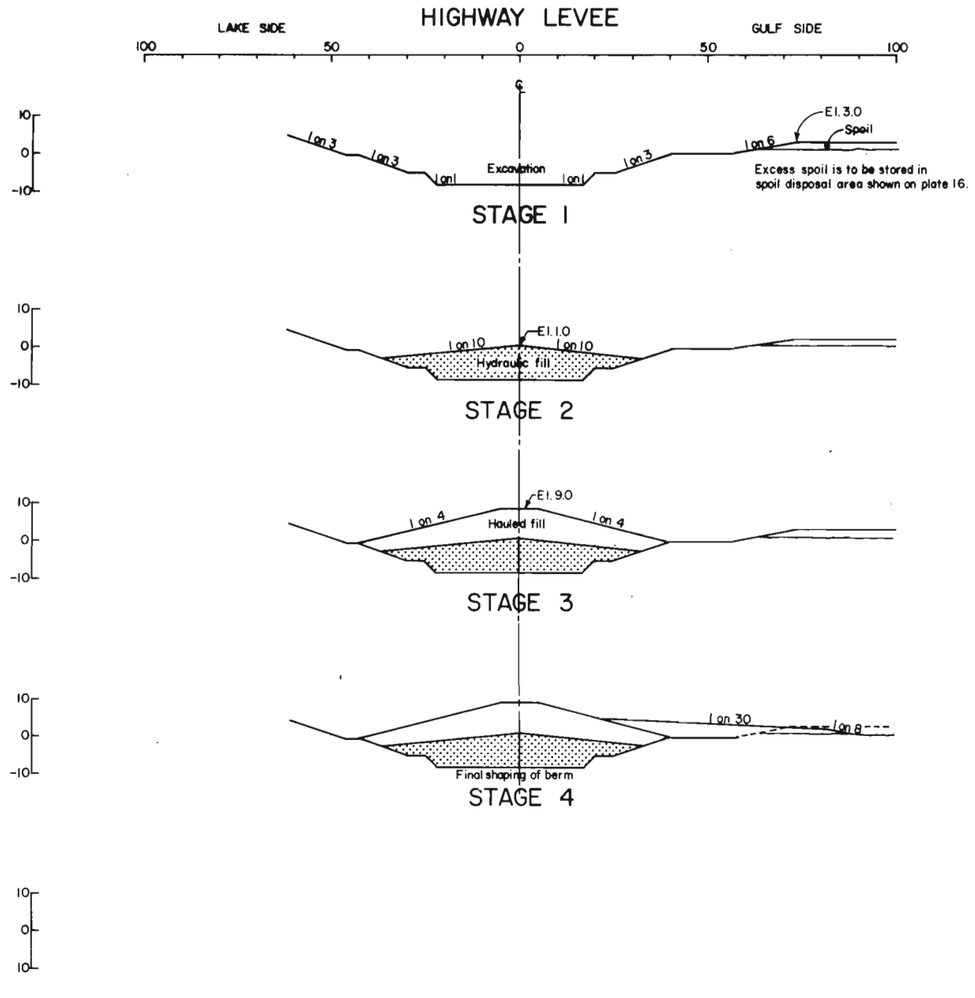
STAGES OF CONSTRUCTION

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

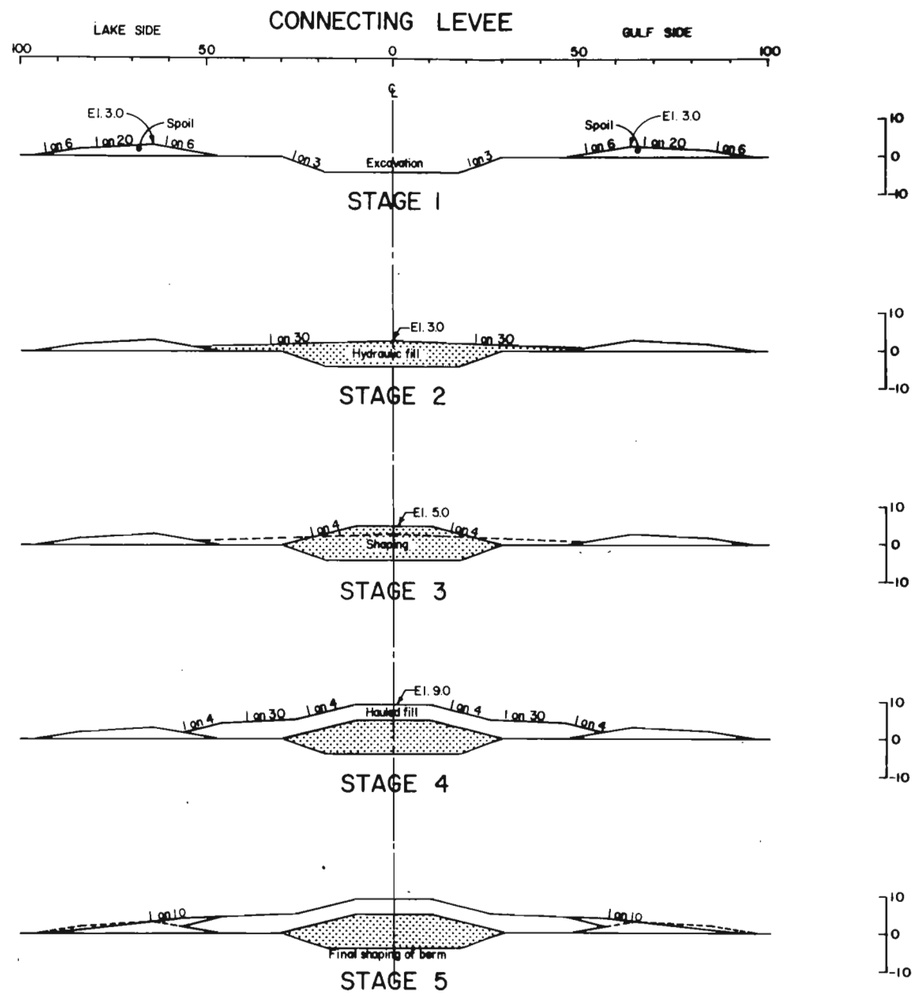
DATE: MARCH 1970 FILE NO. H-2-24414

PLATE A16

HIGHWAY LEVEE



CONNECTING LEVEE



ELEVATIONS IN FEET - M.S.L.

ELEVATIONS IN FEET - M.S.L.

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

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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

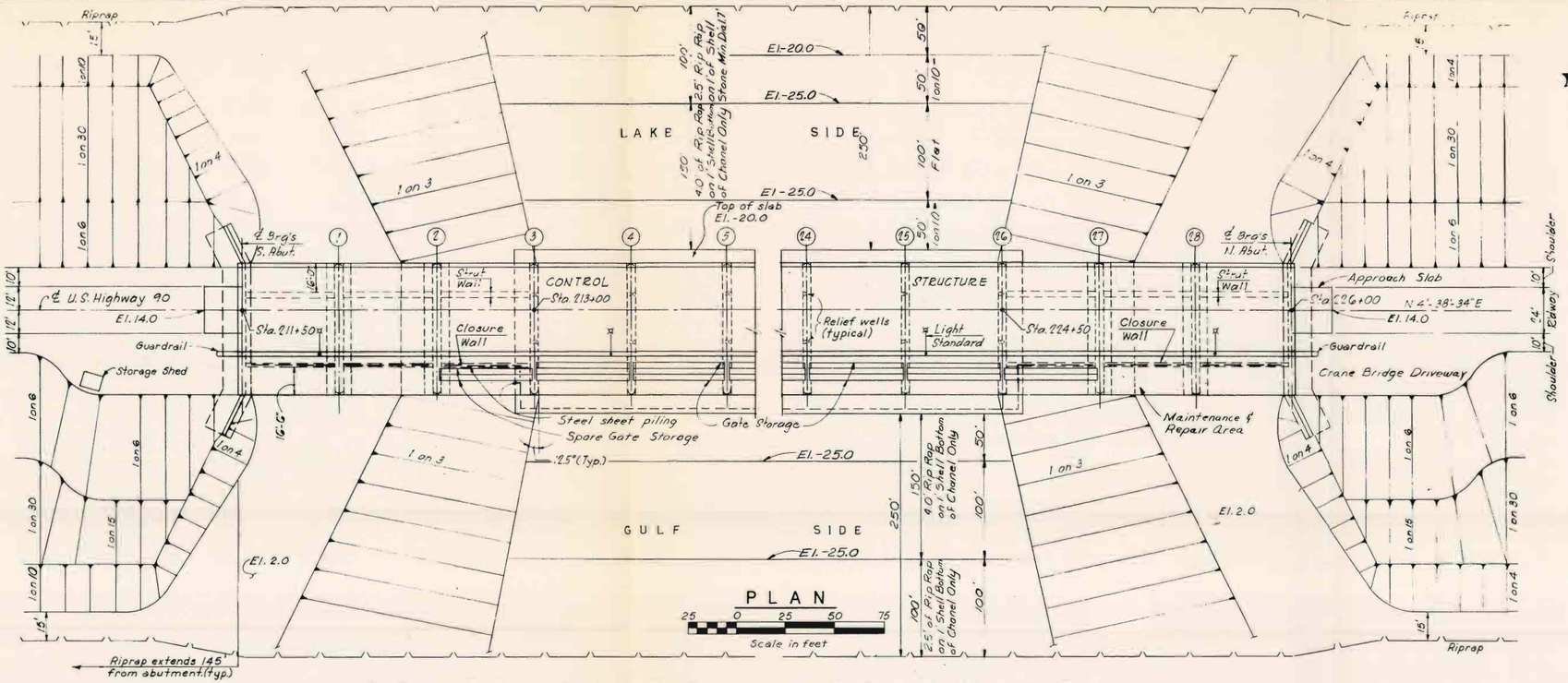
STAGES OF CONSTRUCTION

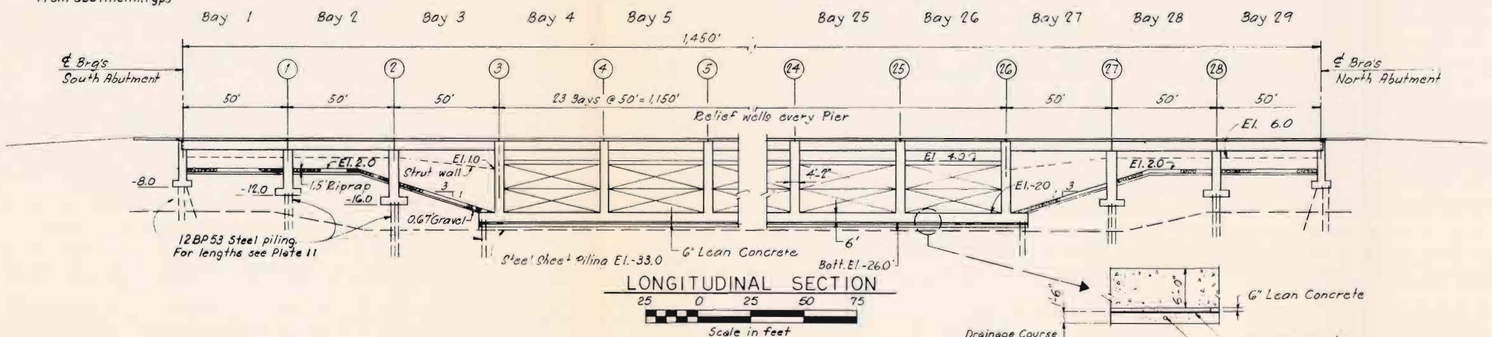
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

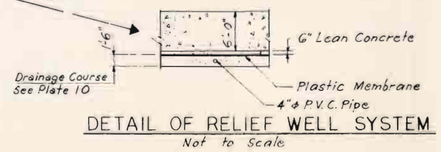
DATE: MARCH 1970

FILE NO. M-2-24414

PLATE A17







DETAIL OF RELIEF WELL SYSTEM
Not to Scale

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

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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

PLAN I - CONTROL STRUCTURE

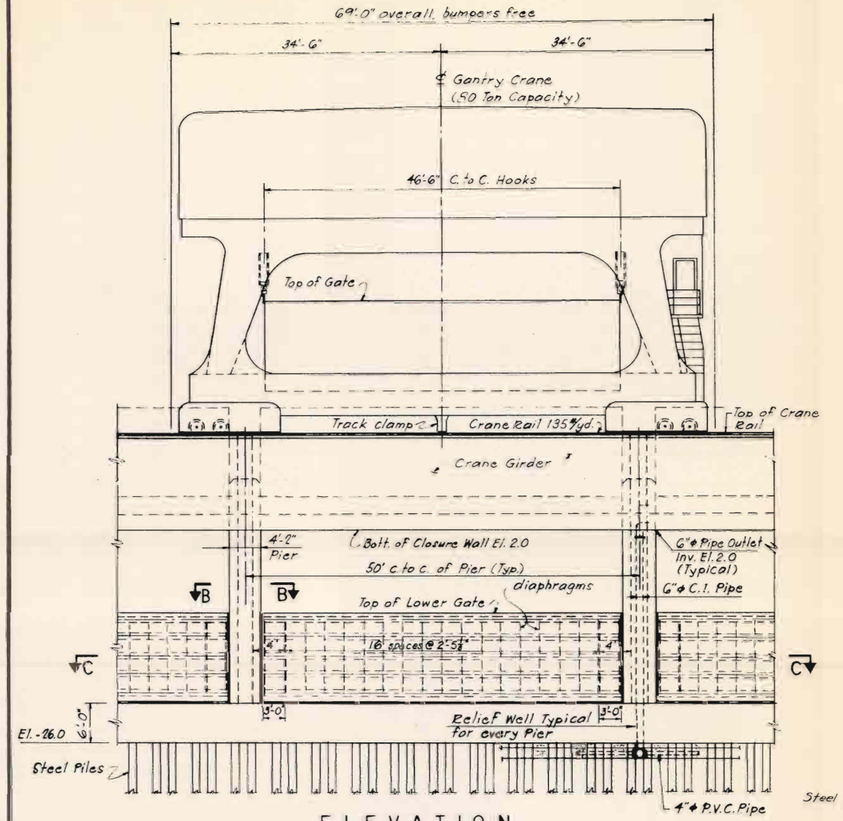
PLAN AND ELEVATION

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

DATE: MARCH 1970

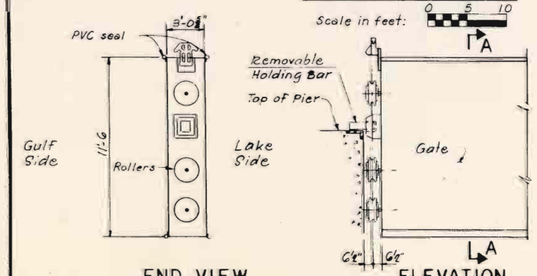
FILE NO. H-2-24414

PLATE A18



ELEVATION

Scale in feet: 0 5 10



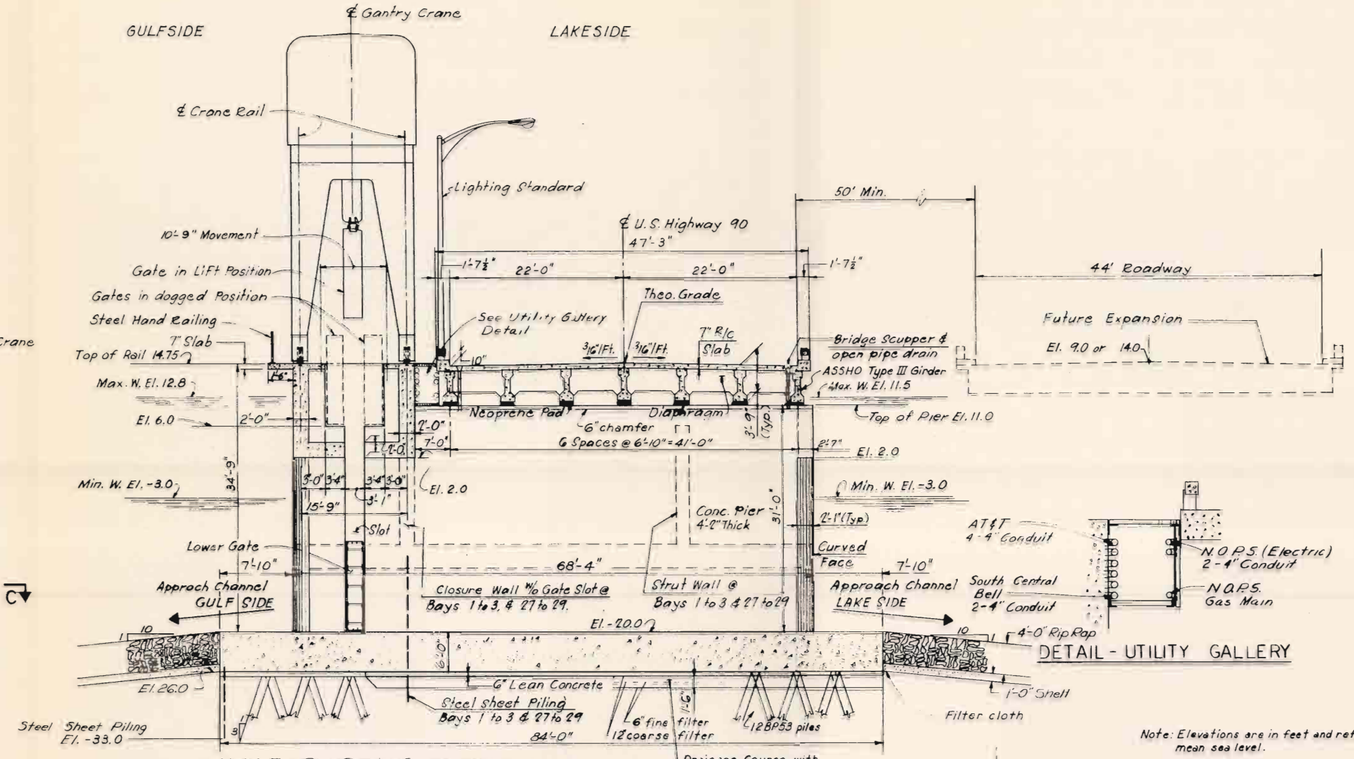
END VIEW

ELEVATION

SECTION A-A

GATE DETAILS

Not to Scale



DETAIL - UTILITY GALLERY

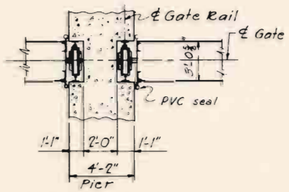
Note: For Pipe Spacing See Pile Plan, Plate No. 11

TYPICAL SECTION

Scale in feet 0 5 10

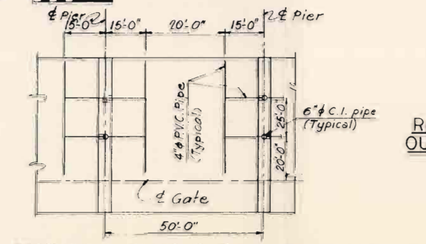
Note: Elevations are in feet and refer to mean sea level.

For pile cap detail see Plate 11.



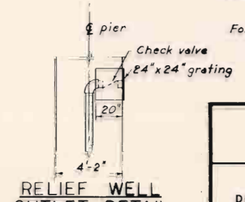
SECTION B-B

Not to Scale



SECTIONAL PLAN C-C (RELIEF WELL LAYOUT)

Not to Scale



RELIEF WELL OUTLET DETAIL

Not to Scale

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

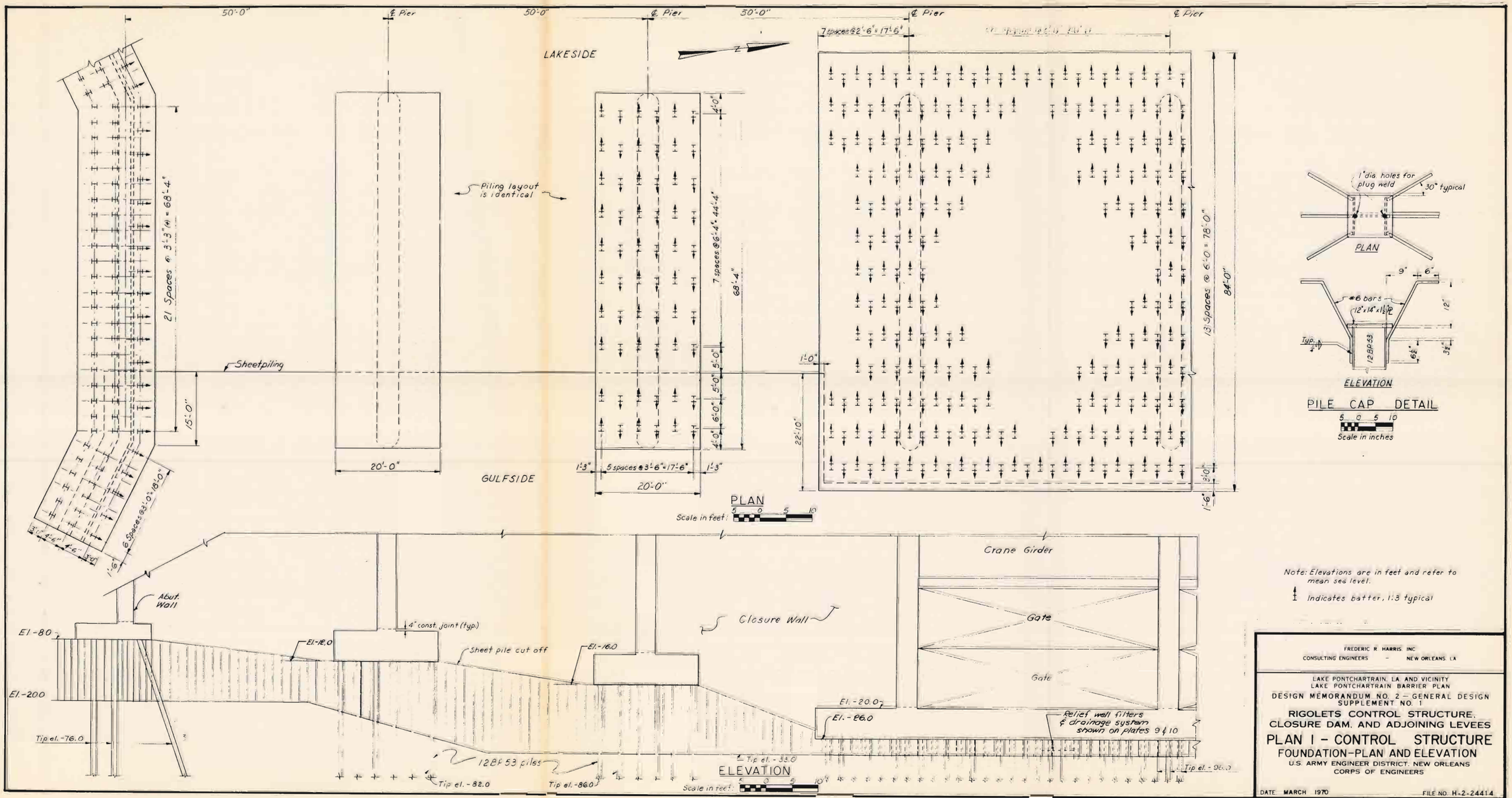
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN I - CONTROL STRUCTURE
TYPICAL SECTION AND ELEVATION

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

DATE: MARCH 1970

FILE NO. M-2-54114

PLATE A19



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

Indicates batter, 1:3 typical

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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

PLAN I – 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 A20

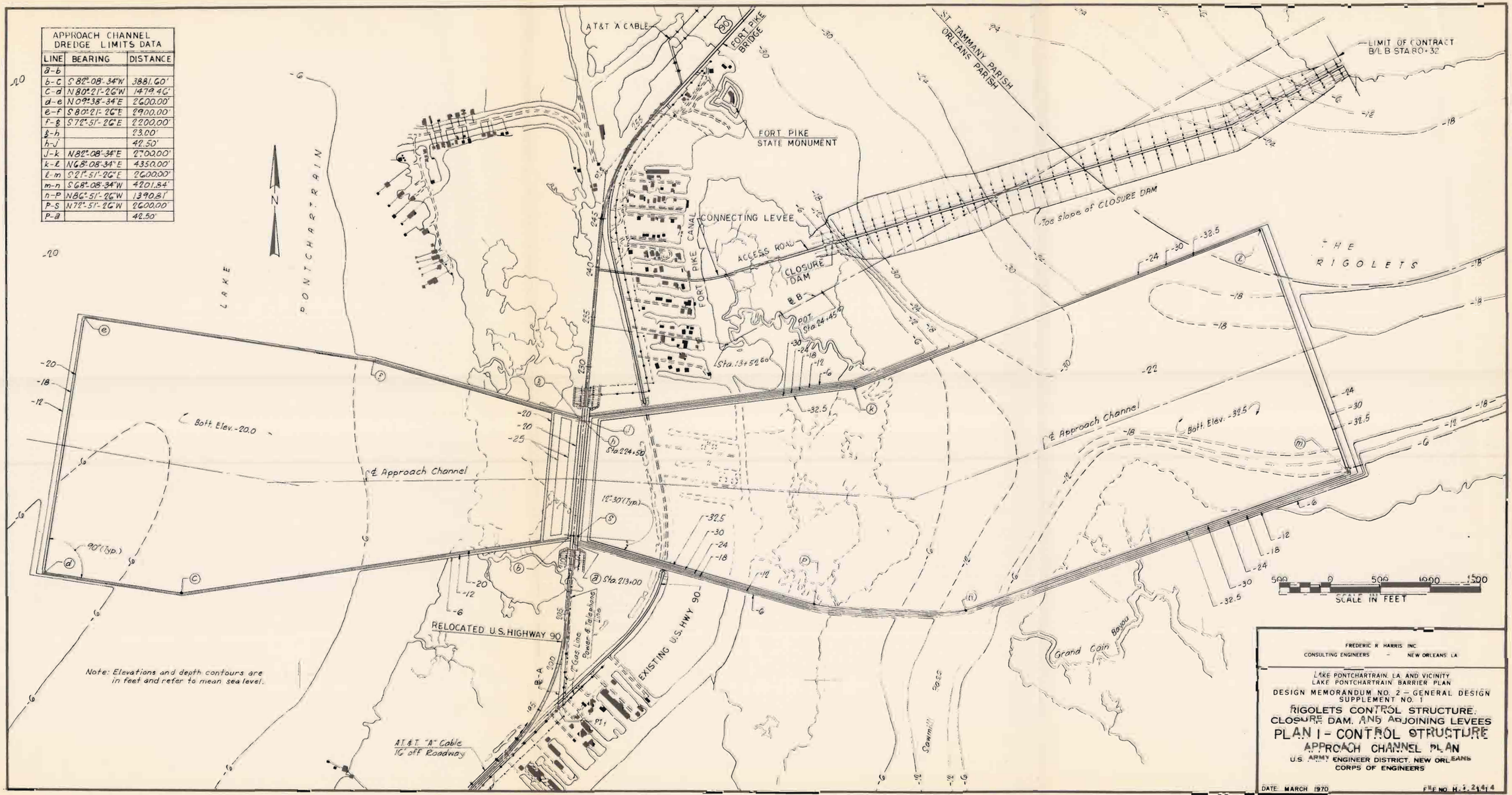
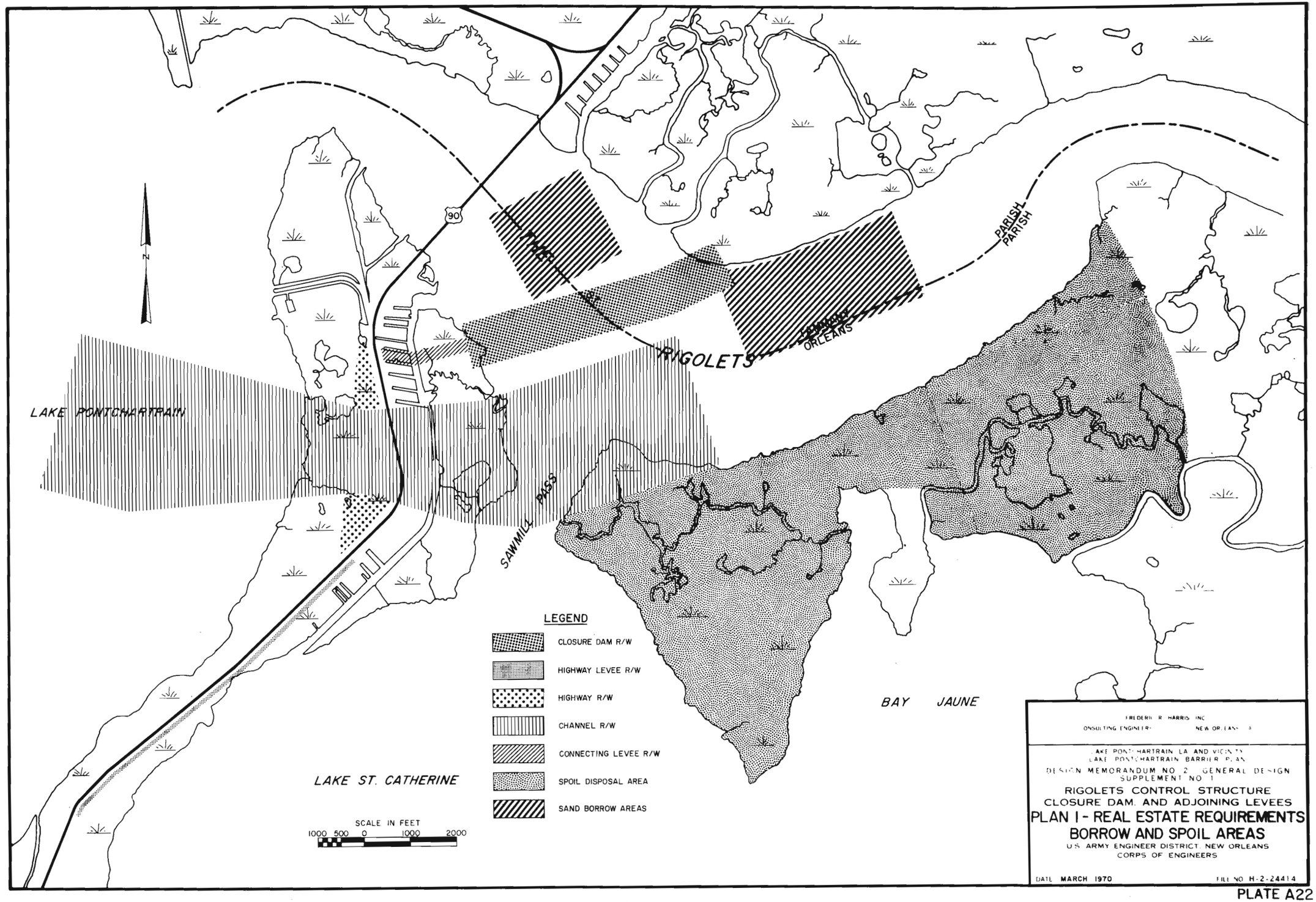

APPROACH CHANNEL DREDGE LIMITS DATA
LINE | BEARING | DISTANCE
a-b | |
b-c | S 82°-08'-34"W | 3881.60'
c-d | N 80°-21'-26"W | 1479.46'
d-e | N 09°-38'-34"E | 2600.00'
e-f | S 80°-21'-26"E | 3900.00'
f-g | S 72°-51'-26"E | 2200.00'
g-h | | 23.00'
h-j | | 42.50'
j-k | N 82°-08'-34"E | 2700.00'
k-l | N 68°-08'-34"E | 4350.00'
l-m | S 21°-51'-26"E | 2600.00'
m-n | S 68°-08'-34"W | 4701.84'
n-P | N 86°-51'-26"W | 1390.81'
P-S | N 72°-51'-26"W | 2600.00'
P-a | | 42.50'
AT&T "A" CABLE
FORT PIKE BRIDGE
ST. TAMMANY PARISH
ORLEANS PARISH
LIMIT OF CONTRACT B/L B STA 80+32
FORT PIKE STATE MONUMENT
FORT PIKE CANAL
CONNECTING LEVEE
ACCESS ROAD
CLOSURE DAM
Toe slope of CLOSURE DAM
POT. Sta. 24+45
Sta. 13+52.60
THE RIGOLETS
LAKE PONTCHARTRAIN
Sta. 224+50
℄ Approach Channel
Bott. Elev. -20.0
Bott. Elev. -32.5
12'-30' (Typ.)
90° (Typ.)
Sta. 213+00
RELOCATED U.S. HIGHWAY 90
EXISTING U.S. HWY 90
Gas Line
Power & Telephone Line
AT&T "A" Cable 16' off Roadway
Grand Coin Bayou
Sawmill
N
SCALE IN FEET
500 0 500 1000 1500
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
PLAN I - CONTROL STRUCTURE
APPROACH CHANNEL PLAN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: MARCH 1970
FILE NO. H-2-21414

PLATE A21



FREDERIC R. HARRIS INC
CONSULTING ENGINEERS NEW ORLEANS

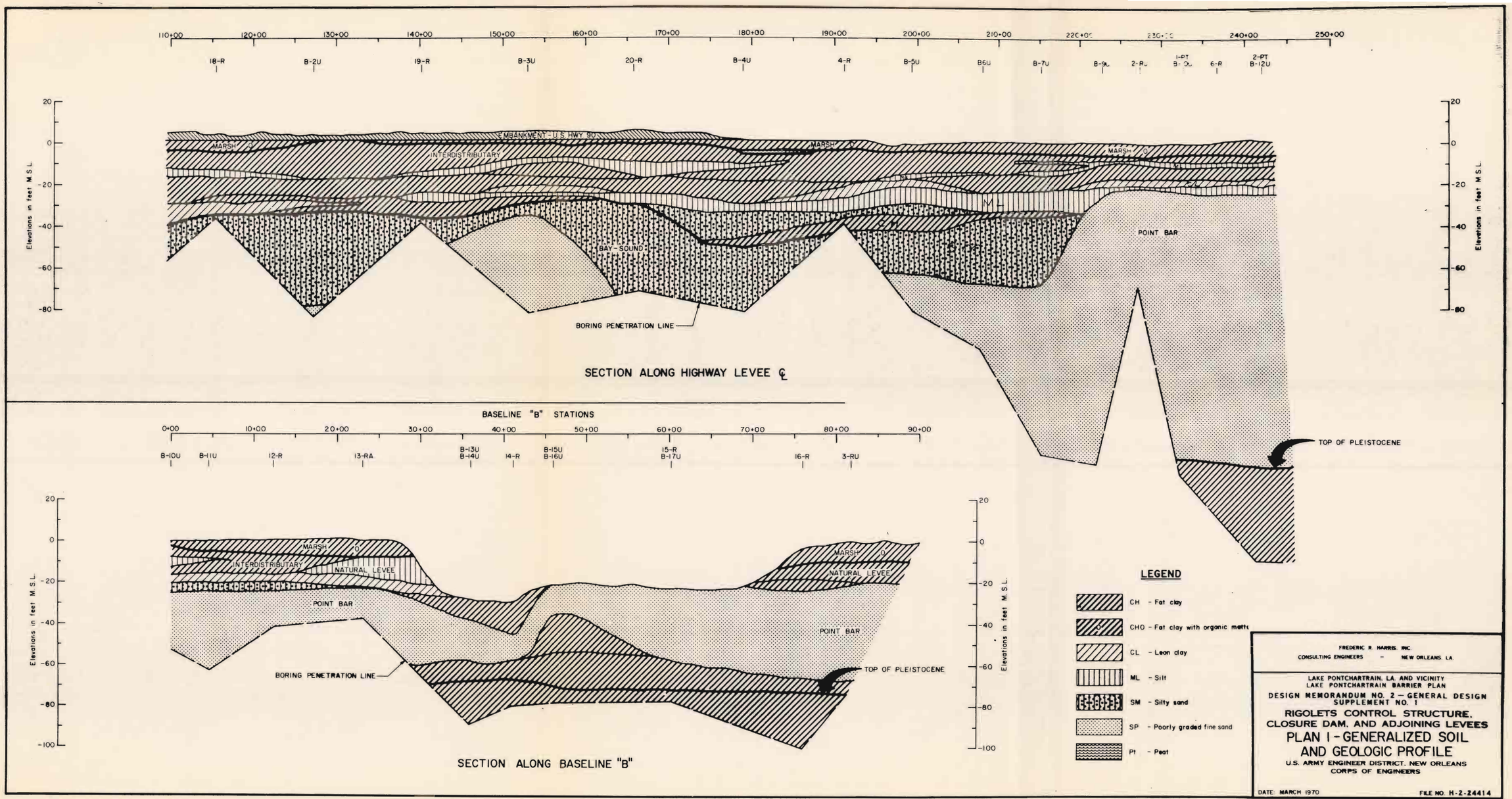
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE CLOSURE DAM AND ADJOINING LEVEES
PLAN I - 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 A22


110+00
120+00
130+00
140+00
150+00
160+00
170+00
180+00
190+00
200+00
210+00
220+00
230+00
240+00
250+00
18-R
B-2U
19-R
B-3U
20-R
B-4U
4-R
B-5U
B6U
B-7U
B-9L
2-RL
1-PT
B-10L
6-R
2-PT
B-12U
Elevations in feet M.S.L.
20
0
-20
-40
-60
-80
EMBANKMENT - U.S. HWY 90
MARSH
INTERDISTRIBUTARY
BAY - SOUND
POINT BAR
BORING PENETRATION LINE
TOP OF PLEISTOCENE
SECTION ALONG HIGHWAY LEVEE ℄
BASELINE "B" STATIONS
0+00
10+00
20+00
30+00
40+00
50+00
60+00
70+00
80+00
90+00
B-10U
B-11U
12-R
13-RA
B-13U
B-14U
14-R
B-15U
B-16U
15-R
B-17U
16-R
3-RU
-100
NATURAL 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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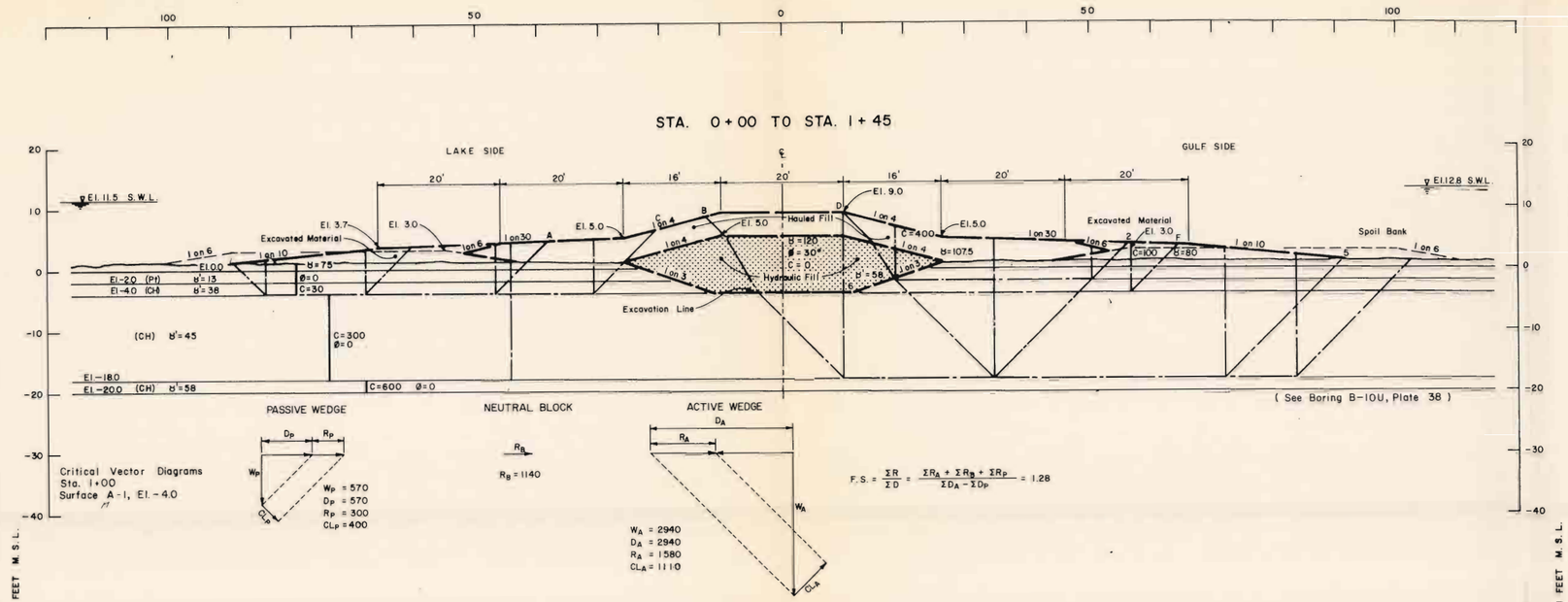
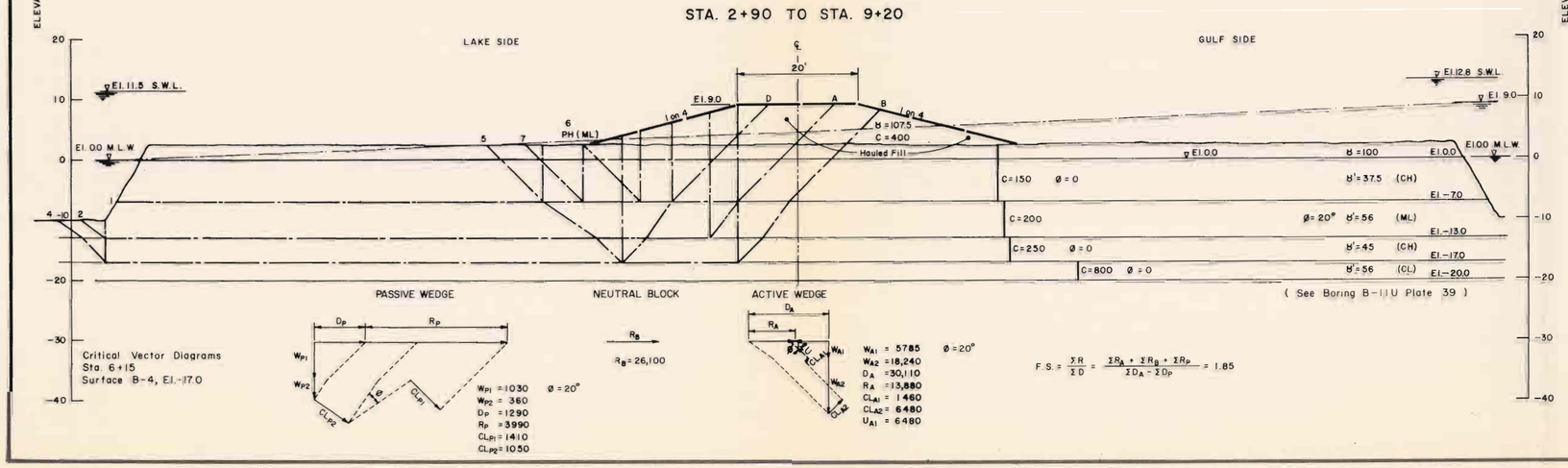
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
SUPPLEMENT NO. 1
RIGOLETS CONTROL STRUCTURE,
CLOSURE DAM, AND ADJOINING LEVEES
PLAN 1 - GENERALIZED SOIL
AND GEOLOGIC PROFILE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: MARCH 1970
FILE NO. H-2-24414

PLATE A23





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 $\Sigma R/\Sigma D$
1+00	A	1	−4	2,940	570	2,370	1,580	1,140	300	3,020	1.28
	B	2	−18	31,460	14,170	17,290	14,460	7,200	9,440	31,100	1.80
		5	−18	31,460	7,750	23,710	14,460	18,600	8,700	41,760	1.76
	C	1	−4	3,650	570	3,080	2,460	1,620	300	4,380	1.42
	D	2	−4	6,750	1,540	5,210	5,940	930	920	7,790	1.49
	E	1	−4	1,800	570	1,230	860	480	300	1,600	1.30
	F	6	−4	1,330	——	1,330	600	1,320	——	1,920	1.44
6+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	4,190	6,140	7,380	780	2,850	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

GENERAL NOTES

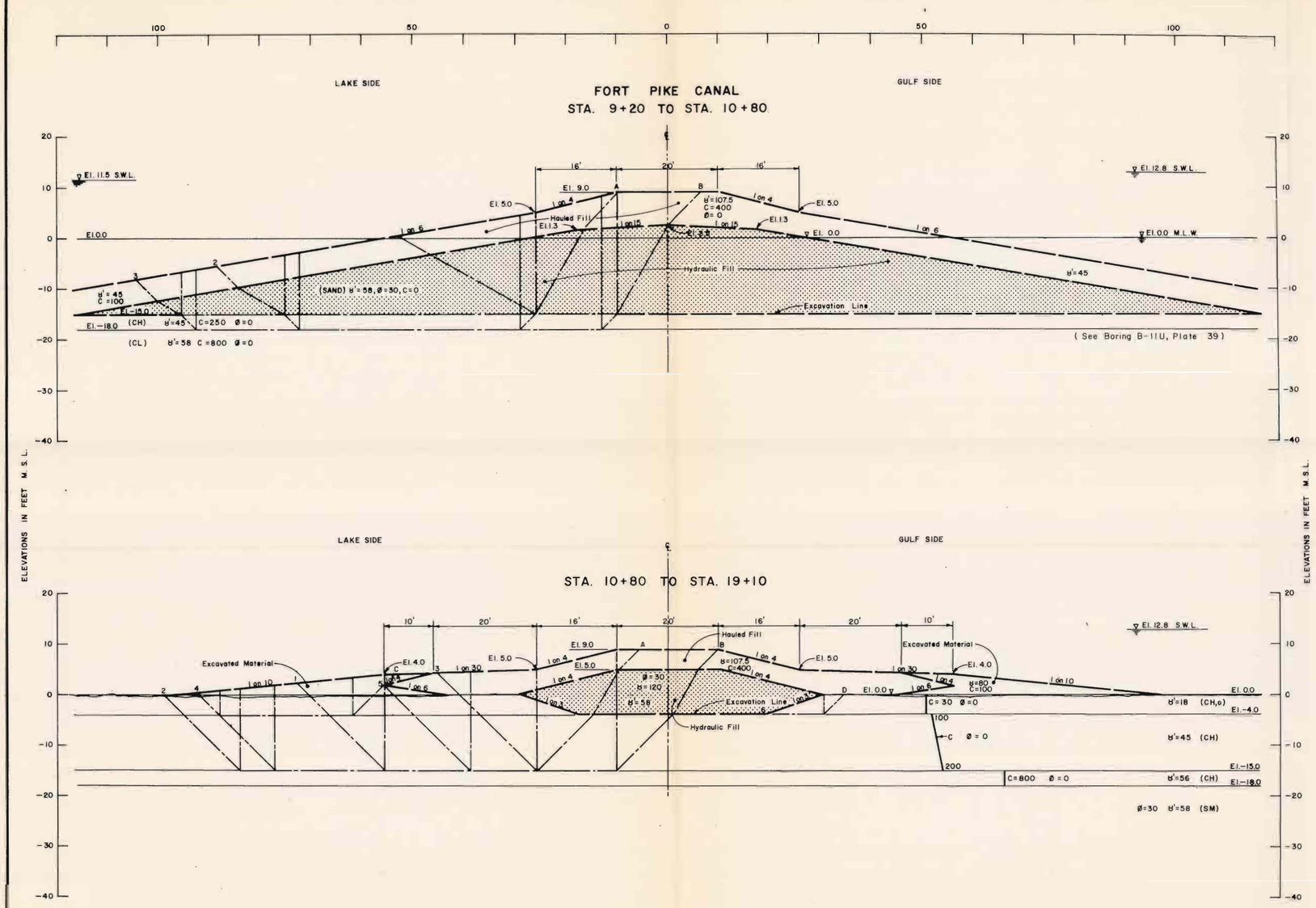
(Q) – Unconsolidated - undrained shear strength in lbs. per sq. ft.
(ϒ) – Unit weight of soil water system in lbs. per cu. ft.
(ϒ') – Submerged unit weight in lbs. per cu. ft.
(Ø) – Angle of internal friction in degrees.
$\bar{D}$ – Horizontal driving force in lbs.
R – Horizontal resisting force in lbs.
F.S. – 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
PLAN 1 - STABILITY ANALYSIS (Q)
CONNECTING LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. N-1-344-4

PLATE A24



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	45560	1.61
17+95	A	1	-15	20660	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	-5	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

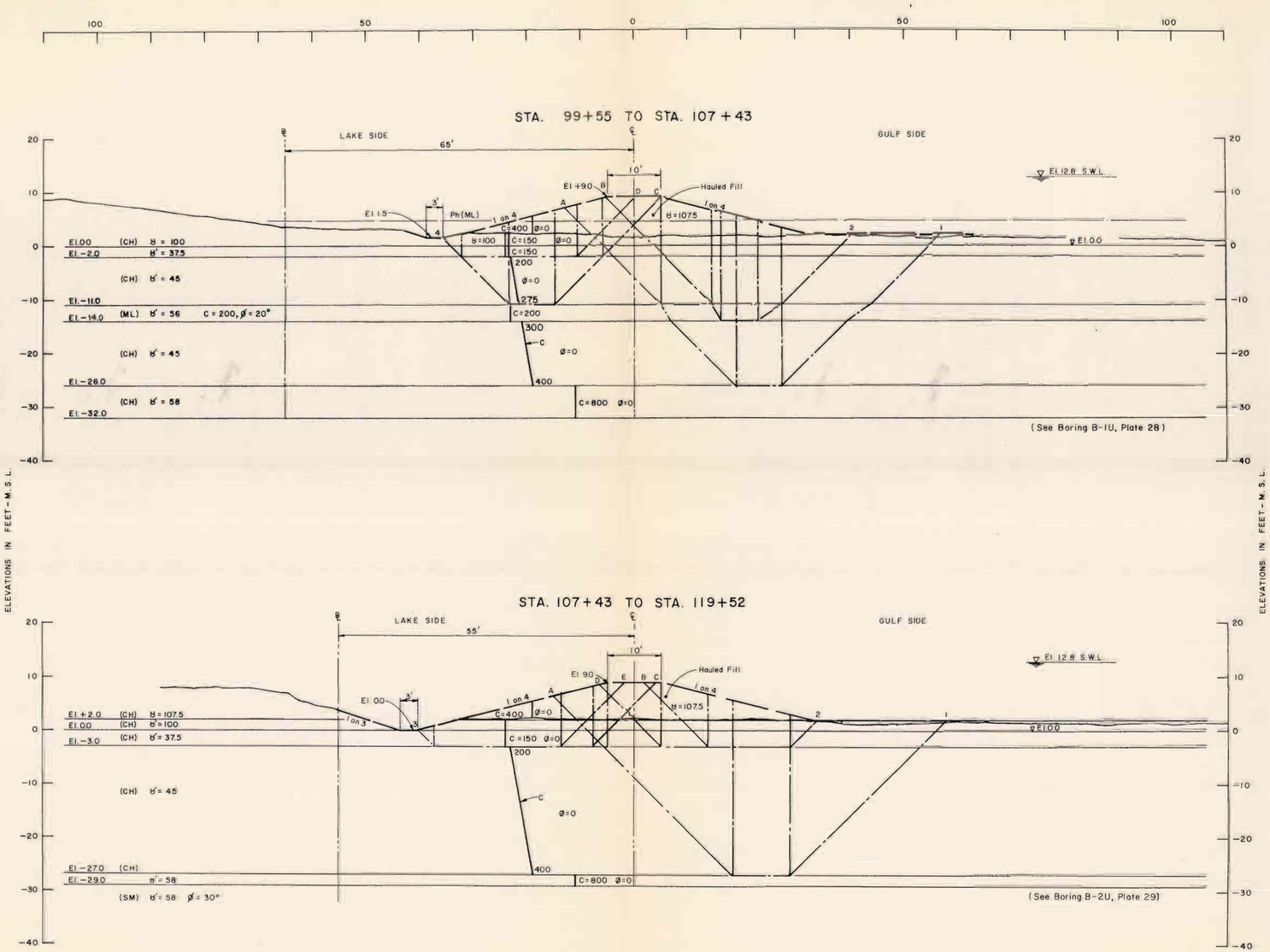
See Plate 24 For General Notes

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
PLAN I - STABILITY ANALYSIS (2)
CONNECTING LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

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

PLATE A25



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	43,740	9,320	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	3,230	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

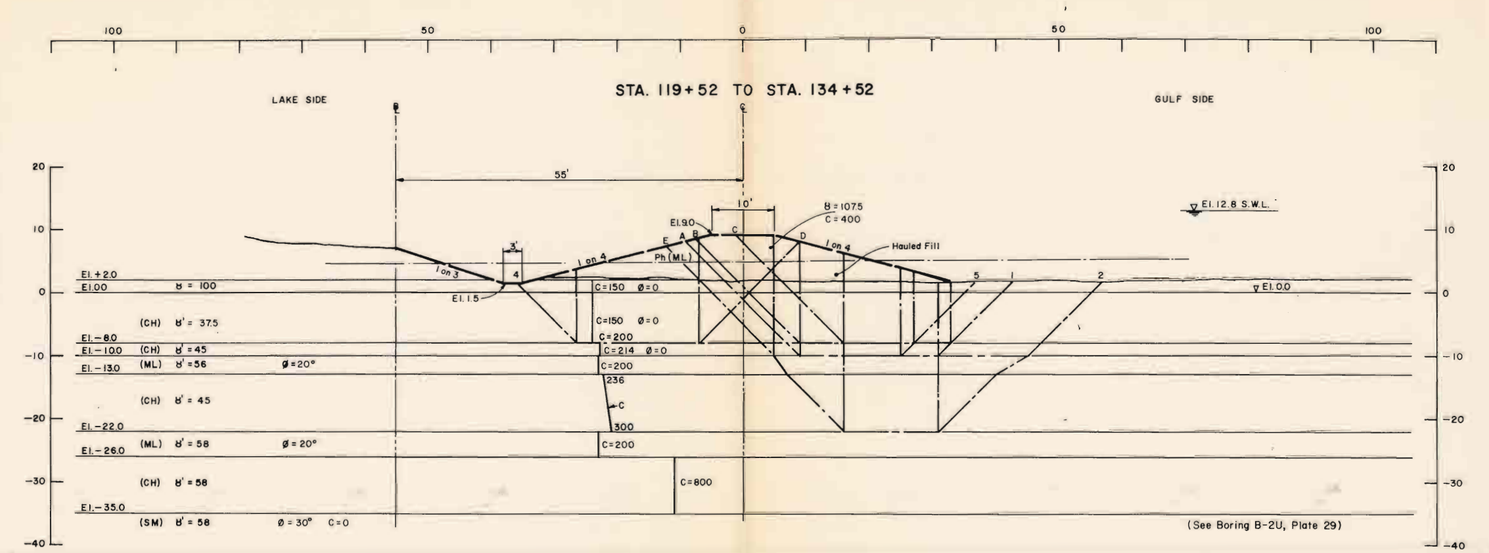
See Plate 24 For General Notes.

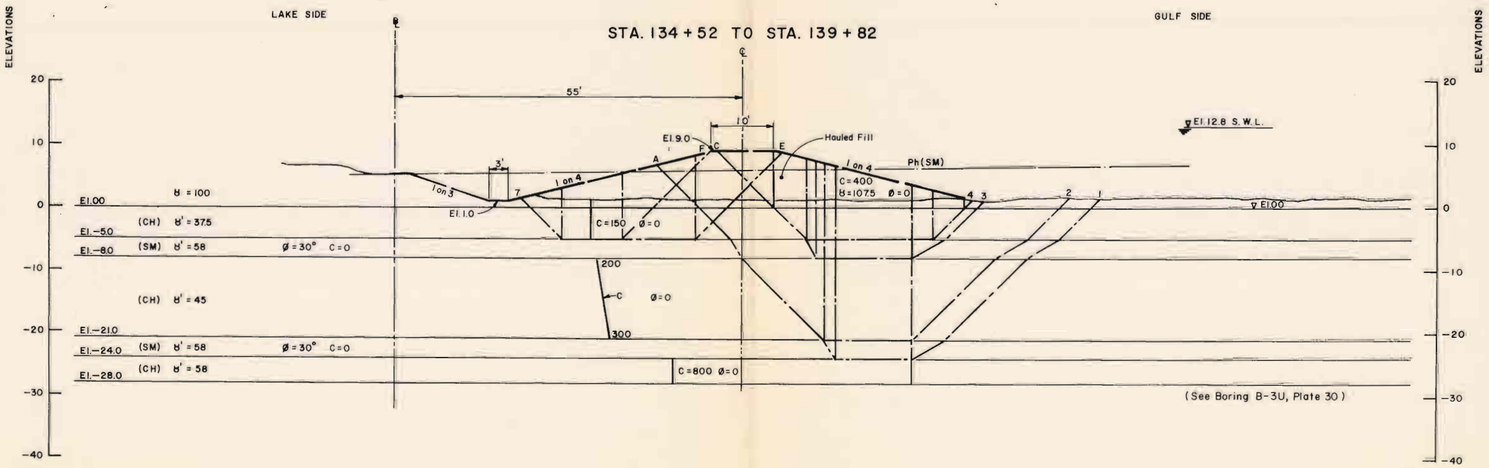
FREDERIC R HARRIS INC
CONSULTING ENGINEERS - NEW ORLEANS LA

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
PLAN I - STABILITY ANALYSIS (Q)
HIGHWAY LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. H-2-24414

PLATE A26





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	1,650	3,000	12,910	1.65
	D	4	−8	12,780	3,560	9,220	7,820	2,920	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

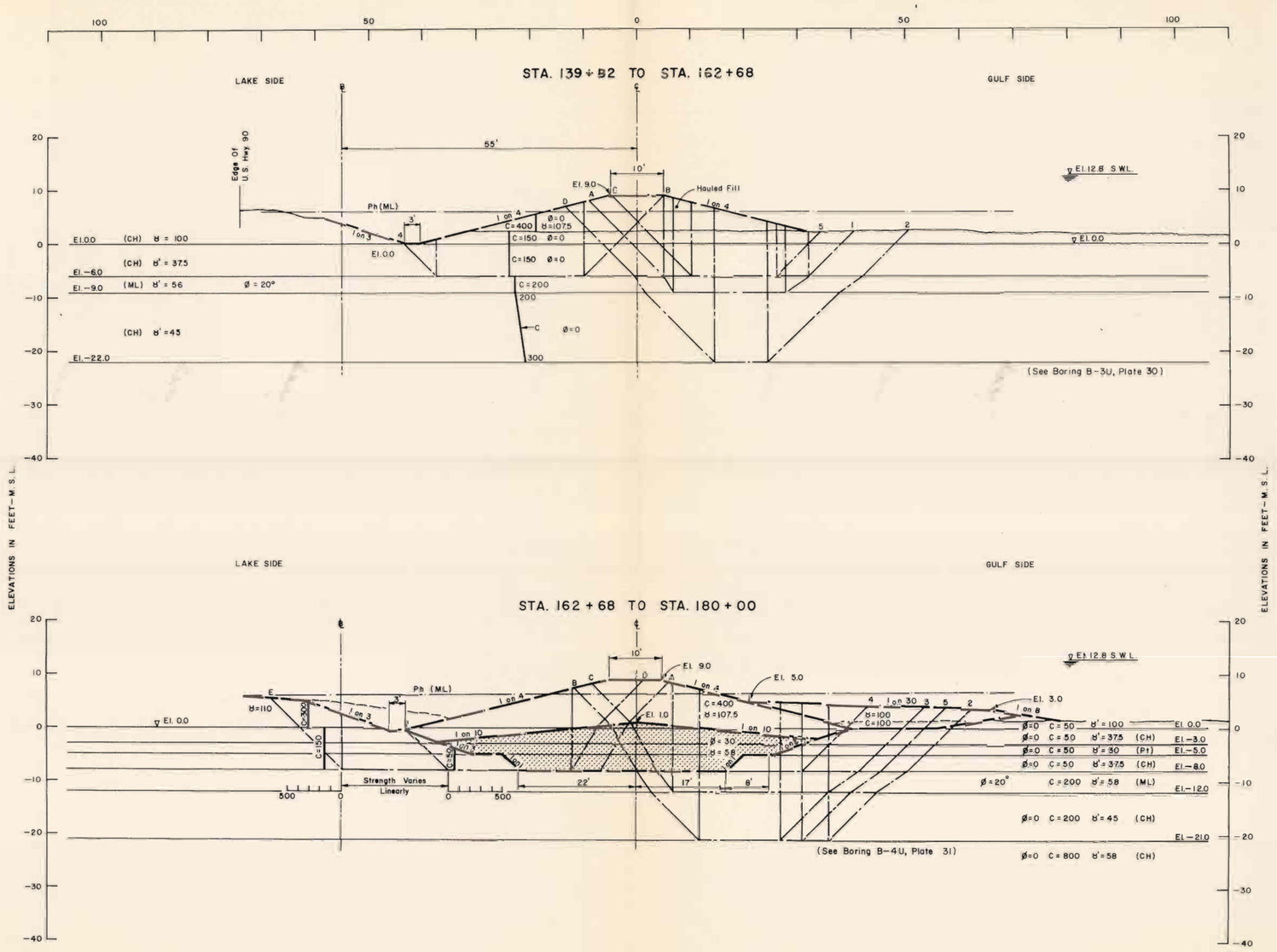
See Plate 24 For General Notes.

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
PLAN I - STABILITY ANALYSIS (Q)
HIGHWAY LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-24614

PLATE A27



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	18,180	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

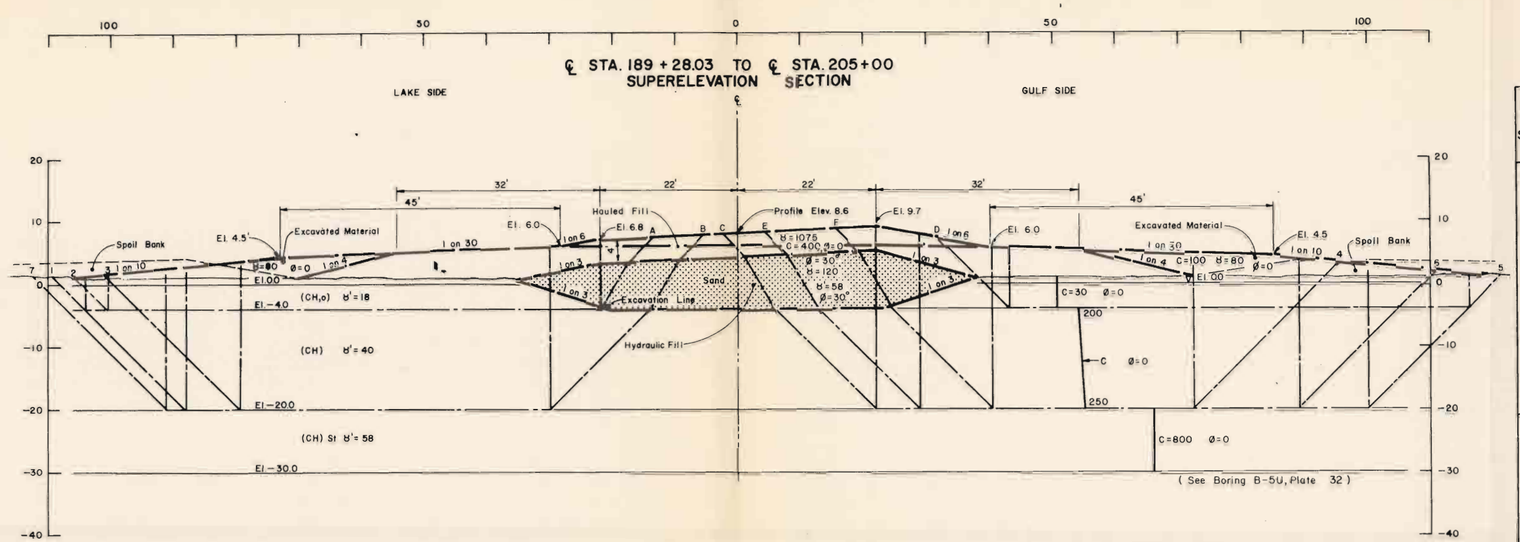
See Plate 24 For General Notes.

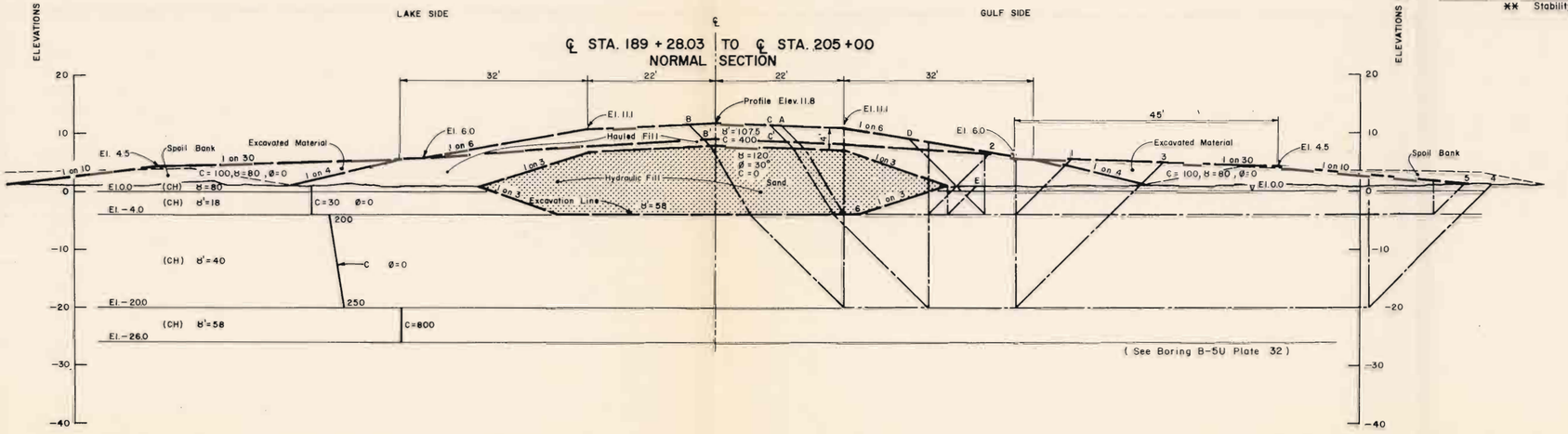
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

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

DATE: MARCH 1970 FILE NO. H-2-2-1-1 4

PLATE A28





STABILITY CALCULATIONS

HWY. 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 $\Sigma R/\Sigma D$
196+00	A	1	−40	6,960	520	6,440	7,260	3,820	300	11,380	1.78
		2	−40	6,960	620	6,340	7,260	3,720	300	11,280	1.78
	B	7	−200	29,900	9,410	19,590	15,440	15,200	7,500	38,140	1.94
	C	5	−200	33,480	9,620	23,860	15,180	19,500	7,500	42,180	1.79
		6	−200	33,480	10,770	22,710	15,180	16,750	7,500	39,430	1.74
	D	5	−40	4,940	620	4,320	5,500	2,190	300	7,990	1.84
	E	5	−200	32,850	9,620	24,230	15,430	17,750	7,500	40,680	1.75
		4**	−200	32,850	12,550	20,300	15,430	10,900	7,900	34,230	1.69
	F	5	−200	30,030	8,620	21,410	15,910	14,900	7,500	38,310	1.83
		6	−200	30,030	10,770	19,260	15,910	12,100	7,500	35,510	1.84
204+00	A	2	−40	12,640	6,250	6,330	9,320	960	2,700	12,980	2.30
	B	3	−200	43,950	17,500	26,450	18,460	7,300	8,300	34,060	1.29
	B'	3**	−200	35,380	13,980	21,400	14,130	7,300	7,500	28,930	1.35
	B	4	−200	43,950	8,660	35,290	18,460	22,400	7,250	48,110	1.36
	C	3	−200	39,750	17,500	22,250	17,320	3,750	8,300	29,370	1.32
	C'	3**	−200	31,000	13,980	17,020	13,260	3,750	7,500	24,510	1.44
	C	4	−200	39,750	8,660	31,090	17,320	18,400	7,250	42,970	1.38
	D	5	−40	6,570	600	5,970	6,800	2,300	300	9,400	1.57
	E	6	−40	500	——	500	300	450	——	750	1.50

** Stability Analysis Before Placement Of Berms

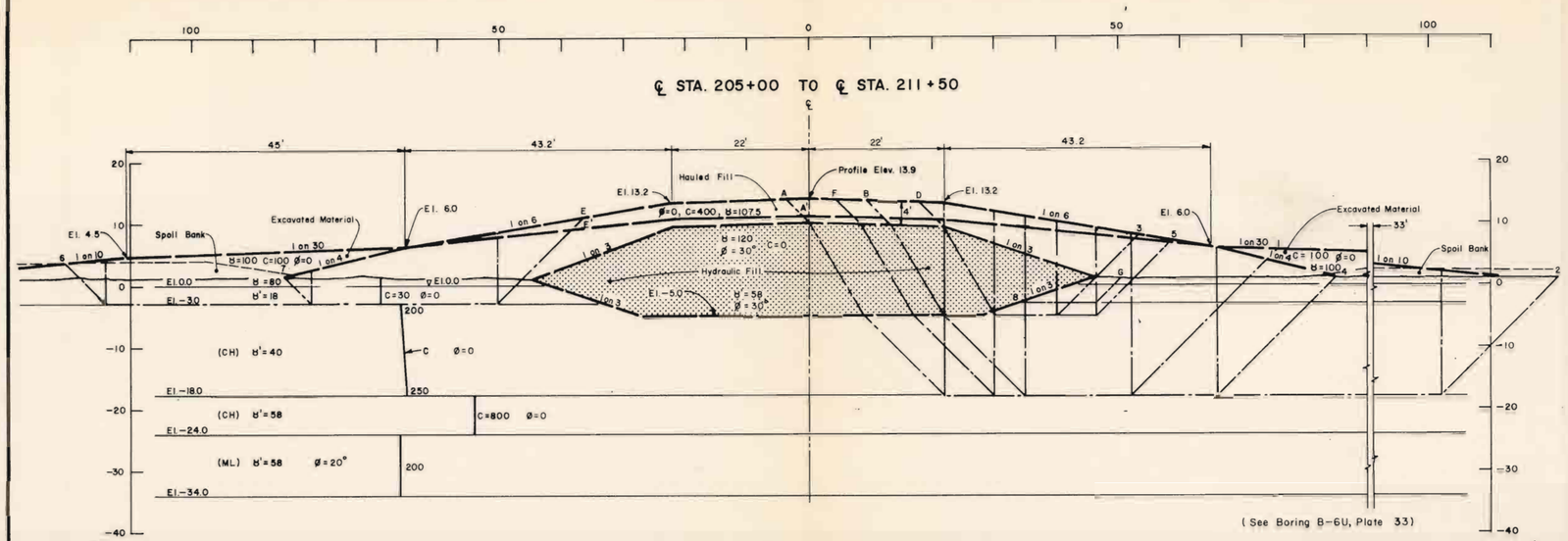
See Plate 24 For General Notes.
Stations Are Relative To B/L "A"
Station 181+48.58 Highway Levee ℄ =
Station 193+61.42 B/L "A"

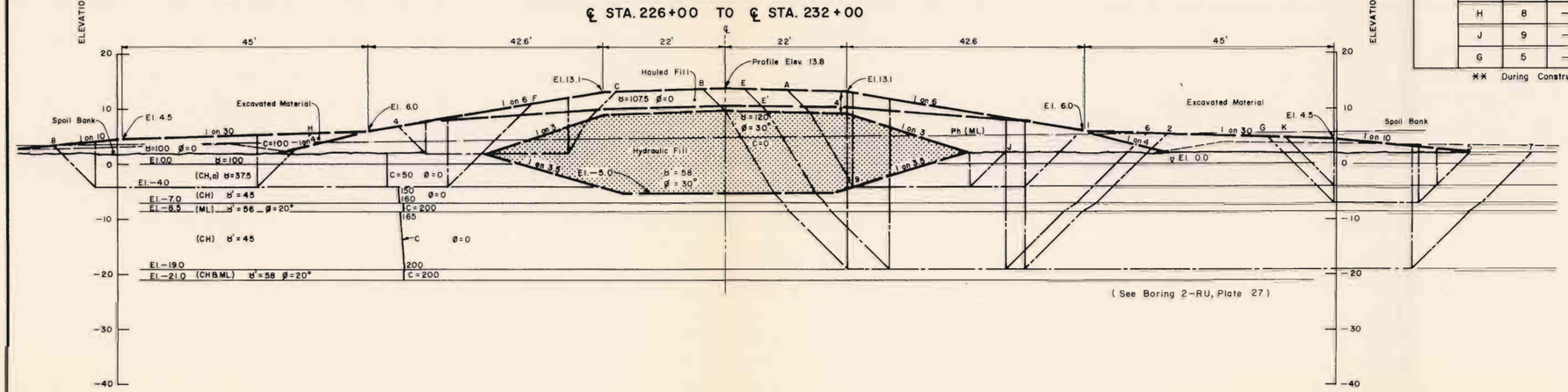
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

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
PLAN I – STABILITY ANALYSIS (Q)
HIGHWAY EMBANKMENT
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. 1-2-24414

PLATE A29





STABILITY CALCULATIONS

HWY. 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 $\Sigma R/\Sigma D$
210+00	A	1	−18	47,930	19,300	26,430	21,050	7,500	9,750	38,300	1.34
	A'	1**	−18	32,690	18,400	14,290	15,460	7,500	9,350	32,310	2.26
	A	2	−18	47,930	7,270	40,660	21,050	27,500	6,990	55,540	1.36
	A'	4**	−18	32,690	12,240	20,450	15,460	11,000	6,990	33,450	1.64
	B	1	−18	44,020	19,300	24,720	21,050	4,250	9,750	35,050	1.42
		2	−18	44,020	7,270	36,750	21,050	24,800	6,990	52,840	1.44
	D	3	−5	16,540	8,720	7,820	13,660	3,320	3,860	20,840	2.66
	E	6	−3	7,930	1,990	5,940	7,840	1,920	760	10,520	1.77
	E'	7	−3	6,580	570	6,010	7,840	900	300	9,040	1.50
	F	2	−18	44,510	7,270	37,240	19,720	25,670	6,990	52,380	1.40
	G	8	−3	360	——	360	180	360	0	540	1.50
228+00	A	1	−4	20,020	5,660	14,360	14,500	1,550	3,500	19,550	1.36
	B	2	−19	50,210	21,680	28,530	22,410	6,400	9,170	37,980	1.33
	E	2	−19	49,800	21,680	28,120	22,600	4,800	9,170	36,570	1.30
		6	−19	49,800	23,180	26,620	22,600	4,200	9,570	36,370	1.36
		7	−19	49,800	12,760	37,040	22,600	18,800	7,270	48,670	1.31
	E'	2**	−19	40,300	19,080	21,220	15,540	4,800	8,650	28,990	1.37
	F	8	−4	9,620	2,780	6,840	7,050	3,200	900	11,150	1.63
	G	5	−7	5,240	3,130	2,610	2,230	1,440	1,530	5,200	1.99
	H	8	−4	3,950	2,780	2,870	1,260	1,500	900	4,000	1.39
	J	9	−4	1,300	——	1,300	600	1,050	——	1,650	1.27
	G	5	−4	3,490	1,480	2,010	1,180	900	900	2,980	1.48

** During Construction Bern Not In Place

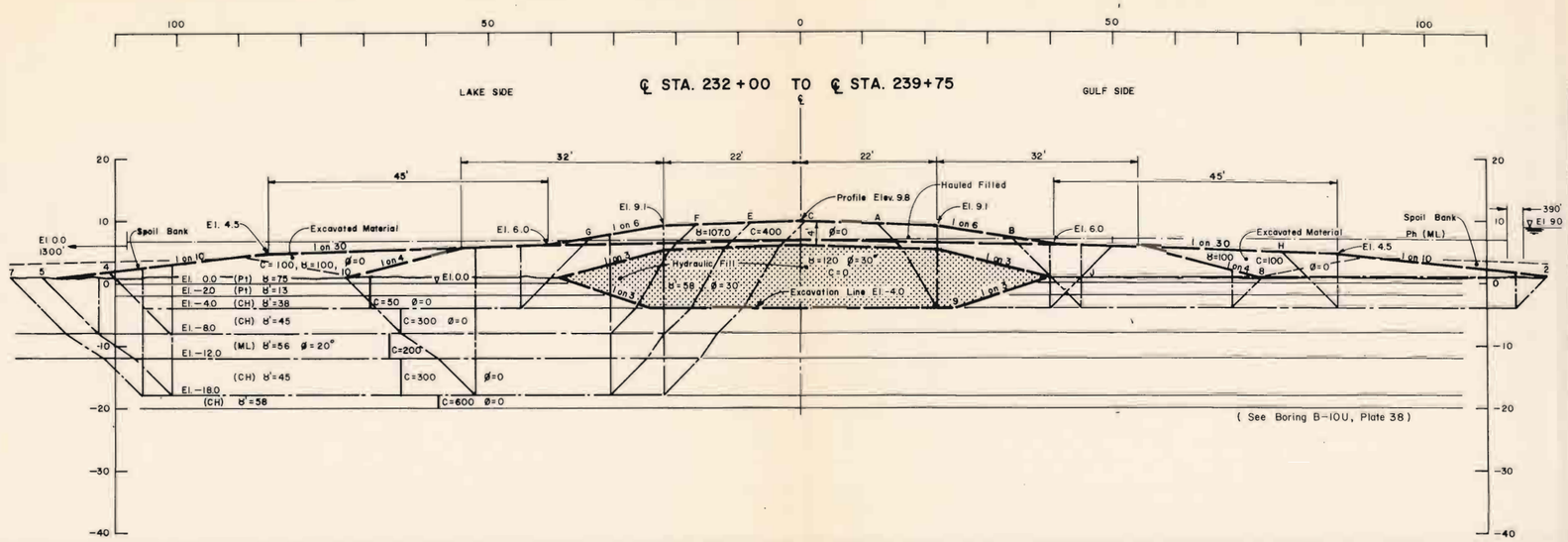
See Plate 24 For General Notes.
Stations Are Relative To B/L "A"

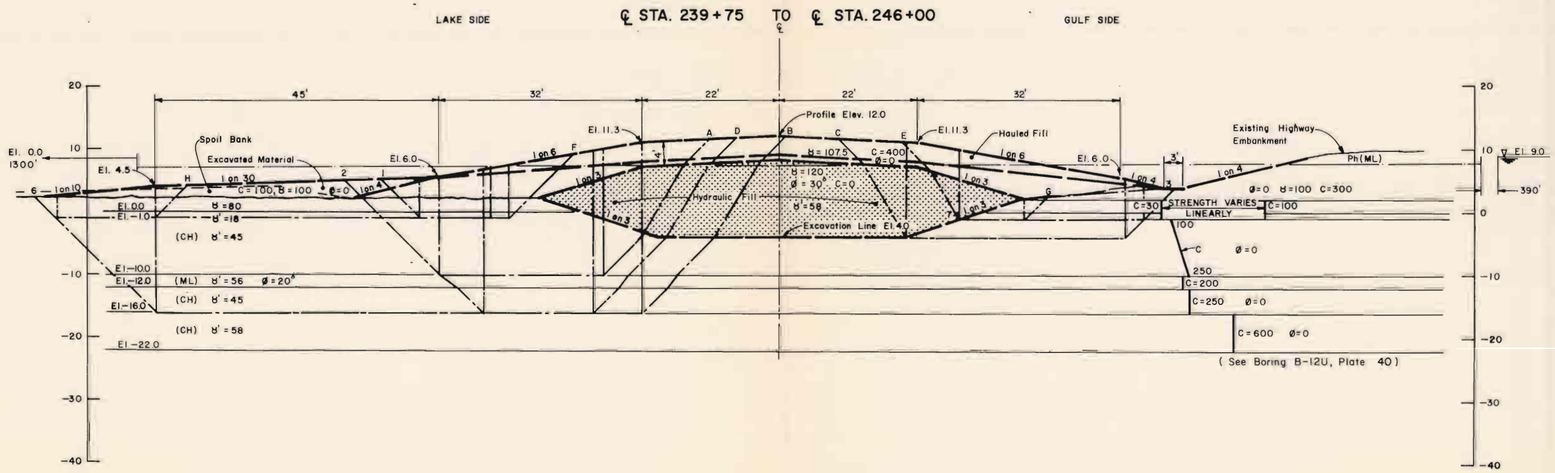
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA

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
PLAN 1 - STABILITY ANALYSIS (Q)
HIGHWAY EMBANKMENT
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-2-26414

PLATE A30





STABILITY CALCULATIONS

HWY. 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 $\Sigma R/\Sigma D$
237+00	A	1	−40	10,450	4,680	5,770	8,130	4,150	4,260	16,540	2.87
		2	−40	10,450	660	9,790	8,130	7,550	500	16,180	1.65
	B	8	−40	4,900	840	4,060	3,920	1,200	500	5,620	1.35
	C	5	−180	33,450	9,820	23,630	18,320	23,700	11,070	53,090	2.48
		10	−180	33,450	12,070	21,380	18,320	9,000	11,970	39,290	1.83
		5 *	−180	35,830	12,370	23,460	17,430	23,700	9,550	50,680	2.16
	E	5	−180	31,930	9,820	22,110	18,130	21,000	11,070	50,250	2.27
		7	−180	31,930	9,040	22,890	18,130	25,200	10,820	54,150	2.36
		7 *	−180	34,480	11,610	22,870	17,250	25,200	9,250	51,700	2.26
	F	5	−180	15,480	1,970	13,510	11,120	24,600	3,000	38,720	2.86
	G	4	−40	4,900	910	3,990	3,920	3,000	600	7,520	1.88
	H	2	−40	2,950	620	2,330	1,240	1,450	500	3,190	1.37
	J	9	−40	500	——	500	500	750	——	1,250	2.50
243+00	A	2	−100	21,310	8,670	12,640	11,010	6,500	3,870	21,380	1.69
	B	2	−160	37,630	15,670	21,960	18,010	6,250	9,070	33,330	1.52
		6	−160	37,630	12,170	25,460	18,010	19,200	8,060	45,270	1.77
	C	3	−40	11,890	2,500	9,390	9,080	5,100	2,130	16,310	1.74
	D	2	−160	34,450	15,670	18,780	16,830	4,380	9,070	30,280	1.61
		2 *	−160	33,900	17,020	16,880	16,380	4,380	8,070	28,830	1.71
		6	−160	34,450	12,170	22,280	16,830	17,380	8,060	42,270	1.89
		6	−160	33,900	13,520	20,380	16,380	17,380	7,230	40,990	2.01
	E	3	−1.0	7,780	1,080	6,700	6,630	870	1,280	8,780	1.31
	F	1	−1.0	4,360	1,780	2,580	4,700	420	1,520	6,640	2.57
	G	7	−1.0	370	——	370	200	270	——	470	1.27
	H	6	−1.0	1,090	220	870	580	480	186	1,240	1.42

* Includes Uplift In ML Strata And Sand Backfill

See Plate 24 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

PLAN I - STABILITY ANALYSIS (Q)

HIGHWAY EMBANKMENT

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

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

PLATE A31

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

APPENDIX B

PLAN 2
ALTERNATE PLAN OF IMPROVEMENT

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

APPENDIX B

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LIST OF PLATES

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LIST OF PLATES

PERTINENT DATA
PLAN 2

CONTROL STRUCTURE

Roadway Bridge

Reinforced concrete bridge with prestressed concrete stringers	
Total length between abutments	1,450 feet
Roadway width	12 feet
Top elevation	14.0*

Crane Bridge

Reinforced concrete framework with 23 gate openings, 50 feet on centers	
50 - Vertical lift gates, two per slot plus 4 spares	
Two - 80 ton gantry cranes on 15'-9" travel way	
Top elevation	14.75

Foundation

Reinforced concrete slab footing supported by prestressed concrete piles	
Sill elevation	-20.0
Bottom elevation	-26.0

APPROACH CHANNEL

Width at structure	1,150 feet
Maximum bottom width - Gulf side	1,747 feet
Maximum bottom width - Lake side	1,300 feet
Bottom elevation - Gulf side	-30.0
Bottom elevation - Lake side	-30.0
Side slopes	1 on 3

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

CLOSURE DAM

Earth fill with steel sheet pile cutoff and 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	$ 242,000
Levees and floodwalls	6,423,000
Floodway control and diversion structures	17,523,000
Engineering and design	2,298,000
Supervision and administration	1,572,000
Lands	223,000
Relocations	59,000
Total	$28,340,000

RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
PLAN 2

PROJECT PLAN

1. General. The project plan described herein as Plan 2 consists of a control structure in the Rigolets with approach channels, closure dam and new levee embankments.

2. Plan 2.

a. Control structure. The gated control structure, as shown on plate B9, is 1,450 feet long and 50 feet wide with the sill at elevation -20.0. The controlling elevation of the structure is 14.0.

b. Approach channel. The approach channel to the control structure, as shown on plate B12, will have a 1,150 foot bottom width at elevation -20.0 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 bottom will slope downward from the structure along a 1 on 10 slope to elevation -30.0 and continue at this elevation for some 3100 feet, thence slope upward on a 1 on 10 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 -30.0 and continue at this elevation for some 2,300 feet, thence slope upward on a 1 on 10 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 B6, will be a hydraulic-filled structure with riprap slope protection. The closure dam consists of a west embankment 525 feet long and an east embankment 3800 feet long. The crest elevation will be 14.0.

d. Levees. The levee network, as shown on plates B2 through B5, is the same system as the recommended plan and described in paragraph 13d.

DEPARTURES FROM PROJECT DOCUMENT

3. General. The plan presented herein as Plan 2 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 Pass. 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.

SOILS AND FOUNDATIONS INVESTIGATION AND DESIGN

4. General. The soil and foundation investigation and design for the levees and flood protection structures in Plan 2 is the same as in the recommended project plan except for the variation in the size of the Rigolets Control Structure as presented in the following paragraphs.

5. 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 50 tons in compression and 28 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.

6. Control structure. A steel sheet pile cellular cofferdam with clear inside dimensions of 2000 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 B14. 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 -26.0 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.

DESCRIPTION OF PROPOSED STRUCTURES AND IMPROVEMENTS

7. Plan 2. The structures and improvements proposed in Plan 2 are the same as in the recommended plan except for the variation in the length and sill elevation of the control structure and minor changes to the approach channel as presented in the following paragraphs.

8. Control structure. The reinforced concrete structure, as shown on plate B9, consists of 23 bays, each 50 feet in width, with a sill elevation at -20.0 and a top

elevation of 14.75. The overall length of the structure is 1,450 feet. Each bay will have two 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 6 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 of plate B10.

9. Approach channel. The control structure approach channel, as shown on plate B12, will vary in width from 1,150 feet at the structure sill to a maximum width at the extremities of 1,747 feet on the gulf side and 1,300 feet on the lake side. The channel will have a minimum elevation of -30.0 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 plates B9 and B10.

REAL ESTATE REQUIREMENTS

10. Plan 2 - Requirements.

a. The total acreage required for the construction and operation of the project is 285 acres. This acreage, as shown on plate B14, 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

11. Plan 2.

a. South Central Bell Telephone Company. The underground cable located in the shoulder of U. S. 90 will not require relocating. However, the local overhead service will require relocating. 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. Plan 2 will require locating overhead service. The estimated cost for this relocation is $16,000.

COST ESTIMATES

12. Plan 2. Based on January 1970 price levels, the estimated first cost of the Rigolets complex of the Lake Pontchartrain, La. and Vicinity project is $28,340,000. This estimate consists of $223,000 for Lands, $59,000 for Relocations, $17,523,000 for the Control structure, $6,423,000 for Levees and floodwalls, $242,000 for Channels and canals, $2,298,000 for Engineering and design, and $1,572,000 for Supervision and administration. Detailed estimates of the first cost are shown in table B1.

OPERATION AND MAINTENANCE

13. 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 $40,200, and the approach channel $18,000. 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 $79,400.

TABLE B1
RIGOLETS COMPLEX
LAKE PONTCHARTRAIN BARRIER PLAN
ESTIMATE OF FIRST COST - PLAN 2
(January 1970 Price Level)

Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 2 - RIGOLETS COMPLEX					
09	Channels and canals				
	Approach channel	1,010,000	c.y.	0.20	$ 202,000
					$ 202,000
	Contingencies 20%				40,000
	Total - Channels and canals				$ 242,000
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 B1 (Cont'd.)

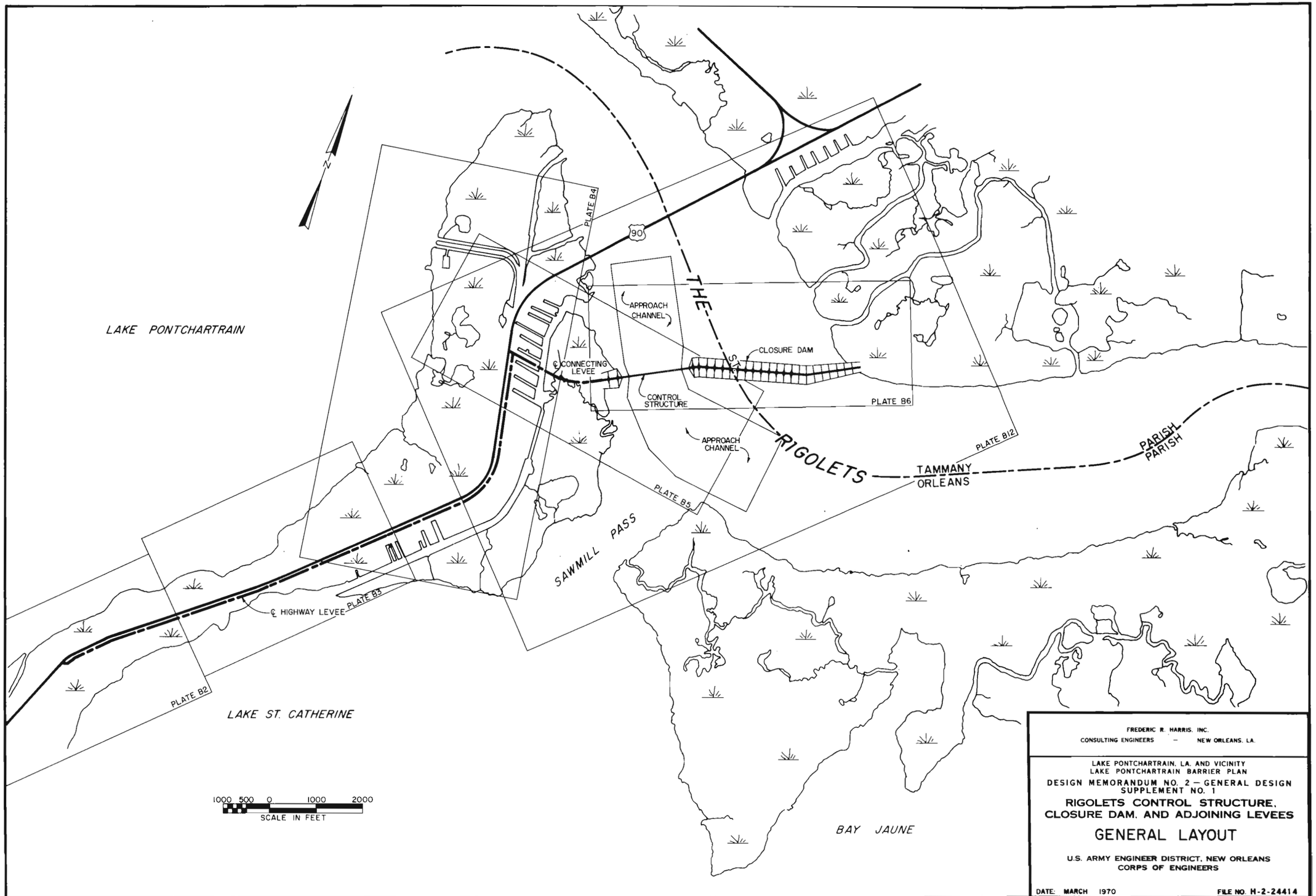
Item	Description	Estimated quantity	Unit	Unit price	Estimated amount
PLAN 2 - RIGOLETS COMPLEX (Cont'd.)					
11	Levees and floodwalls (Cont'd.)				
	Closure dam				
	Derrick stone	204,000	tons	10.00	$2,040,000
	Riprap	70,200	tons	10.00	702,000
	Plastic filter cloth	1,820,000	s.f.	0.10	182,000
	Clam shell (over filter cloth)	40,700	c.y.	8.00	325,600
	Clam shell	11,800	c.y.	10.00	118,000
	Bituminous mix	8,700	s.y.	0.76	6,610
	Excavation	216,000	c.y.	0.18	38,880
	Hydraulic fill	1,800,000	c.y.	0.36	648,000
	Select fill	8,900	c.y.	2.50	22,250
	Redrive sheet piling	353,000	l.f.	1.00	353,000
					$5,352,095
	Contingencies 20%				1,070,905
	Total - Levees and floodwalls				$6,423,000
15	Floodway control and diversion structures				
	Control structure				
	Construction dewatering			L.S.	200,000
	Excavation	107,000	c.y.	0.80	85,600
	Backfill	132,400	c.y.	1.00	132,400
	Filter gravel	2,200	c.y.	10.00	22,000
	Filter sand	1,100	c.y.	10.00	11,000
	Filter cloth	165,000	s.f.	0.10	16,500
	Riprap	143,500	tons	12.50	1,793,750
	Clam shell	33,200	c.y.	10.00	332,000
	Steel sheet piling	14,500	s.f.	4.40	63,800
	Concrete				
	Bridge & crane bridge	3,600	c.y.	140.00	504,000
	Piers & curtain walls	6,300	c.y.	60.00	378,000
	Floor slab	18,600	c.y.	40.00	744,000
	Bents & abutments	2,850	c.y.	60.00	171,000
	Stab. slab	1,550	c.y.	40.00	62,000
	Ballast	260	c.y.	30.00	7,800

TABLE B1 (Cont'd.)

Item	Description	Estimated amount	Unit	Unit price	Estimated amount
PLAN 2 - RIGOLETS COMPLEX (Cont'd.)					
15	Floodway control and diversion structures (Cont'd.)				
	Control structure (Cont'd.)				
	Cement	42,800	bbls.	5.00	$ 214,000
	Reinforcing steel	4,700,000	lbs.	0.16	752,000
	Structural steel	4,870,000	lbs.	0.45	2,191,500
	Prestressed conc. piles (14" oct)	302,500	l.f.	6.00	1,815,000
	ASSHO II girder	4,350	l.f.	16.50	71,775
	Pipe rail	1,450	l.f.	9.40	13,630
	Gantry cranes (2)			L.S.	550,000
	Lighting			L.S.	10,000
	Conc. handrail	2,900	l.f.	12.00	34,800
	Crane rail	134,000	lbs.	0.40	53,600
	PVC water seal	11,500	l.f.	2.00	23,000
	Protective coating	77,500	s.f.	0.05	3,875
	Plastic membrane	84,000	s.f.	0.08	6,720
	Cathodic protection	1		L.S.	25,000
	Storage shed	1		L.S.	1,500
	Cofferdam				
	Steel sheet piling	819,000	l.f.	5.00	4,095,000
	Cell fill	424,700	c.y.	1.50	637,050
	Salvage sheet piling	466,000	l.f.	-0.90	-419,400
					$14,602,900
	Contingencies 20%				2,920,100
	Total - Floodway control & diversion structures				$17,523,000
	Total - Construction				$24,188,000
30	Engineering and design 9.5%				2,298,000
31	Supervision and administration 6.5%				1,572,000
	Total				$28,058,000

TABLE B1 (Cont'd.)

Item	Description	Estimated amount	Unit	Unit price	Estimated amount
PLAN 2 - 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%				36,500
	Total - Lands				$ 223,000
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				$28,340,000



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

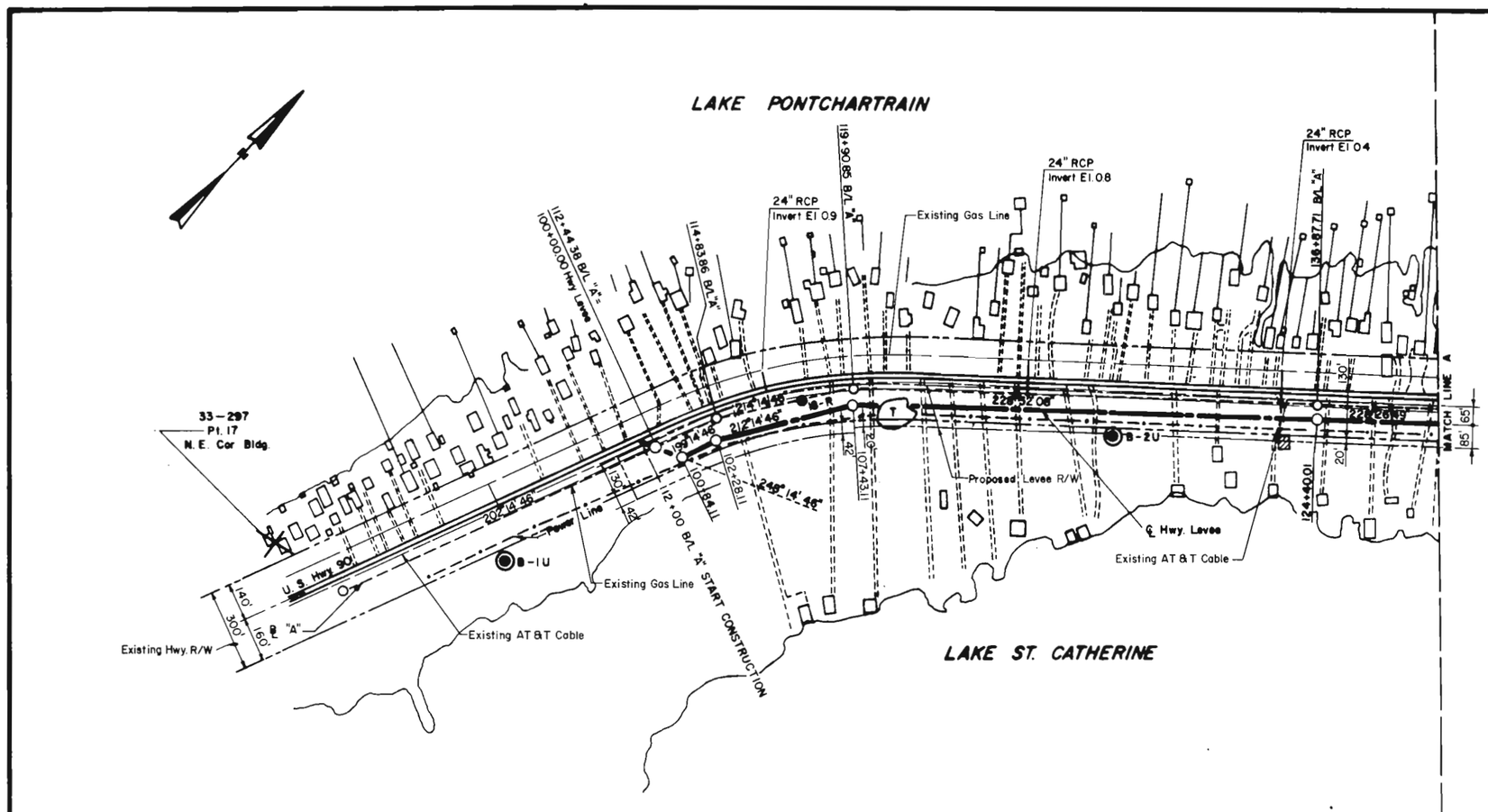
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

GENERAL LAYOUT

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

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

PLATE B1



GENERAL NOTES

See plate A for soil boring legend

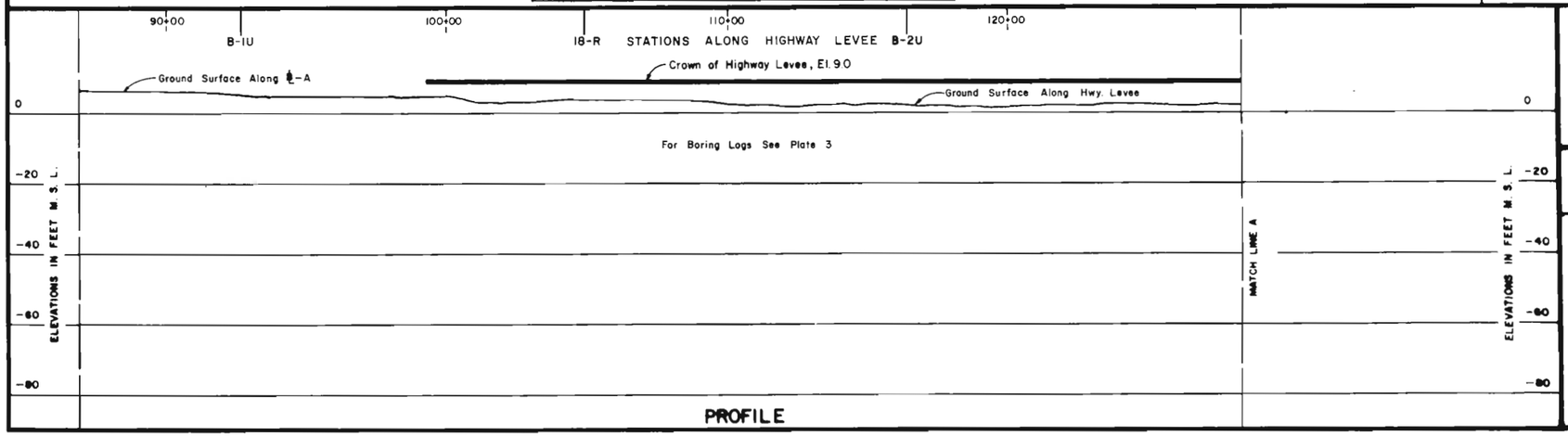
● Indicates general type boring location

◉ 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



PROFILE

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

PLAN 2 - 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 B2

LAKE PONTCHARTRAIN

MATCH LINE A

24" RCP Invert El. 0.0

33 - 29B Pt. 13 S. E. Cor. Bldg.

24" RCP Invert El. 0.0

24" RCP Invert El. 0.0

Existing A T & T Cable

24" RCP Invert El. 0.0

Existing Gas Line

Existing Hwy. R/W

U. S. Hwy. 90

85'

140'

90'

60'

20'

B-3U

Existing Hwy. R/W

Existing Gas Line

℄ Highway Levee

Proposed Levee R/W

4U

4R-3

MATCH LINE B

LAKE ST. CATHERINE

PLAN

SCALE IN FEET

800 0 800 1000

130+00 140+00 150+00 160+00 170+00

19-R B-3U STATIONS ALONG HIGHWAY LEVEE 20-R B4-U

Crown of Highway Levee, El. 9.0

Ground Surface Along Hwy. Levee

For Boring Logs See Plate 4

ELEVATIONS IN FEET M. S. L. MATCH LINE A

ELEVATIONS IN FEET M. S. L. MATCH LINE B

0 -20 -40 -60 -80

PROFILE

See plate B2 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

PLAN 2 - HIGHWAY LEVEE

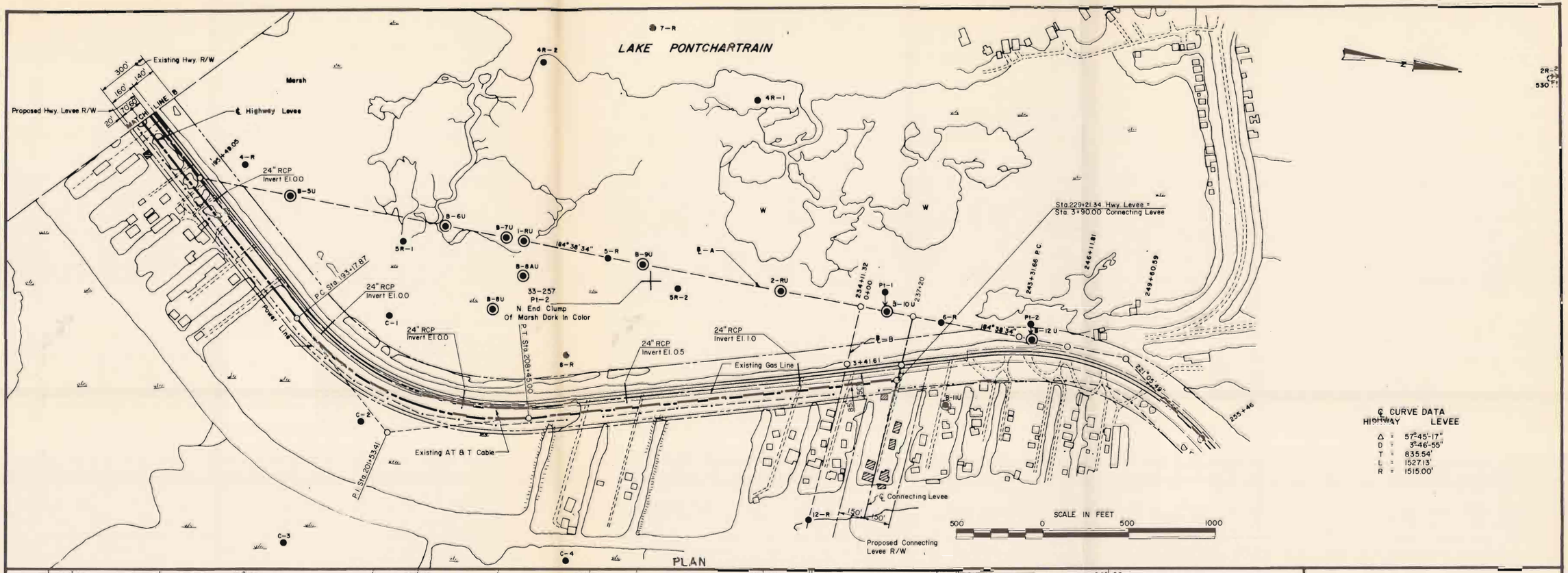
PLAN, PROFILE AND SOIL BORINGS

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

DATE MARCH 1970

FILE NO. M-2-24414

PLATE B3



℄ CURVE DATA

	HIGHWAY	LEVEE
Δ	=	57°45'17"
D	=	3°46'55"
T	=	835.54'
L	=	1527.13'
R	=	1515.00'

See plate B2 for general notes.

FREDERIC R HARRIS INC.
CONSULTING ENGINEERS - NEW ORLEANS LA

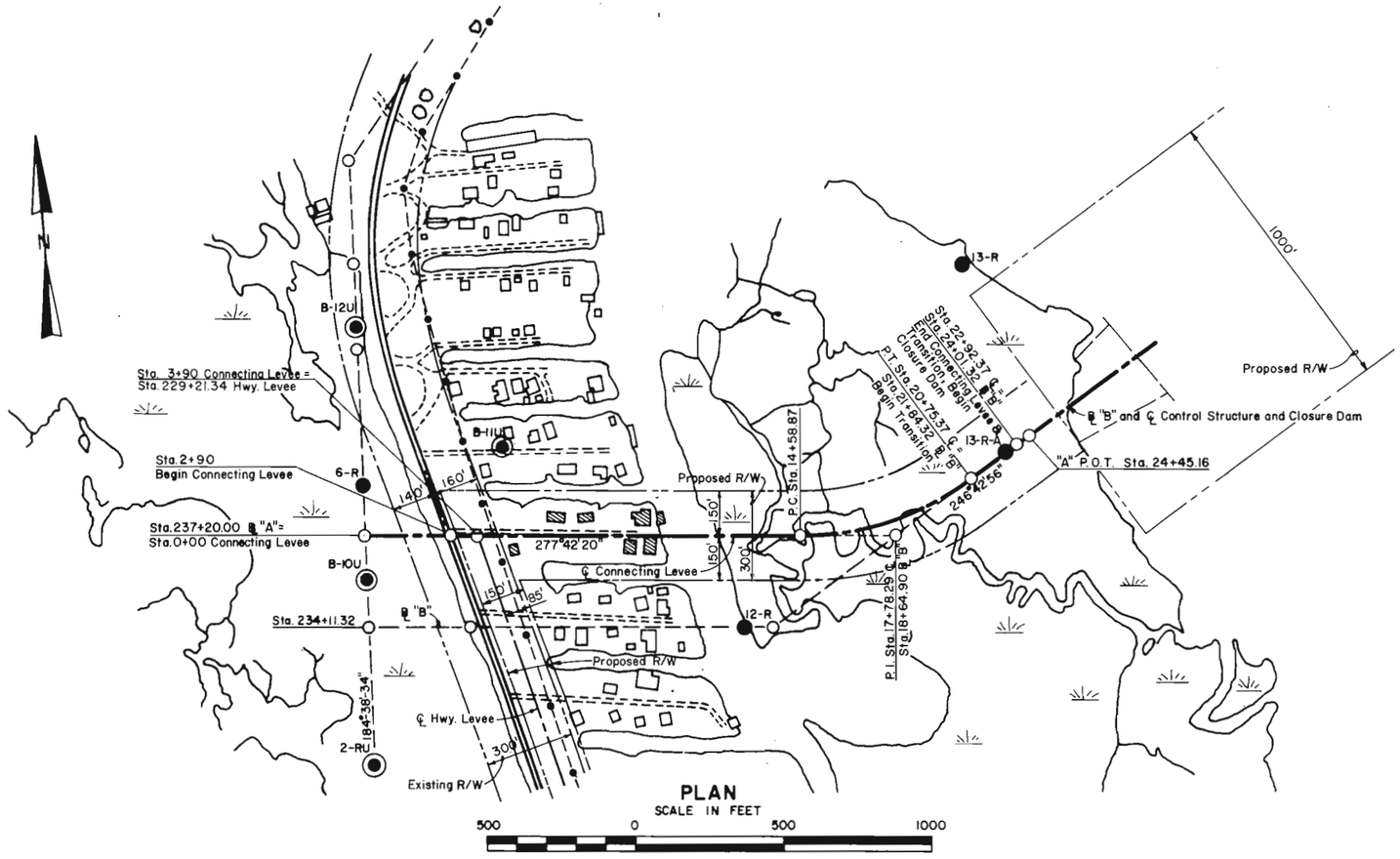
LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN
SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN 2 – HIGHWAY LEVEE
PLAN, PROFILE AND SOIL BORINGS

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

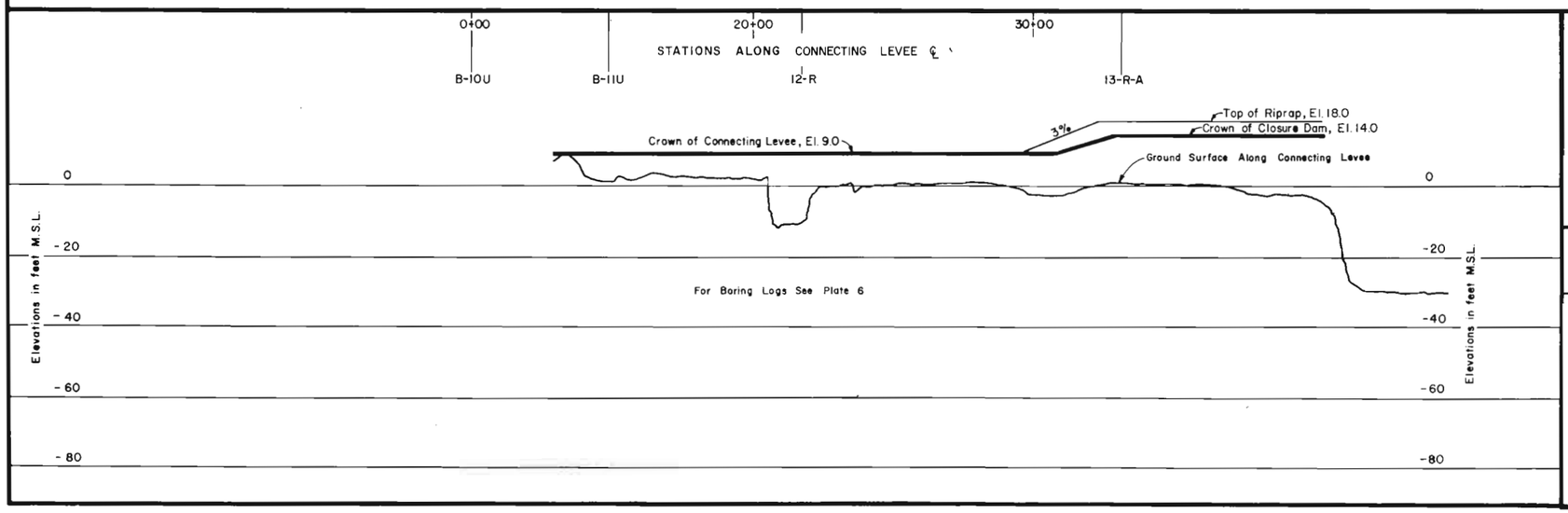
DATE MARCH 1970 FILE NO H-2-24414

PLATE B4



℄ CURVE DATA
CONNECTING LEVEE

Δ	=	36°59'24"
D	=	6°00'00"
T	=	319.42'
L	=	616.50'
R	=	954.93'



See plate B2 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

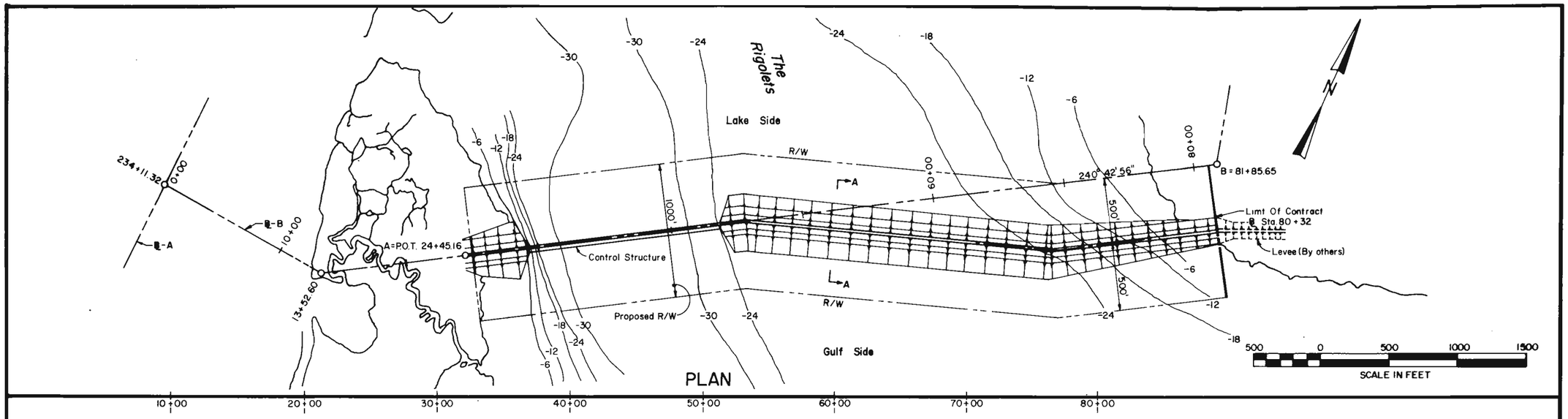
PLAN 2 — CONNECTING LEVEE

PLAN, PROFILE AND SOIL BORINGS

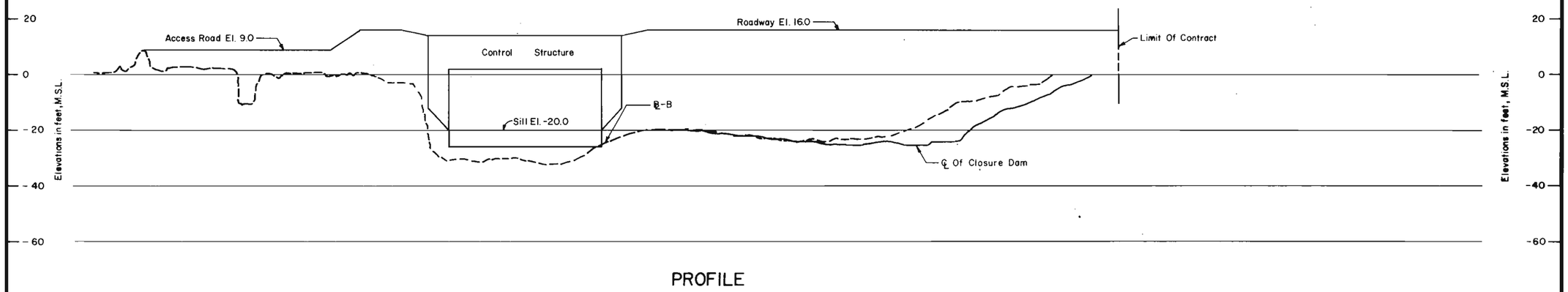
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

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

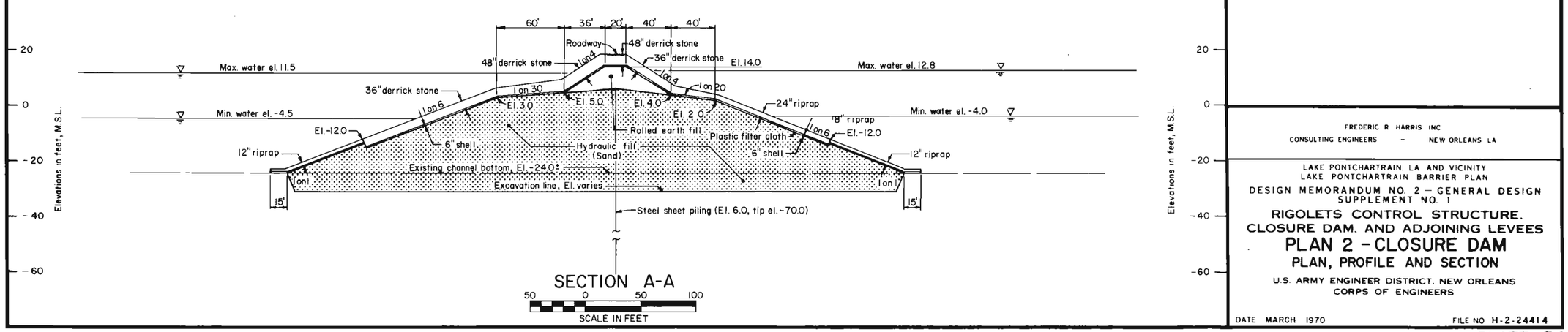
PLATE B5



PLAN



PROFILE



SECTION A-A

FREDERIC R HARRIS INC
CONSULTING ENGINEERS – NEW ORLEANS LA

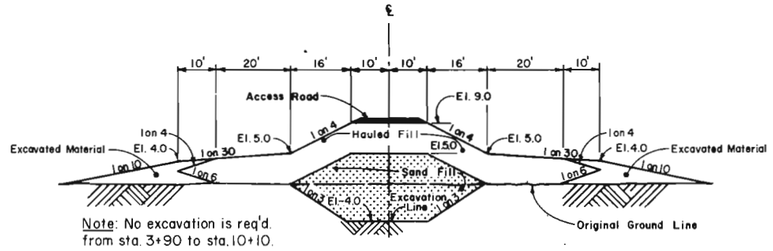
LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 – GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN 2 - CLOSURE DAM
PLAN, PROFILE AND SECTION

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

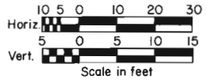
DATE MARCH 1970 FILE NO H-2-24414

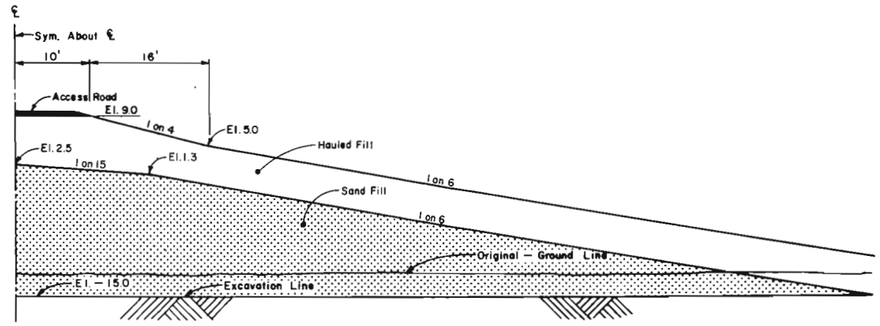
PLATE B6



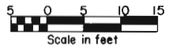
Note: No excavation is req'd. from sta. 3+90 to sta. 10+10.

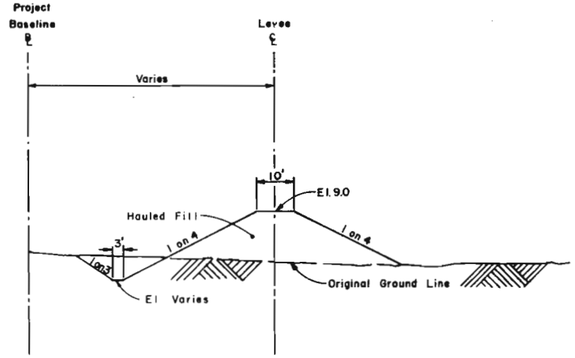
TYPICAL SECTION — CONNECTING LEVEE



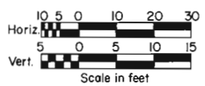


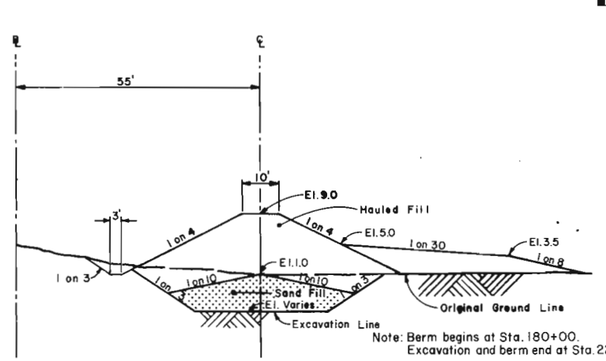
TYPICAL SECTION
CONNECTING LEVEE IN FORT PIKE CANAL
STA. 10+10 TO STA. 12+00





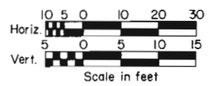
TYPICAL SECTION — HIGHWAY LEVEE
STA. 99+55.62 TO STA. 162+71.36





Note: Berm begins at Sta. 180+00. Excavation and berm end at Sta. 228+00.

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 B 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
PLAN 2 - CONNECTING LEVEE AND HIGHWAY LEVEE, TYPICAL SECTIONS

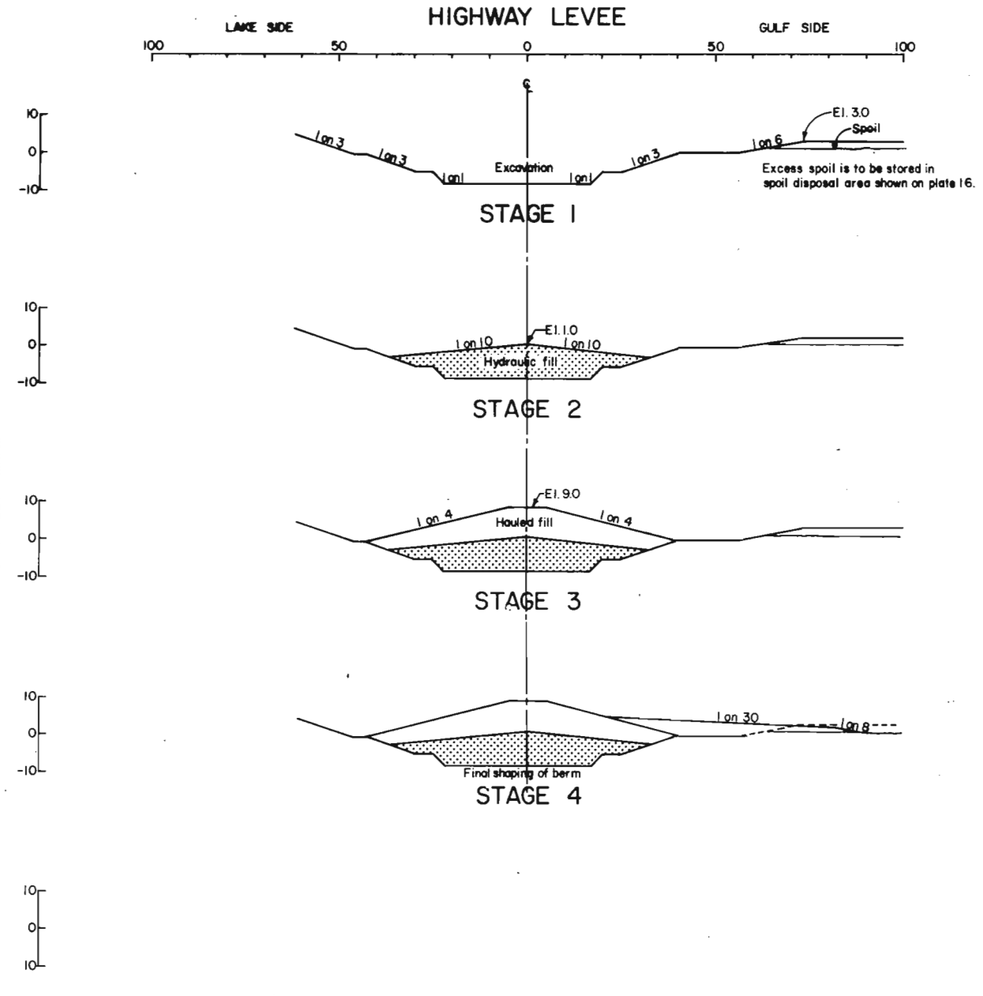
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

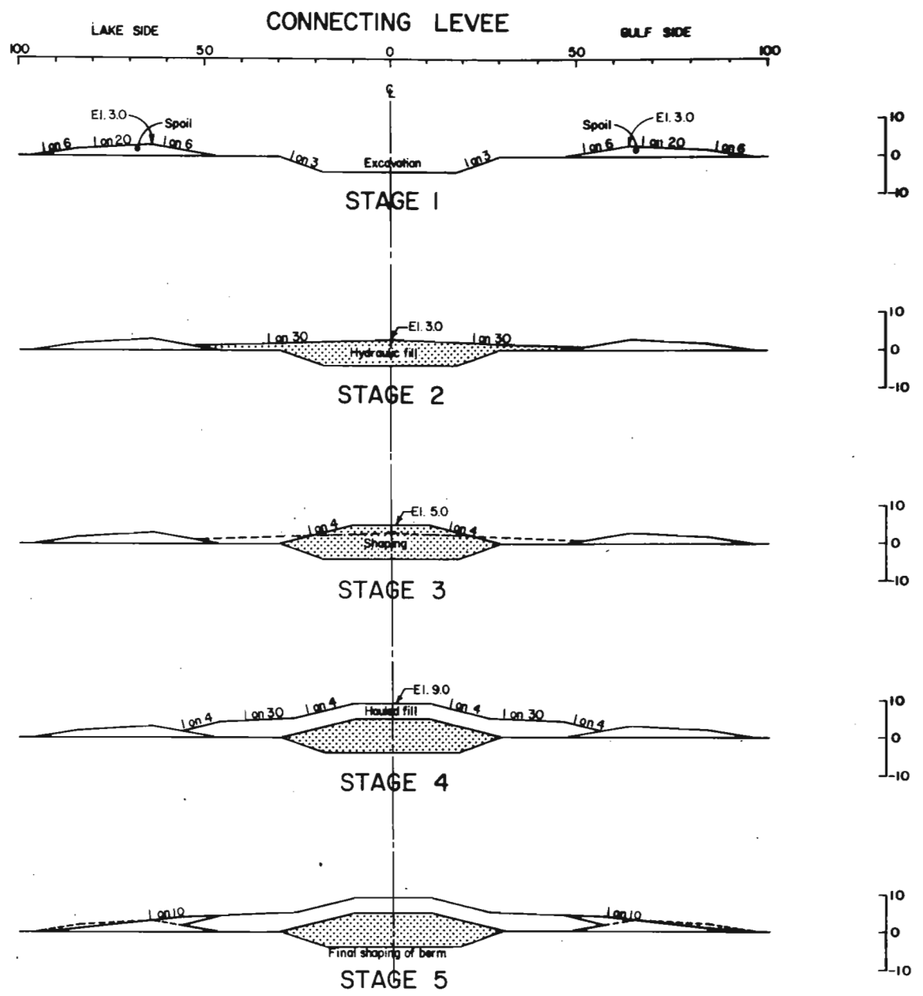
FILE NO. H-2-24414

PLATE B7

HIGHWAY LEVEE



CONNECTING LEVEE



ELEVATIONS IN FEET - M.S.L.

ELEVATIONS IN FEET - M.S.L.

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

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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

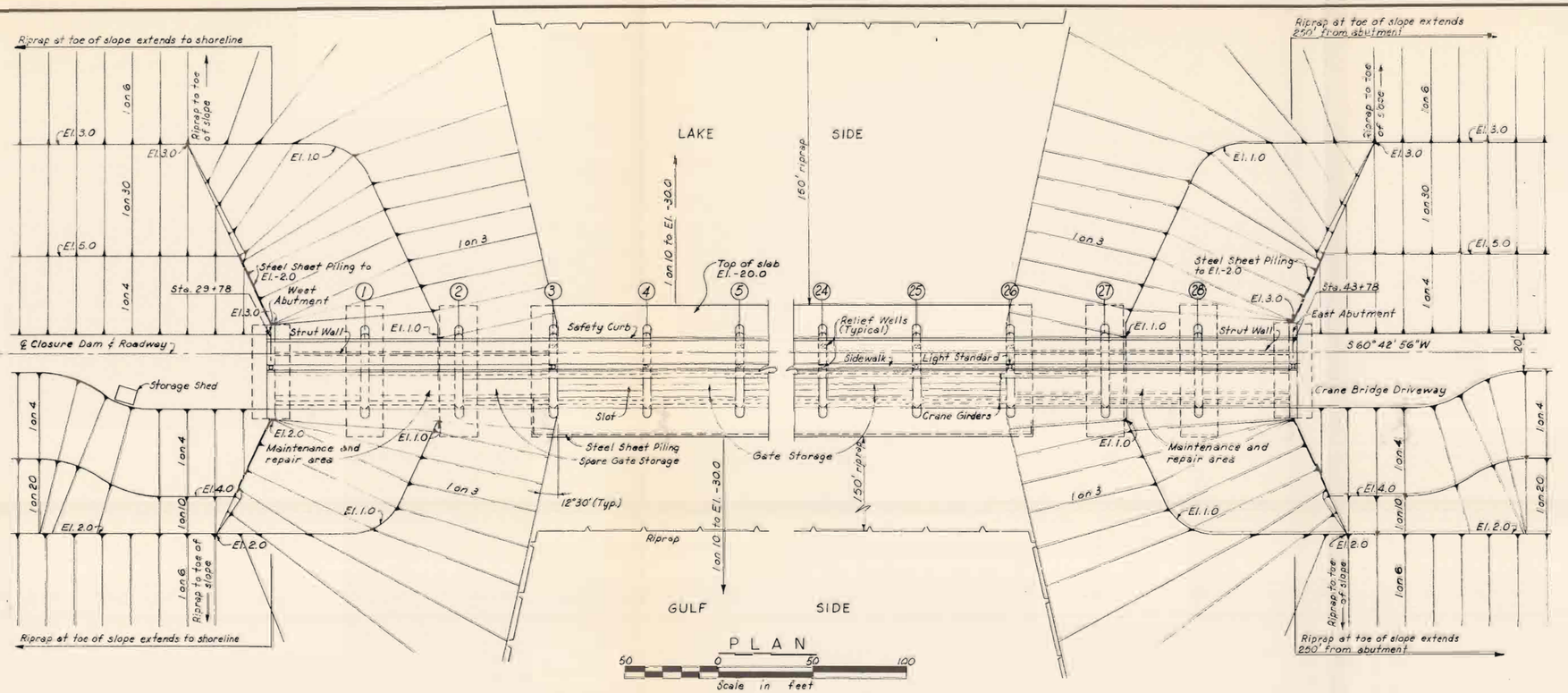
PLAN 2 - CONNECTING LEVEE & HIGHWAY LEVEE STAGES OF CONSTRUCTION

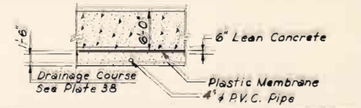
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

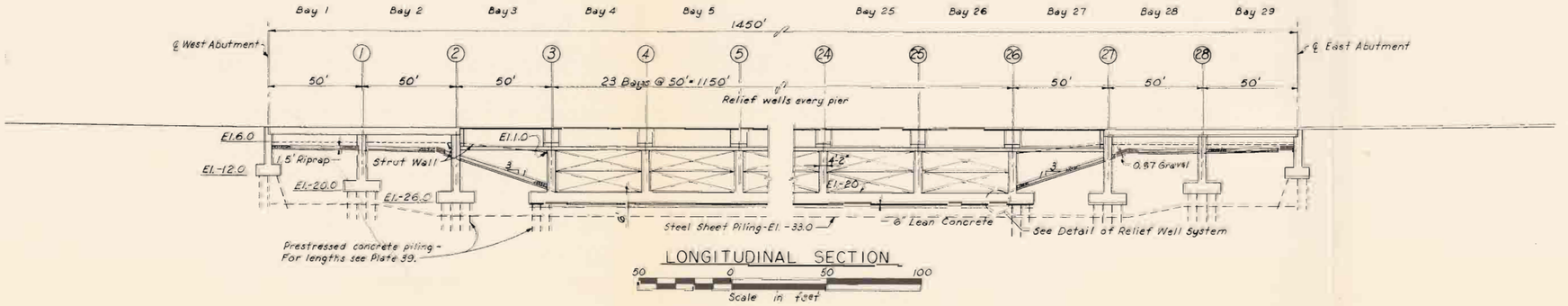
FILE NO. M-2-26414

PLATE B8





DETAIL OF RELIEF WELL SYSTEM
Not to Scale



LONGITUDINAL SECTION
50 0 50 100
Scale in feet

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

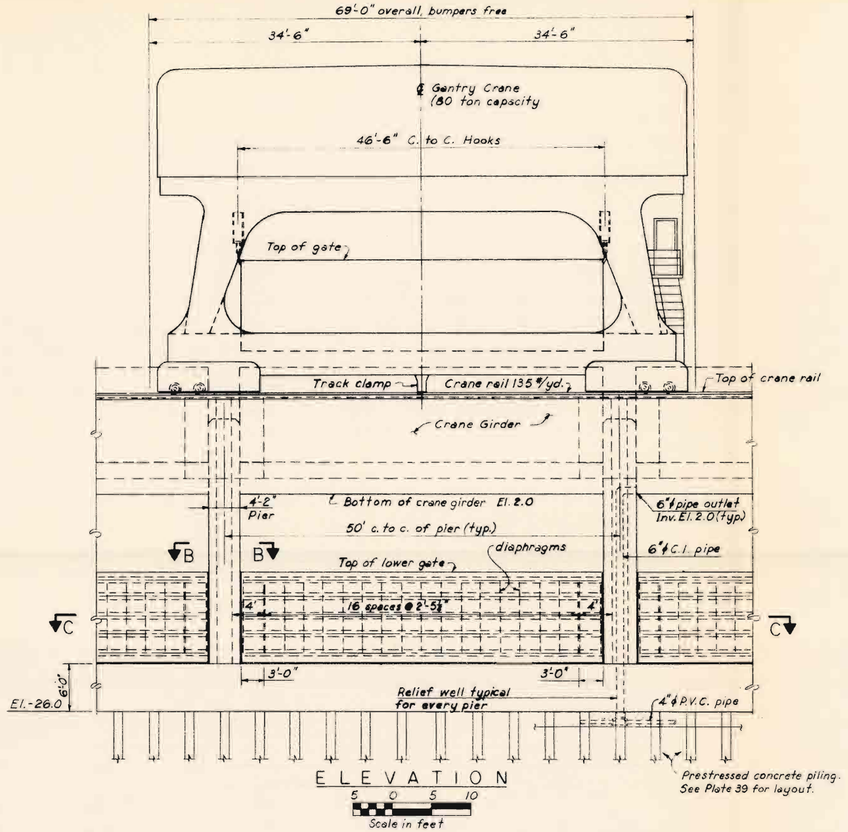
FREDERIC R HARRIS INC
CONSULTING ENGINEERS — NEW ORLEANS LA

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
PLAN 2 - CONTROL STRUCTURE
PLAN AND ELEVATION

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

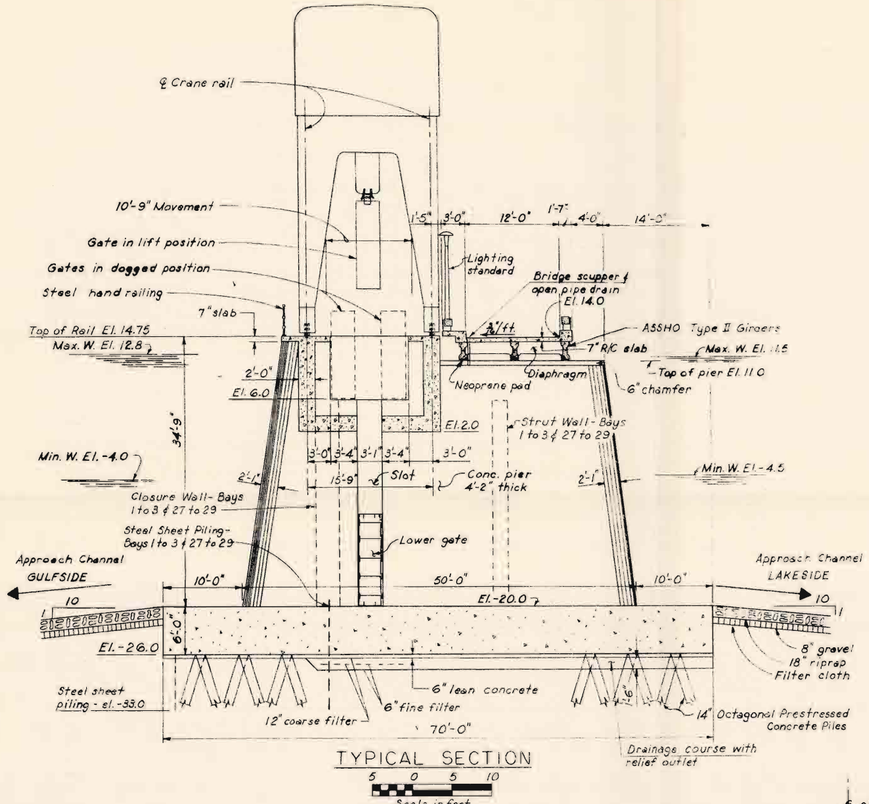
DATE MARCH 1970 FILE NO. H-2-2411.1



ELEVATION

5 0 5 10

Scale in feet



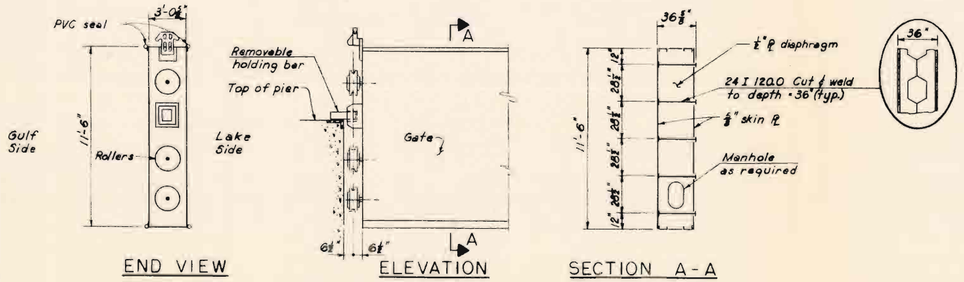
TYPICAL SECTION

5 0 5 10

Scale in feet

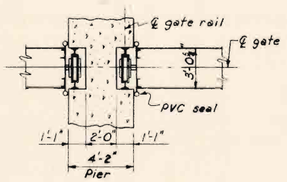
Note: Elevations are in feet and refer to mean sea level.

For pile cap detail see Plate 39.



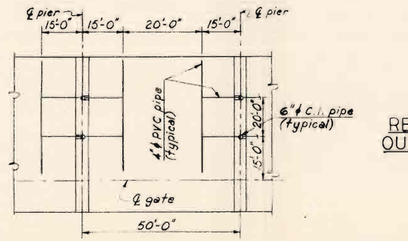
GATE DETAILS

Not to Scale



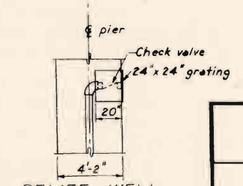
SECTION B-B

Not to Scale



SECTIONAL PLAN C-C (RELIEF WELL LAYOUT)

Not to Scale



RELIEF WELL OUTLET DETAIL

Not to Scale

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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

PLAN 2 - CONTROL STRUCTURE

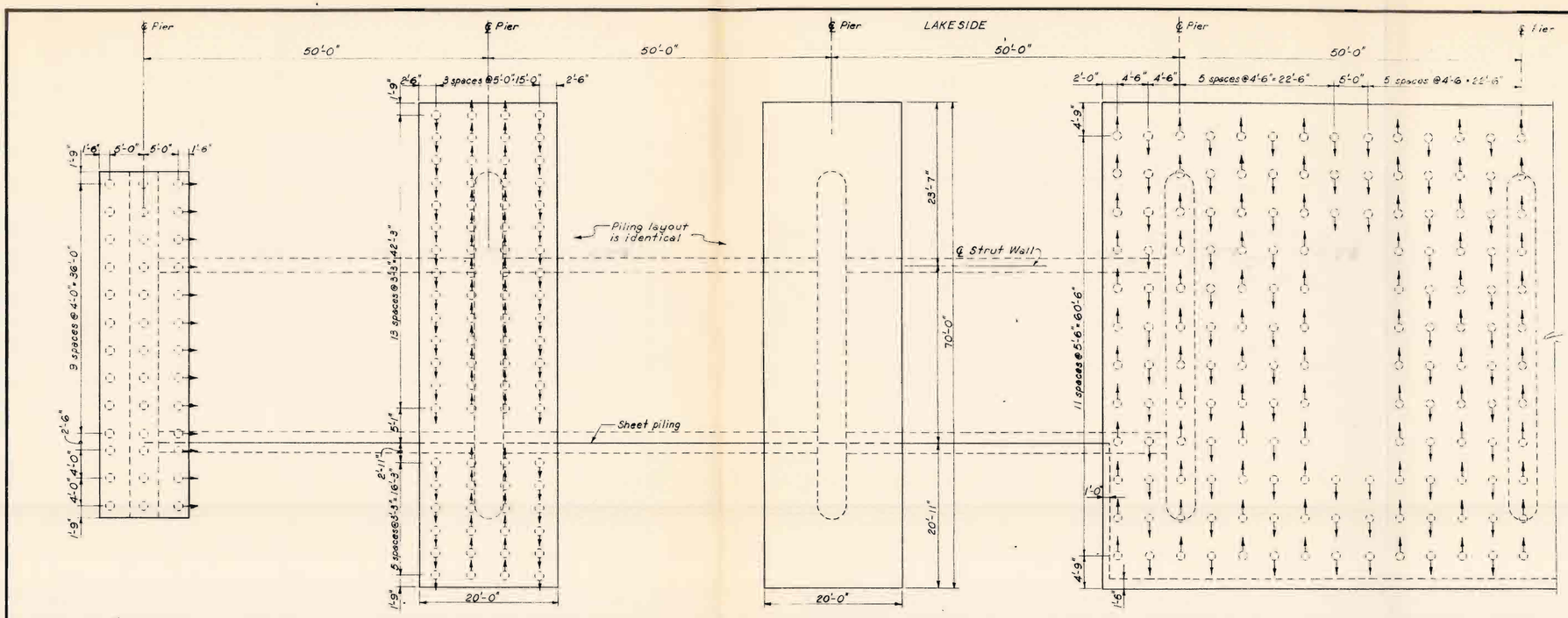
TYPICAL SECTION AND ELEVATION

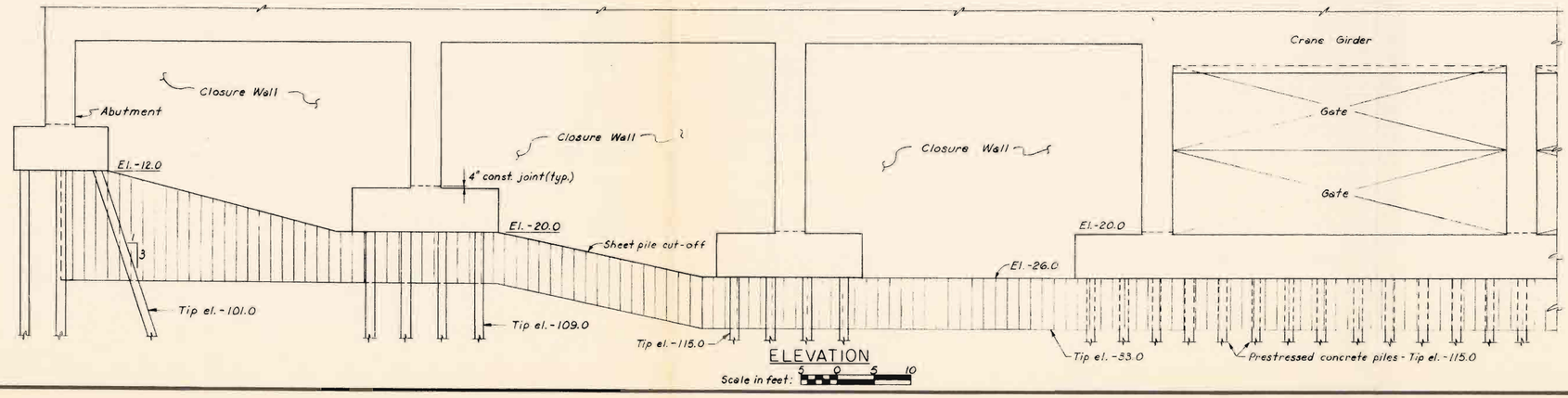
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

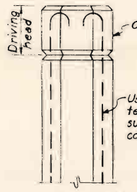
DATE MARCH 1970

FILE NO. H-2-24414

PLATE B10







ELEVATION

TENSION PILE DETAIL

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

Indicates batter, 1:3 typical

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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

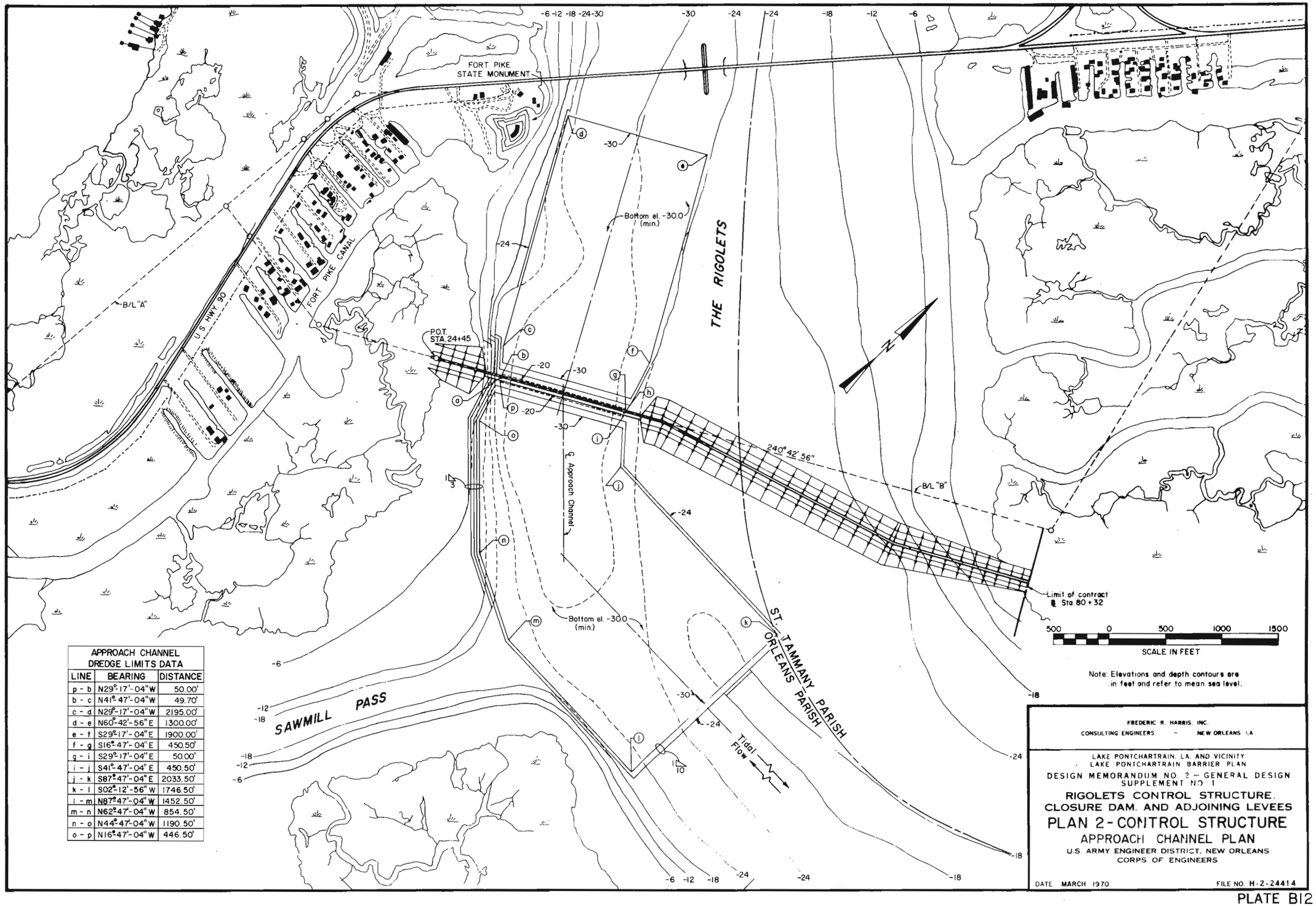
PLAN 2 – CONTROL STRUCTURE FOUNDATION–PLAN AND ELEVATION

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE B11



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

APPROACH CHANNEL DREDGE LIMITS DATA		
LINE	BEARING	DISTANCE
p - b	N29°-17'-04"W	50.00'
b - c	N41°-47'-04"W	49.70'
c - d	N29°-17'-04"W	2195.00'
d - e	N60°-42'-56"E	1300.00'
e - f	S29°-17'-04"E	1900.00'
f - g	S16°-47'-04"E	450.50'
g - i	S29°-17'-04"E	50.00'
i - j	S41°-47'-04"E	450.50'
j - k	S87°-47'-04"E	2033.50'
k - l	S02°-12'-56"W	1746.50'
l - m	N87°-47'-04"W	1452.50'
m - n	N62°-47'-04"W	854.50'
n - o	N44°-47'-04"W	1190.50'
o - p	N16°-47'-04"W	446.50'

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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

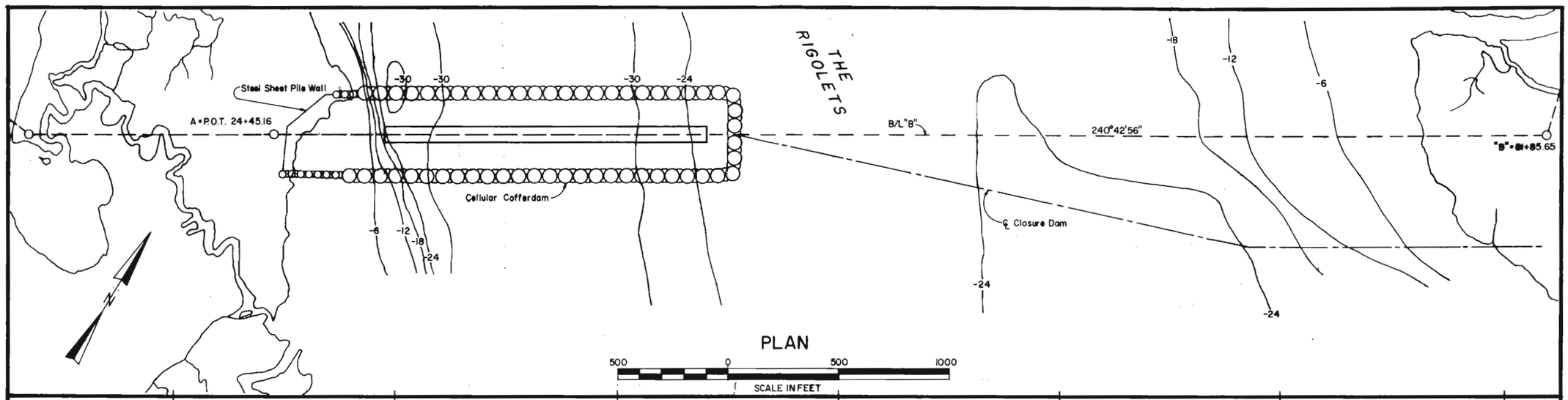
PLAN 2 - CONTROL STRUCTURE

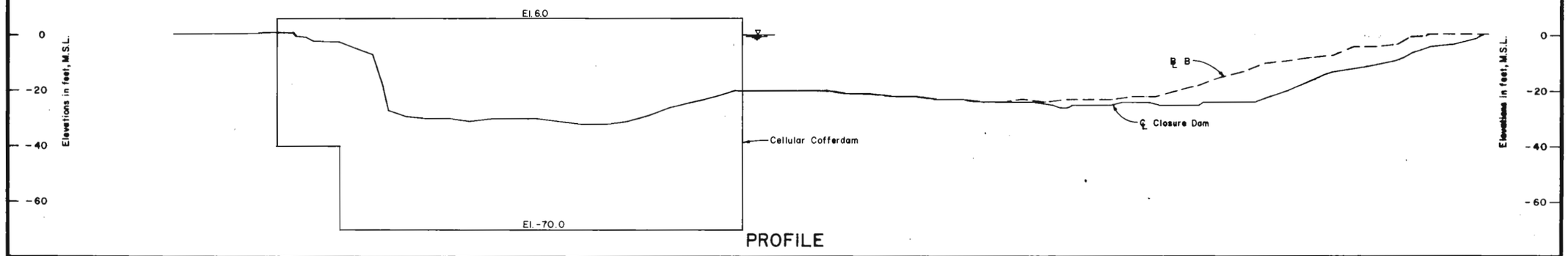
APPROACH CHANNEL PLAN

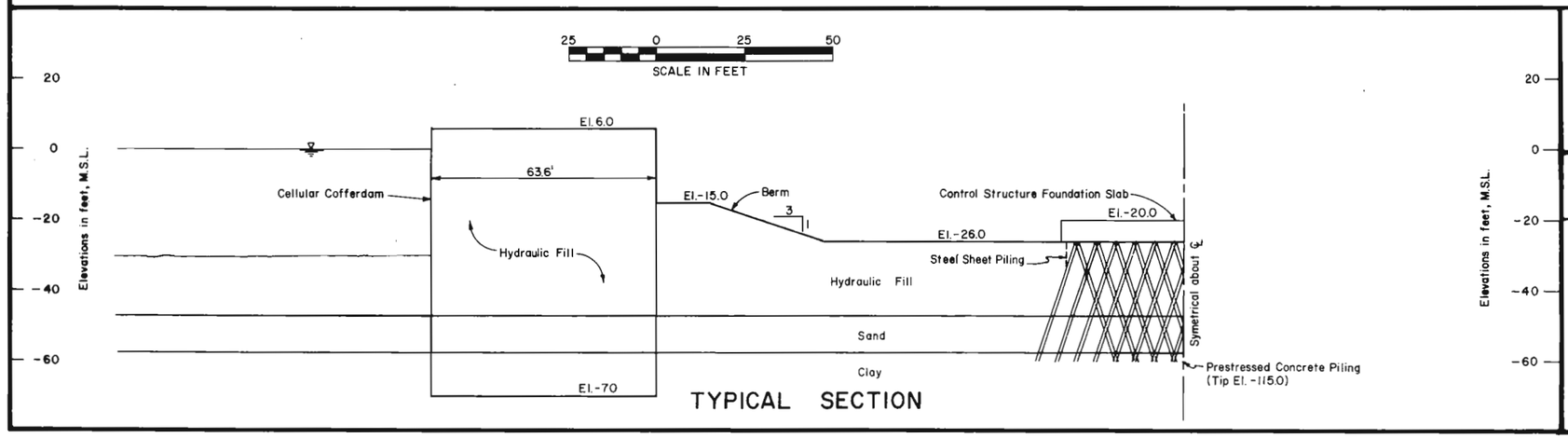
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. H-2-24414

PLATE B12







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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

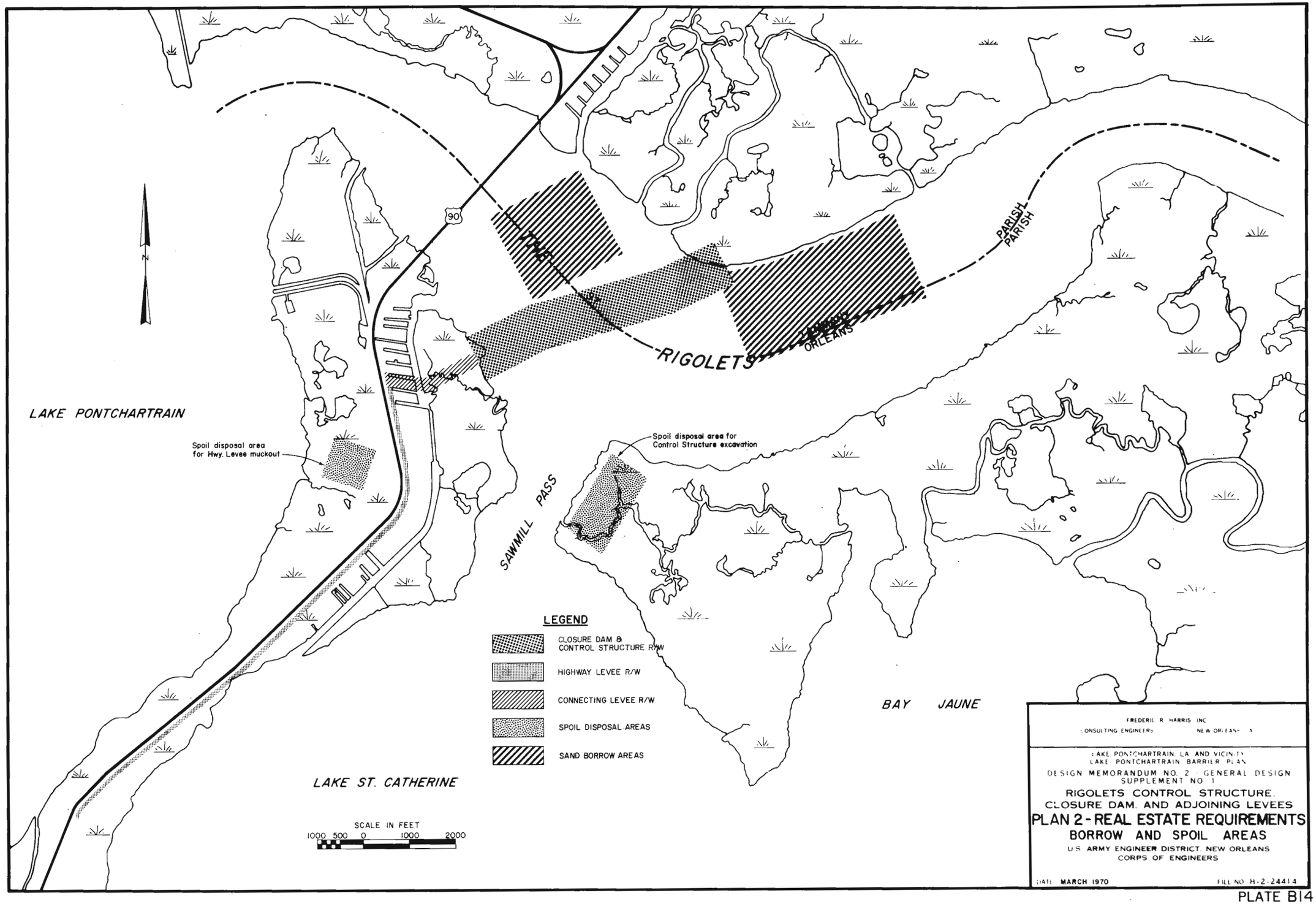
PLAN 2 - COFFERDAM
PLAN, PROFILE AND SECTION

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

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE B13



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CONSULTING ENGINEERS NEW ORLEANS

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN

DESIGN MEMORANDUM NO. 2 GENERAL DESIGN
SUPPLEMENT NO. 1

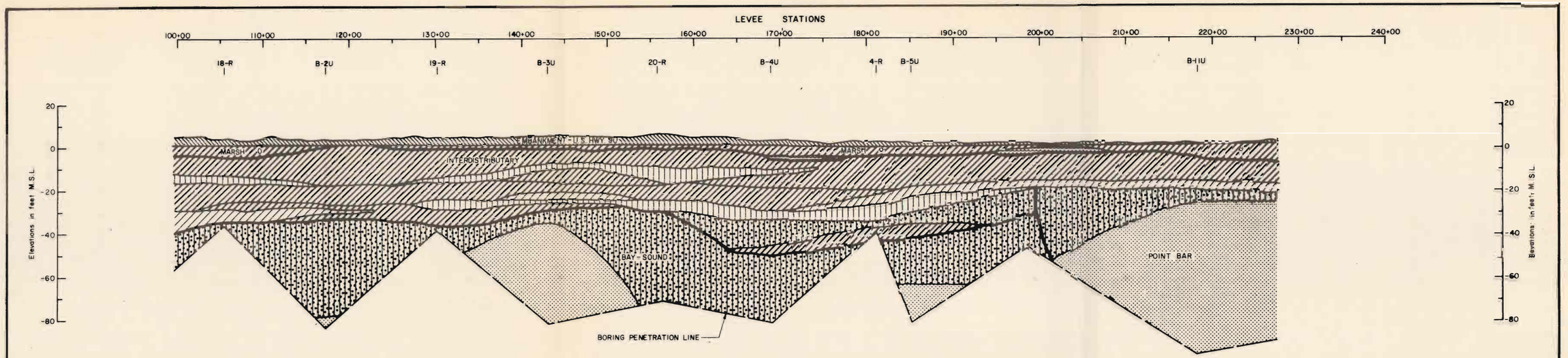
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES

PLAN 2 - REAL ESTATE REQUIREMENTS BORROW AND SPOIL AREAS

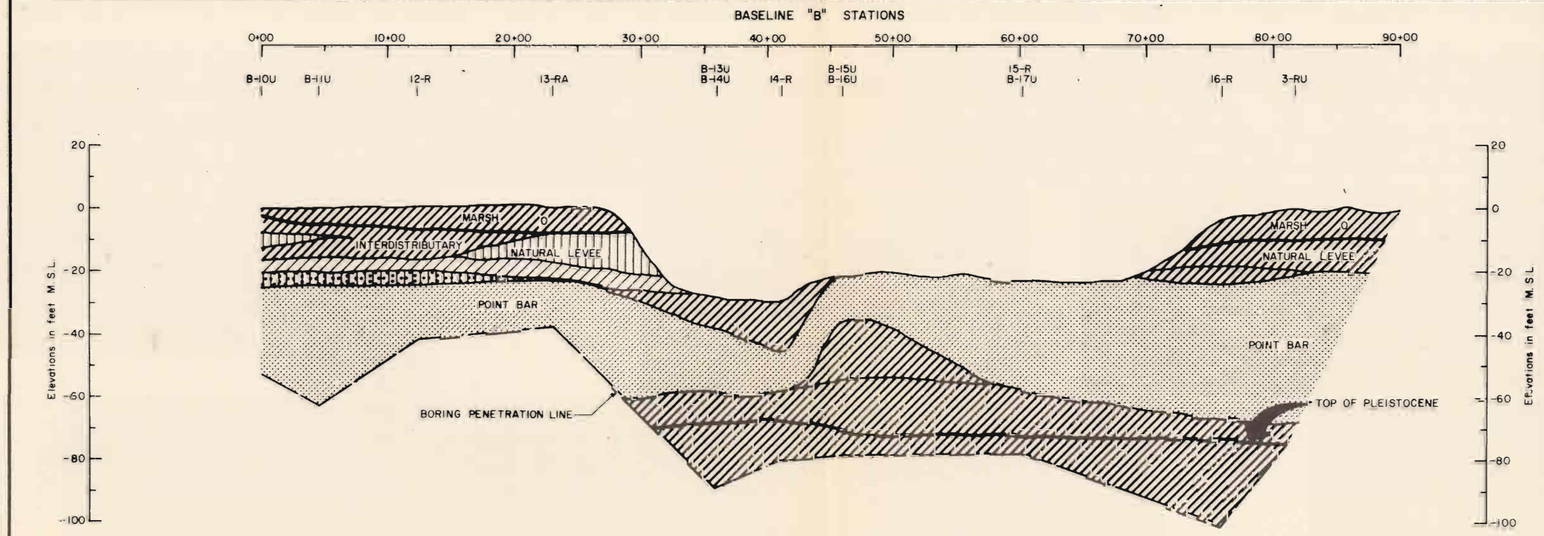
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. H-2-24414

PLATE B14



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

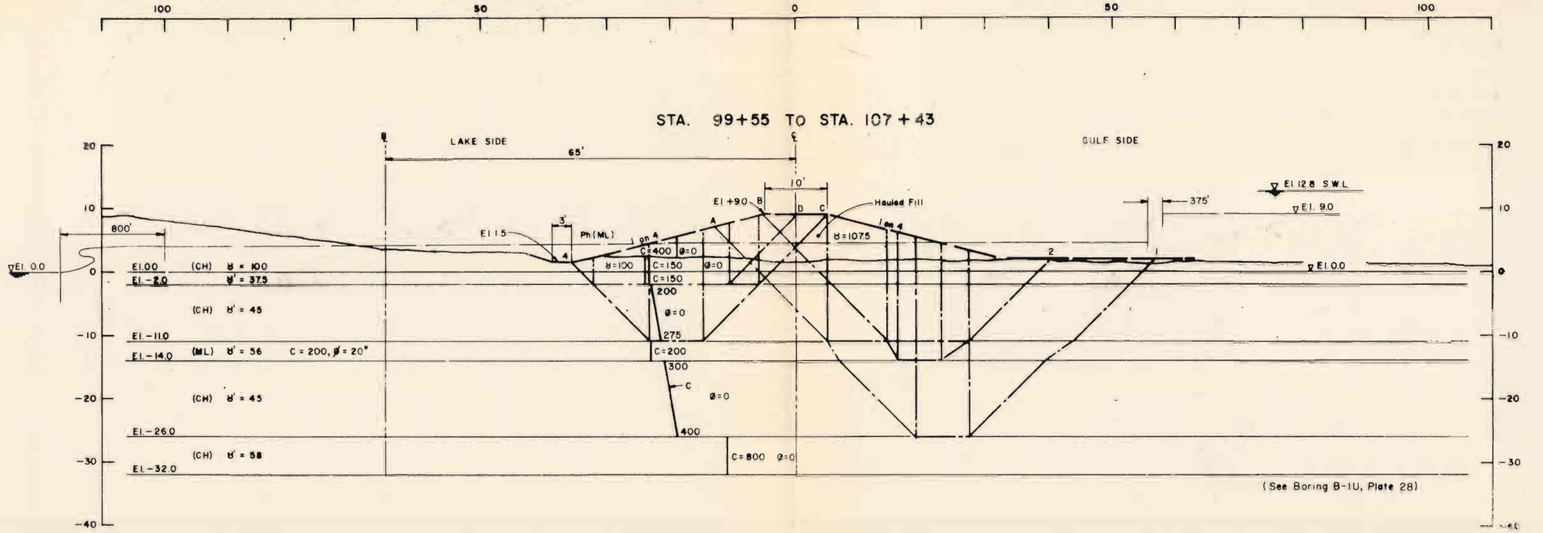
RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN 2 - GENERALIZED SOIL AND GEOLOGIC PROFILE

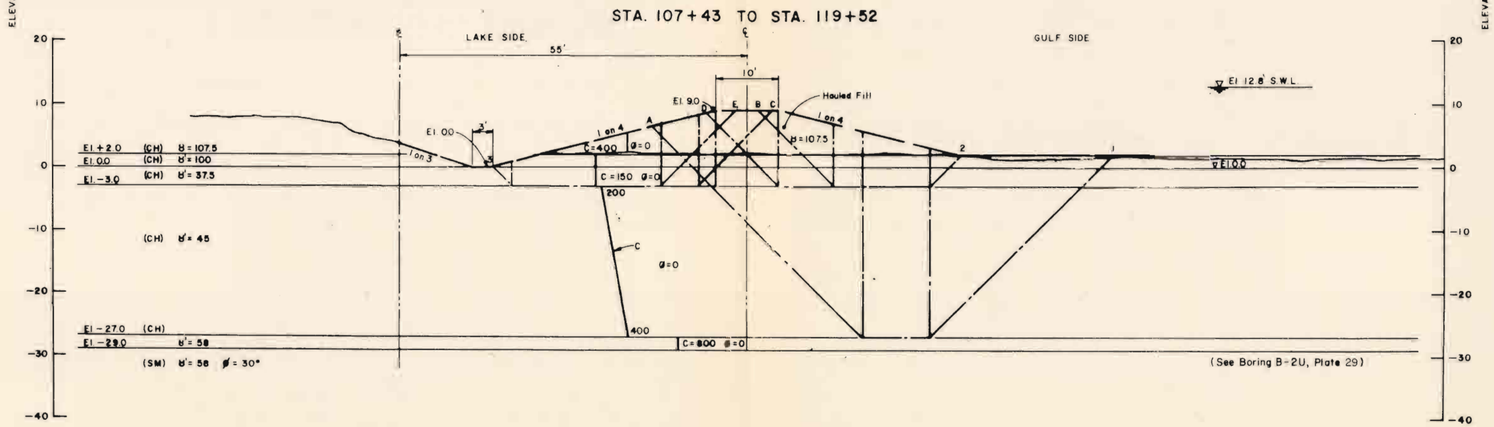
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO. H-2-24414

PLATE B15





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

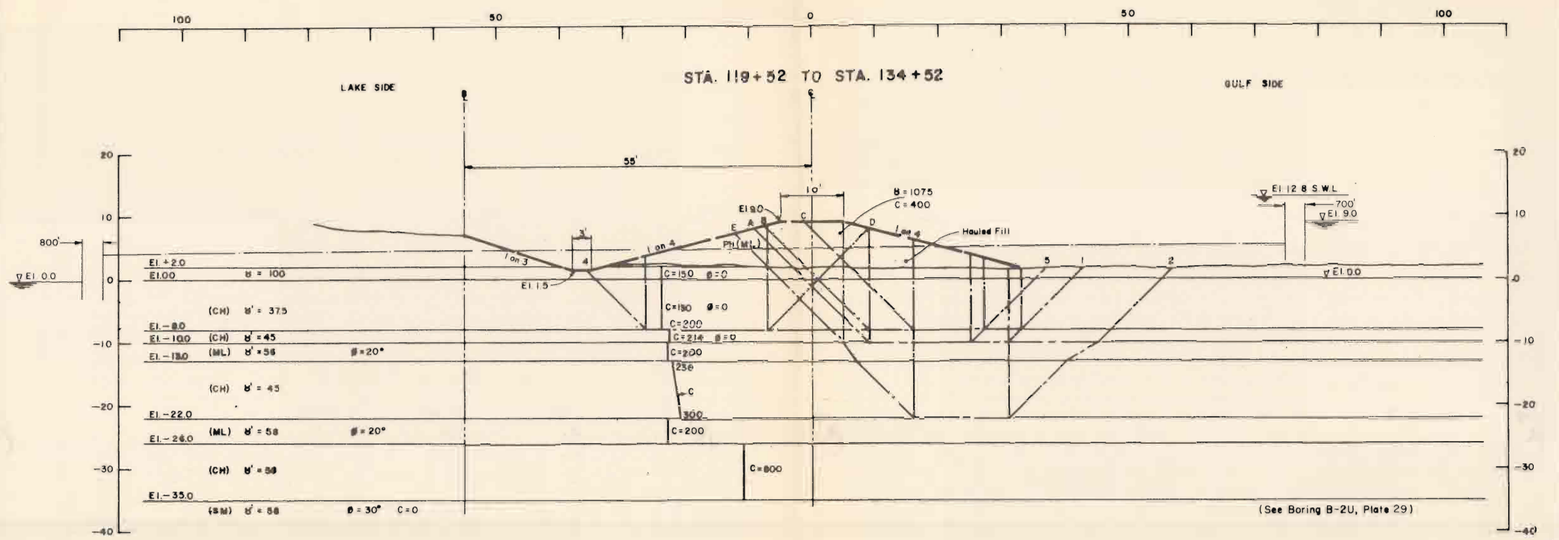
(Q) - Unconsondated - undrained shear strength in lbs. per sq. ft.
(ɣ) - Unit weight of soil water system in lbs. per cu. ft.
(ɣ') - Submerged unit weight in lbs. per cu. ft.
(Ø) - Angle of internal friction in degrees.
$\bar{D}$ - Horizontal driving force in lbs.
R - Horizontal resisting force in lbs.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

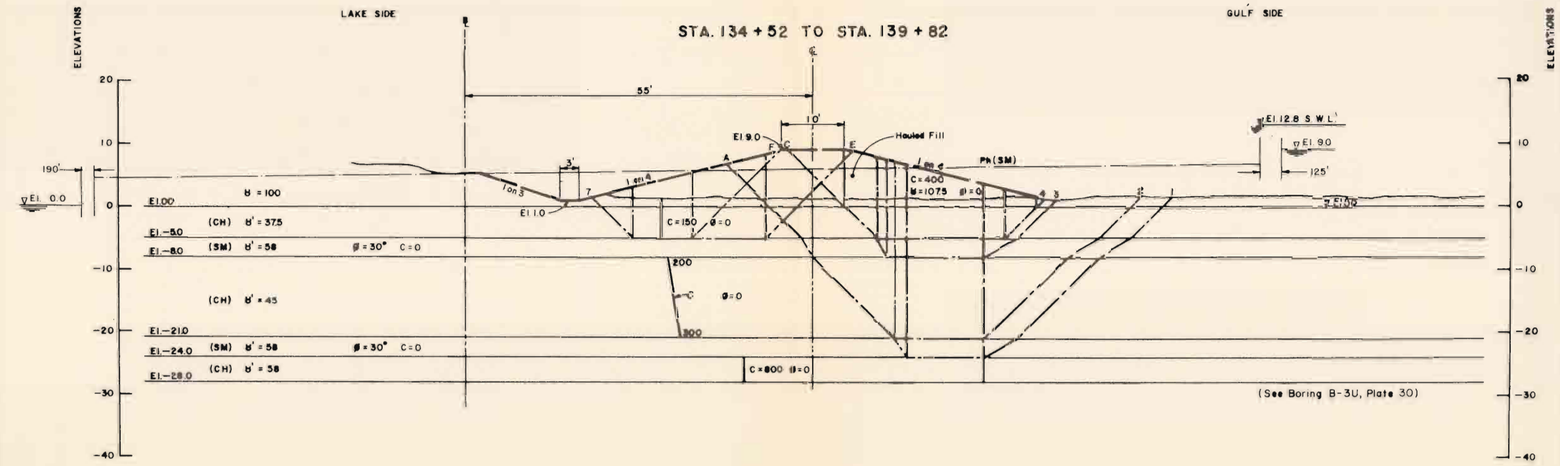
FREDERIC R HARRIS INC.
CONSULTING ENGINEERS - NEW ORLEANS, LA.

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
PLAN 2 - STABILITY ANALYSIS (Q)
HIGHWAY LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970 FILE NO. H-8-64413

PLATE B16





STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		EL.	DRIVING $+D_A$	DRIVING $-D_P$	DRIVING ΣD	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	8,580	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	2,920	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 B16 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

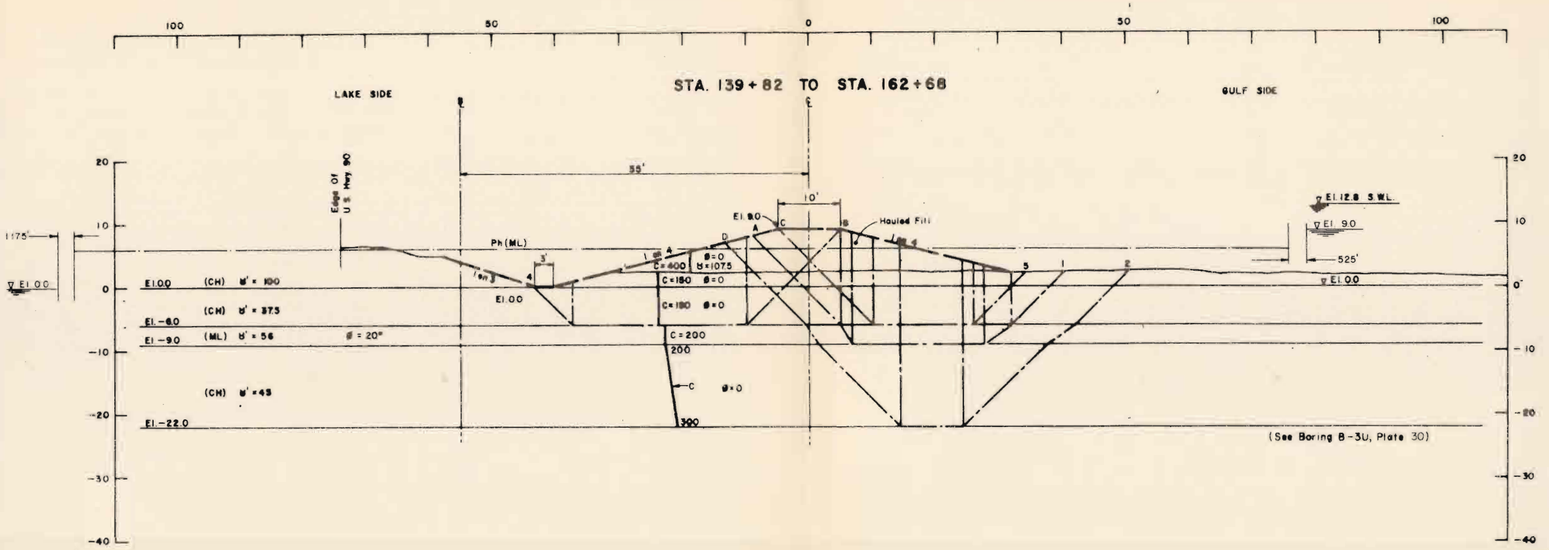
PLAN 2 - STABILITY ANALYSIS (2)
HIGHWAY LEVEE

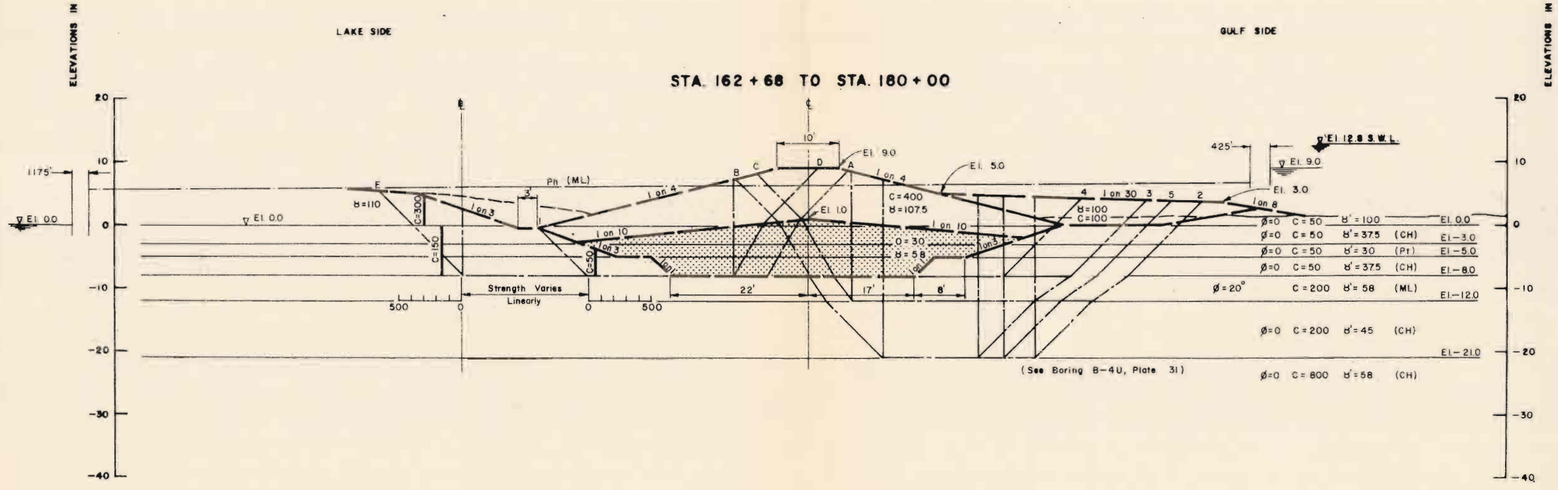
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: MARCH 1970

FILE NO: M-2-54614

PLATE B17





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	−8	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	7,750	2,400	2,550	12,700	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	18,180	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

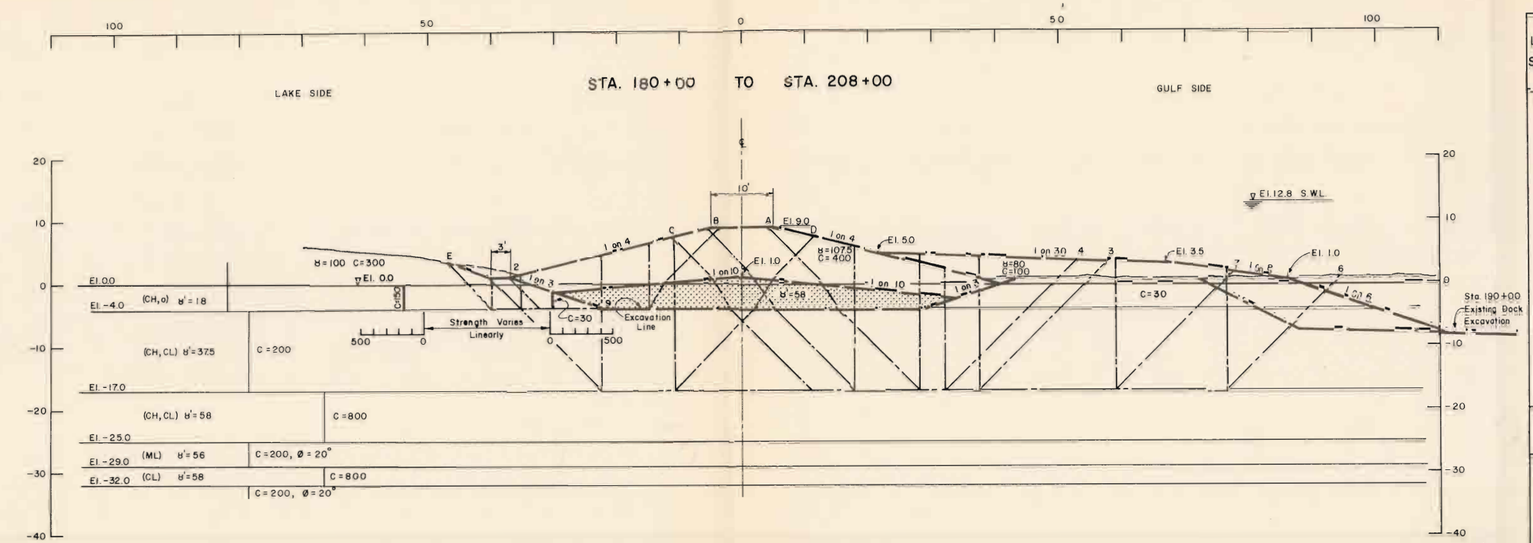
See Plate B16 For General Notes.

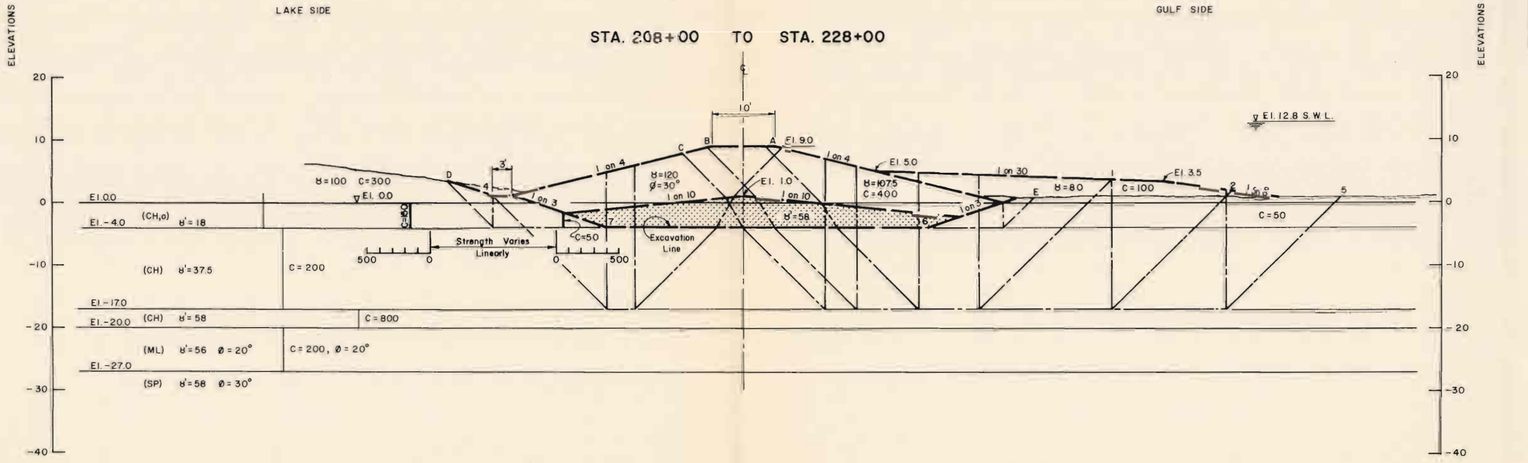
FREDERIC R. HARRIS, INC.
CONSULTING ENGINEERS — NEW ORLEANS, LA.

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
PLAN 2 - STABILITY ANALYSIS (Q)
HIGHWAY LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

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

PLATE B18





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
		6	-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	9,170	2,310	1,160	12,640	2.16
		2	-4	6,600	890	5,710	9,170	1,960	1,080	12,210	2.14
		3	-17	24,710	10,400	14,310	1,500	3,900	6,000	24,900	1.74
		3**	-17	24,710	5,450	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	13,230	12,010	1,900	6,700	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	15,870	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 Tyaical Of Boat Slips In This Reach

See Plate B16 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

PLAN 2 - STABILITY ANALYSIS (2)

HIGHWAY LEVEE

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

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

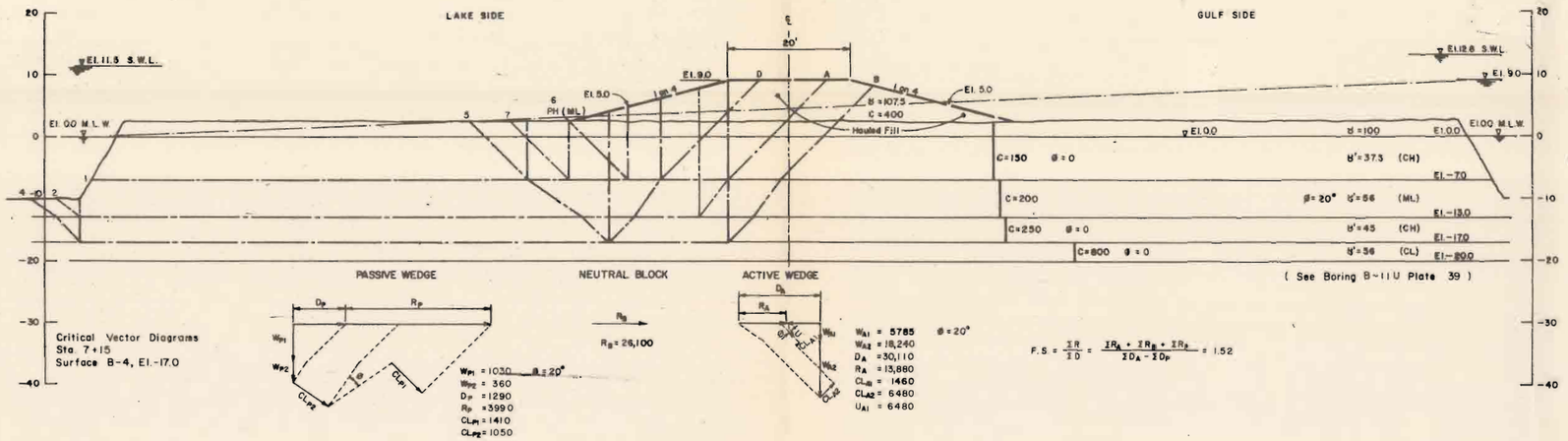
PLATE B19

STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		E.L.	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	22,780	1.92
		2 *	-13	23,630	260	23,370	12,380	25,100	1,990	39,470	1.69
		6	-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	4,190	6,140	7,380	780	2,850	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

STA. 3+90 TO STA. 10+10



$$F.S. = \frac{\Sigma R}{\Sigma D} = \frac{\Sigma R_A + \Sigma R_B + \Sigma R_P}{\Sigma D_A - \Sigma D_P} = 1.52$$

See Plate B16 For General Notes

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

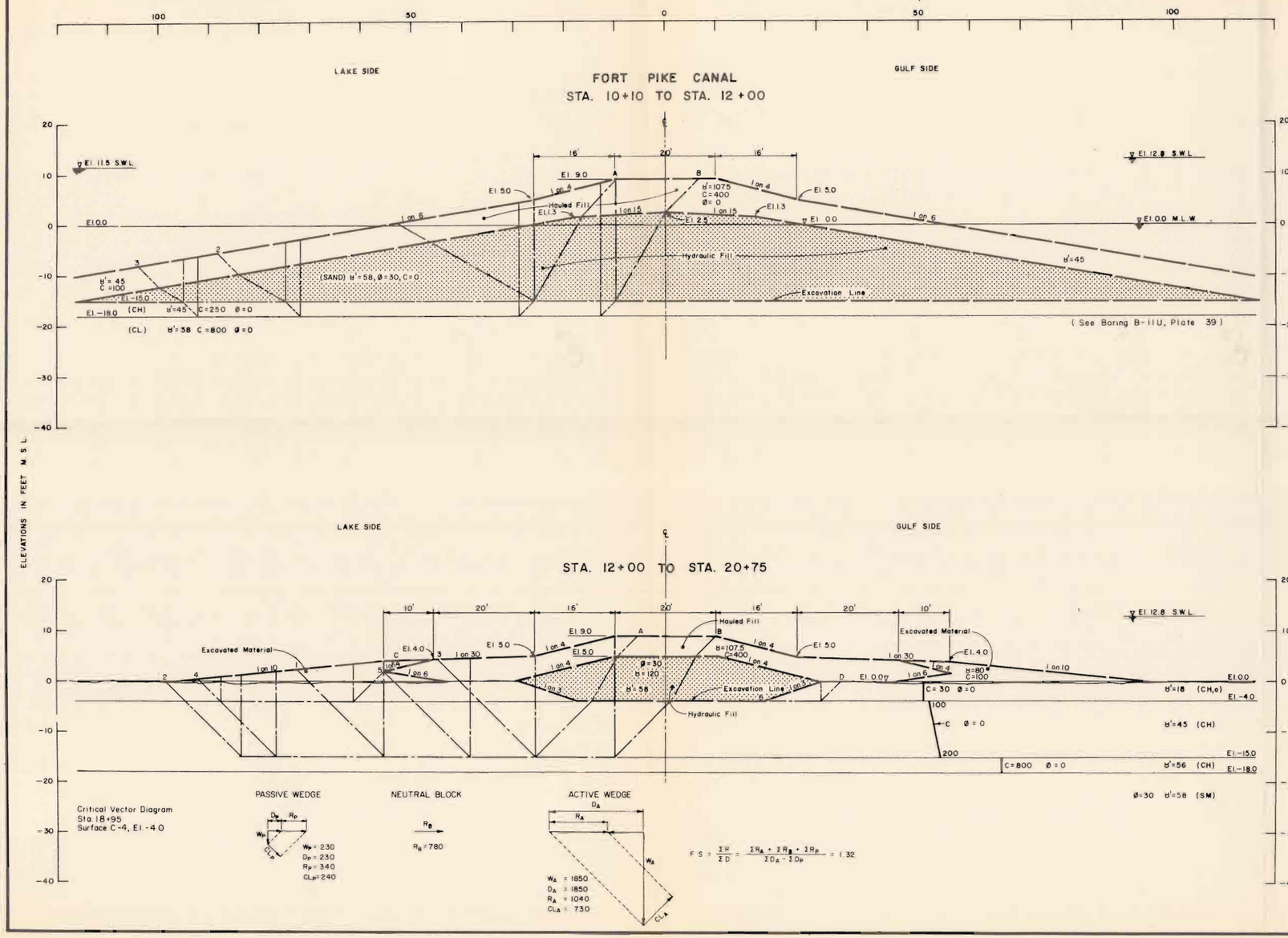
LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 — GENERAL DESIGN SUPPLEMENT NO. 1

RIGOLETS CONTROL STRUCTURE, CLOSURE DAM, AND ADJOINING LEVEES
PLAN 2 - STABILITY ANALYSIS (Q)
CONNECTING LEVEE

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

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

PLATE B20



STABILITY CALCULATIONS

LEVEE STATION	SLIP SURFACE NO.		E.L.	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

See Plate B16 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
PLAN 2 - STABILITY ANALYSIS (Q)
CONNECTING LEVEE
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE MARCH 1970 FILE NO. H-2-24414

PLATE B21

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

APPENDIX C

CORRESPONDENCE RELATIVE TO COORDINATION WITH OTHER AGENCIES

C O P Y

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

LMNED-PP

2 April 1968

Mr. C. Edward Carlson, Regional Director
U. S. Department of the Interior
Fish and Wildlife Service
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Carlson:

Please refer to our letter dated 21 April 1967 requesting your views and comments on the general design memorandum for the Lake Pontchartrain Barrier Plan feature of the "Lake Pontchartrain, La. and Vicinity" project.

Our letter dated 21 April 1967 indicated that your views and comments would be requested for each supplement to the general design memorandum. However, we now feel that your views on the entire Lake Pontchartrain Barrier Plan would be preferable. The layout of the Lake Pontchartrain Barrier Plan, as described in House Document No. 231, 89th Congress, 1st Session, is shown in inclosure 1. The plan, layout of which is shown on inclosure 2, now under consideration is essentially the same as that presented in the House Document, with the following exceptions:

a. Barrier. The Chief of Engineers has approved a change in the alignment of the barrier in the Chef Menteur Pass area to that shown on inclosure 3. The barrier elevation will be 9 feet mean sea level or the elevation of existing U. S. Highway 90, whichever is higher. The remaining structures sites will remain as specified in the House Document, except that consideration is being given to widening the Rigolets Lock from 84 feet to 110 feet. The modification of the width of the Rigolets Lock is not for public release.

b. Seabrook Lock. The Chief of Engineers has approved a change in the controlling elevation of the Seabrook Lock from 13.2 feet to 7.2 feet mean sea level. This change will be effected by lowering the crown of the rock dike which will tie the lock to the levee system. In addition, auxiliary control structures, located on each side of the lock, will be added to provide for passage of flows or salinity control and riparian use when the lock is passing traffic.

c. Levees. Based on revised parameters for the standard project hurricane, as developed by the U. S. Weather Bureau, the levee grades recommended in House Document No. 231 were increased by as much as 1 to 2 feet.

d. St. Charles Parish Levees. The St. Charles Parish Lakefront levee will extend across the Parish Line Canal and tie into the Jefferson Parish Lakefront levee, rather than having a levee extending south approximately 3.5 miles along the west side of the Parish Line Canal to the Illinois Central Railroad. Drainage structures will be provided in the Lakefront levee to allow gravity drainage of the area.

We have received your comments on Seabrook Lock and the Citrus Back Levee, i.e., the levee along the north bank of the Gulf Intracoastal Waterway from the Inner Harbor Navigation Canal to the Michoud Canal, by letters dated 7 June 1967 and 22 June 1967, respectively. Your views, recommendations, and comments on the remainder of the Lake Pontchartrain Barrier Plan are requested.

Because of the urgency of providing protection to the areas vulnerable to hurricane flooding, we are operating on a much compressed planning schedule. Accordingly, it would be very much appreciated if your comments are provided not later than 1 June 1968.

Sincerely yours,

3 Incl
1. Gen map (file H-2-23693) dtd Nov 65
2. Gen map (file H-2-23693) rev May 67
3. Map - barrier alignment (file H-2-24066, plate 2)

THOMAS J. BOWEN
Colonel, CE
District Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
PEACHTREE-SEVENTH BUILDING
ATLANTA, GEORGIA 30323

May 15, 1968

District Engineer
U. S. Army, Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to your letter of April 2, 1968, (LMNED-PP), requesting our views on the Lake Pontchartrain Barrier Plan feature of the Lake Pontchartrain, Louisiana, and Vicinity project.

The overall barrier plan and its influence on fish and wildlife resources have been discussed in prior Bureau reports, most recently our letter report of June 21, 1967.

As indicated in past reports, we are of the opinion that hurricane control structures in the Rigolets and Chef Menteur tidal passes will have little appreciable effect on salinities in Lakes Maurepas, Pontchartrain, and Borgne. Therefore, no adverse effects on fish and wildlife resources in these areas are expected.

Previous model tests have indicated that acceptable salinity levels for the preservation of fish and wildlife resources in Lake Pontchartrain can be obtained by utilization of the Seabrook Lock facility, which includes an auxiliary control structure on each side of the lock. Use of these auxiliary structures should insure that adequate diversion flows for salinity control and riparian use can be provided. The capability for adjusting salinities as may be required for fish and wildlife would tend to prevent the occurrence of detrimental effects.

New levee construction and levee enlargement works as planned, including the modified St. Charles Parish levee, are not expected to directly affect fish and wildlife resources to any great degree. Indirectly, the levee system will hasten urban and industrial development of additional marshland that now provides moderate quality habitat for wildlife. Your staff has indicated that the Parish Line Canal is no longer classed as a navigable waterway. Blockage of the channel, however, will inconvenience boat owners who now use the canal.

We are pleased with your previous recognition of the need for a salinity surveillance system at the Seabrook Lock upon its completion. This Bureau and the Louisiana Wild Life and Fisheries Commission will be glad to participate in the development and monitoring of such a system.

We appreciate the opportunity to provide these comments at this time. If current plans are modified, we request the opportunity for further review and comment.

A copy of this letter has been sent to the Louisiana Wild Life and Fisheries Commission. Any comments that agency wishes to make will be forwarded to you.

Sincerely yours,

W. L. Towns
Acting Regional Director

C O P Y

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

LMNED-PP

8 April 1968

Mr. William C. Galegar, Regional Director
Federal Water Pollution Control Administration
Third Floor--1402 Elm Street
Dallas, Texas 75202

Dear Mr. Galegar:

Please refer to our letter dated 21 April 1967 requesting your views and comments on the general design memorandum for the Lake Pontchartrain Barrier Plan feature of the "Lake Pontchartrain, La. and Vicinity" project.

Our letter dated 21 April 1967 indicated that your views and comments would be requested for each supplement to the general design memorandum. However, we now feel that your views on the entire Lake Pontchartrain Barrier Plan would be preferable. The layout of the Lake Pontchartrain Barrier Plan, as described in House Document No. 231, 89th Congress, 1st Session, is shown in inclosure 1. The plan, layout of which is shown on inclosure 2, now under consideration is essentially the same as that presented in the House Document, with the following exceptions:

a. Barrier. The Chief of Engineers has approved a change in the alignment of the barrier in the Chef Menteur Pass area to that shown on inclosure 3. The barrier elevation will be 9 feet mean sea level or the elevation of existing U. S. Highway 90, whichever is higher. The remaining structures sites will remain as specified in the House Document, except that consideration is being given to widening the Rigolets Lock from 84 feet to 110 feet. The modification of the width of the Rigolets Lock is not for public release.

b. Seabrook Lock. The Chief of Engineers has approved a change in the controlling elevation of the Seabrook Lock from 13.2 feet to 7.2 feet mean sea level. This change will be effected by lowering the crown of the rock dike which will tie the lock to the levee system. In addition, auxiliary control structures, located on each side of the lock, will be added to provide for passage of flows or salinity control and riparian use when the lock is passing traffic.

c. Levees. Based on revised parameters for the standard project hurricane, as developed by the U. S. Weather Bureau, the levee grades recommended in House Document No. 231 were increased by as much as 1 to 2 feet.

d. St. Charles Parish Levees.. The St. Charles Parish Lakefront levee will extend across the Parish Line Canal and tie into the Jefferson Parish Lakefront levee, rather than having a levee extending south approximately 3.5 miles along the west side of the Parish Line Canal to the Illinois Central Railroad. Drainage structures will be provided in the Lakefront levee to allow gravity drainage of the area.

We have received your comments on Seabrook Lock and the Citrus Back Levee, i.e., the levee along the north bank of the Gulf Intracoastal Waterway from the Inner Harbor Navigation Canal to the Michoud Canal, by letter dated 23 June 1967. Your views, recommendations, and comments on the remainder of the Lake Pontchartrain Barrier Plan are requested.

Because of the urgency of providing protection to the areas vulnerable to hurricane flooding, we are operating on a much compressed planning schedule. Accordingly, it would be very much appreciated if your comments are provided not later than 1 June 1968.

Sincerely yours,

3 Incl
1. Gen Map (file H-2-23693) dtd Nov 65
2. Gen map (file H-2-23693) rev May 67
3. Map - barrier alignment (file H-2-24-66, plate 2)

THOMAS J. BOWEN
Colonel, CE
District Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
1402 ELM STREET, 3RD FLOOR
DALLAS, TEXAS 75202

May 15, 1968

Your Ref: LMNED-PP

Colonel Thomas J. Bowen, District Engineer
Department of the Army
New Orleans District, Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to your letter of April 8, 1968 requesting review and comment on the remainder of the Lake Pontchartrain Barrier Plan.

We have reviewed the information submitted in accordance with Executive Order 11288, Sections 1(3) and 1(7) in regard to water pollution control measures and find as follows:

a. All contractors should perform construction operations in a manner that will reduce turbidity and siltation to the lowest practicable level.

b. All contractors should take precautions to prevent water pollution by accidental spillage of hazardous materials which would result in substantial harm to fish or shellfish. Also, all contractors should provide and maintain sanitation facilities that will adequately treat domestic wastes to conform with Federal and local health regulations.

c. It is desirable that the water quality control structures be constructed and operated so as to prevent changes in the present water quality and to ensure that ecological conditions remain unchanged.

The comments of the Louisiana Stream Control Commission have been incorporated in our review.

Colonel Thomas J. Bowen
C/E, New Orleans, Louisiana

5/15/68

Your cooperation in carrying out the requirements of the Order is appreciated.

Sincerely yours,

for WILLIAM C. GALEGAR
Regional Director

cc: Louisiana Stream Control Commission

C O P Y

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

LMNED-PP

15 July 1969

Mr. William C. Galegar, Regional Director
Federal Water Pollution Control Administration
Third Floor - 1402 Elm Street
Dallas, Texas 75202

Dear Mr. Galegar:

Please refer to our letter dated 8 April 1968 requesting your views on the entire Lake Pontchartrain Barrier Plan and your reply dated 15 May 1968. We are now considering a modification to that portion of the current plan located in the vicinity of the Rigolets Pass.

The layout of the Lake Pontchartrain Barrier Plan, provided with our letter of 8 April 1968, and the plan now under consideration are essentially the same; however, two additional schemes for the Rigolets Control Structure and Closure are presently being evaluated. The new schemes are as follows:

a. A control structure with sixteen 50-foot bays and a sill elevation of -30 feet m.s.l. (mean sea level). The structure would be located in the main channel of the Rigolets and constructed inside a cellular sheet pile cofferdam. A closure dam would extend from the east end of the structure thence across the Rigolets. This scheme required no approach channels. (Refer to inclosed layout.)

b. A control structure with twenty-three 50-foot bays and a sill elevation of -20 feet m.s.l. The layout is the same as for the above scheme.

It is requested that you furnish your views and comments on the above schemes at your earliest conveniience.

Sincerely yours,

Incl
Layout

HERBERT R. HAAR, JR.
Colonel, CE
District Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
1402 ELM STREET, 3RD FLOOR
DALLAS, TEXAS 75202

August 5, 1969

Your Ref: LMNED-PP

Colonel Herbert R. Haar, Jr.
District Engineer
U. S. Army Engineer District, New Orleans
P. O. Box 60267
New Orleans, Louisiana 70160

Attention: LMNED-PP

Dear Sir:

Reference is made to your letter of July 15, 1969 requesting our comments on the modifications to your Lake Pontchartrain Barrier Plan in the vicinity of the Rigolets Pass.

We have reviewed this modification in regard to water pollution control measures and recommend that the final plans and specifications for the project require the contractors to:

1. Provide and maintain sanitation facilities that will adequately treat domestic wastes to conform with Federal and State health regulations.

2. Perform construction operations in a manner that will reduce turbidity and siltation to the lowest practicable level.

3. Take precautions to prevent water pollution by accidental spillage of hazardous materials which would result in substantial harm to fish or shellfish.

The comments of the Louisiana Stream Control Commission and Louisiana State Department of Health have been incorporated in our review.

Your cooperation in carrying out the requirements of the Order is appreciated.

Sincerely yours,

JERRY T. THORNHILL, Assistant Chief
Federal Activities Coordination

cc: Louisiana Stream Control Commission

Louisiana State Department of Health

C O P Y

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

LMNED-PP

3 July 1969

Mr. C. Edward Carlson, Regional Director
U. S. Department of the Interior
Fish and Wildlife Service
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Carlson:

Please refer to our letter dated 2 April 1968 requesting your views on the entire Lake Pontchartrain Barrier Plan and your reply dated 15 May 1968. We are now considering a modification to that portion of the current plan located in the vicinity of the Rigolets Pass.

The layout of the Lake Pontchartrain Barrier Plan, provided with our letter of 2 April 1968, and the plan now under consideration are essentially the same; however, two additional schemes for the Rigolets Control Structure and Closure are presently being evaluated. The new schemes are as follows:

a. A control structure with sixteen 50-foot bays and a sill elevation of -30 feet m.s.l. (mean sea level). The structure would be located in the main channel of the Rigolets and constructed inside a cellular sheet pile cofferdam. A closure dam would extend from the east end of the structure thence across the Rigolets. This scheme required no approach channels. (Refer to inclosed layout.)

b. A control structure with twenty-three 50-foot bays and a sill elevation of -20 feet m.s.l. The layout is the same as for the above scheme.

It is requested that you furnish your views and comments on the above schemes at your earliest conveniience.

Sincerely yours,

HERBERT R. HAAR, JR.
Colonel, CE
District Engineer

We appreciate the opportunity to provide these comments at this time. If current plans are further modified, we request the opportunity for further review and comment.

A copy of this letter has been sent to the Louisiana Wild Life and Fisheries Commission. Any comments that agency wishes to make will be forwarded to you.

Sincerely yours,

W. L. Towns
Acting Regional Director

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

APPENDIX D

TIDAL HYDRAULICS

APPENDIX D

LAKE PONTCHARTRAIN BARRIER PLAN
APPENDIX D
TO
SUPPLEMENT NO. 1, GENERAL DESIGN MEMORANDUM NO. 2
RIGOLETS CONTROL STRUCTURE AND ADJOINING LEVEES
LAKE PONTCHARTRAIN BARRIER
TIDAL HYDRAULICS

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LAKE PONTCHARTRAIN BARRIER
TIDAL HYDRAULICS

SECTION I - DESIGN DIFFERENTIAL HEADS

1. General. The Hydrology and Hydraulic Analysis Design Memorandum No. 1 is being presented in a series of four separate reports subtitled Part I - Chalmette, Part II - Barrier, Part III - Lakeshore, and Part IV - Chalmette Extension. Parts I, II, and IV have been approved and Part III - Lakeshore is scheduled for submission in August 1968. These documents present detailed descriptions of the procedures used in the tidal hydraulic design of the plan; include the essential data, assumptions, and criteria; and give results of studies which provide the bases for determining surges, routings, wind tides, wave runup, overtopping volumes, and design storm frequencies. However, specific design criteria will be developed for each structure to include design differential heads, wave data, and, where pertinent, critical design velocities.

2. Design considerations. Maximum surge elevations at the barrier site on the Lake Borgne side were determined in DM No. 1, Part II - Barrier. However, maximum and minimum elevations on the Lake Pontchartrain side and minimum stages on the Lake Borgne side are determined herein to determine conditions producing the most critical differential heads between Lakes Pontchartrain and Borgne. The net grade of 9.0 feet* for the barrier embankment restricts major overflow from either side until overtopping occurs. The rate of discharge over the barrier embankment increases as the upstream stage increases. The hurricane winds, which generate the wind setup on one side of the control structure, blow in such a direction as to cause setdown on the opposite side; consequently, a critical differential head will result across the control structure. The differential head is a function of wind velocity, wind direction, and barrier elevation as these factors affect the upstream stage, downstream controlling stage, and overtopping discharge. Computations of wind setdown at the eastern end of Lake Pontchartrain indicated that before overtopping of the barrier levee began, the Lake Pontchartrain bed near the barrier would become exposed for some hurricanes of intensity equal to or less than the SPH (Standard Project Hurricane)

*Elevations refer to mean sea level datum unless otherwise noted.

following tracks C and F (see plate 1). This illustrated a possible condition for which an 8- to 10-foot stage could occur on the Lake Borgne side of the control structure and a stage of approximately -6 feet on the Lake Pontchartrain side exposing the lake bed near the barrier. With passage of the hurricane, the stage on the Lake Borgne side of the barrier will increase, and the stage on the Lake Pontchartrain side of the barrier will decrease until overtopping of the barrier floods the control structure channel and lake bottom increasing the protected side stage.

3. Methods of computation. In order to determine the stage on the downstream side of the control structure for any given rate of discharge, the location of a control section was determined. The average depth of a cross section of Lake Pontchartrain downstream from the control structure is -6.0 feet (see plate 1). The lake is deeper upstream and downstream from this section.† Consequently, the control section was determined to govern backwater conditions when flow over the barrier began. Since the portion of the lake bed represented by this section is extremely wide and nearly horizontal, fluid mechanics governing horizontal rectangular channels of great width were assumed to apply. For a horizontal channel, slope $S_o=0$, the normal depth is infinite, and flow may be either below critical depth or above critical depth. The equation for water surface slope has the form:

$$\frac{dL}{dy} = \frac{1 - Q^2 T/gA^3}{S_o - n^2 Q^2/2.22A^2 R^{4/3}} \qquad (1)$$

where Q = discharge,
T = width of channel at surface,
A = cross-sectional area,
R = hydraulic radius, equal to the depth y for wide channels,
n = Manning roughness coefficient,
g = acceleration due to gravity.

Flow below critical depth y_c would give lower stages and produce greater differential heads across the control structure than flow above critical depth. For depths y less than critical, dL/dy is positive, the depth increases in the downstream

†As referred to hereinafter in this appendix, upstream of the control section refers to the easterly or barrier side of the control section; and downstream of the control section refers to the westerly side of the control section.

direction,[1‡] and the average velocity V is greater than the critical velocity V_c. The critical velocity V_c is equal to $(gy_c)^{1/2}$ and the critical depth may be computed by the equation:

$$y_c^3 = q^2/g \qquad (2)$$

where q = unit width discharge $\frac{Q}{T}$.

For a peak discharge over the barrier levee of 887,000 cubic feet per second caused by the SPH traveling along track F, the critical depth and velocity at the control section are 2.48 feet and 8.93 feet per second, respectively. The average width T at this section is 40,000 feet. However, a wind shear stress τ_s is imposed upon the water surface along the axis of flow. It can be shown that if the bottom shear stress τ_b is equal to the surface wind shear stress, the energy slope is constant and equal to zero.[2] The resisting force along a short reach of channel L (see plate 2) is equal to the relation $\tau_b LP_b$, where P_b is the wetted perimeter. The driving forces are the forces resulting from a difference in hydrostatic pressure $(p_1-p_2)A$, the axial weight component $\gamma A\Delta y$, and the wind force $\tau_s LP_s$, where gamma γ is the unit weight of water and P_s equals surface width. Equating these and assuming $P_s \simeq P_b$ give the following:

$$(\tau_b-\tau_s)LP = \Delta pA + \gamma Ady \qquad (3)$$

$$(\tau_b-\tau_s)LP = A(\Delta p+\gamma dy) \qquad (4)$$

if $\frac{(\Delta p+\gamma dy)}{\gamma} \simeq$ head losses h_f, and $\tau_s \simeq \tau_b$

then $(\tau_b-\tau_s) = \frac{\gamma A h_f}{PL}$

Since $R = \frac{A}{P}$, $S = \frac{h_f}{L}$, and $\tau_b-\tau_s = 0$; $\gamma RS = 0$ (5)

where S represents the energy gradient and equals the head loss per unit length. The exact value of τ_s is not known but is related to the wind velocity U by the expression $k\rho_a U^2$, where the coefficient k must be evaluated experimentially or estimated from past observations and ρ_a is the density of air[3]. Hunt[4,5] has determined $k\rho_a$ to be equal to 8.65×10^{-6} for a deep bounded channel (y>3 feet)

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‡Superscribed numbers refer to references in Section III - Bibliography.

Par 3

where setup can occur and reach a steady state. It is believed that $k\rho_a$ would be greater than 8.65×10^{-6} for a shallow unbounded channel.[6,7] If the shear stress is constant throughout the depth, then τ_b equals τ_s, and the average instantaneous velocity V may be computed by using Hunt's equation for τ_s and equating it to the bottom stress function τ_b:

$$\tau_b = \frac{f}{4} \rho \frac{V^2}{2} \qquad \tau_s = k\rho_a (U-8)^2$$

$$\frac{f}{4} \rho \frac{V^2}{2} = k\rho_a (U-8)^2 \tag{6}$$

and solving for the water velocity gives

$$V = \sqrt{\frac{8k\rho_a (U-8)^2}{f\rho}} \tag{7}$$

where ρ = density of water, 1.94 slugs/ft.^{3}

$k\rho_a = 8.65 \times 10^{-6}$

f = Darcy-Weisbach roughness coefficient evaluated from a Moody Diagram using the procedure for open channel flow. The Lake Pontchartrain bed is composed of clays and silts and is free of ripples and dunes; therefore, a silt diameter of 0.061 millimeters (where 90% by weight is assumed finer[8]) was chosen as representative of the boundary roughness diameter ε. Assuming an average depth y of 2.0 feet and a peak instantaneous windspeed of 125 miles per hour (183.25 feet per second), $\frac{\varepsilon}{4y} = 0.000025$ and f is taken as 0.009; the peak instantaneous velocity would be:

$$V = \sqrt{\frac{8 \times 8.65 \times 10^{-6} (183.25-8)^2}{1.94 \times 0.009}}$$

$$= 11.06 \text{ feet per second}$$

Therefore, V = 11.06>V_c = 8.93 and flow would be below critical depth y_c as follows:

$$y = \frac{Q}{VT} \qquad (8)$$

$$= \frac{887{,}000 \text{ c.f.s.}}{11.06 \text{ f.p.s.} \times 40{,}000 \text{ feet}}$$

$$= 2.00 \text{ feet}$$

The average water surface elevation at the control section for the SPH would be -4 feet (-6 feet + 2 feet). Assuming a flat slope, S_o=0, the water surface elevation was extended from the lake upstream to the mouth of the proposed control structure approach channel. A backwater computation using the Manning formula was computed from the mouth of the approach channel to the downstream (Lake Pontchartrain) side of the structure. Inflow into the channel was from wave overtopping of the control structure plus flow entering the channel from the west bank due to overflow of the barrier levee west of the control structure (see plate 1). This inflow increased the water surface elevation at the donwstream side of the control structure. This procedure was performed for several different discharge rates and controlling elevations coinciding with different hypothetical hurricane intensities. Similar analyses were made to determine stages at the gates on the Lake Borgne side for a reverse head condition.

4. Design differential heads. For a 10.60-foot stage in Lake Borgne, a coincidental -4.20-foot stage was determined on the Lake Pontchartrain side and for a 12.8-foot stage on the Lake Borgne side, a coincidental -3.0-foot stage was determined on the Lake Pontchartrain side of the control structure. These stages correspond, respectively, to Moderate and Standard Project Hurricanes on track F. A stage-frequency curve, based on four hypothetical moderate and severe hurricanes, was derived in order to determine the differential heads for any hurricane likely to occur. The minimum stages on the Lake Pontchartrain side, coincidental to maximum stages on the Lake Borgne side, were plotted at the frequency positions corresponding to the different hypothetical hurricanes. This plot provided a lower limit of points through which an envelope curve of minimum stages could be drawn. The maximum and minimum stage-frequency curves thus provided a means of determining coincident stages for any hurricane of an intensity equal to or less than the SPH. A study of these curves indicated that differential heads which fell between those actually computed were more critical than the less frequent differential caused by the SPH, and should be used for

design of certain features. This procedure as illustrated on plate 3 was used to determine the differentials in both directions across the control structure. Plates 4 and 5, respectively, illustrate stage-frequency curves for hurricanes following track C, and for hurricanes of intensities equal to or less than the SPH, following any track, producing higher stages on the Lake Pontchartrain side. Differentials produced by hurricanes which generate stages equal to or greater than 9.0 feet may prevail for 15 to 20 hours. Durations of this magnitude should be used in structural design considerations.

SECTION II - DESIGN WAVES

5. Wave data. The parameters which determine wave characteristics are fetch length, windspeed, duration of wind, and the average depth of water over the fetch. In determining the design wave characteristics, it was assumed that steady state conditions prevail; i.e., the windspeed is constant in one direction over the fetch and blows long enough to develop a fully risen sea. The windspeed U is an average velocity over the fetch length F and is obtained from the isovel patterns for the synthetic hurricane chosen as being critical to the location of interest. The average depth of fetch is the average depth of water as shown by the charts and maps for the area, plus the increase in water elevation caused by wind. Data necessary to determine design wave characteristics in the vicinity of the structure are shown in table -1 as follows:

TABLE D-1

DATA USED TO DETERMINE WAVE CHARACTERISTICS
DESIGN HURRICANE

	Lake Borgne side	Lake Pontchartrain side
F - Length of fetch (mi.)	5	5
U - Windspeed (m.p.h.)*	90	90
swl - Stillwater level (ft. m.s.l.)	12.8	11.5
d - Average depth of fetch (ft.)	13.8	20.0

*Represents a 5-minute average referenced to 30 feet above the boundary surface.

The significant wave height H_s and wave period T were determined from curves which are found in Coastal Engineering Research Center, Technical Report No. 4, June 1966, which relates H_s and T to the data in table -1 above. The deepwater wave length L_o was determined from the equation: $L_o=5.12T^2$. The equivalent deepwater wave height H_o' was determined from table D-1 of the above reference, which relates the relative depth d/L_o to H_s/H_o'. Wave characteristics for the design hurricane which are pertinent to the design of the structures are shown in table -2.

TABLE D-2

WAVE CHARACTERISTICS - DESIGN HURRICANE

		Lake Borgne side	Lake Pontchartrain side
H_s	- Significant wave height(ft.)	5.8	7.60
T	- Wave period (sec.)	5.8	6.75
L_o	- Deepwater wave length(ft.)	172	233
d/L_o	- Relative depth	0.08023	0.08584
H_s/H_o'	- Shoaling coefficient	0.9545	0.9471
H_o'	- Deepwater wave height(ft.)	6.08	8.02
H_o'/T^2	- Wave steepness	0.181	0.176
d_b	- H_o' breaking depth (ft.)	7.19	9.59
H_b	- Wave height on breaking(ft.)	5.61	7.49
H_{10}	- Average of highest 10% of all waves (ft.)	7.37	9.65
H_1	- Average of highest 1% of all waves (ft.)	9.70	12.70

SECTION III - BIBLIOGRAPHY

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[2]R.O. Reid, Modification of the Quadratic Bottom-Stress Law for Turbulent Channel Flow in the Presence of Surface Wind-Stress, Beach Erosion Board, Technical Memorandum No. 93, February 1957, p. 22.

[3]Corps of Engineers, U. S. Army, Office of the District Engineer, Jacksonville, Fla. Project, CW-167, Waves and Wind Tides in Shallow Lakes and Reservoirs, Summary Report, June 1955, pp. 27, 28.

[4]I. A. Hunt, Jr., Effect of Wind on Surface of Liquids, unpublished Doctor's thesis, University of Grenoble, Grenoble, France, 1954.

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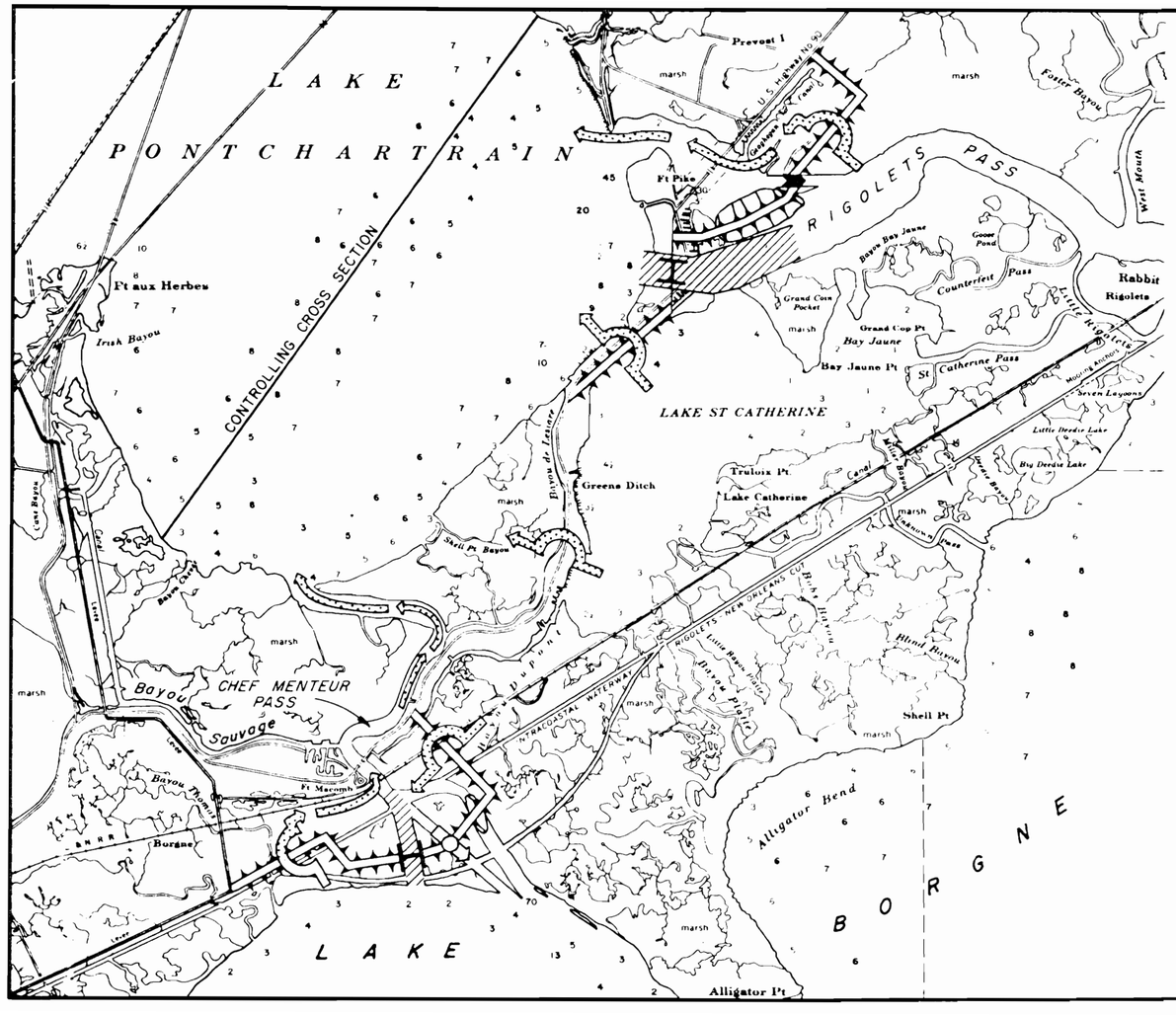
[6]Ira A. Hunt, Jr., Winds, Wind Set-ups, and Seiches on Lake Erie, U. S. Army Lake Survey 1959, pp. 1-11.

[7]Basil W. Wilson, The Prediction of Hurricane Storm-Tides in the New York Bay, U. S. Army Beach Erosion Board (Contract No. DA-49-055-CIV-ENG-58-9) and Texas A&M College, 1959, pp. 40-41.

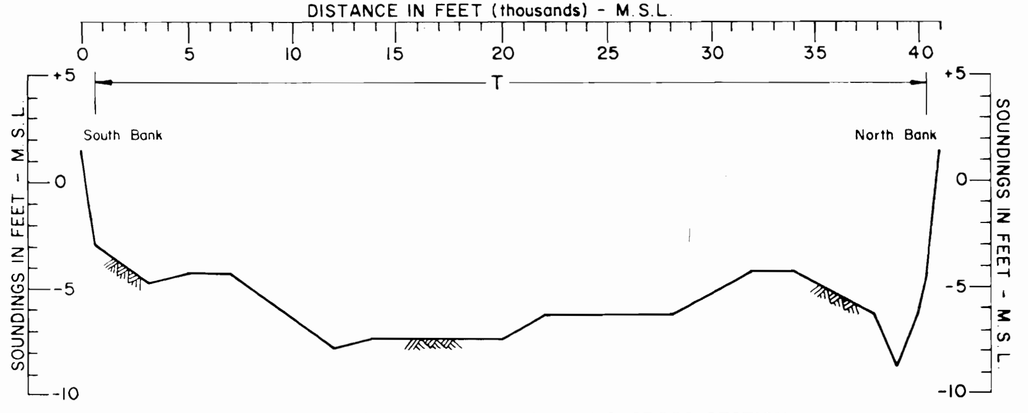
[8]A. J. Raudkivi, Loose Boundary Hydraulics, Pergamon Press, Inc., New York, 1967, pp. 42-43.



L E G E N D

- Lock
- Floodgate
- Control Structure
- Approach Channel
- Closure Dam
- Highway Embankment
- Barrier Embankment (new)
- Railroad Embankment
- Direction of Flow

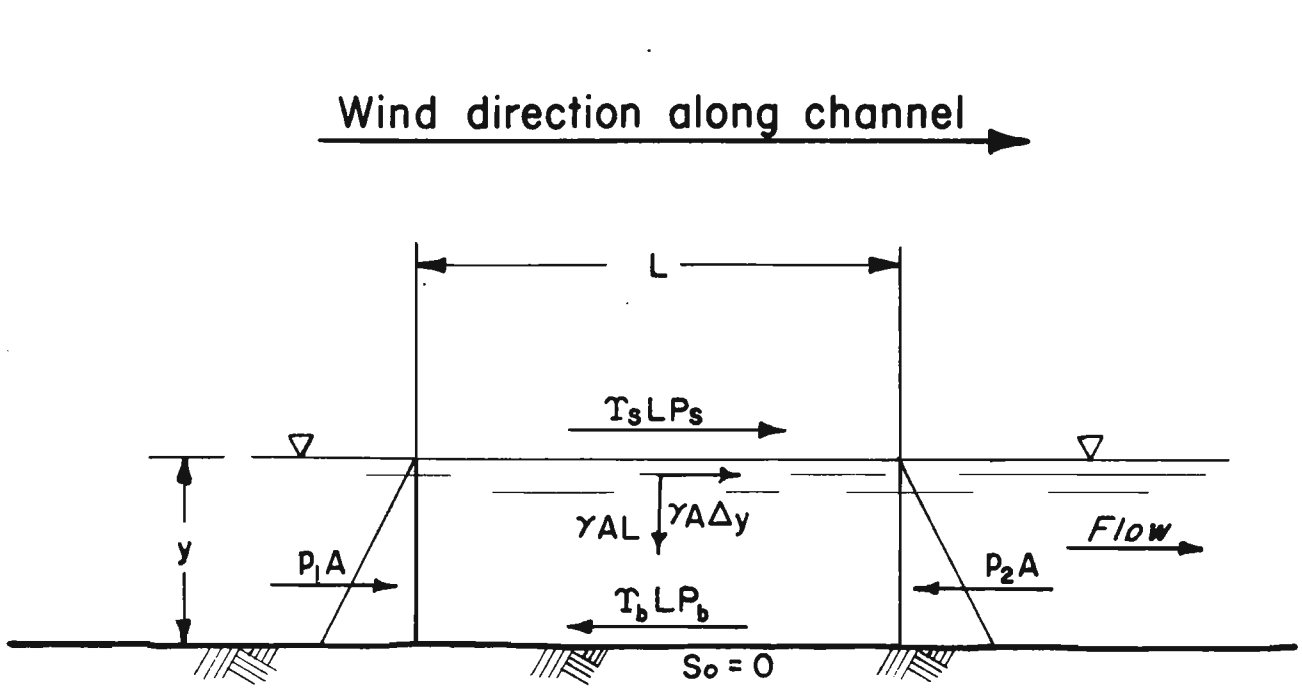
N



LAKE PONTCHARTRAIN CONTROLLING CROSS SECTION

NOTE:
Soundings obtained from C. & G.S. Chart No. 1268.

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
CONTROLLING CROSS SECTION
TRACKS C & F AND FLOW REGIMEN
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
SEPT 1968 FILE NO H-2-24753



Note:

Resisting force is $T_b L P_b$

Driving forces are $(p_1 - p_2)A + \gamma A \Delta y + T_S L P_S$

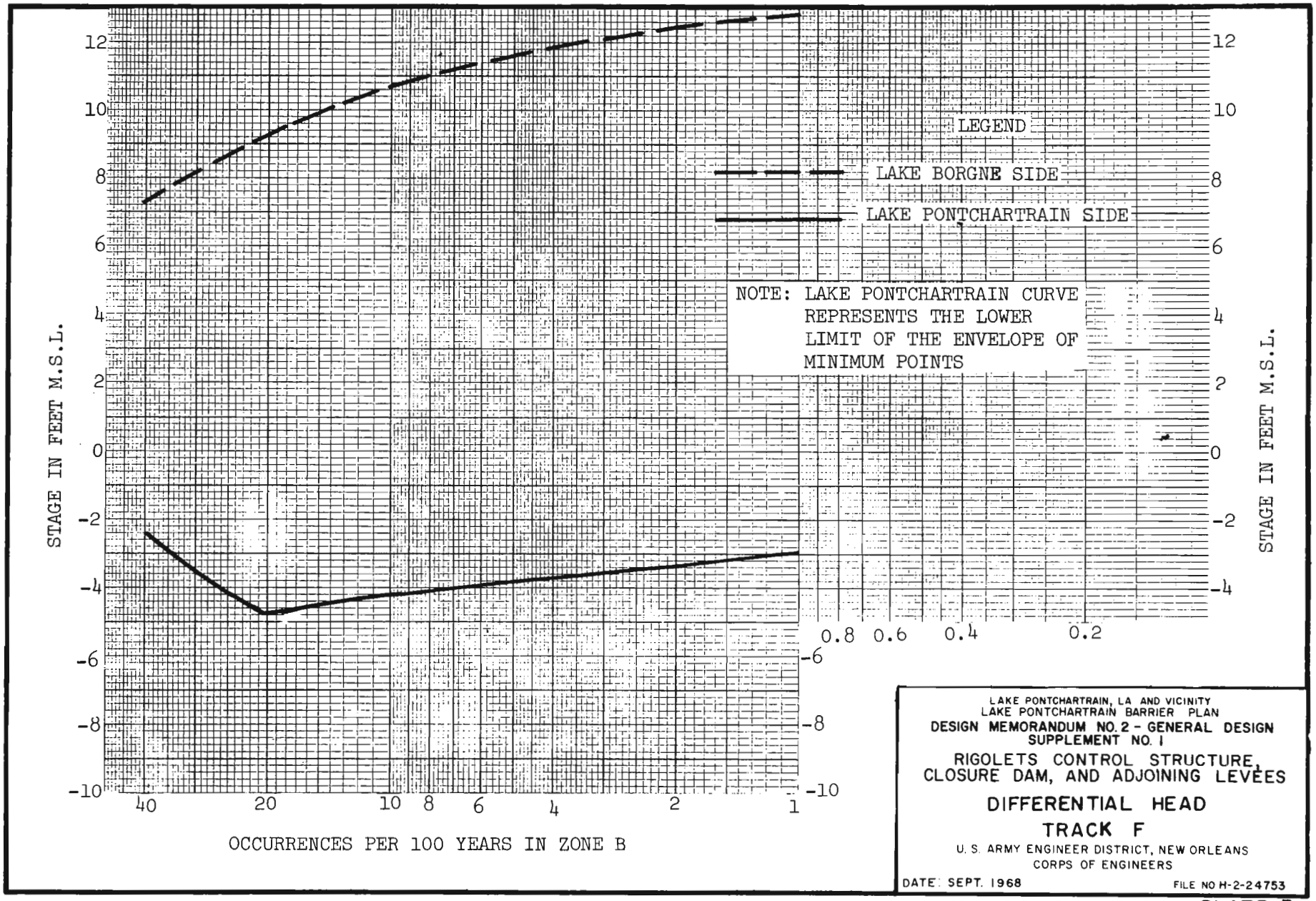
Equating forces gives $T_b L P_b = (\Delta_p + \gamma \Delta_y) A + T_S L P_S$

Transposing wind stress term gives $(T_b P_b - T_S P_S) L = (\Delta_p + \gamma \Delta_y) A$

Assuming $T_b = T_S$ and $P_b \simeq P_S$ then $(\Delta_p + \gamma \Delta_y) \frac{A}{P} = 0$

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
EFFECT OF SURFACE WIND STRESS
ON WATER PROFILES
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
SEPT. 1968
FILE NO H-2-24753

PLATE 2



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

DIFFERENTIAL HEAD

TRACK F

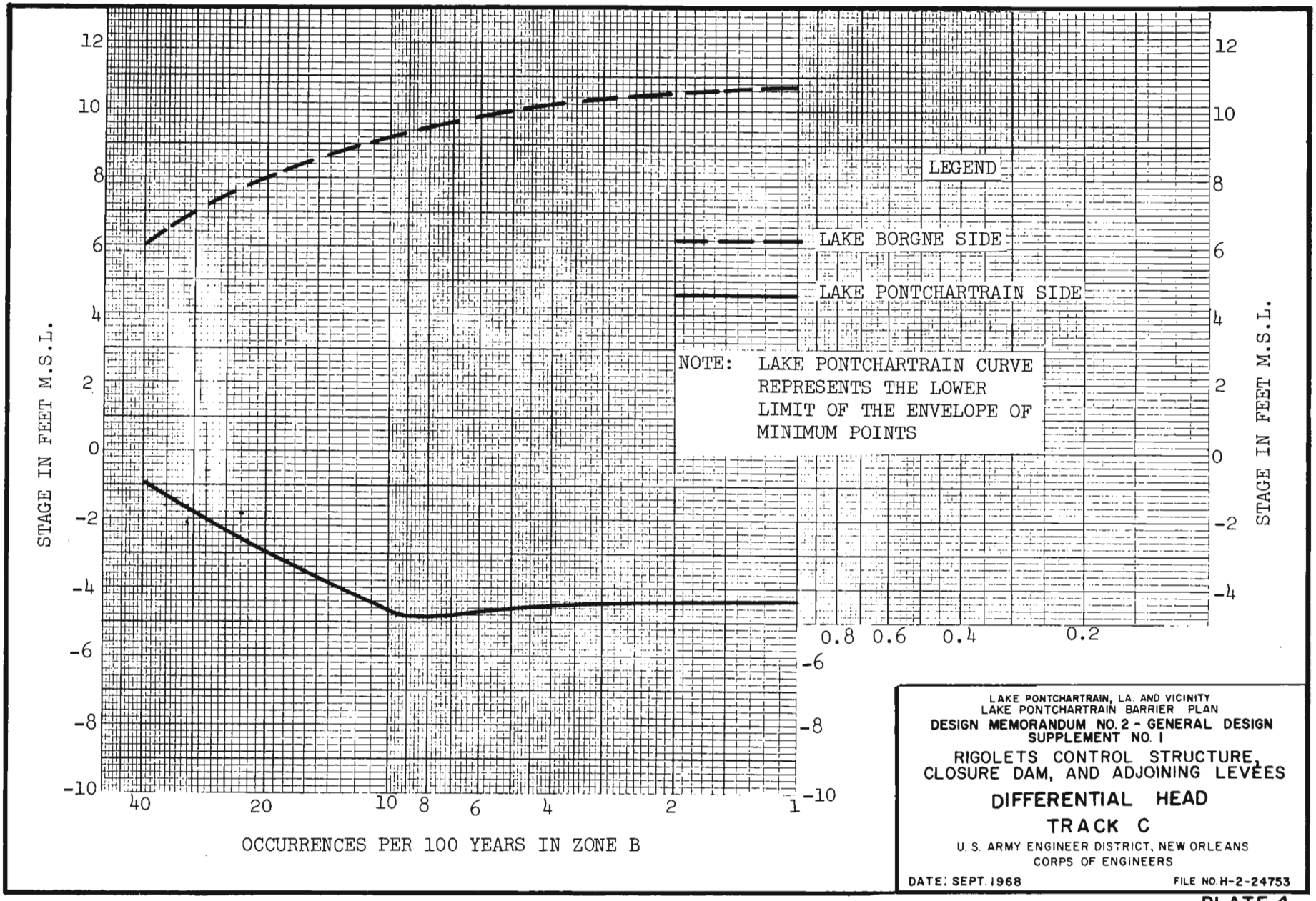
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: SEPT. 1968

FILE NO H-2-24753

PLATE 3

PLATE 3



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

DIFFERENTIAL HEAD

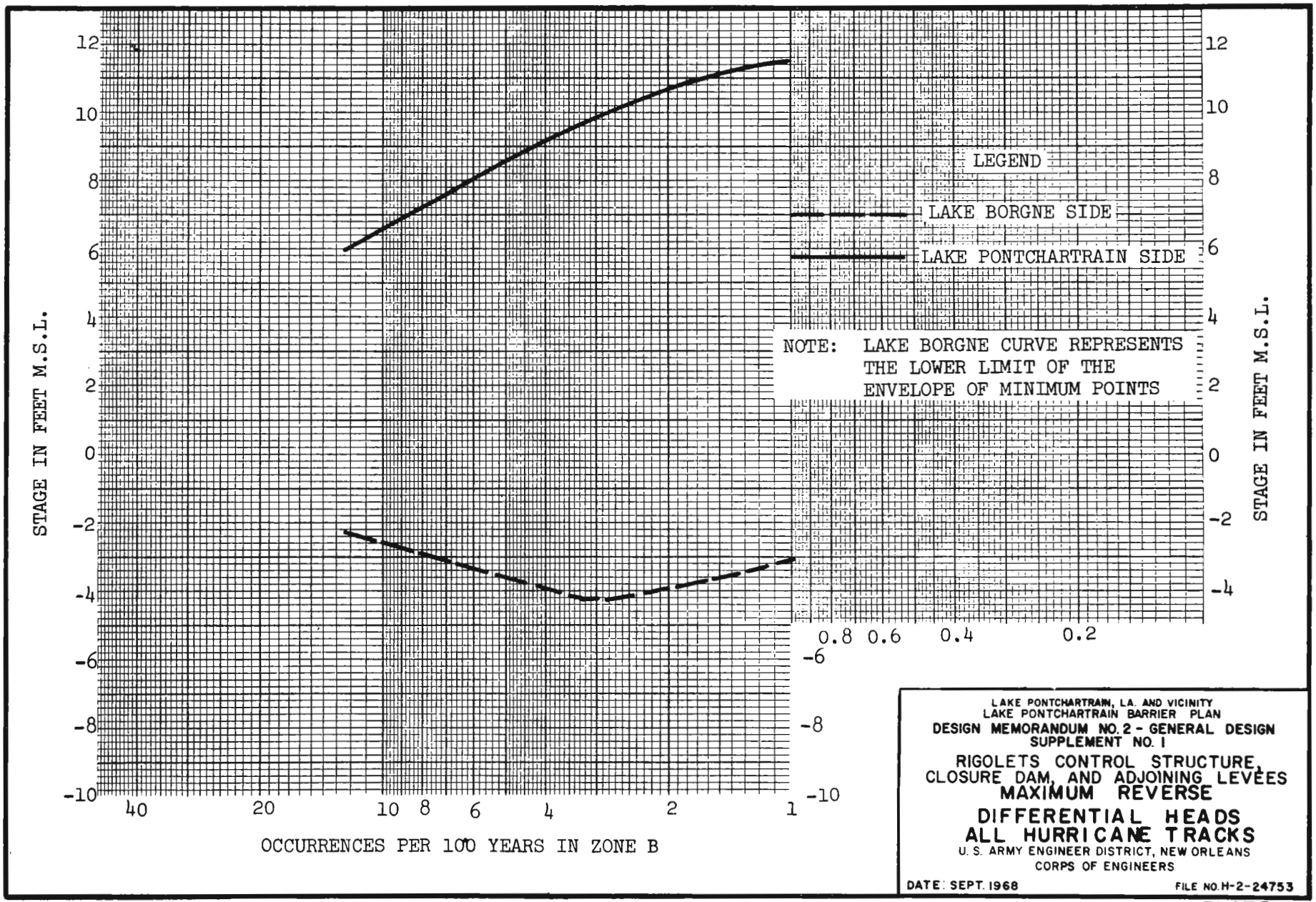
TRACK C

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

DATE: SEPT. 1968 FILE NO. H-2-24753

PLATE 4

PLATE 4



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

MAXIMUM REVERSE

DIFFERENTIAL HEADS
ALL HURRICANE TRACKS

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

DATE: SEPT. 1968

FILE NO. H-2-24753

PLATE 5

PLATE 5