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no. 1-B  
1959

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CORPS OF ENGINEERS, U. S. ARMY

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MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

St. BERN

Yclskey

MARGO "D" borings

DESIGN MEMORANDUM NO. 1-B

CHANNELS

MILE 39.01 - MILE 63.77

PREPARED IN THE OFFICE OF THE DISTRICT ENGINEER  
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS  
NEW ORLEANS, LOUISIANA

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SEPTEMBER 1958

(Revised May 1959)

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TC202  
N46M5G8  
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1959

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS  
CORPS OF ENGINEERS  
Foot of Prytania Street  
New Orleans 9, Louisiana

MAY 14 1959

LMNGY

SUBJECT: Revised Design Memorandum 1-B, Mississippi River-Gulf Outlet.

TO: The Division Engineer  
U.S. Army Engineer Division  
Lower Mississippi Valley  
P. O. Box 80  
Vicksburg, Mississippi

1. Reference is made to your 1st Indorsement dated 2 March 1959, to letter from this District dated 5 February 1959, subject, "Design Memorandum 1-B, Mississippi River-Gulf Outlet."

2. Design Memorandum 1B, approved by Office of the Chief of Engineers, 27 January 1959, subject to your comments, has been revised in accordance with said comments. Eight copies of the revised design memorandum are inclosed.

1 Incl. (8 Cys)  
Design Memo No. 1-B, CHANNELS  
Mississippi River-Gulf Outlet

G. M. COOKSON  
Colonel, CE  
District Engineer

12066

U. S. ENGINEER DISTRICT, NEW ORLEANS  
CORPS OF ENGINEERS  
Foot of Prytania Street  
New Orleans 9, Louisiana

LMNGY

15 September 1958

SUBJECT: Design Memorandum No. 1-B, CHANNELS  
Mississippi River - Gulf Outlet

TO: The Division Engineer  
U. S. Army Engineer Division  
Lower Mississippi Valley  
P. O. Box 80  
Vicksburg, Mississippi

1. In accordance with ER 1110-2-210 (Par. 4214.12 O & R) eight copies of subject design memorandum are forwarded herewith.

2. Approval is recommended.

3. Scheduled advertisement for bids for the first dredging contract proposed in this design memorandum has been advanced to 14 October 1958. This advancement is considered necessary in view of additional funds of \$500,000 in excess of budget request being made available for expenditure in Fiscal Year 1959. To expedite preparation of plans and specifications and advertisement of the work, telegraphic approval of the subject design memorandum is requested.

1 Incl (8 cys)  
Design Memorandum  
No. 1-B - CHANNELS  
Miss. River-Gulf Outlet

G. M. COOKSON  
Colonel, CE  
District Engineer

LMV GU

1st Ind

SUBJECT: Design Memorandum No. 1-B, CHANNELS, Mississippi River-Gulf Outlet (NOD ltr 15 Sep 58)

Office, Div Engr, USA Engr Div, LMV, CE, Vicksburg, Miss. OCT 24 1958

TO: CofEngrs

ATTN: ENGMR & ENGWE

1. Approval of Design Memorandum No. 1-B, Channels, Mississippi River-Gulf Outlet, is recommended subject to the inclosed comments.
2. Submission of subject design memorandum in advance of Design Memorandum No. 2, General Design, was approved by 2d Ind, ENGWE, dated 19 February 1958 on letter, LMNGO, dated 3 February 1958, subject, "Revision of Design Memoranda Submission Dates - Mississippi River-Gulf Outlet". The principal reasons for deferring submission of the general design memorandum, as given in basic letter cited above, are completion of the test pit program and the other studies required to fix the channel location across open water (Chandeleur Sound), and to permit local interests and the U.S. Fish and Wildlife Service to complete studies underway.
3. Telegraphic advice of action taken is requested.

FOR THE ACTING DIVISION ENGINEER:

2 Incls

Withdrawn:

1. 3 cys

Added:

2. LMVD Comments (Trip)

NORMAN R. MOORE

Chief, Engineering Division

U. S. ARMY ENGINEER DIVISION, LOWER MISSISSIPPI VALLEY  
CORPS OF ENGINEERS  
VICKSBURG, MISSISSIPPI

23 October 1958

COMMENTS ON DESIGN MEMORANDUM INCLOSED WITH LETTER, LMNGY,  
DATED 15 SEPTEMBER 1958, SUBJECT, "DESIGN MEMORANDUM NO. 1-B,  
CHANNELS, MISSISSIPPI RIVER - GULF OUTLET"

1. Par. 10, Page 3. The third sentence should be expanded to state how the spoil bank will provide a means of improving drainage.

2. Par. 18, Page 5 and Plate 11.

a. Stability analyses on Plate 11 should be checked; the factors of safety are less than those shown. (The factor of safety of the over-all 1 on 2 channel slope is about unity instead of 1.22).

b. The toe of the spoil retaining dike should be plotted 90 ft. from the channel bank, instead of 140 ft. and critical arcs and/or planes and corresponding factors of safety should be shown for this case.

c. Assumed shear strength and unit weight of spoil should be added to Plate 11.

d. If each phase of channel is excavated as a box cut, channel slopes of about 1 on 2 probably will result during excavation since their factor of safety is about one. However, they may ultimately fail because the shear strength of the clay may decrease due to reduction of effective stress caused by excavation. Therefore, the stability of slopes should be checked based on CD shear test data to evaluate the long-term stability. If these analyses show flatter slopes required, consideration should be given to excavating the final flatter slopes by a series of step cuts to reduce maintenance dredging in lieu of making a box cut and then be confronted with possible considerable maintenance dredging.

3. Par. 20, Page 6. In view of the concern expressed by the U.S. Fish and Wildlife Service over the adverse effects of discharging dredge spoil into the adjacent marshes, lakes, and streams, and the possibility of damage suits as a result thereof, it may be necessary to construct back dikes to confine the spoil to extent practicable.

4. Par. 33, Page 8. A brief statement should be included in this paragraph giving the reasons why the routes traversing the open waters of Lake Borgen were eliminated as undesirable.

5. Par. 39, Page 9. The contractor is being made responsible for preventing spoil from entering existing drainage outlets and also from extending beyond specified disposal areas. It appears that rear retaining dikes are the only positive means of preventing this and it may be

necessary to provide for their construction. The dredge effluent will follow natural drainage routes, thereby presenting a difficult problem of confinement within the spoil areas without the use of back retaining dikes.

6. Pars. 40 and 41, Page 10. It is probable that the 18 ft. by 140 ft. access channel will increase the overall cost of the channel because of the necessity of handling pipeline and the effluent disposal problem twice.

7. Plates 3 through 9. On profiles, change the word "advanced" to "advance". On plans, insert the word "area" after the word "disposal" in the note regarding permanent spoil disposal and insert the word "outer" in front of the note regarding temporary spoil disposal.

8. Plate 3. Shade water areas and show with appropriate gage symbol the location of Highway No. 47 Gage.

9. Plate 6. The stratum at elevation -140 MLG in boring 21-D should be classified.

10. Plate 8. Shade water areas and show with appropriate gage symbol the location of Yscloskey Gage.

MISSISSIPPI RIVER-GULF OUTLET  
LOUISIANA

Previous Design Memoranda

<u>Design Memorandum No.</u>	<u>Title</u>	<u>Date</u>
1 A	CHANNELS, Mile 63.77-Mile 68.85	April 1957 (Revised July 1957)

MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

DESIGN MEMORANDUM NO. 1-B

CHANNELS

MILE 39.01 - MILE 63.77

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MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

DESIGN MEMORANDUM NO. 1-B

CHANNELS

MILE 39.01 TO MILE 63.77

GENERAL

1. Project authorization. The Mississippi River-Gulf Outlet, La., a modification of the existing project, "Mississippi River, Baton Rouge to the Gulf of Mexico," was authorized by the River and Harbor Act 29 March 1956 (Public Law 455, 84th Congress, 2nd Session), substantially in accordance with report of the Chief of Engineers dated 5 May 1948 printed in House Document No. 245, 82nd Congress, 1st Session.

2. Project location. The general location of the project and its various features, situated in the southeast portion of the State of Louisiana, are as shown on Plate 1.

3. Design memorandum authorization. This design memorandum is prepared pursuant to paragraph 2 of letter from the Division Engineer, U. S. Army Engineer Division, Lower Mississippi Valley, dated 24 May 1956, subject: "Responsibility for Preparation of Design Memoranda and Plans and Specifications."

4. Purpose. The purpose of this design memorandum is to present pertinent information and data compiled and utilized in the design of the channel for that portion of the seaway canal extending from Mile 63.77 (500 feet west of Louisiana State Highway No. 47, Paris Road) to Mile 39.01 (Bayou La Loutre). The remainder of the route between Bayou La Loutre and the Gulf of Mexico will be presented in Design Memorandum 1-C, which will be prepared and submitted at a later date as the overall project planning progresses.

CHANNEL LOCATION

5. General. The general location of the proposed channel between Mile 63.77 (Hwy. 47) and Mile 39.01 (Bayou La Loutre) is shown on Plate 1. The detail location is shown on Plates 3 through 9. The proposed alignment follows the project document alignment utilizing the existing Intracoastal Waterway for the upper portion of this reach of the channel. Inasmuch as the Intracoastal Waterway with project dimensions of 12 ft. by 150 ft. is much smaller than the proposed channel, of 36 ft. by 500 ft., major enlargement of this section of the Intracoastal Waterway is necessary. The balance of the reach included in this design memorandum consists of a land cut 36' by 500' across low swamp and marsh lands which are traversed by numerous bayous, small streams, lakes, and sloughs.

6. Route selection. In selecting the route for the overall project, numerous factors are being considered and carefully weighed in arriving at a proposed alignment. For the reach covered by this design memorandum, the route follows the existing Gulf Intracoastal Waterway and the project document alignment in skirting the southern shore of Lake Borgne to Bayou La Loutre. In conformity with alignment of the first reach (Design Memorandum No. 1-A) the channel centerline in the upper portion of the reach (Mile 63.77 to Mile 63.15) will be 250 ft. south of the centerline of the existing Gulf Intracoastal Waterway. By this arrangement the north side slope of the proposed channel coincides approximately with the north side slope of the existing Gulf Intracoastal Waterway. At Mile 63.15 the proposed channel leaves the Gulf Intracoastal Waterway via a one degree curve and runs in a southeasterly direction to and along the south shore of Lake Borgne and through the marshes to Bayou La Loutre (Mile 39.01).

7. Channel design criteria. In order properly to provide for navigational and other requirements, and for future maintenance, the following design criteria have been used in the preparation of this design memorandum.

Datum plane.....	Mean low Gulf (mlG)
Channel width (authorized).....	500 feet
Channel Depth (authorized).....	36 ft. (below mlG)
Required additional depth for advanced maintenance.....	2 feet
Allowable overdepth (inaccuracies in dredging).....	2 feet
Channel side slopes.....	1 on 2
Berm width.....	90 feet (Minimum)
Degree of curvature.....	1° (Maximum)
Tangent distance approaching a bridge.....	2,000 ft. (Minimum)

#### HYDROLOGY

8. General. The proposed outlet is a tidewater channel and its water surface elevation will vary with tidal variations of the Gulf of Mexico. The upper terminus of the outlet is at the Inner Harbor Navigation Canal, also a tidewater channel, which connects to the Gulf of Mexico through the existing Gulf Intracoastal Waterway and also via Lake Pontchartrain, Lake Borgne, and Mississippi Sound.

9. Tidal fluctuations. Gage records are available along the route of the proposed channel at two locations - the Gulf Intracoastal Waterway near Highway 47 and Bayou Yscloskey at Shell Beach, La. The annual high water and annual low water elevations for the 10 year period for which records are available are shown on Plate 10. The highest stage, 8.35 mlG, recorded at the Highway 47 gage occurred during the passing of Hurricane "Flossy" in 1956, and the lowest stage, -0.5 mlG, was recorded in 1954. The highest stage recorded by the gage on Bayou Yscloskey was 11.32 mlG during the passing of Hurricane "Flossy" in 1956, and the lowest water stage during the period of record, -0.84 mlG, also occurred in 1956. Records are available for a much longer

period of time at the Inner Harbor Navigation Canal Lock near the upper terminus of the project. Hydrographs of this gage were included in Design Memorandum No. 1-A, "Channels, Mile 63.77 to Mile 68.85."

The influence of the proposed channel on the water surface elevations of the existing lakes and streams connecting therewith inland as far as Highway No. 47 will be negligible. For normal tides the elevations at Pensacola, Florida, and Lake Borgne, Louisiana, are practically the same. Lake Borgne, with its large openings into Mississippi Sound and the Gulf, controls the elevation in all of the streams inside of Bayou La Loutre crossing, and the small additional area of the project channel will not have any material influence on the elevations produced by ordinary tides, including those from lesser storms. For major storms and hurricanes when tides roll across the marsh many feet deep, as well as through the open water connections, the effect of the new channel will be of no consequence.

10. Drainage and reclamation. Under existing conditions the contiguous area is low swamp and marsh land except for the narrow alluvial ridges along the several bayous. Natural drainage is very poor. Construction of connecting levees and drainage facilities to reclaim the land for agricultural and commercial purposes will be facilitated.

11. Salinity. Under existing conditions the salinity in the area traversed by the channel decreases progressively from Chandeleur Sound toward New Orleans, salinities along the Lake Borgne segment being one-fourth to one-third of those in the Sound. With the project in place, salinities in the channel will tend to be higher toward the inner end, particularly so if the channel is effectively separated from the surrounding areas by spoil dikes. The extent to which these higher salinities will be transmitted into the surrounding area will depend on the number, size, and location of openings in the spoil for navigation, drainage, and other purposes. Normally, the rainfall over the immediate area and generally over the Pontchartrain Basin tends to make the water conditions fresher, by offsetting the salinity intrusion effects. If the channel is separated by spoil from the surrounding area--except for a few openings--the salinities in the area inland from Shell Beach to the west of the channel will tend to be fresher, and Lake Borgne should remain essentially unchanged.

12. Beach Erosion Board participation in studies. Preliminary studies were made and are being continued by the Beach Erosion Board to determine the influence on the channel of bottom movement in the open Gulf and Chandeleur Sound Areas caused by wave action and tidal currents and the influence of possible hurricane wind waves propagated up the channel. In respect to hurricane waves the Beach Erosion Board reported the following: "If the hurricane swell travels up the channel, some effect could be felt at New Orleans. The maximum wave at the entrance might be about 35 feet. Wave energy would be lost due to bottom friction along the side of the levee, and due to refraction. Rough computations

indicate that only 3% of the original height or about 1.0 foot would arrive at New Orleans; this will be less than hurricane wind waves that could be generated within the channel."

### GEOLOGY

13. General geology of the area. The portion of the Mississippi River-Gulf Outlet covered by this design memorandum is located in the lowlands bounded on the south by the natural levee ridges of Bayou La Loutre, an ancient course of the Mississippi River, and on the north by Lake Borgne. The lowlands are composed of Recent marine deltaic and marsh soil deposits which were accumulated as sea level rose during the waning of the late Wisconsin Glacial Stage and since sea level reached its present stand. These Recent soil deposits are underlain by stiff clays of the Pleistocene age. The top of the Pleistocene varies from about 60 to 100 feet below ground surface. The Recent deposits consist predominantly of clay with a highly organic layer about 10 feet thick at the surface and sandy and silty soils at the base. Where minor distributaries of the ancient Mississippi River course are crossed, the Recent deposit is predominantly silty and sandy, but organic layers at the surface are also present. A more detailed description and a generalized geologic section of the entire project area will be included in the General Design Memorandum.

14. Faulting. There is no indication of active faulting along the channel route that would be detrimental to construction of the waterway.

### SOILS

15. Field exploration. General type soil borings extending to depths of 50 to 152 feet were made at intervals of 2,500 to 4,000 feet along the proposed channel location. Two undisturbed borings 2-U and 7-U, extending to depths of 55 and 107 feet (El. -60.5 and -103.5 mlg) respectively, were made at Station 231+04 and Station 997+40. These undisturbed borings are considered representative of the soil conditions found along this portion of the project.

16. Laboratory tests. Visual classification and water content determinations were made on all soil samples obtained from the general type and undisturbed borings. Unconfined compression tests were made on undisturbed clay samples. In addition to the tests made on the undisturbed samples, numerous unconfined compression tests were run on cores from the general type borings, and the results of these tests are shown with the boring logs on Plates 3 through 9. Consolidation tests were run on typical clay samples from undisturbed borings No. 2-U. The water contents, shear strength, densities, and consolidation data for the undisturbed borings are shown on Plate 11.

17. Soil conditions. Soil borings shown on Plates 3 through 9 disclose that the soils along this portion of the proposed waterway

consists generally of a surface layer of peat and highly organic clay about 2 to 12 feet thick with water contents of 200 to 900% overlying very soft organic fat clay with water contents ranging from about 50 to 250%, except that strata 10 to 13 feet thick consisting of alternate thin layers and lenses of silt, silty sand, lean clay, and fat clay were encountered at depths of 10 to 30 feet between stations 268 and 301+09.08=0+00; 0+00 and 70; 380 and 650; 705 and 805; and 980 and 1180. At Bayou La Loutre (Station 1285) there is an old channel filling consisting of a surface layer of soft clay 10 to 15 feet thick overlying silt and fine sand.

18. Stability analysis. The stability of the excavation slope and spoil distances were determined by the method of planes based on the shear strengths determined from the undisturbed and general type borings. The results of the stability analyses and the strength values used for the most critical conditions are shown on Plate 11. The strengths used were determined from tests made on samples from the undisturbed borings and also on the results of unconfined compression tests performed on small core samples obtained from the general type borings, as shown in the boring logs on Plates 3 through 9. Based on these analyses for a factor of safety of 1.2, the toe of the spoil should be a minimum of 90 feet from the edge of excavation with slopes on the channel cut not steeper than 1 on 2. (See Plate 11). Based on past experience in areas where the soil conditions are similar to those along this location, it has been found impracticable to construct fills for retaining dikes generally higher than 6 to 7 feet above the ground surface or to spoil hydraulic fill higher than about 10 feet above ground surface and with slopes steeper than approximately 1 on 40. The design of the spoil cross sections were governed by these practical requirements.

19. Channel protection. No channel protection is recommended initially; however, erosion due to wave wash in open areas can be expected in the upper part of the channel slope where the peat and highly organic clays are exposed. Protection for this area can be provided if and when the need for it becomes necessary. No channel protection is included in the overall cost estimate of the project. It is presumed that sufficient rights-of-way will be furnished by local interests to preclude use of channel protection, or that additional rights-of-way will be furnished if the need arises.

#### RIGHTS-OF-WAY

20. Requirements. The rights-of-way for the channel, the permanent spoil areas, and the temporary spoil areas required for the reach included in this design memorandum are as indicated on Plates 3 through 9. The channel right-of-way across the new land cut will be 1500 ft. wide centered 750 ft. on each side of the channel centerline. For a short distance at the upper end of the reach, where the channel coincides with the existing Gulf Intracoastal Waterway, the channel right-of-way will extend 750 ft. on the south side and 500 ft. on the

north side to conform with the existing Gulf Intracoastal Waterway right-of-way and the right-of-way obtained for the reach covered in previous Design Memorandum No. 1-A. A permanent spoil disposal easement 2000 ft. in width adjacent to the channel right-of-way on the south and west side will be obtained similar to that in Design Memorandum No. 1-A. Experience gained in the initial construction operations, however, indicates that while the 2000 ft. strip is sufficient theoretically to contain the spoil, an additional width is necessary for the proper settling of the dredge effluent to prevent its re-entry into the channel or its contamination of existing marshes. The U.S. Fish and Wildlife Service is much concerned as to the effect the spoil disposal will have on the adjacent marshes, lakes, and streams. Further views of the Service are given in paragraph 35. The temporary spoil disposal strip will be generally 2000 ft. wide except in Orleans Parish where Bayou Bienvenue will form the outer limit and in a few other places where existing drainage canals or important property would be involved.

21. Status. Act of Assurances of Local Cooperation dated 4 April 1957, which includes the furnishing of all lands, easements, rights-of-way, and spoil disposal areas, have been furnished by the Board of Commissioners for the Port of New Orleans, an agency of the State of Louisiana. The acquisition of lands is being pursued by the Port Commissioners, both for project requirements and for related port development purposes. The real estate requirements for continuing the channel to Bayou Dupre has been requested for completion by 1 October 1958 and to Bayou Yscloskey by 1 January 1959. By letter dated 15 January 1959, the Board of Commissioners of the Port of New Orleans granted to the Government a right-of-entry to the reach from Highway No. 47 (Paris Road) to Bayou Dupre.

#### RELOCATIONS

22. Aerial power line crossing. The New Orleans Public Service Inc., has a single circuit, 3 wire, 115,000 volt, 3 phase, electric aerial transmission line that crosses the existing Gulf Intracoastal Waterway and the proposed Outlet channel 75 ft. West of Highway 47 at approximate Station 273+06 as shown on Plate 3. The present crossing provides a minimum horizontal clearance of 125 ft. and a vertical clearance of 150 ft. This is a major transmission line of the company and will be relocated to provide the necessary vertical and horizontal clearances after the location for the new Highway 47 Bridge is determined.

23. Submarine power line crossing. The New Orleans Public Service, Inc. has a single circuit, 3 wire, 13,200 volt, 3 phase, electric submarine power line crossing that crosses the existing Gulf Intracoastal Waterway and the proposed channel 60 ft. west of Highway 47 at approximate station 273+21 as shown on Plate 3. The crossing will have to be relocated to accommodate the proposed channel.

24. State Highway No. 47 Bridge. At present there is a pontoon bridge for the Highway No. 47 crossing of the existing Gulf Intracoastal

Waterway (approximate Station 273+81) as shown on Plate 3. A suitable bridge for the Highway 47 crossing has been authorized as a feature of the project. The details of this relocation are under study and will be presented in a future design memorandum.

25. 24-Inch gas pipeline crossing. The New Orleans Public Service Inc., has a 24-inch gas pipeline crossing the existing Gulf Intracoastal Waterway and proposed channel 200 ft. east of the centerline of Highway 47 at approximate Station 275+81 as shown on Plate 3. The pipeline crossing has a bottom width of 165 ft. at -26.0 ft. mlg, and the pipelining will be relocated to provide the necessary clearances for the enlarged channel.

26. 20-Inch gas pipeline crossing. The Southern Natural Gas Company has a 20" gas pipeline that crosses the proposed channel at approximate Station 274+00 (vicinity Bayou Dupre) as shown on Plates 4 and 5. The pipeline, which is now located in a shallow trench, will have to be relocated to provide the necessary clearances for the proposed channel. An additional 24" pipeline is now under construction in the above shallow trench. Both pipelines will be adjusted to accommodate the channel when dredging of the channel approaches the pipelines.

27. 30-Inch gas pipeline crossing. The Tennessee Gas Transmission Company is in the process of laying a 30" pipeline which will cross the channel at approximate Station 944+83 in the vicinity of Shell Beach as shown on Plate 8. In order to obviate the necessity of alterations at a later date the company is installing the pipeline initially at sufficient depth to clear the channel. The pipeline is being installed at elevation -50 ft. mlg across a bottom width of 750 ft. centered with the proposed channel.

28. State Highway No. 46. State Highway No. 46 will be severed by the proposed channel as shown on Plate 8. This is a 2-lane black top highway that terminates at the nearby settlement of Shell Beach. No plans have been formulated to date by local interests as to the type of facility, if any, that will be provided at this crossing.

29. Electric power line crossing. The Louisiana Power and Light Company has a 4-wire, 3 phase, 13,800 volt electric power line that runs along State Highway No. 46 as shown on Plate 8. This line will have to be altered to provide the necessary clearances or abandoned.

30. Telephone line crossing. Located along State Highway No. 46, as shown on Plate 8, the Southern Bell Telephone and Telegraph Company has a pole line with 4 wires carrying telephone facilities. This pole line will require alteration or abandonment.

31. Responsibility. All of the above mentioned relocations except State Highway No. 47 (Paris Road), as well as all other utility and pipeline crossings in other reaches of the project, are the responsibility of "local interests". The Board of Commissioners of the Port of New Orleans will make the necessary arrangements for the relocations when acquiring the required rights-of-way.



## VIEWS OF OTHER AGENCIES

32. Board of Commissioners, Port of New Orleans. This state agency, officially designated by the Governor of the State of Louisiana as the agency to furnish the required "local cooperation" for the project, has approved the channel alignment set forth in this design memorandum. In letter dated 3 April 1957 the Board furnished the following reply to an inquiry from this office:

"I am authorized to advise you that, so far as the legal powers and jurisdiction of this Board permit, the project as planned and as indicated on the quadrangle maps of the U.S. Geological Survey and your print File No. J-15-20679 are satisfactory to this Board subject to the plan and condition of the Permit issued to this Board by your office under date of September 28, 1956, and, further, subject to such modification, as may be found necessary as the result of negotiations for acquisition of rights-of-way." The area covered by the permit is in the vicinity of the Inner Harbor Navigation Canal, adjacent to the western limits of work covered by Design Memorandum No. 1-A. The Board has been furnished maps indicating the required rights-of-way as far south as Bayou La Loutre and is making arrangements for acquisition as far south as Bayou Yscloskey (Shell Beach).

33. Wildlife and Fisheries Commission, State of Louisiana. This agency has expressed concern as to the probable effects of the channel to the fish and wildlife values of the area traversed. It has recommended that the alignment be changed to traverse the open waters of Lake Borgne. The change in alignment was rejected on the basis that numerous routes were considered prior to congressional authorization and that all routes traversing the open waters of Lake Borgne were eliminated as undesirable. Experience indicates that channels should be sited through land cuts or provided with effective barriers in shallow exposed coastal lakes and sounds. The route adopted makes maximum use of land cuts and traverses a minimum length of shallow sound crossing of the routes considered.

34. St. Bernard Parish Police Jury. This is the governing authority for St. Bernard Parish. The larger part of the project is located in St. Bernard Parish. In letter dated 5 June 1957, the President of the Police Jury stated the following:

"This is to inform you that officials of the Parish of St. Bernard are not in agreement with recommendations of the Commission (Wildlife and Fisheries Commission, State of Louisiana). We would appreciate your action in keeping this office informed of any developments altering plans for the present Deep Water Channel."

35. U.S. Dept. of Interior Fish and Wildlife Service. This agency has expressed concern as to the probable effects the channel will have on the Fish and Wildlife values of the area traversed. The planning is being coordinated with the Service and funds in the amount of \$5,000 were made available to the Service in fiscal year 1958 to

aid in developing a detail plan that would minimize any probable detrimental effects. The Service prepared an "Interim Report on Fish and Wildlife Resources and an Outline of Proposed Fish and Wildlife Studies" in April 1958. The report which outlines the existing conditions concludes that sufficient data are not available upon which to predict the effects of the project and recommends extensive environmental and model studies be made covering a period of several years and costing upwards of \$500,000 exclusive of the model. Subsequent conferences and discussions have demonstrated that the model study is impracticable and it has been eliminated. Tentative agreement has been reached on a plan for submission of interim fish and wildlife reports covering sections of the channel, such reports to contain recommendations for remedial measures for protection of fish and wildlife values. The amount of \$64,400 is tentatively made available to the Service in fiscal year 1959 for the studies on a reimbursable basis.

By letter dated 5 January 1959, the Service furnished a preliminary draft of an interim report on the reach between Highway No. 47 (Paris Road) and Bayou Dupre. The report contained the following recommendations:

1. Spoil be contained within designated spoil areas by construction of retention dikes;
2. Excess water from spoil areas be discharged only into Bayou Bienvenue, Bayou Villere, Bayou Dupre, and/or into the excavated access channel;
3. Weirs for spoil discharge be located so they will be as far from the point of spoil discharge as practical;
4. Weirs be designed with as high crest elevation as engineeringly feasible to encourage maximum spoil retention;
5. Bayou Villere be excluded from the spoil areas by construction of parallel dikes on either side of the bayou channel;
6. The borrow pit for construction of back dikes be located on the outside of the spoil areas and kept open in order to provide a connecting channel with all waterways from Bayou Bienvenue to Bayou Villere, to Bayou Dupre;
7. A dike be constructed on the northeast side of the project rights-of-way when, or if, future studies reveal that fish and wildlife habitat northeast of the channel alignment is deteriorating as a result of project construction;
8. Draglines be used to build all retention dikes in order to minimize dispersal of spoil material; and
9. These measures be included in contract specifications for the areas under consideration.

It is proposed that the foregoing recommendations, except No. 7, be generally incorporated in the plans and specifications of the initial contract for excavation of the reach. Recommendation No. 7 will be considered further, when it becomes apparent that work on the northeast side of the right-of-way is necessary to prevent losses.

36. Department of Highways, State of Louisiana. This agency has assumed responsibility for the acceptance of ownership and maintenance of the bridge along Highway No. 47. It also obligated itself to make any future replacements or alterations that might be required by conditions as they exist at the time of construction, but not as a result of changes or alterations of the waterway facility itself or needs of navigation. The department did not obligate itself to the construction and/or maintenance of any additional structures or to assume any obligations as a result of the construction of the waterway in the vicinity of Shell Beach which severs State Highway No. 46.

### EXCAVATION

37. General. The clays, silts, and sands to be encountered in excavating the channel do not present any unusual problems and can be readily excavated by hydraulic pipeline dredge. The size of the channel makes dragline equipment impractical for this work.

38. Stream closures. Bayous Bienvenue, Villere, Dupre, Yscloskey, and La Loutre, which are navigable channels, will be kept free of spoil and closure dikes. It is planned to close with excavated spoil all streams, bayous, shallow lakes, ponds, and sloughs that lie within the spoil disposal areas south of the channel as indicated on Plates 3 through 9. If found desirable by the U.S. Fish and Wildlife Service for the mitigation of losses, any of the streams, bayous, and sloughs that cross the north right-of-way line of the channel will also be closed by placing suitable plugs between the channel and right-of-way line.

39. Plans and specifications. Plans and specifications will be prepared for performing the work by a hydraulic pipeline dredge on the alignment shown on Plates 3 through 9. The spoil will be confined behind retention dikes to prevent re-entry into the channel. The contractor will be held responsible to keep the spoil from interfering with existing drainage and from extending beyond the specified spoil disposal areas. Typical sections of the proposed channel excavation showing minimum berm distances, spoil disposal requirements, and rights-of-way are indicated on Plate 12. For advance maintenance the contractor will be required to excavate the channel 2 feet below the authorized project depth. An allowable overdepth up to a maximum of 2 feet will also be permitted in order to provide for tidal fluctuations and inaccuracies in dredging operations.

40. Sequence of excavation. It is proposed to excavate the channel between Highway 47 and deep water in Chandeleur Sound in three phases. The first phase will be to excavate an access channel 18 ft. deep by

140 ft. bottom width. This will provide ready access to all parts of the project, allow sufficient dredging equipment to be utilized economically on future contracts, and provide ready refuge for construction equipment from inclement weather and rough seas in the open water reaches. It will also provide a small initial spoil deposit which will have time to consolidate in the marshes prior to the deposition of greater spoil loads. This will permit better control of the dredge effluent and reduce the turbidity of the waste water escaping into the adjacent waters. The second phase will be the enlarging of the access channel to a channel usable by ocean going ships. The excavation of the usable channel 36 ft. deep by 250 ft. wide will permit the initial use of the project at an earlier date than if the full project channel were excavated in one operation, aid in relieving the congestion in the existing Inner Harbor Navigation Canal Lock, and permit early development of the new harbor. The final phase will consist of widening the usable channel to the full project width of 500 feet.

41. Schedule of contracts. Subject to the availability of funds, it is proposed to prepare plans and specifications and award contracts for the various items as listed below:

<u>Item*</u>	<u>Channel Size</u>	<u>Location</u>	<u>Estimated Yardage</u>	<u>Est. Date of Award</u>	<u>Est Completion Date</u>
3A	18' x 140'	GIWW to Bayou Dupre Sta 301=0+00 to 385	5,494,000	April '59	May '60
4A	18' x 140'	Bayou Dupre to Bayou Yscloskey Sta 385 to 996	9,241,000	July '59	Aug '60
5A	18' x 140'	Bayou Yscloskey to Bayou La Loutre Sta 996 to 1285	4,025,000	Oct. '59	June '60
3U	36' x 250'	GIWW to Bayou Dupre Sta 268 to 0=00 to 385	15,000,000	July '60	June '61
4U	36' x 250'	Bayou Dupre to Bayou Yscloskey Sta 385 to 996	21,656,000	Oct. '60	Jan. '62
5U	36' x 250'	Bayou Yscloskey to Bayou La Loutre Sta 996 to 1285	10,113,000	May '60	June '61
3P	36' x 500'	GIWW to Bayou Dupre Sta 268 to 0=00 to 385	15,983,000	July '63	June '64
4P	36' x 500'	Bayou Dupre to Bayou Yscloskey Sta 385 to 996	23,831,000	Dec. '63	June '65
5P	36' x 500'	Bayou Yscloskey to Bayou LaLoutre Sta 996 to 1285	<u>11,014,000</u>	July '64	June '65

Total for Reach 116,357,000

\* A=Access Channel U=Usable Channel P=Project Channel

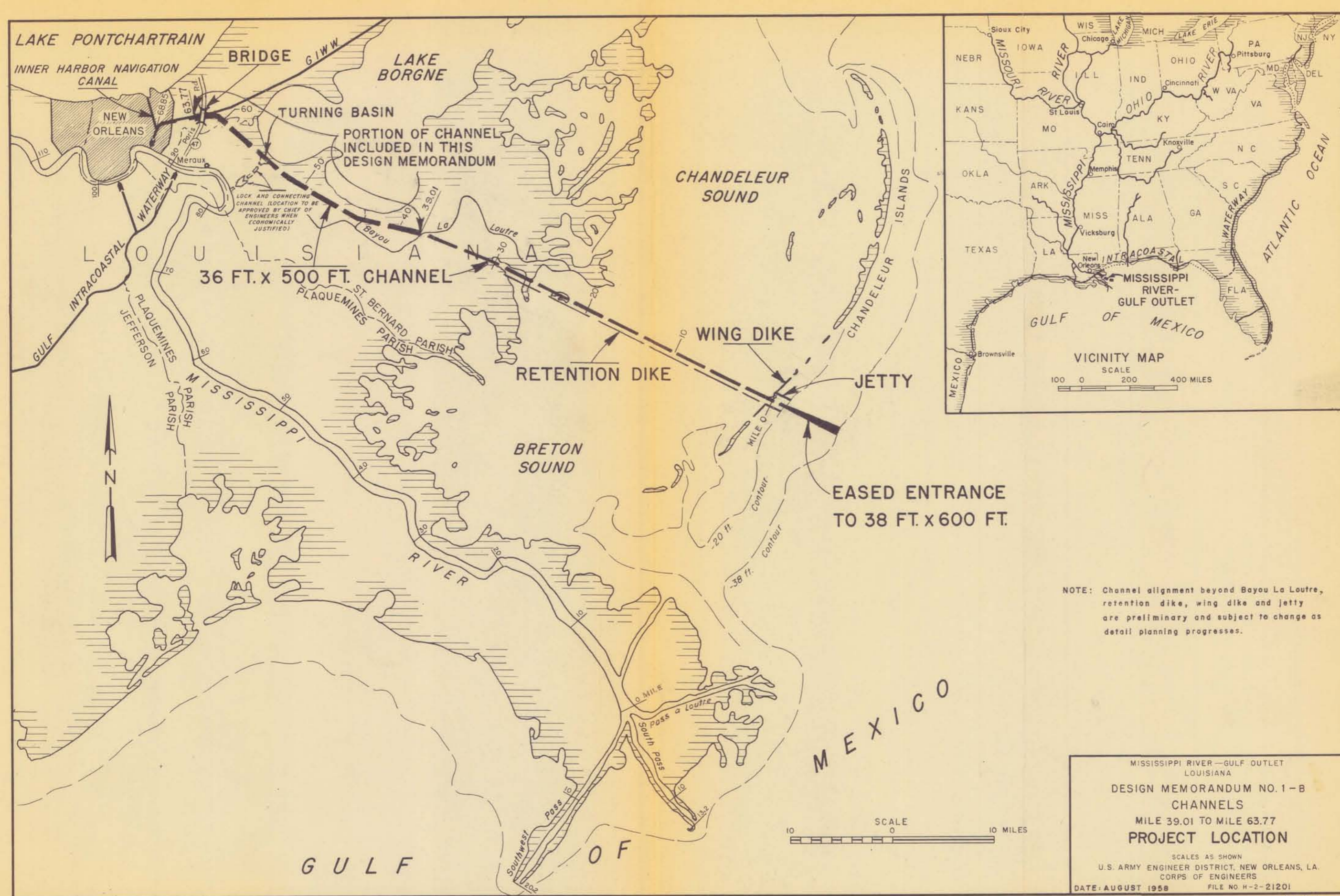
COST

42. Summary of cost. The cost of excavating the channel between Mile 39.01 (Bayou La Loutre) and Mile 63.77 (Paris Road) exclusive of rights-of-way which is a non-Federal obligation, is estimated to be \$23,157,000.

43. Detail cost estimates. A comparison of detail cost estimates covering the same limits of work covered by this design memorandum and that contained in the overall project estimate of \$101,000,000 (Pb-3) approved 27 June 1958 is as follows:

	Latest Approved Estimate (Pb-3) <u>27 June 1958</u>	Design Memo Estimate July 1958 <u>Price Level</u>
Excavation 116,357,000 c.y. @ <del>\$1.65</del> <sup>\$1.165</sup> cu. yd.	\$ 19,199,000	\$19,199,000
Contingencies (15% Pb-3) (12% DM)	2,880,000	2,304,000
Engineering & Design 1.119%	247,000	241,000
Supervision & Administration 6.5%	<u>1,451,000</u>	<u>1,413,000</u>
	23,777,000	23,157,000

It will be noted that the above estimates are based upon the same unit prices and quantities. The contingency item has been reduced from 15% to 12% in the design memorandum to conform to the more advanced stage of the planning.



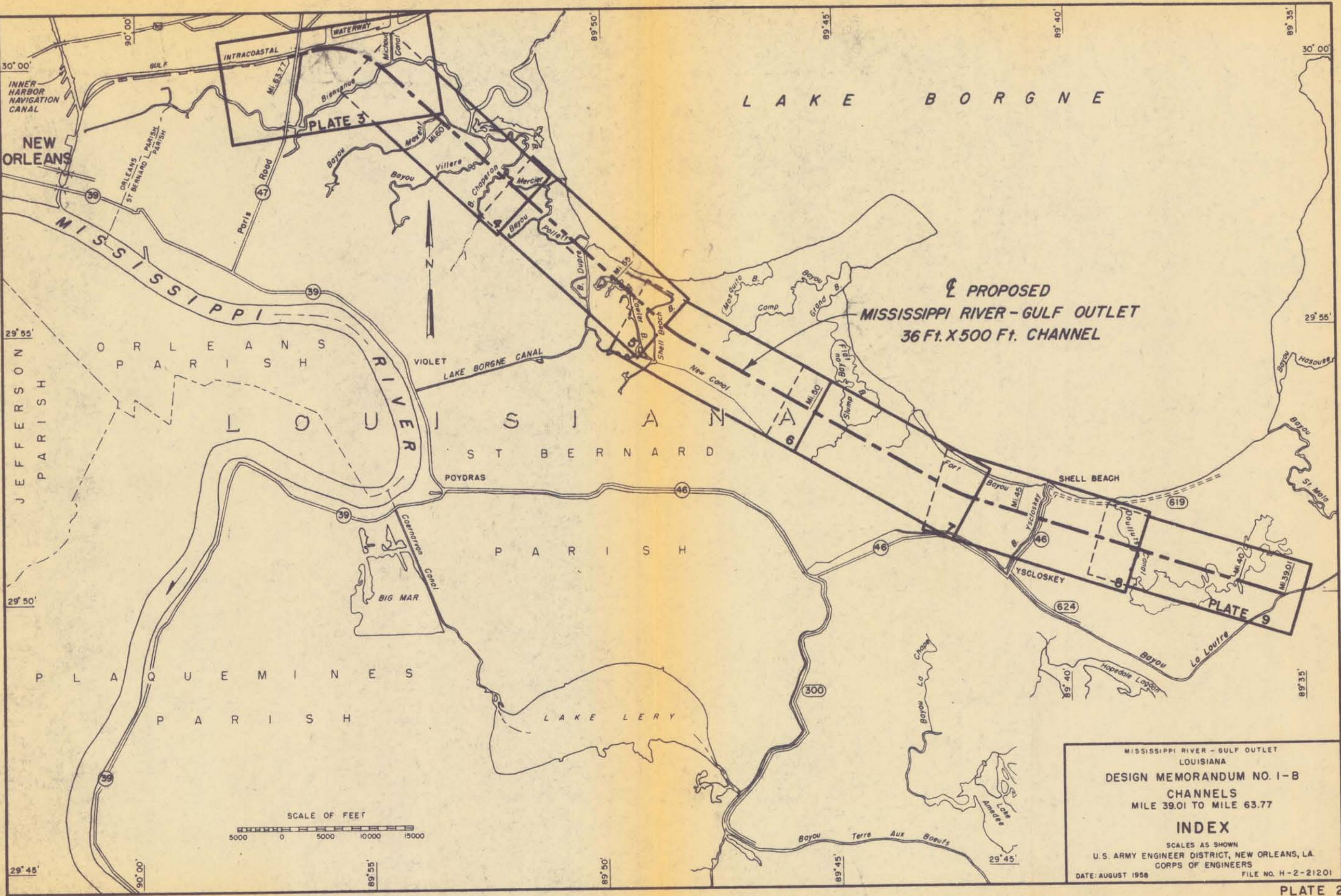
NOTE: Channel alignment beyond Bayou La Loutre, retention dike, wing dike and jetty are preliminary and subject to change as detail planning progresses.

MISSISSIPPI RIVER—GULF OUTLET  
LOUISIANA

DESIGN MEMORANDUM NO. 1-B  
CHANNELS  
MILE 39.01 TO MILE 63.77  
PROJECT LOCATION

SCALES AS SHOWN  
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
CORPS OF ENGINEERS

DATE: AUGUST 1958 FILE NO. H-2-21201



PROPOSED  
MISSISSIPPI RIVER - GULF OUTLET  
36 Ft. X 500 Ft. CHANNEL

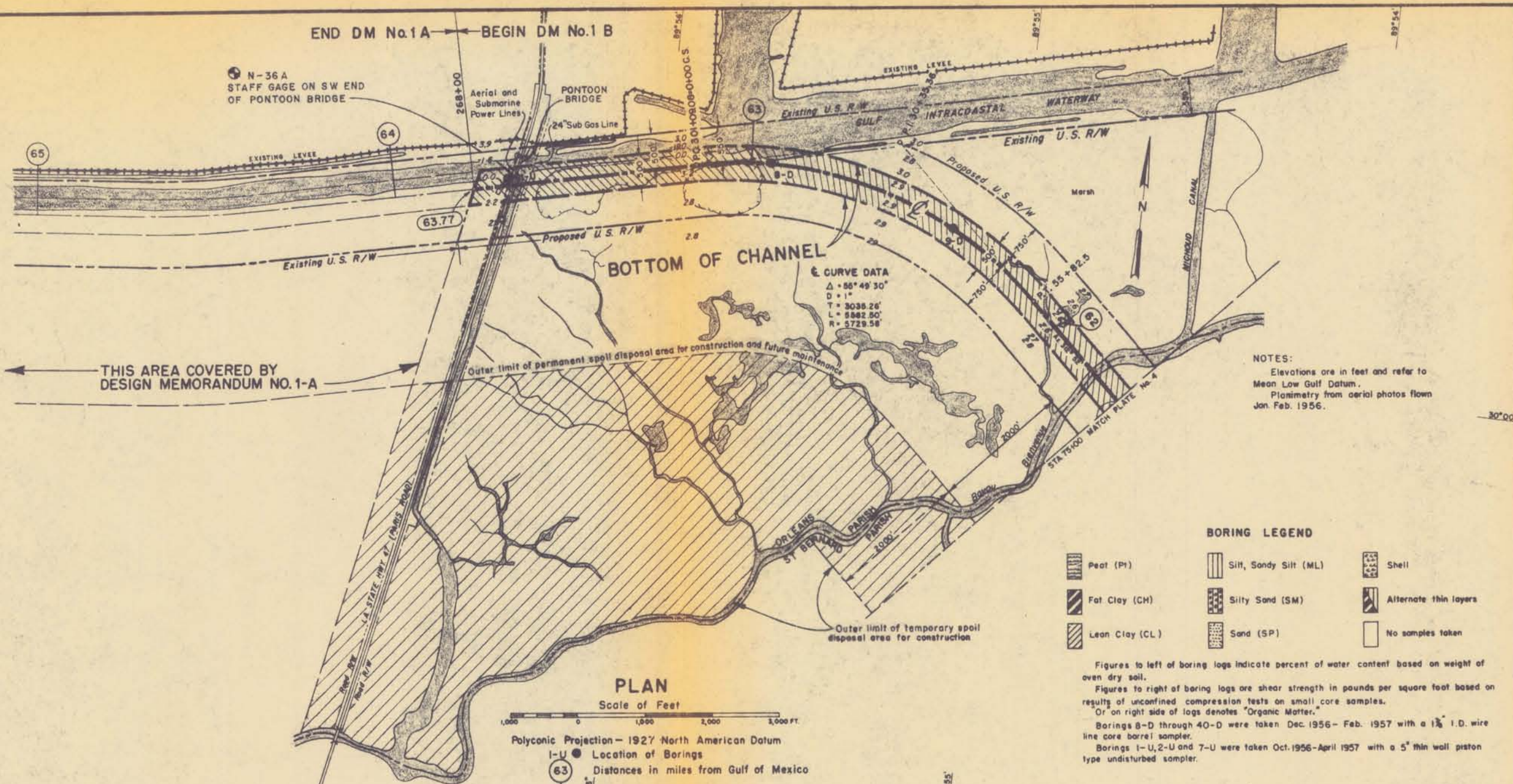
MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA  
DESIGN MEMORANDUM NO. 1-B  
CHANNELS  
MILE 39.01 TO MILE 63.77

**INDEX**

SCALES AS SHOWN  
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END DM No.1 A ← BEGIN DM No.1 B

N-36 A  
STAFF GAGE ON SW END  
OF PONTOON BRIDGE



THIS AREA COVERED BY  
DESIGN MEMORANDUM NO. 1-A

NOTES:  
Elevations are in feet and refer to  
Mean Low Gulf Datum.  
Planimetry from aerial photos flown  
Jan. Feb. 1956.

**BORING LEGEND**

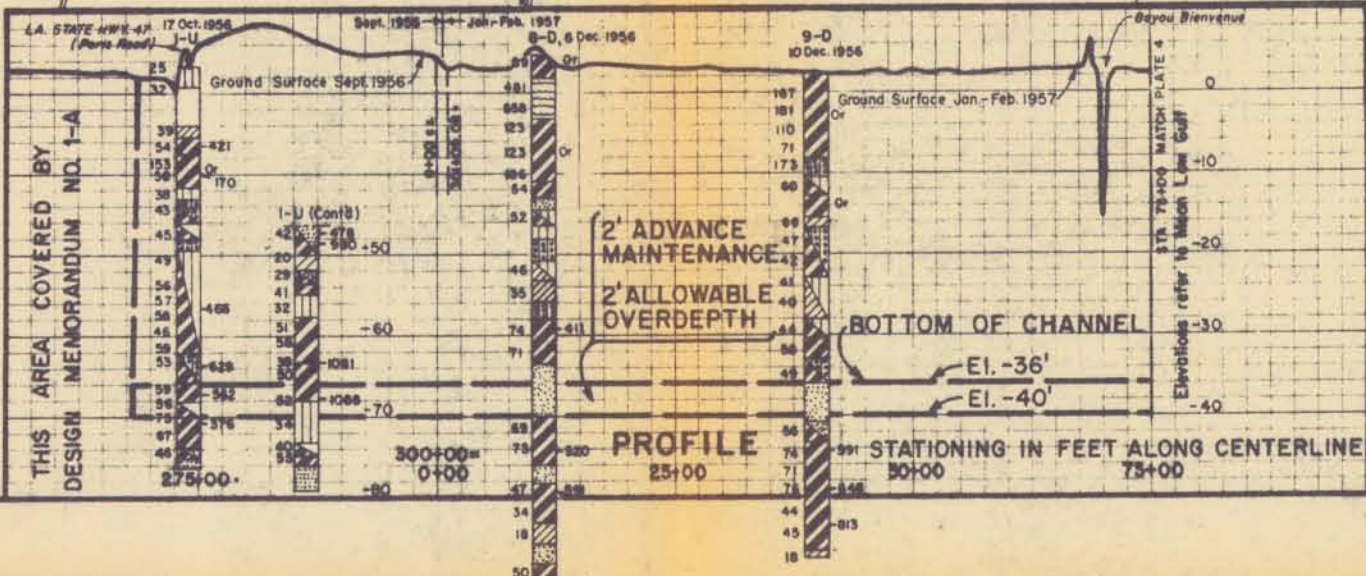
- Peat (Pt)
- Fat Clay (CH)
- Lean Clay (CL)
- Silt, Silty Silt (ML)
- Silty Sand (SM)
- Sand (SP)
- Shell
- Alternate thin layers
- No samples taken

Figures to left of boring logs indicate percent of water content based on weight of oven dry soil.  
Figures to right of boring logs are shear strength in pounds per square foot based on results of unconfined compression tests on small core samples.  
Or on right side of logs denotes "Organic Matter."  
Borings B-D through 40-D were taken Dec. 1956 - Feb. 1957 with a 1 1/2" I.D. wire line core barrel sampler.  
Borings 1-U, 2-U and 7-U were taken Oct. 1956 - April 1957 with a 5" thin wall piston type undisturbed sampler.

**PLAN**

Scale of Feet  
1,000 0 1,000 2,000 3,000 FT.

Polyconic Projection - 1927 North American Datum  
1-U ● Location of Borings  
63 Distances in miles from Gulf of Mexico



THIS AREA COVERED BY  
DESIGN MEMORANDUM NO. 1-A

Revised 8 May 1959

MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

**DESIGN MEMORANDUM NO. 1-B**

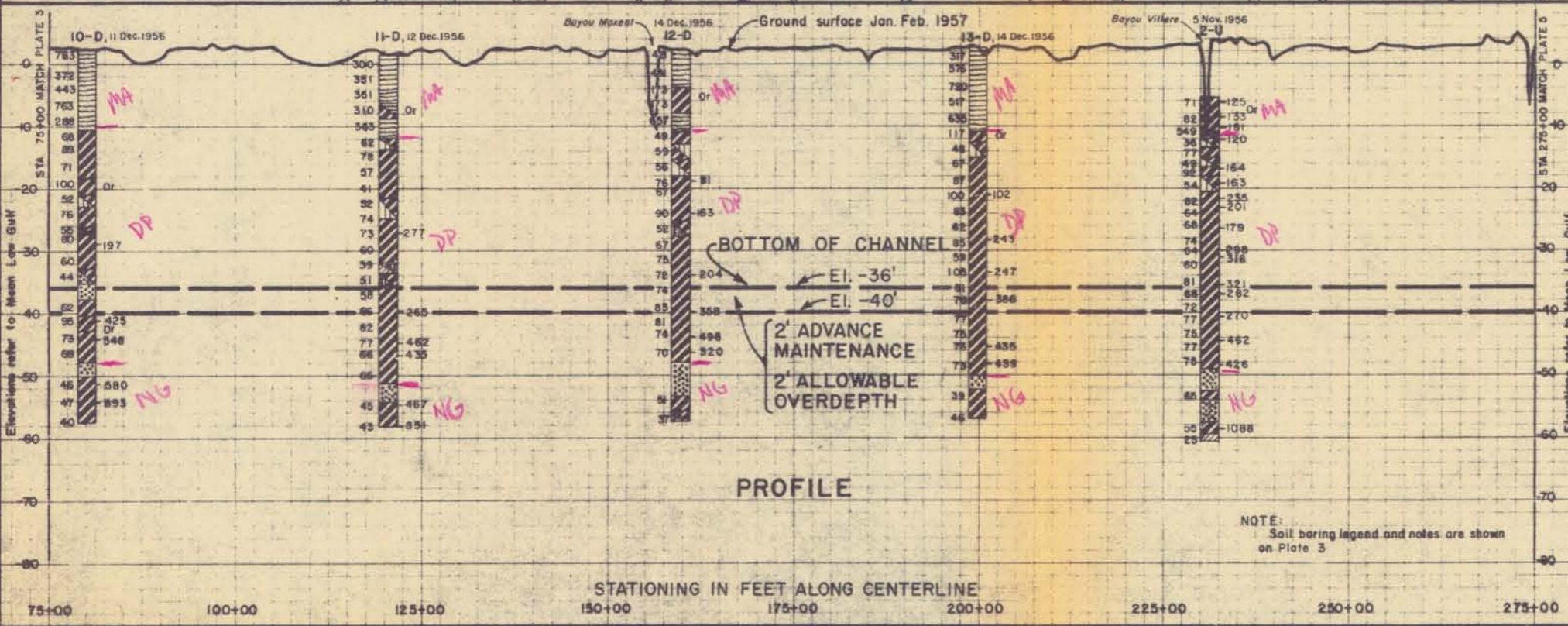
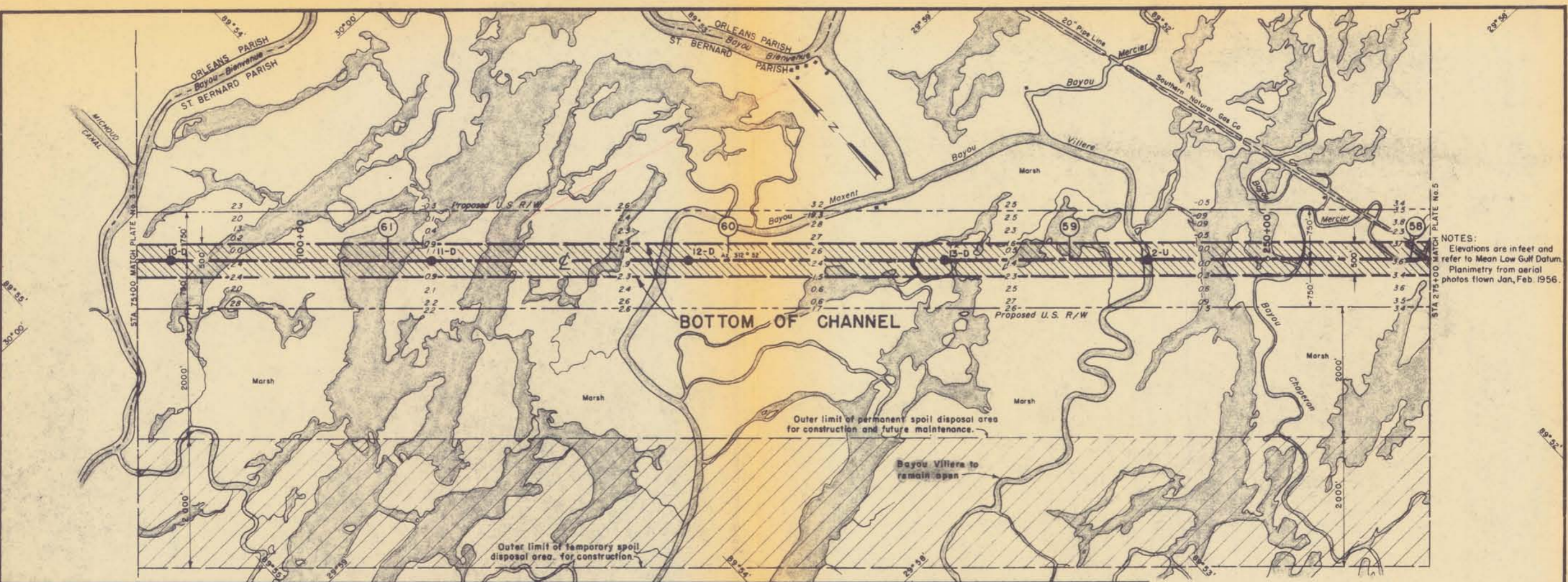
CHANNELS  
MILE 39.01 TO MILE 63.77

**PLAN, PROFILE AND SOIL BORINGS**  
STA. 268+00 to 301+09.08 = 0+00 to STA. 75+00

SCALES AS SHOWN  
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
CORPS OF ENGINEERS

DATE: AUGUST 1958 FILE NO. H-2-21201





**PLAN**

Scale of Feet: 0, 500, 1000, 1500

Polyconic Projection - 1927 North American Datum

12-D ● Location of Borings

60 Distances in miles from Gulf of Mexico

Revised 8 May 1959

MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

**DESIGN MEMORANDUM NO. I-B**

**CHANNELS**

MILE 39.01 TO MILE 63.77

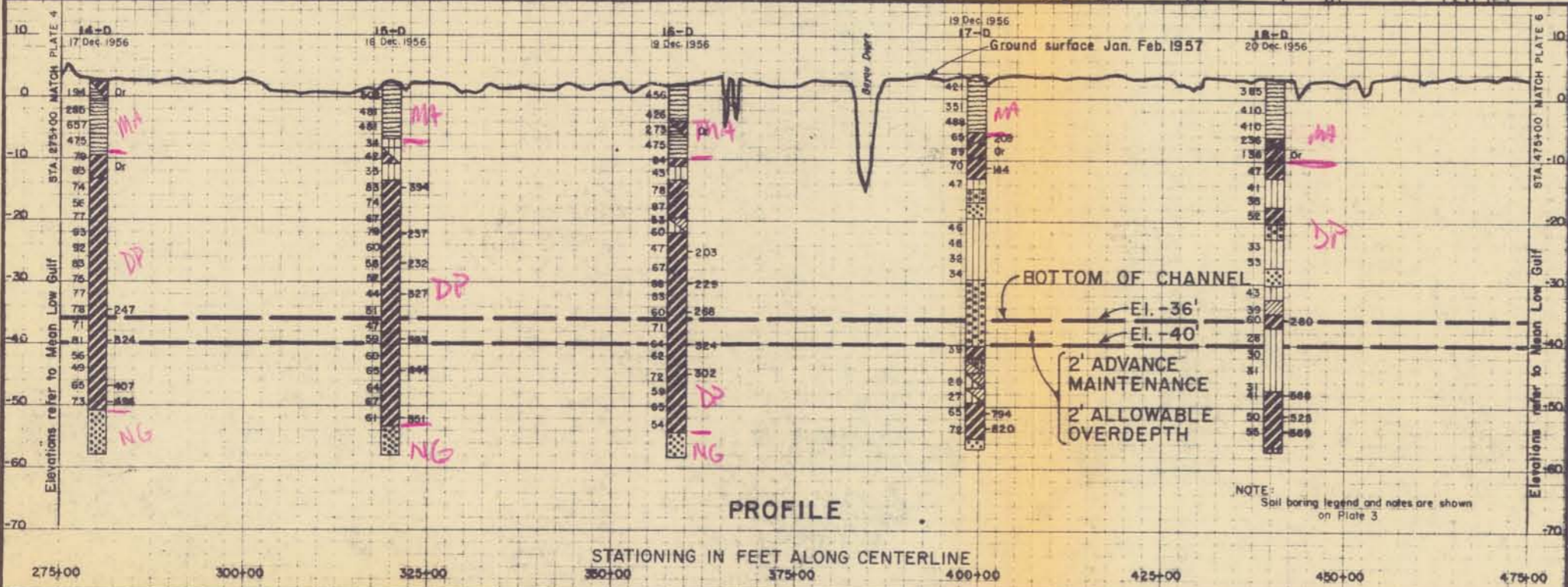
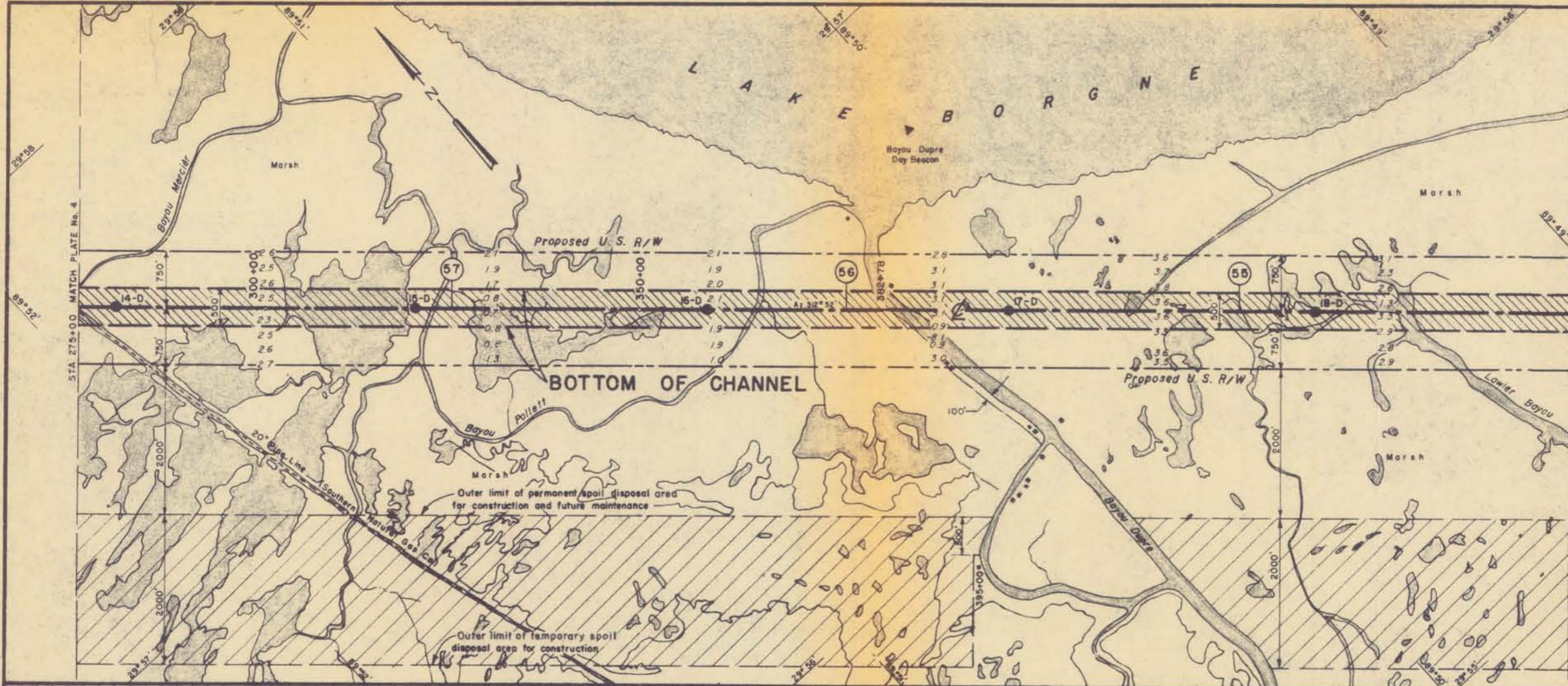
**PLAN, PROFILE AND SOIL BORINGS**

STA. 75+00 to STA. 275+00

SCALES AS SHOWN

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MISSISSIPPI RIVER - GULF OUTLET  
 LOUISIANA

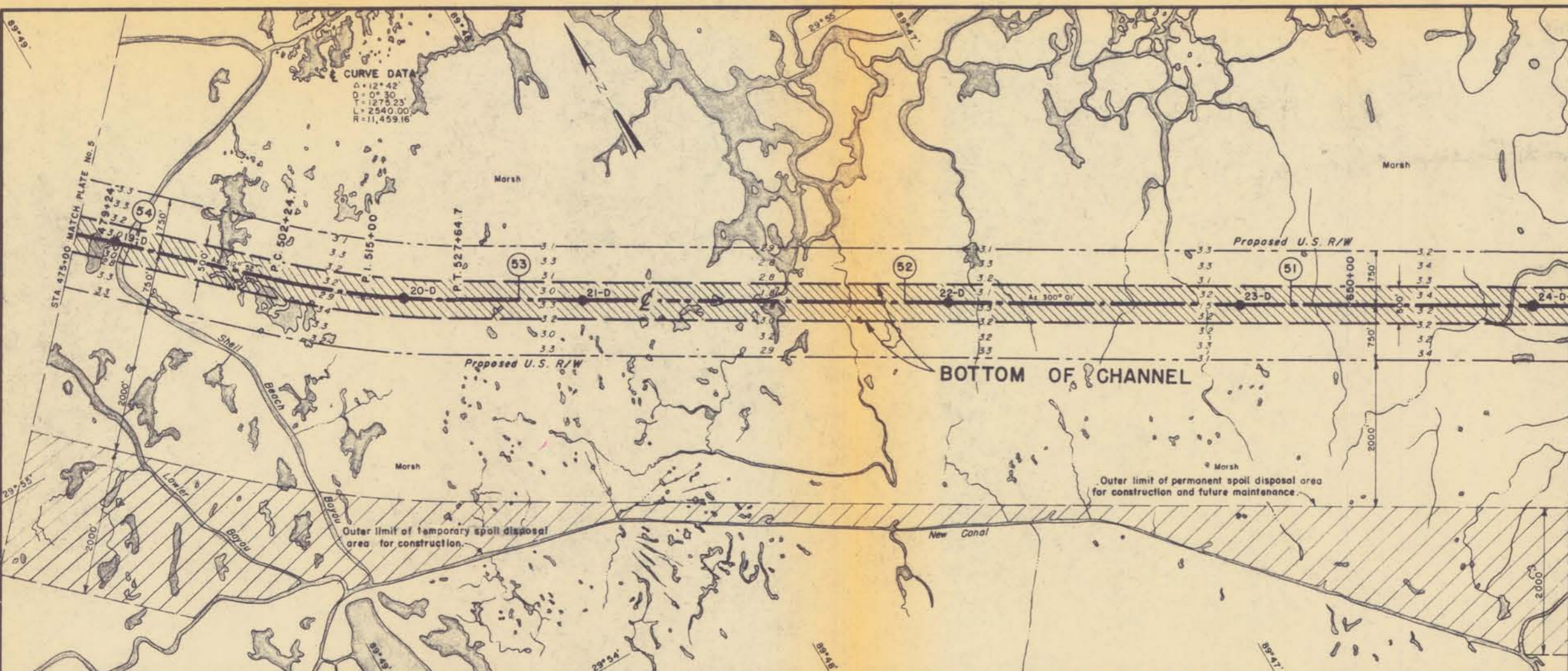
DESIGN MEMORANDUM NO. 1 - B

CHANNELS  
 MILE 39.01 TO MILE 63.77

PLAN, PROFILE AND SOIL BORINGS  
 STA. 275+00 TO STA. 475+00

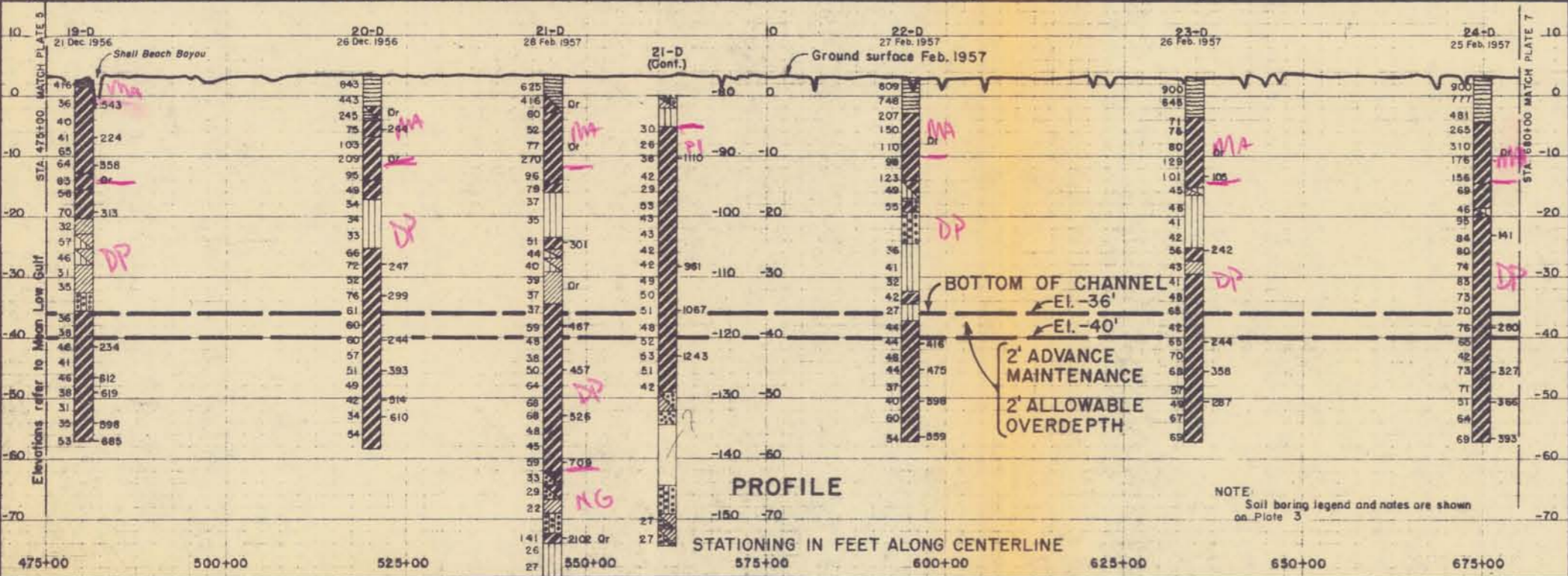
SCALES AS SHOWN  
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NOTES:  
 Elevations are in feet and refer to Mean Low Gulf Datum  
 Planimetry from aerial photos flown Jan., Feb 1956

**PLAN**  
 Scale of Feet  
 0 1,000 2,000 Ft.  
 Polyconic Projection - 1927 North American Datum  
 19-D ● Location of Borings  
 52 Distances in miles from Gulf of Mexico



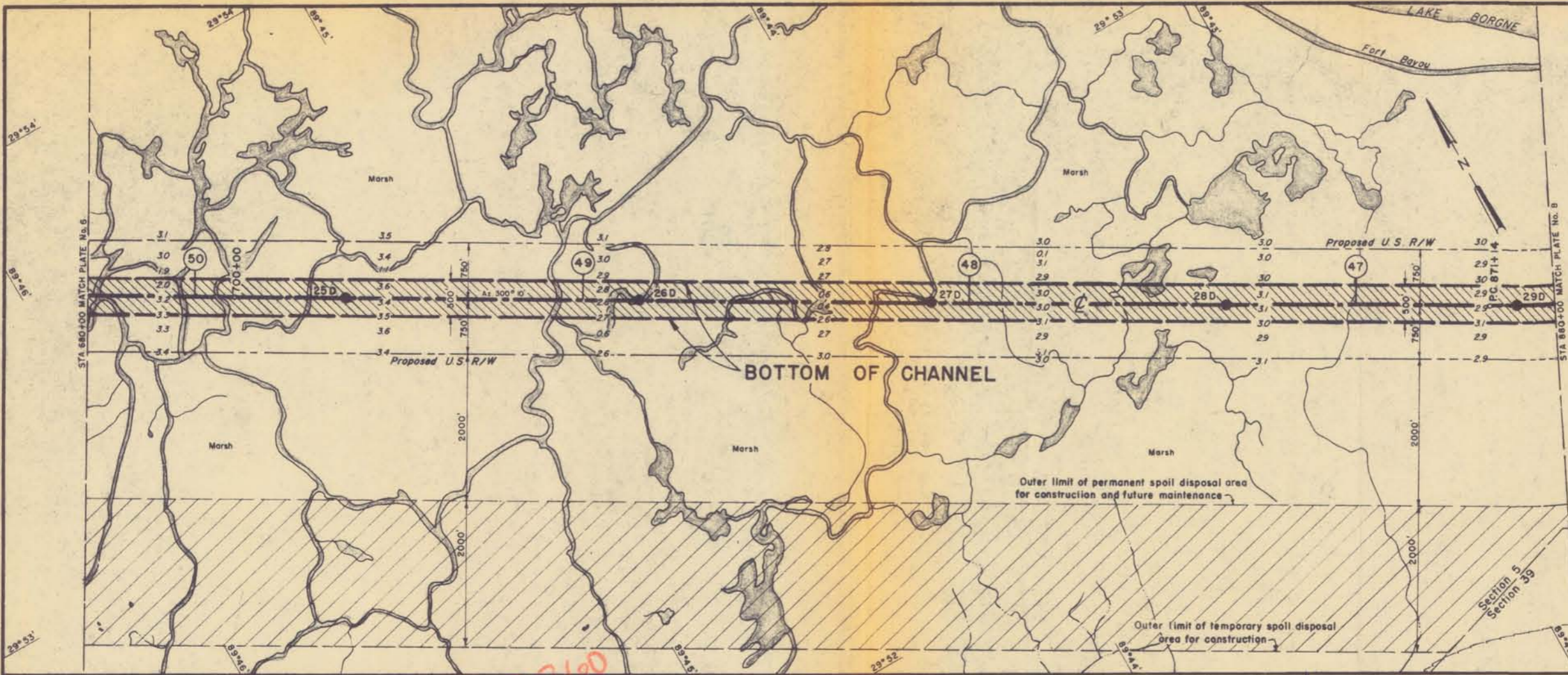
**PROFILE**

STATIONING IN FEET ALONG CENTERLINE

NOTE:  
 Soil boring legend and notes are shown on Plate 3

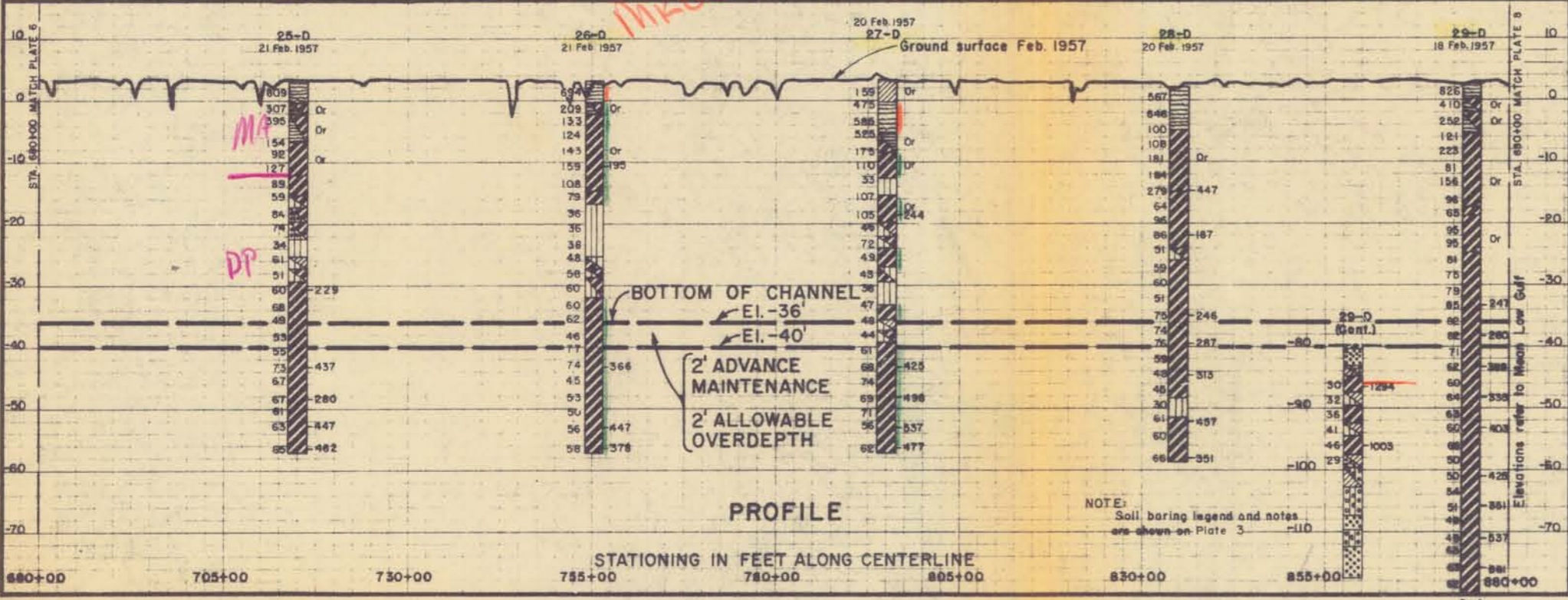
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Revised 8 May 1959  
 MISSISSIPPI RIVER - GULF OUTLET  
 LOUISIANA  
**DESIGN MEMORANDUM NO. 1-B**  
**CHANNELS**  
 MILE 39.01 TO MILE 63.77  
**PLAN, PROFILE AND SOIL BORINGS**  
 STA. 475+00 to STA. 680+00  
 SCALES AS SHOWN  
 U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
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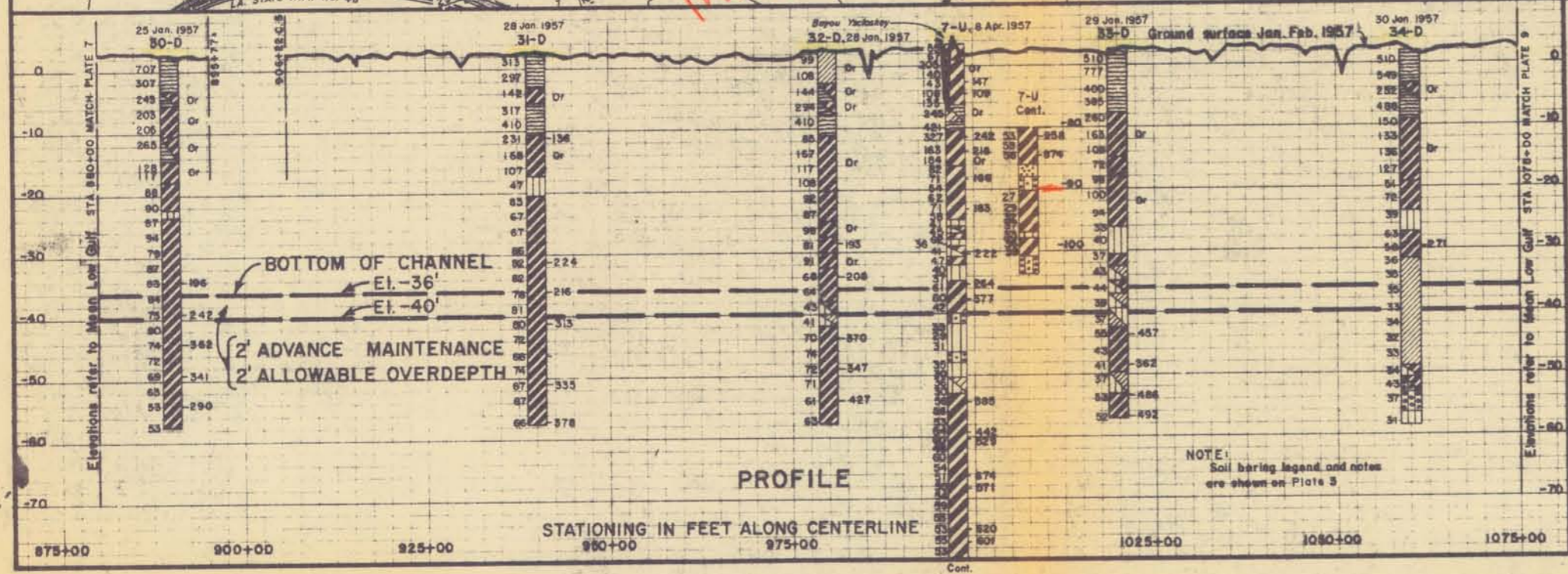
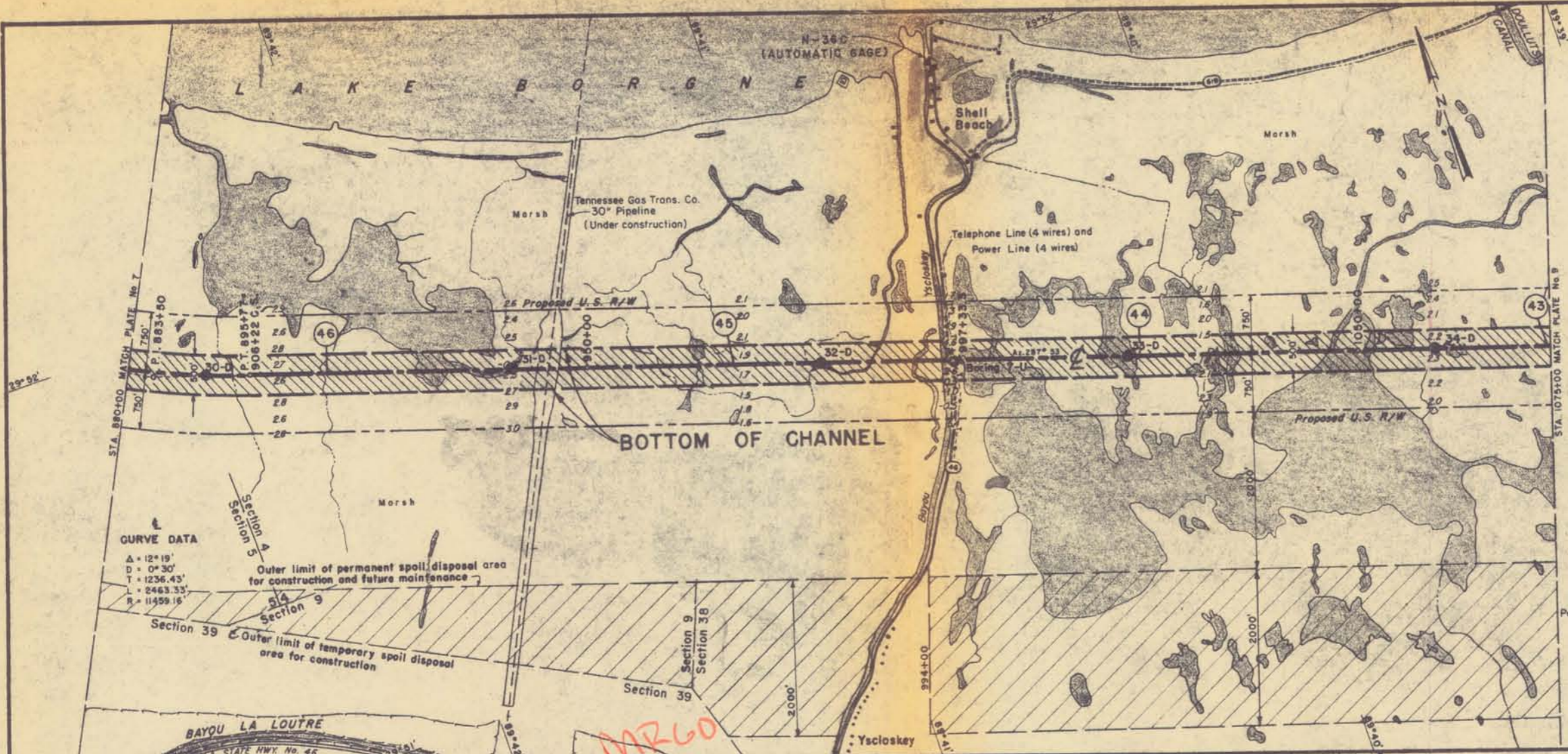


NOTES:  
 Elevations are in feet and refer to Mean Low Gulf Datum.  
 Planimetry from aerial photos flown Jan. Feb. 1956

**PLAN**  
 Scale of Feet  
 0 500 1000 2000 Ft.  
 Polyconic Projection -  
 1927 North American Datum  
 26-D ● Location of Borings  
 (48) Distances in miles from Gulf of Mexico



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 MISSISSIPPI RIVER - GULF OUTLET  
 LOUISIANA  
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**CHANNELS**  
 MILE 39.01 TO MILE 63.77  
**PLAN, PROFILE AND SOIL BORINGS**  
 STA 680+00 to STA 880+00  
 SCALES AS SHOWN  
 U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
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MISSISSIPPI RIVER - GULF OUTLET  
 LOUISIANA

**DESIGN MEMORANDUM NO. I-B**

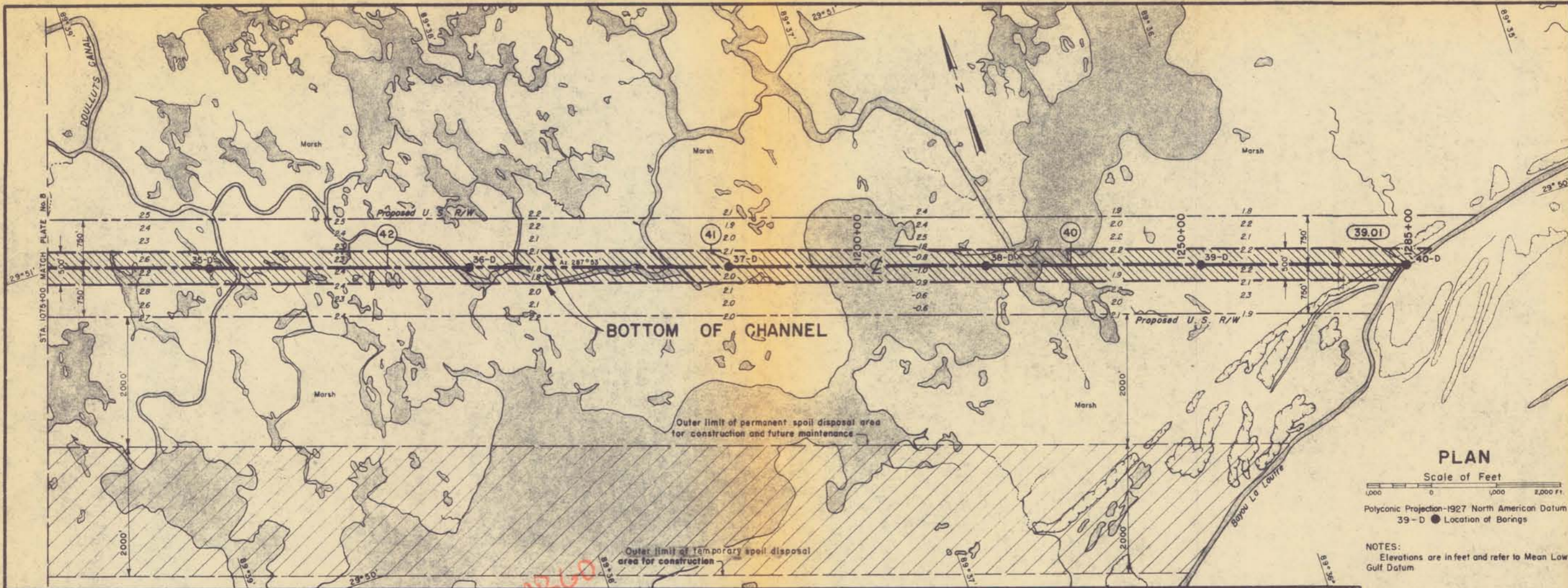
**CHANNELS**  
 MILE 39.01 TO MILE 63.77

**PLAN, PROFILE AND SOIL BORINGS**  
 STA. 880+00 TO STA. 1075+00

SCALES AS SHOWN

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
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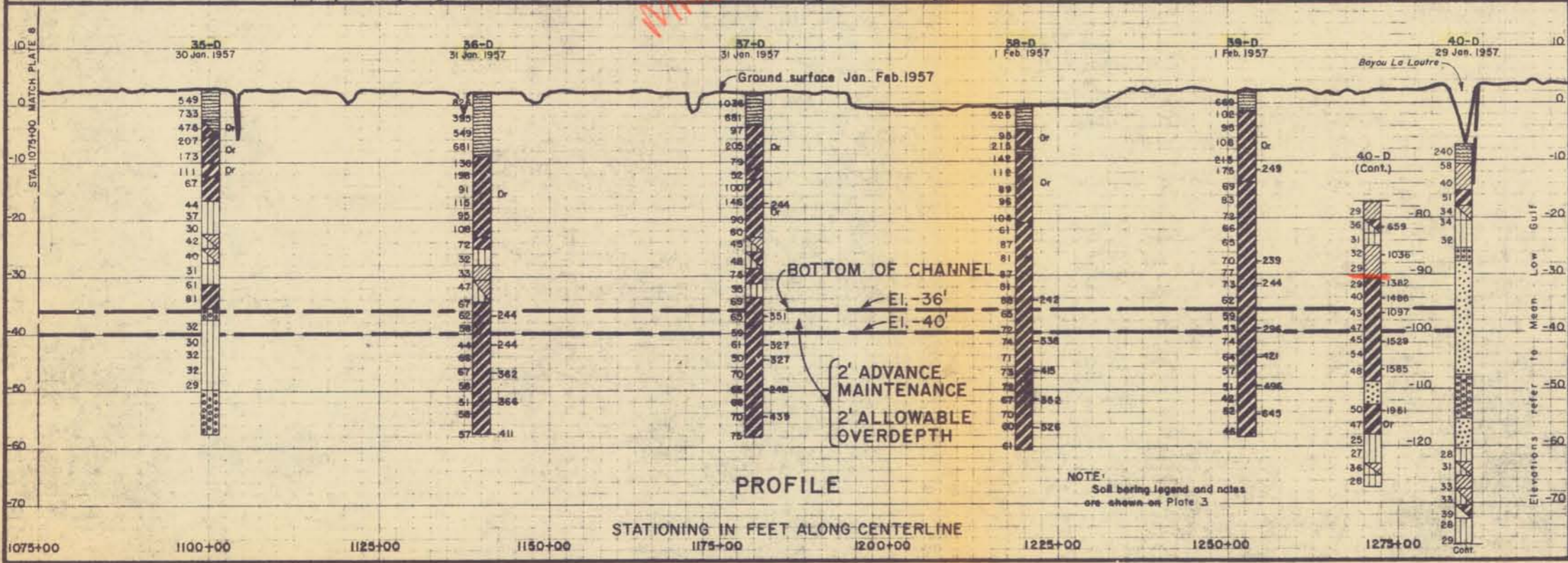
DATE: AUGUST 1958 FILE NO. H-2-21201



**PLAN**  
 Scale of Feet  
 1,000 0 1,000 2,000 Ft.  
 Polyconic Projection-1927 North American Datum  
 39-D ● Location of Borings

**NOTES:**  
 Elevations are in feet and refer to Mean Low Gulf Datum

Planimetry from aerial photos flown Jan., Feb. 1956  
 (41) Distances in miles from Gulf of Mexico

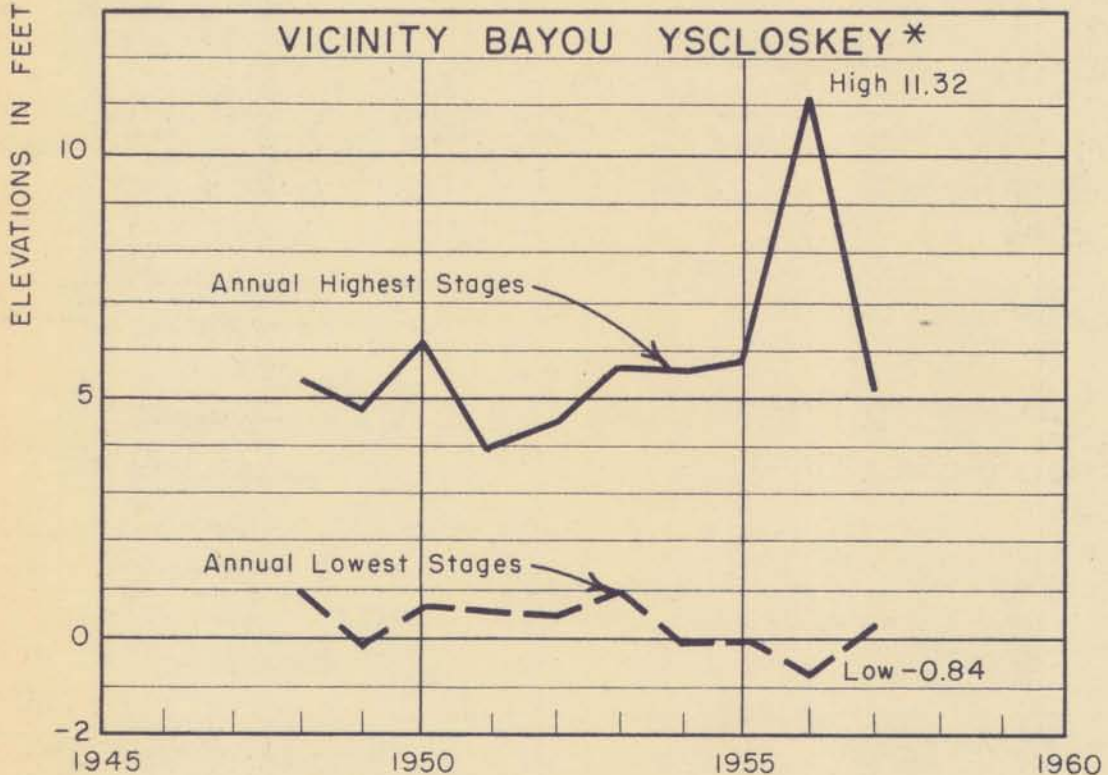
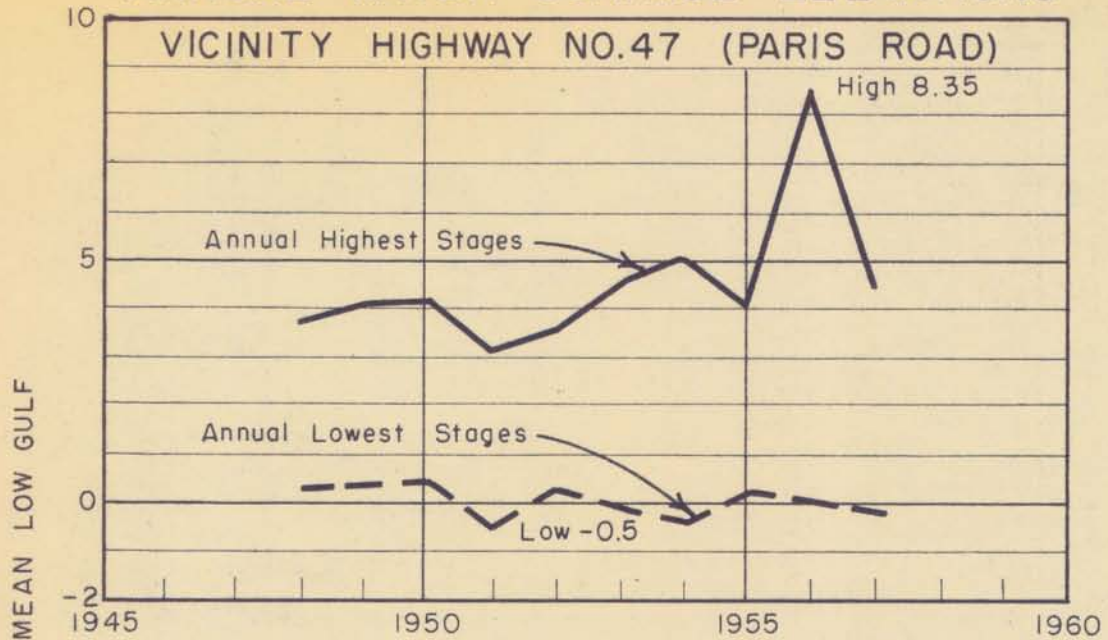


**PROFILE**

**NOTE:**  
 Soil boring legend and notes are shown on Plate 3

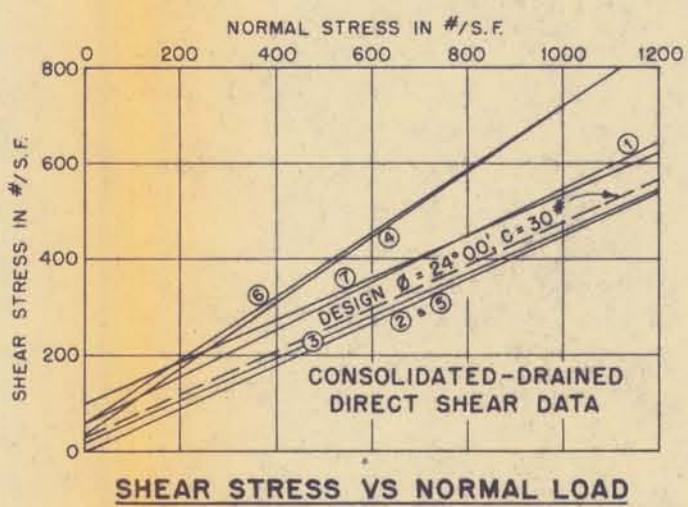
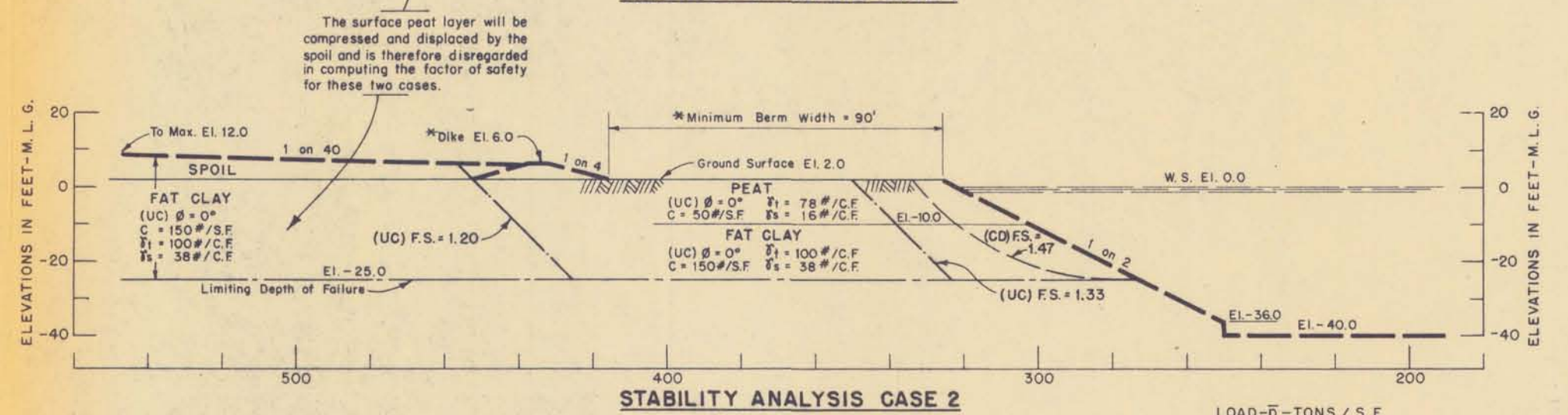
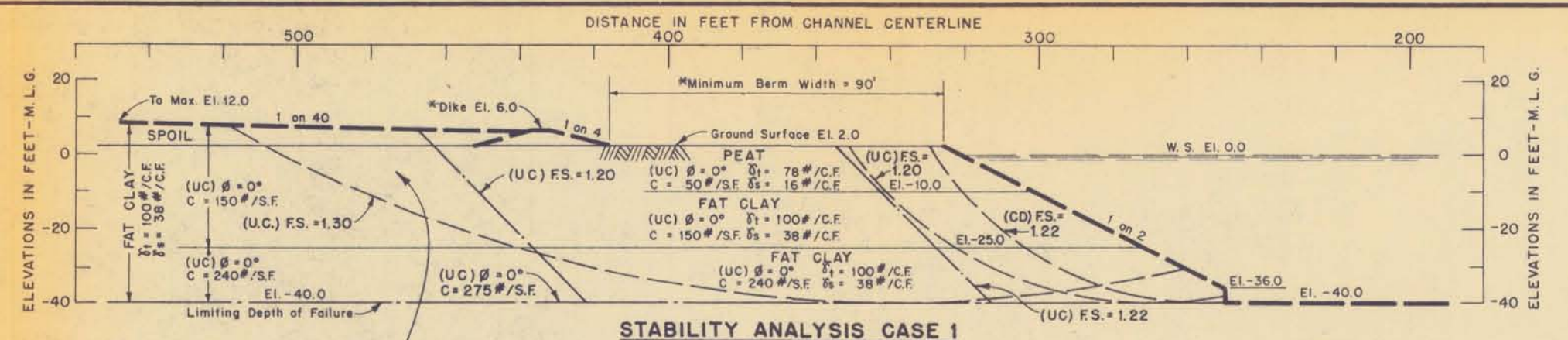
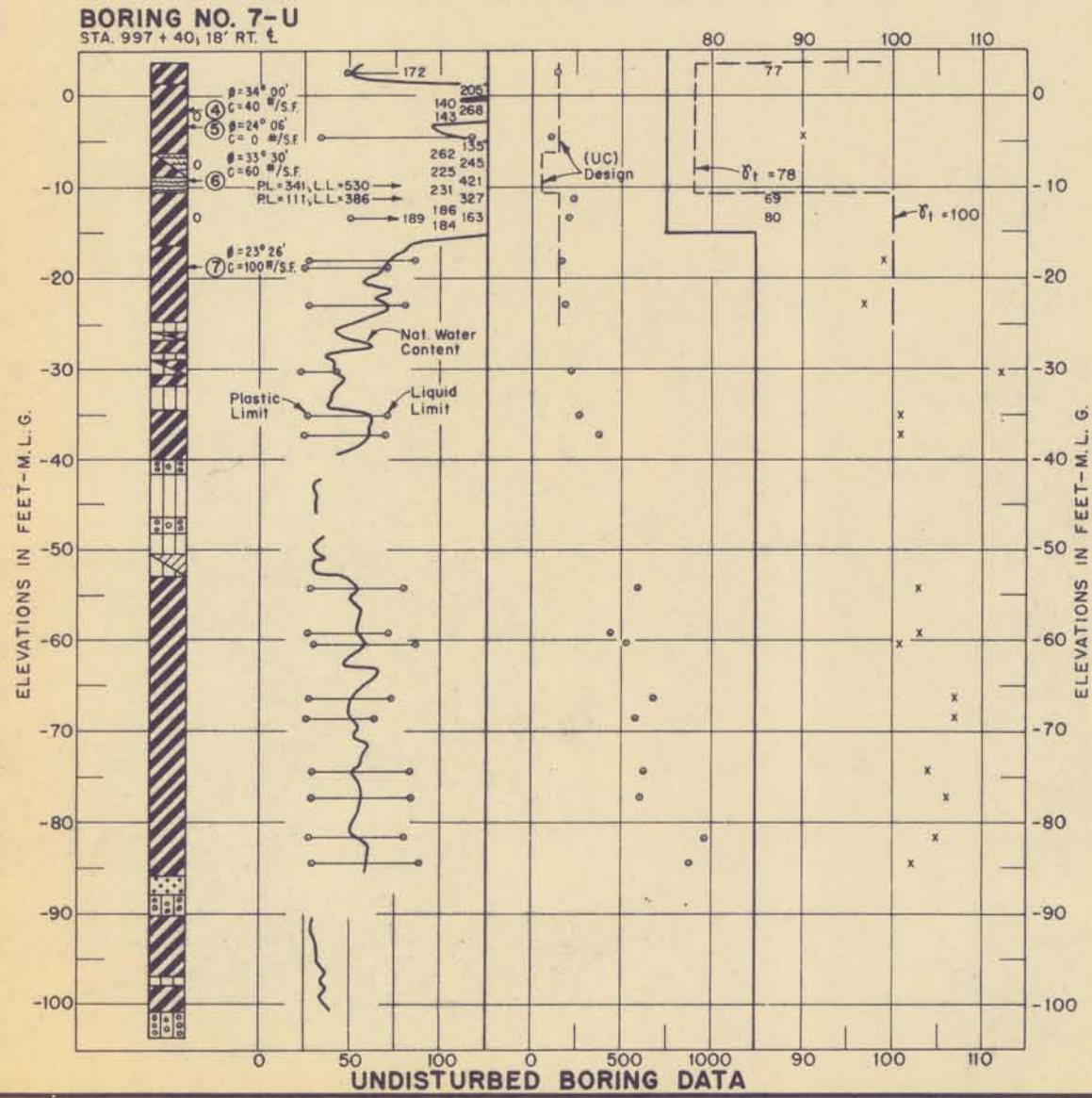
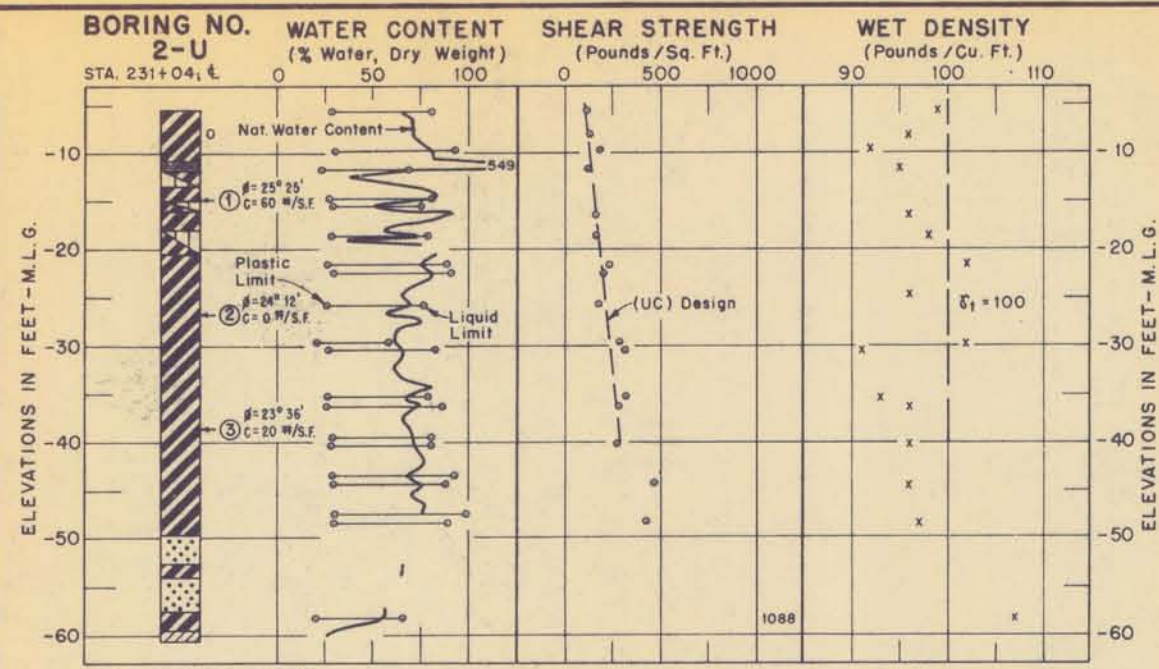
Revised 8 May 1959  
 MISSISSIPPI RIVER - GULF OUTLET  
 LOUISIANA  
**DESIGN MEMORANDUM NO. 1-B**  
**CHANNELS**  
 MILE 39.01 TO MILE 63.77  
**PLAN, PROFILE AND SOIL BORINGS**  
 STA. 1075+00 TO STA. 1285+00  
 SCALES AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
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# ANNUAL WATER SURFACE ELEVATIONS

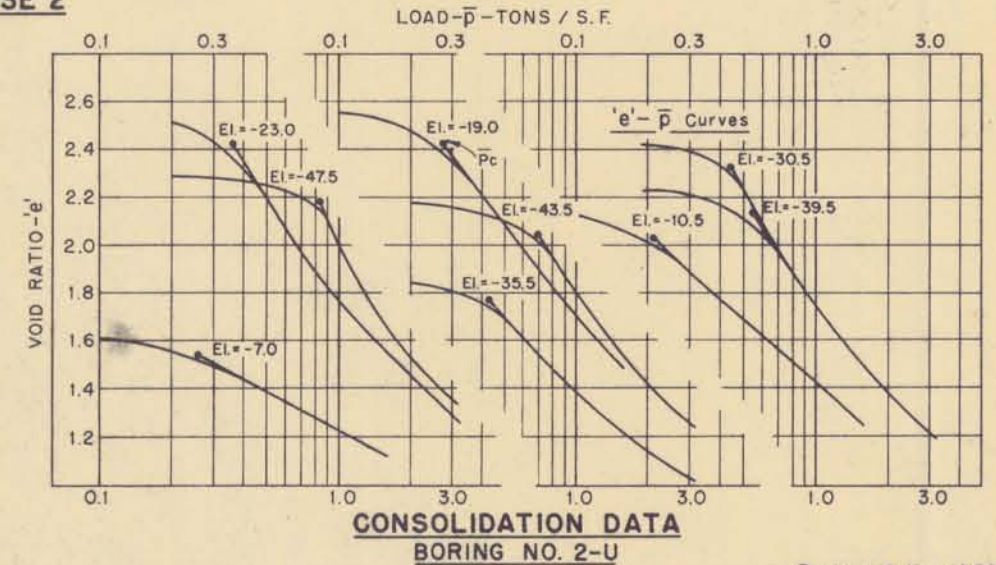


\* Gage located 500 ft. south of mouth of Bayou Yscloskey at Shell Beach, La.

MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA  
DESIGN MEMORANDUM NO. I-B  
CHANNELS  
MILE 39.01 TO MILE 63.77  
HYDROGRAPHS  
SCALES AS SHOWN  
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- BORING LEGEND**
- Sand (poorly graded) (SP)
  - Silty Sand (SM)
  - Sandy Silt (ML)
  - Lean Clay (GL)
  - Fat Clay (CH)
  - Peat (Pt)
  - Alternate thin layers
- GENERAL NOTES**
- $\phi$  Friction angle in degrees
  - C Shear strength (Cohesion) in pounds per square foot
  - $\delta_1$  Unit weight in pounds per cubic foot (Unsubmerged)
  - $\delta_s$  Submerged unit weight in pounds per cubic foot
  - F.S. Factor of safety against assumed shear failure
  - $\bar{p}_c$  Preconsolidation load



\*The stability analysis is based on a minimum berm width of 90 feet and an elevation of 6 for the top of the dike. The berm width will be larger than 90 feet to provide for erosion due to wave wash and the initial section of the retention dike will be as shown on Plate 12.

Revised 8 May 1959

MISSISSIPPI RIVER-GULF OUTLET  
LOUISIANA

**DESIGN MEMORANDUM NO. 1-B**

**CHANNELS**

MILE 39.01 TO MILE 63.77

**SOIL DATA AND STABILITY ANALYSIS**

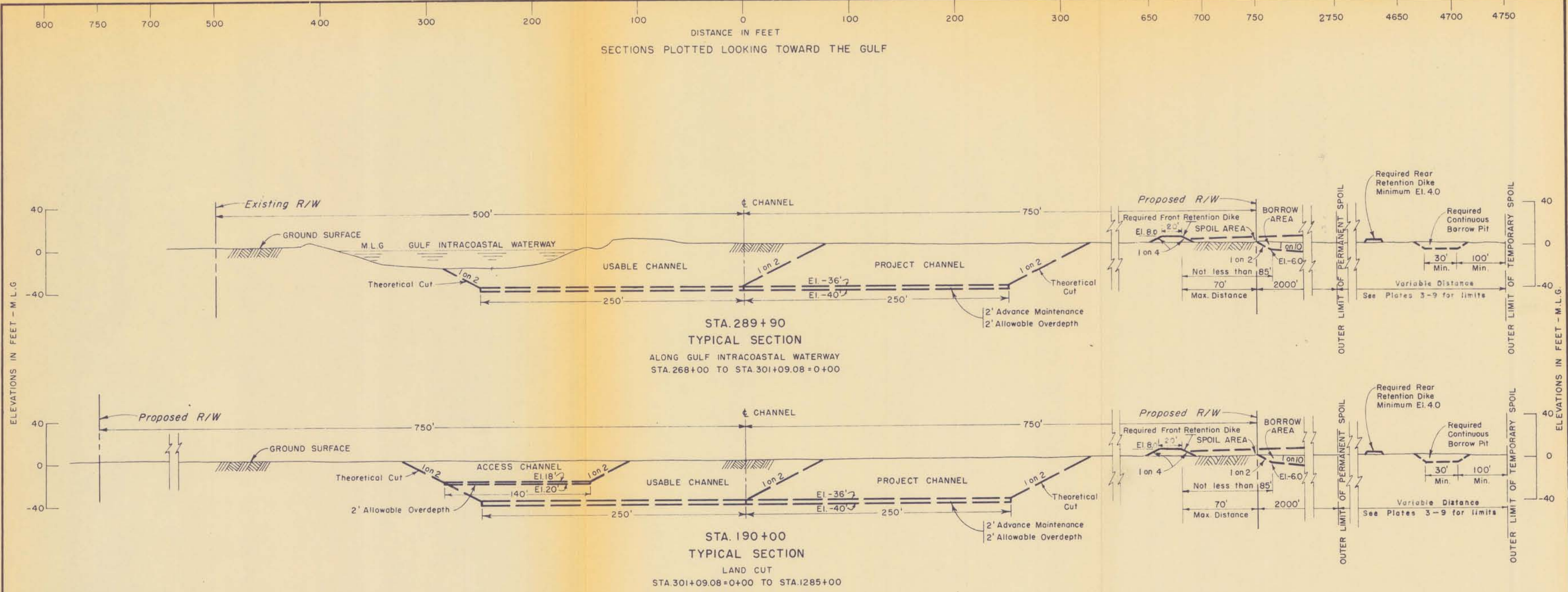
SCALES AS SHOWN

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.  
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AUGUST 1958 FILE NO. H-2-21201



DISTANCE IN FEET  
SECTIONS PLOTTED LOOKING TOWARD THE GULF



**STA. 289+90**  
**TYPICAL SECTION**  
ALONG GULF INTRACOASTAL WATERWAY  
STA. 268+00 TO STA. 301+09.08 = 0+00

**STA. 190+00**  
**TYPICAL SECTION**  
LAND CUT  
STA. 301+09.08 = 0+00 TO STA. 1285+00

2750      4650      4700      4750  
Revised 8 May 1959

MISSISSIPPI RIVER - GULF OUTLET  
LOUISIANA

**DESIGN MEMORANDUM NO 1-B**

**CHANNELS**

MILE 39.01 TO MILE 63.77

**TYPICAL SECTIONS**

SCALES AS SHOWN

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

DATE: AUGUST 1958      FILE NO. H-2-21201