APPENDIX A

INTRAAGENCY CORRESPONDENCE

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

ADDRESS REPLY TO:
DISTRICT ENGINEER
U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
P. O. BOX 60267
ORLEANS, LA. 70160

REFER TO FILE

LMNED-PP

7 October 1965

SUBJECT: Outline of Proposed Planning Procedures for Proposed "Lake Pontchartrain, La. and Vicinity," Project

TO: Division Engineer
U. S. Army Engineer Division
Lower Mississippi Valley
ATTN: LMVED-TD

1. Reference is made to the following:

a. LMNED letter "Review of Possible Engineering and Design Overload" dated 17 August 1965, and 1st Indorsement thereto.

b. Record of telecon between Messrs. Dement, LMVD, and Chatry, NOD, dated 15 September 1965, relative to subject project.

c. DIVR 1110-2-9.

2. The occurrence of hurricane "Betsy" has exerted a distinct influence on the course that should be followed in initiating planning of the subject project. First, it has introduced a requirement for increased tidal hydraulics coverage in the design process; second, it has generated substantial pressure for so arranging the planning that construction may be initiated at the earliest practicable date; and finally, it has preempted, for other purposes, the services of District engineering personnel required for participation in the overall planning effort.

3. We propose to respond to the peculiar requirements imposed by the above-described conditions by utilizing the following planning procedure. In the descriptions, please refer to inclosed map (incl 1):

a. A design memorandum (No. 1) on tidal hydraulics will be prepared in-house with maximum use of overtime when effective. Based on the project being funded on or before 15 October 1965, this memorandum would be forwarded for approval in January 1966. This submission date presupposes that studies now being made by the U. S. Weather Bureau will not result in a change in any of the parameters of the design hurricane. The scheduling of other design memoranda also is influenced by this presupposition.

b. Preparation of a general design memorandum (No. 2) on the barrier complex; i.e., the system of levees and structures required to exclude storm tides from Lake Pontchartrain, will be initiated concurrently with the memorandum on tidal hydraulics. Preparation of this memorandum would be by an A-E contractor with a local office. This memorandum will involve extensive coordination with various local entities, and for this reason is not considered suitable for accomplishment by another Corps office. Work would continue into fiscal year 1967 with submission date estimated to be March 1967, assuming initial funds are available by 15 October 1965.

c. Preparation of a general design memorandum (No. 3) on the Chalmette area also will be initiated concurrently with the memorandum on tidal hydraulics, utilizing an A-E contractor with a local office. For the reason cited in subparagraph b. above, this memorandum is not considered suitable for accomplishment by another Corps office. Work would continue into fiscal year 1967 and the memorandum would be submitted in November 1966, assuming initial funds are available by 15 October 1965.

d. In order to permit the earliest practicable start of construction, a single memorandum (No. 2A) supplementary to both the above GDM's, covering all levees along the Inner Harbor Navigation Canal, will be prepared in-house and submitted in advance of the GDM's. The existing Inner Harbor Navigation Canal levees proved to be very vulnerable during "Betsy." Further, the existing levee system, which will, in effect, provide the base for the project improvements, is under the exclusive control of the Orleans Levee Board, which agency is most anxious to cooperate. In addition, the entire project levee along the west bank of the canal, and that part of the project levee on the east bank of the canal which is north of the Gulf Intracoastal Waterway, will be integral parts of the barrier system, which system will produce more widespread benefits than any other project feature. Assuming that funds are available by 15 October 1965 and maximum use of overtime when effective, the advance supplement would be submitted in May 1966. With normal review time and allowing eight months, after submission of the advance supplement, for preparation of plans and specifications, review, advertisement, etc., construction could be initiated by January 1967.

e. A combination general and detailed design memorandum (No. 3 of the Mississippi River-Gulf Outlet series) for the Seabrook Lock will be prepared by another Corps office or by A-E contractor, using Mississippi River-Gulf Outlet funds. Assuming that funds are available by 15 October 1965, this memorandum would be submitted in July 1966.

LMNED-PP 7 October 1965

SUBJECT: Outline of Proposed Planning Procedures for Proposed "Lake Pontchartrain, La. and Vicinity," Project

4. CPM schedules and estimated planning and construction costs (including E&D and S&A) for the features described above are shown on inclosure 3. The funds required for fiscal year 1966, assuming A-E accomplishment of the barrier and Chalmette general design memoranda, exclusive of the $180,000 of Mississippi River-Gulf Outlet funds required for Seabrook Lock (preparation by A-E), are indicated to be in excess of $450,000 which is the amount expected to be made available. A request for additional funds will, however, be deferred until negotiations with A-E contractors are complete and a more positive requirement for additional funds exists.

5. Reference a. (1st Indorsement) indicated that our request for engineering assistance should be deferred until receipt of definite information that initial funds will be made available. We consider that receipt of initial funds in the amount of $450,000 for the subject project is, for all practical purposes, now assured. Accordingly, it is requested that we be authorized to proceed with arrangements to have the design memoranda for the barrier and the Chalmette area prepared by an A-E contractor. It is further requested that you arrange for preparation of the design memorandum on Seabrook Lock by another Corps office, or that we be authorized to arrange for its preparation by an A-E contractor.

6. Twelve copies of plates 3 and 9 from the survey report on the project are furnished herewith for use in briefing other Corps offices on the Seabrook Lock. Additional copies will be made available on request.

7. Approval of the procedure outlined in paragraphs 3-5 is requested. Further information on planning subsequent to that described will be the subject of future correspondence.

Thomas J. Bowen

THOMAS J. BOWEN
Colonel, CE
District Engineer

4 Incl
1. Map H-2-22077, plate 3 (12 cys)
2. Map H-2-22077, plate 9 (12 cys)
3. CPM - 1 sheet (12 cys)
4. CPM - 8 sheets (trip)

LMVED-TD (7 Oct 65) 1st Ind
SUBJECT: Outline of Proposed Planning Procedures for Proposed "Lake Pontchartrain, La. and Vicinity," Project

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39181 9 Dec 65

TO: District Engineer, New Orleans District, ATTN: LMNED-PP

1. Returned for terminal filing.

2. Action on basic letter was correlated with that taken on your letter, LMVED-PP, 5 November 1965, subject: Revised Outline of Planning Procedures for "Lake Pontchartrain, La. and Vicinity," Project, by LMVED-TD 1st indorsement dated 8 December 1965.

FOR THE DIVISION ENGINEER:

A. J. DAVIS
Chief, Engineering Division

4 Incl
wd 1 cy ea

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

IN REPLY REFER TO
LMNED-PP

5 November 1965

SUBJECT: Revised Outline of Planning Procedures for "Lake Pontchartrain, La. and Vicinity," Project

TO: Division Engineer
Lower Mississippi Valley Division
ATTN: LMVED

1. Reference is made to letter LMNED-PP dated 7 October 1965 subject "Outline of Planning Procedures for Proposed 'Lake Pontchartrain, La. and Vicinity,' Project."

2. Continuing consideration of the subject planning procedures reveals that certain revisions in the procedures outlined in the referenced letter are desirable. A discussion of proposed procedural changes follows in subsequent paragraphs.

3. It is understood that your office is opposed to the combined general and detail memorandum on Seabrook Lock. Accordingly, both an abbreviated general design memorandum establishing the general features of the lock and its precise location and a detail design memorandum will be prepared. Preliminary discussions have already been held with the Buffalo District and WES, and it has been determined that both memoranda will be prepared by Buffalo with assistance from WES on soils, foundations, and geology. Buffalo and WES have agreed to furnish estimates of time and cost for preparation of the two memoranda in the near future. We shall schedule the memoranda after receipt of the above data.

4. In order to reduce the time required to begin construction of elements covered in the general design memorandum for the barrier (see par. 3.b. of referenced letter), we now propose to prepare a general design memorandum for the entire Lake Pontchartrain barrier plan, with full design memorandum scope coverage limited to the two barrier structure complexes and a section of the Citrus back levee extending from the Inner Harbor Navigation Canal to near Michoud. The remainder of the plan would be given only brief coverage using survey report data with cost estimates and benefits updated. Segments of the plan given brief coverage in the general design memorandum will be developed further in a series of supplements.

LMNED-PP 5 November 1965

SUBJECT: Revised Outline of Planning Procedures for "Lake Pontchartrain, La. and Vicinity," Project

5. Preparation of the above-mentioned general design memorandum and plans and specifications for the section of levee detailed therein would be by A-E contractor. A schedule for the work and government estimate of cost (incl 1 & 2) are inclosed.

6. We plan to leave unchanged our prior proposals on design memoranda coverage for the tidal hydraulics, Inner Harbor Navigation Canal levee, and the Chalmette area. The schedules previously furnished for these memoranda are obsolete as to date and will be resubmitted.

7. A government cost estimate for the general design memorandum for the Chalmette area, which is also to be prepared by the A-E contractor, will be forwarded at an early date.

8. A list of proposed design memoranda covering the entire project is inclosed (incl 3).

9. Approval of the revised procedure discussed in paragraphs 3-7 is requested.

10. Approval of the government estimate of cost for the A-E contract for the general design memorandum on the Lake Pontchartrain barrier plan and authority to proceed with contract negotiations are requested.

Thomas J. Bowen

THOMAS J. BOWEN
Colonel, CE
District Engineer

3 Incl (dupe)
1. Schedule
2. Gov't est.
3. List of DM's

LMVED-TD (NOD 5 Nov 65) 1st Ind
SUBJECT: Revised Outline of Planning Procedures for "Lake Pontchartrain, La. and Vicinity," Project

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39181 8 Dec 65

TO: District Engineer, New Orleans District, ATTN: LMNED-PP

1. In addition to letter, LMNED-PP, NOD, 7 Oct 65, cited in par 1 of basic communication, the following correspondence is pertinent to the contents of this indorsement:

a. Letter, LMNED-PP, NOD, 19 Oct 65, subject: Lake Pontchartrain, Louisiana and Vicinity, Dual-Purpose Control Structure at Seabrook (Seabrook Lock), and 1st Ind, LMVED-PH/LMVED-TD, LMVD, 17 Nov 65, thereon.

b. Letter, ENGCW-EY, OCE, 12 Nov 65, subject: Engineering Assistance for the New Orleans District, and 1st Ind, LMVED-PH, LMVD, 23 Nov 65, to NOD.

c. Letter, LMVED-TV, LMVD, 24 Nov 65, to OCE, subject: Request for Engineering Assistance for the New Orleans District, 1st Ind, ENGCW-EZ, OCE, 29 Nov 65, thereon, and 2d Ind, LMVED-T, LMVD, 3 Dec 65.

2. This indorsement is in response to both basic communication and your letter of 7 Oct 65 referred to in par 1 hereof. Your proposed planning on this project provides for use of Architect-Engineer services for preparation of general design memoranda on the Barrier Complex and on the Chalmette Area, for the use of the Buffalo District for preparation of both the GDM and FDM on Seabrook Lock and for the in-house preparation of design memoranda on tidal hydraulics and the Inner Harbor Navigation Canal levees. Reference 1b above authorized the use of A-E services subject to the conditions stated in par 2 thereof. Transfer of the planning work on Seabrook Lock to the Buffalo District was authorized by 1st Ind, ENGCW-EZ, OCE, 29 Nov 65 (see reference 1c above, copy inclosed).

3. Revised planning procedure discussed in par 3 through 7 of basic letter is approved subject to the comments in par 5 below. Government estimate of cost for A-E contract (Incl 2) is approved. You are authorized to proceed with contract negotiations which should be conducted in accordance with par 2 of reference 1b above.

4. In reference 1a above, you were authorized to design Seabrook Lock on a controlling elevation of 7.2 ft msl. Recent review of the authorization contained in the Flood Control Act of 1965 has raised the question as to whether this modification in the controlling elevation is within the discretionary powers of the Chief of Engineers. In view of this uncertainty, it is desired that you proceed with definite project studies to a stage where a firm controlling elevation can be established

for the lock. Upon either confirmation of elevation 7.2 ft msl or the establishment of a new controlling elevation, it is further desired that a letter report be prepared covering this modification in the project. The letter report will be forwarded to the Chief of Engineers for approval pursuant to par 10, EM 1110-2-1150.

5. The following comments are furnished for consideration in firming up your planning schedules:

a. Your understanding in par 3 of basic letter that we are opposed to a combined GDM and FDM on Seabrook Lock is correct. Confirming par 3 of 1st Ind, LMVED-PH/LMVED-TD, LMVD, 17 Nov 65 (reference 1a above), separate general design and feature design memoranda are desired.

b. The schedule for preparation of GDM No. 2 provides very little slack time. Following the notice to proceed, the schedule requires a number of various field and design operations to proceed concurrently. This apparently will require a fair size staff of experienced engineers available to proceed with the work shortly after the notice to proceed is given. It may be difficult to find an A-E with this capability on short notice. The time scheduled may not make sufficient allowance for the various contingencies.

c. Normally, it is desirable to firm up the general requirements and types of structures to be built in the GDM. If the time scheduled does not permit a study of alternate types of structures, then the structures in the GDM could be based on previous structures of similar nature developed only in sufficient detail to serve as a basis for cost estimating. In this case the study of types of structures would either be covered in the FDM or in a letter report submitted for review prior to starting the FDM.

d. The furnishing of satisfactory assurances by local interests is prerequisite to construction. In view of the large non-Federal costs involved (a contribution of $19,021,000 for the Lake Pontchartrain Area

LMVED-TD (NOD 5 Nov 65) 1st Ind 8 Dec 65
SUBJECT: Revised Outline of Planning Procedures for "Lake Pontchartrain, La. and Vicinity," Project

and $3,644,000 for the Chalmette Area, plus the costs of rights-of-way and relocations), it may be a distinct advantage in working out your planning schedule to ascertain from responsible local interests their attitude toward the project and their ability to provide the necessary cooperation. This action, if successful, may dictate changes in your schedule which would permit planning to progress in parallel with the activities of non-Federal interests. Under the present authorization, which includes the recommendation of the Secretary of the Army that the cost of Seabrook Lock be shared equally between hurricane protection and navigation, assurances from local interests must be obtained for the Lake Pontchartrain Area before construction of Seabrook Lock can be initiated.

FOR THE DIVISION ENGINEER:

George B Davis

A. J. DAVIS
Chief, Engineering Division

4 Incl
wd 1 cy ea incl 1-3
Added 1 incl
4. Ltr, LMVD, 24 Nov 65, w/1st & 2d Ind

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

IN REPLY REFER TO
LMNED-PP

8 November 1966

SUBJECT: Lake Pontchartrain, La. and Vicinity - Revised Approach to Advance Supplement on Inner Harbor Navigation Canal Levees

TO: Acting Division Engineer, Lower Mississippi Valley
ATTN: LMVED-TD

1. The advance supplement on the Inner Harbor Navigation Canal (IHNC) levees is presently scheduled for submission on 31 December 1966. As you know, this supplement is being prepared as a means of accelerating construction in an area proven to be critical by the passage of hurricane "Betsy" in September 1965. Preparation of the supplement has proceeded on the basis of having it cover all of the IHNC levees except those on the east bank between the IHNC lock and Florida Avenue, which segment is included in the GDM for the Chalmette area plan submitted to you under date of 1 November 1966 (see incl). As planning has progressed, it has become apparent that certain alignment and design problems would not permit coverage of some areas in sufficient detail for preparation of plans and specifications to follow directly from the advance supplement, and that additional design reports of a detailed nature would be required. Coverage in the advance supplement for such areas (which include the siphon crossings at Florida Avenue, all work on the west bank between the IHNC lock and Florida Avenue, and work on both banks in the vicinity of Interstate Highway 10 and U. S. Highway 90) was, accordingly, to have been limited to survey report scope, with detail design memoranda to follow as required.

2. On 24 October 1966, Mr. Armand Willoz, Chief Engineer of the Orleans Levee District, local cooperators for the project, expressed grave concern over the fact that current schedules would not result in Federal construction on the west bank of the Canal between the IHNC lock and Florida Avenue prior to the next hurricane season. Mr. Willoz explained that construction by the Orleans Levee District since "Betsy" has resulted in a significant increase in the degree of protection in all other areas which proved to be critical in "Betsy," and pointed cut the technical factors which render impracticable an interim approach to providing protection such as has been applied in other areas. He also described the difficulties experienced and the disruption involved in providing emergency protection in the area by makeshift means during the hurricane season just past.

3. We pointed out to Mr. Willoz that, if our planning were revised to emphasize work in the subject area and all preconstruction planning completed in time to permit start of construction prior to next hurricane season, the fiscal outlook was such that construction funds in the amount required might not be available. Mr. Willoz indicated that the Levee District would be happy to undertake the construction with their own funds (subject to credit as in the case of the interim work already done by them), provided we gave them authority to do so. He further offered to have the necessary engineering done by architect-engineers if such action would expedite the production of approved plans.

4. In view of the above, we propose to modify our present planning schedules as follows:

a. The advance supplement will be modified so as to cover only that portion of the Canal between IHNC lock and Florida Avenue on the west bank. Coverage will be in sufficient detail to permit preparation of plans and specifications directly from the advance supplement.

b. Available in-house capability in the structural design area will be concentrated on preparation of the modified advance supplement. We expect that, under these conditions, the advance supplement can be submitted on or before 15 February 1967. Assuming normal review time, an approved set of plans and specifications for the work could be available by 15 June 1967.

c. Two additional supplements to the GDM for the barrier plan will be prepared for other segments of the IHNC levees. One would cover the Florida Avenue siphon crossings, and the other the remainder of the work on the Canal.

d. The emphasis placed on completing the advance supplement will result in slippage of the present schedule for the GDM for the barrier plan. However, this memorandum will cover in detail only the levee on the north bank of the Mississippi River-Gulf Outlet between the IHNC and Michoud. This levee has been raised to elevation 13 feet m.s.l. by the Levee District and currently affords a very high degree of protection. We plan to submit, at an early date, and prior to completion of the barrier plan GDM, a letter report on evaluation of alternate barrier locations, approval of which will permit site selection studies for the barrier structures to proceed without delay. Thus, progress on planning for these structures, which are crucial to the project, will not be delayed by slippage of the barrier plan GDM. We expect that this GDM, presently scheduled for submission on 31 January 1967, can be submitted on or before 1 September 1967. In view of the above, it is considered that this delay can be tolerated.

LMNED-PP 8 November 1966

SUBJECT: Lake Pontchartrain, La. and Vicinity - Revised Approach to Advance Supplement on Inner Harbor Navigation Canal Levees

5. Based on the foregoing, it is recommended that the advance supplement for the Inner Harbor Navigation Canal levees presently scheduled for submission on 31 December 1966 cover only the work between the IHNC lock and Florida Avenue on the west bank of the Canal, and that revised submission dates of 15 February 1967 and 1 September 1967, respectively, for this supplement and the GDM for the barrier plan, be approved.

Thomas J. Bowen

1 Incl
Mosaic fwd sep

THOMAS J. BOWEN
Colonel, CE
District Engineer

LMVED-TD (NOD 8 Nov 66) 1st Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Revised Approach to Advance Supplement on Inner Harbor Navigation Canal Levees

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 18 Nov 66

TO: District Engineer, New Orleans District, ATTN: LMNED

1. Recommendation in para 5 of basic communication is approved.

2. Confirming telephone conversation between Messrs. A. J. Davis and George Hudson 17 Nov 66, tentative agreement has been reached with Chief, Engineering Division, OCE, for concurrent review of the design memorandum followed by a field conference about 10 days after receipt of DM in OCE. When preparation of the DM has progressed to a stage where a firm submission date can be established advise us promptly in order that arrangements may be made with OCE for the field conference.

3. In order to advance work on this project in an expeditious manner, it is desired that the design memorandum, when approved by OCE, be furnished the Orleans Levee District for preparation of contract drawings and specifications and for construction. Contract drawings and specifications prepared by the Orleans Levee District will be reviewed by NOD and submitted to LMVD for review and approval prior to advertising for bids.

4. In view of the reduction in work allowance for FY 67 from $1,600,000 to $850,000, the above procedure will encourage the use of local funds for the work between the IHNC lock and Florida Avenue and permit use of available Federal funds at other locations, thereby further advancing the project.

5. We suggest that all references to "supplement" be changed to "part" in identifying portions of GDM No. 2 for the Barrier Plan as was done with Design Memorandum No. 1, Tidal Hydraulics. All future design memoranda or parts thereof should contain a flyleaf map similar to those prepared as project maps for the purpose of showing the entire project and the relation of the work covered by a specific DM to the overall project. Once the map is prepared, it can be used in all DM's by delineating thereon the work covered by the DM being submitted.

FOR THE ACTING DIVISION ENGINEER:

A. J. DAVIS
Chief, Engineering Division

wd all incl

DEPARTMENT OF THE ARMY
LOWER MISSISSIPPI VALLEY DIVISION
CORPS OF ENGINEERS
VICKSBURG, MISSISSIPPI 39181

IN REPLY REFER TO: LMVPD

9 December 1965

SUBJECT: Lake Pontchartrain and Vicinity, Louisiana

TO: Chief of Engineers
ATTN: ENGCW-V

1. The project for Lake Pontchartrain and Vicinity, Louisiana (hurricane protection) was authorized by the Flood Control Act of 1965 (PL 89-298) at an estimated Federal cost of $56,235,000 substantially in accordance with the recommendation of the Chief of Engineers in House Document 231, 89th Congress, except that the recommendation of the Secretary of the Army in that document shall apply with respect to the Seabrook Lock feature of the project. The Secretary of the Army recommended that the cost of the Seabrook lock feature be allocated equally between navigation and hurricane protection purposes. The basis for this allocation of cost was that the lock would serve a dual purpose--mitigating anticipated adverse effects of the Mississippi River-Gulf Outlet navigation project and serving as an element in the hurricane surge control project.

2. An analysis of the cost estimate and its distribution to purposes and apportionment to interests and projects as recommended by the District Engineer and as authorized by Congress is shown in Inclosure 1.

3. In view of the substantial cash contributions required of local interests ($22,665,000 at 1961 price levels), it is considered advisable to subdivide the project into separable units in order to facilitate initiation of construction. Any funds appropriated by the Congress to initiate construction of the project could be used on that separable unit for which acceptable assurances of cooperation had been received and accepted. This would avoid the necessity of obtaining assurances for the entire project prior to initiating construction. The recommended separable units are as follow (see Plate 3, House Document Numbered 231, 89th Congress, 1st session):

LMVPD 9 December 1965
SUBJECT: Lake Pontchartrain and Vicinity, Louisiana

Separable Unit	Description
New Orleans East	This separable unit comprises the work inclosing the New Orleans East and Citrus Areas and extending to the east of the Rigolets.
Chalmette	This is the area southeast of New Orleans bounded by the Mississippi River Levee on the west and a proposed levee along the Gulf Intracoastal Waterway, Mississippi River-Gulf Outlet and Bayou Dupre.
New Orleans West	This is the area in Orleans, Jefferson, and St. Charles Parishes bounded by the Mississippi River Levee on the south, the Bonnet Carre East Levee on the west, and a proposed levee extending along the south shore of Lake Pontchartrain to Inner Harbor Canal and thence along Inner Harbor Canal to the Mississippi River Levee.
Mandeville	This unit consists of protection works in front of the Town of Mandeville.
Seabrook Lock	This is the lock at the Lake Pontchartrain entrance to the Inner Harbor Navigation Canal. Part of the cost of this lock will be charged to the Mississippi River-Gulf Outlet project.

No longer applicable all costs will be borne by the Lake Pontchartrain & Vic. project. B 1/19/66

4. Authority is requested to use the separable units listed above as basis for computing the amount of local contribution required, for the obtaining of the necessary assurances to provide the required local cooperation, and to initiate construction as soon as local assurances have been received and funds appropriated by Congress. In this connection and prior to construction, the District Engineer should make clear to the local interests inhabiting the New Orleans West and the Mandeville separable units that complete protection against the project hurricane will not be provided until the New Orleans East unit has been completed.

Joe A. Clema

1 Incl (dupe)
Analysis of Cost Estimate

JOE A. CLEMA
Colonel, CE
Acting Division Engineer

Copy furnished:
New Orleans Dist

ENGCW-OC (9 Dec 65) 1st Ind
SUBJECT: Lake Pontchartrain and Vicinity, Louisiana

DA, CofEngrs, Washington, D. C., 20315, 4 January 1966

TO: Division Engineer, Lower Mississippi Valley Division

The division of the Lake Pontchartrain and vicinity area into separable units as described in the basic letter is approved.

FOR THE CHIEF OF ENGINEERS:

R. S. Kristoferson

Incls w/d

R. S. KRISTOFERSON
Lt Colonel, Corps of Engineers
Assistant Director of Civil Works
for Plains Divisions

LMNED-DD 3 March 1966

SUBJECT: Lake Pontchartrain & Vicinity, Louisiana

TO: Division Engineer
Lower Mississippi Valley Division
ATTN: LMVPD

1. References:

a. LMVPD letter of 9 Dec 65 to OCE, subject: as above.

b. 1st Ind to above by OCE dated 4 Jan 66.

c. 2nd Ind to above by LMVPD dated 12 Jan 66.

2. On 2 Nov 65, the Governor of Louisiana appointed the State of Louisiana, Department of Public Works, to act as coordinator in resolving all questions that may arise and to expedite the furnishing of assurances on the Lake Pontchartrain & Vicinity, Louisiana (Hurricane Protection) project.

3. The Governor on 17 Jan 66 then designated the Board of Levee Commissioners of the Orleans Levee Board as the local agency to secure the assurances for the Barrier Plan. Joint assurances will be secured for the Chalmette Plan from the Orleans Levee Board and the Lake Borgne Basin Levee District and/or the St. Bernard Parish Police Jury.

4. Formal request for assurances was made to the Orleans Levee Board for the Barrier Plan and that portion of the Chalmette Plan in Orleans Parish on 19 Jan 66 and 21 Jan 66, respectively, and should be executed within a few days. Formal request for joint assurances was made to the St. Bernard Parish Police Jury and the Lake Borgne Basin Levee District for that portion of the Chalmette Plan in St. Bernard Parish on 8 Feb 66 and should be executed soon, also.

5. In view of the above, the subdivision of the project into the separable units listed in reference 1. a. seems unnecessary since assurances for the entire project are expected soon because of intense

local interest in the project. Therefore, it is recommended that the project be subdivided into two separable units as described in House Document No. 231, 89th Congress, 1st Session; namely, the (a) Barrier Plan, and the (b) Chalmette Plan, with the Chalmette Plan further subdivided into (1) Orleans Parish and (2) St. Bernard Parish.

6. The allocation of costs to the separable units recommended above is derived in the following tables. Costs are based on 1 Oct 65 price levels.

Table I
(Costs to be Apportioned)

Separable Unit	Construction	L&D	Relocations	Total
	(In thousands of dollars)			
Barrier Plan				
	1/			1/
Seabrook Lock	3,100.0	---	---	3,100.0
Rigolets	21,458.0	858.8	---	22,317.6
Chef Menteur	8,066.6	123.7	---	8,190.3
St. Charles	6,274.9	277.5	41.5	6,593.9
Jefferson	587.0	---	---	587.0
New Orleans	5,555.3	1,038.8	76.1	6,670.2
Citrus & New Orleans East	25,787.3	2,143.2	514.5	28,445.0
Barrier Levee	271.0	1,145.0	---	1,416.0
Mandeville Seawall	258.3	---	---	258.3
TOTAL	71,359.2	5,587.0	632.1	77,578.3

1/ One-half the total cost; the other half is allocated to Navigation and is all Federal.

Chalmette Plan				
Orleans Parish	3,366.6	377.9	---	3,744.5
St. Bernard Parish	12,974.2	187.1	515.9	13,677.2
	16,340.8	565.0	515.9	17,421.7

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LMNED-DD 3 March 1966
SUBJECT: Lake Pontchartrain & Vicinity, Louisiana

Table II
(Apportionment of Costs in Table I)

Separable Unit	Costs to be Apportioned	Federal (70%) 1/	Non-Fed. (30%)	Non-Fed.Costs Contributed 1/
	(In thousands of dollars)			
Barrier Plan	77,578.3	54,304.8	23,273.5	17,054.4
Chalmette Plan				
Orleans Parish	3,744.5	2,621.2	1,123.3	745.4
St. Bernard Parish	13,677.2	9,574.0	4,103.2	3,400.2
TOTAL	95,000.0	66,500.0	28,500.0	21,200.0

1/ To be adjusted (see Table III) to reflect a cash contribution of $3,816,000 for capitalized cost of OM&R of Rigolets Lock and $3,100,000 Federal cost for 1/2 the cost of Seabrook Lock.

Table III
(Adjustment of Federal & Non-Federal Costs)

Separable Unit	Costs to be Apportioned	Federal	Non-Fed.	Non-Federal Cash Contrib.
Barrier Plan	77,578.3			
70/30 Apportionment		54,304.8	23,273.5	17,054.4
Rigolets OM&R		-3,816.0	+3,816.0	+3,816.0
1/2 Cost of Seabrook Lock	3,100.0	+3,100.0		
SUBTOTAL	80,678.3	53,588.8	27,089.5	20,870.4
Chalmette Plan				
Orleans Parish	3,744.5			
70/30 Apportionment 1		2,621.2	1,123.3	745.4
St. Bernard Parish	13,677.2			
70/30 Apportionment		9,574.0	4,103.2	3,400.2
SUBTOTAL	17,421.7	12,195.2	5,226.5	4,145.6
TOTAL	98,100.0	65,784.0	32,316.0	25,016.0

7. Authority is requested to use the separable units listed above in lieu of those listed in reference 1. a.

Lipscomb
Franklin
Hudson
Keen
Brune
Exec Ofc

THOMAS J. BOWEN
Colonel, CE
District Engineer

(see #621)

LMVPD (NOD 3 Mar 66) 1st Ind
SUBJECT: Lake Pontchartrain & Vicinity, Louisiana

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 14 Apr 66

TO: District Engineer, New Orleans District, ATTN: LMNED-DD

1. Reference is made to telephone discussion between Messrs. Hudson and Mask of your office and Bush of my office on 13 April 1966.

2. The subject project was subdivided into 5 separable units at the request of local interests who today reaffirmed the desire for the 5-unit breakdown. The 5-unit breakdown was approved by the Chief of Engineers.

3. It is our understanding that St. Tammany Parish and Orleans Parish will furnish assurances for the New Orleans East unit. Orleans Parish should be requested to furnish assurances not only for the New Orleans East unit but also for the Seabrook Lock unit and those portions of the New Orleans West and Chalmette units lying in Orleans Parish. In other words, the assurances from Orleans Parish should cover all of the Lake Pontchartrain and Vicinity project lying in Orleans Parish.

4. There is no objection to subdividing the Chalmette unit into two sub-units; namely, that portion lying in Orleans Parish and that portion lying in St. Bernard Parish. However, these sub-units will not be considered separable units. Satisfactory assurances covering all the work in the Chalmette unit in both Parishes must be accepted before work can start in the Chalmette area.

5. The clarification in paragraph 3 above should remove the objections of the New Orleans District brought out in discussion mentioned above and retain the reaffirmed desires of local interests. For these reasons the 5-unit plan will be retained.

Ellsworth I. Davis

ELLSWORTH I. DAVIS
Major General, USA
Division Engineer

APPENDIX B

CORRESPONDENCE RELATIVE TO COORDINATION WITH OTHER AGENCIES

523-5042

The Board of Levee Commissioners

OF THE

Orleans Levee District

200 WILDLIFE AND FISHERIES BUILDING
418 ROYAL STREET

New Orleans, La.
70130

COMMISSIONERS
MILTON E. DUPUY, PRESIDENT
CLAUDE W. DUKE, PRES. PRO-TEM.
JAMES V. AVALLONE
HENRY H. BUSH
CHARLES C. DEANO

EX-OFFICIO
MAYOR VICTOR H. SCHIRO
COUNCILMAN JOSEPH V. DIROSA

A. L. WILLOZ, CHIEF ENGINEER
JAMES E. GLANCEY, JR., SECRETARY

Engr Div
B

January 11, 1966

Colonel Thomas J. Bowen
U. S. Corp of Engineers
Foot of Prytania Street
New Orleans, Louisiana

Dear ~~Colonel Bowen:~~ Tom

During Hurricane Betsy, tides of 10.0 feet m.g.l. occurred along the Mississippi River Gulf Outlet between Paris Road and the Industrial Canal, and in the Industrial Canal between the Locks and the Louisville & Nashville Railroad. These tides topped the existing levees, which were built to an established grade of 9.5 feet m.g.l., and those flooded a large portion of the lower part of the City of New Orleans.

The U. S. Corp of Engineers' Hurricane Study recommend that these levees be raised to +13.0 feet m.g.l. This cannot be accomplished by the Corps before 1967 or later, because Congress has only appropriated funds for planning and none, as yet, for construction purposes.

To prevent a repetition of the flooding of the lower part of the City, if a hurricane, similar to Betsy, were to hit the City this fall, the Orleans Levee Board could divert some of its funds to raising these levees to immediately provide more adequate flood protection.

We request that the U. S. Corp of Engineers grant the Orleans Levee Board approval to proceed immediately with the raising of as many of the levees, listed below, according to plans and specifications approved by your office, as far as available funds of the Board will permit.

The Board will proceed with this work, with the understanding that it would eceive reimbursement and/or credit as local contribution towards the entire Hurricane Project, as outlined in the study approved by the Congress.

Board of Levee Commissioners
Orleans Levee District

Because of the limited time and availability of monies, only partial enlargement of the levees, listed below, may be possible before next September; however, whatever work is done will reduce the possibility of floods in the lower part of the City. The levees, under consideration, are listed below:

1. Levee No. 31 on the north side of the Mississippi River Gulf Outlet from the Industrial Canal to Paris Road.
2. Levee No. 21 on the east side of the Industrial Canal from the Lock to Florida Avenue.
3. Levee No. 23 on the east side of the Industrial Canal from the M. R. G. O. to Highway U. S. 90.
4. Levee No. 20 on the west side of the Industrial Canal from the Lock to Highway U. S. 90.
5. Levee No. 28 from Michoud to U. S. Highway 90.
6. Levees No. 9, 14 and 19 along the Lakefront.

Your prompt consideration of the above and early reply will be much appreciated.

Sincerely,

Milton

Milton E. Dupuy
President

MED:mhb

cc: Armand L. Willoz, Assistant Secretary - Chief Engineer
Department of Public Works

LMVED-PP 20 January 1966

Mr. Milton H. Dupuy, President
The Board of Levee Commissioners of the
Orleans Levee District
200 Wild Life and Fisheries Building
818 Royal Street
New Orleans, Louisiana 70130

Dear Mr. Dupuy:

This is in reply to your letter dated 11 January 1966 proposing that you proceed with certain levee construction with the understanding that a credit therefor would accrue to your agency, which credit would later be applied to satisfy partially the requirements of local cooperation under the "Lake Pontchartrain, La. and Vicinity," project.

We understand that your organization has been designated by the Governor of Louisiana as the agency to provide the required local cooperation for the 'Lake Pontchartrain Barrier Plan' element of the project: hence, an arrangement such as you suggest would be permissible. There are many factors involved in carrying out your proposal, however, and it is suggested that a meeting be held in this office at your earliest convenience so that these factors may be fully explored. It should be stated at this time, however, that under no circumstances could any credit accruing to your agency be converted to cash reimbursement.

Generally speaking, we anticipate that your agency would prepare plans for any work and submit them to us for review and approval prior to starting the work. The credit allowed would be based on work ultimately incorporated into the Federally-constructed system: e.g., embankment construction falling within the final levee cross section. Evaluation of the credit would be in terms of the reduction in ultimate construction cost.

As you know, we are now working with your soils consultant to resolve design requirements for the levee on the north bank of the Mississippi River-Gulf Outlet from the Inner Harbor Navigation Canal to Paris Road. We are also presently engaged in studies leading to the establishment of design requirements for the levee on the east side of the Inner Harbor Navigation Canal from the lock to Florida Avenue, and anticipate completion of these studies within the next two weeks. On the remainder of the levees covered in your letter (excepting the lakefront levees), we would propose to establish design requirements in

19 Jan 66

LMVED-PP 20 January 1966
Mr. Milton E. Dupuy Chatry/kn/239

accordance with your priorities. The problem of raising the lakefront levees appears to be sufficiently straightforward so that we are now in a position to review any plans therefor without additional preparation.

Again, we suggest an early meeting to discuss the ramifications of your proposal.

Sincerely yours,

Mask

Huesmann

THOMAS J. ROWNY
Colonel, CE
District Engineer

Franklin

Hudson

Copy furnished:
Ch, Fnds. & Mtls. Br., Engrg. Div.
Ch, Design Br., Engrg. Div.

Exe Ofc

Mr. A. L. Willoz, Orleans Levee District

66-100

C O P Y

LMNED-PP 15 February 1967

G. N. Constan, Ph.D., Manager
NASA/Michoud Assembly Facility
P. O. Box 29300
New Orleans, Louisiana 70129

Dear Dr. Constan:

Reference is made to the meeting held in the office of your Mr. Jensen on 10 November 1966, at which levee construction authorized by the "Lake Pontchartrain, La. and Vicinity," project in the vicinity of your plant was discussed.

In accordance with Mr. Jensen's request, we have prepared estimates for two plans for constructing the hurricane levee along the north bank of the Gulf Intracoastal Waterway between the east and west boundaries of the plant area.

The first plan provides for construction of the authorized levee as a straddle enlargement of the existing levee. Under this plan, the landward toe of the authorized levee would, in some locations, encroach on the existing landside canal. We understand that the cross-sectional area of this canal must be preserved and have, accordingly, arranged to obtain a portion of the material for the levee construction from a landside enlargement of this canal to compensate for the reduction in canal cross section occasioned by the encroachment of the authorized levee. We understand, further, that you are opposed to any plan which would require construction landward of the existing levee toe and/or the landward bank of the existing canal, on the basis that it is incompatible with your plans for future development of the Assembly Facility.

As an alternate to the above, we developed a plan providing for enlargement of the existing levee on the side adjacent to the Gulf Intracoastal Waterway. This plan would involve no construction landward of the landward toe of the existing levee.

Itemized cost estimates for the two plans are inclosed. The total costs, including lands, for the straddle and waterway side enlargement plans, are $1,100,000 and $1,500,000, respectively. A map and typical cross sections for the two plans are also inclosed.

LMNED-PP 15 February 1967
G. N. Constan, Ph.D.

Construction of the waterway side enlargement is feasible, and will serve project purposes as well as the straddle enlargement. Inasmuch as a more economic and equally effective plan is available, selection of waterway side enlargement would constitute a betterment in the interest of the National Aeronautics and Space Administration. Under these circumstances, the additional cost involved for providing the betterment ($400,000) will have to be underwritten by the National Aeronautics and Space Administration in order for the waterway side enlargement to be constructed as a part of the authorized project.

Inasmuch as further planning in the area in question must await a decision as to whether the straddle or waterway side enlargement will be used, it is requested that you inform us, at your earliest convenience, of your decision in this matter.

Sincerely yours,

5 Incl
1-2 Estimates
3. Map (trip)
4-5 Cross sections (trip)

THOMAS J. BOWEN
Colonel, CE
District Engineer

1507-03 (G. I. W. W.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MICHOUD OPERATIONS
P. O. Box 29300
New Orleans, La.
70129

IN REPLY REFER TO: I-MICH-MGR

April 17, 1967

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

Dear Colonel Bowen:

Reference is made to your letter dated February 15, 1967, with enclosures, relative to the new levees to be constructed at the Michoud Assembly Facility.

The drawings and estimates have been reviewed by our Facilities Office and, while we would prefer to see a canal-side levee enlargement used on the G.I.W.W., we do not feel that the additional cost could be justified. It is requested therefore that you proceed with the design of a straddle enlargement generally as discussed in the meeting held on April 12, 1967, with Messrs. Baehr, Mask and Chatry of your Engineering Division with a request that the proposed levee cross-sections and calculations be reviewed in an effort to hold our loss of land to a minimum.

There are several factors which must be taken into consideration during the planning, design and construction phases of this portion of your project. These are as follows:

1. Access road to the Saturn loading dock and the dock itself must be maintained in usable condition at all times. The grade on this road cannot be increased to more than 6 percent. General Site Map, sheet 13 of 18 (enclosure 1), shows dock access road and new Saturn Boulevard extension.

2. An access road to the Chrysler Corporation High-Pressure Test Facility and our main pumping station must be maintained at all times. General Site Map, sheet 4 of 18 (enclosure 2), indicates our preference.

3. The existing main drainage canals or the new drainage canals must be available at all times to handle the storm drainage run-off.

4. The nitrogen piping (three lines) owned by Air-Products must be relocated as a part of this project. General Site Map, sheets 2 and 3 of 18 (enclosures 3 and 4), indicates our recommendation for relocating these lines; however, this must be coordinated with the owner. These lines must also remain in service. A shut-down to connect both ends of new lines must be coordinated with the owner and The Boeing Company.

5. Relocate approximately 18 bench marks presently installed on toe of existing levees.

If any further information is required during your planning and design phases, please contact Mr. E. L. Jensen of the Facilities Office, telephone 255-2583.

Sincerely yours,

G. N. Constan

G. N. Constan
Manager

4 Enc.
As stated (in triplicate)

cc:
Mr. Robert Ramsey

LMNED-PP 21 April 1967

Mr. Walter A. Gresh, Regional Director
U. S. Department of the Interior
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Gresh:

This office is presently engaged in preparing a general design memorandum for the Lake Pontchartrain Barrier Plan feature of the "Lake Pontchartrain, La. and Vicinity," project which was authorized by the Flood Control Act of 1965 (Public Law 89-298, approved 27 October 1965).

While the above general design memorandum will be concerned primarily with presenting the detail design for the Citrus back levee (i.e., the levee along the north bank of the Gulf Intracoastal Waterway from the Inner Harbor Navigation Canal to Michoud), it will also contain concise coverage of the remainder of the barrier plan, and it is desired that your views on that overall plan be furnished. It is anticipated that other elements of the Lake Pontchartrain Barrier Plan will be given detailed coverage in a series of supplements to the general design memorandum, and, in the case of Seabrook Lock, in a separate general design memorandum. We shall, of course, coordinate the preparation of all future design reports with your agency and include your views in them.

The layout of the Lake Pontchartrain Barrier Plan is shown on inclosure 1, and the plan is described in House Document No. 231, 89th Congress, 1st Session. The plan now under consideration is essentially the same as that presented in the House Document, with the following exceptions:

a. Barrier. It is anticipated that the barrier alignment in the Chef Menteur area will be modified as shown on inclosure 2. The barrier elevation will remain at 9 feet mean sea level or the existing elevation of U. S. Highway 90, whichever is higher. Control structure sizes will remain as specified in the House Document. This modification is not for public release at this time.

Engineering Division
File Copy

20 Apr 67
Hardy:Chatry/kn/239

LMVED-PP 21 April 1967
Mr. Walter A. Gresh

b. Seabrook Lock. The Chief of Engineers has approved a change in the controlling elevation of the Seabrook Lock from 13.2 feet mean sea level to 7.2 feet mean sea level. This change will be effected by lowering the crown of the rock dike (shown on inclosure 3) which will tie the lock to the levee system. In addition, an auxiliary control structure will be added to the lock to provide for passage of flows for salinity control and riparian use when the lock is passing traffic. In connection with the operation of Seabrook Lock, your attention is invited to our letter of 18 January 1967 which indicates the salinity regimen that the lock will be operated to maintain.

c. Levee grades. 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 will be increased by as much as 1-2 feet.

Your views, recommendations, and comments relative to the Lake Pontchartrain Barrier Plan are requested. While it is desired that your response cover the entire plan, coverage concerning elements other than the Citrus back levee may be of limited scope inasmuch as opportunity for further comment will be provided in connection with the preparation of future supplements.

Because of the urgent nature of the work covered by the design memorandum, we are operating on a much compressed planning schedule. It will, accordingly, be very much appreciated if your comments are provided not later than 16 June 1967.

Sincerely yours,

Chatry

3 Incl
1. General map (file H-2-23693)
2. Map - barrier alignment (file H-2-24066, plate 2)
3. Drawing - Seabrook Lock (file H-2-22077, plate 9)

L. W. NORTON II
Lieutenant Colonel, CE
Acting District Engineer

Mask

Hudson

Exe Ofc

Copy furnished: w/incls
U. S. Fish and Wildlife Service
Vicksburg, Mississippi

La. Wild Life & Fisheries Commission w/o incls
New Orleans, La.

Engineering Division File Copy

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

June 22, 1967

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

Dear Sir:

Attached is a copy of our report, dated June 21, 1967, on the Lake Pontchartrain, Louisiana, and Vicinity project. We are sending under separate cover 54 additional copies.

Sincerely yours,

James R. Fielding
Assistant Regional Director

Attachment

Separate cover:
BSF&W ltr. rpt. dtd. 6/21/67
54 copies

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

June 21, 1967

District Engineer
U. S. Army, Corps of Engineers
New Orleans, Louisiana

Dear Sir:

This is in reply to your letter of April 21, 1967, requesting our views and comments on the Lake Pontchartrain Barrier Plan feature of the Lake Pontchartrain, Louisiana, and Vicinity project which was authorized by the Flood Control Act of 1965. The Bureau's comments, submitted in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), have been prepared in cooperation with the Louisiana Wild Life and Fisheries Commission.

The Bureau commented on the general hurricane protection plan for Lake Pontchartrain and Vicinity in a letter report dated March 13, 1962; in an undated, substantiating document to the March 13 report; and in a letter report dated October 22, 1962. Fish and wildlife aspects of the modified Chalmette area hurricane protection plan were reported on in a letter dated August 10, 1966.

As authorized, the basic plan of protection is designed to prevent hurricane tides from flooding the New Orleans metropolitan area. This will be accomplished through a system of levees, floodwalls, drainage structures, locks, and floodgates. Along the north shore of Lake Pontchartrain, the town of Mandeville will receive protection through the strengthening of the existing seawall. The attached plate 1 depicts the New Orleans area and the location of the various features of the Lake Pontchartrain Barrier Plan.

As discussed in prior Bureau reports on this project, new levee construction and existing levee rehabilitation works will have only minor direct effects on fish and wildlife resources. Indirectly, new and enlarged levees will hasten urbanization and industrialization of valuable marshes by providing basic features for further flood protection and land reclamation. This applies especially to the area of marsh and swamp east of the Bonnet Carre Spillway.

Construction and operation of the proposed Seabrook Lock at the juncture of Lake Pontchartrain and the Inner Harbor Navigation Canal have been the subject of much study. Model tests have indicated that this structure could be utilized to control adverse salinity levels in Lake Pontchartrain introduced by the Mississippi River-Gulf Outlet ship channel. Your letter of January 18, 1967, to the Regional Director sets forth model test conditions for high and low inflow water years. Average salinities predicted by model tests as presented in this letter are considered acceptable for the preservation of fish and wildlife resources in Lake Pontchartrain.

Control structures in the Rigolets and Chef Menteur tidal passes to Lake Pontchartrain have been tested extensively in the above-mentioned model study, and have been reported on in detail in past Bureau reports. The Bureau has concluded from these tests that hurricane control structures in the tidal passes would have little appreciable effect on salinities in Lakes Maurepas, Pontchartrain, and Borgne.

You requested in your letter of April 21, 1967, that we comment specifically on the Citrus back levee alignment (plate 1). Citrus back levee enlargement extends along the north bank of the Gulf Intracoastal Waterway from the Inner Harbor Navigation Canal to the proximity of the Michoud Saturn Missile Plant. Because of the rapidly expanding industrialization of this area, your plan to enlarge this existing levee segment will have very little, if any, adverse influence on fish and wildlife resources in the project study area.

The Bureau has no additional comments at this time on the various modifications of the Lake Pontchartrain Barrier Plan, as presented in your April 21, 1967, letter. Our views regarding these changes will be included in our letters of comment to accompany your supplements to the general design memorandum.

This report has been reviewed and concurred in by the Bureau of Commercial Fisheries and the Louisiana Wild Life and Fisheries Commission. A copy of Director Glasgow's letter is attached.

We appreciate the opportunity to comment on this project.

Sincerely yours,

W. L. Towns
Acting Regional Director

Attachments 2

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

WILD LIFE AND FISHERIES BUILDING
400 ROYAL STREET
NEW ORLEANS, LOUISIANA 70130

May 31, 1967

Mr. W. L. Towns
Associate Regional Director
U. S. Department of the Interior
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Towns:

This is in reply to your letter report of May 26, 1967, on the Lake Pontchartrain, Louisiana, and vicinity project. This report has been reviewed by members of my staff and its general provisions and contents are in accord with our interests.

The Louisiana Wild Life and Fisheries Commission has commented on the general hurricane protection plan for Lake Pontchartrain and vicinity in previous letters which were included or attached to the Bureau's reports regarding this project.

More recently, a letter indicating our specific recommendations regarding the Seabrook Lock segment of this project was sent to both your agency and the U. S. Army Corps of Engineers.

We are principally interested in maintaining the salinity regimen in Lake Pontchartrain similar to conditions prior to the construction of the Mississippi River-Gulf Outlet project. We have been informed by the U. S. Army Corps of Engineers that management facilities will be installed in the Seabrook Lock and salinities can be adjusted as needed or as may be required by fish and wildlife interests.

The levee system as presently planned will have little or no influence on fish and wildlife resources within the

confines of the project as presently outlined. Therefore, we do not have any additional recommendations or considerations to offer at this time. In the event there are any modifications in the present project plan, we would appreciate the opportunity to review and offer any comments we feel necessary.

We appreciate the opportunity to look over and comment on this important project report.

Sincerely yours,

Leslie L. Glasgow

Leslie L. Glasgow
Director

LLG:MWS/js

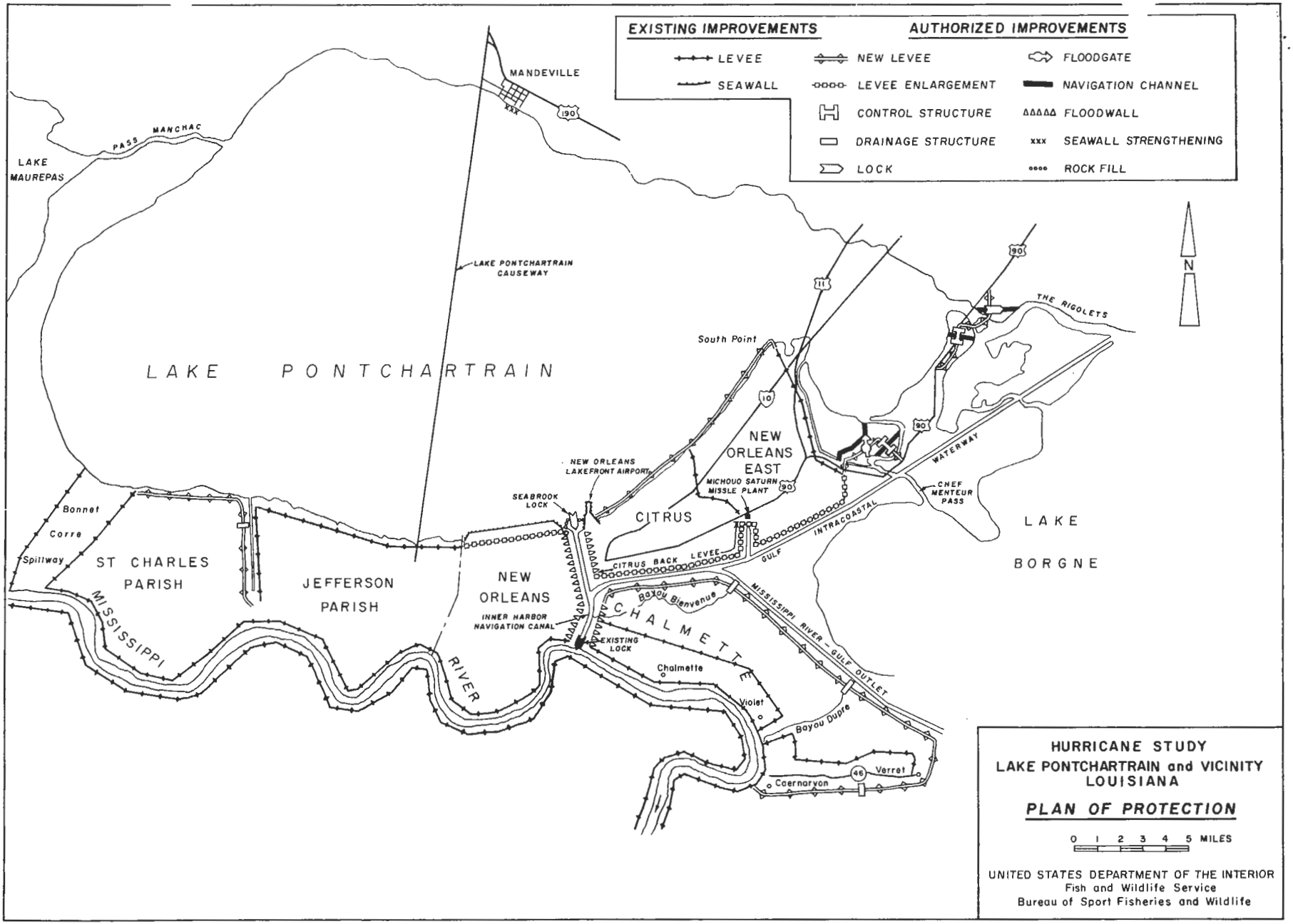

EXISTING IMPROVEMENTS
LEVEE
SEAWALL
AUTHORIZED IMPROVEMENTS
NEW LEVEE
LEVEE ENLARGEMENT
CONTROL STRUCTURE
DRAINAGE STRUCTURE
LOCK
FLOODGATE
NAVIGATION CHANNEL
FLOODWALL
SEAWALL STRENGTHENING
ROCK FILL
MANDEVILLE
PASS MANCHAC
LAKE MAUREPAS
LAKE PONTCHARTRAIN CAUSEWAY
LAKE PONTCHARTRAIN
South Point
THE RIGOLETS
N
NEW ORLEANS LAKEFRONT AIRPORT
NEW ORLEANS EAST
MICHOUD SATURN MISSLE PLANT
SEABROOK LOCK
CITRUS
CITRUS BACK LEVEE
INTRACOASTAL WATERWAY
CHEF MENTEUR PASS
GULF
LAKE BORGNE
Bonnet Carre Spillway
ST CHARLES PARISH
JEFFERSON PARISH
NEW ORLEANS
INNER HARBOR NAVIGATION CANAL
Bayou Bienvenue
MISSISSIPPI RIVER - GULF OUTLET
EXISTING LOCK
CHALMETTE
Chalmette
Violet
Bayou Dupre
Verret
Caernarvon
MISSISSIPPI RIVER
HURRICANE STUDY
LAKE PONTCHARTRAIN and VICINITY
LOUISIANA
PLAN OF PROTECTION
0 1 2 3 4 5 MILES
UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

PLATE 1

LMKED-PP

21
29 April 1967

Mr. Jerome K. Svore, Regional Director
U. S. Department of the Interior
Federal Water Pollution Control Administration
1114 Commerce Street
Dallas, Texas 75202

Dear Mr. Svore:

This office is presently engaged in preparing a general design memorandum for the Lake Pontchartrain Barrier Plan feature of the "Lake Pontchartrain, La. and Vicinity," project which was authorized by the Flood Control Act of 1965 (Public Law 89-298, approved 27 October 1965).

While the above general design memorandum will be concerned primarily with presenting the detail design for the Citrus back levee (i.e., the levee along the north bank of the Gulf Intracoastal Waterway from the Inner Harbor Navigation Canal to Michaud), it will also contain concise coverage of the remainder of the barrier plan, and it is desired that your views on that overall plan be furnished. It is anticipated that other elements of the Lake Pontchartrain Barrier Plan will be given detailed coverage in a series of supplements to the general design memorandum, and, in the case of Seabrook Lock, in a separate general design memorandum. We shall, of course, coordinate the preparation of all future design reports with your agency and include your views in them.

The layout of the Lake Pontchartrain Barrier Plan is shown on inclosure 1, and the plan is described in House Document No. 231, 89th Congress, 1st Session. The plan now under consideration is essentially the same as that presented in the House Document, with the following exceptions:

a. Barrier. It is anticipated that the barrier alignment in the Chef Menteur area will be modified as shown on inclosure 2. The barrier elevation will remain at 9 feet mean sea level or the existing elevation of U. S. Highway 90, whichever is higher. Control structure sizes will remain as specified in the House Document. This modification is not for public release at this time.

Engineering Division
File Copy

21 April 1967
Mr.Chatry/jlf/
239

LMNED-PP 21 April 1967
Mr. Jerome H. Svore

b. Seabrook Lock. The Chief of Engineers has approved a change in the controlling elevation of the Seabrook Lock from 13.2 feet mean sea level to 7.2 feet mean sea level. This change will be effected by lowering the crown of the rock dike (shown on inclosure 3) which will tie the lock to the levee system. In addition, an auxiliary control structure will be added to the lock to provide for passage of flows for salinity control and riparian use when the lock is passing traffic. In connection with the operation of Seabrook Lock, your attention is invited to our letter of 18 January 1967 (inclosure 4) to the U. S. Fish and Wilflife Service, Atlanta, Georgia indicating the salinity regimen that the lock will be operated to maintain.

c. Levee grades. 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 will be increased by as much as 1-2 feet.

Your views, recommendations, and comments relative to the Lake Pontchartrain Barrier Plan are requested. While it is desired that your response cover the entire plan, coverage concerning elements other than the Citrus back levee may be of limited scope inasmuch as opportunity for further comment will be provided in connection with the preparation of future supplements.

Because of the urgent nature of the work covered by the design memorandum, we are operating on a much compressed planning schedule. It will, accordingly, be very much appreciated if your comments are provided not later than 16 June 1967.

Sincerely yours,

Incl
1. General mpa (file H-2-23693)
2. Map - barrier alignment (file H-2-24066, plate 2)
3. Drawing - Seabrook Lock (file H-2-22077, plate 9)
4. Cy letter dtd 18 Jan 67

L. W. NORTON II
Lieutenant Colonel, CE
Acting District Engineer

Mask
Hudson

Exec Of

Engineering Division
File Copy

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
South Central Region
1114 Commerce Street
Dallas, Texas 75202

June 23, 1967

Re: LMNED-PP

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

Dear Sir:

Reference is made to your letters of April 19 and April 21, 1967 initiating coordination of the general design memorandum for the Seabrook Lock and the Lake Pontchartrain Barrier Plan.

We have had an opportunity to review the information submitted in accordance with Executive Order 11288, Section 1, paragraph (7) and Section 6 and find as follows:

Every attempt should be made to minimize water quality degradation during actual construction and to control spoils that would cause highly turbid waters.

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

The Louisiana State Board of Health commented on the lack of information regarding insect control. If the water level in Lake Pontchartrain is raised so as to flood the lowlands bordering the lake, severe mosquito breeding problems may result.

All contractors should take precautions to prevent water pollution by accidental spillage of petroleum products or other harmful materials i.e. insecticides. Also, all contractors should provide and maintain sanitation facilities that will adequately treat domestic wastes to conform with Federal and local health regulations.

Please advise this office (Attention: Federal Activities Coordinator) of significant changes from the plan presented.

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

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

Sincerely yours,

John A. Thomas
for WILLIAM C. GALEGAR
Regional Director

cc: Louisiana State Board of Health
Louisiana Stream Control Commission

COPY

LMNED-PP 25 July 1967

Mr. William C. Galegar, Regional Director
U. S. Department of the Interior
Federal Water Pollution Control Administration
1114 Commerce Street
Dallas, Texas 75202

Dear Mr. Galegar:

Thank you for your letter dated 23 June 1967 relative to the general design memorandum for the Lake Pontchartrain Barrier Plan and Seabrook Lock features of the "Lake Pontchartrain, La. and Vicinity," project.

Provisions to ensure that the objectives of your comments relative to water quality degradation during construction, control or accidental spillages, and maintenance of adequate sanitary facilities by construction contractors will be incorporated into our construction plans and specifications. With respect to the concern of the Louisiana State Board of Health relative to mosquito breeding problems in the event that the average level of Lake Pontchartrain is raised, we would observe that the plan will not result in any increase in the average lake level, but will serve only to lower lake stages during hurricanes.

The Seabrook Lock will be operated to provide a desirable salinity regimen in Lake Pontchartrain. The plan of operation will be developed with the advice of the state and Federal fish and wildlife agencies. We shall be pleased to seek the advice of your agency also when the plan is prepared.

Your cooperation in providing comments on the project is very much appreciated.

Sincerely yours,

THOMAS J. BOWEN
Colonel, CE
District Engineer

APPENDIX C

REPORT ON EVALUATION OF ALTERNATE PLANS INVOLVING MODIFICATIONS IN THE ALIGNMENT OF THE LAKE PONTCHARTRAIN BARRIER

LMVED-TD (NOD 13 Mar 67) 3d Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modifications in the Alignment of the Lake Pontchartrain Barrier

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 19 May 67

TO: District Engineer, New Orleans, ATTN: LMNED-PP

Referred to note approval.

FOR THE DIVISION ENGINEER:

George B. Davis
GEORGE B. DAVIS
Acting Chief, Engineering Division

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

IN REPLY REFER TO
LMNED-PP

13 March 1967

SUBJECT: Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modifications in the Alignment of the Lake Pontchartrain Barrier

TO: Division Engineer, Lower Mississippi Valley
ATTN: LMVED-TD

1. Scope. This report was prepared in accordance with paragraph 9.b. of ER 1110-2-1150 dated 1 July 1966. Its purpose is to establish the bases for adopting a barrier alignment, other than that specified in the project document, and for providing wavewash protection for portions of the barrier, as departures from the project document plan within the discretionary authority of the Chief of Engineers.

2. Project authorization. The "Lake Pontchartrain, La. and Vicinity," project was authorized by the Flood Control Act of 1965 (Public Law 89-298, approved 27 October 1965), substantially in accordance with the recommendations of the Chief of Engineers in his report printed as House Document No. 231, 89th Congress.

3. Project description. The project consists of two independent features--the Lake Pontchartrain Barrier Plan and the Chalmette Area Plan. The Chalmette Area Plan comprises a protection levee extending along the east bank of the Inner Harbor Navigation Canal (IHNC) from the IHNC lock to the Mississippi River-Gulf Outlet (MR-GO), then along the MR-GO to Bayou Lawler, then tieing into the Mississippi River levee at Violet, La., with floodgates in Bayous Bienvenue and Dupre. The Lake Pontchartrain Barrier Plan will serve to protect areas contiguous to the shores of Lake Pontchartrain from flooding by hurricane surges, and has, as its salient segment, the Lake Pontchartrain barrier--a system of levees and control structures extending from New Orleans East to high ground east of the Rigolets, the purpose of which is to limit uncontrolled entry of hurricane tides into Lake Pontchartrain, while preserving navigation access. The barrier, which utilizes the existing U. S. Highway 90 embankment wherever the grade of that embankment is at or above elevation 9(1), also includes new embankment to elevation 9 and regulating

(1) Unless otherwise specified, elevations are in feet and refer to mean sea level.

tidal and/or navigation structures at Chef Menteur Pass, the Rigolets, and Seabrook. In addition to the barrier, the Lake Pontchartrain Barrier Plan includes new lakeshore levees in St. Charles Parish and the Citrus and New Orleans East areas of Orleans Parish, and enlargement or strengthening of existing protective works in Jefferson and Orleans Parishes and at Mandeville (see incl 1).

4. Detailed description of the authorized Lake Pontchartrain barrier. The barrier alignment, as authorized, extends generally eastward from the existing New Orleans East levee for a distance of about 2.4 miles along the north banks of Bayou Sauvage and Chef Menteur Pass, thence southeast across Chef Menteur Pass to the embankment of U. S. Highway 90, thence along the highway embankment to a point about 0.6 mile from the highway bridge crossing the Rigolets, thence across the Rigolets about 0.7 mile southeast of the bridge, thence back to the highway embankment and along that embankment to Apple Pie Ridge (see plate 1). The controlling elevation of the barrier is 9.

5. The structural complex at Chef Menteur Pass consists of a gated control structure of eight bays, each 50 feet wide with invert at elevation -25; a navigable floodgate 56 feet wide with sill at elevation -12; a closure dam in the Pass with crown at elevation 14; and connecting channels for the control and navigation structures. The Rigolets complex consists of a gated control structure of 23 bays, each 50 feet in width, with invert at elevation -20; a navigation lock 860 feet long (pintle to pintle) by 84 feet wide with sill at elevation -14; a closure dam in the Rigolets with crown at elevation 14; and connecting channels for the control structure and navigation lock. U. S. Highway 90 will be rerouted over the control structure.

6. The embankment of U. S. Highway 90 is generally at or above 9 and serves, without modification, as the barrier for a total distance of 7 miles between the closure dam in Chef Menteur Pass and Apple Pie Ridge (see plate 1). For a distance of about 1.5 miles along the northwest shore of Lake St. Catherine, however, the highway is substantially below 9. In this area, a levee with net grade of 9 will be provided adjacent to the highway on the Lake St. Catherine side.

7. Erosion protection will be provided at the structure abutments, on the slopes of the closure dams, and adjacent to the structures in the connecting channels.

8. The authorized barrier is, in some locations, subject to overtopping by hurricane surges which exceed elevation 9. The highway embankment has, in the past, demonstrated marked resistance to erosion damage when overtopped, and erosion is not expected to be a problem in the future. The new barrier embankment will undoubtedly be somewhat more vulnerable; however, experience in hurricane "Betsy," when numerous levees of various descriptions were overtopped without a single instance of what could be described as a structural failure or crevasse, indicates that any damage which might occur during the infrequent instances of short duration overtopping would be of such nature as could be dealt with adequately in connection with maintenance operations. An allowance for such work has been included in the estimated costs for maintenance and operation. All structures and closure dams have top elevations of 14, which elevation is above the surge produced by the standard project hurricane on a path critical to the barrier.

9. Provisions of authorizing legislation pertaining to alterations in levee locations. The project authorization is based on the report of the Chief of Engineers which states, inter alia, that "...The Board of Engineers for Rivers and Harbors concurs in general in the views and recommendations of the reporting officers....Subject to re-examination of the levee alignment in the preconstruction planning stage with a view to protecting additional lands, and to certain requirements of local cooperation, the Board recommends authorization for construction of the improvements....Subject to these modifications, I concur in the recommendations of the Board of Engineers for Rivers and Harbors...." (ENGCW-PD letter dated 4 March 1964 subject "Lake Pontchartrain and Vicinity, La.")

10. Alterations in standard project hurricane parameters subsequent to project authorization. Revised parameters for the standard project hurricane were received from the Weather Bureau, Environmental Science Services Administration, on 3 November 1965. The revised parameters are more severe than those used in studies leading to project authorization. Studies utilizing the revised parameters indicate, however, that a controlling elevation of 9 for the barrier remains the optimum value. The more severe parameters do, however, result in a requirement for increased grades on confining levees, and such grades have been used in evaluating the Plan C alternate considered herein.

11. Alternate plans considered. Three plans involving modification of the Lake Pontchartrain barrier have been considered. Descriptions of these alternate plans follow:

Plan A. Elements of this plan are shown on plate 2. The plan is a modification of the authorized barrier location in the vicinity of Chef Menteur Pass. Consideration of this plan was prompted by vociferous objections to the project document alignment by the firm of New Orleans East, Inc., which is constructing improvements in a 1,533-acre tract located between the Gulf Intracoastal Waterway (GIW) and Bayou Sauvage and extending from the existing New Orleans East levee to Chef Menteur Pass. The 1,533 acres comprise 75 acres of residential developments, 218 acres of future residential development, and 1,240 acres of future recreational and industrial development. The modification consists of relocating the barrier embankment to the south or gulfward side of the above area, and shifting the Chef Menteur Pass structural complex to accommodate the revised alignment. The revised alignment crosses the GIW at two points and requires relocation of that waterway between mile 22 and mile 26 (east of Harvey Lock) as shown on plate 2. Use of this alignment will permit future construction of a lock in lieu of a floodgate, when and if justified, by the addition of another set of gates. Riprap foreshore protection, as authorized for the New Orleans East back levee, will be provided for the revised alignment adjacent to the GIW extending from the New Orleans East levee to the Chef Menteur Pass control structure. Typical cross sections for the relocated barrier embankment and closure dam are shown on plates 5 and 6, respectively. Plan A will provide some measure of protection to the area being developed by New Orleans East as well as to an area east of Chef Menteur Pass. It must be pointed out, however, that these areas remain subject to flooding from lesser hurricanes than the SPH which overtop the barrier, and in addition, are vulnerable to overflow from Lake Pontchartrain.

Plan B. Plan B was derived from a plan suggested for consideration by Mr. W. S. Nelson, a local consulting engineer, formerly retained by New Orleans East, Inc. The plan proposed by Mr. Nelson located the barrier on the north bank of the GIW as far east as Big Deedle Lake, from whence it turned northward to cross the Rigolets and tie into the U. S. Highway 90 embankment at Apple Pie Ridge. The Nelson plan proposed to locate combination control, navigation, and closure structures in the existing channels of Chef Menteur Pass and the Rigolets. These structures were to be constructed in shipyards on huge barge-like hulls, towed to the selected sites, and there sunk, anchored, and outfitted. For various reasons, this method of construction is not considered feasible in the instant locations. Conventional construction would not be possible at Chef Menteur Pass with the Nelson alignment as existing and potential improvements in the area so restrict the space available for construction as to make impracticable a satisfactory

layout of the overall structural complex. By substituting the Plan A alignment in the Chef Menteur area for that of the Nelson plan, and providing for conventional construction of the Rigolets structural complex, a physically feasible plan, equivalent to Mr. Nelson's original plan, can be realized. Economic analyses of this plan must, however, be based on incremental comparison of that portion of Plan B east of Chef Menteur Pass with the corresponding portion of the authorized plan. The Plan B layout is shown on plate 3. Typical sections of the relocated barrier embankment and closure dams for this plan are shown on plates 5 and 6, respectively.

Plan C. As can be seen on plate 4, Plan C involves a radical departure from the project document plan and involves not only modifications in the Lake Pontchartrain barrier, but in the overall Lake Pontchartrain Barrier Plan and the Chalmette Area Plan as well. In effect, Plan C moves the primary line of hurricane defense for Orleans and St. Bernard Parishes eastward to the western shore of Lake Borgne. The modified levee alignment would cross both the MR-GO and the GIW. An opening 400 feet wide by 40 feet deep below mean low gulf would be provided where the alignment crosses the MR-GO, with closure during hurricanes to be effected by a floating gate. A navigation lock 110 feet by 1,200 feet with sill at elevation -14, located in a bypass channel, would provide for uninterrupted use of the GIW. This plan would eliminate much of the levee required for the Chalmette Area Plan and drastically reduce the grade requirements for the Citrus and New Orleans East back levees and the IHNC. Plan C was advanced by an employee of this District. Consideration of a very similar plan was recommended by a local group.

12. Costs. Cost estimates for all work of the authorized Lake Pontchartrain barrier between New Orleans East and Apple Pie Ridge and the Plans A and B modifications are shown on tables I, II, and III, respectively. Derivation of net additional first and annual operation and maintenance costs for Plans A and B, as compared with the authorized plan, is shown on tables IV and V. Cost estimates for the Plan C modification and the portions of the authorized plan it eliminates are shown on tables VI and VII, respectively. Summarized net additional first and annual operation and maintenance costs for Plan C are shown on table VIII. Summarized data on additional annual charges for the various plans are shown on table IX. The total additional annual charges for Plans A, B, & C, respectively, are $38,700, $464,200, and $247,000.

13. Benefits. Discussion of the added benefits, incremental to the project document plan, for the three alternate plans follows:

a. Plan A. (1) The modified barrier alignment in the Chef Menteur area would provide protection to improvements south of Bayou Sauvage and U. S. Highway 90 against hurricanes not overtopping the barrier embankment. These improvements include homes, camps, and commercial establishments. Of particular importance is the Venetian Isles development of New Orleans East, Inc., a Florida-type subdivision located west of Chef Menteur Pass between U. S. Highway 90 and Bayou Sauvage which features waterfront homes in the $50,000 and up price class and miscellaneous commercial establishings (including land). When complete, the development will include 639 homes and 52 commercial establishments having an aggregate value, exclusive of land, in excess of $25,000,000.

(2) The building sites in the Venetian Isles development are raised to elevation 8.5, and damage, under the authorized barrier alignment, would not begin until the hurricane surge reached about 10. Based on damage-frequency analyses, the average annual damage to existing and future development would be $134,700. With the Plan A modification, these damages would be eliminated.

(3) Damage to other homes, camps, and businesses south of U. S. Highway 90 from the New Orleans East area to the tie-in of the Plan A alignment modification and the authorized barrier would begin, under the authorized plan, when the hurricane surge reached 5. Damage-frequency analyses indicate that the average annual damage to existing improvements outside the Venetian Isles area would be $4,900. The Plan A modification would eliminate these damages. Future development outside the Venetian Isles area, with the authorized barrier alignment, would be very limited, and such development was ignored in computing the above damages.

(4) A total of 1,830 acres enclosed by Highway 90 and the Plan A modification in the barrier alignment would be relieved of the threat of direct hurricane overflow from Lake Borgne, and would be enhanced to some extent thereby. Most of this acreage would, however, remain subject to overflow from ordinary high tides, and all would be vulnerable to damage from overflow by storm-driven waters from Lake Pontchartrain. It was estimated that land values would increase from 10% to 25%, depending upon the location. The average annual enhancement was taken to be 5% of the gross increase in land value. On this basis, the average annual enhancement attributable to the Plan A alignment modification is $14,600.

(5) Under existing conditions, the Louisville and Nashville Railroad embankment is subject to damage from overtopping by hurricane surges. With the authorized barrier in place, however, the area between the railroad and U. S. Highway 90 will, with the barrier structural complexes closed, be without an outlet until the barrier embankment begins to overtop. Thus, stages will tend to rise on the Lake Pontchartrain side of the railroad embankment as the surge approaches and thereby limit the stage differential across that embankment. Studies indicate that the maximum velocity of flow over the railroad embankment for the SPH critical to the barrier would be about 2.5 feet per second and that the velocity of flow would exceed one foot per second for only three hours, resulting in negligible damage to the railroad embankment. With the Plan A barrier alignment modification, the flow overtopping the barrier embankment would be diverted to Lake Pontchartrain through Chef Menteur Pass and overtopping of the railroad embankment in the area enclosed by the highway and Plan A modified barrier alignment would not occur. There would, accordingly, be no appreciable damage to this section of the railroad embankment for either the authorized or Plan A barrier alignments. Inasmuch as portions of the railroad embankment will remain directly exposed to hurricane surges under all plans, none of the plans will provide any alleviation of railway traffic delays.

(6) Based on benefit analyses described in (1) through (4) above, Plan A will produce a total average annual benefit of $154,200.

b. Plan B. (1) Plan B would provide, in addition to the benefits described for Plan A, benefits attributable to the protection to improvements located between U. S. Highway 90 and the Plan B barrier alignment east of Chef Menteur Pass. Based on analyses similar to those previously described, the average annual damages in this area with the authorized barrier in place would be $69,300. The Plan B alignment would eliminate these damages.

(2) In addition to the above, the value of 7,497 acres of land within the above area would be enhanced. The increase in land value would average about 10%. The average annual value of enhancement, computed as 5% of the gross increase in land value, would be $33,000.

(3) For the same reasons described in paragraph 13.a.(5) above, average annual damages to the L&N Railroad embankment with the authorized barrier in place would be negligible. With the Plan B modified barrier alignment east of Chef Menteur, however, due to the limited openings in the railroad embankment, the area between the GIW

and the railroad embankment will fill rapidly with water after overtopping of the barrier embankment occurs, and the railroad embankment may be expected to overtop while stages in the Lake St. Catherine area are relatively depressed. Velocities over the railroad embankment would approach a maximum of 6 feet per second for the SPH on a path critical to the barrier and velocities in excess of 2.5 feet per second would be sustained for about four hours. The railroad embankment is constructed of slag and its vulnerability to damage by overflow has been demonstrated several times in the past, particularly in hurricane "Betsy," when a total of $1,095,900 in damages was sustained between the existing New Orleans East levee and the vicinity of Big Deedle Lake. Based on damage-frequency analyses, the average annual damage to the L&N Railroad embankment east of Chef Menteur Pass to its crossing with the Plan B barrier alignment modification would be $11,700. Since these damages would be induced by the Plan B alignment modification, they would reduce the additional benefit attributable to that plan.

(4) Based on benefit analyses described in (1) through (3) above, Plan B would produce, in addition to those produced by Plan A, average annual benefits in the amount of $90,600.

c. Plan C. (1) Plan C would provide benefits similar to those described for Plan A in the Venetian Isles development, and to homes, camps, and commercial establishments located south of U. S. Highway 90 between the existing New Orleans East levee and the Plan C levee. In addition, Plan C would provide protection from the hurricane surge to industrial development adjacent to the IHNC located outside the authorized levee and to lands bounded by the GIW, MR-GO, and the Plan C levee.

(2) Damage to the homes, camps, and commercial developments located in the area described above would begin, under the authorized plan, when the hurricane surge reached elevation 5. Based on damage-frequency analyses, the average annual damage on existing and future development would be $329,600.

(3) Operation of two features of Plan C, namely the floating gate in the MR-GO and the lock in the GIW, would impede seagoing and inland navigation. Studies indicate that the floating gate, along with the other structures in Plan C, would be closed an average of 9 days per year, and in some years, the closure period might be as long as two weeks. At such times, traffic could reach the Port of New Orleans from seaward via the Mississippi River only. Use of the longer route would result in an average annual loss of $210,600. Traffic through the lock

in the GIW would have to be locked through during the 9 days per year the barrier would be closed. In addition, there would be occasional periods in which normal tidal action would cause velocities through the lock to reach magnitudes considered unsafe for navigating the open lock. Studies indicate that the lock would have to be operated an average of 24 days per year to pass traffic during these periods. Under normal operation, traffic would make direct transit of the open lock. All vessels with tows, however, would have to reduce speed and proceed with caution. Based on a loss of 15 minutes per transit, the annual loss is estimated to be approximately 1,280 hours per year. The delay to traffic in the GIW, as a result of the lock being operated an average of 33 days per year, would generate an average annual loss of $83,700, and the delays due to slow transit would generate an additional annual loss of $174,000. The total loss attributable to delays to navigation would, therefore, average $468,300 annually.

(4) Plan C would enhance approximately 4,339 acres of land located south of Highway 90 and located between the Plan C alignment and the MR-GO. The present land value would be increased from 15% to 25% depending on location. The average annual enhancement of Plan C, computed as 5% of the increased land value, is $57,700.

(5) Based on (1) through (4) above, Plan C would result in a net increase in benefits of $53,700 (134,700 + 329,600 + 57,700 -468,300) annually as compared with the authorized plan.

(6) Beyond the fact that it would involve additional costs in excess of the additional benefits it could produce, Plan C is undesirable for a number of other reasons. Its adoption would mean that none of the work already accomplished by local interests subsequent to project authorization would be incorporated into the Federal project and no credit for such work could be allowed. Further, the modifications involved in Plan C are so broad in scope as to be beyond the discretionary authority of the Chief of Engineers to adopt, so that project review and subsequent Congressional action would be required. During the time that this process was being accomplished, progress in planning and constructing some of the most urgently needed project features would be discontinued. Assuming that the plan is authorized and funded, substantially greater planning and construction times would be involved. In view of the extended delay in realizing protection under the Federal project, it is likely that local interests would find it necessary to proceed independently and at great cost with improvements to the existing levee systems for interim protection. For these reasons, the Orleans

Levee District, the agency designated by the Governor to provide the local cooperation required for the project, and the State of Louisiana, Department of Public Works, local coordinator for the project, have expressed their opposition to the plan. (See incl 17, 18, (19.)

14. Conclusions. In accordance with the information presented herein, it is concluded that:

a. Altering the authorized barrier alignment, in the vicinity of Chef Menteur Pass, to that of Plan A is engineeringly feasible, economically justifiable, and desirable. Plan A is the most suitable plan to provide some protection from hurricane surges to the 1,533 acres belonging to New Orleans East, Inc. Plan A would have an additional average annual cost of $38,700 over the portion of the authorized plan it replaces and would provide an additional average annual benefit of $154,200, resulting in a favorable incremental benefit-cost ratio of 4.0 to 1. The change involved is clearly within the discretionary authority of the Chief of Engineers.

b. Altering the authorized barrier alignment east of Chef Menteur Pass to that of Plan B is not economically justifiable. The portion of Plan B east of Chef Menteur Pass would have an additional average annual cost of $464,200 over the portion of the authorized plan it replaces and would provide an additional average annual benefit of $90,600, resulting in an unfavorable incremental benefit-cost ratio of 0.2 to 1.

c. Adoption of Plan C in lieu of the Chalmette Area Plan and the Lake Pontchartrain Barrier Plan as now authorized is not economically justifiable and is considered impracticable. The portion of Plan C between the floating gate in the GIW to the authorized barrier east of Chef Menteur Pass would have an additional average annual cost of $247,000 over the portion of the authorized plan it replaces and would provide an additional average annual hurricane protection benefit of $53,700, resulting in an unfavorable incremental benefit-cost ratio of 0.22 to 1.

15. Recommendations. It is recommended that the authorized plan of improvement for the Lake Pontchartrain Barrier Plan be modified to provide for construction of the Lake Pontchartrain barrier as described herein under Plan A; that this change be covered in the general design

LMNED-PP 13 March 1967

SUBJECT: Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modifications in the Alignment of the Lake Pontchartrain Barrier

memorandum for the Lake Pontchartrain Barrier Plan as a departure from the project document plan within the discretionary authority of the Chief of Engineers; and that this report be included as an appendix to that design memorandum.

19 Incl
1. Map file H-2-23693
2-7 Plates 1 through 6
8-16 Tables I through IX
17. Ltr of DPW dtd 8 Feb 67
18. Ltr of Orleans Levee Dist, dtd 22 Feb 67
19. Ltr of Orleans Levee Dist, dtd 22 Feb 67

THOMAS J. BOWEN
Colonel, CE
District Engineer

LEGEND

LOCK

FLOODGATE

CONTROL STRUCTURE

APPROACH CHANNEL

CLOSURE DAM

BARRIER EMBANKMENT (NEW)

LEVEE

APPLE PIE RIDGE

U. S. HIGHWAY 90 TO SERVE AS PORTION OF BARRIER EMBANKMENT

U. S. HIGHWAY 90 TO SERVE AS PORTION OF BARRIER EMBANKMENT

Line of demarcation between salt marsh and fresh marsh not determined

Line of demarcation between fresh and salt water marsh not determined

NEW ORLEANS EAST

SCALE OF MILES

LAKE PONTCHARTRAIN, LA. AND VICINITY

LAKE PONTCHARTRAIN BARRIER AND CHALMETTE AREA PLANS

LAKE PONTCHARTRAIN BARRIER

PROJECT DOCUMENT PLAN

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

FEBRUARY 1967 FILE NO. LH-2-24066

PLATE I

LEGEND

LOCK

FLOODGATE

CONTROL STRUCTURE

APPROACH CHANNEL

CLOSURE DAM

BARRIER EMBANKMENT (NEW)

LEVEE

U. S. HIGHWAY 90 TO SERVE AS PORTION OF BARRIER EMBANKMENT

U. S. HIGHWAY 90 TO SERVE AS PORTION OF BARRIER EMBANKMENT

APPLE PIE RIDGE

NEW ORLEANS EAST

Line of demarcation between salt marsh and fresh marsh not determined

Line of demarcation between fresh and salt water marsh not determined

SCALE OF MILES

LAKE PONTCHARTRAIN, LA. AND VICINITY

LAKE PONTCHARTRAIN BARRIER AND CHALMETTE AREA PLANS

LAKE PONTCHARTRAIN BARRIER

ALTERNATE PLAN A

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

FEBRUARY 1967 FILE NO. H-2-24066

PLATE 2

LEGEND

- LOCK
- FLOODGATE
- CONTROL STRUCTURE
- APPROACH CHANNEL
- CLOSURE DAM
- BARRIER EMBANKMENT (NEW)
- LEVEE

APPLE PIE RIDGE

NEW ORLEANS EAST

Line of demarcation between salt marsh and fresh marsh not determined

Line of demarcation between fresh and salt water marsh not determined

SCALE OF MILES

LAKE PONTCHARTRAIN, LA. AND VICINITY

LAKE PONTCHARTRAIN BARRIER AND CHALMETTE AREA PLANS

LAKE PONTCHARTRAIN BARRIER

ALTERNATE PLAN B

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

FEBRUARY 1967 FILE NO. H-2-24066

PLATE 3

LOUISIANA

ORLEANS PARISH

ST. BERNARD PARISH

PLAQUEMINES PARISH

LAKE BORGNE

SEABROOK LOCK

NEW ORLEANS AIRPORT

SEABROOK

CITRUS

NEW ORLEANS EAST

CHALMETTE

Line of demarcation between fresh & salt water marsh not determined

FLOATING GATE
400' by -40' MLG

MISSISSIPPI RIVER - GULF OUTLET

SCALE OF MILES

N

LEGEND

- LOCK
- FLOODGATE
- CONTROL STRUCTURE
- APPROACH CHANNEL
- CLOSURE DAM
- ALTERNATE PLAN "C"
- PROJECT DOCUMENT PLAN

LAKE PONTCHARTRAIN, LA. AND VICINITY
LAKE PONTCHARTRAIN BARRIER AND CHALMETTE AREA PLANS
IMPROVEMENTS ON AND TO THE EAST OF INNER HARBOR NAVIGATION CANAL

PROJECT DOCUMENT PLAN AND ALTERNATE PLAN "C"

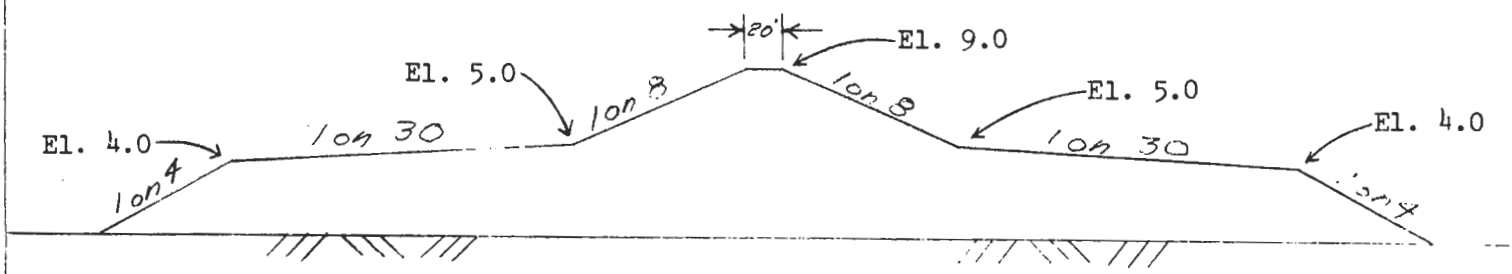
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

FEBRUARY 1967 FILE NO. H-2-24066

PLATE 4

Lake Pontchartrain, La. & Vicinity
Typical Section - Barrier Embankment

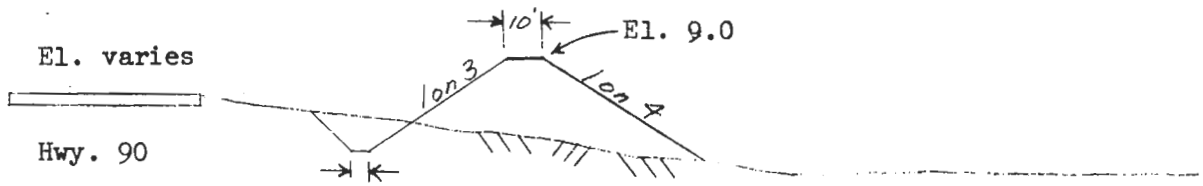
New Embankment - Authorized and
Plans A & B



See Note for Foreshore Protection.

Crown width for portion of Plan B between Chef Menteur Pass and the Rigolets is 10 feet.

Embankment Enlargement - Authorized
and Plan A, South of
Rigolets Control Structures



Elevations are in feet referred to m.s.l.

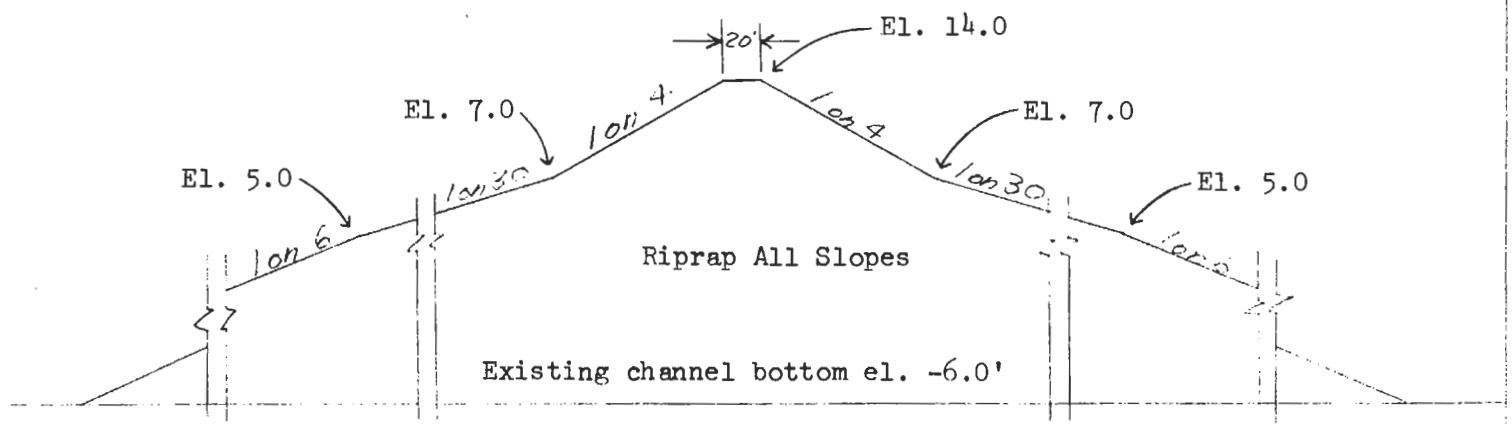
Note: Foreshore protection, extending from el. -3.0 to +3.0 feet m.s.l., will be provided for the portions of Plans A & B adjacent to the GIWW.

Feb 1967
Plate 5

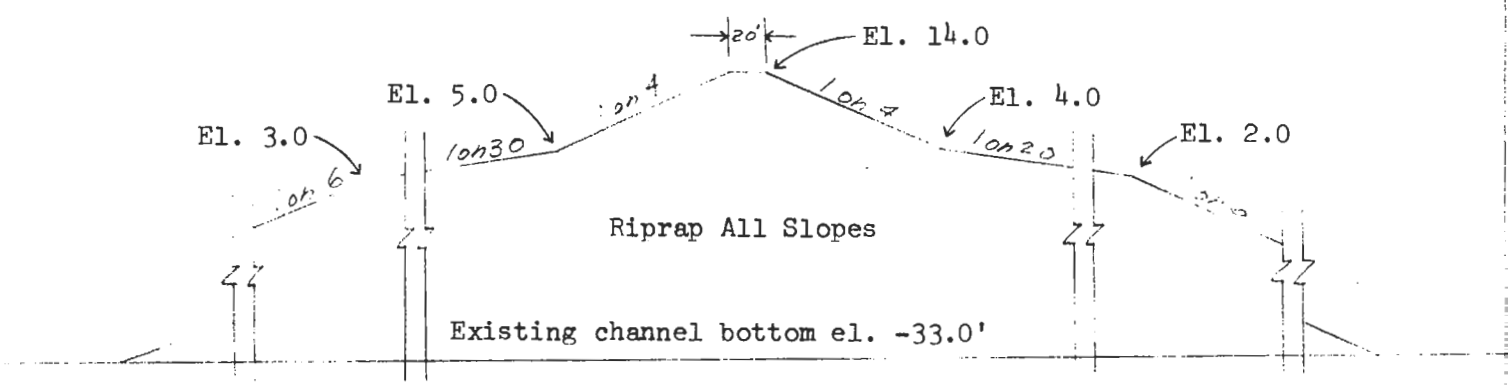
Incl 6

Lake Pontchartrain, La. & Vicinity
Typical Sections - Closure Dams
Authorized and Plans A & B

Chef Menteur Pass Closure



Rigolets Closure



Elevations are in feet referred to m.s.l.

Feb 1967
Plate 6

Incl 7

TABLE I

Lake Pontchartrain Barrier (Authorized)
Cost Estimate
(Jul 1966 price level)
New Orleans East to U. S. Highway 90 Embankment East of Chef Menteur Pass

Item	Quantity	Unit	Unit price	Cost
Structures, Chef Menteur (Project Document Estimate) (Dec 1961 price level)				
Drainage culvert				$ 3,060
Navigation floodgate				875,847
Control structure				2,097,270
Subtotal				$2,976,177
Contingencies 15%				447,427
Subtotal				$3,422,604
Escalated to Jul 1966 price level				4,083,200
E&D				445,100
S&A				351,200
Total				$4,879,500
Channels, Chef Menteur (Project Document Estimate) (Dec 1961 price level)				
Navigation - floodgate				$ 174,960
Approach - control structure				1,213,560
Subtotal				$1,388,520
Contingencies				208,278
Subtotal				$1,596,798
Escalated to Jul 1966 price level				1,905,000
E&D				207,600
S&A				163,800
Total				$2,276,400
Closure dam, Chef Menteur				
1st lift pump	1,560,000	cu.yd.	$ 0.80	1,248,000
2d lift pump	780,000	cu.yd.	0.80	624,000
3d lift shaping	234,000	cu.yd.	0.50	117,000
4th lift shaping	140,000	cu.yd.	0.50	70,000
5th lift shaping	94,000	cu.yd.	0.50	47,000
Riprap	71,400	ton	8.00	571,200
Shell	20,400	cu.yd.	4.50	91,800
Subtotal				$2,769,000
Contingencies				415,350
Subtotal				$3,184,350
E&D				347,100
S&A				273,900
Total				$3,805,400

TABLE I (cont'd)

Item	Quantity	Unit	Unit price	Cost
Levee, Chef Menteur				
Barrier				
1st lift pump	575,300	cu.yd.	$ 0.70	$ 402,700
2d lift pump	288,100	cu.yd.	0.70	201,700
3d lift shaping	120,500	cu.yd.	0.50	60,300
4th lift shaping	51,800	cu.yd.	0.50	25,900
Shell	3,000	cu.yd.	8.00	24,000
Seeding & fertilizing	42	acre	100.00	4,200
Subtotal				$ 718,800
Contingencies				107,800
Subtotal				$ 826,600
E&D				90,100
S&A				71,100
Total				$ 987,800
Levee, New Orleans East (Extending between GIW & U.S. Highway 90) (Project Document Estimate) (Dec 1961 price level)				
1st lift pump	452,900	cu.yd.	0.76	344,200
2d lift pump	188,700	cu.yd.	0.76	143,400
3d lift pump	113,200	cu.yd.	0.76	86,000
4th lift shaping	37,700	cu.yd.	0.40	15,100
5th lift shaping	22,600	cu.yd.	0.40	9,000
6th lift shaping	15,200	cu.yd.	0.40	6,100
Seeding	36	acre	75.00	2,700
Subtotal				$ 606,500
Contingencies				91,000
Subtotal				$ 697,500
Escalated to Jul 1966 price level				832,100
E&D				62,000
S&A				53,000
Total				$ 947,100
Lands and damages				
Chef Menteur complex				123,700
Levees				806,400
Subtotal				$ 930,100
Contingencies				139,500
Total				$1,069,600
First cost				$13,965,800
Operation and maintenance - annual				
Chef Menteur complex				$ 63,400
Levee				5,000
Total				$ 68,400

TABLE I (cont'd)

U. S. Highway 90 Embankment East of
Chef Menteur Pass to Apple Pie Ridge

Item	Quantity	Unit	Unit price	cost
Structures, Rigolets (Project Document Estimate) (Dec 1961 price level)				
Drainage culvert				$ 4,700
Navigation lock				2,217,100
Control structure				4,581,300
Subtotal				$ 6,803,100
Contingencies				1,020,500
Subtotal				$ 7,823,600
Escalated to Jul 1966 price level				9,333,600
E&D				989,400
S&A				793,400
Total				$11,116,400
Channels, Rigolets (Project Document Estimate) (Dec 1961 price level)				
Control structure & lock	21,626,000	cu.yd.	0.18	3,892,600
Contingencies				583,900
Subtotal				$ 4,476,500
Escalated to Jul 1966 price level				5,340,500
E&D				566,100
S&A				453,900
Total				$ 6,360,500
Closure dam, Rigolets				
1st lift pump	2,377,000	cu.yd.	0.80	1,901,600
2d lift pump	1,188,000	cu.yd.	0.80	950,400
3d lift shaping	356,500	cu.yd.	0.50	178,300
4th lift shaping	213,900	cu.yd.	0.50	106,900
5th lift shaping	142,600	cu.yd.	0.50	71,300
Riprap	198,000	ton	8.00	1,584,000
Shell	59,000	cu.yd.	4.50	265,500
Subtotal				$ 5,058,000
Contingencies				758,700
Subtotal				$ 5,816,700
E&D				616,600
S&A				494,400
Total				$ 6,927,700

TABLE I (cont'd)

Item	Quantity	Unit	Unit price	Cost
Levee, Rigolets				
Barrier - North of Rigolets				
1st lift pump	465,700	cu.yd.	$ 0.70	$ 326,000
2d lift pump	233,200	cu.yd.	0.70	163,200
3d lift shaping	97,500	cu.yd.	0.50	48,800
4th lift shaping	41,900	cu.yd.	0.50	21,000
Shell	2,400	cu.yd.	8.00	19,200
Seeding & fertilizing	34	acre	100.00	3,400
Barrier - South of Rigolets				
Cast	244,800	cu.yd.	0.60	146,900
Seeding & fertilizing	30	acre	100.00	3,000
Subtotal				$ 731,500
Contingencies				109,700
Subtotal				$ 841,200
E&D				61,400
S&A				58,000
Total				$ 960,600
Highway relocation, Rigolets (Project Document Estimate) (Dec 1961 price level)				
Embankment pump	220,000	cu.yd.	0.76	167,200
1st lift shaping	15,400	cu.yd.	0.40	6,160
2d lift shaping	6,600	cu.yd.	0.40	2,640
Concrete surface	15,500	sq.yd.	5.50	85,250
Seeding	15	acre	75.00	1,125
Subtotal				$ 262,375
Contingencies				39,625
Subtotal				$ 302,000
Escalated to Jul 1966 price level				360,600
E&D				38,200
S&A				30,700
Total				$ 429,500
Lands and damages				
Rigolets complex				$ 858,800
Levees				413,500
Relocations - Vicinity Rigolets control structure				
Aerial powerline				$ 30,000
AT&T coaxial cable				83,200
Telephone cable				10,000
First cost				$27,190,200
Operation and maintenance - annual				
Rigolets complex				$ 167,800
Barrier levee				12,800
Total O&M				$ 180,600

TABLE II

Lake Pontchartrain Barrier
Alternate Plan "A"
Cost Estimate
(Jul 1966 price level)
New Orleans East to U. S. Highway 90 Embankment East of Chef Menteur Pass

Item	Quantity	Unit	Unit price	Cost
Structures, Chef Menteur (Project Document Estimate) (Dec 1961 price level)				
Navigation floodgate				$ 875,847
Control structure				2,097,270
Subtotal				$ 2,973,100
Contingencies				446,000
Subtotal				$ 3,419,100
Escalated to Jul 1966 price level				4,079,000
E&D				444,600
S&A				350,800
Total				$ 4,874,400
Channels, Chef Menteur				
Navigation floodgate				196,300
Approach control structure				1,440,000
Subtotal				$ 1,636,300
Contingencies				245,400
Subtotal				$ 1,881,700
E&D				205,100
S&A				161,800
Total				$ 2,248,600
Closure dam				
Chef Menteur				
1st lift pump	1,560,000	cu.yd.	0.80	$ 1,248,000
2d lift pump	780,000	cu.yd.	0.80	624,000
3d lift shaping	234,000	cu.yd.	0.50	117,000
4th lift shaping	140,000	cu.yd.	0.50	70,000
5th lift shaping	94,000	cu.yd.	0.50	47,000
Riprap	71,400	ton	8.00	571,200
Shell	20,400	cu.yd.		91,800
GIW (2 dams)				
1st lift pump	153,000	cu.yd.	0.70	107,100
2d lift pump	77,000	cu.yd.	0.70	53,900
3d lift shaping	24,000	cu.yd.	0.50	12,000
4th lift shaping	14,000	cu.yd.	0.50	7,000
5th lift shaping	8,000	cu.yd.	0.50	4,000
Riprap	15,800	ton	8.00	126,400
Shell	4,600	cu.yd.	4.50	20,000

TABLE II (cont'd)

Item	Quantity	Unit	Unit price	Cost
Closure dam (cont'd)				
Subtotal				$ 3,099,400
Contingencies				464,900
Subtotal				$ 3,564,300
E&D				388,500
S&A				306,500
Total				$ 4,259,300
Levee, barrier Chef Menteur				
1st lift pump	1,356,000	cu.yd.	$ 0.70	949,200
2d lift pump	679,000	cu.yd.	0.70	475,300
3d lift shaping	284,000	cu.yd.	0.50	142,000
4th lift shaping	122,000	cu.yd.	0.50	61,000
Riprap	39,200	ton	13.00	509,500
Shell	16,200	cu.yd.	8.00	129,600
Seeding & fertilizing	100	acre	100.00	10,000
Subtotal				$ 2,276,600
Contingencies				341,500
Subtotal				$ 2,618,100
E&D				191,100
S&A				180,600
Total				$ 2,989,800
Lands and damages				
Chef Menteur complex				128,100
Relocated GIW				70,800
Barrier levee				292,400
Subtotal				$ 491,300
Contingencies				73,700
Total				$ 565,000
First cost				$14,937,100
Operation and maintenance - annual				
Chef Menteur complex				$ 63,400
Levees				8,000
Total O&M				$ 71,400

U. S. Highway 90 Embankment East of
Chef Menteur Pass to Apple Pie Ridge
Same as Authorized Plan
($27,190,200)

TABLE III

Lake Pontchartrain Barrier
Alternate Plan "B"
Cost Estimate
New Orleans East to North Bank of GIW East of Chef Menteur Pass

Item	Quantity	Unit	Unit price	Cost
Structures - Same as Plan "A" ($4,874,400)				
Channels - Same as Plan "A" ($2,248,600)				
Closure dams - Same as Plan "A" ($4,259,300)				
Levee				
1st lift pump	1,139,000	cu.yd.	$ 0.70	$ 797,300
2d lift pump	570,400	cu.yd.	0.70	399,300
3d lift shaping	238,600	cu.yd.	0.50	119,300
4th lift shaping	102,500	cu.yd.	0.50	51,300
Riprap	39,200	ton	13.00	509,500
Shell	16,200	cu.yd.	8.00	129,600
Seeding & fertilizing	100	acre	100.00	10,000
Subtotal				$ 2,016,300
Contingencies				302,400
Subtotal				$ 2,318,700
E&D				176,200
S&A				160,000
Total				$ 2,654,900
Lands and damages				
Chef Menteur complex				$ 128,100
Relocated GIW				70,800
Barrier levee				245,600
Total				$ 444,500
First cost				$14,481,700
Operation and maintenance - annual				
Chef Menteur complex				$ 63,400
Barrier levee				6,000
Total O&M				$ 69,400

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TABLE III (cont'd)

North Bank of GIW East of Chef Menteur Pass to Apple Pie Ridge

Item	Quantity	Unit	Unit price	Cost
Structures (Project Document Estimate) (Dec 1961 price level)				
Navigation lock				$ 2,217,100
Control structure				4,581,300
Floodgates (3)				2,115,000
Subtotal				$ 8,913,400
Contingencies				1,337,000
Subtotal				$10,250,400
Escalated to Jul 1966 price level				12,228,700
E&D				1,296,200
S&A				1,039,400
Total				$14,564,300
Closure dam, Rigolets				
1st lift pump	2,415,000	cu.yd.	0.80	1,932,000
2d lift pump	1,076,000	cu.yd.	0.80	860,800
3d lift shaping	300,000	cu.yd.	0.50	150,000
4th lift shaping	200,000	cu.yd.	0.50	100,000
5th lift shaping	110,000	cu.yd.	0.50	55,000
Riprap	198,000	ton	8.00	1,584,000
Shell	59,000	cu.yd.	4.50	265,500
Subtotal				$ 4,946,800
Contingencies				742,000
Subtotal				$ 5,688,800
E&D				603,000
S&A				483,500
Total				$ 6,775,300
Channels, Rigolets				
Control structure & lock	18,750,000	cu.yd.	0.20	3,750,000
Contingencies				562,500
Subtotal				$ 4,312,500
E&D				457,100
S&A				366,600
Total				$ 5,136,200

TABLE III (cont'd)

North Bank of GIW East of Chef Menteur Pass to Apple Pie Ridge

Item	Quantity	Unit	Unit price	Cost
Levee				
1st lift pump	5,615,700	cu.yd.	$ 0.70	$ 3,931,000
2d lift pump	2,834,500	cu.yd.	0.70	1,984,200
3d lift shaping	1,101,900	cu.yd.	0.50	551,000
4th lift shaping	473,400	cu.yd.	0.50	236,700
Riprap	130,500	ton	13.00	1,696,500
Shell	53,900	cu.yd.	0.80	43,100
Seeding & fertilizing	388	acre	100.00	38,800
Subtotal				$ 8,481,300
Contingencies				1,272,200
Subtotal				$ 9,753,500
E&D				712,000
S&A				673,000
Total				$11,138,500
Lands and damages				
Barrier levee				620,800
Rigolets complex				230,000
Subtotal				$ 850,800
Contingencies				127,600
Total				$ 978,400
First cost				$38,592,700
Operation and maintenance - annual				
Levee				$ 31,300
Rigolets complex				167,800
Floodgates (3)				35,600
Boat to service structures				5,000
Total O&M				$ 239,700

Incl 11

TABLE IV

Derivation of Additional First Cost for Barrier
(Jul 1966 price level)
Plans A & B as compared with Authorized Plan

Plan	Segment: New Orleans East to East of Chef Menteur	Segment: East of Chef Menteur to Apple Pie Ridge	Total cost	Difference Plan vs. Authorize
Authorized	$13,965,800	$27,190,200	$41,156,000	-
Plan "A"	14,937,100	27,190,200	42,127,300	$ +971,300
Plan "B"	14,481,700	38,592,700	53,074,400	+11,918,400

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TABLE V

Derivation of Additional O&M Cost for Barrier
(Jul 1966 price level)
Plans A & B as compared with Authorized Plan

Plan	Segment: New Orleans East to East of Chef Menteur	Segment: East of Chef Menteur to Apple Pie Ridge	Total cost	Difference Plan vs. Authorized
Authorized	$68,400	$ 180,600	$249,000	-
Plan "A"	71,400	180,600	252,000	$ 3,000
Plan "B"	69,400	239,700	309,100	60,100

TABLE VI

Lake Pontchartrain Barrier Plan and Chalmette Area Plan
Alternate Plan "C"

Cost Estimate
Floating Gate to Authorized Barrier Levee
East of Chef Menteur Pass
(Jul 1966 price level)

Construction cost for portion of Plan "C" from the floating gate to Highway 90	
Levee	
Hydraulic fill and shaping	$15,650,300
Structures	
Floating gate - MR-GO	20,610,200
Chef Menteur control structure and navigable floodgate including associated channels and closure dams	10,560,700
Bayou Bienvenue navigable floodgate and associated channel	1,691,300
GIW lock including associated channels	6,874,000
L&N RR ramp	25,000
Lands and damages	1,200,300
First cost	$56,611,800
Operation and maintenance	
Levee	60,900
Structures	118,400
Subtotal	$ 179,300
Replacement - Annual	$ 142,700

TABLE VII

Lake Pontchartrain Barrier Plan and Chalmette Area Plan

Costs for Items Which Would Be Eliminated by Plan "C"
(Jul 1966 price level)

Chalmette(1)	
IHNC to floating gate	
Levee and floodwall including bank stabilization	$10,972,900
Bayou Bienvenue navigable floodgate and associated channels	1,691,300
Lake Pontchartrain barrier plan (2)	
New Orleans	
IHNC - levee and floodwall	4,978,200
Citrus	
IHNC and back levee and floodwall	8,977,300
New Orleans East	
Back levee	7,841,200
Chef Menteur barrier struct. floodgate	1,720,800
Chef Menteur barrier struct. levee	1,666,700
Chef Menteur barrier control struct.	5,429,000
Barrier levee	
New Orleans East to Highway 90 embankment east of Chef Menteur Pass	987,800
Lands and damages	
Chef Menteur barrier structures	123,700
Citrus - IHNC and back levee	1,823,750
New Orleans East - back levee	331,250
Barrier levee	763,800
New Orleans	1,038,800
Chalmette	1,823,000
Relocations	
New Orleans East - back levee	274,600
Chalmette	100,000
First cost	$50,544,100
Operation and maintenance - annual	
Chalmette	$ 60,200
Chef Menteur complex	63,400
Barrier levee	5,000
New Orleans East - back	11,700
Citrus - back	10,100
Total O&M	$ 150,400

TABLE VII (cont'd)

Replacement - annual	
New Orleans - IHNC	$ 77,300
Citrus - IHNC	41,300
Chalmette	5,400
Total	$ 124,000

(1) All work along Inner Harbor Navigation Canal and Mississippi River-Gulf Outlet to floating gate would be eliminated. Costs of eliminated work are taken from "Design Memorandum No. 3, General Design, Chalmette Area Plan," dated 1 November 1966.

(2) Existing levees and floodwalls on the Inner Harbor Navigation Canal and the Citrus and New Orleans East back levees are of sufficient height to provide protection from non-hurricane high tides and would require no further work under the authorized project. The authorized Chef Menteur barrier complex, including the levee along Bayou Sauvage, would be replaced by the Plan "C" complex. Costs are from PB-3 dated 1 July 1966.

Incl 15

TABLE VIII

Lake Pontchartrain Barrier Plan and Chalmette Area Plan

Derivation of Additional First Cost and O&M for Plan "C"
Plan "C" as compared with Authorized Plan
(Jul 1966 price level)

Features	Authorized Plan Eliminated by Plan "C"	Plan "C"	Difference Plan "C" vs. Authorized
	Chalmette - MR-GO at floating gate to IHNC lock; Barrier Plan - IHNC levees; Citrus back levee; New Orleans East back levee; Barrier, New Orleans East to U. S. Highway 90 embankment east of Chef Menteur Pass	Floating gate to authorized barrier levee east of Chef Menteur Pass	
First cost	$50,544,100	$56,611,800	$+6,067,700
Operation & maintenance - annual	150,400	179,300	+28,900
Replacement - annual	124,000	142,700	+18,700

TABLE IX

Summarized Additional Annual Charges
Plans "A," "B," & "C"

Plan "A" vs. Authorized Plan

Item	Authorized plan	Plan "A"	Additional ann. charges
Interest and amortization (3-1/8%, 100 yrs.)	$1,564,200	$1,599,900	$ 35,700
Operation and maintenance	249,000	252,000	3,000
Replacement	0	0	0
Total annual charges	$1,813,200	$1,851,900	$ 38,700

Plan "B" vs. Authorized Plan(1)

Item	Authorized plan	Plan "B"	Additional ann. charges
Interest and amortization (3-1/8%, 100 yrs.)	$ 943,600	$1,348,700	$ 405,100
Operation and maintenance	180,600	239,700	59,100
Replacement	0	0	0
Total annual charges	$1,124,200	$1,588,400	$ 464,200

Plan "C" vs. Authorized Plan(2)

Item	Authorized plan	Plan "C"	Additional ann. charges
Interest and amortization (3-1/8%, 100 yrs.)	$1,800,600	$2,000,000	$ 199,400
Operation and maintenance	150,400	179,300	28,900
Replacement	124,000	142,700	18,700
Total annual charges	$2,075,000	$2,322,000	$ 247,000

(1) Plans "A" & "B" are essentially the same between New Orlans East and east of Chef Menteur Pass. Accordingly, evaluation of Plan "B" must be based on a comparison of the portion of that plan between east of Chef Menteur Pass and Apple Pie Ridge with the corresponding portion of the authorized plan. The figures tabulated are those for the increments east of the Chef Menteur Pass for both the authorized plan and Plan "B."
(2) Costs are for elements of Plan "C" and features of authorized plan which would be eliminated by construction of Plan "C."

STATE OF LOUISIANA
DEPARTMENT OF PUBLIC WORKS
BATON ROUGE

LEON GARY
DIRECTOR

February 8, 1967

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

Dear Colonel Bowen:

Reference is made to your letter of January 27, 1967, relative to the proposed modified plan for the "Lake Pontchartrain, Louisiana and Vicinity" project. Reference is also made to the enclosed letter to Mr. A. L. Willoz, Chief Engineer, Orleans Levee District, dated January 24, 1967, and accompanying drawing entitled "Lake Pontchartrain, La. and Vicinity - Lake Pontchartrain Barrier and Chalmette Area Plans, Improvements on and to the East of Inner Harbor Navigation Canal - Project Document Plan and Alternate Plan "C", File No. H-2-24066.

The Department of Public Works has carefully examined Alternate Plan "C" and is of the firm opinion that this plan should not be adopted. We believe that the delay that would be entailed in a restudy of the authorized plan would be unthinkable in view of the urgent need for hurricane protection for the City of New Orleans and adjacent parishes.

We further believe that the proposed 400' x minus 40' MGL floating gate in the Mississippi River Gulf Outlet would not be a safe or a practical means of closing this channel. Also, we believe that this gate could be a serious obstacle to the navigation interests who use this channel.

The lock which would be required in the Intracoastal Canal east of Chef Menteur would be a definite obstacle to the users of this navigation channel. We further believe that the construction of the embankment leading from the location of the 400' barge gate to Chef Menteur would take much too long.

For these reasons, we object to the proposed adoption of Alternate Plan "C".

Sincerely yours,

CALVIN T. WATTS
Assistant Director

/an
cc - Orleans Levee District
Mr. Arthur R. Theis

Encl 17

The Board of Levee Commissioners

OF THE

Orleans Levee District

200 WILDLIFE AND FISHERIES BUILDING
416 ROYAL STREET

New Orleans, La.
70130

COMMISSIONERS
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CLAUDE W. DUKE, PRES. PRO-TEM.
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COUNCILMAN PHILIP C. CIACCIO

A. L. WILLOZ, CHIEF ENGINEER
JAMES E. GLANCEY, JR., SECRETARY

Engr D w/ B

February 22, 1967

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

Dear Colonel Bowen:

The management of the Orleans Levee Board objects to the suggested modification to the Lake Pontchartrain, Louisiana and Vicinity project because it is not in the best interest of our community.

The proposed modification would mean to stop work on the existing project. The modification plan also would cause the present plan to be delayed even though the modification would be rejected by Congress.

If the plan was approved, it could possibly be as much as 20 years in the building. I am sure that the citizens of our community and the Orleans Levee Board would not agree to this condition.

There are many other reasons why we are opposed to this plan being submitted to Congress for consideration, however, you have received a letter from Armand L. Willoz, Chief Engineer for the Orleans Levee Board, that more clearly states our position.

I am forwarding a copy of Mr. Willoz's letter and my letter to our congressional delegation and I will certainly seek their assistance in getting the modification plan rejected.

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In the best interest of the people of New Orleans, I ask that you, as District Engineer for the U. S. Army Corps of Engineers, recommend against the suggested modification to the Lake Pontchartrain, Louisiana and Vicinity Project.

Sincerely,

Milton E. Dupuy
President

MED:baf

cc: Armand L. Willoz, Chief Engineer, Orleans Levee Board
The Honorable Hale Boggs, Member of the House of Representatives
The Honorable Allen J. Ellender, United States Senator
The Honorable Russell B. Long, United States Senator
The Honorable F. Edward Hebert, Member of the House of Representatives
The Honorable John R. Rarick, Member of the House of Representatives

The Board of Levee Commissioners

OF THE

Orleans Levee District

200 WILDLIFE AND FISHERIES BUILDING
418 ROYAL STREET

New Orleans, La.
70130

Engr Div
B

22 February 1967

Colonel Thomas J. Bowen, CE
District Engineer - Dept. of the Army
New Orleans District,
Corps of Engineers
P. O. Box 60267
New Orleans, La. 70160

RE: LMNED-PP

Dear Colonel Bowen:

Reference is made to our recent discussions with yours Messrs. Chatry and Mask, of your office, on 18 January 1967, and your letter of 24 January 1967, relative to an evaluation study of suggested modification to the "Lake Pontchartrain, La. and Vicinity," project.

Consideration of the proposed modification would mean an instant stopping of all planning and work on the existing project by the U. S. Corps of Engineers until Congress had acted.

Should Congress reject the modification, it would mean several years of unnecessary delay in the execution of the present plan.

Should Congress approve the modification it may be as much as twenty years before the new plan be completely executed.

The use of a floating gate, we are certain, will be strongly opposed by the navigation interests, because it will necessitate the closing of the Mississippi River-Gulf Outlet for several days, whenever the area is threatened by a hurricane.

Should the modified plan be adopted, the local agencies would be pressed by the public to provide interim protection along the Industrial Canal, the Mississippi River-Gulf Outlet and the Intracoastal Canal, which would mean an expenditure of about $29,000,000. In addition, the local agencies would be required to contribute 30% of the cost of the modified plan, which would amount to about $15,000,000. The total of the interim protection and the contribution to the modified plan would mean a total local expenditure in excess of $44,000,000. This expenditure would be difficult to finance by local interest, particularly, in view, that $29,000,000. would be spent on interim protection.

Incl 19

Board of Levee Commissioners
Orleans Levee District

It is our view that the modification of the Lake Pontchartrain, La. and Vicinity Project is not to the best interest of the City of New Orleans, because we feel certain that the citizens would strongly oppose any delay in execution of the hurricane protection in this area, and expose a great part of the City to hurricane tides for a long period of years.

It would not be within the present authority of this Board, to finance such a large local contribution.

Under the circumstances, we must oppose any modification to the present plans as it would be against the best interest of our Community.

Sincerely yours,

A. L. WILLOZ
CHIEF ENGINEER

ALW:mgl

cc: Mr. M. E. Dupuy

LMVED-TD (NOD 13 Mar 67) 1st Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modifications in the Alignment of the Lake Pontchartrain Barrier

DA, Lower Miss. Valley Div., CE, Vicksburg, Miss. 39180 28 Mar 67

TO: Chief of Engineers, ATTN: ENGCW-V/ENGCW-E

1. Subject report is forwarded for review and approval pursuant to para 9b, ER 1110-2-1150. The recommendations of the District Engineer, in para 15, are concurred in.

2. The last sentence under Plan A, page 4, would be clearer if written as follows:

"It must be pointed out that these areas will remain subject to flooding by overtopping of the barrier from lesser hurricanes than the SPH, and in addition will be vulnerable to overflow from Lake Pontchartrain."

FOR THE DIVISION ENGINEER:

/s/ George B. Davis
GEORGE B. DAVIS
Acting Chief, Engineering Division

19 Incl (10 cy)
wd 1 cy ea

Copy furnished:
NOD, ATTN: LMNED-PP

ENGCW-EZ (LMNED-PP 13 Mar 67) 2d Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Evaluation of Alternate Plans Involving Modifications in the Alignment of the Lake Pontchartrain Barrier

DA, CofEngrs, Washington, D. C., 20315, 15 May 1967

TO: Division Engineer, Lower Mississippi Valley Division

The recommendations of the District Engineer in paragraph 15 of the basic letter are approved, subject to the comment of the Division Engineer in the 1st indorsement.

FOR THE CHIEF OF ENGINEERS:

/s/ Wendell E. Johnson
WENDELL E. JOHNSON
Chief, Engineering Division
Civil Works

wd incl

APPENDIX D

STRUCTURAL DESIGN

APPENDIX D

STRUCTURAL DESIGN

1. General. Structural design has been accomplished in accordance with standard engineering practice and criteria set forth in Engineering Manuals for Civil Works Construction published by the Office, Chief of Engineers.

2. Basic data. Basic data relevant to the design of the protective works are shown in the following table:

		Elevations
a.	Water elevations	
	Still water level	13.0*
	Landside of floodwall	0.0
b.	Floodwall gross grades	
	Bulk Loading Facility (station 253+35 to station 271+55)	15.0
	NOPSI Electric Generating Plant (station 430+95 to station 454+80)	20.0
	NASA Michoud Assembly Facility (station 571+55 to station 584+23.6)	22.0

c. Unit weights

Item	Lb. per Cu. Ft.
Water	62.5
Concrete	150
Steel	490
Earth	See plates 44 thru 46

d. Design loads

(1)	Earth pressures (lateral). See figures D-1 thru D-5	
(2)	Wind loads	
	(a) On walls	30 p.s.f.
	(b) On overhead beams	50 p.s.f.
(3)	Water loads. See figures D-1 thru D-5 and figure D-7.	

*The tentative stillwater elevation of 13.3 was revised to elevation 13.0; however, computations are based on 13.3.

(4) Wave characteristics (west of Paris Road only)

(a)	Wind speed, U	75 m.p.h.
(b)	Fetch length, F	2 miles
(c)	Significant wave height, H_s	4.8 feet
(d)	Wave period, T	5.6 seconds
(e)	Depth at toe of levee, d_t	10.5 feet
(f)	Structural design wave height, H_1	7.9 feet
(g)	Wave force on wall	See figure D-6

3. Allowable working stresses. The allowable working stresses for concrete and structural steel are in accordance with those recommended in "Working Stresses for Structural Design," EM 1110-1-2101 dated 1 November 1963. Concrete will be designated by basic minimum compressive strength 3000 p.s.i., except for prestressed concrete piling which shall be designated 5000 p.s.i. Steel for steel sheet piling will meet the requirements of ASTM A328-54, "Standard Specification for Steel Sheet Piling." For convenient reference, pertinent allowable stresses are tabulated below:

Reinforced concrete	Stress - p.s.i.
fc'	3,000
fc	1,050
v (without web reinforcement)	60
v (with web reinforcement)	274
fs	20,000
Minimum tensile steel	0.0025 bd
Shrinkage and temperature steel	0.0020 bt
Structural Steel (ASTM A-36)	
Basic stress tensile stress	18,000

DESIGN STRUCTURES

4. Location and alignment. The floodwall will be located in the existing Citrus Back Levee along the alignment shown on plates 2 through 5. The floodwall is described in "Description of Proposed Structures and Improvements," paragraphs 68 through 72.

5. Foundation. The results of subsurface exploration, soil test, and foundation studies are presented in paragraphs 31 through 59. Logs for the general type borings are plotted on plates 2 through 5. The undisturbed boring data are shown on plates 54 through 59.

6. I-Wall. Except for 80 feet of T-wall near the Bulk Loading Facility and 3 gate monoliths in the Electric Generating Plant, all of the floodwall will be I-type wall consisting of steel sheet piling driven into an enlarged levee section and capped with concrete to the required protection height. The sheet pile will extend to 1 foot above the levee crown. The concrete portion will encase the top 3 feet of the sheet pile.

7. The I-type wall is designed for two different conditions. The floodwall west of Paris Road will not be subject to wave loads, and the floodwall east of Paris Road will be subject to wave forces.

8. The floodwall west of Paris Road is located in a levee with an existing grade of approximately elevation 9.0. The levee will be reshaped with the crown at elevation 9.0 and 1 on 3 side slopes. The floodwall is designed, using a factor of safety in the soil of 1.5, for a floodside water elevation of 14.5 and checked for water to the top of the wall at elevation 15.0. Design of the wall is shown on figure D-1, details on plate 26, and typical sections on plate 28.

9. The floodwall east of Paris Road is located in a levee that varies from elevation 11.0 to 14.0. Minimum crown elevation that would make an I-wall stable against the wave load is elevation 12.0. Higher crown elevations were considered to achieve the most economical I-wall and levee combinations. A crown at elevation 13.0 proved most economical. The I-wall designs for crown elevation 12.0 and 13.0 are shown on figures D-2 through D-5. The savings of 4 feet of sheet piling realized by raising the levee crown to elevation 13.0 more than offsets the cost of additional levee fill required.

10. The I-wall east of Paris Road is designed for the following loading cases:

Case I - Static water to top of broken wave (elevation 18.8), 1.5 factor of safety in the soil, no dynamic wave force.

Case II - Static water to top of broken wave, 1.25 factor of safety in the soil, dynamic wave load from broken wave.

The design of the I-wall is shown on figures D-4 and D-6. Details are shown on plate 26. Typical I-wall and levee sections are shown on plates 29, 30, and 31.

11. Where possible the expansion joints in I-walls will be spaced 30 feet apart. The deflection of the I-wall will produce a lateral displacement at the junction of the I-wall with the T-wall and gate monoliths. A special seal located in a notch in the I-wall will prevent water from passing through the expansion joints. Seal details are shown on plate 26.

12. T-Wall. The T-wall, between stations 255+10 and 255+90, is an inverted T-type wall on a concrete bearing pile foundation. The size of the base and location of the stem on the base was determined by studies made for the floodwall on the IHNC, West Levee, Florida Avenue to IHNC Lock as presented in "Design Memorandum No. 2, General, Advance Supplement, Inner Harbor Navigation Canal West Levee, Florida Avenue to IHNC Lock," dated March 1967. See typical T-wall section plate 26.

13. Based on economy, resistance to decay, resistance to corrosive soil and water conditions, and fitness for driving, prestressed concrete piles will be utilized as bearing piles. The concrete piles will meet the requirements of the Joint AASHO and PCI Committee Standard Specifications for "Square Concrete Prestressed Piles." Allowable pile loads are shown on plate 43.

14. The T-wall was designed for the following conditions:

Case I - Water at elevation 15.0 on floodside and water at elevation 5.5 on protected side. Sheet pile cutoff pervious. Uplift varies by decreasing uniformly from full head uplift on floodside to tailwater uplift on protected side.

Case II - Same as Case I except sheet pile cutoff impervious. Full head uplift on floodside of cutoff, and tailwater uplift on protected side of cutoff.

Case III - Water at elevation 12.5 on floodside and water at elevation 5.5 on protected side. Sheet pile cutoff pervious. Uplift varies by decreasing uniformly from full head uplift on floodside to tailwater uplift on protected side.

Case IV - Same as Case III except sheetpile cutoff impervious. Full head uplift on floodside of cutoff, and tailwater uplift on protected side of cutoff.

15. Design of the T-wall and the pile foundation is shown on figures D-7 through D-21. The foundation was analyzed using "Analysis of Pile Foundations with Batter Piles," by A. Hrennikoff, Transactions, ASCE Vol. 115(1950). Figures D-11 through D-15 show the determination of allowable transverse loads and movements. In this determination the soil was considered to have a constant modulus of subgrade reaction (K) with depth. Curves of actual and allowable transverse loads and deflections for various values of K are shown on figure D-16.

16. Gates. The design of the gates is shown on figures D-22 through D-44. The loading cases used to design the gates are as follows:

Case I - Water to elevation 18.8 on floodside (top of broken wave), elevation 10.5 on protected side, no dynamic wave load, normal working stresses.

Case II - Water to elevation 18.8 on floodside (top of broken wave), elevation 10.5 on protected side, dynamic wave load, 1/3 increase in allowable working stresses. To resist the water, wave, and wind forces when the gates are closed, the base will be supported as shown on plate 25. With the gates open the base will be designed to support an H-20 highway load. The gates are shown in plan, elevation, and section on plate 23. Details of the gate are shown on plates 24 and 25.

LAKE PONT & VIC (HURR PROT) sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE

Comp by: W.D.J.
ckd by: LL

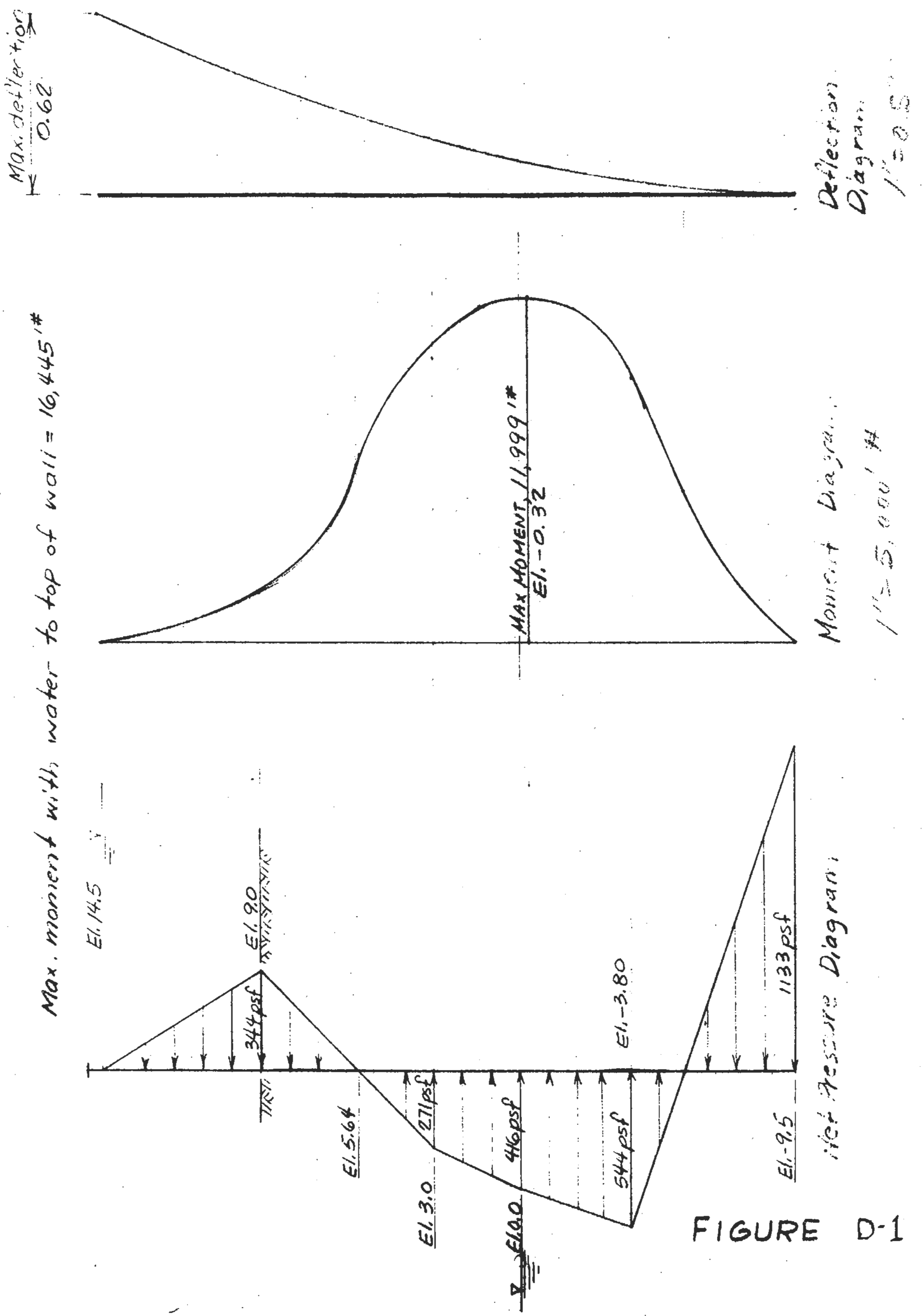
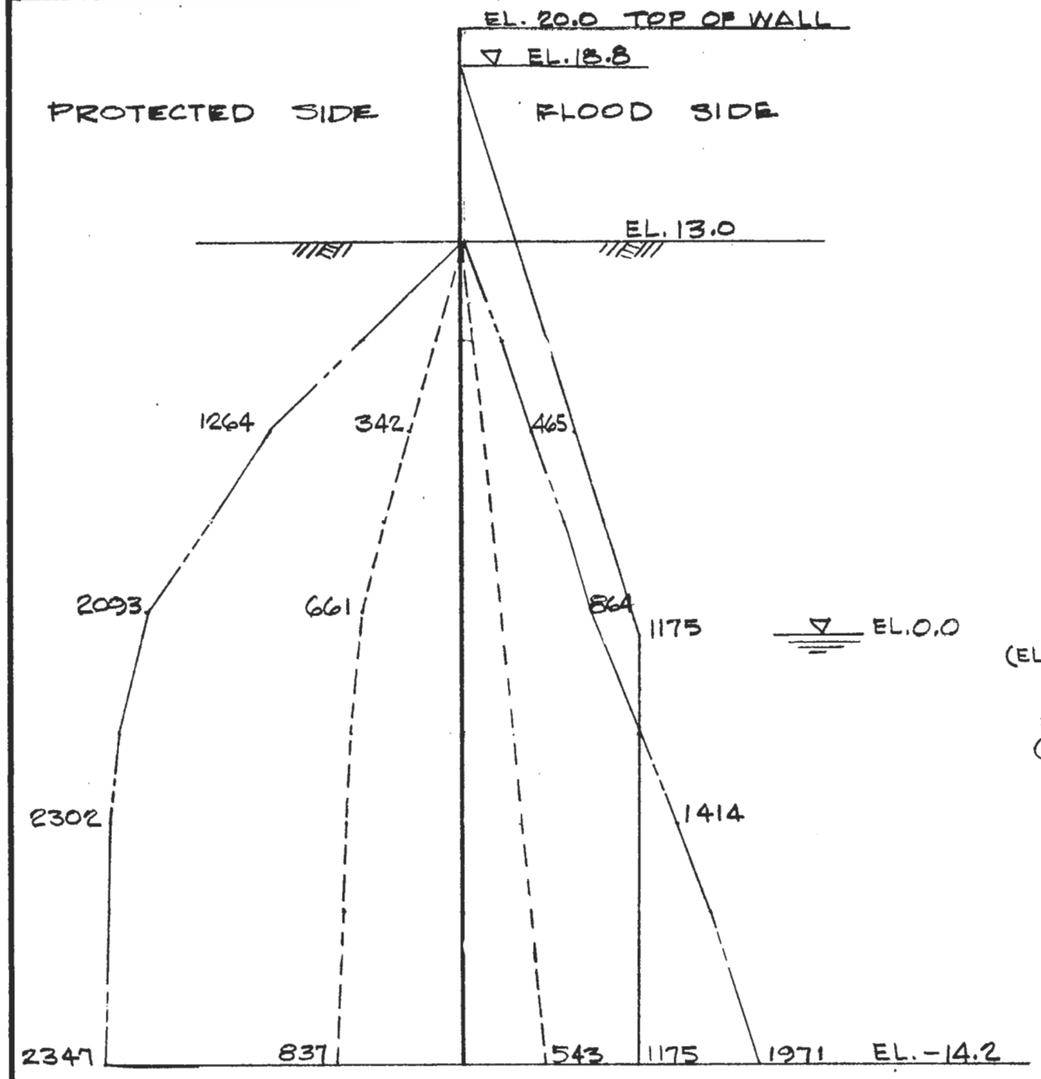


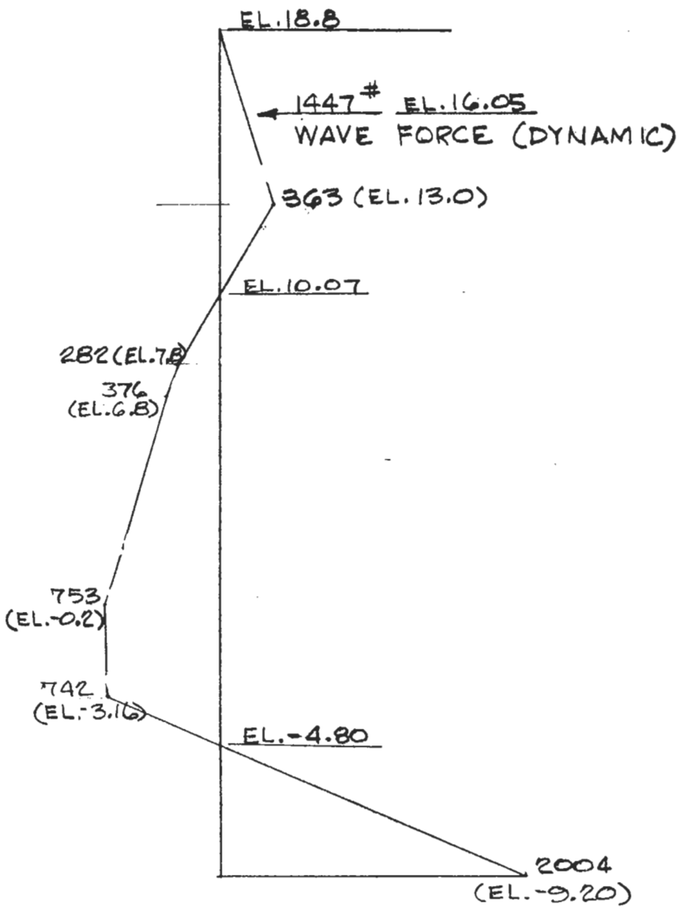
FIGURE D-1



PRESSURE DIAGRAM (F.S. = 1.25)

SCALES: 1"=5'
1"=1000 PSF

LEGEND:
WATER PRESSURE ————————
PASSIVE PRESSURE —— -- ——
ACTIVE PRESSURE - - - - - - -

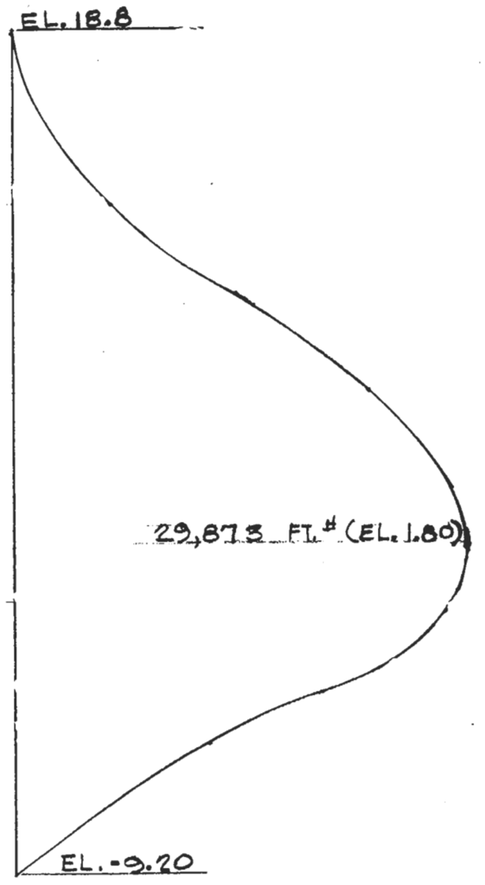


NET PRESSURE DIAGRAM, STATIC + DYNAMIC LOAD

SCALES: 1"=5'
1"=1000 PSF

DEFLECTION AT TOP OF FLOOD WALL = 2.31"

STA. 434+50

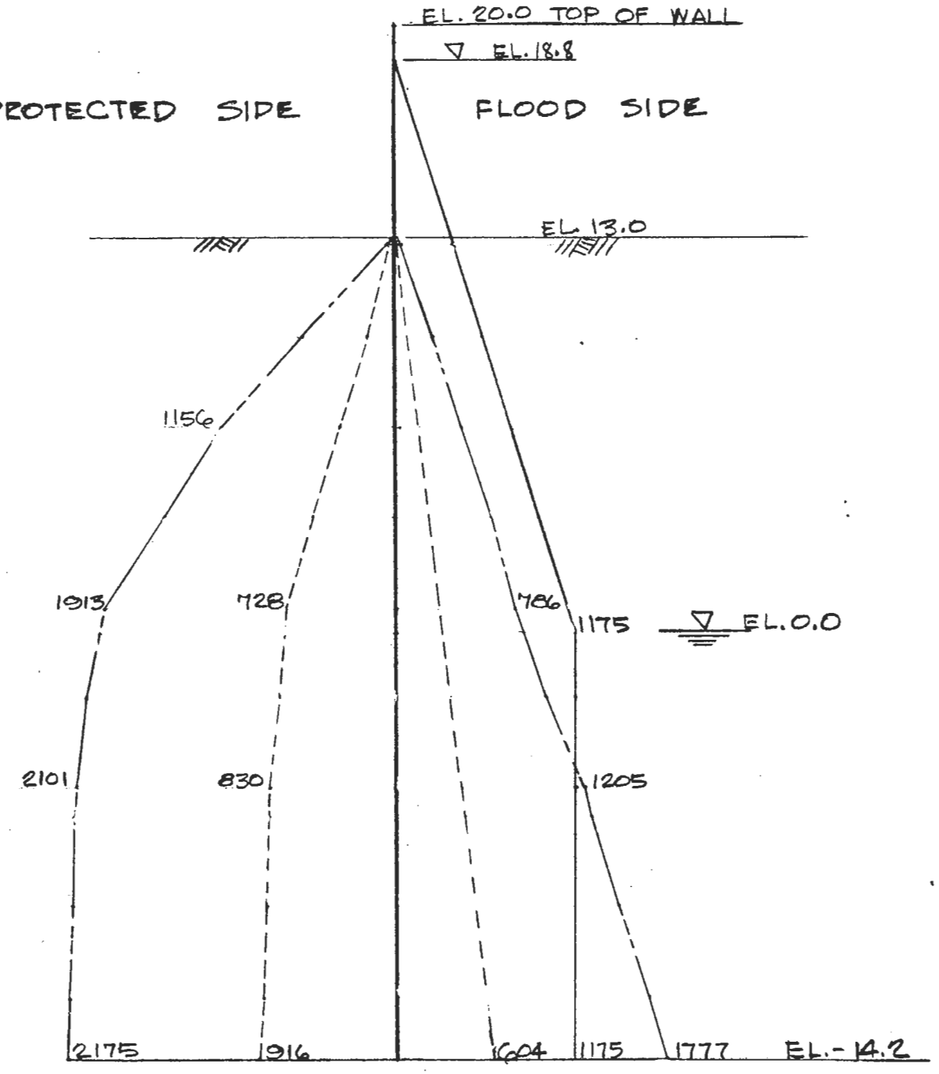


MOMENT DIAGRAM STATIC + DYNAMIC LOAD

SCALES: 1"=5'
1"=10,000 FT.#

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
CITRUS BACK LEVEE
IHNC THRU NASA
I-WALL DESIGN ANALYSIS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1967 FILE NO. H-2-23908

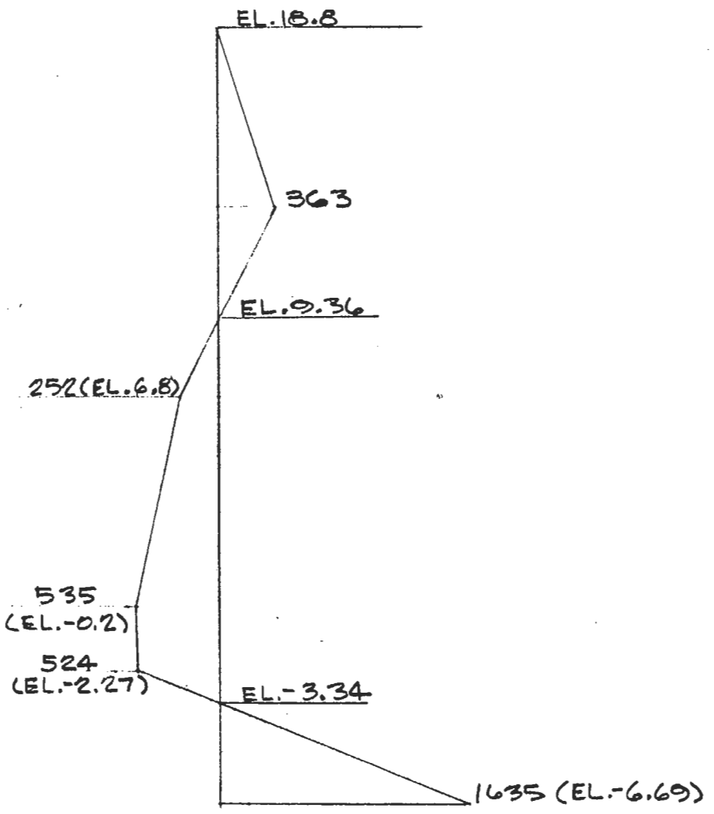
FIGURE D-2



PRESSURE DIAGRAM (F.S. = 1.5)

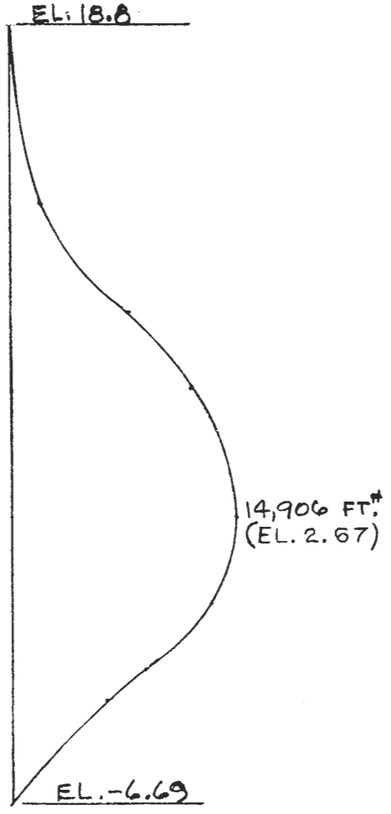
SCALES: 1" = 5'
1" = 1000 PSF

LEGEND:
WATEE PRESSURE ————————
PASSIVE PRESSURE ———·——
ACTIVE PRESSURE - - - - - - - -



NET PRESSURE DIAGRAM,
STATIC LOAD

SCALES: 1" = 5'
1" = 1000 PSF



MOMENT DIAGRAM,
STATIC LOAD

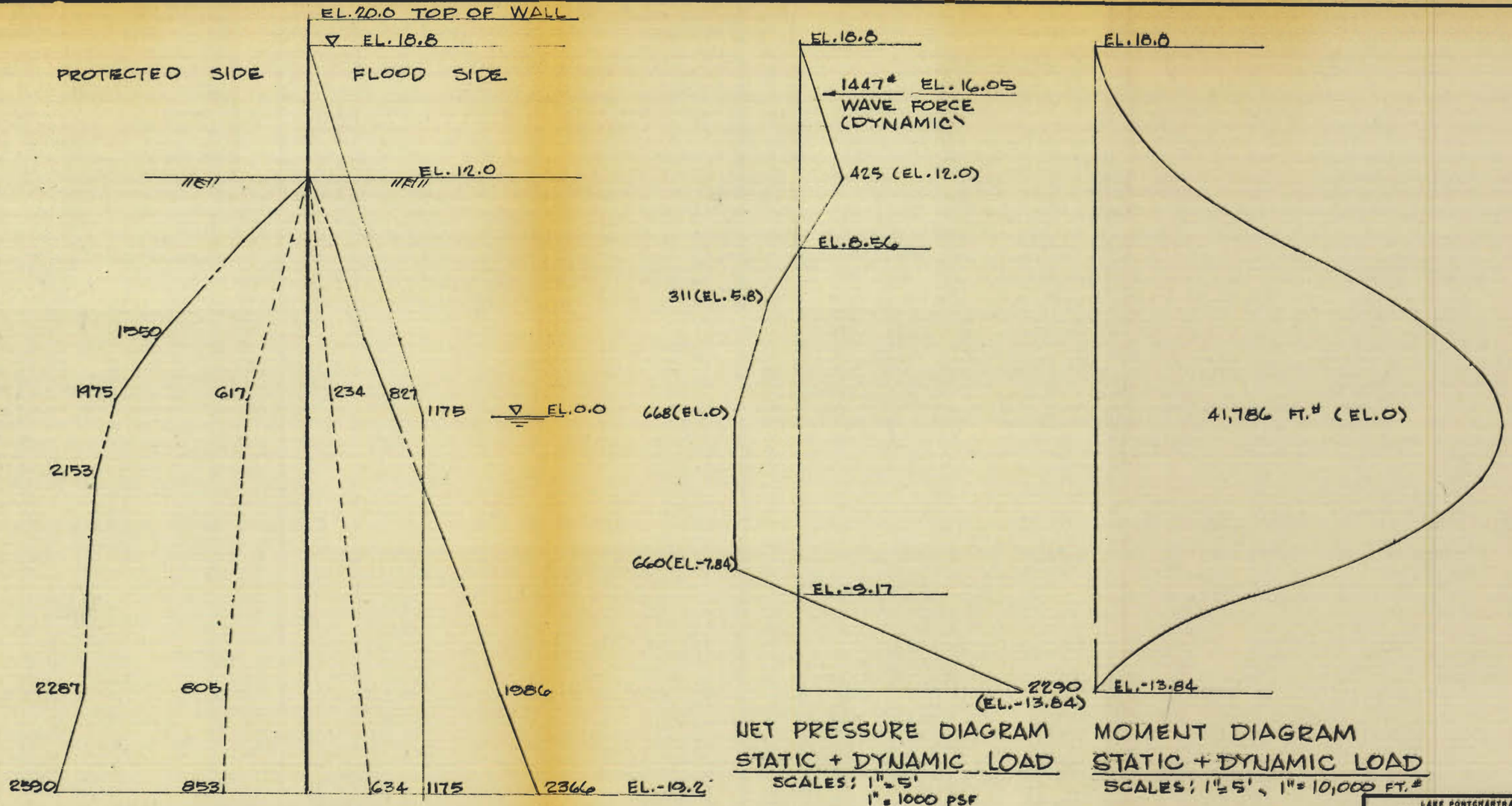
SCALES: 1" = 5'
1" = 10,000 FT.*

DEFLECTION AT TOP
OF FLOOD WALL = 0.91"

STA. 434+50

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
CITRUS BACK LEVEE
IHNC THRU NASA
I-WALL DESIGN ANALYSIS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1967 FILE NO. H-2-23908

FIGURE D-3



PRESSURE DIAGRAM (F.S. = 1.25)

SCALES: 1" = 5', 1" = 1000 PSF

WET PRESSURE DIAGRAM
STATIC + DYNAMIC LOAD

SCALES: 1" = 5'
1" = 1000 PSF

MOMENT DIAGRAM
STATIC + DYNAMIC LOAD

SCALES: 1" = 5', 1" = 10,000 FT.#

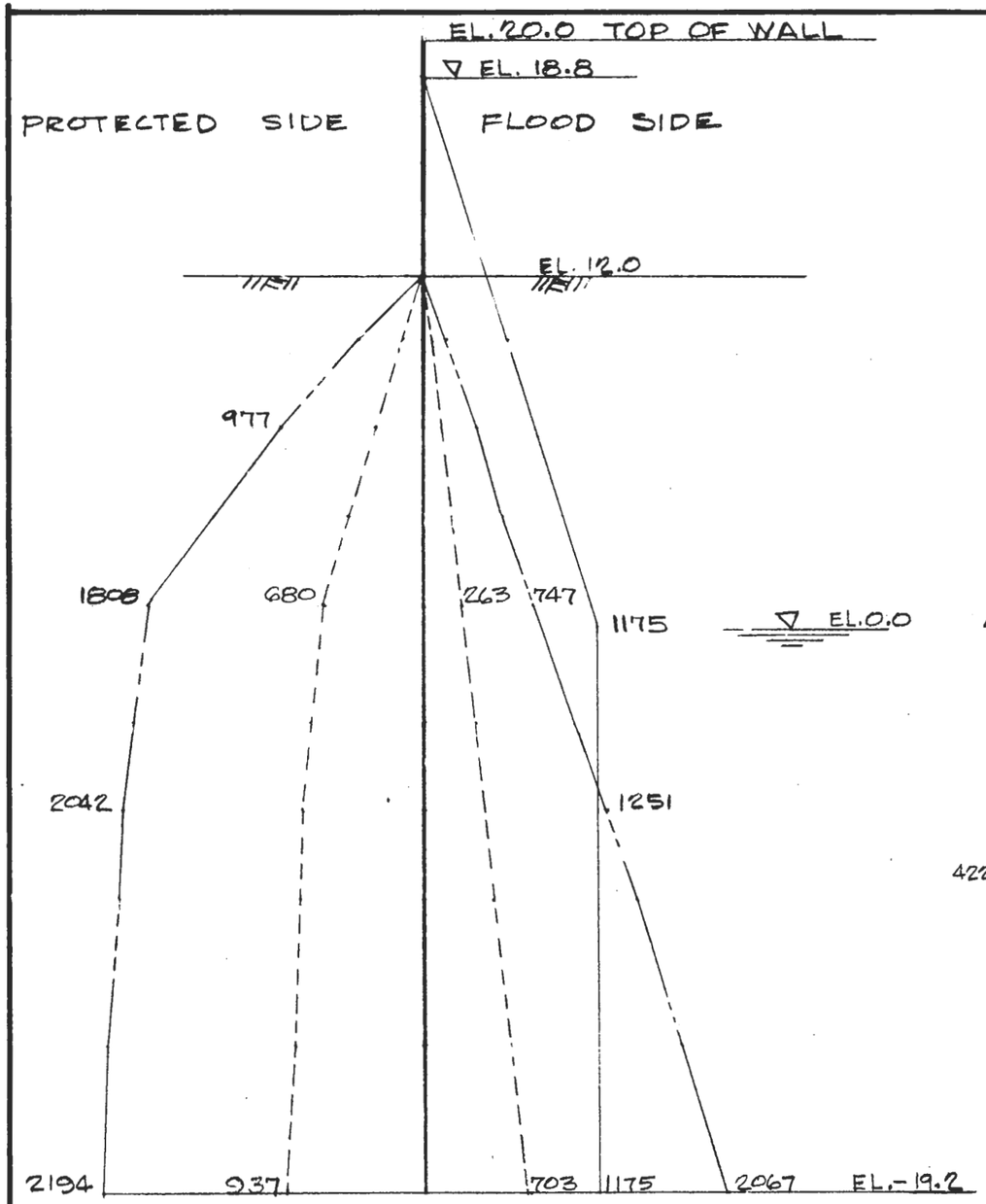
LEGEND: WATER PRESSURE ————
PASSIVE PRESSURE ———— - - ————
ACTIVE PRESSURE — — — — — —

DEFL. AT TOP OF FLOOD WALL = 4.33"

STA. 444+40

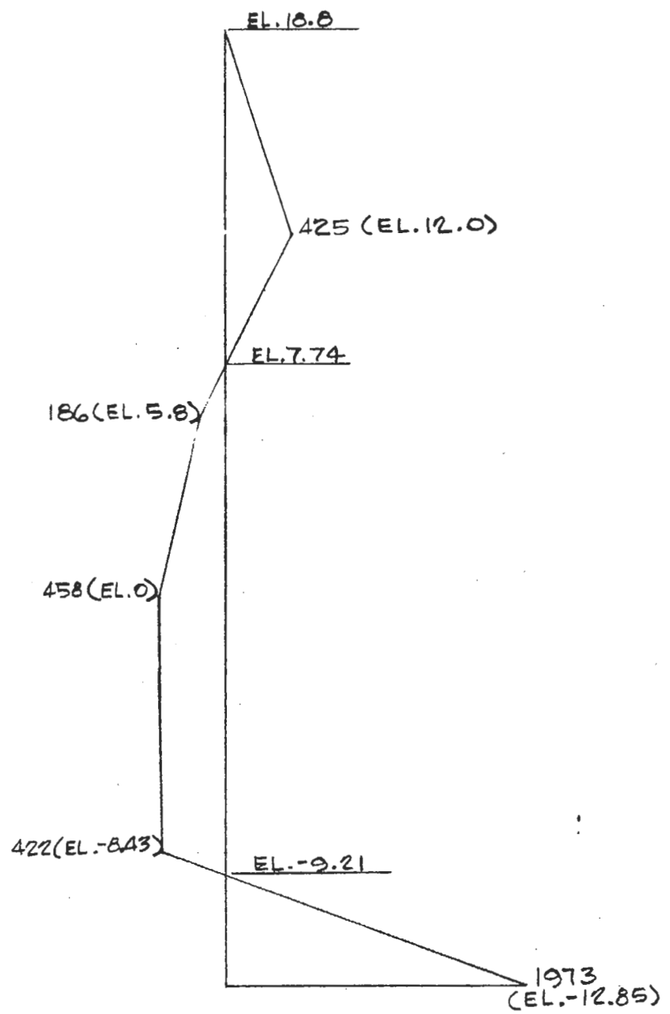
LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2 - GENERAL DESIGN
CITRUS BACK LEVEE
IHNC THRU NASA
I-WALL DESIGN ANALYSIS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1967 FILE NO. H-2-23908

FIGURE D-4



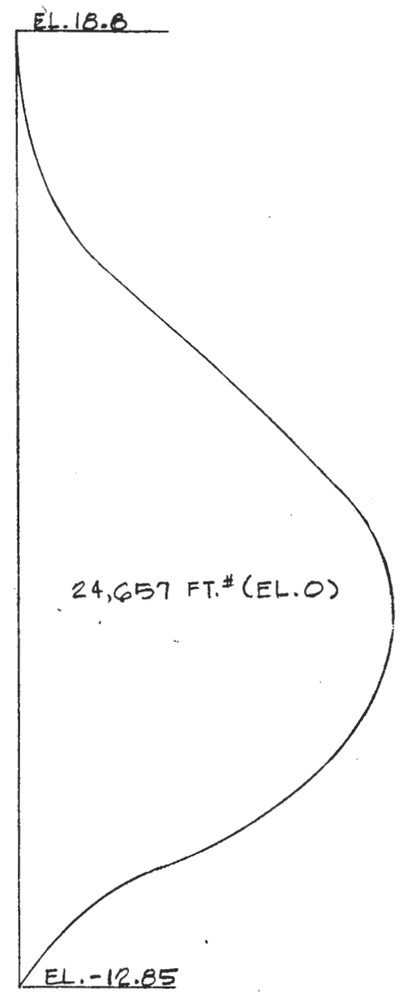
PRESSURE DIAGRAM (F.S. = 1.50)

SCALES: 1" = 5'
1" = 1000 PSF



NET PRESSURE DIAGRAM
STATIC LOAD

SCALES: 1" = 5'
1" = 1000 PSF



MOMENT DIAGRAM
STATIC LOAD

SCALES: 1" = 5'
1" = 10.000' FT#

LEGEND: WATER PRESSURE
PASSIVE PRESSURE
ACTIVE PRESSURE

DEFL. AT TOP OF FLOOD WALL = 2.38"

STA. 444+40

LAKE PONTCHARTRAIN, LA AND VICINITY
LAKE PONTCHARTRAIN BARRIER PLAN
DESIGN MEMORANDUM NO. 2-GENERAL DESIGN
CITRUS BACK LEVEE
IHNC THRU NASA
I-WALL DESIGN ANALYSIS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1967 FILE NO. H-2-23908

FIGURE D-5

LAKE PONT & VIC (HURR PROT) Sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE
Comp by: LL May '67
C'k'd by: WDJ May '67

DETERMINATION OF WAVE FORCE

Wall seaward of shoreline

$H_1 = 7.9'$ S.W.L. = El. 13.3

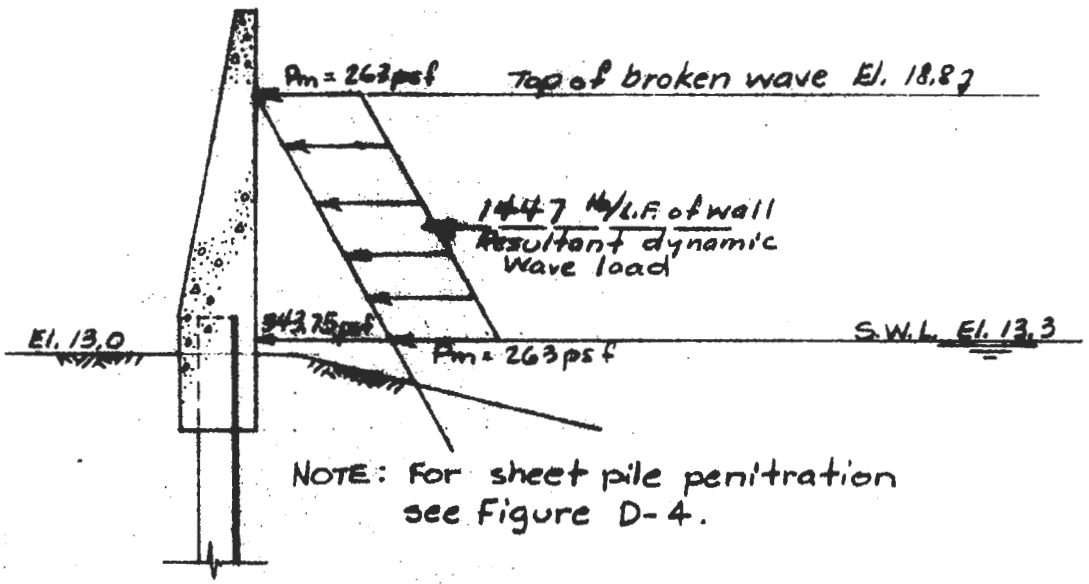
Breaking depth, $d_b = 0.67 \dfrac{7.9}{\left(\frac{7.9}{5.6}\right)^{1/3}} = 8.4'$ Bottom El. = 13.3 - 8.4 = 4.9'

Wave breaks on berm, approx 60' from wall

USE BROKEN WAVE

Reference - U.S. Army Coastal Engineering Research Center, "Shore Protection, Planning and Design," Technical Report No. 4, 3rd ed. 1966

Height of broken wave = 0.7 (H_1) = 0.7 (7.9) = 5.5'
Top of broken wave = 13.3 + 5.5 = El. 18.8

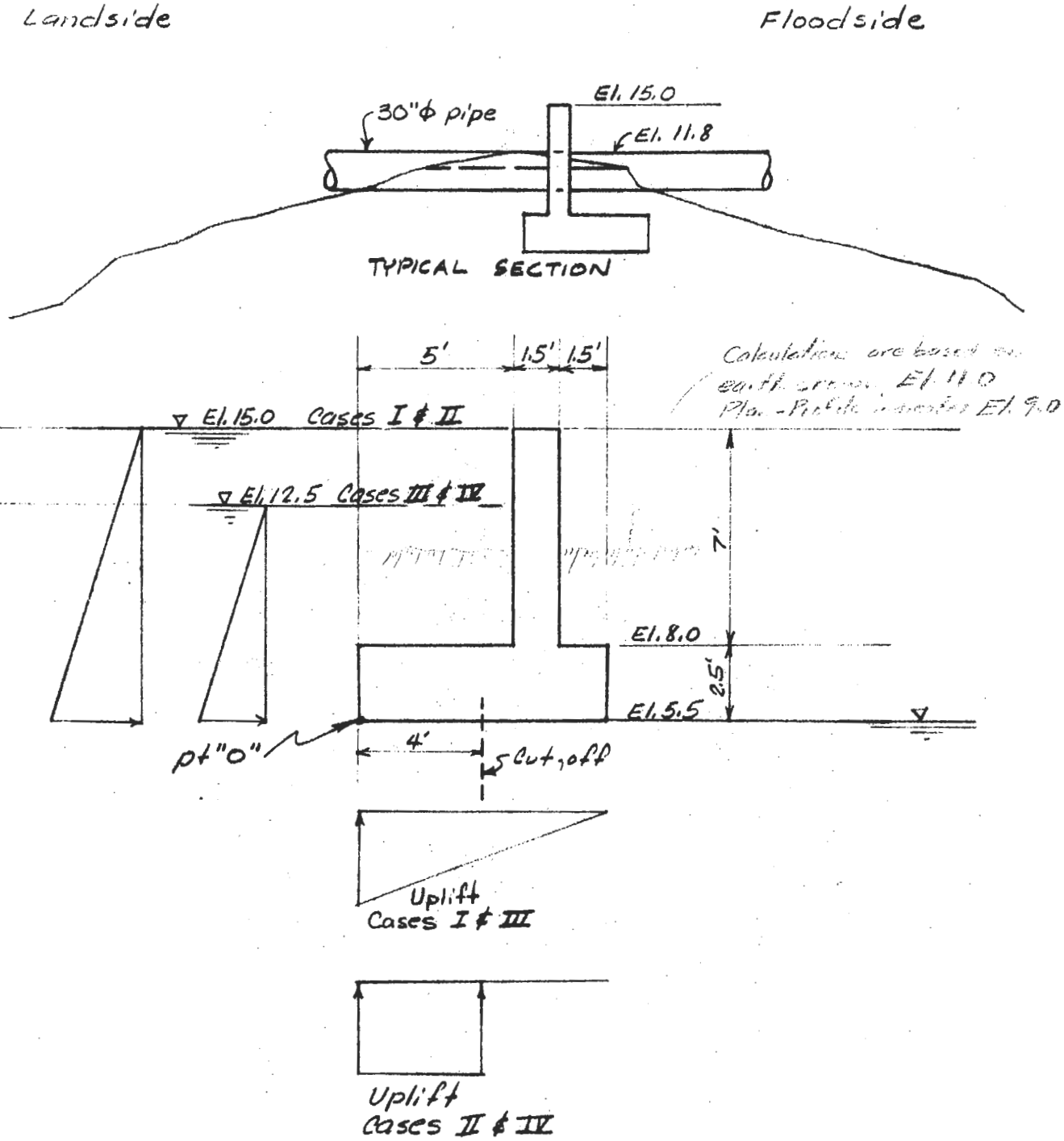


$P_m = \dfrac{w d_b}{2} = \dfrac{62.5 \times 8.4}{2} = 263$ psf

FIGURE D-6

LAKE PONT. & VIC (HURR. PROT.) Sheet 1 of
BARRIER PLAN GDM
CITRUS BACK LEVEE
Comp. by WDJ May 67
Ckd by: L.L. May 67

T Wall @ Bulk Loading Plant
Sta. 255+10 to 255+90



T Wall section selected from studies made on IHNC floodwall - 8' wide base, floodside face of stem 5' from floodside edge of base

FIGURE D-7

LAKE PONT. & VIC. (HURR. PROT.) Sheet 2 of

BARRIER PLAN GDM Comp by: WDJ May 67

CITRUS BACK LEVEE C'k'd by: LL MAY 67

T Wall @ Bulkloading Plant

COMPUTATION OF VERTICAL AND HORIZONTAL LOADS AND MOMENT AT PT "O" FOR 1' STRIP OF WALL

CASES I and II

Item	Computation	V	H	$\bar{x}$	M
Conc. Stem	1.5 x 7 x 150	1575 #↓		5.75'	9,056 '#
Base	2.5 x 8 x 150	3000		4.00	12,000
Soil	1.5 x 3 x 115	517.5		7.25	3,752
Soil	5 x 3 x 52.5	787.5		2.5	1,969
Water↓	7 x 5 x 62.5	2187.5		2.5	5,469
Water →	62.5 x 9.5² x 1/2		2820 #→	3.167	8,931
Subtotal w/o Uplift		8067.5 #↓	2820 #→		41,177 '#
Uplift I	-593.75 x 8 x 1/2	-2375		2.667	-6334
CASE I TOTALS		5692.5 #↓	2820 #→	6.120	34,841 '#
Uplift II	-593.75 x 4	-2375		2.0	-4750
CASE II TOTALS		5692.5 ↓	2820 #←	6.399'	36,427 '#

CASES III and IV

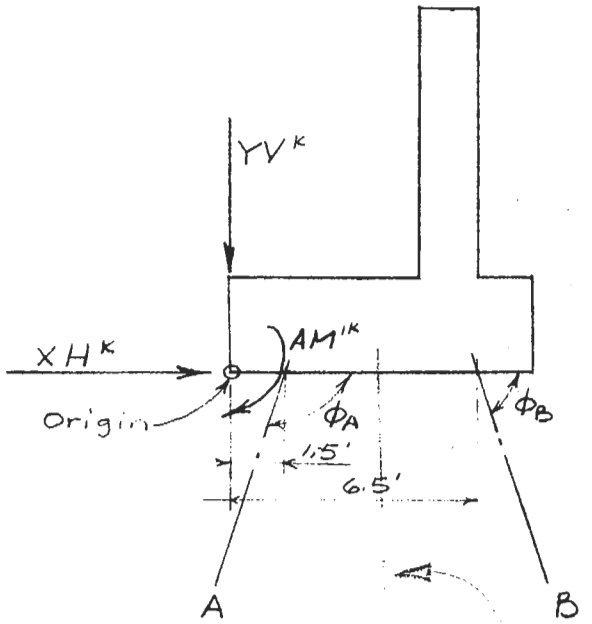
Conc. stem		1575			9056
Base		3000			12000
Soil		517.5			3,752
Soil		787.5			1969
Water ↓	4.5 x 5 x 62.5	1406.25		2.5	3516
Water →	62.5 x 7² x 1/2		1531.25	2.333	3572
Subtotal w/o Uplift		7286 #	1531 #		33,685 '#
Uplift III	-62.5 x 7 x 8 x 1/2	-1750		2.667	-4,667
Case III Totals		5,536 #		5.241	29,018 '#
Uplift IV	-62.5 x 7 x 4	-1750		2.00	3500
Case IV Totals		5536 #		5.452'	30,185 '#

FIGURE D-8

LAKE PONT. & VIC (HURR. PROT.) Sheet 8 of
BARRIER PLAN GDM
CITRUS BACK LEVEE

Comp. by: WDJ May 67
Ckd by: LL May 67

DETERMINE PILE GROUP BY HRENNIKOFF'S METHOD WITH COMPUTER PROGAM 41-GI-Z5-002 WITH MODIFICATIONS MADE FOR IHNC WEST LEVEE FLOODWALL, LOCK TO FLA. AVE



Batter	Φ_A	Φ_B
1 on 2	116.565°	63.435°
1 on 2.5	111.802°	68.199°
1 on 3	108.434°	71.566°
1 on 3.5	105.945°	74.055°
1 on 4	104.036°	75.964°
1 on 5	101.310°	78.690°
1 on 6	99.463°	80.537°
Vertical	90°	90°

Steel sheet piling neglected

AREA = 12" x 12" = 144 □"

$AI = \frac{bd^3}{12} = 12^3 = 1728$ in⁴

E = 4,290,000 p.s.i.

AK = 180 psi. (After economical group is determined, this group will be checked for AK of 15 to 300)

AL = 70 ft. (Will be varied to suit loads)
PA = 80 kips (Will vary with AL)

APLRES = 2 (skin friction pile)
ENDCON = 0 (Assumed hinged @ slab).

Axx = 1.5'

Bxx = 6.5'

Computer printout

P = Axial load on Pile

ST = used to compute transverse deflection

Q = Transverse load on pile head

FIGURE D-9

LAKE PONT & VIC (HURR. PROT.)
BARRIER PLAN GDM
CITRUS BACK LEVEE

Sheet of

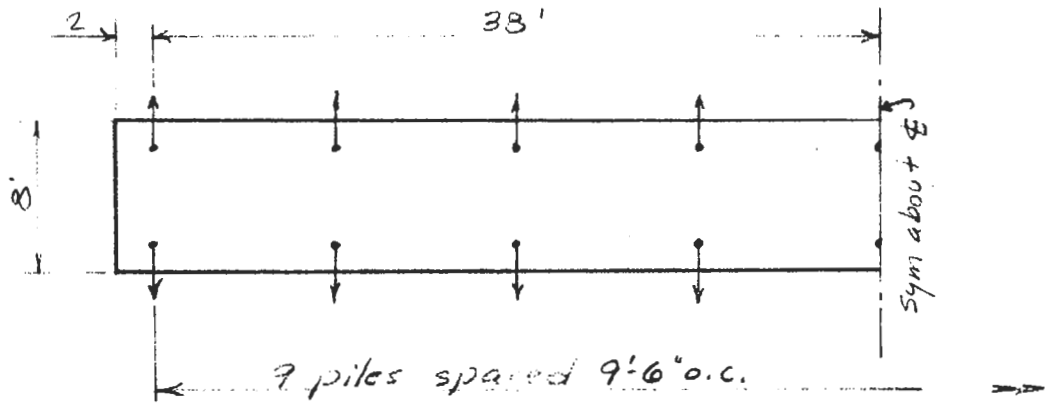
Comp by WDJ Apr 67
Ckd by LL May 67

T Wall @ Bulk Loading Plant

MOMENTS AND FORCES ON 80' OF WALL

CASE	AM (MOMENT)	YV (VERT. LOAD)	XH (HOR. LOAD)
I	2,787.28[1K]	455.40[K]	225.60[K]
II	2,914.16	455.40	225.60
III	2,321.44	442.88	122.50
IV	2,414.80	442.88	122.50

No pile spacing greater than 10' o.c.
start piles 2' in from end



Min number of piles per row = 9'

FIGURE D-10

LAKE PONT & VIC (HURR PROT) Sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE
Comp by WDJ May 67
C'k'd by LL May 67

Batter Pile Foundations

DETERMINE ALLOWABLE TRANSVERSE LOAD AND MOVEMENT OF PILE HEAD

Use 12" ϕ Prestressed Concrete Piling

$f'_c = 5000$ psi , $f_c = 1{,}750$ psi

Allowable pile loads vary with penetration, therefore the following will be computed to solve for the allowable transverse loads and movement for various axial loads

Modulus of Horizontal subgrade soil reaction, $k = 180$ psi

References:

1. A.C.I. Building Code
2. Std Prestressed Conc. Piles (10" to 24" square) Design sheet by Joint Committee of AASHO and PCI
3. Journal #3509, May '63, of Soil Mechanics and Fdns Div. of A.S.C.E. "Laterally Loaded Piles in a Layered Soil System" by M.T. Davisson and H.L. Gill.
4. Design Memorandum No 2, General, Advance Supplement, Inner Harbor Navigation Canal West Levee, Florida Avenue to IHNC Lock

(Ref. 2) Min. Prestress after losses = 700 psi
Eff. Prestress after losses = 840 psi

Area Pile = 144 □" $I_{xx} = \frac{bd^3}{12} = \frac{12\times12^3}{12} = 1728$ in^4

$E_c = (W)^{3/2} 33\sqrt{f'_c} = (150)^{3/2}(33)\sqrt{5000} = 4.29\times10^6$ psi (Ref 2)

(Ref. 3) Max moment in pile due to transverse load on pile head $= 0.5 R Q_A$

0.5 = Max Moment Coef.

$R = \sqrt[4]{\frac{EI}{k}} = \sqrt[4]{\frac{4.29\times10^6\times1728}{180}} = 80.109$"

Q_A = Max. transverse load applied at pile head

Max $M = 0.5\times80.109\times Q_A = 40.055\, Q_A$

S_{xx} pile $= bd^2/6 = 12\times12^2/6 = 288$

(Ref. 3) Allowable pile head deflection $= y_A$

$y_A = \frac{1.375\, R^3 Q_A}{EI} = \frac{1.375\,(80.109)^3 Q_A}{4.29\times10^6\times1728} = 95.355\times10^{-3} Q_A$

FIGURE D11

LAKE HONT. & VIC. (HURR. PROT.) Sheet of
BARRIER PLAN GDM
Comp.by: WDJ May67
CITRUS BACK LEVEE C'k'd by: LL May67

Batter pile Foundations

(Ref. 3) Allowable pile head deflection = y_A

$$y_A = \frac{1.375\ R^3 Q_A}{EI} = \frac{1.375\ (80.109)^3\ Q_A}{4.29 \times 10^6 \times 1728}$$

$$y_A = 95.355 \times 10^{-3}\ Q_A$$

TENSION PILE

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = 1 \qquad f_a = \frac{P_A}{144}\ ;\ F_a = 700\ psi\ ;\ f_b = \frac{M}{S} = \frac{40.055\ Q \times 1000}{288} =$$

$$f_b = 139.080\ Q\ ;\ F_b = 700\ psi$$

$$\frac{\frac{P_A}{144} + 139.080\ Q}{700} = 1\ ;\ \frac{P_A}{144} + 139.080\ Q = 700$$

$$Q_A = \frac{100{,}800 - P_A}{20{,}027.52} \qquad y_A = 95.355 \times 10^{-3}\ Q_A$$

D-13

Plots of Q_A and y_A shown on Figure 11

P_A	Q_A	y_A
60,000#	2.037 K	0.194"
50,000	2.537	0.242
40,000	3.036	0.289
30,000	3.535	0.337
20000	4.034	0.385
10,000	4.534	0.432
0	5.033	0.480

COMPRESSION PILE

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{P_A/144 + 139.080\ Q_A}{910} = 1 \qquad Q_A = \frac{13040 - P_A}{20{,}027.52}$$

$$y_A = 95.355 \times 10^{-3}\ Q_A$$

P_A	Q_A	y_A
80,000#	2.548 K	0.243"
70,000	3.048	0.291
60,000	3.547	0.338
50,000	4.046	0.386
40,000	4.546	0.433

D-14

Plots of Q_A and y_A shown on Figure 12

FIGURE D-12

LAKE PONT. & VIC. (HURR. PROT.) sheet of
BARRIER PLAN GDM
Comp. by: WDJ May '67
CITRUS BACK LEVEE

RESULTS OF FOUNDATION ANALYSIS

CASE	ROW	ACTUAL			ALLOWABLE		
		P	Q	y	P	Q	y
I	A	3.717^{K}	-1.131^{K}	0.111"	72.000^{K}	2.94^{K}	0.281"
I	B	52.805	-1.059	0.104	72.000	2.94	0.281
II	A	0.997	-0.297	0.029	72.000	2.94	0.281
II	B	55.495	-0.134	0.013	72.000	2.94	0.281
III	A	12.745	1.140	-0.112	72.000	2.94	0.281
III	B	40.464	1.414	-0.139	72.000	2.94	0.281
IV	A	10.744	1.754	-0.172	72.000	2.94	0.281
IV	B	42.444	2.095	-0.205	72.000	2.94	0.281

FIGURE D-13

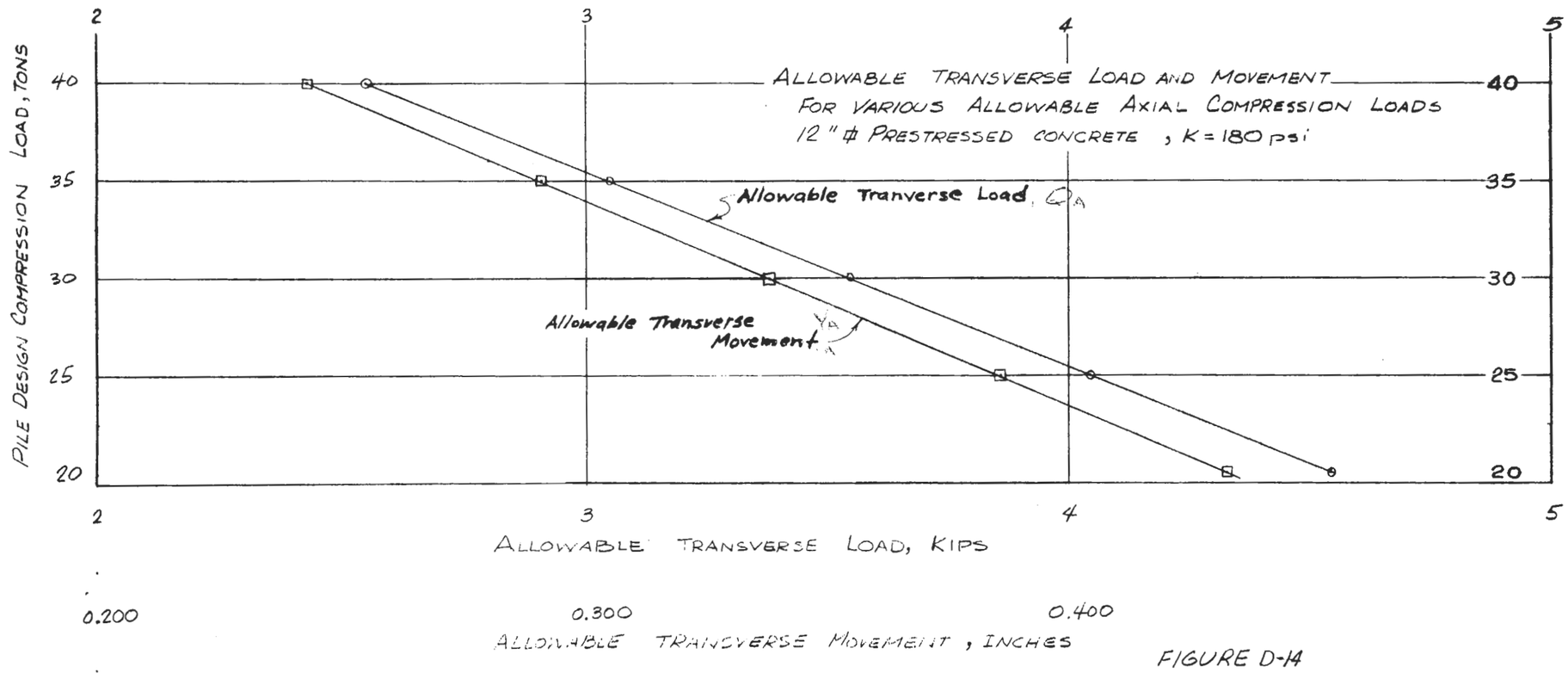

ALLOWABLE TRANSVERSE LOAD AND MOVEMENT
FOR VARIOUS ALLOWABLE AXIAL COMPRESSION LOADS
12" ϕ PRESTRESSED CONCRETE , K = 180 psi
Allowable Tranverse Load
Allowable Thansverse Movement
PILE DESIGN COMPRESSION LOAD, TONS
40
35
30
25
20
2
3
4
5
ALLOWABLE TRANSVERSE LOAD, KIPS
0.200
0.300
0.400
ALLOWABLE TRANSVERSE MOVEMENT, INCHES

FIGURE D-14

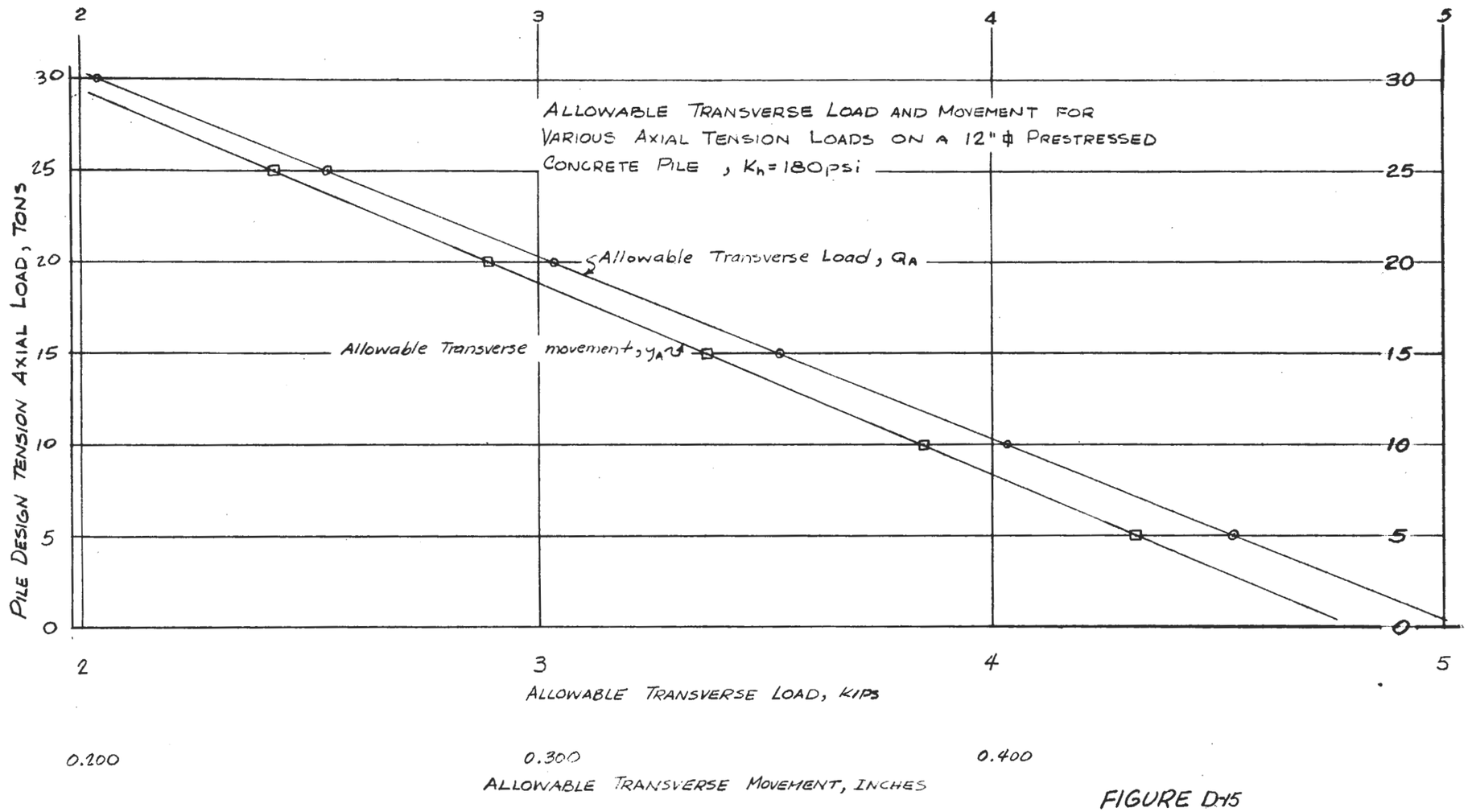

ALLOWABLE TRANSVERSE LOAD AND MOVEMENT FOR VARIOUS AXIAL TENSION LOADS ON A 12" ϕ PRESTRESSED CONCRETE PILE , K_h = 180 psi
Allowable Transverse Load, Q_A
Allowable Transverse movement, y_A
PILE DESIGN TENSION AXIAL LOAD, TONS
0
5
10
15
20
25
30
2
3
4
5
ALLOWABLE TRANSVERSE LOAD, KIPS
0.200
0.300
0.400
ALLOWABLE TRANSVERSE MOVEMENT, INCHES

FIGURE D-15

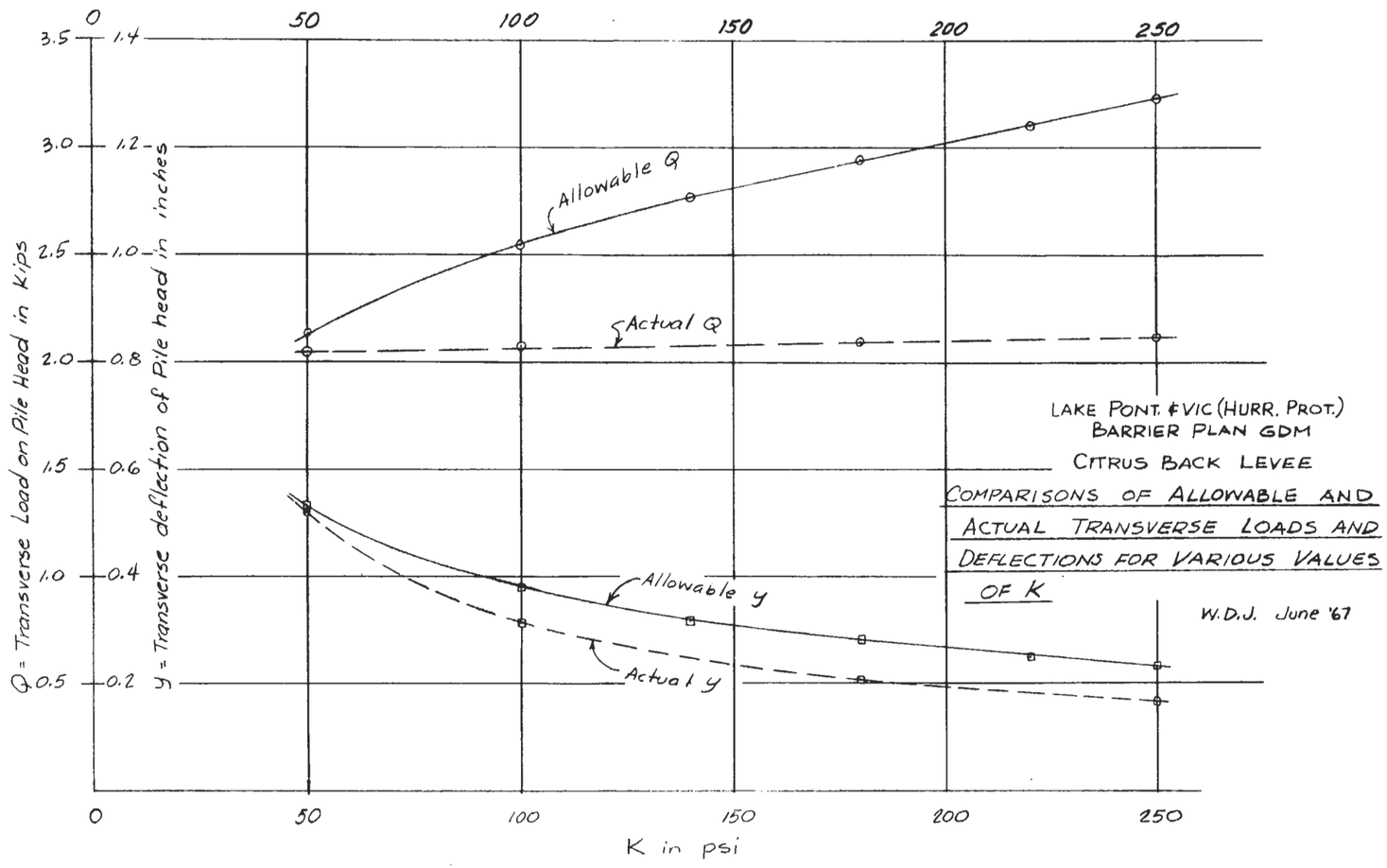

Q = Transverse Load on Pile Head in Kips
y = Transverse deflection of Pile head in inches
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
50
100
150
200
250
Allowable Q
Actual Q
Allowable y
Actual y
K in psi
LAKE PONT. & VIC (HURR. PROT.)
BARRIER PLAN GDM
CITRUS BACK LEVEE
COMPARISONS OF ALLOWABLE AND
ACTUAL TRANSVERSE LOADS AND
DEFLECTIONS FOR VARIOUS VALUES
OF K
W.D.J. June '67

FIGURE D-16

LAKE PONT & VIC (HURR. PROT.) Sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE
T WALL @ BULK LOADING PLANT

Comp. by: W.D.J. May '67
Ckd by LL May 67

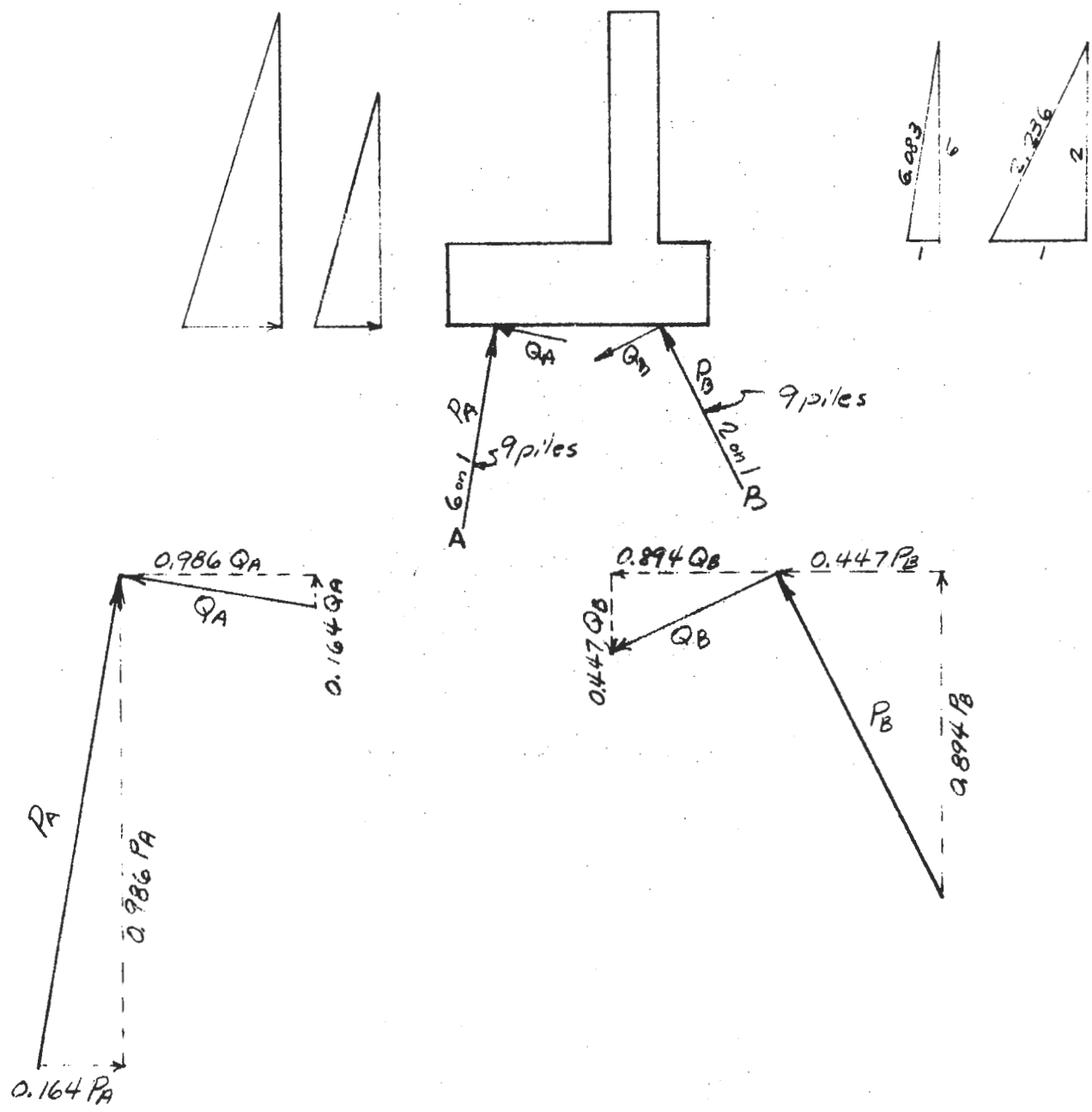
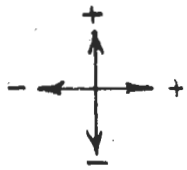


FIGURE D-17

LAKE PONT. & VIC. (HURR. PROT.) Sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE
Comp by: WDJ May 67
Ckd by LL May 67

"T" WALL @ BULK LOADING PLANT

PILE LOADS ON FOOTING
(From computer print out for P_A, Q_A, P_B, Q_B)



PILE FORCES	CASE I	CASE II	CASE III	CASE IV
P_A	3.717 K	0.997 K	12.745 K	10.744 K
P_{AV}	3.664	0.983	12.566	10.593
P_{AH}	0.609	0.163	2.090	1.762
Q_A	-1.131	-0.297	1.140	1.754
Q_{AH}	-1.115	-0.292	1.124	1.729
Q_{AV}	0.185	0.048	-0.186	-0.287
P_B	52.805	55.495	40.464	42.444
P_{BV}	47.207	49.612	36.174	37.944
P_{BH}	-23.603	-24.806	-18.087	-18.972
Q_B	-1.059	-0.134	1.414	2.095
Q_{BH}	-0.946	-0.119	1.264	1.872
Q_{BV}	-0.473	-0.059	0.632	0.936

BASE DESIGN

1' strip

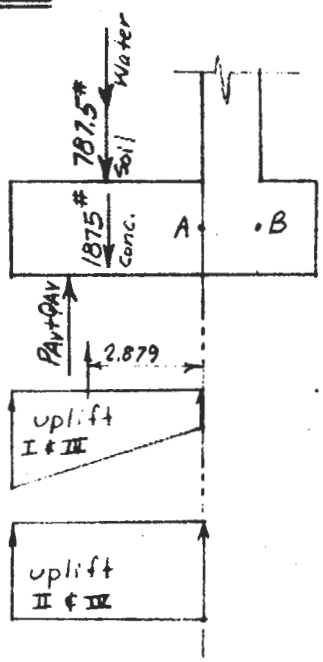


FIGURE D-18

LAKE PONT & VIC. (HURR. PROT.)
BARRIER PLAN GDM
CITRUS BACK LEVEE

Sheet of
Comp by: WDJ May 67
Ckd by LL May 67

T WALL @ BULK LOADING PLANT

BASE DESIGN (cont'd)

Mom about A

CASE I & II

Water	= 7 x 5 x 62.5	= -2187.5	x 2.5	= - 5,469
Soil	=	= -787.5	x 2.5	= - 1,969
Conc	=	= -1875	x 2.5	= - 4,687
		Subtotal		-12,125 '#

CASE I

Pile	= (3664 + 185) 1/9.5	= + 405	x 3.5	= + 1418
Uplift	= 27.5/8 (9.5 x 62.5)	= +2041	x 2.879	= + 5,876
				- 4,831 '# = M_{A_I}

CASE II

Pile	(9.83 + 48) 1/9.5	= + 109	x 3.5	= + 382
Uplift	9.5 x 62.5 x 5	= + 2969	x 2.5	= + 7,423
				-4,320 '# = $M_{A_{II}}$

CASE III & IV

Water	= 4.5 x 62.5 x 5	= -1406.25	x 2.5	= -3,516 '#
Soil	=	= -787.5	x 2.5	= - 1,969
Conc.	=	= -1875	x 2.5	= - 4,688
			Subtotal	-10,172 '#

CASE III

Pile	= (12,566 - 186) 1/9.5	= 1,303	x 3.5	= + 4,560
Uplift	= 27.5/8 (7 x 62.5)	= 1,504	x 2.879	= + 4,330
		Total Case 2I		- 1,282 '# = $M_{A_{III}}$

CASE IV

Pile	(10,593 - 287) 1/9.5	= 1,085	x 3.5	= + 3,797
Uplift	7 x 62.5 x 5	= 2,187.5	x 2.5	= + 5,469
				- 906 '# = $M_{A_{IV}}$

MAX Moment @ A = - 4.831 '# (Case I)

FIGURE D-19

LAKE PONT & VIC (HURR. PROT.)
BARRIER PLAN GDM
CITRUS BACK LEVEE
T Wall @ Bulk Loading Plant

sheet of
Comp by: WDJ May '67
Ckd by: LL May 67

BASE DESIGN (CONT'D)

Longitudinal Reinf.

M over piles carried by 3' wide strip of slab
Load on 3' strip = Max Vert. Pile load ÷ pile spacing
Load per foot = 12380 ÷ 9.5 = 1303 plf (case III)
Assume one pile fails ∴ span = 2 × pile spacing
Max Neg Mom = $\frac{1}{10}(1303)(19)^2 = 47{,}038$ '#

ϕ o.k. by inspection

$A_s = \frac{47.038 \times 12}{20 \times 25 \times 0.891} = 1.27$ □"

use #6, 12" o.c.

Does not agree with calculations or sketch on D-21

Min stl = 0.0025 × 25 × 12 = 0.75 □"
use #8, 12" o.c. Top of slab

bottom of slab:
M = $\frac{1}{8}wl^2 - 47{,}038 = 11{,}760$ '#
use Min stl #8, 12" o.c.

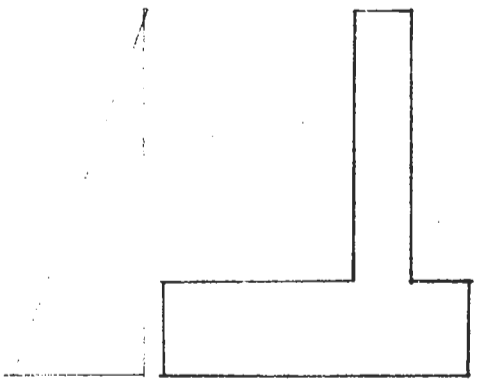
FIGURE D-20

LAKE PONT & VIC. (HURR. PROT.) sheet of
BARRIER PLAN GDM
CITRUS BACK LEVEE
T Wall @ Bulk Loading Plant

Comp. by: WDJ May 67
Ckd by: LL May 67

STEM DESIGN

Moment @ Base of stem
$= 62.5 \times 7^3 \div 6 = 3573'^{\#}/\text{L.F.}$
use Min Stl
$0.0025 \times 15 \times 12 = 0.45\ \square''/\text{L.F.}$
use #6, 12" o.c.



DETAIL "T" WALL

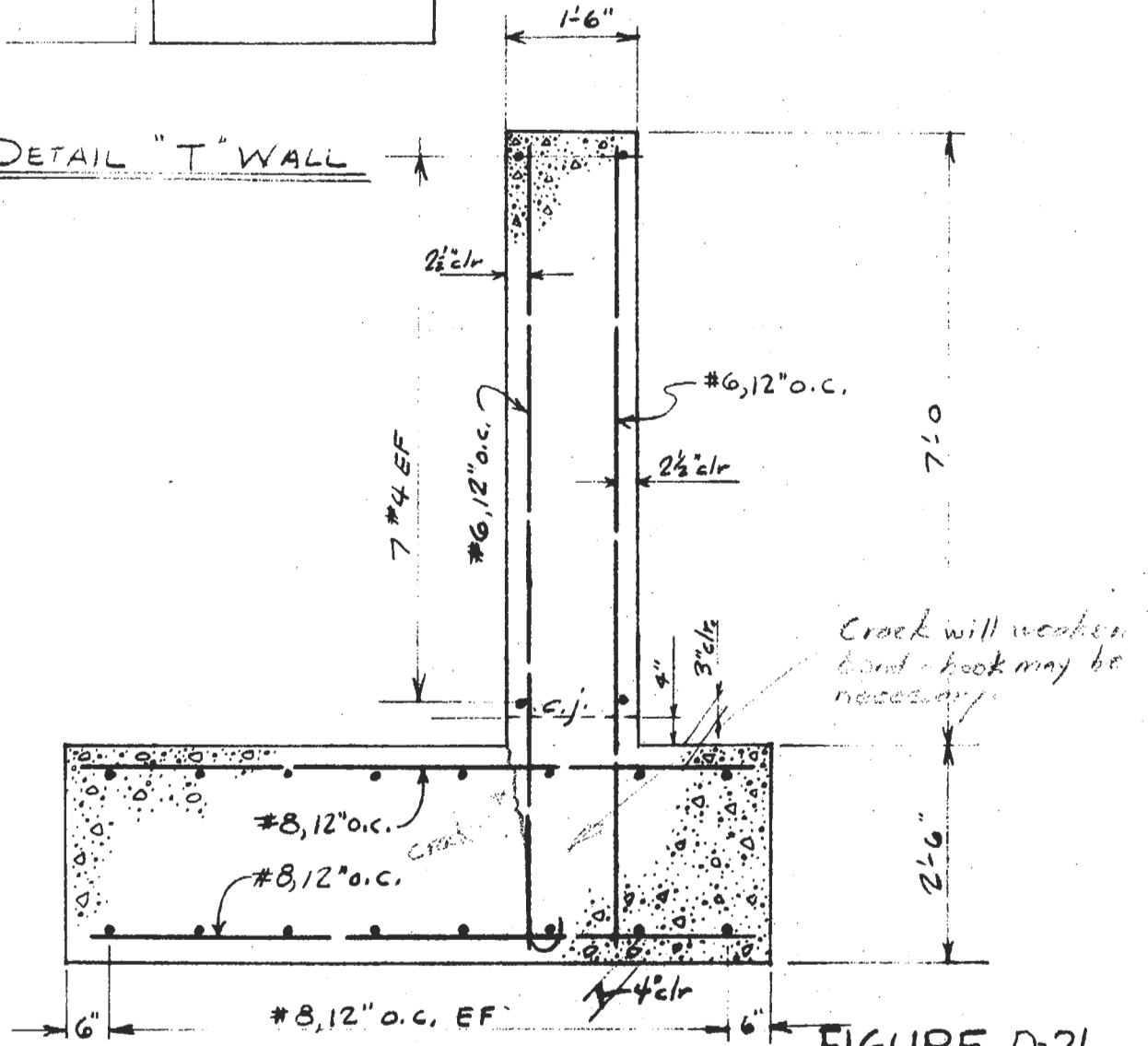


FIGURE D-21

GATE No. 1, APPROX. STA. 439+75
CITRUS BACK LEVEE
LAKE PONTCHARTRAIN BARRIER PLAN
LAKE PONTCHARTRAIN, LA. AND VICINITY

SHEET No. 1
A.R. 11 MAY 1967

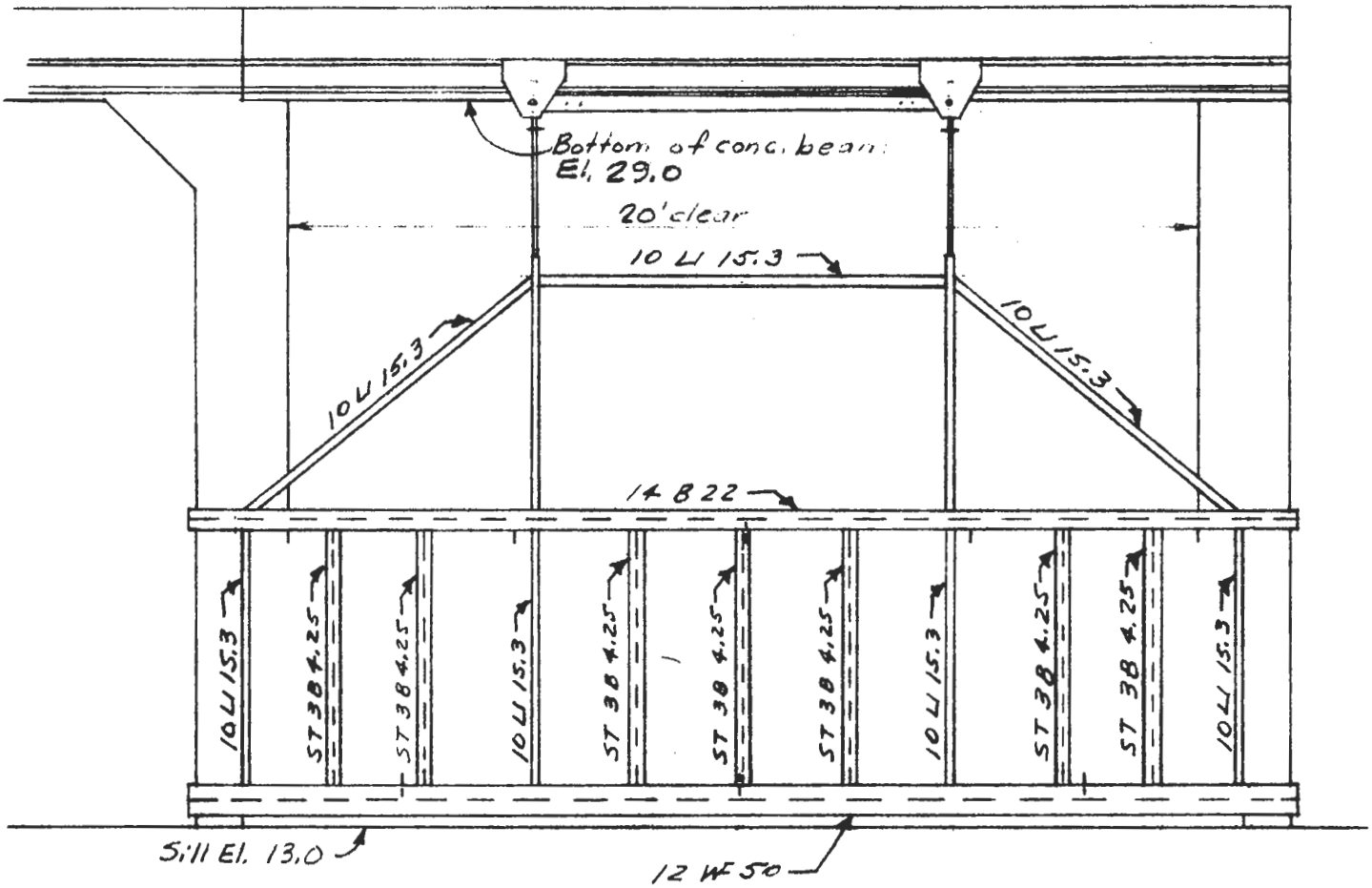


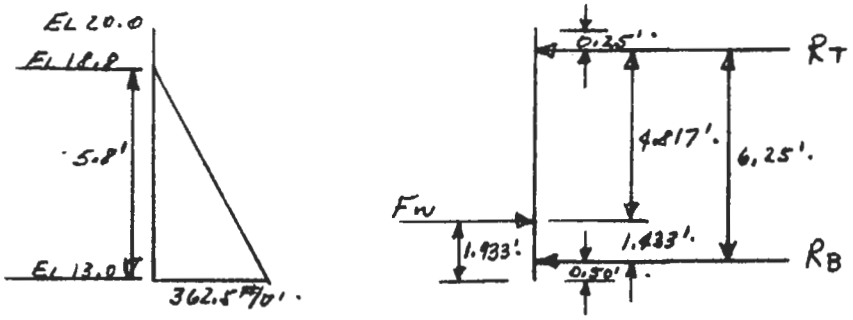
FIGURE D-22

GATE NO.1
CITRUS BACK LEVEE

SHEET 2
A. R. 5 MAY 1967
CKD. BY: L.L. 5/16/67

SELECTION OF MOST CRITICAL CASE:

CASE I = WATER TO EL 18.8, NO WAVE LOAD, F_b = 18,000 & 20,000 psi



$F_W = \frac{1}{2} \times 362.5\,\#/FT^2 \times 5.80'$

$= 1,051.25\,\#$.

$6.25' R_T = 1.433' F_W$

$= \frac{1,051.25\,\# \times 1.433'}{6.25'}$

$= 241.03\,\#$.

$R_B = \frac{F_W \times 4.817'}{6.25'} = \frac{1,051.25\,\# \times 4.817'}{6.25'}$

$= 810.22\,\#$.

TOP GIRDER:

SPAN = 21.083' = 253.0" ; LOAD = 241.03 #/FT.

$M_{MAX} = \frac{WL^2}{8} = \frac{241.03\,\#/FT. \times (21.083\ FT)^2}{8}$

$= 13,392.01!\,\# = 13.392'K$.

$S_{NEEDED} = \frac{M}{F_b} = \frac{13.392'K \times 12}{20.0\ KSI}$ OR $S_{NEEDED} = \frac{13.392'K \times 12}{18.0\ KSI}$

$= 8.04\ IN^3$. OR $= 8.93\ IN^3$.

FIGURE D-23

GATE No. 1
CITRUS BACK LEVEE

SHEET 3
A.R. 5 MAY 1967
✓ L.L. 5/16/67

BOTTOM GIRDER

SPAN = 21.083' = 253.00" ; LOAD = 810.22 #/FT.

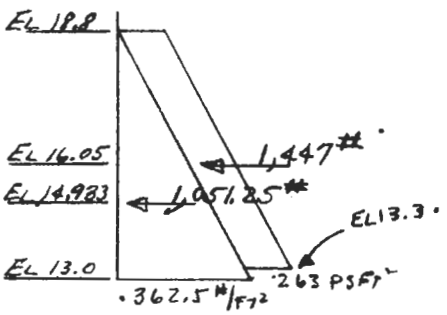
$$M_{max} = \frac{WL^2}{8} = \frac{810.22\ \#/1\ (21.083\ FT.)^2}{8}$$

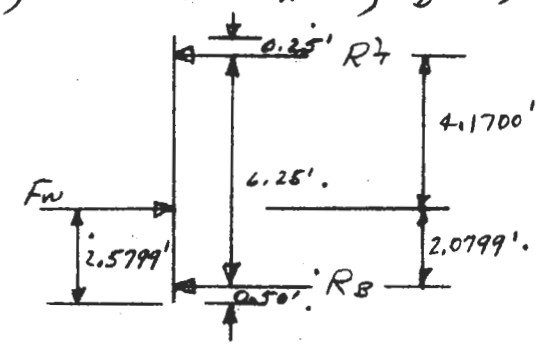
$$= 45,017.13'\# = 45.017'^K.$$

$$S_{NEEDED} = \frac{M}{F_b} = \frac{45.017'^K \times 12}{20.0\ KSI} \quad OR \quad S_{NEEDED} = \frac{45.017 \times 12}{18.0\ KSI}$$

$$= 27.01\ IN^3 \quad OR \quad = 30.01\ IN^3.$$

CASE II = WATER TO EL 18.8, WITH WAVE LOAD, F_b = 24,000 psi # 26.5 KS





$$F_W = 1,051.25\# + 1,447\#$$

$$= 2,498.25\#.$$

$$R_T = \frac{F_W \times 2.0799'}{6.25'} = \frac{2,498.25\# \times 2.0799'}{6.25'}$$

$$= 831.38\#.$$

$$R_B = \frac{F_W \times 4.17'}{6.25'} = \frac{2,498.25\# \times 4.17'}{6.25'}$$

$$= 1,666.83\#.$$

FIGURE D-24

GATE #1
CITRUS BACK LEVEE

SHEET 4
A.R. 5 MAY 1967
✓ L.L. 5/16/67

TOP GIRDER

SPAN = 21.083' = 253.0" ; LOAD = 831.38 #/FT.

$$M_{MAX} = \frac{WL^2}{8} = \frac{831.38\ \#/FT. \times (21.083\ FT.)^2}{8}$$

$$= 46,192.81'\# = 46.193'^K$$

$$S_{NEEDED} = \frac{M}{Fb} = \frac{46.193'^K \times 12}{26.5\ KSI} \quad OR \quad S_{NEEDED} = \frac{46.193 \times 12}{24.0}$$

$$= 20.92\ IN^3. \quad OR \quad = 23.10\ IN^3.$$

BOTTOM GIRDER

SPAN = 21.083' = 253.00" ; LOAD = 1,666.83 #/FT.

$$M_{MAX} = \frac{WL^2}{8} = \frac{1,666.83\ \#/FT. \times (21.083\ FT.)^2}{8}$$

$$= 92,611.76'\# = 92.612'^K$$

$$S_{NEEDED} = \frac{M}{Fb} = \frac{92.612'^K \times 12}{26.5\ KSI} \quad OR \quad S_{NEEDED} = \frac{92.612 \times 12}{24.0}$$

$$= 41.94\ IN^3. \quad OR \quad = 46.31\ IN^3.$$

SINCE CASE II REQUIRES A GREATER SECTIONAL MODULUS, IT IS THE MOST CRITICAL, AND CONTROLS DESIGN.

FOR TOP GIRDER:

TRY 14 B22

$S = 28.8\ IN^3$, $C = 6.86\ IN.$, $I = 197.4\ IN^4$, $d = 13.72"$, $t_W = 0.230\ IN.$

$$f_b = \frac{Mc}{I} = \frac{46.193'^K \times 12 \times 6.86\ IN}{197.4\ IN^4}$$

$$= 19.26\ KSI < 26.5\ KSI \quad \therefore O.K.$$

FIGURE D-25

$$d/t \leq \frac{13,300}{\sqrt{F_y}}$$

$$\frac{13.72''}{0.23''} \leq 70.10$$

$59.65 < 70.10$ ∴ O.K.

UNSUP. LENGTH $\leq$ FL. WIDTH $\times 13$

$= 5.00'' \times 13$

$= 65.00''$

$$\Delta_{MAX} = \frac{5WL^4}{384EI} = \frac{5.0 \times 8.2188 \times 10^2 \#/FT. \times (2.53 \times 10^2 IN)^4}{3.84 \times 10^2 \times 3.0 \times 10^7 \#/IN^2 \times 1.974 \times 10^2 IN^4 \times 12^{IN}/_{FT.}}$$

$$= \frac{1,703,145/2 \times 10^{10} IN.}{272,885 76 \times 10^{11}}$$

$= 0.624 IN.$

$$\frac{\Delta_{MAX}}{L} \leq \frac{1.0}{300.0}$$

$$\frac{0.624''}{253.0''} \leq 0.00333$$

$0.00246 < 0.00333$ ∴ O.K.

USE 14B22, BUT PROVIDE LATERAL STABILITY TO COMPR. FL. AT NO MORE THAN 65" SPACING. (USE GUS. R, WELD TO SK. R)

FOR BOTTOM GIRDER

TRY 12 WF50

$S = 64.7 IN^4$, $C = 6.095''$, $I = 394.5 IN^4$, $d = 12.19''$, $t_N = 0.371''$

$$f_b = \frac{MC}{I} = \frac{92.612^{IK} \times 12 \times 6.095''}{394.5 IN^4}$$

$= 17.17 ksi < 26.5 ksi$ ∴ O.K.

FIGURE D-26

GATE #1
CITRUS BACK LEVEE

SHEET 6
A.R. 8 MAY 1967
L.L.

$$d/t \leq \frac{13,300}{\sqrt{F_y}}$$

$$\frac{12.19''}{0.371''} \leq \frac{13,300}{\sqrt{36,000}}$$

$32.86 < 70.10$ ∴ O.K.

UNSUP. LENGTH $\leq$ FL. WIDTH $\times 13$

$\leq 8.077'' \times 13$

$\leq 105.00''$ OR 8.75 FT.

$$\Delta_{MAX} = \frac{5WL^4}{384EI} = \frac{5.0 \times 1.66683 \times 10^{3}\ \#/FT. \times (2.53 \times 10^{2}\ IN)^4}{3.84 \times 10^{2} \times 3.0 \times 10^{7}\ \#/IN^2 \times 3.945 \times 10^{2}\ IN^4 \times 12''/FT.}$$

$$= \frac{341.46260 \times 10''\ IN.}{545.35680 \times 10''}$$

$= 0.626$ IN.

$$\frac{\Delta_{MAX}}{L} \leq \frac{1.0}{300.0}$$

$$\frac{0.626''}{253.0''} \leq 0.00333$$

$0.00247 < 0.00333$ ∴ O.K.

USE 12 WF 50, BUT PROVIDE LATERAL STABILITY TO COMPR. FLANGE AT NO MORE THAN 8.75' SPACING. (USE GUS. TO, WELD TO SK. PL.)

SKIN PLATE

USE 5/16" PLATE (0.3125" THICK) (MIN. THICKNESS) $C = 0.15625''$

$$I = \frac{BH^3}{12} = \frac{Bt^3}{12} = \frac{12'' \times (0.3125'')^3}{12}$$

$= 0.0305$ IN^4 PER FT. HORZ. OR VERT.

$LOAD_{MAX} = 343.75\ \#/FT^2 + 263.0\ \#/FT^2$

$= 606.75\ \#/FT^2$, OR $606.75\ \#/FT.$ HORIZ.

FIGURE D-27

GATE #1
CITRUS BACK LEVEE

SHEET 7
A.R. 8 MAY 1967
✓L.L.

HORZ. SPACING = L :

FOR INTERIOR MOMENT:

$$M_{max} = \frac{wL^2}{12} = \frac{F_b I}{c}$$

$$\therefore L^2 = \frac{12 \times F_b \times I}{w \times c} = \frac{12 \times 24{,}000\ \#/IN^2 \times 0.0305\ IN^4}{606.75\ \#/FT. \times 0.15625\ IN} \times \frac{FT.}{12\ IN.}$$

$$= \frac{8{,}784.0\ FT^2}{1{,}137.656} = 7.72113\ FT^2$$

$$\therefore L = 2.7787\ FT. = 33.34\ IN.$$

FOR EXTERIOR MOMENT:

$$M_{max} = \frac{wL^2}{10} = \frac{F_b I}{c}$$

$$\therefore L^2 = \frac{10 \times F_b \times I}{w \times c} = \frac{10 \times 24{,}000\ \#/IN^2 \times 0.0305\ IN^4}{606.75\ \#/FT. \times 0.15625\ IN} \times \frac{FT.}{12\ IN.}$$

$$= \frac{7{,}320.0\ FT^2}{1{,}137.656} = 6.43428\ FT^2$$

$$\therefore L = 2.5366\ FT. = 30.44\ IN.$$

∴ USE HORZ. SPACING AS FOLLOWS:

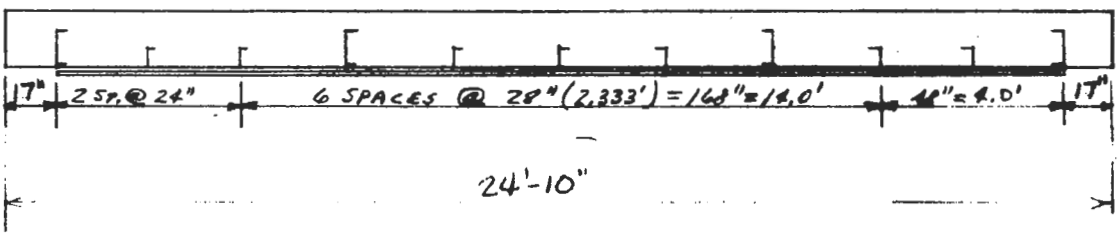


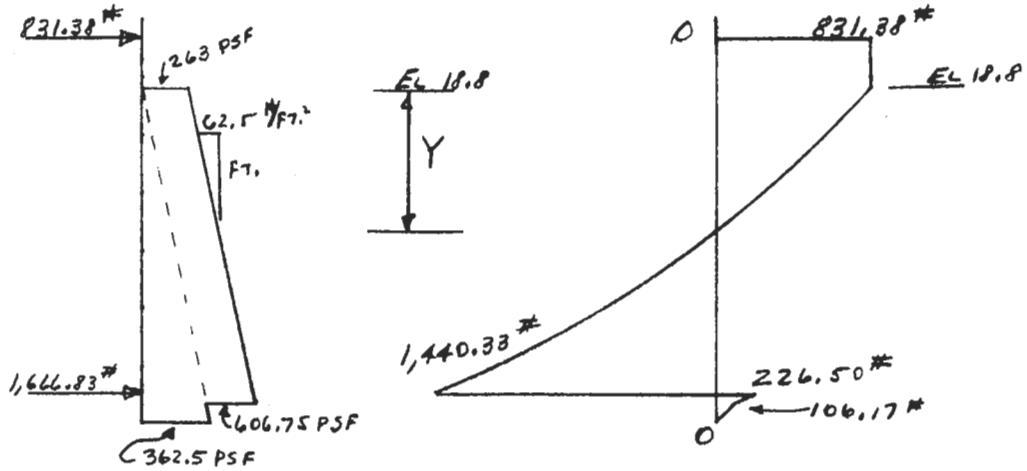
FIGURE D-28

GATE #1
CITRUS BACK LEVEE

SHEET 8
A. R. 8 MAY 1967
L.L.

VERTICAL MEMBERS:

POINT OF MAX. MOM. = PT. OF ZERO SHEAR:



LOAD DIAGRAM SHEAR DIAGRAM

$263^{\#}/FT^2 \times Y + 62.5^{\#}/FT^2 \times Y \cdot 0.5 \cdot Y = 831.38^{\#}$

$263^{\#}/FT^2 Y + 31.25^{\#}/FT^2 Y^2 = 831.38^{\#}$

$Y^2 + 8.416\,Y + 17.70726\,FT.^2 = 26.60416\,FT^2 + 17.70726\,FT^2$

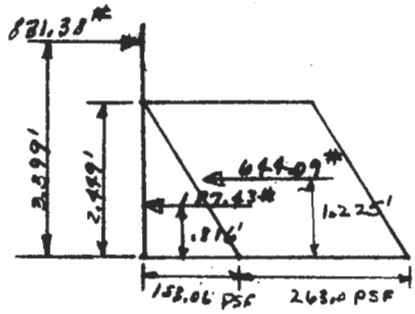
$(Y + 4.208\,FT.)^2 = 44.31142\,FT^2$

$Y = \pm 6.657\,FT. - 4.208\,FT.$

$Y = 2.449\,FT.$

PT. OF MAX. MOM. = PT. OF ZERO SHEAR = EL 16.35

MAX. MOM.:



$MOM._{MAX} = 831.38^{\#} \times 3.899' - 187.43^{\#} \times 0.816' - 644.09^{\#} \times 1.225'$

$= 1,883.91'^{\#}$ PER FT. HORZ.

TOT. $M_{MAX} = 1.884^{'K}/_{FT.} \times 2.333'$

$= 4.395'^{K}$

FIGURE D-29

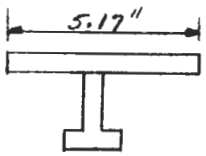
GATE #1
CITRUS BACK LEVEE

SHEET 9
A.R. 9 MAY 1967
✓ L.L.

$$S_{NEEDED} = \frac{M}{Fb} = \frac{4.395^{IK} \times 12}{24.0\ KSI}$$

$$= 2.20\ IN^3$$

TRY AN ST 3B 4.25



$I_{TOT} = 5.08\ IN^4$, $S = 2.52\ IN^3$

$$f_b = \frac{Mc}{I} = \frac{M}{S} = \frac{4.395^{IK} \times 12}{2.52\ IN^3}$$

$$= 20.93\ KSI < 24.0\ KSI \therefore O.K.$$

TOTAL LOAD ON VERT. MEMBER:

$$W = (1,051.25^{\#/FT} + 1,447.0^{\#/FT}) \times 2,333\ FT.$$

$$= 5,828.42\ \#$$

$$\Delta_{MAX} = \frac{0.01304\ WL^3}{EI} = \frac{1.304 \times 10^{-2} \times 5.828\,42 \times 10^{3\#} \times (7.42 \times 10^{1}\ IN)^3}{3.0 \times 10^{7}\ \#/IN^2 \times 5.08\ IN^4}$$

$$= \frac{3,104.84652 \times 10^{4}\ IN.}{15.24 \times 10^{7}} = \frac{3.10485 \times 10^{7}\ IN}{15.24 \times 10^{7}}$$

$$= 0.204\ IN.$$

$$\frac{\Delta_{MAX}}{L} \leq \frac{1.0}{300.0}$$

$$\frac{0.204"}{74.16"} \leq 0.00333$$

$$0.00275 < 0.00333 \quad \therefore O.K.$$

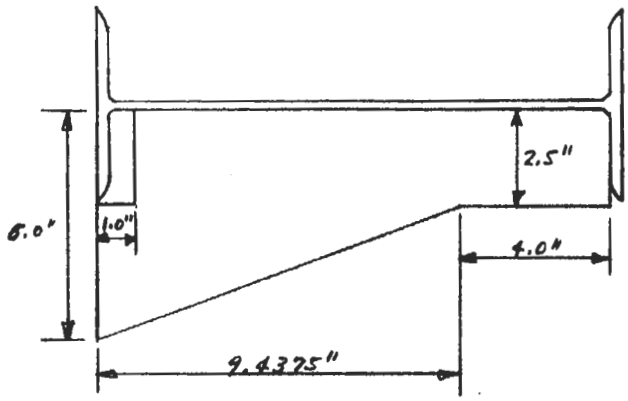
USE ST 3B FOR VERT. MEMBER

FIGURE D-30

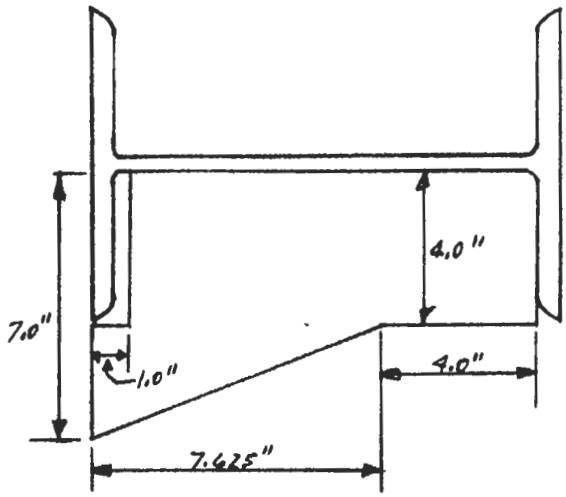
GATE #1
CITRUS BACK LEVEE

SHEET 10
A. R. 9 MAY 1967
L.L.

GUSSET PLATES: USE 5/16" THICK PL (MIN. THICK.)



FOR TOP BEAM = 14B22



FOR BOTTOM BEAM = 12WF50

FOR TOP BEAM (14B22)

USE GUSSET PL AT 60.0" C/C

AREA = (2.5" X 12.4375") ÷ 144.0 $^{D"}/_{FT.}$ = 0.21592 $^{D'}$ @ 12.8 $^{\#}/_{FT^2}$ = 2.764 $^{\#}$

(0.5 X 3.5" X 9.4375") ÷ 144 = 0.11469 = 1.468 $^{\#}$

0.33061 $^{D'}$ @

FOR BOTTOM BEAM (12WF50)

USE GUSSET PL AT 90.0" C/C

AREA = (4.0" X 10.625") ÷ 144.0 $^{D"}/_{FT.}$ = 0.29513 $^{D'}$ @ 12.8 $^{\#}/_{FT^2}$ = 3.778 $^{\#}$

(0.5 X 3.0" X 7.625") ÷ 144 = 0.07942 $^{D'}$ @ 12.8 = 1.017 $^{\#}$

0.19053 $^{D'}$

HANGERS:

TENTATIVELY USE ICLI 15.3, PROJECTING APPROX. 8.50' ABOVE THE GATE.

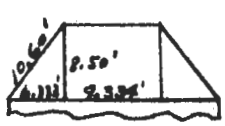


FIGURE D-31

GATE #1
CITRUS BACK LEVEE

SHEET 11
A. R. 9 MAY 1967
V L.L.

WEIGHT & CENTER OF GRAVITY:

MEMBER	LENGTH) AREA	WT.	$\bar{x}$	WT. MOM.
14B22	24.166'	531.652#	7.1725"	3,813.27397
12WF50	24.166'	1,208.300	6.4075	7,742.18225
SK. ℄ – 12.8#/FT – 7.0' x 22.0'		1,971.20	0.15625	308.00
ST3B4.25	5.95' x 7	177.013	.5925	458.994
10LI5.3	73.25'	1,120.725	5.3125"	5,953.85516
UP GUS. ℄	0.21592□' x 5	18.819	7.53125	104.07743
	0.11469□' x 5	7.340	3.4583	25.3839
BOT. GUS ℄	0.29513□' x 3	11.334	6.625	75.0878
	0.07942□' x 3	3.050	2.8541 ℄	8.7051
BOT. SEAL ANGLE 3x3x½	22' @ 9.4#/'	206.800	0.43	88.924
		5,251.233#	3.538"	18,578.4769

IMPACT LOAD = 5.251^K x 1.25

= 6.56^K

CHECK HANGERS:

WT. OF GATE PLUS IMPACT = 6.56^K

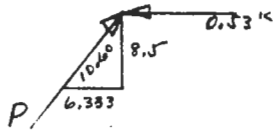
AREA OF STEEL IN TENSION = 4.470" PER LI

$f_t = \frac{6.56^K}{4.470'' \times 2}$ = 0.734 KSI < 24.0 KSI ∴ O.K.

USE 10LI5.3 AS HANGERS

CHECK DIAGONAL STRUTS

SIDESWAY FORCE DUE TO IMPACT = 10% OF 5.251^K = 0.53^K



$\frac{P}{10.60} = \frac{0.53^K}{6.333}$ ∴ P = 0.887^K

$\frac{L}{R} = \frac{10.60' \times 12}{0.72''}$ = 177

F_a = 6.46 KSI

$f_a = \frac{0.887^K}{4.470''}$ = 0.198 KSI < 6.46 KSI ∴ O.K.

USE 10LI5.3 AS DIAG. STRUTS

USE 2 TON TROLLEYS:

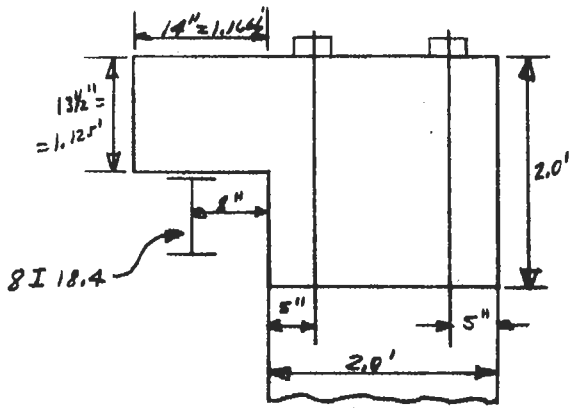
FIGURE D-32

GATE #1
CITRUS BACK LEVEE

SHEET 16
A. R. 9 MAY 67
L. L.

DESIGN OF REMOVABLE OVERHEAD (CONCRETE) BEAM:

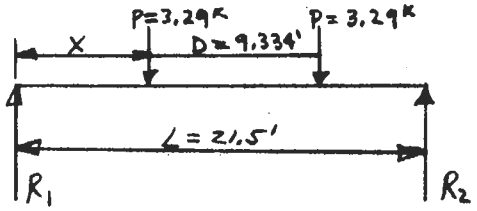
$f'_c = 3{,}000$ psi $f_s = 20{,}000$ psi $n = 9.2$ $f_c = 1{,}050$ psi



AREA = 2'x2' = 4.0000 □'
1.1667' x 1.125' = 1.3125 □'
5.3125 □'

DEAD LD. = 5.3125 □' x 0.15 K = 0.7969 K/'
I BEAM = 0.0184
0.8153 K/'

SIMPLY SUPPORTED BEAM:



$$R_1 = \frac{P(2L-2X-D)}{L}$$

$$= \frac{3.29^K(43' - 2X - 9.334')}{21.5'}$$

MAX. MOMENT FOR MOVING LOADS:

$D = \frac{9.334'}{21.5'} = 0.434L < 0.586L$, THEREFORE,

MAX. MOM. OCCURS AT:

$X = \frac{1}{2}\left(L - \frac{D}{2}\right) = 21.5' \times 0.5 - 9.334' \times 0.25$

$= 8.417$ FT.

MOM. MAX. $= R_1 X$

$= 21.68'^K$

FIGURE D-33

FOR LOADS IN SAME POSITION:

$$M_{MIDSPAN} = 21.68^{'K} - 3.29^{K} \times 2.333'$$
$$= 14.00^{'K}$$

FOR LEFT LOAD AT MIDSPAN

$$M_{MIDSPAN} = R_1 X = R_1 10.75'$$
$$= 20.01^{'K}$$

MAX MOMENT FOR DEAD LOAD:

$$M_{MAX} = \frac{WL^2}{8} = \frac{0.8153^{K/FT.} \times (21.50\ FT.)^2}{8}$$

$$= 47.11^{'K}$$

$$M_{8.417} = \frac{W X (L-X)}{2} = \frac{0.8153^{K/FT.} \times 8.417'(21.50' - 8.417')}{2}$$

$$= 44.89^{'K}$$

TOTAL MAX. MOMENT:

$$M_{MAX} = 20.01^{'K} + 47.11^{'K}$$
$$= 67.12^{'K}$$

TO CALC d:

$$Kbd^2 = 12{,}000\,M \quad \text{(REFER REINF. CONCR. DESIGN HANDBOOK)}$$

$$\therefore d^2 = \frac{12{,}000\,M}{Kb} = \frac{12{,}000 \times 67.12}{152 \times 24}$$

$$= 220.78947\ IN^2$$

$$\therefore d = 14.86\ IN.$$

USE $d = 21.0\ IN. = 1.75'$

FIGURE D-34

GATE #1
CITRUS BACK LEVEE

SHEET 18
A.R. 10 MAY 1967
L.L.

DESIGN OF POSITIVE STEEL:

FOR BALANCED BEAM ($d = 14.86''$)

$A_S = pbd = 0.0085 \times 29.00'' \times 14.86''$

$= 3.03\ IN.^2$

FOR THIS BEAM: ($d = 21.00''$)

$\frac{A_S}{3.03''} = \frac{14.86''}{21.00''}$

$A_S = 2.14\ IN^2$

MIN. $A_S = 0.0025bd = 0.0025 \times 24.0'' \times 21.0''$

$= 1.26''$

USE 2 EA. #8, & 1 EA. #7 ($A_S = 2.18''$)

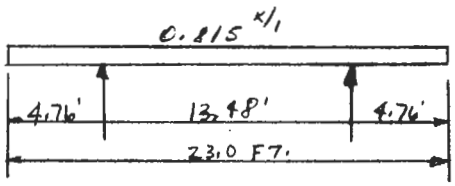
DESIGN OF NEGATIVE STEEL: (USED FOR PICKING UP BEAM)

PICK UP POINTS:

$PT. = 0.207L = 0.207 \times 23.0\ FT.$

$= 4.76'$ FROM ENDS OF BEAM

REACTIONS:



$R_1 = R_2 = \frac{WL}{2} = \frac{0.815\ K/I \times 23.0\ FT.}{2}$

$= 9.37^K$

FIGURE D-35

GATE #1
CITRUS BACK LEVEE

SHEET 19
A.R. 10 MAY 67
L.L.

MAX. MOMENT:

$$M_{max} = R_1\left(\frac{L}{2}-x\right) - \left(w\frac{L}{2}\right)\frac{L}{4} = 9.37^{k}(11.5' - 4.76') - \left(0.815^{k/'} \times 11.5'\right)5.75$$

$$= 63.15^{'k} - 53.89^{'k}$$

$$= 9.26^{'k}$$

TO CALC d:

$$K b d^2 = 12{,}000\, M$$

$$\therefore d^2 = \frac{12{,}000\, M}{K b} = \frac{12{,}000 \times 9.26}{152 \times 24}$$

$$= 30.4605\ IN^2$$

$$\therefore d = 5.52''$$

USE $d = 21.0''$

FOR BALANCED BEAM ($d = 5.52''$)

$$A_s = p\, b\, d = 0.0085 \times 24.0'' \times 5.52''$$

$$= 1.13^{\square''}$$

FOR THIS BEAM: ($d = 21.0''$)

$$\frac{A_s}{1.13^{\square''}} = \frac{5.52''}{21.00''}$$

$$A_s = 0.30^{\square''}$$

$$\text{MIN. } A_s = 0.0025\, bd = 0.0025 \times 24'' \times 21''$$

$$= 1.26^{\square''}$$

USE 3 EA. #6

FIGURE D-36

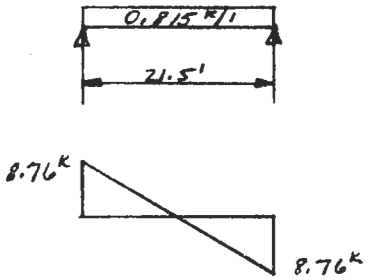
GATE #1
CITRUS BACK LEVEE

SHEET 20
A.R. 10 MAY 67
*L.L.

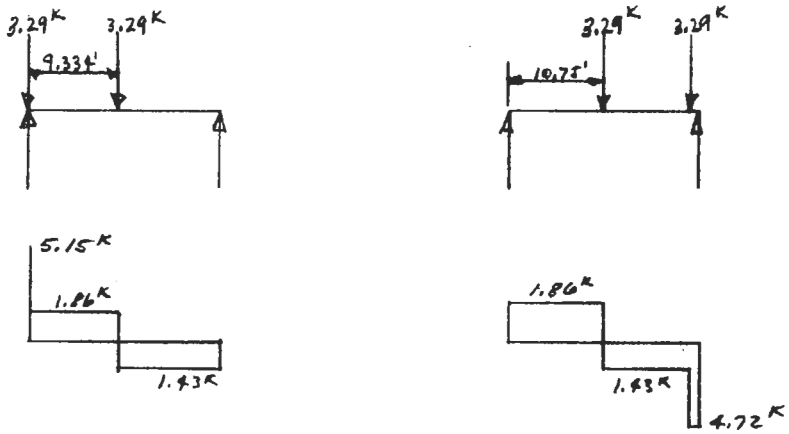
DESIGN OF STIRRUPS:

FOR LIVE LOAD & DEAD LOAD WITHOUT TORSION:

FOR DEAD LOAD



FOR LIVE LOAD



INFLUENCE DIAGRAM FOR MAX. SHEAR DUE TO D.L. & L.L.:

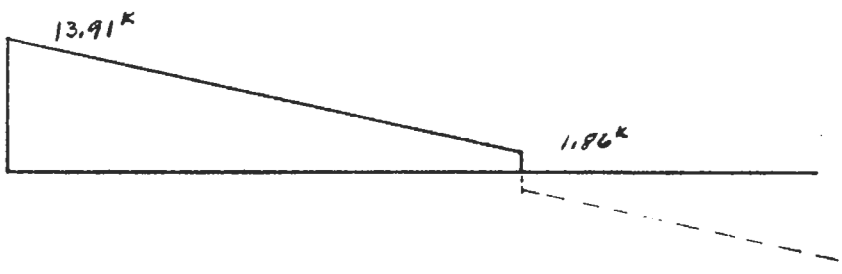


FIGURE D-37

GATE #1
CITRUS BACK LEVEE

SHEET 21
A.R. 10 MAY 67
L.L.

MAX SHEAR STRESSES:

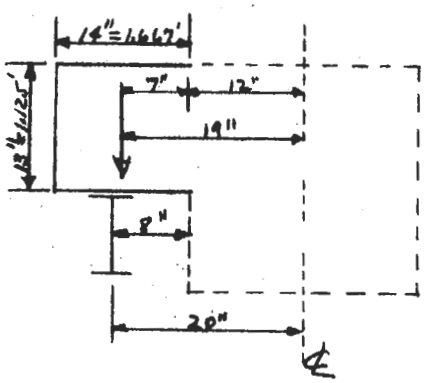
$$v_{0.0} = \frac{V}{bd} = \frac{13,910\#}{24" \times 21"}$$

$$= 27.60 \text{ psi}$$

$$v_{10.75} = \frac{V}{bd} = \frac{1,860\#}{24" \times 21"}$$

$$= 3.69 \text{ psi}$$

FOR TORSION:



TORSION AT ℄ OF BEAM:

$$T_{D.L.} = 1.667' \times 1.125' \times 0.15^{K/FT^3} \times 19" + 0.0184^{K/1} \times 20.0"$$

$$= 5.713 \text{ "K/FT.}$$

$$T_{L.L.} = 3.29^{K} \times 20.0"$$

$$= 65.80 \text{ "K}$$

TORSION DUE TO DEAD LOAD:

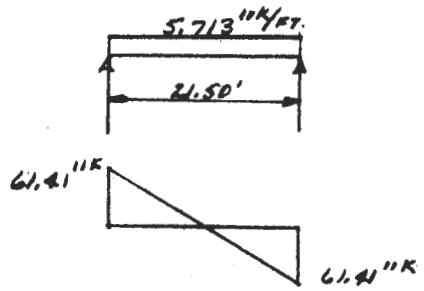
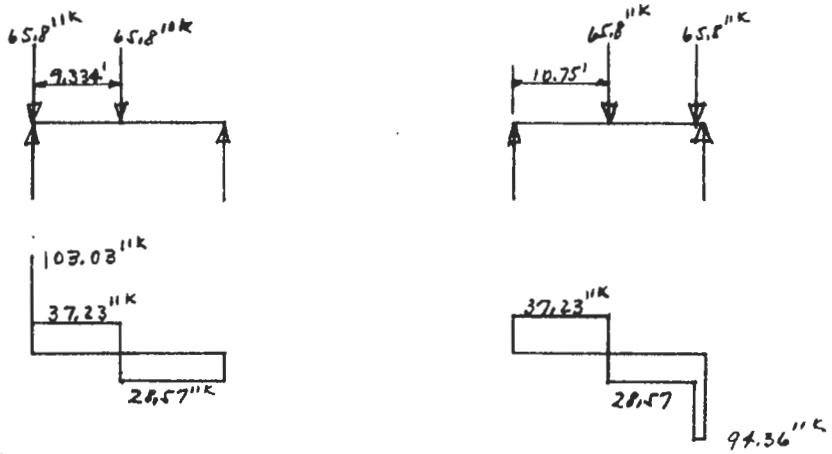


FIGURE D-38

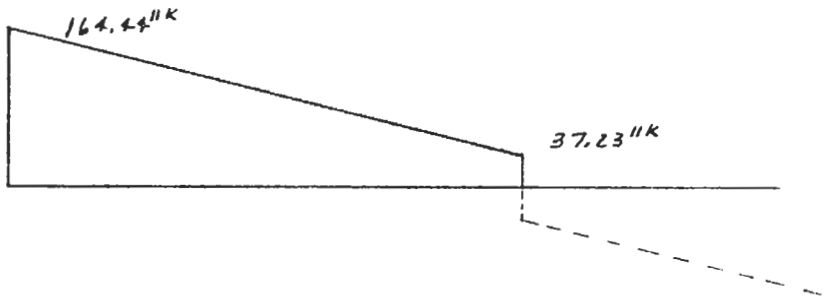
GATE #1
CITRUS BACK LEVEE

SHEET 22
A.R. 10 MAY 67
L.L.

TORSION DUE TO LIVE LOAD:



INFLUENCE DIAGRAM FOR MAX. TORSION DUE TO D.L. & L.L.:



MAX. SHEAR STRESSES:

$$v_{0.0} = \frac{4.8\,T}{b^3} = \frac{4.8 \times 164{,}440''\#}{(24.0'')^3}$$

$$= 57.10\ psi$$

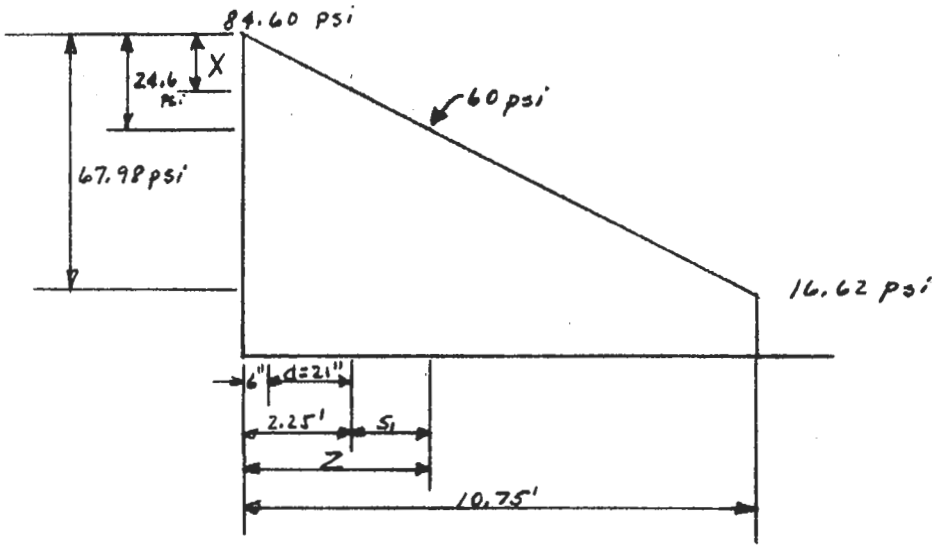
$$v_{10.75} = \frac{4.8\,T}{b^3} = \frac{4.8 \times 37{,}230''\#}{(24\ IN.)^3}$$

$$= 12.93\ psi$$

FIGURE D-39

FOR SHEAR AND TORSION:

MAX SHEAR STRESS INFLUENCE DIAGRAM (WHERE THE MAX SHEAR STR. IS DUE TO SHEAR & TORSION):



SHEAR STR. AT DIST. d FROM FACE OF SUPPORT:

$$\frac{X}{67.98\ psi} = \frac{2.25'}{10.75'}$$

$$X = 14.23\ psi$$

$$v_{2.25} = 84.60\ psi - 14.23\ psi$$

$$= 70.37\ psi$$

DIST. TO PT. WHERE $v = 60\ psi$

$$\frac{Z}{10.75'} = \frac{24.6\ psi}{67.98\ psi}$$

$$Z = 3.89'$$

STRESS CARRIED BY STIRRUPS:

$$v' = 70.37\ psi - 60.0\ psi$$

$$= 10.37\ psi$$

FIGURE D-40

DIST. REQD. TO HAVE STIRRUPS:

$S_1 = 3.89' - 2.25'$

$= 1.64' = 19.68''$

USING NO. 4 STIRRUPS, FROM ACI HANDBOOK:

$$\frac{v'b}{BA_v f_v} = \frac{10.37 \times 24}{1.0 \times 8{,}000}$$

$$= 0.0311$$

FROM TABLE 17:

1 SPACE @ 18"

MAX. STIRRUP SPACING:

FOR SEC 1206(a):

$v < 3\sqrt{f_c}$

$$Sp = \frac{d}{2} = \frac{21.0''}{2}$$

$$= 10.5''$$

FOR SEC. 1206(b):

$0.0015\, b\, Sp = A_v$

$$Sp = \frac{A_v}{0.0015b} = \frac{2 \times 0.20}{0.0015 \times 24}$$

$$= 11.11 \text{ IN.}$$

MAX. SPACING = 10.5 IN.

USE NO 4 STIRRUPS AS FOLLOWS:

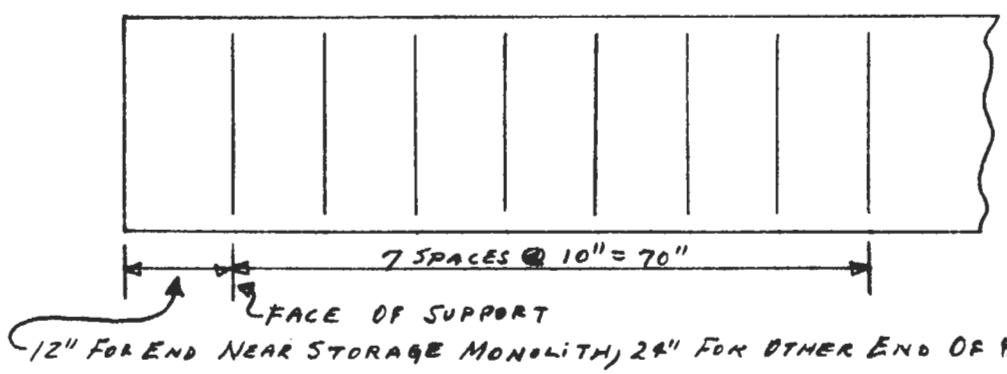


FIGURE D-41

GATE #1
CITRUS BACK LEVEE

SHEET 25
A.R. 10 MAY 67
L.L.

DESIGN OF TRANSVERSE STEEL: (SHRINK. & TEM. STEEL)

$A_s = 0.0020bt = 0.0020 \times 12" \times 13.5"$

$= 0.32^0"$ PER LIN. FT.

USE NO. 4 BARS AT 12" C/C

SKETCH:

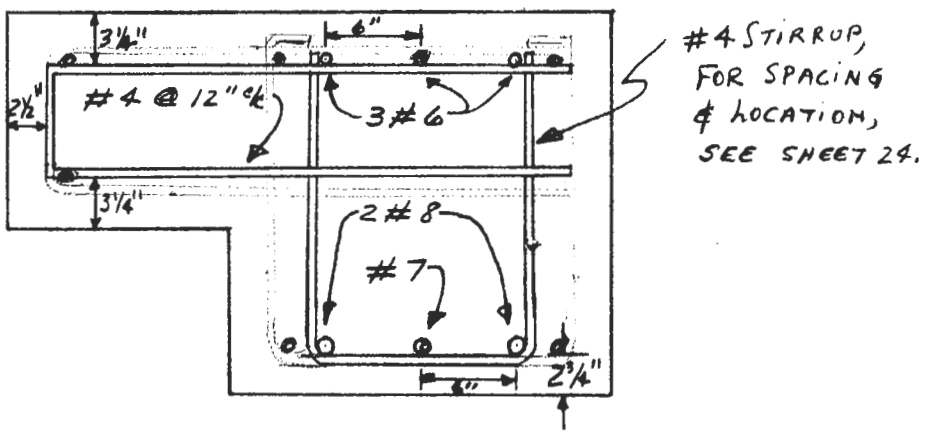
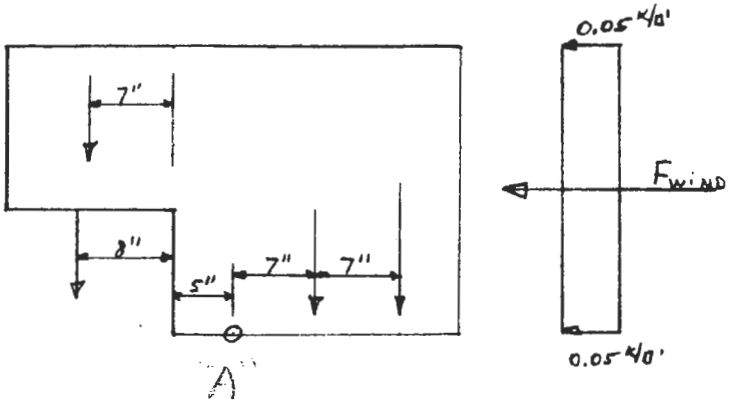


FIGURE D-42

GATE #1
CITRUS BACK LEVEE

SHEET 26
A.R. 10 MAY 1967
L.L.

DESIGN OF ANCHOR BOLTS:



ΣM_A = GATE = $(3.29^K + \frac{12.166'}{21.50'} \times 3.29^K) 13" =$ 66.97 "K

CONCR. = $(1.1666' \times 1.125' \times 21.5' \times 0.15^{K/FT^3} \times 1/2)\ 12" =$ 25.40

I BEAM = $(0.0184^{K/'} \times 21.5' \times 1/2) 13" =$ 2.57

WIND = $(0.05^{K/0'} \times 2.0 \times 21.5' \times 1/2) 12" =$ 12.90

− CONCR. = $(2.0' \times 2.0' \times 21.50' \times 0.15^{K/FT^3} \times 1/2) 7"$ −45.15

62.69 "K

TENSION ON BOLT B:

$14" B = \Sigma M_A$

$B = \frac{62.69 "K}{14.0"}$

$= 4.48^K$

F_t = 15,000 psi (BOLT TYPE = A320-63T, CL B, STR. HARD.)

AREA NEEDED = $\frac{4,480\#}{15,000\ psi}$

$= 0.299\ ^{0"}$

USE 3/4" DIAM. BOLT

FIGURE D-43

GATE #1
CITRUS BACK LEVEE

SHEET 27
A.R. 10 MAY 1967
L.L.

EMBEDMENT OF BOLTS:

ALLOW. BOND STRESS:

$$u = \frac{1.7\sqrt{f'_c}}{D} = \frac{1.7\sqrt{3,000}}{0.75"}$$

$$= 124.15 \text{ psi} < 160 \text{ psi}$$

SUM OF PERIMETERS:

$$\Sigma_o = \pi D = 3.14159 \times 0.75"$$

$$= 2.36"$$

LENGTH OF EMBEDMENT:

$$\frac{P}{\Sigma_o L} = u$$

$$\therefore L = \frac{P}{\Sigma_o u} = \frac{4,480\#}{2.36" \times 124.15 \text{ psi}}$$

$$= 15.29"$$

USE 20.0"

FIGURE D-44

APPENDIX E

REPORT ON CONTROLLING ELEVATION OF SEABROOK LOCK

1507-03 (Lake Pontchartrain) 18 Jan 67

LMVED-TD (NOD 19 Oct 66) 3d Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Report on Controlling Elevation of Seabrook Lock

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 18 Jan 67

TO: District Engineer, New Orleans District, ATTN: LMNED-PP

Referred to note approval of controlling elevation of 7.2 feet msl for Seabrook, unless modified by studies now underway.

FOR THE DIVISION ENGINEER:

A. J. DAVIS
Chief, Engineering Division

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

IN REPLY REFER TO
LMNED-PP

19 October 1966

SUBJECT: Lake Pontchartrain, La. and Vicinity - Report on Controlling Elevation of Seabrook Lock

TO: Acting Division Engineer, Lower Mississippi Valley
ATTN: LMVED-TD

1. Authority and scope. This report is prepared in accordance with instructions contained in LMVED-TD 1st Indorsement dated 8 December 1965 to LMNED-PP letter dated 5 November 1965, subject "Revised Outline of Planning Procedure for 'Lake Pontchartrain, La. & Vicinity,' project," and in paragraph 9.b. of EM 1110-2-1150 dated 1 July 1966, for the purpose of establishing the bases for changing the controlling elevation of the authorized Seabrook Lock from that specified in the project document.

2. Project authorization. The "Lake Pontchartrain, La. and Vicinity," project was authorized by the Flood Control Act of 1965 (Public Law 89-298, approved 27 October 1965), substantially in accordance with the recommendations of the Chief of Engineers in his report printed as House Document No. 231, 89th Congress.

3. Project description. The project consists of two independent features: the Lake Pontchartrain Barrier Plan and the Chalmette Area Plan. Only the former is pertinent to this report. The Lake Pontchartrain Barrier Plan will serve to protect areas contiguous to the shores of Lake Pontchartrain from flooding by hurricane surges. The keystone around which the plan is built is the Lake Pontchartrain barrier--a system of levees and control structures, the purpose of which is to limit uncontrolled entry of hurricane tides into Lake Pontchartrain, while preserving navigation access. The barrier would comprise enlarged embankments along the existing seaward levee system, new embankment extending to high ground on the north side of the Rigolets with regulating tidal and navigation structures in the Rigolets and Chef Menteur Pass, and a dual-purpose navigation lock in the Inner Harbor Navigation Canal (IHNC) at Seabrook. In addition to the barrier, additional protective works consisting of new lakeshore levees in St. Charles Parish and the Citrus and New Orleans East areas of Orleans Parish, and enlargement or strengthening of existing protective works in Jefferson and Orleans Parishes and at Mandeville will be provided (see incl 1).

4. Need for Seabrook Lock. Prior to construction of the Mississippi River-Gulf Outlet (MR-GO), the salinity regimen in Lake Pontchartrain was largely controlled by the interaction between surface runoff entering it, and tidal inflows from Lake Borgne via the Rigolets and Chef Menteur Pass. The 30-foot deep IHNC channel (see incl 2) was connected to Lake Borgne by the Gulf Intracoastal Waterway (GIWW) through the Rigolets and Chef Menteur Pass (see incl 1), but, because of the relatively small, shallow cross section (12' by 125') of the Waterway, this connection exerted little influence on salinities in Lake Pontchartrain. Construction of the MR-GO established a large, deep (36' by 500') direct connection with the highly saline waters of Breton Sound. Tidal flow in the MR-GO reaches Lake Pontchartrain via the IHNC, and salinities in the lake and in the marsh adjacent to the MR-GO have increased significantly since its completion. Unless means are provided to restore a favorable salinity regimen, major damage to marine life in the lake and in the marsh traversed by the MR-GO may be anticipated.

5. A related problem deriving from the construction of the MR-GO is the generation of excessive tidal currents in the IHNC. These increased currents produce navigation difficulties and aggravate scour problems at bridges and along harbor developments.

6. The problems described above relate to normal tidal conditions, and even in the absence of hurricane effects, control works in mitigation are warranted.

7. As alluded to previously, the Lake Pontchartrain Barrier Plan is based upon limiting the entry of hurricane-driven waters into Lake Pontchartrain. In order that this may be accomplished, the MR-GO - IHNC link must be controlled. Further, some means for controlling flow from Lake Pontchartrain into the IHNC during hurricanes which produce conditions critical to the south shore of Lake Pontchartrain is essential.

8. Study of various alternatives leads to the conclusion that control of salinity in Lake Pontchartrain, management of excessive currents in the IHNC, and control of flow from the canal to Lake Pontchartrain and vice versa during hurricane periods can be best achieved by a control structure at Seabrook. Inasmuch as navigation between Lake Pontchartrain and the IHNC must be preserved, a lock is essential.

9. Description of Seabrook Lock (as authorized). The lock as authorized would have a concrete chamber 800 feet long and 84 feet wide with sill elevation at -15.8 feet m.s.l. Gates would be of the 60° radial type. The landward gate bay structure would be connected to shore by a rockfill embankment. The top elevations of the rockfill embankment and the landward gate bay and radial gates would be 13.2 feet m.s.l.

10. Considerations involved in selecting the controlling elevation of Seabrook Lock. The term "controlling elevation" as used herein refers to the elevation at which uncontrolled overflow of the Seabrook structure will commence. The structure may be thought of as having two distinct parts--the lock structure proper, consisting of the gate bays, gates and lock chamber, and the rock dike. In considering uncontrolled overflow of the structure, only the rock dike should be considered inasmuch as the required elevations of the chamber walls, gates, and gate bays must be based on considerations relating to the safe and efficient operation of the lock under various conditions, whereas the elevation of the rock dike may be determined on the basis of how well it will serve hurricane flood control objectives. As will be shown later herein, factors relating to the safe and efficient operation of the lock will require top elevations for the walls, gates, and gate bay which are essentially confining insofar as design hurricane surges are concerned. Thus uncontrolled overflow will involve the rock dike only and, as a practical matter, the controlling elevation of the structure will be equal to the crest elevation of the rock dike. This report will be limited in scope to fixing the crest elevation of the rock dike; elevations relating to the lock proper and the bases therefor will be established in the general design memorandum for the lock.

11. In the studies which led to authorization of the Seabrook Lock, it was considered that, irrespective of any requirements imposed by considerations of hurricane control, the lock, in order to be operable for navigation on a full-time basis (exclusive of major storms and hurricanes), would require a controlling elevation of 8.0 feet m.l.g. (7.2 feet m.s.l.). This elevation was based on the assumption that the lock should be usable for any combination of tides up to three feet and winds up to 25 m.p.h. Based on the conclusion that any interchange of flow between Lake Pontchartrain and the IHNC during a hurricane should be prevented, the controlling elevation was set at 13.2 feet m.s.l.--the elevation required to prevent overtopping of the rock dike and lock by a tidal surge resulting from passage of the standard project hurricane (SPH) critical to the IHNC; i.e., overtopping from the Canal side. The probable crest elevation on the Lake Pontchartrain side, resulting from passage of the SPH on a track critical to the south shore, including wind setup and wave runup, would be some two feet lower.

12. The passage of hurricane "Betsy" in September 1965 demonstrated that, under certain conditions, permitting flow to enter Lake Pontchartrain from the IHNC is advantageous. "Betsy's" surge crested at approximately 11 feet m.s.l. at the junction of the Canal and the MR-GO, while at Seabrook the crest stage was about 6 feet m.s.l.

13. Flow computations in the IHNC for passage of the SPH (using latest U. S. Weather Bureau hurricane parameters) on a path critical to the IHNC, assuming that the Seabrook structure is built so that the rock dike overtops at elevation 7.2 feet m.s.l., indicate that a discharge of 27,000 c.f.s. would flow from the IHNC into Lake Pontchartrain at the crest of the hurricane surge. The water surface elevations at the MR-GO junction and at Seabrook (canal end of the lock) would be 14.0 feet m.s.l. and 11.5 feet m.s.l., respectively. The profiles of the water surface between these two points for both a confining structure at Seabrook and one which would overtop at elevation 7.2 feet m.s.l. are shown on incl 3. In addition to reducing the required levee grades on the IHNC, the overtopping structure would reduce flood damages to industrial plants along the Canal which are located outside the levee system.

14. With a controlling elevation of 7.2 feet m.s.l. for the Seabrook structure, water will flow from the IHNC into the lake for a period of about 15 hours during the passage of the SPH as described in paragraph 13 above. This inflow would raise the average lake level by about 0.05 foot. The increase would have no significant effect on grade requirements for the lakefront levee systems.

15. Storm paths other than that critical to the IHNC can produce higher stages in the lake than in the canal. With the barrier in place, however, the peak stillwater elevation lakeward of Seabrook for the SPH critical to the south shore of Lake Pontchartrain would be about 7 feet m.s.l. Thus overtopping from the lake into the canal would be limited to wave action only. Inasmuch as this overtopping would occur at a time when the winds would be tending to reduce stages in the canal, it would be of little significance.

16. Lowering the controlling elevation below 7.2 feet m.s.l. would further reduce the stage in the canal at Seabrook. The point of diminishing returns in this regard is largely reached, however, at the crest elevation of 7.2 feet m.s.l., since, to achieve significant lowerings in the water surface at the lakeward end of the canal, a substantial additional lowering of the dike would be required. On the other hand, any substantial reduction in the crest of the rock dike below elevation 7.2 feet m.s.l. would be undesirable for a number of

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reasons. First, it would result in a measurable increase in the design levels of Lake Pontchartrain with a corresponding increase in the grades for the lakefront levee systems. Because of the length of levees involved in these systems, the costs for effecting even a small increase in grade would be excessive when compared to the benefits which would result in the IHNC. Second, it would place the crown of the rock dike below the maximum stillwater level in Lake Pontchartrain for major hurricanes on tracks critical to the south shore of the lake and permit direct overflow of the dike to the detriment of conditions in the IHNC. Third, it would subject the dike to overtopping by waves for a number of combinations of non-hurricane winds and tides. Normal access to the lock for operating personnel will be along the crown of the dike and such overtopping would be most undesirable. Finally, the dike would have little or no freeboard over tidal elevations which are experienced outside of the hurricane season every year: sustained east and southeast winds of moderate velocity may be expected to generate tidal stages between 4 and 5 feet m.s.l. at least once each year.

17. Inasmuch as the above considerations rule out a controlling elevation lower than 7.2 feet m.s.l. and since a higher controlling elevation would result in higher stages on the IHNC lakeward of the MR-GO without offering advantages elsewhere, a controlling elevation of 7.2 feet m.s.l. is optimum insofar as limitation of hurricane-generated flows in the IHNC is concerned.

18. Insofar as the requirements of navigation are concerned, consideration must be given to needs arising out of lock operation under normal or average conditions as well as those from combinations of abnormal winds and/or tides. The top of the lockwalls and gates should be at least 10 feet above the normal high tides to facilitate mooring of light-loaded barges in day-to-day operations. Further, the lockwalls should be high enough to permit personnel to work thereon under the most extreme conditions of wind and tide for which the lock is likely to be used; similarly, the gates should be high enough to permit use of the gate walkways under such conditions. The above considerations require that the tops of the lockwalls and gates be well above 7.2 feet m.s.l. They relate to the lock structure only, however, and impose no limitation on the elevation of the rock dike. Overtopping of the rock dike with crest at elevation 7.2 feet m.s.l. would occur infrequently, and would not seriously impede navigation when it does occur.

19. With the crown of the rock dike at elevation 7.2 feet m.s.l. maximum velocities in the IHNC for passage of the SPH on the track critical to the Canal would range from about 1.5 f.p.s. in the Canal proper to 5 f.p.s. at the bridges. Considering the short interval of time during which these velocities would obtain, major scour problems are not anticipated.

20. Implications to local cooperation involved in lowering the controlling elevation of Seabrook Lock. In the survey report on which project authorization is based, the provision of a navigation lock at Seabrook for mitigation of undesirable effects resulting from the construction of the MR-GO was recognized to be a Federal responsibility, and a cost estimate for a lock with a controlling elevation of 7.2 feet m.s.l. (which elevation was considered adequate to meet the needs of navigation) was prepared to establish the basic Federal responsibility under the navigation function. A second cost estimate for a lock with a controlling elevation of 13.2 feet m.s.l. (which elevation was considered necessary to meet the needs of hurricane flood control) also was prepared. The difference between these two estimated costs was then taken to be the added cost for hurricane flood control. The survey report recommended construction of the Lake Pontchartrain Barrier Plan subject to the condition, inter alia, that local interests contribute not less than 30% of the first cost of the project including the hurricane flood control increment of the cost of the Seabrook Lock as computed above. The local interest share of the increment, based on survey report estimates, was $120,000.

21. The recommendations relative to Seabrook Lock contained in the survey report were approved by the Division Engineer, Lower Mississippi Valley, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers. The Bureau of the Budget, however, questioned the allocated cost, noted that standard methods of cost allocation appeared to be inapplicable, and recommended that the cost be allocated equally between the navigation and hurricane flood control functions. Under these cost-sharing arrangements, local interests are required to contribute 30% of half of the total construction cost for the lock with controlling elevation of 13.2 feet m.s.l., rather than 30% of the added cost for such a lock over a similar lock with controlling elevation 6 feet lower. Based on survey report estimates, this results in additional costs to local interests of $687,000. In transmitting the report of the Chief of Engineers to Congress, the Secretary of the Army concurred in the view of the Bureau of the Budget with "...the understanding that this apportionment of costs would not unduly delay construction...." Authorization of the project by Public Law 89-298 specified that the recommendations of the Secretary of the Army with respect to Seabrook Lock would apply.

22. Views of local interests. By letter dated 13 April 1966, the State of Louisiana, Department of Public Works, the agency appointed by the Governor of Louisiana to coordinate the local cooperation on the project, informed the District Engineer, U. S. Army Engineer District, New Orleans, that local interests favored a reduction in the controlling elevation of the Seabrook Lock, and were opposed to the local cooperation requirements for the lock as authorized. A copy of the letter is inclosed (see incl 4). Despite this opposition, the Orleans Levee District, the agency appointed by the Governor of Louisiana to furnish the local cooperation required for the project, on 28 July 1966 adopted an acceptable act of assurance covering the local cooperation for the entire Lake Pontchartrain Barrier Plan. The act of assurance was accepted by and for the United States on 10 October 1966.

23. Discussion. The approaches of the reporting officers and the Bureau of the Budget in determining the local cooperation for the Seabrook Lock were radically different. The reporting officers hold, in effect, that the needs for mitigation of MR-GO effects, which are assignable to the navigation function, are prior to those of hurricane flood control and should be assumed to have been met before hurricane flood control requirements are considered. This is essentially equivalent to assuming that a lock capable of meeting the needs for mitigation is in place before hurricane flood control requirements are considered and that the cost for meeting these requirements is limited to the cost of any modifications to the basic lock which are necessary to provide for the hurricane flood control requirements (except, of course, that the cost advantage of concurrent construction is enjoyed). The Bureau of the Budget takes a contrary view, concluding that the lock is needed as much for one function as the other and rejecting the reporting officers' incremental approach to providing for hurricane flood control requirements.

24. In transmitting the survey report to Congress, the Secretary of the Army concurred in the views of the Bureau of the Budget in regard to the requirements of local cooperation for Seabrook Lock with the proviso that "...this apportionment of costs would not unduly delay construction,...." Accordingly, it would appear that an opportunity for modifying the authorized requirements of local cooperation for the lock, without further Congressional action, would arise only in the event that local interests refused to provide the required assurances of local cooperation for the project and cited as the reason therefor their dissatisfaction with the cost-sharing arrangements for Seabrook Lock. Inasmuch as local interests have provided the requisite assurances of local cooperation for the entire barrier plan, the requirements authorized for the Seabrook Lock will have to remain in force unless and until they are modified by the Congress.

25. The question has been raised as to whether lowering the controlling elevation of the Seabrook Lock involves a modification of the authorized local cooperation which is beyond the discretionary authority of the Chief of Engineers (see LMVED-TD letter to OCE dated 8 December 1965 subject "Lake Pontchartrain and Vicinity, Louisiana," copy of which is inclosed, incl 5). This concern would appear to be without foundation. In effect, the authorizing law directs that a lock capable of serving both the needs of hurricane flood control and mitigation of MR-GO effects be designed and constructed and that the costs for the lock be shared equally by the navigation and hurricane flood control functions. Thus, the requirements of local cooperation for the lock are clearly independent of its physical configuration and controlling elevation.

26. Inasmuch as the requirements of local cooperation for the Seabrook Lock as authorized are independent of the controlling elevation of the lock, selection of the controlling elevation may be based on purely technical considerations. A departure from the project document plan based on such considerations is clearly within the discretionary authority of the Chief of Engineers.

27. Conclusions. Based on the material presented herein, it is concluded that:

a. A change in the controlling elevation of Seabrook Lock from the authorized elevation of 13.2 feet m.s.l. to elevation 7.2 feet m.s.l. is both feasible and desirable. The reduction in controlling elevation will lower the required levee grades on the IHNC north of its junction with the MR-GO and reduce flood damages to industries located outside the levee system on the banks of the canal for hurricanes on tracks critical to the canal. It will not result in any significant increase in average lake levels during hurricanes, and thus will have no practical effect on levee grade requirements for the lakefront levee systems.

b. A controlling elevation of 7.2 feet m.s.l. is optimum. A higher controlling elevation would increase the levee grade requirements on the IHNC and damage riparian industries outside the levee system without producing any compensating advantage. A materially lower controlling elevation would be clearly undesirable. It would significantly raise average lake levels during hurricanes and thus require upward revision of the grades of all the lakefront protective systems, while producing little additional reduction of stages in the IHNC.

LMNED-PP 19 October 1966

SUBJECT: Lake Pontchartrain, La. and Vicinity - Report on Controlling Elevation of Seabrook Lock

c. The requirements of local cooperation for the Seabrook Lock as contained in the authorizing law are fixed and can only be changed by further action on the part of the Congress.

d. The authorized requirements of local cooperation for the Seabrook Lock are independent of the controlling elevation of the lock.

e. The selection of a controlling elevation for the Seabrook Lock involves technical considerations only, and a change in controlling elevation from that contained in the survey report on which authorization is based may be treated as a departure from the project document plan within the discretionary authority of the Chief of Engineers.

28. Recommendations. It is recommended that the Seabrook Lock be designed with a controlling elevation of 7.2 feet m.s.l.; that the change in controlling elevation be covered as a departure from the project document plan in the general design memoranda for the Lake Pontchartrain Barrier Plan and the Seabrook Lock; and that this report be included as an appendix to both memoranda.

THOMAS J. BOWEN
Colonel, CE
District Engineer

5 Incl (quint)
1. General map, file No. H-2-24040/plate 1
2. Map IHNC, file No.H-2-24040/plate 2
3. Profile, IHNC, file No. H-2-24040/plate 3
4. DPW ltr dtd 13 Apr 66
5. LMVED-TD ltr dtd 8 Dec 66

① Engrg
② Real Estate

LMVED-TD (NOD 19 Oct 66) 1st Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Report on Controlling Elevation of Seabrook Lock

DA, Lower Miss. Valley Div, CE, Vicksburg, Miss. 39180 9 Nov 66

TO: Chief of Engineers, ATTN: DDN/14NW ENGCW-V/ENGCW-EH/ENGCW-EZ/ENGRE-AP

1. Subject report is forwarded for review and approval pursuant to para 9, ER 1110-2-1150. The recommendations of the District Engineer in para 28 are concurred in.

2. The location of Seabrook Lock with adjoining rock dike is shown on Plate 4 of Interim Survey Report dated 21 Nov 62 and forwarded by our 1st Ind, LMVGN, dated 18 Jan 63. The Survey Report was printed as HD No. 231, 89th Congress, 1st Session. Plate 4 was not included in the printed document.

3. The correspondence referred to in para 1, basic communication, instructed the District to make a study to determine the controlling elevation for Seabrook Lock and to prepare a letter report, discussing their findings, for submission to your office.

FOR THE ACTING DIVISION ENGINEER:

A. J. DAVIS
Chief, Engineering Division

5 Incl (quad)
wd 1 cy ea

Copy furnished:
New Orleans District
ATTN: LMNED-PP

ENGCW-EZ (19 Oct 66) 2nd Ind
SUBJECT: Lake Pontchartrain, La. and Vicinity - Report on Controlling Elevation of Seabrook Lock

DA, CofEngrs, Washington, D. C., 20315, 12 January 1967

TO: Division Engineer, Lower Mississippi Valley Division

The controlling elevation of 7.2 feet m.s.l. for the proposed Seabrook Lock appears reasonable and is approved, subject to consideration of such modifications as may be indicated by the results of surge studies now under way on the effects of the Mississippi River - Gulf Outlet and surge studies for south shore Lake Pontchartrain. These studies are referred to in paragraph 8d(7) of Design Memorandum No. 1, Hydrology and Hydraulic Analysis, Part I, Chalmette and paragraph 13 of Design Memorandum No. 3, Chalmette Area Plan, General Design.

FOR THE CHIEF OF ENGINEERS:

Herman B Wells

wd Incl

WENDELL E. JOHNSON
for Chief, Engineering Division
Civil Works

PROTECTIVE WORKS

	EXISTING	IMPROVEMENTS AUTHORIZED
Embankments	▪▪▪▪▪▪▪▪▪	Barrier – low level plan
Lock	⊃	➤
HURRICANE BARRIER STRUCTURE: Rigolets		⊕
Chef Menteur		Ⓗ
Drainage Structure High level or barrier		H

LAKE PONTCHARTRAIN

Mandeville

EXPRESSWAY

GREATER NEW ORLEANS BRIDGE

N

ARKANSAS

SHREVEPORT

RED RIVER

Vicksburg

MISSISSIPPI RIVER

MISSISSIPPI

LOCATION

TEXAS

LOUISIANA

SABINE RIVER

PEARL R.

MISSISSIPPI R.-GULF OUTLET

NEW ORLEANS

BRETON SOUND

GULF OF MEXICO

VICINITY MAP

50 0 50Mi.

90

11

RIGOLETS

South Point

NEW ORLEANS EAST

WATERWAY

CHEF MENTEUR PASS

LAKE BORGNE

Seabrook Lock

Seawall

PARIS ROAD

CITRUS

Michoud

INTRACOASTAL

Inner Harbor Navigation Canal

GULF

Branch

MISSISSIPPI RIVER - GULF OUTLET

BONNET CARRÉ SPILLWAY

ST CHARLES PARISH

JEFFERSON PARISH

NEW ORLEANS

CHALMETTE

MISSISSIPPI RIVER

Violet

B. Dupre

Lower B.

SCALE OF MILES

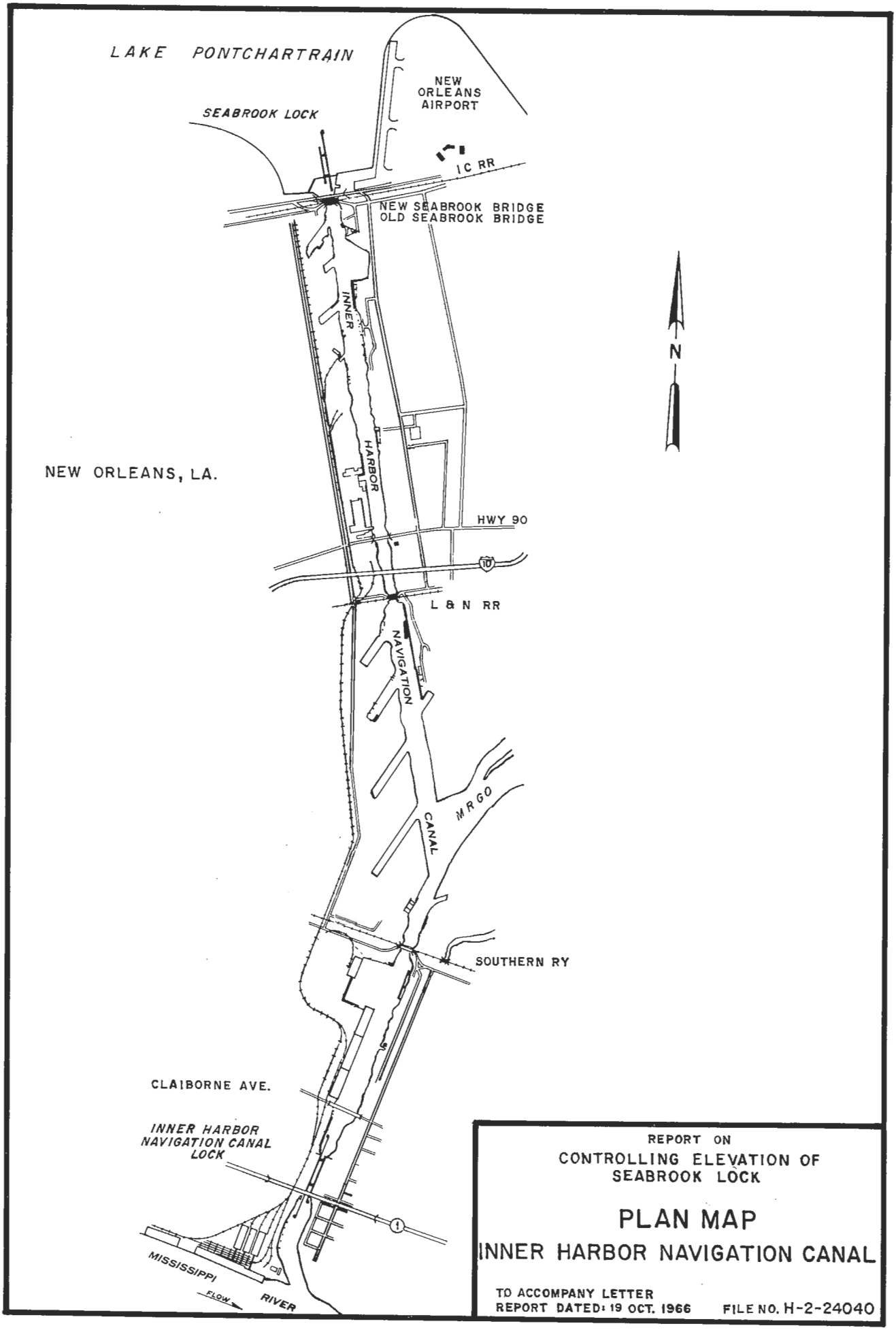
5 0 5

REPORT ON
CONTROLLING ELEVATION OF
SEABROOK LOCK

GENERAL MAP

TO ACCOMPANY LETTER
REPORT DATED: 19 OCT. 1966 FILE NO. H-2-24040

PLATE I



REPORT ON
CONTROLLING ELEVATION OF
SEABROOK LOCK

PLAN MAP
INNER HARBOR NAVIGATION CANAL

TO ACCOMPANY LETTER
REPORT DATED: 19 OCT. 1966 FILE NO. H-2-24040

PLATE 2

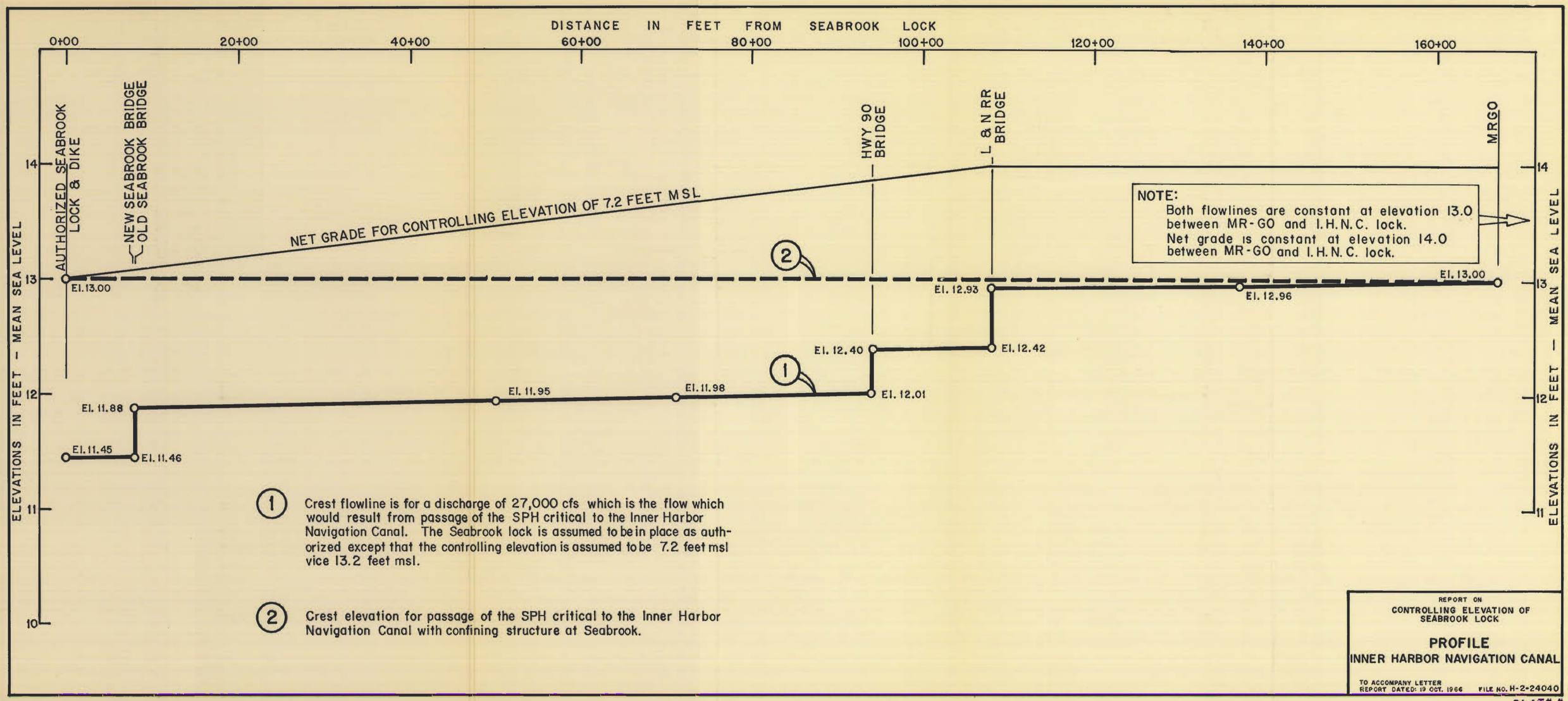

DISTANCE IN FEET FROM SEABROOK LOCK
0+00
20+00
40+00
60+00
80+00
100+00
120+00
140+00
160+00
ELEVATIONS IN FEET - MEAN SEA LEVEL
14
13
12
11
10
AUTHORIZED SEABROOK LOCK & DIKE
NEW SEABROOK BRIDGE
OLD SEABROOK BRIDGE
HWY 90 BRIDGE
L & N RR BRIDGE
MRGO
NET GRADE FOR CONTROLLING ELEVATION OF 7.2 FEET MSL
NOTE:
Both flowlines are constant at elevation 13.0 between MR-GO and I.H.N.C. lock.
Net grade is constant at elevation 14.0 between MR-GO and I.H.N.C. lock.
El. 13.00
El. 13.00
El. 12.93
El. 12.96
El. 12.40
El. 12.42
El. 11.88
El. 11.95
El. 11.98
El. 12.01
El. 11.45
El. 11.46
1 Crest flowline is for a discharge of 27,000 cfs which is the flow which would result from passage of the SPH critical to the Inner Harbor Navigation Canal. The Seabrook lock is assumed to be in place as authorized except that the controlling elevation is assumed to be 7.2 feet msl vice 13.2 feet msl.
2 Crest elevation for passage of the SPH critical to the Inner Harbor Navigation Canal with confining structure at Seabrook.
REPORT ON
CONTROLLING ELEVATION OF SEABROOK LOCK
PROFILE
INNER HARBOR NAVIGATION CANAL
TO ACCOMPANY LETTER REPORT DATED: 19 OCT. 1966
FILE NO. H-2-24040

PLATE 3

STATE OF LOUISIANA
DEPARTMENT OF PUBLIC WORKS
BATON ROUGE

LEON GARY
DIRECTOR

April 13, 1966

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

Dear Colonel Bowen:

As you know, the interim survey report for Lake Pontchartrain, Louisiana and Vicinity, recommended construction of a lock in Lake Pontchartrain near the terminus of the Inner Harbor Navigation Canal (Seabrook). The purposes of this lock are to alleviate undesirable current conditions in the canal generated by the Mississippi River-Gulf Outlet; provide for the preservation of a favorable salinity regimen in Lake Pontchartrain by permitting control of a tendency for the Mississippi River-Gulf Outlet to produce higher salinities in the lake; and for control of hurricane inflow. The interim survey report called for a lock with a controlling elevation of 13.2 feet above mean sea level, which elevation would not be exceeded by the stages expected to result from the passage of the design hurricane. The report further recommended that the costs of this feature chargeable to the hurricane project be limited to the differential in cost between the recommended lock and one with a controlling elevation based on Mississippi River-Gulf Outlet requirements alone (then estimated to be 7.2 above mean sea level). On the above basis, the costs chargeable to the hurricane protection project would have been $400,000 and the local cooperation would have amounted to $120,000.

In reviewing the interim survey report, the Bureau of the Budget recommended a change in the cost sharing specified in the report to provide for allocation of the costs equally between the navigation and hurricane protection functions. The Secretary of the Army agreed to the change with "... the understanding that this apportionment of costs would not unduly delay construction ..." The project, "Lake Pontchartrain, Louisiana and Vicinity," was ultimately authorized in accordance with this recommendation of the Secretary of the Army, resulting in an estimated additional cost to local interests of $687,000.

We understand that consideration is now being given, on technical grounds, to a reduction in the controlling elevation of the Seabrook Lock. We are of the opinion that such reduction is desirable. Hurricane "Betsy" demonstrated the advantages of having some outflow from the canal under certain conditions, in that stages at the lake

end of the canal were some 3 to 4 feet lower than those at the Inner Harbor Navigation Canal Lock as a result of outflow from the canal.

We are opposed to the local cooperation requirements for the Seabrook Lock as recommended by the Bureau of the Budget. We are of the opinion that the construction of a lock adequate to serve adequately the needs of navigation, lake ecology, and current regulation will also provide the degree of control of hurricane inflow required. The Mississippi River-Gulf Outlet project preceded the hurricane protection project. The need for current and salinity control was generated by the Mississippi River-Gulf Outlet, not by the hurricane protection project. It is only proper, therefore, that these needs be satisfied entirely under the Mississippi River-Gulf Outlet project, and that the question of assignment of some costs to the hurricane protection project be considered only if the facilities required to fulfill such needs fail to meet the requirements of the hurricane protection project. In the event that the latter should prove to be the case, we consider that the cost sharing should be along the lines specified in the interim survey report rather than those recommended by the Bureau of the Budget.

In view of the above, we consider that the cost sharing on the Seabrook feature as recommended by the Bureau of the Budget is improper, and we recommend that consideration be given to deleting or modifying, as appropriate, the present requirement for a local contribution toward the cost of construction of this feature.

Sincerely yours,

Calvin T. Watts

CALVIN T. WATTS
Assistant Director

/an

LMVED-TD 8 December 1965

SUBJECT: Lake Pontchartrain and Vicinity, Louisiana

TO: Chief of Engineers
ATTN: LMGCW-V/LMGCW-EH/LMGCW-EZ

1. The project for Lake Pontchartrain and Vicinity, Louisiana (hurricane protection) was authorized by the Flood Control Act of 1965 (PL 89-298) at an estimated Federal cost of $56,235,000 substantially in accordance with the recommendation of the Chief of Engineers in House Document 231, 89th Congress, except that the recommendation of the Secretary of the Army in that document shall apply with respect to the Seabrook Lock feature of the project. The Secretary of the Army recommended that the cost of the Seabrook Lock feature be allocated equally between navigation and hurricane protection purposes. The basis for this allocation of cost was that the lock would serve a dual purpose - mitigating anticipated adverse effects of the Mississippi River-Gulf Outlet navigation project, and serving as an element in the hurricane surge control project.

2. In view of Hurricane Betsy's experience, the District Engineer recognized the possibility that some benefits might be derived along the Inner Harbor Navigation Canal connecting the Mississippi River-Gulf Outlet and Lake Pontchartrain by reducing the controlling elevation of Seabrook Lock. By letter dated 19 October 1965, the District Engineer proposed to reduce the controlling elevation of Seabrook Lock from elevation 13.2 feet msl to 7.2 feet msl. His proposal was approved by our 1st indorsement dated 17 November 1965. Copies of basic letter and 1st indorsement are inclosed herewith for ready reference, copies having been previously furnished OCE to the attention of LMGCW-EH/LMGCW-EZ.

3. Construction of Seabrook Lock to elevation 7.2 feet msl would be a departure from the project document plan. Inasmuch as the lock would be a single-purpose structure for mitigation of effects caused by the Mississippi River-Gulf Outlet project its cost would be charged to that project and the allocation of costs recommended by the Secretary of the Army would be modified. This has raised the question as to whether

ncl 5 NOD, ATTN: LMNED-PP

LMVED-TD 8 December 1965
SUBJECT: Lake Pontchartrain and Vicinity, Louisiana

authority exists for modifying the project to the extent proposed in inclosed NOD letter of 19 October 1965 in light of the language contained in the Flood Control Act of 1965. In view of this uncertainty, and in the absence of more concrete support for the proposed modification, the District Engineer is being instructed to prepare a letter report taking into consideration all factors involving the modification, including technical data, the views of local interests, and the apportionment of costs between Federal and non-Federal interests. In compliance with paragraph 10, EM 1110-2-1150, the letter report will be forwarded to you with our recommendations for review and approval.

FOR THE DIVISION ENGINEER:

1 Incl (dupe)
Cy ltr, LMNED-PP, NOD,
19 Oct 65 w/1st Ind,
LMVED-PH/LMVED-TD, LMVD,
17 Nov 65

GEORGE B. DAVIS
Acting Chief, Engineering Division

Copy furnished:
NOD, ATTN: LMNED-PP