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# LAKE PONTCHARTRAIN, LA.

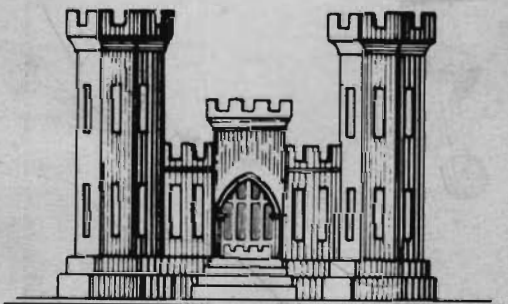
FROM THE ORLEANS - JEFFERSON PARISH LINE  
WESTWARD AND NORTHWARD TO THE VICINITY OF FRENIER

## REVIEW REPORT

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*A0001300*

*824.02 (Lake Pontchartrain  
La Vic. Frenier)*



*Mount.*

*21 X 3112*

*649,360.00*

*30 June 1953*

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS  
NEW ORLEANS DISTRICT  
NEW ORLEANS, LA.

*15 April 1948*

NOT FOR PUBLIC RELEASE  
SERIAL NO. 8

*116-1-1-C*

*1159,02L*

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SUBJECT: Review Report, Lake Pontchartrain, La., from Orleans-Jefferson  
Parish Line Westward and Northward to the Vicinity of Frenier, La.

LMVD 800.92 (Pontchartrain  
Lake)

LMVRC

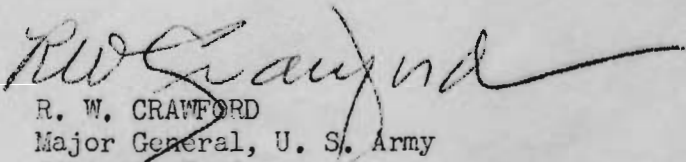
1st Ind.

5 May 1948

Office, Div Engr, LMVD, CE, Vicksburg, Miss.

TO: C. of E., ENGWF

The Division Engineer concurs in the findings of the District Engineer that excessive flood damage caused from overflow by tidal waves on Lake Pontchartrain during infrequent hurricanes, in the portion of Jefferson Parish, Louisiana, situated between Lake Pontchartrain and the Mississippi River and adjacent to New Orleans, is sufficient to warrant the modification of the existing project for flood control in this area (Public No. 526, 79th Congress, approved 24 July 1946). He also concurs in the recommendation of the District Engineer for the construction of a landside enlargement of the existing embankment along Lake Pontchartrain with suitable wave erosion protection and the enlargement of return levees along the Orleans and St. Charles Parish lines at an initial estimated cost to the United States of \$5,100,000 for construction, subject to the requirements of local cooperation as specified in paragraph 35 of the District Engineer's report.

  
R. W. CRAWFORD  
Major General, U. S. Army  
Division Engineer

REVIEW REPORT

LAKE PONTCHARTRAIN, LA.

- SYLLABUS -

The District Engineer finds that the area considered for protection in prior reports sustained flood damage as a result of the hurricane of September 19, 1947. The damage was inconsequential in St. John the Baptist Parish and in St. Charles Parish, however, the damage was severe, including the loss of eight persons by drowning, in that portion of the area for which improvement was previously recommended fronting Jefferson Parish and which is covered by the project adopted by the Flood Control Act of 1946.

As developed in prior reports, the cost of protection across the lake-front in St. John the Baptist and St. Charles Parishes is unwarranted and no federal improvement is recommended at this time.

Construction of a concrete floodwall, as desired by the majority of local property owners, would be disproportionately costly, but landside enlargement of the existing lakeshore embankment and its protection from wavewash, will provide protection of improved property against such storms and lake overflows as have been experienced in the past, at a cost commensurate with the present value of such property.

Modification of the adopted project is recommended, to provide for increased protection against storm-developed tides and wind-driven waves normal to the area. The recommended modification in grade and cross-section of the proposed hydraulic fill enlargement and its protection is estimated to cost the United States \$5,100,000 for initial construction, subject to the condition that local interests-(a) provide free of cost to the United States all lands, easements, and rights-of-way necessary for the improvement, and contribute \$300,000 to the initial cost of construction, over and above the amount to be expended for initial drainage improvement as required below; - (b) undertake rehabilitation and initial improvement of the drainage facilities of the Fourth Jefferson Drainage District at an estimated cost of \$1,500,000; - (c) hold and save the United States free from damages due to the improvement; and (d) furnish assurances satisfactory to the Chief of Engineers that they can and will alter bridges and rehabilitate and progressively improve existing drainage canals and pumping stations as required, and maintain and operate all works including levees and drainage facilities after completion of the project.

SUBJECT: REVIEW REPORT, LAKE PONTCHARTRAIN, LA., FROM ORLEANS-JEFFERSON PARISH LINE WESTWARD AND NORTHWARD TO THE VICINITY OF FRENIER, LA.

TO: THE DIVISION ENGINEER  
LOWER MISSISSIPPI VALLEY DIVISION  
CORPS OF ENGINEERS  
P.O. BOX 80  
VICKSBURG, MISS.

1. Authority. - This report is submitted in compliance with instructions from the Chief of Engineers contained in 1st Ind., dated 28 October 1947, on letter from the Chairman, Committee on Public Works, United States Senate, which conveys the following resolution adopted on 11 October 1947, by the Committee.

RESOLUTION

United States Senate

Committee on Public Works

Resolved by the Committee on Public Works of the United States Senate,

That the Chief of Engineers is hereby requested to review the report on Lake Pontchartrain, Louisiana, printed in House Document Numbered 691, Seventy-Ninth Congress, Second Session, and other reports, with a view to determining whether modification of the recommendations contained therein is advisable at this time in view of the recent hurricane and resultant floods.

/s/ Chapman Revercomb

Chairman

2. Report Reviewed. - As stated in the quoted resolution, the report to be reviewed is printed in House Document numbered 691, Seventy-ninth Congress, Second Session. The report, dated 30 January 1945, subject: - "Flood Control survey, Lake Pontchartrain, La., from Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier" was prepared in the office of the Division Engineer, Lower Mississippi Valley Division. The following SYLLABUS heads the subject report:

"The Division Engineer finds that a concrete wall along the shore of Lake Pontchartrain, as desired by local interests, would be disproportionately costly, but that landside enlargement of the existing lakeshore embankment will insure continued protection of improved urban property from lake overflow at a cost commensurate with the present value of such property.

"He recommends adoption of a Federal flood control project for Lake Pontchartrain, La., to provide for reconstruction and landside enlargement of the existing lakeshore embankment across Jefferson Parish, at an estimated cost of \$1,200,000.00 for initial construction, provided local interests meet prescribed conditions of local cooperation including contribution of 25 percent of the cost."

3. Local interests were advised of the nature of the report and were invited to submit additional information to the Board of Engineers for River and Harbors. At their request the Board conducted a public hearing in Washington, D.C., on 10 September 1945. The Board then recommended adoption of a flood control project for Lake Pontchartrain, La., in Jefferson Parish, substantially in accord with the plan proposed by the Division Engineer.

4. The proposed project was concurred in by the Director, Department of Public Works, State of Louisiana, by letter to the Acting Chief of Engineers, dated at Baton Rouge on 23 October 1945, with the exception of the requirement of a cash contribution by local interests.

5. Prior Reports. - A report of preliminary examination dated 20 June 1942, contained the recommendation that no survey be undertaken at that time.

Reports prior to the unfavorable report of preliminary examination comprise those reports on the existing Mississippi River flood control project as follows:

---

<u>Subject</u>	<u>Document</u>	<u>Recommendation</u>
Flood Control of Miss. River in its alluvial valley	H. Doc. 90, 70th Cong., 1st Sess.	Favorable
Ditto	River & Harbor Committee Doc.28, 70th Cong.,2nd Sess.	Do

Subject	Document	Recommendation
Flood Control of Miss. River in its alluvial valley.	H. Doc. 798, 71st Cong., 3rd Sess.	Favorable
Ditto	River & Harbor Committee, Doc. 1, 74th Cong., 1st Sess.	Do
Ditto	River & Harbor Committee, Doc. 1, 75th Cong., 1st Sess.	Do
Ditto	H. Doc. 359, 77th Cong., 1st Sess.	Do
Ditto	H. Doc. 509, 78th Cong., 2nd Sess.	Do

6. Description: - The area under consideration lies between Lake Pontchartrain on the north and the Mississippi River on the south. It extends westward from the upstream or western boundary line of the City of New Orleans for a distance of about 20 miles to the vicinity of Frenier, which is 2-1/2 miles northwestward from the upper guide levee of the Bonnet Carre Floodway. The average distance between the Mississippi River and the shore of Lake Pontchartrain is approximately 6 miles. The area comprises about 73,000 acres.

The Bonnet Carre Spillway, a feature of the Mississippi river flood control project, lies within the area, approximately 15 miles west of the New Orleans City line. The floodway covers about 7825 acres between guide levees.

7. The area for which flood protection is considered comprises about 30,000 acres in Jefferson Parish; 35,000 acres in St. Charles Parish and 7,800 acres in St. John the Baptist Parish. Roughly 20% of the total area is highland between the 5-foot contour and the natural levee of the Mississippi River which is generally at elevation 12 to 15 feet M.S.L. About 13,000 acres in Jefferson Parish are below sea level. The area below the 5-foot contour comprises 26,000 acres in Jefferson Parish, 29,000 acres in St. Charles Parish and 3,000 acres in St. John the Baptist Parish.

8. About 40% of the total area is unimproved tidal swamp lying in



St. Charles and St. John the Baptist Parishes. The swampy area is traversed by numerous small bayous and coulees which drain into Lake Pontchartrain. These streams, together with several small canals, are generally choked with semi-tropical vegetation, water grasses, hyacinths and debris so that their value as drains for the higher lands is seriously impaired. The low lands in Jefferson Parish, although swampy and supporting heavy growths of wild cane, sawgrass and other tropical and semi-tropical vegetation, have been drained by an intricate system of canals leading to four pumping stations along the lakeshore. Some low lying land in this area has been developed as residential areas, some is being cultivated and some has been converted into pasturage for winter-grazing. Higher land adjoining the Mississippi River in the three parishes has been improved and is used for agricultural, residential and commercial purposes.

9. In the eastern portion of Jefferson Parish the high ground (above 5 M.S.L.) swings sharply northward along a ridge meandering the banks of ancient Bayou Metairie, now completely filled, which appears to have been a high water distributory of the Mississippi River. At one point near the Orleans-Jefferson Parish line, Metairie ridge extends northward to within one and three-quarter miles of the lakeshore.

10. Except along the natural levee of the Mississippi River and along Metairie ridge the composition of the surface soil is soft muck, organic material and peat extending to depths of 25 feet, the average depth being about 10 feet. This material is underlain by the clay, sandy clay and silt characteristic of the Mississippi River Delta. All material has an exceptionally high water content. The muck and organic matter supports a luxuriant growth of semi-tropic vegetation, and thick growths of swamp timbers, including cypress. Most merchantable timber has been cut out.

11. Reference is made to War Department and United States Geological Survey Quadrangles, United States Coast and Geodetic Survey Chart No. 1269, and accompanying drawing titled "Extent of Development and Recommended Plan of Improvement", File No. H-2-16380.

H-2-16381."

12. Economic Development. - a. Communications. - Improved highways traverse the area and provide effective service throughout. The Air Line Highway runs east-west through the three parishes, U. S. Highway 90 comes through New Orleans to connect with the Huey P. Long Bridge over the Mississippi River near Harahan. Louisiana State Highway 1 skirts the Mississippi River levee throughout the area, except across the Bonnet Carre Spillway, where it connects with the Air Line Highway Bridge over the floodway. U. S. Highway 51 forms the upper limit of the area under consideration, running from La. Highway 1, adjoining the Mississippi River, to a point about 1 mile south of Frontier Beach; which is reached over local gravel road from this point.

Metairie Road meanders the ridge of old Bayou Metairie and connects with Canal Street in New Orleans. Numerous secondary roads connect the Air Line Highway with La. Highway 1 adjoining the Mississippi River. Williams Boulevard at Kenner, La., and roadways adjoining the Bonnet Carre Floodway form connections from the Airline Highway to Lakeshore.

The New Orleans-Hammond Highway - State Highway 33 - meanders the lakefront from West End in New Orleans to an intersection with Williams Boulevard. The roadway is interrupted about six miles west of New Orleans where the embankment was washed out. Although a new fill was constructed around the breach by local drainage authorities, the roadway has not been restored thereon. Bridges across Elmwood Canal and Alligator Bayou have been destroyed by storm action and have not been restored.

Three railroads traverse the area from west to east to serve the City of New Orleans. Each crosses the Bonnet Carre Floodway on its own bridge. The Louisiana & Arkansas (K.C.S.) and the Yazoo & Mississippi Valley Railroads cross between the Air Line Highway and the Mississippi River, while the Illinois Central Railroad crosses at the lakefront. The Missouri Pacific, Southern Pacific and Texas & Pacific Railroads enter New Orleans from the west via the Huey P. Long Bridge. The New Orleans Public

Belt Railroad serves the eastern portion of Jefferson Parish and the Southern Railroad has its interchange connection with the other lines near Shrewsbury.

Facilities for handling freight by barge are available at several terminals along the river. Ocean going vessels handle petroleum products from plantside dockage at Norco, Destrehan and St. Rose.

Moisant Airport, one of the finer airports of the nation, is located at Kenner. Moisant functions as a prime service center for air communication between the southwestern states and South and Central America. The Airport, comprising over 800 acres is located wholly within the area subjected to flooding by high lake levels.

Radio Station W.W.L. has its transmitting facilities on the lake-front north of Kenner near Williams Boulevard.

All of the highways described herein, except Louisiana State Highway No. 1, Metairie Road and parts of the Air Line Highway, either have been or are subject to being flooded out by high lake levels. The airport and radio transmitter have been flooded out.

b. Industrial and Commercial. - The lands adjoining the Mississippi River levee in the three parishes have been highly developed. Intensely cultivated for sugar production during the latter part of the last century and during the first two decades of the present century, these lands are now mainly devoted to the growing of diversified crops, to pasturage and dairying. Some sugar cane continues to be cultivated in the western portion of St. Charles Parish and in St. John Parish. Considerable acreage along the Mississippi River front is occupied by oil refineries, tank terminals, lumbering activities and other industrial operations. Most of these lands are subject to flooding for short periods as a result of heavy rainfall coincident with high lake tides which prevent normal runoff.

During World War II, Camp Flauche of the New Orleans Staging Area was in operation. The camp adjoins Harahan and occupies approximately 1000 acres. It is now deactivated and its buildings, which accommodated 25,000 soldiers during the war have been sold and are being demolished. Part

of the camp has been given over to the New Orleans Housing Authority for use as emergency housing and it is presently accommodating more than 3500 residents in 856 family units, 9 commercial establishments and 2 churches.

Assessed valuation of all property in the portion of the area included in St. Charles Parish was \$7,941,388 in 1942. In 1947 it was \$9,238,398.

In Jefferson Parish the assessed value of all real estate in the area was \$14,255,921.00 in 1942 and \$22,952,293.00 in 1947. These assessments were estimated to be 80% of real values in 1942 and only 53% of current real values. 1950 - \$38,392,748

Comparable figures are not available for the small portion of St. John the Baptist Parish involved.

On the basis of assessments, the real value of property in the St. Charles Parish area has advanced 75% in the past 6 years while that in the Jefferson Parish area has advanced 143% in the same period.

The increase in St. Charles Parish is mostly in the increased activity in petroleum production, refining and shipping and to a lesser degree in commercial and residential enhancement. The Shell Oil Company, with a refinery and shipping point at Norco, La., reports an increase in its plant of \$293,780.00 during the 5-year period. Nearly all of the improvements noted in St. Charles and St. John the Baptist Parishes has continued to be confined to the higher ground adjacent to the Mississippi river Levee which is normally not affected by overflow from Lake Pontchartrain. Oil exploration and production in the lowlands is not seriously affected by floods of short duration.

The Jefferson Parish development is in large part represented by residential construction. The Louisiana Power and Light Company reports an increase of 4068 individual electric and 3578 individual gas consumers

during the period 1942-47. The East Jefferson Water Works reports individual service connections as follows: -

<u>Year</u>	<u>Number of Connections</u>	
1941	4,868	1950 - 14,821
1942	5,566	1951 - 16,234
1943	6,116	1952 - 17,757
1944	6,464	6 Apr. 53 - 18,113
1945	6,872	
1946	7,823	
1947	8,919	

Increase since 1941 - 4,051; percent of increase - - 83.2

The Southern Bell Telephone and Telegraph Company reports an increase of 1270 individual subscribers in Jefferson Parish and 10 in St. Charles Parish since 1942. During these war years many applications for service could not be filled.

*1950 Census - 53,997*  
*Based on*  
*Water*  
*Connected*  
*Population*  
*Est.*  
*28 Mar 52*  
*65,500*  
*6 Apr. 53*  
*71,924*

Population of the area under consideration (par. 7) estimated to be about 25,000 in 1940, based on the census of that year, has increased appreciably. The 1940 census shows that the portion of the area in Jefferson Parish had 18,832 residents. The records of the War Price and Rationing Board for Jefferson Parish shows that 27,541 individual ration books were issued in the same area in 1943. The increase in population in Jefferson Parish has continued until it is now estimated to be more than 30,000. Population in St. Charles and St. John the Baptist Parishes is estimated to be about 10,000 making the total for the area about 40,000.

c. Drainage Improvements - (1) Within the St. John the Baptist Parish area existing drainage improvements consist principally of those formerly made by local private enterprise, by the parish, and the more recent improvements of the LaPlace-Woodland Gravity Drainage District No.1.

The La-Place-Woodland Gravity Drainage District embraces approximately 3000 acres of land, southwest of Frenier and adjacent to State Highways No. 61 and 51. The district was organized in 1941 and has had an average assessed valuation of \$622,000. The original bonded debt of \$24,000 has been reduced to \$17,000. Bonds and interest are provided for by a tax levy of 3.0 mills. The operation and maintenance tax of the district is 1.4

mills. Plantation owners within the district area formerly constructed approximately five miles of drainage canals and the drainage district has been improving these drains.

The outlet for the drainage waters of the district and for all lands east of Highway No. 51 is to the east through the landside pit of the lakeshore embankment and thence into Lake Fontchartrain through the Prescott Canal in St. Charles Parish.

High tides in Lake Fontchartrain overflow low-lying unimproved lands, flooding ditches and canals, retarding normal runoff from the higher improved areas. Thus rainfall runoff is often interrupted in the lower improved sections, resulting in water damage only indirectly attributable to tidal action.

(2) In the St. Charles Parish area existing drainage improvements have been constructed principally by the Parish and local private enterprise.

There have been several attempts to organize the area into drainage districts. The following tabulated summary gives the names of the districts together with the date of organization and the date of dissolution.

<u>Description</u>	<u>Date</u>	
	<u>Organized</u>	<u>Dissolved</u>
Gravity Drainage District No. 2	11-3-26	9-4-34
Pontchartrain Drainage District	5-2-11	5-10-11
" " "	* 5-10-11	12-12-24
" " "	* 12-12-24	5-11-26
" " "	* 11-3-26	9-4-34
Sub-District No. 1 - Pontchartrain Drainage District	4-22-12	12-12-24

\* Reorganized

These districts embraced the entire area north of the River in St. Charles Parish, but with only a single exception none ever progressed to the point of authorizing a bond issue. The single exception, the Sub-District No. 1 of the Pontchartrain Drainage District, authorized

a \$220,000 bond issue, but the bonds were never sold.

Parish authorities explain that in the absence of a regularly organized drainage district empowered to levy taxes and obtain funds for improvement of drainage within its own boundaries, only minor maintenance to old existing improvements can be undertaken and no new facilities can be added because ordinary parochial revenues are insufficient. St. Charles Parish has unsolved drainage problems on both sides of the Mississippi River and, it is averred, parish authorities are not in a position to authorize greater expenditures on one side than on the other. The consequence is that neither side enjoys satisfactory drainage facilities.

Of the 35,000 acres in St. Charles Parish north of the Mississippi River, about 29,000 acres are subject to overflow. 26,000 acres were flooded subsequent to the hurricane of September 1947 without appreciable damage because lack of drainage has prevented economic development.

(3) All of the area under consideration in Jefferson Parish is included in the Fourth Jefferson Drainage District comprising a total of about 30,000 acres. This District originally organized in 1913 as a local agency, was reorganized in 1922, as an agency of the State of Louisiana. The funded debt of the District represented by outstanding bonds on 31 December 1947 was \$546,000 of 2%, \$2,010,960 of non-interest bearing and \$1,500,000 of 2.91% bonds. The District has physical installations valued at \$2,000,000.

The District's drainage facilities comprise about 60 miles of canals from 40 to 70 feet wide and over 20 miles of ditches 8 to 20 feet wide. Four pumping stations are located near the shore of Lake Pontchartrain, each at the lake end of one of the four main north-south header canals. Each station has design capacity of about 250,000 gallons per minute handled by two 80-inch pumps operated by 350 horsepower Diesel motors. The system was designed to permit removal of 1-1/2 inches of rainfall per 24 hours. Design capacity has not been maintained, Station No. 3

having been put out of operation in 1932 by rupture of the foundation which necessitated blocking of the outfall canal on the lakeside of the installation to prevent inflow of lake water through the breach. Present capacity of the combined pumping facilities is estimated to permit removal of slightly over 1 inch of runoff per day.

Drainage of about 2700 acres of the district is not dependent on the lakeside pumps. This area, comprising sub-drainage district No. 2, lies between the Orleans-Jefferson Parish line on the east and Arnault Road on the west with Metairie Road as its northern limit and the Mississippi river levee on the south. The sub-district is drained by gravity through two main ditches about 20 feet wide, thence through Hoey's Canal, through the Upper Protection Levee of the City of New Orleans, into the 17th Street Canal of the New Orleans drainage system, from where it is pumped into a canal leading to Lake Pontchartrain by Pumping station No. 6 of the New Orleans Sewerage & Water Board.

The drainage facilities of the Fourth Jefferson Drainage District have been permitted to deteriorate. Replacement of obsolescent equipment has not been carried out promptly as required to maintain efficiency. The principal reason for the deficiencies has been a lack of finances resulting from inability to collect taxes covering roughly 60% of the area. While the system was depreciating, land use in the district was expanding at a record rate. The Division Engineer's report of 30 January 1945 found that should a serious breach occur in the lakeshore embankment, damage would be sustained of upwards of 200 residential and commercial structures and two defense housing projects in Metairie, in addition to other facilities. It was estimated that the value of the improvements subject to damage was in excess of \$6,000,000.00.

Following the hurricane of September 1947, which breached and overtopped the lakeshore embankment, damage was sustained by more than 2800 residential and commercial structures in addition to the other facilities



named. The estimated value of the improvements damaged was in excess of \$20,000,000.00

The drainage district early in 1946 recognized the necessity for restoration of their facilities and proposed a program of repair and expansion estimated to cost \$1,500,000. The funds were authorized by special poll of property owners, and in May 1947, the engineers for the District submitted plans and estimates for the work. None of the proposed work has been done pending commencement of reconstruction of the lakeshore embankment by the Federal Government under the 1946 authorization. The Drainage District now urges adoption of a more comprehensive plan of Federal improvement, including drainage improvement as well as development of control structures against flooding, toward which the district is prepared to contribute a substantial portion of the cost.

13. Climatology. - The climate of the area is greatly influenced by the proximity of the Gulf of Mexico and the many water surfaces provided by lakes and streams, which modify temperature conditions and changes, decreasing the range between extremes and resulting in a mild sub-tropical climate. The annual average temperature of 70 degrees ranges between an 89 degree summer average and a 61 degree winter average.

The annual rainfall in the area varies considerably from year to year and the amount is extremely undependable. Precipitation ranges from high-intensity, short-duration thunderstorms of considerable extent, through intense storms of moderate duration due to cyclonic disturbances, to less intense storms of long-duration and greater frequency resulting from contact between warm moist air from the Gulf and comparatively cold continental air masses. Annual precipitation based on 76 years of record at New Orleans averages 60 inches. Average monthly rainfall varies from 3.5 inches in October to 6.75 inches in July, but up to 25 inches has been experienced in one month. Extreme annual variations as recorded at New Orleans Weather Bureau are 85.73 inches in 1875 and 31.07 inches in 1899. Fair days and days with rain each average 120 per year. Average wind

velocity is 6.3 m.p.h., prevailing from the southeast.

Records of precipitation accompanying eight major storms are presented in Table I.

TABLE I  
PRECIPITATION IN INCHES ACCOMPANYING MAJOR STORMS OF RECORD.

Date of Storm	Precipitation, Inches				
	Area A *	Area B **	Area C * †	All * ††	
1894, Feb. 19-23	10.35	8.26	6.91	7.95	
1915, Sept. 28-29	4.30	8.45	6.70	7.17	
1927, April 15-16	6.18	10.96	14.01	11.66	
1928, June 1-5	12.03	10.20	9.04	9.94	
1929, Sept. 2-7	5.18	7.60	9.15	7.96	
1932, May 16-19	8.76	9.83	10.50	9.98	
1937, Oct. 1-5	6.42	12.86	16.98	13.82	
1943, Sept. 16-21	9.65	9.90	10.07	9.95	

\* Bonnet Carre West Levee to Frenier

\*\* Bonnet Carre East Levee to Jefferson Parish Boundary

\*† Jefferson Parish Area

\*†† Orleans Parish West Boundary to Frenier

14. Drainage Characteristics. - The watershed is divided into three separate areas by existing levees and by the highway embankment of U.S. Route 51. These parts have been designated as follows: - (Ref. accompanying drawing, File No. H-2-16380).

Area A consists of the area between the highway embankment of U.S. Route 51 and the West Guide Levee of the Bonnet Carre Spillway, comprising parts of St. John the Baptist and St. Charles Parishes.

Area B consists of the area between the East Guide Levee of the Bonnet Carre Spillway and the levee along the St. Charles-Jefferson Parish line, all within St. Charles Parish.

Area C consists of the area bounded on the west by the levee along the St. Charles-Jefferson Parish line, and on the east by the levee along

the Jefferson-Orleans Parish line, all in Jefferson Parish.

Natural ground slope in the area concerned is generally from the high ground adjacent to the Mississippi River toward Lake Pontchartrain. Gravity drainage in Areas A and B through improved channels and ditches serves the developed alluvial area abutting the River. The unimproved land comprising by far the greater part of Areas A and B is poorly drained by sluggish bayous and shallow ditches, and is classified generally as marsh area.

Area C is served by an improved drainage system. Much of the ground is below the level of both the lake and Mississippi River low water. The greater portion of the area is below embankment levels adjacent to the lake. Drainage is dependent upon a system of canals and pumps to discharge drainage water into Lake Pontchartrain. Eight pumps of 2,000 c.f.s. combined capacity were originally installed for this work. At present only five pumps are operative with a total capacity of 1250 c.f.s. Pumping has resulted in a general lowering of the ground surface through removal of excess groundwater.

15. Floods of Record. - Comparatively mild flooding frequently experienced from excessive local precipitation is generally of short duration and results in little damage beyond inconvenience. The less frequent inundation due to overflow from Lake Pontchartrain presents a much more serious condition. Such inundation is likely during hurricanes in the Summer and Fall and during occasional strong easterly winds in the Fall and winter months. Damage is most severe in Area C, Jefferson Parish, a highly developed and well populated suburb of New Orleans.

16. Severe hurricanes were experienced on 20 September 1909, 29 September 1915 and 19 September 1947. During these storms water in Lake Pontchartrain at West End reached an elevation of 6.1 feet in 1915 and 5.4 feet in 1947. The elevation reached in 1909 was a few inches under that of 1915.

Stages reached at Frenier, La., were 8 feet in 1909, 13 feet in

1915 and 4.2 feet in 1947. The location of Frenier is such as to be naturally subjected to the occurrence of high tides, terminating a long expanse of shallow open water with a barrier of natural growth timber. This condition, combined with high water in Mississippi Sound, and strong easterly winds, favors occurrence of extreme tides near Frenier.

Higher tides than ever recorded east of Frenier for storms no greater than already experienced are possible with the right combination of wind direction against the artificial barriers constructed for protection against that very possibility. If a hurricane should approach the Gulf Coast from the South with its center somewhat East of New Orleans, it is possible that tides along the Jefferson Parish shoreline could exceed those experienced by a considerable margin.

17. During the 1915 hurricane the wind was from the east all day, changing to northwesterly by 8:00 P.M. and due westerly by 10:00 P.M. With the changing of the wind, the water began receding at Frenier from its maximum of 13 feet and fell fast thereafter. This storm approached the lake from a south-southeasterly direction with a tendency to curve to the right, passed west of the lake and continued in a north-northeasterly direction.

The 1947 storm approached New Orleans from an east-southeasterly direction, passed through the approximate center of the city and south of the lake, and then continued in the same direction. Winds were from the northeast until 10:00 A.M. of September 19th, changing to southeasterly by noon and continuing from that direction until noon of September 21st. Tides approached those of 1915 on the north and south shores of the lake, while the tide at Frenier was below that of 1915.

Severe hurricanes were experienced in 1901 and 1906 with no records preserved of lake stages. However, it is recorded that the hurricane of 15 August 1901 produced a 5.5 foot rise in stage of the Mississippi river at New Orleans, while the 27 September 1906 hurricane produced a rise of 3.0 feet and the 19 September 1947 hurricane a rise of 3.3 feet.

Highest stages recorded since the installation in 1931 of the present gage coverage are as follows:

Frenier	6.4 (Feet above mean Sea Level.)
Mandeville	6.6

West End	5.4	*Staff gages not read at peak.
Little Woods	5.0*	Elevations shown are highwater
Rigolets	6.9*	marks.

Stages of three feet or above have been recorded at West End on 29 days since 1931.

18. Hurricane of 19 September 1947. - While not the greatest hurricane of record in this area, more complete descriptive data are available for this than for any other great hurricane. Damage to the area of Jefferson Parish fronting the lake was the most severe ever experienced because of its present state of economic maturity. Maximum water surface in the lake of 5.42 feet (M.S.L.) at West End overtopped all the levee along the lakeshore in front of Areas A & B, and overtopped or crevassed most of the levee in front of Area C. The lake water remained above four feet for 37 hours, permitting water to continue to enter Area C over much of the existing highway embankment damaged by previous storms and by the severe lashing of the waves during the hurricane.

A reproduction of the wind velocity chart from the anemometer on the Mississippi River Bridge, in Jefferson Parish, is presented as Plate 1. Maximum velocity recorded is 98 m.p.h. The Weather Bureau Station at Moisant International Airport reported a special observation at 9:12 AM showing a wind velocity of 98 m.p.h. and gusts to 112 m.p.h. That station estimated the wind velocity, just before the calm center, to be 110 m.p.h. with gusts of 125 m.p.h.

The maximum height of flood waters ranged from 3.5 feet in Metairie to 3.8 feet near LaPlace, representing depths of more than six feet in some residential areas. A stage hydrograph for the period 15 September to 27 October 1947 for Lake Pontchartrain at West End and in the residential area of Metairie is presented as Plate 2.

19. Table II lists the total areas involved and the portions of them that were flooded.

TABLE II  
AREAS FLOODED BY SEPTEMBER 1947 HURRICANE

LOCATION	TOTAL AREA SQ. MILES	IMPROVED LANDS FLOODED SQ. MILES	MARSH, TIMBER OR UNIMPROVED LAND FLOODED SQ. MILES	TOTAL AREA FLOODED SQ. MILES
Area A	14.7	-	2.7	2.7
Area B	51.0	-	40.8	40.8
Area C	48.6	6.0	27.7	33.7

The flood water receded from Areas A and B within several days, but due to the conditions described in paragraph 14 hereof, the water in Area C remained above the banks of the drainage canals until the 22nd of October. The drainage pumps, with a capacity of 1250 c.f.s., were aided in pumping off the flood waters by a canal excavated by the Corps of Engineers, as an emergency relief measure. This canal connected the existing drainage system to the intake side of the New Orleans Sewerage and Water Board Pumping Plant No. 6 on the 17th Street Canal. The canal was in operation from the 2nd to the 16th of October. The maximum discharge measured was 325 c.f.s. Runoff was also expedited during the first week of the flood by cuts made in the lakeshore embankment and in the levees of the outfall canals. Runoff by this means was of short duration, because of high stages in the lake caused by continuing easterly winds.

20. Flooding by Excessive Local Precipitation. - Local flooding in Areas A and B affects principally the unimproved marsh areas which receive the improved drainage from the alluvial areas near the river. Gravity drainage of the marsh areas to lake level is sluggish.

In Area C natural runoff is trapped in areas of subsidence and intercepted by the levees. Relief is available only through pumping. Maximum daily pumping capacity is 2500 acre feet which represents 1.1 inches of runoff in 24 hours, or an estimated 1.4 inches of rainfall over the area of about 27,000 acres. Applying 1.4 inches of rain in one day to the New Orleans and

vicinity rainfall frequency graph presented as Plate 3 indicates in excess of 10 occurrences yearly of rainfall greater than the present daily pumping capacity.

21. Extent and Character of Flooded Area. - All of the area under consideration comprising about 73,000 acres in St. John the Baptist, St. Charles and Jefferson Parishes, lies below the flood level of the Mississippi River and roughly 58,000 acres below the 5-foot contour in the three parishes are subject to flooding by high lake tides.

Following the hurricane of September 1947 a total of 48,600 acres or about 67% of the total area was inundated. Depths of more than 6 feet were recorded in the improved area north of Metairie ridge.

The area is adequately protected from overflow from flood stages in the Mississippi River by a system of earth levees beginning at the high ground at Baton Rouge, La., and extending downstream to Bohemia, about 50 miles below New Orleans. The Bonnet Carre Spillway, in the western part of St. Charles Parish, traverses the area from river to lake. Adequate side levees connected to the main river levee confine the spillway discharge to the federally owned floodway.

In 1923-24 an embankment was constructed by the Louisiana State Highway Department along the shore of Lake Pontchartrain, westward from the Orleans-Jefferson Parish line, to carry the New Orleans-Hammond Highway. The embankment was constructed of material dredged from the lake bottom a short distance offshore. The roadway was to have been completed to elevation 8 M.S.L., this being the elevation of the two remaining bridges on the route. Upon construction of the Bonnet Carre Spillway, the New Orleans-Hammond route was relocated to coincide with the Air Line Highway at LaPlace, west of the Spillway, so as to cross the floodway on the Air Line Highway Bridge. The lakefront section of the New Orleans-Hammond route was abandoned. The Highway Department maintained a shell-surfaced roadway over part of the abandoned line connecting Williams Boulevard in Kenner with Pontchartrain Boulevard at West End in New Orleans, a distance of about 7 miles.

Recession of the shoreline produced breaks in the embankment and storm waves in the lake overtopped and washed out the roadway for short stretches until the Highway Department decided, in 1946, to abandon further attempts to maintain the roadway on the embankment. The average rate of bank recession has been about 30 feet per year since 1890.

The embankment is the main protection against overflow from Lake Pontchartrain along the Jefferson Parish front. When breaks occurred they were repaired by the Fourth Jefferson Drainage District. Continued settlement and wave wash has reduced the grade to an average elevation of about 3.5 M.S.L. Since tides of 3.0 M.S.L. have been reached or exceeded at least once each year for the past several years the embankment has not been adequate even for protection against these normal tides and reliance for prevention of widespread flooding was placed on the capacity of the lower subsided areas to serve as sufficient reservoir, which would be slowly emptied by pumping.

The embankment along the St. Charles and St. John the Baptist Parish front has not been maintained. There are several breaks in the line between the Jefferson Parish line and the lower guide levee of the Bonnet Carre Spillway. Settlement over some stretches has been nearly 100% and heavy growths of scrub timber and underbrush cover most of the remaining fill. In this section the abandoned embankment has the effect of retarding free flow of drainage and the return of storm tides into the lake.

22. Flood damage. - Eight persons were drowned in Jefferson Parish during the flood accompanying the September 1947 storm.

Property damage and other losses as a result of the September flood aggregated \$3,950,000 in the three parish area. At least 2500 head of stock were drowned. It is averred that this area furnished winter grazing for about 5000 head of beef cattle. As a result of drownings about 1,000,000 pounds of meat was kept from the market this year.

Water covered the runways of Moisant International Airport causing its abandonment for 31 days during which time air traffic was diverted



to Alvin Callendar Airport across river and downstream from New Orleans. The damage to Moisant International Airport and to business operating therefrom is fixed at \$100,500.00

Floodwater covered the marshes, swamps and low woodlands of St. John the Baptist, St. Charles and Jefferson Parishes below elevation 3.7 M.S.L. In St. John the Baptist and St. Charles Parishes waters began receding through ditches, coulees and bayous into Lake Pontchartrain within 72 hours after having initially been flooded. Flood damage in these two parishes is shown to be only \$50,000.00. Even though the flood period in these two parishes was of short duration, the extremely low damage total was due essentially to the economic barrenness of the areas flooded.

Flood damage in the relatively small area of Jefferson Parish was exceptionally severe. Of the total damage in the parish, fixed at \$3,899,000.00, about two-thirds was sustained in the suburban settlement of Metairie and environs. The damage sustained is 17% of the total tax-assessment valuation of \$22,952,293.00. The population of Metairie is presently estimated to be about 25,000 in an area of about 10 square miles. The area of maximum development has its own sewerage disposal system, hard-surfaced streets, sub-surface drains and water purification and distribution and street lighting systems. The concentration of population produced severe suffering during the flood. The danger to the health and well-being of a great metropolitan area was exceptionally serious.

23. Existing Corps of Engineers' Flood Control Project. - The existing project for flood control of the Mississippi river in its alluvial valley protects the area from Mississippi River floods.

Public Law 526 - 79th Congress - 2nd Session, the "Flood Control Act of 1946", approved 24 July 1946, included authorization of a project for flood control on Lake Pontchartrain in Jefferson Parish, La. The authorization is contained in the following paragraph quoted from the section of the Act titled "LOWER MISSISSIPPI RIVER" -

"The project for flood control along Lake Pontchartrain in Jefferson Parish, Louisiana, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 691, Seventy-ninth Congress, Second Session, at an estimated cost of \$900,000."

The approved project contemplates landside enlargement of the abandoned New Orleans-Hammond Highway embankment across Jefferson Parish with suitable enlargement of return levees along the Orleans and St. Charles Parish lines. For estimating purposes a top width of 25 feet at elevation 8 M.S.L. was selected and side slopes of 1 on 6 were assumed.

No work has been undertaken under the approved project.

Extensive repair work to the abandoned highway embankment has become necessary as a result of severe damage by the hurricane tides of September 1947. The emergency repair work is continuing by the Pontchartrain Levee District and was participated in by the Corps of Engineers under emergency authorization which provided for expenditure of \$175,000 to restore a portion of the embankment to its condition prior to the storm.

24. Improvements by other Agencies. - There have been no extensive improvements by public agencies in the area since preparation of the report dated 30 January 1945. In St. John the Baptist and St. Charles Parishes no public improvements affecting transportation, drainage or flood protection have been undertaken in the area subject to lake floods under consideration herein, since publication of the last report.

In Jefferson Parish, the facilities of Moisant International Airport, have been considerably extended, runways have been lengthened and approaches cleared. An additional \$5,000,000 was authorized by the City of New Orleans for improvements and the new construction program is now underway.

Metairie Road, Route 454 of the La. State Highway system has been widened and partly resurfaced and now has a minimum width of 28 feet between curbs. Several miles of streets in Metairie have been concreted and

many additional miles have been graded and surfaced with shells and gravel.

The Fourth Jefferson Drainage District has continued minor maintenance of its system of canals, although efforts in this direction have been something less than adequate.

The East Jefferson Waterworks has continued expansion, having increased the number of service connections from 4868 in 1941 to 8919 in 1947.

25. Improvement Desired. - A public hearing, record of which is appended, was held at Metairie, La., on 15 December 1947 where State and local representatives were heard. The request for adequate protection against floods of the magnitude produced by the hurricane of last September was urged insofar as Jefferson Parish is concerned. Congressman T. Hale Boggs, Second District of Louisiana, urged that the protection be extended to reach the lower guide levee of the Bonnet Carre Floodway along the St. Charles Parish front. The Parish Engineer, St. Charles Parish, stated that insofar as he was advised, the Parish authorities were not interested in the proposal to protect the lakeshore at this time.

The statement for St. John the Baptist Parish was based on alleged damage along the shore of the lake itself at Frenier Beach by the pounding of an accumulation of drift allegedly emanating from the Bonnet Carre Floodway. Subsequent inspection of the area by representatives of the owners and the Department of Public Works, State of Louisiana, disclosed that the claims were greatly exaggerated if not entirely unwarranted.

Representatives of State levee authorities stated that the Pontchartrain Levee Board stood ready to furnish all necessary rights-of-way and maintain and operate the improvements. The Fourth Jefferson Drainage District offered to cooperate to the extent of contributing all of its available funds up to \$1,500,000 for correction of the drainage problem. Plans for this work have already been prepared by the engineers for the drainage district and are being held in abeyance pending action by the Federal Government.

27. Surveys. - All available information obtained through surveys by the Louisiana State Highway Department, the Fourth Jefferson Drainage

District and the Louisiana Department of Public Works was utilized. In addition a new survey traverse with profile and sections extending across the embankment into deep water in Lake Pontchartrain from the Orleans Parish line to the Jefferson-St. Charles Parish line has been completed since the September storm. Additional borings have been obtained along the embankment, landward in the marsh area, and in the lake.

A flood damage survey was made by the Jefferson Parish Police Jury and the Fourth Jefferson Drainage District who jointly employed an appraiser to undertake the work. The survey was participated in by the District Engineer to the extent of making spot checks to insure accuracy. Damage surveys were conducted by District Office personnel in St. Charles and St. John the Baptist Parishes by contacts with owners and through local Police Jury members.

28. Flood Problem. - The flood problem in the area remains the same as covered by previous reports. Local interests, in requesting the improvement seem to lay less stress on the danger of overflow as a result of the operation of Bonnet Carre Spillway and urged an increase in the extent of protection to be provided under the 1946 authorization to withstand the effects of hurricane tides.

The 1945 report recognized the danger of overflow by hurricane tides but considered it to be a remote hazard. It is conceded that the probability of the occurrence of a hurricane coincident with the operation of Bonnet Carre Spillway is extremely remote. However, it has been demonstrated that hurricane tides in Lake Pontchartrain tend to pile up along relatively short stretches of the lake's perimeter contingent on the direction, force and duration of attendant winds.

Tides of from one to three feet above normal lake level occur with comparative frequency and are induced by steady southerly and easterly winds. High winds from the north, usually lasting for several days, and violent storms from the northwest, local in extent and effect, occur several times annually and produce considerable wave action against the lakeshore in this section. These conditions may be termed usual or ordinary and are

comparatively of frequent occurrence.

Extraordinary conditions of wind and tides are created throughout the area by tropical hurricanes occurring usually in the fall of the year. Records of the United States Weather Bureau disclose that tropical hurricanes have entered the Louisiana marsh country 20 times during the July-November period, in the 66 years between 1882 and 1947. Great storms in 1909, 1915 and 1947 swept over New Orleans or immediately westward, producing extraordinary tides in Lake Pontchartrain.

An indication of the varying effects of these storms in Lake Pontchartrain is demonstrated in the behavior of tides observed during the 1915 and 1947 disturbances. Both storms were of about equal intensity but the 1915 storm was of longer duration, although peak high winds did not last appreciably longer. In 1915 tides of 6 feet at West End; 12 feet at LaBranche and 13 Feet at Frenier were noted. In 1947 stages reached 5.4 feet at West End and 6.4 at Frenier. The stage at LaBranche during the 1947 storm is not of record, however local residents familiar with the area state that it was not much higher than 5 feet.

The U. S. Weather Bureau records indicate great storms entering the Louisiana marsh area at or west of New Orleans on a frequency of once in three years. The Louisiana Department of Highways in a published report on the now abandoned New Orleans-Hammond Highway dated February 3, 1923 finds the frequency to be 1 in 3 years and states that records of the Illinois Central Railroad indicate that repairs to its roadbed along the lakeshore are required about once every three years because of heavy-storm damage.

Senior Engineer J. S. Alderman of the Bureau of Public Roads, Department of Agriculture, reporting on the same highway project under date of December 30, 1922 states that "Gulf hurricanes of great severity, such as have occurred at intervals of about seven years according to records kept since 1878 - - - - -".

The most severe storm experienced in the area under discussion occurred in September 1915. Tide elevations produced by that storm are the highest of record along the Jefferson Parish front. The possibility of the

occurrence of greater storms, producing higher tides should not be overlooked.

The three great hurricanes of 1909, 1915 and 1947 indicate an experienced frequency of 1 in 13 years. Heavy storms have produced stages between 4 and 5 feet at West End at least 6 times in the 33 year period 1915-1947, indicating damaging storm frequencies less than hurricane proportions of once in 5.5 years.

After assembly of all material for this report but prior to its final preparation, the lakefront embankment was again overtopped by tides resulting from a storm which began on 5 March 1948 and extended through 6 March. The lakefront embankment was overtopped in six places between the Orleans Parish line and pumping station No. 3. Two breaks occurred in the embankment between pumping station No. 3 and the St. Charles Parish line as a result of overtopping and wave action. The embankment was overtopped along two short stretches between pumping station No. 4 and the St. Charles Parish line. The levee along the 17th Street Canal was overtopped for several hundred feet but no break occurred. A small break occurred in the levee along the St. Charles-Jefferson Parish line.

Emergency repair work was undertaken by the Corps of Engineers assisted by personnel and equipment furnished by the Police Jury of Jefferson Parish, the Pontchartrain Levee Board and the Fourth Jefferson Drainage District.

Water elevations in Lake Pontchartrain reached 4.3 M.S.L. on 6 March 1948 and remained above 3.0 M.S.L. for 5 days during the period 6 thru 10 March. Interior flooding reached 4.0 M.S.L. and covered a portion of the developed area which had been flooded after the 1947 September hurricane. Extent of damage has not been ascertained, although it is understood that considerable damage was sustained.

Water elevations at West End in Lake Pontchartrain and within the protected area at Metairie, are shown on Plate 4.

The menace of overflow resulting from high lake levels is not the only flood problem, however, with which the Jefferson Parish area is faced. The entire area herein considered is subject to flooding during

heavy rains accompanying equinoctial storms of both vernal and autumnal periods. In St. John the Baptist and St. Charles Parishes the floodwaters recede rapidly into the marsh areas from where it flows more slowly into Lake Pontchartrain and in a matter of hours after the rainfall these areas may be free of excess water, depending on lake tides.

In Jefferson Parish, however, rainfall is entrapped within the levees outlining the limits of the Fourth Jefferson Drainage District, a considerable portion of which has subsided, with improved drainage, to below sea level. Excess water must be collected through the intricate system of open ditches and canals and pumped over the levee into Lake Pontchartrain. Of the eight major storms noted herein, that of October 1937 produced the most disastrous results. Drainage of the area was not effected by the pumps until the first week of the following month. Another such storm occurred in April 1927 when slightly over 14 inches of rainfall was experienced within a 24-hour period.

It is conceivable that with continued deterioration of the drainage system, - a condition not anticipated but possible nevertheless - serious flooding of the area could occur despite the achievement of complete protection against overflow from Lake Pontchartrain.

It is therefore concluded that the flood problem in the portion of the area represented by Jefferson Parish is one which requires action against both the threat of overflow from high lake levels and the less serious but potential danger of flooding by interior rainfall through adequate local drainage.

29. Plans of Improvement. - (a) The approved project, on which no work has yet been started, contemplates a minimum of construction to insure continued protection from the threat of overflow by normal or usual high lake levels. The project, classified Plan B of the 1945 report, provides for landside enlargement of the existing lakeshore embankment as a hydraulic fill levee across Jefferson Parish with suitable enlargement of return levees along the Orleans and St. Charles Parish lines to prevent

flanking. The proposed hydraulic fill would have a crown width of 25 feet at elevation 8 M.S.L. and side slopes of 1 on 6. Plan B also envisioned removal of muck from the foundation of the enlargement and would provide suitable protection works to minimize erosion only at locations where the embankment has been damaged.

(b) Local interests, although not insistent, have voiced their preference for construction of some type of rigid wall similar to that on the New Orleans city front extending eastward from West End about 5 miles to the New Orleans Airport. The 1945 report included estimates of the cost of a stepped concrete wall, suitably backfilled. It was found that such a wall fronting Jefferson Parish, including suitable enlargement of the return side levees, would cost \$10,000,000.00 at that time.

Investigating other types of rigid wall construction bordering the lake, disclosed that the New Orleans Airport, constructed in 1931 by diking off and pumping in a portion of the lake bottom adjacent to the shoreline, is rimmed on the shallower portions (depths to 6 feet) by a simpler type of wall which appears suitably adaptable to the purposes under consideration herewith.

The wall is constructed of tongue and groove type, reinforced concrete sheet piling tied together with waling pieces composed of steel channels properly bolted and encased in concrete. The wall thus formed is braced to pin piles of creosoted timber against the backfill thrust, backfill material having been pumped from lake.

(c) A plan of protection embodying the best features of the approved project with additional protection against both hurricane or heavy-storm tides and the continuous eroding action of usual or normal lake waves has been devised. Complete protection against tides capable of being produced by greater hurricanes than already experienced is not feasible at this time. The recommended plan lends itself to future enlargement whenever economic development of the area should require it.

The landside enlargement feature of the approved project, using the existing embankment as an elevated foreshore or berm, has been retained. Dimensions of the enlargement are increased to provide for a 50-foot crown width at elevation 10 M.S.L. with 1 on 10 side slopes. The existing embankment,



becoming an elevated lakeside berm, is proposed to be protected at the lakeside toe by a continuous facing of mass asphalt, tremie concrete or rip-rap or a combination of either, and covered with a deep layer of lake shell bound with bituminous cement. The type of toe protection most suitable will be developed by experimentation at the site. The lakeside slope of the hydraulic fill is to be paved with a 6-inch thickness of asphalt. The crown and landside slope are to be properly sodded, by dressing, compacting, fertilizing and seeding. The existing roadway should be re-established landward of the levee by local interests as desired.

(d) No plan of protection for the Jefferson Parish area encompasses solution of the whole flood problem without inclusion of provisions for assurance of expeditious removal of heavy rainfall before damaging flood results therefrom. Improvements proposed by the Fourth Jefferson Drainage District at an estimated cost of \$1,500,000.00 are the minimum necessary to afford a reasonable degree of drainage to the existing developed areas. Completion of protection against flooding from high tides in Lake Pontchartrain is expected to promote development of all of the area except about 6000 acres of the lowest lands which should be preserved as a storage basin and sump.

As development progresses into the lower areas below 0 M.S.L. it is incumbent on the drainage district to progressively increase their facilities.

It is estimated that approximately 9600 acres of presently unused lands will be returned to use and developed during the two decades following adoption of the project. Revenue available for drainage purposes is expected to be substantially increased by the return to use of this large acreage.

The drainage necessities at that time will require a system capable of expeditiously removing about 5 inches of runoff in 24 hours representing a 6-inch rainfall over the drainage basin. Thus the estimate of \$1,500,000.00 necessary to re-establish minimum drainage requirements at this time must be progressively augmented by approximately \$5,600,000.00 during the next 20 years.

Assurances satisfactory to the Secretary of the Army that they can and will rehabilitate and progressively improve existing drainage facilities should be furnished by the Fourth Jefferson Drainage District.

30. Estimates of Costs and Annual Charges. - Costs for initial construction of the four plans of improvement considered and the annual carrying charges are estimated to be:

TABLE III

Item of Work	Orleans Parish to Frenier		Jefferson Parish	
	Floodwall	Hydraulic Fill	Floodwall	Hydraulic Fill
Concrete & Sheet Piling	6,618,170		3,645,645	
Creosote Timber & Piles	2,206,600		1,215,500	
Struct. Steel	2,363,776		1,302,080	
Reinf.	2,270,433		1,250,700	
Hardware	214,297		118,036	
Lumber	118,000		65,000	
Backfill	1,802,500		848,700	
Misc. Earthwork	134,000	113,000	254,500	240,500
Hydraulic Fill		2,577,120		1,419,600
Mass Asphalt Rev't.		3,209,600		1,768,000
Asphalt Paving		1,069,869		589,333
Shell Surfacing		448,399		247,000
Dress & seed		97,500		54,000
Engr. & Conting.	3,932,224	1,879,512	2,174,839	1,081,567
Total *	19,660,000	9,395,000	10,875,000	5,400,000
ANNUAL CHARGES:				
Federal	887,764	417,280	485,000	227,245
Non-Federal	207,958	278,730	167,400	203,045
**	(97,750)	(165,830)	(58,300)	(91,345)
Total	1,095,722	696,010	652,400	430,290

\* Each figure includes the \$300,000 cash contribution to be made by local Interests

\*\* Includes Estimated Non-Federal maintenance of Federally constructed works in amounts indicated in parentheses.

All of the estimated annual non-Federal charges are based on the estimated initial expenditure by the Fourth Jefferson Drainage District to improve drainage. Improvements estimated to cost \$1,500,000 are proposed and financing arrangements therefor have already been completed.

31. Benefits. - Flood damage in the St. John the Baptist Parish and St. Charles Parish areas has been inconsequential. The protection of these areas from lake flooding might conceivably reclaim portions of the area by inclusion of floodgates through the levee. However, a great portion of the marsh in the area lies below normal lake level and could only be improved by an extensive reclamation project, as already in existence in Jefferson Parish. Local interests aver that such a program cannot be undertaken at this time. Protection of the St. John the Baptist Parish and St. Charles Parish areas can produce no appreciable benefits until an over-all program of reclamation, drainage and flood control can be instituted.

Applying the experienced hurricane flood frequency of once in 13 years to the total damage of \$3,899,483.00, in Jefferson Parish, the annual damage is found to be \$300,000.00, which represents the average annual benefits due to prevention of floods of major proportions, based upon the present degree of development. Damages prevented from lesser floods accruing as a result of frequent high tides may soon become an item of considerable importance as continued realty development encroaches on the area of low elevations. Heavy rainfall in excess of the present pump capacity causes minor damage at a high rate of frequency. With the protection afforded by the levee and the subsequent development in the area this type of loss would increase, or as a result of the planned improvement in drainage facilities by local interests a benefit of material proportions will result. Neither of these benefits have been evaluated.

*(1947) Proj. Percent of 1947 = 103*  
*300,000 x 1.03 = 309,000 (proj.)*

In the flooded area in Jefferson Parish there are approximately 12,000 acres which have reverted to the State for non-payment of taxes. Local authorities and realtors who have been consulted believe that all of these lands will be redeemed for development as commercial and residential areas. The return to use of at least 80% of these lands is a foreseeable

probability because of the absence of sufficient low-cost areas within the metropolitan area.

It is estimated that about 9600 acres of land will be returned to use after completion of the project. About 2600 acres of this land lies above the zero contour. Considerable areas at and below 0 M.S.L. fringing Metairie Ridge and the lakefront near East End have already been developed. Appraised value of these lands, without improvements, in March 1945 was \$4,380.00 per acre. Expansion into the lower areas is continuing. Completion of the project will accelerate development. It is estimated that the 9600 acres of land returned to use through construction of the project will increase in value by \$10,400,000.00 about 20 years after completion of the project, based on the present value of comparable lands in the area.

The average annual benefit during the life of the project which will result from a return of lands to use as residential and commercial areas may be assumed to be equal 3 1/2% return on the enhanced value of \$10,400,000, reduced to 75% to account for the period of development or \$273,000.

Tangible benefits thus total \$573,000 annually and closely approximate the annual cost of the floodwall. These benefits exceed the combined federal and non-federal costs for the levee plan in the ratio of 1.33 to 1.

Intangible benefits are represented by the prevention of loss of human life, a factor in itself believed to be sufficient to weigh heavily in favor of the improvement. The reduction of the danger of epidemics near a very large center of population through prevention of unsanitary conditions produced by flood and the promotion of recreational facilities on the lakefront are additional benefits to be considered. Moreover, the enhancement of property values throughout the area to be protected is a real benefit which warrants participation by local interests in the improvement.

32. Coordination with Other Agencies. - The proposed plans of improvement were discussed at a conference attended by representatives of:

1. The Louisiana State Department of Public Works.
2. Pontchartrain Levee Board
3. Jefferson Parish Police Jury
4. Fourth Jefferson Drainage District
5. Local residents.

The proposed plans of improvement were acceptable to these representatives and assurances were given that all of the items of local cooperation could and would be met promptly.

33. Discussion. - The resolution adopted by the Committee on Public Works of the United States Senate requires determination of a specific problem, i. e., should the approved flood control project be modified in view of the occurrence of the hurricane of September 1947 and floods resultant therefrom.

In the case of St. John the Baptist Parish and St. Charles Parish a sufficient showing of benefits has not been made to enable extension of the project to include these areas at this time.

That portion of the area under consideration included in Jefferson Parish has undergone considerable change in the past decade and has shown rapid continuing economic growth since assembly of material for the 1945 report. Recent increases are principally the result of wartime expansion of industry and shipping in the port of New Orleans.

The population of New Orleans has increased from 494,537 as determined by the 1940 census to an estimated 574,000 as of 31 December 1947, determined by the New Orleans Association of Commerce, an estimated increase of 16%. The metropolitan area of New Orleans, at the last (1940) census counted a population of 540,030, an increase of 9.1% over that of 1930. The estimated 1947 metropolitan area population shows an increase of 20.4% from 540,030 to an estimated 650,000. The suburban metropolitan area showed an increase of 26.0% between 1930 and 1940 according to the Census Bureau, and 67.0% between 1940 and 1947, based on Association of Commerce estimates.

Shortage of housing in the city has resulted in the rapid growth of several outlying sections within the city's own limits, as well as in suburban areas. The Metairie area has had a disproportionately large share

of population increase due to the availability of land and excellent transportation connections with the City.

Expansion in the public services in the immediate suburban areas of Jefferson Parish has been heavy and rapid. Water service connections from the East Jefferson Waterworks system have increased 83% since 1941. Tax assessments have increased from \$14,255,921 in 1942 to \$22,952,293 in 1947, an increase of 61%. Real values indicated by these assessments have increased about 137%. The parish permits a tax-exempt period during which new industries are not assessed. The Assessor for Jefferson Parish avers that there has been considerable construction under the exemption provision, but he is unable to estimate the dollar values involved.

Various agencies, including the New Orleans Homestead Savings and Loan League and numerous individuals appearing at the hearing in Metairie on 15 December 1947, contend that the expansion already experienced will continue and even increase in tempo as the port of New Orleans increases, provided the area is secured from the threat of floods such as that so recently experienced. Various factors are brought forward as basis for the predicted continuation of economic expansion, among them being the reduction in available building sites and the high cost of those remaining within the city; the inconvenience and cost of cross-river commuting in the case of residential development and in the case of industry the restriction of the labor supply because of the same reasons. There appears to be no information to support a contrary contention. Evidence available by inspection of the section of the City of New Orleans known as the Canal Boulevard-Lakeview section is sufficient to confirm the fact that the meanest swamp, upon being drained and protected from overflow is eagerly sought after if it has the advantage of being in or very near a large city, offering a measure of economic security to the individual.

It may be conceded, as found in the 1945 report, that the cost of a rigid wall is disproportionately great in comparison to the values of the properties which would be subjected to the hazard of flood. Moreover, it is uncertain that the rigid wall presents the most adequate

protection, particularly against hurricane waves. Heavy walls along the Gulf Coast in Harrison and Hancock Counties in the state of Mississippi were overtopped and, in short stretches, washed out, by the same hurricane which caused damage along Lake Pontchartrain.

The New Orleans flood wall has been continuously damaged by normal wave action and during the 1947 hurricane extensive damage was inflicted by overtopping wave action and undermining.

A report titled "Recent Storm Damage along the Coasts of Florida and Mississippi", published in the BULLETIN of the Beach Erosion Board dated January 1, 1948, comments that a study of the damage to floodwalls clearly revealed that the most common type of failure resulted from washing away of beach material at the toe and in the rear of the bulkheads. Inasmuch as erosion of the foreshore along the area under consideration herein is persistent and continuous, the furnishing of protection to prevent undermining of a wall-type structure appears mandatory, thus further reducing the cost-benefit ratio.

Construction of an earthen levee by enlargement landward of the existing embankment offers a number of favorable features in addition to the advantage of its lower initial construction cost. The use of the existing embankment as protection against normal high lake levels will be continued by the use of relatively light toe protection whose maintenance is a simple and inexpensive operation. The very flat slope of the enlargement section offers opportunity for high level wave action to be dissipated without over-topping. Freeboard over the highest tide of record at West End is proposed to be about 3.5 to 4 feet. Damage to the paved slope by infrequent peak storm tides will be easily repaired. Wide crown width insures effectiveness throughout a possible extended storm period and permits eventual enlargement to afford protection against higher tides when enhanced interior development so demands.

The recreational possibilities offered by a wide gently sloping fill seem to outweigh those inherent in a wall, particularly in the case

of a vertical face, sheet-pile type of wall which presents a hazard to those seeking relaxation both ashore and in small boats.

34. Conclusion. - Upon review of previous reports bearing on the project together with evidence offered and facts developed at the public hearing and through surveys conducted by the government, by the Louisiana Department of Public Works, by the Jefferson Parish Police Jury and by the Fourth Jefferson Drainage District, it is found that:

(a) Proposed flood control improvements along the lakeshore will not benefit areas in St. John the Baptist and St. Charles Parishes presently subjected to tidal overflow from Lake Pontchartrain, unless provision is made for an extensive drainage program, which local interests aver is not feasible at this time.

(b) Improved and developed lowlands in Jefferson Parish may be protected from inundation due to high tides in Lake Pontchartrain, including intensities of hurricane-driven tides of record, by landside enlargement of the existing lakeshore embankment with suitable toe protection works, at a cost commensurate with the experienced annual damage and foreseeable benefits accruing from the improvement.

An examination of the costs for construction of protective works capable of withstanding the maximum hurricane-driven tides considered possible, disclosed that these costs are of such magnitude as to exceed the economic justification favoring the project at this time. The recommended project proposes a degree of protection which is considered to be the maximum which can be justified at this time. In the future, as development progresses, the project should be again reviewed to determine whether an increased amount of protection is then justifiable. If increased protection is found feasible in the future the recommended plan lends itself readily to modification.

(c) An obligation rests upon local interests as represented by the Fourth Jefferson Drainage District to prevent interior flooding resulting from rainfall over the area. Improvement of protection by the Federal Government will permit return to use of lands necessarily abandoned because of the lack of such protection, and will considerably enhance

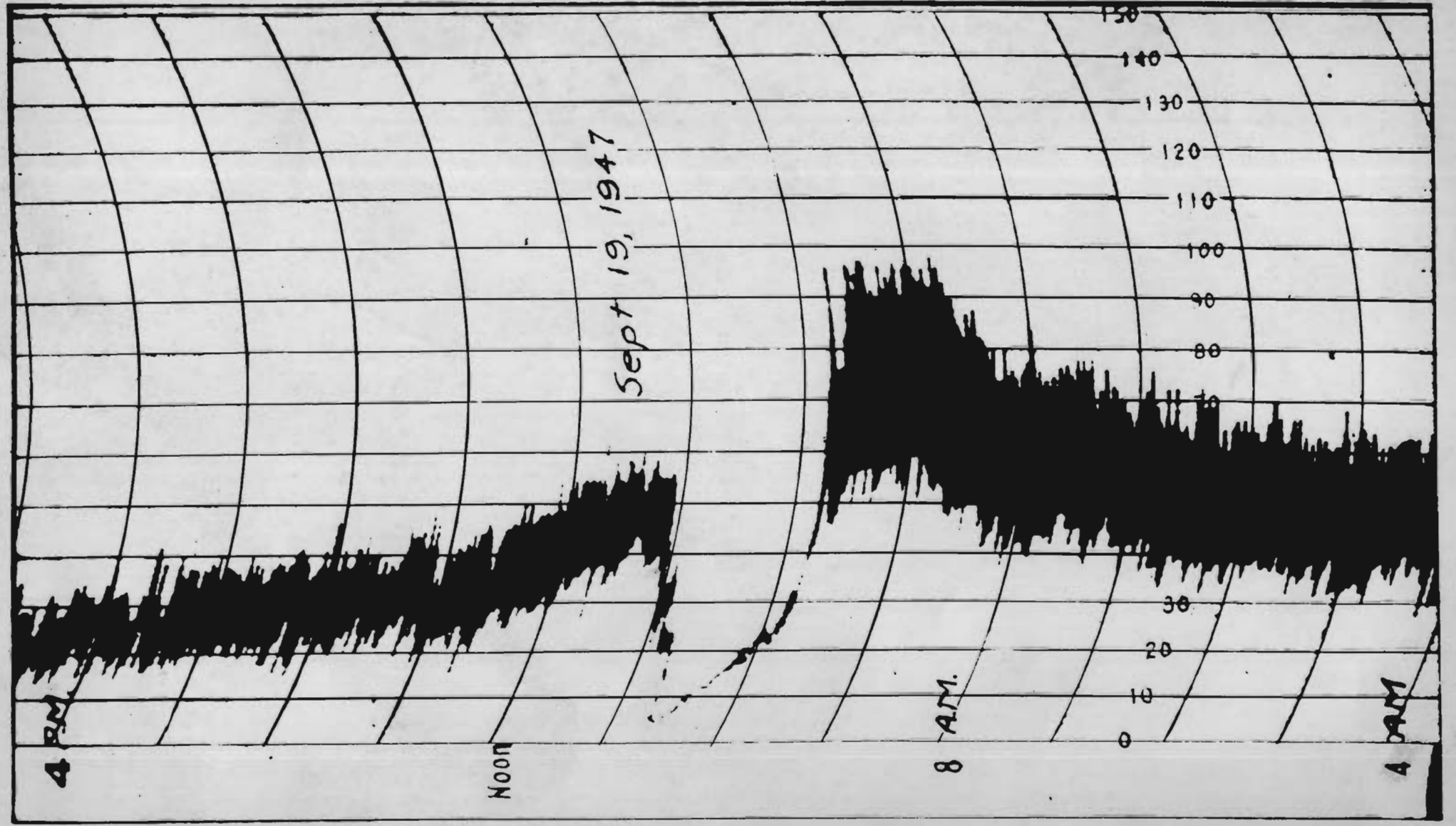


the value of all lands in the district. By reason of the land enhancement features of the project substantial contribution by local interests is justified. The contribution can best be made in the main by providing for interior drainage on a scale commensurate with the present development of the area with drainage improvement in the future to progressively follow the development in the protected area as required.

35. Recommendation. - It is recommended that the approved project for Lake Pontchartrain, La., be revised to provide for construction of the landside enlargement of the existing embankment to increased grade, wider crown and flatter slopes than proposed therein, substantially as described in paragraph 29 (c) hereof, at an estimated initial cost to the United States of \$5,100,000 subject to the condition that local interests - (a) provide free of cost to the United States all lands, easements and rights-of-way necessary for the improvement and contribute \$300,000 to the initial cost of construction, over and above the amount to be expended for initial drainage improvement as required below; - (b) undertake rehabilitation and improvement of the drainage facilities of the Fourth Jefferson Drainage District at an estimated initial cost of \$1,500,000, progressively increasing and augmenting these facilities to keep abreast of the requirements of expanding development in the protected area; - (c) hold and save the United States free from damages due to the improvement; - and (d) furnish assurances satisfactory to the Secretary of the Army that they can and will alter bridges and rehabilitate and improve existing facilities, including drainage canals and pumping plants as required under paragraph 29 (d) hereof, prevent the erection of structures on the embankment or rights-of-way therefor except as may be approved by the Chief of Engineers, and maintain and operate all the works after completion.

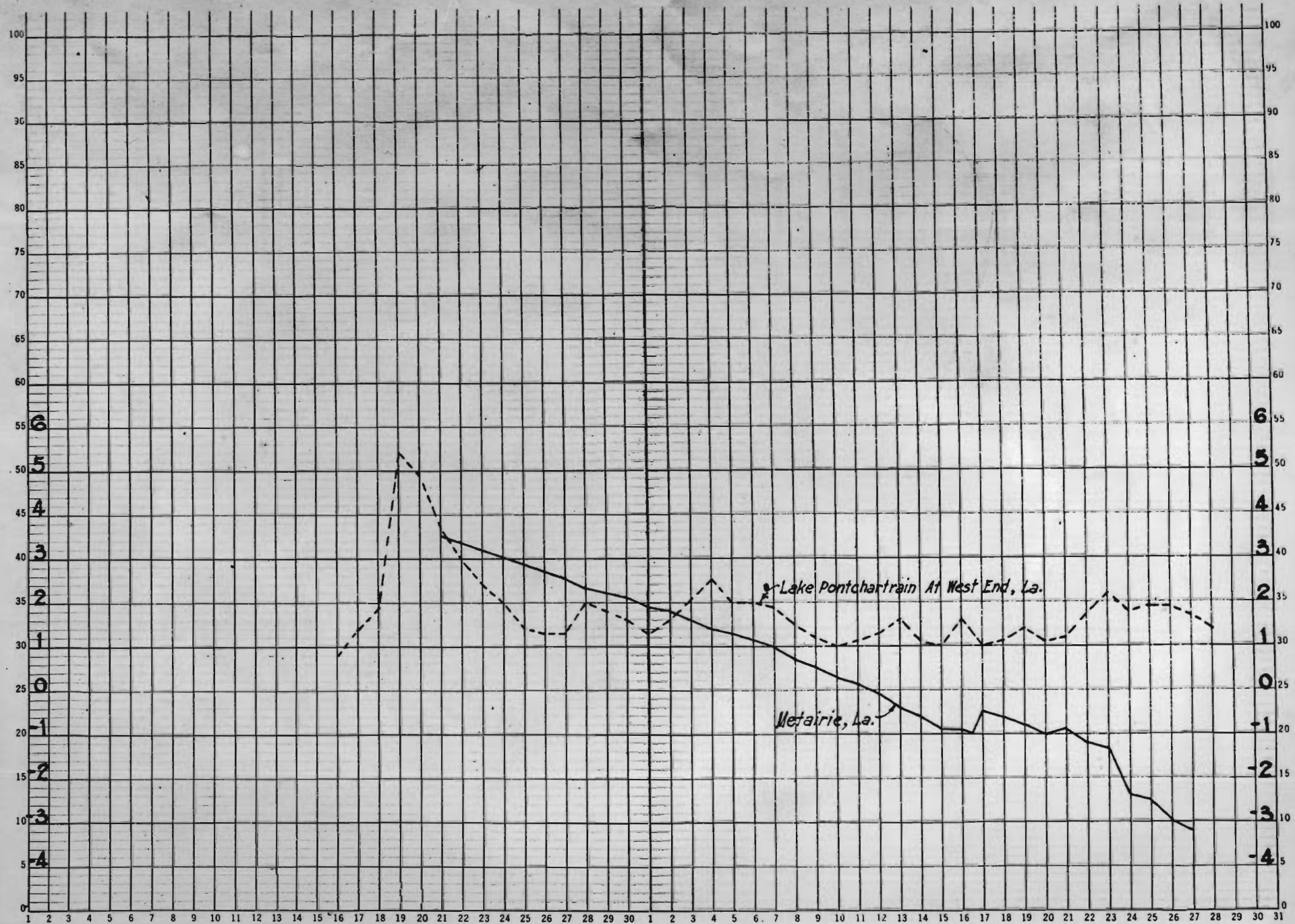
JOHN R. HARDIN  
Colonel, CE  
District Engineer





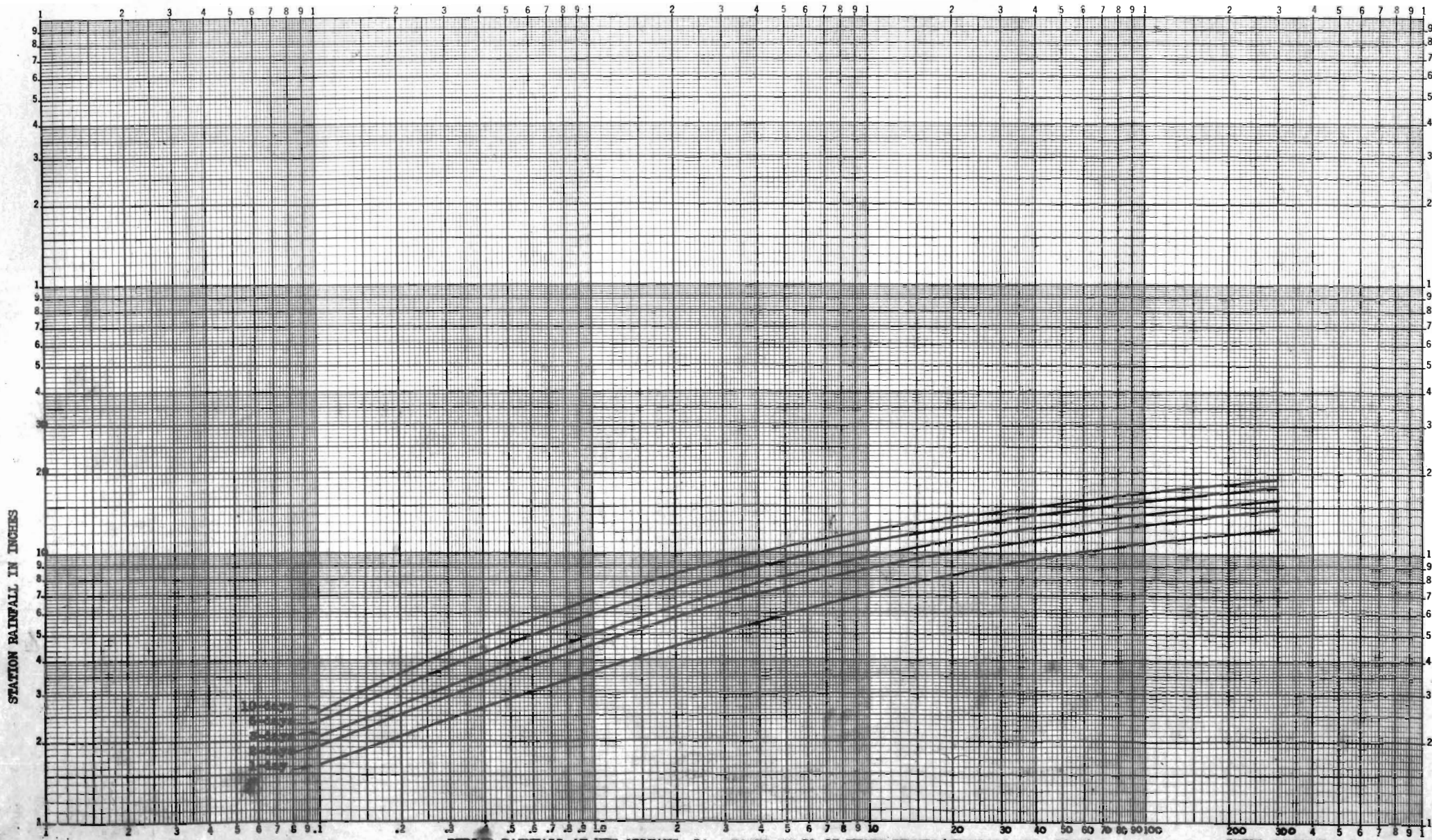
WIND VELOCITY RECORDED ON MISSISSIPPI RIVER BRIDGE, NEW ORLEANS  
 VELOCITIES IN MILES PER HOUR

STAGE IN FEET M.S.L.



Month SEPTEMBER 1947

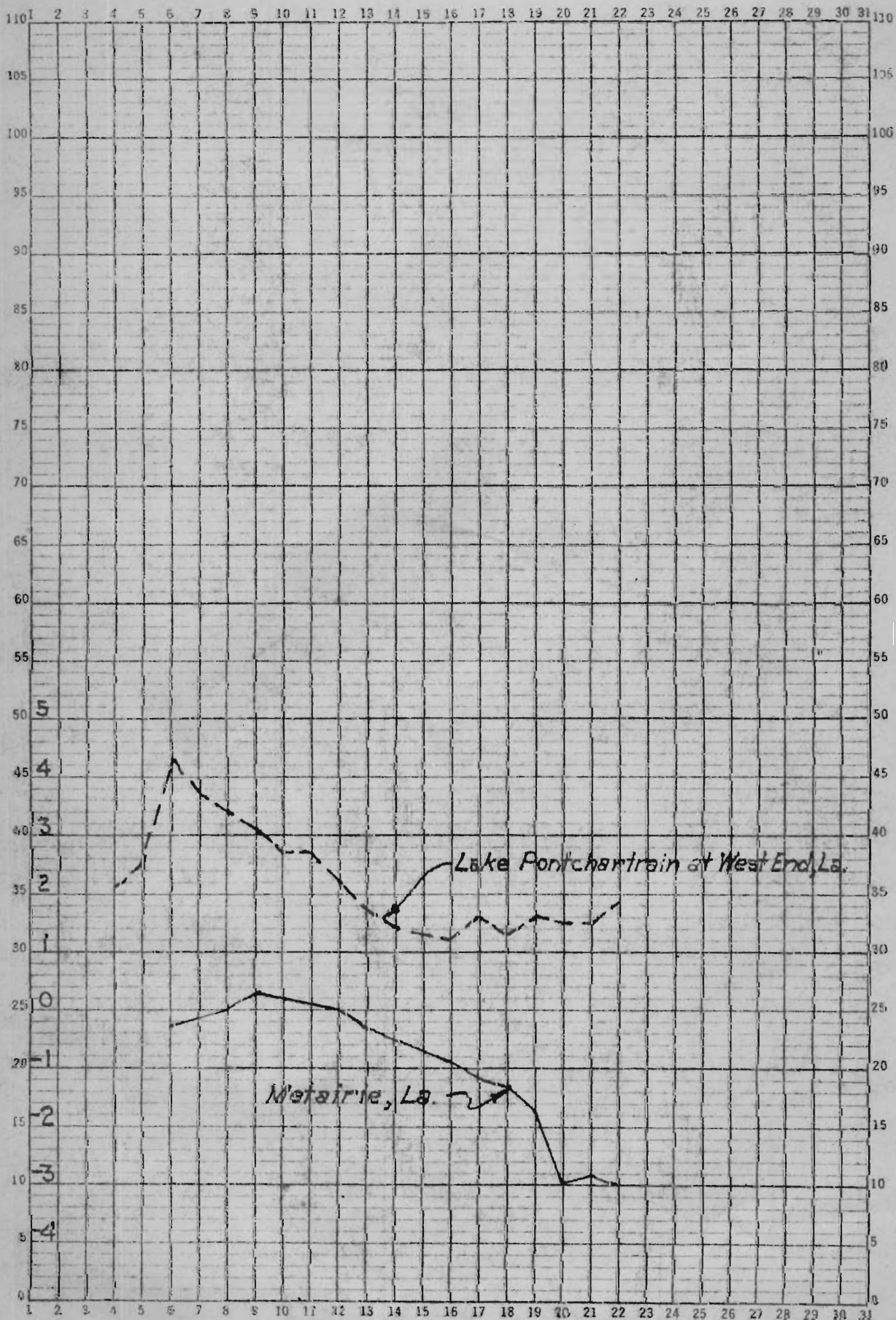
Month OCTOBER 1947



PERIOD RAINFALL AT NEW ORLEANS, LA. BASED ON 51.25 YEARS RECORD (JUNE 1896-AUG. 1947)  
 PROBABLE FREQUENCY IN YEARS OF EQUAL OR GREATER AMOUNT.

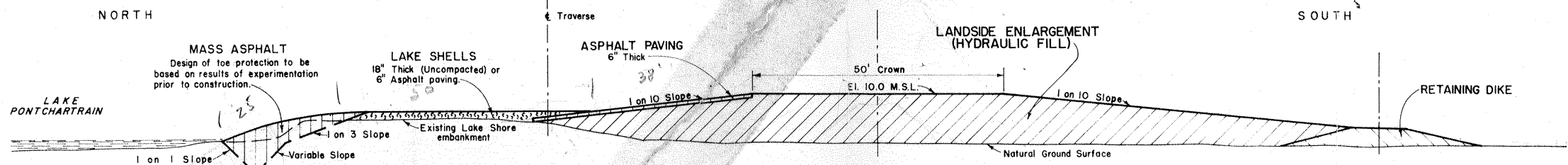
KEUFFEL & ESSER CO., N. Y. NO. 309-125 L  
 Logarithmic, 5 x 3 Cycles.

STAGE IN FEET M. S. L.



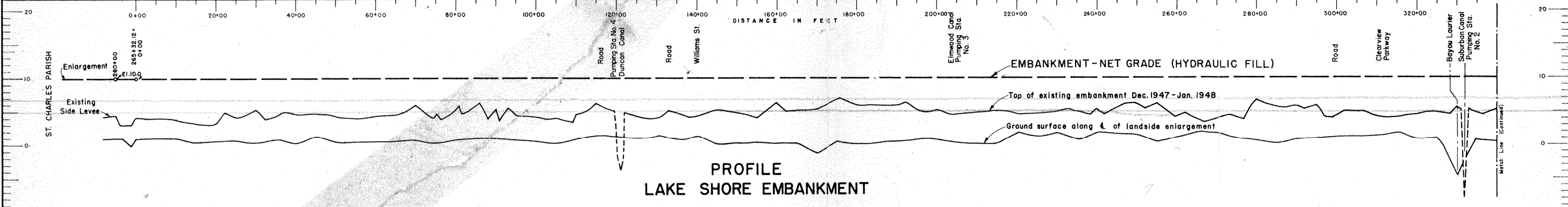
Month MARCH 1948

PLATE 4

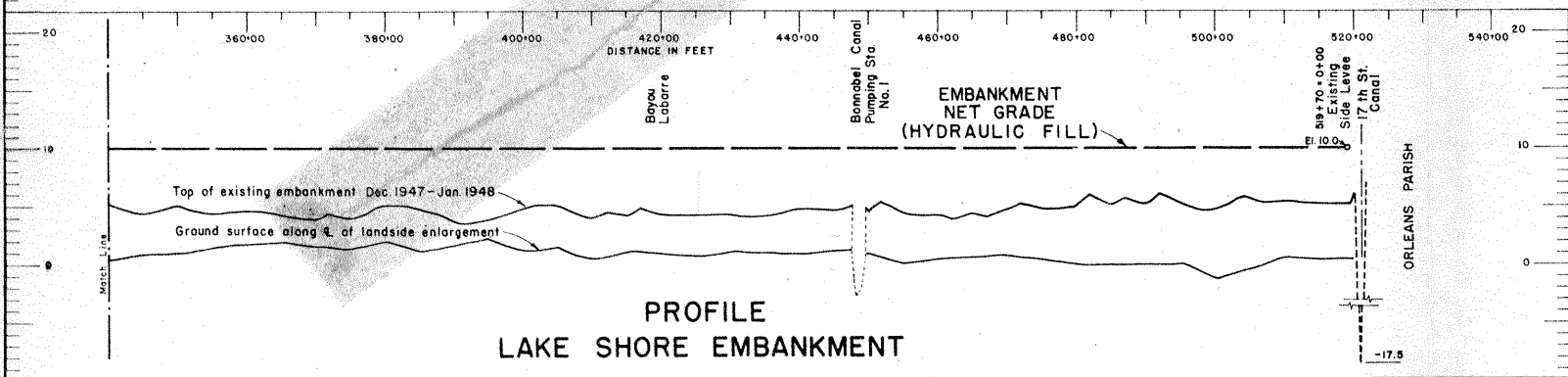


TYPICAL SECTION LAKE SHORE EMBANKMENT

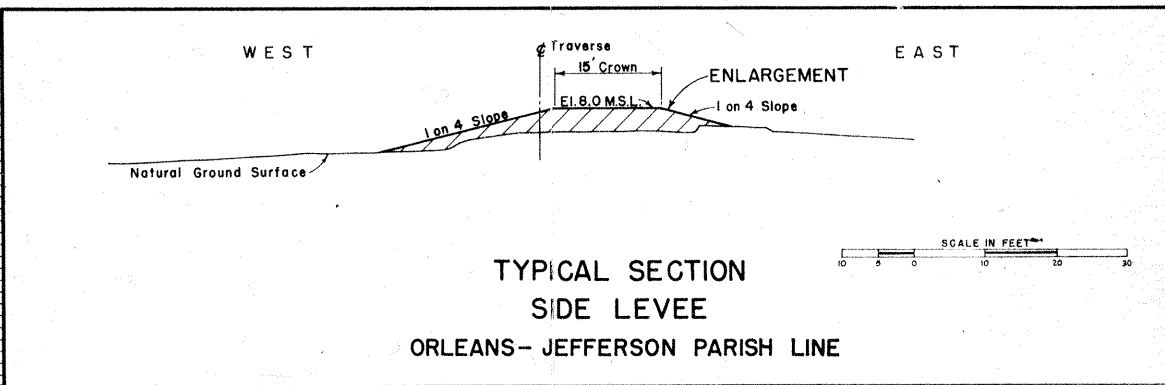
SCALE IN FEET



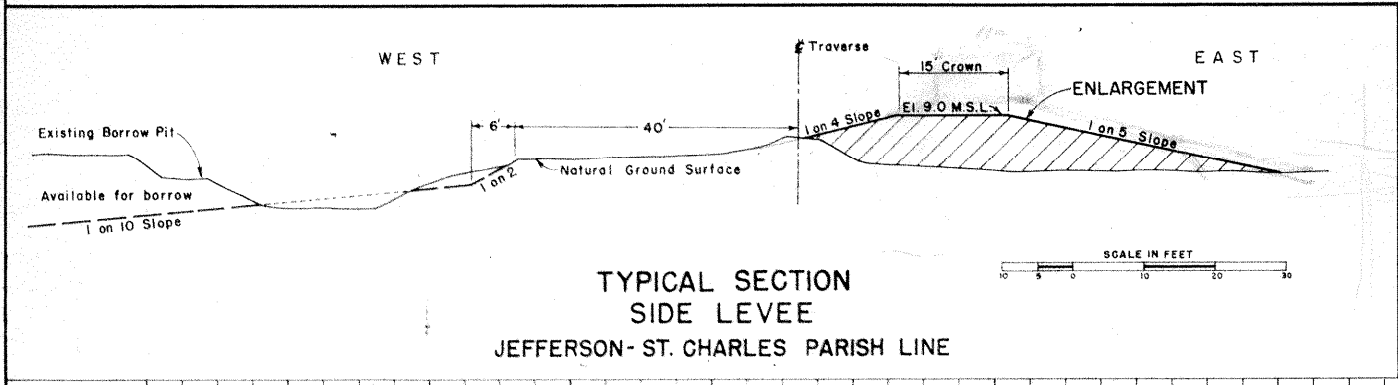
PROFILE LAKE SHORE EMBANKMENT



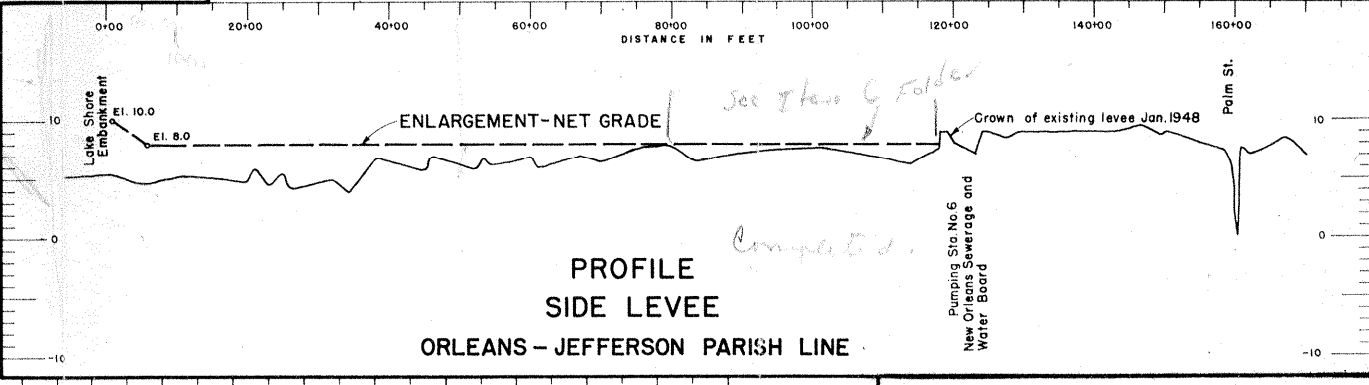
PROFILE LAKE SHORE EMBANKMENT



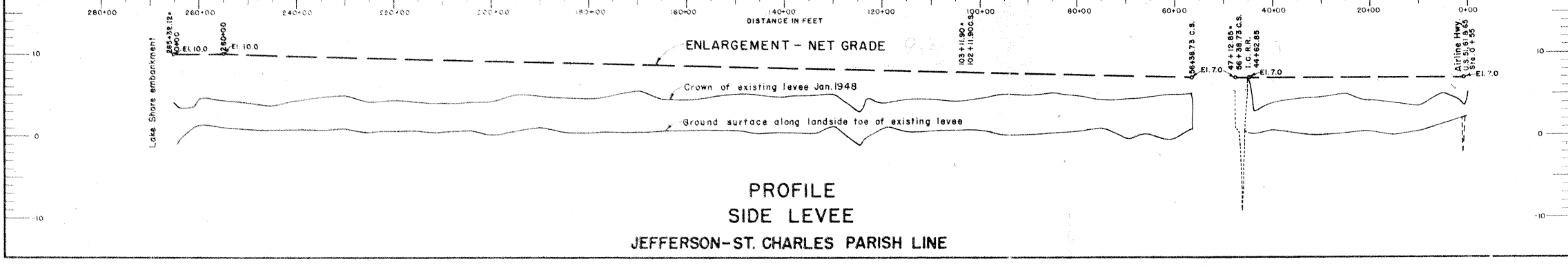
TYPICAL SECTION SIDE LEVEE ORLEANS-JEFFERSON PARISH LINE



TYPICAL SECTION SIDE LEVEE JEFFERSON-ST. CHARLES PARISH LINE



PROFILE SIDE LEVEE ORLEANS-JEFFERSON PARISH LINE



PROFILE SIDE LEVEE JEFFERSON-ST. CHARLES PARISH LINE

NOTE: For location see extent of development and recommended plan of improvement, drawing File No. H-2-16380.

LAKE PONTCHARTRAIN JEFFERSON PARISH, LA. LAKE SHORE EMBANKMENT AND SIDE LEVEES PROFILES AND TYPICAL SECTIONS

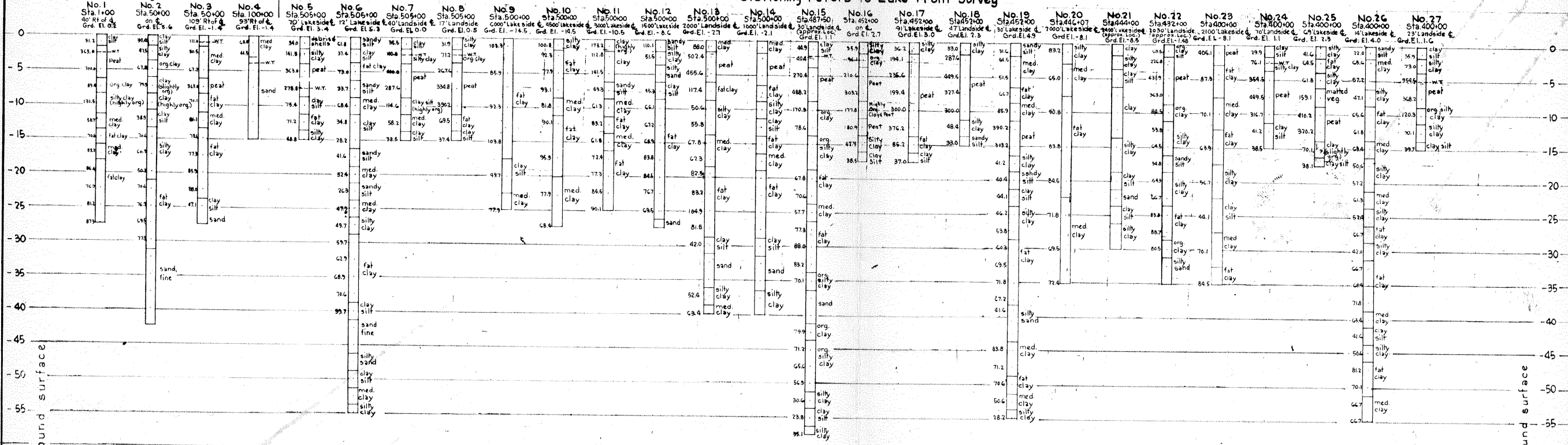
IN 1 SHEET SCALES AS SHOWN ELEVATIONS REFER TO MEAN SEA LEVEL TO ACCOMPANY REVIEW OF REPORTS DATED 15 APRIL 1948

ORLEANS-JEFFERSON PARISH LINE

Stationing refers to Survey of 17th St. Canal Levee

LAKE FRONT

Stationing refers to Lake Front Survey

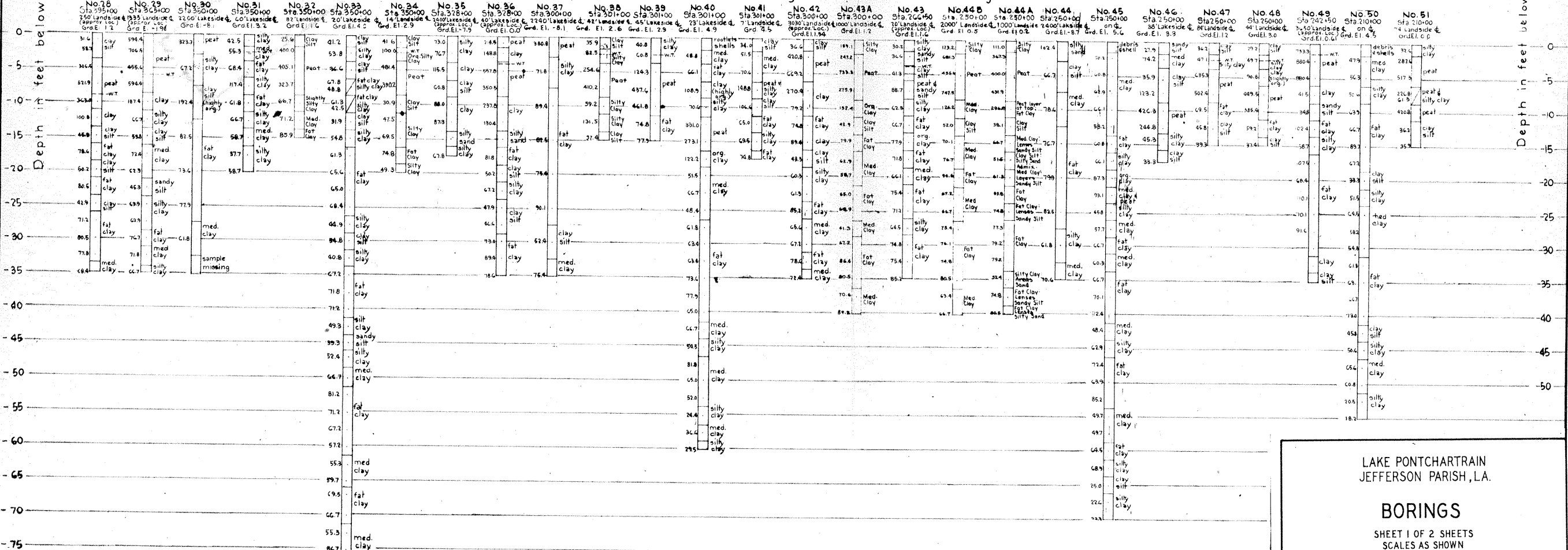


Depth in feet below ground surface

Depth in feet below ground surface

LAKE FRONT

Stationing refers to Lake Front Survey



Depth in feet below ground surface

Depth in feet below ground surface

LAKE PONTCHARTRAIN  
JEFFERSON PARISH, LA.

**BORINGS**

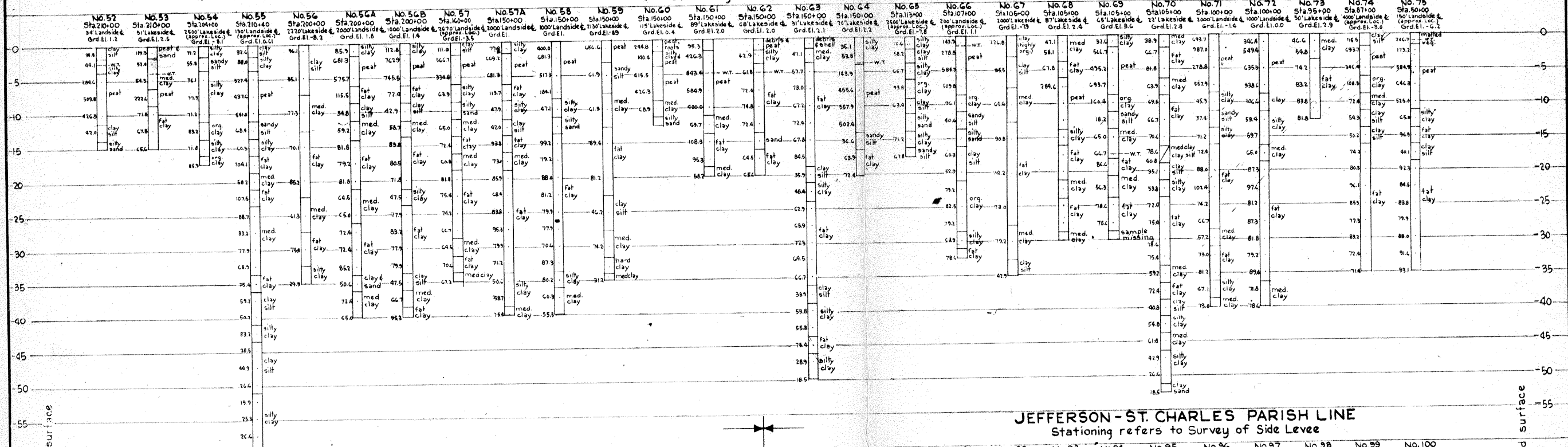
SHEET 1 OF 2 SHEETS  
SCALES AS SHOWN

TO ACCOMPANY REVIEW OF REPORTS  
DATED 15 APRIL 1948

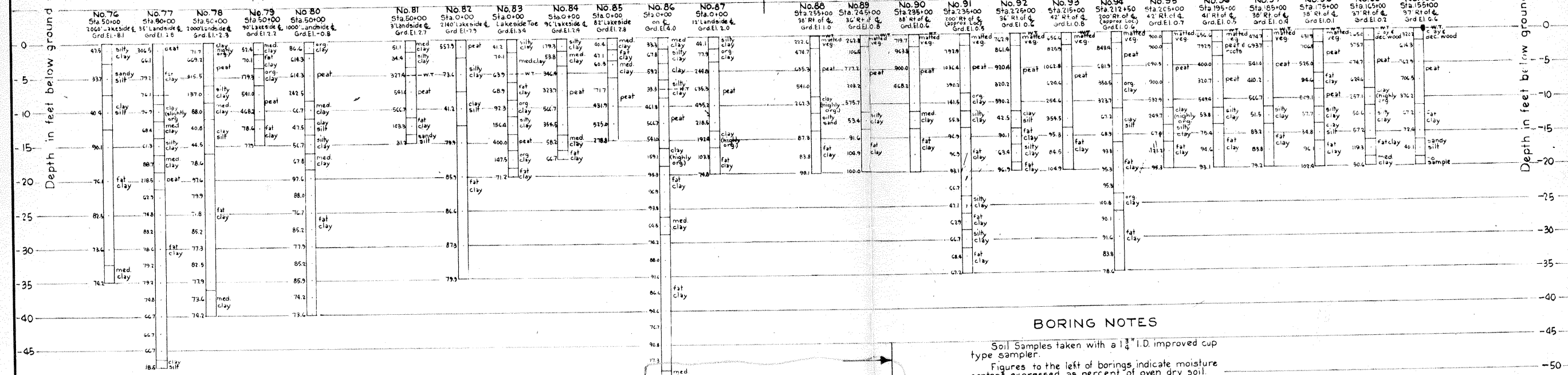
NOTE:  
See Sheet No. 2 for Boring Notes.



LAKE FRONT  
Stationing refers to Lake Front Survey



JEFFERSON-ST. CHARLES PARISH LINE  
Stationing refers to Survey of Side Levee



BORING NOTES

Soil Samples taken with a 1 1/4" I.D. improved cup type sampler.  
 Figures to the left of borings indicate moisture content expressed as percent of oven dry soil.  
 Traces of foreign material, roots, decayed wood etc., humus up to 10% not shown on boring log.  
 Little Woods Gage avg. reading 11.65, Oct. 20-29, 1947 and 10.73, Dec. 30, 1947 - Feb. 17, 1948. Zero of gage = -9.90 M.S.L.  
 Date of Borings: Nos. 15, 21, 22, 28, 29, 35, 36, 42, 43, 49, 54, 55, 57, 66, 74, 75, 91, 94 and 101, Oct. 20-29, 1947.  
 All other borings taken Dec. 30, 1947 - Feb. 17, 1948.  
 Job Slip Nos. 53777, 54409, 54410, 54429, 54439, 54440, 54444, 54521, 54545, 54683, 54684 and 54685.

LAKE PONTCHARTRAIN  
JEFFERSON PARISH, L.A.

BORINGS

SHEET 2 OF 2 SHEETS  
 SCALES AS SHOWN  
 TO ACCOMPANY REVIEW OF REPORTS  
 DATED 15 APRIL 1948

LAKE PONTCHARTRAIN, LOUISIANA  
 TABULATION OF FLOOD DAMAGES REPORTED FOLLOWING THE HURRICANE ON SEPTEMBER 19, 1947,  
 IN JEFFERSON, ST. CHARLES AND ST. JOHN THE BAPTIST PARISHES.

		DAMAGE IN JEFFERSON PARISH	DAMAGE IN ST. CHARLES PARISH	DAMAGE IN ST. JOHN THE BAPTIST PARISH	
Exhibit C	Damage Survey for Police Jury by M. H. Caraway Company Unaccounted for in above survey. (See Caraway letter - 12/9/47)	\$2,599,215.00	-	\$32,000.00	(A)
					(A) Estimated by members of Parish Police Jury
Exhibit D	Police Jury, Jefferson Parish, La.	50,000.00	-	-	
Exhibit E	East Jefferson Sewerage District No. 1	85,776.80	-	-	
Exhibit I	Fourth Jefferson Drainage District	23,500.00	-	-	
Exhibit Q	Moisant International Airport	67,232.67	-	-	
Exhibit R	Louisiana Power & Light Company	100,500.00	-	-	
Exhibit S	Southern Bell Tel. & Tel. Co.	14,529.00	500.00	-	
Exhibit T	Gulf Refining Company	13,500.00	500.00	-	
Exhibit U	Illinois Central Railroad	1,325.00	250.00	-	
Exhibit W	Standard Oil Co. of N.J.	200.00	-	-	
Exhibit Y	Radio Station WWL	2,000.00	-	-	
	Pontchartrain Levee District	10,000.00	-	-	
	American Red Cross	78,300.00	-	-	
Exhibit V	East Jefferson Waterworks Dist. No. 1	350,000.00	-	-	
Exhibit X	Department of Highways, State of La.	17,000.00	-	-	
	U. S. Engineer Department	25,904.62	-	-	
	Indeterminate and collateral losses	175,000.00	-	-	
		285,500.00	9,300.00	8,000.00	
	TOTAL DAMAGE REPORTED	\$ 3,899,483.09	\$ 10,550.00	\$ 40,000.00	
		\$3,950,033.09			

APPENDIX A

ESTIMATE OF QUANTITIES  
AND COSTS

ESTIMATE OF QUANTITIES AND COSTS

FLOODWALL ALONG LAKE PONTCHARTRAIN FROM ORLEANS-JEFFERSON  
PARISH LINE WESTWARD TO THE VICINITY OF FRENIER, LOUISIANA

1. (a) Floodwall along shore of Lake Pontchartrain from West End, (Orleans-Jefferson Parish Line), westward and northward to the vicinity of Frenier, La.

(b) Hydraulic Backfill.

(c) Enlargement of return side levee along the Orleans-Jefferson Parish line and to three pumping stations along the lakefront.

2. TYPE OF WALL: Same as described for Jefferson Parish.

Length of Wall 94,400 Lin. Ft.

3. CONCRETE:

(a) Sheet Piling -

94,400 Lin. Ft. x 30' x 1' = 2,832,000 Cu. Ft.

(b) Cap and Waler -

94,400 Lin. Ft. x 10.735' = 1,013,384 Cu. Ft.

Total 3,845,384 Cu. Ft.

142,422 Cu. Yds.

4. REINFORCING BARS:

From estimate for Jefferson Parish Front: -

Weight per pile 481.024 lbs.

Total Weight - 47,200 piles @ 481.024  
lbs. = 22,704,333 lbs.

5. BOLTS, WASHERS AND SEPARATORS:

(a) Bolts: -

47,200 ea. - 1" x 22" - 264,320 lbs.

35,400 ea. - 1" x 30" - 261,250 lbs.

17,700 ea. - 3/4" x 12" - 31,860 lbs.

Weight of Bolts 557,430 lbs.

(b) Washers: -

165,200 ea. - 1" O.G. - 371,700 lbs.

35,400 ea. - 3/4" O.G. - 53,100 lbs.

94,400 ea. - 5" x 5" x 1/2" Pl. 334,176 lbs.

Weight of Washers 758,976 lbs.

(c) Separators:

94,400 ea. - 1-1/2" Dia. pipe x 3" 63,720 lbs.

6. STRUCTURAL STEEL:

188,800 Lin. Ft. - 12" Channel @ 20.7# 3,908,160 lbs.

94,400 Lin. Ft. - 7" " @ 9.8# 925,120 lbs.

188,800 Lin. Ft. - 5" Angle @ 16.2# 3,058,560 lbs.

Weight of Shapes 7,891,840 lbs.

11,800 ea. - 2" x 25 Ft. Tie Rods with upset threads, turn-  
buckles and piling collars and pin connectors.

7. FORM LUMBER:

10 Ft. B.M. per Lin. Ft. of Wall

94,400 Lin. Ft. @ 10 ft. 944 MBM

8. MISC. HARDWARE:

Wire, Nails - Drift Pins, etc.

5 lbs. per Line. Ft. of Wall

94,400 Lin. Ft. @ 5 lbs. 472,000 lbs.

9. CREOSOTED TIMBER PILES:

11,800 Bents - 8' c. to c.

2 - 40 Ft. Piles to bent

23,600 Piles @ 40 Ft. 944,000 Lin. Ft.

10. CREOSOTED TIMBER WALING:

5,900 pcs. - 12" x 12" - 18' 1,274,400 Ft. B.M.

11. EXCAVATION FOR WALERS AND TIE RODS:

Waler Trench - 2' x 2' x 40,000' = 160,000 Cu. Ft.

Tie Rods - 1' x 2' x 12-1/2 x 5000 = 125,000 Cu. Ft.

Total Volume 285,000 Cu. Ft.

10,500 Cu. Yds.

12. CEMENT:

6.0 Bags per Cu. Yd. - 213,650 Barrels

ESTIMATE OF COSTS

1. Concrete - 142,422 cu. Yds @ \$35.00 \$4,984,770

2. Driving Concrete Piles -

	47,200 Piles - 30 Ft. each - 1,416,000 lin. ft. - 1,416,000 lin. ft. @ 0.55	\$ 778,800
3.	Creosoted Timber Piles - 944,000 Lin. Ft. @ \$2.00 per Lin. Ft.	1,888,000
4.	Creosoted Timber Waling - 1,274,400 BM @ \$250.00 per M	318,600
5.	Structural Steel - 7,891,840 lbs. @ \$0.15	1,183,776
6.	Tie rods, Turnbuckles and Collars - 11,800 each @ \$100.00	1,180,000
7.	Reinforcing Bars - 22,704,333 lbs. @ \$0.10	2,270,433
8.	Bolts - 557,430 lbs. @ \$0.15	83,614
9.	Washers and Separators - Not galvanized 822,696 lbs. @ \$0.09	74,043
10.	Misc. Hardware - 472,000 lbs. @ \$0.12	56,640
11.	Form Lumber 944 M sq. ft. forming @ \$125.00	118,000
12.	Excavation for Walers & Tie Rods - 10,500 Cu. Yds. @ \$2.00	21,000
13.	Cement - 213,650 Bbls. @ \$4.00	<u>854,600</u>
	Sub-Total	\$13,812,276
14.	Backfill - As per estimate for Jefferson Parish - 94,400 Lin. Ft. @ 108.8 Cu. Yds. per Lin. Ft. Total Volume - 10,270,720 Cu. Yds. Estimated Unit Cost - 17½ cents per Cu. Yd. 10,300,000 Cu. Yds. @ \$0.15	\$ 1,802,500

15. Enlarging return side Levee along Orleans-Jefferson Parish Line - 50,000 Cu. Yds. @ \$1.00	\$ 50,000
16. Enlarging and Bulkheading return levees along outfall canals at three pumping stations in Jefferson Parish - See Pars. 1(d) and 5 of "Estimate of Quantities and Costs - Hydraulic Fill Fronting Jefferson Parish" -	\$ 63,000
Total Estimated Construction Cost	\$ 15,727,776
Surveys, Planning, Inspection and Overhead - 25%	3,931,944
	\$ 19,659,720
<u>Estimate of Economic Cost (Par. 4202.18 O. &amp; R.)</u>	
Total Construction First Cost	\$ 19,660,000
Contribution of Local Interests	300,000
Federal Construction Cost.	\$ 19,360,000
Interest during Construction	
Estimated Construction time - 4 years	
3% of \$19,360,000 for 2 years	1,161,600
GROSS FEDERAL INVESTMENT	\$ 20,521,600
Federal Annual Charges:	
Interest at 3% of \$20,521,600 = \$615,648	
Amortization @ 3% for 40 years = 0.01326 x	
\$20,521,600 =	\$272,116
Total Federal Annual Charges	\$ 887,764
Non-Federal Investment:	
Estimated value of lands to be furnished -	
Cash Contribution	300,000
180 Acres Jefferson Parish @ \$1,000 per Acre	180,000
150 Acres St. Charles & St. John the Baptist Parishes @ \$200.00 per Acre	30,000
Rehabilitation of 4th Jefferson Drainage Dist.	1,500,000
Alteration of 2 bridges	40,000
Reconstruction of 1 Bridge	80,000
Minor Rearrangement of Utilities	20,000
Removal of Buildings from R/W	100,000
Total Non-Federal First Cost	\$ 2,250,000

Interest during Construction period estimated to  
be 4 years -

3 $\frac{1}{2}$ % of \$2,250,000 for 2 years \$ 157,500

GROSS NON FEDERAL INVESTMENT \$ 2,407,500

Salvage value of non-federally owned portion  
of the project after 40 years - 330 Acres  
of land \$ 210,000

Net Non-Federal Investment \$ 2,197,500

Non-Federal Annual Charges:

Interest at 3 $\frac{1}{2}$ % on \$2,407,500 84,262

Amortization @ 3 $\frac{1}{2}$ % for 40 years

\$2,197,500 x 0.01183 25,996

Estimated average annual maintenance -

Earthwork - 2% of original

7,555,000 Cu. Yds. @ \$0.25 per cu. yd. 37,750

Repairs to Structure - Replacement of estimated  
200 lin. ft. of wall annually @ \$300  
per lin. ft. 60,000

No loss of Texas -

Total Non-Federal Annual Charges \$ 207,958

Total Annual Charges

Federal \$ 887,764

Non-Federal 207,958

\$1,095,722

Estimated Annual Benefits \$ 575,000

(See computation under Hyd. Fill. from Orleans-  
Jefferson Parish line to vicinity of Frenier, La.)

Ratio of Estimated Benefits to Estimated Costs

\$575,000 : \$1,095,722

1 : 0.52



ESTIMATE OF QUANTITIES & COSTS

HYDRAULIC FILL FROM ORLEANS-JEFFERSON PARISH  
LINE TO VICINITY OF FRENIER, LOUISIANA

1. (a) Hydraulic fill for landside enlargement of the lakeshore highway embankment from West End, (Orleans-Jefferson Parish Line), westward and northward to the vicinity of Frenier, La.

(b) Mass Asphalt - or combination of mass asphalt and riprap now available at the site - for protection of the lakeside face and toe of the existing embankment.

(c) Asphalt paving on lakeside slope of hydraulic fill.

(d) Shell surfacing of lakeside berm of hydraulic fill to prevent erosion by backwash action of waves.

(e) Bituminous binder for shell surfacing.

(f) Enlarging return side levee along the Orleans-Jefferson Parish Line.

(g) Enlarging side levees along outfall canals from 3 pumping stations to Lake Pontchartrain.

(h) Dressing, fertilizing and seeding crown and landside slope of hydraulic fill enlargement.

2. (a) Lakefront enlargement from Orleans-Jefferson Parish line to vicinity of Frenier (excluding Bonnet Carre Floodway).

Total Distance 106,800 Linear Feet

Bonnet Carre Spillway 12,400 " "

Net Distance 94,400 " "

Net Grade - 10.0 M.S.L.

Crown Width- 50.0 Feet

Side Slopes- 1 on 10

Estimated gross quantity per lin. ft. - 182 Cu. Yds.  
(See estimate for Jefferson Parish Front)

Total Gross Hydraulic Fill - 17,180,800 Cu.Yds.

(b) Mass Asphalt:

Average Cross sections as shown on plans

Volume approx. 80 cu. ft. per lin. ft. of embankment.

Weight approx. 4 tons per lin. ft. of embankment

Estimated total volume for 94,400 linear feet -

377,600 Tons

(c) Slope Paving:

Average Width - 60 feet

Depth - 6 inches

Weight - Approx. 1.33 tons per lin. ft.  
of embankment

Estimated total volume - 125,867 tons

(d) Shell Surfacing:

Volume approx. 45 cu. ft. per lin. foot of embankment (uncompacted).

Estimated total volume for 94,400 linear feet -

157,333 Cu.Yds.

(e) Bituminous Binder:

94,400 lin. ft. x 30 ft. = 314,667 sq. yds.

(f) Enlarging Side Levee along Orleans-Jefferson Parish Line:

Total Estimated quantity 50,000 Cu.Yds.  
(See estimate for Jefferson Parish)

(g) Enlarging Side Levees along Outfall Canals: -

Total estimated quantity of earthwork - 50,000  
Cu. Yds.

Bulkhead along levee 4,000 Lin.Ft.  
(See Estimate for Jefferson Parish)

(h) Dressing, fertilizing and Seeding: -

Lakeshore embankment

Average Width - 150 feet

Total Length - 94,400 feet

Estimated Total - 325 Acres

3. Costs: -

Item 2 (a) - 17,180,800 Cu. Yds. @ \$0.15 -	\$ 2,577,120
Item 2 (b) - 377,600 Tons @ 8.50 -	3,209,600
Item 2 (c) - 125,867 Tons @ 8.50 -	1,069,869
Item 2 (d) - 157,333 Cu.Yds. @ 2.25 -	353,999
Item 2 (e) - 314,667 Sq.Yds. @ 0.30 -	94,400
Item 2 (f) - 50,000 Cu.Yds. @ 1.00 -	50,000
Item 2 (g) - (50,000 Cu.Yds. @ .30) ( 4,000 Lin.Ft. @12.00) -	63,000
Item 2 (h) - 325 Acres @300.00 -	<u>97,500</u>
Total Estimated Construction Cost	\$ 7,515,488
Surveys, Planning, Inspection and Overhead - 25%	<u>1,878,872</u>
	\$ 9,394,360
<u>Estimate of Economic Cost (Par. 4202.18 O. &amp; R.)</u>	
Total Construction Cost . . . . .	\$ 9,400,000
Contribution of Local Interests	<u>300,000</u>
Federal Construction Cost	\$ 9,100,000
Interest during Construction:	
Estimated Construction time - 4 years	
3% of \$9,100,000 for 2 years	<u>546,000</u>
GROSS FEDERAL INVESTMENT	\$ 9,646,000
Federal Annual Charges:	
Interest 3% of \$9,646,000 = \$289,380	
Amortization at 3% for 40 years =	
\$9,646,000 x 0.01326 - <u>127,900</u>	
Total Federal Annual Charges	\$ 417,280
Non-Federal Investment:	
Cash Contribution	300,000
Estimated value of lands to be furnished -	
240 Acres Jefferson Parish @ 1,000 per Acre -	240,000
195 Acres St. Charles & St. John Parishes	
@ \$200 per Acre	39,000
Rehabilitation of 4th Jefferson Drainage	
District	1,500,000

Alteration of 2 bridges	φ	40,000
Reconstruction of 1 bridge		80,000
Minor rearrangement of utilities		20,000
Removal of buildings from R/W		<u>100,000</u>
Total Non-federal first Cost	φ	2,319,000
Interest during Construction: -		
Estimated Construction Time - 4 years.		
3½% of φ2,319,000 for 2 years		<u>162,330</u>
Gross Non-Federal Investment	φ	2,481,330
Salvage value of non-federally owned portion of the project after 40 years:		
435 Acres of land		<u>279,000</u>
Net Non-Federal Investment	φ	2,202,330
Non-Federal Annual Charges:		
Interest at 3½% on φ2,481,330		86,846
Amortization at 3½% for 40 years =		
φ2,202,330 x 0.01183		26,054
Estimated average annual maintenance:		
<u>Earthwork</u> - 2% of original 14,160,000 cu. yds. @ φ0.25		70,800
<u>Asphalt</u> - 2% of original 503,467 Tons @ φ8.50		85,589
<u>Shell Surfacing</u> - 2% of original 157,333 Cu. Yds. @ φ3.00		9,441
No Loss of Taxes		-
Total Non-Federal Annual Charges	φ	<u>278,730</u>
Total Annual Charges: -		
Federal	φ	417,280
Non-Federal		<u>278,730</u>
		φ696,010

Estimated Annual Benefits:

Jefferson Parish - (See Par. 31) \$ 573,000

St. Charles Parish:

1947 Tax-Assessment valuation \$9,238,398

1942 " " " 7,941,388

6-Year Increase \$ 1,297,010

Annual Increase 216,170

Experienced flood damage 10,000

Flood damage is 1/10th of 1% of

1947 valuation - Estimated future damage

will be at the rate of 1/10th of 1% of the

rate of economic increase without protection,

or \$216,170.00 x 0.001 \$216.00

Estimated annual damage based on

recurrence of \$10,000 damage each

13 years - 1/13th of \$10,000 770.00

Estimated annual benefit - St. Charles Parish 986.00

Estimated annual benefit St. John the

Baptist Parish (assumed) 986.00

Total Estimated Annual Benefit \$575,000

Ratio of Estimated Benefits to Estimated Cost

\$575,000 : \$696,010

1 : 0.83

ESTIMATE OF QUANTITIES AND COSTS

FLOODWALL FRONTING JEFFERSON PARISH

1. (a) Floodwall along shore of Lake Pontchartrain from West End, (Orleans-Jefferson Parish line), westward to the Jefferson-St. Charles Parish line.

(b) Hydraulic Backfill.

(c) Enlargement of return side levees along St. Charles-Jefferson and Jefferson-Orleans Parish lines and to three pumping stations along the lakefront.

2. Type of Wall: - As sketched. Adapted from single bulkhead wall along inshore sections of New Orleans Airport, constructed in 1931. Located along approximate centerline of existing lakeshore embankment.

Average ground elevation at Wall	4 3.0 M.S.L.
Top of File	4 9.0 "
Length of File	30 Feet
Penetration, Minimum 19 feet - Average 24 feet	
Shape of File - T. & G. - 12" x 24"	
Length of Wall (Jefferson Parish) - 52,000 lin. ft.	

3. Concrete: -

(a) Sheet Piling -

52,000 lin. ft. x 30' x 1' = 1,560,000 cu. ft.

(b) Cap and Waler -

52,000 lin. ft. x 10.735' = 558,220 cu. ft.

Total 2,118,220 cu. ft.

78,455 Cu. Yds.

4. Reinforcing Bars: -

Per File - 8 ea. - 3/4" x 30' = 240'

240' x 1.5 lbs. = 360,000 lbs.

Per File - 57 ea. - 3/8" x 5' = 285'

285' x 0.376 lbs. = 107,160 lbs.

Per Pile - 2 ea. - 3/8" x 6' = 12'  
12' x 0.376 lbs. = 4.512 lbs.

Per Pile - 7 ea. - 1/2" x 2' = 14'  
14' x 0.668 lbs. = 9.352 lbs.

Total Per Pile 481.024 lbs.

Total Weight - 26,000 x 481.024 = 12,506,624 lbs.

5. Bolts, Washers and Separators:

(a) Bolts -

26,000 ea. - 1" x 22" 145,600 lbs.  
19,500 ea. - 1" x 30" 143,900 lbs.  
9,750 ea. - 3/4" x 12" 17,500 lbs.  
Weight of Bolts 307,000 lbs.

(b) Washers -

91,000 ea. - 1" O.G. 204,750 lbs.  
19,500 ea. - 3/4" O.G. 29,250 lbs.  
52,000 ea. - 5" x 5" x 1/2" Pl. 184,080 lbs.  
Weight of Washers 418,080 lbs.

(c) Separators -

52,000 ea. - 1-1/2" x 3" 35,100 lbs.

6. Structural Steel: -

104,000 lin. ft. 12" Channel @ 20.7# - 2,152,800 lbs.  
52,000 " " 7" " @ 9.8# - 509,600 lbs.  
104,000 " " 5" Angle @ 16.2# - 1,684,800 lbs.  
Weight of Shapes 4,347,200 lbs.

6,500 ea. - 2" x 25 ft. Tie Rods w/upset threads,  
turnbuckles and piling collar and pin  
connectors -

7. Form Lumber: -

10 ft. BM per lin. ft. of Wall  
52,000 lin. ft. x 10 520 M.B.M.

8. Misc. Hardware: -

Wire, Nails, Drift pins, etc.  
5 lbs./lin. ft. 260,000 lbs.

9. <u>Creosoted Timber Piles:</u> -		
13,000 ea. @ 40 ft.		520,000 lin. ft.
10. <u>Creosoted Timber Waling:</u> -		
3,250 pcs. - 12" x 12" - 18'		702,000 ft. B.M.
11. <u>Excavation for Walers and Tie Rods:</u> -		
Waler Wrench - 2' x 2' x 26,000		104,000 cu. ft.
Tie rods - 1 x 2 x 12 $\frac{1}{2}$ x 3,250		<u>81,250</u> cu. ft.
	Total	185,250 " "
12. <u>Cement:</u> -		
6.0 Bags per Cu. Yd.		117,680 barrels

COST ESTIMATE

1. <u>Concrete:</u> - Piles		57,780 Cu. Yds.
Cap & Waler		<u>20,675</u> " "
	Total	78,455 Cu. Yds.
	Estimated Unit Cost - \$35.00	
	Estimated Total Cost	\$ 2,745,925
2. <u>Driving Concrete Piles:</u> -		
26,000 Piles - 30 ft. each -	780,000 Lin. Ft.	
Estimated Unit Cost per Lin. Ft. -	\$0.55	
	Estimated Total Cost	\$ 429,000
3. <u>Creosoted Timber Piles:</u> -		
520,000 lin. ft.		
Estimated Unit Cost in place -	\$ 2.00 per lin. ft.	
	Estimated Total Cost	\$ 1,040,000
4. <u>Creosoted Timber Waling:</u> -		
702 M.B.M.		
Estimated Unit Cost in place -	\$250.00 per M.	
	Estimated Total Cost	\$ 175,500
5. <u>Structural Steel:</u> -		
4,347,200 lbs.		



	Estimated Unit Cost in place - \$0.15		
	Estimated Total Cost	\$	652,080
6.	<u>Steel Tie rod - Turnbuckle and Collar: -</u>		
	6500 Each - Estimated Unit Cost - \$100.00		
	Estimated Total Cost		650,000
7.	<u>Reinforcing Bars: -</u>		
	12,507,000 lbs.		
	Estimated Unit Cost - \$0.10 per pound		
	Estimated Total Cost	\$	1,250,700
8.	<u>Bolts: -</u>		
	307,000 lbs.		
	Estimated Unit Cost - \$0.15 per pound		
	Estimated Total Cost	\$	46,050
9.	<u>Washers and Separators: -</u>		
	453,180 lbs.		
	Estimated Unit Cost - \$0.09 per pound		
	Estimated Total Cost	\$	40,786
10.	<u>Misc. Hardware: -</u>		
	260,000 lbs.		
	Estimated Unit Cost - \$0.12		
	Estimated Total Cost	\$	31,200
11.	<u>Form Lumber: -</u>		
	520,000 Sq. Ft. Forming		
	Estimated Unit Cost - \$125.00 M		
	Estimated Total Cost	\$	65,000
12.	<u>Excavation for Walkers &amp; Tierods: -</u>		
	7,000 Cu. Yds.		
	Estimated Unit Cost - \$2.00		
	Estimated Total Cost	\$	14,000
13.	<u>Cement: -</u>		
	117,680 Bbls. - \$4.00	\$	<u>470,720</u>
	Sub-Total	\$	7,610,961

14. Backfill: -

Hydraulic Fill. - Borrow Pit located 1/2 mile offshore

Crown Width - 50 feet

Side slope - 1:10

Average Height - 9.0 feet

Estimated pit requirement is 2-1/2 times net.

Volume net is 855 cu. ft. per lin. ft. of fill

Stripping and waste is 800 cu. ft. per lin. foot of pit.

Pit volume is 2,938 cu. ft. per lin. ft. of fill

Total volume for 52,000 lin. ft. is - 5,658,000 Cu. Yds.

Estimated Unit Cost - \$0.15

Estimated Total Cost \$ 848,700

15. Enlarging Return Levees: -

St. Charles-Jefferson Parish Line -

425,000 Cu. Yds. @ 30¢ 127,500

Orleans - Jefferson Parish Line -

50,000 Cu. Yds. @ \$1.00 50,000

Canal Levees at 3 Pumping Stations  
(See pars. 1d (2) and (3) of Estimate  
of Quantities and Costs for Hydraulic  
Fill fronting Jefferson Parish)

Estimated 4,000 lin. ft. @ \$20.00 63,000

16. Summary: -

Estimated Total Cost of Wall . . . . . 7,610,961

Estimated Total Cost of Backfill . . . . . 848,700

Estimated Total Cost of Return Levees . . . . . 240,500

Total Estimated Contract Cost \$ 8,700,161

Surveys, Planning, Inspection and Overhead - 25% 2,175,040

Total Estimated Cost \$ 10,875,200

Estimate of Economic Cost. (Par. 4202.18 O. & R.)

Total Construction Cost \$ 10,875,200

Contribution of Local Interests 300,000

Federal Construction Cost \$ 10,575,200

Interest during 4 year Construction period -

3% of \$10,575,200 for 2 years 634,800

GROSS FEDERAL INVESTMENT \$ 11,210,000

Federal Annual Charges:

Interest at 3% of \$11,210,000 - \$ 336,300  
 Amortization @ 3% for 40 years  
 = \$11,210,000 x 0.01326 = 148,700

Total Federal Annual Charges \$ 485,000

Non-Federal Investment:

Cash Contribution 300,000

Estimated value of lands to be furnished.

180 Acres @ \$1,000 per Acre \$ 180,000

Rehabilitation of Drainage District 1,500,000

Alteration of 2 Bridges 40,000

Reconstruction of 1 Bridge 80,000

Minor Rearrangement of Utilities 20,000

Removal of Bldgs. from R/W 100,000

Total Non-Federal First Cost \$ 2,220,000

Interest during construction period estimated

to be four years - 3½% of \$2,220,000 for 2 yrs. 155,400

Gross Non-Federal Investment \$ 2,375,400

Salvage value of non-federal owned portion of

project after 40 years - 180 acres of land 180,000

Net Non-Federal Investment \$ 2,195,400

Non-Federal Annual Charges:

Interest at 3½% on \$2,375,400 83,140

Amortization at 3½% for 40 years =

\$2,195,400 x 0.01183 25,970

Estimated Average Annual Maintenance.

Earthwork - 2% of original

5,658,000 cu. yds. @ 0.25 per cu. yd. 28,290

Repairs to Structure - Replacement of esti-

ated 100 lin. ft. of wall annually @

\$300 per lin. ft. 30,000

No Loss of Taxes -

Total Non-Federal Annual Chgs, \$ 167,400

Total Annual Charges:

Federal \$ 485,000

Non-Federal 167,400

\$ 652,400

Estimated Annual Benefits (From Par. 31) \$ 572,950

Ratio of Estimated Benefits to Estimated Cost

\$573,000 : \$652,400

1.0 : 0.88

ESTIMATE OF QUANTITIES AND COSTS

HYDRAULIC FILL FRONTING JEFFERSON PARISH, LA.

1. Earthwork: - (a) Hydraulic fill for landside enlargement of the abandoned lakeshore highway embankment from West End, (Orleans-Jefferson Parish Line), westward to the Jefferson-St. Charles Parish line. Station 0 to Station 520, a total distance of 52,000 linear feet.

(1) Cross Section: - The fill will have a crown width of 50 feet at elevation 10.0 M.S.L. with side slopes of 1 on 10.

(2) Volume: - The average net cross section contains 40 cubic yards per linear foot. It is estimated that settlement will be 50% of the fill, or 20 cubic yards per linear foot. Borrow-pit requirement is estimated to be 2-1/2 times the placement quantity, or 150 cubic yards per linear foot of fill. In addition, it is estimated that 32 cubic yards per linear foot will have to be stripped from the pit area in order to obtain the underlying clay. Total gross borrow pit volume is therefore estimated to be 9,464,000 cubic yards, being 182 cubic yards per linear foot for 52,000 feet.

(b) Enlargement of the side levee along the Jefferson-St. Charles Parish line by clamshell dredge between the I.C.R.R. embankment and the lakefront and by small dragline between the Air Line Highway and the I.C.R.R. Station 0 to Station 265/32.

(1) Cross Section: - The enlargement will have a crown width of 15 feet with centerline shifted sufficiently eastward to permit a net slope not steeper than 1 on 4 on the pit side (west side). Eastside slope to be 1 on 5. The net grade at the lake end (intersection with lakefront enlargement) is 10.0 M.S.L. sloping to 7.0 M.S.L. at the I.C.R.R. embankment at station 50/00 (approx.). Between the I.C.R.R. embankment and the Air Line Highway the net grade is 7.0 M.S.L.

(2) Volume:

Stations 0 to 45 - 4500 lin. ft. @ 6 cu. yds per lin.  
ft. . . . . 27,000 Cu. Yds.

Stations 50 to 140 - 9000 lin.ft. @ 15 cu.	
yds. per lin. ft. =	135,000 cu.Yds.
Stations 140 to 220 - 8000 lin.ft. @ 19 cu.	
yds. per lin. ft. =	152,000 Cu.Yds.
Stations 220 to 265 <sup>4</sup> / <sub>32</sub> - 4532 lin.ft.	
@ 24 cu.yds. per lin.ft. =	<u>108,768 Cu.Yds.</u>
Total	422,768 " "

(c) Enlargement of the side levee along the Orleans-Jefferson Parish line by hauling from borrow pit to be furnished by local interests.

(1) Cross Section: - The enlargement comprises capping of the existing embankment. The crown width is 15 feet at elevation 8.0 M.S.L. (with suitable transition to meet the lakeshore embankment at elevation 10.0 M.S.L.) Side slopes are to be 1 on 4. The work extends from Station 0 to Station 118<sup>4</sup>/<sub>00</sub>, where it meets the dam at the New Orleans Sewerage and Water Board's pumping Station No. 6.

(2) Volume: -

Stations 0 to 4 - 400 lin. ft. @ 8 cu.yds. per lin.ft.	3,200 Cu.Yds.
Stations 4 to 24 - 2000 " " @ 8.15 " " "	16,300 " "
Stations 24 to 44 - 2000" " @ 6.7 " " "	13,400 " "
Stations 44 to 64 - 2000" " @ 3.5 " " "	7,000 " "
Stations 64 to 84 - 2000" " @ 2.3 " " "	4,600 " "
Stations 84 to 118 - 3400 Lin.Ft.@ 1.8 Cu.Yds. per lin.ft.	<u>6,120 " "</u>
Total	50,620 " "

(d) Levees along outfall canals at 3 pumping stations along the lakefront -

(1) Cross Section: - Crown width 15 feet at elevation 10.0 M.S.L. with side slopes of 1 on 5. Levees along both sides of canals at the three stations aggregate approximately 4000 linear feet.

(2) Volume: - Estimated quantity is 12.5 cubic yards per linear foot of levee, a total of 50,000 cubic yards.

(3) Slope Protection: - The slope adjacent to the canal will be protected by a creosoted timber wall of the type in use for protection of Mississippi River Levees from wavewash. Total length 4,000 linear feet.

2. Asphalt: - (a) Mass asphalt is to be applied as protection for the lakeside face and toe of slope of the existing lakeshore embankment. The Cross section of mass asphalt application is as shown on the plans, and it extends from Station 0 to Station 520, a total distance of 52,000 linear feet.

The volume of mass asphalt is approximately 80 cubic feet per linear foot of embankment. The weight being about 100 pounds per cubic foot, the application will weigh 4 tons per linear foot of embankment. Total volume for 52000 linear feet is 208,000 tons.

(b) Slope Paving: - A 6-inch layer of compacted asphalt paving is to be applied to the lakeside slope of the hydraulic fill, extending from the crown down to a firm junction with the compacted shell surface of the berm.

The average width of slope to be paved is 60 feet. The volume is therefore 30 cubic feet ( $60 \times 0.5$ ), or about 1.33 tons per linear foot. The total volume of slope paving is therefore 78,000 tons.

3. Shell Surfacing: - The crown of the existing lakeshore embankment, averaging about 30 feet wide between the mass asphalt installation and the toe of the asphalt slope paving, is to be paved with shell procured from Lake Pontchartrain. Depth of shell paving to be 18 inches (uncompacted). After compaction by traffic (hauling asphalt) the shell paving is to be given a surface treatment with heated bituminous binder under pressure.

The volume of shell is  $30 \times 1.5 \times 52000$  or 86,667 cubic yards. The area to be treated is  $30 \times 52000$  or 173,333 square yards.

4. Dressing, Fertilizing and Seeding: - The crown and landside slope is to be dressed and fertilizer applied and seeded. The area is 150 feet (average width) by 52000 feet or about 180 acres.

5. Costs: -

Hydraulic Fill-par. 1 a (2) - 9,464,000 Cu. Yds. @ 0.15	-	1,419,600
Side Levee - par. 1 b (2) - 425,000 cu. yds. @ 0.30	-	127,500
Side Levee - par. 1 c (2) - 50,000 cu. yds. @ 1.00	-	50,000
Outfall Canal Levees-par. 1 d (2)-50,000 cu.yds. @ .30	-	15,000
" " " par. 1 d (3) - 4,000 lin.ft.@12.00-		48,000
Mass Asphalt - par. 2 a - 208,000 Tons @ 8.50	-	1,768,000
Slope Paving - par. 2 b - 69,333 Tons @ 8.50	-	589,333
Shell Surfacing - par. 3 - 86,667 cu. yds. @ 2.25	-	195,000
Bituminous Treatment - par. 3 - 173,333 sq. yd. @ 0.30	-	52,000
Dressing and Sodding - par. 4 - 180 Acres @ 300.00	-	54,000
		<hr/>
Total Estimated Construction Cost	φ	4,318,433
Surveys, Planning, Inspection and Overhead - 25%		<hr/> 1,079,608
Total Estimated Cost	φ	5,398,041

Estimate of Economic Cost (Par. 4202.18 O. & R.)

Total Construction Cost	φ	5,400,000
Contribution of Local Interests		<hr/> 300,000
Federal Construction Cost	φ	5,100,000
Interest during Construction -		
Estimated construction time - 2 years		
Interest at 3% on φ5,100,000 for 1 year		<hr/> 153,000
GROSS FEDERAL INVESTMENT	φ	5,253,000

Federal Annual Charges: -

Interest at 3% on φ5,253,000 =	φ157,590
Amortization at 3% for 40 years	
φ5,253,000 x 0.01326 =	<hr/> 69,655
Total Federal Annual Charges	φ 227,245

Non-Federal Investment: -

Cash Contribution	300,000
Estimated value of lands to be furnished -	
350 Acres @ φ1,000 per Acre	350,000



Rehabilitation of Drainage District	\$ 1,500,000
Alteration of 2 Bridges	40,000
Reconstruction of 1 bridge	80,000
Minor Rearrangement of utilities	20,000
Removal of buildings from R/W	<u>100,000</u>
Total Non-Federal First Cost	\$ 2,390,000
Interest during construction: -	
3½% of \$2,390,000 for 1 year	<u>83,650</u>
Gross Non-Federal Investment	\$ 2,473,650
Salvage value of non-federally owned portion of the project after 40 years.	
350 Acres of land @ \$1,000	<u>350,000</u>
Net Non-Federal Investment	\$ 2,123,650
Non-Federal Annual Charges: -	
Interest @ 3½% on \$2,473,650	86,578
Amortization at 3½% for 40 years =	
\$2,123,650 x 0.01183	25,122
Estimated Average Annual Maintenance -	
<u>Earthwork</u> - 2% of original	
7,800,000 cu. yds. @ \$0.25	39,000
<u>Asphalt</u> - 2% of original	
277,333 Tons @ \$8.50	47,146
<u>Shell Surfacing</u> - 2% of original	
86,667 Cu. Yds. @ \$3.00	<u>5,199</u>
No Loss of Taxes	<u>91,345</u>
Total Non-Federal Annual Charges	\$ 203,045
TOTAL ANNUAL CHARGES -	
Federal	\$227,245
Non-Federal	<u>203,045</u>
	\$430,290
BENEFITS - \$573,000 (See par. 31)	
Ratio of benefits to Cost = 1 : 1.33	

ESTIMATES OF ECONOMIC COSTS FOR  
EXISTING AND PROPOSED PROJECTS

	<u>BASIC REPORT</u>		<u>ADDITIONAL RECOMMENDED</u>	<u>REVIEW REPORT</u>
	From H.D. 691-79-2	Estimates based on present costs		
Total Construction Cost	\$1,200,000	1,800,000	3,600,000	5,400,000
Local Contribution		300,000	-	300,000
Federal Construction Cost		1,500,000	3,600,000	5,100,000
Interest during Construction	100,000	45,000	108,000	153,000
<b>GROSS FEDERAL INVESTMENT</b>	<b>1,300,000</b>	<b>1,545,000</b>	<b>3,708,000</b>	<b>5,253,000</b>
Federal Annual Charges:				
Interest	40,000	46,350	111,240	157,590
Amortization	10,000	20,487	49,168	69,655
<b>TOTAL FEDERAL ANNUAL CHARGES</b>	<b>50,000</b>	<b>66,837</b>	<b>160,408</b>	<b>227,245</b>
Non-Federal Investment:				
Cash Contribution		300,000	-	300,000
Estimated Value of R/W Rehabilitation of Drainage District		350,000		350,000
Alteration of 2 bridges		40,000	1,500,000	1,500,000
Reconstruction of 1 bridge		80,000		80,000
Minor rearrangement of Utilities		20,000		20,000
Removal of buildings from R/W		100,000		100,000
<b>TOTAL NON-FEDERAL FIRST COST</b>		<b>890,000</b>	<b>1,500,000</b>	<b>2,390,000</b>
Interest during construction		31,150	52,500	83,650
<b>GROSS NON-FEDERAL INVESTMENT</b>		<b>921,150</b>	<b>1,552,500</b>	<b>2,473,650</b>
Salvage value of R/W after 40 years		50,000	-	350,000
<b>NET NON-FEDERAL INVESTMENT</b>	<b>40,000</b>	<b>871,150</b>	<b>1,552,500</b>	<b>2,123,650</b>
Non-Federal Annual Charges:				
Interest	1,600	32,240	54,350	86,578
Amortization	400	10,305	18,370	25,122
Estimated Average Annual Maintenance	25,000	29,000	62,345	91,345
<b>TOTAL NON-FEDERAL ANNUAL CHARGES</b>	<b>27,000</b>	<b>71,545</b>	<b>135,055</b>	<b>203,045</b>
<b>ANNUAL CHARGES:</b>				
Federal	50,000	66,837	160,408	227,245
Non-Federal	27,000	71,545	135,055	203,045
<b>TOTAL ANNUAL CHARGES</b>	<b>77,000</b>	<b>138,382</b>	<b>295,463</b>	<b>430,290</b>
Benefits	78,500	150,000		573,000
Cost/Benefit Ratio	1:1.02	1:1.08		1:1.33

APPENDIX B

RECORD OF PUBLIC HEARING,  
LAKE PONTCHARTRAIN, LA.

PUBLIC HEARING

HELD BY COLONEL JOHN R. HARDIN, DISTRICT ENGINEER,  
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT, AT AMERICAN  
LEGION HOME, METAIRIE, LA., MONDAY 15 DECEMBER 1947

SUBJECT: TO CONSIDER MODIFICATION OF THE PROPOSED IM-  
PROVEMENTS FOR FLOOD CONTROL ALONG LAKE  
FONTCHEMTRAIN.

9:30 a.m. - 11:50 a.m.

PRESENT

- Col. John R. Hardin, District Engineer, Corps of Engineers, New Orleans Dis-  
trict, New Orleans, La. - PRESIDING
- Mr. J. C. Baehr, Engineer, Corps of Engineers, New Orleans District, New  
Orleans, La.
- Mr. S. C. Blaize, Engineer, Corps of Engineers, N.O. District, New Orleans, La.
- Mr. F. C. Carey, Engineer, Corps of Engineers, N.O. District, New Orleans, La.
- Mr. F. E. Estopinal, Jr., Engineer, Corps of Engineers, N.O. District, New  
Orleans, La.
- Mr. H. D. McNamara, Engineer, Corps of Engineers, N.O. District, New Orleans,  
La.
- Mr. A. M. McNeil, Corps of Engineers, New Orleans District, New Orleans, La.
- Mr. W. R. Slaughter, Corps of Engineers, New Orleans District, New Orleans, La.
- Mr. Ben Abadie, Member of Board, 4th Jefferson Drainage District, Jefferson  
Parish, La.
- Mr. Ralph F. Barlow, Real Estate Broker, Mgr. Lake to River Land Co., Inc.,  
1206 Canal Bank Building, New Orleans, La.
- Mr. J. F. Barron, Division Engineer, Southern Railway, Hattiesburg, Miss.
- Mr. James E. Beeson, Salesman, Montaldo Insurance, 352 Harding St., Jefferson  
Parish, La.
- Rep. Hale Boggs, Member of Congress, 2nd Louisiana District, New Orleans, La.
- Mr. M. L. Bonnenl, Merchant, 2001 Metairie Road, New Orleans, La.
- Mr. Enol E. Buckner, Banker, Association of Commerce, 311 Camp Street, New  
Orleans, La.
- Mr. Frank J. Clancy, Sheriff, Parish of Jefferson, Kenner, La.
- Mr. Frank C. Codifer, Contractor, Codifer, Inc., 1905 Metairie Road, 1506  
Bonnabel Blvd., New Orleans, La.
- Mr. E. M. Collier, Engineer, St. Charles Parish Police Jury, P.O. Box 166,  
Paradis, La.
- Mr. L. H. "Pete" Crawford, Salesman, Metairie Hurricane Relief Association,  
3500 St. Rene Street, New Orleans, La.
- Mr. Pascal Guiffi, Plumber, Lake Shore-Hammond, Corner Helois, Metairie, La.
- Mr. Clyde G. de la Houssaye, Lawyer, 4th Jefferson Drainage District,  
Kiwanis Club of Metairie, Metairie Hurricane Relief Association,  
2700 Hullen Street, Metairie, La.
- Mr. J. B. Davidson, Vice-President, 4th Jefferson Drainage District,  
Jefferson Parish, La.
- Mr. J. B. Dossat, Test Deskman, 7th Ward Civic & Improvement Association,  
5th, 6th & 7th Precincts, 160 Jefferson Heights, Jefferson Parish, La.
- Mr. F. J. Dreyfous, Architect, 328 Audubon Building, New Orleans, La.
- Mr. Geo. A. Dreyfous, Landowner, 1317 Canal Bldg., New Orleans, La.
- Mr. Jacob L. Duncan, Deputy Assessor, Assessor's Office, Parish of Jeffer-  
son, #11 Papworth Avenue, Metairie 20, Jefferson Parish, La.
- Mr. John F. Finke, Liquidator, Canal Bank & Trust Company in Liquidation,  
1206 Canal building, New Orleans, La.
- Mr. Maurice J. Fitzgerald, Restaurant Owner, Hammond Highway.
- Mr. John E. Fleury, Dist. Attorney, 24th Jud. Dist. Court, Jefferson Parish,  
Louisiana

Mr. H. C. Ford, Constr. & Maint. Engineer, La. Sales Division, Standard Oil Company of New Jersey, St. Charles & Jackson, New Orleans, La.  
 Mr. Marcel G. Gelpi, Realtor, Property Owners of East Jefferson Parish, La., 414 Maritime Building, New Orleans, La.  
 Mr. Paul G. Gerolonis, East Jefferson Water Works, Kenner, La.  
 Mr. B. S. Graves, Technologist, Shell Oil Company, Inc., Norco, La.  
 Mr. Roy F. Guste, Law Clerk, 2200 Napoleon Avenue, New Orleans, La.  
 Mr. Wm. J. Guste, 1624 Canal Building, New Orleans, La.  
 Mr. W. T. Harter, Journalist, Y.M.B.C., #8 Helen Avenue, Jefferson Parish, La.  
 Mr. J. W. Hodgson, Sr., President & Gen. Manager, East Jefferson Water Works, District #1, P.O. Box 10007, Jefferson Parish, New Orleans 20, La.  
 Mr. J. J. Holtgreve, Police Juror, Police Jury Parish of Jefferson, 144 Metairie Lawn, Metairie, La.  
 Mr. A. H. Johness, Jr., Real Estate, No. 1 Everett Place, New Orleans, La.  
 Mr. Jesse R. Jones, Pontchartrain Levee Board, #24 Oaklawn Drive, Metairie, La.  
 Mr. Maurice M. Jones, Realtor, 2501 Jefferson Highway, New Orleans 20, La.  
 Mr. T. W. Kinsley, Asst. Div. Engineer, New Orleans Terminal Company, 205 Terminal Station, New Orleans, La.  
 Mr. Leonard K. Kirst, Civil Engineer, Louisiana Dept. of Public Works, Capitol Building, Baton Rouge, La.  
 Mr. S. Lapuyade, Sr., Fisherman, East End, Jefferson Parish, La.  
 Mrs. S. Lapuyade, Sr., Housewife, East End, Jefferson Parish, La.  
 Mr. Russell Ledoux, Road Supt., Jefferson Parish, Kenner, La.  
 Mr. Henry R. Lentz, Engineer, Sherling Gardens, 13 William Ave., Jefferson Parish, Louisiana  
 Mrs. H. R. Lentz, Housewife, Sherling Gardens, 13 William Avenue, Jefferson Parish, Louisiana  
 Dr. S. S. Lewis, Optomerist, 550 Aurora Avenue, Metairie, La.  
 Mr. Byron F. Lyons, District Engineer, La. State Dept. of Public Works, Baton Rouge, La.  
 Mr. A. W. McWhorter, Engineer, La. Dept. of Highways, Baton Rouge, La.  
 Mr. A. A. Muhleisen, Funeral Director, 1833 Dryades Street, New Orleans, La.  
 Mr. C. E. Olschner, Jr., Contractor, rep. Clarence E. Olschner, Sr., #17 Santa Ana Avenue, Jefferson Parish, La.  
 Mr. John H. O'Neill, Public Health Engineer, La. State Dept. of Health, Room 207, Civil Court Bldg., New Orleans 7, La.  
 Mr. Robert Ottemann, Retired, Member Police Jury, 7th Ward, Jefferson Parish, 1740 Monticello Avenue, Jefferson Parish, La.  
 Mrs. Earl Patrick, Housewife, East End, Jefferson Parish, La.  
 Mr. E. Patrick, Dairy Farmer, Hammond Highway & Hesper Avenue, New Orleans, La.  
 Mr. R. H. Peak, Jr., Civil Engineer, I.C.R.R., Room #6, Union Station, New Orleans, La.  
 Mr. L. G. Peytavin, President, Pontchartrain Levee Board, Litcher, La. - Union, La.  
 Mr. C. B. Poillion, Sr., Secty-Treas., 4th Jefferson Drainage District, Route 3, East End, New Orleans 19, La.  
 Mr. Jake Radosti, Owner, Grocery & Market, Property Holder, 607 S. Solomon Street, New Orleans, La.  
 Mr. Eugene J. Sault, New Orleans Association of Commerce, 315 Camp Street, New Orleans, La.  
 Mr. Joseph S. Rhodes, Developer, Rhodes & Martin, 220 Audubon Blvd., New Orleans, La.  
 Mr. P. H. Schneckenburger, Commissioner, Pontchartrain Levee Board, Kenner, La.  
 Mr. J. J. Schonekas, Canal Bank & Trust Co. in Liq., 1207 Canal Building, New Orleans, La.  
 Mr. Curtis F. Scott, Savings Loan, N.O. Homestead Savings Loan League & Guaranty Savings & Homestead Assn., 158 Baronne Street, New Orleans, La.  
 Mr. E. L. Shields, Restaurant Owner, East End, Jefferson Parish, La.  
 Dr. R. C. Steib, Dentist, Metairie Civic Council, 614 Metairie Road, New Orleans, La.

Mr. R. R. Steinwinder, Civil Engineer, 223 Carrollton St., Metairie, La.  
Senator Alvin T. Stumpf, 10th Senatorial District of Louisiana, 61 1/2 First  
Street, Gretna, La.  
Mr. H. S. Thomas, Housing Development, White Thomas Inc., - Hilland Homes,  
Inc., - 822 Perdido Street, New Orleans, La.  
Mr. J. H. Watermeier, Jr., Plant Supt., Civic & Improvement Assn., 5th, 6th  
and 7th Precincts, 7th Ward, 4612 Jefferson Highway, Jefferson Parish, La.  
Mr. A. R. Willis, Life Guard, 334 Hestor Avenue, Metairie, La.  
Mr. A. L. Willoz, Civil Engineer, Chief Engineer, Orleans Levee Board, Civil  
Courts Building, New Orleans, La.  
Mr. Vernon J. Wilty, Tax Assessor, 801 Weyer Street, Gretna, La.  
Mr. William C. Wolf, Outside Superintendent, East Jefferson Water Works,  
District #1, 436 Aurora Street, Metairie, La.

RECORDERS: Mr. L. J. Gordy, Jr., and Mrs. Dora Levy  
New Orleans District, Corps of Engineers, New Orleans, La.

#### PROCEEDINGS

COL. HARDIN: The meeting will now please come to order. We are assembled here today to review the project for flood control along Lake Pontchartrain from the Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier, authorized by the Flood Control Act approved on July 24, 1946, and to consider the necessity for its modification.

The notice of Public Hearing issued under date of November 26, 1947 was widely distributed and I am certain that everyone here is familiar with its content.

Following the hurricane of last September nineteenth and the flood resulting from that hurricane, residents and property owners in this Parish appealed for help to prevent a recurrence of this sort of disaster. Their appeal was acted upon in Washington by Senator Overton and Congressman Boggs who prevailed on the Committee on Public Works of the United States Senate to request that the whole matter of flood control in this area be reviewed, so that any necessary action, in the light of new facts brought home by the recent flood, should be incorporated in the plan for adequate flood control.

The resolution adopted on October 11, 1947 by the Committee on Public Works of the United States Senate is as follows:

"Resolved by the Committee on Public Works of the U. S. Senate.

" That the Chief of Engineers is hereby requested to review

the report on Lake Pontchartrain, Louisiana, printed in House Document numbered 691, Seventy-ninth Congress, Second Session, and other reports, with a view to determining whether modification of the recommendations contained therein is advisable at this time in view of the recent hurricane and resultant floods.

Adopted: - October 11, 1947.

/s/ Chapman Kevercomb  
Chairman"

The existing project was adopted by the Congress as part of the Flood Control Bill dated the twenty-fourth of July 1946. The Act provided for construction of a landside enlargement of the existing highway embankment to elevation 8 Mean Sea Level with a cross section having a crown width of 25 feet and side slopes of 1 on 6. Suitable protection works to minimize erosion at location where the embankment has been damaged are to be provided under the Act.

The plan of protection adopted by Congress was in accordance with a report by the Chief of Engineers dated at Washington on December 10, 1945 and published in House Document No. 691, 79th Congress, 2nd Session. The findings of the report as summarized in Paragraph 33 thereof was:

"(a) That operation of the Bonnet Carre Spillway has had and can have no material effect on lake levels even in the immediate vicinity of the spillway and is not relevant to Lake Pontchartrain flood problems.

"(b) That proposed flood-control improvements along the lakeshore will not affect existing conditions with respect to lands above high lake level and will not benefit swamplands of St. Charles and St. John the Baptist Parishes unless supplemented by extensive reclamation works:

"(c) That improved lowlands in Jefferson Parish, embraced in the Fourth Jefferson drainage district, may be protected from the hazard of inundation by lake water, in case of failure of the embankment under the erosive attack of wave action, by landside enlargement of the lakeshore embankment (with suitable erosion protection works for the toe of the lakeward slope where

required) at a cost much less than the value of the affected property and developments and that such protection is advisable."

The cost of the adopted project at that time was estimated to be \$1,200,000.00, of which local interests were to contribute 25%, but not in excess of \$300,000.00.

It has been estimated that the same work at this time would cost nearer \$1,700,000 due to increases in costs of labor and materials and supplies since preparation of the original estimate.

It is desired to have a frank and full expression of the views of all interested parties. I hope that each of you will provide as complete a statement as possible of all information available to you so long as it is pertinent to the subject of the hearing.

The Department will give full weight to all evidence and arguments presented at the hearing. Any material which interested parties wish considered should be brought up now at this hearing. Presentation of material after the hearing is not desirable unless it can be clearly shown that the late evidence is new and substantial and that there are adequate reasons why it could not have been presented at this time. If anyone present has knowledge of the existence of important evidence for or against the proposal which could not be properly prepared in time for presentation here, I may adjourn this meeting for a reasonable period or I may delay transmission of my report a sufficient time to permit its submission and study by everyone concerned. If anyone here needs additional time for submission of important evidence, please let him state definitely the amount of time desired.

I should like now to hear your views concerning the necessity for increasing the extent of protection to be afforded by construction under the adopted project. I should also like to be advised of the nature or type of structure most likely to meet the needs of all interests concerned. In this matter we must be guided by the costs involved for construction and maintenance as weighed against the benefits to be derived therefrom. I do not believe that anyone of us would consider spending a million dollars for construction of a business structure in which it is expected to do a maximum dollar value business less than the amount required to pay the interest on the investment. It is the same with a Federal Project for flood control,



The investment must be capitalized and the annual return on the investment represented by benefits should equal or exceed the annual cost in order to be justified. Therefore, the extent of increased flood protection must be commensurate in cost with the benefits to be anticipated.

I should like now to call on Congressman Boggs to outline to you his views and proposals relating to this subject, Congressman Boggs.

CONGRESSMAN HALE BOGGS, 2ND LOUISIANA DISTRICT: Colonel Hardin, ladies and gentlemen. I just came in from Washington and was very anxious to be here for this meeting. I want to make a very brief statement, because as I understand the nature of this hearing, it is being conducted for the purpose of reviewing the legislation which we have already enacted. For the purpose of the record, and as all of you here know, this project has been before the Congress on numerous occasions. At the 77th Congress, I introduced the first resolution calling for a survey of the Lake Pontchartrain area for the purpose of determining whether or not it should become a Federal Flood Control project. That resolution was passed in the 77th Congress and the hearings which were necessary were conducted. The Engineers at that time approved the project and in the 79th Congress, House Document No. 691, it was approved by Congress and became a law. Under that Document the expenditure of \$900,000 in Federal funds was authorized. That sum was to be matched by \$300,000, if I remember correctly, to be put up by local interests. Throughout the period from the 77th Congress through the 79th Congress, and through the first session of the 80th Congress, both Congressman Maloney and myself had continuously emphasized and stressed the importance of this project. We pointed right out to the members of the Flood Control Committee and later to the Committee on Public Works, which was a consolidated committee in the re-organization of Congress, the vital necessity for protecting this area of Louisiana. We also pointed out the fact that with the opening of the Bonnet Carre Spillway great quantities of water were diverted from the main channel of the Mississippi River to Lake Pontchartrain, and that it was just as necessary for the Federal Government to provide protection from that water immensurating from

the lake as it would to provide protection from that water that may be immensurating from the main channels of the Mississippi.

As all of you know, there were very few new projects appropriated for in the first session of the 80th Congress. It is probably best that it happened that way, because when the disaster of September 18 occurred, it occurred to me, and I believe to all parties who have studied this project, that what had gone before was entirely inadequate. I am not here this morning in any effort to present technical data. My knowledge of engineering problems is, to say the least, very limited. I am here to stress two important things. (1) The need for an adequate program. Now, after the hurricane, at the request of the local officials of this area of the State, I went to Washington and met with the Chief of Army Engineers, and submitted later to the Committee on Public Works a review resolution which is the basis for this hearing this morning. That resolution was adopted by the Committee on Public Works. Under the terms of that resolution, as I understand it, the extent of this hearing is to determine whether or not the program as set forth in House Document No. 691, is an adequate program in view of what has happened. So in my brief statement this morning, I would urge upon the U.S. Army Engineers the adoption of a program which is entirely adequate to protect this vast area of Jefferson Parish. It is needless for me at this time to point out the economical justification of this project. All of you know the rapidity with which this area of the State is growing. All you have to do is look around you, ride around and see that this is certainly the fastest growing residential section of the State of Louisiana, and one of the most ideal residential sections. The hurricane of September 18, among other things, besides the actual damage which it did and which was countless, has affected the value of the property in this area. Until such time as an adequate program is provided, the normal development of this steadily growing area of Jefferson Parish and the State will be retarded, so I fully urge for a sufficient plan, and because I am not an engineer, I would urge that the Engineers here and those who plan to testify present first an adequate plan. The

second thing I would like to urge upon this Board is that we act as quickly and rapidly as humanly possible. This is anything but a new project. The facts have been reviewed, not once, but several times. Time and speed are of the essence. I am hopeful that we can get this report in time to appropriate for the approaching session of Congress so that we can get the project underway as rapidly as possible. This is about the extent of my statement, and I would like to incorporate at a later time, Colonel, if I may, copies of remarks that have appeared in the Congressional Record as part of this hearing. These remarks were made last summer on the floor of the House of Representatives and later in a statement before the Committee on Public Works, and by your leave I would like to make those remarks a part of the public record.

COL. HARDIN: Thank you, Congressman Boggs. We will be most happy to grant your request. I would like to hear now from Mr. Lyons, representing the State Department of Public Works.

MR. B. P. LYONS, STATE OF LOUISIANA, DEPARTMENT OF PUBLIC WORKS:

Colonel Hardin, Ladies and Gentlemen: It is our duty by state laws to act as Engineers for the various public bodies, and one of the bodies we have been Engineers for is the Pontchartrain Levee Board. At the last session of the Legislature, the Pontchartrain Levee Board was authorized to issue two million dollars' worth of bonds for protection of the lakefront from the flood waters of the Bonnet Carre Spillway. Our Department at that time was not consulted as to what the cost of this protection might be and we did not work on it immediately because we knew that this House Bill No. 691 was being considered and an appropriation could be made during the last Congress of the United States to start that work, and when that appropriation was not made, we immediately got busy, made surveys, and they were completed just a day or two before the lakefront completely changed with this last hurricane. We have made a recommendation to the Pontchartrain Levee Board to protect this area against the flood waters of the Bonnet Carre Spillway and to come within the amount available of the two million dollars. This recommendation is being

held in abeyance by the Pontchartrain Levee Board since this Federal Project has been reconsidered and I would like to state that if money is available to protect against the hurricane and the flood waters caused by the hurricane, that is what we really need. The flood waters of The Bonnet Carre Spillway are not going to give you the trouble the hurricane waters will, and it really is a problem now to get the money and protect this area from another hurricane tide which we know we will have some day. You have a most densely populated area. In the last hurricane in this small area - in Jefferson Parish between the highway and the lake - you had about 3 1-2 million dollars' damage in a very concentrated area, which is the greatest damage since the 1927 hurricane. We are putting our facilities at the disposal of the U. S. Engineers; we have a man assigned to their office to help them and make available any records we have. We want to work with them a little more on this project before we definitely make a recommendation as to what type of structure or what will be done. The type of structure and the method of protection is entirely a matter of how much money is going to be available. The economic justification is a definite thing. Whether that will give the people the type of structure they want, I don't know at this time, but I wish to say we are going to do all we can. We realize the serious condition and we are going to help the various interested parties in any way possible. Thank you.

COL. HARDIN: Thank you, Mr. Lyons. I would like to hear next from Mr. Peytavin, President of the Board of Commissioners of the Pontchartrain Levee Board.

MR. L. G. PEYTAVIN, PRESIDENT, PONTCHARTRAIN LEVEE BOARD: Colonel Hardin, Ladies and Gentlemen: I don't think there is very much I can add to what has been said by Mr. Lyons and Congressman Boggs, but I do want to say that the Pontchartrain Levee Board is ready to further their end of this project as soon as the Engineers give us a recommendation which has been accepted. We didn't wait for the hurricane of September; we started doing some temporary work on August 20 and worked ever since. Our records will

show that we have spent todate something like \$50,000 for repairs out there. I would much rather put that money into some program. I want to lay stress on one thing. We are confronted with the problem of roads. We have seen times when material was available and the roads were not suitable to haul it up there on certain days. It is someone's responsibility, and the people want roads and additional protection. If somebody would help us to get a road out there to facilitate matters, we will be able to give you protection now that will bear on your permanent project when it happens. Any questions that anyone may have, I will be glad to answer them. Thank you.

COL. HARDIN: Thank you, Mr. Peytavin. I will now call on Mr. J. J. Holtgreve, representing the Police Jury of the Parish of Jefferson.

MR. J. J. HOLTGREVE, POLICE JURY, PARISH OF JEFFERSON: Colonel Hardin, I represent the Police Jury of the Parish of Jefferson. Before I go any further, I would like to introduce a brief from the Canal Bank and Trust Company in Liquidation and also one from the Association of Commerce. In addressing the Engineers, I have said lots and have been before the Engineers quite a number of times in regard to the lakefront. Our fears have been well founded on the waters of the Lake Pontchartrain, whether from the Spillway or the hurricane, and we believe that with the results of the present disaster that we have just come through, immediate action should be taken to relieve the possibility of any recurrence. (ROADS EXHIBIT "A" AND "B".)

I would like to submit a report which was drawn up by M. H. Garraway & Company, who was recommended to the Police Jury and the Fourth Jefferson Drainage District by a reputable firm in this Parish. In this report, it lists here every street and also gives you the numbers of the houses that a loss was sustained of \$2,599,215.00, the majority of which are residential, against a loss of wind damage of \$161,424.00. In one little area along, the loss was \$1,239.310. That was along East End. Another condition, where he shows the tremendous loss - and I do know it works a hardship on these boys - there was a project developed for Veterans' houses for ex-G.I. boys. I feel for them because I was one in World War No. 1. They show a loss in

an area of two blocks of \$103,445. - loss of their houses and furniture. Another street shows \$71,000; another, \$54,000; another \$28,000. Every one of these losses represents houses and not industries or anything else. This does not include the losses incurred by the various utilities, such as the power companies, the sewer district, the drainage district and also the police jury. This report I would like to submit as our evidence. (SUBMITS EXHIBIT "C")

I have another report here which I would like to make part of this record - flood expense incurred by the Police Jury, Parish of Jefferson. Total amounts expended to date - \$55,776.80. Estimated amounts expended for repairs to equipment - \$11,000; estimated continued expenses and losses - \$19,000; that is to continue the work that we are doing now. Grand total of losses to the Police Jury - \$85,776.80. I would like to submit that. (SUBMITS EXHIBIT "D").

The Sewer District, which does not comprise the entire Eighth Ward, was a very important unit. Up to date, we have spent \$3,500 for repairs caused by the flood. We are also faced with continuous losses of \$20,000 until we find out the damage that has been done to the main line by the water pressure done by the flood. It may be interesting to note that in one particular area, the water was inside the houses, up to the kitchen sinks. It did cover the lavatories and toilets. All of the flood waters came down through the facilities into the sewer district, which created a tremendous pressure. I will submit this. (SUBMITS EXHIBIT "E").

I was asked to submit this brief by the President of the Metairie Lions Club. (SUBMITS EXHIBIT "F").

In conclusion, I wish to thank at this time Colonel Hardin and the U. S. Engineers for the valuable work that they have done and for the cooperation that they have extended to us in this disaster, and I do hope this will be the final hearing we will have to attend to procure the protection of the lakefront.

COL. HARDIN: I appreciate this very comprehensive statement and well prepared data on flood damage. It will play an important part in our plans.

MR. HOLTGRAVE: It lists every house that was contacted in the report, and if it was not for the necessity of speed, it would have been more or less detailed, but they were under the impression this report had to be in rapidly, and under the conditions I think they did pretty good work.

COL. HARDIN: Thank you, Mr. Holtgreve. At the present time, I would like to hear from anyone representing the Police Jury of St. Charles Parish or the Sheriff's office of St. Charles. Is there anyone here from that parish who would like to speak for that parish?

MR. B. M. COLLIER, ENGINEER, ST. CHARLES PARISH, POLICE JURY: I don't know whether we have an interest in this trouble here.....

COL. HARDIN: As I announced at a previous meeting, this study of ours has the same scope as the original project which goes all the way up from the East End of Jefferson Parish to Frenier.

MR. COLLIER: That covers our Parish, but we have no development along the lakefront, and we have no protection project there. I have tried to talk to them a few times trying to drain from the river to the lake, but I guess that will be a good while before it will come up to St. Charles Parish. I think, myself, that everything should be done to protect this part of the State. There has been lots of money spent on the lakefront, and there has been a lot of money spent by the people building. This storm has set them back a long ways, and I don't think the work should be held back any by lack of funds, because I think the amount of money that has already been invested in this part of the parish is more than enough to justify the cost of complete drainage, and I don't know, but I guess the Federal Government puts up the biggest part of it, but considering the amount of property that has been destroyed in this section, it seems to me that Jefferson Parish would be easier able to put up enough to protect their interests, and as far as St. Charles Parish is concerned, I don't see how we would be interested in this at the present time.

COL. HARDIN: Thank you very much. Do we have a representative here from St. John's Parish?

SENATOR ALVIN T. STUMPF, 10TH SENATORIAL DISTRICT OF LOUISIANA: Colonel Hardin, Ladies and Gentlemen: I am Senator Alvin T. Stumpf, representing the 10th Senatorial District of Louisiana and the taxpayers in St. Charles, St. John and Jefferson Parishes. I am heartily in favor of the Engineers doing all they possibly can do for the entire District. Therefore, supplementing Mr. Holtgreve's statement about the damage done here, as Chairman of the American Red Cross I would like to state that 981 families received aid from our American Red Cross, and possibly 2,000 other families were affected that did not seek relief. In reply to Mr. Feytavin, President of the Pontchartrain Levee Board, I would like to state that if he has any roads in the State that need constructing or repairing, we will do all we possibly can to have those roads put in shape.

COL. HARDIN: Thank you, Mr. Stumpf.

MR. W. J. GUSTE, LAWYER, NEW ORLEANS, LA.: Colonel, I am not a representative of St. John's Parish, but I happen to be an owner, and if you don't mind, I would like to make a short statement. Although I don't represent St. John's Parish, I am very much interested in the protection of Jefferson Parish, because I am an owner of land along the lakeshore in Jefferson Parish, and Jefferson owners who have suffered in this section should require first consideration. At this time I want to point out one situation regarding the Bonnet Carre Spillway which has been brought to my attention by owners who live along the shore of Lake Pontchartrain in St. John the Baptist Parish. We think there may not be any particular effect from the rising of the lake level, but due to the operation of the Spillway there is another effect which is due to logs brought out of the Spillway and which jam the shore line and which is continuously causing erosion along the banks in that section. The same effect is resulting in Jefferson Parish because of the debris coming out of the Spillway at the time the Spillway is in operation. There has been a continuous increase in the rate of erosion up along the lakeshore, from the Bonnet Carre Spillway north to the vicinity of Frenier, as a result



of this debris being carried into the lake. It jams the shore line and all the maps dated way back to 1842 will reveal that since the Spillway has been constructed, there has been an increase in the percentage of erosion over the percentage that was in existence prior to the erection of the structure. Subsequently, as an owner and speaking for other owners, I think some protection should be given to the shoreline at that point.

COL. HARDIN: Thank you, Mr. Caste. I would now like to hear from Sheriff Clancy, Sheriff of Jefferson Parish.

MR. FRANK J. CLANCY, SHERIFF, PARISH OF JEFFERSON: Colonel Hardin, Ladies and Gentlemen: Colonel, I think you are familiar with this project a little more than anyone else. If you don't mind, I will read a brief I have here and won't take up too much of your time. (READS EXHIBIT "G").

COL. HARDIN: Thank you, Sheriff Clancy. I understand Mr. O'Neill from the Louisiana Department of Health is present and I would like him to make a statement.

MR. JOHN H. O'NEILL, DIRECTOR, LA. STATE DEPARTMENT OF HEALTH: As a representative of the Louisiana State Health Department, I wish to submit the following comments relative to proposed improvements for flood control along Lake Pontchartrain. (READS EXHIBIT "H".)

COL. HARDIN: Thank you, Mr. O'Neill. I would now like to hear from Mr. J. B. Davidson, Vice-President of the Fourth Jefferson Drainage District.

MR. J. B. DAVIDSON, VICE-PRESIDENT, 4TH JEFFERSON DRAINAGE DISTRICT: Colonel Hardin, Ladies and Gentlemen: As representative of the 4th Jefferson Drainage District, it is most fitting that we take an active part in getting lakeshore protection. After all, the 4th Jefferson Drainage District must drain their waters in Lake Pontchartrain. So we of the 4th Jefferson Drainage District are wholeheartedly behind these moves, and I will read a letter that we have addressed to Colonel Hardin. (READS EXHIBIT "I").

I have filed this with Colonel Hardin in six copies as suggested, and I am going a little further and stating that in discussing the lakeshore protection, if St. Charles Parish and St. John's Parish are not incorporated in

it, then we must ask protection on the parish line between the Parish of St. Charles and Jefferson Parish. That work has been maintained and repaired constantly by the 4th Jefferson Drainage District. Then we also have a levee which is at the 17th Street Canal which must also be maintained. Without that protection we have our two side doors open, so we must not only close the lake there, but both sides. It is most important that the 4th Jefferson Drainage District work with the lakeshore protection, because this is a system that was designed in 1927 or 1928 to take care of normal rainfall, which was estimated at 1-1/2" per 24-hour day. It was not designed to handle the amount of water that we were called on to pump after the hurricane. Quite a few of the residents of the parish that suffered great damage could not understand why this system could not remedy this volume of water in a short time. As I said before, this system was designed 20 years ago. It is not an up-to-date system, but a system that has been operating constantly and doing a wonderful job. Again I say it was designed for 1-1/2" of rainfall per 24-hour day and not for the waters of Lake Pontchartrain that moved into our back yard. I thank you.

COL. HARDIN: Thank you, Mr. Davidson. I would like to hear now from Mr. Jesse R. Jones, member of the Fontchartrain Levee Board.

MR. JESSE R. JONES, MEMBER, PONTCHARTRAIN LEVEE BOARD: Colonel Hardin, Ladies and Gentlemen: I don't know of anything that I can add to what Mr. Lyons and Mr. Peytavin our President have already put in the record there other than that I am a member of the Pontchartrain Levee Board, representing Jefferson Parish, and I guess I kind of have a lot more to talk for than most of our other members, being in the upper end of the District, but I would like to say this. As far as the project that was planned in 1941 for approximately 50% of the population that is in this area today, it was planned before we ever had a hurricane, you might say. Since that time, we have some 2400, 2500 homes, individual homes, practically all of them owned by the people who are living in them, and that, more or less, is the cream of this nation. I mean those people - that's everything they have invested in that

little home. Its something to work hard for, and I think the Congress of the United States should put this first on its list. I don't believe that protection was adequate in 1941, and I don't believe it is adequate today. Everything that the Corps of Engineers will go in there and recommend, I am in favor of. I am not speaking for the Pontchartrain Levee Board now. I will do everything in my power to convince the Board, however, that we should go through and give these people in Jefferson Parish protection. Some of these people may go to sleep at night thinking they will get a good night's sleep and sleep sound, but around 2:00 o'clock in the morning when the high winds start coming, they wake up. We had a tide day before yesterday, and have been having high tides continuously since the hurricane, and it is dangerous. I want to impress on the Congress and the Corps of Engineers that we need protection, and we need it right now. Let's cut all the unnecessary red tape that is involved, or most of it, so that the Government can go ahead and give us that protection before next September. I think we should all get in there and pull for it.

COL. HARDIN: Thank you, Mr. Jones. Are there representatives from the Louisiana State Department of Highways present?

MR. A. W. McWHORTER, ENGINEER, LA. STATE DEPT. OF HIGHWAYS: I am representing the Louisiana Department of Highways, but I am simply sitting in and listening to the discussion, and I have nothing to say.

COL. HARDIN: Thank you, Mr. McWhorter. I understand there are a number of individuals not necessarily representing any agency or public body such as represented by previous speakers. We would be very glad to hear from them, and I will ask Mr. Holtgreve to introduce anyone he knows who would like to make a statement on this project.

MR. HOLTGREVE: We have a gentleman here who represents the New Orleans Homestead Savings & Loan League and also the Guaranty Savings & Homestead Association of New Orleans, which have a very large investment in Jefferson Parish, Mr. Curtis F. Scott.

MR. CURTIS F. SCOTT, PRESIDENT, GUARANTY SAVINGS & HOMESTEAD ASSN. - VICE-CHAIRMAN, N.O. SAVINGS & HOMESTEAD LEAGUE: Colonel Hardin, I would like to make a statement on behalf of the Guaranty Savings & Homestead Association. My name is Curtis F. Scott. (READS EXHIBIT "J").

I have another statement here which I would like to submit on behalf of the New Orleans Homestead Savings & Loan League. (READS EXHIBIT "K").

I would like to say that this part of Jefferson Parish is the area in which New Orleans is to expand. New Orleans is truly a city of one and a half to two million people, which eventually it will be, and I believe in our lifetime it will come true, but the only area in which it can grow is this area, and this is the garden spot, the property for thousands of homes for Veterans in the City of New Orleans. The difficulty is that the area there is pretty largely built up, and a lot in the Parish of Orleans costs between \$2,000 and \$2,500, and that cost alone is the main reason for building low cost homes. In this area the homes can build up and lots would be provided for building at \$700 up to \$1,000, and I guarantee that you will see that area built up entirely of low cost homes in the period of the next 10 years.

COL. HARDIN: Mr. Scott, may I ask a question? Mr. Carey, Chief of my Engineering Division, would like to ask you about your statement of the fill that you had in mind.

MR. FRANK C. CAREY, ENGINEER, NEW ORLEANS DISTRICT, CORPS OF ENGINEERS:  
How large an area, Mr. Scott?

MR. SCOTT: I would like to see it filled up to the Bonnet Carre Spillway. I would settle for something less than that if we could get it. What I had in mind, this Galveston, Texas in 1900 suffered a hurricane and I was a resident there at the time, and that small town - they built this seawall and backed up this seawall 17 feet up to Broadway - up to 17 feet to the foot of Broadway. They sloped it down to a point about a mile. If a little town like Galveston can do it, why can't a section like this with a potential possibility of say two million people; why can't they do it? Why only build a seawall there and not fill in the back area with a fill? You will remember that in the Florida Hurricane - in that hurricane the waters of that Lake Okeechobee were literally taken up from that lake and

dumped on that little town, causing a loss of 1500 lives. That surprised many people in Washington who are familiar with hurricanes that this did not happen in New Orleans. Almost a great volume of water could have been lifted from Lake Pontchartrain on to the City of New Orleans and this area, which would have caused the greatest disaster in the history of this nation. It did happen in Florida and it can happen here. If this area ever experiences a high wind from between 125 to 130 miles an hour, you will see in this area the greatest disaster that ever hit this nation. To prevent anything like that happening, fill in this area from the lakefront on above, and provide drainage in that area, drainage facilities. I have been hearing statements this morning about one million, two million - I am not thinking in terms of that - I am speaking of thirty million. That will be one of the best investments the U. S. Government can make.

MR. HOLTGREVE: The next gentleman I would like to present to you is a gentleman who has assisted us in going to Washington in behalf of this protection of the lakefront. I would like to introduce Dr. S. S. Lewis.

DR. S. S. LEWIS, OPTOMETRIST, METAIRIE, LA.: Colonel Hardin, Ladies and Gentlemen: On behalf of those people whom I have worked for from time to time, although I am not representing them at the moment - I am representing myself - I would like to make a part of the record some of the views of groups that I have worked with and worked for many years. For the sake of brevity, I will read from this brief. (READS EXHIBIT "L")

COL. HARDIN: Ladies and gentlemen, if you don't mind, I have a telegram here which I would like to read into the record:

TELEGRAM

New Orleans, La.

U. S. Engineers

"The Rio Vista Civic & Improvement Assn. should like to be placed on record as being in favor of a combined protection and drainage project."

/s/ C. Harold Louree,  
President

MR. CLYDE G. DE LA HOUSSAYE, LAWYER, 4TH JEFFERSON DRAINAGE DISTRICT,  
METAIRIE KIWANIS CLUB, METAIRIE HURRICANE RELIEF ASSOCIATION: Mr. Chairman,  
I have a resolution from the Kiwanis International here in Metairie, and  
I would like to present it for the record. (READS EXHIBIT "M").

I would like also to put this into the record. My name is Clyde G.  
de la Houssaye. I am also appearing here on behalf of the Metairie Unit of  
the Retail Grocer's Association. You have some men here in the grocery  
trade who have a vital interest in this project. I am also a property hold-  
er right in the flooded area. Most of my property was under water during  
the hurricane. I am also interested as an attorney for the 4th Jefferson  
Drainage District. I feel that last of all, I also represent a group of  
property holders right in the flooded area known as the Metairie Hurricane  
Relief Association, and I have the chairman of that group here today and  
he may tell you in his own plain words what happened to his house and houses  
of other people in that area. I want to present to you at this time Mr.  
L. H. Crawford, one of my neighbors who lives in the flooded area, and he  
is also Chairman of the Metairie Hurricane Relief Association.

MR. L. H. "PETE" CRAWFORD, CHAIRMAN; METAIRIE HURRICANE RELIEF ASSN.:  
Colonel Hardin, Ladies and Gentlemen: Myself, as far as the amount of  
property damage in the area, is nill compared to some of the rest of them.  
I had about 5 feet of water in and around my house, but the ones further  
back towards the lake, new homes that were just built and that some of the  
people had just bought and never had a chance to live in, had four to five  
feet of water in the houses, and they have not as yet been able to move in-  
to those houses. I do know of two families that moved their furniture,  
bought new furniture and a new home and did not even spend one night in the  
home, and it ruined all their furniture and their home and they still can't  
live in it. I know of about 1500 people in our area and throughout Metairie  
that were forced out of their homes and did not have a place to live, and  
I was included with my family for three weeks or better and had to find a  
place to live on account of the flood waters that moved in because of the

hurricane, and I believe that we, as representing the Metairie Hurricane Relief Association, should make a move to protect the homes and the people in the lower class, like myself, and others who need homes in this district so they will have a place to live and come home to at night and get a good night's sleep, instead of being in doubt as to whether the flood waters or hurricane would be upon them again. If there is anything you can do to help out the people in the neighborhood and in this district, I know it will be greatly appreciated by each and every one of them. I will say again that I did not have as much damage in the area as the majority of them, but I do want to see that they have something to protect them in the way of being able to sleep at night and have a place to sleep and stay at home.

COL. HARDIN: Thank you, Mr. Crawford.

MR. HOLTGREVE: I would like to present Mr. R. C. Steib, representing the Metairie Civic Council.

MR. R. C. STEIB, DENTIST, METAIRIE CIVIC COUNCIL: Colonel Hardin, Congressman Boggs, Ladies and Gentlemen: This is not my first appearance before the Board of Engineers. I have had, on several occasions, the privilege of appearing before them, and this time I appear before the Board of Engineers as Chairman of the Metairie Civic Council. (READS EXHIBIT "N"). Thank you, gentlemen, very kindly.

MR. HOLTGREVE: The next gentleman I would like to introduce is Mr. Ben Abadie, who represents a large group of property owners who have suffered great losses due to the recent hurricane.

MR. BEN ABADIE, REPRESENTING MASON SMITH & CO., & 4TH JEFFERSON DRAINAGE DISTRICT: Colonel Hardin, Ladies and Gentlemen: I would like to read to you a letter written to Colonel Hardin just a few days ago. (READS EXHIBIT "O").

COL. HARDIN: Thank you very much, Mr. Abadie.

MR. HOLTGREVE: Another gentleman I would like to introduce is Representative James Beeson.

MR. JAMES E. BEASON, REPRESENTING 10TH SENATORIAL DISTRICT OF LA.:

Colonel Hardin, Ladies and Gentlemen: My efforts in this problem date way back to 1944. In 1944 I introduced a bill in the State Legislature requesting aid from the State. Unfortunately we were not able to secure that help. In 1946 I introduced two bills, one divorcing the Parishes of Jefferson and St. Charles from the Pontchartrain Levee Board and another bill seeking aid from the Pontchartrain Levee Board for this program. We were fortunate in securing help from the Pontchartrain Levee Board and the bill was passed, and in the general election it was also passed and since that time it has been left in the hands of the Department of Public Works. I won't go into detail on that. I want to concur in the remarks of Senator Stumpf about securing aid for the State as far as roads are concerned. I want to concur in the remarks of Mr. William Guste about the erosion of the levee due to the tremendous amount of logs that are forced into the Lake Pontchartrain due to opening of the Spillway, and also the remarks of Mr. Scott about the possibilities of tremendous dangers that the people of this section are subjected to. I think there has been a great amount of stress put on the losses in this area, and I think the losses are tremendous, but I don't think we can stress too much the possibility of an epidemic or disaster that would occur if the waters of Lake Pontchartrain are dumped in our area.

COL. HARDIN: Thank you, Mr. Beason.

MR. HOLTGRAVE: The next gentleman is Mr. Henry R. Lentz, representing Rio Vista.

MR. HENRY R. LENTZ, ENGINEER, SHERLING GARDENS, JEFFERSON PARISH:

Colonel Hardin, Ladies and Gentlemen: We over in the 7th Ward have been caused a lot of flood waters due to the fact that the pumping districts over this part of the section are inadequate. We have approximately two to three thousand homes over there which are valued from \$10,000 to \$15,000 apiece at the present time, and which may deteriorate due to flood waters. Therefore, the organization which I represent would appreciate very much if the U. S. Engineers would recommend to Congress to relieve all these flood



conditions and build up this new levee that all the other gentlemen spoke about.

MR. HOLTGREVE: The next gentleman is Mr. J. W. Hodgson, Sr., President and General Manager of the East Jefferson Waterworks, District #1.

MR. J. W. HODGSON, SR., PRESIDENT AND GEN. MGR., EAST JEFFERSON WATERWORKS, DISTRICT NO. 1: The East Jefferson Waterworks District #1, as all other public bodies in Jefferson Parish, had their losses too. We also had the danger of contamination. We have in Jefferson, East Jefferson, some 185 miles of pipeline system serving the whole of East Jefferson. In the flooded area we had approximately 50 miles of our pipeline covered with flood waters. It was only through the great help given to us by the State Board of Health and the untiring efforts of our own personnel that it was kept down - the contamination of our system. We also had quite a bit of the services connected to the houses broken, where the houses blew away and where they were destroyed. Under this water our pipelines were broken and the water continuously flowed for a period of three weeks causing us considerable loss. We also had the trouble of breakage due to softening of the earth caused by the flood waters, and softening of the earth caused the pipelines to have more chance to blow out and caused us untold damage, and we won't know to what extent those pipes have deteriorated until some time to come. We have spent out there in that section I know better than \$10,000 in repairs to our pipeline system, and we are still spending it. We hope and pray that the Government, with the Parish and State Officials, will do something to help these people in this section and also our public bodies.

MR. HOLTGREVE: The next gentleman is Mr. A. H. Johness.

MR. A. H. JOHNESS, REAL ESTATE, NEW ORLEANS, LA.: Mr. Chairman and residents of Jefferson Parish. By way of introduction, let me say to you gentlemen that in 1914 I was Chairman of the Lakeshore Committee of Property Owners. That Committee saw the necessity for development in Jefferson Parish and reclamation of this area, accomplished with proper flood protection. They were the ones who originated the project, and I remained as

Chairman of that committee for possibly 15 years. I am going to put a new slant on this entirely. When we had in mind the thought of draining this area, it was necessary first to create public demand and in that we were backed by the City and the Parish and other civic organizations of the City of New Orleans. That led then to a study of the feasibility and cost of draining this area. Then from time to time when that was determined, and it took many years and was very costly, it necessarily brought up the question of flood protection against any overflow of Lake Pontchartrain into the drained area, so that the project became divided into three. One was the draining of the lands; another to provide protection against the waters of Lake Pontchartrain; and the other was the building of a road so as to make it accessible. I am not going to go into detail as to what happened, but I will say this, that just at the time or a little ahead of the time when it became necessary for the people to organize themselves into a drainage district and vote taxes on their property in order to do their part of that particular portion of the program, we called into consultation the Federal Government, and we thought then as we do now, that the Federal Government was involved in some way in this project. So after many months and years of discussion there was a definite program agreed upon and here was the program. First, the taxpayers of Jefferson Parish would create a drainage district and tax themselves the necessary money to drain the property and out of that tax there would be sufficient money provided to build an embankment along the shoreline of the lake to protect the inundation of the drained area from the waters of Lake Pontchartrain. Then, into the picture to make it a three-way understanding, came the Federal Government through a gentleman by the name of John D. Fountleroy, who was District Engineer of the Bureau of Public Roads. After all interests had agreed, the people of this State in 1918 voted a Constitutional Amendment to provide funds for the three-way project, known as the "Hammond Highway Fund #2". Then came along the creation of the drainage district, the 4th Jefferson Drainage District,

to provide the money to do the drainage. Now let's see why the Federal Government at that time saw what is taking place today, and I am now talking about in 1922. John H. Fountleroy was District Engineer of the Bureau of Public Roads at that time. I have not seen the road, and I remember when he talked about the road, he was talking about the embankment to be used as a road and as a levee to protect the back doors against overflows in Lake Pontchartrain because that was the common agreement, for a simple drainage project. There was a road provided at some very reasonable normal cost, but the construction of that road and the cost of that road were as required by your own Federal Government enlarged to its base, and raised in cost something like twenty times more per mile than it was intended to cost. I am speaking from the record. They are on file in the Jefferson Parish archives, and I have copies of them. I want to read on now with this resolution I have here.

I lay emphasis and I think it is most appropriate to discuss this fourth paragraph where your own Federal Government said it was unnecessary to levee this land against any possible flood protection. I want, on the face of this understanding, on the face of the agreement definitely reached by your Engineering Division of Highways and the State authorities, our own State Government and the people of the State when they adopted a constitutional amendment to make this possible and provide the money, and when the people of Jefferson taxed themselves to do their part of the program, to state that we believe that we for no other reason are entitled to your full cooperation to try to come through with an agreement, a contract as it should be called, to make possible or prevent recurrence of what has just happened. I want to say that all these matters were thoroughly discussed by the Engineering Departments of every Agency of the United States. We brought into the discussion private engineers, and they to a man all agreed and were in accordance with the program we have here now, and for some reason it was postponed year to year until we found ourselves in this situation of disaster. So I don't think there should be so much attention paid to the

cost of what the project ought to be. There ought to be a willingness on the part of the Federal Government to come through with this thing at this time. I intend, with your permission, Colonel, to send you a file on this subject to show you the study the Government went into before we saw fit to tax ourselves with the risk of losing our property and subjecting the section to what happened last September.

COL. HARDIN: Thank you, Mr. Johnness.

MR. HOLTGREVE: It might be well to have you meet at this time a gentleman who I am sure is well posted on the Parish of Jefferson, Mr. Vernon J. Wilty.

MR. VERNON J. WILTY, TAX ASSESSOR, METairie, LA.: Colonel Hardin, Ladies and Gentlemen: I don't know much I can add to what has already been said, but I am in full accord with what has already been said. The assessments of Jefferson Parish, in the past three years since I became the tax assessor, have increased ten million, of which seven million have come from this section of the parish, the 7th, 8th and 9th Wards of Jefferson, and I hope the Federal Government can see fit to give these people in East Jefferson what they are entitled to.

MR. HOLTGREVE: I might ask Mr. William Guste if he has anything more he would like to say at this time.

MR. WILLIAM GUSTE: I just wanted to say this. I injected myself into the discussion because you were considering the area in St. Charles Parish and Frenier. I have been connected with, and I believe that the group should be represented, the Young Men's Business Club of the City of New Orleans who have been interested in seeing that something was done to protect Jefferson Parish against the situation which resulted last September. This committee has worked for many years in an attempt to coordinate the efforts of all possible public agencies that might be responsible insofar as draining the parish is concerned, because Jefferson Parish is really a vital part of the metropolitan area of the City of New Orleans and when we talk of the City of New Orleans we can hardly have in mind anything which

would exclude this section of Jefferson Parish on the East Bank. It is the future area of New Orleans; it is perhaps the area which will represent the largest amount of expansion insofar as residential construction is concerned and the only area where there could be subdivision residential construction that all major cities of this country enjoy.

This embankment which was discussed - a study of it shows it is absolutely necessary. We have gone into the consideration of the cost of perhaps a concrete revetment or interlocking creosoted pile arrangement, but some type of construction should be present which will mean the absolute prevention of erosion insofar as Lake Pontchartrain is concerned. As I pointed out, it is not only a matter of increase of height on the bottom of the lake as a result of continual pouring of water from the Mississippi with settlement in it, but also a great deal of debris which is in the lake, and it continually pounds against any revetment that can be constructed there, and that debris remains in the lake for many months after the Spillway is closed. From the standpoint of Jefferson Parish, I feel that not only the Young Men's Business Club, but any civic bodies interested in the protection of the metropolitan area of New Orleans, want to participate in any movement to bring about some construction which will prevent this erosion and protect the people of Jefferson Parish. We are glad to see the U. S. Engineers take such a live interest, but we hope this won't be just another hearing without the necessary result. We should have action and have it at once, and it ought not to be a matter of additional public hearings to announce the same thing, because this is one of the most urgent works that can be accomplished in this area. It not only affects the health and sanitation of people in Jefferson, but with the condition which existed last September, the sanitation and health of the people of New Orleans is vitally affected. I believe this is a movement which should take effect at once along the lines of rapid construction. The growth in this area warrants the cost, and there will be an increase in material wealth here as a result of proper protection and that should ultimately be from an economic basis,

supporting any possible construction that is necessitated from the alleviating of this danger from this particular Parish. (SUBMITS EXHIBIT "P").

MR. HOLTGREVE: If there is anyone else here desiring to be heard, please come forward.

MR. C. B. FOILLION, SR., SECRETARY-TREASURER, 4TH JEFFERSON DRAINAGE DISTRICT: For the benefit of the record I would like to comment on the Caraway Survey. I think it is inadequate, and very low for various reasons. One of them is that victims of this hurricane were not in a position to properly estimate their damages. They quoted their visual damage and possible cash outlay. The waters rose some 5 feet in some of the houses and had a salt content or salinity, but most of it came from Lake Pontchartrain. That has promoted an oxidization or rust on metal and ferrous articles, gas pipe, fences, downspouts and other facilities of the home that are made of iron. Those will manifest themselves of damage in the near future. The life and usefulness of other facilities which are present in unserviceable areas remains to be seen. The cess-pools will also have to be taken care of, and screens and many other things. The electric refrigerators, washing machines, etc., which have had a submersion of from four to five weeks in this water will deteriorate and will shorten their life of usefulness. Also the buildings themselves, which are still apparently standing. They may have estimated the visible damage, but they have overlooked the fact that most of them, approximately 99%, are of frame construction. That water was up into five feet of the frame and there was no way for it to dry out and it will deteriorate at an alarming rate. I would like to emphasize the fact that for an over-all plan of rehabilitation in this area it will be necessary that the levee, that the levee and the road be considered, because lack of either one will make the other useless.

COL. HARDIN: Mr. Fleury, I understand you have some remarks you would like to make.

MR. J. E. FLEURY, DISTRICT ATTORNEY, ST. JOHN & ST. CHARLES PARISHES: My position is district attorney for St. John's Parish and St. Charles

Parish. I represent the police juries and various public bodies of those two parishes, and on behalf of those parishes I wish to say that since New Orleans has developed there is no room for the city of New Orleans to either go north or south. New Orleans necessarily must go east or west. It was not so long ago in this territory there were four to five thousand people. Today you have upwards of thirty thousand or forty thousand people and in the upper section of St. Charles Parish I judge you must have fifty thousand affecting this territory. Now heretofore the question of Flood Control has been put up to the U. S. Government in connection with the Mississippi River. It took great crevasses and great catastrophes to bring about the flood control problem that harnessed the Mississippi River, and which resulted in construction of the levees in the front. As you know, the Federal Government takes care of that Mississippi flood levees, and all the levee boards do is furnish the right-of-ways. The Mississippi River is essentially a Government problem. It is too large a problem for the State or a little Parish like Jefferson. The waters of the Mississippi River are controlled and regulated by the Government. The State nor the Parish have anything to do with it. The same thing applies to the waters of Lake Pontchartrain. Those are the waters of the U.S. Government, not the State nor the Parish. If a man goes out on Lake Pontchartrain and violates some regulation of the U. S. Government with respect to the operation of a boat, he is not brought and tried in the State court, but is brought into the Federal Court, because the Government takes the position that the waters of that lake are under its jurisdiction. Since the waters of that lake are under the jurisdiction of the Federal Government, I think it is as much an essential duty for the Government to keep the waters of Lake Pontchartrain out of the back doors of this parish as well as keeping the waters of the Mississippi River out of the front doors. The Spillway has been constructed and has served to wash away the former Hammond Highway constructed a few years ago, and we know and I believe you gentlemen know and feel that the amount of money involved is such that no parish or state could undertake it. Today we are

sending billions of dollars in money and supplies to the people of Europe because they are in distress. I say let's look out for our own people first. What would a few paltry million dollars mean to go back here and construct a magnificent levee like we have in the front and keep the waters of Lake Pontchartrain from destroying property and doing damage like it had before. I say this matter is one for the Federal Government to take charge of and make these people safe by some method that will prevent a recurrence of what happened in the recent hurricane.

MR. HOLTGREVE: Anyone else who would like to be heard? If so, please step forward.

MR. A. R. WILLIS, LIFE GUARD, METAIRIE, LA.: I am just a property holder. Ladies and gentlemen, I have lived on the lakefront all my life and am pretty much familiar with it. What do you figure the cost of a levee and maintaining the outfit? I have been a lifeguard at Pontchartrain Beach for some time and I am familiar with the Levee Boards' actions. They have had beaches pumped in there and pumped up to 300 feet of beach which will last approximately ten years without any maintenance. The seawall along the lakefront is having a big wash in there. I don't remember the figures, but you would have to put a fill in front of that to maintain the seawall. You have a constant wash out there and as the gentleman just said, it is not the Mississippi River. An embankment would wash out in a little time out there. That's about all I want to bring to your attention.

COL. HARDIN: Anyone else who would like to speak?

CONGRESSMAN BOGGS: Colonel, I would like to supplement my statement in two respects. First I would like to express on behalf of all of us and on behalf of myself in particular our appreciation for the very splendid cooperation we have received from you and your staff and the expeditious manner in which you have conducted this hearing, the resolution only having been adopted a few weeks ago. It is very commendable and we appreciate all the help you have given us.



In connection with St. Charles Parish, it seems to me only logical that the area south of the Spillway should be protected. While the St. Charles Parish area has not developed anything like the Jefferson Parish area, it is logical to assume that it will develop. In addition to that, if that area is not protected, as Mr. Davidson brought out, the problem of a protection levee here must be considered. I think that area is equally important in this hearing.

MR. HOLTGRIVE: Colonel, we will have a few more days to submit any additional information we may have?

COL. HARDIN: That's correct. Thank you very much for your efforts in presenting this case to us. I assure you we will give it very thorough and careful consideration and get this report out as promptly as humanly possible. I thank you very much.

*H. Sears, Geo. J. Payne*

LAKE PONTCHARTRAIN, LA.

LETTER

FROM

THE SECRETARY OF WAR

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED DECEMBER 10, 1945, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A PRELIMINARY EXAMINATION AND SURVEY OF LAKE PONTCHARTRAIN, LA., FROM ORLEANS-JEFFERSON PARISH LINE WESTWARD AND NORTHWARD TO THE VICINITY OF FRENIER, AUTHORIZED BY THE FLOOD CONTROL ACT APPROVED ON AUGUST 18, 1941

JULY 3, 1946.—Referred to the Committee on Flood Control and ordered to be printed with two illustrations

WAR DEPARTMENT,  
*Washington, June 28, 1946.*

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated December 10, 1945, from the Chief of Engineers, United States Army, together with accompanying papers and illustrations, on a preliminary examination and survey of Lake Pontchartrain, La., from Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier, authorized by the Flood Control Act approved on August 18, 1941.

In accordance with section 1 of Public Law 534, Seventy-eighth Congress, the proposed report of the Chief of Engineers was furnished the director of the Department of Public Works, State of Louisiana, who has been designated by the Governor as his representative under the provisions of this act. His views are set forth in the enclosed communication.

The Bureau of the Budget has been consulted and advises that authorization of the proposed improvement should not be considered

to be in accord with the program of the President at this time. The complete views of the Bureau of the Budget are set forth in the accompanying communication.

Sincerely yours,

ROBERT P. PATTERSON,  
*Secretary of War.*

COMMENTS OF THE BUREAU OF THE BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT,  
BUREAU OF THE BUDGET,  
*Washington 25, D. C., June 10, 1946.*

The honorable the SECRETARY OF WAR.

(Through the budget officer for the War Department.)

MY DEAR MR. SECRETARY: I have received your letter dated April 1, 1946, submitting additional information and estimates of damages and benefits concerning the flood-control project recommended by the Chief of Engineers for Lake Pontchartrain, La. These data indicate that the project is economically justified, provided precipitation and run-off is removed from within the protected area. You state that the plan of improvement presented in the report presupposes continued maintenance and operation of these facilities by the fourth Jefferson drainage district.

The report of the Chief of Engineers states that the operation of the Bonnet Carre spillway has had and can have no perceptible effects on the levels of Lake Pontchartrain, and hence cannot augment flood hazards. It is noted that you consider the proposed work to consist essentially of the preservation of a major drainage improvement and that its purpose is to protect urban property from permanent flooding from the lake in the event of possible failure of the existing shore embankment. Although the land to be protected borders the city of New Orleans, it consists largely of undeveloped property upon which title has been allowed to revert to the State of Louisiana through tax default. It appears, therefore, that the benefits consist largely of the reclamation of marginal lands, and are largely local in character and of a type to be provided primarily at local cost.

You are, therefore, advised that, based on the information contained in the report and in your letter, and under the existing circumstances, the authorization of the proposed improvement should not be considered to be in accord with the program of the President at this time.

Very truly yours,

PAUL H. APPLEBY,  
*Acting Director.*

COMMENTS OF LOUISIANA DEPARTMENT OF PUBLIC WORKS

STATE OF LOUISIANA,  
DEPARTMENT OF PUBLIC WORKS,  
*Baton Rouge 4, October 23, 1945.*

Maj. Gen. THOMAS M. ROBINS,  
*Acting Chief of Engineers, War Department,*  
*Washington, D. C.*

DEAR GENERAL ROBINS: Wish to acknowledge receipt of your letter of October 9, attaching a copy of the proposed report of the Chief of Engineers on a preliminary examination and survey of Lake Pont-

chartrain, La., from Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier.

We concur in your findings and this report, with the exception of the \$300,000 cash local contribution required. We believe that the Federal Government should assume the entire cost of this project. The requirements that local interests provide rights-of-way and maintain all works when completed is a very heavy burden, and the local interests should not be required to contribute \$300,000 cash toward the construction of the main project.

This is to give you our views on this project and is not to condemn the project that you have submitted to Congress.

Sincerely yours,

DEWITT L. PYBURN, *Director.*

REPORTS OF THE CHIEF OF ENGINEERS, UNITED STATES ARMY

WAR DEPARTMENT,  
OFFICE OF THE CHIEF OF ENGINEERS,  
*Washington, December 10, 1945.*

Subject: Lake Pontchartrain, La., from the Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier.

To: The Secretary of War.

1. I submit for transmission to Congress my report with accompanying papers and illustrations on preliminary examination and survey of Lake Pontchartrain, La., from Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier, authorized by the Flood Control Act approved August 18, 1941.

2. Lake Pontchartrain is a landlocked tidal basin of 640 square miles in southeastern Louisiana, bordering New Orleans on the north. Depths in the lake range up to 15 feet. It receives the run-off from 6,000 square miles in Louisiana and Mississippi and is connected with the Gulf of Mexico through the Rigolets and Chef Menteur Passes, Lake Borgne, and Mississippi and Chandeleur Sounds. The ordinary mean tidal range is 1 foot at the Rigolets and 0.8 foot in the lake, with recorded wind tides up to 4 feet and hurricane tides considerably greater. The area between the Orleans-Jefferson Parish line and Frenier comprises 125 square miles in Jefferson, St. Charles, and St. John the Baptist Parishes, La., lying between the lake shore and the left bank main line Mississippi River levee, which roughly parallels the south shore of the lake at distances ranging from 4 to 7 miles. The portion of Orleans Parish immediately to the eastward is occupied by the city of New Orleans. Bonnet Carre spillway for passing excess floodwaters from the Mississippi River to Lake Pontchartrain crosses the westerly end of the area.

3. About 20 percent of the area, consisting of lands along the Mississippi River levee, has a comparatively high elevation, ranging to 10 feet or more above mean sea level and is utilized for residential, commercial, agricultural, industrial, and military purposes, including oil refineries and terminals, factories, a Navy landing field, Camp Plauche, an airport, and 10 Federal defense-housing projects. The remainder of the area is principally tidal marshes. The 32,000 acres in Jefferson Parish are included in the fourth Jefferson drainage district. In 1940, the area under consideration had a population of 25,000, residing mainly in urban centers, including Metairie, population 10,000, a suburb of New Orleans; Kenner, population 2,375; and Hara-

han, population 1,082. Camp Plauche, with accommodations for 25,000 military personnel, the staging area for the New Orleans port of embarkation, adjoins Harahan. The embankment of an abandoned State highway which extends along the lake front throughout the area, has crown elevations ranging from 2 to 6 feet above mean sea level, except where interrupted by the Bonnet Carre spillway, bayous, and drainage canals. It constitutes the lake-front levee of the fourth Jefferson drainage district. That district has constructed return levees along the Orleans and the St. Charles Parish lines, 20 miles of drainage ditches, 60 miles of canals, and 4 pumping plants from bond issues totaling \$2,712,000. A total of \$126,000 of Federal Work Projects Administration funds has been expended for repairs. The locality is served by improved highways, railroads, and transfer and loading facilities for barges and oceangoing vessels along the Mississippi River.

4. The average annual precipitation at New Orleans is 58 inches. The entire area between the Orleans-Jefferson Parish line and Frenier, except the floor of Bonnet Carre spillway, is protected from Mississippi River floods by the existing project for flood control of the Mississippi River and its alluvial valley. The developed sections on the higher ground are subject to temporary local flooding incidental to direct rainfall, and the low-lying portions are subject to flooding by rainfall and by overflow from the lake. Recorded lake stages near West End, on the east line of Jefferson Parish, exceeded 3, 3.5, and 4 feet above mean sea level in 7, 4, and 1 years, respectively, during the period 1915 to 1944. Stages caused by the hurricane of September 1915 are reported as 6.2 feet at West End and 12.5 to 13.0 feet at Frenier. The division engineer states that failure of the lake-shore embankment would inundate upward of 200 residential and commercial structures, 2 defense-housing projects, 1 radio station, and 1 airport, having an estimated valuation in excess of \$6,000,000.

5. Local interests desire works for protection from lake overflow similar to those provided by the city of New Orleans along its lake front. They suggest that the abandoned highway along the lake front be improved and maintained as a national-defense feature. They have offered to initiate a bond issue to provide not more than \$300,000 for local cooperation.

6. The division engineer has investigated flood conditions along the southwesterly quadrant of Lake Pontchartrain. He finds that operation of the drainage works in Jefferson Parish has lowered the ground-water table, with sufficient attendant subsidence of the muck soil to place much more of the land below lake level. He also finds that operation of the Bonnet Carre spillway has had and can have no perceptible effects on lake levels, and hence cannot augment flood hazards. Protection of the entire area by construction of a lake front wall, as desired by local interests, at an estimated first cost of \$22,000,000 for construction, with a total annual cost of \$1,107,000, is not economically justified. Landside enlargement and raising to elevation 8.0 feet above mean sea level of the lake front embankment in Jefferson Parish, with suitable enlargement of the return levees, as outlined under plan B in the division engineer's report, would protect the Jefferson Parish area from lake overflow at all stages, with the possible exception of the most extreme hurricane tides. The estimated first cost of construction of plan B is \$1,200,000, with total annual charges of \$77,000.

The division engineer concludes that the estimated cost of plan B is much less than the value of the protected property. He recommends the adoption of a Federal flood-control project for Lake Pontchartrain, La., to provide for reconstruction and landside enlargement of the existing lake-shore embankment across Jefferson Parish (with suitable erosion-protection works lakeward therefrom) substantially in accordance with plan B, outlined in paragraph 27 of his report, at an estimated cost of \$1,200,000 for initial construction, subject to the condition that local interests (a) provide free of cost to the United States all lands, easements, and rights-of-way necessary for the improvement and contribute 25 percent of the initial cost of the construction but not in excess of \$300,000; (b) hold and save the United States free from claims for damages due to the improvement; and (c) furnish assurances satisfactory to the Secretary of War that they can and will alter bridges and rehabilitate existing facilities as required, and maintain and operate all works in accordance with regulations prescribed by the Secretary of War.

7. The Board of Engineers for Rivers and Harbors, having carefully considered the report of the division engineer and additional information submitted by local interests in communications and at a public hearing conducted by the Board, concurs generally in the views and recommendations of the division engineer.

8. After due consideration of these reports, I concur in the views of the Board. Low-lying lands outside of Jefferson Parish would be benefited by protective works along the lake front only when accompanied by costly reclamation works. The cost of protection for the entire area is prohibitive at this time. The existing lake-shore embankment across Jefferson Parish, which contains a substantial population, has been damaged by erosion, and cannot be depended upon for protection. Failure of this embankment would permanently flood a large portion of the fourth Jefferson drainage district. Construction of plan B as outlined in the division engineer's report would provide a high degree of protection to valuable property in this area and in my opinion is economically justified.

9. I therefore recommend the adoption of a flood-control project for Lake Pontchartrain, La., in Jefferson Parish, to provide for reconstruction and enlargement of the existing lake-shore embankment in general accordance with plan B as outlined in the report of the division engineer and shown on the accompanying drawings, with such changes therein as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated total first cost for construction of \$1,200,000; provided that responsible local agencies give assurances satisfactory to the Secretary of War that they will (a) provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project; (b) hold and save the United States free from damages due to the construction works; (c) alter bridges and rehabilitate existing facilities as required for the satisfactory operation of the improvement; (d) make a cash contribution equal to 25 percent of the cost of construction of the works but not to exceed \$300,000; and (e) maintain and operate all works after completion in accordance with regulations prescribed by the Secretary of War.

R. A. WHEELER,  
*Lieutenant General, Chief of Engineers.*

## REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

[Second endorsement]

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS,  
*Washington, D. C., September 10, 1945.*

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. Local interests were advised as to the nature of the report of the division engineer and invited to submit additional information to the Board. At their request the Board conducted a public hearing in Washington, D. C., on September 10, 1945, at which local interests stressed the need for lake front protection for the Jefferson Parish area. They pointed out the present danger of an inundation which would create a serious problem in sanitation, menace the health of the community and affect the airport and urged approval of the recommendation of the division engineer.

2. The Board has given careful consideration to the views of local interests as expressed at the public hearings and in communications received. It concurs in the view of the division engineer that flood control improvement along the lake shore would not substantially benefit lands in St. Charles and St. John the Baptist Parishes unless accompanied by expensive reclamation works and finds that provision of protective works for those areas is not warranted at this time. The existing lake front embankment across Jefferson Parish cannot be depended upon for future protection. Its failure would permit the inundation of property having an estimated evaluation in excess of \$6,000,000. The Board concludes that plan B as outlined in the division engineer's report would provide protection for the fourth Jefferson drainage district against all lake stages with the possible exception of the most extreme hurricane tides. In its opinion improvement in accordance with plan B at an estimated first cost of \$1,200,000 for construction is warranted provided local interests contribute 25 percent of the cost of construction but not to exceed \$300,000 and cooperate in other respects as proposed by the division engineer.

3. The Board therefore recommends the adoption of a flood-control project for Lake Ponchartrain, La., in Jefferson Parish, to provide for reconstruction and enlargement of the existing lake-shore embankment in general accordance with plan B as outlined in the report of the division engineer and shown on the accompanying drawings, with such changes therein as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated total first cost for construction of \$1,200,000; provided that responsible local agencies give assurances satisfactory to the Secretary of War that they will (a) provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project; (b) hold and save the United States free from damages due to the construction works; (c) alter bridges and rehabilitate existing facilities as required for the satisfactory operation of the improvement; (d) make a cash contribution equal to 25 percent of the cost of construction of the works but not to exceed \$300,000; and (e) maintain and operate all works after completion in accordance with regulations prescribed by the Secretary of War.

For the Board:

JOHN J. KINGMAN,  
*Brigadier General, United States Army,*  
*Senior Member.*

## SURVEY OF LAKE PONTCHARTRAIN, LA.

## SYLLABUS

The division engineer finds that a concrete wall along the shore of Lake Pontchartrain, as desired by local interests, would be disproportionately costly, but that landside enlargement of the existing lake-shore embankment will insure continued protection of improved urban property from lake overflow at a cost commensurate with the present value of such property.

He recommends adoption of a Federal flood-control project for Lake Pontchartrain, La., to provide for reconstruction and landside enlargement of the existing lake-shore embankment across Jefferson Parish, at an estimated cost of \$1,200,000 for initial construction, provided local interests meet prescribed conditions of local cooperation including contribution of 25 percent of the cost.

WAR DEPARTMENT,  
OFFICE OF THE DIVISION ENGINEER,  
LOWER MISSISSIPPI VALLEY DIVISION,  
Vicksburg, Miss., January 30, 1945.

Subject: Flood-control survey, Lake Pontchartrain, La., from Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier.

To: The Chief of Engineers, United States Army.

1. *Authority.*—This report is submitted in compliance with instructions of the Chief of Engineers dated June 6, 1944, pursuant to the Flood Control Act approved August 18, 1941, which reads in part as follows:

SEC. 4. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the following-named localities, \* \* \* Lake Pontchartrain, Louisiana, from the Orleans-Jefferson Parish line westward and northward to the vicinity of Frenier.

2. After review of the unfavorable preliminary examination report and consideration of additional information presented by local interests, the Board of Engineers for Rivers and Harbors recommended a survey to determine the advisability and cost of improvements desired.

3. *Prior reports.*—These comprise reports on the existing Mississippi River flood-control project as follows:

*Prior reports*

Subject	Document	Recommendation
Flood control of Mississippi River in its alluvial valley.	H. Doc. 90, 70th Cong., 1st sess. ....	Favorable.
Do.....	River and Harbor Committee Doc. 28, 70th Cong., 2d sess. ....	Do.
Do.....	H. Doc. 798, 71st Cong., 3d sess. ....	Do.
Do.....	River and Harbor Committee Doc. 1, 74th Cong., 1st sess. ....	Do.
Do.....	River and Harbor Committee Doc. 1, 75th Cong., 1st sess. ....	Do.
Do.....	H. Doc. 359, 77th Cong., 1st sess. ....	Do.
Do.....	H. Doc. 509, 78th Cong., 2d sess. ....	Do.

4. *Description.*—Lake Pontchartrain, a shallow landlocked tidal basin in southeast Louisiana, comprises about 640 square miles and extends about 40 miles from east to west and about 25 miles from north to south with central depths of 15 feet. It drains about 6,000 square miles of eastern Louisiana and western Mississippi by means of numerous tributaries, including Bayous Bonfouca and Lacombe;



the Chefuncte, Tangipahoa, and Tickfaw Rivers; and Pass Manchac, the outlet for Lake Maurepas and the Amite River. The lake is connected to the Gulf of Mexico through the Rigolets and Chef Menteur, passes which debouch into Lake Borgne and thence to and through Mississippi and Chandeleur Sounds. The connecting passes have developed naturally deep and broad channels with adequate capacity for tidal flow and for discharge of inflow from the drainage area. The city of New Orleans, Orleans Parish, occupies part of the south shore of the lake and extends south to the Mississippi River. Here the industrial canal and lock, constructed by the State of Louisiana, and now operated by the United States as part of the Intracoastal Waterway, afford a navigable connection between the lake and the river. Part of the canal also serves as a tidewater harbor channel for oceangoing ships. About 15 miles west of the Orleans Parish line is the Bonnet Carre spillway, a feature of the Mississippi River flood-control project, which is operated when required to divert excess floodwaters of the river which might endanger the city of New Orleans. Under ordinary conditions the mean range of tide, about 1 foot at the Rigolets, is about 0.8 foot at Pass Manchac and other locations on the lake shore. Wind tides up to 4 feet and high-water marks considerably higher, incident to the record hurricane, have been observed.

5. The area for which flood protection is requested comprises about 125 square miles in Jefferson, St. Charles, and St. John the Baptist Parishes between the shore of Lake Pontchartrain and the left bank main line Mississippi River levee from the west boundary of Orleans Parish to United States Highway No. 51 abreast of Frenier. Near the Mississippi River levee the land is relatively high with elevations of 10 feet or more above mean sea level. Lakeward therefrom elevations are lower and, except in Jefferson Parish, most of the interior area is a tidal swamp traversed by numerous shallow bayous. Swamp vegetation consists of dense canebrakes interspersed with willows, buttonwoods, and stretches of marshgrass. Jefferson Parish has similar physical characteristics, but here, although the shore line is subject to recession (reported to have varied between 1 and 15 with an average of 5 feet per year), the area has been partially reclaimed by the fourth Jefferson drainage district, an abandoned highway embankment being utilized as the lake-shore levee.

6. Soil borings along the lake shore disclose a layer of soft muck averaging 10 feet in thickness, underlain by clay, sandy clays, and silts characteristic of the Mississippi River Delta.

7. Reference is made to War Department and United States Geological Survey quadrangles, United States Coast and Geodetic Survey Chart No. 1269, and accompanying plates 1, 2, and 3.<sup>1</sup> All elevations refer to mean sea level.

8. *Economic development.*—Population of the area, about 25,000 in 1940, is largely concentrated in urban centers, which include Metairie (population 10,000), a suburb of New Orleans; the incorporated towns of Kenner (population 2,375), and Harahan (population 1,082) in Jefferson Parish; unincorporated towns of St. Rose, Destrehan, and Norco in St. Charles Parish, which serve oil company personnel; and LaPlace at the junction of United States Highways 51 and 61. Camp Plauche, the New Orleans staging area, adjoins Harahan and

<sup>1</sup> Only plates 1 and 2 are printed.

accommodates 25,000 soldiers in connection with the use of New Orleans as a port of embarkation.

9. Higher lands adjoining the Mississippi River levee in the three parishes have been improved and are utilized for residential, commercial, or agricultural purposes. Industrial plants include oil refineries at Destrehan and Norco, oil terminals at St. Rose and Good Hope, car repair plants, box factories, lumber and machine companies in Harahan and Kenner. Other developments include the Navy landing field (formerly the Wedell-Williams airfield) at Harahan, the Moisant Airport (a New Orleans CAA project), under construction north of Kenner, the WWL radio broadcasting station on the lake front in Jefferson Parish, and 10 defense housing projects of the Federal Housing Authority, located in the vicinity of Metairie.

10. The portion of the area in Jefferson Parish is embraced in the fourth Jefferson drainage district, which comprises about 6,000 acres above and 26,000 acres below the 5-foot contour. Some 13,000 acres are below sea level; about 12,000 acres are woodland; and only 8,500 acres have been put to beneficial use. The entire area has been subdivided, at least on paper, as a real-estate suburban development. With respect to use, about 2,850 acres above and 1,950 acres below the 5-foot contour have been used for industrial, commercial, or residential purposes, and about 3,100 acres above and 600 acres below the 5-foot contour have been used for agriculture.

11. The locality is adequately served by improved highways including the Air Line Highway (United States Nos. 51, 61, and 65), United States Highway 90 from the Orleans Parish line to the approach to the Huey P. Long Bridge, State Highway No. 1 along the Mississippi River levee (now interrupted by the Bonnet Carre spillway). State Highway No. 33, along the lake front, is interrupted about 6 miles west of West End. Numerous streets and roads serve Metairie and other developed sections. The area is traversed by the Illinois Central, Yazoo & Mississippi Valley, and Louisiana & Arkansas Railroads. There are transfer and loading facilities for barges and oceangoing vessels at terminals along the river.

12. *Precipitation.*—Annual precipitation at New Orleans, as recorded by the United States Weather Bureau for 108 years, ranged between 31 and 86, and averaged 58 inches. Monthly maximum was 25 inches in October 1937. Maximum 3-day rainfall was 17 inches, October 1-3, 1937. Greatest 24-hour rainfall was 14 inches, April 1927. Yarnell's curves (Miscellaneous Publication No. 204, Department of Agriculture), indicate that 24-hour rainfalls may be expected in this vicinity as follows:

Frequency in years.....	100	50	25	10	5
Rainfall in inches.....	14	11	10	8	6

13. *Runoff.*—Except where locally obstructed, run-off flows lake-ward from the Mississippi River levee. In low-lying areas of St. John the Baptist and St. Charles Parishes, drainage is impeded by dense vegetation and flatness of terrain and is precluded for areas at or below sea level. Run-off from Jefferson Parish is pumped into the lake.

14. *Floods.*—Under the flood-control project for the Mississippi River in its alluvial valley, complete protection from headwater floods is provided by the east bank main-line levee and the guide levees of Bonnet Carre spillway for the area between the river and the lake

except that within the spillway. This area is subject to local flooding due to direct rainfall when rainfall excess exceeds the capacity of drainage facilities, and, where elevations less than high tide obtain, is subject to inundation by lake overflow unless protected therefrom. Table 1 lists maximum and minimum lake stages observed at gages maintained by the Department since 1932 along the lake shore and by the Sewerage and Water Board of New Orleans at its pumping station No. 6 for the period 1915-31. These data show that in the period 1915-44 observed lake stages at West End exceeded 3 feet in 7 years, exceeded 3.5 feet in 4 years, and exceeded 4.0 feet only in 1915 when the maximum of 4.3 feet was observed. A compilation of high-water elevations incident to the record hurricane of September 1915, as obtained by C. W. Okey of the United States Department of Agriculture, listed values of 5.6 feet at Little Woods, 6.2 at West End, 9.8 at the Rigolets, and 12.5 to 13.0 at Frenier.

15. *Extent and character of flooded area.*—About 20 percent of the area between the river and the lake, from the Orleans Parish line to Frenier, is relatively high land along the main line levee, subject only to temporary local flooding incident to direct rainfall; about 40 percent, in St. Charles and St. John the Baptist Parishes, is unimproved tidal swamp; about 30 percent, in Jefferson Parish, is lowland embraced in the reclamation project of the fourth Jefferson drainage district, flooding of which depends on effectiveness of the reclamation works; and the remaining 10 percent is utilized by the Bonnet Carre spillway.

16. *Flood damage.*—No estimates of experienced flood damage have been presented and no evidence of such damage was disclosed by the survey. Statements made by local interests as to recession of shore line, wave wash effects, loss of pasturage due to salinity, drainage deficiency, and flooding of areas near the main line levee have to do with beach erosion, shore protection, reclamation, or storm rainfall, but properly are not items of experienced flood damage.

17. *Existing flood control projects.*—The existing project for flood control of the Mississippi River in its alluvial valley protects the area from Mississippi River floods.

18. *Improvements by other agencies.*—The Louisiana State Highway Department in 1924 constructed an embankment along the lake shore west from the Orleans Parish line, as the first link of a New Orleans-Hammond Highway, at an approximate cost of \$835,000. The embankment was constructed by dredging a channel 45 feet wide at the bottom of the muck stratum, depositing the spoil to form dikes 120 feet apart, between which the embankment was built of material dredged from the lake bed below the muck. The Bonnet Carre spillway transverses the highway project, which was abandoned in favor of the Air Line Highway. The embankment now has crown elevations of 3 to 6 feet across Jefferson Parish (with bridge floors at elevation 8) and 2 to 5 feet in St. Charles and St. John the Baptist Parishes, except where interrupted by the spillway, by bayous and by drainage channels. The embankment is utilized by the fourth Jefferson drainage district as a feature of its reclamation works which include levees along the Orleans and St. Charles Parish lines, a drainage system comprising 20 miles of ditches 8 to 20 feet wide, and 60 miles of canals 40 to 70 feet wide, served by 4 pumping stations with outlet channels to the lake. Each station has two 80-inch pumps and the system was designed to remove 1½ inches of rainfall per day. Capacity

has not been maintained, station No. 3 having been shut down since 1932. Station No. 1 and the drainage canals were repaired as WPA projects, 1937 to 1940, at a cost of about \$174,000, of which the drainage district furnished about \$48,000. In addition, emergency repairs of short stretches of the embankment have been effected by the drainage district by installation of timber bulkheads, riprap, and earth dikes, the cost of which is not available. The drainage district, created as a parish agency in 1913, was reorganized as the fourth Jefferson drainage district under State law in 1922 to include all the area (32,000 acres) from the Mississippi River to Lake Pontchartrain between the Orleans and St. Charles Parish lines. Drainage of the area between the Orleans Parish line, Metairie Road, Highway 544 and the Mississippi River levee (2,700 acres) is provided by canals leading to pumping station No. 6 of the Sewerage and Water Board of New Orleans at the parish line. Finances have been involved. Bonds, including those of subdistricts, issued between 1913 and 1929, totaled about \$2,712,000. In 1941 there were outstanding about \$654,000 of 2 percent and \$2,000,000 of noninterest-bearing bonds. These were reduced by liquidation and agreement so that there were less than \$1,500,000 of bonds, mostly noninterest bearing, outstanding in November 1944.

19. *Improvement desired.*—At a public hearing held at Metairie, La., on October 13, 1941, local interests requested flood-control improvements to provide protection from lake overflow from the Orleans Parish line to the vicinity of Frenier, similar to that provided by the city of New Orleans along its lake front. In support of the request, local interests stated that the protection levee, i. e., the Lakeshore or New Orleans-Hammond Highway, along the south shore of the lake, had been damaged due, in part at least, to operation of the Bonnet Carre spillway. They pointed out that the fourth drainage district had expended more than \$2,000,000 (proceeds of bond issues) for levees, canals, and pumping plants which are valueless unless protected from lake overflow. They averred that continuance of the existing condition would cause losses to landowners with possible abandonment of 10,000 acres of lake-front lands. They suggested that the highway should be maintained and improved as a feature of national defense.

20. At a hearing in Washington, D. C., before the Board of Engineers for Rivers and Harbors on September 28, 1942, Jefferson Parish representatives requested a survey of the locality with particular reference to Jefferson Parish, stressing recent construction of housing projects and Army and Navy installations as well as industrial development due to war activities. These projects and installations are depicted on plate 2.

21. The fourth Jefferson drainage district, by its secretary-treasurer, proposed in a letter dated November 11, 1944, to initiate additional bond issues of not more than \$300,000 to secure funds for local cooperation if a project were undertaken by the Government.

22. *Surveys.*—Ground and subsurface surveys for Bonnet Carre spillway by the department and similar surveys for the New Orleans-Hammond Highway and the fourth Jefferson drainage district, made by or for the Highway Commission and Department of Public Works of Louisiana, were utilized. A new survey along the lake shore, with profile and sections of the embankment from the Orleans Parish line

to the vicinity of Frenier, was made together with an appraisal of land values and flood damages.

23. *Flood problems.*—The entire area herein considered is subject to local flooding incident to excess rainfall during tropical storms, removal of which depends on pumping operations. In Jefferson Parish operations of the drainage district to improve wet swamplands by means of levees and artificial drainage involved lowering the water table with attendant consolidation and subsidence of muck soil. Much of the area "protected" is now below lake level and is subject not only to temporary flooding from direct rainfall and run-off from adjoining areas but also to submergence by the lake in case of failure of the lake-shore embankment. Local interests, in requesting flood protection, stressed the danger of overflow from the lake, especially during hurricanes, and suggested that the construction and operation of the Bonnet Carre spillway augmented the hazard.

24. Introduction of flows of the magnitude of designed spillway releases (250,000 cubic feet per second) into a tidal basin such as Lake Pontchartrain is a matter of minor importance. The lake tidal prism, exclusive of that in tributary tideways and basins, exceeds 300,000 acre-feet for average diurnal tides (amplitude, 0.8 foot), and discharge capacity of the outlet passes, Rigolets and Chef Menteur, with a combined cross section of about 120,000 square feet, is far greater than that of the spillway. Releases through the spillway can affect lake levels in its immediate vicinity only at and near high-water slack of spring tides, but the duration of this phase of tide is so short that the effect of spillway flow is inconsequential. The spillway, completed in 1935, was operated during the 1937 flood, when peak release was about 210,000 cubic feet per second. Observations of gages lakeward therefrom at that time (see table 2)<sup>1</sup> reflect daily tidal fluctuations but disclose no increase in lake levels corresponding to increase in releases. Hence, operation of the spillway has had and can have no perceptible effect on lake levels so cannot augment flood hazards.

25. Inundation of the area by lake overflow during hurricanes is a real though remote hazard. Great storm waves on Lake Pontchartrain, critical for its southwest shore, may be expected during tropical cyclones of hurricane intensity, which are central over or west of the lake within perhaps 25 miles. Records of the United States Weather Bureau disclose that such hurricanes crossed the Louisiana coast (397 miles) 16 times in the 50-year period, 1879 to 1928, but that the great 1915 storm is the only instance recorded of a hurricane center passing inland over or close to Lake Pontchartrain. Hence, recurrence of such a storm path, with attendant hurricane seas critically dangerous for the southwest shore of the lake, is a very remote contingency and the probability of such a storm coincident with spillway operation is even more unlikely, since hurricane seasons do not coincide with Mississippi River flood seasons.

26. Construction of a rigid wall along the lake front, similar to that on the New Orleans front, would prevent lake overflow even during storm tides, but would not preclude possible overtopping by hurricane seas critical at this location. Damage due to hurricane seas may be minimized by raising ground elevations inshore. The existing embankment, if restored to and maintained at grade above high

<sup>1</sup> Not printed.

lake level, would prevent lake overflow except during hurricanes critical for this locality. Protection works to prevent erosion by wave action at the lakeward toe of the improvement are advisable for a wall and essential for an earth embankment, unless the work is located inshore from a foreshore berm of sufficient width to allow for anticipated erosion.

27. *Plans of improvement.*—Alternate plans for flood-control improvement along the shore of Lake Pontchartrain to prevent lake overflow are outlined below and shown on plates 2 and 3.<sup>1</sup> These comprise:

*Plan A.*—As requested by local interests, this plan contemplates construction of a backfilled concrete wall (stepped) along the lake shore. Section I extends across Jefferson Parish (with provision for enlarging the levee along the St. Charles Parish line if section I alone is built). Section II extends across St. Charles and St. John the Baptist Parishes (excluding Bonnet Carre spillway) to the vicinity of Frenier with provision for an earth wing levee from the wall near Frenier to United States Highway 51 and pumping plants for removal of intercepted drainage. For estimating purposes, the wall is dimensioned to correspond with the existing New Orleans lake-front wall and provides for a step-faced, reinforced concrete slab (top elevation 10) supported by concrete girders on piles (8-foot centers) with cut-off wall under the toe of the slab and mattress revetment extending lakeward therefrom as required. Provision is included for a dredge backfill with top width of 25 feet inshore from the wall.

*Plan B.*—Minimum improvement to insure continued protection from lake overflow, heretofore afforded by the lake-shore embankment, is contemplated by plan B which provides for landside enlargement of the embankment as a hydraulic fill levee across Jefferson Parish (the existing embankment to serve as a foreshore berm) with suitable enlargement of return levees along Orleans and St. Charles Parish lines to prevent flanking. For estimating purposes a top width of 25 feet at elevation 8, corresponding to bridge floor elevations, is selected and side slopes of 1 on 6 are assumed. The estimate includes provision for removal of muck in way of levee enlargement and for suitable protection works to minimize erosion at locations where the embankment has been damaged.

28. *Estimates of costs and annual charges.*—Estimated costs for initial construction of improvements outlined above as plan A are \$12,000,000 for section I and \$10,000,000 for section II; estimated Federal and non-Federal annual carrying charges are \$480,000 and \$77,000, respectively, for section I and \$400,000 and \$150,000 for section II. Similarly, estimated costs for initial construction of improvements outlined above as plan B are \$1,200,000 and estimated Federal and non-Federal annual carrying charges are \$50,000 and \$27,000, respectively (see table 3).<sup>2</sup>

29. *Discussion.*—With respect to reasons advanced by local interests for Federal flood-control improvement for Lake Pontchartrain, it has been shown that operation of the Bonnet Carre spillway has no material effect on lake levels and can have no bearing on flood problems of lands adjoining the lake. It has also been shown that hurricane seas, critical for the southwest shore of the lake, may be expected only in case of recurrence of a storm like that of 1915 which occurred only

<sup>1</sup> Pl. 3 is not printed.

<sup>2</sup> Not printed.

once in more than 65 years. Such recurrence is an extremely remote hazard and it is even less likely that such a storm would occur coincidentally with operation of the spillway. It is true that expansion of industrial, housing, and military developments has occurred in recent years but these activities have been located generally on lands above high lake level. However, improved urban areas in Metairie, the WWL radio station, and portions of the new Moisant Airport are located below high lake level and depend on the lake-shore embankment for protection against lake overflow. The embankment, constructed without effective revetment or adequate foreshore berm, has been damaged by erosion and may not be depended upon for protection.

30. Flood-control improvement along the lake shore obviously will not alter existing conditions for lands above high lake level and will not benefit swamplands in St. Charles and St. John the Baptist Parishes unless combined with expensive reclamation works. In Jefferson Parish lake-shore improvement will not obviate the necessity for removing rainfall excess by pumping but will insure continuity of protection from lake overflow. Landside enlargement of the existing lake-shore embankment with crown elevation 8 (plan B) will provide a freeboard of nearly 4 feet (3.7 feet) above the maximum stage recorded at West End and nearly 2 feet (1.8 feet) above the high-water mark reported for the record 1915 hurricane at that location. Thus the improvement will provide a greater measure of protection than that heretofore afforded and prevent submergence of lands below high-tide level by lake inflow except during hurricanes critical for this locality.

31. Since there are no records of flood losses due to lake overflow, annual benefits may not be estimated on the basis of experienced flood damages. Enhancement of value of undeveloped lowlands in the drainage district may take place if these lands are freed from flood hazards but such enhancement is extremely speculative. Drainage district operations started in 1913. In 1941, of district lands below elevation 5, less than 10 percent had been put to use and 60 percent had reverted to the State for taxes. Meanwhile the population of New Orleans (494,537 in 1940) increased by 14.2, 18.5, and 7.8 percent in successive decades. There are (1944) some 4,000 acres of vacant lands in the city between the Jefferson Parish line and the industrial canal. The city extends east to the Rigolets and metropolitan activity may expand into St. Bernard Parish on the east bank and into Jefferson and Plaquemines Parishes on the west bank of the river. Hence it is unlikely that an urgent demand for lowlands in the drainage district will develop in the early future and no enhancement of land values may be expected to result from the improvement. However, the value of improved residential and commercial property which would be submerged following a serious breach in the lake shore embankment is a measure of the benefits to be expected from the improvement. Such properties include upward of 200 residential and commercial structures and two defense housing projects in Metairie, the WWL radio station, and the Moisant Airport, north of Kenner, which have an estimated value in excess of \$6,000,000.

32. The cost of a rigid wall along the lake front as requested by local interests (plan A) is disproportionately great in comparison with the value of land and property subject to the hazard of lake waters, but the cost of landward enlargement of the embankment (plan B) is con-

siderably less than the value of improved property at and below high tide that would be submerged as a result of a serious breach in the embankment.

33. *Conclusion.*—In view of the facts developed by the survey, set forth herein, the division engineer finds:

(a) That operation of the Bonnet Carre spillway has had and can have no material effect on lake levels even in the immediate vicinity of the spillway and is not relevant to Lake Pontchartrain flood problems.

(b) That proposed flood-control improvements along the lake shore will not affect existing conditions with respect to lands above high lake level and will not benefit swamplands of St. Charles and St. John the Baptist Parishes unless supplemented by extensive reclamation works.

(c) That improved lowlands in Jefferson Parish, embraced in the fourth Jefferson drainage district, may be protected from the hazard of inundation by lake water, in case of failure of the embankment under the erosive attack of wave action, by landside enlargement of the lake-shore embankment (with suitable erosion protection works for the toe of the lakeward slope where required) at a cost much less than the value of the affected property and developments and that such protection is advisable.

34. *Recommendation.*—The division engineer recommends the adoption of a Federal flood-control project for Lake Pontchartrain, La., to provide for reconstruction and landside enlargement of the existing lake-shore embankment across Jefferson Parish (with suitable erosion-protection works lakeward therefrom) substantially in accordance with plan B, outlined in paragraph 27 hereof, at an estimated cost of \$1,200,000 for initial construction, subject to the condition that local interests (a) provide free of cost to the United States all lands, easements, and rights-of-way necessary for the improvement and contribute 25 percent of the initial cost of the construction but not in excess of \$300,000; (b) hold and save the United States free from claims for damages due to the improvement; and (c) furnish assurances satisfactory to the Secretary of War that they can and will alter bridges and rehabilitate existing facilities as required, and maintain and operate all works in accordance with regulations prescribed by the Secretary of War.

M. C. TYLER,  
*Brigadier General, Corps of Engineers,*  
*Division Engineer.*







(A) IMPROVEMENT DESIRED  
SEE PLATE 2

LAKE PONTCHARTRAIN, LOUISIANA  
ORLEANS-JEFFERSON PARISH LINE  
TO  
VICINITY OF FRENIER  
**INDEX**  
SCALE IN MILES

OFFICE OF DIVISION ENGINEER  
LOWER MISSISSIPPI VALLEY DIVISION  
VICKSBURG, MISSISSIPPI  
TO ACCOMPANY SURVEY REPORT DATED 30 JANUARY 1945  
FILE MRC/2615/1