SOME DATA IN REGARD TO FOUNDATIONS

in

NEW ORLEANS AND VICINITY

COLLECTED AND COMPILED
BY THE
SOIL AND FOUNDATION SURVEY
AS REQUESTED BY
LOUISIANA ENGINEERING SOCIETY

A PROJECT OF THE

WORKS PROGRESS ADMINISTRATION OF LOUISIANA

Harry L. Hopkins, Federal Administrator
James H. Gutcher, State Administrator

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Soil foundation survey.

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Harry L. Hopkins, Federal Administrator
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F. P. Hamilton, Assoc. M. Am. Soc. C.E.

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ERRATA

P. 21 Fourth paragraph, should read:
On page 5 is a "Geologic Column of Louisiana," etc.

P. 252 Under Column Footings change to:
Dead load - 1170 lbs. per sq. ft.
Live load - 375 lbs. per sq. ft.

Map No. 1 Disregard "Scale 1 inch - 1000 feet," account reduction from original.

P. 31, 34, 42, 43 - Disregard scale reference, account reduction from originals.

P 164 "Wing Load" should be "Wind Load."

P. 186 "Headings" should be "Readings."

P. 250 In last paragraph "evident" should be evidence."

P. 254 "St. Ann Steet Building" should be "St. Ann Street Building."

P. 264 In fourth paragraph "spaded" should be "spaced."

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INTRODUCTION

From a study of the behavior of foundations of buildings and other structures in any locality, there is much to be learned with regard to stability, settlement or sinking and the attendant results. Particularly is this applicable to New Orleans and vicinity where the safe bearing capacity of the soil is comparatively low and in consequence the cost of foundations becomes an unusually high item. Many inherent foundation difficulties are encountered. To overcome these difficulties diverse methods are employed. Diverse results are recorded.

The need of a soil and foundation study had long been recognized by Donald Derickson, Professor of Civil Engineering in Tulane University, and such a study, during the present time would also offer an opportunity for additional employment of engineers. This idea was concurred in by Colonel Edward S. Bres, then President of the Louisiana Engineering Society, Mr. John H. O'Neill, then President of the Louisiana Section, American Society of Civil Engineers, and by Mr. H. M. Gallagher, then State Engineer for the Emergency Relief Administration.

In December 1934, Colonel Bres placed the matter before the Louisiana Engineering Society and pointed out the desirability of the knowledge to be gained from a survey of existing structures. The Society promptly approved the proposed survey and voted to sponsor a project to be carried out by the Emergency Relief Administration. Not being a public entity, however, the Society was ineligible for sponsorship, and at a conference with Emergency Relief Administration officials it was decided that the sponsor should be the Emergency Relief Administration of La.

In the creation of this project two objectives were held prime and uppermost. These were that: (a) the project would yield results useful and valuable to the professions of engineering and architecture, and to contractors, by making available and easily accessible a compilation of factual data concerning soil conditions and the foundations of buildings and structures in the New Orleans Area, and (b) during the then existing period of depression, employment could be afforded engineers, architects, draftsmen and others. A prospectus for the proposed Soil and Foundation project was prepared and submitted to the Emergency Relief Administration authorities. The project was promptly approved and the necessary steps taken to start the survey under the direct supervision of the Administrator and the Engineer of the Emergency Relief Administration for the State of Louisiana, acting with a Supervisory Committee of Engineers composed of Messrs. John H. O'Neill, A. R. Brousseau, Professor Donald Derickson and Colonel Edward S. Bres.

On April 12th, 1935, F. P. Hamilton, President, Louisiana Section, American Society of Civil Engineers, was appointed Supervising Engineer of the project. The set up for the survey and the preliminary work is outlined in the letters which were immediately thereafter sent out to all of the Engineers, Architects, Public Boards, and Contractors who had been engaged in such classes of work. These letters were as follows:

New Orleans, La.
April 15th, 1935.

Dear Sir:

At the suggestion of the Louisiana Engineering Society the Federal Emergency Relief Administration has agreed to sponsor and furnish funds for a study of the behavior of the existing foundations in the City of New Orleans and immediate vicinity and making available such data as exists from borings and other investigations. Tulane University has donated office space and necessary utilities for the conduct of the work.

Such a survey is of much economic importance. It will:

(a) Provide, for the use of engineers and architects, information of greatest value and hitherto not developed.

(b) Create positions for approximately twenty-five engineers, architects and draftsmen.

The Emergency Relief Administration has requested the following engineers, under the auspices of this Society, to Supervise the project:

A. R. BROUSSEAU, State Engineer, Works Division, Federal Emergency Relief Administration.

DONALD DERICKSON, Professor, Civil Engineering, Tulane University.

JOHN H. O'NEILL, President, Louisiana Section, Am. Soc. C. E.

EDWARD S. BRES, President, Louisiana Engineering Society.

For the data required, the sources of information will be the files of our local engineers, architects and public agencies.

F. E. R. A. Engineers engaged in this work will call on these persons and at the offices of the public agencies in search of records and other information.

The purpose of this letter is to ask your cooperation with the F. E. R. A. engineers through the use of your fund of knowledge and records.

In our opinion, this project offers a means for the accomplishment of a work of constructive value and an opportunity for employment of engineers and architects. For these reasons your expression of approval and cooperation is requested.

Very truly yours,
Edw. S. Bres,
President.

N. B. In April, 1936 Mr. A. R. Brousseau was replaced on the committee by Mr. A. J. Negrotto, State Director, Division of Operations, W. P. A.

New Orleans, La.
April 27th, 1935.

Dear Sir:

The President of the Louisiana Engineering Society has written to you in regard to the proposed Survey of Foundations here in New Orleans and vicinity.

As Professor of Civil Engineering in Tulane University, it seems to me that there is a real need for such a study. It is not to be expected that the information which, it is hoped, will be derived from the investigation will obviate the necessity of special consideration and tests in the case of an important structure, it would seem, however, that such an investigation might yield results of value to the Architect, the Engineer and the Owner.

The Committee which is looked to for advice and suggestions in the conduct of this project would like to be able to avail itself of the cooperation of those experienced in such matters. This letter is sent to you to ask such cooperation. The services requested are not extensive; you are asked to allow your name to be used as consultant. It should be understood than none other than those serving through the E. R. A. receive compensation.

A reply expressing your willingness to serve as a consultant, together with any recommendations or impressions which you may formulate in regard to this undertaking would be very much appreciated.

Very truly yours,
DONALD DERICKSON
For the Committee

On May 7, 1935, the aims of the project were presented by the President, Mr. N. C. Curtis, to the Louisiana Chapter, American Institute of Architects; and formal action was taken recommending to the members that they make available to the project, any and all of their records and data pertaining to soil and foundation conditions in the city of New Orleans.

With the change of the Federal Emergency Relief Administration to the Works Progress Administration a change of sponsorship became necessary and the Board of State Engineers of Louisiana assumed this role. The cooperation of that Board is expressed in the following letter:

October 1, 1935.

Mr. A. R. Brousseau, State Engineer,
Works Progress Administration,
Canal Bank Bldg.,
New Orleans, La.

My dear Mr. Brousseau:

In accordance with the request of the Engineering Committee originally appointed as sponsor for the F. E. R. A. Project "Soil and Foundation Survey", the Board of State Engineers, at a special meeting held this day, passed the following resolutions:

"WHEREAS, there has been a long felt need for information relative to soil and foundation conditions in Louisiana which should be made available to all engineers and architects, and

"WHEREAS, the collection and compilation of such information has not heretofore been undertaken, due to lack of necessary funds to meet the expenses of such collecting and compiling, and

"WHEREAS, the Works Progress Administration offers an opportunity to obtain this information from the public and private files, records, plans and drawings of engineers, architects and contractors, through the employment for such purpose of engineers, surveyors and draftsmen now in financial distress, and

"WHEREAS, the assembling of this information to be collected and compiled, will be of inestimable value to the engineering and architectural professions in the designing and planning of future structures.

"THEREFORE BE IT RESOLVED, that the Board of State Engineers of the State of Louisiana does hereby endorse and sponsor the proposed Works Progress Administration Project entitled "Soil and Foundation Survey", covering an engineering study of soil characteristics, supporting power, safe loading for various types of foundations, under various soil conditions, and all information pertinent thereto, as presented by the records of structures built in the City of New Orleans and adjacent territory in the State of Louisiana.

"BE IT FURTHER RESOLVED, that the Board of State Engineers records its desire to cooperate to the fullest extent in the above proposed study, and to make available any and all information of the character desired, that may be in the files of this office, for the furtherance of the study contemplated."

Very respectfully,
John Klorer,
Chief State Engineer.

The project was approved, although never formally endorsed, by the American Engineering Council. Council made mention of the progress of the project in its news letters of July 15th and September 15th, 1935. From the latter is quoted the following: "The survey is expected to be of great value in planning construction which is complicated by the variable soil conditions underlying the city."

In December 1935, it appeared that the Federal Government might discontinue the Soil and Foundation Survey Project. The Louisiana Engineering Society entered vigorous protest and requested the American Engineering Council to immediately confer with the Works Progress Administration in Washington. As the result of this conference the Administration continued the project because of its scientific value and relief features.

The report which follows has been divided into four chapters. Chapter 1 discusses the geologic formation of the District and is accompanied by numerous maps. Chapter 2 is devoted to Test Borings. Chapter 4; is a study of Spread Footings and Foundations, and Chapter 3; is a study of Pile Foundations. The information contained in these Chapters is the result of the follow up, by the project engineers, of the letters of Colonel Bres and Professor Derickson, and plans as outlined therein. In visiting the various offices, sketches and notes were made which were brought in and worked into the final shape as it appears in this report. Information not available locally was obtained by mail. Twenty-four months were required for the collection and compilation of these data and report.

Appreciation and gratitude are here expressed to the consultants on the project; to those members of the profession of Engineering and Architecture, and to the public agencies and their many employees who so generously and graciously cooperated in supplying the data which has made this report possible. They are as follows:

Douglas S. Anderson
F. N. Billingsley
Allen Blakemore
C. N. Bott
C. G. Cappell
E. A. Christy
J. F. Coleman
N. C. Curtis
George G. Earle
Jas. P. Ewin
Lionel Favret
C. A. Favrot
Mortimer Favrot
A. M. Fromherz
H. M. Gallagher
B. H. Grehan
O. M. Gwinn
M. H. Goldstein
Orloff Henry
Jens B. Jensen
John Klorer
N. E. Lant
J. A. McNiven
C. G. Melville
Allison Owen
John L. Porter
P. H. Quinlan
Geo. P. Rice
John Riess
Sam Stone, Jr.
A. F. Theard
Emile Weil
Leon Weiss
Victor Wogan

and also to the

Board of Commissioners of the Port of N. O.
Orleans Levee Board
Sewerage & Water Board of New Orleans
City Planning and Zoning Commission
Board of State Engineers
City Engineer and City Architect of N. O.
United States Engineers
Assistant Custodian, U. S. Customhouse
La. State Highway Commission
Superintendent of Buildings & Grounds, U. S. Marine Hospital

Grateful acknowledgement is also made to those employees on the project who have played such a large part in its successful completion.

Noteworthy among those who contributed to the success of this project and to whom special acknowledgement is made, are the late President of Tulane University, Dr. A. B. Dinwiddie, and the Dean of the College of Engineering, Dr. Douglas S. Anderson, for their sympathetic interest and encouragement; and to Professor Donald Derickson, Professor of Civil Engineering, for many hours which he devoted to starting, and aiding in carrying on the work, as an advisor, consultant, and chairman of the Supervisory Committee; to the Louisiana Engineering Society for the share of the preliminary expenses borne by them, and their support in initiating the project, and to the American Engineering Council for their support; also to Tulane University for its generosity in furnishing commodious and comfortable quarters, including light, heat and water, all of which played a very important part in the initiation of and consummation of the project.

CHAPTER I

Historical and Geological

To write a history of the age and development of that portion of the Mississippi delta where New Orleans now stands seems to be an impossible undertaking. That the entire area was at some time covered by the waters of the sea seems certain.

At Baton Rouge, on the Mississippi River, less than 90 miles by airline above New Orleans, the hills cease. A theory has been advanced by engineers and other scientists that the mouth of the river was at one time at Baton Rouge and that the intervening two hundred miles to the Gulf of Mexico has been built up by river deposit. Some credence may be given to this theory because at the present time after intense regulation, the river, each year carries to the Gulf about four hundred million tons of silt which is sufficient to build an area of eight square miles to a height of 30 feet.

Test holes at various locations indicate a bed of sea shells in many places at a depth of about fifty feet. Just when the water receded or how gradual was the change and how many years were passed is impossible to say.

In many locations, in excavating for building foundations, two distinct layers or growths of cypress have been found. These stumps indicate trees of large size; the stumps being two to four or more feet in diameter and fairly closely grouped from eight to fifteen or twenty feet apart. The trunks of the trees are not found and the stumps give the appearance of having been cut. But when and by whom were they cut? It must have taken centuries to grow such trees, indeed centuries before the discovery of America.

The first layer of stumps is only a few feet below the surface and these, of course could have been cut and undoubtedly were cut, since the founding of New Orleans in 1717. But the second layer or forest is found twenty to thirty feet below the surface at about elevation minus twenty five Mean Gulf Level. Not only does this raise the question as to when, why and by whom they were cut but how did they come to be twenty to thirty feet below sea level?

Mr. Alfred F. Theard, General Superintendent of the Sewerage & Water Board, points out that these forests must have been above sea level when grown and their present position indicates the subsidence of the area through centuries. This subsidence is still taking place and may be expected to continue. In recent years, that is since 1897, when the first installation of sanitary and storm sewers was started, the subsidence has been very marked and in some sections amounts to three to six feet or more.

Data for the first contour map of the city area was made in 1893 and elevations at the present time, when a new contour map is being prepared, show that the surface of the ground over the entire area has changed very materially.

Another very interesting and important observation by Mr. Theard, and by Mr. Hampton Reynolds, Civil Engineer, is the existence of a large sand-bar which extends from the shore of Lake Pontchartrain northwest of and through the property of the present West End Country Club, which is located on the west side of Pontchartrain Blvd., about one mile south of Lake Pontchartrain, in a north-easterly direction for a distance of about fifteen miles until it meets the present shore of Lake Pontchartrain at Little Woods. This sand-bar has never been accurately charted for location or cross section. This is a fine white sand mixed with sea shells of various kinds and sizes, which may be found at varying depths of one to fifteen feet below the ground surface. While no definite cross sections have been made, the general section is thought to be similar to a levee or dam, with a sharper slope to the lake side than to the river side. Evidently at some time this was the shore of the lake or sea.

Another important and interesting supposition, with every indication of truth, is that the Mississippi River at one time had an outlet via Bayou Metairie and Bayou Gentilly, or Bayou Sauvage, into what is now Chef Menteur or possibly extending further via Cedar Bayou into the Rigolets.

But this brings up further suppositions or theories because at the present time Bayou St. John cuts directly across the supposed junction of Bayou Metairie and Bayou Gentilly. See the various maps in this volume for a more ready understanding of this theory. The map made by Carlos Trudeau in 1798 shows the location of Bayou Metairie at its meeting with Bayou St. John and also shows the location of Bayou Gentilly from a short distance north east of Bayou St. John on into Bayou Sauvage. This map also shows a short connecting link between Bayou Metairie and Bayou Gentilly and crossing the present Bayou St. John. This connecting link is shown on other maps in this chapter but there is no information as to when it disappeared nor are there any surface indications as to its exact location.

The theory has been advanced that Bayou St. John is the result of a fault in the geologic formation or to some volcanic action which resulted in the separation of Bayou Metairie and Bayou Gentilly.

Mr. Frank H. Waddill, Civil Engineer, in commenting on Bayou St. John, considers the almost total lack of banks as indicating the existence of a fault or rift in the earth's surface. Bayous Metairie and Gentilly indicate a flow through artificial banks, or banks formed by overflow and alluvial deposits.

The same fault theory might be advanced in regard to Chef Menteur which is an outlet from Lake Pontchartrain, of great depth, without banks, and this theory must hold if Bayou Sauvage, the continuation of Bayou Gentilly, actually connected with Cedar Bayou and flowed into the Rigolets. All of this theory can be followed by a study of the accompanying maps and particularly the large contour map, upon which we have superimposed by combining various smaller and older maps, our conception of how the Mississippi River once flowed, in part, to The Rigolets or the Gulf of Mexico.

Mr. Geo. W. Cable in his "History and Present Condition of New Orleans", published in 1881, states that Bayou Manchac, leaving the river at a point about 70 miles above New Orleans, once connected the Mississippi River with the Gulf through Lakes Maurepas, Pontchartrain and Borgne, all of which were, and still are, connected by deep passes or channels. Bayou Manchac was obstructed by military forces in 1814 and the flow of the Mississippi River through this outlet ceased. The territory between this outlet and the main river comprising some 1700 square miles of marsh and swamp was known as Orleans Island.

Without historical support there is a legend of a river near Frenier, above New Orleans, which connected the Mississippi River with Lake Pontchartrain. This passage was used a great deal by the Indians and the early "Courier du Bois". It was called "Manchac" which in the language of the Tchoupitoulas Indians means, "back door", or "rear passage". Also of interest is the fact that the present connection between Lakes Pontchartrain and Maurepas, known as "Pass Manchac", is really South Pass, the real Pass Manchac being one mile north and closed to navigation by the Illinois Central Railroad trestle. The existence of Manchac River and other passages would lend support to the theory that the mouth of the river was at one time where Baton Rouge now stands.

The late Mr. Samuel Young, formerly Chief Engineer of the Board of Commissioners of the Port of New Orleans, in an article in Transactions, American Society of Civil Engineers, Vol. 87, page 1025, says in part: "The boring chart shown in this article illustrates the ground forma-

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tion at the lock site of the Inner Harbor Navigation Canal. This chart was prepared from data obtained from two borings, (See Soil & Foundation Survey Nos. 97 and 160). Other borings (See Soil & Foundation Survey Nos. 147, 158, 159 and 162 to 175) and subsequent excavations on an area 300 feet wide and 1200 feet long established the continuity of the various layers or strata. Many conch and other marine shells were found in the sands at elevation minus 27 C. D. which elevation corresponds to 47.3 below Gulf Level.

"It is interesting to note that a human skull was found 37 feet below the ground surface, by laborers, while making excavations in an undisturbed blue clay. The jaw bone was missing and no other bones and no implements were found. It may be inferred that in a recent geologic epoch, the ground at that location was in contact with the ocean and that the soil immediately above was deposited by the river.

"One of the difficulties in excavating this soil, and also the relative instability of the river banks, is caused by the fact that many of the sand layers extend to the river.

"The location of the borings along the site of the Navigation Canal, as referred to above, was an open marsh area and in some sections was a cypress swamp. Dredging operations along this canal show that marine life existed in the marsh area within 10 ft. of the present sea level. Surface deposits of humus and traces of clay, underlaid by sea sands and shells of a kind not found in Lake Pontchartrain today, were discovered. At Dwyer Road, which marks the edge of the cypress forest there was a change in the ground structure. (See large map for location).

"From Dwyer Road to the Mississippi River there was a marked absence of sea sands and marine life in the first 30 feet below the ground surface, but there was unmistakable evidence that there had been forest life on a plane now approximately 15 ft. below the present ground surface. Two distinct layers of cypress stumps were found while dredging and making excavations in this canal area."

"The reason for the existence of these two layers of stumps may be understood from the investigations relating to subsidence in the lower valley. The rate of this subsidence bears a direct relation to the age of the deposits. Above New Orleans it is hardly discernible, whereas below the city, especially in the more recent deposits, 30 miles or more down the river a perceptible contraction in the width of the tillable strips has occurred within the last 50 years. Further down in the present delta, along South Pass, a subsidence of the banks has been so extensive that it endangers the channel. Thus, in the formation of the wooded areas along the Inner-Harbor Navigation Canal, and elsewhere, deposits were built above the surface of the Gulf Waters. On this new ground dense cypress forests grew. The steady subsidence of these fresh deposits resulted in the gradual sinking of the ground surface below the Gulf Level. The forest growth was destroyed in time, leaving the river again free to spread its settlement over the area and raise the ground above Gulf Level, thus enabling a second growth to begin.

"It is evident from the manner in which the ground has been built up, that no marked uniformity of structure exists over large areas. Likewise, the bearing value of the ground, judging by the support given to pile foundations, varies considerably in different areas."

The human skull, referred to above, was sent to the American Museum of Natural History in New York and is in their permanent collection.

In a recent letter to the president of Tulane University they make the following comment: "The specimen comprises a frontal bone, the parietals and part of the occipital. I should judge it to be a mature male of a quite modern type characteristic of the historic Indians of the region in which it was found.

"It is definetly brachycephalic, somewhat flattened on top and with moderately pronounced parietal bosses. As far as I can see there is nothing unusual about this fragment nor any indication of primitive anatomical characteristics."

The puzzling question is, how did it come to be thirty seven feet below the ground surface.

DATUM PLANES

In 1876, before the Mississippi River Commission came into existence, and before a line of precise levels had been run from the Gulf of Mexico to Cairo, Illinois, it became necessary to establish some fixed datum plane to which elevations along the river could be referred.

This plane was arbitrarily assumed at 300 feet below Cairo City Datum. Cairo City Datum at that time read 9.16 feet on the U. S. Engineer gauge at Cairo.

This datum plane, 300 feet below Cairo City Datum, was intended to approximate Mean Gulf Level, and has ever since been known as "Cairo Datum". When precise levels had been run to the Gulf, and after a Mean Gulf Level had been agreed upon, it was found that 20.434 "Cairo Datum" equalled zero Mean Gulf Level.

For the benefit of those not accustomed to the use of "Cairo Datum" and for the sake of national uniformity we have endeavored, in this work, to reduce all elevations to "Mean Gulf Level" but wherever the letters C. D. appear they mean "Cairo Datum" and where the letters M. G. L. appear they mean "Mean Gulf Level"

"Mean Gulf Level" was fixed by the Mississippi River Commission by establishing at Biloxi, Mississippi, in 1881, a tide-gauge which was read many times, over a period of five years, and in this way an accurate mean of the tide elevations in the Gulf of Mexico was fixed. Biloxi is located on Mississippi Sound, which is protected from the main gulf by a reef of islands, and is not subjected to the heavy surf of the gulf, and was an ideal place for establishing the tide-gage.

For more detail in regard to above subject of datum planes refer to Vol. 5-No. 6 "Proceedings of the Louisiana Engineering Society", dated December 1919.

The reader's attention is called to the fact that the various lakes, streams, bayous, etc., which are shown on the large contour map are located only approximately. Many discrepancies were found in the various maps from which the composite map was made and no two maps could be superimposed and made to fit or check. It was therefore necessary to do a certain amount of juggling.

However, these waterways are all shown on one or more of the accompanying maps and their location on the composite contour map is approximately correct.

In many and most cases all surface indications of their location has been completely effaced and the areas covered by buildings and other structures.

Following this chapter are 14 maps, some of which have been used in making the composite map and others are inserted for historic and geologic interest so that the reader may study them and draw further conclusions.

No. 1 Contour Map with superimpositions
No. 2 U. S. Engineers Map of La. Waterways
No. 3 French Map—1728
No. 4 Pittman Map of British Army—1770
No. 5 English Map—1798
No. 6 Carlos Trudeau Map—1798
No. 7 Baron de Carondelet Map—1798
No. 8 Plan del Local—1803
No. 9 Latour's Map of British Army—1815
No. 10 F. B. Ogden Map—1829
No. 11 Tanesse Map—1815
No. 12 Existing Canals—1825
No. 13 Sauve's Crevasse—1849
No. 14 Gen. Banks Map—1863

There are further shown five photographic reproductions showing some cypress stumps encountered under the Canal Bank and Feibleman buildings, and similar stumps have been found under many other buildings in all sections of the city.

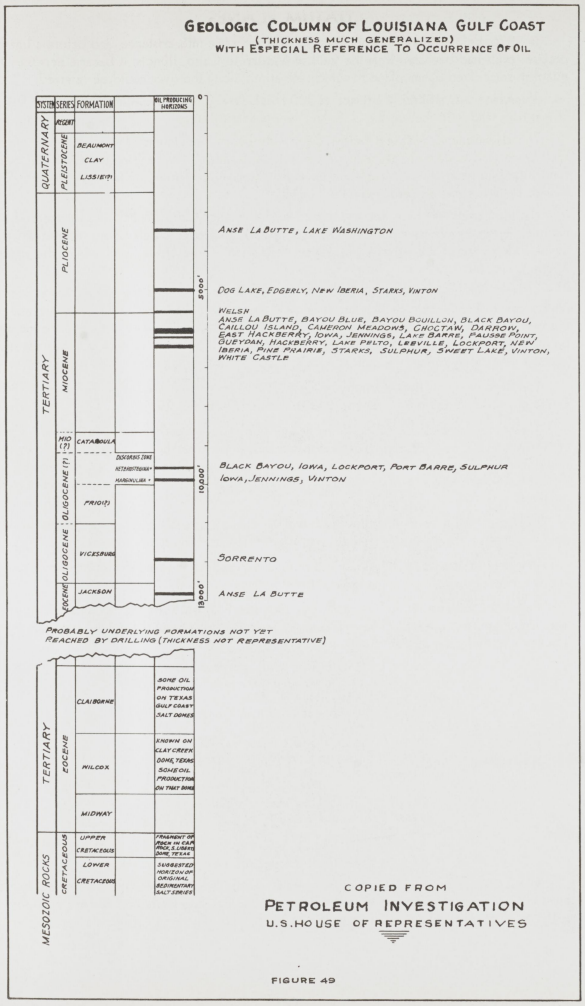


FIGURE 49

PETROLEUM INVESTIGATION

HEARINGS BEFORE A SUBCOMMITTEE
OF THE
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE
HOUSE OF REPRESENTATIVES
Seventy Third Congress
(Recess)
On H. Res. 441

LOUISIANA

The State of Louisiana has produced oil for more than 30 years. To the end of 1933 the total production had been more than 500,000,000 barrels of oil. In 1933 the production amounted to 25,500,000 barrels. Although 70 percent of the total output has come from fields in the northern part of the State, the production from fields along the Gulf Coast has of late years been increasing, and in 1933 about 60 percent of the total production of the State came from fields in the Gulf coast region.

GEOLOGIC DIVISIONS

Louisiana lies wholly within the Gulf Coastal Plain province as geologically and physiographically defined, but it may be divided conveniently into two portions — northern Louisiana and the flat marshland, bayou, and island belt, 50 to 100 miles wide, paralleling the Gulf of Mexico, generally referred to as the Gulf Coast. This portion includes the Delta of the Mississippi River and is topographically very similar to the alluvial valley of that river, 50 miles or more wide, which extends northward to the northern boundary of the State. Nevertheless, the northern part of the Mississippi alluvial plain is included with the northern Louisiana subdivision because of the closer geologic relations of its underlying rocks to those of the northern part of the State. The Gulf coast as roughly defined above is underlain everywhere by deposits of Pleistocene or Recent age. Northward from the Gulf coast successively older formations of the Pliocene, Miocene, Oligocene and Eocene age appear at the surface, the oldest beds exposed belonging to the Wilcox formation, of Eocene age, which crops out in a large area in northwestern Louisiana at the top of the broad structural arch of the Sabine uplift. Younger Eocene beds of the Claiborne group crop out along the northern boundary of the State, as well as east and south of the crest of the Sabine uplift.

STRATIGRAPHY OF THE GULF COAST

Knowledge of the stratigraphic section of the Gulf coast has been greatly increased within the last decade by the numerous deep wells drilled for oil and gas (See fig. 49). It is now known that beds of all the subdivisions of Tertiary time increase greatly in thickness southward from their outcrops and that there are beds aggregating several thousand feet in thickness which do not crop out. The sediments thus lie in overlapping great wedges, with the blades toward the continental interior. For the most part the physical characters of the rocks are not distinctive and much of the knowledge of their relations has been gained by the study of the microscopic fossil content of well cores and cuttings. Inasmuch as the beds of each of the various Tertiary series may aggregate several thousand feet in thickness, no well penetrates them all where they are fully developed, but the picture of the stratigraphic relations is a composite one made from the data afforded by a great many wells. The geologic column of the Louisiana Gulf Coast included with this summary shows in a general way the great thickness of beds involved in the search for oil in this region, but the thicknesses there given are approximate only and represent conditions in the belt in which most of the oil fields occur. So far as known, the thicknesses continue to increase southward to the Gulf of Mexico.



CYPRESS STUMP IN EXCAVATION
FOR FOUNDATION OF
FEIBLEMAN BUILDING-CASE NO.26-
AND SHOWING PART OF CONCRETE IN PLACE



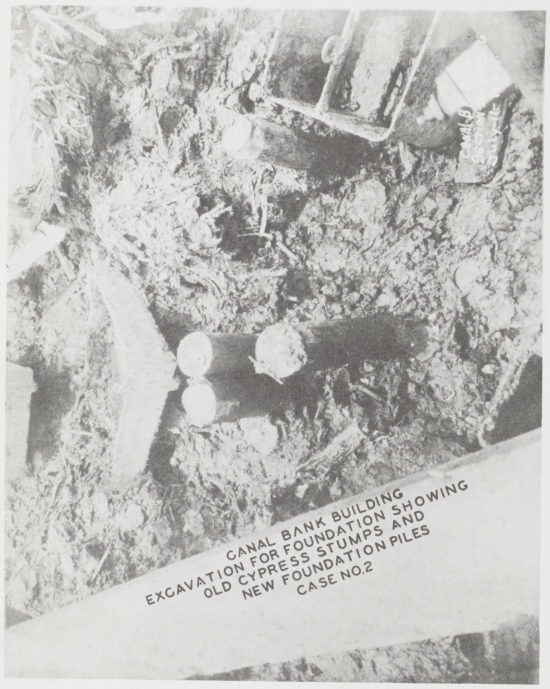
FOUNDATION PILES UNDER
FEIBLEMAN BUILDING.
CASE NO.26

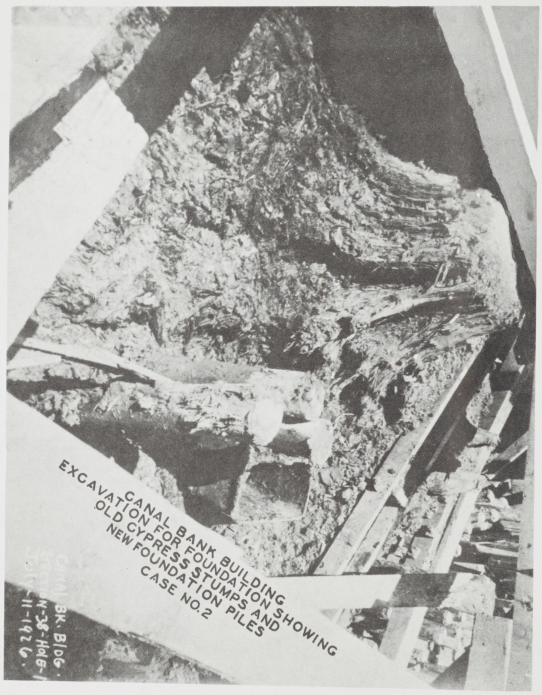


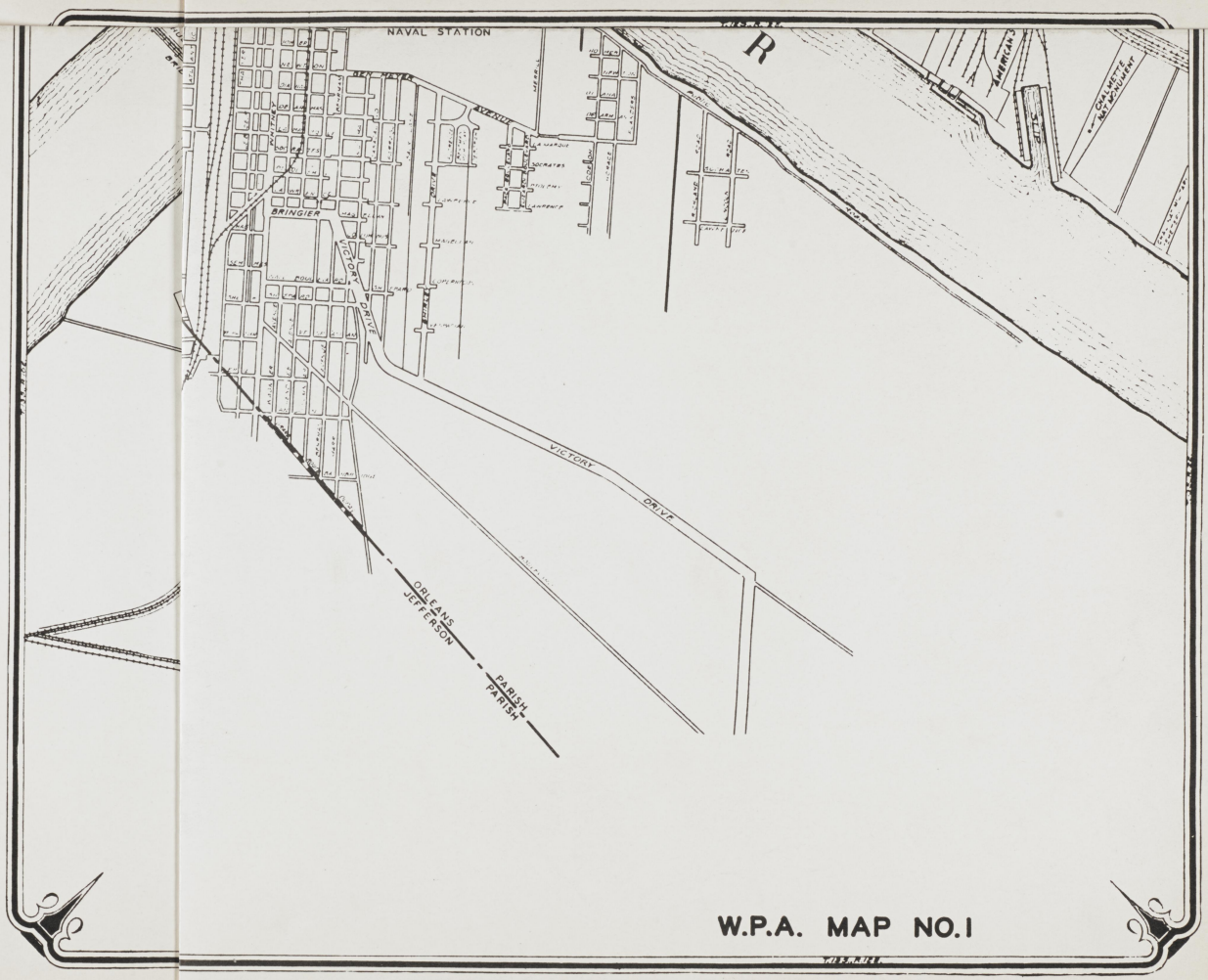
CYPRESS STUMP AND
FOUNDATION PILES UNDER
FEIBLEMAN BUILDING-CASE NO. 26



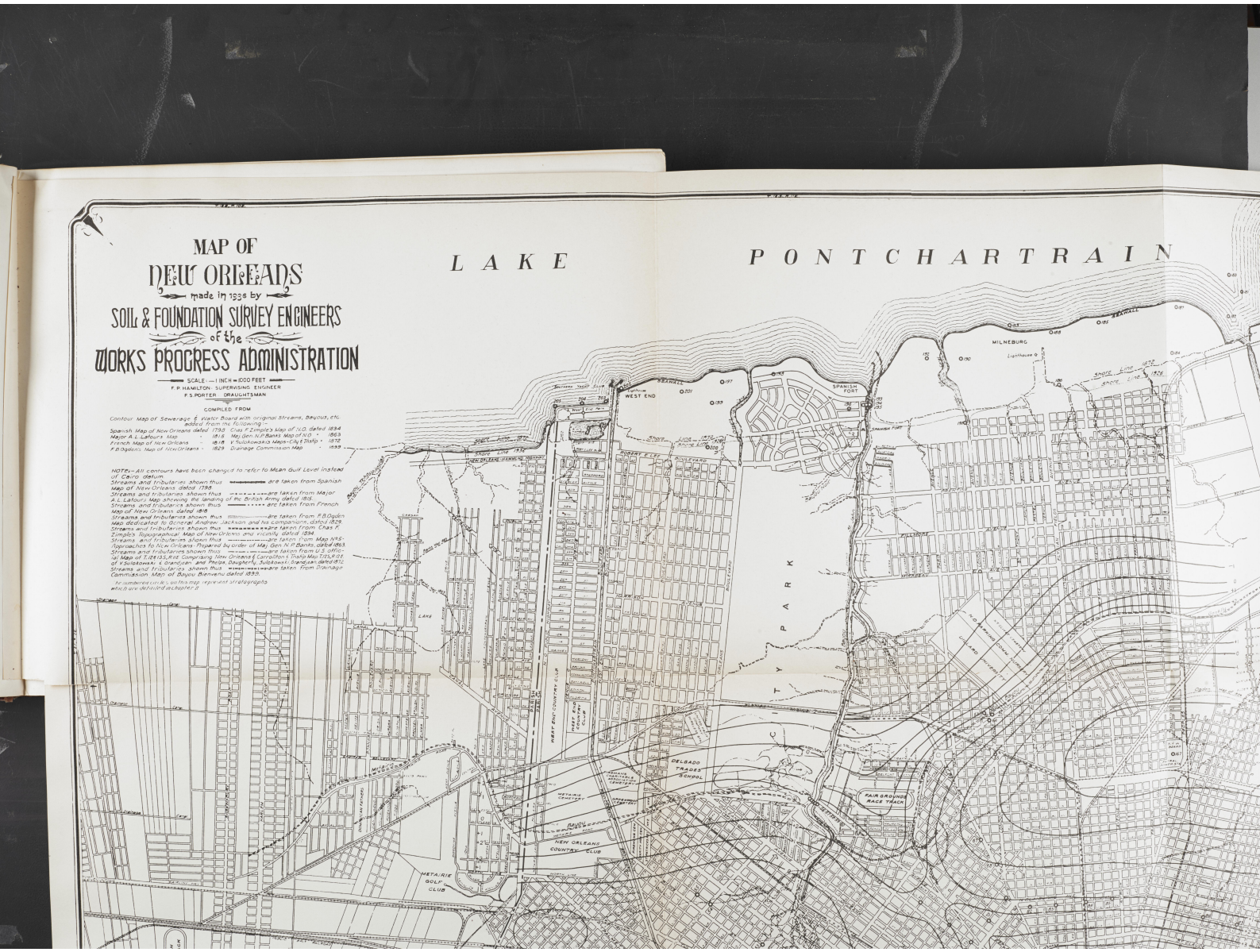
CYPRESS STUMPS AND
FOUNDATION PILES UNDER
FEIBLEMAN BUILDING-CASE NO. 26

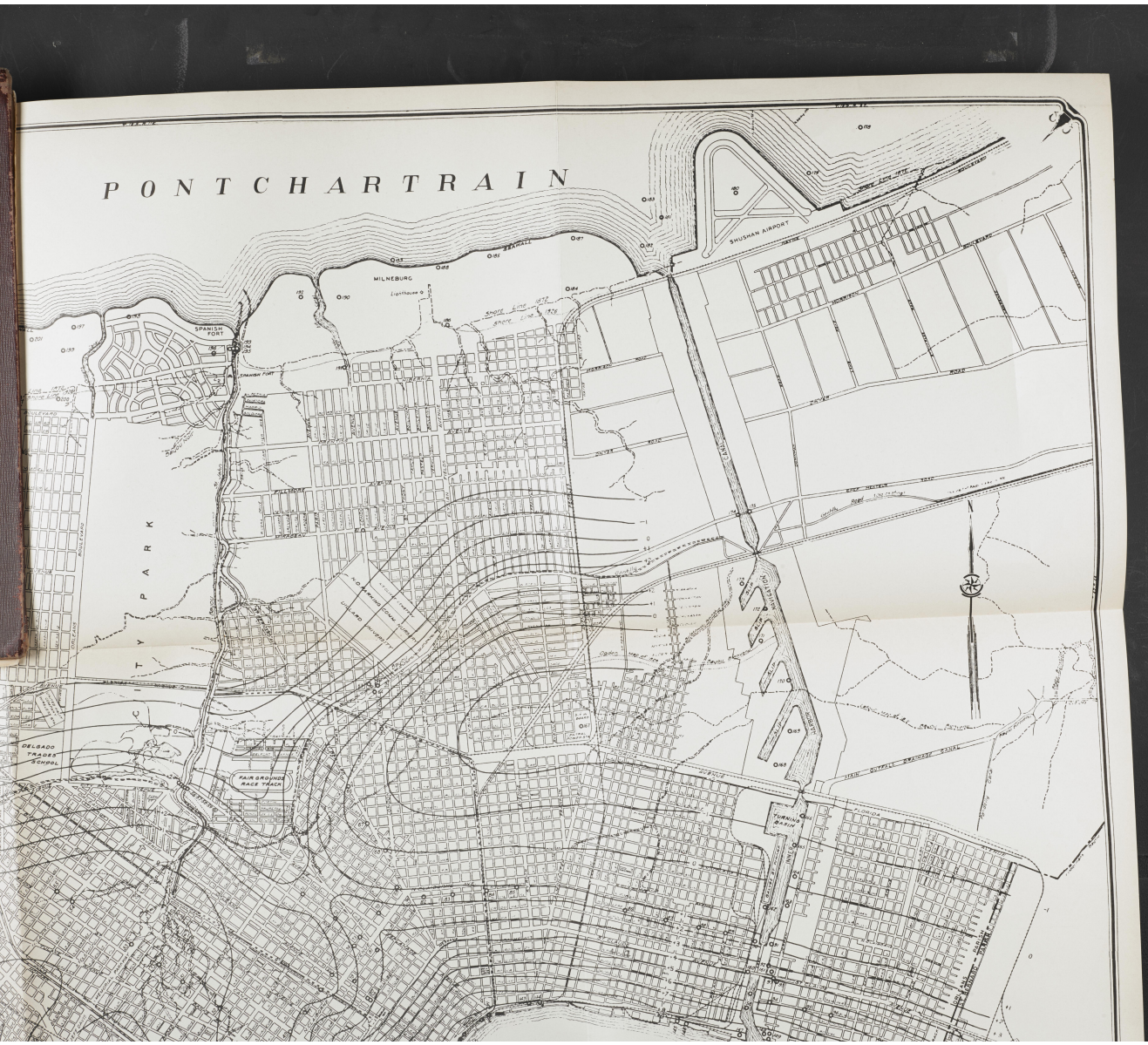

CANAL BANK BUILDING
EXCAVATION FOR FOUNDATION SHOWING
OLD CYPRESS STUMPS AND
NEW FOUNDATION PILES
CASE NO.2

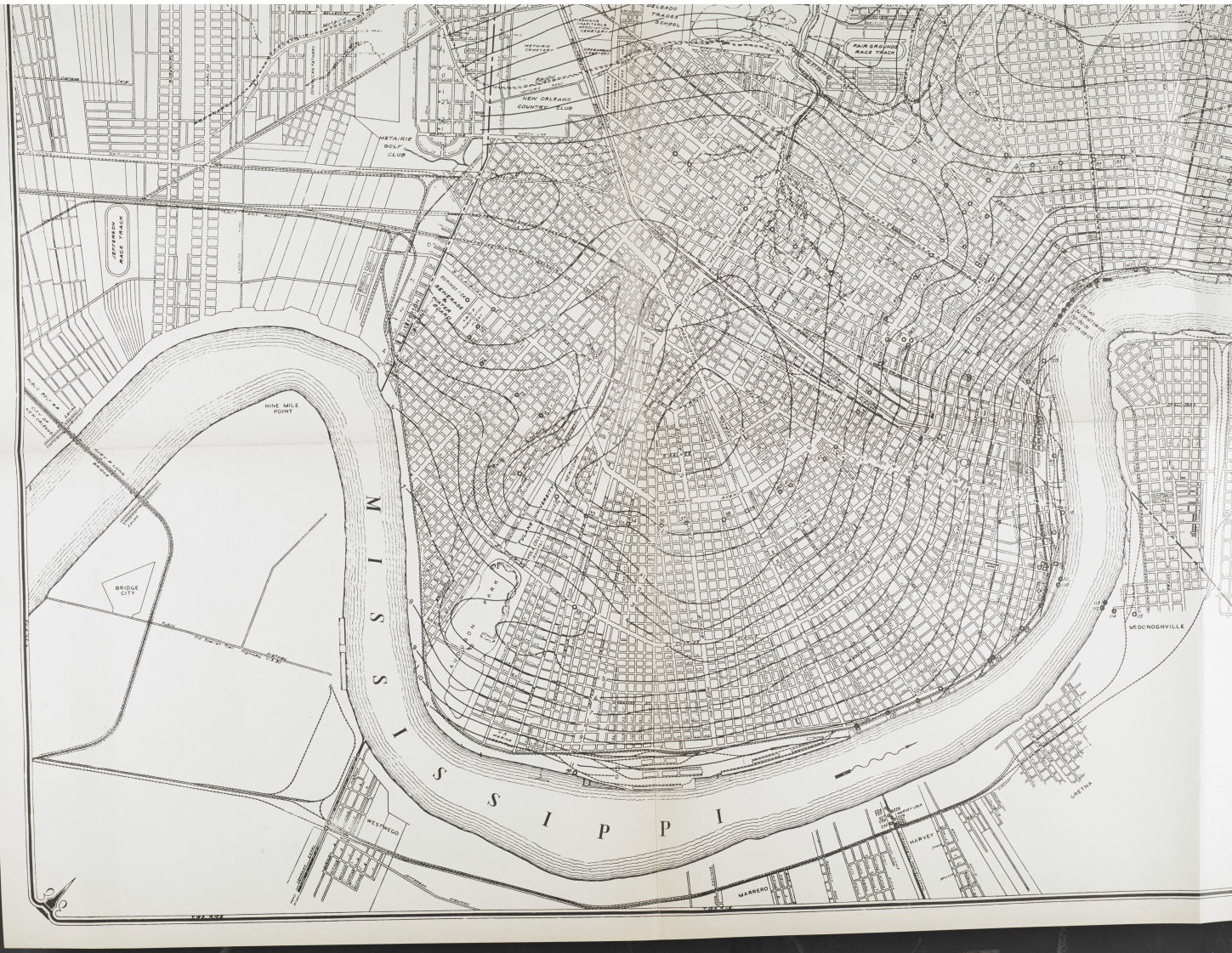

CANAL BANK BUILDING
EXCAVATION FOR FOUNDATION SHOWING
OLD CYPRESS STUMPS AND
NEW FOUNDATION PILES
CASE NO.2

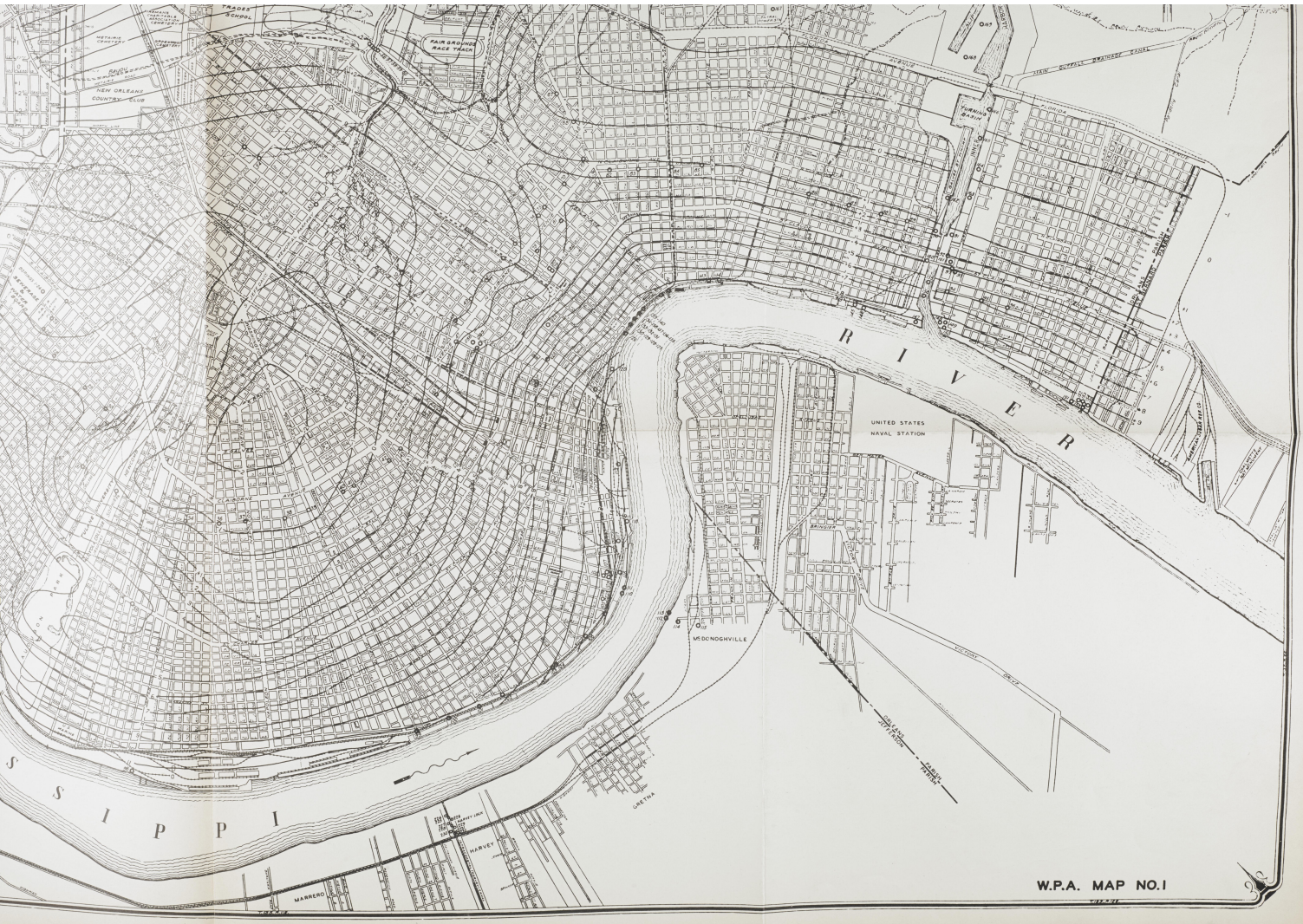

NAVAL STATION
R
AVENUE
BRINGIER
VICTORY DRIVE
VICTORY DRIVE
ORLEANS
JEFFERSON
PARISH
PARISH

W.P.A. MAP NO. 1

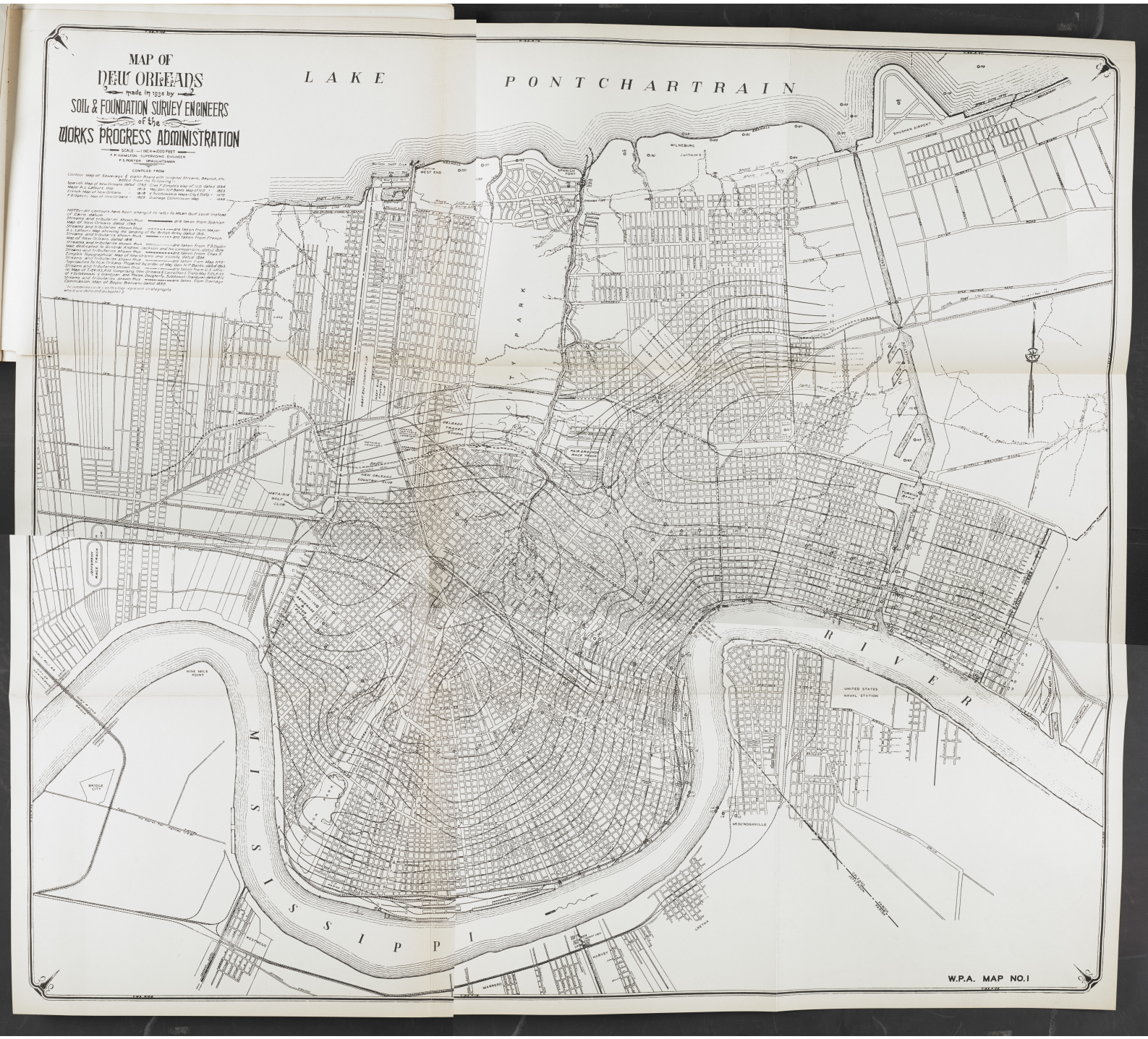

MAP OF
NEW ORLEANS
made in 1938 by
SOIL & FOUNDATION SURVEY ENGINEERS
of the
WORKS PROGRESS ADMINISTRATION
SCALE — 1 INCH = 1000 FEET
F. P. HAMILTON SUPERVISING ENGINEER
F. S. PORTER DRAUGHTSMAN
COMPILED FROM
Contour Map of Sewerage & Water Board with original Streams, Bayous, etc. added from the following:—
Spanish Map of New Orleans dated 1798 Chas. F. Zimple's Map of U.S. dated 1834
Major A. L. Latour's Map " 1815 Maj. Gen. N. P. Banks' Map of N.O. " 1863
French Map of New Orleans " 1818 V. Yulokowski's Maps—City & Parish " 1872
F. P. Ogden's Map of New Orleans " 1829 Drainage Commission Map " 1899
NOTE:—All contours have been changed to refer to Mean Gulf Level instead of Cairo datum.
Streams and tributaries shown thus ——— are taken from Spanish Map of New Orleans dated 1798
Streams and tributaries shown thus — · — · — are taken from Major A. L. Latour's Map showing the landing of the British Army dated 1815
Streams and tributaries shown thus ····· are taken from French Map of New Orleans dated 1818
Streams and tributaries shown thus ——— are taken from F. P. Ogden Map dedicated to General Andrew Jackson and his companions, dated 1829
Streams and tributaries shown thus ———— are taken from Chas. F. Zimple's Topographical Map of New Orleans and vicinity dated 1894
Streams and tributaries shown thus ———— are taken from Map N45-Approaches to New Orleans Prepared by order of Maj. Gen. N. P. Banks, dated 1863
Streams and tributaries shown thus — — — are taken from U.S. Official Map of T. 12 S. R. 13 S., R. 14 E. Comprising New Orleans & Carrollton & Thalp Map T. 13 S., R. 12 E. of V. Yulokowski & Grandjean and Pelras Daughert's Subdivision Bayou dated 1872
Streams and tributaries shown thus ——— are taken from Drainage Commission Map of Bayou Bienvenu dated 1899
The numbers (+1.0, etc.) on this map represent stratigraphic which are detailed in chapter II
LAKE PONTCHARTRAIN
MILNEBURG
Lighthouse
SPANISH FORT
WEST END
SHORE LINE 1872
SHORE LINE 1879
CITY PARK
DELGADO TRADES SCHOOL
FAIR GROUNDS RACE TRACK
NEW ORLEANS COUNTRY CLUB
METAIRIE GOLF CLUB
METAIRIE CEMETERY
WEST END COUNTRY CLUB
LAKE


PONTCHARTRAIN
MILNEBURG
SPANISH FORT
SHUSHAN AIRPORT
CITY PARK
DELGADO TRADES SCHOOL
FAIR GROUNDS RACE TRACK
TURNING BASIN


DELGADO TRADES SCHOOL
FAIR GROUNDS RACE TRACK
METAIRIE CEMETERY
NEW ORLEANS COUNTRY CLUB
METAIRIE GOLF CLUB
JEFFERSON RACE TRACK
NINE MILE POINT
BRIDGE CITY
MISSISSIPPI
AUDUBON PARK
WESTWEGO
MARRERO
HARVEY
GRETNA
McDONOGHVILLE


FAIR GROUNDS RACE TRACK
NEW ORLEANS COUNTRY CLUB
RIVER
UNITED STATES NAVAL STATION
McDONOGHVILLE
HARVEY
MARRERO
S S I P P I

W.P.A. MAP NO.1


MAP OF
NEW ORLEANS
made in 1936 by
SOIL & FOUNDATION SURVEY ENGINEERS
of the
WORKS PROGRESS ADMINISTRATION
SCALE — 1 INCH = 1000 FEET
F. P. HAMILTON: SUPERVISING ENGINEER
F. S. PORTER: DRAUGHTSMAN
COMPILED FROM
Contour Map of Sewerage & Water Board with original Streams, Bayous, etc. added from the following:
Spanish Map of New Orleans dated 1793 Cras F. Empie's Map of U.O. dated 1834
Major A. L. Latours Map 1818 Maj. Gen. N. P. Banks Map of N.O. " 1863
French Map of New Orleans " 1818 V. Sulakowski's Map-City & Shelly " 1872
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NOTE:—All contours have been changed to refer to Mean Gulf Level instead of Cairo datum.
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Streams and tributaries shown thus ——— are taken from Major A. L. Latours Map showing the leaving of the British Army dated 1818
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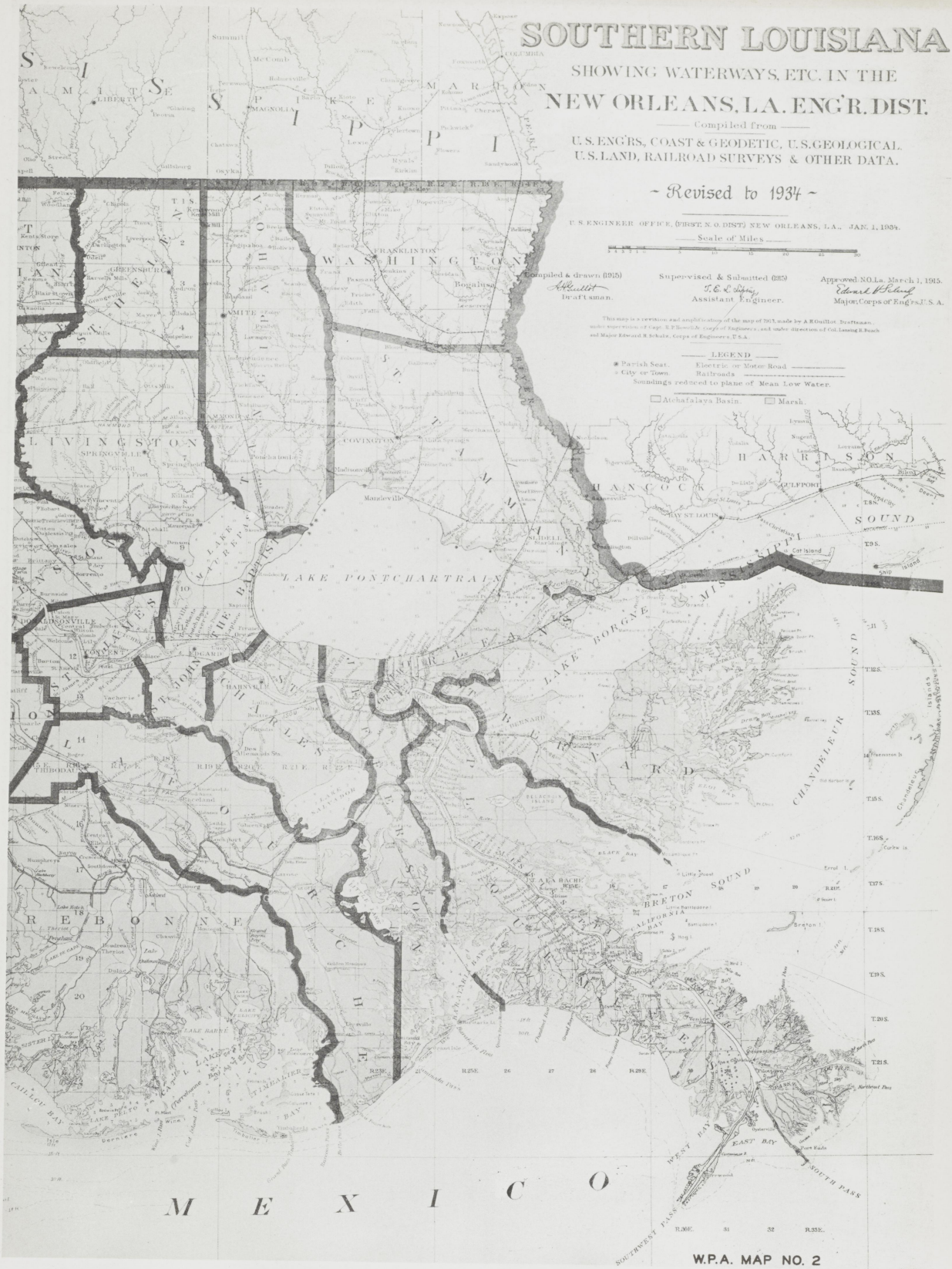
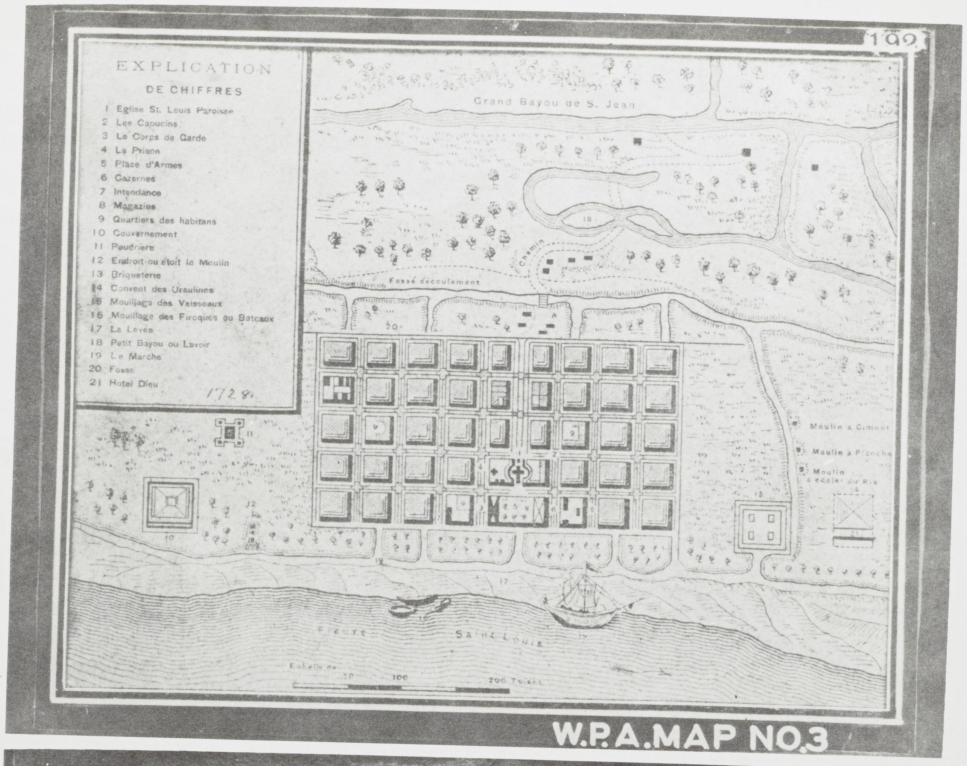
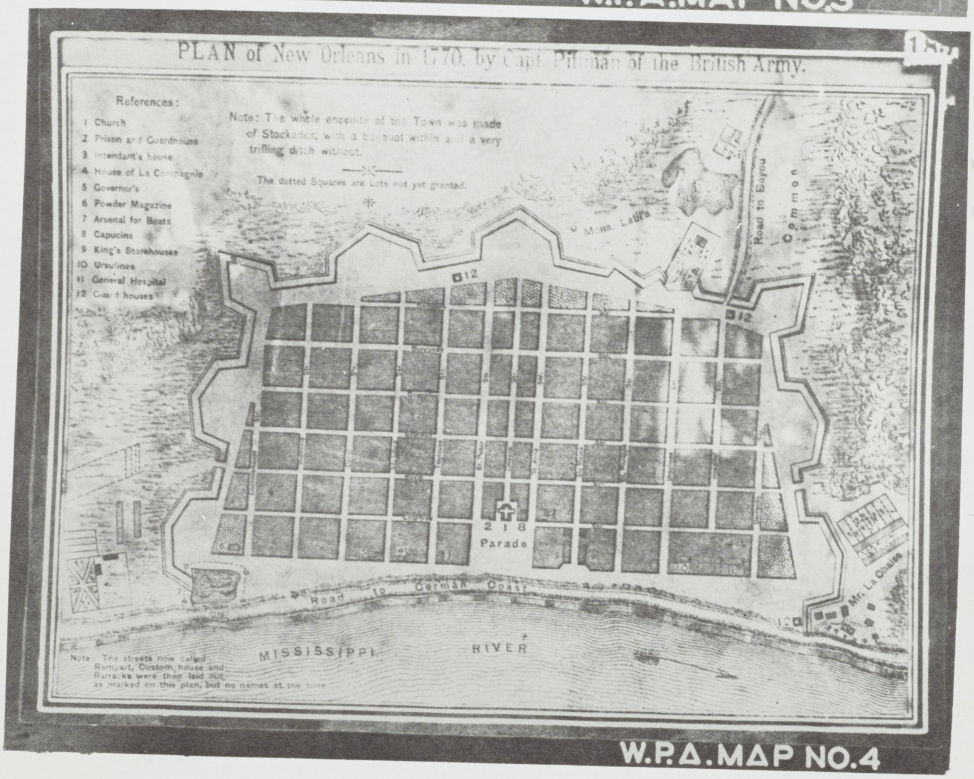
Streams and tributaries shown thus ——— are taken from F. B. Ogden Map dedicated to General Andrew Jackson and his Kentucky Dated 1829
Streams and tributaries shown thus ——— are taken from Cras F. Empie's Topographical Map of New Orleans and vicinity dated 1834
Streams and tributaries shown thus ——— are taken from Map N.O. Approaches to New Orleans Prepared by order of Maj. Gen. N. P. Banks dated 1863
Streams and tributaries shown thus ——— are taken from U.S. Office of Map of Tidewater Rail Company New Orleans & Carrollton Shelly Map 1872 & 1872 of V. Sulakowski & Grandjean and Pierce Daugherty, Kolkhorst-Sandjean dated 1872
Streams and tributaries shown thus ——— are taken from Drainage Commission Map of Bayou Bartholomew dated 1829
Tr. numbered circles on this map represent stratigraphy which are detailed in chapter II
LAKE PONTCHARTRAIN
MISSISSIPPI RIVER
CITY PARK
WEST END
SPANISH FORT
MILNEBURG
SHUSHAN AIRPORT
BELGADO FRASER SCHOOL
NEW ORLEANS COUNTRY CLUB
METAIRIE GOLF CLUB
FAIR GROUND RACE TRACK
JEFFERSON RACE TRACK
NINE MILE POINT
BRIDGE CITY
UNITED STATES NAVAL STATION
MARRERO
HARVEY
GRETNA
W.P.A. MAP NO. I

W.P.A. MAP NO. 2

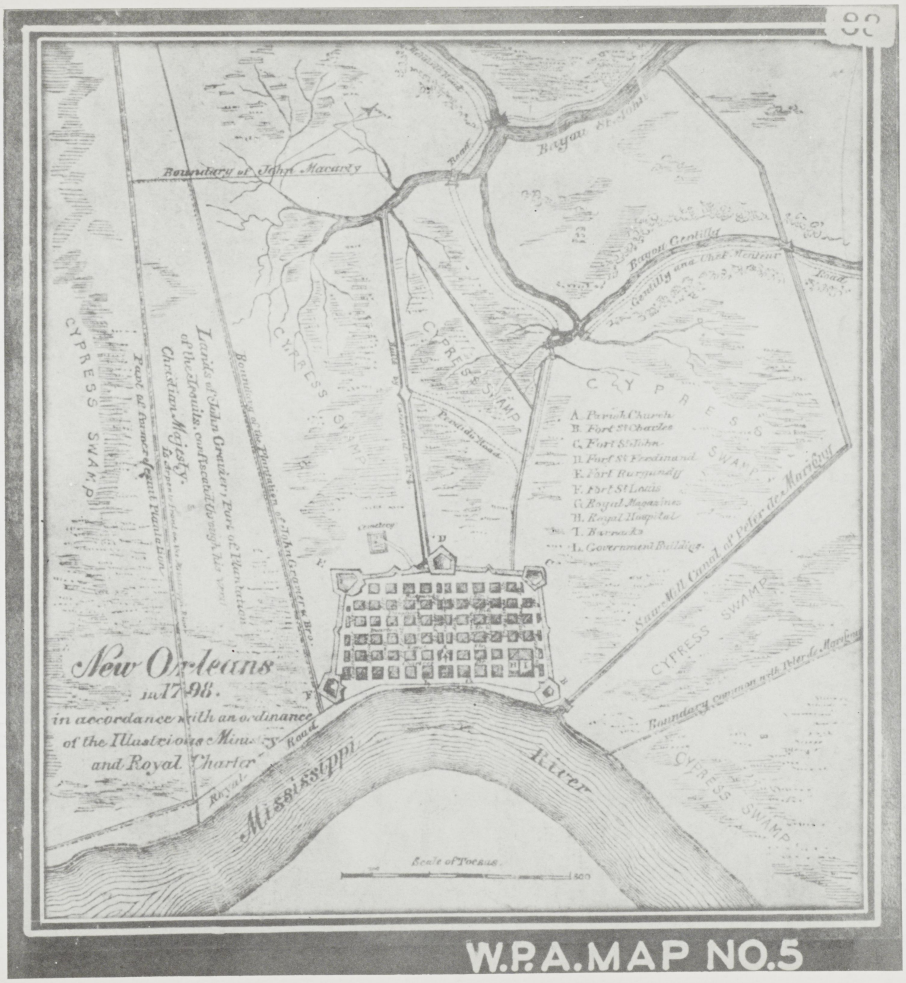

SOUTHERN LOUISIANA
SHOWING WATERWAYS, ETC. IN THE
NEW ORLEANS, LA. ENG'R. DIST.
Compiled from
U.S. ENG'RS, COAST & GEODETIC, U.S. GEOLOGICAL,
U.S. LAND, RAILROAD SURVEYS & OTHER DATA.
~ Revised to 1934 ~
U.S. ENGINEER OFFICE, (FIRST, N.O. DIST.) NEW ORLEANS, LA., JAN. 1, 1934.
Scale of Miles
Compiled & drawn (1915)
A.H. Guillot
Draftsman.
Supervised & Submitted (1935)
T.E.L. Lipsey
Assistant Engineer.
Approved N.O. La. March 1, 1915.
Edward H. Schulz
Major, Corps of Engrs, U.S.A.
This map is a revision and amplification of the map of 1913, made by A.H. Guillot, Draftsman, under supervision of Capt. R.P. Howell, Corps of Engineers, and under direction of Col. Lansing H. Beach and Major Edward H. Schulz, Corps of Engineers, U.S.A.
LEGEND
Parish Seat.
City or Town.
Electric or Motor Road
Railroads
Soundings reduced to plane of Mean Low Water.
Atchafalaya Basin.
Marsh.
LAKE PONTCHARTRAIN
LAKE BORGNE
MISSISSIPPI SOUND
CHANDELEUR SOUND
BRETON SOUND
MEXICO
WEST BAY
EAST BAY
SOUTH PASS
SOUTHWEST PASS
CAILLOU BAY
TIMBALIER BAY
ST. TAMMANY
TANGIPAHOA
WASHINGTON
LIVINGSTON
ST. HELENA
ST. JOHN THE BAPTIST
ST. CHARLES
JEFFERSON
PLAQUEMINES
ST. BERNARD
HANCOCK
HARRISON
ORLEANS
LAFOURCHE
TERREBONNE
W.P.A. MAP NO. 2

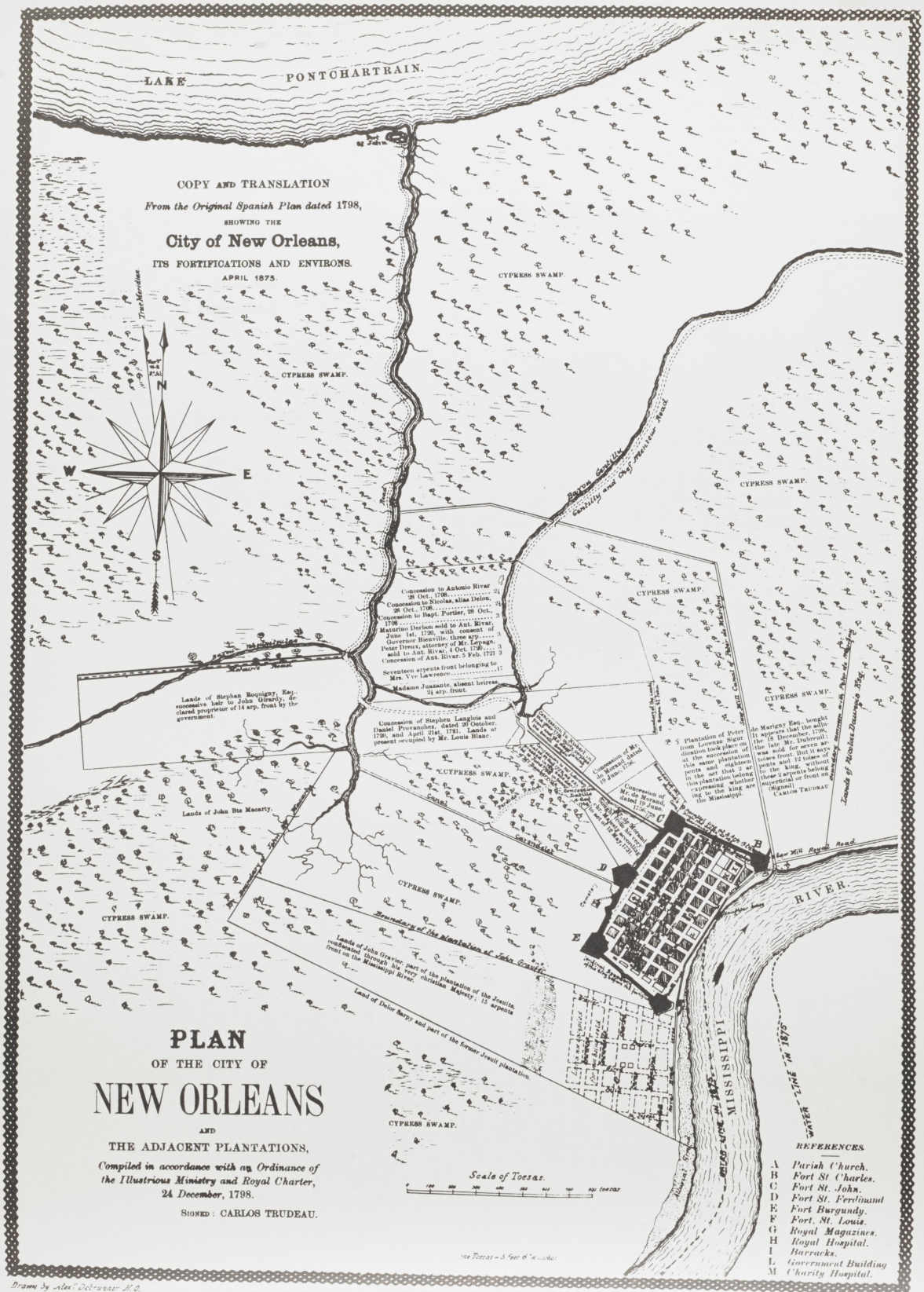


W.P.A. MAP NO. 3



W.P.A. MAP NO. 4


New Orleans
in 1798.
in accordance with an ordinance
of the Illustrious Ministry
and Royal Charter
Boundary of John Macarty
Bayou St. John
Bayou Gentilly
Gentilly and Chef Menteur Road
CYPRESS SWAMP
Lands of John Gravier, Port of Plantation
of the Jesuits, confiscated through his vent
Christian Majesty.
Port of former Jesuit Plantation
Boundary of the Plantation of John Gravier & Bro.
Pierre du Hoad
A. Parish Church
B. Fort St Charles
C. Fort St John
D. Fort St Ferdinand
E. Fort Burgundy
F. Fort St Louis
G. Royal Magazines
H. Royal Hospital
I. Barracks
L. Government Building
Saw-Mill Canal of Peter de Marigny
Boundary common with Peter de Marigny
Mississippi River
Royal Road
Scale of Toesas
500
W.P.A. MAP NO.5

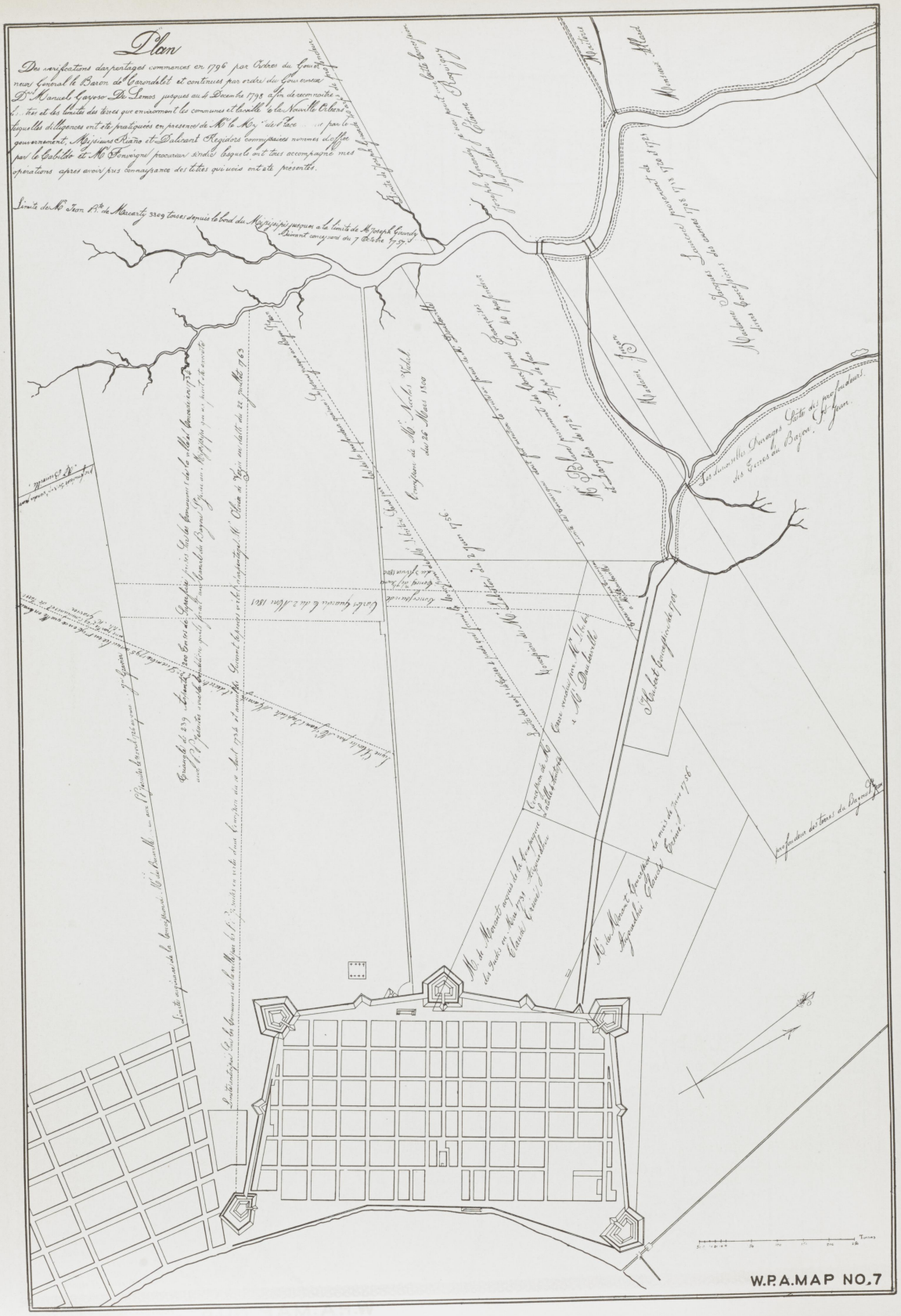


Drawn by Alex. Debrueler N.O.

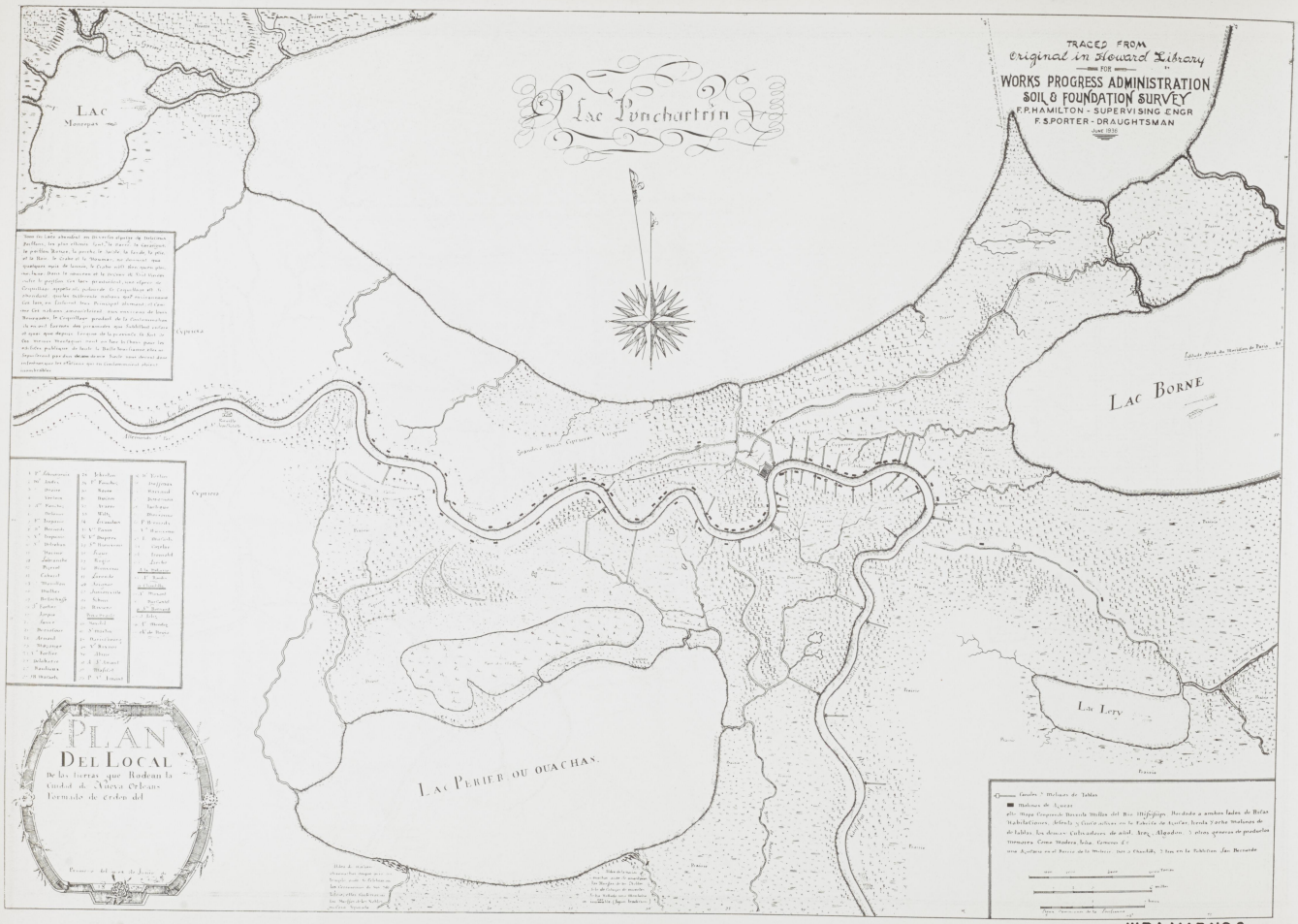
W.P.A. MAP NO. 6

Printed by W. H. Weber, Inc. N.O. Eng. Allied W.P.A.

W.P.A.MAP NO.7

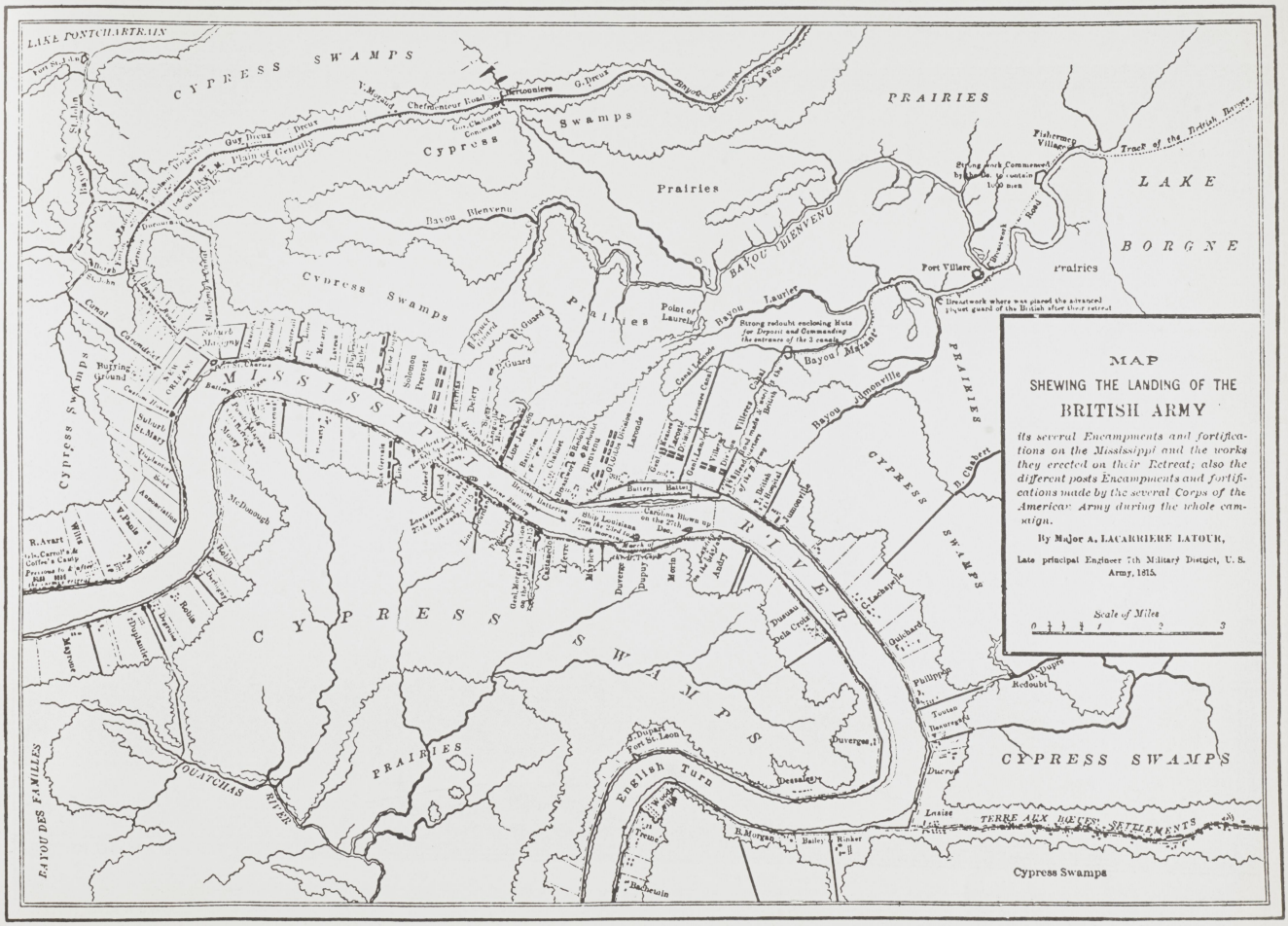


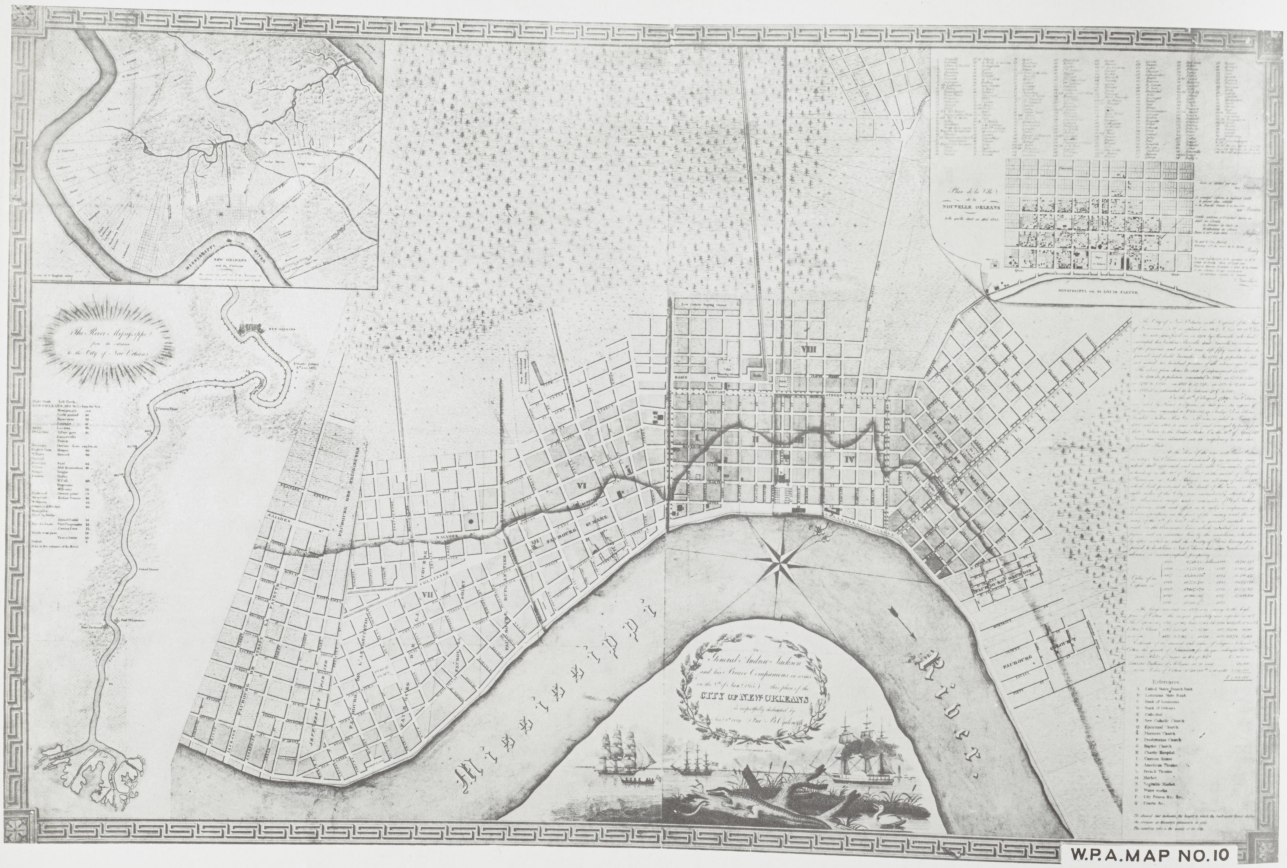
W.P.A.MAP NO.6



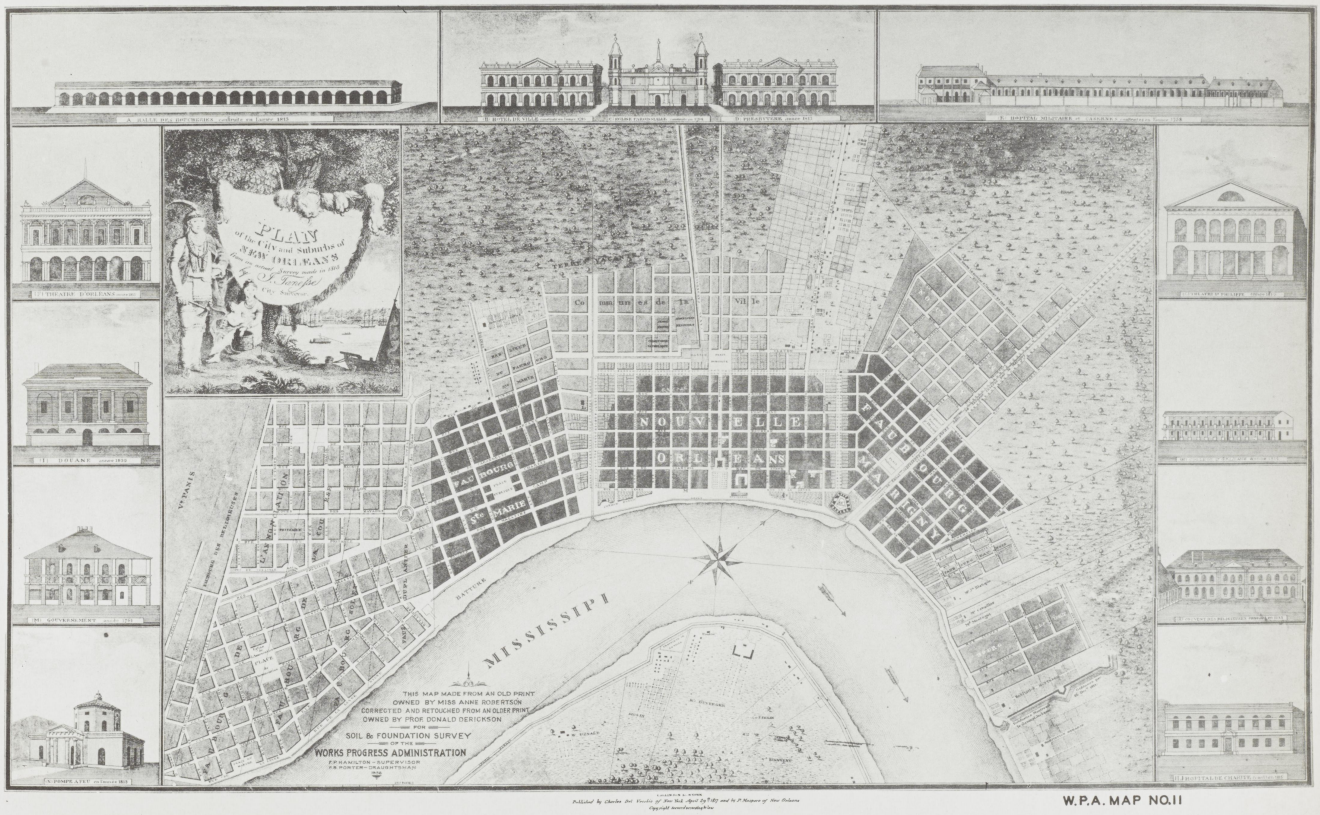
TRACED FROM
Original in Howard Library
FOR
WORKS PROGRESS ADMINISTRATION
SOIL & FOUNDATION SURVEY
F.P.HAMILTON - SUPERVISING ENGR
F.S.PORTER - DRAUGHTSMAN
June 1936

W.P.A. MAP NO. 8


MAP
SHEWING THE LANDING OF THE
BRITISH ARMY
its several Encampments and fortifications on the Mississippi and the works they erected on their Retreat; also the different posts Encampments and fortifications made by the several Corps of the American Army during the whole campaign.
By Major A. LACARRIERE LATOUR,
Late principal Engineer 7th Military District, U. S. Army, 1815.
Scale of Miles
LAKE PONTCHARTRAIN
CYPRESS SWAMPS
PRAIRIES
LAKE BORGNE
MISSISSIPPI RIVER
BAYOU BIENVENU
Fort Villere
Cypress Swamps
Prairies
Bayou Mazant
Bayou Gentilly
Bayou Laurier
Point of Laurel
Fisherman's Village
Track of the British Troops
Redoubt
Entrenchments
Battery
Batteries
Ditch
Canal
Plain of Gentilly
Chef Menteur Road
Bayou Gentilly
Bayou Bienvenu
Bayou Mazant
Bayou Laurier
Bayou Jumonville
Bayou Chef Menteur
Cypress Swamps
Prairies
Swamps
Cypress
Prairies
Cypress Swamps
Prairies
Cypress Swamps
Prairies
Cypress Swamps



W.P.A. MAP NO. 10


PLAN
of the City and Suburbs of
NEW ORLEANS
NOUVELLE
ORLEANS
MISSISSIPI
THIS MAP MADE FROM AN OLD PRINT
OWNED BY MISS ANNE ROBERTSON
CORRECTED AND RETOUCHED FROM AN OLDER PRINT
OWNED BY PROF. DONALD DERICKSON
FOR
SOIL & FOUNDATION SURVEY
OF THE
WORKS PROGRESS ADMINISTRATION
F.B.HAMILTON - SUPERVISOR
F.B.PORTER - DRAUGHTSMAN

W.P.A. MAP NO.11

PLAN representant les Canaux existant, et, ceux qu'il conviendrait de creuser pour égouter convenablement la Ville, et les Fau-bourgs incorpores

Nouvelle Orléans le 17 juin 1825.

Pte. Ville

Voyer de la ville

Renvois et Explications

A.A. Canal parallele au fleuve destiné à recevoir les égouts des rues
B.B. Canaux pour porter au Bayou St. Jean les eaux qui aboutissent dans le Canal parallele au Fleuve
C.C. Bayous et égouts naturels des terres comprises entre le chemin du Bayou la terre haute de Gentilly le Canal Marigny et le Fauxbourg Marigny
D. Place Breloque
E. Pont et ecluse

Observations

Les moyens d'egouter convenablement la Ville et les fauxbourgs incorporés de la Nlle. Orléans, consistent

1°. à élargir de 5 pieds et creuser de 3½ pi. le Canal transversal AA (parallèle au fleuve) et le continuer à chaq. Canal jusqu'à la limite inférieure des fauxbourgs Ste. Marie par en haut et à la limite inférieure des fauxbourg de Marigny par en bas. Ce Canal est destiné à recevoir tous les egouts des rues de la ville, et des fauxbourgs incorporés, et ensuite le porter au Bayou St. J. par les Canaux BB.

2°. Creuser et continuer le Canal de St. Bernard jusqu'au Bayou St. Jean, en lui donnant les dimensions suivantes, — Savoir, à partir de la rue des Bons Enfans jusqu'au Bayou du petit pont 15 pieds de large et 3½ pieds de profondeur de tête en avant le Bayou du petit pont et les nouvelles du Bayou Sauvage jusqu'au Bayou St. Jean 20 pieds de large sur 3½ pieds de profondeur. Ensuite elargir jusqu'à 20 pi. le pont de Gravier sur le Bayou du petit pont également celui de Claiborne sur le Bayou Sauvage. Et pour empêcher le eau de la mer (lors des inondements) de pénétrer et de ravager par le susdit Canal, les terres qui seront et qui sont adjacentes, faire une Ecluse à la nouvelle route du Bayou Sauvage. Le Canal projetté est indispensable pour le bien de la Ville, et de la partie de terre comprise entre le chemin du Bayou la rue des Goutiers, le Canal Marigny, et le chemin de Gentilly. C'est pourquoi il convient d'ordonner d'en donner la priorité le plus tôt possible.

3°. Nettoyer le Canal Girod depuis la rue Toulouse jusqu'au Canal transversal, en lui donnant l'elargir jusqu'à 20 pieds, et le creuser de 3½ pieds à partir du dit Canal transversal jusqu'à la rue des Goyaves, le reste depuis la dite rue d'environ jusqu'au Bayou St. Jean tel qu'il est, c'est à dire de 12 pieds de large ne demande pas à être nettoyé.

4°. Nettoyer le Canal de la rue du Canal depuis la rue du Bourbon jusqu'au Canal transversal, ensuite l'elargir jusqu'à 20 pieds à partir du dit Canal transversal jusqu'à la seconde Branche du Bayou St. Jean.

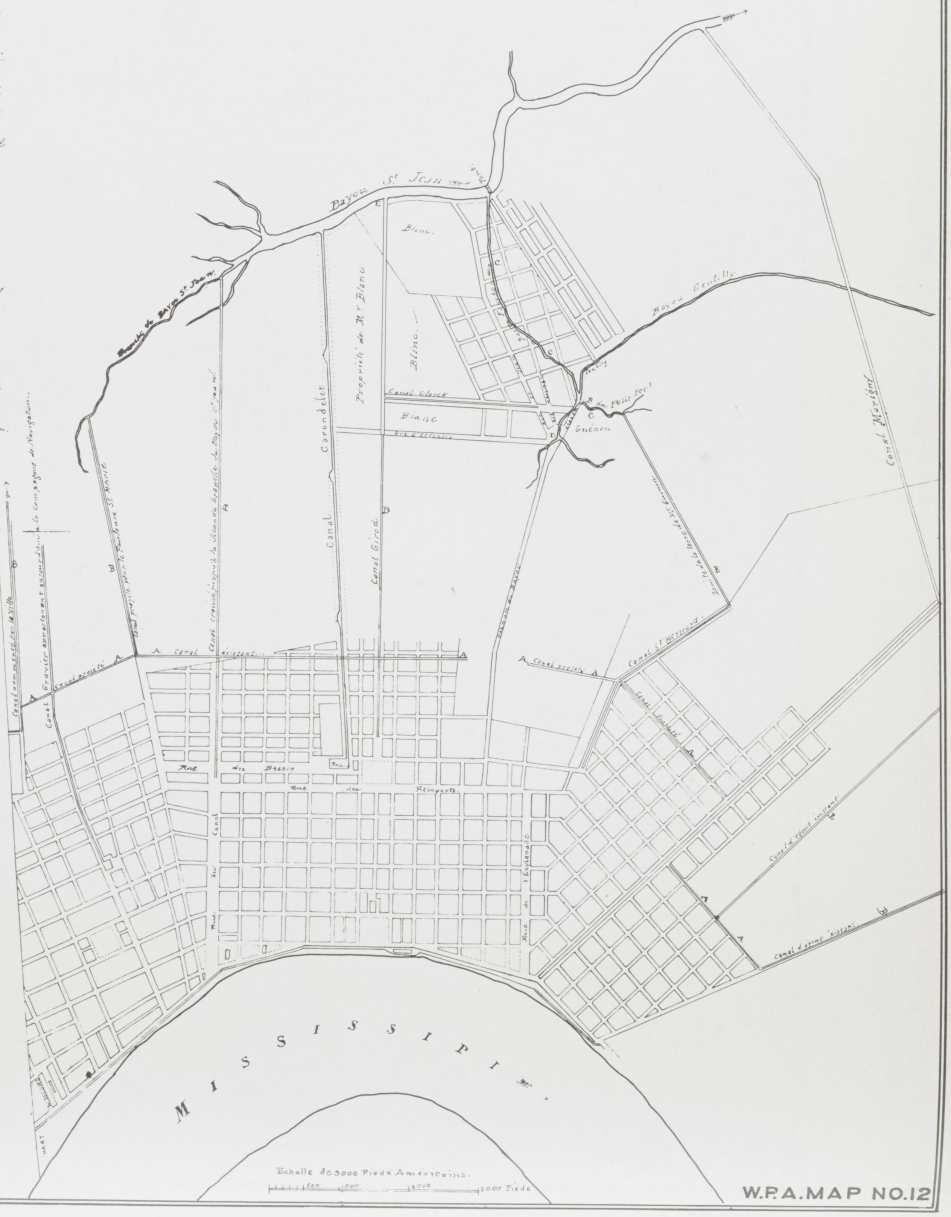
5°. Creuser dans le prolongement de la rue de la Concorde à partir du canal transversal jusqu'aux Branches du Bayou St. Jean un Canal de 12 pieds de large et 3½ pieds de profondeur.

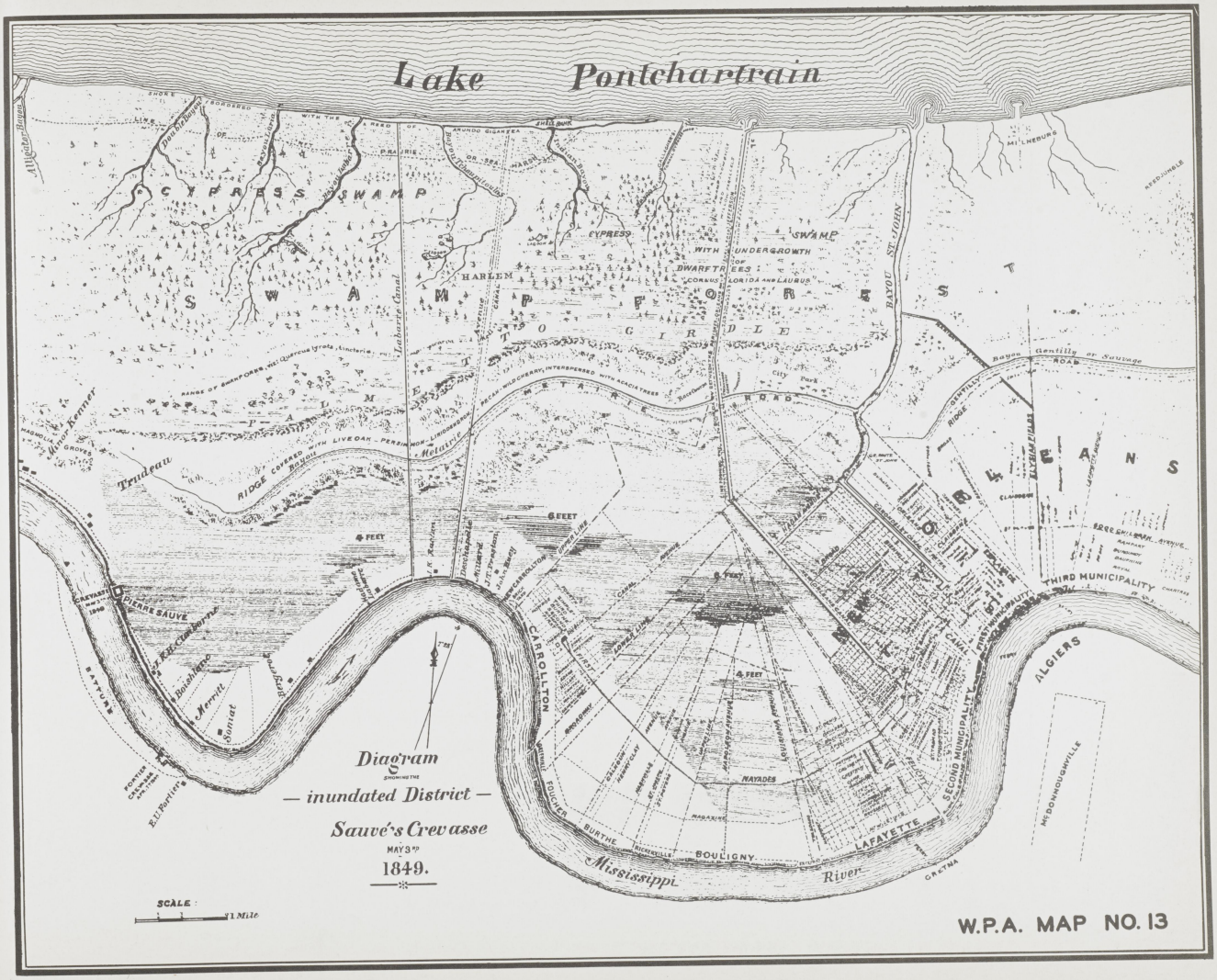
6°. Continuer la feuille vers la Lagoune du Canal d'egout déjà commencé à partir ensuite du Canal projetté au fauxbourg Ste. Marie, et creuser aud. Canal à pied de large sur 3½ pieds de profondeur.

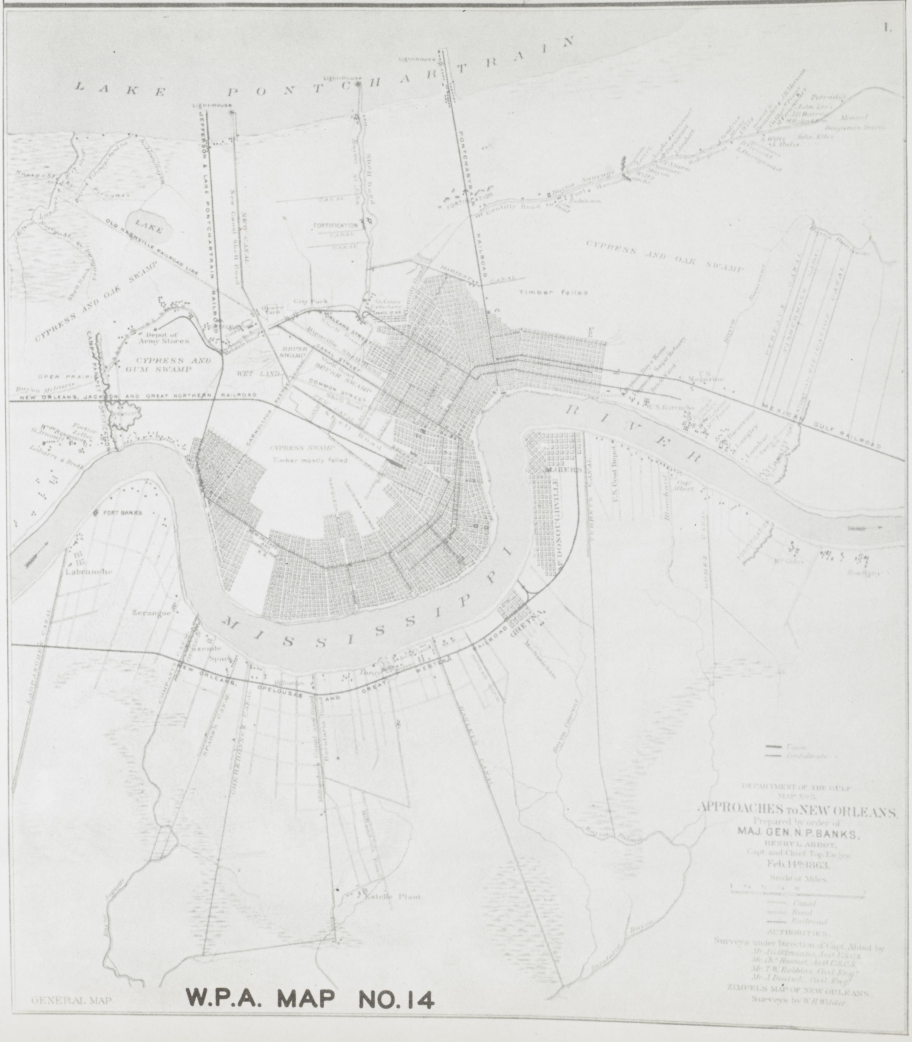
7°. Creuser le long de la rue d'Orgemont jusqu'au Canal Girod un fossé de 3 pieds de large sur 2 pieds de profondeur et ensuite creuser de chaque côté des rues St. Jean Washington et chemin de Gentilly un fossé de 2 pieds de large sur 1½ pied de profondeur à partir de la Rue Bienville jusqu'à la seconde rue de un Bayou Sauvage, le tout pour égouter la dite Place Breloque ainsi que les eaux qui y aboutissent.

Nlle. 17 juin 1825

Pte. Ville


Bayou St. John
Bayou Gentilly
Canal Carondelet
Canal Girod
Canal Marigny
Canal Claiborne
Canal Bienville
Canal Bernard
Canal d'Orgemont
Canal d'égout naturel
Canal d'égout projetté
Canal transversal projetté
Canal transversal
Canal de la Rue du Canal
Canal de la Rue Toulouse
Canal de la Rue Conti
Canal de la Rue Bienville
Canal de la Rue Dauphine
Canal de la Rue Bourbon
Canal de la Rue Royale
Canal de la Rue Chartres
Canal de la Rue de la Levée
Canal de la Rue Burgundy
Canal de la Rue Rampart
Canal de la Rue Derbigny
Canal de la Rue Roman
Canal de la Rue Villere
Canal de la Rue Galvez
Canal de la Rue Prieur
Canal de la Rue Robertson
Canal de la Rue Johnson
Canal de la Rue Gayoso
Canal de la Rue Miro


Lake Pontchartrain
CYPRESS SWAMP
SWAMP
CYPRESS SWAMP WITH UNDERGROWTH OF DWARF TREES CORNUS FLORIDA AND LAURUS
HARLEM
PALM GROVE
RIDGE COVERED WITH LIVE OAK - PERSIMON - LIRIODENDRON
Trudeau
Mirot Kenner
Tchoupitoulas
Jefferson
Carrollton
Gentilly
Bayou Gentilly or Sauvage
Bayou St. John
Milneburg
Reed Birds
City Park
Lake Shore
Esplanade
Bayou Road
Metairie Road
Metairie
Canal
Railroad
Levee
Ridge
Claiborne
Bourbon
Dauphine
Bienville
Burgundy
Rampart
Basin
Franklin
Derbigny
Gayoso
Miro
Roman
Prieur
Johnson
Robertson
Galvez
Roffignac
Liberty
Tonti
Broad
Jefferson Davis
Hagan
Claiborne
Esplanade
Bayou Road
Gentilly Ridge
Elysian Fields
Clouet
Gen. Taylor
Orleans
Bayou St. John
Milneburg
Reed Birds
Lake Shore


1.
LAKE PONTCHARTRAIN
LAKE
CYPRESS AND OAK SWAMP
CYPRESS AND GUM SWAMP
Depot of Army Stores
NEW ORLEANS, JACKSON AND GREAT NORTHERN RAILROAD
MISSISSIPPI RIVER
FORT BANKS
Algiers
Timber felled
Cypress forest. Timber recently felled
Cotton Press
Sugar House
Cane Field
Levee
Road
Railroad
Fortification
Cemetery
Batteries
Redoubt
Rifle Pits
Encampment
Bivouac
Hospital
Magazine
Depot
Ferry
Bridge
Ruins
Cotton Plant
Sugar Plant
Rice Mill
Saw Mill
Brick Yard
Tan Yard
Distillery
Foundry
Gas Works
Water Works
Light House
Windmill
Church
Court House
Jail
Public Building
Hotel
Theatre
Market
Custom House
Mint
Arsenal
Barracks
Hospital
Asylum
Penitentiary
Work House
Alms House
Poor House
Cemetery
Fort
Earthwork

CHAPTER II

Test Borings - Stratagraphs

In the following pages are illustrated the stratagraphs of 239 test holes. These borings cover pretty thoroughly the entire district which is included in this study.

In a few cases the stratagraphs have been duplicated on the drawings to which they have special reference. There are a number of other stratagraphs which are not shown in this chapter but which are illustrated in connection with the cases to which they refer such as: The Bonnet Carre Spillway; the Illinois Central Railroad trestle over the Spillway; the Pontchartrain Bridge across Lake Pontchartrain and the Highway Bridges across Chef Menteur and the Rigolets.

The special sheet covering the Miss. River Bridge is from a photostatic copy furnished by the Contractors.

Following these stratagraphs is a "Geologic Column of Louisiana Gulf Coast," with a discussion, which is copied from a report of a committee of the U. S. House of Representatives.

These stratagraphs are interesting but cannot be relied upon in determining conditions at the site of future structures. An examination of them shows the lack of uniformity and the total lack of extensive stratification.

The chapter on foundation piles also shows how unreliable either borings or test piles may be, and that conditions may be entirely different at points 25 ft. apart under the same structure. The stratagraphs are included in this report as a matter of general interest to engineers, architects and contractors, and show clearly the necessity for thorough examination of any building site. Many more stratagraphs are available but time and circumstances do not permit including them.

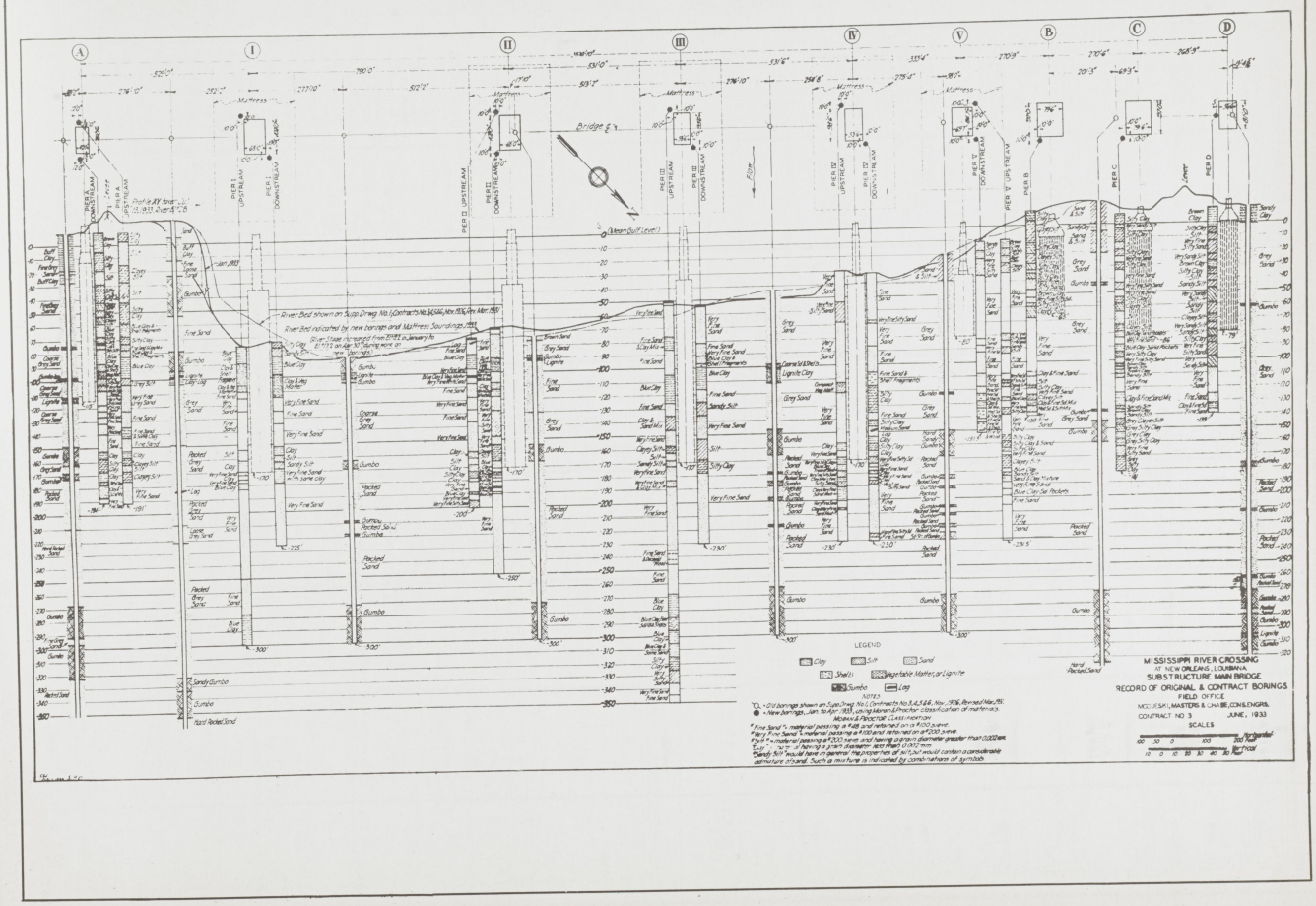
We acknowledge particular indebtedness to the following agencies who have so kindly and generously assisted in the collecting of this information: The Board of Commissioners of the Port of New Orleans, the Orleans Levee Board, the Sewerage and Water Board of New Orleans, the City Engineer's Office, the U. S. Engineer's Office and the Louisiana State Highway Commission.

INDEX OF BORINGS

NO.	LOCATION
1	Hamilton & Sycamore - Purification Plant
2	Panola & Hamilton - " " "
3	Hamilton & Spruce " " "
4	Spruce & Holly Grove " " "
5	Spruce near Gen. Ogden " " "
6	Gen. Ogden & Spruce " " "
7	Panola near Holly Grove " "
8	Gen. Ogden & Panola " " "
9	Sycamore & Holly Grove " "
10	Holly Grove & Sycamore " "
11	Sycamore & Gen. Ogden " "
12	Eagle & Sycamore " " "
13	Eagle & Panola " " "
14	Spruce & Eagle " " "
15	Panola near Monroe " " "
16	Block 294 " " "
17	" " " " "
18	" " " " "
19	" " " " "
20	" " " " "
21	" " " " "
22	" " " " "
23	Monroe & Panola " " "
24	Sycamore & Monroe " " "
25	Leonidas & Spruce
26	Leonidas & Sycamore
27	Leonidas & Claiborne Ave.
28	Cohn & Dante
29	Cohn & Fern
30	Cohn & Lowerline
31	Broadway & Plum
32	Clara in Audubon Park
33	Clara & State
34	Clara & Jefferson Ave.
35	St. Charles & Nashville Aves
36	Clara & Valence
37	Clara & Napoleon Ave.
38	Clara & Gen. Taylor
39	Clara & Louisiana Ave.
40	Clara & Washington Ave
41	Clara & Third
42	Clara & Josephine
43	Clara & Melpomene
44	Clara & Calliope
45	Clara & Julia
46	Clara & Poydras
47	Claiborne & Gravier
48	Derbigny & Tulane Ave.
49	Derbigny & Canal
50	Palmyra & Rocheblave
51	Palmyra & White
52	Palmyra & Salcedo
53	Palmyra & Jefferson Davis Parkway
54	Palmyra & Carrollton Ave.
55	Palmyra & Solomon
56	Esplanade & Bayou St. John
57	" " " "
58	" " " "
59	" " " "
60	" " " "
61	London Ave. & Mirabeau Ave.
62	London Ave. & Gentilly Road
63	" " " "
64	" " " "
65	London Ave & Florida Ave.
66	St. Bernard Ave. & Law.
67	St. Bernard Ave. & Tonti
68	St. Bernard Ave. & Johnson
69	Derbigny & Lapeyrouse
70	Derbigny & Kelerec
71	Rocheblave & Gov. Nicholls
72	Johnson & Gov. Nicholls
73	Derbigny & Gov. Nicholls
74	Derbigny & Ursulines Ave.
75	Derbigny & Orleans Ave.
76	Derbigny & Toulouse
77	Derbigny & Bienville Ave.
78	Robertson & St. Ann
79	Sewerage Pumping Sta. "A"
80	" " " "
81	Robertson & Gov. Nichols
82	Robertson & Allen
83	Robertson & Pauger
84	Robertson & Elysian Fields Ave.

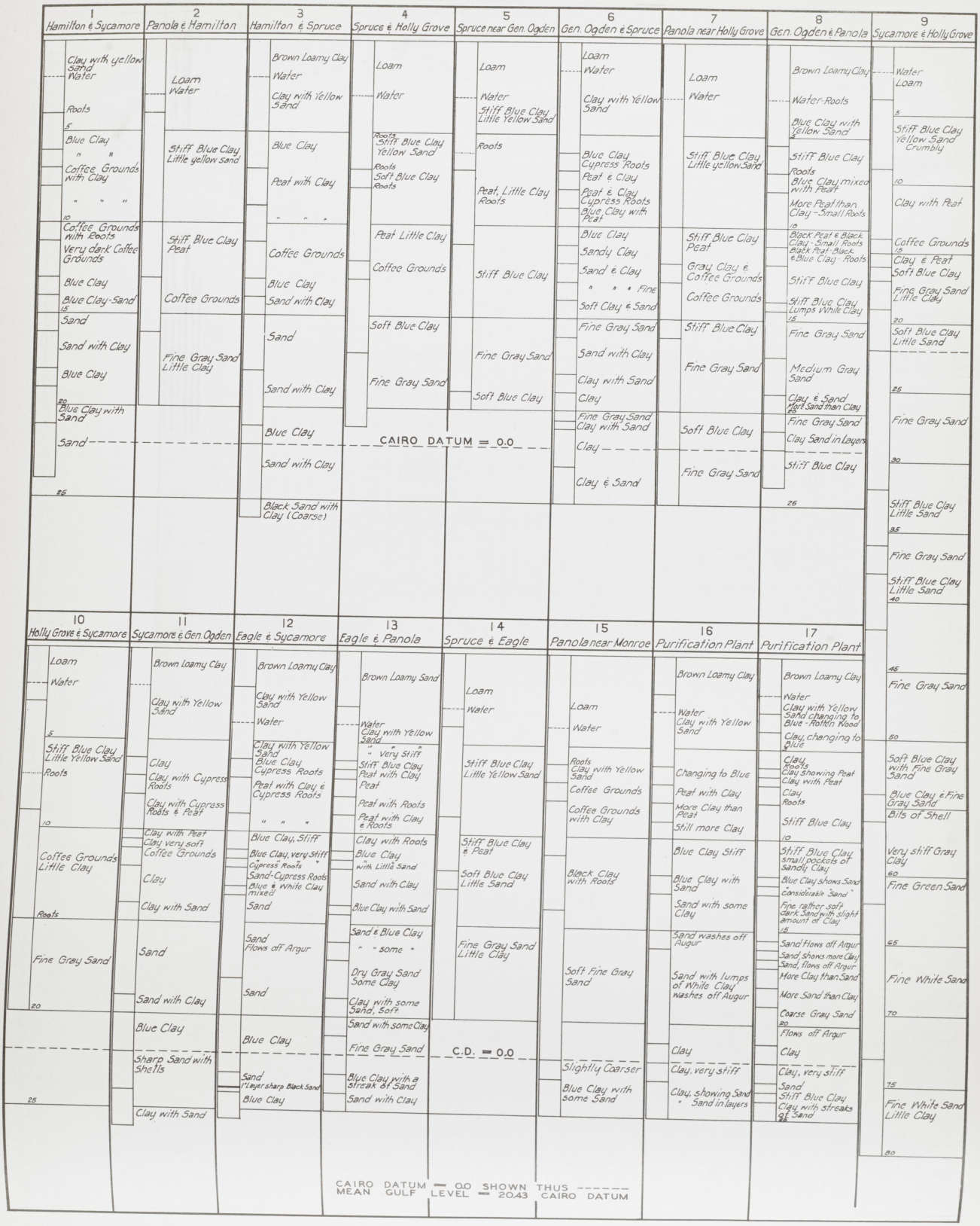
NO.	LOCATION
85	Robertson & Spain
86	Villere & Louisa
87	Villere & Independence
88	Villere & Mazant
89	Villere & Poland
90	Villere & Manuel
91	Villere & Sister
92	Marais & Sister
93	St. Claude Ave. & Jourdan Ave.
94	Burgundy & Jourdan Ave.
95	Burgundy & Forstall
96	Burgundy & Andy
97	St. Claude Ave. & Jourdan Ave.
98	Mississippi River & Jefferson Ave.
99	Mississippi River & Toledano
100	Mississippi River & Eighth
101	Mississippi River & Washington Ave.
102	Mississippi River & Second
103	Mississippi River near Josephine
104	" " " "
105	Mississippi River near Market
106	Mississippi River & Nunn
107	Location of Proposed Hero-Hackett Bridge
108	" " " " " "
109	" " " " " "
110	" " " " " "
111	" " " " " "
112	" " " " " "
113	" " " " " "
114	" " " " " "
115	" " " " " "
116	Mississippi River near Euterpe
117	Mississippi River near Terpsichore
118	Mississippi River near Thalia
119	Mississippi River & Julia
120	Mississippi River & Conti
121	Hibernia Bank Site
122	" " "
123	" " "
124	Canal bet. Baronne & Carondelet
125	Southern Athletic Club - Rampart St.
126	Toulouse St. Shed-Mississippi River-
127	Dumaine St. Shed-Mississippi River-
128	" " " " "
129	" " " " "
130	" " " " "
131	" " " " "
132	" " " " "
133	" " " " "
134	" " " " "
135	" " " " "
136	" " " " "
137	" " " " "
138	" " " " "
139	" " " " "
140	" " " " "
141	Gov. Nichols Shed-Mississippi River-
142	Mississippi River & Barracks
143	Mississippi River & Spain
144	Mandeville St. Shed-Mississippi River-
145	Mississippi River & Mazant
146	Mississippi River & France
147	Mississippi River & Industrial Canal
148	" " " " "
149	" " " " "
150	" " " " "
151	Mississippi River & Jackson Barracks
152	" " " " "
153	" " " " "
154	" " " " "
155	" " " " "
156	" " " " "
157	American Sugar Refinery
158	Dauphine & Industrial Canal
159	Industrial Canal & Rampart
160	St. Claude Ave. & Manuel
161	Sewerage Pumping Sta. "B"
162	Galvez St. Wharf-Navigation Canal-
163	" " " " "
164	" " " " "
165	" " " " "
166	" " " " "
167	Central Power Station
168	Navigation Canal

NO.	LOCATION
169	Navigation Canal
170	" "
171	" "
172	" "
173	" "
174	Navigation Canal & Gentilly Road
175	" " " " "
176	Lake Pontchartrain near Shushan Airport
177	" " " " "
178	" " " " "
179	" " " " "
180	Shushan Airport
181	Lake Pontchartrain near Shushan Airport
182	" " " " "
183	" " " " "
184	Pontchartrain Lakeshore
185	" "
186	" "
187	" "
188	" "
189	" "
190	" "
191	London Ave. & New York Ave - Lakeshore-
192	Pontchartrain Lakeshore
193	Bayou St. John Bridge - Spanish Fort-
194	" " " " " "
195	" " " " " "
196	Pontchartrain Lakeshore
197	" "
198	" "
199	" "
200	" "
201	" "
202	" " West End
203	West End Parkway - West End-
204	" " " " "
205	" " " " "
206	Chef Menteur Pass
207	" " "
208	" " "
209	" " "
210	" " "
211	" " "
212	" " "
213	" " "
214	" " "
215	Rigolets
216	"
217	"
218	"
219	"
220	"
221	"
222	"
223	"
224	Harvey Canal
225	" "
226	" "
227	" "
228	" "
229	" "
230	" "
231	" "
232	" "
233	Pontchartrain Bridge
234	" "
235	" "
236	Louisiana State University Medical Center
237	New Charity Hospital
238	" " "
239	Market Street Power House - Deep Well



80	"	"	164
81	Robertson & Gov. Nichols	"	165
82	Robertson & Allen	"	166
83	Robertson & Pauger		167
84	Robertson & Elysian Fields Ave.		168

Central Power Station
Navigation Canal



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Purification Plant	Purification Plant	Purification Plant	Purification Plant	Purification Plant	Monroe & Panola	Sycamore & Monroe	Leonidas & Spruce	Leonidas & Sycamore

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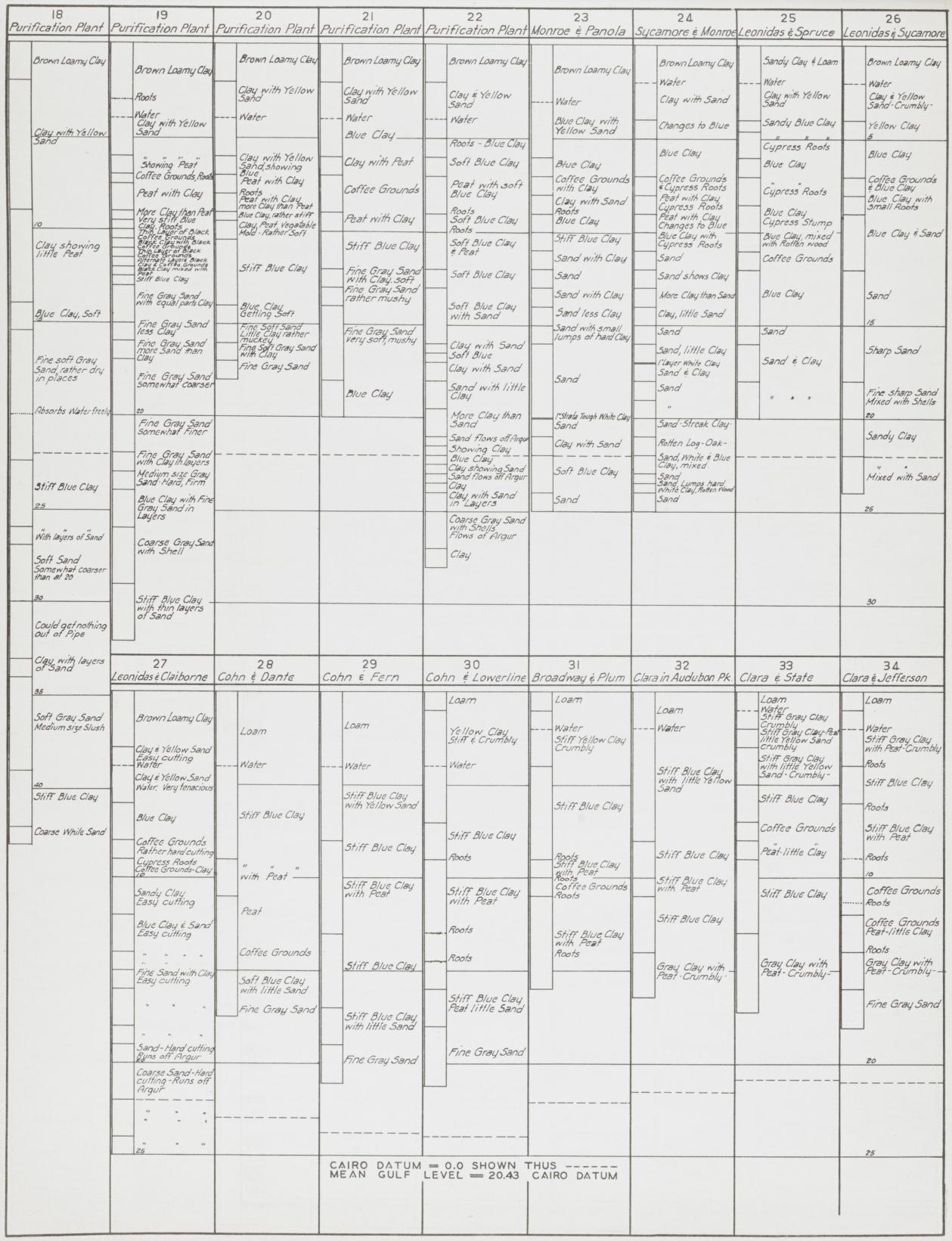

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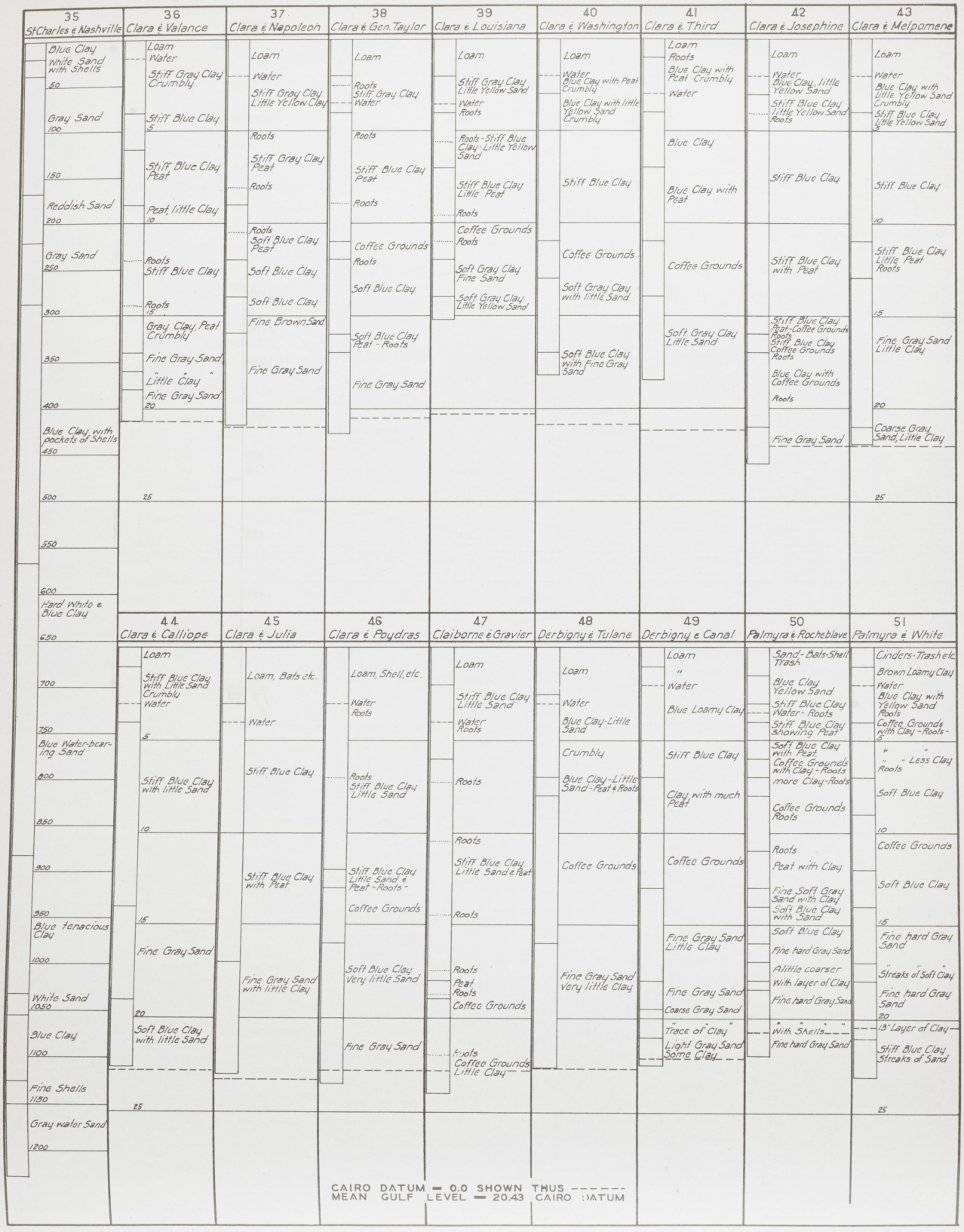

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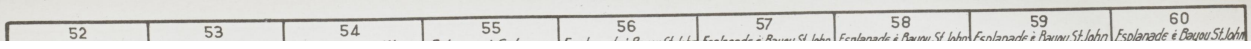

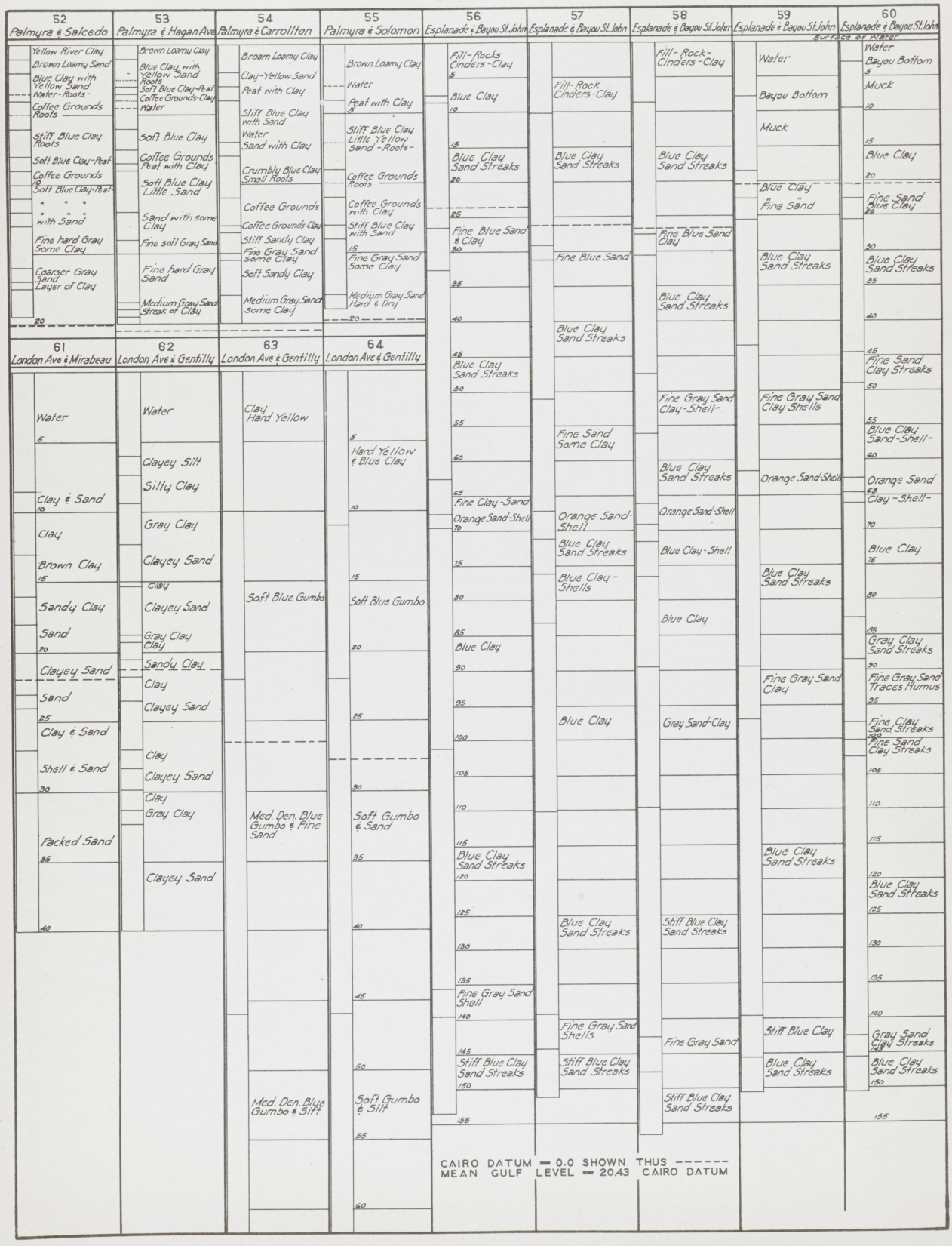
52
Palmyra & Salcedo
Yellow River Clay
Brown Loamy Sand
Blue Clay with Yellow Sand
Water - Roots -
Coffee Grounds
Roots
Stiff Blue Clay Roots
Soft Blue Clay - Peat
Coffee Grounds
Soft Blue Clay - Peat
" " "
" " "
with Sand
Fine hard Gray Some Clay
Coarser Gray Sand
Layer of Clay
20
53
Palmyra & Hagan Ave
Brown Loamy Clay
Blue Clay with Yellow Sand
Roots
Soft Blue Clay - Peat
Coffee Grounds - Clay
Water
Soft Blue Clay
Coffee Grounds
Peat with Clay
Soft Blue Clay
Little Sand
Sand with some Clay
Fine soft Gray Sand
Fine hard Gray Sand
Medium Gray Sand
Streak of Clay
54
Palmyra & Carrollton
Broam Loamy Clay
Clay - Yellow Sand
Peat with Clay
Stiff Blue Clay with Sand
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Sand with Clay
Crumbly Blue Clay
Small Roots
Coffee Grounds
Coffee Grounds - Clay
Stiff Sandy Clay
Fine Gray Sand
Some Clay
Soft Sandy Clay
Medium Gray Sand
some Clay
55
Palmyra & Solomon
Brown Loamy Clay
Water
5
Peat with Clay
Stiff Blue Clay
Little Yellow
Sand - Roots -
Coffee Grounds
Roots
Coffee Grounds
with Clay
Stiff Blue Clay
with Sand
15
Fine Gray Sand
Some Clay
Medium Gray Sand
Hard & Dry
20
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Esplanade & Bayou St. John
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Cinders - Clay
5
Blue Clay
10
Blue Clay
Sand Streaks
20
25
Fine Blue Sand
& Clay
30
35
40
45
Blue Clay
Sand Streaks
50
55
60
65
Fine Clay - Sand
Orange Sand - Shell
70
75
80
85
Blue Clay
90
95
100
105
110
115
Blue Clay
Sand Streaks
120
125
130
135
Fine Gray Sand
Shell
140
145
Stiff Blue Clay
Sand Streaks
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155
57
Esplanade & Bayou St. John
Fill - Rock
Cinders - Clay
Blue Clay
Sand Streaks
Fine Blue Sand
Blue Clay
Sand Streaks
Fine Sand
Some Clay
Orange Sand -
Shell
Blue Clay
Sand Streaks
Blue Clay -
Shells
Blue Clay
Blue Clay
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Shells
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Sand Streaks
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Cinders - Clay
Blue Clay
Sand Streaks
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Clay
Blue Clay
Sand Streaks
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Clay - Shell -
Orange Sand - Shell
Blue Clay - Shell
Blue Clay
Gray Sand - Clay
Stiff Blue Clay
Sand Streaks
Fine Gray Sand
Stiff Blue Clay
Sand Streaks
59
Esplanade & Bayou St. John
Surface of Water
Water
Bayou Bottom
Muck
Blue Clay
Fine Sand
Blue Clay
Sand Streaks
Fine Gray Sand
Clay Shells
Orange Sand - Shells
Blue Clay
Sand Streaks
Fine Gray Sand
Clay
Blue Clay
Sand Streaks
Stiff Blue Clay
Blue Clay
Sand Streaks
60
Esplanade & Bayou St. John
Water
Bayou Bottom
5
Muck
10
15
Blue Clay
20
Fine Sand
Blue Clay
25
30
Blue Clay
Sand Streaks
35
40
45
Fine Sand
Clay Streaks
50
55
Blue Clay
Sand - Shell -
60
Orange Sand
65
Clay - Shell -
70
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75
80
85
Gray Clay
Sand Streaks
90
Fine Gray Sand
Traces Humus
95
Fine Clay
Sand Streaks
100
Fine Sand
Clay Streaks
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110
115
120
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Sand Streaks
125
130
135
140
Gray Sand
Clay Streaks
145
Blue Clay
Sand Streaks
150
155
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London Ave & Mirabeau
Water
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Clay & Sand
10
Clay
Brown Clay
15
Sandy Clay
Sand
20
Clayey Sand
Sand
25
Clay & Sand
Shell & Sand
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Packed Sand
35
40
62
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Clayey Silt
Silty Clay
Gray Clay
Clayey Sand
Clay
Clayey Sand
Gray Clay
Clay
Sandy Clay
Clay
Clayey Sand
Clay
Clayey Sand
Clay
Gray Clay
Clayey Sand
63
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Clay
Hard Yellow
Soft Blue Gumbo
Med. Den. Blue
Gumbo & Fine
Sand
Med. Den. Blue
Gumbo & Silt
64
London Ave & Gentilly
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Hard Yellow
& Blue Clay
10
15
Soft Blue Gumbo
20
25
30
Soft Gumbo
& Sand
35
40
45
50
Soft Gumbo
& Silt
55
60
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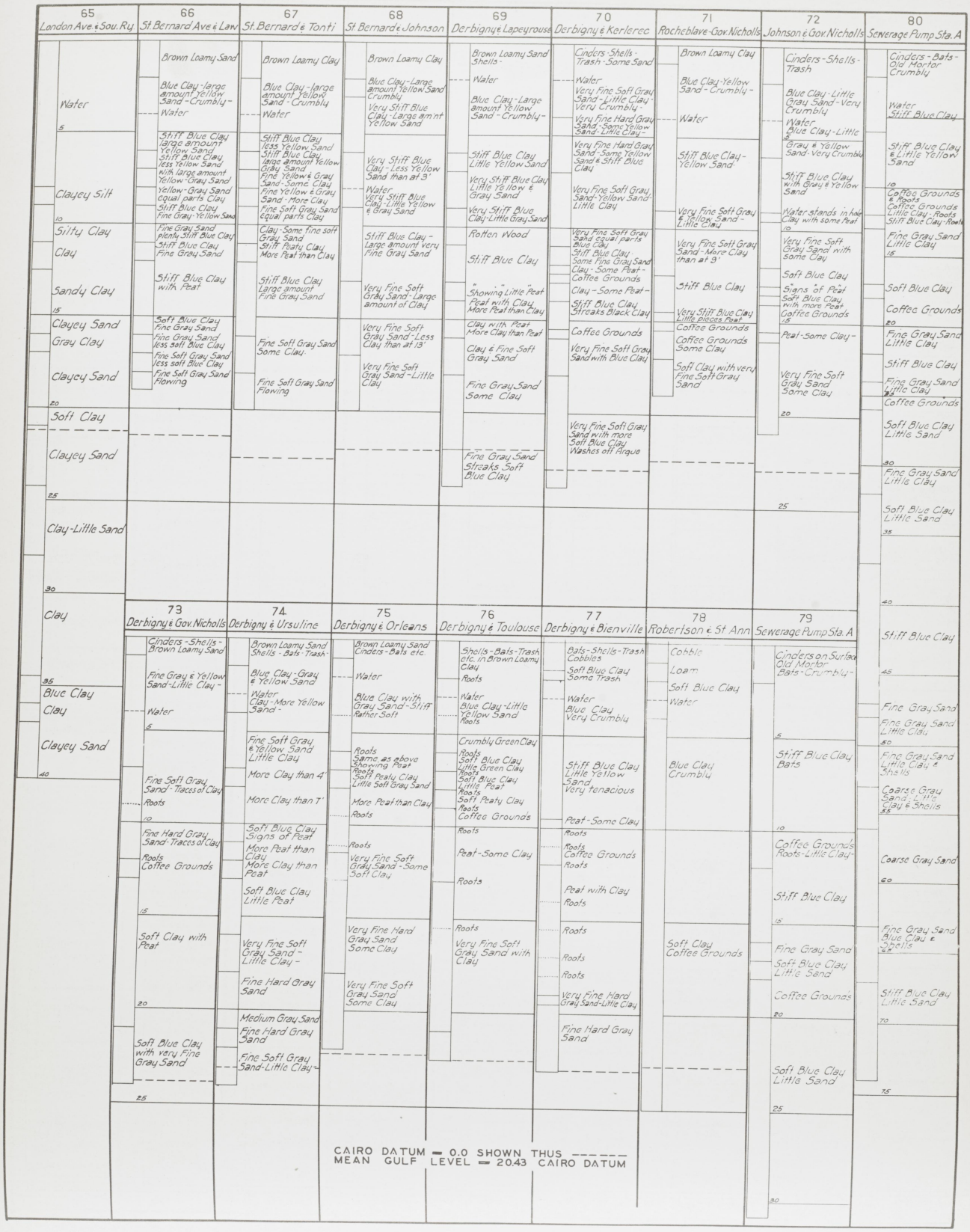

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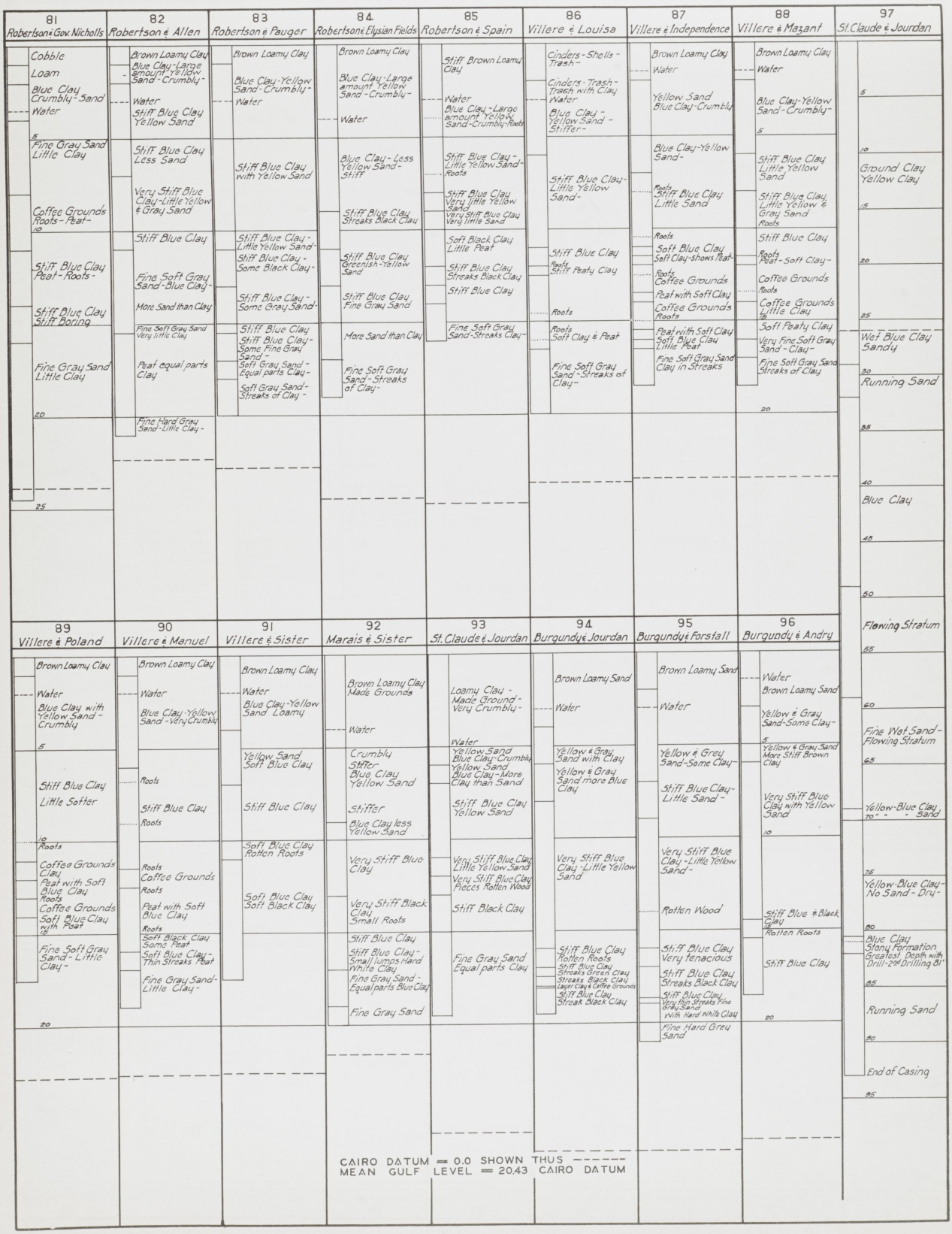
81
Robertson & Gov. Nicholls
Cobble
Loam
Blue Clay Crumbly - Sand
Water
Fine Gray Sand Little Clay
Coffee Grounds Roots - Peat -
Stiff Blue Clay Peat - Roots -
Stiff Blue Clay Stiff Boring
Fine Gray Sand Little Clay
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Water
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Stiff Blue Clay Less Sand
Very Stiff Blue Clay - Little Yellow & Gray Sand
Stiff Blue Clay
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Fine Soft Gray Sand Very little Clay
Peat equal parts Clay
Fine Hard Gray Sand - Little Clay -
83
Robertson & Pauger
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Blue Clay - Yellow Sand - Crumbly -
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Stiff Blue Clay - Little Yellow Sand -
Stiff Blue Clay - Some Black Clay -
Stiff Blue Clay - Some Gray Sand -
Stiff Blue Clay
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Soft Gray Sand - Streaks of Clay -
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Stiff Blue Clay Streaks Black Clay
Stiff Blue Clay Greenish - Yellow Sand
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More Sand than Clay
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Blue Clay - Large amount Yellow Sand - Crumbly - Roots
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Cinders - Trash - Trash with Clay
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Stiff Blue Clay
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Stiff Peaty Clay
Roots
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Running Sand
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Flowing Stratum
Fine Wet Sand - Flowing Stratum
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Yellow - Blue Clay - No Sand - Dry -
Blue Clay Stony Formation Greatest Depth with Drill - 2nd Drilling 81'
Running Sand
End of Casing
89
Villere & Poland
Brown Loamy Clay
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Blue Clay with Yellow Sand - Crumbly
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Roots
Coffee Grounds
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Coffee Grounds
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Soft Blue Clay - Thin Streaks Peat
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91
Villere & Sister
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Fine Gray Sand
93
St. Claude & Jourdan
Loamy Clay - Made Ground - Very Crumbly -
Water
Yellow Sand Blue Clay - Crumbly
Yellow Sand Blue Clay - More Clay than Sand
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Very Stiff Blue Clay Pieces Rotten Wood
Stiff Black Clay
Fine Gray Sand Equal parts Clay
94
Burgundy & Jourdan
Brown Loamy Sand
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Very Stiff Blue Clay - Little Yellow Sand
Stiff Blue Clay Rotten Roots
Stiff Blue Clay Streaks Green Clay
Streaks Black Clay
Layer Clay & Coffee Grounds
Stiff Blue Clay Streak Black Clay
95
Burgundy & Forstall
Brown Loamy Sand
Water
Yellow & Grey Sand - Some Clay -
Stiff Blue Clay - Little Sand -
Very Stiff Blue Clay - Little Yellow Sand -
Rotten Wood
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Stiff Blue Clay Streaks Black Clay
Stiff Blue Clay Very thin Streaks Fine Gray Sand With Hard White Clay
Fine Hard Grey Sand
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Brown Loamy Sand
Yellow & Gray Sand - Some Clay -
Yellow & Gray Sand More Stiff Brown Clay
Very Stiff Blue Clay with Yellow Sand
Stiff Blue & Black Clay
Rotten Roots
Stiff Blue Clay
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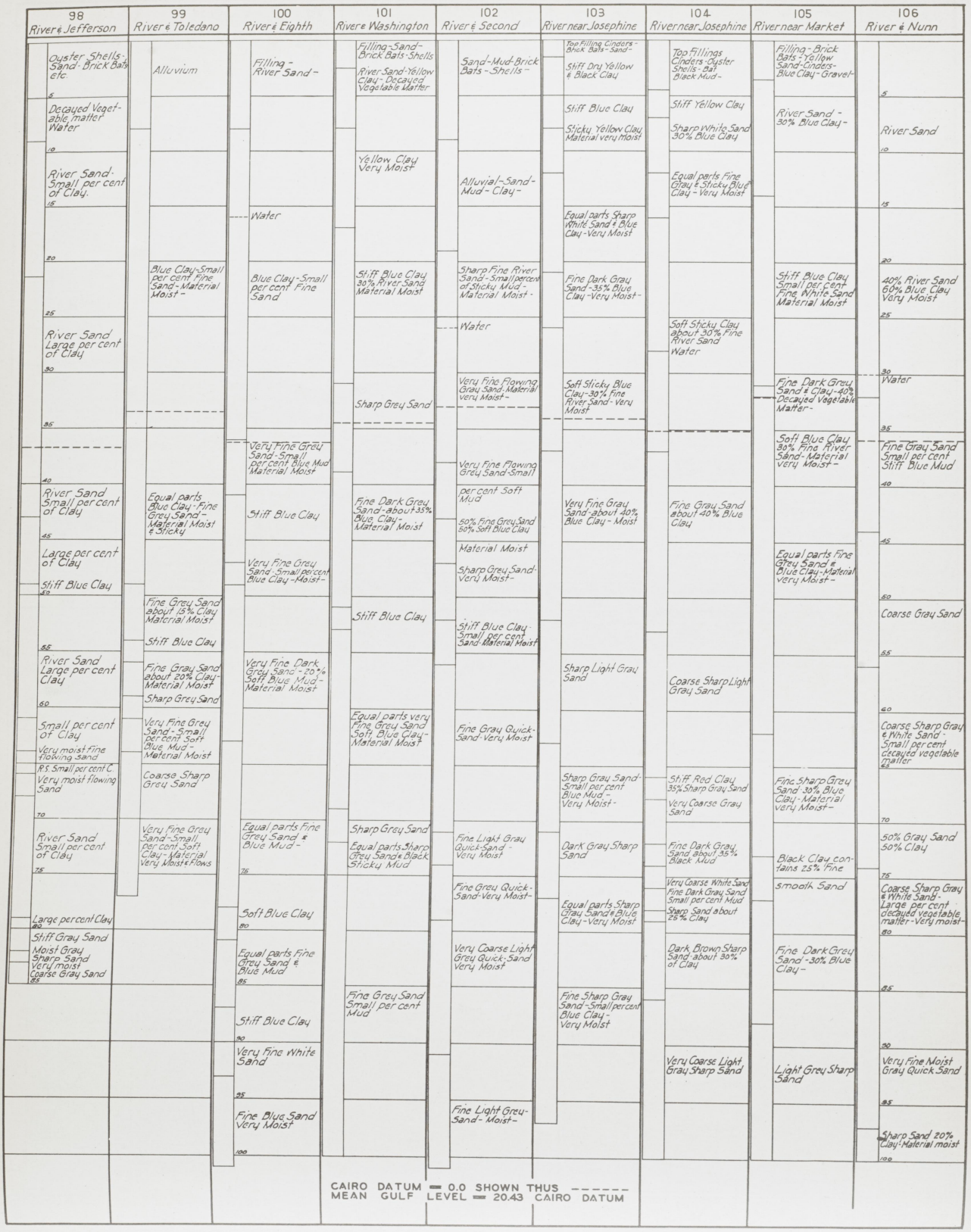

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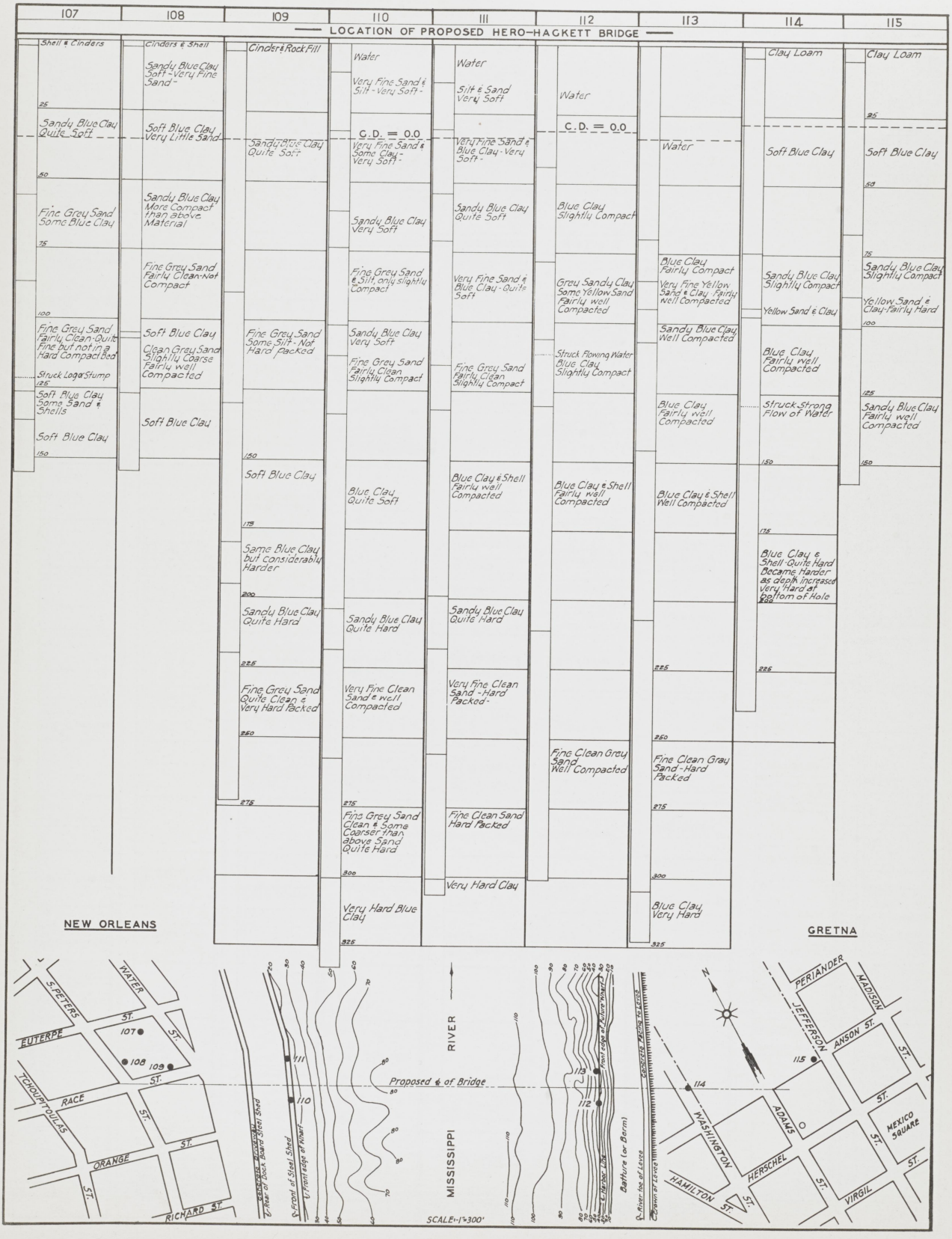
LOCATION OF PROPOSED HERO-HACKETT BRIDGE
107
108
109
110
111
112
113
114
115
Shell & Cinders
Sandy Blue Clay Quite Soft
Fine Grey Sand Some Blue Clay
Fine Grey Sand Fairly Clean-Quite Fine but not in a Hard Compact Bed
Struck Log & Stump
Soft Blue Clay Some Sand & Shells
Soft Blue Clay
Cinders & Shell
Sandy Blue Clay Soft - Very Fine Sand -
Soft Blue Clay Very Little Sand
Sandy Blue Clay More Compact than above Material
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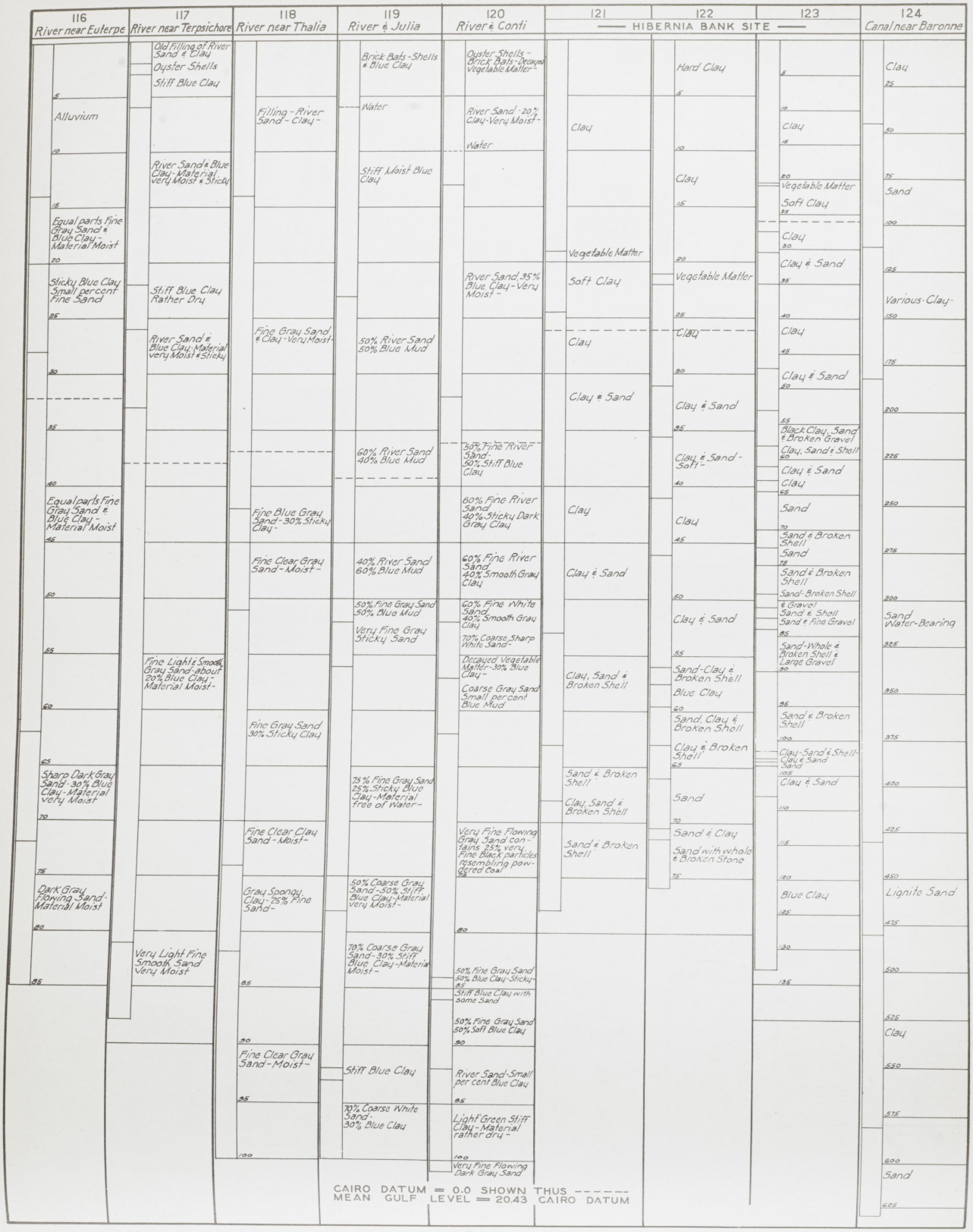
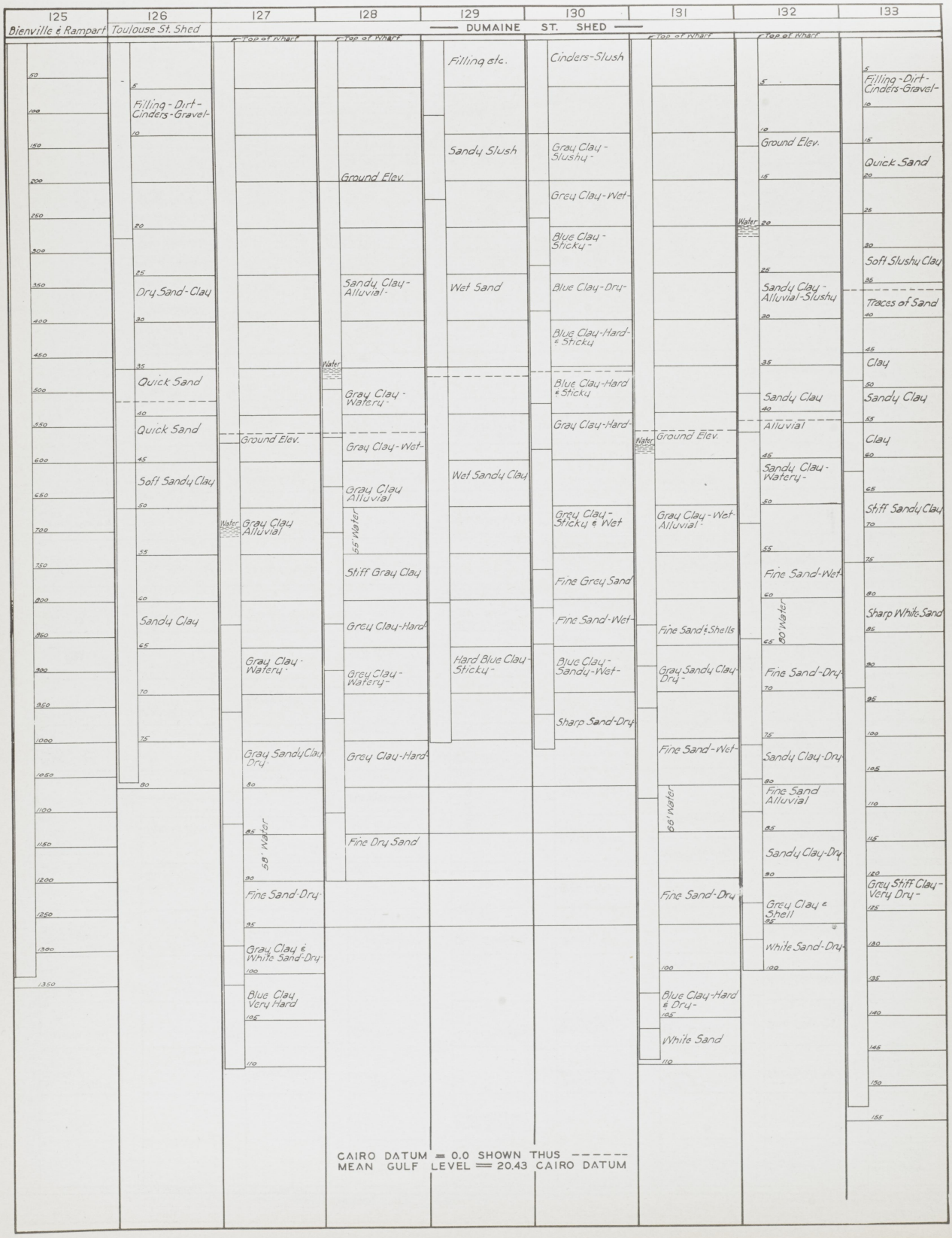
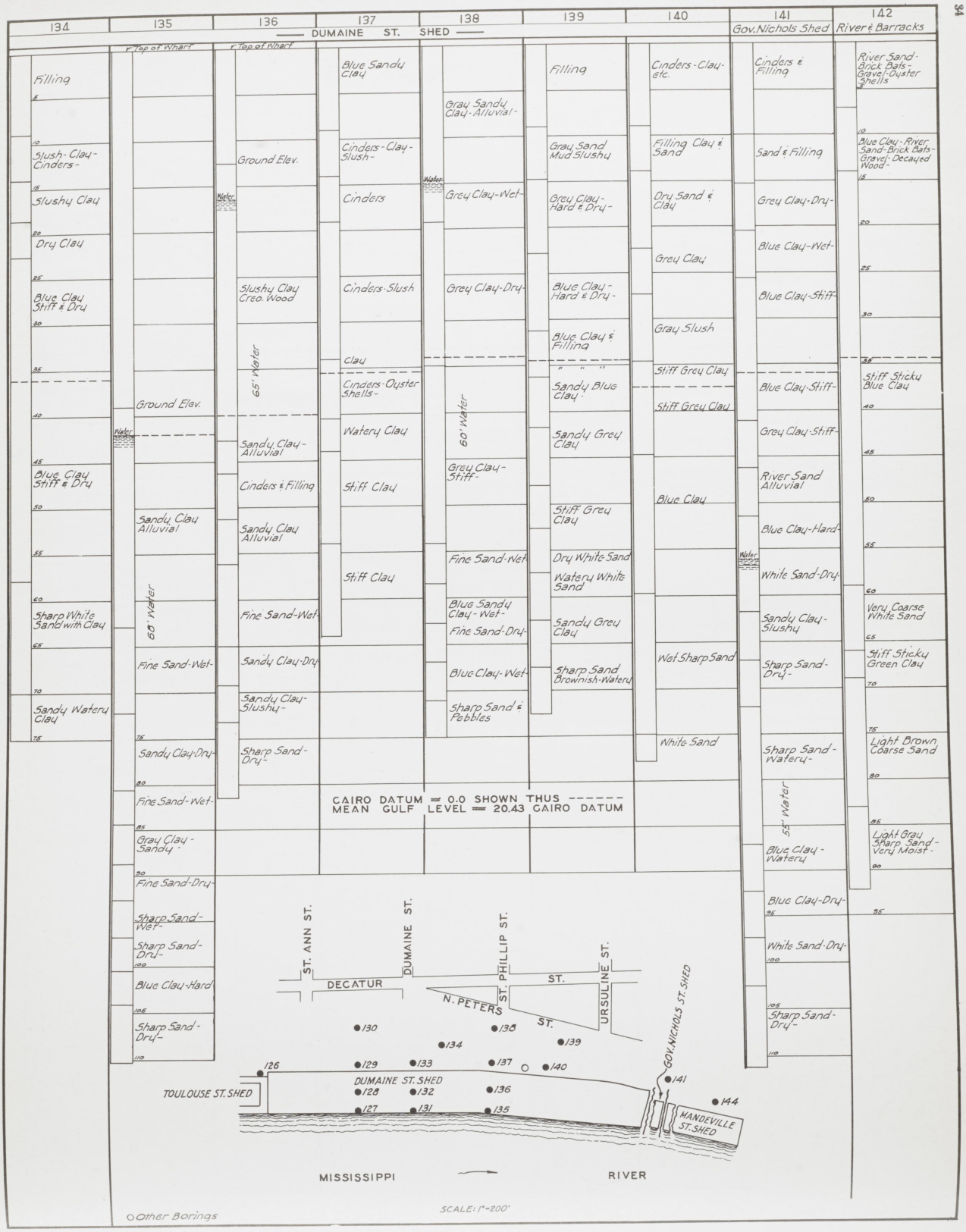
Soft Blue Clay
Clean Grey Sand Slightly Coarse Fairly well Compacted
Soft Blue Clay
Cinder & Rock Fill
Sandy Blue Clay Quite Soft
Fine Grey Sand Some Silt - Not Hard Packed
Soft Blue Clay
Same Blue Clay but considerably Harder
Sandy Blue Clay Quite Hard
Fine Grey Sand Quite Clean & Very Hard Packed
Water
Very Fine Sand & Silt - Very Soft -
C.D. = 0.0
Very Fine Sand & Some Clay - Very Soft -
Sandy Blue Clay Very Soft
Fine Grey Sand & Silt, only slightly Compact
Sandy Blue Clay Very Soft
Fine Grey Sand Fairly Clean Slightly Compact
Blue Clay Quite Soft
Sandy Blue Clay Quite Hard
Very Fine Clean Sand & well Compacted
Fine Grey Sand Clean & Some Coarser than above Sand Quite Hard
Very Hard Blue Clay
Water
Silt & Sand Very Soft
Very Fine Sand & Blue Clay - Very Soft -
Sandy Blue Clay Quite Soft
Very Fine Sand & Blue Clay - Quite Soft
Fine Grey Sand Fairly Clean Slightly Compact
Blue Clay & Shell Fairly well Compacted
Sandy Blue Clay Quite Hard
Very Fine Clean Sand - Hard Packed -
Fine Clean Sand Hard Packed
Very Hard Clay
Water
C.D. = 0.0
Blue Clay Slightly Compact
Grey Sandy Clay Some Yellow Sand Fairly well Compacted
Struck Flowing Water Blue Clay Slightly Compact
Blue Clay & Shell Fairly well Compacted
Fine Clean Grey Sand Well Compacted
Water
Blue Clay Fairly Compact
Very Fine Yellow Sand & Clay Fairly well Compacted
Sandy Blue Clay well Compacted
Blue Clay Fairly well Compacted
Blue Clay & Shell well Compacted
Fine Clean Gray Sand - Hard Packed
Blue Clay Very Hard
Clay Loam
Soft Blue Clay
Sandy Blue Clay Slightly Compact
Yellow Sand & Clay
Blue Clay Fairly well Compacted
Struck Strong Flow of Water
Blue Clay & Shell Quite Hard Became Harder as depth increased Very Hard at Bottom of Hole
Clay Loam
Soft Blue Clay
Sandy Blue Clay Slightly Compact
Yellow Sand & Clay - Fairly Hard
Sandy Blue Clay Fairly well Compacted
NEW ORLEANS
GRETNA
S. PETERS ST.
WATER ST.
EUTERPE ST.
TCHOUPITOULAS ST.
RACE ST.
ORANGE ST.
RICHARD ST.
107
108
109
110
111
112
113
114
115
Proposed ℄ of Bridge
MISSISSIPPI RIVER
SCALE-1"=300'
PERIANDER
MADISON
JEFFERSON
ANSON ST.
WASHINGTON
ADAMS
HERSCHEL
HAMILTON ST.
VIRGIL ST.
MEXICO SQUARE



125	126	127	128	129	130	131	132	133


125
Bienville & Rampart
126
Toulouse St. Shed
DUMAINE ST. SHED
127
128
129
130
131
132
133
Top of Wharf
Filling - Dirt - Cinders - Gravel -
Dry Sand - Clay
Quick Sand
Soft Sandy Clay
Sandy Clay
Gray Clay - Watery -
Fine Sand - Dry -
Gray Clay & White Sand - Dry -
Blue Clay Very Hard
Ground Elev.
Gray Clay Alluvial
Water
55' Water
50' Water
Sandy Clay - Alluvial -
Gray Clay - Wet -
Stiff Gray Clay
Grey Clay - Hard -
Grey Clay - Watery -
Grey Clay - Hard
Fine Dry Sand
Filling etc.
Sandy Slush
Wet Sand
Wet Sandy Clay
Hard Blue Clay - Sticky -
Cinders - Slush
Gray Clay - Slushy -
Grey Clay - Wet -
Blue Clay - Sticky -
Blue Clay - Dry -
Blue Clay - Hard & Sticky
Gray Clay - Hard -
Grey Clay - Sticky & Wet
Fine Grey Sand
Fine Sand - Wet -
Blue Clay - Sandy - Wet -
Sharp Sand - Dry
Gray Clay - Wet - Alluvial -
Fine Sand & Shells
Gray Sandy Clay - Dry -
Fine Sand - Wet -
Fine Sand - Dry -
Blue Clay - Hard & Dry -
White Sand
Sandy Clay - Alluvial - Slushy
Sandy Clay
Alluvial
Sandy Clay - Watery -
Fine Sand - Wet -
Fine Sand - Dry -
Sandy Clay - Dry -
Fine Sand Alluvial
Grey Clay & Shell
White Sand - Dry -
Filling - Dirt - Cinders - Gravel -
Quick Sand
Soft Slushy Clay
Traces of Sand
Clay
Sandy Clay
Stiff Sandy Clay
Sharp White Sand
Grey Stiff Clay - Very Dry -
CAIRO DATUM = 0.0 SHOWN THUS ------
MEAN GULF LEVEL = 20.43 CAIRO DATUM

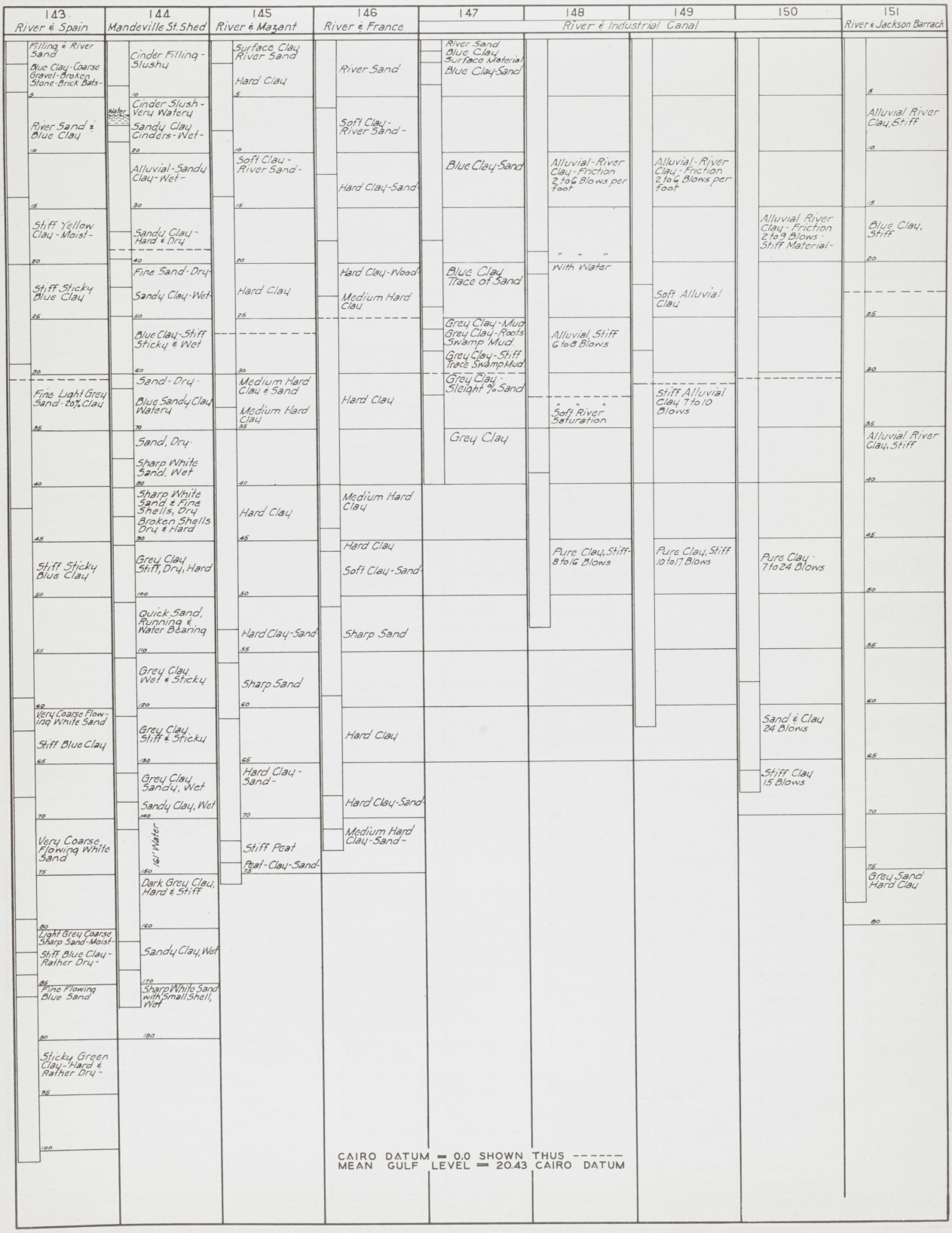


143	144	145	146	147	148	149	150	151

MISSISSIPPI RIVER

○ Other Borings

SCALE: 1"=200'



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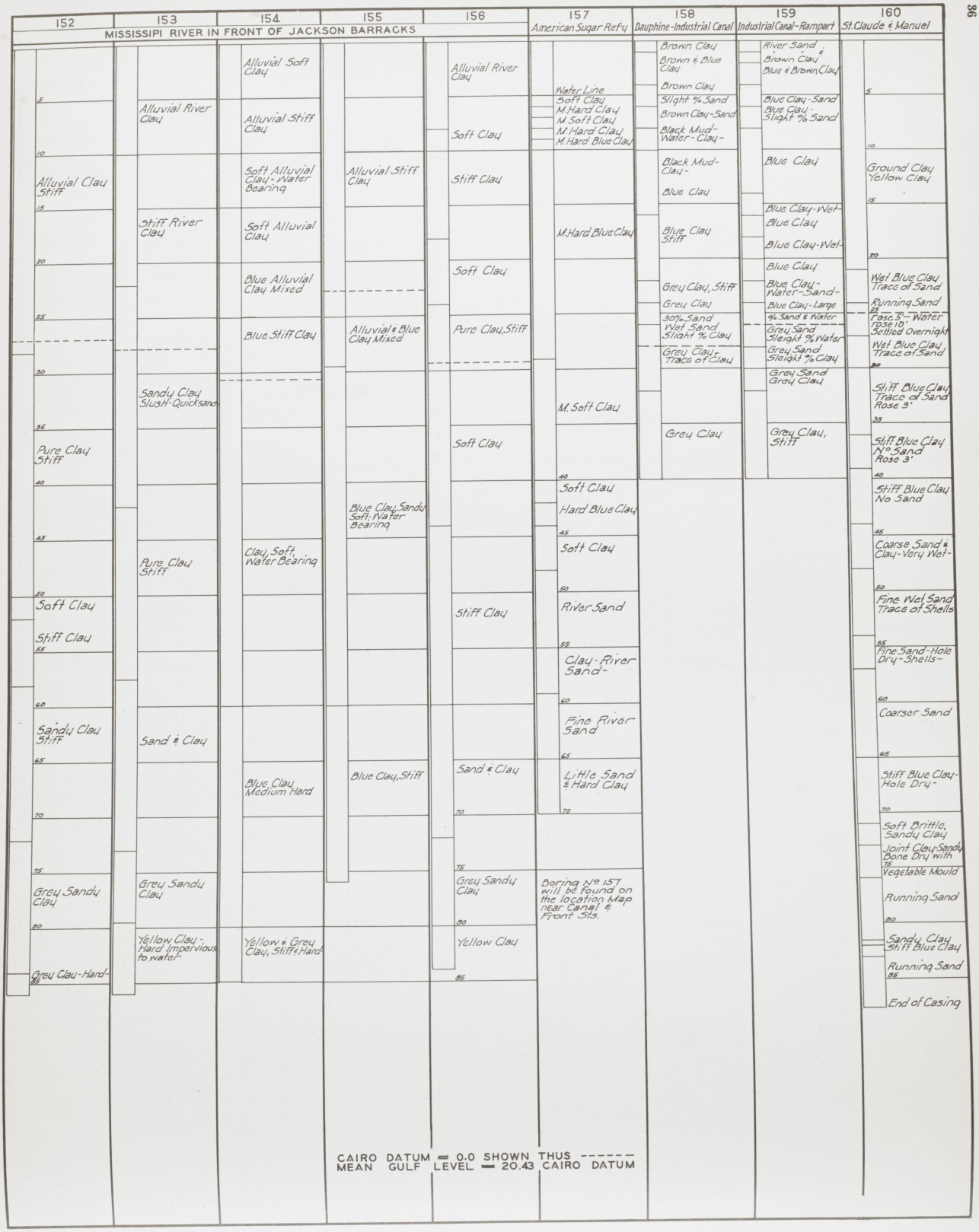
152
153
154
155
156
157
American Sugar Refy
158
Dauphine-Industrial Canal
159
Industrial Canal-Rampart
160
St. Claude & Manuel
MISSISSIPI RIVER IN FRONT OF JACKSON BARRACKS
Alluvial Clay Stiff
Pure Clay Stiff
Soft Clay
Stiff Clay
Sandy Clay Stiff
Grey Sandy Clay
Grey Clay-Hard-
Alluvial River Clay
Stiff River Clay
Sandy Clay Slush-Quicksand
Pure Clay Stiff
Sand & Clay
Grey Sandy Clay
Yellow Clay-Hard Impervious to water-
Alluvial Soft Clay
Alluvial Stiff Clay
Soft Alluvial Clay-Water Bearing
Soft Alluvial Clay
Blue Alluvial Clay Mixed
Blue Stiff Clay
Clay, Soft, Water Bearing
Blue Clay Medium Hard
Yellow & Grey Clay, Stiff & Hard
Alluvial Stiff Clay
Alluvial & Blue Clay Mixed
Blue Clay, Sandy Soft Water Bearing
Blue Clay, Stiff
Alluvial River Clay
Soft Clay
Stiff Clay
Soft Clay
Pure Clay, Stiff
Soft Clay
Stiff Clay
Sand & Clay
Grey Sandy Clay
Yellow Clay
Water Line
Soft Clay
M. Hard Clay
M. Soft Clay
M. Hard Clay
M. Hard Blue Clay
M. Hard Blue Clay
M. Soft Clay
Soft Clay
Hard Blue Clay
Soft Clay
River Sand
Clay-River Sand-
Fine River Sand
Little Sand & Hard Clay
Boring No 157 will be found on the location Map near Canal & Front Sts.
Brown Clay
Brown & Blue Clay
Brown Clay
Slight % Sand
Brown Clay-Sand
Black Mud-Water-Clay-
Black Mud-Clay-
Blue Clay
Blue Clay Stiff
Grey Clay, Stiff
Grey Clay
30% Sand Wet Sand Slight % Clay
Grey Clay-Trace of Clay
Grey Clay
River Sand & Brown Clay
Blue & Brown Clay
Blue Clay-Sand
Blue Clay-Slight % Sand
Blue Clay
Blue Clay-Wet-
Blue Clay
Blue Clay-Wet-
Blue Clay
Blue Clay-Water-Sand-
Blue Clay-Large
% Sand & Water
Grey Sand Sleight % Water
Grey Sand Sleight % Clay
Grey Sand Grey Clay
Grey Clay, Stiff
Ground Clay Yellow Clay
Wet Blue Clay Trace of Sand
Running Sand
Rose 3'-- Water rose 10 Settled Overnight
Wet Blue Clay Trace of Sand
Stiff Blue Clay Trace of Sand Rose 3'
Stiff Blue Clay No Sand Rose 3'
Stiff Blue Clay No Sand
Coarse Sand & Clay-Very Wet-
Fine Wet Sand Trace of Shells
Fine Sand-Hole Dry-Shells-
Coarser Sand
Stiff Blue Clay-Hole Dry-
Soft Brittle, Sandy Clay
Joint Clay-Sandy Bone Dry with Vegetable Mould
Running Sand
Sandy Clay Stiff Blue Clay
Running Sand
End of Casing
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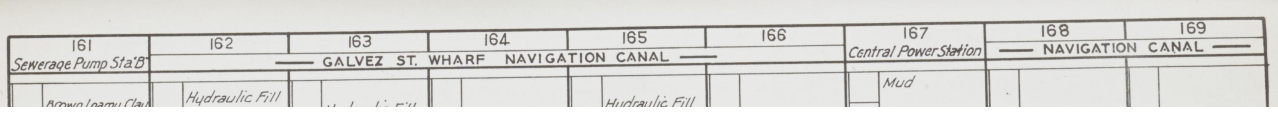
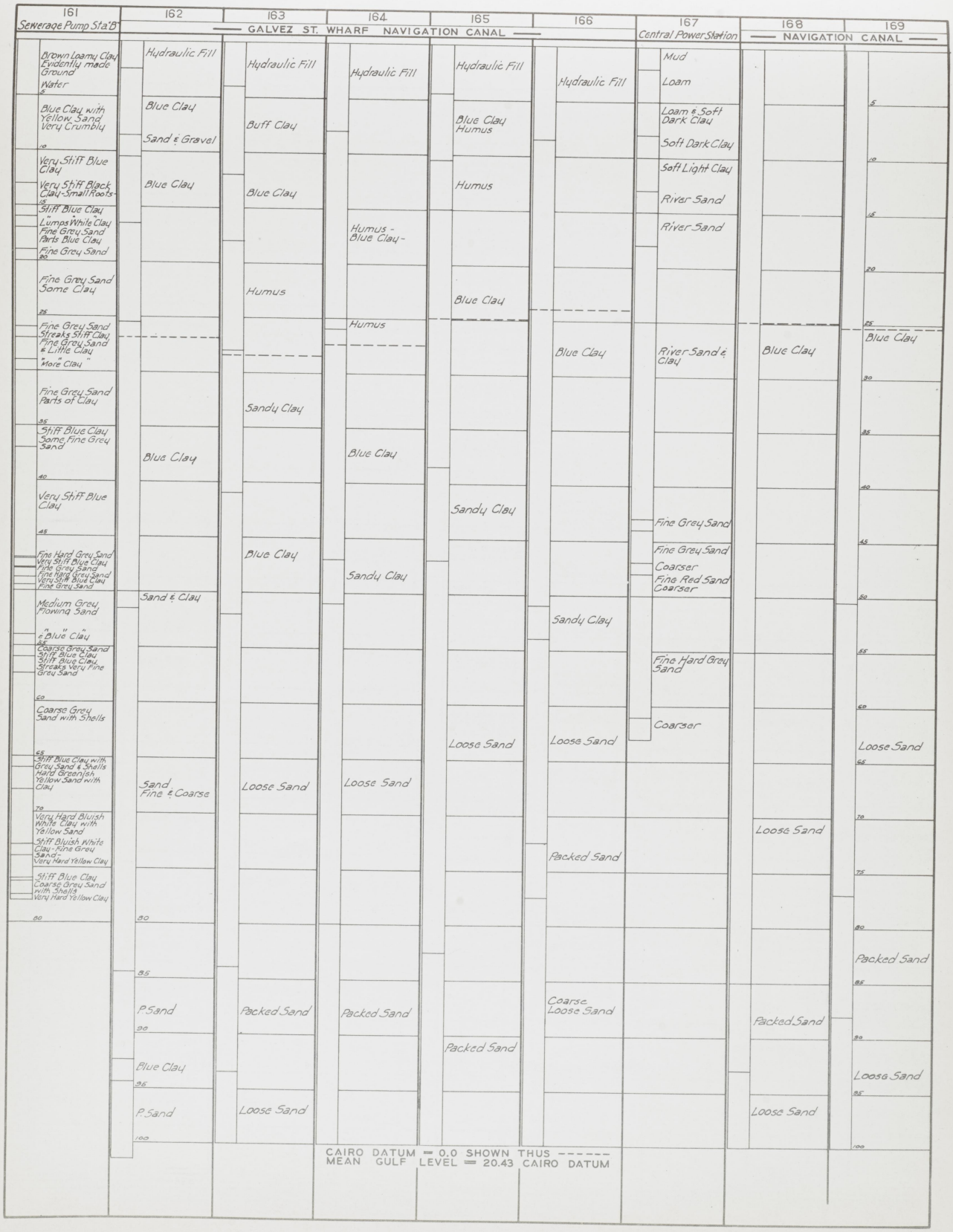
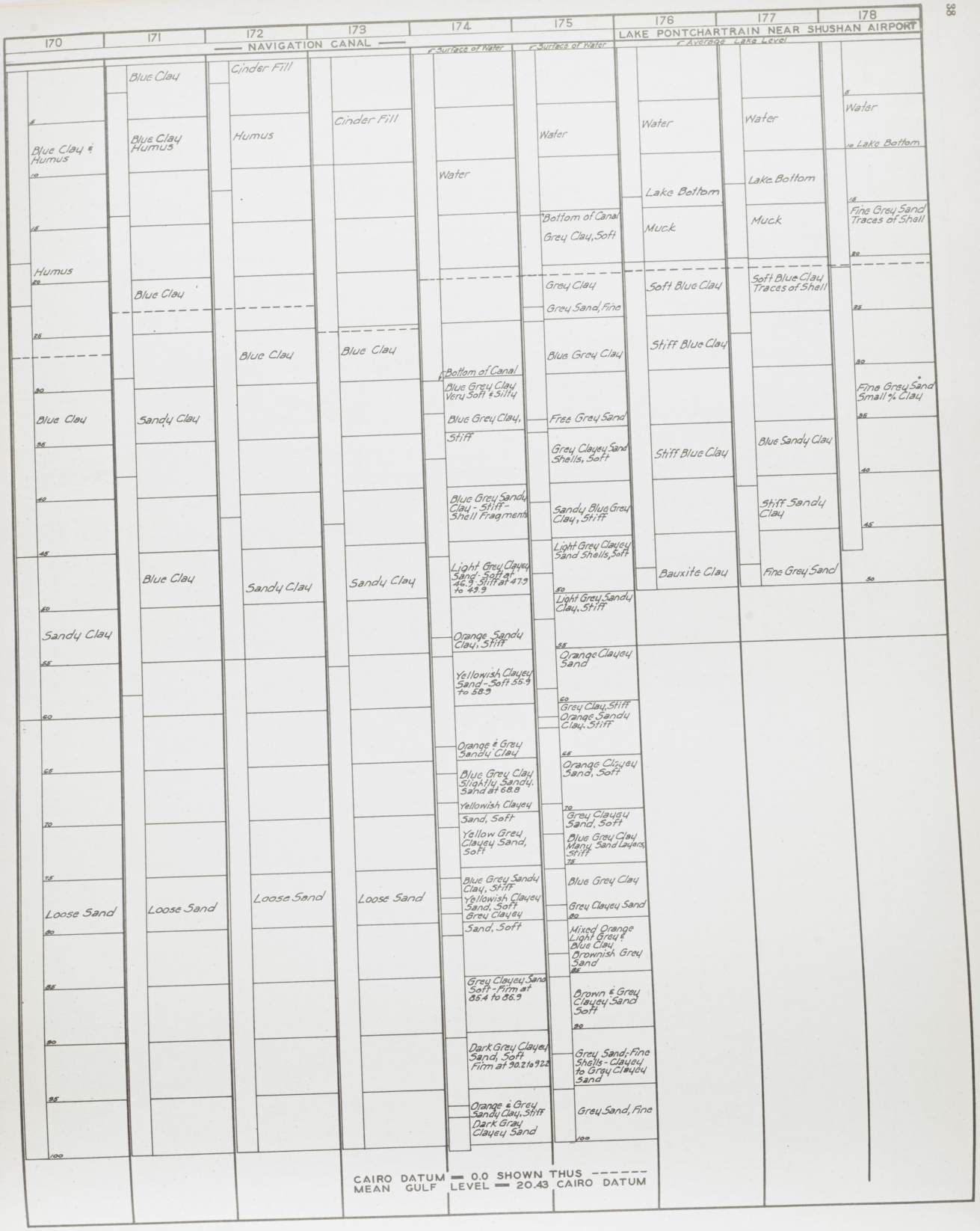
MEAN GULF LEVEL = 20.43 CAIRO DATUM


161
Sewerage Pump Sta'B
162
163
164
165
166
GALVEZ ST. WHARF NAVIGATION CANAL
167
Central Power Station
168
169
NAVIGATION CANAL
Brown Loamy Clay
Hydraulic Fill
Hydraulic Fill
Mud


161
Sewerage Pump Sta'B'
162
163
164
165
166
167
Central Power Station
168
169
GALVEZ ST. WHARF NAVIGATION CANAL
NAVIGATION CANAL
Brown Loamy Clay Evidently made Ground
Water
Blue Clay with Yellow Sand Very Crumbly
Very Stiff Blue Clay
Very Stiff Black Clay-Small Roots
Stiff Blue Clay
Lumps White Clay Fine Grey Sand Parts Blue Clay
Fine Grey Sand
Fine Grey Sand Some Clay
Fine Grey Sand Streaks Stiff Clay
Fine Grey Sand & Little Clay
" " More Clay
Fine Grey Sand Parts of Clay
Stiff Blue Clay Some Fine Grey Sand
Very Stiff Blue Clay
Fine Hard Grey Sand
Very Stiff Blue Clay
Fine Grey Sand
Fine Hard Grey Sand
Very Stiff Blue Clay
Fine Grey Sand
Medium Grey Flowing Sand
"Blue" Clay
Coarse Grey Sand
Stiff Blue Clay
Stiff Blue Clay Streaks Very Fine Grey Sand
Coarse Grey Sand with Shells
Stiff Blue Clay with Grey Sand & Shells
Hard Greenish Yellow Sand with Clay
Very Hard Bluish White Clay with Yellow Sand
Stiff Bluish White Clay Fine Grey Sand
Very Hard Yellow Clay
Stiff Blue Clay
Coarse Grey Sand with Shells
Very Hard Yellow Clay
Hydraulic Fill
Blue Clay
Sand & Gravel
Blue Clay
Blue Clay
Sand & Clay
Sand Fine & Coarse
P. Sand
Blue Clay
P. Sand
Hydraulic Fill
Buff Clay
Blue Clay
Humus
Sandy Clay
Blue Clay
Loose Sand
Packed Sand
Loose Sand
Hydraulic Fill
Humus - Blue Clay -
Humus
Blue Clay
Sandy Clay
Loose Sand
Packed Sand
Hydraulic Fill
Blue Clay Humus
Humus
Blue Clay
Sandy Clay
Loose Sand
Packed Sand
Hydraulic Fill
Blue Clay
Sandy Clay
Loose Sand
Packed Sand
Coarse Loose Sand
Mud
Loam
Loam & Soft Dark Clay
Soft Dark Clay
Soft Light Clay
River Sand
River Sand
River Sand & Clay
Fine Grey Sand
Fine Grey Sand Coarser
Fine Red Sand Coarser
Fine Hard Grey Sand
Coarser
Blue Clay
Loose Sand
Packed Sand
Loose Sand
Blue Clay
Blue Clay
Loose Sand
Packed Sand
Loose Sand
Packed Sand
Loose Sand
Loose Sand
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
CAIRO DATUM = 0.0 SHOWN THUS ------
MEAN GULF LEVEL = 20.43 CAIRO DATUM



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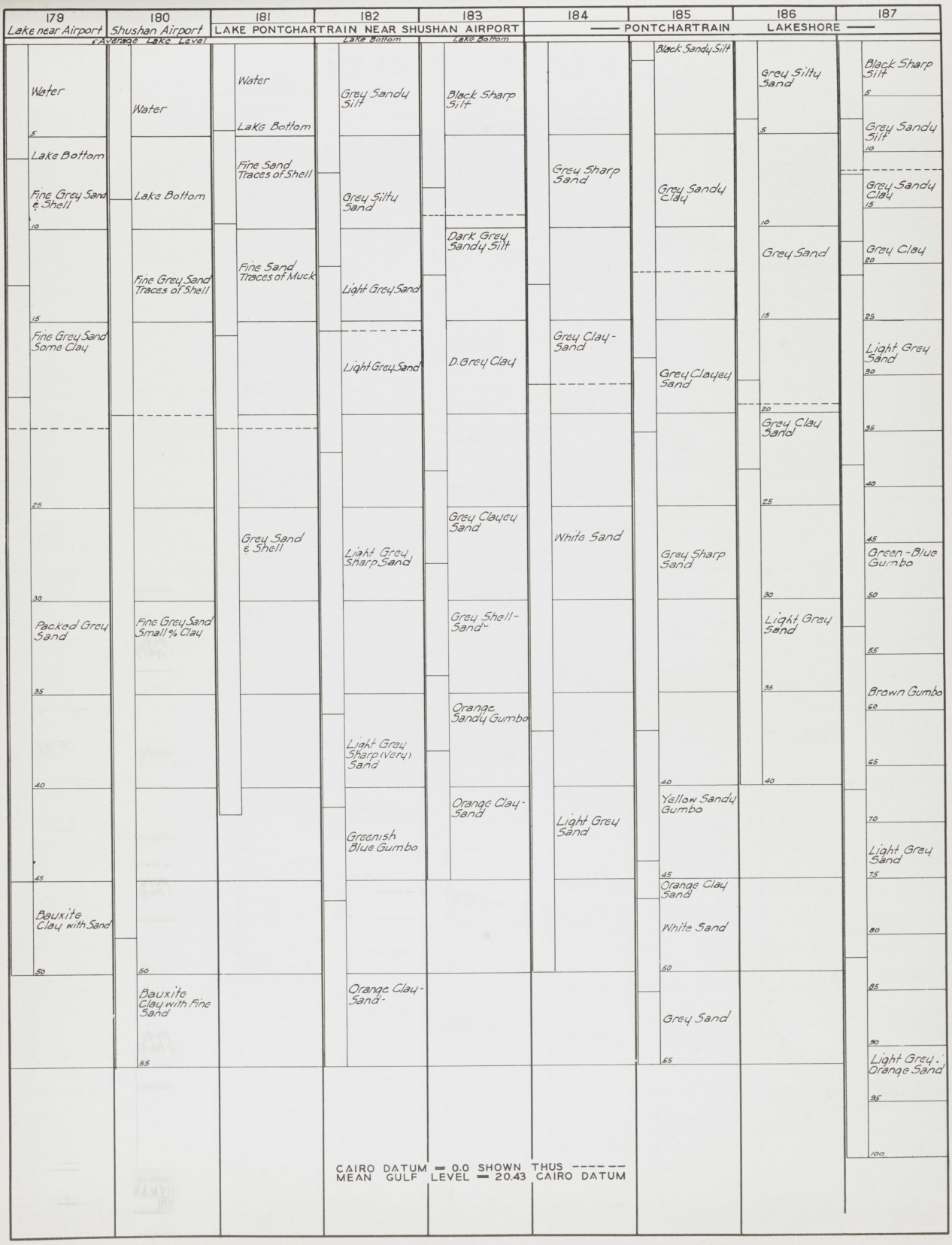
MEAN GULF LEVEL = 20.43 CAIRO DATUM



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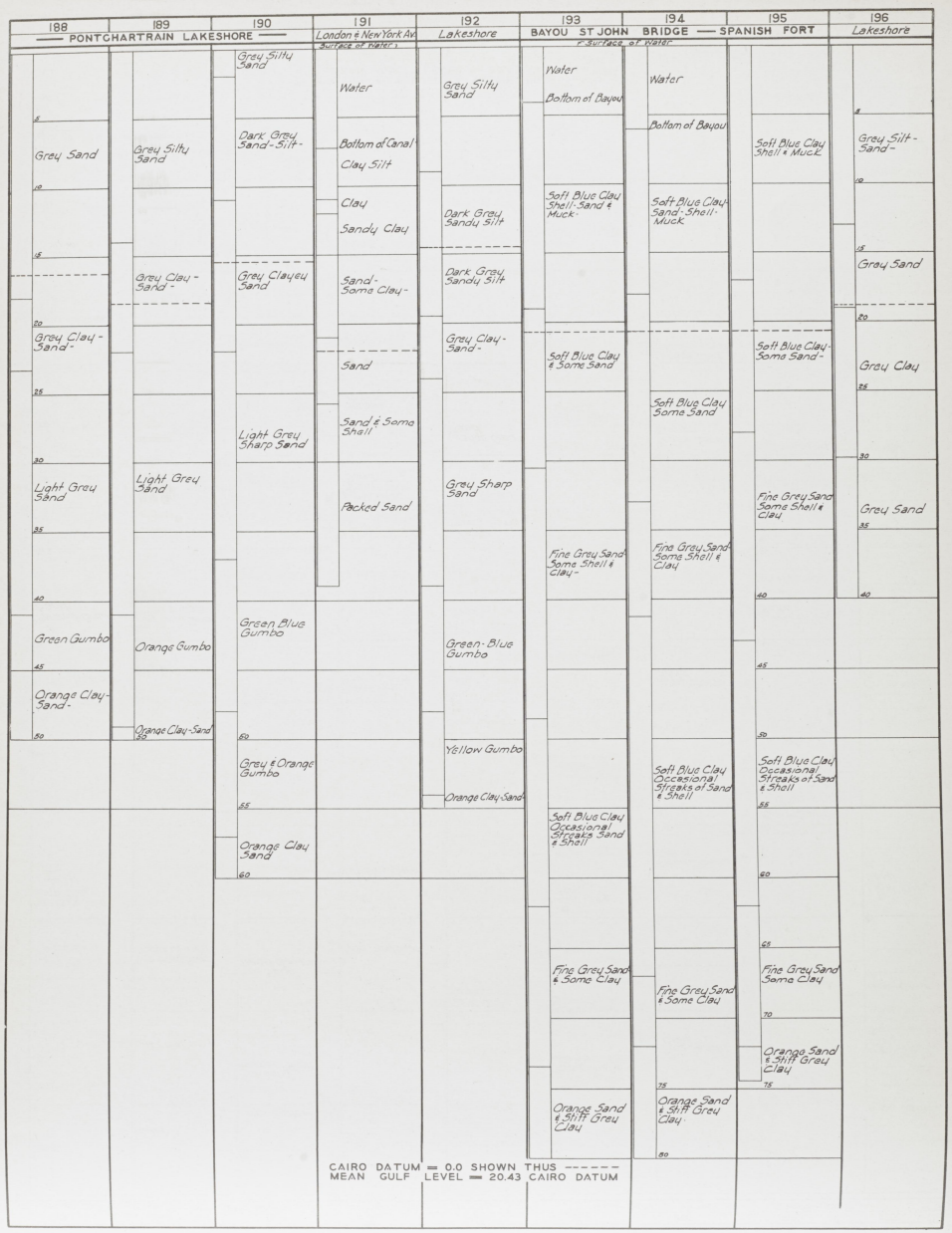
188
PONTCHARTRAIN LAKESHORE
189
190
191
London & New York Av.
192
Lakeshore
193
BAYOU ST JOHN
194
BRIDGE
195
SPANISH FORT
196
Lakeshore
Surface of Water
Grey Silty Sand
Water
Grey Sand
Grey Silty Sand
Dark Grey Sand - Silt -
Bottom of Canal
Clay Silt
Clay
Sandy Clay
Grey Silty Sand
Dark Grey Sandy Silt
Water
Bottom of Bayou
Soft Blue Clay Shell - Sand & Muck
Water
Bottom of Bayou
Soft Blue Clay Sand - Shell - Muck
Soft Blue Clay Shell & Muck
Grey Silt - Sand -
Grey Clay - Sand -
Grey Clayey Sand
Sand - Some Clay -
Dark Grey Sandy Silt
Grey Sand
Grey Clay - Sand -
Sand
Grey Clay - Sand -
Soft Blue Clay & Some Sand
Soft Blue Clay Some Sand
Soft Blue Clay - Some Sand -
Grey Clay
Light Grey Sand
Light Grey Sand
Light Grey Sharp Sand
Sand & Some Shell
Packed Sand
Grey Sharp Sand
Soft Blue Clay Some Sand
Fine Grey Sand Some Shell & Clay
Fine Grey Sand Some Shell & Clay -
Fine Grey Sand Some Shell & Clay
Grey Sand
Green Gumbo
Orange Gumbo
Green Blue Gumbo
Green - Blue Gumbo
Orange Clay - Sand -
Orange Clay - Sand
Grey & Orange Gumbo
Yellow Gumbo
Orange Clay Sand
Soft Blue Clay Occasional Streaks of Sand & Shell
Soft Blue Clay Occasional Streaks of Sand & Shell
Soft Blue Clay Occasional Streaks of Sand & Shell
Orange Clay Sand
Fine Grey Sand & Some Clay
Fine Grey Sand & Some Clay
Fine Grey Sand Some Clay
Orange Sand & Stiff Grey Clay
Orange Sand & Stiff Grey Clay
Orange Sand & Stiff Grey Clay
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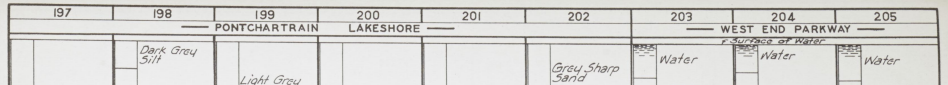
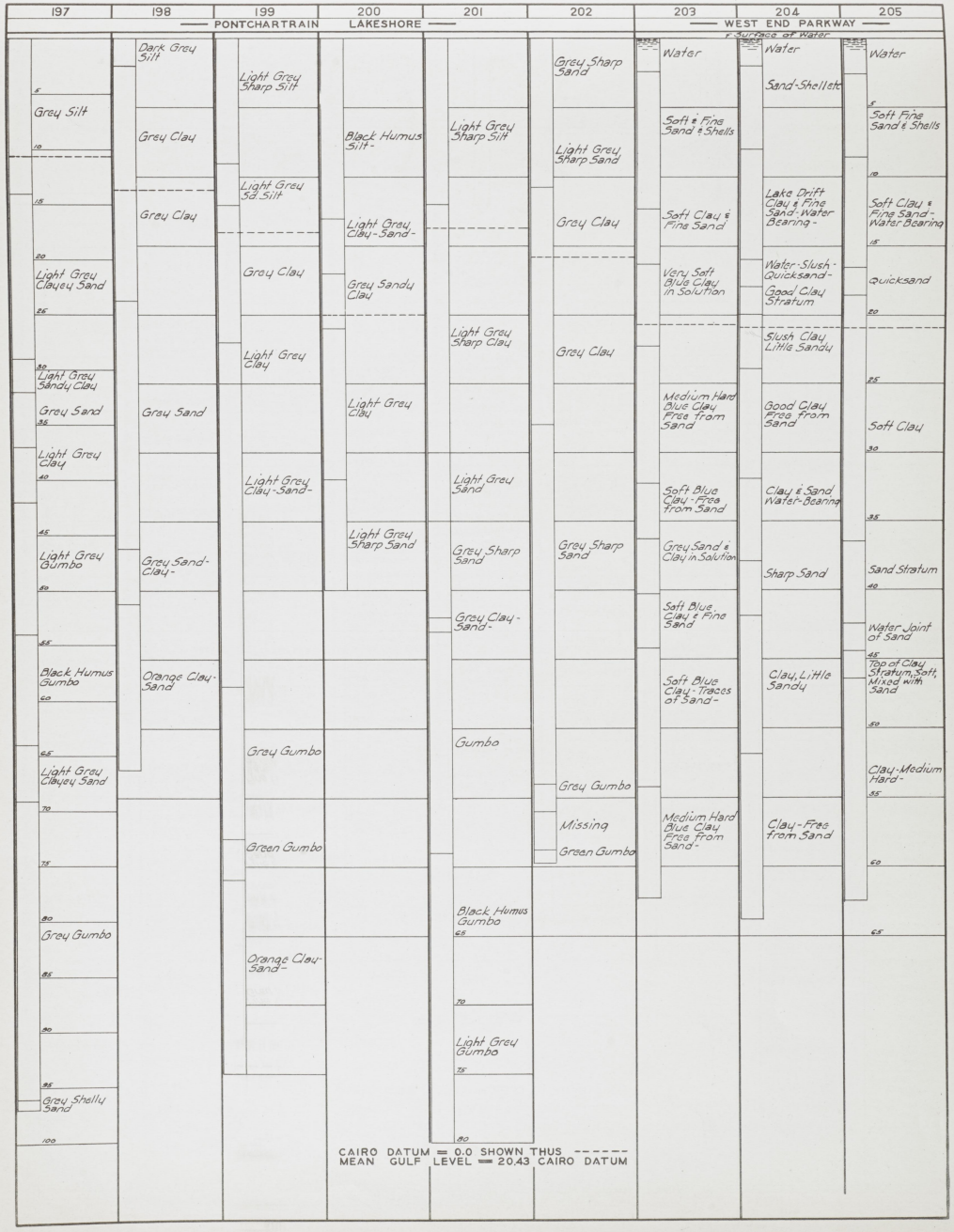
MEAN GULF LEVEL = 20.43 CAIRO DATUM


197
198
199
200
201
202
203
204
205
PONTCHARTRAIN LAKESHORE
WEST END PARKWAY
Surface of Water
Dark Grey Silt
Light Grey
Grey Sharp Sand
Water
Water
Water



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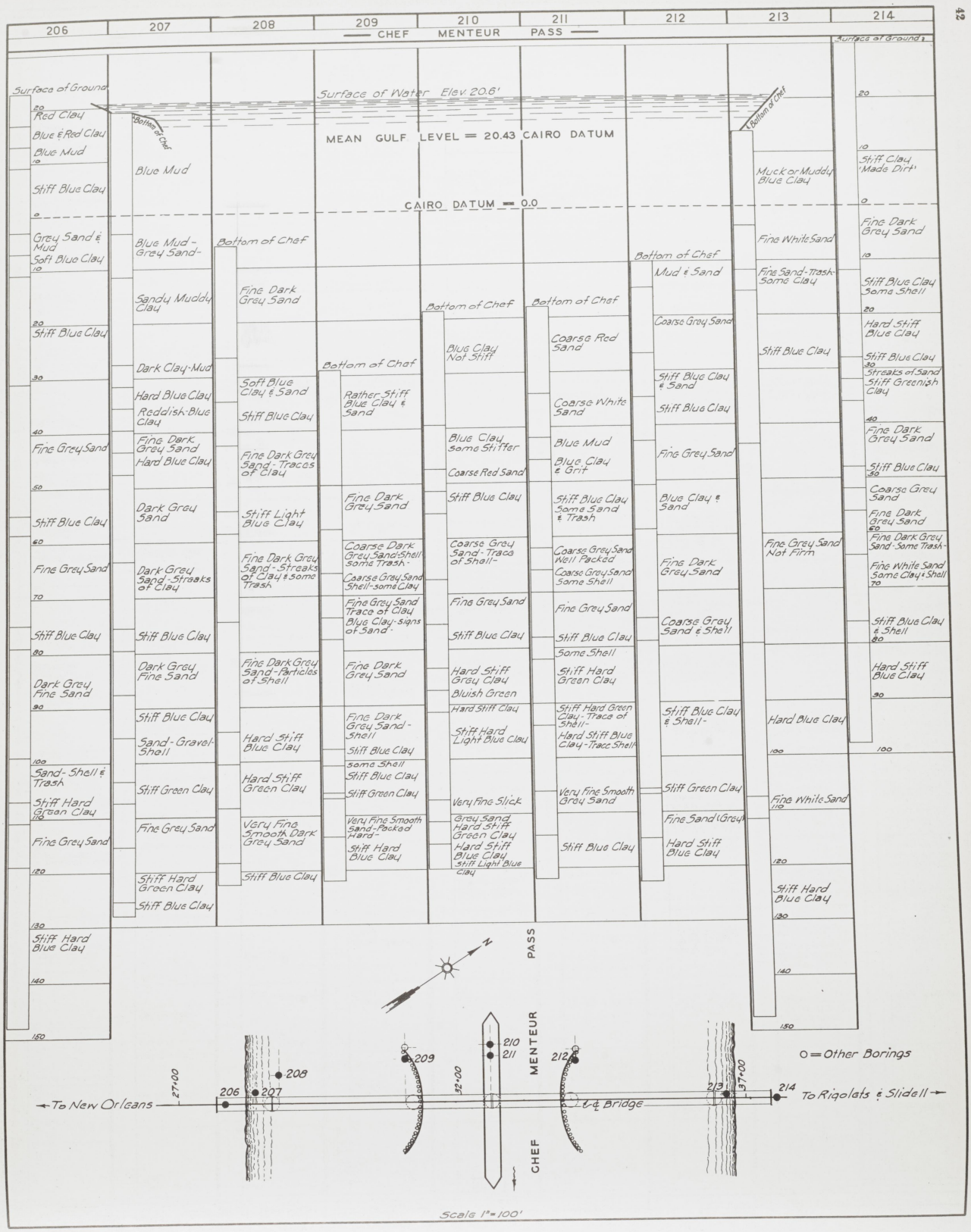


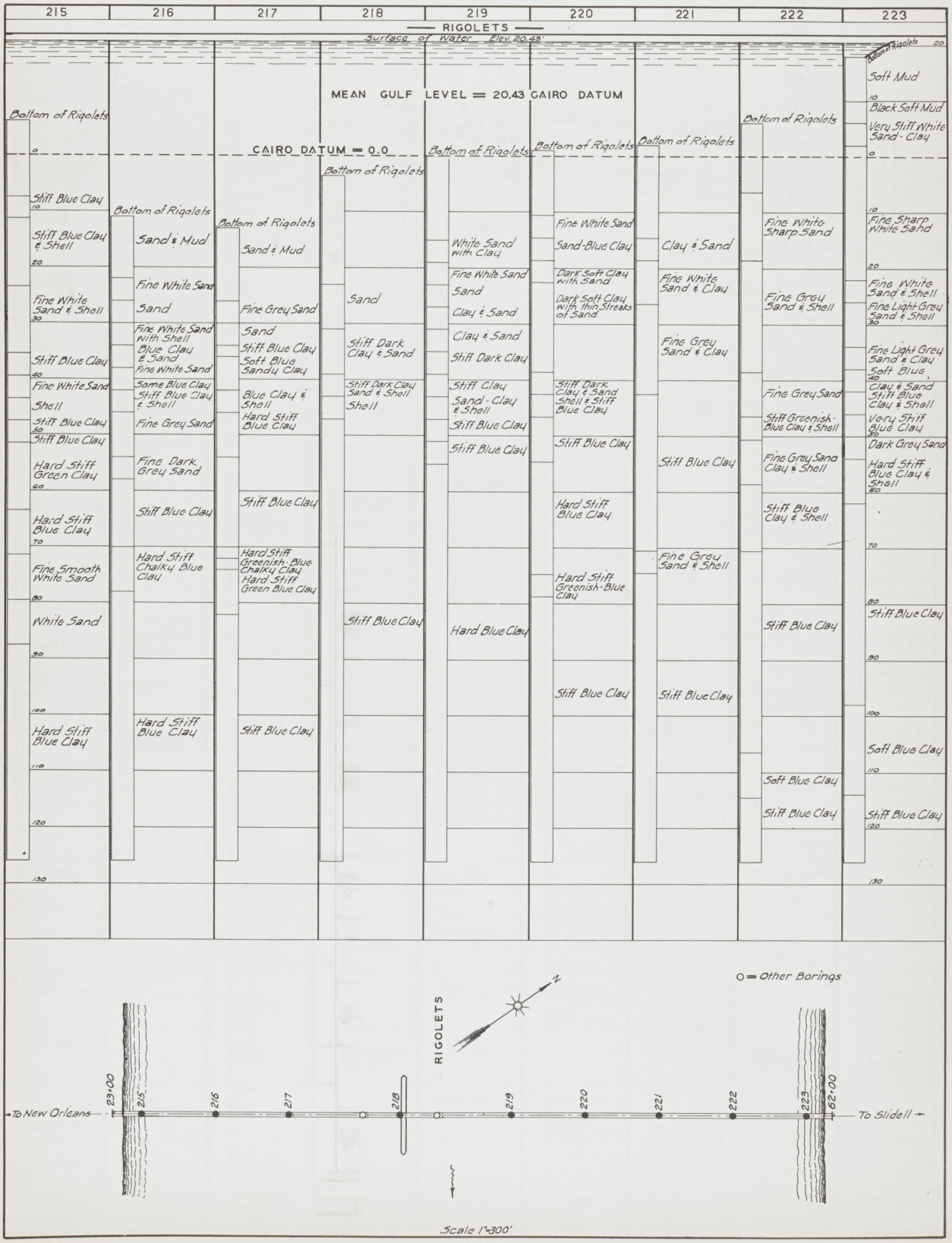
215	216	217	218	219	220	221	222	223

RIGOLETS

Surface of Water Elev. 20.43'

Rigolets 20

Scale 1"=100'

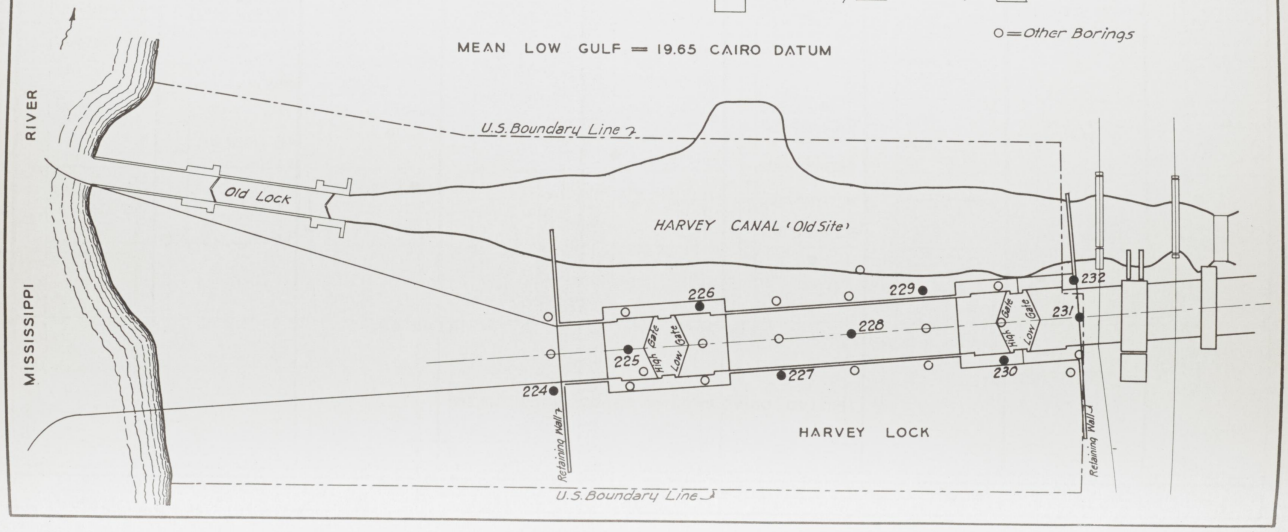


Scale 1"=300'

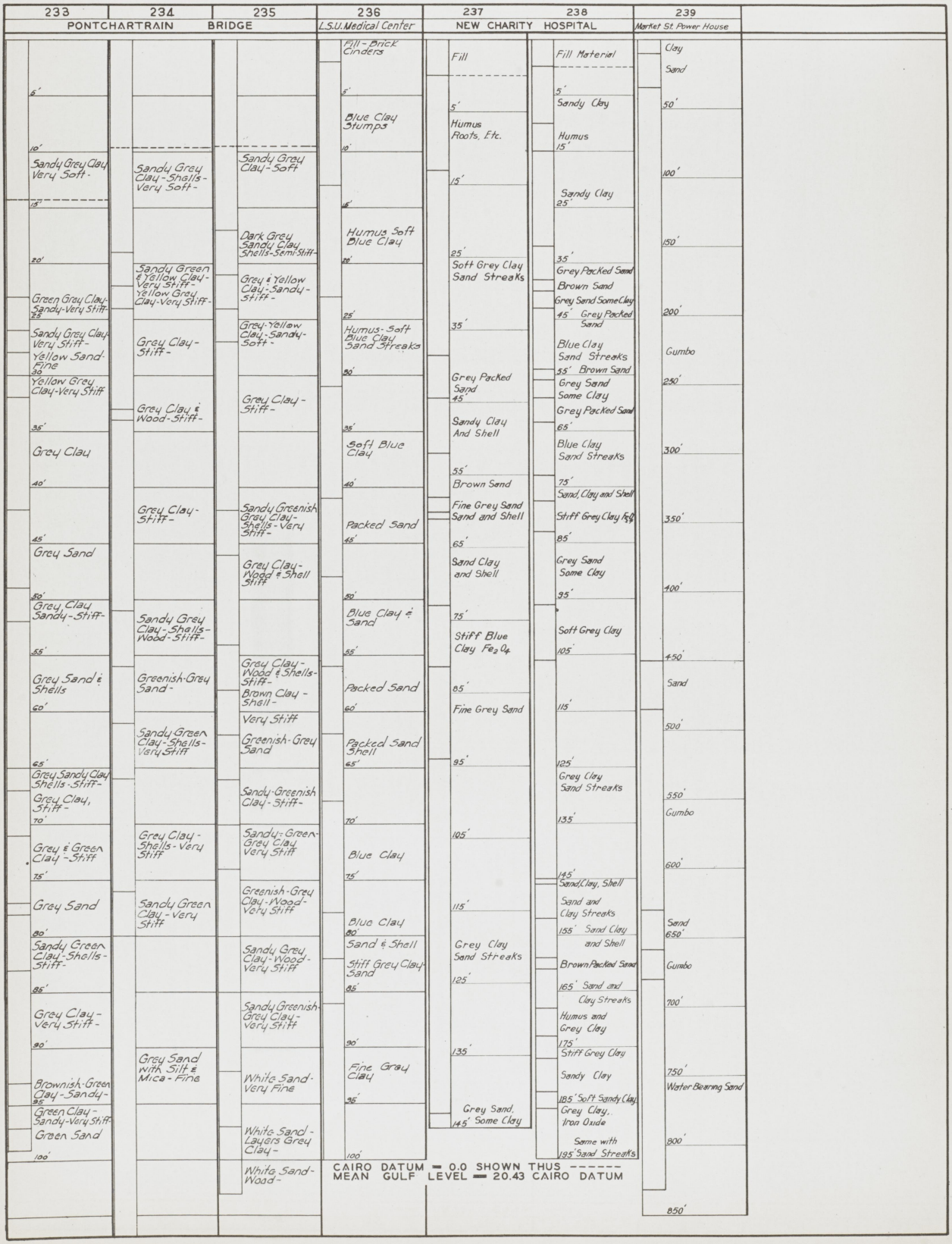
224	225	226	227	228	229	230	231	232
— HARVEY CANAL —								
5 Blue Clay 0	Sandy Buff Clay	Buff Clay M.L.G.	Sandy Buff Clay	Sandy Light Buff Clay	Sandy Buff Clay	Buff Clay M.L.G.	Sandy Buff Clay	Sandy Buff Clay 5 0
Light Buff Clay 5		Light Buff Clay	Blue Clay - Sand Streaks	Stiff Blue Clay	Light Buff Clay	Sandy Light Buff Clay	Sandy Light Buff Clay	Sandy Light Buff Clay 5
Sandy Blue Clay 10				Blue Clay - Sand - Humus	Sandy Blue Clay			Sandy Blue Clay 10
Stiff Blue Clay 15	Blue Clay - Sand Streaks	Sand - Clay - Roots -	Sandy Blue Clay	Sandy Stiff Blue Clay		Blue Clay	Blue Clay - Roots	Stiff Blue Clay 15
Blue Clay - Humus 20	Stiff Blue Clay	Blue Clay - Sand - Humus		Stiff Blue Clay - Humus -	Blue Clay	Humus Blue Clay	Blue Clay - Humus -	Blue Clay 20
Blue Clay	Blue Clay - Humus -	Stiff Blue Clay	Blue Clay - Humus -	Clay - Sand -	Sandy Blue Clay	Humus Blue Clay	Blue Clay - Sand Streaks -	Sand - Humus 25
Stiff Blue Clay 30				Sandy Stiff Blue Clay	Blue Clay Sand Streaks	Humus Blue Clay	Stiff Blue Clay	Stiff Blue Clay 30
Soft Blue Clay 35	Stiff Sandy Blue Clay Blue Clay	Blue Clay	Stiff Blue Clay	Clay - Sand - Humus -	Sandy Stiff Blue Clay	Stiff Blue Clay	Blue Clay - Sand Streaks	Sand - Humus 35
Stiff Blue Clay Sand - Humus 40	Humus Blue Clay - Humus -	Stiff Blue Clay		Blue Clay				Blue Clay - Sand Streaks - 40
Gas 45			Sandy Blue Clay	Blue Clay - Sand Streaks			Blue Clay	Soft Blue Clay 40
Stiff Blue Clay Sand - Gas	Gas Stiff Blue Clay - Sand Streaks -	Blue Clay - Sand - Streaks	Blue Clay	Blue Clay	Blue Clay - Sand Streaks -	Blue Clay - Sand -		Stiff Blue Clay 50
55			Blue Clay - Sand Streaks	Clay - Sand -			Blue Clay Sand Streaks	Blue Clay - Sand Streaks - 55
Sand - Shell - Gas - 60	Sand - Shell - Gas -	Sand - Shell - Gas -	Sand - Shell	Sand - Shell -	Sand - Shell - Soft Blue Clay	Sand - Shell - Blue Clay	Sand - Shell - Gas - Blue Clay	Blue Clay Sand - Shell Sandy Blue Clay

○ = Other Borings

MEAN LOW GULF = 19.65 CAIRO DATUM



233	234	235	236	237	238	239	
PONTCHARTRAIN		BRIDGE	L.S.U. Medical Center	NEW CHARITY	HOSPITAL	Market St. Power House	



CAIRO DATUM = 0.0 SHOWN THUS ------
MEAN GULF LEVEL = 20.43 CAIRO DATUM

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Lake Pontchartrain Bridge	11	70
Lee Monument	56	170
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L. S. U. Medical Center	17	84
Marine Hospital—Main Building	62	186
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Martin Behrman Public School	14	78
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Mc Main High School	38	134
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Seatrain Landing	35	126
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LAKE PONTCHARTRAIN
MILNEBURG
SEABROOK
SPANISH FORT
WEST END
BONNABEL PLACE
CITY PARK (APPROX 326.7 ACRES)
FAIR GROUNDS
METAIRIE GOLF CLUB
CONCOURSE SUBDIVISION
METAIRIE CEMETERY
FAUBOURG BAYOU ST JOHN
ROSEHILL BURIAL PARK
GUS SEEGER
NORTHERN STATES CITRUS & REALTY CO
METROPOLITAN LAND CO
ST CLAUDE AVE
ALGIERS
U.S. NAVAL RESERVATION
AUDUBON PARK (APPROX 234 ACRES)
NINE MILE POINT
CARROLLTON GAUGE
SOUTHPORT
CLAIBORNE GATEWAY
FLORIDA AVE
CITY PARK AVE
N


MAP OF
NEW ORLEANS
AND ADJACENT PARTS OF
JEFFERSON & ST. BERNARD PARISHES
PREPARED BY
CITY ENGINEER'S OFFICE
SCALE IN FEET
APPROVED MAY 1, 1925
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EXPLANATORY
THE NUMBERS ON THIS MAP REFER TO CASES IN CHAPTERS III & IV
T. V. MARKEY
CITY PARK
97 (APPROX. 326.7 ACRES)
METAIRIE GOLF CLUB
SOUTHPORT
NINE MILE POINT
AMESVILLE
FAUBOURG BAYOU ST. JOHN
FAUBOURG DELERY
FAUBOURG LAFRENIERE
FAUBOURG LAFAYETTE
FAUBOURG ST. MARY
FAUBOURG ST. PARK
FAUBOURG ST. THOMAS
FAUBOURG ST. ANDREW
FAUBOURG ST. JOSEPH
FAUBOURG ST. CHARLES
FAUBOURG ST. LOUIS
FAUBOURG ST. JOHN
FAUBOURG ST. PETER
FAUBOURG ST. ANN
FAUBOURG ST. MARIE
FAUBOURG ST. ROCH
FAUBOURG ST. CLAUDE
FAUBOURG ST. ELYSIAN FIELDS
FAUBOURG ST. GABRIEL
FAUBOURG ST. MARTIN
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LAKE PONTCHARTRAIN
MAP OF
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NINE MILE POINT
U.S. NAVAL RESERVATION
T. V. MARKEY.

CHAPTER III
PILE FOUNDATIONS

In the pages following are many interesting cases for the reader to study and as they are fully illustrated it will not be necessary to comment here except to call attention to a few peculiarities.

Case I, The Masonic Temple Building, is of especial interest in that piles over this small area range in length from 30 to 60 feet and some met with very little resistance.

Case 22, Hibernia Bank Building, also presents an unusual condition in that piles range in length from 36 to 60 feet but they are fairly uniformly distributed in two groups as shown on drawing.

Case 79, Telephone Exchange; Case 20, Times-Picayune Building; and Case 16, Van Horn Building, only a short distance south of Case I, Masonic Temple, and Case 22, Hibernia Bank Building, all show piles of about the same length and of uniform length under each building.

Case 2, Canal Bank Building, and Case 76, New Orleans Cotton Exchange, just north of Case 22, Hibernia Bank Building, show piles of uniform length and about 60 feet, while the same is true of Case 26, Feibleman Building.

The buildings of the American Sugar Refinery will be found an interesting group.

Each case is a study in itself. It seems customary to design pile foundations for a total combined load of 12 to 15 tons per pile, while tests that have been made and buildings which have stood without settlement indicate that much heavier loadings could be used with safety. Perhaps this light loading accounts for the fact that we find few, if any, buildings with pile foundations which have settled materially.

Case I, Masonic Temple, shows a 28 ton load held for two weeks on a test pile with a settlement of 5/8 of an inch.

Case No. 72, Army Supply Base, shows a 40 ton test load with no settlement.

Case No. 35, Seatrain Landing, shows a load on 4 piles of 175 tons which collapsed the loaded platform but showed a maximum pile settlement of 4 feet.

Case No. 58, Harvey Lock, presents an unusual picture which is fully described in that study. However, in designing this lock a dead load of 20-1/2 tons per pile was used, and apparently with safety.

Driving test piles in many cases did not yield accurate information, with the result that controversy and litigation has ensued, due to the fact that piles driven during construction did not behave uniformly and did not coincide with test piles.

Borings also have sometimes failed to give satisfactory information.

A sufficient number of borings or test piles will in general, give a good indication of size of piles required but there will be exceptions.

Here we are again confronted with conditions due to the fact that the entire area is built up of alluvial and marine deposits and decayed vegetable matter.

There is no extensive stratification and no two adjacent city blocks are necessarily the same in geologic formation. In fact it has been clearly shown how variable subsurface conditions may be under a single building.

If one lesson can be learned from this chapter on pile foundations it is this. Where piles are spaced 2 to 3 feet on centers and driven to fairly firm resistance, and then loaded to 12 to 15 tons per pile, there will be no settlement of the superstructure. It would seem that the factor of safety in such design is very large but just how large no one can say. A loading of 20 tons per pile would probably still be well within safe limits but this is a matter to be determined by the engineer in each case.

As you study the following cases you will notice that piles are not uniform in length under different buildings or even under an individual building. You will notice that the number of hammer blows to the last foot, or last three feet, is very variable, even in a group of piles under one footing. The conclusion would seem to be that skin friction is the essential element in bearing power of piles in this territory. Would skin friction be even more sustaining if piles were not placed so close together and thus leave the natural repose of the earth less disturbed?

Case No. 1

MASONIC TEMPLE

The Masonic Temple located on St. Charles and Perdido Streets, was designed by Sam Stone, Architect, and was erected by James Stewart in 1925-26. It is a modern steel frame office building fronting 103'-0" on St. Charles Street, and is 168'-11" deep. It rises 228 ft. above the curb having 18 stories and basement. Walls are of brick and are faced with limestone on St. Charles and Perdido Sts.

The entire site was excavated for basement and footings to a depth of 17' below curb or to elevation -9.43 M. G. L. One Section was excavated for a swimming pool to elevation -16.68 M. G. L.

Two layers of cypress stumps were found, one at elevation -1.43 M. G. L. and one at -6.43 M. G. L. The soil at this depth was sand.

Approximately 1850 untreated yellow pine piles, with bark removed, were driven under this building. Piles varied from 30 to 60 feet long with an average length of 35 ft. giving an average effective length of 33 ft. The greater number of piles were in lengths of 30, 34, 35 and 50 feet. All piles were driven with a follower to approximate cut-off points. The minimum diameter of the piles was 5" at tip and 12" at butt. These piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42". Main cut-off was at elevation -9.18 M. G. L.

In driving these piles two resisting strata were reached; one at approximately elevation -40.43 M. G. L. and one at -50.43 M. G. L., but these levels of resistance were not uniformly located. One pile would stop at about minus 40 and the next one about minus 50 or minus 45 and so on over the entire area, though the major number rest at about minus 40 or minus 50. Some were driven to a depth of -62.0 M. G. L. without encountering any decided resistance and were penetrating about two blows per inch when driving was discontinued.

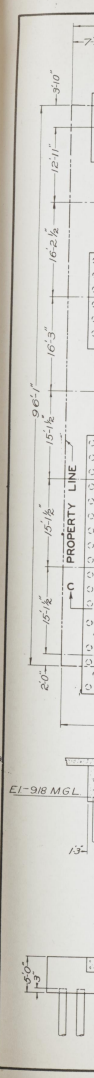
Mr. C. G. Cappel of W. Horace Williams Co., pile driving contractors, states that the record of pile driving is one of extreme non-uniformity. One pile at a depth of 50 ft. met resistance amounting practically to refusal. A second pile 3 ft. removed and driven to about 70 ft. was still sinking readily under hammer blows. At a depth of about 50 ft. some piles met resistance for 6" while others met resistance for 6'. There was very little resistance to driving in most cases and the supporting value of the piles is due almost entirely to skin friction.

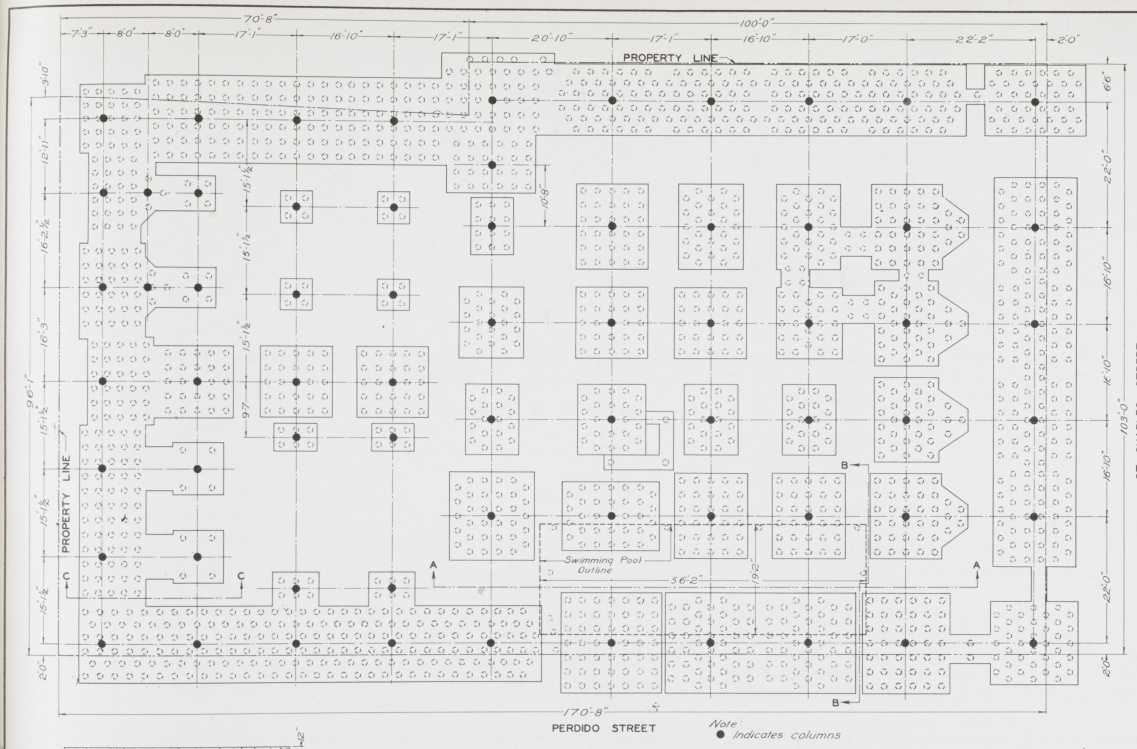
The blows for the last inch of driving in most cases varied from 6 to 33 with an average of 11 blows. The design load for all piles was sixteen tons each. A 50' pile was driven 45' into the ground and left standing for 3 weeks, then loaded with 28 tons of sand. This load was held for 2 weeks and the total downward movement was $\frac{5}{8}$ of an inch. After removing the load the pile had an upward movement of $\frac{1}{2}$". The accompanying drawing shows the method of loading this pile.

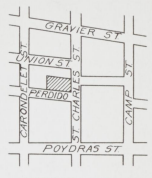
Footings are of reinforced concrete 5'-0" thick. The accompanying drawing shows the size and location of footings and spacing of piles.

Old piles on this site were removed before pile driving started. These square hewn cypress piles were easily pulled with a standard rig equipped with a heavy block. They were saturated with water but were in good condition, however, shortly after they were exposed they were attacked by a fungus and about 3 months later fell apart.

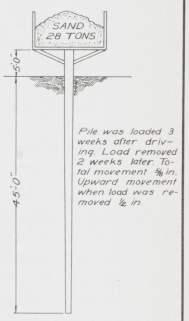
It is evident that the foundations are entirely adequate as there is no evidence of settlement in the building.



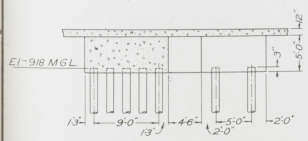




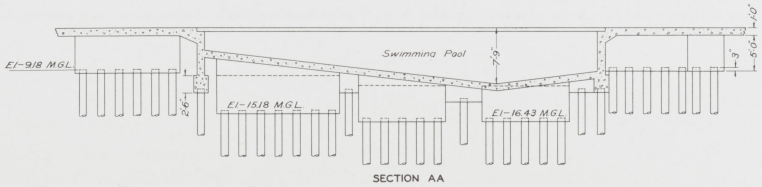
LOCATION MAP



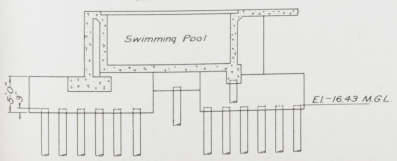
LOADING OF TEST PILE



SECTION CC



SECTION AA



SECTION BB



MASONIC TEMPLE

CASE NO.1

134324

Case No. 2.

CANAL BANK BUILDING

The Canal Bank Building, which is located on the corner of Baronne and Common Streets, was designed by Emile Weil, Inc., Architects, in collaboration with Orloff Henry and Lewis Hooper, Consulting Engineers. The building which was erected in the years 1926-27 by the O. M. Gwinn Construction Company is of modern fireproof steel frame design, having outside walls of brick faced with Indiana Limestone and granite, and curtain walls of hollow tile. The floors are steel framed. It is eighteen stories high and faces approximately 130′ on Baronne Street and has a depth of 260′ on Common Street. There is approximately 20% window area.

The excavation for the building was carried down to an average depth of 21.45′ below curb or to an elevation of -16.20 M. G. L. The average elevation of the curb was 5.25 M. G. L. The piles were cut off at a depth of 21.20′ below the curb or -15.95 M. G. L. The soil excavated was apparently part humus and part gumbo, and at a depth of -14.75 M. G. L. cypress stumps were encountered.

Untreated yellow pine piles varying from 55′ to 70′ with a maximum 7″ to 8″ tip diameter and 13″ to 14″ butt diameter, support the building. All piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42″. Nine test piles 60 feet long with 7½″ to 8″ tips and 13″ to 14″ butts were driven, the graph on the accompanying sheet showing the curves of these piles and the average curve will give an indication of the behavior of the foundation piles.

Footings are of reinforced concrete with the piles spaced 2′-6″ on a basis of theoretical design. However, as a result of soil conditions the piles had a tendency to walk out of line and crowd together. It was therefore necessary to drive additional piles in order to bring the centers of gravity of column footings back to the original position for which designed.

A test load of 27.26 tons was applied to a pile under pier No. 40. This pile which was 51′ long was driven 50′-6″ and the number of blows per foot for the last 3′ were 10, 13 and 38 respectively. The results of this test were as follows:

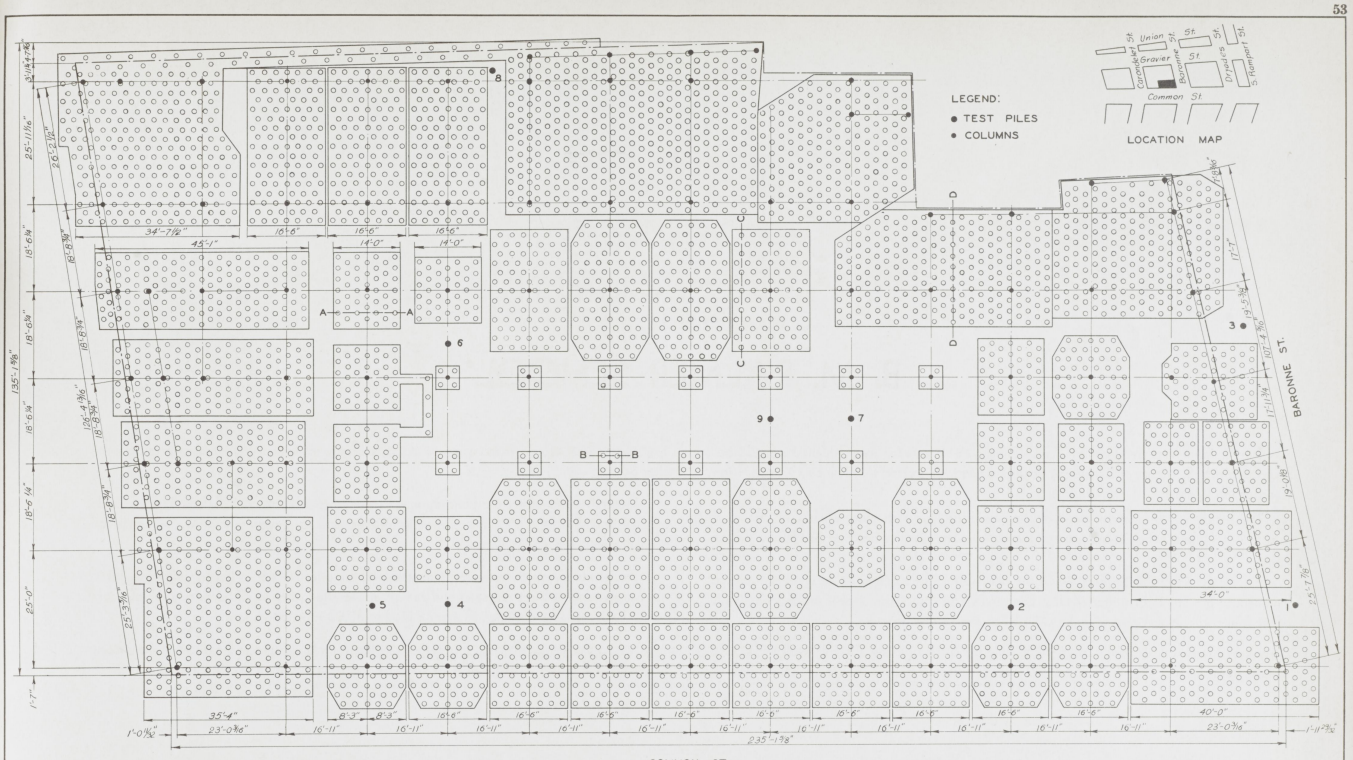
Time under load	43 hrs. 20 min.
Total settlement	.013′ or 5/32″.
Time under settlement	92 hours.
Total settlement	.016′ or 3/16″.

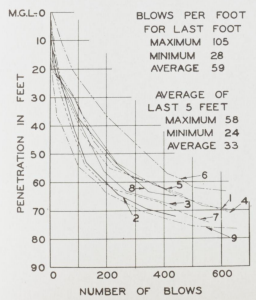
After 92 hours this load was increased to 31.66 tons, and after the additional loading for 48 hours or for 140 hours under load, the pile showed a total settlement of .019′ or 7/32″. Each pile was designed to carry a total load of 25,000 lbs. No information regarding the amount of dead, live and wind loads was available.

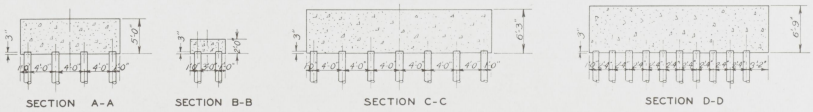
It is interesting to observe that the footings were designed to be 1¼″ higher than the final elevation in order that loading would bring them into exact position thus eliminating settling. The final footing elevation was within ⅛″ of that called for.

Inspection of the building shows no evidence of material or serious settlement but there is some minor cracking or checking along walls adjoining the building.











CANAL BANK BUILDING

CASE NO. 2

Case No. 3.

B. M. PALMER SCHOOL

This building was designed by E. A. Christy, Architect, for the Orleans Parish School Board, with A. S. Montz as Consulting Engineer, and was erected in 1930 by O. M. Gwinn Construction Company.

The building is of modern fireproof steel frame design, with outside walls of brick and stucco. It is 3 stories in height and faces 273' on Clouet Street with a depth of 133' along Villere Street.

An inspection of the building shows the rear wall of the cafeteria to be cracked from the pavement to the first floor window sills. Long transverse cracks also appear in the inner walls of the four corner classrooms, near the ceilings, on the second floor.

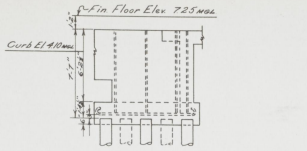
No soil load tests or core borings were made but 6 test piles were driven with a 5000 lb. Vulcan steam hammer No. 1, having a 42" stroke. These test piles showed a penetration of 1⅛" on the final blow. There was no loading test made to determine the behavior of the piles after driving.

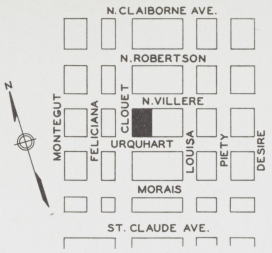
The entire area under the building was excavated to a depth of 6' below the curb level or elevation -2.0 M. G. L., and refilled with river sand to elevation 7.25 M. G. L., the soil encountered being mostly blue muck.

The building rests on untreated pine piles. These piles are 45' in length with minimum 6" tip diameter and 12" butt diameter and cut off at Elevation -1.5 M. G. L. or 5.6' below curb level. Each pile was designed to carry a load of 30,000 lbs. or 15 tons.

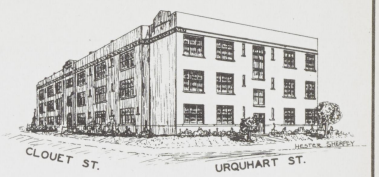
The accompanying drawing shows the complete foundation plan and a detail of the footing supporting the stack. It also shows the location and front elevation of the school building.

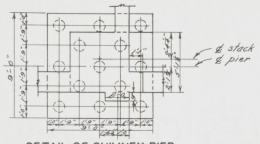
N. VILLERE ST.



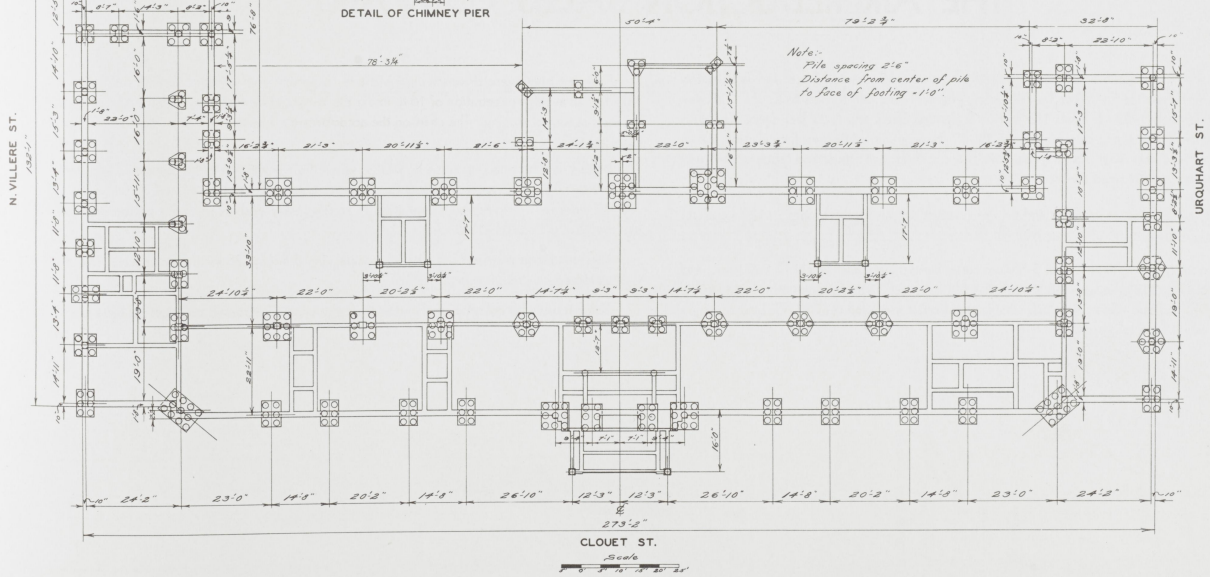


LOCATION MAP





DETAIL OF CHIMNEY PIER



Scale

PILING AND FOUNDATION PLAN

B.M. PALMER PUBLIC SCHOOL

CASE NO. 3

Case No. 4.

THE AIR REDUCTION SALES COMPANY

The Air Reduction Sales Company building, located on S. Rendon Street and Washington Avenue was designed by James W. Billingsley, engineer, and constructed by C. A. D. Bayley Co., contractor in 1923. It fronts 153 feet on S. Rendon Street and is 80 feet deep. The main part of the building is one story high, rising 19'-0" above grade, while the office portion is two stories high and rises 30 ft. above grade. Walls are of brick 1'-1" thick, and footings, piers and floor slab are of reinforced concrete.

This building has no basement and the only excavation was for the footings which go about 2'-3" below grade or to elevation 1.02 M. G. L.

Piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs., and a stroke of 42". 163 piles were 40 ft. long, 6-45 ft. long and 57-50 ft. long with an average tip diameter 7" and butt diameter of 12". Piles are cut off at elevation 0.77 M. G. L. and carry a load of about 12½ tons each.

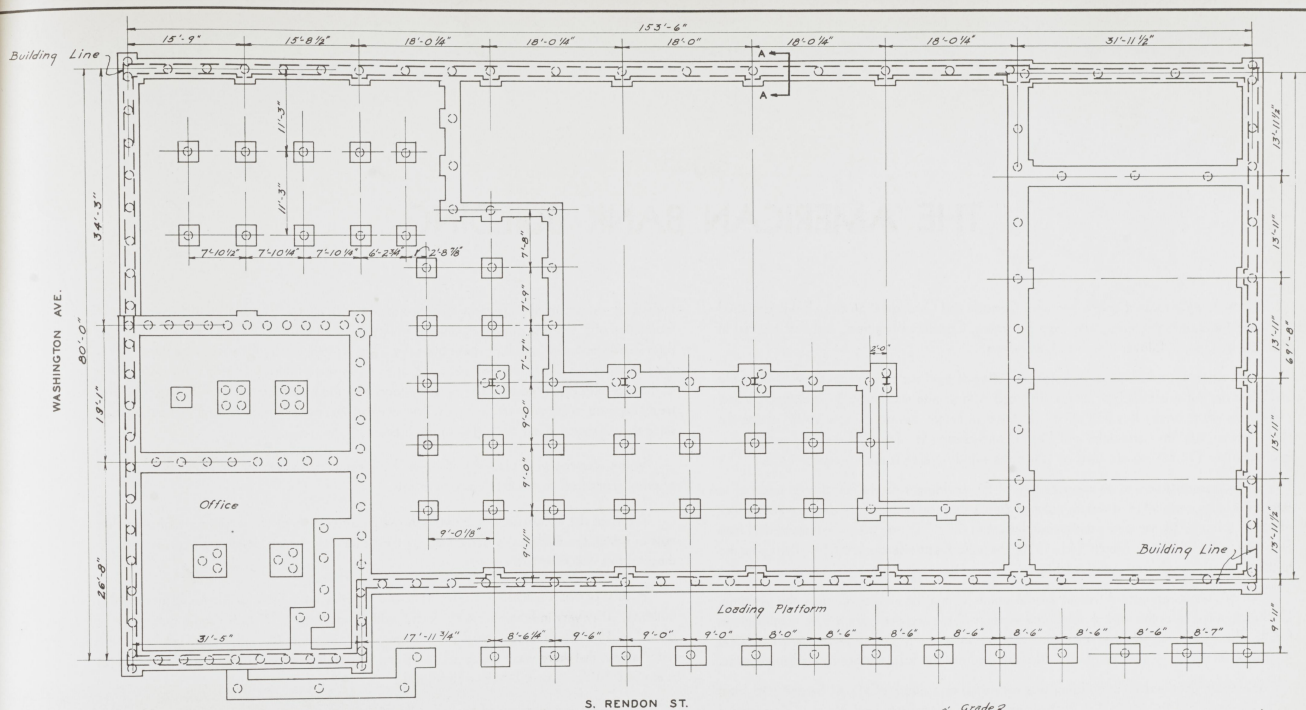
Four test piles were driven with the above equipment and a record kept of the driving. They had an average penetration of 16 ft. under the weight of hammer and averaged 21½ blows for the last foot of driving. The chart on the accompanying drawing shows the driving curve of each test pile.

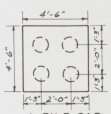
Driving was stopped on test pile No. 2 when the tip was 40 ft. below grade and was penetrating 6" per blow. The 10,000 lb. pile driving hammer was then placed on butt of pile and left there for 16 hours and 47 minutes. A reading taken at the end of this period showed that the pile had settled .018 inches.

The foundation plan and details on accompanying drawing shows the spacing and size of the reinforced concrete footings.

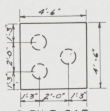
There is no apparent settlement in this structure but no instrumental observations have been made.



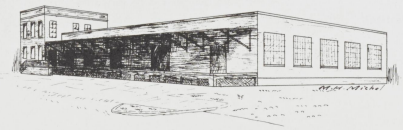




4 PILE CAP



3 PILE CAP

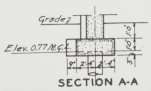


AIR REDUCTION SALES CO.

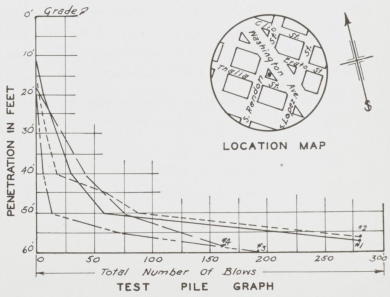
CASE NO. 4.



1 PILE CAP



SECTION A-A



TEST PILE GRAPH

LOCATION MAP

Case No. 5.

THE AMERICAN BANK BUILDING

This building is located on the corner of Common and Carondelet Streets. It was designed by Moise Goldstein, Architect, with Jens B. Jensen, Consulting Engineer, and was erected in 1928-29 by Geo. J. Glover Co., Inc., Contractors.

It is a modern fireproof bank and office building of steel skeleton construction, hollow tile and concrete, the street walls of which are faced with granite and limestone, and the rear and party walls are of brick. It is 275' 6" or 22 stories in height, having a tower 35'-5" above the roof. It faces 106' on Carondelet and 106'-5" on Common St. The total exposed wall area is approximately 111,250 square feet, of which the window area is approximately 17%.

During construction and after completion of this building a careful check was made as to settlement. Elevations taken at various columns during a period ranging from January 28th, 1929 to March 14th, 1930, showed a uniform settlement of 0.12'. During the six months period from September 19th, 1929 to March 14th, 1930, the uniform settlement was 0.01". Thereafter, no further data as to settlement was available.

Ten 60' test piles were driven at various points within the area covered by the building. Of these ten test piles the logs of only three were available and these are shown graphically in Fig. 1. These piles and all other piles were driven with a No. 1 Vulcan steam hammer of 5000 lb. striking force, having a stroke of 42". No pile load nor soil load nor boring tests were made.

The entire area under the building was excavated to a depth of 20'-4" below curb level or to elevation -14.93' M. G. L. There is no definite information available as to character of soils encountered during excavation but it is of the usual alluvial silt character. Cypress stumps were encountered at about 10 ft. below street grade. They were found over the area about 20 ft. apart and were about 4 feet in diameter.

The site of this building was formerly occupied by the Liverpool, London and Globe building which was demolished to make room for this new structure. The old building rested on a foundation of 359 round piles averaging 48' in length. The usual engineering methods for pulling piles were employed in pulling these old piles. The resistance to pulling was very little. After the pulling of the old foundation piles, the open holes were filled with sand. An examination of the old piles disclosed that they were in good condition, immediately after pulling, but after being exposed to the weather for a short time an effort was made to redrive them without success, since they snapped under the action of the hammer.

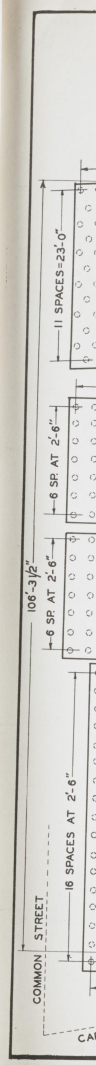
In the accompanying plan, Fig. 2 shows the general arrangement of the foundation; spacing of piles; reinforced concrete pile caps and mats.

Fig. 3 of the accompanying drawing shows a part section of the reinforced concrete pile mats in which the thickness is designated by the Letter "T", which designation corresponds to those of like character in the plan.

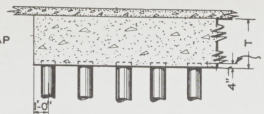
A total of 1653 untreated, peeled yellow pine piles were used for the foundation of this building. They vary in length from 45' to 60' with tip diameter of 7" to 8", and a butt diameter of 13" to 14". The average actual penetration of all piles was 46' and the driving log of the last 3' shows that there were required 14, 18 and 28 blows per foot. The cut-off of all the piles is at -14.6 M. G. L. or 20' below curb level.

The foundation is designed for a maximum load on each pile of not more than 13.5 tons under the main footings and 12.5 tons under the lesser footings.

At the time of this survey there appeared no evidence of undue settlement except that near the corner of the building, on both Carondelet and Common Streets, cracks have developed in the stone and granite which, from appearance, would seem to extend to the foundation.



SECTION A-A
TYPICAL PILE CAP
FIG. 3



LEGEND
● TEST PILES

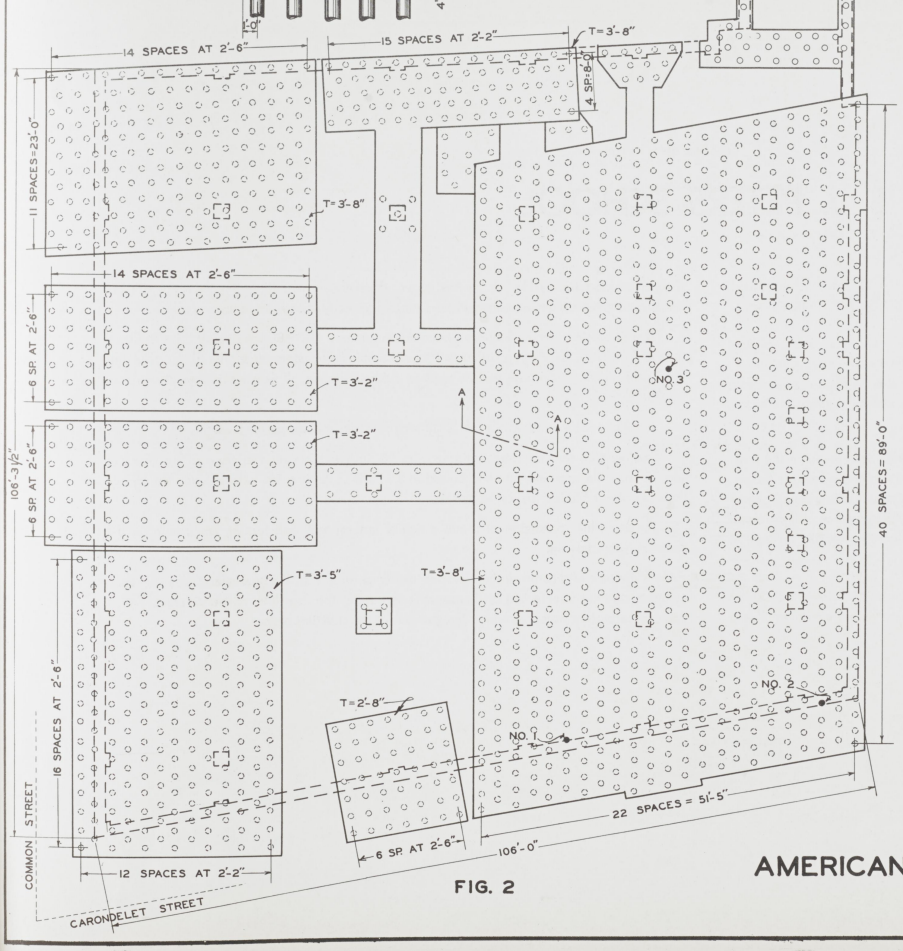
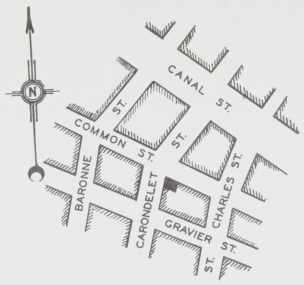


FIG. 2

LOCATION MAP



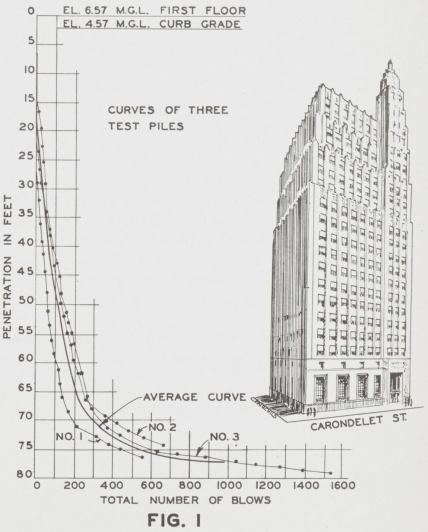


FIG. 1

AMERICAN BANK BUILDING

CASE NO. 5

Case No. 6.

S. J. PETERS SCHOOL

This building was designed by E. A. Christy, Architect, for the N. O. Parish School Board, with A. S. Montz, as Consulting Engineer, and was erected in 1927 by J. A. Petty & Sons.

It is a 3 story school building on untreated yellow pine pile foundations and is of steel framework with brick walls and stucco finish, having circular concrete fire protection for it's steel columns. It faces 152′ on S. Broad Street and has a depth of 264′ on Baudin Street and is classified as "slow-burning", with the exception of a reinforced concrete auditorium which is entirely fireproof.

An inspection of the building showed cracks in the third floor ceiling and in the inner walls of the two rear corners. The first floor, which is not an integral part of the structure proper, was found to have sunk from 3 to 4 inches between all column footings, resulting in a "rolling" floor. This floor was pulling away from all column and wall bases. An inspection of the grounds showed the sinking of all sidewalks and cracking of steps away from the building, as well as cracks in the base of the building.

No soil tests or core borings were made but four 50′ test piles were driven with a 5000 lb., No. 1 Vulcan steam hammer having a 42″ stroke. These piles were followed down 5′ and showed a penetration of 1¼″ on the final blow. An average curve illustrating the action of these test piles is given on the accompanying drawing. No load tests were made.

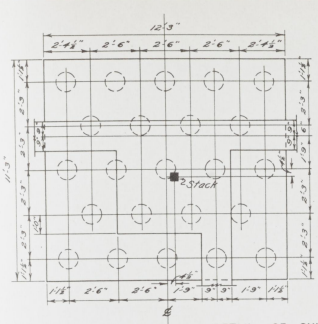
The excavations for the footings were made to a depth of 6.68′ below curb level to Elevation -5.77 M. G. L. and backfilled with river sand to Elevation +2.23 M. G. L. The first floor is of tongue and groove yellow pine on cinder concrete; fill having a finished Elevation of +2.73 M. G. L.

The soil encountered was a black rubbery mass entirely useless for backfill.

The building rests on untreated pine piles 50′ in length having a minimum 6″ tip diameter and 12″ butt diameter and cut off at Elevation 5.27 M. G. L. or 6.18′ below curb. The design load per pile is 25,000 lbs. or 12½ tons.

The complete foundation plan and a typical column and wall footing are shown on the accompanying drawing.

At the time of this survey there was no evidence of lack of structural safety but a very pronounced continued settlement of the unstable soil under the first floor of the structure, which floor, as heretofore noted, is not an integral part of the structure proper.


12'3"
2'4½"
2'6"
2'6"
2'6"
2'4½"
11'3"
2'3"
2'3"
2'3"
2'3"
2'3"
1'6"
1'6"
1'2"
2'3"
2'3"
2'3"
2'3"
1'2"
2'3"
2'3"
2'3"
1'6"
1'6

Case No. 7.

NEW ORLEANS HOTEL

The New Orleans Hotel located on Canal and Loyola Streets was designed by Emile Weil Inc., architects, in collaboration with A. M. Scott, Consulting Engineer. The building which was erected in the years 1927-28 by R. P. Farnsworth Inc., has a frontage of 57'-0" on Canal Street and 127'-0" on Loyola Street and has a total height from curb to roof of 135'-0". The building which is 16 stories high has about 30% window surface area. The exterior walls are brick, while the interior walls are of hollow tile. The floors and frame are of reinforced concrete.

The entire building site was excavated to an average depth of -16.73 M. G. L. The soil excavated was yellow clay and gumbo, and at a depth of -8.23 M. G. L. cypress stumps were encountered. Under the elevator pit at a depth of 10.63 M. G. L. a stratum of sand was found.

916 untreated yellow pine piles 55' long with 6" minimum tip and 12" minimum butt with an average effective length of 50 ft. were driven in this foundation. The piles were cut off at -16.40 M. G. L.

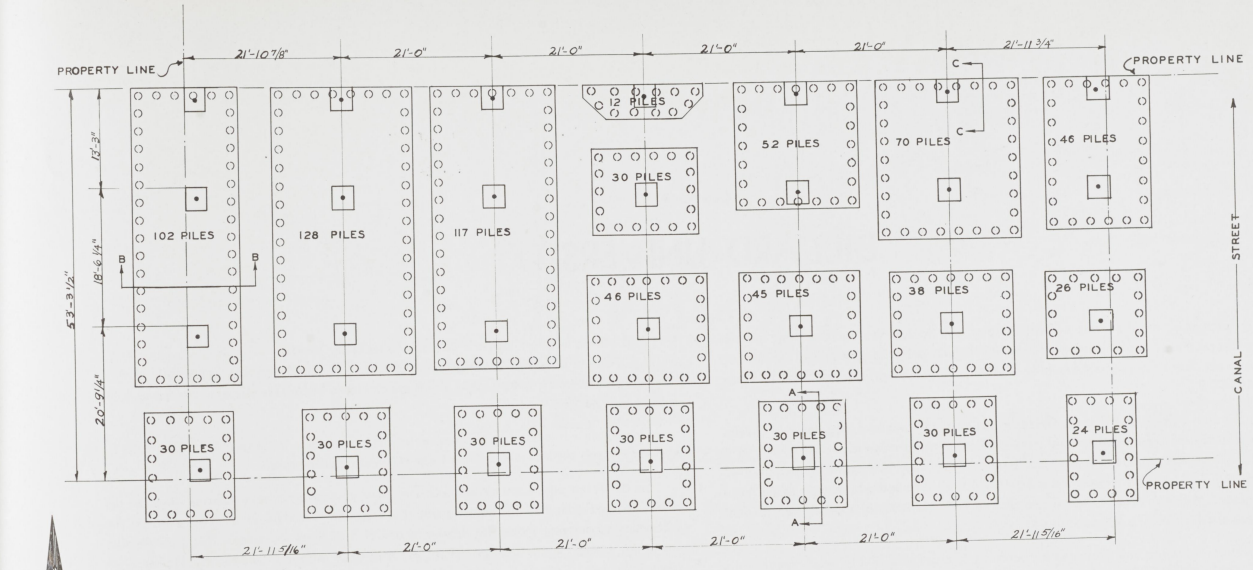
The piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42".

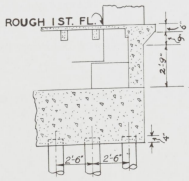
Footings or pile caps are of reinforced concrete with the piles spaced 2'-6" on center. The piles, which were driven quite accurately were designed to carry a maximum load of 12½ tons.

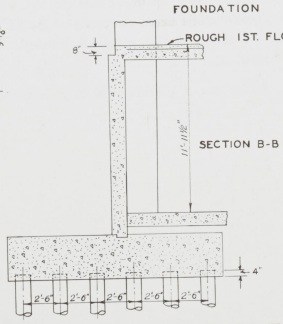
No information regarding the live load and dead load was available but a wind load of 25 lbs. per square foot was allowed.

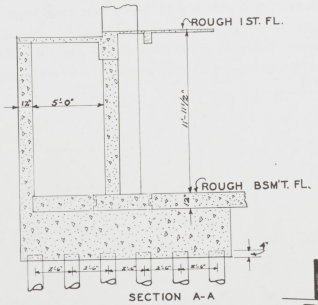
An inspection of the basement and such foundations as were open to inspection revealed no evidence of settlement.

The basement floor and the entire surface of the building are in perfect condition.

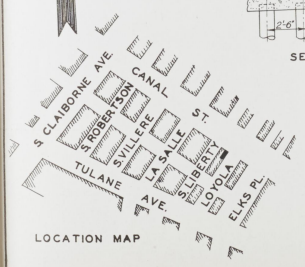












LOCATION MAP

NEW ORLEANS HOTEL

CASE NO. 7

Case No. 8.

DILLARD UNIVERSITY

This building is one of a group of five buildings, and houses the class rooms and administration office of the Dillard University for negroes. It, was designed by Moise H. Goldstein, Architect, with Jens B. Jensen as Consulting Engineer, and was constructed by Geo. J. Glover Co. in 1934-35.

It is 2 stories high, with a basement under a portion of building and is constructed of reinforced concrete with brick exterior walls. Height from grade to ridge of roof is 46'-4". It is set back 270' from the property line and faces Gentilly Road. The building is T shaped; 168'-4" long x 52'-11" wide and the wing at rear is 56'-0" x 43'-4". The entire building is carried on a pile foundation with reinforced concrete pile caps. It has a wall area of approximately 17,927 square feet of which 20% is window area.

A portion of the site was excavated for basement to a depth of 6'-11" below grade or to elevation -2.17 M. G. L. River sand was found the full depth of excavation. About 285 L. L. Y. P. piles, with bark removed and creosoted 12 lb. per cu. ft., were driven under this building. These piles were 45 ft. long with 7" to 8" tips and 13" to 14" butts, and were driven with a No. 1 Vulcan steam hammer with a weight of 5000 lbs. and a stroke of 42". No sustaining stratum was encountered so the piles were driven to within 2' of cut-off, giving the pile an effective length of 43'. The average blows for the last 3 ft. of driving were as follows: 3rd ft. 5 blows; 2nd ft. 6 blows; last ft. 6 blows. Cut-off of piles under basement footings is elevation -2.17 M. G. L. Cut-off of other piles is elevation 1.99 M. G. L. and elevation 4.24 M. G. L. It will be readily seen that the piles depend almost entirely upon friction for support. The design load is 12½ tons per pile.

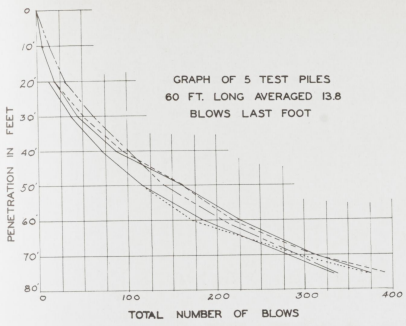
This building is located on the sandbar which is referred to in Chapter 1. About 1000 ft. back or towards the lake, the soil is all silt, clay and humus material.

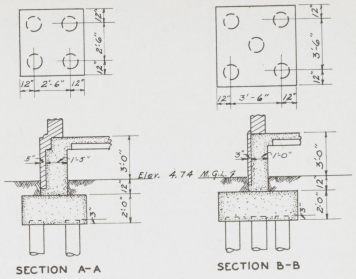
Six 60 ft. test piles were driven with the above equipment, driving stopped when the tip of pile reached a depth of 75' below grade or at elevation -70.26 M. G. L. The graph on the accompanying drawing shows the driving record of 5 of these test piles. This drawing also shows the arrangement of the foundation, the spacing of piles and construction details of the pile caps.

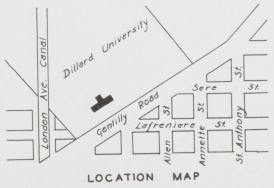
Pile caps are of reinforced concrete, 2 ft. thick. Exterior loads are carried by the brick walls on concrete grade beams except where the 12" steel columns are shown in rear of building. Interior loads are carried on concrete columns. The accompanying drawings form a part of this survey.

At the time of this survey the construction of the building was not quite complete.











DILLARD UNIVERSITY

CASE NO. 8

Case No. 9.

OFFICE BUILDING OF THE BOARD OF COMMISSIONERS OF THE PORT OF NEW ORLEANS

This building was designed in 1928 by the engineering staff of The Board. with Samuel Young as Chief Engineer, and with Diboll & Owen as Consulting Architects. The building was erected in the same year by John Riess, Contractor.

As shown on accompanying plan, the building is a shop building with the front portion used temporarily for office purposes. The present building is two stories high. The large footing, designated "Footing F" is the rear portion of what is proposed to be a fifteen story office tower, which would be approximately square in shape, the balance to be built out in front of "Footing F" The four small footings now in front of "Footing F" would be discarded with the building of the tower. "Footing F", as constructed, is designed to carry the fifteen story tower, with the addition of proper steel columns.

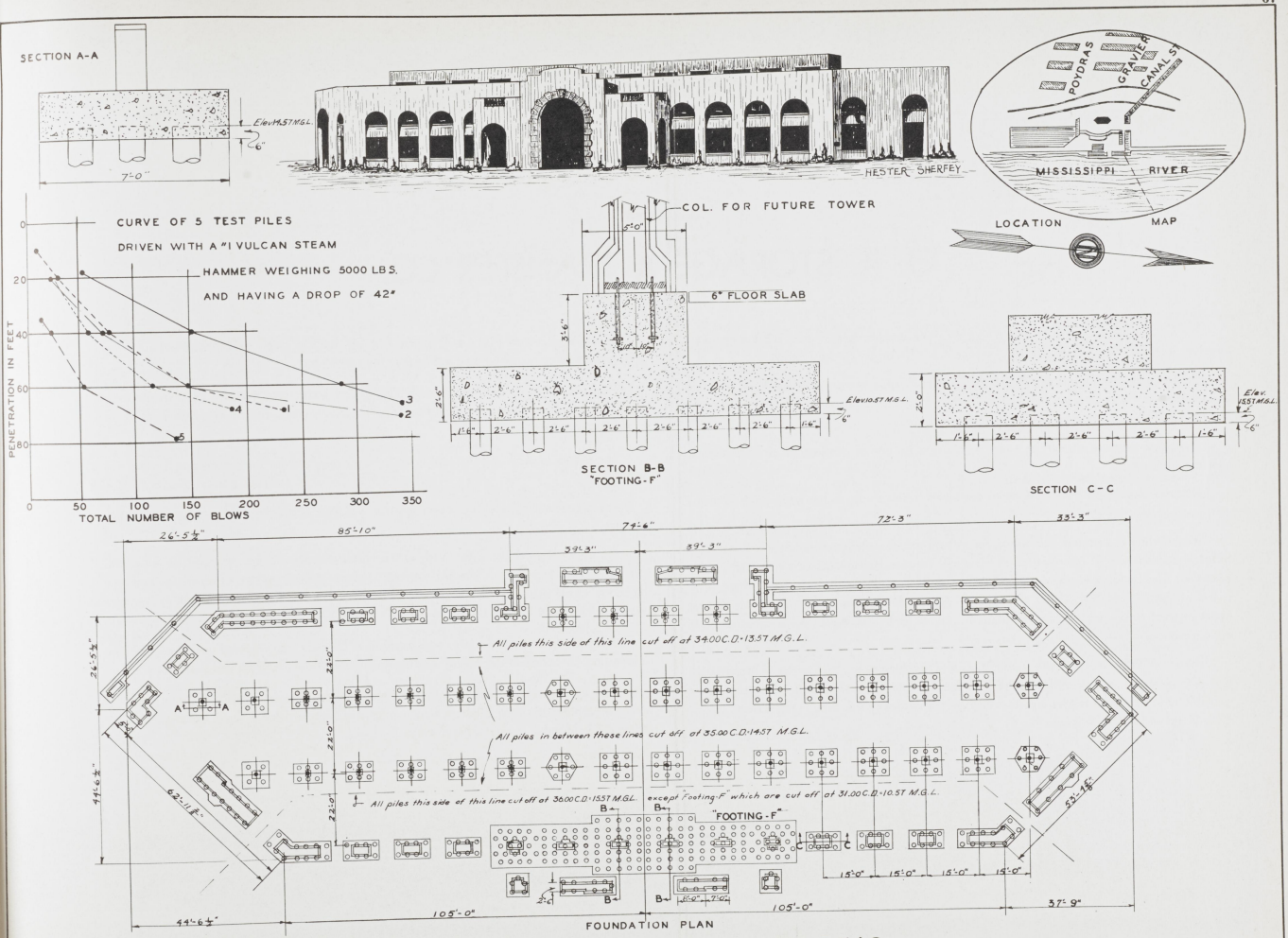
The building as now standing is supported on pile foundations with reinforced concrete caps. Steel columns and beams are used except in the outside walls, which are hollow reinforced concrete. All piles are southern yellow pine treated with 12 pounds of creosote oil per cubic foot. There are 161 piles 75 feet long and 599 piles 60 feet long. Piles 75 feet long have 6-inch minimum tips and piles 65 feet long have 7-inch minimum tips. Butts are 14″ to 20″

Eight test piles were driven to full length ranging from 68 feet to 80 feet. See driving chart on accompanying drawing.

All foundation piles were driven approximately full length and were cut off for concrete caps as indicated on accompanying drawing. A No. 1 Vulcan steam hammer weighing 5000 lbs. with a stroke of 42″ was used in driving.

There is no basement, the ground floor being a reinforced concrete slab laid directly on the ground. The loads used in designing were L. L. on roof, 20 lbs. per sq. ft. L. L. on second floor, 250 lbs. per sq. ft. Total live and dead loads per foundation pile, 10 tons.





DOCK BOARD OFFICE BUILDING

CASE NO. 9

Case No. 10.

O. K. STORAGE & TRANSFER CO.

The O. K. Storage and Transfer Co. building was erected in two units and the complete structure fronts 98′-4¼″ on St. Charles Avenue and 110′ on St. Andrew Street.

The first unit which fronts 49′-7¼″ on St. Charles Avenue was designed by Weiss, Dreyfous and Seiferth of New Orleans and was erected in 1925 by Jefferson Construction Co., with W. Horace Williams Company as pile driving contractors.

The entire structure appears as a unit with almost no line of demarcation or separation in exterior appearance.

The two foundation plans have been combined in this study, as has been done with the perspective elevation.

The building is a modern reinforced concrete fireproof warehouse building with all walls of brick, backed with 8″ hollow tile. All footings, columns, beams and floors are of reinforced concrete. The building is six stories high and rises 71 feet above the sidewalk. There is no basement and the only excavation was for wall and column footings which are at an average depth of 6′-6″ below curb grade to elevation 0.22 M. G. L. No stumps were encountered in this excavation.

There are 266 untreated yellow pine piles fifty feet long in the foundation of the first unit, and 302 untreated yellow pine piles seventy feet long in the second unit. No records are available as to size but it is presumed that they are the customary size used in this section, that is, 6″ to 8″ tip and 12″ to 14″ butt.

No driving record is available in the first unit but the graph on accompanying drawing shows the driving record of four test piles in the second unit.

Piles under the first unit were cut off 5′-6″ below grade, or at 1.22 M. G. L., while those under the second unit were cut off at from 6′ to 10′ below grade, or from elevation 0.72 M. G. L. to -3.28 M. G. L.

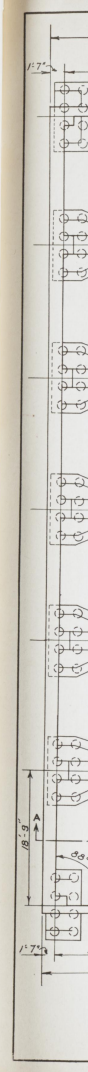
The design load for the first unit is 15 tons per pile, and for the second unit 12 tons per pile.

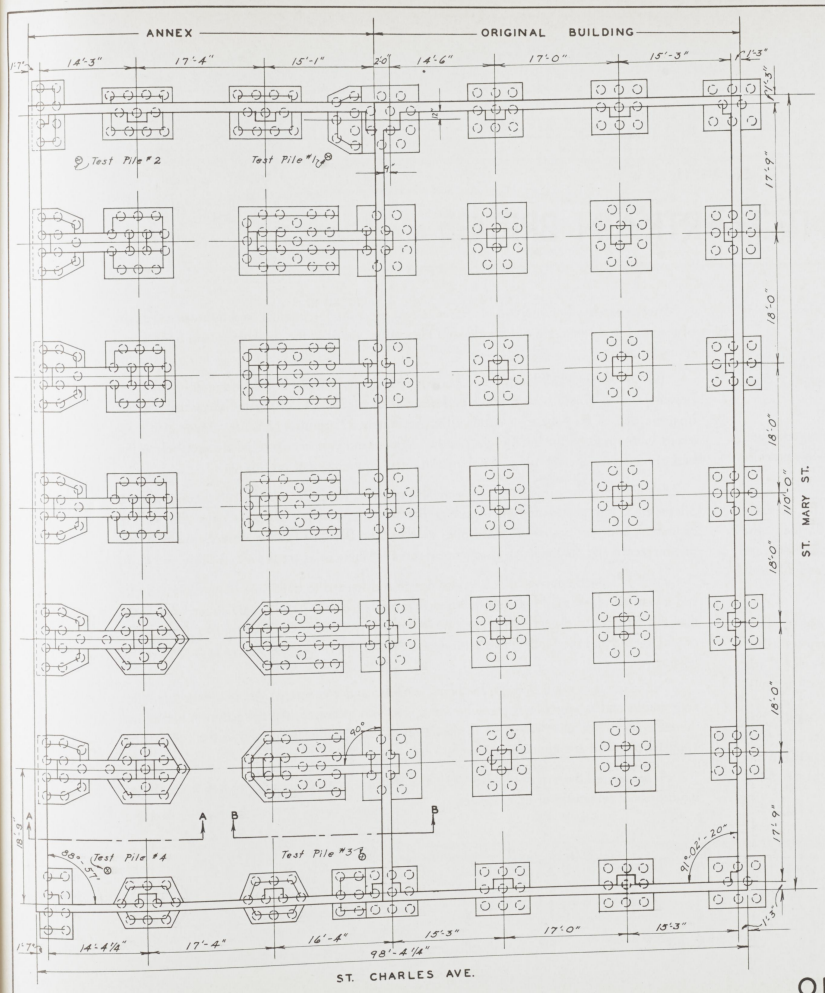
The accompanying drawing shows the size and type of footings and number and spacing of piles.

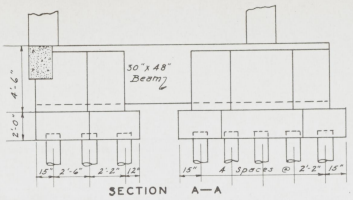
An examination of the outer walls of the building shows no sign of cracks or settlement. Even where the face brick of the two units join in front there is no sign of separation and only by careful examination can one detect the junction. There is a decided settlement in the sidewalk paving where it meets the building.

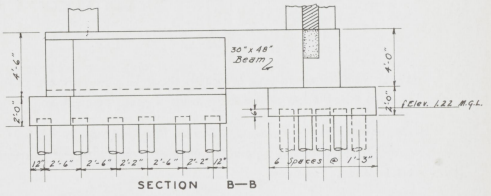
A letter addressed to Moores and Dunsford at Chicago was returned unclaimed, and the information contained in this report was obtained from Weiss, Dreyfous and Seiferth.

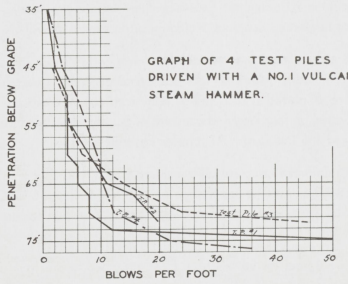
Here are two buildings merged into one and used as one but erected at different times, by different contractors, with different length piles and different design loads, and neither unit nor the whole show any sign of settlement.

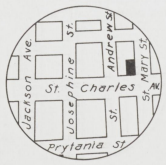




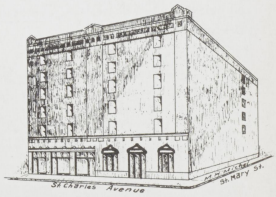








LOCATION MAP



OK STORAGE & TRANSFER CO.

CASE NO. 10

Case No. 11.

LAKE PONTCHARTRAIN BRIDGE

The Lake Pontchartrain Bridge is located about 18 miles northeast of New Orleans having its start at Point Aux Herbes on the south shore of Lake Pontchartrain.

It was erected by the Raymond Concrete Pile Company in 1926-27. Ford, Bacon and Davis were the designing and supervising engineers and Elliot and Harmon Engineering Company were consulting engineers.

The length of the bridge is 24,922 feet with the pile bents 35 feet from center to center throughout the entire length. Expansion slip joints are provided at every 5th bent. This structure is built of reinforced concrete, including piles, except as will be noted below.

The width of the roadway is 33 feet having a 1½" rock asphalt surface over a 10" concrete slab, which slab is carried by four reinforced concrete girders having a span of 35 feet. The girders are supported at each end by reinforced concrete caps, 2' x 3'-6" x 28', and these caps are supported on four Raymond concrete piles. The dead load per pile is 25 tons and the combined dead and live load is 37 tons for concrete piles.

The reinforced concrete piles measure 2' x 2' and 2' x 2'-6" having an average length of 73.7 feet and an average penetration of 60.5 feet below M. G. L. or 50.5 feet below the bed of the lake. All piles were driven with a No. 1 Vulcan steam hammer having a stroke of 42" and a striking force of 5000 lbs. and required an average of 39 blows for the last foot of driving.

Two passages for vessels have been provided in the form of two steel draw spans, one about 2500 feet from Point Aux Herbes and one about 6000 feet from North Shore. The piers of these spans are supported on untreated green straight line timber piles 60' long with the cut-off below the bed of the lake. The dead load on these piles is 12 tons each and the dead and live load 18 tons each.

Accompanying Drawing No. 1 shows in part view the longitudinal and transverse sections of the reinforced concrete pile trestle, and elevational views of the south draw and north draw of the bridge.

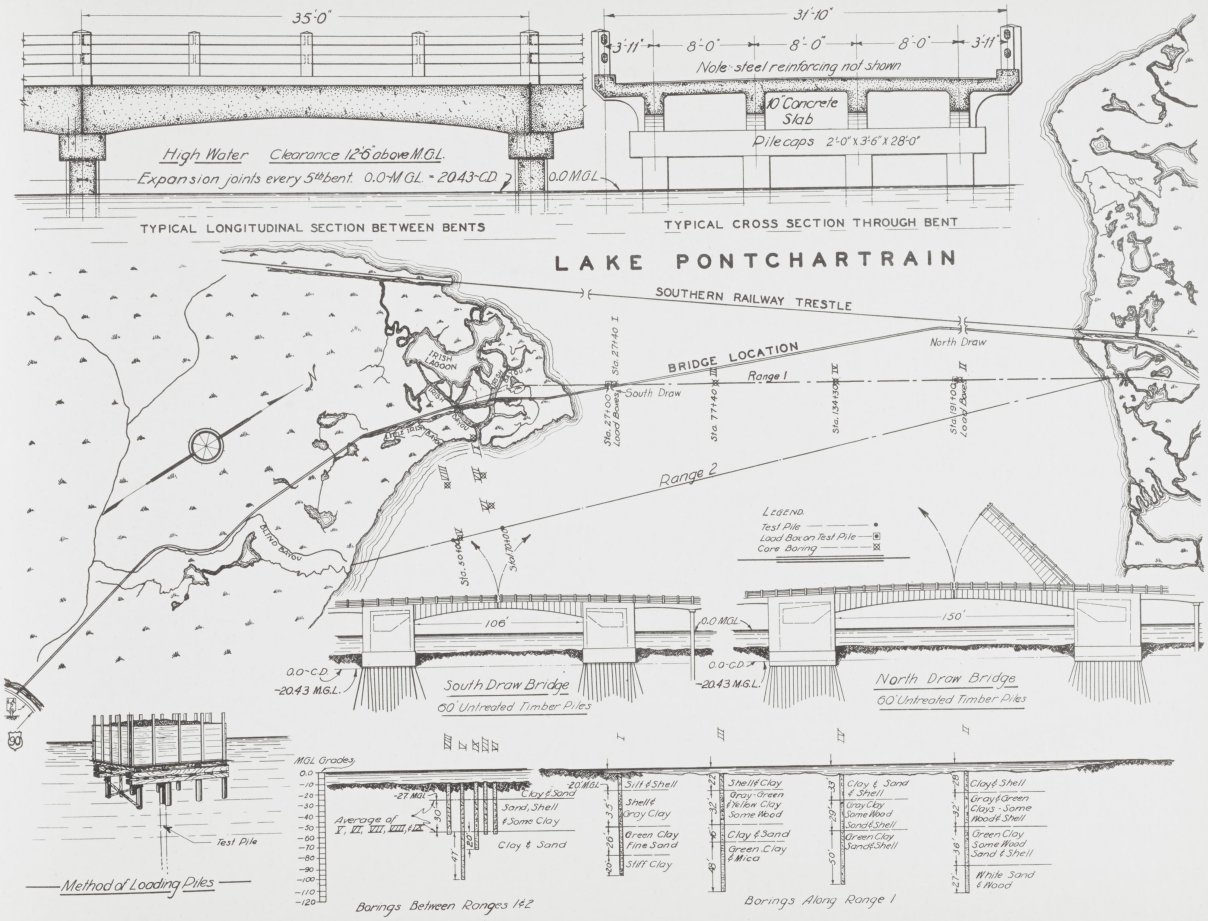
The stratagraphs and locations of borings made along the site of the bridge are shown on Drawing No. 1. These borings were performed with a jet in a 4" casing and show that the soil from the bed of the lake to a depth of approximately 87' consists of mostly grey marine clay, mixed with sand and shell at various depths. White sand was encountered 87 feet below the bed of the lake. These borings are shown in detail in the chapter on borings.

To determine the safe carrying capacity of the piles, 4 wooden and 4, 18" square concrete piles were driven and loaded and a close record kept over a period of several days. The method of loading and the location of these piles is shown on Drawing No. 1. Graphs showing the driving record and the loading and settlement curves of these piles are shown on Drawing No. 2.

A 60 ft. lagged concrete pile was also driven and loaded to determine its carrying capacity and it was found that the load required to make this pile fail was 70 tons, only about 4 tons more than the 60 ft. concrete pile which had no lagging. Two graphs on Drawing No. 2 show the driving record and the loading and settlement curves of this pile. Also shown is the method of lagging.

Deflection tests were made by loading 2 wooden and 2 concrete piles of different lengths. Four graphs on Drawing No. 2 show how the load was increased, the deflection in inches and the recovery of the piles when the load was removed. Another graph shows the comparative elasticity of wood and concrete piles.

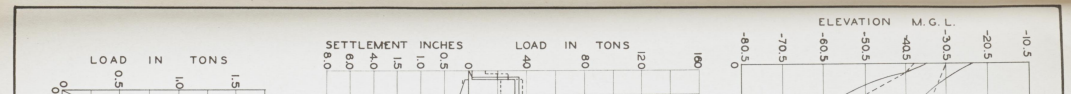
At the time of this survey in June 1935, the bridge is in excellent condition with no surface indications of settlement or other defects.



LAKE PONTCHARTRAIN BRIDGE

CASE NO. 11

DRAWING NO. 1


LOAD IN TONS
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0.5
1.0
1.5
SETTLEMENT INCHES
8.0
6.0
4.0
1.5
1.0
0.5
0
LOAD IN TONS
40
80
120
160
ELEVATION M. G. L.
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-70.5
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-40.5
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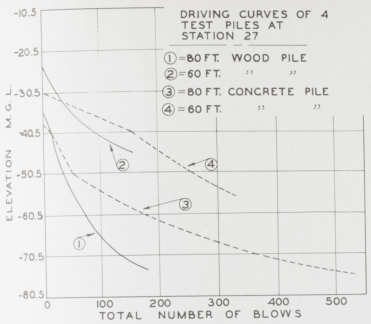
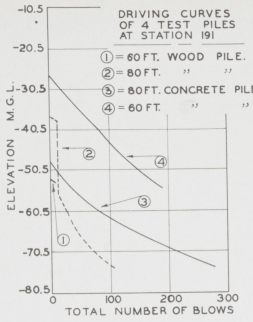
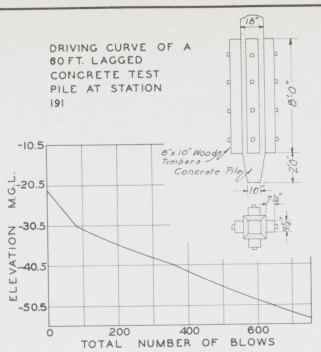
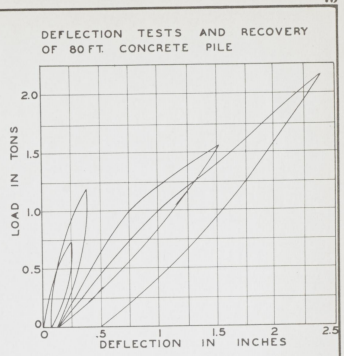
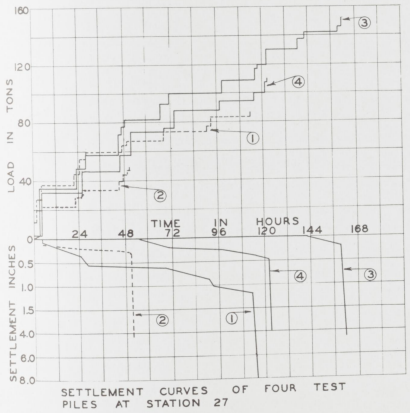
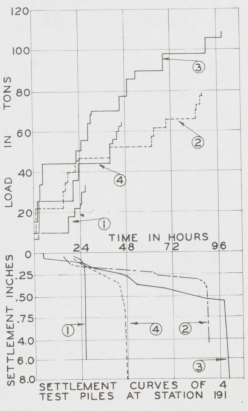


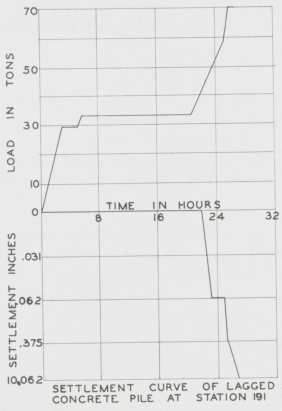


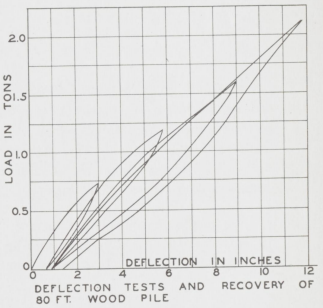


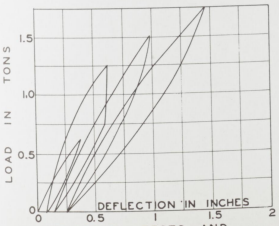


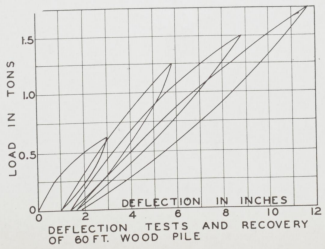


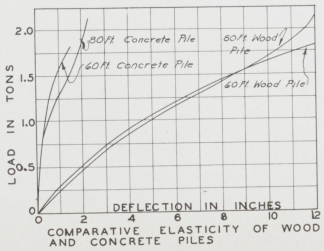


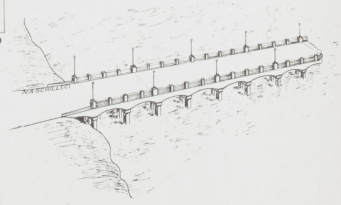












LAKE PONTCHARTRAIN BRIDGE

CASE NO. 11 DRAWING 2

Case No. 12.

DOMINICAN COLLEGE

Founders Hall of Dominican College was designed by A. S. Montz, engineer and architect, and was erected by A. Fromherz, contractor, in 1928. The building is located on Broadway, near the corner of St. Charles Avenue. It is a reinforced concrete frame with outer walls of rock face stone, backed with brick. Floors are reinforced concrete and the building is fireproof and modern in construction. The outside dimensions of the building are 40′ x 160′ and it is 4 stories high or 60′ from grade to parapet.

The foundation is built on untreated yellow pine piles 60′ long with 6″ minimum tips and 12″ minimum butts. They were driven full length with a No. 1 Vulcan steam hammer, and were cut off at minus one M. G. L. which is about 7′-6″ below curb.

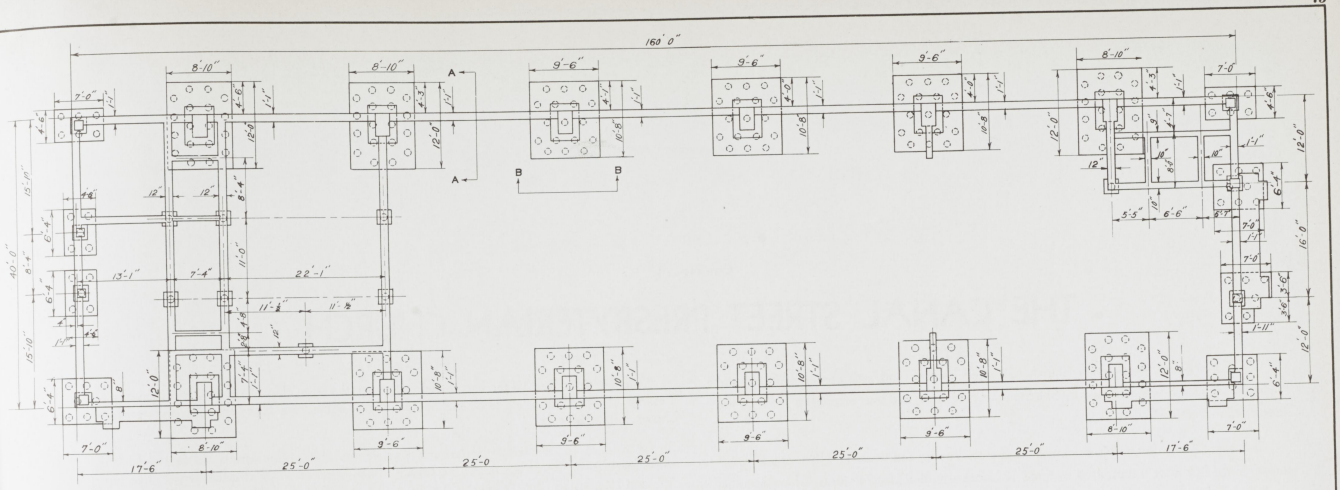
Three test piles 60′ long were driven and a graph of the driving record is shown on drawing. One pile was loaded for a test, and a detail of loading and the result is shown on drawing There was practically no settlement, after seven days, with a final load of 30 tons.

The average number of blows per last four feet of driving for all foundation piles was 24. This varied, by footings, from 16 to 33 but most of them were very close to the average.

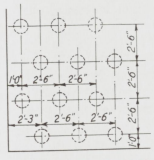
The live load is figured at 40 lbs. per sq. ft. for rooms and 70 lbs. for corridors and 30 lbs. for roof. One fourth of this is assumed as carried to footings. The dead load per pile is estimated to be 13½ tons.

The building is in perfect condition and shows no signs of cracking or settlement.

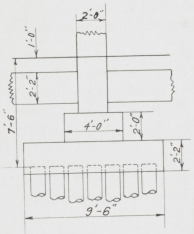




FOUNDATION PLAN



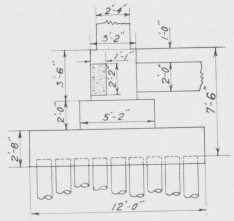
TYPICAL PILE SPACING



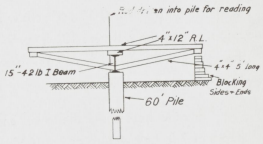
SECTION B - B



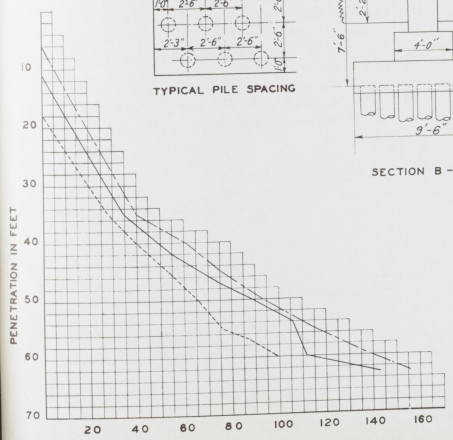
LOCATION MAP



SECTION A - A



TEST LOAD RIG





BROADWAY

DOMINICAN COLLEGE

CASE NO. 12

TEST LOAD SCHEDULE

DATE	TIME	LOAD	Pile	SIDE WALK	NAIL IN TREE	DIFFERENCE
Sept. 10	9 AM		1.540	4.750	3.485	
Sept. 10	5.30PM		1.537	4.753	3.483	No Settlement
Sept. 11	2.45PM	20T.	1.550	4.750	3.485	
Sept. 11	5.00PM	20T.	1.542	4.750	3.484	
Sept. 12	7.00AM	20T.	1.542	4.752	3.482	Settled .003
Sept. 12	8.45AM	30T.	1.555	4.750	3.483	
Sept. 13	8.00AM	30T.	1.560	4.752	3.484	
Sept. 14	8.30AM	30T.	1.555	4.750	3.484	
Sept. 15	8.00AM	30T.	1.560	4.750	3.485	
Sept. 16	10.00AM	30T.	1.560	4.752	3.484	
Sept. 17	8.30AM	30T.	1.560	4.752	3.483	Settled .015

Case No. 13.

THE CANAL STREET PRESBYTERIAN CHURCH

The Canal Street Presbyterian Church is located on the Southwest corner of Canal and Hennessy Streets. It was designed by Sam Stone Jr., architect, and was erected in 1927 by the Reimann Construction Co.

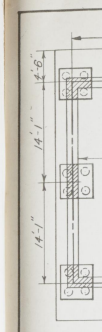
It is a modern building with brick walls and stone coping and trimming. The School Auditorium on the first floor is supported by three 18″ I beams with 2″ by 14″ joists. The gymnasium on the second floor is supported by three 20″ I-beams with timber joists 2″ x 14″, 16″ centers. All other floors are carried on joists 2″ x 12″, 18″ c.c. and 2″ x 14″, 16″ c.c. with the roof and rafters over the two story part supported on scissors trusses which exert no outward push on the walls. Sub-floors are of 1″ x 6″ yellow pine and finished floors 7/8″ x 2 1/2″ T. & G. The outside dimensions of the walls are 131 ft. by 94 ft. The ridge of the roof is 43 ft. above curb level and the tower is 51′-10 1/2″ high. The percentage of window area varies for the different walls but averages about 20%.

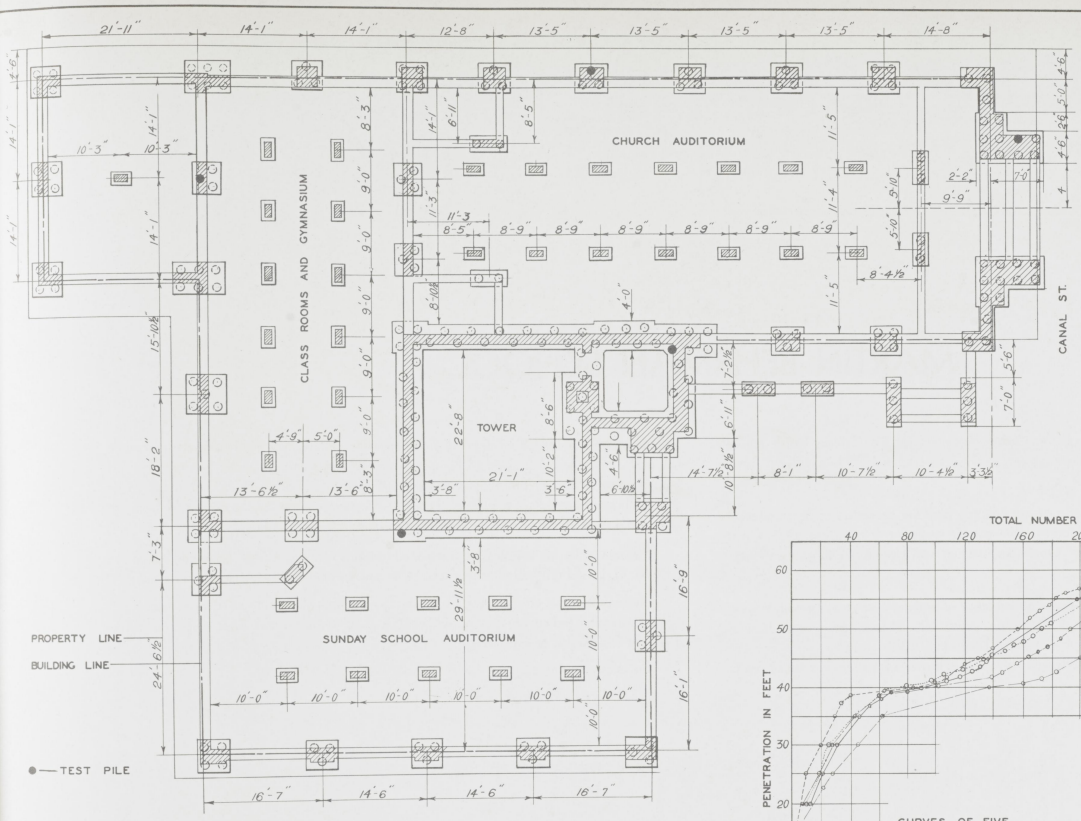
Only the areas under the tower and along the walls were excavated. Excavation was to depth of 7 ft. below curb or —5.9 M. G. L., and extended at least 6″ beyond facing of caps. There is no record of the character of the soils encountered.

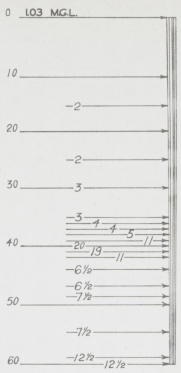
The first floor loads of the church auditorium and the large class rooms are carried on spread footings. These footings are brick and measure 2′ x 3′ at the base. They are spaced uniformly as shown in the drawing.

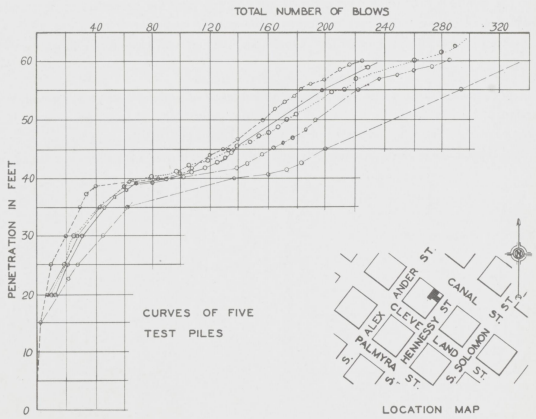
A total of 235 full length peeled untreated yellow pine piles minimum 12″ butt and 5″ tip were used, 82 of which are under the tower. Two piles are 31′ in effective length, five piles 32′, and 22 piles 33′, cut-off being 7′ below curb or —5.9 M. G. L. Piles in general are spaced 2′-6″ in center, with 3′-3″ spacing in the two pile footings. The average total load per pile is 12 tons. Concrete caps, a total of 40, are on piles. Basement slab under tower is 12″ concrete, and subgrade tower walls are 17″ thick and are brick.

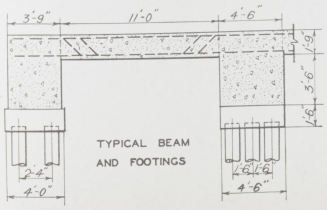
Five test piles were driven at various points within the area covered by the building, four of which were later used in the foundations. The graph on the drawing shows the curves of the log of these piles giving the total number of blows per foot of penetration to 63 feet below curb or —62.9 M. G. L. All test piles were 60′ long and were driven with a No. 1 Vulcan steam hammer with 5000 lbs. striking force and a stroke of 42″. The penetration from the last five blows was from 4″ to 6″. It can be noted from the chart on the drawing, showing the average resistance per foot penetration, that two resisting strata were reached, one at about 38′ to 40′ below curb or —36.93 M. G. L. to —38.93 M. G. L. and the other at 60′ or —58.93 M. G. L. All foundation piles stop at first stratum. No pile load nor soil load nor boring tests were made.













CANAL STREET PRESBYTERIAN CHURCH

CASE NO. 13

Case No. 14.

MARTIN BEHRMAN SCHOOL

This building was designed by E. A. Christy, Architect for the Orleans Parish School Board with A. S. Montz as Consulting Engineer, and was erected in 1929 by Caldwell Bros., Contractors.

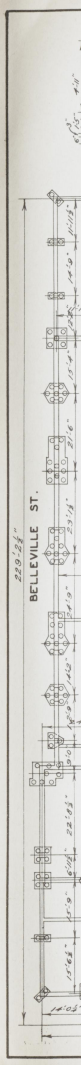
The building is of reinforced concrete construction with the exception of structural steel framework of central tower and auditorium. The outside walls are of brick and stucco. It is three stories in height and faces 240′ on Opelousas Avenue, with a depth of 230′ along Vallette Street.

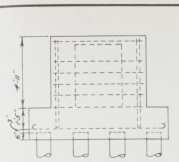
An inspection of the building showed no evidence of settlement or cracking with the exception of hairline cracks in the base of all outside walls. No soil load tests or core borings were made but 5 test piles were driven with a No. 1 Vulcan 5000 lb. steam hammer with a 42″ stroke. These piles showed a penetration of 1″ on the final blow. One of these piles driven to a depth of 56′ was loaded by means of a corrugated iron water tank 10′ in diameter placed on top of it and supported by steel I-beams and a cast iron pile cap. This pile was progressively loaded up to 30 tons in 144 hours showing a settlement of $\frac{3}{16}$″ of which $\frac{1}{16}$″ was found to be due to fibre compression in the top of the pile. An average curve for the driving of the 5 test piles and a log of the load test are shown on the accompanying drawing.

The area under the building was excavated to a depth of about 6′-6″ below curb level, to 0.89 M. G. L. and refilled with river sand. The soil encountered being mostly soft muck.

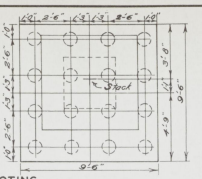
The building rests on untreated pine piles 55′ in length with minimum 6″ tip diameter and 12″ butt diameter and cut-off at Elevation 1.4 M. G. L. or 6′ below curb level. Each pile carries a load of 25,000 lbs. or 12½ tons.

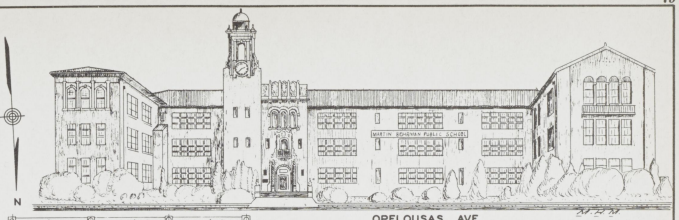
The accompanying drawing shows the complete foundation plan.



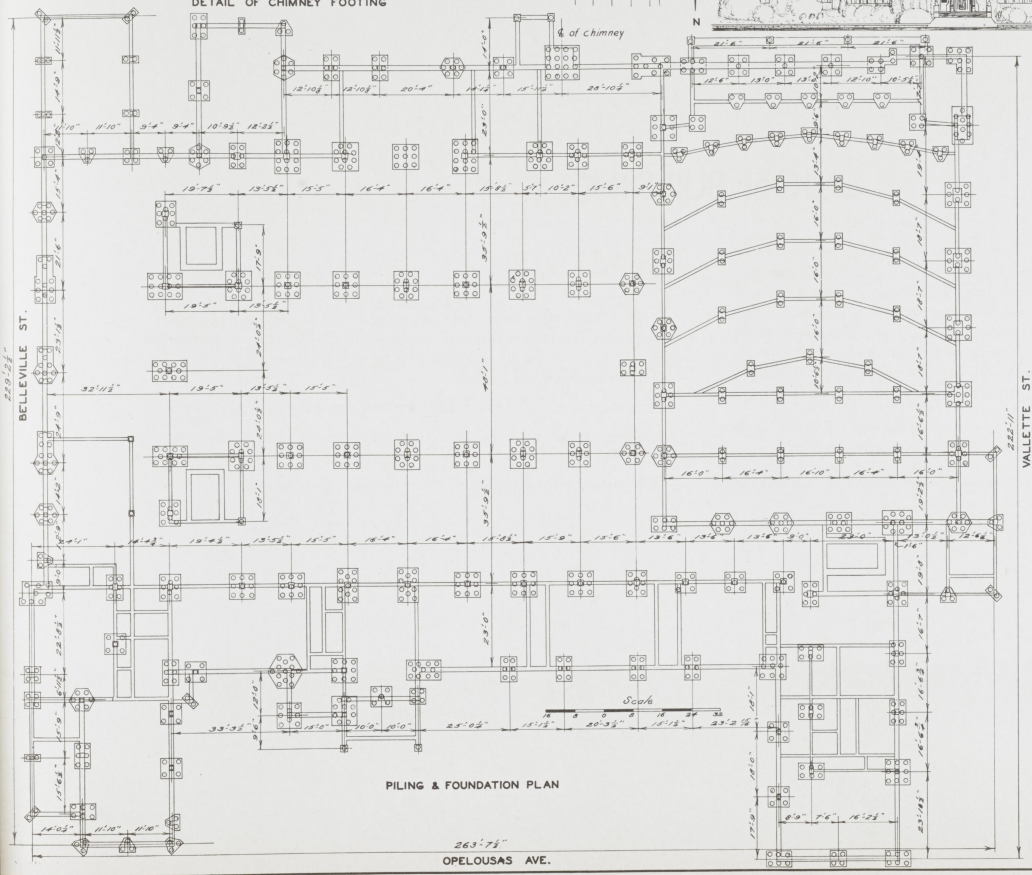


DETAIL OF CHIMNEY FOOTING

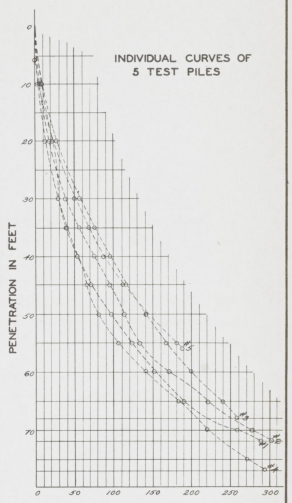


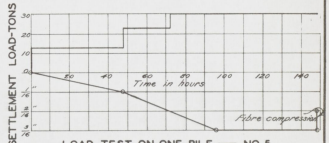


OPELOUSAS AVE.



PILING & FOUNDATION PLAN





LOAD TEST ON ONE PILE — NO. 5

MARTIN BEHRMAN PUBLIC SCHOOL

CASE NO.14

Case No. 15.

UNION BUILDING

The Union Building located on the corner of Baronne and Gravier Streets was designed by Moise H. Goldstein with Favrot and Livaudais, associated architects, in collaboration with Gundvald Aus, Consulting Engineer. The structure, which was erected in 1924 by O. M. Gwin Construction Company, is a modern steel frame office building fronting 84'-1" on Gravier Street, and 170'-6" on Baronne Street. The building is 14 stories high and has a basement under the entire building. The exterior walls are of limestone and brick while the interior walls are of gypsum and terra cotta. About 30% of the exterior walls is occupied by windows.

The curb elevation is approximately 7.0 M. G. L. Pile cut-offs vary from —9.13 M. G. L. to —10.77 M. G. L. The excavation depth varies from 14' to 22' averaging around 16'.

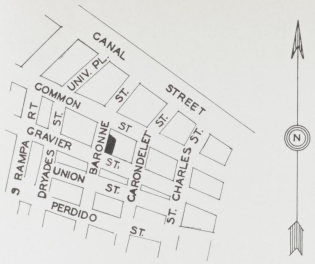
Untreated yellow pine piles with a 6" to 8" tip diameter and a 12" to 15" butt diameter were used. The piles varied from 55' to 60' long, and the total number of piles in foundation is 1561.

A No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42" was used to drive the piles. The blows for the last foot were about 14 to 40. The next to last foot 9 to 25, and the third to last foot 7 to 20. The penetration for the last 5 blows was 3" or less. No data on soil or pile tests could be located.

Footings are of reinforced concrete with the piles spaced 2'-3" on center.

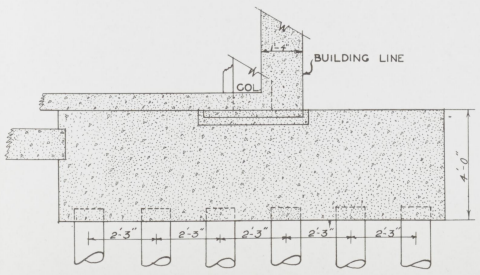
Each pile was designed to bear a total approximate load of 12 tons. No information regarding the live load and dead load per pile was available.

Upon inspection of the building no signs of settlement were observed.

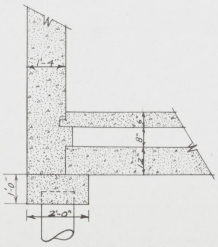


LOCATION MAP

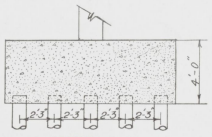
FOUNDATION PLAN



SECTION A-A



SECTION B-B



SECTION C-C

UNION BUILDING

CASE NO. 15



Case No. 16.

VAN HORN BUILDING

The Van Horn Building was designed by Diboll and Owen, Architects, and C. G. Cappel, Consulting Engineer. The building is located on Camp Street between Poydras and Lafayette Streets, fronting 52′ on Camp Street. The building was erected in 1922 by Doullut and Williams Inc., Contractors.

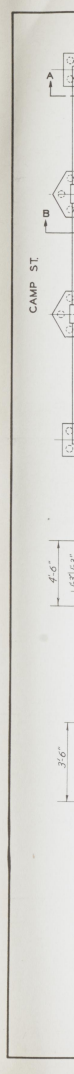
It is a modern fireproof warehouse and store building of reinforced concrete mushroom type construction. All loads are transmitted to reinforced concrete footings through beams and columns, brick curtain walls being supported on reinforced concrete beams as illustrated. The estimated total dead and live load used in designing is 15 tons per pile.

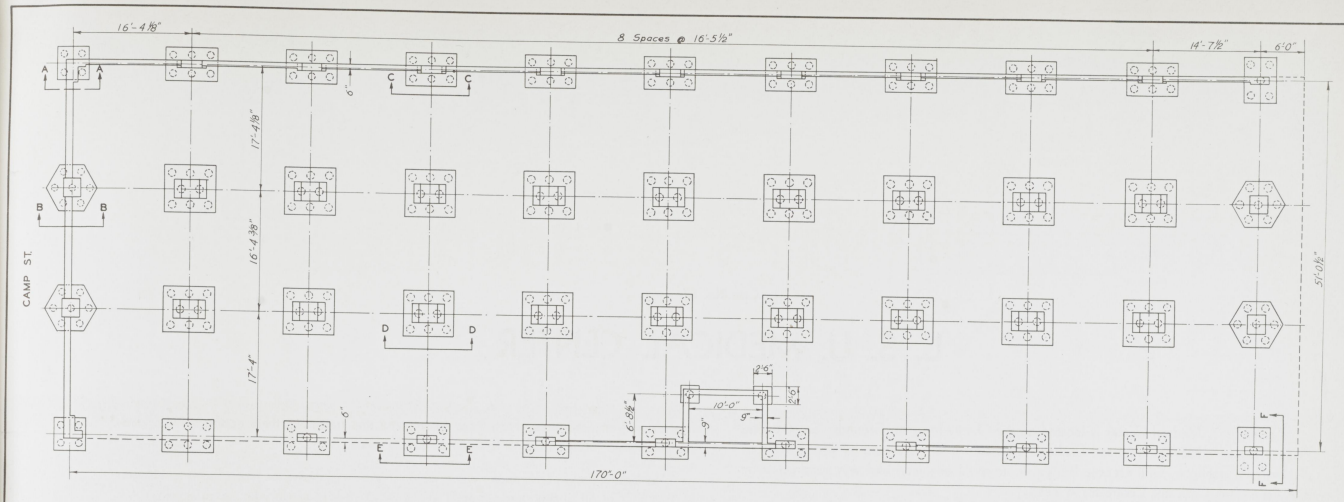
All column footings are reinforced concrete supported on untreated yellow pine piles 50′ long with 6″ minimum tips and 12″ minimum butts. These piles were driven with a No. 1 Vulcan steam hammer with a 5000 pound striking force and a stroke of 42″, with the tips resting at approximately 50′ below ground surface or at approximately -40 M. G. L. All piles were cut off 5′-6″ below curb grade or at approximately 5.4 M. G. L. No accurate record of driving is available but it is stated by the contractors that driving was very uniform and easy until they reached approximately 50′ below surface at which point resistance was practically refusal.

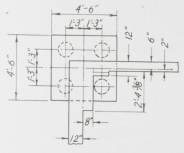
There is no basement under the building and there was no excavation except for concrete footings which were carried to 6″ below pile cut-off.

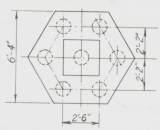
The accompanying drawing shows the general layout, location and spacing of piles with typical sections of concrete footings, columns and grade beams, all concrete being reinforced with steel bars.

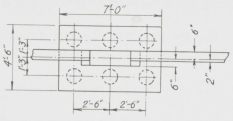
There is no indication of settlement in any part of the building.

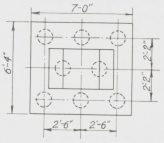


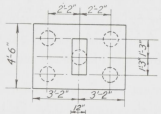


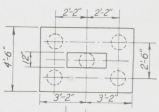


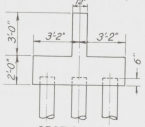


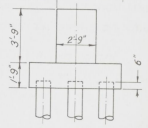






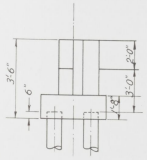




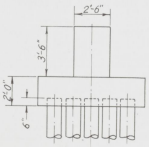


SECTION F-F

SECTION E-E



SECTION A-A



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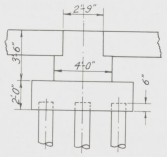

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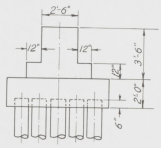

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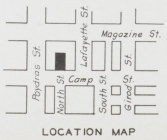
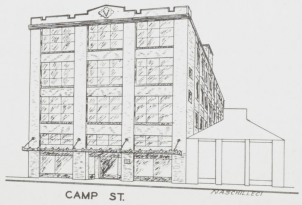


LOCATION MAP

VAN HORN BUILDING

CASE NO. 16



CAMP ST.

Case No. 17.

L. S. U. MEDICAL CENTER

The L. S. U. Medical Center is located on the Charity Hospital Grounds, facing Tulane Avenue between LaSalle Street and Claiborne Avenue. It was designed by Weiss, Dreyfous and Seiferth, architects, with George P. Rice as structural engineer, and was constructed by R. P. Farnsworth Company, Contractor in 1933.

The building is 217'-8" wide by 52'-8" deep, the main portion rising 7 stories and the center rising an additional 3 stories. A basement occupies a part of the site under the center of the building. Walls are faced with limestone; floors are reinforced concrete slabs.

Excavation for footings and basement vary from elevation -3.33 to -19.83 M. G. L. Basement floor is 8'-8" below grade or at elevation -4.50 M. G. L. In excavating, cypress stumps fairly close together were found from 6 ft. to 12 ft. below grade.

Approximately 1300 untreated pine piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs., and a stroke of 42". Driving records are available on only 57 piles but these are fairly well distributed and the table on the drawing shows the blows required for final driving of these piles. From these records and the stratagraph there apparently is a hard stratum of sand located from 40 ft. to 47 ft. below grade.

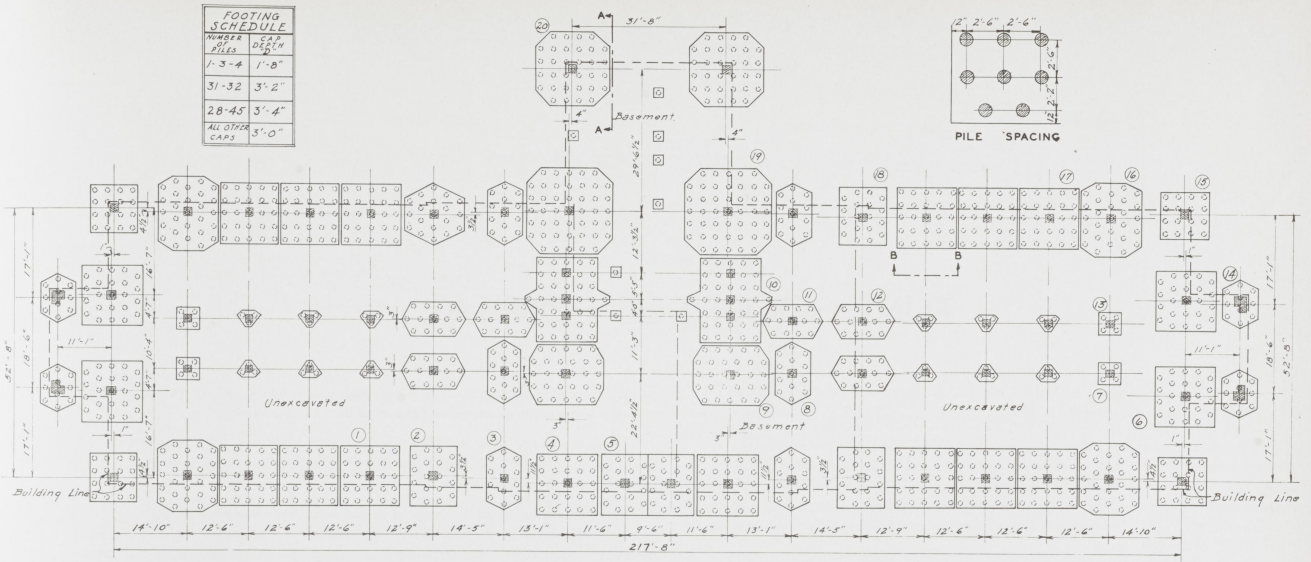
The boring shown on drawing was made on the site and shows the type of soils to a depth of 100 ft. Cut off of piles varies from 7'-0" to 22'-6" below grade with the piles under the majority of the large footings cut off at elevation -8.16 M. G. L.

The accompanying drawing shows the foundation plan, the spacing of piles and details of the construction of the reinforced concrete pile caps.

The total load per pile, used in the design, was 12½ tons

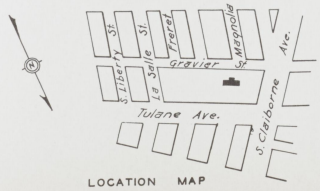
There appears to be settlement in most of the outer walls of this building, which is evident through cracks in the stone masonry. Just how much this settlement amounts to we do not know but it is not serious and not noticeable to a casual observer. With a 12½ ton load and piles driven to a firm bearing, as indicated, no settlement was to be expected.

FOOTING SCHEDULE	
NUMBER OF PILES	CAP DEPTH
1-3-4	1'-8"
31-32	3'-2"
28-45	3'-4"
ALL OTHER CAPS	3'-0"



PILE DRIVING RECORD				
Footing Number	Pile Lengths	No. Piles	Tip Elev. Below M.S.L.	Blows
9-10-8 11	35' to 50'	26	40.16 to 43.16	15 to 40 Last 6"
2-19-20 10-9	34' to 40'	6	39.16 to 40.65	200 to 275 Last 3"
3-4-5-19 6-10-12	36' to 40'	13	37.65 to 42.65	67 to 368 Last 1"
1-19-18 17-14	34' to 40'	7	36.73 to 39.49	75 to 80 Last ½"
16-15-20 7-13	30' to 40'	5	39.00 to 39.65	68 to 75 Last ¼"

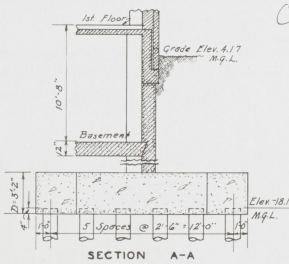




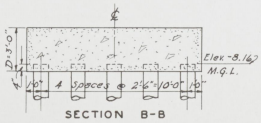
LOCATION MAP

L.S.U. MEDICAL CENTER

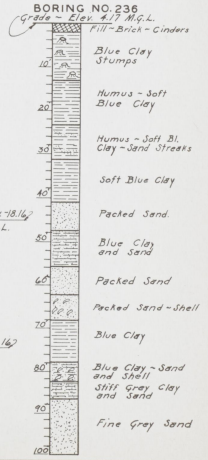
CASE NO. 17



SECTION A-A



SECTION B-B



Case No. 18.

FLINT-GOODRIDGE HOSPITAL

This building was designed by Moise Goldstein, Architect, with Jens Braae Jensen as Consulting Engineer, and was erected in 1931.

The building is of modern fireproof reinforced concrete design with outside walls of brick, backed with hollow tile. Joists and floor slabs are cement and finished floors are terrazo. The building is 56'-1" or 4 stories in height with a penthouse 9'-10" above the roof, and faces approximately 136' on Louisiana Avenue between Freret and LaSalle Streets, and has a depth of approximately 51'-2". The total wall area is approximately 18,624 sq. ft. and the window area is 20% of the wall area.

Elevations to determine settlement have never been taken, and the settlement, if any, has been uniform, as no cracks have appeared in the structure.

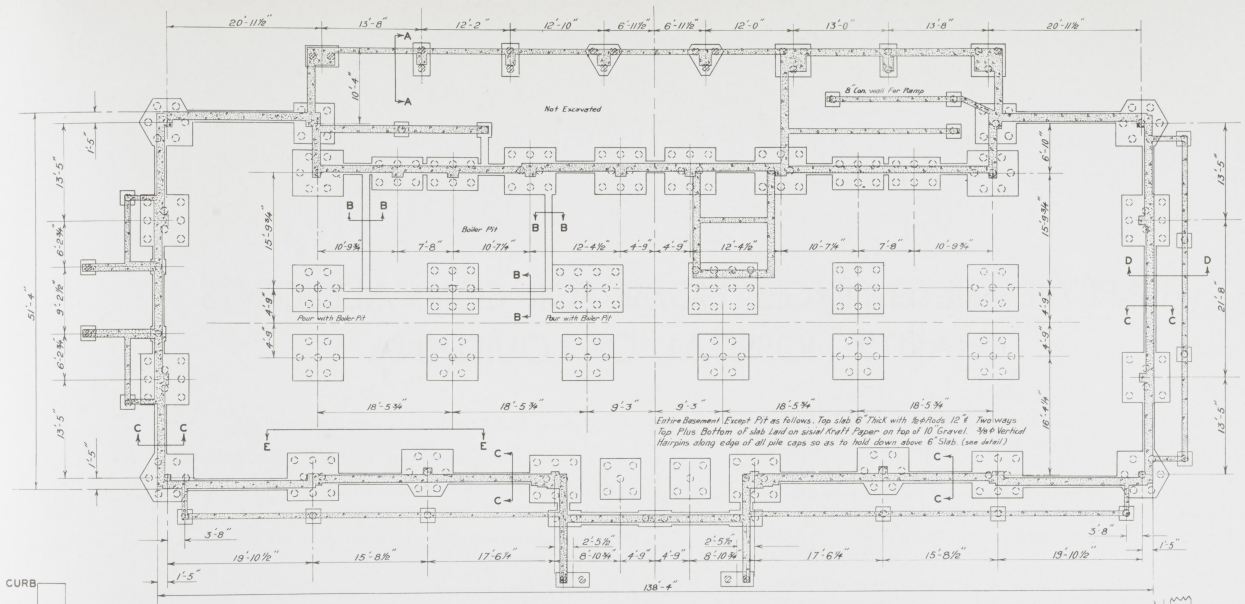
No soil load tests or core borings were made, but 60' test piles were driven at various points within the area covered by the building. The log of one of these is not available. A record of the behavior of the other five is shown graphically on the accompanying drawing. These piles were driven with a 5000 lb. Vulcan steam hammer having a 42" stroke. There were no loading tests made to determine the behavior of the piles after driving.

The entire area under the building was excavated to a depth of 10'-1"-below the curb level or to elevation -7.67 M. G. L. Information as to the character of the soils encountered during the excavation is not available.

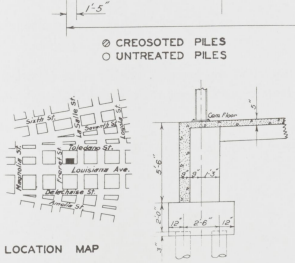
The building is supported on untreated peeled pine piles; these piles are 40' to 45' in length with minimum 8" tip diameter and 14" butt diameter. All piles were straight and were driven with a 5000 lb. steam hammer having a 42" stroke. The average penetration of all piles was 40' and the log of the last 3' driven is very irregular, showing from 9 to 100 blows required. Approximately 60% of piles required an average of 35 blows for the last foot of settlement. The piles were cut off at elevation -7.42 M. G. L. or approximately 10' below the curb level.

Piles are spaced 2'-6" on centers.

The design load for each pile is approximately 15 tons.



Ø CREOSOTED PILES
○ UNTREATED PILES

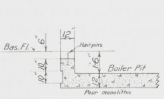


LOCATION MAP

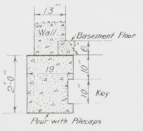
SECTION A-A



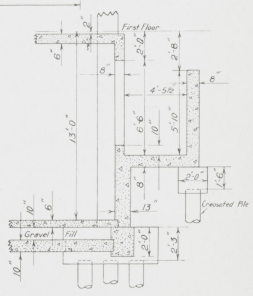
LOUISIANA AVE.



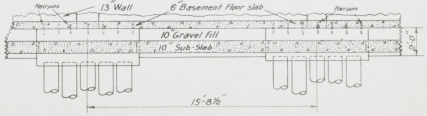
SECTION B - B



SECTION C-C



SECTION D-D



SECTION E-E

CURVES OF FIVE TEST PILES

FLINT GOODRIDGE HOSPITAL

CASE NO 18

Case No. 19.

LAPEYRE MILTENBERGER HOME FOR CONVALESCENTS CHARITY HOSPITAL OF LOUISIANA

This is one of the group of Charity Hospital Buildings. It was designed by Weiss, Dreyfous & Seiferth, Architects, with Geo. P. Rice, as Consulting Engineer. The building was erected in 1933 by Gervais F. Favrot, Contractor.

It is a modern hospital building on pile foundations. The frame is structural steel and the outside walls are of brick and cut stone. Interior walls are plaster on metal lath. The building is of modern fireproof construction throughout. The frontage is 79' on Tulane Avenue and the depth is 100 feet.

There is a total of 727 untreated peeled yellow pine piles, 45 to 50 feet long with 6 to 8 inch minimum tips and 12 to 14 inch minimum butts, the tips of which were driven to approximately 50 feet below curb grade, or to approximately -46.00 M. G. L. Effective length of piles about 37'.

Piles were driven with a No. 1 Vulcan steam hammer, having a weight of 5000 lbs. and a stroke of 42".

A test boring under the L. S. U. Medical building about 200 ft. away shows a stratum of blue clay and sand at about -44.00 M. G. L. to -52.00 M. G. L.

Piles are cut off at varying elevations from -8.59 M. G. L. to -9.26 M. G. L.

The entire foundation area was excavated to depths varying from -8.92 M. G. L. to -9.59 M. G. L. and the material was very wet blue gumbo.

The accompanying drawing shows the size and arrangement of footings, which are reinforced concrete caps on pile groups.

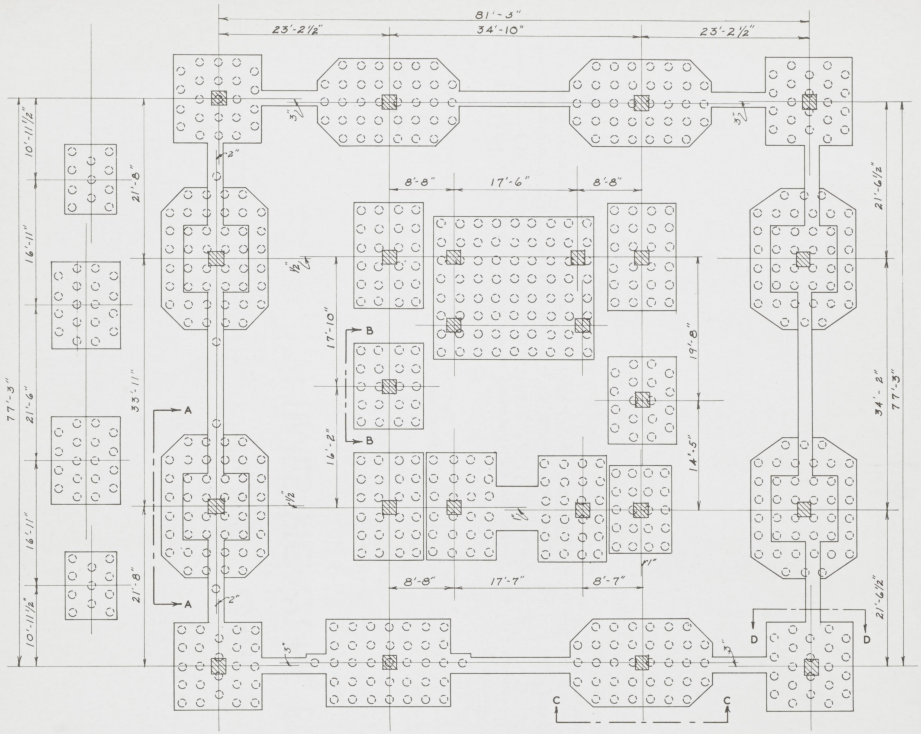
Wall beams are reinforced concrete 20" x 36" poured monolithic with reinforced concrete caps.

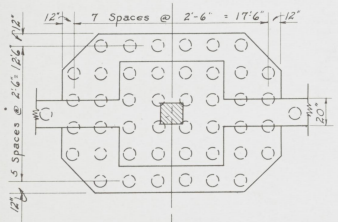
All loads are carried on piles, so no consideration was given to bearing value of surface soils. However, it is interesting to note that large cypress stumps were found scattered over the area at depths of five to fifteen feet.

A wind load of 30 lbs. per sq. ft. was used in designing, and a total dead and live load of 12½ tons per pile.

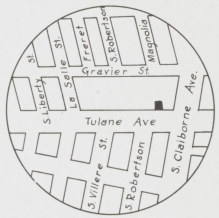
SECTION B—B

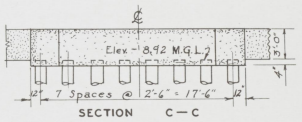
SECTION D—D





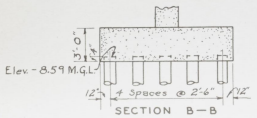


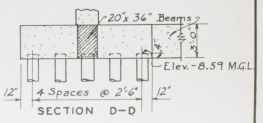




LAPEYRE MILTENBERGER CONVALESCENT HOME

CASE NO. 19





Case No. 20.

TIMES PICAYUNE BUILDING

This building was designed by Moise Goldstein, Architect, with A. S. Montz, Consulting Engineer and was built by Geo. J. Glover Co. Inc., Contractors, in 1920.

It is a modern fire-proof structural steel and concrete office building and publishing house. The outside walls are brick and the building measures 150′ on North Street by 84′-3″ on Camp Street.

The foundation is reinforced concrete supported on untreated yellow pine piles 45′ with 6″ minimum tip and 12″ minimum butt. The piles were driven with a No. 1 Vulcan steam hammer having a striking force of 5000 lbs. and a stroke of 42″. The graphs on accompanying drawing show the driving record of 6 of these piles. All piles were cut off at —1.60 M. G. L.

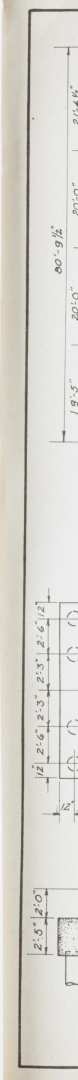
The information is not available as to how the total load was sub-divided, but the total design load per pile was approximately 13 tons.

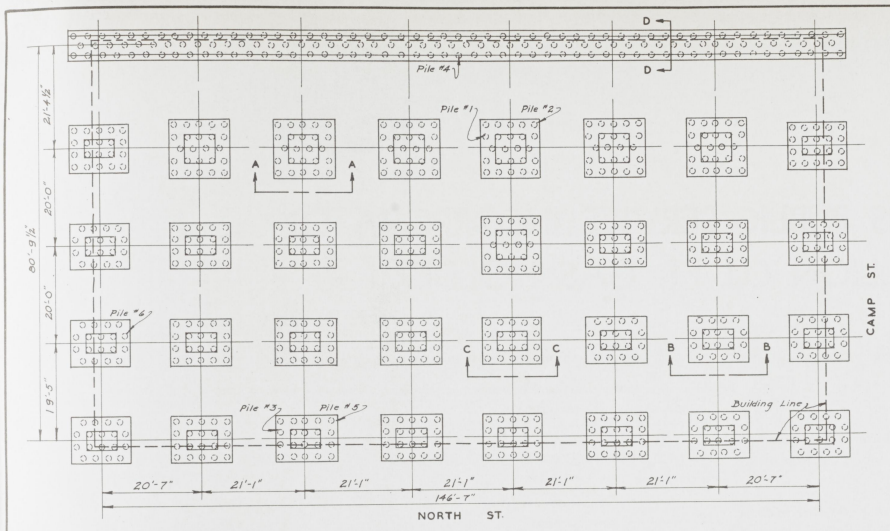
The total wall area is approximately 34,700 sq. ft. and the window area is about 25% of the wall area.

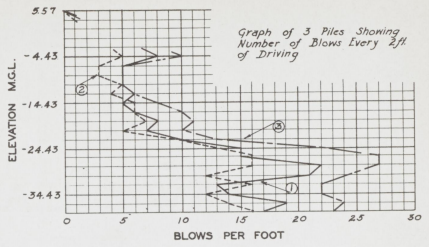
The entire area under the building was excavated to a depth of approximately 6′-5″ below curb grade or to 2.31 M. G. L. Additional excavation for concrete footings was carried to elevation —2.10 M. G. L.

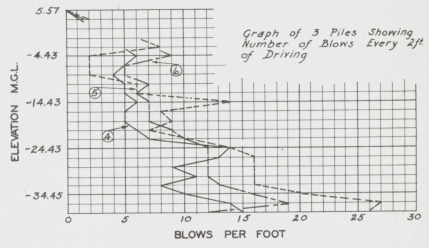
The general foundation plan and typical details are shown on the accompanying drawing.

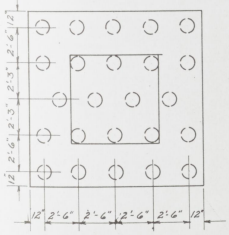
At the time of this survey there were no visible cracks in the walls of the building and no evidence of settlement.



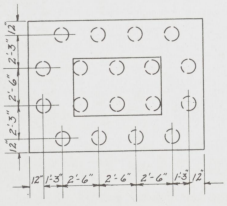




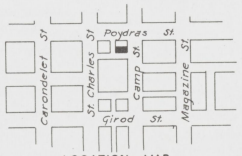




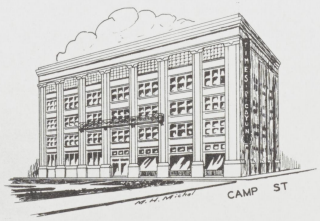
SECTION A—A



SECTION B—B

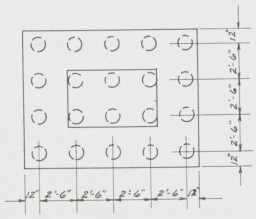


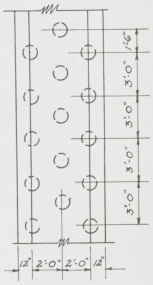
LOCATION MAP

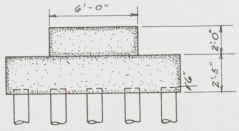


TIMES PICAYUNE BUILDING

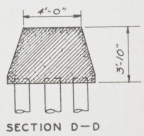
CASE NO. 20







SECTION C—C



SECTION D—D

Case No. 21.

NEW ORLEANS PUBLIC SERVICE INCORPORATED FIVE MILLION CU. FT. GAS HOLDER

The New Orleans Public Service Five Million Cu. Ft. Gas Holder was erected by the Jefferson Construction Company, J. P. O'Leary, President, in 1913.

This structure is located at Perdido and South Robertson Streets.

The diameter of the holder at the bottom is 189'-9" and the diameter of the foundation 192'-0". The height of the gas holder is variable, being dependent upon the amount of gas stored therein, but the height of the steel frame is 232'.

The average curb elevation is 3.0 M. G. L. and the average excavation was made to about 8' below curb or —5.0 M. G. L. The consistency of the soil is shown by the stratagraphs on the drawing. The five test borings as shown were made in connection with the small gas holder but are shown here because of proximity to this case.

3,355 untreated yellow pine piles were used for the foundation. 45' piles were driven about 44' until the tips rested in a sand stratum at about —41.0 M. G. L. The cut-off of the butt was at about 0.0 M. G. L. The effective length of the piles in place is about 41'. The tips of the piles varied from 8" to 9" and the butts from 12" to 14". These piles were driven with a No. 1 Vulcan steam hammer weighing 5,000 lbs. with a stroke of 42".

No record of driving is available but Mr. O'Leary states that easy driving was encountered until a sand stratum was reached at about —39.00 M. G. L. Driving was stopped at about -41.00 M. G. L. to prevent shattering of piles.

A reinforced concrete capping is on top of the piles, forming one large mat. The thickness of the concrete for the outer ring is 4'-6" and for the inner part 2'-6". The outer ring is reinforced with steel bars and the inner part is plain concrete.

The loads per square foot shown on drawing are taken from blue print of R. D. Wood and Company, Philadelphia, Pa.

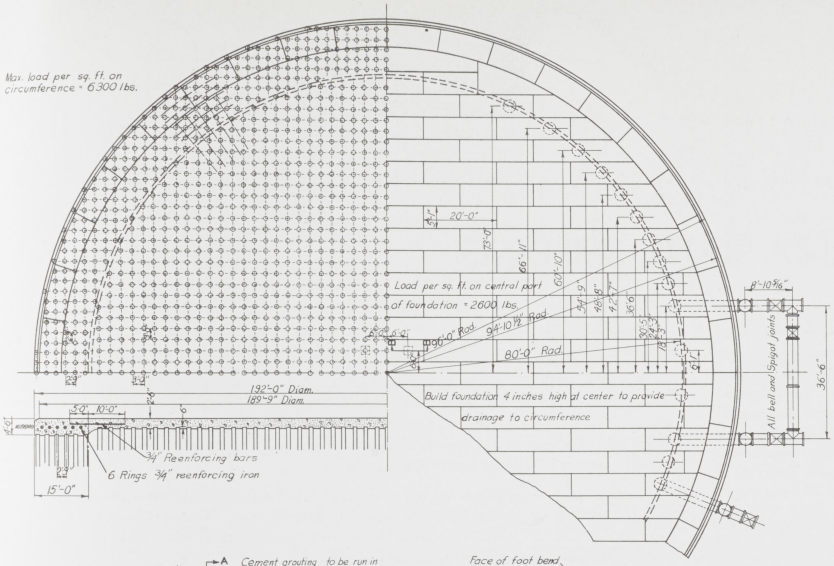
The following figures furnished by The Stacey Manufacturing Company, Cincinnati, Ohio, refer to a standard 5,000,000 cu. ft. holder exclusive of foundations which are subject to local conditions.

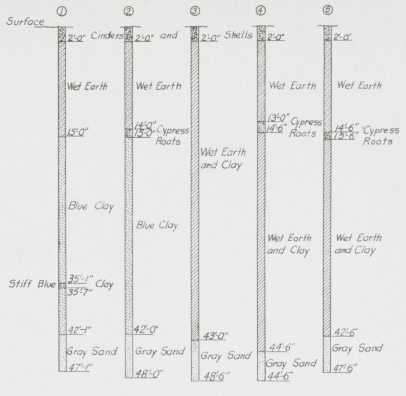
Inner Section	843,190 Lbs.
Second Section	351,490 Lbs.
Third Section	351,445 Lbs.
Fourth Section	345,945 Lbs.
Outer Section	325,800 Lbs.
Guide Frame	1,096,765 Lbs.
Steel Tank	1,656,060 Lbs.
Stairs and ladders	55,000 Lbs.
Three 30" Connections	58,500 Lbs.
	5,084,195 Lbs.

Weight of Water in Steel Tank, 72,833,475 Lbs.

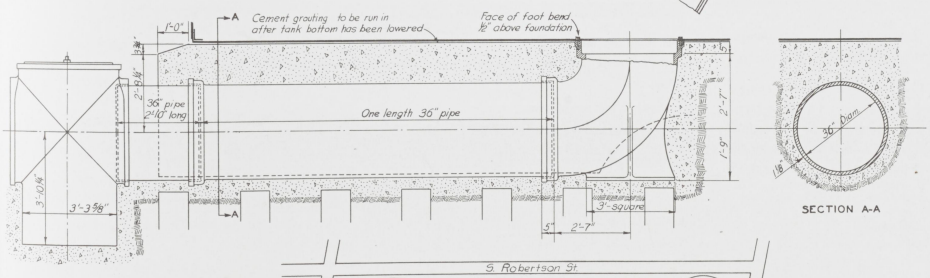
Gallons of Water in Steel Tank, 8,716,726.

This structure has settled slightly and now, as shown by the level of the water in the tank, the north or Gravier Street side of the structure is 2" lower than the south or Perdido Street side and this means that the structure is tilted to the north about 2.3 inches.

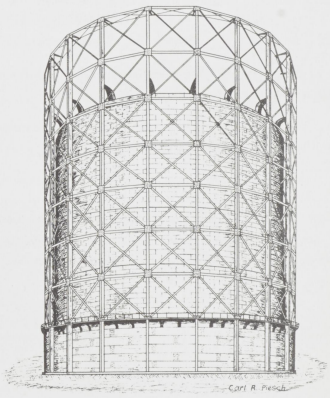


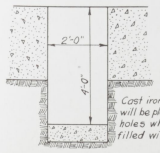


TEST BORINGS UNDER MILLION CU. FT. HOLDER

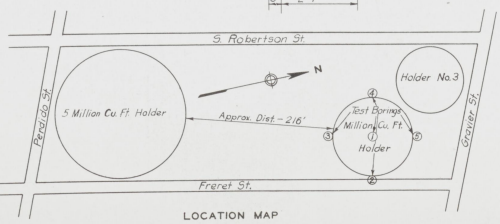


SECTION A-A





SECTION B B



LOCATION MAP

NEW ORLEANS PUBLIC SERVICE INC.

FIVE MILLION CU. FT. GAS HOLDER

CASE NO. 21

Case No. 22.

HIBERNIA BANK BUILDING

The Hibernia Bank Building, located on Carondelet Street between Gravier and Union Streets, is a modern fireproof steel frame building 20 stories high, with basement and tower, and was designed by Favrot & Livaudais, Architects, and was constructed by Geo. A. Fuller, Contractor, in 1920-21. It fronts 176′ on Carondelet Street and is 110′ deep. First and second floors cover the entire site, the third to fifteenth floors are built around a court measuring 73′ wide by 65′ deep which faces Carondelet Street. The sixteenth to twentieth floors rise at the rear of building only and form a base from which the tower rises an additional three stories. All exterior walls are faced with limestone except rear wall which is of brick. Floors are of wood on hollow tile and concrete. Window space occupies about 30% of wall area.

Entire site of building was excavated, footings and basement, to an average depth of 16′-6″ below curb or to elevation —10.84 M. G. L.

Three borings were made on site of building to determine the type of soils at various depths. The depth of these borings and their location are shown on the accompanying sheet No. 1.

Twelve untreated wood test piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42″. The following is the average record of these piles: length 58′; butt 14″ and tip 7″. Penetration under weight of hammer and pile 10 ft. Number of blows from elevation —66.33 M. G. L. to elevation —67.33 M. G. L. was sixty-five, or 65 blows for last foot of driving. The graph on sheet No. 1 shows the average curve of these 12 piles.

Untreated wood piles 36 to 60 ft. long were driven with the above equipment. The majority of the shorter piles were driven in the Union Street footings and the central footings.

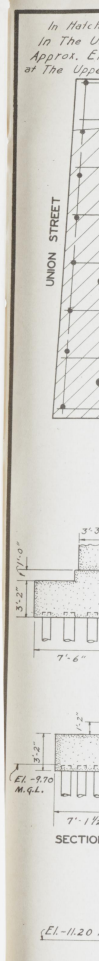
Cut off varied from —9.70 M. G. L. to —11.20 M. G. L., and elevation of tips, as shown on plot plan on sheet No. 1, varied from —43.43 M. G. L. to —59.43 M. G. L. This makes the effective lengths of piles vary from 32 ft. to 50 ft. An average taken from the driving records of 300 piles of different lengths gives the effective pile length as 41 ft., with an average of 55 blows for last foot. The design load is 10 tons to the pile.

Footings are of reinforced concrete, and where they butt they are separated by construction joints. Areas between footings have a 12″ reinforced concrete slab. Thickness of footings vary from 2′-7″ to 6′-3″. Size and spacing of footings and spacing of piles are shown on sheet No. 2. Details of footings are shown on sheet No. 1.

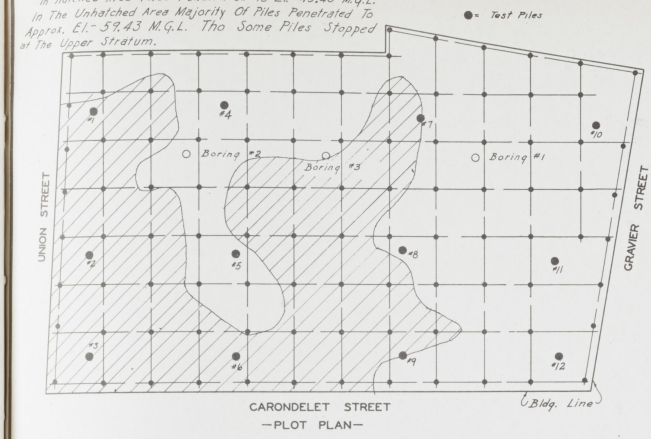
Readings taken at the four corners of building at beginning of construction and at completion in August 1921 show that there was a maximum settlement of .21 of a foot during construction.

Settlement was as follows:

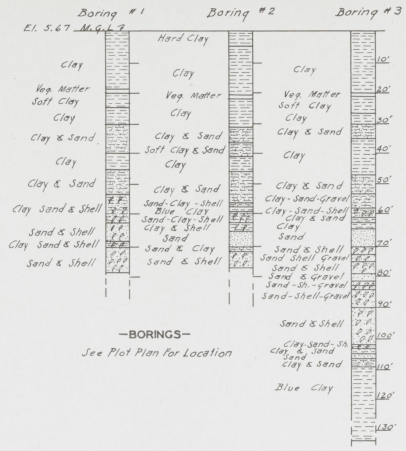
Baronne—Union Street Corner	.17 of a ft.
Union—Carondelet " "	.21 of a ft.
Carondelet—Gravier " "	.12 of a ft.
Gravier—Baronne " "	.14 of a ft.



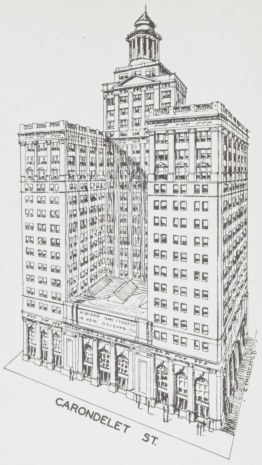
In Hatched Area Piles Penetrated To El.-43.43 M.G.L. In The Unhatched Area Majority Of Piles Penetrated To Approx. El.-59.43 M.G.L. Tho Some Piles Stopped at The Upper Stratum.

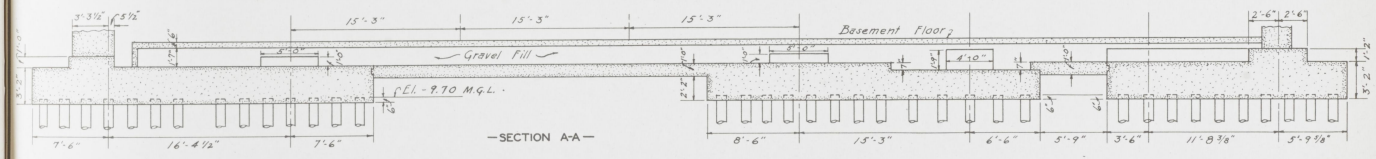


—PLOT PLAN—

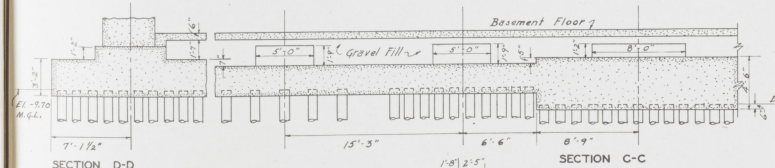


—BORINGS—
See Plot Plan for Location



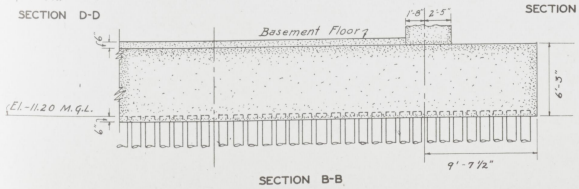


—SECTION A-A—



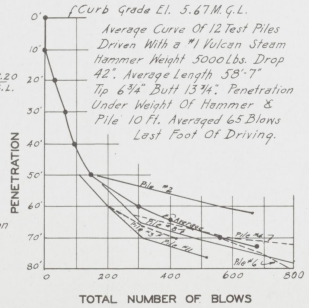
SECTION D-D

SECTION C-C



SECTION B-B

Refer To Sheet #2 for Foundation Plan & Location Of Sections.



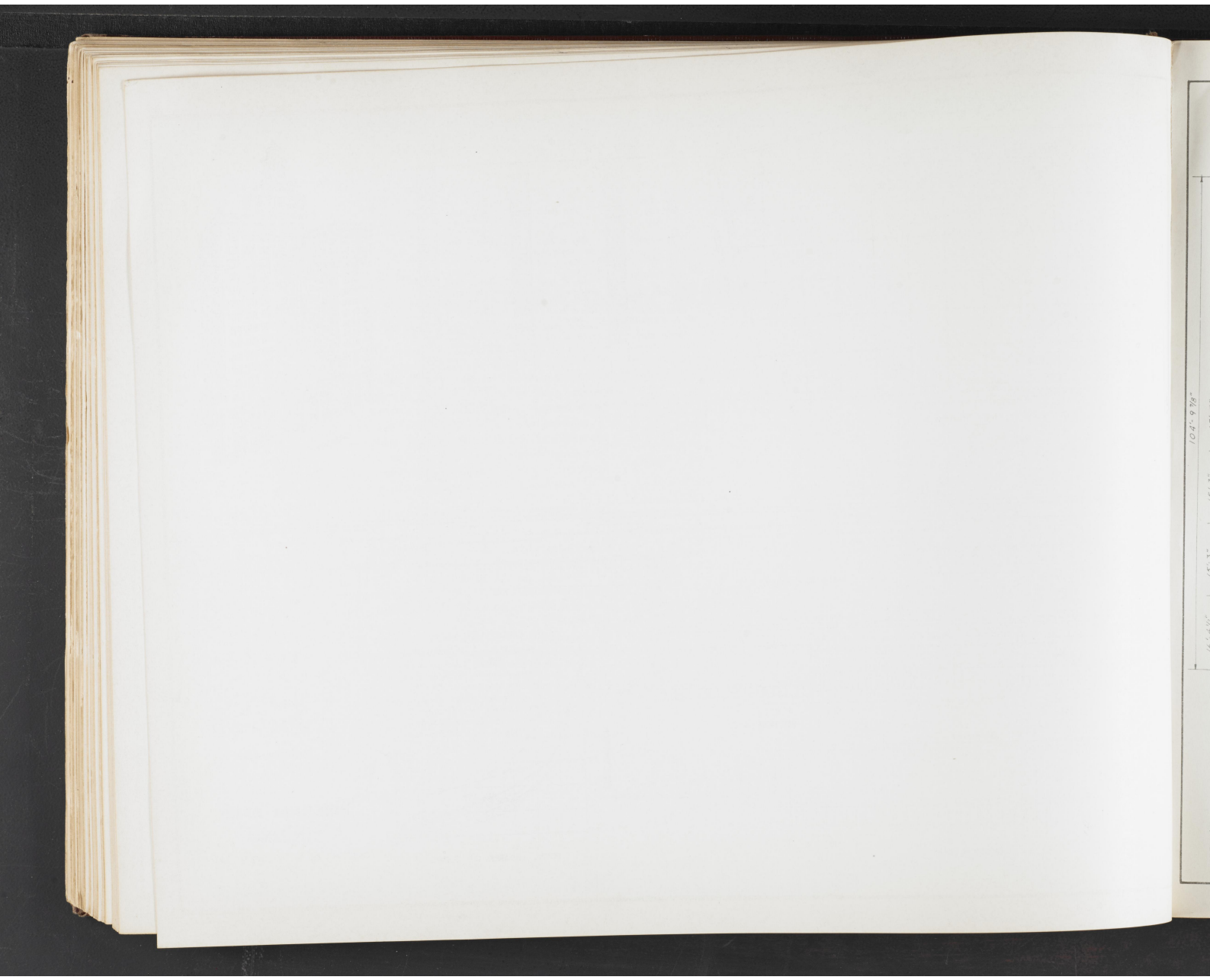
TOTAL NUMBER OF BLOWS

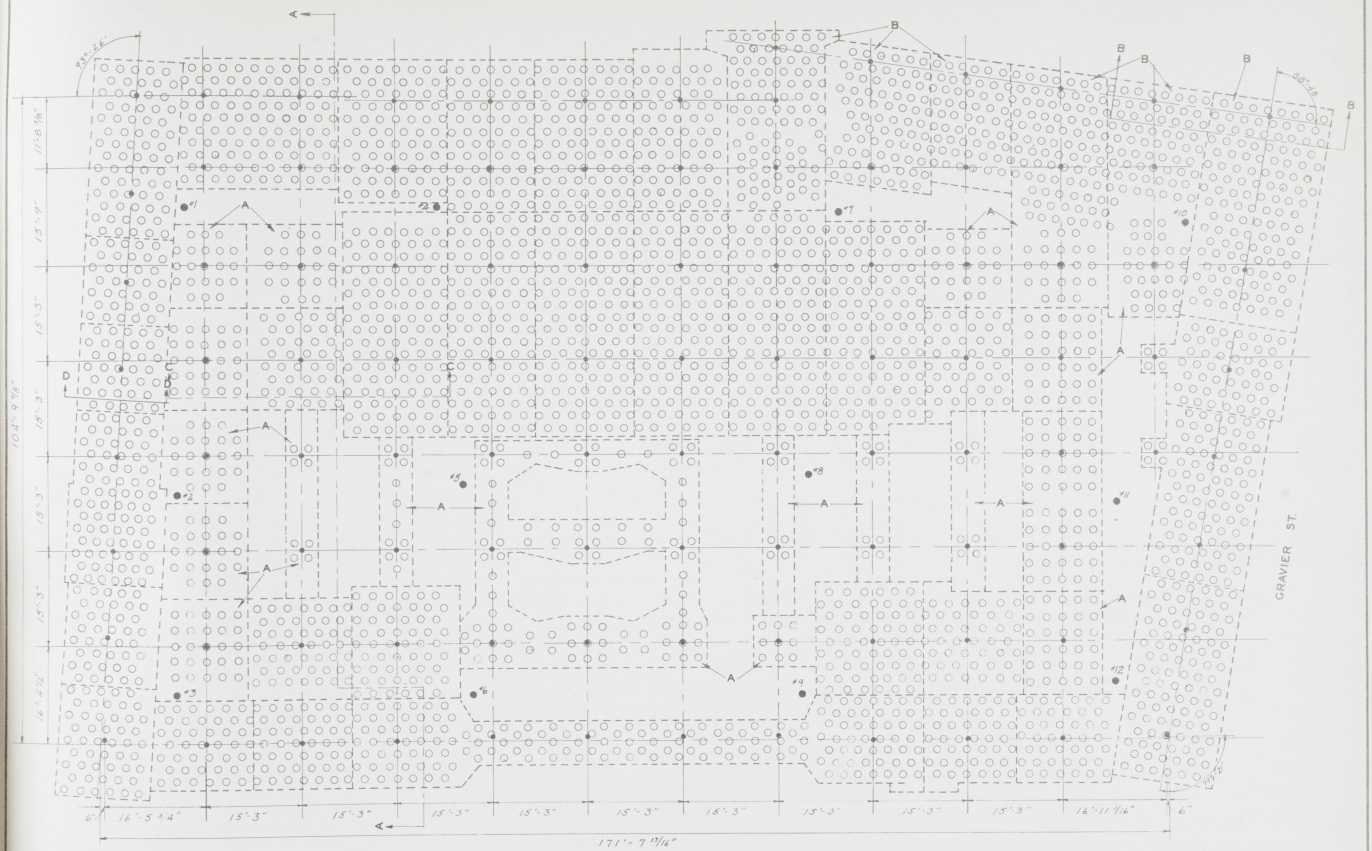


LOCATION MAP

HIBERNIA BANK BUILDING

CASE NO. 22 SHEET NO. 1





Each Space 1'-3"
Each Spa 2'-0"

TYPICAL SPACING OF PILES UNLESS OTHERWISE SHOWN

Each Space 2'-6"
Each Spa 2'-6"

SPACING OF PILES UNDER FOOTINGS MARKED "A"

Each Space 1'-5"
Each Spa 2'-0"

SPACING OF PILES UNDER FOOTINGS MARKED "B"

● = Test Piles

HIBERNIA BANK BUILDING

CASE NO. 22

SHEET NO. 2

Case No. 23.

JESUIT CHURCH

This building is located on Baronne Street between Canal and Common Streets. It was designed in 1929 by Wogan and Bernard, Architects, and was erected in the same year by Geo. Glover Co. Inc. It is a Catholic Church building with an ornamental brick front.

All outside walls are brick and they are supported on continuous reinforced concrete footings. The interior frame of the building is structural steel columns and beams. Steel columns rest on reinforced concrete footings which are supported by pile groups.

The outside dimensions of the building are 77 feet on Baronne Street by a depth of 150 feet. The height of building above nave is 82'-5". Height of dome over sanctuary is 137'-7" above grade. Height of front towers is 128'-7" above grade and these are surmounted by 12 foot crosses.

The only excavation, except for footings, is a 9'-6" basement under sanctuary which was excavated to a total depth of 17 feet below grade; and pipe tunnels running under each side aisle, with a clearance of 5'-4". After concrete footings were complete all excavated areas except small basement and pipe tunnels, were refilled with sand and gravel, thoroughly hand and water tamped, up to bottom of floor slab.

The building is supported entirely on pile foundations the total number of piles being 851. Piles are untreated yellow pine 65' long with minimum 6" tips and minimum 12" butts. Piles were driven with a No. 1 Vulcan steam hammer; 5,000 lbs. weight; 42" stroke. Piles were cut off 8'-7" below curb grade or at —3.00 M. G. L.

Ten test piles, 60 ft. long were driven. These are indicated on the drawing. There is also a graphic chart on drawing showing the penetration record of four of the test piles, and an average curve. This average curve is representative of the ten piles, the others not being shown on account of confusion of lines.

A live load of 150 lbs. per square foot, and a total combined load of 12½ tons per pile, were used in design.

Mr. Bernard offers some interesting historical comments as follows:

This new structure replaces one that was built in 1851-57 which was, in architectural style, Spanish Moresque. At the time of building the location still bore traces of a water covered cypress swamp, and adjacent modern skyscrapers were not thought of.

In April 1928 the famous old structure began to show signs of weakness when pile foundations for large neighboring buildings were being driven. A committee of architects, engineers and contractors inspected the church and decided that while preservation was possible it would be wise to demolish the old building and erect a new one on a pile foundation. The following description of the foundation of the old church was contributed by Mr. Wogan.

"The excavation was extended 6'-0" below grade and at that depth a 6' wide course of hard burnt bricks was laid directly on the soil, herringbone fashion, and on the flat. Spaces of approximately ½" left between the bricks were filled with a good cement grout, I should judge a 1 to 2 mixture, and a coat of similar cement was laid over the entire surface of these bricks. Over and across this work was a layer of 2" x 10" cypress boards, laid on the flat, the boards being 5'-6" long, or 6" shorter than the underlying brickwork.

"On top of this planking, at each end of the underlying layer of bricks, and flush with the other edges, was built a wall 1½ brick wide and 10" high.

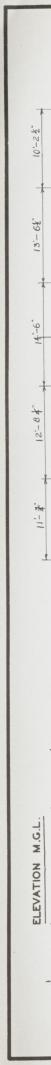
"On top of the above mentioned planking and between the above mentioned brick walls 2" x 10" cypress boards were set longitudinally and on edge. The space between the boards and the brick walls and between the boards themselves, were filled with oysters and cement, not oyster shells, but the live oysters in their shells, I should judge a 1 to 4 mixture, and the whole thoroughly tamped.

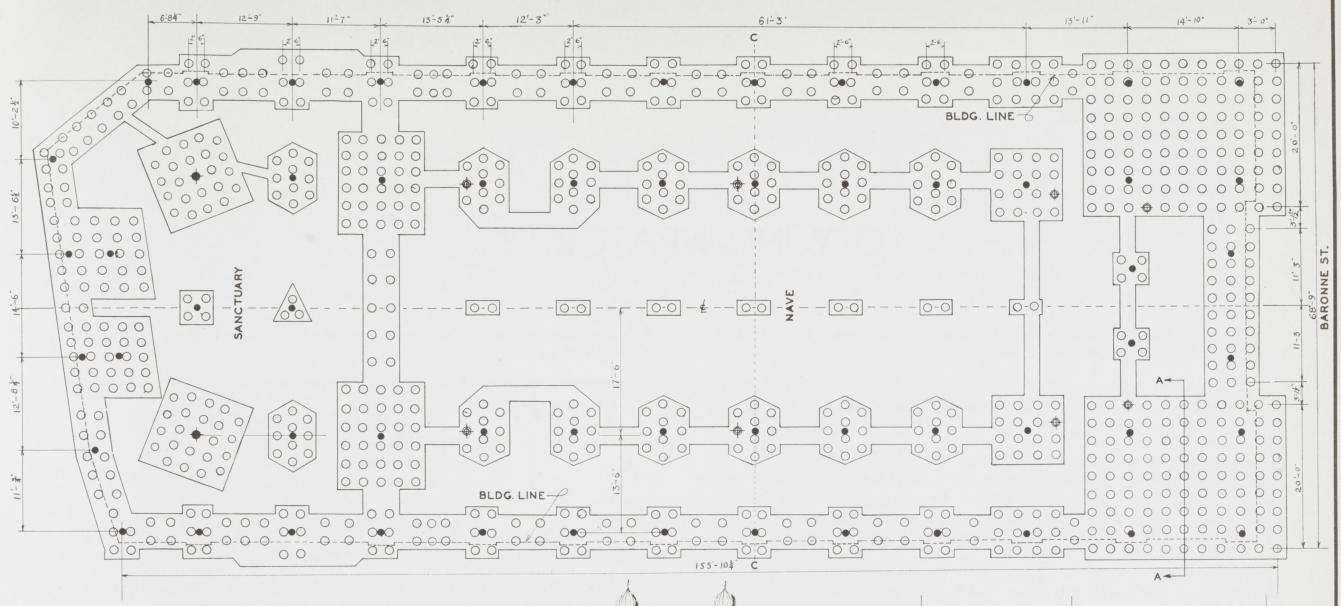
"On top of this construction 2" x 10" cypress pieces were laid diagonally about 18" on centre, the ends of these pieces being kept 4" away from the outer face of the brick walls above mentioned, and these two brick walls were then raised 10" higher and on a line with the top of the diagonal cypress pieces. The spaces between the boards were filled with oyster shells and cement, as above mentioned and thoroughly tamped.

"The footings began on top of the above described construction. However, before building the footings, a wrought iron strap ⅜" x 2½" was laid longitudinally 2'-7" from the outside edge of the foundations; and at each pilaster of the wall a 1" square rod was bent and fastened to the said ⅜" x 2½" wrought iron piece, these 1" square rods extending the full height of each pilaster, being evidently intended for anchors.

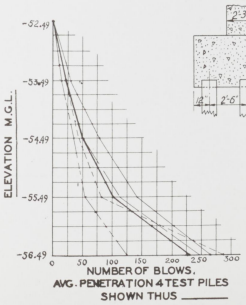
"The footings were built as follows: The first two courses of bricks were laid flush with the outer walls. The next three courses were laid flush but recessed 1" from the course immediately below them. The next three courses were laid with a 2" offset each. The next three courses were laid flush but offset 2" away from the course immediately below them. The next three courses were laid 2½" offset for the first, 3" offset for the second, and a 1¾" offset for the third. The wall proper was built on top of this last course."

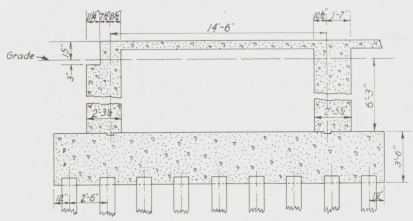
The building is in excellent condition with no signs of undue settlement.



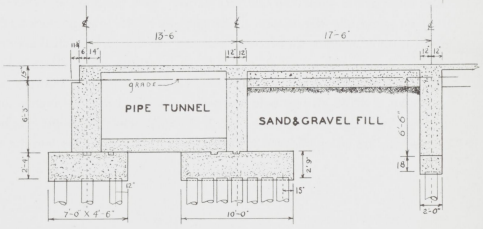


◈ INDICATES TEST PILES









HALF SECTION THROUGH CC

JESUIT CHURCH

CASE NO. 23

Case No. 24.

CITY INCINERATOR "B"

This structure known as City Incinerator "B" is located between Sixth and Seventh Streets, Loyola Avenue and Saratoga Street.

It was designed by Messrs. Bartlett and Snow, in collaboration with Carl Schneider, mechanical engineer, Division of Public Works of the City of New Orleans, and was completed in 1928 by J. A. Petty and Sons, Contractor.

It is a modern fireproof garbage incinerator plant with steel roof trusses supported on steel H. columns. The reinforced concrete floor is supported on steel beams which are carried by the above columns and smaller intermediate steel columns. All walls are of brick above ground line and concrete below ground line and they are supported by reinforced concrete footings. The exterior walls rise 4 stories while the interior brick walls rise only 3 stories.

The chimneys shown in detail on the accompanying drawing are 125' in height with double brick walls above grade and concrete below. Both buildings and chimneys are supported entirely on wood pile foundations. These piles are all 45' long, untreated peeled long leaf yellow pine having as minimum diameters 6" tips and 12" butts. The actual penetration of piles ranged from 46' to 48' with cut-off at —1.93 M. G. L. and the actual effective length of piles in place after being cut off is about 40'. The inspector on the job reported that a hard stratum was encountered at 46 to 48 feet below ground surface and that this stratum was found to be about 4' thick, and piles were cut off 2' to 3' in order that they should not be driven through this stratum, the tips being allowed to penetrate only 6 to 12 inches into the stratum. In excavating for the cut-off elevation the soils found were blue clay and sand with stumps and roots about 6' below surface grade.

The resistance encountered necessitated the following number of blows in the last foot of driving expressed in percentages.

3% took from 5 - 10 blows
42% took from 11 - 25 blows
41% took from 26 - 50 blows
12.2% took from 51 - 75 blows
1.0% took from 76 - 100 blows
0.5% took over 100 blows

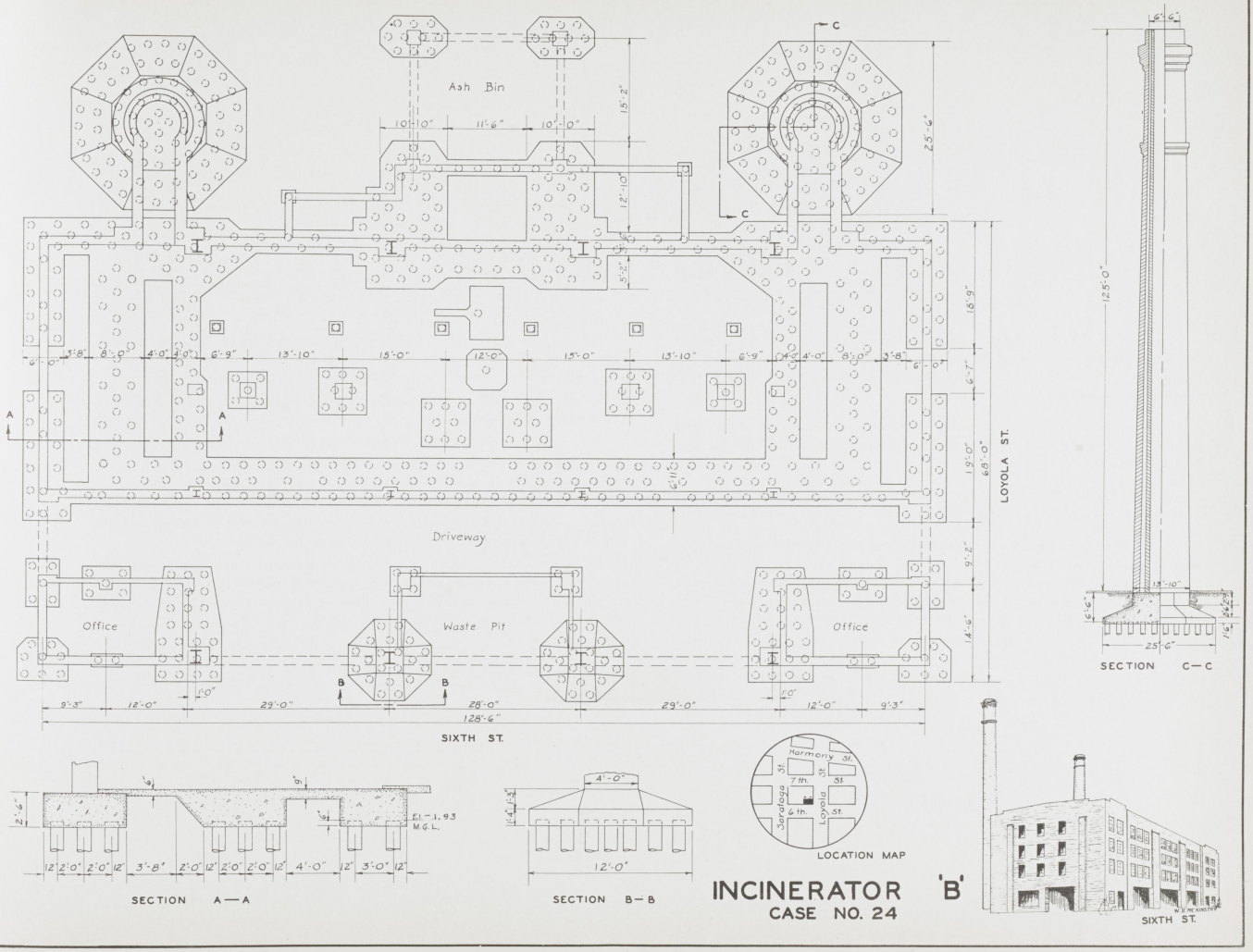
The total number of piles is 765, 81 being under each chimney.

The pile footings were designed for a maximum total load per pile of 10 tons. The chimneys were designed to resist a 100 mile per hour wind, or 40 lbs. per square foot.

In the independent pile clusters the pile spacing is 2'-6" while the wall footing piles are irregular.

The accompanying drawing shows the foundation plan, details of the reinforced concrete footings and a detail of chimney.

There is, at the time of this report, no evidence of settlement.



INCINERATOR 'B'

CASE NO. 24

Case No. 25.

INCINERATOR "D"

City Incinerator "D" was designed by the Decaire Incinerator Company with Carl Schneider, Mechanical Engineer for the City of New Orleans consulting. The building was erected in 1922 by G. E. & E. E. Reimann, Ltd., contractors. It is located on S. Genois Street between Gravier Street and the New Basin Canal.

The building is a fireproof concrete and brick structure with steel columns for interior supports. The outside brick walls are load bearing walls, with floor and roof loads transmitted through steel beams.

The outside walls from the pile cut-offs or concrete footings are concrete up to and above the grade line or to 3.57 M. G. L.. From this point on the walls are of brick and are 13" thick.

The building is supported on untreated peeled yellow pine piles 45' long with 14" minimum butts and 6" minimum tips. From several sources of information it seems certain that 45 feet piles were used and that they met with practical refusal to penetrate after being driven approximately 40 feet. This is also true of several other cases within a few city blocks of this location. The effective length of pile left in place appears to be about 35 feet.

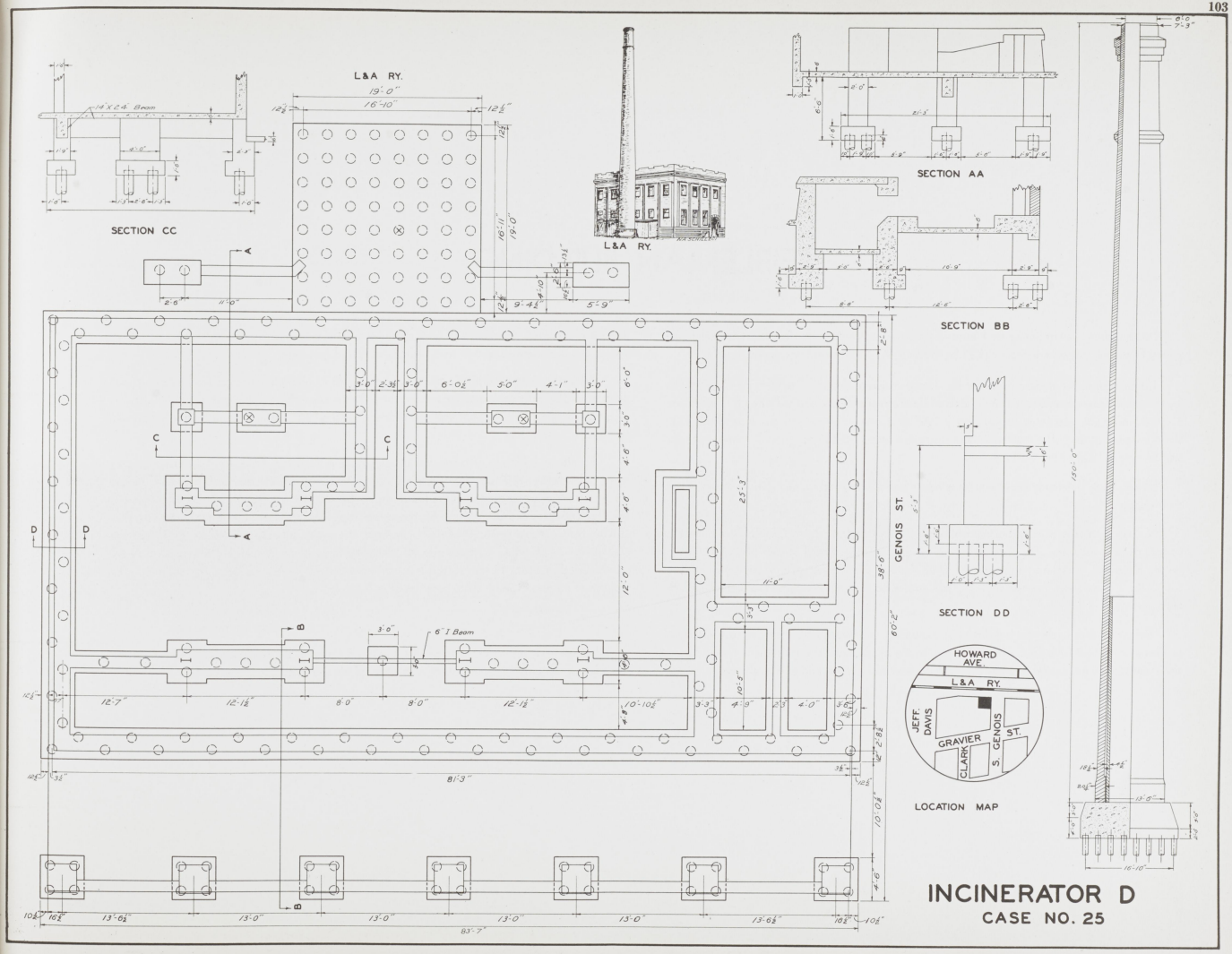
All piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42", and they were cut off at elevation —3.46 M. G. L. and the entire site was excavated to 6" below this depth, and reinforced concrete footings began at this point.

The elevation of the ground surface at the site was approximately 24.0 C. D. or 3.57 M. G. L., and the excavation was carried down to —3.96 M. G. L.

The accompanying drawing shows the general plan of the foundation with various sections, and including the chimney.

No information is available as to loads used in designing this structure. There are numerous cracks evident in the brick walls on all sides, some of which extend through the concrete foundation walls. There are also numerous cracks in the lowest brick section of the chimney. The total load per pile on outside walls would seem to not exceed 12 tons.

Of the many cases reviewed in this report this one is unique as a pile foundation case with many cracks in walls. It is unfortunate that so little information is available in regard to piles and pile driving. No records could be found and the oral statement of several parties connected with the construction is the only information available.



INCINERATOR D

CASE NO. 25

Case No. 26.

FEIBLEMAN BUILDING

This building was designed by Moise Goldstein, Architect, with Jens B. Jensen as Consulting Engineer. It was erected in 1931 by the B. & W. Construction Company.

The building is of modern fireproof reinforced concrete design. The Baronne Street walls are faced with limestone, backed with brick while the rear and side are of brick. It is 82'-9" or 5 stories in height, and faces approximately 199' on Common Street and has a depth of 101' along Baronne Street. The total wall area is approximately 56,531 sq. ft. and window area is approximately 12% of the wall area.

Elevations to determine settlement have never been taken, and no cracks have appeared in the structure.

No soil load tests or core borings were taken. Twelve test piles 65' long were driven at various points within the area covered by the building and the record of four of them is shown on the drawing. The others agree closely with the average. These piles were driven with a 5,000 lb. Vulcan steam hammer having a 42" stroke, to a depth of approximately 85' below curb grade.

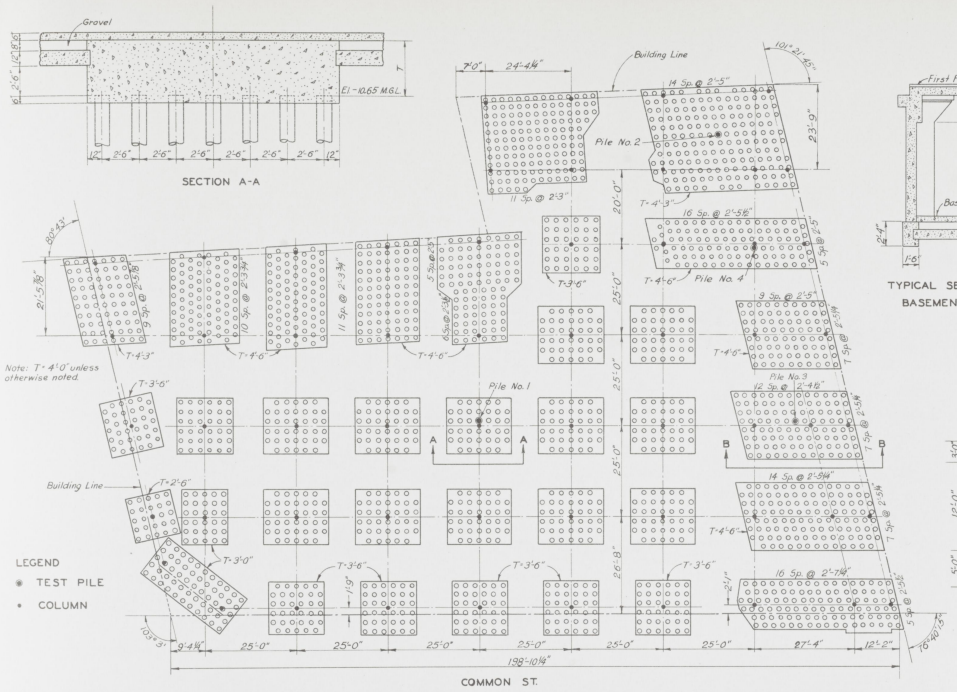
The entire area under the building was excavated to a depth of 16' below curb grade or to elevation —11.14 M. G. L. Information as to the character of the soils encountered during the excavation is not available other than that it was sticky gumbo, and that large cypress stumps were encountered. These stumps were encountered 12' below curb or at approximately —7.15 M. G. L. They were 4 to 6 ft. in diameter and 6 to 8 feet high.

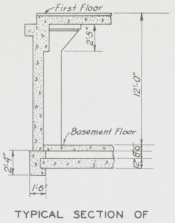
The building is supported on approximately 1,800 untreated peeled pine piles. These piles are 16%—60' long and 84%—65' long with minimum 6" tip diameter and 14" butt diameter. All piles were straight and were driven with a No. 1 Vulcan steam hammer having a 42" stroke.

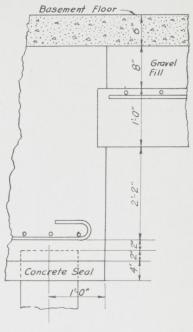
The effective lengths of piles after driving were as follows: Minimum 44', Maximum 64', with an average of 60' and they were cut off at elevation —10.64 M. G. L. or 15.6" below curb grade; the log of driving of the last 3' shows the settlement to be 23, 27 and 50 blows per foot for 60' piles and 30, 32 and 50 blows per foot for 65' piles. The tips of the piles after driving rest at about —70.00 M. G. L. average, the minimum being —54.0 M. G. L. and the maximum —74.00 M. G. L. Each pile was designed to carry a total load of 15 tons but they are now loaded to about 11 tons so that two additional stories may be added to the building. The column footings are designed to carry loads as follows:

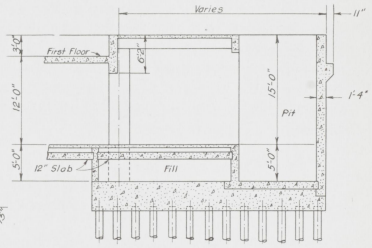
Dead load . . . . . 1,056 lbs. per sq. ft.
Live load . . . . . 905 lbs. per sq. ft.

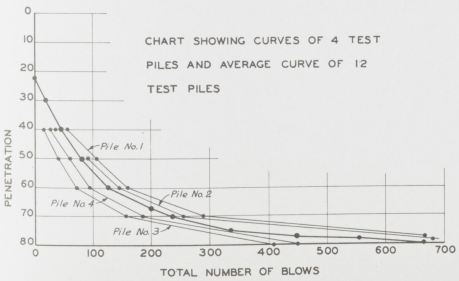
The drawing shows the spacing of the piles; the size of the reinforced concrete caps; the location of the column centers and the location of the test piles.













FEIBLEMAN'S

CASE NO. 26



Case No. 27.

ROOSEVELT HOTEL

The Roosevelt Hotel Annex, located on Baronne Street between Canal and Common Streets was designed by Favrot & Livaudais, architects, with Gunvald Aus as structural engineer and it was constructed by C. A. D. Bayley Company in 1924. This building is a modern steel frame structure with a basement and 15 floors, rising about 190 feet above the sidewalk. It fronts 124′ on Baronne Street, is approximately 148′ wide at rear and averages 160′ in depth. Walls are of brick with an area of approximately 116,000 sq. ft. of which 30% is occupied by windows.

The entire site was excavated for basement and footings to an average depth of 16 ft. below curb or to elevation —10.43 M. G. L. A few large cypress stumps about 4′ or 5′ in diameter were found scattered over the site. These stumps were found approximately 5′ below grade.

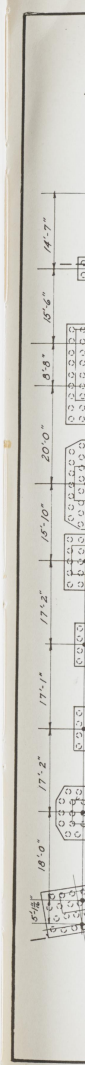
Approximately 2,000 L. L. Y. P. piles were driven for the foundation of this building.

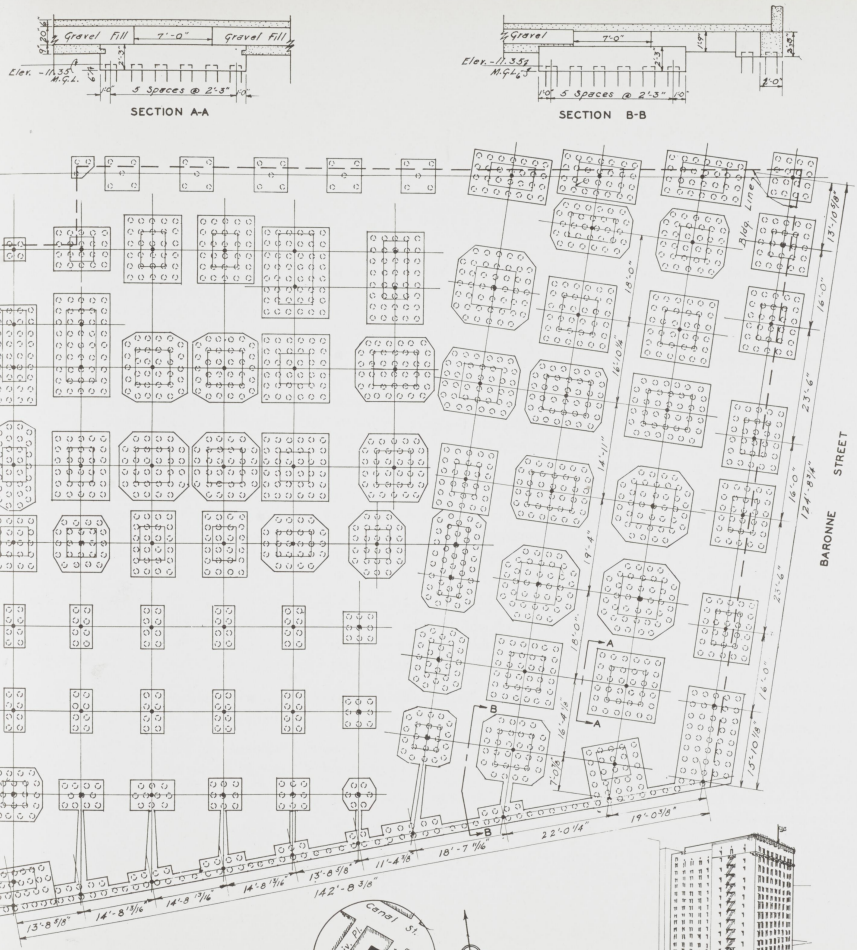
A No. 1 Vulcan steam hammer weighing 5,000 lbs. and having a stroke of 42″, was used. The driving record of these piles is not available but the drawings on accompanying sheet show the driving record and curve of 12 test piles 60′ long with 6½″ tips and 12″ to 13½″ butts that were driven with the above equipment.

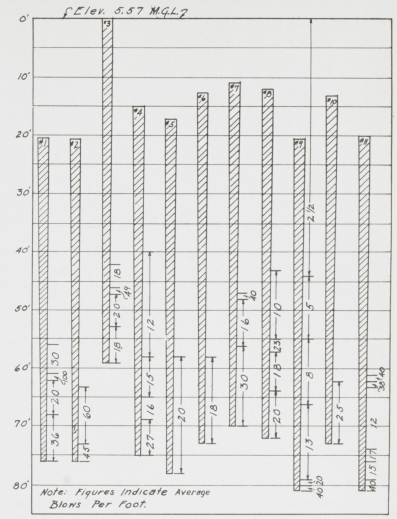
The cut-off of piles varies from elevation —15.93 to —6.26, with the average cut-off at elevation —11.35. Foundation piles are designed to carry a load of 12½ tons each. Majority of piles are spaced 2′-3″ on center with a few spaced 2′-0″ and 2′-6″.

Pile caps are of reinforced concrete 2′-3″ thick, length and width of caps vary according to the number of piles in footing but all caps extend 1′-0″ beyond the center of end of piles. The accompanying drawing shows the size, spacing and details of these caps.

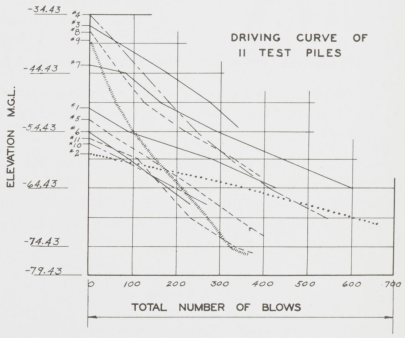
There is no apparent settlement in this building but no instrumental records are available.







TEST PILES



ROOSEVELT HOTEL ANNEX

CASE NO. 27

Case No. 28.

SHUSHAN AIRPORT

Shushan Airport is located about six miles, in an airline, from the business center of the city and is built on made land which extends into Lake Pontchartrain and this made land is surrounded and held in place by a concrete retaining seawall. The made land is mostly fine lake sand and the fill was made with hydraulic dredges after the seawall was built.

The Airport buildings consist of an administration building, which is the subject of this study, flanked on each end by large hangars.

The Administration building was designed in 1934 by Weiss, Dreyfous and Seiferth with Rice & Staples as Consulting Engineers, and was erected in the same year by Caldwell Brothers & Hart.

The building is a modern fireproof concrete and steel structure with walls of hollow tile and an imitation stone stucco exterior finish. The accompanying plan of the foundation and the perspective elevation, give a good idea of the shape and design. The total length of the building, measured along the front is 257 feet. The central portion is 100' wide and the wings 76' wide.

The building is supported on 784 creosoted yellow pine piles 60' long with 14" minimum butts and 7" minimum tips. All piles were driven with a No. 1 Vulcan steam hammer weighing 5,000 lbs. with a 42" stroke, and the tips all rest at approximately —53.0 M. G. L., which test borings indicate as being, in some tests, "Beauxite clay," in some, "Fine Gray sand," in some, "Stiff sandy clay," and in some, "Fine sand with large percentage of shells."

No record of test piles is available for the administration building, but Mr. John Klorer, Chief Engineer, Orleans Levee Board, in an article in Engineering News-Record of April 12, 1934 refers to concrete test piles driven for the sea-wall in the following language:

"Concrete test piles were driven to supplement the information obtained from borings. These piles were 12" x 12"—50 feet long. Under the weight of a No. 1 hammer,(10,500 lb.) and without striking a blow, they penetrated the soft lake bottom for 20 ft. At that depth a thin stratum of shell formation, varying from 3 to 5 feet in thickness, was encountered which was penetrated at the rate of 3 or 4 blows to the foot. Underlying this thin stratum was another formation, 6 to 8 feet in thickness, which was penetrated by the piles without driving, the piles then "fetching up" on a hard stratum of adequate thickness to support the proposed wall, at a depth of 30 to 32 feet beneath the lake bottom. The depth of water where these conditions prevailed varied from 9 to 13 feet."

We have included in our drawing a small plat of the landing field and sea-wall surrounding it. We have shown a cross section through this sea-wall, and we have shown in graphic form the driving record of four concrete test piles, with their location, as referred to by Mr. Klorer. A total of 18 test piles were driven and the curves of those not shown fall within the limits of those illustrated in graph.

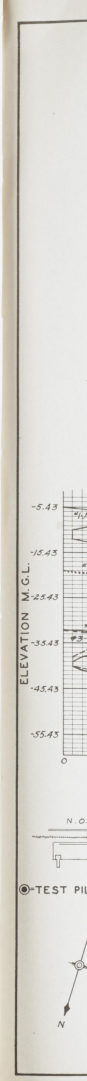
This sea-wall is almost parabolic in shape and is about 8,700 feet in perimeter. It is about 4,600 feet wide at the open end, is about 4,200 feet from the vertex to the Administration Building, which is located in the center of the open end. Stratagraphs of certain test borings in connection with the sea-wall and airport are shown in Chapter II, Nos. 176, 177, 178, 179, 180, 181, 182, 183.

No complete record of pile driving for the Administration Building is available but it is stated that for the last 3 ft. of driving the average number of blows was 25-28-33 respectively. However this average is misleading since some piles showed as low as 13 blows to last foot while some showed 55 to 63 blows to last 4 inches.

Piles were driven in groups, and capped with concrete, which support columns and wall beams, as illustrated in drawing. Piles were cut off at elevation 2.91 and 3.91 M. G. L.

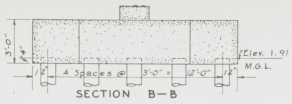
The design load is 12 tons per pile which is based on full dead, plus 20 per cent of live load. Live load was assumed as 50 lbs. per sq. ft. Wind load —25 lbs. per sq. ft.

There is no visible evidence of settlement either in the exterior or interior walls or floors of the building.





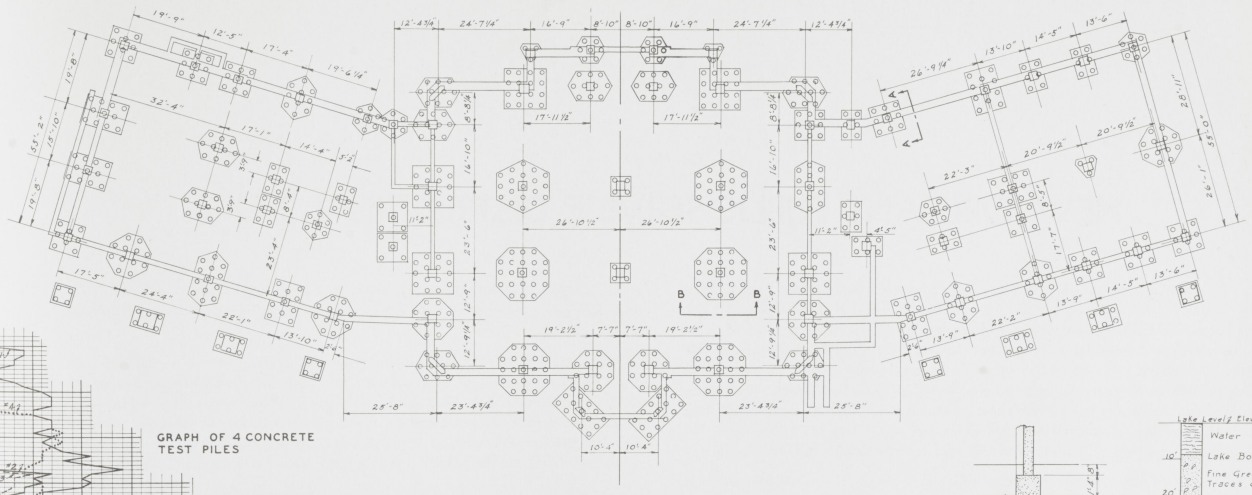
PILE SPACING
MAIN BLDG.

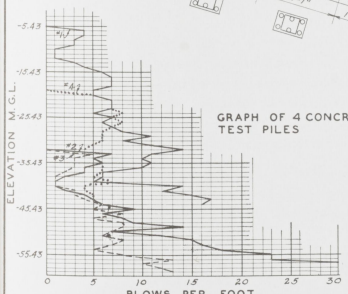


SECTION B—B



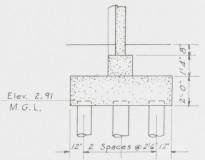
PILE SPACING
FOR WINGS



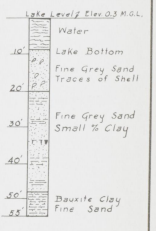


GRAPH OF 4 CONCRETE
TEST PILES

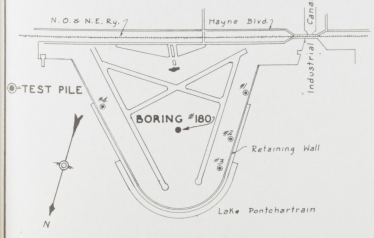




SECTION A-A



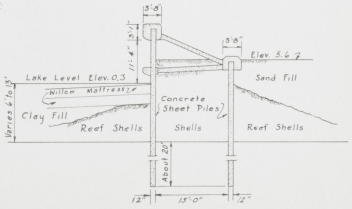
BORING #180



LOCATION MAP

SHUSHAN AIRPORT

CASE NO. 28



RETAINING WALL

Case No. 29.

NEW ORLEANS PUBLIC SERVICE DISTRIBUTION BLDG.

The New Orleans Public Service Distribution Building is a fireproof steel frame structure designed by J. J. Bulluing, Civil Engineer and was constructed by J. A. Petty and Sons in 1929. The Lukens Steel Company were the designing engineers for the steel work. It is located on the corner of Tulane Avenue and N. Cortez Street, fronting 72'-4½" on Tulane Avenue by 159' deep. The building is two stories high, rising 37 feet above grade. Exterior walls are of brick 13" thick and the floors are 6" reinforced concrete slabs. The second floor is supported by columns but the roof is carried on steel trusses having a span of 71' which is supported by the exterior wall columns. Approximately 22% of the wall area is occupied by windows. The foundation of this building is of piles and reinforced concrete footings and grade beams.

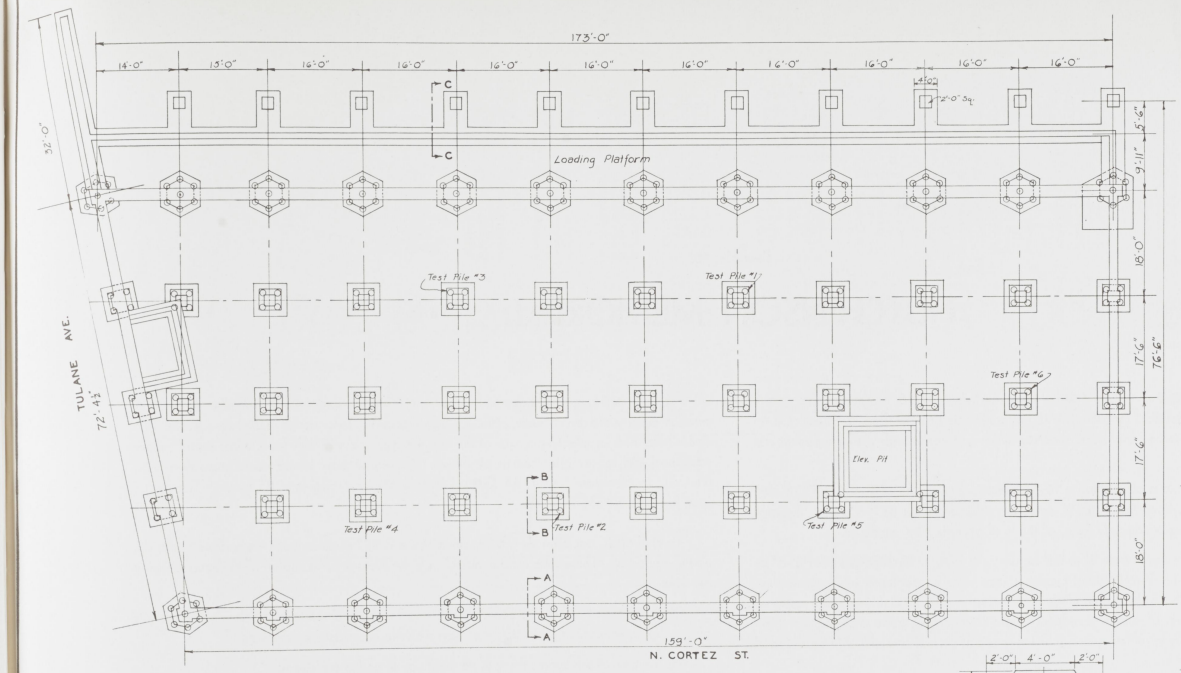
The only excavation was for the footings which go to a depth of 6'-6" below grade or to elevation —5.66 M. G. L.

Six 60' test piles were driven to determine the length needed to reach the proper resistance. A No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42", was used to drive these piles. The graph on the accompanying drawing shows the driving records of these piles.

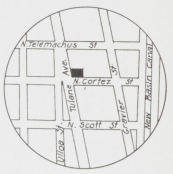
301 untreated L. L. Y. P. piles 50 feet long with 6" to 8" tips and 13" to 16" butts were driven for the foundation. Three feet of these piles were cut off giving them an effective length of 47 feet. These piles were driven to grade, a follower was put on and they were then driven an additional three feet. The table on the accompanying drawing shows the driving record of these last three feet. Piles were cut off at elevation —5.16 M. G. L. and the tips rest at approximately —52 M. G. L. The building is designed for a total load per pile of 12½ tons.

The pile caps are of reinforced concrete and vary in size and depth. A few spread footings are on the side of this building but they support the loading platform and not the building proper. The accompanying drawing shows the spacing of these caps and details of their construction.

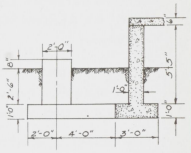




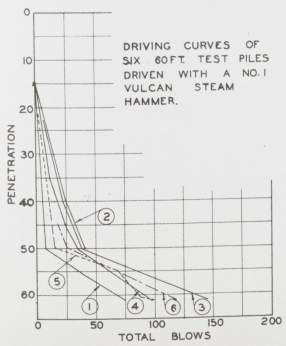
Blows Last Three Feet			
	Mim.	Max.	Avg.
1st. Ft	3	9	4
2nd. Ft	3	11	6
Last ft.	8	12	10



LOCATION MAP

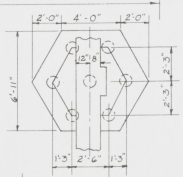


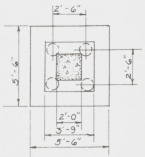
SECTION C—C

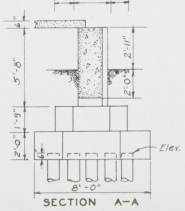




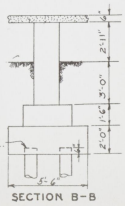
DISTRIBUTION BUILDING
N.O. PUBLIC SERVICE
CASE NO. 29







SECTION A—A



SECTION B—B

Case No. 30.

HUTCHINSON MEMORIAL

This building is located on Tulane Avenue between LaSalle and S. Liberty Streets. It was designed by Favrot & Livaudais, Architects, and was constructed by the Geo. J. Glover Co. in 1930. It is a modern fireproof reinforced concrete building 8 stories high with a basement and two towers.

Height from grade to top of building is 112'-0" and the towers are 120'-10" and 131'-10" above sidewalk. The building fronts 88'-9" on Tulane Avenue and is 331'-8" deep. Exterior walls are of brick with approximately 20% of the area occupied by windows.

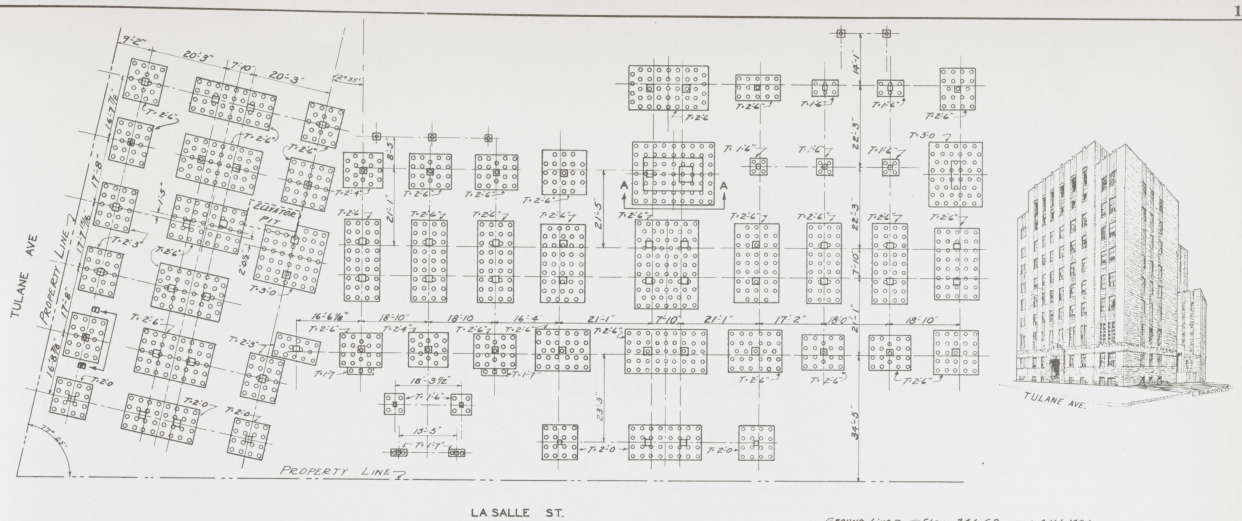
Excavations varied in depth from 7' to 16' below curb with an average depth of 8'-6" or Elevation —4.63 M. G. L. Two layers of cypress stumps were encountered while excavating. First stumps were found about 6 ft. below grade at Elevation —1.84 M. G. L. and were scattered over the site. Second layer of stumps were found about 11 ft. below grade at Elevation —6.84 M. G. L. These were close together covering the entire site of excavation and had to be chopped with hand axes to be removed.

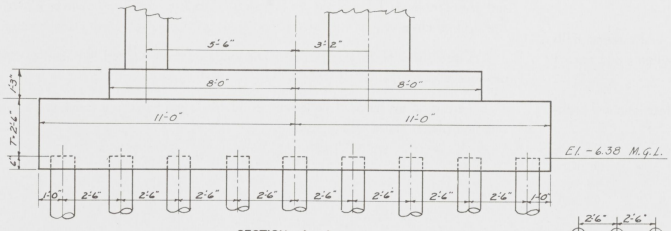
About 1,500 L. L. Y. P. piles bark removed 40' and 50' long with 6" minimum tips and 13" minimum butts were driven with a No. 1 Vulcan steam hammer, weight 5,000 lbs., stroke 42". These piles had an effective length of 37 and 48 feet. Several soft spots were found where additional and longer piles had to be driven. Cut-off of piles varied from Elevation —3.63 M. G. L. to Elevation —13.43 M. G. L. Last foot of driving averaged 25 blows. The design load for piles is 13½ tons each.

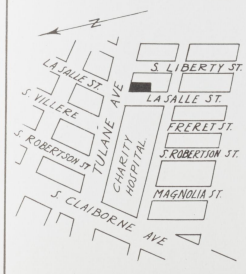
Twelve 60 ft. test piles with 6" minimum tips and 12" minimum butts were driven with the above equipment. These piles follow very closely the average curve shown on the accompanying drawing.

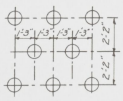
Pile caps are of reinforced concrete and vary in size and thickness. Spacing and details of these caps, also spacing of piles, are shown on the accompanying drawing.

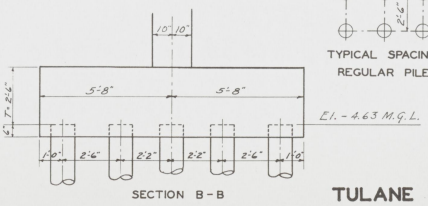
At the time of this survey there is no evidence of undue settlement.

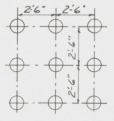


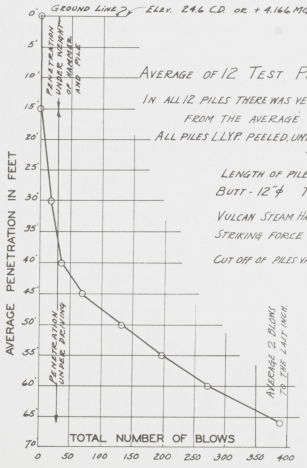












TULANE MEDICAL SCHOOL - HUTCHINSON MEMORIAL

CASE NO. 30

Case No. 31.

LAFAYETTE HOTEL

This building was designed by S. S. Labouisse, Architect, and was erected in 1916 by Fromherz and Drennan, contractors. It is located on St. Charles Street between South and Girod Streets, and measures 149'-8" on St. Charles Street and 50'-2" on South Street.

It is a steel frame structure with walls of brick and is five stories high.

Footings are reinforced concrete resting on untreated yellow pine piles, and exterior walls are carried on reinforced concrete grade beams which extend around the building and rest on the concrete footings.

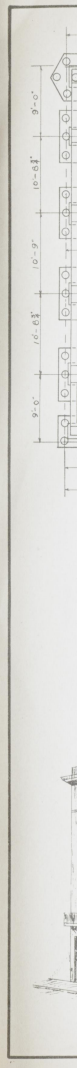
A total of 308 piles were driven in the foundation. These piles are 45 feet long and probably have 7-inch minimum tips and 12-inch minimum butts.

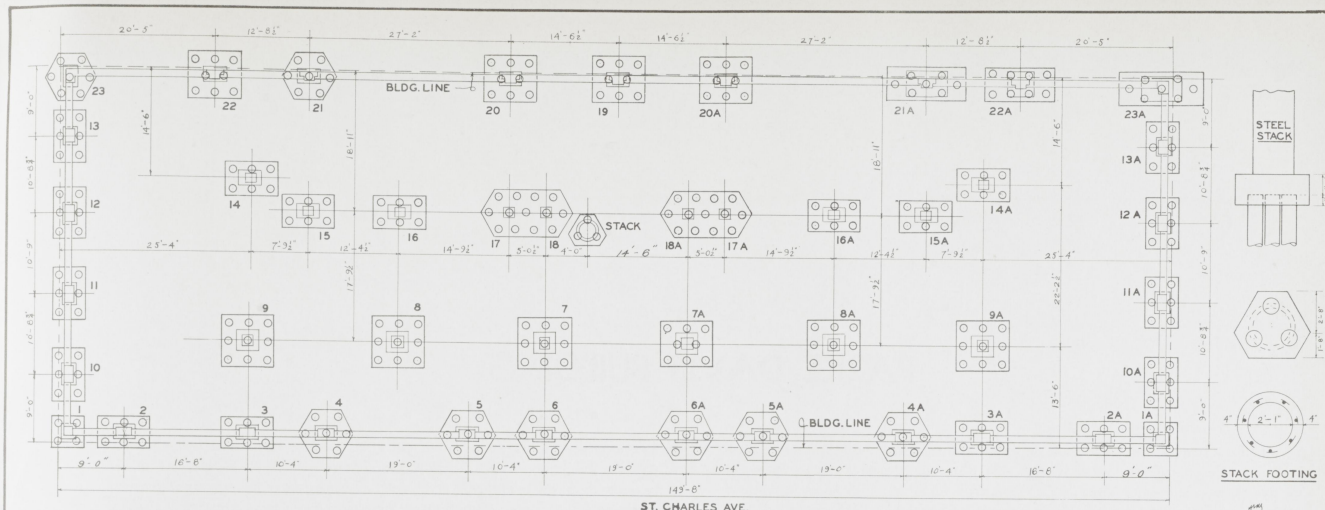
There is no basement and all piles are cut off at 5 feet below curb grade or at approximately 4.5 M. G. L. Excavation for footings was 6 inches below pile cut-off.

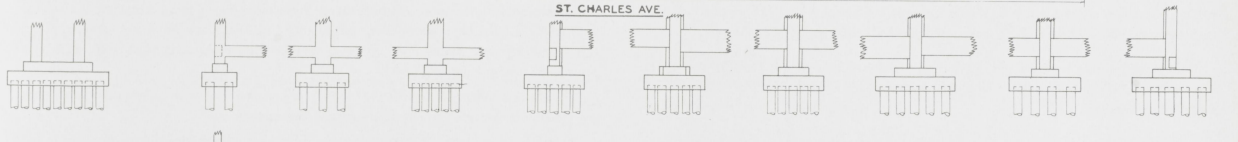
The accompanying drawing shows the foundation outline with location of piles; and shape and size of footings. Pile spacing varies from 2'-1" to 3'-8" but is approximately 2'-6" on centers. The stack or chimney is of reinforced concrete and is supported on three foundation piles.

A dead load of 12 tons per pile was used and the estimated live load was 150 pounds per square foot.

There is no evidence of settlement, as no cracks can be seen in brick walls, and there are very few plaster cracks visible inside.







COLS. 17 - 18
17A - 18A

COLS.-1-1A

COLS.-2 - 2A
3 - 3A
10 - 10A
11 - 11A
12 - 12A
13 - 13A

COLS.- 4 - 4A
5 - 5A
6 - 6A

COL.- 23

COL.- 21

COLS.- 19
20 - 20A
22

COL.- 21A

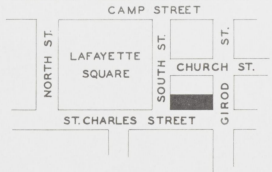
COL.- 22A

COL.- 23A

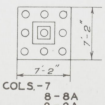


HOTEL LAFAYETTE

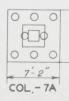
CASE NO. 31



LOCATION MAP



COLS.- 7
8 - 8A
9 - 9A



COL.- 7A

COLS.- 14 - 14A
15 - 15A
16 - 16A

Case No. 32.

PARKE-DAVIS BUILDING

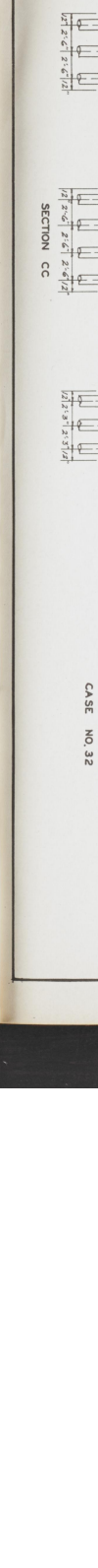
The Parke-Davis Building, located on the corner of Camp Street and Howard Ave., is a reinforced concrete building four stories high with a basement occupying about a quarter of the site. It was designed by Moise H. Goldstein, architect, with Jens B. Jensen as structural engineer, and was erected by O. M. Gwin Construction Company in 1924. It is 50'-6" high from grade to roof and fronts 124 ft. on Camp Street by 106 ft. on Howard Avenue.

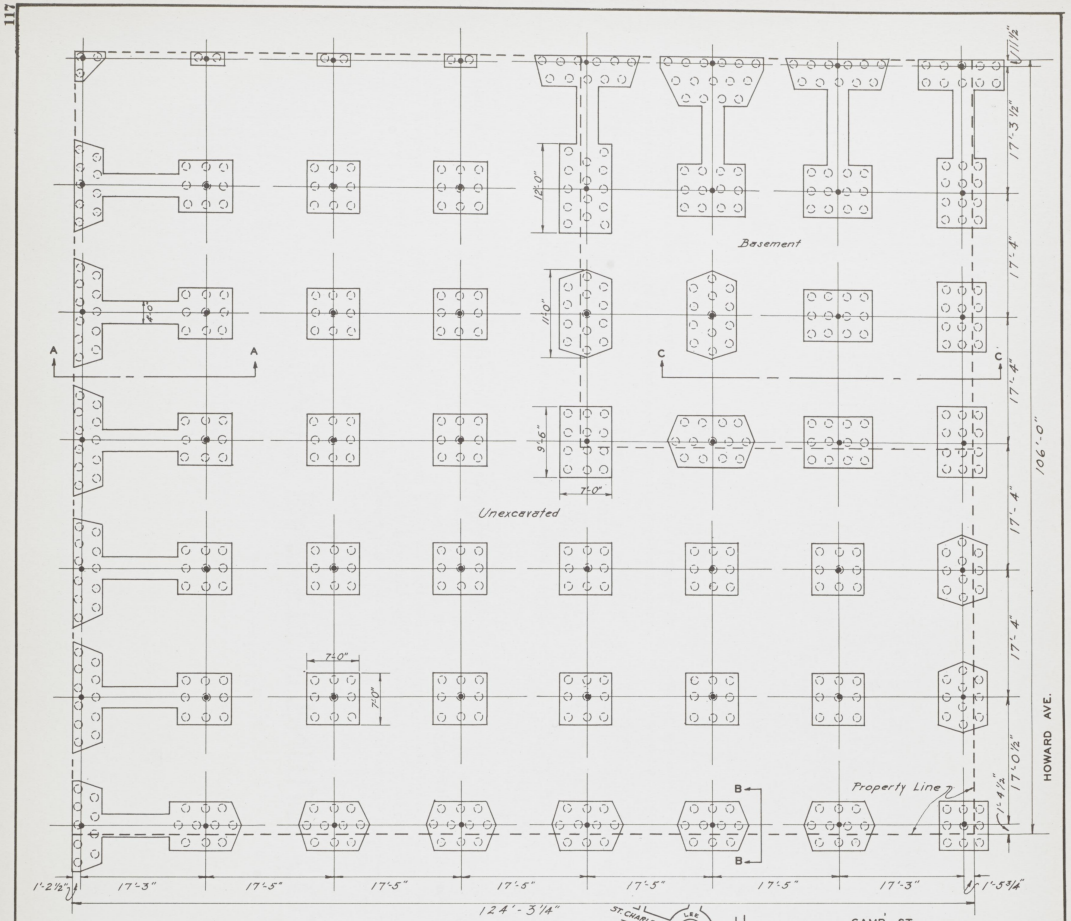
The front and side walls are of brick and are faced with cast stone for the first story. The rear and side walls are of brick. Wall area is approximately 23,000 sq. ft. of which 18% is occupied by windows.

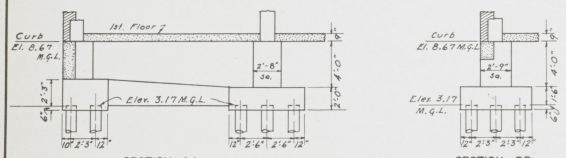
About 550 L. L. Y. P. untreated piles with bark removed were driven under the foundations. These piles were 50 ft. long with 6" minimum tips and 12" minimum butts and had an average effective length of 47 ft. They were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". No driving records are available but the specifications call for them to be driven to a solid bearing which shall be determined by a penetration not exceeding $1^{3}/_{10}$ inches on the final blow. All piles except those under the basement are cut off at elevation 3.17 M. G. L. The basement piles are cut off at —0.25 M. G. L. The design load per pile is $12\frac{1}{2}$ tons. Piles are spaced 2'-6" on center except where shown otherwise in the details on the accompanying drawing.

Reinforced concrete caps form the footings for columns. The accompanying drawing shows the location of the caps and the details of their construction.

There is no evidence of settlement in the building but no records have been kept in this regard.

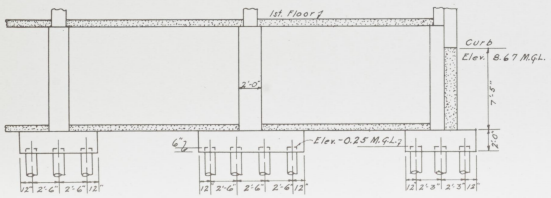






SECTION AA

SECTION BB



SECTION CC





PARKE DAVIS BUILDING

CASE NO. 32

Case No. 33.

MAX BARNETT FURNITURE CO.

The Max Barnett Furniture Company, located on Carondelet and Lafayette Streets was designed by Weiss & Dreyfous, architects, and was constructed by R. P. Farnsworth & Company, Inc. in 1927. The building fronts 103 feet on Carondelet Street by 150 feet on Lafayette Street and has a basement under a small part of the building. There are 8 main floors which rise 108 ft. above the sidewalk, and an auditorium which is set back and which rises an additional 26 ft. It is a modern, fireproof, reinforced concrete structure with exterior walls of pressed brick trimmed with stone.

The basement, as shown on the plan on accompanying drawing, occupies only a small part of the site at the rear of the building. The excavation for the footings under the basement goes down to a depth of 13'5" below grade or to elevation —4.86 M. G. L. The excavations for other footings vary from 7 to 8 ft. below grade or from elevation 1.03 to 0.03 M. G. L.

1023 untreated L: L. Y. P. piles were driven with a No. 1 Vulcan steam hammer having a weight of 5000 lbs. and a stroke of 42". The driving records of the piles are not available, but a stratum that was fairly uniform was reached at a depth of 45 ft. below grade or at elevation —36.97 M. G. L. and the piles were of such a length as to bring their tips to rest at approximately this elevation.

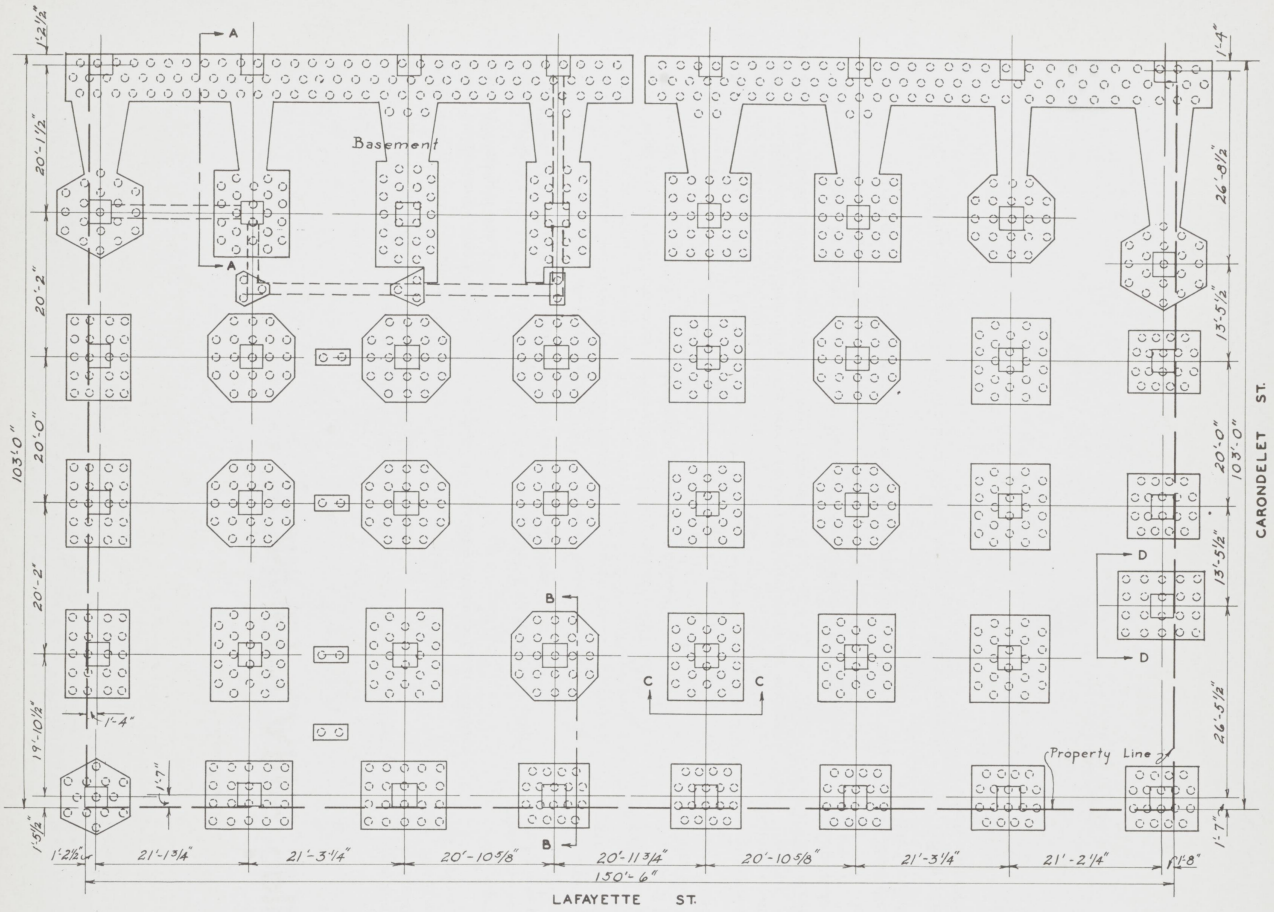
The following table gives the lengths, cut-off, etc. of the piles:

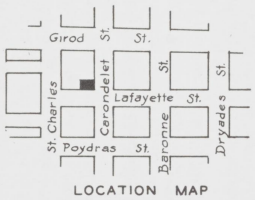
No. of Piles	Cut-off Below Grade	Lengths Ordered	Effective Lengths (Approx.)
670	7'- 0"	42'-0"	38'-0"
162	8'- 1"	40'-0"	37'-0"
19	12'- 1"	38'-0"	33'-0"
172	12'-11"	35'-0"	32'-0"

The design load is approximately 13 tons per pile.

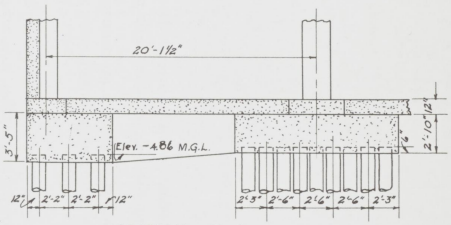
Pile caps are of reinforced concrete of various sizes. The accompanying drawing shows the spacing of piles, size, and spacing of caps and details of their construction.

There are no cracks visible in brick walls and if any settlement has taken place it must be slight and uniform.

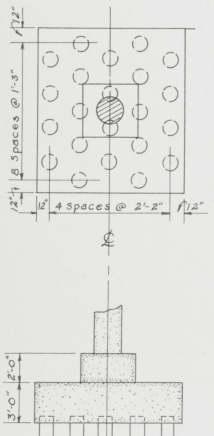




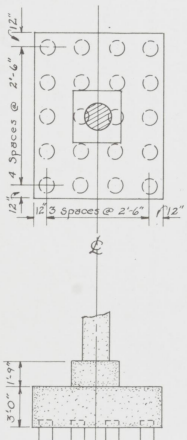
LOCATION MAP



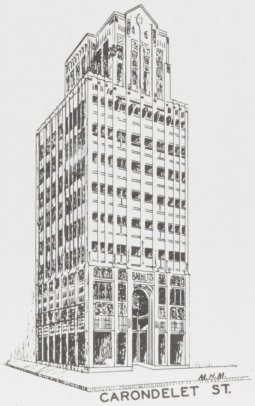
SECTION A—A

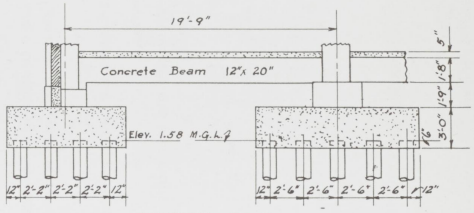


SECTION C—C



SECTION D-D





SECTION B—B

MAX BARNETT FURNITURE BUILDING

CASE NO. 33

Case No. 34.

BONNET CARRÉ SPILLWAY

This structure is located on the east bank of the Mississippi River with its lower abutment just north of Belle Town which is about 28 miles north of New Orleans.

Preliminary tests were begun in 1929 and the construction completed in 1931.

The structure was designed by the U. S. Engineers. The building contractors were Stevens Bros. and Miller-Hutchison.

The structure was erected in order to insure the safety against flood of the lower Mississippi Valley and New Orleans area during flood stage of the Mississippi River.

The structure is what is known as a needle weir. The flow of water over the weir crest is controlled by creosoted timber needles operated by cranes on rails on top of crest runway. Referring to the accompanying drawing No. 1 it is seen that in front of the spillway crest is a 20 ft. concrete apron protected from underwash by an integral toe and gravel and sand. Between the spillway crest and this apron is a 5 foot depression designed to partly diminish the flow of the water. The crest of the weir rises to a height of 11 feet above the bottom of the depression. A concrete rip-rap extends for 44 ft. beyond the weir crest. Integral with this are protruding blocks designed to further diminish the force of the water. Beyond this is an articulated concrete slab extending 225 feet from construction joint. This slab rests on a 12" gravel fill and is protected from underwash by steel sheet piles. The apron sections are attached to the main weir structure by construction joints to provide for uneven settlement.

The Spillway discharge channel runs into Lake Pontchartrain thru about 6 miles of swamp. It is confined by hydraulically created levees as shown on the accompanying drawing No. 2.

The soil characteristics of this locality were determined before any foundation design was made.

A stratagraph of borings made on this site and their location is shown on the accompanying drawing No. 3.

These borings indicated that this underlying soil consists in general of strata of grey clay, blue clay and stiff blue clay. All of these contain some sand, and farther down, strata of packed sand. Shells were encountered in two instances as shown, and salt water was found at a depth of 68' below Mean Gulf Level.

Soil loading tests were conducted on the site, the results of which are graphically represented on the accompanying drawing No. 2. The loads were applied as shown. Platforms were built in pits dug to a stratum of soil free from roots and organic matter. Over a period of approximately 188 hours, loads of pig iron were applied in increments and the settlement at each increment of additional load was recorded. After the maximum load was applied and the corresponding settlement recorded the load was removed and the rebound noted.

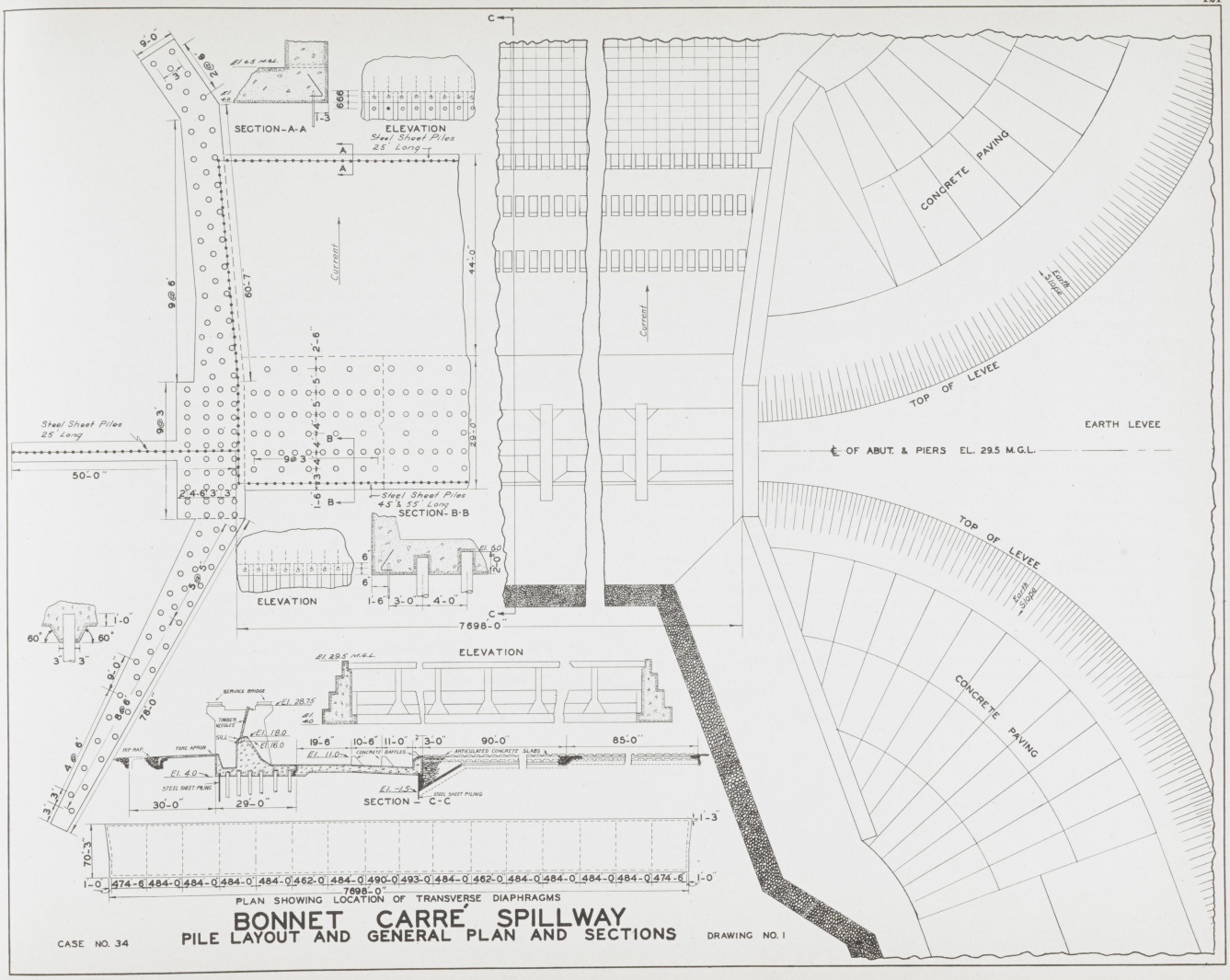
Lateral friction tests were conducted by means of a concrete block 3' x 5' x 2' resting flat on this soil 2 ft. below natural surface, which was pulled by a ratchet. Dynamometer readings indicated that with a normal pressure of 300 lbs. per sq. ft. and a 1¼ inch lateral movement the maximum frictional resistance was 400 lbs. per sq. inch.

Similarly with a 500 lb. per sq. in. normal pressure and 2½" lateral movement the maximum frictional resistance was 375 lbs. per sq. inch.

The results of these tests indicate that the soil in general has a bearing value in excess of 1500 pounds per sq. ft. The average settlement is .05 ft. and average permanent settlement is .02 ft.

Since the direct bearing value of the soil was insufficient to support the main weir structure, a pile foundation was used for this section of the structure.

Both timber and concrete test piles were driven on the structure site and the results of the tests are graphically represented on the accompanying drawing No. 2.



BONNET CARRE' SPILLWAY

PILE LAYOUT AND GENERAL PLAN AND SECTIONS

CASE NO. 34

DRAWING NO. 1

The timber test piles varied in length from 70 to 75 feet. Butt measurements varied from 15 to 18 inches and tip measurements varied from 6 to 8 inches. The Raymond concrete piles varied in length from 36 to 37 feet and tapered from 8 inch tips to 22 inch butts. The piles were driven with a Vulcan No. 1 steam hammer weighing 5000 pounds and having a 42" drop.

The comparison of blows struck with the depth penetrated by the piles is indicated on the accompanying drawing No. 2.

After driving, the piles were cut off at about 2 ft. above natural ground level and a loading platform was built on two steel I beams resting on pile caps. The platform was then loaded with pig iron in increments and the amount of settlement recorded for each increment. The results of these tests are shown graphically on the accompanying drawing No. 2. A graphic representation of the lateral thrust tests is also shown.

In addition to these tests a report was submitted by the J. F. Coleman Engineering Company, Consulting Engineers, which report recommends the use of 70 and 75 feet long untreated timber piles, spaced in such a manner that the dead load would be 12 tons per pile. Recommendations made by the firm were not a result of mathematical conclusions but were based upon results of their own experience and their acquaintance with the experience of others in this territory.

This report states that from many years of experience in pile driving this firm has sought to evolve a formula from which the safe loading of piles might be determined, as a result of the action of the pile under the hammer, and have thus far been unable to evolve such a formula. It is believed that for the most part the carrying capacity of the pile is due to skin friction. Since the use of piles for foundations in this locality began, it has been customary to drive the piles to such a depth as to seat them in packed sand, stiff clay or other similar strata, or to use piles of such length as to afford considerable surface for skin friction, for example 70 ft. to 80 ft. piles.

In considering the type of pile to be used the following types were considered and the reason for their rejection or acceptance given.

Concrete piles poured in place.

Since the piles must be driven to a depth greater than 40 ft. and it is difficult to assure a good concrete from a mixture poured at this depth, they were eliminated.

Composite piles. This type of pile was eliminated because of the uncertainty of bond between the wood and concrete, even though the lateral thrust, due to hydrostatic pressure on the structure, will probably never operate on the piles.

These two types being eliminated the choice must be made from untreated wood, creosoted wood, and precast concrete.

The cost per linear foot of these piles at the time the report was written were as follows:

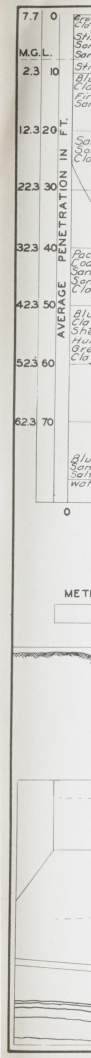
Untreated Wood	$0.35
Creosoted Wood	.85
Precast Concrete	$4.00 to $4.50

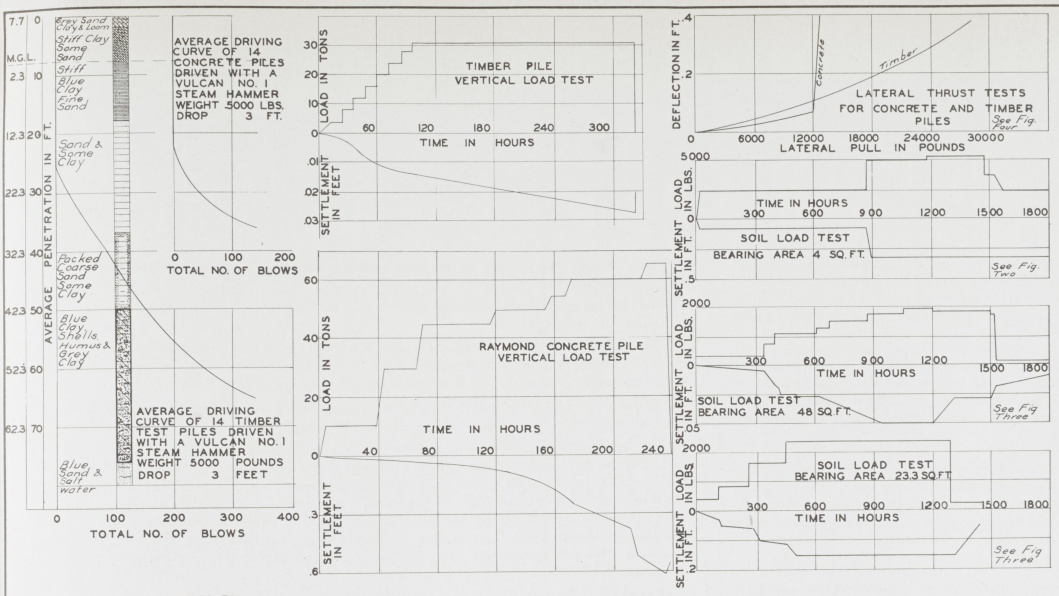
The bearing value of concrete being not more than double that of the wooden pile the difference in cost seems sufficient to reject the concrete pile, unless it be so greatly more durable than the wood as to justify the cost. This did not seem to be the case and it was felt that they should be eliminated.

Should the untreated piles have as great a life expectancy as the concrete structure they must support, there was no justification for the added expense of creosoted piles.

Upon examination of records of untreated piles placed in a similar situation it was found that in no instance, where there was as much as four feet of earth covering the piles, was there any sign of decay of the piles, no matter what their age.

Since timber decays in the presence of three agencies, that is, heat, air and moisture, and the exclusion of any one of these arrests or prevents decay, it was assumed that untreated timber piles could be adopted since the design of the weir structure required that the piles be cut





METHOD OF LOADING PILES

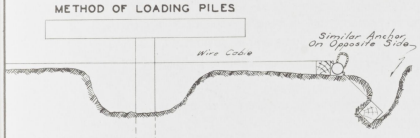


FIGURE 1

METHODS OF TESTING SOIL

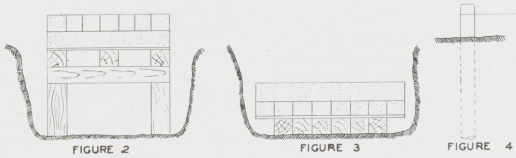
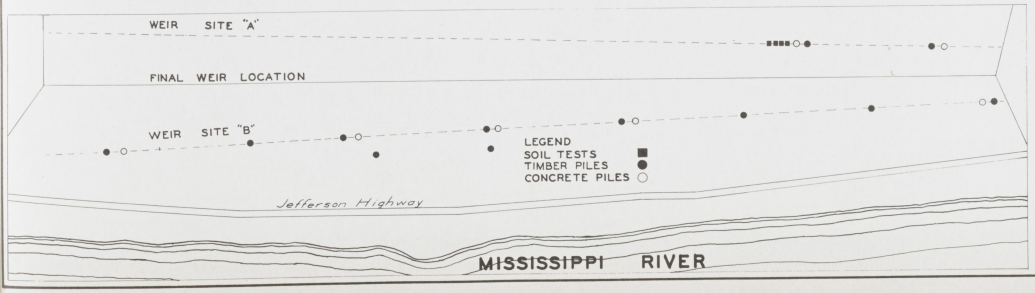
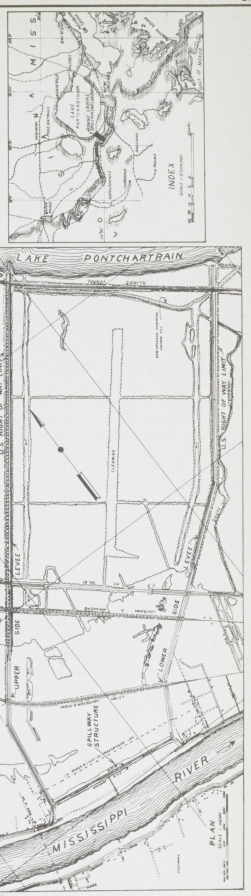


FIGURE 2

FIGURE 3

FIGURE 4





BONNET CARRÉ SPILLWAY

SOIL & PILE TESTS

CASE NO. 34 DRAWING NO. 2

off at or below the existing water table which is 4 to 7 feet above M.G.L. and the natural ground level is 12 to 14 feet above M. G. L. Thus there would be sufficient capillary attraction to have the same effect as if the pile were wholly submerged and the air would be excluded from the piles by a four foot thickness of concrete above them, and the soil which surrounds the piles below the concrete.

On the basis of comparison of the results of the soil and pile tests with similar tests on previous jobs, which have proven wholly successful, it was recommended that 70 to 75 feet piles be used in 50% proportions. Where the greatest resistance to driving was encountered the shorter piles were to be used. The piles were to be spaced as uniformly as possible in order that each pile be subjected to a load of 12 tons.

Since driving of piles causes those piles already driven to react upward slightly, and settlement of foundations has been found to be the result of piles assuming the position to which they had originally been driven, it was suggested that a check be kept on the elevation of the piles and that an additional blow or blows from the hammer be given to the dislodged piles in order to reseat them. If this were done it was safe to assume that no measurable settlement would result in the foundation.

The main weir footings are of reinforced concrete, continuous in 347 sections, each 22 ft. long, with an expansion joint between each section. They extend for 7698 feet between abutment faces and are 29 feet wide.

There is an average of 31 piles in each 22 ft. section spaced at 3, 4 and 6 feet. This spacing is in accord with correct distribution of load to insure a uniformity of 14 tons per pile dead and live load, which the U. S. Engineers used in design. The live load is due to a maximum head of water of 15 feet.

The wing walls and abutment foundations are as shown in the accompanying drawing No. 1, with an overall length of 177 feet and varying widths of from 5 feet at the ends increasing to 14 ft. at abutments. The piles are spaced approximately at 3 ft. centers, varying slightly under main structure and abutments.

The fore and rear aprons rest directly upon the soil, the loads being 375 and 112 pounds per square foot respectively.

This area was excavated to an average elevation of 4.0 M. G. L., except for the area covered by the concrete rip-rap, where this excavation was to an elevation of 2.0 M. G. L. All stumps and organic matter were removed, and excavated material was used as fill for levee work.

To this date, which is April 1936, there has been no occasion to use this Spillway, and the structure appears to be in first class condition without signs of settlement.

On January 30th, 1937, when water in the river rose to elevation 17.5 M. G. L. on the weir the Engineers began removing the gate needles to permit the river water to pass through the Spillway to the Lake. More needles were removed from time to time until all of the 18 ft. bays were open and 63 percent. of the 16 ft. bays had been opened. At this time the elevation of the water at the upper side of the weir was 21.8 M. G. L. and the total flow through the Spillway was approximately 210,000 second-feet. For the existing stage at the Spillway 76 percent. of capacity of the weir structure was being utilized. The highest point reached on the Carrollton gauge was 19.3 M. G. L. February 28th.

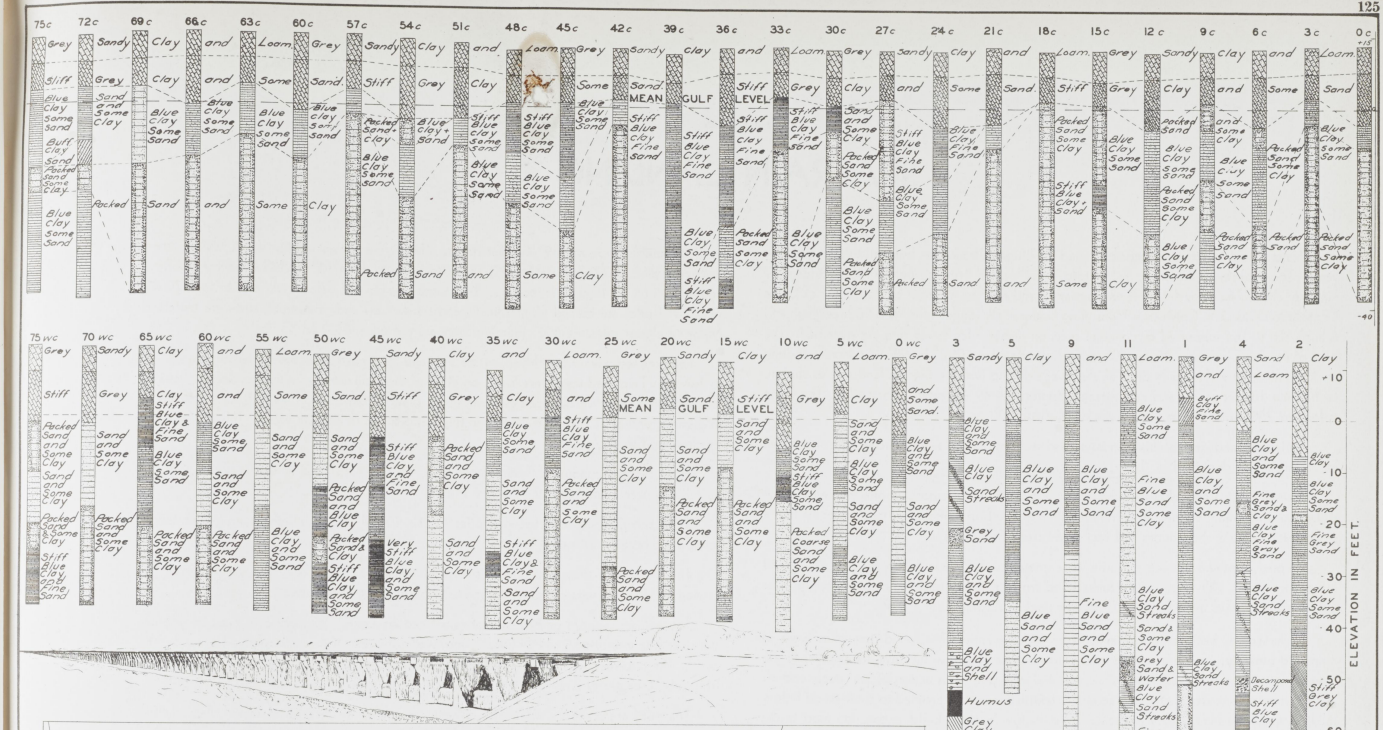
On March 2, the river began to fall and on March 6, when a steady fall was indicated, the engineers began replacing the gate needles and on March 16th all needles were back in closed position and the elevation of the water at the upper side of the weir was 21.8 M. G. L.

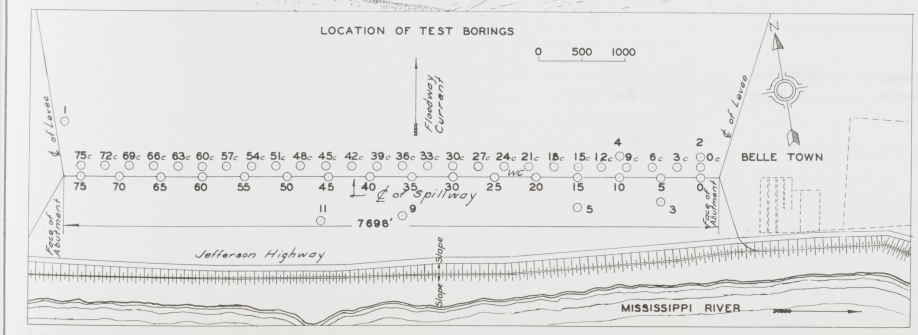
The Engineers estimate that the stage at the Carrollton gauge was lowered between 2½ and 3 ft. by the operation of the Spillway.

There is still no evidence of settlement or misalignment in the concrete weir and the Spillway has been proven to be effective and efficient.

All bays in the weir are 20′ wide, but 176 bays have sills at 18.0 M. G. L. and 174 bays have sills at 16.0 M. G. L. Hence the reference to 18′ bays and 16′ bays.







BONNET CARRÉ SPILLWAY TEST BORINGS

COPIED FROM U. S. ENGINEERS REPORT.

CASE NO. 34 DRAWING NO. 3

Case No. 35.

SEATRAIN LANDING

This is a steel Gantry crane structure used for lifting railroad cars from rail to ship and vice versa. The capacity of the crane is 125 tons. It is located 16 miles below New Orleans by highway and 20 miles by river. It was designed and erected in 1929 by the Frederick Snare Corporation with J. F. Coleman as Consulting Engineer for foundations. It is 105 feet high and is anchored to and supported by concrete piers on timber piles driven into the river bed. The base of the crane measures 35′ by 60′ and is supported by a 9′-3″ by 93′-0″ concrete footing on 138 untreated yellow pine piles on the river side and two footings on land side as shown, each being 18 feet square and each being supported by 49 untreated timber piles. The crane is located 350 feet out from west levee of Mississippi River.

A plan and end view of this foundation and sections of railway approach trestle are shown on accompanying drawing No. 1.

A single track approaches from the N. O. L. C. R. R. enters upon the pile trestle 620′ upstream from the crane, divides into a double track to enter upon the crane base, emerges into a single track trestle and continues 621 feet downstream from crane.

All piles, caps and stringers in trestle were treated with "Grade A" creosote oil, 14 pound full cell treatment. All braces, guard timbers and cross ties were treated 8 pound Rueping. The trestle was designed by F. E. Bates, Bridge Engineer, Missouri Pacific R. R.

A change has been made in the concrete piers recently. The foundation piles were of untreated pine and since the original piers did not extend below the low water level of the river, these piles were alternately submerged and exposed. This action of the water and air caused these piles to decay to such a serious extent that it was determined to cut them off below the low water line and cap them with concrete at the low level and build up concrete piers to the undersides of the original concrete bases of the crane. A sketch of the present appearance of the river side pier is shown as insert on drawing No. 2.

It should be noted that the untreated foundation piles are sound, where they are continuously under the water, and no settlement has been noticed and no renewal or replacement of, or addition to, these piles has been required.

The piles used in the crane foundation were untreated yellow pine from 85 to 90 feet long with 8″ minimum tips and 12″ minimum butts. They were driven with a No. 1 Vulcan steam hammer, weight 5,000 lbs., stroke 42″. The piles were cut off at 10.15 M. G. L. on front footings and at 8.65 M. G. L. on rear footings. They penetrated to 50′ below river bed or to —70 M. G. L. All piles are braced longitudinally and transversely and in addition some are battered. Mooring cluster piles are 105′ long and they are cut off at 35.0 M. G. L.

Fourteen test piles were driven on the site, and the penetration under final blows was ⅛ to ⅙-inch. Two load tests were made on eight of these piles. The method of loading was as follows: four piles were braced as a unit and a platform built upon them. A steel tank 20 ft. in diameter and 10 ft. high was placed on this platform and filled with water. This is illustrated on drawing No. 2.

In the first test conducted, with piles 7, 8, 9, 10, the piles failed when the water tank was ¾ full and precipitated the tank into the river.

In the second test conducted with piles 11, 12, 13, 14, the piles were given a slight batter toward the center and special attention was given to the bracing.

The location of these test piles is shown on drawing number one, and the results of the driving and loading tests are shown graphically on drawing number two.

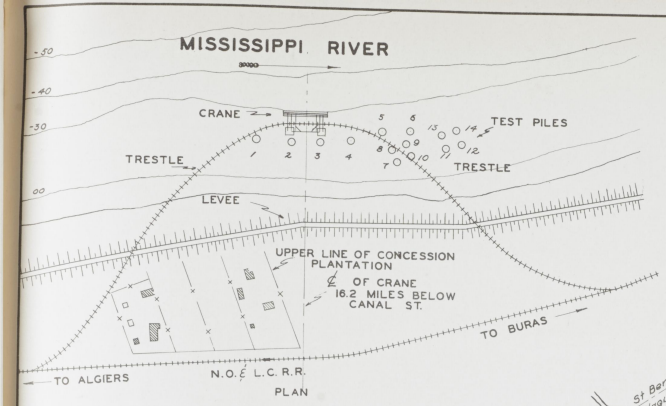
The column footings or piers are of reinforced concrete. They are 3 in number, one on the river side measuring 9′-3″ by 93′-0″, and two in the rear of these measuring 18 feet by 18′ by 7′. The two rear caps are spaced 64′-2⅛″ center to center and the distance from center of front pier to center of 2 rear piers is 35 ft.

The piles are spaced 2′-6″ center to center as shown on the accompanying plan. In the front footing or pier the pile heads are embedded 3 ft. in the concrete while in the two rear footings they are imbedded 2 ft.

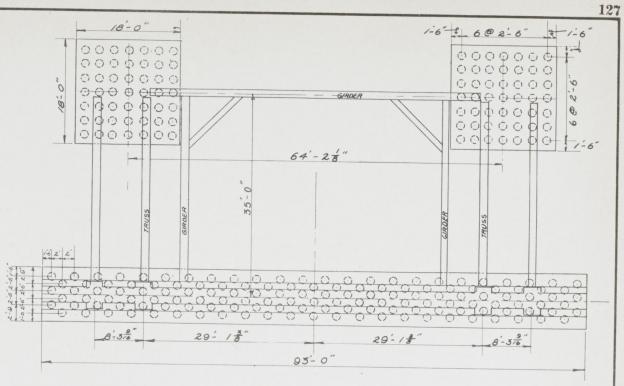
The total live load and dead load on the columns are as follows:

Rear columns . . . . . 287,500 Lbs.
Front columns . . . . . 676,750 Lbs.

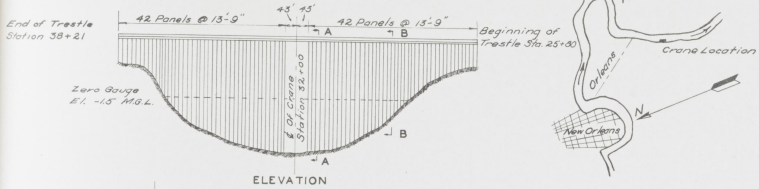
25% of the load is allowed for impact. The total design load per pile is 10 tons.



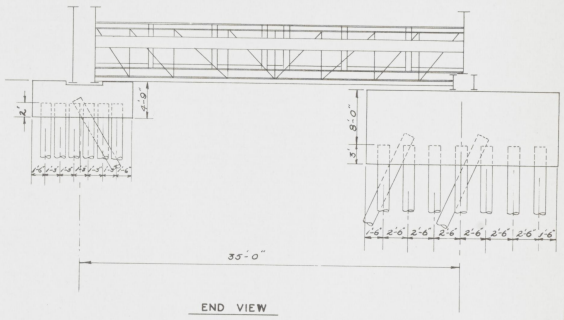
PLAN



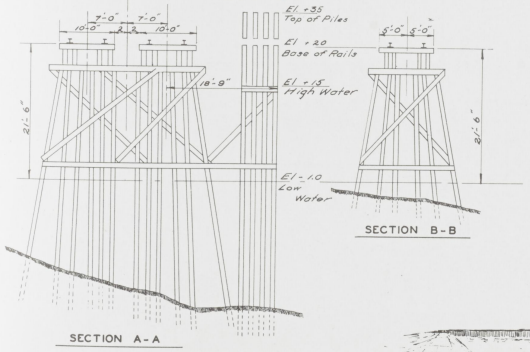
FOUNDATION PLAN



ELEVATION

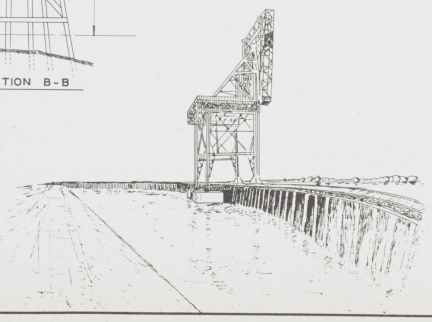


END VIEW



SECTION A-A

SECTION B-B

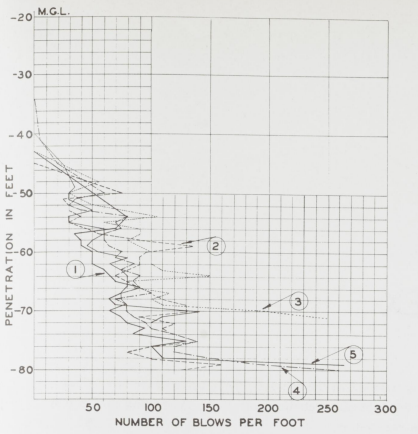


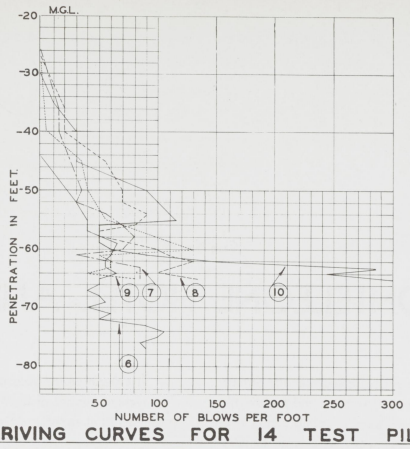
TRESTLE APPROACH

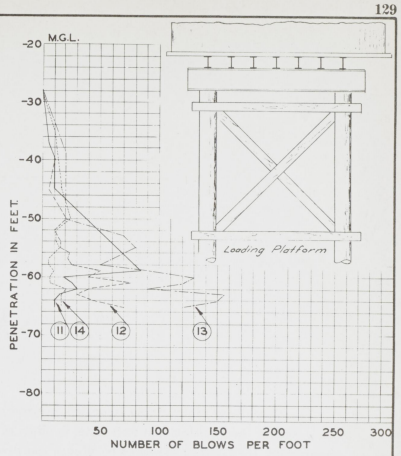
GANTRY CRANE
SEA TRAIN LANDING
BELLE CHASSE LA.

CASE NO 35

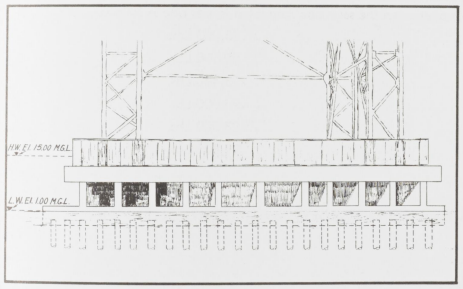
DRAWING NO. 1

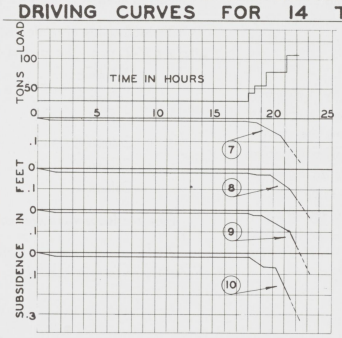


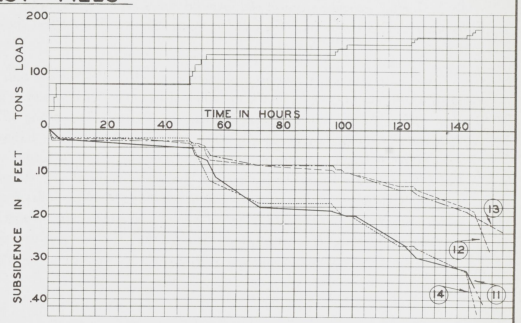




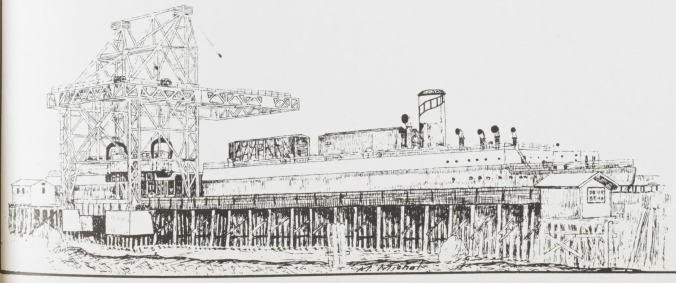
DRIVING CURVES FOR 14 TEST PILES







SETTLEMENT CURVES



TEST DATA
GANTRY CRANE SEA TRAIN LANDING
BELLE CHASSE LA

CASE NO 35 DRAWING NO. 2

Case No. 36.

MONTELEONE HOTEL ANNEX

The Monteleone Hotel Annex is located on Royal between Bienville and Iberville Streets. It is a modern fireproof fourteen story hotel building of steel, concrete, brick and hollow tile construction. The building, designed by Wogan and Bernard, Architects, in collaboration with G. E. Conrad, associate architect and Gunvald Aus, Consulting Engineer, was erected in 1927 by Geo. J. Glover Co. Inc. The building fronts 95'-3" on Royal Street and runs to a depth of 55'-2".

The entire site was excavated to an average depth of 8'-6" below curb or to an elevation of approximately 1.00 M. G. L. On the whole the soil excavated was moist greyish blue marine clay. Before the site was excavated yellow pine 8" x 12" sheet piling 30' long was driven. Following this the site was excavated to the underside of the pile caps. 815 yellow pine peeled piles 50'-0" in length, with the exception of 12 test piles 70'-0" in length, were driven with a No. 1 Vulcan steam hammer weighing 5000 lbs. with a stroke of 42". All piles had a butt diameter of from 12" to 13" and a tip diameter of from 6" to 9". Many piles showed a tendency to move upward slightly when adjacent piles were driven and the ground area in general showed an upheaval of about 6" after all piles were driven. This upward movement of piles during driving is not an uncommon occurrence when many piles are driven close together.

The graph on the accompanying page shows the average driving curve of the twelve piles. The average number of blows per last foot of penetration was 78.6. A resisting stratum was encountered at approximately 45 ft. penetration.

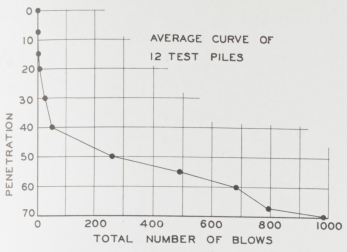
The footings are of reinforced concrete, the piles having a spacing of 2'-6" o. c. Staggered piles are 2'-2" o. c. The loading of piles is not the same throughout but is, per pile as follows:

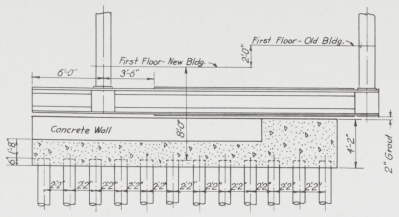
Column E	25,000 Lbs.
Column F	20,500 Lbs.
Column H	23,400 Lbs.
Column X	24,000 Lbs.
Column Y	23,000 Lbs.
Column Z	29,300 Lbs.

Eccentric loads were created in places through the use of cantilever steel girders.

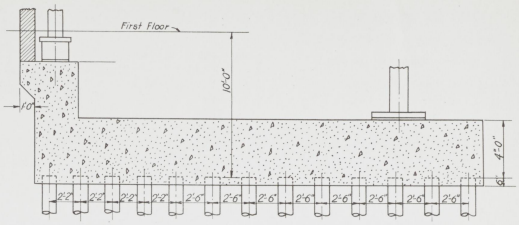
At the time of this report there is no evidence of undue or irregular settlement but no instrumental observances are available.





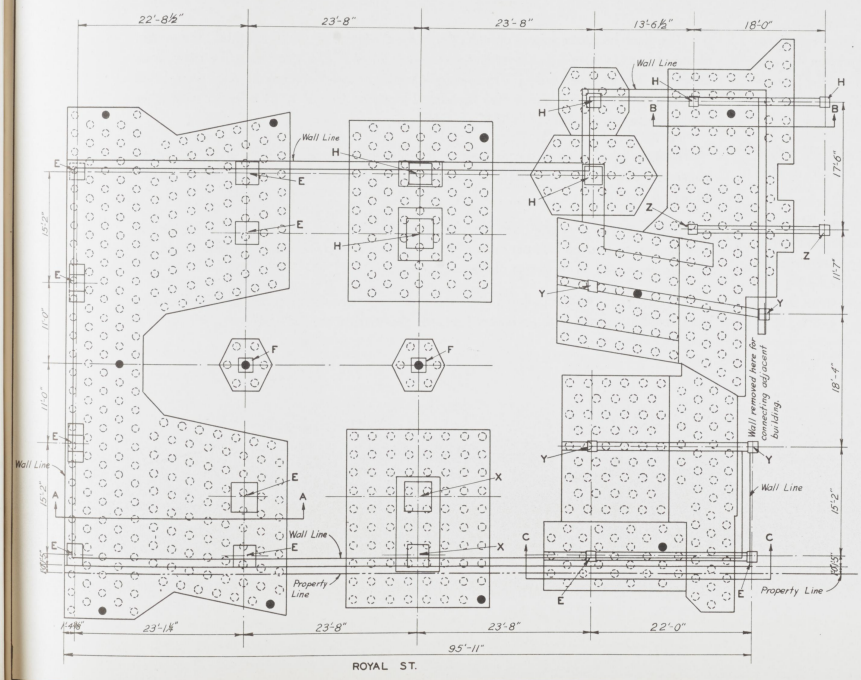


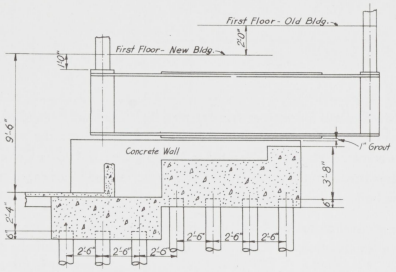
SECTION C-C



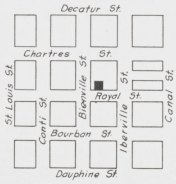
SECTION A-A

● TEST PILES

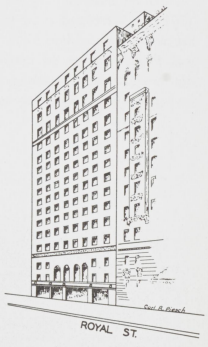




SECTION B-B



LOCATION MAP



MONTELEONE HOTEL ANNEX

CASE NO. 36

Case No. 37.

XAVIER COLLEGE

Xavier College for negroes was designed by Wogan and Bernard, Architects in collaboration with Henry, Hooper and Chisholm, Consulting Engineers. The building fronts on Palmetto and Lowerline Streets and was erected in 1931 by Geo. J. Glover Company, Inc. The Science and Administration building, consisting of two stories and basement, is of reinforced concrete, steel and hollow tile construction. The outer walls are faced with limestone and brick.

The excavation for the building was carried down to an average depth of 7′-9″ below curb or to an elevation of —6.43 M. G. L. The piles were cut off at a depth of 7′-3″ or at an elevation of —5.93 M. G. L. The soil excavated was largely fat bluish moist clay.

Ten test piles 60′ long were driven to varying depths as shown on drawing. A total of 1101 piles were used in the foundation. Of these 1037 penetrated approximately 33′ while the other 64 varied from 37 to 59 feet. All piles other than 33 ft. penetration are indicated with their lengths on the drawing. All piles are untreated peeled yellow pine having 13″ minimum butts and 6″ minimum tips and they were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42″.

The graph on accompanying drawing shows the driving curves of 10 test piles. The number of blows per foot for the last three feet averaged 4, 21 and 75 respectively. The penetration for the last 5 blows averaged $\frac{3}{4}$″. However, as a result of soil conditions the piles were found to have a tendency to move from their theoretical location. Out of 1,101 piles 56 showed an upward movement of from $\frac{3}{8}$″ to $1\frac{3}{8}$″ after driving.

Footings are of reinforced concrete with the piles spaced generally 2′-6″, and 2′-2″ where staggered. There is a continuous wall footing on piles in addition to 91 pile caps of various geometric shapes.

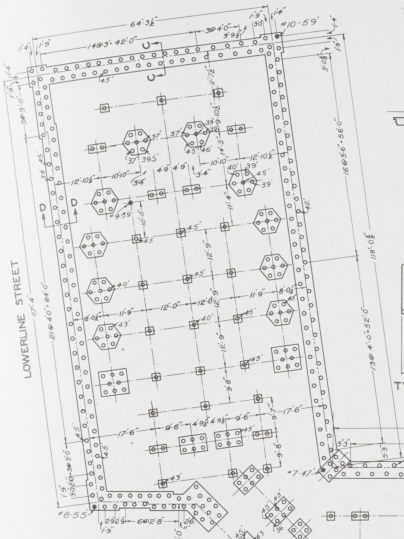
In no case does the total load per pile exceed 25,000 lbs. An allowable wind load of 25 lbs., an average dead load per pile of 18,750 lbs. and an average total live load of 6,250 lbs. per pile were used in the design of the pile footings.

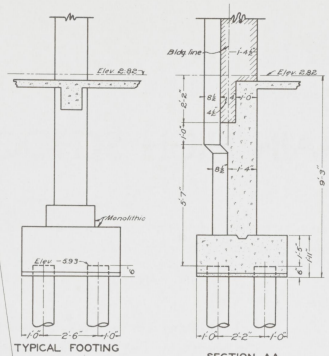
An inspection of the building did not indicate any irregular or undue settlement and no cracks are in evidence. No instrumental records of settlement are available.



LOWERLINE ST.

Small figures opposite piles on this plan indicate the actual length of pile in ground. All other piles are 33 ft. long. ●-Denotes test piles

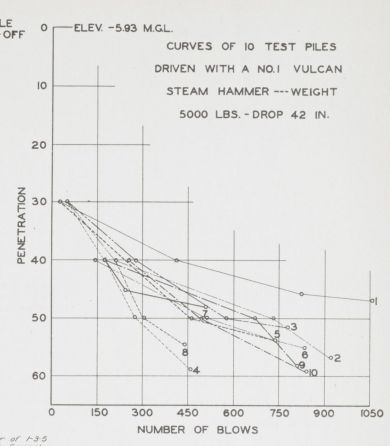


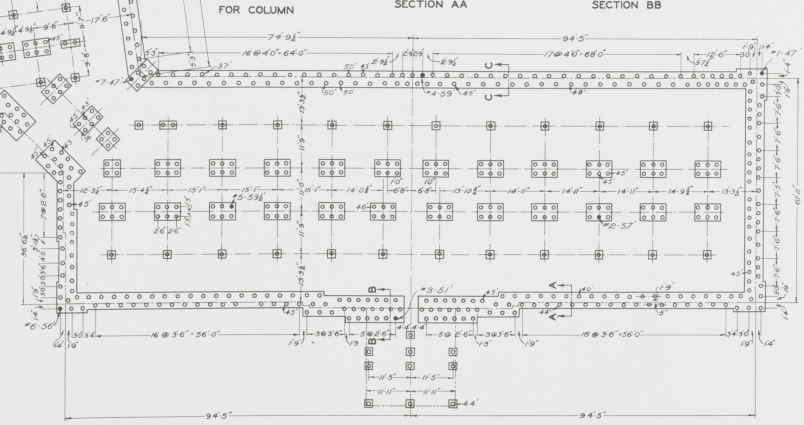


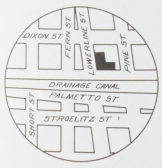
TYPICAL FOOTING FOR COLUMN

SECTION AA

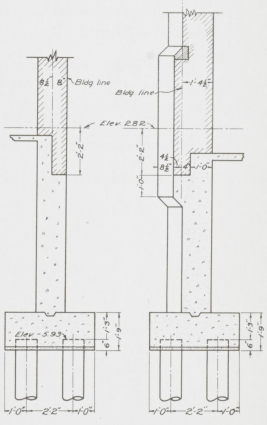
SECTION BB







LOCATION MAP



SECTION CC

SECTION DD

XAVIER COLLEGE

CASE NO. 37

Case No. 38.

ELEANOR MC MAIN HIGH SCHOOL

This building was designed by E. A. Christy, Architect for the Orleans Parish School Board with Jens Braae Jensen as Consulting Engineer, and it was erected in 1930-32 by J. A. Petty & Sons, Contractors.

The building, a modern high school for girls, is of reinforced concrete construction with the exception of structural steel framework for the auditorium. The outside walls are of brick with exterior stucco finish. It is three stories high, about 50', and faces 180' on S. Claiborne Avenue with a depth of 400' on Nashville Avenue. The window area constitutes approximately 30% of the total wall surface.

Because of improved drainage conditions in the city, which lowered the water table, the humus material of this swampy area has contracted. Consequently wherever any sidewalks or floors depended on the earth surface for support, either directly or through the medium of tamped fill, considerable settlement has resulted. This was found to be evident about the interior walls, and all floors, and exterior walls and sidewalks.

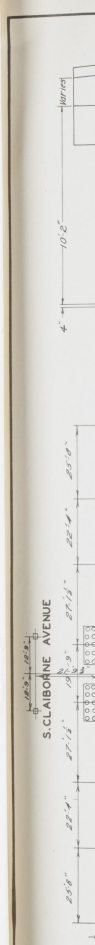
No soil tests or core borings were made in connection with this building, but the excavated material was mostly humus. Excavation was only for pier and wall footings, and to a depth of about 8' or to —8.6' M. G. L.

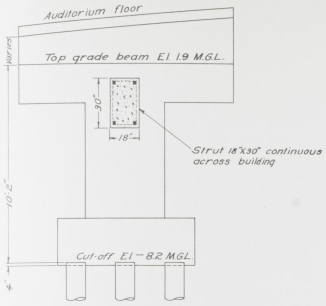
5 test piles were driven, having an average penetration of 65' but no record of driving is available.

The building rests on untreated yellow pine piles 60' in length, with 6" minimum tips and 12" minimum butts. They were followed 5' in the ground and cut off at elevation —8.2 M. G. L. or 11' below curb level, and leaving practically 60' of effective length in the ground. Most of these piles, driven with a No. 1 Vulcan steam hammer with a 42" stroke, took 12 blows per foot for the last 5' of driving. The design load per pile is 15 tons.

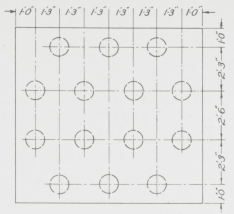
An inspection of the building indicated that the foundations, in general, had not settled to any noticeable extent. There are two cracks in the front wall which may be due to slight settlement.

The accompanying drawing shows the complete foundation plan with typical footing and typical pile spacing.

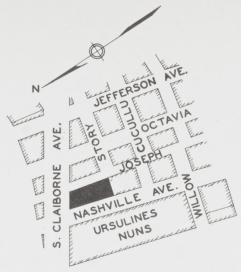




SECTION A-A

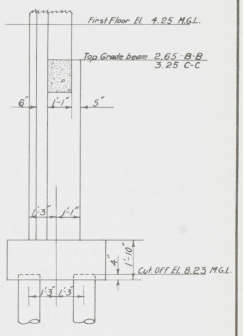


TYPICAL SPACING OF PILES



LOCATION MAP





SECTION B-B C-C

FOUNDATION PLAN

ELEANOR McMAIN HIGH SCHOOL

CASE NO. 38

Case No. 39.

ROGERS GARAGE

This is a storage garage located on Gravier Street between S. Rampart and Saratoga Streets. It was designed by Moise H. Goldstein, Architect, with Jens B. Jensen as Engineer, and was constructed by Lionel F. Favret in 1926. It is a five story reinforced concrete fireproof building 70 feet high fronting 60' on Gravier Street and is 120' deep. Exterior curtain walls are of hollow tile with cement plaster on both sides. It has a wall area of approximately 25,180 square feet of which 21% is window area.

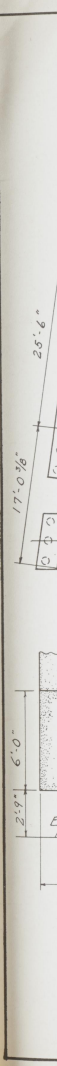
The only excavation was for the footings and was carried down 6'-11½" below curb or to elevation —2.79 M. G. L.

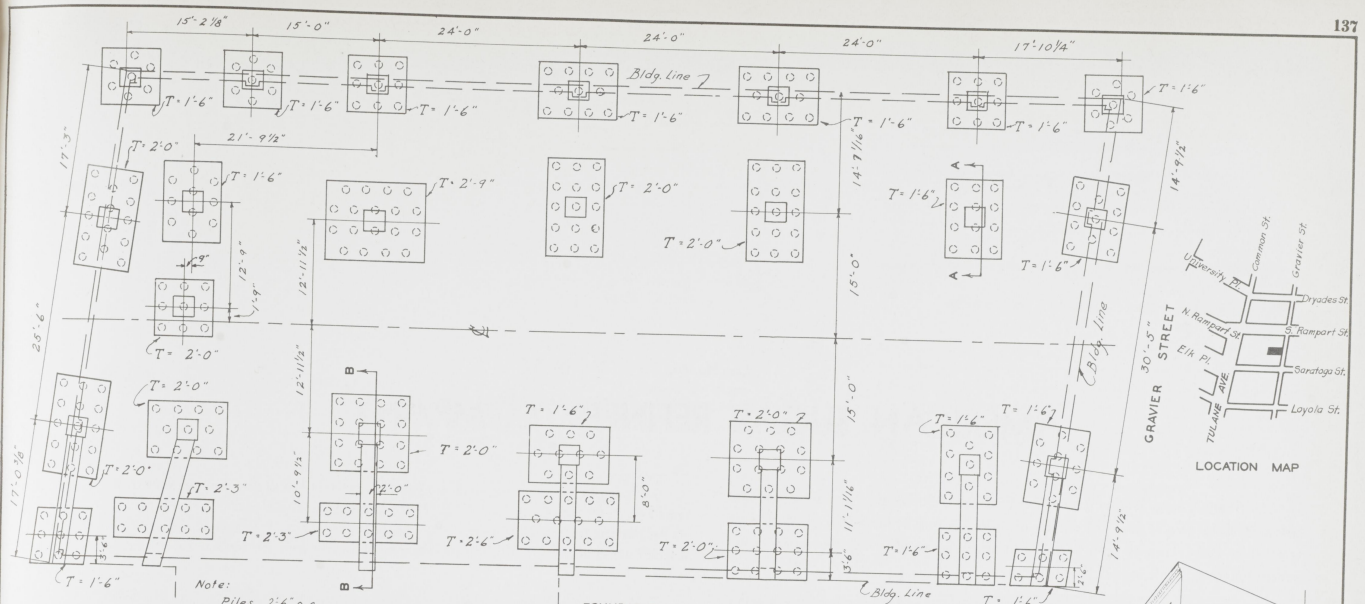
The building is carried on a pile foundation with reinforced concrete pile caps. 323 L. L. Y. P. straightline piles, with bark removed, were driven. These piles were 55 ft. long, effective length 52', with 6" to 7" tips and 12" to 13" butts. They were driven with a No. 1 Vulcan steam hammer with a weight of 5,000 lbs. and a stroke of 42". Average number of blows for last three feet of driving is as follows: 1st foot 5 blows; 2nd foot 6 blows; last foot 10 blows. Elevation of cut-off —2.25 M. G. L., elevation of tip —54.25 M. G. L. Piles are loaded approximately 12½ tons each. Six 60 ft. test piles were driven with the above equipment. The average penetration under weight of hammer and pile was 14'-6" and the number of blows on last foot of driving was as follows:

Pile No. 1	7 blows
Pile No. 2	22 blows
Pile No. 3	36 blows
Pile No. 4	12 blows
Pile No. 5	7 blows
Pile No. 6	12 blows

The chart on accompanying drawing shows the driving record and the average curve of these piles. Pile caps are of reinforced concrete. Size and spacing of these caps are shown on the accompanying foundation plan.

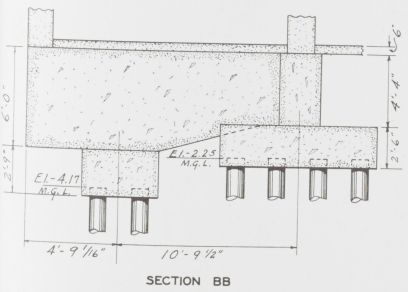
At the time of this survey, namely September 1935, there is no evidence of undue settlement.



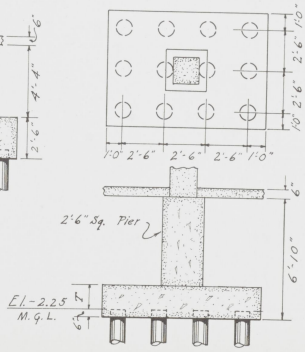


FOUNDATION PLAN

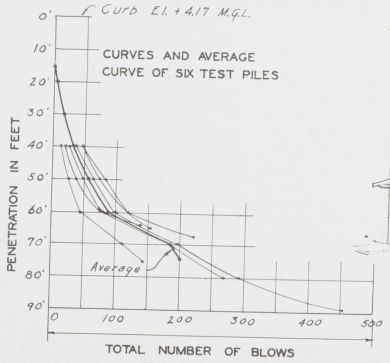
LOCATION MAP



SECTION BB



SECTION AA
TYPICAL CAP





ROGER'S GARAGE
CASE 39

Case No. 40.

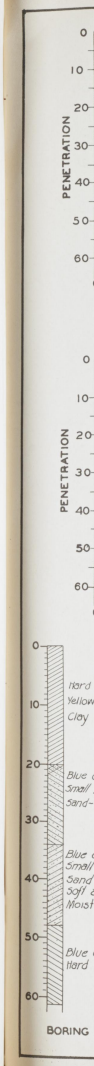
AMERICAN SUGAR REFINERY COMPANY

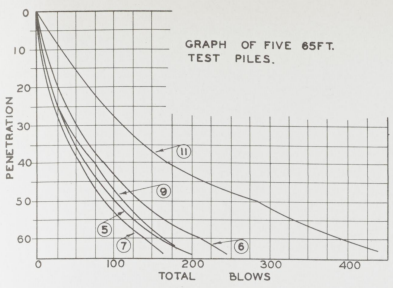
The American Sugar Refinery is located at Chalmette in St. Bernard Parish about five miles below the Canal Street Ferry. This refinery occupies numerous buildings, five of which were selected for study. Case 40 deals with no particular structure but shows the records of test piles, borings, etc., made around these buildings.

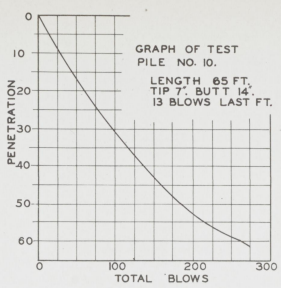
Fifteen test piles 65 feet long, with 6" to 8" tips and 12" to 15" butts were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". Four graphs on the accompanying drawing show the penetration and blows for each of these piles.

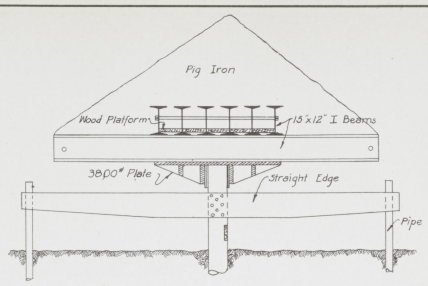
Test pile No. 10 was loaded with pig iron and readings taken to determine the settlement. From 7:00 A. M. May 8th to 10:30 A. M. May 10th, 1905 a total load of 65.1 tons was placed on this pile and a total settlement of $^{5}/_{16}$ of an inch was recorded. On the accompanying drawing, a sketch shows the method of loading and a graph shows the load and settlement every three hours.

Six borings, which went to a depth of 62 feet are shown on the drawing. The plot plan shows the approximate location of these borings and of the test piles and their relation to the various buildings.

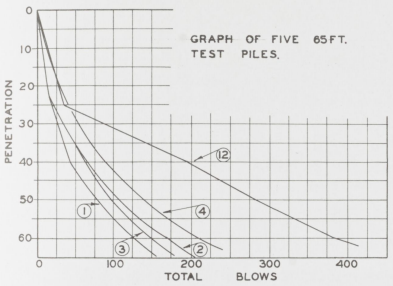


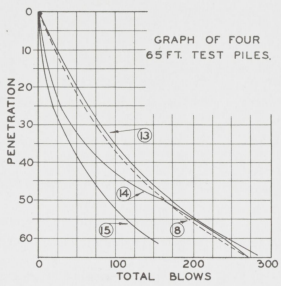


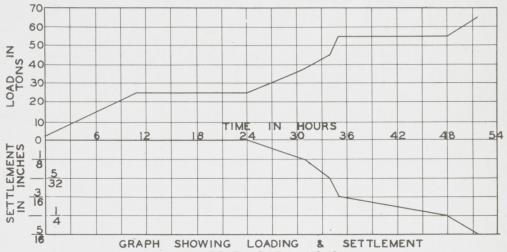




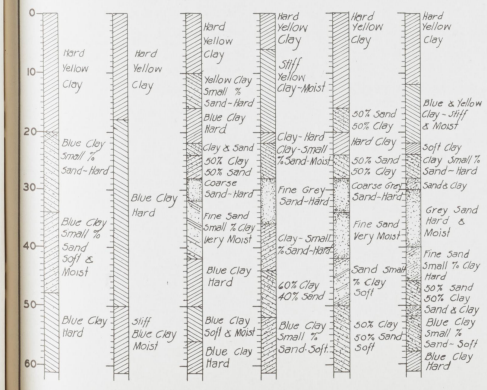
METHOD OF LOADING TEST PILE 10.

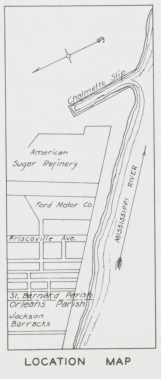




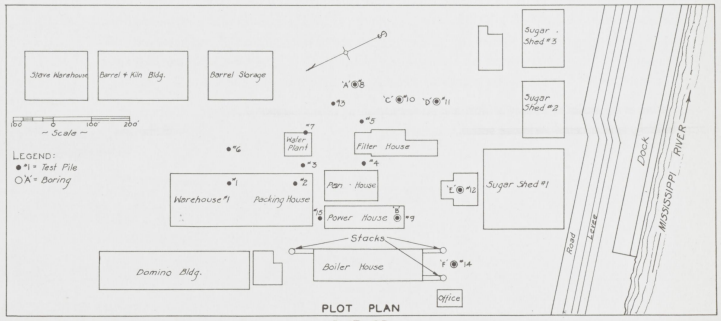


GRAPH SHOWING LOADING & SETTLEMENT OF TEST PILE NO. 10





LOCATION MAP



PLOT PLAN

PLAT OF
GROUNDS AND BUILDINGS
TEST BORINGS — TEST PILES — TEST LOADS

AMERICAN SUGAR REFINERY

CASE NO. 40

Case No. 41.

AMERICAN SUGAR REFINERY COMPANY
DOMINO BUILDING

The Domino Building of the American Sugar Refinery at Chalmette is a combination factory and warehouse which was designed by Eugene Kell, with C. A. Turner as engineer, and was constructed by the Jefferson Construction Company in 1920. This building measures 420 feet by 120 feet of which approximately one-half is six stories high and the rest two stories high. It is a reinforced concrete building with brick curtain walls and concrete footings on untreated wood piles.

The location of this building is shown on the general ground plat, Case No. 40. This sheet also shows stratagraphs and test piles driven near this building.

The only excavation was for the footings which go to a depth of 8' below grade or to elevation —1.5 M. G. L.

5,503 untreated yellow pine piles 60 feet long were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". The tips of these piles varied from 5" to 12" and averaged 8" in diameter while the butts varied from 12" to 23" and averaged 16" in diameter. These piles are cut off at elevation —1.00 M. G. L. and have an effective length of approximately 57 feet. These piles required from 9 to 25 blows for the last foot of driving.

The two story section of building at north end has the foundation built to support a six story building, same as central warehouse section.

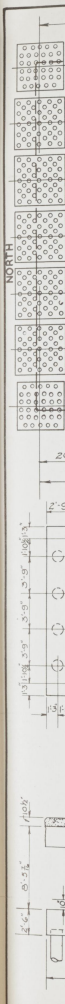
The design load per pile in tons varies from 11 to 21½, the dead load varying from 8 to 10 tons. In nearly all cases the total load is approximately 20 tons, the lightest loading being on footings across north end where the live load is much smaller. At section A-A the dead load is 8 tons and the live load 12 tons. At section B-B the dead load is 9 tons and live load 9 tons. At section E-E the dead load is 10.4 tons and live load 8½ tons. At section C-C the dead load is 10 tons and live load 10 tons. At section D-D the dead load is 8 tons and live load 12 tons. These figures are taken from the designing engineer's plans.

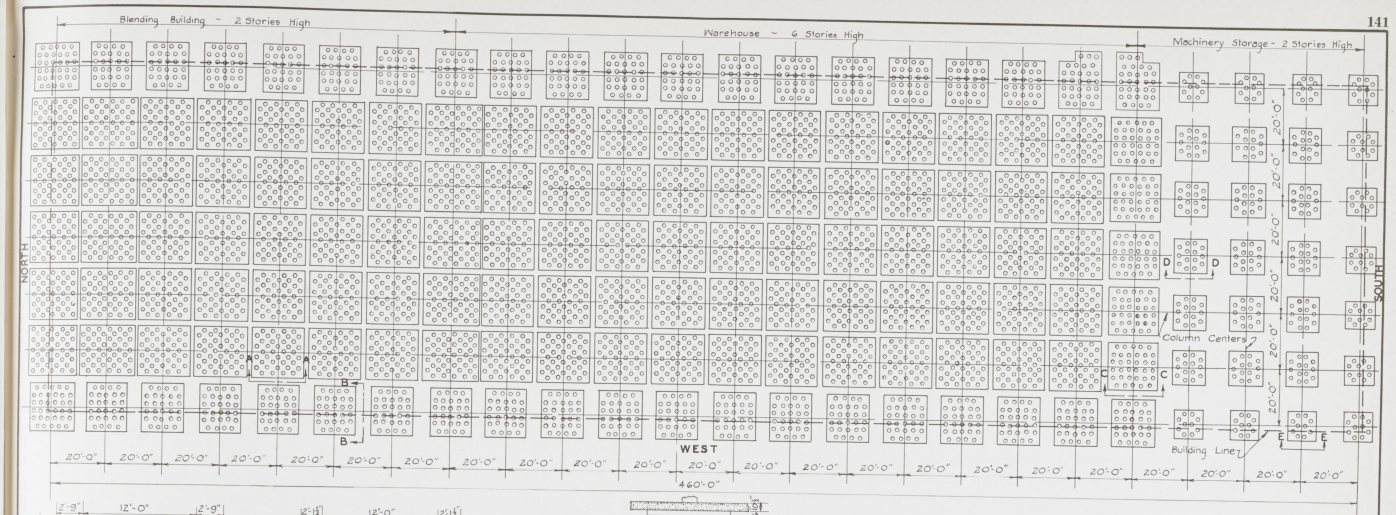
One pile was driven to within one foot of cut off and the hammer removed. Driving of this pile was resumed the next day and it required 57 blows to drive it the last foot.

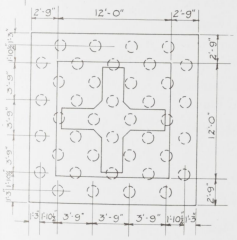
Pile caps are of reinforced concrete and are spaced 20 feet on center both ways of building. The size and depth varied according to the number of piles in the footing. The footings under the blending building now support only two floors but are designed so that 4 additional stories may be added in the future.

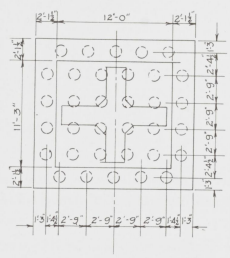
The accompanying drawing shows the spacing of piles and footings and details of their construction.

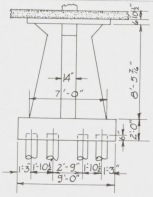
At the time of this survey this building showed no outward sign of settlement.

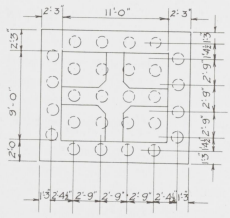


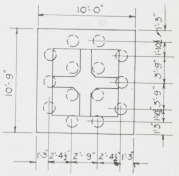


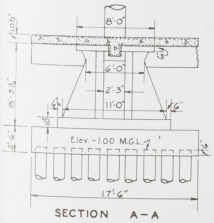


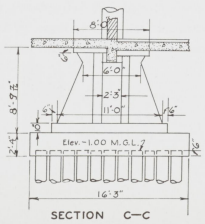


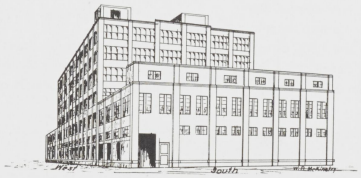








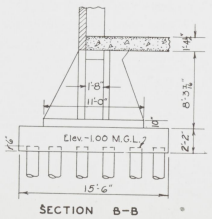


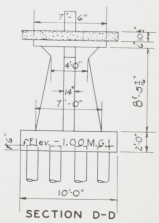


DOMINO BUILDING

AMERICAN SUGAR REFINERY

CASE NO. 41





Case No. 42.

AMERICAN SUGAR REFINERY FILTER HOUSE

The Filter House was planned and designed by Arthur E. Krause and was erected by the Stewart Contracting Company in 1905 and 1906.

The building is approximately 265′ in length by 75′ to 90′ in width. It is 14 stories high or about 150′. The window area is approximately 50% of the total wall surface. The building houses kilns and other heavy refining apparatus. This building is old-fashioned in design. The footings rest on a grillage which is in turn supported by the piles. The grillage consists of 12″ x 12″ timbers laid on the pile butts, with 6″ x 12″ timbers laid across the bottom timbers. This grillage is as shown in sections and is not encased in concrete. It was assumed at time of construction that the grillage was below the line of permanent saturation. Brick footings rest upon these timbers. These footings are capped with stone and cast iron base plates where cast iron columns are used, and with cast iron forms where structural steel columns are used; the frame of the building being a combination of both types.

The excavation for the Filter House is about 270′ in length and varies in width from 55′ to 90′. It is about 9′ below curb, or zero M. G. L. There is no record of the material taken out of the excavation, but an idea of the nature of the soil may be gotten from the test borings made near the Filter House and shown in Case No. 40, and the excavation in Case No. 44.

The building is supported on 2,635 peeled, untreated pine piles. The lengths varied from 25′-0″ to 62′. Why the variation in effective length is not clear since the record shows that all piles delivered to the job were about 65′ long. The butts vary from 12″ to 18″ and the tips from 7″ to 10″. The piles were driven with a No. 1 Vulcan steam hammer with a total weight of 9,850 lbs., and a stroke of 42″. The tabulations on accompanying drawing give a good idea of the driving of the piles and may indicate the cause of settlement. Note, for instance the pile under Pier No. 22 where 1,680 blows were struck from the 49 to 50 ft. level and 1,500 blows from 52 to 53 feet. Then contrast the ease with which piles in pier No. 31 penetrated. The piles were cut off about 9′ below curb or zero M. G. L. All piles were spaced 2′-6″ from center to center.

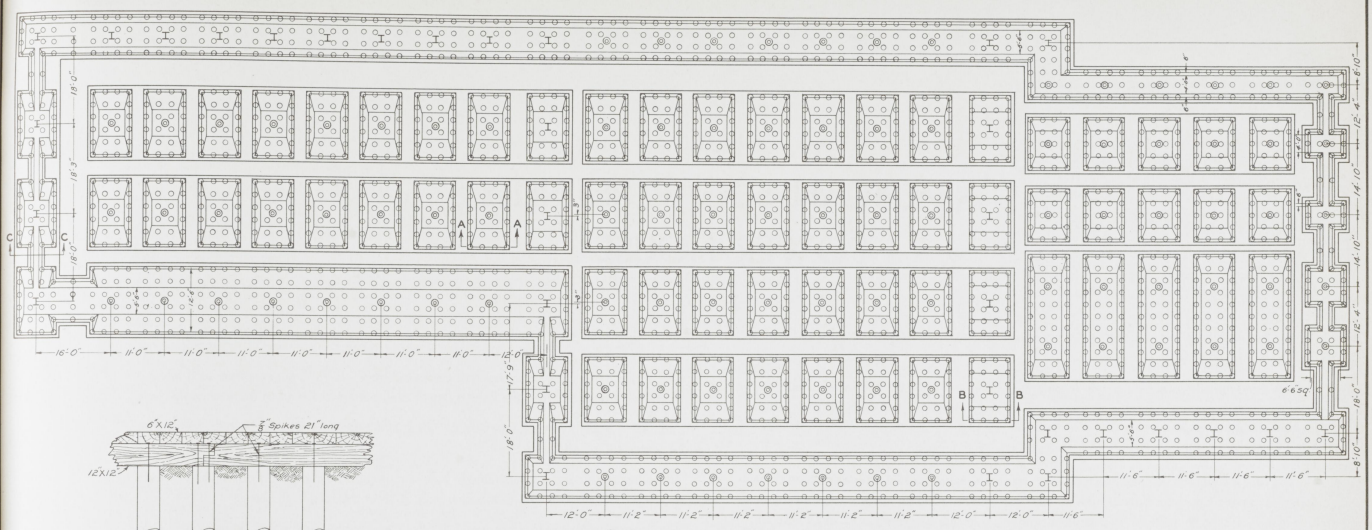
No settlement data has been kept on this building, but on inspection it is found that there are settlement cracks in almost all the brick work surrounding the exterior columns. Several of these have opened up ½″ or more. If a comparison were possible it would probably be found that the building had settled considerably but uniformly. As this is only conjecture partially borne out by evidence, it would be well to take into account the fact that the piles for this structure were driven hard. To illustrate what is meant by "driven hard" the records show the number of blows per last foot of driving as follows:

25 piles	5 to	10 blows
928 piles	11 to	15 blows
978 piles	16 to	20 blows
333 piles	21 to	25 blows
163 piles	26 to	50 blows
39 piles	51 to	100 blows
141 piles	101 to	500 blows
29 piles	501 to	1,450 blows

There are two circular brick stacks as shown in elevation. These stacks begin at the third floor level and are 147′ high. The inside diameter is 8′-6″ throughout and outside diameter is 9′-9″ at base and 9′-3″ at top.

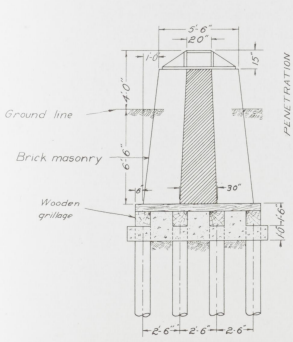
W. P. A. Engineers estimate the dead load per pile to be 10½ tons, except under stacks, where the load is estimated at 12½ tons.

The 2nd, 3rd and 4th floors are heavily loaded with kilns, dryers, etc. All other floors are loaded with machinery of various types used in purifying sugar. It has been impossible to arrive at any estimate of weight of this machinery, but much of it is motors and other vibratory machinery.



DETAIL OF CAPPING JOINTS

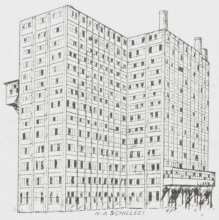
◎ Cast iron column and stone base
I Structual steel column and base of cast iron
All piles spaced 2'-6" on centers



SECTION CC

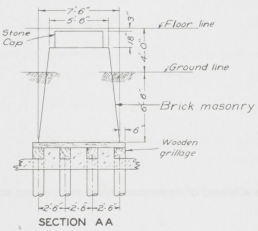
BLOWS PER FOOT

PENETRATION

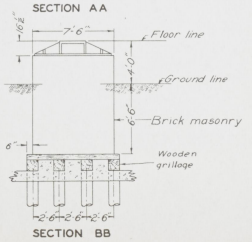


BLOWS PER FOOT

PENETRATION



SECTION AA



SECTION BB

FILTER HOUSE
AMERICAN SUGAR REFINERY
CASE NO. 42

Case No. 43.

AMERICAN SUGAR REFINERY POWER HOUSE

The Power House was designed by A. E. Krause, architect, and erected by the McClinic-Marshall Construction Company in 1906.

The building is fireproof with steel frame construction and brick curtain walls. The floors are of reinforced concrete. The building rises 46'-6" above grade, with a skylight in the center rising an additional 5'-0", but has only one floor. In the engine room this floor is 11'-0" above grade while the floor in the pump room is about level with the grade.

The roof is supported by steel trusses, which are in turn supported by exterior columns. The interior columns support the first floor only. The 5 large footings in the engine room numbered 1, 2, 3, 4, 5, are the foundations for 5 large generators which are described as G. E. Co. Generators, Class 28-350, 240 Volts, 107 R.P.M., Form E, and 22" x 42" D. C., H. D. R. B. C. Engine. These machines weigh about 180,000 lbs. per set. The estimated load per pile is about 12.7 tons.

The small interior footings support various small machines weighing about 9,000 to 15,000 lbs. each. The load per pile on these footings is about 9½ tons per pile.

The dead load per pile under the outside walls is about 12 tons.

The interior wall which separates the engine room from the pump room supports only its own weight.

The area at left end of engine room where small footings are shown, some without piles, is covered with a concrete slab on which rests a twin Corliss engine, weighing about 250,000 lbs.

The above figures are approximations computed by W. P. A. Engineers from such information as could be obtained from the Refinery engineers, but are believed to be reasonably close.

No data is available as to settlement but the foundations all appear to be sufficient and no serious settlement is noticeable.

The other machinery is comparatively light and is supported on the floor without special foundations. The window area is approximately 50% of the total wall space.

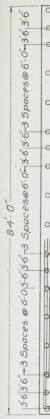
The excavation for the footings was 7'-8" deep and approximately 257' long by 81' wide.

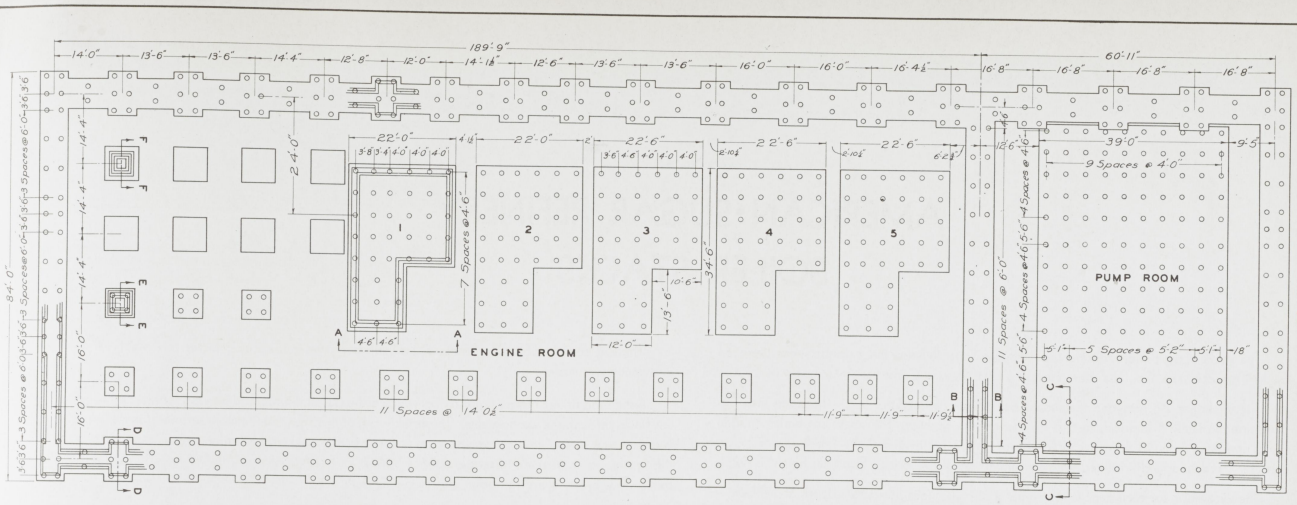
All footings rest on untreated yellow pine piles, which total 755, except the eight footings where no piles are indicated and which are detailed in Section F. F.

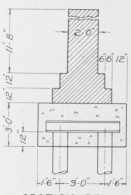
These piles varied from 40 to 50 feet in length, about 75% being 50 foot piles. The tips were 7" to 8" in diameter and the butts were 13" to 14" in diameter.

A No. 1 Vulcan steam hammer was used in driving piles. The piles were cut off about 6'-8" below grade, the effective length of pile being 37' to 47'.

The number of blows for the last foot of driving varied from 2 to 15. The majority of piles required an average of 5 blows for the last foot.



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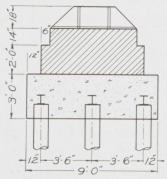
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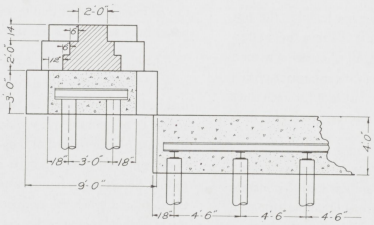
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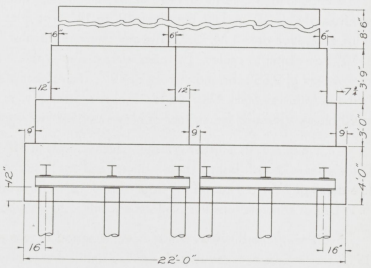
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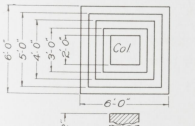

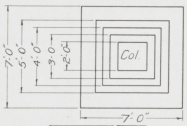

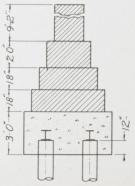
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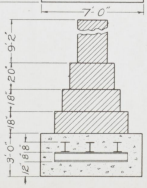
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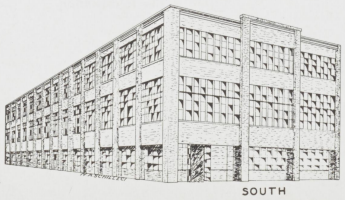

SOUTH

POWER HOUSE

AMERICAN SUGAR REFINERY

CASE NO. 43

Case No. 44.

AMERICAN SUGAR REFINERY BOILER STACKS

The stacks of the Boiler House at the American Sugar Refinery in Chalmette were designed by the Tienecke Stack Co., and were erected by the Stewart Construction Company in 1906.

The stacks are 19′ octagons of standard size brick to a height of 50′. The stacks then become approximately cylindrical, that is, they taper very slightly. The stacks are built of radial bricks and taper from 18′ in diameter to approximately 14′ in diameter. The flues are 12′ in diameter throughout and are lined with perforated radial fire brick. The total height is 225′.

The excavation for each stack is square 32′ x 32′, and goes down to a depth of 12′ below grade or minus 3 M. G. L. The type of soil encountered was a wet sandy clay.

The foundation consists of 144 peeled yellow pine piles of 60′ average length. The tips vary from 6½″ to 10″ and the butts from 12″ to 14″. The piles were cut off 2′ above the bottom of the excavation or —1 M. G. L. The pile spacing is regular throughout, all piles being spaced 2′-10″ from center to center. The piles were driven with a No. 1 Vulcan steam hammer with a total weight of 9,850 lbs. and a stroke of 42″. The number of blows per last foot for each stack varied as follows: Stack No. 1, 5 to 15 blows; Stack No. 2, 10 to 20 blows; Stack No. 3, 5 to 20 blows. The average number of blows per last foot was 11.

On the piles rests a timber grillage, which consists of 12″ x 12″ yellow pine beams secured to the piles with drift bolts. These stringers and the heads of the piles are encased in concrete to a depth of 2′ below cut-off. A floor of 6″ x 12″ yellow pine planks rests upon the stringers. A 2′ bed of concrete tops this platform and this in turn supports the brick work of the stack.

Settlement recordings were made over a period of two years May 22, 1914 to July 19th, 1916, readings being taken about every six months. The total amount of settlement of stack No. 1 was $^{15}/_{32}$″; of stack No. 2 was $^{9}/_{16}$″; of stack No. 3 was $^{13}/_{16}$″.

There is some doubt as to whether this settlement was caused by a factor for which no allowance was made.

When the Boiler House was first constructed the flues from the boilers were connected to the stacks through the economizers. The brick work of the flues, the economizers and the stacks were all one piece, with no provision made for expansion when the boilers are running. As this represents an increase of temperature of 500° F. in a length of over 300′ of brick work the tremendous pressure exerted upon the stack is evident.

Whether due to this expansive pressure, whose center of effect was about 40′ from the top of foundation, or due to settlement alone, there resulted many and large cracks in the octagonal base sections of the stacks which required extensive repairs and reinforcement.

In the year 1920 such large expansion cracks had opened up in the stacks that it was necessary to cut the economizers and flues loose from the stacks and make provision for expansion. The cracks that had opened in the base were 50′ long and ranged up to 10″ in width. These were repaired so that at present the eye would never detect that there had been any trouble. Some small cracks have opened up later but they are negligible and hardly noticeable. Strange to say no cracks have appeared in the circular sections of the stacks and if the stacks are out of plumb the eye cannot detect it. It therefore seems that the large cracks in the octagonal bases were due to expansion, and when the proper expansion joints were provided in 1920 all trouble ended. The stacks as they appear today are monumental and beautiful.

The total dead load per pile is about 11½ tons, which is low and therefore it is not thought that any material settlement has taken place, and that the cracks previously referred to must be due to expansion.

LEVELS TAKEN ON BOILER HOUSE STACKS 1, 2, & 3

STACK NO! 1

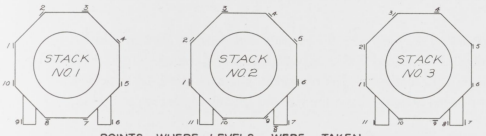
DATE	1	2	3	4	5	6	7	8	9	10	11
MAY 22, 1914	15.552	15.544	15.549	15.552	15.552	15.560	15.557	15.552	15.552	15.552	
JAN 16, 1914	15.544	15.536	15.539	15.532	15.530	15.525	15.530	15.530	15.539	15.534	
JUNE 18, 1915	15.536	15.536	15.536	15.528	15.533	15.528	15.533	15.528	15.547	15.534	
JAN 24, 1916	15.539	15.531	15.537	15.533	15.528	15.522	15.528	15.522	15.529	15.529	
JULY 19, 1916	15.528	15.528	15.533	15.524	15.524	15.519	15.508	15.519	15.528	15.523	

STACK NO. 2

MAY 22, 1914	15.549	15.544	15.544	15.552	15.549	15.544	15.542	15.542	15.542	15.542	15.542
JAN 16, 1915	15.520	15.525	15.534	15.544	15.534	15.523	15.521	15.507	15.515	15.512	15.522
JUNE 18, 1915	15.517	15.517	15.531	15.536	15.531	15.526	15.526	15.506	15.511	15.506	15.522
JAN 24, 1916	15.520	15.522	15.534	15.539	15.529	15.518	15.518	15.499	15.504	15.507	15.528
JULY 19, 1916	15.513	15.507	15.507	15.518	15.507	15.514	15.519	15.514	15.496	15.496	15.511

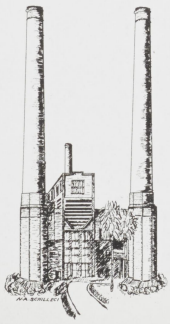
STACK NO. 3

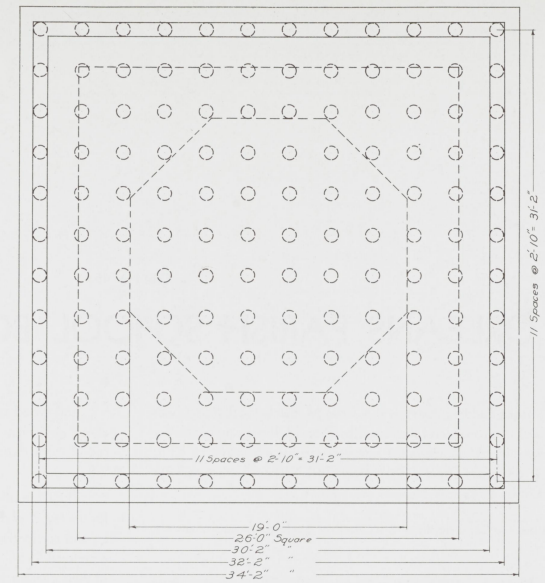
MAY 22, 1914	14.938	14.932	14.938	14.927	15.016	15.016	14.930	14.938	14.932		14.938
JAN 16, 1915	14.912	14.919	14.925	14.922	14.995	14.990	14.906				14.906
JUNE 18, 1915	14.920	14.925	14.919	14.919	15.021	15.021	14.938	14.933	14.933	14.938	14.920
JAN 24, 1916	14.957	14.965	14.968	14.967	15.042	15.032	14.943	14.943	14.944	14.953	14.947
JULY 19, 1916	14.936	14.936	14.948	14.937	15.015	15.010	15.010				14.937

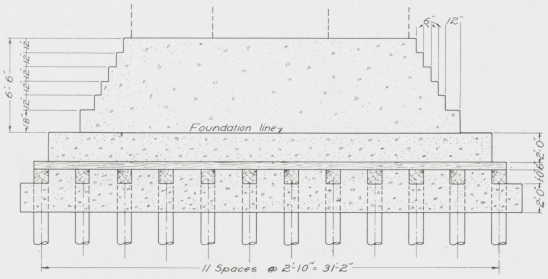


POINTS WHERE LEVELS WERE TAKEN









BOILER STACKS

AMERICAN SUGAR REFINERY

CASE NO. 44



ELEVATION

Case No. 45.

ORLEANS PARISH SCHOOL BOARD BUILDING

The Orleans Parish School Board Building, formerly the James M. Batchelor Building, was designed by Rathbone De Buys, architect, and was constructed by Thos. H. Brockman, contractor in 1927. It is a 5 story building rising 65'-6" above the sidewalk and has a frontage of 43 ft. on Carondelet Street by 98 feet on Girod Street. It is a steel frame fireproof structure with exterior walls of limestone backed by 8" hollow tiles.

The excavation for the footings go to a depth of 8'-6" below grade or to approximately elevation —2.43 M. G. L.

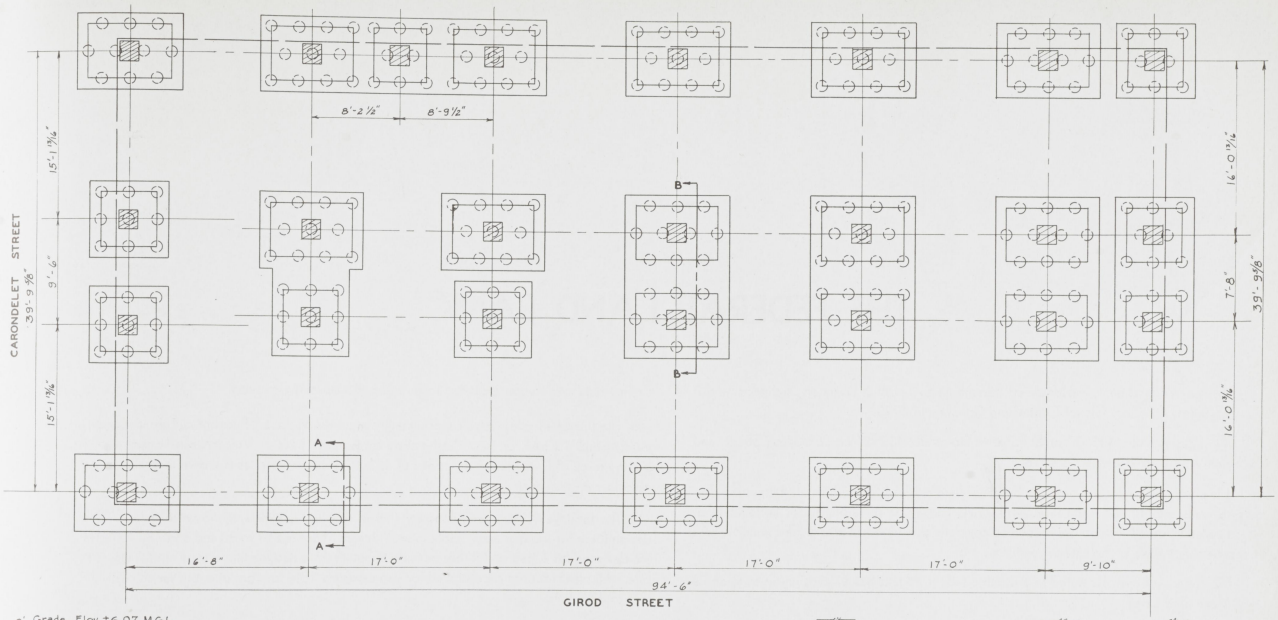
Two 60 ft. test piles with 6" tips and 12" butts were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". The graph on the accompanying drawing shows the driving curve of these two piles.

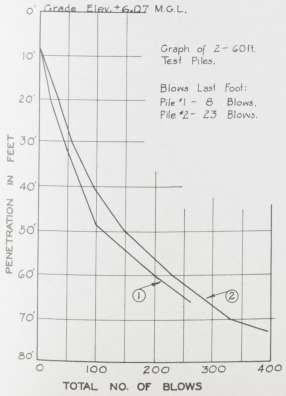
286 wood piles 60 ft. long with 6" to 9" tips and 12" to 16" butts were driven with the above equipment. These piles had a waste of 1'-0" which gives them an effective length of 69'-0". The butts were driven flush with the ground and then followed down an additional 7 ft.

The table on the accompanying drawing gives the minimum and maximum number of blows for the last 3' of driving. All piles are spaced 2'-6" o. c. with cut-off at elevation —1.93 M. G. L., and are loaded approximately 10 tons each. The reinforced pile caps are 2'-0" thick with a pedestal 2'-6". The accompanying drawing shows the size and spacing of the caps and details of their construction.

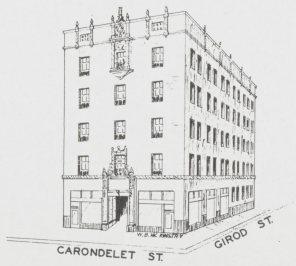
There is no evidence of settlement anywhere in this building and none can be expected with a 10 ton pile loading and 69 feet of pile in the ground and a stiff driving resistance.

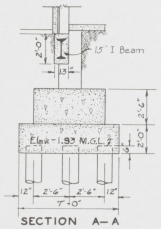


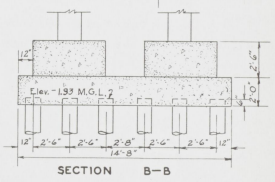












Driving Record Last 3 Feet			
Blows	3rd from Last	2nd from Last	Last Foot
Min.	6	7	7
Max.	20	25	30

ORLEANS PARISH SCHOOL BOARD BLDG.

CASE NO. 45

Case No. 46.

THE FEDERAL LAND BANK

The Federal Land Bank was designed throughout by Favrot & Livaudais, architects, and it was erected by the Geo. Glover Contracting Company in 1925.

The building fronts 113'-7" on St. Charles Street and 112'-2" on St. Joseph Street, and the height from curb to parapet is 49'-8".

It is a modern reinforced concrete building three stories high with two penthouses. The outside walls are of hollow tile faced with brick, and inside partitions are of hollow tile or wood construction. All floors are reinforced concrete with wood covering. The window area is approximately 25% of the exterior wall area.

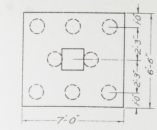
The entire area was excavated to a depth of about 10 feet below curb grade or to about zero Mean Gulf Level.

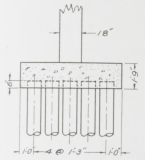
The building is supported on 407 untreated peeled yellow pine piles mostly 50' long but with a few 55' long. The tips measured from 7 to 10 inches and the butts from 13 to 15 inches. Driving data is shown in tabulated form on the accompanying drawing.

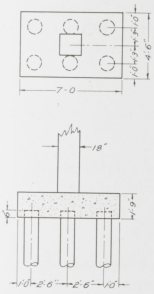
The tips of all piles rests at approximately minus 49 M. G. L. Piles are cut off at approximately minus 1.23 M. G. L. All piles were driven with a No. 1 Vulcan steam hammer with a striking force of 5,000 lbs. and a stroke of 42". The spacing of piles is shown in detail on the accompanying drawing.

The footings of reinforced concrete vary in size and thickness as shown in details. The design loads for footings are variable in small degree. Footings 27 to 30 and 35 to 38 inclusive are designed for a load of 7.6 tons per pile. Footing 63 is designed for a load of 9¾ tons per pile. All other footings are designed for approximately 12½ tons per pile, but varying from 11 tons to 13.9 tons.

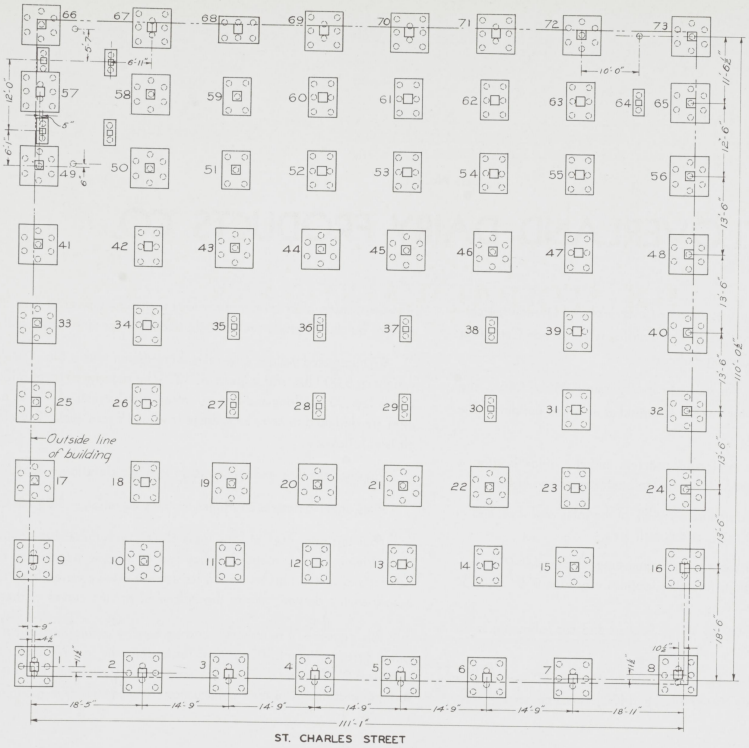
No data is available in regard to settlement of the building but up to this time no settlement is apparent to the eye.

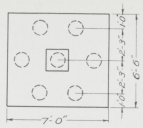


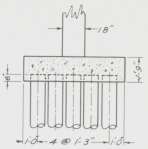


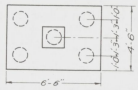


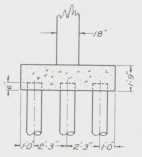
TYPICAL FOOTINGS

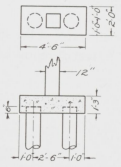




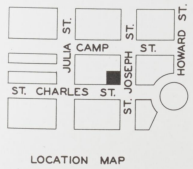








TYPICAL FOOTINGS



LOCATION MAP



FEDERAL LAND BANK

CASE NO. 46

FOOTING NUMBER	AVERAGE BLOWS PER FOOT LAST THREE FEET		
	No. OF LAST 3	2nd OF LAST 3	LAST FOOT
1	11	10	10
6	12	12	10
12	10	10	10
18	9	8	7
24	11	11	10
30	9	9	8
36	8	7	6
42	9	9	8
48	10	10	8
54	8	8	9
60	9	10	9
66	7	6	6

Case No. 47.

CLOVERLAND DAIRY PRODUCTS CO.

The Cloverland Dairy Products Co. building was designed by Favrot and Livaudais, architects, and was erected by Geo. J. Glover Co., in 1923. The building is located on Carrollton Avenue between Olive Street and the Illinois Central Railroad.

The main building, which is referred to in this study, is approximately 96′ by 246′. The front portion, to a depth of 62′, is three stories high and is occupied as an office building. The balance is used for bottling, storage of milk, etc.

The frame work of the entire building is reinforced concrete and the office portion is finished in brick and glazed tile. The factory portion is finished in cement stucco on hollow tile.

The window area in the office portion is approximately 20% of the total wall area, and in the factory portion the windows occupy about 60% of the wall area.

Excavation for basement and footings under basement is to an average depth of 9′-9″ below grade or to elevation —6.6 M. G. L. Excavations for other footings vary from 9′-9″ to 3′-5″ below grade.

A test boring was made on this site in 1920 by W. J. Seghers and the following is his report verbatim.

"The character of the soil in this vicinity I find by boring with a 2″ auger 20 feet deep as follows: 10 feet of yellow plastic clay, sustaining power 1200 to 1400 pounds per sq. ft.; 5 feet of swampy material or loam, approximate sustaining power of from 300 to 1000 lbs.; 5 feet or more of quicksand mixed with a slight trace of river sand. Practically no sustaining power."

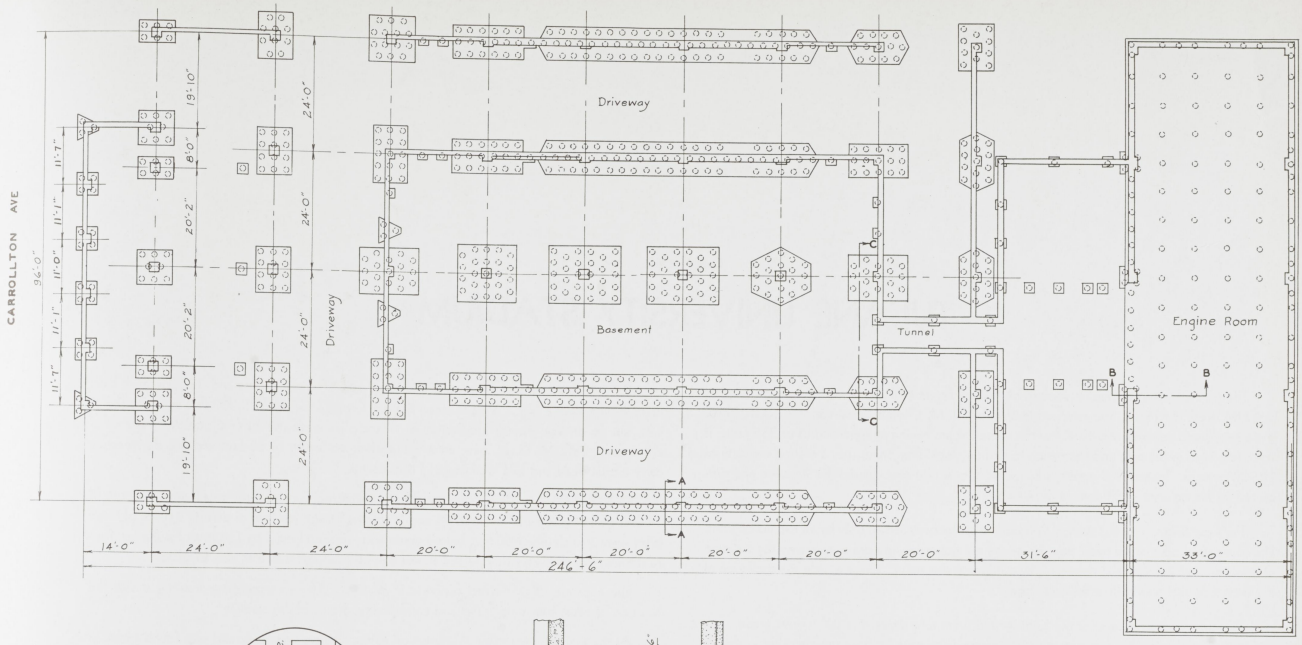
970 untreated yellow pine piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42″. The majority of these piles were 30 and 35 feet long with a few 50 feet long and had an average tip diameter of 7″ and butt diameter of 12″. These piles are designed to carry an average load of 12 tons each. Cut-off varies but the average cut, off is as follows:

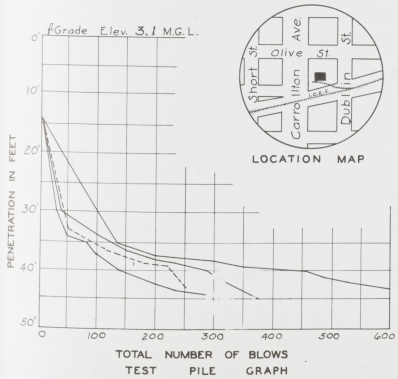
Piles under office and engine room footings elevation —1.64 M. G. L.

Piles under basement and other footings elevation —5.88 M. G. L.

Four test piles 60 feet long were driven with the above equipment and a record kept of their driving. It was found that they had an average penetration of 14′ under the weight of hammer and that the blows for the last foot of driving varied from 15 to 55. The graph on the accompanying drawing shows the individual driving curves of these four piles.

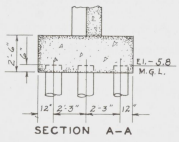
Pile caps are of reinforced concrete varying in thickness and size. The footings under the office part vary from 2′-0″ to 3′-0″ thick while the footings under the factory part of building vary from 2′-6″ to 4′-0″ thick. The accompanying drawing shows the size and spacing of these footings and details of their construction. No settlement is apparent to the eye.



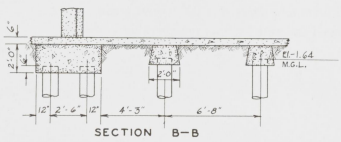


TOTAL NUMBER OF BLOWS
TEST PILE GRAPH

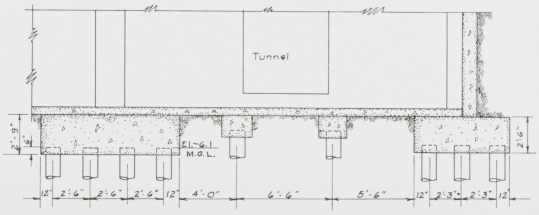
LOCATION MAP



SECTION A–A



SECTION B–B



SECTION C–C



CARROLLTON AVE.

CLOVERLAND DAIRY

CASE NO. 47

Case No. 48.

TULANE UNIVERSITY STADIUM

The Tulane University Stadium located on Willow Street near Audubon Blvd., was designed by Emile Weil, Architect, and was constructed by O. M. Gwinn Construction Co., in 1926. It is a reinforced concrete structure, built as a circular arc having an inner radius of 355 feet. It is 43 feet high in the rear and the concrete stadium, including boxes, has a seating capacity of 22,988 persons. Ingress and egress is by means of concrete ramps under the structure and supported by the columns and beams of the structure.

The superstructure of this stadium was built in six sections joined only by an expansion joint. The foundation plan of the west side shown on the accompanying drawing shows the location of these expansion joints and details of the columns at this point. The east side is a duplicate of the west side and was built at the same time.

The only excavation was for the footings and went to a depth of 7'-0" below grade. The soil to this depth was clay and humus. All reinforced concrete footings rest on piles, as shown on drawing.

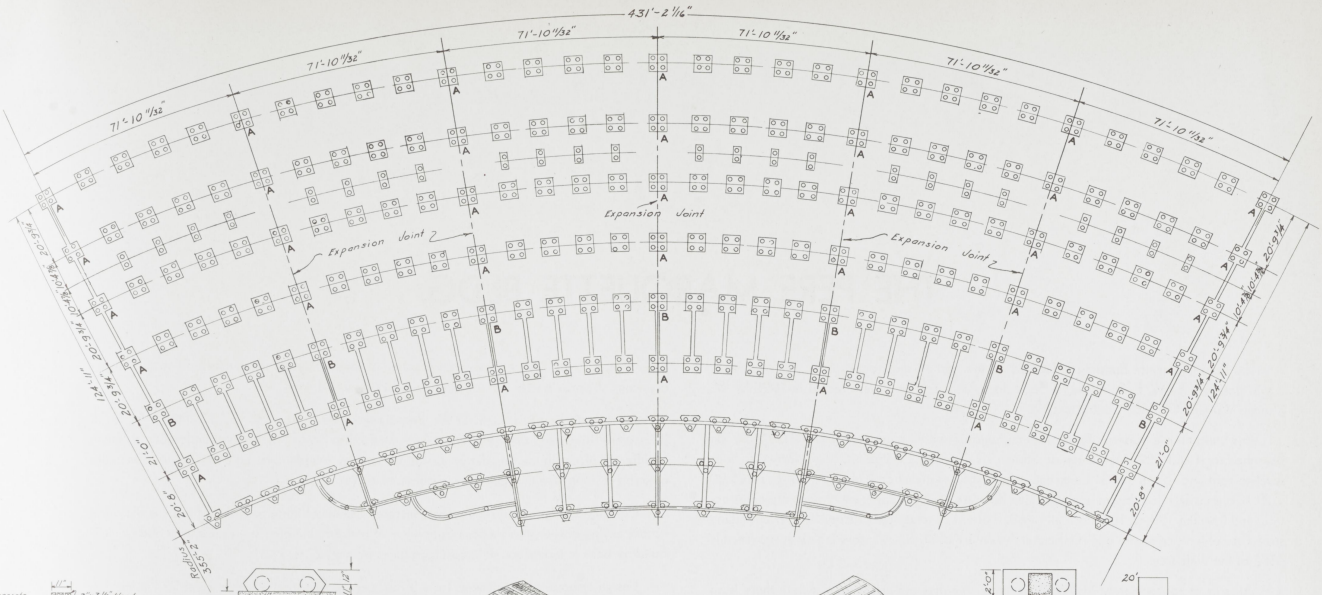
403 untreated yellow pine piles 55' long with 7" minimum tips and 12" minimum butts were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42", but no driving records are available. These piles were cut off 6'-6" below grade or at elevation —5.63 M. G. L., have an average effective length of 53 feet and are designed to carry a total dead and live load of 12½ tons each.

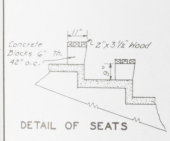
Six test piles were driven with the above equipment. Two of these piles went to depth of 70 feet below grade and required 11 and 16 blows for the last foot of driving. Three of these piles went to a depth of 60 feet below grade and required from 7 to 13 blows for the last foot of driving, which is easy driving and shows that pile support is due to skin friction.

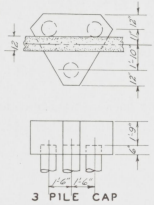
Pile caps are of reinforced concrete 2'-3" thick. The accompanying drawing shows the location of caps, spacing of piles and construction details of this stadium.

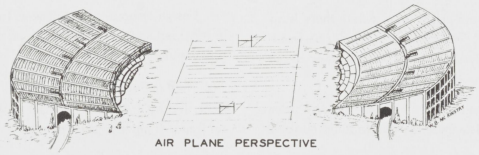
At the time of this survey an inspection of the stadium was made and was found to be in perfect condition. No cracks or signs of settlement were apparent.

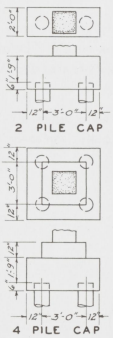


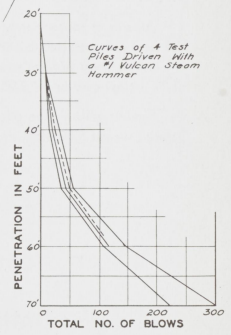


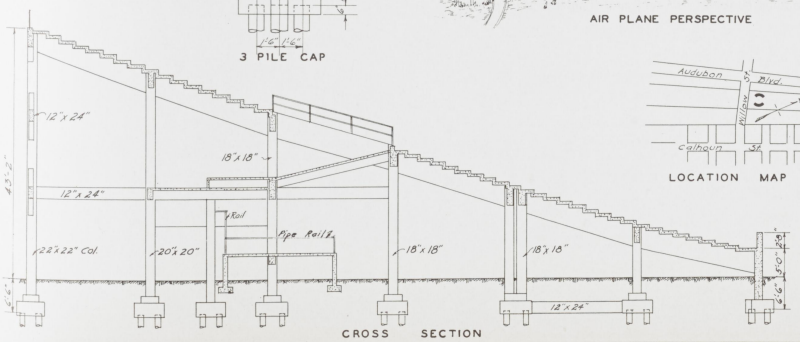


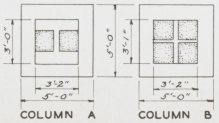












TULANE STADIUM

WEST SIDE

CASE NO. 48

Case No. 49.

THE PERE MARQUETTE BLDG.

The Pere Marquette Building is located on the corner of Baronne and Common Streets. It was designed by W. E. Spink and S. Scott Joy, Architects, and was erected in 1926 by W. Horace Williams Co. Inc., Contractors.

This building is a modern fireproof office building with a basement. It faces 127'-5⅜" on Baronne Street and 129 ft. on Common Street. The building is 202'-10" high from first floor level to roof and has an 11'-5" basement. The first floor elevation is 4.57 M. G. L. or 25.00 C. D. Columns and floor beams up to the 12th floor are of steel. Joists are of concrete construction, and from the 12th to 18th floor all members are of concrete construction. The walls facing streets are of terra cotta and brick and curtain walls are of brick. Window area is approximately 35% of the wall area.

An area of approximately 11,400 sq. ft. under the Baronne Street wing where there is no basement was excavated to pile cut-off at 8.6' below curb or —4.03 M. G. L. Under basement in Common Street wing an approximate area of 3,900 sq. ft. was excavated to an average depth of 17' below curb or —12.93 M. G. L.

Barkless yellow pine piles were driven for this foundation with a No. 1 Vulcan steam hammer, weight 5,000 lbs., stroke 42". An analysis of pile data under column footings numbers 1, 2, 3, 4, 5, 6 and 7 as indicated on drawing of the foundation is tabulated on accompanying drawing. Approximately 3 ft. of piles was cut off after driving.

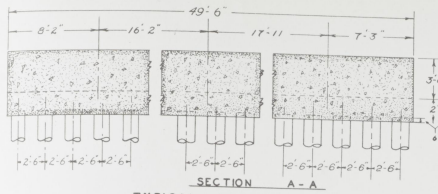
Tip diameters range from 6" to 9". Butt diameters range from 12" to 15". A total of 1,572 piles were driven and these range in length from 45 to 66 ft. There is no uniformity of length at different places in the foundation as will be seen by reference to table on drawing, as under column No. 4 where the lengths range from 47 to 70 feet.

Column footings are of reinforced concrete. Details of these typical footings are shown in accompanying drawing and a composite view of entire foundation with piles, cap outlines and building lines is indicated. Pile spacing ranges from 2'-2" to 2'-6".

Design embodies requirements for a 30 lb. per sq. ft. normal wind load, as 75 lbs. per sq. ft. live load and a reduced live load per sq. ft. as per building code. The total pile load is approximately 15 tons per pile.

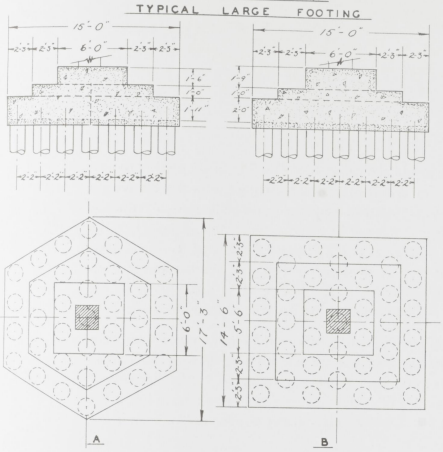
The condition of the building is good, with no outward signs of undue or irregular settlement, and no cracks are apparent. No instrumental records have been kept to determine what settlement if any has taken place.



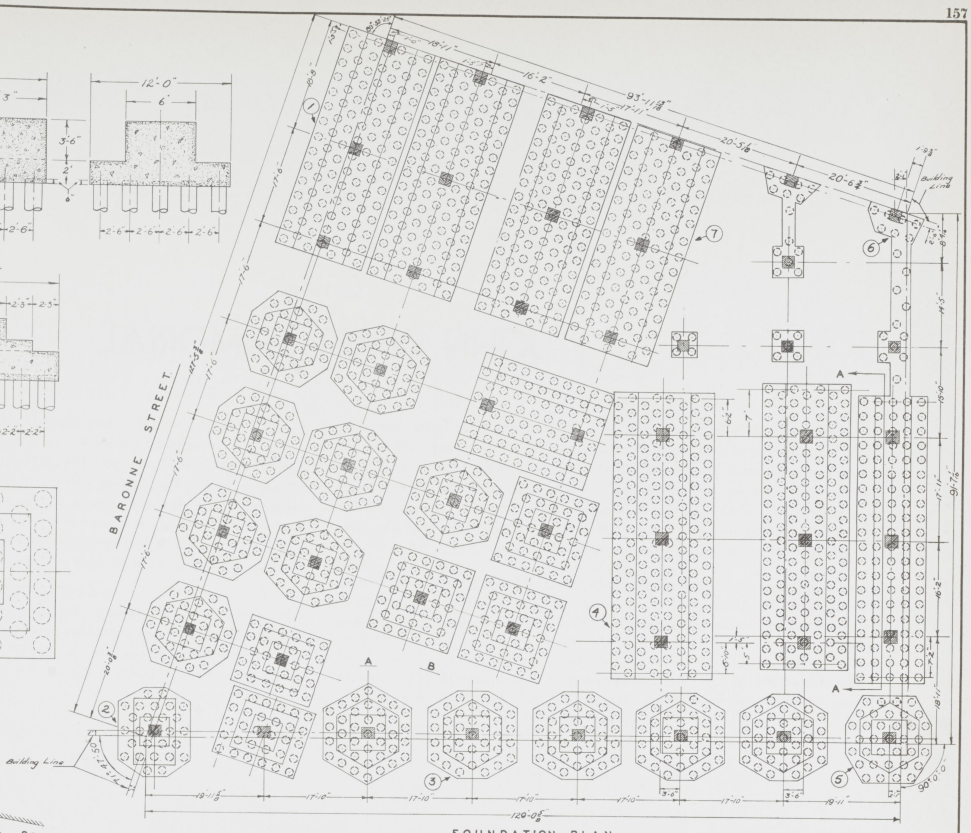


SECTION A-A

TYPICAL LARGE FOOTING

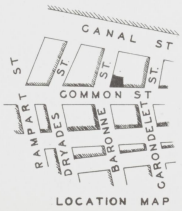


TYPICAL SMALL FOOTINGS.



FOUNDATION PLAN
COMMON STREET.





LOCATION MAP

Column Numbers	Number of Piles	Length of Piles Max.	Min.	Avg.	Depth of Foundation	Blows Per Last Foot Max.	Min.
1	102	70'	58'	62.5	66.2	250	7
2	27	70'	58'	60.7	65.3	27	9
3	85	57'	56'	56.3	62.1	38	10
4	156	70'	47'	49.5	62.5	250	9
5	35	53'	48'	49.5	60.8	36	10
6	7	65'	60'	62.0	64.7	36	15
7	94	70'	55'	59.3	64.5	150	10

PERE MARQUETTE BUILDING

CASE NO. 49

Case No. 50.

JOHN DIBERT MEMORIAL

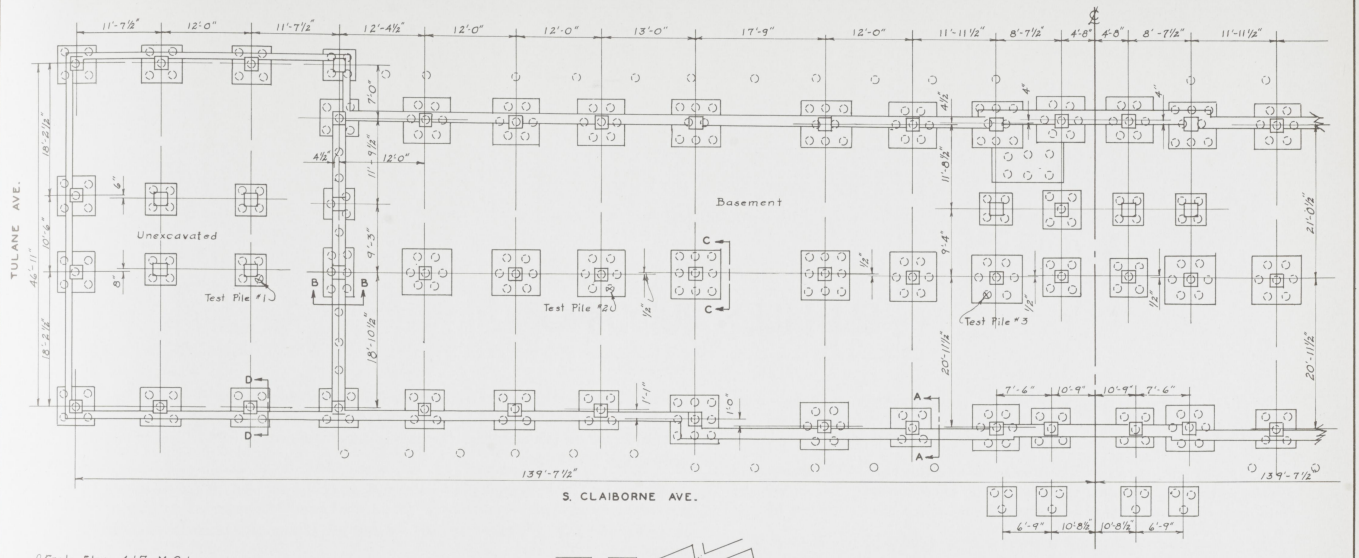
The John Dibert Memorial Hospital located on S. Claiborne Street and Tulane Avenue on the Charity Hospital grounds, was designed by Sam Stone Jr. Inc., architects, with Jens B. Jensen as structural engineer, and it was constructed by the Geo. J. Glover Co. Inc., in 1925-26. It is a modern fireproof reinforced concrete building having 4 stories, a basement and tower. This building fronts 279'-3" on S. Claiborne Avenue by 46'-11" on Tulane Avenue and the main portion rises 52'-6" above grade with the tower rising an additional 27 feet. The basement does not cover the entire site but is approximately 208' x 42'.

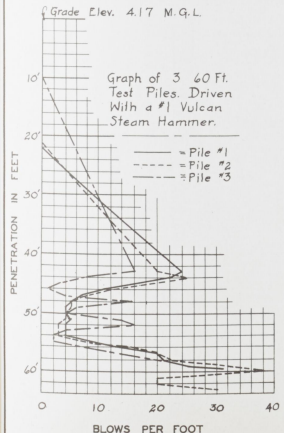
Excavation for basement and footings under main portion of building was carried down to an average depth of 10'-6" below grade or to elevation —6.33 M. G. L. Excavation for footings under wings of building was carried down to a depth of 6'-6" below grade or to elevation —2.33 M. G. L.

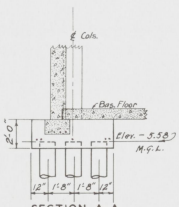
Approximately 539 L. L. Y. P. piles with bark removed were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". These piles were from 31 ft. to 50 ft. long and since they were followed and driven to within 2 ft. of cut-off they had an effective length of from 29 to 48 ft. The driving records of these piles show that the weight of the hammer caused them to sink 10 to 20 feet then there was a gradual increase of resistance to a depth of 43 ft. below grade with an average of 21 blows per foot at this depth. From 43 to 50 feet below grade the resistance decreased but again increased below 50 ft. The average penetration for the last five blows was 2". Cut-off of piles under basement varies from 9'-9" to 10'-5" below grade or from elevation —5.58 to —6.25 M. G. L. Piles under wings are cut off 6 ft. below grade or at elevation —1.83 M. G. L. The design load is 15 tons per pile.

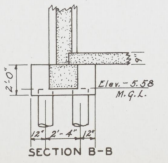
Five test piles 60 ft. long with tips from 5½ to 6½ inches and 12 inch minimum butts were driven with the above equipment. The two graphs on the accompanying drawing show penetration and blows per foot of these five piles. The location of test piles No. 1, No. 2 and No. 3 are shown on the foundation plan. Test pile No. 4 is in the same relative position as No. 2 but in the opposite side of building. Pile No. 5 is in the same relative position as No. 1 but in the opposite wing of building.









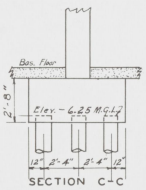


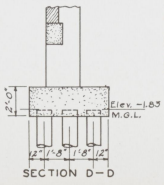


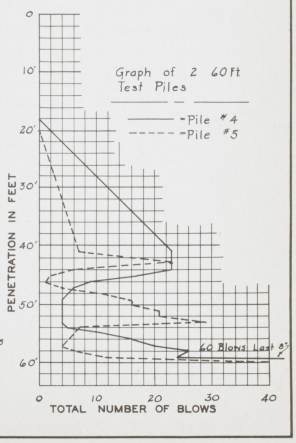


JOHN DIBERT MEMORIAL

CASE NO. 50







Case No. 51.

ELI LILLY BUILDING

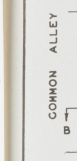
The Eli Lilly Building was designed by Favrot & Livaudais, Architects, and it was erected in 1926 by R. P. Farnsworth Company. The building is located on the corner of Camp and Capdeville Streets fronting 59′ 3¾″ on Camp Street by 111′ on Capdeville Street.

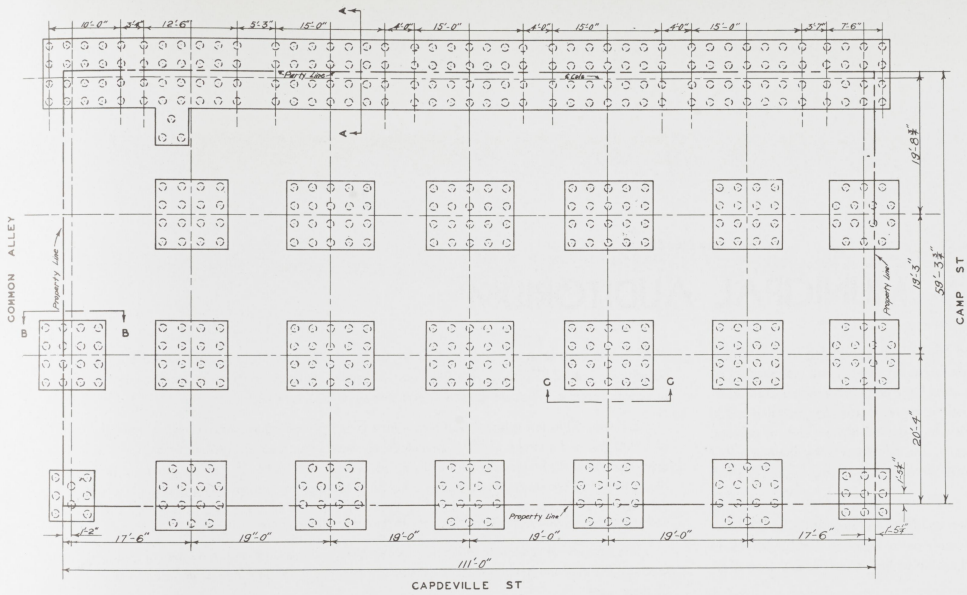
It is a modern fireproof reinforced concrete building 4 stories high. All loads are carried by reinforced concrete columns and wall beams directly to concrete caps. Exterior walls are of brick with approximately 70% of the area occupied by windows.

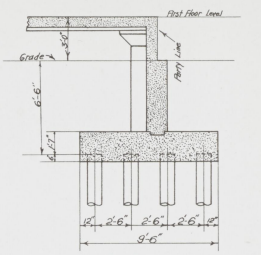
This structure is supported on 390 untreated wood piles, 50 to 55 feet long with 6″ to 8″ tips and 12″ to 13½″ butts driven with a No. 1 Vulcan steam hammer having a stroke of 42″ and a weight of 5,000 lbs. These piles had an average penetration of approximately 53′ below curb or to elevation —44.15 M. G. L. giving them an average effective length of 46′-6″. The piles were cut off 6′-6″ below curb or elevation 2.15 M. G. L. and an average of 55 blows was required for the last foot of driving. The minimum design load per pile is 24.7 Tons and the maximum load is 26.2 Tons.

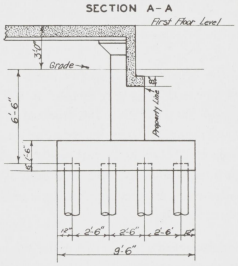
The drawing shows in graphic form the driving record of 6 test piles. It also shows the number and spacing of piles in each footing. The average number of blows per last foot of driving for test piles is 62. There is no basement and there was no excavation except for concrete footings.

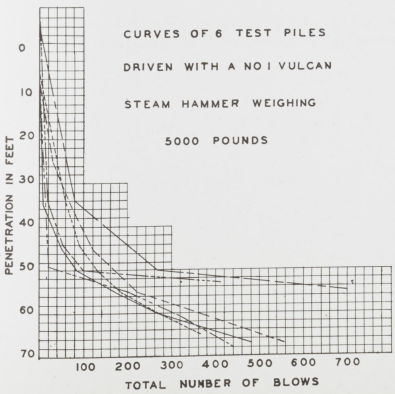
There is no evidence of settlement but no instrumental observations are available.

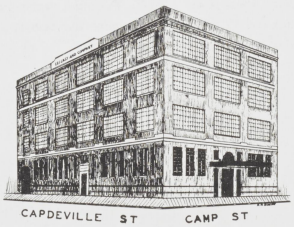


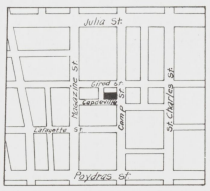


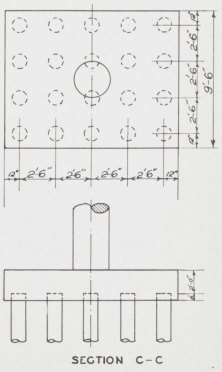












ELI LILLY BUILDING

CASE NO. 51

Case No. 52.

MUNICIPAL AUDITORIUM

The Municipal Auditorium fronts on Beauregard Square and is bounded by Saint Peter, Saint Ann and N. Liberty Streets. It was designed by Favrot & Livaudais and was erected by Caldwell Bros. in 1929. This Auditorium is a modern steel frame and reinforced concrete structure consisting of a main building and an exhibition hall at the rear. The main building is 320 ft. long by 202 ft. wide with walls faced with stone which rise 66 ft. from curb to parapet. It has 5 levels with the top row of seats 50 ft. above curb. The exhibition hall at the rear is 317 ft. wide by 70 ft. deep and has walls of brick which rise 46 ft. from curb to parapet. This hall has two floor levels.

A basement occupies part of the site under the main building. The excavation for this basement was carried down approximately 8'-0" below curb or to elevation —4.03 M. G. L. Excavation for other footings under main building and exhibition hall varied in depth from 8'-0" to 18'-0" below curb.

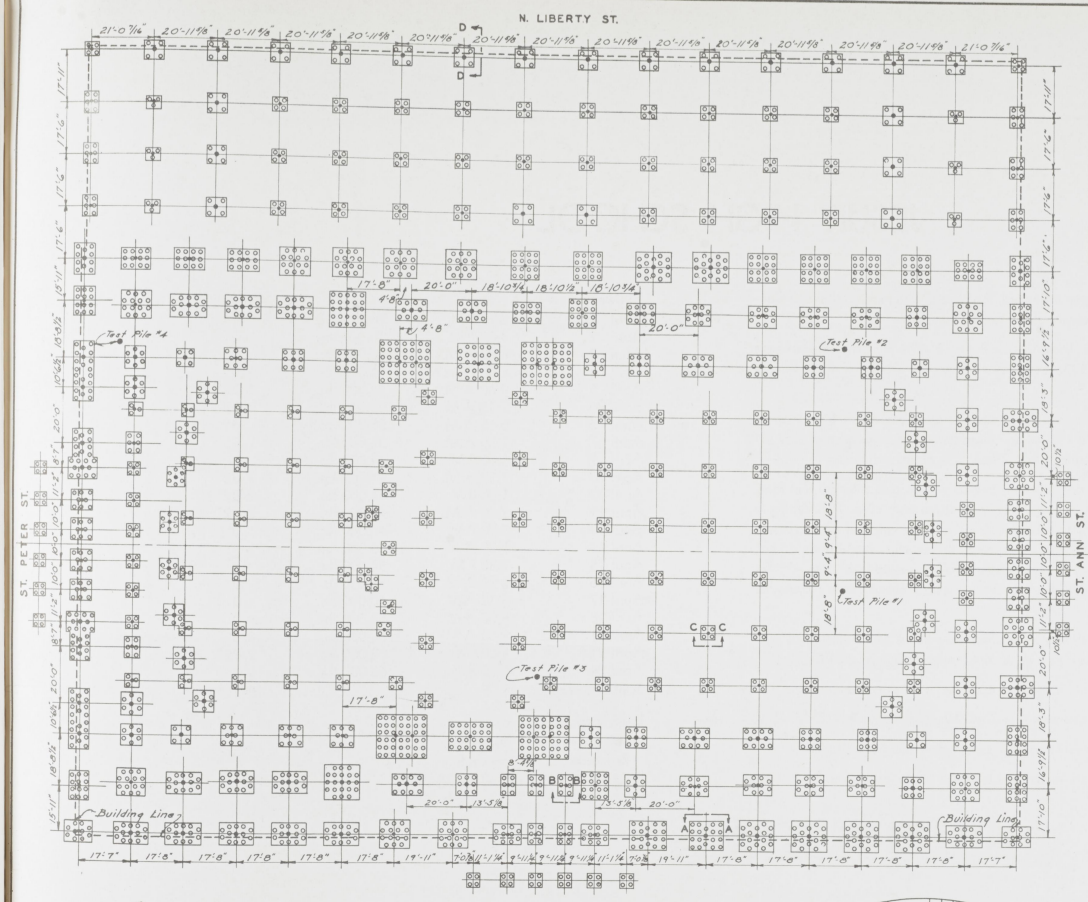
Approximately 2,500 untreated wood piles were driven under this auditorium. These piles were 40 ft. and 50 ft. long with a majority 50 ft. long and had 6 to 8 inch tips and 12 to14 inch butts. Cut-off varied from 7'-6" to 17'-6" below curb with the majority of piles cut off 7'-6" below curb or at elevation —3.53 M. G. L. The spacing of these piles varied but the majority are spaced 2'-6" o. c. The details on accompanying drawing show the spacing of piles in various footings. Piles are loaded at approximately 12½ tons each.

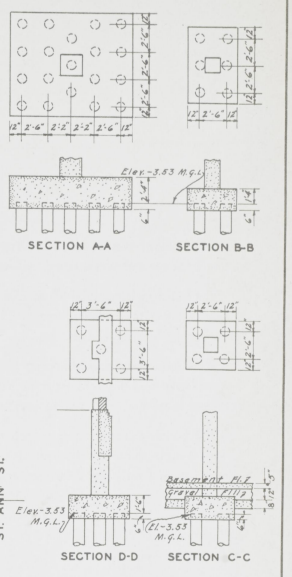
Eighteen 60 ft. test piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". Seventeen of these piles took an average of 8 blows to drive from 69 to 70 feet below curb or from —65.03 to —66.03 M. G. L. The other test pile No. 4 took 137 blows to drive the same distance. The graph on accompanying drawing shows the average driving curve of these 17 piles, the individual driving curve of 3 of these 17 piles and the curve of pile No. 4 which is not included in the average.

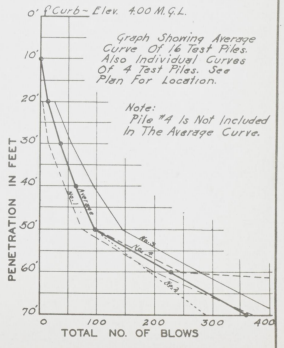
Pile caps are of reinforced concrete of varying sizes, depending on the number of piles in footing. The plan and details on accompanying drawing shows the spacing size and construction of these caps.

A careful examination of the building reveals no signs of settlement. No instrumental observations have been made but the building superintendent and City Engineer report no evidence of settlement.





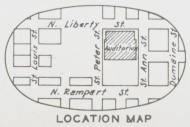






MUNICIPAL AUDITORIUM

CASE NO. 52



Case No. 53.

JESUIT HIGH SCHOOL

This building was designed by Wogan & Bernard, Architects, with Percy C. Kuhn as Consulting Engineer and was erected by George Glover Co., Contractors.

The building fronts 272'-9" on Carrollton Avenue and is 58'-2" wide. The general shape is a U. One wing on Banks Street is 155 feet long by 47 feet wide and the wing on Palmyra Street is 140 feet by 47 feet.

It is a modern fireproof building with concrete footings on pile groups. The frame is structural steel and outside walls are brick. The building is three stories and basement and is 67'-6" from base to parapet. The window and door area is about 35% of the wall area.

The building is supported entirely on untreated, peeled yellow pine piles 60 feet long, 12 inches minimum butts and 6 inch minimum tips. They were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". All piles are cut off at 7.5 feet below curb grade or at approximately —7.00 M. G. L. No complete record is available on driving, but it is stated that for the fourth from last foot the number of blows varied from 15 to 42. For the last foot the blows varied from 5 to 30, a large percent averaging about six blows and another large percent averaging about 20 blows.

All clusters of piles are capped with reinforced concrete which is 12" wider on all sides than the clusters. Thickness of caps varies from 1'-6" to 2'-6" (see schedule on drawing).

A total of 1,456 piles were driven in foundation exclusive of 12 shown under steps.

The entire area was excavated for basement to a depth of approximately —7.50 M. G. L.

Numerous cypress stumps were encountered at 3' to 4' below the ground surface.

One pile 60 ft. long was driven and loaded as a test with the following result:

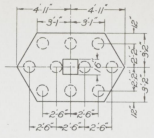
Date	Time	Load	Settlement
April 2	3:15 P.M.	No load	0
April 2	4:00 P.M.	10,000 lbs.	0
April 3	8:00 A.M.	20,000 lbs.	0
April 4	8:00 A.M.	24,000 lbs.	0
April 5	9:00 A.M.	24,000 lbs.	1/32"
April 6	7:15 A.M.	24,000 lbs.	1/32"
April 6	8:15 A.M.	25,000 lbs.	0
April 7	11:30 A.M.	31,000 lbs.	0
April 9	5:00 P.M.	44,000 lbs.	0
April 10	7:30 A.M.	44,000 lbs.	2/32"
April 10	5:00 P.M.	44,000 lbs.	2/32"
April 11	7:00 A.M.	44,000 lbs.	2/32"
April 13	5:00 P.M.	46,000 lbs.	0
April 14	7:30 A.M.	50,000 lbs.	0
April 15	7:30 P.M.	54,000 lbs.	0
April 16	8:30 A.M.	56,000 lbs.	0
April 17	8:00 A.M.	60,000 lbs.	0
April 18	8:00 A.M.	68,000 lbs.	0
April 21	8:00 A.M.	68,000 lbs.	2/32"
April 21	5:00 P.M.	68,000 lbs.	2/32"
April 24	5:00 P.M.	68,000 lbs.	0
Total Settlement			12/32"

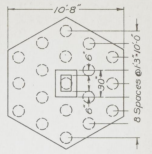
Loads used in design were:
Wing Load 15 lbs. sq. ft.
Reduced L. L. 150 lbs. sq. ft.
Total maximum load per pile 12½ tons.

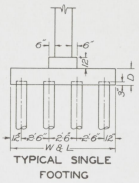


PILE CAP SCHEDULE			
NUMBERS	PILE CAP		
	W	L	D
83	4'6"	7'0"	2'6"
84-91-74	6'4"	7'0"	1'11"
21-22-39-41-54-92	6'4"	7'0"	1'11"
82-85	7'0"	7'0"	1'11"
109	4'6"	11'4"	2'6"
7-9-10-11-15-16-46-47-48-52-99	See	De-	2'2"
53-62-63-64-68-69-70-75-97-98		tail	do.
3-5-17-42-93-103-107-113	6'4"	9'6"	2'0"
6-12-18-28-29-32-33-43-49	7'0"	9'6"	2'3"
54A-65-71-77-80-87-94-100	do.	do.	do.
81-86-105-106	8'10"	9'6"	2'1"
23-38	7'0"	12'0"	2'9"
30-31	7'0"	13'10"	3'0"
4-55-58-59-108	9'6"	9'6"	2'5"
2-24-37	9'6"	10'8"	2'4"
110	8'10"	12'0"	2'3"
8	See Detail		2'6"
76	9'6"	12'0"	2'3"
40	10'8"	12'0"	3'0"
25-36	10'8"	12'0"	2'5"
A-B-C-D-E-F	2'0"	2'0"	1'6"

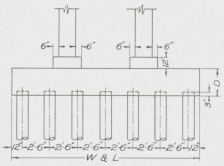
COMBINED PILE CAP SCHEDULE			
NUMBERS	W	L	D
13-14, 19-20, 44-45, 73-72,	8'10"	19'6"	3'0"
95-96, 101-102	do.	do.	do.
111-112	9'6"	16'4"	2'4"
88-89	9'6"	16'4"	2'6"
79-78	9'6"	17'0"	2'5"
50-51, 56-57, 60-61, 66-67	9'6"	17'0"	2'3"
34-35 26-27	9'6	24'6	2'9"





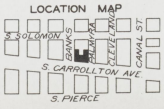


TYPICAL SINGLE FOOTING



TYPICAL COMBINED FOOTING

LOCATION MAP



JESUIT HIGH SCHOOL

CASE NO. 53

Case No. 54.

BIENVILLE HOTEL

The Bienville Hotel, located on St. Charles Avenue near Lee Circle, was designed by Toledano, Wogan and Bernard, Architects, with Gunvald Aus Company as Consulting Engineers and was constructed in 1920. It was built by sub-contractors under general supervision of Theo. Grunewald, the owner. Piles were driven by J. Ed. Hemenway.

This building fronts 100' on St. Charles Avenue by 217 feet deep and is 8 stories high rising 96' above the sidewalk. The interior is of steel frame construction with concrete floor slabs and the exterior walls are load bearing and are solid brick. Loads are carried by steel columns and steel beams and brick walls, there being no columns in outside walls.

The building has no basement and the only excavation was for the footings, which go to a depth of about 8'-6" below grade.

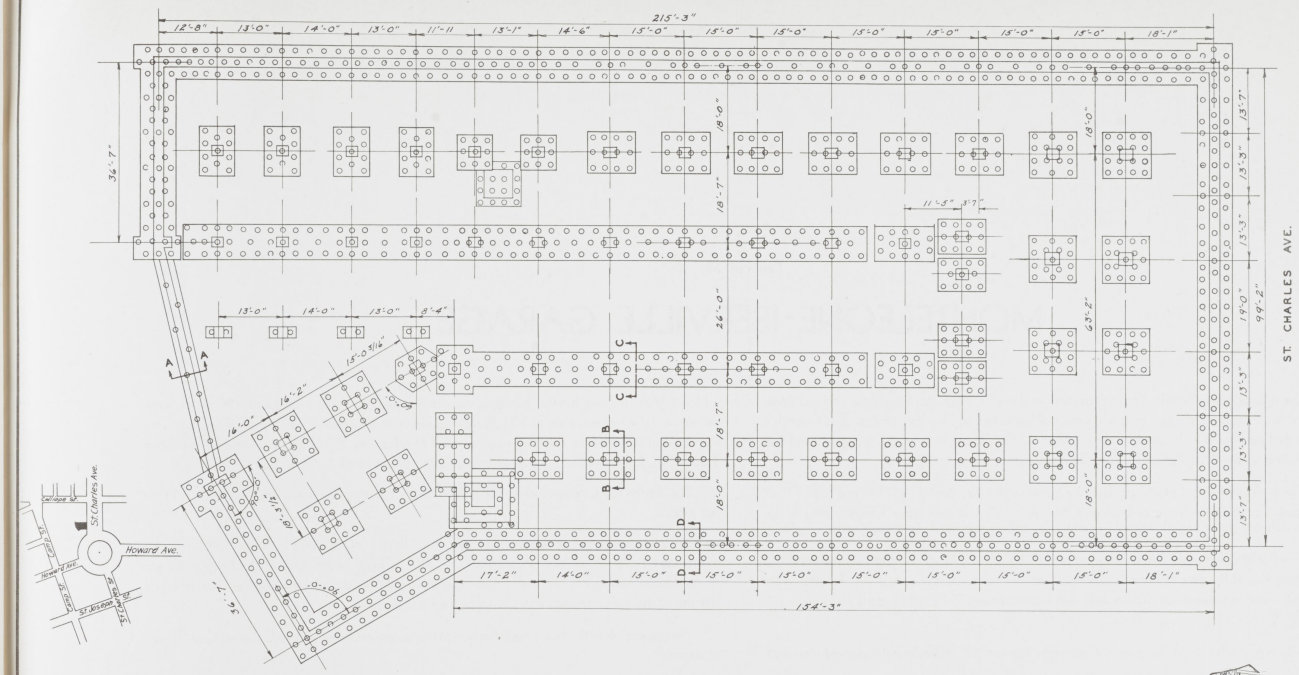
Approximately 1,400 piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42", and were cut off 7'-6" below grade or at elevation 1.32 M. G. L. These were southern yellow pine, peeled, piles with a 7" minimum tip and a 14" minimum butt. The majority of the piles were 55 feet long with a few 50 feet long, and were driven full length and followed about 5 feet. This would give them an effective length of 52'-6" and 48'-6". They are cut off at 8 feet below curb or at approximately zero M. G. L. Driving over the entire site was very uniform and firm.

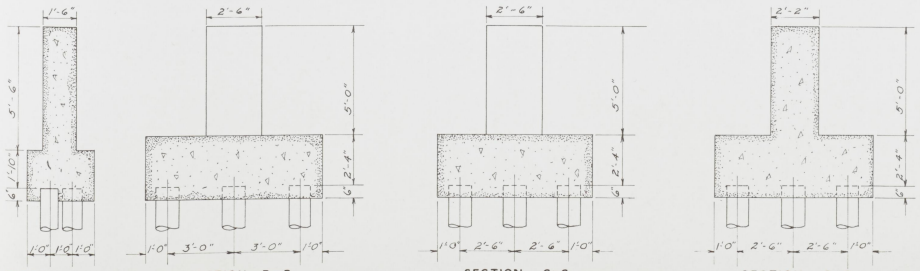
The dead load was figured as 110 lbs. per sq. ft. and the live load as 10 lbs. per sq. ft. This works down to approximately 12½ tons per pile.

Pile caps are of reinforced concrete 2'-10" thick with 2'-6" square concrete piers on the interior footings. The pile cap under the exterior walls is continuous around the entire building with a continuous concrete pier 2'-2" wide.

The accompanying drawing shows the spacing and details of column and wall footings.

There is no outward evidence of any settlement in the building.







BIENVILLE HOTEL

CASE NO. 54

Case No. 55.

MONTELEONE-IBERVILLE GARAGE

The Monteleone-Iberville Garage located on Iberville Street between Bourbon and Royal Streets, is a 7 story reinforced concrete fireproof building used for the storage of automobiles. It was designed by Wm. E. Spink, architect, with C. G. Cappel as structural engineer, and was constructed by the W. Horace Williams Construction Company in 1925.

The building fronts 117'-6" on Iberville Street with a depth of 111'-7½" and rises 71'-9" from curb. Exterior walls are of brick and the Iberville Street wall has a window area of approximately 64% of the wall area while only 33% of the other walls are occupied by windows.

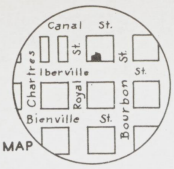
This building has no basement but a pit or semi-basement 171'-6" by approximately 54'-10" was excavated at the rear of the site to a depth of about 4 ft. below curb or to elevation 4.00 M. G. L. The excavation for the footings was carried down 7'-4" below curb or to elevation 0.67 M. G. L.

523 wood piles, 50 ft. long with 7" minimum tips and 12" minimum butts were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". Piles were driven until the tips were about 50 ft. below grade or at elevation —42.0 M. G. L. The driving to this point was uniform and very easy. Cut-off of piles was 7'-0" below grade or at elevation 1.00 M. G. L., giving the piles an effective length of about 43 ft.

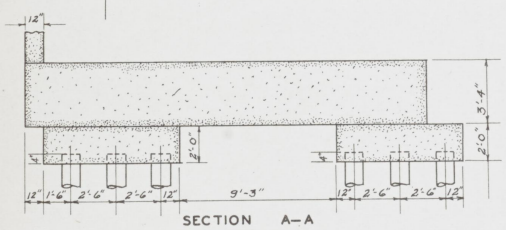
The design load, not including the weight of the concrete footing is approximately 15 tons per pile.

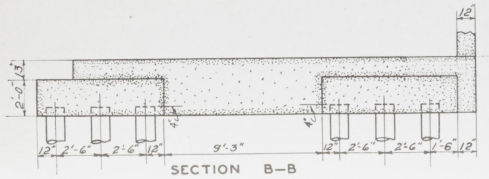
All pile caps are of reinforced concrete 2'-0" thick. Interior pile caps are surmounted by a 3 ft. square pier of reinforced concrete 6'-4" high. Grade beams carrying the brick walls are or reinforced concrete. The accompanying drawing shows the spacing of piles, the size and spacing of the concrete caps and details of their construction.

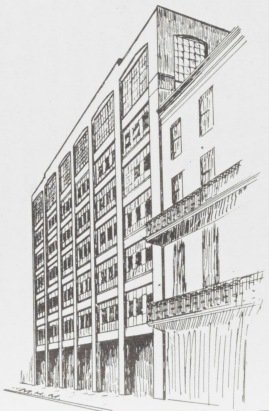
An inspection of the building at the time of this survey revealed no cracks nor signs of uneven settlement.

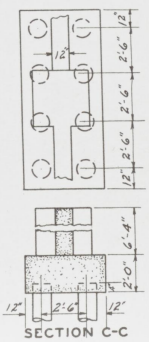


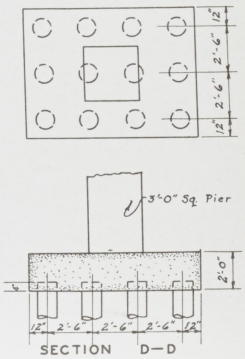
LOCATION MAP


SECTION A–A


SECTION B–B




SECTION C–C



SECTION D–D

MONTELEONE IBERVILLE GARAGE

CASE NO. 55

Case No. 56.

LEE MONUMENT

The Robert E. Lee Monument stands in Lee Circle which is the intersection of St. Charles Street and Howard Avenue.

It was designed throughout, except the bronze statue of General Lee, by John Roy of New Orleans in 1877. Alexander Doyle designed the bronze statue and it was cast in New York by the Hinsdale and Doyle Co. The monument was constructed in 1883 and unveiled on February 22, 1884, and cost complete $40,000.00.

The foundation is odd and unique in design and consists of untreated, unpeeled red cypress piles which apparently vary in length from 40 ft. to 49 ft., and red cypress cap timbers. The drawing by John Roy indicates square piles and square timbers but Mr. Coleman states that all piles are round and cap timbers are hewn on two sides. The tips all rest at approximately minus 31 M. G. L. and they are cut off, as shown in drawing, at five different elevations. The lowest cut-off is at about curb level and the highest about 9′ above curb level.

The accompanying drawing is copied from the original of John Roy, which is on file in the City Engineer's office. It appears to be an original sketch and may not be the final working drawing if any such was ever made.

In 1929 the J. F. Coleman Engineering Company made a partial inspection of this foundation by excavating and uncovering the piles and grillage. Mr. Coleman stated that all wood was found to be in a sound condition. This is a remarkable fact after standing 52 years and it cannot be expected to stand always though just when serious disintegration may begin or how fast it may progress is impossible to forecast. He states that the piles and bottom caps were found to be in a very moist clay but that moisture decreased upward until the top layer of timbers was found to be covered by very dry earth with practically no moisture content. The natural water table at this time is about minus 5 M. G. L. so that the portion of piles below the water line is about 25 feet.

From the top of the General's hat to the top of the mound is 96′-10″. The base 12′ high and 42′ square, is of Georgia granite. The fluted column, 60′ high is of Tennessee white marble. The statue is cast bronze and is 16½′ high and weighs approximately 7,000 pounds.

The total weight of monument including foundation is estimated, from such data as is available, to be about 1,141 tons or 14 tons per pile.

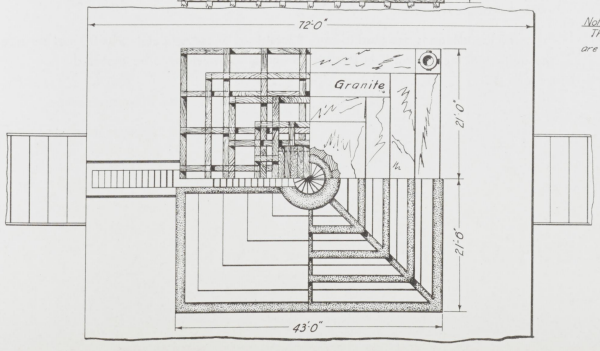
There is no indication of settlement up to this time which is October 1936.

ROBERT E. LEE MONUMENT
CASE NO. 56



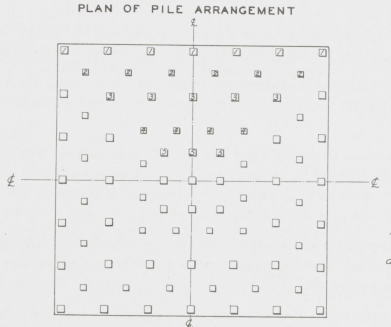
LOCATION MAP

SECTIONAL ELEVATION

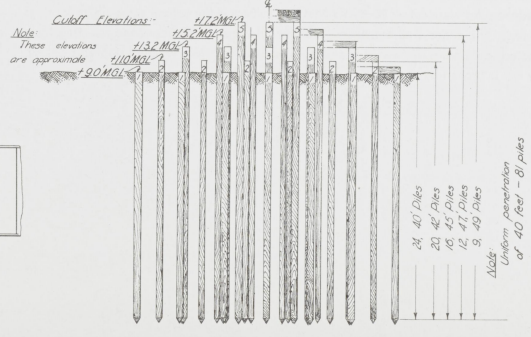


SECTIONAL PLAN

PLAN OF PILE ARRANGEMENT



Note
Information available indicates square piles
No other dimensions available except as shown



SECTIONAL ELEVATION

Case No. 57.

NEW ORLEANS PUBLIC SERVICE

The New Orleans Public Service Office Building was designed in 1926 by Favrot and Livaudais, Architects, and was erected in 1926-27 by Geo. J. Glover Co. Inc. Contractors.

It is located at 317 Baronne Street between Gravier and Union Streets, and is approximately 112′ x 223′ except for the small building at corner of Union and Baronne Streets which is about 38′ x 98′.

It is a modern fireproof steel frame office building with terra cotta flat arch floor slabs The exterior walls on Baronne and Union Streets are of cut stone backed with brick and hollow tile. All other exterior walls are brick backed with hollow tile. Interior walls and partitions are mostly hollow tile, with some wood studs and plaster.

The structural design of the building anticipates a twelve story structure only eight stories of which have been erected. Therefore present loads and stresses are much less than those for which the foundations are designed.

The entire area under the building was excavated to a depth of about 15′ or to —10.4 M. G. L. and the piles were cut off at —9.95 M. G. L., except in the several areas where footings were lowered. The entire area was then covered with a reinforced concrete mat 18″ thick, except as noted, and on this mat was built pedestals or bases 15″ thick which support the column bases. The mat is broken by construction joints as indicated by heavy lines on plan.

In two areas the thickness of footings was increased by 6″; viz. under columns 45, 46, 47, 58, 59 and 60, and under columns 50, 63, 76 and 79. The only deeper excavations were for three elevator pits and the depressed area under column 61.

The structure is supported on untreated peeled yellow pine piles which vary in effective length, after being driven, between 48′ and 56′.

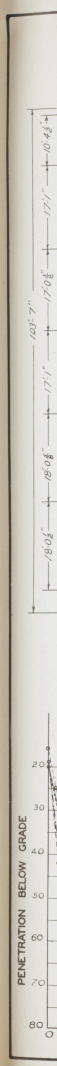
Tips of piles vary from 5½″ to 8″ and butts from 12″ to 14″.

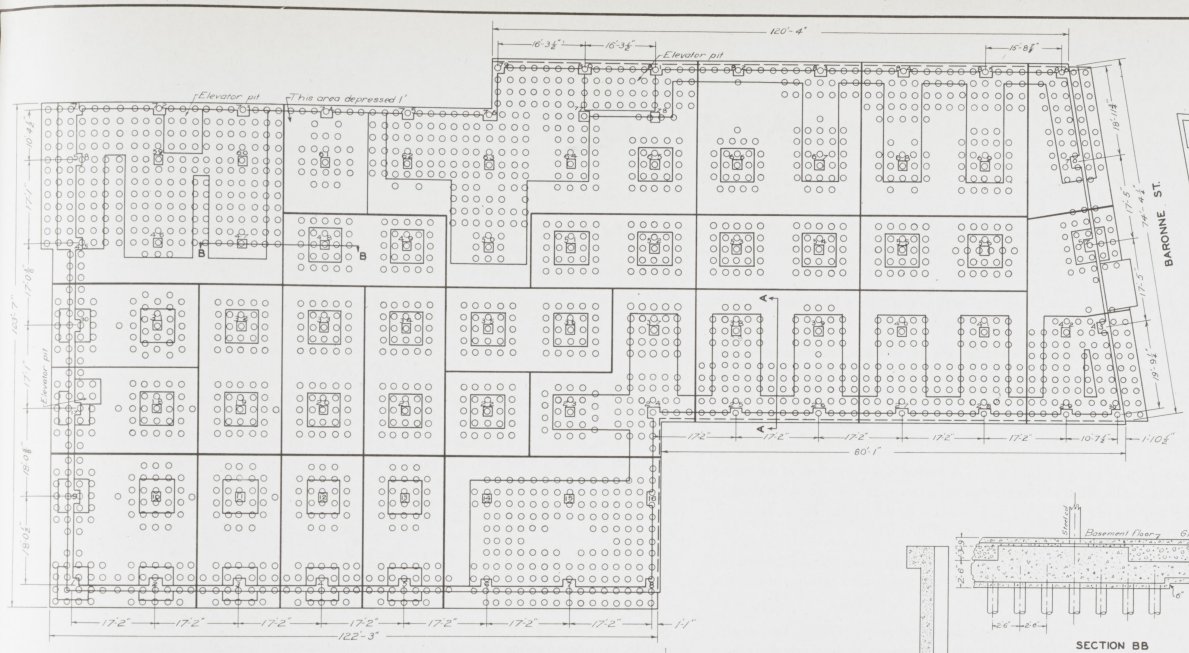
A total of 2,116 piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42″.

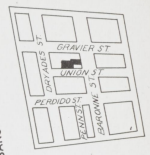
The penetration of piles varied from 47′ to 58′ and the points rest at about minus 52.4 to minus 64.4 M. G. L., at which levels they practically refused to yield to hammer blows.

On the accompanying drawing are two graphs which illustrate the driving records of ten test piles. The exact location of these test piles is not known but they are scattered throughout the foundation. There is no data on driving the other piles but the record is said to agree closely with that of the test piles.

The foundation is designed to carry a total load of approximately 23,500 lbs. per pile and naturally with the present light loading no sign of settlement is to be expected.

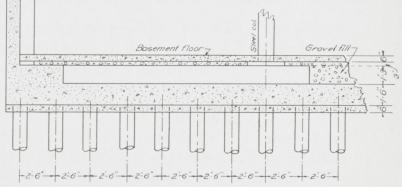




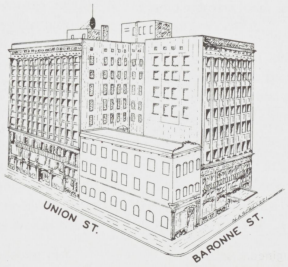


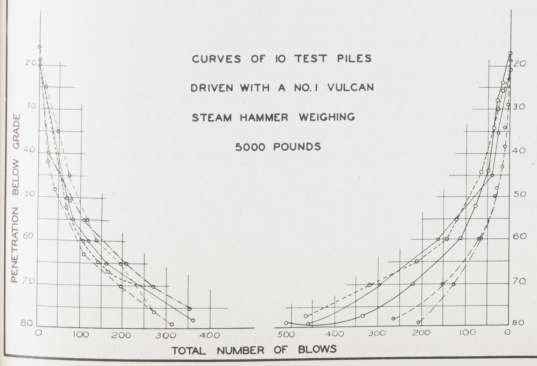
LOCATION MAP

SECTION BB



SECTION AA





N.O. PUBLIC SERVICE BLDG.

CASE NO. 57

Case No. 58.

HARVEY LOCK

This lock is located at Harvey, La., on the right bank of the Mississippi River and is a part of the Louisiana Intracoastal Waterway, having a navigable width of 75'-0", chamber length of 323'-0", and a maximum water depth of 32'-6" with water in the Mississippi River at 21.38 Mean Gulf Level.

The lock was designed in the United States Engineer's Office at New Orleans under direction of Major R. A. Fowler. It was erected in 1934 by C. F. Lytel, contractor.

The lock is a reinforced concrete structure resting entirely on a pile foundation as is illustrated in plan and section on Drawing No. 2. This drawing also shows a progress picture taken during construction, which was sketched from an actual photograph.

The overall length of the foundation is 693'-3" and the greatest width, as shown at "Section H-H" is 120'-10". All of this can be more readily understood by referring to Drawing No. 2.

Drawing No. 3 is the "Hypotheses of Design" as copied from the records of the United States Engineer's office and illustrates graphically the assumptions made in designing this structure and does not check with the final design. It is included here for the benefit of those who wish to follow the reasoning of the engineers in designing the structure.

It will be seen that the safe load used in designing the structure varies from 20.4 tons per pile to 4.68 tons per pile and the actual maximum load per pile in the completed structure is 20.4 tons.

All foundation piles used in this structure were Southern Yellow Pine 80' long with an average tip of 8" and an average butt of 16½" and all were treated with 12 lb. of creosote oil per cubic foot. A total of 8547 piles were driven in this foundation.

Drawing No. 1 shows the location of the lock geographically and, in more detail with, reference to the old lock and canal. This drawing also shows the record of three test borings which were made in advance of design. 24 other borings were made at a later date and 9 of these are recorded as our numbers 224-232 inclusive and may be seen in Chapter II. The others were omitted on account of similarity of stratification.

On Drawing No. 1 may also be seen in detail a tabulated record of the driving of 3 test piles 80' long and the location of the test piles. On this drawing are two sketches which were made from photographs taken during construction; one showing the completed lock empty and the other showing a part of the lock chamber half full of water.

The following is quoted from the records of the United States Engineers:

"Only one test pile was loaded. A 70' straight pine pile 13" butt and 7" tip was driven until the tip was at elevation of minus 56' M. G. L. in the center of the pit, and was supposedly resting in an 18" sand stratum. A platform was built on the butt and loadings progressed as follows, readings being taken at 8 A. M. and 8 P. M. each day throughout the process of loadings:

"5 Tons on Feb. 26th
5 Tons on March 1st
5 Tons on March 3rd
5 Tons on March 5th

"The 20 ton load was kept on until March 10th. Five tons more was added on March 10th. Five tons more was added on March 12th. The final load of 30 tons was placed at 11 A.M. At 4:30 P.M. no settlement had taken place. At 8 P.M. still no movement was noticed, but at 12:00 midnight the pile had settled approximately 7 feet and would have continued but for the platform and bracing resting on bottom of pit."

One soil load test was made and the result is shown on Drawing No. 1. The method of applying the load is illustrated and settlement curves referring to the four corners of the sand box are also shown. This test was described by the engineers as follows:

"Ground had been dry for 7 days. A 2 inch hard crust had formed. Under the crust, ground was in a semi-fluid state. The load was applied in increments, at 1,350 lbs. per hour. Settlement readings were taken every 20 minutes until a total load of 9,153 lbs. had been applied. At 800 lbs. per square foot the top crust of the subsoil ruptured and the test load box settled rapidly. Mud boils occurred around the edges of the supporting platform. The box tipped when loaded to 850 lbs. per square foot. Southwest and Northwest corners going down and Northeast and Southeast corners going up."

This test would seem to be of little or no value but is included here as a part of the record.

Excavations for the structure were carried down to from minus 15 to minus 23 M. G. L. or to an average below natural ground surface of 20 to 28 feet. During excavation considerable difficulty was had with sand water gas boils. A wall had to be constructed across one corner of the excavation, cutting off the sand water gas boils from the rest of the pit. The sand built up to an elevation of about 6', after which no more sand came in although water and gas continued to flow up to zero Mean Gulf Level.

No settlement is apparent.

CORRECTION

HARVEY LOCK - CASE 58 - PAGE 174

Change Paragraph 1 to read:

This lock is located at Harvey, Louisiana, on the right bank of the Mississippi River and is a part of the Louisiana-Texas Intracoastal Waterway, having a navigable width of 75'-0", usable chamber length of 425'-0", and a minimum water depth of 12'-0" at elevation zero mean low Gulf level.

Change Paragraph 2 to read:

The lock was designed in the United States Engineers' office at New Orleans under direction of Major R. F. Fowler. It was completed in 1934. The foundation and masonry were constructed by C. F. Lytle, Contractor.

Change Paragraph 4 to read:

The overall length of the foundation, exclusive of the wing walls is 683'-3" and the greatest width as shown at 'Section H-H' is 122'-0".

Change Paragraph 6 to read:

The maximum assumed safe pile load used in designing the structure was 20.5 tons and the calculated pile loads in the completed structure vary from 20.4 tons to minus 4.11 tons.

Change Paragraph 7 to read:

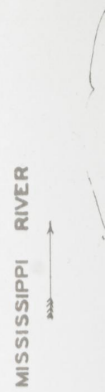
All foundation piles are untreated Southern Yellow Pine with effective length in place approximately 38 ft., with average 10" tips and average 16-1/2" butts. The tips rest at approximately minus 57 M. G. L. Long creosoted piles were used only in wing walls, fenders, clusters, etc.

Change Paragraph 15 to read:

While the soil load test was of no value in designing the lock, it was of considerable value in determining the method of construction.

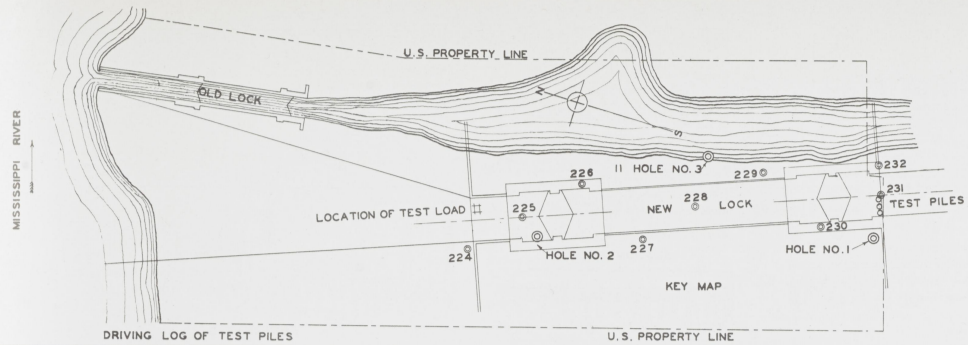
Change Paragraph 16, Line 2, to read:

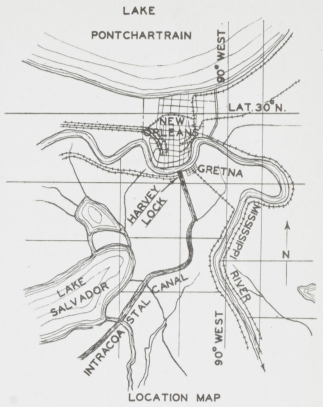
During excavation <u>of the test pit</u> considerable, etc.



TEST PILE

Distance of Pile Tip Below Water Surf.	Blows Per Foot	R
22	Wt. of Pile	Ground
23		
24		
25		
26		
27		
28		
29		
30	Weight of Hammer	
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44	9	
45	6	
46	4	
47	5	
48	5	
49	5	
50	6	
51	5	
52	6	
53	7	
54	9	
55	8	
56	11	
57	9	
58	11	
59	11	
60	11	
61	15	Sand
62	14	
63	15	
64	15	
65	16	
66	23	
67	26	
68	25	
69	26	Hamme
70	23	Per M
71	26	
72	28	
73	24	
74	35	
75	43	
76	41	
77	41	
78	46	
79	39	
80	44	Bottom
81	50	at Surf
82	55	
83	55	
84	70	
85	71	Hamm
86	70	
87	75	Hamm
88	100	Per Mi
89	83	
90	88	
91	89	
92	80	
93	86	
94	92	
95	90	

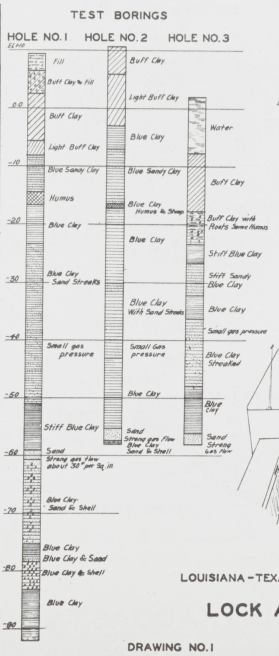


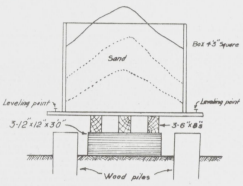


DRIVING LOG OF TEST PILES

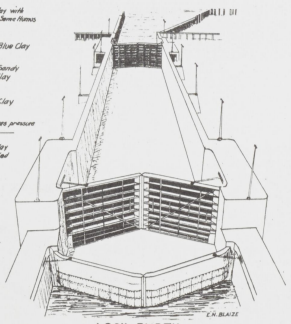
TEST PILE NO. 1			TEST PILE NO. 2			TEST PILE NO. 3		
Distance of Pile Tip Below Water Surf.	Blows Per Foot	REMARKS	Distance of Pile Tip Below Water Surf.	Blows Per Foot	REMARKS	Distance of Pile Tip Below Water Surf.	Blows Per Foot	REMARKS
22	1	Ground Bottom of Pit	23	1	Ground Bottom of Pit	23	1	Ground Bottom of Pit
23	1		24	1		24	1	
24	1		25	1		25	1	
25	1		26	1		26	1	
26	1		27	1		27	1	
27	1		28	1		28	1	
28	1		29	1		29	1	
29	1		30			30		
30			31			31		
31			32			32		
32			33			33		
33			34			34		
34			35			35		
35			36			36		
36			37			37		
37			38			38		
38			39			39		
39			40			40		
40			41			41		
41			42			42		
42			43			43		
43			44			44		
44			45			45		
45			46			46		
46			47			47		
47			48			48		
48			49			49		
49			50			50		
50			51			51		
51			52			52		
52			53			53		
53			54			54		
54			55			55		
55			56			56		
56			57			57		
57			58		Sand Stratum @ 60 Driving Stopped at 60.3 Assumed Ult. Bearing Value = 93 Tons E. N. Formula	58		Driving stopped at 60.3 Assumed Ult. Bearing Value = 93 Tons E. N. Formula
58			59			59		
59			60			60		
60			60.3			60.3		
61		Sand Stratum	61			61		
62			62			62		
63			63			63		
64			64			64		
65			65			65		
66			66			66		
67			67		Hammer 140 Blows Per Minute	67		Hammer 130 Blows Per Minute
68			68			68		
69		Hammer 140 Blows Per Minute	69			69		
70			70			70		
71			71			71		
72			72			72		
73			73			73		
74			74			74		
75			75			75		
76			76			76		
77			77		Hammer 138 Blows Per Minute	77		
78			78			78		
79			79			79		
80		Bottom of Hammer at Surface of Water	80			80		Bottom of Hammer at Surface of water
81			81			81		
82			82			82		
83			83			83		
84			84			84		
85		Hammer Submerged	85		Hammer Submerged	85		Hammer Submerged
86			86			86		
87		Hammer 168 Blows Per Minute	87			87		Hammer 140 Blows Per Minute
88			88			88		
89			89			89		
90			90			90		
91			91		Hammer 136 Blows Per Minute	91		
92			92			92		Hammer 136 Blows Per Minute
93			93			93		
94			94			94		
95			95			95		

TEST BORINGS

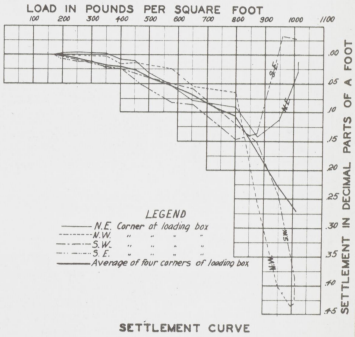


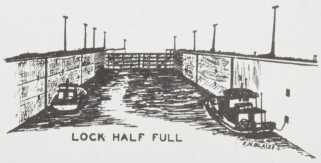


SECTION OF TEST LOAD



LOCK EMPTY





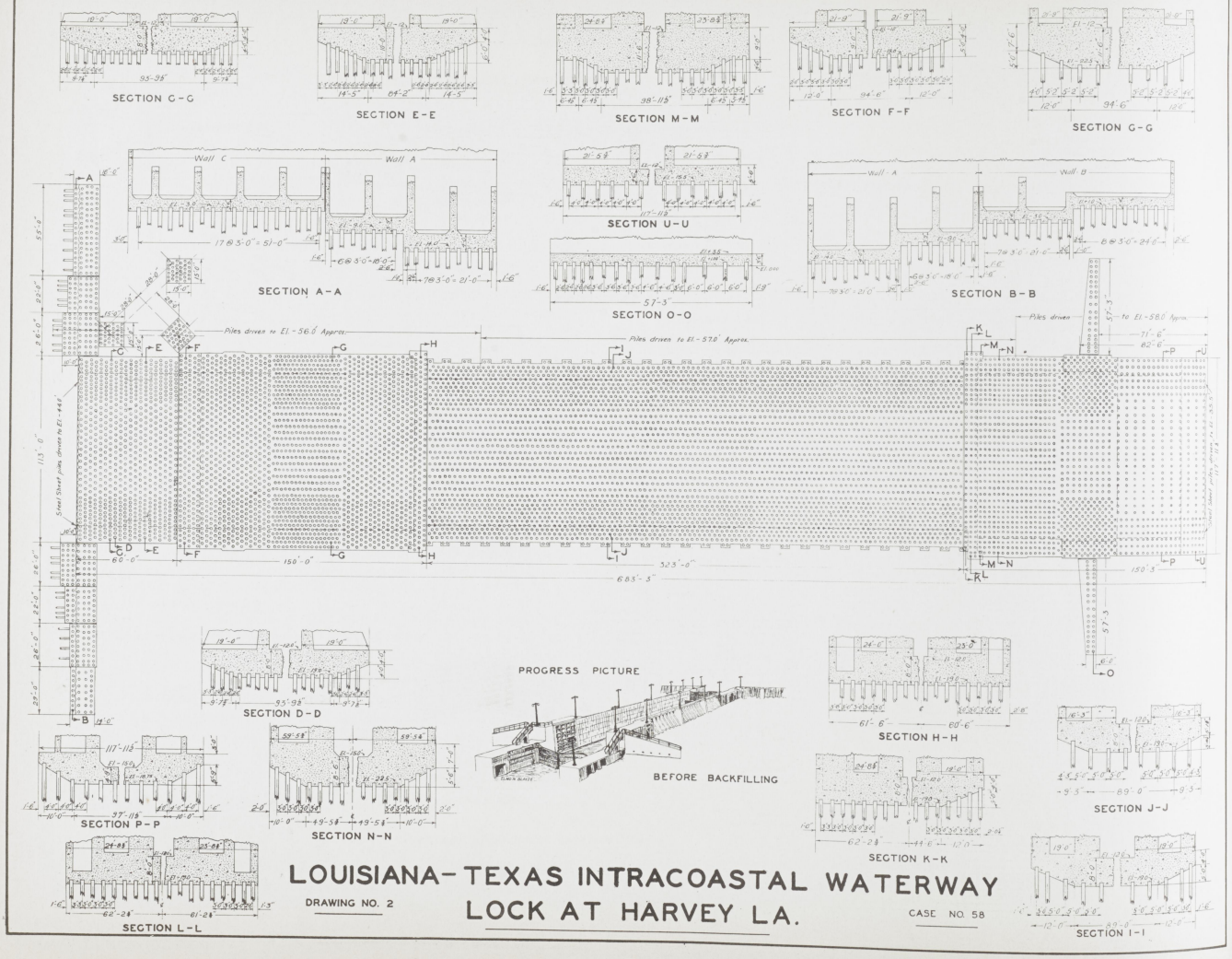
LOCK HALF FULL

LOUISIANA-TEXAS INTRACOASTAL WATERWAY

LOCK AT HARVEY LA.

DRAWING NO. 1

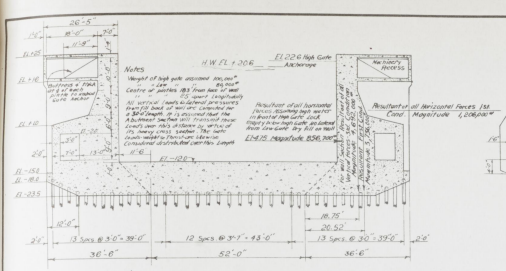
CASE NO. 58



LOUISIANA-TEXAS INTRACOASTAL WATERWAY
LOCK AT HARVEY LA.

DRAWING NO. 2

CASE NO. 58



WALL SECTION
PILE BENTS 3'-0" CTRS.
PILE LOAD CONDITIONS

1st Assume Case A with High Gate and Low Gate Swinging Open
2nd Same as 1st except using Dry Backfill
3rd Assume Case B with both gates swinging open

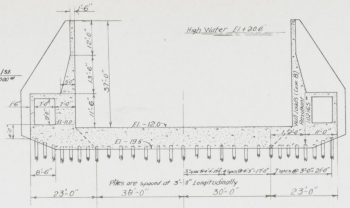
SLAB SECTION
PILE BENTS @ 3'-0" CTRS
PILE LOADS - TONS / PILE

1st Condition	+ 8.97
2nd "	+ 8.97
3rd "	+ 19.56
Case C & D	0.00
Case E	- 1.50

WALL SECTION
PILE BENTS @ 3'-0" CTRS
PILE LOADS TONS / PILE

1st Condition	+ 15.79
2nd "	+ 16.13
3rd "	+ 19.55
Case C & D	0.00
Case E	+ 4.68

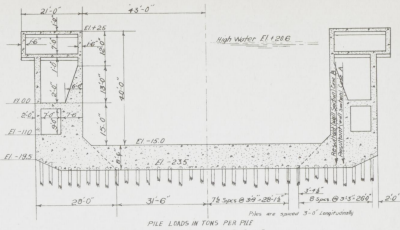
CROSS SECTION SHOWING LOADING SECTION C - C



Pile Loads in Tons per pile

	Case A	Case B	Case C & D	Case E
Wall Section	+16.60	+20.4	0.0	+7.29
Slab "	+7.31	+20.4	0.0	-4.11

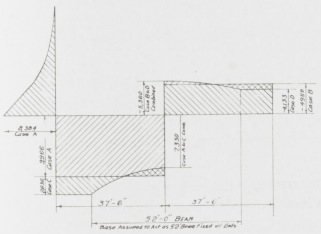
CROSS SECTION A - A



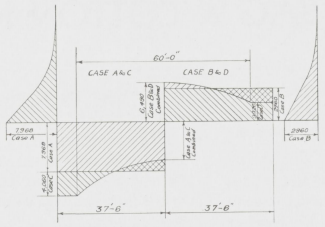
PILE LOADS IN TONS PER PILE

	Case A	Case B	Case C & D	Case E
Wall Section	+ 14.50	+19.80	0.0	+3.51
Slab "	+ 7.17	+19.50	0.0	-3.26

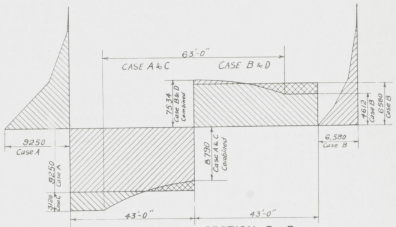
CROSS SECTION B - B



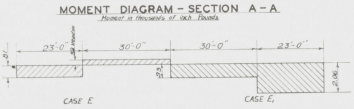
MOMENT DIAGRAMS - SECTION C - C
Moments in thousands of inch Pounds



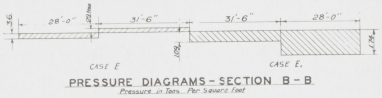
MOMENT DIAGRAM - SECTION A - A
Moment in thousands of inch Pounds



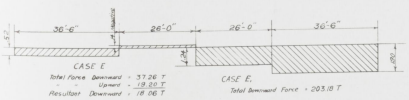
MOMENT DIAGRAM - SECTION B - B
Moment in thousands of inch Pounds



PRESSURE DIAGRAMS - SECTION A - A
Pressure in Tons per Square Foot



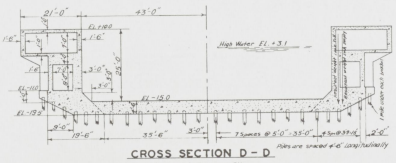
PRESSURE DIAGRAMS - SECTION B - B
Pressure in Tons Per Square Foot



Total Force Downward = 37.26 T
Upward = 19.20 T
Resultant Downward = 18.06 T

Total Downward Force = 203.18 T

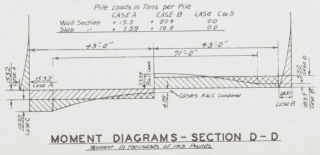
PRESSURE DIAGRAMS - SECTION C - C
Pressure in Tons per Square Foot



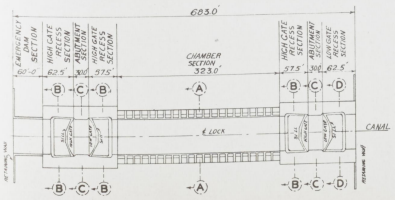
CROSS SECTION D - D

Pile Loads in Tons per Pile

	CASE A	CASE B	CASE C & D
Wall Section	+ 15.5	+ 20.4	0.0
Slab "	+ 7.59	+ 19.9	0.0



MOMENT DIAGRAMS - SECTION D - D
Moment in thousands of inch Pounds



KEY PLAN

CASES OF LOADING

CASE-A Lock empty, fresh fill, all piles bearing
CASE-B Lock full, compacted fill, all piles bearing
CASE-C Lock empty, hydrostatic uplift = Weight of Structure
CASE-E₁ Lock full, Compacted fill pressure distributed over base.
CASE-D Lock full, hydrostatic uplift = Weight of Structure
CASE-E Water in lock at El 0.0, compacted fill, and uplift due to water in river at elevation + 20.6

GENERAL NOTES

Moments, pressures and loads indicated on all diagrams are for one longitudinal foot of the lock except as otherwise noted

Weight of concrete assumed	150# per cu. ft.
Weight of fresh fill assumed	80# per cu. ft.
Weight of compacted fill assumed	100# per cu. ft.
Weight of water assumed	62.5# per cu. ft.
Equivalent fluid pressure - fresh fill	71.6# per sq. ft. per ft. of height

Equivalent fluid pressure - compacted fill above elevation + 11.0 = 13# per sq. ft. per ft. of height.
Equivalent fluid pressure - compacted fill below elevation + 8.0 = 26# per sq. ft. per foot of height
Safe pile load assumed, 20.5 tons
Ultimate strength of concrete assumed, 2500# per sq. ft.
Steel reinforcement assumed to be intermediate billet grade.

DATUM Mean Low Gulf Level = + 19.654 C.D.

LOUISIANA-TEXAS INTRACOSTAL WATERWAY
LOCK AT HARVEY LOUISIANA

HYPOTHESESE OF DESIGN

DRAWING NO. 3

CASE NO. 58

Case No. 59.

FULTON BAG & COTTON MILL

The Fulton Bag and Cotton Mill is located on the corner of Gaiennie and South Peters Streets, and was designed by Stone Brothers, Architects, and erected in 1909. It is a five story brick building with a tower and basement and houses the office, factory and warehouse of this Company.

The height from grade to roof is 86'-4" and the tower rises an additional 49 feet. It fronts 102'-0" on Gaiennie Street and is 132'-11" on South Peters Street. Timber columns on the pile footings in basement are 14" x 14" and on the spread footings are 8" x 8". First floor beams are of timber 12" x 14" with a span of 12'-6"; second to fifth floor beams are 12" x 18" with a span of 25'-0"

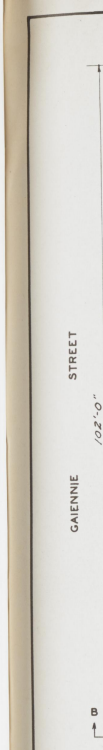
Excavation for footings and basement covered the entire site and was carried down 8'-10" below curb or to elevation 4.14 M. G. L.

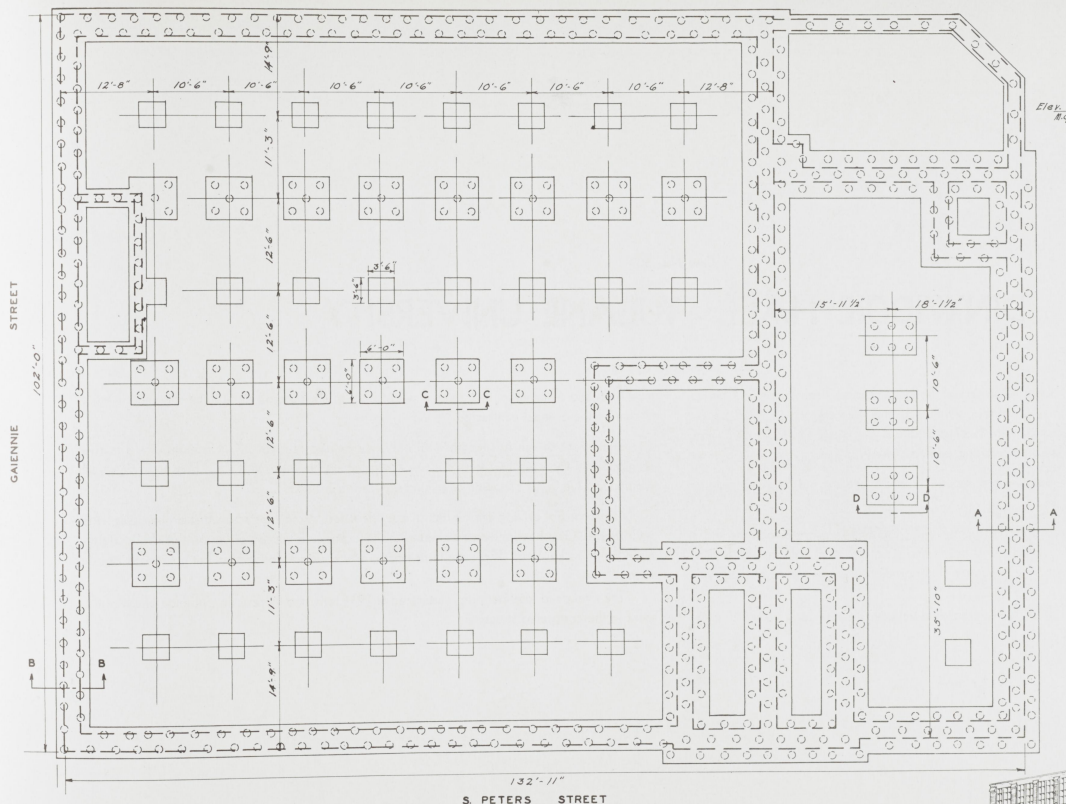
Approximately 1,100 piles were driven but no records of size or driving conditions could be found. The sections on accompanying drawing shows the typical spacing of these piles in various footings.

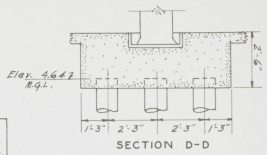
Reinforced concrete pile caps and spread footings form the foundation of this building. The pile caps under interior columns are 6'-0" x 6'-0" x 2'-6" and are spaced 25'-0" on center the width of building, and 10'-6" the length of building. The spread footings are 3'-6" x 3'-6" and are spaced between the pile caps. These spread footings carry only a part of the first floor load.

The wall loads are carried on a continuous concrete pile cap footing 4'-6" wide under factory and 6'-6" wide under warehouse and these footings are 2'-6" deep. The accompanying drawing shows the spacing and details of these footings.

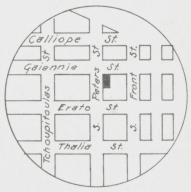
Design loads could not be located but we estimate the dead load under walls at 11½ tons per pile and under interior columns at 6.6 tons per pile. The live load is not known but is quite heavy.







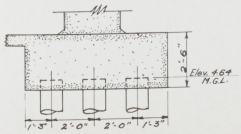
SECTION D-D



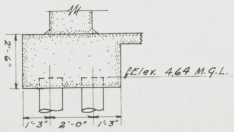
LOCATION MAP

FULTON BAG AND COTTON MILL

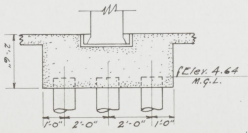
CASE NO. 59



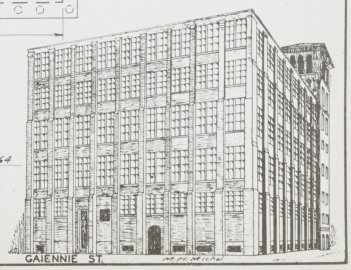
SECTION A-A



SECTION B-B



SECTION C-C



GAIENNIE ST.

Case No. 60.

DINWIDDIE HALL - TULANE UNIVERSITY

Dinwiddie Hall of Tulane University is located on the Tulane campus, fronting on St. Charles Avenue. It was designed by Moise Goldstein, Architect, and was erected in 1922-23 by Doullut and Williams, Inc., Contractors, and in 1927 an addition was erected by C. A. D. Bayley Co., Contractors, the addition being the north end marked Library.

The overall dimensions of the building are about 162′ x 84′ and the height from grade to peak of roof is 68′-5″.

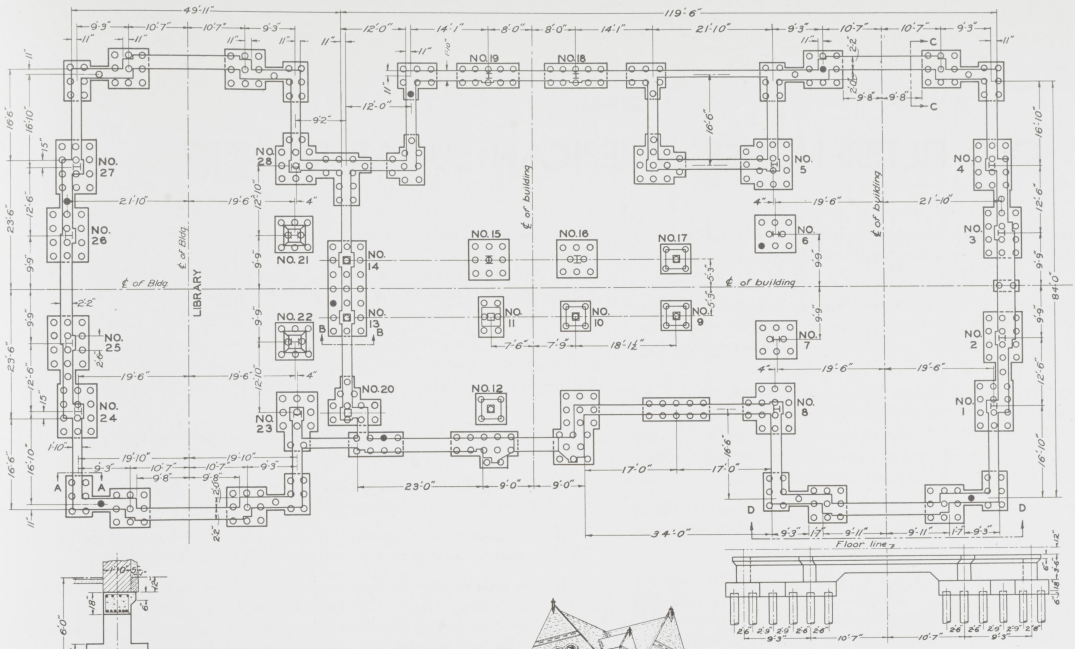
The building is of modern fireproof construction with reinforced concrete footings and a combination of reinforced concrete columns and beams and structural steel columns and beams. All floors are flat slab, reinforced concrete. Outer walls are rock face cut limestone backed with brick.

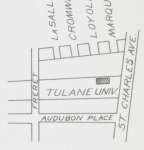
The foundation piles, numbering 501, are creosoted yellow pine 50′ long with 12″ minimum butts and 6″ minimum tips, treated with 12 lb. of creosote oil per cubic foot, and all were driven by the original contractors in 1922.

Piles were driven full length with only one or two feet cut off at footings, the effective length being about 48 feet with the tips resting at about —48′ M. G. L. Elevation of cut-off is minus 0.5 M. G. L. Elevation of ground surface is 5.5 M. G. L.

No record of driving can be found, but it is stated by the contractors that driving was fairly uniform and a firm bearing was reached with 50 ft. piles. Eight test piles were driven to determine length to be used. These are indicated by black spots in foundation but no record can be found.

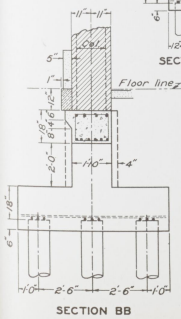
The total dead load per pile is estimated at 12½ tons, and there is no evidence of any settlement in the completed structure.



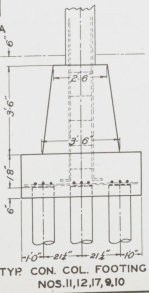


LOCATION MAP

SECTION AA



SECTION BB



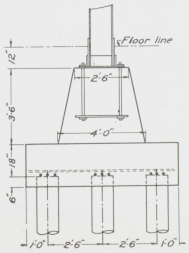
TYP. CON. COL. FOOTING
NOS. 11, 12, 17, 9, 10



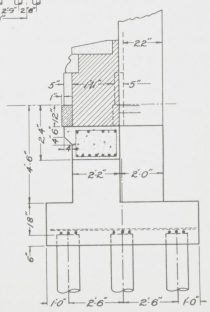
DINWIDDIE HALL

TULANE UNIVERSITY

CASE NO. 60



TYP. STEEL COL. FOOTING
NOS. 6, 7, 15, 16, 21, 22



SECTION CC

Case No. 61.

OLD FILTER HOUSE AMERICAN SUGAR REFINERY

The Old Filter House of the American Sugar Refinery was designed by Arthur Krause, and was erected in 1899-1900. In 1906 the building was abandoned, and has remained vacant since then.

It is a 10 story brick building, with a structural steel framework. At the time of its completion, this structure was thought to be the heaviest in the city. The building faces 162′ on Front Street and has a depth of 65′ on Bienville St., and rises to a height of 127′. The windows occupy about 40% of the wall area.

The structure is supported on a pile foundation. There is a wooden grillage resting on the piles. The piles are capped with 12″ x 12″ yellow pine stringers set in concrete which runs 1′ below the pile cut-off. A platform of 12″ x 12″ beams rest on top of the stringers. Brick footings are then built up from the grillage. Granite caps are placed on the brick footings. The space between adjacent caps is filled in with brick. On the caps rest steel H. columns.

The excavation for the footings was roughly 162′ by 65′ and went to a depth of 10 feet below curb. The strata encountered were blue clays of varying degree of hardness according to depth, (see stratagraph, Drawing No. 2).

1,161 untreated yellow pine piles were driven. Their lengths were from 70′ to 75′ and the butts were about 14″ in diameter. A No. 1 Warrington Steam Hammer was used to drive these piles. The hammer weighed 4,800 lbs. and had a stroke of 36″. The piles penetrated an average of about 73′. A diagram or graph of the driving of 8 test piles and a stratagraph of one test hole is shown on sheet No. 2. This is copied from a print furnished by American Sugar Refinery Engineers. The location of 7 of the test piles is shown on Drawing No. 1.

There are 13 interior footings and a 10′ wide exterior footing which runs under the 3 outside walls. The exterior footing supports the walls and the exterior columns. The Filter House is adjacent to another building of a similar construction, and when the Filter House was constructed the footing which supported the wall of the adjacent building was used to carry some of the load, and to support the fourth wall of the new building. Also the wall of the old building was used as the wall of the new building. The pile spacing under this footing is 3′-0″ on centers and the distribution is shown in the cross hatched circles.

The interior columns are supported on 13 rectangular footings, 4 of which are 32′ x 8′-6″, and the remaining are 40′ x 10′. All footings are spaced about 2′-6″ apart. In the small footings the piles are spaced 2′-6″ on centers, and in the larger footings the piles are spaced 3′-0″ on centers.

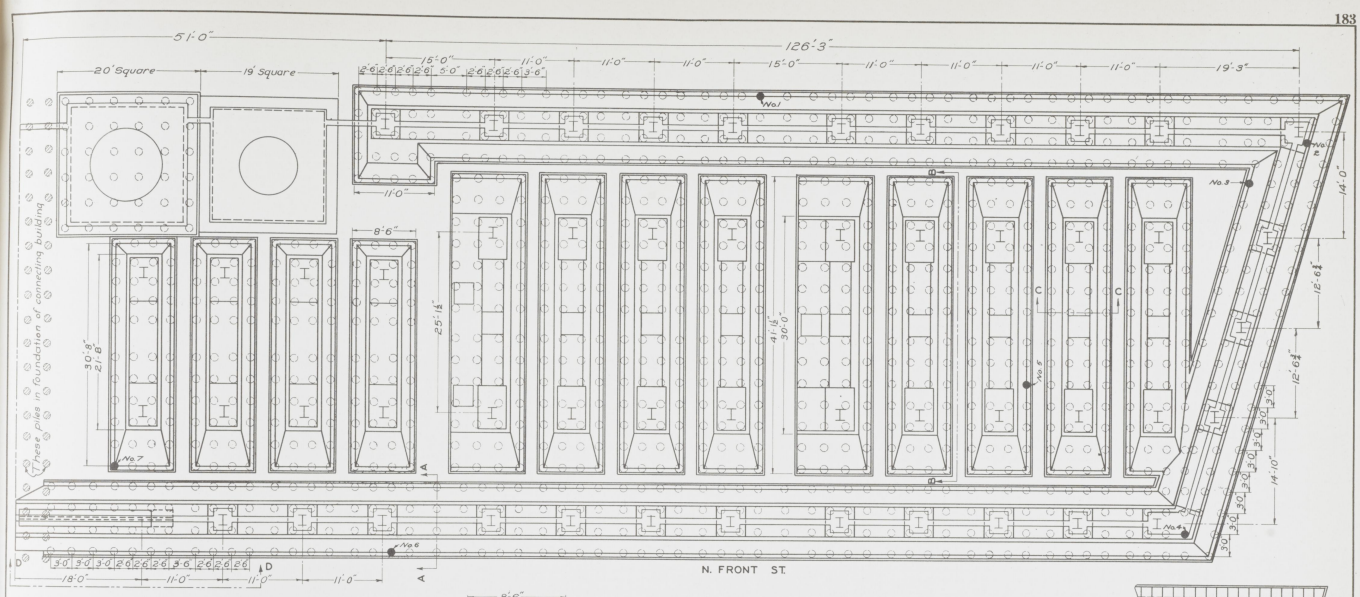
The exact purpose of the cantilever girder shown in drawing is not known but it is a tie between the wall of this building and the adjacent building.

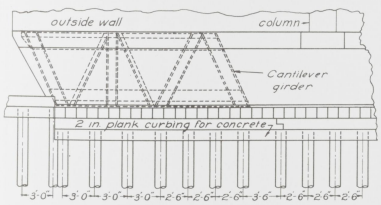
It was mentioned that this building had an excessive weight. This may be accounted for by the fact that the floors are of arched brick and concrete varying from 8″ to 15″ thick.

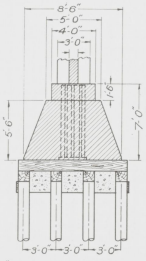
W. P. A. Engineers have calculated that there is a dead load of about 12 tons per pile. This is very nearly the actual load on the piles at present, because the building is vacant.

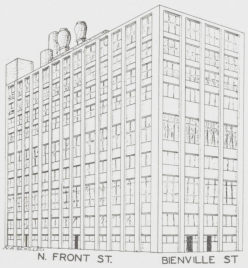
The two stacks shown on drawing are on square brick bases about four stories high and continuing as circular iron stacks. One is on a pile foundation with timber grillage similar to building foundations, and the other is on timber grillage, three layers thick, but without pile foundation. The brick bases for both stacks are badly cracked. The main building has been standing vacant for 30 years and the glass windows are all out, many have been blown out during the hurricane of 1915, shows no signs of settlement.

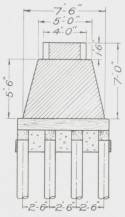
It is of interest to note that the location of this building is over what was at one time, the bed of the Mississippi River.

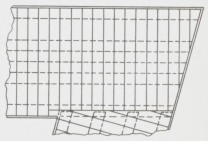


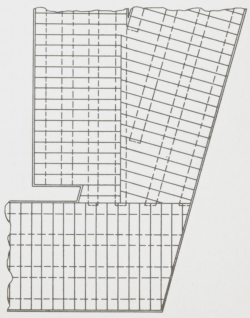


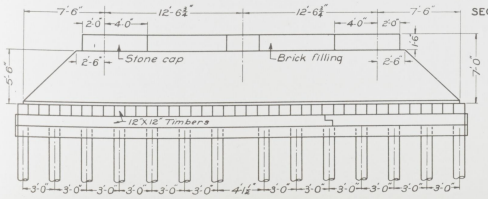












OLD FILTER HOUSE

AMERICAN SUGAR REFINERY

CASE NO. 61

DRAWING NO.1

REPORT OF TEST PILES

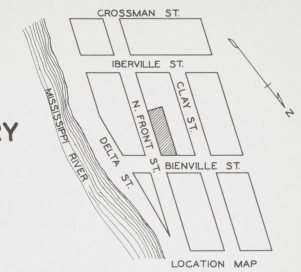
DRIVEN WITH A NO.1 WARRINGTON STEAM HAMMER
WEIGHT 4800 LBS. DROP 36"

AMERICAN SUGAR REFINERY

OLD FILTER HOUSE

CASE NO. 61

DRAWING NO. 2.



Case No. 62.

UNITED STATES MARINE HOSPITAL

The main building of the U. S. Marine Hospital is a modern fireproof reinforced concrete structure. It was designed by James Wetmore, Supervising Architect for the United States Government, and was constructed by R. P. Farnsworth Co. Inc. in 1930-31. The central portion and wings of building are 5 stories high rising about 65 feet above grade with a tower rising an additional 60 ft. The rest of the building is only three stories in height. The walls are faced with brick and are trimmed with stone. Approximately 20% of the wall area is occupied by windows. As shown by the location map on the accompanying drawing, the hospital grounds are located on State Street and the river, and the main building is centrally located on these grounds.

The only excavation was for the footings which go to a depth of from 3½ to 4 feet below grade or from elevation 3.07 to 3.57 M. G. L. The soil at this depth was a sandy loam.

Approximately 2,009 Mac Arthur composite piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". These composite piles were constructed of wood logs 12 to 38 feet long with an average length of 26 feet topped with 10 ft. of concrete encased in a corrugated iron shell. The wood logs were 16 to 20 inches in diameter with very little taper. A detail on accompanying drawing shows the construction of these piles. Cut-off was 3 and 3½ ft. below grade or at elevation 3.57 and 3.07 M. G. L. The maximum number of blows for the last foot of driving was 200 and the minimum number was 26 blows. The following table shows the number of blows required for the last foot of driving:

No. of Piles	Minimum	Maximum
1073	26	50
563	51	75
232	76	100
64	101	125
45	126	150
21	151	175
11	176	200

These composite piles were designed for a maximum load of 25 tons per pile.

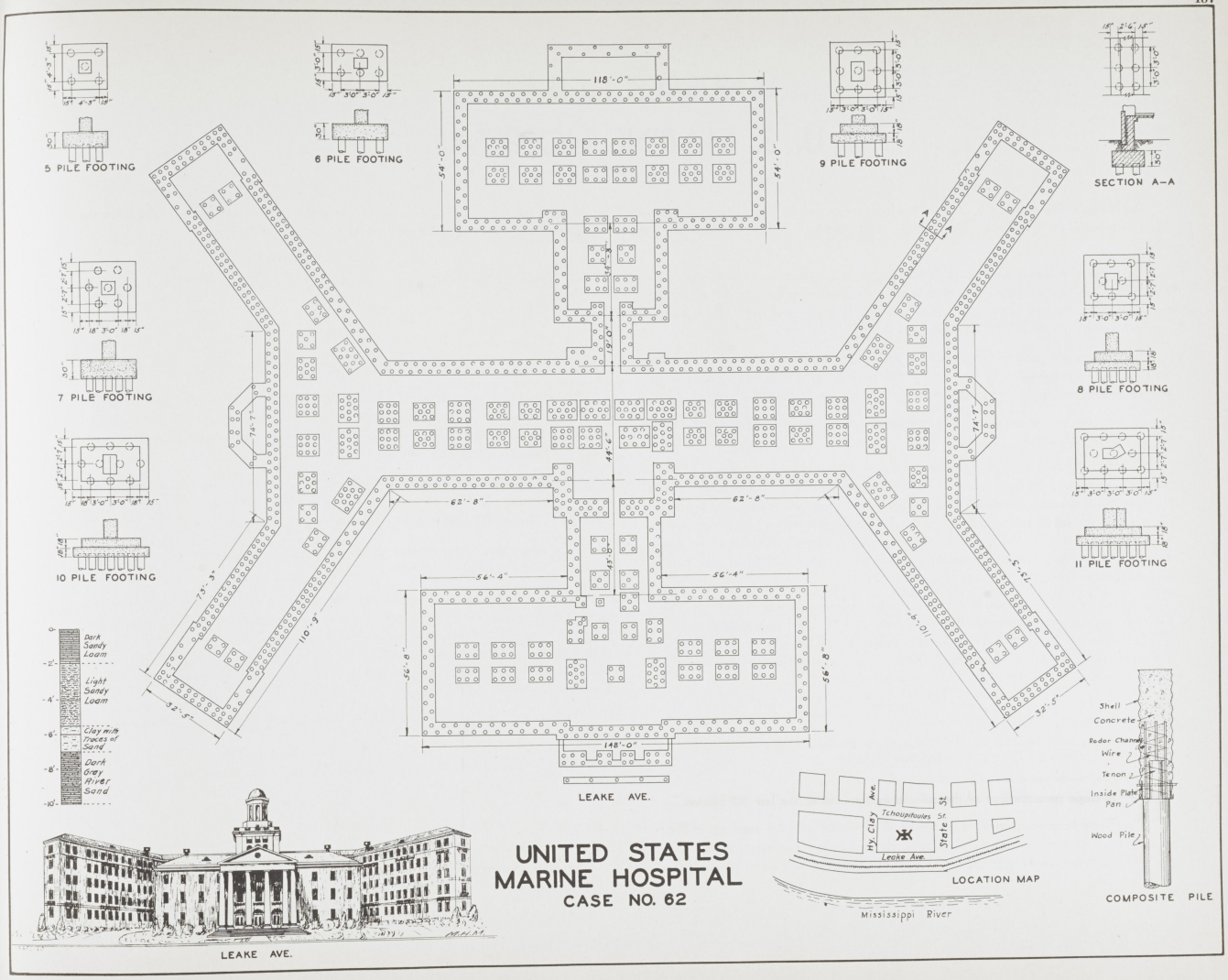
The estimated dead load varies from 80 lbs. to 150 lbs. per sq. ft. The live load is estimated at 80 lbs. to 100 lbs. per sq. ft. for main floors and 50 lbs. per sq. ft. for ward wings. Wind load was assumed at 20 lbs. per sq. ft.

The footing supporting the exterior walls of reinforced concrete 2'-6" thick by 5'-0" wide and is continuous around the entire building. The individual interior footings are of reinforced concrete and vary from 2'-6" to 3'-0" thick.

The accompanying drawing shows the location and size of these footings and the spacing of the piles.

Headings were taken about a year after construction to determine the amount of settlement and it was found that the building had settled between ¾" and 1½" throughout. This settlement opened cracks around the window frames and caused two large cracks to appear in the floor of the portico.

At the time of this survey there were no cracks in the exterior walls of this structure.



LEAKE AVE.

UNITED STATES MARINE HOSPITAL

CASE NO. 62

Case No. 63.

NURSES HOME
U. S. MARINE HOSPITAL

The Nurses Home of the U. S. Marine Hospital was designed by James Wetmore, Supervising Architect of the U..S. Government, and was constructed by R. P. Farnsworth Co. Inc., in 1930-31.

The building is one of a group of hospital buildings located near the East Bank of the Mississippi River between Henry Clay Avenue and State Street. The building is 3 stories high with an attic, and the total height is 43'. It measures 170' in length by 42 feet in width, and the window area is approximately 20% of the wall area.

The structure is a reinforced concrete frame with exterior walls of brick. Interior columns are supported on individual reinforced concrete footings, and the exterior walls are supported on a continuous reinforced concrete footing which extends around the entire building.

All concrete footings are supported on creosoted yellow pine piles, treated with 18 lbs. creosote oil per cubic foot.

A total of 285 piles were driven in the foundation and they range in length from 40 to 54 feet but average about 45 feet. Test piles were driven to determine the actual length of piles to be used but the record of driving is not available. The minimum tip diameters of piles were 6" and the minimum butt diameters were 14". All piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". A maximum of 40 blows and a minimum of 16 blows were required to drive the piles for the last foot of penetration. The building specifications contained the following clause:

"All pile heads shall be encased in concrete with a minimum dimension of 1'-3" from center pile to outside edge of the concrete. Piles shall be driven in trenches or pits excavated to point of cut-off or lower. Each pile shall be a wood pile creosoted 18 lbs. treatment of such diameter and length as to sustain a superimposed load of 17 tons when calculated by the following formula:

$$P = \frac{2\,W\,H}{S + 0.1}$$

in which P = bearing value of pile in tons.

W = the weight of the ram plus the total effective steam pressure of the piston in tons, which shall be not more than 6,000 lbs. and not less than 3,000 lbs.

H = the stroke of the ram in feet.

S = average penetration of the pile in inches under the last 10 blows."

There is no order of regularity in the lengths of piles used or in the number of blows required. The piles with the highest number of blows per last foot are often adjacent to those with the lowest number. In some instances a pile with a very high number of blows per last foot will be found entirely surrounded by piles with a low number of blows per last foot. The following table shows the number of blows required for the last foot of driving.

	Blows Per Last Foot	
No. of Piles	Minimum	Maximum
128	16	20
82	21	25
36	26	30
14	31	35
21	36	40

All excavations were carried to elevation 3.07 M. G. L. and all piles were cut off 6" higher than the bottom of concrete. Little information is available in regard to soil conditions except that the excavation for footings was moist sandy loam. The drawing shows one stratagraph 10 ft. deep made on the grounds in 1928.

The estimated dead load varied from 80 lbs to 150 lbs. per square foot. Estimated live load is 60 lbs. per square foot and the estimated wind load 20 lbs. per square foot. However, the foundation piles are designed to carry a maximum load of 17 tons per pile.

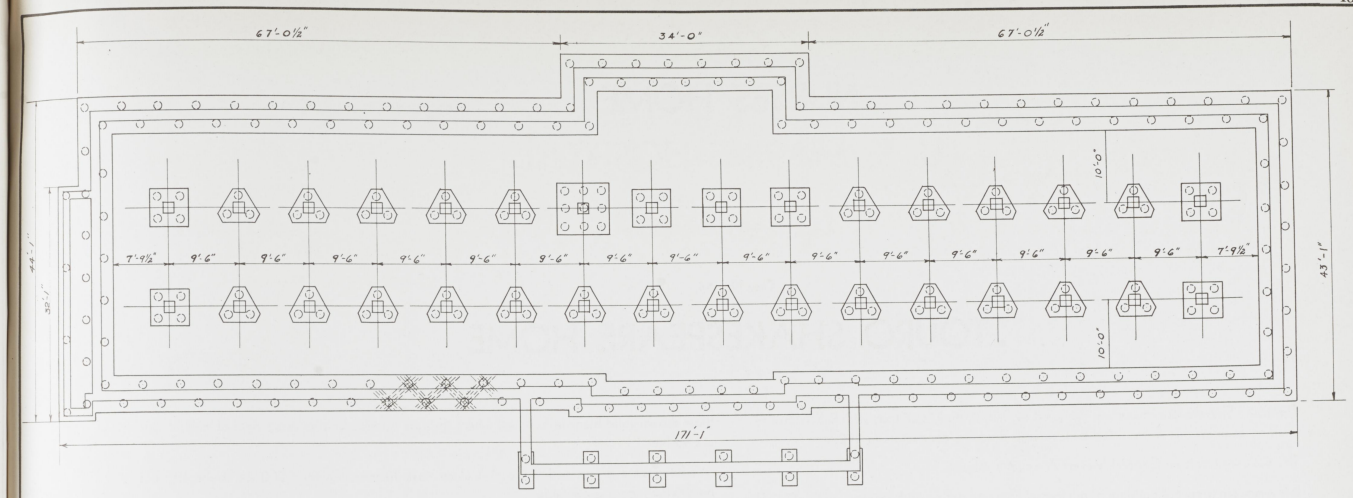
The accompanying drawing shows the foundation plan of the building with location and sizes of footings and location and spacing of piles.

The Power House is a separate building but shown on the accompanying drawing is a detail of the foundation of the smoke stack. It is a tapering irregular octagonal brick stack 125 ft. high and is supported on a concrete base which rests on 60 Mac Arthur composite piles, similar to those described and illustrated under Case No. 62, and designed to carry 25 tons per pile. The wind load was assumed at 30 lbs. per sq. ft. gross exposed area, and the dead load per pile is estimated to be about 12½ tons.

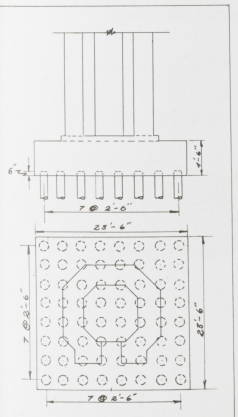
The following table shows the variation in blows per last foot of penetration for the foundation piles:

	Blows Per Last Foot	
No. of Piles	Minimum	Maximum
14	26	50
23	51	75
18	76	100
5	101	125

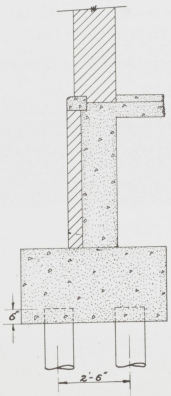
There are no signs of undue settlement in either of the structures described.



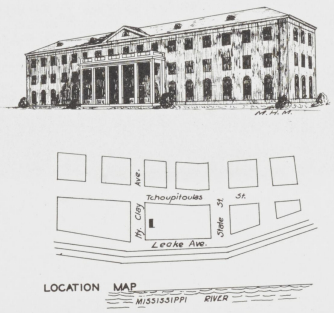
FOUNDATION PLAN

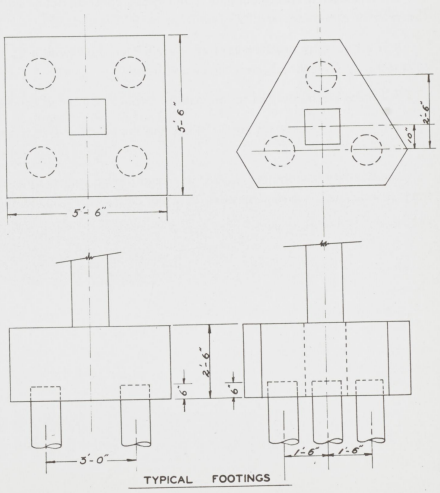


SMOKE STACK FOUNDATION
U.S. MARINE HOSPITAL POWER HOUSE



TYPICAL WALL FOOTING





TYPICAL FOOTINGS

NURSES HOME
U.S. MARINE HOSPITAL
CASE NO. 63

Case No. 64.

TOURO SHAKESPEARE HOME

The Touro Shakespeare Home was designed by Wm. R. Burk, architect, with R. S. Moroney as consulting engineer. It was erected by Caldwell Brothers, contractors in 1929.

The building fronts on General Meyers Avenue in Algiers.

It is a modern fireproof building of reinforced concrete design with exterior walls of brick. The exterior dimensions are 193 feet front by 200 feet depth.

It is a two story structure approximately 27 feet high with a 25 ft. square central tower, approximately 45 feet high, over the central front.

All loads are transmitted to foundations through reinforced concrete columns and beams.

The exterior brick walls are 13" thick and the window area is approximately 25% of the total wall area.

The building is supported on 602 untreated peeled yellow pine piles, 45, 50 and 60 feet long, as indicated on plan. All piles on left of central axis of building are 45 feet long, except those shown solid black in footings, where they are 50 feet. All piles on right of central axis are 45 feet.

Piles were driven with a No. 1 Vulcan steam hammer, weight 5,000 lbs. stroke 42", but no driving record is available.

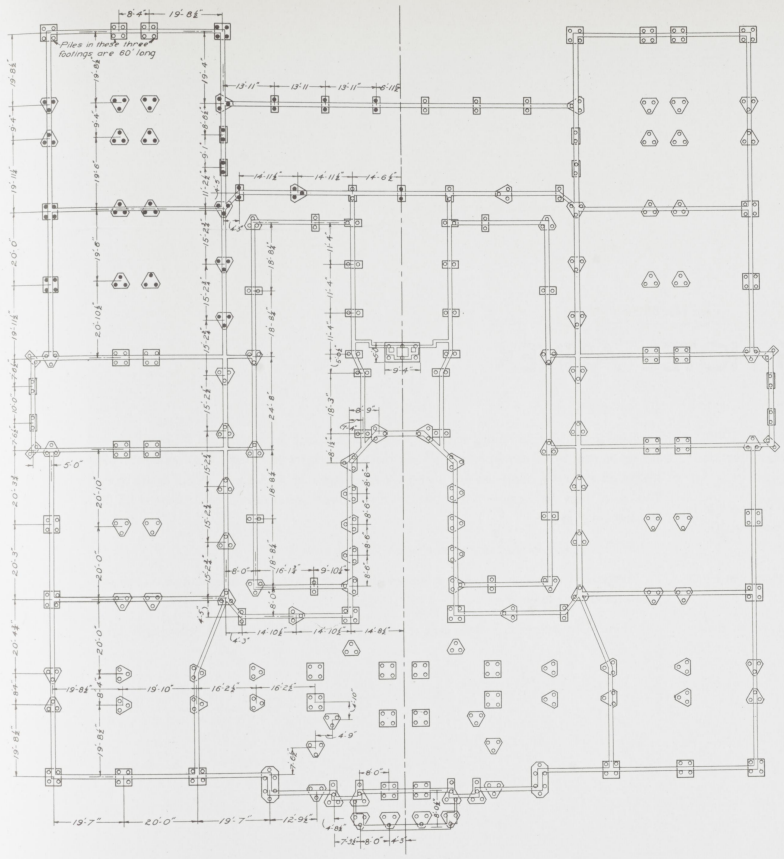
All reinforced concrete footings are as shown on drawing with piles spaced 2'-6" on centers. Cut-offs vary from 0'-10" to 3'-4" below curb grade, and curb grade is approximately 5 feet M. G. L.

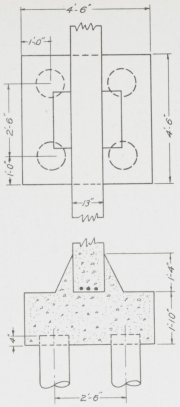
There is no basement and excavation was only four inches below pile cut off, where concrete footings begin. At this depth the soil is wet sandy loam.

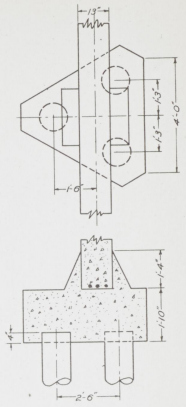
There is no test boring, and no record of test piles or foundation piles is available.

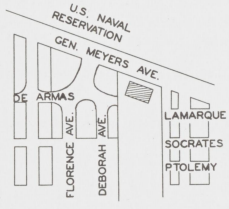
The total design load is 12 tons per pile.

The building is new and there is no indication of settlement.

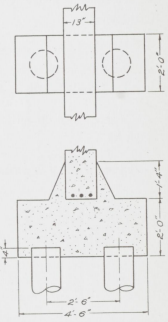






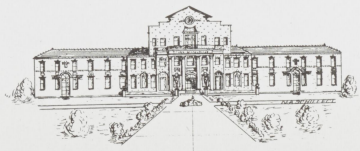


LOCATION MAP



TOURO-SHAKESPEARE HOME

CASE NO. 64



GEN. MEYERS AVE.

Case No. 65.

JUNG HOTEL ANNEX

The Jung Hotel Annex was designed by Weiss, Dreyfous and Seiferth, Architects, in 1935, with George P. Rice as Consulting Engineer and it was erected by the O. M. Gwin Construction Company.

The building is sixteen stories high and has a roof garden and basement. The walls are of brick and trimmed with cut stone. It is a modern fireproof steel frame structure and measures 100 feet on LaSalle Street by 103'-8" where it joins on back of the original Jung Hotel.

The excavation varies from 8'-6" to 26'-9" below curb and curb elevation is approximately 2.60 M. G. L.

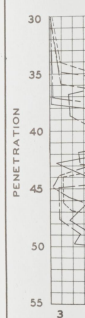
The building is supported on 1,270 untreated peeled yellow pine piles, length and diameter unknown, and no record of driving is available except for 5 test piles 60 feet long and this driving record is shown graphically on the accompanying drawing. The foundation piles are cut off at varying depths but the average is about minus 15.4 M. G. L. All piles are spaced 2'-6" o. c. They were driven with a No. 1 Vulcan steam hammer with a striking force of 5,000 lbs. and a 42" stroke.

Piles are designed to carry approximately 12 tons each.

There has been no appreciable settlement as no cracks have developed but no instrumental observations have been kept.

There is no indication of settlement or cracking where the annex joins the original building.









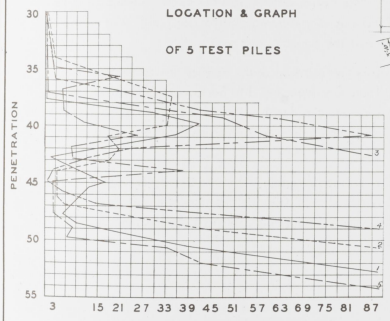


LOCATION MAP

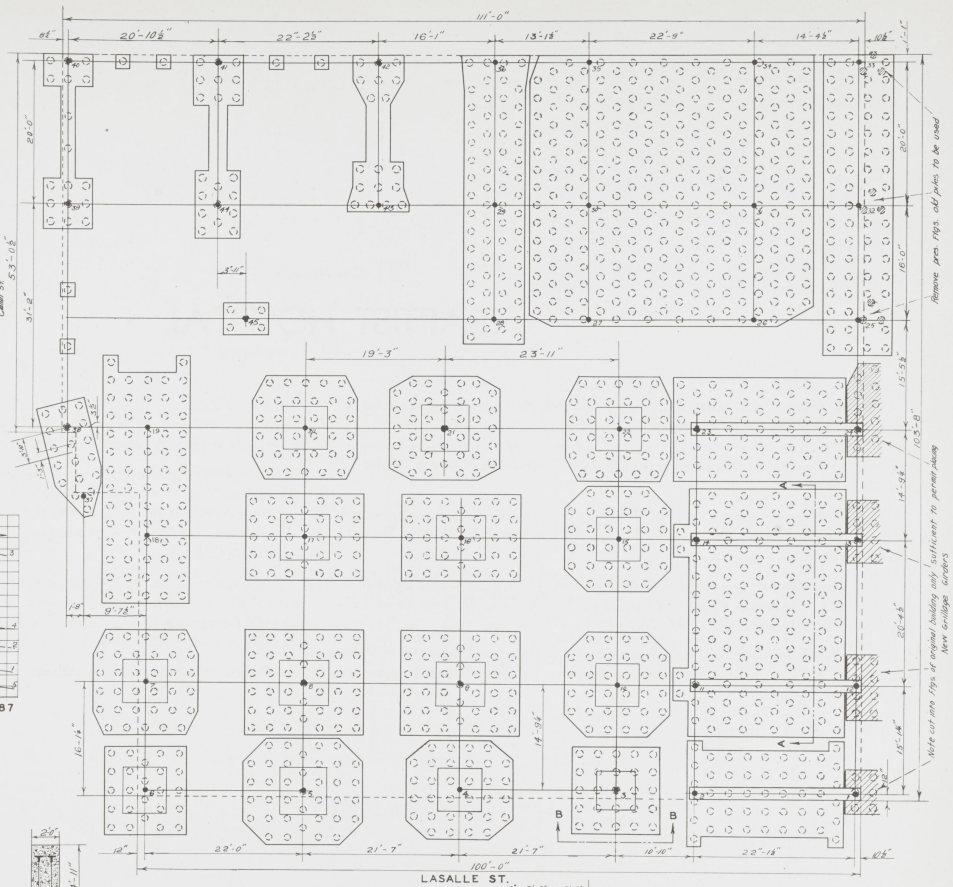


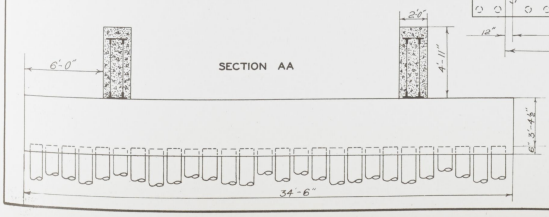
LOCATION & GRAPH

OF 5 TEST PILES



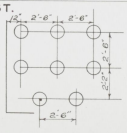
NUMBER OF BLOWS PER FOOT

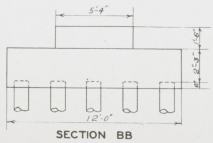




JUNG HOTEL ANNEX

CASE NO. 65





Case No. 66.

BAPTIST HOSPITAL

The Baptist Hospital was designed by Favrot & Livaudais, Architects, and was erected by the Selden Breck Construction Company in 1925. The building, which is T shaped, occupies part of a square of ground bounded by Napoleon Avenue, on which it fronts, S. Robertson, Magnolia and Jena Streets. The building measures 160'-5" parallel to Napoleon Avenue by 107'-10" in depth.

It is a modern, reinforced concrete framed structure consisting of nine stories, a tower and basement. The exterior walls are faced with brick and the interior partitions are tile. The concrete floor slabs are laid over tile.

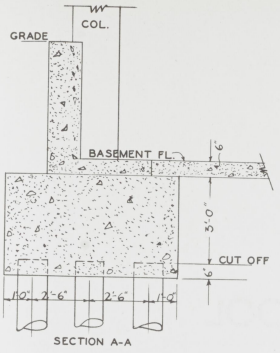
The entire building was excavated to an average depth of 5'-6" or an average elevation of —5.43 M. G. L. The average elevation of the curb was 0.07 M. G. L. The piles were cut off at a depth of 5.75' below curb or —4.68 M. G. L.

Untreated yellow pine piles varying from 40' to 45' in length and having a 7" to 9" tip diameter and an 11" to 13" butt diameter were driven with a No. 1 Vulcan steam hammer weighing 5,000 lbs. and having a stroke of 42". 9 test piles varying from 60' to 61' in length, with a butt diameter varying from 12" to 14½" and a tip diameter varying from 6½" to 8" were driven. The graph on the accompanying sheet shows the curves of test piles.

It is interesting to note that throughout the area the first drop of the hammer carried the tip of pile about 15 to 16 feet below curb grade. There a resistance of 3 to 5 blows per foot was encountered for about 18" after which the resistance decreased to 1 or 1½ blows per foot until last 4 or 5 feet. This first stiff stratum is about 17 or 18 feet below the surface or about elevation —16.43 M. G. L.

Footings, which total 70 in number, are of reinforced concrete. The pile spacing throughout is 2'-3" o. c. Each pile was designed to carry a load of 25,000 lbs. The maximum live load used in the design was 40 lbs. per sq. ft. The accompanying drawing contains a chart indicating the footings in which the test piles are located.

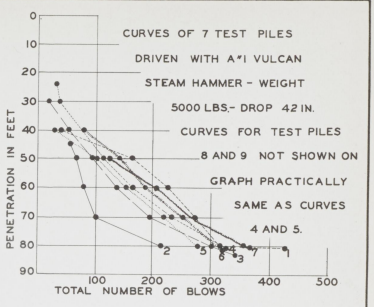
There is no visible evidence of settlement



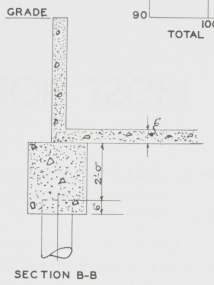
SECTION A-A



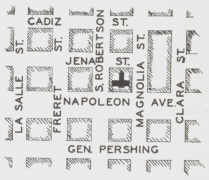
NAPOLEON AVE



LOCATION OF TEST PILES								
TEST PILE	1	2	3	4	5	6	7	8	9
FOOTING	17	54	59	22	52	28	1	8	12



SECTION B-B



LOCATION MAP

FOUNDATION PLAN
NAPOLEON AVE

BAPTIST HOSPITAL

CASE NO. 66

Case No. 67.

MOST HOLY NAME OF JESUS SCHOOL

The Most Holy Name of Jesus School, located on Calhoun Street and Cromwell Place, was designed by Rathbone De Buys, architect, with Rice and Staples as structural engineers, and was constructed by Lionel Favret, contractor, in 1932.

This school is three stories high and is a fireproof reinforced concrete structure with brick exterior walls. The building is supported on reinforced concrete pile caps and untreated pine piles.

This building has no basement and the only excavation was for the footings which go to a depth of approximately 8' below grade or to elevation —2.35 M. G. L.

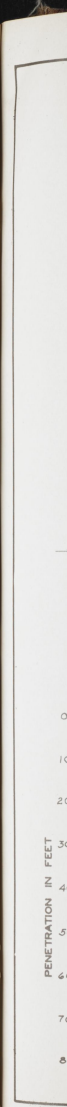
Six 60 ft. test piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs., and a stroke of 42". These piles were driven until the butts were flush with the ground and then followed down an additional 17 ft. The two graphs on the accompanying drawing show the driving record of these test piles and the number of blows required for the last foot of driving. The location of these piles is shown on the foundation plan.

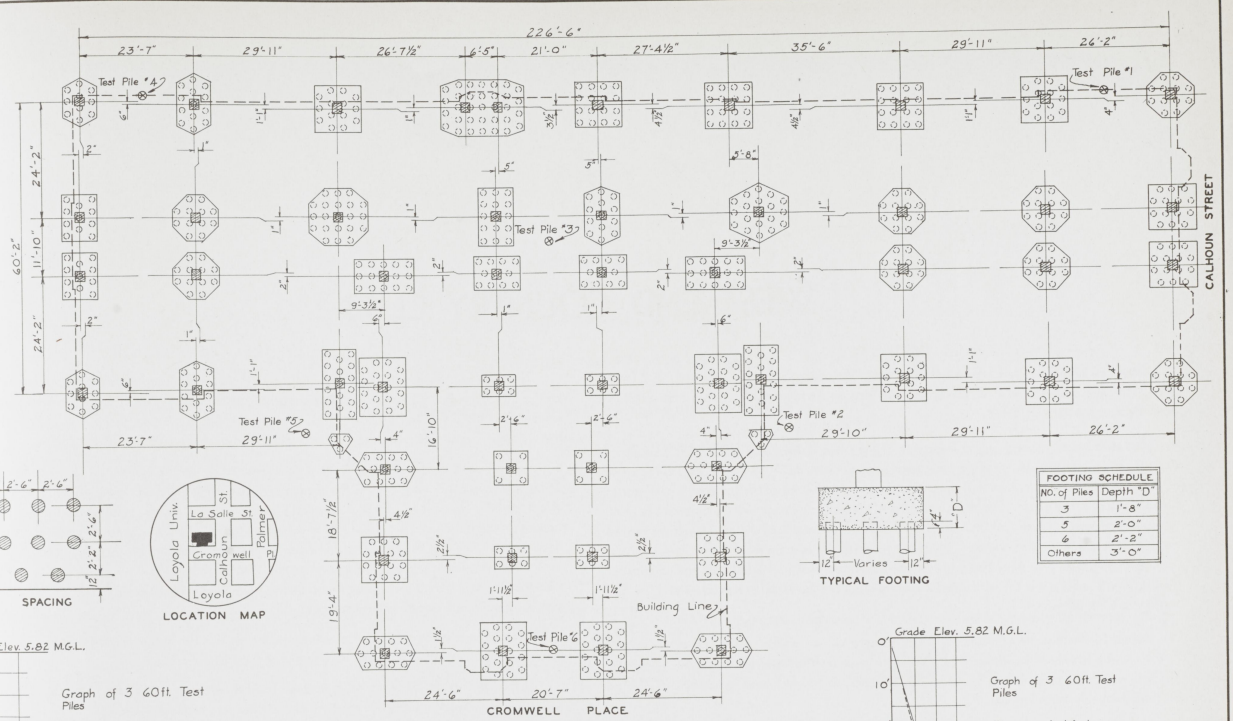
671 untreated pine piles, 65' long with 6 to 7 inch tips and 12 to 13 inch butts were driven with the above equipment. These piles had a waste of 1'-6" giving them an effective length of 63'-6".

These piles required an average of 17 blows for the last foot of driving and are loaded approximately 12 tons each. Cut-off is at elevation —2.68 M. G. L.

Pile caps are of reinforced concrete varying in size and depth. The accompanying drawing shows the spacing and size of these caps and the spacing of piles.

There is no visible evidence of settlement.



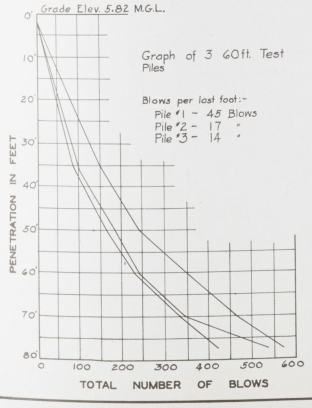


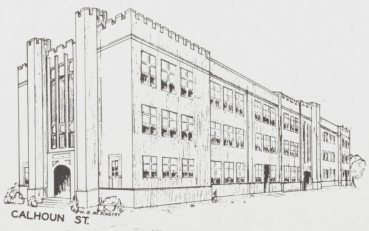
PILE SPACING

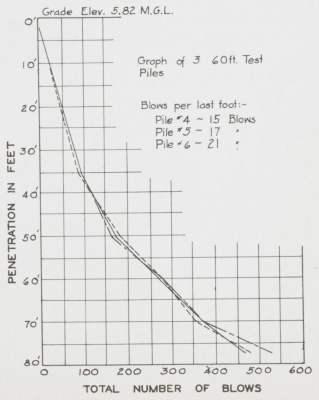
LOCATION MAP

TYPICAL FOOTING

FOOTING SCHEDULE	
NO. of Piles	Depth "D"
3	1'-8"
5	2'-0"
6	2'-2"
Others	3'-0"







MOST HOLY NAME OF JESUS SCHOOL

CASE NO. 67

Case No. 68.

WEST END COUNTRY CLUB

The West End Country Club was designed by Moise H. Goldstein, architect, and Emile Weil, associate architect, with R. L. Moroney as structural engineer, and was constructed by John Reiss, contractor in 1922.

This club house located on the west side of the New Basin Canal about 330′ from Pontchartrain Blvd., is irregular in shape measuring approximately 287′ by 62′. The lounge room of the building is one story high and rises 41′ above grade, the rest of the building is two stories high rising 28′ above grade. The locker room has 4″ steel pipe columns and the basement has 14″ reinforced concrete columns which support the first floor. Second floor and roof loads are carried partly by the first floor and basement columns and partly by exterior walls. The roof over the lounge is carried on two steel trusses which are supported by four steel H columns. Except for the first floor, which is a 6″ reinforced concrete slab, the building is framed with 2″ x 10″ joists and 2″ x 8″ rafters.

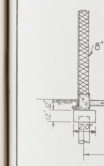
Except for the basement portion of building there was very little excavation as the bottom of the footing is only 2′ below grade. The footings under the basement are 8′ below grade. The soil was found to be humus to a depth of about 6′, then white sand for a depth of at least 10′ and probably much deeper.

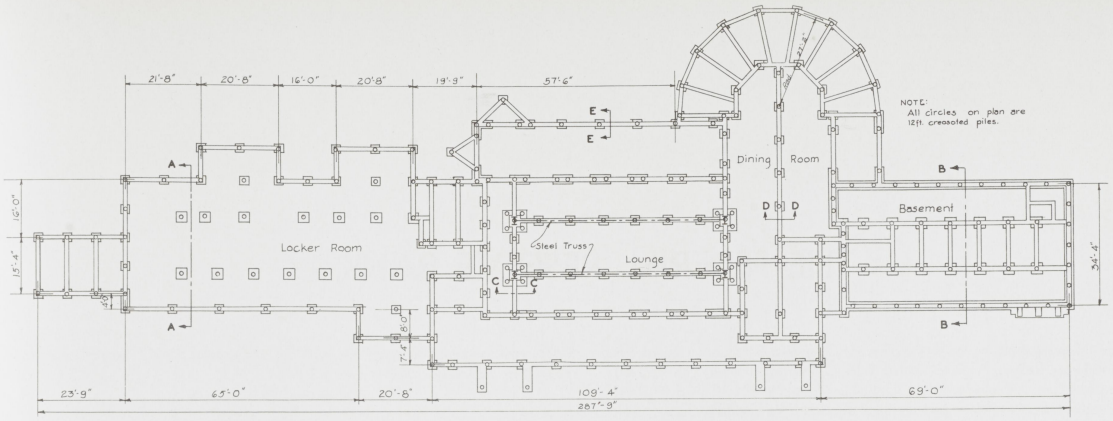
The chart on the accompanying drawing shows the driving record of three test piles driven on the site of this building. These piles were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42″. These piles had an average penetration of 6′ under the weight of hammer and required from 540 to 800 blows to drive them the next 6′-9″.

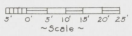
Pine piles creosoted with a 12 lb. treatment were driven for the foundation of this building. These piles were 12′ long with 12″ butts and 10″ tips and were driven with a No. 1 Vulcan steam hammer. The cut-off of the majority of the piles is 1′-6″ below grade except under the basement where they are cut off 7′-6″ below grade. The tips of all piles were driven to the same depth, about 12′, and since the cut-off under basement is 7′-6″ below grade the piles in this area have an effective length of approximately 4′-6″. All piles were driven to practical refusal in this white sand and could not be driven any further without destroying them. The design load per pile is approximately 12 tons.

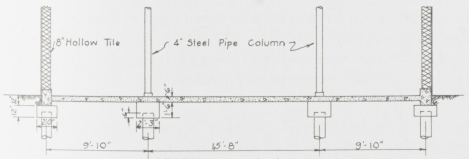
Pile caps and grade beams are of reinforced concrete. The accompanying drawing shows the layout of these caps and beams and details of their construction.

There has been no evidence of settlement. It is interesting to note that the foundation piles under this building rest in the sand bed which has been referred to in Chapter I.

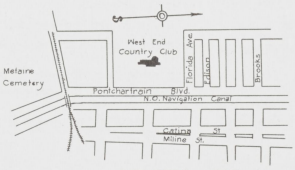




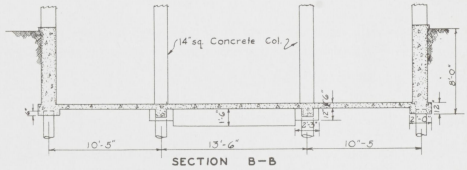




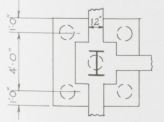
SECTION A—A



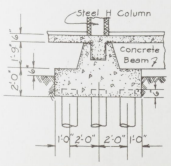
LOCATION MAP



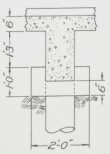
SECTION B—B







SECTION C-C

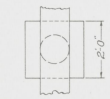


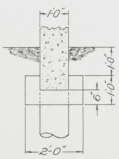
SECTION D-D



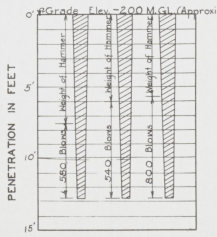
WEST END COUNTRY CLUB

CASE NO. 68





SECTION E-E



TEST PILES

Case No. 69.

THE FEDERAL RESERVE BANK

The Federal Reserve Bank, located on the corner of Carondelet and Common Streets, was designed by Rathbone De Buys, Architect, with J. Frank Coleman as Consulting Engineer, and was constructed by Geo. J. Glover in 1922. This building fronts 65'-3" on Carondelet Street by 106'-9" deep and rises 91'-6" from grade to top of parapet. It is a steel frame building with concrete floor joists and concrete floor slabs. The building now has four working floors, one storage floor, and a basement but the footings are designed so that two floors may be added in the future.

The two walls facing the streets are of granite and limestone and the rear and side walls are of brick. The total wall area is approximately 34,000 sq. ft. of which 9.4% is occupied by windows.

Excavation for basement and footings varied from 15 ft. to 21 ft. below curb with an average depth of 16 ft. or to elevation —10.63 M. G. L.

1,503 untreated wood piles, with bark removed, were driven for the foundation. These piles were 60 ft. long with 6" to 7" tips and 12" to 14" butts, and were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42". The number of blows required for the last foot of driving are as follows:

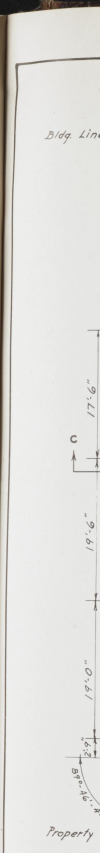
17% required 20 blows
62% required 30 blows
21% required 40 blows

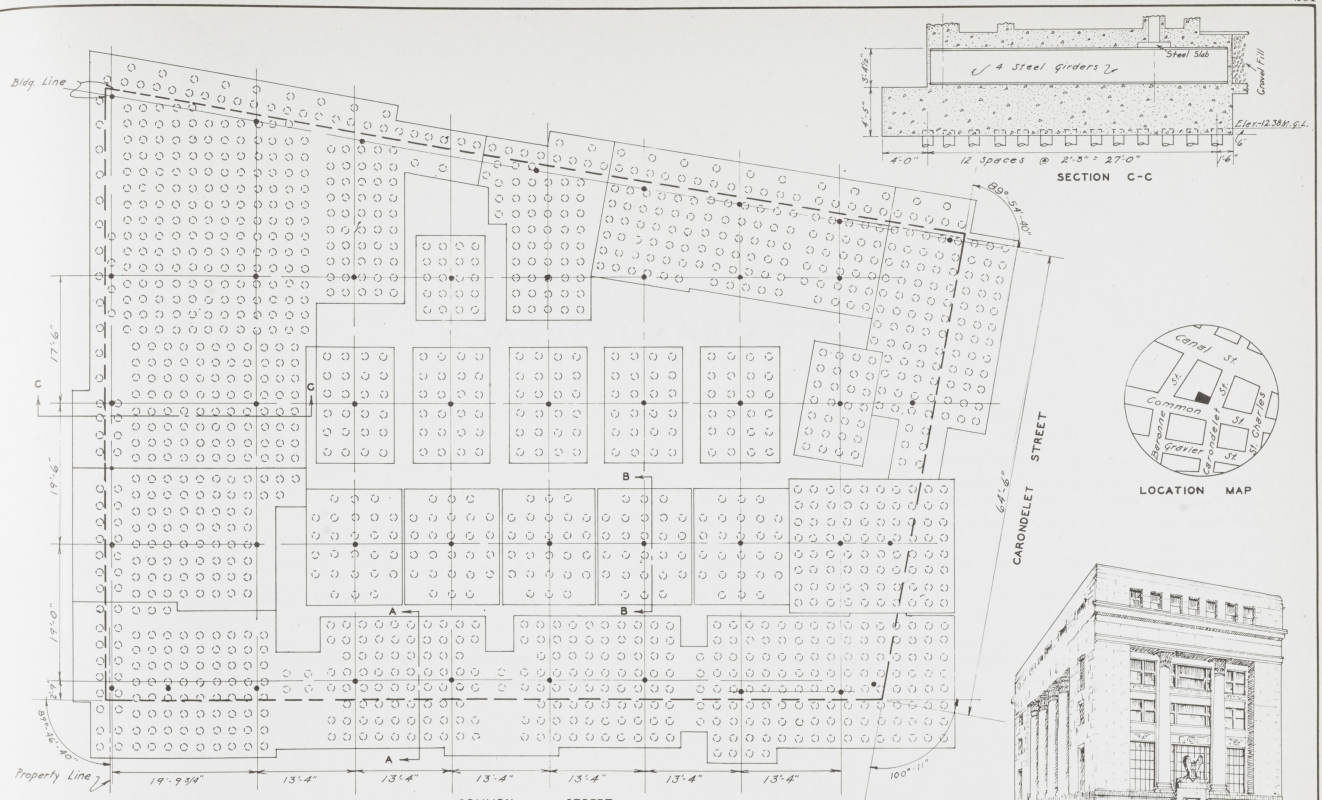
Test piles were driven but no records are available.

The piles under the individual interior footings are spaced 2'-6" o. c. and under the other footings are spaced 2'-3" o. c. Cut-off of piles varies from elevation —9.63 to —15.63 M. G. L. The piles are now loaded approximately 10 tons each and, when the two extra floors are added will be loaded approximately 12 tons each. All loads are transmitted to foundation piles through steel H. columns resting on reinforced concrete footings.

The pile caps are of reinforced concrete from 3'-5" to 4'-5" thick. The accompanying drawing shows the spacing and construction of these caps and the spacing of piles.

No cracks or signs of settlement are evident in this structure.

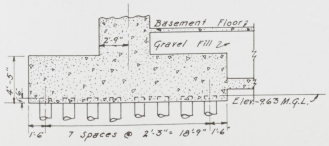




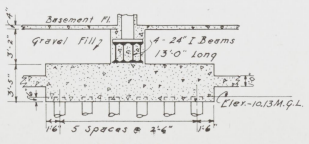
SECTION C-C

LOCATION MAP

CARONDELET ST.



SECTION A-A



SECTION B-B

FEDERAL RESERVE BANK

CASE NO. 69

Case No. 70.

CLARK'S STRAND GARAGE

This building was designed by Favrot and Livaudais, architects, and was erected in 1925 by Gervais Favrot, contractor, with Doullut & Ewin as contractors for foundation piles.

The building is a modern reinforced concrete frame structure to be used as an automobile storage garage. It is 5 stories high with 6 reinforced concrete floors for storage. The building is approximately 116′ x 149′ and is 70′ high from curb to parapet. The exterior walls are brick and the floors are reinforced concrete with reinforced concrete ramps extending from floor to floor.

The window area is about 50% of the total of three sides, the south side having no windows.

The curb elevation is approximately 2.27′ M. G. L. The entire area was excavated to a depth of approximately 7′ below curb or to —4.73 M. G. L.

There are 642 untreated yellow pine piles in the foundation. The piles were 60′ long with 12″ to 14″ butts and 7″ to 8″ tips and were driven with a No. 1 Vulcan steam hammer having a weight of 5,000 lbs. and a stroke of 42″.

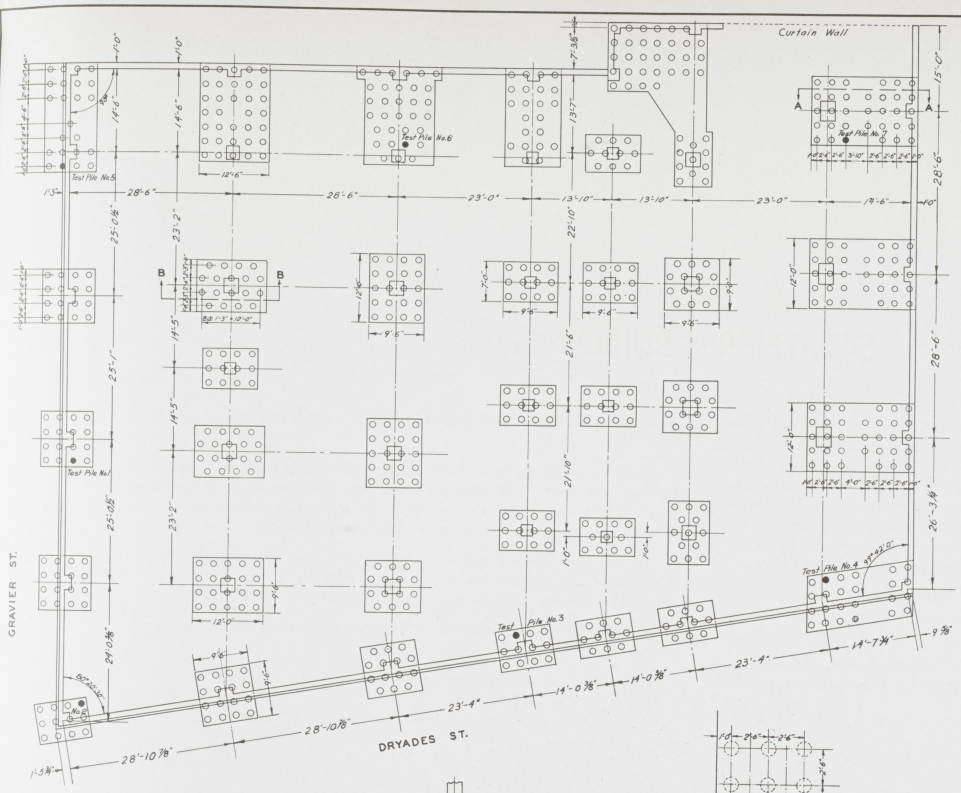
All piles were driven to a uniform depth with the tips resting at approximately —62 M. G. L. The effective length of piles in place is 58 feet. No recod of driving is available but the contractors state that driving was uniform with the piles penetrating about one inch to the last blow. On the accompanying drawing will be seen a graph which illustrates the driving log of test piles, which were 60′ long, and this conforms closely with the driving of the foundation piles.

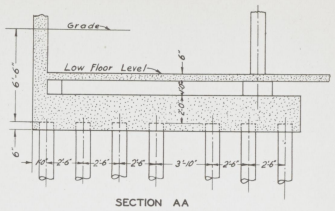
The design load varies from 8½ to 15 tons per pile but with the exception of two or three footings the load is uniform and approximately 12½ tons per pile.

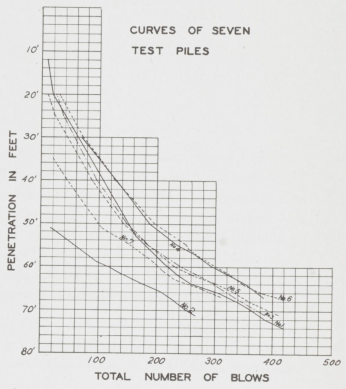
Reinforced concrete pile caps and column footings are shown in plan and section on the accompanying drawing.

No instrumental record has been kept to determine settlement and there is no indication that settlement has taken place.

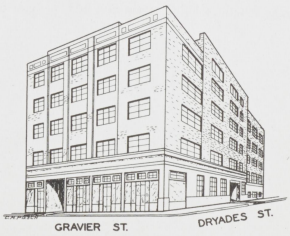


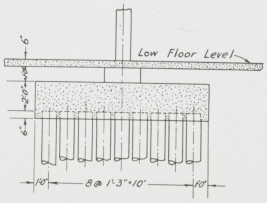




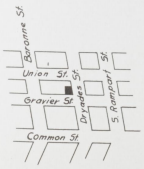


TYPICAL PILE SPACING





SECTION BB



LOCATION MAP

STRAND GARAGE

CASE NO. 70

Case No. 71.

SOUTHERN BUILDING

The Southern Building was designed by W. E. Spink, Architect, and W. Horace Williams Co. Engineers, and was erected by W. Horace Williams Co., Contractors, in 1926. It is located at the intersection of Howard Avenue, St. Joseph and Baronne Streets, triangular in shape to conform with the lot on which it is located. This building is a modern 7 story steel frame fireproof office building, approximately 83′ high. The exterior walls are constructed of 4″ face brick with 8″ hollow tile backing. The building facing 88′-8½″ on St. Joseph Street, 95′-5¼″ on Howard Avenue and 10′-0″ on Baronne Street has an approximate window area of 22%. The floor construction is of masillon bar joist topped with ⅜″, 4 lb. rib lath and a 2″ slab.

The entire building site was excavated to a depth of 3′-0″ or an elevation of approximately 5.0 M. G. L. to care for the upheaval after pile driving. After the piles were driven the entire site was excavated to a depth of 6′-4″ below curb or an elevation of approximately 1.6 M. G. L.

137 straight peeled yellow pine piles were driven under this building. The piles having an average length of 50′-0″ a minimum butt diameter of 12″ and a minimum tip diameter of 6″, were driven with a No. 1 Vulcan steam hammer, having a weight of 5,000 lbs. and a stroke of 42″.

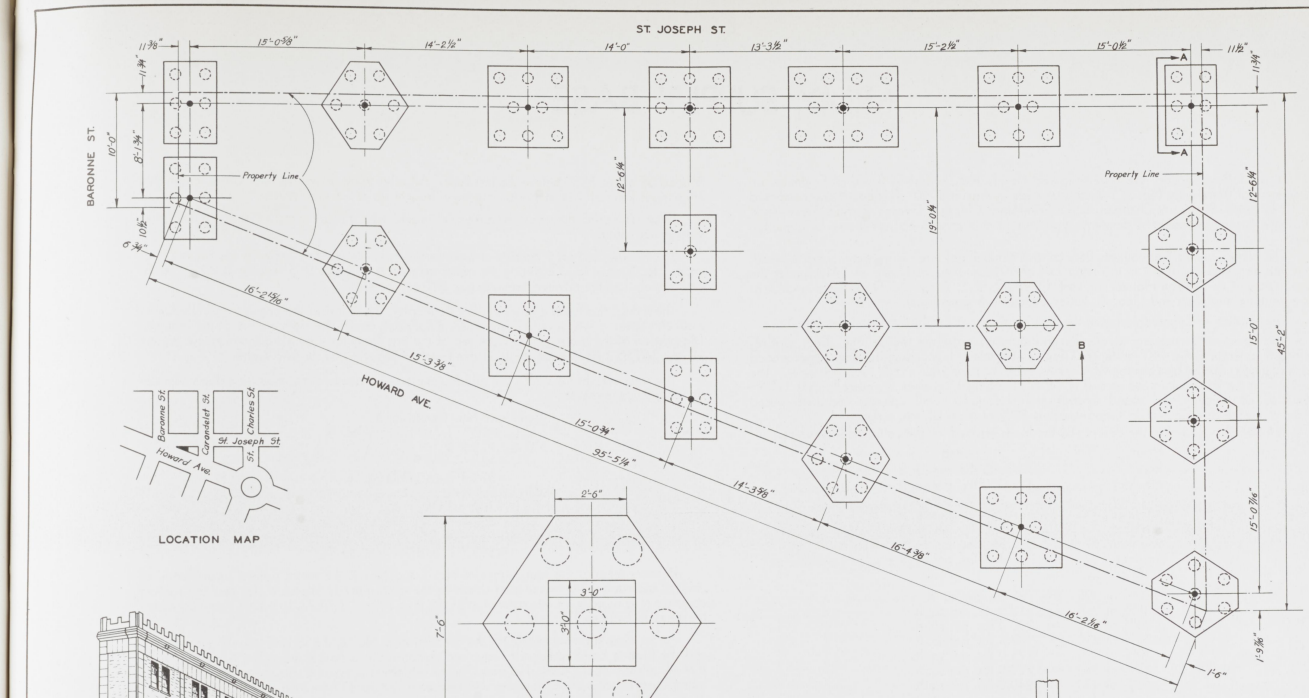
The piles were driven true to a resistance of not less than an average of 18 blows in the last three feet. According to available information the piles were driven 50′ and cut off 6′ leaving 44′ of effective length in the ground. No driving record is available but the engineers state that driving was stopped at 50′ where a hard stratum was reached.

Footings which total 19 in number, are of reinforced concrete. The pile spacing throughout is 2′-6″ on centers. Each pile was designed to carry a load of 12.5 tons. The total live load used in the design was 75 lbs. per sq. ft. with a 30 lb. per sq. ft. normal wind load.

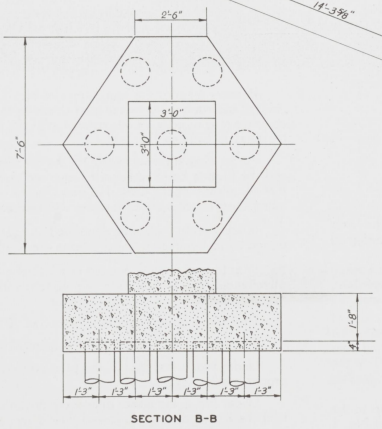
The accompanying drawing shows the foundation plan and sections, and location of all piles and column footings.

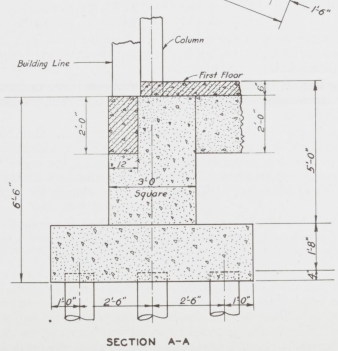
At this time there is no visible sign of settlement.











SOUTHERN BUILDING

CASE NO. 71

Case No. 72.

ARMY SUPPLY BASE

In the following story we have followed closely the "Report of Board of Engineers on Settlement of Warehouse No. 2," which was made in August 1920. This Board was composed of C. E. Smith, St. Louis; Chairman, E. C. Shankland, Chicago; George Perrine, New York. We have quoted indirectly by condensing and we have quoted directly as shown by quotation marks.

The New Orleans Army Supply Base consists generally of three large warehouses, a wharf, and Railroad tracks, all built in the latter half of 1918 and the early half of 1919, under the supervision of A. Pearson Hoover, Lt. Col. Q. M. C. U. S. Army with Ford, Bacon and Davis as consulting engineers and Geo. A. Fuller Company as general contractors.

The location and general layout of the Base are shown in Exhibit "A" Drawing No. 1.

The three warehouses are identical with the exception of the foundations. Each is of reinforced concrete about 140' wide, 600' long and 6 stories high. Each building is surrounded by a platform covered by a canopy which makes each first floor 180' x 630', approximately. The height from the first floor to the second is 14'-6", the height between the other floors is 11'-6". Flat slab construction and round interior and rectangular wall columns are used, spaced 20' c-c in each direction. The window area is 33% of the total wall surface.

The floor loads used in the design and the loads assumed for the column design were:

Floor	Load
Roof	25 lbs. per sq. ft.
6th floor	250 lbs. per sq. ft.
5th floor	250 lbs. per sq. ft.
4th floor	250 lbs. per sq. ft.
3rd floor	250 lbs. per sq. ft.
2nd floor	350 lbs. per sq. ft.
1st floor	400 lbs. per sq. ft.

Column		Load
100% of 25	=	25 lbs. per sq ft.
85% of 250	=	212.5 lbs. per sq. ft.
80% of 250	=	200.0 lbs. per sq. ft.
75% of 250	=	187.5 lbs. per sq. ft.
70% of 250	=	175.0 lbs. per sq. ft.
65% of 350	=	227.5 lbs. per sq. ft.
60% of 400	=	240.0 lbs. per sq. ft.

The foundations were designed for the full dead load and 85% of the live load, the latter amounting to about 1500 lbs. per sq. ft. Thus each intermediate column footing was designed to carry 600,000 lbs. L. L. or 300 tons.

Below the first floor slabs, the construction of the reinforced concrete floor and footing under No. 2 is different from that under No. 1 and No. 3. See Exhibit C for No. 2 and Exhibit B for No. 1 and No. 3.

Under No. 1 and No. 3, 11,242 untreated timber piles, 50 to 55 feet long with a design load of 12 Tons each were driven down and cut off at the assumed ground water level about 11'-6" below the first floor, or approximately 1.4 M. G. L. The lowest level of the footing consists of a reinforced concrete mattress covering the entire area except squares 10' x 10' at the center of each panel. The area of this footing slab or mattress for each column amounts to 300 sq. ft.

The next step is a block 7' square 2'-6" deep, then a column 4'-6" in diameter up to the first floor slab. The footing concrete and first floor slab, for an intermediate column of No. 1 and No. 3 weigh 204,450 lbs. making the total dead weight 550,650 lbs. or 275.3 tons.

Under No. 2, in order to avoid the delay and expense incident to the excavation of earth down to 11'-6" below the first floor, 8200 Raymond composite piles, with a design load of 16 tons each were used. Plans for these pile foundations were prepared by the Raymond Concrete Pile Company. These piles are untreated timber driven down to the ground water level about -0.35 M. G. L., and surmounted by sections of concrete, enclosed in steel shells, about 10' high and weighing about 1 ton and extending up to the ground line. These piles were finished off about 3'-3" below the first floor. All piles were driven for their entire length thru Mississippi River alluvial deposits until they brought up at the sand stratum.

"The assumption that the composite piles would support more weight than the timber piles was unwarranted."

The footing for No. 2 consists of a reinforced concrete mattress similar to the bottom layer under No. 1 and No. 3 covering the entire area except a space 9'-6" square at the center of each panel, the area covered amounting to 310 square feet.

The top of this footing forms the first floor level, the spaces at the center were filled with earth and covered with a reinforced concrete floor slab continuous with the top of the footings. The portion of the footing below the top of the first floor, for a standard intermediate column weighs 161,250 lbs. making the total dead weight 507,450 lbs. or 253.7 tons.

The total weight for which the pile foundation of a standard intermediate column was designed is thus seen to be:

Warehouse No. 1 and No. 3
L. L. 300 T.
D. L. 275.3 T.

575.3 T. or 1.9 T. Sq. Ft.

Warehouse No. 2
L. L. 300 T.
D. L. 253.7 T.

553.7 T. or 1.7 T. per Sq. Ft.

In excavating for the foundations of No. 1 and No. 3, the entire surface accumulation of cinders and rubbish was excavated down to the comparatively firm blue clay and the footing concrete rests directly on this material at El. 22.0 C. D. or 1.6 M. G. L. which materially assists the piles in carrying the load.

As no excavation was made for the foundation of No. 2, the surface fill was not removed and the footing being somewhat loose and compressible probably assists the piles very little, if at all, in carrying the load. However, as the settlement progresses, the soil under the footing, being compressed as the piles settle, will take more and more of the load off the piles.

In addition to the above mentioned foundation piles, the outer edge of the platform is supported by 234 untreated timber piles in each building spaced 6' to 8' apart.

Prior to construction, one test pile 50' long with 10½' of concrete was driven at the center of warehouse No 2. This pile held 40 tons with no settlement and brought up to 3 to 4 blows per inch under a Vulcan steam hammer.

Piles driven down under No. 1 required 20 to 30 blows in the last foot of driving.

Piles driven down under No. 2 required 24 to 36 blows in the last foot of driving.

Under No. 1 and No. 3, the piles were driven in one operation and then cut off to the proper grade.

Under No. 2, the timber piles were driven to the ground level and left there. Several days later the Raymond driver followed them down after the ground had been compacted by other piles, thus subjecting the piles to hard driving, disturbing the skin friction and possibly breaking many piles. Exposure of some of these composite piles in 1920 showed buckling at the joint.

LENGTH OF PILES

A statement in reference to the piles under warehouse No. 2, from H. A. Christie who superintended the pile driving for the Raymond Concrete Pile Company read as follows:

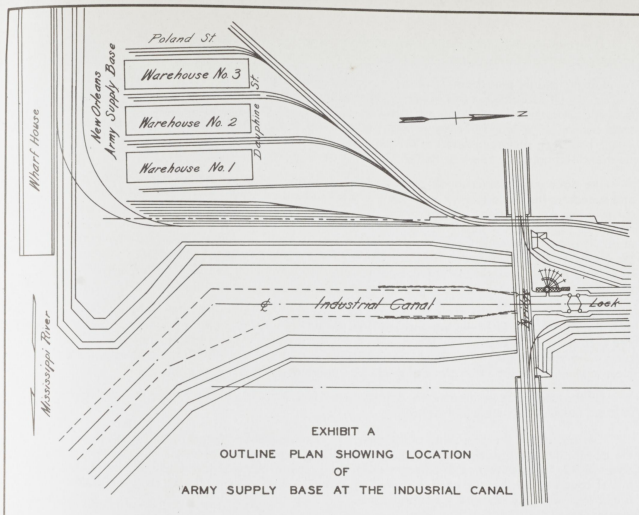


EXHIBIT A
OUTLINE PLAN SHOWING LOCATION
OF
ARMY SUPPLY BASE AT THE INDUSRIAL CANAL

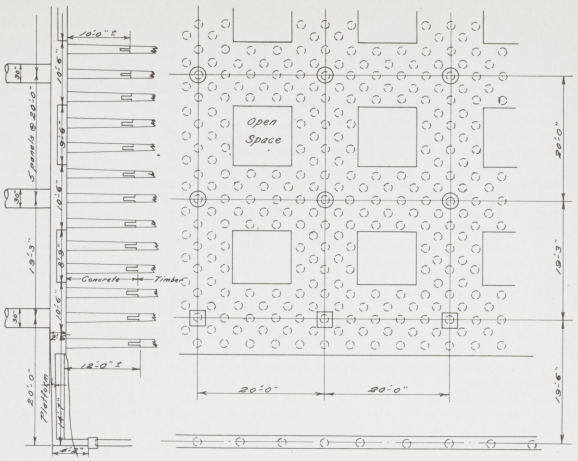


EXHIBIT C
DETAILS OF FOUNDATION CONSTRUCTION - WAREHOUSE NO. 2

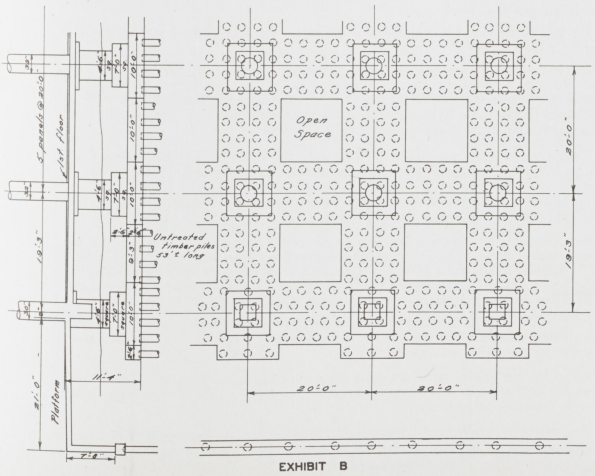


EXHIBIT B
DETAILS OF FOUNDATION CONSTRUCTION - WAREHOUSE NO. 1 & 3

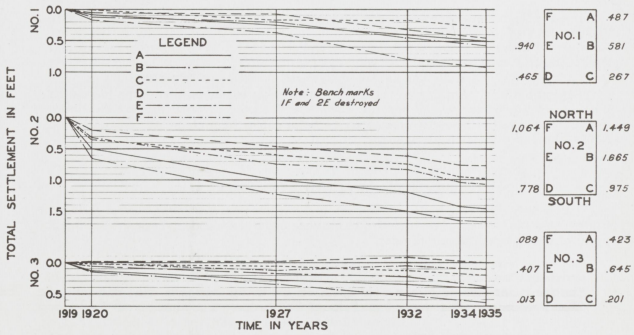


EXHIBIT - D
SETTLEMENT OF SIX BENCH MARKS ON EACH OF THE THREE
ARMY SUPPLY BASE WAREHOUSES SINCE CONSTRUCTION

ARMY SUPPLY BASE

CASE NO. 72 DRAWING NO 1

Baltimore, Aug. 18, 1920

"Length wood piles used 50 to 55 ft. greater majority 50'. Concrete length 10½ to 12 feet. Longest piles driven at end of building nearest river. Test pile driven at center of building 50' with 10½' of concrete held 40 tons, no settlement. Piles brought up 3 to 4 blows per inch."

In view of the above statement it is interesting to note that actual settlement of this warehouse occurred when the piles were loaded approximately 10 tons per pile or less, less than ¼ of the test load that caused no settlement.

In an article in Engineering News Record, April 24th, 1919, Mr. Geo. H. Davis of Ford, Bacon and Davis, Supervising Engineers of the Army Supply Base, said:

"Piling is of round yellow pine and of various lengths for various parts of the plant. Under the warehouse units the points of the piles rest in a sand stratum at approximately -28 Cairo Datum (-7.57 M. G. L.) giving a total penetration of approximately 51'. The piles are driven for the entire length thru Mississippi River alluvial deposit until they bring up at the sand stratum before mentioned."

The Board examined valuable records of the driving of 3200 piles under Warehouse No. 1 which ran from 49 to 54', averaging about 52' long. The tips of these piles were driven down to about -30 C. D. (-9.57 M. G. L.) about 6' into the second stratum. The last foot of driving required from 20 to 30 blows of a Vulcan steam hammer.

The Board also examined records of the driving of 3500 piles under No. 2, which averaged about 48' long. The tips of these piles were first driven down to -38.43 M. G. L. in the blue clay under 4 to 6 blows to the last foot. There were also available the records of 60 piles that were followed down by the Raymond Concrete Pile Co. hammer about 10' to -27 C. D. (-6.57 M. G. L.) about 3' into the second sand stratum. Of these over ½ were given from 24 to 36 blows to the last foot, agreeing very well with the last foot of driving under No. 1, making allowance for the increased resistance due to the taper and corrugations of the concrete tops.

The remainder of the piles that were followed down required a much greater number of blows (4 of the 60 recorded required from 96 to 120 blows) and it is probable that many of these piles were rendered valueless by such driving, as no piles can stand such punishment without injury.

"Each pile under No. 1 and No. 3 was driven in one operation and cut off to the proper grade after other piles in the vicinity had been driven. These piles had the advantage of the set given them by the original driving and of the compacting of the ground by the driving of adjacent piles."

"It is a well known fact that after a pile has been left alone for days after driving it is very difficult to start it down again. Yet, this is what occurred to every pile under No. 2. The timber pile driver first drove the pile to the ground level and passed on. Several days later the Raymond driver followed them down after the ground had been compacted by other piles, thus subjecting the piles to hard driving, disturbing the skin friction and possibly breaking many piles."

"Suggestions have been offered that the driving of piles in one portion of the foundation which caused ground to "swell" and rise elsewhere lifted the Raymond tops off the timber piles but this appears to have been disproven by the piles that were excavated and also by the fact that the entire building has settled."

EXPOSURE OF FOUNDATION PILES

"As the only difference in the construction of the warehouses was in the number and kind of piles under No. 2 the Board concluded to excavate under the foundation mattress to inspect several of the Raymond composite piles.

Three piles were uncovered near the center of the east edge of the footing where the total settlement since construction amounted to more than 11". The excavation was made down to the point between the steel encased concrete top and the wooden pile. The shoulders of the 3 wooden piles were found about 10' below the bottoms of the footing.

The steel shell rested on the shoulder of the south pile. The lower 9" of the steel shell surrounding the wood pile core was filled with loose sand and gravel, not concrete as supposed. The next 3" was open, the shell having separated, and the wood pile core could be seen. The next 6" of shell was apparently partly filled with loose sand and gravel that could be removed with the fingers.

The lower part of the steel shell was then cut away to expose the top of the wood pile core. At that level solid concrete was found in close contact with the top of the wood pile core, 9" in diameter, which had been slightly battered in driving.

This pile was defective as the lower portion of the steel encased concrete pile was of absolutely no value from the top of the timber pile to the shoulders.

On the middle pile about 7" of the wood pile core just above the shoulder was exposed. The steel shell had buckled and lacked 7" of reaching the shoulder. The lower section of steel shell and concrete were then cut away to expose the top of the wood pile core. At that level solid concrete was found in close contact with the top of the wood pile core, 9" in diameter, which had been slightly battered in driving. This pile was defective as the lower edge of the steel encased concrete pile was not within 7" of bearing on the shoulder of the wooden pile.

The north pile showed good contact of the steel shell on the shoulder of the wood pile and soundings indicated that the steel shell was full of hard concrete. Therefore, the bottom of the pile was not cut open. The top of this pile was not in contact with the footing concrete on the N. E. side, but was separated ¼" into which a flat piece of thin steel was easily inserted about 1 foot. Apparently the S. W. edge of the pile was still in contact with the footing concrete. As it was evident by the formation that the footing and the pile head had been originally in contact it was apparent that the composite pile was buckling at the joint, which must have moved to the S. W. nearly 2" to cause the top to separate ¼" from the footing.

As these 3 piles on the east side were all defective the tops of 3 more piles were uncovered near the N. W. corner of the warehouse. The top of one pile was found in good condition. The tops of the other two had pulled away from the footings about ¼", indicating that these two piles were also buckling at the joint. The joints were moving to the N. E. The openings were clean enough to permit a thin piece of steel to be inserted about 1'.

Of the total of 6 piles uncovered, defects were found in 5. No further excavation was made as it did not seem advisable at that time.

On account of the possibility of the timber piles having been injured in following down; the possibility of the steel shell having been displaced when empty or when filled with wet concrete; by the disturbance of adjacent piles; the possible lifting of the steel shell, empty or full of concrete, off the pile head; by swelling ground and other possible defects, great doubt is cast over all of the Raymond Composite piles."

Exhibit E shows cross sections of the layout east and west and at right angle to the warehouses and Industrial Canal, and north and south parallel to the building, and at right angles to the Mississippi River levee.

The bed of the new Industrial Canal is 23' below the floor of the warehouses and 18' above the average bottom of the piles.

The bed of the Mississippi River is 72' below the bottom of the piles and about 800' away. The river bank under water is somewhat steeper than elsewhere in New Orleans but it was heavily mattressed by the Mississippi River Commission in 1909 and again in 1919 and is apparently stable, as the levee at this point has never settled nor slid. The proximity of the river appears to have had no direct bearing on the settlement.

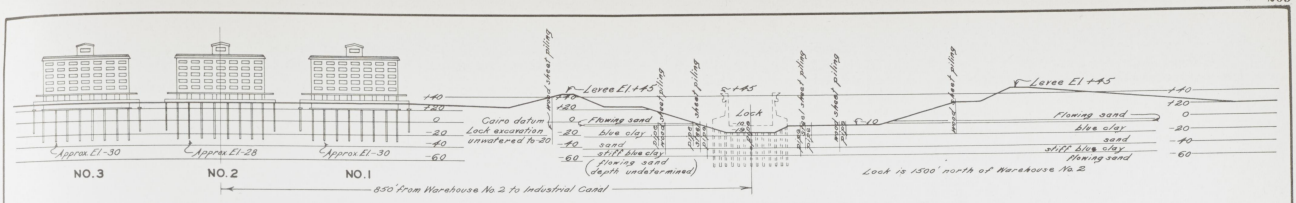
On the contrary the opposite appears to be true. The levees along the east and south sides of the buildings have compacted the ground under them and increased its bearing power. The settlement on the east side of Warehouse No. 1 adjoining the Industrial Canal Levee, is less than on the west side, and the settlement of the south ends of the building, adjoining the Mississippi River Levee, is less than on the north ends.

No borings were made under No. 2 or No. 3. Exhibit H shows logs of borings made prior to construction at the site of No. 3 and elsewhere at the Base. These borings are typical of N. O. subsoil. Excavations elsewhere in New Orleans uncover cypress roots and bogs which indicate that the whole area was once a cypress swamp. Peat bogs were encountered in borings 6 and 7 at each end of the wharf and roots were encountered in holes 4 and 5 on the site of No. 1.

Exhibit "J" shows a record of the settlement of the 3 warehouses from 1919 to 1920. Exhibit D shows curves of the settlement of 6 bench marks on each of the 3 buildings over a period of 16 years 1919 to 1935.

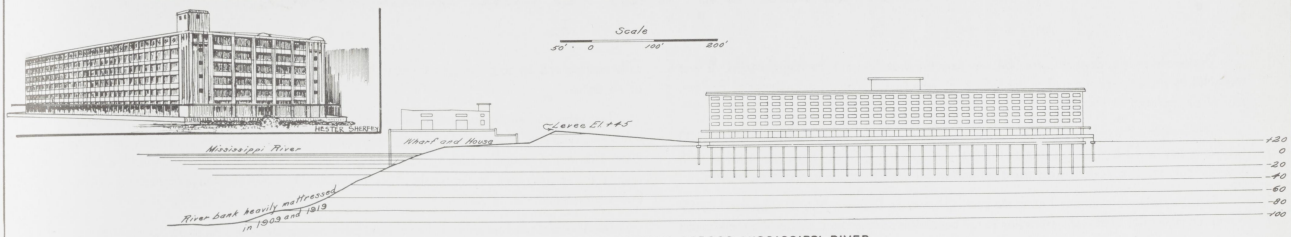
Altho the first year of settlement caused considerable cracks to appear in No. 2 and a number in No. 1 and No. 3, a recent survey of the buildings in 1932 showed no noticeable change in their physical conditions.

From the settlement curves, it is reasonable to assume that the building will continue to settle for some time but at a much reduced rate and more uniformly, without any dangerous results.



ARMY WAREHOUSES

EAST AND WEST CROSS SECTION ACROSS INDUSTRIAL CANAL

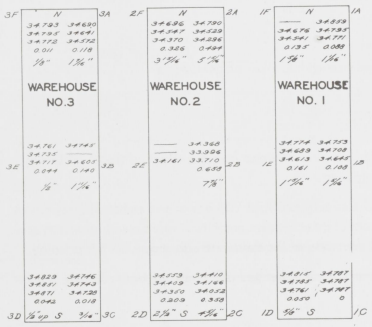


NORTH AND SOUTH CROSS SECTION ACROSS MISSISSIPPI RIVER

ELEVATIONS ON THIS DRAWING REFER TO CAIRO DATUM.

TO REDUCE TO M.G.L. DEDUCT 20.43

EXHIBIT "E"



B.M. is top of cap on top of pipe, numbered 2/5, and is over B.M. 2/5 on east side of Forstall St. about 18" from fence. El. 25.546 C.D. On corner of Forstall and Villere Sts.

Nos. 1A to 1F, 2A to 2F, 3A to 3F, refer to brass plug bench marks in concrete columns. Top figures are elevations by Ford, Bacon & Davis, June 1919, Cairo Datum. Second figures are elevations by Utilities Officer, Jan. 1920. Third figures are elevations by George Perrine of Board of Engineers, Aug. 1920. Bottom figures show total measured settlement June 1919 to Aug. 1920. (Except 2E and 1F, latter 1 3/4" Jan. to Aug. 1920.)

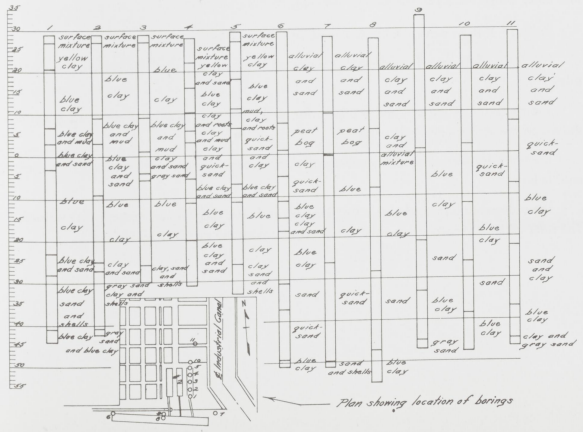
Bench mark 1C used as base referenced in Jan. 1920 to bench mark in timber trestle and foundation of bridge to wharfhouse checked as follows:-

	Jan. 1920	Aug. 1920
Bench mark 1C	34.757	34.757
Spike in trestle	30.883	30.875
Bridge foundation	32.032	32.017

ELEVATIONS OF FORD, BACON & DAVIS BENCH MARKS & SETTLEMENT IN WAREHOUSES

JUNE 1919 - JAN. 1920 - AUG. 1920

EXHIBIT "J"



RECORD OF BORINGS MADE PRIOR TO CONSTRUCTION

EXHIBIT "F"

ARMY SUPPLY BASE

CASE NO. 72

DRAWING NO. 2

Case No. 73.

I. C. R. R. TRESTLE BONNET CARRE SPILLWAY

This trestle crosses Bonnet Carre Spillway near the shoreline of Lake Pontchartrain. It was designed by the engineering staff of the I. C. R. R. with C. C. Westfall as Engineer of Bridges, and was completed in May 1935, by Walsh Construction Company.

It is a railroad standard 12 pile double track ballast deck trestle, approximately 12,000 feet long, having 13 foot bays; concrete fire walls at 500 and 900 foot intervals, together with five 35-foot, and five 70-foot steel spans for additional fire protection and passing of drift.

The firewalls are reinforced concrete piers (Shown on Drawing No. 3) supported by 29 creosoted pine piles with walls extending to rail base. The 35 foot steel spans rest on reinforced concrete piers which are supported by 43 creosoted pine piles. The 70 foot steel spans rest on concrete piers which are supported by 73 creosoted pine piles. The foundation piles are designed to carry total loads of 12 to 12½ tons as computed by Engineering News Formula:

$$P = \frac{2\,W\,H}{S + 0.1}$$

The live load design is in accordance with Cooper's E-60 formula.

The impact load formula is $\frac{LL \times LL}{LL + DL}$

Engineering information for this study was obtained from the offices of the U. S. Government Engineers and the I. C. R. R. Engineers.

Tests conducted by the railroad company consist of 20 borings and eight test piles driven along the site of the trestle. The results of these tests are graphically represented on accompanying drawing No. 1. A section and side view of the trestle are also shown on this drawing.

Tests conducted by the government along a dredged canal near the trestle site are graphically represented on accompanying drawing No. 2. A map of this vicinity locates the position of all tests.

Test piles and all other piles in the structure are Southern yellow pine 18 lbs. creosote treatment, with tips of approximately 7½" and butts of approximately 16". Lengths vary from 78 to 105 feet. Generally speaking the shortest piles were used from the north end of the spillway to the seventh span of the trestle or station 9780+00 while the longest piles were used from station 9798+00 to 9811+00.

The 105 foot piles are spliced. The spliced piles were made with a 30 to 35 tip of untreated pile which was first driven in the ground and then fitted at the top with a pipe sleeve made of a 10" steel pipe 3 feet long. This pipe was placed with a tight fit with one half its length over the driven pile, and the 60' to 65' length of creosoted pile which was to be placed on top of it was shaped to fit tight into the sleeve and then placed in position. These piles were then driven in the ordinary manner. The sleeve was held in position on the point pile by two spikes driven into holes which had been burned into the pipe on opposite sides.

A No. 1 Vulcan steam hammer was used for driving test piles.

No. 9-B3 McKiernan-Terry double acting steam hammers were used for driving the trestle piles.

The character of the soil and the behavior of the piles under driving and load tests are shown on the accompanying drawings.

The test piles were thoroughly guyed and then loaded with pig iron on a timber platform, until failure.

The only excavations made were for fire walls and piers and this was nothing but soft muck. The piles under these structures were cut off at approximately minus 15 feet M. G. L.

C O R R E C T I O N

I.C.R.R. TRESTLE BONNET CARRE SPILLWAY - CASE 73 PAGE 210

Change Paragraph 1 to read:

Concrete piers and fire walls were built by Walsh Construction Company, all other work done by I.C.R.R. forces.

Change Paragraph 3 as follows:

Eliminate the word "creosoted" in reference to piles under concrete piers. These piles are untreated.
Eliminate reference to Engineering News Formula and to Cooper's E 60, as they were not used, but design was based upon experience of the Railroad Company, and the tests conducted.

Change Paragraph 7 to read:

"Drawing No.2"

Change Paragraph 8 to read:

"Drawing No. 1."

Change Paragraph 9 to read:

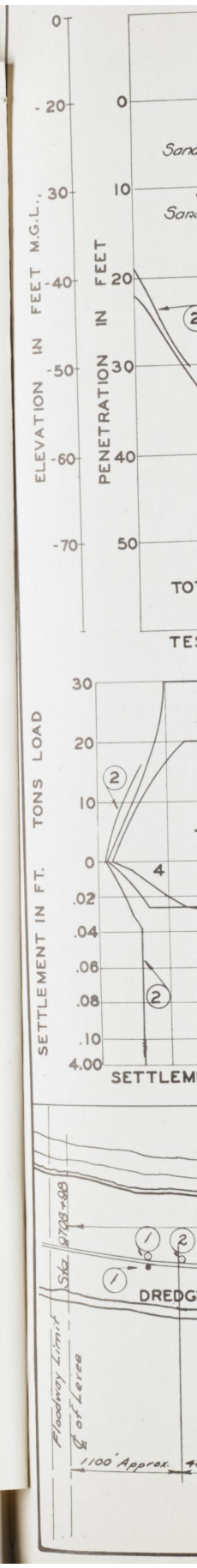
Test piles were untreated "all other piles in the structure are, etc."

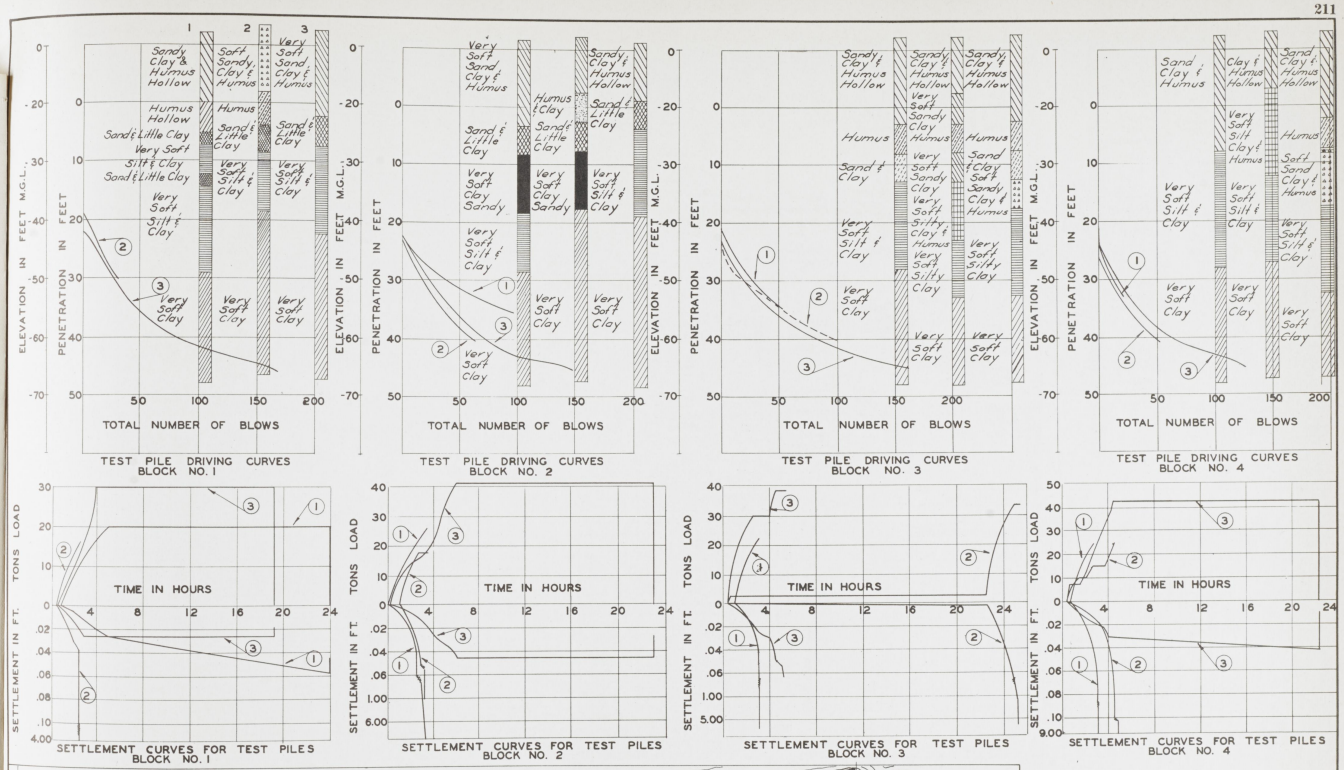
Change Paragraph 11 to read:

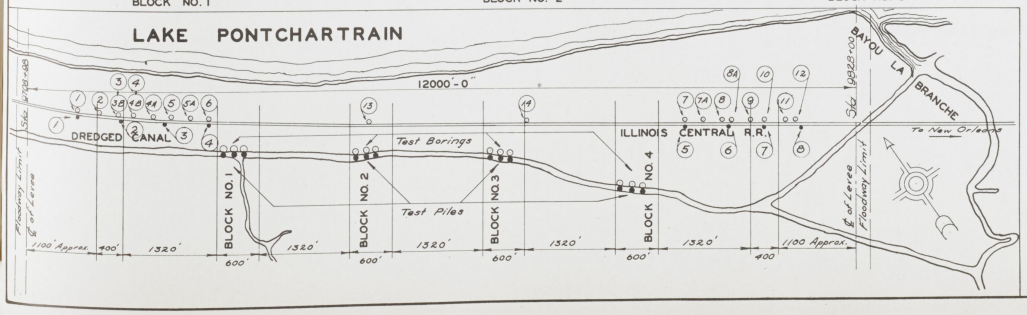
"The 105 ft. piles were full length, the spliced piles were approximately 95 ft."

Change Paragraph 14 by adding:

"These tests were made by U. S. Government and not by I.C. Railroad."


ELEVATION IN FEET M.G.L.
PENETRATION IN FEET
SETTLEMENT IN FT. TONS LOAD
DREDG
Floodway Limit
℄ of Levee
1100' Approx.



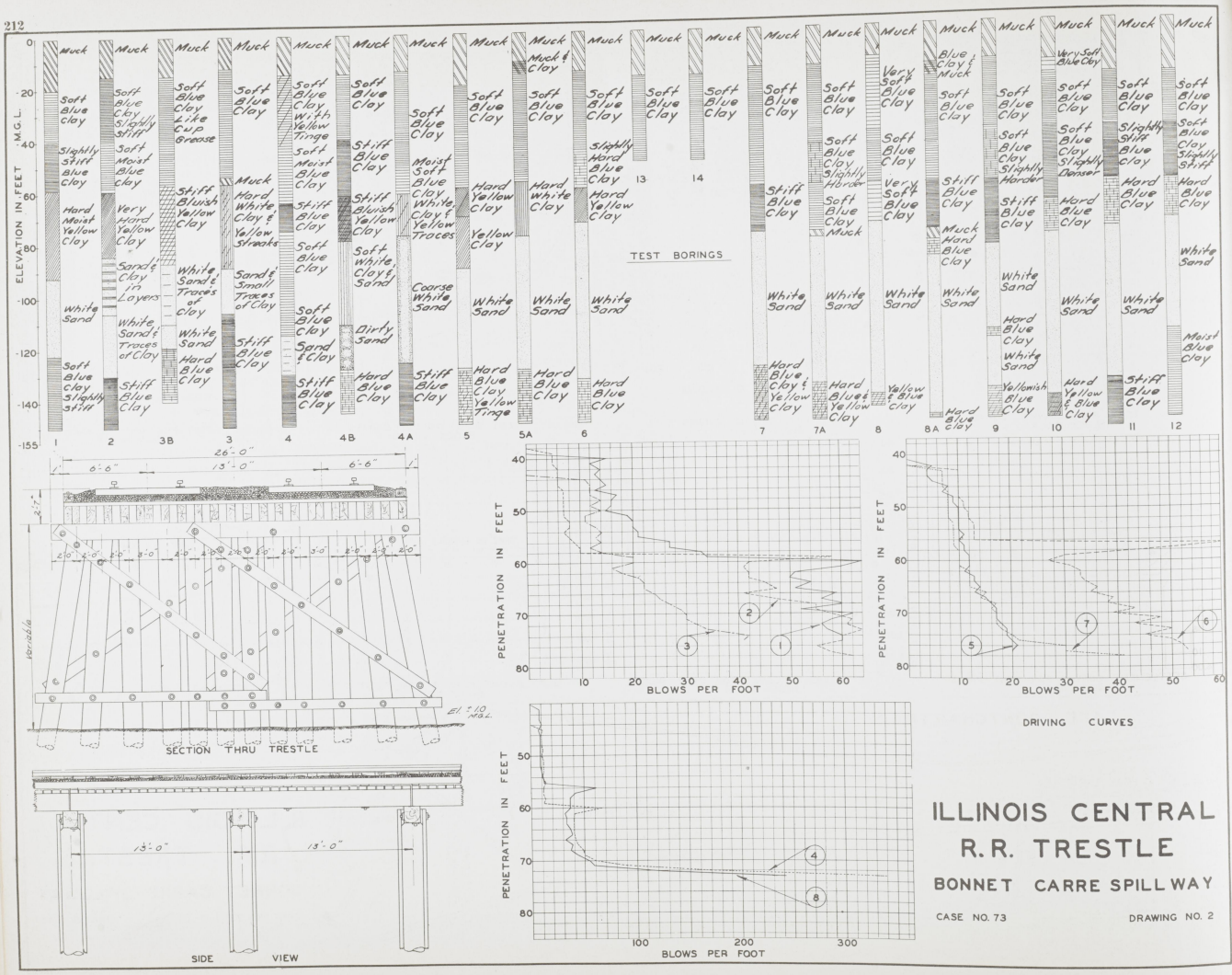


ILLINOIS CENTRAL R.R. TRESTLE

BONNET CARRE SPILLWAY

CASE NO. 73

DRAWING NO. 1



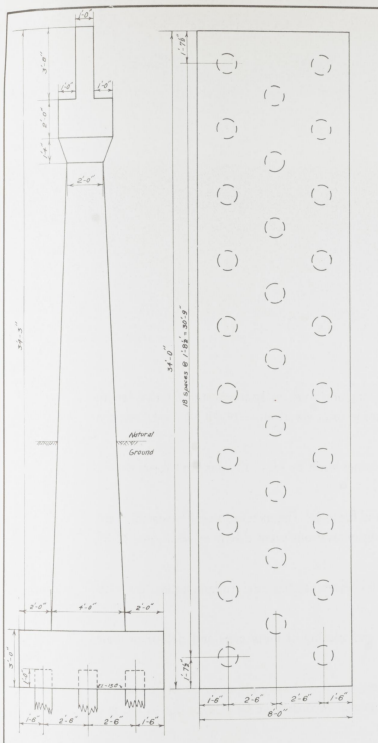
DRIVING CURVES

ILLINOIS CENTRAL R.R. TRESTLE

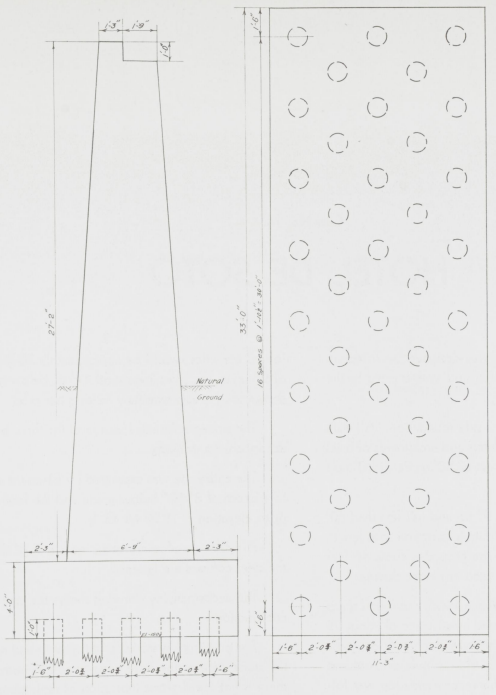
BONNET CARRE SPILLWAY

CASE NO. 73

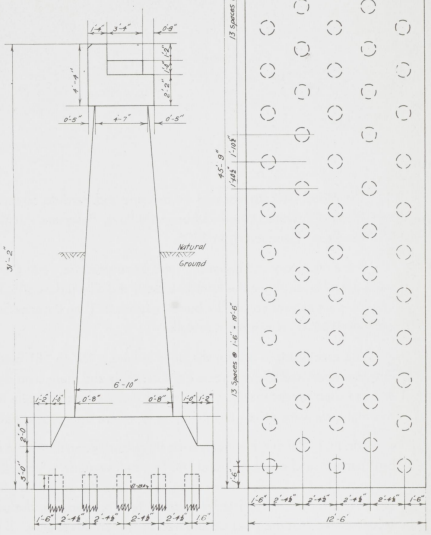
DRAWING NO. 2



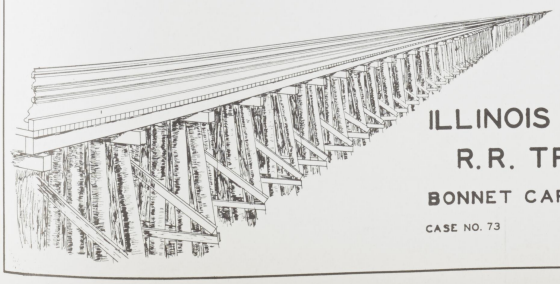
FIREWALL



PIER FOR 35' I-BEAM SPAN



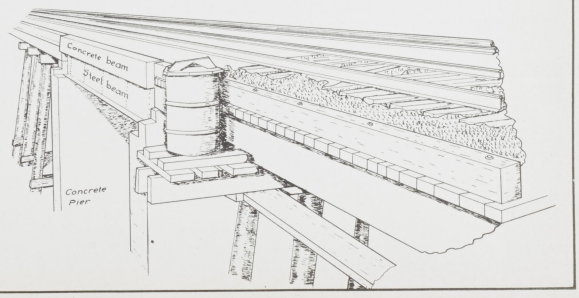
PIER FOR 70' D.T. THRU PLATE GIRDER SPAN



ILLINOIS CENTRAL R.R. TRESTLE

BONNET CARRE SPILLWAY

CASE NO. 73 DRAWING NO. 3



Case No. 74.

HOTEL DE SOTO

The Hotel De Soto, located on Baronne and Perdido Streets, was designed by Toledano and Wogan, Architects, and Rathbone De Buys, Associate Architect, and was erected by the Milliken Bros., Contractors, in 1906.

It is a nine story and basement, steel frame structure, resting on a pile foundation. All main walls are of brick above the limestone base; and all window sills, lintels and architraves of oriel windows are of terra cotta. The building fronts 221′ on Baronne Street by 58′ on Perdido Street and rises 134′-6″ above the sidewalk.

The specifications call for the piles to have a 15″ to 18″ butt, 9″ tip and not less than 60′ long, however, the pile records are not available and there is no definite information as to length and size used except that Mr. Wogan says that the length of pile in the ground is about 40 feet and that they were driven to refusal, or to where they would not stand any more driving.

Mr. H. L. Zander, Engineer, made three borings on this site in March 1906, and found sharp hard packed sand at approximately 40 feet below grade which offered a resistance of about 95 blows per foot to the iron pipe casing, which was driven with a hammer weighing 150 lbs. and a drop of 10 feet. He estimated it would offer a resistance to the piles of 24 blows per foot and recommended that the piles be allowed to rest on this stratum. If this recommendation was followed the piles would be approximately 30 ft. long and have an approximate effective length of 28 feet. The piles are cut off 14′-6″ below grade or at elevation —11.93 M. G. L. and the design load is approximately 12 tons per pile.

The stratagraphs and location of the three borings made by H. L. Zander are shown on the accompanying drawing.

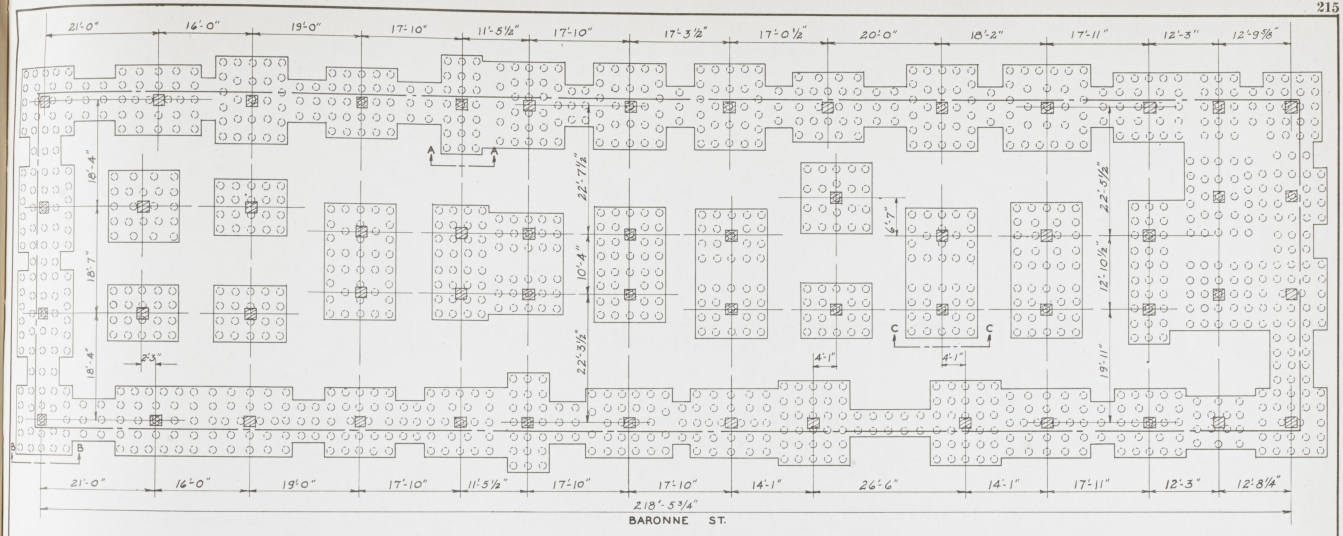
The entire site was excavated for basement and footings. The excavation for basement went to a depth of 8′-10″ below grade and the footing excavations went down an additional 6′-8″ or to elevation —12.93 M. G. L.

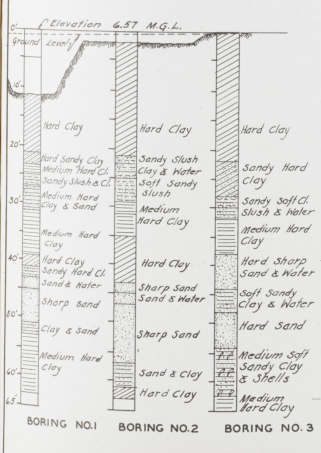
Pile caps are of reinforced concrete 3′-8″ thick. Each cap has steel grillage beams to which the steel columns are fastened.

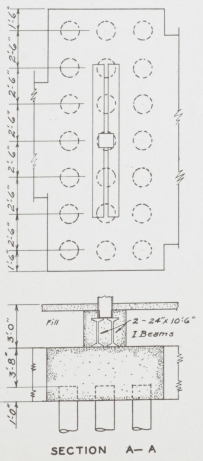
The accompanying drawing shows the size and spacing of these caps and details of their construction.

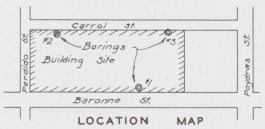
The building has stood for thirty years and no signs of settlement either in the brick walls or the stone base or the terra cotta trim. No instrumental records have been kept but to the eye there is not the slightest indication of settlement.





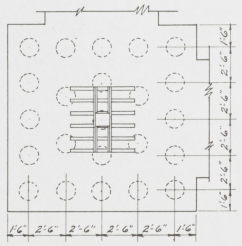


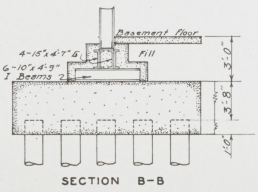


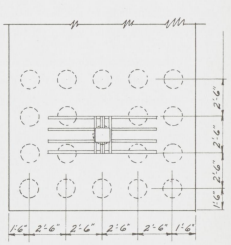


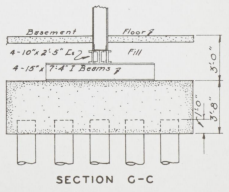


HOTEL DE SOTO
CASE NO. 74









Case No. 75.

LAKE PONTCHARTRAIN SEAWALL

The Lake Pontchartrain Seawall was designed by the Orleans Levee Board, John D. Klorer, Chief Engineer, and was constructed by the Raymond Concrete Pile Co., in 1930-31. This seawall is approximately 5½ miles long extending from the New Basin Canal at West End to the Industrial Canal.

The wall is divided into four zones. Zone 1 extends from the New Basin Canal to Orleans Canal, Zone 2 from Orleans Canal to Bayou St. John, Zone 3 from Bayou St. John to London Avenue Canal, and Zone 4 from London Avenue Canal to the Industrial Canal. The present wall is approximately 1000 to 3000 feet out, or seaward, from the shore line of 1926. The location of zones and wall can be seen by referring to large contour map in Chapter I.

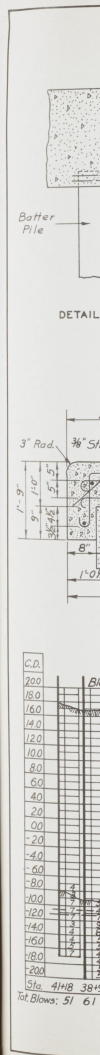
This reinforced concrete step-wall consists of 689-40′ bays which are supported on reinforced concrete piles. The "A" piles and batter piles are on the land side of the wall. The "B" piles in about the middle and the sheet piles on the lake side, as shown in the drawing. These piles were driven with a No. 1 Vulcan steam hammer weighing 10,500 lbs. with a striking force of 5,000 pounds and a stroke of 42". The lengths of the piles vary somewhat, because of the difference in elevation of the hard stratum, as shown in the drawing.

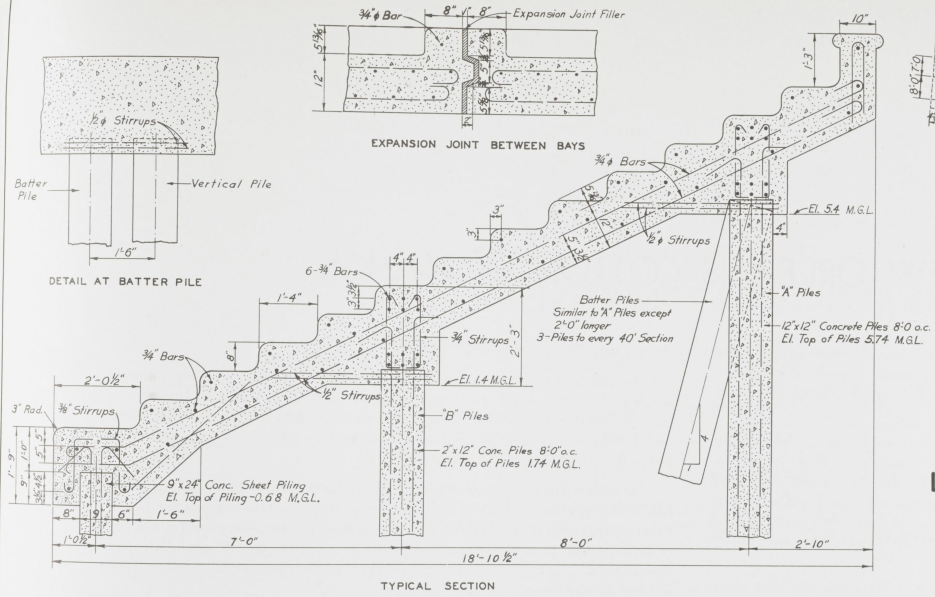
The record of test piles of Zone 4, as shown in the drawing, is typical of the four zones. The records of the other three zones have never been compiled in chart form. Test piles were driven just a few feet inside or behind the toe of the present wall.

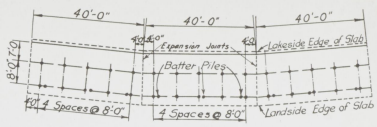
The weight of the wall, excluding the weight of the piles, is approximately 4,800 pounds per linear foot.

Settlement in the wall is variable and amounts to three or four inches in places, while in many places there is no indication of settlement. This is attributed to the fact that while the pile tips rest in a hard stratum this stratum is not very deep below the water surface nor is the stratum itself very thick and it is underlaid in places with a softer stratum. The belief is that the very great hydraulic fill behind the wall has compressed the lower soft stratum and carried down the higher hard stratum in which the pile tips rest.

For a clearer understanding refer to stratagraphs Nos. 196 to 202 in Chapter II.





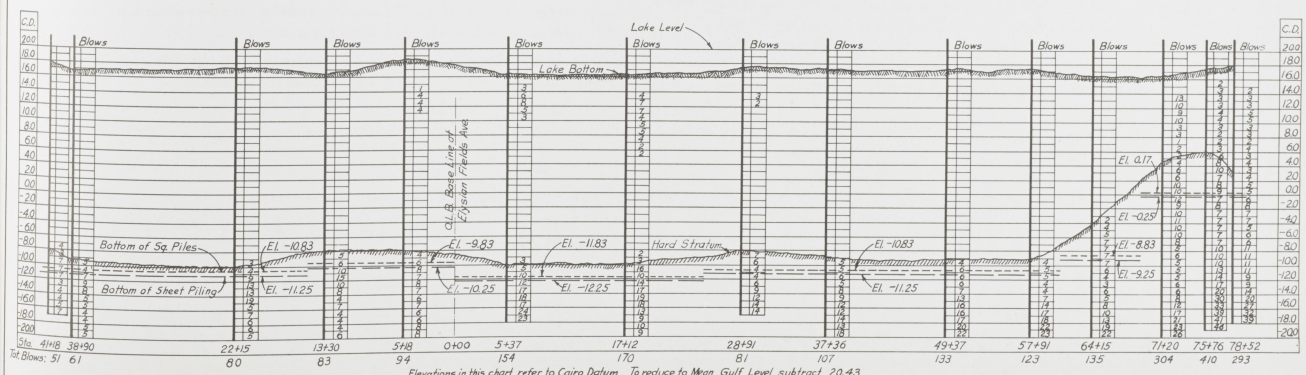


Bay	Sheet	B	A	Batter
1 - 75	38	40	44	46
76 - 135	36	38	42	44
136 - 266	34	36	40	42
267 - 270	32	34	38	40
271 - 300	32	34	38	40
301 - 368	29	33	37	39
369 - 407	29	33	37	39
408 - 432	31	34	36	40
433 - 479	31	32	36	38
480 - 555	32	34	38	40
556 - 633	31	33	37	39
634 - 652	29	33	37	39
653 - 663	20	33	37	39
664 - 689	20	20	20	29

ACTUAL PILE LENGTHS IN SEA WALL

LAKE PONCHARTRAIN SEAWALL

CASE NO. 75



Elevations in this chart refer to Cairo Datum. To reduce to Mean Gulf Level subtract 20.43

RECORD OF TEST PILES IN ZONE FOUR

Case No. 76.

THE NEW ORLEANS COTTON EXCHANGE

The New Orleans Cotton Exchange is located on the corner of Carondelet and Gravier Streets. The original design by Favrot & Livaudais, architects was for a steel frame, but this was later changed to a reinforced concrete frame, designed by Brussel & Viterbo of Chicago, Engineers.

It is a modern fireproof office building with seven stories, penthouse, and full basement. The street walls are limestone backed with brick and the rear walls are of brick. Interior partitions are gypsum and terra cotta, interior walls are plastered except on second story, where they are marble and Caen Stone Cement. Ceilings are plastered except on second story where they are metal, and floors are concrete and tile slabs with wood finish. The building measures 120′ on Gravier Street, 76′-6″ on Carondelet Street, 78′-10″ on Varieties Alley and 119′-11″ on the side opposite Gravier Street.

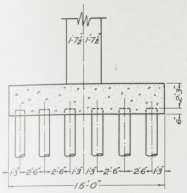
Eleven test piles were driven at various points within the area covered by the building. There is no log given for one of these. On the drawing the average curve of the logs of the other ten piles shows graphically the number of blows required to drive the piles from —50.43 M. G. L. to —70.43 M. G. L. There is no information given as to the number of blows required from curb level to —50.43 M. G. L. These piles and all other piles were driven with a No. 1 Vulcan steam hammer with 5,000 lbs. striking force and a stroke of 42″. No pile load nor soil load nor boring tests were made.

The entire area under the building, which is roughly rectangular in shape, was excavated to a depth of 13′ below curb level or to elevation -9.43 M. G. L. There is no record of the character of the soils encountered during excavation. All of the piles used were untreated peeled yellow pine. Pile records could not be located but test piles indicate that 60′ piles were used with a probable tip of 7″ and a butt of 13″.

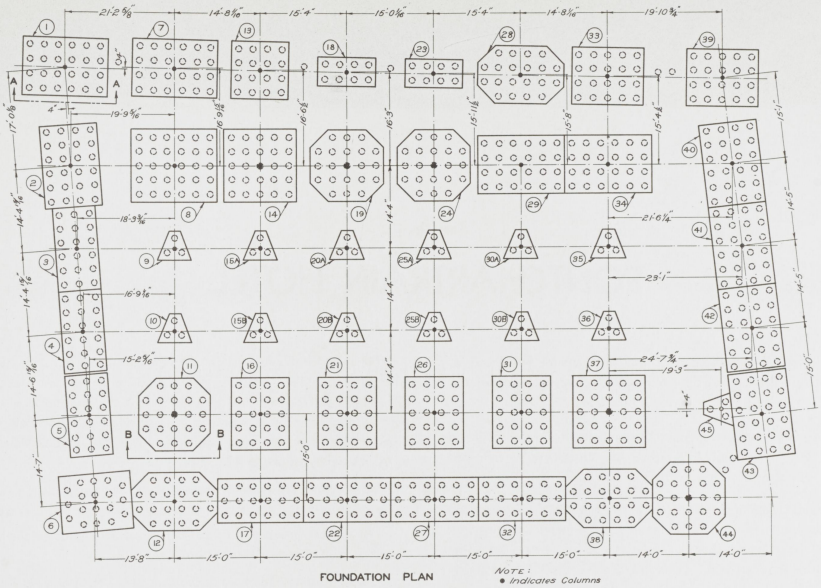
The average effective length of all piles was 47.6′. The cut-off of all piles was at 12′ below curb level or at elevation -8.43 M. G. L. The average number of blows per pile for last six inches of driving was 18. The accompanying drawing shows the plan of the general arrangement of the foundation; the spacing of the piles, which are almost uniformly 2′-6″ on center, with a few cases of 2′-3″ and 2′-4″ on center, and the reinforced concrete pile caps, detailed sections of which are also shown.

The average load per pile is 24,510 lbs. The minimum is 15,850 lbs. and the maximum load is 35,125 lbs. In thirteen of the 45 footings the load per pile is over 15 tons.

An inspection of the building showed no evidence of settlement or cracking. No instrumental observations have been made, however, and no exact figures are available.

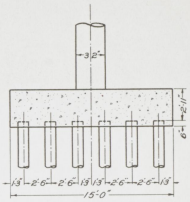


SECTION AA

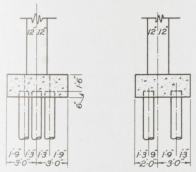


FOUNDATION PLAN

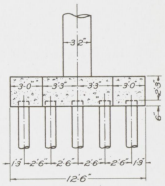
NOTE:
● Indicates Columns



FOOTING NO. 8



TYPICAL 3 PILE FOOTING



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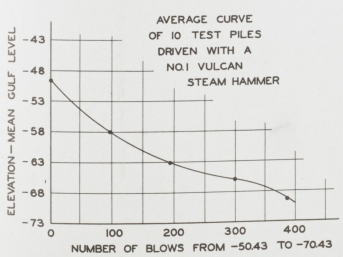
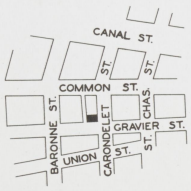






LOCATION MAP

NEW ORLEANS

COTTON EXCHANGE

CASE NO. 76

PILE CAP SCHEDULE			
Footing No.	Length	Width	Depth
1-7-43	15'0"	10'0"	3'3"
2	14'5"	10'0"	3'3"
3-4-5	14'5"	7'6"	3'3"
6	12'6"	10'0"	3'3"
8	15'0"	12'6"	4'1"
9-10-15A-15B-20A	26'0"	30'0"	2'4"
20B-25A-25B-30A			
30B-35-36-45	6'0"		
11	12'6"	12'6"	3'3"
12-28	15'0"	10'0"	3'3"
13	10'0"	10'0"	3'3"
14-37	12'6"	12'6"	4'1"
16-21-26-31	12'6"	10'0"	3'3"
17-22-27-32	15'6"	7'6"	3'3"
18-23	10'0"	5'0"	3'3"
19-24	12'6"	12'3"	3'3"
29-34	15'1"	10'0"	4'1"
33-39	12'6"	10'0"	3'3"
38	14'10"	10'0"	3'3"
40-41-42	14'5"	10'0"	3'3"
44	12'6"	12'6"	3'3"

Case No. 77.

PONTCHARTRAIN HOTEL

The Pontchartrain Apartment Hotel is located on the corner of Josephine Street and St. Charles Avenue in New Orleans, Louisiana. It was designed by Weiss, Dreyfous and Seiferth, Architects, and was erected in 1926 by J. V. & R. T. Burkes, Contractors.

This building is a modern fireproof apartment building 12 stories high. It faces 73 ft. on St. Charles Avenue and extends 120 ft. along Josephine Street. The structure is of reinforced concrete with walls and curtain walls of brick.

Excavation was made from a curb elevation of 5.97 M. G. L. to a maximum depth of —7.28 M. G. L. The depth of excavation is not uniform, since the elevation at which the footings rest on piles varies. The consistency of the soil at this location, as determined from excavation ranges from sandy loam on the surface to bluish grey gumbo. The water content is low. There are no bearing soils. The building is entirely supported by untreated pine piles and walls are carried by grade beams of reinforced concrete and these beams are supported on reinforced concrete footings.

The piles for this foundation were driven in May and June 1926. The total number of piles driven was 593. These were distributed in the following lengths: 108 piles 60 ft. long; 375 piles 70 feet long and 110 piles 45 feet long. Minimum tips of piles were 7" in diameter, and minimum diameter of piles, measured at ¼ of pile length from butt, was 1 foot. Maximum butt diameter was 20 inches. These piles were driven with a No. 1 Vulcan steam hammer, weighing 5,000 lbs. with a stroke of 42 inches.

No complete driving record was available but the tabulation on drawing sheet shows the maximum and minimum blows for last foot of driving and this is representative of all piles.

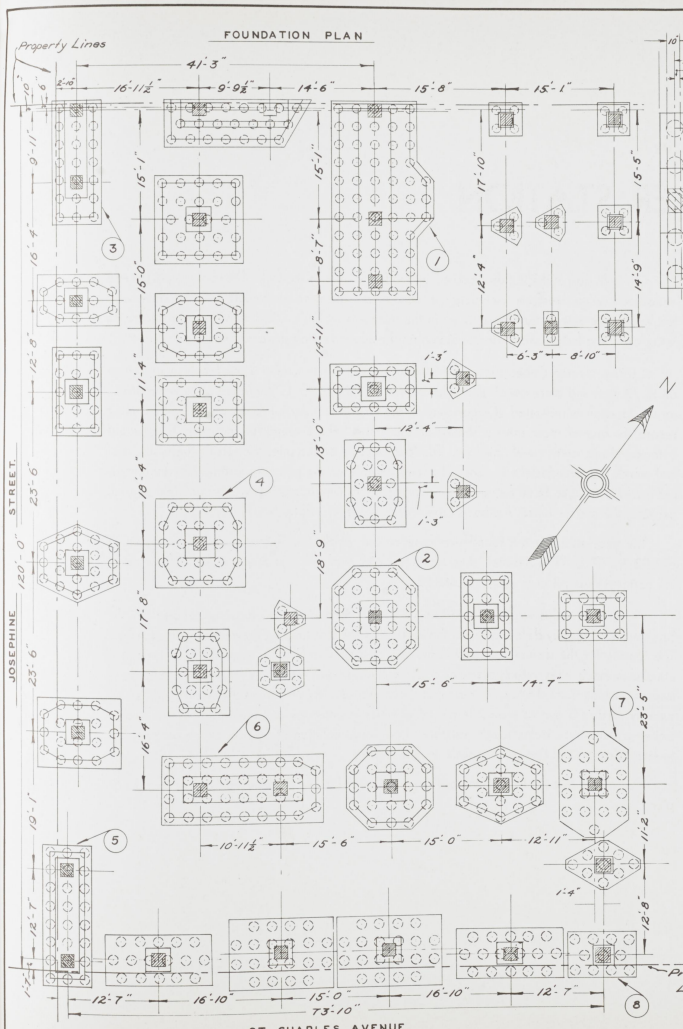
No information was available as to live and dead loads but the foundations were designed to carry a load of approximately 14 tons per pile.

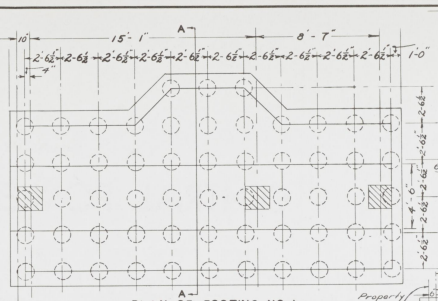
Column footings are of reinforced concrete. Details of some of these are shown on accompanying drawing, which also illustrates the entire foundation plan.

An inspection of the building does not show any evidence of settlement.

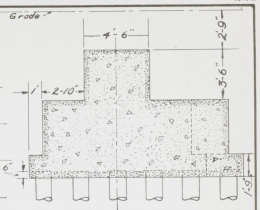


FOUNDATION PLAN

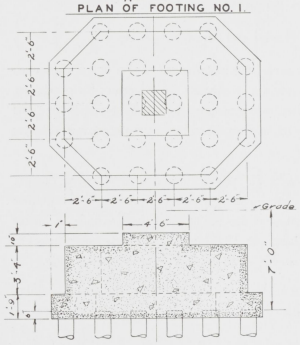




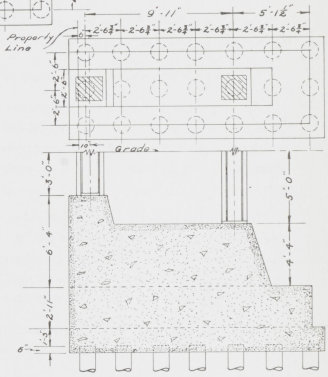
PLAN OF FOOTING NO. 1.



SECTION A - A

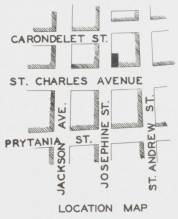


PLAN AND SECTION OF FOOTING NO. 2.



PLAN AND SECTION OF FOOTING NO. 3.

Column Number	Number of Piles	Length of Piles Max	Min	Avg.	Blows Per Last Foot Max	Min
1	58	60	52	57	62	14
2	26	70	70	70	36	14
3	21	60	50	55	60	18
4	23	70	65	65.5	40	16
5	24	70	70	70	36	14
6	35	70	65	69	39	10
7	18	70	70	70	30	11
8	11	70	70	70	20	10



LOCATION MAP



PONTCHARTRAIN APARTMENT HOTEL

CASE NO. 77

Case No. 78.

CENTRAL POWER STATION

The Central Power Station was designed by Major B. M. Harrod and was constructed by the National Contracting Company of New York during the years 1897 to 1898.

The station is located at the intersection of Florida and Peoples Avenues.

At the present time, the building no longer serves the purpose for which it was designed. It was originally used to house steam boilers and engines connected with dynamos for producing electrical energy. Later this building was converted into a pumping station by the Sewerage and Water Board. All the steam machinery was removed, and replaced by modern electrical pumping units.

The building is a one story brick building with 18″ walls trimmed in stone. The outside dimensions of the building are 181′ x 139′-6″. The building consists of two parts, the engine room, which now houses the pumping equipment; and the boiler room from which all boiler equipment has been removed. The engine room measures 181′ long by 90′ wide and reaches to a height of 52 feet at the roof. The boiler room is 45′ wide by 181′ long and is 35′ high.

The building is supported on a pile foundation. The piles are capped with a timber grillage consisting of 12″ x 12″ timbers running longitudinally, on top of which is laid a solid floor of boards 6″ thick.

This wooden floor supports a 4′ mat of concrete except under columns and walls where the footing is built up of brick. On this concrete mat rest individual brick foundations for the machinery.

There are 12 steel columns which are on the longitudinal centerline of the engine room. These columns, in conjunction with the front and partition walls, support the engine room roof, and 2 ten ton overhead traveling cranes. The footings for the columns and walls are of brick and are similar in form. They are 5′ at the bottom and taper up to 30″ in 1 foot rise. See drawing No. 2.

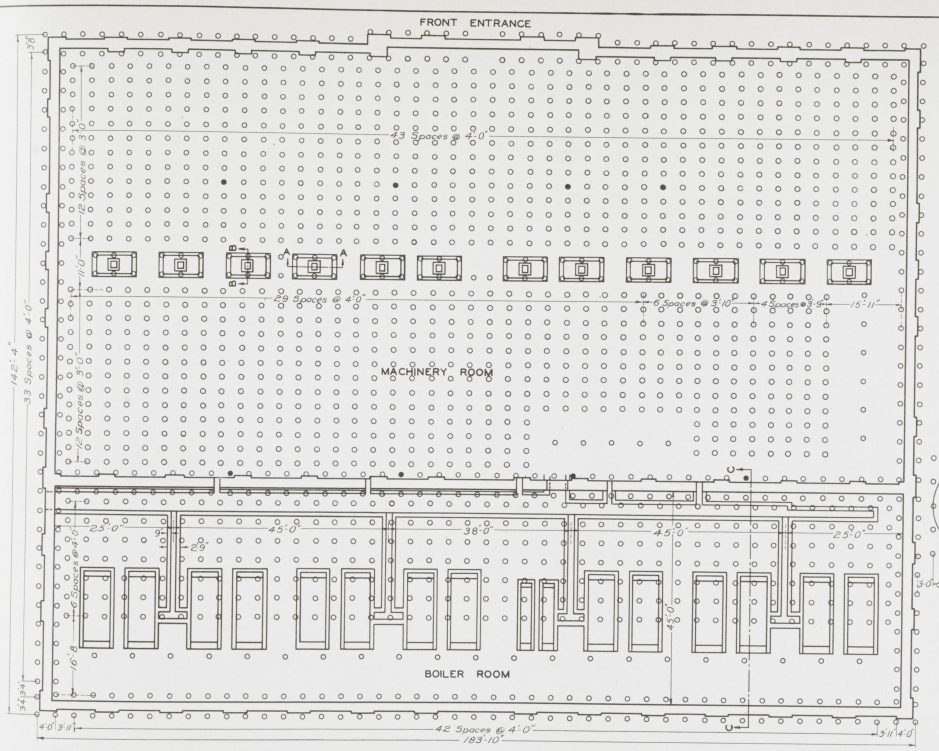
On each side of the building there is a foundation for a smokestack. The smokestacks became antiquated when the steam machinery was abolished. The stack on the left was torn down and the right stack was partly blown away in the hurricane of Sept. 1915. The portion remaining is cut off at the height shown in the sketch on the accompanying drawing No. 1.

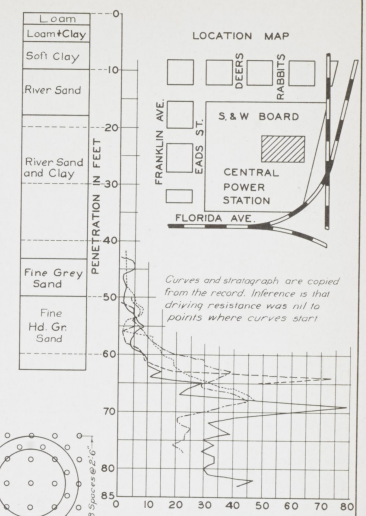
1,897 untreated timber piles were used to support this structure. Their lengths varied from 64 to 73 feet, and were cut off at an elevation of —1.93 M. G. L. Eight test piles were driven on the location as indicated in accompanying drawing No. 1, by full black circles. The driving record for four of these piles is shown on the graph. The average for the other four would coincide almost exactly with this four. The load per pile on the piles supporting the walls, roof and cranes is approximately 11 tons. The load per pile on the piles supporting the machinery is not readily available, but it may be safely assumed that it is much less than was originally designed, because the old machinery has been superseded by lighter and less machinery.

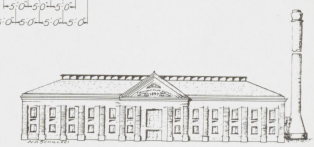
The excavation for the foundation covered the whole building area and went down to —1.93 M. G. L. The material taken from the excavation was principally alluvial loam, but at the bottom of the pit clay was encountered.

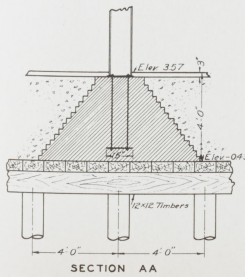
At the time of this writing the building is in perfect condition, with no sign of cracks in the brick walls. The only defect being in the footing for the standing stack, which is badly cracked. The footing for the demolished stack shows no cracks. This footing, as seen above ground is circular in shape with outside diameter of 20′ and inside diameter of 13′, making the supporting masonry, which is solid brick, 7′ wide and standing 2′-3″, above ground elevation. This is presumably carried down to same pile cut-off as other foundations and built up on same kind of timber grillage but a detail is not available. Piles for foundation of other stack are omitted, due to lack of space, but they are the same as those shown.

Please note that the front of the building as sketched is exactly reversed from the foundation plan.

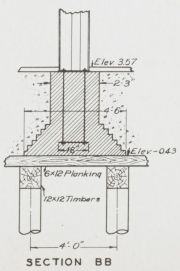




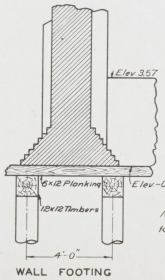




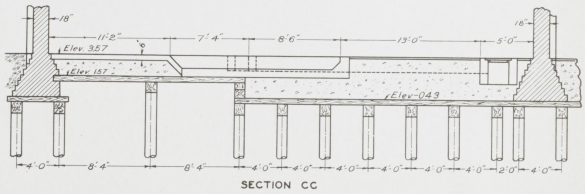
SECTION AA



SECTION BB



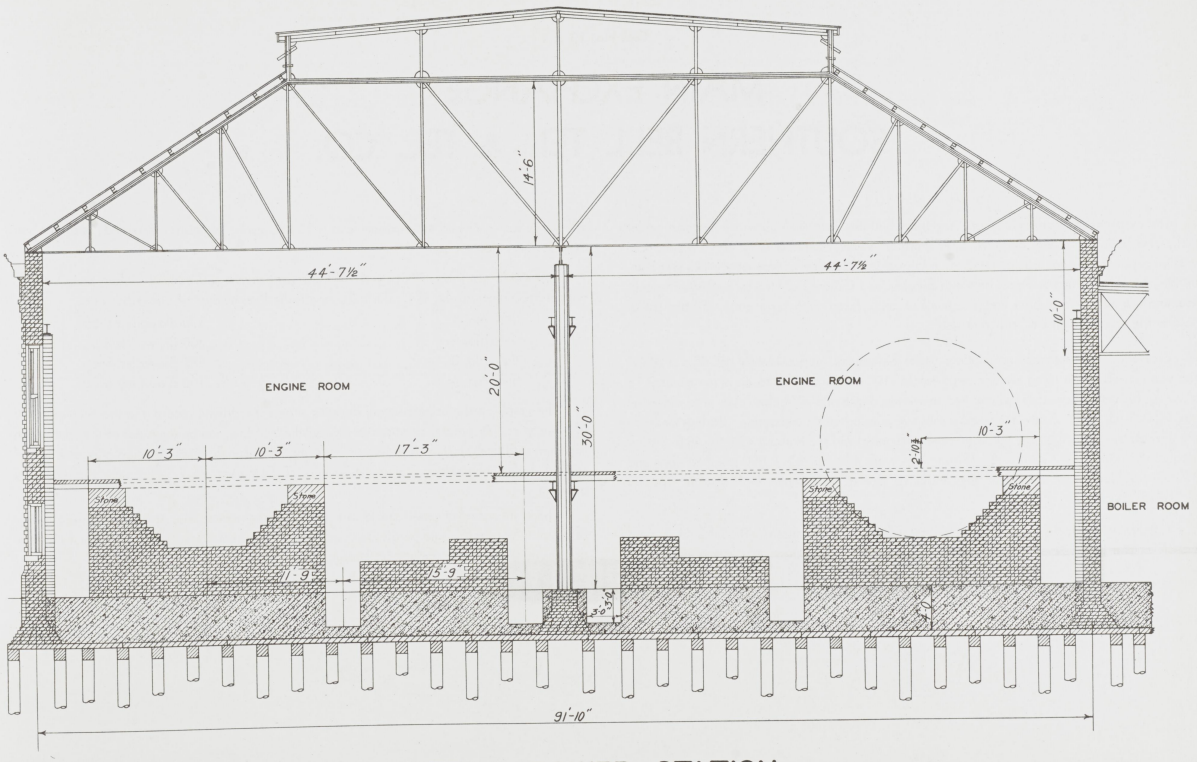
WALL FOOTING



Note: All elevations refer to Mean Gulf Level

CENTRAL POWER STATION

DRAWING NO. 1 CASE NO. 78



CENTRAL POWER STATION

DRAWING NO. 2 CASE NO. 78

Case No. 79.

MAIN EXCHANGE
SOUTHERN BELL TEL. & TEL. CO.

This Exchange is a modern fireproof steel frame building 8 stories high with a basement under part of the building. It was designed by P. Thornton Marye, Architect with Wm. C. Spiker Co. as Engineers, and was constructed by Geo. J. Glover in 1916. It is approximately 125 feet high, fronting 61'-6" on Poydras Street between Baronne and Carondelet Streets, by 158'-7" deep. Rear and side walls are of brick and front wall of brick faced with terra cotta. Floors are of hollow tile topped with a 6" concrete slab.

Excavation for basement and footings under basement is approximately 62'-6" x 110'-0" and was carried down to an average depth of 14'-10" below curb or to elevation minus 9.15 M. G. L. Excavation for other footings had an average depth of 5'-9" below curb or to elevation minus 0.085 M. G. L. A few scattered stumps were found while excavating. Borings made on site showed that there is a hard stratum of cemented gravel and shells about 45 ft. to 48 ft. below curb or elevation —39.33 M. G. L. (Boring logs were not available.) 890 piles 40' long and 300 piles 60' long were used. All piles untreated, peeled yellow pine with 7" to 8" tips and 12" to 13" butts.

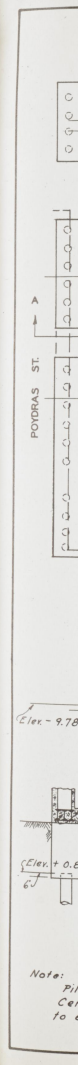
The average cut-off for piles under basement footings is elevation —8.65 M. G. L. and average cut-off for other piles is elevation 0.42 M. G. L. The minimum live and dead load on piles is 14 tons each and the maximum load is 15 tons each. No exact information as to live and dead loads could be obtained.

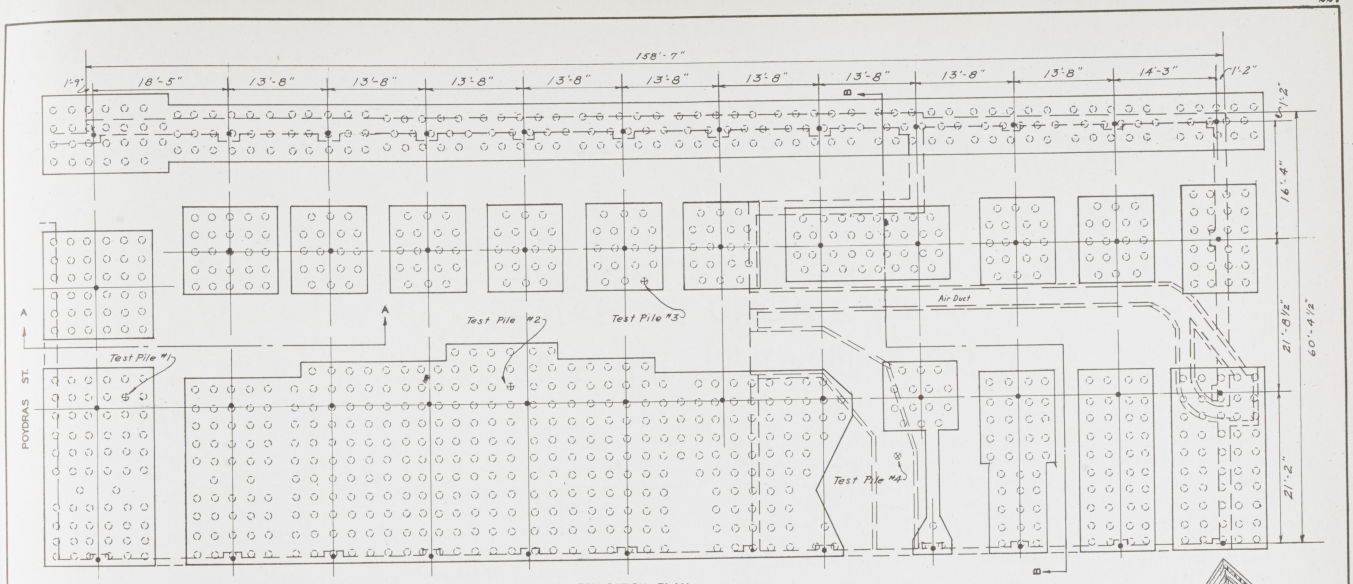
Four 60 ft. test piles, 9" tips and 16" butts were driven with a No. 1 Vulcan steam hammer, weight 5,000-lbs., stroke 42". The following is the final number of blows per pile:

Pile No. 1.....500 Blows last foot.
Pile No. 2.....300 Blows last 3 in.
Pile No. 3.....182 Blows last foot.
Pile No. 4.....102 Blows last foot.

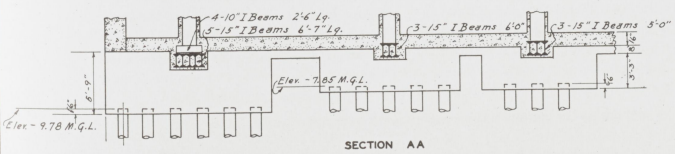
The graph on the accompanying drawing shows the driving record and the average curve of these piles. A general perspective view of the building, and arrangement of the foundation together with cross sections is shown on drawing. Pile caps are of reinforced concrete with steel grillage under each column. Size and spacing of these caps are shown on the accompanying drawing.

There are some very small cracks in evidence in the granite base at front northwest corner of building but these could hardly be construed as settlement cracks. No instrumental observations have been kept to observe settlement.

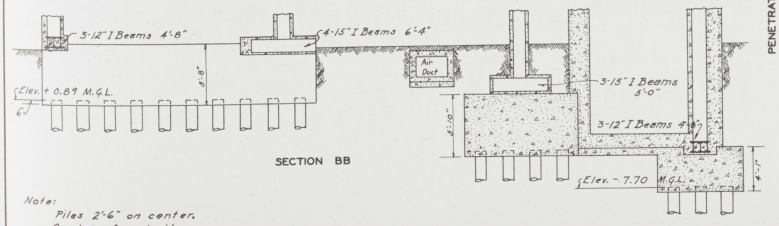




FOUNDATION PLAN

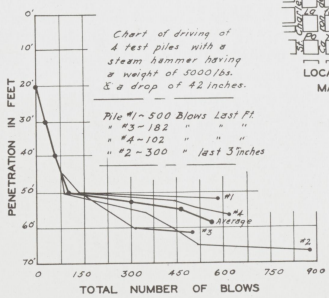


SECTION AA



SECTION BB

Note:
Piles 2'-6" on center.
Center of end pile
to edge of cap 1'-6"





MAIN EXCHANGE
SOUTHERN BELL TEL. & TEL. CO.

CASE NO. 79

Case No. 80.

RAYMOND EXCHANGE
SOUTHERN BELL TEL. & TEL. CO.

This is a modern, fireproof, steel and reinforced concrete building located on Baronne Street between Poydras and Lafayette Streets. The building was designed by Marye, Alger and Alger, Architects, with Robert Soule as Consulting Architect and Wm. C. Spiker Company, Engineers. It was constructed by W. Horace Williams Co. in 1926. It is 45'-11" high, fronts 97' on Baronne Street and is 182'-2" deep.

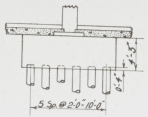
The footings were designed so that 6 additional floors could be added in the future. Floors are constructed of a 9" concrete slab with a 3" concrete fill and 1½" cement finish. Rear and side walls are of brick, front wall of limestone.

Basement is approximately 50 x 60'. Excavation for basement and footings under basement were carried down to an average depth of 17'-4" below curb or elevation —11.66 M. G. L., other footing excavations to an average depth of 7'-3" below curb or elevation —1.56 M. G. L. 1,768 piles 30' and 40' L. L. Y. P. untreated straightline, peeled, with 7" to 8" tips, 11" minimum butts were driven.

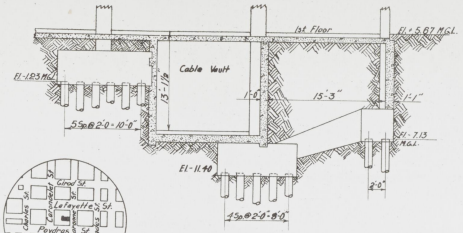
30 ft. piles were used in the deep footings and 40' piles used in other footings. 78 old piles on site of building were pulled and redriven. The effective length of these piles, from cut-off to tip is approximately 28 feet and 38 feet. Elevation of cut-off of piles under basement footing is —11.45 M. G. L. Cut-off of other piles is elevation —1.23 M. G. L.

These piles were driven with a No. 1 Vulcan steam hammer, weight 5,000 lbs. stroke 42". These piles at present are loaded approximately 7 tons each but when the 6 additional floors are added will be loaded at approximately 15 tons each. Several test piles were driven but the driving record is not available. These test piles encountered a hard stratum approximately 45 ft. below curb or at elevation —40.67 M. G. L. and were driven to refusal at this depth. The length of piles ordered and the effective length of the piles below cut-off show that all the piles under the building were driven to this depth. It will be noticed that this corresponds with the Main Exchange Case No. 79. Pile caps are of reinforced concrete. Drawing No. 1 and No. 2 show the size and spacing of piles and caps and the general arrangement of the foundation.

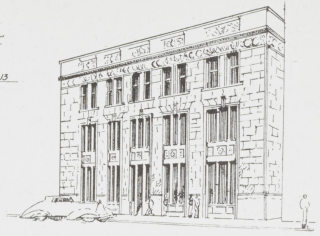
At the time of this survey there was no evidence of settlement.



SECTION B-B



SECTION A-A



LOCATION MAP

RAYMOND EXCHANGE – SOUTHERN BELL TEL. & TEL. CO.

CASE NO 80

Case No. 81.

FEMALE BUILDING CHARITY HOSPITAL

The Female Building of the N. O. Charity Hospital group was designed by Favrot and Livaudais, architects, in 1925, and was erected in the same year by G. E. & E. E. Reimann, contractors. It is located on the Charity Hospital grounds on Gravier Street near Freret Street, and stood until 1935 without showing signs of settlement. It was supported on 418 untreated pine piles of approximately the same length and size as those now used, and with the tips resting at approximately minus 50 M. G. L.

For a stratograph see No. 236 in Chapter II.

The purpose of this study is to report the moving of this building from its original location to a new location and in doing this we quote verbatim from the Manufacturers Record, Daily Construction Bulletin of August 5, 1935, the following:

"Without scratching a brick, or cracking the plaster, or unsettling the action of a single door or window a 10,000,000 pound 5 story building was recently moved 162 feet in 20 minutes at New Orleans, La., by W. Horace Williams Co. Inc., engineering contracting firm, of New Orleans.

"The moving job was occasioned when the Louisiana State University, confronted with the problem of finding a site for a proposed 17 story dental building to be a part of the Louisiana State University Medical Center at the Charity Hospital, found that the only available location was presently occupied by a 5 story ward building. Because the Charity Hospital is in need of additional facilities and because the practice of sound economy opposed the destruction of the building, it was determined the structure should be moved to a new site.

"The proper methods to accomplish the objective were adopted only after exhaustive studies by the contractors. The problem was to transfer the load onto a movable structure and to provide the proper foundation on which to move the building. The structure measuring 57 feet wide, 105 feet long and 77 feet above the first floor, is of reinforced concrete frame with brick spandrel walls and tile and joist floor construction. The columns supporting the building are in four rows along the major axis.

"There is no rock or other firm structure in the subsurface makeup in New Orleans, strata of mixed sand and shell are found at varying depths. Luckily, in this case test borings revealed a satisfactory stratum, comparatively uniform, which could be reached with 45-ft. piles. To offset the effects of quick loading, 15 per cent more piles were placed in the new foundation and runways than in the original foundation, now 10 years old.

"Continuous footings, designed for the heaviest column in each row of columns, were placed in the direction the building was moved. A steel cradle composed of two 24-inch I-beams per row of columns was clamped to the columns, bolted through and grouted in after having been brought to line and grade within an accuracy of 1/64 of an inch. On top of these cradle beams 12-inch I-beam clamps were bolted onto the columns in the opposite direction and grouted-in up to the bottom of the first floor. Next the traveling I-beams were set approximately in position on short steel columns, which in turn rested on sill beams running continuously through the basement along the major axis.

"Although the basement floor had been poured directly on top of the footings it was deemed necessary to put a distributing sill beam in as some concentration of load might occur directly over a column, which might rest on the edge or near the edge of a footing and thus have a tendency to cause the footing to kick-up or at least cause an overloading of certain piles.

"The actual running media were 6-inch double flange spools, turned out of 7-inch shafting to provide a half-inch flange on each end, beveled 1/8-inch in 1/2-inch. The flange of the cradle beams was 7 inches wide; the flange of the traveling beam, 6 inches. The turn surface of the spool was 7 1/16 inches long. Under the building 342 spools were placed. A total of 600, each weighing 100 pounds was used.

"With the traveling and sill beams approximately in position, the spools were set on top of the traveling beams, the sill beams were wedged up with 640 heavy steel wedges, and the sill beams were grouted-in. The runway and new foundation were then completely leveled with the run beams, which consisted of two channels spaced 1-inch apart back to back and grouted tightly under the flanges.

"Motive power was supplied by a 10 x 12-inch steam engine, working through one set of 8-sheave blocks, weighing over a ton each, and one set of emergency 4-sheave blocks. The blocks were fastened to the cradle at one-third the length of the building forward from the rear and were anchored into the continuous footing at the fore end of the travel. As the point of pull was centered on the building, and the pull transmitted to all four lines of columns, it was necessary to cross brace the cradle in order to transmit the pull from the block fastenings to the outer column without perceptible deflection.

"A total pull of 615,000 pounds had to be exerted on the building before it began to move, but investigation disclosed that despite all precautions, dust had accumulated in front of the rollers. Once the dust was removed a practically uniform pull of 338,000 pounds sufficed to move the load. The total elapsed time for traversing the 162 feet was 1 hour and 58 minutes, since it was necessary to stop several times for readjustment of the spools and the pull cables.

"Every movement of the building was checked and noted. As the front end of the building went onto the new runway structure it went down 1/8 inch. When the entire building was on the new foundation, the rear of the building went down a corresponding 1/8 inch. The first 24 hours after the building was in its final location it settled 1/4-inch. The next 48 hours showed an additional 1/4-inch settlement. Ten days later the building came to rest at 3/4-inch below its original level.

"It is interesting that the entire project was handled without the use of jacks and that the wedging was done so thoroughly that when the columns were cut off no single point settled appreciably; that is, it was not possible to measure any settlement which may have occurred. When the building was free of the run beams and steel supporting structure in the old basement, the steel supporting structure rose 1/4-inch.

"When the building reached its final location the columns were grouted down to the new foundation and all rollers were encased in heavy grease and the cradle beams were grouted-in, leaving the rollers in place. Thus, if it is desired to move the building again it is all "set to go."

"The work was carried out under the supervision of Leon C. Weiss, of the firm of Weiss, Dreyfous and Seiferth, architects, of New Orleans. It was planned and designed by C. Glenn Cappel, vice president of W. Horace Williams Co. Inc., and executed by J. L. V. Grenier, another vice president of the company."

The building was moved on June 4, 1935, and on February 23, 1937 it was moved back to its original location, the movement being effected in the same way as the original movement, and the building was placed back on the same foundation piles from which it had been moved. The only change in foundation is in the concrete, as was necessitated in building continuous beams on which to roll the building.

In regard to settlement it has been previously stated that the building came to rest in 12 days with a uniform settlement of 3/4". Later when the continuous beams, on which the building had been moved, were cut so as to remove the portions not used in the permanent foundation, additional settlement took place and on February 23, 1937, the total settlement was approximately 3" except at the N. W. corner where the continuous beam had not been cut and where settlement was about 2 1/2".

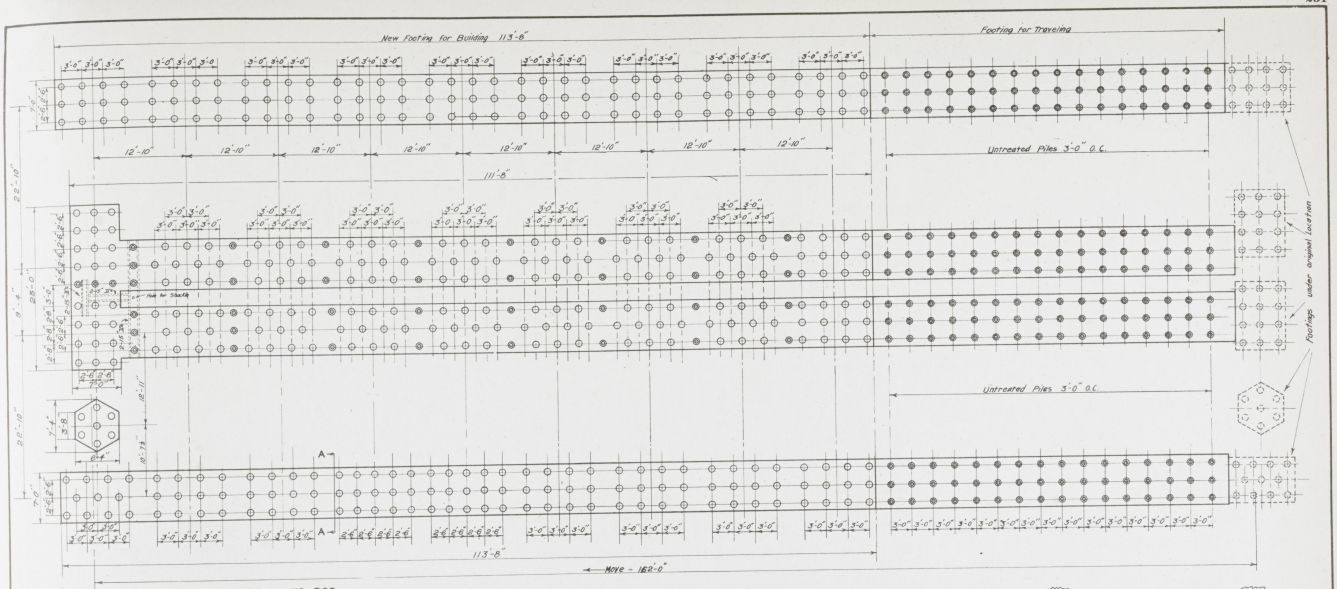
The building was moved back to its original location and the rollers again grouted in place, and on March 3, 1937 the total settlement was approximately 1/2" and uniform.

Observations on the original foundation after the first moving operation showed a rise of 1/4" thruout.

The building has been twice moved and no sign of a crack has developed in the outside masonry, and only minor cracks in the plaster walls.

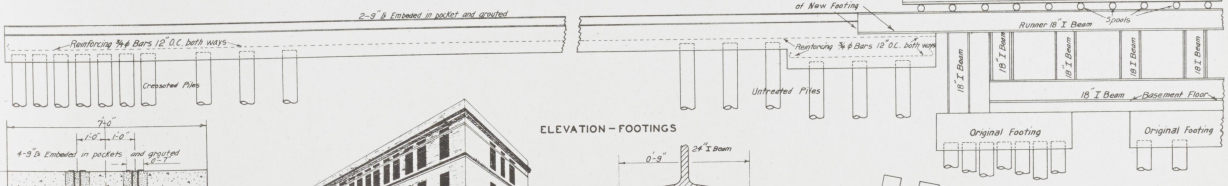
The total number of piles and spacing is the same in each location except that in the second location a number of untreated piles are shown in addition to the creosoted foundation piles. These were put in for support of the continuous beams during the moving process and were used untreated under the assumption that in time they would decay and the creosoted piles would then carry the entire load.

While the number and length of piles and spacing was the same in the original foundation as in second foundation the footings were separated instead of continuous, and 37 in number, and supported 37 steel columns.

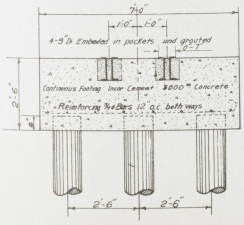


○ CREOSOTED PILES — 418 PCS.
◎ UNTREATED PILES — 230 PCS.

PILING PLAN



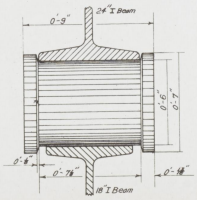
ELEVATION - FOOTINGS



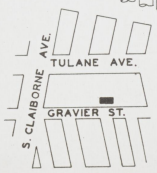
SECTION A-A



GRAVIER ST.



SPOOL DETAIL



LOCATION MAP

FEMALE BUILDING
CHARITY HOSPITAL

CASE NO. 81

Case No. 82.

BAYOU ST. JOHN BRIDGE

The bridge is located over Bayou St. John at a point near its entrance to Lake Pontchartrain. It provides crossing over the Bayou for the highway along the lake shore seawall.

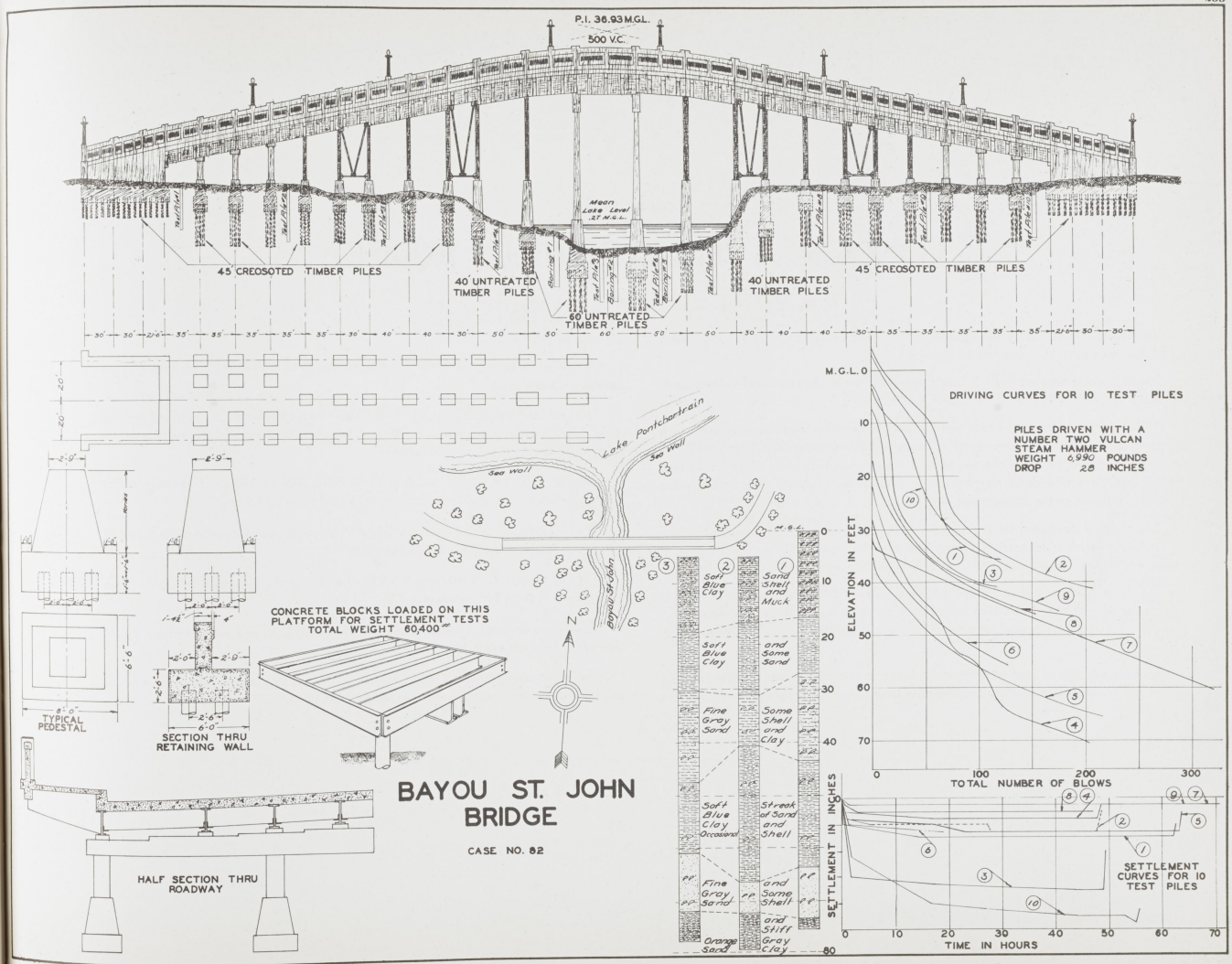
The bridge was designed by N. E. Lant, Bridge Engineer for the Louisiana State Highway Commission. It was constructed by Doullut & Ewing, Contractors, in 1935-36. This bridge is of reinforced concrete and steel construction. It has an overall length of 1;053 feet and the point of intersection of a 300 ft. vertical curve is at an elevation of 36.92 M. G. L. The bridge rises on a 5% grade from an elevation of 15.57 M. G. L., at the retaining wall to a point 295 feet away where the 300 foot vertical curve begins. The approaches are inclosed by reinforced concrete retaining walls rising from an elevation of 7.07 M. G. L. to 15.57 M. G. L.

The entire bridge is supported on yellow pine piles whose lengths vary from 40' to 60'. Pile tips are 7" minimum and butts 14" minimum at 4 ft. from butt. The distribution of these lengths is indicated on the accompanying drawing. Piles are spaced generally 2'-6" from center to center under pedestals and 5'-0" under retaining walls. Design load for these piles is 15 tons per pile, under the land piers of trestle and 16 tons under bayou piers, while under the abutments the load is 9, 13 and 15 tons. All piles which are cut off above water level are creosoted 16 lbs. per cubic foot, while those cut off below water level are untreated yellow pine. Ten test piles were driven and three borings made along the center line of the bridge at the location indicated on the drawing.

Pedestals are of reinforced concrete and have H columns. All bents employing steel columns are braced transfersely with steel and there are four longitudinal bracings as shown. The roadway consists of a reinforced concrete slab 8" thick 40 ft. wide in a parabolic crown shape. There are 6 ft. sidewalks on each side of the roadway. The bridge roadway is supported by steel I-beams running longitudinally and reinforced concrete stiffener beams running transversely to the bridge.

The results of the driving and loading tests are graphically represented on the accompanying drawing.

At the time of this study, March 1936, construction is not complete but no settlement is apparent or to be expected.



BAYOU ST. JOHN BRIDGE

CASE NO. 82

Case No. 83.

LONDON AVENUE GENTILLY BRIDGE

This bridge is located on Gentilly Road where it crosses the London Avenue Canal as shown on the location map on the accompanying drawing.

The bridge was designed by N. E. Lant, Bridge Engineer for the Louisiana Highway Commission. It was built in 1935 by B. N. Davis, Contractor.

This bridge is a combination I-beam and flat slab span resting on four concrete bents which are supported by untreated timber piles 65′ in length. All piles were driven full length and only one or two feet were cut off for concrete footings. Driving resistance being very much the same from 60′ to 80′, it was decided to rely largely upon skin friction for support. A plan of the bridge foundation is shown on the accompanying drawing.

The bridge is designated by the Louisiana Highway Commission as a Standard H-15 or 15 tor bridge which is designed to support with safety two loaded 15 ton trucks passing in opposite directions. Impact load is taken as 30% of the total live load.

The design load per pile in the two outside bents is 11 tons, and in the inside bents is 14 tons per pile. A total of 112 piles were driven for this structure. These piles were driven with a No. 1 Vulcan steam hammer, weight 5,000 pounds, stroke 42 inches, by J. Ed. Hemenway, contractor.

Four test piles 80 feet long were driven full length on this site, but not in position for permanent use. The result of the driving and loading of these piles is graphically represented on the accompanying drawing.

A view of the loading rig, which was designed by W. C. Walker, and a stratagraph of two borings are also shown.

The total load applied to test piles was 56,000 lbs. and consisted of weight of tank and frame, 5,200 lbs. plus water in tank 50,800 lbs. The water load was applied gradually and the pile settlement observed with level readings.

Pile No. 1, Bent 4, started loading at 11:10 A.M., July 22, 1935, and was completed at 1 P.M. July 24th. The total settlement was 1/16″ and the rebound was 1/16″.

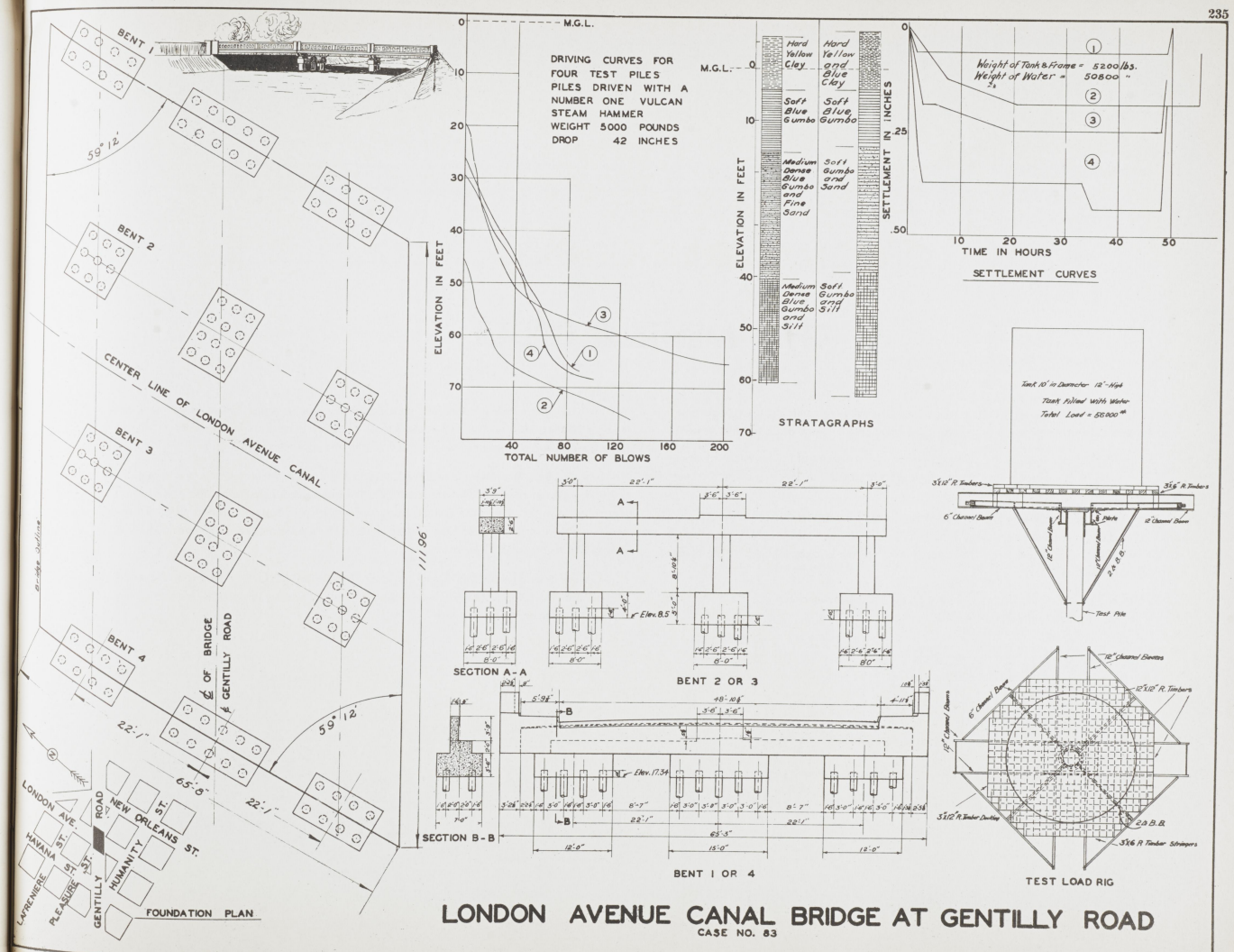
Pile No. 2, Bent 3, started loading at 5:30 P.M. July 27th, and was completed at 5:30 P.M. July 29th. Total settlement 3/16″ rebound 2/16″.

Pile No. 3, Bent 2, started loading 1 P.M. July 31st, and was completed 1 P.M. August 2nd. Total settlement 1/4″ rebound 1/8″.

Pile No. 4, Bent No. 1 started loading 10 A.M. July 25th, and was completed 8 A.M. July 27th. Total settlement 7/16″, rebound 4/16″.

The accompanying drawing shows a footing plan and two sections which illustrate the end bents or abutments and the two intermediate bents.





LONDON AVENUE CANAL BRIDGE AT GENTILLY ROAD

CASE NO. 83

Case No. 84.

CHEF MENTEUR BRIDGE

This bridge is located over a tidal stream called Chef Menteur which connects Lake Pontchartrain with Lake Borgne. It is a link in the Chef Menteur Highway, or U. S. Highway 90.

The bridge was designed by the Bridge Engineering Department of the Louisiana Highway Commission with N. E. Lant as Bridge Engineer. It was constructed in 1921 by Frederick Snare Corporation.

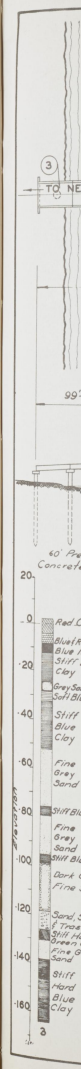
This bridge consists of two approaches of reinforced concrete resting on concrete piles, and two fixed and one swing steel spans. The two fixed spans each measure 250 feet in length and the swing span is 270 feet long. The overall length of the bridge is 979'-7" The bridge carries a 20 ft. roadway.

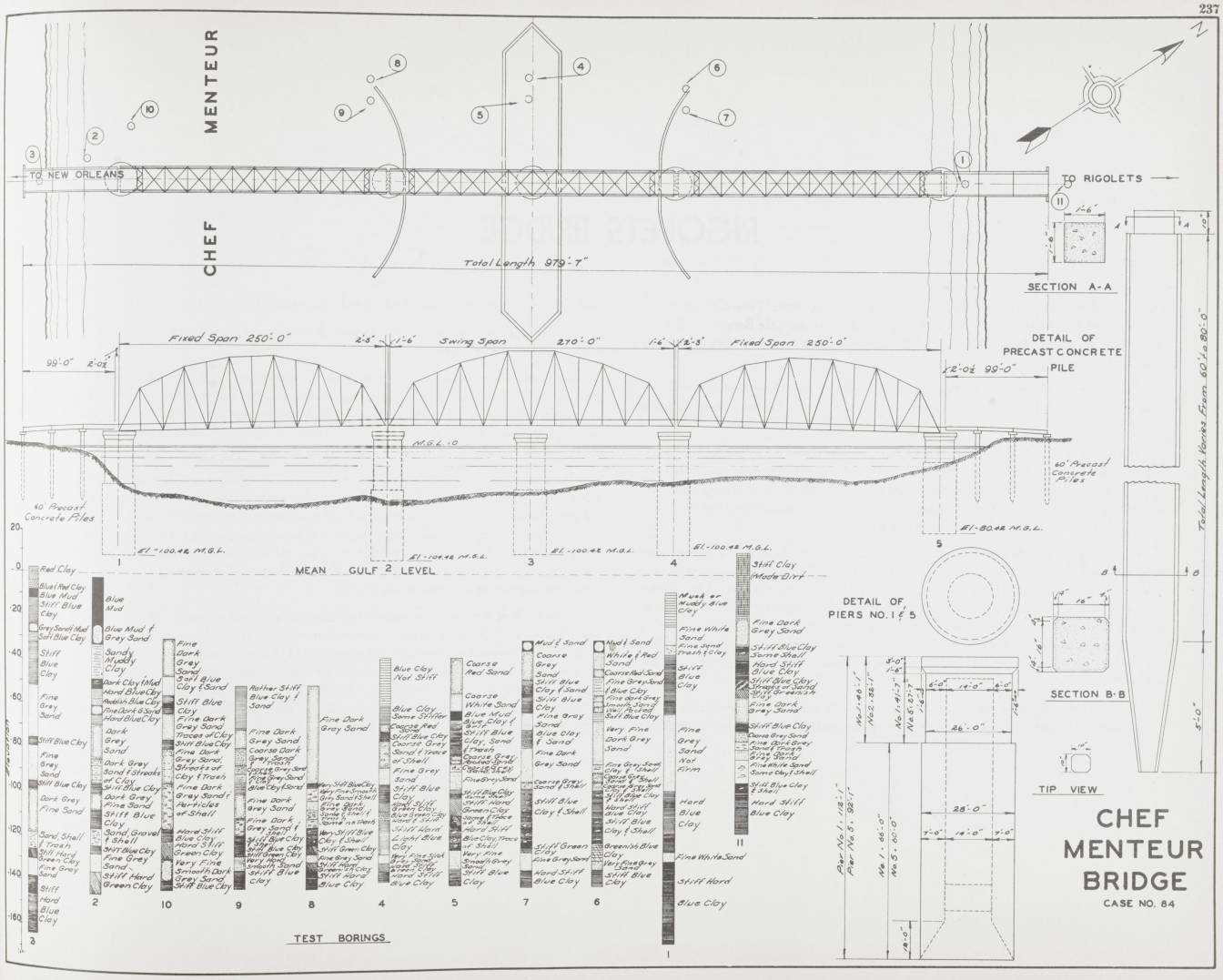
A plan and profile of this bridge is shown on the accompanying drawing. The piles in the approaches are of precast reinforced concrete.

A detail of one such pile is shown on the accompanying drawing. The dead load per pile is about 26 tons, and the live load about 7 tons. These piles were driven with No. 0 Vulcan steam hammer having a striking weight of 7,500 lbs. and a stroke of 48".

Stratagraphs of wash borings and their location is shown on the accompanying drawing. A detail of a typical pier is shown. A description of the method of building and sinking these piers is given in the case of the Rigolets Bridge where the pier design is similar. The load per sq. ft. in tons is roughly dead load of pier alone 7.35, super-structure 0.48, live load 0.32, making a total load of 8.15 tons.

On the drawing, Pier 3 is shown as resting at —100.42 M. G. L. which is as shown on original drawing but in fact the engineers found it necessary to carry this pier 40' deeper before finding a satisfactory bearing stratum




CHEF MENTEUR
TO NEW ORLEANS
TO RIGOLETS
Total Length 979'-7"
SECTION A-A
DETAIL OF PRECAST CONCRETE PILE
Fixed Span 250'-0"
Swing Span 270'-0"
Fixed Span 250'-0"
99'-0"
2'-0½"
M.G.L. 0
60' Precast Concrete Piles
El -100.42 M.G.L.
El -80.42 M.G.L.
MEAN GULF LEVEL
DETAIL OF PIERS NO. 1 & 5
SECTION B-B
TIP VIEW
Total Length Varies From 60' to 80'-0"
TEST BORINGS
CHEF MENTEUR BRIDGE
CASE NO. 84

Case No. 85.

RIGOLETS BRIDGE

This bridge is located about 30 miles east of the business center of New Orleans over a channel called the Rigolets, which connects Lake Pontchartrain and Lake Borgne. It is a link in the highway between New Orleans and Mississippi known as the Chef Menteur Highway or U. S. Highway 90.

The bridge was designed by the Bridge Engineering Department of the Louisiana Highway Commission with N. E. Lant as Bridge Engineer. It was constructed by Frederick Snare Corporation in 1928.

This bridge consists of an approach of reinforced concrete resting on precast concrete piles, and three fixed spans and one swing steel span resting on reinforced concrete piers. The concrete approach is on the Slidell side of the bridge and is 2,150 feet long as shown on the accompanying drawing. The steel spans are each 400 feet long. The overall length of the bridge is 3,899'-6". The bridge and approaches carry a 20 ft. roadway.

A cross section thru the roadway and an elevation of one of the bents at an expansion joint in the approach is shown on the accompanying drawing No. 1. There are five concrete piles to a bent as shown. A detail of a precast concrete pile is shown. These piles vary in length from 60 to 85 feet as shown on the profile of the bridge. Driving curves for these piles and stratagraphs of wash borings made along the bridge site are shown on accompanying drawing No. 2. These curves represent one pile only in each of the five bents which are indicated by number. The dead load per pile is about 31 tons, and the live load about 8 tons, making a total load per pile of 39 tons.

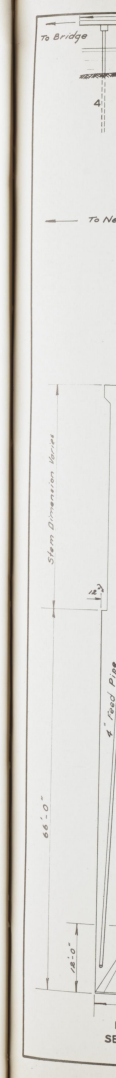
The piles were sunk as far as possible after being placed in position, under their own weight and by means of a water jet. When they no longer penetrated by this means they were driven with a No. 0 Vulcan steam hammer having a striking weight of 7,500 lbs. and a stroke of 48".

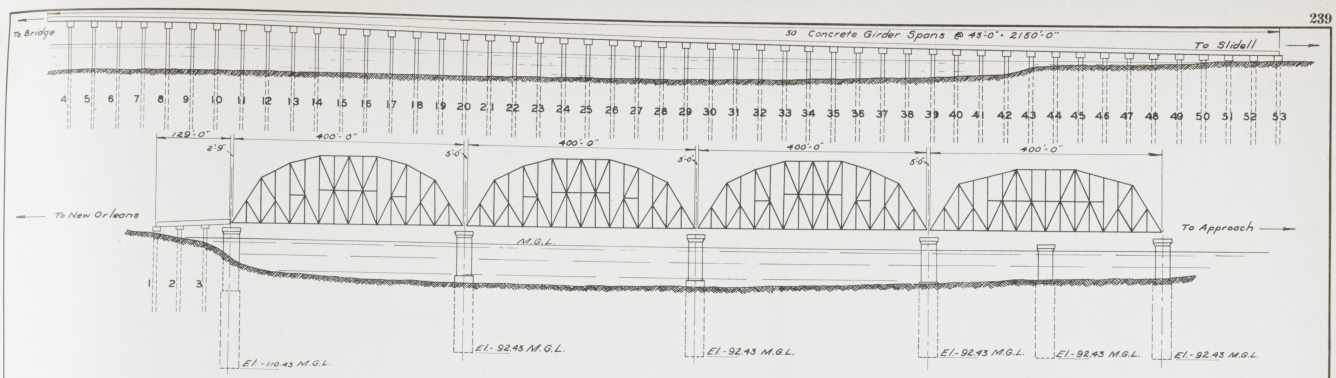
On some piles no jet was used, but in each case the driving curve begins where the pile ceased to sink under jet or weight of hammer.

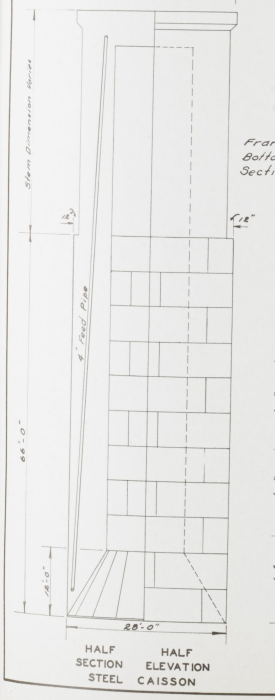
Details of the steel caisson used for sinking the bridge piers are shown on the accompanying drawing No. 1. These caissons consist of two concentric cylinders built in sections. The cutting edge is formed by tapering the inner shell to meet the outer shell as shown. Bracing between the two shells is shown. Four 4" feed pipes run down to four jet systems of which a detail of one is shown.

The piers were sunk in this manner. Water was forced under pressure through the feed pipes to the jets located around the circumference of the cutting edge and concrete poured into the space between the shells. The dislodged soil was dredged out through the center of the caisson. As the caisson sank under its own weight additional sections were put on and the foregoing procedure continued until its bottom had reached the elevation at which the pier was to rest. The shells were then built up to form a cap on these piers. The steel was removed from around the concrete as far down as was possible.

As a result of this operation a reinforced concrete cylindrical pier was built with walls seven feet thick, a diameter of 28 feet, a uniform bottom section 66 feet long from tip to the offset of one foot where the stem begins, and a stem 26 feet in diameter and a length varying with the demands of the bridge design. The cap is 6 feet thick. A detail of a typical finished pier is shown on the drawing of the Chef Menteur Bridge, Case No. 84, where similar methods were used in sinking piers. The loads on the piers are, in tons per square foot, roughly 6.7 D. L., 1.75 super-structure, 0.52 L. L. making a total load of 8.97 tons.

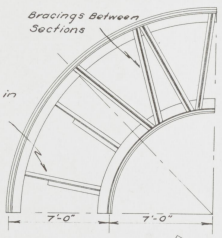


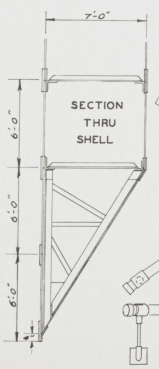


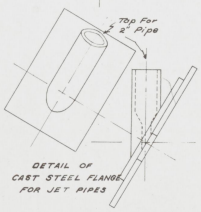


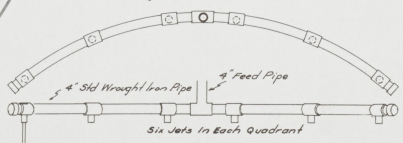
HALF SECTION STEEL

HALF ELEVATION CAISSON



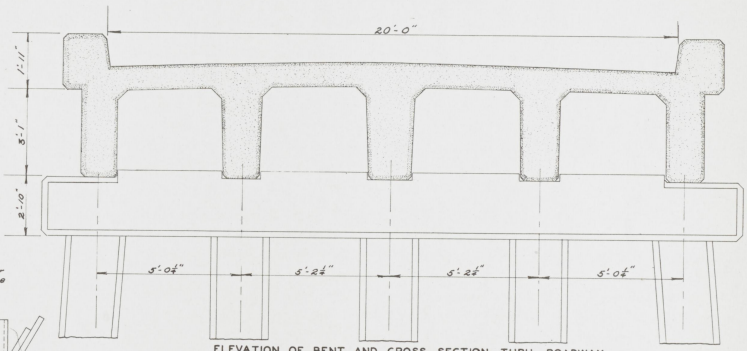




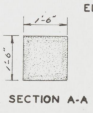


Cast Steel Flange See Detail

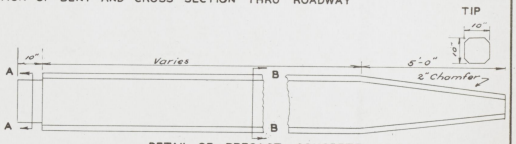
DETAIL OF JET SYSTEM



ELEVATION OF BENT AND CROSS SECTION THRU ROADWAY



SECTION A-A



DETAIL OF PRECAST CONCRETE PILE

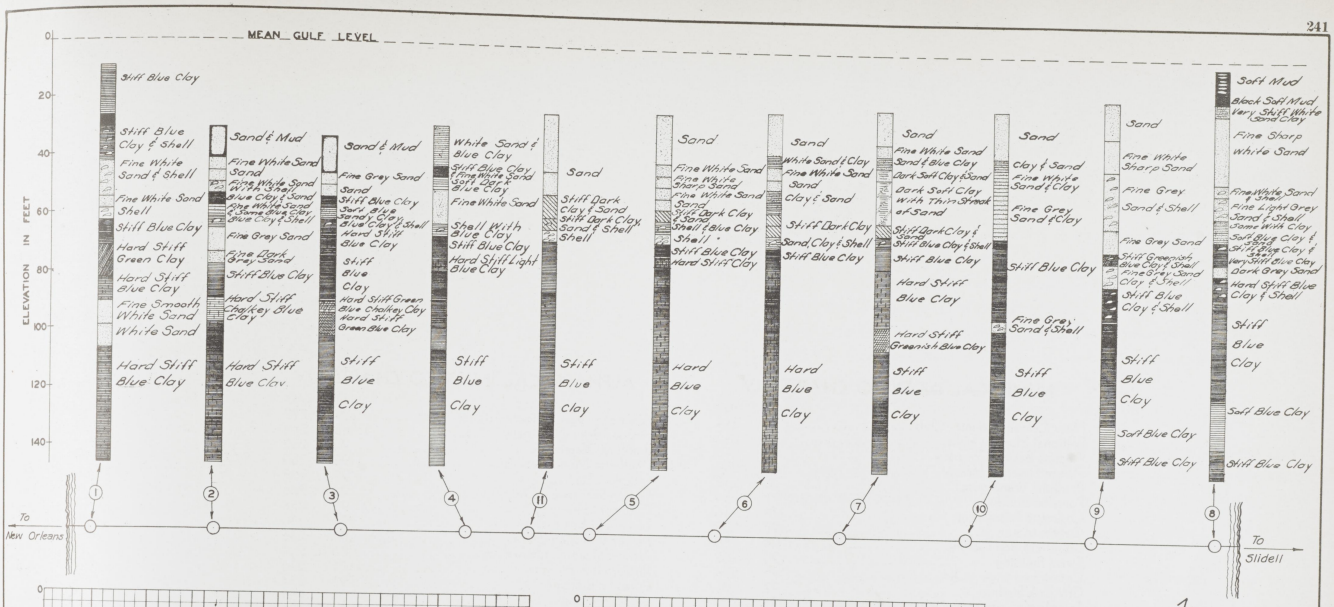


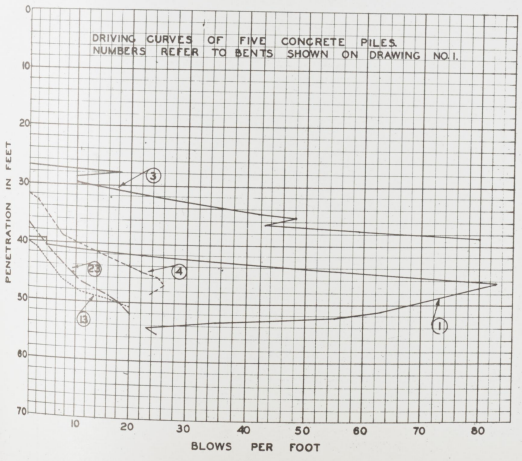
SECTION B-B

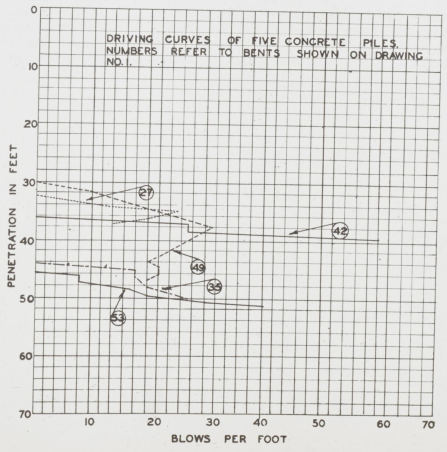
RIGOLETS BRIDGE

DRWG. NO. 1 CASE NO. 85

ELEVATION IN FEET
0
20
40
60
80
100
120
140
To
New Orle
PENETRATION IN FEET
0
10
20
30
40
50
60
70









WASH BORINGS AND PILE DRIVING CURVES

RIGOLETS BRIDGE

DRWG. 2. CASE 85

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Bradford Warehouse	90	252
Pontalba Building	91	254
Chalmette Monument	92	256
Custom House	93	258
Lengsfield Box Factory	94	260
Sierra Building	95	262
Cotton Exchange—Old	96	264
City Park Stadium	97	268
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SPREAD FOOTINGS
CHAPTER IV

Certain conclusions may be drawn from a study of spread footings illustrated in this report.

First; the consideration of drainage, and consequent drying and shrinkage of the upper ground surface, is important.

A study of the Custom House, Case No. 93, where loads of 3000 to 4200 pounds per square foot are carried; and a study of the Old Cotton Exchange, Case No. 96, where loads of 1200 to 2200 pounds are carried, indicates clearly that these loads are excessive except that in the case of the Cotton Exchange drainage might be thought to have played some part in shrinkage and settlement. In the case of the Custom House, however, the ground water has always been, and still is above the grillage.

In the Sierra Building, Case No. 95, which has been built since drainage was completed, the settlement has been slight and the loads of 2243 pounds per square foot would seem to be within safe limits.

The Lengsfield Box Factory, Case No. 94, is quite a distance removed from the other cases cited, and is a building of longer standing. The loads in this case are about 1200 pounds per square foot under columns, and 1450 pounds per square foot under walls. Such settlement as appears to have occurred, without instrumental observations, may probably be due to lowering of ground water and shrinkage of the upper ground surface.

The Pontalba Building, Case No. 91 is very old. It was built long before any drainage was provided other than by open ditches. The load per square foot in this case is about 2400 pounds and such settlement as may have occurred, there being no instrumental observations, has not been such as to cause appreciable or noticeable cracks in the brick walls.

Surface soil conditions are vastly different in different sections of the metropolitan district.

The Chalmette Monument, Case No. 92, is resting on a natural bed of clean sand and the load per square foot is 1885 pounds with no indication of settlement. Drainage would not enter into a consideration of this case at this time and even if it were a consideration nearness to the river might offset in large part such consideration.

Other sections, such as Lakeview, and along the south shore of Lake Pontchartrain where the surface for several feet in depth is composed almost wholly of decayed vegetable matter, humus, peat, stumps, etc., present an entirely different problem. Settlement in this area has been very great, amounting in some cases to several feet. We have no other heavy structures on spread footings to refer to other than the City Park Stadium, Case No. 97, now under construction, where a dead load per square foot of 858 pounds is estimated. Even here soil conditions are a modification of conditions farther toward the lake.

It may be said, however, that in large parts of the lakeview and similar sections, a bed of clean white sand underlies the humus surface. At some places it is virtually out-cropping while at other places it may be several feet down.

Other cases will be found in the pages following.

The conclusion may be drawn that while a study of the foregoing cases would indicate that a safe load of 1500 to 2000 pounds per sq. ft. could be employed in design, that such is not universally true. In every instance of any importance the soil should be subjected to loading tests to the end that the safe bearing capacity of the soil be determined for the location involved.

A further study impresses one with the fact that the bearing capacity of the soil is variable even over a small area.

In December 1935, what was known as the "Jackson House" on St. Peter street was condemned as unsafe and was demolished. This building was of brick and was 3 stories, or about 45 feet, in height and was erected in, or about, 1844. The foundations consisted of two layers of cypress and poplar, and when uncovered this was found to be about 75% decayed which accounts in large measure for the extreme settlement and the dangerous condition of the building. In all probability lowering of the ground water level caused the decay in the timber grillage. The lower layer of grillage was found to be under water at the time the building was demolished. The bottom side of this grillage was about 4'-6" below curb grade.

Case No. 86.

THE NEW ORLEANS COUNTRY CLUB

The New Orleans Country Club was designed by Favrot & Livaudais, architects, and was erected in 1915 by Geo J. Glover. It was destroyed by fire in October 1921, and was rebuilt in 1921 and 1922 by Geo. J. Glover on same foundation, except at the north and south ends where the foundations were extended about 20' to support an open paved terrace.

It is located on Pontchartrain Boulevard just west of the New Basin Canal and South of Metairie Road.

It is a one story and basement structure with outer walls of brick. The basement walls are brick and concrete and the first floor slab and basement columns are reinforced concrete. All first floor beams are reinforced concrete. Partitions and mezzanine floor are timber. Main roof trusses are structural steel surmounted with wooden rafters and joists.

There are 92 reinforced concrete columns as shown in schedule and these support the floor loads and roof except that part which is supported on brick and concrete walls.

There are no foundation piles, the footings being of spread type and of reinforced concrete, all as shown in more detail on drawing.

On the drawing is also a column footing schedule showing the design loads per square foot of footing area, which approximate 1,200 pounds per square foot.

Excavations for footings were made to a depth of 2 to 3 feet below the natural ground surface.

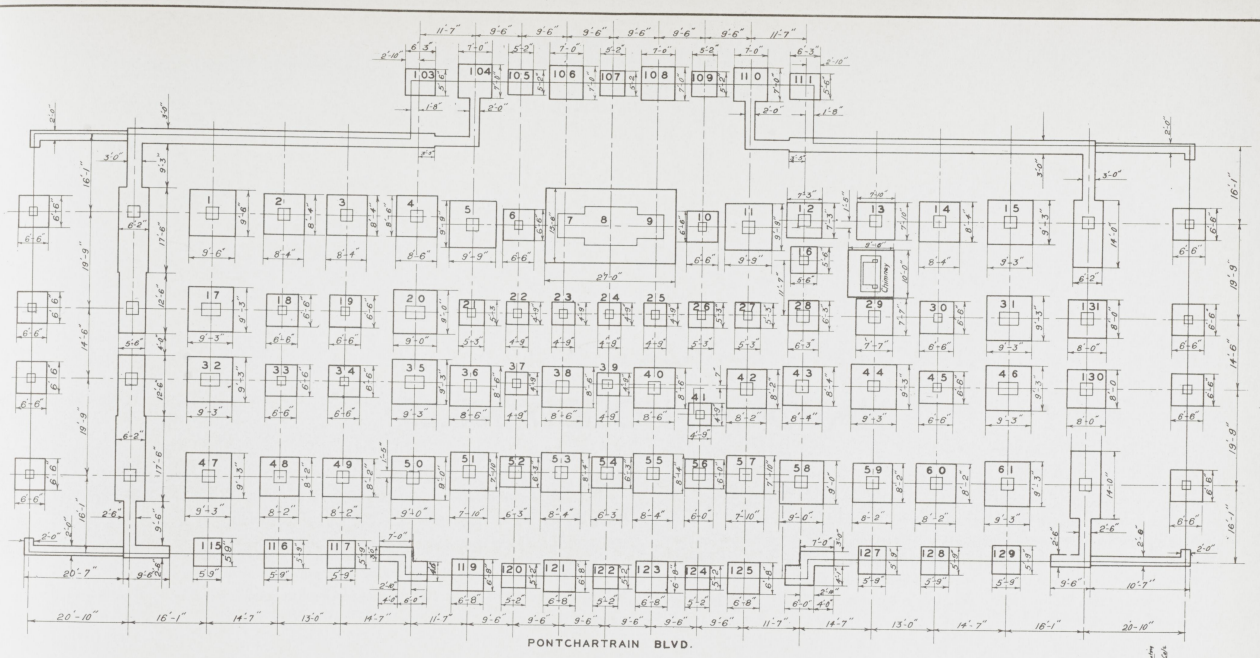
No information is available as to the exact kind of soil excavated but the building is located in a low flat section and the soil is probably the usual black clay, or what is locally known as gumbo.

The ground elevation is about plus 2 M. G. L.

The footing areas are apparently sufficient and the loads safe as no settlement is noticeable.

LAST STREET END

Colum Numb
1
2 3
4
5 11
6 10
7 8 9
12
13
14
15
16
17 32
18 19
33 34
20
21 27
22 23
25 37
41
28
29
26
31 44
35
36
38 40
42
43



COLUMN AND FOOTING SCHEDULE

Column Number	Footing Thickness	Footing Area	Load Per Square Foot
1	16	9025	1265
2 3	14	6939	1255
4	14	7225	1284
5 11	16	9506	1243
6 10	10	4225	1190
7 8 9		3645	1316 Max.
12	12	5256	1240
13	12	6084	1198
14	14	6939	1226
15	14	8556	1255
16	10	3025	1165
17 32	14	8556	1285
18 19 30	10	4225	1216
33 34 45	10	4225	1216
20	14	8100	1208
21 27	10	2756	1195
22 23 24	8	2256	1185
25 37 39	8	2256	1186
41	8	2256	1186
28	10	3906	1213
29	12	5746	1243
26	10	2756	1215
31 46	14	8556	1260
35	14	8556	1262
36	14	7225	1285
38 40	14	7225	1242
42	14	6675	1242
43	14	6939	1242

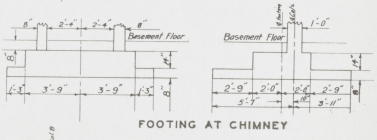
Column Number	Footing Thickness	Footing Area	Load Per Square Foot
44 61	14	8556	1235
47	14	8556	1231
48 49	14	6675	1240
59 60	14	6675	1240
50 58	14	8100	1210
51 57	12	6084	1235
52 54	10	3906	1220
53 55	14	6939	1248
56	10	3600	1170
101 102	8	3'0"	1183
103 111	8	3440	981 Min.
104 106	10	4900	1195
108 110	10	4900	1195
105 107	8	2670	1198
109	8	2670	1198
112 113	8	3'0" Wide	1167
114	8	3'0" Wide	1167
115 116	8	3306	1242
117 127	8	4306	1242
128 129	8	3306	1242
119 125	10	4449	1210
120 122	8	2673	1150
124	8	2673	1150
121 123	10	4449	1195
Corner at gallery front	8	4550	1160
Chimney	8	9500	1100
End Wall left end	8	5'6" Wide	1190
End Wall Right end	8	6400	1220



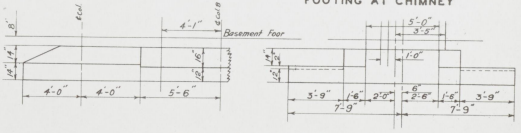
NEW ORLEANS

COUNTRY CLUB

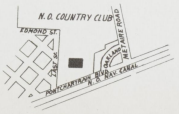
CASE NO. 86



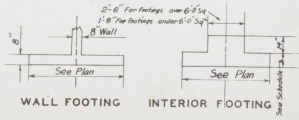
FOOTING AT CHIMNEY



FOOTING FOR COLUMNS 7-8-9



LOCATION MAP



WALL FOOTING INTERIOR FOOTING

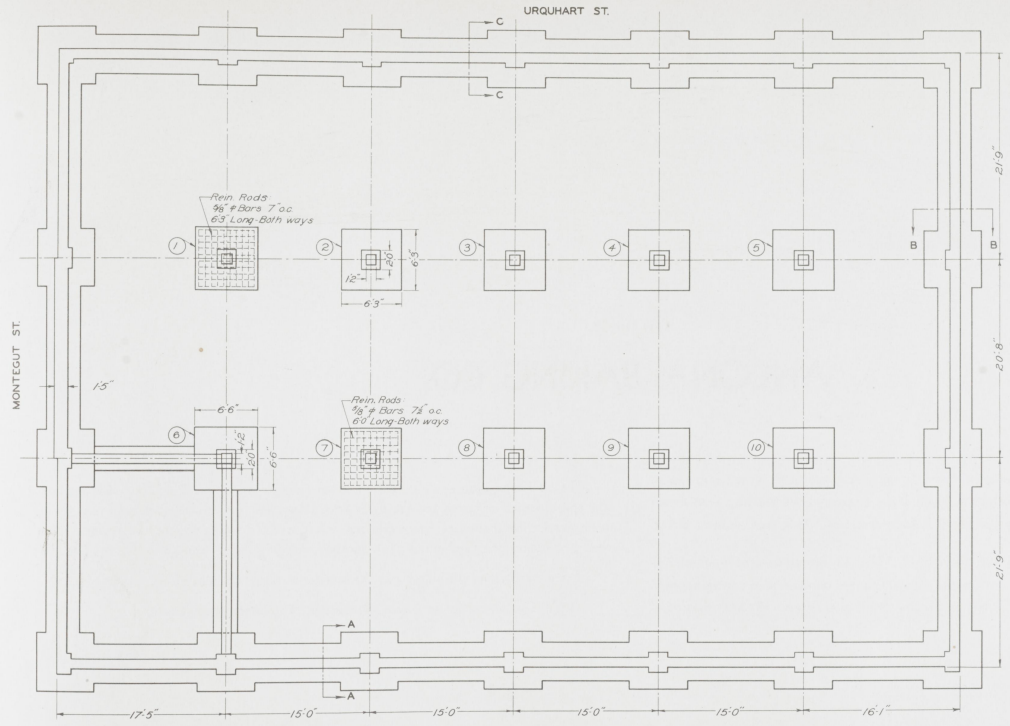
Case No. 87.

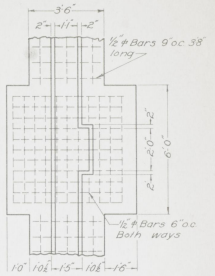
NATIONAL HOSIERY MILLS

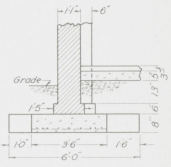
The National Hosiery Mills located on the corner of Montegut and Urquhart Streets is a two story brick building designed by Moise H. Goldstein, Architect, and constructed by G. E. & E. E. Reimann Construction Company in 1917-18. This building is 32'-8" high from grade to top of parapet, fronts 64'-2" on Montegut Street and is 93'-6" deep. 12" x 12" wood columns support the second floor and roof. Framing for second floor consists of 12" x 16" wood girders and 3" x 12" wood joists, 16" on center. Wall area is approximately 10,500 sq. ft. of which 20% is occupied by windows.

The only excavation was for the reinforced concrete footings which go to a depth of 2'-0" below grade. The soil is loaded about 1,200 lbs. per square foot. The accompanying drawing shows the spacing and construction details of the footings.

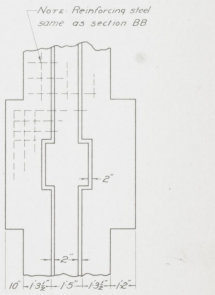
A small crack following the joints of the brick work from the first floor window sill to grade has appeared between the last two columns on Urquhart Street, other than this there is no evidence of settlement.

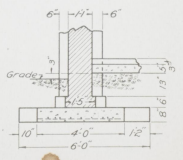






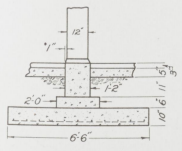
SECTION BB



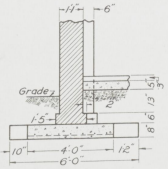


SECTION AA

Note:
Footing nos 1 & 6 are same size
Nos 2,3,4,5,7,8,9,10 are same



COLUMN FOOTING



SECTION CC



NATIONAL HOSIERY MILL

CASE NO. 87



LOCATION MAP

Case No. 88.

ANCONA BAKING CO.

The building occupied by the Ancona Baking Company, located on St. Mary and Constance Streets, was designed by Jones, Roessle and Olschner, architects, with J. B. Jensen as engineer, and it was constructed by A. M. Fromherz in 1933. It is a one story brick building, with a mezzanine floor over the office, fronting 125 ft. on St. Mary Street by 128 ft. on Constance Street.

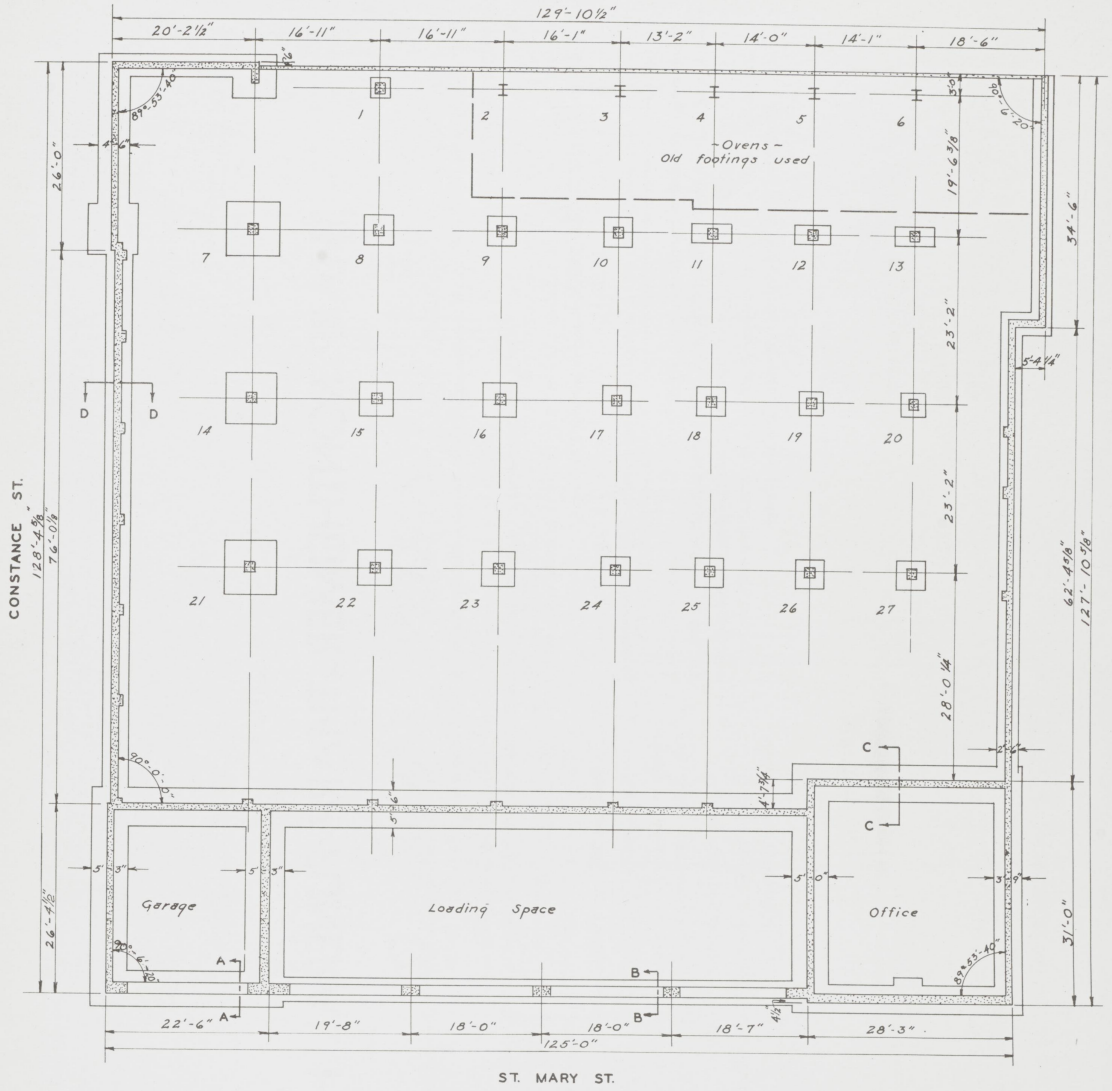
Exterior walls are load bearing and are of brick, 12" thick, resting on a continuous reinforced concrete spread footing. Interior columns are steel carried on reinforced concrete spread footings. Roof construction is steel girders and beams with wood rafters. The main floor is of wood on a reinforced concrete slab on earth fill.

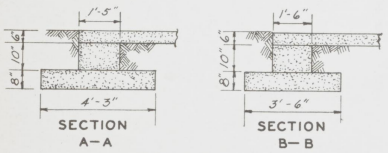
The only excavation was for the footings which go to a depth of 2 to 3 feet below grade. The soil consisted of humus and silt about 1 foot deep and gumbo with some sand and a high water content for the rest of the excavation. This type of soil was considered very poor and the load per square foot, used in design, is approximately 900 lbs. and not in excess of 1,000 lbs.

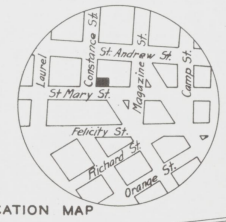
The accompanying drawing shows the foundation plan with spacing and size of footing.

At this time no cracks are visible and there is no evidence of settlement.

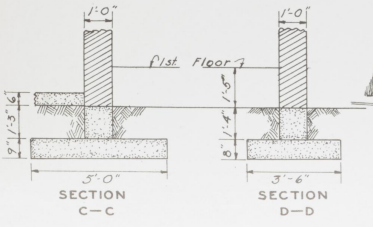




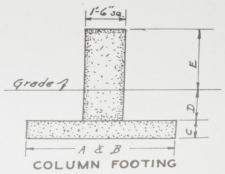




-COLUMN FOOTINGS-				
Col. No.	A & B	C	D	E
7	7'6" x 7'6"	12"	3'-0"	2'-11"
14	6'-9" x 6'-9"	"	"	"
21	7'-3" x 7'-3"	"	"	"
8-17-18-26	3'-9" x 3'-9"	9"	2'-0"	"
15-16	4'-3" x 4'-3"	"	"	"
22-23	4'-6" x 4'-6"	"	"	"
9-10-24-25	4'0" x 4'-0"	"	"	"
19-20-27	3'6" x 3'6"	"	"	"
1	3'-0" x 3'-0"	"	"	"
12	2'-6" x 5'-0"	"	3'-0"	"
11-13	2'-6" x 3'-6"	"	"	"







ANCONA BAKING CO.

CASE NO. 88

Case No. 89.

THARP-SONTHEIMER-THARP FUNERAL HOME

This building was designed by Jones, Roessle & Olschner, Architects, with Jens B. Jensen as Consulting Engineer, in the year 1930. It was erected in the same year under force account with supervision by the Architects.

The building is irregular in shape but is roughly 80′ x 60′, exclusive of the garage in rear. It is ornamental in design consisting of rock-face stone in front, and brick in other walls, with a flat tile roof. The building is two stories high and is without a basement.

No foundation piles were driven and it is strictly a spread footing design with reinforced concrete footings.

There is a continuous reinforced concrete wall beam under outside walls and this was poured monolithic with footings. The first floor is reinforced concrete beam and flat slab construction. Second floor and roof is wood frame construction. Interior dividing walls are hollow tile and smaller partition walls are wood studs with metal lath and plaster.

No loading tests were made on the foundation soil but a safe load of 1,000 lbs. per square foot was assumed.

Loads used in designing were:

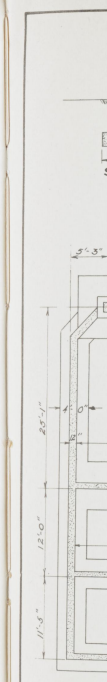
Wind load	15 lbs. per sq. ft.
	Roof, 30 lbs. per sq. ft.
Live loads	Second Floor, 50 lbs. per sq. ft.
	First Floor, 75 lbs. per sq. ft.

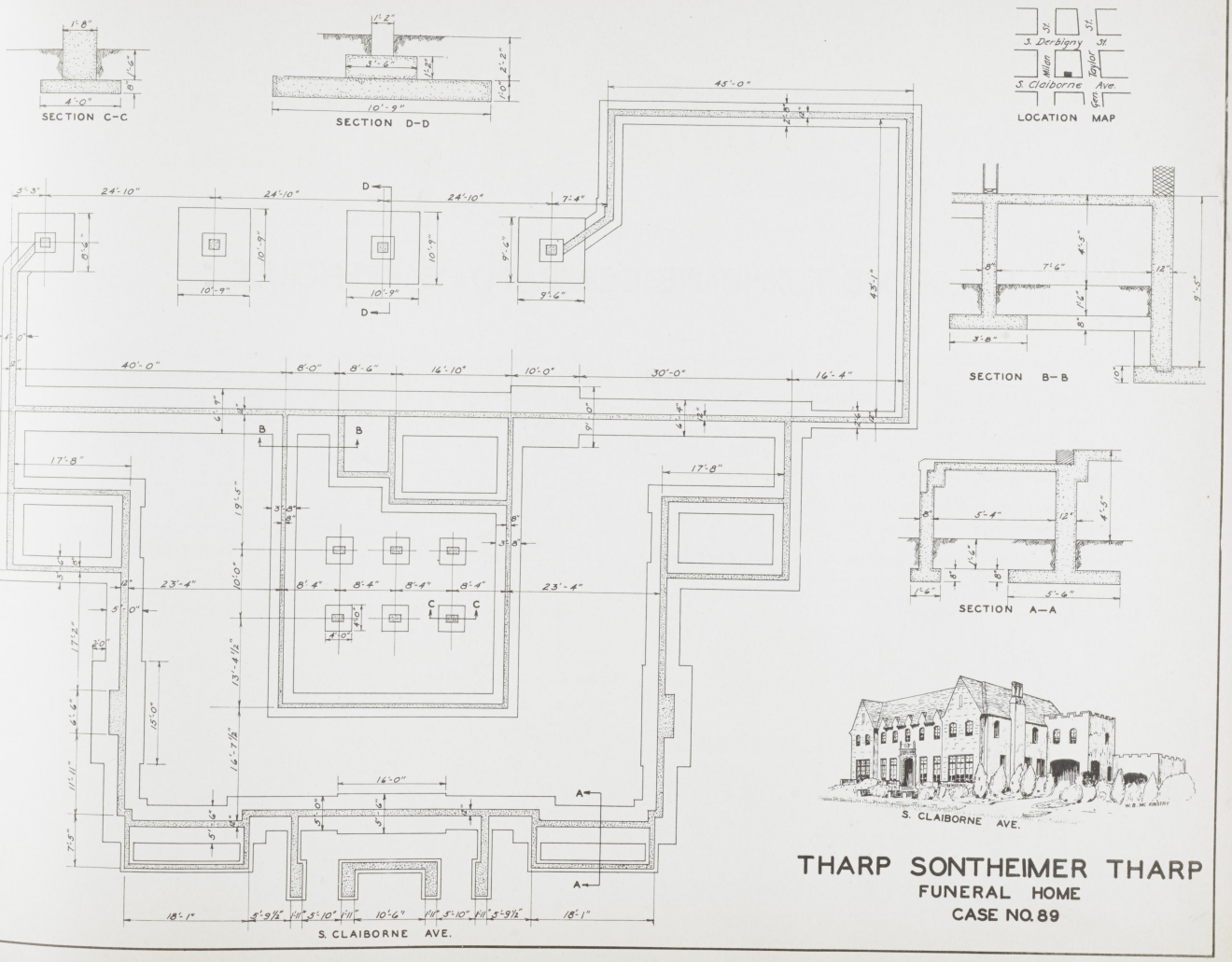
Reduced live load 150 lbs. per sq. ft.

The average excavation for footings was about two feet below ground surface or approximately —3.00 M. G. L. The excavated material was moist blue gumbo in which the footings rest. Some stumps were encountered and these were removed and the voids filled with sand.

The accompanying drawing shows the foundation plan with footing and wall sections.

There is no instrumental record of settlement, but cracks in exterior walls are evident that settlement has taken place.





THARP SONTHEIMER THARP

FUNERAL HOME

CASE NO. 89

Case No. 90.

BRADFORD FURNITURE COMPANY WAREHOUSE

This warehouse, located on St. Joseph between St. Charles and Carondelet Streets is used as a work shop and for the storage of furniture, and was designed by Weiss and Dreyfous, architects, and was constructed by R. P. Farnsworth and Sons, contractor, in 1921. It is a five story building rising about 70' above grade and fronting 83'-11" on St. Joseph Street by 87'-4" deep on east side. The building is of slow burning mill construction with timber framing and brick bearing walls and has reinforced concrete spread footings. The east and rear walls have no openings, but approximately 22% of the other wall areas are door and window openings.

This building has no basement and the only excavation was for the footings which go to a depth of about 3 ft. below grade or to elevation approximately 5.07 M. G. L.

The foundations are reinforced concrete spread footings. The footing under the exterior walls is 12 ft. wide and is continuous around the entire building. The interior column footings are 8 ft. by 8 ft. and 7 ft. by 10 ft. The accompanying drawing shows the size and location of these footings and details of their construction.

No information was available as to the actual loads on these footings, however, the following is our estimate of the dead and live loads. In calculating the live load we assumed it to be 200 lbs. per square foot of floor area and used 60% of the total.

COLUMN FOOTINGS:

Dead load	375 lbs. per sq. ft.
Live load	1170 lbs. per sq. ft.
Total D. & L. L.	1545 lbs. per sq. ft.

EAST WALL FOOTING:

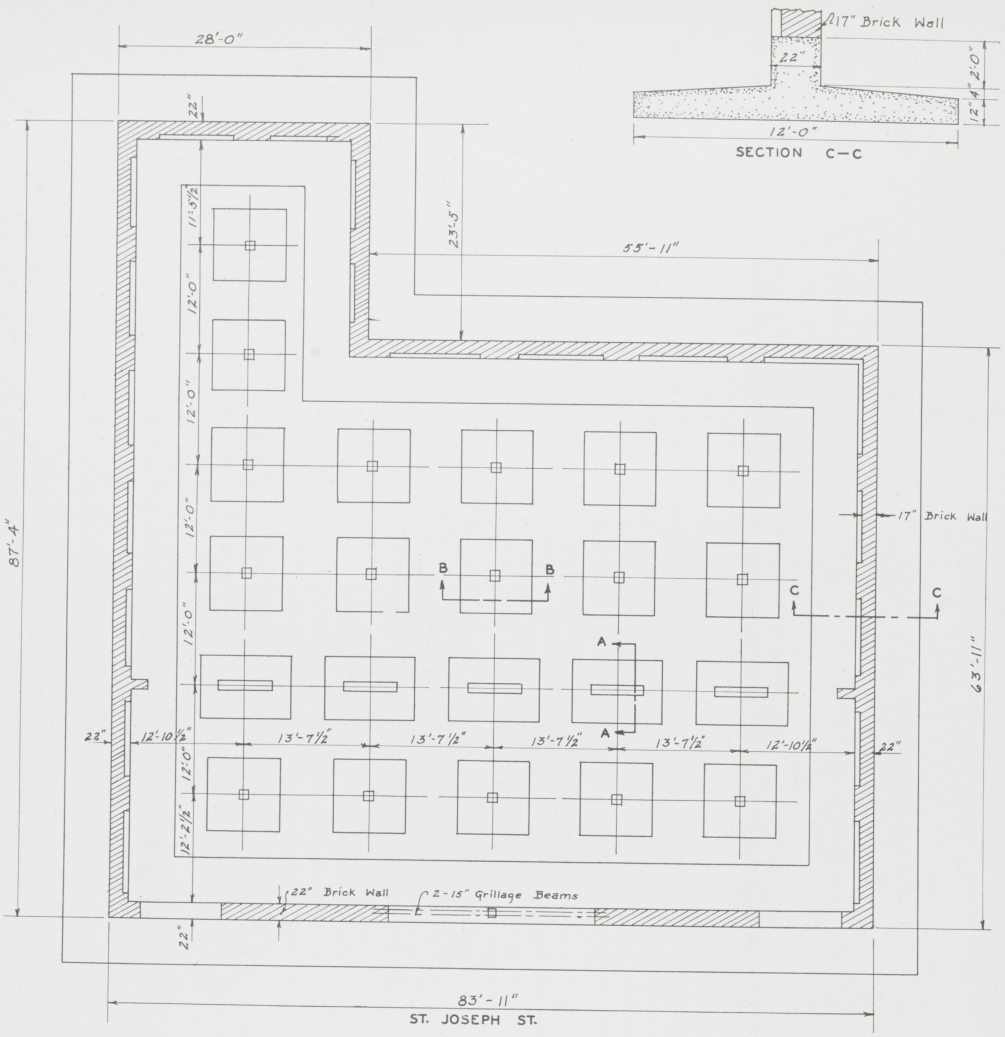
Dead Load	1120 lbs. per sq. ft.
Live Load	325 lbs. per sq. ft.
	1445 lbs. per sq. ft.

No cracks have developed and there is no evidence of uneven settlement in this building.

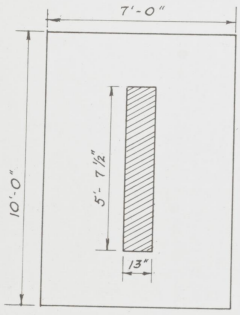
SECTION A—A

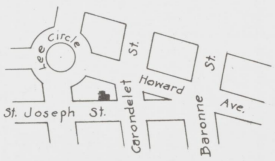
BRADFORD FURNITURE COMPANY WAREHOUSE CASE NO. 90

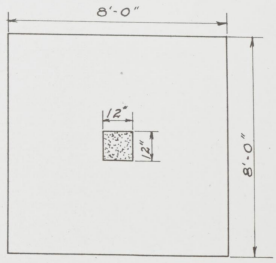
SECTION B—B



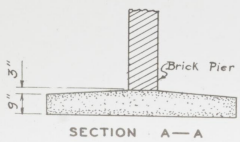
SECTION C—C



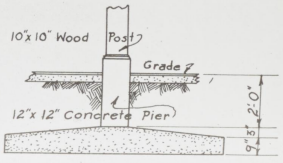








SECTION A—A



SECTION B—B

BRADFORD COMPANY FURNITURE WAREHOUSE
CASE NO. 90

Case No. 91.

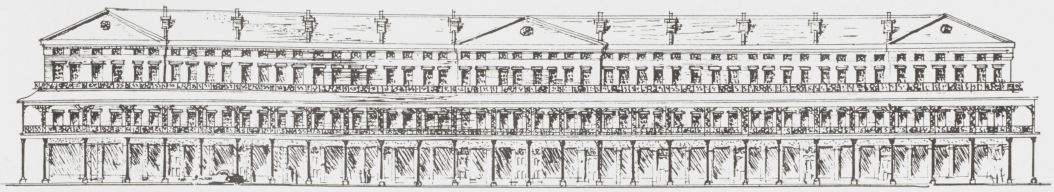
PONTALBA BUILDING

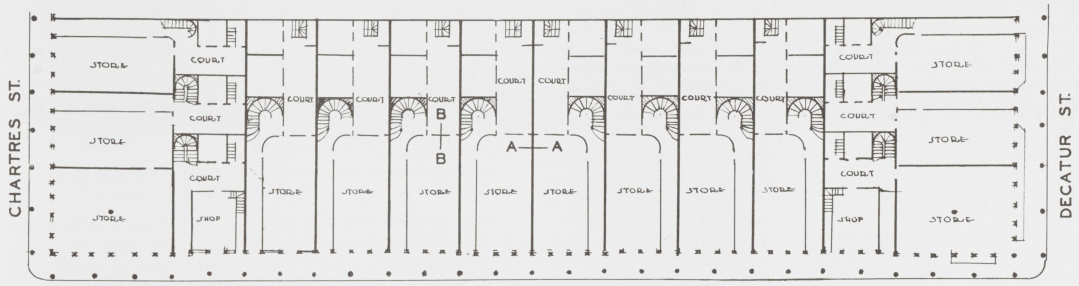
The two Pontalba Buildings occupy a half block each on opposite sides of Jackson Square, facing each other and flanking the Cathedral, Cabildo and Presbytere. They are identical in design and supposedly identical in construction. The constuction of these buildings was financed and supervised by the Baroness Pontalba and they were intended to be apartment houses, with stores on the ground floor. Stanley Arthur in "Old New Orleans" states: "The plans were drawn by James Gallier, the elder, and the contract for the sixteen buildings on the St. Peter Street side was given to Samuel Stewart, July 20th, 1849, the contractor agreeing to erect them for $156,000. Work began at once and the day before Christmas 1849, the same contractor agreed to put up the St. Ann Steet Building for $146,000. It was not until March 1851 that the Baroness Pontalba signed the rental leases."

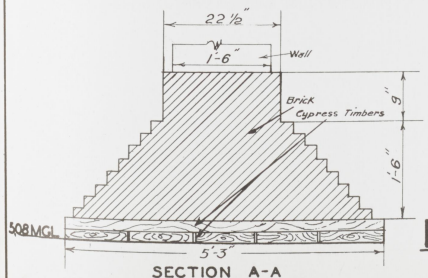
The two buildings are approximately 356 feet long and 88 feet deep. They are solidly constructed with bearing walls and outside walls of brick, and the outside front wall of the first story is a series of square granite piers or columns. The first floor is concrete and rests directly on the ground. The second, third and attic floors and the slate roof are carried on large cypress joists and rafters. The second floor balcony, held up by slender cast iron columns, and the narrower third floor balcony, of cantilever construction, run the entire length of the building, and their intricate cast iron ballustrades give an excellent decorative effect.

The information given in this report regarding the foundations is made on the basis of one excavation in the rear of 525 St. Ann Street in the St. Ann Street Pontalba Building by W. P. A. workers, for this survey. The excavation showed both a bearing wall and a crosswall. There are no records or drawings available which give a general foundation plan. Accounts of other excavations made in the course of repairs and changes to the buildings check closely with this. All bearing walls run parallel to Chartres Street, except in the end wings, and are 26 feet apart. They measure 18" thick for the first floor, 12" for the second and third and 9" for the attic, with an approximate height of 60' from the first floor to the peak of the roof. They rest on a brick foundation of twelve courses, the first four being all a half brick wider than the wall and the others increasing in width by about half a brick each as they go down to a final width of about five feet. Under this brick work is a two layer cypress grillage only slightly wider than the bricks. The top layer runs at right angles to the wall and the timbers vary in size from 2" x 10" to 2" x 14". The bottom layer runs parallel to the wall and the timbers are 2" thick and of undetermined width. The cross walls are 13" thick and rest on 14 courses of brick, the first seven courses are a half brick wider than the wall, and the others increase in width to about 4 ft. There is no cypress grillage under these cross walls. See Sections "A-A" and "B-B" on drawing for details of footings.

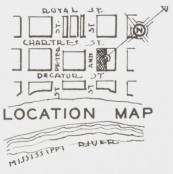
The cypress grillage appeared to be in a good state of preservation although the general water level seemed to be lower than the timbers. At the one place where excavation was made the soil was blue clay and very moist. Settlement is not noticeable in the brick or plaster, but there is a considerable slope to some of the second and third floors particularly in the apartments on Decatur Street and Chartres Street, at the ends of the building. There has been no accurate record of settlement kept and no soil tests have been made. The maximum load per square foot of soil area as figured by this survey, and by others, varies from 2,125 lbs. to 2,550 lbs.





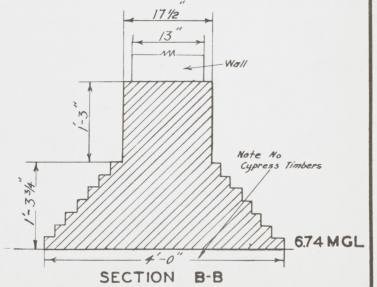


SECTION A-A
TYPICAL BEARING WALL



PONTALBA BUILDING —

CASE NO. 91



SECTION B-B
TYPICAL CROSS WALL

Case No. 92.

CHALMETTE MONUMENT

This monument is located at Chalmette just outside the lower corporation limits of New Orleans. It was designed by Newton Richards and was erected to a height of 57'-0" in 1855, and was completed by Doullut & Williams, Inc., in 1908, under the supervision of the U. S. Corps of Engineers, Alfred F. Theard being appointed by the U. S. Government as local architect. This monument was built in commemoration of the battle of New Orleans, fought against the English on January 8th, 1815.

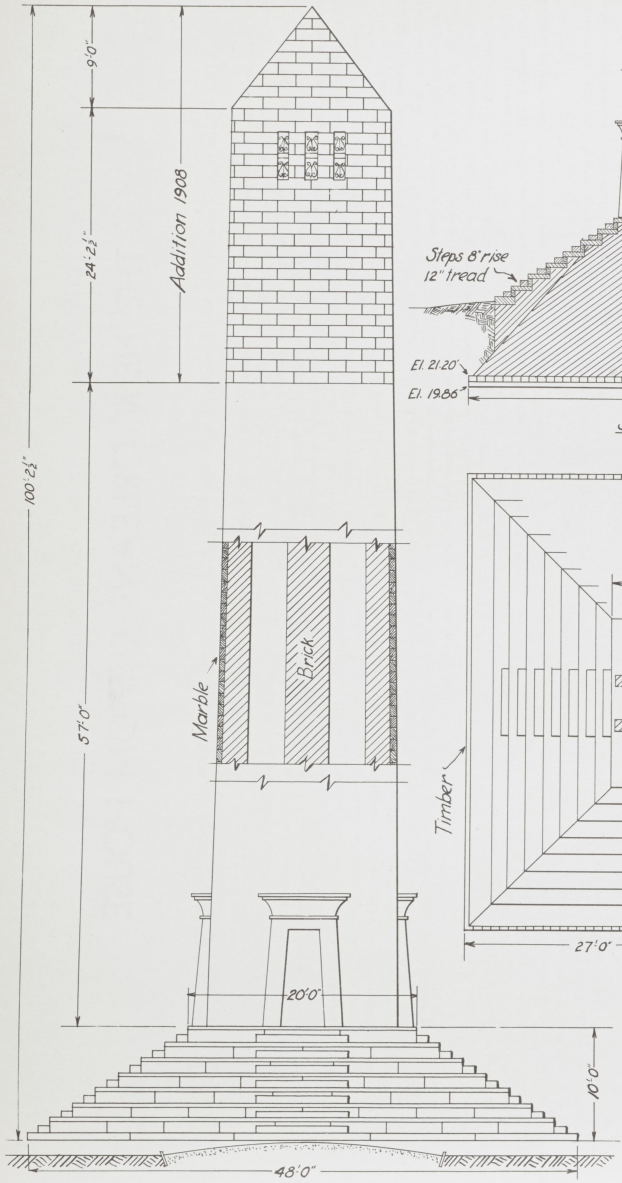
In substance it is a brick and mortar structure covered with marble ashlar. As shown in Figure 3 on the accompanying drawing it rests on 8" x 12" cypress grillage 54 feet square, all timber laid flat. The bottom of the grillage is 9.15' below the natural surrounding ground. From the top of the grillage bricks bonded with mortar form a spread footing pyramidically arranged, which in turn forms a pedestal for the monument proper. The portion above ground level is faced with marble steps as shown on accompanying drawing, figures 1, 2, 3, affording access to the interior of the structure, which extends 100'-2½" above ground. The interior is hollow having a winding stair around a brick shaft partly shown in figure 3 of the accompanying drawing.

The stair lands at a platform within the top of the monument. The platform is conveniently located in such manner as to afford a view thru outlook openings on all four sides at the top of the structure. These openings are embellished with ornamental ironwork on the outside.

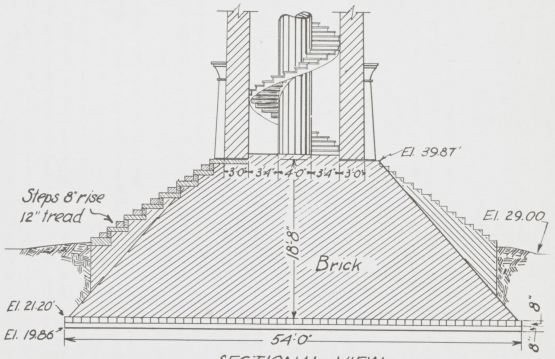
The base of the monument proper and the top of its footing is at elevation 9.43 M. G. L. (39.86 City Datum). The top of the footings is 20'-0" square and the shaft is 16'-8" at its base, and rises 81'-2½" from the footing and is topped with a 9'-0" pyramid having a pitch of ⅜" per foot as shown in Figure 1.

The structure weighs approximately 5½ million pounds, thus imparting a load of 1,885 pounds per sq. ft. upon the bearing soil, which is said to be white sand.

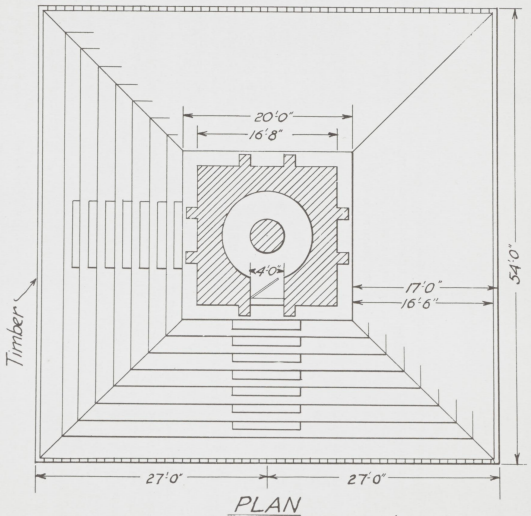
During the summer of 1936 the project supervisor, with two U. S. Government Engineers who at the time were engaged on beautifying Chalmette Park, checked the monument with an engineer's transit and it was found to be exactly plumb in a north and south direction but about one inch out of plumb in an east and west direction. This may have been due to some little error in observing the tip top of the monument rather than to any actual leaning or being out of plumb.



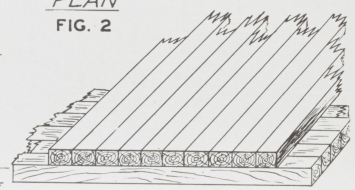
ELEVATION FIG. 1



SECTIONAL VIEW
FIG. 3



PLAN
FIG. 2



8"x12" CYPRESS GRILLAGE FIG. 4

CHALMETTE MONUMENT

CASE NO. 92

Case No. 93.

THE NEW ORLEANS CUSTOM HOUSE

The New Orleans Custom House occupies the entire block bounded by Canal, N. Peters, Iberville and Decatur Streets. It was designed by A. T. Wood, although James Gallier in his autobiography implies that Wood plagiarized the design from plans and models sent into the Treasury Department by Gallier and other architects. The foundations of the building were started in 1847. Construction was suspended during the Civil War. In 1871 operations were resumed under modified plans. The second floor was completed in 1879 and the third floor in 1881. The fourth floor and the roof, with the large dome over the central rotunda and a heavy granite cornice, were not completed as originally designed because of settlement, but sometime before 1881 a roof of copper stripping was put on and a cast iron cornice was added. This copper roof was never satisfactory and in 1916 it was replaced by a composition covering of felt and asphalt pitch.

The building is exceptionally solid with exterior walls of granite from 3 to 4 feet thick including the brick backing, and interior walls of similar proportions. Through all the walls at intervals of about 2 feet in height flat iron bands are built in the longitudinal joints of the brick work, and this probably accounts for the fact that in spite of all the settlement that has taken place there are no serious cracks in the masonry. The second or main floor is carried on groined brick arches supported on brick walls and piers, the space above the arches being filled with concrete. A part of the third floor is also constructed in this way, and other floors are carried on iron beams with brick arches between the beams. All iron beams are built up of plates and angles. The roof is formed with wood and iron trusses covered with wood rafters and sheathing. The decorative features of the building are the large marble stairway leading from the Canal Street entrance to the second floor and the marble hall on the second floor, two stories high. The hall is 90′ x 120′ and 50′ in height.

The ceiling of iron frame work with glass lights is supported on 14 marble Corinthian columns 41 feet high and 4 feet in diameter. In general, the style of the building is classic but the capitals of the columns supporting the pediment over the four entrances are distinctly Egyptian in feeling.

The entire area under the building was probably excavated to about 11′-8″ below curb. No record of the original excavation is available but it is reported that almost the entire excavation was below water level, and that sheet piling was driven to hold back the water. This was not water-tight and cotton bales were hauled to the site and cotton ropes made to caulk the piling. This probably accounts for the impossible popular story that the custom house is built on a foundation of cotton bales. Recent excavations have shown the ground to be of stiff black alluvial soil. They have also shown that the original ground surface was 3′-4″ below the present street curb. The ground water level was found to be not less than 5″ above the top of the timber grillage. From readings of this ground water taken at different times, it appears that the stage of water in the river has some influence on the height of the underground water. There is now a gauge extending to the base of the foundations to observe the elevation of the water.

The foundations of the building rest on cypress grillage, as shown in Sections A-A and B-B in the drawing. The bottom planks, 3″x12″ cypress, are about 9 feet below the present street level. On top of these, 12″x12″ cypress timbers are laid longitudinally and these are crossed by another layer of 12″ x 12″ cypress timbers. Next there is a layer of 12″ shell and concrete, and then the brick walls. Between the piers and across the large openings are inverted brick arches to distribute the weight evenly over the footings. When the grillage was uncovered in 1926 it was found to be sound with no signs of decay.

There has been considerable settlement, largely taking place while construction on the building was in progress. From 1851 to 1856 Major P. G. T. Beauregard reported a maximum settlement of 16.99 inches and a minimum settlement of 9.88 inches. In 1857 this had increased to a maximum of 19.33 inches and a minimum of 11.22; in 1858, to 20.88 inches and 13 inches; in 1859 Major Beauregard's last report, to 23.51 inches and 13 inches. From 1860 to 1885, during which time the second and third stories and roof were completed, the settlement appears, from what records are available, to have increased to approximately 28 inches. From 1885 there is no record of any further settlement. A diary kept by the Superintendent of construction, when quarters were fitted up for the Post Office in 1860, says that certain piers supporting the court room floors were loaded with railroad rails, etc. to give them a load more equal to that imposed on other footings. When the building was remodeled in 1916 it was found that the settlement of those particular piers was 4½″ less than that of surrounding walls and piers.

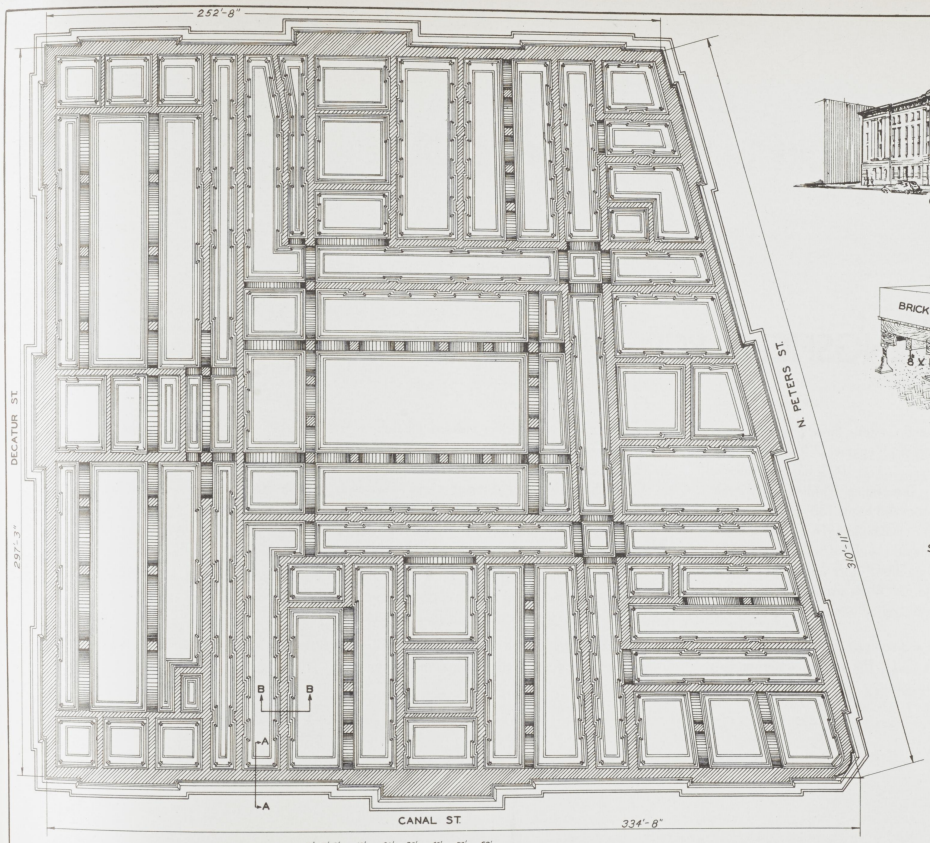
In regard to loads on the foundation, Mr. H. G. Richey, U. S. District Engineer, Atlanta, Ga., who uncovered the grillage in 1926 and to whom we are indebted for a large part of the information in this report, states the following: "While the designers of the building contemplated considerable settlement, and reinforced the walls and floors to prevent cracks, no consideration was given to loading the foundation equally at all points. It was found, during the investigation made in 1926, that the spread of the grillage footing was not designed comparable with the loads to be carried, and that the load carried by the grillage footing ranges from 3,000 to 4,200 pounds per square foot, the heavy load being at the front and rear entrances, which now show the greatest amount of settlement. The loads carried by the footings are considered excessive for this soil."

From our own calculations we found that the load carried on the footings under the big marble hall is approximately 3200 lbs. per square foot.

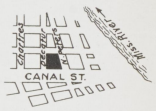
In 1926 when alterations to the building were contemplated a soil test was made. A pit was dug to the bottom of the grillage and an area of ten square feet was loaded with a maximum load of 62,000 lbs., 6200 lbs. per sq. ft. The drawing shows the structure of the loading platform and a graph of the settlement which was 3.25 inches while placing the load, and increased to 3.4631 inches over a period of 22 days. As a result of the test it was decided not to place any additional weight on the foundation.

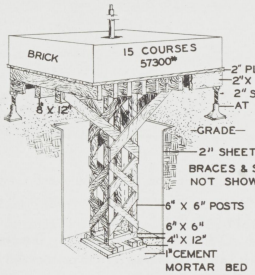
It is to be noted that the loads on the foundations of the Custom House, 3000 to 4200 lbs., are much higher than those of other old buildings in New Orleans, such as the Old Cotton Exchange and the Pontalba Buildings. However, in spite of the settlement which is great and is not uniform, the masonry is in excellent condition with no apparent cracking, and the safety of the building is unimpaired.



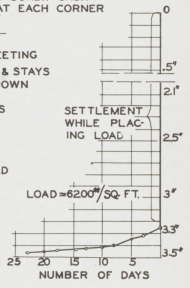




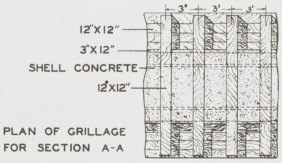




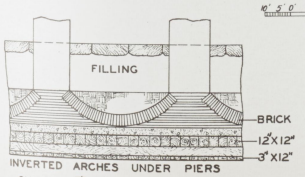
PLATFORM FOR
SOIL LOAD TEST



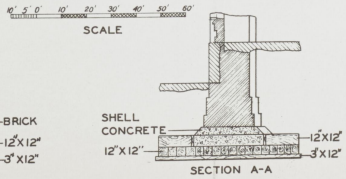
CURVE OF SETTLEMENT
IN SOIL LOAD TEST



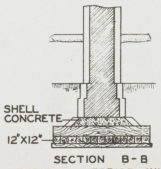
PLAN OF GRILLAGE
FOR SECTION A-A



INVERTED ARCHES UNDER PIERS
SHOWN IN PLAN



SECTION A-A
TYPICAL EXTERIOR WALL



SECTION B-B
TYPICAL INTERIOR WALL

NEW ORLEANS
CUSTOM HOUSE

CASE NO. 93

Case No. 94.

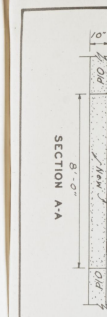
LENGSFIELD BOX FACTORY

The Lengsfield Box Factory, located on Tchoupitoulas and Calliope Streets, was designed by Moise H. Goldstein, architect, with Jens B. Jensen as structural engineer. It was originally two stories high constructed by G. E. & E. E. Reimann Company Ltd. in 1923, but an additional story was added by John A. O'Brien, contractor, in 1931. The original building was 39 feet high. The present building is 54'-11" high from curb to parapet and fronts 160'-6" on Tchoupitoulas Street and 128'-7" on Calliope Street. Second floor (original building) has 13½" x 17½" wood girders and 3" x 13½" floor joists. 15" I-beams running the width of building and 21" I-beams running the length of building were added when the additional story was built. The new floor has 8" and 21" I-beams and 3" x 13½" wood floor joists. Walls are of brick, having an area of 32,000 sq. ft. of which approximately 22.8% is occupied by windows.

Reinforced concrete spread footings support the walls and columns. The bottoms of these footings are 2'-5" below the curb or at elevation 10.16 M. G. L. The original wall footing is continuous around the building and additional footings with I-beam grillage was added to this to support the extra load of the new floor. The original column footings are 7'-0" x 7'-0" x 1'-0", the added footings are 9'-0" x 11'-0" x 10". Two 18" I-beams running the width of the building tie the old and new footings together and form one continuous footing carrying six columns. The soil under the column footings is loaded approximately 1,200 lbs. per square foot and under the rear wall footings approximately 1,450 lbs. The accompanying drawing shows the spacing of and details of the original and the added footings.

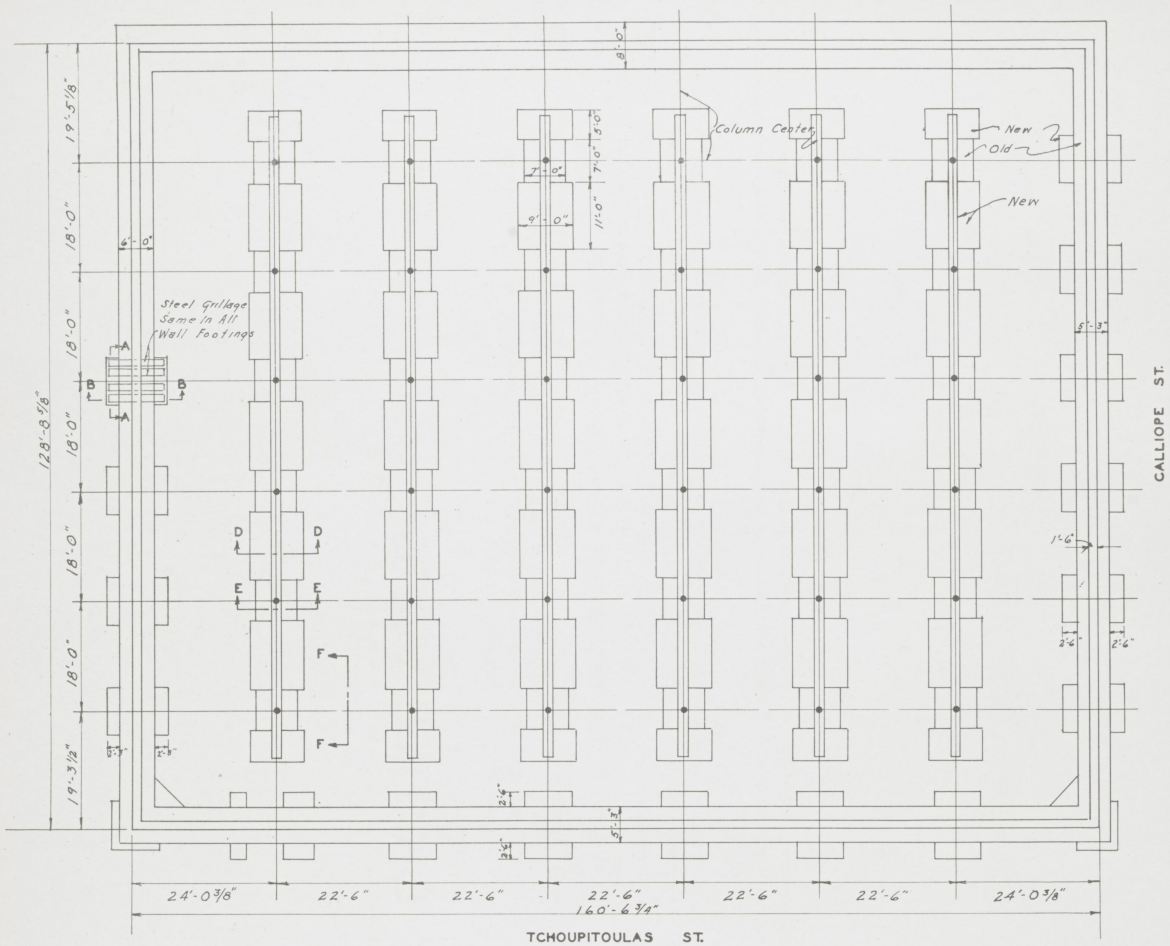
Cracks have developed in the brick work under some of the first floor windows. These cracks start about the center of the window, under the sill and follow the mortar joints to the ground. A few of the cast stone sills are also cracked.

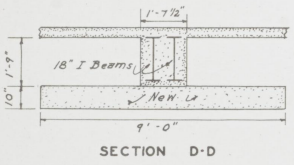
Any settlement is probably due to shrinkage or subsidence which is so common to New Orleans and not to any overloading of the bearing soil.



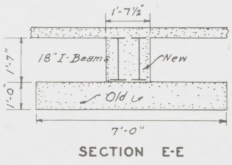
BOX FACTORY
CASE NO. 94





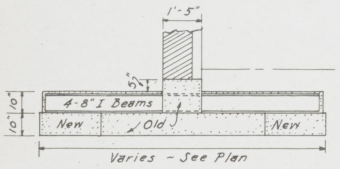


SECTION D-D

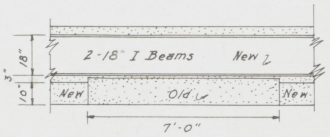


SECTION E-E

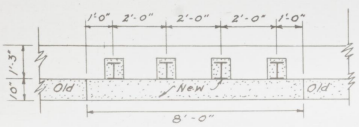




SECTION B-B

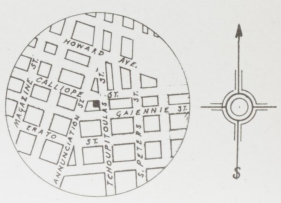


SECTION F-F



SECTION A-A

LENGSFIELD BROS.
BOX FACTORY
CASE NO. 94



LOCATION MAP

Case No. 95.

SIERRA BUILDING

The Sierra Building is located on the North side of Canal Street between Rampart and Burgundy Streets. It was designed by S. S. Labouisse, Architect, and was erected in 1915 by John Riess, Contractor.

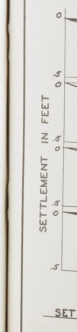
This building is constructed of reinforced concrete and is supported by reinforced concrete footings. It faces 42 feet on Canal Street and has a depth of 128'. It is set on property lines as indicated on the accompanying drawing and measures 90' from Burgundy Street. The enclosing walls are of brick and are 13" thick. The total window space inclusive of entrances on the Canal Street frontage is 28% of total wall area. This building bears the municipal numbers 1015-17 Canal Street.

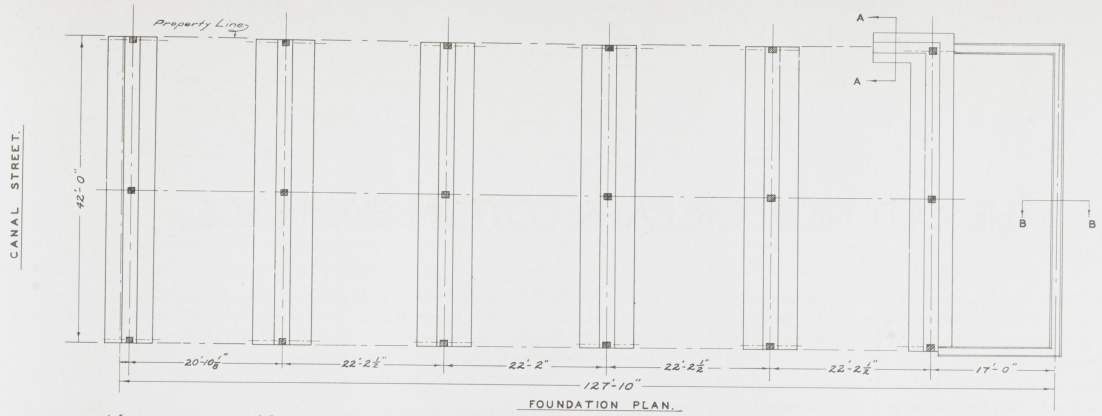
The entire area under the building was excavated to a depth of 4'-6" below curb or —0.83 M. G. L., to provide for pouring the concrete footings. The bearing soil is a slightly wet top soil or loam.

A plan of the foundation and details of the spread footings are indicated on the accompanying drawing. The total load on the soil figured at each column center averages 2,243 lbs. per square foot.

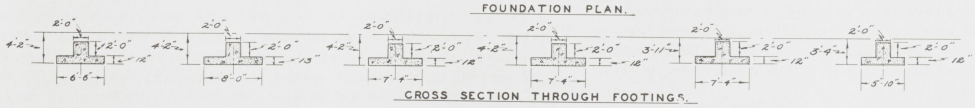
The condition of this building is good with no cracks apparent. The settlement of this building recorded over a period extending from 6-21-15 to 2-14-16 is graphically represented on the accompanying drawing.

This settlement is fairly uniform varying from .05 to .44 inches as shown on graph, and no instrumental observations have been made since Feb. 1916. However, no cracks have developed and indications are that the loads used are safe for the bearing soil.





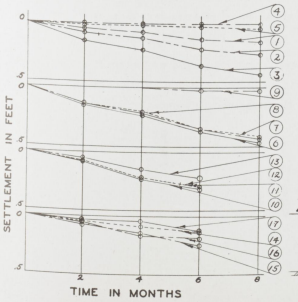
FOUNDATION PLAN.



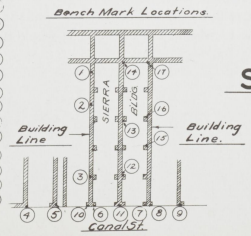
CROSS SECTION THROUGH FOOTINGS.



DETAIL OF TYPICAL FOOTING.

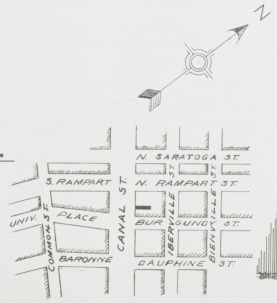


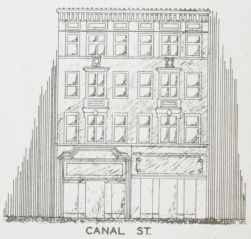
SETTLEMENT CURVES 17 BENCH MARKS.



SIERRA BUILDING.

CASE NO. 95





CANAL ST.

Case No. 96.

THE OLD NEW ORLEANS COTTON EXCHANGE

The Old New Orleans Cotton Exchange was located on the corner of Carondelet and Gravier Streets. It was designed and built in 1881 by H. Wolters, Architect, Louisville, Kentucky. In 1920 it was demolished and a new building for the Cotton Exchange was erected on the site of the old structure.

The Old Exchange was a virtually fireproof office building of four stories. The exterior walls were grey granite and Indiana limestone and were lavishly decorated with wrought iron work and statuary. Interior walls were brick or concrete and floors were carried largely on heavy timber beams. All floors were tile laid in English Portland Cement. The building measured 114′-6″ on Gravier Street, 79 ft. on Carondelet Street; 77′-1″ on Varieties Alley and 117′-9″ on the side opposite Gravier Street.

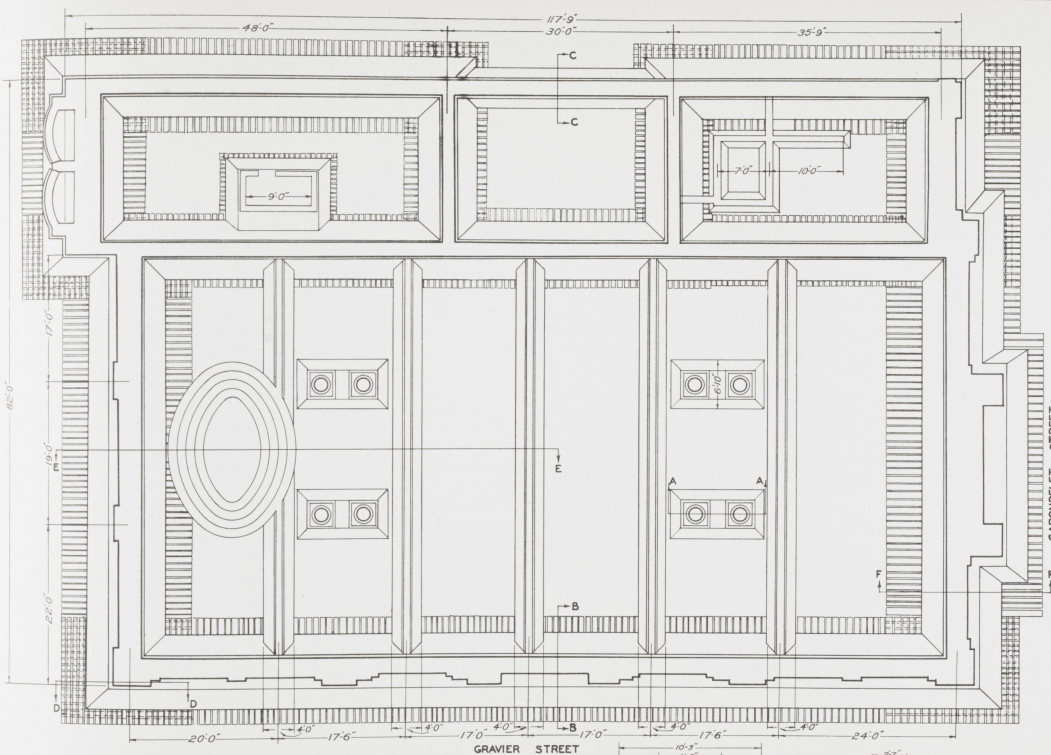
A record of the settlement of the building was kept from January 26th, 1883 to May 14th, 1905, by Major F. M. Kerr; from Nov. 25th, 1902 to Feb. 11, 1912 by Mr. A. C. Bell; and from Feb. 11, 1912 to June 24th, 1917 by Mr. J. F. Coleman. A graph of this record and notes on the leaning from the vertical are shown on Drawing 2.

The entire area under the building, which was roughly rectangular in shape, was excavated from 4′ to 6′ below curb level, and a bed of shell, gravel, and coal tar pitch was laid. The foundations were brick spread footings resting on cypress grillage. The brick footings were approximately 8′-6″ at the base and tapered up to 3′ under the wall opposite Gravier Street, and under the other three exterior walls they were approximately 10′-9″ at the base tapering up to 4′-6″. Immediately under the brick was a layer of cypress timbers about 4″ x 6″ and beneath this another layer of timbers which varied in size but seem to have been 8″ and 10″ by 12″ and were spaded 3″ to 6″ apart. These two layers, projected several feet beyond the base of the brick footings, as shown in foundation plan and section details of Drawing 1. The interior walls were carried on footings about 8′ at the base tapering to 2′-6″. The first floor rested on five footings running parallel to Carondelet Street spaced 17′ and 17′-6″ on center and 20′ and 24′ from the outer footings. These footings were 4′ at base tapering to about 1′ at top, and about 1′-3″ in height. They rested on a single layer of cypress timbers, probably 4″ x 6″ which did not project beyond the brick work. Some of the weight of the upper floors was carried on eight columns which rested on four spread footings as shown in foundation plan and Section A-A.

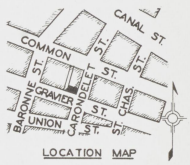
There are no records available as to what load per sq. ft. soil area the footings were designed to carry. This can only be figured approximately because of incompleteness of the plans. The total load per sq. ft. soil area figured for the section of wall at the center of the Gravier Street side was 1,912 lbs; for the section of wall at the entrance on Carondelet Street, 2,910 lbs; for the section of wall on Carondelet Street, not at the entrance, 2,075 lbs.; and for the section of wall at the center of the side on Varieties Alley 2,128 lbs. Loads on some interior columns were found to be as low as 1,200 lbs. per square foot. According to graph record shown in Drawing 2, settlement at this first point on Gravier Street side (Kerr No. 3, Bell No. 4, Coleman No. 4) was 1.02′ from 1883 to 1915, and settlement at the entrance on Carondelet Street (Kerr No. 2, Bell No. 2, Coleman No. 11) was 1.19 ft. over the same period of time.

It can not be said that settlement was due to overloading, and from the estimated loads as given above the loading was fairly uniform on walls but much less on columns. Settlement was probably due mainly to removal of ground water caused by installation of city drainage systems subsequent to 1897.

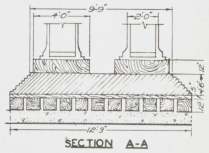
When the building was demolished there was a difference of opinion among engineers as to whether it could be restored and made safe. There was also a difference among members of the Cotton Exchange as to whether the old building should be preserved or a new building erected.



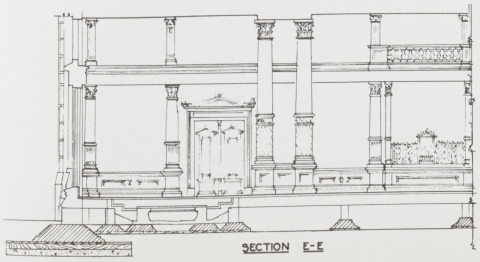




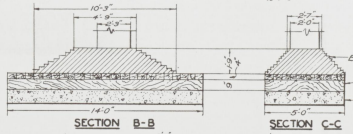
LOCATION MAP



SECTION A-A

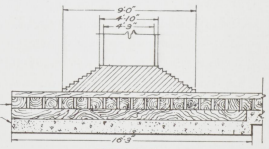


SECTION E-E

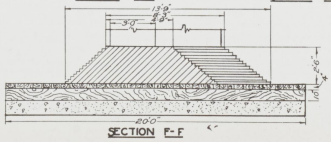


SECTION B-B

SECTION C-C



SECTION D-D

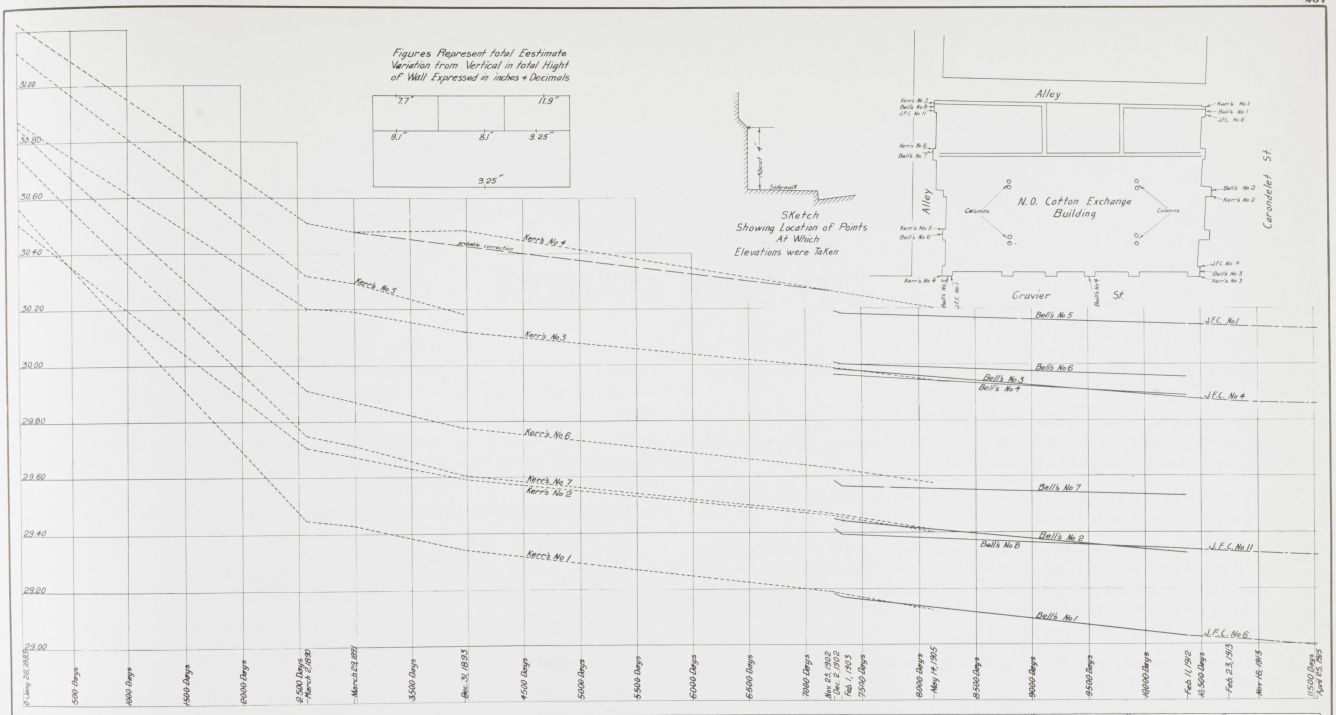


SECTION F-F

OLD NEW ORLEANS COTTON EXCHANGE

CASE NO. 96 DRAWING NO. 1


31.00
30.80
30.60
30.40
30.20
30.00
29.80
29.60
29.40
29.20
29.00
Stations
No. 1.
No. 2.
No. 3.
No. 4.
No. 5.
No. 6.
No. 7.



Stations	Out of Level January 26, 1883	Out of Level March 2, 1890	Out of Level March 29, 1891	Out of Level December 31, 1893	Out of Level November 25, 1902	Out of Level May 14, 1905	Total Settlement Since January 26, 1883	Rate of Settlement Per Year Jany 26, 1883 to March 2, 1890	Rate of Settlement Per Month March 2, 1890 to March 29, 1891	Rate of Settlement per Year March 29, 1891 to December 31, 1893	Rate of Settlement per Month Dec. 31, 1893 to November 25, 1902	Rate of Settlement per Year Nov. 25, 1902 to May 14, 1905	Rate of Settlement per Year Jany 26, 1883 to May 14, 1905	Rate of Settlement per Month Jany 26, 1883 to May 14, 1905	Rate of Settlement per Year Jany 26, 1883 to May 14, 1905
No 1.	8.000"	12.718"	12.718"	13.687"	13.687"	12.968"	17.593"	1.906"	0.343"	0.375"	0.218"	0.343"	1.687"	1.312"	0.843"	0.843"
No 2.	6.750"	9.718"	9.718"	10.687"	9.593"	9.593"	13.187"	1.312"	0.343"	0.375"	0.187"	0.281"	1.187"	0.968"	0.593"	0.593"
No 3.	4.250"	3.718"	3.968"	4.375"	3.250"	3.125"	11.156"	1.093"	1.187"	0.312"	0.187"	0.250"	0.968"	0.843"	0.468"	0.468"
No 4.	0.0	0.0	0.0	0.0	0.0	0.0	11.125"	1.187"	0.343"	0.0	0.312"	0.3125"	1.093"	0.843"	0.593"	0.593"
No 5.	1.250"	2.281"	2.281"	3.593"	.....	.....	12.375"	1.312"	0.343"	0.468"	.....	.....	1.187"	1.093"	.....	.....
No 6.	4.500"	7.312"	7.312"	6.531"	7.562"	7.562"	15.375"	1.562"	0.343"	0.437"	0.187"	0.291"	1.437"	1.187"	0.718"	0.718"
No 7.	5.750"	9.250"	9.250"	10.500"	9.593"	9.187"	16.187"	1.687"	0.343"	0.468"	0.187"	0.281"	1.562"	1.312"	0.718"	0.718"

Date of Observation	Number of Days Intervening	Station No 1 N. Corner			Station No 2 N Side Main Ent Carondelet			Station No. 3 S. E. Corner			Station No 4 S.W. Corner			Station No 5 1st Plinth in Alley			Station No 6 N Side main ent in Alley			Station No 7 N.W. Corner		
		Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day	Elevation	Diff in Elev.	Rate of Settling Per Day
1883 January 26	.....	52.38	.....		52.32			52.69	.....		53.05			52.94			52.67			52.67		
1890 March 2	2592+718 yrs 7.18 yrs.	51.27	-1.11	0.00043	51.52	-0.80	Δ	52.02	-0.67	0.00026	52.33	0.72	0.00028	52.14	0.80	0.00027	51.72	-0.95	0.00037	51.56	-1.01	0.00039
1891 March 29	392+1.08 yrs. 2984+8.18 yrs.	51.24	-0.03	0.00008	51.49	-0.03	0.00008	52.01	-0.01	0.00003	52.30	0.03	0.00008	52.11	0.03	0.00008	51.69	-0.03	0.00008	51.53	-0.03	0.00008
1893 December 31	1008+2.76 yrs. 3992+10.94 yrs.	51.16	-0.08	0.00008	51.41	-0.08	0.00008	51.94	-0.07	0.00007	52.30	0.00	0.00000	52.00	0.11	0.00011	51.59	-0.10	0.00009	51.42	-0.11	0.00011
1902 November 25	3250+8.90 yrs. 7210+19.84 yrs.	51.01	-0.15	0.00005	51.28	-0.13	0.00004	51.81	-0.13	0.00004	52.08	0.22	0.00007				51.45	0.14	0.00004	51.28	-0.11	0.00004
1905 May 14	901+2.47 yrs. 8143+22.31 yrs.	50.94	-0.07	0.00008	51.22	-0.06	0.00007	51.76	-0.05	0.00006	52.02	-0.06	0.00007				51.39	-0.06	0.00007	51.22	-0.06	0.00007
Totals	8143+22.31 yrs.		-1.44	0.00018		1.10	0.00014		-0.95	0.00011		1.03	0.00013					-1.28	0.00016		-1.32	0.00017

OLD NEW ORLEANS COTTON EXCHANGE

DRAWING NO 2

CASE NO 96

Case No. 97.

CITY PARK STADIUM

This case covers the west side of the City Park Stadium located in City Park, New Orleans, La.

It was designed by Weiss, Dreyfous and Seiferth—Armstrong and Koch, Architects with E. A. Christy, consulting architect and George P. Rice, consulting engineer. It was constructed by the Federal Emergency Relief Administration.

It is a reinforced concrete structure having a seating capacity of 7,200 persons, designed in the form of a circular sector 90'-0" wide in plan, having an inner radius of 540'-0".

The rear of the stadium rises 32'-6" above the grade. The seats are 2'-3" wide and have a rise of 7" in the lower tier, 8" in the second tier, 9" in the third tier and 10" in the top tier. These seats are supported by reinforced concrete columns and beams as shown by the cross section on accompanying drawing. The interior columns are 1'-4" square while the exterior columns vary in size.

The only excavation was for the footings which go to a depth of 5'-0" below grade and which rest on a sandy grey clay soil.

The soil was explored for several feet below footing bottoms to determine whether stumps were present. Where stumps were found within two or three feet of footing bottoms they were removed and the holes filled with packed sand. Under all footings the excavation was carried down one foot and this space was filled with packed sand, so that each footing rests on one foot of sand.

This stadium is supported by reinforced concrete spread footings of various sizes and depths. The accompanying drawing shows the spacing and construction details of these footings. Also shown is a footing schedule which gives the size and depth of the various footings.

The design computation for the footings as to soil bearing value per square foot is as follows and was furnished by Mr. Geo. P. Rice:

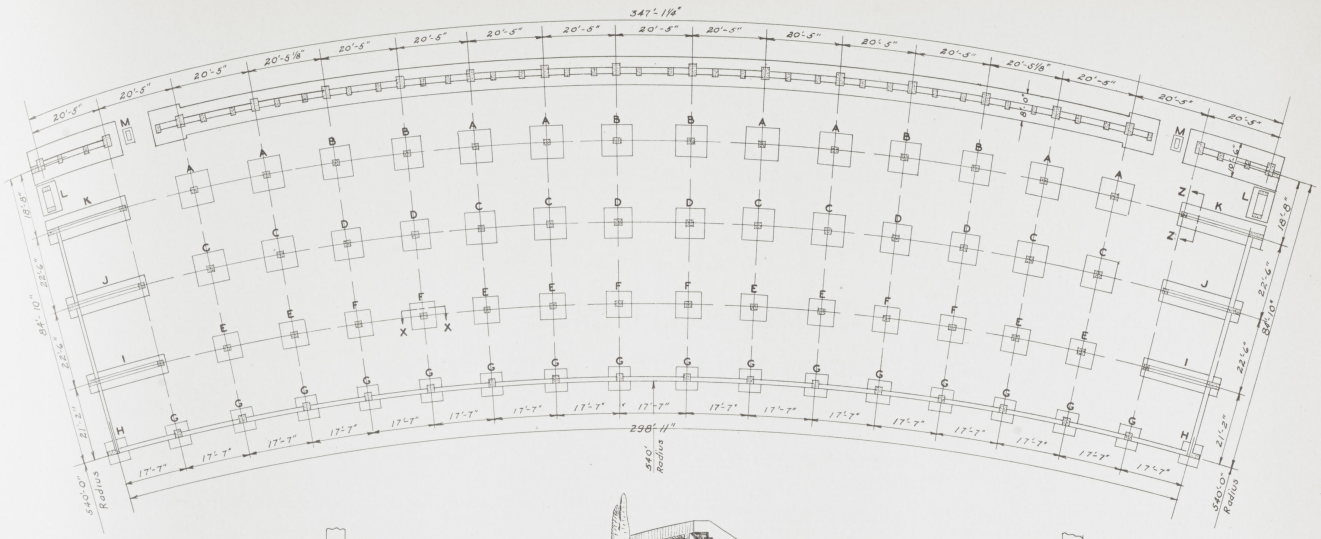
"Dead load only 780 lbs. SF
Dead Load 25% LL. (10 lbs. SF) 800 lbs. SF
Dead load 100% LL. (40 lbs. SF) 858 lbs. SF

"The super structure is designed for a live load of 100 lbs. per square foot which includes 150% for impact but the maximum live load to footings is 40 lbs. per square foot as the impact would be absorbed by flexure and inertia of the structure."

At the time of this survey no evidence of settlement had appeared and the structure was not quite complete. As this report goes to press, an east side section, exactly similar to west side, has been completed, and the north ends have been joined so as to form a complete horseshoe.

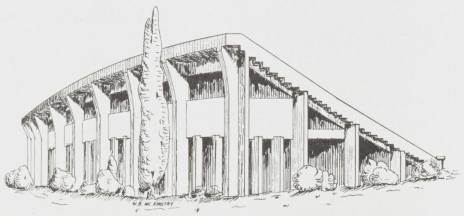


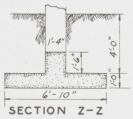
FOOTI	
Mark	Siz
A	9'-4
B	8'-4
C	9'-0
D	7'-8
E	7'-3
F	7'-0
G	5'-4
H	5'-1
I	4'-10"
J	6'-2"
K	6'-10"
L	5'-9"
M	4'-0"





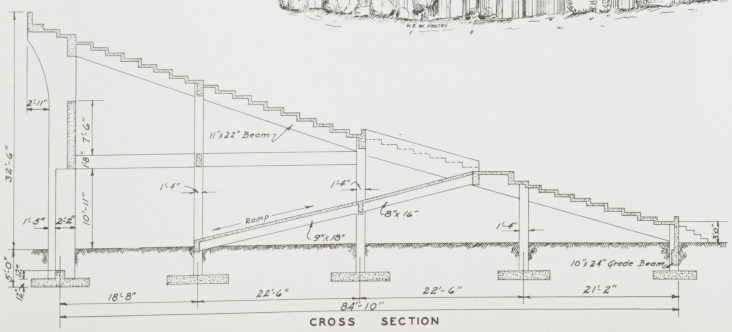
SECTION X-X



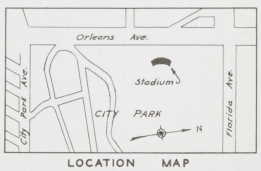


SECTION Z-Z

FOOTING SIZE		
Mark	Size	Depth
A	9'-4" Sq.	1'-2"
B	8'-4" Sq.	1'-2"
C	9'-0" Sq.	1'-2"
D	7'-8" Sq.	1'-0"
E	7'-3" Sq.	1'-0"
F	7'-0" Sq.	1'-0"
G	5'-10" Sq.	1'-0"
H	8'-1" x 6'-6"	1'-0"
I	4'-10" x 22'-1 3/4"	1'-0"
J	6'-2" x 22'-9"	1'-0"
K	6'-10" x 23'-6 3/4"	1'-0"
L	5'-9" x 8'-6"	1'-0"
M	4'-0" X 2'-6"	1'-0"



CROSS SECTION



LOCATION MAP

CITY PARK STADIUM

WEST SIDE

CASE NO. 97

Case No. 98.

CEDAR EXCHANGE
SOUTHERN BELL TEL. & TEL. CO.

This building was designed by Marye, Alger & Alger, Architects, and was constructed in 1925 by the Underwood Construction Company, Contractors.

It is a two story wood frame building of slow burning construction with exterior walls of brick veneer. It is located in Jefferson Parish about one mile west of the city limits, on Metairie Road and Gruner Avenue.

The height of the building is about 35 ft. It fronts 41'-11" on Metairie Road and is 49'-1" deep. Footings are all reinforced concrete without pile foundations. Interior column footings cover 18 square feet each and the continuous wall footings cover 3½ square feet per linear foot of wall.

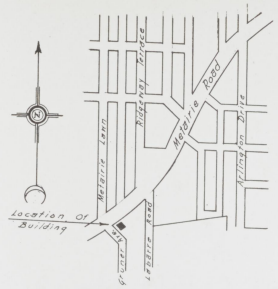
The bearing value of the soil was assumed at 1,500 lbs. per square foot and the building was designed accordingly.

The live load and dead load are transmitted to the footings through steel columns and through wood studs.

The ground was excavated only for, and to the bottom of, the footings, to a depth of 2 ft. below grade; grade being approximately 3.5 M. G. L.

The accompanying drawing shows the foundation plan together with various cross sections of the footings, and the location of the building.

At the time of this survey there are no visible cracks and no evidence of undue settlement.



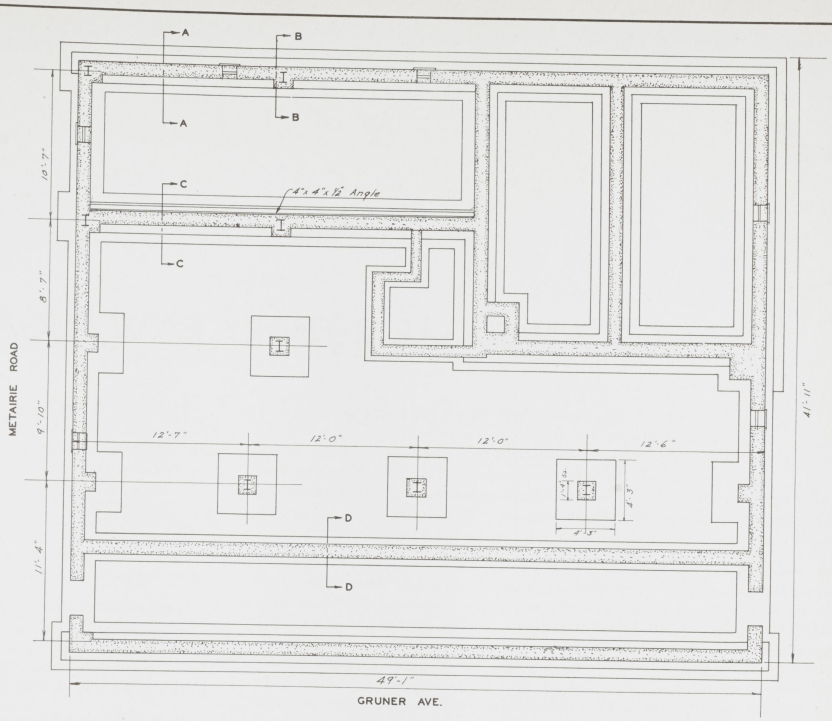
LOCATION MAP

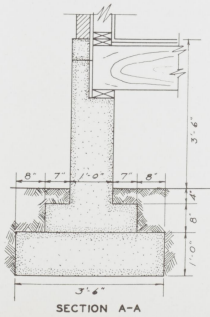


CEDAR EXCHANGE

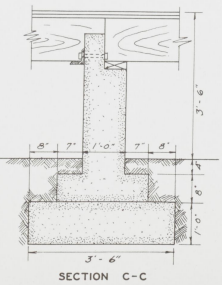
SOUTHERN BELL TEL. & TEL. CO.

CASE NO. 98

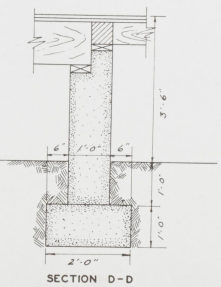




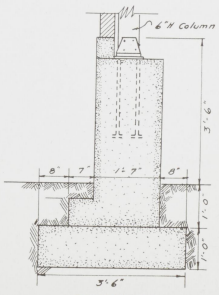
SECTION A-A



SECTION C-C



SECTION D-D



SECTION B-B

Case No. 99.

AMERICAN SUGAR REFINERY RAW SUGAR SHED No. 3

The Raw Sugar Shed No. 3 of the American Sugar Refiney at Chalmette, La., is used for storing raw sugar. It was designed by Eugene Kell, engineer for the Refinery, and built by the American Sugar Refinery in 1909. The building measures 180' by 140' and is 34' high. The two long sides of this shed have sliding corrugated iron doors with only the steel columns separating the doors. The two short sides also have corrugated doors but brick pillars separate them. The building is of steel frame with brick end walls which are 13" thick. The roof is of arched concrete and 8" steel I-beams supported on steel trusses which are supported by steel columns.

The foundation for piers and walls are concrete, resting on cypress grillage 6" thick. These spread footings do not carry any load other than that of the building itself. When this warehouse is loaded a small live load will be transmitted to the concrete piers because of their bevel shape and the fact that the floor partially rests on these piers. The floor of the warehouse is a double wood plank floor which rests upon sleepers imbedded in 4" of a sand and tar mixture. The whole floor in turn rests on a river sand fill. When the shed is full of sugar, there is a load between 1,700 lbs. per sq. ft. to 1,800 lbs. per sq. ft. on this floor, the floor being independent of the building frame. This floor has sagged in varying degrees everywhere and changes in level as sugar is stored and taken out of the shed.

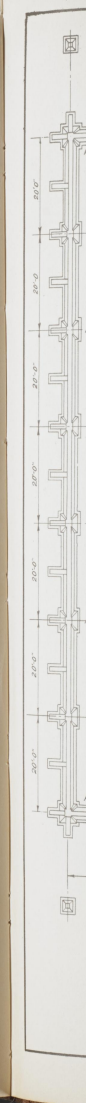
The weight of the roof is about 57½ lbs. per sq. ft. and is distributed to the piers as follows: 907 lbs. per sq. ft. on the four corner piers, 626 lbs. per sq. ft. on the piers of the two long sides, 1,320 lbs. per sq. ft. on the piers of the two short sides and 1,270 lbs. per sq. ft. on the interior piers.

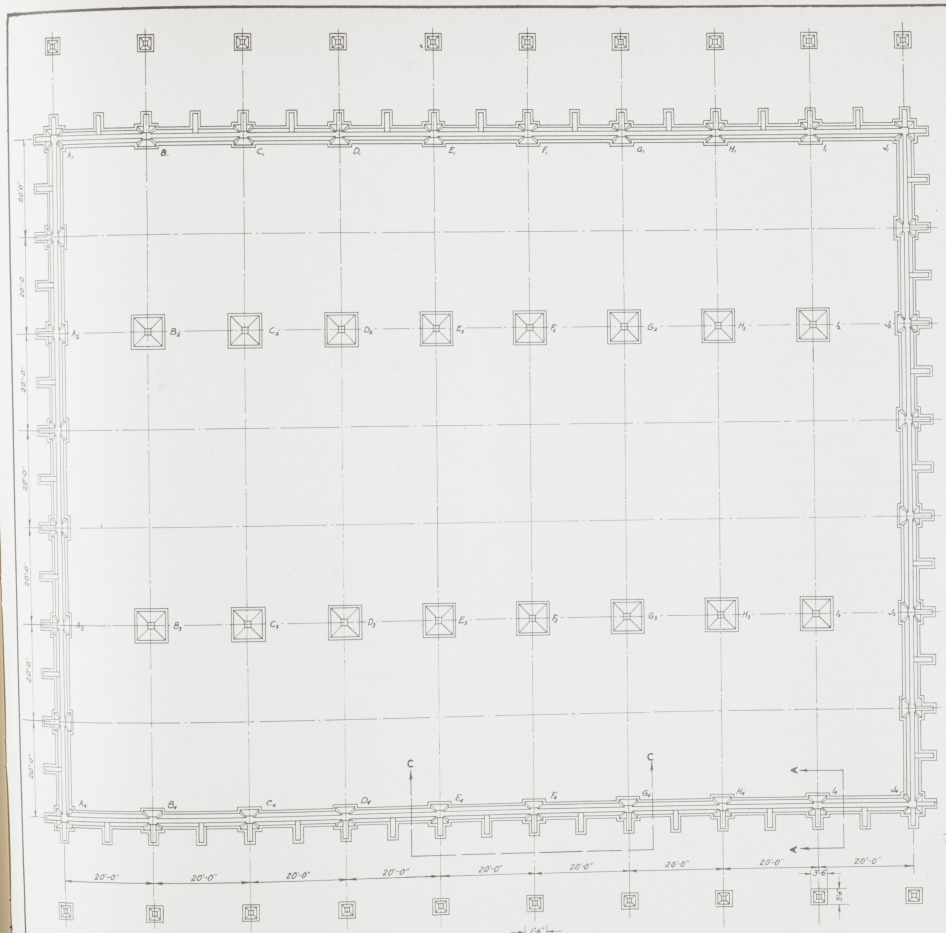
The only excavation was for the footings, which go to a depth of 3 feet below grade, or, to elevation 5.3 M. G. L. and were made large enough for working and placing of forms.

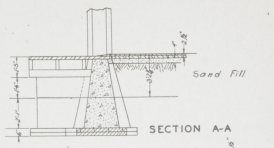
There were no piles driven as all are spread footings including footings for walls. The concrete footings rest on cypress grillage as shown in plan.

Levels were taken in Raw Sugar Shed No. 3, on December 23rd, 1914. It was then empty but had been normally loaded shortly before. Levels were again taken on January 24, 1916, when the shed was empty. Also on July 19, 1916, when the shed was empty. On September 17, 1917, refined sugar was piled 20 bags high in the area bounded by columns B1, B2, C3, D3, F3, G3, H4, I4 and J4 and levels were taken as shown on accompanying log.

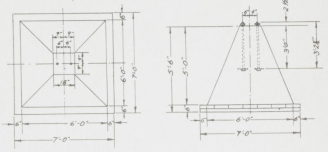
The building proper shows no sign of settlement.







SECTION A-A

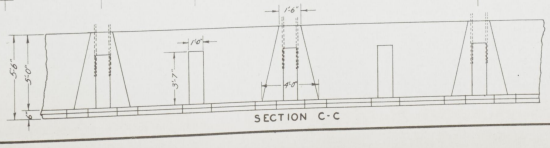


TYPICAL INTERIOR FOOTING

Date	A_2	B_2	C_2	D_2	E_2	F_2	G_2	H_2	I_2	J_2
May 23, 1914		15.432	15.432	15.431	15.473	15.463	15.396	15.393	15.469	
Dec. 17, 1914		15.432	15.432	15.431	15.473	15.463	15.393	15.393	15.409	
June 25, 1915										
Jan. 24, 1916		15.423	15.468	15.462	15.447	15.426	15.387	15.367	15.398	
July 19, 1916		15.368	15.368	15.371	15.407	15.380	15.324	15.314	15.353	
Sept. 14, 1917										
	A_3	B_3	C_3	D_3	E_3	F_3	G_3	H_3	I_3	J_3
May 23, 1914		15.493	15.473	15.477	15.495	15.491	15.453	15.453	15.488	
Dec. 17, 1914		15.493	15.473	15.473	15.493	15.491	15.453	15.449	15.471	
June 25, 1915		15.463	15.454							
Jan. 24, 1916		15.498	15.488	15.476	15.468	15.461	15.438	15.441	15.466	
July 19, 1916		15.464	15.454	15.439	15.439	15.414	15.404	15.383	15.415	
Sept. 14, 1917		15.480	15.490	15.462	15.448	15.430	15.434			
	A_4	B_4	C_4	D_4	E_4	F_4	G_4	H_4	I_4	J_4
May 23, 1914	15.614	15.679	15.666	15.662	15.651	15.653	15.652	15.652	15.678	15.599
Dec. 17, 1914		15.679	15.666	15.662	15.650	15.653	15.654	15.657	15.678	
June 25, 1915	15.593	15.633	15.618	15.605	15.619	15.619	15.612	15.616	15.625	15.580
Jan. 24, 1916	15.638	15.660	15.628	15.665	15.649	15.667	15.655	15.656	15.664	15.640
July 19, 1916	15.593	15.618	15.624	15.631	15.622	15.636	15.616	15.624	15.638	15.571
Sept. 14, 1917	15.618	15.663	15.647	15.655	15.651	15.654	15.644	15.654		

LEVELS TAKEN IN RAW SUGAR STORAGE SHED NO. 3





SECTION C-C

RAW SUGAR SHED NO. 3

AMERICAN SUGAR REFINERY

CASE NO. 99

Case 100.

STANLEY THOMAS HALL TULANE UNIVERSITY

Stanley Thomas Hall is one of a group of buildings of the School of Engineering. It was designed by Andry & Bendernagel, architects, and was erected by George J. Glover in 1911. The original building was three stories in height but in 1927 the roof was removed and rebuilt so as to provide a fourth story. This addition was designed by J. H. Thompson of the School of Architecture and was erected by J. A. O'Brien, contractor.

The building, at its base, measures 132′-8″ by 63′-8″ and is 48′ high to the roof cornice, and from this point to top of roof is about 28′.

The original roof was very heavy and it was removed and replaced with a slate roof supported on a structural steel frame. The entire fourth floor addition and new roof did not add materially to the weight of the building.

The walls of the building are brick with limestone base course and trim.

Footings, numbered one to sixteen, support cast iron columns on which rest steel I-beams with one end resting on the brick walls. All loads are transmitted to the foundation through these columns and wall supports.

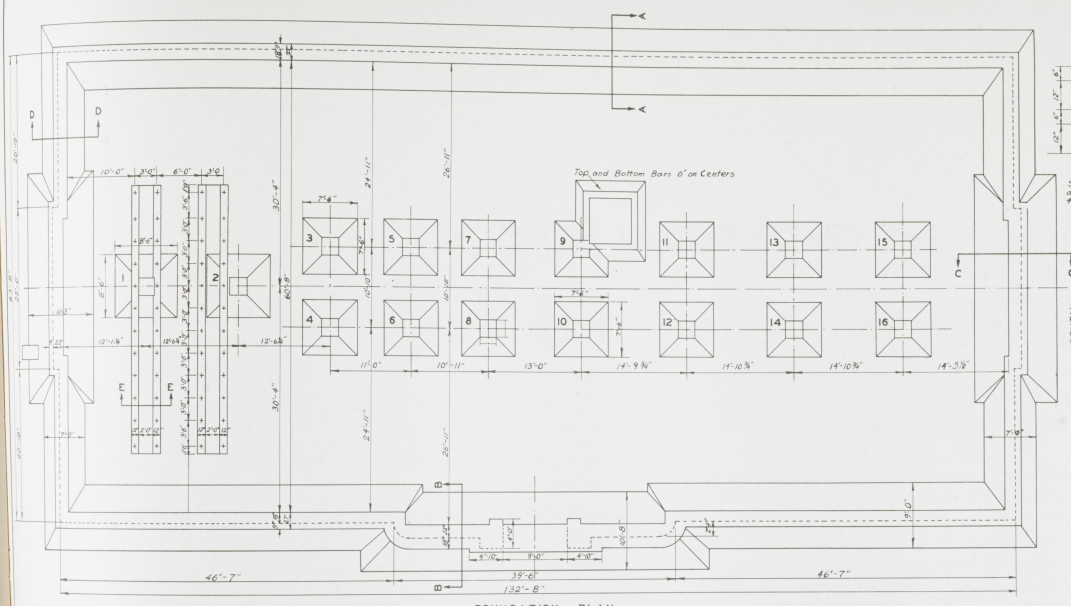
The elevation of the ground is approximately zero M. G. L. and the excavation for footings was about 2½′ deep. All footings are reinforced concrete as shown on drawing.

Mr. Thompson is authority for the statement that this was the first building erected in New Orleans with reinforced concrete spread footings.

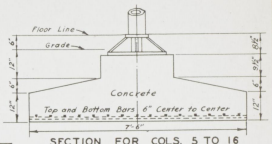
The dead load of the building is estimated at approximately 1,350 lbs. per square foot. The live load is negligible and would probably not ever exceed 25 lbs. per square foot.

There is no evidence of settlement in this building and if any has taken place it has been so uniform as not to develop cracks.



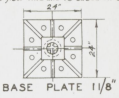


FOUNDATION PLAN

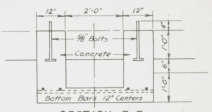


SECTION FOR COLS. 5 TO 16

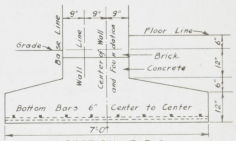
Section for 3,4,7&9 are similar except that columns are 8" in diameter. Col. 9 at elevator has top of base 4'0" below first floor line and is cased in cement.



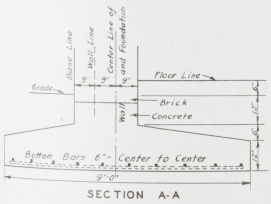
C.I. BASE PLATE 11/8" METAL



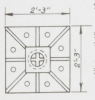
SECTION E-E



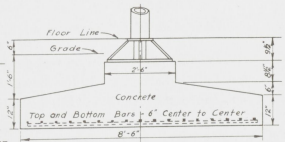
SECTION D-D



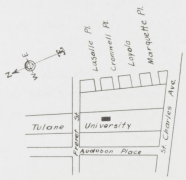
SECTION A-A



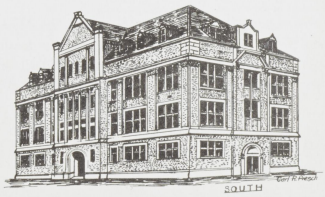
C.I. BASE PLATE 1" METAL



SECTION FOR COLS. 1 AND 2



LOCATION MAP

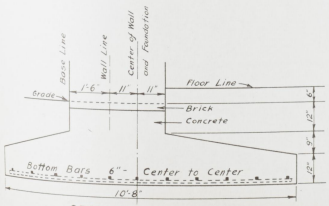


SOUTH

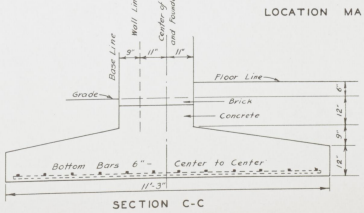
STANLEY THOMAS HALL

TULANE UNIVERSITY

CASE NO. 100



SECTION B-B



SECTION C-C

Case No. 101.

THE PRESBYTERIAN HOSPITAL

The Presbyterian Hospital was designed by Toledano & Wogan, Architects, in 1903 and was erected in 1904 by Chas. A. Sicard. Contractor

The building fronts on Carondelet Street and is located between Julia and Girod Streets.

This is a hospital building with exterior, and some interior, walls of brick, with wooden floors and partitions. It is approximately 170′ long by 46′ wide and 51′ high from ground line to parapet.

The foundations are approximately 5′ deep on spread footings as illustrated in sections on drawing. The footings consist of a grillage of 3″ x 10″ pine plank laid directly on the ground and surmounted by brick work laid in cement mortar.

This building was demolished in 1935 to be replaced by a modern school building on pile foundation. At the time of demolition the grillage timber was all found to be in a perfect state of preservation although apparently above the point of saturation in the ground. It is possible that at this depth the soil was continuously moist. During demolition of the foundations it was necessary to keep a pump running but this was during a rainy season and it was not definitely determined whether there was some ground water or whether it was rain water. The saturated timbers indicated that they were always wet to some extent.

The bottom of grillage was at approximately 1.47 M. G. L. and the soil was a blue clay or gumbo, with a small admixture of fine sand. The footings were continuous under the entire building, as can be seen from the footing plan, which represents in detail a partial plan of the building. Shown in miniature is a complete foundation plan.

While no data is available as to possible settlement it can be stated that when the building was demolished there were no signs of cracks in any of the brick walls or in the brick footings.

The estimated dead load per square foot of foundation area is 1,150 pounds.

Six test piles 60′ long were driven on this site to determine length to be used under the new Rabouin School.

First pile with 8″ tip penetrated 6′ under weight of hammer and at 50′ depth it was taking about 100 blows per foot.

Second pile with 6½″ tip penetrated 11′ under hammer and at 48′ depth was taking about 90 blows per foot.

Third pile with 6½″ tip penetrated 10′ under hammer and at 50′ was taking 225 blows.

Fourth pile with 6″ tip penetrated 23′ under hammer and at 51′ was taking 100 blows.

Fifth pile with 7½″ tip penetrated 16′ under hammer and at 48′ was taking 145 blows.

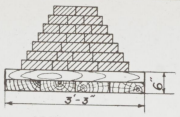
Sixth pile with 6″ tip penetrated 10′ under hammer and at 53′ was taking 150 blows.

From about 50′ to 70′ the average number of blows per foot was about 20, and running as low as 10 and as high as 31. This shows a hard stratum between 48′ and 53′. Piles were ordered 45′ long for the foundation. This has no particular bearing on the Hospital case except to show the low resistance of upper ten feet of soil.



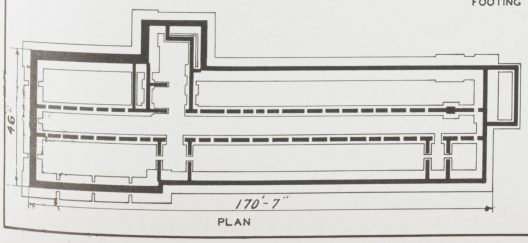


LOCATION MAP

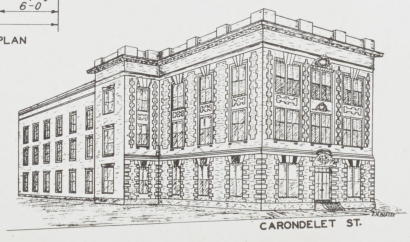


SECTION B-B

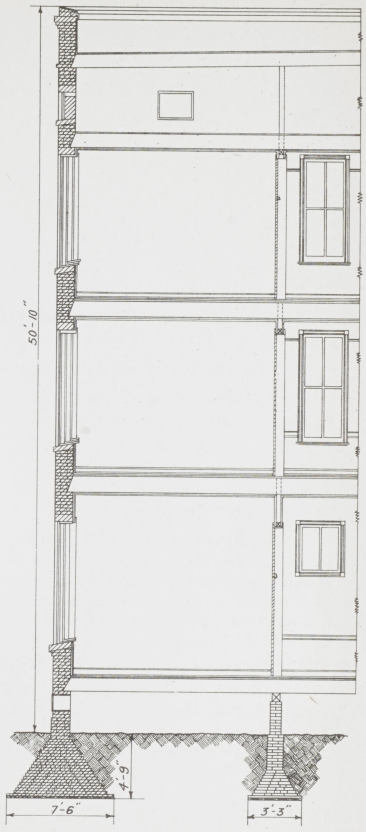
FOOTING PLAN



PLAN



CARONDELET ST.



SECTION A-A

PRESBYTERIAN HOSPITAL

CASE NO. 101

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LIBRARY
U OF KY



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University of Kentucky
Library

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Readers finding a book injured are expected to report the same.

8-28 10M 347=6370X

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