

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND GEOTECHNICAL ENGINEERING



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The value h_m could be computed from observations registered by the micrometer at piles 1 and 9 (single lifts h_1 and h_9 respectively). The penetration of the actual test pile 5 was found to be $e_5 = e_5 - h_5$, this being the difference between the micrometer observations e_5 at this pile and the lift h_5 , deducted from h_1 and h_9 of the above mentioned group of piles at place 5. All these vertical pile shiftings are represented in the table of Fig. 2, in connection with the pressure forces gradually increased in the course of two hours from 20.46 to 42.28 t. There will also be found the average frictional tensions τ_m caused by the pressure forces P on the side-area- F of the piles (if the resistances at the pile shoes are ignored) and the longitudinal tensions σ (pull z , pressure d) related to the cross-sections f of the piles. For pile-group 1 to 4 and 6 to 9 $F_z = 259,500 \text{ cm}^2 = 25.95 \text{ m}^2$ and $f_z = 5415 \text{ cm}^2$, while for pile 5 the analogous values are $F_d = 40100 \text{ cm}^2 = 4.01 \text{ m}^2$ and $f_d = 660 \text{ cm}^2$. Then there is $\tau_{z1m} = \frac{P}{F_z}$, $\tau_{d1m} = \frac{P}{F_d}$, $\sigma_{z1m} = \frac{P}{f_z}$, $\sigma_{d1m} = \frac{P}{f_d}$. The above mentioned table also shows the progress

of the test. The load was sometimes allowed to act unchanged for a longer period, and once the load was partially removed in order to ascertain a possible elastic behaviour. The piles of the aforesaid group are driven into the ground at a depth of four metres, whereas pile 5 is 4.4 metres deep. As several trial bores have shown, the piles are, for the upper three metres of their depth, in young alluvial soil, while their lower ends rest about 1.2 m deep in blue clay of the Pontium period. The first kind of soil was pedologically examined and, with its broken stone and sand contents of 46%, 52% Mo and 2% silt and clay, recognized to be an orange-yellow sand containing dust and clay, rich in deposits, dating from the latest Flysch-alluvions of the River Wien. The natural humidity of this soil was ascertained at $w = 29\%$, its degree of plasticity $B \sim 4\frac{1}{2}$; its shrinkage is $s = 2\%$; its cone flowing test specimen fell to pieces after having been immersed in water for eight days. This kind of soil alternates in layers of fine gray sand of greater plasticity ($B \sim 9$), with considerable clay contents.

The relations h_m/P and e_5/P described in the table (Fig. 2) are graphically represented as load/shift diagrams in Fig. 3. It will be seen that the pressure resistance of such a pile in this particular soil is exhausted when the yield point of the latter is reached, corresponding to a pile compression of 64.1 kg per square centimetre of the cross-section. The resistance of the pile against extraction appears to be limited at a maximum lifting power of 1.63 t/m² in relation to the pile side area. The soil showed an entirely plastic behaviour during this test.

No. I-6

PILE LOADING TESTS, BONNET CARRE FLOODWAY

J. P. Dean, Captain, Corps of Engineers, U.S.A.

and J. C. Baehr, Junior Engineer; United States Engineer Office, Second New Orleans District

The projects, loading tests for which are covered in the following report, are all located in the Bonnet Carre Floodway, situated along the east bank of the Mississippi River about twenty-five miles above New Orleans, Louisiana. Sheet A-1.

Included in the structures for which pile test data were gathered and which will be discussed in order in the following paragraphs are: a. The Spillway Weir Structure; b. The Airline Highway Crossing; c. The L. & A. Railroad Crossing, and d. The I. C. Railroad Crossing.

a. The Spillway weir is a reinforced concrete structure, 29 feet wide, 7,7000 feet long divided into 22 foot bays and supported on untreated timber piles; with a fore apron 44 feet wide, 2 $\frac{1}{2}$ feet thick and rear apron 20 to 30 feet wide, both bearing directly on the subsoil. Sheets A-2, 3.

Material encountered in the borings is typical of recent alluvium adjacent to stream banks; stiff clays with numerous lenses or pockets of packed sand which show very little, if any, continuity. Sheet A-5.

Piles under the main portion of the weir are untreated timber, 65 to 70 feet long, out off to elevation +6 feet M.G.L., with natural ground surface at approximately +12 feet M.G.L., and spaced 3 feet centers along the length and 4 to 5 feet on the width. Sheet A-4.

Pile driving and loading tests at the weir site were of both round timber piles and Raymond concrete piles. Wood piles of untreated long leaf yellow pine, 6-8 inch tip, 15-16 inch butt, with penetrations of 65 to 70 feet below the bottom of a 5 foot excavation, and driven with a No. 1 Vulcan hammer, 5000 # weight, 3 foot drop.

Concrete piles, precast reinforced piles, 8 inch tip, 22 inch butt, with penetrations of 30 to 35 feet below surface of a 5 foot excavation, were driven with the same Vulcan hammer as above. Sheet A-6.

Pile driving records were kept on all piles, and bearing capacities computed by the Engineering News formula indicated safe loads of 11 to 24 tons for timber, and 13 to 28 tons for concrete piles. Loading tests, concrete blocks and pig iron on a loading platform, conducted on these same piles shortly after driving, show maximum loads supported with settlement under $\frac{1}{2}$ inch of from 25 to 50 tons for timber and 50 to 100 tons for concrete. Sheet A-7a, b. These test loads were from 2 to 3 times those indicated as safe by the Engineering News formula.

A marked difference in supporting power (skin friction) is noted between timber and concrete piles; timber varying from 250 to 500#/sq ft, and concrete from 600 to 1200#/sq ft. This difference is probably due to the fact that for a skinned timber pile friction is between wood and soil; whereas for concrete the shear surface is a minute distance from the roughened pile surface, the friction being of soil against soil.

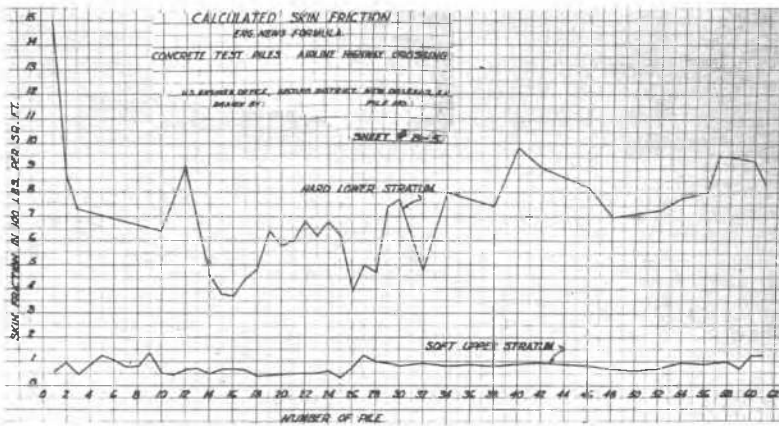
Soil bearing tests to disclose the safe bearing capacity of the top soil were conducted since both fore and rear apron were to bear directly on the soil. In all, four such tests were made as follows: (1) 4 - 1 ft x 1 ft posts supporting a loading platform; (2) 6 ft x 8 ft flat slab; (3) 3 ft x 6 ft; and (4) 2 ft x 2 ft flat slab. Loads applied were of concrete blocks and pig iron, with load-settlement graphs shown on Sheet A-9. A marked increase in unit supporting power is noticed in the case of the smaller areas, the 1 ft x 1 ft post supporting 2500#/sq ft while the 6 ft x 8 ft slab supports only 1900#/sq ft with less than $\frac{1}{2}$ inch settlement.

b. The Airline Highway Crossing is a reinforced concrete beam and slab roadway 40 ft wide, 6,000 ft long, supported by 20 in x 20 in concrete pile bents spaced 39 ft centers, with a 1,500 ft earth embankment on either end. Natural ground surface varied from +2 to +4 ft M.G.L., with cut-off at +19 ft M.G.L. Sheet B-1.

Test borings along the proposed center-line show that the material may be roughly divided into two strata. The upper extends from ground surface to a depth of -65 ft M.G.L. between Stations 2110+00 and 2119+00, and to -45 ft M.G.L. from Station 2119+00 to 2170+00. It consists principally of medium and firm clays, 40 to 80 per cent clay (0.005 mm) and 30 to 40 per cent moisture (per cent wet weight), with slightly higher moisture content at the surface. Occasional lenses of humus, with moisture contents 60 to 70 per cent, are found in the upper 15 or 20 feet. A few scattered pockets of sandy material occur throughout. The lower stratum is made up chiefly of very hard yellow and gray clays, 40 to 80 per cent clay, moisture contents of 15 to 27 per cent, with occasional pockets of sandy material. Sheet B-2.

In all, a total of 48 test piles, each 20 in x 20 in x 75 ft, precast concrete, were driven with #0 Vulcan hammer and loaded with 5 ton concrete blocks. Graphs of driving and loading data on each pile are given on Sheets B-4a, b, c, d, etc. On these graphs is plotted also the top elevation of the hard clay stratum. It might be noted in passing the marked increase in driving resistance or skin friction when penetrating the hard lower stratum. Sheet B-5 shows a comparison of the driving resistance in each layer based on the Engineering News formula, indicating a value of about 100#/sq ft for the upper, and 600 to 800#/sq ft. for the lower.

Test loads, sustained with less than $\frac{1}{2}$ in settlement, of 50 to 120 tons, were 2 to 4 times the value indicated as safe by the Engineering News formula, the same as in the



case of the weir.

A series of five Carnegie H sections of various weights and lengths were driven along the north approach, with a No. 1 Vulcan hammer. Complete driving records were not kept, only the penetration per blow at the end of a driving period was recorded. See Sheet B-6. Pile No. 1, an 8 in, 33#, H section, was driven to 49 ft penetration and loaded to 28 tons with no settlement. Piles Nos. 2, 3, 4 and 7 were first driven to 49 ft penetration and loaded. Subsequently, 20 ft and 10 ft sections were spliced on one at a time, piles redriven and loaded at each new penetration. Sheet B-6. Pile No. 3, a 10 in 49# section, was boxed in by welding plates between the flanges to increase the skin friction. Comparison of loading of Pile No. 2, a 10 in 40# section without boxing, with No. 3, shows an appreciable increase in the supporting power of the boxed section.

c. The L. & A. Railroad Crossing is a single track trestle, supported on creosoted piles, seven to the bent, 14 in x 14 in creosoted caps and 4 steel 24 in I beams, 24 ft long stiffened by diaphragms at the third points.

Material encountered in the borings consisted generally of blue and gray clays with occasional pockets of sand and humus. A layer of hard clay was found at -45 ft M.G.L. Sheet C-1.

Test piling of timber 40 to 60 ft lengths, were driven with a double acting No. 2 Vulcan hammer and loaded by means of a steel water tank on a loading platform. No sustained loading tests were conducted, a maximum of three hours being required to load piles continuously until failure occurred. Sheet C-2a, b.

Loads for 50 ft penetration ranged from 25 to 50 tons with settlement under $\frac{1}{2}$ in.

d. The I. C. Railroad Crossing is a standard ballast deck double track creosoted timber trestle carried on 12 pile bents spaced 13.5 ft apart with firewalls at intervals of 500 to 900 ft. Incorporated in the trestle are five 35 ft and five 70 ft I beam spans for passing of drift.

Borings adjacent to the crossing showed alternate pockets of very soft sand and clay with considerable humus to a depth of -40 ft M.G.L. From -40 to -60 ft M.G.L., the material was predominantly very soft clay. Sheet D-1.

Piles in the firewall and pier footings were spaced 2 $\frac{1}{2}$ to 3 ft on centers with cut-off elevation -15 ft M.G.L.

Test piles of creosoted long leaf yellow pine 75 ft lengths were driven with a No. 1 Vulcan hammer; penetration 30 to 45 ft below bottom of canal at elevation -20 ft M.G.L. Loadings of pig iron on a timber platform were applied continuously until failure occurred, a maximum of 25 hours being required for any one test. Sheet D-2a, b. Test piles with penetration of 30 to 45 ft sustain test loads varying from 15 to 40 tons with settlements under $\frac{1}{2}$ in.

Conclusion: Bearing power of timber piles at the Weir, L. & A., and I. C., were practically identical, varying from $\frac{1}{2}$ to 1 ton per ft penetration. The value at the Weir site was slightly less probably due to the time element involved. A period of 5 to 20 days elapsed in these tests whereas for the railroad tests only one day at most was required.

A similar comparison of concrete piles at the Weir and the Airline Highway shows a supporting power of $1\frac{1}{2}$ to 3 tons per ft penetration at the Weir and 1 to $2\frac{1}{2}$ tons per ft at the Airline, the sandy material at the Weir probably accounting for this increase.

A 20 in by 20 in concrete pile and an 8 in tip, 16 in butt wood pile driven in connection with the Carnegie H sections show the following bearing capacities for 78 \pm ft penetration; concrete 128 tons, timber 110 tons, 12 in C. B. section 73 tons, 10 in boxed section 58 tons, and the same unboxed section, 49 tons.

APPENDIX

a. Weir Structure

Sheet A-1	General Location
A-2, 3	Construction Details
A-4	File Plan
A-5	Soil Borings
A-6	Location of File & Soil Bearing Tests
A-7a, b	Driving & Loading Graphs
A-9	Soil Bearing Graph

b. Airline Highway

Sheet B-1	Profile & Elevation
B-2	Borings
B-4a, b, c, etc.	Driving & Loading Graphs
B-5	Skin Friction Graph
B-6	Carnegie H Sections

c. L. & A. Railroad

Sheet C-1	Location & Borings
C-2a, b	Driving & Loading Graphs

d. I. C. Railroad

Sheet D-1	Location & Borings
D-2a, b	Driving & Loading Graphs

CORPS OF ENGINEERS U.S.A.

DEPARTMENT

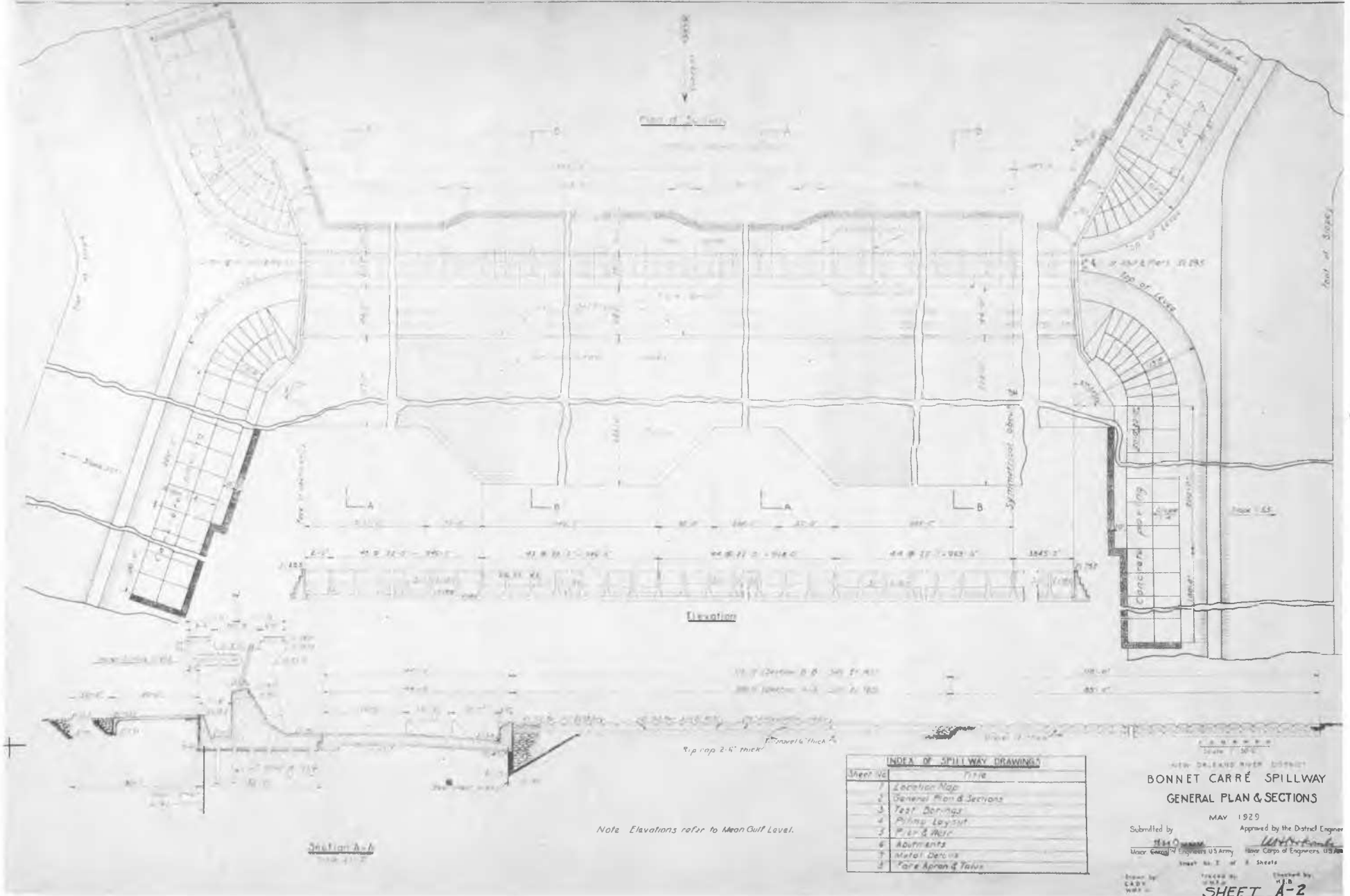


DATA

Location 23 miles above New Orleans
 High Water Elev. 24.3 M.S.L. Corresponding to H. 1915 - 1916 Stage
 Project Discharge 250,000 C.F.S.
 Length of Spillway 7659 ft.
 Clear Opening 350 ft. x 19 ft. x 20 ft. (700,000 ft.³)
 Length of Floodway 5.7 miles (4,900 ft.)
 Area of Floodway 7860 acres
 Elevations refer to Mean Sea Level
 Maximum height of Levees 15.17 ft.
 Length of Levee 14.7 miles

NEW ORLEANS RIVER DISTRICT
BONNET CARRÉ SPILLWAY
 LOCATION MAP
 MAY 1928
 Approved by the District Engineer
 Submitted by
 Major General J. G. ...
 Sheet No. 1 of 8 Sheets of Engineering Data
 Drawn by
 W. H. ...
 Checked by
 W. H. ...

SHEET A-1.



Sheet No.	Title
1	Location Map
2	General Plan & Sections
3	Test Drawings
4	Piling Layout
5	Pier & Rail
6	Adjustments
7	Metal Deck
8	Gate Apron & Tails

NEW ORLEANS RIVER DISTRICT
BONNET CARRÉ SPILLWAY
GENERAL PLAN & SECTIONS

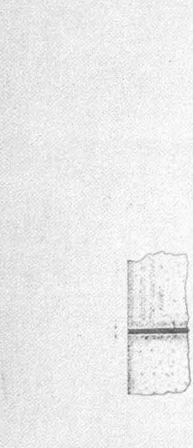
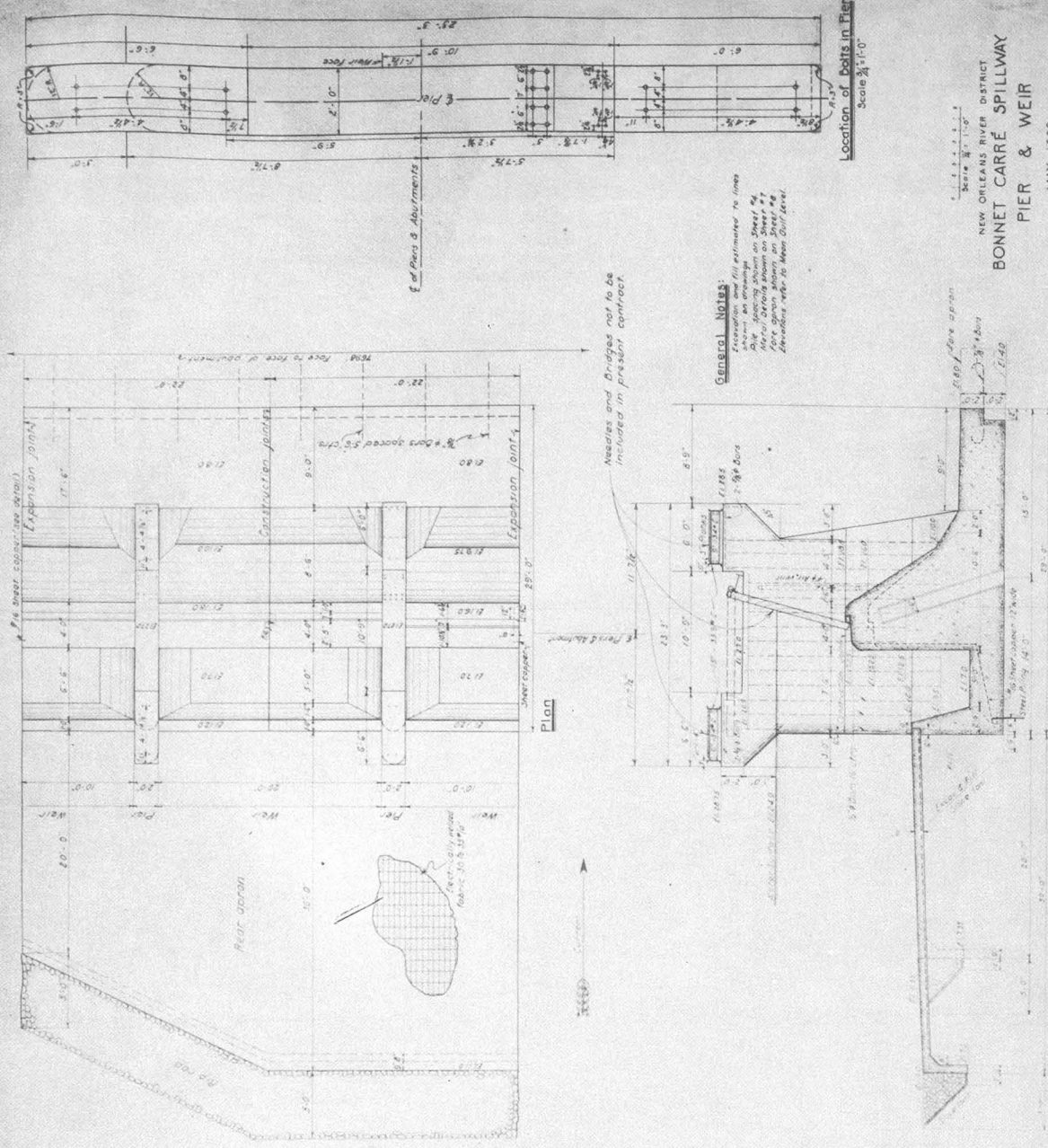
Submitted by *[Signature]* MAY 1929
 Approved by the District Engineer *[Signature]*

Major General Engineers U.S. Army
 Major General Engineers U.S. Army

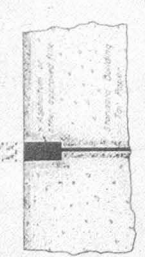
Drawn by *[Signature]* CHECKED BY *[Signature]* DESIGNED BY *[Signature]*
 SHEET A-2

1-6

233



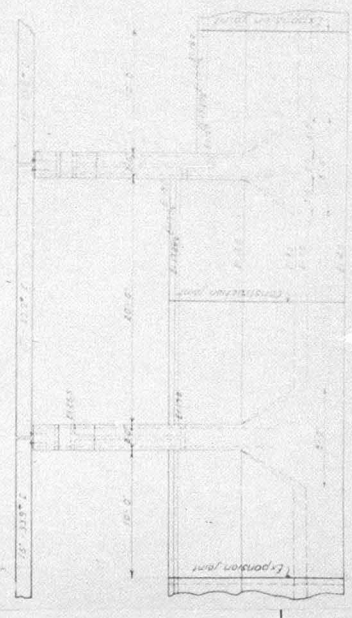
Horizontal Expansion Joint between Rear Apron Section



Horizontal Expansion Joint between Weir & Fore Apron Sections



Vertical Expansion Joint between Weir Sections



Elevation

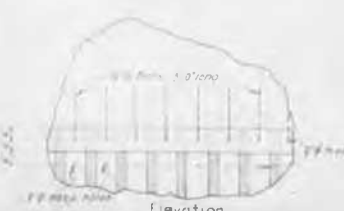
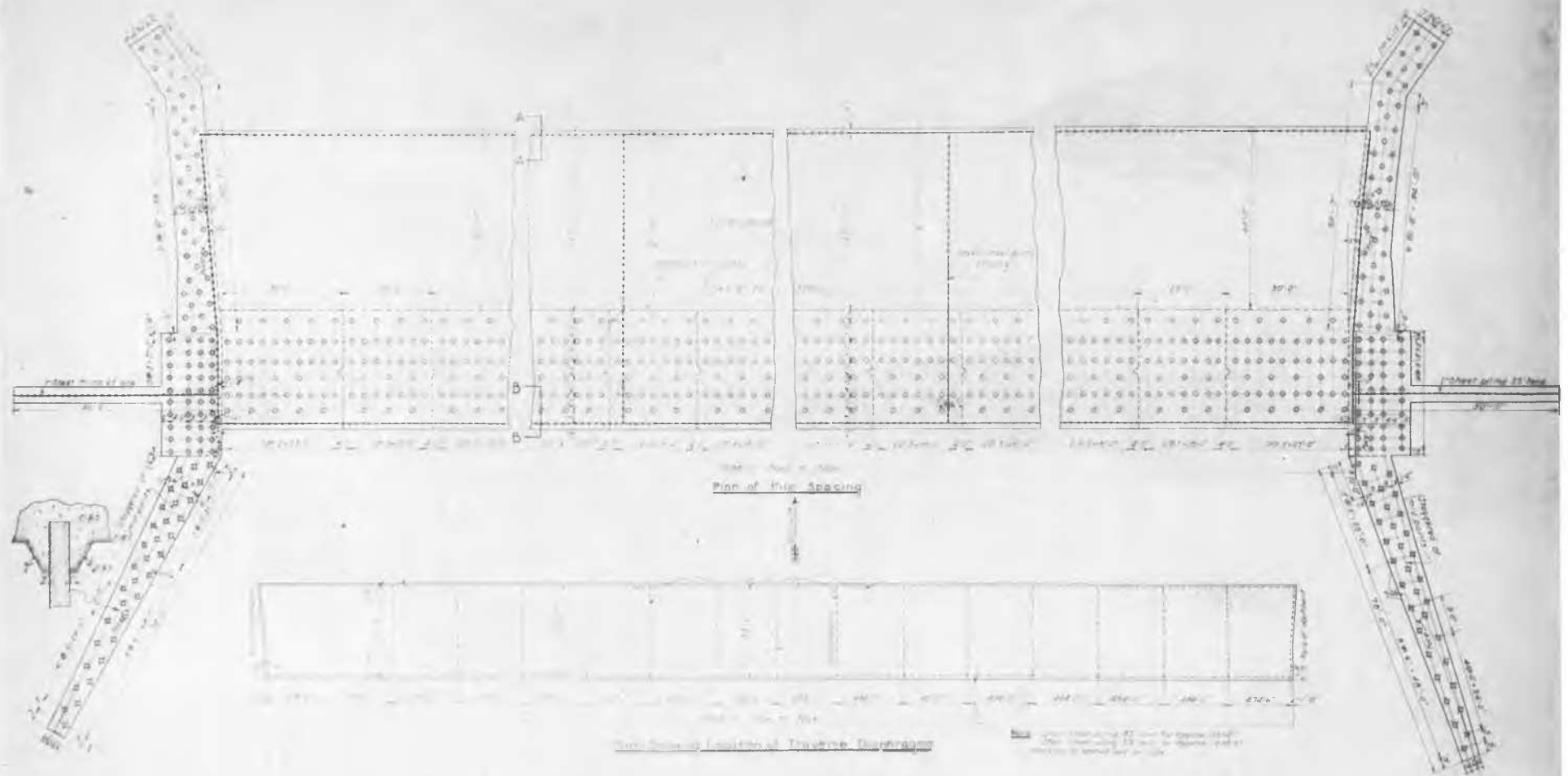
General Notes:
 1. Reinforcement and all estimates to lines shown on this sheet are to be furnished in accordance with the specifications for concrete and steel in the contract.
 2. All dimensions are to mean full level.
 3. All elevations refer to Mean Gulf Level.

Location of Bolts in Pier

Scale 1/2"=1'-0"

Scale 1/2"=1'-0"
 NEW ORLEANS RIVER DISTRICT
BONNET CARRÉ SPILLWAY
PIER & WEIR

Submitted by: **MA. Daniels**
 Major Corps of Engineers, US Army
 Checked by: **W.H.P.**
 Sheet No. 5 of 6 Sheets
 MAY 1929
 Approved by the District Engineer
W.H.P.
 Major Corps of Engineers, US Army



Scale 1" = 40'

NEW ORLEANS RIVER DISTRICT
BONNET CARRÉ SPILLWAY
PILING LAYOUT

MAY 1925

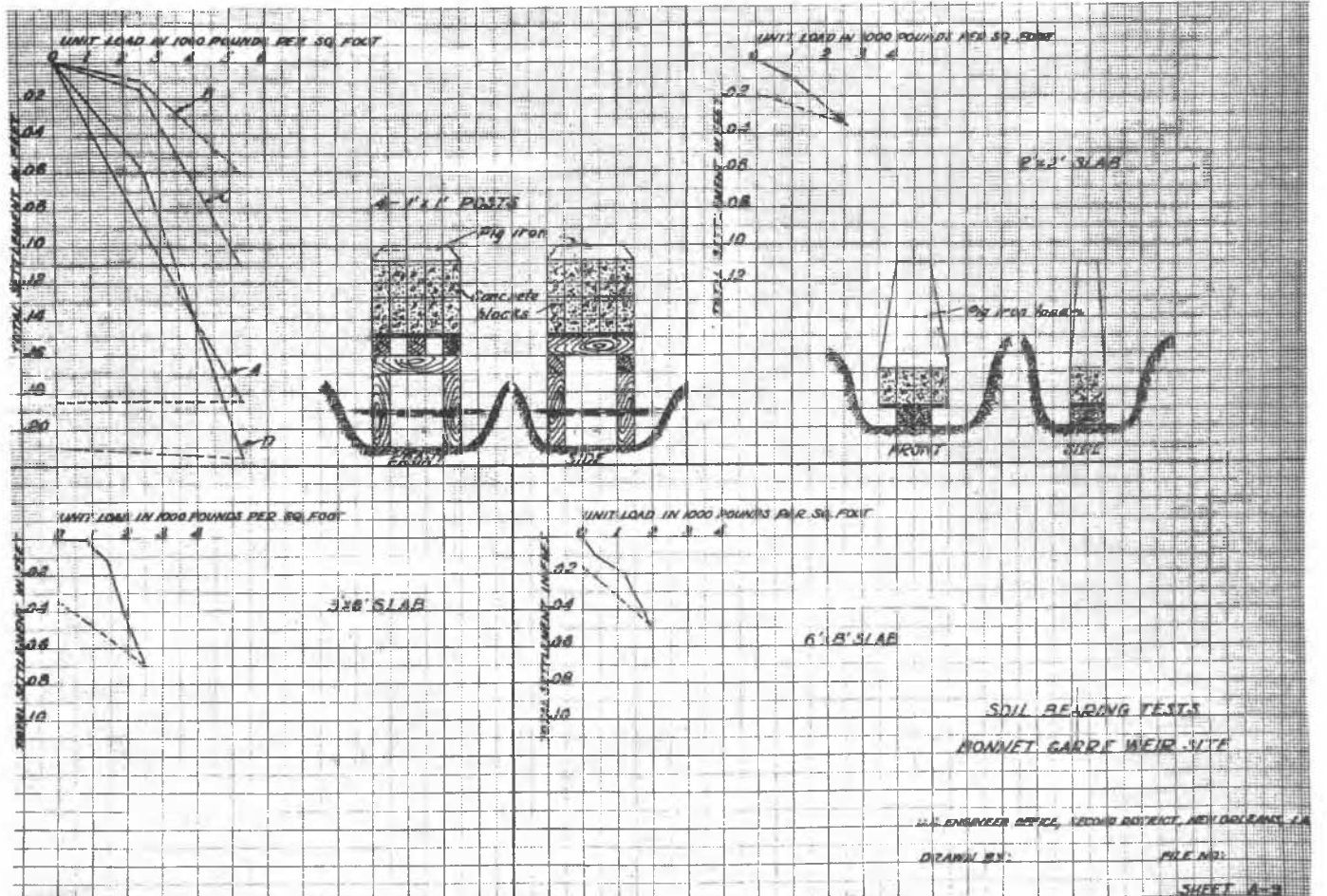
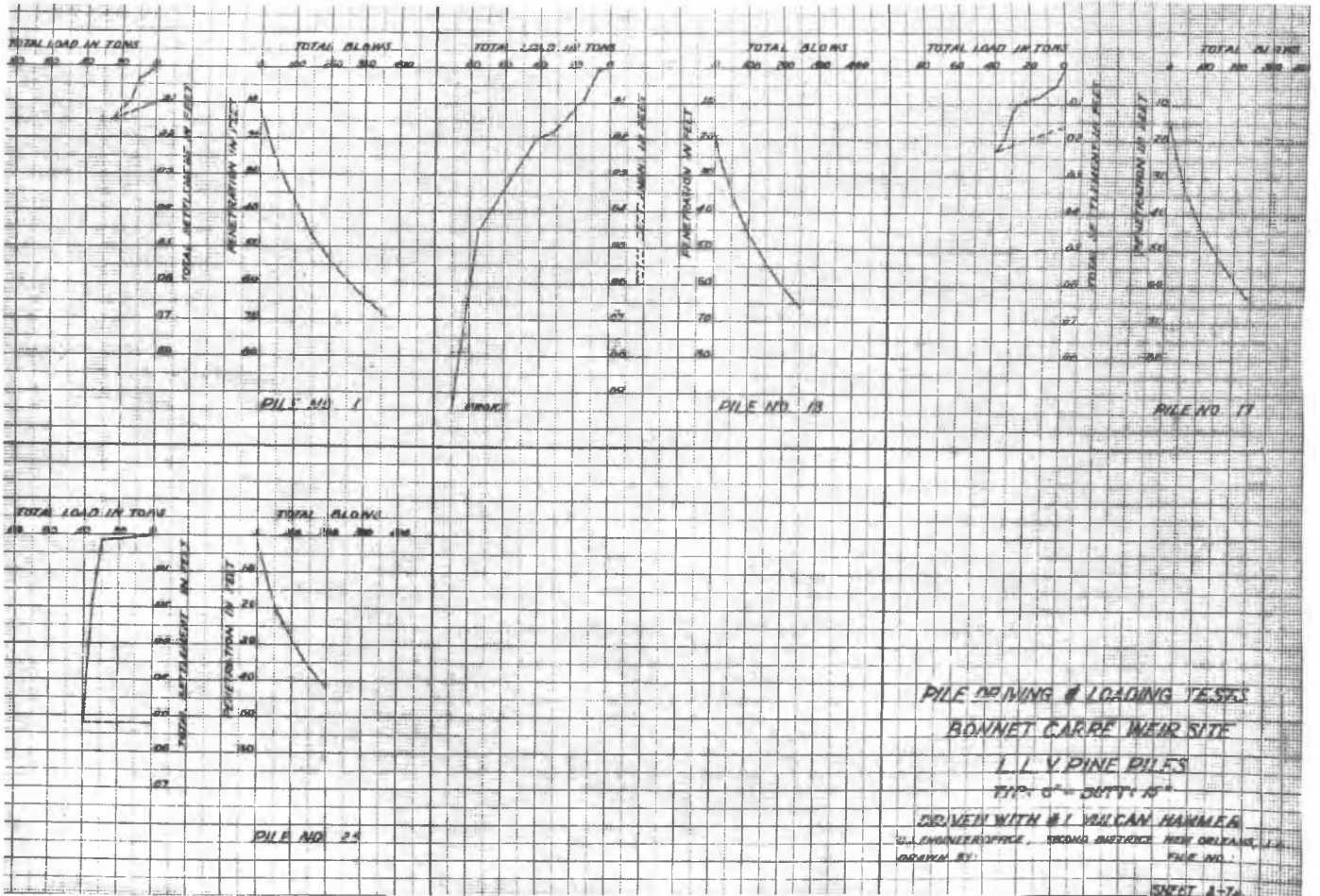
Submitted by: *M. S. Trace*
 Approved by the District Engineer: *W. H. ...*
 Major, Corps of Engineers, U.S. Army
 Major, Corps of Engineers, U.S. Army

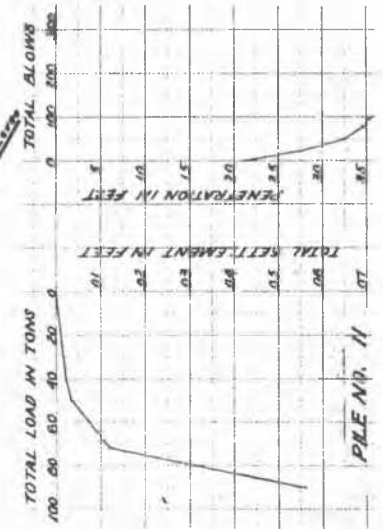
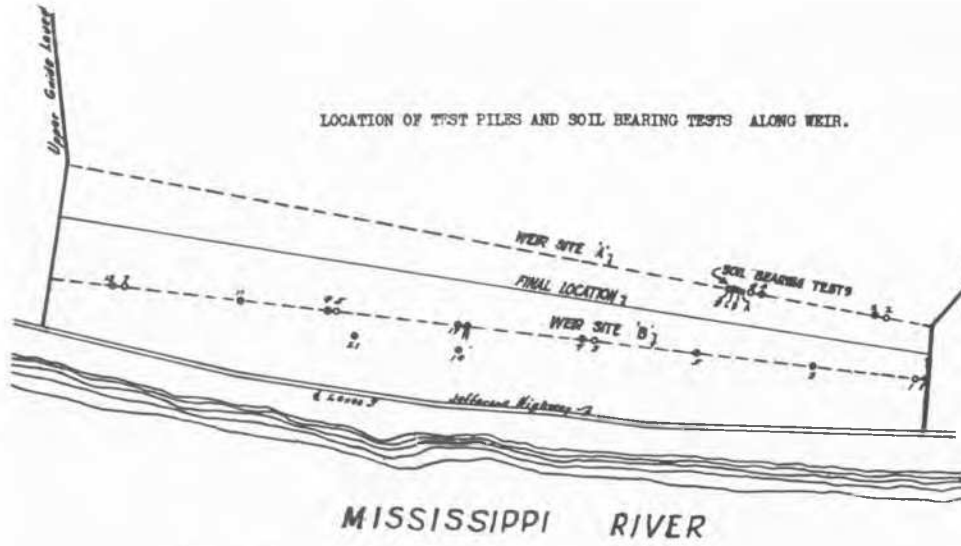
Sheet No. 4 of 6 Sheets

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 Checked by: *...*
SHEET A-4

1-6

235





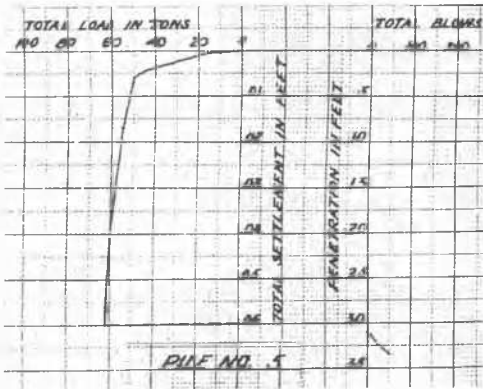
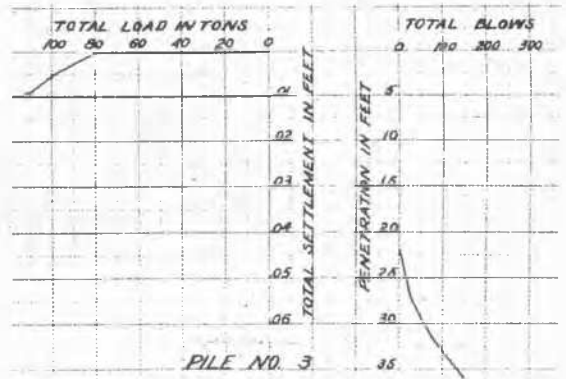
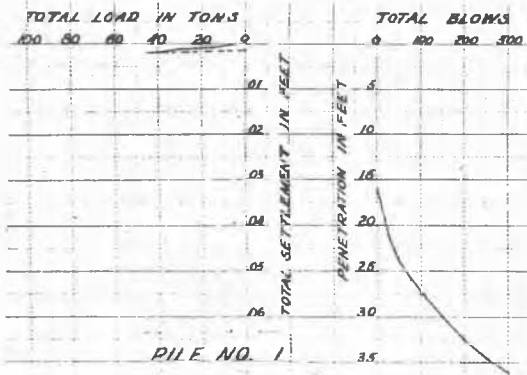
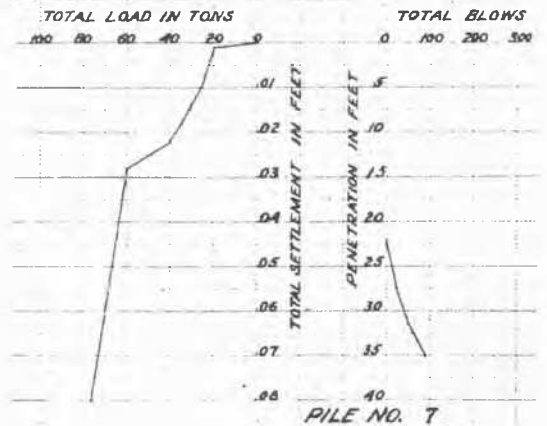
TEST PILING WOOD & CONCRETE

No.	Kind	Date Driven	Date Loaded	Date Unloaded
1	Wood	Dec.7, 1928	12/14/28	2/17/29
2	Wood	Dec.12, 1928		
3	Wood	Dec.15, 1928		
4	Wood	Dec.18, 1928		
5	Wood	Dec.22, 1928		
7	Wood	Dec.31, 1928	3/21/29	
19	Wood	Jan.4, 1929		
17	Wood	Jan.4, 1929	1/23/29	2/21/29
9	Wood	Jan.9, 1929	3/22/29	
21	Wood	Jan.9, 1929		
11	Wood	Jan.11, 1929	3/27/29	
23	Wood	Jan.15, 1929		
25	Wood	Jan.15, 1929	3/18/29	3/22/29
13	Wood	Jan.16, 1929	2/19/29	5/4/29
1	Concrete	Dec.10, 1928	12/27/28	1/17/29
2	Concrete	Dec.13, 1928		
4	Concrete	Dec.19, 1928	Broke	2/21/29
3	Concrete	Dec.29, 1928	3/23/29	
11	Concrete	Jan.3, 1929	1/21/29	3/1/29
5	Concrete	Jan.9, 1929	3/9/29	
7	Concrete	Jan.16, 1929	2/18/29	2/28/29

SOIL BEARING TESTS

No.	Description	Size	Date Loaded
A	Four posts	1 sq.ft each.	Dec.18, 1928
B	Flat slab	6x8 = 48 sq.ft.	Dec.27, 1928
C	Flat slab	3x6 = 18 sq.ft.	Jan. 4, 1929
D	Flat slab	2x2 = 4 sq.ft.	Jan.7, 1929

SHEET A-6



PILE DRIVING & LOADING TESTS

BONNET CARRE WEIR SITE

RAYMOND CONCRETE PILES

TIP 6" - BUTT 22"

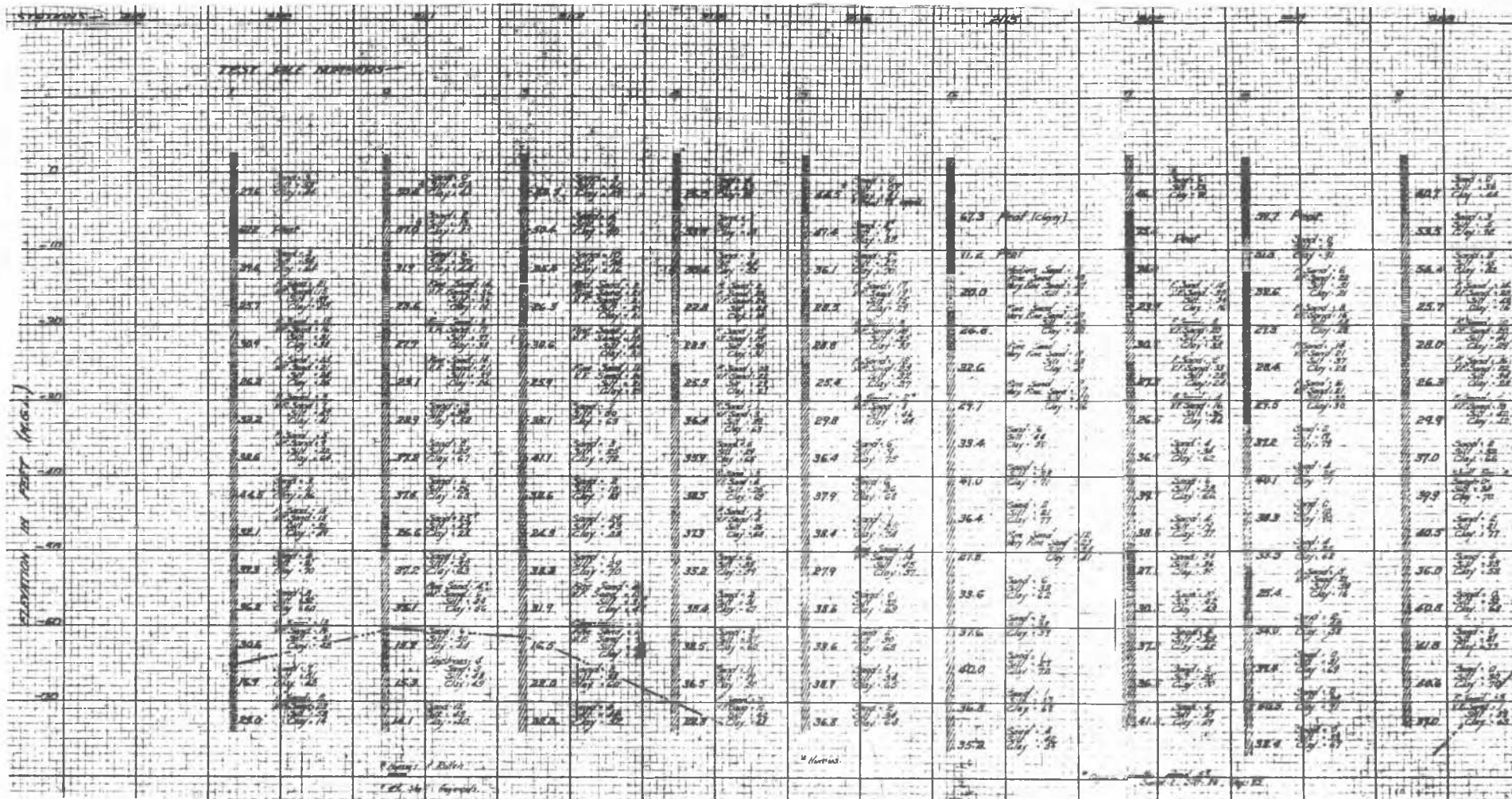
DRIVEN WITH #1 VULCAN HAMMER

U.S. ENGINEER OFFICE, SECOND DISTRICT, NEW ORLEANS, L.A.

DRAWN BY:

FILE NO.

SHEET 5-76



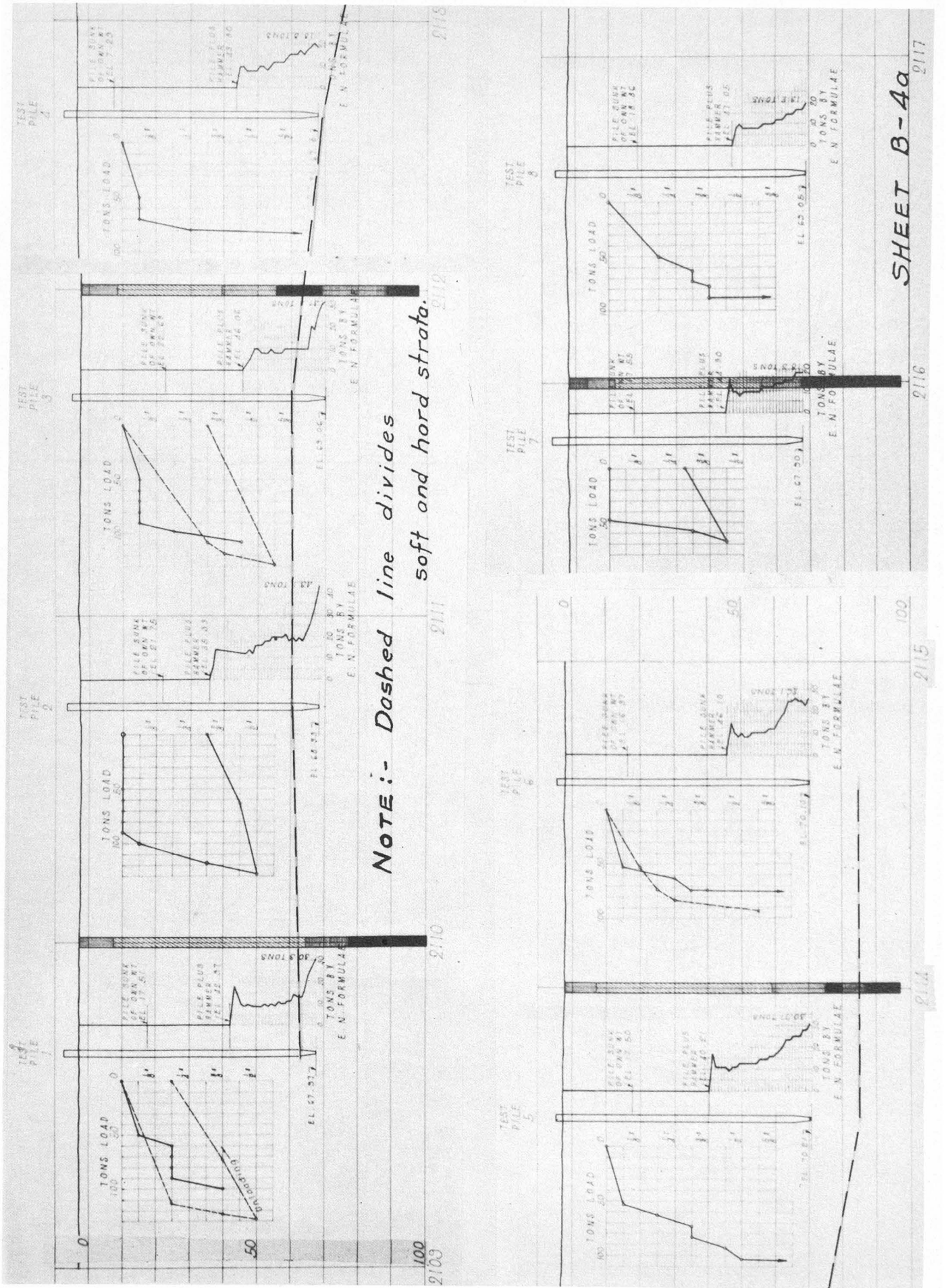
LEGEND		GRAIN SIZES		BONNET CARRE SPILLWAY BORINGS ALONG & OF HIGHWAY BRIDGE LOCATION Borings taken Sept. 13, 1934 - Oct. 23, 1934 Horizontal Scale 1" = 50' Vertical Scale 1" = 10'
Sand	Clay Loam	SAND - 0.25 to 0.50 M.M.		
Sandy Loam	Silty Clay Loam	FINE SAND - 0.10 to 0.25 M.M.		
Sandy Clay Loam	Silty Clay	VERY FINE SAND - 0.05 to 0.10 M.M.		
Sandy Clay	Clay	SILT - 0.005 to 0.05 M.M.		
Loam	Peat	CLAY - FINER THAN 0.005 M.M.		
Silt Loam	Clay (Plastic)			
35.6% - Indicates per cent moisture in basis of wet sample				SHEET No. B-2
Division between the Present and the soils and the Present and the consolidated parent soils.				

237	238	239	240	241	242	243	244	245
348	349	350	351	352	353	354	355	356
357	358	359	360	361	362	363	364	365
366	367	368	369	370	371	372	373	374
375	376	377	378	379	380	381	382	383
384	385	386	387	388	389	390	391	392
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933	934	935	936	937	938	939	940	941
942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959
960	961	962	963	964	965	966	967	968
969	970	971	972	973	974	975	976	977
978	979	980	981	982	983	984	985	986
987	988	989	990	991	992	993	994	995
996	997	998	999	1000				

2187	2187	2189	2191	2193	2195
39.0	26.2	22.8	26.0	26.3	22.8
37.1	29.7	28.4	28.9	27.8	27.8
35.2	44.8	58.2	60.0	60.8	57.4
29.3	22.2	22.5	16.3	25.8	30.1
26.0	23.4	29.8	29.9	24.7	29.6
30.9	25.8	24.6	25.5	25.3	27.4
33.6	35.8	35.2	27.7	32.0	33.4
37.0	40.6	37.3	32.2	40.0	41.5
34.4	33.0	36.1	34.2	30.5	33.5
17.7	17.8	18.7	16.6	18.3	14.3
19.7	24.7	23.4	22.5	20.4	22.2
25.4	22.5	25.4	21.9	24.0	25.2
27.0	25.0	26.7	27.6	22.1	

2197	2199	2201	2203	2205	2207	2209
34.3	31.0	37.9	34.5	39.1	35.7	35.0
28.5	28.7	34.2	36.4	45.0	46.1	39.9
64.2	62.8	69.5	64.0	67.0	67.6	66.5
29.0	26.6	26.9	29.0	44.1	32.2	28.4
29.4	28.7	32.0	27.7	30.3	28.3	30.8
28.2	25.4	27.4	29.5	27.9	25.6	24.2
37.6	32.3	35.7	31.4	22.0	34.7	31.1
37.8	36.4	44.3	38.6	37.3	40.1	33.8
37.1	34.8	36.0	32.8	32.3	39.9	35.5
16.0	16.1	18.9	14.1	16.8	21.0	11.6
24.7	21.3	21.4	17.6	19.1	14.7	16.6
24.4	23.3	20.6	20.9	23.4	21.8	16.1
23.9		25.3		24.0		25.5



NOTE:- Dashed line divides
soft and hard strata.

SHEET B-4a

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214

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TEST PILE 8

TEST PILE 7

TEST PILE 6

TEST PILE 5

TEST PILE 4

TEST PILE 3

TEST PILE 2

TEST PILE 1

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PILE BANK OF DRUM WT
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PILE BANK OF DRUM WT
TEL 21 25

PILE BANK OF DRUM WT
TEL 17 25

PILE PLUS RAMMER
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PILE PLUS RAMMER
TEL 26 04

PILE PLUS RAMMER
TEL 25 03

PILE PLUS RAMMER
TEL 22 57

PILE BANK OF DRUM WT
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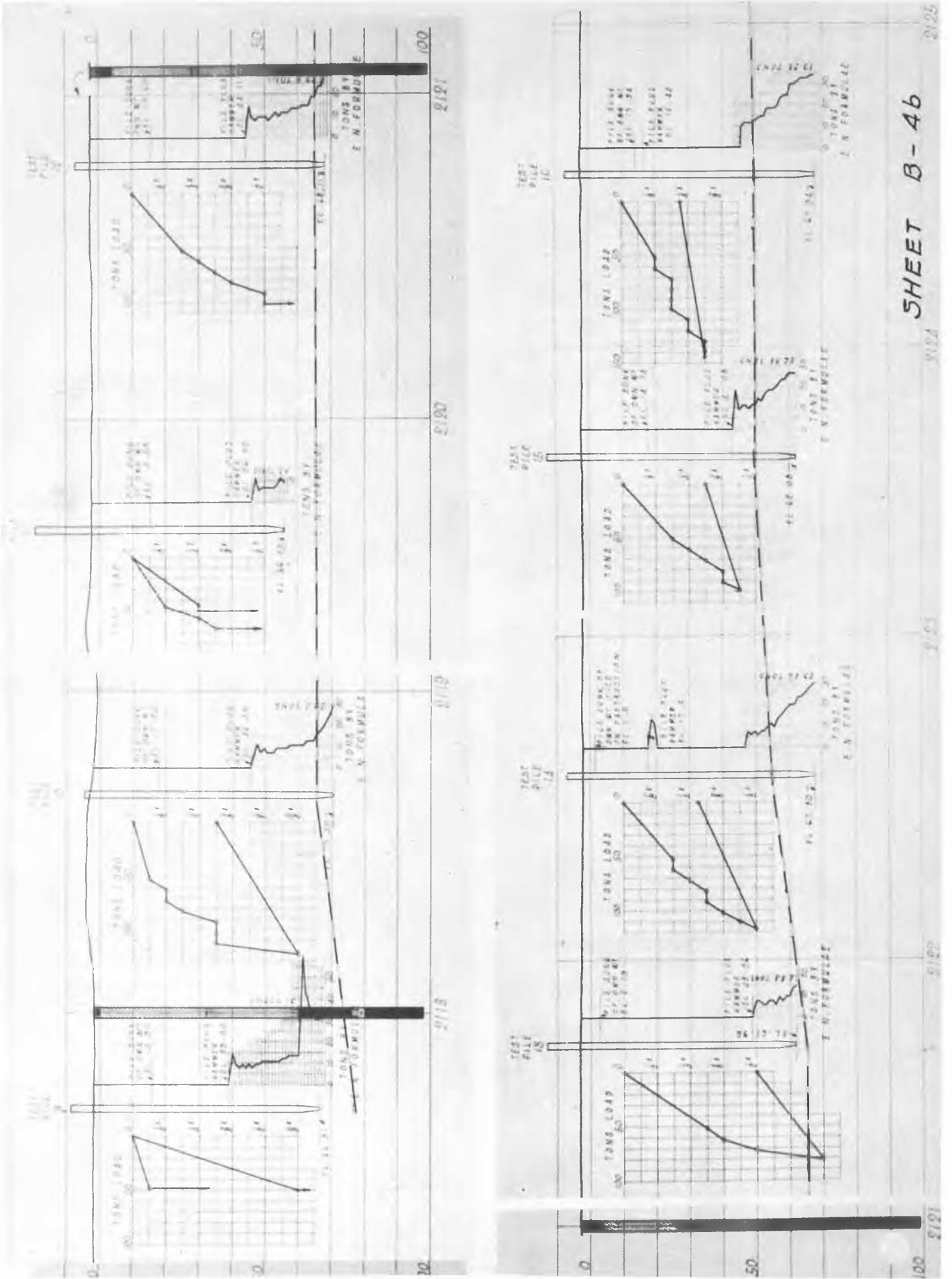
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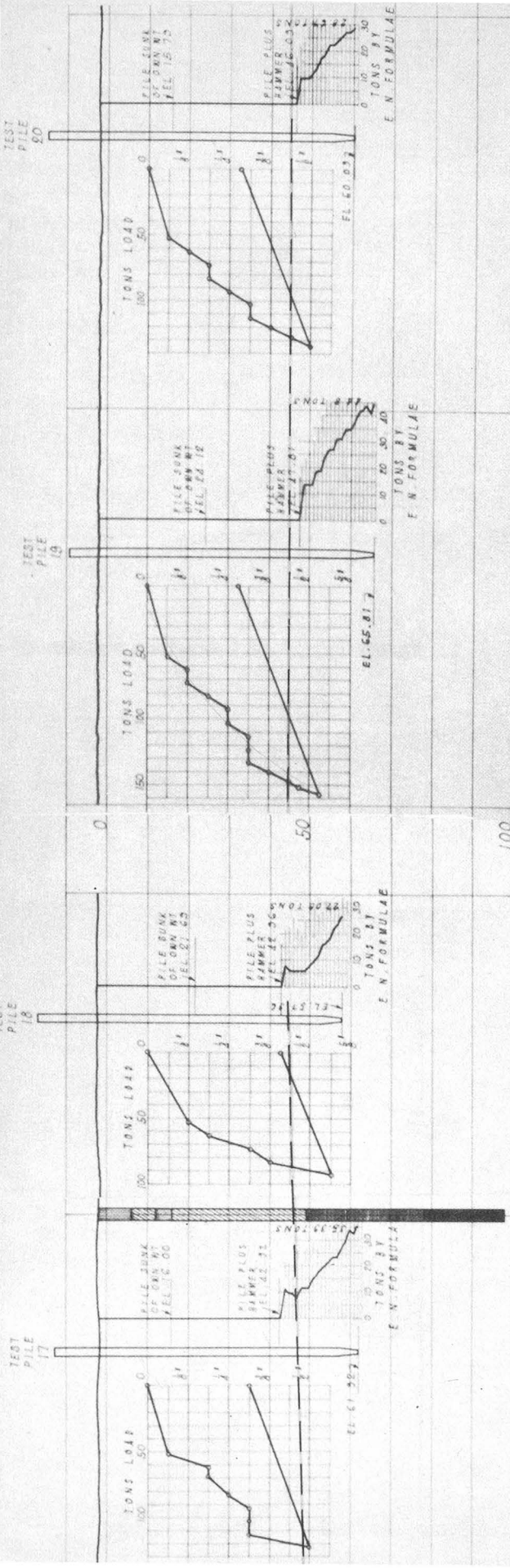
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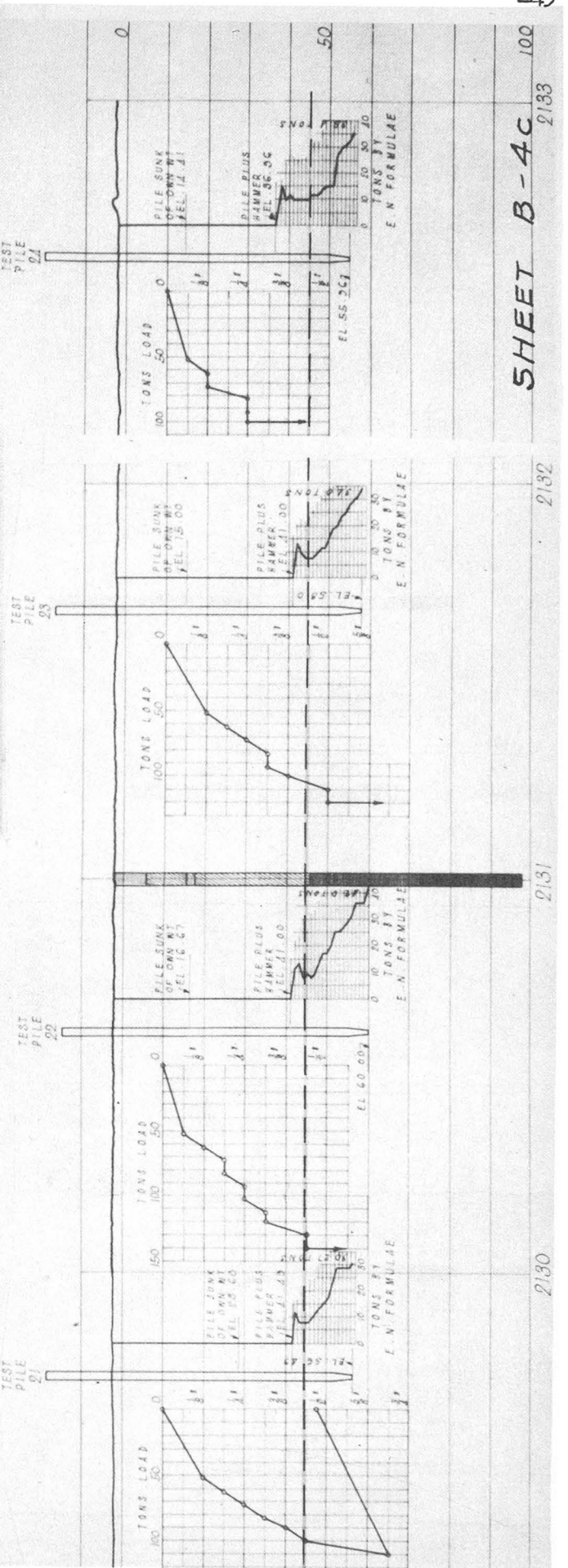
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SHEET B-46

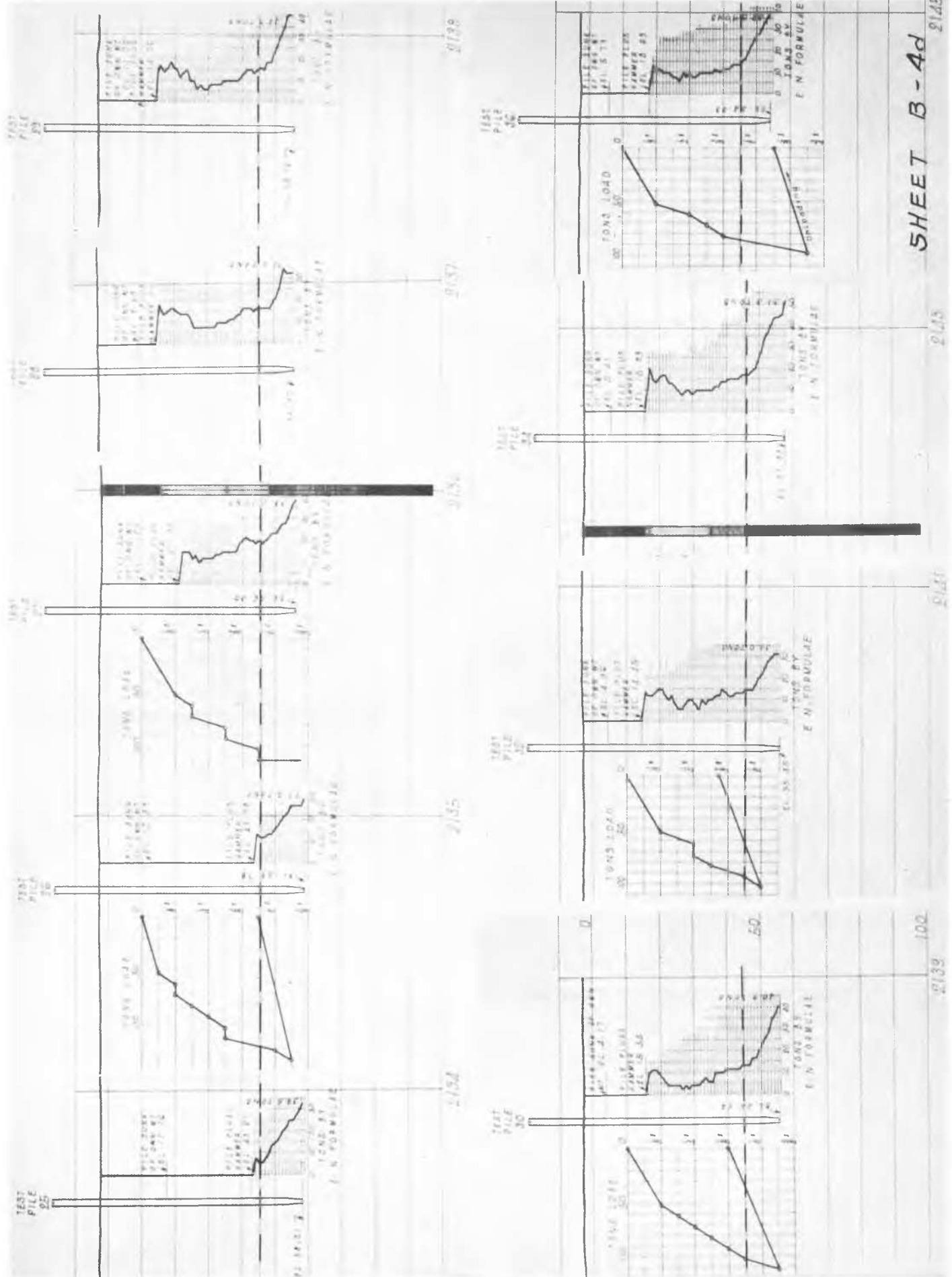


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SHEET B-4C



SHEET B-Ad

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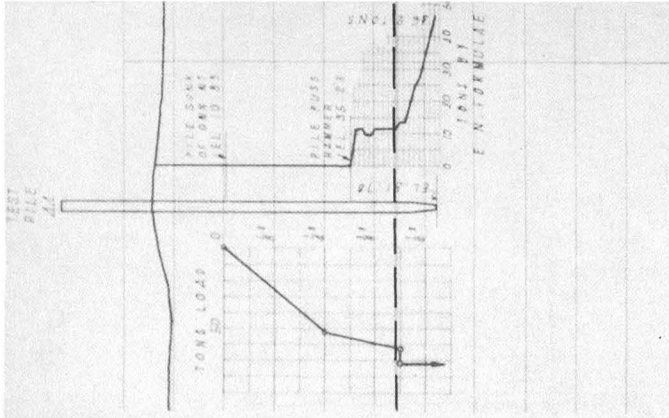
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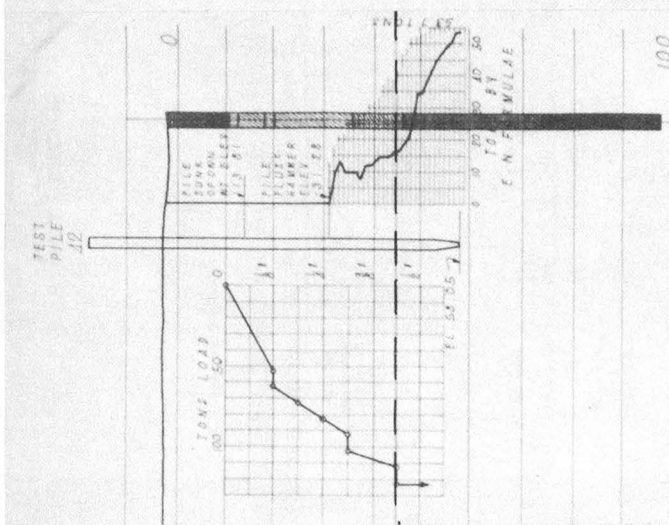
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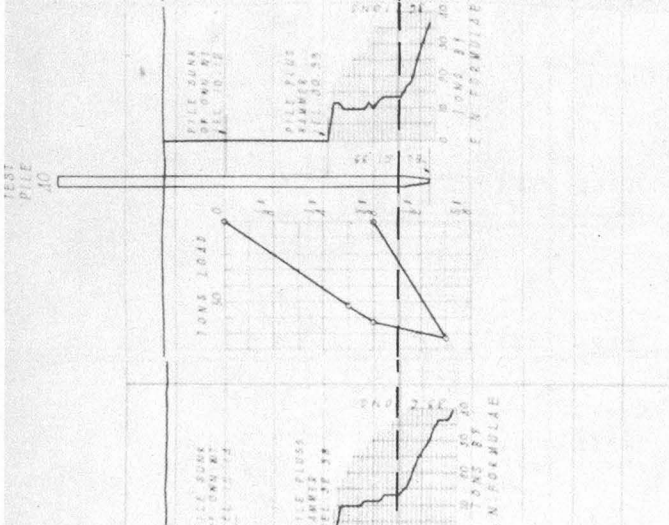
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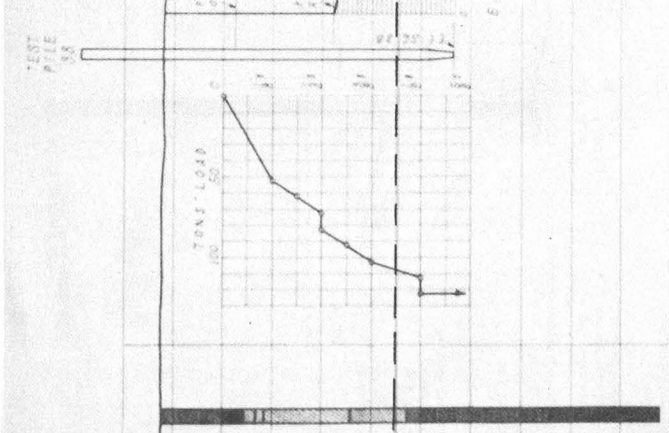
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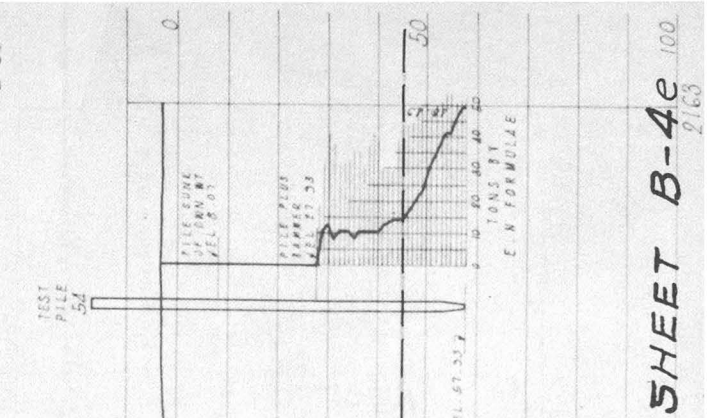
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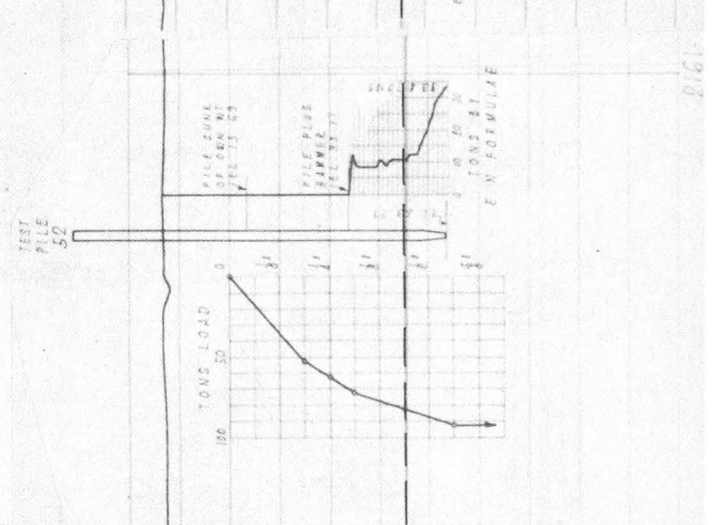
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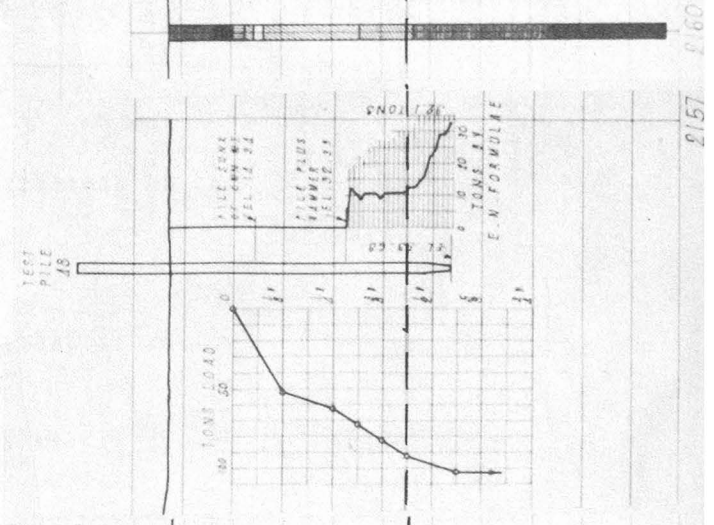
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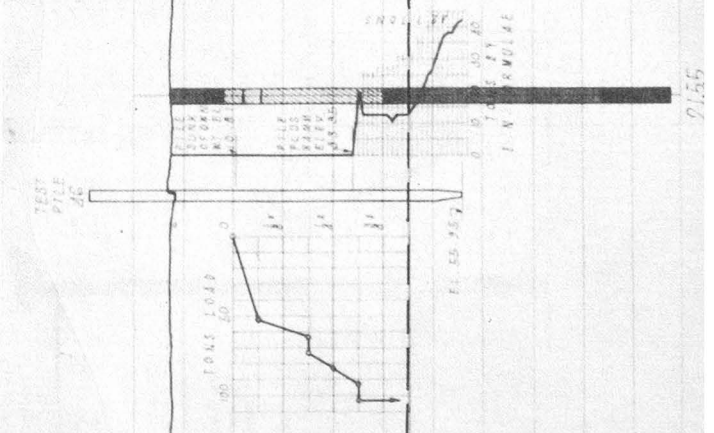
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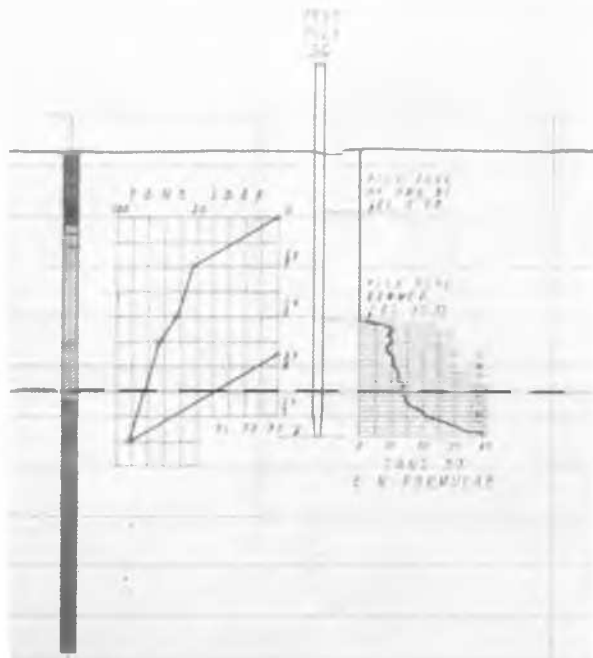
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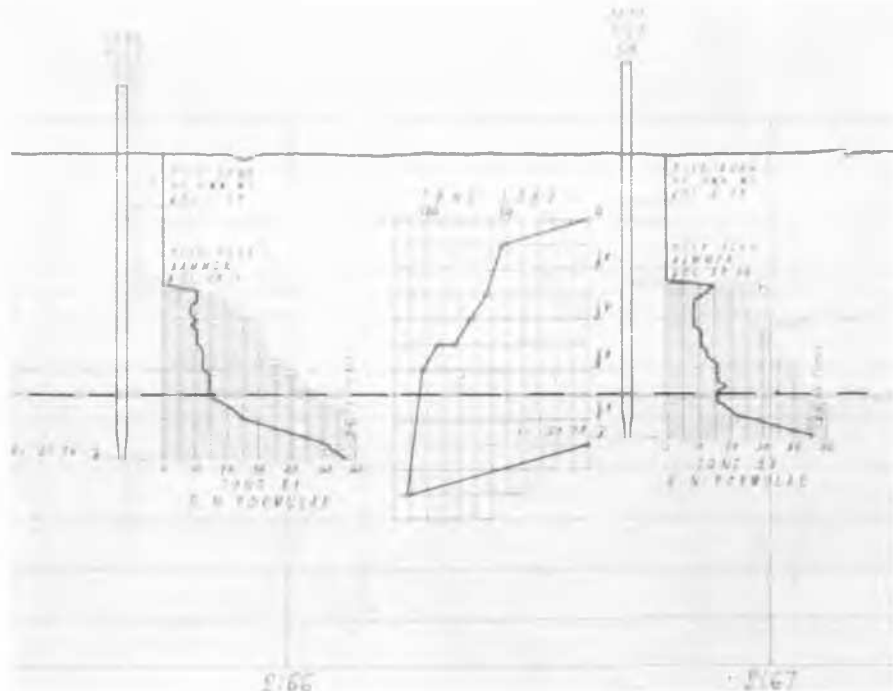
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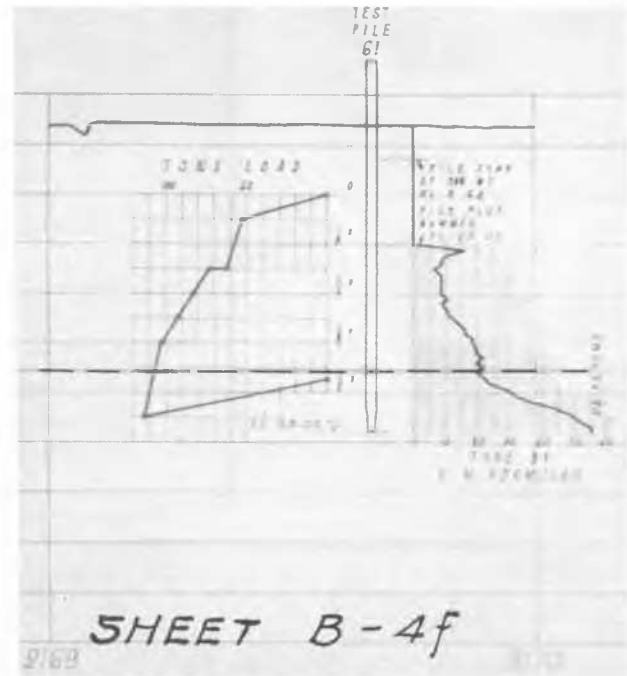
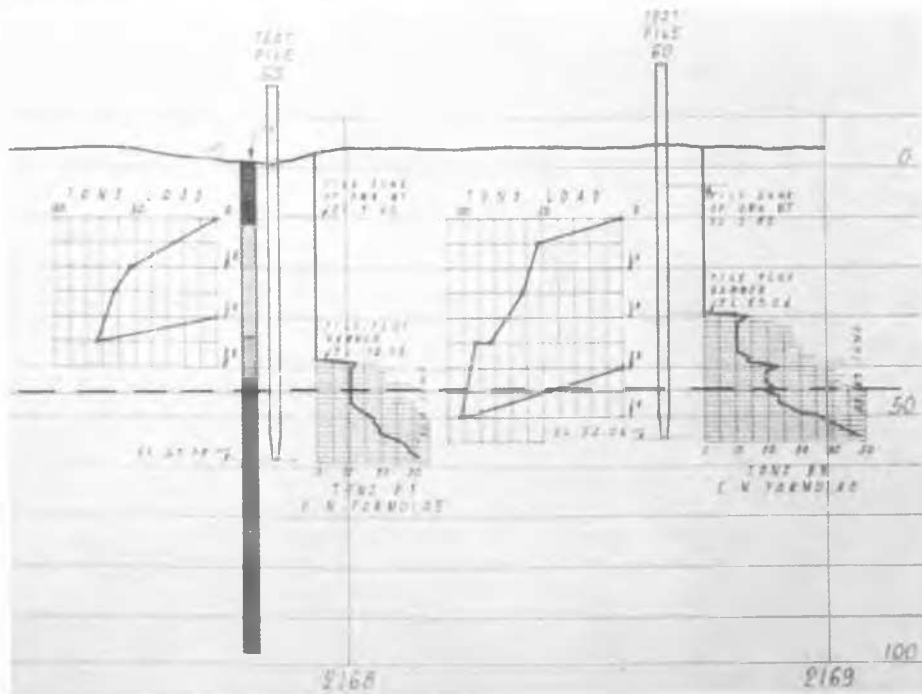
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SHEET B-4f

December 22, 1933

CARNegie STEEL COMPANY, PITTSBURGH, PA. - SALES ENGINEERING DIVISION

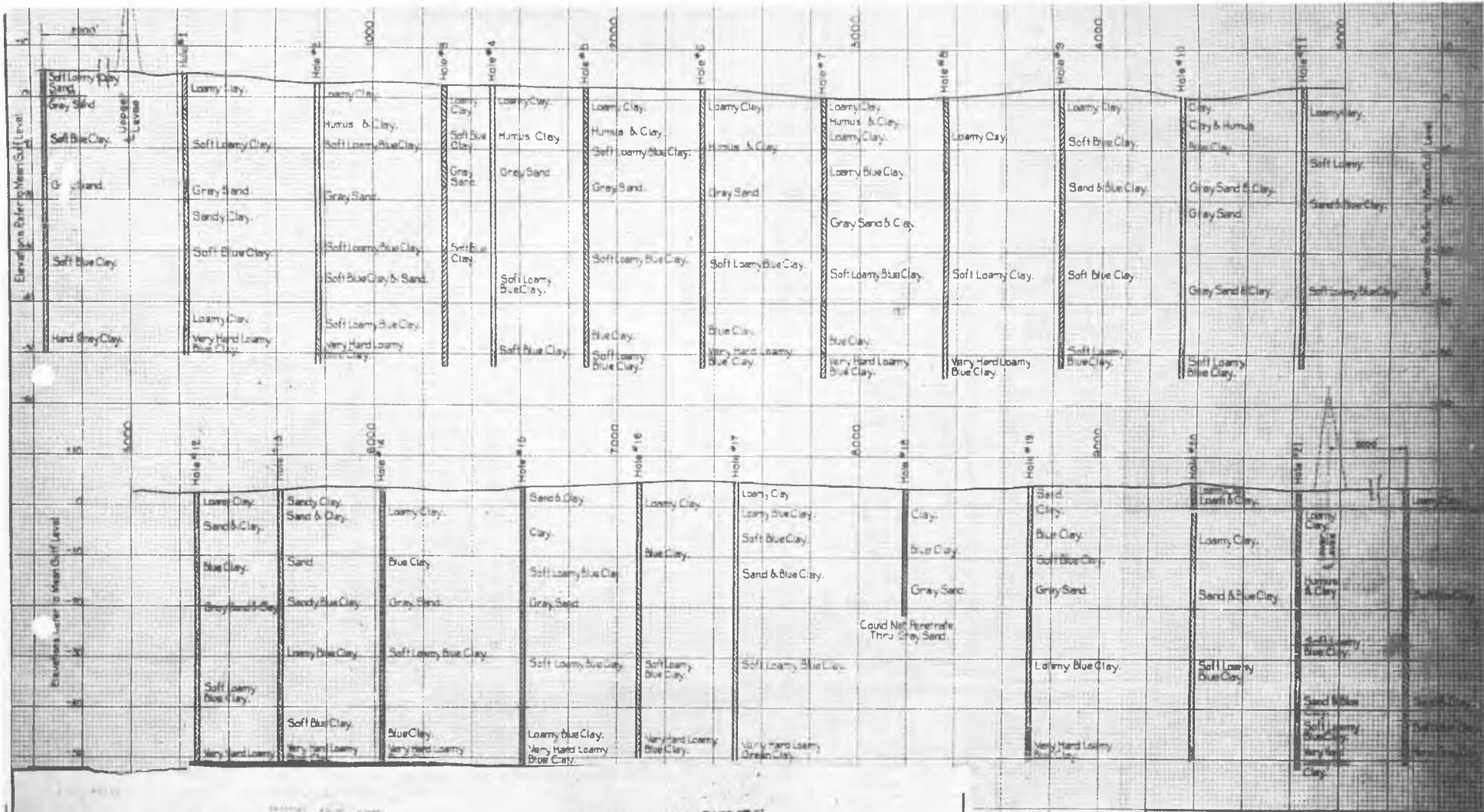
SUMMARY OF TEST DATA - H SECTION - STEEL BEARING PILES

Test Report No.	Kind of Section	Design Load	Max. Test Load	Settlement Under Load	Penetration	Kind of Hammer	Soil Condition	Penetration Per Blow at End of Driving	Pulling Resistance to Start of Pile	Type of Structure Supported	Location and Date of Test	General Remarks
1	8" CB 35½ Case Pile Bottom Pointed		28 tons		54'	Vulcan #1	Alluvial layers Clay-Sandy Clay- Rumus and Clay-Sand Shells Clay-Stiff Blue Clay	3.24"	Proposed Bridge	Proposed Bridge	Bennet Carrs Floodway - 1933 Near New Orleans, La.	The general characteristic of material encountered is very tension stiff plastic clay with occasional strata of sand.
2	10" CB 49½ 4 pos. 55', 20' 10' and 10' Bottom Pointed	21.4 tons 61.2 "	21.4 tons 61.2 "	.66" .31"	49' 69'	do	do	3.00" 1.33"	65 tons	do	do	Point stopped in packed sand at this penetration. Note higher capacities for all piles with points at this approximate level.
3	10" CB 49½-beamed by welding plates between flanges 4 pos. 55', 20', 10' and 10' Square Pyramidal Welded Point	30.6 tons 61.2 "	30.6 tons 61.2 "	.23" .19"	49' 69'	do	do	2.86" 1.20"	81.2 tons	do	do	
4	12" CB 65½ 6 plates 56', 20', 10', 10', 18.4' and 14.6'	30.5 tons 82.8 "	30.5 tons 82.8 "	.11" .70"	49' 69'	do	do	2.40" .92"	do	do	do	
5	20" x 20" Pointed Present Concrete Pile	177.5 tons 128.5 "	177.5 tons 128.5 "	.31" .42"	69.6' 75'	vulcan #0 do	do	.84" with Calotex Cushion on Pile	do	do	do	Tested in line and in conjunction with steel piles.
6	Wood Pile Bett 18" dia. Point 8" dia.	110.2 tons	110.2 tons	.34"	76.7'	Vulcan #1	do	1.69"	do	do	do	
7	14x14-1/2" CB 87½ 2 Sections 65' each Bottom Pointed Piles #2-4-7-9	34.0 tons 120.0 tons 73.4 tons 65.5 tons 68.5 tons 115.0 tons	34.0 tons 120.0 tons 73.4 tons 65.5 tons 68.5 tons 115.0 tons		49' 69' 79' 89' 107' 116' 121' 122'	Vulcan #1 Single Acting Steam Hammer Net Wt. 8600# Wt. Ram or Strik- ing Parts 6000# Stroke 33"	do	File #2 - 74 - 47 - 82 2.0" 2.6" 2.0" 2.70" 0.5" 0.96" 0.67" 0.50" 0.43" 0.56" 0.55" 0.57" 0.34" 0.52" 0.55" 0.55" 0.31" 0.45" 0.45" 0.40" 0.29" 0.38" 0.39" 0.37" 0.27" 0.24" 0.26" 0.28" 0.22" 0.22" 0.24" 0.23"	Anchor Piles	These piles driven in line and in conjunction with other piles shown on this page. Presumably calculated test loads interpolated from actual results on 12 x 12" CB 65½ driven to equal penetrations in same test. Values seem to indicate high point resistance for large pile at shallow depths with relative values decreasing with deeper penetration.		

(----- Report of Test of Steel, Concrete and Wood Piles by -----)

American Bridge Company
Carnegie Steel Company
Illinois Steel Company

SHEET B-6

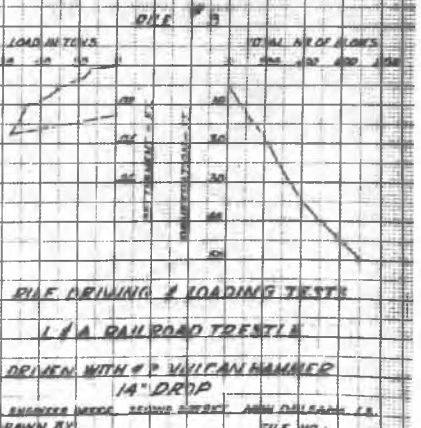
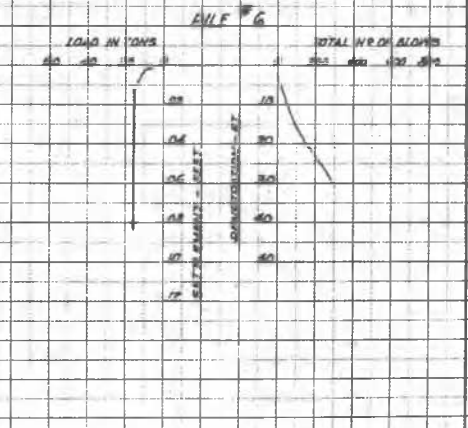
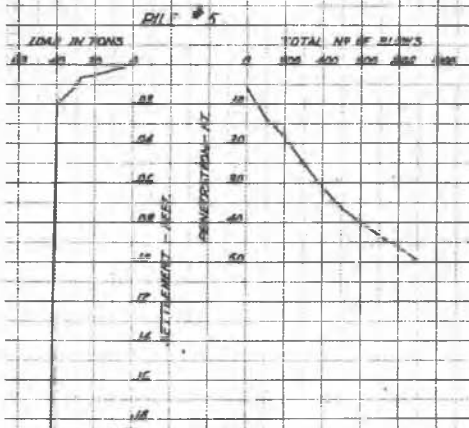
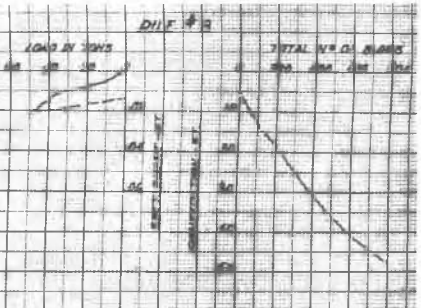
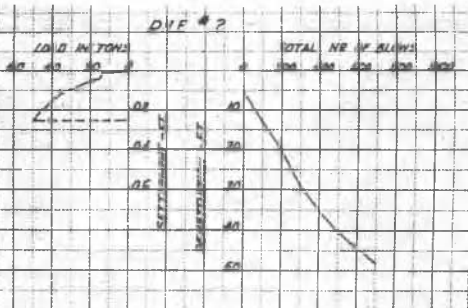
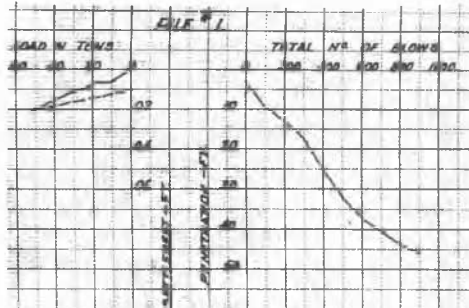


**TEST BORINGS
ALONG LAKE SIDE OF L & A.R.R.**

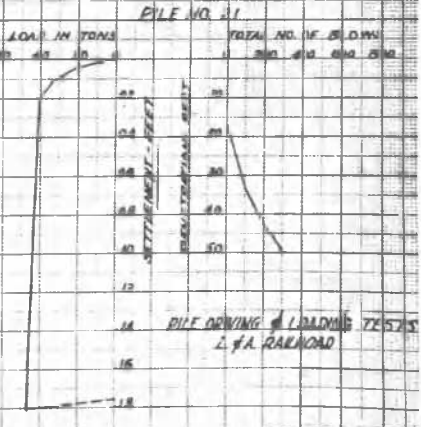
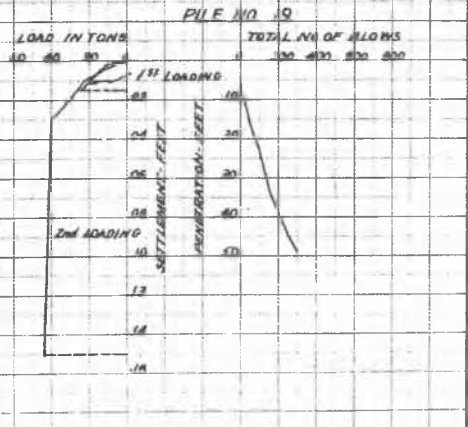
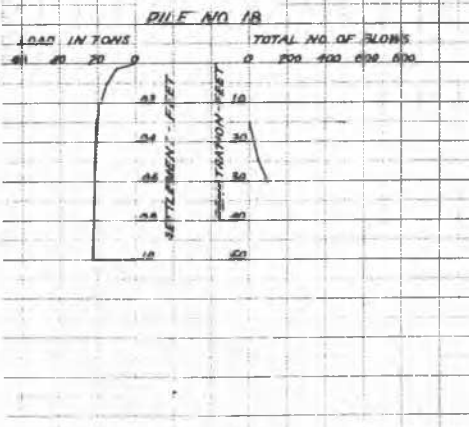
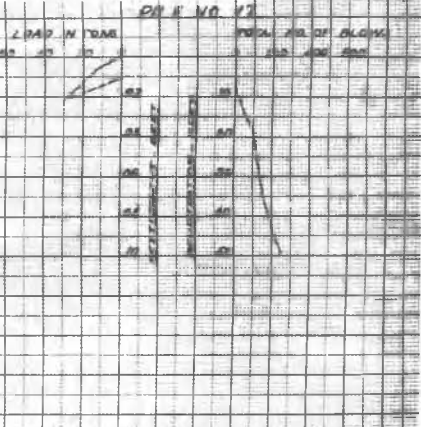
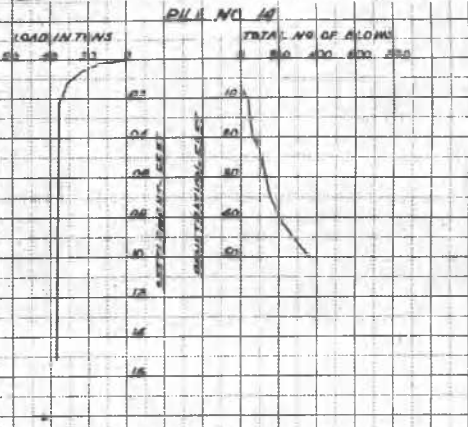
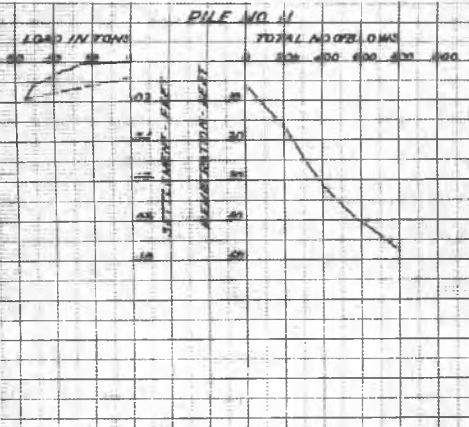
PREPARED IN THE
U.S. ENGINEER OFFICE SECOND DISTRICT NEW ORLEANS
MAY 1931

SCALE - HOR. 1" = 200'. VER. 1" = 10'

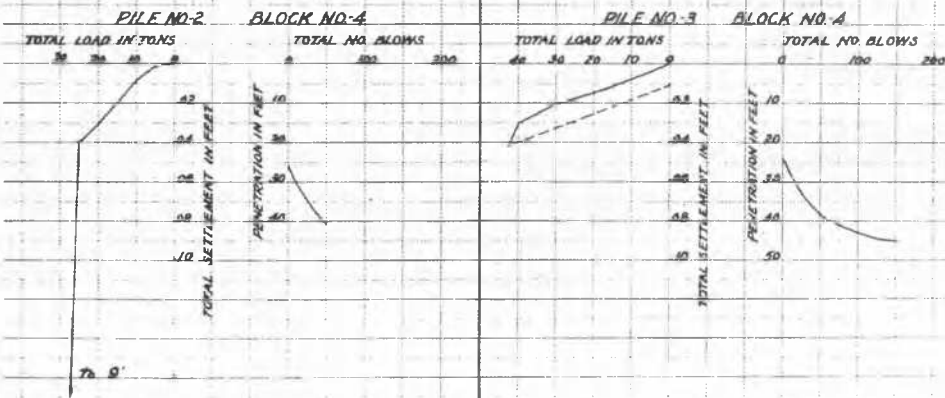
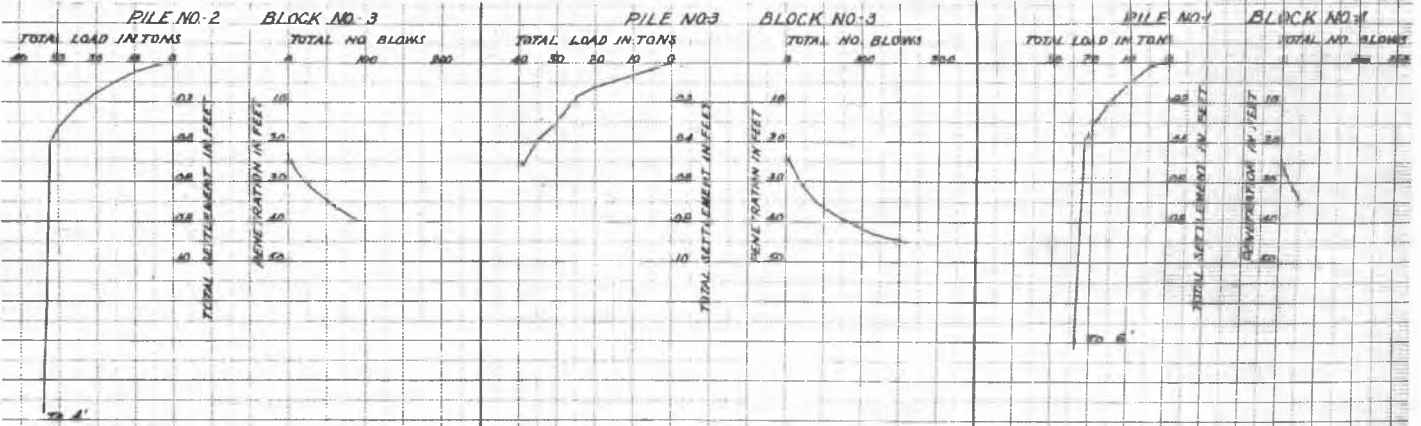
SHEET C-1



PILE DRIVING & LOADING TESTS
L & A RAILROAD TRESTLE
DRIVEN WITH # 2 VULCAN HAMMER
14" DROP
 H. SHERMAN WOOD, SENIOR SURVEYOR, NEW ORLEANS, LA.
 FILE NO.:
 DRAWN BY: SNEY I-P-2



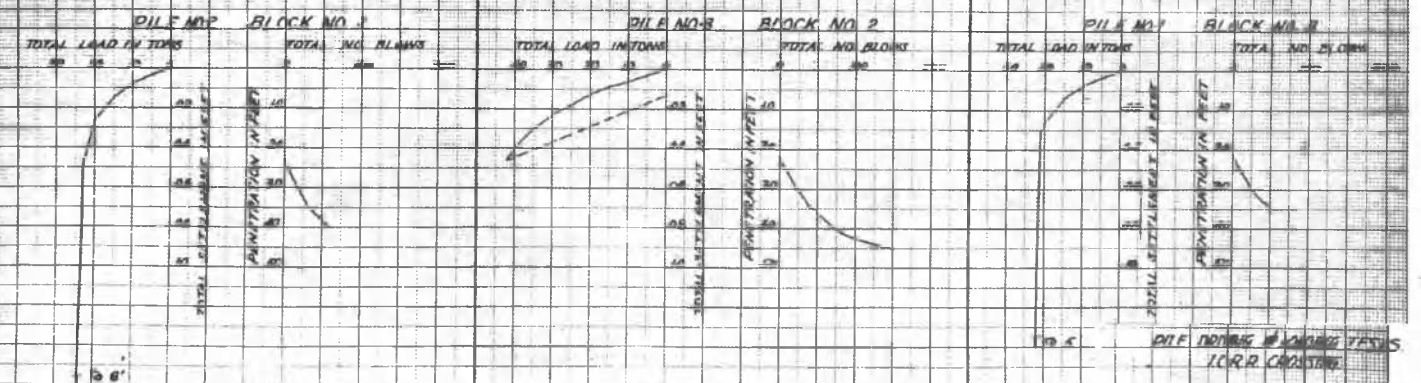
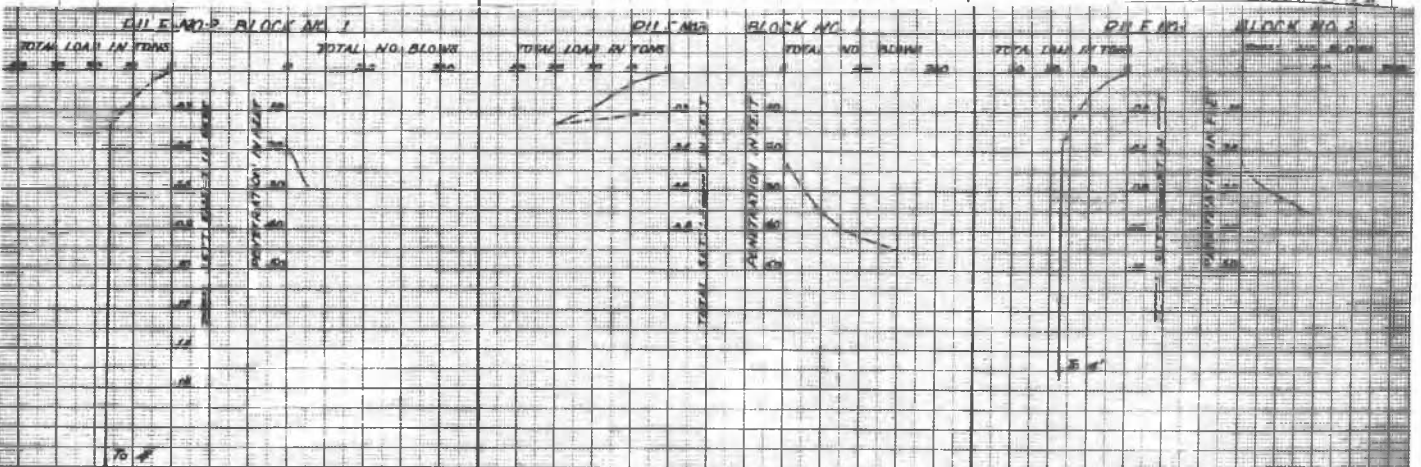
PILE DRIVING & LOADING TESTS
L & A RAILROAD



**PILE DRIVING & LOADING TESTS
I.C.R.R. CROSSING
BONNET CARRE FLOODWAY**

U.S. ENGINEER OFFICE, SECOND DISTRICT, NEW ORLEANS, LA.
DRAWN BY: FILE NO.:

SHEET D-2a



**PILE DRIVING & LOADING TESTS
I.C.R.R. CROSSING**

FILE NO.:

SHEET D-2b