Stan Yeh - Re: San Gabriel - Geotech Report

From:
To: "Stan Yeh"
Date: 8/15/2007 3:57 PM
Subject: Re: San Gabriel - Geotech Report
CC: , ,
Attachments: , ,

DOCKET
07-AFC-2
DATE AUG 1 5 2007
RECD. AUG 1 5 2007

Stan:

These are the geotechnical reports:

- Dames & Moore, May 1, 1951, Report of Foundation Investigation, Proposed Etiwanda Steam Station
- Dames & Moore, May 18, 1951, Report of Testing of Compacted Fill, Proposed Etiwanda Steam Station
- URS, April 12, 2005, Summary Report of Geophysical Utility Survey and Surface Wave Investigation, Etiwanda Steam Station

The first 2 are attached to this email. The 2005 report will be sent in 3 emails (since it has color photos and is a big file)

Regards,

Anne
(See attached file: 0032 Report of Foundation Investigation.pdf)(See attached file: 0033 Report of Compacted Fill.pdf)

This e-mail and any attachments are confidential. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

"Stan Yeh" <Syeh@energy.state.ca.us>

"Stan Yeh"
<Syeh@energy.state.ca.us>

08/15/2007 10:23 AM

To<Anne_Connell@URSCorp.com>
cc
SubjectSan Gabriel - Geotech Report

Anne,

In Appendix A, under section 3.1.1, you mention a geotechnical investigation. Can you please provide me with this report.

Thanks,
Stan

DAMES & MOORE, Civil Engineers
FOUNDATION INVESTIGATIONS · SOIL MECHANICS ENGINEERING
LOS ANGELES · SAN FRANCISCO · PORTLAND · SEATTLE · NEW YORK

ERNEST R. DAMES
WILLIAM W. MOORE
L. LEROY CRANDALL
WILLIAM W. BREWER
VERNON A. SMOOTS
WILLIAM ENKEBOLL

MICHIGAN 0748
816 WEST FIFTH STREET
LOS ANGELES 17, CALIF.
L. LEROY CRANDALL
RESIDENT PARTNER

May 1, 1951

Southern California Edison Company
Edison Building
601 West Fifth Street
Los Angeles 17, California

Attention: Mr. T. M. Hotchkiss,
Assistant Chief Mechanical Engineer

Gentlemen:

Eight copies of our "Report of Foundation Investigation, Proposed Etiwanda Steam Station, Etiwanda, California, for the Southern California Edison Company" are herewith submitted.

The scope of the investigation was planned in collaboration with the staff of the Southern California Edison Company and with the Stone & Webster Engineering Corporation.

The results being obtained were submitted to the parties concerned from time to time during the progress of the investigation. Typical undisturbed samples of the soils encountered in exploration borings at the site were transmitted to Stone & Webster on March 9, 1951.

Yours very truly,

DAMES & MOORE

By L. LeRoy Crandall
L. LeRoy Crandall

LLC-WDC DB

REPORT OF FOUNDATION INVESTIGATION

PROPOSED ETIWANDA STEAM STATION

ETIWANDA, CALIFORNIA

for the

SOUTHERN CALIFORNIA EDISON COMPANY

SCOPE

This report presents recommendations, with supporting data, resulting from our foundation investigation of the site of the Proposed Steam Station that is to be constructed for the Southern California Edison Company at Etiwanda, California. The site of the proposed development is shown in relation to Etiwanda Street, the adjacent railroad tracks, and the aqueduct of the Metropolitan Water District which traverses the site, on Plate 1, Plot Plan.

The presently planned Station will include two generating units; ultimately, the Station will be expanded to four units. Each unit will have a capacity of 125,000 KVA. This investigation is concerned with both the present and future construction programs.

Grading plans require fills of as much as ten feet at the location of Unit 1, and cuts of approximately three feet at the locations of the remaining units. The initial and final grades are shown on the Plot Plan; the floor grades of Units 1 and 2 will be at Elevation 1116.0. Exploration borings, laboratory tests, and field load tests were conducted in conjunction with this investigation, and are described in the Appendices. All of these studies were performed prior to the grading of the site. Pertinent data

since obtained in the testing of compacted fills have been referred to in the preparation of the recommendations contained herein. The results of the tests on the fills will be submitted under separate cover.

STRUCTURAL CONSIDERATIONS

The locations of the principal components of the units proposed for present construction are shown on the Plot Plan. We have been informed that foundation loads will vary widely throughout the development, with maximum loads being imposed by the boilers and turbines. Certain of the structural columns of the boilers will impose loads of approximately 2,000,000 pounds. The mat supporting the turbines will have plan dimensions of approximately 32 by 105 feet; total loads, exclusive of the weight of the foundations, will be approximately 3,000 pounds per square foot.

No appreciable excavations will be made to establish the floor grades, except for the turbines. The bottom of the turbine mat will be approximately nine feet below the exterior finish grade.

RECOMMENDATIONS

GENERAL:

The soils at the site consist predominantly of sand and gravel with a few lenses of sandy loam, sandy clay loam, and silty loam. The undisturbed soils will provide relatively good bearing values to spread foundations. Fills to bring portions of the site to the desired grade have been compacted. Tests performed on the compacted fills indicate that they are comparable to the undisturbed natural soils and will offer equal support to spread foundations.

BEARING VALUES:

The bearing values recommended for the support of various widths of spread foundations established on undisturbed soils, or on properly compacted fills, are presented on the graph entitled "Available Bearing Values" on Plate 2, Spread Foundations. The bearing values are presented in terms of depth in feet below the lowest adjacent grade. As noted on the graph, the indicated bearing values apply to the total of all design loads, dead, live, and seismic.

FOUNDATION SPACING:

In order that a given foundation will not be adversely influenced by the stresses imposed by adjacent foundations, it is advised that the foundations be spaced horizontally and vertically such that a line connecting the lower adjacent edges of adjacent foundations does not exceed an angle of 45 degrees with the horizontal. Similar spacing is advised between foundations and adjacent excavations. The zone in which foundations may be established is illustrated on the graph ~~of Available Bearing Values~~ entitled "Foundation Spacing" on Plate 2. In selecting foundation depths on the basis of the recommended spacing, construction conditions may justify the use of slopes flatter than the maximum permissible slope of 45 degrees.

SETTLEMENT ANALYSES:

Column Footings. The settlements that typical spread footings sustaining various loads would undergo are presented on the graph entitled "Settlement Analyses" on the lower half of Plate 2. As noted below the graph, the settlement studies were performed for foundations established at a depth of four feet below the lowest adjacent grade. Two lines are presented: the lower line describes the settlements of foundations that are designed in accordance with the maximum recommended bearing values described on the graph

of Available Bearing Values. The upper line describes the settlements for foundations designed to impose footing pressures of 4,000 pounds per square foot. The ratio of real load to total design load of 0.9 was assumed in the studies; settlements for other ratios would be proportional. Practically all of the indicated settlement will accompany the initial application of load.

Mat Foundation. Settlement studies were made for a relatively rigid mat supporting the turbine. These studies indicated an ultimate settlement of approximately 3/4 of an inch, which would be approximately uniform over the base area. Practically all of the settlement would accompany the initial application of load. For the rigid mat, the distribution of the soil pressure on the bottom of the mat due to the dead load would be greater at the edges than at the center. Below the edge of the mat, the soil pressure would be approximately twice the average pressure; in the center of the mat, the soil pressure would be approximately one-half of the average pressure.

It should be kept in mind that the load on the soils supporting the mat will produce settlement in the area immediately adjacent to the mat. Beyond the mat, the settlement will vary from the amount of the edge settlement at the edge of the mat to a negligible value at a distance of approximately one-half the width of the mat from the edge of the mat. Individual footings within this zone would undergo settlements resulting from the load of the mat, in addition to the settlement produced by the foundations themselves.

-oOo-

The following plates and appendices are attached and complete this report:

Plate 1 - Plot Plan

Plate 2 - Spread Foundations

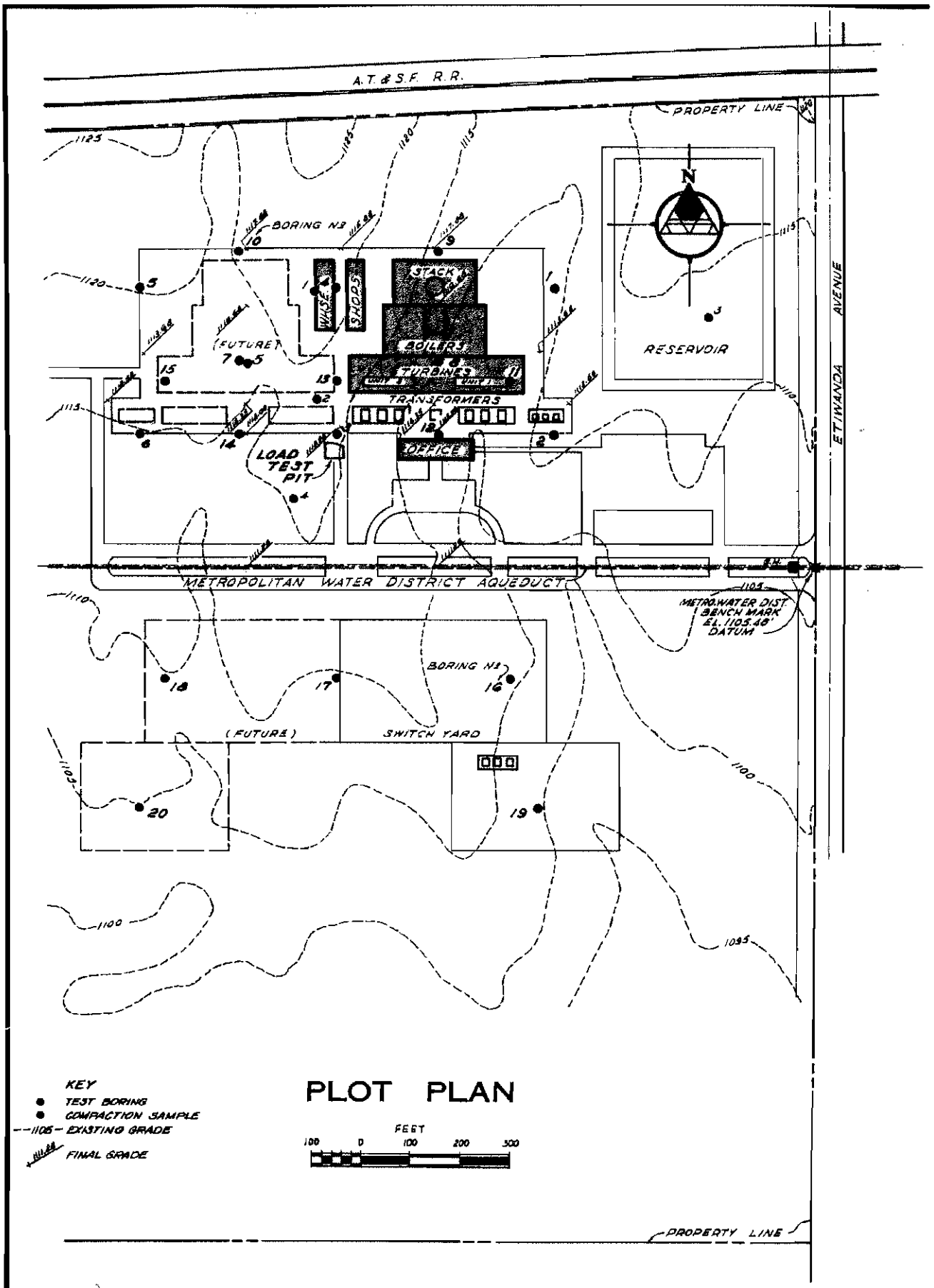
Appendix A - Explorations and Laboratory Tests

Appendix B - Field Load Tests.

Respectfully submitted,

DAMES & MOORE

By L. LeRoy Brandell
L. LeRoy Brandell

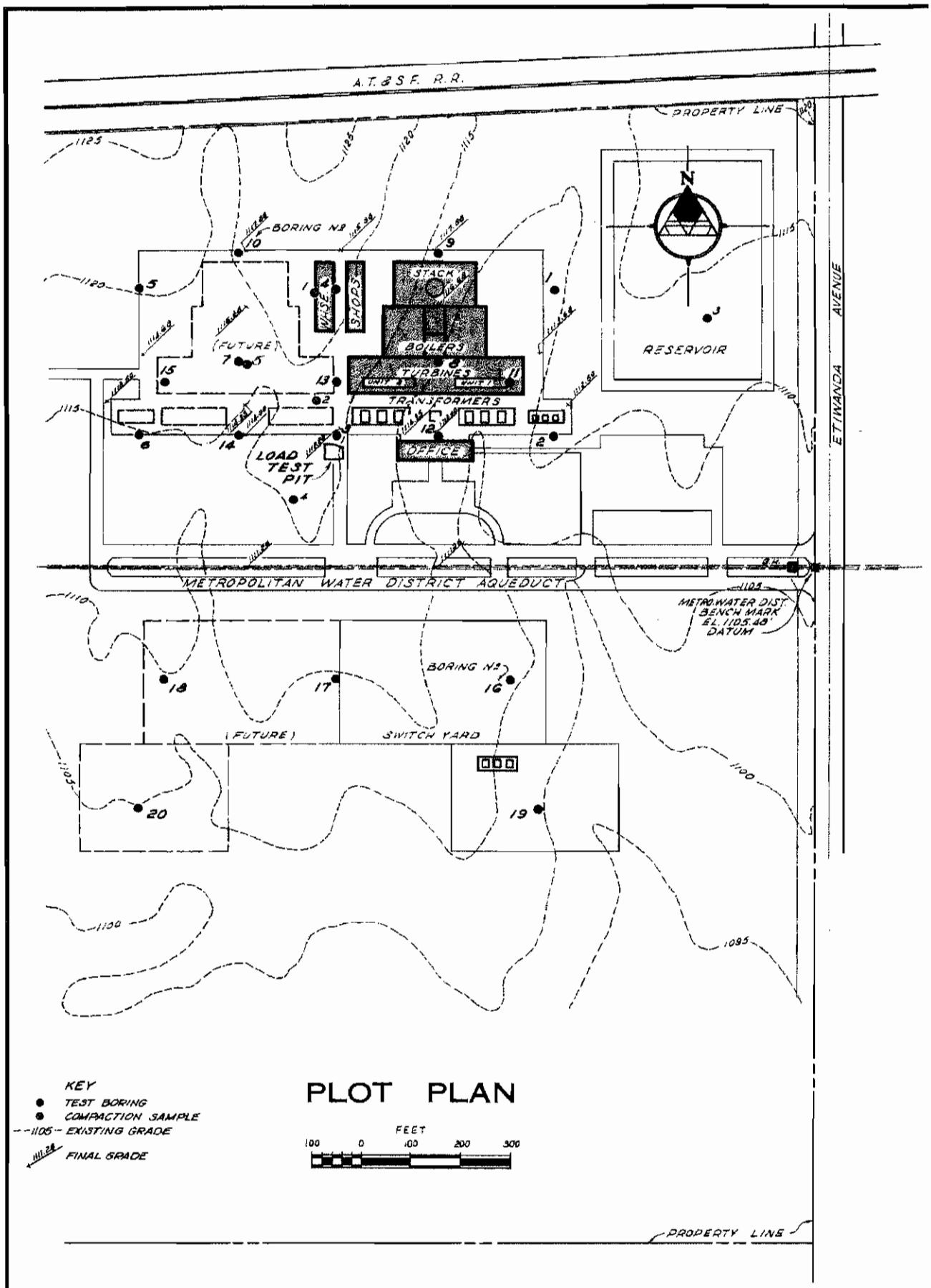


PLOT PLAN

REFERENCE:
SOUTHERN CALIFORNIA EDISON CO. DRAWING Nº 534052 (PRELIMINARY PLOT PLAN FOR ETIWANDA STEAM STATION) DATED 12-27-50.

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE 1



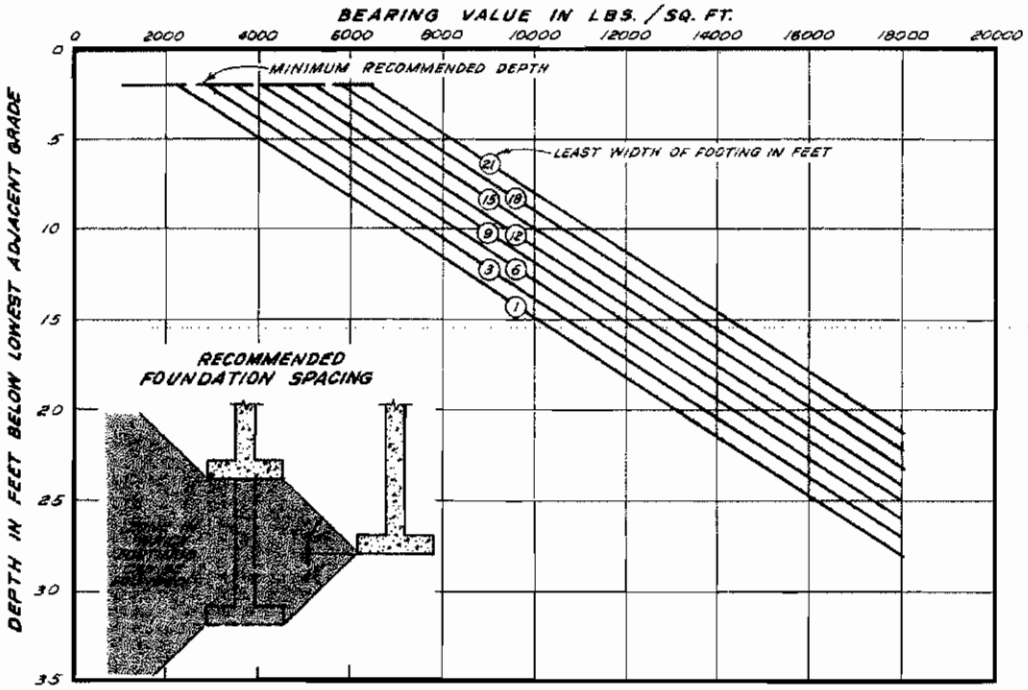
PLOT PLAN

REFERENCE:
SOUTHERN CALIFORNIA EDISON CO. DRAWING Nº 534052 (PRELIMINARY PLOT PLAN FOR ETIWANDA STEAM STATION) DATED 12-27-50.

DAMES & MOORE
FOUNDATION ENGINEERS

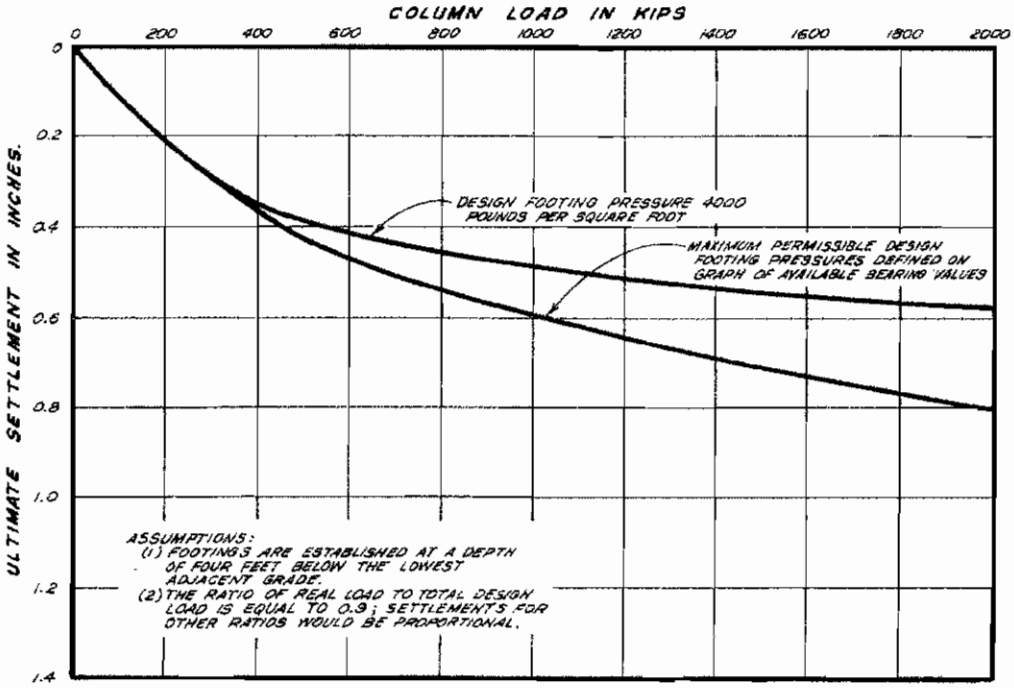
PLATE 1

AVAILABLE BEARING VALUES



NOTE:
THE VALUES SHOWN ARE INTENDED TO APPLY TO THE TOTAL OF ALL LOADS, DEAD, LIVE, AND SEISMIC, AND WERE PREPARED FOR FOUNDATIONS ESTABLISHED AT A MINIMUM DEPTH OF SIX INCHES BELOW THE UPPER SURFACE OF UNDISTURBED NATURAL SOILS OR ON PROPERLY COMPACTED FILLS.

SETTLEMENT ANALYSES



ASSUMPTIONS:
(1) FOOTINGS ARE ESTABLISHED AT A DEPTH OF FOUR FEET BELOW THE LOWEST ADJACENT GRADE.
(2) THE RATIO OF REAL LOAD TO TOTAL DESIGN LOAD IS EQUAL TO 0.9; SETTLEMENTS FOR OTHER RATIOS WOULD BE PROPORTIONAL.

SPREAD FOUNDATIONS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE 2

APPENDIX A

EXPLORATIONS AND LABORATORY TESTS

EXPLORATIONS

The site was explored by drilling a total of twenty exploration borings at the locations shown on the Plot Plan. Borings 1 through 4 were drilled to a depth of 101 feet below the ground surface with rotary wash-boring drilling equipment. The remaining borings were drilled with 20-inch-diameter truck-mounted rotary bucket-type drilling equipment. Borings 5 through 15 extended to a depth of approximately 41 feet; Borings 16 through 20 were 23 feet in depth.

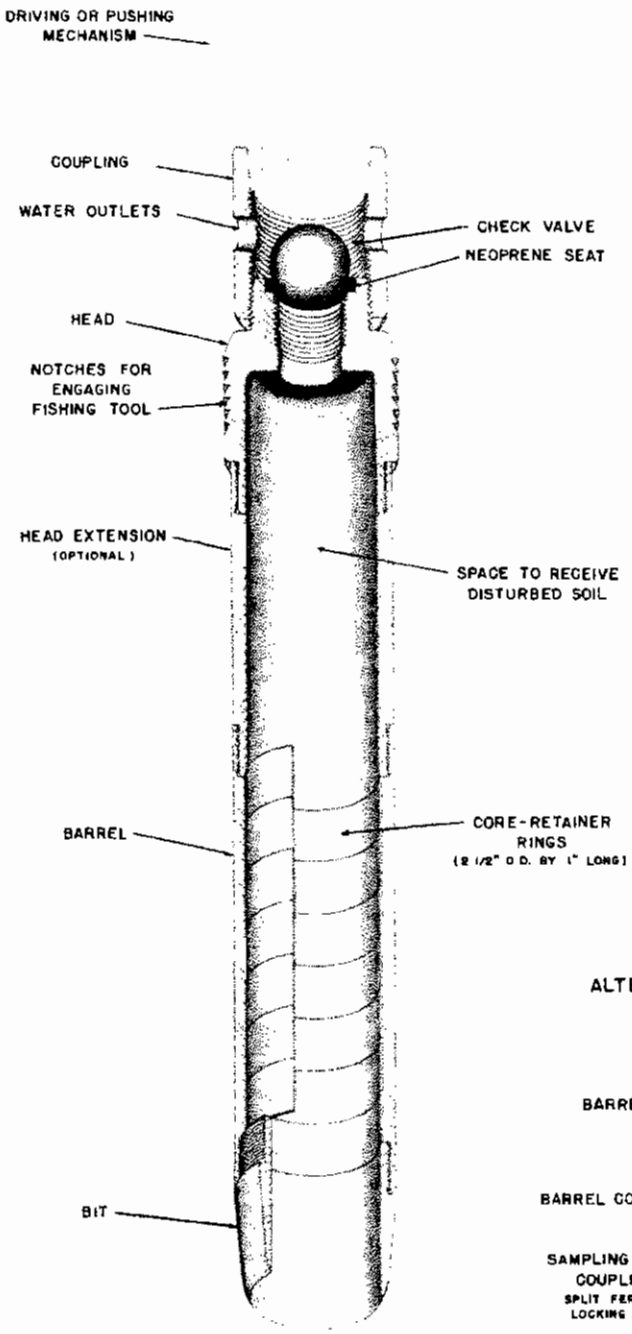
Core samples of the various strata encountered in the exploration borings were extracted in the "Soil Sampler Type D" illustrated on Page A-2 of this Appendix. In addition to the undisturbed samples, five loose samples, representative of the soils available at the site for use in fills, were obtained for the purpose of compaction studies. The soils were classified by visual and textural examination in the field; these observations were supplemented by examination of the samples in the laboratory.

Graphical representations of the soils encountered in the exploration borings appear on Plates A-1A through A-1I, Log of Borings; the nomenclature employed is described by the "Soil Classification Chart" that appears on Plate A-2, Soil Classification Chart and Key to Test Data.

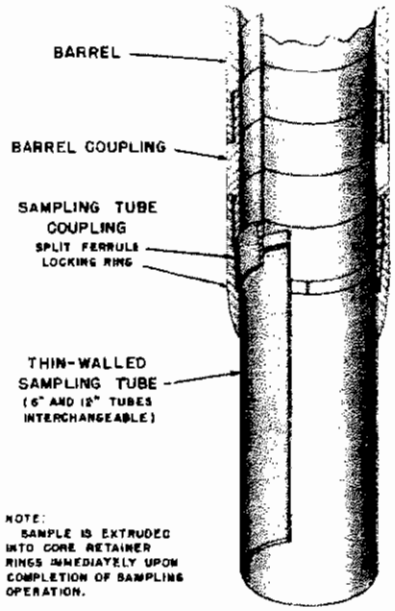
The soils encountered in the exploration borings were predominantly granular consisting of sand and gravel with some lenses of sandy loam, silty loam, and silty clay loam. Ground water was not encountered in the exploration borings.

SOIL SAMPLER TYPE D

FOR SOILS EASY TO RETAIN IN SAMPLER



ALTERNATE ATTACHMENTS



NOTE:
SAMPLE IS EXTRUDED INTO CORE RETAINER RINGS IMMEDIATELY UPON COMPLETION OF SAMPLING OPERATION.

LABORATORY TESTS

GENERAL:

Selected undisturbed samples were subjected to a series of laboratory tests which included shear tests, density studies, and consolidation tests. Selected loose samples were subjected to compaction tests.

SHEAR TESTS:

To determine the strengths of the soils, selected undisturbed samples were subjected to shear tests that were performed in accordance with the "Method of Performing Shear and Friction Tests" described on Page A-4. All of the samples subjected to shear tests were tested at a surcharge pressure equal to the weight of the overburden existing at the time of the explorations. To evaluate the variations in strengths that would result from grading the site, selected samples were tested at either a reduced or an increased surcharge pressure.

DENSITY STUDIES:

The dry density and moisture contents of the majority of the undisturbed samples were determined. In addition, we were requested to evaluate the relative densities of selected samples.

The relative density is defined by the equation,

$$D = \frac{E\ max. - E}{E\ max. - E\ min.}$$

in which

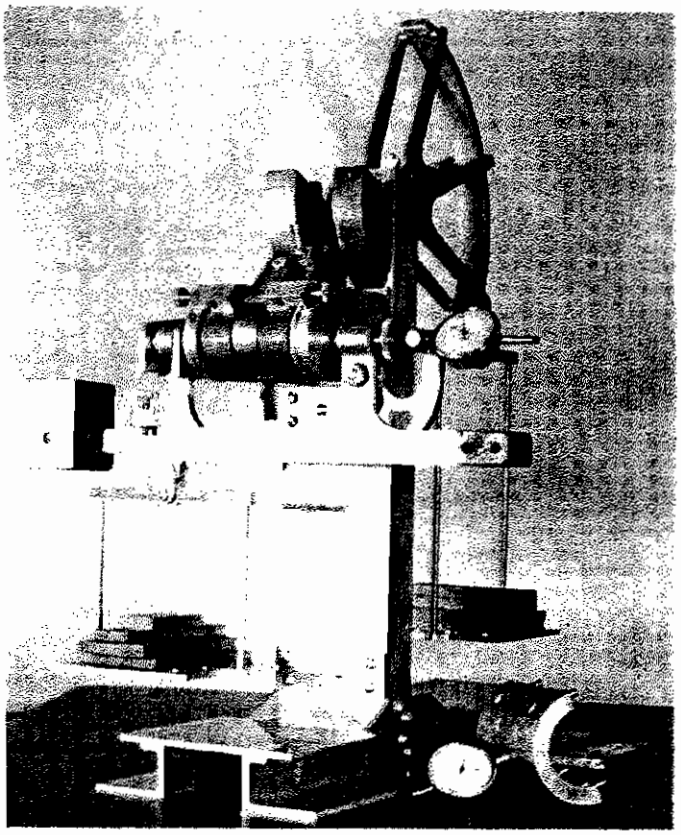
E = voids ratio $\frac{\text{(volume of voids)}}{\text{(volume of solids)}}$ of undisturbed soil.

E max. = voids ratio of the soil in its loosest state.

E min. = voids ratio of the soil in its densest state.

METHOD OF PERFORMING SHEAR AND FRICTION TESTS

In the performance of the shear tests, a three-inch length of the core sample is tested in double shear while confined within three of the retainer rings in which the sample was obtained. The sample is placed in the shearing apparatus under the surcharge pressure at which it is desired to determine the shearing strength of the soil and then, at equal time intervals, equal increments of load are applied in a direction perpendicular to the axis of the sample to the center ring of the three-ring sample of soil, while all transverse movements of the outer rings are prevented. The deflections of the center ring and the axial movements of the sample are measured for each load increment by micrometer dial gauges. These deflections are plotted against the shearing load, giving a stress-strain curve which is used to determine the yield point shearing strength of the core, this shearing strength being related to the bearing value in the ratio 3.14*. The bearing value so computed is that yield point bearing value which would be established by a properly conducted field load test performed at the same conditions of moisture and confinement as the shear tests.



APPARATUS FOR PERFORMING SHEAR AND FRICTION TESTS
Shows lower half of sample carriage including shear dial removed to expose partly sheared core sample of soil.

In order to determine the decrease in strength which may occur with future increases in moisture content, the strength of the soil at possible future moisture conditions is determined by performing the shear test at an artificially increased moisture content. The change in moisture content is accomplished by immersing the sample in water for a period of at least 18 hours (The period is varied depending on the characteristics of the soil and the probable amount of moisture infiltration which may occur in the field.) while the sample is confined under the desired surcharge pressure.

Friction tests of the soil in contact with steel, wood, or concrete, representing the surfaces of the various types of driven piling, are performed in the same apparatus and at the same surcharge pressures, moisture contents, and densities as the corresponding shear tests. The method of performing the test is identical to that of the shear tests, the only difference being that the center ring of soil is replaced by a disk of steel, wood, or concrete.

*"Practical Shear Tests for Foundation Design", Civil Engineering, December, 1940, Pages 784 and 785.

The E max. and E min. were determined from laboratory-prepared samples.* The samples for E max. were prepared by pouring oven-dried soil into a sample ring 2½ inches in diameter by one inch in height. The samples for E min. were prepared by pressing moistened soil into the sample ring with a hydraulic press. A specific gravity of 2.77, as determined from tests on representative samples, was used in the computations.

SHEAR AND DENSITY TEST DATA:

The results of the shear tests, and of the associated moisture and density studies, are presented at the left of the logs of the appropriate exploration borings on Plates A-1A through A-1I, in the manner described by the "Key to Test Data" on Plate A-2, Soil Classification Chart and Key to Test Data.

The shear test results have been summarized on the graph entitled "Shear Test Data" on the upper half of Plate A-3, Summary of Shear and Consolidation Test Data. The values of shearing strength considered in the determination of the bearing values available to spread foundations are defined by the line that has been passed through the plotted test data.

CONSOLIDATION TESTS:

To provide data for settlement studies, four selected samples were subjected to consolidation tests that were performed in accordance with the "Method of Performing Consolidation Tests" described on Page A-6. The load-versus-consolidation curves obtained from these tests are presented on Plate A-3.

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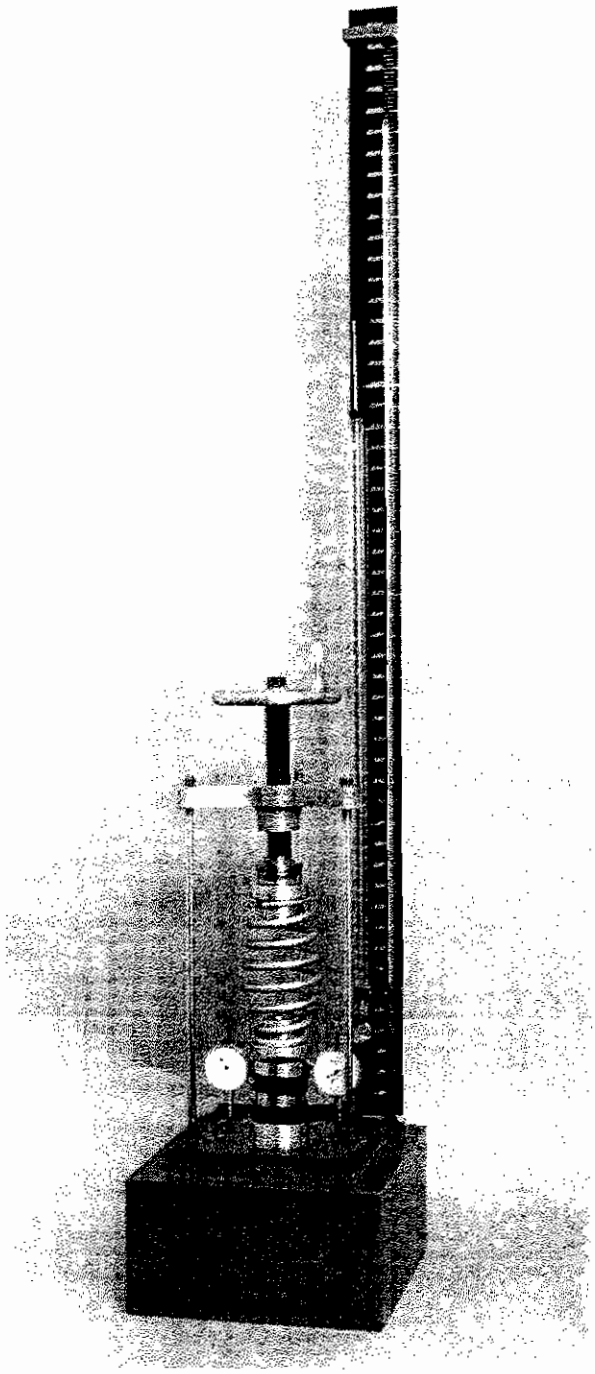
*Methods for preparing the samples have not been standardized. Values will vary with different laboratories, depending on the techniques employed.

METHOD OF PERFORMING CONSOLIDATION TESTS

To determine the consolidation characteristics of the foundation soils so that settlement analyses may be performed, consolidation tests are performed in the consolidation apparatus on confined one-inch-thick core samples compressed between two porous stones. Axial loads are applied to the sample in increments and observations of the consolidation under the various load increments, as measured by micrometer dial gauges, are recorded at various time intervals. In general, each load is maintained constant until the rate of consolidation is observed to cease substantially, and then an additional load increment is applied and the observation repeated. From these data, time-versus-consolidation curves and load-versus-consolidation curves are obtained which enable estimates to be made of the probable magnitude and rate of settlement of foundations supported by the soil tested.



APPARATUS FOR PERFORMING CONSOLIDATION TESTS
Shows one-inch length of soil sample confined in retainer ring and under axial load.

COMPACTION TESTS:

In order to evaluate the compaction characteristics of the materials available at the site for use in fills, three representative loose samples were subjected to compaction tests that were performed in accordance with the Modified A.A.S.H.O.* method of compaction described on Page A-8. The results of these tests are presented in graphical form on Plate A-4, Compaction Test Data.

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The following plates are attached and complete this appendix:

Plate A-1A - Log of Borings (Boring 1)

Plate A-1B - Log of Borings (Boring 2)

Plate A-1C - Log of Borings (Boring 3)

Plate A-1D - Log of Borings (Boring 4)

Plate A-1E - Log of Borings (Borings 5, 6, and 7)

Plate A-1F - Log of Borings (Borings 8, 9, and 10)

Plate A-1G - Log of Borings (Borings 11, 12, and 13)

Plate A-1H - Log of Borings (Borings 14, 15, and 16)

Plate A-1I - Log of Borings (Borings 17, 18, 19, and 20)

Plate A-2 - Soil Classification Chart and Key to Test Data

Plate A-3 - Summary of Shear and Consolidation Test Data

Plate A-4 - Compaction Test Data.

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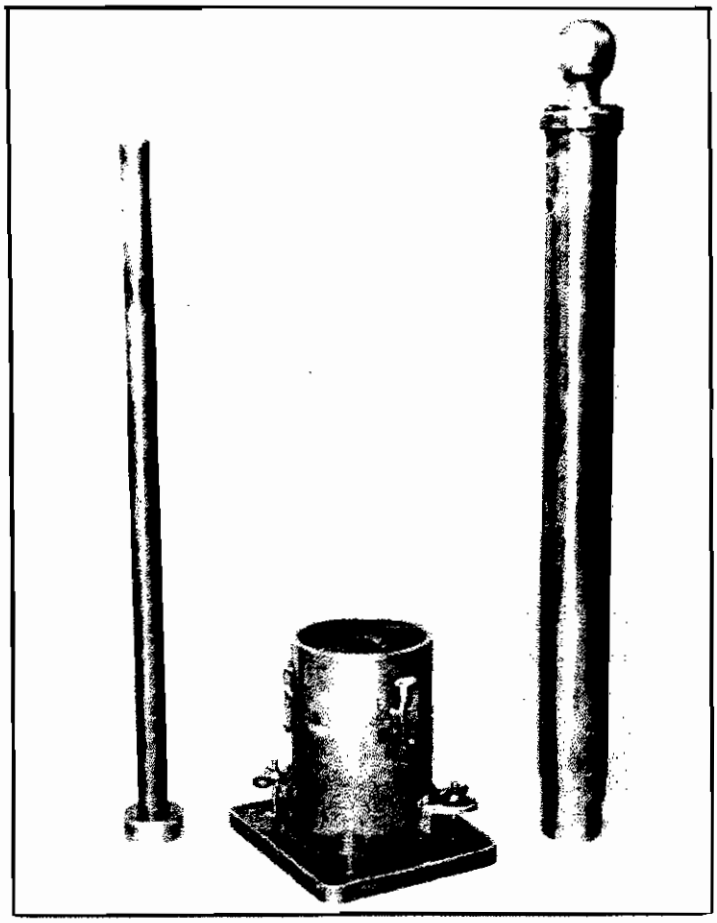
*American Association of State Highway Officials.

METHOD OF PERFORMING COMPACTION TESTS

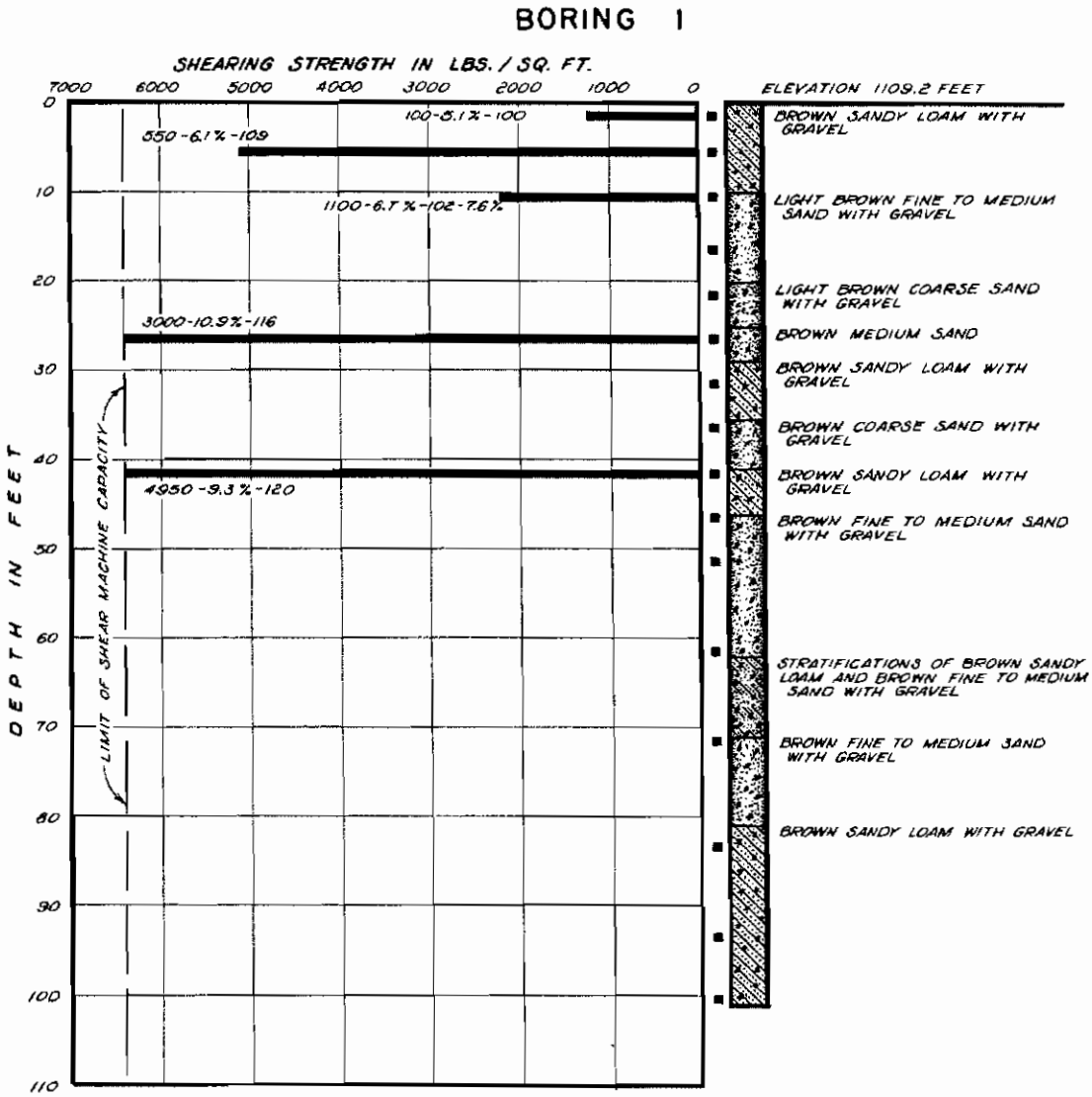
(STANDARD AND MODIFIED A.A.S.H.O. METHODS)

It has been established that, when compacting effort is held constant, the density of a rolled earth fill increases with added moisture until a maximum dry density is obtained at a moisture content termed the "optimum moisture content", after which the dry density decreases. The compaction curve showing the relationship between density and moisture content for a specific compacting effort is determined by experimental methods -- two commonly used methods are described in the following paragraph.



APPARATUS FOR PERFORMING COMPACTION TESTS
Shows, from left to right, 5½-pound rammer (sleeve controlling 12" height of drop removed), 1/30-cubic-foot cylinder with removable collar and base plate, and 10-pound rammer within sleeve.

For the "Standard A.A.S.H.O." method of compaction, the soil sample is compacted in accordance with the "Standard Laboratory Method of Test for the Compaction and Density of Soil" as specified by the American Association of State Highway Officials under Designation T99-38. In this method of testing, a portion of the soil sample is compacted at a specific moisture content in three equal layers in a standard compaction cylinder having a volume of 1/30 cubic foot, using twenty-five 12-inch blows of a standard 5½-pound rammer to compact each layer. In the "Modified A.A.S.H.O." compaction method, a portion of the soil sample is compacted at a specific moisture content in five equal layers in a standard compaction cylinder having a volume of 1/30 cubic foot, using twenty-five 18-inch blows of a 10-pound rammer to compact each layer. For both methods, the wet density of the compacted sample is determined by weighing the known volume of soil; the moisture content, by measuring the loss of weight of a portion of the sample when oven dried; and the dry density, by computing it from the two determined quantities. A series of such compactions is performed at increasing moisture contents until a sufficient number of points defining the moisture-density relationship have been obtained to permit the plotting of the compaction curve. The maximum dry density and optimum moisture content for the particular compacting effort are determined from the compaction curve.

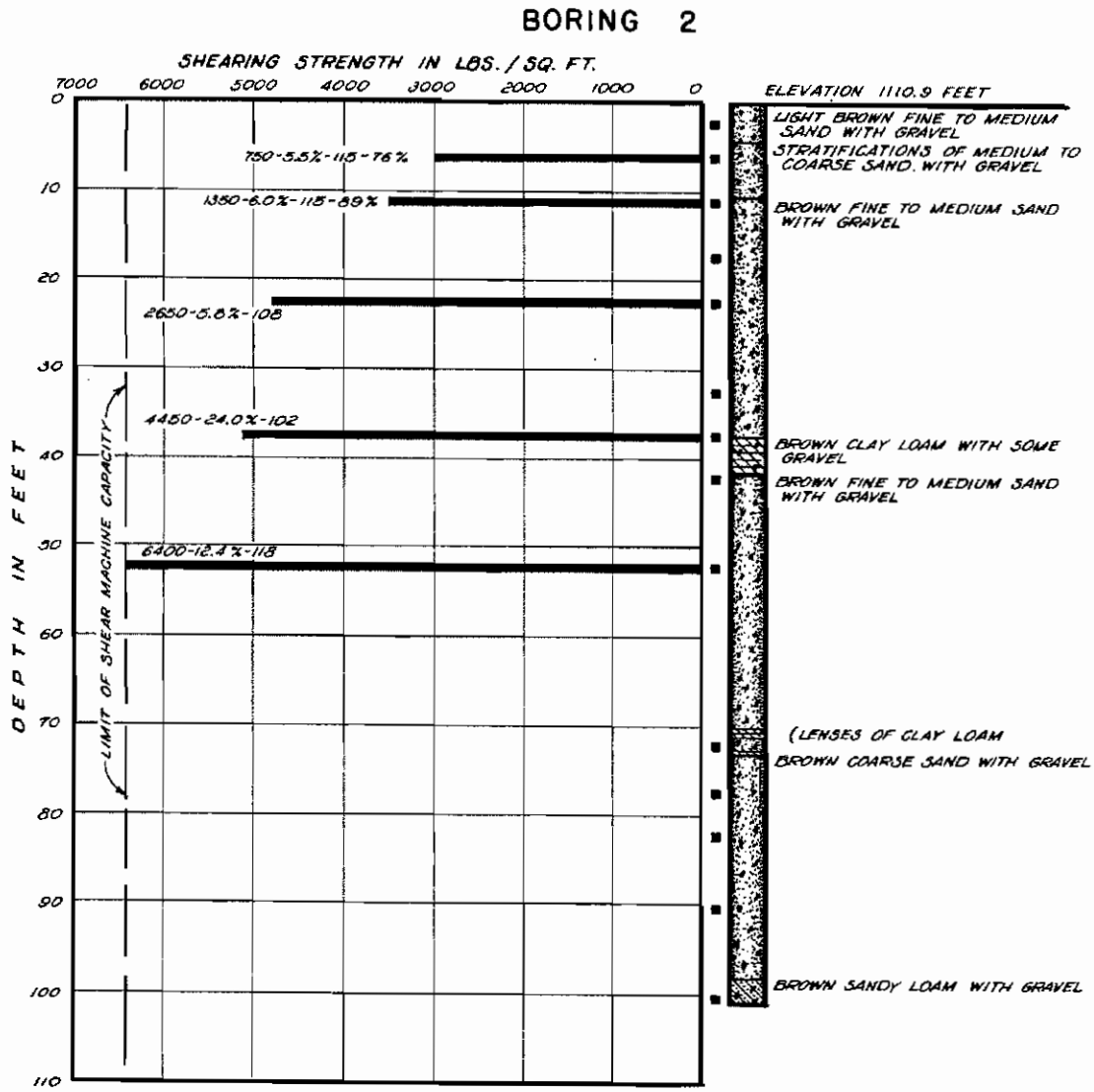


LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-1A

DAMES & MOORE
JOB No. 3742
THIS DRAWING IS ONE OF A SERIES OF ___ DRAWINGS
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED 1-31-51
DATE PRINTED
DRAWN BY
DATA CHECK BY
DRAFTING CHECK BY
REPORT DICTATED BY
DATE



LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-18

DAMES & MOORE
JOB No. 872-6
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LOCATION
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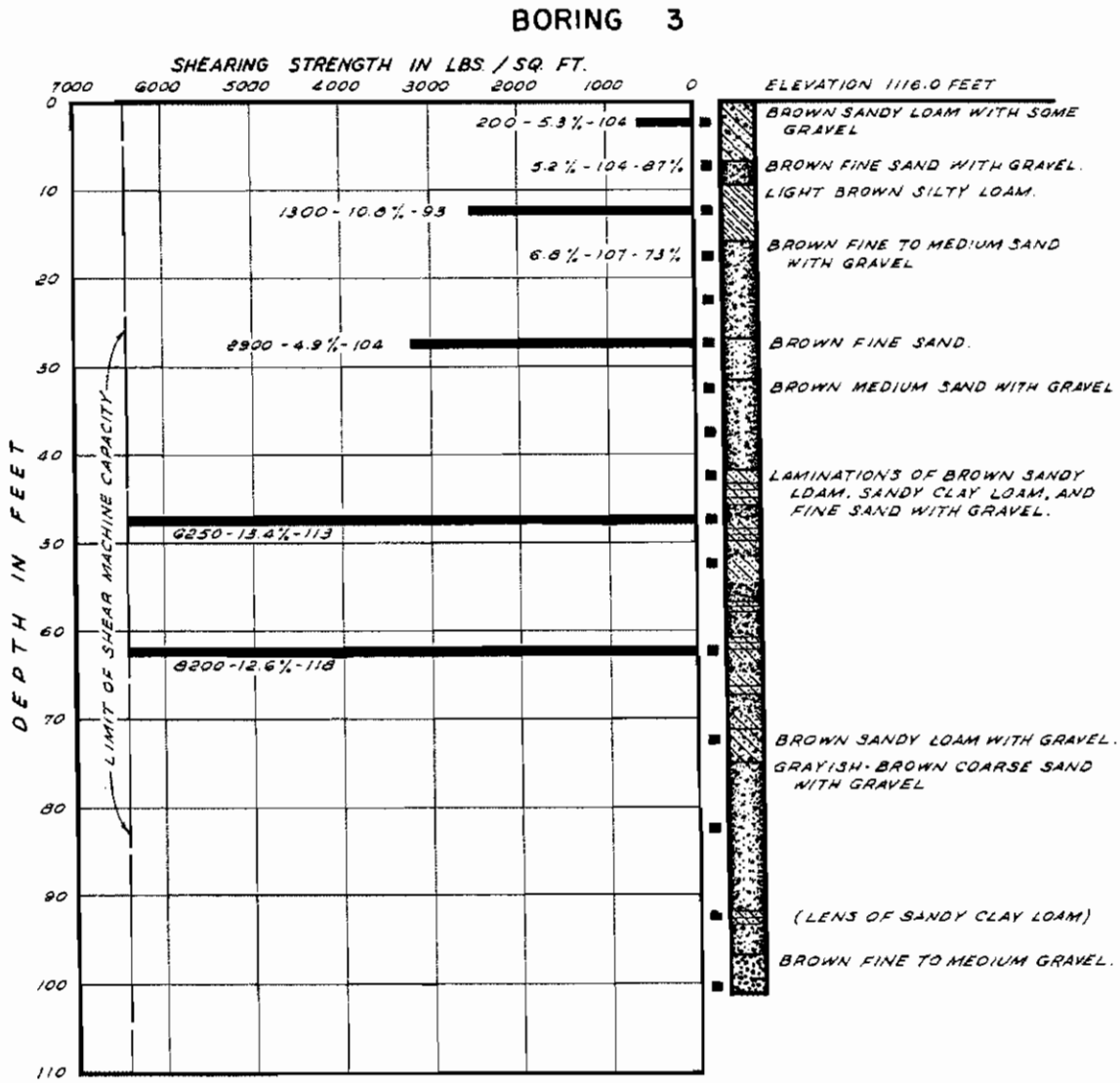
DATE 9-23-51
REPORT DICTATED BY
DATE



LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-1C

DAMES & MOORE
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LOCATION
CLIENT
DATE JOB STARTED 1-11-51
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DATE 6-26-51
REPORT DICTATED BY
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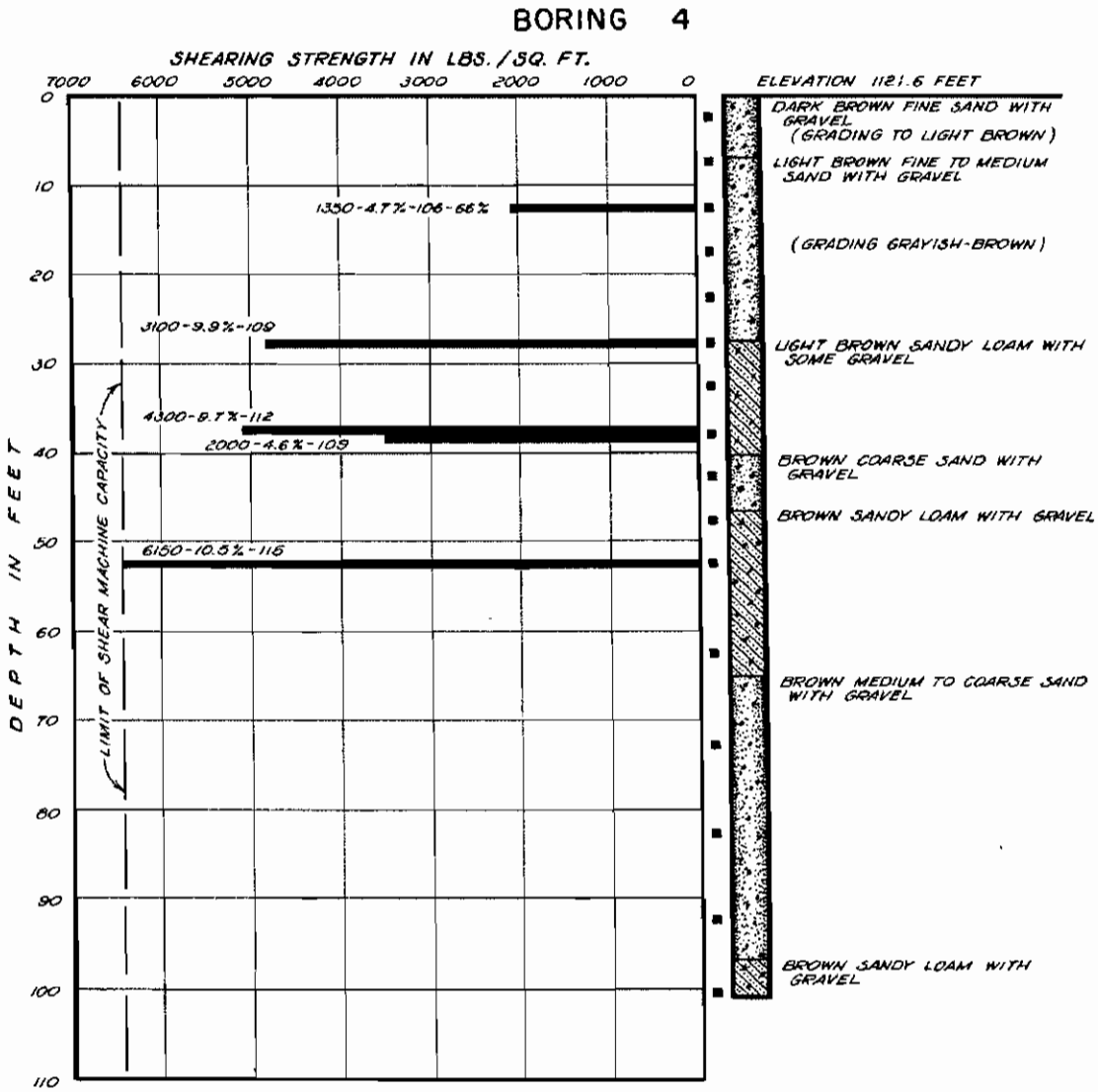

LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-1D

DAMES & MOORE
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THIS DRAWING IS ONE OF A SERIES OF ___ DRAWINGS
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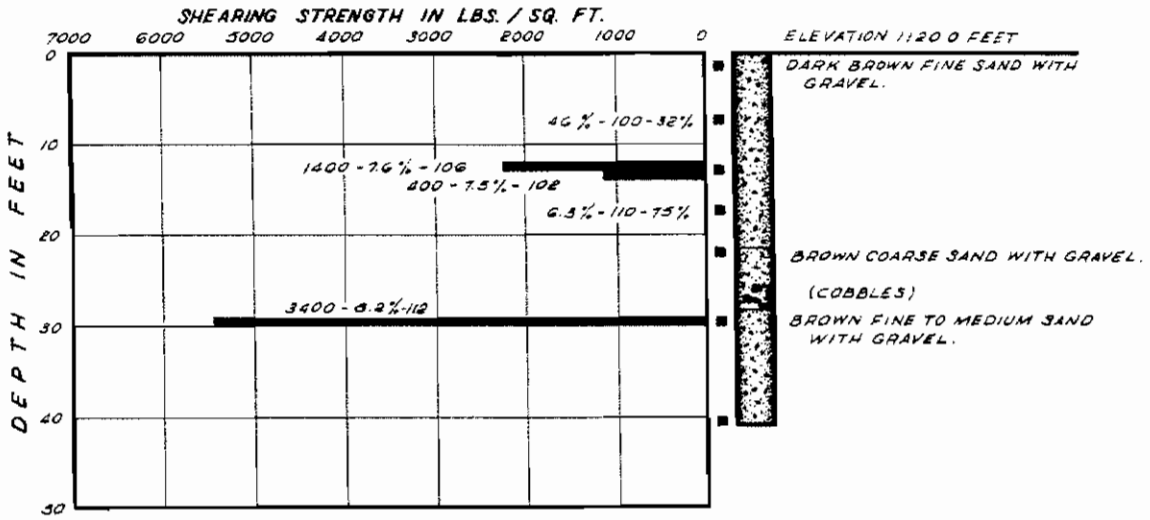
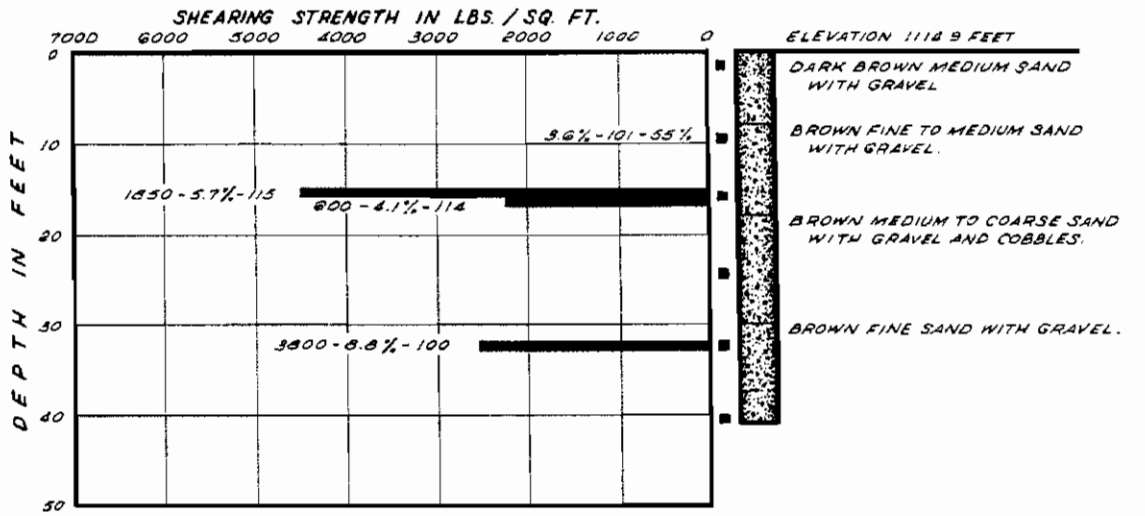
DATE JOB STARTED 1-31-51
DATE PRINTED
DRAWN BY
DATA CHECK BY DATE 4-25-51
DRAFTING CHECK BY DATE 4-25-51
REPORT DICTATED BY DATE

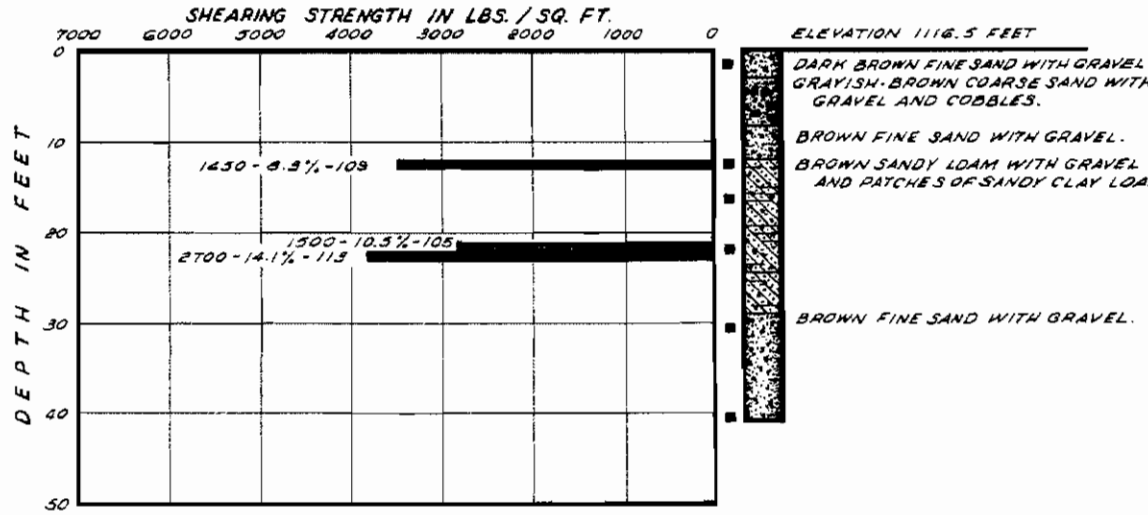
BORING 5



BORING 6



BORING 7



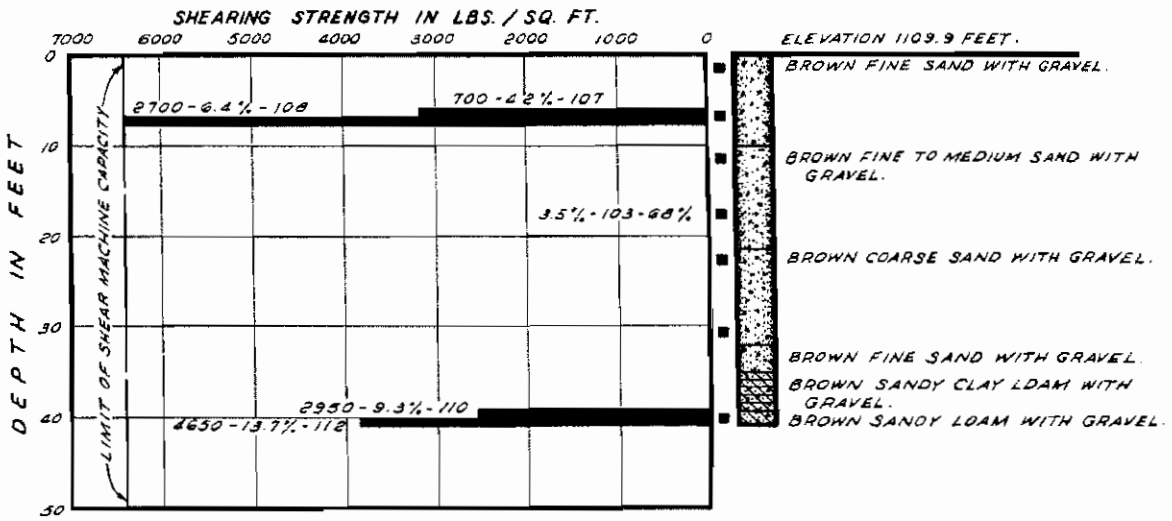
LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

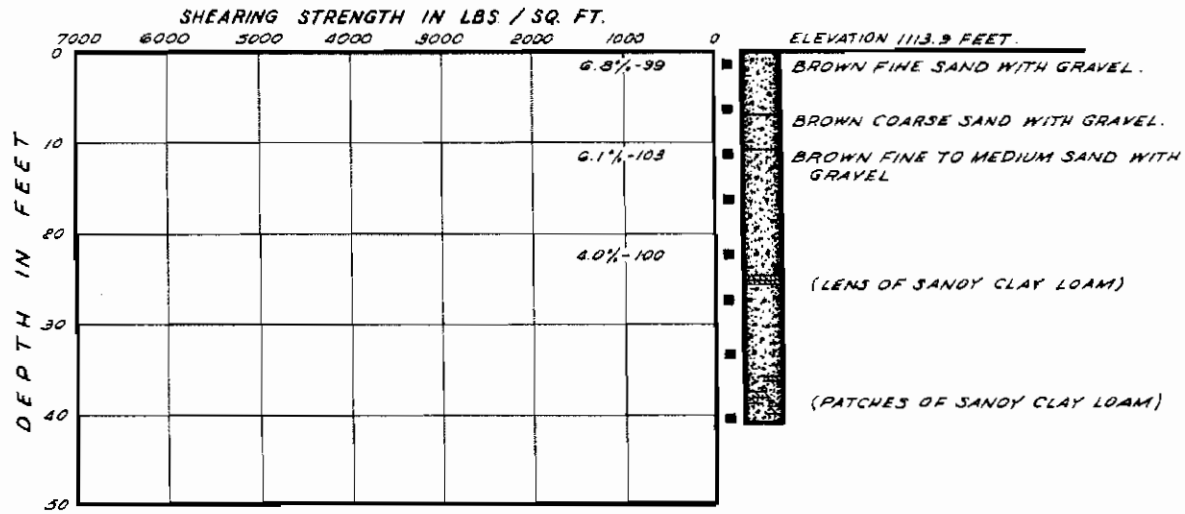
PLATE A-1E

DAMES & MOORE
JOB No. 3712
THIS DRAWING IS ONE OF A SERIES OF ___ DRAWINGS
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED 1-31-57
DATE PRINTED
DATA CHECK BY DATE 4-25-57
DRAFTING CHECK BY DATE 4-25-57
REPORT DICTATED BY DATE

BORING 8



BORING 9



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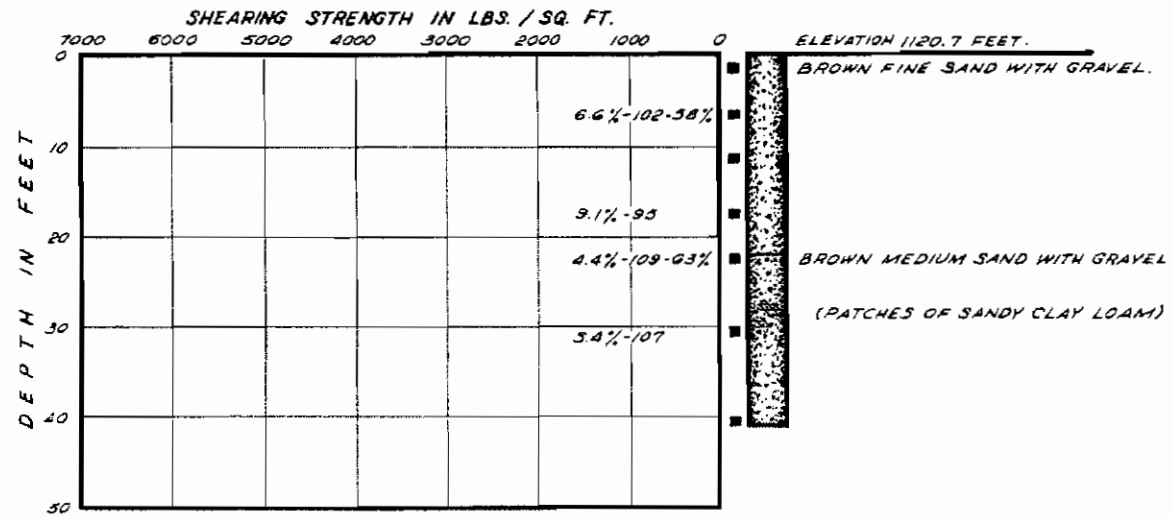


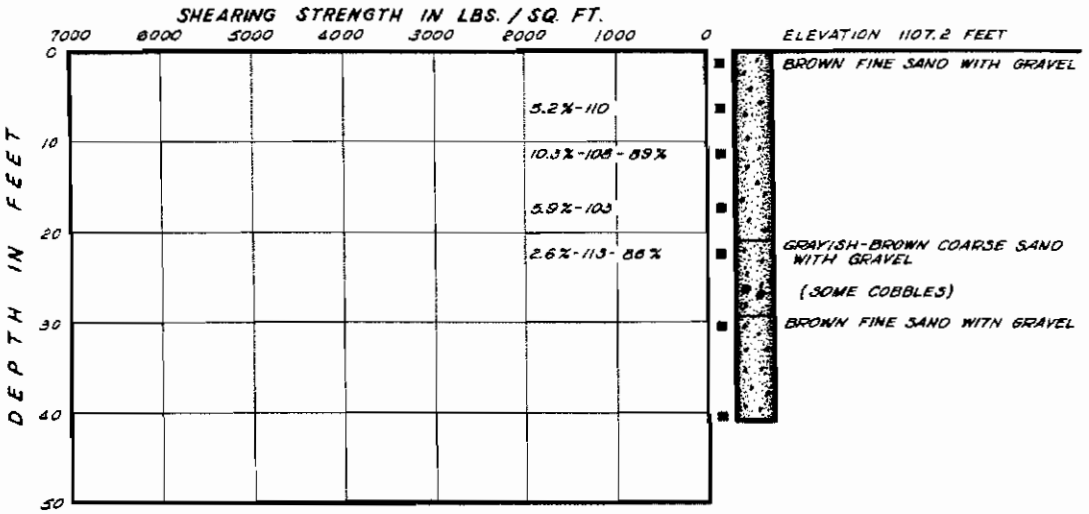
LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-1F

DAMES & MOORE
JOB No. 377-6
THIS DRAWING IS ONE OF A SERIES OF ____ DRAWINGS
JOB TITLE Foundation Investigation
LOCATION near Gorham, Calif.
CLIENT So. Cal. Edison Co.
DATE JOB STARTED 1-31-51 DATE PRINTED
DRAWN BY Leary DATE
DATA CHECK BY Yeme DATE 4-25-51
DRAFTING CHECK BY Yeme DATE 4-25-51
REPORT DICTATED BY Smith DATE

BORING 11



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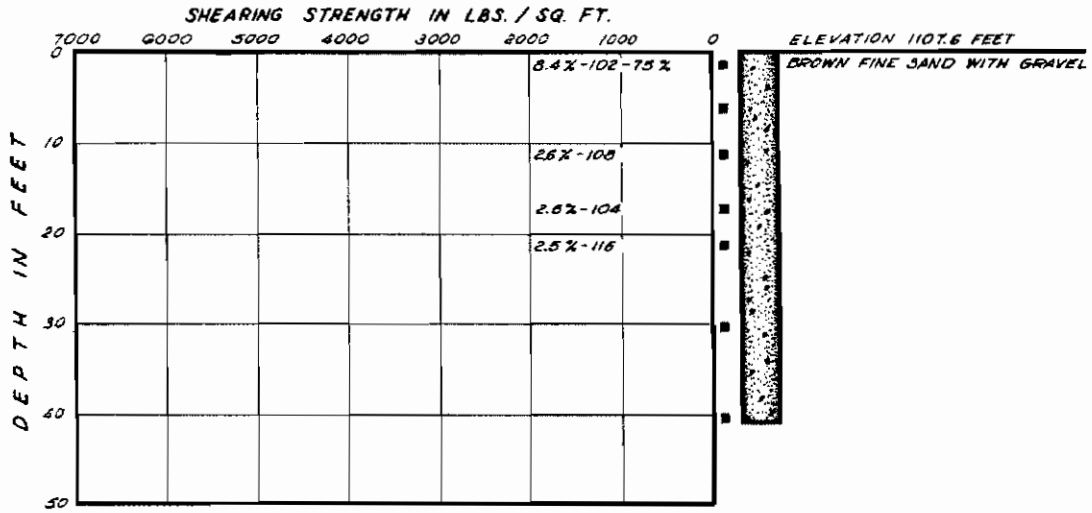
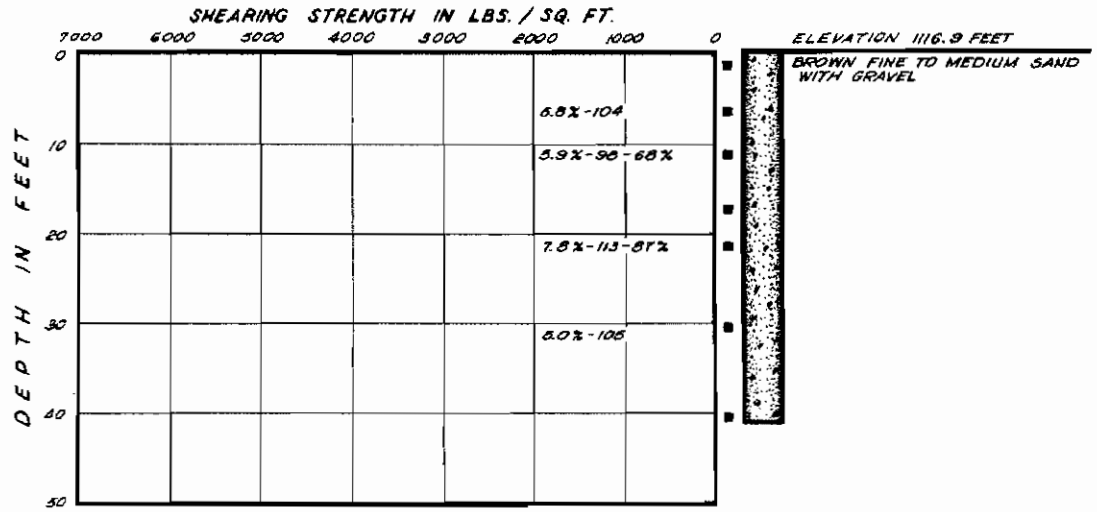


BORING 13



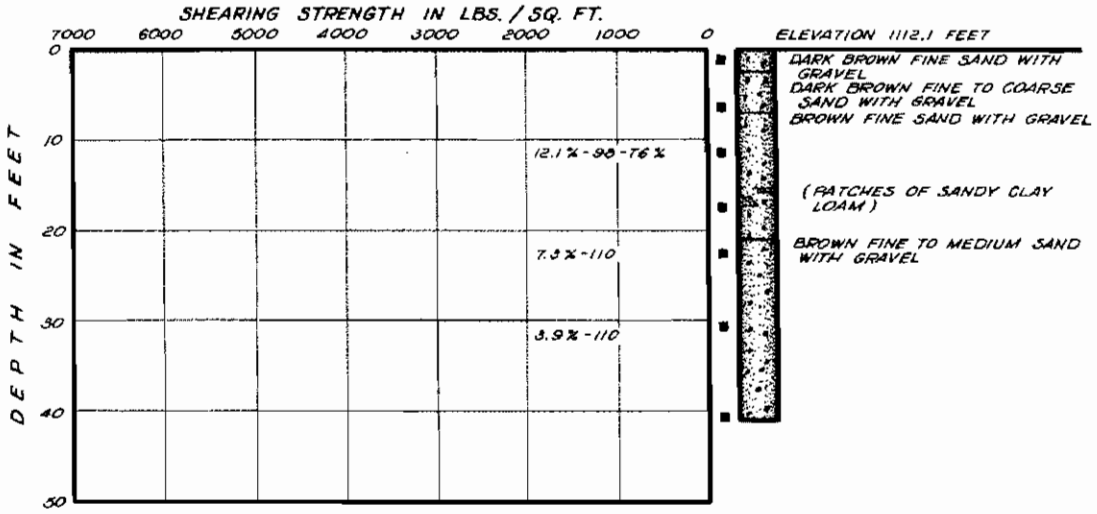
LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

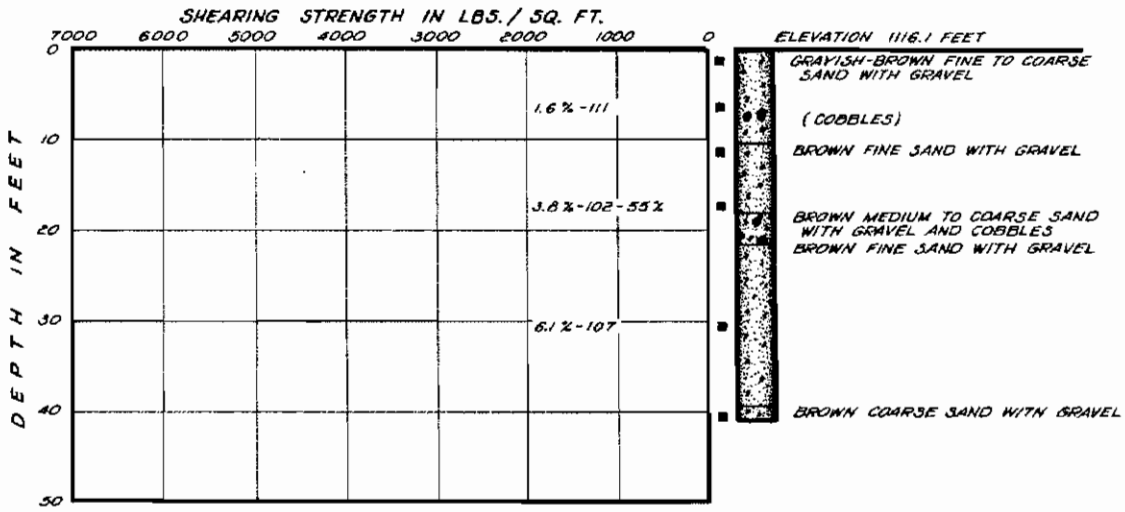
PLATE A-16

DAMES & MOORE
JOB NO. 377-8
THIS DRAWING IS ONE OF A SERIES OF ____ DRAWINGS
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED 1-8-51
DATE PRINTED
DRAWN BY
DATE 4-30-51
DATA CHECK BY
DATE 6-25-51
DRAFTING CHECK BY
DATE
REPORT DICTATED BY
DATE

BORING 14



BORING 15



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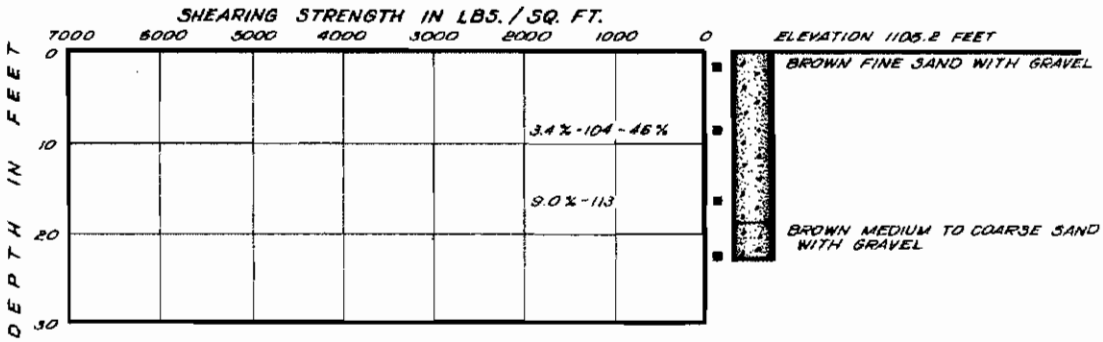


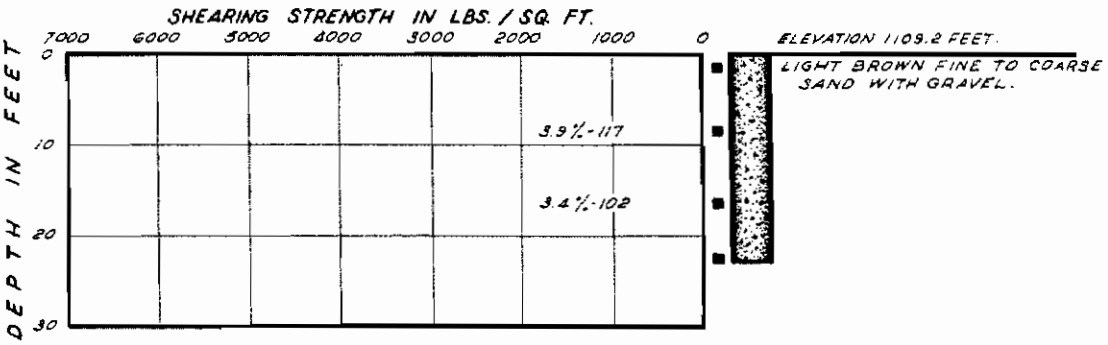
LOG OF BORINGS

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-1H

DAMES & MOORE
JOB No. 322-1
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED 1-3-51
DATE PRINTED
THIS DRAWING IS ONE OF A SERIES OF DRAWINGS
DATA CHECK BY DATE 4-20-51
DRAFTING CHECK BY DATE 4-25-51
REPORT DICTATED BY DATE

BORING 17



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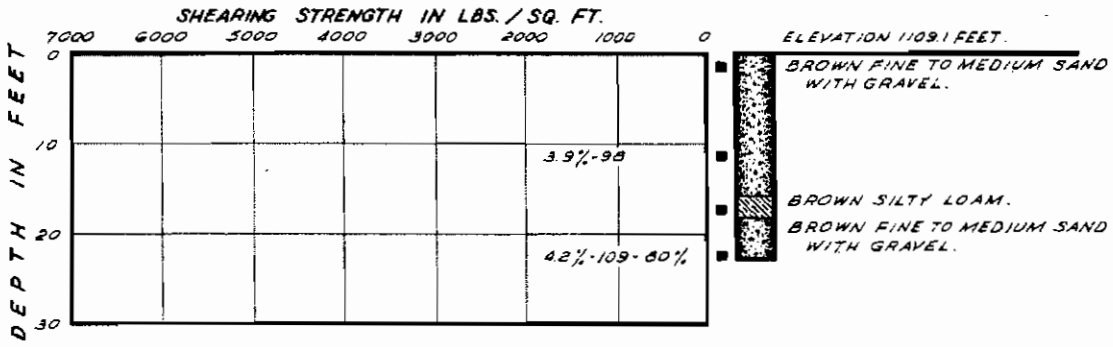
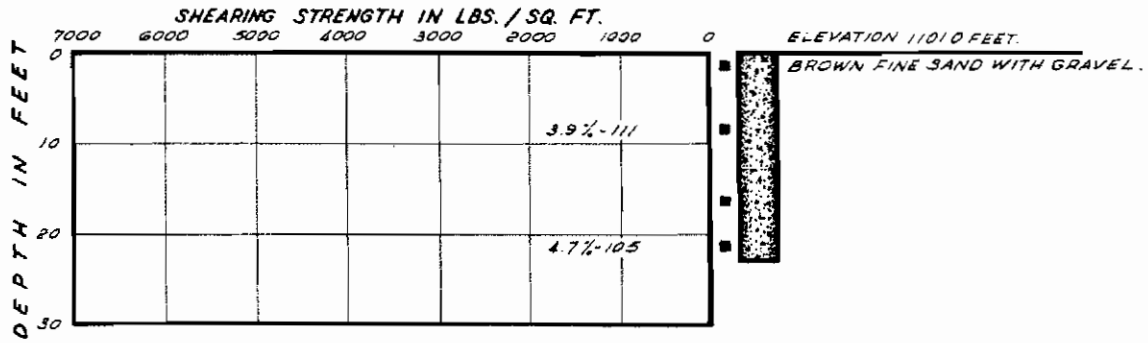


BORING 19



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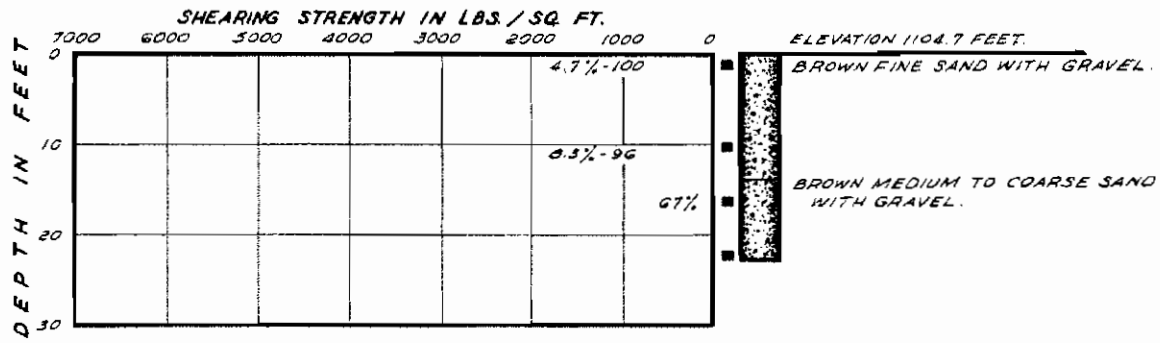


LOG OF BORINGS

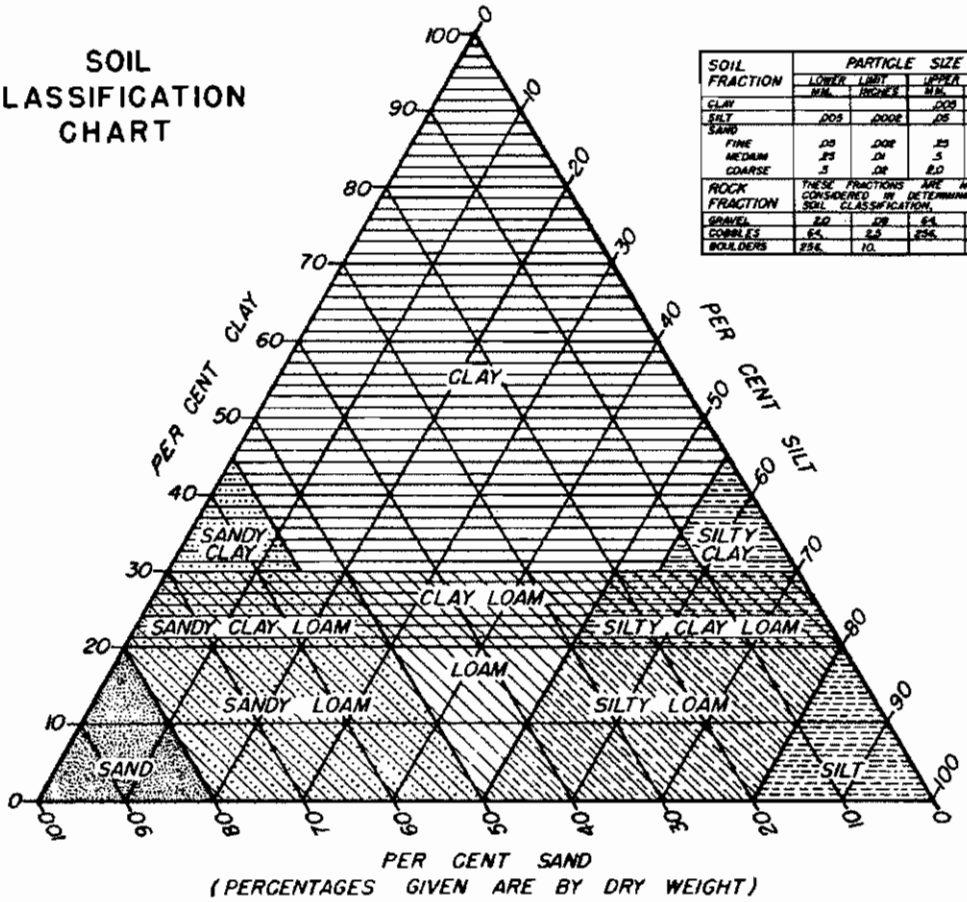
DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-11

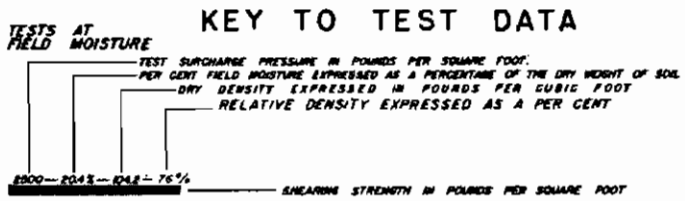
DAMES & MOORE
JOB NO. 3277-L
THIS DRAWING IS ONE OF A SERIES OF ____ DRAWINGS
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED 1-31-51 DATE PRINTED
DRAWN BY
DATA CHECK BY DATE 4-26-51
DRAFTING CHECK BY DATE 4-23-51
REPORT DICTATED BY DATE

SOIL CLASSIFICATION CHART

SOIL FRACTION	PARTICLE SIZE			
	LOWER LIMIT MM.	LOWER LIMIT INCHES	UPPER LIMIT MM.	UPPER LIMIT INCHES
CLAY			.005	.00002
SILT	.005	.00002	.05	.002
SAND				
FINE	.05	.002	.25	.01
MEDIUM	.25	.01	.5	.02
COARSE	.5	.02	2.0	.08
ROCK FRACTION	THESE FRACTIONS ARE NOT CONSIDERED IN DETERMINING SOIL CLASSIFICATION.			
GRAVEL	2.0	.08	64.	2.5
COBBLES	64.	2.5	256.	10.
BOULDERS	256.	10.		



KEY TO TEST DATA



■ INDICATES DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

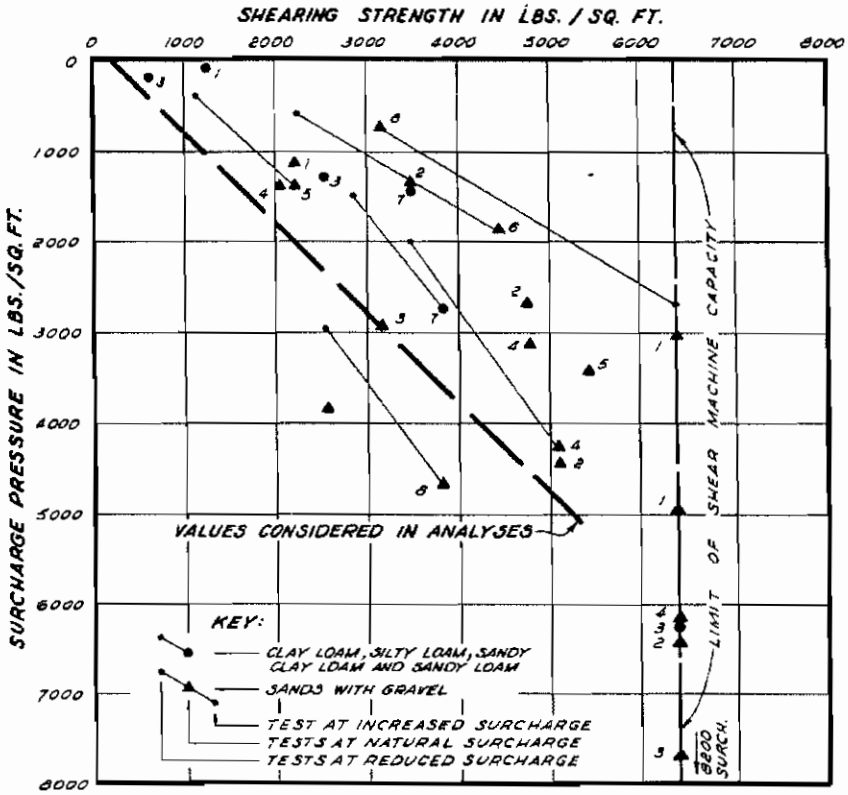
SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

DAMES & MOORE
FOUNDATION ENGINEERS

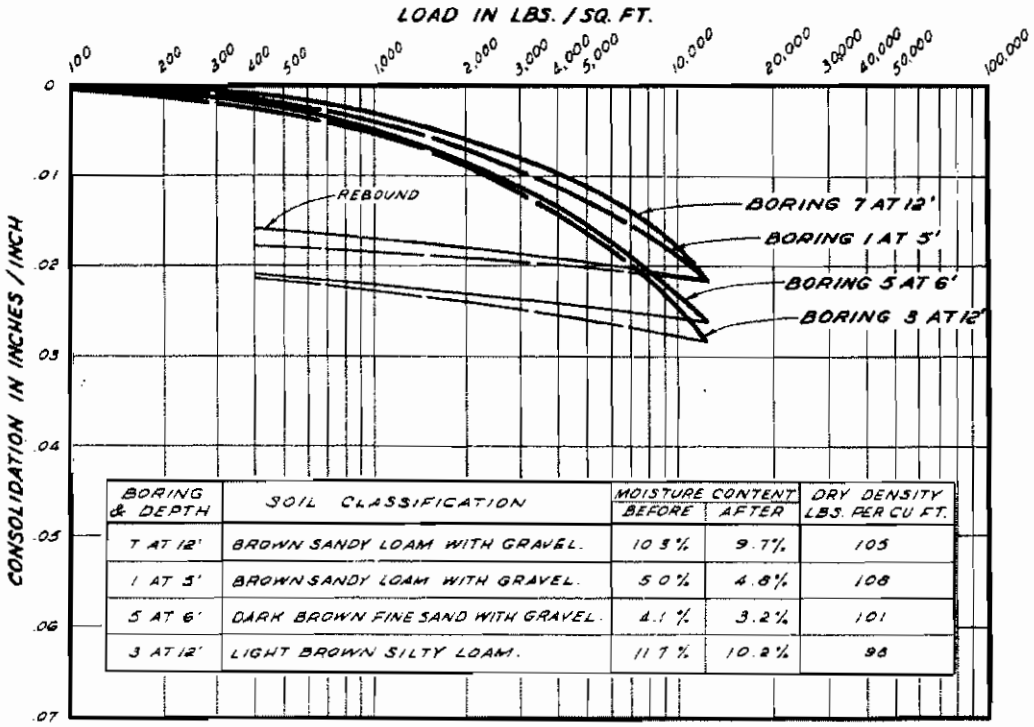
PLATE A-2

DAMES & MOORE
JOB NO. ____ JOB TITLE ____ DRAWN BY ____ DATE ____
THIS DRAWING IS ONE OF A SERIES OF ____ DRAWINGS
LOCATION ____ DATA CHECK BY ____ DATE ____
CLIENT ____ DRAFTING CHECK BY ____ DATE ____
DATE JOB STARTED ____ DATE PRINTED ____ REPORT DICTATED BY ____ DATE ____

SHEAR TEST DATA



CONSOLIDATION TEST DATA



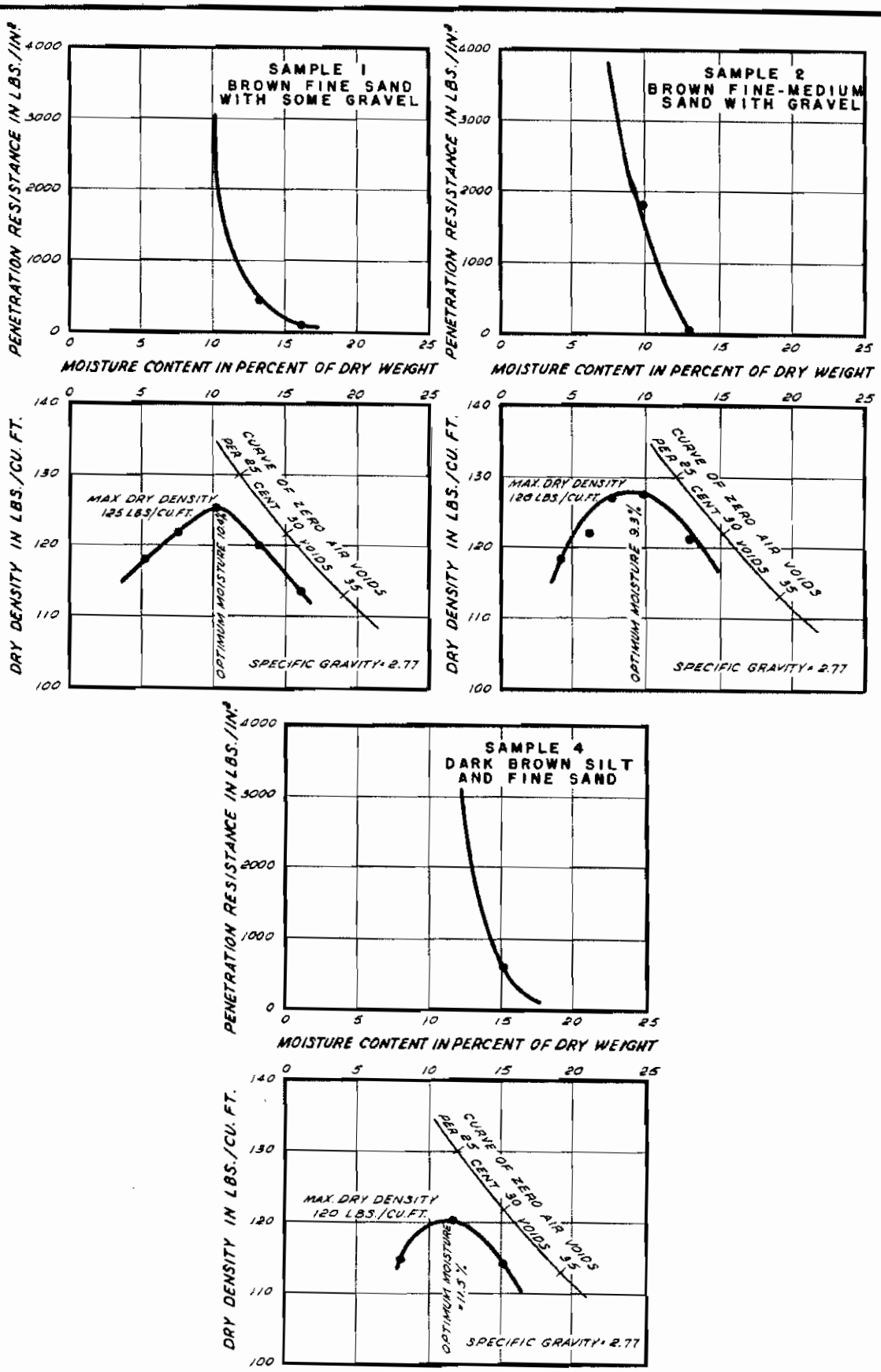
BORING & DEPTH	SOIL CLASSIFICATION	MOISTURE CONTENT BEFORE	MOISTURE CONTENT AFTER	DRY DENSITY LBS. PER CU FT.
7 AT 12'	BROWN SANDY LOAM WITH GRAVEL.	10.3%	9.7%	105
1 AT 5'	BROWN SANDY LOAM WITH GRAVEL.	5.0%	4.8%	108
5 AT 6'	DARK BROWN FINE SAND WITH GRAVEL.	4.1%	3.2%	101
3 AT 12'	LIGHT BROWN SILTY LOAM.	11.7%	10.2%	98

SUMMARY OF SHEAR AND CONSOLIDATION TEST DATA

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-3

DAMES & MOORE
JOB No. 1221
THIS DRAWING IS ONE OF A SERIES OF ___ DRAWINGS
JOB TITLE
LOCATION
CLIENT
DATE JOB STARTED
DATE PRINTED
DATA CHECK BY
DATE
DRAFTING CHECK BY
DATE
REPORT DICTATED BY
DATE



COMPACTION TEST DATA

NOTE
COMPACTION TESTS WERE PERFORMED IN ACCORDANCE WITH THE MODIFIED A.A.S.H.O. METHOD.

DAMES & MOORE
FOUNDATION ENGINEERS

PLATE A-4

DAMES & MOORE
JOB No. 377-6
THIS DRAWING IS ONE OF A SERIES OF ____ DRAWINGS
JOB TITLE Foundation Investigation
LOCATION Near Fortuna, Calif.
CLIENT Sa. Co. Edison Col.
DATE JOB STARTED 1-31-51 DATE PRINTED
DRAWN BY ____ DATE 4-25-51
DATA CHECK BY ____ DATE 4-25-51
DRAFTING CHECK BY ____ DATE
REPORT DICTATED BY ____ DATE

APPENDIX B

FIELD LOAD TESTS

SCOPE

At the request of the Stone & Webster Engineering Corporation, field load tests were performed to supplement the laboratory test results in determining the behavior of spread foundations. In selecting the locations of the load tests, it was desired to test the soils at the approximate depths at which foundations would be established, and at the same time, to test a stratum that had the lowest density. A stratum of silty loam at Elevation 1106 at the location of Boring 3 was selected for testing. The stratum essentially met the depth and density criteria--the results of shear tests on the stratum indicated strengths somewhat greater than the values selected for the design of spread foundations. To provide information on the characteristics of footings of different sizes, two separate tests were performed on the selected stratum. In one test, a square plate with dimensions of one foot by one foot was employed; in the other test, a square plate with dimensions of three feet by three feet was used. The locations of the tests are shown on the Plot Plan.

On the basis of the "Values Considered in Analyses" defined on the Summary of Shear Test Data on Plate A-3 of Appendix A, it was determined that spread foundations with a least dimension of one foot and established at a depth equal to that planned for the bearing plates could safely impose a footing pressure of 5,000 pounds per square foot; a footing pressure of 6,000 pounds per square foot could be employed for a footing with a least width of three feet. To assure an adequate range of load test data, it was concluded that each test would be carried to a pressure of 12,000 pounds per square foot.

TEST SETUP:

The load test setup is illustrated on the right of Plate B-1, Load Test Data. To provide excavation conditions comparable to those that would occur in the completed development, the ground surface in the vicinity of the tests was excavated to the planned finish grade of Elevation 1112. Individual excavations were then made to Elevation 1105 for each test.

To apply the load in the desired predetermined amounts to the bearing plates, fifty-ton capacity gear driven jacks were employed between the test plates and reaction frames loaded with dead weight. The loads applied were measured by calibrated beam gauges which were placed between the jacks and the reaction frames.

Measurements of vertical movements of the bearing plates were made using micrometer dial gauges reading directly to 0.001 inch and supported independently from the test plates. In order to compensate for any movements of the dial gauges themselves, the settlement of the plates was also observed by reading micrometer targets to an accuracy of 0.001 inch with a precise level mounted between the two tests. The targets and the level are not shown in the sketches.

TESTING PROCEDURE:

To expedite the completion of the testing program, both tests were performed simultaneously. The loads were applied in increments of 1,000 pounds per square foot. Each increment was maintained constant for a period sufficient to assure that the deflection under the applied load was essentially complete--this condition was assumed to exist when the movement of the plates was less than 0.01 inches in six hours. Several times during the progress of each test, the test load was released and reapplied in increments to measure the rebound of the plate.

The load tests were maintained under continuous operation 24 hours per day until completion. The readings of the dial gauges were taken at approximately 30-minute intervals during the test. The micrometer targets were read with the application of increments of load and at approximately one hour intervals.

The "Load-Versus-Settlement" curves and typical "Time-Versus-Settlement" curves for each test are presented on Plate B-1.

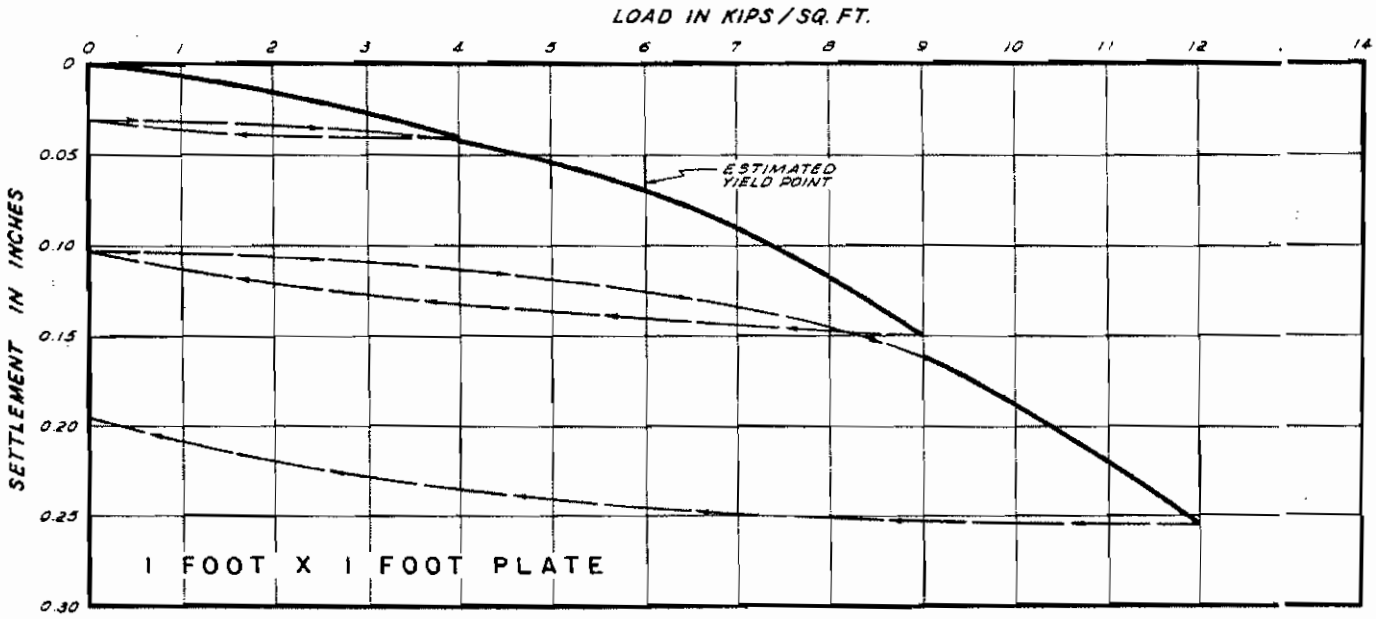
CONCLUSIONS:

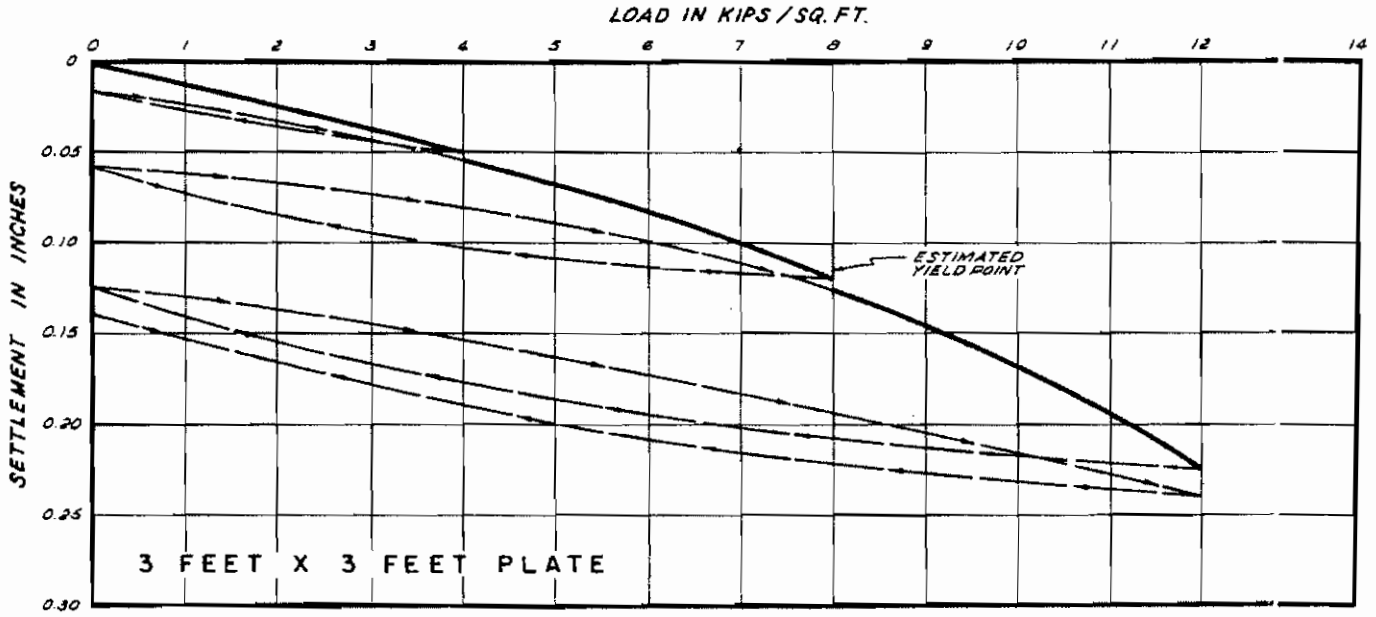
The one square-foot load test indicated a fairly well defined yield point at 6,000 pounds per square foot. The yield point for the three-foot plate is less clearly defined, although a definite break can be noted at 8,000 pounds per square foot. Both values are in excess of those recommended for general design, but are in fair agreement with the results anticipated on the basis of the shear test data for the silty loam stratum.

For comparable unit loads, the settlements of the three-foot plate were expected to be greater than the settlements of the one-foot plate. While some differences can be noted in the test data, greater differences were expected. The fact that greater differences did not occur can probably be attributed to the greater degree of effective confinement provided to the three foot plate and to variations in soil conditions at the locations of the two tests.

-oOo-

LOAD - VERSUS - SETTLEMENT





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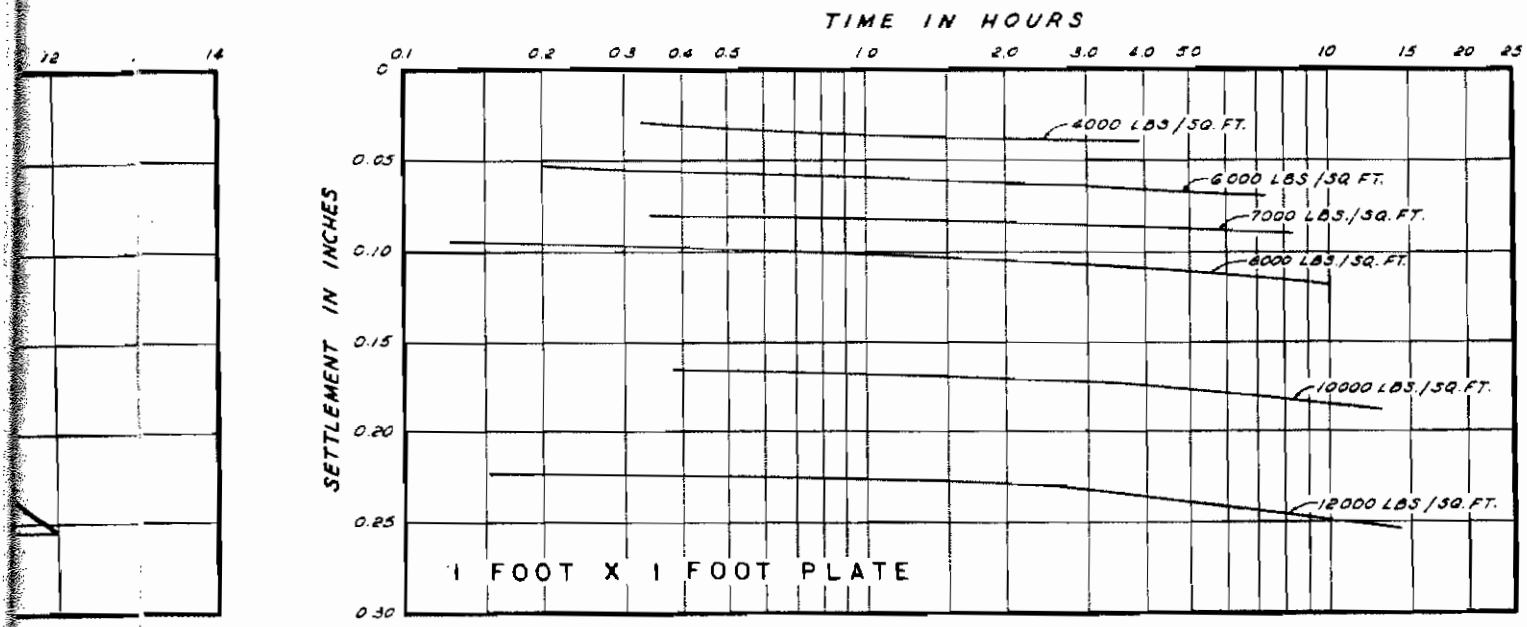
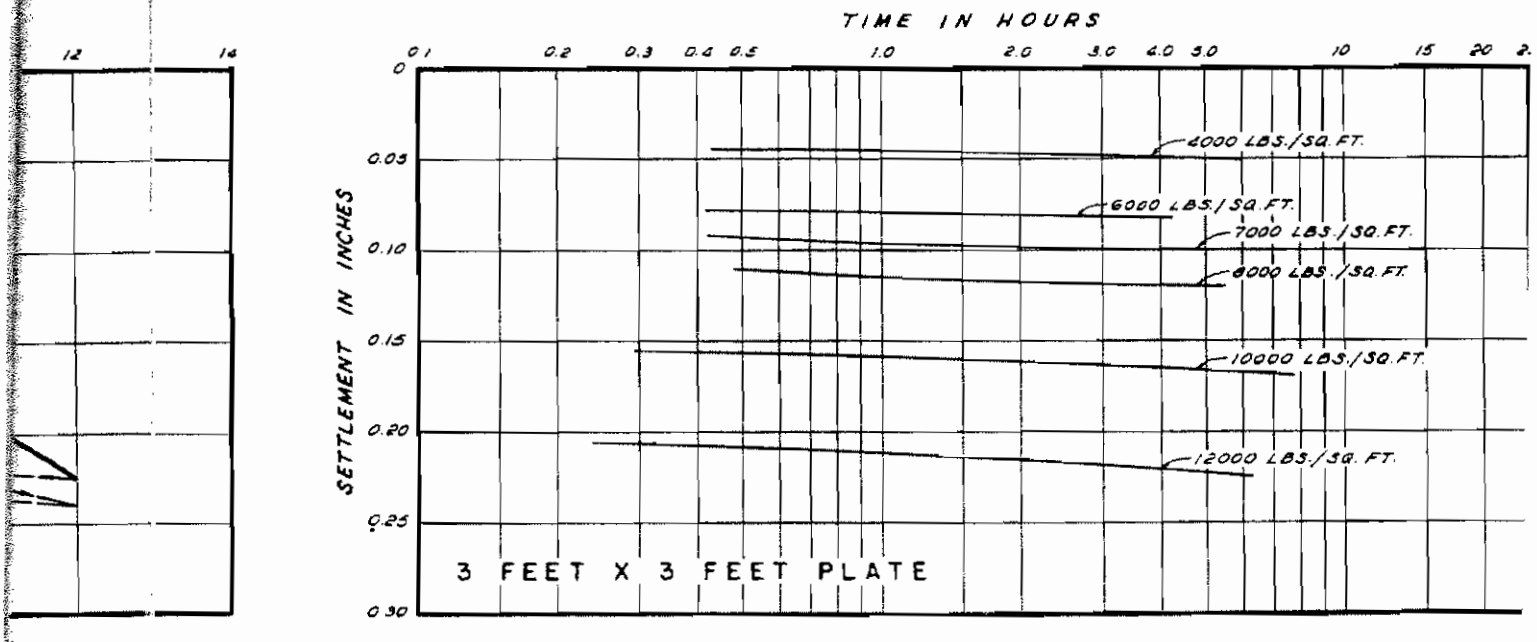
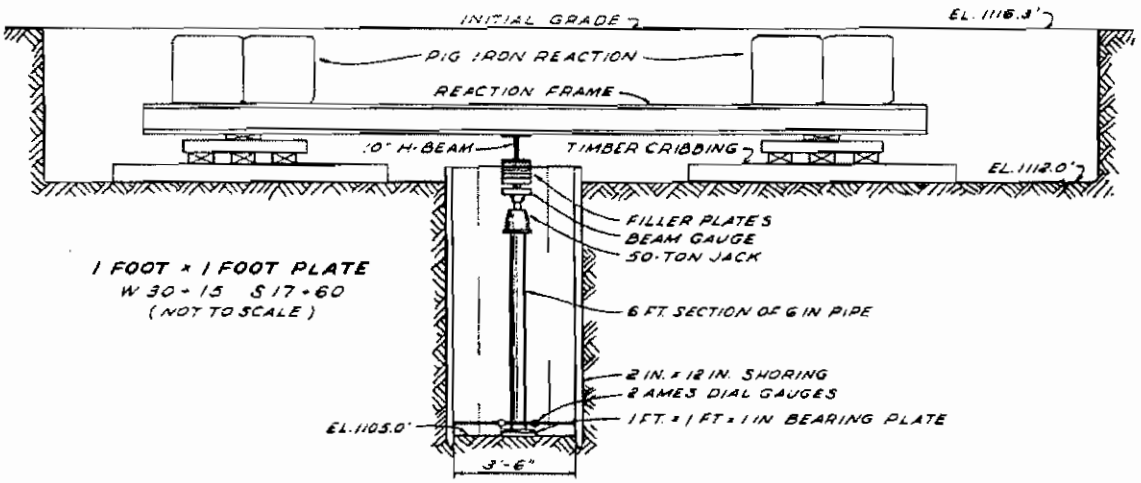
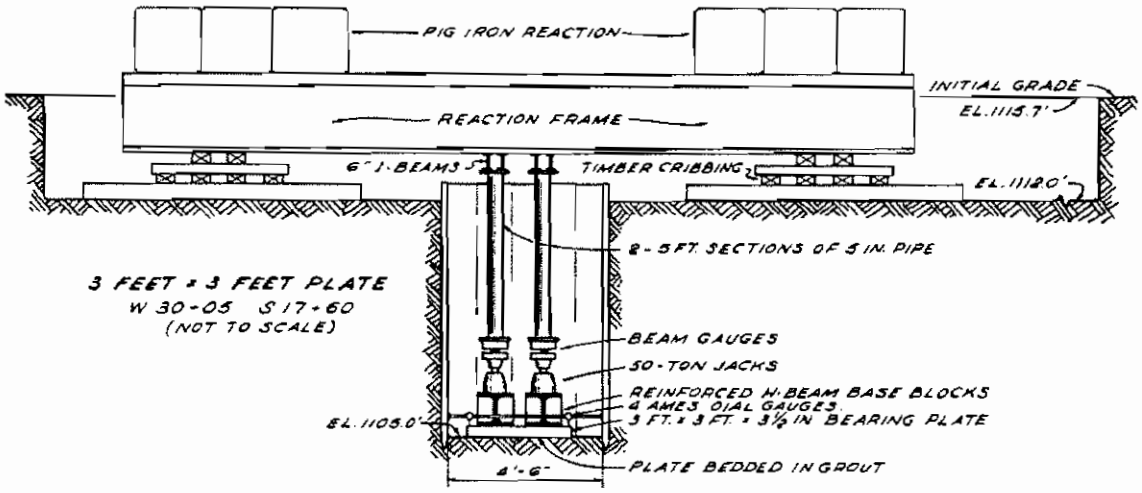
TIME - VERSUS - SETTLEMENT





LOAD TEST SETUP





LOAD TEST DATA

DAMES & MOORE
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PLATE B-1