GEOTECHNICAL INVESTIGATION
SECOND STREET EXTENSION PROJECT
FROM HOME DEPOT SHOPPING CENTER
WESTERN BOUNDARY
TO PENNSYLVANIA AVENUE
BEAUMONT, CALIFORNIA

-Prepared By-

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August 25, 2020

Project No. 644-20020
20-07-064

Cozad & Fox, Inc.
151 South Girard Street
Hemet, California 92544

Subject: Geotechnical Investigation

Project: Second Street Improvement Project
From Home Depot Shopping Center to
Pennsylvania Avenue
Beaumont, California

Sladden Engineering is pleased to present the results of our geotechnical investigation performed for the Second Street extension project proposed for the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. Our services were completed in accordance with our revised proposal for geotechnical engineering services dated March 19, 2020 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site in order to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out during construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

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GEOTECHNICAL INVESTIGATION
SECOND STREET EXTENSION PROJECT
FROM HOME DEPOT SHOPPING CENTER WESTERN BOUNDARY
TO PENNSYLVANIA AVENUE
BEAUMONT, CALIFORNIA

August 25, 2020

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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the street improvements proposed for the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. The approximate location of the project alignment is indicated on the Site Location Map (Figure 1).

SCOPE OF WORK

The purpose of our investigation was to determine the pavement thicknesses within the existing segment of Second Street and the subgrade soil conditions along the roadway extension alignment in order to provide recommendations for new pavement construction. Our investigation included measuring the existing asphalt pavement thicknesses, subsurface soil sampling, laboratory testing, engineering evaluation and the preparation of this report.

The scope of services performed was as outlined in our revised proposal dated March 19, 2020. This investigation was performed in accordance with contemporary geotechnical engineering principles and practice. We make no other warranty, either express or implied.

PROJECT DESCRIPTION

The proposed Second Street Extension project includes the portion of Second Street extending west from the westerly boundary of the Home Depot shopping center to Pennsylvania Avenue in the City of Beaumont, California. The segment of Second Street extending west from the western boundary of the Home Depot shopping center to the western boundary of the First Street Storage facility that was previously paved will be widened to the full design width. The remaining segment extended west from the First Street Storage facility to Pennsylvania Avenue that remains vacant will consist of new construction. The approximate borehole locations are indicated on the Borehole Location Photograph (Figure 2) included within this report.

The eastern portions of the existing roadway segment previously constructed in conjunction with the development of the Home Depot shopping center consist of asphalt pavement with concrete curbs and gutters along portions of the streets. The preliminary project plans prepared by Cozad & Fox, Inc. indicate that the existing paved section of Second Street between the western boundary of First Street Storage facility and the western boundary of the Home Depot shopping center will be widened. It is proposed to extend Second Street from the western boundary of First Street Storage facility to Pennsylvania Avenue through currently vacant property. In addition, Pennsylvania Avenue will be widened within the vicinity of the Second Street intersection.

EXISTING PAVEMENT SECTION THICKNESSES

The existing pavement thickness was determined by measuring the existing asphalt and base material sections within the 6 borehole locations within existing pavement. Concrete pavement was encountered directly underlying the existing asphalt pavement within the vicinity of Boreholes 4 & 5 (BH-4 & BH-5). The approximate asphalt and base material thickness measurements are presented along with the corresponding borehole locations within the following table. The approximate borehole locations are indicated on the borehole Location Photograph (Figures 2).

Borehole	Street	Locality	Asphalt Thickness (in)	Base Thickness (in)	Subgrade Soil Type
BH-1	2nd Street	West Bound Lane	5.0	15.0	SC
BH-2	2nd Street	West Lane	4.5	6.0	SC
BH-3	2nd Street	Center Lane	4.0	20.0	SC
BH-4	2nd Street	Center Lane	3.5 inches asphalt over > 3.0 inches concrete	N/A	SC
BH-5	2nd Street	Center Lane	3.5 inches asphalt over > 6.0 inches concrete	N/A	SC
BH-6	2nd Street	West Bound Lane	4.0	13.0	SC
BH-7	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-8	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-9	2nd Street (Proposed)	N/A	N/A	N/A	SC
BH-10	2nd Street (Proposed)	N/A	N/A	N/A	SC

SUBSURFACE SOIL CONDITIONS

Our field exploration included collecting soil samples to evaluate the near surface soil conditions. Based upon our field exploration and laboratory testing, it is apparent that the subgrade soil conditions vary somewhat throughout the subject roadway alignment. The near surface soil encountered within our bores consisted primarily of silty sand (SM) and clayey sand (SC) with minor portions of sandy clay (CL). The near surface soil appeared relatively firm within the majority of our borehole locations.

Laboratory testing indicated R-Values of 74 by expansion pressure and 76 by exudation pressure for the silty sand (SM) materials. Laboratory testing indicated R-Values of 15 by expansion pressure and 10 by exudation pressure for the clayey sand materials (SC). Expansion testing indicated that the silty sand materials (SM) are generally non-expansive (E.I. = 1) and the clayey sand materials (SC) are potentially moderately expansive (E.I. = 50). Graphic representations of the laboratory test results are included within Appendix B of this report.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types, although the transitions may be gradual and variable across the site.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 20 parts per million (ppm). The soil is considered to have a "negligible" corrosion potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes should not be necessary.

The pH levels of the surface soil was determined to be 8.8 & 8.0. Based on soluble chloride concentration testing (50 & 60 ppm), the soil is considered to have a "negligible" corrosion potential with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 9,100 & 2,900 ohm-cm, that indicates the site soil is considered to have a "low & moderate" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding mitigation for corrosion sensitive installations.

DISCUSSIONS AND CONCLUSIONS

The majority of the pavement within the existing segment of Second Street roadway remains in good condition. The existing asphalt thickness varies from 4.0 to 5.0 inches except where concrete was encountered. The existing base material thickness varies from 6.0 inches to 20.0 inches. In our opinion, significant modifications or repairs to the existing asphalt pavement do not appear warranted. The existing pavement sections are near the new pavement design sections recommended in this report and should remain adequate. It should be noted that concrete pavement was encountered directly beneath the asphalt within BH-4 and BH-5 that are located along the north side of First Street Storage facility. The drillers were unable to penetrate the concrete that should be expected to be at least 6 inches thick.

PAVEMENT DESIGN RECOMMENDATIONS

The following recommendations are based upon the pavement coring, our subgrade soil investigation and our understanding of the proposed roadway construction project. Because the subgrade soil conditions vary somewhat with location and the R-Values test results varied significantly, it is our opinion that an intermediate R-Value would be appropriate for use in pavement design. Because significant grading will be necessary to accomplish the proposed new roadway construction, we expect that substantial mixing and blending of the surface soil will occur during roadway construction. In our opinion an intermediate design R-Value of 30 is conservatively appropriate for use in preliminary pavement design. The actual R-Value of the subgrade soil should be determined after subgrade has been established to verify the adequacy of the preliminary design sections. The following new pavement design sections are based upon a preliminary design R-Value of 30.

PAVEMENT DESIGN SECTION – FOR DESIGN R-VALUE = 30				
Pavement Material	Recommended Thickness (inches)			
	TI = 7.0	TI = 7.5	TI = 8.0	TI = 8.5
Asphalt Concrete Surface Course	4.0	5.0	5.5	6.0
Class II Aggregate Base Course	9.5	9.0	10.0	10.5
Compacted Subgrade Soil	12.0	12.0	12.0	12.0

Asphalt concrete should conform to the latest edition of the Standard Specifications for Public Works Construction (Greenbook) or Caltrans Standard Specifications. Aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook, latest edition. The subgrade soil should be compacted to at least 90 percent of maximum density and the aggregate base material should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557. Precise control of grades and thicknesses should be maintained throughout the paving operations.

It is possible that wet and potentially unstable subgrade soil may be encountered in during pavement construction operations. Wet or unstable soil should be allowed to dry prior to compaction or excessively wet soil should be removed and replaced with drier soil or base material.

GENERAL

The findings and recommendations presented in this report are based upon an interpolation of the pavement thickness and soil conditions between core locations and extrapolation of these conditions throughout the subject roadway area. Should conditions encountered during reconstruction appear different than those indicated in this report, this office should be notified.

This report is considered applicable for use by the Cozad & Fox and the City of Beaumont for the specific project described herein. The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the reconstruction operations by a representative of Sladden Engineering. All recommendations are considered tentative pending our review of the roadway reconstruction operations and additional testing, if necessary.

REFERENCES

California Building Code (CBC), 2019, California Building Standards Commission.

GoogleEarth.com, 2020, Vertical Aerial Photograph for the Beaumont area, California, Undated, Variable Scale.

FIGURES

SITE LOCATION MAP
BOREHOLE LOCATION PHOTOGRAPH

USGS (2018)

Sladden Engineering	SITE LOCATION MAP	FIGURE 1
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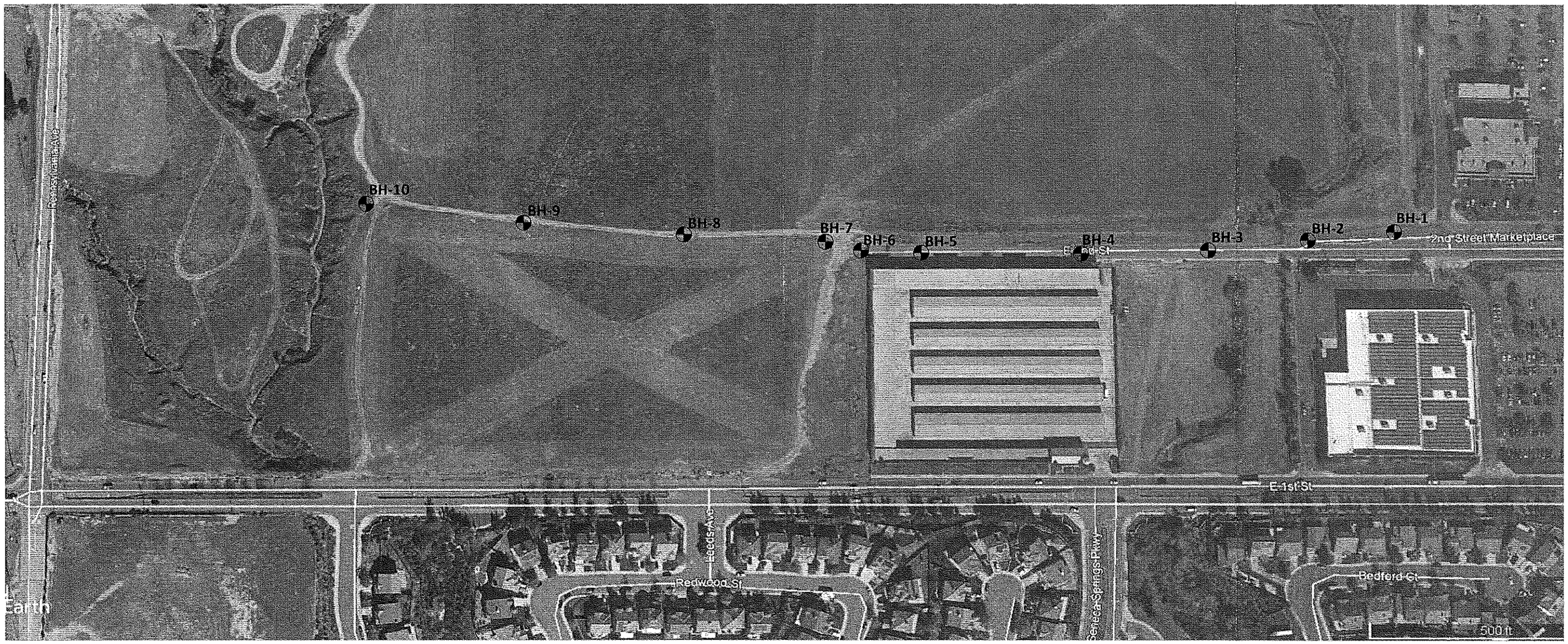
	Report Number: 20-07-064	
	Date: August 5, 2020	



Google Earth (2020)

LEGEND

BH-10 Approximate Exploratory Borehole Location

Sladden Engineering

BOREHOLE LOCATION PHOTOGRAPH

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FIGURE

2

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation ten (10) exploratory bores were excavated on July 1, 2020 utilizing a truck mounted hollow stem auger rig (Mobile B-61). Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the boreholes were classified in accordance with the Unified Soil Classification System which is presented in this appendix.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140-pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									5.0 inches asphalt over 15.0 inches base.
	7/8/10	1	1	31.4	11.0	123.4	2		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	6/9/9			29.9	11.4	121.2	4		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	3/4/5			25.3	11.4		6		Silty Sand (SM); brown, moist, loose, fine-to-coarse grained with trace gravel.
	11/17/24			17.6	6.6	116.3	8		Silty Sand (SM); brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							10		
							12		
							14		
							16		
							18		Terminated at ~ 16.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.5 inches asphalt over 6.0 inches base.
	7/8/10			33.7	8.7	131.1	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	6/9/9			23.4	7.6		4 6		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.0 inches asphalt over 20.0 inches base.
	16/28/29			32.5	9.2	123.9	2		Clayey Sand (SC); yellowish brown, moist, dense, fine-to-coarse grained with trace gravel.
	12/17/15			31.7	9.1	128.9	4 6 8		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	1/2/2			66.1	21.6		10 12		Sandy Clay (CL); yellowish brown, moist to very moist, soft, high plasticity with trace gravel.
	5/7/8			44.9	15.3	113.9	14 16		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~ 16.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		3.5 inches asphalt over concrete.
							2		Practical Auger Refusal due to Concrete.
							4		No Groundwater or Seepage Encountered
							6		No Bedrock Encountered
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		3.5 inches asphalt over concrete.
							2		Practical Auger Refusal due to Concrete.
							4		No Groundwater or Seepage Encountered
							6		No Bedrock Encountered
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									4.0 inches asphalt over 13.0 inches base.
	5/9/13			40.3	10.7	125.3	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	3/4/6			48.2	12.5		4 6		Clayey Sand (SC); yellowish brown, moist, loose, fine-to-coarse grained with trace gravel.
							8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	17/31/42			55.5	11.4	125.2	2		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
	32/41/50-5"			58.5	10.4	118.7	4		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
							6		
							8		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-8

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	10/18/24			40.7	11.6	123.1	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	13/13/13			30.9	11.0		6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	20/36/25			21.4	6.0	123.1	10		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							12		Terminated at ~ 11.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-9

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	7/14/25			39.5	5.9	121.6	2		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							4		
	13/16/16			43.6	7.4	130.1	6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
							8		Terminated at ~ 6.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
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							38		
							40		
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							44		
							46		
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Drill Rig:	Mobile B-61	Date Drilled:	7/1/2020
Elevation:	2580 Ft (MSL)	Boring No:	BH-10

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); yellowish brown, slightly moist, fine-to-coarse grained with trace gravel (Fill/Disturbed).
	19/31/36	1	50	51.4	10.0		2		Sandy Clay (CL); yellowish brown, slightly moist to moist, hard, medium to high plasticity with trace gravel.
	10/12/10			46.1	9.6		6		Clayey Sand (SC); yellowish brown, moist, medium dense, fine-to-coarse grained with trace gravel.
	20/36/44			36.5	7.4	124.7	10		Clayey Sand (SC); yellowish brown, moist, very dense, fine-to-coarse grained with trace gravel.
							12		Terminated at ~ 11.5 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered

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APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soil underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil. This is shown on the Boring Logs, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: Two (2) bulk samples were selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Tests: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Consolidation: One (1) relatively undisturbed sample was selected for consolidation testing. For this test, a one-inch thick test specimen was subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. Testing was performed in accordance with ASTM Test Method D-2435.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

R-Value Testing: Two (2) representative bulk samples were selected for R-Value testing. The R-Value test measures the response of compacted subgrade soil to a vertically applied load. The R-Value tests and traffic indices are used for determining pavement design.

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Maximum Density/Optimum Moisture

ASTM D698/D1557

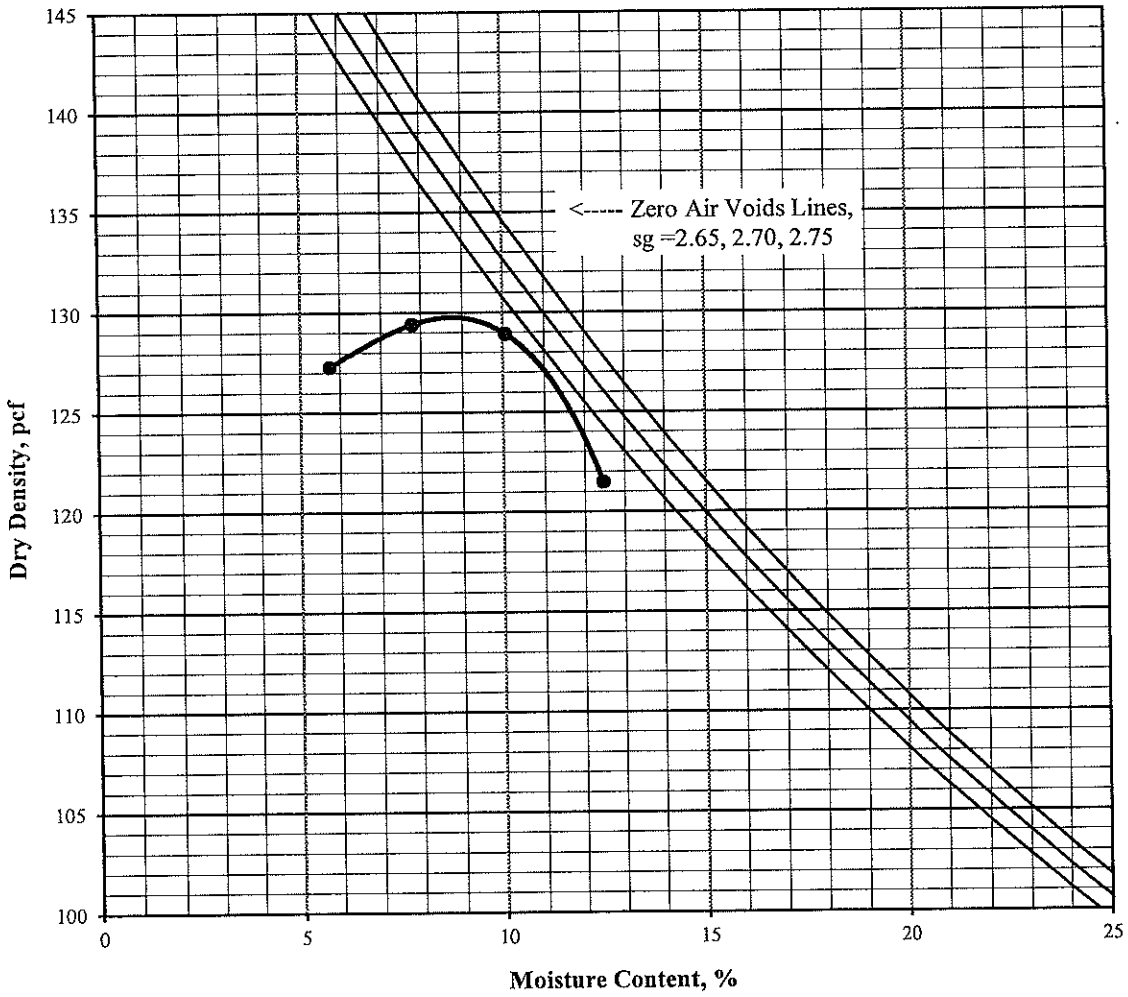
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample Location: BH-1 Bulk 1 @ 0-5'
Description: Brown Silty Sand (SM)

July 27, 2020

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: 130 pcf
Optimum Moisture: 9%

Sieve Size	% Retained
3/4"	
3/8"	
#4	8.5



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Maximum Density/Optimum Moisture

ASTM D698/D1557

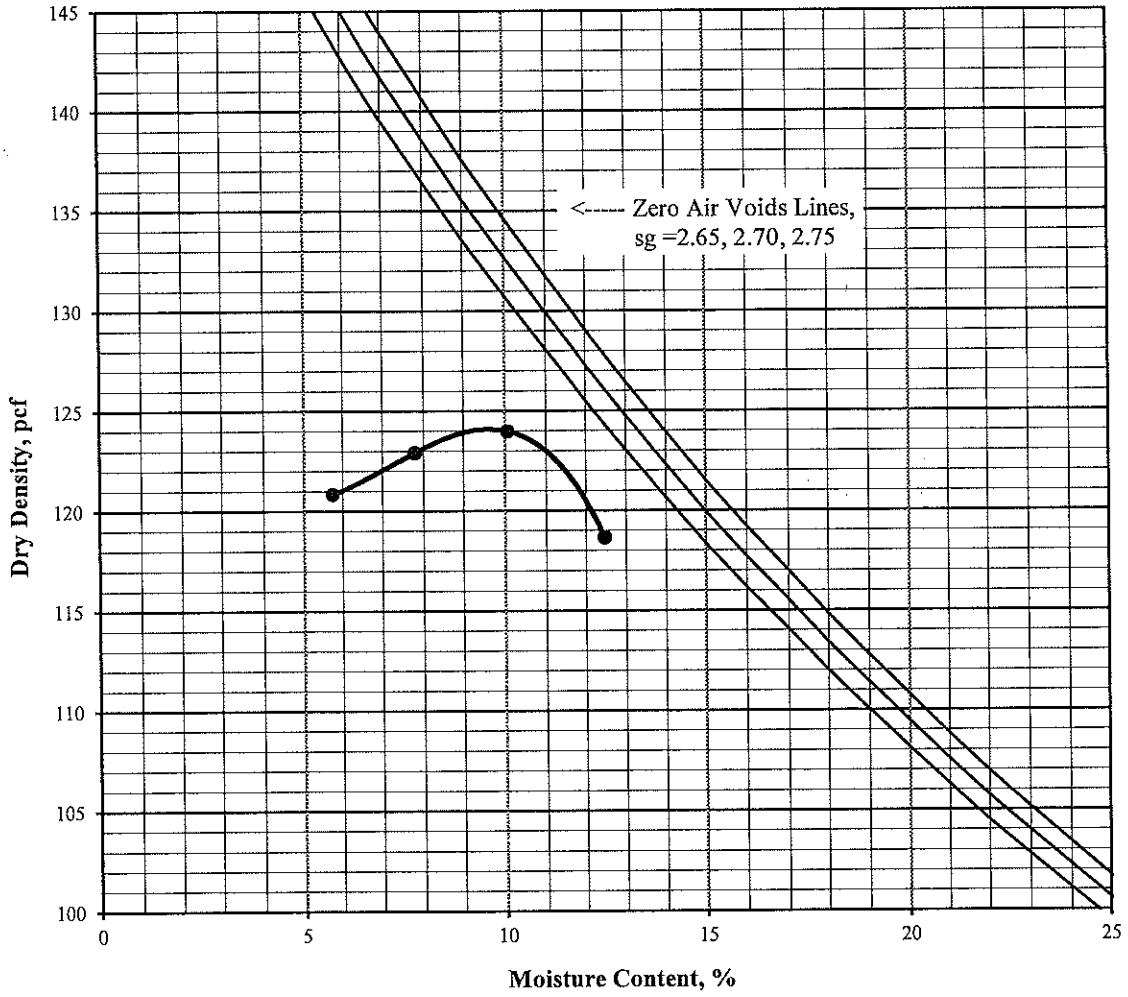
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample Location: BH-10 Bulk 2 @ 0-5'
Description: Red Brown Clayey Sand (SC)

July 27, 2020

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: 124 pcf
Optimum Moisture: 9.5%

Sieve Size	% Retained
3/4"	
3/8"	
#4	1.5



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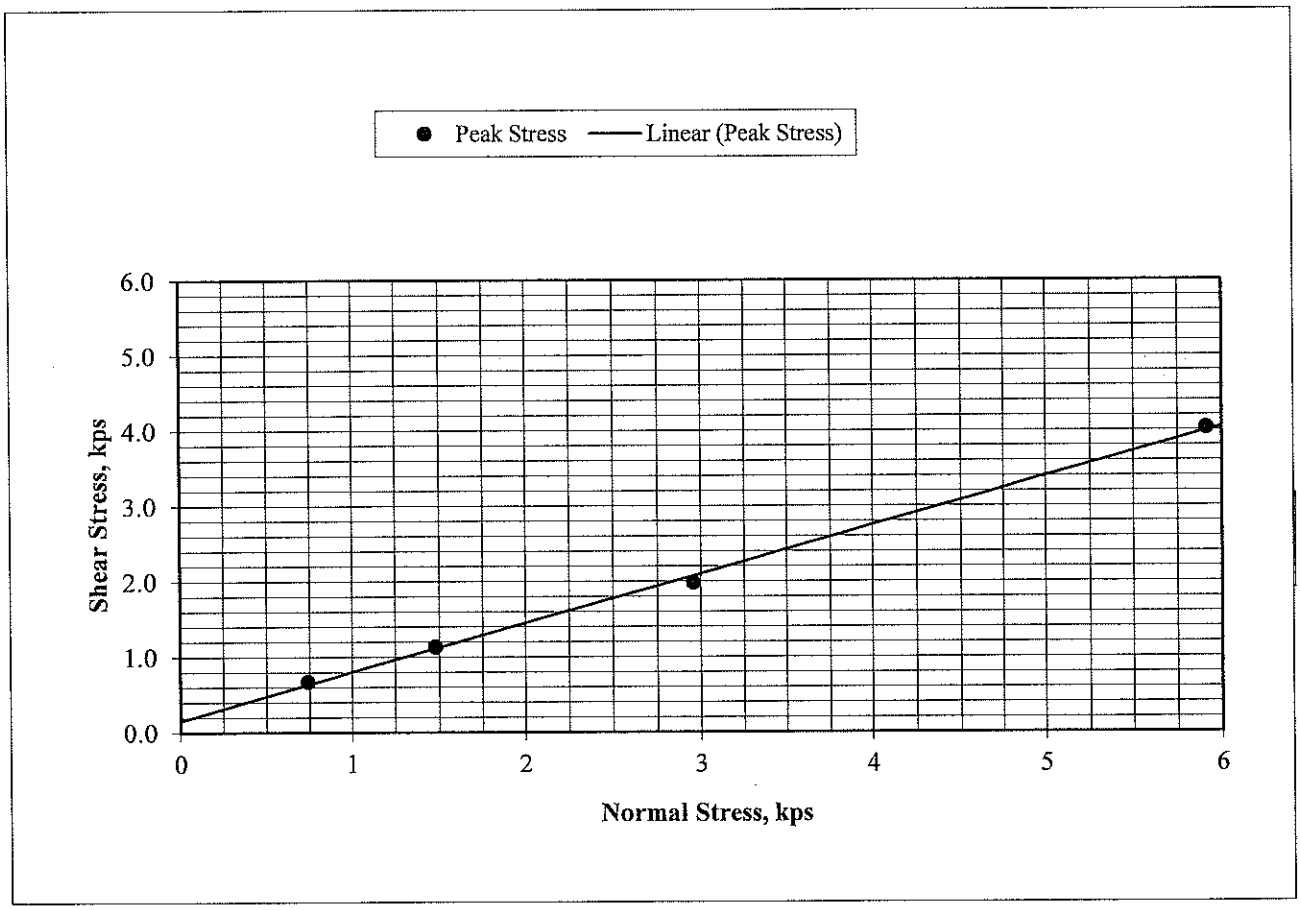
Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number: 644-20020
Job Name 2nd Street Improvements
Lab ID No. LN6-20316
Sample ID BH-1 Bulk 1 @ 0-5'
Classification Brown Silty Sand (SM)
Sample Type Remolded @ 90% of Maximum Density

July 27, 2020
Initial Dry Density: 116.5 pcf
Initial Mosture Content: 9.3 %
Peak Friction Angle (Ø): 33°
Cohesion (c): 160 psf

Test Results	1	2	3	4	Average
Moisture Content, %	14.9	14.9	14.9	14.9	14.9
Saturation, %	90.0	90.0	90.0	90.0	90.0
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.676	1.134	1.984	4.033	



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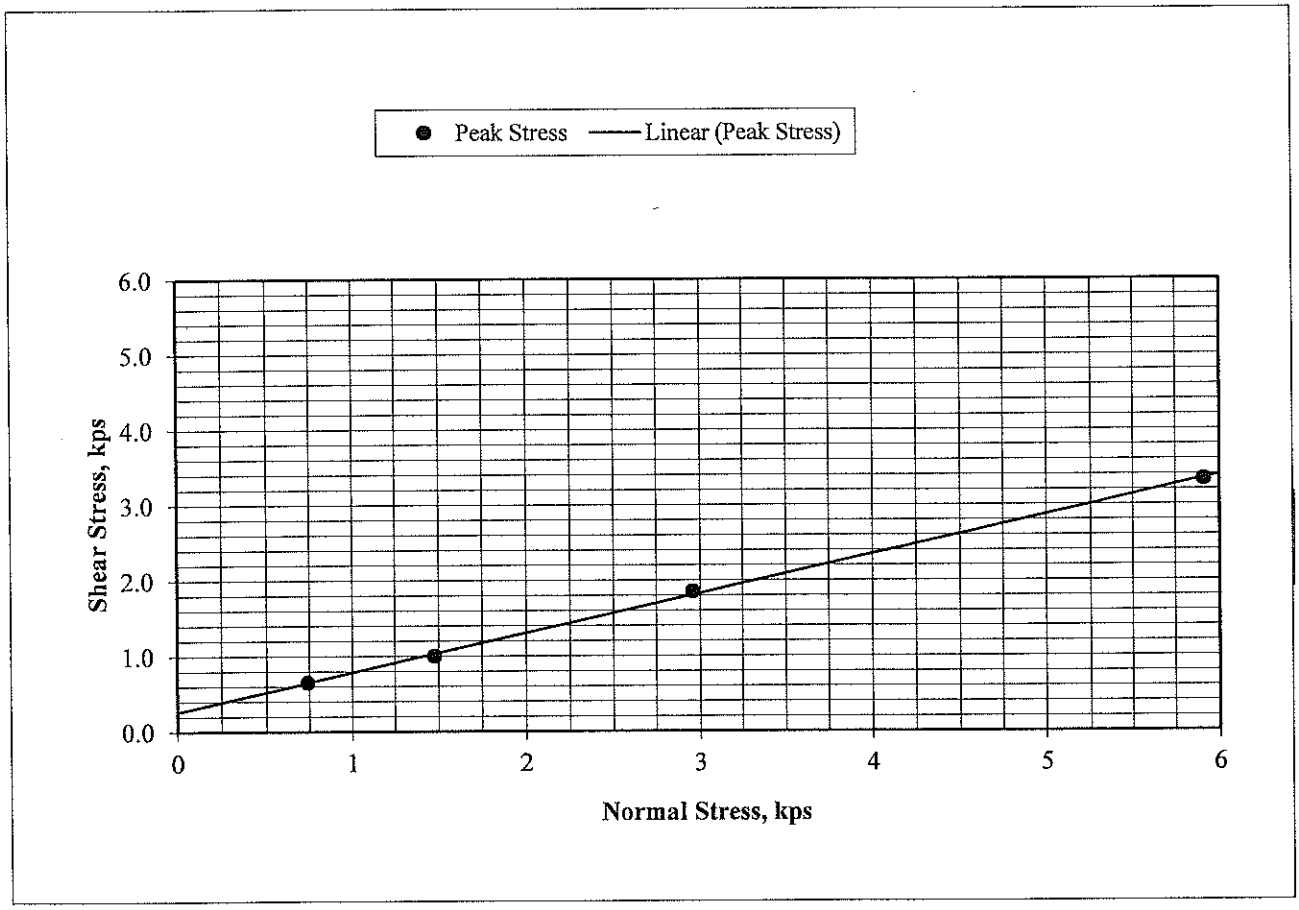
Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	644-20020		July 27, 2020
Job Name	2nd Street Improvements	Initial Dry Density:	111.9 pcf
Lab ID No.	LN6-20316	Initial Mosture Content:	9.3 %
Sample ID	BH-10 Bulk 2 @ 0-5'	Peak Friction Angle (Ø):	28°
Classification	Red Brown Clayey Sand (SC)	Cohesion (c):	270 psf
Sample Type	Remolded @ 90% of Maximum Density		

Test Results	1	2	3	4	Average
Moisture Content, %	19.1	19.1	19.1	19.1	19.1
Saturation, %	101.9	101.9	101.9	101.9	101.9
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.654	1.003	1.853	3.335	



Job Number: 644-20020
Job Name: 2nd Street Improvements
Date: 7/27/2020

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	130.0
Moist As Is:	9.9	Optimum Moisture:	9.0
Moist Wanted:	9.0		
ml of Water to Add:	-8.2	Wt Soil per Ring, g:	153.4

UBC

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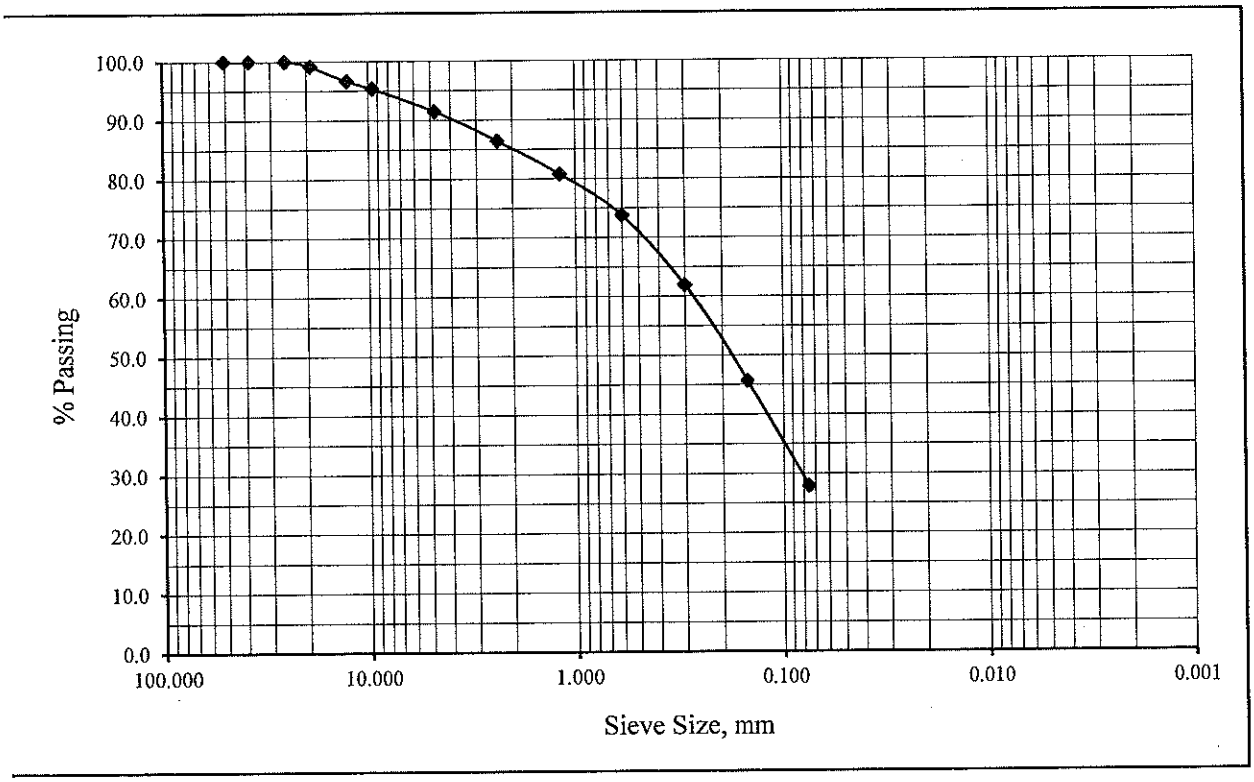
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.2
1/2"	12.7	96.7
3/8"	9.53	95.4
#4	4.75	91.5
#8	2.36	86.5
#16	1.18	80.8
#30	0.60	73.8
#50	0.30	62.0
#100	0.15	45.7
#200	0.075	27.9



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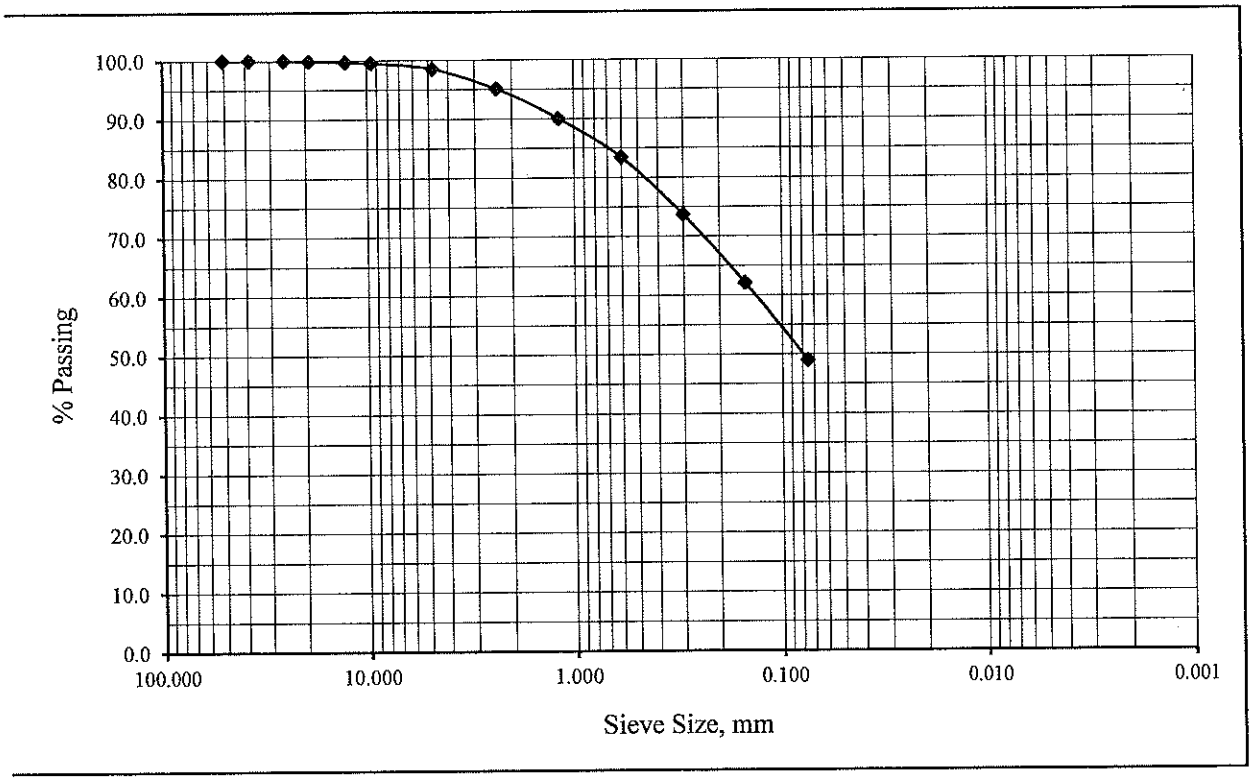
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 Bulk 2 @ 0-5' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.9
1/2"	12.7	99.7
3/8"	9.53	99.5
#4	4.75	98.5
#8	2.36	95.1
#16	1.18	90.1
#30	0.60	83.4
#50	0.30	73.7
#100	0.15	62.1
#200	0.075	49.0



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Gradation

ASTM C117 & C136

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-2 @ 5'

July 27, 2020

Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.3
#4	4.75	97.6
#8	2.36	94.0
#16	1.18	88.9
#30	0.60	82.9
#50	0.30	70.1
#100	0.15	47.9
#200	0.074	29.9

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Gradation

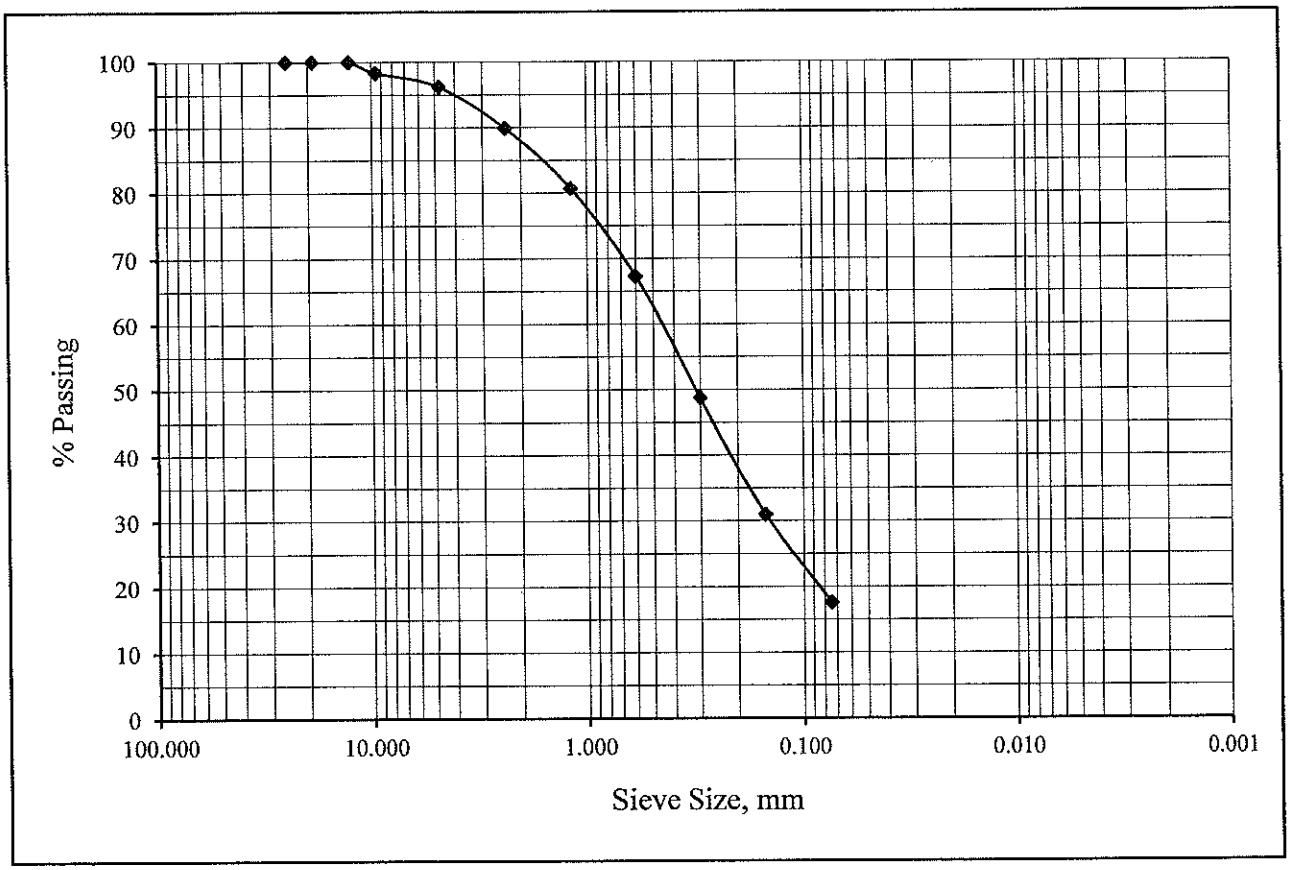
ASTM C117 & C136

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-4 @ 15'

July 27, 2020

Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	98.3
#4	4.75	96.2
#8	2.36	89.9
#16	1.18	80.7
#30	0.60	67.3
#50	0.30	48.8
#100	0.15	31.0
#200	0.074	17.6



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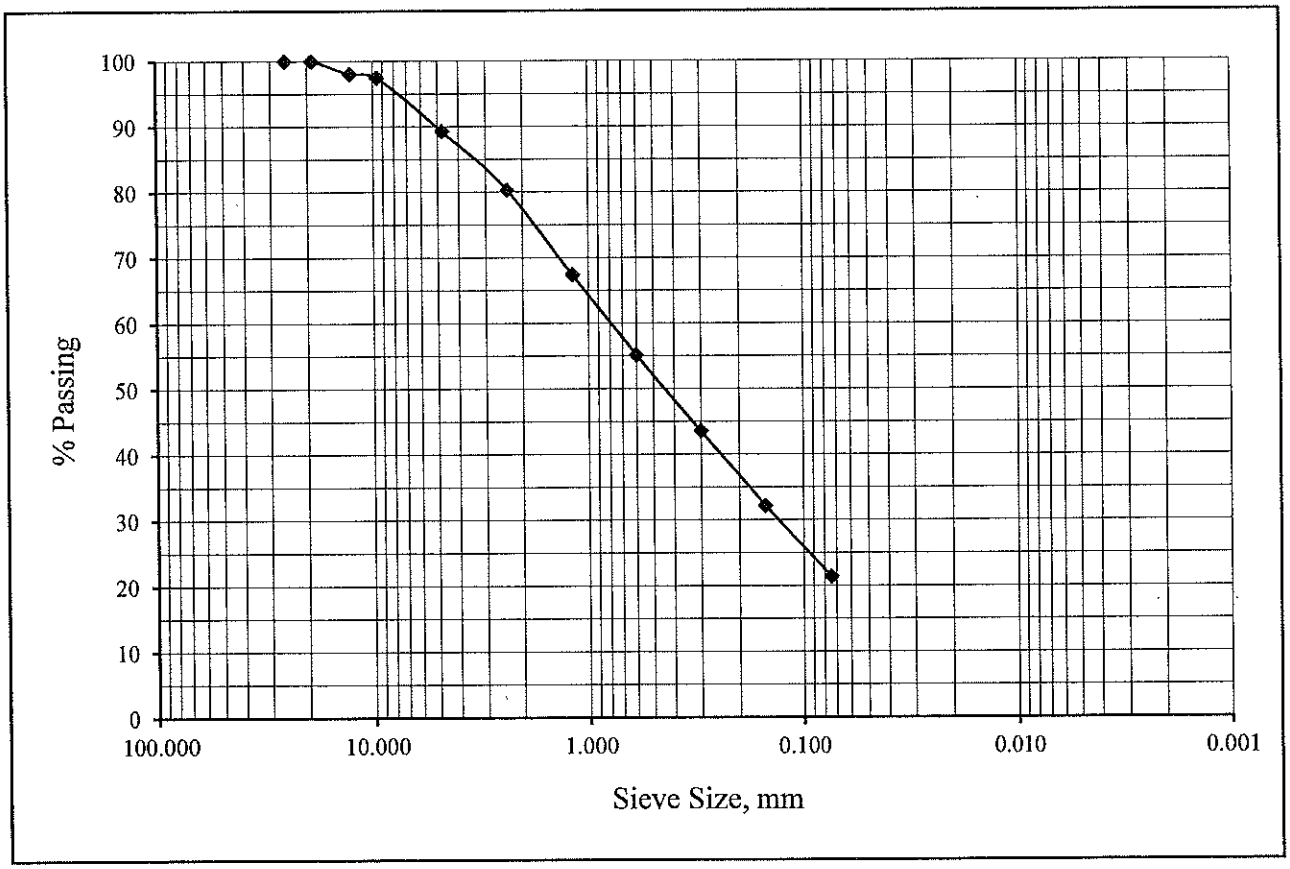
Gradation

ASTM C117 & C136

Project Number: 644-20020 July 27, 2020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-8 R-3 @ 10' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	98.0
3/8"	9.53	97.5
#4	4.75	89.3
#8	2.36	80.3
#16	1.18	67.4
#30	0.60	55.2
#50	0.30	43.5
#100	0.15	32.2
#200	0.074	21.4



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Gradation

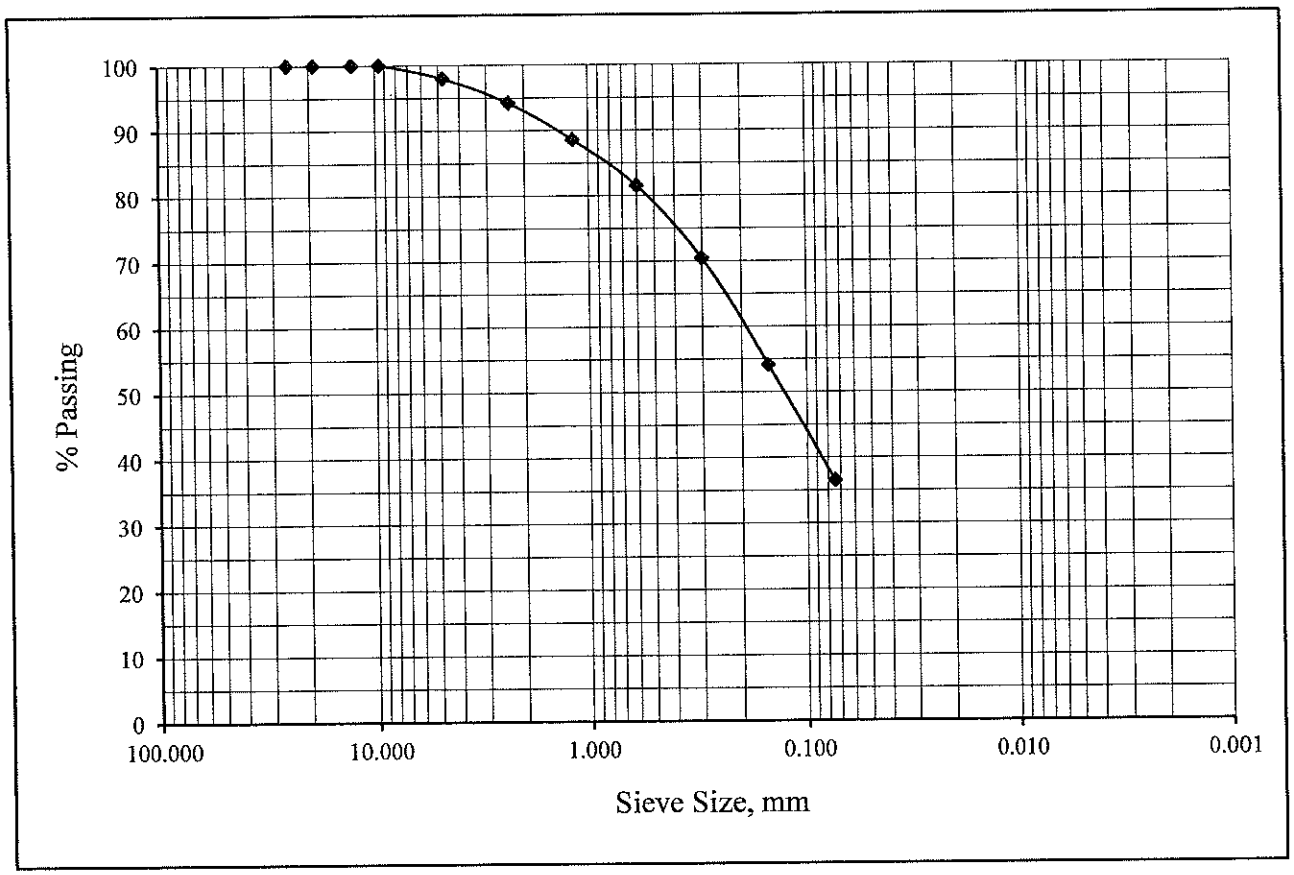
ASTM C117 & C136

July 27, 2020

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 R-3 @ 10'

Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.0
#8	2.36	94.2
#16	1.18	88.6
#30	0.60	81.6
#50	0.30	70.5
#100	0.15	54.1
#200	0.074	36.5



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Expansion Index

ASTM D 4829

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5'
Soil Description: Brown Silty Sand (SM)

Wt of Soil + Ring:	595.6
Weight of Ring:	192.0
Wt of Wet Soil:	403.6
Percent Moisture:	7.1%
Sample Height, in	0.95
Wet Density, pcf:	129.2
Dry Denstiy, pcf:	120.6

% Saturation:	48.3

Expansion **Rack # 2**

Date/Time	7/23/2020	2:45 PM
Initial Reading	0.0000	
Final Reading	0.0013	

Expansion Index **1**

(Final - Initial) x 1000

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Expansion Index

ASTM D 4829

July 27, 2020

Job Number: 644-20020

Job Name: 2nd Street Improvements

Lab ID Number: LN6-20316

Sample ID: BH-10 Bulk 2 @ 0-5'

Soil Description: Red Brown Clayey Sand (SC)

Wt of Soil + Ring:	576.7
Weight of Ring:	194.9
Wt of Wet Soil:	381.8
Percent Moisture:	9.1%
Sample Height, in	0.95
Wet Density, pcf:	122.2
Dry Denstiy, pcf:	112.0

% Saturation:	48.7

Expansion **Rack # 3**

Date/Time	7/23/2020	2:35 PM
Initial Reading	0.0000	
Final Reading	0.0498	

Expansion Index **50**

(Final - Initial) x 1000

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One Dimensional Consolidation

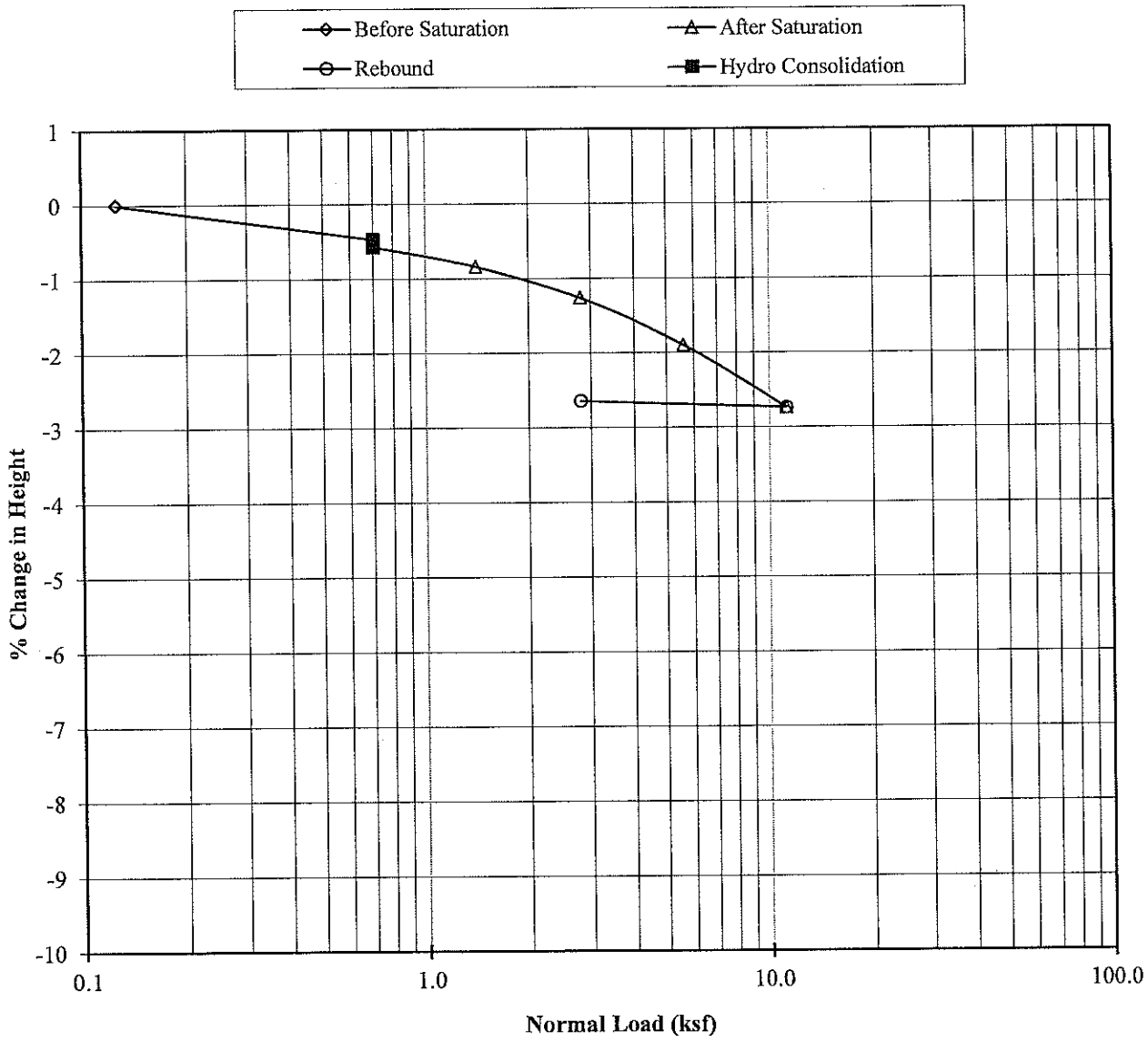
ASTM D2435 & D5333

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 R-2 @ 5'
Soil Description: Brown Silty Sand (SM)

Initial Dry Density, pcf:	117.7
Initial Moisture, %:	11.4
Initial Void Ratio:	0.416
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



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One Dimensional Consolidation

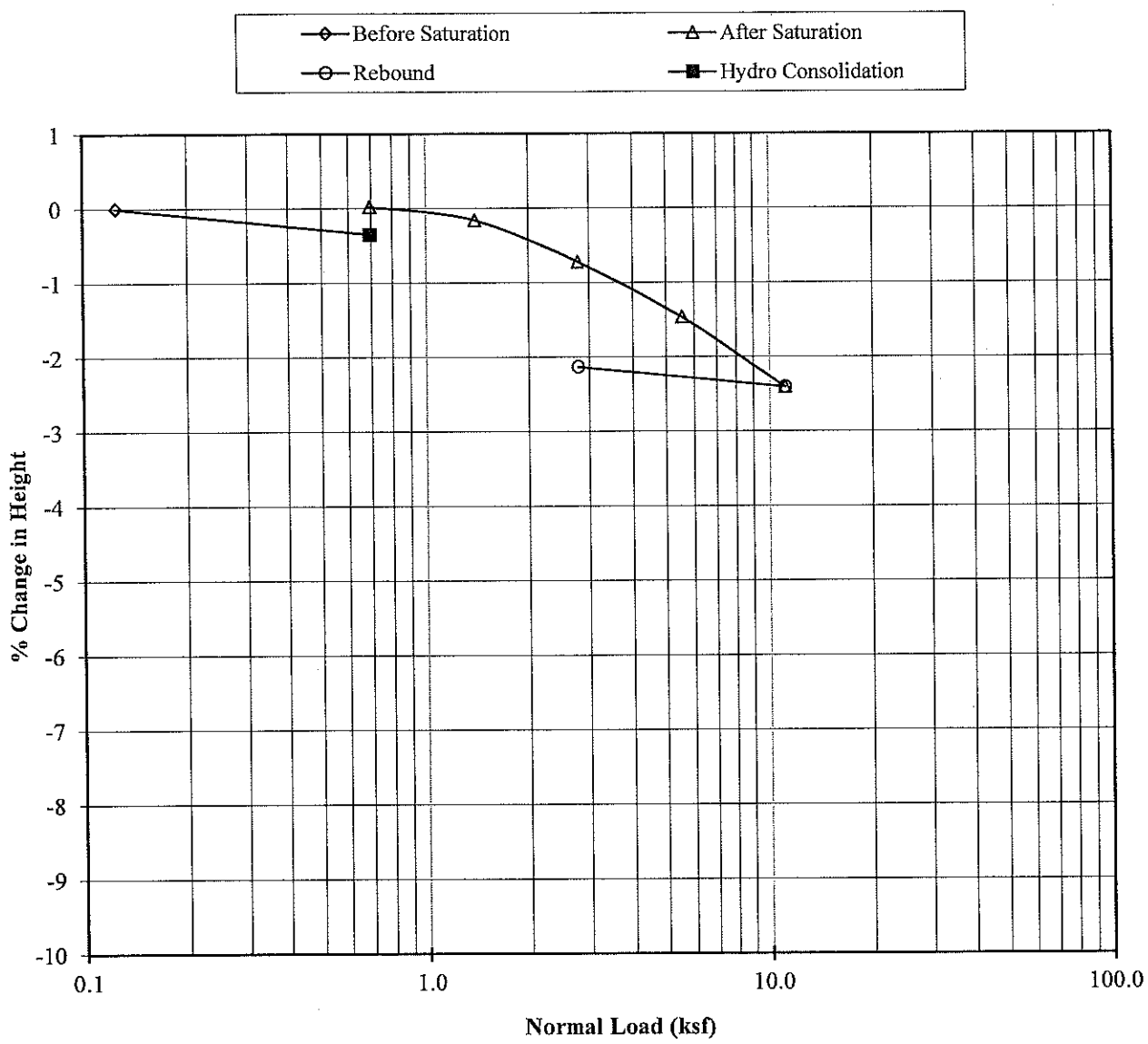
ASTM D2435 & D5333

July 27, 2020

Job Number: 644-20020
Job Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 R-3 @ 10'
Soil Description: Red Brown Clayey Sand (SC)

Initial Dry Density, pcf:	122.4
Initial Moisture, %:	7.4
Initial Void Ratio:	0.362
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



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45090 Golf Center Pkwy, Suite F, Indio CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: July 27, 2020

Account No.: 644-20020

Customer: Cozad and Fox, Inc

Location: 2nd Street, Beaumont

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5'	8.8	20	50	9100
BH-10 @ 0-5'	8.0	20	60	2900

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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

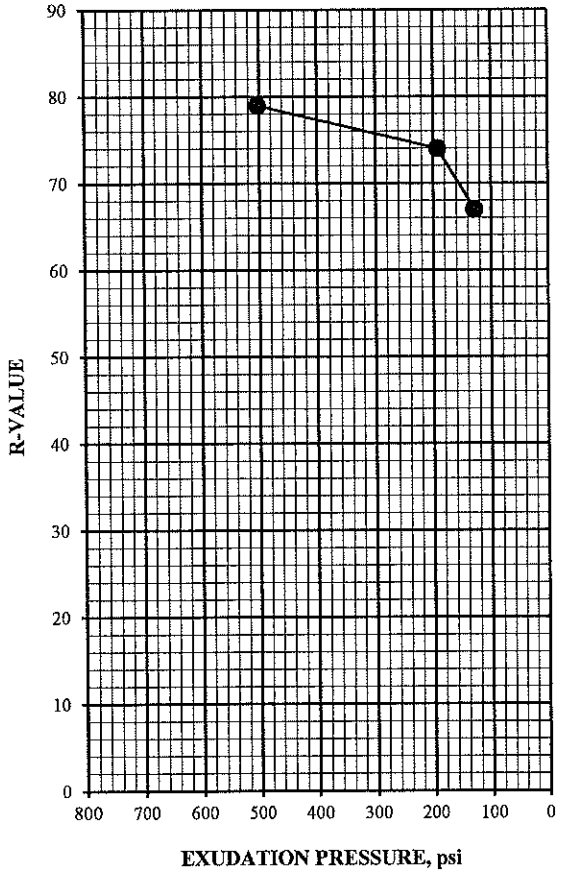
CTM 301

July 27, 2020

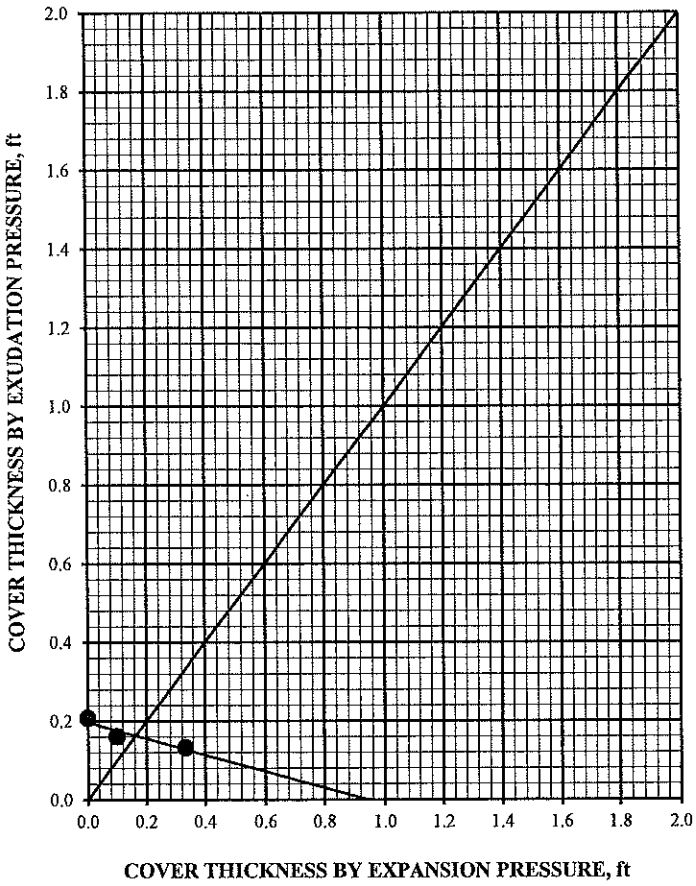
Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-1 Bulk 1 @ 0-5'
Sample Description: Brown Silty Sand (SM)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 124.8-pcf
%Moisture @ 300 psi Exudation Pressure: 10.0%
R-Value - Exudation Pressure: 76
R-Value - Expansion Pressure: 74
R-Value @ Equilibrium: 74

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

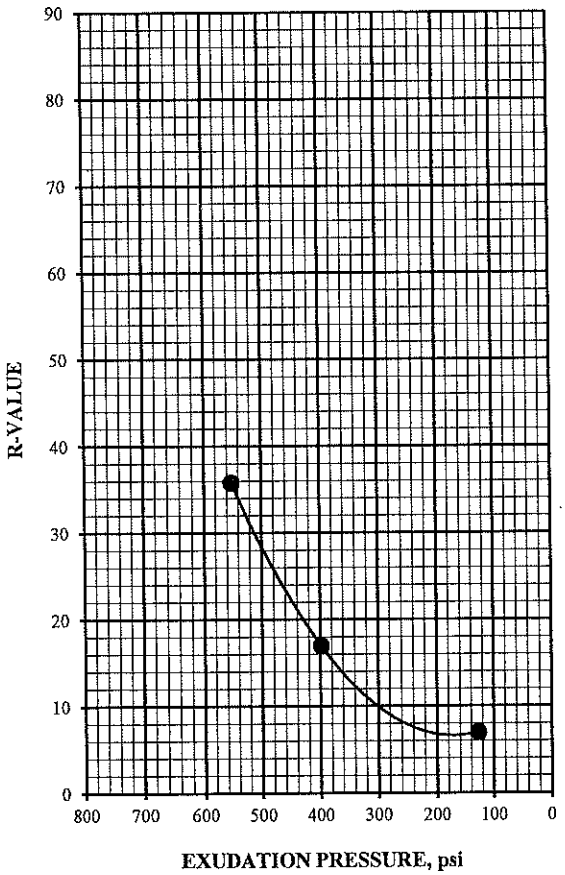
CTM 301

July 27, 2020

Project Number: 644-20020
Project Name: 2nd Street Improvements
Lab ID Number: LN6-20316
Sample ID: BH-10 Bulk 2 @ 0-5'
Sample Description: Red Brown Clayey Sand (SC)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 114.0-pcf
%Moisture @ 300 psi Exudation Pressure: 15.8%
R-Value - Exudation Pressure: 10
R-Value - Expansion Pressure: 15
R-Value @ Equilibrium: 10

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART