GEOTECHNICAL REPORT

5853 & 5863 Rue Ferrari

San Jose, California

November 12, 2020
Project No. 4743

REGISTERED PROFESSIONAL ENGINEER
GREG G. GULARTE
GE 2633
EXP. 12/31/21
GEOTECHNICAL
STATE OF CALIFORNIA

Prepared for
Duke Realty
by
Gularte & Associates, Inc.

Gularte & ASSOCIATES, INC.
Geotechnical Consultants

1049 NICHOLS DRIVE, ROCKLIN, CA 95765
Phone: **916.626.5577**
FAX: 916.626.5533

TABLE OF CONTENTS

FIGURES

APPENDICES

1 INTRODUCTION

Duke Realty has retained Gularte & Associates, Inc. to provide a geotechnical report for the new warehouse building to be located at 5853 & 5863 Rue Ferrari in San Jose, California. To conduct this geotechnical report, we performed the following services:

- Reviewed the site geology and ground water conditions;
- Performed 7 exploratory borings to a maximum depth of approximately 50 feet below existing grade to classify the soil and obtain samples for laboratory testing.
- Performed 6 moisture-density tests on tube samples from our exploratory borings.
- Performed 6 sieve analyses to the #200 screen.
- Performed 4 unconfined compression tests to determine the strength characteristics of the native soil.
- Performed an expansion index test to determine the expansion potential of the native soil.
- Performed 2 percolation tests to aid in storm drainage design.
- Performed engineering analyses and used engineering judgment for earthwork and foundation recommendations in this report.
- Prepared this report with our findings, conclusions, and recommendations.

Structural plans were not available at the time of this report. We recommend that we be retained to review the project grading and structural plans at the 50 to 90 percent stage for compliance with our report. Additionally, we recommend that we be retained to perform soil compaction testing services for trench backfill, building pads and pavement areas.

2 LOCATION, SITE DESCRIPTION AND PHYSICAL SETTINGS

2.1 LOCATION

Figure 1 shows the Vicinity Map of the project site located at 5853 and 5863 Rue Ferrari in San Jose, California. The site is bordered by the Coyote Creek nature trail to the north, existing office/warehouse developments to the east and west, and Rue Ferrari to the south. The site is located several hundred feet northeast of CA-Hwy 101.

2.2 SITE DESCRIPTION

The approximately 17.4-acre site has two existing office/warehouse buildings and associated parking areas, which are to be demolished as part of the site redevelopment. Proposed construction consists of a new 355,000-SF warehouse in the center of the site surrounded by asphalt pavement, with loading docks and trailer parking along the western side of the building. Employee parking is proposed along the western and eastern property boundaries.

2.3 PHYSICAL SETTINGS

2.3.1 Regional Geology

The site is located on the western border of the Great Valley Province. The Great Valley is an asymmetrical synclinal trough with a gently dipping eastern limb, and is filled with a thick (up to 60,000 feet thick) sequence of sedimentary units, which are Jurassic age and younger (up to 208 million years ago [m.y.a.]). The deepest part of the basin is near the western edge, west of the present axis. The thin eastern valley deposits overlap the metamorphic terrains of the Sierran Foothills and the polycrystalline basement of the Sierra Nevada Block. The older units of the Great Valley Province that form the eastern part of the Coast Ranges, from the Klamath Mountains to Bakersfield, California, have become uplifted and deformed by a series of blind thrust-fault zones underlying the western edge of the basin. Most of the Great Valley Province was covered by sea from the early Eocene (36 to 57 m.y.a.) to the end of the Pliocene (1.6 m.y.a.).

2.3.2 Local Geology

We reviewed the 2006 Geologic Map of the San Francisco Bay Region (1:275,000), prepared by the United States Geological Survey (USGS). This source indicates that the site geology is alluvium deposited during the Holocene epoch (11,700 years ago to present). The Seismic Hazard Zone Report for the San Jose East Quadrangle indicates the site consists of the Qht and Qhty geologies (Holocene stream terrace deposits).

2.3.3 Faults and Seismicity

Based on the 2010 Fault Activity Map of California prepared by the Department of Mines and Geology, the site resides adjacent to the Palo Alto, San Jose, and Stanford Faults. These faults show undifferentiated movement during the Quaternary period (11,700 to 1.6 million years ago). Other nearby faults include the

Monte Vista fault and San Andreas Fault at 12 and 14 miles west, respectively. The Monte Vista fault exhibits movement during the Holocene epoch (11,700 years to present). The San Andres Fault ruptured historically in 1838, 1906, and 1989. The seismic hazard zone report identifies the site as having a predominant earthquake magnitude of 6.4 with a distance of 7 kilometers to the active fault.

According to the 2008 Ground Motion Interpolator prepared by the California Geological Survey, the earthquake peak ground acceleration that has 2% probability of being exceeded in 50 years for the property is 0.813g, and the earthquake peak ground acceleration that has 10% probability of being exceeded in 50 years for the property is 0.543g. This is a relatively high level of ground shaking for California.

2.3.4 Geologic Hazards/Liquefaction Potential

We evaluated liquefaction using high ground water elevation of 20 feet per SP117. SPT blow counts were corrected to N_160 clean sands by appropriate methods. Grain size were taken from samples during our field exploration. Based on a peak acceleration of 0.54, we calculated the cyclic stress ratio (CSR). Additionally, the Magnitude Scaling Factor of 1.6 was used based on a moment magnitude of 6.4. Based on the N_160 blow counts exceeding 30, the site is not susceptible to liquefaction.

The site is located within an area known to have a low probability for liquefaction (CGS, 2000). This is supported by the soil profiles consisting of predominantly very stiff, fine-grained soils. Liquefiable soils such as saturated poorly graded sands were not observed in our exploratory borings. As such, in our opinion the proposed development is at a very low risk for liquefaction. Due to the relatively flat topography at the site (approximately 2% grade or less), risk from landsliding and lateral spreading are considered to be insignificant.

2.3.5 Groundwater

Based on the Seismic Hazard Report, historic high water elevation is approximately 20 feet below the current site grades. We encountered groundwater during our subsurface exploration between 24 and 32 feet below the current site grade. This is confirmed by data obtained from the California Department of Water Resources, which list the depth to groundwater in nearby monitoring wells as approximately 20 to 40 feet.

3 FINDINGS AND CONCLUSIONS

3.1 SUBSURFACE CONDITIONS

We performed seven exploratory borings within the site to a maximum depth of 50 feet below ground surface to classify the soil type, density, SPT N-value and obtain samples for laboratory testing. The findings in the borings were generally consistent across the site.

In general, the soil profiles consisted of very stiff, low plasticity silts and clays in the upper 40 feet, underlain by dense clayey and well-graded sand down to the bottom of the boring. There were no poorly graded sands below the groundwater table.

3.2 LABORATORY TESTING

Four unconfined compression analyses were performed on 2.5-inch diameter stainless tube samples obtained during the subsurface exploration. The results of those analyses are presented in Table 1.

Boring	Depth (ft)	Unconfined Compressive Strength (tsf)
B-2	2.5	3.8
B-3	18.5	1.6
B-4	10	4.0
B-7	2.5	2.1

Table 1 – Unconfined Compressive Strength Analysis (ASTM D2166)

An Expansion Index (EI) test was performed to evaluate the expansion potential of the onsite soil. The Expansion Index test resulted in an EI of 32 for soil obtained between 2 and 3 feet bgs of boring B-2. This indicates a low expansion potential.

Five sieve wash analyses over the No. 200 sieve were performed to further classify the native soil observed during the subsurface exploration. The results of these tests confirmed our field classifications and are presented in Table 2.

Boring	Depth (feet)	Passing No. 200 Sieve (%)
B-2	45	9.0
B-4	15	82.2
B-5	20	85.6
B-6	5	78.5
B-7	25	75.7

Table 2 – Sieve Wash Analyses Over No. 200 Sieve

Six sieve analyses were performed to further classify the native soil observed during the subsurface exploration. The results of these tests confirmed our field classifications and are presented in Table 3.

Boring	Depth (feet)	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Fines (%)
B-1	5	0.0	0.2	0.8	12.1	86.9
B-1	35	0.0	0.0	0.4	24.5	75.1
B-2	40	0.0	4.0	17.5	58.7	19.5
B-2	50	0.0	10.1	62.0	22.0	5.7
B-3	25	0.0	1.0	1.4	37.0	55.8
B-7	15	0.0	1.4	2.9	30.0	64.2

Table 3 – Sieve Analyses

Moisture-density tests were performed on 2.5-inch diameter stainless steel tube samples obtained during the subsurface exploration. The results of these tests are shown in Table 4.

Boring	Depth (feet)	Water Content (%)	Dry Soil Density (pcf)
B-1	2.5	11.2	103.1
B-1	20	16.9	108.1
B-2	10	15.8	111.8
B-3	30	26.5	95.3
B-4	2.5	13.4	108.5
B-6	10	16.5	109.6

Table 4 – Moisture-Density Tests on Tube Samples

3.3 INFILTRATION RATES

We performed two percolation tests on site, see Figure 2 – Site Plan. The percolation test was taken within the upper 5 feet within a 6-inch diameter hole. We classified the soil within this zone as dark brown silts and silty clays. Our percolation tests resulted in an average design percolation rate of 0.20 inches per hour.

Proposed infiltration does not introduce any geotechnical hazards to the site or increase risk of liquefaction.

Percolation testing was performed using the Boring Percolation Testing Method. We applied correction factors CF_S and CF_V to the design value.

Location	NRCS Soil Classification	Percolation Rate (in./hr.)
P1	C	0.34
P2	C	0.05

Table 5 – Hydromodification Parameters

3.4 EXCAVATION EFFORT

Based upon the findings in exploratory borings, conventional grading equipment should be able to excavate the on-site soil with reasonable expectations.

3.5 SUITABILITY FOR CONSTRUCTION

From an earthwork, pavement, and foundations viewpoint, the soils at this site are considered suitable for support of the anticipated loads provided our recommendations are followed properly.

4 EARTHWORK RECOMMENDATIONS

4.1 NATIVE AND IMPORT FILL MATERIAL

On-site soil (less debris and organic materials) are considered suitable as fill material. Imported fill materials should have a plasticity index less than 12 and a maximum particle size of 2-inches. Allow Gularte & Associates 48 hours to sample and test proposed import fill materials prior to delivery at the site.

4.2 DEMOLITION

We recommend that we be retained to check the demolition of the existing footings/pavements and associated backfill operations. Once removed, the footing excavations should be backfilled and compacted to a minimum of 90 percent relative compaction, per ASTM D1557. Refer to Section 4.5 regarding trench backfill recommendations. We require 48 hours' notice prior to these operations so we can schedule our inspections.

Existing utilities within the proposed building pad should be removed entirely regardless of depth. Refer to Section 4.4 regarding trench backfill recommendations.

4.3 FILL COMPACTION/BUILDING PAD PREPARATION

After demolition per Section 4.2, we recommend that the building pad be overexcavated to 4-foot below finished pad grade. The overexcavation should extend 5 feet beyond the edge of the building lines.

Scarify the excavated grade to prepare for structural fill. Scarification should include ripping the upper 12 inches of the site and moisture conditioning the soil to within 0 to +4 percent of optimum moisture content prior to re-compaction. Compaction should be done with dedicated compaction equipment. Once compaction testing has been performed on the excavated grade, structural fill placement may commence.

The fill material should be moisture conditioned to within 0 to +4 percent of optimum moisture content, spread in loose lifts not exceeding 12-inches thick, and compacted to a minimum of 90 percent relative compaction per ASTM D1557. Compaction should be done with dedicated compaction equipment.

We recommend that Gularte & Associates be retained to check that native soil has been prepared properly, and to test structural fill placement every 12 to 18 inches to verify that the soil has been compacted adequately during the grading operations.

4.4 TRENCH BACKFILL

The contractor is responsible for conducting all trenching and shoring in accordance with CALOSHA requirements. Place and compact trench backfill as follows:

- Trench backfill should have a maximum particle size of 2-inches;
- Moisture condition trench backfill to within 0 to +4 percent of optimum water content; moisture condition backfill outside the trench.

- Place fill in loose lifts not exceeding 12-inches for backhoes and 18-inches for large excavators.
- Compact fill to 90 percent relative compaction per ASTM D1557.
- Jetting of trench backfill is not acceptable except in joint utility trenches where damage to conduits makes mechanical compaction methods impractical.

4.5 SITE DRAINAGE

Surface drainage design should include the following:

1. Slope concrete pavement areas at least ½ percent and asphalt concrete pavements at least ½ and preferably 1 percent to extend pavement life. Do not allow water to pond on pavement areas.
2. If soil surrounds the building, discharge roof down spouts to storm drain system. Where soil surrounds the building, provide a 5 percent slope away from building exteriors for a distance of at least 3 feet.
3. Direct sprinklers away from buildings. Use drip irrigation near the structure and pavements. Excess watering increases to risk of premature pavement failure and shrink/swell underneath the structure.

5 FOUNDATION RECOMMENDATIONS

5.1 FOUNDATIONS

The proposed structure can be supported on continuous or isolated spread footings bearing in competent native soil or compacted fill per our recommendations in Section 4. Continuous footings should be at least 18-inches wide and at least 24-inches deep below adjacent pad grade. Spread footings should be at least 24-inches wide and 24-inches deep below adjacent pad grade (not including crushed rock or pavement).

Table 6 below provide maximum allowable bearing capacity for dead plus live loads for the primary structure (inclusive of wind and seismic loads).

Minimum Footing Dimensions	Allowable Bearing Capacity (PSF)
Strip Footings 18” W x 24” Deep	2,800
Strip Footings 30” W x 24” Deep	3,200
Spread Footing 24” W x 24” Deep	3,000
Spread Footing 48” W x 24” Deep	3,500

Table 6 – Footing Parameters

For perimeter strip footings, provide at least two No. 4 reinforcing bars top and two No. 4 bars bottom.

Lateral loads may be resisted by friction along the base of footings and by passive pressure along the face of footings. The passive pressure is based on an equivalent fluid pressure in pounds per cubic foot (pcf). We recommend a passive lateral pressure of 320 pcf and a coefficient of friction equal to 0.32 for design.

Utility excavations parallel to footing lines should be clear of a 1:1 (horizontal:vertical) plane projected downward from the base of footings. Where utility lines cross footings, they should be sleeved and footings deepened as appropriate.

5.2 SLAB ON GRADE

We recommend the following for slabs-on-grade:

1. Place 6 inches of Caltrans Class II aggregate baserock (AB) compacted to at least 95 percent relative compaction.
2. Place a minimum 15-mil Stego Wrap vapor barrier between the pad and AB or alternatively over the AB. Pouring slab directly on vapor barrier in warm weather could be problematic for proper curing of slab; contractor to take necessary precautions. *Note: Where moisture migration is not a concern to the end user, vapor barrier may be omitted provided there will be no flooring over the concrete slab nor storing any boxes directly on the slab for extended periods. This is only applicable in warehouse areas.*
3. Provide a minimum concrete thickness of 8 inches.

4. Reinforce slabs with No. 5 reinforcing bars placed on 24-inch centers each way. Place dobies per ACI; we recommend a maximum dobie spacing of 6 feet on center, each way.
5. Use a concrete water-cement ratio of 0.50 or less for the slab; may be further modified by structural engineer requirements.
6. Use higher strength concrete, minimum 3,500 psi for the slab; may be further modified by structural engineer requirements.

Slab thickness and reinforcing steel requirements above are provided for purposes of resisting soil expansion potential. The structural engineer may increase these parameters based on building loads or anticipated building use. The structural engineer should provide final design thickness and additional reinforcement, if necessary, for the intended structural loads.

Exterior Flatwork: Exterior flatwork includes items such as concrete sidewalks, steps, and outdoor courtyards exposed to foot traffic only. Provide a minimum concrete flatwork thickness of 4 inches over 4 inches of aggregate base. Exterior flatwork subgrade should be moisture conditioned to within 0 to +4 percent of optimum water content and compacted to at least 90 percent relative compaction per ASTM D1557.

5.3 RETAINING WALL PARAMETERS

Provided that adequate drainage is included, we recommend that walls subjected to active soil pressure be designed to resist an equivalent fluid pressure of 45 pounds per cubic foot (pcf). For at-rest conditions, we recommend an at-rest fluid pressure of 65 pcf with level backfill conditions. Retaining wall backfill should be predominantly granular, non-expansive backfill. Generally, we expect horizontal movements for retaining walls under active pressure conditions to rotate laterally an amount equal to 1% of the height of the wall.

The above lateral earth pressures assume sufficient drainage behind the walls to prevent any build-up of hydrostatic pressures (i.e. sump) from surface water infiltration and/or a rise in the ground water level. Drainage of the walls may be accomplished by one of the following methods:

1. Clean drain rock wrapped in Mirafi 140N non-woven filter fabric or equivalent as approved by our office. Drain rock should be ¾ to 1-1/2 inch in size and should have less than 5% passing the No. 200 sieve. Rock can be crushed or rounded. Drain rock should be 12 inches wide and extend to within 12 inches of subgrade.
2. Caltrans Class II Permeable material placed 12 inches wide and extended to within 12 inches of subgrade. The Caltrans Class II Permeable is self filtering; and as such a geotextile filter fabric is not necessary.
3. Geocomposite drainage can be used in lieu of crushed rock. We commonly recommend Amerdrain C96 geocomposite drainage board. The product should be installed per the manufacturer's directions. We recommend the

wider drainage board be placed in the lower 2 feet of the wall. It is important that the proper transition pieces are used to transition from the geocomposite to 4-inch tight pipe for outletting purposes.

In either of the above cases, we recommend waterproofing of the walls with a product such as Sonneborne 5000 or equivalent as reviewed and approved by our office in writing. Waterproofing should be applied per the manufacturer's instructions.

Water collected at the bottom of the drain system should be transmitted away from the wall by a perforated pipe or weep holes. The pipe should be at least four inches in diameter with the perforations placed down (lettering typically on top). The pipe should daylight to a lower grade or connect to a sump, storm drain, or other suitable disposal facility. If adequate drainage is not provided, we recommend that an additional equivalent fluid pressure of 40 pcf be added to the values recommended above.

5.4 2019 CBC SEISMIC PARAMETERS

We provide the 2019 California Building Code parameters in the table below.

Categorization	Design Value
Site Latitude	37.249926° N
Site Longitude	121.777842° W
Site Class	D
Mapped Acceleration Parameter (S_S)	1.655 g
Mapped Acceleration Parameter (S_1)	0.625 g
Site Class Factor, Fa	1.2
Site Class Factor, Fv	1.7
Spectral Response Acceleration (S_{MS})	1.986 g
Spectral Response Acceleration (S_{M1})	1.06 g
Design Spectral Response Acceleration (S_{DS})	1.324 g
Design Spectral Response Acceleration (S_{D1})	0.708 g

Table 7 – CBC Seismic Parameters

5.5 PAVEMENT DESIGN

5.5.1 Asphalt Concrete Pavement

Several different asphalt pavement sections are shown in the table below. Our design is based on an R-value of 14 and Procedure 608 of the Caltrans Highway Design Manual. Specific traffic sections can be prepared upon request; contact our office if other sections are desired.

	Traffic Index				
	4	5	6	7	8
Asphalt Concrete (in)	2.5	3	3.5	4	4.5
Aggregate Base (in)	7	8	11	14	16

Table 8 – Pavement Sections

A possible option to reduce the aggregate baserock within the parking area is to lime treat the asphalt pavement subgrade. Typically, this option may result in a 1/3 to 1/2 reduction in baserock thickness. Should this option be of interest, contact our office for further analysis and recommendations.

5.5.2 Trash Enclosure Concrete Pavement Design

Use concrete pavement sections to resist heavy loads and turning forces in trash enclosures. We recommend the following minimum design sections for trash enclosure rigid pavements:

- Place 7-inches of concrete over 6-inches of aggregate base compacted to at least 95 percent relative density per ASTM D1557.
- Concrete pavement should have a minimum 28-day compressive strength of 3,000 psi.
- Provide minimum control joint spacing in accordance with Portland Cement Association guidelines.
- Reinforce slabs with No. 5 reinforcing bars placed on 24-inch centers, each way, placed within the middle third of the slab. Place dobies per ACI. If shrinkage cracking is acceptable and the concrete is not subject to heavy truck traffic, then reinforcing bar could be replaced with the appropriate type and amount of fiber mesh.

Note, the above pavement section recommendation is designed for trash enclosures only and should not be used for Portland cement concrete trucking driveway or loading dock apron slabs. Please contact our office should you require a PC concrete slab design for trucking driveways or loading dock aprons.

5.5.3 Special Inspections

We recommend the following minimum special inspections as part of the grading and foundation portions of the project. The project architect, governing agency, or structural engineer may require other inspections.

- Observation that the previous structure footings have been removed and the resulting excavations backfilled and compacted to a minimum of 90 percent relative compaction, per ASTM D1557.
- Observation of grading and overexcavation.

- Observation of backfill of abandoned underground structures and utilities.
- Observation of proposed footing excavations.
- Observation of slab reinforcing steel.
- Observation, sampling, and testing of concrete footings and slabs.

6 LIMITATIONS

The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence is not implied or suggested by this report and should not be inferred.

The accompanying report summarizes the findings and opinions of Gularte & Associates, Inc. Our findings and opinions are based on information obtained on given dates by borings, laboratory testing, engineering judgment, and analyses.

The analyses, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our study, and further assume that probes such as exploratory borings are representative of the subsurface conditions throughout the site; i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the probes.

If during construction different subsurface conditions from those encountered during our exploration or different from those assumed in design are observed or appear to be present, or where variations from our design recommendations are made, we must be advised promptly so that we can review these conditions and modify the applicable recommendations if necessary. We cannot be held responsible for differing site conditions, changes in design, or modified geotechnical recommendations not brought to our attention.

Soil conditions cannot be fully determined by borings and, therefore, unanticipated soil conditions are commonly encountered. Such unexpected soil conditions often require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency funding is recommended to accommodate potential extra costs.

Foundation dimensions, minimum slab thickness, and reinforcing details recommended herein are based upon geotechnical and construction considerations and are not offered in lieu of foundation design by an engineer. A determination of flooding potential, the existence of wetlands, or corrosive soil was beyond the scope of this report.

This geotechnical study did not include an investigation regarding the existence, location, or type of possible hazardous materials. If an investigation is necessary, we should be advised. In addition, if any hazardous materials are encountered during construction of the project, the proper regulatory officials should be notified immediately.

This report was prepared for the specific use of our client and applies only to the subject property. We are not responsible for interpretations by others of data presented in this report. This report is not a legal opinion. No warranty is expressed or implied. We base our conclusions in this report on judgment and experience. We performed this work in accordance with generally accepted standards of practice existing in northern California at the time of the report.

Gularte & Associates, Inc. is not an expert on mold prevention. If particular recommendations are desired to prevent mold, we recommend that you contact an expert in that field.

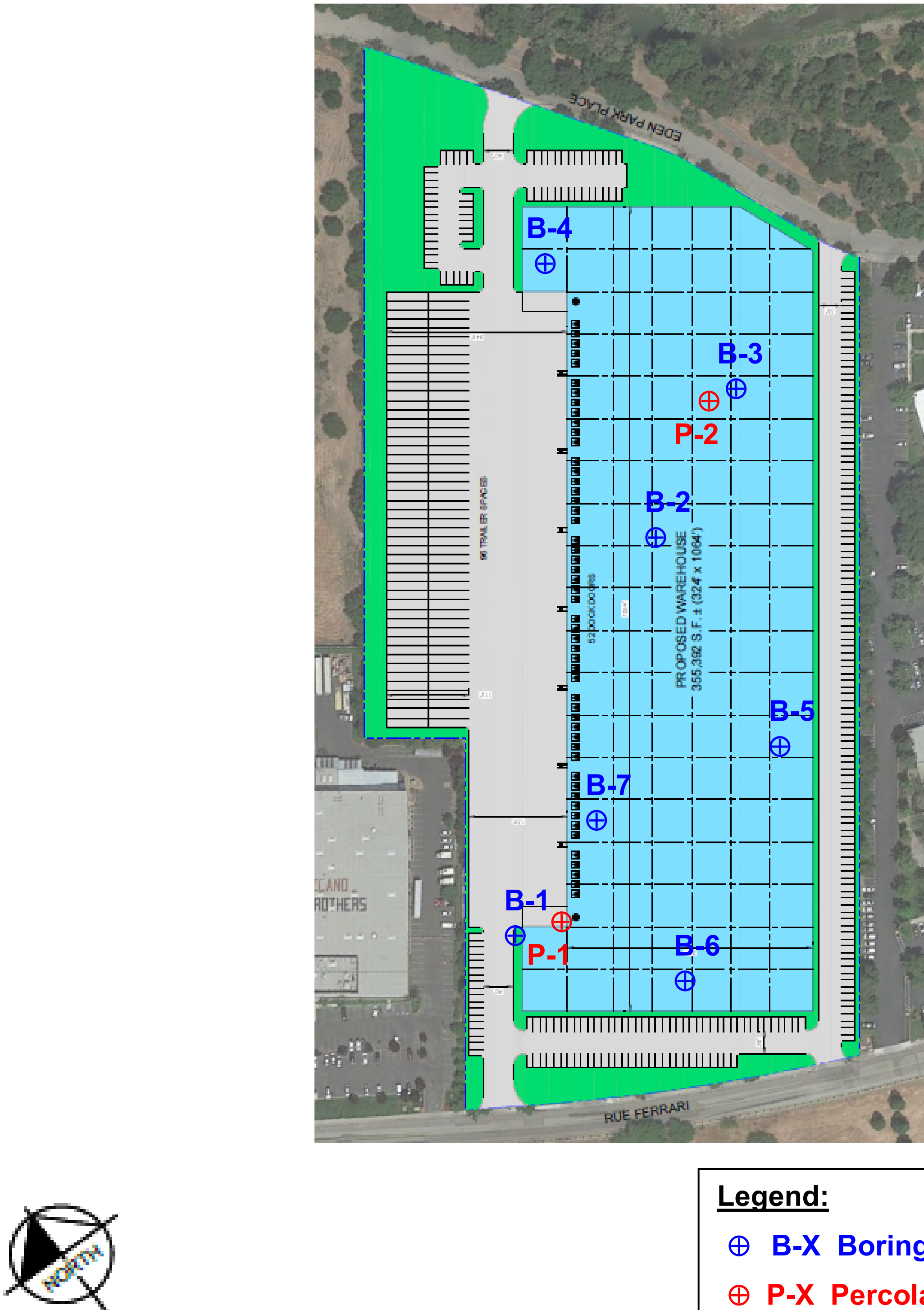
FIGURES

Vicinity Map

5853 & 5863 Rue Ferrari – San Jose

November 2020	Job No. 4743	Figure 1

Gularte & ASSOCIATES INC. Geotechnical Consultants



Legend:

⊕ B-X Boring Location

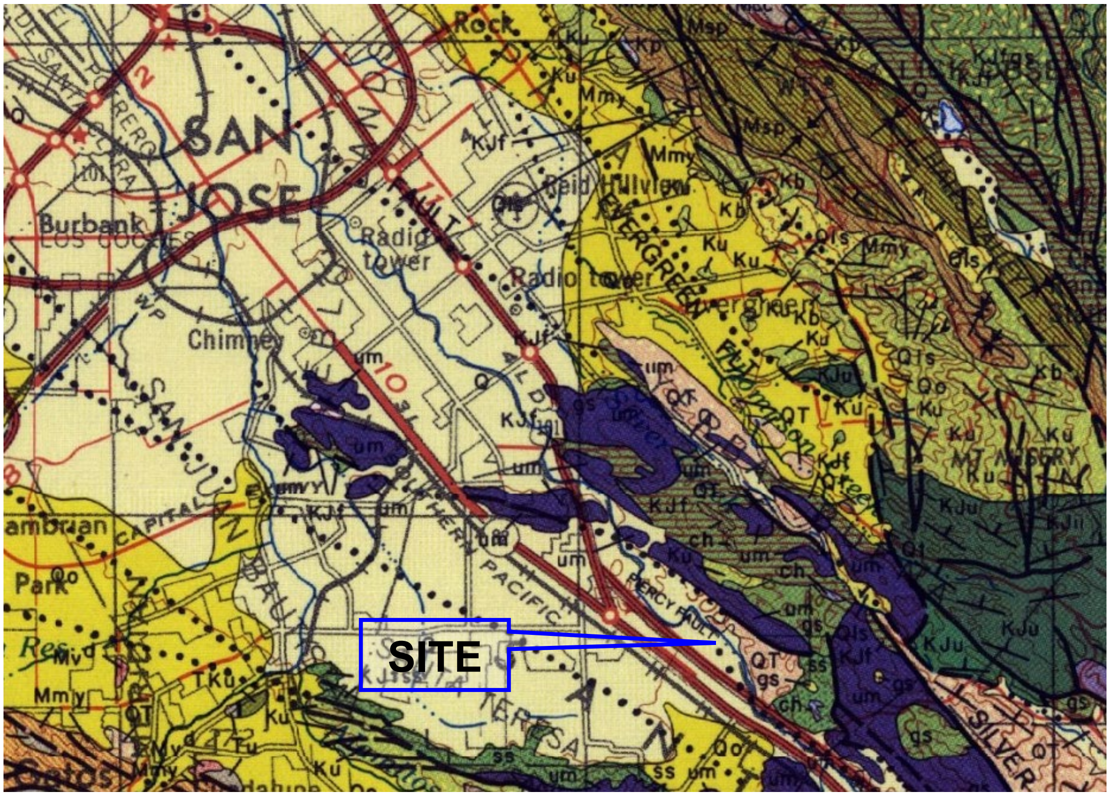
⊕ P-X Percolation Test Location

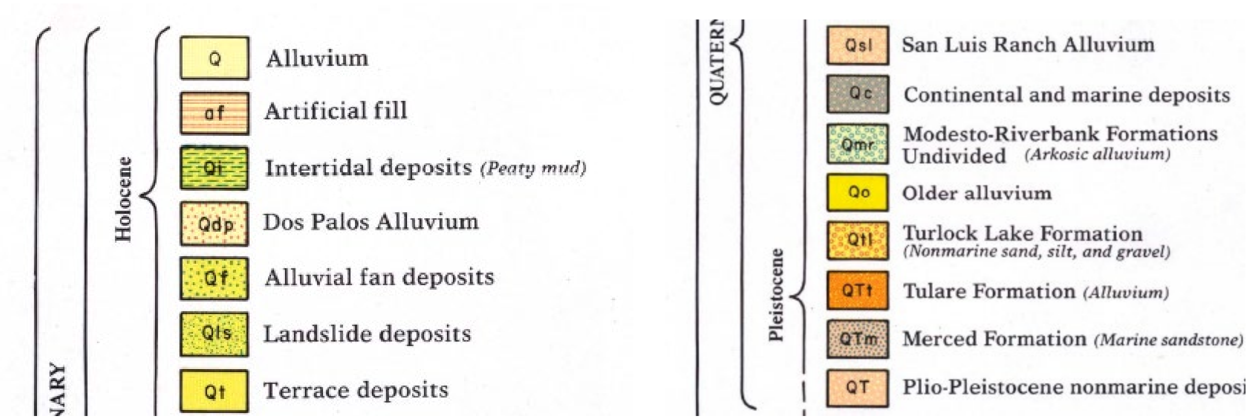
Site Plan

5853 & 5863 Rue Ferrari – San Jose

Gularte & ASSOCIATES INC. Geotechnical Consultants

November 2020	Job No. 4743	Figure 2





Adapted from the 1991 CA DMG Geologic Map of the San Francisco-San Jose Quadrangle, California.

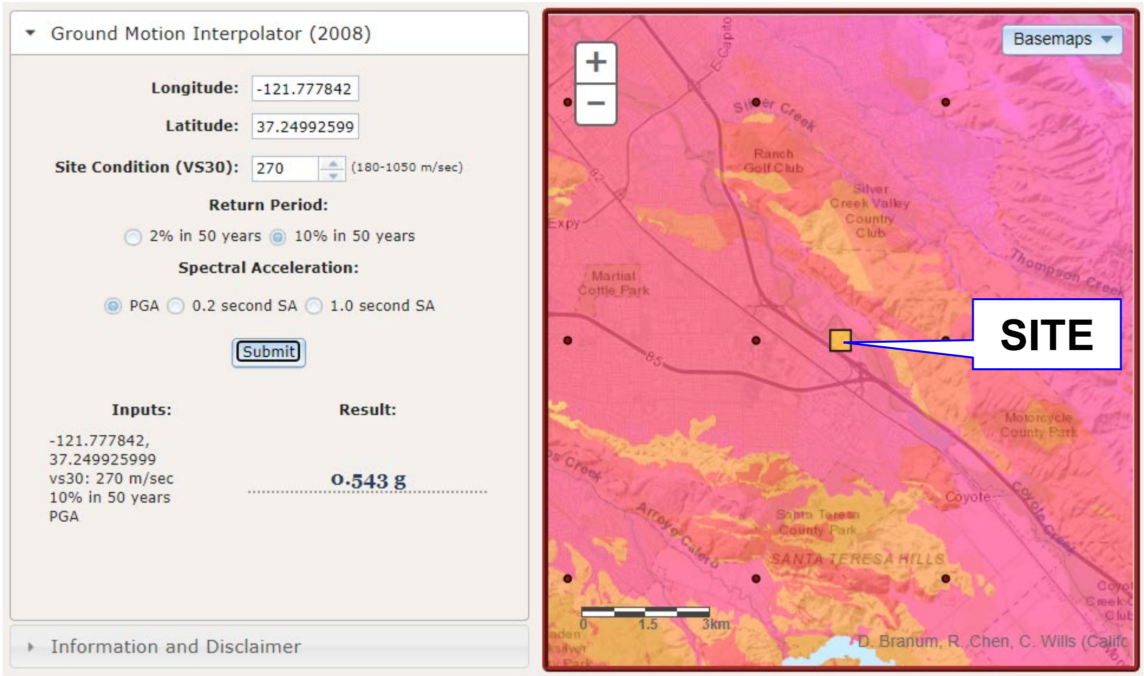
N

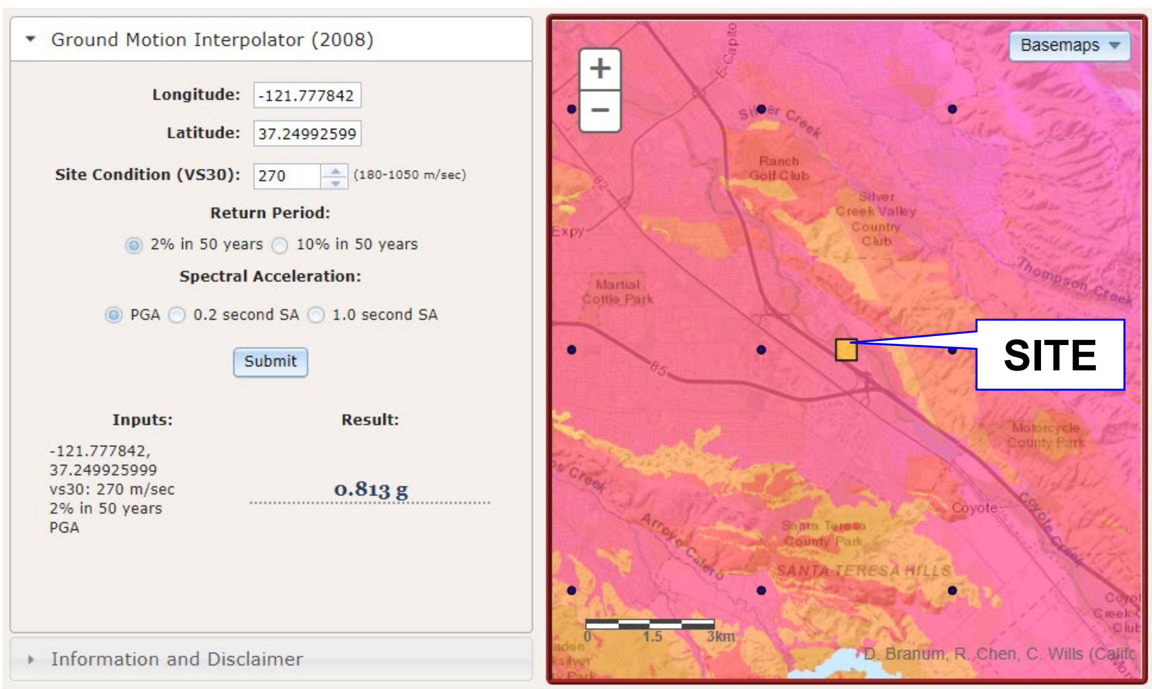
Geologic Map

5853 & 5863 Rue Ferrari – San Jose

Gularte & ASSOCIATES INC. Geotechnical Consultants

November 2020	Job No. 4743	Figure 3





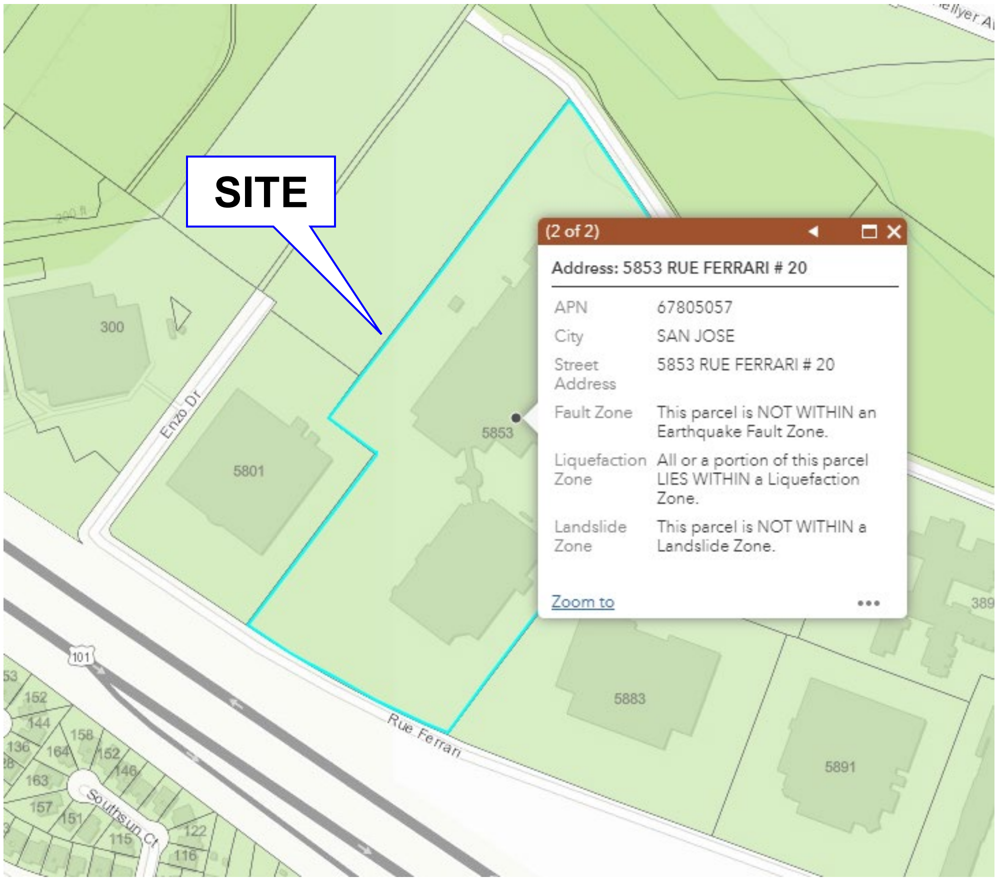
N

Seismic Hazard Accelerations

5853 & 5863 Rue Ferrari – San Jose

Gularte & ASSOCIATES INC. Geotechnical Consultants

November 2020	Job No. 4743	Figure 4



Explanation:

- Parcel is in an Earthquake Fault Zone, a Liquefaction Zone, and a Landslide Zone
- Parcel is in an Earthquake Fault Zone and a Liquefaction Zone
- Parcel is in an Earthquake Fault Zone and a Landslide Zone
- Parcel is in an Earthquake Fault Zone
- Parcel is in a Liquefaction Zone and Landslide Zone
- Parcel is in a Liquefaction Zone
- Parcel is in a Landslide Zone
- Parcel is not in a zone or has not been evaluated

N

Adapted from the CGS Earthquake Zones of Required Investigation

Map of Seismic Hazard Zones

5853 & 5863 Rue Ferrari – San Jose

Gularte & ASSOCIATES INC. Geotechnical Consultants

November 2020	Job No. 4743	Figure 5

APPENDIX A

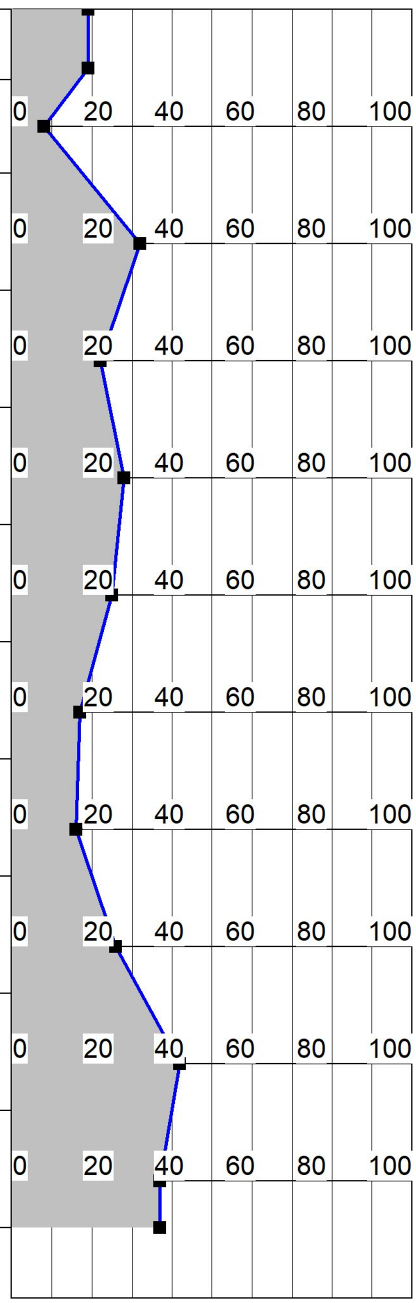
Boring Logs

Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 15, 2020

Boring # B1

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type	Lithology	LITHOLOGIC DESCRIPTION
0					ML: DARK BROWN CLAYEY SILT; STIFF; DAMP
	B1-1	9/8/11	CAL MOD		ML: DARK BROWN CLAYEY SILT; STIFF; DAMP
5	B1-2	4/4/4	SPT		
					ML: DARK BROWN SANDY SILT W/ CLAY; STIFF; DAMP
10	B1-3	10/15/17	CAL MOD		
					ML: MED. BROWN CLAYEY SILT; VERY STIFF; MOIST
15	B1-4	8/8/14	SPT		
					CL: OLIVE BROWN SILTY CLAY; VERY STIFF; MOIST
20	B1-5	11/13/15	CAL MOD		
					CH: OLIVE BROWN SILTY HIGH PLASTICITY CLAY; VERY STIFF; MOIST
25	B1-6	8/11/14	SPT		
					CH: OLIVE BROWN SILTY HIGH PLASTICITY CLAY; VERY STIFF; MOIST
30	B1-7	11/8/9	CAL MOD		
					CL: OLIVE BROWN SANDY CLAY; VERY STIFF; WET
35	B1-8	6/7/9	SPT		
					CL: OLIVE BROWN SANDY CLAY; VERY STIFF; WET
40	B1-9	11/12/14	CAL MOD		
					CL: OLIVE BROWN SANDY SILTY CLAY; HARD; WET
45	B1-10	14/18/24	SPT		
					SC: OLIVE BROWN CLAYEY SAND; DENSE; WET
50	B1-11	14/15/22	SPT		
55					

SPT or Cal Mod "N" Value (Uncorrected)



Client	Project	Sheet
Duke Realty	Rue Ferrari	1 of 1

Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 15, 2020

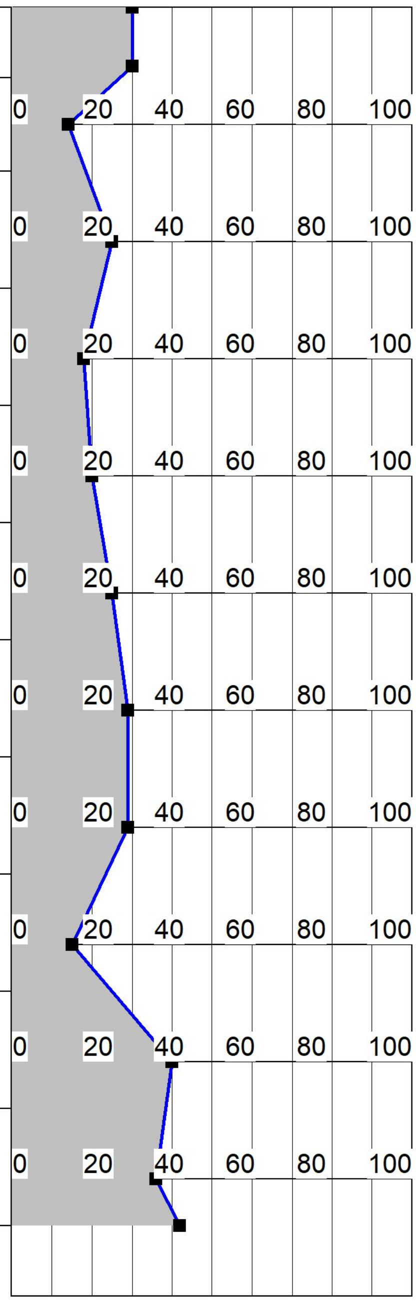
Gularte & Associates, Inc.

Boring # B2

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type
	B2-1	9/12/18	CAL MOD
5	B2-2	4/6/8	SPT
10	B2-3	8/6/14	CAL MOD
15	B2-4	4/8/10	SPT
20	B2-5	5/8/12	SPT
25	B2-6	8/11/14	CAL MOD
30	B2-7	11/13/16	SPT
35	B2-8	4/6/9	CAL MOD
40	B2-9	14/18/22	SPT
45	B2-10	12/14/22	SPT
50	B2-11	9/16/26	SPT

Lithology	LITHOLOGIC DESCRIPTION
ML	ML: DARK BROWN CLAYEY SILT; STIFF; DAMP
ML	ML: DARK BROWN CLAYEY SILT; STIFF; DAMP
ML	ML: MED. BROWN CLAYEY SILT; STIFF; MOIST
ML	ML: LIGHT BROWN SILT W/ CLAY; STIFF; MOIST
CL	CL: OLIVE GREEN/BROWN SILTY CLAY; STIFF; MOIST
CL	CL: OLIVE BROWN SILTY CLAY W/ SAND; STIFF; MOIST
CH	CH: OLIVE BROWN SILTY HIGH PLASTICITY CLAY; STIFF; MOIST
CL	CL: MED. BROWN SANDY SILTY CLAY; STIFF; WET
SM	SM: MED. BROWN COARSE SAND W/ SILT; DENSE; WET
SW	SW: BROWN FINE TO COARSE SAND; DENSE; WET
SW	SW: BROWN FINE TO COARSE SAND; DENSE; WET

SPT or Cal Mod "N" Value (Uncorrected)



Depth (feet): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55

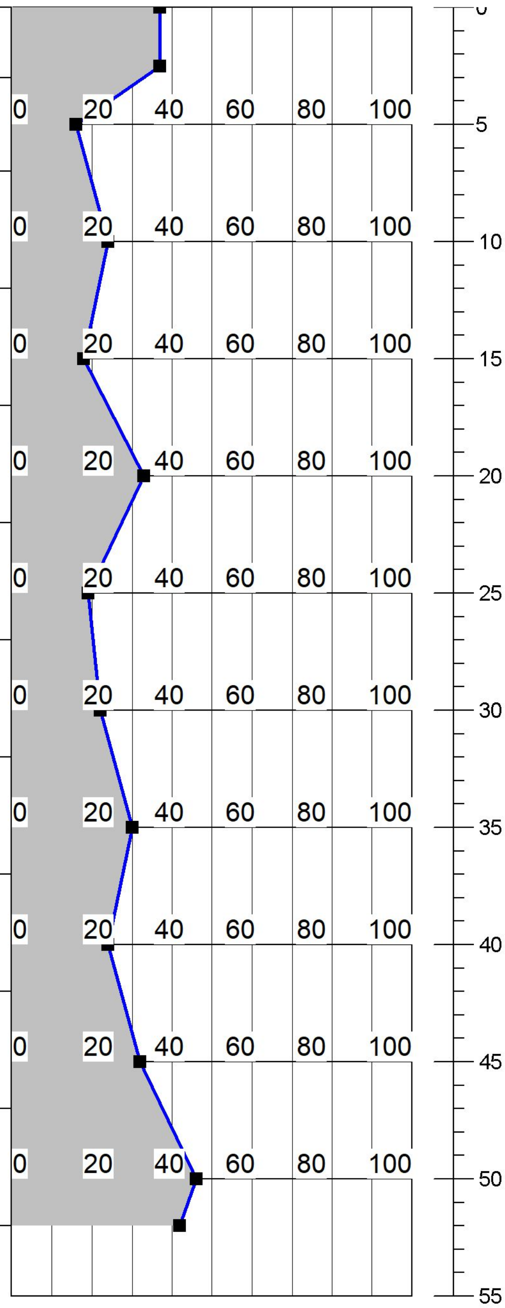
Client	Project	Sheet
Duke Realty	Rue Ferrari	1 of 1

Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 15, 2020

Boring # B3

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type	Lithology	LITHOLOGIC DESCRIPTION
0					ML: MED. BROWN SILTY W/ CLAY; STIFF; DAMP
	B3-1	11/17/20	CAL MOD		ML: MED. BROWN SILTY; STIFF; DAMP
5	B3-2	6/7/9	SPT		
					ML: DARK BROWN CLAYEY SILT; STIFF; DAMP
10	B3-3	8/11/13	CAL MOD		
					ML: MED. BROWN SILT W/ SAND; STIFF; DAMP
15	B3-4	6/7/11	SPT		
					ML: OLIVE BROWN CLAYEY SILT; VERY STIFF; MOIST
20	B3-5	9/14/19	CAL MOD		
					CL: OLIVE BROWN SANDY SILTY CLAY; VERY STIFF; MOIST
25	B3-6	7/9/10	SPT		
					CL: OLIVE BROWN CLAY W/ SILT; STIFF; MOIST
30	B3-7	9/10/12	CAL MOD		
					CH: OLIVE BROWN HIGH PLASTICITY CLAY; HARD; MOIST
35	B3-8	10/14/16	SPT		
					CH: OLIVE BROWN HIGH PLASTICITY CLAY; VERY STIFF; MOIST
40	B3-9	9/11/13	CAL MOD		
					CH: OLIVE/ORANGE BROWN SILTY HIGH PLASTICITY CLAY; HARD; MOIST
45	B3-10	8/15/17	SPT		
					: NO RECOVERY
50	B3-11	14/17/29	SPT		
55					

SPT or Cal Mod "N" Value (Uncorrected)



Client	Project	Sheet
Duke Realty	Rue Ferrari	1 of 1

Auger Hollow Stem Auger
Size 6"
Drill Mobile B53
Logged By Rory Taylor

Gularte & Associates, Inc.

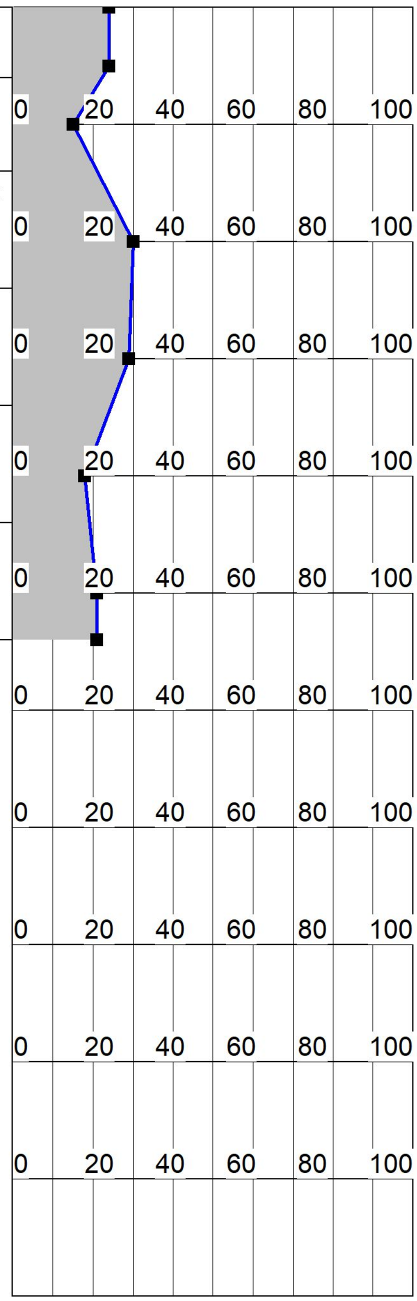
Project No. 4743
Project Name Rue Ferrari
Elevation
Date October 24, 2020

Boring # B4

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type
~3.5	B4-1	7/11/13	CAL MOD
5	B4-2	5/7/8	SPT
~10.5	B4-3	8/14/16	CAL MOD
~15.5	B4-4	9/12/17	SPT
~20.5	B4-5	6/7/11	SPT
~25.5	B4-6	5/9/12	SPT

Depth (feet)	LITHOLOGIC DESCRIPTION
0 – 2.5	ML: LIGHT BROWN CLAYEY SILT; VERY STIFF; DAMP
2.5 – 7	ML: LIGHT BROWN CLAYEY SILT; VERY STIFF; DAMP
7 – 12	CL: OLIVE SILTY CLAY; VERY STIFF; MOIST
12 – 17	ML: OLIVE BROWN CLAYEY SILT; VERY STIFF; MOIST
17 – 22	CH: OLIVE BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; MOIST
22 – 27	CL: OLIVE BROWN SILTY SANDY CLAY; VERY STIFF; WET

SPT or Cal Mod "N" Value (Uncorrected)



Depth (feet): 0 – 55

Client Duke Realty
Project Rue Ferrari
Sheet 1 of 1

Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 24, 2020

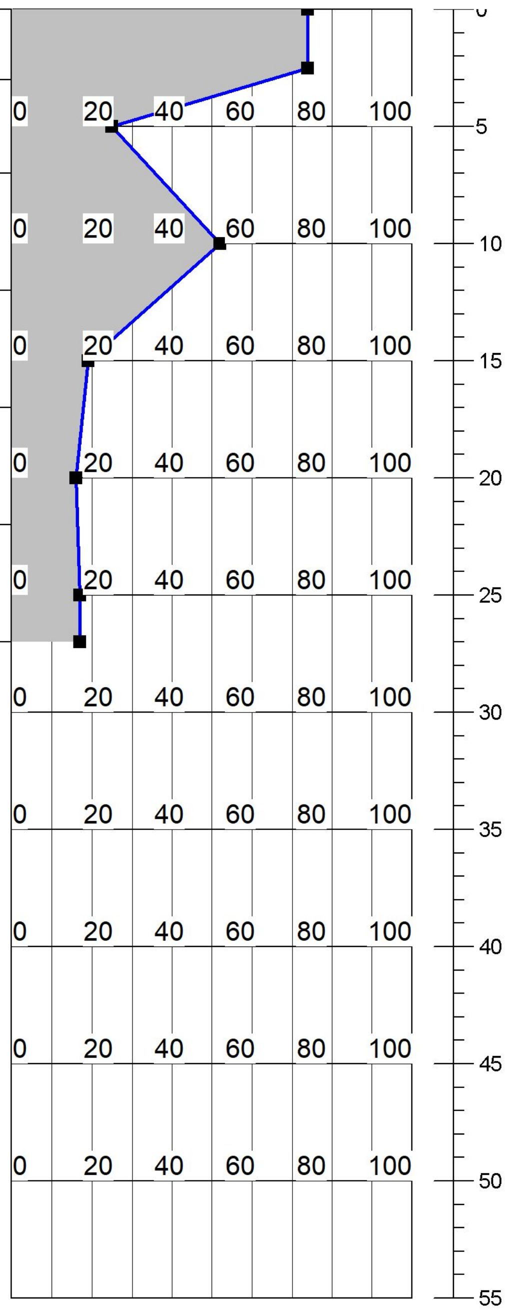
Boring # B5

Sample No.	SPT/Cal Mod N-Value	Sample Type
B5-1	21/33/41	CAL MOD
B5-2	8/8/17	SPT
B5-3	17/21/31	CAL MOD
B5-4	10/18/11	SPT
B5-5	7/6/10	SPT
B5-6	6/8/9	SPT

LITHOLOGIC DESCRIPTION

- CL: DARK BROWN SILTY SANDY CLAY; HARD; DAMP
- CL: DARK BROWN SILTY SANDY CLAY; VERY STIFF; DAMP
- CL: MED. BROWN SILTY CLAY; HARD; DAMP
- ML: LIGHT BROWN SANDY SILT; VERY STIFF; DAMP
- CH: OLIVE BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; MOIST
- CH: OLIVE BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; MOIST

SPT or Cal Mod "N" Value (Uncorrected)



Client	Project	Sheet
Duke Realty	Rue Ferrari	1 of 1

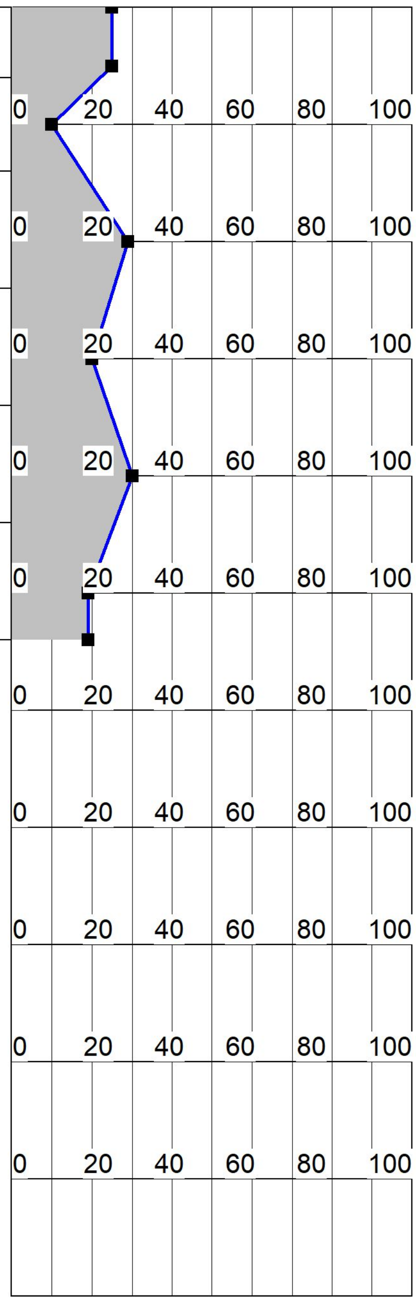
Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 24, 2020

Gularte & Associates, Inc.

Boring # B6

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type	Lithology	LITHOLOGIC DESCRIPTION
0–2.5				CL	CL: DARK BROWN SILTY SANDY CLAY; VERY STIFF; DAMP
2.5–6.5	B6-1	7/12/13	CAL MOD	CL	CL: DARK BROWN SILTY CLAY; STIFF; MOIST
	B6-2	3/4/6	SPT		
6.5–11.5	B6-3	9/14/15	CAL MOD	CL	CL: MED. BROWN SILTY CLAY; VERY STIFF; MOIST
11.5–16.5	B6-4	6/7/13	SPT	ML	ML: MED. BROWN CLAYEY SILT; VERY STIFF; MOIST
16.5–21.5	B6-5	9/13/17	SPT	CH	CH: MED. BROWN SILTY CLAY; HIGH PLASTICITY; HARD; MOIST
21.5–27	B6-6	4/7/12	SPT	CH	CH: MED. BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; WET

SPT or Cal Mod "N" Value (Uncorrected)



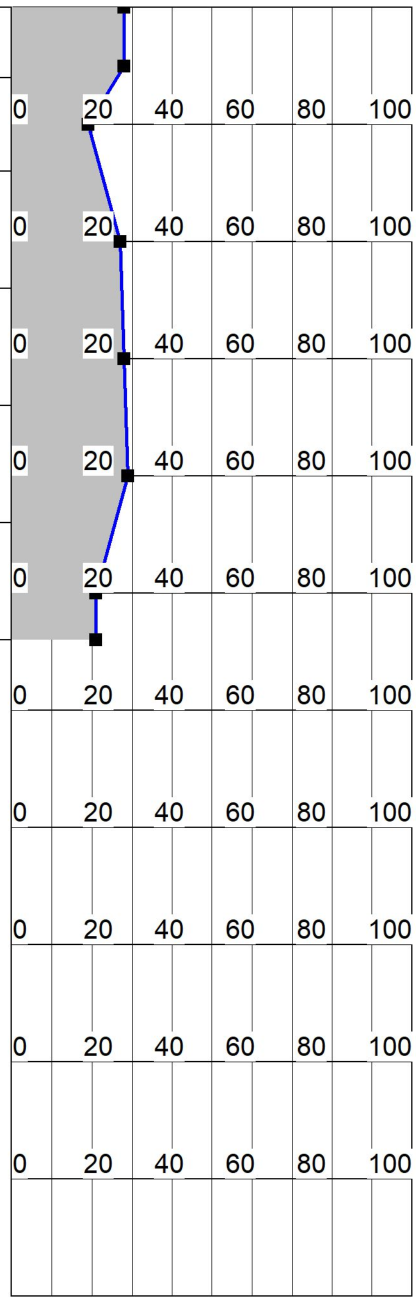
Client	**Project**	**Sheet**
Duke Realty	Rue Ferrari	1 of 1

Auger	Hollow Stem Auger	**Project No.**	4743
Size	6"	**Project Name**	Rue Ferrari
Drill	Mobile B53	**Elevation**	
Logged By	Rory Taylor	**Date**	October 24, 2020

Boring # B7

Depth (feet)	Sample No.	SPT/Cal Mod N-Value	Sample Type	LITHOLOGIC DESCRIPTION
0–3				CL: DARK BROWN SILTY CLAY; VERY STIFF; MOIST
3–7	B7-1	10/12/16	CAL MOD	CL: DARK BROWN SILTY CLAY; VERY STIFF; MOIST
	B7-2	5/9/10	SPT	
7–12	B7-3	9/12/15	CAL MOD	CL: DARK BROWN SILTY SANDY CLAY; VERY STIFF; MOIST
12–17	B7-4	10/15/13	SPT	ML: OLIVE BROWN CLAYEY SILT; VERY STIFF; DAMP
17–22	B7-5	8/12/16	SPT	CH: OLIVE BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; MOIST
22–27	B7-6	5/9/12	SPT	CH: OLIVE BROWN SILTY CLAY; HIGH PLASTICITY; VERY STIFF; MOIST

SPT or Cal Mod "N" Value (Uncorrected)



Client	Project	Sheet
Duke Realty	Rue Ferrari	1 of 1

APPENDIX B

Laboratory Test Results

Expansion Index Test; ASTM D4829

Gularte & ASSOCIATES, INC.

Project No.:	4743
Project Name:	RUE FERRARI
Date:	10/28/2020
Sampling Location:	B2 - BULK
Sample Description	CLAYEY SILT

Water Content	**No. 1**	
Mass of pan	190.4	grams
Mass of wet soil+pan	316.8	grams
Mass of dry soil+pan	304.5	grams
Water Content (%)	**10.8**	percent

Dry Soil Density		
Weight of Ring	199	grams
Weight of Ring + Soil	609.8	grams
Height of Ring	1	inches
Ring Diamenter	4	inches
Volume of Ring	12.6	in^3
Wet Soil Density	124.3	pcf
Dry Soil Density	**112.2**	**pcf**

Saturation and Expansion Index	
Percent Saturation	58.0
Uncorrected EI	27.3
Corrected EI	**31.9**

Dial Readings	
Time (hrs)	Reading (in)
3:45 PM	0.0000
4:30 PM	0.0162
8:00 AM	0.0269
1:30 PM	0.0273

Delta	0.0273

EI	**Classification**
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
> 130	Very High

Notes:

ASTM D2216/2922 Moisture/Density Test

Project No.: 4743
Project Name: RUE FERRARI
Sampling Locations: SEE SITE PLAN

Gularte & ASSOCIATES, INC.

Soil Description: SEE BORING LOGS

Boring Location	B1	B1	B2	B3	B4
Sample Depth	2.5	20	10	30	2.5

Water Content Calculations	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**
Obtain Mass of Container	195.0	191.0	192.6	187.8	193.0
Obtain Mass of Wet Specimen+Container	1026.2	1059.0	1130.2	1061.6	1083.4
Obtain Mass of Dry Specimen+Container	942.4	933.6	1002.2	878.6	978.4
Water Content (%)	**11.2**	**16.9**	**15.8**	**26.5**	**13.4**

Soil Density Calculations	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**
Obtain Mass of Mold:	240.6	243.0	210.2	205.0	272.4
Obtain Mass of Soil and Mold:	1072.2	1159.4	1149.4	1080.0	1164.6
Total Mass of Soil	831.6	916.4	939.2	875.0	892.2
Length of sample	6.0	6.0	6.0	6.0	6.0
Wet Soil Density	114.6	126.3	129.4	120.6	123.0
Dry Soil Density	**103.1**	**108.1**	**111.8**	**95.3**	**108.5**

Notes

ASTM D1140 Sieve Wash Over The No. 200 Screen

Gularte & Associates, Inc.

Project No.: 4743
Project Name: RUE FERRARI
Date: 10/28/2020

Soil Description: SEE BORING LOGS

Basic Information

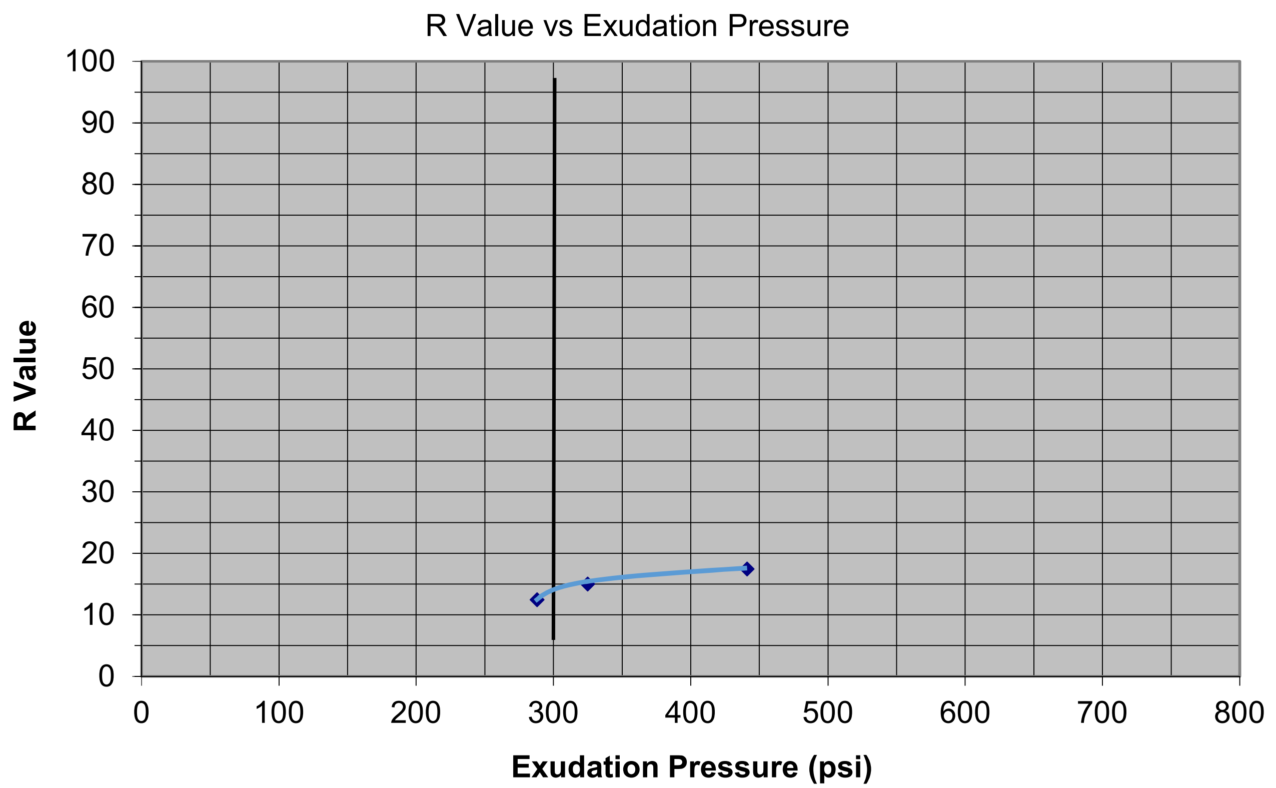
Procedure Used (A or B) A
Preparation Method Used (Wet or Dry) DRY

Boring #	B2	B6	B7	B4	B5
Depth	45	5	25	15	20

Pan #	**8**	**5**	**11**	**AA**	**77**
Mass of Container	195.6	191.0	193.6	182.8	188.6
Mass of Dry Specimen+Container	383.2	374.0	433.2	361.4	416.6
Mass of Dry Washed+Container	366.4	230.4	251.8	214.6	221.4
Percent Passing No. 200 Sieve	**9.0**	**78.5**	**75.7**	**82.2**	**85.6**

Notes

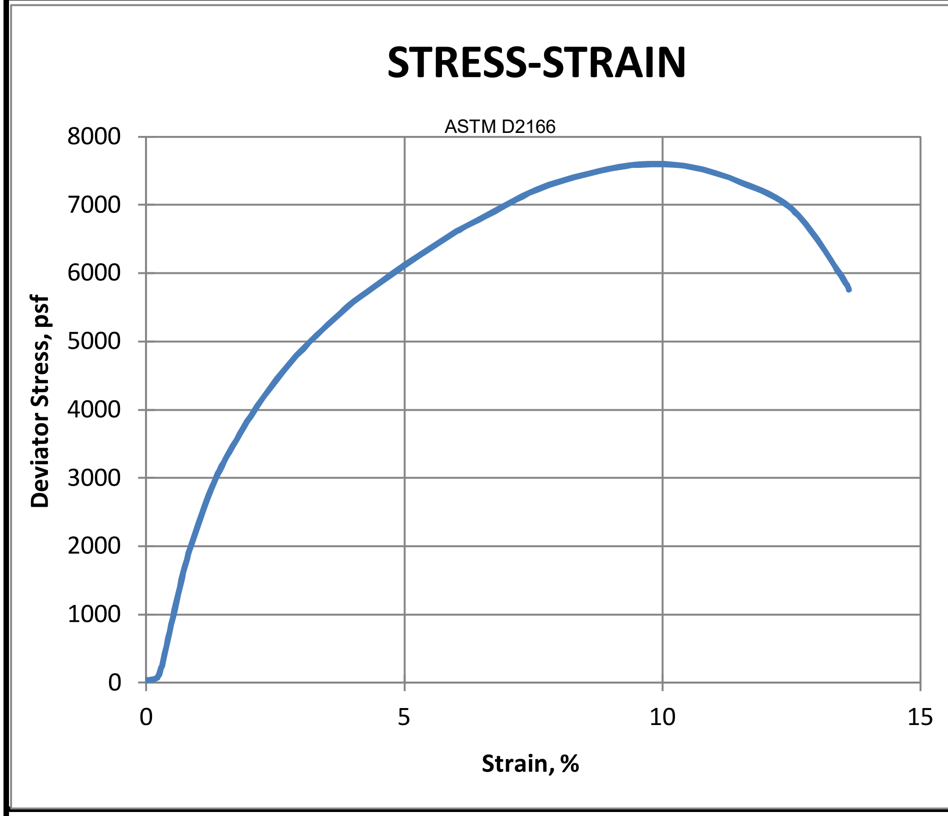
Mass of Container+Wet Specimen					
Mass of Container+Dry Specimen					
Moisture Content %	0	0	0	0	0



Sample ID & Description			
Boring Number	B1		
Sample Depth (feet)			
Material Description	Dark Grayish Brown lean CLAY		
Test Data			
Specimen	12	13	4
Exudation Pressure (psi)	325	288	441
Expansion Dial (.0001")	0	0	15
Expansion Pressure (psf)	0.0	0.0	65.0
Resistance 'R' Value	15	12	17
Moisture at test (%)	15.1	15.7	14.6
Dry density at test (pcf)	116.5	114.3	111.4
R Value at 300 psi exudation pressure		**14**	
R Value by expansion pressure (TI=7.0)		**20**	
R Value by Equilibrium		**14**	

GEOCON CONSULTANTS, INC.
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Resistance "R" Value, ASTM D2844, CTM 301
Project: Gularte #4743
Location:
Number: S1739-05-01
Figure:



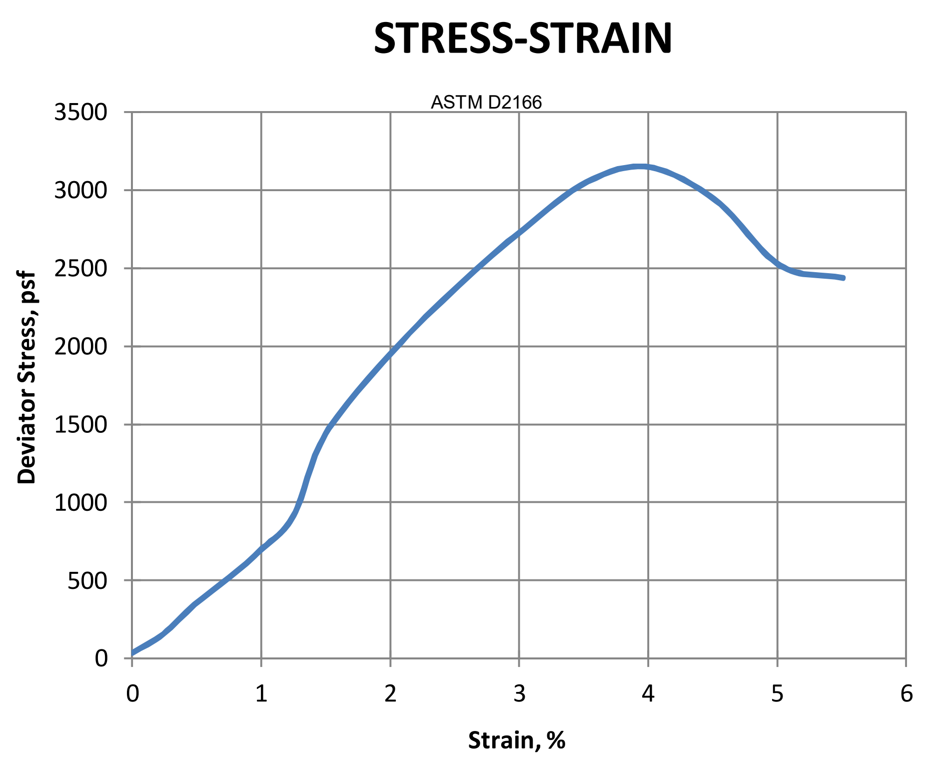
Failure Photo

Sample Description	
Sample ID	B2
Sample Depth (feet)	2.50
Material Description	Very dark brown lean CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	4.82
Diameter (inch) average of 3	2.40
Moisture Content (%)	17.4
Dry Density (pcf)	114.4
Estimated Specific Gravity	2.7
Saturation (%)	99.4
Shear Test Conditions	
Strain Rate (%/min)	1.0239
Major Principal Stress at Failure (psf)	7590
Strain at Failure (%)	9.5
Test Results	
Unconfined Compressive Strength (tons/ft^2)	3.8
Unconfined Compressive Strength (lbs/ft^2)	7592
Unconfined Compressive Strength (psi)	53
Shear Strength (tons/ft^2)	1.9
Shear Strength (lbs/ft^2)	3796

GEOCON CONSULTANTS, INC.
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Unconfined Compressive Strength (ASTM D2166)

Project: Gularte #4743
Location:
Number: S1739-05-01
Figure:



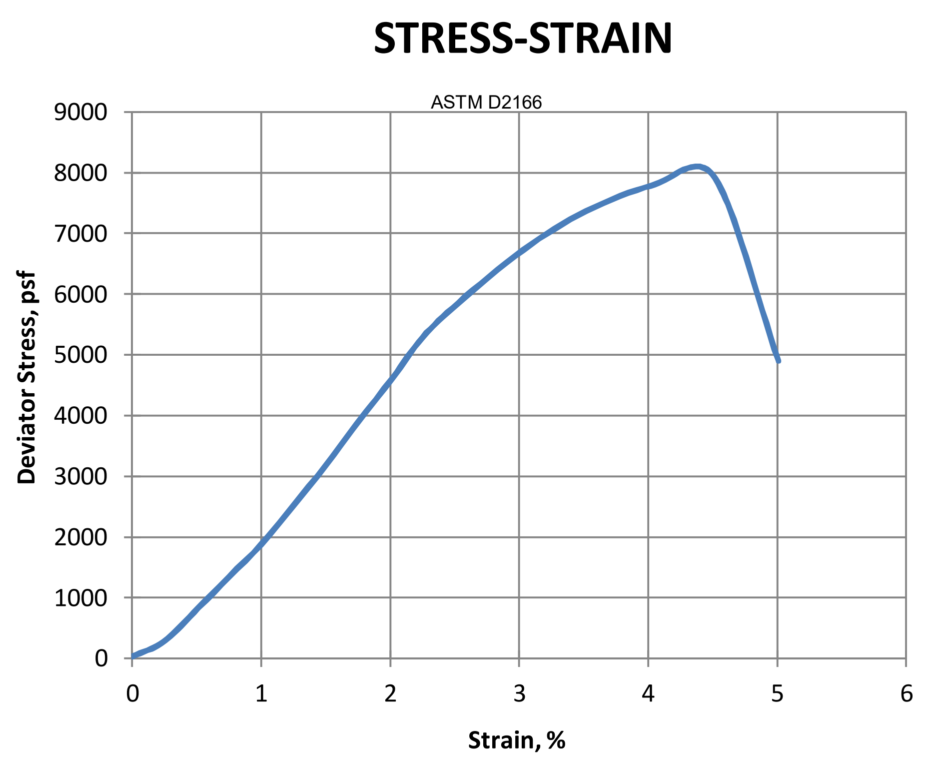
Failure Photo

Sample Description	
Sample ID	B3
Sample Depth (feet)	18.50
Material Description	Dark yellowish brown Sandy lean CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	4.91
Diameter (inch) average of 3	2.38
Moisture Content (%)	17.6
Dry Density (pcf)	112.1
Estimated Specific Gravity	2.7
Saturation (%)	94.5
Shear Test Conditions	
Strain Rate (%/min)	0.0048
Major Principal Stress at Failure (psf)	3150
Strain at Failure (%)	4.0
Test Results	
Unconfined Compressive Strength (tons/ft^2)	1.6
Unconfined Compressive Strength (lbs/ft^2)	3146
Unconfined Compressive Strength (psi)	22
Shear Strength (tons/ft^2)	0.8
Shear Strength (lbs/ft^2)	1573

GEOCON CONSULTANTS, INC.
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Unconfined Compressive Strength (ASTM D2166)

Project: Gularte #4743
Location:
Number: S1739-05-01
Figure:



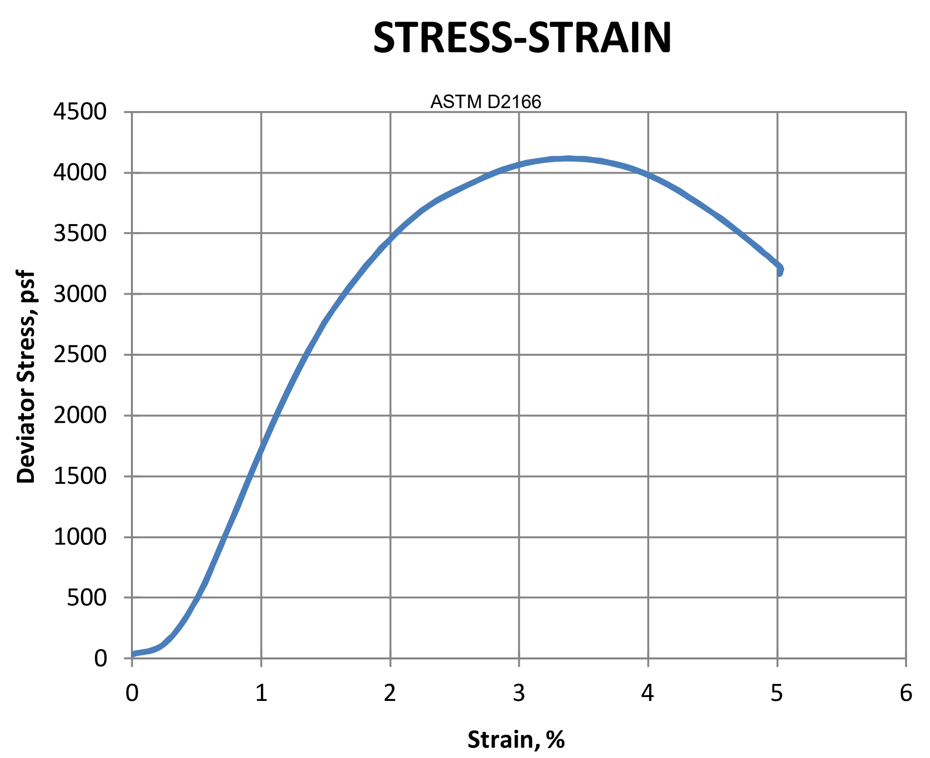
Failure Photo

Sample Description	
Sample ID	B4
Sample Depth (feet)	10.00
Material Description	Dark yellowish brown Sandy lean CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	4.84
Diameter (inch) average of 3	2.41
Moisture Content (%)	13.4
Dry Density (pcf)	115.6
Estimated Specific Gravity	2.7
Saturation (%)	78.9
Shear Test Conditions	
Strain Rate (%/min)	0.9948
Major Principal Stress at Failure (psf)	7940
Strain at Failure (%)	4.5
Test Results	
Unconfined Compressive Strength (tons/ft^2)	4.0
Unconfined Compressive Strength (lbs/ft^2)	7936
Unconfined Compressive Strength (psi)	55
Shear Strength (tons/ft^2)	2.0
Shear Strength (lbs/ft^2)	3968

GEOCON CONSULTANTS, INC.
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Unconfined Compressive Strength (ASTM D2166)

Project: Gularte #4743
Location:
Number: S1739-05-01
Figure:



Failure Photo

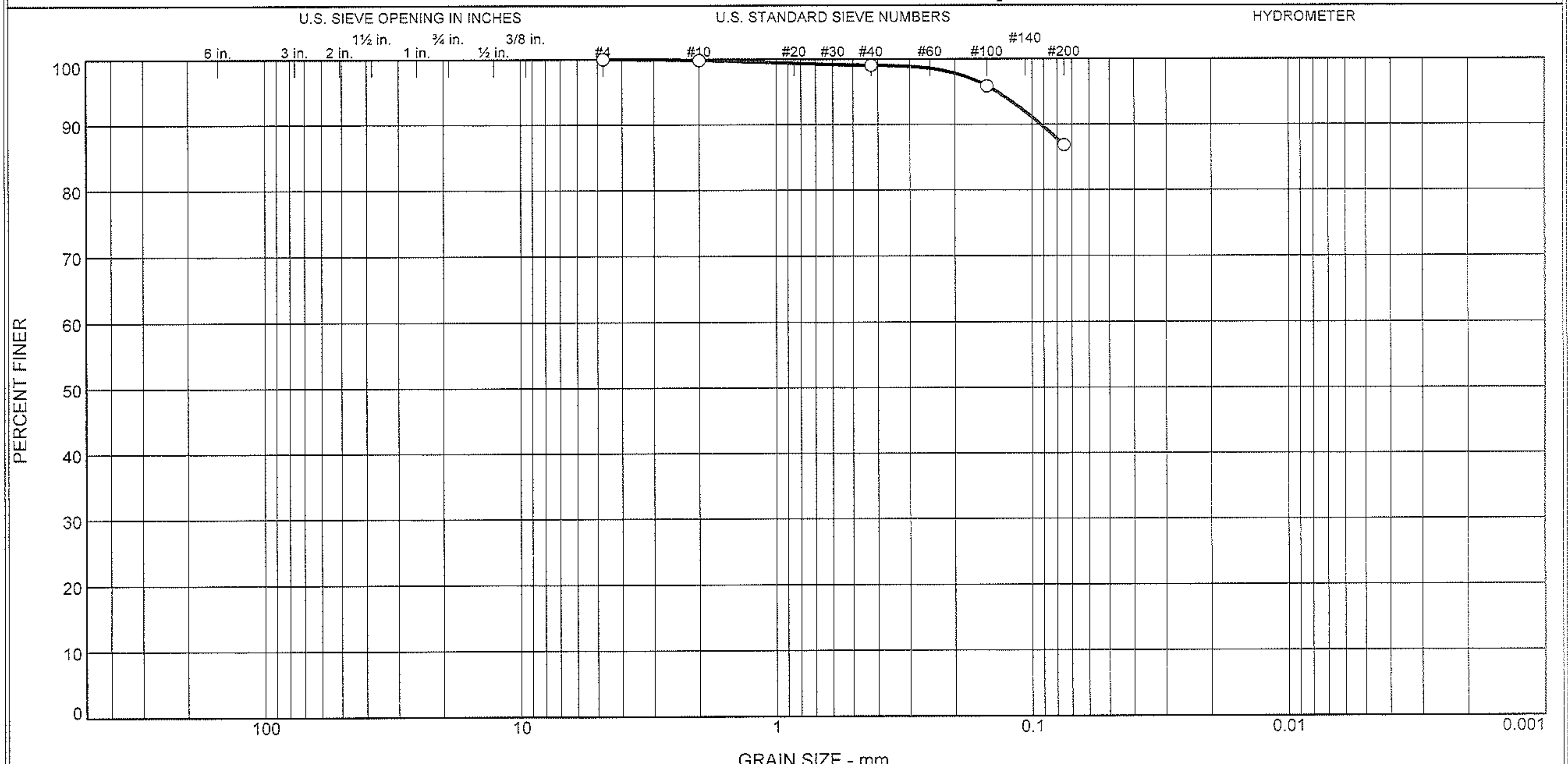
Sample Description	
Sample ID	B7
Sample Depth (feet)	2.50
Material Description	Dark Brown Lean CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	4.83
Diameter (inch) average of 3	2.41
Moisture Content (%)	19.0
Dry Density (pcf)	104.5
Estimated Specific Gravity	2.7
Saturation (%)	83.6
Shear Test Conditions	
Strain Rate (%/min)	0.9967
Major Principal Stress at Failure (psf)	4110
Strain at Failure (%)	3.5
Test Results	
Unconfined Compressive Strength (tons/ft^2)	2.1
Unconfined Compressive Strength (lbs/ft^2)	4112
Unconfined Compressive Strength (psi)	29
Shear Strength (tons/ft^2)	1.0
Shear Strength (lbs/ft^2)	2056

GEOCON CONSULTANTS, INC.
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Unconfined Compressive Strength (ASTM D2166)

Project: Gularte #4743
Location:
Number: S1739-05-01
Figure:

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	0.0	0.2	0.8	12.1	86.9

Identification	Date Sampled	Date Received	Date Tested
Location: B1 Depth: 5' Sample Number: 1	10/15/20	10/19/20	11/3/20

Client Duke Realty

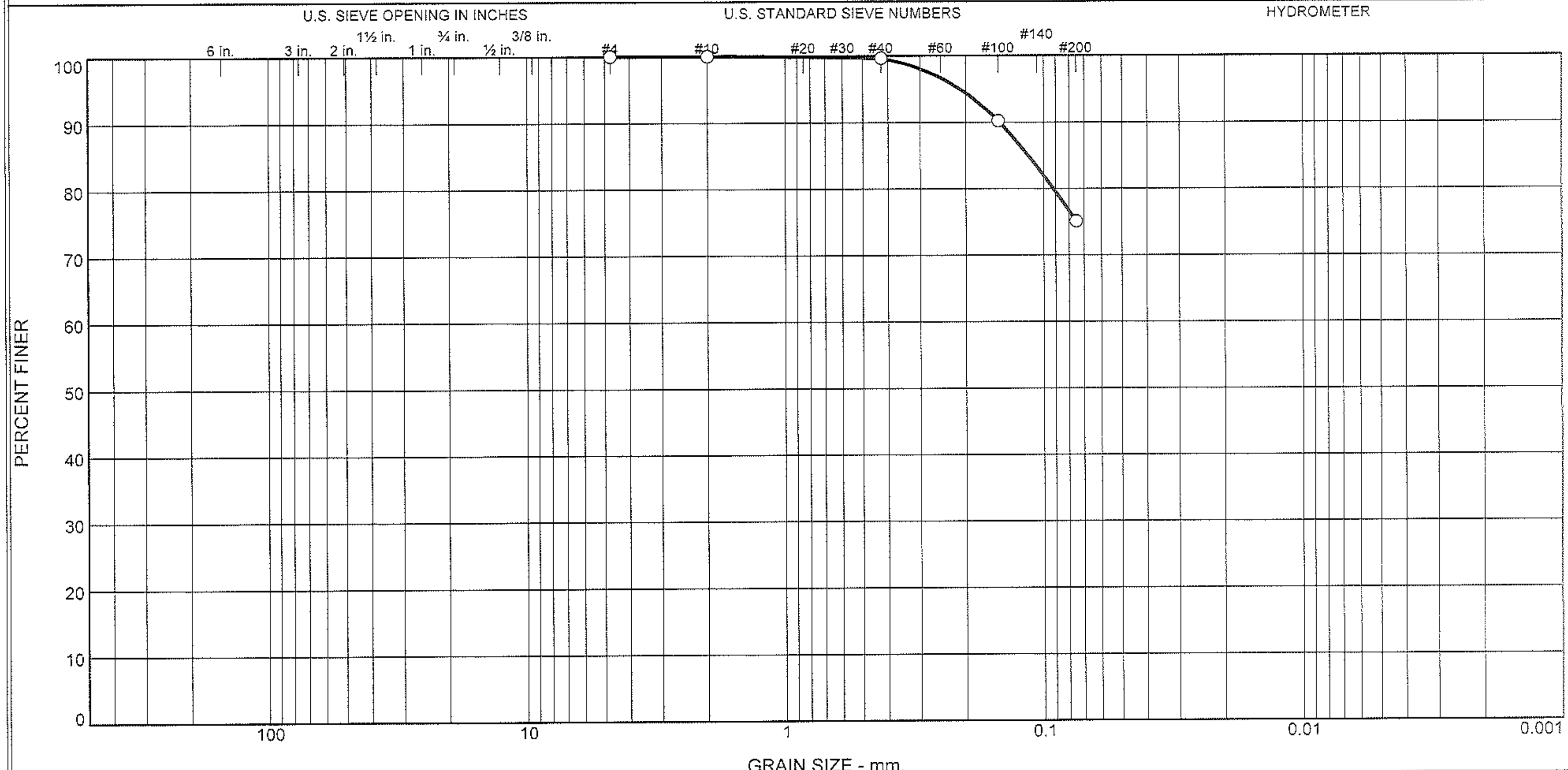
Project Rue Ferrari

Project No. 4743 Figure

GULARTE & ASSOCIATES, INC. Rocklin, CA

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	0.0	0.0	0.4	24.5	75.1

Identification	Date Sampled	Date Received	Date Tested
Location: B1 Depth: 35' Sample Number: 2	10/15/20	10/19/20	11/3/20

Client Duke Realty

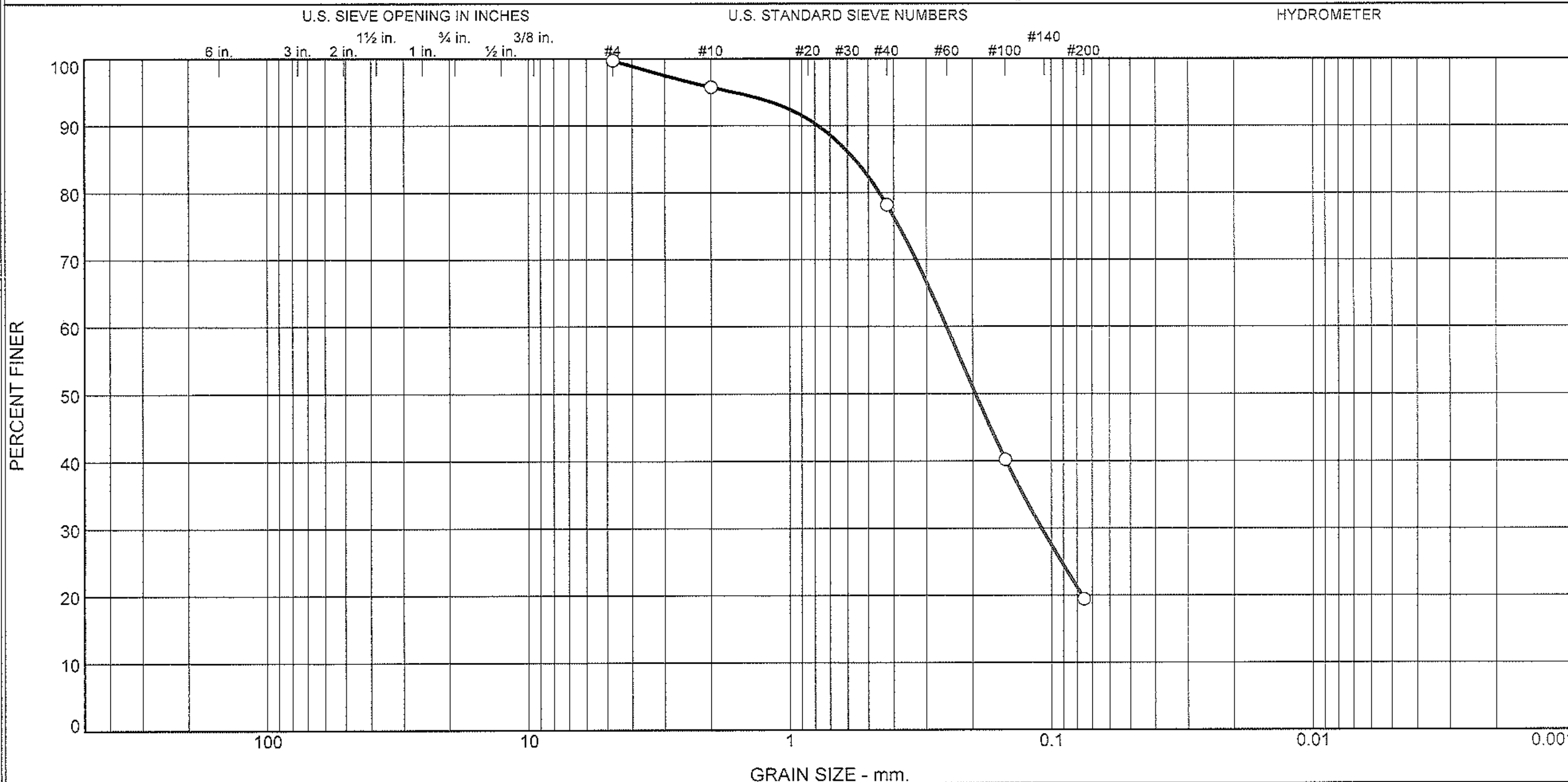
Project Rue Ferrari

Project No. 4743 Figure

GULARTE & ASSOCIATES, INC. Rocklin, CA

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○				4.0	17.5	58.7	19.5

Identification	Date Sampled	Date Received	Date Tested
Location: B2 Depth: 40' Sample Number: 3	10/15/20	10/19/20	11/3/20

Client Duke Realty

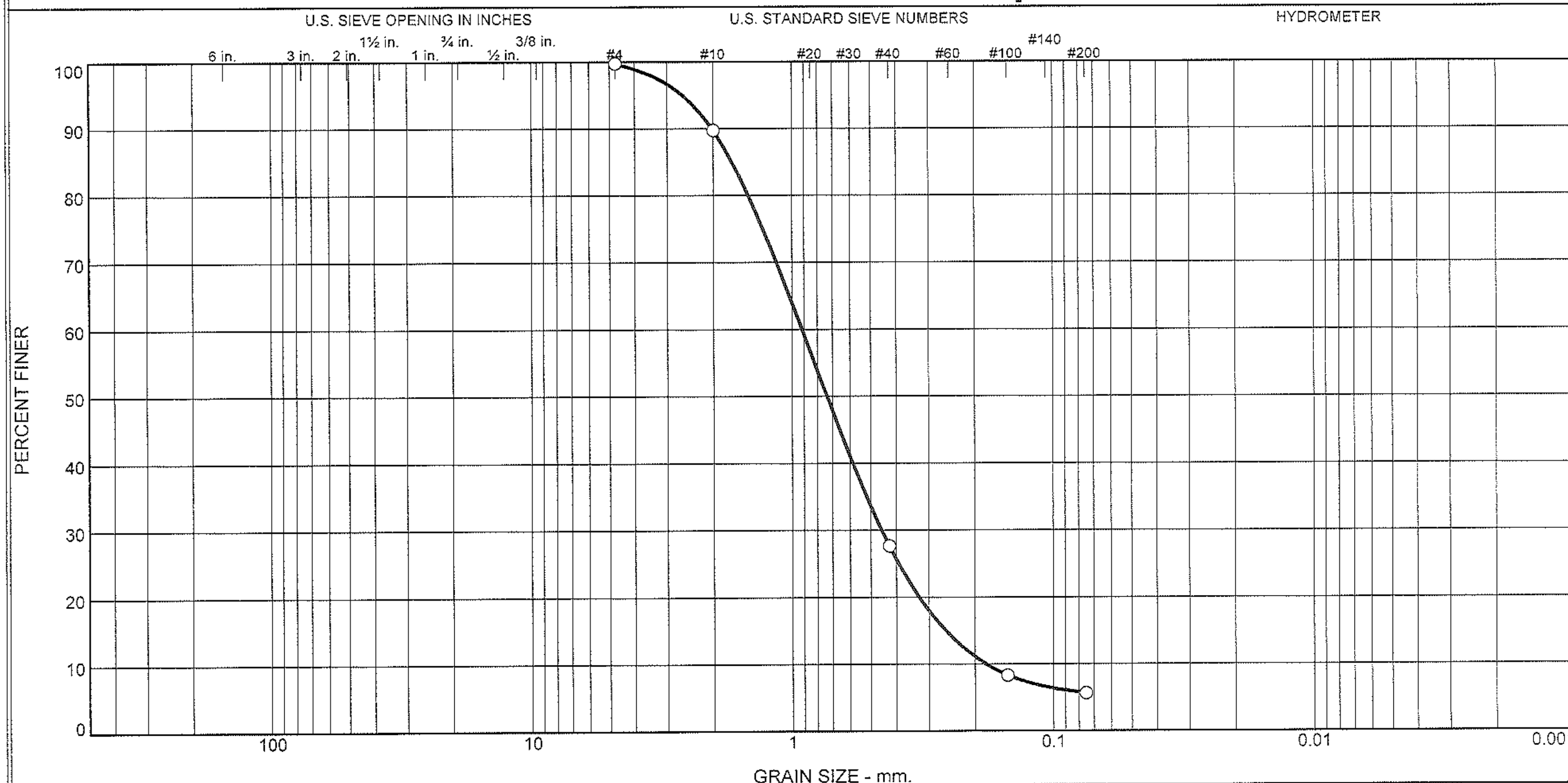
Project Rue Ferrari

Project No. 4743 Figure

GULARTE & ASSOCIATES, INC. Rocklin, CA

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○				10.1	62.0	22.0	5.7

Identification	Date Sampled	Date Received	Date Tested
Location: B2 Depth: 50' Sample Number: 4	10/15/20	10/19/20	11/3/20

Client Duke Realty

Project Rue Ferrari

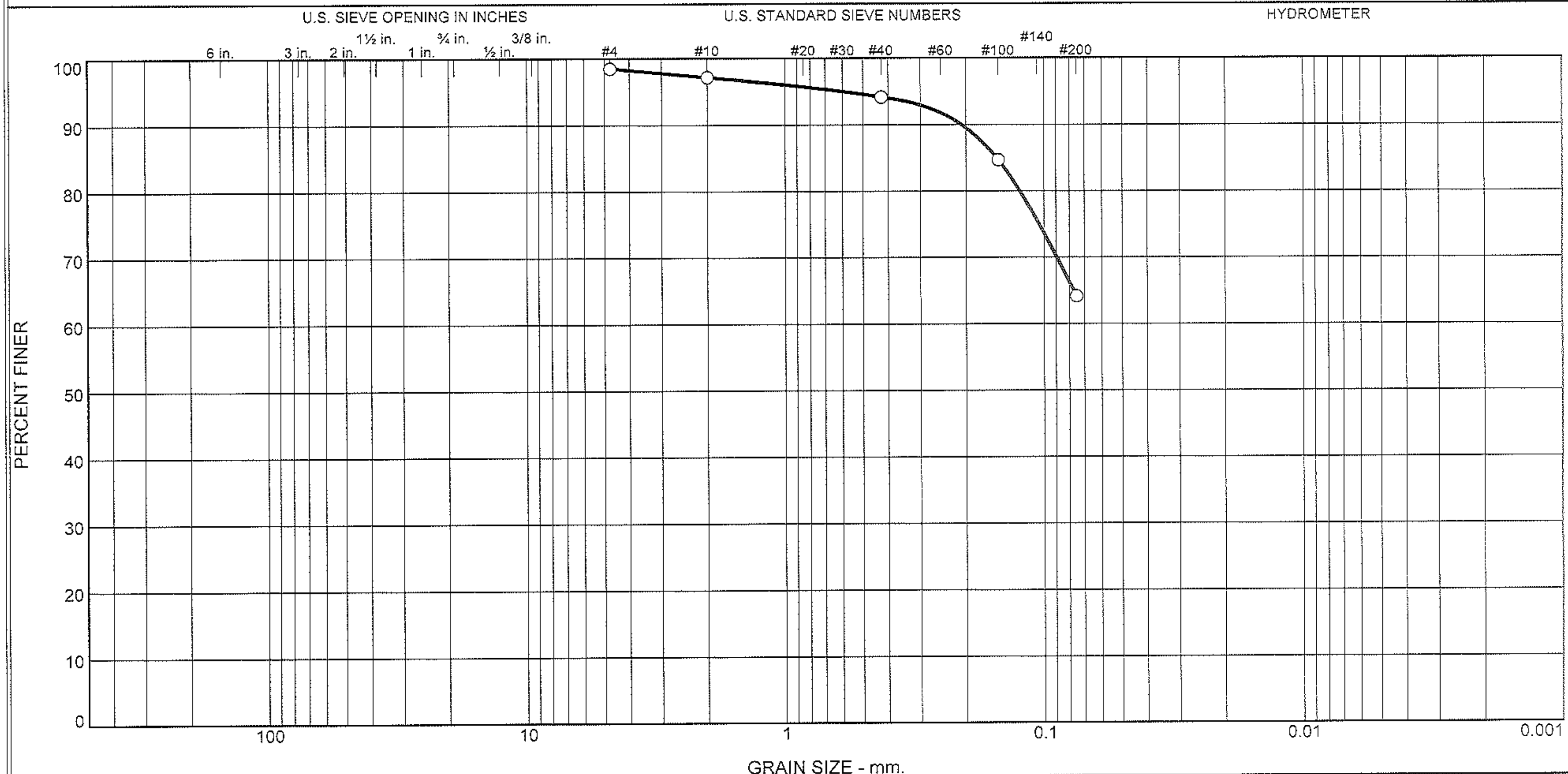
Project No. 4743

Figure

GULARTE & ASSOCIATES, INC. Rocklin, CA

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○				1.4	2.9	30.0	64.2

Identification	Date Sampled	Date Received	Date Tested
Location: B7 Depth: 15' Sample Number: 5	10/24/20	10/26/20	11/3/20

Client Duke Realty

Project Rue Ferrari

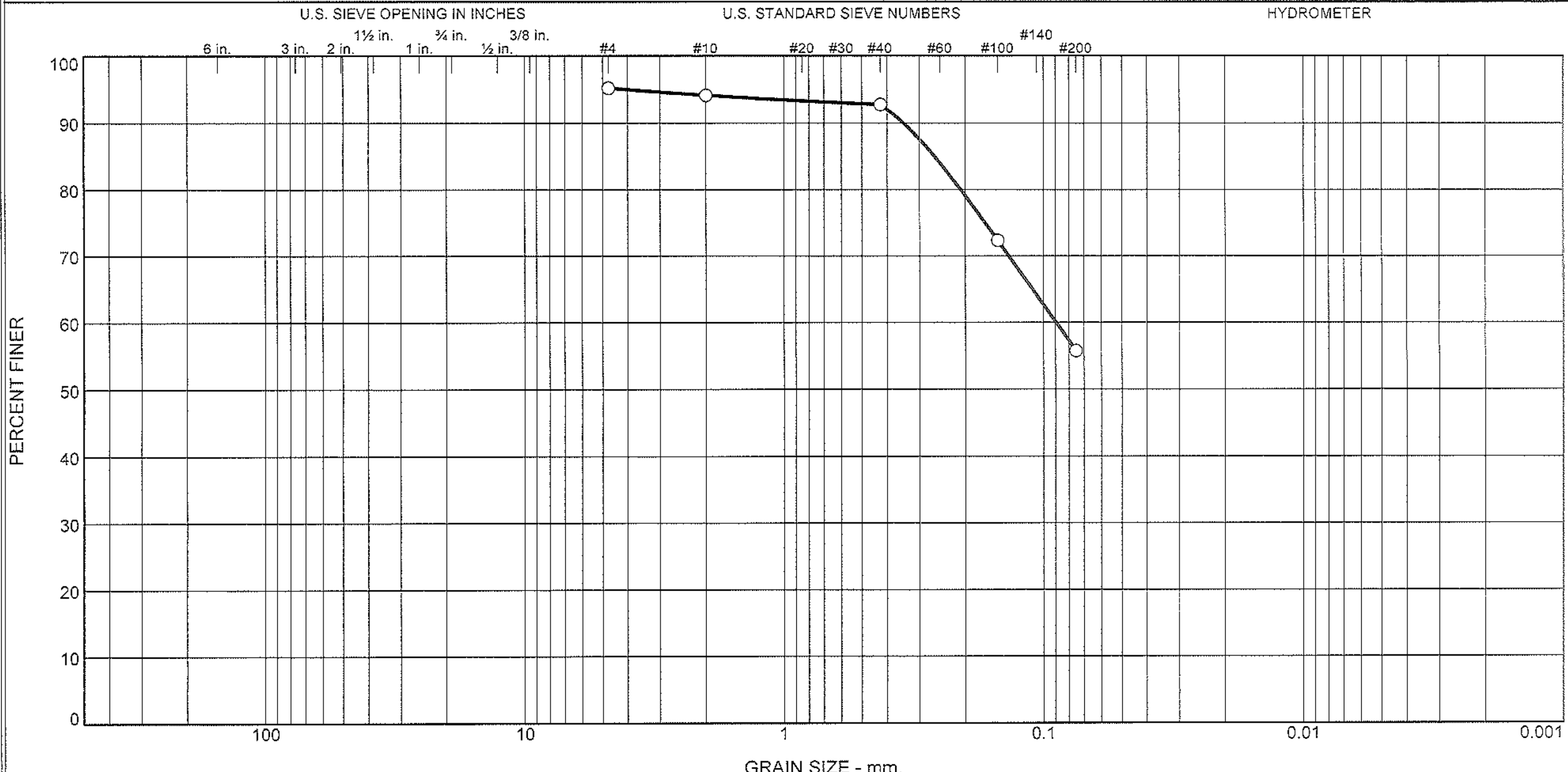
Project No. 4743

Figure

GULARTE & ASSOCIATES, INC.
Rocklin, CA

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
O				1.0	1.4	37.0	55.8

Identification	Date Sampled	Date Received	Date Tested
Location: B3 Depth: 25' Sample Number: 6	10/16/20	10/19/20	11/3/20

Client Duke Realty

Project Rue Ferrari

Project No. 4743 Figure

GULARTE & ASSOCIATES, INC. Rocklin, CA

Tested By: BH

Percolation Test Results

Boring: P-1
Date: 10/15/2020
Job # 4743
Job Name RUE FERRARI

Presoak

Borehole Diameter (in.)	Total Boring Depth (ft.)	Initial Water Depth, d_i (min.)	Drop, Δd (in.)	Time Start / End	Δ Time (min.)
6	4.75	6	2	7:05 AM / 7:35 AM	30

Percolation Test

Borehole Diameter, D (in.)	Total Boring Depth (ft.)	Initial Water Depth, d_i (in.)	Drop, Δd (in.)	Time Start / End	Δ Time, Δt (min.)	Percolation Rate (in/hr)	Reduction Factor	Adjusted Percolation Rate (in/hr)
6	4.75	6	1.75	7:35 AM / 8:05 AM	30	3.50	2.71	1.29
6	4.75	6	1	8:17 AM / 8:47 AM	30	2.00	2.83	0.71
6	4.75	6	1	8:49 AM / 9:19 AM	30	2.00	2.83	0.71
6	4.75	6	0.5	9:21 AM / 9:51 AM	30	1.00	2.92	0.34
6	4.75	6	0.5	9:52 AM / 10:22 AM	30	1.00	2.92	0.34

Percolation Rate = $60/\Delta t * \Delta d$

Reduction Factor = $(2 * d_i - \Delta d)/D + 1$

Percolation Test Results

Boring: P-2
Date: 10/15/2020
Job # 4743
Job Name RUE FERRARI

Presoak

Borehole Diameter (in.)	Total Boring Depth (ft.)	Initial Water Depth, d_i (min.)	Drop, Δd (in.)	Time Start / End	Δ Time (min.)
6	5	6	2.5	12:14 12:44	30

Percolation Test

Borehole Diameter, D (in.)	Total Boring Depth (ft.)	Initial Water Depth, d_i (in.)	Drop, Δd (in.)	Time Start / End	Δ Time, Δt (min.)	Percolation Rate (in/hr)	Reduction Factor	Adjusted Percolation Rate (in/hr)
6	5	60	1.5	12:47 PM 1:07 PM	30	3.00	20.75	0.14
6	5	60	1.25	1:07 PM 1:37 PM	30	2.50	20.79	0.12
6	5	60	0.5	1:37 PM 2:07 PM	30	1.00	20.92	0.05
6	5	60	0.5	2:07 PM 2:37 PM	30	1.00	20.92	0.05
6	5	60	0.5	2:37 PM 3:07 PM	30	1.00	20.92	0.05

Percolation Rate = $60/\Delta t * \Delta d$

Reduction Factor = $(2 * d_i - \Delta d)/D + 1$

APPENDIX C

Liquefaction Spreadsheet

Project Name: Rue Ferrari San Jose
Project No.: 4743
Date: November 9, 2020

BLOW COUNT DATA REDUCTION & Liquefaction Calculations

Sample Number	Soil Classif. (USCS)	SPT N Value	depth (ft)	hammer efficiency Em	borehole dia. corr. Cb	sampler corr. Cs	rod length correction Cr	depth correction Cn	effective stress sig'v(psf)	Total Stress sig v(psf)	depth corrected N'60	stress reduction coeff r(d)	cyclic stress ratio CSR(M,sig'v)	**Percent fines**	fines corrected N'1(60)	CRR 7.5	MSF	CRR Site	FS	**Notes**
B7-15	ML	28	15	0.9	1.05	1.20	0.80	1.03	1875	1875	44	0.95	0.34	**64**	**71**	**0.52**	**1.60**	**0.83**	**2.47**	
B3-25	CL	19	25	0.9	1.05	1.20	1.00	0.82	2850	3125	30	0.89	0.34	**56**	**47**	**0.29**	**1.60**	**0.46**	**1.33**	
B1-35	CL	15	35	0.9	1.05	1.20	1.00	0.72	3550	4375	20	0.85	0.37	**75**	**39**	**0.11**	**1.60**	**0.18**	**0.48**	
B2-40	SM	40	40	0.9	1.05	1.20	1.00	0.68	3900	5000	51	0.82	0.37	**20**	**59**	**0.41**	**1.60**	**0.66**	**1.77**	
B2-45	SW	36	45	0.9	1.05	1.20	1.00	0.64	4250	5625	44	0.78	0.36	**9**	**45**	**0.25**	**1.60**	**0.40**	**1.11**	
B2-50	SW	41	50	0.9	1.05	1.20	1.00	0.61	4600	6250	47	0.75	0.36	**6**	**47**	**0.29**	**1.60**	**0.46**	**1.27**	

Groundwater Elevation	20	Historical High GW
Unit Weight above GW	125	Based on Moisture Density Tests
Unit Weight below GW	70	Based on Moisture Density Tests
PGA	0.54	Per Geo Report
Mw	6.4	Per Geo Report
Borehole Diameter	6	inches

** We used SPT corrections for energy, borehole, sampler, rod length, and overburden per Implementation of SP117
*** We used an SPT fines correction per January 5, 1996 NCEER Workshop

APPENDIX D

Geotechnical Terms/Definitions

Referenced Geotechnical Terms

ASTM: **A**merican **S**ociety for **T**esting and **M**aterials is one of the largest voluntary standards development systems in the world. Soils and materials tests are described in detail in their annual books of standards.

Bench: A relatively level step, excavated into acceptable material of a slope face, against which fill is to be placed. Its purpose is to provide a firm and stable contact between the existing material and the new fill to be placed.

Buttress: An engineered fill designed and built to support or retain a weak or unstable Slope.

Compaction: The densification of soil through mechanical manipulation (tamping, rolling, vibrating, etc.). The addition of optimum amounts of water can be crucial to obtaining adequate densification of the material.

Cut: The depth to which a material is to be removed/excavated to reach final grade elevation.

Consolidation: The gradual reduction in volume of a soil mass due to an increase in compressive stress (load).

Daylight Line: The surface contact of *cut* and *fill* soil.

Density Test: A field test used to determine compaction of a fill or native soil. The test is typically performed by the nuclear gauge method.

Expansive Soil: A soil (usually clayey) that increases in volume when water is added (expands), and shrinks when water content is reduced.

Geotechnical: Pertaining to the practical applications of soil science and civil Engineering.

Geotextile Fabric: A permeable fabric used during grading to stabilize, allow for drainage, filtration, or add reinforcement beneath a pavement or structure.

Maximum Density Test: ("curve", "max"," or "proctor") A laboratory test used to determine the optimum moisture and maximum dry density of a soil type (typically ASTM standard test method D 1557).

Native Soil (Natural Ground, NG): (1) Soil deposited by the forces of nature through weathering, erosion, etc.; soil that has not been moved by man. (2) The undisturbed surface prior to the commencement of grading, sometimes referred to as Original Ground (OG).

Nesting: Oversized material (typically >6" size) that has been placed in a manner that leaves voids between the piled boulder or rock fragments, and these voids are not infilled with solid material (soil, fine gravel/sand, etc). The <u>absence</u> of nesting rock is required in a *rock fill*.

NICET: National **I**nstitute for **C**ertification in **E**ngineering **T**echnologies. Engineering technicians that are tested by NICET may be certified at various levels of expertise (Levels I through IV) in different fields of construction.

Optimum Moisture: The moisture content at which the maximum density of a soil can be achieved during the compaction process. Each soil type (or blend of soil types) has its own specific optimum moisture content that is used as a guide for moisture conditioning during the grading process.

Over-excavation: The removal of the upper portion of soil on site. Usually performed under roadways or building pads and combined with replacement of structural fill

Pass: One trip or movement across a designated area by a piece of compaction equipment or machinery.

Percent Compaction: The ratio (expressed as a percentage) of the dry density of a soil (as determined by the nuclear gauge) to the maximum density of a soil (as determined by the maximum density test).

Pre-Saturation: The moisture conditioning (above optimum) of a pad subgrade or footing excavation prior to placing/pouring a foundation. Pre-saturation is usually performed on expansive soils to help limit future swelling that may be caused by seasonal rains or heavy landscape watering.

Pumping: May be observed as a rolling motion in soils compacted in an over-optimum condition (too wet). These pumping soils may, during the rolling process, become rutted or indented by rubber-tired equipment, usually leaving a bulging path in the soil parallel to the tire print.

Relative Compaction: A means of comparing the dry soil density in the field to the laboratory compaction curve. It equals the field dry density divided by the lab max dry density, and then is multiplied by 100 and expressed as a percentage.

Rock Fill: "Oversized material" (typically 6" or larger diameter) mixed/compacted during placement with a soil matrix in such a manner as to limit voids and nesting, allowing for a homogeneous, well-compacted fill.

Scarify (Rip): The act of loosening the exposed surface material (usually the upper 8-12 inches by ripper teeth on a dozer or blade) to mix, blend, moisten, or prepare for fill placement.

Structural Fill: Fill that is supporting manmade structures, including buildings, roadways, levees, and slopes. Structural Fill is typically compacted to 90 percent relative compaction.

Subdrain: A drainage system placed beneath the surface to drain surface water, or relieve hydrostatic pressure (such as water buildup behind a fill slope). It typically consists of filter material (rock and/or fabric) and a perforated drainpipe.

Toe: The contact point of the bottom of a fill or cut slope with a relatively level or pre-existing ground surface.

Transition Lot: A lot which a portion is to be cut (excavated) and a portion is to be filled (raised) to reach pad grade.

Unified Soil Classification System (USCS): A system used by soil engineers to classify soil for engineering purposes. A kind of a shorthand for describing soil types.