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SUPPLEMENTAL GEOTECHNICAL INVESTIGATION 5030 COLLEGE AVENUE SAN DIEGO, CALIFORNIA

PREPARED FOR:

CAPSTONE DEVELOPMENT PARTNERS
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PREPARED BY:

SOUTHERN CALIFORNIA SOIL AND TESTING, INC.
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Providing Professional Engineering Services Since 1959

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February 26, 2015

SCST No. 140568N
Report No. 2

Mr. Craig Brown
Vice President of Construction Management
Capstone Development Partners
162 Rancho Santa Fe Road, Suite B-80
Encinitas, California 92024

Subject: SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
5030 COLLEGE AVENUE
SAN DIEGO, CALIFORNIA

Reference: *Geotechnical Investigation, 5030 College Avenue, San Diego, California,* dated September 19, 2008, prepared by Southern California Soil & Testing, Inc. (SCST Report No. 0811164-1).

Dear Mr. Brown:

This letter transmits Southern California Soil and Testing, Inc.'s (SCST) report describing the supplemental geotechnical investigation performed for the subject site. This investigation was conducted in general conformance with the scope of work presented in SCST's proposal dated January 5, 2015. If you have any questions concerning this report please call us at (619) 280-4321.

Respectfully Submitted,
SOUTHERN CALIFORNIA SOIL AND TESTING, INC.

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(1) Addressee via email

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EXECUTIVE SUMMARY

This report presents the results of our supplemental geotechnical investigation for the project located at 5030 College Avenue in the city of San Diego, California. We conducted a geotechnical investigation at the site in 2008, and the geotechnical report summarizing our conclusions and recommendations is referenced above. We have reviewed the project development plans since that initial report was published. Currently, the project will consist of the design and construction of a 4-story apartment complex over 1 or 2 levels of underground parking with a finish floor of approximately 416 feet above sea level (msl). To accomplish the cuts required for this construction, temporary shoring will be needed. Additionally, temporary soil nail walls have been considered as shoring. To analyze these proposed cuts, we performed a supplemental investigation.

Four supplemental exploratory borings were drilled to depths of between 30 and 51 feet with a truck mounted drill rig equipped with a hollow stem auger. Additionally, 1 test pit was excavated using hand tools. Selected samples from the borings and test pit were tested to evaluate pertinent classification and engineering properties and enable development of geotechnical conclusions and recommendations.

Materials encountered in the subsurface explorations consisted of fill over formational material commonly identified as the Mission Valley Formation. The formational material generally consists of medium dense to very dense silty sandstone. The fill generally extends between 3 and 5 feet below the existing grade with some areas as much as 22 feet. The fill is comprised of loose to medium dense silty and clayey sand and sandy clay with some cobble, debris, trash and gravel lenses. Additionally, trash was observed in the fill.

We understand that the proposed excavation will extend up to a depth of approximately 30 feet below the existing grade along the northern, southern, and eastern property line and then daylight to the west. We analyzed a representative cut slope for local and global stability. The results of the stability analysis indicates that the cut slope in its proposed configuration does not have an adequate factor of safety for temporary conditions. Temporary shoring will be required for construction of the subterranean parking. However, the analysis indicates that once properly shored, the cut does not exhibit adverse global stability.

Finally, competent formational material will generally be exposed at the bottom of the planned excavation elevations, except for the western portion of the pad where fill is present. To support the structure on spread footings, we recommend that the western portion of the pad and portions underlain by fill or weathered formation be over-excavated and replaced with cement-treated fill materials in order to reduce the potential for differential settlement.

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our supplemental geotechnical investigation for the project located at 5030 College Avenue in the city of San Diego, California (Figure 1). We understand that the project will consist of the design and construction of a 4-story apartment complex over 1 or 2 levels of underground parking. The purpose of this report is to provide supplemental conclusions and recommendations regarding the geotechnical aspects of the project beyond those presented in our previous geotechnical report (2008).

1.2 SCOPE OF WORK

1.2.1 Field Exploration

Subsurface conditions were further explored by drilling 4 borings to depths of between 30 and 51 feet with a truck mounted drill rig equipped with a hollow stem auger (borings B-4 through B-7) and excavating 1 test pit using hand tools (TP-1). Our previous subsurface exploration consisted of 3 exploratory borings and 5 test trenches. The locations of the subsurface explorations are shown on Figure 2. A SCST engineer logged the explorations and obtained samples for examination and laboratory testing. The logs of the explorations are in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1.

1.2.2 Laboratory Testing

The supplemental laboratory program consisted of tests for in-situ moisture content and dry density, grain size distribution and shear strength. The results of the laboratory tests, and brief explanations of test procedures, are in Appendix II.

1.2.3 Analysis and Report

The results of the field and laboratory tests were evaluated to develop supplemental conclusions and recommendations regarding:

1. Subsurface conditions beneath and adjacent to the new proposed structure.
2. Update geologic and seismic hazards that could have an impact on the project.
3. Slope stability analysis.
4. Site preparation and grading to prepare the site for spread footings for the building.
5. Alternative types of temporary shoring for the excavation with geotechnical engineering criteria for design.

2. FINDINGS

2.1 SITE DESCRIPTION

The site is bounded by residential property on the north, south and west and College Avenue on the east. Vegetation on-site consists of grasses, shrubs and trees. Topographically, the ground surface descends to the west with slopes along the northern and southern property lines that descend towards the middle of the site. The total elevation difference from east to west is about 30 feet. A storm drain is located in the middle of the site that extends from the eastern property line to the western property line. An abandoned sewer line crosses the mid portion of the property from north to south.

2.2 SUBSURFACE CONDITIONS

Fill and formational material underlie the subject site. Geologic cross-sections are included on Figures 3 and 4.

Fill: Fill comprised of loose, clayey sand and sandy clay with gravel and cobble was encountered in all of the supplemental borings and test pits. Fill material generally extends between 3 and 8 feet below the existing ground surface. Deeper fill encountered in the trenches and borings are likely related to in-place subsurface utilities. The fill is underlain by formational material.

Formational Material: Tertiary-age formational material commonly identified as the Mission Valley Formation is the bedrock unit underlying the undocumented fill. This material is comprised of silty sandstone that is medium to very dense in-place. The upper approximate 10 feet is considered weathered with root debris resulting in loose pockets. A layer of moderately indurated claystone was encountered at a depth of approximately 40 feet below existing grade in boring B-6.

Based on our explorations, no adverse geologic features were encountered, except for the claystone layer. The claystone layer encountered in boring B-6 was considered in our slope stability analysis. Cross-sections are presented on Figures 3 and 4.

2.3 GROUNDWATER

Groundwater was not encountered in the borings or trenches. However, groundwater levels can fluctuate following periods of precipitation or irrigation. It is likely that water will become perched on the relatively impermeable formational material following heavy rains or irrigation.

2.4 SLOPE STABILITY EVALUATION

Slope stability analyses were performed on Cross-Section D-D', shown on Figure 4 using the commercially available software SLIDE6 (RocScience, 2014). The temporary cut slope profile was developed based on input from the project shoring engineer. This cut slope is proposed to be inclined for approximately 16 feet high at a 1:1 (horizontal:vertical) inclination from the southern property line and then transition to a vertical cut 19 feet in height to the bottom of the proposed excavation. Based on borings and the test pit advanced in this portion of the site, approximately 7 feet of fill is expected be exposed in the upper portion of this cut slope. The remainder of the cut slope will expose formational material. Shear strength parameters for the fill and formational materials were developed from SPT blow count correlations and results of direct shear tests and sieve analyses performed on material obtained during the investigation. We analyzed a representative cut slope for local and global stability. The results of the stability analyses indicate that the cut slope in its proposed configuration does not have an adequate factor of safety for temporary conditions. However, the effect of the adverse geologic feature encountered in boring B-6 is considered negligible. Slope stability figures are presented in Appendix III. The following table presents a summary of stability analyses performed along with the resulting Factor of Safety.

Slope Stability Summary Table

ANALYSIS CONDITION	CALCULATED FACTOR OF SAFETY
Local – Figure III-1	0.5
Global – Figure III-2	2.4

3. CONCLUSIONS

The project will consist of student housing with subterranean parking approximately 30 feet high. We analyzed a representative cut slope for local and global stability. The results of the stability analysis indicates that the cut slope in its proposed configuration does not have an adequate factor of safety for temporary conditions. Temporary shoring will be required for construction of the subterranean parking. However, the analysis indicates that once properly shored, the cut does not exhibit adverse global stability. Competent formational material will generally be exposed at the bottom of the planned excavation elevations, except for the western portion of the pad where fill is present. To support the structure on spread footings, we

recommend that the western portion of the pad and portions underlain by fill or weathered formation be overexcavated and replaced with cement-treated fill materials in order to reduce the potential for differential settlement. Otherwise, the foundation and grading recommendations in the referenced report (2008) are considered applicable to the proposed improvements. Where updates are needed, we have included those herein.

4. RECOMMENDATIONS

4.1 TEMPORARY EXCAVATIONS

Temporary slopes in fill and weathered formational material should not be steeper than 1:1 (horizontal: vertical). Temporary slopes in competent formational material should not be steeper than ½:1 (horizontal: vertical) where less than 20 feet in height. The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the trench.

Slopes steeper than those described above will require shoring. Soldier piles and lagging, sheet piles, internally braced shoring, anchor tie-back walls, or soil nail walls could be used. Recommended earth pressure values for cantilever shoring (soldier piles and lagging and sheet piles without tie-back anchors) and for shoring with multiple levels of bracing (internally braced or tie-back) are shown on Figure 4 in the referenced geotechnical report. Soil parameters for soil nail wall design are presented in the table below. The bond stress used in design should incorporate a safety factor of 2. However, the contractor can select a bond stress different from that provided shown, provided the value can be tested with a verification program before production.

Soil Nail Retaining Wall Design Properties

Material	Unit Weight (pcf)	Angle of Internal Friction (degrees)	Apparent Cohesion (psf)	Ultimate Bond Stress (psi)
Fill	115	27	150	5
Formation	125	35	180	20

Excavated materials should not be stockpiled behind temporary shoring within a distance equal to the depth of the excavation. SCST should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. The

surcharge loads on shoring from traffic and construction equipment working adjacent to the trench can be modeled by assuming an additional 2 feet of soil behind the wall.

Survey monuments should be installed at no more than 100-foot intervals around the perimeter of the excavation. One row of monuments should be located just beyond the edge of the top of excavation. A second row should be established 10 feet beyond the excavation, and a third row should be set 20 feet from the top of the excavation. A reference point should be established well away from the block where the excavation will take place. The horizontal and vertical location of each monument should be established with a survey instrument before excavation starts. Readings should be made daily during the initial stages of excavation, say for up to one week. Results of the initial readings will be reviewed by SCST and modifications to the monitoring schedule may be made, depending on these results.

Drainage above temporary shoring should be designed and maintained so that water does not overtop or drain behind the shoring system. The contractor should monitor the drainage conditions above the shoring periodically.

4.2 SOIL-CEMENT TREATMENT OF FILL PAD

The building foundation will span a cut-fill transition. To reduce the potential for adverse differential settlement between the cut portion and the fill portion, a combination of shallow and deep foundations were recommended. In lieu of a combination of foundations, we recommend earthwork be performed to mitigate the cut-fill transition. Because deep shoring is needed on the east end of the pad, over-excavation of the cut portion is not practical. Therefore, we consider removal and replacement of the existing fill materials with soil-cement treated fill to be a feasible option for providing a common foundation for building support. We anticipate removals on the order of 10 feet on the west end of the pad, and less towards the middle of the pad. To produce the soil-cement foundation fills, we recommend the following:

- The unconfined compressive strength of soil-cement should be 75 psi at 7 days.
- Based on the soil encountered in our investigation, a cement application rate of 4% cement by dry unit weight and a soil-cement dry unit weight of 110 pounds per cubic foot (pcf) can be assumed for bidding. The actual percentage of cement should be assessed during grading.
- The soil-cement structural fill should be placed between competent formational material and the bottom of footing elevation. Horizontally, the soil-cement should extend 10 feet outside the footing perimeter.

- Soil-cement should be compacted to 95% of the maximum dry density obtained using ASTM D558, except the test method should be modified such that compaction is performed using a 10-lb rammer dropped from a height of 18 inches. The moisture content should be not less than 1 percent below or not more than 2 percent above optimum.
- The fill between the top and sides of footings and bottom of slab-on-grade can be filled with fill compacted at least 90% of the maximum dry density obtained using ASTM D1557.

We recommend that quality control during construction consist of:

- Maximum Dry Density and Optimum Moisture Content: One test for each material type or change of material.
- In-Place Moisture and Density: One test for each lift or every 2,000 cubic yards of soil-cement mixed and placed.
- Unconfined Compressive Strength: Three soil-cement cylinders for every 2,000 cubic yards of soil-cement mixed and placed. Two cylinders should be tested at 7 days.

4.3 GRADING PLAN REVIEW

The updated grading plans should be submitted to SCST for review to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are necessary due to changes in the development scheme.

5. GEOTECHNICAL ENGINEERING DURING CONSTRUCTION

The geotechnical engineer should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

6. CLOSURE

SCST should be advised of any changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can, occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the

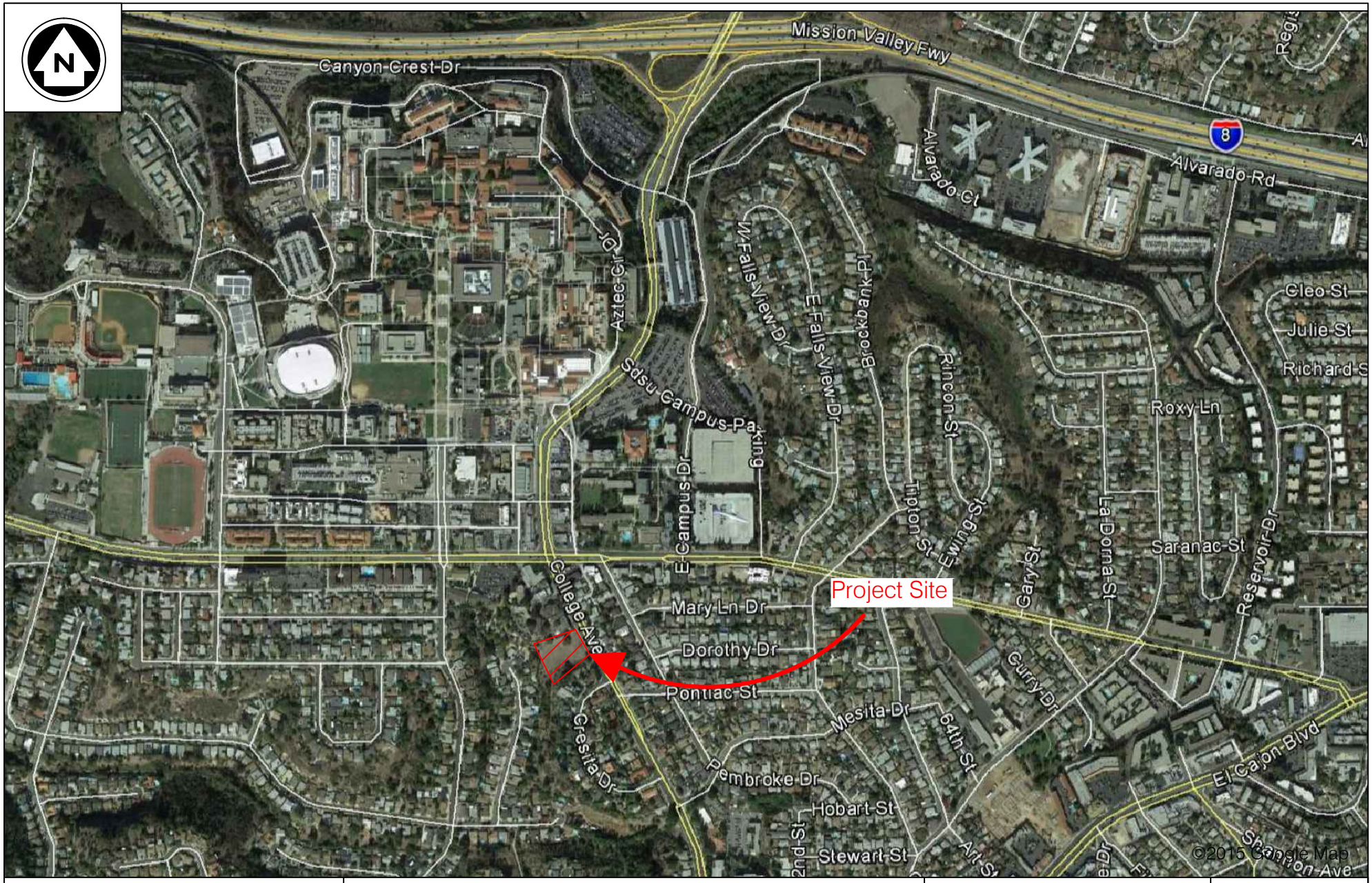
standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations, and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

7. REFERENCES

California Building Code, 2013, Volume 2.

Federal Highway Administration, 2003, "Geotechnical Engineering Circular No. 7, Soil Nail Walls, FHWA0-IF-03-017", dated March.



SOUTHERN CALIFORNIA SOIL & TESTING, INC.

SITE VICINITY MAP
5030 College Avenue

San Diego, California

Date:	February, 2015
By:	JGA
Job No.:	140568N-1
Scale:	NTS

Figure: 1

SCST LEGEND:

B-7 — Approximate Location of Boring (2015)

B-3 — Approximate Location of Boring (2008)

TP-1 — Approximate Location of Test Pit (2015)

T-6 — Approximate Location of Trench (2008)

D D' — Approximate Location of Cross Section

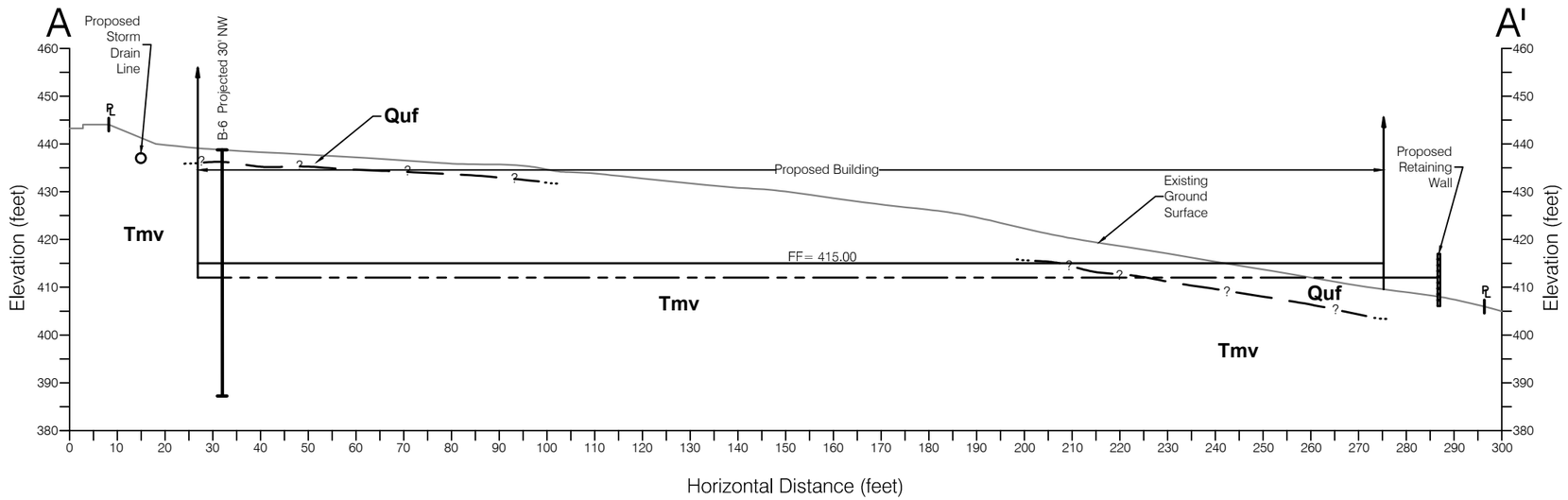
0 30′ 60′

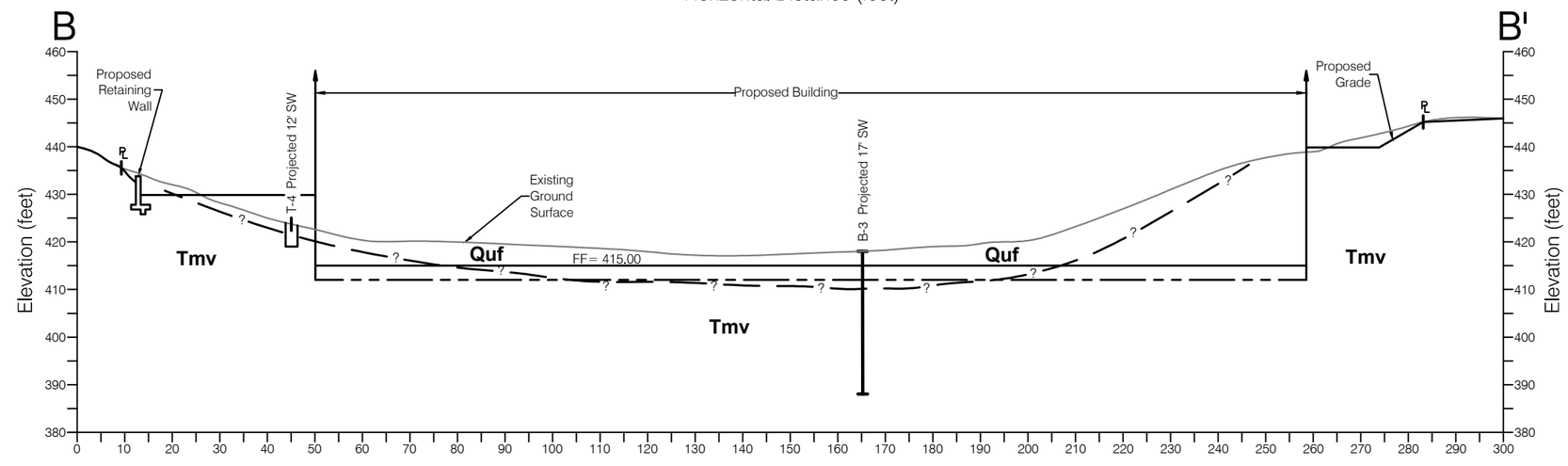
Date: February, 2015
By: JGA
Job No.: 140568N-1

SUBSURFACE EXPLORATION MAP
5030 College Avenue
San Diego, California

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

Figure: 2





SCST LEGEND:

B-6	Approximate Location of Boring	**Quf**	Undocumented Fill
T-4	Approximate Location of Trench	**Tmv**	Mission Valley Formation

Approximate Bottom of Proposed Excavation

Approximate Geologic Contact, Queried Where Uncertain

PL Property Line

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

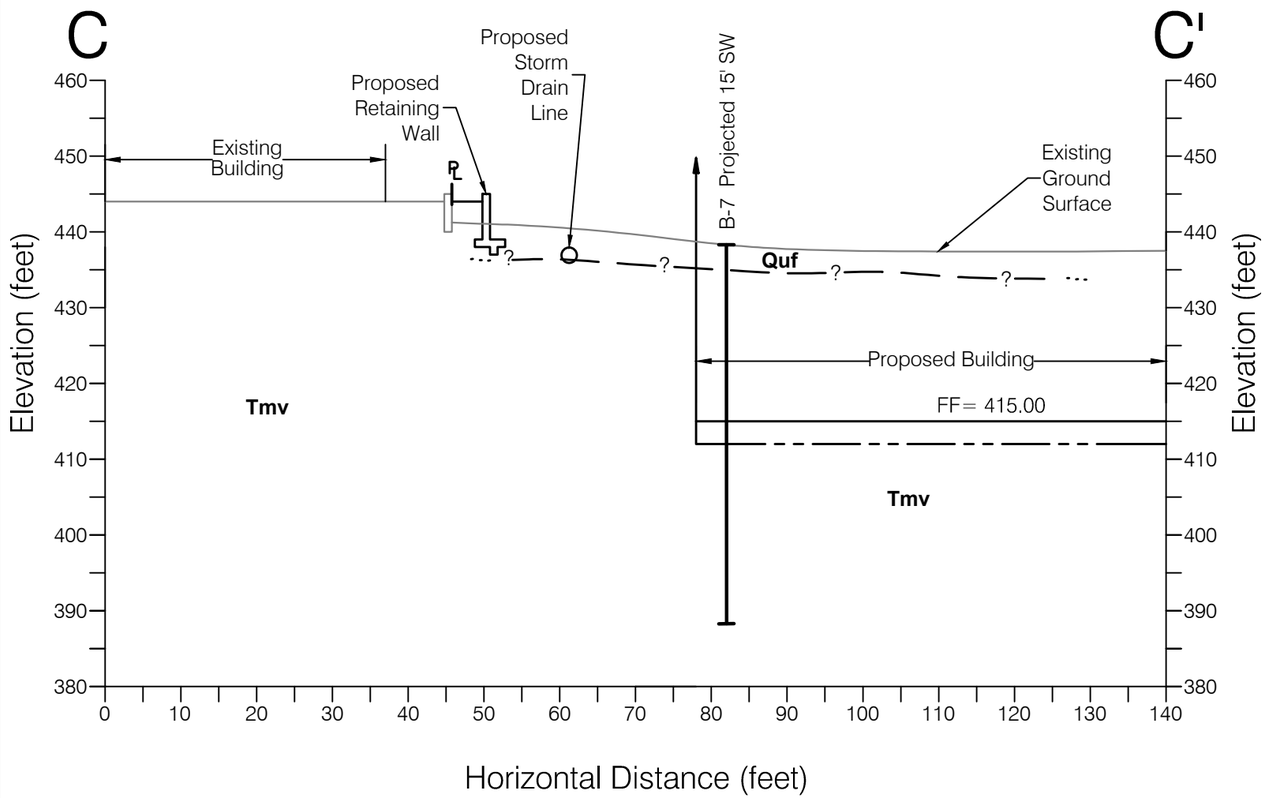
GEOLOGIC CROSS SECTION
5030 College Avenue

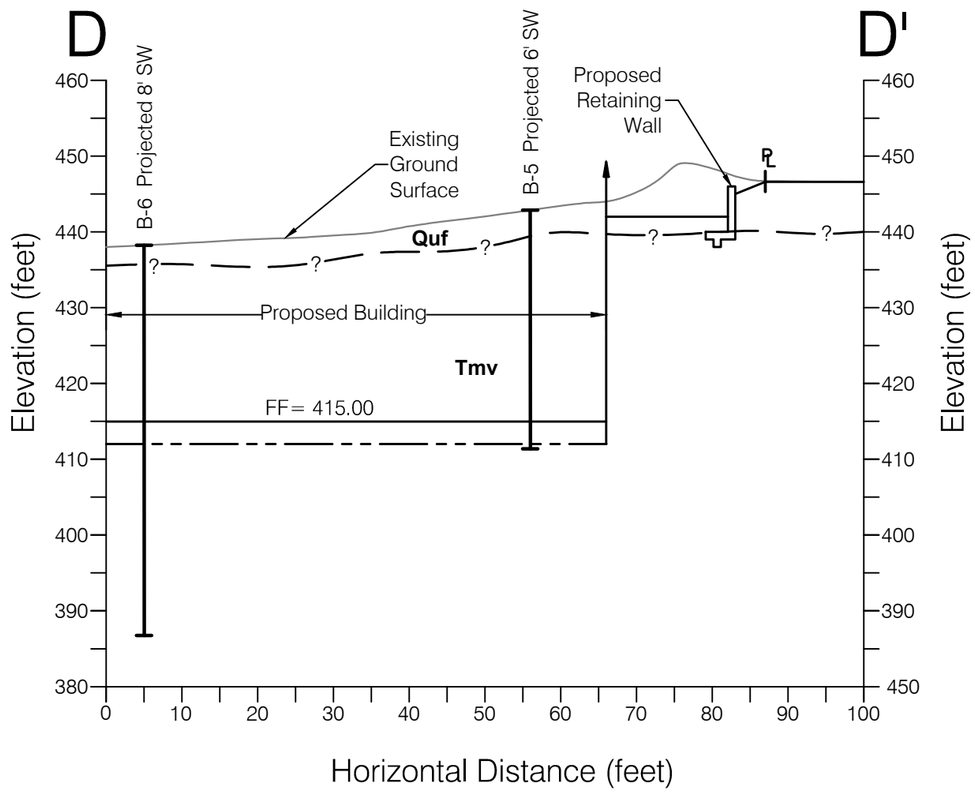
San Diego, California

0 30′ 60′
Scale

Date: February, 2015
By: JGA
Job No.: 140568N-1

Figure: 3





SCST LEGEND:

B-7	Approximate Location of Boring	**Tmv**	Mission Valley Formation		Approximate Bottom of Proposed Excavation
Quf	Undocumented Fill	?~?	Approximate Geologic Contact, Queried Where Uncertain	PL	Property Line

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

GEOLOGIC CROSS SECTIONS
5030 College Avenue

San Diego, California

0 20′ 40′
Scale

Date: February, 2015
By: JGA
Job No.: 140568N-1

Figure: 4

APPENDIX I
FIELD INVESTIGATION

Five exploratory test borings were drilled and 1 test pit were excavated at the locations indicated on Figure 2 on January 28, 2015. The fieldwork was performed under the observation of a registered SCST geologist, who also logged the borings and obtained samples of the materials encountered. Relatively undisturbed samples were obtained with a 2.5-inch inner diameter sampler driven with a 140-pound weight falling 30 inches. Disturbed samples were obtained from drill cuttings and during Standard Penetration Testing. Standard Penetration Tests were performed by driving a 1.4-inch inner diameter sampler with a 140-pound weight falling 30 inches. The number of blows required to drive the sampler the final 12 inches of an 18-inch drive are noted on the borings logs as “Penetration (blows/ft. of drive).”

The test boring and test pit logs are presented on Figures I-2 through I-12. Soils are described in accordance with the Unified Soil Classification System illustrated on Figure I-1.

SUBSURFACE EXPLORATION LEGEND

UNIFIED SOIL CLASSIFICATION CHART

SOIL DESCRIPTION		GROUP SYMBOL	TYPICAL NAMES
I. COARSE GRAINED, more than 50% of material is larger than No. 200 sieve size.			
GRAVELS More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3".	CLEAN GRAVELS	GW	Well graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels, gravel sand mixtures, little or no fines.
	GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
		GC	Clayey gravels, poorly graded gravel-sand, clay mixtures.
SANDS More than half of coarse fraction is smaller than No. 4 sieve size.	CLEAN SANDS	SW	Well graded sand, gravelly sands, little or no fines.
		SP	Poorly graded sands, gravelly sands, little or no fines.
		SM	Silty sands, poorly graded sand and silty mixtures.
		SC	Clayey sands, poorly graded sand and clay mixtures.
II. FINE GRAINED, more than 50% of material is smaller than No. 200 sieve size.			
	SILTS AND CLAYS (Liquid Limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL	Organic silts and organic silty clays or low plasticity.
	SILTS AND CLAYS (Liquid Limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity.
III. HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils.

SAMPLE SYMBOLS

- ☒ - Bulk Sample
- CAL - Modified California sampler
- CK - Undisturbed Chunk sample
- MS - Maximum Size of Particle
- ST - Shelby Tube
- SPT - Standard Penetration Test sampler

GROUNDWATER SYMBOLS

- ▽ - Water level at time of excavation or as indicated
- ≈ - Water seepage at time of excavation or as indicated

LABORATORY TEST SYMBOLS

- AL - Atterberg Limits
- CON - Consolidation
- COR - Corrosivity Tests (Resistivity, pH, Chloride, Sulfate)
- DS - Direct Shear
- EI - Expansion Index
- MAX - Maximum Density
- RV - R-Value
- SA - Sieve Analysis
- UC - Unconfined Compression

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 College Avenue

By:	JGA	Date:	2/18/2015
Job Number:	140568N-1	Figure:	I-1

LOG OF BORING B-4

Date Drilled:	1/28/2015	Logged by:	CTL
Equipment:	Marl M5, 8" Hollow Stem Auger	Project Manager:	ER
Elevation (ft):	434	Depth to Groundwater (ft):	Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
1		**UNDOCUMENTED FILL (Quf)** - CLAYEY SAND, brown, few gravels, cobbles and debris, moist, loose.							
2									
3									
4		becomes silty, dense.	CAL		38				DS
5	SC	**MISSION VALLEY FORMATION (Tmv)** - CLAYEY SANDSTONE, yellowish gray and orange, fine to medium grained, moist, loose to medium dense.							
6			CAL		22				
7									
8									
9									
10		SILTY SANDSTONE, yellowish gray, fine to medium grained, moist, dense to very dense.							
11			CAL		50				
12									
13									
14									
15			CAL		50/5"		8.1	112.6	
16									
17									
18									
19									
20									

BORING LOG CONTINUED ON FIGURE I-3.

LOG OF BORING B-4 (CONTINUED)

Date Drilled: 1/28/2015 | Logged by: CTL

Equipment: Marl M5, 8" Hollow Stem Auger | Project Manager: ER

Elevation (ft): 432 | Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
21		**MISSION VALLEY FORMATION (Tmv)** - CLAYEY SANDSTONE, yellowish gray and orange, fine to medium grained, moist, very dense.	SPT		63				
25			CAL		50/4"		11.8	105.0	
30			CAL		50/4"				
31		**TERMINATE BORING AT 31 FEET.**							

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 College Avenue

By:	JGA	Date:	2/18/2015
Job Number:	140658N-1	Figure:	I-3

LOG OF BORING B-5

Date Drilled:	2/28/2015	Logged by:	CTL
Equipment:	Marl M5, 8" Hollow Stem Auger	Project Manager:	ER
Elevation (ft):	444	Depth to Groundwater (ft):	Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
1	CL	**UNDOCUMENTED FILL (Quf)** - SANDY CLAY with GRAVEL, dark brown, few cobbles and debris, moist, stiff.		X					
2									
3		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, yellowish gray, fine grained, moist, very dense.							
4									
5									
6			CAL		50/4"				
7									
8									
9									
10									
11			CAL		50/4"				DS
12									
13									
14									
15									
16		becomes dense	SPT		39				
17									
18									
19									
20									

BORING LOG CONTINUED ON FIGURE I-5.

LOG OF BORING B-5 (CONTINUED)

Date Drilled: 1/28/2015 | Logged by: CTL

Equipment: Marl M5, 8" Hollow Stem Auger | Project Manager: ER

Elevation (ft): 437 | Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
21		**MISSION VALLEY FORMATION (TMV)** - SILTY SANDSTONE, yellowish gray, fine to medium grained, moist, very dense.	SPT		59				
22									
23									
24									
25									
26			SPT		54				
27									
28									
29									
30									
31			SPT		55				
32		**TERMINATE BORING AT 31½ FEET.**							
33									
34									
35									
36									
37									
38									
39									
40									

LOG OF BORING B-6

Date Drilled:	1/28/2015	Logged by:	CTL
Equipment:	Marl M5, 8" Hollow Stem Auger	Project Manager:	ER
Elevation (ft):	438	Depth to Groundwater (ft):	Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
1	CL	**UNDOCUMENTED FILL (Quf)** - SANDY CLAY, brown, some crushed rock and debris, moist, medium stiff.							
2									
3		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, yellowish gray, fine to medium grained, moist, medium dense.							
4									
5									
6			CAL		46	11.8	115.5		
7									
8									
9									
10									
11		grades with orange and black, very loose.	SPT		4				
12									
13									
14									
15									
16		grades without orange and black, very dense.	CAL		50/5.5"		10.6	112.8	
17									
18									
19									
20									

BORING LOG CONTINUED ON FIGURE I-7.

LOG OF BORING B-6 (CONTINUED)

Date Drilled: 1/28/2015 | Logged by: CTL

Equipment: Marl M5, 8" Hollow Stem Auger | Project Manager: ER

Elevation (ft): 438 | Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
21		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, yellowish gray, fine to medium grained, moist, dense.	SPT		44				
22									
23									
24									
25									
26			SPT		50				
27									
28									
29									
30									
31		grades with more silt, yellowish gray with pink streaks, fine to medium grained, moist, dense.	SPT		47				
32									
33									
34									
35									
36		becomes very dense, grades with yellowish gray specks.	SPT		57				
37									
38									
39									
40									

BORING LOG CONTINUED ON FIGURE I-8.

LOG OF BORING B-6 (CONTINUED)

Date Drilled:	1/28/2015	Logged by:	CTL
Equipment:	Marl M5, 8" Hollow Stem Auger	Project Manager:	ER
Elevation (ft):	438	Depth to Groundwater (ft):	Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
41		**MISSION VALLEY FORMATION (Tmv) -** CLAYSTONE, yellowish brown, trace sand, moist, moderately indurated, moderately cemented, hard.	SPT		44				SA
42									
43									
44									
45		SILTY SANDSTONE, yellowish brown, fine to medium grained, moist, weakly cemented, very dense.	CAL		50/4"				DS
46									
47									
48									
49									
50									
51			SPT		63				
52		**TERMINATE BORING AT 51½ FEET.**							
53									
54									
55									
56									
57									
58									
59									
60									

LOG OF BORING B-7

Date Drilled:	1/28/2015	Logged by:	CTL
Equipment:	Marl B5, 8" Hollow Stem Auger	Project Manager:	ER
Elevation (ft):	437	Depth to Groundwater (ft):	Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
1		**UNDOCUMENTED FILL (Quf)** - CLAYEY SAND, brown, few gravels and debris, fine to medium grained, moist, loose.							
2									
3		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, yellowish brown, fine to medium grained, moist, weakly cemented, medium dense.							
4									
5									
6									
7									
8									
9									
10									
11			CAL		31		15.3	100.6	
12									
13									
14									
15									
16									
17									
18									
19									
20									

BORING LOG CONTINUED ON FIGURE I-10.

LOG OF BORING B-7 (CONTINUED)

Date Drilled: 1/28/2015 | Logged by: CTL

Equipment: Marl B5, 8" Hollow Stem Auger | Project Manager: ER

Elevation (ft): 437 | Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
21		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, gray, fine to medium grained, moist, weakly cemented, dense.	SPT		31				
22									
23									
24									
25									
26									
27									
28									
29									
30			SPT		81				
31		becomes very dense.							
32									
33									
34									
35									
36									
37									
38									
39									
40									

BORING LOG CONTINUED ON FIGURE I-11.

LOG OF BORING B-7 (CONTINUED)

Date Drilled: 1/28/2015 | Logged by: CTL

Equipment: Marl M5, 8" Hollow Stem Auger | Project Manager: ER

Elevation (ft): 437 | Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVEN	SAMPLES: BULK	DRIVING RESISTANCE (blows/ft of drive)	N_{60}	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
41		**MISSION VALLEY FORMATION (Tmv)** - SILTY SANDSTONE, gray, fine to medium grained, moist, weakly cemented, very dense.	SPT		50/6"				
42									
43									
44									
45									
46									
47									
48									
49									
50		**BORING TERMINATED AT 50 FEET (sampler bouncing on rock)**							
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

LOG OF TEST PIT NUMBER TP-1

Date Excavated:	1/28/2015	Logged by:	CTL
Equipment:	4" Hand Auger	Project Manager:	ER
Surface Elevation (ft):	449	Depth to Water (ft):	Not encountered

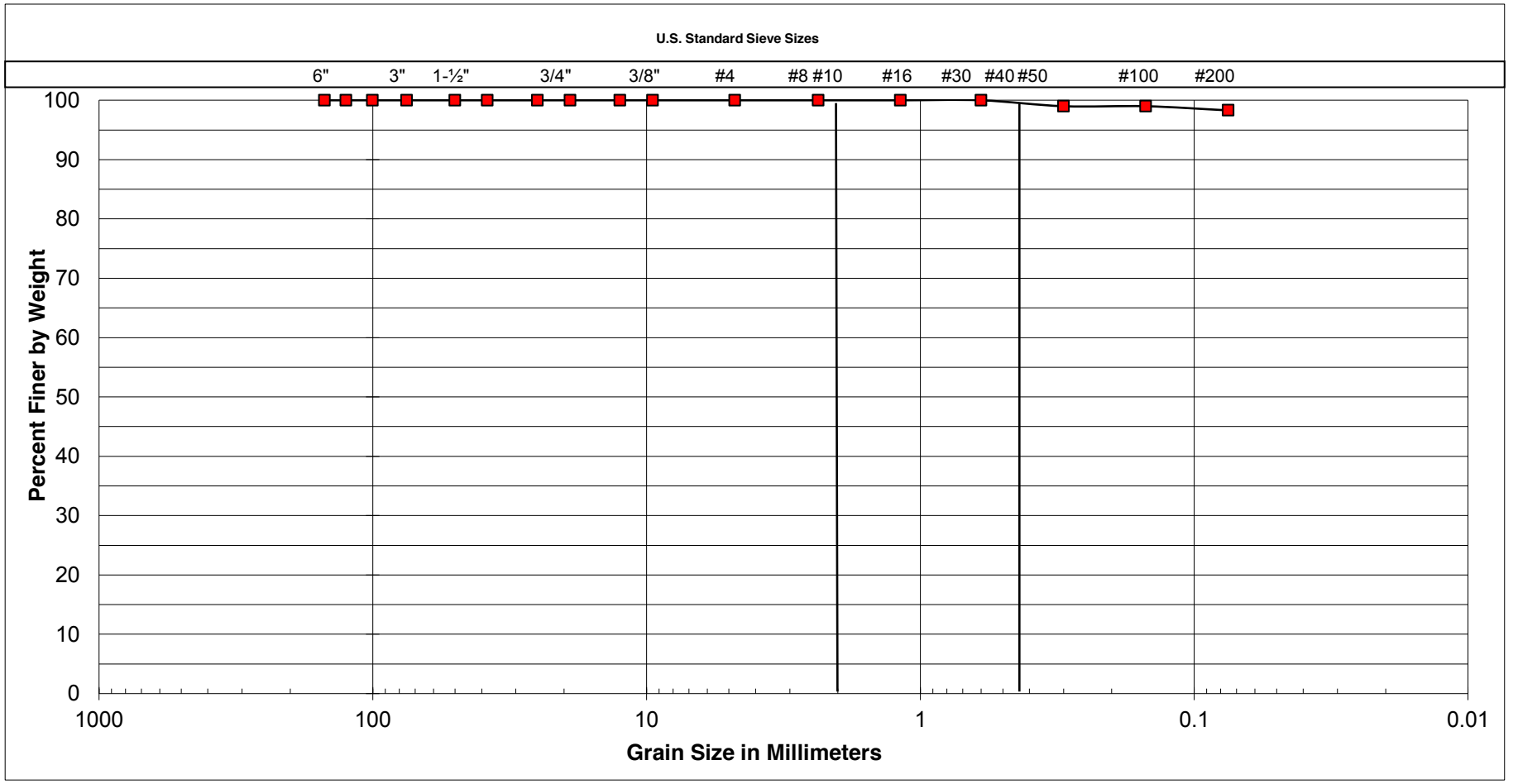
DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	MOISTURE (%)	DRY UNIT WT. (pcf)	LBAORATORY TESTS
1	SC	**UNDOCUMENTED FILL (Quf)** - CLAYEY SAND with GRAVEL, brown, trace cobbles, fine to medium grained, moist, loose to medium dense.		X			SA
2							
3		**AUGER REFUSAL AT 3 FEET.**					
4							
5							
6							
7							
8							
9							
10							

APPENDIX II
LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were conducted:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **GRAIN SIZE DISTRIBUTION:** Grain size distributions were determined for 4 samples in accordance with ASTM D 422. The results of these tests are presented on Figures II-1 through II-2.
- **DIRECT SHEAR:** Direct shear tests were performed in accordance with ASTM D 3080. The shear stress was applied at a constant rate of strain of approximately 0.003 inch per minute. The results of these tests are presented on Figures II-3 through II-5.

Soil samples not tested are now stored in our laboratory for future reference and analysis, if needed. Unless notified to the contrary, all samples will be disposed of 30 days from the date of this report.



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

SAMPLE LOCATION
B6@40.5-41.5

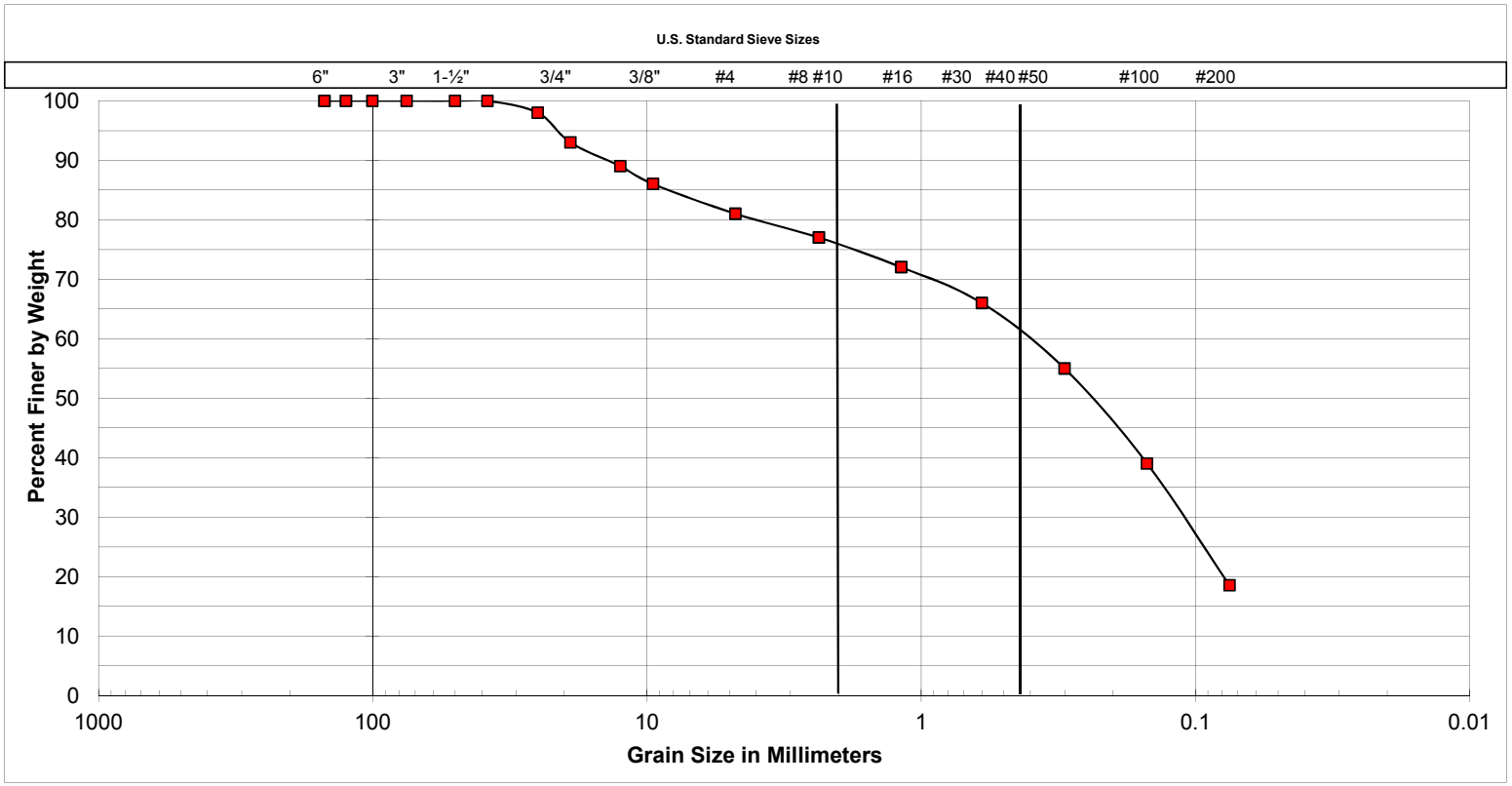
UNIFIED SOIL CLASSIFICATION:	CL
DESCRIPTION	CLAYSTONE

ATTERBERG LIMITS	
LIQUID LIMIT	--
PLASTIC LIMIT	--
PLASTICITY INDEX	--

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 COLLEGE AVENUE

By:	DAS	Date:	2/18/15
Job Number:	140568N	Figure:	II-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

SAMPLE LOCATION
TP-1@0-3

UNIFIED SOIL CLASSIFICATION:	SC
DESCRIPTION	CLAYEY SAND WITH GRAVEL

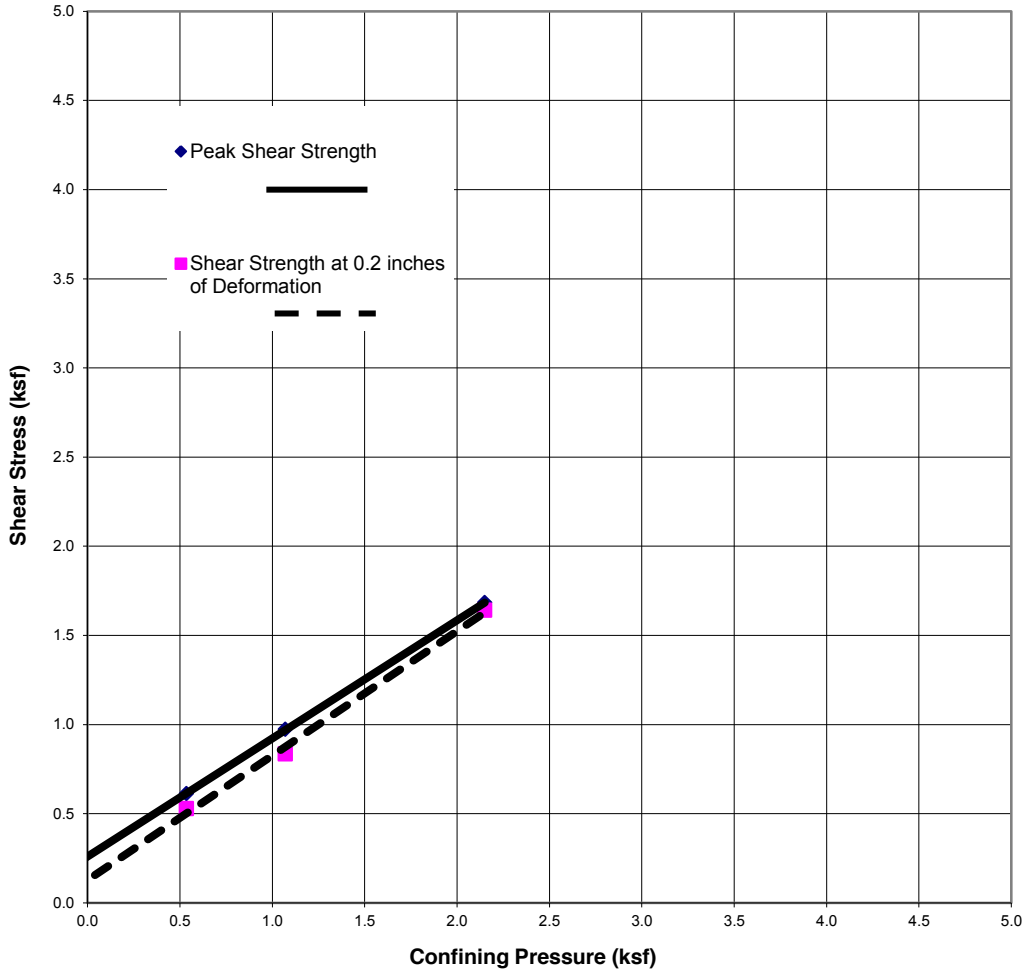
ATTERBERG LIMITS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 COLLEGE AVENUE

By:	DAS	Date:	2/18/15
Job Number:	140568N	Figure:	II-2

Direct Shear Test Results



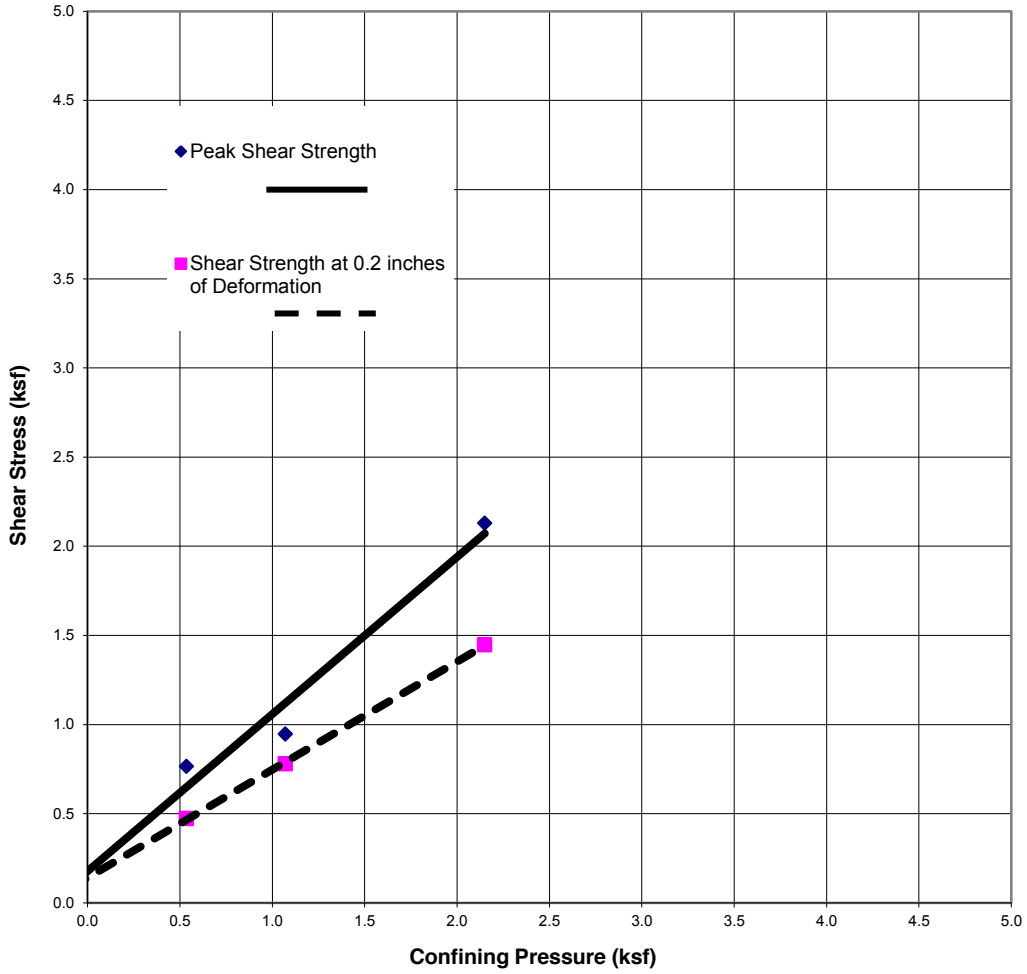
SAMPLE	DESCRIPTION	INTERNAL FRICTION ANGLE(DEG.)	COHESION INTERCEPT (PSF)
B4@4	Brown Clayey Sand		
Peak		34	261
Shear Strength at 0.2 inches of Deformation		35	129

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 COLLEGE AVENUE

By:	TBC	Date:	2/18/2015
Job Number:	140568N	Figure:	II-3

Direct Shear Test Results



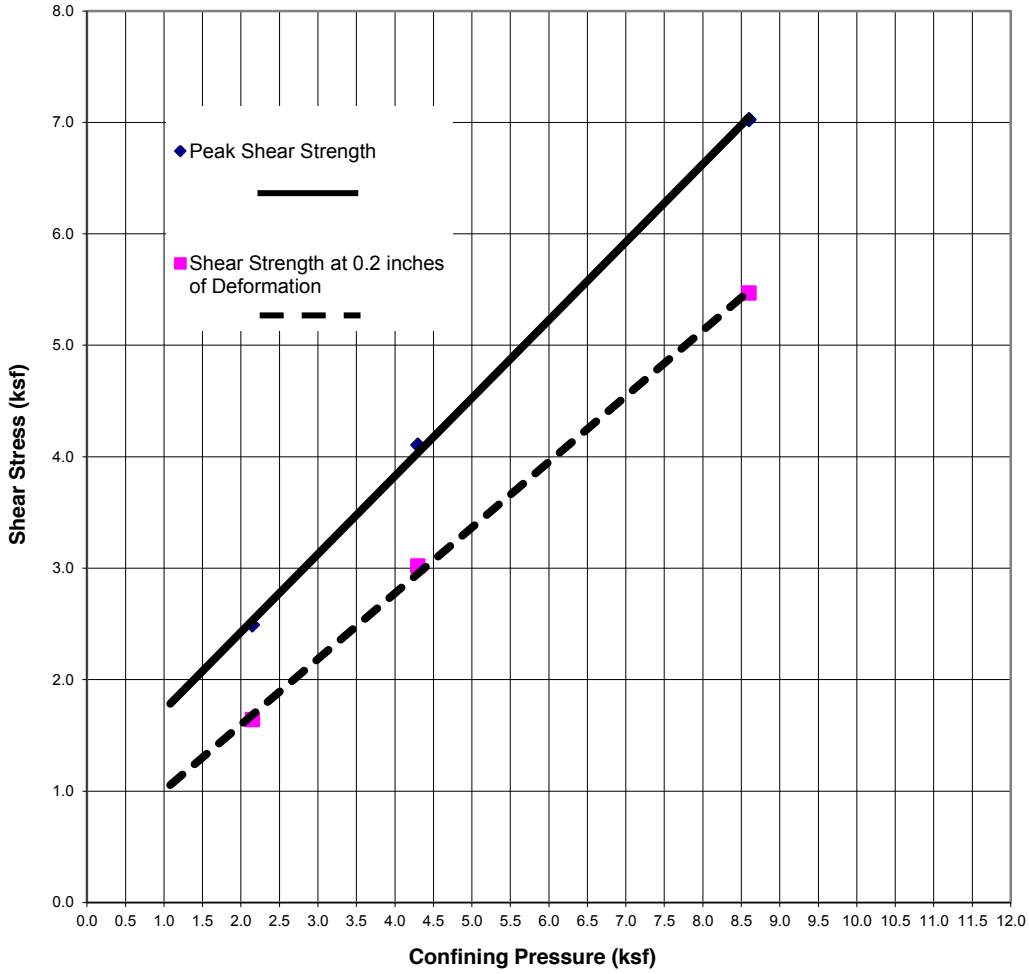
SAMPLE	DESCRIPTION	INTERNAL FRICTION ANGLE(DEG.)	COHESION INTERCEPT (PSF)
B5@10.5	SILTY SANDSTONE		
Peak		41	180
Shear Strength at 0.2 inches of Deformation		31	140

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 College Avenue

By:	TBC	Date:	2/18/2015
Job Number:	140568N	Figure:	II-4

Direct Shear Test Results



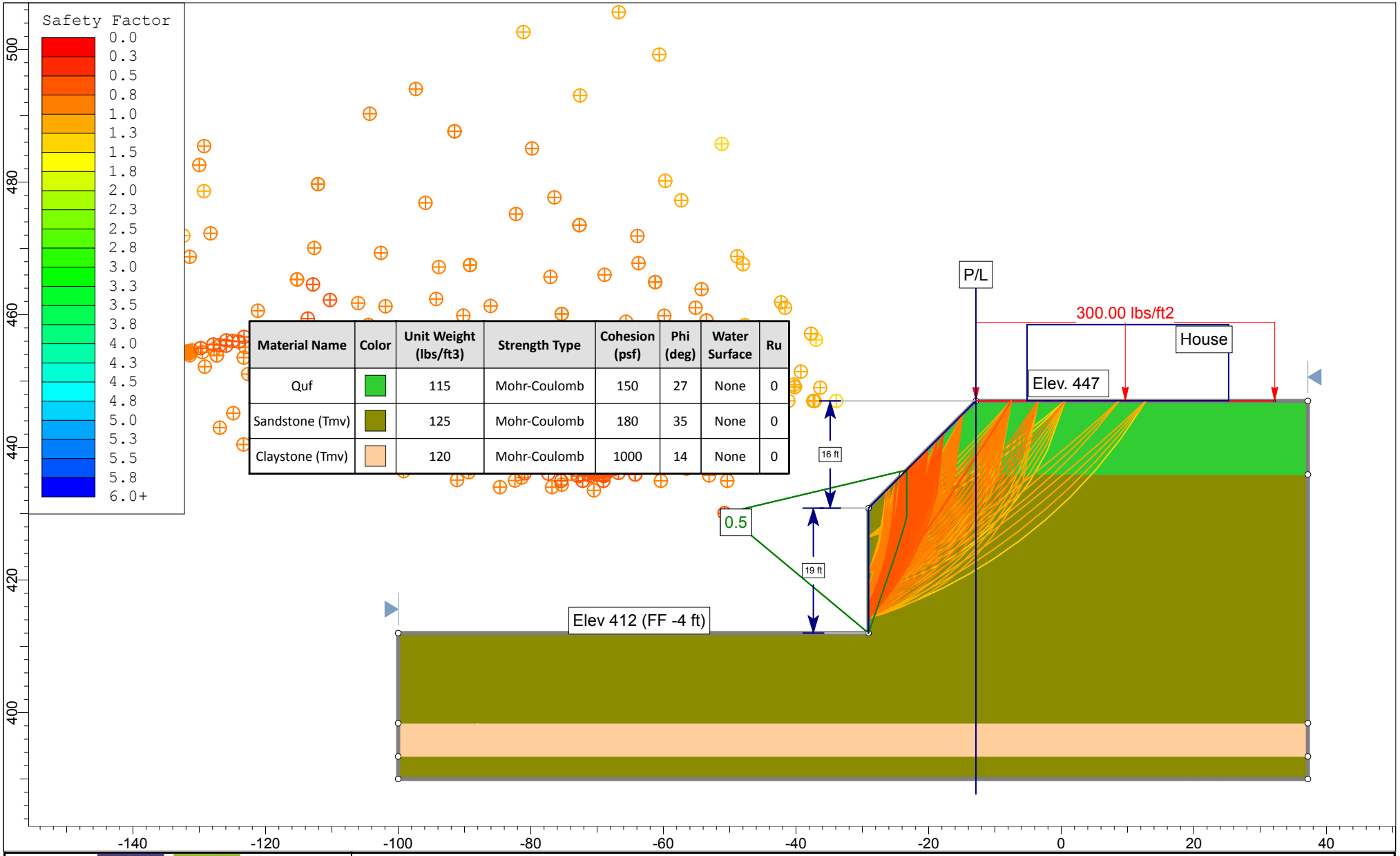
SAMPLE	DESCRIPTION	INTERNAL FRICTION ANGLE(DEG.)	COHESION INTERCEPT (PSF)
B6@45	SILTY SANDSTONE		
Peak		35	1030
Shear Strength at 0.2 inches of Deformation		31	420

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

5030 COLLEGE AVENUE

By:	TBC	Date:	2/18/2015
Job Number:	140568N	Figure:	II-5

APPENDIX III
SLOPE STABILITY ANALYSIS

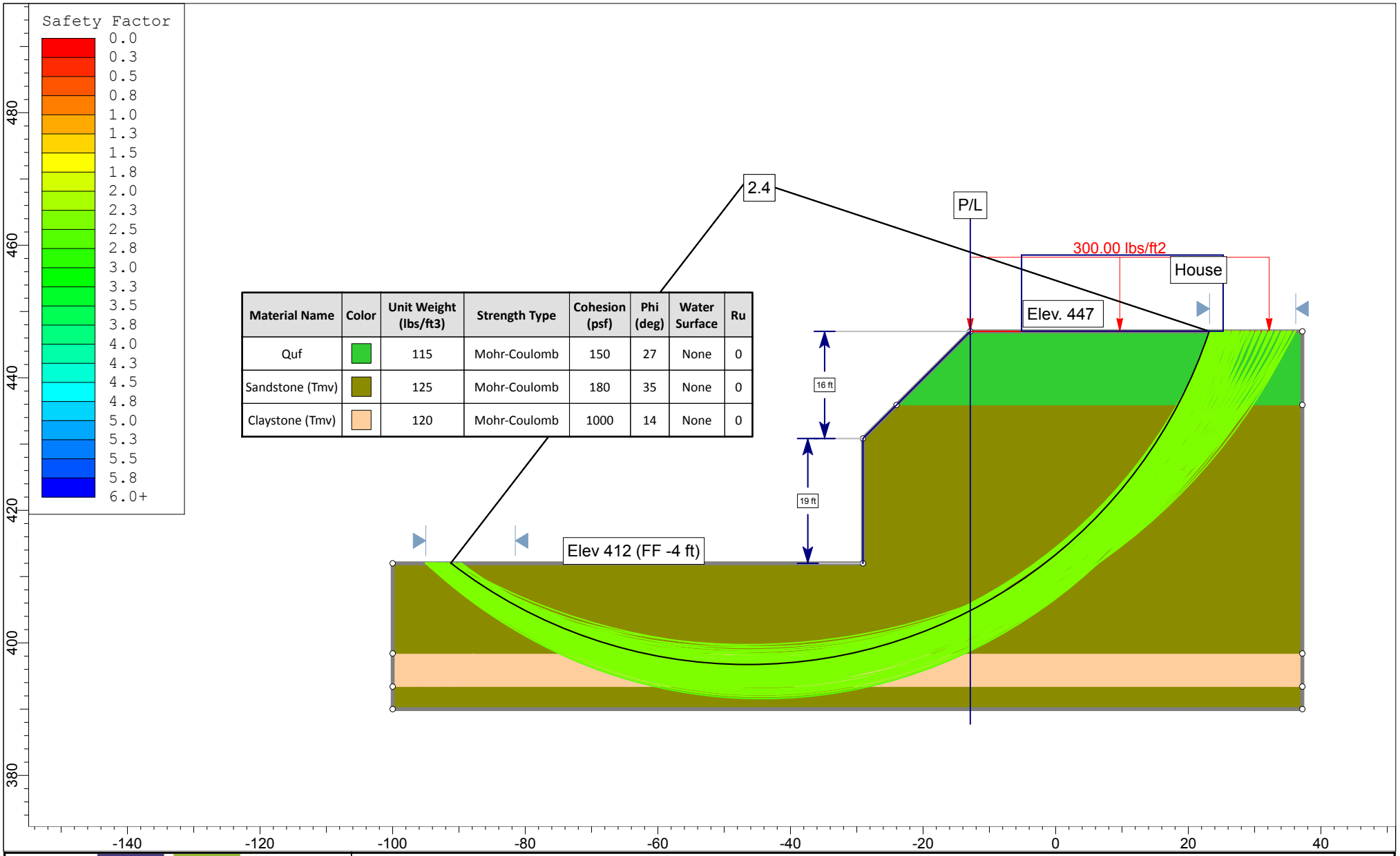


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Quf		115	Mohr-Coulomb	150	27	None	0
Sandstone (Tmv)		125	Mohr-Coulomb	180	35	None	0
Claystone (Tmv)		120	Mohr-Coulomb	1000	14	None	0

SCST ENGINEERING

SLIDEINTERPRET 6.033

Project	5030 College Ave		
Analysis Description	Slope Stability Analysis - Local		
Drawn By	CTL	*Scale* 1":20'	*Company* SCST Engineering
Date	2/18/2015		*Figure* III-1



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Quf		115	Mohr-Coulomb	150	27	None	0
Sandstone (Tmv)		125	Mohr-Coulomb	180	35	None	0
Claystone (Tmv)		120	Mohr-Coulomb	1000	14	None	0

SCST ENGINEERING

SLIDEINTERPRET 6.033

Project	5030 College Ave		
Analysis Description	Slope Stability Analysis - Global		
Drawn By	CTL	*Scale* 1":20'	*Company* SCST Engineering
Date	2/18/2015		*Figure* III-2