October 16, 2015

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Real Estate Development Associates
4100 MacArthur Boulevard, Suite 120
Newport Beach, California 92660

Attention: Mr. Bill Goltermann
Principal

Proposal No.: **15G116-2**

Subject: **Addendum to Feasibility Study**
Proposed Commercial/Industrial Development
NEC Merrill Avenue and Carpenter Avenue
Ontario, California

Reference: Geotechnical Feasibility Study, Proposed Commercial/Industrial Development, NEC Merrill Avenue and Carpenter Avenue, Ontario, California, prepared for Real Estate Development Associates by Southern California Geotechnical, Inc. (SCG), SCG Project No. 15G116-1, dated February 25, 2015.

Gentlemen:

In accordance with your request, we have performed additional subsurface exploration and laboratory testing at the subject site. At the time of the referenced study, the northwestern-most and southwestern-most parcels were not accessible to our field personnel and equipment. As such, this addendum report has been prepared to summarize the results of the additional exploration and testing.

Project Description and Background

The subject site is located at the northeast corner of Merrill Avenue and Carpenter Avenue in Ontario, California. The site is bounded to the north by Eucalyptus Avenue, to the east by the Cucamonga Creek flood control channel, to the south by Merrill Avenue, and to the west by Carpenter Avenue. The general location of the site is illustrated on the Site Location Map included as Plate 1 of this report.

The overall site consists of seven (7) contiguous parcels, which total 124.8± acres in size. The three (3) northeastern parcels are currently developed as a dairy. The farm house, milking barn, and other dairy related structures are located in the northern portion of these parcels. The structures appear to be single story structures of wood frame construction and assumed to be supported on conventional shallow foundations with concrete slab-on-grade floors. Eleven (11) canopy structures are located in the central area of these three parcels and detention ponds for liquid-waste, such as cattle wash water, are located in the southern portion of these parcels.

As previously noted, the referenced feasibility study was prepared in February 2015 for the general eastern portion of the subject site. However, the referenced feasibility study did not include the northwestern-most and southwestern-most parcels of the site, as these were not accessible to the drilling and trenching equipment.

The southwestern parcel is developed as a dairy. A farm house, milking barn, and other dairy related structures are present along the western property line of this parcel. Eleven (11) canopy structures are present in the central area of this parcel and a soil/manure stockpile is present in the northeastern corner of this parcel.

Ground surface cover throughout the active dairies generally consists of manure in the cattle pen areas, native grass and weed growth in the pond areas, turf grass and asphaltic concrete and concrete pavements surrounding the single family residences and the remaining areas consist of exposed soils with sparse native grass and weed growth.

The two northwestern parcels appear to have been previously developed as dairies. Two large debris stockpiles were observed in the central regions of each parcel, measuring approximately 1,000 feet long, 35 feet wide, and 10 feet high. We assume that the stockpile was generated from the demolition of previously existing structures. Currently these two parcels are being utilized for agricultural purposes. The ground surface cover in these parcels consists of exposed soil and remnants of several structures along the northern property line of this parcel.

Detailed topographical information was not available at the time of this report. Visually, the overall site topography slopes gently downward to the south, at an estimated gradient of 1± percent. Based on our review of the USGS 7.5' topographic map of the Corona North quadrangle, there is up to 25± feet of elevation differential across the subject site.

Proposed Development

Based on a conceptual site plan provided by the client, the site will be developed with seven (7) commercial/industrial buildings. Five (5) of the buildings will be located in the northern area of the site and will range in size from 44,880 ft² to 90,000± ft². The two (2) buildings located in the southern area of the site will be 1,052,240 ft² and 1,149,720± ft² in size. Loading docks will be constructed along the southern walls for the northern buildings. The two southern buildings will be constructed in a cross-dock configuration, with loading docks on the east and west sides of each building. The buildings will be surrounded by asphaltic concrete pavements in the parking and drive lane areas and Portland cement concrete pavements in the loading dock areas. It is also anticipated that several landscape planter areas will be located throughout the site. One (1) new private street will be constructed between Buildings 1 and 2 as part of the new development.

Detailed structural information has not been provided. It is assumed that the buildings will be single story structures of tilt-up concrete construction, typically supported on conventional shallow foundations with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 80 kips and 3 to 5 kips per linear foot, respectively.

Grading plans for the proposed development are currently not available. Based on the site topography, cuts and fills of 5 to 7± feet will be necessary to achieve the proposed building site grades. No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development.

Previous Studies

Southern California Geotechnical, Inc. (SCG) previously performed a geotechnical feasibility study for the subject site. At that time, the northwestern-most and southwestern-most parcels were not accessible. The results of the feasibility study are documented in the above reference report.

During the subsurface exploration for this study, manure was encountered at several boring and trench locations, extending to depths of 3 to 6± inches. Artificial fill soils were encountered at several boring and trench locations to depths of 2½ to 6½± feet and consisted of silty fine sands and clayey fine sands. Native alluvium was encountered beneath the manure or fill materials or at the ground surface at all of the boring and trench locations to depths of 31± feet. The upper alluvial soils generally consist of loose to medium dense fine sands with trace to little amounts of silt and loose to medium dense silty fine sands and clayey fine sands, extending to the maximum depth explored of 31± feet below existing site grades. At greater depths the alluvium generally consists of medium dense clayey fine sands and medium stiff to stiff fine sandy clays with trace to little amounts of silt extending to the maximum depth explored of 30± feet. Occasional strata consisting of very soft to stiff sandy clays and/or clayey silts were encountered at Boring Nos. B-3 and B-5 and Trench Nos. T-4 and T-5. Free water was not encountered within 31 feet of the ground surface in the borings performed as part of this study.

SCG recommended that the new buildings be supported on conventional shallow foundation systems, founded in newly placed structural fill soils. SCG recommended that the existing artificial fill soils and upper portion of the native alluvial soils in the building areas be removed and replaced as structural fill materials.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for this project consisted of four (4) borings advanced to depths of 25 to 30± feet below currently existing site grades. In addition to the four borings, a total of four (4) trenches were excavated at the site to depths of 3 to 7½± feet below existing site grades. All of the borings and trenches were logged during drilling and excavation by a member of our staff.

The exploration procedures and sampling methods were performed as described is Section 4.1 of the referenced feasibility study. The approximate locations of the borings and trenches are indicated on the Boring and Trench Location Plan, included as Plate 2 in this report. The Boring and Trench Logs, which illustrate the conditions encountered at the boring and trench locations, as well as the results of some of the laboratory testing, are included herein.

Geotechnical Conditions

Manure was present at the ground surface within the cattle pens at Trench No. T-7 with a thickness of 3± inches below existing site grades.

Artificial fill soils were encountered at the ground surface at Trench No. T-8. The fill soils generally extend to a depth of ½± foot below existing site grades, and generally consist of medium dense silty fine sands with trace amounts of medium to coarse sand and fine to coarse gravel content. The fill soils possess a disturbed appearance, resulting in their classification as artificial fill.

Native alluvial soils were encountered beneath the fill soils or at the ground surface at all of the boring and trench locations. The alluvial soils generally consist of loose to medium dense fine sands, silty fine sands and fine sandy silts with varying amounts of medium to coarse sand and clay content, extending to the maximum depth explored of 30± feet. Boring No. B-6 also encountered layers of stiff clayey silts and fine sandy clays between the depths of 22 and 30± feet.

The native alluvial soils exposed at the ground surface, at several of the boring and trench locations, appear to be disturbed, presumably due to the ongoing agricultural uses of the site. These materials extend to a depth of up to 3± feet and are classified as Disturbed Alluvium on the Boring and Trench Logs. These soils are similar in composition to the underlying alluvium, but possess a disturbed appearance.

Free water was not encountered during drilling of any of the borings or excavation of any trenches. Based on the lack of any water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 30± feet at the time of the subsurface exploration.

Laboratory Testing

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

In-situ Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring and Trench Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-4 of this report.

Soluble Sulfates

A representative sample of the near-surface soils was submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	**Soluble Sulfates (%)**	**ACI Classification**
B-3 @ 0 to 5 feet	0.009	Negligible

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample was tested to determine its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557, and are presented on Plate C-5 of this report. This test is generally used for comparison with the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Organic Content Testing

Selected soil samples have been tested to determine their organic content, in accordance with ASTM Test Method 2974. The results of the testing are as follows:

Sample Identification	**Organic Content (%)**
T-7 @ 0 to 3 inches	38.7
T-7 @ 3 to 6 inches	1.3
T-7 @ 6 to 9 inches	5.2
T-8 @ 0 to 3 inches	2.0
T-9 @ 0 to 6 inches	4.3
T-9 @ 6 to 12 inches	4.7
T-9 @ 12 to 18 inches	4.5
T-10 @ 0 to 6 inches	3.9
T-10 @ 6 to 12 inches	3.0
T-10 @ 12 to 18 inches	3.3

Geotechnical Design Considerations

The active cattle pen areas are covered with manure at the ground surface, with a thickness of 3± inches at Trench No. T-7. All of the manure and any organic topsoil should be removed and disposed of off-site. Additionally, some of the soils in the upper 18± inches, located beneath the manure and at the ground surface, possess an organic content greater than 3 percent. It may be feasible to use these soils in fills provided that they are cleaned of highly organic materials and are blended with the underlying soils in order to reduce the organic content to less than 3 percent throughout.

Artificial soils were encountered at Trench No. T-8 extending to a depth of ½± foot. Additionally, the near-surface alluvial soils generally possess low strengths and unfavorable consolidation/collapse characteristics. The existing fill soils and near-surface alluvium, in their present condition, are not considered suitable for support of the foundation loads of the new structures. Based on these conditions, remedial grading is considered warranted within the proposed building areas in order to remove and replaced the artificial fill soils and a portion of the near-surface alluvial soils as compacted fill.

The near-surface soils generally consist of fine sands, silty fine sands and fine sandy silts. Based on their composition, these soils have been visually classified as very low to non-expansive. Therefore, no design considerations related to expansive soils are considered warranted for this site.

Conclusions and Recommendations

The subsurface conditions encountered within the southwestern-most and northwestern-most parcels are very similar to those encountered during the referenced feasibility study for the eastern region of the site. Based on the results of the additional exploration, the preliminary design recommendations presented in the referenced study are considered valid for the entire subject site.

It should be noted that the work completed to-date for the overall subject site remains as a geotechnical feasibility study. A future geotechnical investigation will be required once the final site configuration and/or a conceptual grading plan become available.

Closure

We sincerely appreciate the opportunity to be of service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Pablo Montes Jr.
Staff Engineer

John A. Seminara, GE 2294
Principal Engineer

Distribution: (2) Addressee

Enclosures: Plate 1 Site Location Map
Plate 2 Boring and Trench Location Plan
Boring and Trench Logs
Laboratory Testing
Plate E-1 Seismic Design Parameters

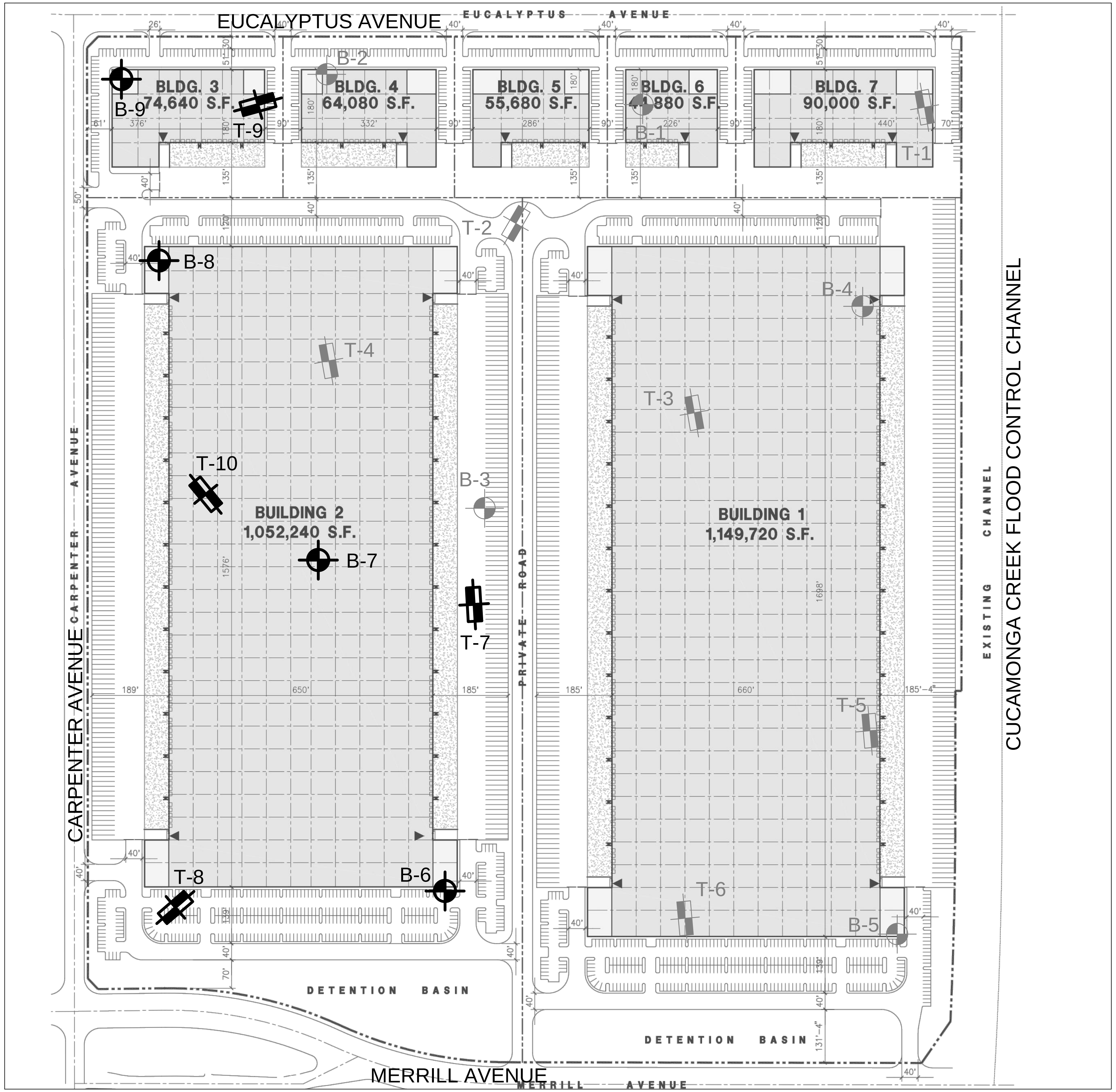
SOURCE: SAN BERNARDINO COUNTY
THOMAS GUIDE, 2013

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

ONTARIO, CALIFORNIA

SCALE: 1" = 2400'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MRM CHKD: JAS	
SCG PROJECT 15G116-2	
PLATE 1	



GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE TRENCH LOCATION
- APPROXIMATE BORING LOCATION FROM PREVIOUS STUDY (SCG PROJECT NO. 15G116-1)
- APPROXIMATE TRENCH LOCATION FROM PREVIOUS STUDY (SCG PROJECT NO. 15G116-1)

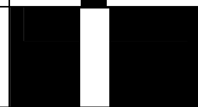
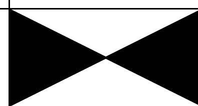
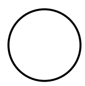
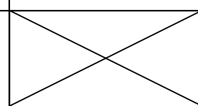
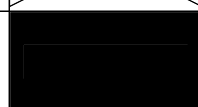
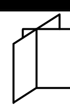
NOTE: BASE MAP OBTAINED FROM HPA ARCHITECTURE.

BORING AND TRENCH LOCATION PLAN
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT
ONTARIO, CALIFORNIA

SCALE: 1" = 300'
DRAWN: MRM
CHKD: JAS
SCG PROJECT 15G116-2
PLATE 2

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3” indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		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, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS 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, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS 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 OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 15G116-2	DRILLING DATE: 9/28/15	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 22 feet
LOCATION: Ontario, California	LOGGED BY: Matt Manni	READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		15			ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, loose to medium dense-damp to moist	98	9					
		10				96	6					
5		18			Light Brown Silty fine Sand, trace Clay, trace Iron oxide staining, trace Organics, medium dense-moist	112	11					
		17			Gray to Gray Brown Silty fine Sand, trace medium Sand, little Clay, trace calcareous veining, medium dense-moist	112	12					
10		19			Light Gray Silty fine Sand to fine Sandy Silt, some Clay, slightly porous, medium dense-very moist	97	24					
15		20			Gray Brown fine Sand, trace Silt, trace Clay nodules, trace Iron oxide staining, trace medium Sand, medium dense-damp		5					
20		12			Gray Brown fine Sandy Silt, some Clay, trace calcareous veining, trace Iron oxide staining, medium dense-very moist		21					
		12	0.5		Light Gray Clayey Silt, trace Iron oxide staining, stiff-very moist		31					
25					Gray Brown fine Sandy Silt, trace Clay, trace calcareous nodules, medium dense-very moist		21					
30		13	0.5		Gray Brown fine Sandy Clay, trace Silt, trace medium Sand, trace calcareous veining, stiff-very moist		20					
					Boring Terminated at 30'							

TBL 15G116-2.GPJ SOCALGEO.GDT 10/19/15

TEST BORING LOG **PLATE B-6**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 15G116-2
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 9/28/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Matt Manni

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					ALLUVIUM: Gray Brown Silty fine Sand, trace calcareous veining, loose-moist							
	X	6					10					
					Light Gray Brown Silty fine Sand, trace medium Sand, trace calcareous veining, slightly porous, medium dense-moist							
	X	24					10					
5												
	X	25					12					
					Light Gray Brown Silty fine Sand to fine Sandy Silt, trace Iron oxide staining, trace calcareous nodules, loose to medium dense-very moist							
	X	10					20					
10												
					Gray Brown fine Sand, some Silt, trace Iron oxide staining, trace medium Sand, medium dense-moist							
	X	29					10					
15												
					Gray Brown Silty fine Sand, little Clay, abundant Iron oxide staining, medium dense-moist							
	X	21					15					
20												
					Light Brown fine Sandy Silt, trace Clay, trace Iron oxide staining, medium dense-moist							
	X	18					15					
25												
					Boring Terminated at 25'							

TBL 15G116-2.GPJ SOCALGEO.GDT 10/19/15

BORING NO. B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 15G116-2
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 9/28/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Matt Manni

WATER DEPTH: Dry
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	7			DISTURBED ALLUVIUM: Brown Silty fine Sand, trace medium Sand, loose-damp to moist		9					
5	X	8			ALLUVIUM: Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, loose-moist		14					
	X	7			Gray Brown fine Sand, some Silt, loose-damp		6					
10	X	10			Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, little Clay, loose to medium dense-moist		15					
15	X	17					20					
					Light Gray fine Sandy Silt, trace to little Clay, trace Iron oxide staining, medium dense-moist							
20	X	19			Gray Brown Silty fine Sand, trace medium Sand, trace Iron oxide staining, medium dense-moist to very moist		15 17					
25	X	17					17					
					Boring Terminated at 25'							

TBL 15G116-2.GPJ SOCALGEO.GDT 10/19/15

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 15G116-2	DRILLING DATE: 9/28/15	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 21 feet
LOCATION: Ontario, California	LOGGED BY: Matt Manni	READING TAKEN: At Completion

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
		14			DISTURBED ALLUVIUM: Gray Brown Silty fine Sand, loose-moist	101	11					
		12			ALLUVIUM: Light Gray Brown fine Sand, some Silt, trace Iron oxide staining, loose-damp	89	4					
5		8			Light Brown Silty fine Sand, loose-moist	93	11					
		12			Light Brown fine sand, some Silt, loose-damp	97	7					
10		11			Light Gray Brown Silty fine Sand, trace Clay, trace calcareous veining, loose-moist	96	12					
		17			Gray Brown Silty fine Sand, trace medium to coarse Sand, trace calcareous veining, trace Iron oxide staining, trace Clay, meidum dense-moist to very moist		17					
15					Light Gray Brown Silty fine Sand, trace medium Sand, trace calcareous veining, slightly porous, medium dense-very moist		22					
20		24			Gray Brown Silty fine Sand, trace medium to coarse Sand, trace Iron oxide staining, medium dense-moist to very moist		16					
25		22			Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, abundant Iron oxide staining, medium dense-moist to very moist		19					
30		22					17					
					Boring Terminated at 30'							

TBL 15G116-2.GPJ SOCALGEO.GDT 10/19/15

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-7

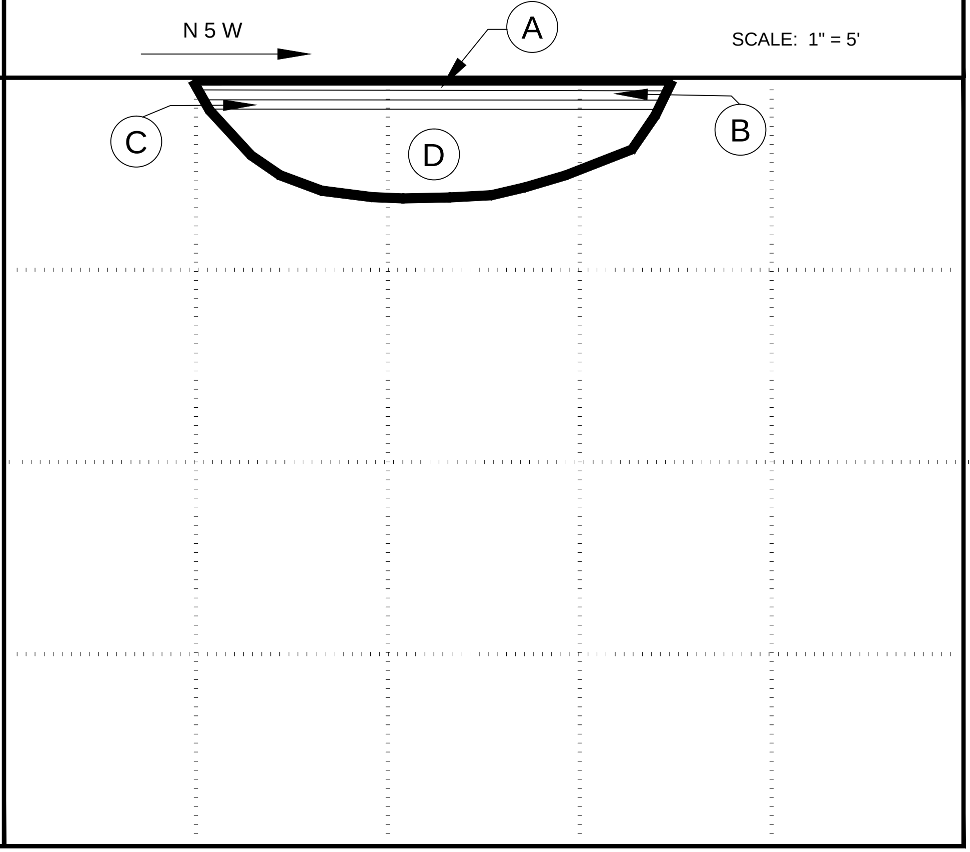
JOB NO.: 15G116-2
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: 9-30-2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: N 5 W

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b	39	58	A: MANURE: 0 to 3 inches thick
	b	15	15	B: ALLUVIUM: Light Gray Brown Silty fine Sand, trace medium to coarse Sand, slightly porous, medium dense - moist
	b		10	C: ALLUVIUM: Light Brown Silty fine Sand to fine Sandy Silt, trace medium to coarse Sand, loose - moist
				D: ALLUVIUM: Light Gray Brown Silty fine Sand, trace medium to coarse Sand, trace Calcareous veins, slightly porous, medium dense - moist @ 2-3 feet: trace Iron oxide staining
5				Trench Terminated @ 3 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-8

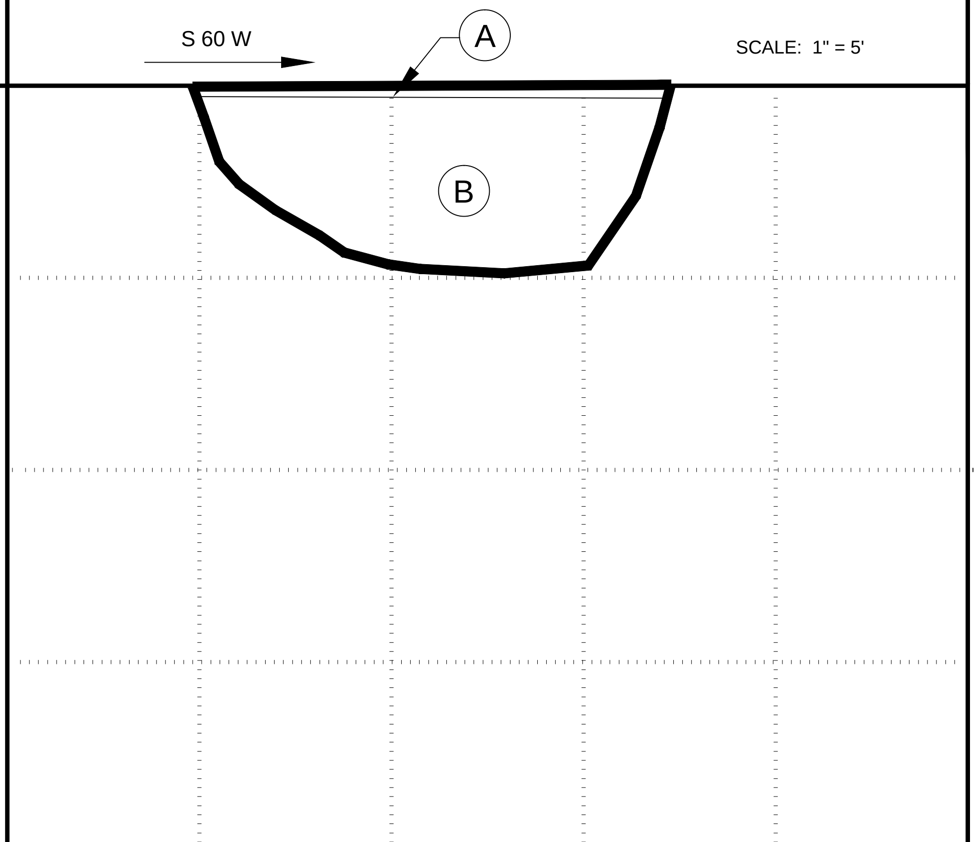
JOB NO.: 15G116-2
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: 9-30-2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: S 60 W

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b	2	3	A: FILL: Light Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, mottled, medium dense - damp
	b		5	B: ALLUVIUM: Gray Brown fine Sand, some Silt, trace medium to coarse Sand, loose - damp
	b		7	@ 2 to 3 feet: trace Calcareous veins
5				Trench Terminated @ 5 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
T-9

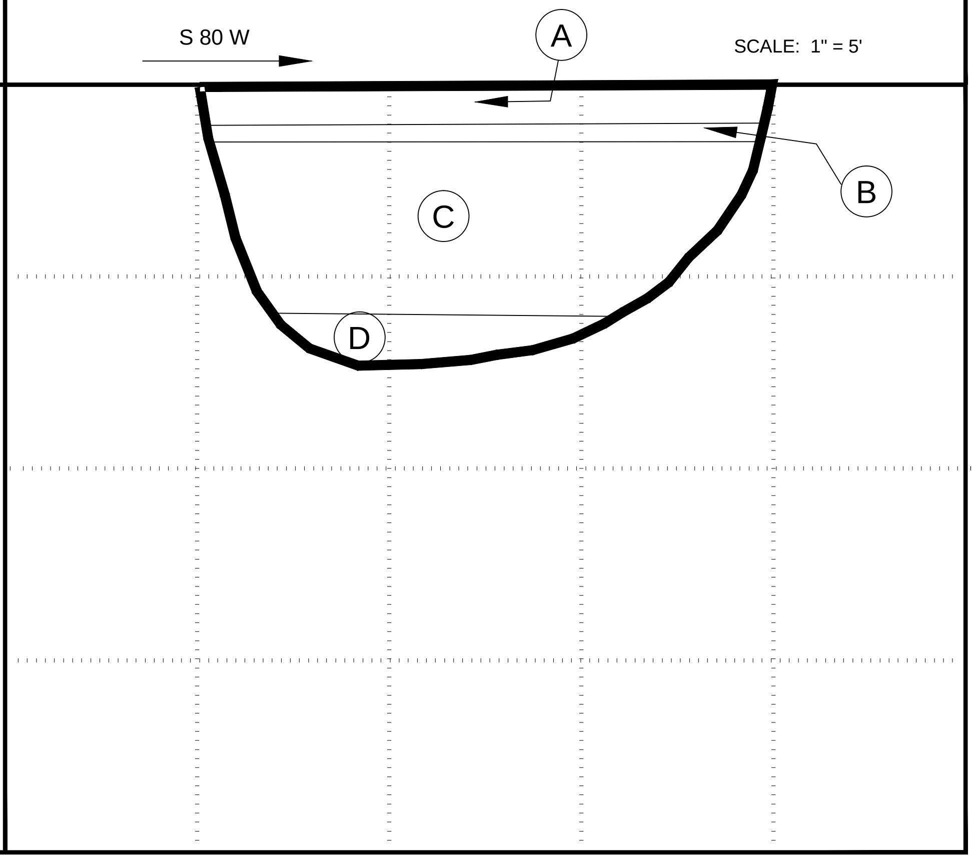
JOB NO.: 15G116-2
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: 9-30-2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: S 80 W

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b	4	16	A: DISTURBED ALLUVIUM: Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, abundant fine root fibers, trace organics, loose - moist to very moist
	b	5	20	
	b	5	18	B: ALLUVIUM: Gray Brown Silty fine Sand, trace medium to coarse Sand, trace organics, medium dense - very moist
	b		8	C: ALLUVIUM: Light Gray Brown fine Sand, trace medium to coarse Sand, some Silt, loose to medium dense - damp to moist
5				
	b		15	D: ALLUVIUM: Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, little Clay, trace Calcareous veining, slightly porous, medium dense - moist
				Trench Terminated @ 7 ½ feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
T-10

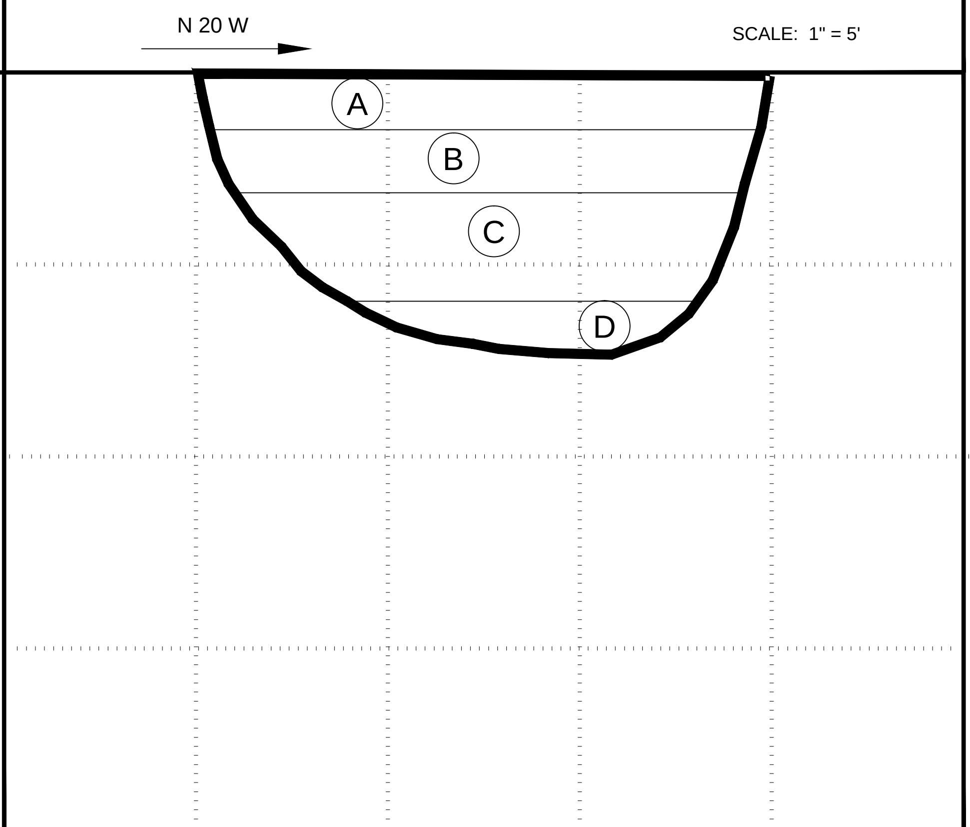
JOB NO.: 15G116-2
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: 9-30-2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: N 20 W

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b	4	23	A: DISTURBED ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace fine root fibers, trace organics, loose - very moist
	b	3	21	
	b	3	23	
	b		9	B: ALLUVIUM: Light Gray Brown Silty fine Sand, trace medium to coarse Sand, medium dense - damp to moist
5	b		17	C: ALLUVIUM: Gray Brown Silty fine Sand to fine Sandy Silt, trace medium to coarse Sand, trace Iron oxide staining, medium dense - moist to very moist
	b		4	D: ALLUVIUM: Gray fine to coarse Sand, trace fine to coarse Gravel, occasional Cobbles, trace Silt, medium dense - damp
				Trench Terminated @ 7 ½ feet
10				
15				

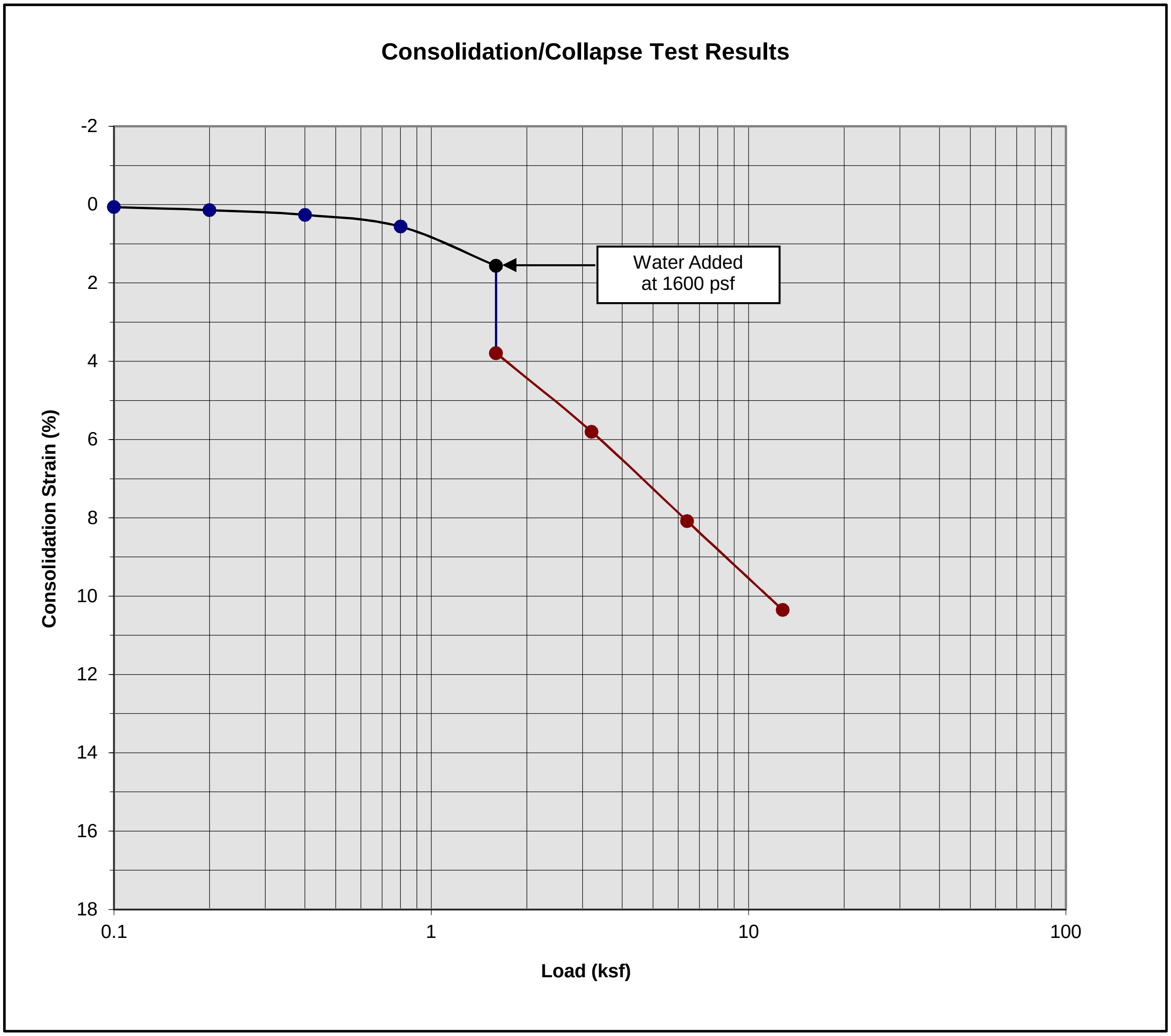
GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-4



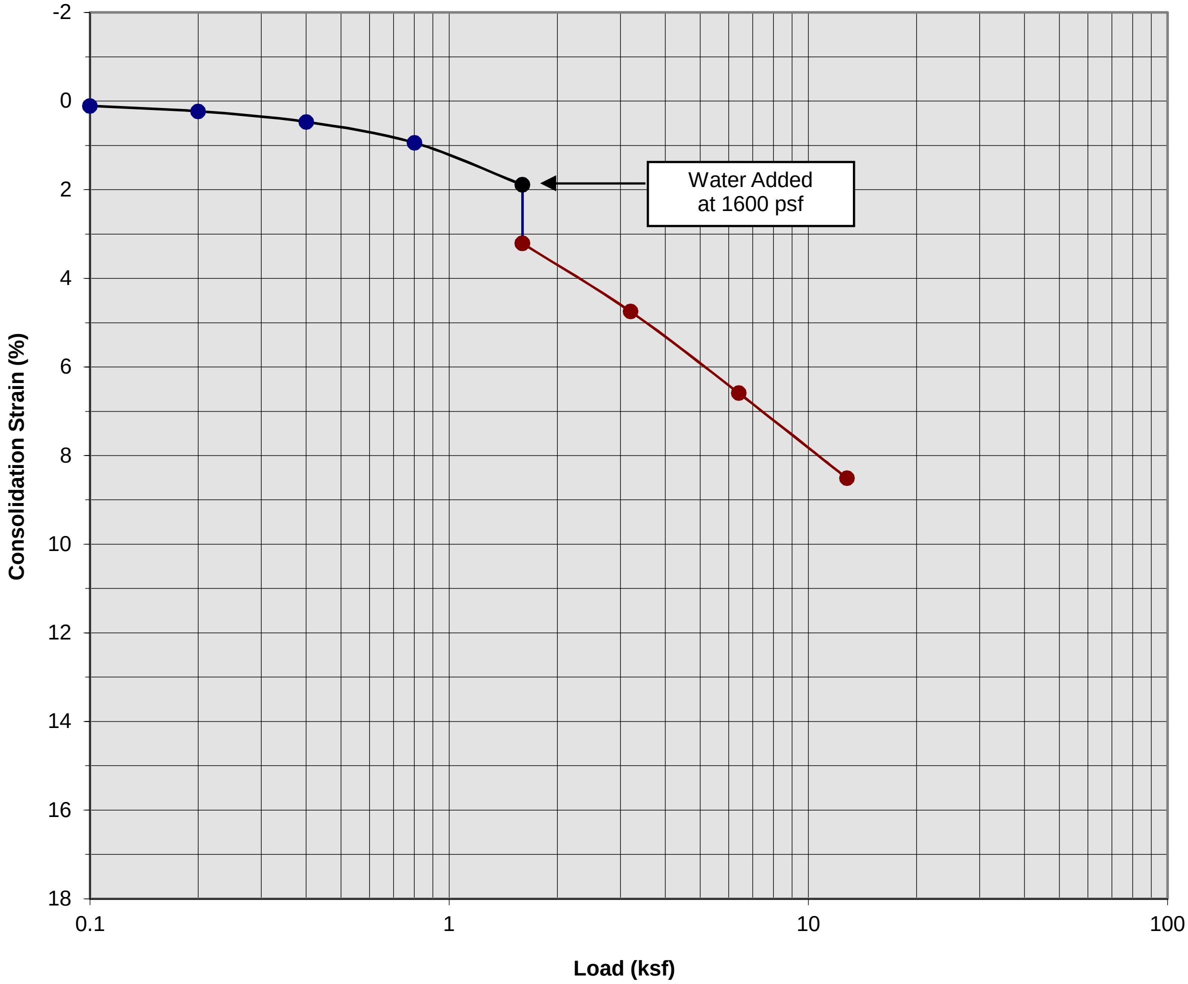
Classification: Gray Brown Silty fine Sand, trace medium Sand

Boring Number:	B-6	Initial Moisture Content (%)	6
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	3 to 4	Initial Dry Density (pcf)	96.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	107.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.23

Proposed C/I Development
Ontario, California
Project No. 15G116-2
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

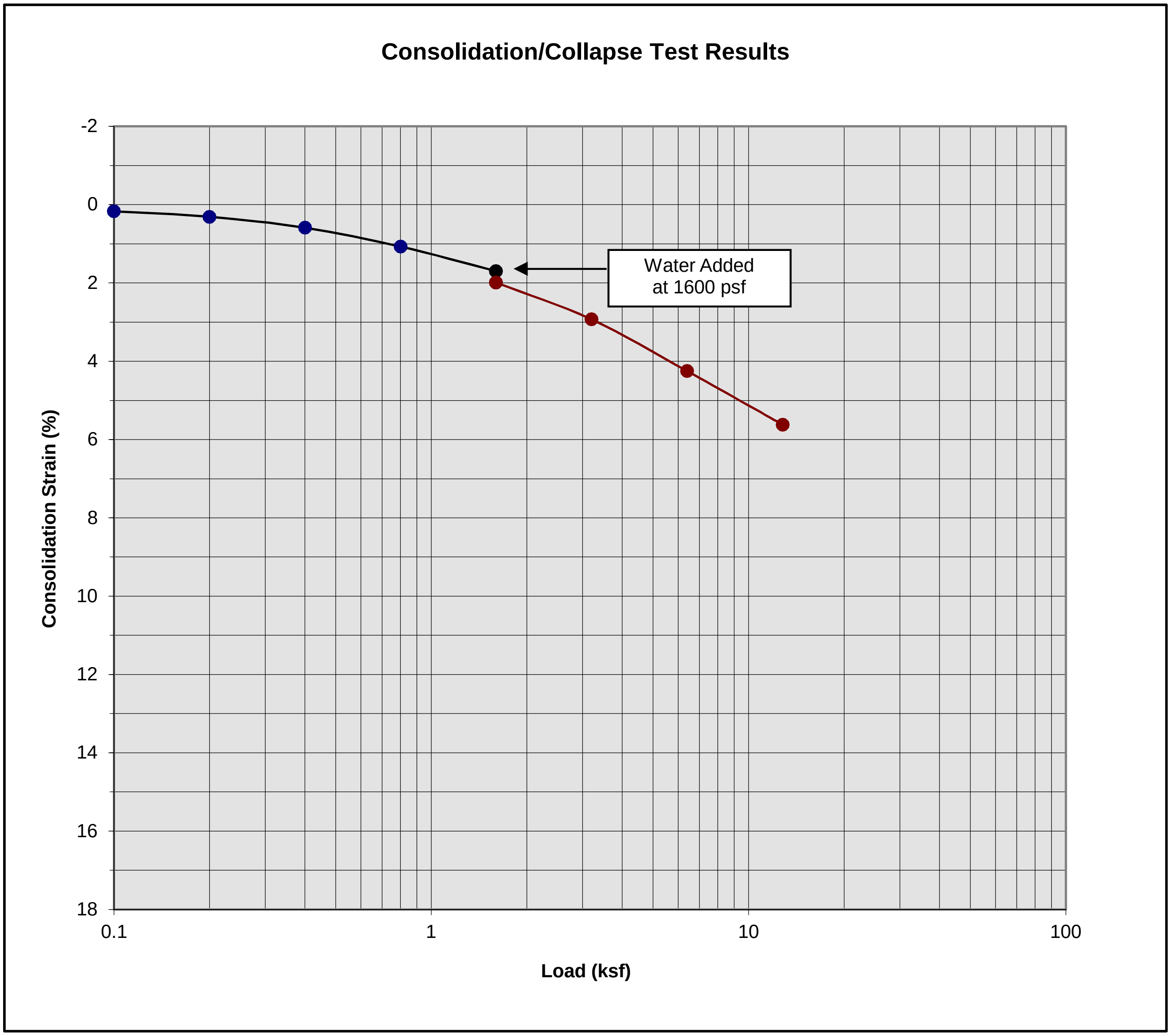


Classification: Light Brown Silty fine Sand, trace Clay

Boring Number:	B-6	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	5 to 6	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.32

Proposed C/I Development
Ontario, California
Project No. 15G116-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

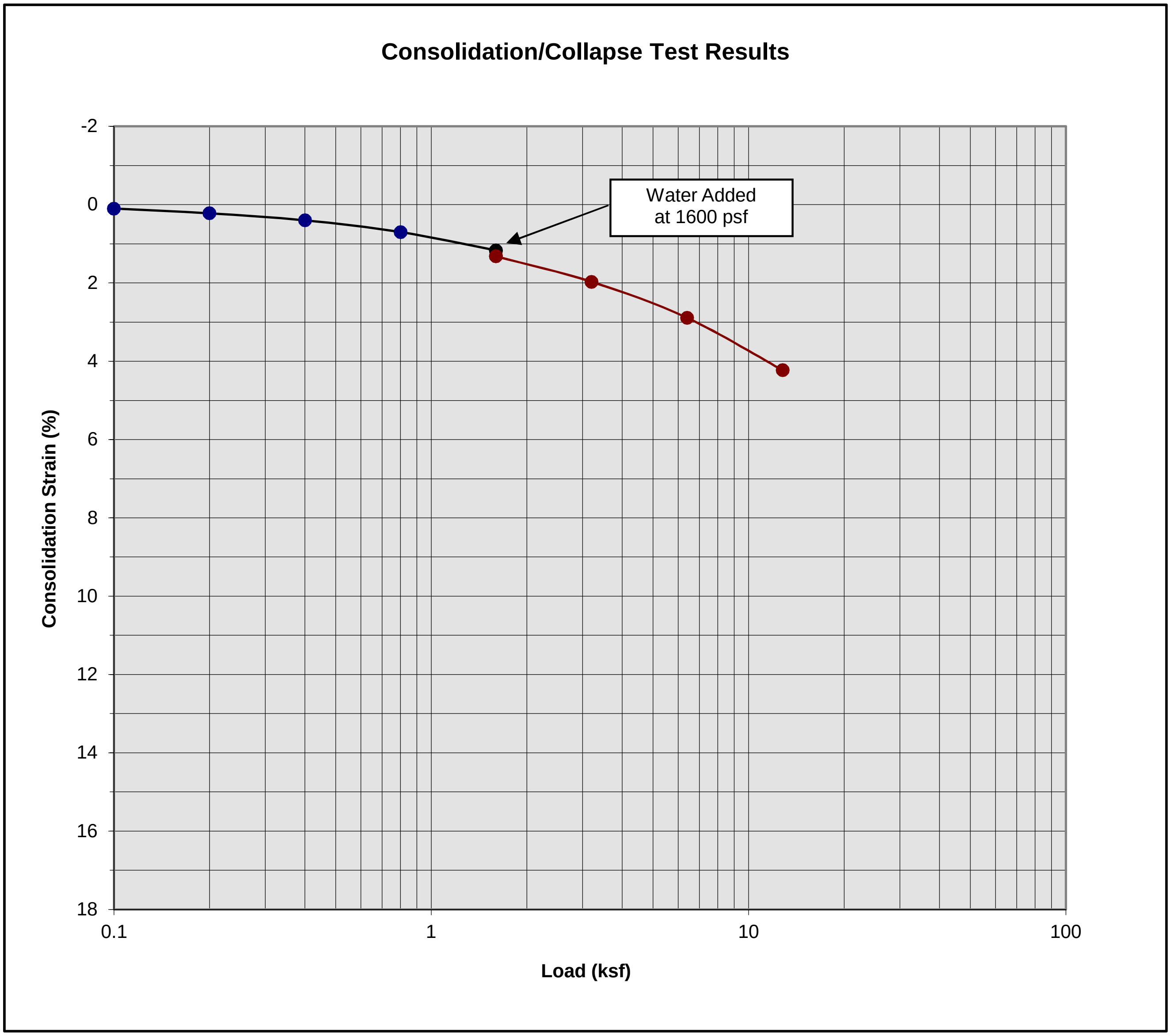


Classification: Gray to Gray Brown Silty fine Sand, trace medium Sand, little Clay

Boring Number:	B-6	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	7 to 8	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	119.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.29

Proposed C/I Development
Ontario, California
Project No. 15G116-2
PLATE C- 3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

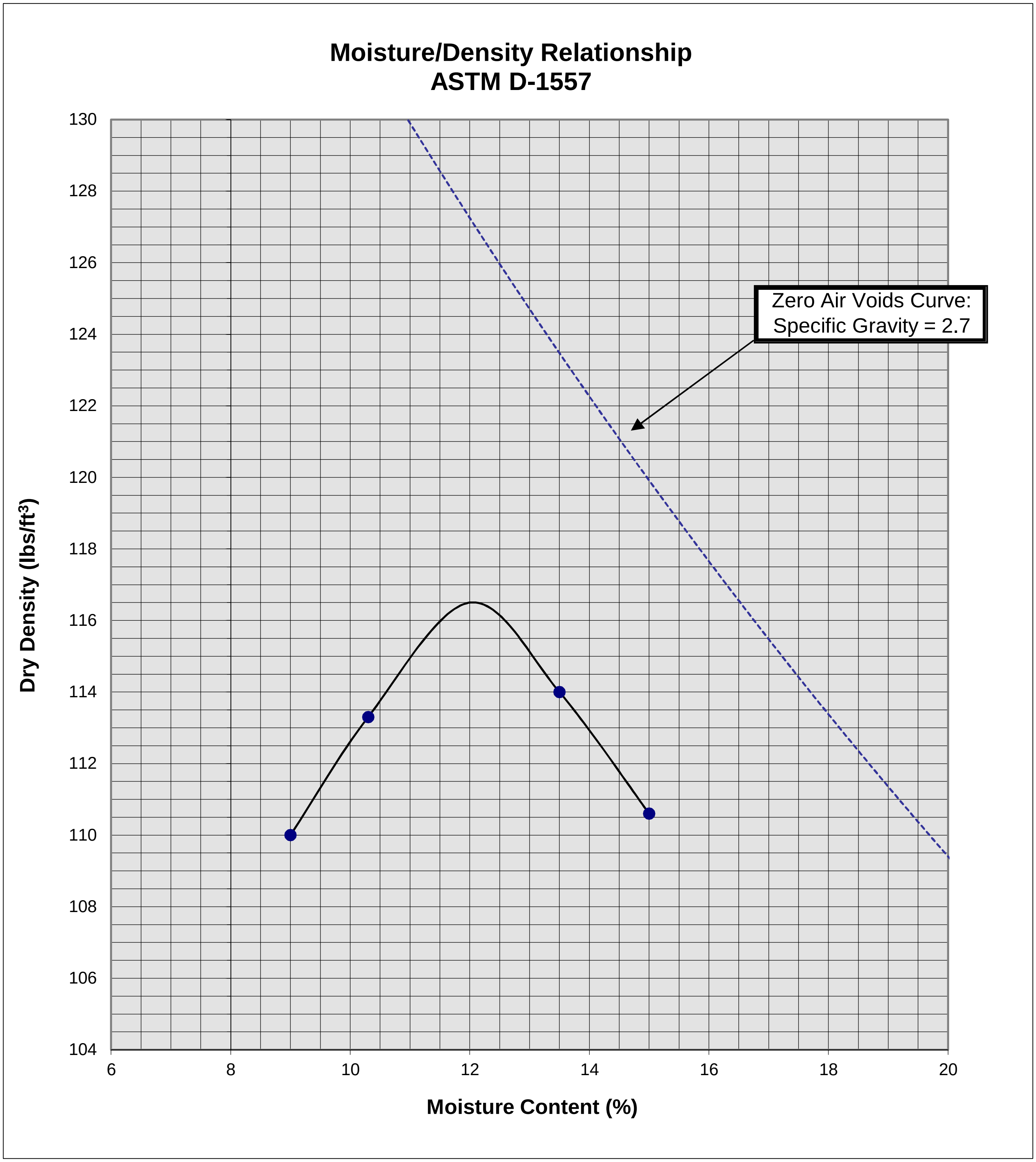


Classification: Light Gray Silty fine Sand to fine Sandy Silt, some Clay

Boring Number:	B-6	Initial Moisture Content (%)	24
Sample Number:	---	Final Moisture Content (%)	27
Depth (ft)	9 to 10	Initial Dry Density (pcf)	96.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	100.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.15

Proposed C/I Development
Ontario, California
Project No. 15G116-2
PLATE C- 4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-6 @ 0 to 5'
Optimum Moisture (%)	12
Maximum Dry Density (pcf)	116.5
Soil Classification	Brown Silty fine Sand, trace medium Sand

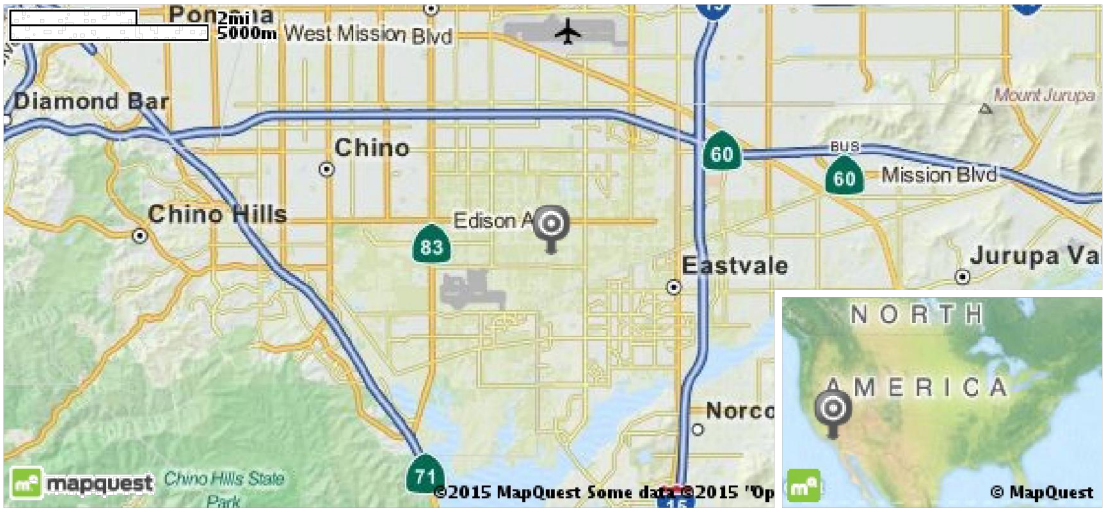
Proposed C/I Development
Ontario, California
Project No. 15G116-2
PLATE C-5

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Design Maps Summary Report

User–Specified Input

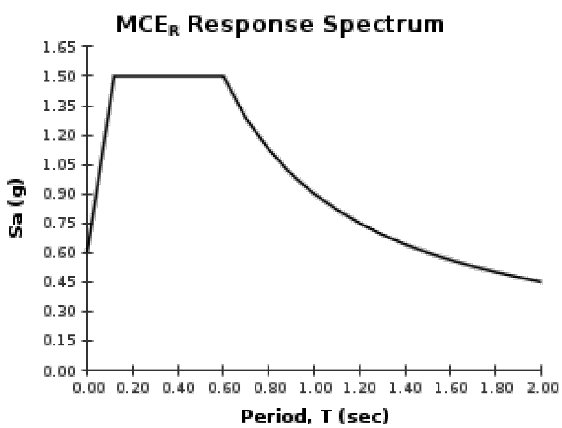
Report Title	Proposed Commercial/Industrial Developement Fri October 2, 2015 21:44:55 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.98609°N, 117.60526°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

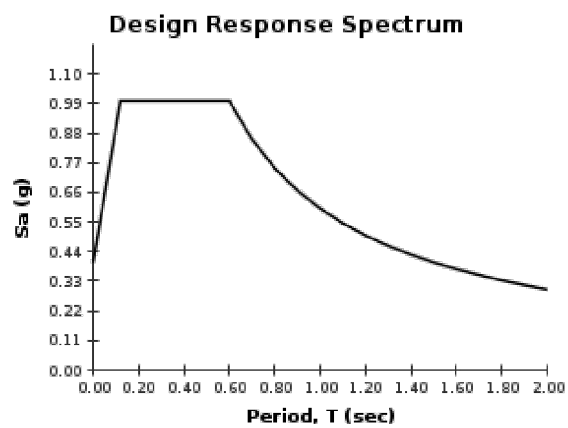


USGS–Provided Output

S_S = 1.500 g	S_{MS} = 1.500 g	S_{DS} = 1.000 g
S_1 = 0.600 g	S_{M1} = 0.900 g	S_{D1} = 0.600 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
<http://geohazards.usgs.gov/designmaps/us/application.php>

SEISMIC DESIGN PARAMETERS

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

ONTARIO, CALIFORNIA

DRAWN: MRM
CHKD: JAS

SCG PROJECT
15G116-2

PLATE E-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

GEOTECHNICAL FEASIBILITY STUDY
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

NEC Merrill Avenue and Carpenter Avenue
Ontario, California
For
Real Estate Development Associates

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

February 25, 2015

Real Estate Development Associates
4100 MacArthur Boulevard, Suite 120
Newport Beach, California 92660

Attention: Mr. Bill Goltermann
Principal

Project No.: **15G116-1**

Subject: **Geotechnical Feasibility Study**
Proposed Commercial/Industrial Development
NEC Merrill Avenue and Carpenter Avenue
Ontario, California

Gentlemen:

In accordance with your request, we have conducted a geotechnical feasibility study at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Daniel W. Nielsen, RCE 77915
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL W. NIELSEN
No. 77915
CIVIL
STATE OF CALIFORNIA

John A. Seminara, GE 2294
Principal Engineer

Distribution: (2) Addressee

22885 Savi Ranch Parkway ▾ Suite E ▾ Yorba Linda ▾ California ▾ 92887
voice: (714) 685-1115 ▾ fax: (714) 685-1118 ▾ www.socalgeo.com

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

It should be noted that this investigation was focused on determining the geotechnical feasibility of the proposed development. **It was not intended to be a design level investigation. Future studies will be necessary to refine the preliminary design parameters that are presented within this report.**

Preliminary Geotechnical Design Recommendations

- Demolition of the numerous existing structures, including buildings and canopy structures will be required in order to facilitate construction of the new buildings. Demolition of these structures and associated improvements should include all foundations, floor slabs, utilities, and any other subsurface improvements that will not remain in place for use with the new development. Debris resultant from demolition should be disposed of offsite. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2 inch particle size, well mixed with the on-site soils, and incorporated into new structural fills or it may be crushed and made into crushed miscellaneous base (CMB), if desired.
- Site stripping of any existing vegetated areas should include all vegetation, organic soils, and root masses. These materials should be disposed of offsite. Site stripping should also include removal of all manure and any topsoil. These materials should also be disposed of off-site. Manure was observed throughout the site, especially within the active cattle pens with thickness of 3 to 6± inches at the boring and trench locations. Additionally, some of the soils in the upper 6 to 18± inches in the cattle pen areas are blended with manure and possess moderate to high organic contents.
- Some of the borings and trenches encountered artificial fill soils, extending to depths of 1½ to 5½± feet. The fill soils are considered to represent undocumented fill, and are not suitable for support of the new structures. The fill soils are generally underlain by low to moderate strength native alluvial soils.
- The proposed development is considered to be feasible with respect to the geotechnical conditions encountered at the boring and trench locations at the site. However, remedial grading will be necessary in order to support the proposed structures on conventional shallow foundation systems. Preliminary remedial grading and foundation design recommendations have been provided herein, based on the provided site plans, assumed site grading, and assumed foundation loads.
- Based on these preliminary assumptions, remedial grading should be performed within the proposed building areas, to remove the undocumented fill soils in their entirety, as well as the upper portion of the alluvial soils, and replace them as compacted fill for support of the floor slabs and foundations.
- Preliminarily, the overexcavation within the building area is also recommended to extend to a depth of at least 3 to 5 feet below existing and proposed building pad subgrade elevations. The overexcavation should also extend to a depth of at least 2 to 4 feet below bearing grade within the influence zones of any new foundations. These recommendations are subject to review and may be revised after further geotechnical investigation.

- Following completion of the recommended overexcavation, the exposed soils should be evaluated by the geotechnical engineer. After the overexcavation subgrade soils have been approved by the geotechnical engineer, the resulting soils may be replaced as compacted structural fill.
- Preliminarily, the new parking area subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Preliminary Foundation Design Recommendations
- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,000 to 3,000 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of two (2) to four (4) No. 5 rebars in strip footings. Additional reinforcement may be necessary for structural considerations.

Preliminary Floor Slab Design Recommendations
- Conventional Slabs-on-Grade, minimum 5 to 6 inches thick.
- The actual thickness and reinforcement of the floor slabs should be determined by the structural engineer based on the imposed loading.

Preliminary Pavement Design Recommendations

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	6½	8	9
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in general accordance with our Proposal No. 15P124, dated February 2, 2015. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to determine the geotechnical feasibility of the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical feasibility study.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the northeast corner of Merrill Avenue and Carpenter Avenue in Ontario, California. The site is bounded to the north by Eucalyptus Avenue, to the east by the Cucamonga Creek flood control channel, to the south by Merrill Avenue, and to the west by Carpenter Avenue. The general location of the site is illustrated on the Site Location Map included as Plate 1 in Appendix A of this report.

The overall site consists of seven (7) contiguous parcels, which total 124.8± acres in size. However, the northwestern-most and southwestern-most parcels were not accessible at the time of this study. The three (3) northeastern parcels are currently developed as a dairy. The farm house, milking barn, and other dairy related structures are located in the northern portion of these parcels. The structures appear to be single story structures of wood frame construction and assumed to be supported on conventional shallow foundations with concrete slab-on-grade floors. Multiple canopy structures are located in the central area of these three parcels and detention ponds for liquid-waste, such as cattle wash water, are located in the southern portion of these parcels.

The southwestern parcel is developed as a dairy. A farm house, milking barn, and other dairy related structures are present along the western property line of this parcel. Several canopy structures are present in the central area of this parcel and a soil/manure stockpile is present in the northeastern corner of this parcel.

Ground surface cover consists throughout the active dairies generally consists of manure in the cattle pen areas, native grass and weed growth in the pond areas, turf grass and asphaltic concrete and concrete pavements surrounding the single family residences and the remaining areas consist of exposed soils with sparse native grass and weed growth.

The two northwestern parcels appear to have been previously developed as dairies and are no longer operational. The ground surface cover in these parcels consists of exposed soil, row crops, and remnants of several structures.

The southeastern parcel is utilized for agricultural purposes. The ground surface cover throughout this parcel consists of row crops and areas with exposed soil.

Detailed topographical information was not available at the time of this report. Visually, site topography slopes gently downward to the south, at an estimated gradient of 1± percent. Based on our review of the USGS 7.5′ topographic map of the Corona North quadrangle, there is up to 25± feet of elevation differential across the subject site.

3.2 Proposed Development

Based on two site plans provided by the client, Scheme 1 and 2 which are both dated October 23, 2013, the site will be developed with either four (4) or five (5) commercial/industrial buildings. The buildings will range from 354,900± ft^2 to 1,237,080± ft^2 in size. One (1) large commercial/industrial building will be located in the eastern half of the site. This building will be constructed in a cross-dock configuration with loading docks along the east and west sides of the building. The remaining smaller commercial/industrial buildings will be located in the western half of the site. These buildings will have loading docks along the north and/or south sides of the buildings. The buildings will be surrounded by asphaltic concrete pavements in the parking and drive lane areas and Portland cement concrete pavements in the loading dock areas. It is also anticipated that several landscape planter areas will be located throughout the site.

Detailed structural information has not been provided. It is assumed that the buildings will be single story structures of tilt-up concrete construction, typically supported on conventional shallow foundations with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 80 kips and 3 to 5 kips per linear foot, respectively.

Grading plans for the proposed development are currently not available. Based on the site topography, cuts and fills of 5 to 7± feet will be necessary to achieve the proposed building site grades. No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development.

Detailed grading plans were not available at the time of this report. The proposed development is not expected to include any significant amounts of below grade construction such as basements or crawl spaces. Based on the existing and assumed topography, cuts and fills 8 to 10± feet are expected to be necessary to achieve the proposed building pad grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of five (5) borings advanced to depths of 25 to 31± feet below existing site grades. All of the borings were logged during drilling by a member of our staff. In addition to the five borings, a total of six (6) trenches were excavated at the site to depths of 10½ to 11± feet below existing site grades. These trenches were excavated using a backhoe with a 36-inch wide bucket. All of the trenches were logged during excavation by a member of our staff.

The borings were advanced with hollow-stem augers, by a limited access track-mounted drilling rig. Representative bulk and in-situ soil samples were taken during drilling. Relatively undisturbed in-situ samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. In-situ samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers were driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings and trenches are indicated on the Boring and Trench Location Plan, included as Plate 2 in Appendix A of this report. The Boring and Trench Logs, which illustrate the conditions encountered at the boring and trench locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Manure

Manure was present at the ground surface within the cattle pens at Boring No. B-1 and at Trench Nos. T-1, T-2, and T-3 with thicknesses of 3 to 6± inches below existing site grades.

Artificial Fill

Artificial fill soils were encountered at the ground surface at Boring Nos. B-3 and B-4, and beneath manure materials at Trench No. T-2. The fill soils generally consist of loose to medium dense silty fine sands or clayey fine sands extending to depths of 2½ to 6½± feet. The fill soils possess a disturbed appearance and/or artificial debris, such as brick or glass fragments, resulting in their classification as artificial fill.

The fill materials at Boring No. B-3 from depths between 5 and 6 feet possessed significant organic content. The presence of organic materials within this sample resulted in an elevated moisture content test result.

Alluvium

Native alluvial soils are present at the ground surface or beneath the fill soils or manure at all of the boring and trench locations. The upper alluvial soils generally consist of loose to medium dense fine sands with trace to little amounts of silt and loose to medium dense silty fine sands and clayey fine sands, extending to the maximum depth explored of 31± feet below existing site grades. At greater depths the alluvium generally consists of medium dense clayey fine sands and medium stiff to stiff fine sandy clay with trace to little amounts of silt extending to the maximum depth explored of 30± feet. Occasional strata consisting of very soft to stiff sandy clays and/or clayey silts were encountered at Boring Nos. B-3 and B-5 and Trench Nos. T-4 and T-5. Occasional samples of the alluvium from various depths possess slight to moderate porosity.

Groundwater

Groundwater was not encountered at any of the borings or trenches. In addition, delayed readings taken within the open boreholes and trenches did not identify any free water. Based on the lack of any water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 31± feet below existing site grades, at the time of the subsurface investigation.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

In-situ Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring and Trench Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-8 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A Representative bulk sample was tested to determine its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557, and are presented on Plate C-9 in Appendix C of this report. This test is generally used for comparison with the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Soluble Sulfates

Representative samples of the near-surface soils were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	ACI Classification
B-3 @ 0 to 5 feet	0.049	Negligible
B-5 @ 0 to 5 feet	0.017	Negligible

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829 as required by the California Building Code (CBC). The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-1 @ 0 to 5 feet	3	Very Low
T-5 @ 0 to 5 feet	14	Very Low

Organic Content Testing

Selected soil samples have been tested to determine their organic content, in accordance with ASTM Test Method 2974. The results of the testing are as follows:

Sample Identification	Organic Content (%)
T-1 @ 0 to 3 inches	9.2
T-1 @ 3 to 6 inches	11.6
T-1 @ 6 to 9 inches	6.3
T-1 @ 6 to 9 inches	8.5
T-2 @ 0 to 3 inches	15.2
T-2 @ 6 to 12 inches	11.4
T-3 @ 16 to 20 inches	2.3
T-3 @ 0 to 6 inches	44.1
T-3 @ 6 to 12 inches	1.3

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations. The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record.

Based on the preliminary nature of this investigation, further geotechnical investigation(s) will be required prior to construction of the proposed development. The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2013 California Building Code (CBC) was adopted by all municipalities within Southern California on January 1, 2014. The CBC provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

The 2013 CBC Seismic Design Parameters have been generated using U.S. Seismic Design Maps, a web-based software application developed by the United States Geological Survey. This software application, available at the USGS web site, calculates seismic design parameters in accordance with the 2013 CBC, utilizing a database of deterministic site accelerations at 0.01 degree intervals. The table below is a compilation of the data provided by the USGS application. A copy of the output generated from this program is included as Plate E-1 in Appendix E of this report. A copy of the Design Response Spectrum, as generated by the USGS application is also included in Appendix E. Based on this output, the following parameters may be utilized for the subject site:

2013 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.600
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.900
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.600

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

Research of the San Bernardino County Land Use Services website indicates that the subject site is not located within a zone of liquefaction susceptibility. In addition, the subsurface conditions at the boring locations are not considered to be conducive to liquefaction. Based on the mapping performed by San Bernardino County and the conditions encountered at the boring locations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

The active cattle pen areas are covered with manure at the ground surface, with thicknesses of about 6± inches at the boring and trench locations. All of the manure and any organic topsoil should be removed and exported from the site. Additionally, some of soils in the upper 18± inches, located beneath the manure and topsoil, possess organic contents greater than 3 percent. It may be feasible to use these soils in fills, provided that they are cleaned of highly organic materials and can be blended with the underlying soils in order to reduce the organic content to less than 3 percent throughout.

Artificial fill soils are present at some of the boring and trench locations extending to depths of 1½ to 5½± feet. These fill materials are somewhat variable in composition and strength, and occasional samples possess trace amounts of artificial debris. One of the samples of fill materials, recovered from Boring No. B-3 between depths of 5 to 6 feet possessed significant organic content. Based on these characteristics and on the lack of any documentation regarding the placement or compaction of the fill soils, these near-surface fill soils are considered to represent undocumented fill and are not considered suitable for support of the new structures. The near surface native alluvial soils also possess variable strengths and marginal consolidation and collapse characteristics and are not considered suitable for support of the proposed structure. Based on these conditions, remedial grading is considered warranted within the proposed building areas in order to remove and replace the artificial fill soils and a portion of the near surface alluvial soils as compacted structural fill.

Settlement

The recommended remedial grading will remove the existing fill soils as well as some of the native alluvium, and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant load increases from the foundations of the new structure. Provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structures are expected to be within tolerable limits.

Soluble Sulfates

The results of the soluble sulfate testing, as discussed in Section 5.0 of this report, indicate soluble sulfate concentrations of 0.017 and 0.049 percent. This concentration is considered to be negligible with respect to the American Concrete Institute (ACI) Publication 318-05 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at the proposed building pad grades.

Expansion

The near surface soils at this site generally consist of silty sands, sandy silts and fine sands. Laboratory testing indicates that these materials have a very low expansion potential (EI = 2 and 14). Based on these test results, no design considerations related to expansive soils are considered warranted for this site. It is recommended that additional expansion index testing be conducted during subsequent geotechnical investigation and at the completion of rough grading to verify the expansion potential of the as-graded building pads.

Organic Content

The results of laboratory testing performed on near-surface soils within the active cattle pen areas indicates soils within the upper 18± inches possess organic contents ranging from the soils possess organic contents generally ranging from 1.3 to 44.1 percent. Based on the results of laboratory testing, the soils possessing the greater organic content are generally located in the upper 6 to 18 inches of the ground surface.

It is recommended that all manure and any organic topsoil be removed during site stripping. It is expected that grubbing and segregating of the top 6 to 18± inches in the cattle pens will be performed prior to grading. Therefore, subsequent to the stripping of any organic materials at the site, the remaining soils are expected to possess organic contents of less than 3± percent, with exception to any organic materials in artificial fills, such as those encountered at Boring No B-3. Any additional organic materials encountered in buried fills should also be segregated during grading.

It is feasible to use some of the soils in the upper 6 to 18± in structural fills, provided that these soils are cleaned of all apparent vegetation or highly organic material and thoroughly blended with the inorganic soils from greater depths at the site. Based on our experience with similar projects in the vicinity of the project site, a final mixture containing less than 3 percent organic content is acceptable for the project site. It is recommended that additional organic testing be conducted during rough grading of the building pads in order to verify that the organic content of the blended on-site soils are within the acceptable limits.

Shrinkage/Subsidence

Based on the results of the laboratory testing, removal and recompaction of the near-surface undocumented fill soils is estimated to result in an average shrinkage of 8 to 12 percent. Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.10 to 0.15 feet.

These estimates are based on previous experience and the subsurface conditions encountered at the boring and trench locations. The actual amount of subsidence is expected to be variable and will be dependant on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

No grading or foundation plans were available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report. These plans should also be made available prior to performance of the design level geotechnical investigation.

6.3 Preliminary Site Grading Recommendations

The preliminary grading recommendations presented below are based on the design details that were available at the time of this report, and the subsurface conditions encountered at our boring locations. These recommendations are general in nature, and should be confirmed as part of the design level geotechnical investigation.

Site Stripping and Demolition

Initial site stripping should include removal of all manure and any surficial vegetation. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

The proposed development will require demolition of the existing buildings, dairy structures and pavements. Additionally, any existing improvements that will not remain in place for use with the new development should be removed in their entirety. This should include all foundations, floor slabs, utilities, and any other subsurface improvements associated with the existing structures. The existing pavements are not expected to be reused with the new development. Debris resultant from demolition should be disposed of offsite. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2 inch particle size, well mixed with the on-site soils, and incorporated into new structural fills or it may be crushed and made into CMB, if desired.

Treatment of Existing Soils: Building Pads

Remedial grading will be necessary within the proposed building pad areas to remove all of the undocumented fill soils and a portion of the near surface alluvial soils. The depth of overexcavation should be determined during the design level geotechnical investigation. On a preliminary basis, overexcavation to depths of 3 to 5 feet below existing and proposed building pad grades should be anticipated. The overexcavation recommendation within the foundation areas will likely be 2 to 3± feet below foundation bearing grade. Please note that adverse geologic conditions encountered during the design level investigation could result in additional overexcavation requirements.

The overexcavation areas should extend at least 5 feet beyond the building perimeters and foundations, and to an extent equal to the depth of fill below the new foundations. If the proposed structures incorporate any exterior columns (such as for a canopy or overhang) the overexcavation should also encompass these areas.

Based on conditions encountered at the exploratory boring locations, occasional zones of very moist soils may be encountered at or near the base of the recommended overexcavation in some localized areas. Scarification and air drying of these materials may be sufficient to obtain a stable subgrade. However, if highly unstable soils will be encountered, and if the construction schedule does not allow for delays associated with drying, mechanical stabilization, usually consisting of coarse crushed stone and/or geotextile, will likely be necessary. Concrete and asphalt debris that is crushed to a 4-inch particle size may also be feasible to use as a subgrade stabilization material. If unstable subgrade conditions are encountered, the geotechnical engineer should be contacted for supplementary recommendations.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches, moisture treated to 2 to 4 percent above optimum, and recompacted. The previously excavated soils may then be replaced as compacted structural fill, with exception to any buried organic materials, such as those encountered in the fill materials at Boring No. B-3.

Treatment of Existing Soils: Retaining Walls and Site Walls

Although not indicated on the site plan, it may be necessary to construct some small retaining walls or site walls at or near the existing surface grade. Overexcavation will also be necessary in these areas to remove the existing fill soils and lower strength alluvium. The overexcavation depth should be expected to be on the order of 1 to 3 feet below proposed foundation bearing grade.

Treatment of Existing Soils: Parking Areas

Based on economic considerations, overexcavation of the existing soils in the new parking areas is not considered warranted, with the exception of areas where lower strength, or unstable soils are identified by the geotechnical engineer during grading.

Subgrade preparation in the new parking areas should initially consist of removal of all soils disturbed during stripping and demolition operations. The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength alluvial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed parking areas. The grading recommendations presented above do not mitigate the extent of undocumented fill soils in the parking areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, all of the existing undocumented fill soils within these areas should be removed and replaced as structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent of the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.

- All grading and fill placement activities should be completed in accordance with the requirements of the CBC and the grading code of the city of Ontario.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of very low to non-expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Ontario. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near surface soils generally consist of silty sands, sandy silts, and fine sands. These materials will be subject to caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, temporary excavation slopes should be made no steeper than 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

Most of the near surface soils possess appreciable silt and occasional clay content and may become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. In addition, based on their granular content, some of the on-site soils will also be susceptible to erosion. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

If the construction schedule dictates that site grading will occur during a period of wet weather, allowances should be made for costs and delays associated with drying the on-site soils or import of a drier, less moisture sensitive fill material. Grading during wet or cool weather may also increase the depth of overexcavation in the pad areas as well as the need for and/or the thickness of the crushed stone stabilization layer, discussed in Section 6.3 of this report.

Groundwater

Based on the conditions encountered in the borings, groundwater is not present within 30± feet of the ground surface. Based on the anticipated depth to groundwater, it is not expected that the groundwater will affect excavations for the foundations or utilities.

6.5 Preliminary Foundation Design and Construction

Based on the preceding geotechnical design considerations and preliminary grading recommendations, it is assumed that the new buildings will be underlain by newly placed structural fill soils, extending to depths of 2 to 3 feet below foundation bearing grade. Based on this subsurface profile, the proposed structures may be supported on conventional shallow foundations.

The foundation design parameters presented below provide anticipated ranges for the allowable soil bearing pressures. These ranges should be refined during the subsequent design level geotechnical investigation.

Building Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,000 to 3,000 lbs/ft^2.

- Minimum longitudinal steel reinforcement within strip footings: Two (2) to Four (4) No. 5 rebars.

General Foundation Design Recommendations

The allowable bearing pressures presented above may be increased by one-third when considering short duration wind or seismic loads. Additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Estimated Foundation Settlements

Typically, foundations designed in accordance with the preliminary foundation design parameters presented above will experience total and differential settlements of less than 1.0 and 0.5

inches, respectively. A detailed settlement analysis should be conducted as part of the design level geotechnical investigation, once detailed foundation loading information is available.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 275 - 325 lbs/ft^3
- Friction Coefficient: 0.25 to 0.35

6.6 Preliminary Floor Slab Design and Construction

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Preliminarily, the floors of the proposed structures may be constructed as conventional slabs-on-grade supported on newly placed structural fill. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 5 to 6 inches.

- Minimum slab reinforcement: Not required for geotechnical considerations due to the very low expansion potential of the near surface soils. Additional expansion index testing should be performed to confirm this recommendation at the time of the design level investigation. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab which will incorporate such coverings. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Preliminary Retaining Wall Design and Construction

Although not indicated on the site plan, the proposed development may require some small retaining walls to facilitate the new site grades and in loading docks. Retaining walls are also expected within the truck dock areas of the proposed building. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. The following parameters assume that only the on-site soils will be utilized for retaining wall backfill. The on-site soils generally consist of silty sands, sandy silts and fine sands. Based on their composition, the on-site soils have been assigned a friction angle of 30 degrees.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type: On-Site Sands and Silty Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		125 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	42 lbs/ft^3
	Active Condition (2h:1v backfill)	67 lbs/ft^3
	At-Rest Condition (level backfill)	63 lbs/ft^3

Regardless of the backfill type, the walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 2 feet below the proposed bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a minimum 1 foot thick layer of free-draining granular material (less than 5 percent passing the No. 200 sieve) be placed against the face of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. This material should be approved by the geotechnical engineer. In lieu of the 1 foot thick layer of free-draining material, a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, may be used. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The layer of free draining granular material should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557-91). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Seismic Lateral Earth Pressures

In accordance with the 2013 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 8-foot on-center spacing. The weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system.

6.8 Preliminary Pavement Design Parameters

Presented below are preliminary recommendations for pavements that may be required around the perimeters of the proposed structures. Grading recommendations for these pavement areas should be developed during the design level geotechnical investigation.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of silty sands, sandy silts and fine sands. These soils are considered to possess fair to good pavement support characteristics with an estimated R-values ranging from 40 to 50. The subsequent pavement design is based upon an assumed R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed after completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20 year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35
9.0	93

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as determined by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	6½	8	9
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A

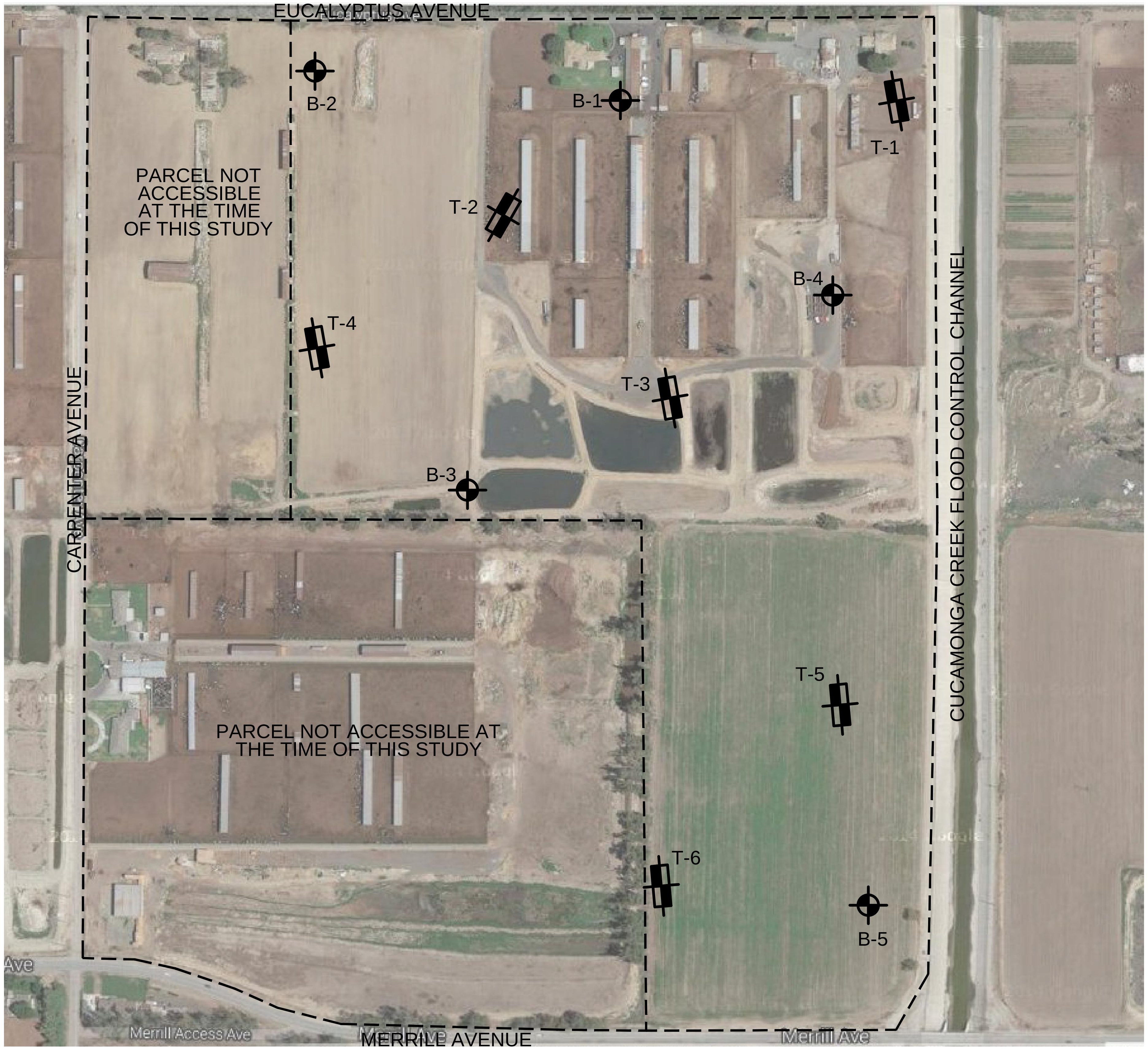
SOURCE: SAN BERNARDINO COUNTY
THOMAS GUIDE, 2013

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

ONTARIO, CALIFORNIA

SCALE: 1" = 2400'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: ENT CHKD: JAS	
SCG PROJECT 15G116-1	
PLATE 1	



GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

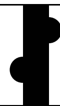
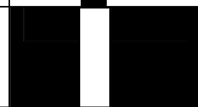
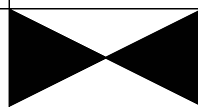
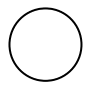
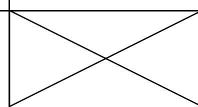
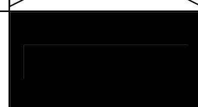
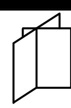
APPROXIMATE TRENCH LOCATION

NOTE: BASE MAP OBTAINED FROM GOOGLE EARTH.

BORING AND TRENCH LOCATION PLAN	
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT	
ONTARIO, CALIFORNIA	
SCALE: 1" = 300'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: ENT CHKD: JAS	
SCG PROJECT 15G116-1	
PLATE 2	

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3” indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS 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 OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING NO. B-1

JOB NO.: 15G116
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 2/10/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					MANURE: 3 to 6± inches thick							
	X	16			ALLUVIUM: Gray Brown fine Sand, trace medium Sand, little to some Silt, medium dense-damp	100	3					
	X	11			@ 2½ to 8½ feet, very loose to loose	95	3					
5	X	6				96	3					
	X	12				102	3					
10	X	10			Light Brown Silty fine Sand, loose-damp	106	6					
					Gray Brown Silty fine Sand, trace medium Sand, slightly porous, trace Iron oxide staining, medium dense-damp to moist							
15	X	34			@ 14½ to 15½ feet, trace fine to coarse Gravel	97	12					
					Gray Brown fine Sandy Silt, trace Clay, trace fine to coarse Gravel, trace Iron oxide staining, medium dense-moist to very moist							
20	X	27				100	23					
					Gray Brown Silty fine Sand, trace fine to coarse Gravel, trace Clay, trace Iron oxide staining, medium dense-moist to very moist							
25	X	31				109	17					

Boring Terminated at 25'

TBL 15G116.GPJ SOCALGEO.GDT 2/26/15

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 15G116
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 2/10/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					ALLUVIUM: Gray Brown fine Sand, little to some Silt, loose-moist							
		7				98	7					
		7				104	8					
5		14			Gray Brown Silty fine Sand, loose to medium dense-moist	107	13					
		31				113	15					
		19			@ 9 feet, trace Iron oxide staining	97	18					
10												
		21					13					
15												
					Gray Brown Clayey fine Sand, little Silt, trace Iron oxide staining, medium dense-moist to very moist							
		18					20					
20												
					@ 22 to 27 feet, trace fine to coarse Gravel, trace medium to coarse Sand, abundant Iron oxide staining							
		13					17					
25												
					Gray fine Sandy Clay, trace Silt, very soft to soft-very moist							
		3	0.5				30					
30		2	0.5			91	27					
					Boring Terminated at 31'							

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 15G116
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 2/10/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					FILL: Gray Brown to Brown Silty fine Sand, trace Glass fragments, mottled, loose-damp to moist							
	X	14				92	12					
					FILL: Gray Brown fine Sand, little to some Silt, mottled, loose-damp to moist							
	X	13				100	6					
5					FILL: Dark Brown Silty fine Sand, little to some Organics, loose-moist to very moist							
	X	8				62	44					
					ALLUVIUM: Gray to Gray Brown fine Sand, little to some Silt, loose-moist							
	X	7				96	11					
	X	7				97	6					
10					Gray to Gray Brown Silty fine Sand, trace Iron oxide staining, loose-moist							
					Gray Clayey fine Sand, little Silt, trace Iron oxide staining, medium dense-moist							
	X	19					16					
15												
					Gray Brown Clayey Silt, trace fine Sand, trace Iron oxide staining, moderately porous, medium stiff-very moist							
	X	11	1.5				27					
20					Gray Brown Silty fine Sand, trace Iron Oxide staining, trace medium Sand, medium dense-moist to very moist		16					
	X	16					19					
25												
					@ 27 to 30 feet, abundant Iron oxide staining, loose to medium dense							
	X	10					24					
30					Boring Terminated at 30'							

TBL 15G116.GPJ SOCALGEO.GDT 2/26/15

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 15G116
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 2/10/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (SURFACE ELEVATION: --- MSL)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	7			FILL: Gray to Gray Brown Clayey fine Sand, trace Silt, trace medium Sand, trace fine to coarse Gravel, medium dense-damp		7					
					FILL: Gray To Gray Brown Silty fine Sand, trace Clay, mottled, loose-damp		6					
	X	20			ALLUVIUM: Gray Brown fine Sand, little to some Silt, medium dense-damp		5					
5	X	10			Gray to Gray Brown Clayey fine Sand, some Silt, trace Iron oxide staining, loose to medium dense-moist to very moist		14					
	X	11					13					
10												
	X	20			Light Gray Silty fine Sand, trace Clay, trace medium Sand, slightly porous, trace Iron oxide staining, medium dense-moist		15					
15												
	X	16			Gray Brown Clayey fine Sand, some Silt, trace Iron oxide staining, trace calcareous veining, slightly porous, medium dense-moist to very moist		21					
20												
	X	11					21					
25					Boring Terminated at 25'							

TBL 15G116.GPJ SOCALGEO.GDT 2/26/15

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 15G116
PROJECT: Proposed C/I Development
LOCATION: Ontario, California

DRILLING DATE: 2/10/15
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Eric Torres

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					<u>ALLUVIUM:</u> Gray Brown Silty fine Sand, loose-moist to very moist							
	X	9				93	19					EI = 2 @ 0 to 5'
	X	8				105	15					
					Light Gray to Gray Clayey fine Sand to fine Sandy Clay, slightly porous, loose to medium stiff-moist to very moist							
5	X	12	4.5+			110	18					
	X	7	2.75			85	29					
	X	7	2.25			95	27					
10												
					Gray to Gray Brown Silty fine Sand, trace medium Sand, loose-moist to very moist							
	X	13				100	18					
15												
					Gray Brown fine Sandy Clay, some Silt, trace Iron oxide staining, trace calcareous veining, very soft to soft-very moist							
	X	3	1.25			89	34					
20												
					@ 22 to 30 feet, medium stiff to stiff							
	X	13	4.5			107	20					
25												
	X	11	2.0			103	24					
30												
					Boring Terminated at 30'							

TBL 15G116.GPJ SOCALGEO.GDT 2/26/15

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-1

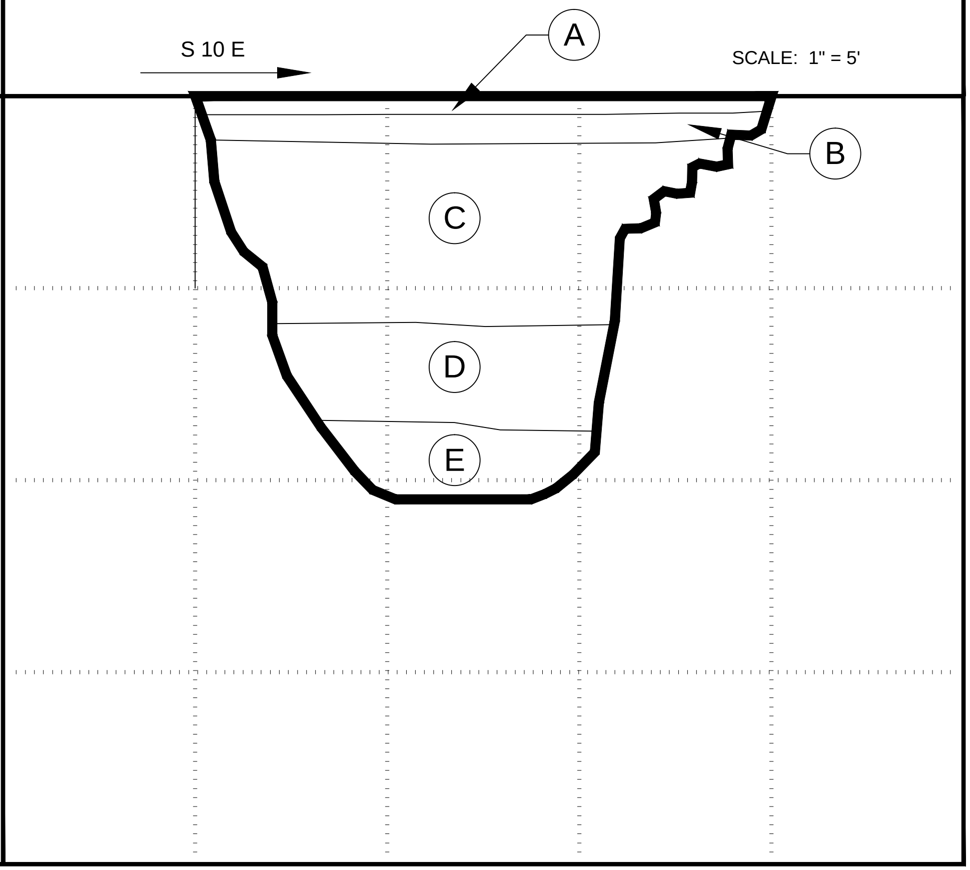
JOB NO.: 15G116-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: February 10, 2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: S 10 E

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		26	A: MANURE: 6 inches thick
	b		10	
	b		10	B: DISTURBED ALLUVIUM: Dark Gray Brown Silty fine Sand, some manure, loose - moist
	b		6	C: ALLUVIUM: Light Brown fine Sand, trace medium Sand, trace fine to coarse Gravel, little to some Silt, slightly porous, medium dense - damp
5				
	b		15	D: ALLUVIUM: Light Gray Brown Clayey fine Sand, trace medium Sand, trace Silt, slightly porous, medium dense - moist
10	b		10	E: ALLUVIUM: Gray to Gray Brown Silty fine Sand, trace Clay, slightly porous, medium dense - damp
				Trench Terminated @ 10½ feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
b - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-2

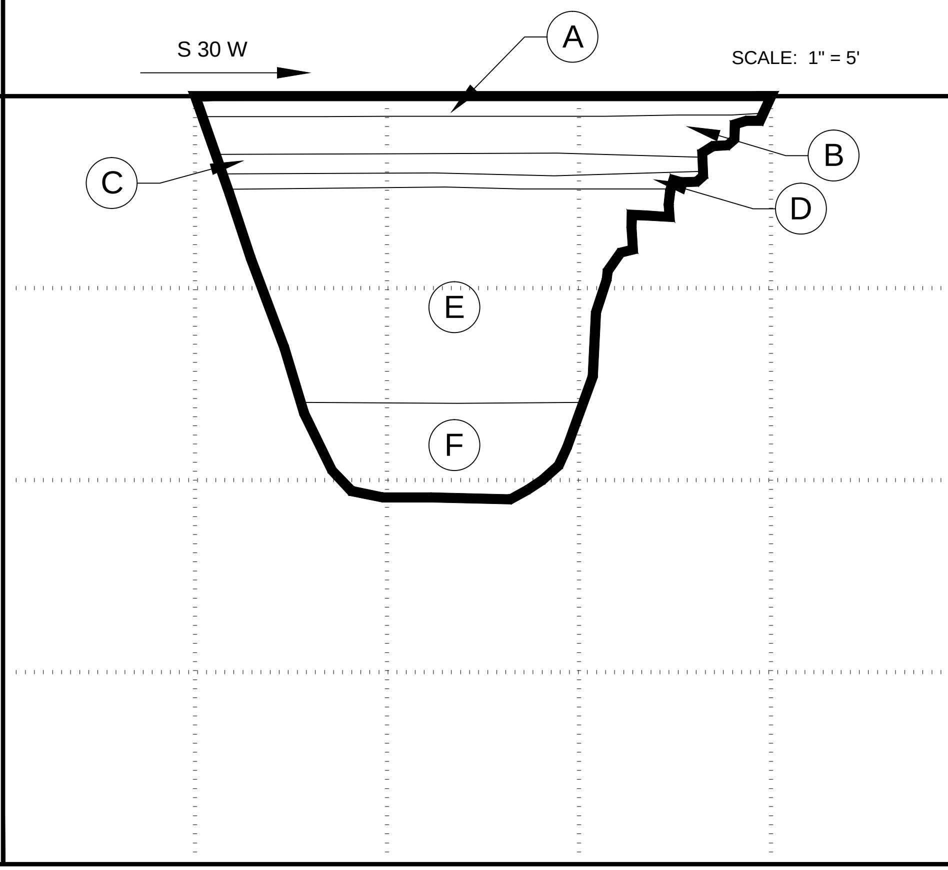
JOB NO.: 15G116-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: February 10, 2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: S 30 W

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		13	A: MANURE: 6 inches thick
	b		27	
	b		13	B: DISTURBED ALLUVIUM: Dark Gray Brown Silty fine Sand, some manure, loose - very moist
	b		20	
	b		3	C: FILL: Gray Brown Clayey fine Sand, trace Silt, little medium to coarse Sand, trace to little fine to coarse Gravel, trace brick fragments, medium dense - damp
5				D: FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace organics, mottled, medium dense - damp
				E: ALLUVIUM: Gray Brown fine Sand, trace Silt, loose to medium dense - damp
	b		8	F: ALLUVIUM: Gray Brown Silty fine Sand, medium dense - damp to moist
10	b		10	@ 9 to 10½': trace medium to coarse sand, slightly porous
				Trench Terminated @ 10½ feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
b - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-7

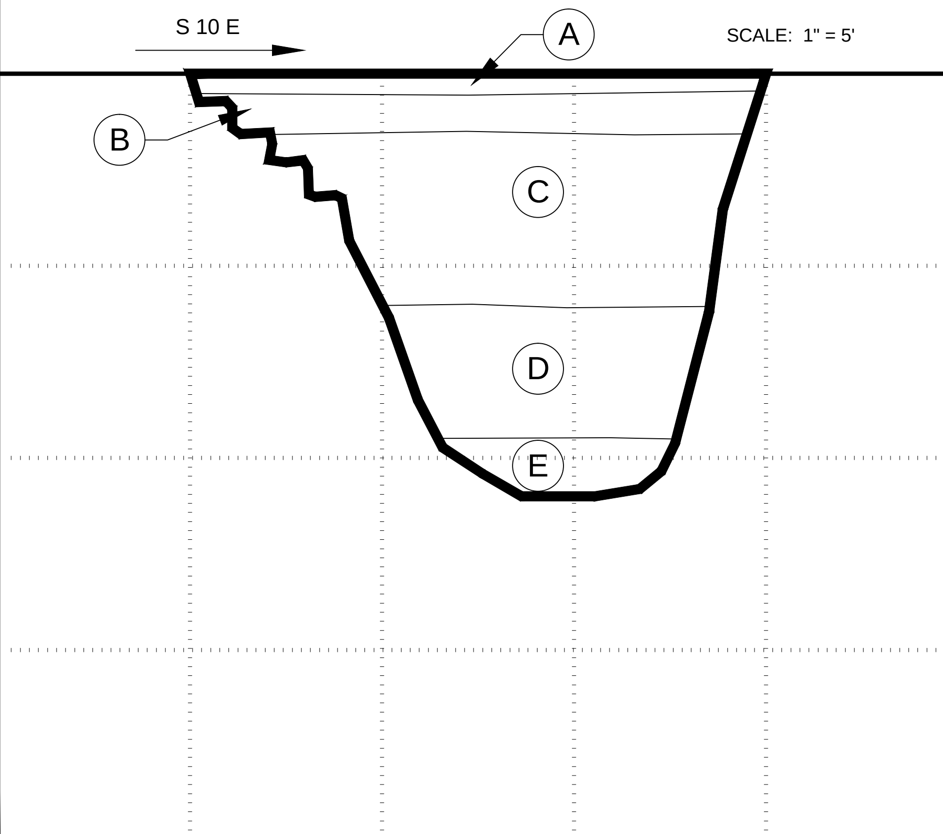
SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-3

JOB NO.: 15G116-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Commercial/Industrial Development	LOGGED BY: Matt Manni	SEEPAGE DEPTH: Dry
LOCATION: Ontario, CA	ORIENTATION: S 10 E	READINGS TAKEN: At Completion
DATE: February 10, 2015		

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		34	A: MANURE: 6 inches thick
	b		9	B: ALLUVIUM: Gray Silty fine Sand, trace medium Sand, trace fine to coarse Gravel, medium dense - damp to moist
	b		8	C: ALLUVIUM: Gray Brown fine Sand, trace medium Sand, some Silt, medium dense - moist
5				
	b		11	D: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace fine Gravel, slightly porous, medium dense - moist
10	b		16	E: ALLUVIUM: Dark Gray Silty fine Sand, trace medium Sand, trace Clay, moderately porous, medium dense - moist
				Trench Terminated @ 11 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
b - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-8

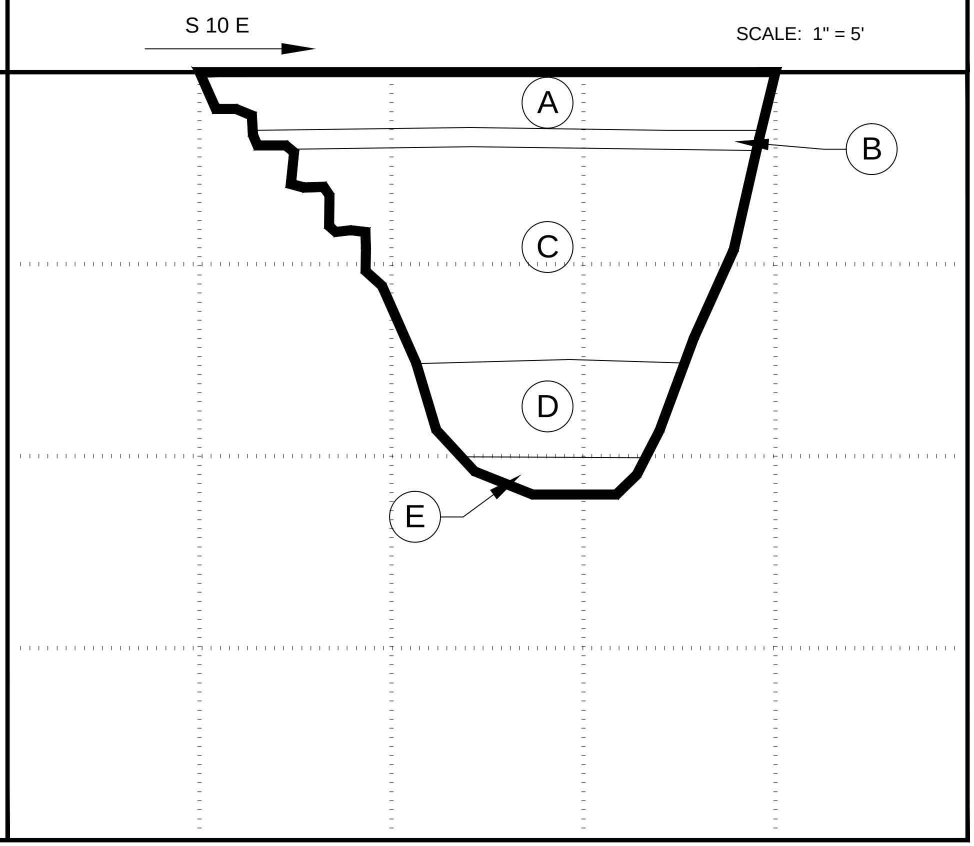
SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
T-4

JOB NO.: 15G116-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Commercial/Industrial Development	LOGGED BY: Matt Manni	SEEPAGE DEPTH: Dry
LOCATION: Ontario, CA	ORIENTATION: S 10 E	READINGS TAKEN: At Completion
DATE: February 10, 2015		

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		31	A: ALLUVIUM: Brown to Gray Brown Silty fine Sand, trace medium to coarse Sand, trace to little organic content, abundant fine root fibers, loose to medium dense - moist to very moist
	b		24	
	b		11	B: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, slightly porous, medium dense - moist
5	b		8	C: ALLUVIUM: Light Brown Silty fine Sand, trace medium Sand, loose to medium dense - moist
	b		13	D: ALLUVIUM: Gray Brown to Gray Clayey fine Sand, trace medium Sand, trace fine Gravel, trace Silt, medium dense - moist
10	b		21	E: ALLUVIUM: Light Gray to Gray fine Sandy Clay, trace medium Sand, trace Silt, trace Iron Oxide staining, slightly porous, medium stiff - moist to very moist
				Trench Terminated @ 11 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
b - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-9

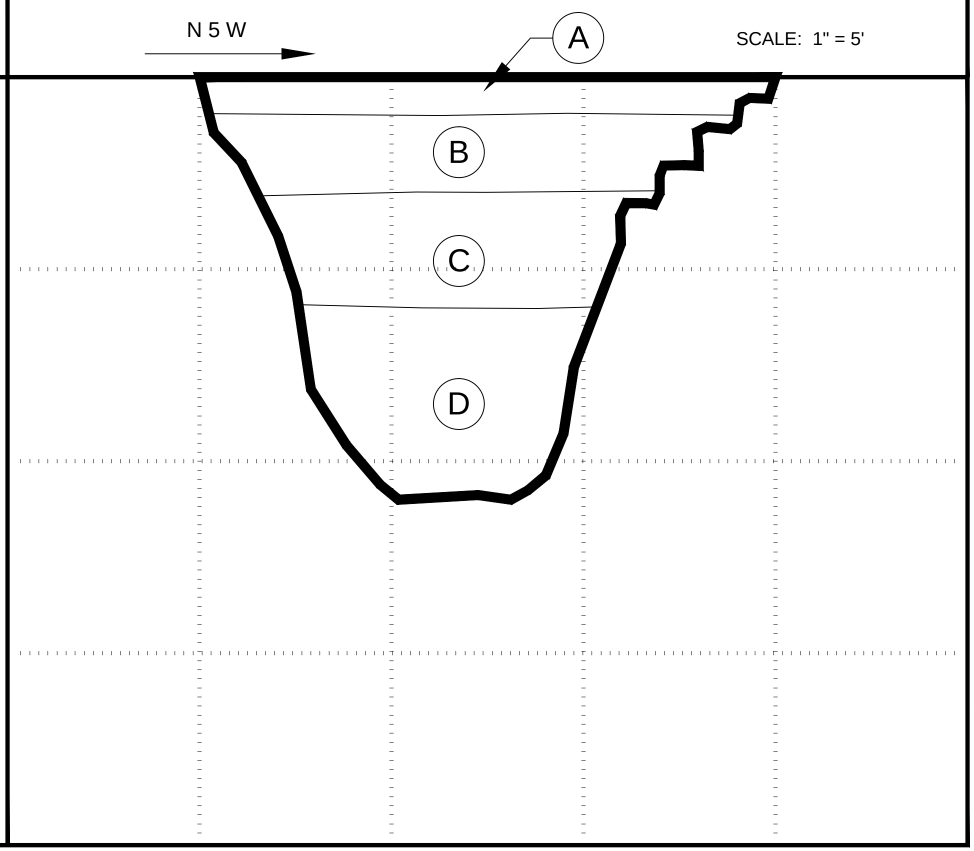
SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-5

JOB NO.: 15G116-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Commercial/Industrial Development	LOGGED BY: Matt Manni	SEEPAGE DEPTH: Dry
LOCATION: Ontario, CA	ORIENTATION: N 5 W	READINGS TAKEN: At Completion
DATE: February 10, 2015		

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		34	A: ALLUVIUM: Dark Brown Silty fine Sand, trace medium Sand, trace fine Gravel, trace Clay, trace organic content, trace fine root fibers, loose to medium dense - very moist
	b		16	B: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, medium dense - very moist
	b		22	
5				C: ALLUVIUM: Gray to Gray Brown fine Sandy Clay, trace Silt, slightly porous, medium stiff - very moist
	b		17	
				D: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace Clay, slightly porous, medium dense - very moist
10				
	b		16	
				Trench Terminated @ 11 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-10

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-6

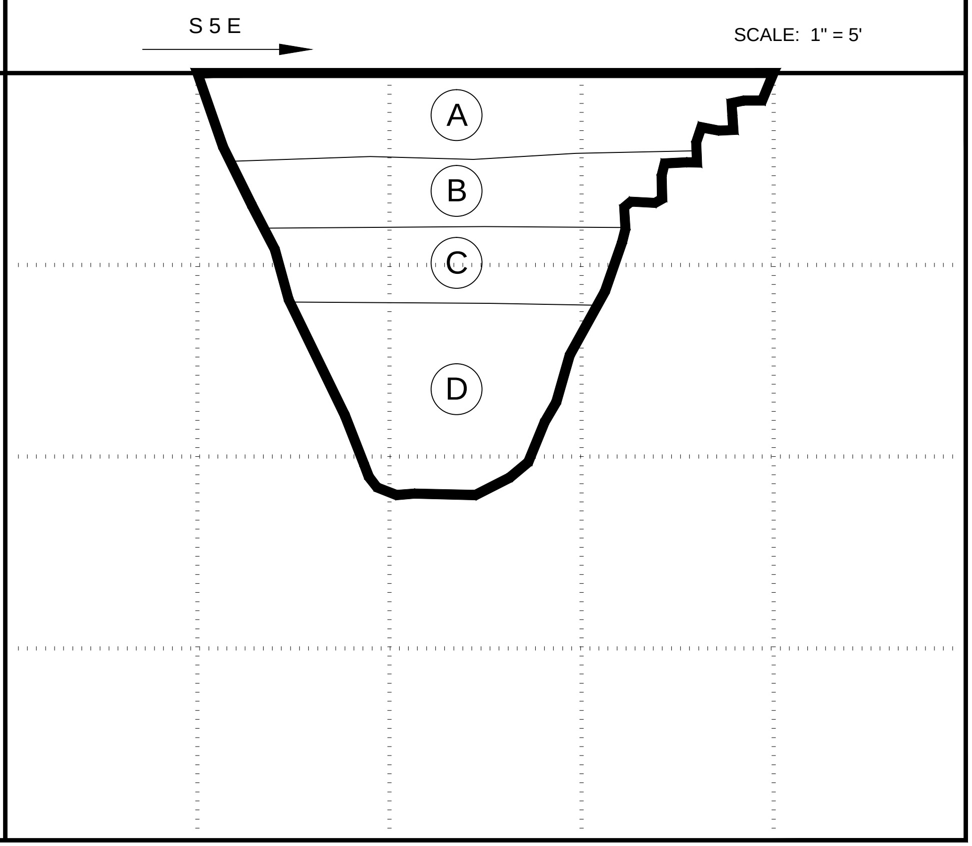
JOB NO.: 15G116-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Ontario, CA
DATE: February 10, 2015

EQUIPMENT USED: Backhoe
LOGGED BY: Matt Manni
ORIENTATION: S 5 E

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		33	A: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace fine Gravel, abundant fine root fibers, little organic content, trace roots, loose - very moist
	b		10	B: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace roots, medium dense - moist
5	b		12	C: ALLUVIUM: Gray Brown fine Clayey fine Sand, trace medium Sand, trace Silt, moderately porous, stiff - moist
	b		17	
10	b		19	D: ALLUVIUM: Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, trace Clay, trace calcareous veining, moderately porous, dense - moist to very moist
				Trench Terminated @ 11 feet
15				

GRAPHIC REPRESENTATION

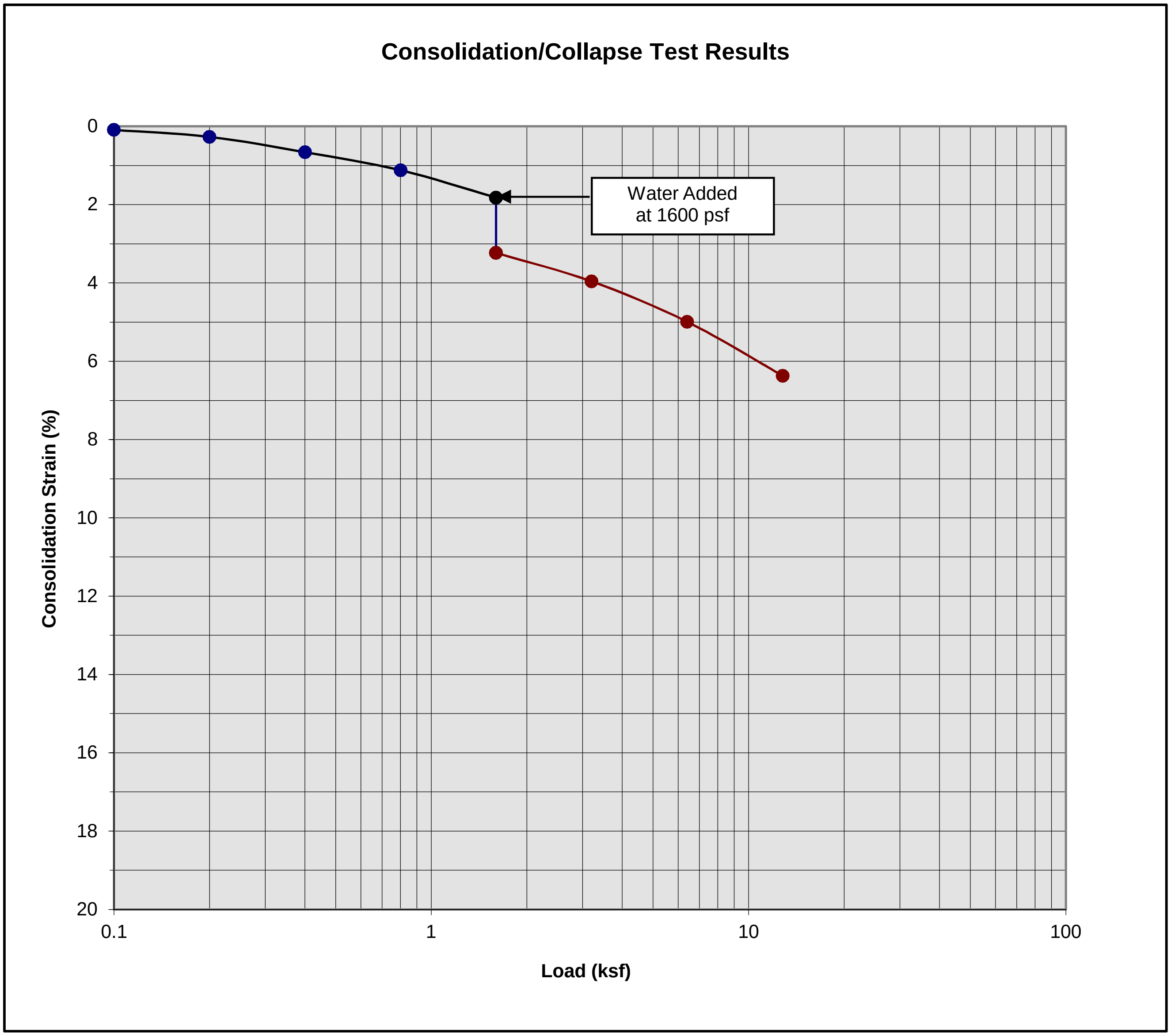


KEY TO SAMPLE TYPES:
b - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-11

APPENDIX C



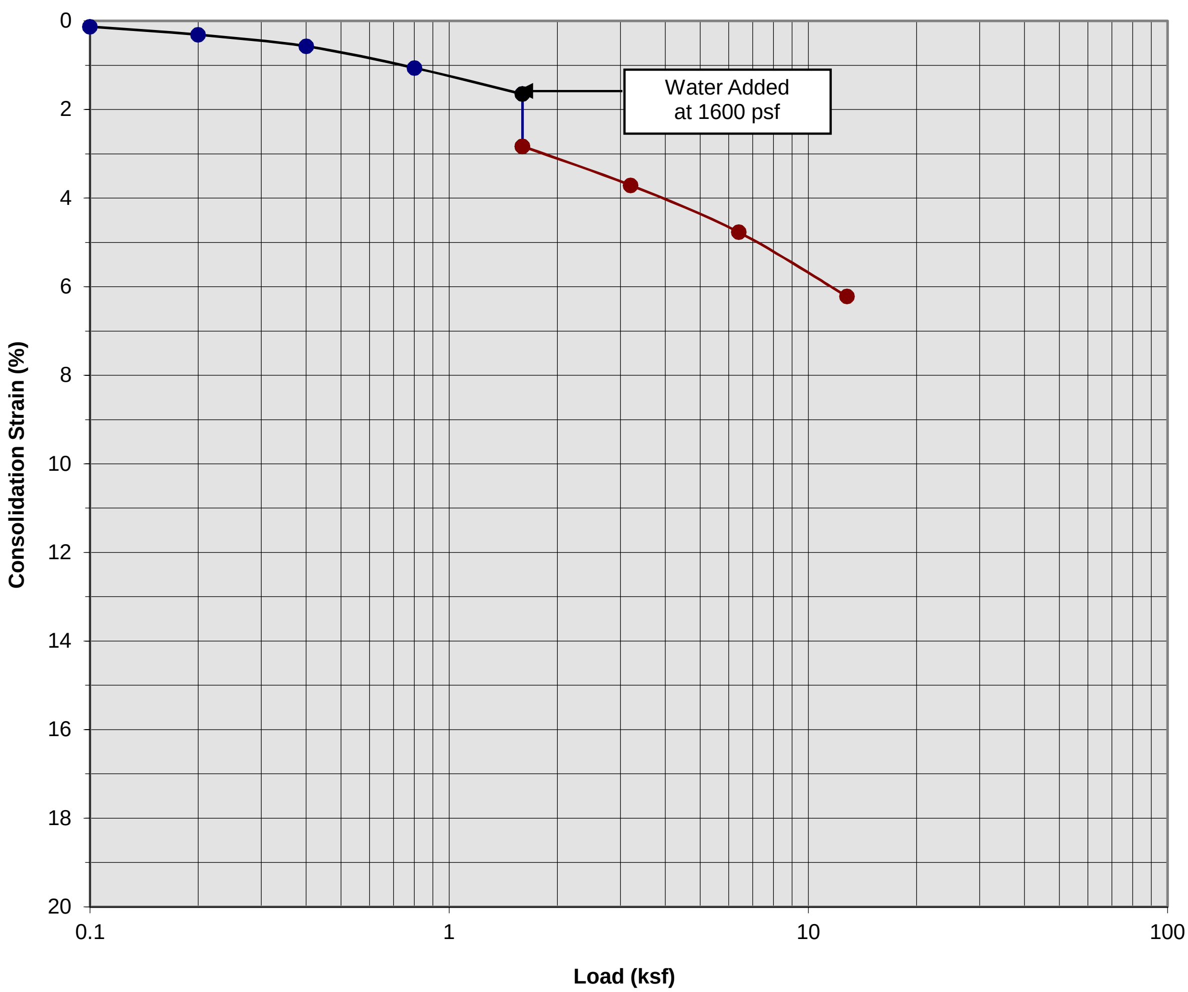
Classification: Gray Brown fine Sand, trace medium Sand, little to some Silt

Boring Number:	B-1	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	22
Depth (ft)	3 to 4	Initial Dry Density (pcf)	95.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	100.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.41

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

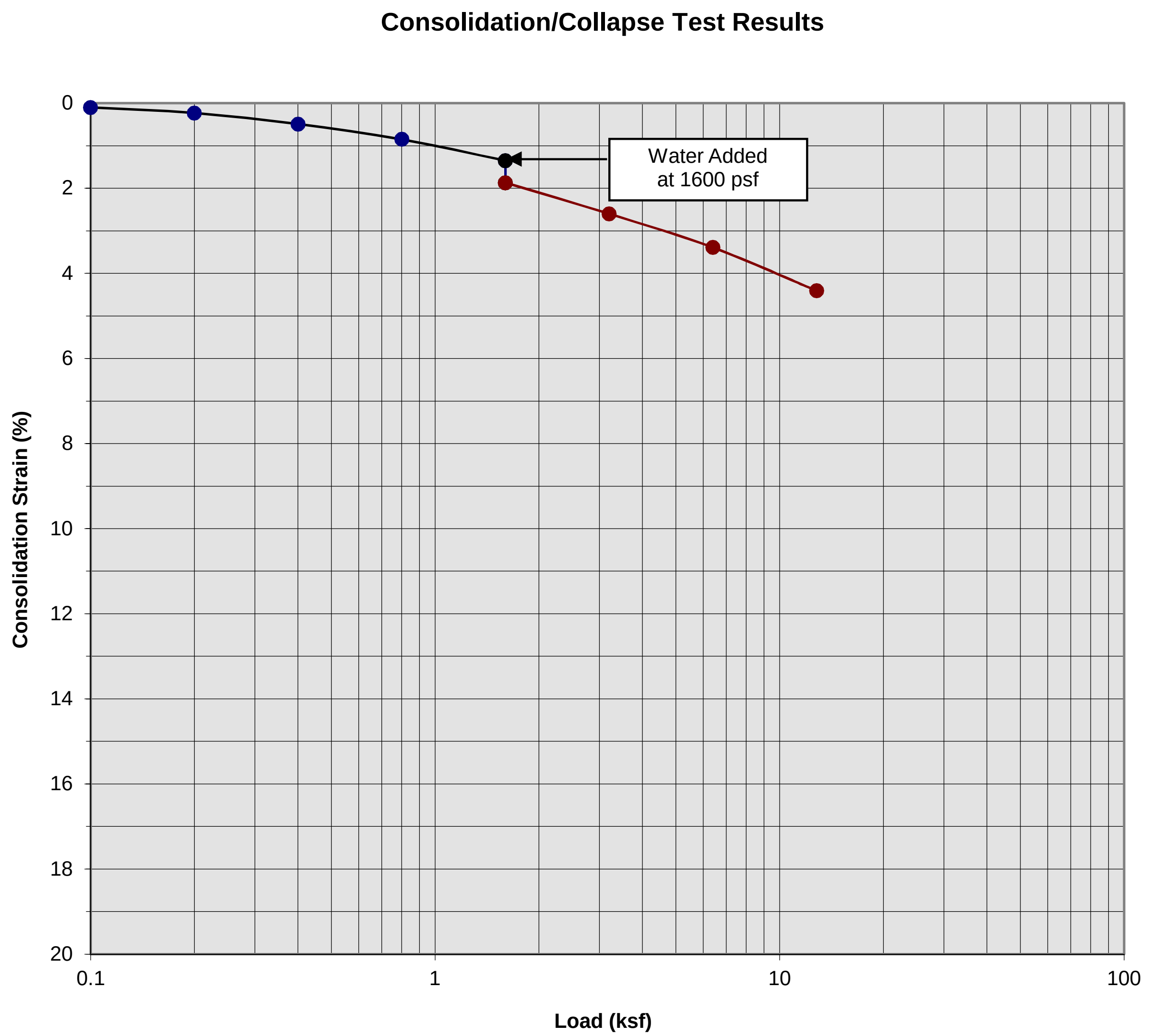


Classification: Gray Brown fine Sand, trace medium Sand, little to some Silt

Boring Number:	B-1	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	5 to 6	Initial Dry Density (pcf)	96.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	102.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.18

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



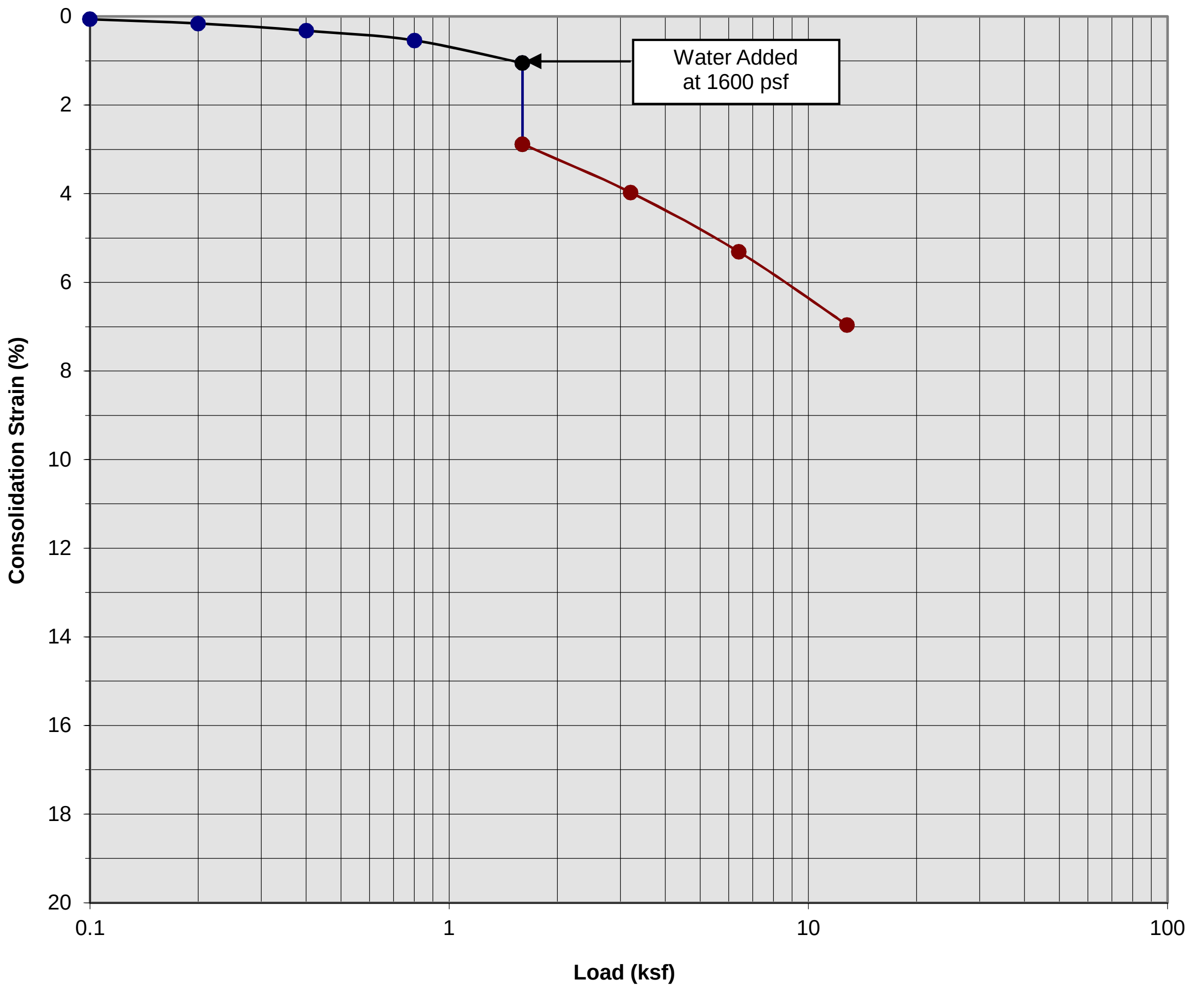
Classification: Gray Brown fine Sand, trace medium Sand, little to some Silt

Boring Number:	B-1	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	7 to 8	Initial Dry Density (pcf)	104.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.52

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

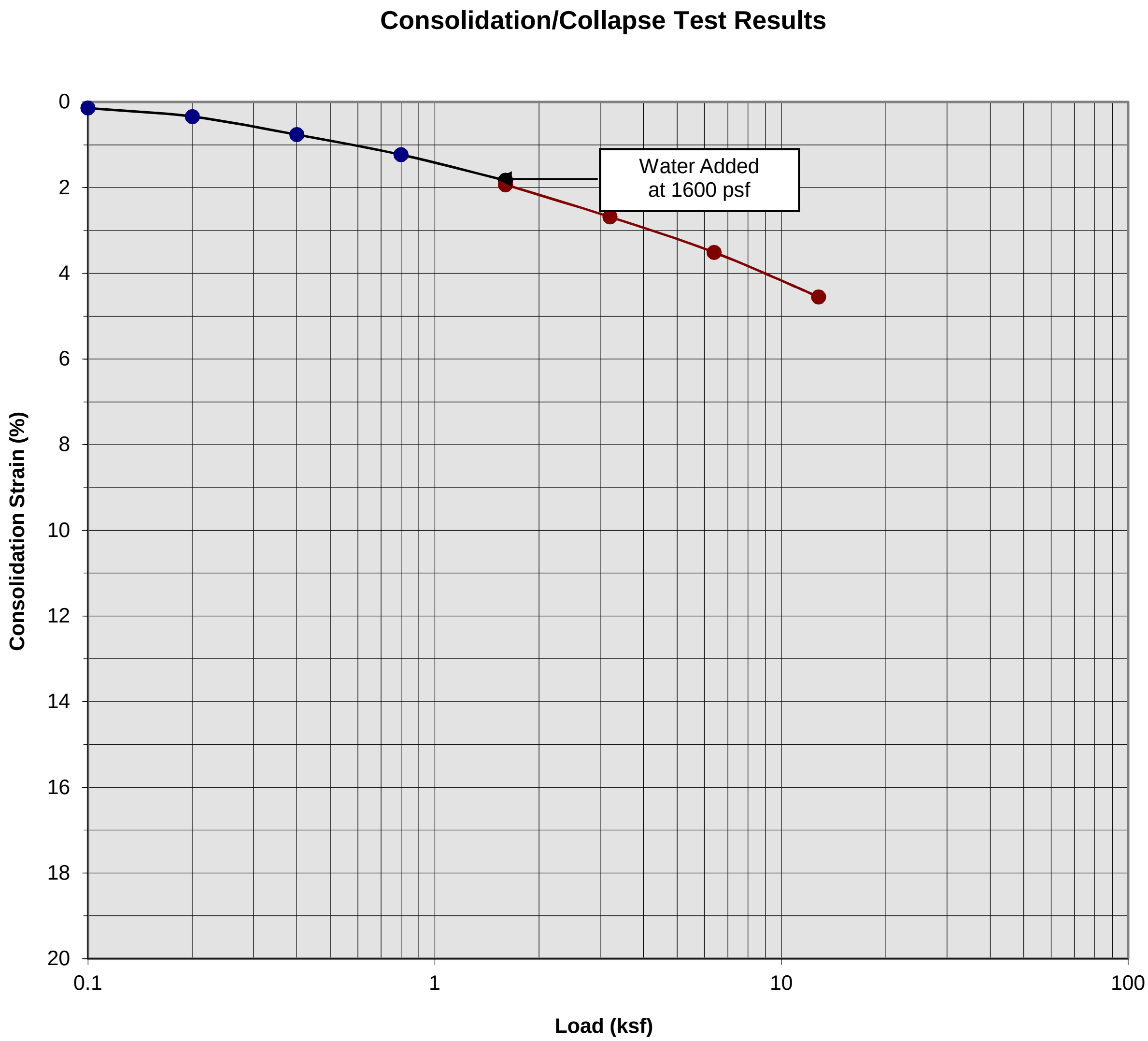


Classification: Light Brown Silty fine Sand

Boring Number:	B-1	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	9 to 10	Initial Dry Density (pcf)	105.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	112.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.83

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 4

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

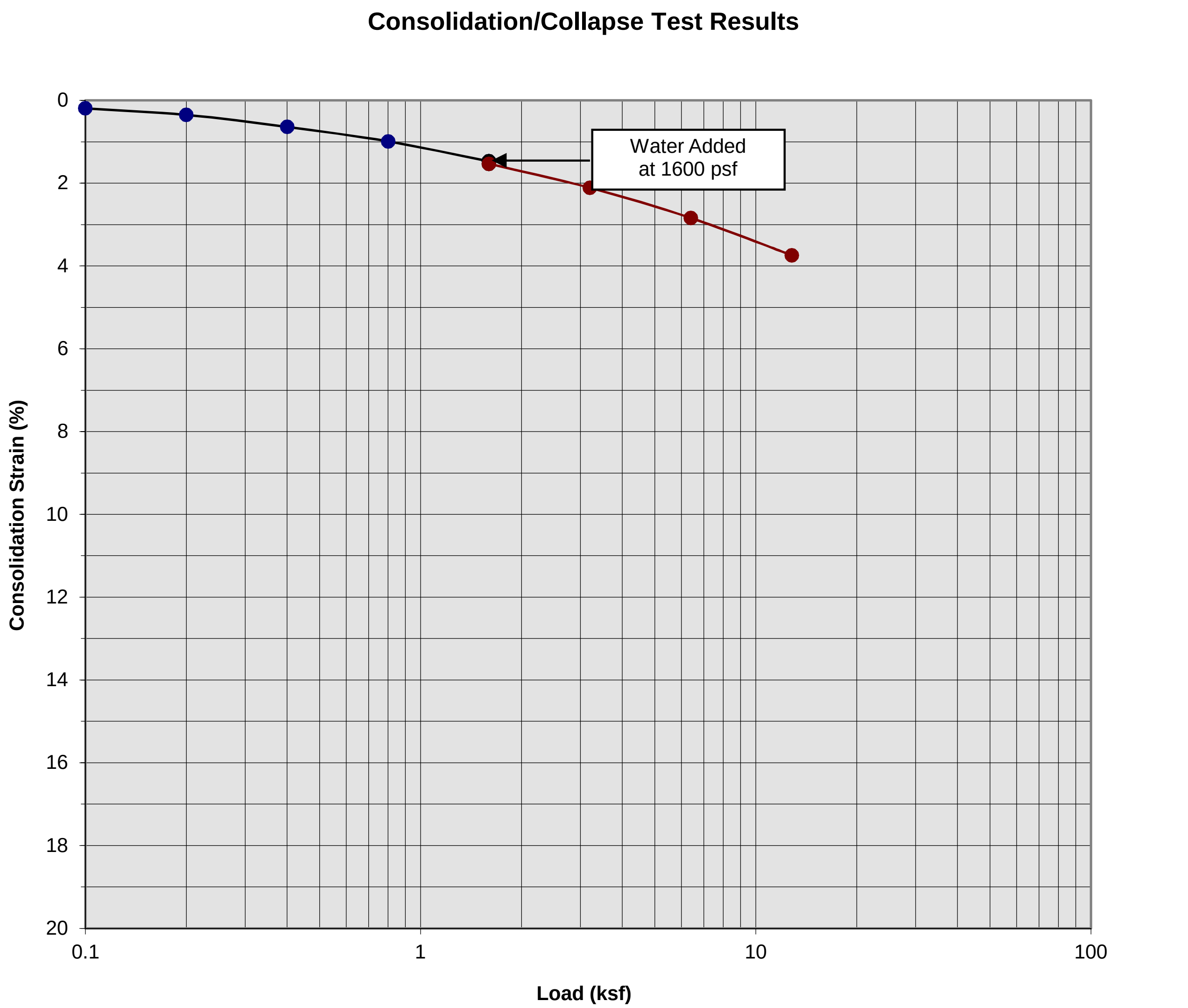


Classification: Gray Brown Silty fine Sand

Boring Number:	B-5	Initial Moisture Content (%)	19
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	1 to 2	Initial Dry Density (pcf)	93.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	100.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.10

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 5

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

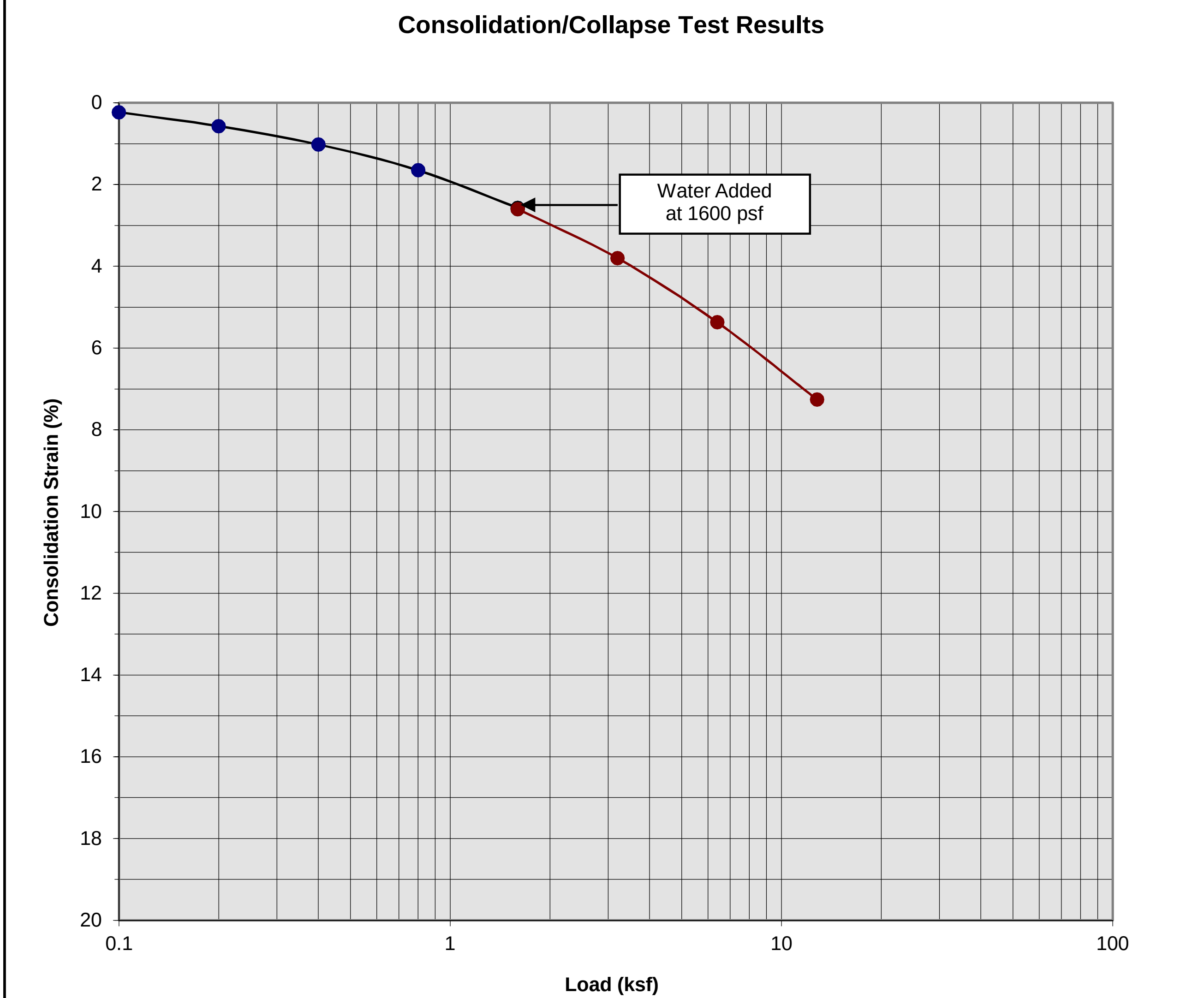


Classification: Gray Brown Silty fine Sand

Boring Number:	B-5	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	3 to 4	Initial Dry Density (pcf)	104.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	106.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.06

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

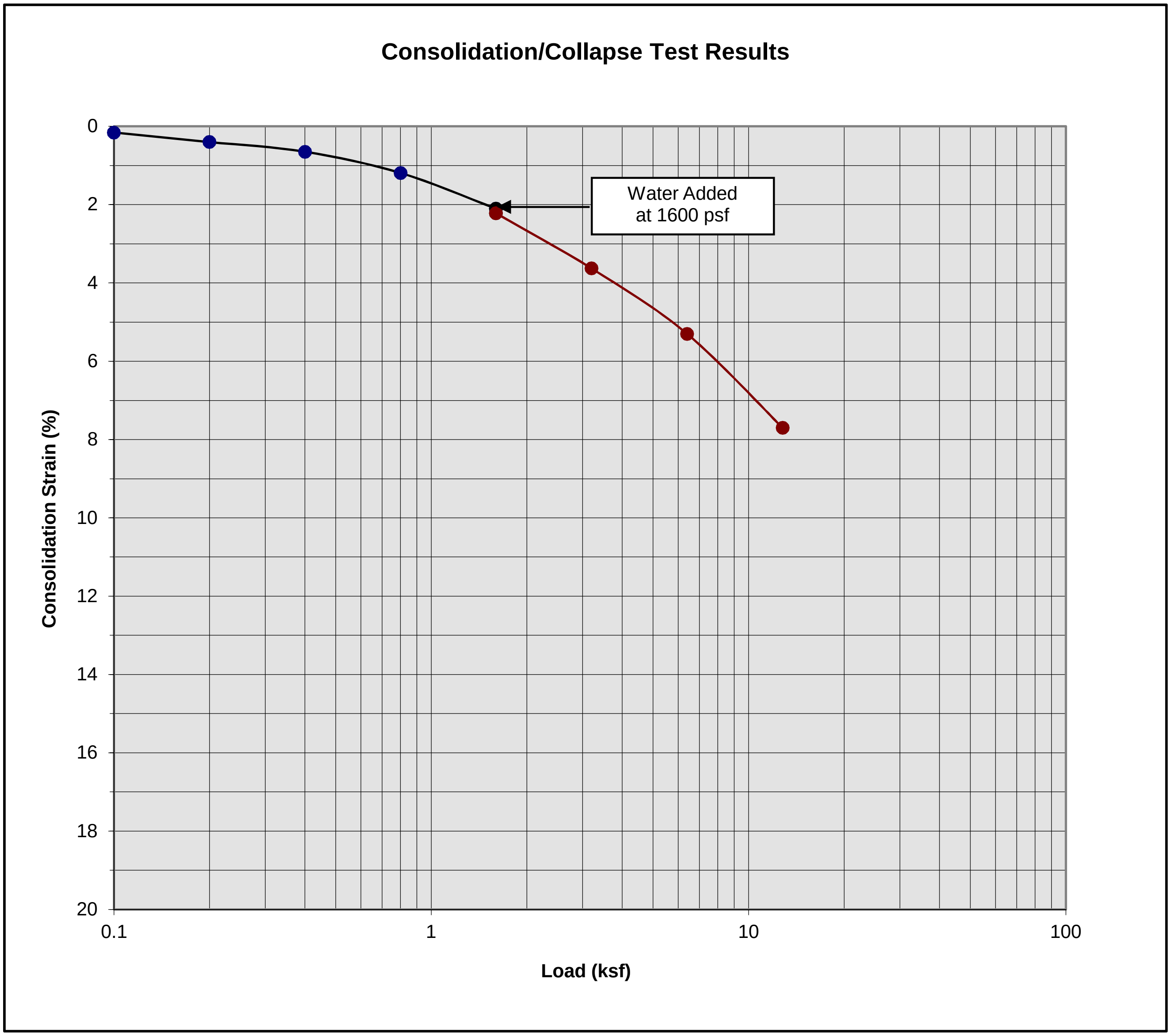


Classification: Light Gray to Gray Clayey fine Sand to fine Sandy Clay

Boring Number:	B-5	Initial Moisture Content (%)	18
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	5 to 6	Initial Dry Density (pcf)	109.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

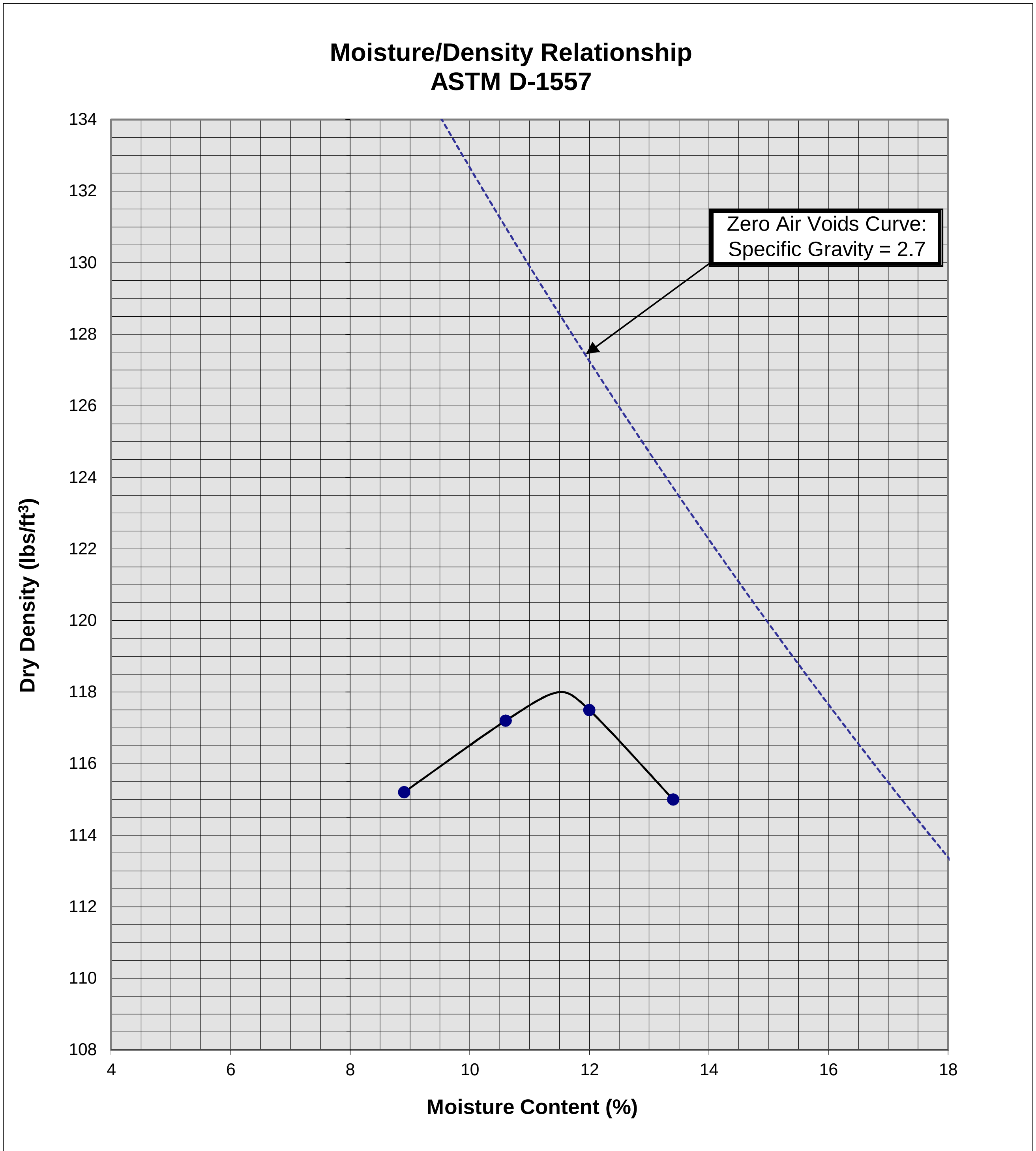


Classification: Light Gray to Gray Clayey fine Sand to fine Sandy Clay

Boring Number:	B-5	Initial Moisture Content (%)	29
Sample Number:	---	Final Moisture Content (%)	32
Depth (ft)	7 to 8	Initial Dry Density (pcf)	86.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	93.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C- 8

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number	B-2 @ 0 to 5'
Optimum Moisture (%)	11.5
Maximum Dry Density (pcf)	118
Soil Classification	Gray Brown Silty fine Sand, trace fine Gravel

Proposed C/I Development
Ontario, California
Project No. 15G116
PLATE C-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

<u>Compacted Fills</u>

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as "contaminated," and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

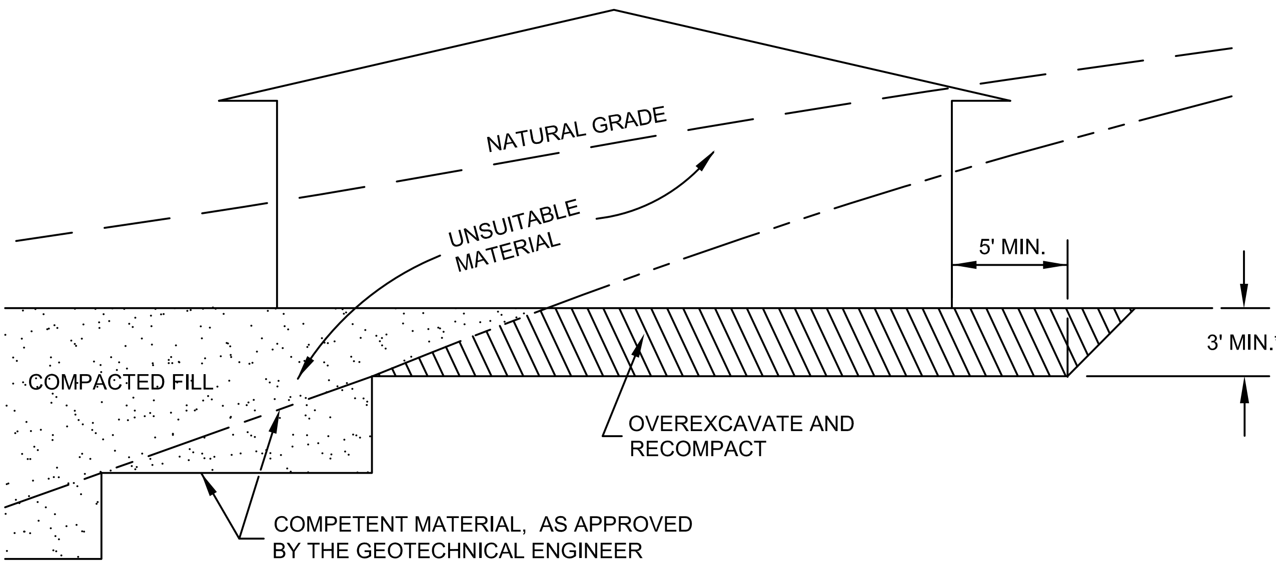
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

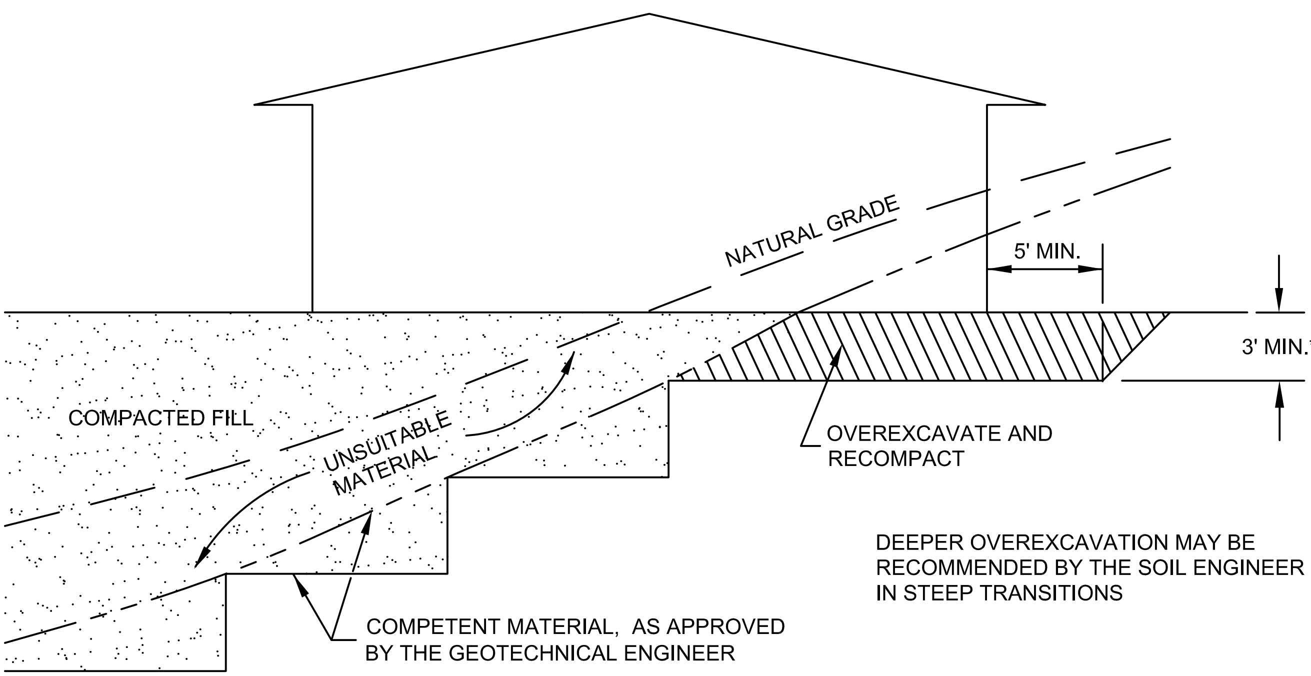
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT

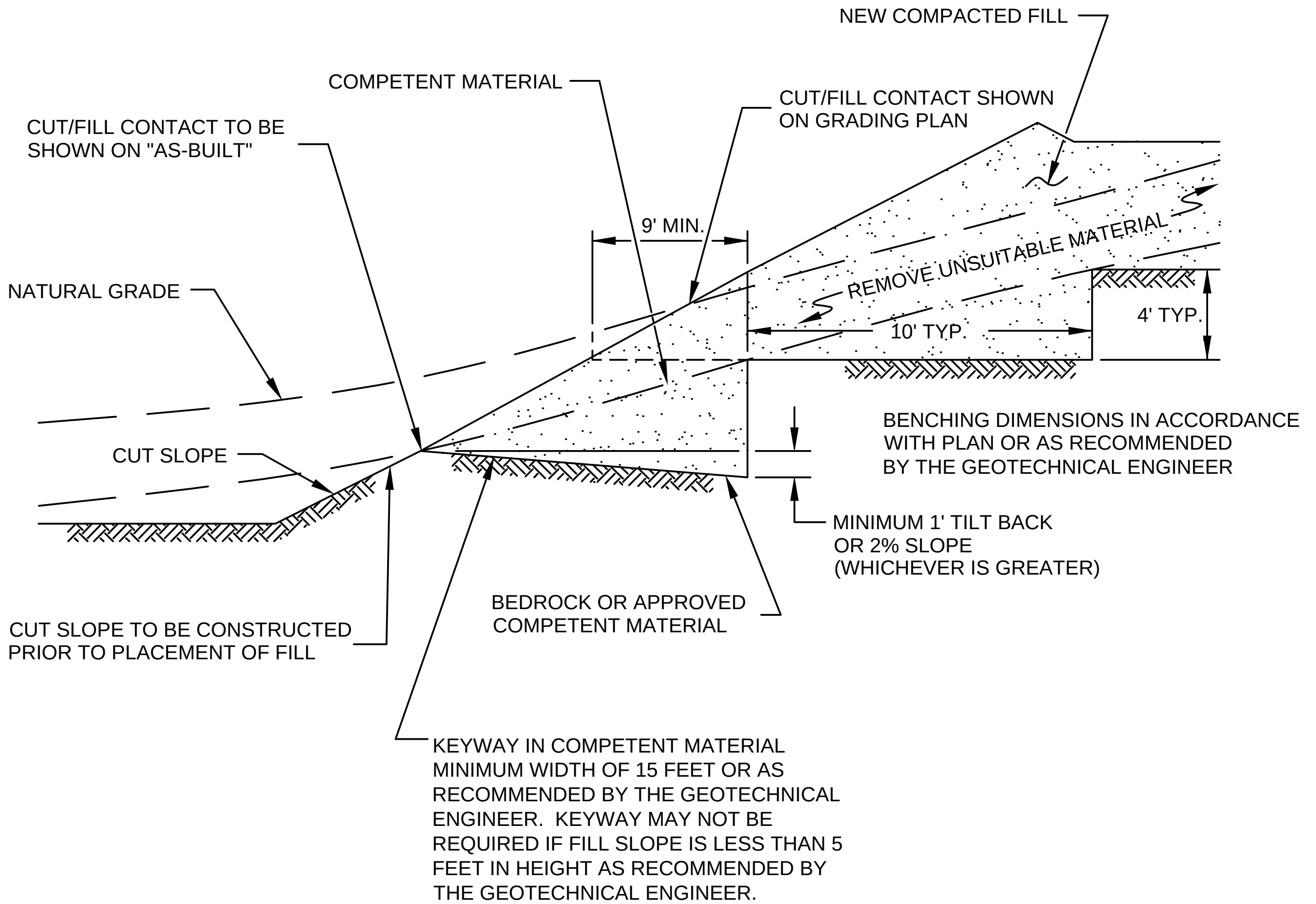


CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION.
ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	SOCALGEO SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-1	



FILL ABOVE CUT SLOPE DETAIL

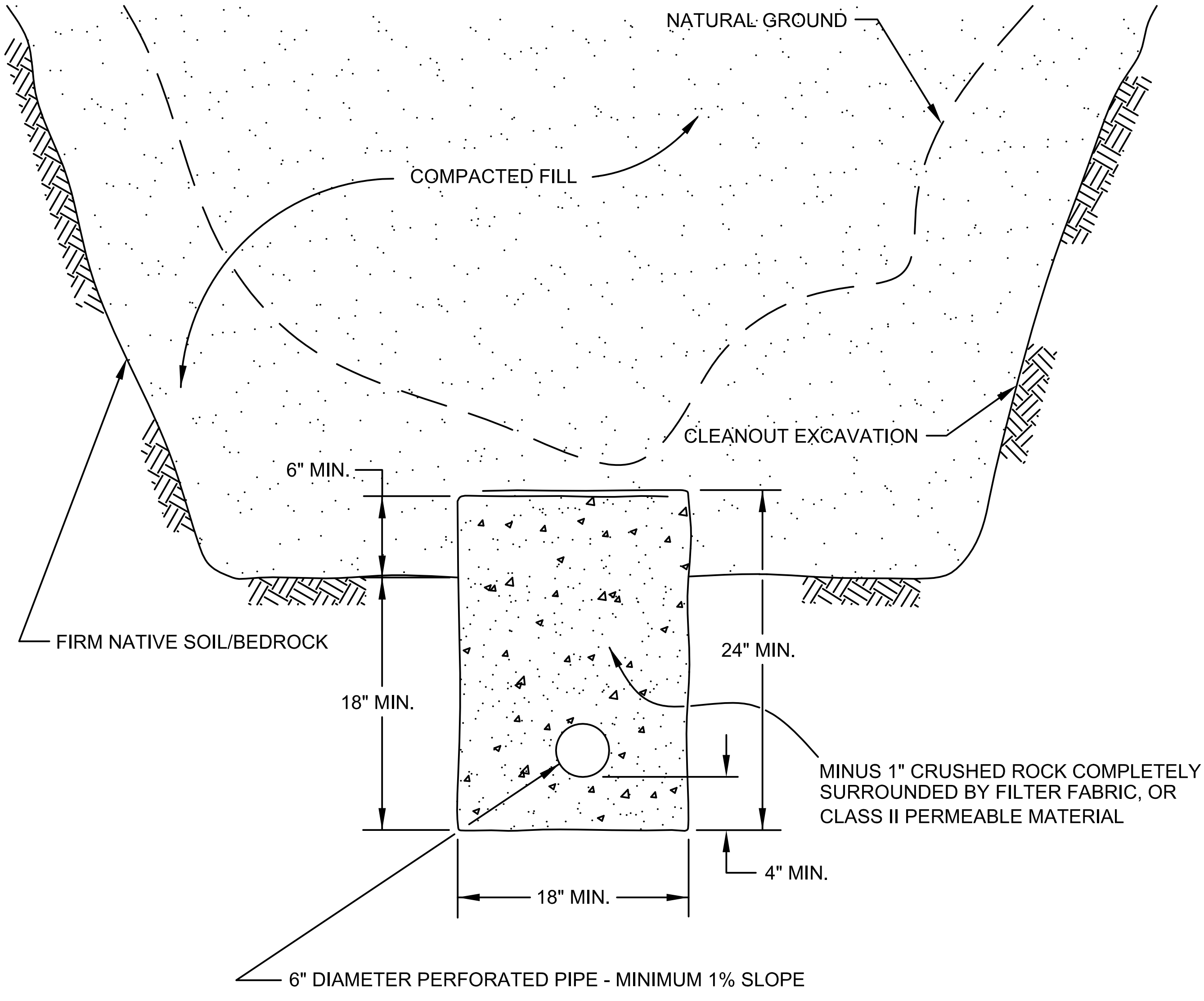
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

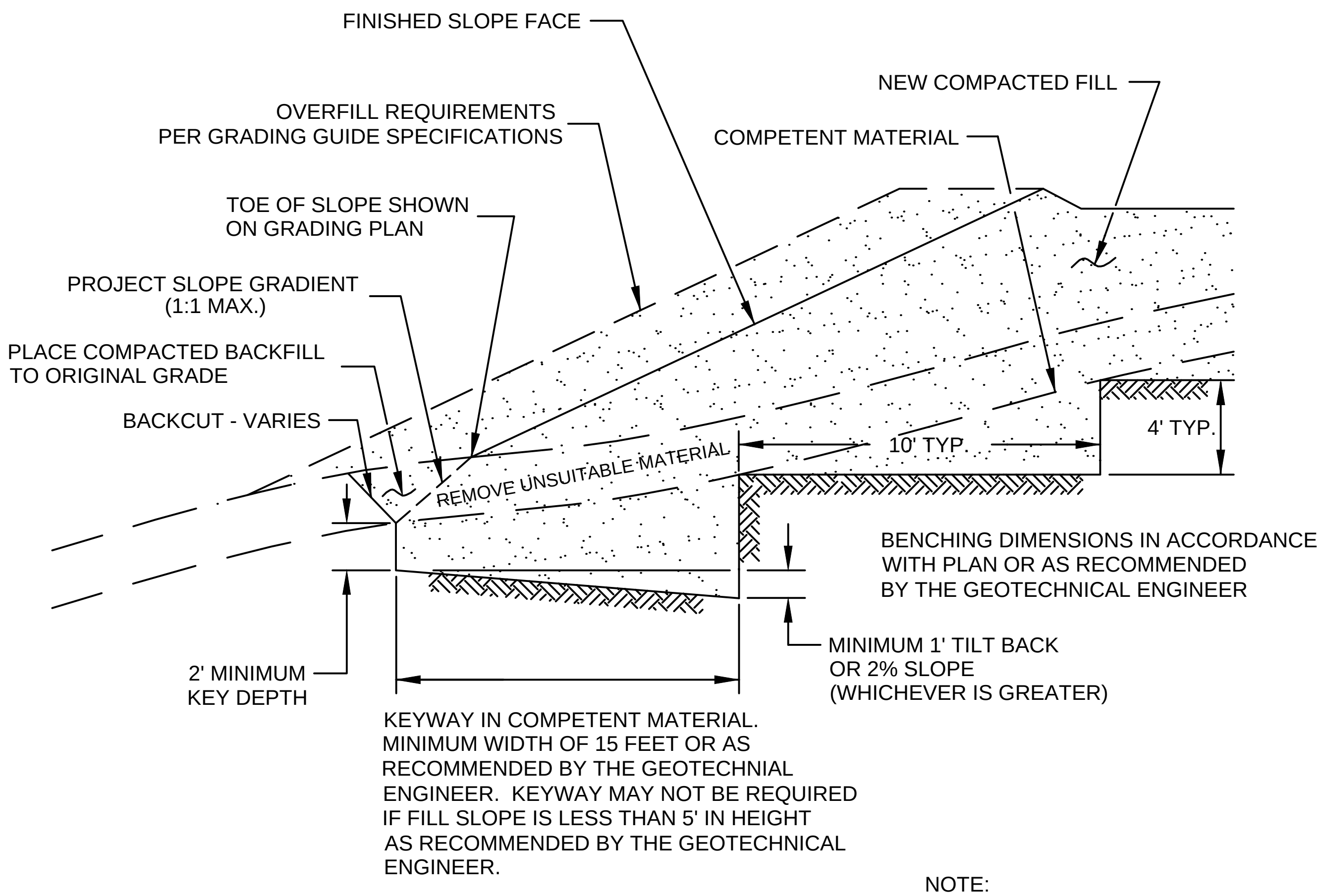
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED
WHEN NATURAL SLOPES ARE
EQUAL TO OR STEEPER THAN 5:1
OR WHEN RECOMMENDED BY
THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

GRADING GUIDE SPECIFICATIONS

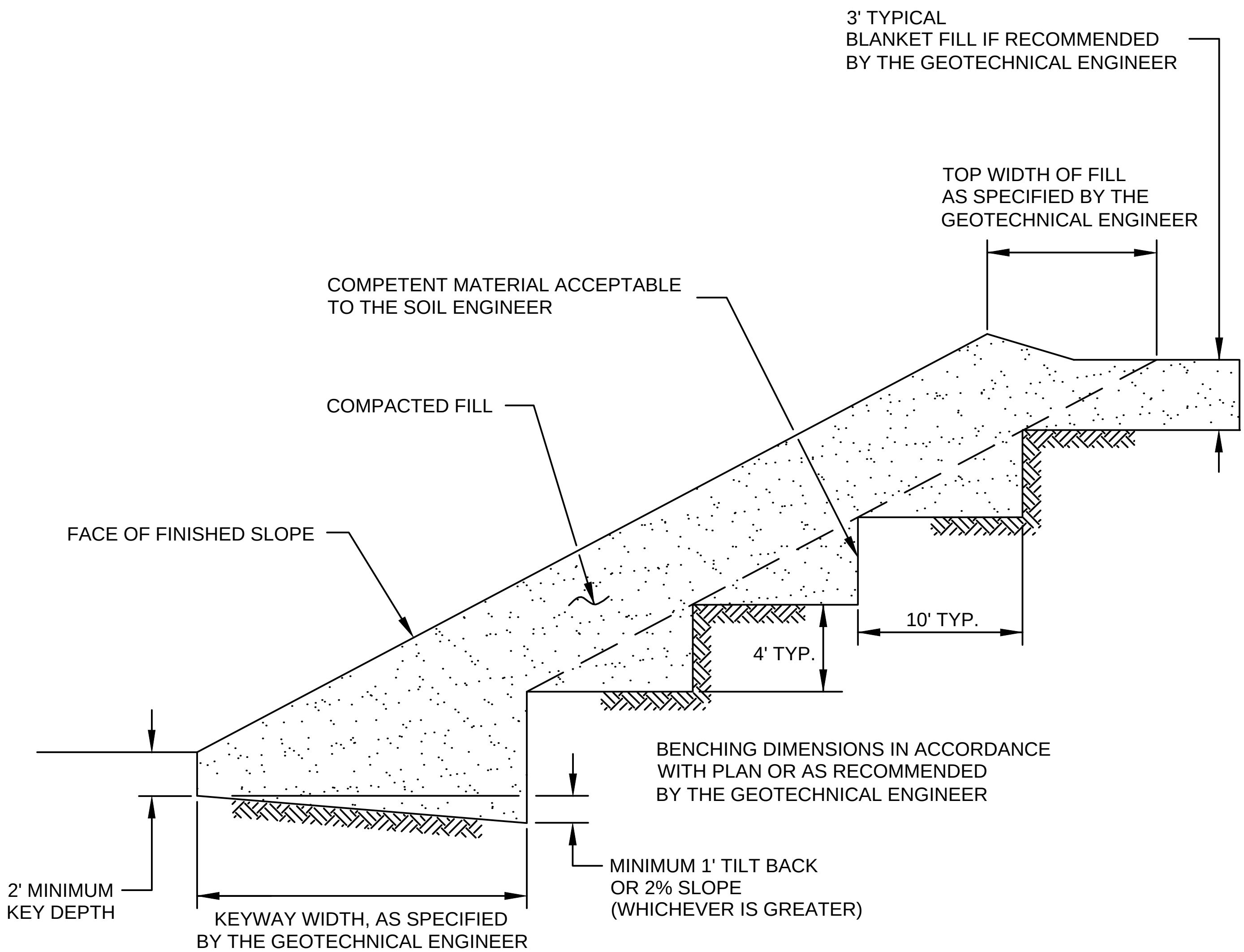
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

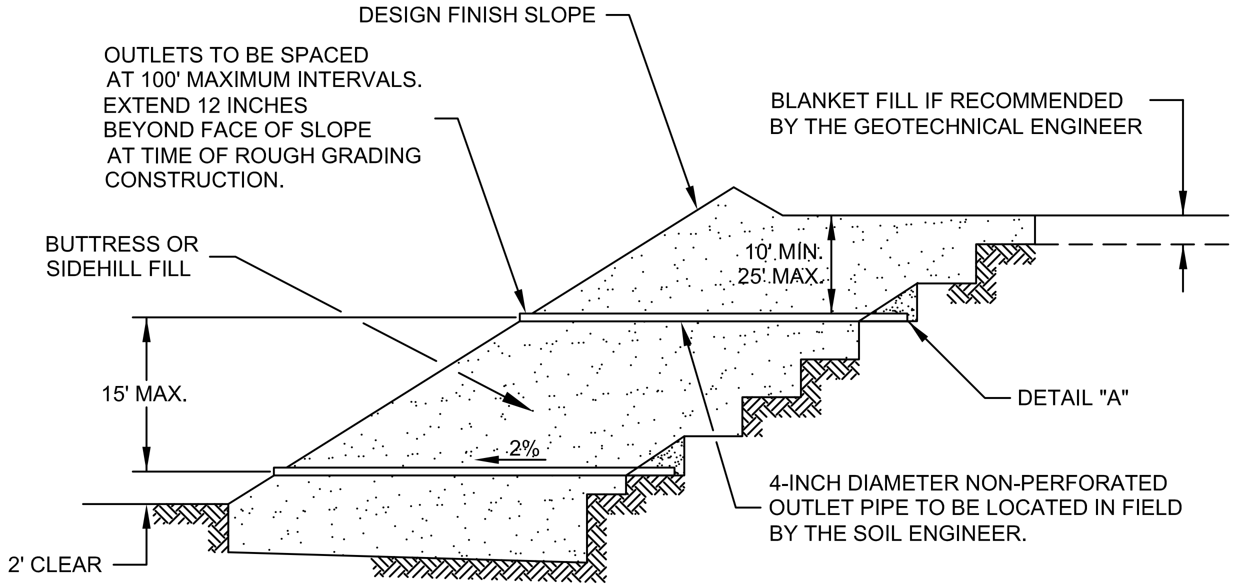
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

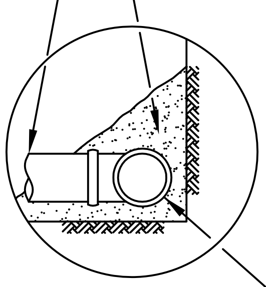
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW



FILTER MATERIAL - MINIMUM OF FIVE CUBIC FEET PER FOOT OF PIPE. SEE ABOVE FOR FILTER MATERIAL SPECIFICATION.

ALTERNATIVE: IN LIEU OF FILTER MATERIAL FIVE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE ABOVE FOR GRAVEL SPECIFICATION.

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4-INCH DIAMETER PVC SCH 40 OR ABS CLASS SDR 35 WITH A CRUSHING STRENGTH OF AT LEAST 1,000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

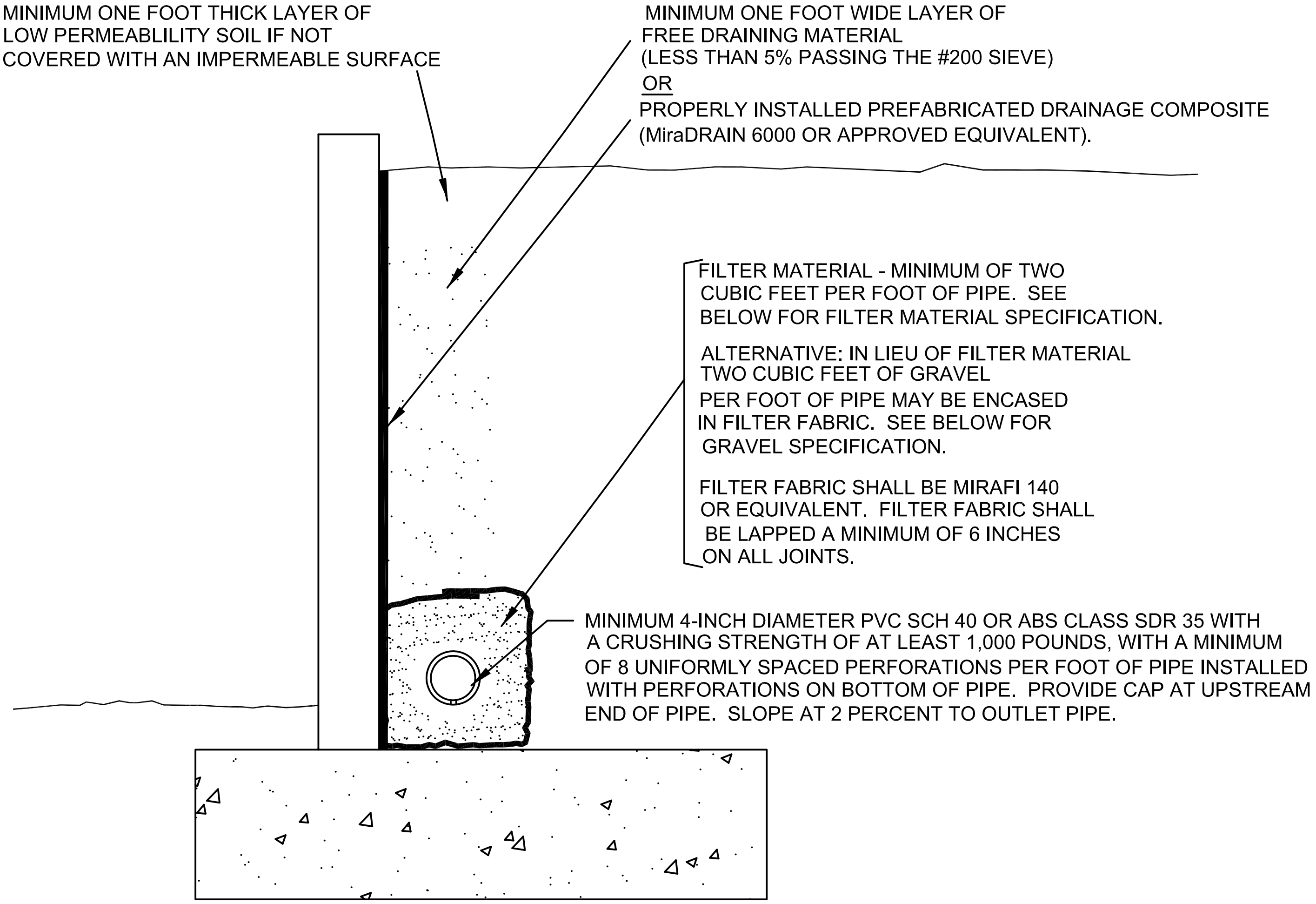
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

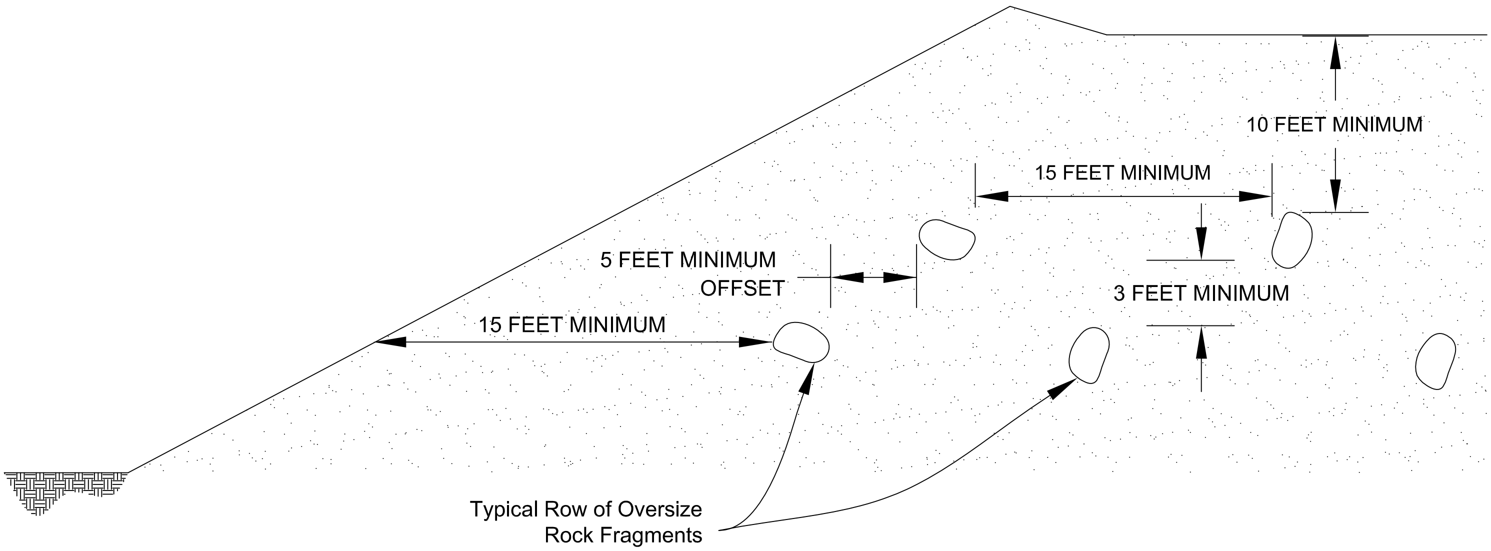
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

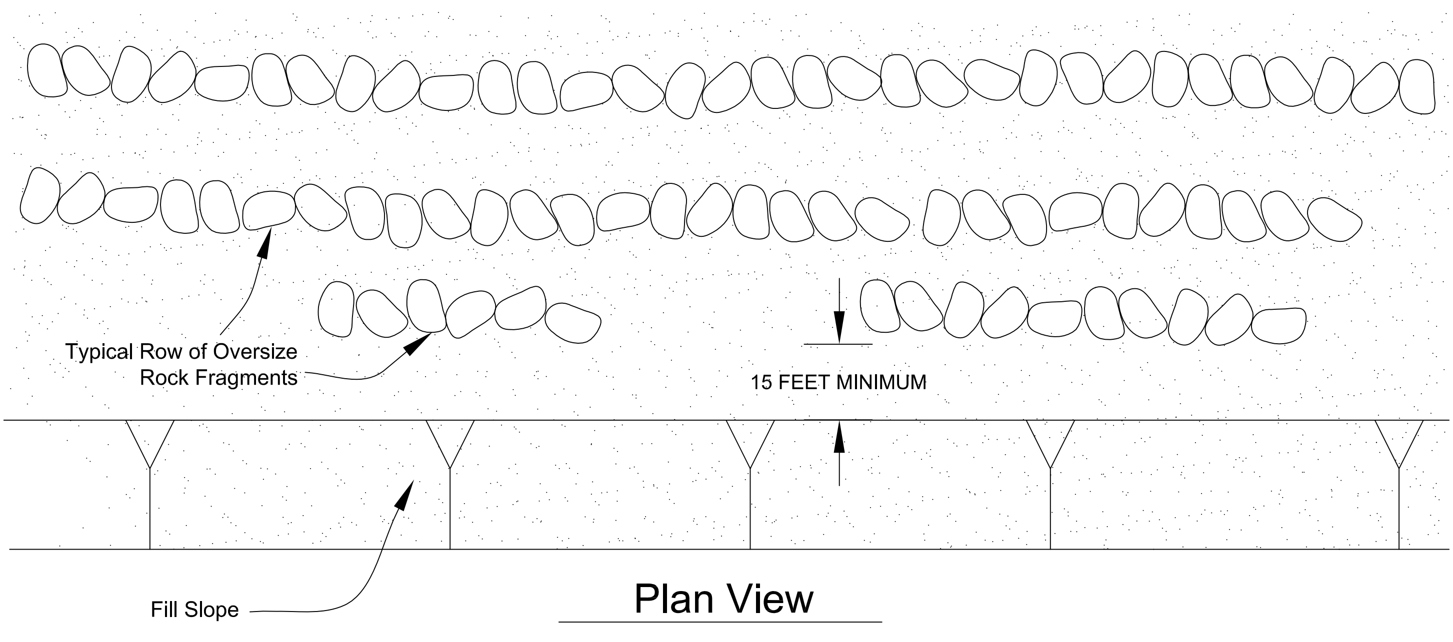
DRAWN: JAS
CHKD: GKM

PLATE D-7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL
GRADING GUIDE SPECIFICATIONS

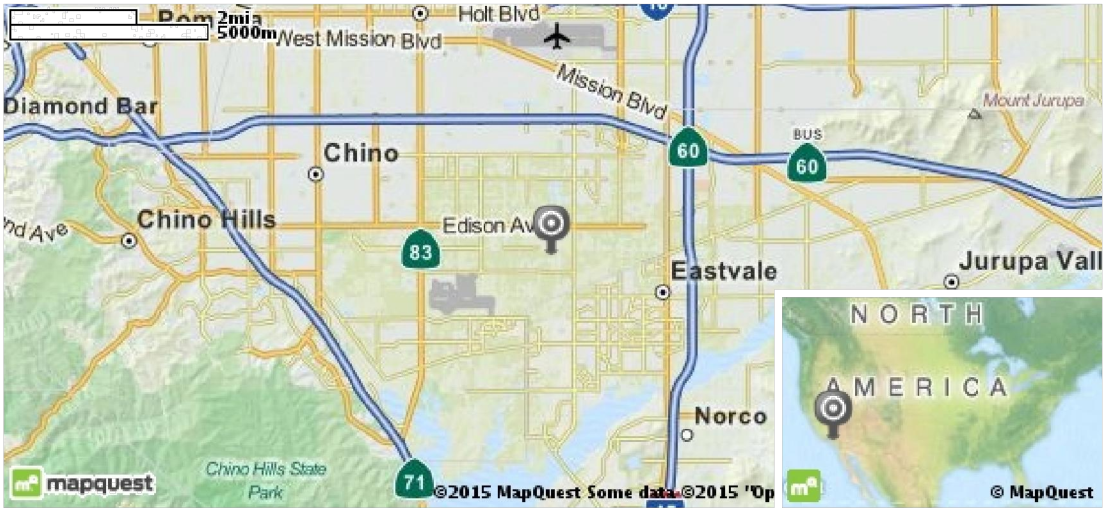
NOT TO SCALE	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: PM CHKD: GKM	
PLATE D-8	

APPENDIX E

USGS Design Maps Summary Report

User–Specified Input

Report Title	Proposed Commercial/Industrial Development Thu February 19, 2015 22:39:23 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.98794°N, 117.60137°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

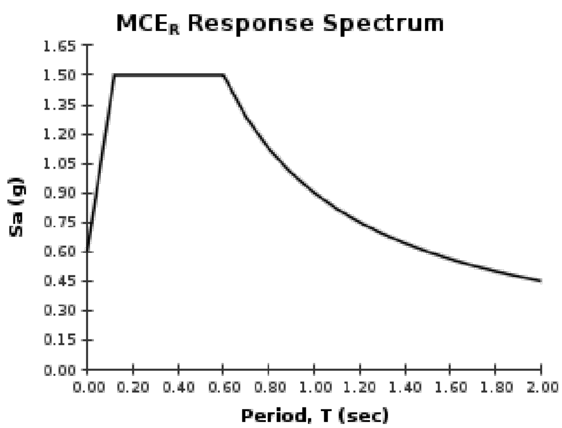


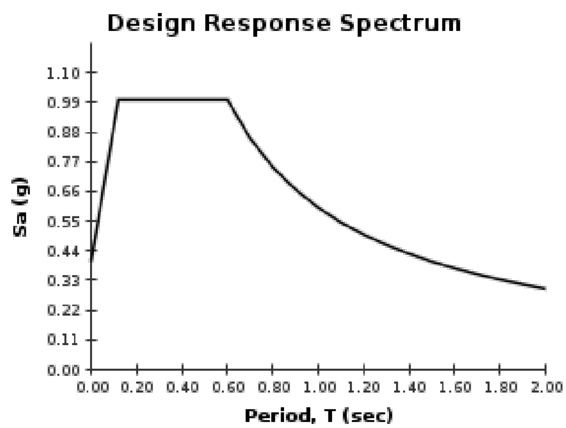
USGS–Provided Output

S_S = 1.500 g S_{MS} = 1.500 g S_{DS} = 1.000 g

S_1 = 0.600 g S_{M1} = 0.900 g S_{D1} = 0.600 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
<http://geohazards.usgs.gov/designmaps/us/application.php>

SEISMIC DESIGN PARAMETERS

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

ONTARIO, CALIFORNIA

DRAWN: ENT
CHKD: JAS

SCG PROJECT
15G116-1

PLATE E-1

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SOUTHERN CALIFORNIA GEOTECHNICAL