# Appendix E-3

## Geotechnical Investigation

# GEOTECHNICAL INVESTIGATION PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

NWC Mission Boulevard and Ramona Avenue
Montclair, California
for
Mission Boulevard Industrial Owner, L.P.

SoCalGeo
SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

June 26, 2019

Mission Boulevard Industrial Owner, L.P.
3520 Piedmont Road, Suite 100
Atlanta, Georgia 30305

Attention: Mr. John C. Atwell
Senior Vice President

Project No.: **19G146-1**

Subject: **Geotechnical Investigation**
Proposed Commercial/Industrial Development
NWC Mission Boulevard and Ramona Avenue
Montclair, California

Gentlemen:

In accordance with your request, we have conducted a geotechnical investigation 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.


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# TABLE OF CONTENTS

**1.0 EXECUTIVE SUMMARY 1**

**2.0 SCOPE OF SERVICES 3**

**3.0 SITE AND PROJECT DESCRIPTION 4**

3.1 Site Conditions 4
3.2 Proposed Development 4

**4.0 SUBSURFACE EXPLORATION 6**

4.1 Scope of Exploration/Sampling Methods 6
4.2 Geotechnical Conditions 6

**5.0 LABORATORY TESTING 8**

**6.0 CONCLUSIONS AND RECOMMENDATIONS 10**

6.1 Seismic Design Considerations 10
6.2 Geotechnical Design Considerations 12
6.3 Site Grading Recommendations 13
6.4 Construction Considerations 16
6.5 Foundation Design and Construction 16
6.6 Floor Slab Design and Construction 18
6.7 Retaining Wall Design and Construction 19
6.8 Pavement Design Parameters 21

**7.0 GENERAL COMMENTS 24**

**APPENDICES**

A Plate 1: Site Location Map
Plate 2: Boring Location Plan
B Boring Logs
C Laboratory Test Results
D Grading Guide Specifications
E Seismic Design Parameters

# 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.

**Geotechnical Design Considerations**

- Artificial fill soils were encountered most of the boring and, extending from the ground surface or below the existing pavements to depths of 1½ to 12± feet. The fill soils are underlain by loose to medium dense native alluvium.
- The fill soils and near-surface alluvial soils possess varying strengths and densities. In addition, some of the existing fill soils possess a minor potential for hydrocollapse. The existing fill soils are considered to represent undocumented fill. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structures.
- Some of the native alluvium extending to depths of 5 to 6± feet a possesses a moderate potential for hydrocollapse when inundated with water.
- Remedial grading will be necessary to remove the existing fill soils and a portion of the near-surface alluvial soils and replace them as compacted structural fill.

**Site Preparation Recommendations**

- Initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any weeds, grasses, and any organic topsoils.
- Demolition of existing buildings and pavements will be necessary in the northern portion of the site. Debris resultant from demolition should be disposed of off-site. Alternatively, 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. It may also be crushed and made into crushed miscellaneous base (CMB), if desired.
- We recommend that remedial grading be performed within the proposed building areas in order to remove all of the artificial fill soils and a portion of the near-surface alluvium. The soils present within the proposed building areas should be overexcavated to a depth of at least 5 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevation. The proposed foundation influence zones should also be overexcavated to a depth of at least 3 feet below proposed foundation bearing grade. Additional overexcavation should be anticipated in the area of Boring No. B-5. Fills soils up to 12 feet deep were encountered at this boring location.
- After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be overexcavated. The resulting soils should be scarified and moisture conditioned to 0 to 4 percent above the optimum moisture content, to a depth of at least 12 inches. The overexcavation subgrade soils should then be recompacted under the observation of the geotechnical engineer. The previously excavated soils may then be replaced as compacted structural fill.
- The new pavement and flatwork 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.

## Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft$^2$ maximum allowable soil bearing pressure.
- Reinforcement consisting of at least two (2) No. 5 rebars (1 top and 1 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

## Building Floor Slab Design Recommendations

- Conventional Slabs-on-Grade: minimum 6-inch thickness.
- Modulus of Subgrade Reaction: k = 150 psi/in.
- Reinforcement is not expected to be necessary for geotechnical considerations.
- The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

## Pavement Design Recommendations

| ASPHALT PAVEMENTS (R=50) | | | | | |
|---|---|---|---|---|---|
| **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 | 3 | 4 | 5 | 5 | 7 |
| Compacted Subgrade | 12 | 12 | 12 | 12 | 12 |

| PORTLAND CEMENT CONCRETE PAVEMENTS (R=50) | | | | |
|---|---|---|---|---|
| **Materials** | **Thickness (inches)** | | | |
| | Autos and Light Truck Traffic (TI = 6.0) | Truck Traffic | | |
| | | TI = 7.0 | TI = 8.0 | TI = 9.0 |
| PCC | 5 | 5½ | 6½ | 8 |
| Compacted Subgrade (95% minimum compaction) | 12 | 12 | 12 | 12 |

## 2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 19P223, dated May 7, 2019. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slabs, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

# 3.0 SITE AND PROJECT DESCRIPTION

## 3.1 Site Conditions

The subject site is located at the northwest corner of Ramona Avenue and Mission Boulevard in Montclair, California. The site is bounded to the north by State Street, to the west by neighboring industrial buildings, to the south by Mission Boulevard, and to the east by Ramona Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 of this report.

The site consists of a nearly rectangular-shaped parcel, 27.87± acres in size. The site is presently developed as a drive-in movie theater and swap-meet location. Several structures are present in the northwestern, central and northeastern portions of the site. A two-story building, 16,500± ft² in size, is present in the north-central area of the site and is utilized as an office/maintenance building for the location. A large maintenance building, 5,200± ft² in size, is located in the northwest corner of the site, southwest of the office building. Several equipment sheds are present near the office building, ranging in size from 600 to 650± ft², as well as parking booths which are about 40± ft² in size. A 9,100± ft² multi-story building with a rotunda comprising the upper-most portion of the structure is present in the central portion of the site. A large drive-in movie theater screen is present near each of the four corners of the site (4 screens total). The screens are supported by metal frames. Concrete posts, approximately 4 ft tall, are present throughout the parking areas for the drive-in theaters. The ground surface cover throughout the majority of the site consists of asphaltic pavements, with the exception a Portland cement concrete paved parking lot, 65,000± ft² in size, in the northwest corner of the site.

The parcel in the northeast corner of the site is presently occupied by the Montclair Tire Company and is developed with one metal building. The ground surface surrounding the building appears to be paved with asphaltic concrete. A concrete retaining wall and an ascending slope are present along the east property line. The slope ascends from the top of the wall to Ramona Avenue.

All pavements throughout the site are in poor condition with severe cracking throughout. Landscaped areas with grass, shrubs, and trees are present along the south and east property lines.

Detailed topographic information was not available at the time of this report. However, based on topographic information obtained from Google Earth, the site topography ranges from 902± feet mean sea level (msl) in the southern area of the site to 926± feet msl in the northern area of the site. The site topography slopes gently downward to the south at a gradient of 1± percent.

## 3.2 Proposed Development

A conceptual site plan for the proposed development, prepared by GAA Architects was provided to our office by the client. The plan is identified as Scheme B, and indicates that the site will be developed with five (5) new commercial/industrial buildings. The buildings are identified on the site plan as Buildings 1 through 5, inclusive. Building 1 will be constructed in the north ½± of the site and will possess a footprint area of 281,000± ft². Buildings 2 through 5 will be constructed in the southern ½± of the site and will possess footprint areas ranging between 34,000± ft² and 97,500± ft². All of the proposed buildings will be constructed with dock-high doors along one building wall. We expect that the new buildings will be surrounded by asphaltic concrete pavements in the automobile parking and drive areas, and Portland cement concrete pavements in the truck loading areas. Some landscape planters may be constructed in limited areas throughout the site.

The site plan also indicates that the existing alignment of Third Street (which presently terminates at the western boundary of the site) will be extended through the central portion of subject site, connecting to Ramona Avenue at the existing intersection of Ramona Avenue and Dale Street. The traffic index (TI) for this new portion of 3rd Street has not been provided to our office.

Detailed structural information has not been provided. We assume that the new buildings will be single-story structures of tilt-up concrete construction, typically supported on conventional shallow foundation systems with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 6 kips per linear foot, respectively.

Grading plans are presently unavailable for the proposed development. No significant amounts of below-grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of 3 to 5± feet are expected to be necessary to achieve the proposed site grades.

# 4.0 SUBSURFACE EXPLORATION

## 4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of seventeen (17) borings, advanced to depths of 10 to 35± feet below currently existing site grades. All of the borings were logged during drilling by a member of our staff.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil 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 are 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 are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

## 4.2 Geotechnical Conditions

### Pavements

All of the borings were drilled in areas developed with asphaltic concrete pavements, with the exception of Boring No. B-1. At these locations, the pavement sections consist of 1 to 4± inches of asphaltic concrete with 0 to 3± inches underlying aggregate base. Boring B-1 was drilled in an unpaved planter area.

### Artificial Fill

Artificial fill soils were encountered at most of the boring locations. Fill soils were encountered at the ground surface at Boring No. B-1 and beneath the pavements at all of the remaining boring except for Boring Nos. B-4, B-10, and B-15. The fill soils generally consist of loose to medium dense fine to medium sands and silty sands with varying coarse sand and fine gravel content. The fill soils generally extend to depths of 1½ to 6½± feet, but deeper fills extending to a depth of 12± feet were encountered at Boring No. B-5. These soils possess a disturbed and mottled appearance and some of the fill soils possess minor artificial debris content including asphaltic concrete fragments and plastic debris, resulting in their classification as artificial fill.

Alluvium

Native alluvial soils were encountered beneath the fill soils or pavements at all of the boring locations. The alluvium generally consists of loose to very dense silty fine sands, fine sandy silts, and well graded sands with varying fine gravel content. Native alluvium extends to at least the maximum depth explored of 35± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater is considered to have existed at a depth in excess of 35± feet at the time of the subsurface exploration.

As part of our research, we reviewed available groundwater data in order to obtain more recent high groundwater level for the site. The primary reference used to determine the groundwater depths in this area is the California Department of Water Resources website, http://www.water.ca.gov/geotracker/. The nearest monitoring well is located 4,900± feet southwest of the site. Water level readings within these monitoring wells indicate high groundwater levels of 270± feet below site grades (October 2011).

# 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. Field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

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 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

Two representative bulk samples were tested for their maximum dry density and optimum moisture contents. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plates C-9 and C-10 in Appendix C of this report. These tests are generally used to compare 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 (%) | Sulfate Classification |
|---|---|---|
| B-2 @ 0 to 5 feet | 0.002 | Not Applicable (S0) |
| B-11 @ 0 to 5 feet | 0.002 | Not Applicable (S0) |

R-value

R (resistance)-value testing was conducted on one representative sample of the recovered soils obtained from the boring locations at the subject site. The R-value was determined for representative soils samples in accordance with CA Test Method 301. This test provides a measure of the pavement support characteristics of the soils, and is used in the pavement thickness design procedure. The results of the R-value testing are as follows:

| Sample ID | R-Value |
|---|---|
| B-15 @ 0 to 5 feet | 78 |

# 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. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

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

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2016 edition of the California Building

Code (CBC). 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 2016 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 2016 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 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:

**2016 CBC SEISMIC DESIGN PARAMETERS**

| Parameter | | Value |
|---|---|---|
| Mapped Spectral Acceleration at 0.2 sec Period | $S_S$ | 1.829 |
| Mapped Spectral Acceleration at 1.0 sec Period | $S_1$ | 0.651 |
| Site Class | --- | D |
| Site Modified Spectral Acceleration at 0.2 sec Period | $S_{MS}$ | 1.829 |
| Site Modified Spectral Acceleration at 1.0 sec Period | $S_{M1}$ | 0.977 |
| Design Spectral Acceleration at 0.2 sec Period | $S_{DS}$ | 1.219 |
| Design Spectral Acceleration at 1.0 sec Period | $S_{D1}$ | 0.651 |

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.

The California Geological Survey (CGS) has not yet conducted detailed seismic hazards mapping in the area of the subject site. The general liquefaction susceptibility of the site was determined by research of the San Bernardino County Land Use Plan, General Plan, Geologic Hazard Overlays. Map FH28 indicates that the subject site is not located within an area of liquefaction susceptibility. Based on the mapping performed by the county of San Bernardino and the subsurface 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 near surface soils encountered at the boring locations consist of artificial fill soils and native alluvium. The artificial fill soils, where encountered, generally extend to depths of 1½ to 6½± feet below the existing site grades. Boring No. B-5 encountered deeper fill soils extending to a depth of 12± feet. The fill soils possess variable strengths and densities and based on the results of consolidation/collapse testing, some of the fill materials possess a minor potential for hydrocollapse when inundated with water. Based on these considerations, and a lack of documentation of the placement and compaction of these soils, the existing fill materials are considered to consist of undocumented fill, unsuitable for the support of the proposed structure. The near surface alluvium also possesses variable strengths, densities, and composition. The results of laboratory testing indicate that some of the alluvium extending to depths of 5 to 6± feet possess a minor to moderate potential for hydrocollapse when inundated with water. Therefore, remedial grading is considered warranted within the proposed building areas in order to remove all of the undocumented fill soils in their entirety as well as the upper portion of the near-surface native alluvial soils and replace them as compacted fill soils.

Settlement

The recommended remedial grading will remove the existing undocumented fill soils and a portion of the near-surface native alluvial soils 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 stress increases from the foundations of the new structures. Therefore, following completion of the recommended grading, post-construction settlements are expected to be within tolerable limits.

Expansion

The near-surface soils encountered at the boring locations consist of silty sands underlain by well graded sands. These materials have been visually classified as very low to non-expansive. Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing indicate that the selected samples of the on-site soils to correspond to Class S0 with respect to the American Concrete Institute (ACI) Publication 318-14 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 pad grade within the building areas.

Shrinkage/Subsidence

Based on the results of the laboratory testing, removal and recompaction of the loose to medium dense near-surface soils, extending to depths of 3 to 6± feet, is estimated to result in an average shrinkage of 8 to 15 percent. It should be noted that this shrinkage estimate is based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

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 0.1± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience in the area of the subject site and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent 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

Grading and foundation plans were not available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

## 6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping and Demolition

Initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any grass and weed growth as well as any organic top soils. If any trees are removed from the existing landscaped areas, the associated root masses should also be removed in their entirety. 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 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, septic systems, 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 off-site. 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. Concrete and asphalt may also be crushed and made into crushed miscellaneous base (CMB), if desired.

Treatment of Existing Soils: Building Pads

Remedial grading should be performed within the proposed building pad areas in order to remove any soils disturbed during demolition, the existing undocumented fill soils, and the upper portion of the near-surface native alluvium. Based on conditions encountered at the boring locations, we recommend that the existing soils within the proposed building areas be overexcavated to a depth of at least 5 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater. **The depth of the overexcavation should also extend to a depth sufficient to remove all undocumented fill soils**. The undocumented fills extend to depths of 1½ to 12± feet at most of the boring locations. Additional overexcavation should be performed within the influence zones of the new foundations, to provide for a new layer of compacted structural fill extending to a depth of at least 3 feet below proposed bearing grades.

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

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. **Some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low density native soils are encountered at the base of the overexcavation**.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture treated to 0 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of proposed retaining and non-retaining site walls should be overexcavated to a depth of at least 2 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pads. Any undocumented fill soils within any of these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 5 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Any erection pads for tilt-up concrete walls are considered to be part of the foundation system. Therefore, these overexcavation recommendations are applicable to erection pads. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils, as discussed for the building areas. The previously excavated soils may then be replaced as compacted structural fill.

If the recommended remedial grading cannot be completed for screen walls located along property lines, such walls should be designed for a reduced allowable bearing pressure. The allowable bearing pressure will be determined based on the actual extent of remedial grading that can be accomplished during site grading.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing near-surface existing soils in the new flatwork, parking and drive 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 flatwork, parking and drive 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. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above the optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial 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 flatwork, parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork, parking and drive areas. The grading recommendations presented above do not completely mitigate the extent of existing fill soils that may be present in the flatwork, parking and drive areas. As such, some 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, the flatwork, parking and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above 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 2016 CBC and the grading code of the city of Montclair.
- 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 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 soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. It is recommended that materials in excess of 3 inches in size not be used for utility trench backfill. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Montclair. 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 underlain by well graded sands and gravelly sands. These materials will likely be subject to minor to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 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.

Groundwater

The static groundwater table is considered to have existed at a depth in excess of 35± feet at the time of the subsurface exploration. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

## 6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pads will be underlain by structural fill soils used to replace the existing fill soils and a portion of the near-surface alluvial soils. These new structural fill soils are expected to extend to depths of at least 3 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been scarified, moisture conditioned, and recompacted. Based on this subsurface profile, the proposed structures may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft$^2$.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent of the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

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: 300 $lbs/ft^3$
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill soils. The maximum allowable passive pressure is 3,000 $lbs/ft^2$.

## 6.6 Floor Slab Design and Construction

Subgrades which will support the new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floors of the proposed structures may be constructed as conventional slabs-on-grade supported on newly placed structural fill (or densified existing soils), extending to a depth of at least 3 feet below finished pad grades. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 150 psi/in.

- Minimum slab reinforcement: Reinforcement is not considered necessary from a geotechnical standpoint. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab 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 where such moisture sensitive floor coverings are anticipated. 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 0 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 slabs should be completed by the structural engineer to verify adequate thickness and reinforcement.

## 6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. 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 near-surface soils generally consist of silty 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<br>On-site Silty Sands |
|---|---|---|
| Internal Friction Angle ($\phi$) | | 30° |
| Unit Weight | | 130 lbs/ft$^3$ |
| Equivalent Fluid Pressure: | Active Condition (level backfill) | 43 lbs/ft$^3$ |
| | Active Condition (2h:1v backfill) | 70 lbs/ft$^3$ |
| | At-Rest Condition (level backfill) | 65 lbs/ft$^3$ |

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.

Seismic Lateral Earth Pressures

In accordance with the 2016 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.

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 proposed foundation 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 properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls be used. If the drainage composite 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 drainage composite 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). 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.

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 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

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 and sandy silts. The results of laboratory testing indicate that these soils possess excellent pavement support characteristics with an R value of 78. Based on the variability of the composition of the near-surface soils, the subsequent pavement design is therefore based upon a conservative R-value of 50. 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 to verify that the pavement design recommendations presented herein are valid.

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=50) | | | | | |
|---|---|---|---|---|---|
| **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 | 3 | 4 | 5 | 5 | 7 |
| 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 (R=50) | | | | |
|---|---|---|---|---|
| **Materials** | **Thickness (inches)** | | | |
| | Autos and Light Truck Traffic (TI = 6.0) | Truck Traffic | | |
| | | TI = 7.0 | TI = 8.0 | TI = 9.0 |
| PCC | 5 | 5½ | 6½ | 8 |
| Compacted Subgrade (95% minimum compaction) | 12 | 12 | 12 | 12 |

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

# 7.0 GENERAL COMMENTS

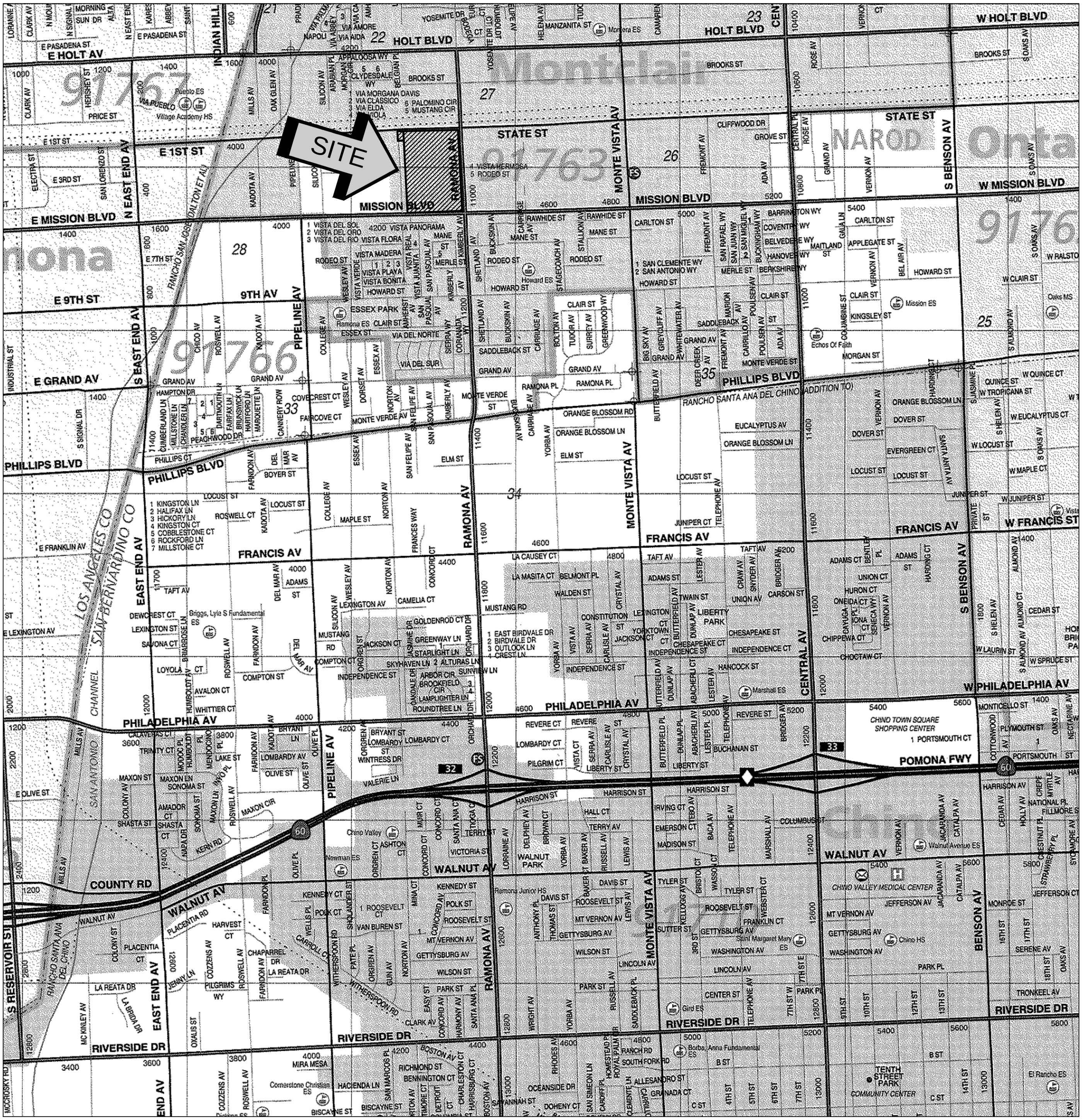
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other 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

MONTCLAIR, CALIFORNIA

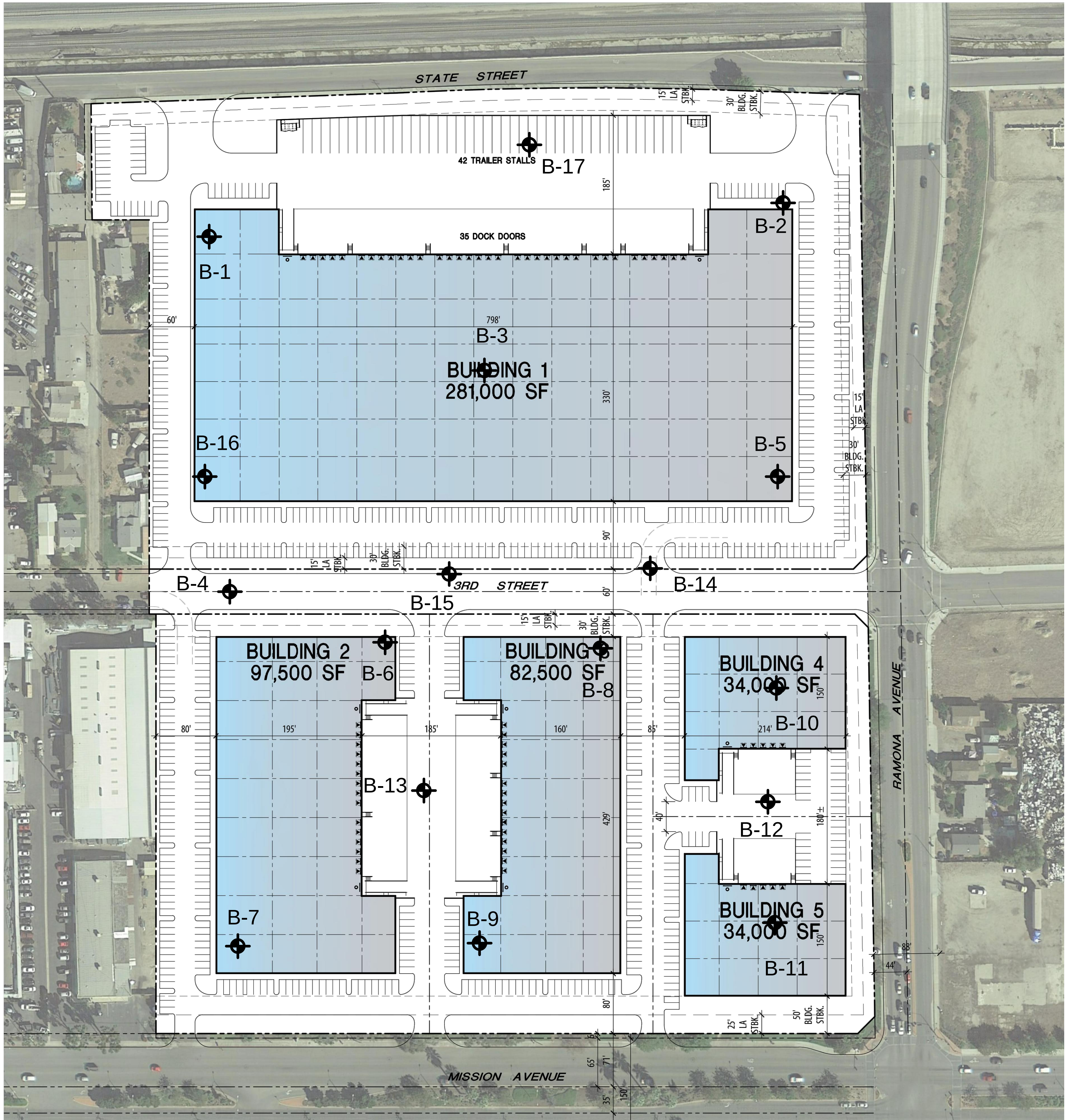
SCALE: 1" = 2400'

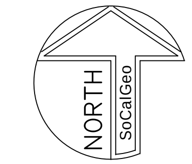
DRAWN: RK
CHKD: DWN

SCG PROJECT
19G146-1

**PLATE 1**

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL




GEOTECHNICAL LEGEND

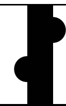
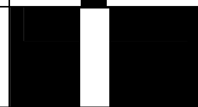
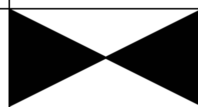
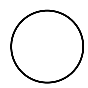
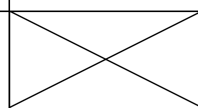
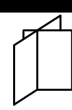
⌖ APPROXIMATE BORING LOCATION

| BORING LOCATION PLAN |
|---|
| PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT |
| MONTCLAIR, CALIFORNIA |

| | |
|---|---|
| SCALE: 1" = 150' | SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL |
| DRAWN: RK<br>CHKD: DWN | |
| SCG PROJECT<br>19G146-1 | |
| 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

# SOUTHERN CALIFORNIA GEOTECHNICAL

A California Corporation

**BORING NO. B-1**

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/10/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 22 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

| DEPTH (FEET) | BLOW COUNT | POCKET PEN. (TSF) | DESCRIPTION | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | FILL: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, loose-damp to moist | | | | | | | |
| | 13 | | | 112 | 7 | | | | | |
| | | | FILL: Brown Silty fine Sand to fine Sandy Silt, trace fine root fibers, trace Asphaltic Concrete fragments, trace plastic debris, loose-moist to very moist | | | | | | | |
| | 8 | | | 104 | 13 | | | | | |
| 5 | 10 | | | 108 | 11 | | | | | |
| | | | ALLUVIUM: Brown Silty fine Sand, trace medium Sand, loose-moist to very moist | | | | | | | |
| | 14 | | | 117 | 12 | | | | | |
| 10 | 11 | | | 115 | 13 | | | | | |
| | | | ALLUVIUM: Gray Brown fine to medium Sand, little Silt, loose-moist to very moist | | | | | | | |
| 15 | 13 | | | 103 | 11 | | | | | |
| 20 | 8 | | | | 16 | | | | | |
| | | | ALLUVIUM: Gray Brown fine to medium Sand, trace Silt, trace coarse Sand, trace fine Gravel, medium dense-moist | | | | | | | |
| 25 | 25 | | | | 8 | | | | | |
| | | | ALLUVIUM: Gray Brown fine to coarse Sand, little Gravel, very dense-damp | | | | | | | |
| 30 | 71 | | | | 3 | | | | | |
| | | | Boring Terminated at 30' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-2

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/10/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 14 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 3± inches Asphaltic Concrete, 3± inches Aggregate Base | | | | | | | |
| | X | 61 | | | FILL: Gray Brown Silty fine to medium Sand, trace coarse Sand, trace Gravel, very dense-damp | | 4 | | | | | |
| | X | 22 | | | ALLUVIUM: Brown Silty fine to medium Sand, trace Gravel, medium dense-damp | | 5 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 16 | | | | | 6 | | | | | |
| | X | 13 | | | | | 5 | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray fine Sand, little Silt, trace medium Sand, trace coarse Sand, trace fine Gravel medium dense-damp to moist | | | | | | | |
| | X | 13 | | | | | 5 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 15 | | | | | 10 | | | | | |
| 20 | | | | | | | | | | | | |
| | | | | | Boring Terminated at 20' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

# BORING NO. B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

| | | |
|---|---|---|
| JOB NO.: 19G146 | DRILLING DATE: 6/10/19 | WATER DEPTH: Dry |
| PROJECT: Proposed C/I Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 12 feet |
| LOCATION: Montclair, California | LOGGED BY: Ross Kovtun | READING TAKEN: At Completion |

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 4± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 20 | | | FILL: Brown to Dark Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp | 115 | 5 | | | | | |
| | | | | | ALLUVIUM: Brown fine to medium Sand, trace to little Silt, trace coarse Sand, little Gravel, medium dense-damp | | | | | | | |
| | X | 17 | | | | 110 | 5 | | | | | |
| 5 | X | 22 | | | | 115 | 4 | | | | | |
| | X | 50 | | | ALLUVIUM: Gray Brown fine to coarse Sand, little fine Gravel, dense-dry to damp | 115 | 2 | | | | | |
| 10 | X | 50 | | | | 117 | 2 | | | | | |
| | | | | | ALLUVIUM: Gray Brown fine to coarse Sand, trace to little fine Gravel, dense to very dense-dry to damp | | | | | | | |
| 15 | X | 44 | | | | | 3 | | | | | |
| 20 | X | 66/12" | | | | | 2 | | | | | |
| | | | | | Boring Terminated at 20' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-4

| | | |
|---|---|---|
| JOB NO.: 19G146 | DRILLING DATE: 6/10/19 | WATER DEPTH: Dry |
| PROJECT: Proposed C/I Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 15 feet |
| LOCATION: Montclair, California | LOGGED BY: Ross Kovtun | 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 (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 12 | | | ALLUVIUM: Brown Silty fine Sand, trace medium Sand, trace fine Gravel, loose to medium dense-moist | | 7 | | | | | |
| | X | 11 | | | | | 8 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 10 | | | | | 8 | | | | | |
| | X | 12 | | | ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, medium dense-moist | | 7 | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray fine to medium Sand, trace Silt, trace coarse Sand, medium dense-damp to moist | | | | | | | |
| | X | 14 | | | | | 4 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 13 | | | | | 11 | | | | | |
| 20 | | | | | Boring Terminated at 20' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-5

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 25.5 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

| Depth (feet) | Blow Count | Pocket Pen. (TSF) | Description | Dry Density (PCF) | Moisture Content (%) | Liquid Limit | Plastic Limit | Passing #200 Sieve (%) | Organic Content (%) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 3± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | 18 | | FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Asphaltic Concrete fragments, medium dense-moist | 114 | 8 | | | | | |
| | 16 | | | 115 | 7 | | | | | |
| 5 | 17 | | | 116 | 10 | | | | | |
| | 19 | | FILL: Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, medium dense-moist | 118 | 10 | | | | | |
| 10 | 31 | | FILL: Brown to Dark Gray Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, mottled, medium dense-moist | 106 | 9 | | | | | |
| 15 | 17 | | ALLUVIUM: Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp | | 5 | | | | | |
| 20 | 14 | | ALLUVIUM: Brown fine Sand, trace to little Silt, medium dense-damp | | 6 | | | | | |
| 25 | 18 | | ALLUVIUM: Gray fine to medium Sand, trace to coarse Sand, trace fine Gravel, medium dense-damp | | 3 | | | | | |
| 30 | 14 | | ALLUVIUM: Gray Brown fine Sandy Silt, medium dense-very moist | | 22 | | | | | |
| 35 | 18 | | ALLUVIUM: Brown Silty fine Sand, medium dense-very moist | | 13 | | | | | |

Boring Terminated at 35'

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

**TEST BORING LOG**

**PLATE B-5**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-6

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/10/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 14.5 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | DESCRIPTION | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| 0 | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 12 | | | FILL: Dark Brown Silty fine to medium Sand, trace coarse Sand, trace Asphaltic Concrete fragments, medium dense-damp | | 5 | | | | | |
| | X | 20 | | | ALLUVIUM: Gray Brown fine to coarse Sand, little fine Gravel, medium dense to dense-dry to damp | | 4 | | | | | |
| 5 | X | 23 | | | | | 2 | | | | | |
| | X | 45 | | | | | 3 | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray fine to coarse Sand, little fine Gravel, very dense-dry to damp | | | | | | | |
| | X | 58 | | | | | 2 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 55 | | | | | 2 | | | | | |
| 20 | | | | | | | | | | | | |
| | X | 85/9" | | | | | | | | | | No sample recovered |
| 25 | | | | | Boring Terminated at 25' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

# BORING NO. B-7

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/17/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | DESCRIPTION | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 25 | | FILL: Dark Brown Silty fine to medium Sand, trace coarse Sand, little to some fine Gravel, trace Asphaltic Concrete fragments, loose to medium dense-damp to moist | 106 | 9 | | | | | |
| | X | 15 | | | 112 | 6 | | | | | |
| 5 | X | 21 | | ALLUVIUM: Brown fine to coarse Sand, trace Silt, trace fine Gravel, medium dense-damp to moist | 108 | 4 | | | | | |
| | X | 22 | | | 115 | 4 | | | | | |
| 10 | X | 40 | | ALLUVIUM: Gray Brown fine to coarse Sand, little to some fine Gravel, medium dense to very dense-dry to damp | 102 | 2 | | | | | |
| 15 | X | 88/12" | | | | 2 | | | | | |
| 20 | X | 81/11" | | | | 1 | | | | | |
| 25 | X | 80/11" | | | | 2 | | | | | |
| 30 | X | 24 | | ALLUVIUM: Gray Brown fine Sandy Silt, trace medium Sand, medium dense-very moist | | 16 | | | | | |

Boring Terminated at 30'

# BORING NO. B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | DESCRIPTION | LABORATORY RESULTS | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | |
| | | | | | 2± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 16 | | | FILL: Dark Brown Silty fine to medium Sand, trace coarse Sand, trace Asphaltic Concrete fragments, medium dense-damp to moist | 116 | 7 | | | | | |
| | X | 12 | | | ALLUVIUM: Brown Silty fine Sand, trace medium Sand, loose to medium dense-moist | 106 | 8 | | | | | |
| 5 | X | 21 | | | | 109 | 8 | | | | | |
| | X | 14 | | | ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, trace fine Gravel, loose to medium dense-damp to moist | 105 | 6 | | | | | |
| 10 | X | 26 | | | | 101 | 9 | | | | | |
| 15 | X | 11 | | | | | 10 | | | | | |
| | | | | | ALLUVIUM: Gray Brown fine Sandy Silt, trace Clay, loose-very moist | | | | | | | |
| 20 | X | 8 | | | | | 21 | | | | | |
| | | | | | ALLUVIUM: Gray Brown Silt, trace fine Sand, medium dense-moist | | | | | | | |
| 25 | X | 16 | | | | 104 | 12 | | | | | |

Boring Terminated at 25'

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-9

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 16 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 12 | | | FILL: Gray Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp | | 6 | | | | | |
| | X | 8 | | | ALLUVIUM: Light Brown to Brown Silty fine Sand, trace medium Sand, trace fine Gravel, loose-moist | | 7 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 8 | | | | | 8 | | | | | |
| | X | 11 | | | ALLUVIUM: Gray Silty fine Sand, medium dense-damp to moist | | 6 | | | | | |
| 10 | | | | | | | | | | | | |
| | X | 11 | | | | | 8 | | | | | |
| 15 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-moist | | | | | | | |
| | X | 16 | | | | | 7 | | | | | |
| 20 | | | | | Boring Terminated at 20' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

# BORING NO. B-10

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 23 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 (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | 1± inches Asphaltic Concrete,no discernible Aggregate Base | | | | | | | |
| | X | 8 | | | ALLUVIUM: Dark Brown Silty fine Sand, trace medium Sand, loose-moist | | 9 | | | | | |
| | X | 6 | | | | | 10 | | | | | |
| 5 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray Brown Silty fine Sand, trace fine Gravel, loose-moist | | | | | | | |
| | X | 7 | | | | | 10 | | | | | |
| | X | 7 | | | | | 9 | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray fine to medium Sand, little Silt, medium dense-moist | | | | | | | |
| | X | 11 | | | | | 8 | | | | | |
| 15 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray Brown fine to medium Sand, trace Silt, trace coarse Sand, trace fine Gravel, medium dense-damp to moist | | | | | | | |
| | X | 16 | | | | | 8 | | | | | |
| 20 | | | | | | | | | | | | |
| | X | 20 | | | | | 8 | | | | | |
| 25 | | | | | | | | | | | | |
| | X | 22 | | | | | 4 | | | | | |
| 30 | | | | | Boring Terminated at 30' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-11

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | | 20 | | | FILL: Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp | 117 | 5 | | | | | |
| | | 14 | | | ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, loose to medium dense-moist | 104 | 8 | | | | | |
| 5 | | 15 | | | | 100 | 9 | | | | | |
| | | 17 | | | | 109 | 9 | | | | | |
| | | 20 | | | ALLUVIUM: Light Gray to Gray Brown fine Sand, trace to little Silt, medium dense-moist | 107 | 8 | | | | | |
| 10 | | | | | | | | | | | | |
| | | 14 | | | | | 9 | | | | | |
| 15 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray Brown fine to medium Sand, trace Silt, medium dense-damp to moist | | | | | | | |
| | | 11 | | | | | 6 | | | | | |
| 20 | | | | | | | | | | | | |
| | | 15 | | | | | 10 | | | | | |
| 25 | | | | | Boring Terminated at 25' | | | | | | | |

# BORING NO. B-12

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 16 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 7 | | | FILL: Dark Brown to Brown Silty fine Sand, trace medium Sand, trace Asphaltic Concrete fragments, loose-moist | | 9 | | | | | |
| | X | 8 | | | | | 8 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 6 | | | ALLUVIUM: Brown Silty fine Sand, trace coarse Sand, loose-moist | | 9 | | | | | |
| | X | 6 | | | | | 8 | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | ALLUVIUM: Gray Brown fine to coarse Sand, trace fine Gravel, medium dense-moist | | | | | | | |
| | X | 28 | | | | | 7 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 20 | | | | | 7 | | | | | |
| 20 | | | | | Boring Terminated at 20' | | | | | | | |

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-13

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/17/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | DESCRIPTION | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 24 | | | FILL: Dark Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp | | 5 | | | | | |
| | X | 47 | | | FILL: Brown fine to coarse Sand, trace fine Gravel, dense-damp | | 3 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 15 | | | ALLUVIUM: Brown fine to coarse Sand, trace Silt, trace fine Gravel, medium dense-damp | | 3 | | | | | |
| | X | 55 | | | ALLUVIUM: Gray Brown fine to coarse Sand, trace to some fine Gravel, medium dense to very dense-damp | | 2 | | | | | |
| 10 | | | | | | | | | | | | |
| | X | 30 | | | | | 2 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 28 | | | | | 2 | | | | | |
| 20 | | | | | | | | | | | | |
| | | | | | Boring Terminated at 20' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-14

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 2± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | | 76/10" | | | FILL: Gray to Dark Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, trace Asphaltic Concrete fragments, very dense-damp | | 4 | | | | | |
| | | 86 | | | | 112 | 6 | | | | | |
| 5 | | 30 | | | ALLUVIUM: Brown Silty fine Sand, trace medium Sand, medium dense-moist | 112 | 8 | | | | | |
| | | 33 | | | | 118 | 7 | | | | | |
| | | 38 | | | ALLUVIUM: Light Gray Brown Silty fine to medium Sand, trace fine Gravel, medium dense-moist | 116 | 7 | | | | | |
| 10 | | | | | | | | | | | | |

Boring Terminated at 10'

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-15

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/11/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 7.5 feet
READING TAKEN: At Completion

| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION<br>SURFACE ELEVATION: --- MSL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 3± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 21 | | | ALLUVIUM: Brown fine to coarse Sand, trace fine Gravel, medium dense-damp | 104 | 3 | | | | | |
| | X | 20 | | | | 108 | 5 | | | | | |
| 5 | X | 39 | | | ALLUVIUM: Gray Brown fine to coarse Sand, trace to some fine Gravel, medium dense to very dense-damp | 100 | 4 | | | | | |
| | X | 33 | | | | 110 | 3 | | | | | |
| 10 | X | 52 | | | | | | | | | | No sample recovered |
| | X | 83/11" | | | | 124 | 2 | | | | | |

Boring Terminated at 12'

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

# BORING NO. B-16

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/10/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

WATER DEPTH: Dry
CAVE DEPTH: 13 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 (%) | ORGANIC CONTENT (%) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | 1± inches Asphaltic Concrete, no discernible Aggregate Base | | | | | | | |
| | X | 6 | | | FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Asphaltic Concrete fragments, loose-moist | | 9 | | | | | |
| | X | 8 | | | | | 7 | | | | | |
| 5 | X | 9 | | | ALLUVIUM: Brown Silty fine Sand, trace medium Sand, loose-moist | | 8 | | | | | |
| | X | 10 | | | ALLUVIUM: Gray Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, loose to medium dense- moist | | 7 | | | | | |
| 10 | | | | | | | | | | | | |
| | X | 11 | | | | | 12 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 15 | | | | | | | | | | No sample recovered |
| 20 | | | | | | | | | | | | |
| | X | 23 | | | | | 13 | | | | | |
| 25 | | | | | Boring Terminated at 25' | | | | | | | |

TBL 19G146.GPJ SOCALGEO.GDT 6/26/19

SOUTHERN CALIFORNIA GEOTECHNICAL
*A California Corporation*

# BORING NO. B-17

JOB NO.: 19G146
PROJECT: Proposed C/I Development
LOCATION: Montclair, California

DRILLING DATE: 6/10/19
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ross Kovtun

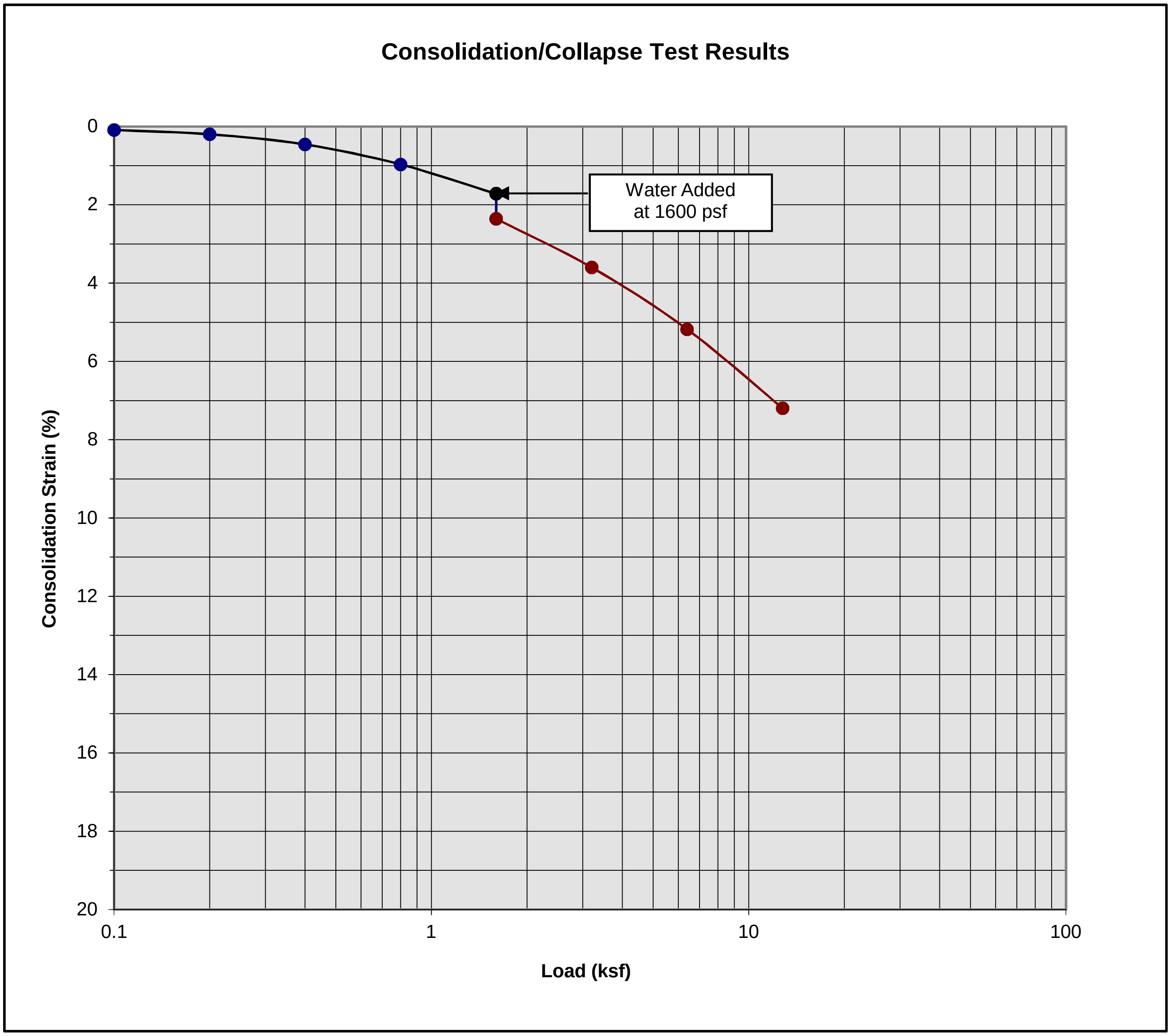
WATER DEPTH: Dry
CAVE DEPTH: 13 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

| FIELD RESULTS | | | | | | LABORATORY RESULTS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FEET) | SAMPLE | BLOW COUNT | POCKET PEN. (TSF) | GRAPHIC LOG | DESCRIPTION | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | LIQUID LIMIT | PLASTIC LIMIT | PASSING #200 SIEVE (%) | ORGANIC CONTENT (%) | COMMENTS |
| | | | | | 4± inches Asphaltic Concrete, 3± inches Aggregate Base | | | | | | | |
| | X | 8 | | | FILL: Dark Brown to Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, loose-damp to moist | | 7 | | | | | |
| | X | 5 | | | | | 6 | | | | | |
| 5 | | | | | | | | | | | | |
| | X | 15 | | | ALLUVIUM: Gray Brown fine to coarse Sand, trace to little fine Gravel, medium dense-damp | | 3 | | | | | |
| | X | 52 | | | ALLUVIUM: Gray fine to coarse Sand, some fine Gravel, dense to very dense-dry to damp | | 3 | | | | | |
| 10 | | | | | | | | | | | | |
| | X | 47 | | | | | 2 | | | | | |
| 15 | | | | | | | | | | | | |
| | X | 44 | | | | | 3 | | | | | |
| 20 | | | | | | | | | | | | |

Boring Terminated at 20'

# APPENDIX C

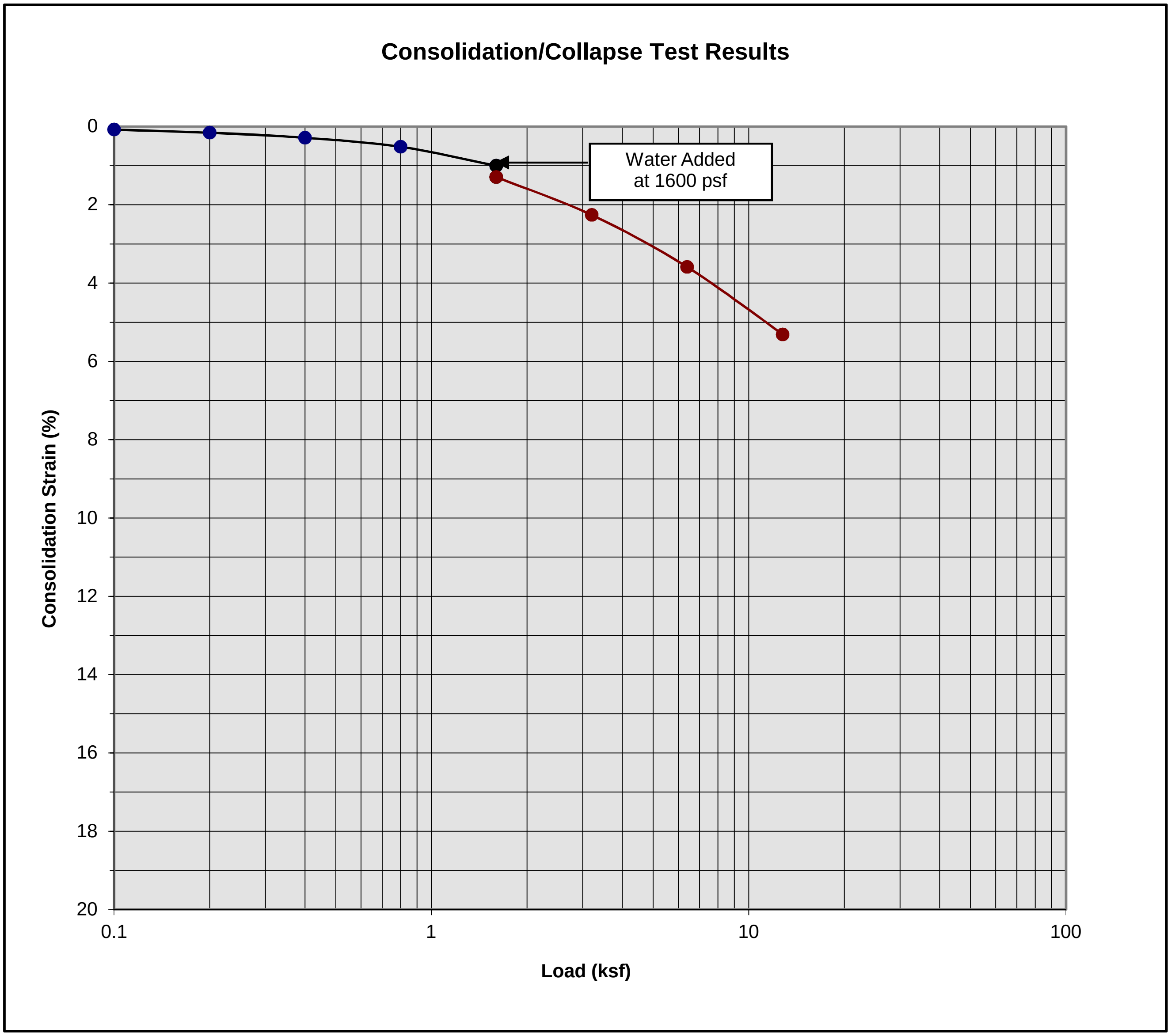



Classification: FILL: Brown Silty fine Sand to fine Sandy Silt

| | | | |
|---|---|---|---|
| Boring Number: | B-1 | Initial Moisture Content (%) | 12 |
| Sample Number: | --- | Final Moisture Content (%) | 15 |
| Depth (ft) | 3 to 4 | Initial Dry Density (pcf) | 104.9 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 113.0 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.64 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



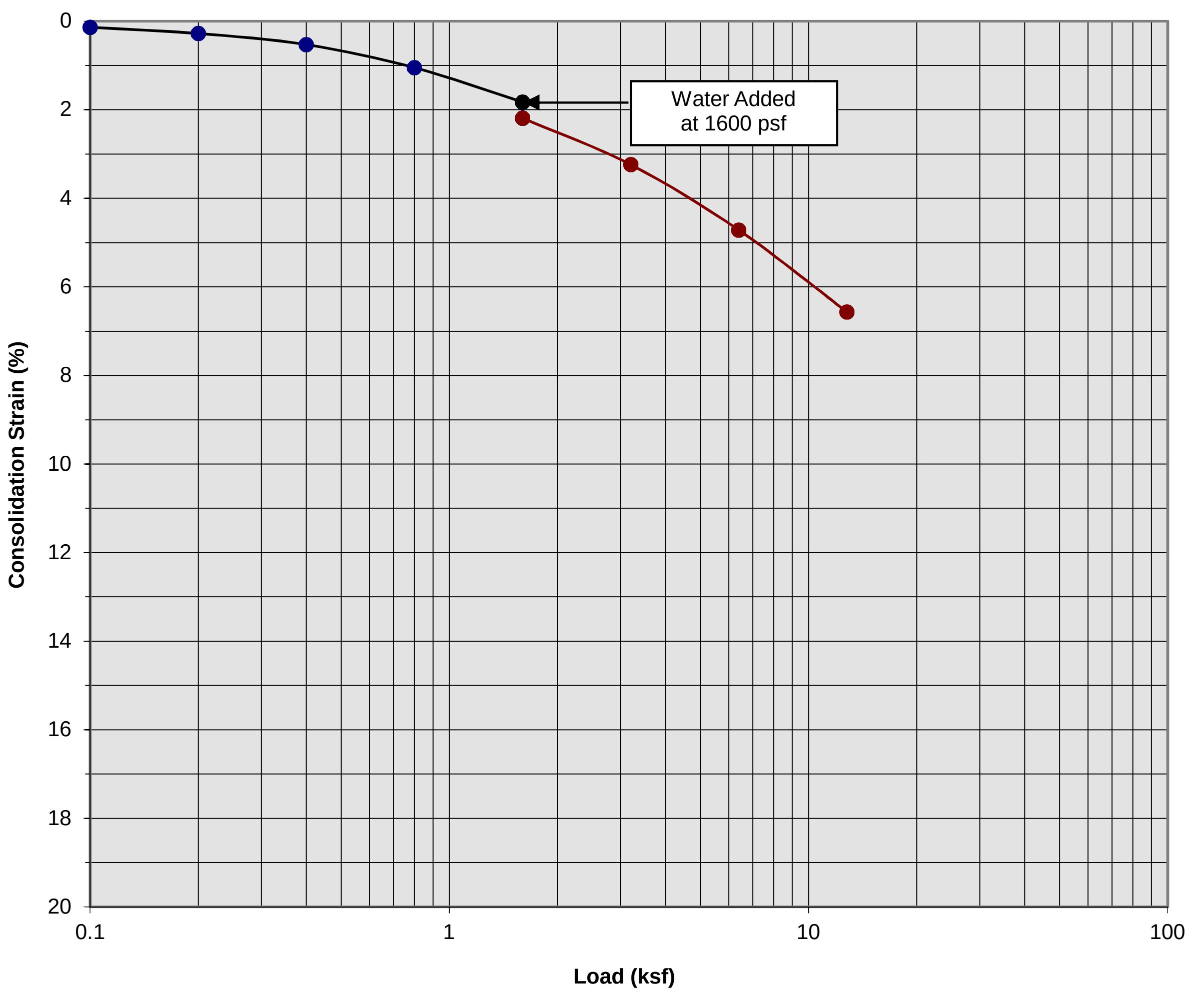

Classification: FILL: Brown Silty fine Sand to fine Sandy Silt

| | | | |
|---|---|---|---|
| Boring Number: | B-1 | Initial Moisture Content (%) | 11 |
| Sample Number: | --- | Final Moisture Content (%) | 13 |
| Depth (ft) | 5 to 6 | Initial Dry Density (pcf) | 109.1 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 115.4 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.29 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 2**

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

## Consolidation/Collapse Test Results

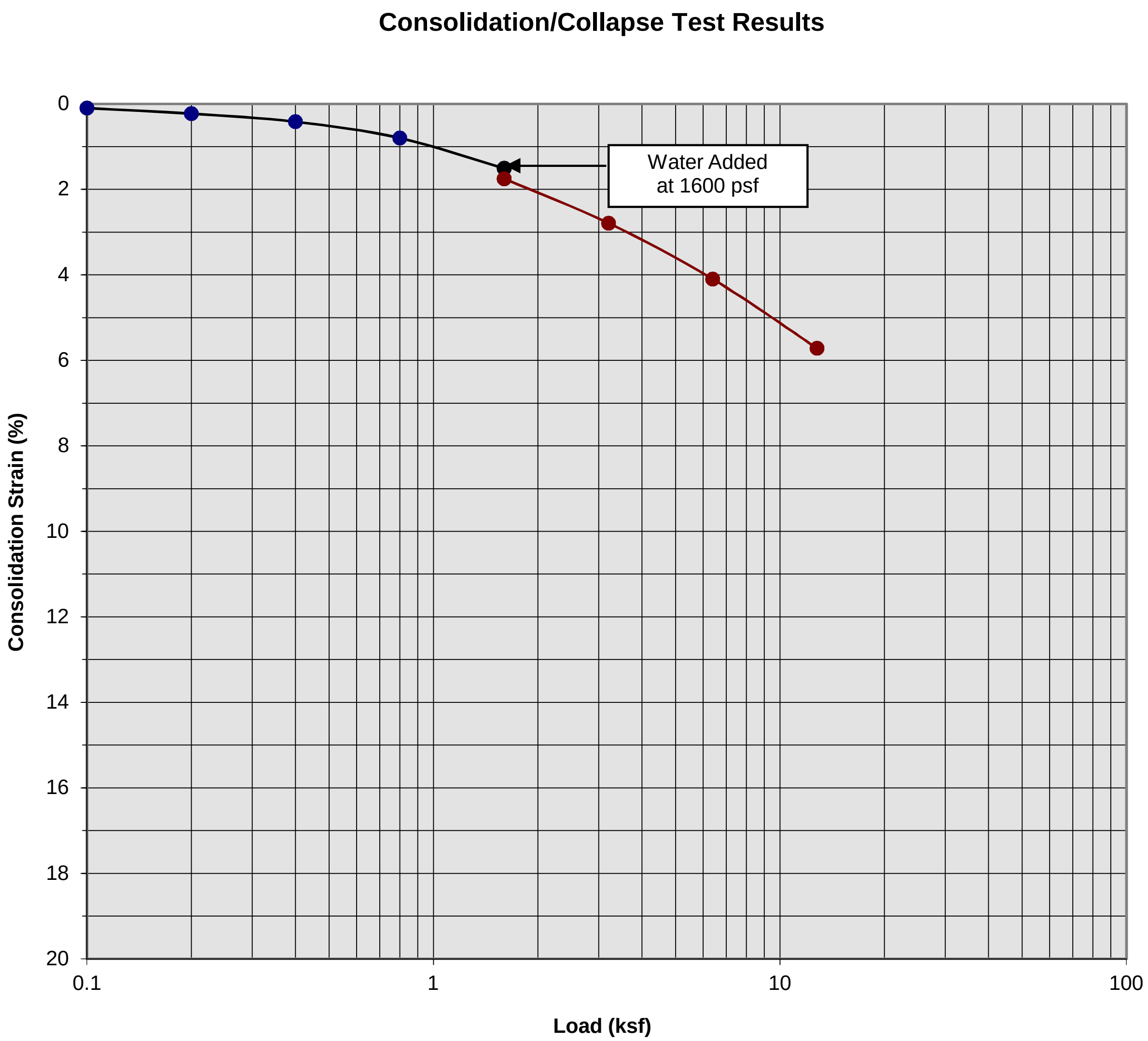



Classification: Brown Silty fine Sand

| | | | |
|---|---|---|---|
| Boring Number: | B-1 | Initial Moisture Content (%) | 11 |
| Sample Number: | --- | Final Moisture Content (%) | 13 |
| Depth (ft) | 7 to 8 | Initial Dry Density (pcf) | 116.7 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 124.8 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.36 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 3**

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

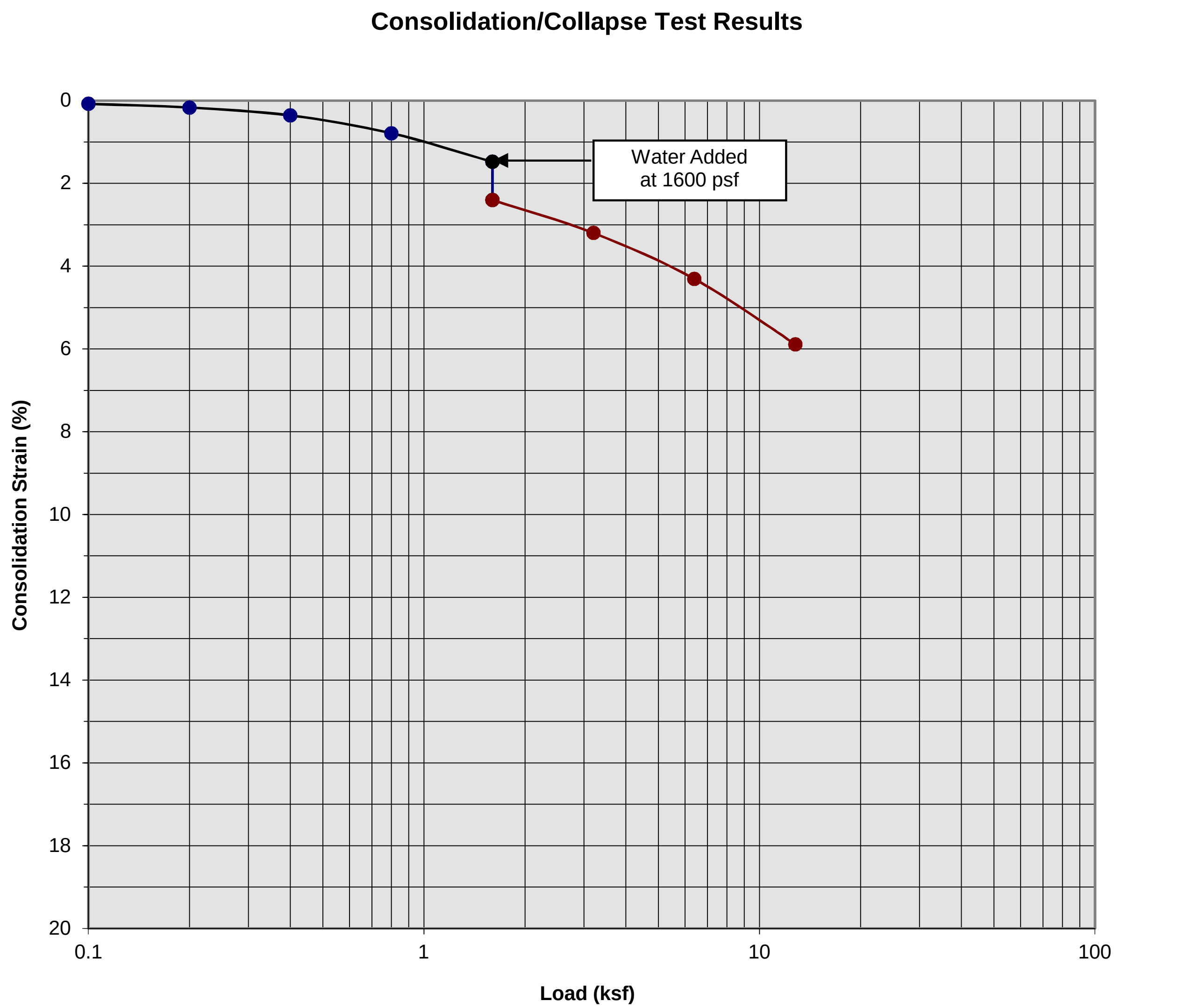



Classification: Brown Silty fine Sand

| | | | |
|---|---|---|---|
| Boring Number: | B-1 | Initial Moisture Content (%) | 13 |
| Sample Number: | --- | Final Moisture Content (%) | 14 |
| Depth (ft) | 9 to 10 | Initial Dry Density (pcf) | 114.7 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 121.4 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.24 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 4**

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
*A California Corporation*

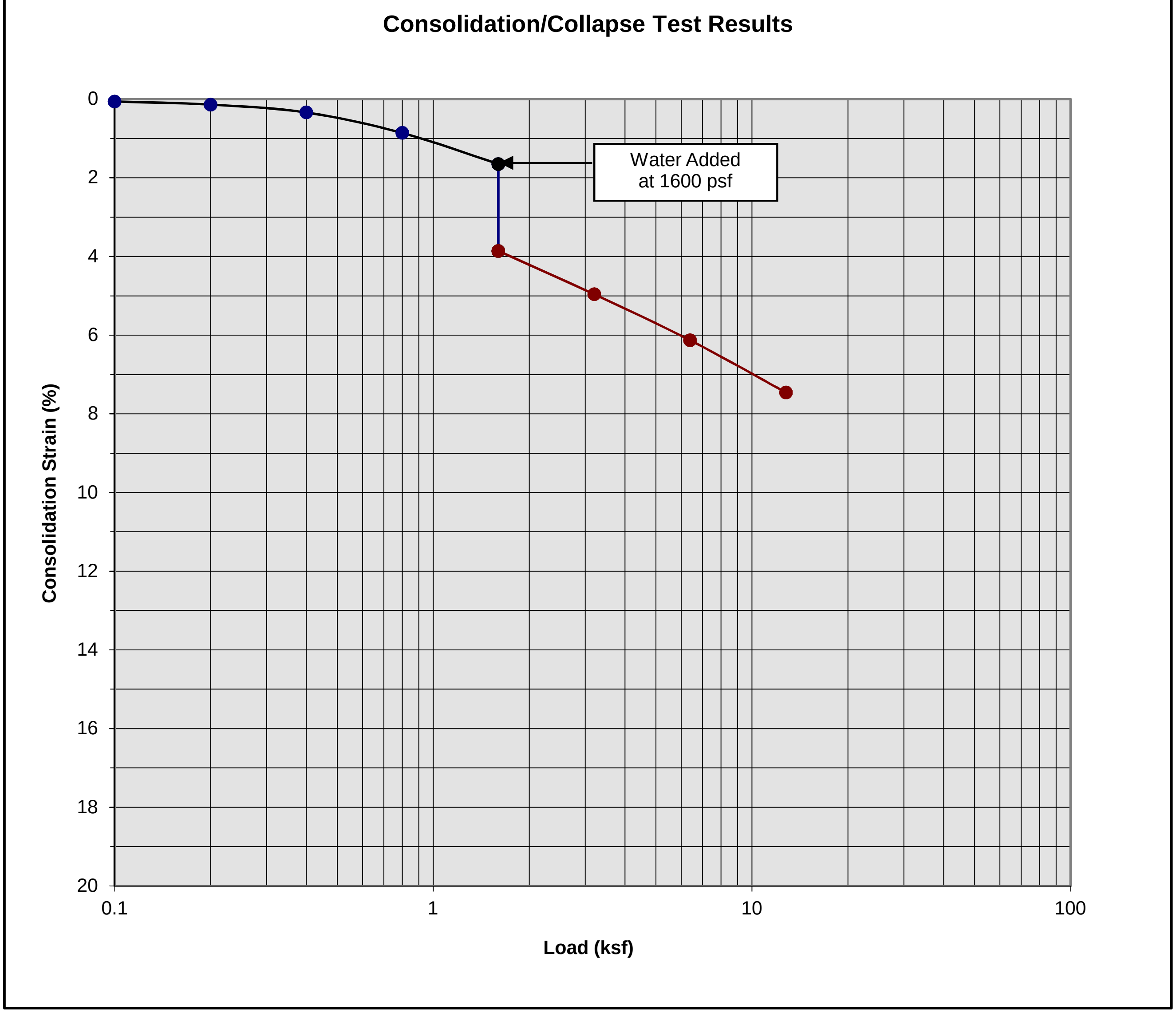



Classification: Brown Silty fine Sand

| | | | |
|---|---|---|---|
| Boring Number: | B-8 | Initial Moisture Content (%) | 8 |
| Sample Number: | --- | Final Moisture Content (%) | 16 |
| Depth (ft) | 3 to 4 | Initial Dry Density (pcf) | 106.6 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 117.2 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.92 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 5**

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

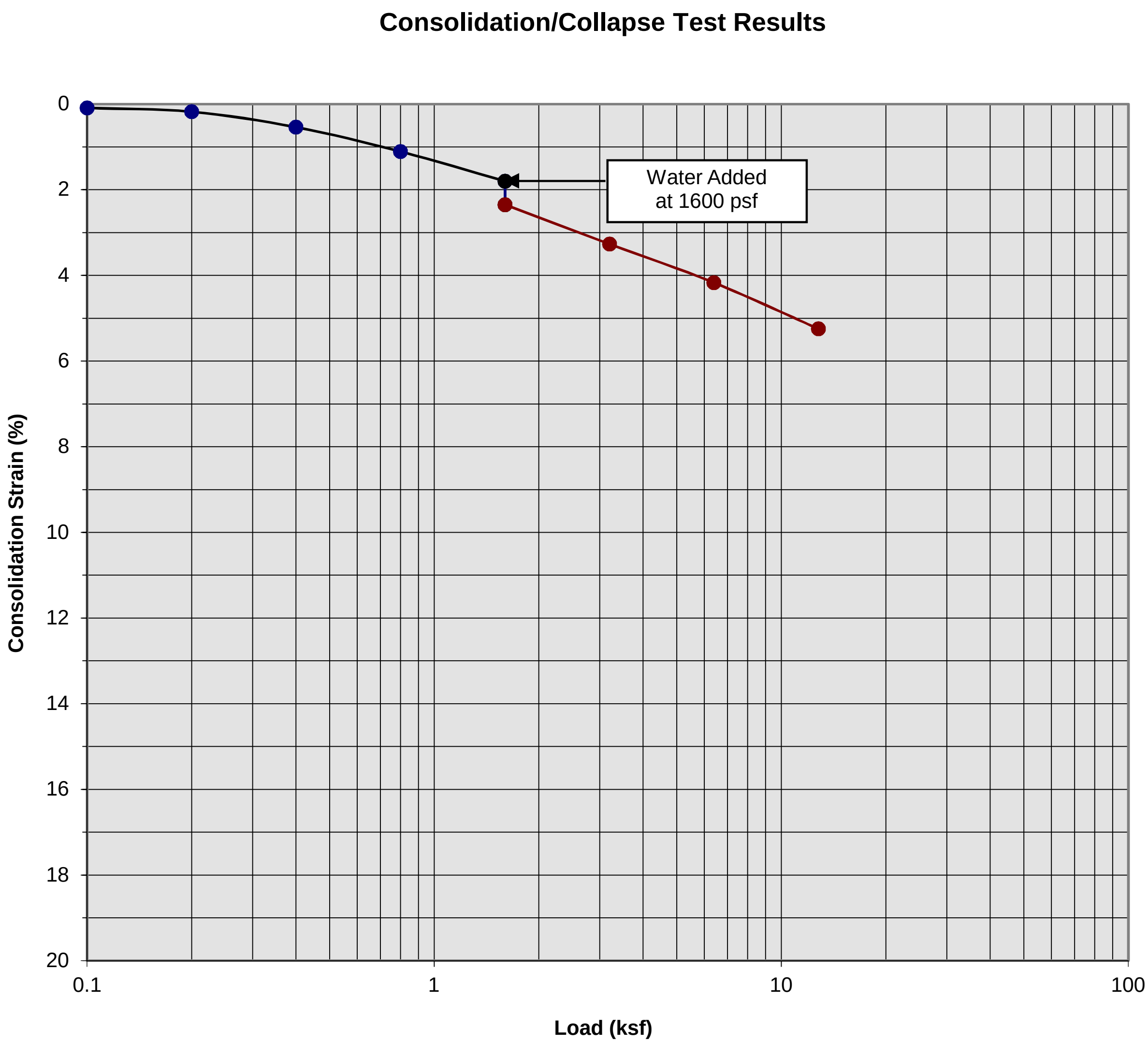



Classification: Brown Silty fine Sand

| | | | |
|---|---|---|---|
| Boring Number: | B-8 | Initial Moisture Content (%) | 8 |
| Sample Number: | --- | Final Moisture Content (%) | 15 |
| Depth (ft) | 5 to 6 | Initial Dry Density (pcf) | 108.7 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 117.8 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 2.21 |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 6**

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

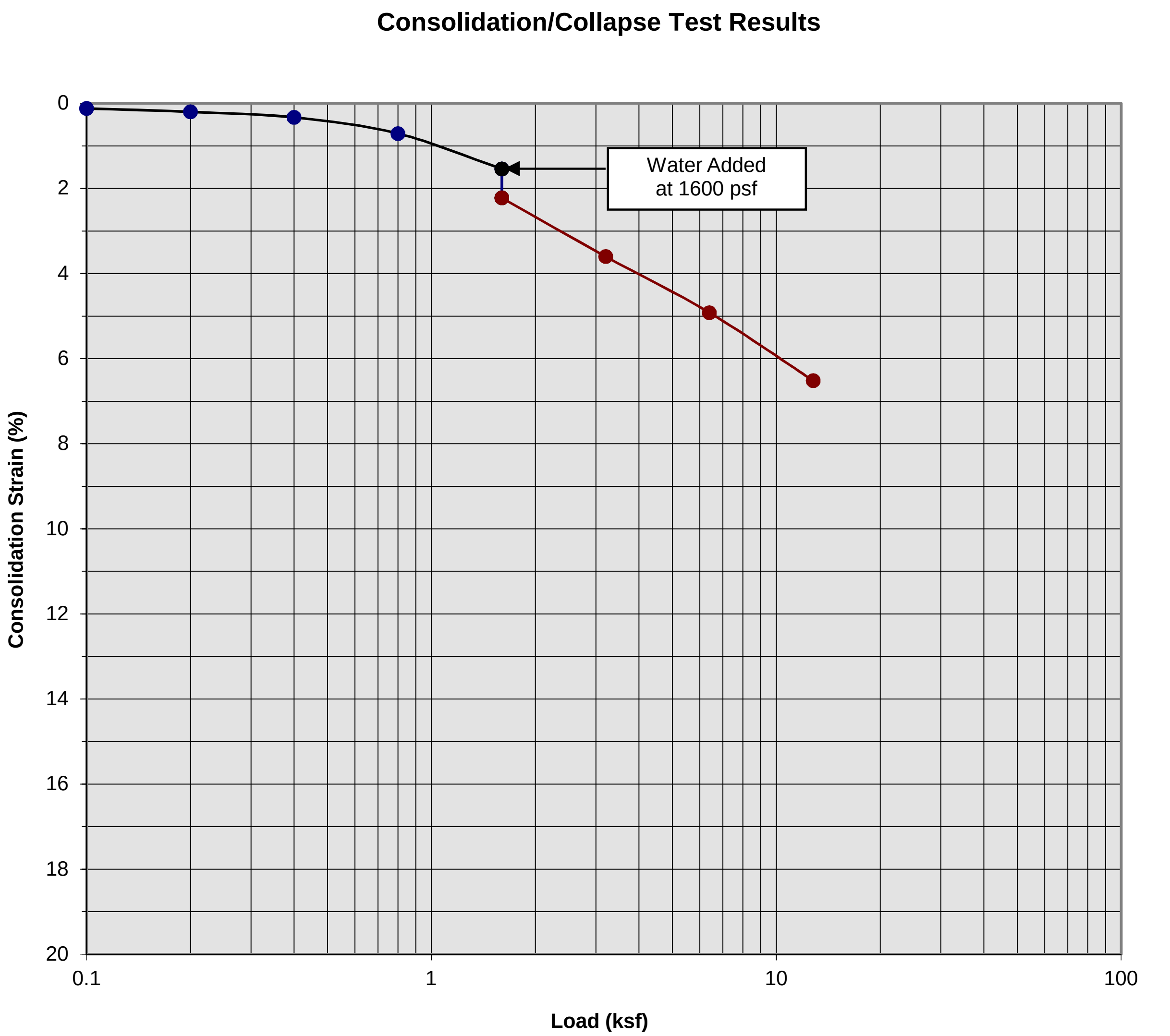



Classification: Gray Brown Silty fine Sand

| | | | |
|---|---|---|---|
| Boring Number: | B-8 | Initial Moisture Content (%) | 6 |
| Sample Number: | --- | Final Moisture Content (%) | 20 |
| Depth (ft) | 7 to 8 | Initial Dry Density (pcf) | 105.0 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 108.9 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.55 |

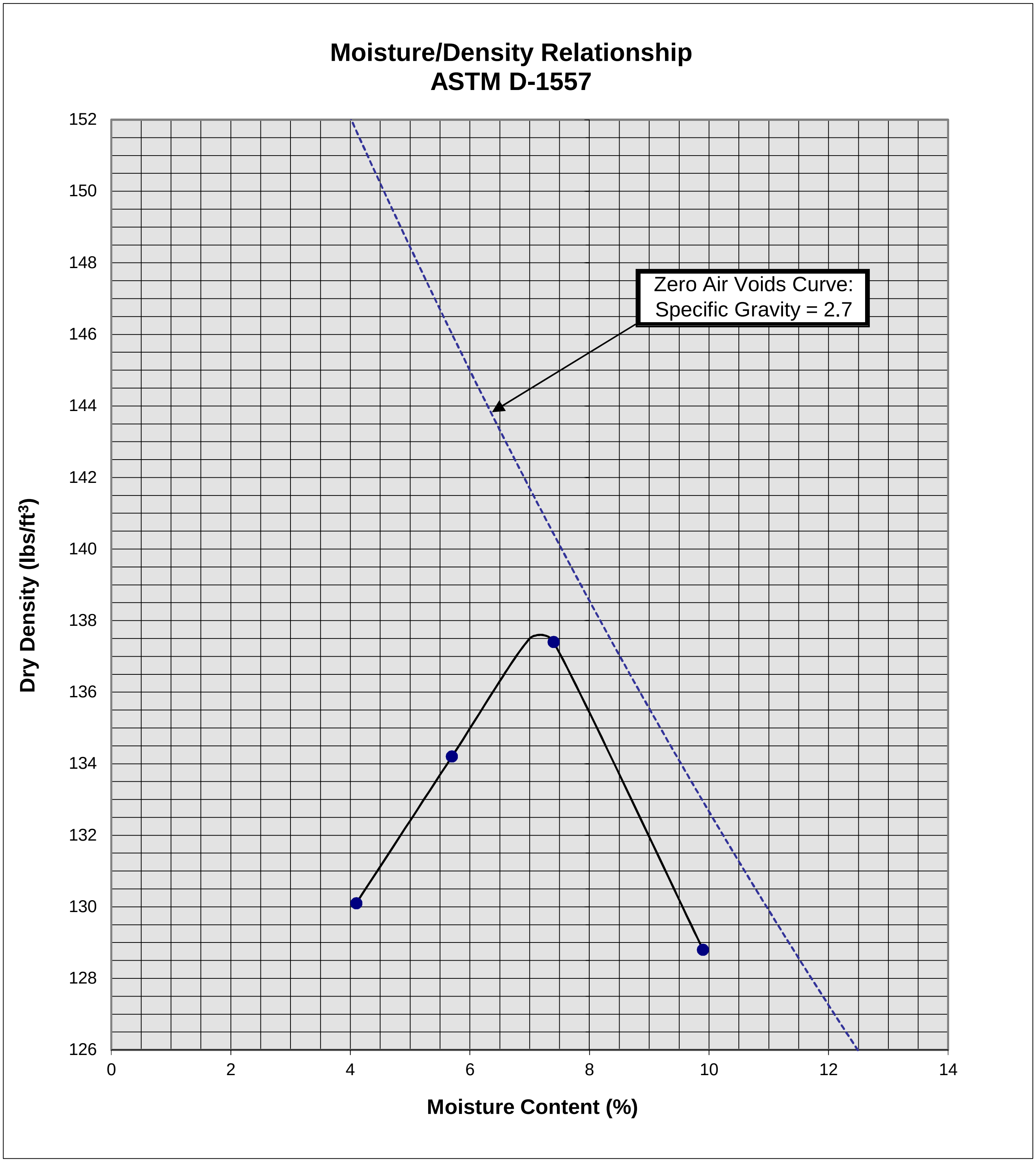
Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C- 7**

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation




Classification: Gray Brown Silty fine Sand

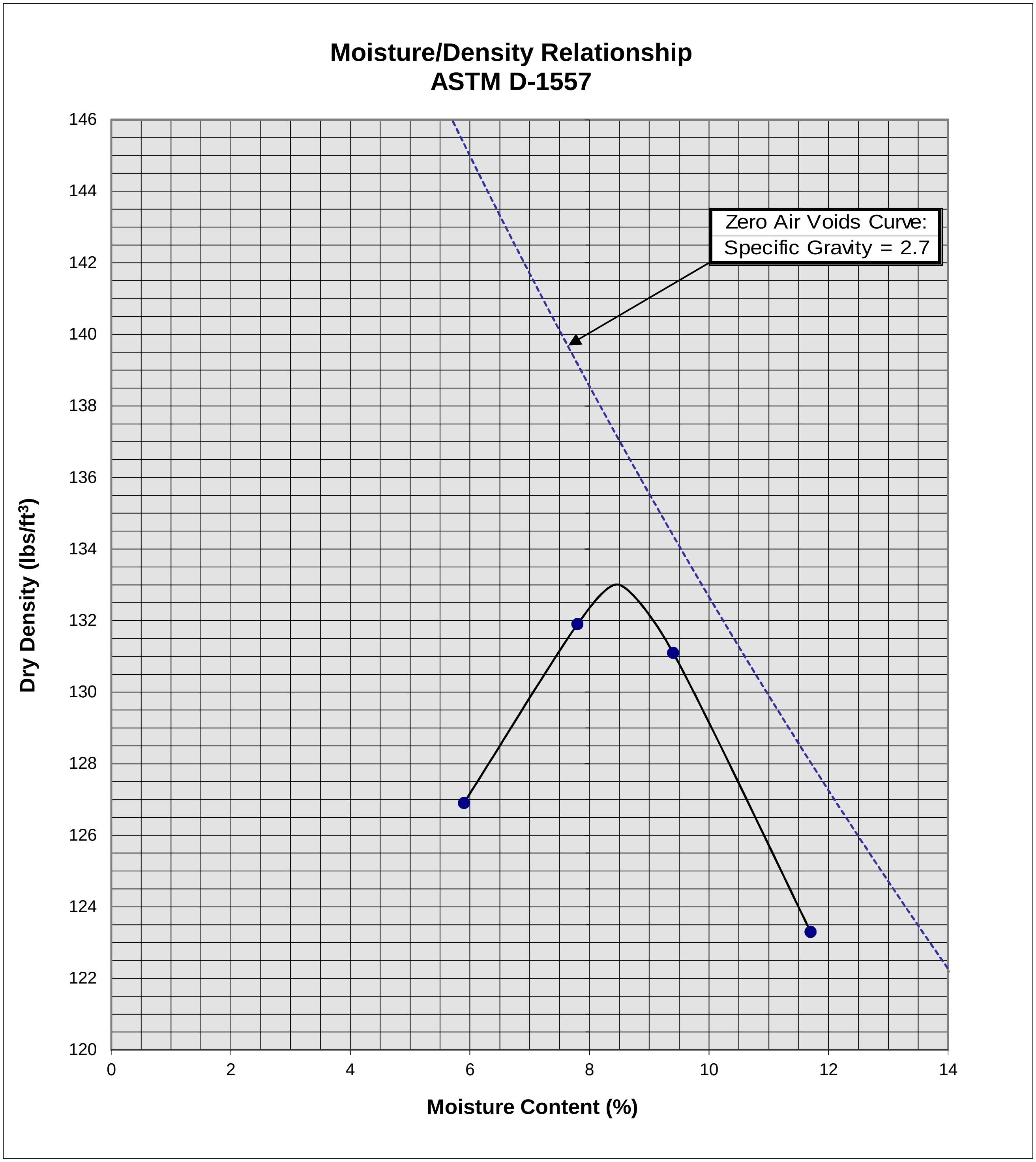
| | | | |
|---|---|---|---|
| Boring Number: | B-8 | Initial Moisture Content (%) | 9 |
| Sample Number: | --- | Final Moisture Content (%) | 24 |
| Depth (ft) | 9 to 10 | Initial Dry Density (pcf) | 101.4 |
| Specimen Diameter (in) | 2.4 | Final Dry Density (pcf) | 108.8 |
| Specimen Thickness (in) | 1.0 | Percent Collapse (%) | 0.68 |




| | |
|---|---|
| Soil ID Number | B-2 @ 0-5' |
| Optimum Moisture (%) | 7 |
| Maximum Dry Density (pcf) | 137.5 |
| Soil Classification | Brown Silty fine to medium Sand trace fine Gravel |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C-9**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation




| | |
|---|---|
| Soil ID Number | B-11@ 0-5' |
| Optimum Moisture (%) | 8.5 |
| Maximum Dry Density (pcf) | 133 |
| Soil Classification | Brown Silty fine Sand, trace medium to coarse Sand |

Proposed Commercial/Industrial Development
Montclair, California
Project No. 19G146
**PLATE C-10**

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.

Compacted Fills

- 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.

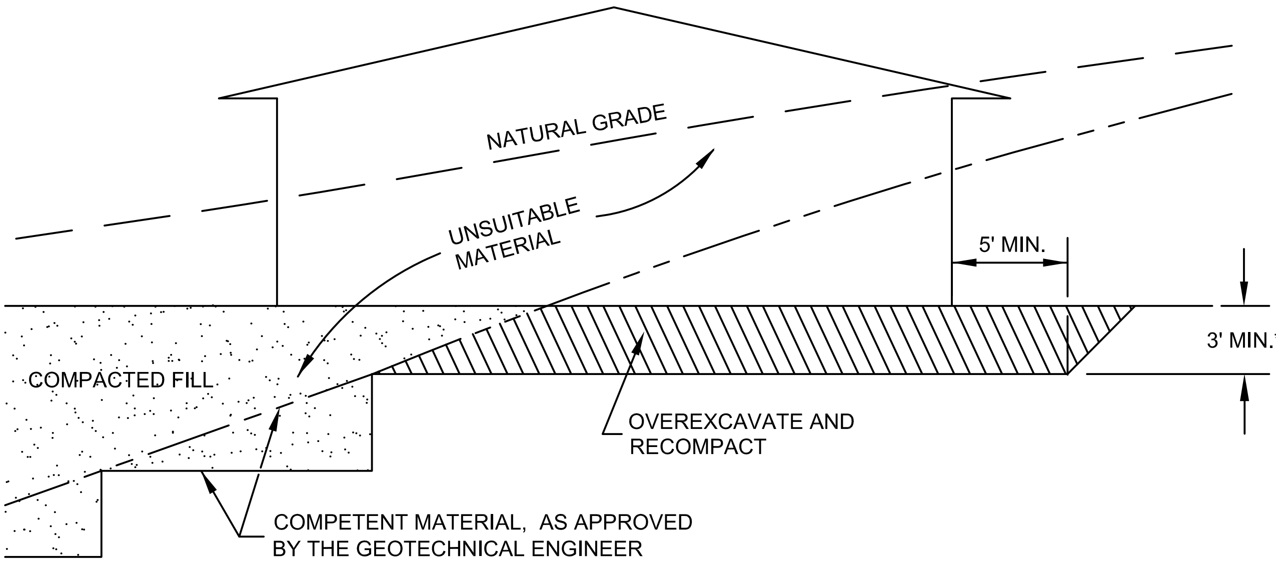
Subdrains

- 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.

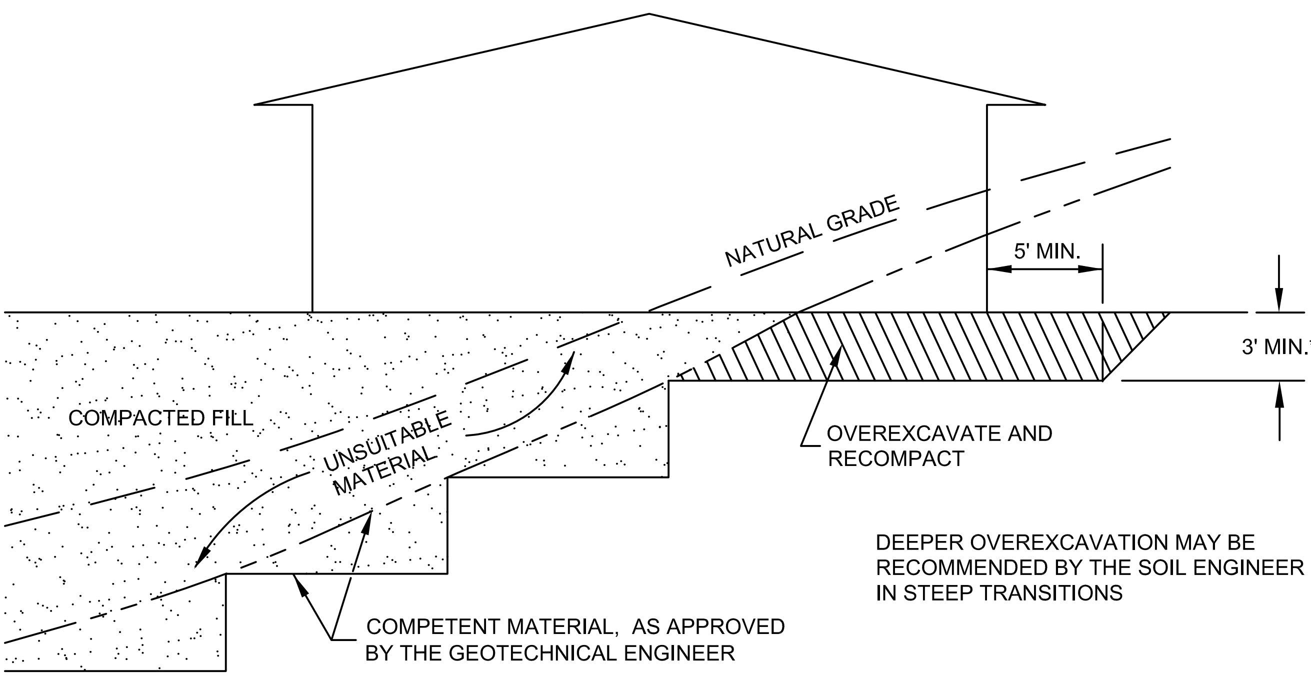
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- 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

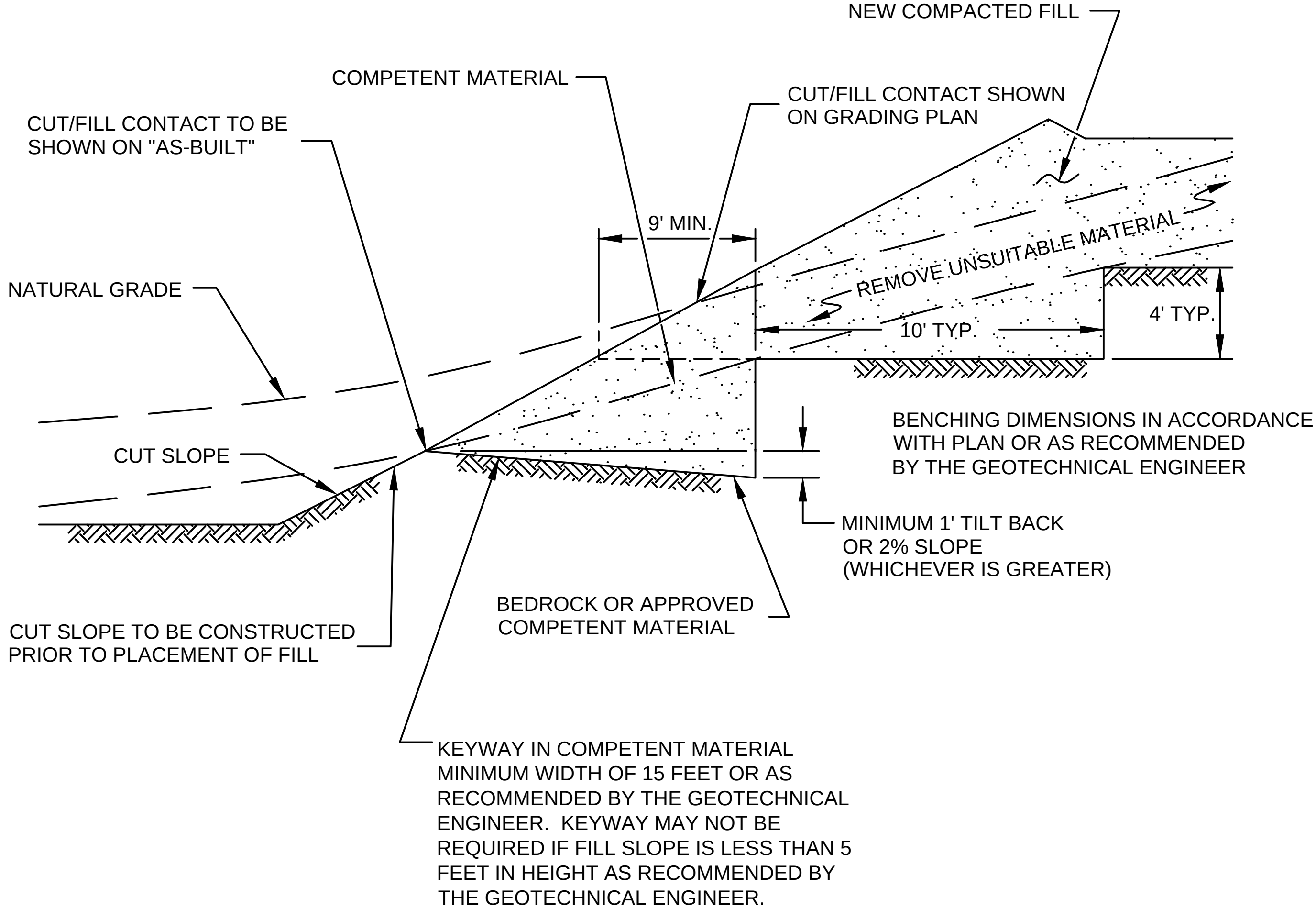
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

**PLATE D-1**

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL




**FILL ABOVE CUT SLOPE DETAIL**

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

**PLATE D-2**

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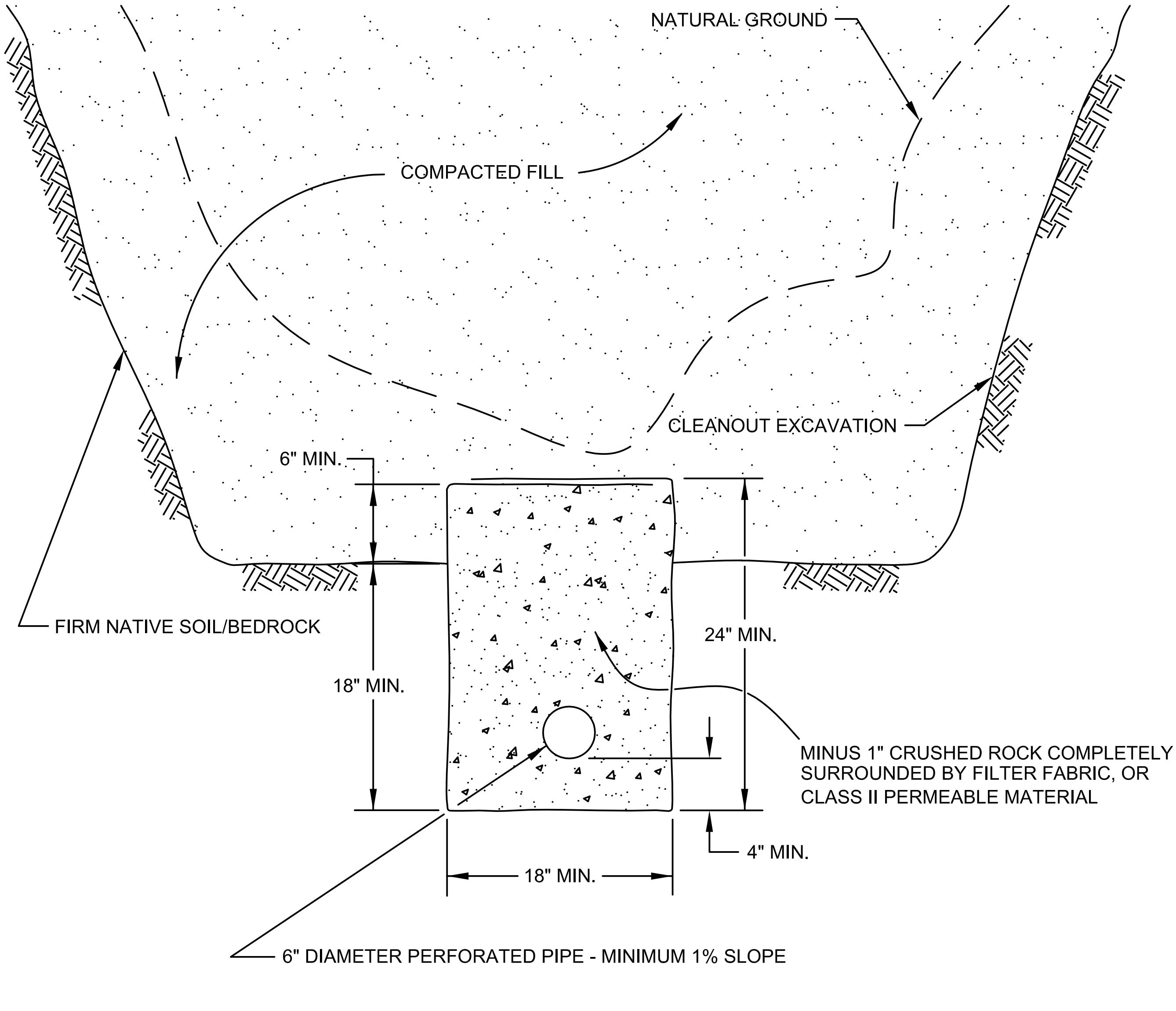
SOUTHERN CALIFORNIA GEOTECHNICAL




| 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**

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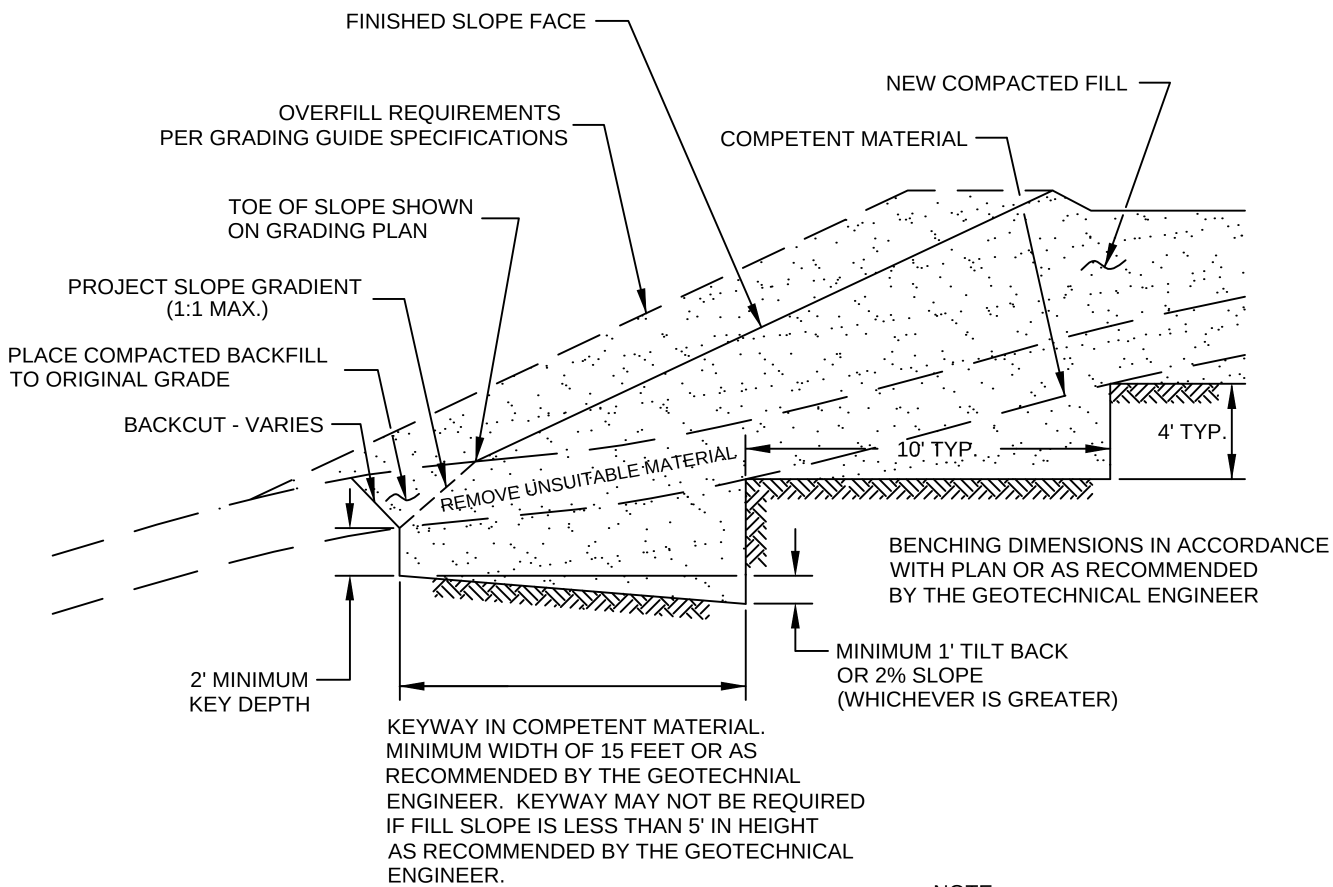



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

**FILL ABOVE NATURAL SLOPE DETAIL**

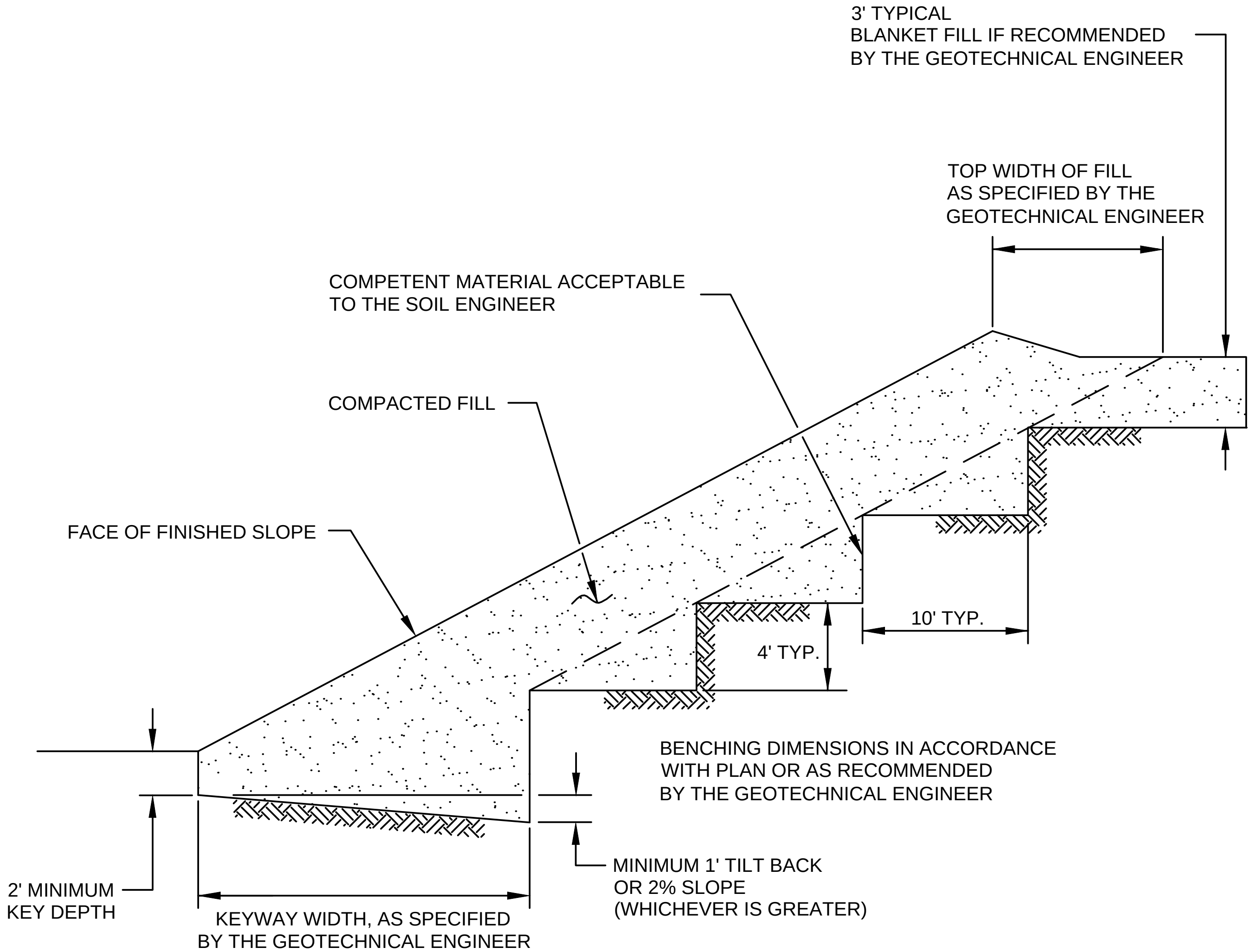
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

**PLATE D-4**

SOUTHERN CALIFORNIA GEOTECHNICAL




**STABILIZATION FILL DETAIL**

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

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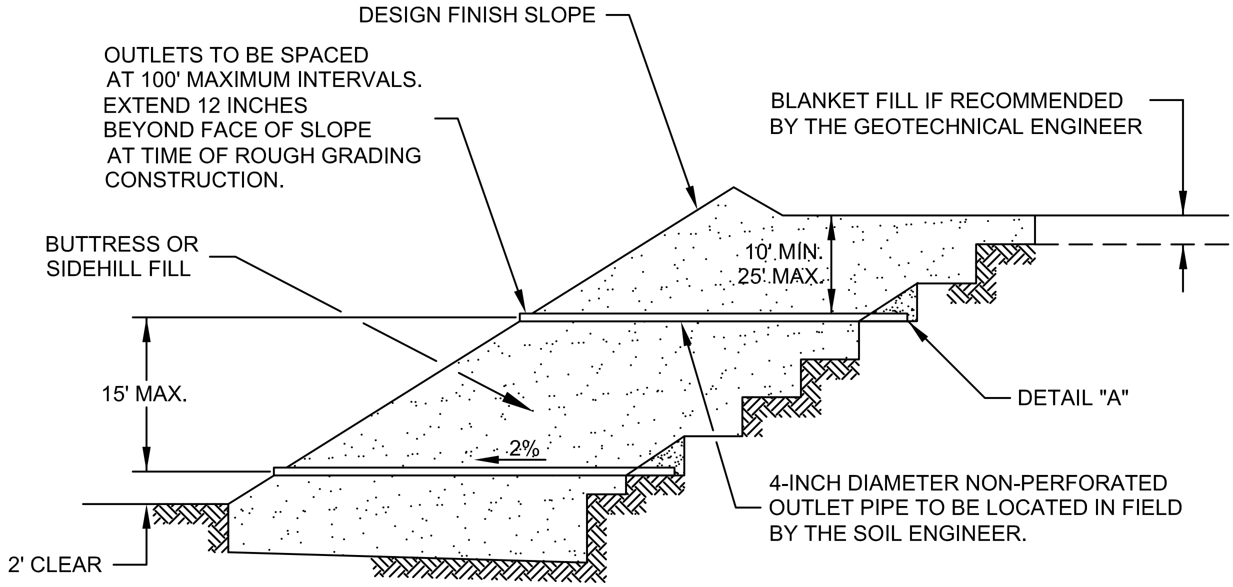
SOUTHERN CALIFORNIA GEOTECHNICAL



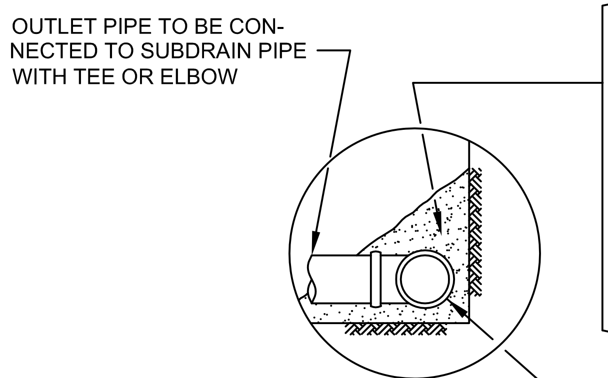

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

| 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




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**

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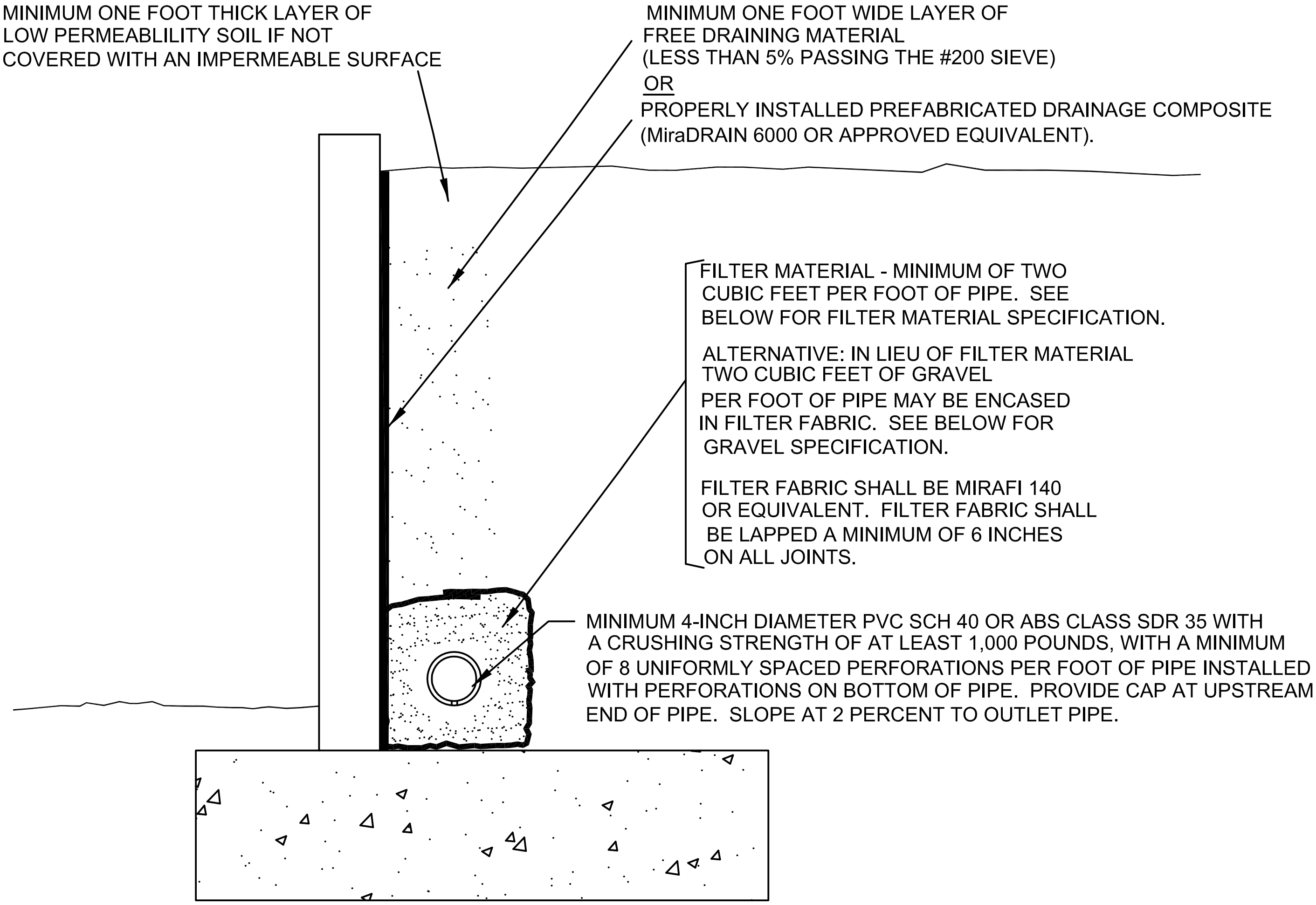


"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

| 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**

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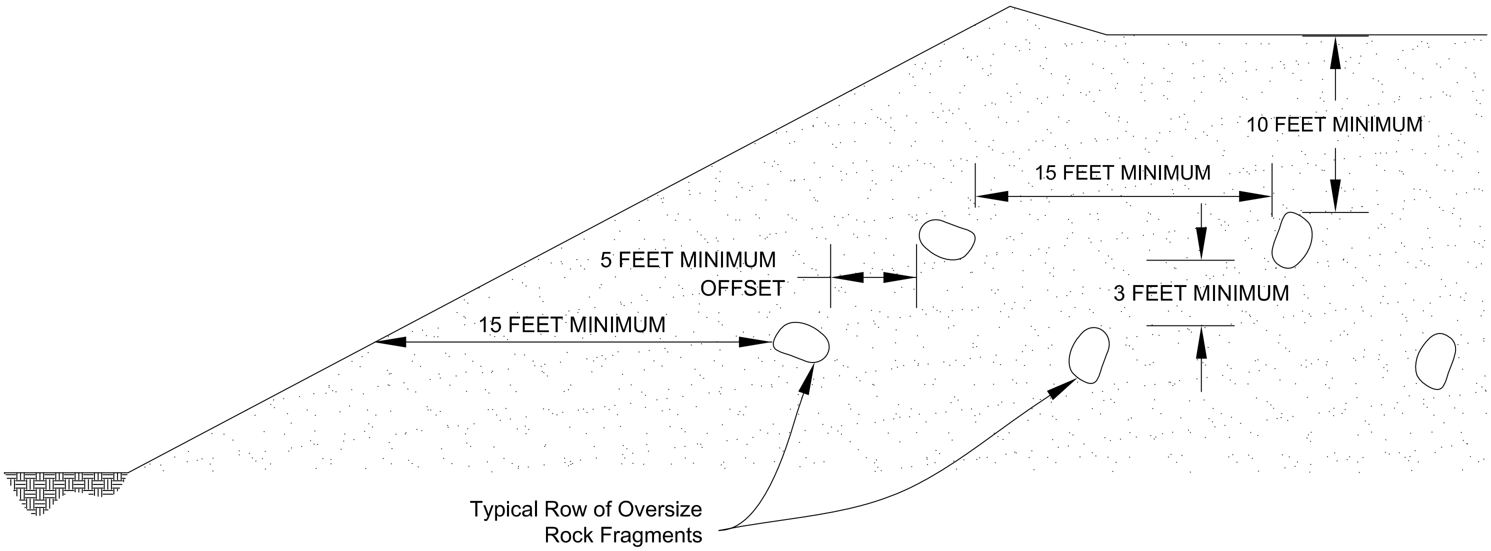
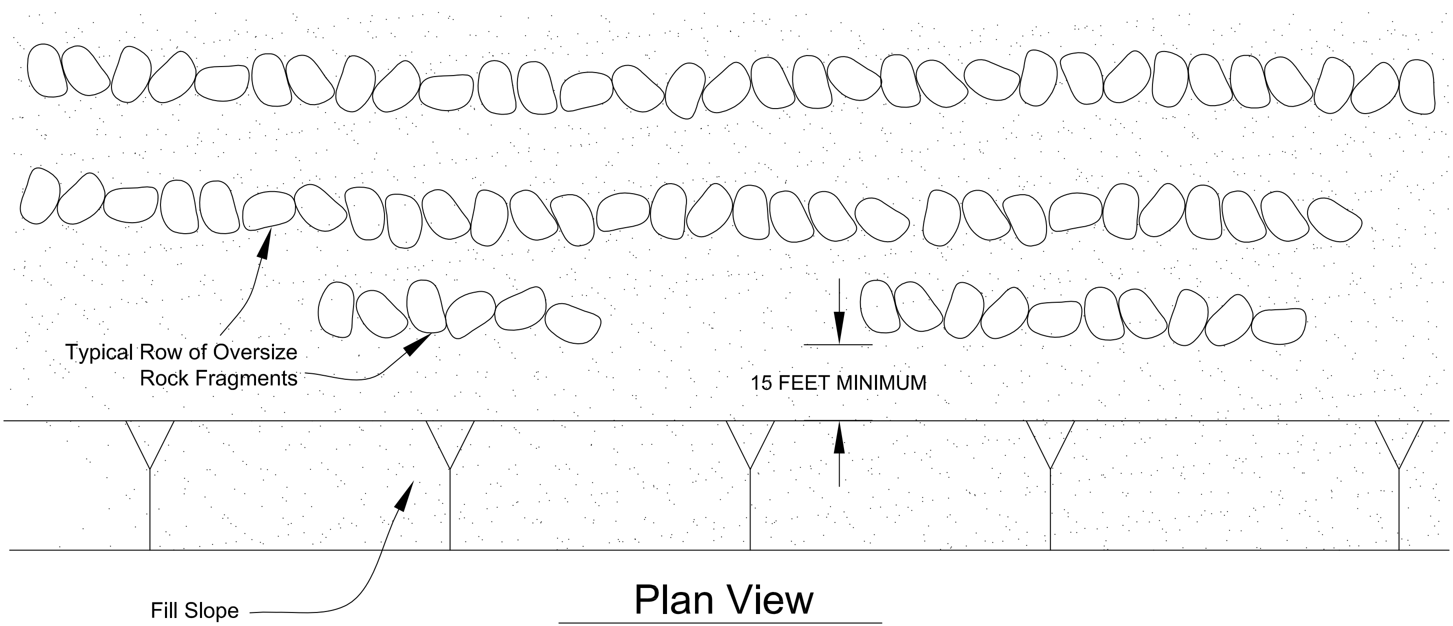
SOUTHERN CALIFORNIA GEOTECHNICAL




Section View




Plan View

**PLACEMENT OF OVERSIZED MATERIAL**

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

**PLATE D-8**

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SOUTHERN CALIFORNIA GEOTECHNICAL

# APPENDIX E

## 10798 Ramona Ave, Montclair, CA 91763, USA

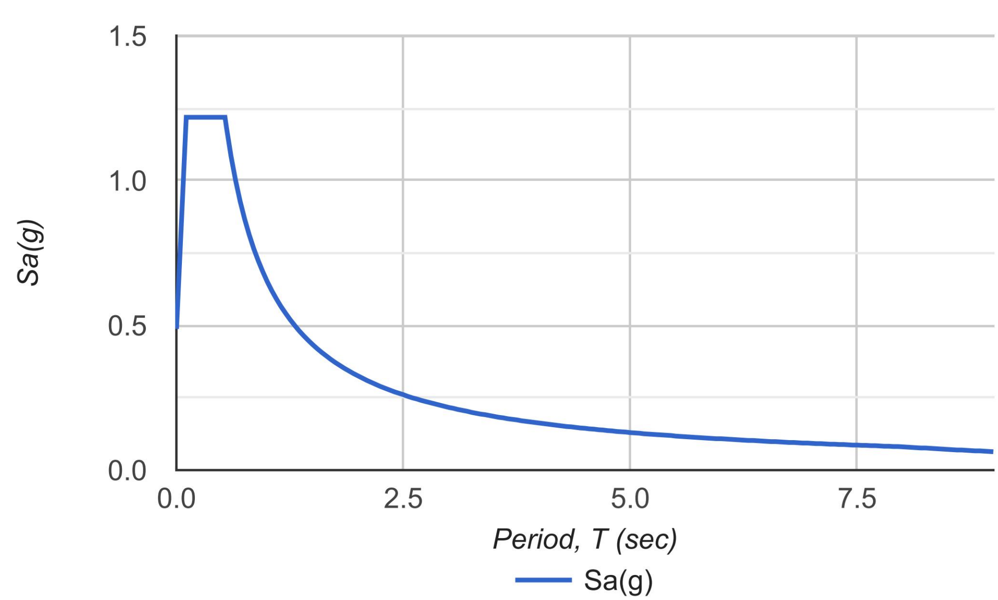
**Latitude, Longitude: 34.0578469, -117.70852990000003**


| | | | |
|---|---|---|---|
| **Date** | 6/18/2019, 2:58:17 PM | | |
| **Design Code Reference Document** | ASCE7-10 | | |
| **Risk Category** | II | | |
| **Site Class** | $S_{D1}$ | 0.651 | Numeric seismic design valu |

| Type | Value | Description |
|---|---|---|
| $S_S$ | 1.829 | $MCE_R$ ground motion. (for 0.2 second period) |
| $S_1$ | 0.651 | $MCE_R$ ground motion. (for 1.0s period) |
| $S_{MS}$ | 1.829 | Site-modified spectral acceleration value |
| $S_{M1}$ | 0.977 | Site-modified spectral acceleration value |
| $S_{DS}$ | 1.219 | Numeric seismic design value at 0.2 second SA |

| Type | Value | Description |
|---|---|---|
| SDC | D | Seismic design category |
| $F_a$ | 1 | Site amplification factor at 0.2 second |
| $F_v$ | 1.5 | Site amplification factor at 1.0 second |
| PGA | 0.697 | $MCE_G$ peak ground acceleration |
| $F_{PGA}$ | 1 | Site amplification factor at PGA |

### Design Response Spectrum




SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

**SEISMIC DESIGN PARAMETERS**

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

MONTCLAIR, CALIFORNIA

DRAWN: RK
CHKD: DWN

SCG PROJECT
19G146-1

**PLATE E-1**

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