

PRELIMINARY GEOTECHNICAL INVESTIGATION AND INFILTRATION FEASIBILITY STUDY

EASTLAKE HIGH SCHOOL

**Eastlake Parkway
Chula Vista, California**

Prepared By:
SCST, Inc.
6280 Riverdale Street
San Diego, California 92120

**Prepared For:
Armando Murillo
Sweetwater Union High School District
1130 Fifth Avenue
Chula Vista, California 91911**

Providing Professional Engineering Services Since 1959





PRELIMINARY GEOTECHNICAL INVESTIGATION AND INFILTRATION FEASIBILITY STUDY



October 26, 2018

**SCST No. 180335P4.1
Report No. 2**



**Mr. Armando Murillo
Sweetwater Union High School District
1130 Fifth Avenue
Chula Vista, California 91911**

Subject: PRELIMINARY GEOTECHNICAL INVESTIGATION AND INFILTRATION FEASIBILITY STUDY
SWEETWATER UNION HIGH SCHOOL DISTRICT
EASTLAKE HIGH SCHOOL
1120 EASTLAKE PARKWAY
CHULA VISTA, CALIFORNIA


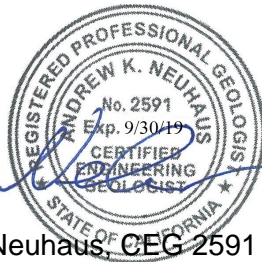
Dear Mr. Murillo:

SCST, Inc. (SCST) is pleased to present our report describing the preliminary geotechnical and infiltration study investigation performed for the subject project. We conducted the geotechnical investigation in general conformance with the scope of work presented in our proposals dated May 14 and August 24, 2018. Based on the results of our investigation, we consider the planned construction feasible from a geotechnical standpoint provided the recommendations of this report are followed. If you have any questions, please call us at (619) 280-4321.

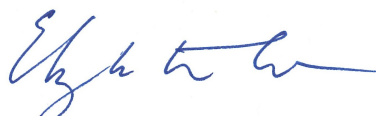
Respectfully submitted,
SCST, INC.

Isaac Chun, GE 2649
Principal Engineer

Andrew K. Neuhaus, CEG 2591
Senior Geologist


Elizabeth White, GIT 893
Staff Geologist

AKN:IC:EMW:hu

(1) Addressee via e-mail: Armando.murillo@sweetwaterschools.org

TABLE OF CONTENTS

SECTION	PAGE
EXECUTIVE SUMMARY	i
1. INTRODUCTION.....	1
2. SCOPE OF WORK	1
2.1 FIELD INVESTIGATION	1
2.2 LABORATORY TESTING	1
2.3 ANALYSIS AND REPORT	1
3. SITE DESCRIPTION.....	2
4. PROPOSED DEVELOPMENT	2
5. GEOLOGY AND SUBSURFACE CONDITIONS.....	2
6. GEOLOGIC HAZARDS	3
6.1 FAULTING AND SURFACE RUPTURE	3
6.2 CBC SEISMIC DESIGN PARAMETERS	3
6.3 LIQUEFACTION AND DYNAMIC SETTLEMENT	4
6.4 LANDSLIDES AND SLOPE STABILITY	4
6.5 TSUNAMIS, SEICHES, AND FLOODING	4
6.6 SUBSIDENCE	4
6.7 HYDRO-CONSOLIDATION	4
7. CONCLUSIONS.....	5
8. RECOMMENDATIONS.....	5
8.1 SITE PREPARATION AND GRADING	5
8.1.1 Site Preparation	5
8.1.2 Remedial Grading	6
8.1.3 Compacted Fill	6
8.1.4 Expansive Soil.....	7
8.1.5 Imported Soil.....	7
8.1.6 Excavation Characteristics	7
8.1.7 Oversized Material	7
8.1.8 Temporary Excavation	7
8.1.9 Temporary Shoring	8
8.1.10 Temporary Dewatering.....	8
8.1.11 Slopes	9
8.1.12 Surface Drainage	9
8.1.13 Grading Plan Review	9
8.2 FOUNDATIONS	10
8.2.1 Shallow Spread Footings	10
8.2.2 Settlement Characteristics	10
8.2.3 Foundation Plan Review	10
8.2.4 Foundation Excavation Observations	11

TABLE OF CONTENTS (Continued)

SECTION	PAGE
8.3 SLABS-ON-GRADE	11
8.3.1 Interior Slabs-on-Grade.....	11
8.3.2 Exterior Slabs-on-Grade	11
8.4 CONVENTIONAL RETAINING WALLS	12
8.4.1 Foundations	12
8.4.2 Lateral Earth Pressures	12
8.4.3 Seismic Earth Pressure.....	12
8.4.4 Backfill.....	13
8.5 MECHANICALLY STABILIZED EARTH RETAINING WALLS.....	13
8.6 PIPELINES.....	13
8.6.1 Thrust Blocks	13
8.6.2 Modulus of Soil Reaction	14
8.6.3 Pipe Bedding.....	14
8.6.4 Backfill.....	14
8.7 PAVEMENT SECTION RECOMMENDATIONS	14
8.8 PERVIOUS PAVEMENT SECTION RECOMMENDATIONS	15
8.9 SOIL CORROSIVITY	16
8.10 INFILTRATION FEASIBILITY	16
9. GEOTECHNICAL ENGINEERING DURING CONSTRUCTION	17
10. CLOSURE.....	17
11. REFERENCES.....	18

ATTACHMENTS

FIGURES

Figure 1	Site Vicinity Map
Figure 2.....	Subsurface Exploration Map
Figure 3.....	Regional Geology Map
Figure 4.....	Typical Retaining Wall Backdrain Details
Figure 5.....	Typical MSE Retaining Wall Detail

APPENDICES

Appendix I	Field Investigation
Appendix II	Laboratory Testing
Appendix III	Infiltration Rate Test Results
Appendix IV.....	Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

EXECUTIVE SUMMARY

This report presents the results of the preliminary geotechnical investigation and infiltration study SCST, Inc. (SCST) performed for the subject project. At the time of this investigation, no site or grading plans were available. We understand the project may consist of the design and construction of new school buildings and a parking lot on the high school campus, and improvements to the high school's entrances and drop-off area. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project.

We explored the subsurface conditions by drilling 10 borings, two test pits, and one percolation test hole to depths between about 3 and 50½ feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow-stem auger and hand tools. An SCST geologist logged the borings and test holes and collected samples of the materials encountered for laboratory testing. SCST tested selected samples from the borings and test holes to evaluate pertinent soil classification and engineering properties to assist in developing geotechnical conclusions and recommendations.

The materials encountered in the borings, test pits, and percolation test holes consist of fill and Otay Formation. The fill extends to a depth up to about 41 feet below the existing ground surface and consists of loose to very dense silty to clayey sand and stiff to very stiff sandy clay with varying amounts of gravel. Cobbles were also encountered within the fill. The Otay Formation consists of weakly to strongly cemented clayey sandstone and weakly to well indurated sandy claystone. Groundwater was encountered in borings B-7 and B-9 at 45½ and 41 feet below the ground surface, respectively.

We performed one borehole percolation test. Tested infiltration rates of 1.5 inches per hour were measured at this location. The tested infiltration rates support infiltration of stormwater in any appreciable quantity. On-site stormwater BMP facilities should be lined with an impermeable liner and a subdrain and collection pipe system installed to reduce the potential for lateral migration of the introduced water beneath structures and improvements.

Based on the results of our investigation, we consider the proposed construction feasible from a geotechnical standpoint provided the recommendations of this report are followed. At this time, the locations of the proposed improvements have not been determined. Site-specific geotechnical investigations will need to be conducted once preliminary plans and building locations are available.

In general, the most favorable areas to develop new buildings are within shallow fill areas to the west and center of the campus (vicinity of B-1, B-4, B-5, and B-6) as shown on Figure 2 (Subsurface Exploration Map). Our borings indicate low expansive materials within the upper 2 to 3 feet underlain by Otay Formation. The least favorable areas for new structures are to the northwest (B-2) and to the south (B-7). Our borings indicate that these areas have deeper fills, with expansive fills within the upper 5 feet.

EXECUTIVE SUMMARY (Continued)

The main geotechnical consideration affecting the proposed development is the presence of varying depth of fills, transitions from Otay Formation to fill spanning the proposed structures, the presence of expansive soils, and difficult excavations in strongly cemented and well indurated Otay Formation. Fill depths range from 2 to 41 feet below existing grades and vary from an expansion index of low to medium. Remedial grading will need to be performed to reduce the potential for distress to the planned building and improvements. The planned building can be supported on shallow spread footings with bottoms levels on compacted fill.

1. INTRODUCTION

This report presents the results of the preliminary geotechnical investigation and infiltration study SCST, Inc. (SCST) performed for the subject project. At the time of this investigation, no site or grading plans were available. We understand the project may consist of the design and construction of new school buildings and a parking lot on the high school campus, and improvements to the high school's entrances and drop-off area. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project. Figure 1 presents a site vicinity map.

2. SCOPE OF WORK

2.1 FIELD INVESTIGATION

We explored the subsurface conditions by drilling 10 borings, two test pits, and one percolation test hole to depths between about 3 and 50½ feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow-stem auger and hand tools. Figure 2 shows the approximate locations of the borings and percolation tests. An SCST geologist logged the borings, percolation test hole, and test pits and collected samples of the materials encountered for laboratory testing. Logs are presented in Appendix I. Soils are classified according to the Unified Soil Classification System illustrated on Figure I-1.

2.2 LABORATORY TESTING

Selected samples obtained from the borings, percolation test holes, and test pits were tested to evaluate pertinent soil classification and engineering properties and enable development of geotechnical conclusions and recommendations. The laboratory tests consisted of in situ moisture and density, particle-size analysis, Atterberg limits, expansion index, R-value, corrosivity, and direct shear. The results of the laboratory tests and brief explanations of the test procedures are presented in Appendix II.

2.3 ANALYSIS AND REPORT

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

- Subsurface conditions beneath the site
- Potential geologic hazards
- Criteria for seismic design in accordance with the 2016 California Building Code (CBC)
- Site preparation and grading



- Foundation alternatives and geotechnical engineering criteria for design of the foundations
- Estimated foundation settlements
- Support for concrete slabs-on-grade
- Lateral pressures for the design of retaining walls
- Pavement sections
- Soil corrosivity
- Infiltration feasibility

3. SITE DESCRIPTION

Eastlake High School is located at 1120 Eastlake Parkway in the City of Chula Vista, California. Figure 1 presents a site vicinity map. The site is bound by Eastlake Parkway to the east, SR-125 on the west, Chula Vista Community Park to the north, and by undeveloped land to the south. Existing improvements at the site consist of several one- to multi-story buildings, landscape, hardscape, and pavements. The site slopes toward the south with a total elevation difference of about 20 feet across the entire project site.

4. PROPOSED DEVELOPMENT

We understand the project may consist of the design and construction of new school buildings, a new parking lot, and associated improvements. Additional proposed improvements consist of the removal of the existing curb, sidewalk, and vegetation to prepare for the widening of the drop-off area located at the school's entrance. The improved drop-off will include a bike lane and a stormwater BMP. Site or grading plans were not available at the time of the investigation.

5. GEOLOGY AND SUBSURFACE CONDITIONS

The materials encountered in the borings, test pits, and percolation test hole consist of fill and Otay Formation. Descriptions of the materials are presented below. Figure 3 presents the regional geology in the vicinity of the site.

Fill: Fill was encountered in all the borings, test pits, and in the percolation test hole. The fill materials are variable and consist of loose to very dense silty to clayey sand and stiff to very stiff sandy clay with varying amounts of gravel. Cobbles were also encountered within the fill. Approximate depths of fill encountered in our borings are as follows.



Boring	Fill Depth	Boring	Fill Depth
B-1	2 feet	B-6	2 feet
B-2	25 feet	B-7	36 feet
B-3	37 feet	B-8	20 feet
B-4	3 feet	B-9	41 feet
B-5	2 feet	B-10	35 feet

Otay Formation: The fill is underlain by the Otay Formation. The Otay Formation consists of weakly to strongly cemented clayey sandstone and weakly to well indurated sandy claystone.

Groundwater: Groundwater was encountered in borings B-7 and B-9 at 45½ and 41 feet below the ground surface, respectively. The groundwater table is expected to be below a depth that will influence planned construction. However, groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage. Because groundwater rise or seepage is difficult to predict, such conditions are typically mitigated if and when they occur.

6. GEOLOGIC HAZARDS

6.1 FAULTING AND SURFACE RUPTURE

The closest known active fault is the Newport Inglewood/Rose Canyon fault zone located about 11.0 miles (17.7 kilometers) west of the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults are known to underlie or project toward the site. Therefore, the probability of fault rupture at the site is low.

6.2 CBC SEISMIC DESIGN PARAMETERS

A geologic hazard likely to affect the project is ground shaking as a result of movement along an active fault zone in the vicinity of the subject site. The site coefficients and maximum considered earthquake (MCE_R) spectral response acceleration parameters in accordance with the 2016 CBC are presented below:

Site Coordinates: Latitude 32.640210°
Longitude -116.968128°

Site Class: D
Site Coefficients, $F_a = 1.169$
 $F_v = 1.760$

Mapped Spectral Response Acceleration at Short Period, $S_s = 0.827g$
Mapped Spectral Response Acceleration at 1-Second Period, $S_1 = 0.320g$
Design Spectral Acceleration at Short Period, $S_{DS} = 0.645g$
Design Spectral Acceleration at 1-Second Period, $S_{D1} = 0.375g$
Site Peak Ground Acceleration, $PGA_M = 0.377g$



6.3 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction occurs when loose, saturated sands and silts are subjected to strong ground shaking. The soils lose shear strength and become liquid, resulting in large total and differential ground surface settlements and possible lateral spreading during an earthquake. Given the relatively dense nature of the materials beneath the site, and provided the recommended remedial grading is performed, the potential for liquefaction and dynamic settlement to occur at the site is considered low.

6.4 LANDSLIDES AND SLOPE STABILITY

Evidence of landslides or slope instabilities was not observed. The potential for landslides or slope instabilities to occur at the site is considered low.

6.5 TSUNAMIS, SEICHES, AND FLOODING

The site is not located within an area affected by tsunami inundation; therefore, damage due to tsunamis is considered negligible. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is low. According to the Flood Insurance Rate Map (FIRM), the site is located within an area designated as Zone X (FEMA, 2012). Zone X is an area determined to be outside the 0.2% annual chance flood.

6.6 SUBSIDENCE

The site is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum); therefore, the potential for subsidence due to the extraction of fluids is negligible.

6.7 HYDRO-CONSOLIDATION

Hydro-consolidation can occur in recently deposited sediments (less than 10,000 years old) that were deposited in a semi-arid environment. Examples of such sediments are aeolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore spaces between the particle grains can re-adjust when inundated by groundwater causing the material to consolidate. The relatively dense materials underlying the site are not considered susceptible to hydro-consolidation.



7. CONCLUSIONS

Based on the results of our investigation, we consider the proposed construction feasible from a geotechnical standpoint provided the recommendations of this report are followed. At this time, the locations of the proposed improvements have not been determined. Site-specific geotechnical investigations will need to be conducted once preliminary plans and building locations are available.

In general, the most favorable areas to develop new buildings are within shallow fill areas to the west and center of the campus (vicinity of B-1, B-4, B-5, and B-6) as shown on Figure 2 (Subsurface Exploration Map). Our borings indicate low expansive materials within the upper 2 to 3 feet underlain by Otay Formation. The least favorable areas for new structures are to the northwest (B-2) and to the south (B-7). Our borings indicate that these areas have deeper fills, with expansive fills within the upper 5 feet.

The main geotechnical consideration affecting the proposed development is the presence of varying depth of fills, transitions from Otay Formation to fill spanning the proposed structures, the presence of expansive soils, and difficult excavations in strongly cemented and well indurated Otay Formation. Fill depths range from 2 to 41 feet below existing grades and vary from an expansion index of low to medium. Remedial grading will need to be performed to reduce the potential for distress to the planned building and improvements. Remedial grading recommendations are provided herein. The planned building can be supported on shallow spread footings with bottoms levels on compacted fill. The recommendations presented herein will need to be updated once final plans are developed. Contract documents should specify that the contractor mobilize equipment capable of excavating strongly cemented and well indurated Otay Formation.

8. RECOMMENDATIONS

8.1 SITE PREPARATION AND GRADING

8.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, topsoil, vegetation, and debris. Subsurface improvements that are to be abandoned should be removed, and the resulting excavations should be backfilled and compacted in accordance with the recommendations of this report. Pipeline abandonment can consist of capping or rerouting at the project perimeter and removal within the project perimeter. If appropriate, abandoned pipelines can be filled with grout or slurry as recommended by and observed by the geotechnical consultant.



8.1.2 Remedial Grading

All loose and compressible fills and weathered Otay Formation should be excavated in their entirety below planned structures, settlement sensitive improvements and areas to receive new fill. Excavations of up to 5 feet are anticipated and should extend at least 5 feet outside the planned perimeter foundations, at least 2 feet outside the planned hardscape and pavements, or up to existing improvements or the project boundary, whichever is less. An SCST representative should observe conditions exposed in the bottom of the excavation to determine if additional excavation is required.

The planned buildings should not be underlain by cut/fill transitions or transitions from shallow fill to deep fill. Where such transitions are encountered, the Otay Formation should be over-excavated and replaced with compacted fill to provide a relatively uniform thickness of compacted fill beneath the entire building and reduce the potential for differential settlement. The over-excavation depth should be at least 5 feet below the planned finished pad elevation, at least 3 feet below the deepest planned footing bottom elevation, or to a depth of $H/2$, whichever is deeper, where H is the greatest depth of fill beneath the structure. Horizontally, the over-excavation should extend at least 5 feet outside the planned footing perimeter or up to existing improvements, whichever is less. Where practical, the bottom of excavations should be sloped toward the fill portion of the site and away from its center. An SCST representative should observe the conditions exposed in the bottom of excavations to determine if additional excavation is required.

8.1.3 Compacted Fill

Excavated material, except for soil containing roots, debris, and rock greater than 6 inches, can be used as compacted fill. Concrete slabs-on-grade should be underlain by at least 2 feet of material with an expansion index of 20 or less determined in accordance with ASTM D4829. Based on our laboratory test results, we expect that most of the on-site soils will not meet the expansion index criteria.

The material exposed at the bottom of excavations should be scarified to a depth of 12 inches, moisture conditioned to 2 to 3% above optimum moisture content, and compacted to 90% relative compaction based on ASTM 1557 laboratory test procedure. Fills should be placed in horizontal lifts at a thickness appropriate for the equipment spreading, mixing, and compacting the material, but generally should not exceed 8 inches in loose thickness. Fill should be moisture conditioned to near optimum moisture content and compacted to at least 95% relative compaction. The maximum dry density and optimum moisture content for evaluating relative compaction should be determined in accordance with ASTM D 1557. Utility trench backfill beneath structures, pavements,



and hardscape should be compacted to at least 95% relative compaction. The top 12 inches of subgrade beneath pavements should be compacted to at least 95%.

8.1.4 Expansive Soil

The on-site soils tested range from a low to medium expansion potential. The foundation recommendations presented in this report reflect a low expansion potential.

8.1.5 Imported Soil

Imported soil should consist of predominately granular soil free of organic matter and rocks greater than 6 inches. Imported soil should have an expansion index of 20 or less and should be inspected and, if appropriate, tested by SCST prior to transport to the site to determine suitability for the intended use.

8.1.6 Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order. Cobbles and debris should be anticipated in the fill. Difficult excavation should be anticipated in cemented zones within the Otay Formation.

8.1.7 Oversized Material

Excavations may generate some oversized material. Oversized material is defined as rocks or cemented clasts greater than 6 inches in largest dimension. Oversized material should be broken down to no greater than 6 inches in largest dimension for use in fill, used as landscape material, or disposed of offsite.

8.1.8 Temporary Excavation

Temporary excavations 3 feet deep or less can be made vertically. Deeper temporary excavations should be laid back no steeper than 1:1 (horizontal:vertical). Deeper temporary excavations in competent Otay Formation should be laid back no steeper than $\frac{3}{4}$:1 (horizontal:vertical) up to 20 feet deep. The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation. SCST should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be



maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces.

Slopes steeper than those described above will require shoring. Additionally, temporary excavations that extend below a plane inclined at 1½:1 (horizontal:vertical) downward from the outside bottom edge of existing structures or improvements will require shoring or underpinning. Soldier piles and lagging, internally braced shoring or trench boxes could be used. If trench boxes are used, the soil immediately adjacent to the trench box is not directly supported. Ground surface deformations immediately adjacent to the pit or trench could be greater where trench boxes are used compared to other methods of shoring.

As an alternative to shoring, maximum 10-foot-wide slots can be excavated and immediately backfilled adjacent to existing structures and improvement. Care should be taken to not undermine existing footings. Slot excavations should be filled prior to performing adjacent excavations.

8.1.9 Temporary Shoring

For design of cantilevered shoring, an active soil pressure equal to a fluid weighing 35 pcf can be used for level retained ground or 55 pcf for 2:1 (horizontal:vertical) sloping ground. The surcharge loads on shoring from traffic and construction equipment adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring. For design of soldier piles, an allowable passive pressure of 300 psf per foot of embedment over twice the pile diameter up to a maximum of 5,000 psf can be used. Soldier piles should be spaced at least three pile diameters, center to center. Continuous lagging will be required throughout. The soldier piles should be designed for the full anticipated lateral pressure; however, the pressure on the lagging will be less due to arching in the soils. For design of lagging, the earth pressure can be limited to a maximum value of 400 psf.

8.1.10 Temporary Dewatering

Groundwater seepage may occur locally due to broken pipes, local irrigation, or following heavy rain. Groundwater should be anticipated in the planned excavations. Dewatering can be accomplished by sloping the excavation bottom to a sump and pumping from the sump. A layer of gravel about 6 inches thick placed in the bottom of the excavation will facilitate groundwater flow and can be used as a working platform.



8.1.11 Slopes

All permanent slopes should be constructed no steeper than 2:1 (horizontal:vertical). Faces of fill slopes should be compacted either by rolling with a sheepsfoot roller or other suitable equipment or by overfilling and cutting back to design grade. Fills should be benched into sloping ground inclined steeper than 5:1 (horizontal:vertical). It is our opinion that cut slopes constructed no steeper than 2:1 (horizontal:vertical) will possess an adequate factor of safety. An engineering geologist should observe all cut slopes during grading to ascertain that no unforeseen adverse geologic conditions are encountered that require revised recommendations. All slopes are susceptible to surficial slope failure and erosion. Water should not be allowed to flow over the top of slope. Additionally, slopes should be planted with vegetation that will reduce the potential for erosion.

8.1.12 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures. Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

8.1.13 Grading Plan Review

SCST should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented and that no revised recommendations are needed due to changes in the development scheme.



8.2 FOUNDATIONS

8.2.1 Shallow Spread Footings

The planned buildings can be supported on shallow spread footings with bottoms levels entirely on compacted fill or competent Otay Formation. Footings should extend at least 24 inches below lowest adjacent finished grade. Continuous footings should be at least 12 inches wide. Isolated or retaining wall footings should be at least 24 inches wide. For footings supported entirely on compacted fill, an allowable bearing capacity of 2,500 psf can be used. This bearing capacity can be increased by 500 psf for each foot of depth below the minimum and 250 psf for each foot of width beyond the minimum up to a maximum of 5,000 psf. For footings supported entirely on competent Otay Formation, an allowable bearing capacity of 5,000 psf can be used. This bearing capacity can be increased by 500 psf for each foot of depth below the minimum and 250 psf for each foot of width beyond the minimum up to a maximum of 8,000 psf.

The bearing value can be increased by $\frac{1}{3}$ when considering the total of all loads, including wind or seismic forces. Footings located adjacent to or within slopes should be extended to a depth such that a minimum horizontal distance of 7 feet exists between the lower outside footing edge and the face of the slope.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used. Passive pressure can be computed using an allowable lateral pressure of 300 psf per foot of depth below the ground surface for level ground conditions. Reductions for sloping ground should be made. The passive pressure can be increased by $\frac{1}{3}$ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

8.2.2 Settlement Characteristics

Total foundation settlements are estimated to be less than 1 inch. Differential settlements between adjacent columns and across continuous footings are estimated to be less than $\frac{3}{4}$ inch over a distance of 40 feet. Settlements should be completed shortly after structural loads are applied.

8.2.3 Foundation Plan Review

SCST should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised



recommendations are not necessary as a result of changes after this report was completed.

8.2.4 Foundation Excavation Observations

A representative from SCST should observe the foundation excavations prior to forming or placing reinforcing steel.

8.3 SLABS-ON-GRADE

8.3.1 Interior Slabs-on-Grade

The project structural engineer should design the interior concrete slabs-on-grade floor. However, we recommend that building slabs be at least 5 inches thick and reinforced with at least No. 4 bars at 18 inches on center each way.

Moisture protection should be installed beneath slabs where moisture sensitive floor coverings will be used. The project architect should review the tolerable moisture transmission rate of the proposed floor covering and specify an appropriate moisture protection system. Typically, a plastic vapor barrier is used. Minimum 10-mil plastic is recommended. The plastic should comply with ASTM E1745. The vapor barrier installation should comply with ASTM E1643. Construction practice often includes placement of a 2-inch-thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture to the underside of the slab that can increase the time required to reduce vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The slab can be placed directly on the vapor retarder/barrier.

8.3.2 Exterior Slabs-on-Grade

Exterior slabs should be at least 4 inches thick and reinforced with at least No. 3 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns. A 1-inch maximum size aggregate mix is recommended for concrete for exterior slabs. The corrosion potential of on-site soils with respect to reinforced concrete will need to be taken into account in concrete mix design. Coarse and fine aggregate in concrete should conform to the "Greenbook" Standard Specifications for Public Works Construction.



8.4 CONVENTIONAL RETAINING WALLS

8.4.1 Foundations

The recommendations provided in the foundation section of this report are also applicable to conventional retaining walls.

8.4.2 Lateral Earth Pressures

The active earth pressure for the design of unrestrained retaining walls with level backfill can be taken as equivalent to the pressure of a fluid weighing 35 pcf. The at-rest earth pressure for the design of restrained retaining walls with level backfills can be taken as equivalent to the pressure of a fluid weighing 55 pcf. These values assume a granular and drained backfill condition. Higher lateral earth pressures would apply if walls retain expansive clay soils. An additional 20 pcf should be added to these values for walls with a 2:1 (horizontal:vertical) sloping backfill. An increase in earth pressure equivalent to an additional 2 feet of retained soil can be used to account for surcharge loads from light traffic. The above values do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. If any other surcharge loads are anticipated, SCST should be contacted for the necessary increase in soil pressure.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a backdrain to reduce the accumulation of hydrostatic pressures. Backdrains may consist of a 2-foot-wide zone of $\frac{3}{4}$ -inch crushed rock. The backdrain should be separated from the adjacent soils using a non-woven filter fabric, such as Mirafi 140N or equivalent. Weep holes should be provided, or a perforated pipe should be installed at the base of the backdrain and sloped to discharge to a suitable storm drain facility. As an alternative, a geocomposite drainage system such as Miradrain 6000 or equivalent placed behind the wall and connected to a suitable storm drain facility can be used. The project architect should provide waterproofing specifications and details. Figure 4 presents typical conventional retaining wall backdrain details.

8.4.3 Seismic Earth Pressure

If required, the seismic earth pressure can be taken as equivalent to the pressure of a fluid weighing 20 pcf. This value is for level backfill and does not include a factor of safety. Appropriate factors of safety should be incorporated into the design. This pressure is in addition to the un-factored, static active earth pressure. The passive pressure and bearing capacity can be increased by $\frac{1}{3}$ in determining the seismic stability of the wall.



8.4.4 Backfill

Wall backfill should consist of granular, free-draining material having an expansion index of 20 or less. The backfill zone is defined by a 1:1 plane projected upward from the heel of the wall. Expansive or clayey soil should not be used. We anticipate that most of the on-site soils will not be suitable for wall backfill. Additionally, backfill within 3 feet from the back of the wall should not contain rocks greater than 3 inches in dimension. Backfill should be compacted to at least 90% relative compaction. Backfill should not be placed until walls have achieved adequate structural strength. Compaction of wall backfill will be necessary to minimize settlement of the backfill and overlying settlement sensitive improvements. However, some settlement should still be anticipated. Provisions should be made for some settlement of concrete slabs and pavements supported on backfill. Additionally, any utilities supported on backfill should be designed to tolerate differential settlement.

8.5 MECHANICALLY STABILIZED EARTH RETAINING WALLS

The following soil parameters can be used for design of mechanically stabilized earth (MSE) retaining walls.

MSE Wall Design Parameters

Soil Parameter	Reinforced Soil	Retained Soil	Foundation Soil
Internal Friction Angle (degrees)	32°	32°	32°
Cohesion (psf)	0	0	0
Moist Unit Weight (pcf)	130	130	130

The reinforced soil should consist of granular, free-draining material with an expansion index of 20 or less. The bottom of MSE walls should extend to such a depth that a total of 5 feet exists between the bottom of the wall and the face of the slope. Figure 5 presents a typical MSE retaining wall backdrain detail. MSE retaining walls may experience lateral movement over time. The wall engineer should review the configuration of proposed improvements adjacent to the wall and provide measures to help reduce the potential for distress to these improvements from lateral movement.

8.6 PIPELINES

8.6.1 Thrust Blocks

For level ground conditions, a passive earth pressure of 300 psf per foot of depth below the lowest adjacent final grade can be used to compute allowable thrust block



resistance. A value of 150 psf per foot should be used below groundwater level, if encountered.

8.6.2 Modulus of Soil Reaction

A modulus of soil reaction (E') of 2,000 psi can be used to evaluate the deflection of buried flexible pipelines. This value assumes that granular bedding material is placed adjacent to the pipe and is compacted to at least 90% relative compaction.

8.6.3 Pipe Bedding

Pipe bedding as specified in the “Greenbook” Standard Specifications for Public Works Construction can be used. Bedding material should consist of clean sand having a sand equivalent not less than 30 and should extend to at least 12 inches above the top of pipe. Alternative materials meeting the intent of the bedding specifications are also acceptable. Samples of materials proposed for use as bedding should be provided to the engineer for inspection and testing before the material is imported for use on the project. The on-site materials are not expected to meet “Greenbook” bedding specifications. The pipe bedding material should be placed over the full width of the trench. After placement of the pipe, the bedding should be brought up uniformly on both sides of the pipe to reduce the potential for unbalanced loads. No voids or uncompacted areas should be left beneath the pipe haunches. Ponding or jetting the pipe bedding should not be allowed.

8.6.4 Backfill

Excavated materials free of organic debris and rocks greater than 6 inches in any dimension are generally expected to be suitable for use as utility trench backfill, unless beneath structures or hardscape. Imported material should not contain rocks greater than 3 inches in any dimension or organic debris. Imported material should have an expansion index of 20 or less. SCST should observe and, if appropriate, test proposed import materials before they are delivered to the site. Backfill should be placed in lifts 8 inches or less in loose thickness, moisture conditioned to optimum moisture content or slightly above, and compacted to at least 90% relative compaction. The top 12 inches of soil beneath pavement subgrade or utility trenches beneath structures should be compacted to at least 95% relative compaction.

8.7 PAVEMENT SECTION RECOMMENDATIONS

The pavement support characteristics of the soils encountered during our investigation are considered medium. An R-value of 23 was used for design of preliminary pavement sections. The actual R-value of the subgrade soils should be determined after grading and



final pavement sections are established. Based on an R-value of 23, the following preliminary pavement structural sections are provided for the assumed Traffic Indexes.

Pavement Structural Section Recommendations

Traffic Type	Traffic Index	Asphalt Concrete (inches)	PCC Pavement (inches)
Parking Stalls	4.5	3 AC / 6 AB	6 PCC / 6 AB
Driveways	6.0	4 AC / 8 AB	6 PCC / 6 AB
Fire Lanes	7.5	5 AC / 12 AB	7½ PCC / 6 AB

AC - Asphalt Concrete
AB - Aggregate Base
PCC - Portland Cement Concrete

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be stabilized or removed and replaced with compacted fill or aggregate base. Aggregate base and asphalt concrete should conform to the Caltrans Standard Specifications or the “Greenbook” and should be compacted to at least 95% relative compaction. Aggregate base should have an R-value of not less than 78. All materials and methods of construction should conform to good engineering practices and the minimum local standards.

8.8 PERVIOUS PAVEMENT SECTION RECOMMENDATIONS

Pervious pavement section recommendations are based on Caltrans (2014) pavement structural design guidelines. The pavement sections below are based on the strength of the materials. However, the actual thickness of the sections may be controlled by the reservoir layer design, which the project civil engineer should determine.

Pervious Asphalt Pavement

Traffic Type	Category	*Asphalt Treated Permeable Base (ATPB) (inches)	Class 4 Aggregate Base (inches)
Parking Stalls	B	4½	8½

*1¼ inches of an open graded friction course (OGFC) should be placed on top of the ATPB.

Pervious Concrete Pavement

Traffic Type	Category	Pervious Concrete (inches)	Class 4 Aggregate Base (inches)
Parking Stalls	B	6	8½



Permeable Interlocking Concrete Pavers (PICP)

Traffic Type	Category	PICP (inches)	Class 3 Permeable (inches)	Class 4 Aggregate Base (inches)
Parking Stalls	B	3 1/8	4 1/2	8 1/2

The top 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding subgrade areas should be removed and replaced with compacted fill or permeable base. All materials and methods of construction should conform to good engineering practices and the minimum local standards.

Deepened curbs or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed at the edges of pervious pavements to reduce the potential for water-related distress to adjacent structures or improvements. The membrane should extend below the reservoir section. If infiltration is not used, the membrane should also extend horizontally between the subgrade and pervious base, and a suitable subdrain system should be installed.

8.9 SOIL CORROSIVITY

A representative sample of the on-site soils were tested to evaluate corrosion potential. The test results are presented in Appendix II. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

8.10 INFILTRATION FEASIBILITY

We performed one borehole percolation test at the approximate locations shown on Figure 2 to assess stormwater infiltration feasibility. Appendix III presents the field data and test results. The table below presents the tested infiltration rates.

Infiltration Rate Test Results

Test Location	Test Depth (feet)	Material Type at Test Depth (USCS Classification)	Infiltration Rate (inch/hour)
P-1	6	SILTY SAND (SM)	1.5

Based on our test results, the feasibility screening category is full infiltration. BMP facilities should be lined with an impermeable geomembrane to reduce the potential for water-related distress to adjacent structures or improvements. A subdrain system should be installed at



the bottom of BMP facilities. Foundations should be set back at least 10 feet from BMP facilities, or the foundation should be deepened to a depth that extends below the bottom of the BMP.

9. GEOTECHNICAL ENGINEERING DURING CONSTRUCTION

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

10. CLOSURE

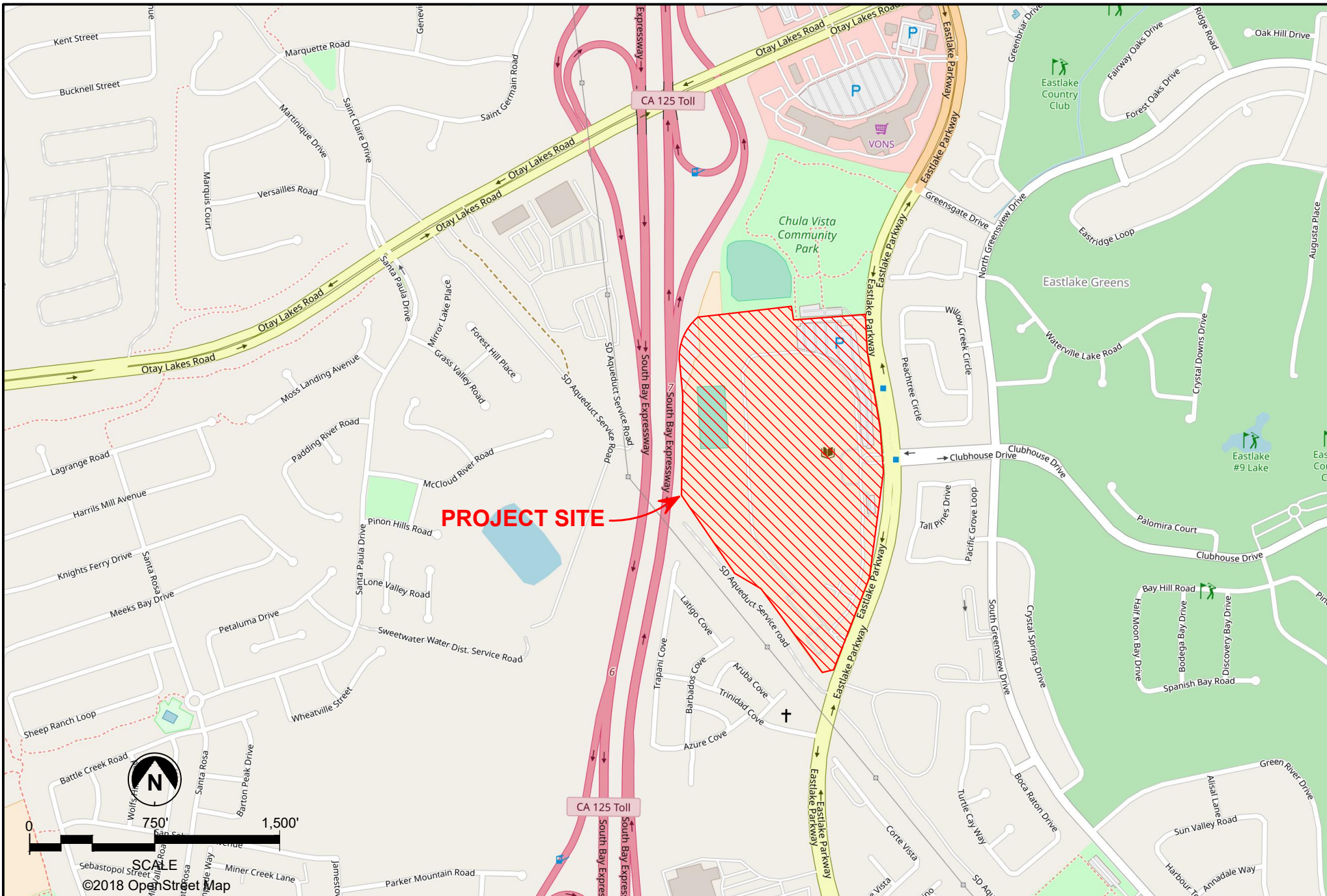
SCST should be advised of any changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can, however, occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

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



11. REFERENCES

- American Concrete Institute (ACI) (2012), Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary, August.
- California Building Standards Commission (2016), 2016 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Based on the 2015 International Building Code, Effective January 1, 2017.
- Caltrans (2010), Standard Specifications.
- Caltrans (2014), Pervious Pavement Design Guidance, August
- Federal Emergency Management Agency (2012), FIRM Flood Insurance Rate Map, San Diego County, California and Incorporated Areas, Map Number 06073C1939G, May 16.
- Public Works Standards, Inc. (2018), The "Greenbook," Standard Specifications for Public Works Construction, 2018 Edition.
- Tan, S.S. (2002), Geologic Map of the Jamul Mountains 7.5' Quadrangle, San Diego County, California, California Geological Survey.



PROJECT SITE

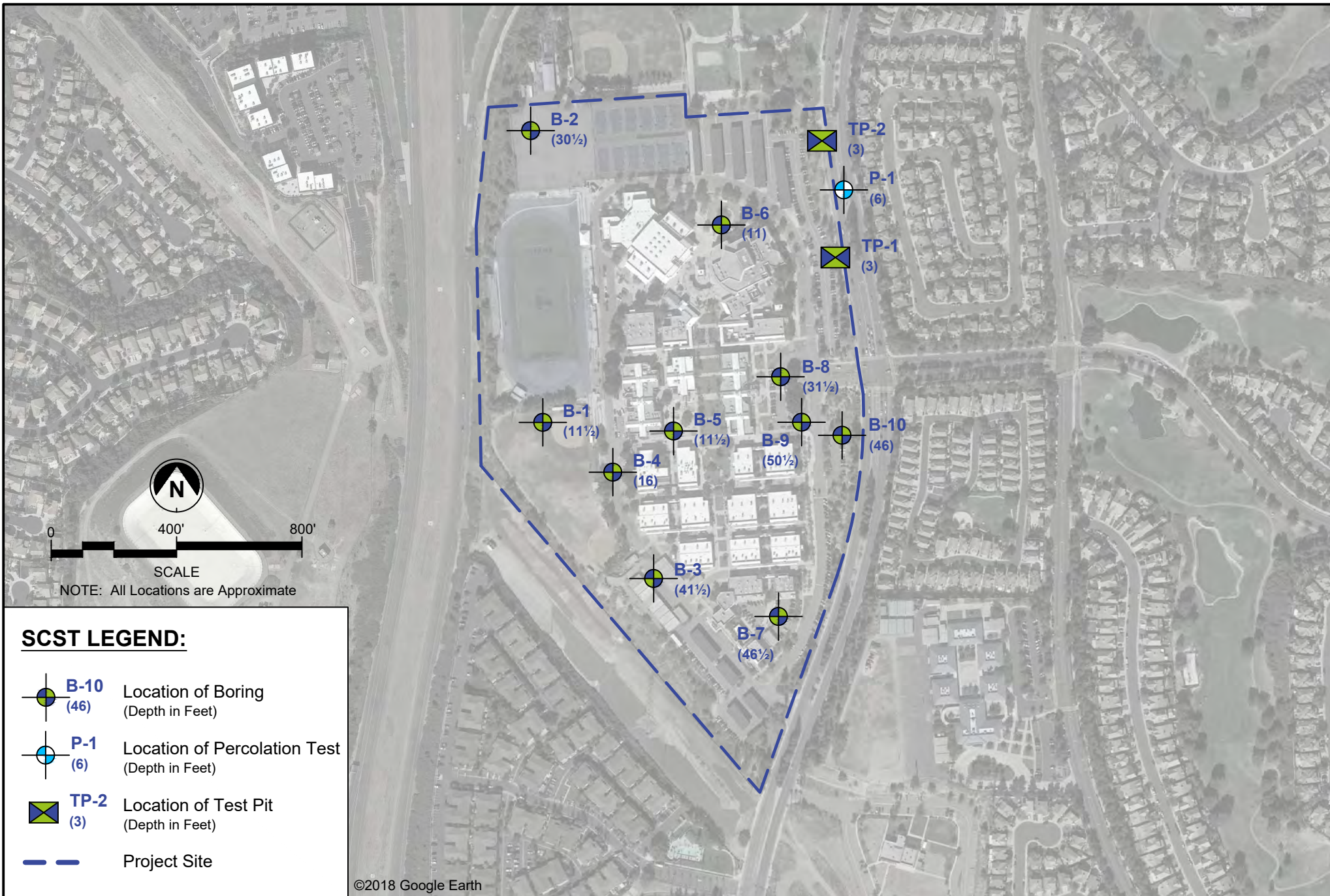


SCST, Inc.

SITE VICINITY MAP
 Eastlake High School
 Chula Vista, California

Date: October, 2018
 By: JH/DTC
 Job No.: 180335P4.1-1

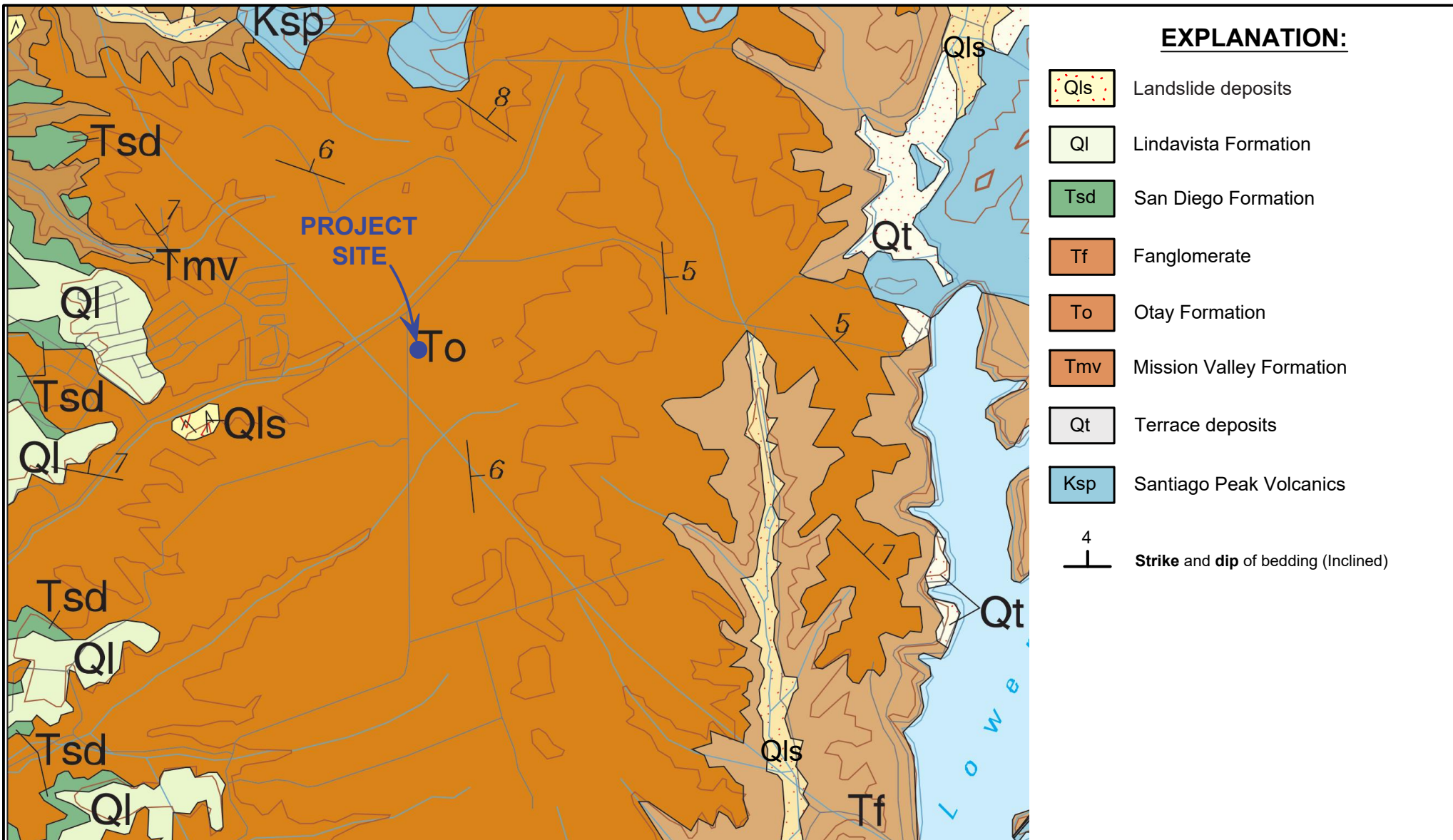
Figure:
1



SUBSURFACE EXPLORATION MAP
 Eastlake High School
 Chula Vista, California

Date: October, 2018
 By: JH/DTC
 Job No.: 180335P4.1-1

Figure:
2



Reference:
 Todd V.R. (2004), Geologic Map of the El Cajon 30' x 60' Quadrangle,
 California, California Geological Survey, Scale 1:100,000



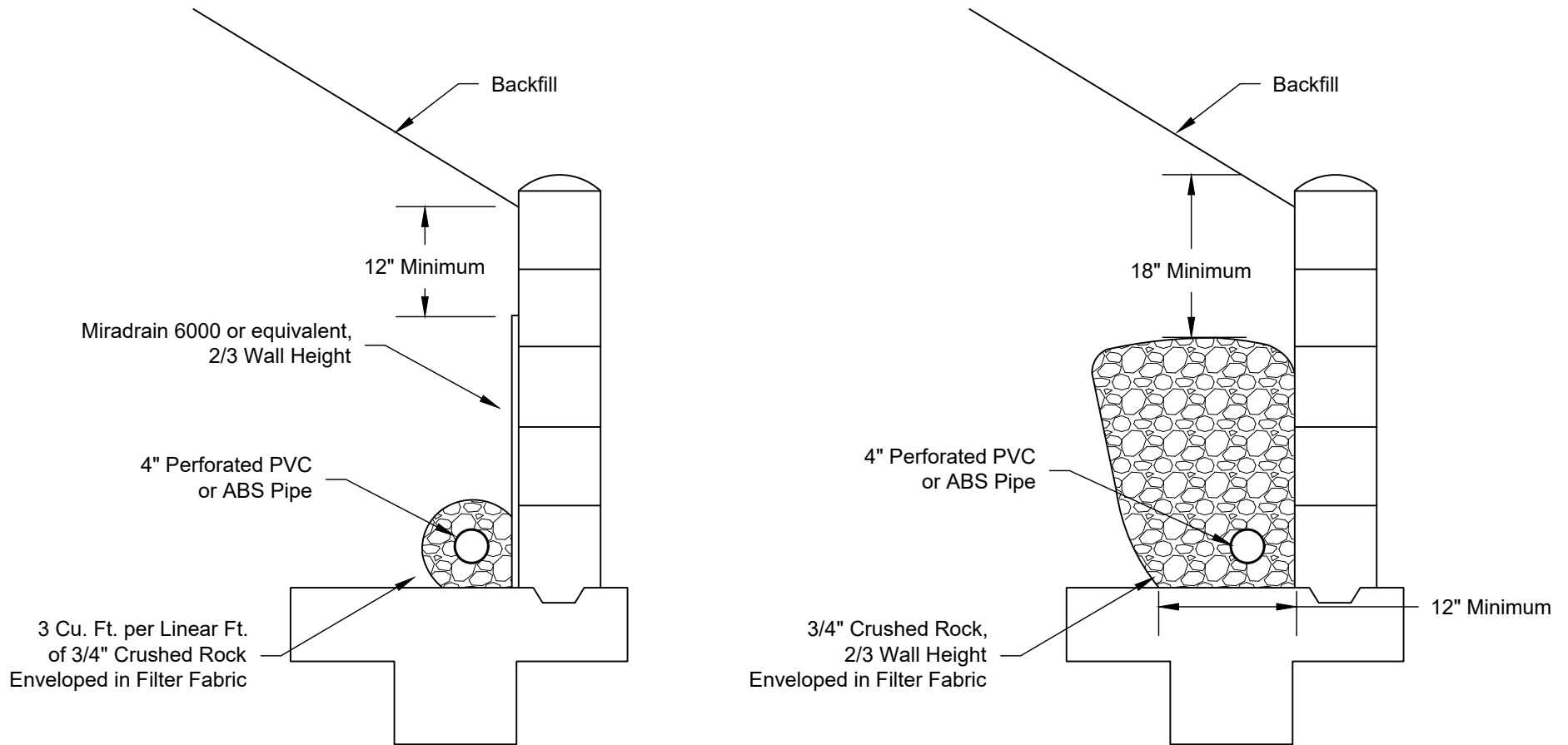
SCST, Inc.

REGIONAL GEOLOGY MAP

Eastlake High School
 Chula Vista, California

Date: October, 2018
 By: JH/DTC
 Job No.: 180335P4.1-1

Figure:
3



NOT TO SCALE

NOTES:

- 1) Dampproof or waterproof back of wall following architect's specifications.
- 2) 4" minimum perforated pipe, SDR35 or equivalent, holes down, 1% fall to outlet. Provide solid outlet pipe at suitable locations.
- 3) Drain installation and outlet connection should be observed by the geotechnical consultant.



SCST, Inc.

TYPICAL RETAINING WALL BACKDRAIN DETAILS

Eastlake High School
Chula Vista, California

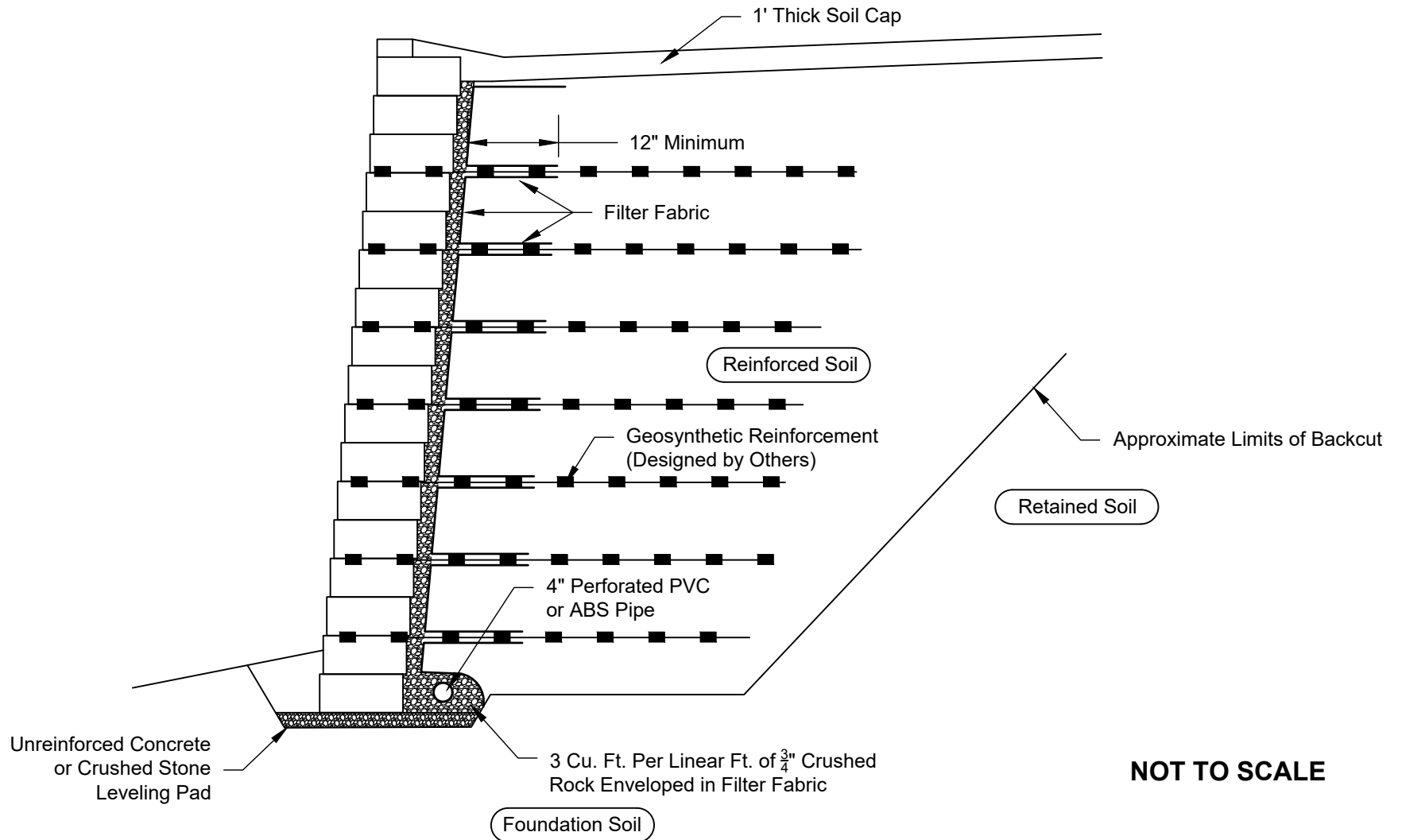
Date: October, 2018

By: EMW

Job No.: 180335P4.1-2

Figure:

4



NOT TO SCALE

NOTES:

- 1) Backcut as recommended by the geotechnical report or field evaluation
- 2) Additional drain at excavation backcut may be recommended base on conditions obsewrved during construction.
- 3) Filter fabric should be installed between crushed rock and soil. Filter fabric should consist of Mirafi 140N or equivalent. Filter fabric should be overlapped approximately 6 inches.
- 4) Perforated pipe should outlet through a solid pipe to an appropriate gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.



SCST, Inc.

TYPICAL MSE RETAINING WALL DETAIL

Eastlake High School
Chula Vista, California

Date: October, 2018

By: EMW

Job No.: 180335P4.1-2

Figure:

5

APPENDIX I FIELD INVESTIGATION

Our field investigation consisted of drilling 10 borings, excavating two test pits, and drilling one percolation test hole on September 24 through the 26, 2018 and October 2 through 3, 2018 to depths between about 3 and 50½ feet below the existing ground surface using a truck-mounted drill rig equipped with a hollow-stem auger and hand tools. Auger refusal was encountered in one of the borings. Figure 2 shows the approximate locations of the borings, test pits, and percolation test. The field investigation was performed under the observation of an SCST engineer who also logged the borings, test pits, and test holes and obtained samples of the materials encountered.

Relatively undisturbed samples were obtained using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. Standard Penetration Tests (SPT) were performed using a 2-inch outer diameter and 1⅜-inch inner diameter split tube sampler. The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows needed to drive the samplers the final 12 inches of an 18-inch drive is noted on the boring logs as “Driving Resistance (blows/ft. of drive).” SPT and CAL sampler refusal was encountered when 50 blows were applied during any one of the three 6-inch intervals, a total of 100 blows was applied, or there was no discernible sampler advancement during the application of 10 successive blows. The SPT penetration resistance was normalized to a safety hammer (cathead and rope) with a 60% energy transfer ratio in accordance with ASTM D6066. The normalized SPT penetration resistance is noted on the boring logs as “N₆₀.” Disturbed bulk samples were obtained from the SPT sampler and the drill cuttings.







The soils are classified in accordance with the Unified Soil Classification System as illustrated on Figure I-1. Logs of the borings and test holes are presented on Figures I-2 through I-24.

SUBSURFACE EXPLORATION LEGEND



UNIFIED SOIL CLASSIFICATION CHART

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

SAMPLE SYMBOLS

	- Bulk Sample
	- Modified California Sampler
	- Undisturbed Chunk sample
	- Maximum Size of Particle
	- Shelby Tube
	- Standard Penetration Test sampler

GROUNDWATER SYMBOLS

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

LABORATORY TEST SYMBOLS

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



SCST, Inc.

Eastlake High School
Chula Vista, California

By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: I-1

LOG OF BORING B-1

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 595

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
		3 inches of lawn and associated top soil.							
1	SM	FILL (Qf): SILTY SAND, loose to medium dense, brown to light brown, moist, fine to coarse grained, few gravel, trace cobble.		X					SA
2									
3		OTAY FORMATION (To): CLAYEY SANDSTONE, light grayish brown, moist, fine to coarse grained, moderately cemented, weathered, trace gravel.	CAL		50/2"		13.9	107.6	
4									
5		-----							
6		SANDY CLAYSTONE, light grayish brown, moist, fine to medium grained SAND, well indurated, trace gravel.	SPT		61	80			
7									
8									
9									
10									
11			SPT		63	82			
12		BORING TERMINATED AT 11½ FEET							
13									
14									
15									
16									
17									
18									
19									
20									



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-2

LOG OF BORING B-2

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 610

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	CL	2 inches of Asphalt Concrete over 6 inches of Aggregate Base	X						SA AL EI COR
2		FILL (Qf): Lean CLAY, stiff to very stiff, brown to light brown, moist, fine to medium grained SAND, trace gravel.							
3		Dense, fine to coarse grained.							
4				CAL	45		27.5	93.8	
5	SC	CLAYEY SAND, dense, brown to light brown, moist, fine to coarse grained, trace gravel.		CAL	54		11.1	103.1	DS
6									
7									
8									
9									
10		Medium dense.			SPT	17	22		
11									
12									
13									
14									
15									
16				CAL	28		10.7	98.1	
17									
18									
19									
20									

BORING CONTINUED ON I-4



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-3

LOG OF BORING B-2 (CONTINUED)

Date Drilled: 9/24/2018

Equipment: CME-95 w/ 8-inch HSA

Elevation (ft): Approx. 610

Logged by:

Reviewed by:

Depth to Groundwater (ft):

EMW

AKN

Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21	SC	FILL (Qf): CLAYEY SAND, very dense, brown to light brown, moist, fine to coarse grained, few gravel, trace cobble.	SPT		64/11'	84			
22		Light brown to gray.	OTAY FORMATION (To): CLAYEY SANDSTONE, light brown, moist, fine to medium grained, moderately to strongly cemented, weathered, trace gravel.						
23									
24									
25			SPT		50/3"	>50			
26									
27									
28									
29									
30			SPT		50/5"	>50			
31		BORING TERMINATED AT 30½ FEET							
32									
33									
34									
35									
36									
37									
38									
39									
40									



SCST, Inc.

Eastlake High School

Chula Vista, California

By: EMW

Date: October, 2018

Job Number: 180335P4.1-2

Figure: I-4

LOG OF BORING B-3

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 605

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	SM	4 inches of Asphalt Concrete over 4 inches of Aggregate Base		X					
2		FILL (Qf): SILTY SAND, loose to medium dense, light brown, moist, fine to coarse grained, trace gravel.		X					
3		Dense.	CAL		49		16.8	107.6	DS
4				X					SA
5				CAL		38		23.9	100.9
6									
7									
8	SC	CLAYEY SAND , dense, brown, moist, fine to medium grained, trace gravel.							
9									
10		Brown with orange and dark gray.							
11			SPT		38	50			
12									
13									
14									
15									
16		Very dense, brown and red, trace cobbles.	CAL		50/5"		23.9	99.2	
17									
18									
19									
20									

BORING CONTINUED ON I-6



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-5

LOG OF BORING B-3 (CONTINUED)

Date Drilled: 9/24/2018

Equipment: CME-95 w/ 8-inch HSA

Elevation (ft): Approx. 605

Logged by:

Reviewed by:

Depth to Groundwater (ft):

EMW

AKN

Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21	SC	FILL (Qf) : CLAYEY SAND, very dense, brown and red, moist, fine to medium grained, trace gravel.	SPT		67	87			
22									
23									
24									
25	CL	SANDY CLAY, very stiff, gray to dark gray, moist, fine to coarse grained SAND, trace gravel, trace cobble.	SPT		18	23			
26									
27									
28									
29									
30		Stiff.							
31			SPT		10	13			
32									
33									
34									
35									
36	SC	CLAYEY SAND, medium dense, light brown, moist, fine to coarse grained, trace gravel.	SPT		13	17			
37									
38		OTAY FORMATION (To) : CLAYEY SANDSTONE, light brown, moist, fine to medium grained, moderately to strongly cemented, weathered, trace gravel.							
39									
40									

BORING CONTINUED ON I-7



SCST, Inc.

Eastlake High School

Chula Vista, California

By: EMW

Date: October, 2018

Job Number: 180335P4.1-2

Figure: I-6

LOG OF BORING B-3 (CONTINUED)

Date Drilled: 9/24/2018

Equipment: CME-95 w/ 8-inch HSA

Elevation (ft): Approx. 605

Logged by:

EMW

Reviewed by:

AKN

Depth to Groundwater (ft):

Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
41		OTAY FORMATION (To): CLAYEY SANDSTONE, light brown, moist, fine to medium grained, moderately to strongly cemented, weathered, trace gravel.	SPT		77	100			
42		BORING TERMINATED AT 41½ FEET							
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									



SCST, Inc.

Eastlake High School
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-7

LOG OF BORING B-4

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 608

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS	
			DRIVEN	BULK						
1	SC	3 inches of Asphalt Concrete over 4 inches of Aggregate Base		X						
2		FILL (Qf): CLAYEY SAND, loose to medium dense, light brown, moist, fine to medium grained, trace gravel.		X						
3		OTAY FORMATION (To): CLAYEY SANDSTONE, light brown, moist, fine to medium grained, moderately to strongly cemented, weathered. Light gray to light brown.	CAL		50/4"		8.5	102.0		
4										
5										
6					SPT		83/10'	108		
7										
8										
9										
10										
11					CAL		50/3"			
12										
13										
14										
15										
16		SANDY CLAYSTONE, light brown, moist, fine grained SAND, well indurated, weathered.	SPT		50/5	>50				
17		BORING TERMINATED AT 16 FEET								
18										
19										
20										



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-8

LOG OF BORING B-5

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 612

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	SM	FILL (Qf) : SILTY SAND, loose to medium dense, light brown, moist, fine to medium grained, trace gravel, trace cobble.		X					
2		OTAY FORMATION (To) : CLAYEY SANDSTONE, light brown, moist, fine to medium grained, moderately to strongly cemented, weathered.		X					SA AL EI COR
3				X					
4					X				
5					X				
6				CAL		50/5"		19.1	
7									
8									
9									
10									
11			SPT		95/9"	124			
12		BORING TERMINATED AT 11½ FEET							
13									
14									
15									
16									
17									
18									
19									
20									



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-9

LOG OF BORING B-6

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS	
			DRIVEN	BULK						
1	SC	3 inches of Asphalt Concrete over 6 inches of Aggregate Base		X					S A L E I C O R	
2		FILL (Qf): CLAYEY SAND, loose to medium dense, light brown, moist, fine to coarse grained, trace gravel.								
3		OTAY FORMATION (To): CLAYEY SANDSTONE, light grayish brown, moist, fine to medium grained, weakly to moderately cemented, weathered.	CAL		50/3"		11.4	107.2		
4										
5										
6			SPT		50/3"	>50				
7										
8										
9										
10										
11			CAL		50/4"		13.4	103.2		
12		BORING TERMINATED AT 11 FEET								
13										
14										
15										
16										
17										
18										
19										
20										



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-10

LOG OF BORING B-7

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 605

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): 45½

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	CL	3 inches of Asphalt Concrete over 6 inches of Aggregate Base	X						SA AL EI DS COR
2		FILL (Qf): Lean CLAY, hard, brown, moist, fine to coarse grained, trace gravel.							
3									
4		CAL	60	22.4	102.4				
5	SM	SILTY SAND, very dense, light brown, moist, fine to medium grained.	CAL	63	13.9	110.4			
6									
7	CL	SANDY CLAY, very stiff, dark gray to brown, moist, fine to coarse grained SAND, trace gravel.							
8									
9									
10	SC	CLAYEY SAND, medium dense, brown to light brown, moist, fine to medium grained, trace gravel.	SPT	22	29				
11									
12									
13									
14									
15		Dense, brown and orange, trace cobble.							
16			CAL	56	29.0	94.2			
17									
18									
19									
20									

BORING CONTINUED ON I-12



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-11

LOG OF BORING B-7 (CONTINUED)

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 605

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): 45½

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21	SC	FILL (Qf): CLAYEY SAND, medium dense, dark gray to brown, moist, fine to coarse grained, trace gravel. Dense.	SPT		13	17			
22									
23									
24									
25									
26			SPT		25	33			
27									
28									
29									
30	CL	SANDY CLAY, very stiff, dark brown, moist, fine to coarse grained SAND, trace gravel, trace cobble. Dark gray.	SPT		13	17			
31									
32									
33									
34									
35									
36		OTAY FORMATION (To): CLAYEY SANDSTONE, light brown, moist, fine to medium grained, well to strongly cemented, weathered.	SPT		80	104			
37									
38									
39									
40									

BORING CONTINUED ON I-13



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-12

LOG OF BORING B-7 (CONTINUED)

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 605

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): 45½

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
41		OTAY FORMATION (To): CLAYEY SANDSTONE, light gray, moist, fine to medium grained, well to strongly cemented, weathered.	SPT		50/6"	>50			
42		SANDY CLAYSTONE, brown, moist, fine to medium grained SAND, well indurated, weathered.							
43									
44									
45									
46		Groundwater at 45½ feet.	SPT		50	65	▽		
47		BORING TERMINATED AT 46½ FEET							
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-13

LOG OF BORING B-8

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1		3 inches of Asphalt Concrete over 6 inches of Aggregate Base							
2	SM	FILL (Qf): SILTY SAND, loose to medium dense, brown, moist, fine to medium grained, trace gravel.		X					
3			CAL		60		19.5	103.5	
4		Very dense, light brown.		X					
5		Dense, light brown with white, fine to coarse grained.	SPT		32	42			SA AL EI COR
6									
7									
8									
9									
10		Trace cobble.	CAL		40				
11									
12									
13									
14									
15									
16			SPT		26	34			
17									
18									
19									
20									

BORING CONTINUED ON I-14



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-14

LOG OF BORING B-8 (CONTINUED)

Date Drilled: 9/25/2018

Equipment: CME-75 w/ 8-inch HSA

Elevation (ft): Approx. 615

Logged by:

Reviewed by:

Depth to Groundwater (ft):

EMW

AKN

Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21		OTAY FORMATION (To): SANDY CLAYSTONE, light brown, moist, fine to medium grained SAND, well indurated, weathered.	CAL		79/12'		32.1	90.0	
22		Light brown to brown.			50/4"	>50			
23									
24									
25									
26									
27			SPT		87/11'	114			
28									
29									
30									
31		CLAYEY SANDSTONE, light brown to brown, moist, fine to medium grained, strongly cemented, weathered.	SPT						
32		BORING TERMINATED AT 31½ FEET							
33									
34									
35									
36									
37									
38									
39									
40									



SCST, Inc.

Eastlake High School
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-15

LOG OF BORING B-9

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): 41

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	SM	3½ inches of Asphalt Concrete over 4½ inches of Aggregate Base FILL (Qf): SILTY SAND, loose to medium dense, light brown, moist, fine to coarse grained.	X	X					
2									
3									SA
4									AL
5			Medium dense.						
6				CAL		29		13.2	102.0
7									
8									
9									
10	SC	CLAYEY SAND, dense, light brown, moist, fine to coarse grained, trace gravel.	SPT		32	42			
11									
12									
13									
14									
15			Medium dense, light brown to grayish brown with white.						
16				CAL		35		24.3	99.3
17									
18									
19									
20									

BORING CONTINUED ON I-17



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-16

LOG OF BORING B-9 (CONTINUED)

Date Drilled: 9/25/2018

Equipment: CME-75 w/ 8-inch HSA

Elevation (ft): Approx. 615

Logged by:

Reviewed by:

Depth to Groundwater (ft):

EMW

AKN

41

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21	SC	FILL (Qf): CLAYEY SAND, dense, brown, moist, fine to coarse grained, trace gravel.	SPT		24	31			
22									
23									
24									
25	CL	SANDY CLAY, stiff, brown with white, moist, fine to coarse grained SAND, trace gravel.	SPT		10	13			
26									
27		Very stiff, dark brown to light brown.							
28									
29									
30		Brown.	SPT		13	17			
31									
32									
33									
34									
35									
36			SPT		20	26			
37									
38									
39									
40									

BORING CONTINUED ON I-18



SCST, Inc.

Eastlake High School
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-17

LOG OF BORING B-9 (CONTINUED)

Date Drilled: 9/25/2018
 Equipment: CME-75 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): 41

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
41	SC	FILL (Qf): CLAYEY SAND, dense, brown, moist, fine to coarse grained, trace gravel.	SPT		48	63	▽ 		
42		OTAY FORMATION (To): SANDY CLAYSTONE, hard, light brown, moist, fine grained SAND, moderately indurated, weathered. Perched groundwater encountered at 41 feet.							
43									
44									
45									
46		CLAYEY SANDSTONE, very dense, brown, moist, fine grained, strongly cemented, weathered.	SPT		76/10'	99			
47		SANDY CLAYSTONE, hard, brown, moist, fine grained SAND, moderately indurated, weathered.							
48									
49									
50			SPT		50/6"	>50			
51		BORING TERMINATED AT 50½ FEET							
52									
53									
54									
55									
56									
57									
58									
59									
60									



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-18

LOG OF BORING B-10

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft. of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
1	SC	FILL (Qf): CLAYEY SAND, medium dense, light brown, moist, fine to medium grained, trace gravel.		X					
2				X					
3		Very dense, fine to coarse grained.							
4			CAL		50/4"		10.5	114.5	
5				X					
6	SM	SILTY SAND, very dense, light brown, moist, fine to medium grained, trace gravel.			55	72			SA AL
7									
8									
9									
10		Dense, fine to medium grained.							
11			SPT		38	50			
12									
13									
14									
15	SC	CLAYEY SAND, very dense, gray and brown, moist, fine to coarse grained, trace gravel.							
16			CAL		66		22.2	98.6	DS
17									
18									
19									
20									

BORING CONTINUED ON I-20



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-19

LOG OF BORING B-10 (CONTINUED)

Date Drilled: 9/24/2018

Equipment: CME-95 w/ 8-inch HSA

Elevation (ft): Approx. 615

Logged by:

Reviewed by:

Depth to Groundwater (ft):

EMW

AKN

Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
21	SC	FILL (Qf): CLAYEY SAND, dense, light brown, moist, fine to coarse grained, trace gravel, trace cobble.	SPT		30	39			
22									
23									
24									
25									
26			SPT		35	46			
27									
28									
29									
30	CL	SANDY CLAY, very stiff, brown to gray, fine to coarse grained SAND, trace gravel.	SPT		12	16			
31									
32									
33									
34									
35		OTAY FORMATION (To): CLAYEY SANDSTONE, very dense, brown, moist, fine to medium grained, trace gravel, weakly to moderately cemented.	SPT		68	89			
36									
37									
38									
39									
40									

BORING CONTINUED ON I-7



SCST, Inc.

Eastlake High School

Chula Vista, California

By: EMW

Date: October, 2018

Job Number: 180335P4.1-2

Figure: I-20

LOG OF BORING B-10 (CONTINUED)

Date Drilled: 9/24/2018
 Equipment: CME-95 w/ 8-inch HSA
 Elevation (ft): Approx. 615

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
41		OTAY FORMATION (To): SANDY CLAYSTONE, hard, brown, moist, fine to medium grained SAND, well indurated.	SPT		86/11'	112			
42									
43									
44									
45		----- CLAYEY SANDSTONE, very dense, brown, moist, fine to medium grained, moderately to strongly cemented.	SPT		50/5"	>50			
46									
47		BORING TERMINATED AT 46 FEET							
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									



SCST, Inc.

Eastlake High School Chula Vista, California			
By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-21

LOG OF BORING TP-1

Date Drilled: 9/26/2018
 Equipment: Hand Tools
 Elevation (ft): Approx. 620

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
		1 inch of lawn and associated top soil.							
½	SC	FILL (Qf): CLAYEY SAND, medium dense, light brown, moist, fine to medium grained, trace gravel. Light reddish brown, roots.	 	 					RV
1									
1½									
2									
2½									
3		TEST PIT TERMINATED AT 3 FEET							
3½									
4									
4½									
5									
5½									
6									
6½									
7									
7½									
8									
8½									
9									
9½									
10									



SCST, Inc.

Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: I-22

LOG OF BORING TP-2

Date Drilled: 9/26/2018
 Equipment: Hand Tools
 Elevation (ft): Approx. 623

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
		3 inches of lawn and associated top soil.							
½	SC	FILL (Qf): CLAYEY SAND, medium dense, light brown, moist, fine to medium grained, trace gravel, roots. Dense.	 	 					RV
1									
1½									
2									
2½									
3									
		TEST PIT TERMINATED AT 3 FEET							
3½									
4									
4½									
5									
5½									
6									
6½									
7									
7½									
8									
8½									
9									
9½									
10									



SCST, Inc.

Eastlake High School
 Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-23

LOG OF BORING P-1

Date Drilled: 10/2/2018
 Equipment: Hand Tools
 Elevation (ft): Approx. 620

Logged by: EMW
 Reviewed by: AKN
 Depth to Groundwater (ft): Not Encountered

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES		DRIVING RESISTANCE (blows/ft of drive)	N ₆₀	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)	LABORATORY TESTS
			DRIVEN	BULK					
		5 inches of lawn and associated top soil.							
1	SM	FILL (Qf): SILTY SAND, medium dense, light brown, moist, fine to medium grained, some gravel, roots. Dense.							SA AL
2									
3									
4									
5									
6		BORING TERMINATED AT 6 FEET							
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									



SCST, Inc.

Eastlake High School
 Chula Vista, California

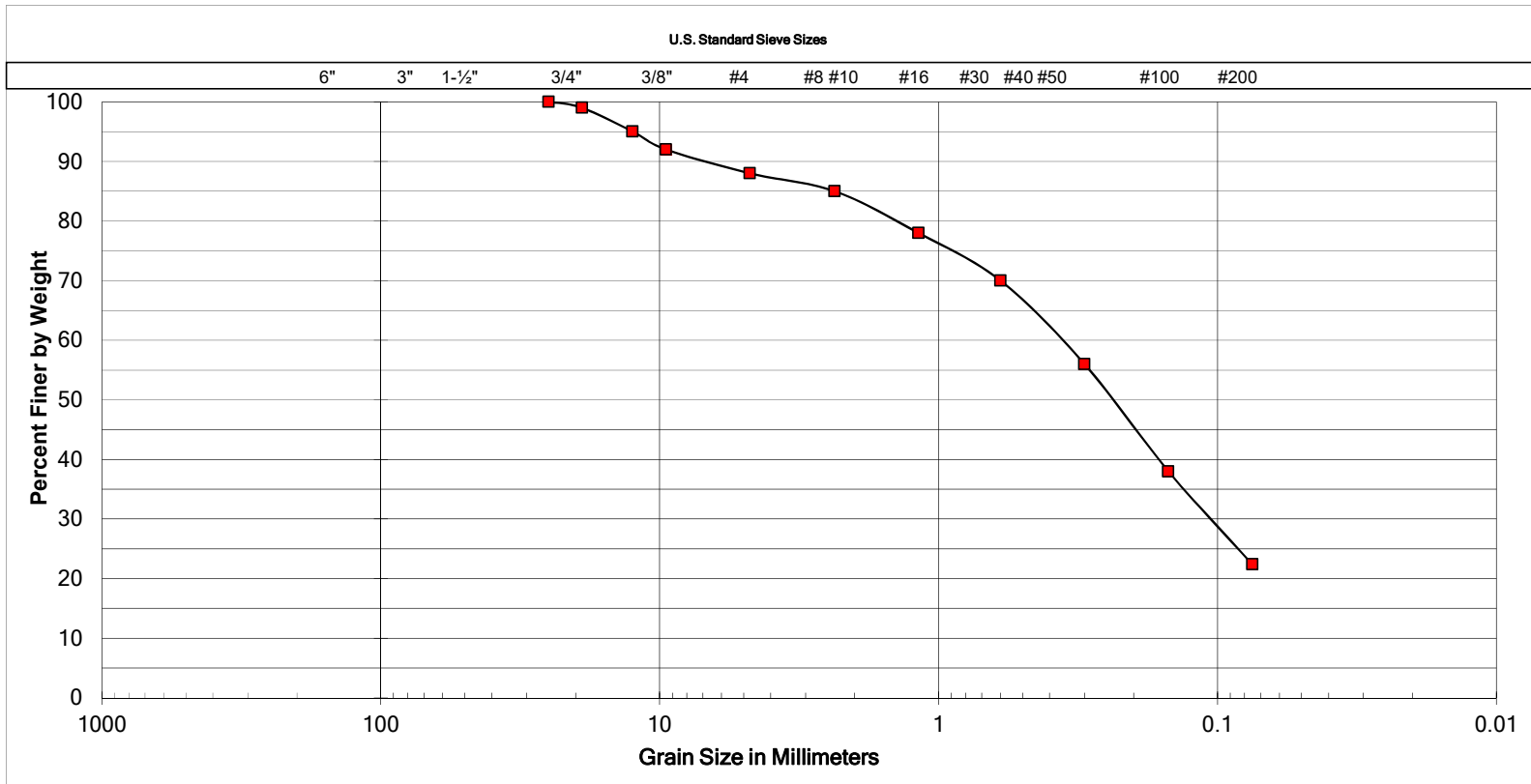
By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	I-24

APPENDIX II LABORATORY TESTING

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

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **IN SITU MOISTURE AND DENSITY:** The in situ moisture content and dry unit weight were determined on samples collected from the borings. The test results are presented on the boring logs in Appendix I.
- **PARTICLE-SIZE DISTRIBUTION:** The particle-size distribution was determined on four samples in accordance with D6913.
- **ATTERBERG LIMITS:** The Atterberg limits were determined on four soil samples in accordance with ASTM D4318.
- **EXPANSION INDEX:** The expansion index was determined on three soil samples in accordance with ASTM D4829.
- **R-VALUE:** An R-value test was performed on one soil sample in accordance with California Test Method 301.
- **CORROSIVITY:** Corrosivity tests were performed on two soil samples. The pH and minimum resistivity were determined in general accordance with California Test 643. The soluble sulfate content was determined in accordance with California Test 417. The total chloride ion content was determined in accordance with California Test 422.
- **DIRECT SHEAR:** Direct shear tests were performed on selected samples in accordance with ASTM D3080. The shear stress was applied at a constant rate of strain of 0.003 inch per minute.

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



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

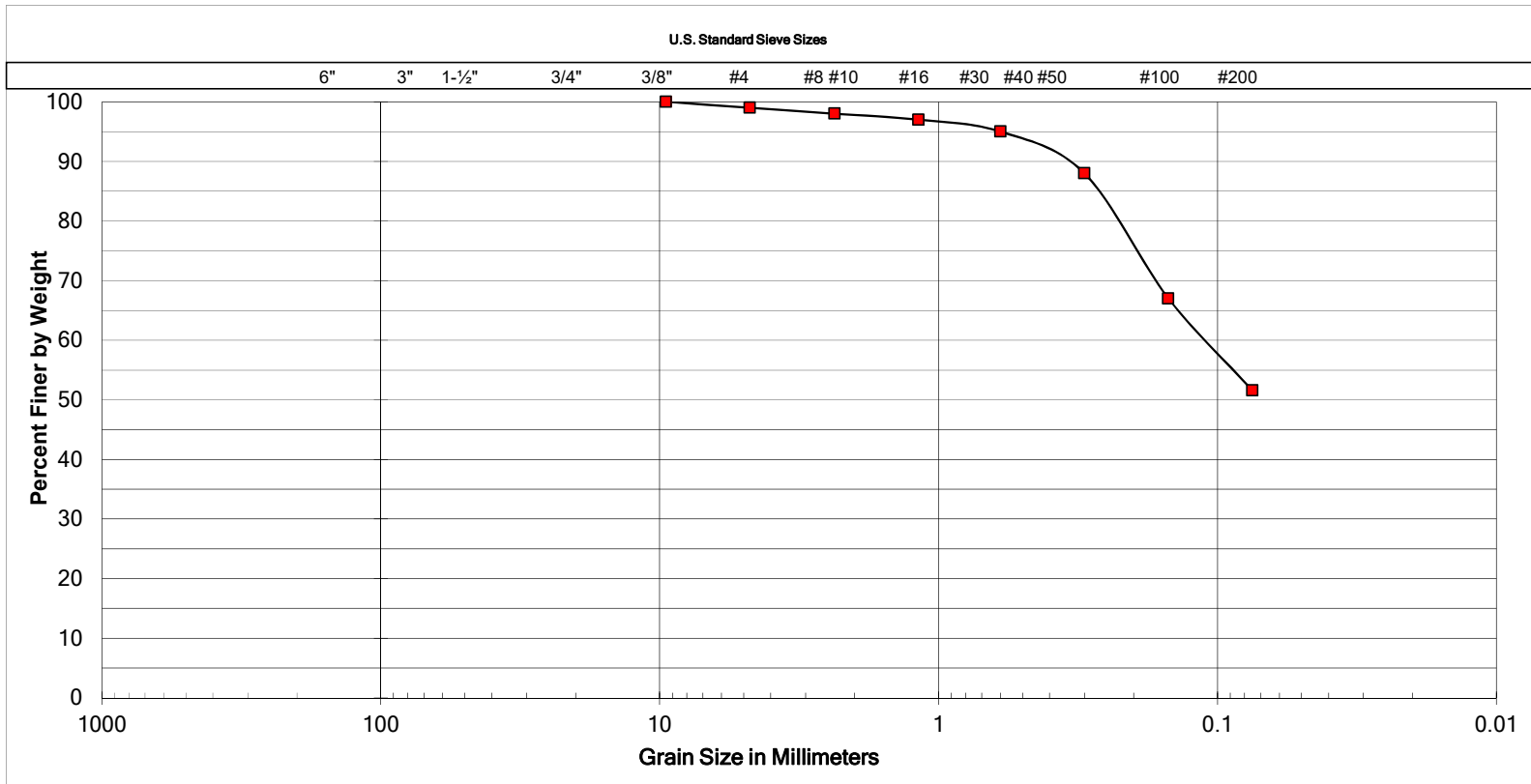
SAMPLE LOCATION
B-1 at ½ to 2½ feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

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



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

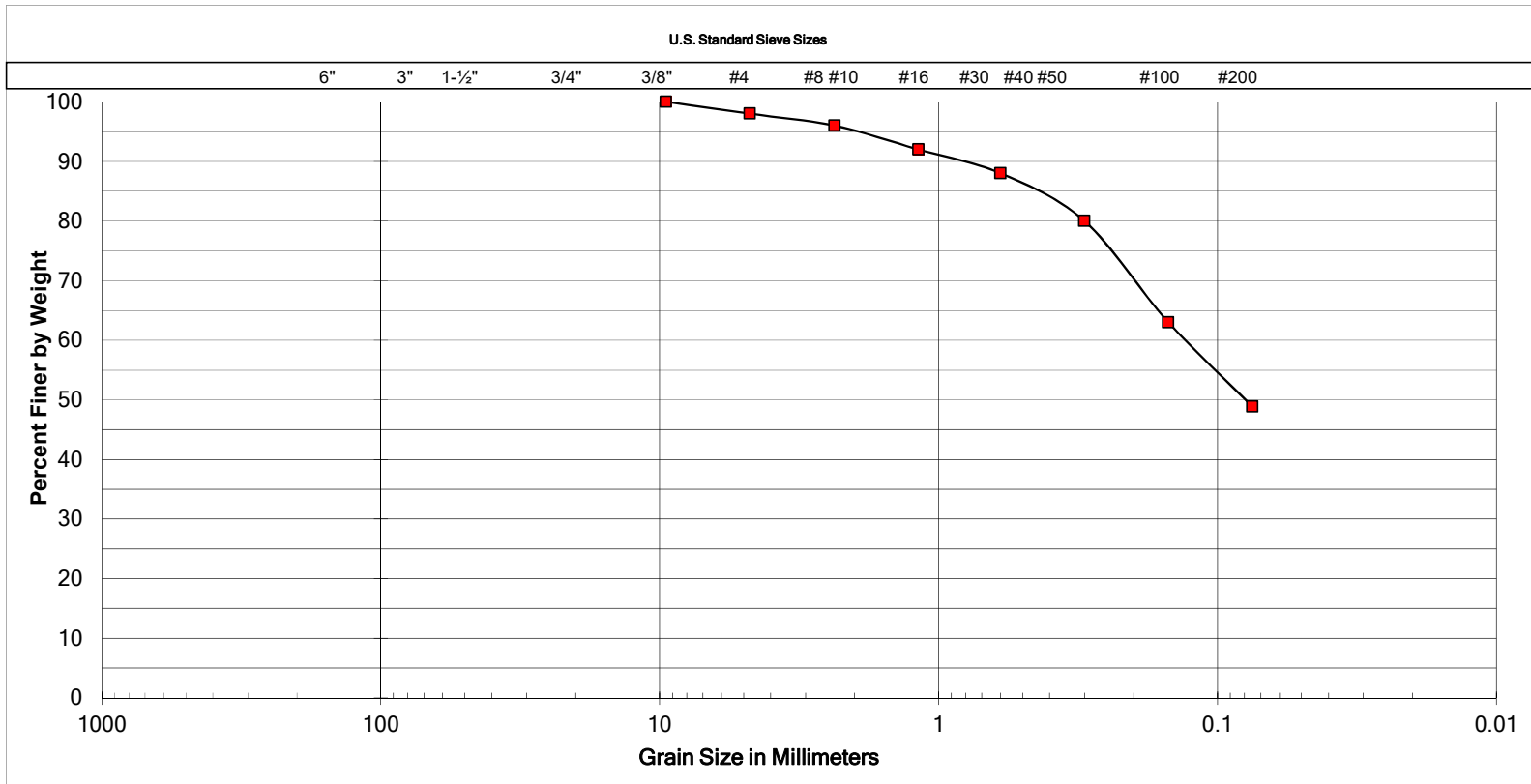
SAMPLE LOCATION
B-2 at 1/2 to 5 feet

UNIFIED SOIL CLASSIFICATION:	CL
DESCRIPTION	LEAN CLAY

ATTERBERG LIMITS	
LIQUID LIMIT	40
PLASTIC LIMIT	19
PLASTICITY INDEX	21



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-2



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

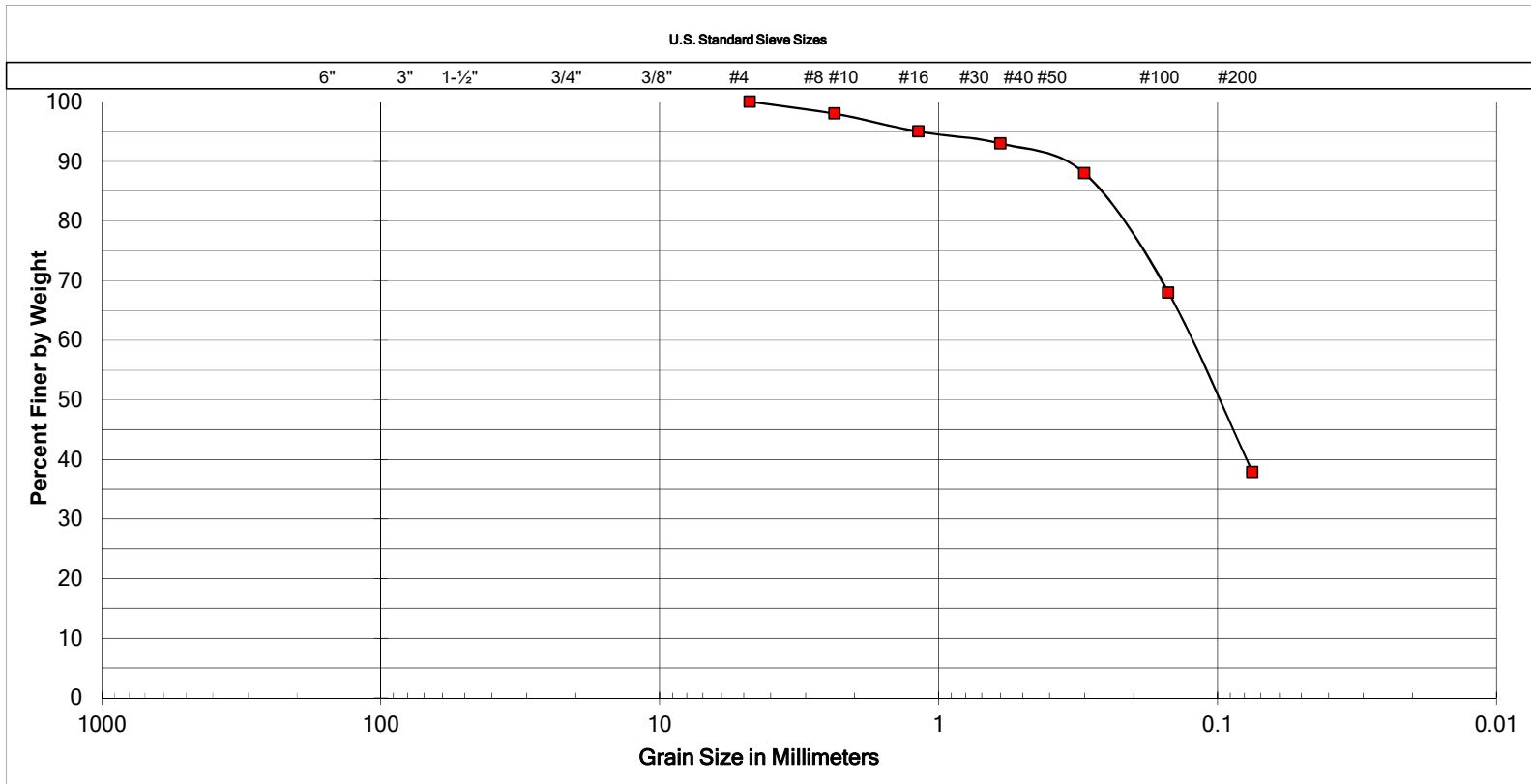
SAMPLE LOCATION
B-3 at 4 to 5 feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

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



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-3



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

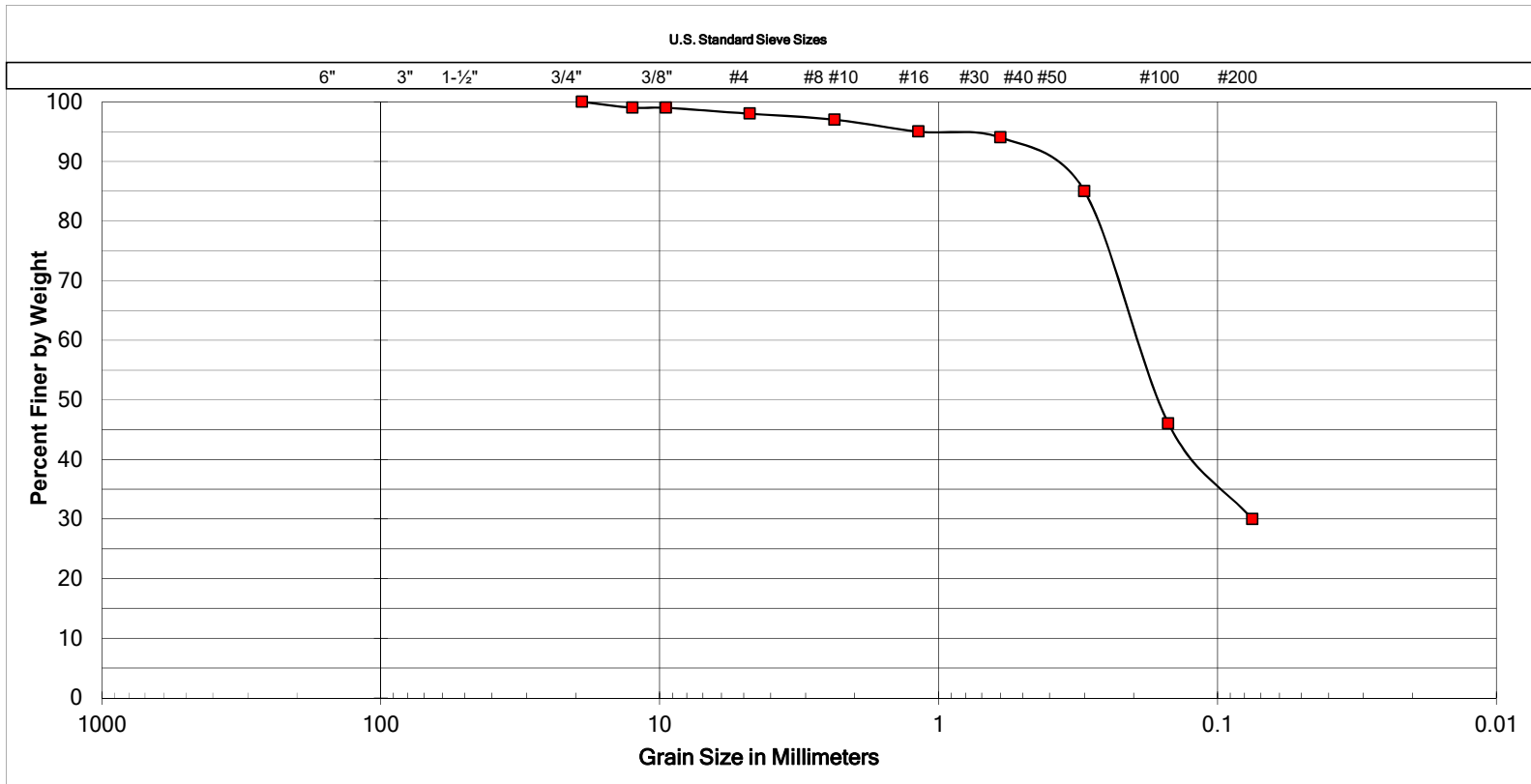
SAMPLE LOCATION
B-5 at 2 to 5 feet

UNIFIED SOIL CLASSIFICATION:	SC
DESCRIPTION	CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	39
PLASTIC LIMIT	23
PLASTICITY INDEX	16



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-4



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

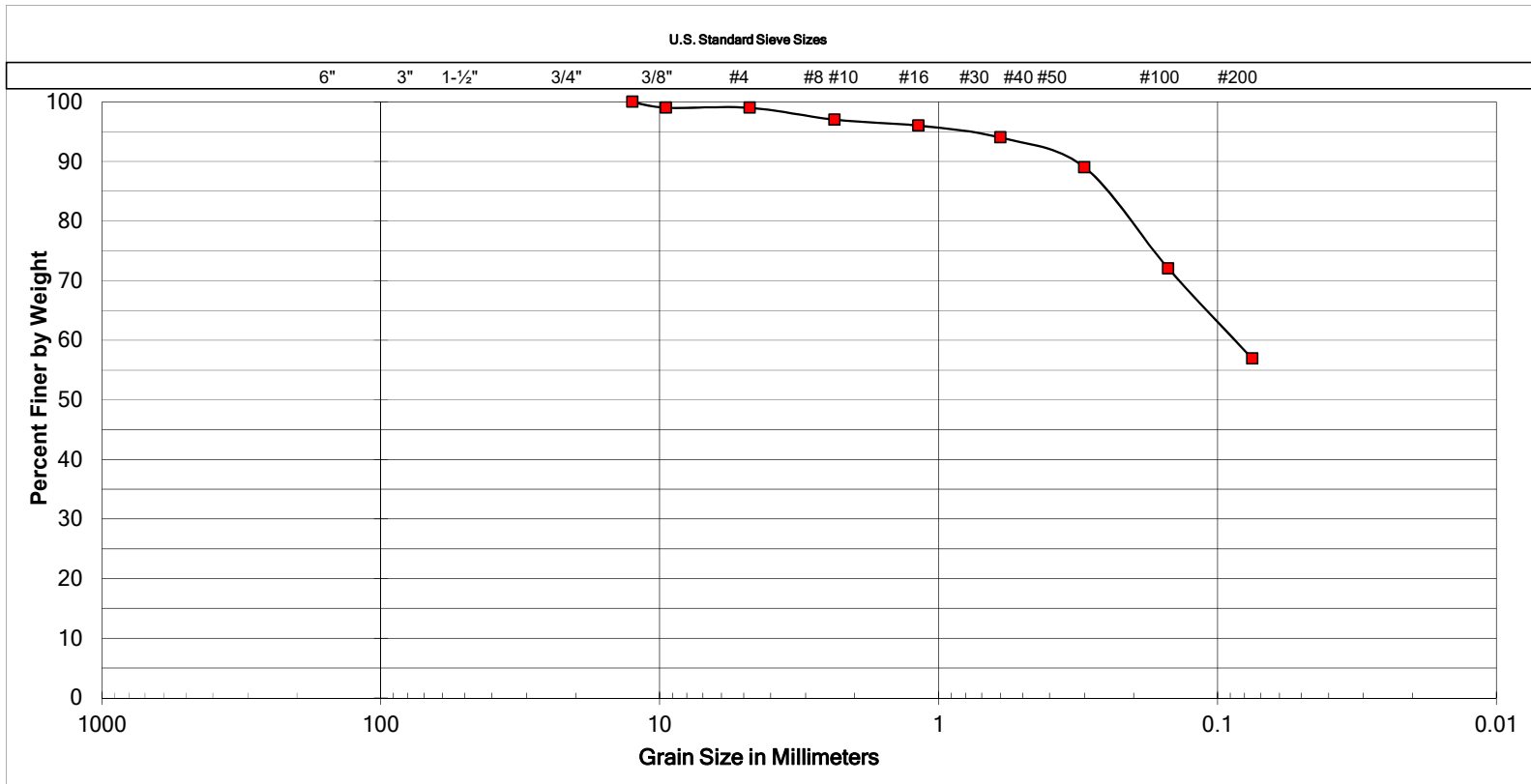
SAMPLE LOCATION
B-6 at ½ to 2½ feet

UNIFIED SOIL CLASSIFICATION:	SC
DESCRIPTION	CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	38
PLASTIC LIMIT	23
PLASTICITY INDEX	15



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-5



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

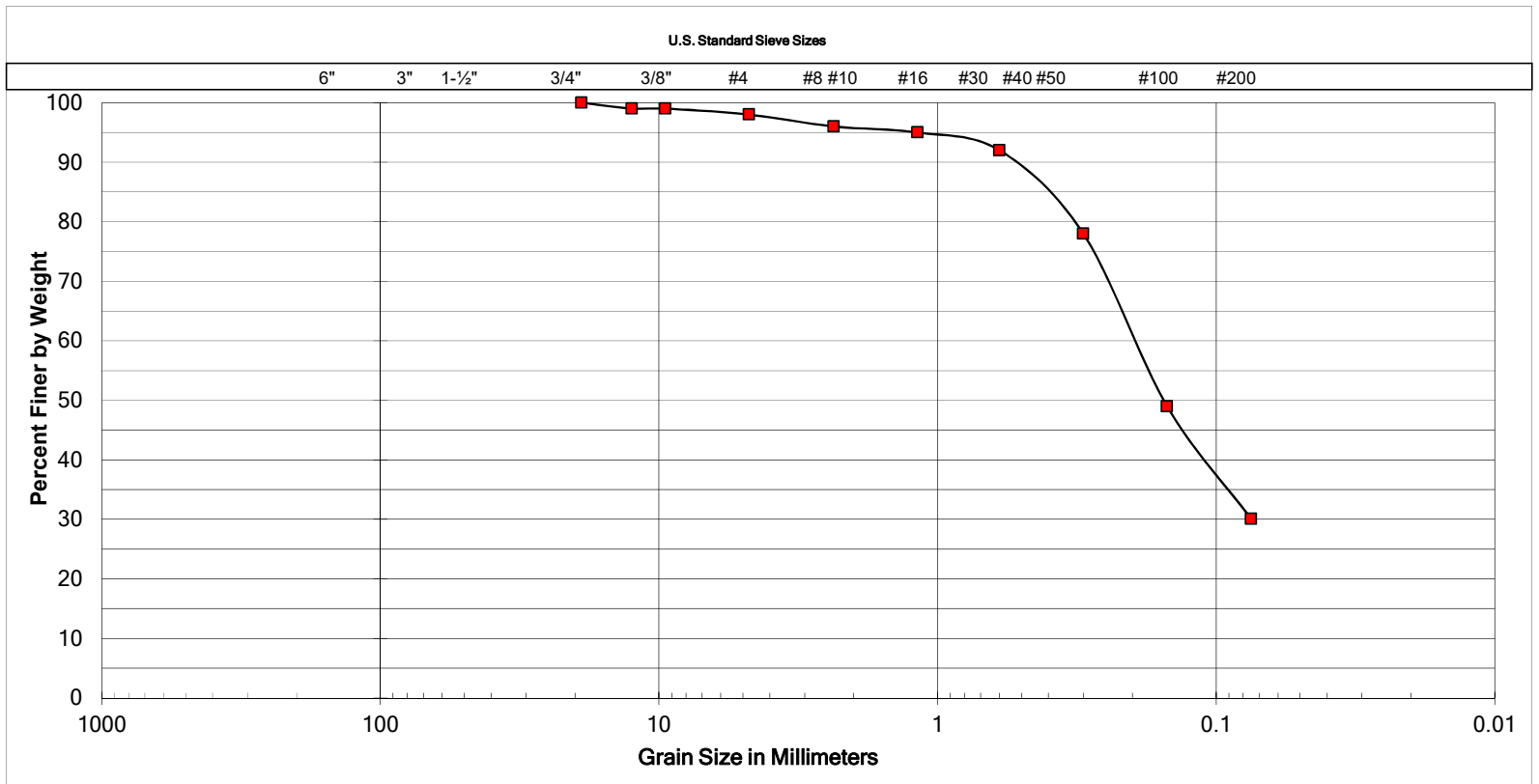
SAMPLE LOCATION
B-7 at ½ to 5 feet

UNIFIED SOIL CLASSIFICATION:	CL
DESCRIPTION	LEAN CLAY

ATTERBERG LIMITS	
LIQUID LIMIT	44
PLASTIC LIMIT	21
PLASTICITY INDEX	23



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-6



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

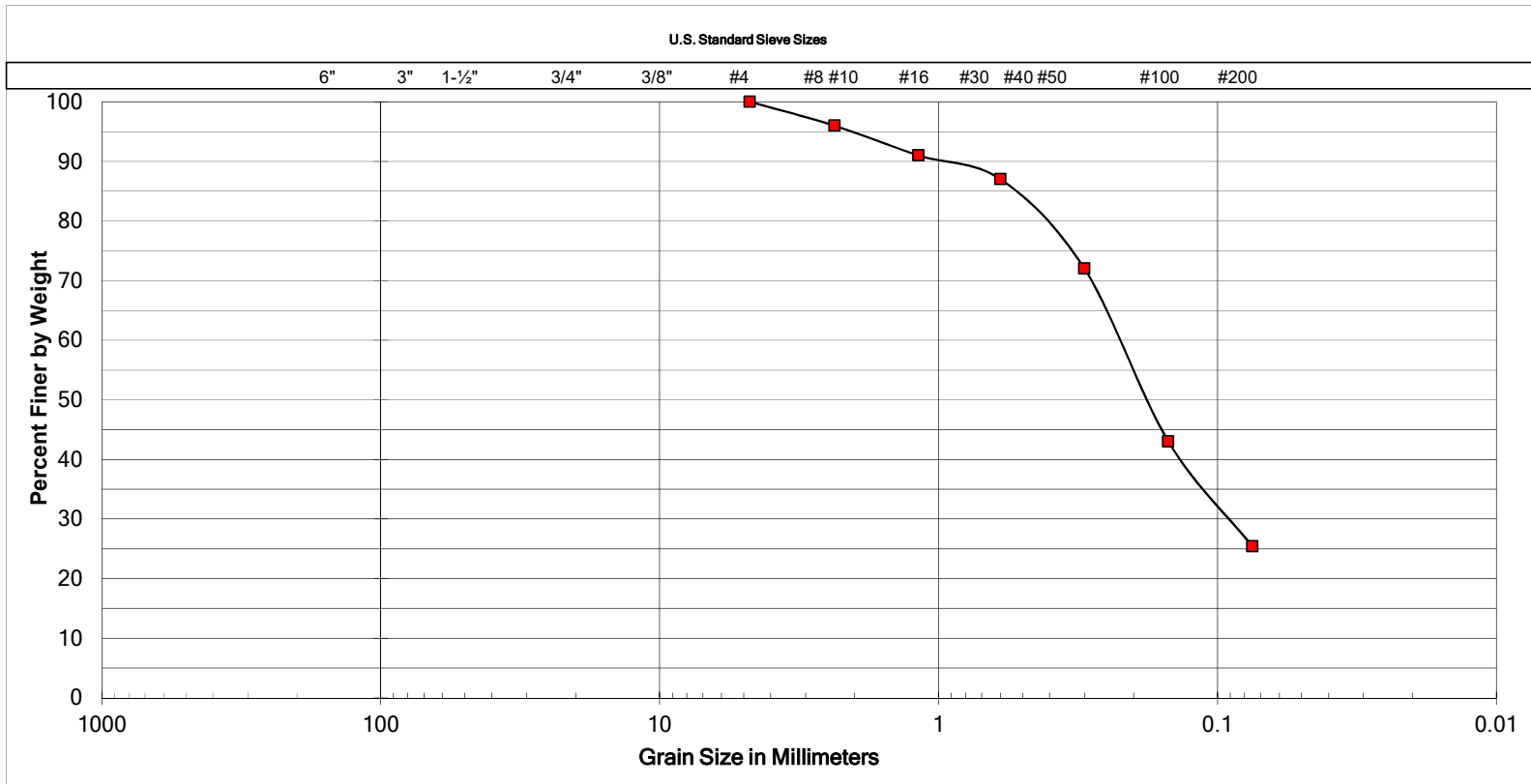
SAMPLE LOCATION
B-8 at 4 to 5 feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTICITY INDEX	NP



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-7



Cobbles	Gravel	Sand	Silt or Clay
	Coarse Fine	Coarse Medium Fine	

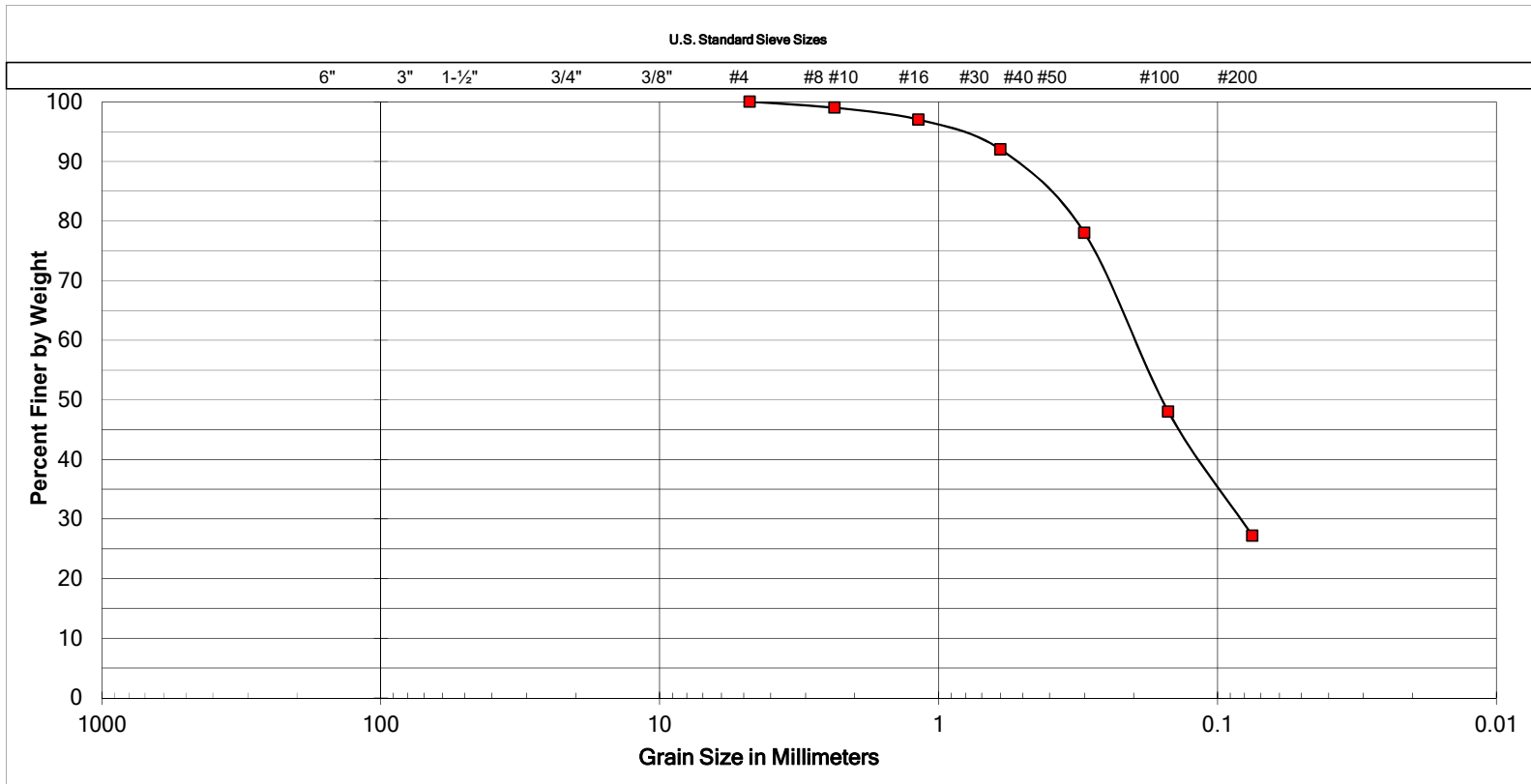
SAMPLE LOCATION
B-9 at ½ to 5 feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTICITY INDEX	NP



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-8



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

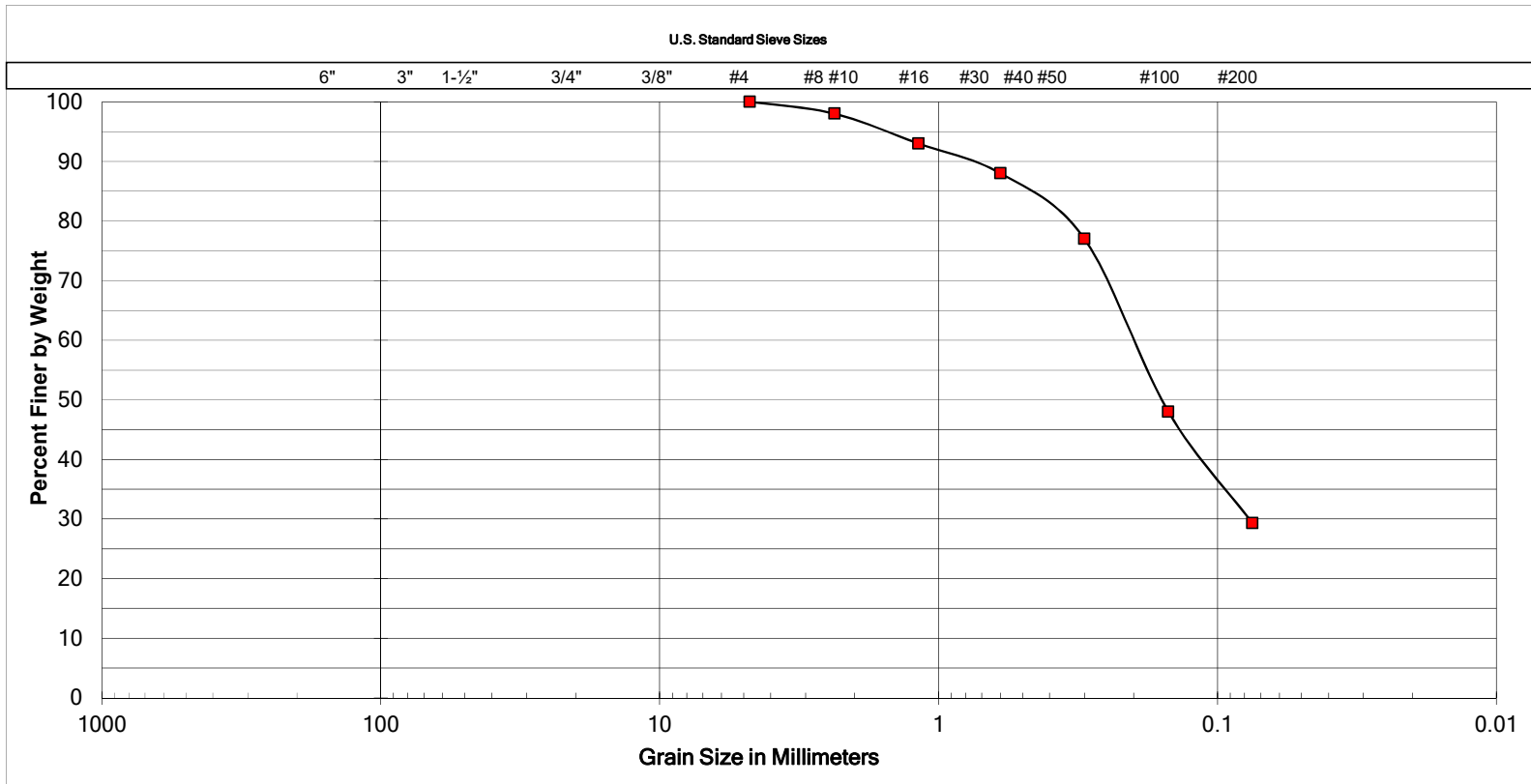
SAMPLE LOCATION
B-10 at 5½ to 6½ feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTICITY INDEX	NP



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-9



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

SAMPLE LOCATION
P-1 at ½ to 5 feet

UNIFIED SOIL CLASSIFICATION:	SM
DESCRIPTION	SILTY SAND

ATTERBERG LIMITS	
LIQUID LIMIT	NP
PLASTIC LIMIT	NP
PLASTICITY INDEX	NP



Eastlake High School Chula Vista, California	
By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-10

EXPANSION INDEX

ASTM D2489

SAMPLE	DESCRIPTION	EI
B-2 at ½ to 5 feet	Lean CLAY	61
B-5 at 2 to 5 feet	CLAYEY SAND	37
B-6 at ½ to 2½ feet	CLAYEY SAND	29
B-7 at ½ to 5 feet	SANDY CLAY	68
B-8 at 4 to 5 feet	SILTY SAND	31

Classification of Expansive Soil¹

EXPANSIVE INDEX	POTENTIAL EXPANSION
1-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

1. ASTM - D4829

R-VALUE

CALIFORNIA TEST 301

SAMPLE	DESCRIPTION	R-VALUE
TP-1 at ½ to 3 feet	CLAYEY SAND	26
TP-2 at ½ to 3 feet	CLAYEY SAND	23

RESISTIVITY, pH, SOLUBLE CHLORIDE and SOLUBLE SULFATE

pH & Resistivity (Cal 643, ASTM G51)

Soluble Chlorides (Cal 422)

Soluble Sulfate (Cal 417)

SAMPLE	RESISTIVITY (Ω-cm)	pH	CHLORIDE (%)	SULFATE (%)
B-2 at ½ to 5 feet	817	9.08	0.001	0.000
B-5 at 2 to 5 feet	446	8.32	0.037	0.030
B-6 at ½ to 2½ feet	1010	9.45	0.010	0.006
B-7 at ½ to 5 feet	1250	8.45	0.001	0.001
B-8 at 4 to 5 feet	1360	8.75	0.007	0.000

Sulphate Exposure Classes²

CLASS	SEVERITY	WATER-SOLUBLE SULFATE (SO ₄) IN SOIL, PERCENT BY MASS
S0	Not applicable	SO ₄ < 0.10
S1	Moderate	0.10 ≤ SO ₄ < 0.20
S2	Severe	0.20 ≤ SO ₄ ≤ 2.00
S3	Very Severe	SO ₄ > 2.00

2. ACI 318, Table 19.3.1.1

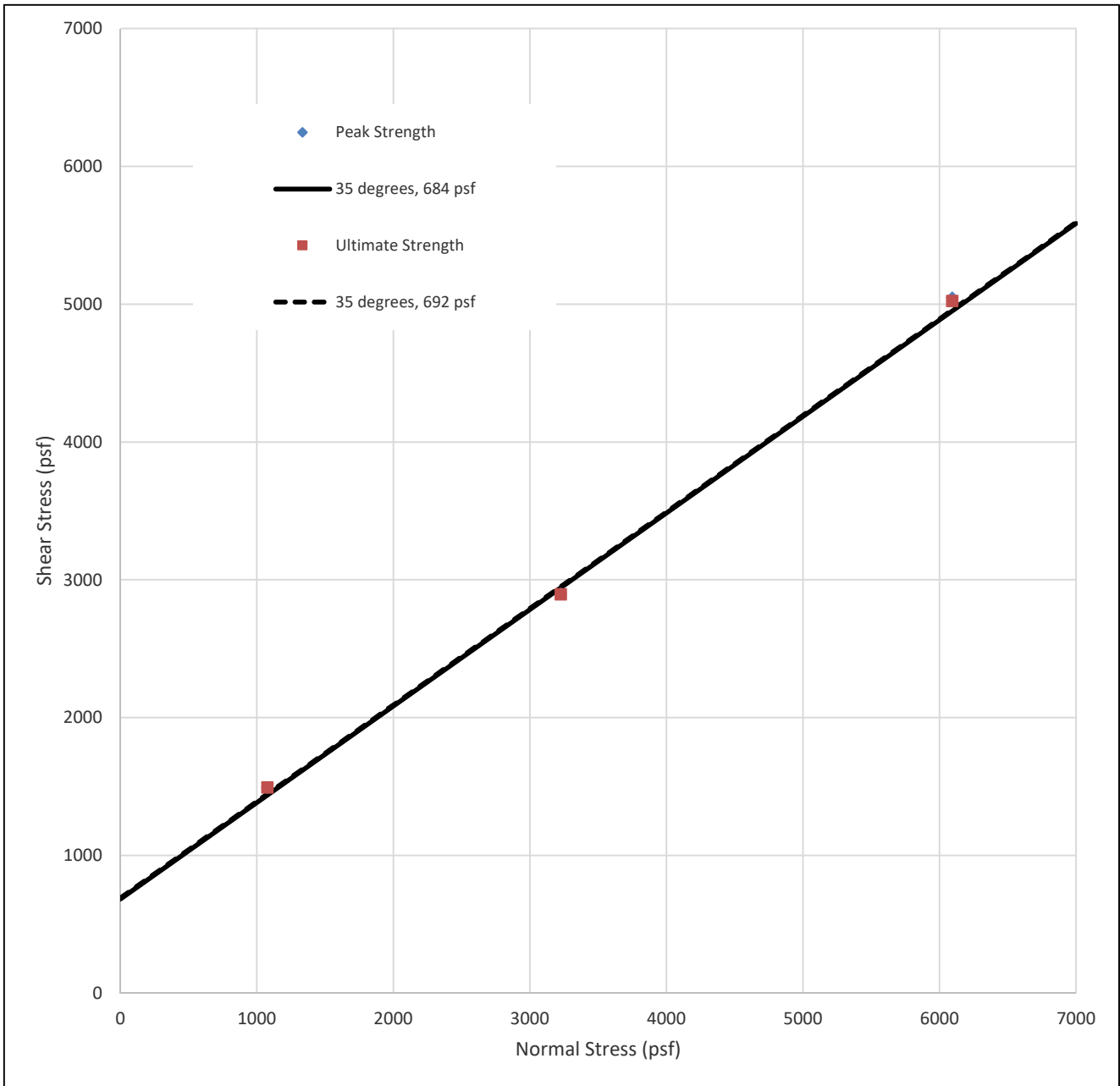


SCST, Inc.


Eastlake High School

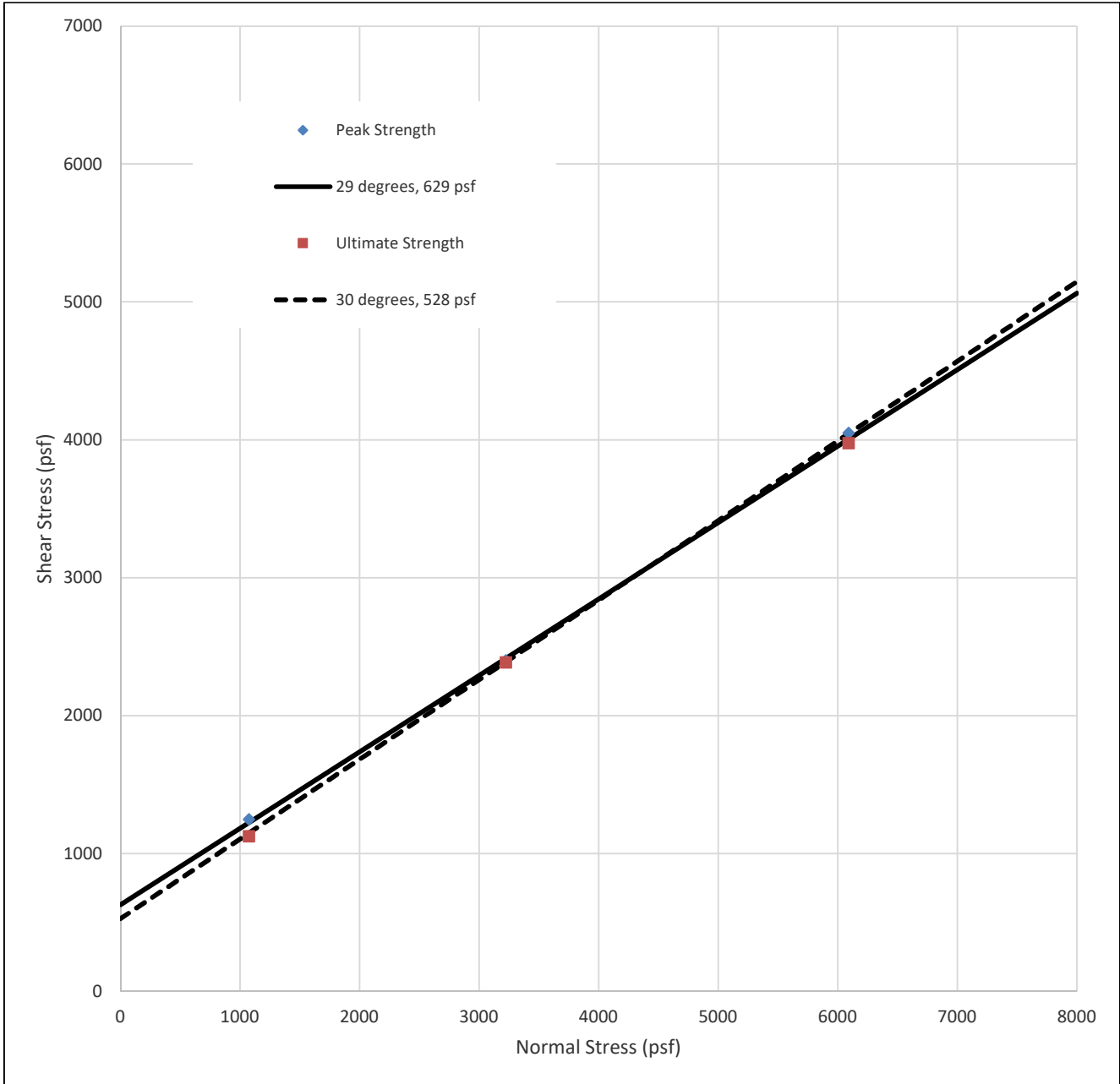
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	II-11



SAMPLE ID: B-2 at 6 to 6½ feet	Φ	Peak	Ultimate
		35 °	35 °
CLAYEY SAND	c	684 psf	692 psf
NOTES: Insitu	γ _d	Initial	Final
		103.1 pcf	103.1 pcf
Strain Rate: 0.003 in/min	w _c	11.1 %	19.8 %
Sample was consolidated and drained	Saturation	48 %	85 %

 SCST Inc.	Eastlake High School Chula Vista, California	
	By: EMW	Date: October, 2018
	Job Number: 180335P4.1-2	Figure: II-12



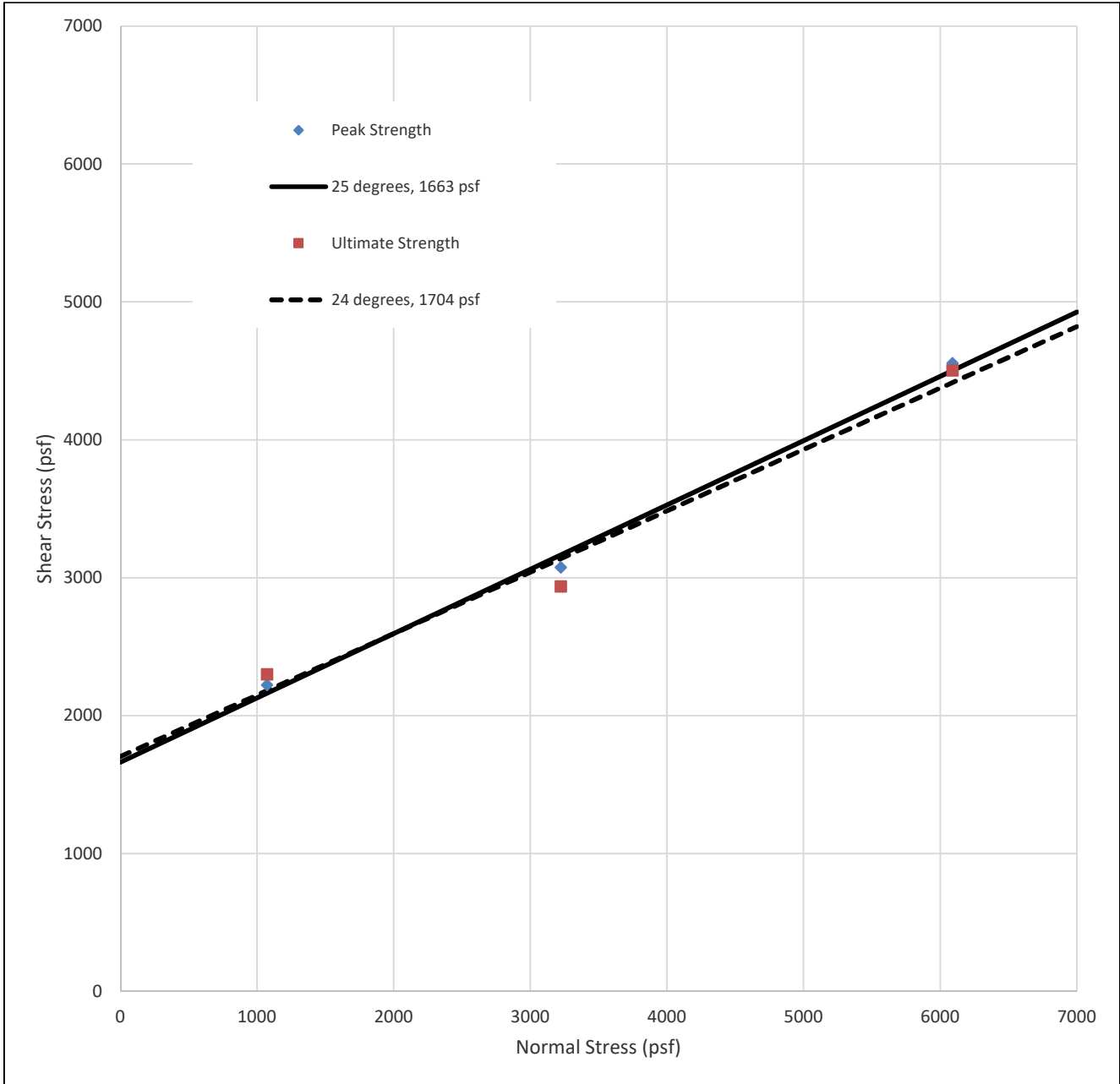
SAMPLE ID: B-3 at 3½ to 4 feet	Φ	Peak	Ultimate
		29 °	30 °
SILTY SAND	c	629 psf	528 psf
NOTES: Insitu Strain Rate: 0.003 in/min Sample was consolidated and drained	γ _d w _c Saturation	Initial	Final
		107.6 pcf	109.5 pcf
		16.8 %	20.6 %
		81 %	100 %



SCST Inc.

Eastlake High School
Chula Vista, California

By: EMW	Date: October, 2018
Job Number: 180335P4.1-2	Figure: II-13



SAMPLE ID: B-7 at 3½ to 4 feet

LEAN CLAY

NOTES: Insitu

Strain Rate: 0.003 in/min

Sample was consolidated and drained

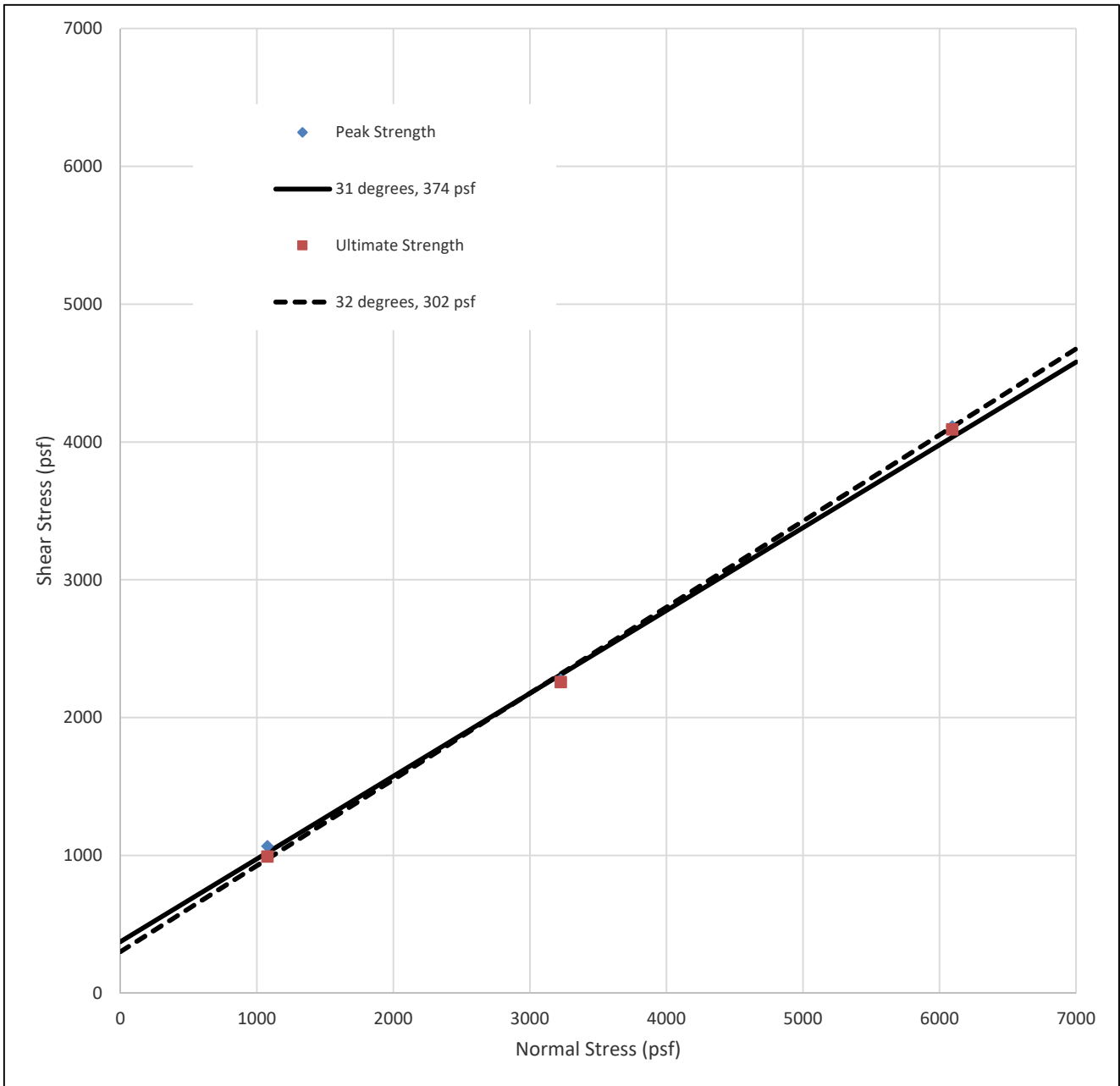
	Peak	Ultimate
Φ	25 °	24 °
c	1663 psf	1704 psf
γ_d	Initial 102.4 pcf	Final 102.4 pcf
w_c	22.4 %	24.6 %
Saturation	95 %	100 %



SCST Inc.

Eastlake High School
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	II-14



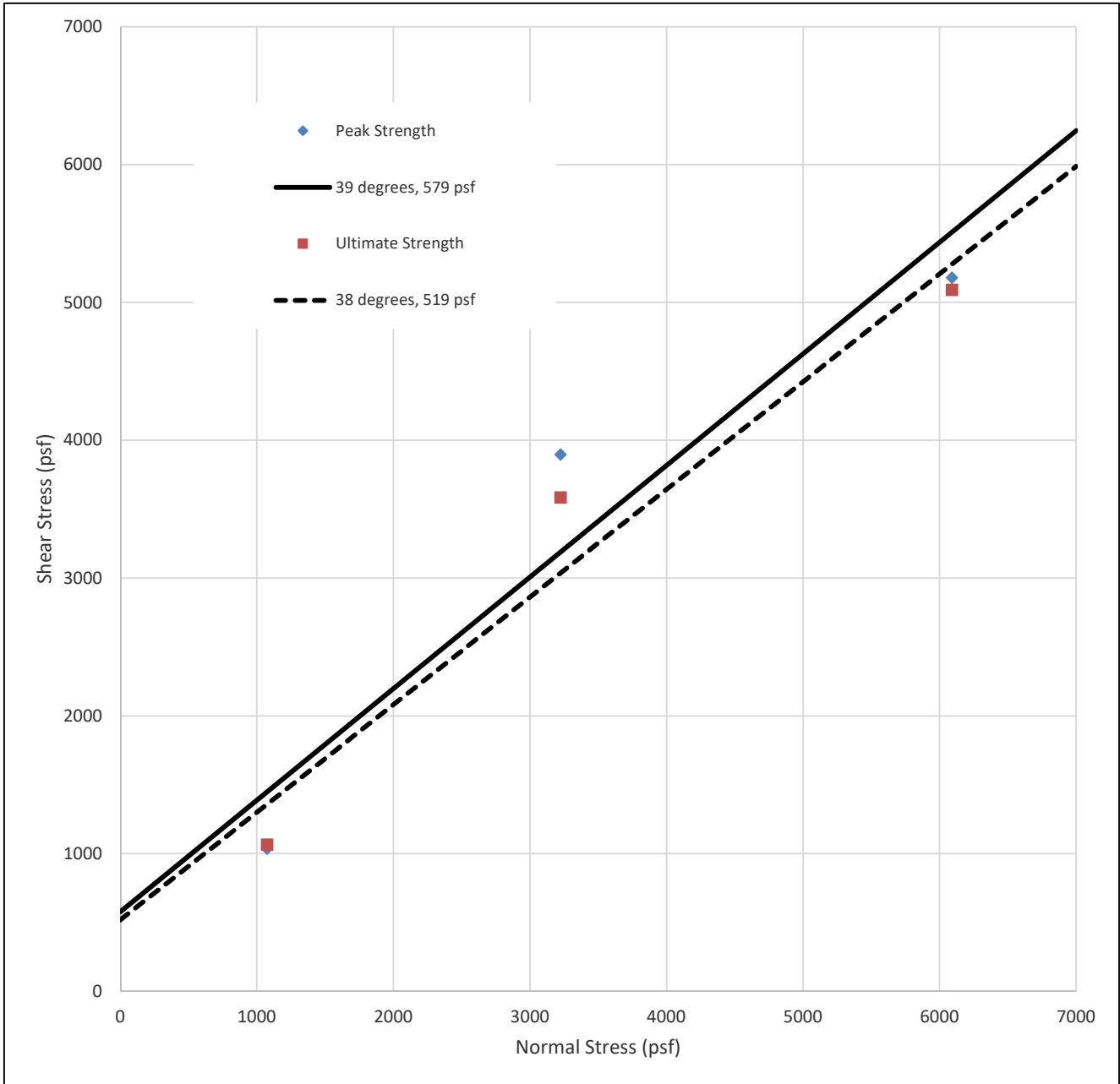
SAMPLE ID:	B-9 at 6 to 6½ feet	Φ	Peak 31 °	Ultimate 32 °
SILTY SAND		c	374 psf	302 psf
NOTES: In situ		γ_d	Initial 102.0 pcf	Final 102.0 pcf
Strain Rate: 0.003 in/min		w_c	13.2 %	20.5 %
Sample was consolidated and drained		Saturation	55 %	86 %



SCST Inc.

Eastlake High School
Chula Vista, California

By:	EMW	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	II-15



SAMPLE ID: B-10 at 16 to 16½ feet

Clayey Sand

NOTES: Insitu

Strain Rate: 0.003 in/min

Sample was consolidated and drained

	Peak	Ultimate
ϕ	39 °	38 °
c	579 psf	519 psf
γ_d	Initial 98.6 pcf	Final 98.6 pcf
w_c	22.2 %	25.1 %
Saturation	86 %	97 %



SCST Inc.

Eastlake High School
Chula Vista, California

By:	DRB	Date:	October, 2018
Job Number:	180335P4.1-2	Figure:	II-16

APPENDIX III INFILTRATION RATE TEST RESULTS

We performed falling head borehole percolation testing at one location (P-1) in general conformance with Appendix C of the Model BMP Design Manual for San Diego Region. The borings were prepared for percolation testing by placing about 6 inches of pea gravel in the bottom of the test hole and then installing a 4-inch diameter solid PVC pipe from the top of the $\frac{3}{4}$ -inch gravel (about 6 feet below the existing ground surface) to about 2 feet above the ground surface. $\frac{3}{4}$ -inch gravel was placed in the annular space between the PVC pipe and the boring sidewall between the depths of about 6 feet and about 4 feet below the ground surface; hydrated bentonite chips were placed above about 2½ feet. Prior to starting the percolation testing, the test holes were presoaked overnight (approximately 24 hours) by filling the holes with water. The percolation testing was performed immediately after presoaking by filling the test holes with clean potable water to the top of the PVC pipe and measuring the drop in the water level every 30 minutes until a constant rate was established. Figure III-1 presents the results of the testing.

Report of Borehole Percolation Testing

Storm Water Infiltration

Project Name: Eastlake High School
 Job Number: 180335P4.1-2
 Date Drilled: 10/2/2018
 Drilling Method: 6" Hand Auger
 Drilled Depth (feet): 6.0
 Test Hole Diameter (inches): 6
 Gravel Pack: Y
 Pipe Diameter (inches): 4

Test Number: P-1
 Tested By: EMW
 Date Tested: 10/3/2018
 Presoak Time: 24 HR

Trial No.	Time	Time Interval, ΔT (min)	Initial Water Height, H _o (ft)	Final Water Height, H _f (ft)	Change in Water Height, ΔH (in)	Percolation Rate (min/in)
1	10:34	0:30	0.95	0.53	5.04	6
	11:04					
2	11:07	0:30	1.45	0.80	7.80	4
	11:37					
3	11:37	0:30	0.80	0.41	4.68	6
	12:07					
4	12:07	0:30	0.41	0.26	1.80	17
	12:37					
5	12:42	0:15	0.68	0.45	2.76	5
	12:57					
6	12:59	0:15	0.72	0.53	2.28	7
	13:14					
7	13:16	0:15	0.78	0.60	2.16	7
	13:31					
8	13:33	0:15	1.01	0.80	2.52	6
	13:48					
Observed Percolation Rate:					6 min/in 10.1 in/hr	
Gravel Correction Factor:					1.50	
Corrected Percolation Rate:					9 min/in 6.7 in/hr	
*Tested Infiltration Rate, I_t:					1.5 in/hr	

*Tested infiltration rate using the Porchet Method:

$$I_t = \frac{\Delta H(60r)}{\Delta T(r + 2H_{avg})}$$

ΔH = Change in water head height over the time interval [in] = 2.5

r = Test hole radius [in] = 3

ΔT = Time interval [min] = 15

H_{avg} = Average water height over time interval = 12(H_o + H_f)/2 [in] = 8.9



SCST, Inc.

Eastlake High School
Chula Vista, California

By: <u>EMW</u>	Date: <u>October, 2018</u>
Job No: <u>180335P4.1-2</u>	Figure: <u>III-1</u>

APPENDIX IV

APPENDIX IV WORKSHEET C.4-1: CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION

Appendix C: Geotechnical and Groundwater Investigation Requirements

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
<p>Part 1 - Full Infiltration Feasibility Screening Criteria</p> <p>Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?</p>			
Criteria	Screening Question	Yes	No
1	<p>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>The tested infiltration rate is approximately 1.5 inches per hour. The tested infiltration rate is approximately 1.5 inches per hour, and an infiltration rate greater than 0.5 inch per hour is reliable. To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
2	<p>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>The tested infiltration rate is approximately 1.5 inches per hour, and an infiltration rate greater than 0.5 inch per hour is reliable. To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			

Appendix C: Geotechnical and Groundwater Investigation Requirements

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	<p>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>Without pre-treatment, infiltration of stormwater pollutants could migrate laterally and adversely affect down-gradient sites. SCST would recommend pre-treatment of stormwater runoff. In SCST's opinion, allowing infiltration of pre-treated stormwater runoff in any appreciable quantity does not pose a significant risk to the regional groundwater table.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
4	<p>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>The project design engineer is responsible for completing criterion 4.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
Part 1 Result*	<p>If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration</p> <p>If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</p>		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by [City Engineer] to substantiate findings.

Appendix C: Geotechnical and Groundwater Investigation Requirements

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Provide basis:

The tested infiltration rate is approximately 1.5 inches per hour. The tested material is believed to be generally representative of the material that will be encountered below the proposed BMP locations.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
---	---	-------------------------------------	--------------------------

Provide basis:

To mitigate the increased risk associated with infiltration at the bottom of the proposed BMP basins to an acceptable level and reduce the potential for groundwater migration and adverse impacts to adjacent structures and improvements, cutoff walls or vertical cutoff membranes consisting of 30 mil HDPE or PVC should be installed along the sides of the BMPs, and a subdrain should be placed at the bottom of the basins and connected to a storm drain.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/ data source applicability and why it was not feasible to mitigate low infiltration rates.

Appendix C: Geotechnical and Groundwater Investigation Requirements

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	<p>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>The tested infiltration rate at the site supports allowing infiltration greater than 0.5 inch per hour. Without pre-treatment, infiltration of stormwater pollutants could migrate laterally and adversely affect down-gradient sites. SCST would recommend pre-treatment of stormwater runoff. In SCST's opinion, allowing infiltration of pre-treated stormwater runoff in any appreciable quantity does not pose a significant risk to the regional groundwater table.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</p>			
8	<p>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Provide basis:</p> <p>The project design engineer is responsible for completing criterion 8.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</p>			
Part 2 Result*	<p>If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.</p> <p>If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</p>		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings