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March 26, 2025
Project No. 3346-CR

TTLC Management, Inc. an Arizona Corporation
4350 Von Karman Avenue, Suite 200
Newport Beach, California 92660

Attention: Mr. Michael Torres

Subject: **Geotechnical Evaluation Update**
Proposed Garrison School Site Residential Development
Assessor's Parcel Numbers 162-020-24 and 161-030-14
333 Garrison Street
Oceanside, San Diego County, California

References: See Page 4

Dear Mr. Torres:

As requested, GeoTek, Inc. (GeoTek) has prepared this letter to update the referenced report prepared for the subject project by GeoTek (GeoTek, 2024).

Site Description

The approximate 11.14-acre site is addressed as 333 Garrison Street, in the City of Oceanside, San Diego County, California (See Figure 1, Site Location Map). The site is comprised of two (2) parcels of land identified as San Diego County Assessor's Parcel Numbers 162-020-24 and 161-030-14. The site is currently occupied by the former E. G. Garrison Elementary School, which has now been abandoned. Current site improvements include ten (10) classroom buildings, a miscellaneous-use building, paved parking and drive isle areas, as well as landscaping and hardscaping areas. GeoTek understands that a failed storm drain trends through the south-central portion of the site and was utilized for the now abandoned elementary school. The eastern portion of the site is vacant of structures and appears to have been utilized for sporting fields.

The site is in an area largely characterized by residential development. The site is bordered by vacant land and residential tract development to the north; Garrison Street, followed by a drainage channel and multi-family residential development to the east; La Cresta Drive and multi-family residential development to the south; and a large fill slope, followed by a single-family residential tract development to the west.

Topographically, the site has relatively flat terrain with surface drainage being directed to the southwest by sheetflow. The elevation of the northern portion of the site is approximately 117 feet with approximately 30 feet of elevation differential across the site.

The site is geotechnically essentially unchanged since the issuance of the referenced report (GeoTek, 2024).

Proposed Development

Based on the *Site Plan* prepared by KTGY and dated November 25, 2024, it is proposed to construct 22 muti-family structures consisting of 140 units, along with open spaces, and associated utility/street/tract improvements (See Figure 2, Site Plan).

It is assumed that the multi-family structures will likely be wood-framed and/or masonry-framed, one- to three-stories in height and that the structures will also be supported by conventional shallow spread footings. For the purposes of this report, it is assumed maximum column and wall loads will be about 75 kips and 3.5 kips per foot, respectively.

Based upon existing site topograpy and anticipated site grading, grading of the site will involve cuts and fills of less than ten feet in height, not including any recommended remedial grading. Low (less than five feet in height) site retaining walls are anticipated as part of the project development. Sewage disposal is anticipated to be be provided by a public sewer system. If site development differs from the assumptions made herein, the recommendations included in this update report should be subject to further review and evaluation.

Based on review, the proposed development remains essentially geotechnically unchanged since the referenced *Geotechnical and Infiltration Evaluation* (GeoTek, 2024)

Conclusions

The 2022 California Building Code (CBC) has not introduced any changes to the procedures used to determine the generalized geotechnical design recommendations, slope stability, or for structural analysis or design. Based upon review, the recommendations contained in the referenced Geotechnical and Infiltration Evaluation (GeoTek, 2024) remain valid and applicable to the design and construction of the subject project, unless specifically superseded in this report.

This report is intended to be made a part of, and incorporated with, the referenced Geotechnical and Infiltration Evaluation (GeoTek, 2024). All conclusions, recommendations and limitations of the referenced report, except as amended in this report or future reports prepared by GeoTek for the project, remain valid and apply to this report.

The opportunity to be of continued service on this project is sincerely appreciated. If you should have any questions, please do not hesitate to call GeoTek's office.

Respectfully submitted,
GeoTek, Inc.

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Geotechnical Engineer

Attachment: Figure 1, Site Location Map
Figure 2, Site Plan

Distribution: (1) Addressee via email (one PDF file)

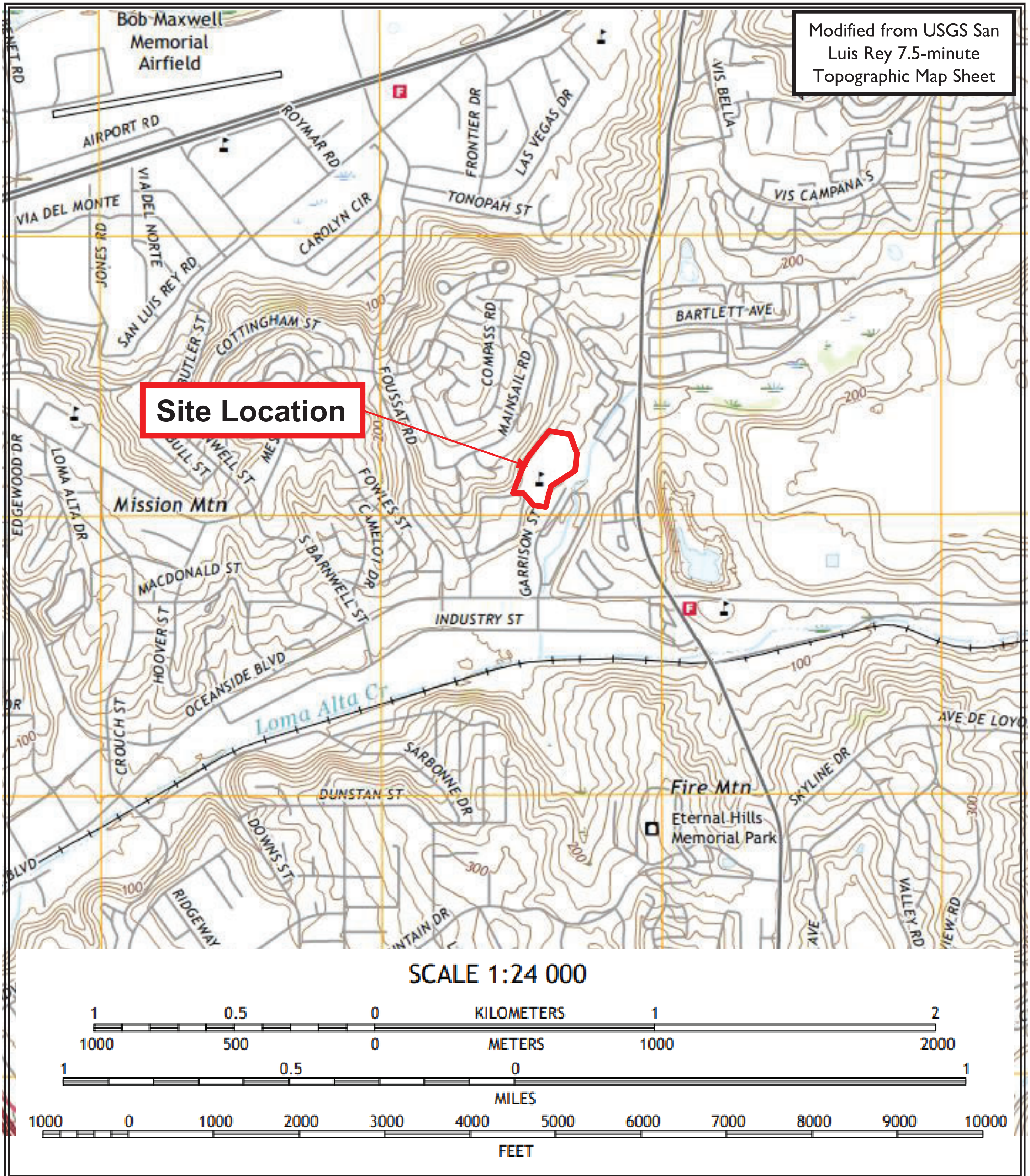
https://geotekusa.sharepoint.com/teams/Corona_Branch/Shared Documents/Projects/GeoTek Inc/3300/3346/GEO/Updates & Addendums/3346-CR Geotechnical Evaluation Update Garrison Street.docx

REFERENCES

GeoTek, Inc., 2024, “Geotechnical and Infiltration Evaluation, Proposed Garrison School Site Residential Development, APNs 162-020-24 and 161-030-14, 333 Garrison Street, Oceanside, San Diego County, California,” Project No. 3346-CR, dated June 24.

Hunsaker & Associates, Inc., 2024, “Conceptual Site Setbacks, Garrison Elementary School,” Sheet 12 of 13, WO# 3214-0002, Plot Dated November 8.

Ktgy, 2024, “Site Plan, Garrison Street Oceanside, CA”, plan dated November 25.



Modified from USGS San Luis Rey 7.5-minute Topographic Map Sheet

TTLC Management Inc. an Arizona Corporation
333 Garrison Street
Oceanside, San Diego County, California

Project No. 3346-CR

NORTH

Figure 1

Site Location Map

GEOTEK

Site Summary
Gross Site Area: ±8.3 Acres 3rd CHECK
Dwelling Units: 140 Units
Density: 17 du/ac
Lot Coverage: 31.0%

3 Story Townhomes A:

Plan	Type	Area	Quantity
P1	2 Bed/ 2.5 Bath	1319 sf Net	10 du
P2	2 Bed/ 2.5 Bath	1402 sf Net	10 du
P3	3 Bed/ 3 Bath	1371 sf Net	20 du
P4	3 Bed/ 3.5 Bath	1748 sf Net	20 du
P5	4 Bed/ 3.5 Bath	1849 sf Net	21 du
Total:			81 du

3 Story Townhomes A Building Summary:

Bldg #	Description	Quantity
B400	4-Plex	1
B700	7-Plex	3
B800	8-Plex	7

3 Story Townhomes B:

Plan	Type	Area	Quantity
P6	3 Bed/ 3.5 Bath	1766 sf Net	17 du
P7	4 Bed/ 3.5 Bath	1940 sf Net	20 du
P8	4 Bed/ 3.5 Bath	2102 sf Net	22 du
Total:			59 du

3 Story Townhomes B Building Summary:

Bldg #	Description	Quantity
B400	4-Plex	2
B500	5-Plex	3
B600	6-Plex	6

Parking Required:

2+ Bed: 140 x 2/du	280 Spaces
Guest: 140 x 0.2 + 1	29 Spaces
Total Required:	309 Spaces

Parking Provided:

Garages:	280 Spaces
Open parking:	38 Spaces
Total Provided:	318 Spaces (2.27/Unit)

Open Space Required:
140 du x 300 sf: 42,000 sf

Open Space Provided:

Private Townhome Balconies:	9,920 sf
Common Usable Open Space:	32,494 sf
Total:	42,414 sf
	303 sf / du

Additional Development Standards (RM-C)
Density Required: 15.1-20.9 du/ac
Density Provided: 17 du/ac

Setbacks Required: Front - 15', Side - 5'/10',
Corner Side - 10', Rear - 15'
Setbacks Provided: Front - 10' min., Side - 7' min.,
Corner Side - 10' min.,
Rear - 15' min.
Max Height: 36'-0
Max Height Provided: 35'-0"

NOTE: Buildings to be equipped with
NFPA 13D sprinkler systems

EV EV Space with Charger

ktgy

TRUE LIFE

GARRISON STREET OCEANSIDE
Oceanside, CA

NORTH 0 20 40 80

Schematic Design
NOVEMBER 25, 2024

SITE PLAN

A1.00

TTLC Management Inc.
333 Garrison Street
Oceanside, San Diego County, California

Project No. 3346-CR

NORTH

Figure 2:

Site Plan

GEOTEK

GEOTECHNICAL AND INFILTRATION EVALUATION
PROPOSED GARRISON SCHOOL SITE RESIDENTIAL DEVELOPMENT
APNs 162-020-24 AND 161-030-14
333 GARRISON STREET
OCEANSIDE, SAN DIEGO COUNTY, CALIFORNIA

PREPARED FOR

TTLC MANAGEMENT, INC. AN ARIZONA CORPORATION
4350 VON KARMAN AVENUE, SUITE 200
NEWPORT BEACH, CALIFORNIA 92660

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92878

PROJECT NO. 3346-CR JUNE 24, 2024

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
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June 24, 2024
Project No. 3346-CR

TTLC Management, Inc. an Arizona Corporation
4350 Von Karman Avenue, Suite 200
Newport Beach, California 92660

Attention: Mr. Michael Torres

Subject: **Geotechnical and Infiltration Evaluation**
Proposed Garrison School Site Residential Development
APNs 162-020-24 and 161-030-14
333 Garrison Street
Oceanside, San Diego County, California

Dear Mr. Torres:

GeoTek, Inc. (GeoTek) is pleased to provide the results of this Geotechnical and Infiltration Evaluation for the proposed residential development to be located at 333 Garrison Street, in the City of Oceanside, San Diego County, California. This report presents the results of GeoTek's evaluation, discussion of findings, and provides geotechnical recommendations for foundation design and construction.

Based upon review and evaluation, site development appears feasible from a geotechnical viewpoint provided that the recommendations included in this report are incorporated into the design and construction phases of the project.

The opportunity to be of service on this project is sincerely appreciated. If you should have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,
GeoTek, Inc.

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Distribution: (1) Addressee via email (one PDF file)

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Figure 2 – Exploration Location Map

Appendix A – Logs of Exploratory Borings
Appendix B – Results of Laboratory Testing
Appendix C – Percolation Test Data and Porchet Calculations
Appendix D – General Earthwork Grading Guidelines

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the geotechnical engineering and geologic conditions at the project site, as outlined in GeoTek's proposal P-0903322-CR, dated September 13, 2022. Services provided for this study included the following:

- Research and review of available geologic data and general information pertinent to the site,
- Site exploration consisting of the excavation, logging, and sampling of eight (8) exploratory test borings extending to depths ranging from about 14.5 to 51.5 feet below grade,
- Infiltration testing of four (4) additional test borings,
- Laboratory testing of soil samples collected during the field investigation,
- Review and evaluation of site seismicity, and
- Preparation of this geotechnical report which presents GeoTek's findings, conclusions, and recommendations for this site.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The approximate 11.14-acre site is addressed as 333 Garrison Street, in the City of Oceanside, San Diego County, California. The site is comprised of two (2) parcels of land identified as San Diego County Assessor's Parcel Numbers 162-020-24 and 161-030-14. The site is currently occupied by the former E. G. Garrison Elementary School, which has now been abandoned. Current site improvements include ten (10) classroom buildings, a miscellaneous-use building, paved parking and drive isle areas, as well as landscaping and hardscaping areas. GeoTek understands that a failed storm drain trends through the south-central portion of the site and was utilized for the now abandoned elementary school. The eastern portion of the site is vacant of structures and appears to have been utilized for sporting fields.

The site is in an area largely characterized by residential development. The site is bordered by vacant land and residential tract development to the north; Garrison Street, followed by a drainage channel and multi-family residential development to the east; La Cresta Drive and multi-family residential development to the south; and a large fill slope, followed by a single-family residential tract development to the west.

Topographically, the site has relatively flat terrain with surface drainage being directed to the southwest by sheetflow. The elevation of the northern portion of the site is approximately 117 feet with approximately 30 feet of elevation differential across the site.

2.2 PROJECT DESCRIPTION

Based on the *Proposed Site Plan* prepared by Urban Area and dated August 4, 2022, it is proposed to construct a residential development, community open space and swimming pool area and associated utility/street improvements. Currently, 46 single-family residences and 14 multi-family buildings consisting of 95 total units are proposed.

GeoTek has assumed that the single-family structures will be wood-framed, one- to two-stories in height and that the structures will be supported by conventional shallow spread footings. It is assumed that the multi-family structures will likely be wood-framed and/or masonry-framed, one- to three-stories in height and that the structures will also be supported by conventional shallow spread footings. For the purposes of this report, it is assumed maximum column and wall loads will be about 75 kips and 3.5 kips per foot, respectively.

Based upon existing site topograpy and anticipated site grading, grading of the site will involve cuts and fills of less than ten feet in height, not including any recommended remedial grading. Low (less than five feet in height) site retaining walls are anticipated as part of the project development. Sewage disposal is anticipated to be be provided by a public swer system. If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation.

3. FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The field exploration for this report was conducted on October 12, 2022 and consisted of excavating eight (8) geotechnical exploratory test borings with a hollow-stem drill rig to depths ranging from about 14.5 to 51.5 feet below grade. The approximate locations of the GeoTek excavations are shown on the Exploration Location Map (Figure 2). An engineer from GeoTek logged the excavations and collected earth material samples for use in subsequent laboratory testing. The logs of the exploratory borings are included in Appendix A.

Bulk and relatively undisturbed soil samples were recovered at various intervals in the geotechnical borings with a California sampler. The California sampler is a 3-inch outside diameter, 2.5-inch inside diameter, split barrel sampler lined with brass rings. The sampler was 18 inches long. The sampler conformed to the requirements of ASTM D 3550. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. The relatively undisturbed samples, together with bulk samples of representative soil types, were returned to the laboratory for testing and evaluation. The California sampler test data are presented on the boring logs in Appendix A.

In Boring B-1, Standard Penetration Tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was approximately 18 inches in length. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 160-pound automatic trip hammer was utilized, dropping approximately 30 inches for each blow. The sampler penetration test data are presented on the Log for Boring for Boring B-1 in Appendix A.

Infiltration Testing

Four (4) infiltration tests (Tests I-1 through I-4) were conducted on the project site to review the infiltration potential of the site soils. Infiltration testing was conducted in these borings in general accordance County of San Diego guidelines. The infiltration tests consisted of drilling eight-inch diameter test holes to the desired depth and installing approximately two inches of gravel in the bottom of the holes. A three-inch diameter perforated PVC pipe, wrapped in a filter sock, was placed in the excavations and the annular space was filled with gravel to prevent caving within the drill holes. Water was then placed in the bores to presoak the holes and percolation testing was performed following the pre-soak period. Following presoaking, the percolation tests were performed which consisted of adding water to each test hole and measuring the water drop over a 30-minute period. The water drop was recorded for twelve test intervals, depending upon the measurement time. The field percolation rates were then converted to an infiltration rate using the Porchet Method. The infiltration rates calculated using the Porchet Method are presented in the following table:

SUMMARY OF INFILTRATION RATES		
Boring	Depth of Test (Feet)	Infiltration Rate (Inches per hour)
I-1	10.0	0.09
I-2	10.0	0.91
I-3	10.0	0.09
I-4	10.0	0.04

Copies of the percolation data sheets and the Porchet infiltration rate conversion calculations are presented in Appendix C. No factors of safety were applied to the rates provided. Over the lifetime of the infiltration areas, the infiltration rates may be affected by sediment build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rate in designing the infiltration system.

Infiltration rates appear to be poor for the subject site. It is GeoTek's opinion that due to subsurface soil conditions, infiltration is likely to be infeasible for this site.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed on-site soils. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates may be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

3.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively undisturbed ring and bulk samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the materials encountered and to evaluate their physical properties for use in the engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included on the exploratory borings logs included in Appendix A.

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The subject property is located in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends roughly 975 miles from the north and northeasterly adjacent the Transverse Ranges geomorphic province to the peninsula of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zones trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province. The closest known active fault is the Newport-Inglewood-Rose Canyon Fault Zone located approximately seven miles southwest of the site. No faults are shown in the immediate site vicinity on the map reviewed for the area.

4.2 GENERAL SOIL CONDITIONS

A brief description of the earth materials encountered is presented in the following section. Based on the site reconnaissance, the exploratory excavations and review of published geologic maps, the area investigated is generally underlain by artificial fill and/or alluvium underlain by sedimentary bedrock.

4.2.1 Artificial Fill

Asphalt concrete (AC) pavement was encountered at the surface of the borings located within the existing school site. Undocumented fill was encountered at the surface in all of the exploratory borings. The fill ranged from approximately 1 foot to approximately 2.5 feet below existing grade in the areas encountered. Additional areas and greater depths of fill may be present within unexplored areas of the site. The fill encountered in the test borings generally consisted of silty sands and clayey sand (SM and SC soil type based upon the Unified Soil Classification System). This fill was likely placed during the original grading of the school.

4.2.2 Alluvium

Alluvium was encountered in the borings beneath the fill soils. These soils extended to depths ranging from approximately 1 to 38.5 feet below existing grade. The depth of the alluvium appears thickest in the southern and southeastern portions of the site and thinnest in the northwestern portion of the site. As encountered in the borings, the alluvium consisted of interbedded layers of silty sands, clayey sands, relatively clean sands, sandy silts and sandy and silty clays (SM, SC, SP, ML and CL soil types).

Based on the laboratory test results, the near surface soils have a "low" expansion index potential (ASTM D 4829). Based on the laboratory test results, the near surface soils have a soluble sulfate content of less than 0.1 percent (ASTM D 4327). Based upon the collapse tests performed, the upper approximate three to four feet of the site soils (undocumented fill) are anticipated to have a moderate to high potential for hydroconsolidation (settlement due to the addition of water with or without additional loading). The test results are provided in Appendix B.

4.2.3 Silverado Formation Sedimentary Bedrock

Silverado Formation sedimentary bedrock was encountered at depth in Borings B-1, B-3, B-4 and B-7. The sedimentary bedrock was shallowest in Boring B-4 (approximately 2.5 feet below the existing ground surface) and deepest in Boring B-1 (39.5 feet). The bedrock consists predominately of sandy siltstones and sandstones. Where encountered, the bedrock was found to be highly weathered at the soil/bedrock contact but becomes less weathered with depth. The bedrock had laminated to thin bedding planes where encountered.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

If encountered during earthwork operations, surface water on this site is likely the result of precipitation or possibly some minor surface run-off from the surrounding areas. Overall site area drainage varies due to the site topography and existing improvements. Provisions for surface drainage will need to be accounted for by the project civil engineer.

4.3.2 Groundwater

Groundwater was encountered within Boring B-1 at a depth of approximately 33.5 feet below the existing ground surface. This groundwater is considered to be perched above the underlying sedimentary bedrock. Groundwater was not encountered in any other boring.

Due to the depth to groundwater, it is unlikely that groundwater will be encountered during grading. However, it is possible for perched groundwater to occur in areas of the project site that are underlain by shallow bedrock. If encountered during grading, dewatering may be necessary. The possibility of encountering localized areas of groundwater during grading should be considered and accounted for by the project civil engineer.

4.4 FAULTING AND SEISMICITY

4.4.1 Faulting

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone or a Special Studies Zone (Bryant and Hart, 2007). No faults transecting the site were identified on the readily available geologic maps reviewed. The nearest known active fault is the Newport Inglewood-Rose Canyon Fault located about seven miles to the southwest of the site.

4.4.2 Seismic Design Parameters

The site is located at approximately 33.2059 degrees West Latitude and 117.3373 degrees North Longitude. Due to the depth of relatively shallow bedrock beneath the site, a Site Class "C" is considered appropriate for this site. Site spectral accelerations (S_a and S_1) for 0.2 and 1.0 second periods for a Class "C" site were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. These values are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	0.971g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.357g
Site Coefficient for Site Class "C", F_a	1.2
Site Coefficient for Site Class "C", F_v	1.5
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.166g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.536g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	0.777g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.357g
Peak Ground Acceleration (PGA_M)	0.507g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

4.5 LIQUEFACTION

Liquefaction describes a phenomenon in which cyclic stresses, produced by earthquake-induced ground motion, create excess pore pressures in relatively cohesionless and some low-plastic silt and clay soils. These soils may thereby acquire a high degree of mobility, which can lead to lateral movement, sliding, settlement of loose sediments, sand boils and other damaging deformations. This phenomenon occurs only below the water table, but, after liquefaction occurs, the liquefied soil/water matrix can propagate upward into overlying non-saturated soil as excess pore water dissipates.

The factors known to influence liquefaction potential include soil type and grain size, relative density, plasticity, groundwater level, confining pressures, and both intensity and duration of ground shaking. In general, materials that are susceptible to liquefaction are loose, saturated granular soils having low fines content under low confining pressures and some low plastic silts and clays.

Due to the presence of relatively dense alluvium and relatively shallow bedrock, the liquefaction potential for this project is considered low. Due to the dense and clayey nature of the subsurface soils and presence of relatively shallow bedrock, seismic induced ("dry sand") settlements are estimated to be minimal within the areas of alluvium.

4.6 OTHER SEISMIC HAZARDS

Evidence of landslides or slope instabilities at the subject site was not observed during this investigation. However, the northwest portion of the site is regionally geologically mapped as the "toe" of landslide deposits that descend from the adjacent properties/slope to the west (Kennedy, M.P., Tan, S.S., Bovard, K.R., Alvarez, R.M., Watson, M.J., and Gutierrez, C.I., 2007). Based upon review of aerial imagery, the adjacent properties to the west are comprised of a residential tract development with what appears to be a large engineered slope descending to the subject site. The landslide deposits on the descending slope appear to have been mitigated by means of industry standard slope grading and benching, "v"-ditch construction and surficial landscaping.

The potential for secondary seismic hazards such as tsunami is considered negligible due to site elevation and distance from the Pacific Ocean. The potential for secondary seismic hazards such as seiche is considered remote due to the site elevation and distance to an open body of water.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

The anticipated site development appears feasible from a geotechnical viewpoint provided that the following recommendations, and those provided by this firm at a later date, are incorporated into the design and construction phases of development. Site development, grading and foundation plans should be reviewed by GeoTek, Inc. when they become available so the recommendations contained in this report can be confirmed.

The on-site soils exhibit a "low" expansion potential. Expansion index testing should be conducted at the completion of earthwork operations to verify this soil parameter.

Deposits of undocumented fill soils were encountered in the explorations. Some of these soils were tested to have a moderate to high potential for hydroconsolidation (settlement due to the addition of water with or without additional loading). In addition, the upper site soils are anticipated to be disturbed by the demolition of existing site structures and underground utilities. Deeper deposits of undocumented fill may be present in areas that were not explored. Remedial grading, consisting of overexcavation and recompaction of the upper site soils, is recommended to provide a uniform bearing for the proposed structures. GeoTek understands that a failed storm drain trends through the central portion of the site in the northern portion of the school site which will require repair, removal and/or replacement.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the County of San Diego, City of Oceanside and the 2022 California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix D outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix D.

5.2.2 Site Clearing

Initial site preparation should commence with removal of existing structures, underground utilities, slabs, pavements, debris, deleterious materials and vegetation within the limits of the planned improvements. The exact locations of underground utilities are not known. As previously discussed, exiting structures are present in the school portion of the site. GeoTek understands that a failed storm drain trends through the central portion of the site in the northern portion of the school site which will require repair, removal and/or replacement. Any site clearing and demolition materials should be properly disposed of off-site. Voids resulting from removing any materials should be replaced with engineered fill materials with expansion characteristics similar to the onsite materials.

5.2.3 Site Preparation

Building Areas

Due to the non-uniform nature, thickness and hydroconsolidation potential of the near-surface artificial fill and alluvium, as well as the anticipated disturbance of the upper site soils to the demolition of existing structures and utilities, it is recommended that the soils be removed beneath the planned building footprints of the proposed structures to a depth of at least 5 feet below existing grade, or three (3) feet beneath the base of the proposed foundations, whichever is greater. Removal bottoms should be relatively uniform in soil type which is not visibly porous and having an in-place density of at least 85 percent of the soil's maximum dry density as determined by ASTM D 1557 test procedures. A representative of this firm should observe and approve the bottom of all remedial excavations. The lateral extent of this recommended over-excavation should extend at least 5 feet beyond the building or foundation limits.

Following site clearing operations, over-excavation and lowering of site grades, where necessary, it is recommended that the exposed subgrade soils beneath all surface improvements be proof rolled with a heavy rubber-tired piece of construction equipment approved by and in the presence of the geotechnical engineering representative. The proof rolling equipment should possess a minimum weight of 15 tons and proof rolling should include at least 4 passes, two in each perpendicular direction. All soil that ruts or excessively deflects during proof rolling should be removed as recommended by the GeoTek representative. Following proof rolling and removal of any unsuitable bearing soil, the exposed subgrade should be scarified to a depth of about 12 inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density as determined by ASTM D-1557 test procedures.

Pavement Areas

Undocumented fill should be removed below proposed pavement areas. If no undocumented fill is encountered or is relatively shallow, the natural soils should be overexcavated to a depth of 12 inches below existing grade or 12 inches below proposed finished grade, whichever is deeper. Finished grade is defined as the top of the subgrade. The exposed soils in these areas and in cut areas should be scarified to a depth of approximately eight inches, moistened to at least the optimum moisture content and compacted to a minimum relative compaction of at least 95 percent of maximum dry density as determined by ASTM D 1557 test procedures.

Hardscape Areas

Undocumented fill should be removed below hardscape areas. The exposed soils in these areas and in cut areas should be scarified to a depth of approximately eight inches, moistened to at least the optimum moisture content and compacted to a minimum relative compaction of at least 90 percent of maximum dry density as determined by ASTM D 1557 test procedures.

5.2.4 Engineered Fill

The on-site soils are generally considered suitable for reuse as engineered fill provided they are free from vegetation, debris, oversized materials (~6 inches) and other deleterious material. All areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in 6-to-8-inch loose lifts, moisture conditioned to slightly above the optimum moisture content and compacted to a minimum relative compaction of 90 percent as determined by ASTM D-1557 test procedures.

If wet soils are encountered during remedial grading, methods for drying soils such as stockpiling or mixing with dry soils may be required to bring the soils to the required moisture content for placement as engineered fill. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

5.2.5 Transition Lot Condition

Building pads graded with a cut/fill transition should be undercut to reduce the potential for differential settlement. The cut portion of the cut/fill transition should be undercut to a depth of at least 3 feet or two (2) feet below the deepest proposed footing, whichever is deeper, and be backfilled with a properly compacted engineered fill. The bottom of the undercut should be sloped at a minimum of 1 percent toward the adjacent street area.

5.2.6 Oversized Rock Disposal

Oversized cobbles, boulders and rock fragments may be encountered during rough grading and utility trench operations, especially if bedrock is encountered. On-site disposal of oversized materials is possible, provided the oversized materials are placed as recommended on Plate D-4 within Appendix D. Alternatively, oversized materials can be exported from the site.

5.2.7 Excavation Characteristics

Excavations in the on-site alluvium, fill and upper sedimentary bedrock should be readily accomplished with heavy-duty earthmoving or excavating equipment in good operating condition. All excavations should be formed in accordance with current Cal-OSHA requirements.

Some excavation difficulties should be anticipated for any deep excavations into the on-site bedrock. "Overbreak" (shattering) of deep utility trench excavations into the bedrock should be anticipated. Dependent upon the depth of excavations, specialized equipment and/or techniques may be necessary.

5.2.8 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at a 1:1 inclination for short durations during construction and where cuts do not exceed 15 feet in height. Deeper temporary excavations should be reviewed by GeoTek prior to their planned excavation to determine if supplemental recommendations or analysis are warranted. It is anticipated that temporary cuts to a maximum height of 4 feet can be excavated vertically.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined by ASTM D-1557 test procedures). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than 6 inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be properly moisture conditioned prior to placement in trenches.

5.2.9 Shrinkage and Bulking

For planning purposes, a shrinkage loss of about 10 to 15 percent is anticipated for excavations within the artificial fill and upper alluvium at the site that are removed and placed as compacted fill. A bulking factor of up to 10 percent should be considered for excavations extending into the underlying sedimentary bedrock. Demolition of existing site structures, pavements, and utility lines will increase site earthwork losses and need to be accounted for.

Several factors will impact earthwork balancing on the site, including shrinkage, trench spoil from utilities and footing excavations, as well as the accuracy of topography. Shrinkage and bulking are primarily dependent upon the degree of compactive effort achieved during construction, depth of fill and underlying site conditions.

Due to the presence of relatively shallow bedrock and dense alluvium, subsidence is not anticipated to be a factor.

Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of earthwork construction.

5.2.10 Grading Plan Review

Upon completion of the site grading plans, it is recommended that those plans be provided to GeoTek for review. Based on that review, some modifications to the recommendations provided in this report may be necessary.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundation Design Criteria

The earth materials anticipated to be utilized in the site grading operations are predominantly granular soils, or bedrock that excavates as granular soils, and anticipated to possess a “low” (21≤EI≤50) expansion index in accordance with ASTM D 4829. However, based on GeoTek’s experience with nearby projects soils, soils that possess a “medium” (51≤EI9̲50) expansion index may be possible. Laboratory testing should be performed at the completion of site grading to verify the expansion index of the near-surface soils.

Foundation design criteria, in general conformance with the 2022 CBC, are presented below. The recommendations provided are minimal and are not intended to supersede the design by the project structural engineer. It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

The foundation elements for the proposed structures should bear entirely in engineered fill soils as recommended in this report. Foundations should be designed in accordance with the *2022 California Building Code* (CBC). A summary of the foundation design recommendations is presented in the following table:

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALLY REINFORCED FOUNDATIONS		
Design Parameter	"Low" Expansion Index (21≤EI≤50)	"Medium" Expansion Index (51≤EI≤90)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- and two-story – 12 Three-story – 18	One- and two-story – 18 Three-story – 24
Minimum Foundation Width (Inches)*	One-story – 12 Two-story – 12 Three-story – 15	One-story – 12 Two-story – 15 Three-story – 18
Minimum Slab Thickness (Inches)	4 – Actual	4 – Actual
Minimum Slab Reinforcing	6" x 6" – W2.9/W2.9 welded wire fabric or No. 3 reinforcing bars placed at 24 o.c. each way placed in middle of slab	No. 3 reinforcing bars placed at 18 o.c. each way or No. 4 reinforcing bars placed at 24 o.c. each way placed in middle of slab
Minimum Reinforcement for Continuous Footings, Grade Beams, and Retailing Wall Footings	Two No. 4 reinforcing bars, one placed near the top and one near the bottom	Two No. 4 reinforcing bars, one placed near the top and one near the bottom
Presaturation of Subgrade Soil (Percent of Optimum/Depth in Inches)	Minimum 110% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete	Minimum of 120% of the optimum moisture content to a depth of at least 18 inches prior to placing concrete

*Code minimums per Table 1809.7 of the 2022 CBC should be complied with.

In general, an allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This value may be increased by 300 psf for each additional 12 inches in depth and 300 psf for each additional 12 inches in width to a maximum value of 3,000 psf.

Additionally, an increase of one-third may be applied when considering short-term live loads (e.g., seismic and wind loads).

The recommended allowable bearing capacity is based on an estimated maximum post-construction settlement of 1-inch. Differential settlement of about one-half of the total settlement over a horizontal distance of 40 feet could result. Seismically induced settlement is also expected to be approximately less than 1/2-inch total and 1/4-inch differential settlement over a horizontal distance of 40 feet. The project structural engineer, foundation engineer, and earth retention structure designer should incorporate these settlement estimates into the design, as appropriate.

For resistance to lateral loads, an allowable passive earth pressure equivalent to a fluid density of 350 pounds per cubic foot (pcf) is recommended assuming that (1) there is constant contact between the footing and soil, (2) passive pressure does not exceed maximum total resistance of 3,500 psf, (3) the upper one foot of soil below the adjacent grade is not used in calculating passive pressure, and (4) the footings are fully founded in engineered fill. An allowable passive earth pressure equivalent to a fluid density of 250 pcf is recommended for footings on 2:1 sloping ground.

Full friction and passive resistance can be combined to resist lateral loads provided that the passive pressure component is reduced by one-third. An allowable friction coefficient of 0.35 with dead load forces may be used for resistance sliding between soil and concrete.

A grade beam, 12 inches wide by 12 inches deep (minimum), should be utilized across large openings (garages). The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

It is recommended that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural/civil engineer.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g., stake penetrations, tears, punctures from walking on the vapor retarder placed atop the underlying aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a 6-mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10 mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. The membrane should consist of Stego wrap or the equivalent.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limited migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired performance level.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarder systems should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, architect, and/or other experts specializing in moisture control within the building be consulted to evaluate the general and specific moisture and vapor transmission paths and associated potential impact on the proposed construction. That person (or persons) should provide recommendations relative to the slab moisture and vapor retarder systems and for migration of potential adverse impact of moisture vapor transmission on various components of the structures, as deemed appropriate.

In addition, the recommendations in this report and GeoTek's services in general are not intended to address mold prevention; since GeoTek, along with geotechnical consultants in general, do not practice in the area of mold prevention. If specific recommendations addressing potential mold issues are desired, then a professional mold prevention consultant should be contacted.

5.3.1 Miscellaneous Foundation Recommendations

5.3.1.1 To reduce moisture penetration beneath the slab on grade areas, utility trench excavations should be backfilled with engineered fill, lean concrete or concrete slurry where they intercept the perimeter footing or thickened slab edge.

5.3.1.2 Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

5.3.2 Foundation Setbacks

Minimum setbacks for all foundations should comply with the 2022 CBC, San Diego County or City of Oceanside requirements, whichever is more stringent. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The top outside edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least five feet and need not exceed 40 feet.

5.3.3 Soil Corrosivity

The soil resistivity at this site was tested in the laboratory on one (1) soil sample collected during the field investigation. The results of the testing indicate that the on-site soils are considered to "highly corrosive" (2,747 ohm-cm) (Roberge, 2000) to buried ferrous metal in accordance with current standards used by corrosion engineers. It is recommended that a corrosion engineer be consulted to provide recommendations for the protection of buried ferrous metal at this site.

5.3.4 Soil Sulfate Content

The sulfate content was determined in the laboratory on one (1) sample collected during the field investigation. The results indicate that the soil water-soluble sulfate content is less than 0.1 percent by weight, which is considered "negligible" as per Table 4.2.1 of ACI 318. Based on the test results and Table 4.3.1 of ACI 318, no special recommendations for concrete are required for this project due to soil sulfate exposure.

5.4 RETAINING AND GARDEN WALL DESIGN AND CONSTRUCTION

5.4.1.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical retaining walls to a maximum height of up to six (6) feet. Additional review and recommendations should be requested for higher walls. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Retaining wall foundations should be embedded a minimum of 18 inches into engineered fill. Retaining wall foundations should be designed in accordance with Section 5.3 of this report. Structural needs may govern and should be evaluated by the project structural engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 5.2.4 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the earth retention structure, may be designed using the "active" condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the "at-rest" condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (horizontal : vertical) projection from the surcharge on the stem of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

5.4.1.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to six (6) feet high. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, seismic events, or adverse geologic conditions.

ACTIVE EARTH PRESSURES

Surface Slope of Retained Materials (horizontal : vertical)	Equivalent Fluid Pressure (pcf) Select Backfill* and Native Soils
Level	44
2:1	74

*The design pressures assume the backfill material has an expansion index less than or equal to 20. Backfill zone includes area between back of the wall to a plane (1:1 horizontal : vertical) up from bottom of the wall foundation (on the backside of the wall) to the ground surface.

For walls with a retained height greater than 6 feet, an incremental seismic pressure should be included into the wall design. Where needed, it is recommended that an equivalent fluid pressure of 16 pcf be included in the wall design to account for seismic loading conditions. This pressure may be applied as a triangular distribution.

5.4.1.3 Retaining Wall Backfill and Drainage

The wall backfill should also include a minimum one (1) foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The upper 24 inches should consist of compacted on-site materials. The rock should be separated from the earth with filter fabric. The presence of other materials might necessitate revision of the parameters provided and modification of the wall designs. The backfill materials should be placed in lifts no greater than eight (8) inches in thickness and compacted to a minimum of 90% relative compaction as determined by ASTM D 1557 test procedures. Proper surface drainage needs to be provided and maintained.

As an alternative to the drain, rock and fabric, a pre-manufactured wall drainage product (example: Mira Drain 6000 or approved equivalent) may be used behind the retaining wall. The wall drainage product should extend from the base of the wall to within two (2) feet of the ground surface. The subdrain should be placed in direct contact with the wall drainage product.

Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four (4)-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one (1) cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the walls is undesirable.

5.4.1.4 Restrained Retaining Walls

Retaining walls that will be restrained at the top that support level backfill or that have reentrant or male corners, should be designed for an equivalent at-rest fluid pressure of 65 pcf, plus any applicable surcharge loading. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

5.4.1.5 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

5.5 PRELIMINARY PAVEMENT DESIGN RECOMMENDATIONS

5.5.1 Asphaltic Concrete Pavement

Although planned final grades beneath the street improvements within the site are not yet known, the following preliminary pavement design recommendations are based on a Traffic Index (TI) of 5.0 for Local Streets and a TI of 6.0 for Local Collectors as designated by the City of Oceanside (Table A). Preliminary pavement thickness design is based on the CalTrans Highway Design Manual (2018). An R-value of 20 has been assumed for the preliminary design of the project pavement sections. Once the traffic loading information becomes more defined, revision to the pavement design recommendations may be warranted. It is recommended that the final pavement design be based on R-value testing of the as-graded subgrade soils within the pavement areas.

Based on the assumptions noted above the following preliminary pavement recommendations are provided for the site:

PRELIMINARY MINIMUM PAVEMENT SECTION		
Traffic Index	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
5.0	3.0*	8.0
6.0	4.0*	9.0

*City of Oceanside minimum requirement.

Traffic Indices (TIs) used in the pavement design are designated by the City of Oceanside and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

All base material and the upper 12 inches of subgrade should be compacted to at least 95 percent of the material's maximum dry density as determined by ASTM D 1557 test procedures. All materials and methods of construction should conform to the requirements of the City of Oceanside.

5.5.2 Permeable Interlocking Concrete Pavers

Interlocking concrete pavers can be used for this project. The pavers are assumed to be approximately 3.2 inches (80 millimeters) in thickness. Concrete pavers should be underlain by 1.0 inch to 1.5 inches of bedding sand overlying four inches of aggregate base founded on compacted subgrade soils. The aggregate base should be compacted to at least 95 percent of maximum dry density as determined by ASTM D 1557 test procedures.

Where possible, the aggregate base should extend beyond the perimeter of the pavers a minimum distance of four inches.

The bedding sand should be placed, lightly moistened and compacted. Since this compaction cannot be tested it should be observed by a representative of this firm.

Historically, paver systems have experienced failures in areas where water has degraded the support characteristics of the underlying base and/or subgrade soils. Since paver systems are permeable and allow transmission of water into the underlying materials, it may be prudent to discuss with the paver designer/manufacturer what methods may be employed to address the issue of potential water introduction into the underlying materials. Underdrain systems, local subgrade reinforcement, or additional structural elements such as geotextiles can be considered, particularly in high traffic areas and/or low areas where water will tend to collect. The recommendations of the designer/manufacturer should then be implemented in the design and construction of the paver system.

5.5.3 Portland Cement Concrete (PCC) Pavement

For the proposed vehicle parking and access lanes, it is recommended that a minimum of 5.0 inches of PCC pavement overlying four inches of aggregate base over 12 inches subgrade compacted to at least 95 percent of maximum dry density as determined by ASTM D 1557 test procedures be utilized. For vehicle service lanes, it is recommended that a minimum of six inches of PCC pavement over overlying four inches of aggregate base over 12 inches subgrade compacted to at least 95 percent of maximum dry density be utilized. This section should also be used in heavy truck traffic areas such as fire lanes, trash dumpster pads and approaches.

Requirements of Section 90 of Caltrans Standard Specifications, and various ACI and ASTM standards regarding mixing and placing concrete should be followed. The PCC pavement should have a minimum modulus of rupture of 500 pounds per square inch, and a minimum 28-day compressive strength of 4,000 pounds per square inch. Concrete should incorporate 1-inch maximum size aggregate and should be proportioned to achieve a maximum slump of four inches. Instead of increasing the water content, a plasticizing admixture may be utilized to increase the workability of the concrete. The concrete should be properly cured after placement. Concrete should not be placed during hot and windy weather.

Crack control joints should be provided in the transverse direction spaced at horizontal intervals ranging from 24 to 36 times the thickness of the concrete.

5.5.4 Pavement Construction

All pavement installation, including preparation and compaction of subgrade and base material, placement and rolling of asphaltic concrete and placement of concrete pavement, should be done in accordance with the City of Oceanside or County of San Diego guidelines, and under the observation and testing of GeoTek and a City/County inspector, where required.

Any aggregate base should consist of crushed rock with an R-Value and gradation in accordance with Crushed Aggregate Base (Section 400-2.4 of the "Greenbook" Regional Supplement Amendments). Minimum compaction requirements should be 95 percent of maximum dry density as determined by ASTM D 1557 test procedures for both soil subgrade and aggregate base. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern. The upper 12 inches of subgrade should be moisture-conditioned to at least optimum moisture.

The top of the subgrade and aggregate base should be graded to drain to the perimeter of the pavement.

5.6 CONCRETE CONSTRUCTION

5.6.1 General

Concrete construction should follow the 2022 CBC and ACI guidelines regarding design, mix placement and curing of the concrete. If desired, GeoTek could provide quality control testing of the concrete during construction.

5.6.2 Concrete Mix Design

As discussed in Section 5.3.5, no special recommendations for concrete are required for this project due to soil sulfate exposure. Additional testing should be performed during grading so that specific recommendations can be formulated based on the as-graded conditions.

5.6.3 Concrete Flatwork

Exterior concrete flatwork is often one of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. Cracking of these features is common due to various factors. While cracking usually does not affect the structural performance of the concrete, it is unsightly. It is recommended that the same standards of care be applied to these features as to the structure itself.

Flatwork should consist of a minimum four-inch (actual) thick concrete and the use of temperature and shrinkage control reinforcement is suggested. The project structural engineer should provide final design recommendations.

5.6.4 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are hairline to more than 1/8 inch in width. Most cracks in concrete while unsightly do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete undergoes chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance approximately equal to 24 to 36 times the slab thickness.

5.7 POST CONSTRUCTION CONSIDERATIONS

5.7.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundations. This type of landscaping should be avoided. Planters within 30 feet of the buildings should be above ground and underlain by a concrete slab. Waterproofing of the foundation and/or subdrains may be warranted and advisable. GeoTek could discuss these issues, if desired, when plans are made available.

5.7.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings and floor-slabs. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

Roof gutters should be installed that will direct the collected water at least 20 feet from the buildings.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

5.8 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

It is recommended that site grading, specifications, and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. It is also recommended that GeoTek representatives be present during site grading and foundation construction to observe and document for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of all unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement, including utility trench excavation backfill. Also, test the fill for density, relative compaction and moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials with respect to density.

If requested, a construction observation and compaction report can be provided by GeoTek which can comply with the requirements of the governmental agencies having jurisdiction over the project. It is recommended that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

6. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of GeoTek's evaluation is limited to the area explored that is shown on the Exploration Location Map (Figure 2). This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to GeoTek by the client. Further, no evaluation of any existing site improvements is included. The scope is based on GeoTek's understanding of the project and the client's needs, GeoTek's proposal (Proposal No. P-0903322-CR) dated September 13, 2022 and geotechnical engineering standards normally used on similar projects in this region.

7. LIMITATIONS

GeoTek's findings are based on site conditions observed and the stated sources. Thus, GeoTek's comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering at this time and location and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since the recommendations contained in this report are based on the site conditions observed and encountered and laboratory testing, the conclusions and recommendations are professional opinions that are limited to the extent of the available data. Thus, GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty of any kind is expressed or implied. Standards of care/practice are subject to change with time.

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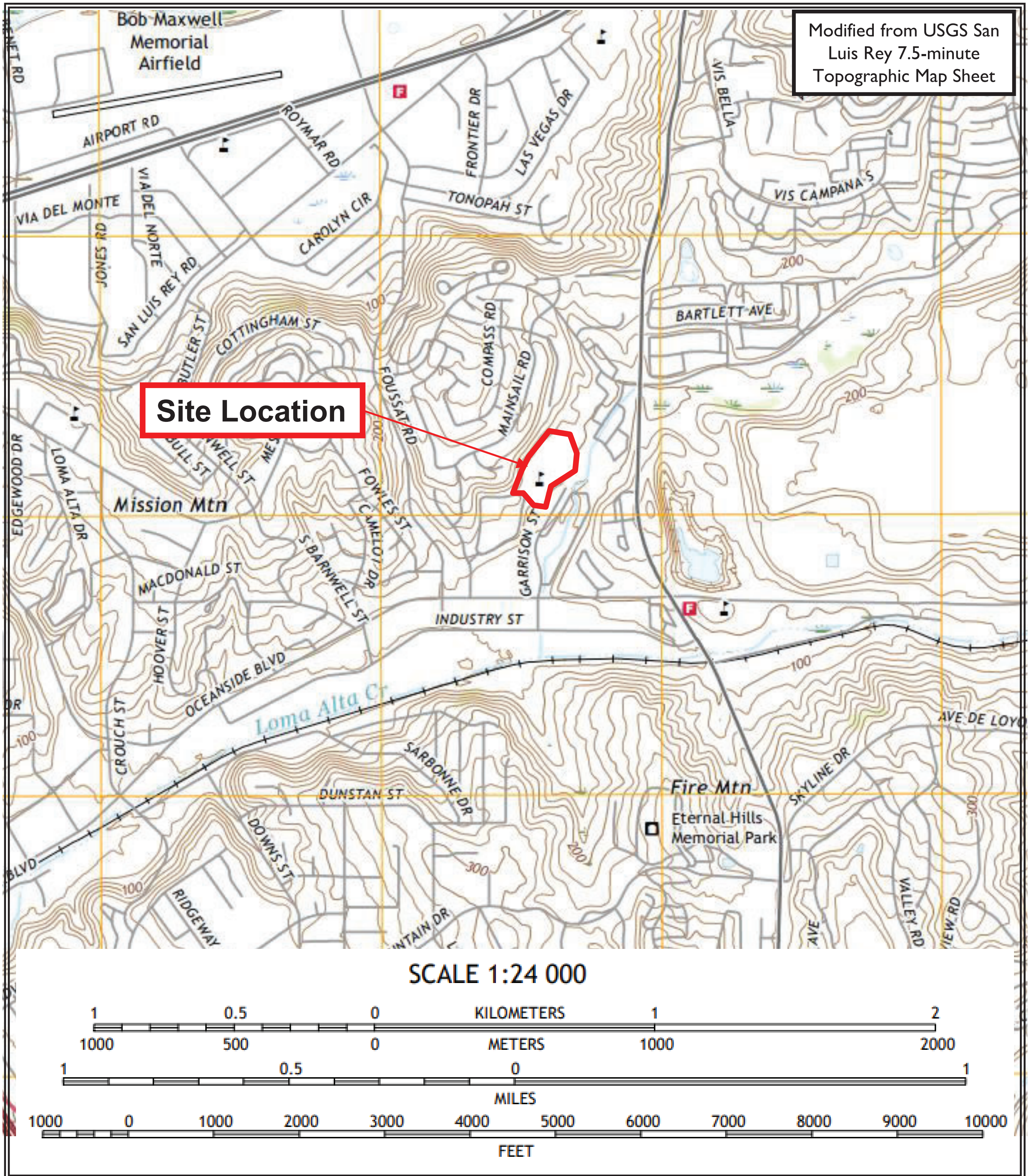


Modified from USGS San Luis Rey 7.5-minute Topographic Map Sheet

TTLC Management Inc. an Arizona Corporation
333 Garrison Street
Oceanside, San Diego County, California

Project No. 3346-CR

NORTH

Figure 1

Site Location Map

GEOTEK

TTLC Management Inc. and Arizona Corporation
333 Garrison Street
Oceanside, San Diego County, California

Project No. 3346-CR

NORTH

Figure 2

Exploration Location Map

GEOTEK

APPENDIX A

LOG OF EXPLORATORY BORINGS

Proposed Garrison School Site Residential Development
333 Garrison Street
Oceanside, San Diego County, California
Project No. 3346-CR

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The Ring sampler is driven into the ground at various depths in accordance with ASTM D 3550 test procedures. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Standard penetration tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was 18 inches long. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 160-pound automatic trip hammer was utilized, dropping 30 inches for each blow. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. Disturbed samples are removed from the sample barrel, sealed in a plastic bag, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)

These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B - BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the log of borings:

SOILS	
USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium
GEOLOGIC	
B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
━━━	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the boring logs)

LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Boring No.: B-1

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
0					**6" Asphaltic Concrete:**			
	☒				**Undocumented Fill:**			
	■	11 10 10	R1	SP-SM	**Alluvium:** f-m SAND, light brown, moist, medium dense, trace clay	7.0	113.3	
5	■	13 17 19	R2		less clay			Collapse
	■	10	R3	CL	silty CLAY, light brown, moist, stiff			
		15		SC	clayey f-m SAND, light brown, moist, medium dense	10.1	115.5	
		20		CL	f-m sandy CLAY, light brown, moist, very stiff			
10	■	9 14 19	R4		f sandy CLAY, light brown, moist, very stiff			
15	■	13 16 20	R5		f sandy to silty CLAY, light brown, moist, very stiff	95.4	26.1	
20	■	9 15 22	R6		f-m sandy CLAY, light brown, moist, very stiff becomes reddish-brown	105.5	11.5	
25	▮	3 4 4	S1		f sandy CLAY, light brown, very moist, stiff, trace oxidation staining			
30	▮	4 9 9	S2	SM	silty f-m SAND, greyish-brown, very moist, medium dense, trace oxidation staining, little clay		18.2	

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ≚ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: TTLC Management, Inc.
PROJECT NAME: 333 Garrison Street
PROJECT NO.: 3346-CR
LOCATION: See Boring Location Map
DRILLER: 2R Drilling
DRILL METHOD: Hollow Stem
HAMMER: 140#/30"
LOGGED BY: KIG
OPERATOR: Jaime
RIG TYPE: CME 75
DATE: 10/12/2022

Depth (ft)	SAMPLES			USCS Symbol	**Boring No.: B-1 (continued)**	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
								▽
35	▮	15 18 21	S3	SC	clayey f-c SAND, greyish-brown, wet, medium dense	21.3		44.1% Passing #200 Sieve Liquid Limit = 34 Plastic Limit = 18 Plasticity Index = 16
40	▮	15 20 38	S4		**Sedimentary Bedrock:** f sandy SILTSTONE to SANDSTONE, light brown, moist, dense, little oxidation staining			
45	▮	15 26 39	S5			23.0		
50	▮	10 7 22	S6					
					BORING TERMINATED AT 51.5 FEET Groundwater encountered at 33 FEET 6 INCHES Boring backfilled with soil cuttings			

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

	SAMPLES				**Boring No.: B-2**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
0					**2" Asphaltic Concrete:**			
					Undocumented Fill:			
					Alluvium:			
	▨	6 7 6	R1	CL/SC	f-m sandy CLAY to clayey f-m SAND, whitish light-brown, moist, medium dense	11.0	119.8	
5	▨	6 8 11	R2	CL	f-m sandy CLAY, dark grey, moist, stiff, trace oxidation staining	18.3	110.7	
	▨	8 13 15	R3		f-m sandy CLAY, bluish light-grey, moist, very stiff	10.9	110.8	
10	▨	6 11 24	R4		f-m sandy CLAY, dark grey, moist, very stiff			
15	▨	13 30 32	R5		f-c sandy CLAY, greyish light-brown, moist, hard	13.8	111.5	
20	▨	16 20 24	R6	SC/CL	f-m sandy CLAY to clayey f-m SAND, dark grey-brown, moist, medium dense to very stiff			
					BORING TERMINATED AT 21.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ≚ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT: TTLC Management, Inc.
PROJECT NAME: 333 Garrison Street
PROJECT NO.: 3346-CR
LOCATION: See Boring Location Map
DRILLER: 2R Drilling
DRILL METHOD: Hollow Stem
HAMMER: 140#/30"
LOGGED BY: KIG
OPERATOR: Jaime
RIG TYPE: CME 75
DATE: 10/12/2022

Depth (ft)	SAMPLES			USCS Symbol	Boring No.: B-3	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number		MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
0					**4" Asphaltic Concrete:**			
					Undocumented Fill:			
	▨	10	R1					
	▨	13 13			**Alluvium:** f-m sandy CLAY to clayey f-m SAND, light brown, moist, medium dense	12.7	106.8	
5	▨	9 7 7	R2		f sandy CLAY, light brown, moist, stiff	14.4	112.2	
	▨	35 50/4"	R3		**Sedimentary Bedrock:** excavates as silty f SAND, whitish-tan, moist			
10	▨	40 50/5"	R5		Whitish-yellow, little oxidation staining	8.4	120.5	
	▨	40 50/4"	R6					
15					**BORING TERMINATED AT 14.5 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ▨ ---Ring ▮ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Boring No.: B-4

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
0					**Undocumented Fill**			
	▨	18	R1	SC	clayey f-m SAND, light brown, moist			
	▨	44 50/3"			**Sedimentary Bedrock:** silty SANDSTONE, yellowish-tan, slightly moist, very dense	10.9	122.3	
5	▨	43 50/2"	R2					
	▨	12 50/4"	R3			12.6	120.6	
10	▨	49 50/3"	R5		excavates as silty f-m SAND, whitish light-brown, moist			
15	▨	50/2"	R6			6.9	123.3	
					BORING TERMINATED AT 15.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ▨ ---Ring ▮ ---SPT ◸ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: TTLC Management, Inc.
PROJECT NAME: 333 Garrison Street
PROJECT NO.: 3346-CR
LOCATION: See Boring Location Map

DRILLER: 2R Drilling
DRILL METHOD: Hollow Stem
HAMMER: 140#/30"

LOGGED BY: KIG
OPERATOR: Jaime
RIG TYPE: CME 75
DATE: 10/12/2022

	SAMPLES				**Boring No.: B-5**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
0					**2" Asphaltic Concrete:**			
					Undocumented Fill:			
	☒ ▨	4	R1					
		11			**Alluvium:**	11.9	119.8	MD, EI, SH
		14		CL	f-m sandy CLAY, dark grey, moist, very stiff			Expansion Index =13
	▨	6	R2	SC	clayey f-m SAND, whitish-brown, moist, medium dense			
5		7		CL	f-m sandy CLAY, dark grey, moist, very stiff	17.9	108.8	
		10						
	▨	9	R3		f-m sandy CLAY, dark grey, moist, very stiff			
		9					18.9	
		11						
	▨	11	R4					
10		15				103.9	12.7	
		20						
	▨	7	R5	SM	silty f SAND, blackish dark grey, moist, medium dense, trace organics			
		7				122.1	7.5	
15		7						
	▨	16	R6	CL	f-m sandy CLAY, bluish-grey-brown, moist, very stiff			
		17						
20		17						
					BORING TERMINATED AT 20.0 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▮ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT: TTLC Management, Inc.
PROJECT NAME: 333 Garrison Street
PROJECT NO.: 3346-CR
LOCATION: See Boring Location Map

DRILLER: 2R Drilling
DRILL METHOD: Hollow Stem
HAMMER: 140#/30"

LOGGED BY: KIG
OPERATOR: Jaime
RIG TYPE: CME 75
DATE: 10/12/2022

Boring No.: B-6

	SAMPLES					Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
0					**Undocumented FIll:**			
					Alluvium:			
	▨	7 8 8	R1	SM	silty f-m SAND, dark grey, slightly moist, medium dense, trace clay	3.2	100.4	Collapse
5	▨	17 25 28	R2	SC	f-m sandy CLAY, brown, moist, hard	9.0	106.0	
	▨	10 15 20	R3		trace oxidation staining	15.4	115.1	
10	▨	9 15 15	R5		becomes grey-brown	17.5	109.3	
15	▨	10 16 28	R6					
					BORING TERMINATED AT 16.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Boring No.: B-7

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
0					**Undocumented FIll:**			
	☒ ■	12 32 30	R1	SM/SC	**Alluvium:** silty to clayey f-m SAND, brown, moist, dense	8.5	129.9	Corrosion
5	■	14 21 28	R2	SC	clayey f-m SAND, light grey-brown, moist, dense, trace oxidation staining	6.0	128.4	
	■	14 22 28	R3		clayey f-m SAND, light brown, moist, dense	13.7	118.8	
10	■	16 37 50	R4	ML	f sandy SILT, light brown, moist, very dense, trace clay	18.6	112.6	
	■	14 23	R5					
15		49		CL	silty CLAY, brown, moist, hard			
					BORING TERMINATED AT 15.0 FEET No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

	SAMPLES				**Boring No.: B-8**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
0					**Undocumented Fill:**			
					Alluvium:			
	■	30 33 33	R1	SM	silty f-m SAND, light brown, slightly moist, dense	3.1	121.7	
5	■	8 12 14	R2	CL	f sandy CLAY, whitish-grey, moist, very stiff	18.2	105.2	
	■	15 23 24	R3	SC	clayey f-m SAND, light brown, moist, dense	9.0	116.3	
10	■	9 13 29	R5		clayey f-m SAND, light grey-brown, moist, medium dense			
	■	40 50/2"		SC/SM	clayey to silty f-m SAND, whitish-tan, moist, very dense	8.3	113.8	
					REFUSAL AT 13.0 FEET			
15								
					No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Boring No.: I-1

Depth (ft)	SAMPLES			USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
0					**6" Asphaltic Concrete:**			
					Undocumented Fill:			
				SP	**Alluvium:** f-m SAND, light brown, moist, medium dense, trace clay			
5					no clay			
				CL	f-m sandy CLAY, light brown, moist, very stiff			
10					**BORING TERMINATED AT 10 FEET** No groundwater encountered Boring set with pipe, sock, and gravel			
15								
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: TTLC Management, Inc.
PROJECT NAME: 333 Garrison Street
PROJECT NO.: 3346-CR
LOCATION: See Boring Location Map
DRILLER: 2R Drilling
DRILL METHOD: Hollow Stem
HAMMER: 140#/30"
LOGGED BY: KIG
OPERATOR: Jaime
RIG TYPE: CME 75
DATE: 10/12/2022

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**Boring No.: I-2** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
0					**6" Asphaltic Concrete:**			
					Undocumented Fill:			
				SP	**Alluvium:** f-m SAND, light brown, moist, medium dense, trace clay			
5					no clay			
				CL	f-m sandy CLAY, light brown, moist, very stiff			
10					**BORING TERMINATED AT 10 FEET** No groundwater encountered Boring set with pipe, sock, and gravel			
15								
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	**Boring No.: I-3** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
0					**2" Asphaltic Concrete:**			
					Undocumented Fill:			
				CL	**Alluvium:** f-m sandy CLAY, dark grey, moist, very stiff			
5								
10					**BORING TERMINATED AT 10 FEET** No groundwater encountered Boring set with pipe, sock, and gravel			
15								
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	TTLC Management, Inc.	**DRILLER:**	2R Drilling	**LOGGED BY:**	KIG
PROJECT NAME:	333 Garrison Street	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Jaime
PROJECT NO.:	3346-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	See Boring Location Map			**DATE:**	10/12/2022

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**Boring No.: I-4** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
0					**2" Asphaltic Concrete:**			
					Undocumented Fill:			
				CL	**Alluvium:** f-m sandy CLAY, dark grey, moist, very stiff			
5								
10					**BORING TERMINATED AT 10 FEET** No groundwater encountered Boring set with pipe, sock, and gravel			
15								
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

APPENDIX B

RESULTS OF LABORATORY TESTING

Proposed Garrison School Site Residential Development
333 Garrison Street
Oceanside, San Diego County, California
Project No. 3346-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance with the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of borings in Appendix A.

Atterberg Limits

Atterberg limits testing were performed on select fine-grained samples collected from the site. The tests were performed in general accordance with ASTM D 4318 test procedures. The test results are presented on the boring logs included within Appendix A.

Materials Finer Than the No. 200 Sieve

A #200 sieve wash was performed on selected samples of the soils according to ASTM Test Method D 1140. The results of this testing are presented on the boring logs in Appendix A.

Direct Shear

Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM D 3080 test procedures. The rate of deformation was approximately 0.035 inch per minute. The samples were sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. The tests were performed on soil samples remolded to approximately 90 percent of maximum dry density as determined by ASTM D 1557 test procedures. The shear test results are presented graphically in Appendix B.

Expansion Index

Expansion Index testing was performed on one (1) soil sample obtained from the field exploration. Testing was performed in general accordance with ASTM Test Method D 4829. The results of the testing are provided below and graphically in Appendix B.

Boring No.	Depth (ft.)	Description	Expansion Index	Classification
B-5	1-5	Clayey Sand (SC)	13	Very Low

In-Situ Moisture and Density

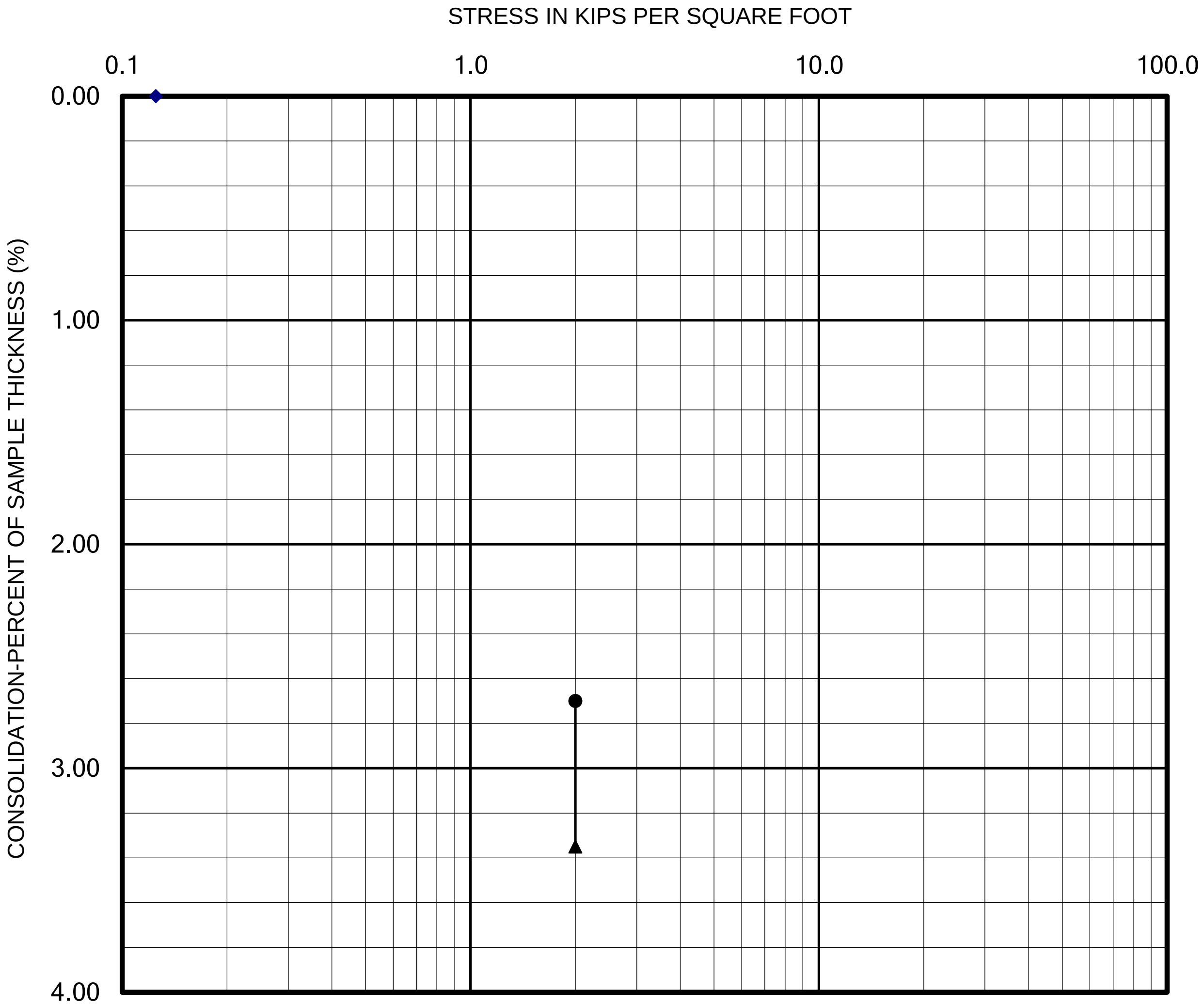
The natural water content of sampled soils was determined in general accordance with ASTM D 2216 test procedures on samples of the materials recovered from the subsurface exploration. In addition, in-place dry density of the sampled soils was determined in general accordance with ASTM D 2937 test procedures on relatively undisturbed samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths in Appendix A.

Moisture-Density Relationship

Laboratory testing was performed on one (1) sample collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil type was determined in general accordance with test method ASTM Test Procedure D 1557. The results of the testing are presented graphically in Appendix B.

Sulfate Content, Resistivity and Chloride Content
Testing to determine the water-soluble sulfate content was performed by others in general accordance with ASTM D4327 test procedures. Resistivity testing was completed by others in general accordance with ASTM G187 test procedures. Testing to determine the chloride content was performed by others in general accordance with ASTM D4327 test procedures. The results of the testing are provided below and in Appendix B.

Boring No.	Depth (ft.)	pH ASTM D4972	Chloride ASTM D4327 (mg/kg)	Sulfate ASTM D4327 (% by weight)	Resistivity ASTM G187 (ohm-cm)
B-7	1-5	7.6	43.0	0.0107	2,747



- - -●- - - Seating Cycle
—●— Loading Prior to Inundation
—▲— Loading After Inundation
- - -▲- - - Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

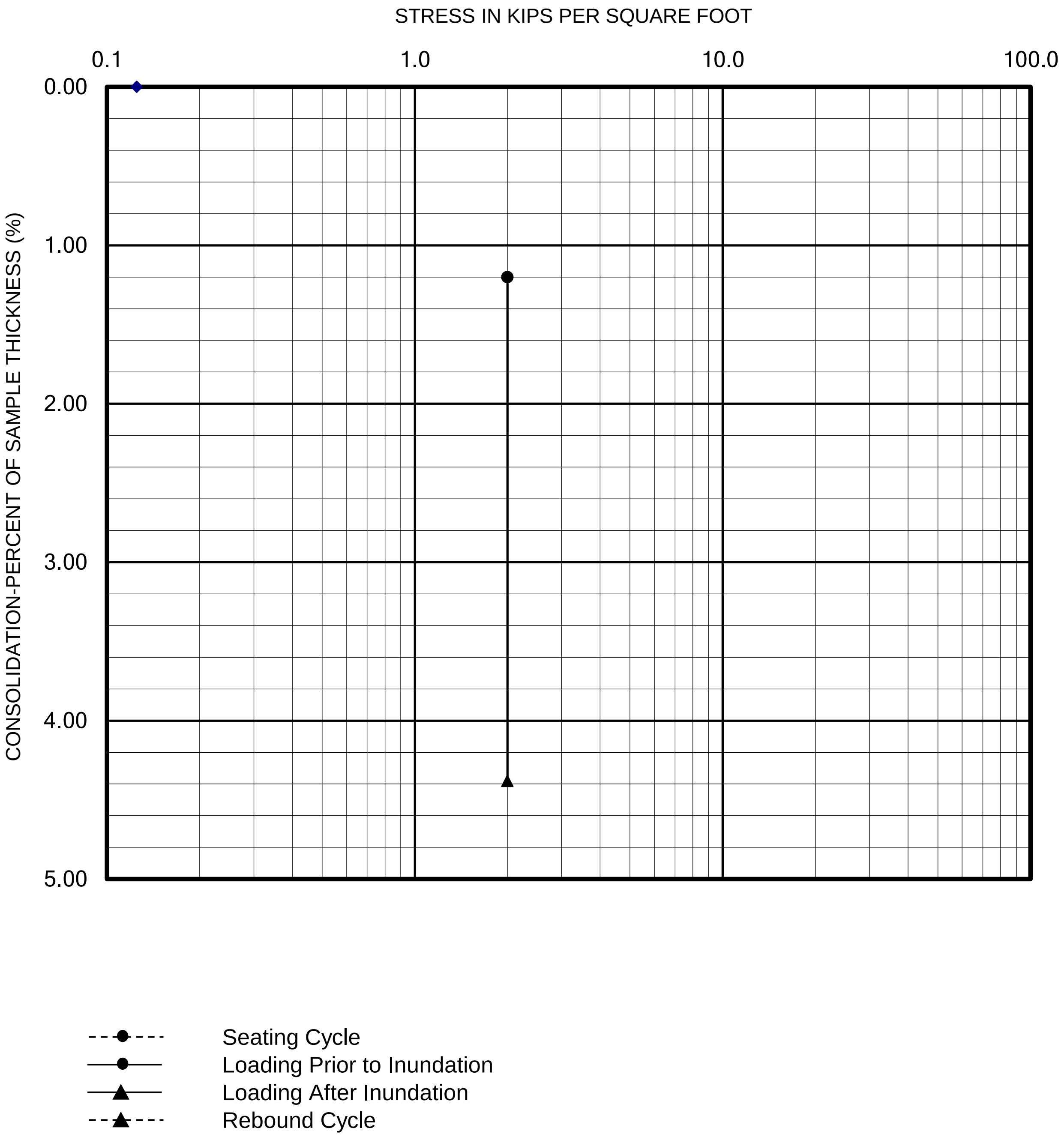
GEOTEK

COLLAPSE REPORT

Sample: B-1 @ 5 feet

Plate B-1

CHECKED BY: JB	Lab: Corona
PROJECT NO.: 3346-CR	Date: 11/8/2022



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

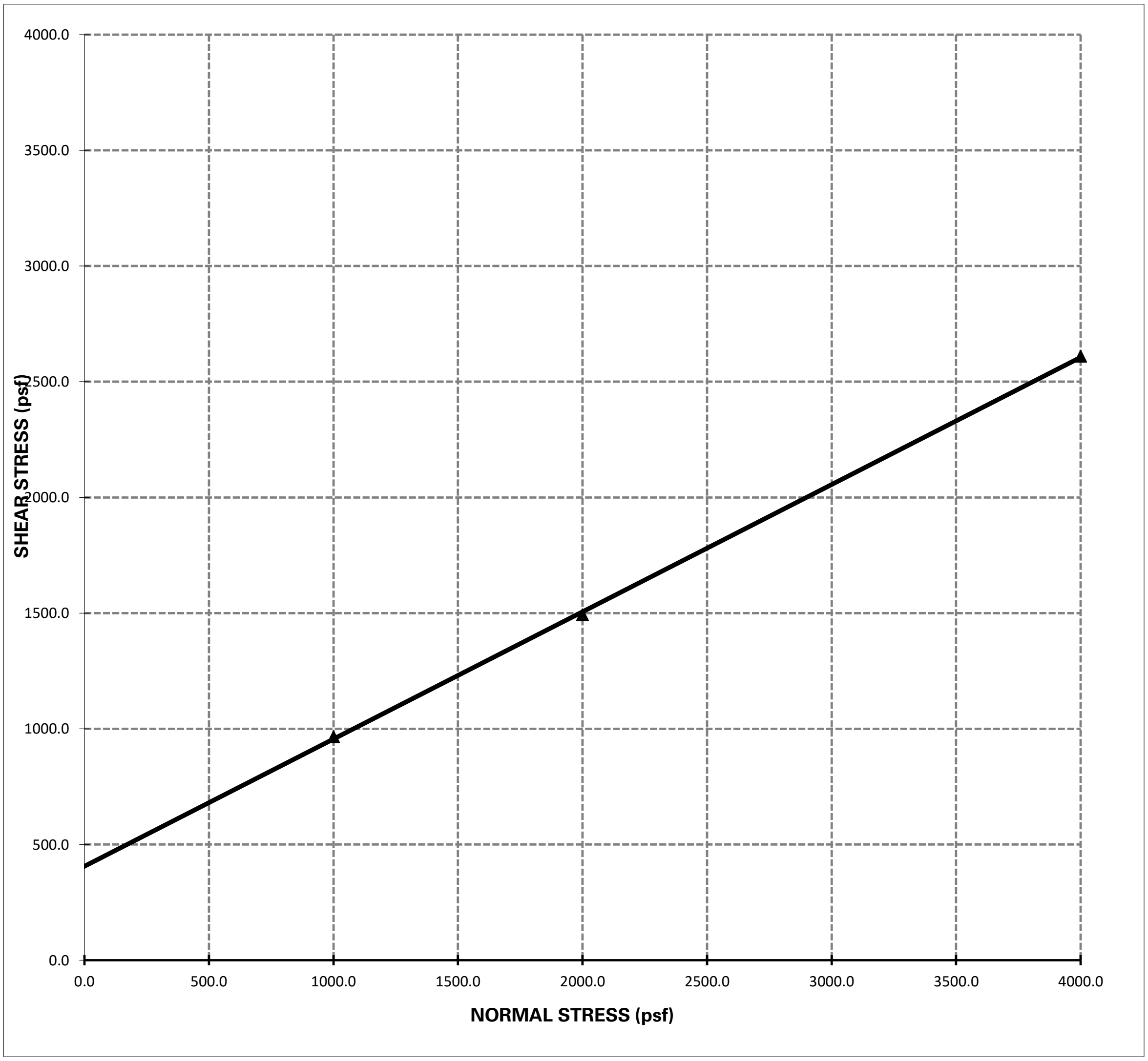
Sample: B-6 @ 2 feet

Plate B-2

CHECKED BY: JB	Lab: Corona
PROJECT NO.: 3346-CR	Date: 11/8/2022

DIRECT SHEAR TEST

Project Name: 333 Garrison Street
Project Number: 3346-CR
Sample Location: B-5 @ 0-5 feet
Date Tested: 11/10/2022



Shear Strength: **Φ = 29 °** **C = 406 psf**

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
2 - The above reflect direct shear strength at saturated conditions.
3 - The tests were run at a shear rate of 0.01 in/min.

DIRECT SHEAR TEST

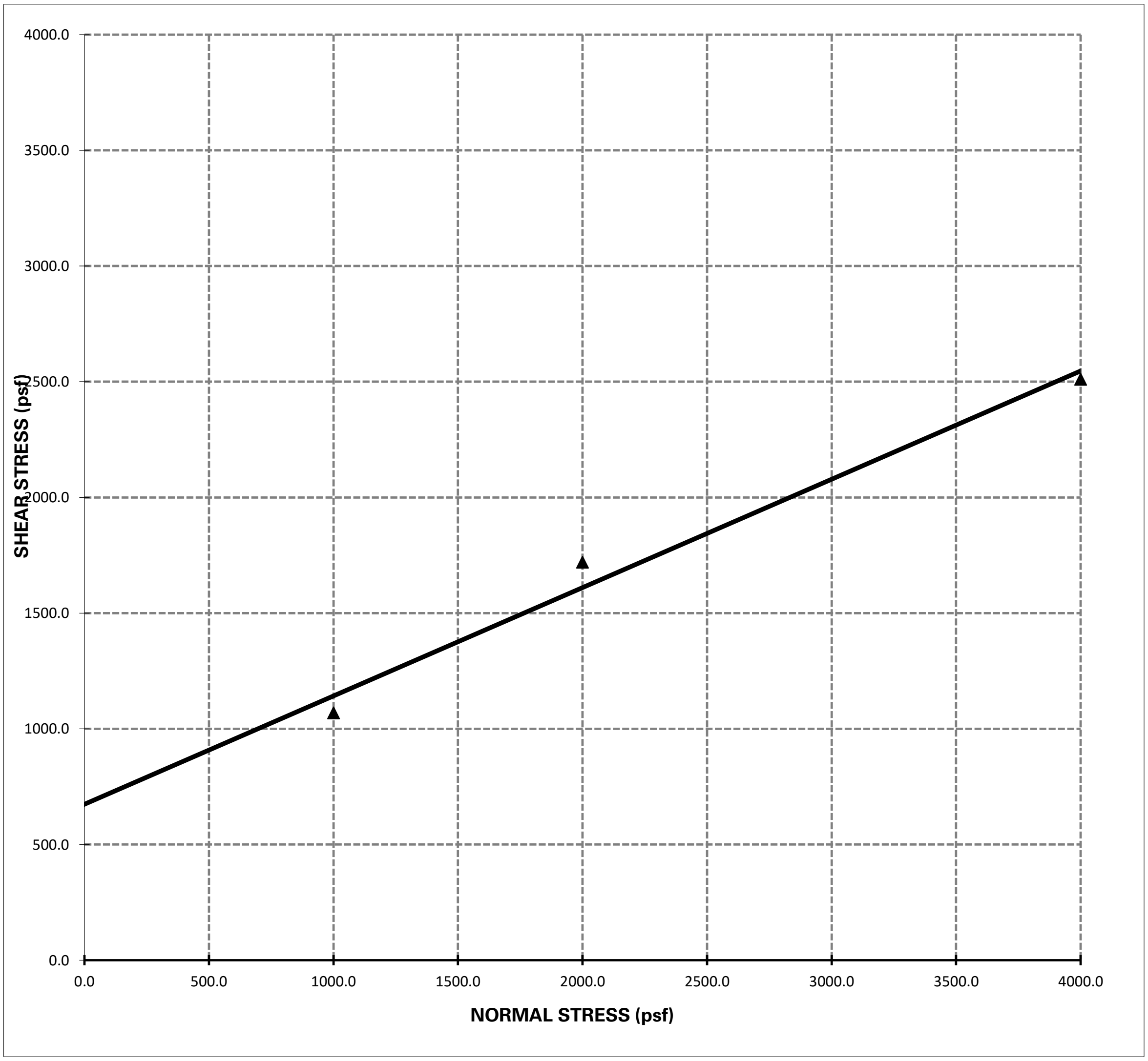
Project Name: 333 Garrison Street

Sample Location: B-5 @ 0-5 feet

Project Number: 3346-CR

Date Tested: 11/10/2022

PEAK VALUE



Shear Strength: **Φ = 25 °** **C = 674 psf**

Notes:

1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.01 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: TTLC Management, Inc.

Project Number: 3346-CR

Project Location: Garrison School Site

Tested/ Checked By: RL Lab No Corona

Date Tested: 10/28/2022

Sample Source: B-5 @ 0-5 feet

Sample Description: Clayey fine to medium sand

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	787.6
Weight of ring (gm)	370.5
Net weight of sample (gm)	**417.1**
Wet Density, lb / ft3 (C*0.3016)	**125.8**
Dry Density, lb / ft3 (D/1.F)	**115.9**

SATURATION DETERMINATION

Moisture Content, %	8.5
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20°C, (pcf)	**62.4**
% Saturation	**50.6**

READINGS

DATE	TIME	READING	
10/28/2022		0.5340	Initial
10/28/2022		0.5320	10 min/Dry
10/31/2022		0.5450	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
810.1	**13.9**

EXPANSION INDEX = 13

GeoTek - Corona
1548 N. Maple St.
Corona, CA 92880
Phone: (951) 710-1160
Fax: (951) 710-1167

Report No: PTR:22-00111-S01

Proctor Report

Client: TTLC Management, Inc. an AZ
ATTN: Michael Torres
Costa Mesa CA 92626

CC:

Project: 3346-CR
333 Garrison Street, Oceanside

Sample Details

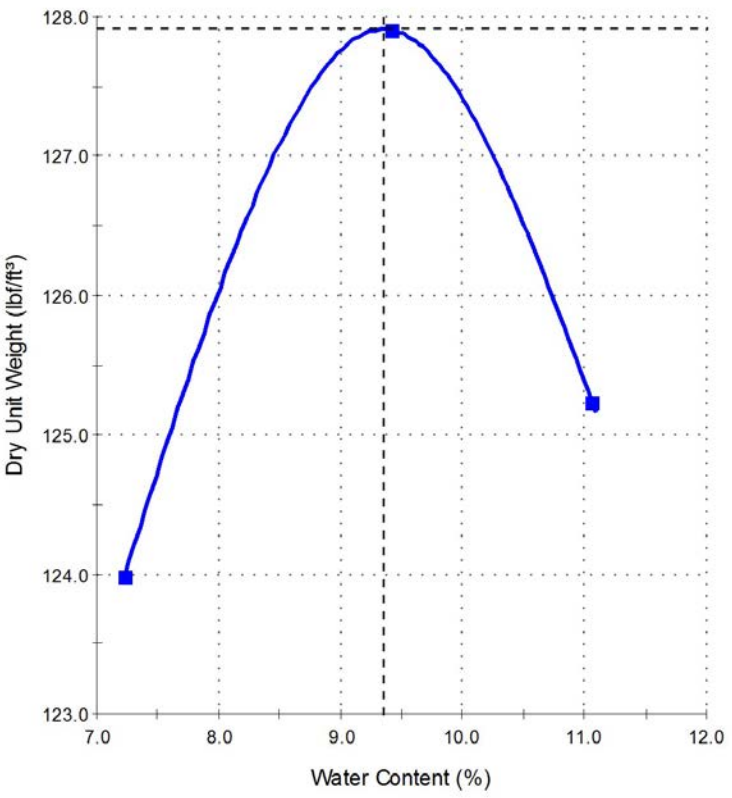
Sample ID: 22-00111-S01

Date Sampled: 10/12/2022

Sampled By: Kevin Gonzalez

Location: B-5 @ 0'-5' / Clayey fine to medium sand

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 1557

Maximum Dry Unit Weight (lbf/ft³): **127.9**

Optimum Water Content (%): **9.4**

Method: A

Preparation Method:

Tested By: Mycheal Phillips

Date Tested: 10/28/2022

Comments

Project X
Corrosion Engineering
Corrosion Control – Soil, Water, Metallurgy Testing Lab

Results Only Soil Testing

for
333 Garrison St.
Oceanside

October 24, 2022

Prepared for:
Kyle McHargue
GeoTek, Inc.
1548 North Maple Street
Corona, CA 92280
kmchargue@geotekusa.com

Project X Job#: S221020F
Client Job or PO#: 3346-CR TTLC Management Inc

Respectfully Submitted,

Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

No. M37102

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: 333 Garrison St., Oceanside
Client Job Number: 3346-CR TTLC Management Inc
Project X Job Number: S221020F
October 24, 2022

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates**		**Chlorides**		**Resistivity**		**pH**	**Redox**	**Sulfide**	**Nitrate**	**Ammonium**	**Lithium**	**Sodium**	**Potassium**	**Magnesium**	**Calcium**	**Fluoride**	**Phosphate**
		SO_4^{2-}		Cl^-		**As Rec'd**	**Minimum**			S^{2-}	NO_3^-	NH_4^+	Li^+	Na^+	K^+	Mg^{2+}	Ca^{2+}	F_2^{--}	PO_4^{3-}
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(Ohm-cm)**	**(Ohm-cm)**		**(mV)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**
B-7	1-5	106.6	0.0107	43.0	0.0043	19,430	2,747	7.6	170	16.20	6.7	2.2	ND	278.4	30.8	232.6	478.8	13.9	3.3

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Project X
Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Lab

Lab Request Sheet Chain of Custody
Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com
Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

Project X Job Number S221020F Geotek 3346-CR 333 Garrison st 1 Full

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Company Name: Geotek USA
Contact Name: Kyle McHargue
Phone No: 951-206-5443
Mailing Address: 1548 N. Maple Ave. Corona, CA
Contact Email: kmchargue@geotekusa.com
Accounting Contact:
Invoice Email: kmchargue@geotekusa.com
Client Project No: 3346-CR TTLC Management Inc.
Project Name: 333 Garrison St., Oceanside
P.O. #:

	3-5 Day Standard	3 Day Guarantee 50% mark-up	24 hour RUSH 100% mark-up
(Business Days) Turn Around Time:			

Results By: ☐ Phone ☐ Fax ☐ Email

Date & Received by : 10/20/22 Cynthia Diaz

Special Instructions:

ANALYSIS REQUESTED (Please circle)

			Default Method
Soil Resistivity	Caltrans CTM643	AASHTO T2888	ASTM G187
pH	Caltrans CTM643	AASHTO T 289	ASTM G 51
Sulfate	Caltrans CTM417	AASHTO T 290	ASTM D4327
Chloride	Caltrans CTM422	AASHTO T 291	ASTM D4327
Redox Potential		SM 2580B	ASTM G200
Sulfide			SM 4500-S2
Ammonia		SM 4500-NH3	ASTM D4327
Nitrate		SM 4500-NO3	ASTM D4327
Flouride			SM 2320B
Phosphate			ASTM D4327
Lithium			ASTM D4327
Sodium			ASTM D4327
Potassium			ASTM D4327
Magnesium			ASTM D4327
Calcium			ASTM D4327
BiCarbonate			SM 2320B
Full Corrosion Series			
Soil Corrosivity Evaluation Report	*Req: Min. 3 Samples, site map, and groundwater info		
Water Corrosivity Mini Report			
Moisture Content			ASTM D2216
Total Alkalinity			SM 2520B
Thermal Resistivity		ASTM D5334	IEEE 442
(ANC) Alk Neutr Cap			
(SRB) Sulfate Reducing			HACH BART
Puckorius Index			
XRF Elemental Analysis	ASTM A751	ASTM E322	ASTM E1621
Water Hardness			

				Full Corrosion Series																	Reports									
					Geo Quad																									
	SAMPLE ID - BORE #	DEPTH (ft)	DATE COLLECTED	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	Sulfide	Ammonia	Nitrate	Flouride	Phosphate	Lithium	Sodium	Potassium	Magnesium	Calcium	BiCarbonate	Full Corrosion Series	Soil Corrosivity Evaluation Report	Water Corrosivity Mini Report	Moisture Content	Total Alkalinity	Thermal Resistivity	(ANC) Alk Neutr Cap	(SRB) Sulfate Reducing	Puckorius Index	XRF Elemental Analysis	Water Hardness
196 1	B-7	1'-5'																		X										
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
13																														
14																														
15																														

APPENDIX C

PERCOLATION TEST DATA AND PRCHET CALCULATIONS

Proposed Garrison School Site Residential Development
333 Garrison Street
Oceanside, San Diego County, California
Project No. 3346-CR

Client: **TTLC Management, Inc.**
Project: **333 Garrison Street, Oceanside**
Project No: **3346-CR**
Date: **10/14/2022**

Boring No. **I-1**

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt = 30
Final Depth to Water, D_F = 104.5
Test Hole Radius, r = 3
Initial Depth to Water, D_O = 104
Total Test Hole Depth, D_T = 120

Equation -

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

$H_O = D_T - D_O =$ 16
$H_F = D_T - D_F =$ 15.5
$\Delta H = \Delta D = H_O - H_F =$ 0.5
$H_{avg} = (H_O+H_F)/2 =$ 15.75

I_t = 0.09 **Inches per Hour**

GEOTEK

Client: **TTLC Management, Inc.**
Project: **333 Garrison Street, Oceanside**
Project No: **3346-CR**
Date: **10/14/2022**

Boring No. **I-2**

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt =	30
Final Depth to Water, D_F =	118
Test Hole Radius, r =	3
Initial Depth to Water, D_O =	116.75
Total Test Hole Depth, D_T =	120

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

$H_O = D_T - D_O =$	3.25
$H_F = D_T - D_F =$	2
$\Delta H = \Delta D = H_O - H_F =$	1.25
$Havg = (H_O+H_F)/2 =$	2.625

I_t = 0.91 **Inches per Hour**

GEOTEK

Client: **TTLC Management, Inc.**
Project: **333 Garrison Street, Oceanside**
Project No: **3346-CR**
Date: **10/14/2022**

Boring No. **I-3**

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt = 30
Final Depth to Water, D_F = 104.5
Test Hole Radius, r = 3
Initial Depth to Water, D_O = 104
Total Test Hole Depth, D_T = 120

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

$H_O = D_T - D_O =$ 16
$H_F = D_T - D_F =$ 15.5
$\Delta H = \Delta D = H_O - H_F =$ 0.5
$Havg = (H_O+H_F)/2 =$ 15.75

I_t = 0.09 **Inches per Hour**

Client: TTLC Management, Inc.
Project: 333 Garrison Street, Oceanside
Project No: 3346-CR
Date: 10/14/2022

Boring No. I-4

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt = 30
Final Depth to Water, D_F = 102
Test Hole Radius, r = 3
Initial Depth to Water, D_O = 101.75
Total Test Hole Depth, D_T = 120

Equation -

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

$H_O = D_T - D_O =$ 18.25
$H_F = D_T - D_F =$ 18
$\Delta H = \Delta D = H_O - H_F =$ 0.25
$Havg = (H_O+H_F)/2 =$ 18.125

I_t = 0.04 **Inches per Hour**

GEOTEK

PERCOLATION DATA SHEET

TTLC Management, Inc an AZ Corporation

Project: 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-1 **Tested By:** C.D **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
	7:02		120	22				
	7:32	30			21 3/4	1/4		
	7:32		120	21. 3/4				
	8:02	30			21 1/2	1/4		
1	8:02		120	21 1/2				
	8:32	30			21	1/2		
2	8:32		120	21				
	9:02	30			20 1/2	1/2		
3	9:02		120	20 1/2				
	9:32	30			20	1/2		
4	9:32		120	20				
	10:02	30			19 1/2	1/2		
5	10:02		120	19 1/2				
	10:32	30			19	1/2		
6	10:32		120	19				
	11:02	30			18 1/2	1/2		
7	11:02		120	18 1/2				
	11:32	30			18	1/2		
8	11:32		120	18				
	12:02	30			17 1/2	1/2		

PERCOLATION DATA SHEET

TTLC Management, Inc an AZ Corporation

Project: 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: T-1 **Tested By:** C.D. **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
9	12:02		120	17 1/2				
	12:32	30			17	1/2		
10	12:32		120	17				
	1:02	30			16 1/2	1/2		
11	1:02		120	16 1/2				
	1:32	30			16	1/2		
12	1:32		120	16				
	2:02	30			15 1/2	1/2		

PERCOLATION DATA SHEET

Project: TTLC Management, Inc an AZ Corporation 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-2 **Tested By:** C.D **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
	7:00		120	22 1/2				
	7:30	30			21	1 1/2		
	7:30		120	21				
	8:00	30			19 1/2	1 1/2		
1	8:00		120	19 1/2				
	8:30	30			17 3/4	1 3/4		
2	8:30		120	17 3/4				
	9:00	30			16	1 3/4		
3	9:00		120	16				
	9:30	30			14 1/4	1 3/4		
4	9:30		120	14 1/4				
	10:00	30			12 3/4	1 1/2		
5	10:00		120	12 3/4				
	10:30	30			11 1/4	1 1/2		
6	10:30		120	11 1/4				
	11:00	30			9 3/4	1 1/2		
7	11:00		120	9 3/4				
	11:30	30			8 1/4	1 1/2		
8	11:30		120	8 1/4				
	12:00	30			7	1 1/4		

PERCOLATION DATA SHEET

Project:

Job No.: 3346-CR

Test Hole No.: I-2

Tested By: C.D

Date: 10/14/2022

Depth of Hole As Drilled: 120"

Before Test: 120"

After Test: 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
9	12:00		126	7				
	12:30	30			5 3/4	1 1/4		
10	12:30		120	5 3/4				
	1:00	30			4 1/2	1 1/4		
11	1:00		120	4 1/2				
	1:30	30			3 1/4	1 1/4		
12	1:30		120	3 1/4				
	2:00	30			2	1 1/4		

PERCOLATION DATA SHEET

TTLC Management, Inc an AZ Corporation

Project: 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-3 **Tested By:** C.D. **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
	7:09		120	21 ½				
	7:39	30			21	½		
	7:39		120	21				
	8:09	30			20 ¾	¼		
1	8:09		120	20 ¾				
	8:39	30			20 ½	¼		
2	8:39		120	20 ½				
	9:09	30			20	½		
3	9:09		120	20				
	9:39	30			19 ½	½		
4	9:39		120	19 ½				
	10:09	30			19	½		
5	10:09		120	19				
	10:39	30			18 ½	½		
6	10:39		120	18 ½				
	11:09	30			18 ¼	¼		
7	11:09		120	18 ¼				
	11:39	30			18	¼		
8	11:39		120	18				
	12:09	30			17 ½	½		

PERCOLATION DATA SHEET

TTLC Management, Inc an AZ Corporation

Project: 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-3 **Tested By:** C.D. **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
9	12:09 12:39	30	120	17 1/2	17	1/2		
10	12:39 1:09	30	120	17	16 1/2	1/2		
11	1:09 1:39	30	120	16 1/2	16	1/2		
12	1:39 2:09	30	120	16	15 1/2	1/2		

PERCOLATION DATA SHEET

Project: TTLC Management, Inc an AZ Corporation 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-4 **Tested By:** C.D. **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
	7:07		120	21 1/2				
	7:37	30			21 1/4	1/4		
	7:37		120	21 1/4				
	8:07	30			21	1/4		
1	8:07		120	21				
	8:37	30			20 3/4	1/4		
2	8:37		120	20 3/4				
	9:07	30			20 1/2	1/4		
3	9:07		120	20 1/2				
	9:37	30			20 1/4	1/4		
4	9:37		120	20 1/4				
	10:07	30			20	1/4		
5	10:07		120	20				
	10:37	30			19 3/4	1/4		
6	10:37		120	19 3/4				
	11:07	30			19 1/2	1/4		
7	11:07		120	19 1/2				
	11:37	30			19 1/4	1/4		
8	11:37		120	19 1/4				
	12:07	30			19	1/4		

PERCOLATION DATA SHEET

Project: TTLC Management, Inc an AZ Corporation 333 Garrison Street, Oceanside **Job No.:** 3346-CR

Test Hole No.: I-4 **Tested By:** C.D **Date:** 10/14/2022

Depth of Hole As Drilled: 120" **Before Test:** 120" **After Test:** 120"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
9	12:07 12:37	30	120	19	18 3/4	1/4		
10	12:37 1:07	30	120	18 3/4	18 1/2	1/4		
11	1:07 1:37	30	120	18 1/2	18 1/4	1/4		
12	1:37 2:07	30	120	18 1/4	18	1/4		

APPENDIX D

GENERAL GRADING GUIDELINES

Proposed Garrison School Site Residential Development
333 Garrison Street
Oceanside, San Diego County, California
Project No. 3346-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the Uniform Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.

4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and artificial fill as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.

5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
    a) shallow (12 + inches) under slab interior trenches and,
    b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

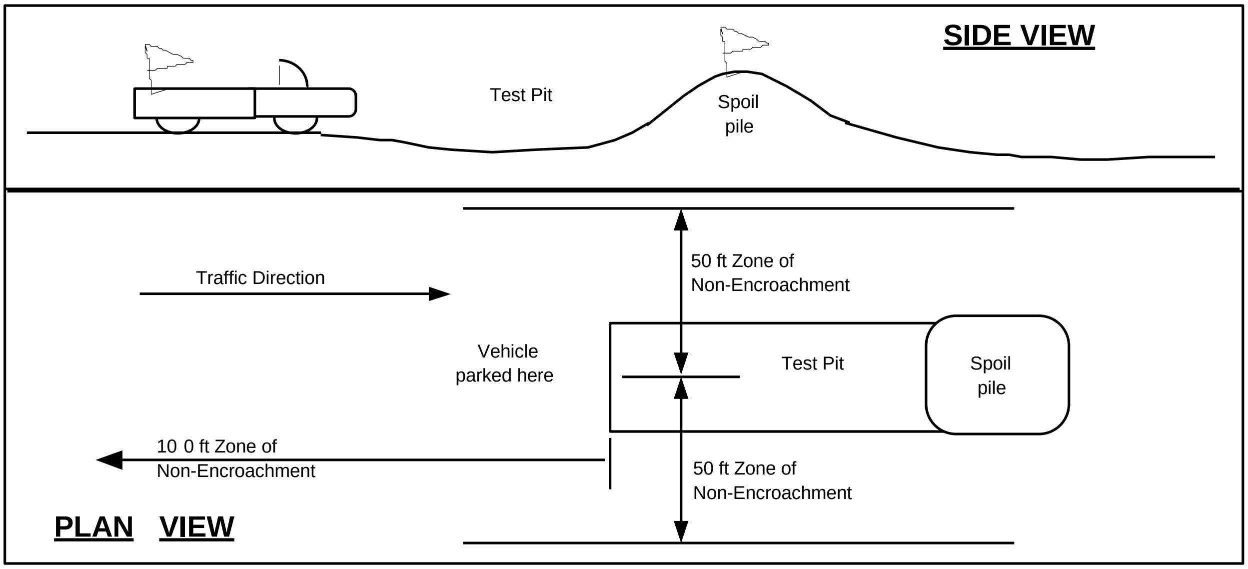
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or

4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor’s representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.