

Appendix E

Geotechnical Due Diligence Study



GEOTECHNICAL

OPTIMIZED SOIL ENGINEERING

June 14, 2024

Project No. 24082-01

To: Meritage Homes
5 Peters Canyon Road, Suite 310
Irvine, California 92606

Attention: Mr. Danny Hinojosa

Subject: Geotechnical Due Diligence Study, Subsurface Exploration, and Preliminary Design Recommendations, 1501 West Del Norte Street, Assessor's Parcel Number 8458-020-901, City of West Covina, California

At your request, SA Geotechnical, Inc. (SA GEO) has conducted a geotechnical due diligence study and subsurface exploration for the proposed residential development at 1501 West Del Norte Street, Assessor's Parcel Number (APN) 8458-020-901, in the City of West Covina, California (Figure 1). The purpose of this study was to evaluate the geotechnical site conditions considering the proposed grading and improvements in order to provide a geotechnical summary and preliminary geotechnical recommendations for project design, grading, and construction. Our evaluation included review of available geologic maps and data pertinent to the subject site; a site-specific subsurface exploration; laboratory testing; percolation testing; geotechnical analysis; and preparation of this report.

The subject site is currently developed with an existing (non-operational) occupational school and technical center with asphalt concrete parking lot and associated hardscape/landscape improvements. A large portion of the property includes open fields and sports fields. Based on our review and subsurface exploration, the primary geotechnical constraints include the presence of weathered/unsuitable alluvium in the uppermost 5 to 7 feet, the presence of friable sandy soils prone to caving in steep sided (trench) excavations, and seismic shaking during a strong earthquake event. The site subsurface soils generally consist of sandy silt and silty sand near-surface and silty sand and sand with gravel at depth. Groundwater was not encountered during our exploration to a maximum depth of 50.5 feet below ground surface. Percolation testing was also performed during this study and indicates that stormwater infiltration is feasible at the site.

This report presents our findings, conclusions, and preliminary design recommendations for the proposed residential development. Based on our exploration and review, the proposed grading and development is considered geotechnically feasible provided the recommendations in this report are implemented during design, grading, and construction. Additional geotechnical evaluation and analysis may need to be performed as the project plans for grading, foundations, and stormwater infiltration systems are developed.

References pertinent to the site are included in Appendix A. Boring logs are included in Appendix B. Laboratory test results are included in Appendix C. Seismic design parameters are presented in Appendix D. Percolation test data sheets are provided in Appendix E. General Earthwork and grading specifications are presented in Appendix F.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

SA GEOTECHNICAL, INC.



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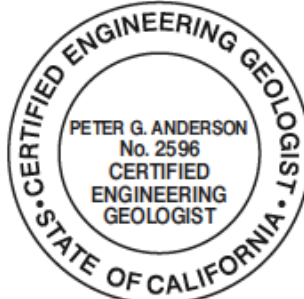


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EXECUTIVE SUMMARY

The subject site is underlain by native alluvium generally composed of sandy silt and silty sand near surface and silty to clean sand with gravel at depth. Groundwater was not encountered during our exploration to a maximum depth of 50.5 feet below ground surface and is anticipated to remain at depths greater than 100 feet below ground surface. The primary geotechnical constraints at the site include the following:

- The presence of weathered/unsuitable alluvium in the upper 5 to 7 feet below existing grades, which will need to be removed and replaced as compacted fill;
- Presence of friable sandy soils prone to caving in steep sided (trench) excavations; and
- Potential for strong seismic shaking during an earthquake event.

Remedial grading for the site should consist of the removal and recompaction of all weathered/disturbed alluvium in order to provide competent subgrade and bearing conditions for the proposed building structural slabs and foundations. In general, remedial removals are anticipated to extend 5 to 7 feet below existing grades within the site. Deeper removals may be required locally, where existing trees, utility lines, and structures/foundations are to be abandoned and removed or where deeper unsuitable soils are encountered. The recommended remedial removals will help reduce the potential for future settlement at the site. Septic tanks, cesspools, underground structures, and/or wells may be encountered at the site during demolition and grading. If encountered, they should be removed in accordance with Los Angeles County Department of Public Health requirements and the project environmental engineer's recommendations.

Building foundations and slabs should be designed to tolerate a total settlement of 1-inch and a differential settlement of ½-inch over a span of 40 feet. Onsite soils are anticipated to have "Very Low" expansion potential at the completion of grading and are not considered corrosive to concrete.

Based on our findings, we conclude that the proposed residential development is feasible from a geotechnical viewpoint, provided it is designed and constructed in accordance with the recommendations presented in this report and any future design report(s). The site is considered suitable for stormwater infiltration.

1.0 INTRODUCTION

1.1 Introduction and Scope of Services

At your request, SA Geotechnical, Inc. (SA GEO) has conducted geotechnical due diligence review and subsurface exploration for the proposed residential development at the subject site in the City of West Covina, California (Figure 1). The purpose of our study was to assess the onsite geologic and geotechnical conditions and provide preliminary recommendations for design, grading, and construction of the proposed improvements. We have reviewed the Conceptual Site Plan, dated May 2024, which shows the generalized development configuration; however, contains no existing or proposed grades. A Google Earth satellite image was utilized as the base for our Geotechnical Map (Plate 1).

Our scope of services for this due diligence study included the following tasks:

- Review of available geologic and geotechnical maps, reports, and data for the subject site and surrounding area. A list of references is included in Appendix A.
- Review of available historic aerial photographs dating back to 1948.
- Notification and coordination with DigAlert to identify and clear boring locations of underground utilities.
- Subsurface exploration consisting of nine hollow-stem auger borings (H-1 through H-5 and P-1 through P-4) to depths ranging from 10.5 to 50.5 feet below ground surface (bgs). Boring logs are included in Appendix B.
- Percolation testing at four locations (P-1 through P-4) to determine infiltration rates. Percolation data sheets are included in Appendix E.
- Laboratory testing of selected samples to determine engineering properties of onsite soils, including in-situ moisture and density, grain size distribution, Atterberg limits, maximum density and optimum moisture content, consolidation/collapse, shear strength, R-value, expansion potential, and soluble sulfate content. Laboratory test results are included in Appendix C.
- Geotechnical evaluation and analysis of the compiled data regarding the proposed grading and development.
- Evaluation of faulting, seismicity, and seismic and static settlement in accordance with the 2022 California Building Code (CBC).
- Preparation of this report including our findings, conclusions, preliminary recommendations, and accompanying illustrations.
- Consultations with the project team.

SA GEO's expertise and scope of services do not include assessment of potential subsurface environmental contaminants or environmental health hazards.

1.2 Site Condition and History

The subject site is located at 1501 West Del Norte Street in the City of West Covina, California (Figure 1). The approximately 13.6-acre property is roughly rectangular-shaped and is bound to the north and east by a park and recreational facilities (Del Norte Park), to the west by North Nora Avenue, and to the south by West Del Norte Street. The site is currently developed with an occupational school and technical center that is non-operational at this time. The school campus includes classrooms/buildings, sports fields covering most of the site, parking lots and associated drive aisles, and associated hardscape/landscape improvements.

Based on our review of available historic aerial photographs dating back to 1948, the earliest observed site use was for agriculture. During this time an onsite residential structure and outbuildings were observed in the southerly portion of the site, adjacent to Del Norte Street, within the footprint of the current school buildings. By 1964, the prior structures and agriculture/orchards had been removed and the current school campus was developed. Except for minor upgrades to landscape and hardscape, including solar panels in the southwest parking lot, the site has remained largely unchanged up to the present day.

1.3 Proposed Grading and Improvements

Based on our review of the Conceptual Site Plan and review of the general site topography during our site exploration, we anticipate design cuts and fills to be relatively minor across the site, on the order of 1 to 5 feet. We understand the project is proposed to include grading for 39 multifamily residential buildings (338 total units), common space/outdoor areas, and utility and street improvements to support the proposed residential development. The proposed multifamily units will be 3- to 4-stories, consisting of wood-framed construction.

1.4 Subsurface Exploration

Our field exploration was performed on May 23 and 24, 2024, and included nine hollow-stem auger borings (H-1 through H-5 and P-1 through P-4) to depths ranging from 10.5 to 50.5 feet below ground surface (bgs). The borings were geologically logged, and samples were obtained at selected intervals. The approximate boring locations are shown on Plate 1 (Geotechnical Map). Boring logs are included in Appendix B.

Soil sampling in borings was performed using a Modified California ring sampler. Relatively undisturbed ring samples were obtained from the borings at various depths with a 2.5-inch inside-diameter, split-barrel sampler. The sampler was driven with a 140-pound, automatic trip hammer, free falling 30 inches. Representative bulk samples of onsite soils were also collected from soil cuttings and used for additional soil identification purposes and laboratory testing. The sampling was used to assess the soil beneath the site and to obtain a measure of soil resistance to penetration (recorded as blows-per-foot on the geotechnical boring logs).

Following drilling, percolation testing was performed in four borings (P-1 through P-4) in general conformance with the 2021 Los Angeles County Guidelines (GS200.1). Within the borings, a 2-inch diameter slotted well pipe was installed, and the annular space was backfilled with No. 3 select sand to prevent caving during testing. The results of the onsite percolation testing are

included in Appendix E and discussed in Sections 2.6 and 3.13. At the completion of testing, the pipes were removed, and the borings were backfilled with soil cutting and sand.

1.5 Laboratory Testing

Representative samples of onsite soils collected during our field exploration were tested to characterize the engineering properties. Laboratory tests performed on selected relatively undisturbed and bulk soil samples included:

- Moisture content and dry density;
- Sieve analysis;
- Atterberg limits;
- Direct shear;
- Consolidation/collapse;
- Maximum density and optimum moisture content;
- R-value;
- Expansion potential; and
- Soluble sulfate.

Laboratory tests were conducted in general conformance with applicable ASTM International standards. The laboratory test results are provided in Appendix C.

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting and Geotechnical Conditions

The subject site is located northwest of the San Jose Hills and north of Walnut Creek, within the Peninsular Ranges geomorphic province of Southern California. The site is mapped by the California Division of Mines and Geology (CDMG, 2000) as underlain by Quaternary-age young alluvial fan deposits (Figure 2). The alluvium (Qal) encountered in our borings generally consisted of dark brown, yellowish brown, yellowish gray and gray sandy silt and silty sand near-surface (uppermost 5 to 7 feet), below which the soils consisted of silty sand, clean sand, and sand with gravel.

Based on our geotechnical exploration and laboratory testing (Appendix C), the site geotechnical conditions are generally as follows:

Soil Moisture Content and Dry Density: Native alluvial soils had in-situ moisture content and dry densities ranging from 1.6 to 15.4 percent and 87.7 to 137.3 pounds per cubic foot (pcf), respectively. Blow counts in the alluvial materials ranged from 4 to 20 blows per foot in the uppermost 5 to 7 feet. Below 7 feet, blow counts in the alluvium ranged from 18 to 84+ blows per foot. The alluvium was generally found to be loose/soft near surface and medium dense to very dense at depth.

Soil Properties: Grain-size distribution tests were conducted on two bulk samples collected from the uppermost 5 feet and eight ring samples collected at depths between 2.5 and 12 feet bgs. The near-surface bulk samples were classified in accordance with the Unified Soil Classification System (USCS) as silty sand (SM), with fines contents (passing No. 200 sieve) of 35 and 49 percent. The ring samples were classified as poorly graded sand (SP), sand with silt (SP-SM), and silty sand (SM), with fines contents ranging from 2 to 17 percent.

Soil plasticity testing was performed on two rings samples collected at depths of 7.5 and 9 feet bgs. Both samples were sandy, contained less than 50 percent fines, and were classified as non-plastic.

Maximum dry density testing of one near surface sample (0 to 5 feet bgs) indicates that the silty sand has a maximum dry density of 122.5 pcf at an optimum moisture content of 11.5 percent.

Shear Strength: Direct shear testing was performed on two samples: one relatively undisturbed sample collected at a depth of 7.5 feet bgs and one remolded sample performed on material from a bulk sample collected in the uppermost 5 feet, representative of future compacted fill material (remolded to 90% relative compaction). The undisturbed sample had ultimate and peak internal friction angle of 38 and a cohesion of 375 pounds per square foot (psf). The remolded sample had ultimate and peak internal friction angle of 30 degrees and cohesions of 75 and 150 psf, respectively.

Consolidation/Collapse Potential: In general, the onsite soils are anticipated to have low compressibility/collapse potential upon the completion of grading. Laboratory testing was performed on five samples collected from the uppermost 10 feet and indicates collapse potentials of less than 1.5 percent upon addition of water at loads of 3.2 and 1.6 ksf.

R-value: One sample collected a depth of 0 to 5 feet in Boring H-5 had an R-value of 65.

Expansion Potential: Two near-surface samples, both collected at depths of 0 to 5 feet in Borings H-2 and H-4, had "Very Low" expansion potential, with expansion indices of 3 and 4, respectively.

Soluble Sulfate: Two bulk samples, both collected at depths of 0 to 5 feet in Borings H-2 and H-4, were also tested for sulfate content. The tests are anticipated to indicate that sulfate content of the soils may be classified as "S0" (negligible) per Table 19.3.1.1 of ACI-318.

2.2 Groundwater

Historic high groundwater mapping by California Division of Mines and Geology indicates very deep groundwater, approximately 100 feet bgs (CDMG, 1998). Groundwater was not encountered during our subsurface exploration to a maximum depth of 50.5 feet. We have also reviewed groundwater data available through the GeoTracker database for several sites near the subject site. The data indicates groundwater in the vicinity of the site is generally greater than 110+ feet deep.

2.3 Regional Faulting and Seismicity

Regional Faults: The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CGS, 2018). Also, based on mapping by the State (Jennings and Bryant, 2010), there are no active faults mapped at the site. Regional Faults are presented in Figure 3.

Seismicity: Properties in southern California are subject to seismic hazards of varying degrees depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake) or secondary (i.e., related to the effect of earthquake energy on the physical world). Since there are no active faults at the site, the potential for primary ground rupture is considered very low. The primary seismic hazard for this site is ground shaking during a future earthquake. The closest active fault to the site is the San Jose Fault, approximately 4.1 miles southeast of the site. The maximum moment magnitude for the controlling fault is 7.4 Mw, which would be generated from the Puente Hills Fault.

The site is not located within a potential liquefaction hazard zone, as defined by the State's Seismic Hazard Mapping (CDMG, 1999). The attached Site Location and Seismic Hazard Map (Figure 1) depicts the site relative to mapped potential liquefaction hazard zones. Other secondary seismic hazards, such as tsunami and seiche are considered nil due to the site elevation of approximately 400 feet above sea level and distance from the ocean or other confined bodies of water.

2.4 Settlement and Foundation Considerations

In general, the anticipated settlements depend upon the building loads, type of foundations, and the geotechnical properties of the supporting subgrade. Considering the subsurface soil conditions, laboratory test data, and anticipated lightly loaded residential structures, we estimate total settlement (combined static and seismic) to be on the order of 1-inch with differential settlement of ½-inch over a 40-foot span. The settlement estimate assumes remedial grading measures recommended in Section 3.2 of this report are implemented during grading.

2.5 Shrinkage and Bulking

The shrinkage and bulking (reduction or increase in volume of excavated materials on recompaction as fill) depend primarily on in-situ density and the maximum dry density of the soil type. We anticipate that the weathered alluvium will shrink 8 to 15 percent. An average shrinkage value of 12 percent may be assumed for soils in the upper 7 feet. Ground subsidence at the site is estimated to be on the order of 0.1 foot.

2.6 Percolation Testing

Percolation testing was performed on May 23 and 24, 2024, in general conformance with the 2021 Los Angeles County Guidelines (GS200.1). The Small Diameter Boring Infiltration Test procedure was performed in general accordance with the referenced guidelines. Percolation testing was performed in Borings P-1 through P-4, which were drilled to depths ranging from 10.5 to 15 feet bgs. Within the percolation test borings, a 2-inch-diameter slotted well pipe was installed and backfilled (annular space) with No. 3 select sand, as noted on the boring logs, in order to prevent caving during testing.

Initial soaking was performed prior to testing to ensure that the native soil was fully saturated. The Small Diameter Boring Infiltration Test was performed following the initial presoak. The three final measurements were used to calculate the pre-adjusted infiltration rates. Infiltration rates were calculated by dividing the approximate discharged water volume by the wetted surface area in a given amount of time, per the guidelines. The infiltration rates ranged from 4.7 to 12.4 inches per hour, using the minimum Reduction Factor of 3. This reduction factor does not consider infiltration device design, pre-filtration, maintenance, or other factors that may affect long-term performance. The infiltration rates are representative of the location and depths at which the tests were performed. The field percolation test data sheets are provided in Appendix E.

<i>Boring No.</i>	<i>Tested Depth (feet)</i>	<i>Pre-Adjusted Infiltration Rate (in./hr.)</i>	<i>Infiltration Rate (in./hr.) – Reduction Factor of 3</i>
P-1	5 to 9.5	14.2	4.7
P-2	13 to 14.75	17.9	6.0
P-3	7 to 9.5	32.6	10.9
P-4	13.25 to 14.75	37.1	12.4

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on our subsurface exploration and review, construction of the proposed residential development, as described herein, is considered geotechnically feasible provided the preliminary recommendations in this report are implemented during design, grading, and construction. Additional geotechnical exploration, including percolation testing at the location/depth of the infiltration devices, may need to be performed during the design phase. Also, grading, foundation, utility, structural and wall plans for the project should be reviewed by the geotechnical consultant during the design phase. Updated recommendations should be provided once the project plans are finalized and reviewed by SA GEO and as needed.

The recommendations in this report should be considered minimum and may be superseded by more restrictive requirements of others. In addition to the following recommendations, General Earthwork and Grading Specifications are provided in Appendix F.

3.2 Site Preparation and Earthwork

Site preparation and grading should be performed in accordance with the recommendations herein and the requirements of the City of West Covina.

3.2.1 Site Demolition and Clearing

Prior to remedial grading, any existing structures, foundations, hardscape/landscape, and utilities to be abandoned should be demolished. Deleterious materials and debris should be cleared and disposed of offsite. Onsite concrete material may be mixed with onsite soils and placed as compacted fill provided that it is broken into pieces that are smaller than 6 inches in the largest diameter. Onsite asphalt concrete may also be used in compacted fill materials; however, it should not be placed under the residential pads. Placement of concrete and asphalt as compacted fill should also be approved by the project environmental engineer. Excavations for the removal of existing foundations, utilities, and vegetation, including onsite trees, should be observed by the geotechnical consultant. Large roots, highly organic soils, and existing utilities should be removed and should not be incorporated into new fills.

Soil that is disturbed as part of excavations or removal of trees or underground utilities should be evaluated by the geotechnical consultant. Excavations that require backfill should be properly documented and compacted under the observation and testing of the geotechnical consultant.

Cesspools, septic tanks, underground storage tanks, and/or wells may be encountered at the site. If encountered, they should be removed in accordance with Los Angeles County Department of Public Health requirements and the project environmental engineer's recommendations. The voids should be backfilled with suitable onsite or import materials and compacted in accordance with the recommendations provided in Section 3.2.4.

3.2.2 Protection of Existing Improvements and Utilities

Existing buildings, improvements, and utilities adjacent to the site that are to be protected in place should be located and visually marked prior to grading operations. Excavations adjacent to improvements to be protected in-place or any utility easement should be performed with care, so as not to undermine existing foundations or destabilize the adjacent ground (see the following Section 3.2.3).

Stockpiling of soils more than 5 feet in height at or near existing structures and over utility lines should not be allowed. If deeper removals are required, shoring or other special measures (i.e., setback or laybacks) to provide safety and mitigate the potential for lateral/vertical movements may be required.

3.2.3 Remedial Grading Measures

Remedial grading at the site should consist of removal of undocumented fill, if any, and weathered/unsuitable alluvium in their entirety. In general, we recommend that remedial removals consist of removal and recompaction of soils in the upper 5 to 7 feet, below existing grades across the site. Where deeper unsuitable material or undocumented fill is encountered, the removals should be extended to the bottom of unsuitable materials and/or undocumented fill to competent native soils. Where not limited by adjacent properties, the removals should extend a minimum of 5 feet laterally beyond the building footprints.

The geotechnical consultant should review and approve removal bottoms prior to fill placement and should provide specific recommendations based on actual conditions, if necessary.

Excavations deeper than 4 feet will need to be laid back at a minimum inclination of 1.5H:1V (horizontal to vertical) or provided with shoring. Shallow, unconfined excavations (4 feet or less) may consist of near-vertical excavation, locally, and upon review by the geotechnical consultant. Trench excavations should be performed in accordance with Cal/OSHA requirements for Soil Type "C" (also see Section 3.11). The contractor's qualified person should verify compliance with Cal/OSHA requirements. Excavations near existing structures (within a 1:1 projection) should be provided with shoring that is designed to support the surcharge load of the existing structure. Otherwise, excavations may need to be performed in sections (A/B/C slot cuts). Slot cuts should not exceed more than 20 feet in length. The conditions should be reviewed in the field by the project geotechnical consultant. Additional recommendations should be provided based on the actual conditions encountered during excavation and grading, as needed.

3.2.4 Fill Placement

Upon the completion of remedial grading measures, the approved removal bottoms should be scarified a minimum of 6 inches. The removal bottoms and fill materials should be compacted to at least 90 percent of maximum dry density, as determined by ASTM Test Method D1557. Fill materials should be placed in loose lifts no thicker than 8 inches.

Fill materials should be relatively free of deleterious material. The existing native alluvial soils are considered suitable for re-use as compacted fill provided any deleterious material is

removed. Existing onsite concrete material may be mixed with onsite soils and placed as compacted fill provided that it is broken into pieces that are smaller than 6 inches in the largest diameter. Existing onsite asphalt concrete may also be used in compacted fill materials; however, it should not be placed under the residential pads. Placement of concrete and asphalt as compacted fill should also be approved by the project environmental engineer. The compacted fill soils should be moisture conditioned to above optimum moisture content but within the compactable moisture range.

3.2.5 Import

The geotechnical consultant should evaluate and accept any import soils prior to transportation to the subject site. We recommend that import soils have similar engineering properties as onsite soils. At minimum, the import materials should have Expansion Index of less than 50, Plasticity Index of less than 15, fines content (passing Sieve 200) of less than 50 percent, and negligible soluble sulfate content.

3.3 Settlement Potential

The amount of settlement will depend upon the type of foundation(s) selected and future loading by additional fill and structures. Based on our subsurface exploration, analysis, and considering the remedial grading recommendations provided in this report are implemented during grading, and the anticipated structural loads typically associated with the proposed structures, we estimate that total and differential post-construction settlement (combined static and seismic) will be on the order of 1-inch and ½-inch over a span of 40 feet, respectively.

SA GEO should be provided with the foundation plans and structural loads, once available, in order to further evaluate the potential for post-construction settlement of the proposed building and associated improvements. The parameters provided herein will then be confirmed/updated based on the planned foundations and loads and additional testing and analysis.

3.4 Foundation Design

We understand that post-tension slabs will be used for the proposed residential units. The slab and foundations should be designed by the project structural engineer based on the proposed structure type and the anticipated loading conditions. The following foundation recommendations are provided with the assumption that the recommendations included in Section 3.2 of this report are implemented during grading of the site.

The recommended net allowable bearing capacity for continuous and isolated footings may be calculated based on the following equation:

$$q_{all} = 800 D + 300 B + 700 \text{ (but not to exceed 3,500 psf)}$$

where:

D = embedment depth of footing, in feet

B = width of footing, in feet

Also, the following parameters may be used for design of foundation and slabs:

- Soil unit weight = 120 pcf
- Soil internal friction angle = 30 degrees
- Coefficient of Friction = 0.38
- Subgrade modulus (k) of 125 pci (corrected for large slabs)
- Soil elastic modulus (Es) of 2,500 psi

The dead load of concrete below adjacent grades (buried concrete foundations) may be neglected. The allowable bearing pressure and friction coefficient may be increased by one-third for wind and seismic loading.

We recommend that strip and isolated footings for the buildings have a minimum embedment depth of 12 inches below the lowest adjacent grade. Continuous footings should be at least 12 inches wide and isolated column footings should be at least 24 inches wide. The footings of freestanding and isolated structures, such as walls and pilasters, should have a minimum embedment depth of 18 inches into approved soils.

Considering that the onsite soils have "very low" expansion potential, the design of post-tension foundation slabs may be based on Post-Tensioning Institute (PTI) DC 10.5 Edition, "Slabs on Stable Soils" using TYPE II slabs per the Building Research Advisory Board (BRAB) report. The following table provides our general guidelines and preliminary recommendations for design of post-tensioned foundations and slabs in accordance with the 2022 California Building Code (CBC) and Post-Tension Institute (PTI) DC 10.5 Edition provisions (as an alternative to Type II slabs per BRAB).

GEOTECHNICAL GUIDELINES FOR DESIGN OF POST-TENSIONED SLABS

Parameter	Recommendation
Center Lift	
Edge Moisture Variation Distance, e_m	9.00 feet
Center Lift, y_m	0.35 inches
Edge Lift	
Edge Moisture Variation Distance, e_m	5.00 feet
Edge Lift, y_m	0.50 inch
Presaturation, as needed, to obtain the minimum moisture down to the minimum depth	Pre-wet

We recommend that post-tensioned slabs have a thickened edge such that the slab is embedded a minimum of 12 inches below the lowest adjacent grade.

In addition, as indicated in the DC 10.5 Edition of PTI, shape factor calculations should be performed by the project structural engineer in order to determine if strengthening/modification of foundations are necessary. Per PTI guidelines, modifications to the foundations design should be considered if the shape factor (ratio of square of foundation perimeter over foundation area) exceeds 24.

If non-post-tensioned slabs-on-grade and foundations are considered at the site, an effective Plasticity Index of 15 is considered appropriate for the upper 15 feet of soil materials, in accordance with Wire Reinforcement Institute (WRI) method (per the 2022 CBC). For non-post-tensioned slabs, we recommend a minimum embedment of 12 inches below the lowest adjacent grade for the perimeter footings.

The foundations and slabs should also be designed to tolerate the total and differential settlements discussed in Section 3.3 of this report.

For the design of pole-type foundations (i.e., light poles, shade structures, etc.), an allowable soil-bearing pressure (s_1) of 360 psf/ft may be used for Equation 18-1 (the "pole" equation) of the 2022 CBC Section 1807.3.2.1 to determine the depth of embedment for the footings, considering level ground conditions. The equation is applicable for designed embedment depths of less than 12 feet for the purpose of computing lateral pressure. Also, for vertical loads on pole-type foundations, an allowable skin friction of 250 pounds per square foot may be used. For cast-in-place pole-type foundations, the vertical end bearing pressure should be neglected. We recommend that pole-type foundations have a minimum embedment of 2.5 feet below lowest adjacent grades.

3.5 Interior Slab Moisture Mitigation

In addition to geotechnical and structural considerations, the project owner should also consider interior moisture mitigation when designing and constructing slabs-on-grade.

The intended use of the interior space, type of flooring, and the type of goods in contact with the floor may dictate the need for, and design of, measures to mitigate potential effects of moisture emission from and/or moisture vapor transmission through the slab. Typically, for human occupied structures, a vapor retarder or barrier is recommended under the slab to help mitigate moisture transmission through slabs. The most recent guidelines by the American Concrete Institute (ACI 302.1R-04) suggest that the vapor retarder be placed directly under the slab (no sand layer). However, the location of the vapor retarder may also be subject to the builder's past successful practice. Placement of 1 or 2 inches of sand over the moisture retardant has been common practice by builders in southern California. Specifying the strength of the retarder to resist puncture and its permeance rating is important. These qualities are not necessarily a function of the retarder thickness. A minimum of 10-mil is typical but some materials, such as 10-mil polyethylene ("Visqueen"), may not meet the desired standards for toughness and permeance.

Vapor retarders, when used, should be installed in accordance with standards such as ASTM E 1643 and/or those specified by the manufacturer.

Concrete mix design and curing are also significant factors in mitigating slab moisture problems. Concrete with lower water/cement ratios results in denser, less permeable slabs that also "dry" faster with regard to when flooring can be installed, due to reduced moisture emission quantities and rates. Rewetting of the slab following curing should be avoided since it can result in additional drying time required prior to flooring installation. Proper concrete slab testing prior to flooring installation is also important.

Concrete mix design, the type and location of the vapor retarder should be determined in coordination with all parties involved in the finished product, including the project owner, architect, structural engineer, geotechnical consultant, concrete subcontractors, and flooring subcontractors.

3.6 Retaining Walls Design and Lateral Earth Pressures

Recommendations for lateral earth pressures for permanent retaining walls and structures (if any) with approved onsite drained soils and above groundwater table are as follows:

<i>Conditions</i>	<i>Level (pcf)</i>	<i>2:1 Sloping</i>
Active	40	65
At-Rest	60	85
Passive	360	180 (sloping down)

These parameters are based on a soil internal friction angle of 30 degrees and soil unit weight of 120 pcf.

To design an unrestrained retaining wall, such as a cantilever wall, the active earth pressure may be used. For a restrained retaining wall, the at-rest pressure should be used. Passive pressure is used to compute lateral soils resistance developed against lateral structural movement. The passive pressures provided above may be increased by one-third for wind and seismic loads. The passive resistance is taken into account only if it is ensured that the soil against embedded structure will remain intact with time. Future landscaping/planting and improvements adjacent to the retaining walls should also be taken into account in the design of the retaining walls. Excessive soil disturbance, trenches (excavation and backfill), future landscaping adjacent to footings and over-saturation can adversely impact retaining structures and result in reduced lateral resistance.

For sliding resistance, the friction coefficient of 0.38 may be used at the concrete and soil interface. The coefficient of friction may be increased by one-third for wind and seismic loading. The retaining walls may also need to be designed for additional lateral loads if other structures or walls are planned within a 1H:1V projection.

The seismic lateral earth pressure for walls retaining more than 6 feet of soil and level backfill conditions may be estimated to be an additional 23 pcf for active and at-rest conditions. The earthquake soil pressure has a triangular distribution and is added to the static pressures. For the active and at-rest conditions, the additional earthquake loading is zero at the top and maximum at the base. The seismic lateral earth pressure does not apply to walls retaining less than, or equal to, 6 feet of soil (2022 CBC Section 1803.5.12).

Drainage behind walls retaining more than 2.5 feet of soil should also be provided in accordance with the attached Figure 4. Specific drainage connections, outlets and avoiding open joints should be considered during design.

3.7 Seismic Design Parameters

The following table summarizes the seismic design criteria for the subject site. The seismic design parameters are developed in accordance with ASCE 7-16 and 2022 CBC. Please note that, considering the proposed structures and anticipated structural periods, site-specific ground-motion hazard analysis was not performed for the site. Per Supplement 3 of ASCE 7-16, the value of S_{M1} , and therefore S_{D1} , have been increased by 50 percent. The seismic response coefficient, C_s , should be determined per the parameters provided below and using equation 12.8-2 of ASCE 7-16.

<i>Selected Seismic Design Parameters from 2022 CBC/ASCE 7-16</i>	<i>Seismic Design Values</i>	<i>Reference</i>
Latitude	34.0770 North	
Longitude	-117.9369 West	
Controlling Seismic Source	Puente Hills	USGS, 2024
Site Class per Table 20.3-1 of ASCE 7-16	D	
Spectral Acceleration for Short Periods (S_s)	1.663 g	SEA/OSHPD, 2024
Spectral Accelerations for 1-Second Periods (S_1)	0.611 g	SEA/OSHPD, 2024
Site Coefficient F_a , Table 11.4-1 of ASCE 7-16	1.0	SEA/OSHPD, 2024
Site Coefficient F_v , Table 11.4-2 of ASCE 7-16	1.7	
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-4 of ASCE 7-16	1.109 g	SEA/OSHPD, 2024
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-16 (Includes 50% increase per Supplement 3)	1.039 g	
T_s , S_{D1}/S_{DS} 11.4.6 of ASCE 7-16	0.937 sec	
T_L , Long-Period Transition Period	8 sec	SEA/OSHPD, 2024
Peak Ground Acceleration Corrected for Site Class Effects ($PGAM$) from Equation 11.8-1 of ASCE 7-16	0.775 g	SEA/OSHPD, 2024
Seismic Design Category, Section 11.6 of ASCE 7-16	D	

3.8 Corrosivity

Based on the laboratory testing performed during our study, soluble sulfates exposure in the onsite soils is anticipated to be classified as "S0" per Table 19.3.1.1 of ACI-318-14. Structural concrete elements in contact with soil include footings and building slabs-on-grade. The flatwork and sidewalk concrete are typically not considered structural elements. Concrete mix for structural elements should be based on the "S0" soluble sulfate exposure class of Table 19.3.2.1 in ACI-318-14. Other ACI guidelines for structural concrete are recommended. Also, onsite soils are anticipated to be corrosive to metals.

3.9 Exterior Concrete

The driveway, patio slabs and other flatwork elements should be at least 4 inches thick. Considering that the onsite soils have "Very Low" expansion potential, reinforcement of concrete is not necessary from a geotechnical standpoint; however, reinforcement will reduce the potential for concrete cracking as a result of shrinkage. If reinforcement is used, we recommend that No. 3

bars be placed at 24 inches on center both ways. Concrete slabs should be provided with construction or weakened plane control joints at a maximum spacing of 10 feet. The control joints should have a thickness that is $\frac{1}{4}$ of the total concrete thickness. Upon the placement and compaction of subgrade soils (per Section 3.2 of these recommendations), the upper 6 inches of the subgrade soils should be pre-wetted to 110 percent of optimum moisture content prior to placement of concrete and reinforcement.

For exterior slabs, the use of a granular sublayer is primarily intended to facilitate presaturation and subsequent construction by providing a better working surface over the saturated soil. It also helps retain the added moisture in the native soil in the event that the slab is not placed immediately. Where these factors are not significant, the layer may be omitted. If used, we recommend placement of 2 to 4 inches of granular material over subgrade soils.

Exterior concrete elements such as curb and gutter, driveways, sidewalks, and patios are susceptible to lifting and cracking when constructed over expansive soils. With expansive soils, the impacts to flatwork/hardscape can be significant, generally requiring removal and replacement of the affected improvements. Please note that reducing concrete problems is often a function of proper slab design, concrete mix design, placement, and curing/finishing practices. Adherence to guidelines of the American Concrete Institute (ACI) is recommended. Also, the amount of post-construction watering, or lack thereof, can have a very significant impact on the adjacent concrete flatwork.

On projects with expansive soils, additional measures such as thickened concrete edges/footings, subdrains and/or moisture barriers should be considered where planters or natural areas with irrigation are located adjacent to the concrete improvements. Design and maintenance of proper surface drainage is also very important. If the concrete will be subject to heavy loading from cars/trucks or other heavy objects, at minimum, a 6-inch-thick pavement section should be used; however, the section should be designed by the geotechnical consultant using appropriate traffic indices for the intended use.

The above recommendations typically are not applied to curb and gutter.

3.10 Preliminary Asphalt Concrete Pavement Design

The testing of a sample collected of the onsite soils shows an R-value of 65. Final structural pavement sections should be based on R-value testing after the completion of grading and in accordance with City of West Covina requirements. Based on an assumed design R-value of 30 and estimated traffic indices (TIs), we recommend the following preliminary pavement sections:

<i>Street Location</i>	<i>Estimated TIs</i>	<i>Pavement Section</i>
General Drives	TI – 5.5	4-inch AC / 6-inch AB
Parking Stalls	TI – 4.0	3-inch AC / 6-inch AB
<i>AC = Asphalt Concrete, AB = Aggregate Base</i>		

Please note that for two-stage paving operations, we recommend that the final AC cap be a minimum of 1-inch thick.

Asphalt concrete pavement should be placed in accordance with the requirements of Sections 301 and 302 of the Standard Specifications of Public Works Construction (the Greenbook). Prior to construction of pavement sections, the subgrade soils should be scarified to a minimum depth of 6 inches, moisture-conditioned as needed, and recompact in-place to a minimum of 90 percent relative compaction (per ASTM D1557). Subgrade should be firm prior to aggregate base placement.

Aggregate base materials may consist of crushed aggregate base or crushed miscellaneous base, in accordance with the Greenbook (Section 200-2). The materials should be free of any deleterious materials. Aggregate base materials should be placed in 6- to 8-inch-thick loose lifts, moisture-conditioned as necessary, and compacted to a minimum of 95 percent relative compaction (per ASTM D1557). Asphalt concrete should also be compacted to a minimum relative compaction of 95 percent.

Unpaved median and parkway areas should also be provided with vertical moisture barriers.

3.11 Trench Excavation and Backfill

Excavations should be performed in accordance with the requirements set forth by Cal/OSHA Excavation Safety Regulations (Construction Safety Orders, Section 1504, 1539 through 1547, Title 8, California Code of Regulations). In general, onsite soils may be classified as Type "C" (sandy, friable soils). Cal/OSHA regulations indicate that, for workmen in confined conditions, the steepest allowable slopes in Type "C" soils are 1.5H:1V (horizontal to vertical), for excavations less than 20 feet deep. Where there is no room for these layback slopes, we anticipate that shoring will be necessary.

The subsurface soils, especially at depths below 5 feet, consist of sandy soils that are highly friable, may be locally loose, and prone to caving. Adequate shoring (i.e., shields) should be provided, as deemed necessary. Backfilling may require sand-cement slurry in order to reduce the potential of caving during the removal of shoring. The soils within the adjacent streets are anticipated to be similar to onsite soils. Excavations should be reviewed periodically by the contractor's qualified person to confirm compliance with Cal/OSHA requirements.

Utility trench backfill should be in accordance with City of West Covina's requirements and/or the governing jurisdiction's specifications. In general, native soils are anticipated to be suitable for use as trench backfill (above the pipe zone) from a geotechnical viewpoint; however, the City or governing agency may require select material, sand-slurry, or other measures. The City requires 36 inches of crushed aggregate base, compacted to 95 percent relative compaction, in the upper portion of the trenches within the existing street right of way. Native backfill materials should be compacted to a minimum of 90 percent relative compaction (per ASTM D1557). Rocks greater than 3 inches in largest diameter should generally not be used as trench backfill materials unless approved by the agency and geotechnical consultant of record. Backfill of the pipe zones should generally consist of clean sand (SE 30 or better) or gravel/crushed rock, in accordance with governing agency requirements. Excavation and backfilling of HDPE pipes (if any) should be in accordance with the manufacturer's requirement and the Greenbook. Select granular backfill (i.e.,

clean sand with SE 30 or better) may be used in lieu of native soils but should also be compacted or densified with water jetting and flooding.

Trenches excavated next to structures and foundations should also be properly backfilled and compacted to provide full lateral support and reduce settlement potential.

3.12 Groundwater

Based on our subsurface exploration and review of published groundwater data in the vicinity of the site, groundwater is anticipated to remain deeper than 100 feet below proposed finish grades. Groundwater is not expected to be encountered during rough grading; however, the presence of locally saturated soils and/or perched water cannot be ruled out, especially during rainy seasons.

3.13 Stormwater Infiltration

Based on our onsite percolation testing, stormwater infiltration is generally considered feasible at the tested locations, between 7 and 15 feet bgs. Additional percolation testing may need to be conducted onsite once a water quality management plan has been prepared in order to evaluate and test the subsurface soils at the actual location and depth of the proposed device(s). For preliminary design purposes, a design infiltration rate of 4.7 inches per hour may be used for devices that are 7 to 15 feet deep. This design infiltration rate includes the required minimum reduction factor (factor-of-safety) of 3 per the guidelines. Higher design infiltration rates may be used locally and at the locations/depths representative of the percolation tests performed during this study (see table in Section 2.6).

Infiltration systems should be designed and constructed in accordance with County of Los Angeles and City of West Covina requirements. Infiltration systems should have a minimum setback of at least 10 feet (or outside a 1:1 plane) from the bottom of adjacent foundations and at least 10 feet from property lines. The soils utilized as the infiltration surface should be reviewed and approved by the geotechnical consultant prior to installation of any infiltration devices. Special care should be taken to limit disturbance to native soils used as the infiltration surface. Proper maintenance will also be required to extend the operational life and reduce siltation or reduction in infiltration performance. All infiltration devices should be provided with an overflow system.

3.14 Surface Drainage and Irrigation

Maintaining adequate surface drainage, proper disposal of run-off water, and control of irrigation will help reduce the potential for future moisture-related problems and differential movements from soil heave/settlement.

Surface drainage should be carefully taken into consideration during design, grading, landscaping, and building construction. Positive surface drainage should be provided to direct surface water away from structures and slopes and toward the street or suitable drainage devices. Ponding of water adjacent to the structures should not be allowed. Buildings should have roof gutter systems and the run-off should be directed to parking lot/street gutters by area drainpipes or by sheet flow over paved areas. Paved areas should be provided with adequate drainage devices, gradients, and curbing to prevent run-off flowing from paved areas onto adjacent unpaved areas.

Considering the climatic conditions in southern California and the relatively low expansion potential of onsite soils, a two-percent slope away from structures should be provided and is in substantial compliance with the 2022 CBC. Also, swales with one-percent slopes are acceptable from our geotechnical standpoint and are common practice in this locale.

Construction of planter areas immediately adjacent to structures should be avoided if possible. If planter boxes are constructed adjacent to or near buildings, the planters should be provided with controls to prevent excessive penetration of the irrigation water into the foundation and flatwork subgrades. Provisions should be made to drain excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Raised planter boxes may be drained with weepholes. Deep planters (such as palm tree planters) should be drained with below-ground, water-tight drainage lines connected to a suitable outlet. Moisture barriers should also be considered.

It is also important to maintain a consistent level of soil moisture, not allowing the subgrade soils to become overly dry or overly wet. Properly designed landscaping and irrigation systems can help in that regard.

3.15 Additional Subsurface Exploration and Laboratory Testing

Additional subsurface exploration and laboratory testing may be necessary during the design phase of the project for determination/confirmation of the percolation rates, depending on the location and depth of the proposed system(s). Also, additional laboratory testing should be performed during and upon the completion of grading to confirm/update the design parameters provided herein.

3.16 Review of Future Plans

The project grading, foundation, wall, and landscape plans should be reviewed and accepted by the geotechnical consultant prior to grading and construction.

3.17 Observation and Testing during Grading and Construction

Geotechnical observation and testing should be performed by SA GEO during the following phases of grading and construction:

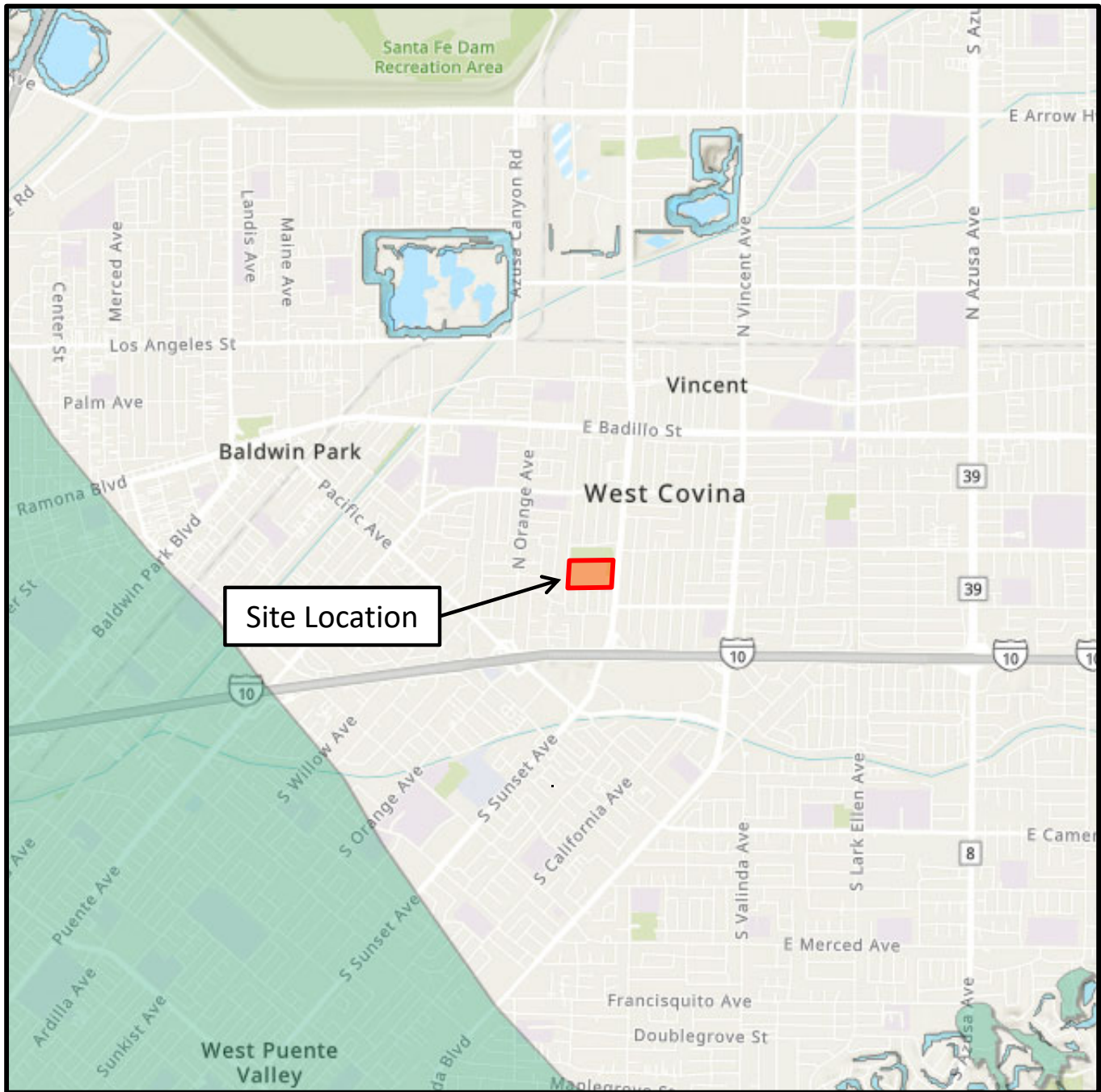
- During site demolition, preparation and clearing;
- During excavations performed for remedial grading and to relocate or remove existing underground improvements;
- During earthwork, including observation and acceptance of remedial removal bottoms and fill placement, including import material, if any;
- Following the completion of grading, in order to verify soil properties for foundations, slab-on-grade and pavements;
- Upon completion of any foundation or structural excavation, prior to pouring concrete;
- During slab and flatwork subgrade preparation prior to pouring concrete;

- During placement of backfill for utility trenches, and stormwater infiltration/filtration devices;
- During placement of backfill for retaining structures (if any);
- During installation and backfill of subdrainage systems (if any); and
- When any unusual soil conditions are encountered.

4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Meritage Homes, within the scope of services requested for the subject property described herein. This report or its contents should not be used or relied upon for other projects or purposes, or by other parties without the acknowledgement of SA GEO and the consultation of a geotechnical professional. The means and methods used by SA GEO for this study are based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, expressed or implied, is given.

Our findings, conclusions, and recommendations are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can vary from point to point, can be very different in-between exploration points, and can also change over time. Our conclusions and recommendations are, by nature, preliminary and subject to verification and/or modification during grading and construction when more subsurface data is exposed.

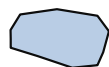


Source: Seismic Hazard Zones, Baldwin Park Quadrangle (CDMG, 1999)



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resource Code Section 2693(c) would be required.



Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resource Code Section 2693(c) would be required.

Site Location and Seismic Hazard Map

Meritage Homes
Proposed Residential Development
1501 Del Norte Street
West Covina, California

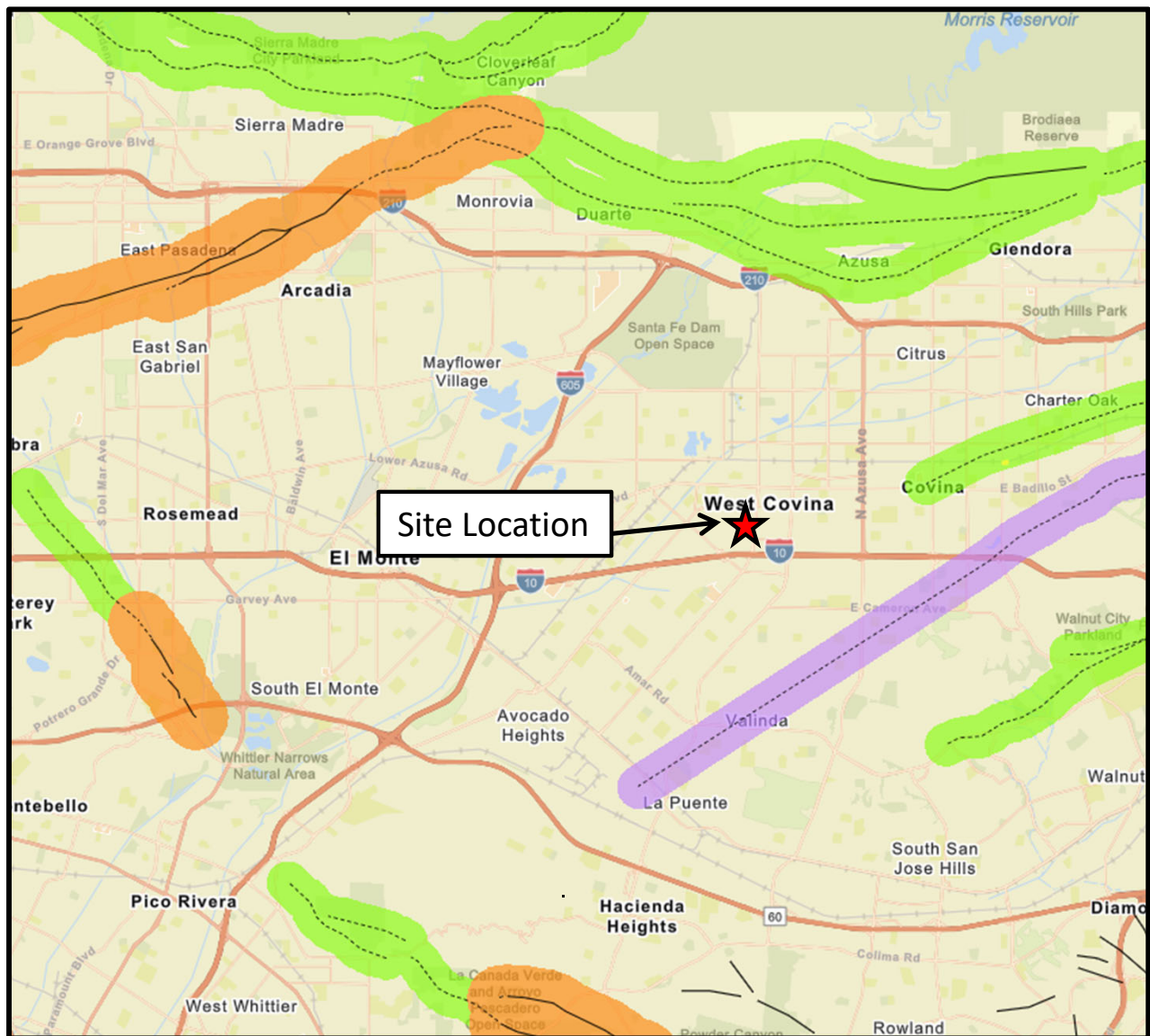
Project Number: 24082-01
Date: June 14, 2024
Figure 1





Source: Geologic Map of the Baldwin Park 7.5' Quadrangle (CDMG, 2000)

Regional Geologic Map		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Date: June 14, 2024 Figure 2	



Source: Fault Activity Map of California (Jennings and Bryant, 2010)



Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.



Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.



Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.



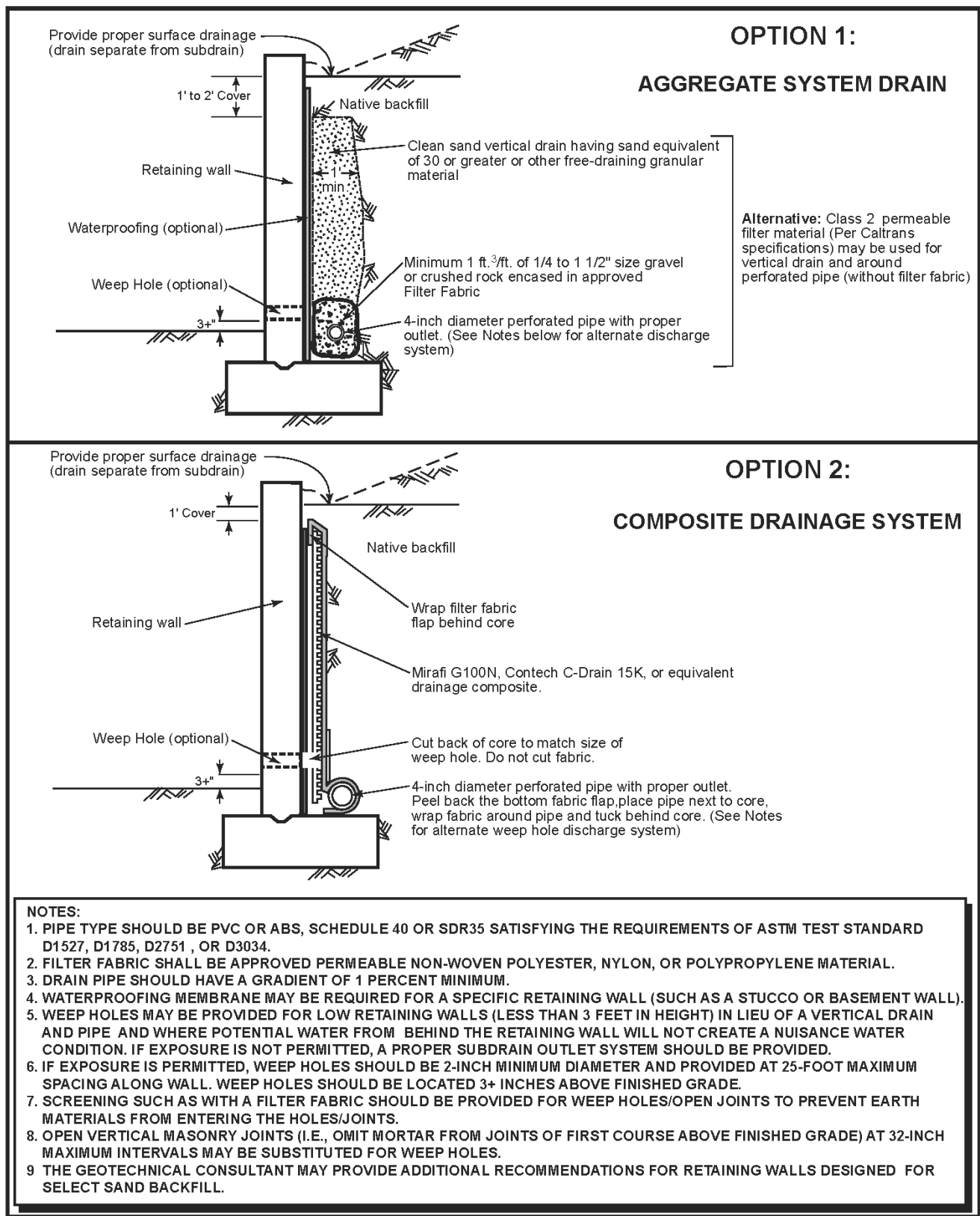
Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissance nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

Regional Fault Map

Meritage Homes
Proposed Residential Development
1501 Del Norte Street
West Covina, California

Project Number: 24082-01
Date: June 14, 2024
Figure 3





Retaining Wall Drainage Detail



Figure 4

Appendix A

APPENDIX A

REFERENCES

- California Division of Mines and Geology (CDMG), 1998, Seismic Hazard Zone Report for the Baldwin Park 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 022.
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- Structural Engineers Association/Office of Statewide Health Planning and Development (SEA/OSHDP), 2024, U.S. Seismic Design Maps, web site address: <https://seismicmaps.org/>; Date Accessed: June 10, 2024.
- U.S. Geological Survey, 2024, Unified Hazard Tool, NSHM 2014 Dynamic Deaggregation Program; web site address: <https://earthquake.usgs.gov/hazards/interactive/>; Date Accessed: June 10, 2024.

Appendix B

SOIL CLASSIFICATION CHART

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

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

Sampler and Symbol Descriptions

- Modified California sample (D-#)
 - ▣ Standard Penetration Test (S-#)
 - ▢ Shelby tube sample (T-#)
 - ▣ Large bulk sample (B-#)
 - ▣ Small bulk sample (SB-#)
 - ▽ Approximate depth of groundwater during drilling
 - ▽ Approximate depth of static groundwater
- Note: Number of blows required to advance driven sample 12 inches (or length noted).

Laboratory and Field Test Abbreviations

- AL** Atterberg limits (plasticity)
- CC** Chemical Testing incl. Soluble Sulfate
- CN** Consolidation
- DS** Direct Shear
- EI** Expansion Index
- GS** Grain Size Analysis (Sieve, Hydro. and/or -No. 200)
- MD** Maximum Density and Optimum Moisture
- RV** Resistance Value (R-Value)
- SE** Sand Equivalent
- UU** Unconsolidated Undrained Shear Strength

Notes:

- Soil classifications are based on the Unified Soil Classification System and include color, moisture, and relative density or consistency. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate. Bedrock descriptions are based on visual classification and include rock type, moisture, color, grain size, strength, and weathering.
- Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were drilled. They are not warranted to be representative of subsurface conditions at other locations or times.



KEY TO LOG OF BORING

Date(s)Drilled: 5-24-2024	Logged By: AC	H-1	Page 1 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	36.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows Per Foot					
0					Surface: Grass			
					<u>Alluvium (Qal)</u>			
	D-1	4		SM	@ 2.5': Upper: Dark brown silty fine SAND, moist, loose, roots, weathered/disturbed.	13.6	93.0	GS
5	D-2	13		SP-SM	Lower: Brown fine to coarse SAND with silt, moist, loose, roots.	2.4	98.4	CN
	D-3	28		SP	@ 5': Dark yellowish brown to yellowish gray fine to coarse SAND with silt, damp, loose to medium dense, trace gravel, roots in upper sample.	1.8	109.2	DS
10	D-4	62		SP	@ 7.5': Dark yellowish brown to yellowish gray fine to coarse SAND with gravel, damp, medium dense, trace silt.	2.3	114.2	
15	D-5	75		SP	@ 10': Dark yellowish brown to yellowish gray fine to coarse SAND with fine gravel, damp, medium dense, trace silt.	3.6	123.1	
20	D-6	40		SP-SM	@ 15': Yellowish gray to brownish gray fine to coarse SAND with fine to coarse gravel, damp, dense, trace silt.	5.3	101.0	
25	D-7	50/5"		SP	@ 20': Yellowish gray to yellowish brown fine to coarse SAND with silt, damp, medium dense, fine to coarse gravel. -Cobbles @ 21'	2.4	109.2	
30					@ 25': Yellowish gray to light gray fine to coarse SAND, damp, medium dense, fine to coarse gravel.			

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-24-2024	Logged By: AC	H-1 Page 2 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"	
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")	
Sampling Method(s): Modified California		Total Depth Drilled (ft) 36.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number					
30	D-8	50/6"	SP	@ 30': Yellowish gray fine to coarse SAND, damp, dense, fine to coarse gravel.	2.4	119.1	
35	D-9	85	SP	@ 35': Yellowish gray to yellowish brown fine to coarse SAND with fine to coarse gravel, damp, dense.	3.0	112.3	
40				Notes: Total Depth: 36.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
45							
50							
55							
60							

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-2	Page 1 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft)	30.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows Per Foot					
0					Surface: Grass			
	B-1				<u>Alluvium (Qal)</u>			B-1 @ 0-5' GS, EI, CC, DS, MD
	D-1	4		SM	@ 3': Dark brown to dark yellowish brown silty fine SAND, moist, loose, roots, weathered/disturbed.	15.4	90.3	
5	D-2	20		SP-SM	@ 6': Yellowish gray fine to medium SAND with silt, damp, medium dense.	4.0	90.8	
	D-3	23		SP	@ 9': Yellowish gray to light gray fine to coarse SAND, damp, medium dense, fine gravel.	2.3	110.0	
	D-4	29		SP-SM	@ 12': Reddish brown to yellowish gray fine to coarse SAND with silt, damp, very dense, fine gravel.	6.3	127.4	
15	D-5	63		SP	@ 15': Pale yellowish gray fine to coarse SAND with fine to coarse gravel, damp, dense.	2.1	117.3	
20	D-6	50/6"		SP	@ 20': Pale yellowish gray fine to coarse SAND with fine to coarse gravel, damp, dense.	1.9	117.4	
25	D-7	50/6"		SP-SM	@ 25': Yellowish brown to brownish gray fine to coarse SAND with silt, damp, very dense, fine to coarse gravel.	3.1	126.4	
					-Cobbles @ 27'			
30								

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-2	Page 2 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft)	30.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number					
30	D-8	50/5"	SP	@ 30': Yellowish brown to brownish gray fine to coarse SAND, damp, very dense, gravel.	3.2	113.7	
35				Notes: Total Depth: 30.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							
60							

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-3	Page 1 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	31
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows Per Foot					
0					Surface: Grass			
					<u>Alluvium (Qal)</u>			
	D-1	4		SM	@ 2.5': Dark brown to dark yellowish brown silty fine SAND, moist, loose, roots, weathered/disturbed.	9.5	96.6	
5	D-2	6		SM	@ 5': Dark brown to yellowish brown silty fine SAND, moist, medium dense, trace coarse gravel, roots, weathered/disturbed.	5.9	102.5	GS, CN
	D-3	18		SP	@ 7.5': Yellowish gray fine to medium SAND, damp, medium dense, trace fine gravel and coarse sand.	3.6	102.4	
10	D-4	72		SP	@ 10': Yellowish gray to light gray fine to coarse SAND, damp, dense, fine to coarse gravel.	2.4	123.0	
					-Cobbles @ 14'			
15	D-5	59		SP	@ 15': Yellowish gray to light gray fine to coarse SAND, damp, dense, fine to coarse gravel, trace cobbles.	2.2	126.7	
20	D-6	51		SP	@ 20': Yellowish gray to light gray fine to coarse SAND, damp, dense, fine to coarse gravel, trace cobbles.	3.2	123.6	
25	D-7	82		SP	@ 25': Yellowish gray to light gray fine to coarse SAND, damp, dense, fine to coarse gravel and cobbles.	2.6	125.9	
30								

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-3	Page 2 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	31
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number					
30	D-8	50/5"	SP	@ 30': Yellowish gray to light gray fine to coarse SAND, damp, very dense, fine to coarse gravel and cobbles.	4.0	102.7	
35				Notes: Total Depth: 31 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							
60							

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-4	Page 1 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft)	50.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows Per Foot					
0	B-1				Surface: Grass			
	D-1	4		SM	<u>Alluvium (Qal)</u> @ 2.5': Dark brown silty fine SAND, moist, medium dense, trace coarse sand, pores, roots, weathered/disturbed.	9.3	102.3	B-1 @ 0-5' GS, EI, CC
5	D-2	5		SM	@ 5': Dark brown silty fine to medium SAND, moist, medium dense, trace coarse sand, soil pores, roots, weathered/disturbed.	10.9	100.0	
	D-3	10		SP-SM	@ 7.5': Yellowish gray to light gray fine to coarse SAND with silt, moist, medium dense, trace fine gravel.	7.0	102.4	GS, AL, CN
10	D-4	18		SP	@ 10': Yellowish gray fine to coarse SAND, damp, medium dense to dense, trace silt and fine gravel.	2.5	112.7	
15	D-5	54		SP	@ 15': Yellowish gray fine to coarse gravelly SAND, damp, dense, trace silt.	3.7	113.5	
20	D-6	19		SP-SM	@ 20': Light yellowish gray fine to coarse SAND with silt and fine to coarse gravel, damp, dense. -Cobbles @ 21'	2.1	125.3	
25	D-7	50/6"		SP	@ 25': Dark gray to dark yellowish gray fine to coarse SAND, damp, dense, coarse gravel, trace silt.	3.1	129.0	
30								

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	H-4	Page 2 of 2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft)	50.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Blows Per Foot					
30	D-8	84	SP	@ 30': Yellowish brown fine to medium SAND, moist, medium dense, micaceous. -Cobbles @ 33'	4.8	104.7	
35	D-9	50/6"	SP	@ 35': Yellowish brown fine to coarse SAND, damp, very dense, coarse gravel, trace cobbles.	3.2	126.5	
40	D-10	50/6"	SP	@ 40': Yellowish brown fine to coarse SAND, damp, very dense, fine to coarse gravel, trace cobbles.	2.8	123.7	
45	D-11	50/2"	SP	@ 45': Yellowish gray to light gray fine to coarse SAND, damp, very dense, fine to coarse gravel and cobbles.	3.1	137.3	
50	D-12	50/5"		@ 50': No Sample Recovery.			
55				Notes: Total Depth: 50.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
60							

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-24-2024	Logged By: AC	H-5 Page 1 of 1
Drilling Method: Hollow Stem	Drill Bit Size/Type: 11"	
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")	
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft) 26.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number Blows Per Foot					
0	B-1			Surface: Grass <u>Alluvium (Qal)</u>			B-1 @ 0-5'
	D-1	5	SM	@ 2.5': Dark brown silty fine SAND, moist, loose, roots, weathered/disturbed.	11.4	102.2	
5	D-2	6	SM	@ 5': Dark brown silty fine SAND, moist, loose, roots, weathered/disturbed, less silty in sampler tip.	11.0	101.1	
	D-3	16	SP	@ 7.5': Yellowish gray to yellowish brown fine to medium SAND, damp, loose to medium dense.	3.8	99.2	GS, AL, CN
10	D-4	24	SP	@ 10': Yellowish gray fine to coarse SAND, damp, medium dense, trace coarse gravel.	2.6	118.3	
				-Cobbles @ 14'			
15	D-5	40	SP	@ 15': Yellowish gray to light gray fine to coarse SAND with fine to coarse gravel, damp, medium dense.	3.0	102.9	
20	D-6	50/5"	SP	@ 20': Yellowish gray to yellowish brown gravelly fine to coarse SAND, damp, dense, trace coarse gravel. - SAMPLE DISTURBED -	2.1	117.1	
25	D-7	50/5"	SP	@ 25': Yellowish gray to yellowish brown fine to coarse SAND, damp, dense, fine gravel, trace coarse gravel.	2.4	112.1	
30				Notes: Total Depth: 26.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	P-1	Page 1 of 1
Drilling Method: Hollow Stem	Drill Bit Size/Type: 9"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	10.5
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES				MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows Per Foot	USCS				
0					Surface: Grass			
					<u>Alluvium (Qal)</u>			
	D-1	4		SM	@ 3': Dark brown silty fine SAND, moist, loose, trace fine gravel, roots, weathered/disturbed.	13.2	87.7	
5	D-2	9		SM	@ 6': Dark brown to dark yellowish brown silty fine SAND, moist, loose, trace fine gravel.	8.6	99.0	
10	D-3	19		SP	@ 9': Yellowish gray to light gray fine to coarse SAND, damp, medium dense.	2.1	110.8	GS
					Notes: Total Depth: 10.5 Feet. Groundwater Not Encountered. 10' Slotted 2" Well Pipe Installed. Backfilled with No. 3 Sand. Presoak performed 5/23/24. Percolation Testing Performed 5/23/24. Backfilled with Cuttings/Sand.			
15								
20								
25								
30								

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024	Logged By: AC	P-2	Page 1 of 1
Drilling Method: Hollow Stem	Drill Bit Size/Type: 9"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	15
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES				USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows	Per Foot					
0						Surface: Grass			
						<u>Alluvium (Qal)</u>			
	D-1	6			SM	@ 3': Dark brown silty fine SAND, moist, loose, roots, weathered/disturbed.	12.7	100.4	
5	D-2	18			SP	@ 6': Yellowish gray to yellowish brown fine to coarse SAND, damp, medium dense, trace fine gravel.	3.2	104.4	
10	D-3	29			SP	@ 9': Yellowish gray fine to coarse SAND with fine to coarse gravel, damp, medium dense.	2.5	110.0	
	D-4	50			SP	@ 12': Yellowish gray to yellowish brown fine to coarse SAND with fine to coarse gravel, damp, medium dense, cobble in sampler tip.	4.5	104.8	GS
15						Notes: Total Depth: 15 Feet. Groundwater Not Encountered. 10' Slotted; 5' Solid 2" Well Pipe Installed. Backfilled with No. 3 Sand. Presoak performed 5/23/24. Percolation Testing Performed 5/23/24. Backfilled with Cuttings/Sand.			
20									
25									
30									

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Date(s)Drilled: 5-23-2024		Logged By: AC		P-3 Page 1 of 1				
Drilling Method: Hollow Stem		Drill Bit Size/Type: 9"						
Drill Rig Type: CME 85		Hammer Type: Auto (140lbs @ 30")						
Sampling Method(s): Modified California				Total Depth Drilled (ft) 10.5				
Approximate Groundwater Depth: Groundwater Not Encountered.				Approximate Ground Surface Elevation (ft)				
Comments:								
Depth (ft) 0 5 10 15 20 25 30	SAMPLES		USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS	
	Type	Number Blows Per Foot						
				Surface: Grass				
				<u>Alluvium (Qal)</u>				
	D-1	5	SM	@ 3': Dark brown to yellowish brown silty fine to medium SAND, moist, loose, trace fine gravel, roots, weathered/ disturbed.	8.3	98.5		
	D-2	16	SP	@ 6': Yellowish gray to light gray fine to medium SAND, damp, loose to medium dense, trace coarse gravel.	3.2	93.2		
	D-3	26	SP	@ 9': Yellowish gray to gray fine to coarse SAND with gravel and cobbles, damp, medium dense.	1.6	114.8	GS, CN	
				Notes: Total Depth: 10.5 Feet. Groundwater Not Encountered. 10' Slotted 2" Well Pipe Installed. Backfilled with No. 3 Sand. Presoak performed 5/24/24. Percolation Testing Performed 5/24/24. Backfilled with Cuttings/Sand.				
Log Of Boring								S A
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California				Project Number: 24082-01 Appendix B				

Date(s)Drilled: 5-23-2024	Logged By: AC	P-4	Page 1 of 1
Drilling Method: Hollow Stem	Drill Bit Size/Type: 9"		
Drill Rig Type: CME 85	Hammer Type: Auto (140lbs @ 30")		
Sampling Method(s): Modified California		Total Depth Drilled (ft)	15
Approximate Groundwater Depth: Groundwater Not Encountered.		Approximate Ground Surface Elevation (ft)	
Comments:			

Depth (ft)	SAMPLES				USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	Type	Number	Blows	Per Foot					
0						Surface: 2.25" AC			
						<u>Alluvium (Qal)</u>			
	D-1	7			SM	@ 3': Dark brown to yellowish brown silty fine to medium SAND, moist, loose, roots, weathered/disturbed.	10.0	98.8	
5									
	D-2	20			SP	@ 6': Yellowish gray to yellowish brown fine to medium SAND, damp, medium dense, trace fine gravel.	3.4	108.6	
10									
	D-3	31			SP	@ 9': Yellowish gray fine to coarse SAND with fine gravel, damp, dense, slightly friable, trace coarse gravel.	2.1	120.0	
	D-4	37			SP	@ 12': Yellowish gray fine to coarse SAND with fine gravel, damp, medium dense, slightly friable, trace coarse gravel.	3.6	119.0	GS
15									
						Notes: Total Depth: 15 Feet. Groundwater Not Encountered. 10' Slotted; 5' Solid 2" Well Pipe Installed. Backfilled with No. 3 Sand. Presoak performed 5/24/24. Percolation Testing Performed 5/24/24. Backfilled with Cuttings/Sand.			
20									
25									
30									

Log Of Boring		
Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Appendix B	

Appendix C



MATERIALS FINER THAN 75- μ m (No. 200) SIEVE by WASHING

ASTM D1140

Client: SA Geotechnical, Inc
 Project: 1501 Del Norte Street
 Project No.: 24082-01

HAI Project No.: SAG-24-026
 Performed by: GA
 Checked by: KL
 Date: 5/31/2024

Boring No.	Sample No.	Depth (ft)	Sample Description (USCS)	Dry Soil before Wash + W _{Container}	Dry Soil after #200 Wash + W _{Container}	W _{Container}	Wt of soil retained on # 200 sieve	Initial wt of dry soil	Soil % passing 200 sieve
				g	g	g	g	g	%
H-1	D1	2.5	Brown, Poorly Graded Sand with Silt (SP-SM)	593.43	572.76	216.74	356.02	376.69	5.49
H-2	B1	0-5	Brown, Silty Sand (SM)	597.40	412.11	221.68	190.43	375.72	49.32
H-3	D2	5	Brown, Silty Sand (SM)	591.20	527.26	221.74	305.52	369.46	17.31
H-4	B1	0-5	Brown, Silty Sand (SM)	672.63	515.36	220.52	294.84	452.11	34.79
H-4	D3	9	Light Brown, Poorly Graded Sand with Silt (SP-SM)	576.52	548.19	216.86	331.33	359.66	7.88
H-5	D3	7.5	Light Brown, Poorly Graded Sand (SP)	591.53	583.86	220.51	363.35	371.02	2.07



PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D6913

Client: SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project No.: 24082-01
 Boring No.: P-1
 Sample No.: D-3
 Depth (ft): 9
 Sample Description: Light Brown, Poorly Graded Sand with Gravel (SP)

HAI Project No.: SAG-24-026

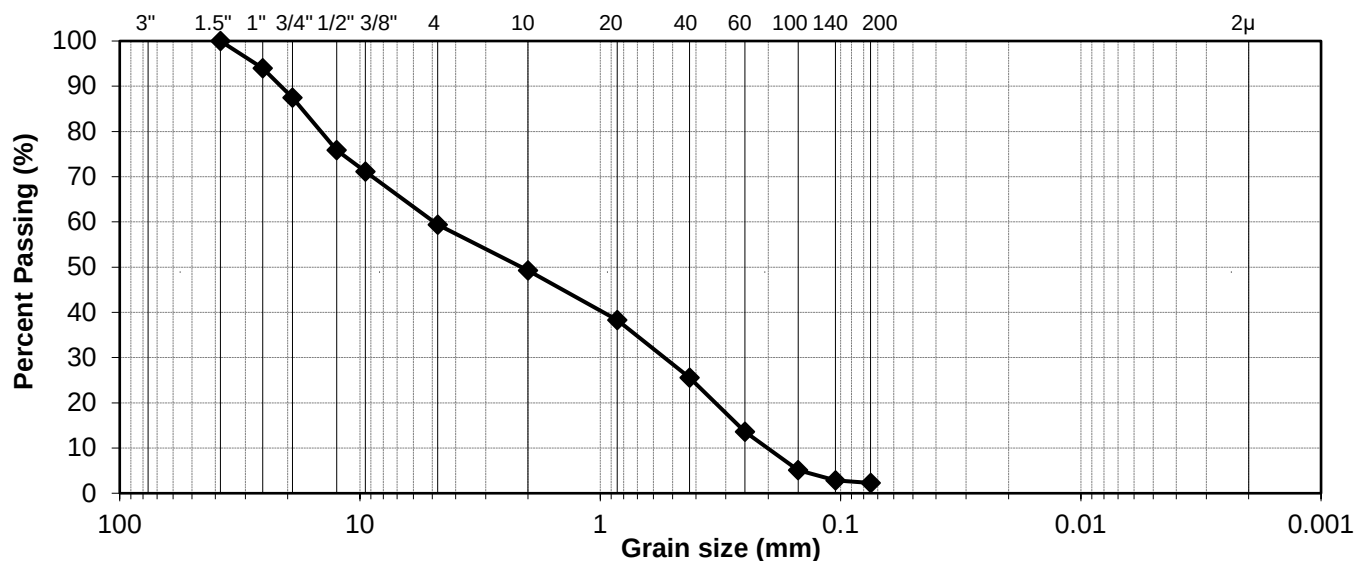
Tested by: GA

Checked by: KL

Date: 05/31/24

Dry Weight (g) 506.9

Sieve Size	Aperture	Weight Retained	% Retained	% Passing	Project Specification
	mm	g	%	%	%
3"	76.2	0.00	0.0	100.0	-
1.5"	38.1	0.00	0.0	100.0	-
1"	25.4	30.42	6.0	94.0	-
3/4 "	19.1	33.18	6.5	87.5	-
1/2 "	12.5	58.66	11.6	75.9	-
3/8 "	9.5	24.04	4.7	71.1	-
# 4	4.75	59.51	11.7	59.4	-
# 10	2.00	51.42	10.1	49.3	-
# 20	0.85	55.49	10.9	38.3	-
# 40	0.425	64.54	12.7	25.6	-
# 60	0.250	60.60	12.0	13.6	-
# 100	0.150	43.24	8.5	5.1	-
# 140	0.105	11.31	2.2	2.9	-
# 200	0.075	2.98	0.6	2.3	-
Pan		11.53	2.3	0.0	-



Particle-Size Analysis	D ₁₀	0.21	% Gravel	% Sand	% Fines
	D ₃₀	0.57	40.6	57.1	2.3
	D ₆₀	4.99	Sample Description / USCS Classification		
	C _u	24.06	Light Brown, Poorly Graded Sand with Gravel (SP)		
	C _c	0.32			



PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D6913

Client: SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project No.: 24082-01
 Boring No.: P-2
 Sample No.: D-4
 Depth (ft): 12
 Sample Description: Light Brown, Poorly Graded Sand (SP)

HAI Project No.: SAG-24-026

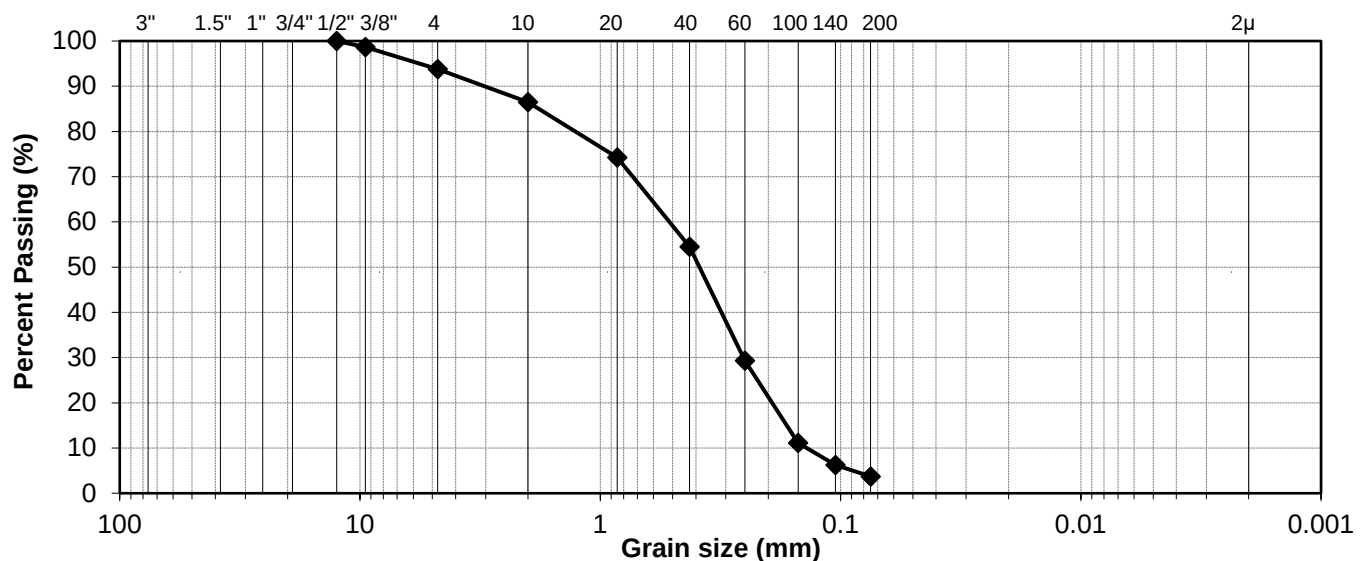
Tested by: GA

Checked by: KL

Date: 05/31/24

Dry Weight (g) 384.4

Sieve Size	Aperture	Weight Retained	% Retained	% Passing	Project Specification
	mm	g	%	%	%
3"	76.2	0.00	0.0	100.0	-
1.5"	38.1	0.00	0.0	100.0	-
1"	25.4	0.00	0.0	100.0	-
3/4 "	19.1	0.00	0.0	100.0	-
1/2 "	12.5	0.00	0.0	100.0	-
3/8 "	9.5	5.08	1.3	98.7	-
# 4	4.75	18.77	4.9	93.8	-
# 10	2.00	28.18	7.3	86.5	-
# 20	0.85	47.04	12.2	74.2	-
# 40	0.425	75.94	19.8	54.5	-
# 60	0.250	96.67	25.1	29.3	-
# 100	0.150	69.93	18.2	11.1	-
# 140	0.105	18.69	4.9	6.3	-
# 200	0.075	9.79	2.5	3.7	-
Pan		14.29	3.7	0.0	-



Particle-Size Analysis	D ₁₀	0.14	% Gravel	% Sand	% Fines
	D ₃₀	0.25	6.2	90.1	3.7
	D ₆₀	0.54	Sample Description / USCS Classification		
	C _u	3.90			
	C _c	0.85			

Light Brown, Poorly Graded Sand (SP)



PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D6913

Client: SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project No.: 24082-01
 Boring No.: P-3
 Sample No.: D-3
 Depth (ft): 9
 Sample Description: Light Brown, Poorly Graded Sand with Gravel (SP)

HAI Project No.: SAG-24-026

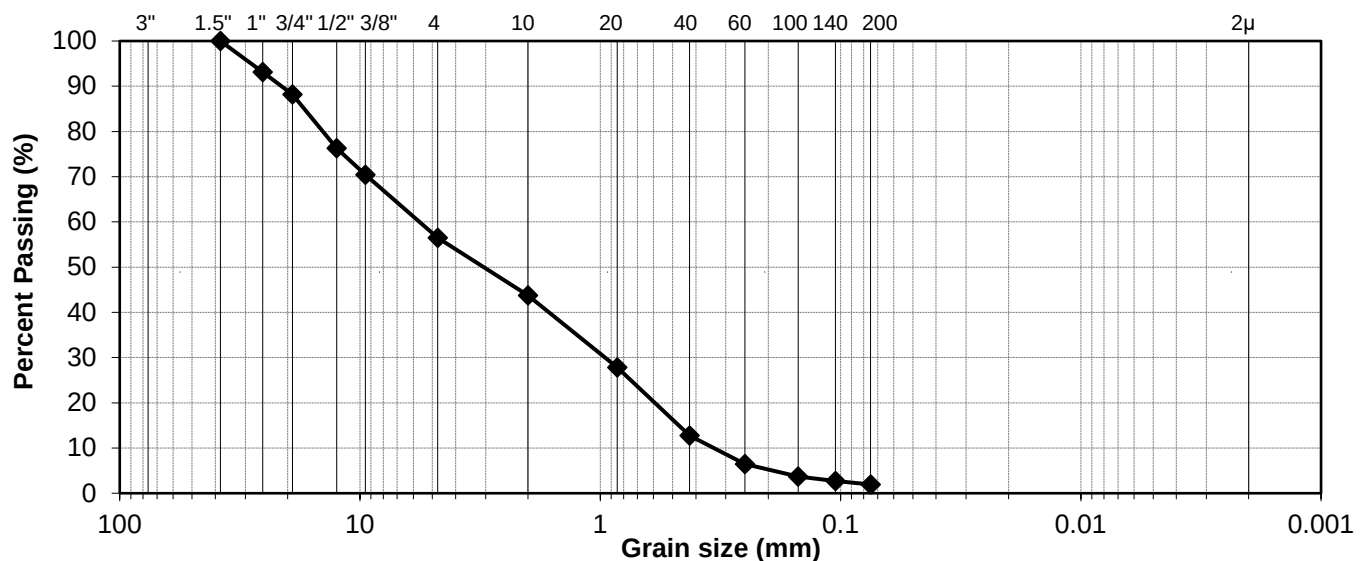
Tested by: GA

Checked by: KL

Date: 05/31/24

Dry Weight (g) 719.8

Sieve Size	Aperture	Weight Retained	% Retained	% Passing	Project Specification
	mm	g	%	%	%
3"	76.2	0.00	0.0	100.0	-
1.5"	38.1	0.00	0.0	100.0	-
1"	25.4	49.45	6.9	93.1	-
3/4 "	19.1	35.51	4.9	88.2	-
1/2 "	12.5	85.83	11.9	76.3	-
3/8 "	9.5	42.04	5.8	70.4	-
# 4	4.75	100.29	13.9	56.5	-
# 10	2.00	91.93	12.8	43.7	-
# 20	0.85	114.28	15.9	27.9	-
# 40	0.425	108.76	15.1	12.7	-
# 60	0.250	45.42	6.3	6.4	-
# 100	0.150	19.44	2.7	3.7	-
# 140	0.105	7.28	1.0	2.7	-
# 200	0.075	5.55	0.8	1.9	-
Pan		14.02	1.9	0.0	-



Particle-Size Analysis	D ₁₀	0.35	% Gravel	% Sand	% Fines
	D ₃₀	1.01	43.5	54.6	1.9
	D ₆₀	5.94	Sample Description / USCS Classification		
	C _u	17.03	Light Brown, Poorly Graded Sand with Gravel (SP)		
	C _c	0.49			



PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D6913

Client: SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project No.: 24082-01
 Boring No.: P-4
 Sample No.: D-4
 Depth (ft): 12
 Sample Description: Light Brown, Poorly Graded Sand with Gravel (SP)

HAI Project No.: SAG-24-026

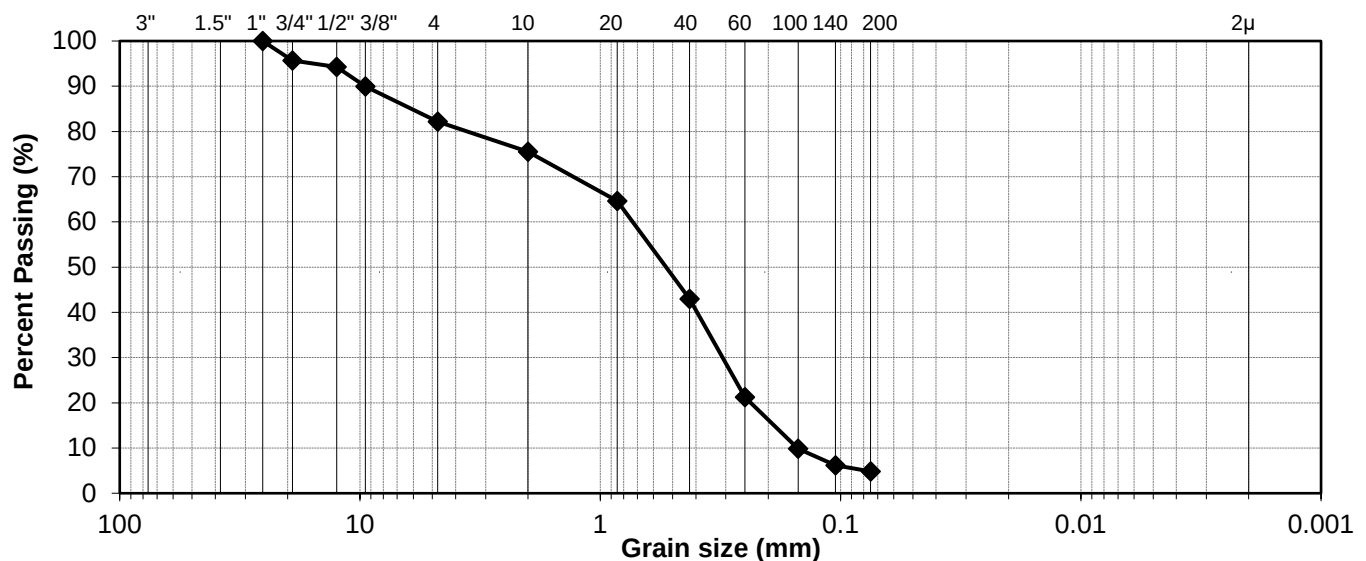
Tested by: GA

Checked by: KL

Date: 05/31/24

Dry Weight (g) 468.2

Sieve Size	Aperture	Weight Retained	% Retained	% Passing	Project Specification
	mm	g	%	%	%
3"	76.2	0.00	0.0	100.0	-
1.5"	38.1	0.00	0.0	100.0	-
1"	25.4	0.00	0.0	100.0	-
3/4 "	19.1	20.27	4.3	95.7	-
1/2 "	12.5	6.62	1.4	94.3	-
3/8 "	9.5	20.08	4.3	90.0	-
# 4	4.75	36.55	7.8	82.2	-
# 10	2.00	31.27	6.7	75.5	-
# 20	0.85	50.72	10.8	64.7	-
# 40	0.425	101.48	21.7	43.0	-
# 60	0.250	101.78	21.7	21.2	-
# 100	0.150	53.21	11.4	9.9	-
# 140	0.105	17.27	3.7	6.2	-
# 200	0.075	6.37	1.4	4.8	-
Pan		22.60	4.8	0.0	-



Particle-Size Analysis	D ₁₀	0.15	% Gravel	% Sand	% Fines
	D ₃₀	0.32	17.8	77.3	4.8
	D ₆₀	0.76	Sample Description / USCS Classification Light Brown, Poorly Graded Sand with Gravel (SP)		
	C _u	5.02			
	C _c	0.90			



Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4318

Client: SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project No.: 24082-01
Boring No.: H-4
Sample No.: D3
Depth (ft): 9.0
Soil Description: Light Brown, Poorly Graded Sand with Silt (SP-SM)

HAI Project No.: SAG-24-026

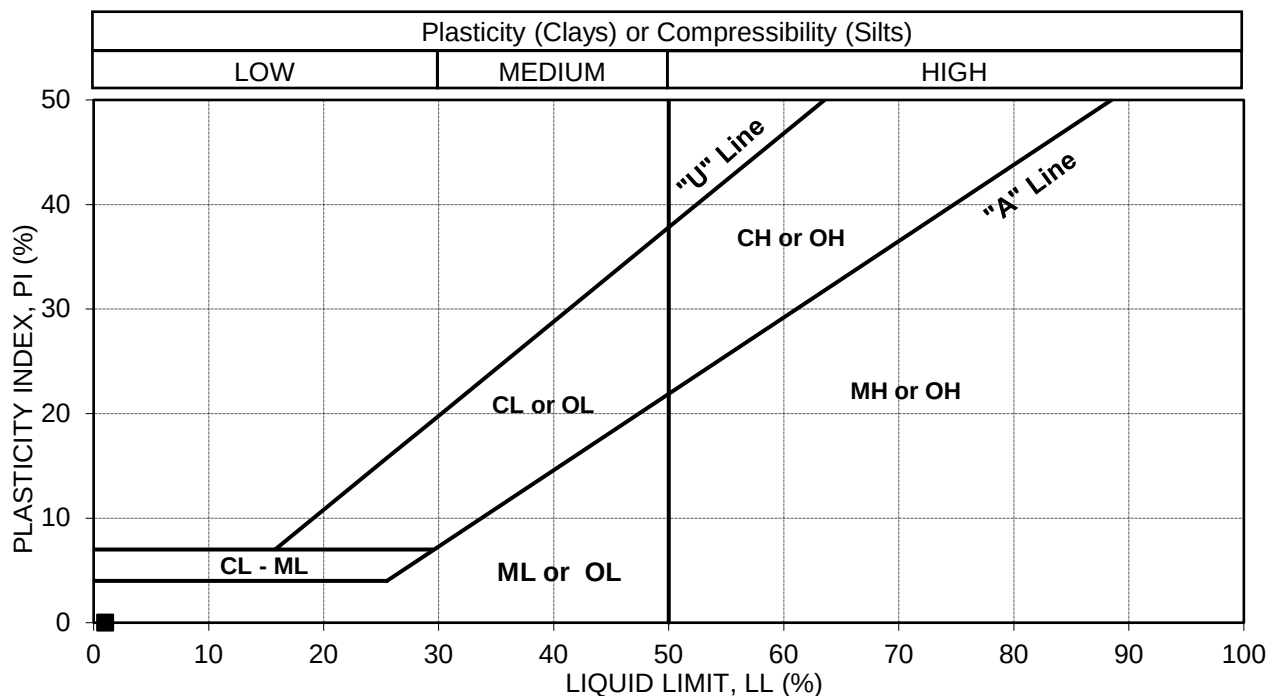
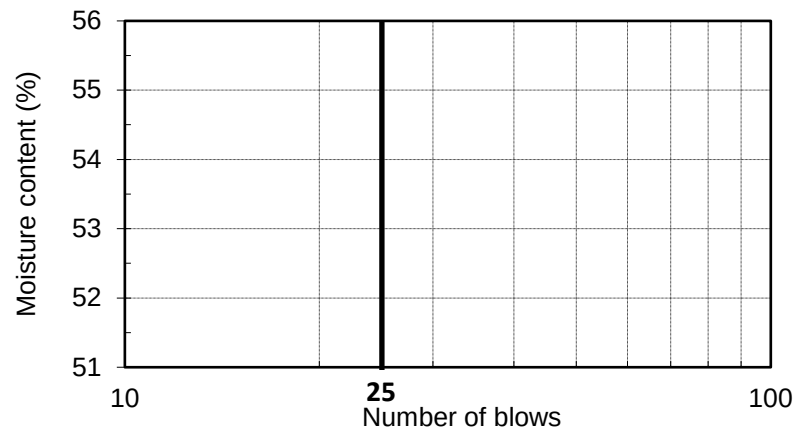
Tested by: GA

Checked by: KL

Date: 05/31/24

Test		LL	LL	LL	PL	PL
No. of blows	-	-	-	-	-	-
Wt. of Wet Soil + Container	(g)	-	-	-	-	-
Wt. of Dry soil + Container	(g)	-	-	-	-	-
Wt. of Container	(g)	-	-	-	-	-
Water content	(%)	-	-	-	-	-

Liquid Limit (LL)	-
Plastic Limit (PL)	-
Plasticity Index (PI)	-
USCS	NP
Remarks: - Fine Sample is Less than 50% of Passing #200	





Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4318

Client: SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project No.: 24082-01
Boring No.: H-5
Sample No.: D3
Depth (ft): 7.5
Soil Description: Light Brown, Poorly Graded Sand (SP)

HAI Project No.: SAG-24-026

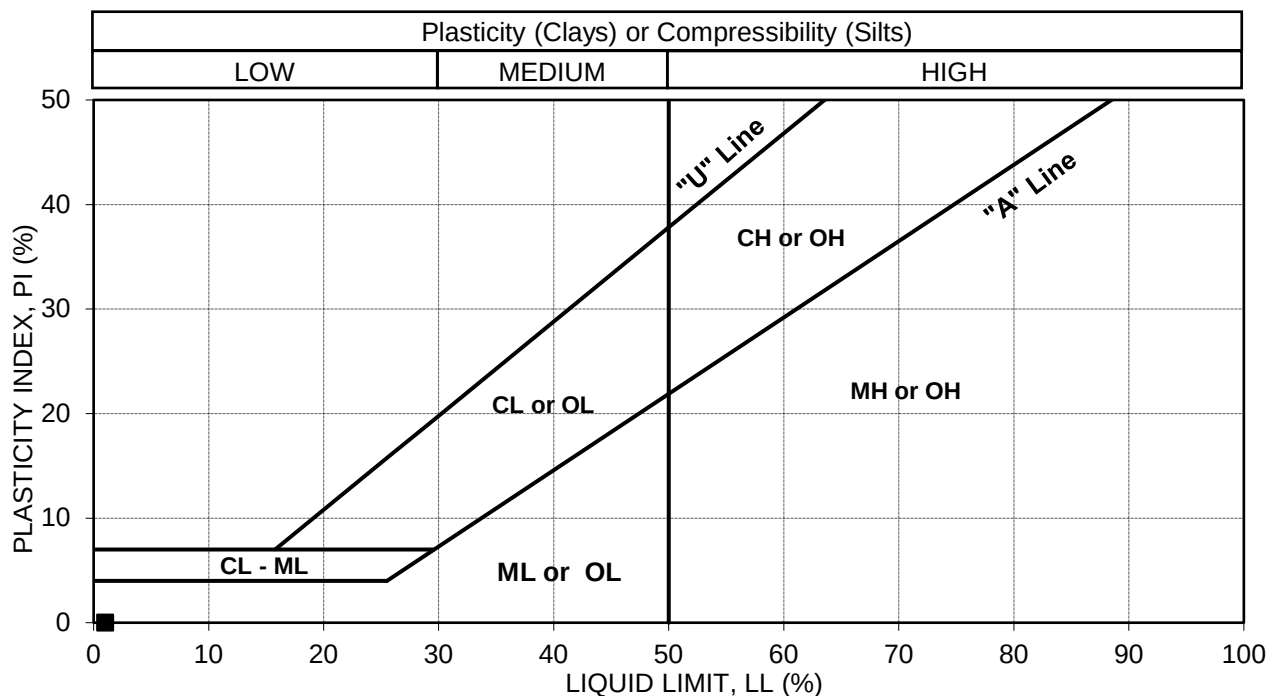
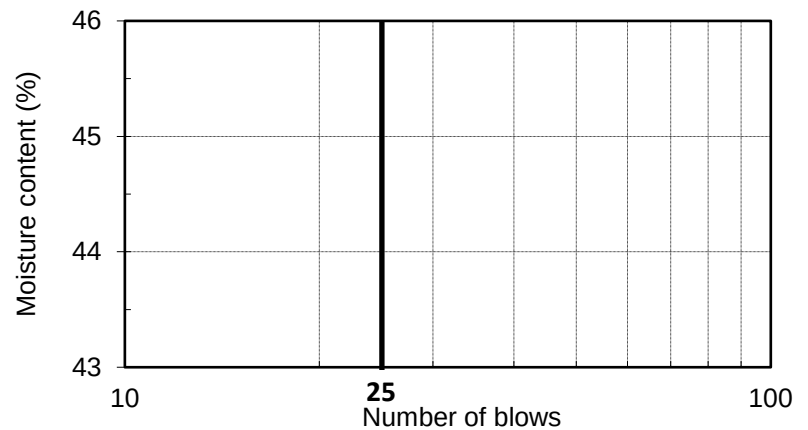
Tested by: GA

Checked by: KL

Date: 05/31/24

Test		LL	LL	LL	PL	PL
No. of blows	-	-	-	-	-	-
Wt. of Wet Soil + Container	(g)	-	-	-	-	-
Wt. of Dry soil + Container	(g)	-	-	-	-	-
Wt. of Container	(g)	-	-	-	-	-
Water content	(%)	-	-	-	-	-

Liquid Limit (LL)	-
Plastic Limit (PL)	-
Plasticity Index (PI)	-
USCS	NP
Remarks: - Fine Sample is Less than 50% of Passing #200	





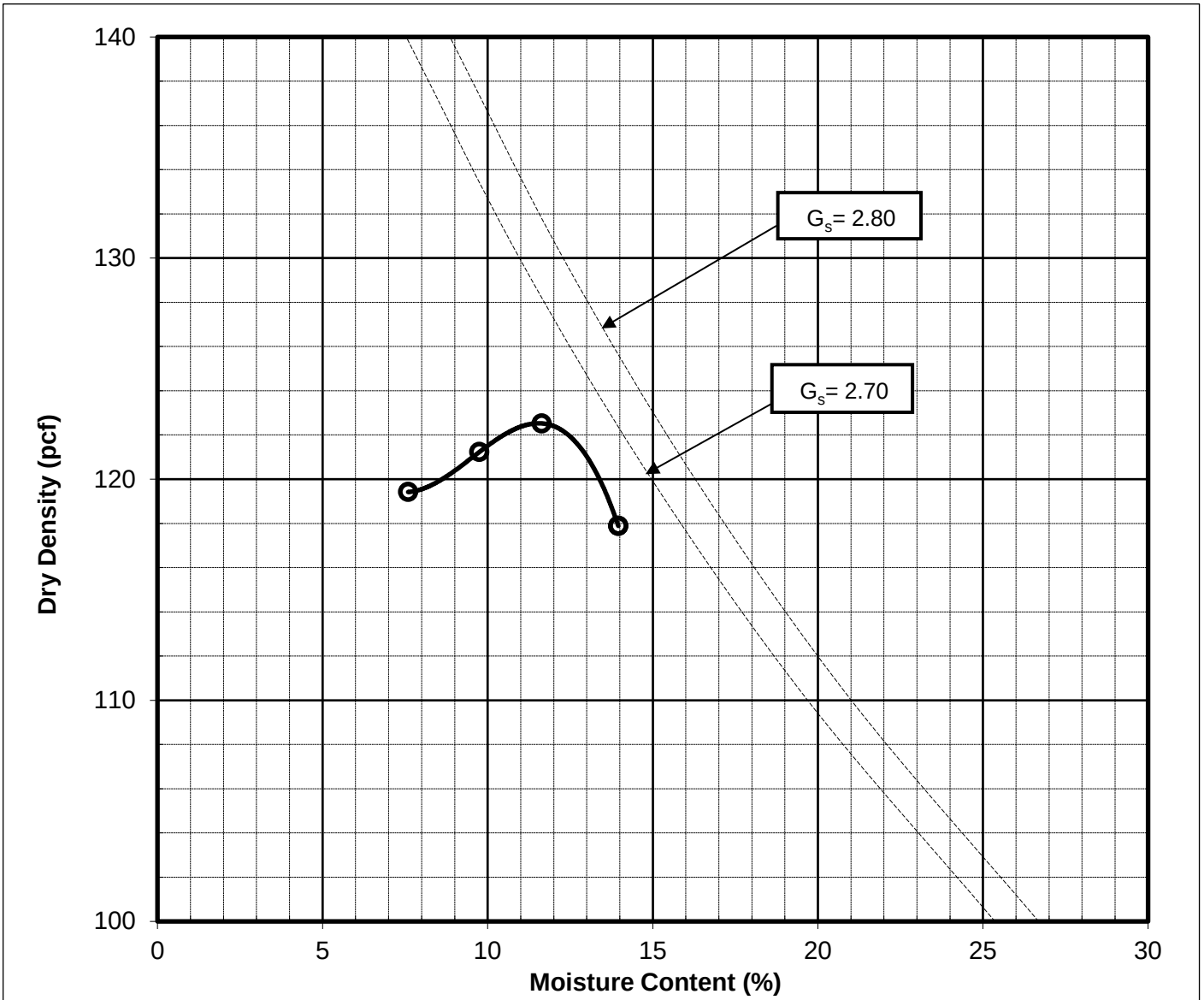
Compaction Characteristics of Soils Using Modified Effort

ASTM D1557

Client: SA Geotechnical, Inc
 Project: 1501 Del Norte Street
 Project No.: 24082-01
 Boring Number: H-2
 Sample Number: B1
 Depth (ft) : 0-5
 Soil Description: Brown, Silty Sand (SM)

HAI Project No.: SAG-24-026
 Tested by: GA
 Checked by: KL
 Date: 05/31/24

Mold size (in)	4"	Maximum Dry Density (pcf)	122.5
Procedure	A	Optimum Moisture Content (%)	11.5
Weight Retained on:	1.9	Corrected Maximum Dry Density (pcf)	-
Remarks:		Corrected Optimum Moisture Content (%)	-





EXPANSION INDEX

ASTM D4829

Client: SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project No.: 24082-01
Boring No.: H-2
Sample No.: B1
Depth (ft): 0-5
Soil Description: Brown, Silty Sand (SM)

HAI Project No.: SAG-24-026

Tested by: GA

Checked by: KL

Date: 5/31/2024

Apparatus No.: 2

Initial Specimen Info		
Wt. of wet soil + cont.	243.79	g
Wt. of dry soil + cont.	229.04	g
Wt. of container	24.44	g
Wt. of water	14.75	g
Wt. of dry soil	204.60	g
Moisture Content	7.2	%

Wt. of wet soil + ring	625.55	g
Wt. of ring	206.33	g
Wt. of wet soil	419.22	g
Wet density of soil	130.6	pcf
Dry density of soil	121.8	pcf
Specific gravity of soil	2.68	-
Saturation	51.8	%

Final Specimen Info		
Wt. of wet soil + cont.	654.61	g
Wt. of dry soil + cont.	591.17	g
Wt. of container	206.33	g
Wt. of water	63.44	g
Wt. of dry soil	384.84	g
Moisture Content	16.5	%

Date & Time	Elapsed Time (min)	Dial Reading	Δh , Expansion
6/6/2024 16:00	0	0	0
6/6/2024 16:10	10	0.0000	0
Add Distilled Water to Sample			
6/7/2024 16:00	1440	0.0025	0.0025

Expansion Index =

3

Very Low



EXPANSION INDEX

ASTM D4829

Client: SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project No.: 24082-01
Boring No.: H-4
Sample No.: B1
Depth (ft): 0-5
Soil Description: Brown, Silty Sand (SM)

HAI Project No.: SAG-24-026

Tested by: GA

Checked by: KL

Date: 5/31/2024

Apparatus No.: 3

Initial Specimen Info		
Wt. of wet soil + cont.	231.17	g
Wt. of dry soil + cont.	214.68	g
Wt. of container	24.54	g
Wt. of water	16.49	g
Wt. of dry soil	190.14	g
Moisture Content	8.7	%

Wt. of wet soil + ring	607.05	g
Wt. of ring	197.22	g
Wt. of wet soil	409.83	g
Wet density of soil	124.9	pcf
Dry density of soil	115.0	pcf
Specific gravity of soil	2.68	-
Saturation	51.1	%

Final Specimen Info		
Wt. of wet soil + cont.	635.28	g
Wt. of dry soil + cont.	570.53	g
Wt. of container	197.22	g
Wt. of water	64.75	g
Wt. of dry soil	373.31	g
Moisture Content	17.3	%

Date & Time	Elapsed Time (min)	Dial Reading	Δh, Expansion
6/6/2024 16:20	0	0	0
6/6/2024 16:30	10	0.0000	0
Add Distilled Water to Sample			
6/7/2024 16:20	1440	0.0036	0.0036

Expansion Index =

4

Very Low



DIRECT SHEAR TEST

ASTM D3080

HAI Project No.: SAG-24-026

Client: SA Geotechnical, Inc

Project Name: 1501 Del Norte Street

Project Number: 24082-01

Boring No.: H-1

Sample No.: D3

Sample Type: Undisturbed Ring

Depth (ft): 7.5

Soil Description: Brown, Poorly Graded Sand with Silt (SP-SM)

Type of test: Consolidated, Drained

Tested by: GA

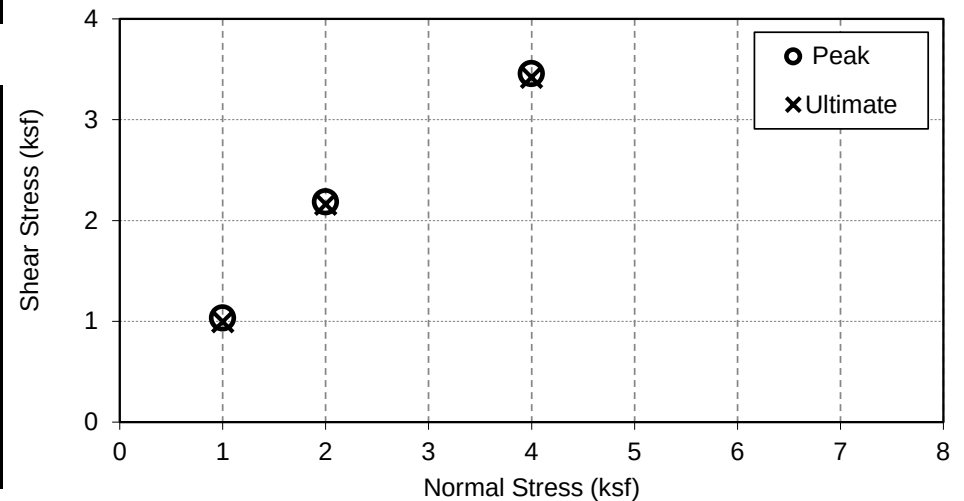
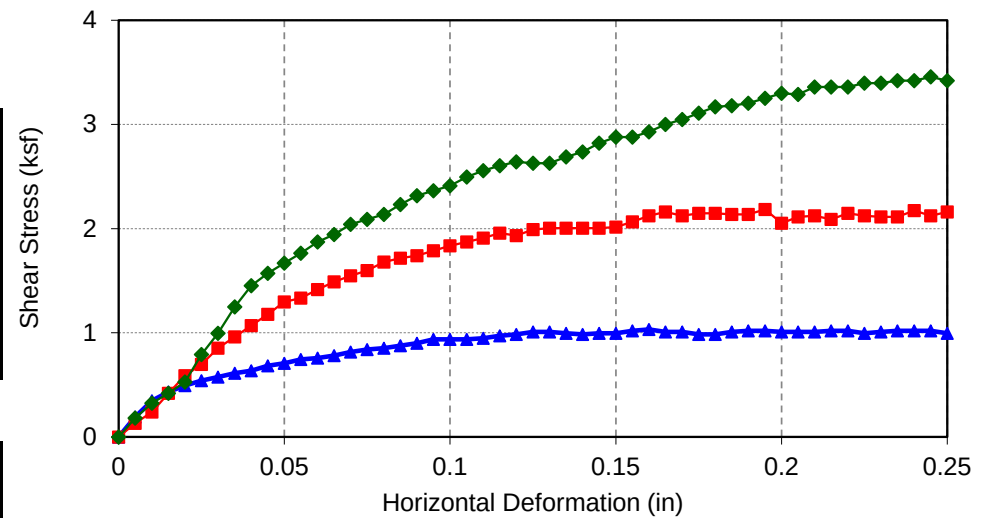
Checked by: KL

Date: 5/31/2024

Test No.	1	2	3
Symbol	▲	■	◆
Normal Stress (ksf)	1	2	4
Deformation Rate (in/min)	0.002	0.002	0.002

Peak Shear Stress (ksf)	O	1.03	2.18	3.46
Shear Stress @ End of Test (ksf)	X	1.00	2.16	3.42

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in)	0.9981	0.9939	0.9813
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	1.8	1.8	1.8
Final Moisture Content (%)	16.1	13.6	13.4
Dry Density (pcf)	103.7	113.1	109.6





DIRECT SHEAR TEST

ASTM D3080

HAI Project No.: SAG-24-026

Client: SA Geotechnical, Inc

Project Name: 1501 Del Norte Street

Project Number: 24082-01

Boring No.: H-2

Sample No.: B1

Sample Type: Sample Remold

Depth (ft): 0-5

Soil Description: Brown, Silty Sand (SM)

Tested by: GA

Checked by: KL

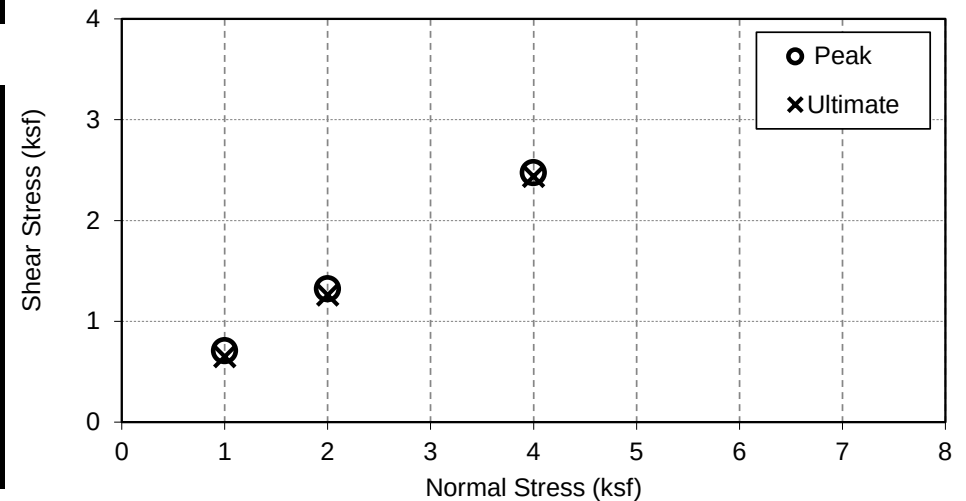
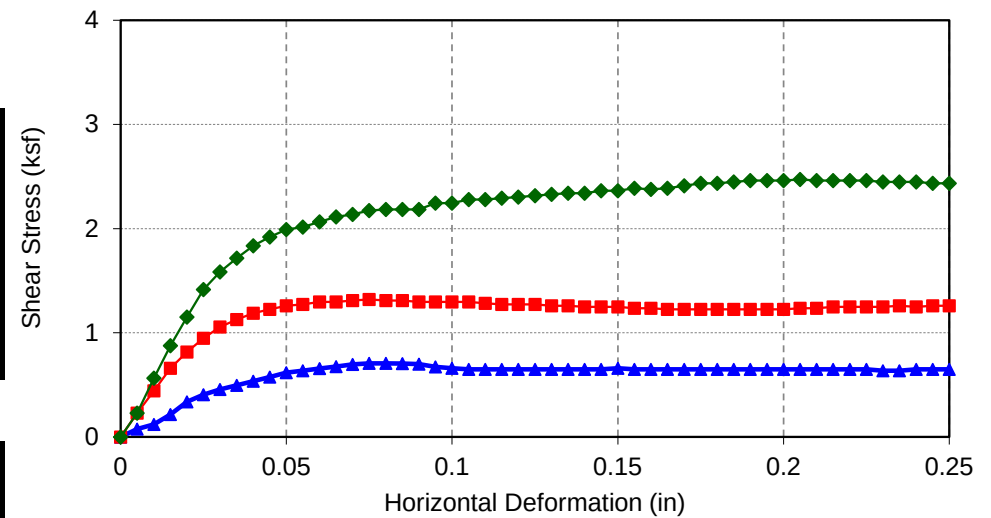
Date: 5/31/2024

Type of test: Consolidated, Drained

Test No.	1	2	3
Symbol	▲	■	◆
Normal Stress (ksf)	1	2	4
Deformation Rate (in/min)	0.002	0.002	0.002

Peak Shear Stress (ksf)	O	0.71	1.32	2.47
Shear Stress @ End of Test (ksf)	X	0.65	1.26	2.44

Initial Height of Sample (in)	1.000	1.000	1.000
Height of Sample before Shear (in)	0.9938	0.9889	0.9978
Diameter of Sample (in)	2.416	2.416	2.416
Initial Moisture Content (%)	11.5	11.5	11.5
Final Moisture Content (%)	17.7	17.7	17.9
Dry Density (pcf)	110.1	110.0	110.1





CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project Number: 24082-01
 Boring No.: H-1
 Sample No.: D-2
 Type of Sample: Undisturbed ring
 Depth (ft): 5
 Soil Description: Brown, Poorly Graded Sand with Silt (SP-SM)

HAI Project No.: SAG-24-026
 Tested by: KL
 Checked by: MV
 Date: 05/31/24

Initial Total Weight	Final Total Weight	Final Dry Weight
(g)	(g)	(g)
136.92	152.71	133.75

Initial Conditions			Final Conditions	
Height	H	(in)	1.000	0.946
Height of Solids	H _s	(in)	0.664	0.664
Height of Water	H _w	(in)	0.042	0.252
Height of Air	H _a	(in)	0.293	0.029
Dry Density	(pcf)		111.1	124.2
Water Content	(%)		2.4	14.2
Saturation	(%)		12.6	89.7

* Saturation is calculated based on G_s= 2.68

Load (ksf)	δH (in)	H (in)	Voids (in)	e	Consol. (%)	a _v (ksf ⁻¹)	M _v (ksf ⁻¹)	Comment
0.01	-----	1.0000	0.336	0.505	0			
0.2	0.0019	0.9981	0.334	0.502	0.2	1.5E-02	1.0E-02	
0.4	0.0046	0.9954	0.331	0.498	0.5	2.0E-02	1.4E-02	
0.8	0.0074	0.9927	0.328	0.494	0.7	1.0E-02	6.9E-03	
1.6	0.0117	0.9883	0.324	0.488	1.2	8.2E-03	5.5E-03	
3.2	0.0174	0.9827	0.318	0.479	1.7	5.3E-03	3.6E-03	
3.2	0.0256	0.9744	0.310	0.467	2.6	Water Added		
6.4	0.0371	0.9630	0.299	0.450	3.7	5.4E-03	3.7E-03	
12.8	0.0460	0.9541	0.290	0.436	4.6	2.1E-03	1.5E-03	
25.6	0.0646	0.9355	0.271	0.408	6.5	2.2E-03	1.6E-03	
6.4	0.0613	0.9388	0.274	0.413	6.1	Unloaded		
1.6	0.0569	0.9431	0.279	0.420	5.7			
0.4	0.0544	0.9456	0.281	0.423	5.4			

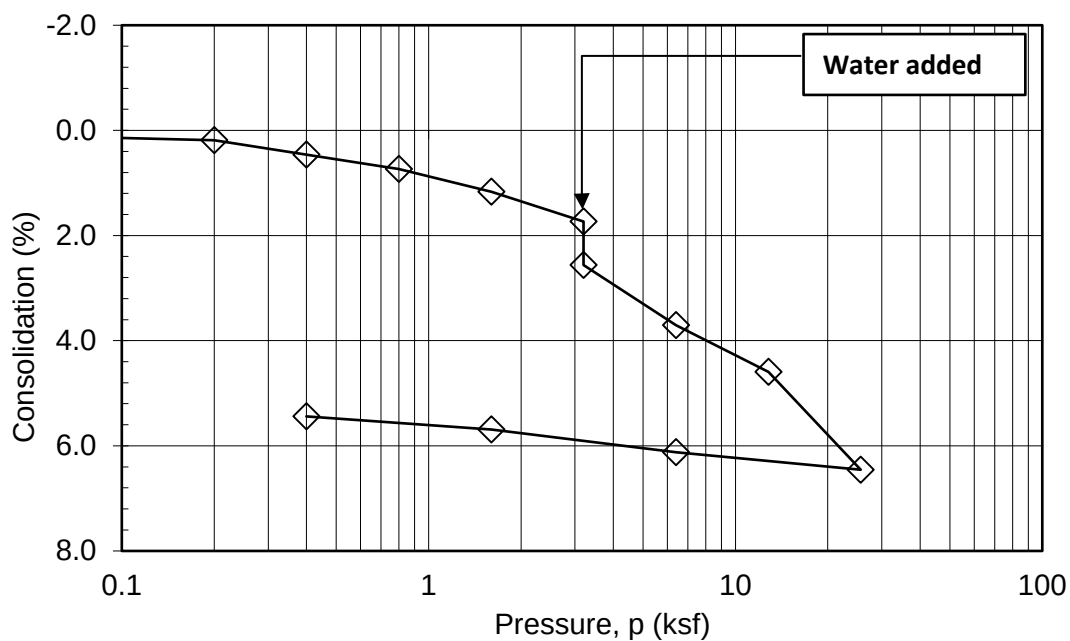
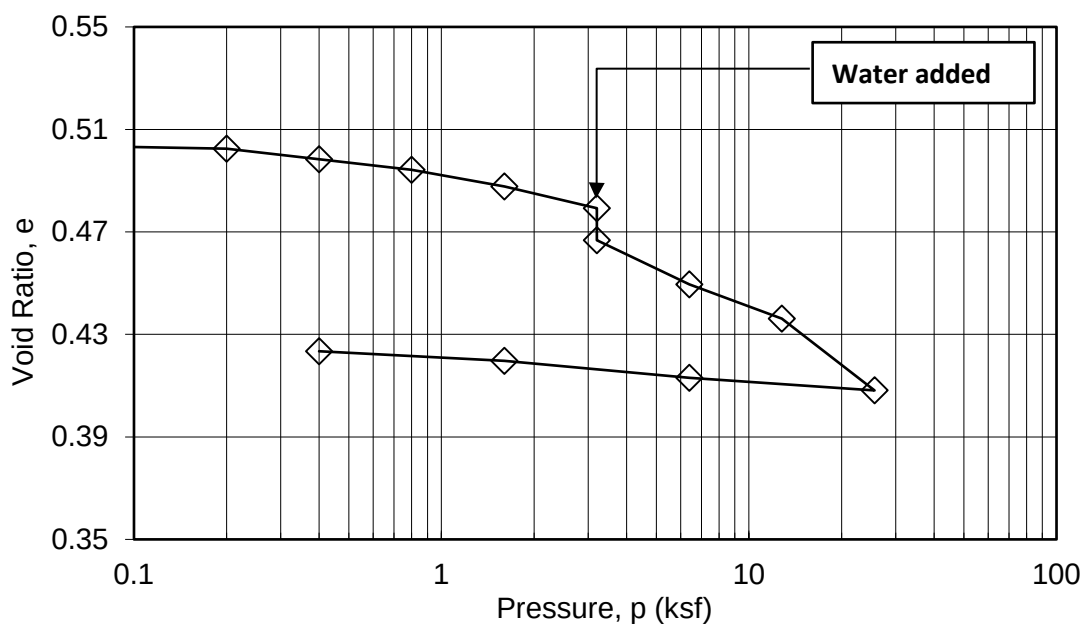


CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project Number: 24082-01
Boring No.: H-1
Sample No.: D-2
Type of Sample: Undisturbed ring
Depth (ft): 5
Soil Description: Brown, Poorly Graded Sand with Silt (SP-SM)

HAI Project No.: SAG-24-026
Tested by: KL
Checked by: MV
Date: 05/31/24





CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project Number: 24082-01
 Boring No.: H-3
 Sample No.: D-2
 Type of Sample: Undisturbed ring
 Depth (ft): 5
 Soil Description: Brown, Silty Sand (SM)

HAI Project No.: SAG-24-026

Tested by: KL

Checked by: MV

Date: 05/31/24

Initial Total Weight	Final Total Weight	Final Dry Weight
(g)	(g)	(g)
137.31	150.25	127.91

Initial Conditions			Final Conditions	
Height	H	(in)	1.005	0.937
Height of Solids	H _s	(in)	0.635	0.635
Height of Water	H _w	(in)	0.125	0.297
Height of Air	H _a	(in)	0.244	0.004
Dry Density	(pcf)		105.8	121.1
Water Content	(%)		7.3	17.5
Saturation	(%)		33.9	98.7

* Saturation is calculated based on G_s= 2.68

Load (ksf)	ΔH (in)	H (in)	Voids (in)	e	Consol. (%)	a _v (ksf ⁻¹)	M _v (ksf ⁻¹)	Comment
0.01	-----	1.0045	0.369	0.581	0			
0.2	0.0021	1.0024	0.367	0.578	0.2	1.7E-02	1.1E-02	
0.4	0.0054	0.9991	0.364	0.573	0.5	2.6E-02	1.7E-02	
0.8	0.0095	0.9950	0.360	0.566	0.9	1.6E-02	1.0E-02	
1.6	0.0150	0.9895	0.354	0.558	1.5	1.1E-02	6.9E-03	
3.2	0.0223	0.9823	0.347	0.546	2.2	7.1E-03	4.6E-03	
3.2	0.0274	0.9771	0.342	0.538	2.7	Water Added		
6.4	0.0381	0.9664	0.331	0.521	3.8	5.3E-03	3.5E-03	
12.8	0.0574	0.9471	0.312	0.491	5.7	4.7E-03	3.2E-03	
25.6	0.0811	0.9235	0.288	0.454	8.1	2.9E-03	2.0E-03	
6.4	0.0767	0.9278	0.292	0.460	7.6	Unloaded		
1.6	0.0720	0.9325	0.297	0.468	7.2			
0.4	0.0679	0.9367	0.301	0.474	6.8			

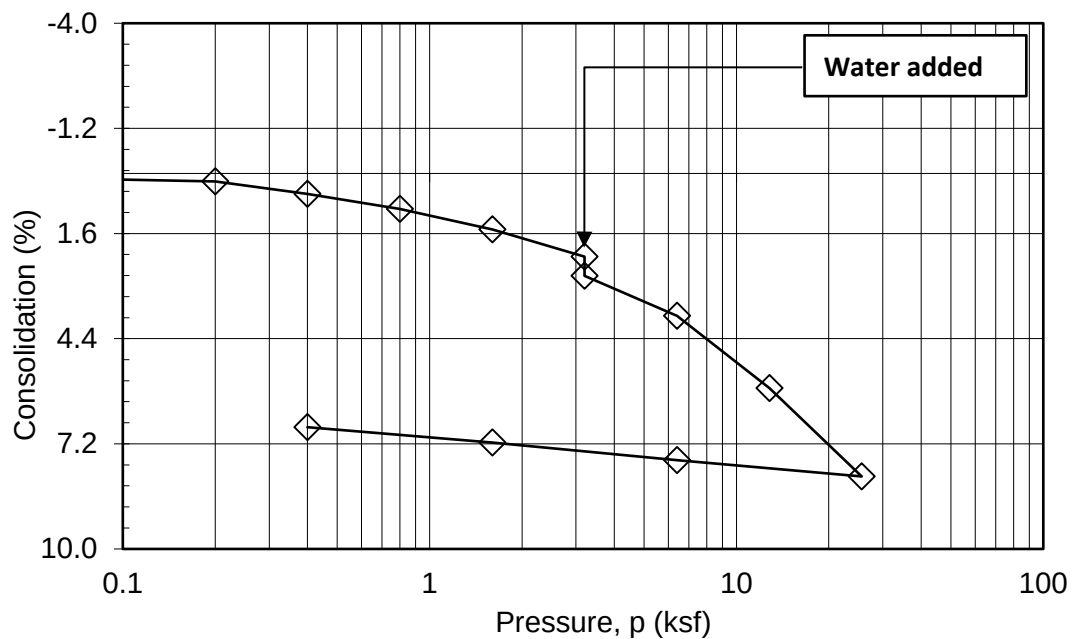
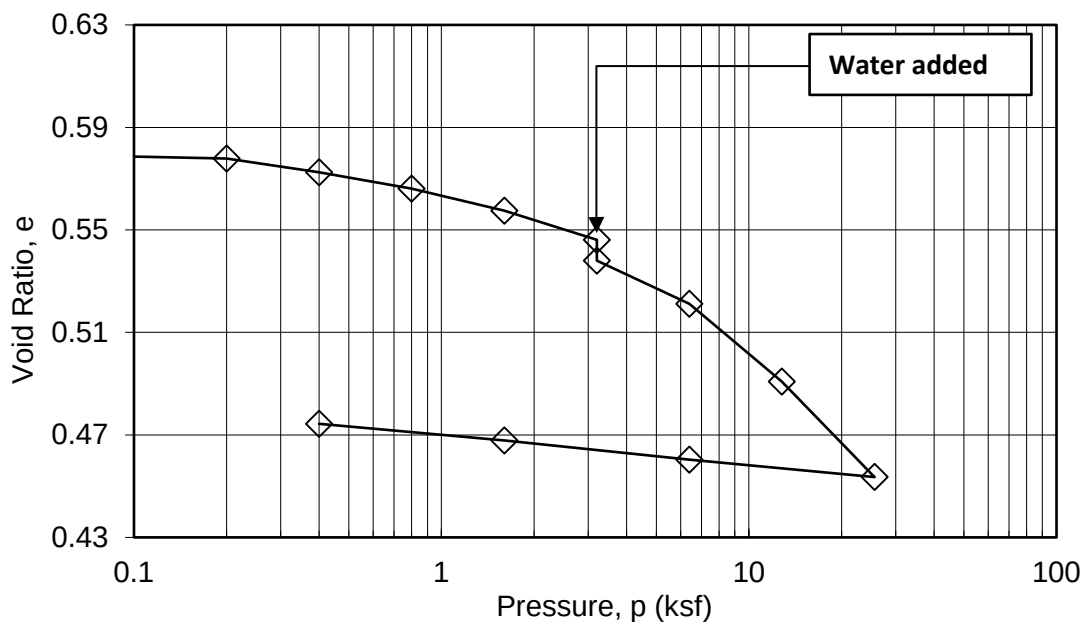


CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project Number: 24082-01
Boring No.: H-3
Sample No.: D-2
Type of Sample: Undisturbed ring
Depth (ft): 5
Soil Description: Brown, Silty Sand (SM)

HAI Project No.: SAG-24-026
Tested by: KL
Checked by: MV
Date: 05/31/24





CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project Number: 24082-01
 Boring No.: H-4
 Sample No.: D3
 Type of Sample: Undisturbed ring
 Depth (ft): 7.5
 Soil Description: Light Brown, Poorly Graded Sand with Silt (SP-SM)

HAI Project No.: SAG-24-026

Tested by: KL

Checked by: MV

Date: 05/31/24

Initial Total Weight	Final Total Weight	Final Dry Weight
(g)	(g)	(g)
131.19	146.13	124.20

Initial Conditions			Final Conditions	
Height	H	(in)	1.000	0.937
Height of Solids	H _s	(in)	0.617	0.617
Height of Water	H _w	(in)	0.093	0.292
Height of Air	H _a	(in)	0.290	0.028
Dry Density	(pcf)		103.2	117.5
Water Content	(%)		5.6	17.7
Saturation	(%)		24.3	91.2

* Saturation is calculated based on G_s= 2.68

Load (ksf)	ΔH (in)	H (in)	Voids (in)	e	Consol. (%)	a _v (ksf ⁻¹)	M _v (ksf ⁻¹)	Comment
0.01	-----	1.0000	0.383	0.621	0			
0.2	0.0010	0.9990	0.382	0.619	0.1	9.0E-03	5.5E-03	
0.4	0.0035	0.9966	0.380	0.615	0.3	1.9E-02	1.2E-02	
0.8	0.0078	0.9922	0.375	0.608	0.8	1.8E-02	1.1E-02	
1.6	0.0152	0.9849	0.368	0.596	1.5	1.5E-02	9.3E-03	
3.2	0.0263	0.9738	0.357	0.579	2.6	1.1E-02	7.1E-03	
3.2	0.0392	0.9608	0.344	0.558	3.9	Water Added		
6.4	0.0470	0.9531	0.336	0.545	4.7	3.9E-03	2.5E-03	
12.8	0.0595	0.9406	0.324	0.525	5.9	3.2E-03	2.1E-03	
25.6	0.0726	0.9275	0.311	0.503	7.3	1.7E-03	1.1E-03	
6.4	0.0692	0.9309	0.314	0.509	6.9	Unloaded		
1.6	0.0657	0.9344	0.317	0.515	6.6			
0.4	0.0632	0.9369	0.320	0.519	6.3			

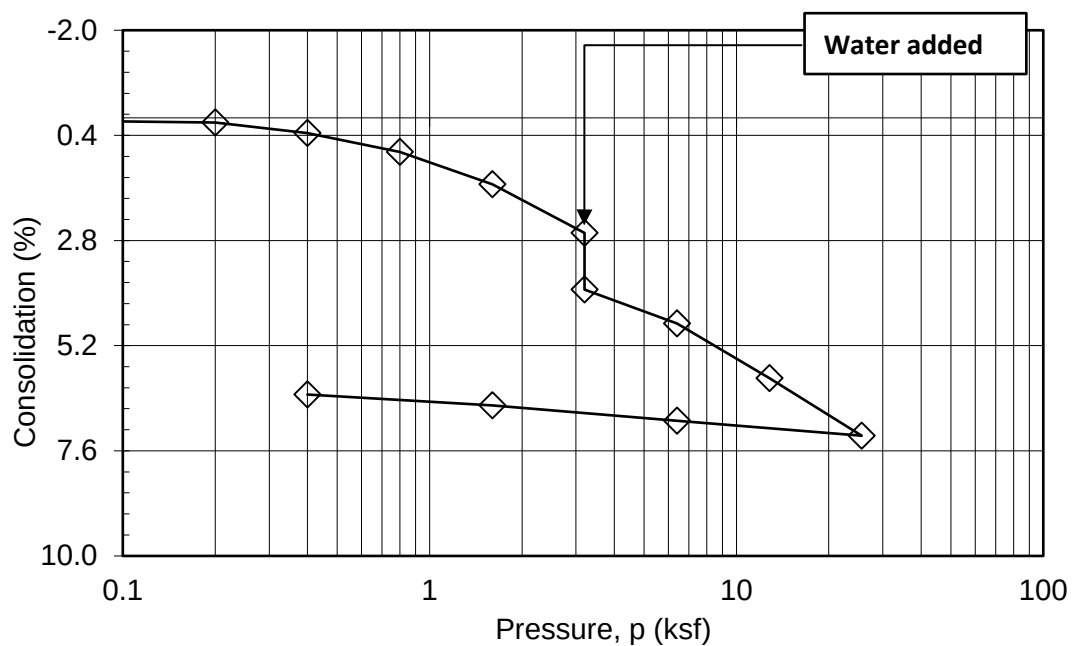
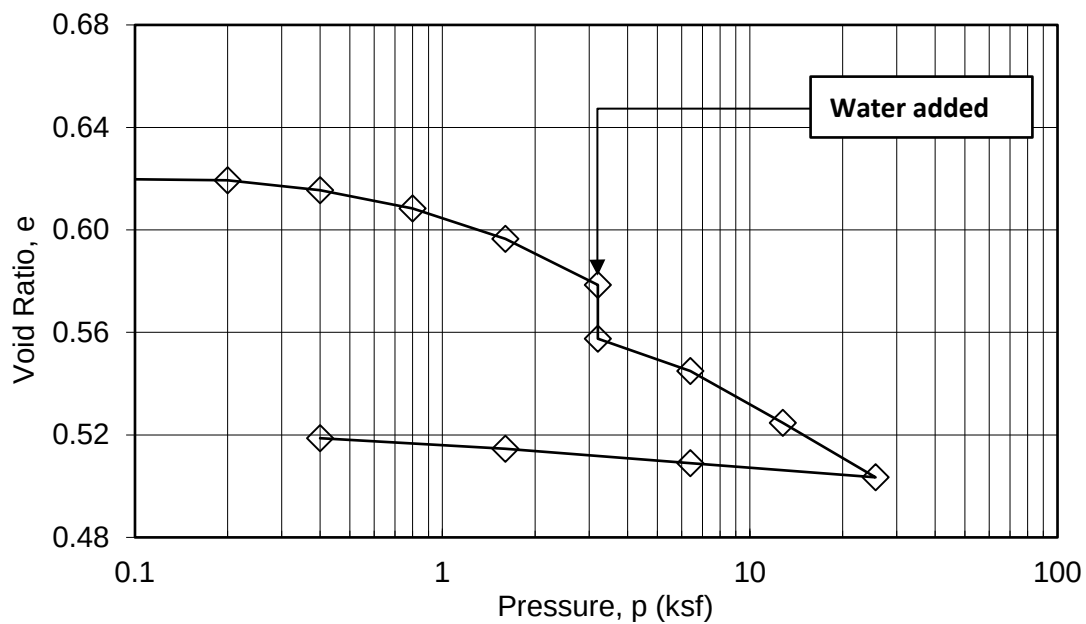


CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project Number: 24082-01
Boring No.: H-4
Sample No.: D3
Type of Sample: Undisturbed ring
Depth (ft): 7.5
Soil Description: Light Brown, Poorly Graded Sand with Silt (SP-SM)

HAI Project No.: SAG-24-026
Tested by: KL
Checked by: MV
Date: 05/31/24





CONSOLIDATION TEST

ASTM D2435

Client : SA Geotechnical, Inc
 Project Name: 1501 Del Norte Street
 Project Number: 24082-01
 Boring No.: H-5
 Sample No.: D3
 Type of Sample: Undisturbed ring
 Depth (ft): 7.5
 Soil Description: Light Brown, Poorly Graded Sand (SP)

HAI Project No.: SAG-24-026
 Tested by: KL
 Checked by: MV
 Date: 05/31/24

Initial Total Weight	Final Total Weight	Final Dry Weight
(g)	(g)	(g)
120.40	142.53	115.58

Initial Conditions			Final Conditions	
Height	H	(in)	1.000	0.953
Height of Solids	H _s	(in)	0.574	0.574
Height of Water	H _w	(in)	0.064	0.359
Height of Air	H _a	(in)	0.362	0.020
Dry Density	(pcf)		96.0	105.7
Water Content	(%)		4.2	23.3
Saturation	(%)		15.1	94.7

* Saturation is calculated based on G_s= 2.68

Load (ksf)	ΔH (in)	H (in)	Voids (in)	e	Consol. (%)	a _v (ksf ⁻¹)	M _v (ksf ⁻¹)	Comment
0.01	-----	1.0000	0.426	0.742	0			
0.2	0.0006	0.9995	0.425	0.741	0.1	5.0E-03	2.9E-03	
0.4	0.0028	0.9973	0.423	0.737	0.3	1.9E-02	1.1E-02	
0.8	0.0060	0.9940	0.420	0.731	0.6	1.4E-02	8.3E-03	
1.6	0.0120	0.9881	0.414	0.721	1.2	1.3E-02	7.5E-03	
3.2	0.0186	0.9814	0.407	0.710	1.9	7.2E-03	4.2E-03	
3.2	0.0212	0.9788	0.405	0.705	2.1	Water Added		
6.4	0.0287	0.9713	0.397	0.692	2.9	4.1E-03	2.4E-03	
12.8	0.0418	0.9582	0.384	0.669	4.2	3.6E-03	2.1E-03	
25.6	0.0575	0.9425	0.368	0.642	5.8	2.1E-03	1.3E-03	
6.4	0.0540	0.9460	0.372	0.648	5.4	Unloaded		
1.6	0.0505	0.9496	0.375	0.654	5.0			
0.4	0.0472	0.9529	0.379	0.660	4.7			



CONSOLIDATION TEST

ASTM D2435

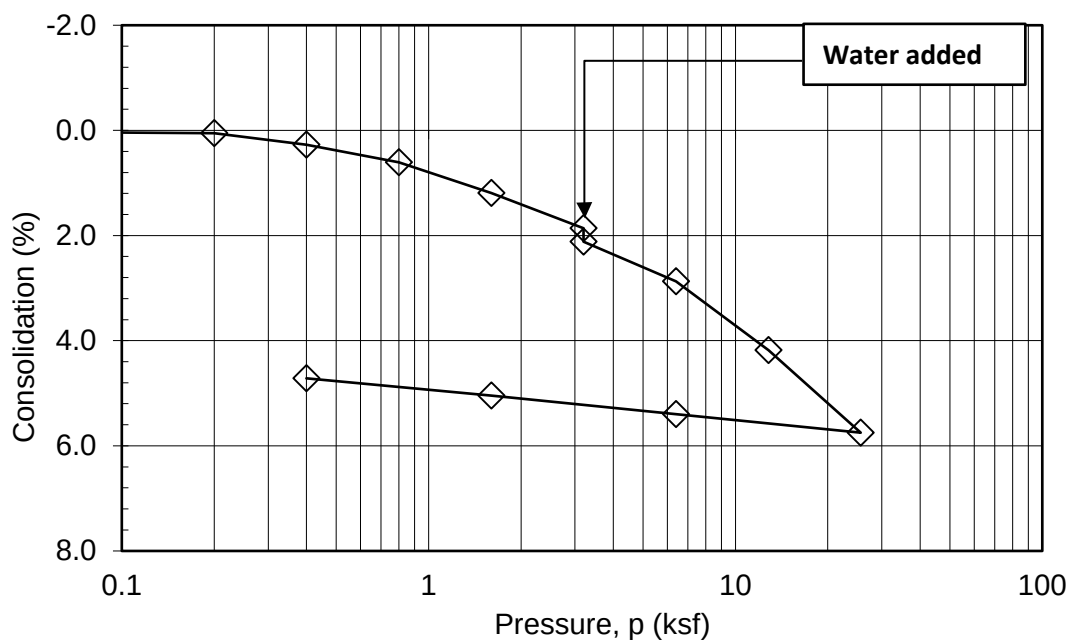
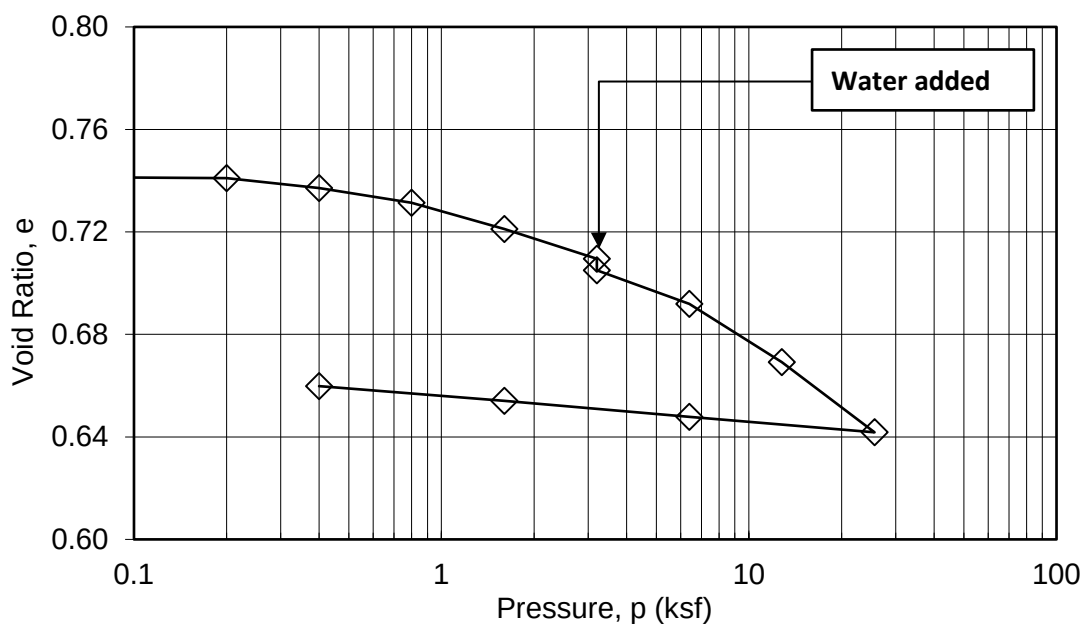
Client : SA Geotechnical, Inc
Project Name: 1501 Del Norte Street
Project Number: 24082-01
Boring No.: H-5
Sample No.: D3
Type of Sample: Undisturbed ring
Depth (ft): 7.5
Soil Description: Light Brown, Poorly Graded Sand (SP)

HAI Project No.: SAG-24-026

Tested by: KL

Checked by: MV

Date: 05/31/24





SWELL / COLLAPSE TEST

ASTM D4546

Client :	SA Geotechnical, Inc	HAI Project No.:	SAG-24-026
Project Name:	1501 Del Norte Street	Tested by:	KL
Project No.:	24082-01	Checked by:	MV
Boring No.:	P-3	Date:	05/31/24
Sample No.:	D3		
Type of Sample:	Undisturbed Ring		
Depth (ft):	9		
Soil Description:	Light Brown, Poorly Graded Sand with Gravel (SP)	Load (ksf):	1.6

Initial Total Weight (g)	Final Total Weight (g)	Final Dry Weight (g)
134.34	147.83	130.91

			Initial Conditions	Final Conditions
Height	H	(in)	1.000	0.983
Height of Solids	Hs	(in)	0.650	0.650
Height of Water	Hw	(in)	0.046	0.225
Height of Air	Ha	(in)	0.304	0.108
Dry Density		(pcf)	108.7	112.5
Water Content		(%)	2.6	12.9
Saturation		(%)	13.1	67.6

* Saturation is calculated using $G_s = 2.68$

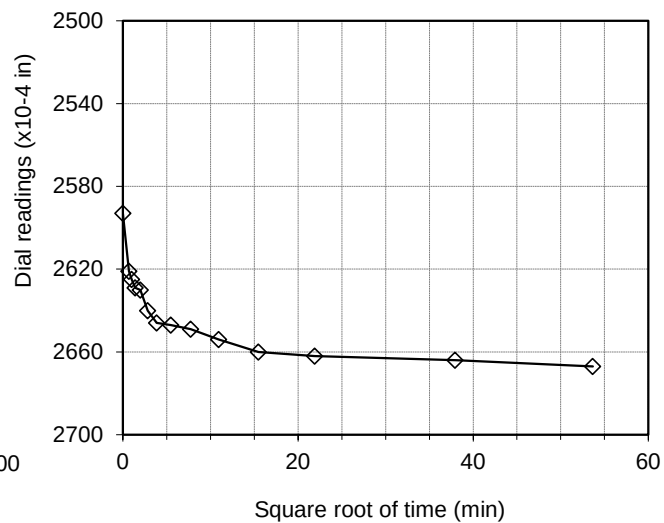
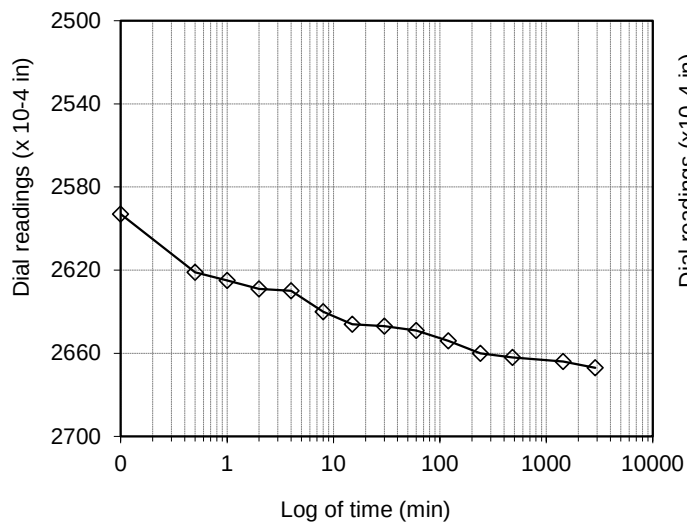
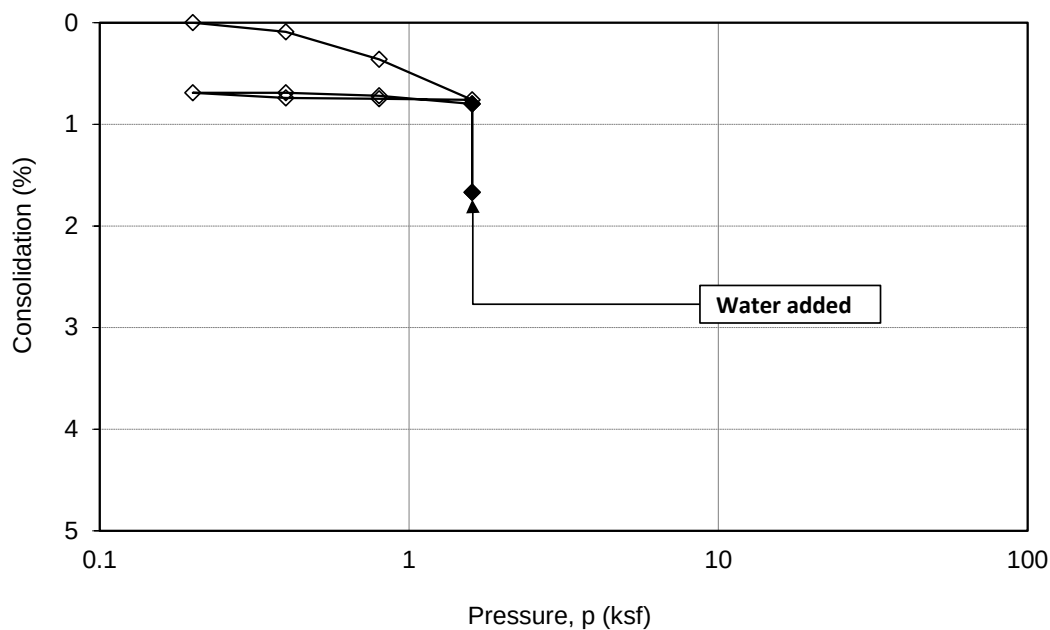
Load (ksf)	δH (in)	H (in)	Voids (in)	e	Consol. (%)	a_v (ksf ⁻¹)	M_v (ksf ⁻¹)	Comment
0.01	-----	1.0000	0.350	0.538	0			
0.2	0.0000	1.0000	0.350	0.538	0.0	0.0E+00	0.0E+00	
0.4	0.0009	0.9991	0.349	0.537	0.1	6.9E-03	4.5E-03	
0.8	0.0036	0.9964	0.346	0.532	0.4	1.0E-02	6.8E-03	
1.6	0.0076	0.9924	0.342	0.526	0.8	7.7E-03	5.0E-03	
0.8	0.0075	0.9925	0.342	0.526	0.8	Unloaded		
0.4	0.0074	0.9926	0.342	0.527	0.7			
0.2	0.0069	0.9931	0.343	0.527	0.7			
0.4	0.0069	0.9931	0.343	0.527	0.7	0.0E+00	0.0E+00	
0.8	0.0072	0.9928	0.343	0.527	0.7	1.2E-03	7.6E-04	
1.6	0.0080	0.9920	0.342	0.526	0.8	1.5E-03	1.0E-03	
1.6	0.0167	0.9833	0.333	0.512	1.7	Water Added		



SWELL / COLLAPSE TEST

ASTM D4546

Client :	SA Geotechnical, Inc	HAI Project No.:	SAG-24-026
Project Name:	1501 Del Norte Street	Tested by:	KL
Project No.:	24082-01	Checked by:	MV
Boring No.:	P-3	Date:	05/31/24
Sample No.:	D3		
Type of Sample:	Undisturbed Ring		
Depth (ft):	9		
Soil Description:	Light Brown, Poorly Graded Sand with Gravel (SP)	Load (ksf):	1.6
		Settlement (%)	0.87



- ANALYSIS
- DESIGN

LaBelle • Marvin

PROFESSIONAL PAVEMENT ENGINEERING

A CALIFORNIA CORPORATION

- SOILS, ASPHALT
TECHNOLOGY

June 10, 2024

Kang Chieh Lin
Hushmand Associates, Inc.
250 Goddard
Irvine, California 92618

Project No. 50087

Attention: Kang Chieh Lin
Testing of the bulk soil sample delivered to our laboratory on 6/7/2024 have been completed.

P.N.: SAG-24-026/24082-01
Reference: 1501 Del Norte Street
Sample: H-5, B-1 @ 0-5

Data sheets are attached for your use and file. Any untested portion of the sample will be retained for a period of 60 days prior to disposal. The opportunity to be of service is sincerely appreciated and should you have any questions, kindly call.

Very truly yours,



Steven R. Marvin
RCE 30659

SRM:tw
Enclosure



R - VALUE DATA SHEET

PROJECT No. 50087
DATE: 6/10/2024

BORING NO. H-5, B-1 @ 0-5
1501 Del Norte Street
P.N. SAG-24-026/24082-01

SAMPLE DESCRIPTION: Brown Slightly Silty Sand

R-VALUE TESTING DATA CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	1	2	3
Water added, grams	58	48	43
Initial Test Water, %	12.0	11.0	10.5
Compact Gage Pressure,psi	250	350	350
Exudation Pressure, psi	163	391	654
Height Sample, Inches	2.53	2.52	2.54
Gross Weight Mold, grams	3068	3050	3058
Tare Weight Mold, grams	1949	1940	1952
Sample Wet Weight, grams	1119	1110	1106
Expansion, Inches x 10exp-4	2	9	14
Stability 2,000 lbs (160psi)	26 / 47	17 / 31	16 / 30
Turns Displacement	5.38	4.95	4.80
R-Value Uncorrected	53	68	69
R-Value Corrected	53	68	69
Dry Density, pcf	119.6	120.2	119.4

DESIGN CALCULATION DATA			
Traffic Index	Assumed:	4.0	4.0
G.E. by Stability		0.48	0.33
G. E. by Expansion		0.07	0.30

Equilibrium R-Value		65 by EXUDATION	Examined & Checked: 6 /10/ 24
REMARKS:	Gf = 1.25 1.0% Retained on the 3/4" Sieve.		 DocuSigned by: No. 30659 D9A356504F0B448 Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.



R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 50087

DATE: 6 /10/ 24

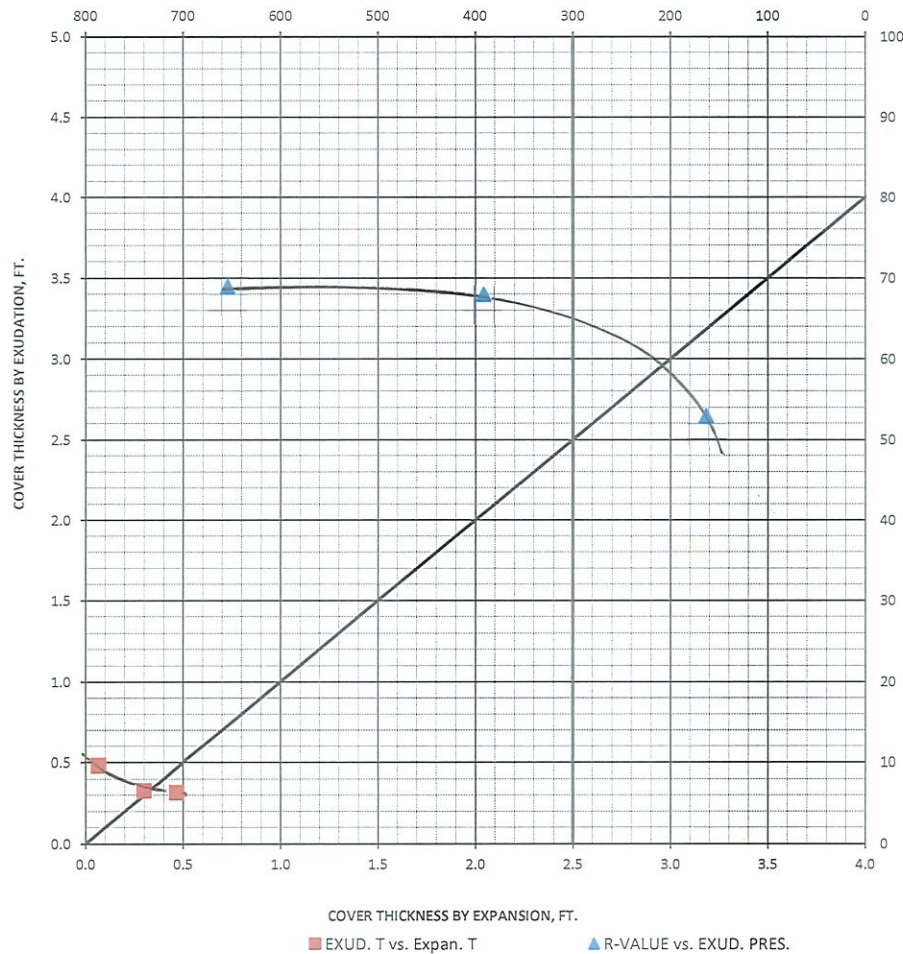
REMARKS: _____

BORING NO. H-5, B-1 @ 0-5

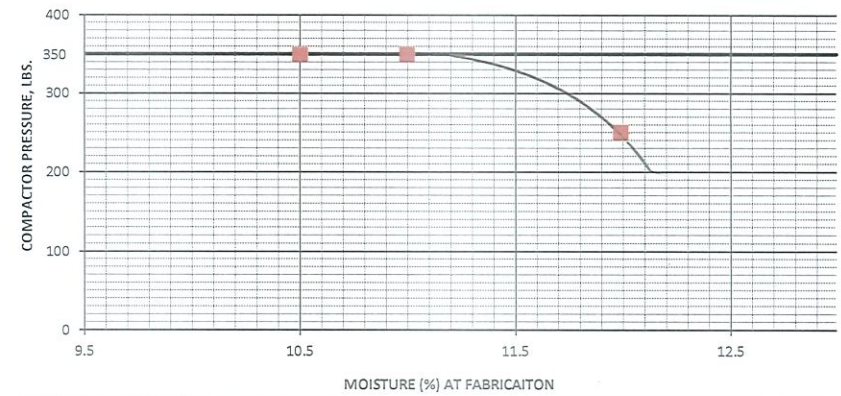
1501 Del Norte Street

P.N. SAG-24-026/24082-01

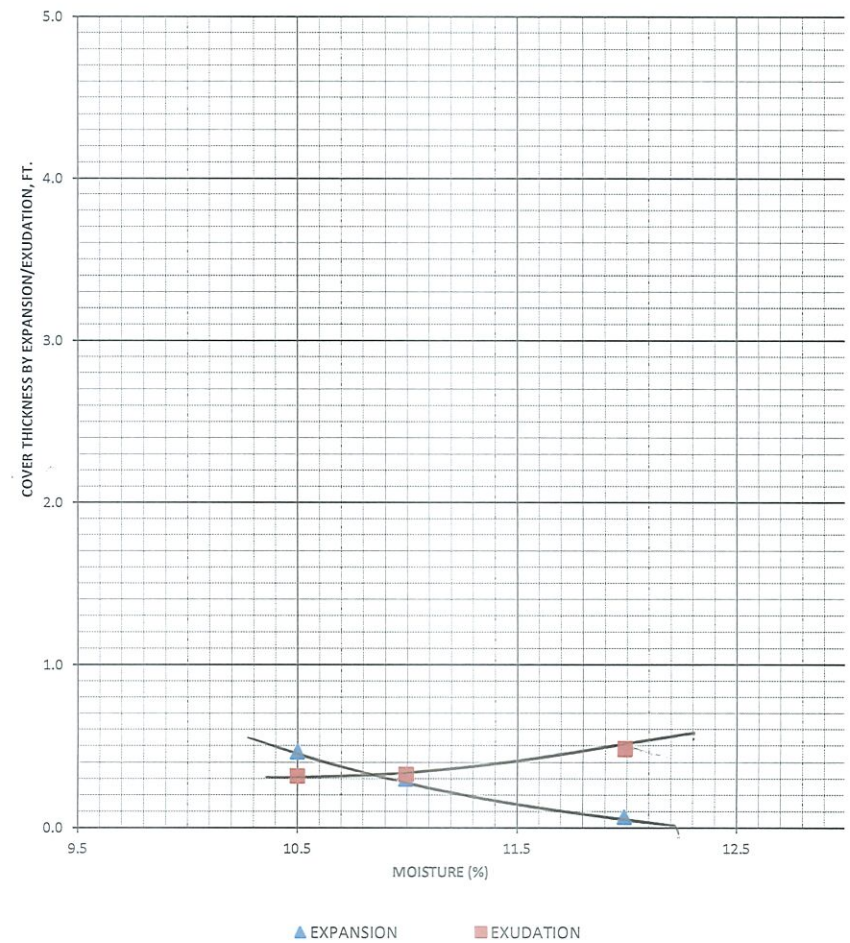
COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS vs MOISTURE %





Soil Analysis Lab Results

Client: HAI
Job Name: Del Norte Street
Client Job Number: SAG-24-026 / 24082-01
Project X Job Number: S240604G
June 6, 2024

	Method	ASTM D4327		ASTM D4327	
Bore# / Description	Depth	Sulfates SO_4^{2-}		Chlorides Cl^-	
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)
H-2 B1	0-5	38.9	0.0039	12.2	0.0012
H-4 B1	0-5	28.6	0.0029	8.2	0.0008

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)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

Try out our new online forms: [SOIL CORROSIVITY & THERMAL RESISTIVITY LAB REQUEST FORM](#) & [IN-SITU WENNER 4 PIN QUOTE REQUEST FORM](#)

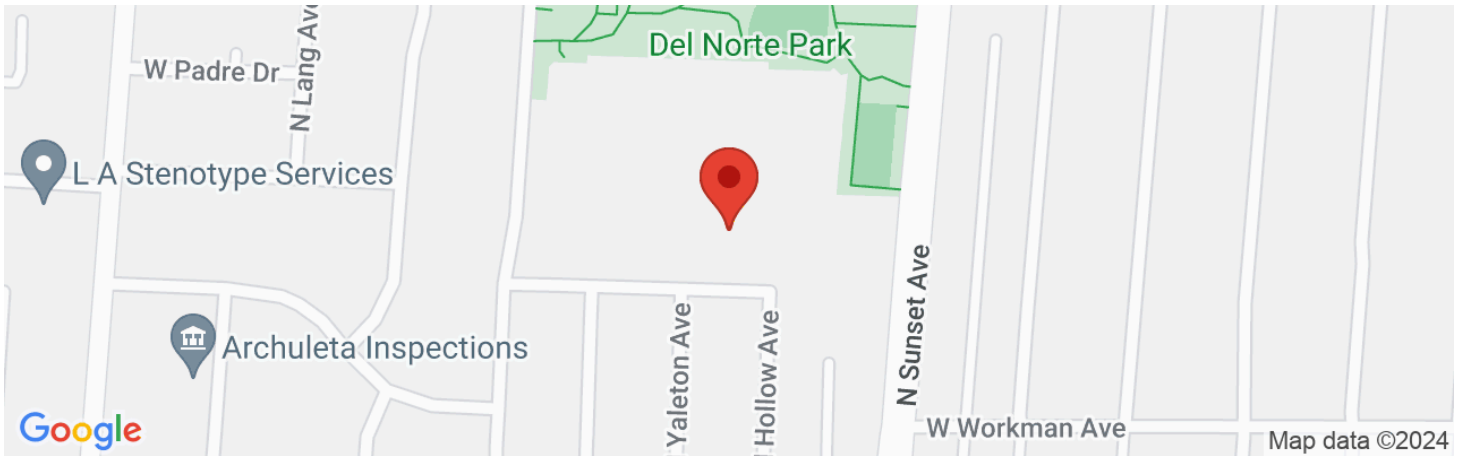
Appendix D

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout error*.
USGS web services are now operational so this tool should work as expected.



1501 W Del Norte St, West Covina, CA 91790, USA

Latitude, Longitude: 34.0770309, -117.9369244



Date	6/10/2024, 11:39:33 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.663	MCE_R ground motion. (for 0.2 second period)
S_1	0.611	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.663	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.109	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.704	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.775	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	1.663	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.819	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	2.158	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.611	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.675	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.671	Factored deterministic acceleration value. (1.0 second)
PGAd	0.862	Factored deterministic acceleration value. (Peak Ground Acceleration)

Type	Value	Description
PGA_{UH}	0.704	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.914	Mapped value of the risk coefficient at short periods
C_{R1}	0.905	Mapped value of the risk coefficient at a period of 1 s
C_V	1.433	Vertical coefficient

DISCLAIMER

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Unified Hazard Tool



Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the [U.S. Seismic Design Maps web tools](#) (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Please also see the new [USGS Earthquake Hazard Toolbox](#) for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

^ Input

Edition

Dynamic: Conterminous U.S. 2014 (u...

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

34.0770309

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitudes

-117.9369244

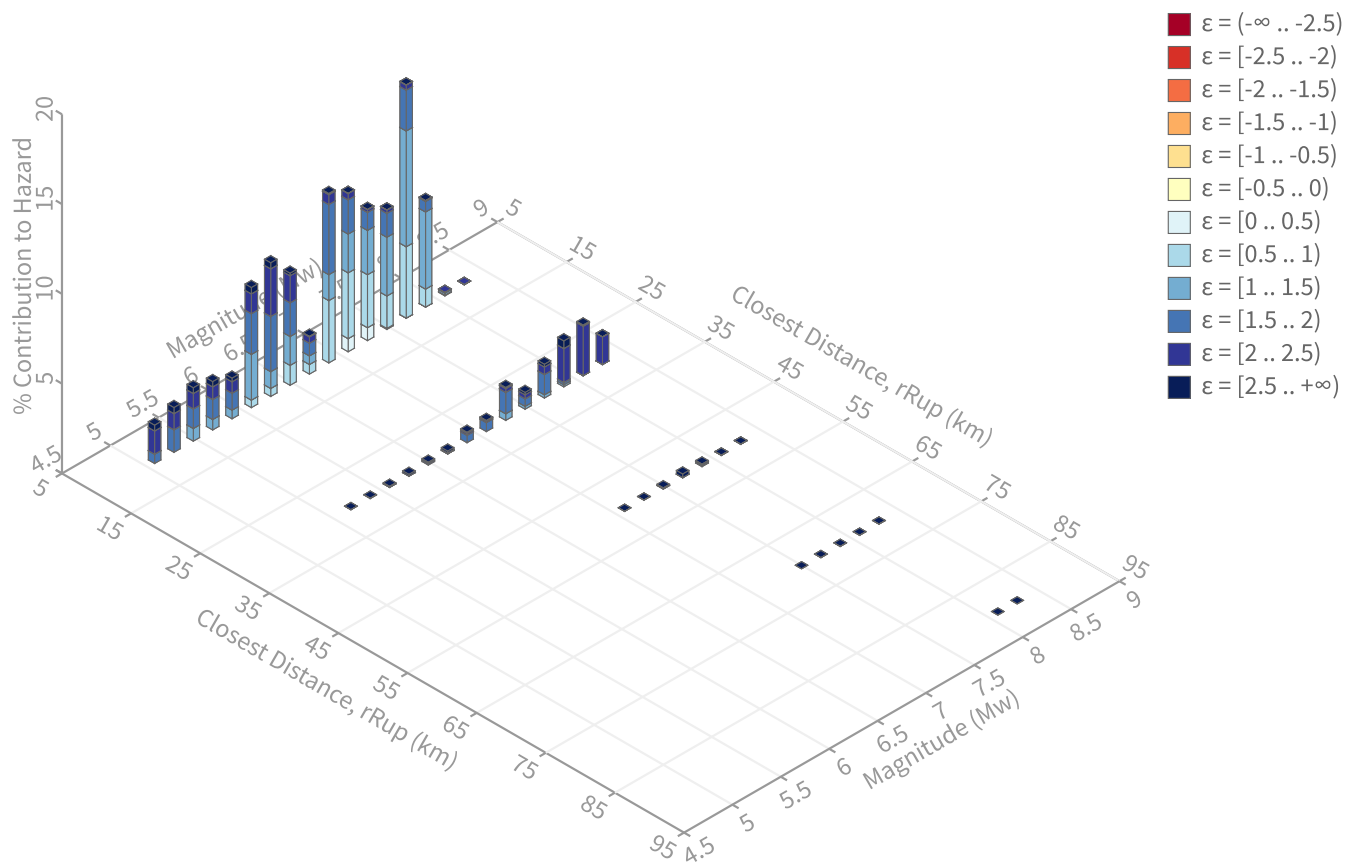
Site Class

259 m/s (Site class D)

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs

Exceedance rate: 0.0004040404 yr⁻¹

PGA ground motion: 0.76250482 g

Recovered targets

Return period: 2961.7856 yrs

Exceedance rate: 0.00033763416 yr⁻¹

Totals

Binned: 100 %

Residual: 0 %

Trace: 0.09 %

Mean (over all sources)

m: 6.97

r: 13.83 km

ε₀: 1.52 σ

Mode (largest m-r bin)

m: 7.72

r: 11.84 km

ε₀: 1.18 σ

Contribution: 12.99 %

Mode (largest m-r-ε₀ bin)

m: 7.72

r: 11.46 km

ε₀: 1.24 σ

Contribution: 6.45 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km

m: min = 4.4, max = 9.4, Δ = 0.2

ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)

ε1: [-2.5 .. -2.0)

ε2: [-2.0 .. -1.5)

ε3: [-1.5 .. -1.0)

ε4: [-1.0 .. -0.5)

ε5: [-0.5 .. 0.0)

ε6: [0.0 .. 0.5)

ε7: [0.5 .. 1.0)

ε8: [1.0 .. 1.5)

ε9: [1.5 .. 2.0)

ε10: [2.0 .. 2.5)

ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↴	Source	Type	r	m	ϵ_0	lon	lat	az	%
UC33brAvg_FM31		System							40.13
	Puente Hills [1]		11.76	7.37	0.84	117.957°W	33.944°N	186.96	6.60
	Sierra Madre [2]		9.24	7.66	1.20	117.933°W	34.159°N	2.50	5.91
	San Jose [2]		6.59	7.00	0.84	117.881°W	34.043°N	126.32	5.38
	Whittier alt 1 [7]		12.02	6.89	1.59	118.000°W	33.979°N	207.89	3.61
	San Andreas (Mojave S) [12]		39.94	8.06	2.29	117.738°W	34.397°N	27.13	3.43
	Raymond [0]		11.14	7.11	1.58	117.991°W	34.166°N	333.32	2.86
	Elysian Park (Upper) [0]		15.32	6.53	2.18	118.097°W	34.077°N	270.06	1.72
	Compton [0]		21.60	7.27	1.68	118.122°W	33.750°N	205.14	1.28
	Whittier alt 1 [6]		12.02	6.51	1.71	117.980°W	33.972°N	198.95	1.08
	Chino alt 1 [0]		16.79	6.52	2.24	117.752°W	34.028°N	107.82	1.04
UC33brAvg_FM32		System							40.01
	Sierra Madre [2]		9.24	7.67	1.20	117.933°W	34.159°N	2.50	5.91
	San Jose [2]		6.59	6.98	0.84	117.881°W	34.043°N	126.32	5.26
	Whittier alt 2 [6]		12.36	7.32	1.42	118.001°W	33.979°N	208.32	3.96
	San Andreas (Mojave S) [12]		39.94	8.05	2.30	117.738°W	34.397°N	27.13	3.44
	Raymond [0]		11.14	7.11	1.58	117.991°W	34.166°N	333.32	3.11
	Puente Hills (Coyote Hills) [0]		12.38	7.13	0.89	117.868°W	33.919°N	160.09	3.04
	Whittier alt 2 [5]		12.36	7.29	1.08	117.982°W	33.972°N	199.61	2.98
	Richfield [1]		14.02	6.17	1.61	117.870°W	33.882°N	164.11	2.56
	Elysian Park (Upper) [0]		15.32	6.97	1.89	118.097°W	34.077°N	270.06	1.86
	Compton [0]		21.60	7.36	1.64	118.122°W	33.750°N	205.14	1.47
UC33brAvg_FM32 (opt)		Grid							9.96
	PointSourceFinite: -117.937, 34.118		6.66	5.73	1.54	117.937°W	34.117°N	0.00	1.93
	PointSourceFinite: -117.937, 34.118		6.66	5.73	1.54	117.937°W	34.117°N	0.00	1.93
	PointSourceFinite: -117.937, 34.135		7.91	5.77	1.71	117.937°W	34.135°N	0.00	1.04
	PointSourceFinite: -117.937, 34.135		7.91	5.77	1.71	117.937°W	34.135°N	0.00	1.04
UC33brAvg_FM31 (opt)		Grid							9.89
	PointSourceFinite: -117.937, 34.118		6.65	5.73	1.54	117.937°W	34.117°N	0.00	1.97
	PointSourceFinite: -117.937, 34.118		6.65	5.73	1.54	117.937°W	34.117°N	0.00	1.97
	PointSourceFinite: -117.937, 34.135		7.93	5.76	1.72	117.937°W	34.135°N	0.00	1.05
	PointSourceFinite: -117.937, 34.135		7.93	5.76	1.72	117.937°W	34.135°N	0.00	1.05

Appendix E

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-1

Tested By: PA

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 117

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Date Excavated: 5/23/24

Date Presoak: 5/23/24

Date Tested: 5/23/24

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
10:03	5	57.0	109.8	52.8	1251.5	1013.6	14.8
10:08							
10:10	5	54.6	108.6	54.0	1280.0	1064.5	14.4
10:15							
10:17	5	55.8	108.6	52.8	1251.5	1047.6	14.3
10:22							
10:24	5	57.0	109.8	52.8	1251.5	1013.6	14.8
10:29							
10:30	5	54.6	107.4	52.8	1251.5	1081.5	13.9
10:35							
10:37	5	78.0	109.2	31.2	739.5	725.2	12.2
10:42							
10:44	5	67.8	109.8	42.0	995.5	861.0	13.9
10:49							
10:51	5	67.8	110.4	42.6	1009.8	852.5	14.2
10:56							
10:59	5	70.2	111.0	40.8	967.1	810.1	14.3
11:04							
11:06	5	64.2	109.9	45.7	1083.7	910.2	14.3
11:11							
11:12	5	63.0	109.8	46.8	1109.3	928.8	14.3
11:17							
11:19	5	79.8	108.6	28.8	682.7	708.3	11.6
11:24							
11:27	5	64.2	109.8	45.6	1080.9	911.8	14.2
11:32							
11:36	5	65.4	109.8	44.4	1052.4	894.9	14.1
11:41							
11:43	5	66.6	108.6	42.0	995.5	894.9	13.3
11:48							

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-1 (Continued)

Tested By: PA

Pipe Dia (in): 2

Depth (in): 117

Pipe Area (in²) per inch: 3.1

Boring Dia. (in.): 9

Boring Area (in²) per inch: 63.6

Date Excavated: 5/23/24

Date Presoak: 5/23/24

Date Tested: 5/23/24

Sand Backfill Porosity: 0.34

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
11:49	5	65.4	109.8	44.4	1052.4	894.9	14.1
11:54							
11:57	5	67.8	107.4	39.6	938.7	894.9	12.6
12:02							
12:03	5	64.2	108.6	44.4	1052.4	928.8	13.6
12:08							
12:09	5	64.2	109.8	45.6	1080.9	911.8	14.2
12:14							
12:15	5	59.4	109.8	50.4	1194.6	979.7	14.6
12:20							
12:23	5	60.6	109.8	49.2	1166.2	962.7	14.5
12:28							
12:29	5	61.8	109.8	48.0	1137.8	945.8	14.4
12:34							
12:38	5	66.6	109.8	43.2	1024.0	877.9	14.0
12:43							
12:45	5	63.0	108.6	45.6	1080.9	945.8	13.7
12:50							
12:52	5	67.8	111.0	43.2	1024.0	844.0	14.6
12:57							
1:01	5	61.8	109.8	48.0	1137.8	945.8	14.4
1:06							

Infiltration Rate (I) = (Preadjusted Infiltration Rate)/(Reduction Factor)

Reduction Factor (Rf) = 3

I= 4.7 in./hr.

Note: Preadjusted infiltration rate uses average of last three readings

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-2

Tested By: PA

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 177

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Date Excavated: 5/23/24

Date Presoak: 5/23/24

Date Tested: 5/23/24

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
11:17	3	160.2	174.0	13.8	327.1	343.5	19.0
11:20							
11:23	2	157.2	169.8	12.6	298.7	445.3	20.1
11:25							
11:26	2	159.6	167.4	7.8	184.9	445.3	12.5
11:28							
11:30	3	157.2	173.4	16.2	384.0	394.4	19.5
11:33							
11:35	3	158.4	174.6	16.2	384.0	360.5	21.3
11:38							
11:42	3	156.6	174.6	18.0	426.7	385.9	22.1
11:45							
11:47	3	157.8	173.4	15.6	369.8	385.9	19.2
11:50							
11:52	3	157.8	173.4	15.6	369.8	385.9	19.2
11:55							
11:57	3	159.0	174.6	15.6	369.8	352.0	21.0
12:00							
12:02	3	157.8	172.8	15.0	355.5	394.4	18.0
12:05							
12:07	3	157.2	172.8	15.6	369.8	402.9	18.4
12:10							
12:12	3	157.2	172.2	15.0	355.5	411.4	17.3
12:15							
12:17	3	157.2	172.8	15.6	369.8	402.9	18.4
12:20							
12:22	3	159.0	174.6	15.6	369.8	352.0	21.0
12:25							
12:27	3	156.6	171.0	14.4	341.3	436.8	15.6
12:30							

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-2 (Continued)

Tested By: AC

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 177

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Date Excavated: 5/23/24

Date Presoak: 5/23/24

Date Tested: 5/23/24

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
12:32	3	156.6	172.8	16.2	384.0	411.4	18.7
12:35							
12:37	3	158.4	174.0	15.6	369.8	369.0	20.0
12:40							
12:42	3	157.2	172.8	15.6	369.8	402.9	18.4
12:45							
12:47	3	156.6	173.4	16.8	398.2	402.9	19.8
12:50							
12:53	3	157.2	174.6	17.4	412.4	377.5	21.9
12:56							
12:59	3	158.4	171.6	13.2	312.9	402.9	15.5
13:02							
1:04	3	157.8	172.2	14.4	341.3	402.9	16.9
1:07							
1:09	3	157.2	172.8	15.6	369.8	402.9	18.4
1:12							
1:14	3	156.6	172.2	15.6	369.8	419.9	17.6
1:17							
1:19	3	157.2	173.4	16.2	384.0	394.4	19.5
1:22							
1:24	3	158.4	172.8	14.4	341.3	385.9	17.7
1:27							
1:29	3	157.2	172.8	15.6	369.8	402.9	18.4
1:32							
1:34	3	156.6	171.6	15.0	355.5	428.4	16.6
1:37							
1:39	3	156.6	172.2	15.6	369.8	419.9	17.6
1:42							
1:44	3	157.2	173.4	16.2	384.0	394.4	19.5
1:47							

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-2 (Continued)

Tested By: PA

Pipe Dia (in): 2

Depth (in): 177

Pipe Area (in²) per inch: 3.1

Boring Dia. (in.): 9

Boring Area (in²) per inch: 63.6

Date Excavated: 5/23/24

Date Presoak: 5/23/24

Date Tested: 5/23/24

Sand Backfill Porosity: 0.34

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
1:49	3	158.4	175.2	16.8	398.2	352.0	22.6
1:52							
1:55	3	156.6	172.2	15.6	369.8	419.9	17.6
1:58							
2:00	3	156.6	172.2	15.6	369.8	419.9	17.6
2:03							
2:05	3	156.6	171.6	15.0	355.5	428.4	16.6
2:08							
2:10	3	156.6	172.8	16.2	384.0	411.4	18.7
2:13							
2:15	3	157.2	172.8	15.6	369.8	402.9	18.4
2:18							

Infiltration Rate (I) = (Preadjusted Infiltration Rate)/(Reduction Factor)

Reduction Factor (Rf) = 3

I= 6.0 in./hr.

Note: Preadjusted infiltration rate uses average of last three readings

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24002-01

Test Hole Number: P-3

Tested By: PA

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 117

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Date Excavated: 5/23/24

Date Presoak: 5/24/24

Date Tested: 5/24/24

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
8:38	2	90.6	114.6	24.0	568.9	470.8	36.3
8:40							
8:46	2	90.0	114.0	24.0	568.9	487.7	35.0
8:48							
8:53	2	89.4	114.0	24.6	583.1	496.2	35.3
8:55							
9:01	2	90.0	114.0	24.0	568.9	487.7	35.0
9:03							
9:09	2	89.4	113.4	24.0	568.9	504.7	33.8
9:11							
9:17	2	88.2	113.4	25.2	597.3	521.7	34.4
9:19							
9:27	2	88.8	113.4	24.6	583.1	513.2	34.1
9:29							
9:37	2	87.6	112.8	25.2	597.3	538.6	33.3
9:39							
9:46	2	88.2	112.8	24.6	583.1	530.1	33.0
9:48							
10:00	2	87.6	113.4	25.8	611.5	530.1	34.6
10:02							
10:08	2	88.2	112.8	24.6	583.1	530.1	33.0
10:10							
10:19	2	88.2	113.4	25.2	597.3	521.7	34.4
10:21							
10:30	2	87.6	112.8	25.2	597.3	538.6	33.3
10:32							
10:40	2	87.6	113.4	25.8	611.5	530.1	34.6
10:42							
10:50	2	88.2	112.2	24.0	568.9	538.6	31.7
10:52							

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24002-01

Test Hole Number: P-3 (Continued)

Date Excavated: 5/23/24

Date Presoak: 5/24/24

Date Tested: 5/24/24

Tested By: PA

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 117

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
11:00	2	87.0	112.8	25.8	611.5	547.1	33.5
11:02							
11:10	2	87.0	112.2	25.2	597.3	555.6	32.3
11:12							
11:20	2	86.4	112.2	25.8	611.5	564.1	32.5
11:22							
11:30	2	85.8	112.2	26.4	625.8	572.6	32.8
11:32							
11:40	2	86.4	112.2	25.8	611.5	564.1	32.5
11:42							

Infiltration Rate (I) = (Preadjusted Infiltration Rate)/(Reduction Factor)

Reduction Factor (Rf) = 3

I = 10.9 in./hr.

Note: Preadjusted infiltration rate uses average of last three readings

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-4

Tested By: PA

Pipe Area (in²) per inch: 3.1

Pipe Dia (in): 2

Boring Dia. (in.): 9

Depth (in): 177

Boring Area (in²) per inch: 63.6

Sand Backfill Porosity: 0.34

Date Excavated: 5/23/24

Date Presoak: 5/24/24

Date Tested: 5/24/24

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
8:42	2	160.8	177.0	16.2	384.0	292.6	39.4
8:44							
8:50	1	162.0	171.0	9.0	213.3	360.5	35.5
8:51							
8:57	2	161.4	176.4	15.0	355.5	292.6	36.4
8:59							
9:05	2	161.4	175.8	14.4	341.3	301.1	34.0
9:07							
9:13	2	161.4	177.0	15.6	369.8	284.2	39.0
9:15							
9:21	2	160.8	175.8	15.0	355.5	309.6	34.5
9:23							
9:33	2	160.8	175.8	15.0	355.5	309.6	34.5
9:35							
9:42	2	161.4	176.4	15.0	355.5	292.6	36.4
9:44							
9:50	2	161.4	176.4	15.0	355.5	292.6	36.4
9:52							
10:04	2	160.8	175.8	15.0	355.5	309.6	34.5
10:06							
10:12	2	161.4	175.8	14.4	341.3	301.1	34.0
10:14							
10:23	2	160.2	175.8	15.6	369.8	318.1	34.9
10:25							

Percolation Data Sheet

Project Name: Meritage/1501 Del Norte Street

Project Number: 24082-01

Test Hole Number: P-4 (Continued)

Tested By: PA

Pipe Dia (in): 3

Depth (in): 177

Pipe Area (in²) per inch: 7.1

Boring Dia. (in.): 9

Boring Area (in²) per inch: 63.6

Date Excavated: 5/23/24

Date Presoak: 5/24/24

Date Tested: 5/24/24

Annular Backfill Porosity: 0.34

Time	Time Interval (mins.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Volume of Water (in ³)	Wetted Surface Area (in ²)	Preadjusted Infiltration Rate (in./hr.)
10:35	2	160.2	175.8	15.6	410.2	318.1	38.7
10:37							
10:45	2	160.2	175.2	15.0	394.4	326.6	36.2
10:47							
10:55	2	161.4	175.2	13.8	362.9	309.6	35.2
10:57							
11:05	2	160.2	175.2	15.0	394.4	326.6	36.2
11:07							
11:15	2	159.6	175.8	16.2	426.0	326.6	39.1
11:17							
11:25	2	160.8	175.8	15.0	394.4	309.6	38.2
11:27							
11:35	2	160.2	175.2	15.0	394.4	326.6	36.2
11:37							
11:45	2	159.6	175.2	15.6	410.2	335.1	36.7
11:47							

Infiltration Rate (I) = (Preadjusted Infiltration Rate)/(Reduction Factor)

Reduction Factor (Rf) = 3

I= 12.4 in./hr.

Note: Preadjusted infiltration rate uses average of last three readings

Appendix F

APPENDIX F

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 GENERAL

- 1.1 **Intent:** These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these general Specifications. Observations of the earthwork by the project Geotechnical Consultant during grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).
- 1.2 **Geotechnical Consultant:** Prior to commencement of work, the project owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all keyway bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of subgrade and fill materials and perform adequate relative compaction testing of fill to determine the attained level of compaction and assess if, in their opinion, if the work was performed in substantial compliance

with the geotechnical report(s) and these specifications. The Geotechnical Consultant shall provide test results to the owner on a routine and frequent basis.

- 1.3 The Earthwork Contractor:** The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with applicable grading codes, the project plans, and these specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork planned for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are corrected.

2.0 PREPARATION OF FILL AREAS

- 2.1 Clearing and Grubbing:** Areas to be excavated and filled shall be cleared and grubbed. Vegetation, such as brush, grass, roots, and other deleterious material, man-made structures, and similar debris shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant. Borrow areas shall be cleared and grubbed to the extent necessary to provide a suitable fill material.

Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 3 and 4. Earth fill material

shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent organic matter. Nesting of organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, etc.) have chemical constituents that are considered hazardous waste. As such, the indiscriminate dumping or spillage of such fluids may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

The Geotechnical Consultant shall not be responsible for the identification or analysis of potentially hazardous materials; however, if observations, odors, or soil discoloration are suspect, the Geotechnical Consultant may request from the owner the termination of grading operations until such materials are deemed not hazardous as defined by applicable laws and regulations.

2.2 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

2.3 Processing: Ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Ground that is not satisfactory shall be removed/overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction. After scarification, the surface should be moisture conditioned, as necessary, to achieve the proper moisture content and compacted in accordance with Section 4 of these specifications.

2.4 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured, or otherwise unsuitable ground shall be overexcavated to competent ground as recommended by the Geotechnical Consultant during grading.

- 2.5 **Benching:** Fills to be placed on ground sloping steeper than 5H:1V (horizontal to vertical units) shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for fill placement.

3.0 FILL MATERIAL

- 3.1 **General:** Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.
- 3.2 **Oversize:** Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or other underground construction.
- 3.3 **Import:** If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1 and/or requirements defined in the project geotechnical report(s). The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before import begins so that suitability can be determined, and appropriate laboratory tests performed.

4.0 FILL PLACEMENT AND COMPACTION

- 4.1 **Fill Layers:** Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

- 4.2 **Fill Moisture Conditioning:** Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with ASTM International (ASTM Test Method D1557).
- 4.3 **Compaction of Fill:** After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction and uniformity.
- Compaction of Fill Slopes:** In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.
- 4.4 **Compaction Testing:** Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).
- 4.5 **Frequency of Compaction Testing:** Tests shall be taken at intervals required by the governing agency and as deemed necessary by the Geotechnical Consultant in order to adequately qualify the fill material. In general, it should be anticipated that tests will be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill, unless recommended otherwise by the Geotechnical Consultant. In addition, test(s) shall be taken on slope faces and/or each 10 feet of vertical height of slope as deemed necessary by the Geotechnical Consultant. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

- 4.6 Compaction Test Locations:** The Geotechnical Consultant shall document the approximate elevation and location of each compaction test. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided. Alternatively, GPS units may be used to determine the approximate location/coordinates of the field density tests.

5.0 SUBDRAIN INSTALLATION

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and standard details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys. The Contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The Contractor is responsible for the performance of subdrains.

6.0 EXCAVATION

Excavations, including over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical report(s) and plans are estimates. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 TRENCH BACKFILLS

- 7.1** Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.
- 7.2** Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

- 7.3** Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.
- 7.4** Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill, unless required differently by the governing agency or the Geotechnical Consultant.
- 7.5** Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.
- 7.6** Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.



Basemap Source: Google Earth

Legend			Geotechnical Map		
	H-5 TD: 26.5'	Approximate Hollow Stem Auger Boring Location, Showing Total Depth in Feet	Earth Units (Circled Where Buried)		
	P-4 TD: 15'	Approximate Hollow Stem Auger Boring and Percolation Test Location, Showing Total Depth in Feet	Qal	Meritage Homes Proposed Residential Development 1501 Del Norte Street West Covina, California	Project Number: 24082-01 Date: June 14, 2024 Plate 1
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