

Northgate Subaru

Geotechnical Engineering Report

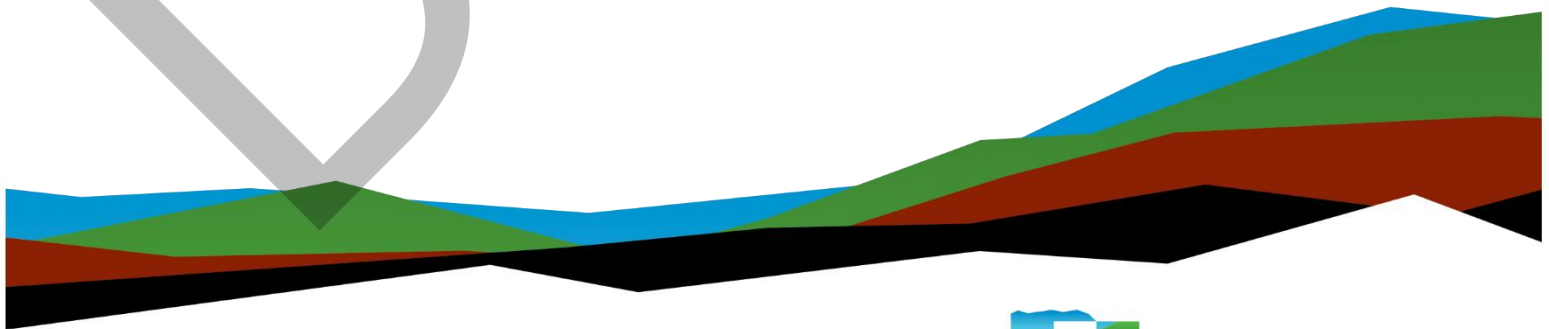
208, 249, and 309 Gleneagle Gate View, Colorado Springs,
Colorado

October 25, 2024 (Revised July 18, 2025)

Terracon Project No. 23245098

Prepared for:

Carlson West Povondra Architects, Inc.
5060 Dodge Street
Omaha, Nebraska 68132



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- Facilities
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October 25, 2024 (Revised July 18, 2025)

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Attn: Bob Soukup
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Re: Geotechnical Engineering Report
Northgate Subaru
208, 249, and 309 Gleneagle Gate View
Colorado Springs, Colorado
Terracon Project No. 23245098

Mr. Soukup:

We have completed the scope of Geotechnical Engineering services for the project referenced above in general accordance with Terracon Proposal No. P23245098 dated August 9, 2024. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, pavements, and floor slabs for the proposed project.

This report was revised on July 17, 2025 to add discussion of Geologic Hazards and relevant maps.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Nick M. Novotny, P.G., C.E.G.
Geotechnical Department Manager

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Regional Geotechnical Manager

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Exploration and Testing Procedures

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Supporting Information

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the  Terracon logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic ¹	Overview Statement ²
Project Description	<p>We understand the project consists of 3 separate parcels with the following improvements:</p> <ul style="list-style-type: none"> ■ 208 Gleneagle Gate: This lot is about 6 acres and has an elevation change of about 30 feet through the property. This lot is planned to be the main area for construction, which consists of the following: <ul style="list-style-type: none"> ■ A showroom and service area: 63,300 square feet ■ 2nd floor parts storage: 7,820 square feet ■ Separate carwash: 3,060 square feet ■ Total building area: 74,180 square feet ■ 309 Gleneagle Gate View: This lot is about 4 acres and will mainly be utilized for inventory parking with about 300 parking stalls. Solar panels and battery storage may be planned to be constructed in this area. ■ 249 Gleneagle Gate View: This lot is primarily used for stormwater detention and there is already existing storm water detention on the lot. There may be a desire to gain a few more parking stalls on this lot, if allowed.
Geotechnical Characterization	<p>The subsurface conditions encountered in the exploratory borings generally consisted of existing fill materials to depths of about 2 to 6 feet below the existing ground surface (bgs), underlain by native soils consisting of sand with varying amounts of silt to the maximum depth explored of about 10 to 50 feet bgs in the exploratory borings.</p> <p>Existing fill materials generally consisted of sand soils with varying amounts of silt and clay and clay soils with varying amounts of sand.</p> <p>Groundwater was encountered exclusively in Boring Nos. P-2 and P-3 at depths of about 9 to 10 feet bgs.</p>
Existing Fill Materials	<p>Based upon the results of our field exploration and laboratory testing, it is our opinion the existing fill should not be used to support foundations, interior slabs, exterior slabs-on-grade, or pavement construction without complete removal and recompaction.</p>

Topic ¹	Overview Statement ²
	<p>If the owner is willing to accept a higher risk of movement for pavements and exterior slabs, consideration could be given to over-excavating a portion of the existing fill materials below these elements, then processing, moisture conditioning and compacting the materials back to subgrade elevation.</p>
<p>Deep Fills</p>	<p>Based on the provided grading plan, we understand the proposed buildings are planned to be constructed partially on new engineered fill materials, and partially over native soils, with cuts on the order of about 10 feet on the northern portion of the site and fills on the order of about 30 feet on the southern portion of the site, respectively.</p> <p>Elements constructed on deep new engineered fill are subject to settlement resulting from self-weight of the new engineered fill materials, and we anticipated settlement from self-weight of the new engineered fill materials may be on the order of about 4 to 7 inches. Therefore, it is critical that new engineered fills be monitored for settlement during and after placement, and Terracon should review the settlement data and provide consultation for allowing time for the fill to settle before building construction commences in the deep fill portions of the site.</p>
<p>Foundation Recommendations</p>	<p>The proposed buildings may be constructed on a shallow spread footing foundation bottomed on new engineered fill, provided the owner is willing to accept the associated risk of movement.</p>
<p>Interior Floors</p>	<p>The floor system for the proposed buildings may consist of a slab-on-grade constructed on new engineered fill, provided the owner is willing to accept the risk of movement.</p>
<p>Pavements</p>	<p>New pavements will likely consist of flexible asphalt and rigid concrete pavement. New pavements constructed on the existing fill materials will have a moderate risk of movement. We recommend subgrade soils below pavements are scarified to a depth of at least 12 inches, moisture conditioned, and recompacted to grade to improve performance.</p>
<p>General Comments</p>	<p>This section contains important information about the limitations of this geotechnical engineering report.</p>

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Northgate Subaru dealership to be located at 208, 249, and 309 Gleneagle Gate View in Colorado Springs, Colorado. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface conditions
- Groundwater conditions
- Earthwork
- Grading and drainage
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification
- Lateral earth pressures
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of 17 test borings (designated as Building Boring Nos. B-1 to B-8 and Pavement Boring Nos. P-1 to P-9) to depths ranging from approximately 10 to 50 feet below existing site grades.

Plans showing the site and boring locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the [Exploration Results](#) section.

Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	<p>An email request for proposal was provided by Bob Soukup from Carlson. The email included the following attachments:</p> <ul style="list-style-type: none"> ■ 240804_Northgate Subaru_Geotech.docx ■ Northgate Subaru – Option 1.pdf ■ Northgate Subaru – Grading Plan Options
Project Description	<p>We understand the project consists of 3 separate parcels with the following improvements:</p> <ul style="list-style-type: none"> ■ 208 Gleneagle Gate: This lot is about 6 acres and has an elevation change of about 30 feet through the property. This lot is planned to be the main area for construction, which consists of the following: <ul style="list-style-type: none"> ■ A showroom and service area: 63,300 square feet ■ 2nd floor parts storage: 7,820 square feet ■ Separate carwash: 3,060 square feet ■ Total building area: 74,180 square feet ■ 309 Gleneagle Gate View: This lot is about 4 acres and will mainly be utilized for inventory parking with about 300 parking stalls. Solar panels and battery storage may be planned to be constructed in this area. ■ 249 Gleneagle Gate View: This lot is primarily used for stormwater detention and there is already existing storm water detention on the lot. There may be a desire to gain a few more parking stalls on this lot, if allowed.
Building Construction	<p>We anticipate the proposed building will be constructed of light gauge metal or wood framing with cast-in-place concrete foundations.</p>
Finished Floor Elevation	<p>We understand the Finished Floor Elevation (FFE) for the dealership buildings are anticipated to be at about 6,758.5 feet.</p>
Maximum Loads	<p>We anticipate the following loads based on our experience with similar projects.</p> <ul style="list-style-type: none"> ■ Columns: 100 to 500 kips ■ Walls: 2 to 5 kips per linear foot (klf) ■ Slabs: 150 to 250 pounds per square foot (psf)

Item	Description
Grading/Slopes	Based on our review of the existing site topography and provided grading plans, we anticipate cuts on the order of about 10 feet and fills up to about 30 feet for this project.
Below-Grade Structures	None indicated.
Free-Standing Retaining Walls	<p>We understand new retaining walls on the order of about 26 feet in height are anticipated to develop final site grades. We understand the final wall construction and heights are still being determined and could be subject to change. Therefore, design recommendations for tall retaining walls are not included in this report.</p> <p>Terracon should be contacted once the type and height of the proposed retaining walls on this project are confirmed, so we can provide the necessary recommendations.</p>
Pavements	<p>New pavements will likely consist of flexible asphalt and rigid concrete pavement. Traffic loads were not available at the time of this proposal. We will assume traffic loads consistent with that of similar use. Unless information is provided prior to the report, we assume that the traffic classification will consist of:</p> <ul style="list-style-type: none"> ■ Automobile Parking: Parking stalls for passenger vehicles and pickup trucks ■ Main Traffic Corridors: Traffic consisting of passenger vehicles, single-unit delivery trucks and garbage trucks <p>The pavement design period is 20 years.</p>
Building Code	2021 International Building Code (IBC)

Terracon should be notified if any of the above information is inconsistent with the planned construction, particularly the anticipated grading efforts, as revised and/or additional geotechnical recommendations may be required.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	<p>The project is located at 208, 249, and 309 Gleneagle Gate View in Colorado Springs, Colorado.</p> <p>Latitude/Longitude (approximate): 39.0294° N, -104.8305° W See Site Location</p>
Existing Improvements	The site currently consists of three vacant lots. The lots are subdivided by the existing Glendale Gate View roadway.
Current Ground Cover	Ground cover on the site consists of barren ground with areas of light to moderate vegetation.
Existing Topography	<p>Based on our review of the available aerial imagery, each location has the following topography:</p> <ul style="list-style-type: none"> ■ 208 Gleneagle Gate View: The site slopes down to the southeast with an elevation difference on the order of about 30 feet across the site. ■ 309 Gleneagle Gate View: The site slopes down to the south with an elevation difference on the order of about 10 feet across the site. ■ 249 Gleneagle View: The site slopes down to the south with an elevation difference on the order of about 5 feet across the site.
Geology	<p>Surficial geologic conditions near the site, as mapped by the Colorado Geological Survey (CGS) (¹Thorson and Madole 2004), consist of alluvial-slope deposits of Quaternary age. These deposits within this area have been reported to include poorly sorted (well-graded) sand and sandy fine pebble gravel.</p> <p>The geologic conditions presented in this section were obtained by locating the subject site on available large-scale geologic maps. Due to the scales involved, precise location of the site can be difficult to determine. In addition, the large-scale geologic maps describe only general trends. Local variations are possible and site specific geology may differ from those described above. A site-specific detailed geologic description is beyond the scope of this project.</p>

¹Thorson, J.P. and Madole, R.F., 2004, **Geologic Map of the Monument Quadrangle, El Paso County, Colorado**, Colorado Geological Survey, Open-File Report OF-02-04.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration Results](#) and the GeoModel can be found in the [Figures](#) attachment of this report. As noted in [General Comments](#), the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Subsurface Profile

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Topsoil	About 4 to 6 inches thick
2	Aggregate Surfacing	About 12 inches thick
3	Fill	Existing fill materials consisting of sand soils with varying amounts of silt and clay and clay soils with varying amounts of sand; various densities
4	Native Sands	Native sand soils with varying amounts of silt; loose to medium dense

Stratification boundaries on the boring logs represent the approximate location of changes in soil and material types; in situ, the transition between materials may be gradual. Further details of the borings can be found on the boring logs in the [Exploration Results](#).

Based on the results of the laboratory testing and our experience in the area, the fill materials have low expansive potential, while native sand soils are considered to be non-expansive. A summary of laboratory test results is included in the [Exploration Results](#).

Groundwater Conditions

The borings were observed while drilling and upon completion of drilling for the presence and level of groundwater. The water levels encountered in the boreholes can be found on the boring logs in [Exploration Results](#) and are summarized below.

Boring No.	Shallowest depth to groundwater encountered while or upon completion of drilling ¹
B-1	Not encountered to the maximum depth explored of 40 feet
B-2	Not encountered to the maximum depth explored of 20 feet
B-3	Not encountered to the maximum depth explored of 40 feet
B-4	Not encountered to the maximum depth explored of 20.5 feet
B-5	Not encountered to the maximum depth explored of 20 feet
B-6	Not encountered to the maximum depth explored of 50 feet
B-7	Not encountered to the maximum depth explored of 40 feet
B-8	Not encountered to the maximum depth explored of 20 feet
P-1	Not encountered to the maximum depth explored of 10 feet
P-2	About 10 feet
P-3	About 9 feet
P-4	Not encountered to the maximum depth explored of 10 feet
P-5	Not encountered to the maximum depth explored of 10 feet
P-6	Not encountered to the maximum depth explored of 10 feet
P-7	Not encountered to the maximum depth explored of 10 feet
P-8	Not encountered to the maximum depth explored of 10 feet
P-9	Not encountered to the maximum depth explored of 10 feet

1. Due to safety concerns, borings were backfilled immediately after completion. Therefore, subsequent groundwater measurements were not obtained.

These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times or at other locations.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed.

Groundwater levels during construction or at other times in the life of the structures may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Geologic Hazards

Geologic Hazard	Discussion
<p>Groundwater</p>	<p>Based on the results of our field exploration performed for this project in September 2024, groundwater was encountered in Boring Nos. P-2 and P-3 at depths of about 9 to 10 feet below ground surface (bgs), respectively and elevations of about 6,723 feet to 6,727 feet above sea level (asl), respectively.</p> <p>Based on the results of our field exploration for the proposed retaining walls in December 2024 (Terracon Report No. 23245149 dated, February 18, 2025), groundwater was encountered in Boring No. RW-4 at a depth of about 13.5 feet bgs and an elevation of about 6,722.5 feet asl.</p> <p>Based on our review of the anticipated site grading plans, the proposed site grades in the areas of Boring Nos. P-2, P-3, and RW-4 are expected to receive about 10 to 20 feet or more of new engineered fill.</p> <p>Based on observed groundwater depths and review of the anticipated site grading, we believe groundwater will not affect the proposed construction. Therefore, the risk of groundwater impacting the proposed construction is considered to be low.</p>

Geologic Hazard	Discussion
<p>Expansive and Collapsible Soils</p>	<p>Based on review of Colorado Geological Survey (CGS) publication ON-006-04 Collapsible Soils of Colorado, the project area is not mapped in an area of collapsible soils. In addition, based on review of the map provided in CGS publication EG-14 Collapsible Soils in Colorado, the project area is not mapped in an area of collapsible soils. We evaluated the on-site soils for swell and collapse potential utilizing soil unit weights, blow counts, and one-dimensional laboratory testing. We found that the existing undocumented fill encountered in Boring No. P-5 had a low swell potential. Due to the nature of the samples in the area of the proposed site improvements, reliable laboratory one-dimensional swell or collapse potential of the native soils could not be obtained. Therefore, we relied on soil unit weight and density determinations to assess the potential for collapsible soils. Based on our analysis, we recommend foundations be constructed on a minimum of 2 feet of new engineered fill as presented in the Foundation Recommendations section of this report.</p> <p>Based on our review of CGS publications, encountered lithology, and results of our laboratory testing, and geotechnical analysis, the risk of collapsible soils at the site is considered low. In addition, the foundation recommendations presented in this report have considered the potential expansive and collapsible soils.</p>
<p>Landslide Susceptibility</p>	<p>Based on ON-006-01 Colorado Landslide Inventory by CGS, the site is not mapped in a landslide susceptible area.</p> <p>On-site observations during our field exploration did not encounter signs of landslide activity. Slopes on-site were lightly to moderately vegetated at the time of our field exploration.</p> <p>Review of the grading plans for this project indicate the site is planned to have maximum grades on the order of about 6.3% or flatter.</p> <p>Based on review of ON-006-01, on-site observations, and review of the anticipated grading plans, the risk of landslide hazards at this site is considered to be low.</p>

Corrosivity

The table below lists the results of laboratory soluble sulfate testing. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary

Boring	Sample Depth (feet)	Soluble Sulfate (%)
B-2	1-4	<0.1
B-3	19-20	<0.1
B-8	1-4	<0.1

Results of water-soluble sulfate testing indicate samples of the on-site soils have an exposure class of S0 when classified in accordance with the American Concrete Institute (ACI) Design Manual. The results of the testing indicate ASTM Type I or IL portland cement is suitable for project concrete in contact with on-site soils. However, if there is no (or minimal) cost differential, use of ASTM Type II portland cement is recommended for additional sulfate resistance of construction concrete. Concrete should be designed in accordance with the provisions of the ACI Design Manual.

Imported fill materials may have significantly different properties than the site materials noted above and should be evaluated if expected to be in contact with materials used for construction.

Geotechnical Overview

Based on subsurface conditions encountered in the borings, the site appears suitable for the proposed construction from a geotechnical point of view provided certain precautions and design and construction recommendations outlined in this report are followed. We

have identified geotechnical conditions that could impact design and construction of the proposed buildings, pavements, and other site improvements.

Existing Fill Materials

Up to about 6 feet of existing fill materials were encountered in portions of the site. It should be noted that fill depths presented in the boring logs are approximate and the depth, lateral extents, and composition of fill should be expected to vary. We do not possess any information regarding whether the fill was placed under the observation of a geotechnical engineer.

Based upon the results of our field exploration and laboratory testing, it is our opinion the existing fill should not be used to support foundations, interior slabs, exterior slabs-on-grade, or pavement construction without complete removal and recompaction.

If the owner is willing to accept a higher risk of movement for pavements and exterior slabs, consideration could be given to over-excavating a portion of the existing fill materials below these elements, then processing, moisture conditioning and compacting the materials back to subgrade elevation.

The existing fill can be reused as engineered fill below foundations, slabs-on-grade, and pavements, provided the material meets the requirements of imported soils in the **Material Types** subsection in **Earthwork** and any deleterious materials are removed. Some removal and replacement may be required if unsuitable or soft materials are exposed.

Loose Soils

Test boring data indicate loose soils may be locally present. Consequently, loose soils could be encountered below foundations or other improvements and these conditions will likely require some corrective work. Corrective work could involve removal and re-compaction or replacement, in-place soil densification, or deepening footing excavations to suitable bearing materials. In any event, Terracon should be contacted to observe foundation excavations to evaluate bearing conditions and to provide guidance concerning corrective work (if needed).

Deep Fill Zones

Based on the provided grading plan, we understand deep fills on the order of about 30 feet in depth are planned for the southern portion of the project site.

Foundation elements construed on deep fills are subject to settlement resulting from self-weight of the new engineered fill materials, which is anticipated to be on the order of 4 to 7 inches or more. The amount of time for the new engineered fill to settle under

its own weight cannot be accurately predicted. However, some studies have shown that 75% of the self-weight settlement of new fill can occur during construction, with the remaining settlement occurring over an extended period. This long-term settlement could influence the performance of the development and should be considered in the design.

Therefore, it is critical that new engineered fills be monitored for settlement during and after placement. Terracon should review the settlement data and provide consultation for allowing time for the fill to settle before construction in the deep fill areas.

Earthwork

The following sections present recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. All earthwork on the project should be observed and evaluated by Terracon.

Site Preparation

Strip and remove existing vegetation, organics, and other deleterious materials from proposed building and pavement areas. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.

Stripped materials consisting of vegetation, unsuitable fills, and organic materials should be wasted from the site or used to revegetate landscaped areas or exposed slopes after completion of grading operations.

Where possible, the site should be initially graded to create a relatively level surface to receive fill and to provide for a relatively uniform thickness of fill beneath the proposed building and improvement areas. All exposed areas that will receive fill, once properly cleared, should be scarified to a minimum depth of 12 inches, conditioned to near optimum moisture content, and compacted. It is imperative the moisture content of prepared materials be protected from moisture loss.

Although evidence of underground facilities were not observed during our exploration, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

We anticipate excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

Depending upon seasonal conditions, surface water may infiltrate into the excavations on the site. Water seeping into excavations at this site could most likely be controlled by shallow trenches leading to a sump pit where the water could be removed by pumping.

The stability of subgrade soils may be affected by precipitation, repetitive construction traffic, or other factors. If unstable conditions are encountered or develop during construction, workability may be improved by overexcavation of wet zones and mixing these soils with crushed gravel. Use of geotextiles could also be considered as a stabilization technique. Lightweight excavation equipment may be required to reduce subgrade pumping.

Material Types

Fill for this project should consist of new engineered fill. New engineered fill is fill that meets the criteria presented in this report and has been properly documented.

New engineered fill should meet the following material property requirements:

Fill Type ^{1,2}	USCS Classification	Acceptable location for placement
On-site clay soils mixed with sand soils ³	CL	On-site clay soils mixed with sand soils are considered suitable for reuse as engineered fill below foundation, slab, and pavement areas, and as general fill for this project.
On-site sand soils	SP, SW, SM, SC	On-site sand soils are considered suitable for reuse as engineered fill below foundation, slab, and pavement areas and as general fill for this project.
Imported soils	Varies	Imported soils meeting the gradation presented herein can be considered acceptable for use as engineered fill beneath foundations, slabs and pavements.

1. Engineered fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation.
2. Care should be taken during the fill placement process to avoid zones of dis-similar fill. Improvements constructed over varying fill types are at a higher risk of differential movement compared to improvements over a uniform fill zone.
3. On-site clay soils should be mixed with on-site sand soils to meet the gradation requirements presented below for imported soils.

Imported soils for use as new engineered fill (if required) should meet the following material property requirements:

Gradation	Percent finer by weight (ASTM C136)
3"	100
No. 4 Sieve	30-100
No. 200 Sieve	5-40

- Liquid Limit..... 30 (max.)
- Plasticity Index..... 15 (max.)
- Maximum Expansive Potential (%)..... 0.5*

*Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at optimum water content. The sample is confined under a 200-psf surcharge and submerged.

Compaction Requirements

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.

Item	Description
Fill lift thickness	8-inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6-inches in loose thickness when hand-guided equipment (i.e. jumping jack, plate compactor) is used
Compaction requirements ^{1,2}	Minimum of 98% of the material's standard Proctor maximum dry density (ASTM D698).
Moisture content cohesionless soils (sand soils)	-2 to +2% of the optimum moisture content

1. We recommend engineered fill be tested for water content and compaction during placement. Should the results of the in-place density tests indicate the specified water or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified water and compaction requirements are achieved.
2. Water levels should be maintained low enough to allow for satisfactory compaction to be achieved without the compacted fill material pumping when proofrolled.

Excavation

Excavations into the subsurface soils will encounter a variety of conditions. The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards.

Soils penetrated by the proposed excavations may vary significantly across the site. The soil classifications are based solely on the materials encountered in the exploratory borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, the actual conditions should be evaluated to determine any excavation modifications necessary to maintain safe conditions.

Grading and Drainage

All grades must be adjusted to provide positive drainage away from the buildings during construction and maintained throughout the life of the proposed project. Infiltration of water into utility or foundation excavations must be prevented during construction. Landscaped irrigation adjacent to the foundation systems should be minimized or eliminated. Water permitted to pond near or adjacent to the perimeter of the buildings (either during or post-construction) can result in significantly higher soil movements than those discussed in this report. As a result, any estimations of potential movement described in this report cannot be relied upon if positive drainage is not obtained and maintained, and water is allowed to infiltrate the fill and/or subgrade.

Permanent grades should be sloped at a minimum of 5 percent grade for at least 5 feet beyond the perimeter of the buildings. Asphalt pavement or concrete flatwork should be sloped at a minimum of 2 percent beyond the building perimeters for the life of the buildings. Where Americans with Disabilities Act (ADA) or other requirements or existing site features limit the gradient, slopes on the order of 1/2 to 1 percent minimum may be necessary to comply with the ADA but do increase the risk of unanticipated movement. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be compacted in accordance with recommendations in this report and free of all construction debris to reduce the possibility of water infiltration. After building construction and prior to project completion, we recommend that verification of final grading be performed to document that positive drainage, as described above, has been achieved.

Where paving or flatwork abuts the buildings, care should be taken that joints are properly sealed and maintained to prevent the infiltration of surface water.

Landscape or xeriscape areas within 5 feet of the foundation systems shall not be hindered by landscape edging, grade variations, or vegetation. In addition, consideration should be given to snow removal practices that will minimize the stockpiling of snow in planter and landscaped areas adjacent to structural improvements.

Planters located adjacent to the buildings should be watertight. Sprinkler mains and spray heads should be located a minimum of 5 feet away from the building lines. Where drip line irrigation is located near the buildings, we recommend that drip line irrigation systems be located at least 5 feet from the outside edge of the foundations. Roof drains should discharge on pavements or be extended away from the buildings a minimum of 5 feet through the use of splash blocks or downspout extensions.

Earthwork Construction Considerations

Upon completion of grading operations, care should be taken to maintain the moisture content of the subgrade prior to construction of slabs-on-grade, pavements, etc. Construction traffic over prepared subgrade should be minimized and avoided to the extent practical.

The site should also be graded to prevent ponding of surface water on prepared subgrade or in excavations. In areas where water is allowed to pond over a period of time, the affected area should be removed and allowed to dry out. If constraints do not allow for moisture conditioning of affected soils as recommended in this report, the affected area should be overexcavated and replaced with engineered fill. As an alternative, geotextiles could also be considered as a stabilization technique.

The Geotechnical Engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during overexcavation operations, excavations, subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of building floor slabs.

Foundation Recommendations

Based upon the results of the field exploration and laboratory testing program for this exploration, proposed buildings may be supported on spread footing foundations bottomed on a minimum of 2 feet of new engineered fill, provided all existing fill materials are over-excavated down to native soils and modified or replaced with new engineered fill, and the owner is willing to accept the associated risk of movement.

Spread Footing Foundation Recommendations

Design recommendations for spread footing foundation systems are presented in the following table and paragraphs.

Description	Value
Supporting Stratum	A minimum of 2 feet of new engineered fill
Subgrade preparation	All existing fill materials shall be over-excavated down to native soils and modified or replaced with new engineered fill
Maximum Allowable Bearing Pressure ^{1,2}	2,500 psf
Coefficient of Friction (Sliding)	0.36
Minimum Footing Dimensions	Isolated footings: 24 inches Continuous footings: 18 inches
Minimum Embedment Below Finished Grade for Frost Protection ³	30 inches
Approximate Total Movement ⁴	About 1 inch
Estimated Differential Movement ^{4,5}	About ½ to ¾ inch

1. The recommended maximum allowable bearing pressure assumes that any existing fill or lower strength soils, if encountered, will be excavated and replaced with engineered fill.
2. The maximum allowable soil bearing pressure can be increased by 1/3 for transient loading conditions.
3. For perimeter footings, footings beneath unheated areas, and footings that will be exposed to freezing conditions during construction. Interior footings may bottom at a minimum depth of 12 inches below finished grade in heated areas.
4. Foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of engineered fill, and the quality of the earthwork operations and footing construction.
5. Footings should be proportioned on the basis of equal total dead load pressure to reduce differential movement between adjacent footings.

Additional foundation movements could occur if water from any source infiltrates the foundation soils; therefore, proper drainage should be provided in the final design and during construction and throughout the life of the structure. Failure to maintain the proper drainage as recommended in the **Grading and Drainage** section of **Earthwork** will nullify the movement estimates provided above.

Unstable subgrade conditions should be observed by the Geotechnical Engineer to assess the subgrade and provide suitable alternatives for stabilization. Stabilized areas should be proofrolled prior to continuing construction to assess the stability of the subgrade.

Over-excavation of existing fill materials below footings should extend laterally beyond all edges of the footings at least 5 feet. The over-excavation should then be backfilled up to the footing base elevation with approved fill placed in lifts of 8 inches or less in loose thickness (6 inches or less if using hand-guided compaction equipment) and compacted to at least 98 percent of the material's standard effort maximum dry density (ASTM D698).

The base of all foundation excavations should be free of water and loose soil prior to concrete placement. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete.

Footings, foundations, and masonry walls should be detailed and reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Seismic Considerations

Based on our subsurface exploration and laboratory testing, it is our opinion the soils have a low risk of liquefaction. The following table presents the seismic site classification based on the 2021 International Building Code (IBC), and the subsurface conditions encountered within the borings:

Code Used	Site Classification
2021 International Building Code (IBC) ^{1,2}	D

1. In general accordance with the 2021 International Building Code which refers to ASCE 7-10.
2. The 2021 International Building Code (IBC) requires a site subsurface profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot subsurface profile determination. The deepest boring of this exploration extended to a maximum depth of about 50 feet and this seismic site class definition considers that similar subsurface conditions exist below the maximum depth of the subsurface exploration.

Floor Slabs

Interior Floors

Slab-on-grade floors may be utilized for the interior floor systems, provided slabs-on-grade are constructed on a minimum of 2 feet of new engineered fill, all existing fill materials shall be over-excavated down to native soils and modified or replaced with new engineered fill, and some slab movement can be tolerated. We estimate this alternative will reduce movement to about 1 inch. If very little movement can be tolerated, structural floors, supported independent of the subgrade materials, are recommended.

The following design and construction recommendations apply to conventional slab-on-grade construction. New fill materials beneath slabs-on-grade should be placed and compacted as outlined in the **Earthwork** section of this report.

For structural design of concrete slabs-on-grade, a modulus of subgrade reaction of 120 pounds per cubic inch (pci) may be used for point or limited area loads for floors supported on an engineered fill.

Additional floor slab design and construction recommendations are as follows:

- Positive separations and/or isolation joints should be provided between slabs and all foundations, columns, or utility lines to allow independent movement.
- Control joints should be provided in slabs to control the location and extent of cracking.
- Interior trench backfill placed beneath slabs should be compacted in accordance with recommended specifications described previously.
- The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions regarding the use and placement of a vapor retarder.
- Floor slabs should not be constructed on frozen subgrade.
- Other design and construction considerations, as outlined in Section 302.1R of the ACI Design Manual, are recommended.

Movements of slab-on-grades using the above outlined technique will likely be reduced and tend to be more uniform. The estimates outlined previously assume that the other recommendations in this report are followed. Therefore, it is imperative that the recommendations outlined in this section and in the **Grading and Drainage** subsection of **Earthwork** be followed.

Exterior Flatwork

Exterior slabs-on-grade and flatwork constructed on the existing fill materials will have a moderate risk of movement. We believe the lowest risk alternative would be to remove all of the existing fill materials below exterior slabs-on-grade down to native soils and replace with new engineered fill. However, this can be very costly.

Alternatively, consideration could be given to partially over-excavating the existing fill below exterior slabs-on-grade to a depth of 2 feet and modifying or replacing with new engineered fill to improve performance. At a minimum (if no over-excavation is selected to reduce risk for potential movement), we recommend the subgrade soils below exterior slabs-on-grade be sacrificed a minimum of 12 inches, properly moisture conditioned, and compacted to grade prior to construction followed by a thorough proof roll to delineate any areas that may require over-excavation due to significant deflection.

New fill materials beneath slabs-on-grade should be placed and compacted as outlined in the **Earthwork** section of this report.

For structural design of exterior concrete slabs-on-grade, a modulus of subgrade reaction of 120 pci may be used for point or limited area loads for exterior slabs-on-grade at this site.

Additional slab design and construction recommendations are as follows:

- Minimizing moisture increases in the backfill.
- Controlling moisture-density during placement of backfill.
- Positive separations and/or isolation joints should be provided between exterior slabs and the buildings to allow independent movement.
- Control joints should be provided in slabs to control the location and extent of cracking.
- Exterior slabs should not be constructed on frozen subgrade
- Other design and construction considerations, as outlined in Section 302.1R of the ACI Design Manual, are recommended.

Movements of exterior slabs-on-grade using the above technique will likely be reduced and tend to be more uniform. Therefore, it is imperative that the recommendations outlined in the **Grading and Drainage** subsection of **Earthwork** be followed.

Lateral Earth Pressures

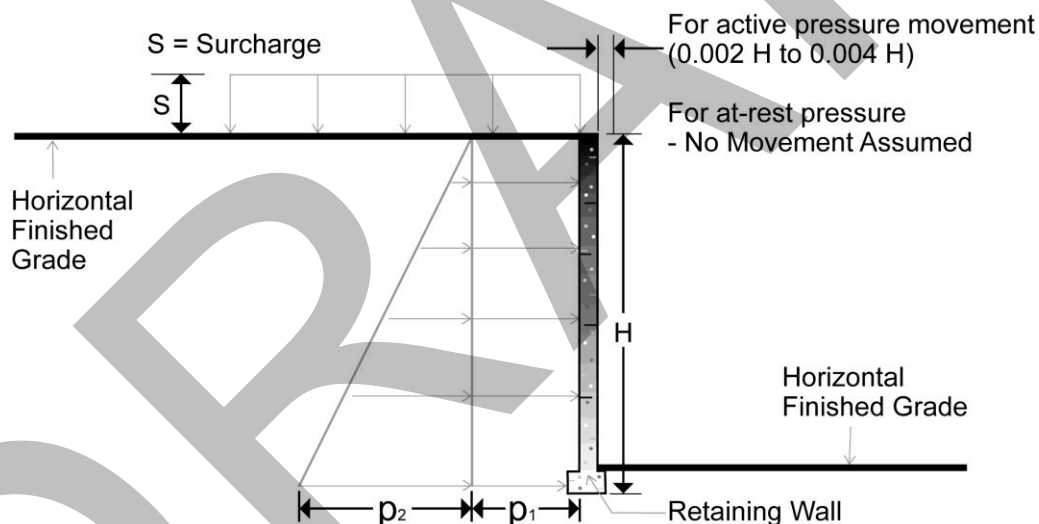
We understand new retaining walls on the order of about 26 feet in height are anticipated to develop final site grades. We understand the final wall construction and

heights are still being determined and could be subject to change. Therefore, design recommendations for tall retaining walls are not included in this report.

Terracon should be contacted once the type and height of the proposed retaining walls on this project are confirmed, so we can provide the necessary recommendations.

Concrete Cantilever Retaining Wall Recommendations

Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.



Earth Pressure Conditions	Lateral Earth Pressure Coefficient	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	0.33	40	$(0.33)S$	$(40)H$
At-Rest (K_o)	0.50	60	$(0.50)S$	$(60)H$
Passive (K_p)	3.00	300	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about $0.002 H$ to $0.004 H$, where H is wall height
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance.
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted to at least 95 percent of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters

To control hydrostatic pressure behind earth-retaining walls, we recommend that a drain be installed below the foundation of the wall with a collection pipe leading to a reliable discharge. If this is not possible, then combined hydrostatic and lateral earth pressures should be calculated for lean clay backfill using an equivalent fluid weighing 90 and 100 pcf for active and at-rest conditions, respectively. For granular backfill, an equivalent fluid weighing 85 and 90 pcf should be used for active and at-rest conditions, respectively. These pressures do not include the influence of surcharge, equipment, or floor loading, which should be added. Heavy equipment should not operate within a distance closer than the exposed height of retaining walls to prevent lateral pressures more than those provided.

The preceding data are applicable only to cast-in-place concrete or modular block walls up to 5 feet in height. **If taller single walls, tiered walls, or Mechanically Stabilized Earth (MSE) walls will be included in the proposed development, additional site-specific studies and laboratory testing will be required.** In addition, the wall designer should perform standard wall design practices including analysis for overturning, sliding, bearing capacity, and global stability, and results of these analyses should be provided for our review. Additional sampling, laboratory testing and document review associated with retaining walls is beyond the original scope of work but can be performed as a separate scope, for a separate fee.

Pavements

Design of privately maintained pavements for the project has been based on the procedures outlined by the Asphalt Institute (AI) and the American Concrete Institute (ACI).

Design Traffic

We assumed the following design parameters for Asphalt Institute flexible pavement thickness design:

- Automobile Parking Areas
 - Parking stalls and parking lots for cars and pick-up trucks, up to 50 stalls
- Main Traffic Corridors
 - Parking lots with a maximum of 5 trucks per day
- Subgrade Soil Characteristics
 - USCS Classification –SC to SP (medium to good subgrade)

We assumed the following design parameters for ACI rigid pavement thickness design based upon the average daily truck traffic (ADTT):

- Automobile Parking Areas
 - ACI Category A-1: Automobile parking with an ADTT of 1 over 20 years
- Main Traffic Corridors
 - ACI Category B: Commercial entrance and service lanes with an ADTT of 25 over 20 years
- Subgrade Soil Characteristics
 - USCS Classification – SC to SP (medium to high support)
- Concrete modulus of rupture value of 500 psi

We should be contacted to confirm and/or modify the recommendations contained herein if actual traffic volumes differ from the assumed values shown above.

Subgrade Soils

Based on subgrade soil Unified Soil Classifications of SC to SP, AI classifies the subgrade soil as medium to good, while ACI classifies the subgrade soil as medium to high support.

Pavements constructed on the existing fill materials will have a moderate risk of movement. We believe the lowest risk alternative would be to remove all of the existing fill materials below pavements down to native soils and replace with new engineered fill. However, this can be very costly.

Alternatively, consideration could be given to partially over-excavating the existing fill below pavements to a depth of 2 feet and modifying or replacing with new engineered fill to improve performance. At a minimum (if no over-excavation is selected to reduce risk for potential movement), we recommend the subgrade soils below pavements be sacrificed a minimum of 12 inches, properly moisture conditioned, and compacted to

grade prior to construction followed by a thorough proof roll to delineate any areas that may require over-excavation due to significant deflection.

Recommended Minimum Pavement Sections and Materials

Recommended alternatives for flexible and rigid pavements are summarized for each traffic area as follows:

Traffic Area	Alternative	Preliminary Pavement Thickness (Inches)			
		Asphalt Concrete Surface	Aggregate Base Course	Portland Cement Concrete	Total
Automobile Parking (AI Class I and ACI Category A)	A	5	--	--	5
	B	4	6	--	10
	C ¹	--	--	5	5
Main Traffic Corridors (AI Class III and ACI Category B)	A	6	--	--	6
	B	4	8	--	12
	C ¹	--	--	6	6

1. The minimum pavement section thickness per ACI

Each alternative should be investigated with respect to current material availability and economic conditions. A minimum 7-inch thickness of rigid reinforced concrete pavement is recommended at the location of dumpsters where trash trucks park and load, and in areas of tight turning radius.

Concrete pavement joint spacing and reinforcement should be in accordance with specifications in ACI 330R-08.

For analysis of pavement costs, the following specifications should be considered for each pavement component:

Pavement Component	Colorado Department of Transportation Criteria
Asphalt Concrete Surface	Grading S or SX
Aggregate Base Course	Class 5 or 6
Portland Cement Concrete	Class P

Pavement Maintenance

Future performance of pavements constructed at this site will be dependent upon several factors, including:

- Maintaining stable moisture content of the subgrade soils both before and after pavement construction.
- Providing for a planned program of preventative maintenance.

The performance of all pavements can be enhanced by minimizing excess moisture, which can reach the subgrade soils. The following recommendations should be implemented:

- Site grading at a minimum 2 percent grade onto or away from the pavements.
- Water should not be allowed to pond behind curbs.
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade.
- Sealing all landscaped areas in or adjacent to pavements or providing drains to reduce the risk of moisture migration to subgrade soils.
- Placing compacted backfill against the exterior side of curb and gutter.
- Placing curb, gutter, and/or sidewalk directly on subgrade soils without the use of base course materials.

Preventative maintenance should be planned and provided for an ongoing pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration.

Preventative maintenance consists of both localized maintenance (e.g. crack sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program.

Pavement Construction Considerations

Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the pavement subgrade may not

be suitable for pavement construction and corrective action will be required. The subgrade should be carefully evaluated at the time of pavement construction for signs of disturbance or excessive rutting. If disturbance has occurred, pavement subgrade areas should be reworked, moisture conditioned, and properly compacted to the recommendations in this report immediately prior to paving.

We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem axle dump truck prior to final grading and paving. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. All pavement areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to paving.

The placement of a partial pavement thickness for use during construction is not recommended without a detailed pavement analysis incorporating construction traffic. In addition, if the actual traffic varies from the assumptions outlined above, we should be contacted to confirm and/or modify the pavement thickness recommendations outlined above.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is

solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

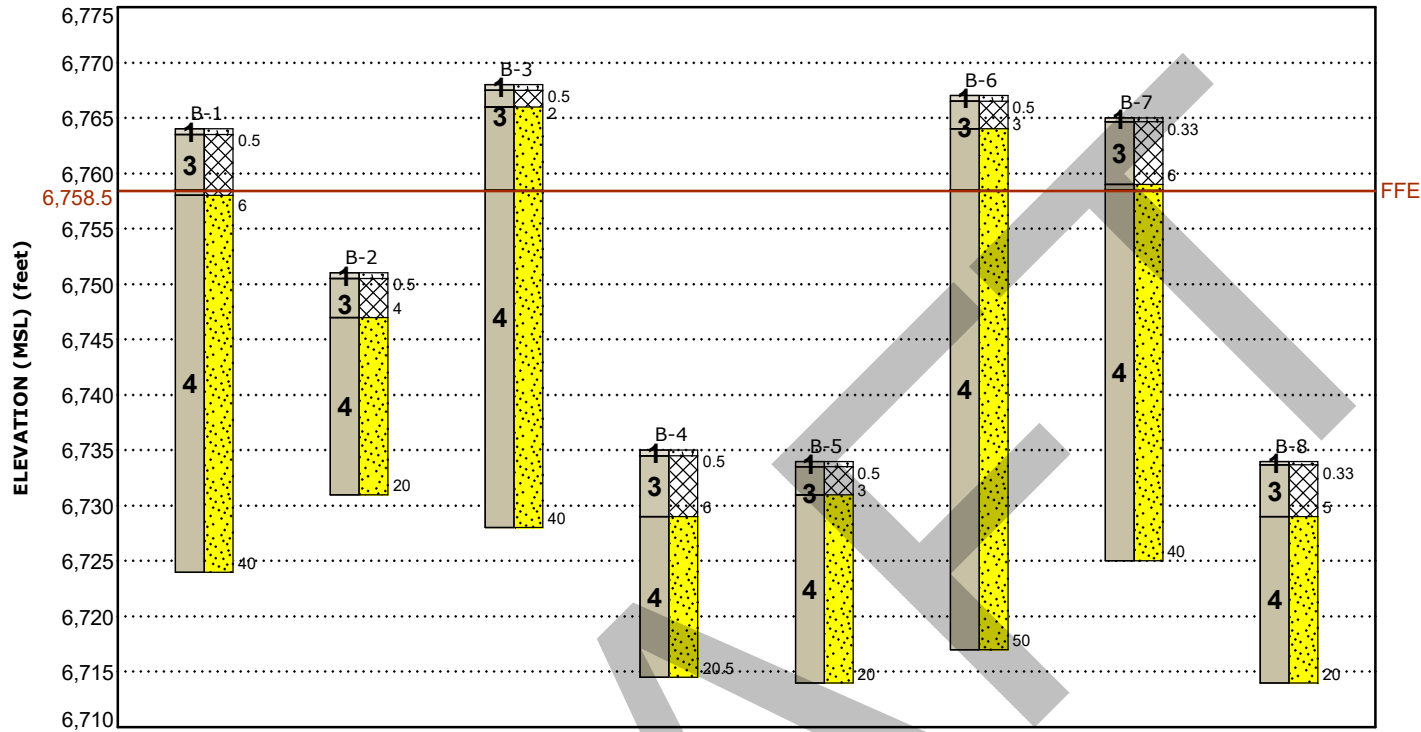
Figures

Contents:

GeoModel (2 pages)
General Site Geology
Collapsible Soils Plan
Landslide Susceptibility Plan

Note: All figures are one page unless noted above.

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

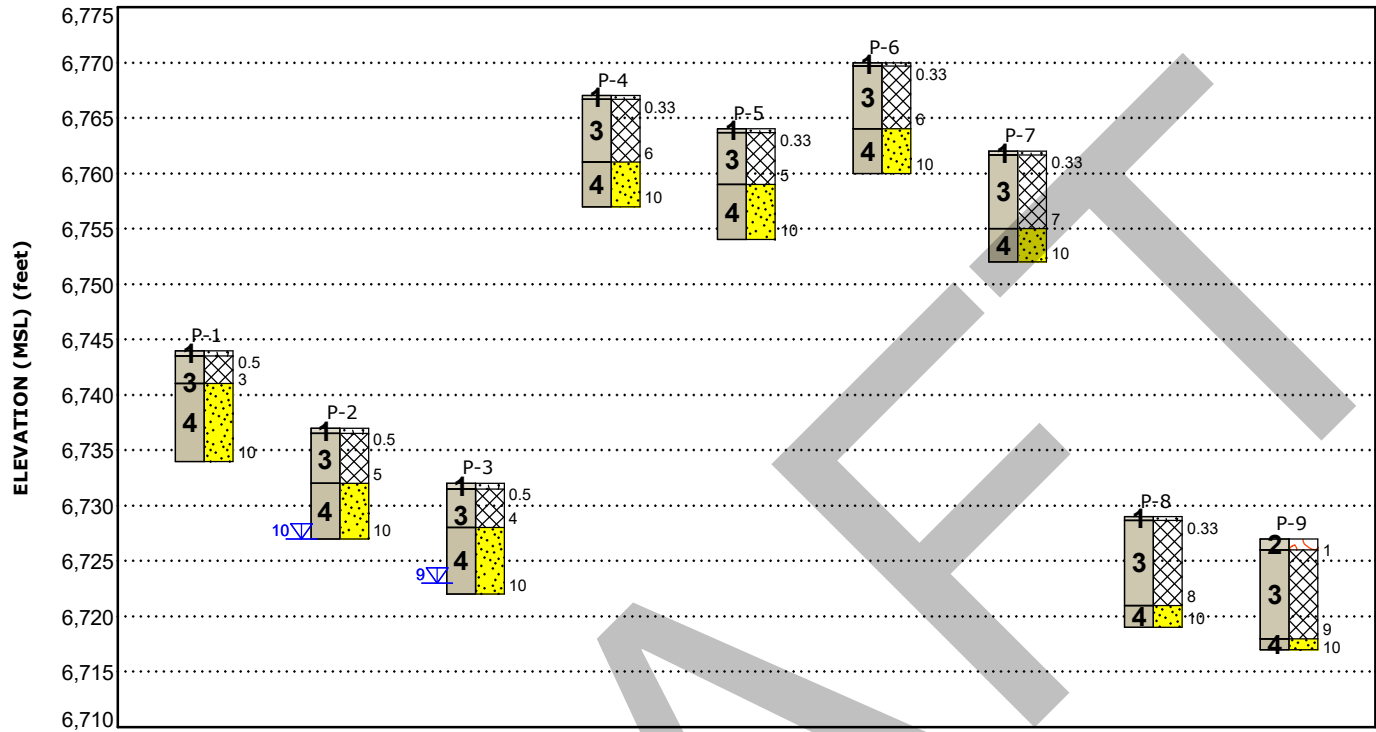
Model Layer	Layer Name	General Description	Legend	
1	Topsoil	About 4 to 6 inches thick	Topsoil	Fill
2	Aggregate Surfacing	About 12 inches thick	Poorly-graded Sand	Approximate FFE (EL. 6,758.5 feet)
3	Fill	Existing fill materials consisting of sand soils with varying amounts of silt and clay and clay soils with varying amounts of sand; various densities		
4	Native Sands	Native sand soils with varying amounts of silt; loose to medium dense		

- First Water Observation
- Second Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

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General Site Geology

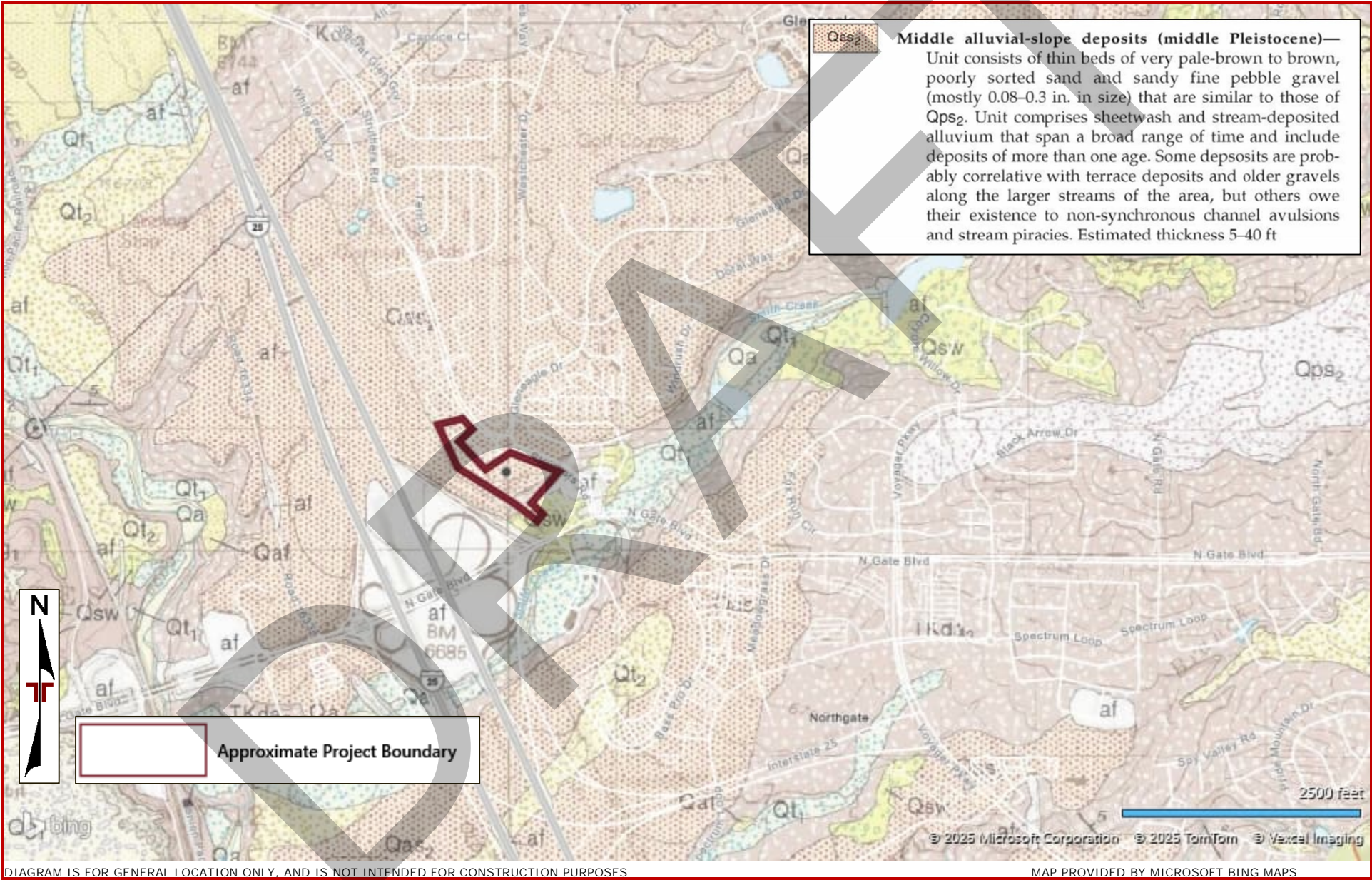


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Collapsible Soils Plan

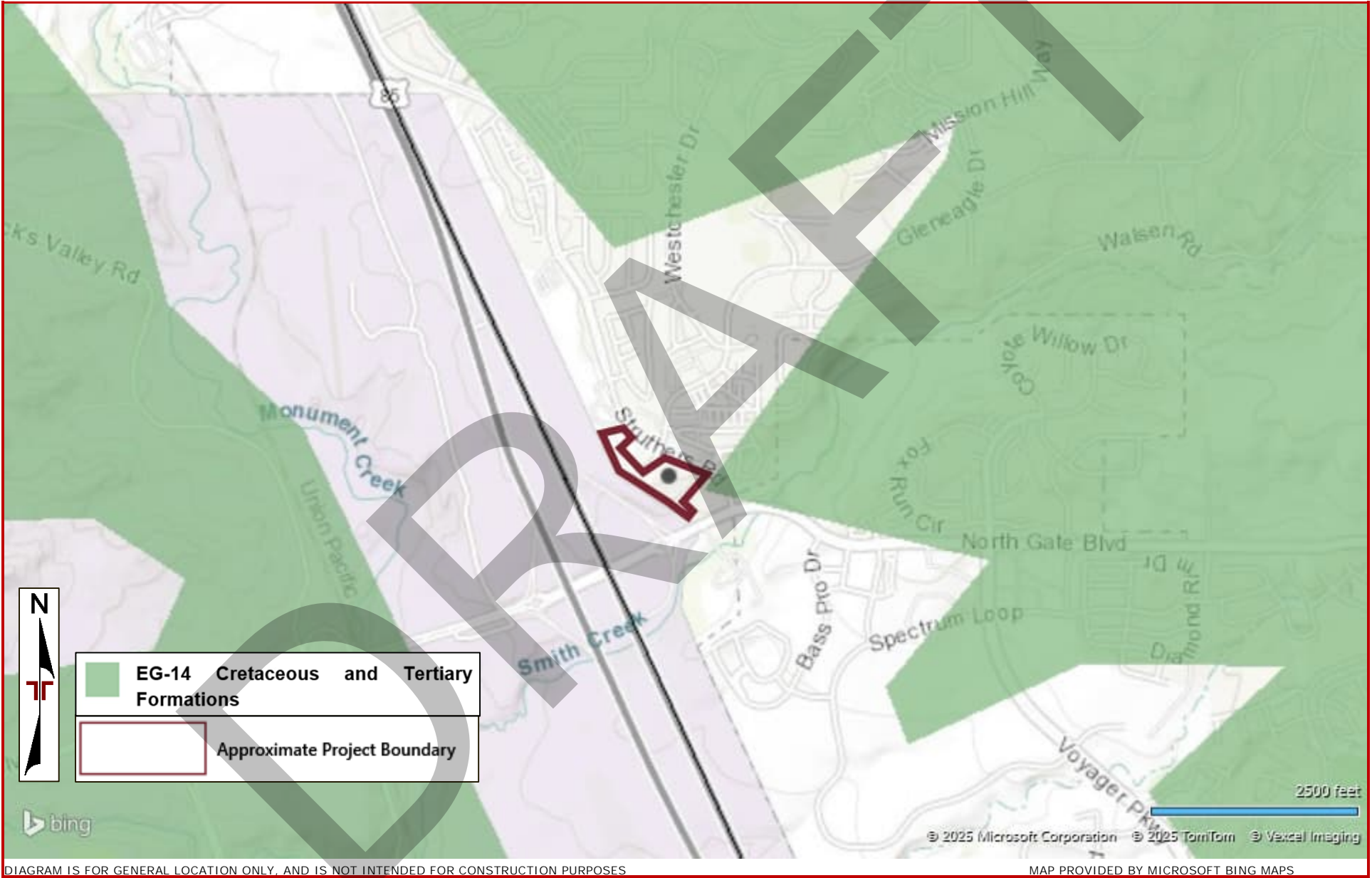
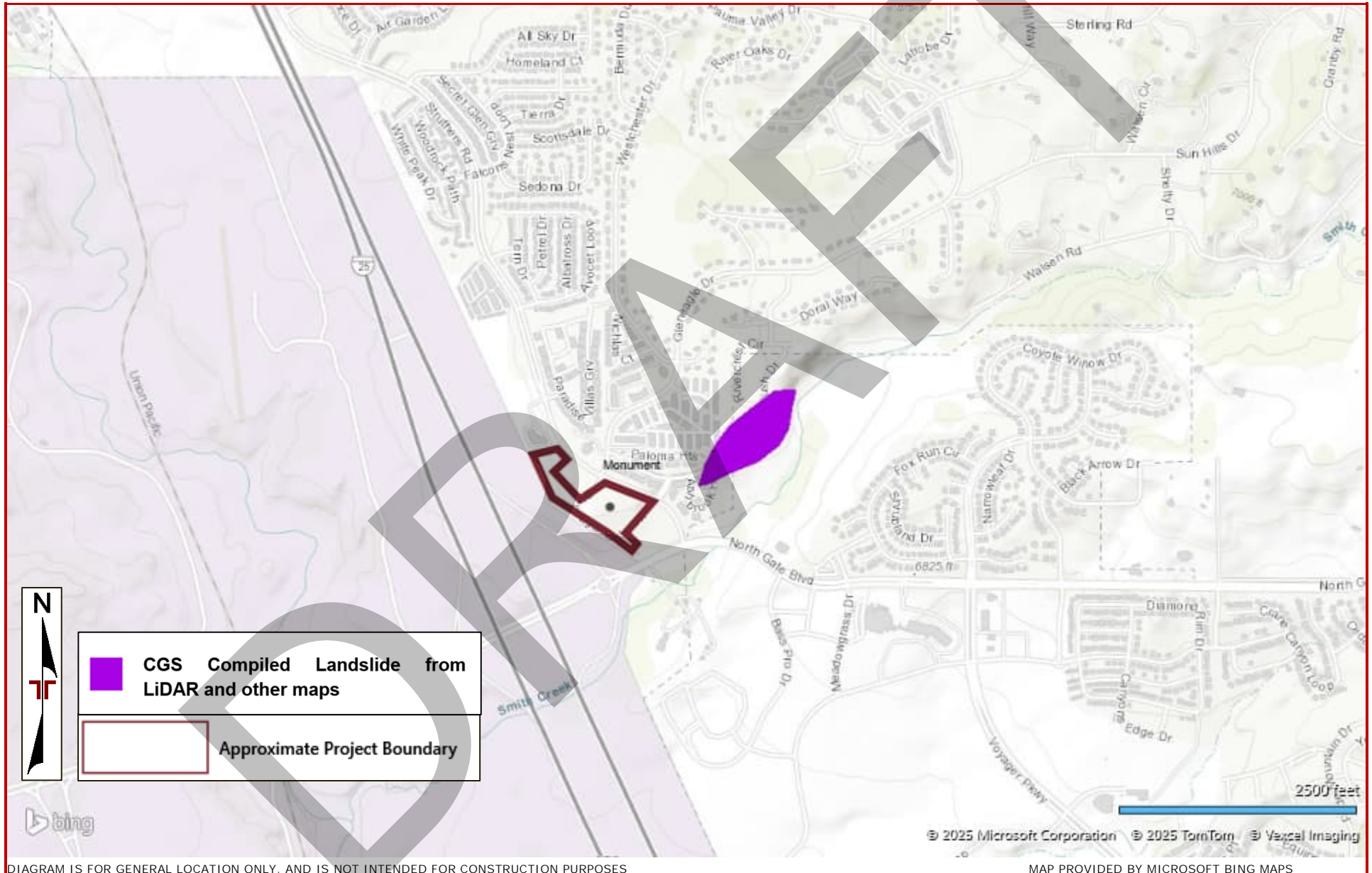


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MAP PROVIDED BY MICROSOFT BING MAPS

Landslide Susceptibility Plan



Geotechnical Engineering Report

Northgate Subaru | Colorado Springs, Colorado

October 25, 2024 (Revised July 18, 2025) | Terracon Project No. 23245098



Attachments

Exploration and Testing Procedures

Field Exploration

Boring Layout and Elevations: The locations of the borings are presented in the [Site Location and Exploration Plans](#). The borings were located in the field by overlaying the site plan on Google Earth, recording the latitude and longitude coordinates, and staking the borings using a handheld, recreational-grade GPS unit. The accuracy of the latitude and longitude values is typically about +/- 25 feet when obtaining the values using this method. Ground surface elevations at the boring locations were estimated from the preliminary grading plan provided by the client titled "Layout Concerns – Original Site Plan" dated August 20, 2024. The accuracy of the boring locations and elevations should only be assumed to the level implied by the methods used.

Subsurface Exploration Procedures: The borings were drilled with a CME-55 and CME-750X all-terrain rotary drill rigs with hollow-stem augers. During the drilling operations, lithologic logs of the borings were recorded by the field engineer. Relatively undisturbed samples were obtained at selected intervals utilizing a 2-inch outside diameter standard split spoon sampler and a 2½-inch outside diameter modified California barrel sampler. Bulk samples were obtained from auger cuttings of the upper 5 feet of the borings, excluding topsoil. Penetration resistance values were recorded in a manner similar to the standard penetration test (SPT). This test consists of driving the sampler into the ground with a 140-pound hammer free falling through a distance of 30 inches. The number of blows required to advance the barrel sampler 12 inches (18 inches for standard split-spoon samplers, final 12 inches are recorded) or the interval indicated is recorded and can be correlated to the standard penetration resistance value (N-value). The blow count values are indicated on the boring logs at the respective sample depths. Modified California barrel sampler blow counts are not considered N-values.

An automatic hammer was used to advance the samplers in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The standard penetration test provides a reasonable indication of the in-place density of sandy type materials, but only provides an indication of the relative stiffness of cohesive materials since the blow count in these soils may be affected by the soil moisture content. In addition, considerable care should be exercised in interpreting the N-values

in gravelly soils, particularly where the size of the gravel particle exceeds the inside diameter of the sampler.

Groundwater measurements were obtained in the borings at the time of drilling. Due to safety concerns, the borings were backfilled with auger cuttings after drilling. Some settlement of the backfill may occur and should be repaired as soon as possible.

Laboratory Testing

Samples retrieved during the field exploration were returned to the laboratory for observation by the Geotechnical Engineer and were classified in general accordance with the Unified Soil Classification System presented in the [Supporting Information](#).

At this time, an applicable laboratory-testing program was formulated to determine engineering properties of the subsurface materials. Following the completion of the laboratory testing, the field descriptions were confirmed or modified as necessary, and the boring logs were prepared. The boring logs are included in the [Exploration Results](#).

Laboratory test results are included in the [Exploration Results](#). These results were used for the geotechnical engineering analyses and the development of foundation, earthwork, and pavement recommendations. All laboratory tests were performed in general accordance with the applicable local or other accepted standards.

Selected soil samples were tested for the following engineering properties:

- Water content
- Dry density
- Grain size distribution
- Atterberg limits
- Swell/consolidation
- Water-soluble sulfate content

Site Location and Exploration Plans

Contents:

Site Location

Exploration Plan with Aerial Imagery

Exploration Plan with Site Plan Overlay

Note: All attachments are one page unless noted above.

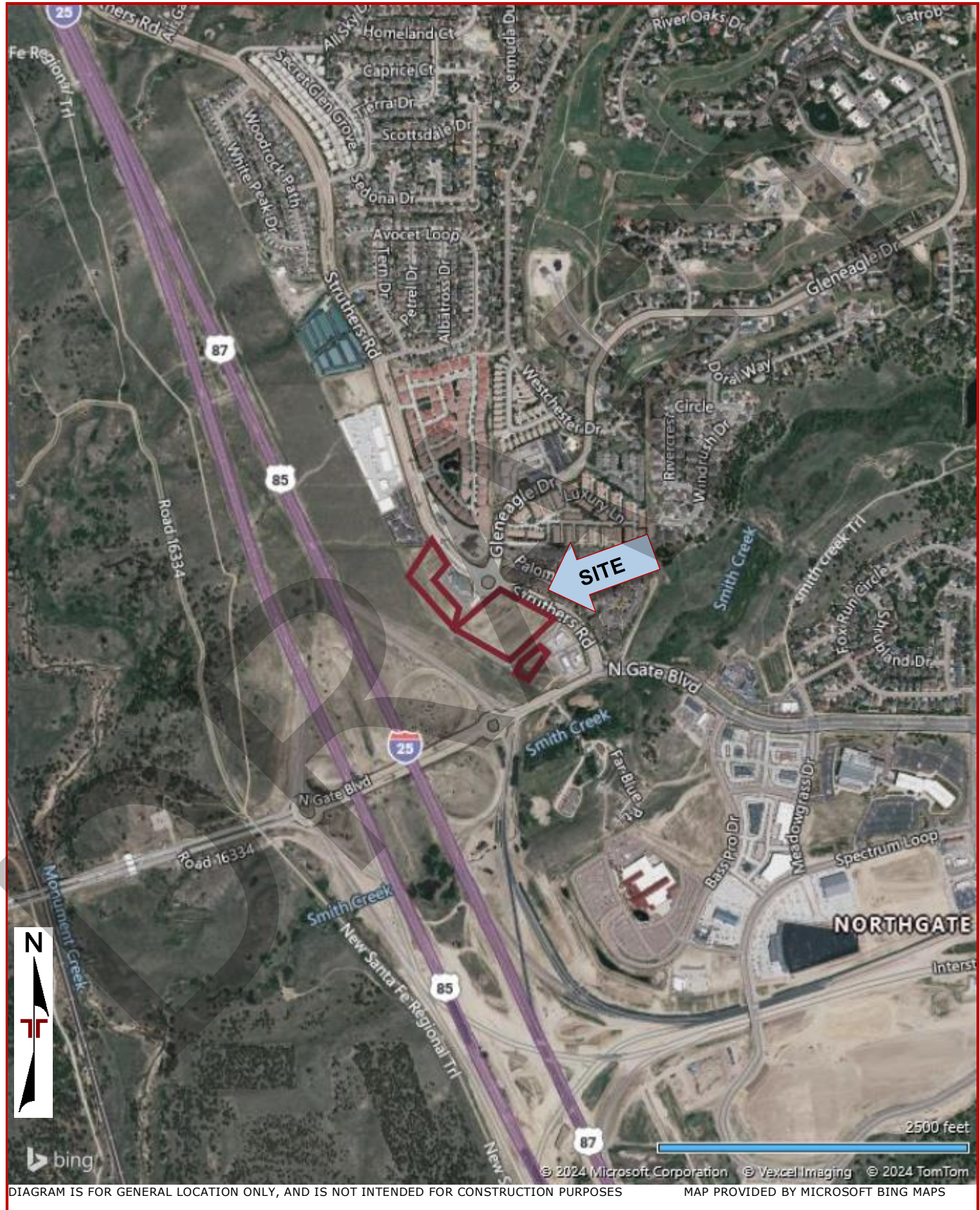
Geotechnical Engineering Report

Northgate Subaru | Colorado Springs, Colorado

October 25, 2024 (Revised July 18, 2025) | Terracon Project No. 23245098



Site Location



Exploration Plan with Aerial Imagery

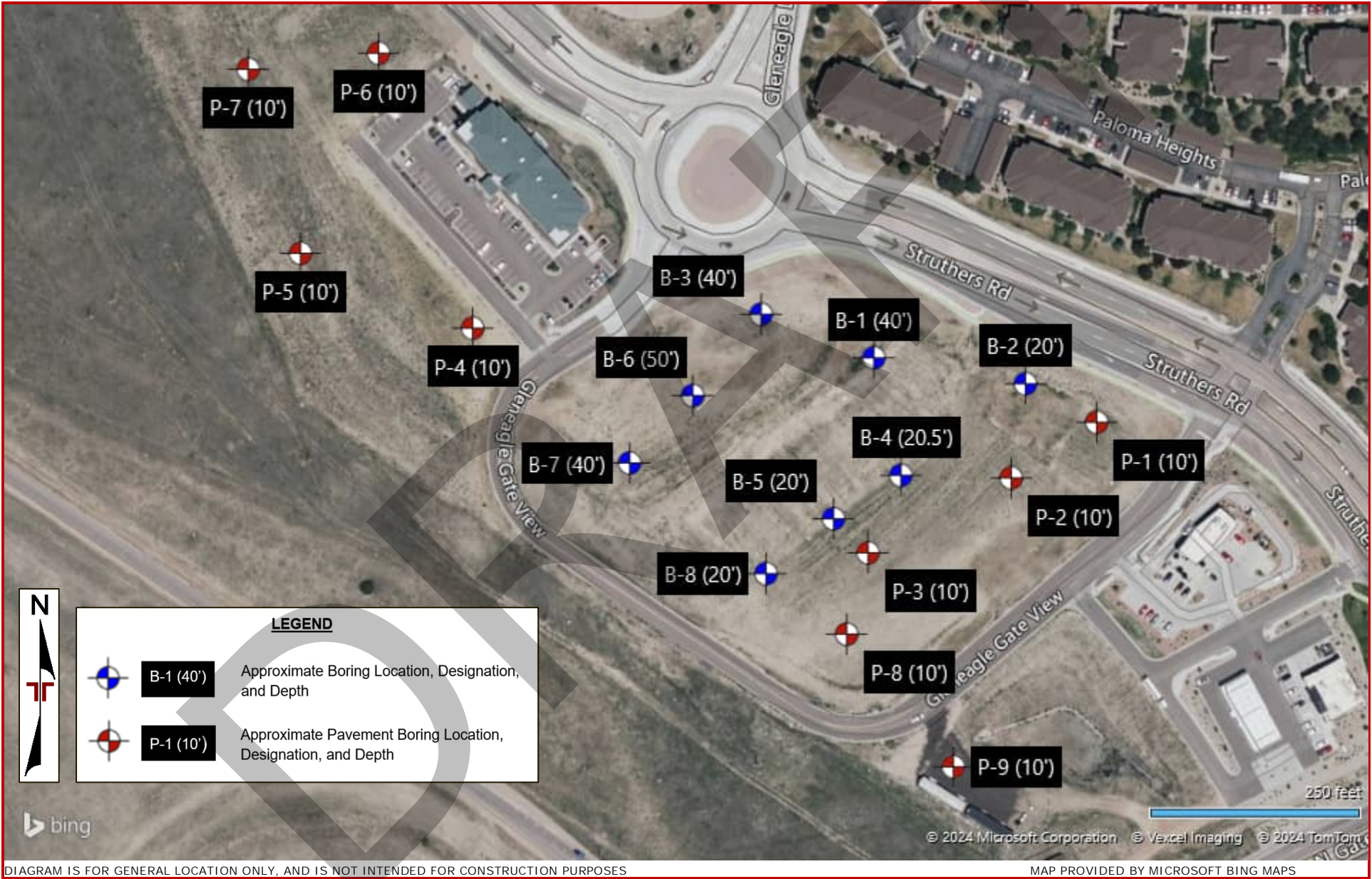
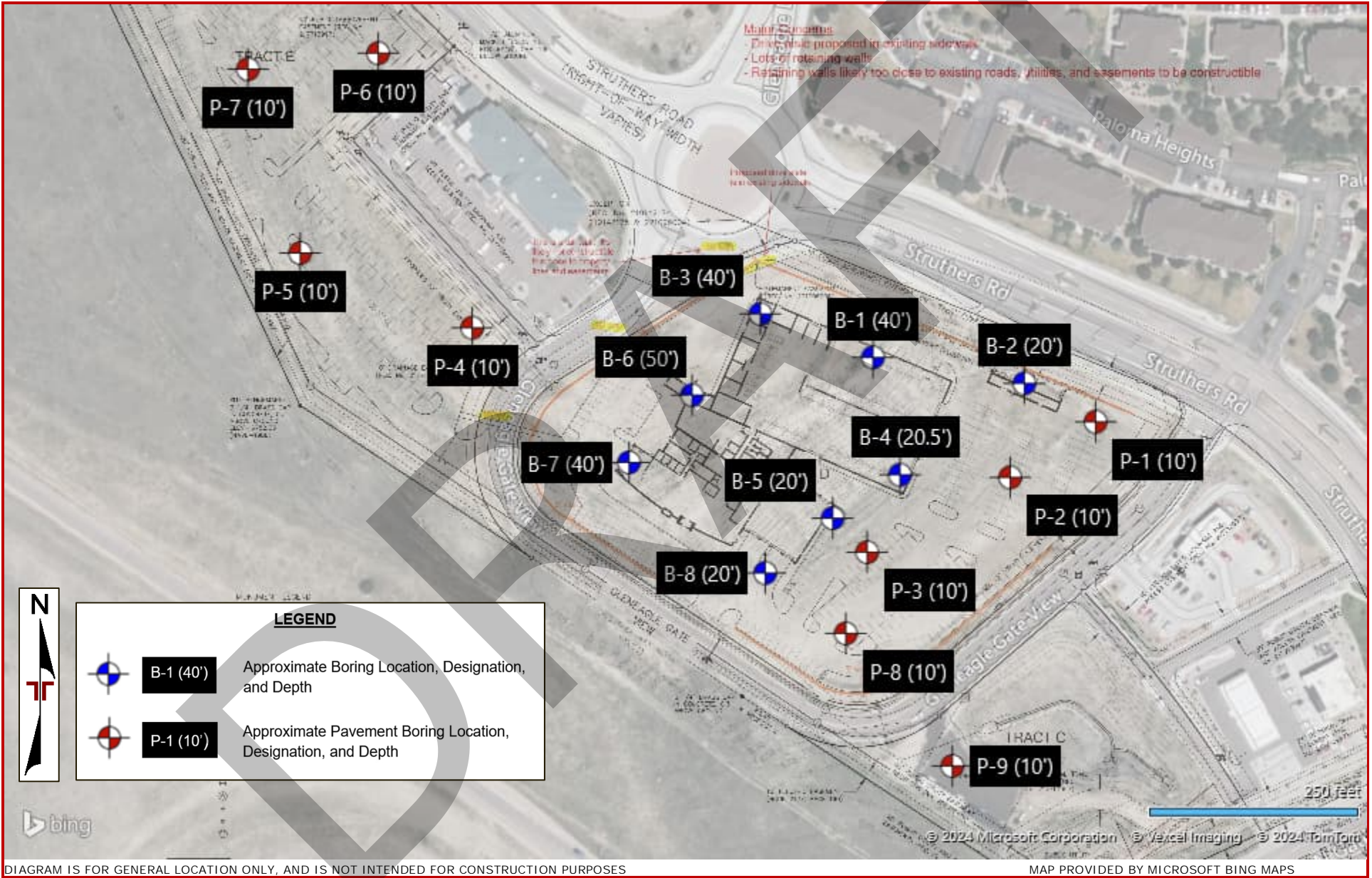


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan with Site Plan Overlay



Exploration and Laboratory Results

Contents:

Boring Logs (Building Boring Nos. B-1 to B-8 and Pavement Boring Nos. P-1 to P-9)

Swell/Consolidation

Grain Size Distribution (4 pages)

Atterberg Limits

Water Soluble Sulfate

Summary of Laboratory Test Results (3 pages)

Note: All attachments are one page unless noted above.

Boring Log No. B-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0298° Longitude: -104.8305° Depth (Ft.) Elevation: 6764 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.5									
		TOPSOIL , about 6 inches thick	6763.5								
3		FILL - SILTY SAND (SM) , fine to coarse grained, tan to brown				7-9		6.6	111		
						9-9					
		5.5	6758.5								
		6.0	6758								
		FFE=6,758.5 feet									
		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, tan to brown, medium dense				13-16				NP	8
						9-17		6.4	114		
						11-12		4.6	111		
						13-17					
						12-13		4.5	112		
						13-17					
						14-15					
		40.0	6724								
		Boring Terminated at 40 Feet									

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (If any).
See **Supporting Information** for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"
Finished Floor Elevation (FFE) = 6,758.5 feet

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
CME-55

Hammer Type
Automatic Hammer
efficiency: 91.3%
Driller
Terracon

Advancement Method
6-inch diameter, continuous-flight, hollow-stem, power auger

Logged by
TPS

Boring Started
09-24-2024

Boring Completed
09-24-2024

Abandonment Method
Boring backfilled with excess cuttings upon completion

Boring Log No. B-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0297° Longitude: -104.8298° Depth (Ft.) Elevation: 6751 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.5									
3		4.0				7-6		7.4	110		
		6747				10-11				NP	5
4			5			7-8		5.9	109		
			10			9-10		8.0	110		
			15			10-12					
		20.0	20								
		6731									
Boring Terminated at 20 Feet											

Notes See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20" Finished Floor Elevation (FFE) = 6,758.5 feet	Water Level Observations Groundwater not encountered	Drill Rig CME-750X
	Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
	Abandonment Method Boring backfilled with excess cuttings upon completion	Logged by DMG Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. B-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0299° Longitude: -104.8309°		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
											LL-PL-PI	
		Depth (Ft.)	Elevation: 6768 (Ft.) +/-									
1		0.5	6767.5									
3		2.0	6766									
		TOPSOIL, about 6 inches thick										
		FILL - SILTY SAND (SM), varies to well-graded sand with silt, fine to coarse grained, brown to dark brown					11-11				NP	7
		POORLY GRADED SAND (SP), with silt, varies to well-graded sand with silt, fine to coarse grained, brown to yellowish brown, medium dense		5			10-13					
		9.5	6758.5									
		FFE=6,758.5 feet		10			11-12		4.4	103		
				15			13-17		5.9	117	NP	6
				20			12-19					
				25			10-19		7.4	122		
				30			12-16					
				35			10-18		4.0	112		
		40.0	6728	40			11-11					
		Boring Terminated at 40 Feet										

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"
Finished Floor Elevation (FFE) = 6,758.5 feet

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
CME-55
Hammer Type
Automatic Hammer
efficiency: 91.3%
Driller
Terracon

Advancement Method
6-inch diameter, continuous-flight, hollow-stem, power auger

Logged by
TPS
Boring Started
09-24-2024
Boring Completed
09-24-2024

Abandonment Method
Boring backfilled with excess cuttings upon completion

Boring Log No. B-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0294° Longitude: -104.8303° Depth (Ft.) Elevation: 6735 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.5									
3		TOPSOIL , about 6 inches thick FILL - SILTY SAND (SM) , varies to poorly graded sand with silt, fine to coarse grained, brown to dark brown	6734.5			7-10		4.4	101		
		6.0	5			7-8				NP	6
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, brown to yellowish brown, loose to medium dense	6729			5-5		11.3	106		
			10								
			15			5-8					
		20.5	20			5-7-6 N=13		9.0			
Boring Terminated at 20.5 Feet											

Notes See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20" Finished Floor Elevation (FFE) = 6,758.5 feet	Water Level Observations Groundwater not encountered	Drill Rig CME-750X Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine Logged by DMG Boring Started 09-25-2024 Boring Completed 09-25-2024
	Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	
	Abandonment Method Boring backfilled with excess cuttings upon completion	

Boring Log No. B-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0293° Longitude: -104.8306°		Depth (Ft.)	Elevation: 6734 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
1				0.5	6733.5									
3				3.0	6731				6-8					
4						5			11-10		5.6	111		
						10			8-10					
						15			7-10-10 N=20		8.2			
						20			9-10					
Boring Terminated at 20 Feet														

Notes See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20" Finished Floor Elevation (FFE) = 6,758.5 feet	Water Level Observations Groundwater not encountered	Drill Rig CME-750X
	Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Hammer Type Automatic Hammer efficiency: 91.3% Driller Terracon
	Abandonment Method Boring backfilled with excess cuttings upon completion	Logged by TPS Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. B-6

Model Layer	Graphic Log	Location: See Exploration Plan		Depth (Ft.)	Elevation: 6767 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
		Latitude: 39.0297° Longitude: -104.8312°											LL-PL-PI	
1		0.5		6766.5										
3		3.0		6764					13-16					
									10-12		5.3	104		
		8.5		6758.5					8-12		5.5	112	NP	5
		FFE=6,758.5 feet							10-13		6.0			
									17-20					
									13-16		8.7	114		
									10-15					
									10-40		5.7	108		
									11-19					
									13-24					
		50.0		6717					12-18					
		Boring Terminated at 50 Feet												

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"
Finished Floor Elevation (FFE) = 6,758.5 feet

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
CME-55

Hammer Type
Automatic Hammer
efficiency: 94.2%
Driller
Vine

Advancement Method
6-inch diameter, continuous-flight, hollow-stem, power auger

Logged by
DMG

Boring Started
09-24-2024

Boring Completed
09-24-2024

Abandonment Method
Boring backfilled with excess cuttings upon completion

Boring Log No. B-7

Model Layer	Graphic Log	Location: See Exploration Plan		Depth (Ft.)	Elevation: 6765 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
		Latitude: 39.0295°	Longitude: -104.8315°									LL-PL-PI	Percent Fines
1		0.3		0.3	6764.67								
3		TOPSOIL, about 4 inches thick						8-6				NP	10
		FILL - SILTY SAND (SM), varies to well-graded sand with silt, fine to coarse grained, brown to dark brown						8-7					
		6.0		6.0	6759								
4		6.5		6.5	6758.5			10-10				NP	4
		POORLY GRADED SAND (SP), trace silt, varies to well-graded sand with silt, fine to coarse grained, tan to brown, medium dense						8-12		7.8	113		
		FFE=6,758.5 feet						12-14					
								9-13-11 N=24		5.7			
								8-11					
								9-12-13 N=25					
								9-11		3.3	101		
		40.0		40.0	6725								
		Boring Terminated at 40 Feet											

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (If any).
See **Supporting Information** for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"
Finished Floor Elevation (FFE) = 6,758.5 feet

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
CME-750X

Hammer Type
Automatic Hammer
efficiency: 94.2%
Driller
Vine

Advancement Method
6-inch diameter, continuous-flight, hollow-stem, power auger

Logged by
DMG

Boring Started
09-24-2024

Boring Completed
09-24-2024

Abandonment Method
Boring backfilled with excess cuttings upon completion

Boring Log No. B-8

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0291° Longitude: -104.8309° Depth (Ft.) Elevation: 6734 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.3									
3		TOPSOIL , about 4 inches thick	6733.67								
		FILL - SILTY SAND (SM) , varies to poorly graded sand with silt, fine to coarse grained, pale brown to dark brown				7-8		4.6	100	NP	16
		5.0	6729			8-7					
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, pale brown to brown, medium dense				10-11					
						9-10		7.8	103		
		20.0	6714			10-11					
Boring Terminated at 20 Feet											

Notes See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20" Finished Floor Elevation (FFE) = 6,758.5 feet	Water Level Observations Groundwater not encountered	Drill Rig CME-750X
	Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
	Abandonment Method Boring backfilled with excess cuttings upon completion	Logged by DMG Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. P-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0296° Longitude: -104.8295° Depth (Ft.) Elevation: 6744 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.5									
3		3.0				14-18		5.1	115	NP	16
4		10.0				11-15		11.0	110		
Boring Terminated at 10 Feet											

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"	Water Level Observations Groundwater not encountered	Drill Rig CME-55 Hammer Type Automatic Hammer efficiency: 91.3% Driller Terracon	
	Notes	Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger Abandonment Method Boring backfilled with excess cuttings upon completion	Logged by TPS Boring Started 09-24-2024 Boring Completed 09-24-2024

Boring Log No. P-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0294° Longitude: -104.8299° Depth (Ft.) Elevation: 6737 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.5 TOPSOIL, about 6 inches thick 6736.5									
3		FILL - SILTY SAND (SM), varies to poorly graded sand with silt, fine to coarse grained, brown to very dark brown				12-18		5.5	129	NP	15
		5.0 6732	5			11-17		5.6	116		
4		POORLY GRADED SAND (SP), with silt, varies to well-graded sand with silt, fine to coarse grained, pale brown to brown, medium dense									
		10.0 6727	10			11-14					
Boring Terminated at 10 Feet											

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"

Notes

Water Level Observations
▽ 10 feet while drilling
▽ 10 feet after drilling

Advancement Method
6-inch diameter, continuous-flight, hollow-stem, power auger

Abandonment Method
Boring backfilled with excess cuttings upon completion

Drill Rig
CME-55

Hammer Type
Automatic Hammer
efficiency: 91.3%
Driller
Terracon

Logged by
TPS

Boring Started
09-24-2024

Boring Completed
09-24-2024

Boring Log No. P-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0292° Longitude: -104.8305° Depth (Ft.) Elevation: 6732 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.5 TOPSOIL , about 6 inches thick	6731.5								
3		FILL - SILTY SAND (SM) , varies to poorly graded sand with silt, fine to coarse grained, brown to dark brown				13-16		6.9	108	NP	17
		4.0	6728			10-10		6.3	116		
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, pale brown to brown, medium dense				10-12					
		10.0	6722								
Boring Terminated at 10 Feet											

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (If any).
See **Supporting Information** for explanation of symbols and abbreviations.
Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"

Notes

Water Level Observations

- 9 feet while drilling
- 9 feet after drilling

Drill Rig

CME-55

Hammer Type

Automatic Hammer

efficiency: 91.3%

Driller

Terracon

Logged by

TPS

Boring Started

09-24-2024

Boring Completed

09-24-2024

Advancement Method

6-inch diameter, continuous-flight, hollow-stem, power auger

Abandonment Method

Boring backfilled with excess cuttings upon completion

Boring Log No. P-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0299° Longitude: -104.8321° Depth (Ft.) Elevation: 6767 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.3									
3		FILL - CLAYEY SAND (SC) , varies to silty sand and to poorly graded sand with silt, fine to coarse grained, yellowish brown to dark brown				10-15		4.5	112	NP	25
		6.0	5			14-14					
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, yellowish brown to very dark brown, medium dense									
		10.0	10			8-7		8.3	112		
Boring Terminated at 10 Feet											

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"	Water Level Observations Groundwater not encountered	Drill Rig CME-750X Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Logged by DMG
		Abandonment Method Boring backfilled with excess cuttings upon completion	Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. P-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0301° Longitude: -104.8329° Depth (Ft.) Elevation: 6764 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.3									
2		0.3									
3		FILL - SANDY LEAN CLAY (CL), interlayered with poorly graded sand with silt, brown to dark brown				5-8	+0.6	4.8	105	31-18-13	67
		5.0				17-16	@ 200 psf	6.8	118		
4		POORLY GRADED SAND (SP), with silt, varies to well-graded sand with silt, fine to coarse grained, brown to dark brown, loose									
		10.0				6-4		6.2	112		
Boring Terminated at 10 Feet											

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"	Water Level Observations Groundwater not encountered	Drill Rig CME-750X Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Logged by DMG
		Abandonment Method Boring backfilled with excess cuttings upon completion	Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. P-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0308° Longitude: -104.8325° Depth (Ft.) Elevation: 6770 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.3									
3		FILL - CLAYEY SAND (SC) , varies to poorly graded sand with silt, fine to coarse grained, brown to dark brown				10-17		2.8	115	30-15-15	37
		6.0	5			17-21					
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, brown to dark brown, loose									
		10.0	10			5-7		5.3	104		
Boring Terminated at 10 Feet											

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"	Water Level Observations Groundwater not encountered	Drill Rig CME-750X Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Logged by DMG
		Abandonment Method Boring backfilled with excess cuttings upon completion	Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. P-7

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0307° Longitude: -104.8331° Depth (Ft.) Elevation: 6762 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
										LL-PL-PI	
1		0.3									
3		TOPSOIL , about 4 inches thick FILL - CLAYEY SAND (SC) , varies to poorly graded sand with silt, fine to coarse grained, tan to dark brown				11-14		4.5	109	28-14-14	30
4		POORLY GRADED SAND (SP) , with silt, varies to well-graded sand with silt, fine to coarse grained, brown to tan, loose				14-10					
		7.0 6755	5								
		10.0 6752	10			4-7		6.3	118		
Boring Terminated at 10 Feet											

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations Groundwater not encountered	Drill Rig CME-750X
	See Supporting Information for explanation of symbols and abbreviations.		
	Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"		
Notes		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Hammer Type Automatic Hammer efficiency: 94.2%
		Abandonment Method Boring backfilled with excess cuttings upon completion	Driller Vine
			Logged by DMG
			Boring Started 09-25-2024
			Boring Completed 09-25-2024

Boring Log No. P-8

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.0289° Longitude: -104.8306° Depth (Ft.) Elevation: 6729 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
										LL-PL-PI	Percent Fines
1		0.3									
2		0.3									
3						3-3		6.0	103	NP	13
3			5			4-4		6.4	108		
4		8.0									
4		10.0	10			8-8					
Boring Terminated at 10 Feet											

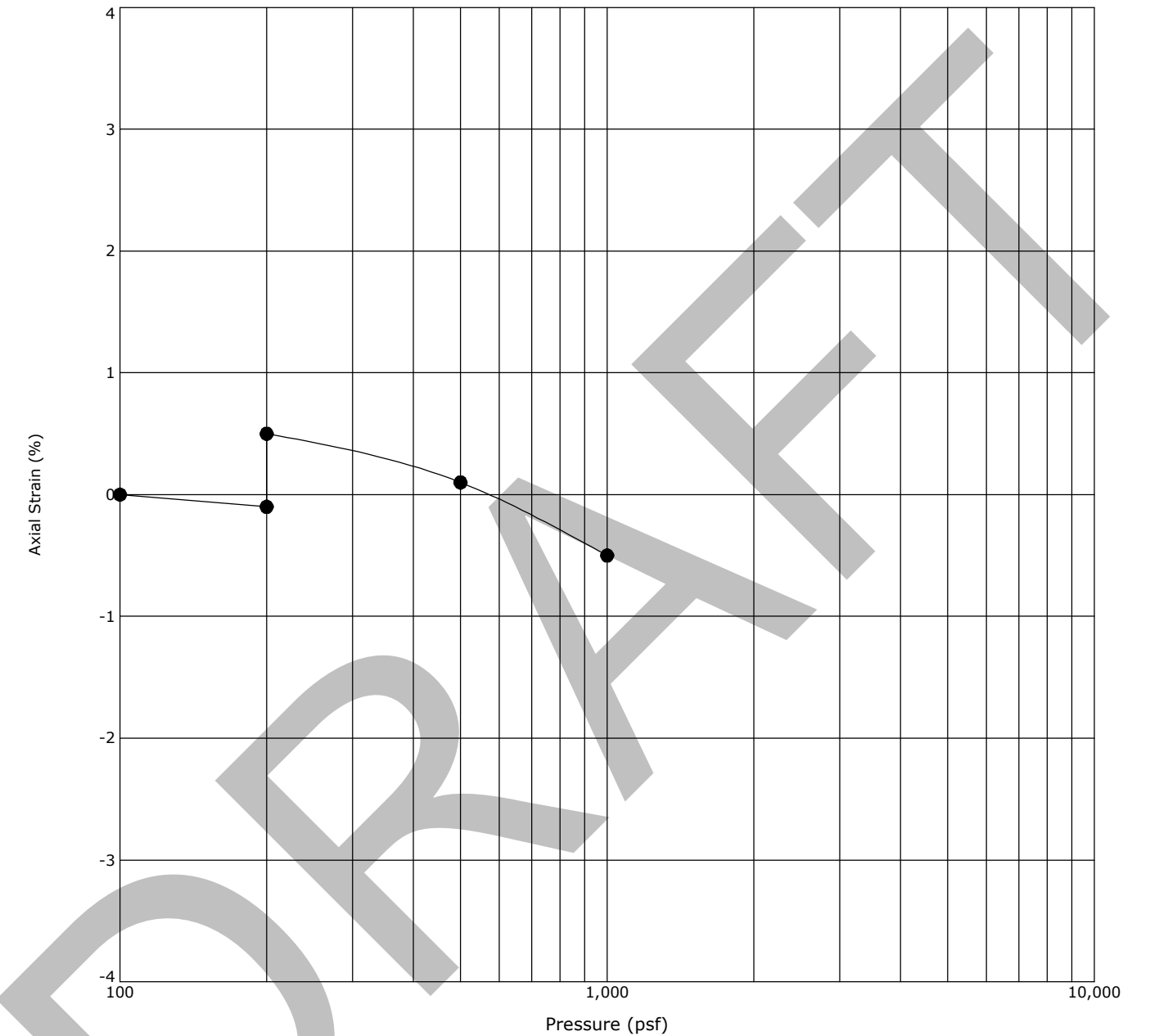
Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"	Water Level Observations Groundwater not encountered	Drill Rig CME-750X Hammer Type Automatic Hammer efficiency: 94.2% Driller Vine
		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Logged by DMG
		Abandonment Method Boring backfilled with excess cuttings upon completion	Boring Started 09-25-2024 Boring Completed 09-25-2024

Boring Log No. P-9

Model Layer	Graphic Log	Location: See Exploration Plan		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
		Latitude: 39.0285° Longitude: -104.8301°	Elevation: 6727 (Ft.) +/-								LL-PL-PI	Percent Fines
2		1.0	AGGREGATE SURFACING, about 1 foot thick	6726								
3		9.0	FILL - SILTY SAND (SM), varies to well-graded sand with silt, fine to coarse grained, dark brown to black	6718			6-8		6.8	112		
				5			10-10				NP	11
							4-4					
4		10.0	POORLY GRADED SAND (SP), with silt, varies to well-graded sand with silt, fine to coarse grained, tan to brown, loose	6717			6-7		4.2	106		
			Boring Terminated at 10 Feet	10								

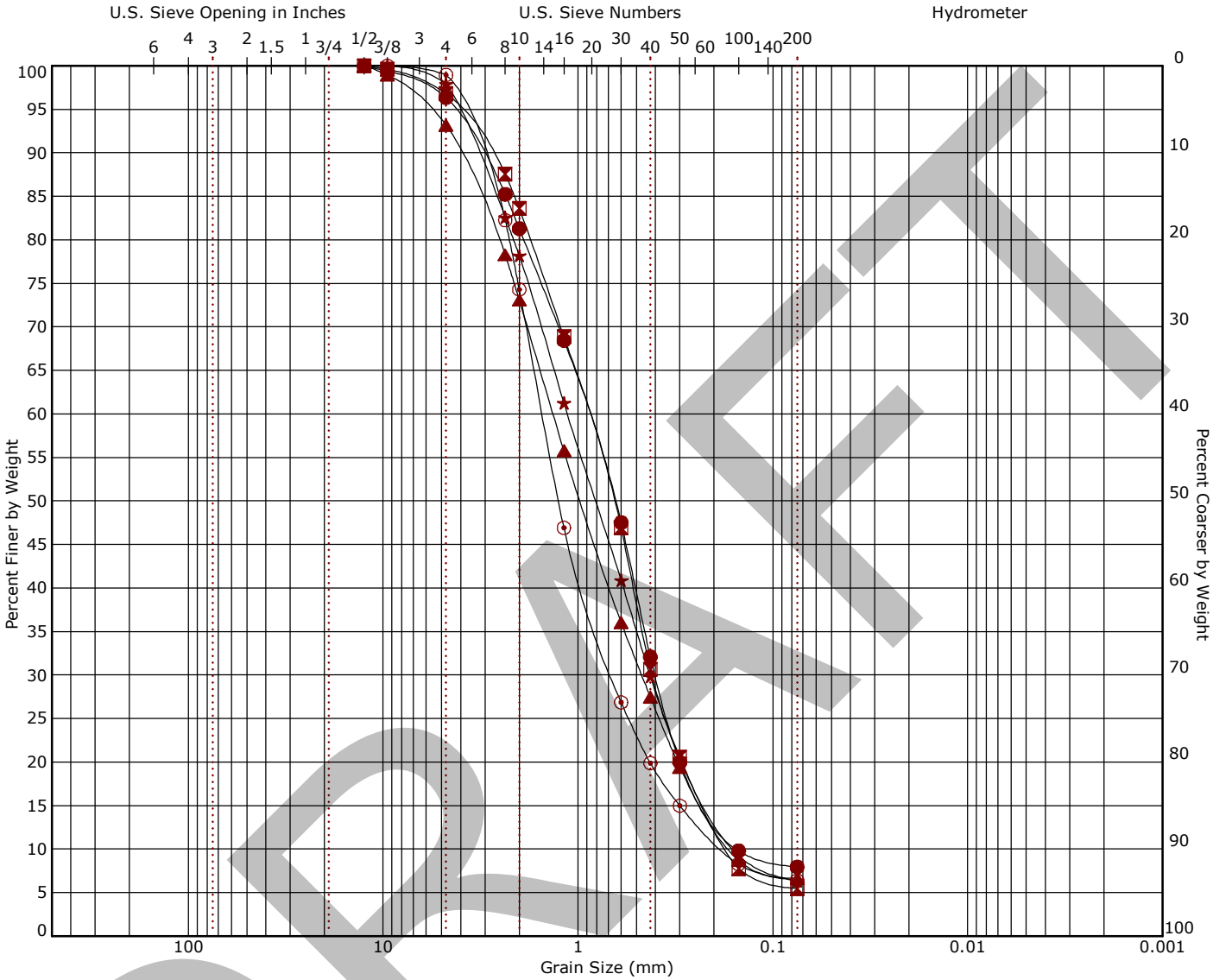
Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations Groundwater not encountered	Drill Rig CME-750X
	See Supporting Information for explanation of symbols and abbreviations.		
	Elevation Reference: Elevations approximated through file provided by client titled "Layout Concerns - Original Site Plan" dated "2024/08/20"		
Notes		Advancement Method 6-inch diameter, continuous-flight, hollow-stem, power auger	Hammer Type Automatic Hammer efficiency: 94.2%
		Abandonment Method Boring backfilled with excess cuttings upon completion	Driller Vine
			Logged by DMG
			Boring Started 09-25-2024
			Boring Completed 09-25-2024

One-Dimensional Swell or Collapse



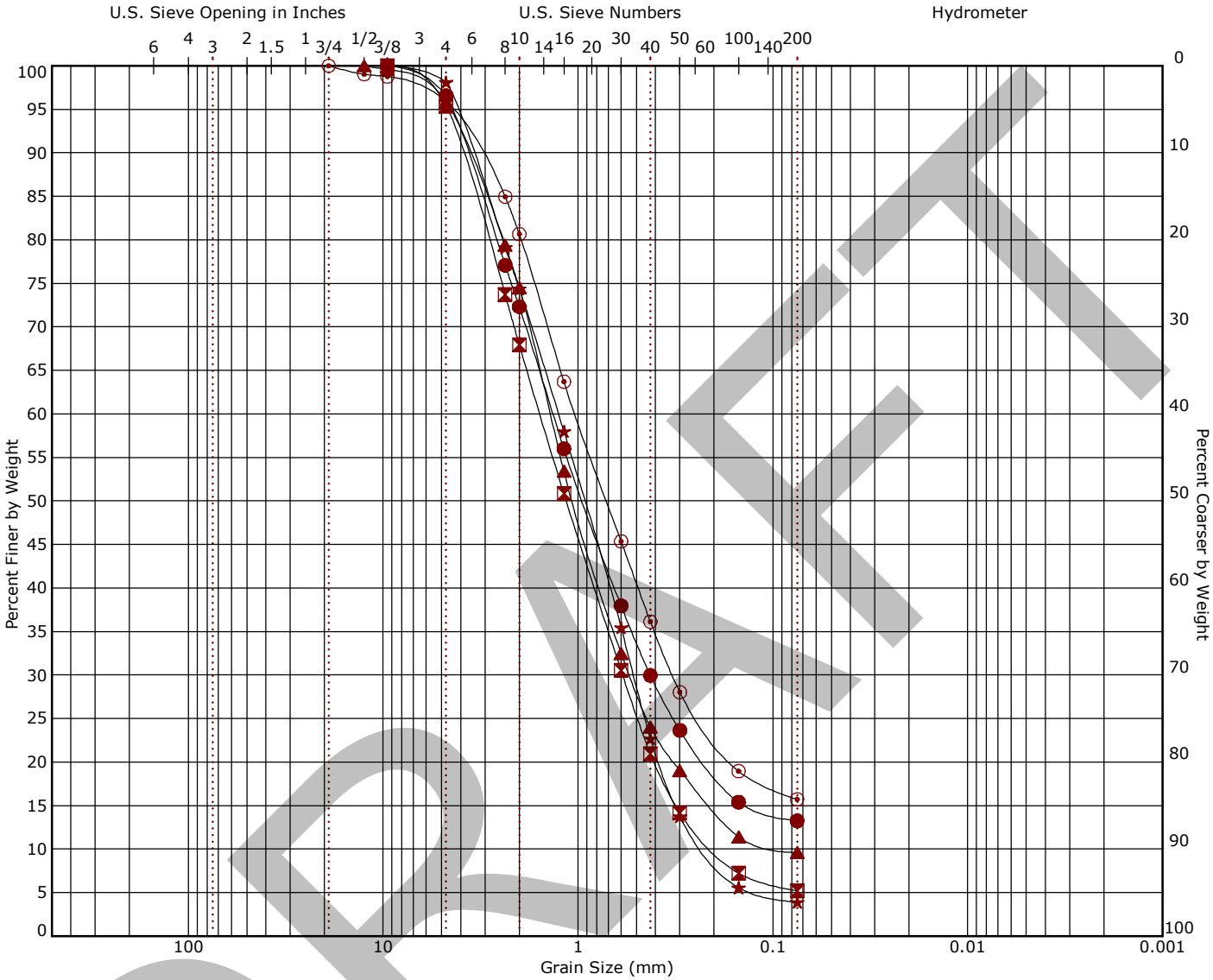
Boring ID		Depth (Ft)	Description	USCS	γ _d (pcf)	WC (%)
●	P-5	2 - 3	SANDY LEAN CLAY	CL	105	4.8
Notes: Sample exhibited 0.6 percent swell upon wetting under an applied pressure of 200 psf.						

Grain Size Distribution
ASTM D422 / ASTM C136



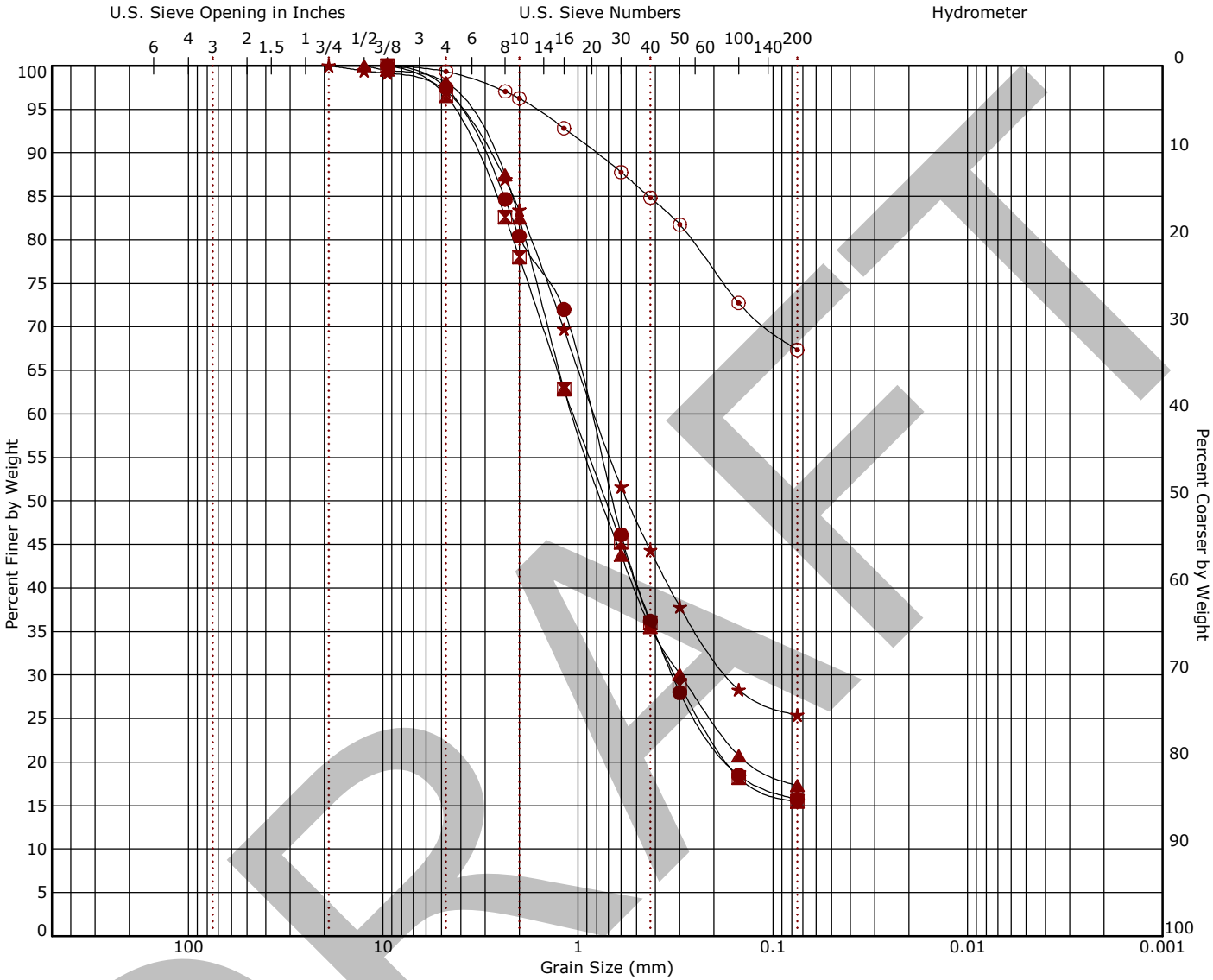
Cobbles		Gravel		Sand			Silt or Clay					
		coarse	fine	coarse	medium	fine						
Boring ID	Depth (Ft)	USCS Classification				USCS	AASHTO	LL	PL	PI	Cc	Cu
● B-1	9 - 10	POORLY GRADED SAND with SILT				SP-SM	A-1-b (0)	NP	NP	NP	1.17	5.91
▣ B-2	4 - 5	POORLY GRADED SAND with SILT				SP-SM	A-1-b (0)	NP	NP	NP	1.14	5.30
▲ B-3	2 - 3	WELL-GRADED SAND with SILT				SW-SM	A-1-b (0)	NP	NP	NP	1.01	8.23
★ B-3	14 - 15	WELL-GRADED SAND with SILT				SW-SM	A-1-b (0)	NP	NP	NP	1.03	7.20
◎ B-4	4 - 5	WELL-GRADED SAND with SILT				SW-SM	A-1-b (0)	NP	NP	NP	1.64	8.47
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay	
● B-1	9 - 10	12.5	0.898	0.4	0.152	0.0	3.7	88.4	7.9			
▣ B-2	4 - 5	12.5	0.898	0.416	0.169	0.0	3.2	91.3	5.5			
▲ B-3	2 - 3	12.5	1.342	0.47	0.163	0.0	6.8	86.5	6.6			
★ B-3	14 - 15	9.5	1.132	0.427	0.157	0.0	2.1	91.5	6.4			
◎ B-4	4 - 5	9.5	1.519	0.667	0.179	0.0	1.1	92.5	6.4			

Grain Size Distribution
ASTM D422 / ASTM C136



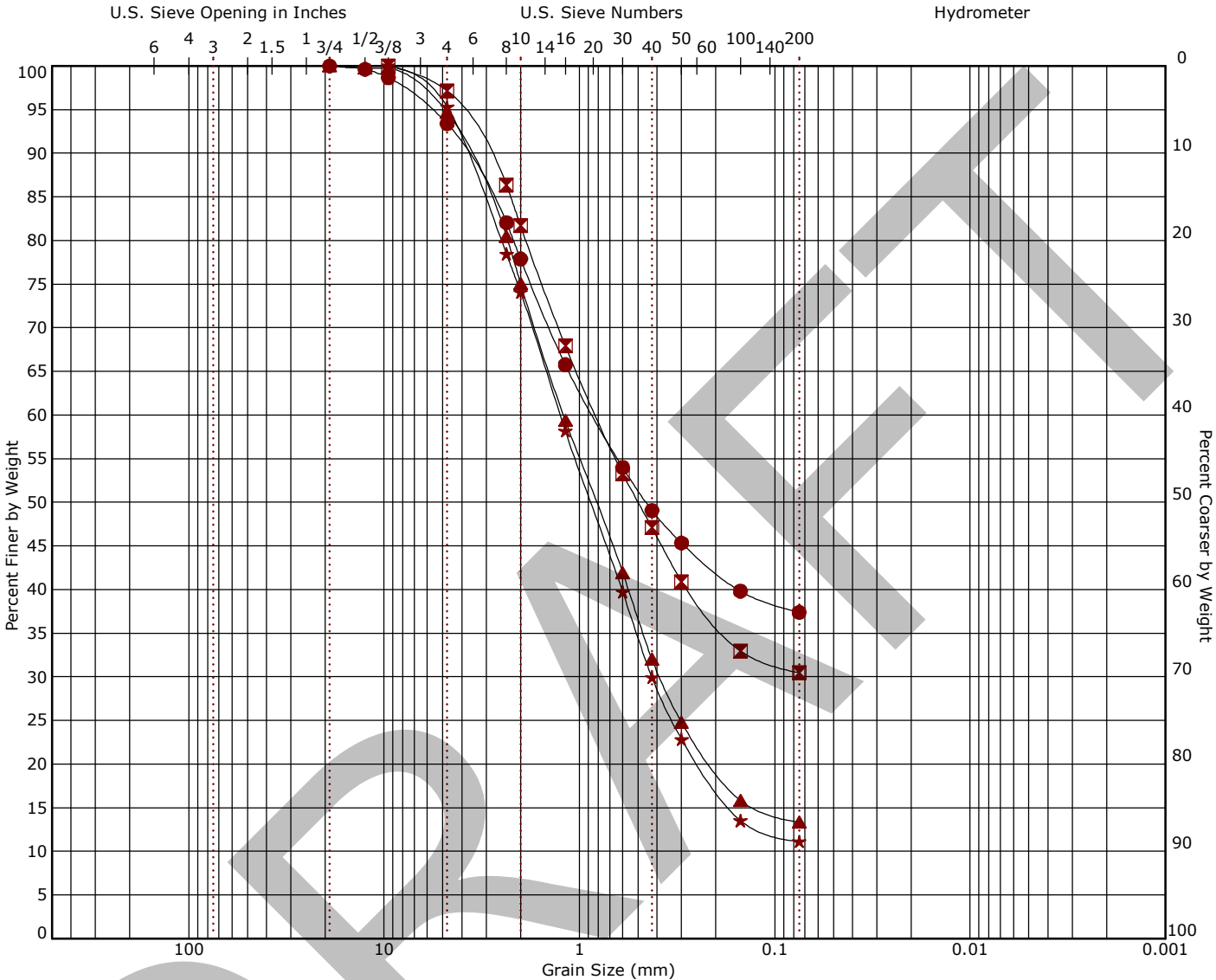
		Cobbles		Gravel		Sand			Silt or Clay				
				coarse	fine	coarse	medium	fine					
Boring ID		Depth (Ft)	USCS Classification				USCS	AASHTO	LL	PL	PI	Cc	Cu
●	B-5	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
⊠	B-6	9 - 10	WELL-GRADED SAND with SILT				SW-SM	A-1-b (0)	NP	NP	NP	1.12	7.93
▲	B-7	2 - 3	WELL-GRADED SAND with SILT				SW-SM	A-1-b (0)	NP	NP	NP	2.42	15.92
★	B-7	9 - 10	POORLY GRADED SAND				SP	A-1-b (0)	NP	NP	NP	0.98	5.76
⊙	B-8	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
Boring ID		Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay	
●	B-5	1 - 4	9.5	1.343	0.426		0.0	3.4	83.3	13.3			
⊠	B-6	9 - 10	9.5	1.565	0.589	0.197	0.0	4.6	90.2	5.2			
▲	B-7	2 - 3	12.5	1.392	0.542	0.087	0.0	4.1	86.3	9.6			
★	B-7	9 - 10	9.5	1.258	0.518	0.218	0.0	1.9	94.2	3.9			
⊙	B-8	1 - 4	19	1.029	0.327		0.0	4.1	80.2	15.7			

Grain Size Distribution
ASTM D422 / ASTM C136



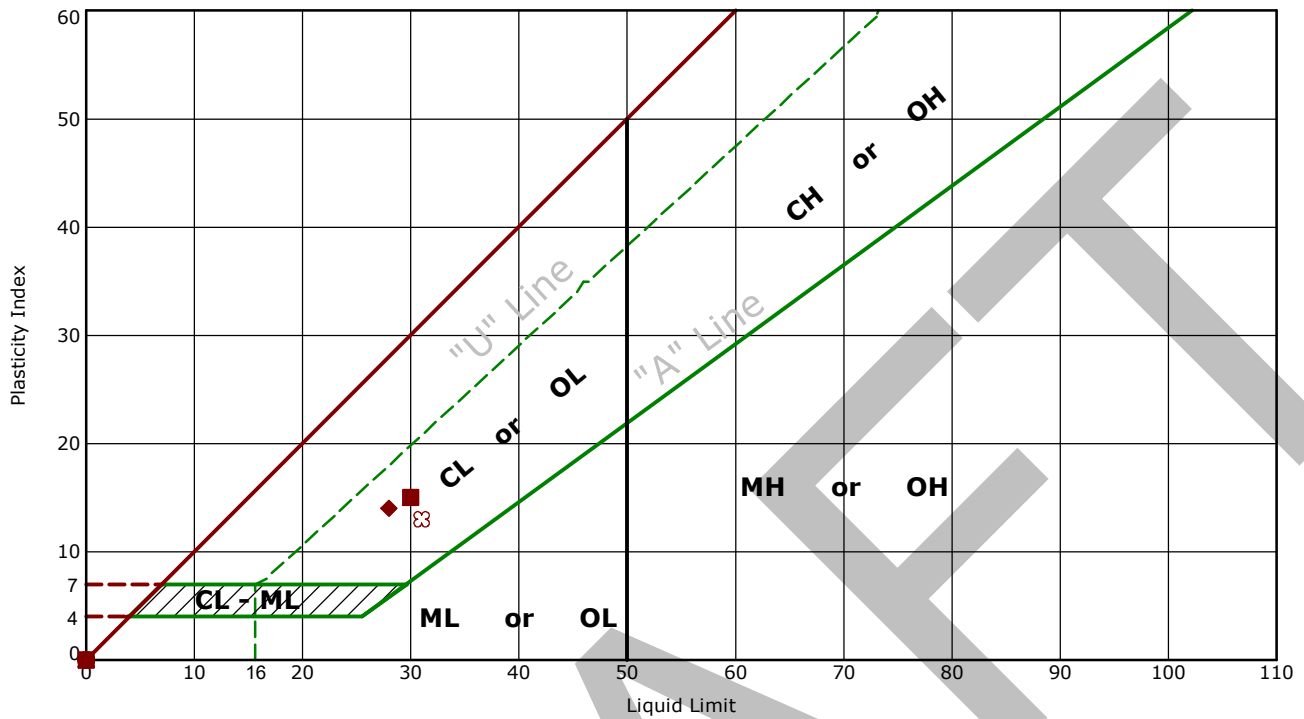
		Cobbles		Gravel		Sand			Silt or Clay				
				coarse	fine	coarse	medium	fine					
Boring ID		Depth (Ft)	USCS Classification				USCS	AASHTO	LL	PL	PI	Cc	Cu
●	P-1	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
▣	P-2	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
▲	P-3	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
★	P-4	1 - 4	SILTY SAND				SM	A-1-b (0)	NP	NP	NP		
◎	P-5	1 - 4	SANDY LEAN CLAY				CL	A-6 (7)	31	18	13		
Boring ID		Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay	
●	P-1	1 - 4	9.5	0.862	0.327		0.0	2.5	81.7	15.7			
▣	P-2	1 - 4	9.5	1.058	0.317		0.0	3.4	81.1	15.5			
▲	P-3	1 - 4	12.5	1.064	0.298		0.0	1.9	80.8	17.3			
★	P-4	1 - 4	19	0.82	0.17		0.0	2.9	71.7	25.4			
◎	P-5	1 - 4	9.5				0.0	0.7	32.0	67.4			

Grain Size Distribution
ASTM D422 / ASTM C136



Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-1	9 - 10	NP	NP	NP	7.9	SP-SM	POORLY GRADED SAND with SILT
⊠	B-2	4 - 5	NP	NP	NP	5.5	SP-SM	POORLY GRADED SAND with SILT
▲	B-3	2 - 3	NP	NP	NP	6.6	SW-SM	WELL-GRADED SAND with SILT
★	B-3	14 - 15	NP	NP	NP	6.4	SW-SM	WELL-GRADED SAND with SILT
⊙	B-4	4 - 5	NP	NP	NP	6.4	SW-SM	WELL-GRADED SAND with SILT
⊕	B-5	1 - 4	NP	NP	NP	13.3	SM	SILTY SAND
○	B-6	9 - 10	NP	NP	NP	5.2	SW-SM	WELL-GRADED SAND with SILT
△	B-7	2 - 3	NP	NP	NP	9.6	SW-SM	WELL-GRADED SAND with SILT
⊗	B-7	9 - 10	NP	NP	NP	3.9	SP	POORLY GRADED SAND
⊕	B-8	1 - 4	NP	NP	NP	15.7	SM	SILTY SAND
□	P-1	1 - 4	NP	NP	NP	15.7	SM	SILTY SAND
⊕	P-2	1 - 4	NP	NP	NP	15.5	SM	SILTY SAND
⊕	P-3	1 - 4	NP	NP	NP	17.3	SM	SILTY SAND
★	P-4	1 - 4	NP	NP	NP	25.4	SM	SILTY SAND
⊠	P-5	1 - 4	31	18	13	67.4	CL	SANDY LEAN CLAY
■	P-6	1 - 4	30	15	15	37.4	SC	CLAYEY SAND
◆	P-7	1 - 4	28	14	14	30.4	SC	CLAYEY SAND
◇	P-8	1 - 4	NP	NP	NP	13.4	SM	SILTY SAND
⊗	P-9	4 - 5	NP	NP	NP	11.1	SW-SM	WELL-GRADED SAND with SILT

Client
Carlson West Povondra Achitects, Inc.

Project
Northgate Subaru
23245098

Date Received: 10/8/2024

Results from Corrosion Testing

Sample Location	B-2	B-3	B-8	
Sample Depth (ft.)	1.0-4.0	19.0-20.0	1.0-4.0	
Water Soluble Sulfate (SO ₄), AASHTO T290, (%)	<0.10	<0.10	<0.10	

Analyzed By:

Daryl Lee
Laboratory Supervisor

The tests were performed in general accordance with applicable ASTM and AASHTO test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

SUMMARY OF LABORATORY TEST RESULTS

Northgate Subaru - Colorado Springs, Colorado

Terracon Project No. 23245098

Boring No.	Depth (ft)	USCS Class.	Initial Water Content (%)	Initial Dry Density (pcf)	Swell/Consolidation		Particle Size Distribution, Percent Passing by Weight					Atterberg Limits		Water Soluble Sulfates (%)	Remarks
					Surcharge (psf)	Swell (%)	3/4"	#4	#10	#40	#200	LL	PI		
B-1	2	SM	6.6	111											4
B-1	9	SP					100	96	81	32	8	NV	NP		
B-1	14	SP	6.4	114											4
B-1	19	SP	4.6	111											4
B-1	29	SP	4.5	112											4
B-2	1-4	SM/SP												<0.1	
B-2	2	SM	7.4	110											4
B-2	4	SP					100	97	84	31	6	NV	NP		
B-2	9	SP	5.9	109											4
B-2	14	SP	8.0	110											4
B-3	2	SP					100	93	73	28	7	NV	NP		
B-3	9	SP	4.4	103											4
B-3	14	SP	5.9	117			100	98	78	30	6	NV	NP		4
B-3	19	SP												<0.1	
B-3	24	SP	7.4	122											4
B-3	34	SP	4.0	112											4
B-4	2	SP	4.4	101											4
B-4	4	SP					100	99	74	20	6	NV	NP		
B-4	9	SP	11.3	106											4
B-4	19	SP	9.0												
B-5	1-4	SM/SP					100	97	72	30	13	NV	NP		
B-5	4	SP	5.6	111											4
B-5	14	SP	8.2												
B-6	4	SP	5.3	104											4
B-6	9	SP	5.5	112			100	95	68	21	5	NV	NP		4

Notes:

Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

* = Partially disturbed sample

- = Compression/settlement

NV = no value

NP = non-plastic

Remarks:

- 1 Remolded Compacted density (about 95% of ASTM D698 maximum density near optimum moisture content)
- 2 Remolded Compacted density (about 95% of ASTM D1557 maximum density near optimum moisture content)
- 3 Water added to sample
- 4 Dry density and/or moisture content determined from one ring of a multi-ring sample
- 5 Minus #200 Only
- 6 Moisture-Density Relationship Test Method ASTM D698/AASHTO T99
- 7 Moisture-Density Relationship Test Method ASTM D1557/AASHTO T180

SUMMARY OF LABORATORY TEST RESULTS

Northgate Subaru - Colorado Springs, Colorado

Terracon Project No. 23245098

Boring No.	Depth (ft)	USCS Class.	Initial Water Content (%)	Initial Dry Density (pcf)	Swell/Consolidation		Particle Size Distribution, Percent Passing by Weight					Atterberg Limits		Water Soluble Sulfates (%)	Remarks
					Surcharge (psf)	Swell (%)	3/4"	#4	#10	#40	#200	LL	PI		
B-6	14	SP	6.0												
B-6	24	SP	8.7	114											4
B-6	34	SP	5.7	108											4
B-7	2	SM					100	96	75	24	10	NV	NP		
B-7	9	SP					100	98	74	23	4	NV	NP		
B-7	14	SP	7.8	113											4
B-7	24	SP	5.7												
B-7	39	SP	3.3	101											4
B-8	1-4	SM/SP					100	96	81	36	16	NV	NP	<0.1	
B-8	2	SP	4.6	100											4
B-8	14	SP	7.8	103											4
P-1	1-4	SM/SP					100	98	80	36	16	NV	NP		
P-1	2	SP	5.1	115											4
P-1	9	SP	11.0	110											4
P-2	1-4	SM/SP					100	97	78	36	16	NV	NP		
P-2	2	SM	5.5	129											4
P-2	4	SP	5.6	116											4
P-3	1-4	SM/SP					100	98	83	36	17	NV	NP		
P-3	2	SP	6.9	108											4
P-3	4	SP	6.3	116											4
P-4	1-4	SC/SP					100	97	83	44	25	NV	NP		
P-4	2	SP	4.5	112											4
P-4	9	SP	8.3	112											4
P-5	1-4	CL/SP					100	99	96	85	67	31	13		
P-5	2	CL	4.8	105	200	+0.6									3,4

Notes:

Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

* = Partially disturbed sample

- = Compression/settlement

NV = no value

NP = non-plastic

Remarks:

- 1 Remolded Compacted density (about 95% of ASTM D698 maximum density near optimum moisture content)
- 2 Remolded Compacted density (about 95% of ASTM D1557 maximum density near optimum moisture content)
- 3 Water added to sample
- 4 Dry density and/or moisture content determined from one ring of a multi-ring sample
- 5 Minus #200 Only
- 6 Moisture-Density Relationship Test Method ASTM D698/AASHTO T99
- 7 Moisture-Density Relationship Test Method ASTM D1557/AASHTO T180

Northgate Subaru - Colorado Springs, Colorado
Terracon Project No. 23245098

Notes:

* = Partially disturbed sample

- = Compression/settlement

NV = no value

NP = non-plastic

1 Remolded Compacted density (about 95% of ASTM D698 maximum density near optimum moisture content)

2 Remolded Compacted density (about 95% of ASTM D1557 maximum density near optimum moisture content)

3 Water added to sample

4 Dry density and/or moisture content determined from one ring of a multi-ring sample

5 Minus #200 Only

6 Moisture-Density Relationship Test Method ASTM D698/AASHTO T99

7 Moisture-Density Relationship Test Method ASTM D1557/AASHTO T180

Supporting Information








Contents:

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

General Notes

Sampling	Water Level	Field Tests
<div><div> Auger Cuttings</div><div> Modified California Ring Sampler</div><div> Standard Penetration Test</div></div>	<div><div> Water Initially Encountered</div><div> Water Level After a Specified Period of Time</div><div> Water Level After a Specified Period of Time</div><div> Cave In Encountered</div></div> <p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>	<div><div>N Standard Penetration Test Resistance (Blows/Ft.)</div><div>(HP) Hand Penetrometer</div><div>(T) Torvane</div><div>(DCP) Dynamic Cone Penetrometer</div><div>UC Unconfined Compressive Strength</div><div>(PID) Photo-Ionization Detector</div><div>(OVA) Organic Vapor Analyzer</div></div>

Descriptive Soil Classification
Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes
Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted by Terracon to confirm the surface elevation. Instead, the surface elevation was approximately determined from a file provided by the client titled "Layout Concerns - Original Site Plan" dated "2024/08/20".

Strength Terms						
Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Loose	0 - 3	0 - 5	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	6 - 14	Soft	0.25 to 0.50	2 - 4	3 - 5
Medium Dense	10 - 29	15 - 46	Medium Stiff	0.50 to 1.00	4 - 8	6 - 10
Dense	30 - 50	47 - 79	Stiff	1.00 to 2.00	8 - 15	11 - 18
Very Dense	> 50	≥ 80	Very Stiff	2.00 to 4.00	15 - 30	19 - 36
			Hard	> 4.00	> 30	> 37

Relevance of Exploration and Laboratory Test Results
Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve		Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
		Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50		Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
		Inorganic:	$PI > 7$ and plots above "A" line ^J	CL	Lean clay ^{K, L, M}
	Silts and Clays: Liquid limit 50 or more		$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N}
					Organic silt ^{K, L, M, O}
Highly organic soils:		Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}
			PI plots below "A" line	MH	Elastic silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P}
	Primarily organic matter, dark in color, and organic odor				Organic silt ^{K, L, M, Q}
				PT	Peat

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

^E $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

