Architectural
Structural
Geotechnical

RMG
Engineers / Architects

Materials Testing
Forensic
Civil/Planning

SOIL AND GEOLOGY STUDY

6001 E. Platte Road
Platte Self-Storage
El Paso County, Colorado

PREPARED FOR:

Colorado Commercial Construction
12325 Oracle Blvd, Suite 120
Colorado Springs, CO 80921

JOB NO. 195706

May 9, 2024

Respectfully Submitted,
RMG – Rocky Mountain Group

Kelli Zigler

Kelli Zigler
Project Geologist

Reviewed by,
RMG – Rocky Mountain Group

COLORADO REGISTERED
ANTHONY P. MUNGER
5/9/24
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PROFESSIONAL ENGINEER

Tony Munger, P.E.
Sr. Geotechnical Project Manager

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INTRODUCTION

RMG – Rocky Mountain Group was retained to perform a Soil and Geology Study of the site referenced above. The purpose of this study is to identify/characterize geologic conditions present on the site, and present our opinions of the potential effect of these conditions on the currently proposed development of the site.

1.1 Scope and Objective

The scope of this study is to include a physical reconnaissance of the site and a review of pertinent, publically available documents including (but not limited to) previous geologic and geotechnical reports, overhead and remote sensing imagery, published geology and/or hazard maps, design documents, etc. Our services exclude the evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

The objectives of our study are to:

- Identify geologic conditions that are present on this site,
- Analyze the potential negative impacts of these conditions on the proposed site development,
- Analyze the potential negative impacts to the surrounding properties and/or public services resulting from the proposed site development as it relates to existing geologic hazards,
- Provide our opinion of suitable techniques that may be utilized to mitigate the potential negative impacts identified herein.

This report presents the findings of the study performed by RMG relating to the geologic conditions of the above-referenced site. Revisions and modifications to this report may be issued subsequently by RMG, based upon:

- Additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report,
- Review of pertinent documents (development plans, plat maps, drainage reports/plans, etc.) not available at the time of this study,
- Comments received from the governing jurisdiction and/or their consultants subsequent to submission of this document.

1.2 Previous Studies and Field Investigations

Reports of previous geotechnical engineering/geologic and environmental investigations specifically addressed to this site or the surrounding development were available and are listed below:

- *Preliminary Subsurface Soil Investigation, Lots 1-4, 6001 E. Platte Ave., Colorado Springs, Colorado,* prepared by RMG – Rocky Mountain Group, Job No. 194217, dated September 21, 2023.

The findings, conclusions and recommendations contained in those reports were considered during the preparation of this report.

1.3 Additional Documents

Additional documents reviewed during the performance of this study are included in Appendix A.

2.0 QUALIFICATIONS OF PREPARERS

This Soil and Geology Study was prepared by a professional geologist as defined by Colorado Revised Statures section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42).

The principle investigators for this study are Kelli Zigler P.G., and Tony Munger, P.E. Ms. Zigler is a Professional Geologist as defined by State Statute (C.R.S 34-1-201) with over 23 years of experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Tony Munger, P.E. is a licensed professional engineer with over 23 years of experience in the construction engineering (residential) field. Mr. Munger holds a B.S. in Architectural Engineering from the University of Wyoming.

3.0 GENERAL SITE AND PROJECT DESCRIPTION

3.1 Project Location

The project lies in NW¼ of Section 18, Township 14 South, Range 65 West, of the 6th Principal Meridian in El Paso County, Colorado. The site currently consists of one parcel that is located immediately east of Powers Boulevard (State Hwy 21) and Platte Avenue (Highway 24), accessed via Motel Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

3.2 Existing and Proposed Land Use

The site currently consists of one parcel. Below is the parcel included in this study, as recorded on the El Paso County Assessors. The proposed development is shown on Figure 2, Proposed Development Plan.

- Schedule No. 5418000075 – currently addressed as 6001 E. Platte Avenue, consists of 17.22 acres, and is zoned as *"CS CAD-O"*.

It is our understanding no zone changes are currently proposed.

3.3 Proposed Construction

The Site Development Plan, presented in Figure 2, is still in process at the time of this investigation. The proposed development is to subdivide the lot into 5 parcels, (4 commercial lots

and 1 tract for a pond). Lot 1 is to consist of mini-storage for RV with additional outdoor storage. Lots 2 through 4 could eventually contain an office and warehouse type buildings, in the future. Roadway improvements are proposed for Motel Road, near the entrance to the development. A traffic study is currently underway, with the coordination of CDOT for the frontage road, Motel Rd, also near the entrance of the development.

Based on conversations with the architect, the project is to be completed in stages. Phase 1 is to consist of construction of the storage units to be located in the eastern portion of the site. The structures are to be enclosed storage units that will likely reside atop a slab-on-grade foundation. It is our understanding that the proposed modifications for future Phases are not yet finalized.

A private detention basin is proposed near the southwest portion of the site and is to be located in a dedicated tract (A). The location of the pond is to be within an area that has historically been utilized as a washout area for the garden shop. It is our understanding a Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement agreement has been drawn up and is to be signed by the Developer, who will be charged with the duties of constructing, operating, maintaining, and repairing the detention basin.

Sand Creek East Fork is located off-site to the west of the property. The creek is contained and the site is located outside the designated floodplain.

A retaining wall is proposed along the northern boundary, with an additional retaining walls proposed within the site. The height of the walls is unknown at this time. The Site Development Plan is presented in Figure 2.

3.4 Aerial Photographs and Remote-Sensing Imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, Colorado Geological Survey – CGS surficial geologic mapping, and historical photos dating back to 1947. Overall, development of the area began prior to 1947. Peterson Air Force Base was in operation with minor activity in the surrounding area. Prior to 1999, Sand Creek East Fork was improved to a concrete channel and the Powers Boulevard frontage road was constructed. Since 2005, the surrounding properties have undergone minimal changes.

4.0 GENERAL SITE AND PROJECT DESCRIPTION

4.1 Existing Site Conditions

The site is developed land. The site is bound to the north by Platte Avenue (Highway 24), to the south by a FedEx facility, to the west by an open space owned by the Department of Transportation, and to the east by developed commercial properties. The proposed development is to infill the undeveloped areas that remain within this developed area. It is our understanding Cherokee Metro District is to supply the water and wastewater facilities needed for the development.

Historically, the site was used as a landscaping supply yard. Don's Garden Shop has been in business since 1975 at this location, and has a large assortment of gardening and landscaping products. This includes numerous stockpiles of soil, rock, organics, etc.

4.2 Topography

The overall site topography is generally flat with gently rolling terrain with approximately 40 to 45 feet of relief across the entire site. The site generally slopes down to the southwest towards Sand Creek East Fork.

Isolated steep slopes currently exist along the eastern side of the existing washout area and along the eastern side of the soil/rock storage area. In general, the entire perimeter of the site has isolated steep slopes due to either cuts/fills along the property boundaries.

4.3 Vegetation

Vegetation is limited to the perimeter of the site and near the entrance, and consists of deciduous trees, shrubbery/bushes. The interior of the site is generally devoid of vegetation.

4.4 Project Description

Based on a concept plan prepared by RMG, we understand the Platte Storage Facility development is to consist of single-story storage unit structures along the eastern half of the property. The storage units are to be atop slab-on-grade foundations. The Proposed Development Plan is included in Figure 2.

Access into the development is to be from the existing Motel Road. Motel Road is to undergo improvements. Additional proposed land usage includes stormwater, detention areas, district tracts, utility easements and private roadways and driveways. Interior driveways and parking areas will most likely be privately owned. If public streets are developed, they will require a site-specific

pavement design investigation and report. Individual wells and on-site wastewater treatment systems are not proposed.

The purpose of this report is to provide a Soil and Geology Study for the approval of the development within El Paso County, Colorado.

4.5 Aerial Photographs and Remote-Sensing Imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, CGS surficial geologic mapping, and historical photos by historicaerials.com dating back to 1947. Portions of Peterson Air Force Base (PAFB) were constructed prior to 1947. Other than PAFB, the area was relatively devoid of structures prior to 1969. After 1969, significant commercial and rural residential construction began. Don's Garden Shop was in place prior to 2005 and has remained to date. Sand Creek East Fork improvements were constructed prior to 1999.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

The subsurface conditions within the property were previously explored by RMG by drilling six (6) exploratory test borings to depths of 15 to 35 feet below the existing ground surface. Since the issuance of the original report, referenced above, the site layout has changed. Two of test borings presented within the referenced report above, TB-4 and TB-7, now lie outside the area of proposed structures but all data, conclusions, and recommendations from the previous report was considered for completeness.

The test borings were drilled with a power-driven, continuous-flight auger drill rig. Samples were obtained during drilling of the test boring in general accordance with ASTM D-1586 and D-3550, utilizing a 2-inch O.D. Split Barrel Sampler and a 2½-inch O.D. California sampler, respectively. Results of the Standard Penetration Tests are shown on the test boring logs. The location of the test borings is presented on the Engineering and Geology Map, Figure 3. The Test Boring Location Plan, An Explanation of Test Boring Logs, and Test Boring Logs are presented in Appendix B.

5.1 Laboratory Testing

Soil laboratory testing was performed as part of the referenced investigation. Laboratory testing included moisture content, grain-size analysis, and Atterberg Limits. A Summary of Laboratory Test Results, Soil Classification Data and Swell/Consolidation Test Results are presented in Appendix B.

5.2 Groundwater

Groundwater was encountered in one of the test borings during the field exploration at a depth of approximately 27 feet, perched atop the sandstone bedrock. The majority of the upper soils are well-draining and the natural moisture contents were low. Fluctuations in groundwater and subsurface moisture conditions will occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect

groundwater levels. Groundwater is not anticipated to be encountered in the excavations for the proposed slab-on-grade foundations.

6.0 SITE GEOLOGY AND DESCRIPTIONS

6.1 General Physiographic and Geologic Setting

Based upon review of the *Geologic Map of the Elsmere 7.5 Minute Quadrangle, El Paso County, Colorado*, and a review of the site, which is located east of the Colorado Springs metro area, within the southern part of the Colorado Piedmont section of the Great Plains. The Great Plans is distinguished by having a topographically lower elevation than the adjoining physiographic regions. The underlying bedrock in the area generally dips gently in an easterly direction but is considered essentially flat with little dip.

6.2 Subsurface Soil Conditions

The subsurface materials encountered in the test borings performed for the *Preliminary Subsurface Investigation* (PSSI) referenced above were classified within the laboratory using the Unified Soil Classification System (USCS). he materials classified primarily as native silty sand (SM), clayey sand (SC) with interbedded sandy silt (ML), and well graded sand with silt and gravel (SW-SM).

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the engineer's description of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

6.3 Bedrock Conditions

Bedrock was encountered in four of the 6 test borings performed for the PSSI included in Appendix B. Sandstone bedrock was encountered near the surface near the surface in two of the borings on the western half of the property. Bedrock was encountered on the eastern half of the property, but at depths ranging between 13 and 27 feet below grade. In general, bedrock (as mapped by Colorado Geologic Survey – CGS) beneath this site is considered part of the Laramie formation. The geologic quadrangle is presented in Section 5.5. Bedrock is not anticipated to be encountered during construction on the eastern half of the property. The currently proposed storage units are estimated to have excavation cuts of 3 to 4 feet below finished grade. Utility trenches may encounter sandstone at various locations across the site. The sandstone can generally be excavated with standard construction equipment, such as a skid loaders, loaders, backhoes, etc.

6.4 U.S. Soil Conservation Service

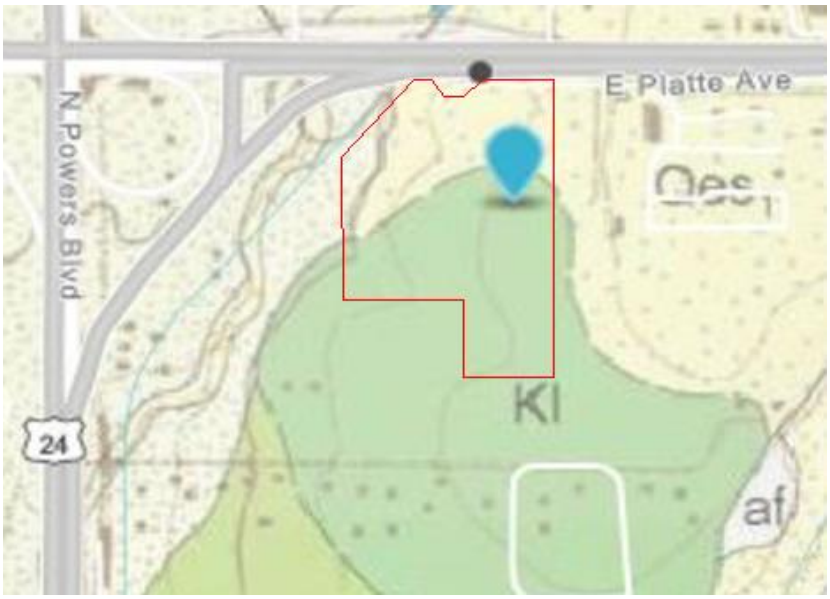
The USDA/NRCS soil survey identifies the site soils as:

The U.S. Soil Conservation Service along with United States Department of Agriculture (USDA) identifies the site soils as:

- 8 – Blakeland loamy sand, 1 to 9 percent slopes. The Blakeland loamy sand was mapped by the USDA to encompass the majority of the property. Properties of the loamy sand include, somewhat excessively drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding and ponding is low, and landforms include depressions.

6.5 General Geologic Conditions

Based on our PSSI field exploration and observations, as well as the Geologic Map of the Elsmere 7.5 Minute Quadrangle (depicted in the image below), we created an interpreted map of geologic conditions affecting the development, significant surficial deposits, and surface features for the site. The interpreted map is presented on the Engineering and Geology Map, Figure 3.



The site generally consists of eolian deposits overlying sandstone bedrock. The geologic units mapped at the site were:

- *Qes1 – Younger eolian sand (middle and early Holocene and late? Pleistocene)* – The unit is overall very coarse sand that appears to have been deposited as sand sheets (low relief sand dune). Unit thickness is estimated to be deeper on the eastern portion of the site and thickness could range between 3 to 20 feet.
- *Kl – Laramie Formation, undivided (Upper Cretaceous)* – This formation is divided into two members, upper member and sandstone member. Areas or probably Laramie Formation were mapped in previous CGS studies, but are not obscured by urbanization are shown as undivided. The upper member contains interbedded sandy shale, thin coal beds, and channel filings. The Laramie was encountered in our test borings at depths ranging between 0 to 27 feet across the site.
- *ss – steep slopes* – isolated steep slopes are located around the perimeter of the site and within the interior of the site. The slopes are man-made (either cut or fill) and were utilized to contain landscaping materials and provide a protective boundary around the exterior of the site. It's our understanding these slopes are to be regraded to facilitate the proposed storage unit structures.
- *Af – artificial man-placed fill* – fill associated with the existing landscaping activates, storage of materials, (soil, rock, etc.) and the temporary retaining structures put in place to hold such materials.

6.6 Engineering Geology

Charles Robinson and Associates (1977) have mapped the following environmental engineering units at the site as:

- *3B* – Expansive and potentially expansive soils and bedrock on flat to moderate slopes (0-12%).

6.7 Structural Features

Structural features such as schistocity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed on the site.

6.8 Surficial (Unconsolidated) Deposits

Lake and pond sediments, swamp accumulations, sand dunes, marine terrace deposits, talus accumulations were not observed on the site. Slump and slide debris were also not observed on the site.

Minor slope wash and creep were not observed on the site. The steepest isolated slopes are located around the existing (and proposed) pond. The isolated slopes surrounding the perimeter of the site and within the site are expected to be regraded prior to construction of the storage units.

6.9 Features of Special Significance

Features of special significance such as accelerated erosion, (advancing gully head, badlands, or cliff reentrants) were observed around the perimeter of the property within the isolated slope cuts that surround the entire property. Features indicating settlement or subsidence such as fissures, scarplets, and offset reference features were also not observed on the study site.

6.10 Drainage of Water and Groundwater

The overall topography of the site is fairly level, with a gentle slope across the interior to the property, down to the southwest. Groundwater was encountered in one of the PSSI test borings (TB-1) at a depth of approximately 27 feet. Groundwater depths at the time of drilling in August 2023 are greater than 20-feet in the area and are not expected to affect slab-on- grade foundation construction. If future structures are proposed on the western portion of the site, additional drilling would be recommended to determine the depth of groundwater at that time.

It should be noted that in granular soils and bedrock, some subsurface water conditions might be encountered due to the variability of the soil profile. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can convey subsurface water. Subsurface water may also flow atop the interface between the upper soils and the underlying bedrock. While not indicative of a "groundwater" condition, these occurrences of subsurface water migration can (especially in times of heavy rainfall or snowmelt) result in water migration into the excavation or (once construction is complete) the building envelope. Builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions during on-site construction, and be prepared to evaluate and mitigate each individual occurrence as necessary.

Based on our knowledge of the area and engineering design and construction techniques commonly employed in the El Paso County area at this time, it is our opinion shallow groundwater conditions are not expected to be found at the time of overlot grading and during construction. If subsurface water is encountered in the deeper utility trenches, it is likely perched water trapped atop the sandstone bedrock and/or within the isolated gravelly layers.

Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

6.11 Flooding and Surface Drainage

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0754G and the online ArcGIS El Paso County Risk Map, the site does not lie within a 100-year floodplain. The site is within the boundaries of Zone X.

Zone X is defined by FEMA as an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. Additional information is included in **7.6 Floodplains.**

7.0 POTENTIAL GEOLOGIC HAZARDS AND THEIR BEARING ON INTENDED LAND USE

This section involves the effects of the geologic features upon the proposed grading, construction, and land use, as well as the future effects (if any) of the proposed modifications upon the geological processes in the area. We have identified no geologic conditions that we believe will preclude the development, as currently proposed. The conditions identified herein can be mitigated with typical construction practices common to the Colorado Springs area.

A review of local geologic hazards mapping indicates that the following geologic hazards and constraints are not present at the site:

Hazards

- Avalanches
- Debris Flow-Fans/Mudslides
- Ground Subsidence
- Landslides
- Rockfall

Constraints

- Corrosive Minerals
- Downhill/Down-Slope Creep
- Erosion and Erosion-Related Slope Instability
- Floodplain/Floodway
- Soil Slumps and Undercutting
- Scour, Erosion, accelerated erosion along creek banks and drainage ways
- Springs and High Groundwater
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Valley Fill

The following sections present geologic hazards and constraints that have been identified on the property:

7.1 Potentially Expansive Soils and Bedrock – *constraint*

It is our understanding shallow slab-on-grade foundations are to be utilized for the storage units within this proposed development. Based on the test borings performed by RMG for the *PSSI*, included in Appendix B, neither sandy clay nor claystone were encountered in the 6 borings performed on-site, ranging between 15 to 35 feet across the site. The upper alluvial sand materials and Laramie sandstone generally possesses low to nil swell potential. However, the Laramie is known to contain sandy shale, which generally possesses moderate to high swell. The Laramie may contain interbedded layers of sandy shale, but not to the extent that a mass subexcavation would generally be recommended. Furthermore, the sandstone bedrock appears to be centrally

located on the site, within the area around the existing pond. Areas where the sandstone bedrock was encountered at or near the surface are indicated on Figure 3, Engineering and Geology Map.

Mitigation
Should expansive soils or bedrock be encountered beneath foundations, mitigation will be required. Thin interbedded layers of expansive material (generally 1 to 3 feet thick) may be encountered at various depths across the site. If these materials are encountered, they can readily be mitigated with typical construction practices common to this region of El Paso County, Colorado such as overexcavation and replacement of the unsuitable soils and/or bedrock.

Expansive soils and bedrock, if encountered during construction, should be suitably mitigated. Mitigation options include (but are not limited to) overexcavation and replacement, use of a foundation with an intermittent (voided) footing designed to provide sufficient dead load to resist uplift swell pressures, or use of a deep foundation system (drilled piers, helical piers, micropiles, etc.). If appropriate mitigations are implemented, the potential presence of expansive soil/bedrock is not considered to pose a risk to the proposed structures.

7.2 Compressible Soils - *constraint*

Based on the test borings performed by RMG for the PSSI, the upper silty sands with gravel are anticipated to possess moderate compressibility potential.

Compressible soils, if encountered during construction, should be suitably mitigated. Mitigation options include (but are not limited to) overexcavation and replacement with a mass subexcavation, use of a foundation with an intermittent (voided) footing designed to provide sufficient dead load to resist consolidation, or use of a deep foundation system (drilled piers, helical piers, micropiles, etc.). If appropriate mitigations are implemented, the potential presence of expansive soil/bedrock is not considered to pose a risk to the proposed structures.

Mitigation
The upper sands were encountered at loose to medium densities, and could be prone to compression beneath foundations. If loose soils are encountered, mitigation will be required. Loose soils are readily mitigated with typical construction practices common to this region of El Paso County, Colorado such as applying additional compactive effort to the soil and/or subexcavation and replacement of the upper soils.

Settlement is directly related to saturation of the soils adjacent to foundation walls and below the entire foundation areas. Good long-term drainage is imperative to reduce the potential for settlement, for the entirety of the structures life. The ground surface should be sloped from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum 5 feet from the foundation and sloped parallel with the wall with a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure. Homeowners

should maintain the surface grading and drainage recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

7.3 Erosion - *constraint*

Due to the nature of the upper sandy soils encountered at the site, they are susceptible to erosion by wind and flowing water. The sparsely vegetated isolated steep slopes are susceptible to concentrated surface runoff down the slopes from the unpaved but highly compacted roadways.

Mitigation

The silty sand and gravel on site are mildly to moderately susceptible to wind erosion and moderately to highly susceptible to water erosion. Mass overlot grading is not proposed, but wind erosion and/or associated dust problems should be expected for a short time during construction. If the problem is considered severe, watering of the cut areas may be required to control dust.

Provided these recommendations are implemented, the occurrence of erosion will be limited and is not considered to pose a risk to the proposed development.

7.4 Fill Soils - *constraint*

Shallow fill soils were encountered in one of the test borings (TB-2) performed for the PSSI. Due to the previous usage of the site, fill soils will likely be encountered across the site at various depths. The fill soils must be considered undocumented fill, and as such are not suitable for development in its current condition for the following reasons. The degree of consolidation is unknown, material densities will vary, and pockets and seams of soft and loose material may be encountered. Uneven and differential settlement potential exists. We do not believe the site has a history of use as a landfill.

Mitigation

It is anticipated the majority of the unsuitable fill soils will be penetrated either by the overlot grading and/or by the individual excavations for each proposed storage unit structure. However, if unsuitable fill soils remain below the proposed foundation components, they will require removal (overexcavation) and replacement with newly placed and compacted structural fill. The zone of

overexcavation shall extend to the bottom of the unsuitable fill zone and shall extend at least that same distance beyond the building perimeter (or lateral extent of the fill, if encountered first).

Provided that appropriate mitigations and/or foundation design adjustments are implemented, the presence of undocumented fill placement is not considered to pose a risk to the proposed structures.

7.5 Seasonal Surface and Subsurface Water - *constraint*

Sand Creek East Fork is located to the east of the site and a unnamed drainageway parallels the northwestern property boundary. The unnamed drainageway continues south of the site and then is redirected to the south and west where it eventually discharges into Sand Creek East Fork. The existing pond will likely be drained to allow for improvements to comply with current code requirements.

Groundwater was encountered in one of the PSSI test borings at a depth of approximately 27 feet. Based on the depths from the current ground surface to the measured groundwater depths (at the time of drilling) and the likelihood that the elevation will be raised in these areas during overlot grading, groundwater expected to be more than 25 feet below the final "developed" ground surface. Even with typical seasonal variations in groundwater depths, the groundwater is not expected to encroach within 10 feet of "typical" slab-on-grade foundation depths on the proposed lots. It is our opinion that groundwater will not affect shallow foundations for the structures or shallow buried utilities proposed on the site.

Subsurface water may also flow atop the interface between the upper soils and the underlying bedrock. While not indicative of a "groundwater" condition, these occurrences of subsurface water migration can (especially in times of heavy rainfall or snowmelt) result in water migration into the excavation or (once construction is complete) the building envelope. Builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions within the deep utility trenches (greater than 15 feet) during on-site construction.

<u>Mitigation</u>
A minimum 3- to 5-foot separation is generally recommended between the bottom of the foundation components/floor slabs and the estimated seasonal high-water table levels. We believe the currently proposed slab-on-grade foundations will have adequate separation from the underlying groundwater. Additional drainage and/or ground stabilization measures (beyond those already presented herein) are not expected. If future structures are proposed within the western portion of the site, particularly near the detention pond, an additional groundwater investigation should be considered.

Foundations must have a minimum 30-inch depth for frost protection. Perimeter drains are recommended around portions of the structures which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable. Perimeter drains are recommended for portions of the structures which will have below-grade spaces to help reduce the intrusion of water into areas below grade.

Provided that appropriate mitigations and/or foundation design adjustments are implemented, the presence of seasonally fluctuating groundwater is not considered to pose a risk to the proposed structures.

7.6 Floodplains- *hazard*

The site is not zoned "*SS*" – *Streamside* per the El Paso County Public Record Real Estate Property Search. Based on our review of the available FEMA and the online ArcGIS El Paso County Risk Map, the site lies outside the 100-year floodway of Sand Creek East Fork. The proposed structures are located outside the designated floodway. FEMA denotes the current floodplain as contained within the man-made banks of the creek.

Mitigation

The proposed structures are to be located outside the designated floodway. Per the latest approved edition of the Pikes Peak Regional Building Code, the lowest finished floor elevation (including basement together with attendant utility and sanitary facilities) shall be elevated one-foot or more above the BFE.

Provided that the recommendations presented herein, as well as any requirements stipulated by the governing regulatory agencies, are adhered to, the presence of the floodplain is not anticipated to preclude the proposed main level slab-on-grade construction.

7.7 Faults and Seismicity - *hazard*

The closest faults are associated with the Ute Pass Fault Zone. An unnamed fault transvers the very northwestern corner of the property. Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith, which includes pull from minor movements along faults found in the Denver basin. It is our opinion that ground motions resulting from minor earthquakes may affect structures (and the surrounding area) at this site if minor shifting were to occur.

Mitigation

In accordance with the International Building Code, 2018, seismic design parameters have been determined for this site. The Seismic Site Class has been interpreted from the results of the soil test borings drilled within the project site. The Applied Technology Council seismic design tool has been used to determine the seismic response acceleration parameters using ASCE 7-16. The soil on this site is not considered susceptible to liquefaction. The following recommended Seismic Design Parameters are based upon Seismic Site Class D, and a 2 percent probability of exceedance in 50 years. The Seismic Design Category is “B”.

6001 E Platte Ave, Colorado Springs, CO 80915, USA
Latitude, Longitude: 38.838401, -104.7147146

Date	5/9/2024, 1:29:39 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	0.193	MCE_R ground motion. (for 0.2 second period)
S_1	0.057	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.309	Site-modified spectral acceleration value
S_{M1}	0.137	Site-modified spectral acceleration value
S_{DS}	0.206	Numeric seismic design value at 0.2 second SA
S_{D1}	0.091	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second

7.8 Radon – *constraint*

Radon is a gas that can move feely within the soil and air but can become trapped in structures constructed on the soil. Radon is a byproduct of the natural decay of uranium and radium. Trace amounts of radioactive nuclides are common in the soils and bedrock that underlie this region and site.

***"Radon Act 51** passed by Congress set the natural outdoor level of radon gas (0.4 pCi/L) as the target radon level for indoor radon levels".*

Southern El Paso County and the 80926 zip code, in which the site is located, has an EPA assigned Radon Zone of 1. A radon Zone of 1 predicts an average indoor radon screening level greater than 0.4 pCi/L (picocuries per liter), which is above the recommended levels assigned by the EPA. *The EPA recommends corrective measures to reduce exposure to radon gas.*

All of the State of Colorado is considered EPA Zone 1 based on the information provided at https://county-radon.info/CO/El_Paso.html. Elevated levels of radon from naturally occurring sources are anticipated at this site.

Mitigation
Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards. Passive radon mitigation systems are also available.

Passive and active mitigation procedures are commonly employed in this region to effectively reduce the buildup of radon gas. Measures that can be taken after the residence is enclosed during construction include installing a blower connected to the foundation drain and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, it is recommended that the residence be tested after they are enclosed and commonly utilized techniques are in place to minimize the risk.

7.9 Proposed Grading, Erosion Control, Cuts and Masses of Fill - *constraint*

Based on the test borings from the PSSI, the excavations are anticipated encounter silty to clayey sand with gravel and well graded sand with silt, clay and gravel. The on-site sand soils and sandstone bedrock are suitable for use as site-grading fill. The sandstone bedrock may need to be "pulverized" and contain chunks less than 1.5 inches in dimeter if being processed and/or placed by a loader, or not greater than 3 inches in diameter if being processed/placed as part of "mass" fill (scrapers and disking) operations.

Mitigation
A preliminary concept grading plan was presented on the Site Development Plan, Figure 2. Prior to placement of overlot fill or removal and recompaction of the existing materials, topsoil, low-density native soil, fill and organic matter should be removed from the fill area. The subgrade should be scarified, moisture conditioned to within 2% of the optimum moisture content, and recompacted to the same degree as the overlying fill to be placed. The placement and compaction of fill should be periodically observed and tested by competent personnel.

An existing detention pond (private) currently resides on the property. It is our understanding the pond is to be expanded to the east, north and south. The western boundary is to remain as is. The pond is to be drained, unsuitable materials are to be removed, and the earthen banks are to be reworked as required. The banks of the pond are to be elevated approximately 1-foot above grade. The pond is not to be deepened.

If unsuitable fill soils are encountered at the time of construction, they should be removed (overexcavated) and replaced with newly placed and compacted structural fill. The zone of overexcavation shall extend to the bottom of the unsuitable fill zone and shall extend at least that same distance beyond the building perimeter (or lateral extent of any fill, if encountered first).

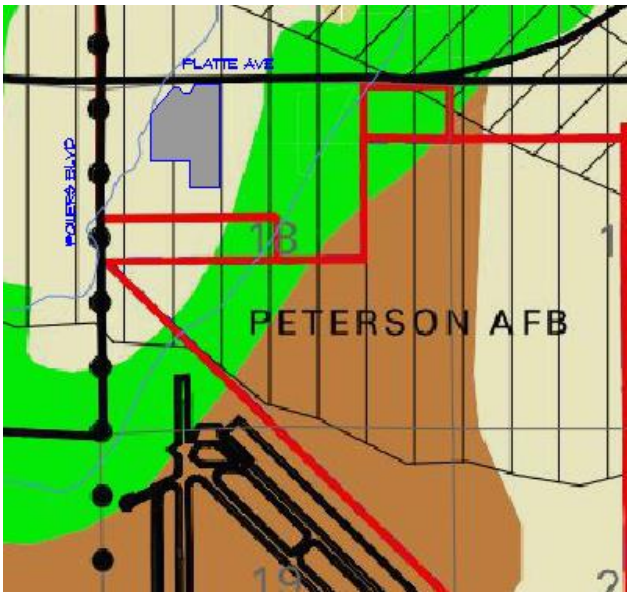
We anticipate that the deepest excavation cuts for the proposed storage unit structures utilizing a shallow spread footing foundation will be approximately 3 to 4 feet below the finished ground surfaces for slab-on-grade foundations, not counting overexcavation if required. Currently basement foundations are not proposed. We believe the surficial soils will classify as Type C materials as defined by OSHA in 29CFR Part 1926, dated January 2, 1990. OSHA requires

temporary slopes made in Type C materials be laid back at ratios no steeper than 1.5:1 (horizontal to vertical) unless the excavation is shored or braced.

Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should high moisture conditions occur. It is recommended that long-term fill slopes be no steeper than 3:1 (horizontal to vertical).

8.0 ECONOMIC MINERAL RESOURCES

Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction*, *Map 2* indicates the site is identified as *"Eolian Deposits"*. Extraction of the fine wind-blown sands would not be considered to be economical compared to materials available elsewhere within the county.



According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands*, the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped "Poor" for coal resources, no active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site.

9.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

The geologic hazard, seismicity (as described in Section 7 of this report) is known to be present at this site. Geologic constraints (as described in section 7 of this report) such as potentially expansive soils and bedrock, compressible soils, isolated steep slopes, erosion, radon, and minor fill soils were found on the site.

It is our opinion that the identified geologic and engineering conditions can be satisfactorily mitigated through proper engineering design and construction practices.

The upper silty sand and gravel are typically loose to medium dense, with the density increasing with depth. Due to the interbedded nature of the soils on this site, expansive layers maybe encountered at various depths across the site. Expansive soils if encountered, will require mitigation. These occurrences should be identified and dealt with on an individual basis. These soils will not prohibit development. The silty to clayey sand with gravel encountered on the site generally will provide good support for foundations. Foundations for the storage unit structures are anticipated to be spread footing with stemwall on grade configurations. Mitigation of expansive soils (or bedrock) should be determined in an additional site specific subsurface soils investigation on an individual lot basis.

Although the upper silty sand and gravel are typically suitable for foundations, these soils were encountered in a loose state which could increase the compressibility. If compressible soils are encountered they will require mitigation.

The isolated steep slopes identified within the property boundaries and around the perimeter of the site are likely to be regraded to allow for a "flatter" ground surface for the proposed structures. The isolated steep slopes are primarily subject to sheetwash and rill erosion. Significant grading is not anticipated across the entire site. Any cuts made into unstable slope areas for access to buildable areas should be no steeper than 3:1 unless supported by engineered retaining walls or other retention systems.

10.0 ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for the proposed development. The test borings, laboratory test results, conclusions and recommendations presented in this report are for preliminary evaluations, and not intended for use for final design and construction. ***We recommend that a lot-specific subsurface soil investigation be performed for the proposed structures.*** The extent of any expansive soils (or bedrock) and fill soils encountered during the building-specific investigations should be evaluated for suitability to support the proposed structures prior to construction.

The building-specific subsurface soil investigation should consider the proposed structure type, anticipated foundation loading conditions, location within the property, and local construction methods. Recommendations resulting from the investigations should be used for design and confirmed by on-site observation and testing during development and construction.

11.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. The geologic hazard, seismicity is known to be present at this site. Geologic constraints such as potentially expansive soils and bedrock, compressible soils, isolated steep slopes, erosion, radon, and minor fill soils were found on the site. These conditions, however, are considered typical for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and suitable construction practices.

Surface runoff from off-site should be redirected and controlled during development and prior to the construction of the proposed single-family residences. In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be considered. Exterior, perimeter foundation drains should be installed around below-grade habitable or storage spaces. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil. Over-irrigation should be avoided.

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction, which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

We believe the sand soils will classify as Type C materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type C materials be laid back at ratios no steeper than 1½:1 (horizontal to vertical), unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

The foundation systems for the proposed storage unit structures, retaining walls greater than 4 feet, and any retention/detention facilities should be designed and constructed based upon recommendations developed in a site-specific subsurface soil investigation.

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction, which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

It is important for the Owner(s) of the property to read and understand this report, and to carefully familiarize themselves with the geologic hazards associated with construction in this area. This report only addresses the geologic constraints contained within the boundaries of the site referenced above.

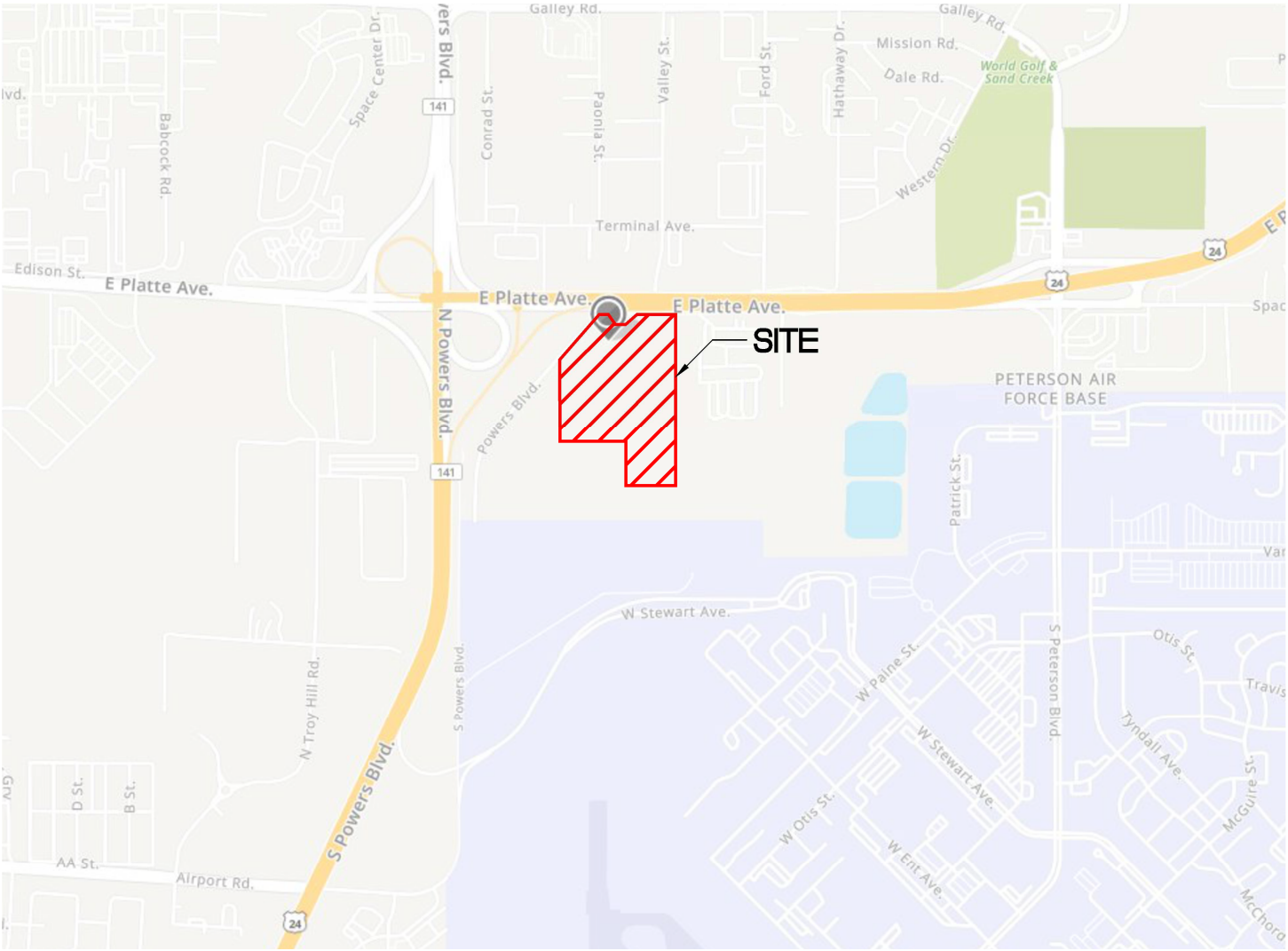
12.0 CLOSING

This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to, biological or toxicological issues, are beyond the scope of this report. If the owner is concerned about the potential for such contamination or conditions, other studies should be undertaken.

This report has been prepared for **Colorado Commercial Construction** in accordance with generally accepted geotechnical engineering and engineering geology practices. The conclusions and recommendations in this report are based in part upon data obtained from review of available topographic and geologic maps, review of available reports of previous studies conducted in the site vicinity, a site reconnaissance, and research of available published information, soil test borings, soil laboratory testing, and engineering analyses. The nature and extent of variations may not become evident until construction activities begin. If variations then become evident, RMG should be retained to re-evaluate the recommendations of this report, if necessary.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers and engineering geologists practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied, is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

FIGURES



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Southern Colorado, Denver Metro, Northern Colorado

SITE VICINITY MAP

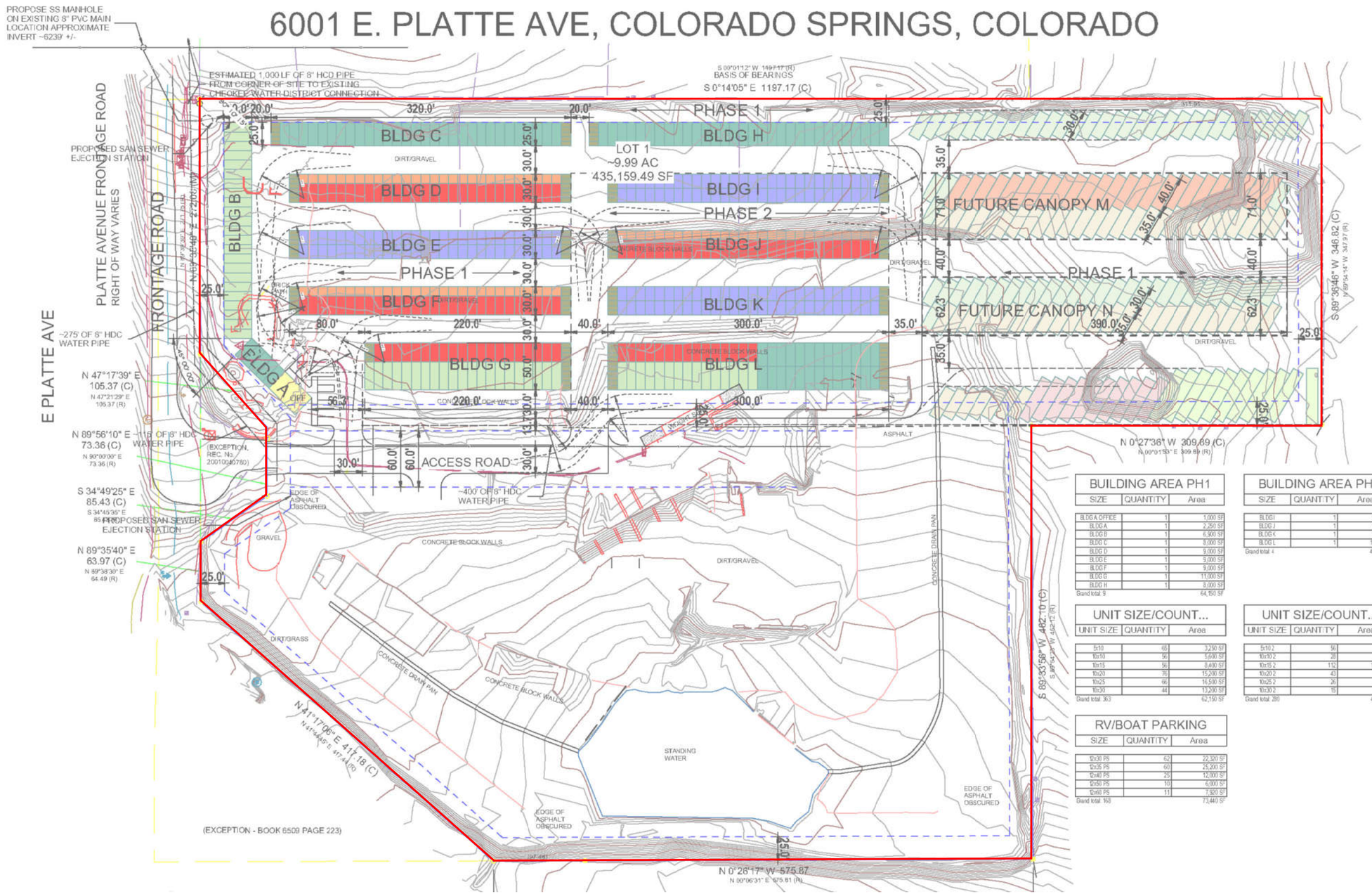
PLATTE SELF-STORAGE
6001 E. PLATTE AVE
EL PASO COUNTY, CO
COLORADO COMMERCIAL
CONSTRUCTION, INC.

JOB No. 195706

FIG No. 1

DATE 5-9-2024

6001 E. PLATTE AVE, COLORADO SPRINGS, COLORADO



BUILDING AREA PH1

SIZE	QUANTITY	Area
BLDG A OFFICE	1	1,000 SF
BLDG A	1	2,250 SF
BLDG B	1	6,300 SF
BLDG C	1	9,000 SF
BLDG D	1	9,000 SF
BLDG E	1	9,000 SF
BLDG F	1	9,000 SF
BLDG G	1	11,000 SF
BLDG H	1	8,000 SF
Grand total: 9		64,150 SF

BUILDING AREA PH2

SIZE	QUANTITY	Area
BLDG I	1	9,000 SF
BLDG J	1	9,000 SF
BLDG K	1	9,000 SF
BLDG L	1	15,000 SF
Grand total: 4		42,000 SF

UNIT SIZE/COUNT...

UNIT SIZE	QUANTITY	Area
5x10	65	3,250 SF
10x10	56	5,600 SF
10x15	56	8,400 SF
10x20	76	15,200 SF
10x25	66	16,500 SF
10x30	44	13,200 SF
Grand total: 363		62,150 SF

UNIT SIZE/COUNT...

UNIT SIZE	QUANTITY	Area
5x10 2	56	2,800 SF
10x10 2	28	2,800 SF
10x15 2	112	16,800 SF
10x20 2	43	8,600 SF
10x25 2	26	6,500 SF
10x30 2	15	4,500 SF
Grand total: 280		42,000 SF

RV/BOAT PARKING

SIZE	QUANTITY	Area
12x30 PS	62	22,320 SF
12x35 PS	60	25,200 SF
12x40 PS	25	12,000 SF
12x50 PS	10	6,000 SF
12x60 PS	11	7,920 SF
Grand total: 168		73,440 SF

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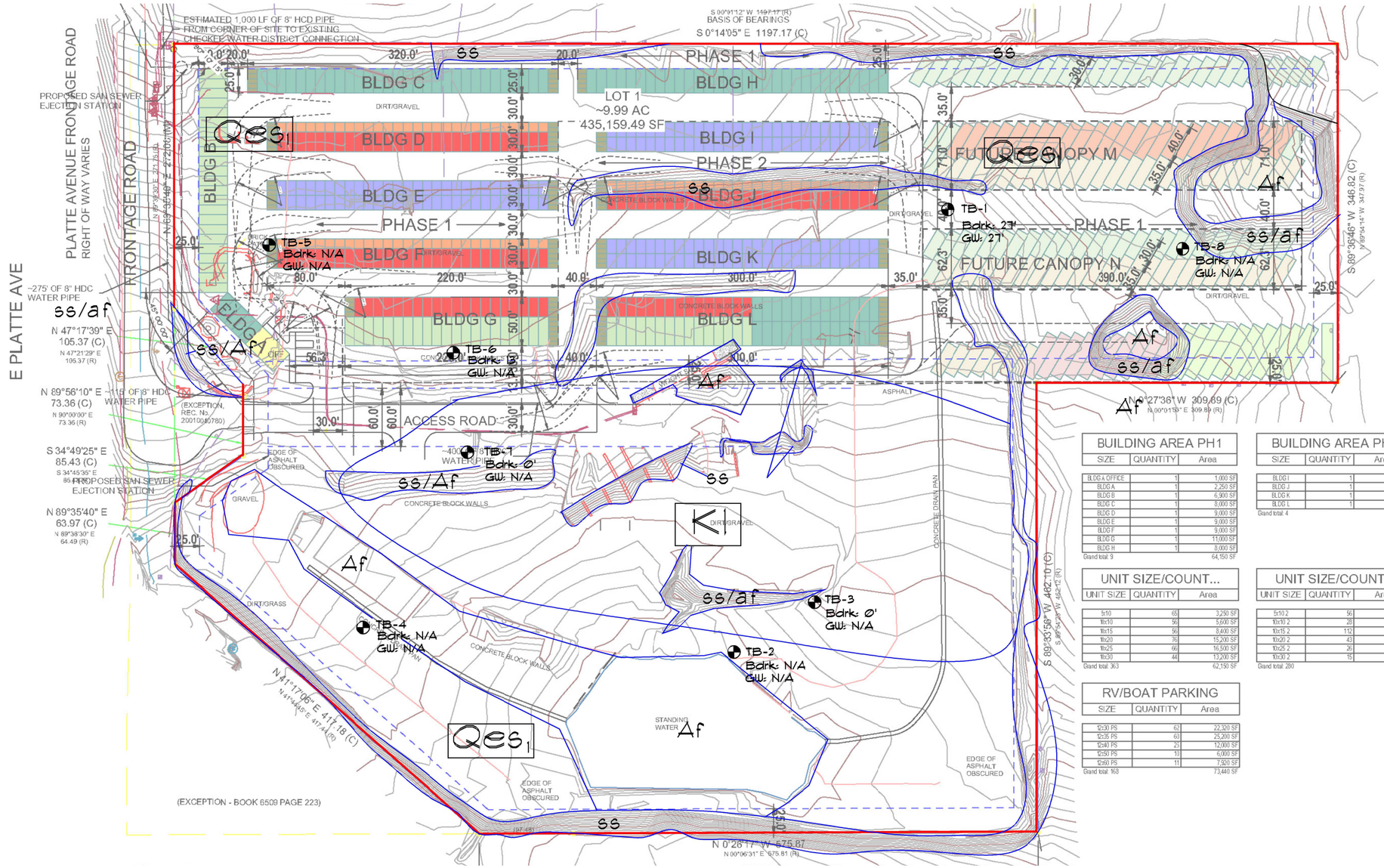
PLATTE SELF-STORAGE
6001 E. PLATTE AVE
EL PASO COUNTY, CO

COLORADO COMMERCIAL CONSTRUCTION, INC.

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	5-9-2024

SITE DEVELOPMENT PLAN

SHEET No.
FIG-2



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BLDG F	1	9,000 SF
BLDG G	1	11,000 SF
BLDG H	1	8,000 SF
Grand total: 9		64,150 SF

BUILDING AREA PH2		
SIZE	QUANTITY	Area
BLDG I	1	9,000 SF
BLDG J	1	9,000 SF
BLDG K	1	9,000 SF
BLDG L	1	15,000 SF
Grand total: 4		42,000 SF

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UNIT SIZE	QUANTITY	Area
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12x50 PS	10	6,000 SF
12x60 PS	11	7,920 SF
Grand total: 168		73,440 SF

GEOLOGIC CONDITIONS

- ***Qes$_1$ - Younger eolian sand (middle and early Holocene and late? Pleistocene)*** - The unit is overall very coarse sand that appears to have been deposited as sand sheets (low relief sand dune). Unit thickness is estimated to be deeper on the eastern portion of the site and thickness could range between 3 to 20 feet.

- ***Kl - Laramie Formation, undivided (Upper Cretaceous)*** - This formation is divided into two members, upper member and sandstone member. The Laramie was encountered in our test borings at depths ranging between 0 to 27 feet across the site.

- ***ss - steep slopes*** - isolated steep slopes are located around the perimeter of the site and within the interior of the site. The slopes are man-made (either cut or fill) and were utilized to contain landscaping materials and provide a protective boundary around the exterior of the site. These slopes will be regraded to allow a flatter surface for the storage unit structures.

- ***Af - artificial man-placed fill*** - fill associated with the existing landscaping activates, storage of materials, (soil, rock, etc.) and the temporary retaining structures put in place to hold such materials.

- ***3B*** - Expansive and potentially expansive soils and bedrock on flat to moderate slopes (0-12%).

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PLATTE SELF-STORAGE
6001 E. PLATTE AVE
EL PASO COUNTY, CO

COLORADO COMMERCIAL CONSTRUCTION, INC.

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	5-9-2024

ENGINEERING GEOLOGY MAP

SHEET No.
FIG-3

Appendix A

Additional Reviewed Documentation

1. *Site Development Plan, Platte Self-Storage, 6001 E. Platte Avenue*, prepared by RMG – Rocky Mountain Group, last revised March 22, 2024.
2. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 081041C0754G*, Federal Emergency Management Agency (FEMA), effective December 7, 2018. *FEMA Flood Map Service Center:* https://msc.fema.gov/portal/home.
3. *Geologic Map of the Elsmere 7.5 Minute Quadrangle, El Paso County, Colorado, by* Madole, R.F. and Thorson, J.P. 2003.
4. *Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
5. *Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
6. *Reconnaissance Geologic Map of Colorado Springs and Vicinity, Colorado,* Department of the Interior United State Geologic Survey, prepared by Glenn R. Scott and Reinhord A. Wobus, Miscellaneous Field Studies, Map MF-482, Sheets 1 and 2, 1973.
7. *El Paso County, Master Plan for Mineral Extraction,* dated February 8, 1996.
8. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board,* prepared by Colorado Geological Survey, dated February 19, 2003, Open-file Report OF-03-07.
9. *USDA – Natural Resources Conservation Service, Web Soil Survey* https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
10. *Colorado Springs Landslide Susceptibility, Colorado Geological Survey:* https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=5e7484a637c4432e84f4f16d0af306d3
11. *Colorado Landslide Inventory, Colorado Geological Survey:* https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=9dd73db7fbc34139abe51599396e2648.
12. *Pikes Peak Regional Building Department:* https://www.pprbd.org/.
13. *City of Colorado Springs, Subdivision Document Viewer:* http://www.springsgov.com/SubDivView/default.asp?cmdGoBack=New+Search....
14. *El Paso County Assessor, El Paso County, Colorado:* https://property.spatialest.com/co/elpaso/#/property/5418000075
15. *Colorado Geological Survey, USGS Geologic Map Viewer*: http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
16. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1947, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, and 2021.
17. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ Images dated 1950, 1951, 1956, 1657, 1963, 1966, 1970, 1974, 1977, 1994, 2001, 2013, and 2018.
18. *Google Earth Pro,* Imagery dated 1999, 2003, 2004, 2005, 2006, 2011, 2015, 2017, 2018, 2019, 2020, 2022, and 2023.

APPENDIX B

Preliminary Subsurface Soil Investigation – RMG

Architectural
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Geotechnical

RMG
Engineers / Architects

Materials Testing
Forensic
Civil/Planning

PRELIMINARY SUBSURFACE SOIL INVESTIGATION

Lots 1-4
6001 E Platte Ave
Colorado Springs, Colorado

PREPARED FOR:

Terra Partners, LLC
303 S. Broadway, Suite 200-300
Denver, CO 80209

JOB NO. 194217

September 21, 2023

Respectfully Submitted,

RMG – Rocky Mountain Group

Jared McElmeel, E.I.
Geotechnical Staff Engineer

Reviewed by,

RMG – Rocky Mountain Group

COLORADO REGISTERED
ANTHONY P. MUNGER
9/22/23
39818
PROFESSIONAL ENGINEER

Tony Munger, P.E.
Sr. Geotechnical Project Manager

TABLE OF CONTENTS

GENERAL SITE AND PROJECT DESCRIPTION

Project Description

The site is located in the southeastern portion of Colorado Springs, Colorado, southeast of the intersection of East Platte Ave and N Powers Blvd. The purpose of the investigation was to evaluate the subsurface soil conditions and provide geotechnical design and construction criteria for the project. These services were provided in accordance with our Proposal for RMG Job No. 194217 dated August 9, 2023.

The existing site (El Paso County Schedule No. 5418000075) reportedly consists of approximately 17.22 acres and is currently zoned as CS CAD-O. It is our understanding that this parcel is to be subdivided into 4 lots, each ranging between 2.17 and 7.52 acres, and 1 tract (approximately 1.25 acres). It's our understanding that the lots are to contain a mixture of office buildings, storage units, and RV storage areas.

Existing Site Conditions

The site appears to have been cleared and grubbed, and leveled by overlot grading. Neither utilities nor curb-and-gutter have been installed within the roadway alignments, and the roads have not been paved. The location of the site is shown on the Site Vicinity Map, Figure 1.

FIELD INVESTIGATION AND LABORATORY TESTING

Drilling

The subsurface conditions on the site were investigated by drilling eight exploratory test borings for the single lot development. The approximate locations of the test borings are presented in the Test Boring Location Plan, Figure 2.

The test borings were advanced with a power-driven, continuous-flight auger drill rig. Two Test Borings were advanced to a depth of 15 feet below the existing ground surface, five Test Borings were advanced to a depth of 20 feet below the existing ground surface, and one Test Boring was advanced to a depth of 30 feet below the existing ground surface. Samples were obtained in general accordance with ASTM D-1586 utilizing a 2-inch OD split-barrel sampler or in general accordance with ASTM D-3550 utilizing a 2½-inch OD modified California sampler. An Explanation of Test Boring Logs is presented in Figure 3. The Test Boring Logs are presented in Figures 4 through 7.

Laboratory Testing

The moisture content for the recovered samples was obtained in the laboratory. Grain-size analysis, Atterberg Limits, and Denver Swell/Consolidation tests were performed on selected samples for purposes of classification and to develop pertinent engineering properties. A Summary of Laboratory Test Results is presented in Figure 8. Soils Classification Data are presented in Figures 9 through 11 Swell/Consolidation Test Results are presented in Figure 12.

SUBSURFACE CONDITIONS

Subsurface Materials

The subsurface materials encountered in the test borings were classified using the Unified Soils Classification System (USCS) and the materials were grouped into the general categories of silty to clayey sand fill, native silty to clayey sand, and sandstone.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the engineer's classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

Groundwater

Groundwater was observed in one of the test borings at a depth of 27 feet below the existing ground surface at the time of field exploration. Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

ANTICIPATED FOUNDATION SYSTEMS

Overexcavation and Replacement Concepts

Expansive clay and claystone were not encountered in the test borings. If expansive soils or bedrock are encountered near foundation or floor slab bearing levels, overexcavation and replacement with non-expansive structural fill to depths of approximately 3 to 4 feet below foundation components should be anticipated. However, depending on the soil conditions encountered in the site specific subsurface soil investigations, overexcavation to deeper depths may be required. Note, the removed clay soils and claystone bedrock are not recommended for use as structural fill below foundation components of floor slabs.

Loose sands were encountered in four of the test borings. Sandstone was encountered at various depths across the site. Loose sands will typically require additional compaction to achieve the allowable bearing pressure indicated in this report. In some cases, removal and recompaction may be required for loose soils.

If fill soils are encountered during the Open Excavation Observation, they will require removal (overexcavation) and replacement with compacted structural fill. The zone of overexcavation shall extend to the bottom of the fill zone and shall extend at least that same distance beyond the building perimeter. As an alternative to the noted overexcavation and replacement, the foundation may be extended down through the fill to bear directly atop the native soil below.

Anticipated Foundation Concepts

Based on the information presented previously, conventional shallow foundation systems consisting of standard spread footings/stemwalls or stiffened slabs are anticipated to be suitable for the proposed commercial structure on the proposed site. Alternative foundation systems are not anticipated. It is assumed that the deepest excavation cuts will be approximately 2 to 3 feet below the final ground surface, not including overexcavation or subexcavation which may be required.

The foundation system should be designed and constructed based upon recommendations developed in a lot-specific subsurface soil investigation completed after site development activities are complete. The recommendations presented in the Subsurface Soils Investigation should be verified following the excavation and evaluation of the building loads.

Note, even after the recommended overexcavation and replacement is completed, it is possible that some of the replacement soils will exhibit low-density or expansive characteristics. In all cases, contractors shall retain the responsibility for excavating to the appropriate line and grade, for the quality of their work, for adhering to plans and specifications, and for repairing defects regardless of when they are discovered.

The allowable bearing pressures to be used for design of foundation components should be determined by a lot-specific subsurface soils investigation. Allowable bearing pressures are anticipated to range from 2,000 to 3,000 psf for native, undisturbed sand soils. An allowable bearing pressure of 2,000 psf is anticipated for granular, non-expansive soils compacted as indicated herein.

Foundation Drains

A subsurface perimeter drain is recommended around portions of the structures which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas. Groundwater was encountered in one test boring during the subsurface investigation at approximately 27 feet below existing ground surface. Depending on the conditions encountered during the lot-specific subsurface soils investigation and the conditions observed at the time of the open excavation observation, additional subsurface drainage systems may be recommended.

One such system is an underslab drainage layer to help intercept groundwater before it enters the slab area should the groundwater levels rise. In general, if groundwater was encountered within 4 to 6 feet of the proposed basement slab elevation, an underslab drain should be anticipated. Another such system would consist of a subsurface drain and/or vertical drain board placed around the perimeter of the overexcavation to help intercept groundwater and allow for proper placement and compaction of the replacement structural fill. Careful attention should be paid to grade and discharge of the drain pipes of these systems.

It must be understood that the drain systems are designed to intercept some types of subsurface moisture and not others. Therefore, the drains could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

Floor Slabs

Slab performance risk evaluation is an engineering judgement which is used as a predictor of the general magnitude of potential slab heave, and the risk of poor slab performance. The Slab Performance Risk within the upper 10 feet at this site is judged to be 'Low" (less than 2% swell under a 1,000 psf surcharge) based on the criteria in the following table.

Slab Performance Risk Categories

Slab Performance Risk Category	Representative Percent Swell (500 psf Surcharge)	Representative Percent Swell (1,000 psf Surcharge)
Low	0 to < 3	0 to < 2
Moderate	3 to < 5	2 to < 4
High	5 to < 8	4 to < 6
Very High	>8	>6

Note: Based on Colorado Association of Geotechnical Engineers, Guidelines for Slab Performance Risk Evaluation and Residential Basement Floor System Recommendations (Denver Metropolitan Area, 1996).

Floor slabs should be separated from structural components to allow for vertical movement. Control and construction joints should be placed in accordance with the latest guidelines and standards published by the American Concrete Institute (ACI) and applicable local Building Code requirements.

Concrete

Type I/II cement is recommended for concrete in contact with the subsurface materials. Calcium chloride should be used with caution for soils with high sulfate contents. The concrete should not be placed on frozen ground. If placed during periods of cold temperatures, the concrete should be kept from freezing. This may require covering the concrete with insulated blankets and heating. Concrete work should be completed in accordance with the latest applicable guidelines and standards published by ACI.

EARTHWORK

Structural Fill

Areas to receive structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) prior to placing structural fill.

Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill shall consist of granular, non-expansive material. It should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557. The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement. The on-site clay soils are not recommended for use as structural fill below foundation components.

Proposed Grading, Cuts and Masses of Fill

Preliminary grading plans were not provided or reviewed by RMG at the time the report was issued. It is assumed (based on the test borings for this investigation) that the excavations will encounter silty to clayey sand (man-placed and native), and silty sandstone. The on-site sand soils can generally be used as site grading fill or structural fill. Clay and claystone are not recommended for use as structural fill or for use as site grading fill in areas that will be below or directly adjacent to the proposed structures. Clay and claystone can generally be used as site grading fill for areas that have a minimum of 10 feet of separation from the proposed structures.

Prior to placement of overlot fill or removal and recompaction of the existing materials, topsoil, low-density native soil, fill and organic matter should be removed from the fill area. The subgrade should be scarified, moisture conditioned to within 2% of the optimum moisture content, and recompacted to the same degree as the overlying fill to be placed. The placement and compaction of fill should be periodically observed and tested by a representative of RMG during construction.

- ***Guideline Site Grading Specifications are included in the Appendix A.***

Surface Grading and Drainage

The ground surface should be sloped from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum 5 feet from the foundation and sloped parallel with the wall with a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure. Owners should maintain the surface grading and drainage recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

The recommendations listed in this report are intended to address normal surface drainage conditions, assuming the presence of groundcover (established vegetation, paved surfaces, and/or structures) throughout the regions upslope from this structure. However, groundcover may not be present due to a variety of factors (ongoing construction/development, wildfires, etc.). During periods when groundcover is not present in the "upslope" regions, higher than normal surface drainage conditions may occur, resulting in perched water tables, excess runoff, flash floods, etc. In these cases, the surface drainage recommendations presented herein (even if properly maintained) may not mitigate all groundwater problems or moisture intrusion into the structure. We recommend that the site plan be prepared with consideration of increased runoff during periods when groundcover is not present on the upslope areas.

BURIED UTILITIES

Based upon the conditions encountered in the exploratory test borings, we anticipate that the soils encountered in the individual utility trench excavations will consist of silty to clayey sand (man-placed and native), and silty sandstone. It is anticipated that the sand and sandstone will be encountered at loose to hard relative densities.

We believe the sand and sandstone will classify as Type C materials. OSHA requires that temporary excavations made in Type C materials be laid back at ratios no steeper than 1½:1 (horizontal to vertical), respectively, unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

Utility mains such as water and sanitary sewer lines are typically placed beneath paved roadways. The settlement of the utility trench backfill can have a detrimental effect on pavements and roadway surfaces. We recommend that utility trench backfill be placed in thin loose lifts, moisture conditioned as required and compacted to the recommendations outlined in the **Structural Fill** section of this report. The placement and compaction of utility trench backfill should be observed and tested by a representative of RMG – Rocky Mountain Group during construction. Use of “flowable fill,” (i.e., a controlled low strength material (CLSM), or a similar material) should be considered in lieu of compacted soil backfill for areas with low tolerances for surface settlements in deep excavations and areas with difficult access.

It is a common local practice for underdrains to be placed at the bottom of sanitary sewer trenched within drive lanes. Underdrains placed in the sanitary sewer trenches in areas where groundwater is anticipated will likely be the "active" type, which uses a perforated drain pipe. In areas where groundwater is not anticipated, “passive” type underdrains may be used. The outfall for the sanitary sewer trench underdrain was not known at the time of this investigation because the development plan and grading plan were not available for our review. Typical underdrain details are presented in Figures 13 and 14.

PRELIMINARY PAVEMENT RECOMMENDATIONS

The discussion presented below is based on the subsurface conditions encountered in the test borings, laboratory test results and the project characteristics previously described. If the subsurface conditions are different from those described in this report or the project characteristics change, RMG should be retained to review our recommendations and modify them, if necessary. The conclusions and recommendations presented in this report should be verified by RMG during construction.

Pavement Design

The pavement design was performed using the Colorado Asphalt Pavement Association's *A Guideline for the Design and Construction of Asphalt Parking Lots in Colorado*. Table 1 of this document shows suggested thicknesses for Hot Mix Asphalt (HMA) over aggregated base course (ABC) for various California Bearing Ratio (CBR) values and traffic levels.

Soil samples were collected and returned to RMG's soil laboratory for testing, classification and analysis. This material will form the subgrade of the pavement section, and its stability and strength are critical to pavement design. The soil consisted of primarily sand and sandstone. These soils are generally considered "excellent to good" as subgrade material.

Subgrade Preparation

All subgrade fill material placed below pavements should be moisture conditioned and compacted in accordance with the ***Structural Fill – General*** section of this report. Prior to placement of the pavement section, the final subgrade should be scarified to a depth of 12 inches, adjusted to within 2 percent of the optimum moisture content and recompacted. The subgrade should then be proof-rolled with a heavy, pneumatic tired vehicle. Areas which deform under wheel loads should be removed and replaced. Base course should be compacted to at least 95 percent of the maximum Modified Proctor density (ASTM D1557).

Pavement Thickness

Based on Table 1 (referenced above) and the estimated CBR of 10, the recommended pavement section for the majority of paved areas and for heavy vehicle loading areas is presented below.

Estimated Hot-Mix Asphalt Pavement Section	
Traffic Level	**HMA over ABC (inches)**
Moderate Traffic / Some Trucks	4.0 / 6.0
Heavy Vehicles with Turning Motions	6.0 / 7.0

As an alternative to the HMA section above, Rigid Concrete Pavements are recommended in areas where heavy vehicle loading is expected. These areas include drop-off/pick-up areas, loading docks, trash pick-up areas, and other locations where heavy trucks will be making frequent turning and braking movements. Rigid pavements may be constructed directly on proof-rolled non-expansive granular subgrade, the top one foot of which has been compacted to a minimum of 95% of maximum dry density as determined by ASTM D1557.

Minimum Rigid Concrete Pavement Section	
Traffic Level	**Portland Cement Concrete (in.)**
Heavy Vehicles with Turning Motions	5.0 in.

These recommendations are for preliminary planning purposes only. The CBR value is based on the materials encountered at the time of drilling and will be dependent upon the soil material used for site fill and subgrade construction. We suggest evaluating the soil conditions after site grading and pavement layout to assess our recommendations.

Pavement Materials

Pavement materials should be selected, prepared, and placed in accordance with the above referenced document, the *Pikes Peak Region Asphalt Paving Specifications*, and all other requirements set forth by the governing jurisdictions. Tests should be performed in accordance with the applicable procedures presented in those specifications.

Surface Drainage

Surface drainage is important for the satisfactory performance of pavement. Wetting of the subgrade soils or base course will cause a loss of strength which can result in pavement distress. Surface drainage should provide for efficient removal of storm-water runoff. As a general rule, parking area surfaces should have a minimum slope of 2 percent (approximately ¼ inch per foot). Water should not be allowed to pond on the pavement or at the edges of the pavement, and areas adjacent to the pavement should be designed to provide positive drainage away from the paved surface.

ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for future development. Unless indicated otherwise, the test borings, laboratory test results, conclusions and recommendations presented in this report are not intended for use for design and construction. **We recommend that a site-specific subsurface soil investigation be performed for all proposed structures including (but not limited to) residences, community or common buildings, retaining walls and pumphouses, commercial buildings, etc.**

To develop recommendations for construction of the proposed roadways, a pavement design investigation should be performed. This investigation should consist of additional test borings, soil laboratory testing and specific recommendations for the design and construction of roadway pavement sections.

CLOSING

This report has been prepared for the exclusive purpose of providing geotechnical engineering information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

This report has been prepared for the exclusive use by **Terra Partners, LLC** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical engineering practices. The analyses and recommendations in this report are based in part upon data obtained from test borings, site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG should be retained to review the recommendations presented in this report considering the varied condition, and either verify or modify them in writing.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

The scope of services for this project does not include, either specifically or by implication, environmental assessment of the site or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to biological or toxicological issues, are beyond the scope of this report. If the Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

FIGURES

Guideline Site Grading Specifications

Description: Unless specified otherwise by local or state regulatory agencies, these guideline specifications are for the excavation, placement and compaction of material from locations indicated on the plans, or staked by the Engineer, as necessary to achieve the required elevations. These specifications shall also apply to compaction of materials that may be placed outside of the project.

General: The Geotechnical Engineer shall approve fill materials, method of placement, moisture contents and percent compactions, and shall give written approval of the compacted fill.

Clearing Site: The Contractor shall remove trees, brush, rubbish, vegetation, topsoil and existing structures before excavation or fill placement is commenced. The Contractor shall dispose of the cleared material to provide the Owner with a clean job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures. Clearing shall also include removal of existing fills that do not meet the requirements of this specification and existing structures.

Preparation of Slopes or Drainage Areas to Receive Fill: Natural slopes or slopes of drainage gullies where grades are 20 percent (5:1, horizontal to vertical) or steeper shall be benched prior to fill placement. Benches shall be at least 10 feet wide. Benches may require additional width to accommodate excavation or compaction equipment. At least one bench shall be provided for each 5 feet or less of vertical elevation difference. The bench surface shall be essentially horizontal perpendicular to the slope or at a slight incline into the slope.

Scarifying: Topsoil and vegetation shall be removed from the ground surface in areas to receive fill. The surface shall be plowed or scarified a minimum of 12 inches until the surface is free from ruts, hummocks or other uneven features which would prevent uniform compaction by the equipment to be used.

Compacting Area to Receive Fill: After the area to receive fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, moisture conditioned to a proper moisture content and compacted to the maximum density as specified for the overlying fill. Areas to receive fill shall be worked, stabilized, or removed and replaced, if necessary, in accordance with the Geotechnical Engineer's recommendations in preparation for fill.

Fill Materials: Fill material shall be free from organic material or other deleterious substances, and shall not contain rocks or lumps having a diameter greater than six inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer or imported to the site and shall be approved by the Geotechnical Engineer prior to placement. It is recommended that the fill materials have nil to low expansion potential, i.e., consist of silty to slightly clayey sand.

Moisture Content: Fill materials shall be moisture conditioned to within limits of optimum moisture content specified. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas or imported to the site.

The contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water to the fill material during placement. The Contractor may be required to rake or disk the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with watering equipment, approved by the Geotechnical Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are eroded.

Should too much water be added to the fill, such that the material is too wet to permit the desired compaction to be obtained, compacting and work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework the wet material in an approved manner to hasten its drying.

Compaction of Fill Areas: Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill materials shall be placed such that the thickness of loose material does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical Engineer. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area.

Moisture Content and Density Criteria:

A. For fill soils supporting utilities and roadways, 95% maximum Standard Proctor dry density at 2% $\pm$ of optimum moisture content.

B. For granular, structural fill soils fills supporting future buildings, 92% maximum Modified Proctor dry density at 2% $\pm$ of optimum moisture content. For moisture-conditioned expansive fill soils supporting future buildings, 95% of maximum Standard Proctor dry density at 1% to 4% above optimum moisture content.

C. For general grading fills, 90% maximum Standard Proctor dry density or Modified Proctor dry density at 2% $\pm$ of optimum moisture content.

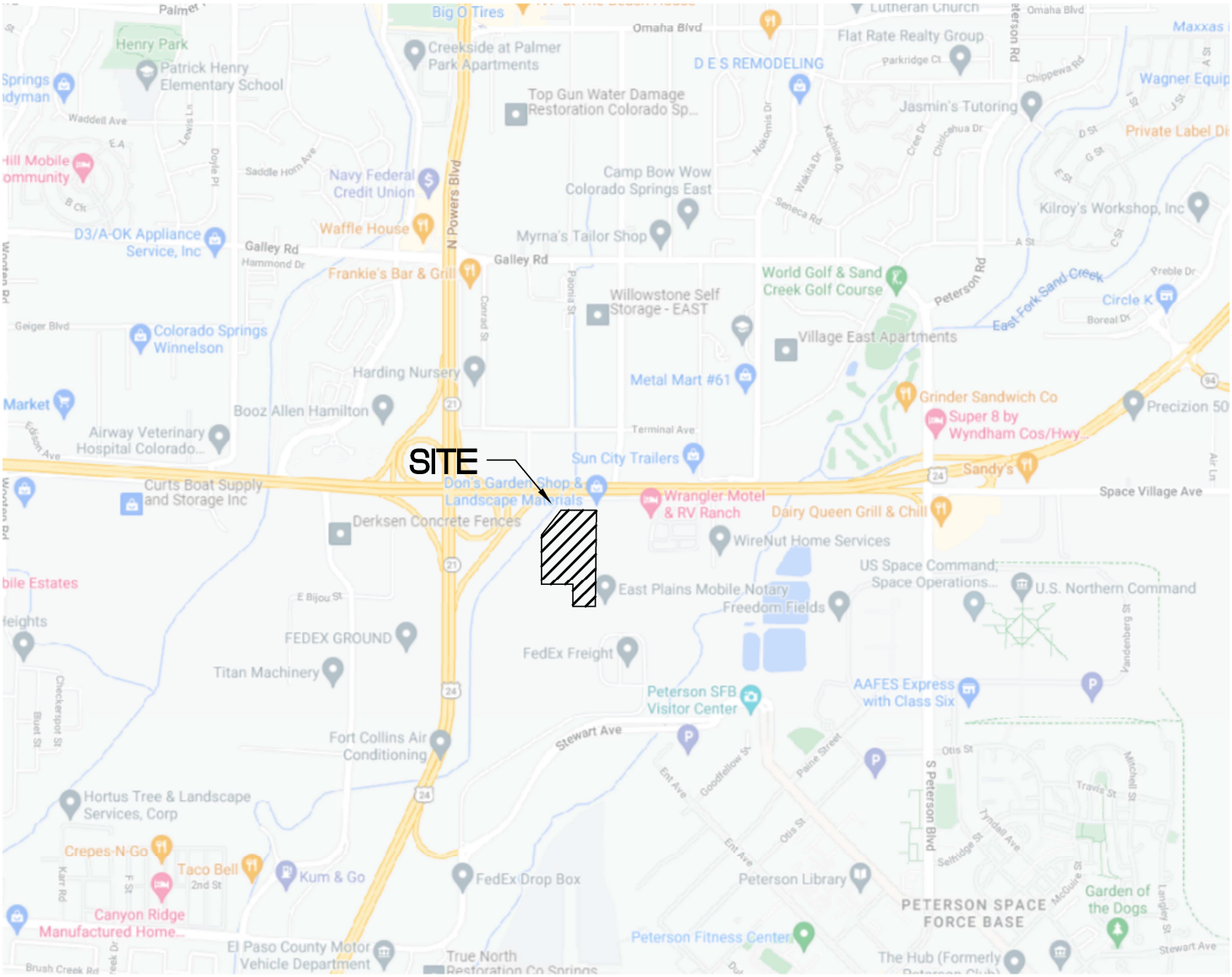
Compaction of Slopes: Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and such that there is no appreciable amount of loose soil on the slopes. Compaction of slopes may be done progressively in increments of three to five feet in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

Density Testing: Field density testing shall be performed by the Geotechnical Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

Observation and Testing of Fill: Observation by the Geotechnical Engineer shall be sufficient during the placement of fill and compaction operations so that he can declare the fill was placed in general conformance with Specifications. All observations necessary to test the placement of fill and observe compaction operations will be at the expense of the Owner.

Seasonal Limits: No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer indicates the moisture content and density of previously placed materials are as specified.

Reporting of Field Density Tests: Density tests made by the Geotechnical Engineer shall be submitted progressively to the Owner. Dry density, moisture content, percent compaction, and approximate location shall be reported for each test taken.



NOT TO SCALE

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Southern Colorado, Denver Metro, Northern Colorado

SITE VICINITY MAP

PARCEL NO. 5418000075
COLORADO SPRINGS, COLORADO
TERRA PARTNERS, LLC

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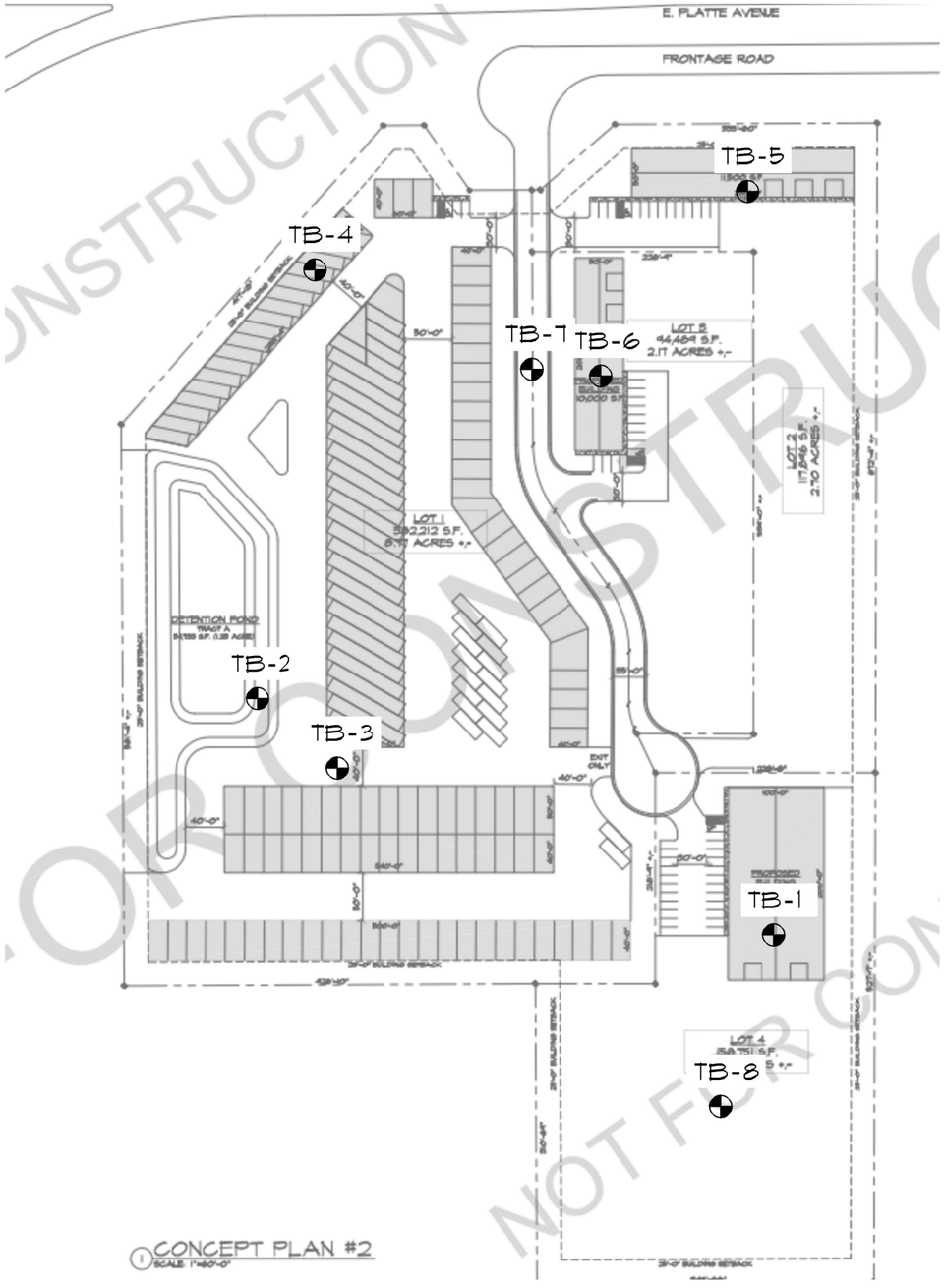
FIG No. 1

DATE 9-21-2023



1 CONCEPT PLAN #2
SCALE: 1"=60'-0"

NOT TO SCALE

DENOTES APPROXIMATE LOCATION OF TEST BORINGS

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PARCEL NO. 5418000075
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TERRA PARTNERS, LLC

ENGINEER:	TM
DRAWN BY:	JM
CHECKED BY:	TM
ISSUED:	9-21-2023

TEST BORING LAYOUT PLAN

SHEET No.
FIG-2

SOILS DESCRIPTION


FILL: SAND, SILTY TO CLAYEY


SANDSTONE


SILTY SAND


SILTY TO CLAYEY SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
2910 AUSTIN BLUFFS PARKWAY
COLORADO SPRINGS, COLORADO

SYMBOLS AND NOTES


XX — STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


XX — UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


FREE WATER TABLE


DEPTH AT WHICH BORING CAVED


BULK — DISTURBED BULK SAMPLE


AUG — AUGER "CUTTINGS"

4.5 — WATER CONTENT (%)

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EXPLANATION OF TEST BORING LOGS

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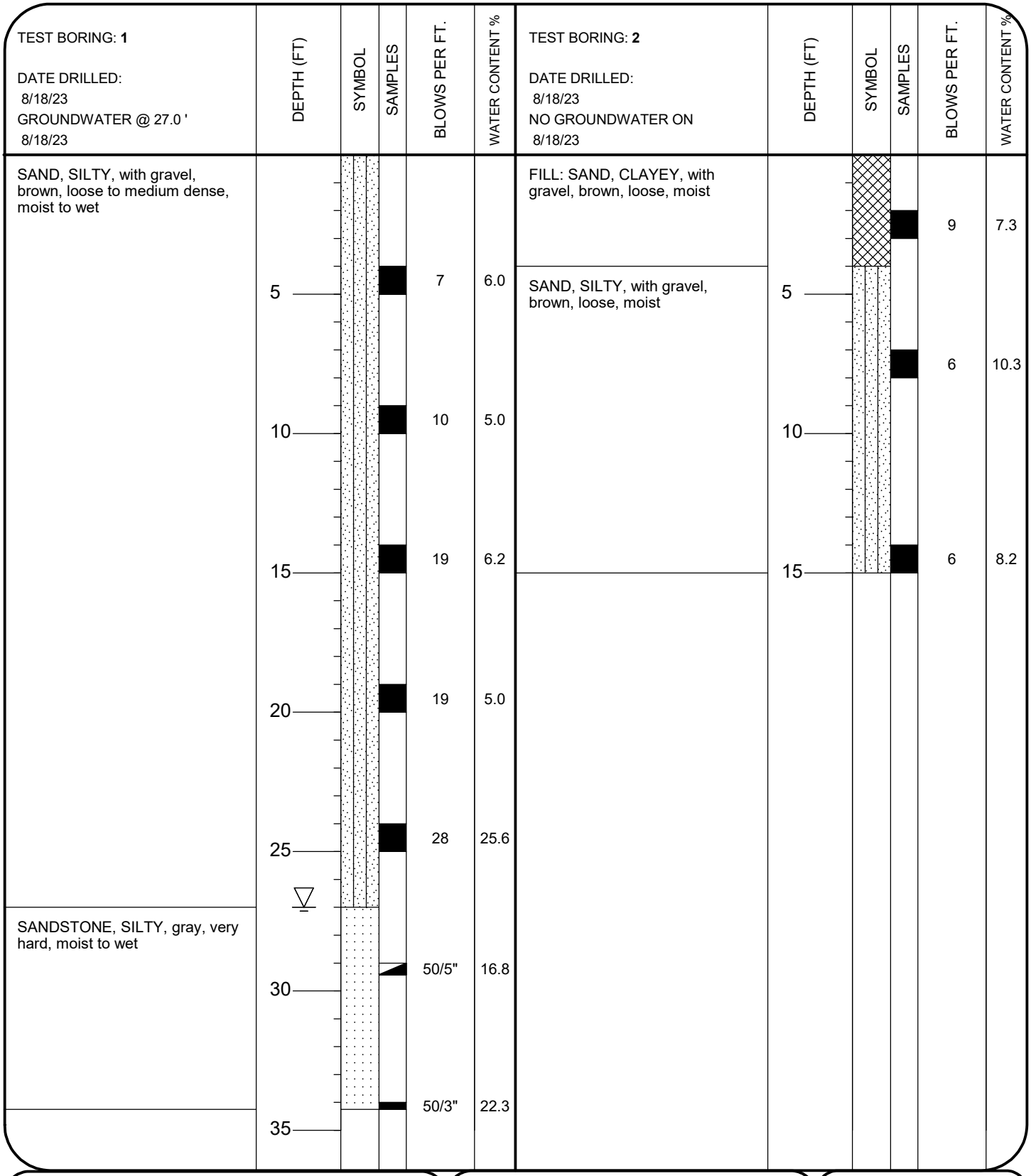
FIGURE No. 3

DATE Sep/21/2023



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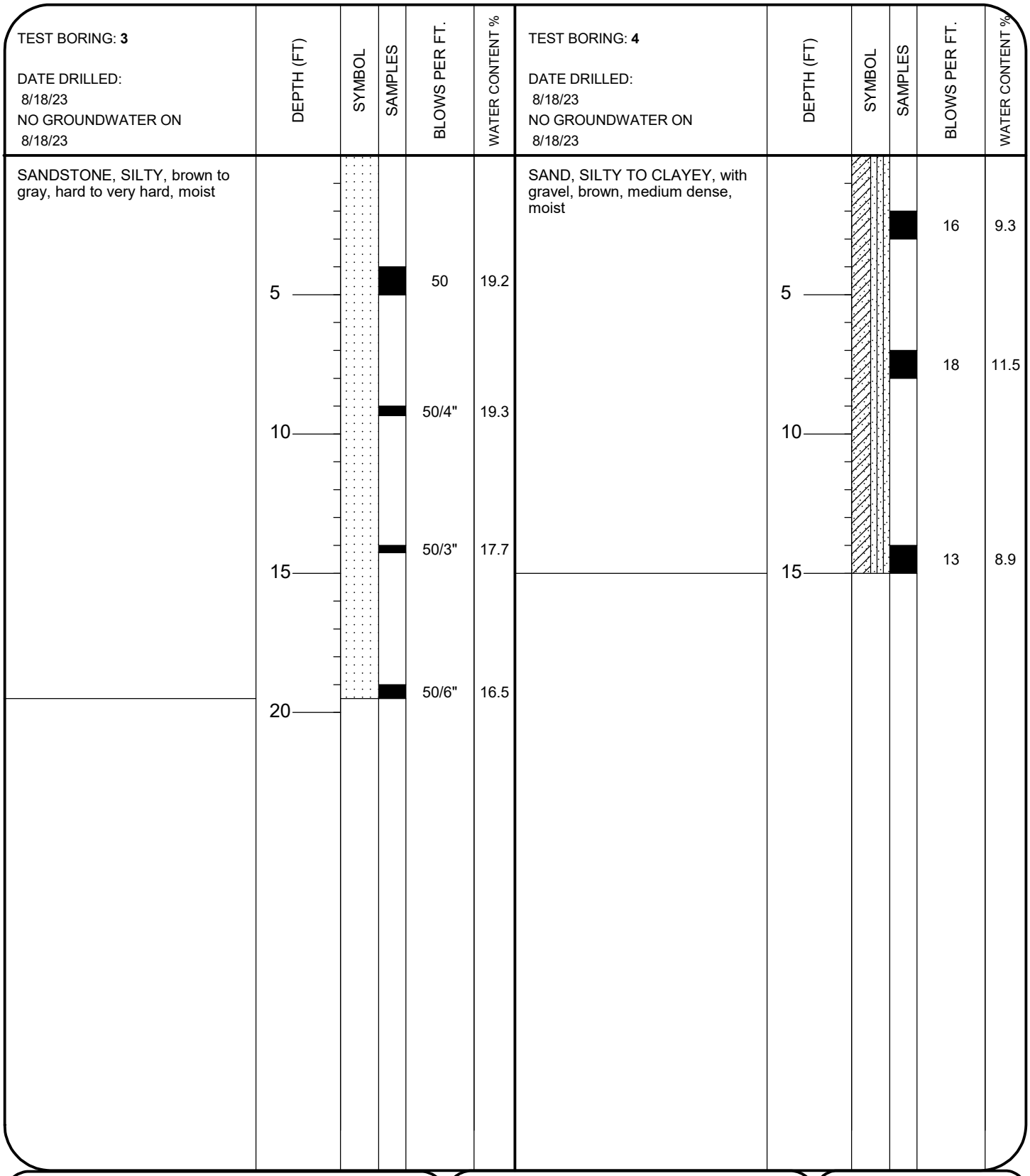
TEST BORING LOG

JOB No. 194217

FIGURE No. 4

DATE Sep/21/2023



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TEST BORING LOG

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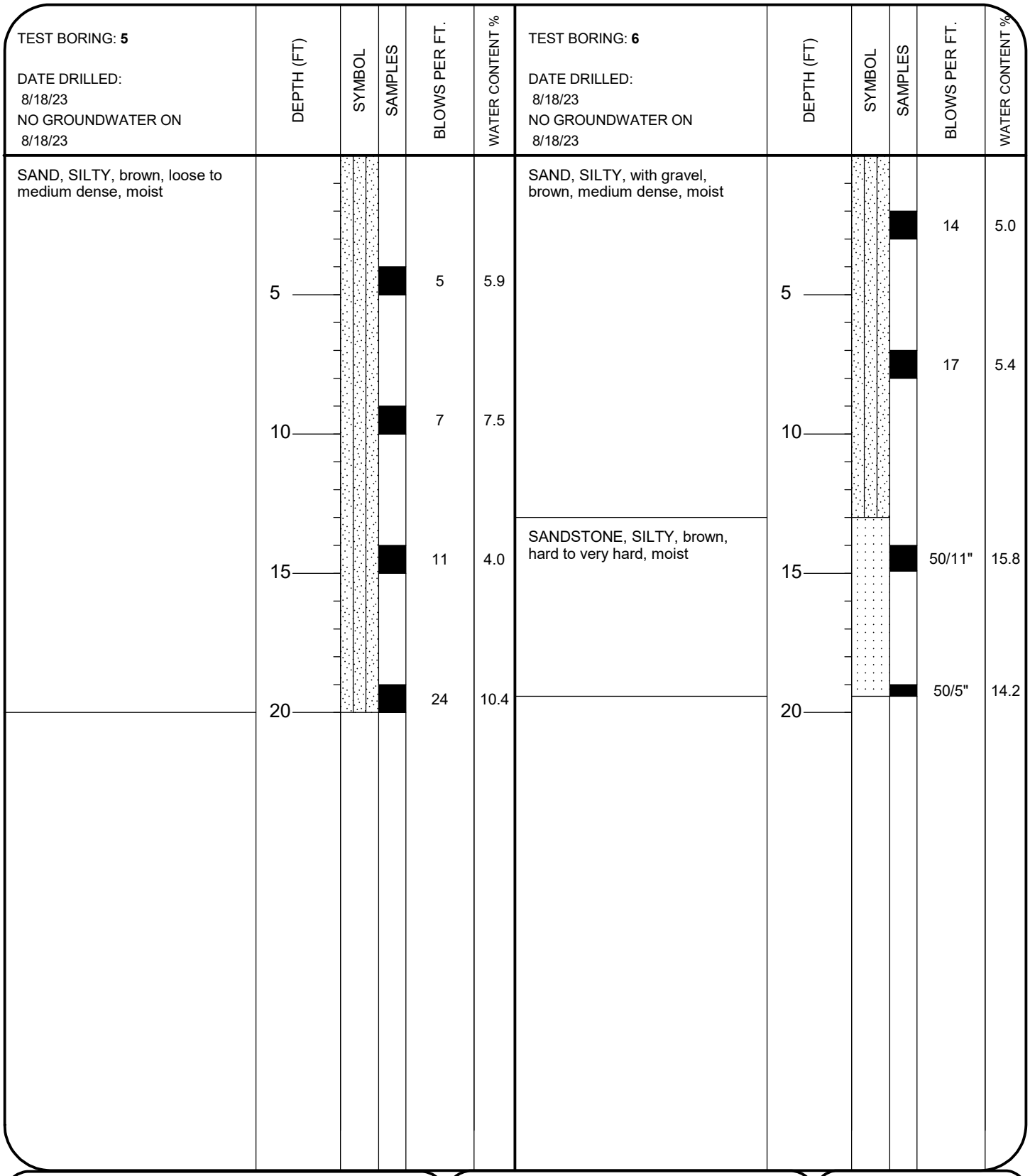
FIGURE No. 5

DATE Sep/21/2023



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TEST BORING LOG

JOB No. 194217

FIGURE No. 6

DATE Sep/21/2023

TEST BORING: **7**

DATE DRILLED:
8/18/23
NO GROUNDWATER ON
8/18/23

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	SANDSTONE, SILTY, brown to gray, hard to very hard, moist			
5			50/9"	17.3
10			50/5"	14.7
15			50/4"	17.4
20			50/4"	17.6

TEST BORING: **8**

DATE DRILLED:
8/18/23
NO GROUNDWATER ON
8/18/23

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	SAND, SILTY TO CLAYEY, with gravel, light brown to brown, loose to medium dense, moist			
			5	6.7
5				
			7	4.8
10				
			10	5.7
15				
			12	3.9
20				

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TEST BORING LOG

JOB No. 194217

FIGURE No. 7

DATE Sep/21/2023

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
1	4.0	6.0		NP	NP	0.0	12.3			SM
1	9.0	5.0								
1	14.0	6.2				6.7	8.3			
1	19.0	5.0								
1	24.0	25.6								
1	29.0	16.8	98.6	NP	NP		60.1		- 1.7	ML
1	34.0	22.3								
2	2.0	7.3								
2	7.0	10.3		NP	NP	0.9	32.1			SM
2	14.0	8.2								
3	4.0	19.2								
3	9.0	19.3		NP	NP	0.0	50.9			ML
3	14.0	17.7								
3	19.0	16.5								
4	2.0	9.3								
4	7.0	11.5								
4	14.0	8.9		27	11	3.6	25.5			SC
5	4.0	5.9								
5	9.0	7.5		NP	NP	0.0	13.4			SM
5	14.0	4.0								
5	19.0	10.4								
6	2.0	5.0								
6	7.0	5.4		NP	NP	8.5	7.9			SW-SM
6	14.0	15.8								
6	19.0	14.2								
7	4.0	17.3		NP	NP	0.0	19.8			SM
7	9.0	14.7				0.0	17.7			
7	14.0	17.4								
7	19.0	17.6								
8	2.0	6.7								
8	7.0	4.8				0.0	14.9			
8	14.0	5.7								
8	19.0	3.9								

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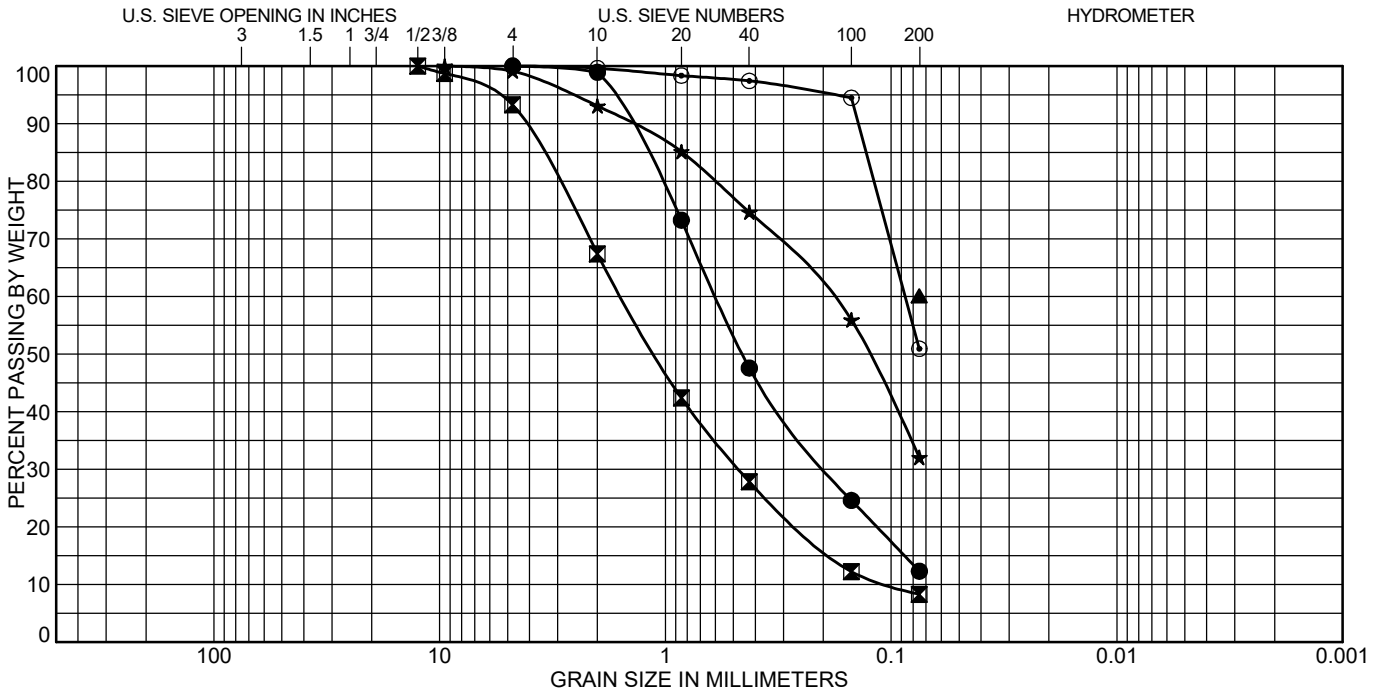
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 194217
FIGURE No. 8
PAGE 1 OF 1
DATE Sep/21/2023



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	1	4.0	SILTY SAND(SM)	NP	NP	NP
⧓	1	14.0				
▲	1	29.0	SANDY SILT(ML)	NP	NP	NP
★	2	7.0	SILTY SAND(SM)	NP	NP	NP
⊙	3	9.0	SANDY SILT(ML)	NP	NP	NP

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	4.0	0.0	87.7	12.3	
⧓	1	14.0	6.7	85.0	8.3	
▲	1	29.0			60.1	
★	2	7.0	0.9	67.1	32.1	
⊙	3	9.0	0.0	49.1	50.9	

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SOIL CLASSIFICATION DATA

JOB No. 194217

FIGURE No. 9

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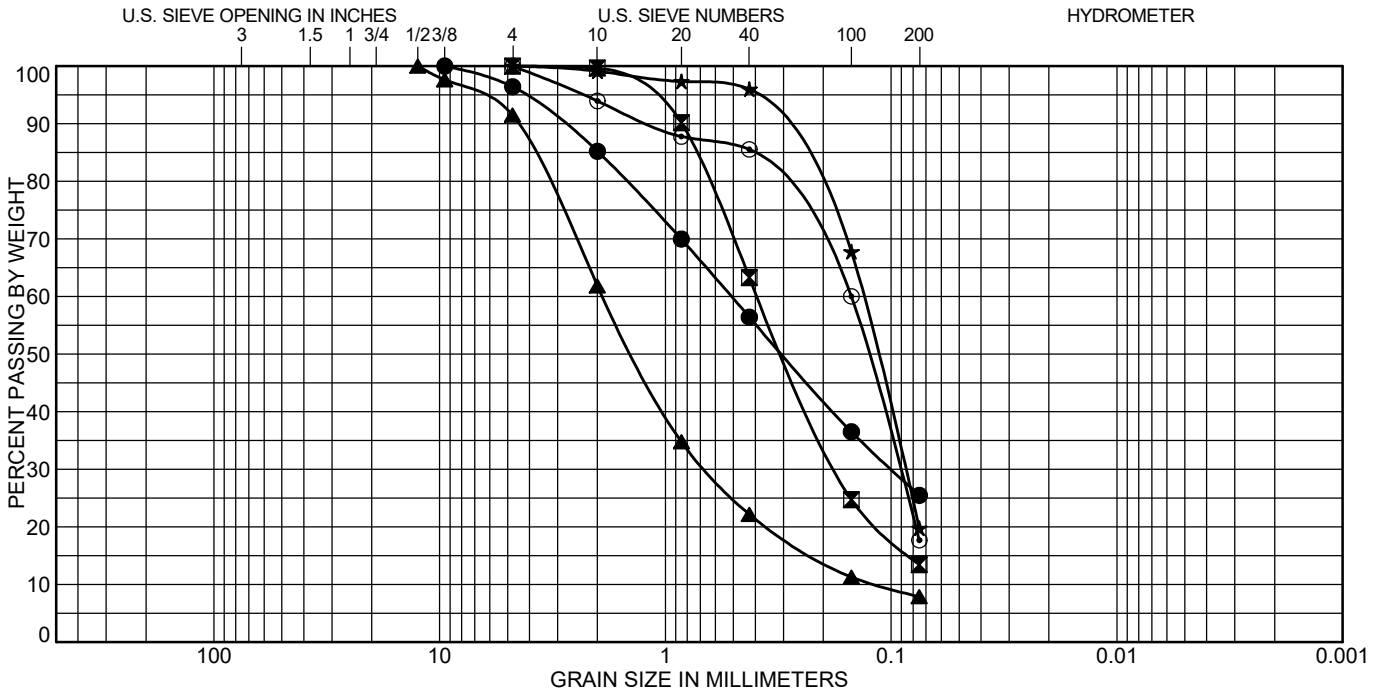

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	4	14.0	CLAYEY SAND(SC)	27	16	11
⊠	5	9.0	SILTY SAND(SM)	NP	NP	NP
▲	6	7.0	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP
★	7	4.0	SILTY SAND(SM)	NP	NP	NP
⊙	7	9.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	4	14.0	3.6	70.9	25.5	
⊠	5	9.0	0.0	86.6	13.4	
▲	6	7.0	8.5	83.6	7.9	
★	7	4.0	0.0	80.2	19.8	
⊙	7	9.0	0.0	82.3	17.7	

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SOIL CLASSIFICATION DATA

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FIGURE No. 10

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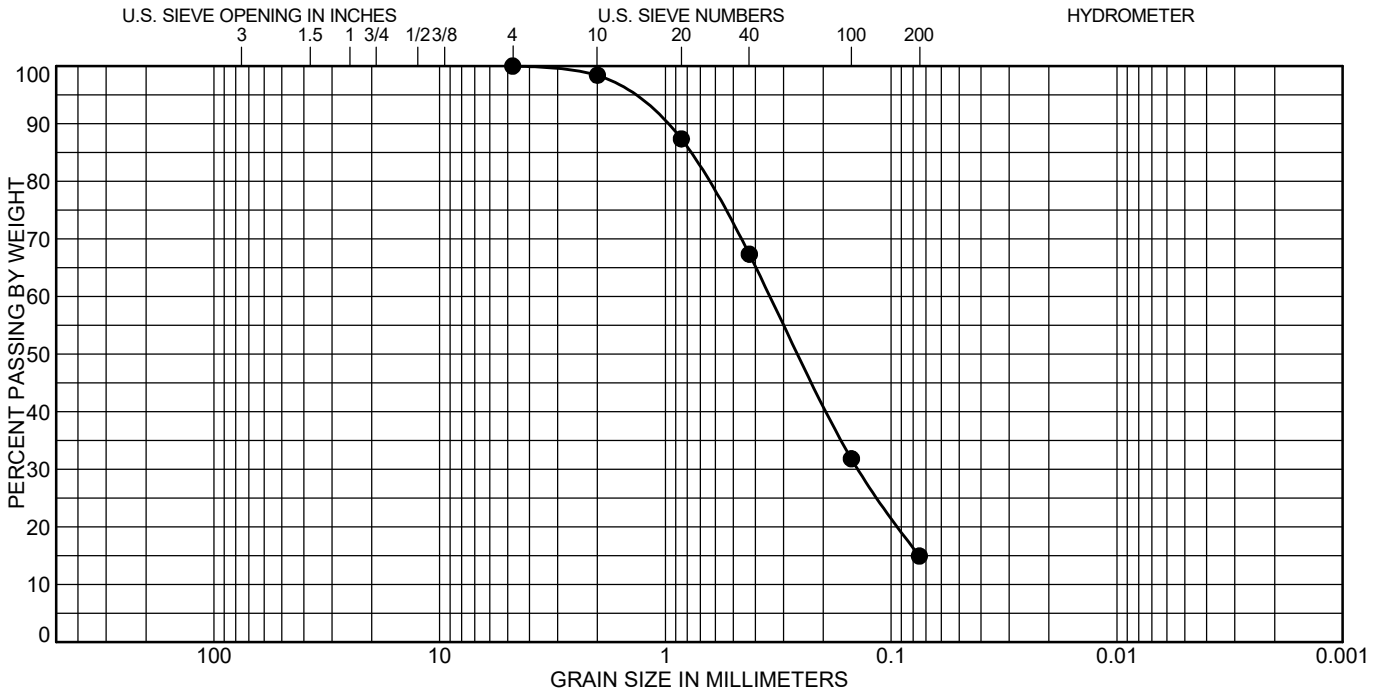

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	8	7.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	8	7.0	0.0	85.1	14.9	

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SOIL CLASSIFICATION DATA

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FIGURE No. 11

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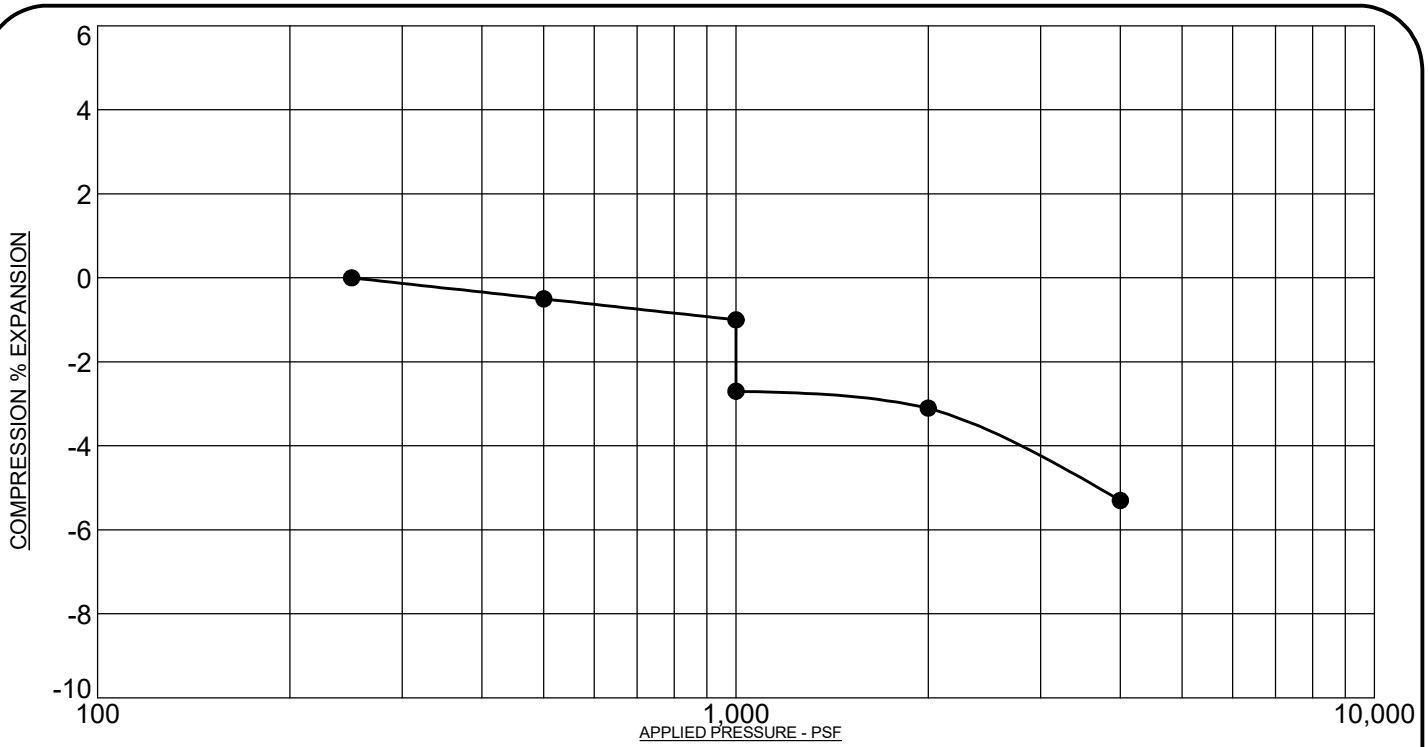

PROJECT: **6001 E Platte Ave, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **SANDSTONE, SILTY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **1 @ 29 FT**
NATURAL DRY UNIT WEIGHT: **98.6 PCF**
NATURAL MOISTURE CONTENT: **16.8%**
PERCENT SWELL/COMPRESSION: **- 1.7**

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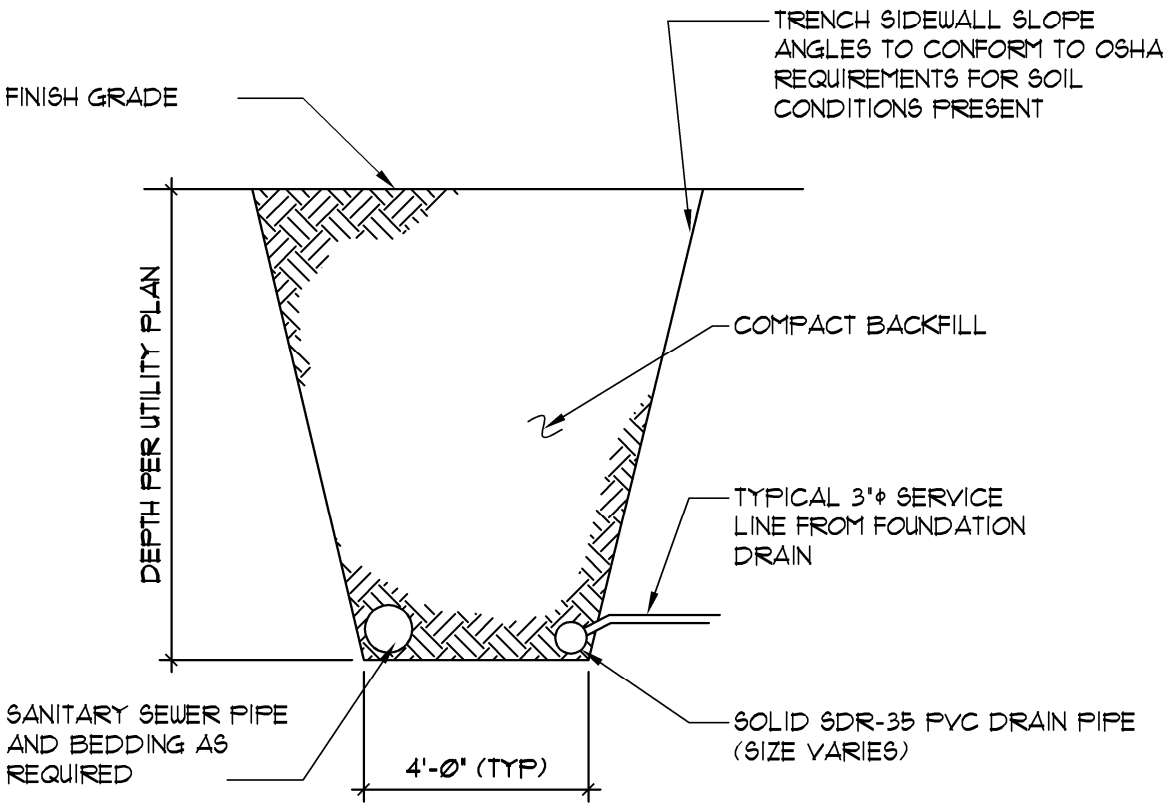
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 194217

FIGURE No. 12

DATE Sep/21/2023

NOTE: TO BE USED WHERE NO SHALLOW GROUNDWATER IS KNOWN TO EXIST



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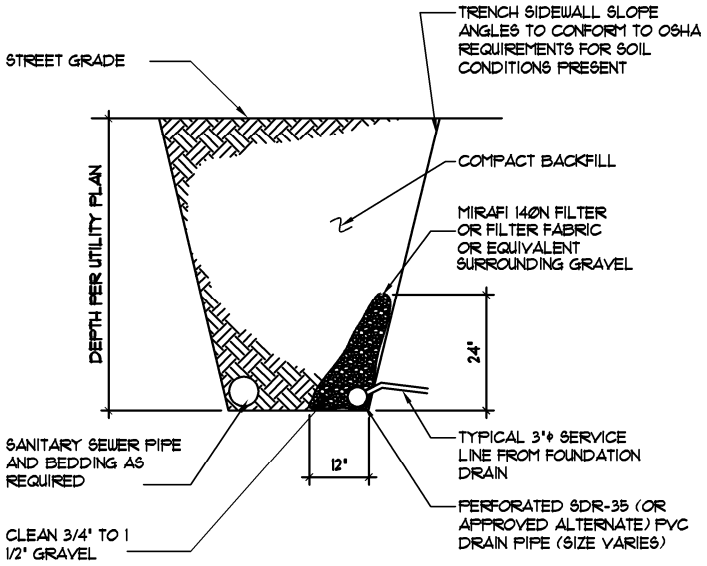
PASSIVE UNDERDRAIN IN SANITARY SEWER TRENCH

FIG No. 13

NOTE: TO BE USED IN CASES WHERE GROUNDWATER IS FOUND DURING TRENCHING OR WHERE SHALLOW GROUNDWATER IS KNOWN TO EXIST



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ACTIVE UNDERDRAIN IN SANITARY SEWER TRENCH

FIG No. 14

APPENDIX A