Architecture
Structural
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ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Materials Testing
Forensic
Civil/Planning

SOILS AND GEOLOGY STUDY

15330 Chaparral Loop East
(a portion of Lot 104, 15550 Chaparral Loop East)
El Paso County, Colorado

PREPARED FOR:

M.V.E., Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909

JOB NO. 176395

September 25, 2020

Respectfully Submitted,
RMG – Rocky Mountain Group

Kelli Zigler

Kelli Zigler
Project Geologist

Reviewed by,
RMG – Rocky Mountain Group

COLORADO REGISTERED
ANTHONY P. MUNGER
9/28/20
39818
PROFESSIONAL ENGINEER

Tony Munger, P.E.
Geotechnical Project Manager

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Subsurface Soil Investigation, 15330 Chaparral Loop East, El Paso County, Colorado, prepared by RMG – Rocky Mountain Group, Job No. 159645, last dated September 8, 2017.

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the NW¼ of Section 33 and the SW1/4 of Section 28, Township 11 South, Range 63 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located north and east of the intersection of Wagon Trail and Chaparral Loop East. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Project Description

The total calculated area involved in the project is 17.01 acres, as recorded on the El Paso County (EPC) Assessors website. The proposed site development is to consist of subdividing the property into two lots. The parcels included in this study are:

- EPC Schedule No. 3128002004 (addressed as 15550 E. Chaparral Loop), which is the northern portion of the property, is to consist of 8.32 acres. The existing residence, accessory structures, septic system, and well are to remain.
- EPC Schedule No. 3133002011 (addressed as 15330 E. Chaparral Loop), which is the southern portion of the property, is to consist of 8.69 acres. This parcel is to utilize an individual well and on-site wastewater treatment system for the proposed new single family residence. The individual on-site wastewater treatment system and well permit are the responsibility of the property owners.

Tracts or No Build areas are not proposed. The proposed lot layout is shown on Figure 2, Replat Map.

1.3 Proposed Construction

The proposed construction is to consist of one new single-family residence on the new lot that is to be addressed as 15330 E. Chaparral Loop.

2.0 QUALIFICATIONS OF PREPARERS

This Soils 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 19 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 is a licensed professional engineer with over 19 years of experience in the construction engineering (residential) field. Mr. Munger and holds a Bachelor of Science in Architectural Engineering from the University of Wyoming.

3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical and geologic site conditions, and present our opinions of the potential effect of these conditions on the proposed development of single-family residences within the referenced site. As such, our services exclude evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

Revisions to the conclusions presented in this report may be issued based upon submission of the Development Plan. This study has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC) specifically Chapter 8 last updated August 27, 2019 applicable sections include 8.4.8 and 8.4.9. and the Engineering Criteria Manual (ECM), specifically Appendix C last updated July 9, 2019.

This report presents the findings of the study performed by RMG relating to the geotechnical and geologic conditions of the above-referenced site. 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.

3.1 Scope and Objective

The scope of this study included 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.

3.2 Site Evaluation Techniques

The information included in this report has been compiled from:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports
- Available aerial photographs
- Exploratory soil test borings by RMG
- Laboratory testing of representative site soil and rock samples by RMG
- Geologic research and analysis
- Site development plans prepared by others

Geophysical investigations were not considered necessary for characterization of the site geology. Monitoring programs, which typically include instrumentation and/or observations for changes in groundwater, surface water flows, slope stability, subsidence, and similar conditions, are not known to exist and were not considered applicable for the scope of this report.

3.3 Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site and nearby sites were available for our review and are listed below:

1. *Subsurface Soil Investigation, 15330 Chaparral Loop East, El Paso County, Colorado,* prepared by RMG – Rocky Mountain Group, Job No. 159645, last dated September 8, 2017.
2. *Wastewater Study, 15330 Chaparral Loop East, El Paso County*, prepared by RMG – Rocky Mountain Group, Job No. 176395, last dated September 25, 2020.

3.4 Additional Documents

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

4.0 SITE CONDITIONS

4.1 Proposed Land Use and Zoning

The site currently consists of two parcels with a total calculated acreage of 17.01 acres. The included parcels are currently zoned *RR-5 – Residential Rural.* The zoning is to remain *Residential Rural*. It is our understanding the proposed site development is to consist of one single family residence with a well and an onsite wastewater treatment system on the southern parcel. Figure 3 presents the general boundaries of our investigation.

4.2 Topography

Based on our site observations on July 31 and August 21, 2020, the site topography is generally rolling hills and contains slopes less than 10 percent. The approximate elevation difference from the southern portion of the site to the center of the property slopes up approximately 35 feet forming a ridge through the center of the property.

4.3 Vegetation

The majority of the site consists of low lying native grasses and weeds. No deciduous trees are present on the site.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

5.1 Drilling

The subsurface conditions below the subject site were investigated in the referenced report by RMG on August 19, 2017 as part of a site specific *Subsurface Soil Investigation (SSI).* It is our understanding the client of the original soils report did not proceed and has since sold the lot to the current owner. RMG's test borings extended to depths of approximately 20 feet below the existing ground surface. The SSI is presented in Appendix B. The approximate locations of the RMG test borings locations are presented on the Engineering and Geology Map, Figure 3.

5.2 Test Pit Excavations

Two test pits were performed on August 21, 2020 by RMG to explore the subsurface soils underlying the proposed Onsite Wastewater Treatment Systems. The number of test pits is in accordance with Regulations of the El Paso County Board of Health, Chapter 8, Onsite Wastewater Treatment Systems (OWTS) as required by 8.5.D.3.a.

The two test pits were located and observed by RMG. The test pits were excavated to approximately 8 feet. Restrictive or limiting layers were not encountered. The approximate locations of the test pits are presented in the Engineering and Geology Map, Figure 3.

5.3 OWTS Visual and Tactile Evaluation

A visual and tactile evaluation was performed by RMG. The soils were evaluated to determine the soils types and structure. Bedrock was not encountered in the test pits. Restrictive layers were not encountered in the test pits. Evidence of seasonal high groundwater was not observed in test pits. The soil descriptions of the test pit evaluation are presented in the Wastewater Study, referenced above.

5.4 Groundwater

Groundwater, redoximorphic features indicating the fluctuation of groundwater or higher ground water levels, or elevated water content were not encountered in the test borings during the 2017 investigation, nor in the test pits performed in August 2020. 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.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

The site physiographically lies in the western portion of the Great Plains Physiographic Province south of the Palmer Divide. Approximately 11 miles to the west is a major structural feature known as the Rampart Range Fault. The fault marks the boundary between the Great Plains Physiographic and Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of residual soils and alluvial soils of the Holocene and late Pleistocene Age. The residual soils are produced by the action of weathering of the in-situ bedrock.

6.1 Subsurface Soil Conditions

The subsurface soils encountered in the 2017 RMG test borings and 2020 test pit excavations were classified using the Unified Soil Classification System (USCS) and the United States Department of Agriculture (USDA), respectively.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented in the SSI, by RMG presented in Appendix B. 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.

6.2 Bedrock Conditions

Bedrock (as defined by USDA Soil Structure and Grade) was not encountered in the test pits excavations used for this investigation. In general, the bedrock beneath the site (as defined by Colorado Geologic Survey) is considered to be part of the Denver Basin Group D2 Sequence (Eocene) also known as the Dawson Arkose of Dawson Formation, which consists of silty sandstone with interbedded layers of claystone. The Dawson Formation is thick-bedded to massive, generally light colored arkose, pebbly, and pebble conglomerate. The sandstones are poorly sorted with high clay contents. The sandstone is generally permeable, well drained, and has good foundation characteristics. The claystone is generally well sorted with high sand contents. The claystone generally is less permeable than the sandstone and is generally not suitable for direct bearing of shallow foundations. The Dawson sandstone is generally considered a restrictive layer for the OWTS.

6.3 U.S. Soil Conservation Service

The U.S. Soil Conservation Service along with USDA has identified the soils on the property as:

- 8 – Blakeland loamy sand, 1 to 9 percent slopes. The Blakeland loamy sand was mapped by the USDA to be located on the northern and eastern portion of the property. Blakeland loamy sand encompasses the majority of the property. Properties of the Blakeland loamy sand include, somewhat excessively drained soil, 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 none, and landforms are hills and flats. The Blakeland loamy sand is anticipated in the area of the new residence and treatment area.

- 95 – Truckton loamy sand, 1 to 9 percent slopes. The Truckton loamy sand was mapped by the USDA to encompass the south-west, western portion of the property. Properties of the Truckton loamy sand include, well-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 none, and landforms include hills and flats.

The USDA Soil Survey Map is presented in Figure 4.

6.4 General Geologic Conditions

Based on our field observations and review of relevant geologic maps, a geologic map was prepared which identifies the geologic conditions affecting the development. The geologic units present on the site are presented in the Engineering and Geology Map, Figure 3.

The site generally consists of fine-coarse grained sand with little clay content overlying the Dawson Formation. Three geologic units were mapped at the site as:

- *Tkda – Dawson Formation (Eocene)* – the formation is generally thick-bedded to massive and consists of poorly sorted friable sandstone with high clay content. Contains thin- to very thin interbedded claystone. Total thickness of the formation is 2,000 feet. The Dawson formation is generally resistant to erosion and foundation stability of the sandstone is good. The interbedded claystone is generally not suitable for direct bearing of shallow foundations.

- *Da – disturbed areas* – areas that are no longer in their native state, soils have been removed and/or replaced for the existing driveway, existing residence, existing OWTS, and utility easements.

- *sw – seasonally wet* area where near-surface moisture conditions may sometimes occur.

6.5 Structural Features

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

6.6 Surficial (Unconsolidated) Deposits

Lake and pond sediments, swamp accumulations, sand dunes, marine terrace deposits, talus accumulations, creep, or slope wash were not observed on the site. Slump and slide debris were also not observed on the site. The alluvial deposits are non-marine terrace deposits that have been reworked from conglomerates in the Dawson Formation up-valley, along nearby creeks.

6.7 Engineering Geology

Charles Robinson and Associates (1977) have mapped one engineering unit at the site as:

- 2D – Eolian deposits generally on flat to gentle slopes of upland areas. Emphasis on wind erosion, stabilization, depth to bedrock and potential hydrocompaction.

The engineering geology is presented in the Engineering and Geology Map, Figure 3.

6.8 Features of Special Significance

Features of special significance such as accelerated erosion, (advancing gully head, badlands, or cliff reentrants) were not observed on the property. Features indicating settlement or subsidence such as fissures, scarplets, and offset reference features were not observed on the property or surrounding areas.

Features indicating creep, slump, or slide masses in bedrock and surficial deposits were not observed on the property.

7.0 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 1* indicates the site is identified as upland deposits comprised of sand, gravel, silt and clay remnants of older stream deposits on topographic highs or beach like features. Extraction of the sand and gravel resources are not 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.

8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

The El Paso County Engineering Criteria Manual recognizes and delineates the difference between hazards and constraints. A geologic hazard is one of several types of adverse geologic conditions capable of causing significant damage or loss of property and life. Geologic hazards are defined in Section C.2.2 Sub-section E.1 of the ECM. A geologic constraint is one of several types of adverse geologic conditions capable of limiting or restricting construction on a particular site. Geologic constraints are defined in Section C.2.2 Sub-section E.2 of the ECM (1.15 Definitions of Specific Terms and Phrases). The following geologic constraints were considered in the preparation of this report, and are not are not anticipated to pose a significant risk to the proposed development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Floodplains
- Ground Subsidence
- Landslides
- Rockfall
- Ponding water
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Scour, Erosion, accelerated erosion along creek banks and drainageways
- Springs and High Groundwater

The following sections present geologic constraints that have been identified as potentially impacting the property:

8.1 Expansive Soils and Bedrock

Based on the recent test pit logs, previous test boring logs, and laboratory testing performed on the site, the fine to coarse grained sand with low clay content generally possesses nil to low swell potential. However, the Dawson Formation is known to contain expansive soil/bedrock seams.

Mitigation
Foundation design and construction are typically adjusted for expansive soils. Expansive bedrock is not anticipated to be encountered during construction. However, if expansive soils or bedrock are encountered, mitigation of these expansive materials should follow the recommendations presented in a lot-specific subsurface soil investigation performed for the proposed structure.

Typical mitigation can be accomplished by overexcavation and replacement with structural fill or by subexcavation and replacement with on-site moisture-conditioned soils.

8.2 Compressible Soils

The subsurface materials at the site generally fine to coarse grained sand with nil to low compressibility potential. It is anticipated that if compressible materials are encountered during construction, they can readily be mitigated with typical construction practices common to this region of El Paso County, Colorado.

Mitigation
Foundation design and construction are typically adjusted for compressible soils. However, if compressible soils are encountered, mitigation of these compressible materials should follow the recommendations presented in a lot-specific subsurface soil investigation performed for the proposed structure.

Typical mitigation can be accomplished by overexcavation and replacement with structural fill or by subexcavation and replacement with on-site moisture-conditioned soils.

8.3 Faults and Seismicity

Based on review of the Earthquake and Late Cenozoic Fault and Fold Map Server provided by CGS located at http://dnrwebmapgdev.state.co.us/CGSOnline/ and the recorded information dating back to November of 1900, Colorado Springs has not experienced a recorded earthquake with a magnitude greater than 1.6 during that time period. The nearest recorded earthquakes over 1.6 occurred in December of 1995 in Manitou Springs, which experienced magnitudes ranging between 2.8 to 3.5. Additional earthquakes over 1.6 occurred between 1926 and 2001 in Woodland Park, which experienced magnitudes ranging from 2.7 to 3.3. Both of these locations are in the vicinity of the Ute Pass Fault, which is greater than 10 miles from the subject site.

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
The Pikes Peak Regional Building Code, 2017 Edition, indicates maximum considered earthquake spectral response accelerations of 0.185g for a short period (S_s) and 0.059g for a 1-second period (S_1). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class B, with average shear wave velocities ranging from 2,500 to 5,000 feet per second for the materials in the upper 100 feet.

8.4 Radon

***"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.*

Northern El Paso, CO and the 80132 zip code located in El Paso County, has an EPA assigned Radon Zone of 1. A radon zone of 1 predicts an average indoor radon screening level greater than 4 pCi/L, which is above the recommended levels assigned by the EPA. Black Forest is located in a high risk area of the country. *The EPA recommends you take corrective measures to reduce your exposure to radon gas.*

Most of Colorado is generally considered to have the potential of high levels of radon gas, based on the information provided at: http://county-radon.info/CO/El_Paso.html. There is not believed to be unusually hazardous levels of radon from naturally occurring sources 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.

Measures that can be taken after the residence is enclosed 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 it is enclosed and commonly utilized techniques are in place to minimize the risk.

8.5 Corrosive Minerals

The upper sands encountered at the site may contain corrosive minerals. The Dawson sandstone at this site typically has low resistivity values (less than 2,000 ohm-cm) and is likely to be potentially corrosive to buried concrete, ferrous metal piping and utilities.

Mitigation
To help mitigate potential corrosion, ferrous metal piping, conduit, and similar construction materials should be coated, wrapped or otherwise protected to avoid or reduce contact with the on-site soils. For environments corrosive to concrete, sulfate-resistant cement and additives should be used.

8.6 Erosion

Due to the fine-grain nature of the soils on the site, the upper sands encountered at the site are susceptible to erosion by wind and flowing water.

Mitigation
Minor wind erosion and dust problems may arise during and immediately after construction. If the problem becomes severe during this time, watering of the cut areas may be required to control dust. Installation of erosion protection or vegetation after completion of the structures is anticipated to mitigate the majority of the erosion and dust problems.

8.7 Fill Soils

Fill soils were not anticipated to be encountered during construction. However, limited fill soils may be encountered, even where none are indicated on the test boring logs. If fill soils are encountered, they will be considered unsuitable unless appropriate documentation can be provided which indicates that the fill soils were selected, placed, and compacted as engineered structural fill.

Mitigation
If fill soils are encountered during construction, they should be removed (overexcavated) and replaced with new compacted structural fill. The on-site soils are generally suitable for re-use as structural fill. Provided that this recommendation is implemented, the presence of fill is not considered to pose a risk to proposed structures.

8.8 Proposed Grading, Cuts and Masses of Fill

A preliminary grading plan has not been prepared for the proposed new single-family residence that is to be constructed on the proposed new southern lot. It is assumed based on the soils information that the excavations will encounter the fine- to coarse-grained sand with low clay content.

Prior to placement of any overlot grading 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 facilitate construction (generally 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.

Mitigation
We anticipate that the deepest excavation cuts for basement level construction will be approximately 6 to 8 feet below the existing ground surface. 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 groundwater conditions occur. It is recommended that fill slopes be no steeper than 3:1 (horizontal to vertical).

9.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in Section 8.0 of this report) that were found to be present at this site include radon. Geologic constraints (also as described in section 8.0 of this report) such as: expansive and compressible soils, faults, seismicity, and corrosive minerals, erosion were found on the site. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering and design contraction practices and avoidance when deemed necessary.

10.0 ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site development. Unless indicated otherwise, the test borings, laboratory test results, conclusions and recommendations presented in this report are only intended for the use of the minor subdivision and are *not intended* for use for design and construction of the proposed single family residences or for any future proposed structures. We recommend that all future structures (whether proposed at this time or at a future date) be designed based on the recommendations provided in a lot-specific subsurface soil investigation.

Future lot-specific subsurface soil investigations 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.

15.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. The geologic conditions identified are the potential of expansive and compressible soils, faults, seismicity, radon, corrosive minerals, and erosion are not considered usual 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 local construction practices.

In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be implemented. 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.

The foundation and floor slabs of the structure should be designed using the recommendations provided in the lot-specific subsurface soil investigation performed for the proposed new lot. In addition, appropriate surface drainage should be established during construction and maintained by the homeowner.

We believe the surficial sand soils will classify as Type C materials as defined by OSHA in 29CFR Part 1926, date 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. Flatter slopes will likely be necessary should groundwater conditions occur.

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).

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 these properties read and understand this report, as well as the previous reports referenced above, and to carefully to 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.

16.0 CLOSING

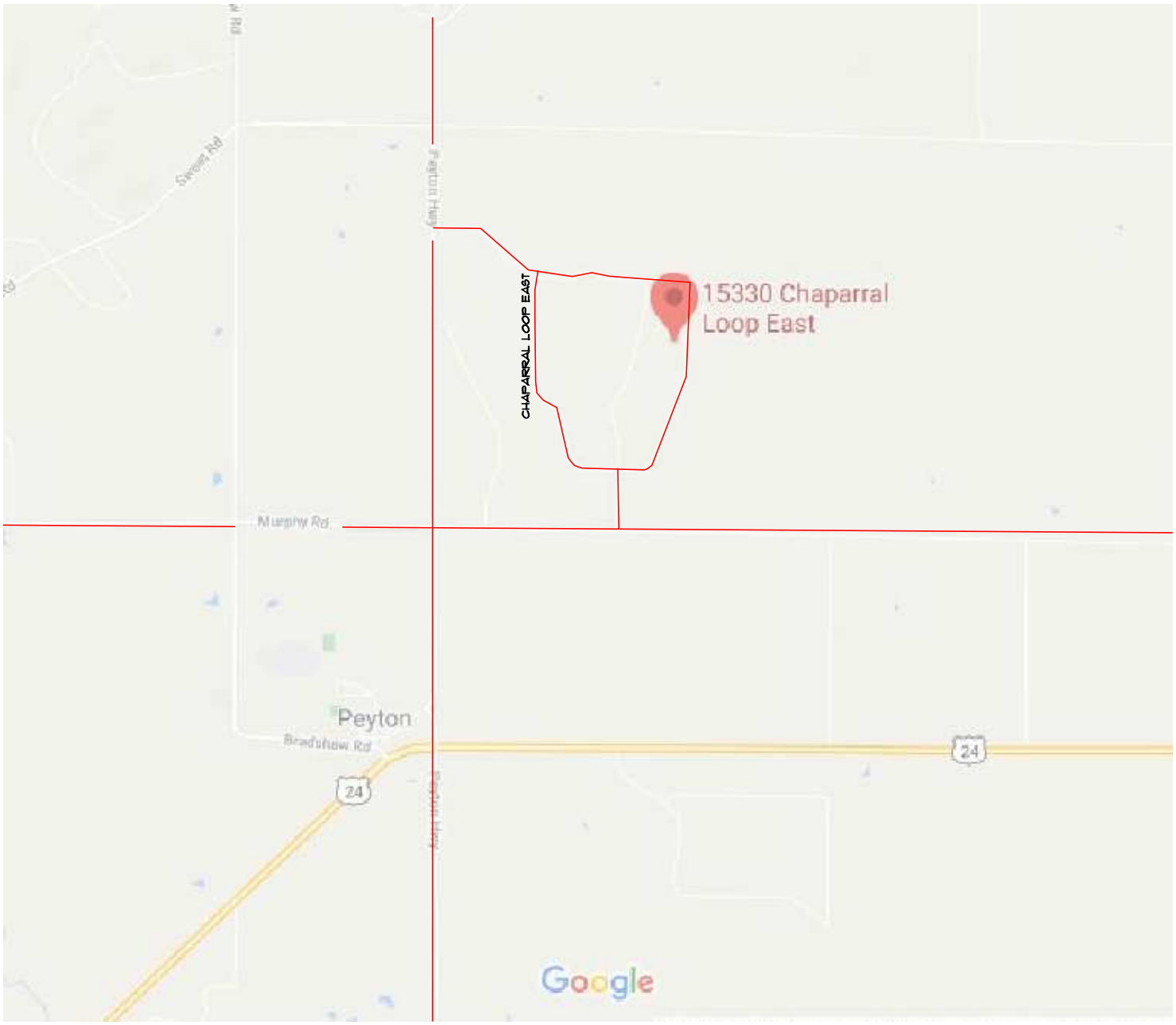
This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification 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 **M.V.E, Inc.** 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.

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.

FIGURES



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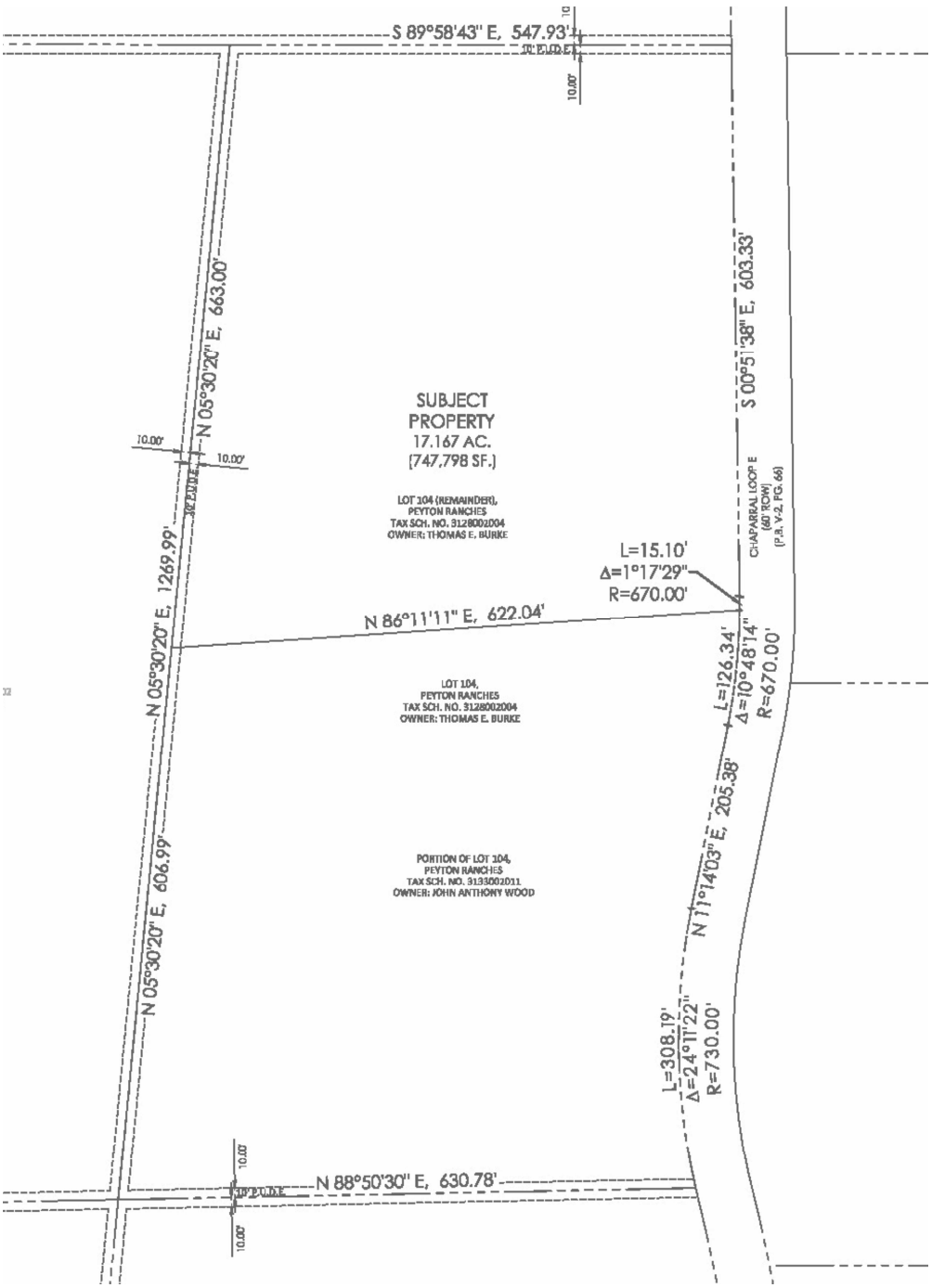
SITE VICINITY MAP

15330 CHAPARRAL LOOP EAST
EPC SCHEDULE NO.s 3128002004
AND 3133002011
EL PASO COUNTY, COLORADO
M.V.E, INC.

JOB No. 176395

FIG No. 1

DATE 9-25-2020



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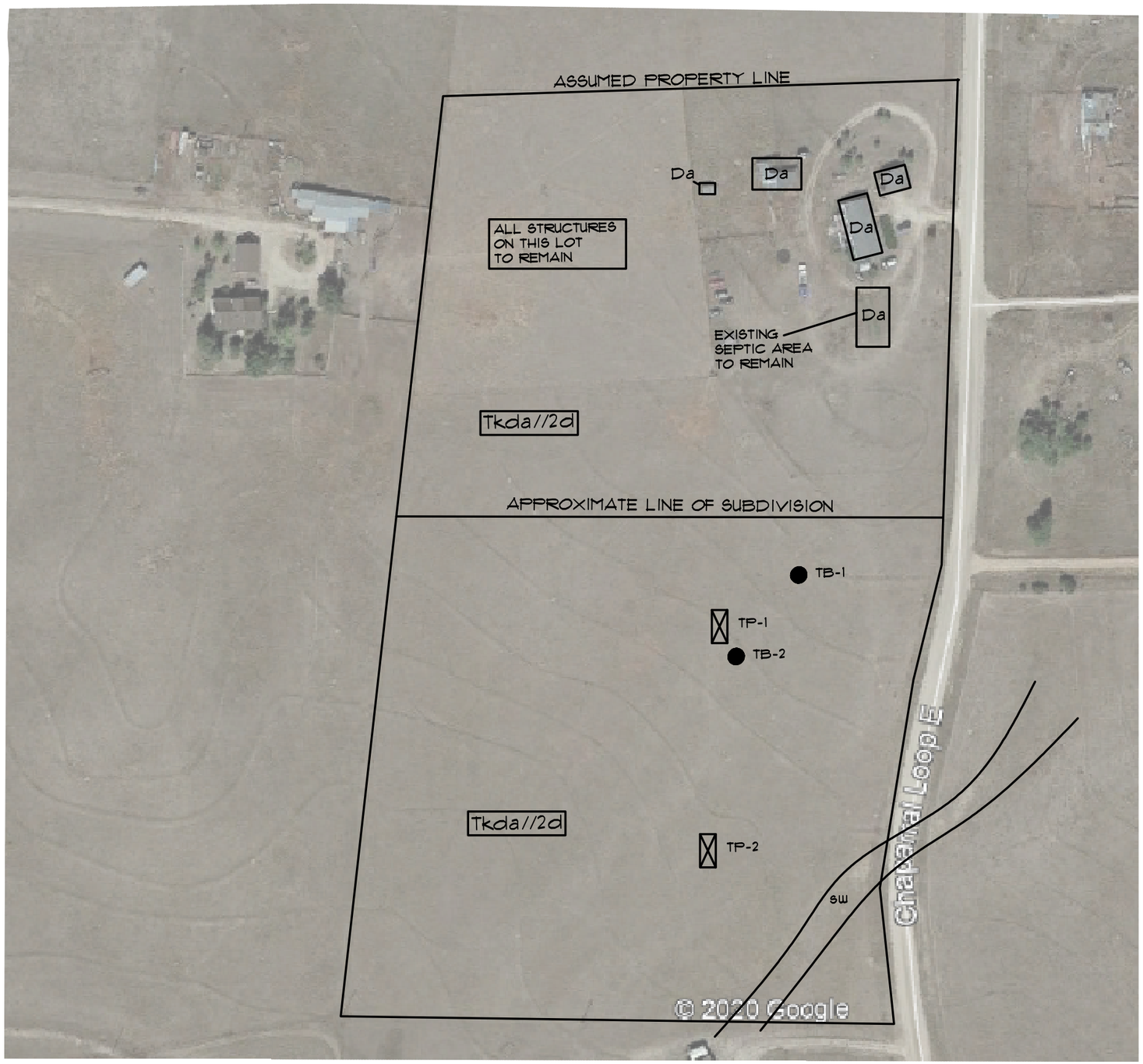
REPLAT MAP

15330 CHAPARRAL LOOP EAST
EPC SCHEDULE NO.s 3128002004
AND 3133002011
EL PASO COUNTY, COLORADO
M.V.E, INC.

JOB No. 176395

FIG No. 2

DATE 9-25-2020



GRAPHICAL REPRESENTATION ONLY
(ALL LOCATIONS ARE APPROXIMATE)

NOT TO SCALE
BASE MAP PROVIDED BY: GOOGLE

General Geologic Units

- *Tkda - Dawson Formation (Eocene)* - the formation is generally thick-bedded to massive and consists of poorly sorted friable sandstone with high clay content. Contains thin- to very thin interbedded claystone. Total thickness of the formation is 2,000 feet. The Dawson formation is generally resistant to erosion and foundation stability of the sandstone is good. The interbedded claystone is generally not suitable for direct bearing of shallow foundations.
- *Da - disturbed areas* - areas that are no longer in their native state, soils have been removed and/or replaced for the existing driveway, existing residence, existing OWTS, and utility easements.
- *sw - seasonally wet* area where near-surface moisture conditions may sometimes occur.

Engineering Geology Units

- 2D - Eolian deposits generally on flat to gentle slopes of upland areas. Emphasis on wind erosion, stabilization, depth to bedrock and potential hydrocompaction.

● Denotes approximate location of test borings performed for the *Subsurface Soil Investigation, 15330 Chaparral Loop East, El Paso County, Colorado,* prepared by RMG - Rocky Mountain Group, Job No. 159645, last dated September 8, 2017.

⊠ DENOTES APPROXIMATE LOCATION OF TEST PITS OBSERVED BY RMG FOR THIS INVESTIGATION

JOB No. 176395

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ROCKY MOUNTAIN GROUP

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Greeley / Evans, CO 80620
(970) 330-1071
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

15330 CHAPARRAL LOOP EAST
EPC SCHEDULE NO. 3128002004
AND 3133002011
EL PASO COUNTY, CO
M.V.E., INC.

ENGINEER:	TPM
DRAWN BY:	KMZ
CHECKED BY:	TPM
ISSUED:	9-25-2020

REVISION:	DATE:
	JOB #:

ENGINEERING AND GEOLOGY MAP

SHEET No.
FIG-3

8 - Blakeland loamy sand, 1 to 9% slopes

95 - Truckton loamy sand, 1 to 9% slopes

NOT TO SCALE

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USDA SOIL SURVEY MAP

15330 CHAPARRAL LOOP EAST
EPC SCHEDULE NO.s 3128002004
AND 3133002011
EL PASO COUNTY, COLORADO
M.V.E, INC.

JOB No. 176395

FIG No. 4

DATE 9-25-2020

APPENDIX A
Additional Reference Documents

1. *Replat of Lot 104, Peyton Ranches Subdivision,* prepared by MVE Inc., MVE Project No. 61140, dated May 14, 2020.
2. *Land Survey Plat,* prepared by Clark Land Surveying, Inc., Project No. 170651, dated August 23, 2017.
3. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 081041C0375G,* Federal Emergency Management Agency (FEMA), effective December 7, 2018.
4. *Notes on the Denver Basin geologic maps: Bedrock geology, structure, and isopach maps of the Upper Cretaceous to Paleogene starta between Greely and Colorado Springs, Colorado:* Colorado Geological Survey, compiled by: Dechesnce, Marieke, Raynolds, R.G. Barkmann, P.E., and Johnson, K.R., 2011, scale 1:250,000, Plate 1 of 13.
5. *Corral Bluffs Quadrangle, Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
6. *Corral Bluffs, Quadrangle, Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
7. *Pikes Peak Regional Building Department:* https://www.pprbd.org/.
8. El Paso County, Assessor, https://property.spatialest.com/co/elpaso/#/property/3133002011 Schedule No.: 3133002011 and https://property.spatialest.com/co/elpaso/#/property/3128002004 Schedule No. 3128002004.
9. *Colorado Geological Survey, USGS Geologic Map Viewer*: http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
10. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1952, 1955, 1968, 1999, 2005, 2009, 2011, 2013, and 2015.
11. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ Colorado Denver Quadrangles dated 1953, 1957, 1958, 1960 and Peyton Quadrangles dated 1973 and 1978.
12. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2010, 2011, 2015, 2017 and 2019.

APPENDIX B

*Subsurface Soil Investigation, 15330 Chaparral Loop East, El Paso County, Colorado, prepared by RMG – Rocky Mountain Group, Job No. 159645, last dated September 8, 201*7.

ROCKY MOUNTAIN GROUP

Job No. 159645

September 8, 2017

Candie Macon
7287 Joe Brooks Rd SW
Ocean Isle Beach, NC 28469

Re: Subsurface Soil Investigation
15330 Chaparral Loop East
El Paso County, Colorado

Dear Candie Macon:

RMG – Rocky Mountain Group drilled two test borings at the above-referenced address on August 19, 2017. A Site Vicinity Map and Test Boring Location Plan are presented in Figures 1 and 2, respectively. Our findings, conclusions and recommendations are provided in this report.

This report presents geotechnical engineering recommendations for design and construction of residential foundations. The following is excluded from the scope of this report including but not limited to geologic, natural and environmental hazards such as landslides, unstable slopes, seismicity, snow avalanches, water flooding, corrosive soils, erosion, radon, wild fire protection, hazardous waste and natural resources.

Subsurface Materials

The subsurface materials encountered in the test borings generally consisted of silty sand extending to the 20-foot termination depths of the test borings. Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented in the Test Boring Logs.

Groundwater was not encountered in the test borings at the time of drilling or when checked one day subsequent to drilling. 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.

An Explanation of the Test Boring Logs, the Test Boring Logs, and a Summary of Laboratory Test Results are presented in Figures 3 through 5. Soil Classification Data is presented in Figure 6.

Geotechnical Considerations

Loose soils were encountered in both of the test borings at depths anticipated to affect foundation construction. Loose soils may be encountered in the excavation, even on lots where none are indicated on the test boring logs. If unsuitable soils are encountered in the excavation, they will require additional

compaction and/or removal (overexcavation) and replacement as indicated under the **Overexcavation and Replacement** section of this report.

Foundation design recommendations, based on the field investigation and laboratory testing, are presented below. It must be understood that these recommendations should be verified after the excavation on each individual lot is completed.

Overexcavation and Replacement

If loose soils are encountered during the Open Excavation Observation, they may require additional compaction to achieve the allowable bearing pressure indicated in this report. Fluctuations in material density may occur. In some cases, removal and recompaction of up to 2 feet of soil may be required. The removal and recompaction shall extend a minimum of 2 feet beyond the building perimeter, and at least that same distance beyond the perimeter of counterfort and "T" wall footings. The use of track-mounted excavation equipment, or other low ground pressure equipment, is recommended on loose soils to reduce the likelihood of loss of stability during excavation.

Foundation Recommendations

A spread footing foundation supported on the on-site sand soils or compacted structural fill is suitable for the proposed structure. A maximum allowable bearing pressure of 2,000 psf with no minimum dead load requirement may be used for design. The foundation design should be prepared by a qualified Colorado Registered Professional Engineer using the recommendations presented in this report. This foundation system should be designed to span a minimum of 10 feet under the design loads. The bottoms of exterior foundations should be at least 30 inches below finished grade for frost protection.

Open Excavation Observation

During construction, foundation excavations should be observed by RMG prior to placing structural fill, forms, or concrete to verify the foundation bearing conditions for each structure. Based on the conditions observed in the foundation excavation, the recommendations made at the time of construction may vary from those contained herein. In the case of differences, the Open Excavation Observation report shall be considered to be the governing document. The recommendations presented herein are intended only as preliminary guidelines to be used for interpreting the subsurface soil conditions exposed in the excavation and determining the final recommendations for foundation construction.

Soil Test Borings

The soil/rock classifications shown on the logs are based upon the engineer's classification of samples. Lines shown on the logs represent the approximate boundary between subsurface materials, and the actual transition may be gradual and vary across the site.

Interior Floor Slabs

Vertical slab movement on the order of one to three inches is considered possible for soils/bedrock of low expansion potential. In some cases, vertical movement may exceed this range. If movement and associated damage to floors and finishes cannot be tolerated, a structural floor system should be used.

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.

Recommendations for exterior concrete slabs, such as patios, driveways, and sidewalks, are not included in this report.

Interior Partitions

Interior non-bearing partitions and attached furnishings (e.g., cabinets, shower stalls, etc.) on concrete slabs should be constructed with a void so that they do not transmit floor slab movement to the roof or overlying floor. A void of at least 1-1/2 inches is recommended beneath non-bearing partitions. The void may require reconstruction over the life of the structure to re-establish the void due to vertical slab movement.

Lateral Earth Pressure Parameters

Foundation walls should be designed to resist lateral earth pressures. For granular, non-expansive backfill materials, we recommend an equivalent fluid pressure of 40 pcf be used for design. Expansive soils or bedrock should not be used as backfill against foundation walls.

The above lateral earth pressure applies to level, drained backfill conditions. Equivalent Fluid Pressures for sloping/undrained conditions should be determined on an individual basis.

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.

Perimeter Drain

A subsurface perimeter drain is recommended around portions of the structure which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable. A typical drain detail is presented in Figure 7.

A subsurface perimeter drain is designed to intercept some types of subsurface moisture and not others. Therefore, the drain could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

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.

Exterior Backfill

Backfill 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 85 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557 on exterior sides of walls in landscaped areas. In areas where backfill supports pavement and concrete flatwork, the materials should be compacted to 92 percent of the maximum dry density.

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.

The appropriate government/utility specifications should be used for fill placed in utility trenches. If material is imported for backfill, the material should be approved by the Geotechnical Engineer prior to hauling it to the site.

The backfill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement. Backfill should be compacted by mechanical means, and foundation walls should be braced during backfilling and compaction.

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, and 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.

To verify the condition of the compacted soils, density tests should be performed during placement. The first density tests should be conducted when 24 inches of fill have been placed.

Foundation Configuration Remarks

The configuration of the foundation system is critical to its performance. The position of foundation windows, jogs, steps and the relative elevation of adjacent and opposite walls can affect foundation performance. The nature of residential foundation construction does not allow for control of these conditions by the Foundation Design Engineer. Improper placement of the above can result in differential and lateral foundation movement not anticipated by the Geotechnical Engineer. The Foundation Design Engineer should be contacted regarding the foundation configuration.

General Remarks

The recommendations provided in this report are based upon the subsurface conditions encountered in the test borings, anticipated foundation loads, and accepted engineering procedures. The recommendations are intended to reduce differential movement. *It must be recognized that the foundation will undergo some movement on all soil types*. Concrete floor slabs will likely move vertically. The recommendations for isolating floor slabs from columns, walls, partitions or other structural components should be implemented to mitigate potential damage to the structure. Subsequent owners should be provided a copy of this report. The recommendations are based on accepted local engineering practice and are intended for individuals familiar with local construction practices and standards.

RMG does not assure the existence of and/or the compliance with the above recommendations. This is the responsibility of the client referenced on the first page. RMG provided recommendations only and does not supervise, direct or control the implementation of the recommendations.

Senate Bill 13

This report may be partial fulfillment of Colorado Senate Bill 13 (1984), C.R.S. 6-6.5-101, *The Soil and Hazard Analysis of Residential Construction*, if the purchaser receives this report at least fourteen days prior to closing.

The purpose of Senate Bill 13 is to inform the purchaser of the presence of expansive soil or hazards on the site. Geologic and environmental hazards are outside the scope of services of this report. Expansive soil and bedrock may result in movement of foundation components and floor slabs. The recommendations presented in this report are intended to reduce, not eliminate, these movements.

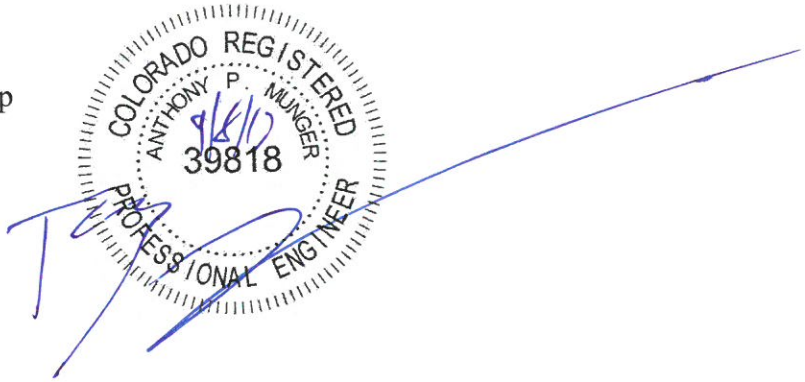
The owner and builder should review and become familiar with Special Publications 43 issued by the Colorado Geologic Survey.

This report and the recommendations contained therein are only valid if all parts of Senate Bill 13 are satisfied.

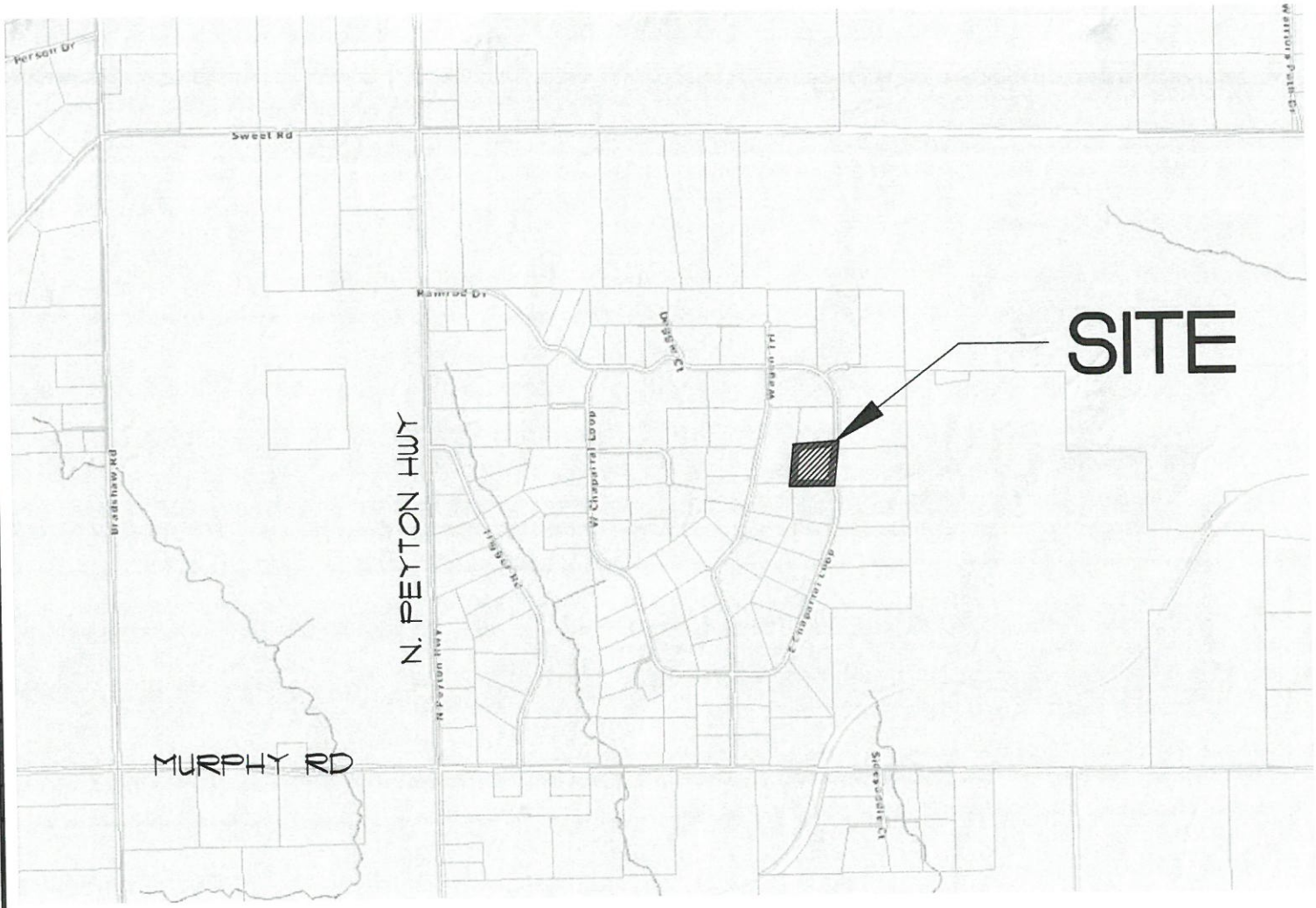
Should you have questions, please do not hesitate to call.

Cordially,

RMG – Rocky Mountain Group



Tony Munger, P.E.
Geotechnical Project Manager



REFERENCE
NOT TO SCALE

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Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

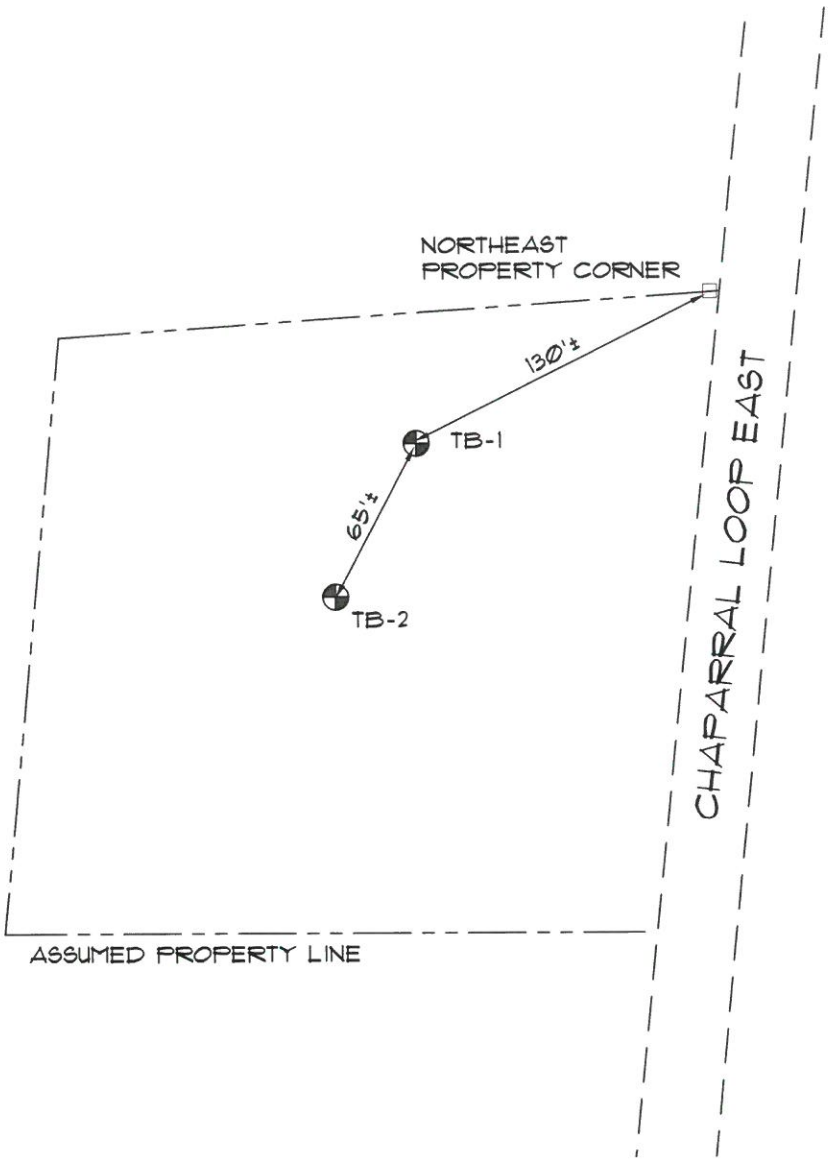
SITE VICINITY MAP

15330 CHAPARRAL LOOP EAST
EL PASO COUNTY, CO
CANDIE MACON

JOB No. 159645

FIG No. 1

DATE 9-8-2016



REFERENCE
NOT TO SCALE

DENOTES APPROXIMATE
LOCATION OF TEST BORINGS

ARCHITECTS RMG ENGINEERS
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TEST BORING LOCATION PLAN

15330 CHAPARRAL LOOP EAST
EL PASO COUNTY, CO
CANDIE MACON

JOB No. 159645

FIG No. 2

DATE 9-8-2016

SOILS DESCRIPTION

 SILTY 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 AT TIME OF DRILLING

 FREE WATER TABLE AT REFERENCED DATE

 DEPTH AT WHICH BORING CAVED

 BULK DISTURBED BULK SAMPLE

4.5 WATER CONTENT (%)

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ARCHITECTS RMG ENGINEERS

Geotechnical
Materials Testing
Civil, Planning

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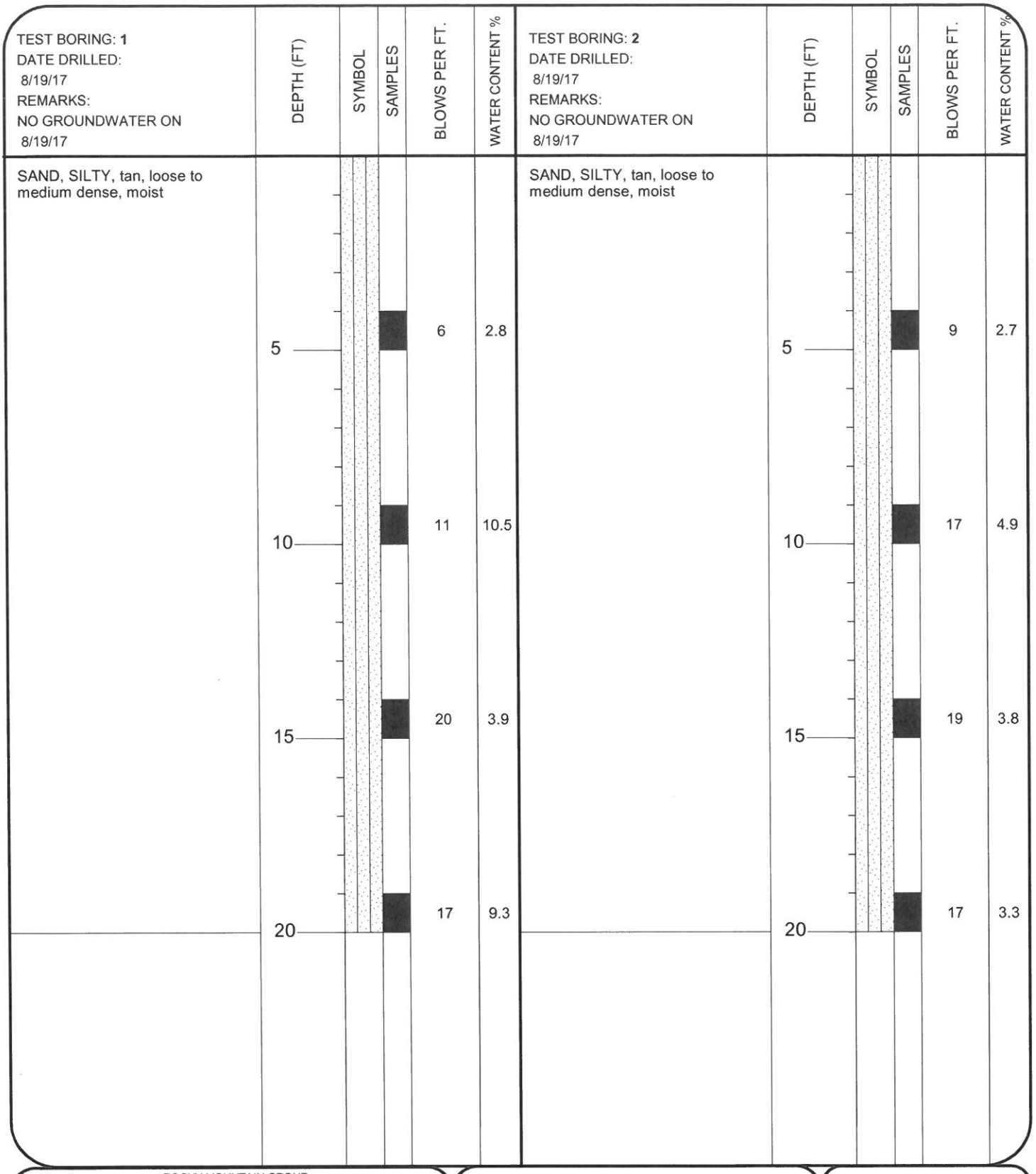
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

EXPLANATION OF TEST BORING LOGS

JOB No. 159645

FIGURE No. 3

DATE 9/8/17



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Structural
Forensics

Geotechnical
Materials Testing
Civil, Planning

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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

TEST BORING LOGS

JOB No. 159645

FIGURE No. 4

DATE 9/8/17

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	FHA Expansion Pressure (psf)	% Swell/ Collapse	USCS Classification
1	4.0	2.8		NP	NP	0.5	10.5			SW-SM
1	9.0	10.5								
1	14.0	3.9								
1	19.0	9.3								
2	4.0	2.7								
2	9.0	4.9		NP	NP	8.8	9.3			SW-SM
2	14.0	3.8								
2	19.0	3.3								

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Forensics

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Civil, Planning

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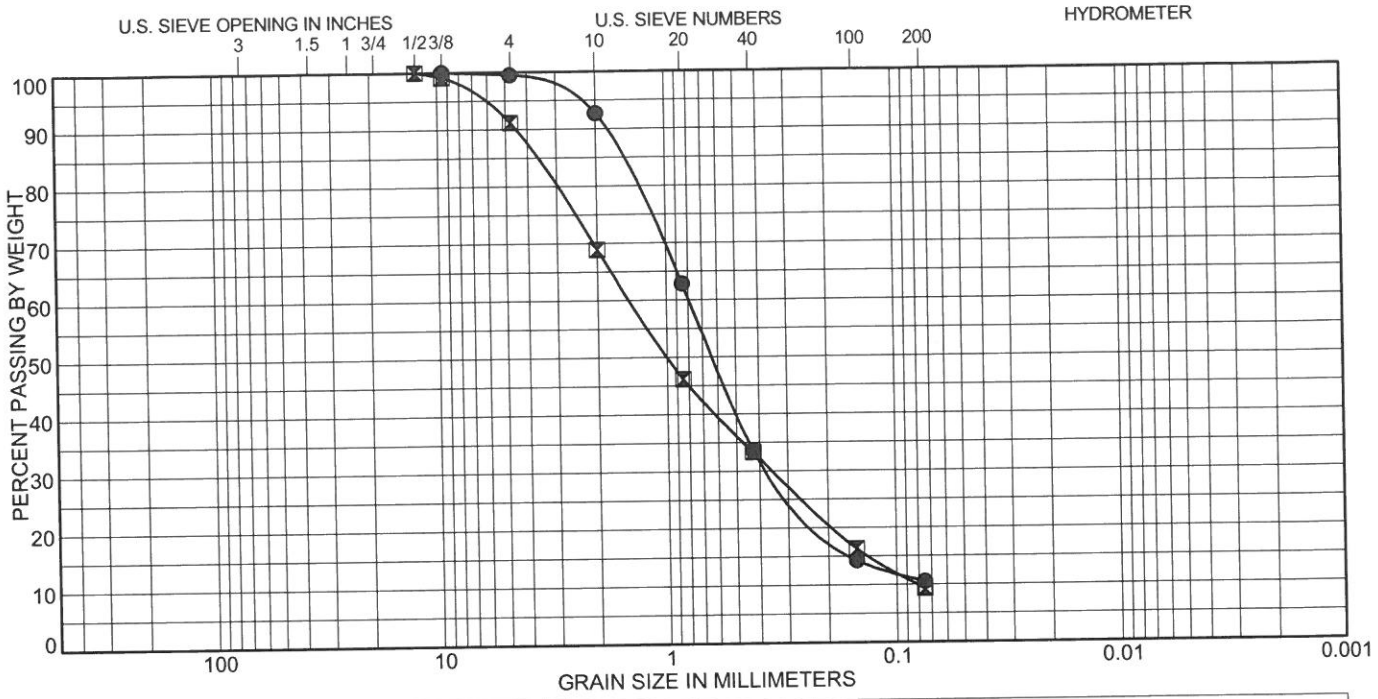
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

SUMMARY OF LABORATORY TEST RESULTS

JOB No. 159645
FIGURE No. 5
PAGE 1 OF 1
DATE 9/8/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring		Depth (ft)	Classification	LL	PL	PI
●	1	4.0	**WELL-GRADED SAND with SILT(SW-SM)**	**NP**	**NP**	**NP**
⊠	2	9.0	**WELL-GRADED SAND with SILT(SW-SM)**	**NP**	**NP**	**NP**

Test Boring		Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	4.0	0.5	88.9	10.5	
⊠	2	9.0	8.8	81.8	9.3	

ROCKY MOUNTAIN GROUP

Architectural
Structural
Forensics

ARCHITECTS RMG ENGINEERS

Geotechnical
Materials Testing
Civil, Planning

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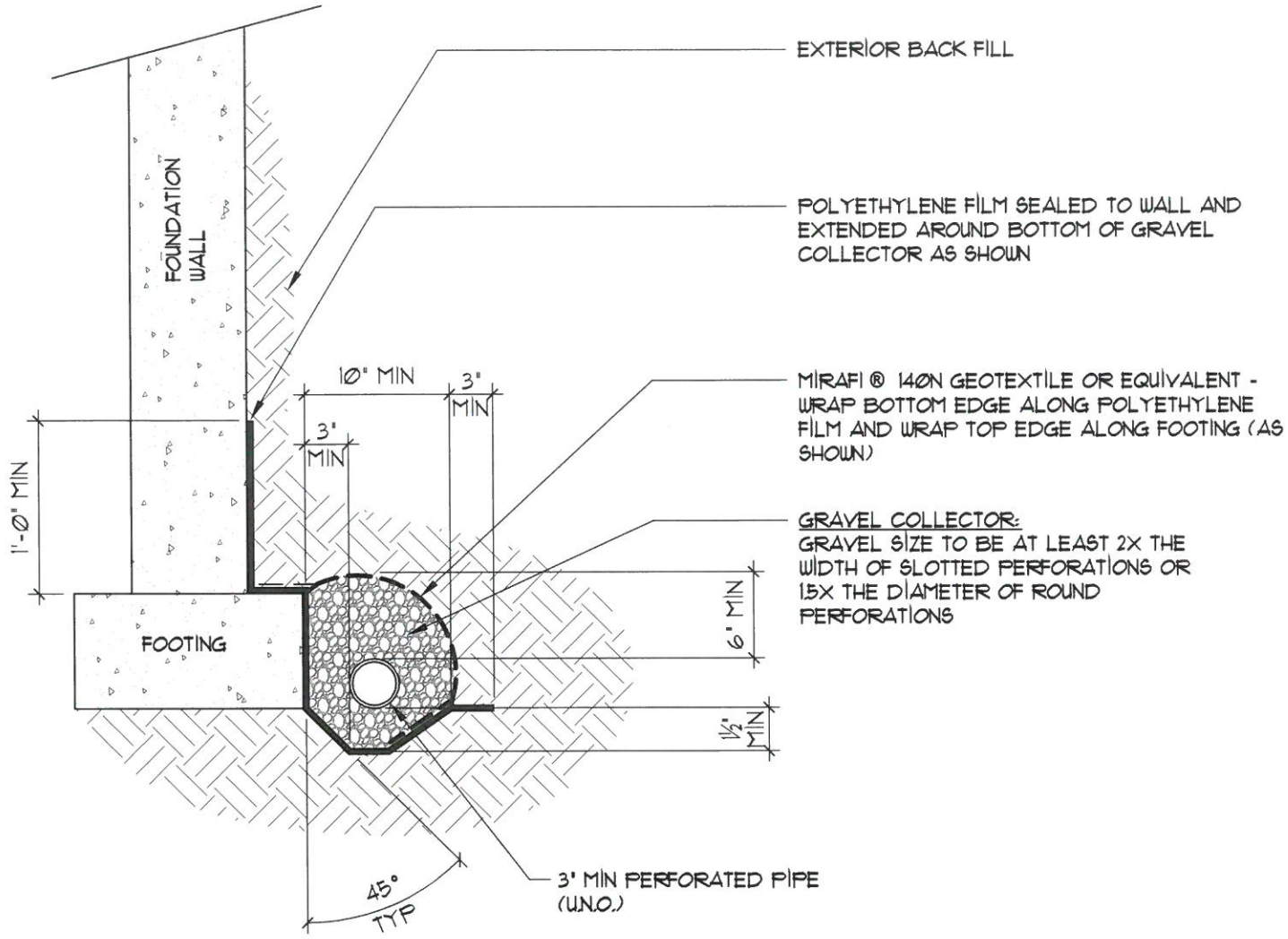
SOIL CLASSIFICATION DATA

JOB No. 159645

FIGURE No. 6

DATE 9/8/17



GENERAL NOTES:

1. BOTTOM OF DRAIN PIPE SHALL BE AT OR BELOW BOTTOM OF FOOTING AT ALL LOCATIONS
2. ALL DRAIN PIPE SHALL BE PERFORATED PLASTIC, WITH THE EXCEPTION OF THE DISCHARGE PORTION WHICH SHALL BE SOLID, NON-PERFORATED PIPE.
3. DRAIN PIPE SHALL HAVE POSITIVE FALL THROUGHOUT.
4. DRAIN PIPE SHALL BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. IF A GRAVITY OUTFALL CANNOT BE ACHIEVED, THEN A SUMP PIT AND PUMP SHALL BE USED.
5. ALL DRAIN COMPONENTS SHALL BE RATED/APPROVED BY THE MANUFACTURER FOR THE INSTALLED DEPTH AND APPLICATION
6. DRAIN SYSTEM, INCLUDING THE OUTFALL OF THE DRAIN, SHALL BE OBSERVED BY QUALIFIED PERSONNEL PRIOR TO BACKFILLING TO VERIFY INSTALLATION.

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(970) 330-1071

PERIMETER DRAIN

FIG No. 7