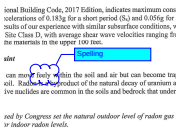
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SOIL AND GEOLOGY STUDY

2825/2819 Slocum Road
Lots 1 and 2, Amo Acres, Filing No. 1
El Paso County, Colorado

PREPARED FOR:

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January 14, 2025

Respectfully Submitted,
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2007 Soils Report, Lot 2 (2819), Geoquest, LLC
Appendix C – *Wastewater Study*, prepared by RMG Engineers

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the NW¼ of Section 36, Township 13 South, Range 64 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located south and east of the intersection of Jones Road and Slocum Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Proposed Land Use and Project Description

The total calculated area of the included parcel, as recorded on the El Paso County (EPC) Assessors website, is currently 38.46 acres. The proposed site development is to consist of subdividing the parcel into two lots. Lot 1 is to be located on the northern portion of the parcel and consist of 19.03 acres. Lot 2 is to be located on the southern portion of the parcel and consist of 19.03 acres. The included parcel is:

- **EPC Schedule No. 4336000004**, reportedly contains 38.46 acres, currently addressed as 2825/2819 Slocum Road, aka Tract 1, Amo Acres, and zoned RR-5 – Residential Rural.

The site (as referenced in this report) refers to the entire 38.46-acre parcel.

It is our understanding that the parcel was not properly subdivided per the El Paso County regulations. El Paso County is requesting the lot to be replatted and properly subdivided into two new lots. For the purposes of this investigation, we are presenting our results and recommendations as though this report had been completed prior to the construction of the residence and septic system on Lot 2, when that replatting and subdivision would normally have occurred.

The *Land Survey Plat*, referenced above, indicates the residence currently addressed as 2825 Slocum Road is to remain on Lot 1, the northern lot. The residence currently addressed as 2819 Slocum Road is to remain on Lot 2, the southern lot. Both residences have an individual well and septic system that are to remain on each lot. The residence on Lot 1 was reportedly constructed in 1996 and the residence on Lot 2 was reportedly constructed in 2008. Both residences are described as a manufactured home with an attached garage.

Based on a DWR (Denver Water Resources) Well Permit Research there is one well on Lot 2 that is designated in the Upper Black Squirrel Creek Basin. This well is to remain on Lot 2.

Both lots are to maintain the existing access from Slocum Road. The Proposed Lot Layout, Figure 2, outlines the proposed subdivision and the general boundaries of our investigation.

An existing FEMA (Zone A) floodplain is mapped along the southwestern corner of the property. The floodplain is to be a No Build zone. The existing structures and OWTS are located outside of the floodplain boundary.

The structures and septic system on Lot 2 were constructed prior to any approved subdivision. The current investigation is for the subdivision of the property properly per the El Paso County

regulations. No new development is currently proposed. This report presents the results of our geologic evaluation and wastewater study for the individual on-site wastewater treatment systems.

2.0 QUALIFICATIONS OF PREPARERS

This Geology and Soils report 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 24 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 24 years of experience in the construction engineering (residential) field. Mr. Munger holds a Bachelor of Science in Architectural Engineering from the University of Wyoming. Mr. Munger has supervised and performed numerous geological and geotechnical field investigation programs in Colorado.

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 to include single-family within the referenced proposed development. 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.

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 and test pits by RMG
- Laboratory testing of representative site soil and rock samples
- 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 were available for our review and are listed below:

1. *Wastewater Study, Lots 1 and 2, Amo Acres, Filing No. 1, El Paso County, Colorado,* prepared by RMG Engineers, dated January 10, 2025;
2. *Soils Report, 2819 Slocum Road, El Paso County, Colorado,* prepared by Geoquest, LLC, Job #07-0287, dated July 24, 2007;
3. *Soil test for Lot 1, Amo Estates Subdivision, El Paso County, Colorado,* prepared by Colorado Engineering & Geotechnical Group, Inc., Job # 00059, dated February 14, 2000.

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

3.4 Additional Documents

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

4.0 SITE CONDITIONS

4.1 Existing Site Conditions

The site contains two existing single-family residences, a horse stall/barn, and multiple sheds near the western portion of the site. Topographically, the overall slope of the site is fairly flat with a slight slope downward from the northeast to southwest. Elevation difference across the entire site ranges between 40 to 45 feet. Isolated low-lying areas are present near the front (west) portion of the site. Slopes greater than 25 percent are not located on-site.

A natural water basin (retention pond) collects surface water from a tributary of Black Squirrel Creek. This basin is located along the southwestern property boundary and lies within the FEMA floodplain. The entire site consists of low-lying native grasses and weeds. Deciduous trees are sparse across the site and are mainly located around the existing residences and detention basin.

4.2 Aerial photographs and remote-sensing imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, and historical photos by historicaerials.com dating back to 1947. Prior to 1983, the area was fairly desolate with few residences. It appears Slocum Road was a dirt road and has been in place since prior to 1947. The natural water basin (retention pond) was redefined by man and possibly "deepened" prior to 1983. The main residence on proposed Lot 1 was constructed prior to 1996. The second residence was reportedly constructed in 2008. Since 2008, little has changed on the site. Aerial photographs indicate the water basin has controlled and contained the fluctuating surface water since it was redefined. The tributary of Black Squirrel Creek appeared dry in the photos reviewed. Indications that the tributary has widened or deepened significantly was not observed.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

Once the subdivision is approved, it is our understanding that no new construction is currently proposed.

5.1 RMG Drilling

For the purposes of this investigation, we are presenting our results and recommendations as though this report had been completed prior to the construction of the residence and septic system on Lot 2. Accordingly, the subsurface conditions within the area of proposed Lot 2 were explored by RMG, by drilling two (2) exploratory borings extending to 20 and 35 feet below the existing ground surface on December 6, 2024. Additionally, two (2) test pits were observed on Lot 2 on December 19, 2024. Neither test borings nor test pits were performed within the boundaries of Lot 1 for this investigation. The approximate locations of the test borings and test pits are presented on the Test Boring and Test Pit Layout, Figure 3.

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. An Explanation of Test Boring Logs is presented in Figure 4. The Test Boring Logs are presented in Figure 5.

5.2 Drilling by Others

Two soil reports were completed previously, one for each residence, referenced above and included in Appendix C. The original soil reports were obtained from the Pikes Peak Regional Building website and discussed in some detail below.

2825 Slocum Rd

The *Soil test for Lot 1* was performed for the original existing residence on proposed Lot 1. One exploratory test boring was reportedly performed on February 2, 2000. The test boring logs indicated a brown, silty fine-grained sand from the surface to a depth of approximately 2.5 feet, overlying a fine to medium-grained sand that extended to the 10-foot termination depth of the borings. The report noted the soil density and expansion potential was low. In review of the gradation test results, the fines ranged from 10.2% at 4 feet to 12.2% at 12 feet and the soils classified as silty sand (SM) to clayey sand (SC). It was noted in the report, groundwater was not encountered in the test borings at the time of drilling.

2819 Slocum Rd

The *Soils Report* was performed for the second existing residence on proposed Lot 2. Two exploratory test holes were performed on July 2, 2007, with an additional boring performed on July 13, 2007. The first two test boring logs indicated 4 inches of topsoil overlying fine-medium grained sand with low clay content extending to the 15-foot termination depth of test hole TH-1. Underlying the topsoil in TH-2, fine grained clay with low sand content extended to the 15-foot termination depth of

the hole. The third boring TH-3 was reportedly performed due to the high clay content encountered in TH-2. TH-3 indicated 4 inches of topsoil overlying fine-medium grained sand with low clay content. In review of the gradation test results, the fines ranged from 15.9% at 12 feet to 19.1% at 3 feet. The laboratory testing indicated the soil classified as silty sand (SM) to sandy clay (CL), respectively. Groundwater depths were not reported.

5.3 RMG 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 6. Soil Classification Data are presented in Figure 7. Due to the loose nature of the sand soils, a Denver Swell/Consolidation test was not performed. Based on the percent fines ranging between 8.6% and 14.0% and the non-plasticity of the soil below 4 feet, it is our opinion the sand soil has low swell potential.

5.4 Test Pit Excavations

The two test pits were performed to explore the subsurface soils surrounding the existing On-site Wastewater Treatment System on Lot 2. The number of test pits is in accordance with Regulations of the El Paso County Board of Health, Chapter 8, On-site Wastewater Treatment Systems (OWTS) as required by 8.5.D.3.a.

The test pits were excavated to approximately 8 feet below the existing ground surface. Additional information is provided in Section 9.0, On-site Disposal of Wastewater.

5.5 OWTS Visual and Tactile Evaluation

A visual and tactile evaluation was performed in conjunction with this investigation. The soils were evaluated to determine the soils types and structure. Neither bedrock nor restrictive layers were encountered in the test pits. Evidence of seasonally fluctuating high groundwater was not observed in the test pits. The test pit logs and soil descriptions are presented in the Wastewater Study, included in Appendix C.

5.6 Groundwater

Groundwater was not encountered at the time of our drilling. Due to the locations of the test borings, they were immediately backfilled subsequent to drilling. We do anticipate the potential for periodically high surficial and subsurface moisture conditions due to the proximity to the Black Squirrel Creek tributary and the mapped FEMA floodplain.

We do understand surface and subsurface water elevations will fluctuate throughout the year. The previous soil reports, completed in July 2007 and February 2000, provide a window of the groundwater depth through the years. Overall, the borings were drilled at various times throughout the year and groundwater has not been encountered in the two seasons (summer and winter)

explored. However, it should be noted that in granular soils and bedrock, some perched water conditions might be encountered due to the variability of the soil/bedrock. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can carry water in the subsurface. Groundwater may also flow atop the underlying bedrock. If future construction was proposed on either lot, builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions during on-site construction, in order to evaluate and mitigate each individual problem as necessary.

Fluctuations in groundwater and subsurface moisture conditions will occur due to variations in rainfall, irrigation, changes in surface drainage patterns, and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels. In the absence of irrigation, we anticipate a 4- to 6-foot fluctuation in groundwater levels, perched or within the fractured bedrock, should be expected.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

6.1 Geologic Conditions

The site physiographically lies in the western portion of the Great Plains Physiographic Province south of the Palmer Divide. Approximately 6 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 upper Cretaceous and Paleocene Age. The residual soils are produced by the in-situ action of weathering of the bedrock.

6.2 Subsurface Soil Conditions

The subsurface soils encountered in the test borings performed by RMG were classified using the Unified Soil Classification System (USCS). The laboratory testing performed revealed the on-site soils and bedrock classified as sandy clay (CL), silty sand (SM), well graded sand with silty (SW-SM), and poorly graded sand with silt (SP-SM).

The subsurface soils encountered in the test pit excavations were classified using the United States Department of Agriculture (USDA). The test pit summary revealed the on-site soils classified as sandy clay loam and sandy loam.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented in the Test Boring Logs, presented in Figure 4. The classifications shown on the logs are based upon visual 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.

6.3 Bedrock Conditions

Bedrock was not encountered in the test boring or test pit excavations used for this investigation. In general, the bedrock (as defined by Colorado Geologic Survey) beneath the site is considered to be part of the Dawson Formation which consists of about half silty sandstone and conglomerate and half interbedded layers of shale, claystone, and siltstone. 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 Dawson sandstone is generally not considered a restrictive layer for OWTS. However, the claystone bedrock would be considered a restrictive layer. Based on the depth of the sandstone encountered in the test borings (17 to 18 feet), the sandstone is expected to have sufficient separation from the bottom of the OWTS.

6.4 U.S. Soil Conservation Service

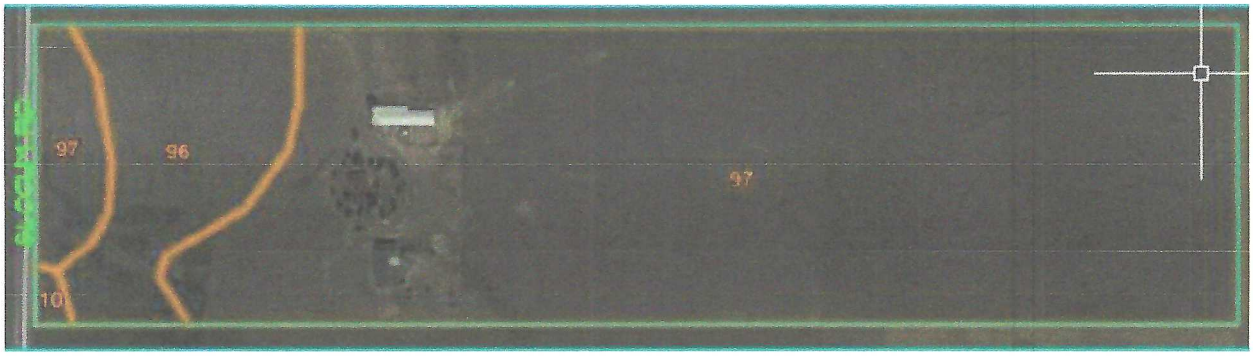
The U.S. Soil Conservation Service along with USDA has identified the soils on the property as:

- 10 – Blendon sandy loam, 0 to 3 percent slopes. The Blendon sandy loam was mapped by the USDA to encompass a narrow "strip" that runs parallel to the northern property line. Properties of the sandy loam include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms include depressions.

- 96 – Truckton loamy sand, 0 to 3 percent slopes. The Truckton loamy sand was mapped within a "pocket" near the northeast corner of the property. The 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 low, frequency of flooding and ponding is none, and landforms include interfluves and fan remnants.

- 97 – Truckton loamy sand, 3 to 9 percent slopes. The Truckton loamy sand was mapped within the southeastern corner of the property. The 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 low, frequency of flooding and ponding is none, and landforms include interfluves and fan remnants.

The USDA Soil Survey Map is presented below.



Neither groundwater nor bedrock were encountered in the test borings or test pits performed by RMG.

6.5 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 8.

The site generally consists of silty to clayey sand and clay overlying the Dawson Formation. The silty sand is generally permeable, well drained, and has good foundation characteristics. As the clay content increases, the permeability and foundation characteristics decline. The sandstone (if encountered) is considered less permeable and not as well drained, but generally suitable for foundations. The geologic units mapped at the site were as follows:

- *Tkdw – Dawson Formation, (Upper Cretaceous and Paleocene)* – the unit is generally drab colored; which includes shades of grey, yellow and brown. Pebbles are mostly granitic, quarts, feldspar, with pebbles ranging up to 2 inches in diameter. This unit is approximately 1,350 feet thick in this area. The sandstone was encountered in the test borings at depths ranging between 17 and 18 feet.
- *fw – Regulatory floodway* as designated by FEMA. This area is to be designated a "No Build Area" until further investigations are completed. No new construction is currently proposed onsite.
- *da* – areas no longer in their native state due to the development on both lots.

6.6 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.

6.7 Surficial (Unconsolidated) Deposits

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.

6.8 Groundwater

The site contains existing structures within the western half of the property. Topographically, the site is lowest near the floodplain boundaries and the water holding ponds. Elevations gradually increase to the north and east with gentle rolling terrain.

Based on the test borings performed by RMG and our observations of the site, the groundwater information for this site is as follows:

- No groundwater at the time of drilling,
- No groundwater in the previous two soil reports,
- The ground elevation increase from the FEMA floodplain to the residences is approximately 20 to 23 feet,
- No new basement foundation construction is currently proposed.

The residence on Lot 1 does not have a basement and was reportedly constructed in 1998. The existing owner(s) of the property, who have owned the main home since 2005, have indicated that groundwater or infiltration of water into the building footprint has not been problematic to date. Additionally, the owner of the second residence, constructed in 2008, has also indicated that they have not had issues with groundwater or infiltration of water into the building footprint. It is our opinion that future basement construction should not be restricted due to groundwater or seasonally fluctuating groundwater. However, if subsurface water is encountered in a future investigation, additional drainage systems and/or basement restrictions may be recommended at that time.

6.9 Engineering Geology

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

- 1A – Stable alluvium, colluvium and bedrock on gentle slopes (0 to 5%).
- 7A - Physiographic flood plain where erosion and deposition presently occurs and is generally subject to recurrent flooding. Includes the 100-year flood plain along major streams where flood plain studies have been conducted.

The engineering and geology is presented in the Engineering and Geology Map, Figure 8.

6.10 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.

6.11 Flooding and Surface Drainage

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0785G the online ArcGIS Pikes Peak Regional Floodplain Map, an area designated Special Flood Hazard Area encroaches within the southwest corner of the site. Base Flood Elevations (BFE) have not been determined. The remainder of the site lies outside the 100-year or 500-year floodplains. The FEMA Map is presented below.



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 eolian deposits, windblown sands. Extraction of the sand resource is 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 conditions were considered in the preparation of this report, and are not anticipated to pose a significant risk to the existing development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Ground Subsidence and Abandoned Mining Activity
- Landslides
- Rockfall

- Steeply Dipping Bedrock
- History of Landfill or Uncontrolled/Undocumented Fill Placement
- Valley Fill
- Downhill/Down-slope Creep
- Soil Slumps and Undercutting
- Corrosive Minerals

The following section presents the geologic conditions that have been identified on the property:

8.1 Compressible Soils - *constraint*

Loose soils were encountered in RMG's test boring TB-1 at a depth of 9 feet. The overlying alluvial deposits may have localized areas of lower density.

Mitigation
Loose or compressible soils encountered beneath foundations or floor slabs can generally be mitigated through localized overexcavation and replacement. Provided that appropriate mitigations and/or foundation design adjustments were implemented during construction, the presence of compressible soils is not considered to pose a risk to the existing structures.

8.2 Expansive Soils and Bedrock - *constraint*

Based on the laboratory testing performed by RMG and on the results presented in the previous investigations referenced above for the area, the sandy clay generally possesses low swell potential.

Mitigation
Expansive soils or bedrock encountered beneath foundations or floor slabs can generally be mitigated through localized overexcavation and replacement. Provided that appropriate mitigations and/or foundation design adjustments were implemented during construction, the presence of compressible soils is not considered to pose a risk to the existing structures.

Floor slabs bearing directly on expansive material should be expected to experience a higher degree of movement. Overexcavation and replacement below the floor slabs has been successful in reducing slab movement. If slab movement cannot be tolerated drilled straight-shaft piers below foundation components is an alternative to the overexcavation and replacement.

8.3 Special Flood Hazard Area - *hazard*

Based on our review of the FEMA map and the online ArcGIS El Paso County Risk Map, the southwestern property corner lies within the 100-year floodplain of a tributary of Black Squirrel Creek. However, the majority of the site does lie outside the Regulatory Floodway.

Mitigation
The proposed residences are currently located outside the designated Regulatory Floodway as presented on Figure 8, Engineering and Geology Map. Currently, we are proposing the

southwestern portion of the lot within the Regulatory Floodway of Black Squirrel Creek be considered a "No Build Area". No construction is currently proposed within this area. If new development and/or construction are proposed within this "No Build Area" in the future, additional investigations should be performed to determine the feasibility of construction. The drainageway is fairly shallow and does not contain banks that would scour and eroded away.

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, as designated by FEMA.

Builders should be advised that mitigation may be required for the potential floodwater and any resulting debris. Designs may be required to include (but are not limited to) openings to automatically equalize hydrostatic pressure, anchorage to resist buoyancy, "breakaway" panels, etc.

Provided that the recommendations presented herein, as well as any requirements stipulated by the governing regulatory agencies, are followed, the presence of the revised floodplain/floodway is not anticipated to preclude the proposed construction.

8.4 Springs and High Groundwater - *constraint*

Groundwater was not encountered in the test borings performed by RMG or within the test borings performed for the site-specific soil reports for the existing residences. The southwestern portion of the site does contain a low lying area that may capture surface water during heavy precipitation events.

Based on our site observations and review of the Corral Bluffs Quadrangle and Google Earth images dating back to September 1999, springs do not appear to originate on the subject site. Groundwater was not encountered at the time of drilling for this investigation or the two previous investigations. Shallow groundwater is not anticipated to impact the existing structures.

Mitigation

Currently, no new construction is proposed. However, if future construction is proposed, 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.

8.5 Surface Drainage - *constraint*

Since portions of the property lie within a designated Regulated Floodway of Black Squirrel Creek, its drainageway should be taken into consideration when considering the placement of any future structures.

Mitigation

If new construction is proposed in the future, Black Squirrel Creek and the associated floodway should be avoided. Structures should not block the creek. Any site grading should be done in a manner to avoid ponding of water around the structures and treatment area.

All construction should remain outside the Black Squirrel Creek drainageway. It is recommended the utility easement and Black Squirrel Creek be identified as a "No Build Area" unless additional studies are performed, in conjunction with the drainage engineer, prior to any new construction. These areas are shown on Figure 8.

8.6 Faults and Seismicity - *hazard*

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 15 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 0.183g for a short period (S_s) and 0.056g 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 D, with average shear wave velocities ranging from 2,500 to 5,000 feet per second for the materials in the upper 100 feet.

8.7 Radon - *constraint*

Spelling

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.*

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.

9.0 ON-SITE DISPOSAL OF WASTEWATER

It is our understanding the On-site Wastewater Treatment Systems (OWTS) for both lots are installed, and no new OWTS are currently proposed. The site was evaluated by observing two profile pits on Lot 2, within or near the existing OWTS location, to obtain a general understanding of the soil and bedrock conditions. The Test Pit Logs are presented in the Wastewater Study included in Appendix C.

9.1 Subsurface Materials

The subsurface materials encountered in the test pit excavations were classified using Table 10-1 Soil Treatment Area Long-term Acceptance Rates from the EPCDHE Chapter 8, OWTS Regulations and the USDA Soil Structure Shape and Grade. The materials were grouped into the following general categories:

- *Clay*
  USDA Soil Texture: Sandy Clay Loam
  USDA Soil Type: 3
  USDA Structure Shape and Grade: Granular, Strong
  Non-cemented

- *Sandy Clay*
  USDA Soil Texture: Loamy Sand
  USDA Soil Type: 1
  USDA Structure Shape and Grade: Single-Grain, Structureless
  Non-cemented

Limiting layers were not encountered in the test pits. The long term acceptance rate (LTAR) associated with the most restrictive soils observed in the test pits was 0.20 gallons per day per square foot (gpd/sf) for the sandy clay loam (Soil Type 4). Neither groundwater nor indications of seasonally shallow groundwater were observed in the test pit excavations at the time of the field observation.

9.2 Bedrock Conditions

Bedrock (as defined by USDA Soil Structure and Grade) was not encountered in the test pits observed by RMG. In general, the bedrock (as defined by Colorado Geologic Survey) beneath the site is considered to be part of the Dawson. The Dawson sandstone is generally considered a restrictive layer for OWTS.

9.3 Treatment Areas

Treatment areas at a minimum must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018, amended May 23, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCDHE);
- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCDHE;
- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches;
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, cut banks and fill areas (from the crest);
- The lots have been laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways, Preservation Areas). Based on the test pit observations, the parcel has a minimum of two locations for the OWTS.

Contamination of surface and subsurface water resources should not occur provided the OWTS is installed according to the El Paso County Guidelines and property maintained.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. It should be noted that the LTAR values stated above are for the test pit locations performed only, for the purpose of demonstrating suitability of the proposed systems. The final OWTS systems shall be designed based on an LTAR determined at the time of the OWTS Site Evaluation.

This does not constitute an OWTS design. If a future structure and/or OWTS are proposed, an individual OWTS site evaluation and system design will need to be completed prior to construction of the new residence.

10.0 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 and faults/seismicity. Geologic constraints (also as described in section 8.0 of this report) include potentially compressible soils, expansive soils/bedrock, and lies within a Special Hazard Floodway. 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.

11.0 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 intended for use for design and construction.

A site-specific Subsurface Soil Investigation for any proposed future structure(s) and/or a site-specific OWTS Site Evaluation and OWTS Design for any future proposed on-site wastewater systems will need to be prepared for future development.

12.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. The geologic conditions identified herein are not considered unusual 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 a lot-specific Subsurface Soil Investigation performed for Lot 1. In addition, appropriate surface drainage should be established during construction and maintained by the homeowner.

All construction should remain outside the Special Flood Hazard Area. It is recommended the area near the southwestern property corner be identified as a "No Build Area" unless additional studies are performed, in conjunction with the drainage/civil engineer, prior to any new construction.

We believe the surficial sand soils will classify as Type C materials and the clay soils will classify as Type B 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) and slopes made in Type B materials be laid back at ratios no steeper than 1:1 (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 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.

13.0 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 **Mary Lee DeConza-Winblad** 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 us.

FIGURES



NOT TO SCALE

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects

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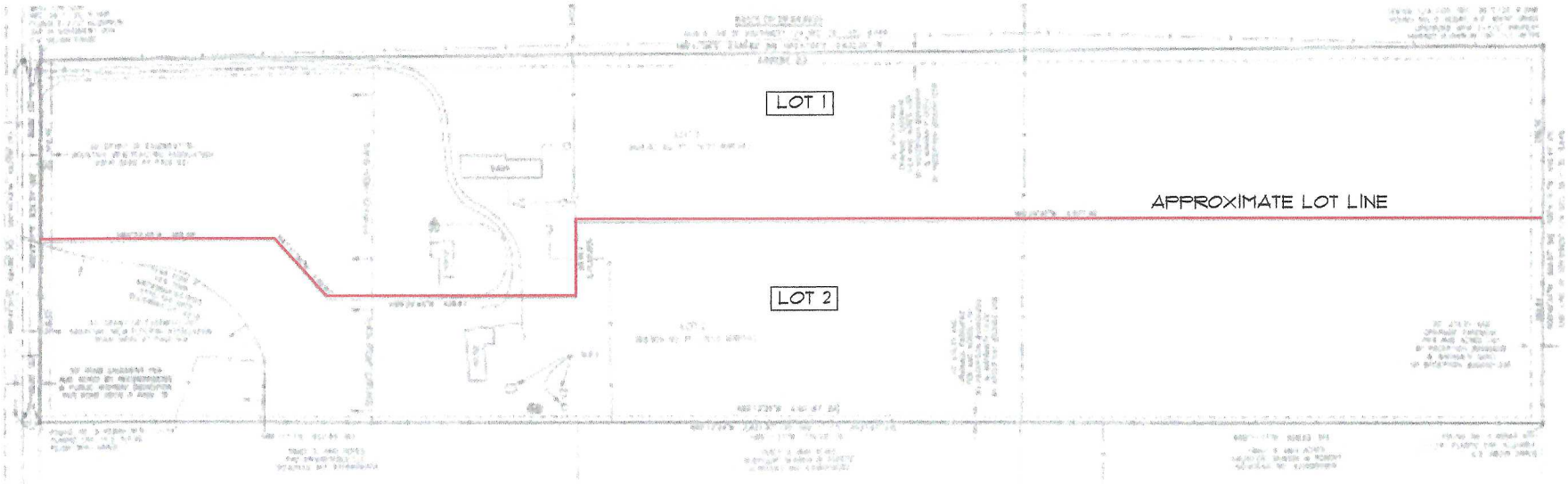
SITE VICINITY MAP

2825/2819 SLOCUM RD
LOT 1 and 2, AMO ACRES, FILING NO. 1
EL PASO COUNTY, CO
MARY LEE DECONZA-WINBLAD

JOB No. 198011

FIG No. 1

DATE 1-14-2024



NOT TO SCALE

BASE MAP PROVIDED BY:
APEX LAND SURVEYING AND MAPPING, LLC

JOB No. 198011

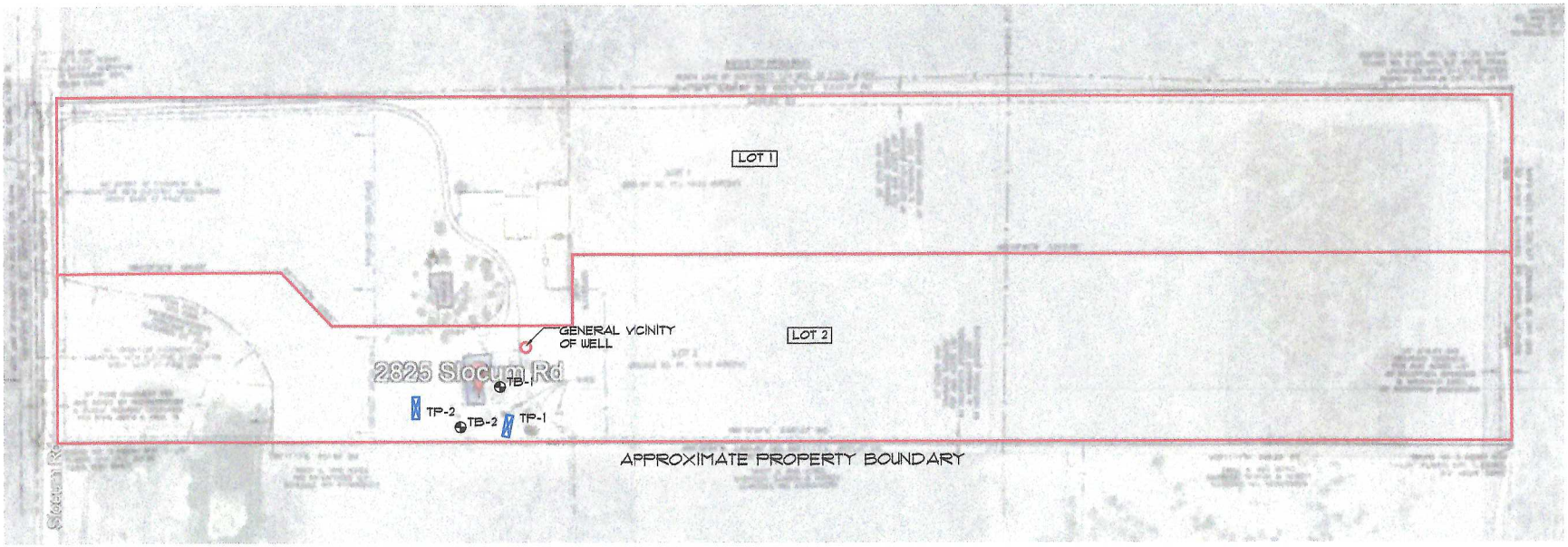
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2825 / 2819 SLOCUM RD
LOTS 1 AND 2, AMO ACRES
FILING NO. 1
EL PASO COUNTY, CO
MARY LEE DECONZA-WINBLAD

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-14-2024

PROPOSED LOT LAYOUT

SHEET No.
FIG-2



DENOTES APPROXIMATE LOCATION OF TEST BORINGS

DENOTES APPROXIMATE LOCATION OF TEST PITS

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EL PASO COUNTY, CO
MARY LEE DECONZA-WINBLAD

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-14-2024

TEST PIT/BORING LOCATION PLAN

SHEET No.
FIG-3

SOILS DESCRIPTION

 SANDSTONE

 SANDY CLAY

 SILTY SAND

 SILTY TO CLAYEY SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
5085 LIST DRIVE, SUITE 200
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 (%)

ROCKY MOUNTAIN GROUP

Structural Forensics

RMG

Geotechnical Materials Testing

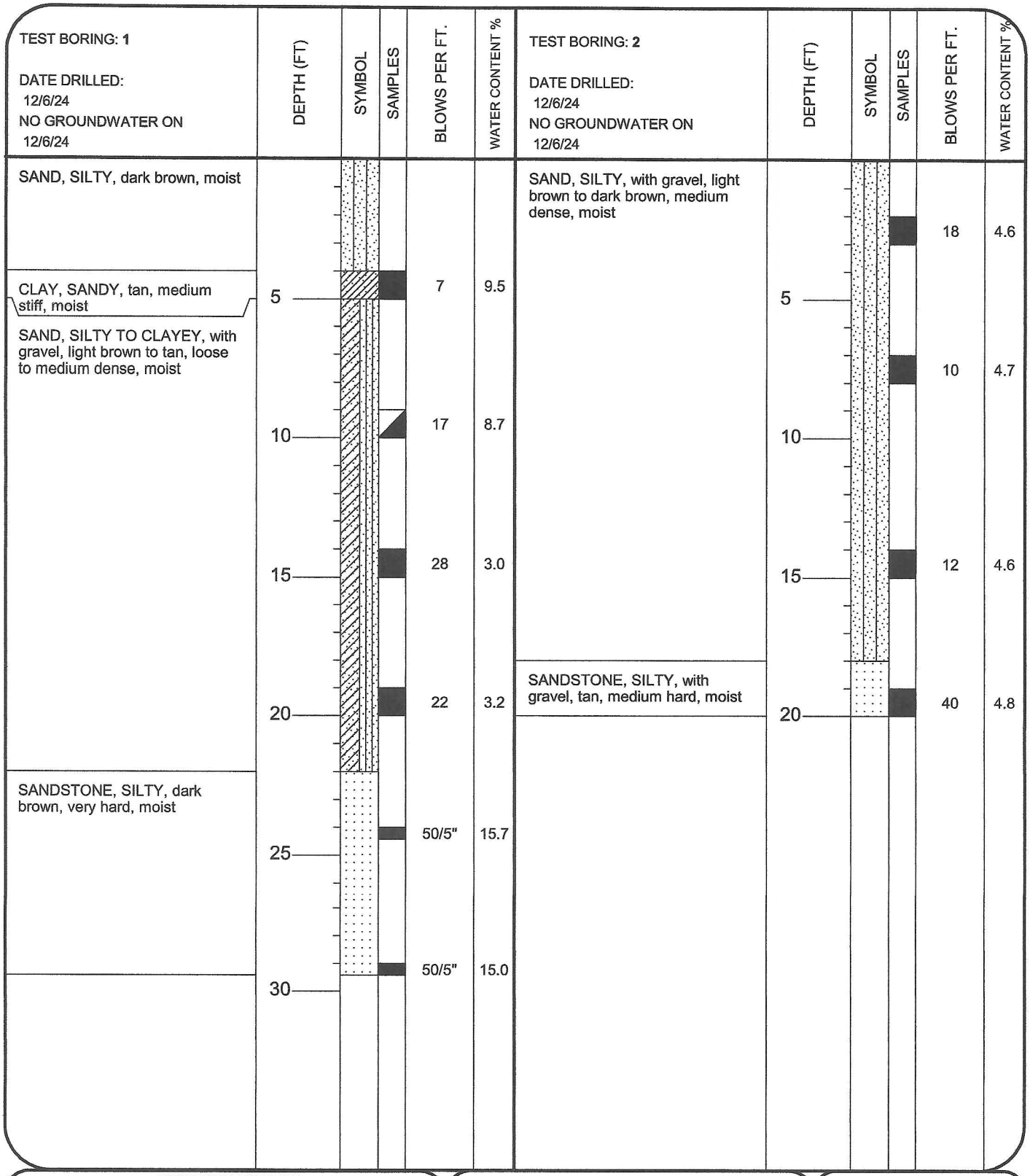
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EXPLANATION OF TEST BORING LOGS

JOB No. 198207

FIGURE No. 4

DATE Jan/14/2025



ROCKY MOUNTAIN GROUP

Structural Forensics

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TEST BORING LOG

JOB No. 198211

FIGURE No. 5

DATE Jan/14/2025

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	9.5		29	10	0.0	61.8			CL
1	9.0	8.7								
1	14.0	3.0		NP	NP	6.2	8.6			SW-SM
1	19.0	3.2								
1	24.0	15.7								
1	29.0	15.0								
2	2.0	4.6								
2	7.0	4.7		NP	NP	0.0	14.0			SM
2	14.0	4.6								
2	19.0	4.8		NP	NP	16.3	11.9			SP-SM

ROCKY MOUNTAIN GROUP

Structural Forensics

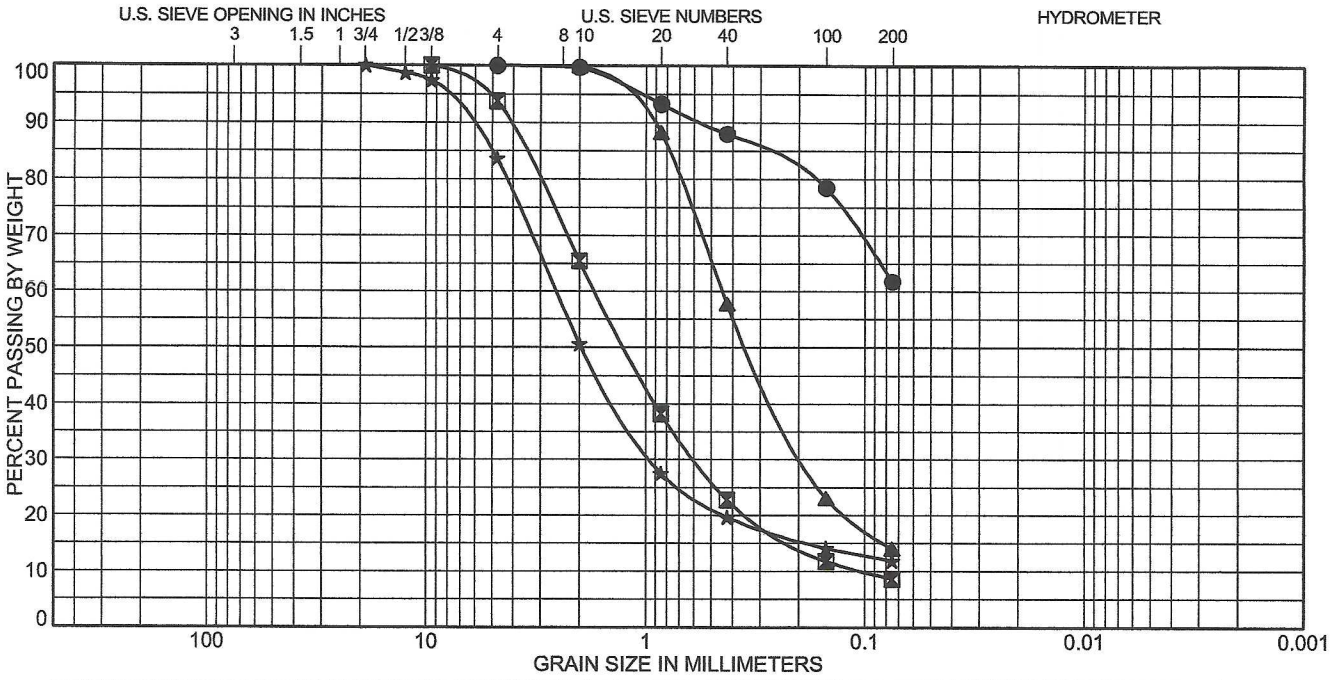
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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 198011
FIGURE No. 6
PAGE 1 OF 1
DATE Jan/14/2025



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	1	4.0	SANDY LEAN CLAY(CL)	29	19	10
⊠	1	14.0	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP
▲	2	7.0	SILTY SAND(SM)	NP	NP	NP
★	2	19.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	4.0	0.0	38.2	61.8	
⊠	1	14.0	6.2	85.1	8.6	
▲	2	7.0	0.0	86.0	14.0	
★	2	19.0	16.3	71.8	11.9	

ROCKY MOUNTAIN GROUP

Structural Forensics

RMG

Geotechnical Materials Testing

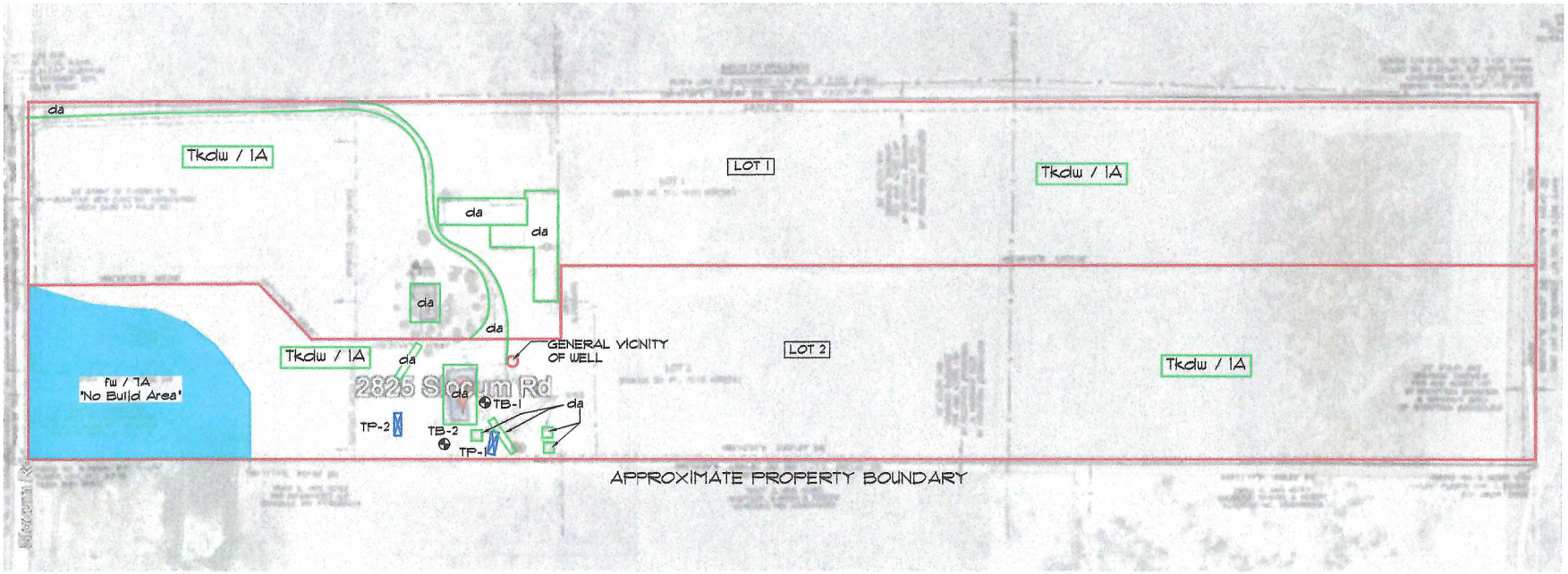
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SOIL CLASSIFICATION DATA

JOB No. 198011

FIGURE No. 7

DATE Jan/14/2025



LEGEND

GEOLOGIC CONDITIONS

- *Tkdw - Dawson Formation, (Upper Cretaceous and Paleocene)* - the unit is generally drab colored; which includes shades of grey, yellow and brown. Pebbles are mostly granitic, quarts, feldspar, with pebbles ranging up to 2 inches in diameter. This unit is approximately 1,350 feet thick in this area. The sandstone was encountered in the test borings at depths ranging between 17 and 18 feet.
- *fw - Regulatory floodway* as designated by FEMA. This area is to be designated a "No Build Area" until further investigations are completed.
- *da* - areas no longer in their native state due to the development on both lots.

ENGINEERING GEOLOGY

- 1A - Stable alluvium, colluvium and bedrock on gentle slopes (0 to 5%).
- 7A - Physiographic flood plain where erosion and deposition presently occurs and is generally subject to recurrent flooding. Includes the 100-year flood plain along major streams where flood plain studies have been conducted.

NOT TO SCALE

DENOTES APPROXIMATE LOCATION OF TEST PITS

DENOTES LOTS WHERE TEST BORINGS WERE PERFORMED

JOB No. 198011

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FILING NO. 1
EL PASO COUNTY, CO
MRS. DECONZA-WINBLAD

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-14-2024

ENGINEERING AND GEOLOGY MAP

SHEET No.
FIG-8

APPENDIX A

Additional Reference Documents

1. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0785G,* Federal Emergency Management Agency (FEMA), effective December 7, 2018. https://msc.fema.gov/portal/home.
2. *Geologic Map of the Corral Bluffs Quadrangle, El Paso County, Colorado,* by Soister, P.E. 1968, US Geological Survey, Geologic Quadrangle Map GQ-783.
3. *Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
4. *Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
5. *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.
6. *El Paso County, Master Plan for Mineral Extraction,* dated February 8, 1996.
7. *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.
8. *USDA – Natural Resources Conservation Service, Web Soil Survey* https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
9. *Colorado Springs Landslide Susceptibility, Colorado Geological Survey:* https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=5e7484a637c4432e84f4f16d0af306d3
10. *Colorado Landslide Inventory, Colorado Geological Survey:* https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=9dd73db7fbc34139abe51599396e2648.
11. *Pikes Peak Regional Building Department:* https://www.pprbd.org/.
12. *City of Colorado Springs, Subdivision Document Viewer:* http://www.springsgov.com/SubDivView/default.asp?cmdGoBack=New+Search....
13. *El Paso County Assessor, El Paso County, Colorado:* https://property.spatialest.com/co/elpaso/#/property/4336000004
14. *Colorado Geological Survey, USGS Geologic Map Viewer*: http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
15. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1947, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, and 2021.
16. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ Images dated 1947, 1952, 1955, 1960, 1983, 1966, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, and 2024.
17. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2011, 2015, 2017, 2019, 2022, and 2024.