Architectural
Structural
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Engineers / Architects

Materials Testing
Forensic
Civil/Planning

SOILS AND GEOLOGY STUDY

Ivilo Heights
Currently addressed as: 6225 Vessey Road
El Paso County, Colorado

PREPARED FOR:

Pawel Posorski
7655 Dawnview Ct
Colorado Springs, CO 80920

JOB NO. 191208

December 5, 2022

Respectfully Submitted,
RMG – Rocky Mountain Group

Kelli Zigler

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Project Geologist

Reviewed by,
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TABLE OF CONTENTS

FIGURES

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the SE ¼ of the NE ¼ of Section 06 Township 12 South, Range 67 West of the 6th Principal Meridian in El Paso County, Colorado, and is generally located east and south of the intersection of Holmes Road and Vessey Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Existing and Proposed Land Use

The site currently consists of one parcel (per the El Paso County Assessor's website) of approximately 6.02 acres:

- Schedule No. 5206000107, current land use is a partially vacant residential lot

The current zoning is *"RR-5" – Residential Rural.* The parcel is currently vacant and partially developed land. The future zoning designation is to remain "*RR-5".*

1.3 Project Description

An existing single family residence, detached garage, well and septic are currently located on the western portion of the property. The existing residence and potentially septic are to be removed. The well is likely to remain.

It is our understanding that the property is to be subdivided into two lots of approximately 3.01 acres each. Each new lot is to be developed with a new single-family residence, well, and on-site wastewater treatment system (OWTS). Both lots are to be accessed from Vessey Road. The Proposed Lot Layout Plan is presented in Figure 2.

1.4 Previous Investigations

Reports of previous geotechnical engineering/geologic investigations for this site were not available for our review.

2.0 QUALIFICATIONS OF PREPARERS

622
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 21 years of

experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Tony Munger, P.E. is a licensed professional engineer with over 21 years of experience in the construction engineering (residential) field. Mr. Munger holds a B.S. in Architectural Engineering from the University of Wyoming

3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical, geologic site conditions, and on-site wastewater treatment system (OWTS) feasibility and present our opinions of the potential effect of these conditions on the proposed development within El Paso County, Colorado. 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 El Paso County Engineering Criteria Manual (ECM), specifically Appendix C last updated July 9, 2019.

3.1 Scope and Objective

The scope of this study is to include a physical reconnaissance of the site and a review of pertinent, publically available documents including, but not limited to, previous geologic and geotechnical reports, overhead and remote sensing imagery, published geology and/or hazard maps, design documents, etc.

The objectives of our study are to:

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

This report presents the findings of the study performed by RMG-Rocky Mountain Group 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 several sources, including:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports
- Available aerial photographs
- Subsurface exploration
- Visual and tactile characterization of representative site soil and rock samples
- Geologic research and analysis

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 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 is partially developed. The original structures at this site were destroyed by a fire in 2013. The foundation and a portion of the existing brick of the original residence and the detached garage located near the northwestern portion of the site remain. It is our understanding the original well, septic tank and septic field also remain in place.

4.2 Topography

Based on our site reconnaissance on October 3, 2022 and USGS 2019 topographic map of the Black Forest Quadrangle, the site generally slopes down to the south and east with an overall elevation change of approximately 20 to 25 feet across the entire site. The elevation change is gradual as the ground surface is undulating. A drainage channel runs parallel to the western property boundary and is shown as a seasonally wet (SW) area on Figure 7, Engineering Geology Map. The water level in the drainage channel is anticipated to vary, depending upon local precipitation events.

4.3 Vegetation

The Black Forest fire burned the majority of trees on the southern and eastern portions of the site and around the previous residence. Deciduous trees remain near the northern and western portions of the site. Overall, the vegetation across the site primarily consists of native grasses, weeds, and other prairie-type vegetation. The drainage channel along the western boundary contains lush grasses and is devoid of trees.

4.4 Aerial Photographs and Remote-Sensing Imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, Colorado Geological Survey (CGS) surficial geologic mapping, and historical photos by historicaerials.com dating back to 1947. The Black Forest area was impacted by a fire in June 2013 in which approximately 14,280 acres were burned and 509 homes were destroyed. This site was one of the homes that was destroyed. The original residence was reportedly constructed around 1975. Prior to 1975, the site was undeveloped forest land. After the 2013 fire, the site was not redeveloped and has remained in ruins.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

The subsurface conditions within the property were explored by drilling two (2) exploratory borings on September 21, 2022, extending to depths of approximately 20 feet below the existing ground surface. The test borings were spaced to provide soil information for each of the two proposed lots. The Proposed Lot Layout with Test Boring Locations is presented in Figure 2.

The number of borings is in excess of the minimum one test boring per 10 acres of development up to 100 acres and one additional boring for every 25 acres of development above 100 acres as required by the ECM, Section C.3.3.

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, utilizing a 2-inch O.D. Split Barrel Sampler. An Explanation of Test Boring Logs and the Test Boring Logs are presented in Figures 3 and 4.

5.1 Laboratory Testing

Soil laboratory testing was performed as part of this investigation. The laboratory tests included moisture content, grain-size analyses, and Atterberg Limit tests. A Summary of Laboratory Test Results is presented in Figure 5. Soils Classification Data is presented in Figure 6.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

The site is located within the central portion of the Great Plains Physiographic Province. A major structural feature known as the Rampart Range Fault is located approximately 4 miles west of the site. The Rampart Range Fault marks the boundary between the Great Plains Physiographic

Province and the Southern Rocky Mountain Province. The site exists within the southern portion of a large structural feature known as the Denver Basin. In general, the geology at the site consists of Louviers and Slocum alluvium composed of sand, silt, clay, and gravel with loamy colluvium that overlies the Dawson Formation.

6.1 Subsurface Soil Conditions

The subsurface materials encountered in the test borings were classified within the laboratory using the Unified Soil Classification System (USCS). The materials were visually identified in the field and classified in the laboratory as well-graded sand with silt (SW-SM) and silty sand (SM) overlying sandstone bedrock.

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

6.2 Bedrock Conditions

In general, the bedrock (as mapped by Colorado Geologic Survey - CGS) beneath the site is considered to be part of the Dawson Formation. The Dawson Formation is entirely of the Late Cretaceous age and is primarily sandstone with relative proportions of fine-grained claystone and siltstone. The sandstone was encountered in both test borings at depths of 4 to 5 feet below the ground surface. Seams of claystone/siltstone bedrock were not encountered but should be expected.

The bedrock is anticipated to be encountered in basement foundation excavations and the utility trenches for the proposed development. Overall, the Dawson sandstone and claystone/siltstone bedrock (if encountered) can readily be excavated with standard construction equipment such as a front-end loader or excavator.

6.3 U.S. Soil Conservation Service

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

- 26 – Elbeth sandy loam, 8 to 15 percent slopes. Properties of the complex include well drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms include hills.

The USDA Soil Survey Map is presented in Figure 9.

6.4 General Geologic Conditions

Based on our field observations and review of relevant geologic maps, we identified the geologic conditions (listed below) affecting the development, as shown on the Engineering Geology Map, Figure 7.

The site generally consists of alluvium and colluvium deposits of the late Cretaceous overlying the Dawson Arkose Formation. Two geologic units were mapped at the site as:

- *Tkda$_5$ – Dawson Formation facies unit five (early to middle(?)Eocene)* – these sandstones are poorly sorted, have high clay contents, and are usually thin to medium bedded. The facies five is estimated to be about 500 feet thick. The unit is generally permeable, well drained, and has good foundation characteristics.
- *SW –Seasonally Wet areas* – areas that may contain low amounts of surface water during heavy rainstorms.
- *Af – Artificial Fill* – fill resulting from the construction of the original structures and septic system.

6.5 Engineering Geology

One engineering geology units were mapped at the site as:

- *1A* – Stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%)

The map unit descriptions for these units are provided by Charles Robinson and Associates (1977).

6.6 Structural Features

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

6.7 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.

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 study site or surrounding areas.

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

6.9 Drainage of Water and Groundwater

The overall topography of the site slopes down to the south and east. As observed in the drainage channel running parallel to the western property boundary, it is anticipated the direction of surface water and groundwater is to flow in the same direction. Groundwater was not encountered in the test borings at the time of drilling or when checked approximately a month subsequent to drilling.

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

The proposed foundations should penetrate sufficient depth to discourage the formation of frost/ice lenses beneath foundations. It is recommended that foundations extend to a depth of at least 2.5 feet below the finished grade for frost protection. A subsurface drain will be necessary to help prevent the intrusion of water into areas located below grade. A typical perimeter drain detail is presented in Figure 11.

It must be understood that the recommended drainage system 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. It is our opinion that at this time there is no evidence to limit the possibility of basement foundations.

6.10 Flooding and Surface Drainage

A natural drainage channel runs parallel to the western property boundary. The drainageway was dry at the time of the site recon performed by RMG. The USGS Topo Map is presented in Figure 8.

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0315G and the online ArcGIS El Paso County Risk Map, the site lies outside of a 100-year floodplain. The site is within the boundaries of Zone X. The FEMA Map is presented in Figure 10.

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

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 2* indicates the site is identified as valley fill comprised of sand and gravel with silt and clay deposited by water in one or a series of stream valley. 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.

The site has also been mapped as “Poor” for oil and gas resources per the Atlas of Sand, Gravel, and Quarry Aggregate Resources. No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area lack the geologic structure for trapping oil or gas, therefore, it is not considered a significant resource.

8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

The El Paso County Engineering Criteria Manual recognizes and delineates the difference between geologic 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 anticipated to pose a significant risk to the proposed development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Compressible Soils
- Ground Subsidence and Abandoned Mining Activity
- Landslides
- Rockfall
- Flood Prone Area
- Groundwater Springs or Seeps
- Shallow Groundwater Tables
- Ponding water
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Scour, Erosion, Accelerated Erosion Along Creek Banks and Drainageways

- Downhill/Down-slope Creep
- Soil Slumps and Undercutting
- Corrosive Minerals
- History of Landfill

The following sections present the geologic conditions that have been identified on the property:

8.1 Expansive Soils

Based on the test borings performed by RMG, sandy clay and claystone bedrock was not encountered at the time of drilling. However, expansive claystone is commonly encountered within the Dawson Formation. These occurrences are typically sporadic. If expansive clay soils or claystone bedrock are encountered beneath foundations, they can cause differential movement in the structures foundation. These occurrences should be identified and mitigated at the time of the site specific subsurface soil investigations and open excavation observations.

Mitigation

If expansive soils or bedrock are encountered beneath the foundations, mitigation will be required. "Mass" subexcavation during land development is currently not proposed, nor do we recommend it at this time. If expansive materials are encountered, localized overexcavation and replacement with non-expansive soils at a minimum of 92 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) is a suitable mitigation. Floor slabs bearing directly on expansive material should be expected to experience movement. Overexcavation and replacement has been successful in reducing slab movement. If clay or claystone seams are encountered, overexcavation depths of 3 to 4 feet are anticipated. Moisture-conditioning and recompacting the on-site clays (if encountered) may also be considered for mitigation of expansive materials.

The final determination of mitigation alternatives and foundation design criteria are to be determined in site-specific subsurface soil investigations for each lot. Provided that appropriate mitigations and/or foundation design adjustments are implemented, the presence of expansive soils or bedrock is not considered to pose a risk to the proposed structures.

8.2 Uncontrolled/Undocumented Fill Placement

It is our understanding the existing structures are to be demolished and all resulting debris removed prior to the construction of a new single-family residence. At this time, the removal of the existing septic components has not been confirmed. However, due to the age of the system it is anticipated the septic components may be removed and replaced with a new on-site wastewater treatment system (OWTS).

Mitigation

Fill soils were not encountered during our investigation. However, with the removal of the existing residence and possibly the septic components, some uncontrolled fill may remain. At this time, the location of a future residences and OWTS systems are unknown. If the new residences were to lie in the same location as the previous structures, some unsuitable fill soils may be encountered during construction. All fill and contaminated soils encountered are considered unsuitable for

support of foundation components. Typically, mitigation of uncontrolled fill soils will require removal (overexcavation) and replacement with newly placed and compacted structural fill. The zone of overexcavation shall extend to the bottom of the unsuitable fill zone and shall extend at least that same distance beyond the building perimeter (or lateral extent of the fill, if encountered first).

8.3 Seasonal Surface Water

A natural drainageway runs parallel to the western property boundary. The drainageway was dry at the time of the site recon performed by RMG. In this area we would anticipate the potential for periodically high subsurface moisture conditions and frost heave potential. This are lies within a low lying area that may collect surface water during high moisture periods. This area can likely be avoided or properly mitigated if construction were to encroach. If structures were to encroach this area the following precautions should be followed.

Mitigation

In areas where higher moisture conditions are periodically anticipated, additional subsurface drains may be recommended to prevent the intrusion of water in to areas below grade. Foundations are required to have a minimum 30-inch depth for frost protection. Any grading in and around this area should be done to direct surface flow around construction to avoid ponding water. Septic fields should not be located in drainageways due to the potential for ponding water.

8.4 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 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 located near 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 0.213g 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.

8.5 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 County and the 80908 zip code in which the site is located, has an EPA assigned Radon Zone of *1*. A radon Zone of *1* predicts an average indoor radon screening level greater than 0.4 pCi/L (picocuries per liter), which is above the recommended levels assigned by the EPA. *The EPA recommends corrective measures to reduce exposure to radon gas.*

All of the State of Colorado is considered EPA Zone 1 based on the information provided at https://county-radon.info/CO/El_Paso.html. Elevated hazardous levels of radon from naturally occurring sources are not anticipated at this site.

Mitigation

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

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

8.6 Proposed Grading, Cuts and Masses of Fill, and Erosion Control

Fill soils were not encountered at the time of drilling. If fill soils are encountered, they may be considered unsuitable for a variety of reasons. These include (but are not limited to) non-engineered fills, fill soils containing trash or debris, fill soils that appear to have been improperly placed and/or compacted, etc.

Mitigation

If unsuitable fill soils are encountered during the site-specific subsurface soil investigation and/or the open excavation observation, they will require removal (overexcavation) and replacement with newly-placed and compacted structural fill.

The on-site sand soils can generally be used as site-grading fill. If unsuitable fill soils are encountered at the time of construction for the single-family residences, they should be removed (overexcavated) and replaced with compacted structural fill. The zone of overexcavation shall extend to the bottom of the unsuitable fill zone and shall extend at least that same distance beyond the building perimeter (or lateral extent of any fill, if encountered first). Provided that this

recommendation is implemented, the presence of this fill is not considered to pose a risk to proposed structures.

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

We believe the surficial silty to clayey 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 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).

Erosion generally refers to lowering the ground surface over a wide area. The on-site soils are mildly to moderately susceptible to wind and water erosion. Temporary problems may arise due to minor wind erosion and dust during and immediately after construction. Watering of the cut areas or the use of chemical palliatives may be needed to control dust. However, once construction has been completed and vegetation reestablished, the potential for wind erosion and dust will be considerably reduced.

Loose soils are the most susceptible to water erosion. The residually weathered sands on site were encountered at medium densities and overlaid medium hard to very hard sandstone bedrock which is increasingly less susceptible to water erosion.

Cut and fill areas may be subjected to sheetwash (surface) erosion. Unchecked erosion could eventually lead to concentrated flows of water. Generally, the most effective means to control erosion is to re-vegetate the cut and fill slopes with native vegetation.

9.0 ON-SITE WASTEWATER TREATMENT SYSTEMS

It is our understanding that On-site Wastewater Treatment Systems (OWTS) are proposed for the subdivided lots. The site was evaluated in general accordance with the El Paso Land Development Code, specifically sections 8.4.8. Two test pits were performed across the site to obtain a general understanding of the soil and bedrock conditions. The Test Pits Logs are presented in Figure 12.

The United States Department of Agriculture (USDA) as discussed in section 6.3 consisted of sandy loam. Limiting layers were encountered in both test pits at a depth of 5.5 and 6.5 feet due to the sandstone bedrock. The long term acceptance rates (LTAR) associated with the upper sand soils observed in the test pits is expected to be 1.0 (soil types R-0 and R-1) gallon per day per square foot. Signs of seasonal groundwater were not observed in the test pits.

Contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to the El Paso County Board of Health Guidelines and property maintained.

Treatment areas at a minimum, must achieve the following:

- 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, most recently amended May 23, 2018;
- Each lot (after purchase but prior to construction of an OWTS) will require an OWTS Site Evaluation report prepared per *the Regulations of the El Paso County Board of Health, Chapter 8 OWTS Regulations*. During the site reconnaissance, a minimum of two 8-foot deep test pits will need to be excavated in the vicinity of the proposed treatment area;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCHDE);
- 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 EPCHDE;
- It is not recommended that the existing septic system be utilized for new construction. The existing system was constructed in 1975. The average life span of a septic system is generally 20 to 30 years. It is unlikely the existing septic system will meet the current criteria for a Transfer of Title Inspection per 8.4 (O).6 per EPCHDE;
- If an existing system is to be removed, the resulting debris (e.g. tank, components, and/or contaminated soil) should be disposed of properly;
- New treatment areas are not to be located within the existing septic field areas unless the existing system has been properly removed and disposed of.

It is our opinion that if the EPCHDE physical setback requirements are met for each lot, there are no restrictions on the placement of the individual On-site Wastewater Systems.

Soil and groundwater conditions at the site are suitable for individual treatment systems. It should be noted that the LTAR values stated above are for the test pit locations performed for this report only. The LTAR values may change throughout the site. The soils encountered at the time of our observation are anticipated to require an "engineered system". Additional information can be reviewed within the Wastewater Study, presented in Appendix C.

10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in section 8 of this report) found to be present at this site include faults and seismicity and radon. Geologic conditions (as described in section 8 of this report) found to be present at this site include expansive soils, seasonal surface water and potentially uncontrolled fill. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering, design, and construction practices.

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 not intended for use for design and construction. **We recommend that a *lot-specific* Subsurface Soil Investigation be performed for the proposed future structures.** The extent of any fill soils encountered during the lot-specific investigation(s) should be evaluated for suitability to support the proposed structures prior to construction.

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

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 are considered typical for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and suitable construction practices.

In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be considered. Exterior, perimeter foundation drains should be installed around below-grade habitable or storage spaces. A typical perimeter drain detail is presented in Figure 11. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil.

The foundation system for each single family residences should be designed and constructed based upon recommendations developed in a site-specific subsurface soil investigation.

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.

Additionally, 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.

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.

We believe the surficial sand soils will classify as Type C 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 1-1.5:1 (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 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 too carefully familiarize themselves with the geologic constraints 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 **SMH Consultants** in accordance with generally accepted geotechnical engineering and engineering geology practices. The conclusions and recommendations in this report are based in part upon data obtained from review of available topographic and geologic maps, review of available reports of previous studies conducted in the site vicinity, a site reconnaissance, and research of available published information, soil test borings, soil laboratory testing, and engineering analyses. The nature and extent of variations may not become evident until construction activities begin. If variations then become evident, RMG should be retained to re-evaluate the recommendations of this report, if necessary.

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

FIGURES

NOT TO SCALE

Architecture
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Materials Testing
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SITE VICINITY MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, COLORADO
PAWEL POSORSKI

JOB No. 191208

FIG No. 1

DATE 12-5-2022

NOT TO SCALE

DENOTES APPROXIMATE LOCATION OF TEST BORINGS PERFORMED FOR THIS STUDY

JOB No. 191208

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MLO HEIGHTS
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EL PASO COUNTY, COLORADO
PAWEL POSORSKI

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	12-05-2022

PROPOSED LOT LAYOUT WITH TEST BORING LOCATIONS

SHEET No.
FIG-2

SOILS DESCRIPTION

 SANDSTONE

 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

 DEPTH AT WHICH BORING CAVED

 BULK DISTURBED BULK SAMPLE

 AUG AUGER "CUTTINGS"

4.5 WATER CONTENT (%)

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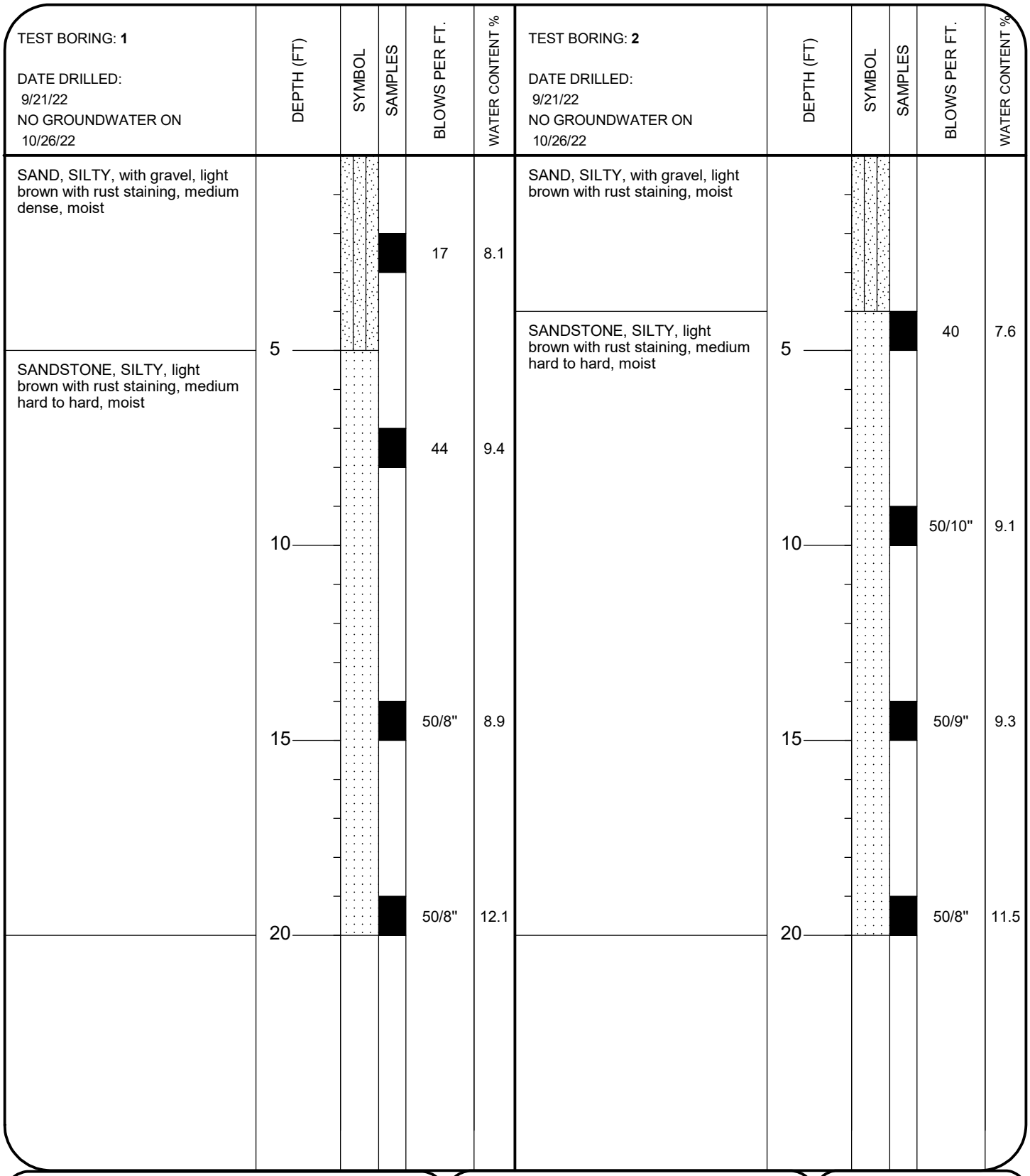
EXPLANATION OF TEST BORING LOGS

JOB No. 191208

FIGURE No. 3

DATE Dec/05/2022



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TEST BORING LOG

JOB No. 191208

FIGURE No. 4

DATE Dec/05/2022

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	2.0	8.1								
1	7.0	9.4		NP	NP	3.8	12.6			SM
1	14.0	8.9								
1	19.0	12.1								
2	4.0	7.6		NP	NP	12.2	9.7			SW-SM
2	9.0	9.1								
2	14.0	9.3								
2	19.0	11.5								

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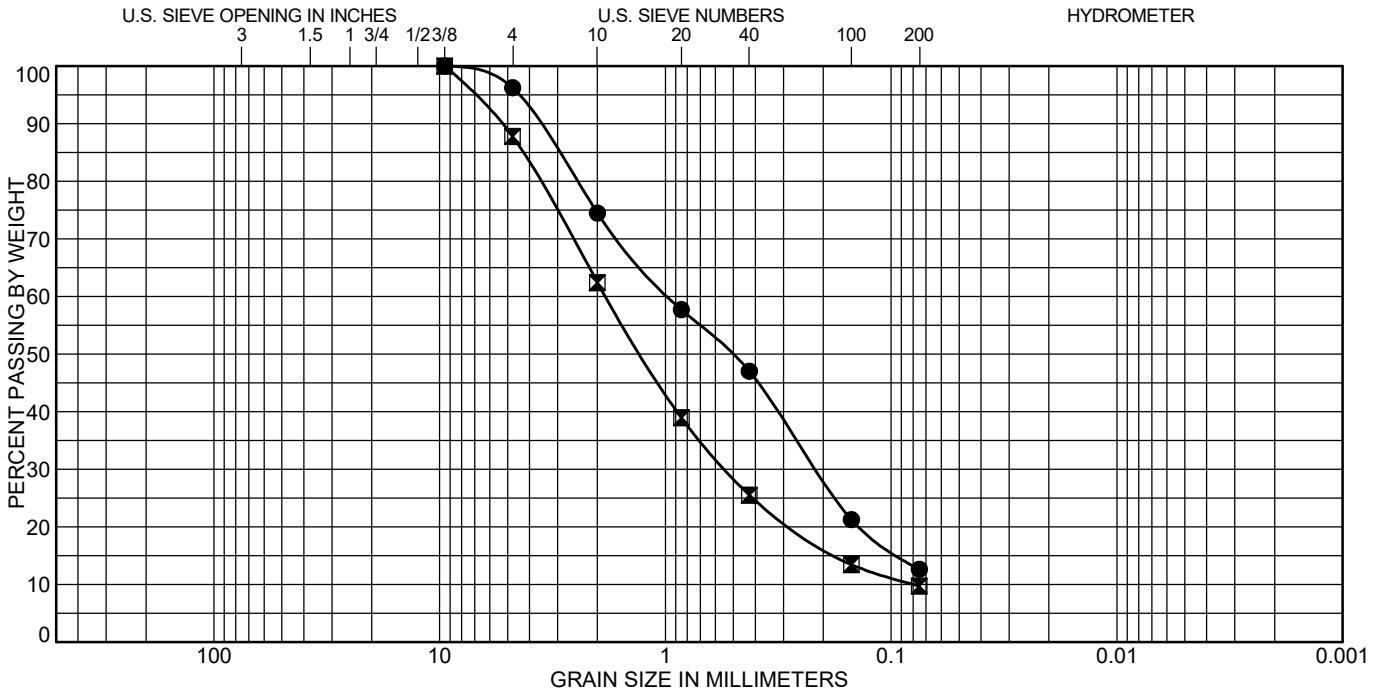
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 191208
FIGURE No. 5
PAGE 1 OF 1
DATE Dec/05/2022



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	1	7.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊠	2	4.0	**WELL-GRADED SAND with SILT(SW-SM)**	**NP**	**NP**	**NP**

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	7.0	3.8	83.6	12.6	
⊠	2	4.0	12.2	78.1	9.7	

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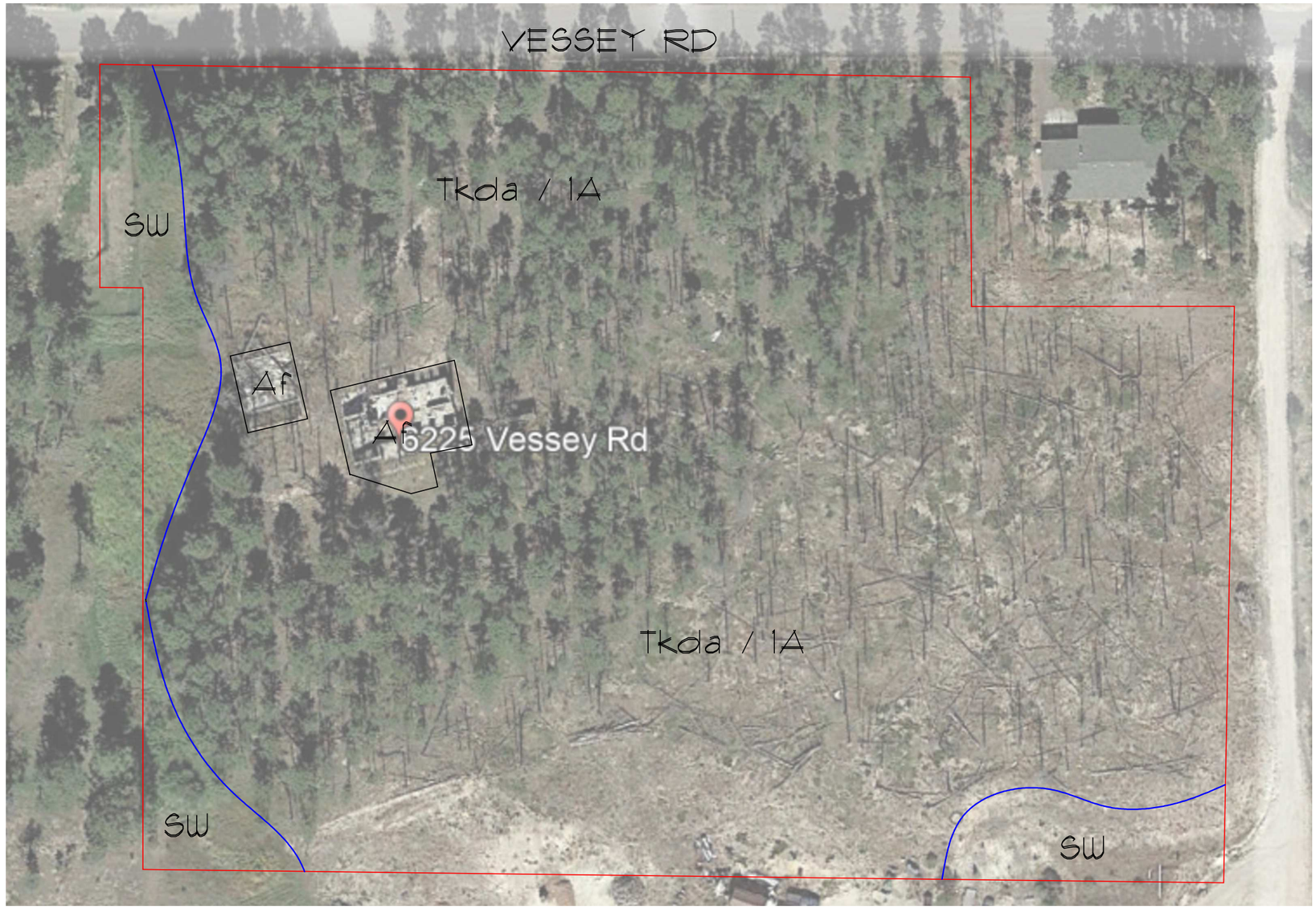
SOIL CLASSIFICATION DATA

JOB No. 191208

FIGURE No. 6

DATE Dec/05/2022



NOT TO SCALE

General Geologic Conditions

- *$Tkda_5$* - Dawson Formation facies unite three (Eocene) - these sandstones are poorly sorted, have high clay contents, and are usually thin to medium bedded. The facies five is estimated to be about 500 feet thick. The unit is generally permeable, well drained, and has good foundation characteristics.
- *SW* -Seasonally Wet areas - areas that may contain low amounts of surface water during heavy rainstorms.
- Af - Artificial Fill - fill resulting from construction of the original structures and septic system.

Engineering Geology

- *1A* - Stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%)

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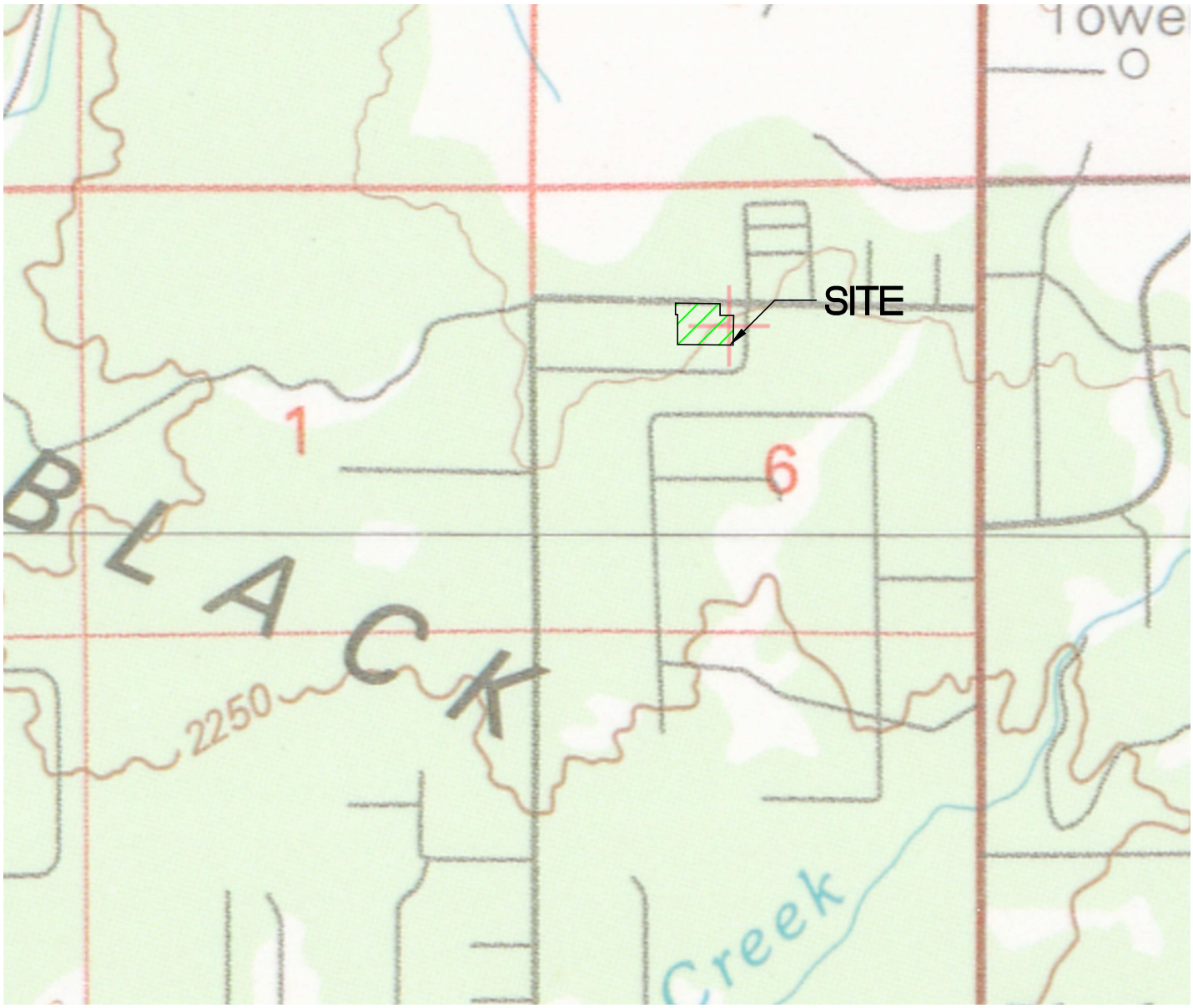
ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	12-05-2022

ENGINEERING GEOLOGY MAP

SHEET No.
FIG-7



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USGS TOPO MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, COLORADO
PAWEL POSORSKI

JOB No. 191208

FIG No. 8

DATE 12-5-2022

28 - Elbeth sandy loam, 8 to 15 percent slopes

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USDA SOIL SURVEY MAP

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JOB No. 191208

FIG No. 9

DATE 12-5-2022

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FEMA MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, COLORADO
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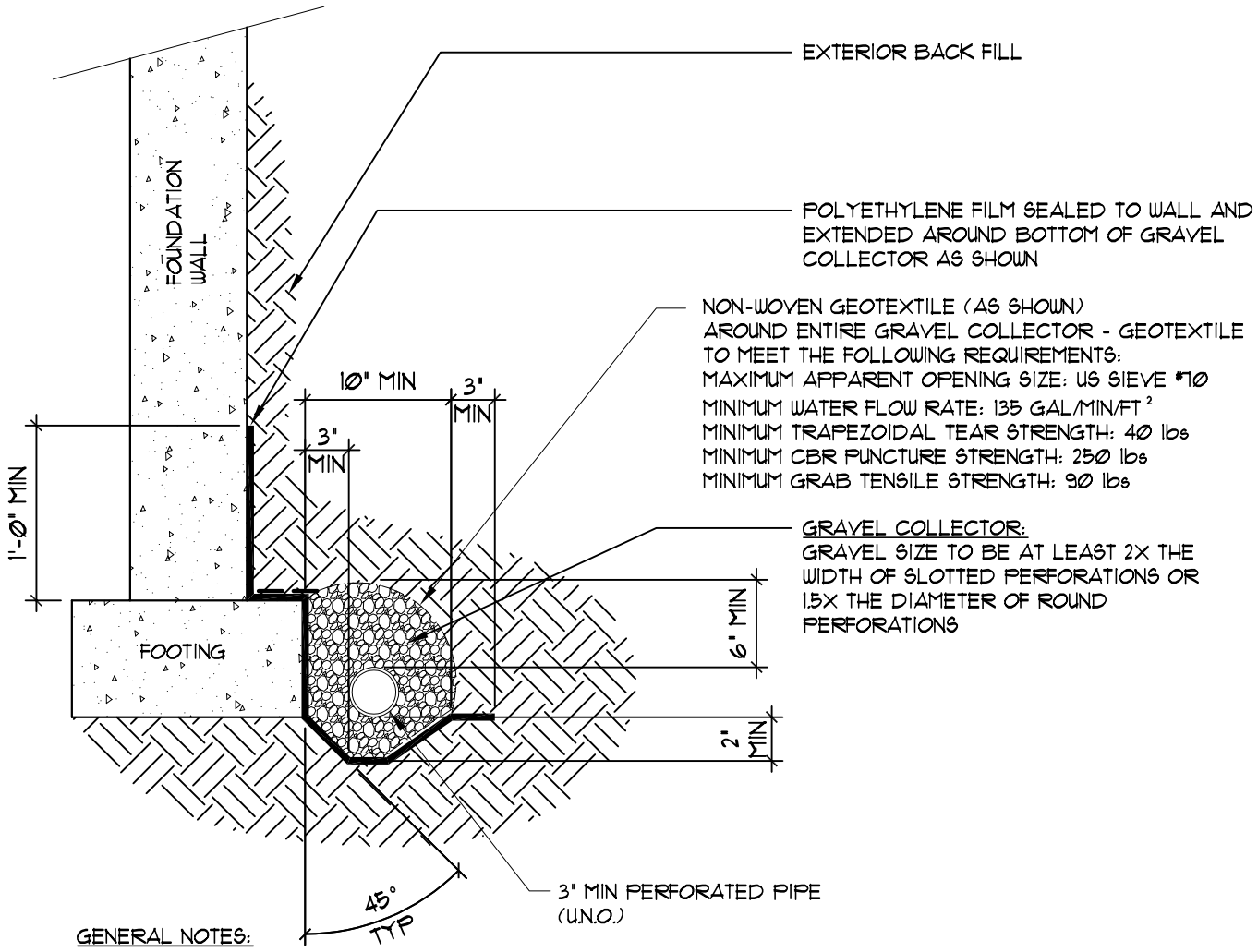
JOB No. 191208

FIG No. 10

DATE 12-5-2022



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. THE OUTFALL SHOULD EXTEND PAST BACKFILL ZONES AND DISCHARGE TO A LOCATION THAT IS GRADED TO DIRECT WATER OFF-SITE.
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.
7. A VERTICAL SEGMENT OF PERFORATED DRAIN PIPE, CAPPED AT THE TOP, SHALL EXTEND TO FINISH GRADE WITHIN ALL WINDOW WELLS.

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PERIMETER DRAIN

FIG No. 11

TEST PIT TP-1

DATE OBSERVED: 10/4/22

SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 5.5 FT SANDY CLAY LOAM (STRONG)	2ft 4ft		4
	6ft 8ft		

TEST PIT TP-2

DATE OBSERVED: 10/4/22

SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 1 FT LOAMY SAND (SINGLE GRAIN)			1
1 - 6.5 FT SANDY CLAY (STRONG)	2ft 4ft 6ft		4
	8ft		

SOIL DESCRIPTIONS

LOAMY SAND

SANDY CLAY LOAM

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TEST PIT LOGS

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, CO
PAWEL POSORSKI

JOB No. 191208

FIG No. 12

DATE 11-9-2022

SHEET 1 of 1

APPENDIX A

Additional Reference Documents

1. *Exhibit, 6225 Vessey Road, El Paso County, Colorado,* prepared by SMH Consultants, dated June 6, 2022.
2. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0315G,* Federal Emergency Management Agency (FEMA), effective December 7, 2018.
3. *Geologic Map of the Monument Quadrangle, El Paso County, Colorado,* Thorson, J.P., and Madole, R.F., Colorado Geological Survey, Open-File Report OF02-04, 2004.
4. *Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
5. *Map of Potential Geologic Hazards and Surficial Deposits,* compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
6. *Pikes Peak Regional Building Department:* https://www.pprbd.org/.
7. El Paso County Assessor Website https://property.spatialest.com/co/elpaso/#/property/5206000107
8. *Colorado Geological Survey, USGS Geologic Map Viewer*: http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
9. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1947, 1952, 1955, 1960, 1969, 1983, 1984, 1999, 2005, 2009, 2011, 2013, 2011, 2013, 2015, 2017, and 2019.
10. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ El Paso County, Black Forest Quadrangle, 2019.
11. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2011, 2015, 2017, 2019, 2020 and 2022.
12. Kirkham, R.M., and Ladwig, L.R., 1979, Coal resources of the Denver and Cheyenne basins, Colorado: Colorado Geological Survey Resource Series 5, 70 p., 5 plates
13. Keller, J.W., Phillips, R.C., and Morgan, Karen, 2002, Digital inventory of industrial mineral mines and mine permit locations in Colorado: Colorado Geological Survey Information Series IS-62, CD ROM.
14. Mason, G. T., and Arndt, R. E., 1996, Mineral resource data system (MRDS): U.S. Geological Survey Digital Data Series DDS-20 (CD-ROM).
15. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands*
16. The *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction*, *Map 1.*

Appendix B
Site Reconnaissance Photos


211°SW (T) 39°2'12"N, 104°42'41"W ±13ft ▲7544ft
SNOW CHAMP
191028
Culvert south neighbor
03 Oct 2022, 10:48:28


204°SW (T) 39°2'16"N, 104°42'43"W ±13ft ▲7566ft
191028
Remaining house
03 Oct 2022, 11:08:47


355°N (T) 39°2'14"N, 104°42'44"W ±13ft 7559ft
RMG TP-1
TP-1
191028
03 Oct 2022, 11:00:48


28°NE (T) 39°2'14"N, 104°42'39"W ±13ft 7543ft
RMG TP-2
TP-2
191028
03 Oct 2022, 10:43:40


359°N (T) 39°2'14"N, 104°42'44"W ±13ft 7562ft
191028
TP-1 N
03 Oct 2022, 11:01:44


271°W (T) 39°2'15"N, 104°42'44"W ±19ft 7563ft
191028
TP-1 W
03 Oct 2022, 11:04:06


90°E (T) 39°2'14"N, 104°42'39"W ±16ft ▲7543ft
191028
TP-2 E
03 Oct 2022, 10:54:07


270°W (T) 39°2'14"N, 104°42'38"W ±13ft ▲7543ft
191028
TP-2 W
03 Oct 2022, 10:55:25


210°SW (T) 39°2'16"N, 104°42'44"W ±13ft ▲7564ft
191028
Wet Land
03 Oct 2022 11:07:02

Appendix C
Wastewater Study

Job No. 191208

December 5, 2022

Pawel Posorski
7655 Dawnview Cf
Colorado Springs, CO 80920

Re: Wastewater Study
Ivilo Heights
El Paso County, Colorado

Dear Mr.Posorski:

As requested, personnel of RMG – Rocky Mountain Group has performed a preliminary investigation and site reconnaissance at the above referenced address. It is our understanding the parcels included in this study are:

- EPC Schedule No. 5206000107: the parcel, addressed as 6225 Vessey Road, which consists of 6.02 acres and is zoned *"RR-5" – Residential Rural.*

It is our understanding that the property is to be subdivided into two lots of approximately 3.01 acres each. Each new lot is to be developed with a new single-family residence, well, and on-site wastewater treatment system (OWTS). Both lots are to be accessed from Vessey Road.

This letter is to provide information for the on-site wastewater report per the On-Site Wastewater Treatment Systems (OWTS) Regulations of the El Paso County Board of Health pursuant to Chapter 8.

The following are also excluded from the scope of this report including (but not limited to) foundation recommendations, site grading/surface drainage recommendations, subsurface drainage recommendations, 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.

Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site were not available for our review. However, RMG completed a Soils and Geology Study for the proposed Ivilo Heights subdivision, Job No. 191208, dated December 5, 2022.

The findings, conclusions and recommendations contained in the Soils and Geology Study were considered during the preparation of this report.

SITE CONDITIONS

Personnel of RMG performed a reconnaissance visit on October 3, 2022 and observed the test pit excavation on October 4, 2022. The purpose of the reconnaissance visit was to evaluate the site surface characteristics including landscape position, topography, vegetation, natural and cultural features, and current and historic land uses. Two test pits were performed on the site during our reconnaissance visit. A Test Pit Location Plan is presented in Figure 1.

The Black Forest fire burned the majority of trees on the southern and eastern portions of the site and around the previous residence. Deciduous trees remain near the northern and western portions of the site. Overall vegetation across the site primarily consists of native grasses, weeds, and other prairie-type vegetation. The drainage channel along the western boundary contains lush grasses and is devoid of trees.

The following conditions were observed with regard to the 6.02-acre parcel:

- A well currently **does** exist on the existing 6.02-acre site;
- No runoff or irrigation features anticipated to cause deleterious effects to treatment systems on the site were observed;
- No major waterways exist on the property. The entire site lies outside the designated floodway or floodplain;
- A minor drainageway exists near the western property boundary;
- Slopes greater than 20 percent **do not** exist on the site and,
- Significant man-made cuts **do not** exist on the site.

Treatment Areas

The United States Department of Agriculture (USDA) classified the soils as sandy loam. Limiting layers were encountered in both test pits at a depth of 5.5 and 6.5 feet due to the sandstone bedrock. The long term acceptance rates (LTAR) associated with the upper sand soils observed in the test pits is expected to be 1.0 (soil types R-0 and R-1) gallon per day per square foot. Signs of seasonal groundwater were not observed in the test pits.

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;
- 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 (EPCHDE);
- 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 EPCHDE;
- 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, dry gulches, cut banks and fill areas (from the crest);
- The new lots shall be laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways). Based on the test pit observations, the parcel has a minimum of two locations for the OWTS;
- It is not recommended that the existing septic system be utilized for new construction. The existing system was constructed in 1975. The average life span of a septic system is generally 20 to 30 years. It is unlikely the existing septic system will meet the current criteria for a Transfer of Title Inspection per 8.4 (O).6 per EPCHDE;
- If an existing system is to be removed, the resulting debris (e.g. tank, components, and/or contaminated soil) should be disposed of properly;
- New treatment areas are not to be located within the existing septic field areas unless the existing system has been properly disposed of.

The City-County Health Department, permit and sewage disposal inspection forms are included in Appendix A.

Contamination of surface and subsurface water resources should not occur if the treatment areas are evaluated and installed according to El Paso County Health Department and State Guidelines in conjunction with proper maintenance.

DOCUMENT REVIEW

RMG has reviewed the above referenced site plan, identified the soil conditions anticipated to be encountered during construction of the proposed OWTS for the Ivilo Heights subdivision which included a review of documented Natural Resource Conservation Service - NRCS data provided by websoilsurvey.nrcs.usda.gov. The Soil Survey Descriptions are presented below. A review of FEMA Map No. 08041C0315G, effective December 7, 2018 indicates that the proposed treatment areas are not located within an identified floodplain.

SOIL EVALUATION

Personnel of RMG performed a soil evaluation to include two 8-foot deep test pits, on October 4, 2022 (Test Pit TP-1 and TP-2), utilizing the visual and tactile method for the evaluation of the site soils. The test pits were excavated in areas that appeared most likely to be used for residential construction. The Test Pit Logs are presented in Figure 2. A Septic Suitability map is presented in Figure 3.

The soil conditions as indicated by the NRCS data are anticipated to consist of Elbeth sandy loam, 8 to 15 percent slopes. Properties of the complex include well drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms include hills. A USDA Soil Survey Map and USDA Full Map Unit Descriptions are presented in Figures 4 and 5.

Groundwater was not encountered in the test pits. However, bedrock was encountered in both the test pits performed by RMG.

An OWTS is proposed for both lots within the Ivilo Heights subdivision and should conform to the recommendations of a future OWTS site evaluation, performed in accordance with the applicable health department codes prior to construction. This report may require additional test pits in the vicinity of the proposed treatment field. A minimum separation of 4 feet shall be maintained from groundwater and bedrock to the infiltrative surface.

Redoximorphic features indicating the fluctuation of groundwater or higher ground water levels were not observed in the test pits.

CONCLUSIONS

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. There are no foreseeable or stated construction related issues or land use changes proposed at this time. The new lots are suitable for an individual OWTS.

LIMITATIONS

The information provided in this report is based upon the subsurface conditions observed in the profile pit excavations and accepted engineering procedures. The subsurface conditions encountered in the excavation for the treatment area may vary from those encountered in the test pit excavations. Therefore, depth to limiting or restrictive conditions, bedrock, and groundwater may be different from the results reported in this letter.

An OWTS site evaluation will need to be performed in accordance with the applicable health department codes prior to construction.

I hope this provides the information you have requested. Should you have questions, please feel free to contact our office.

Cordially,

RMG – Rocky Mountain Group

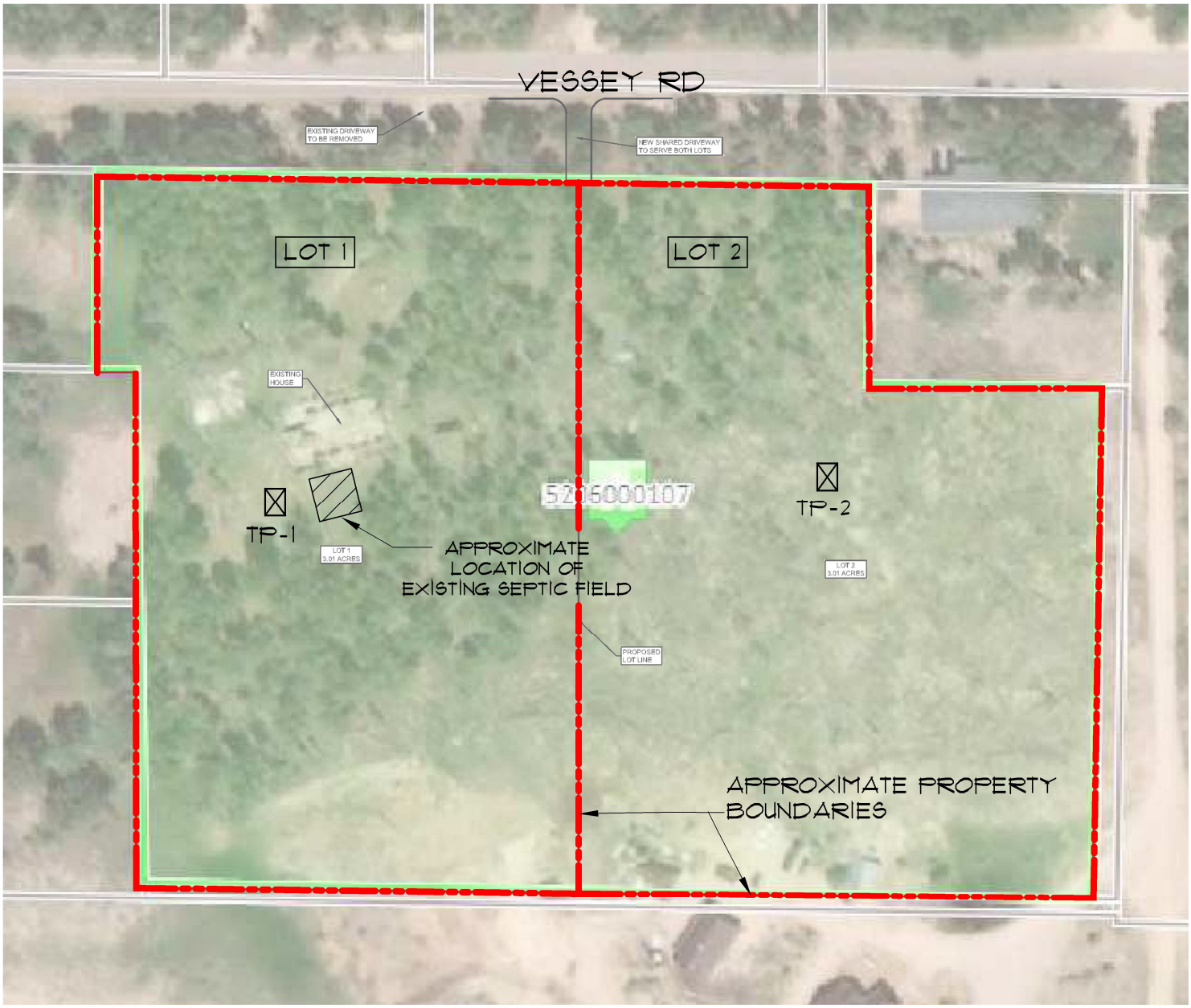
Kelli Zigler

Kelli Zigler
Sr. Project Geologist

Reviewed by,

RMG – Rocky Mountain Group

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



NOT TO SCALE

☒ DENOTES APPROXIMATE LOCATION OF TEST PITS

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects
SOUTHERN COLORADO OFFICE
2910 AUSTIN BLUFFS PKWY, SUITE 100,
COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM
Southern Colorado, Denver Metro, Northern Colorado

TEST PIT LOCATION MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, CO
PAWEL POSORSKI

JOB No. 191208

FIG No. 1

DATE 12-5-2022

TEST PIT TP-1

DATE OBSERVED: 10/4/22

SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 5.5 FT SANDY CLAY LOAM (STRONG)	2ft 4ft		4
	6ft 8ft		

TEST PIT TP-2

DATE OBSERVED: 10/4/22

SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 1 FT LOAMY SAND (SINGLE GRAIN)			1
1 - 6.5 FT SANDY CLAY (STRONG)	2ft 4ft 6ft		4
	8ft		

SOIL DESCRIPTIONS

LOAMY SAND

SANDY CLAY LOAM

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects
SOUTHERN COLORADO OFFICE
2910 AUSTIN BLUFFS PKWY, SUITE 100,
COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

TEST PIT LOGS

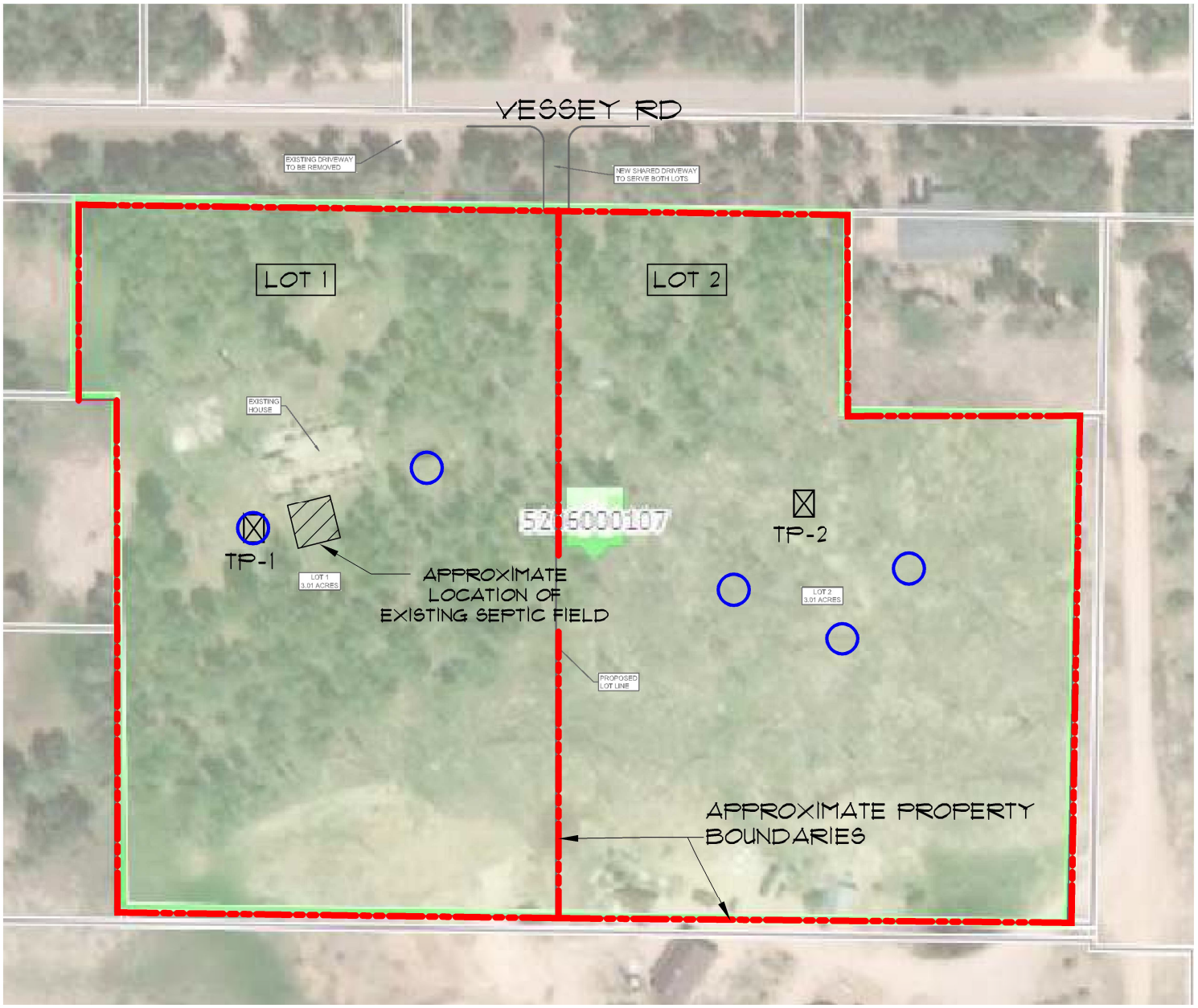
MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, CO
PAWEL POSORSKI

JOB No. 191208

FIG No. 2

DATE 12-5-2022

SHEET 1 of 1



NOTE: The septic locations are for illustration only. If the El Paso County Health Department physical setback requirements are met for each lot, there are no restrictions on the placement of the individual OWTS

NOT TO SCALE

DENOTES PRIMARY AND ALTERNATE SEPTIC LOCATIONS

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects
SOUTHERN COLORADO OFFICE
2910 AUSTIN BLUFFS PKWY, SUITE 100,
COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM
Southern Colorado, Denver Metro, Northern Colorado

SEPTIC SUITABILITY MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, CO
PAWEL POSORSKI

JOB No. 191208

FIG No. 3

DATE 12-5-2022

28 - Elbeth sandy loam, 8 to 15 percent slopes

NOT TO SCALE

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects
SOUTHERN COLORADO OFFICE
2910 AUSTIN BLUFFS PKWY, SUITE 100,
COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM
Southern Colorado, Denver Metro, Northern Colorado

USDA SOIL SURVEY MAP

MILO HEIGHTS
VESSEY ROAD
EL PASO COUNTY, COLORADO
PAWEL POSORSKI

JOB No. 191208

FIG No. 4

DATE 12-5-2022

APPENDIX A

The City-County Health Department, permit and sewage disposal inspection

Black Forest 5.4 acres/well

#52060-00-107 # 4068

P File 2215

CITY-COUNTY HEALTH DEPARTMENT
COLORADO SPRINGS, COLORADO

SEWAGE DISPOSAL INSPECTION FORM

APPROVAL: V.A. & F.H.A. DATE OF INSP. 3 Sep. '75
YES ✓ NO ___ ENVIRONMENTALIST G. Harris

LOCATION (STREET NUMBER) 6225 Vessey Rd. OCCUPANT Glen Bert Janes

LEGAL DESCRIPTION ___

CONTRACTOR (occupant) NO.OF BEDROOMS 5 bdrms.

TYPE OF CONSTRUCTION Brick House

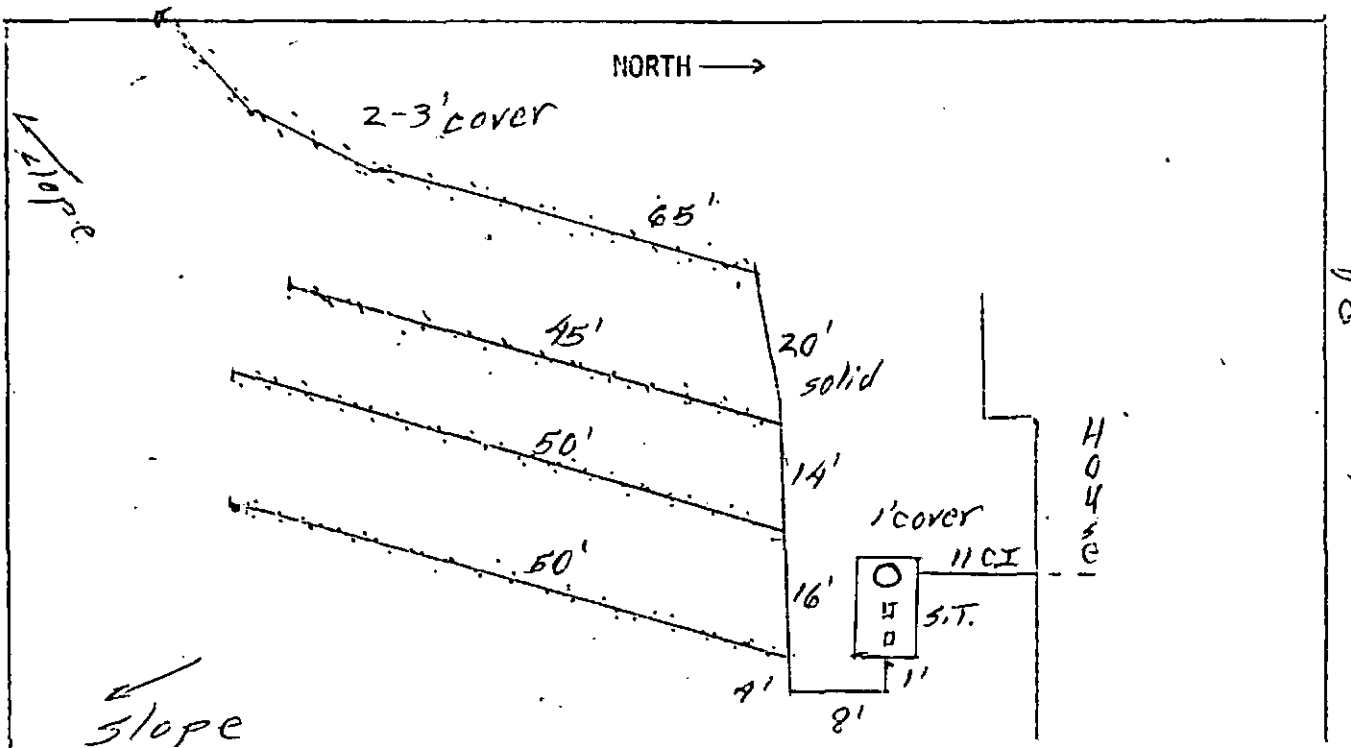
SYSTEM INSTALLED BY (occupant) & Jack Ford

PRIMARY TREATMENT

COMMERCIAL MFG. Pre-cast S.T. SIZE 1500 gals.
NON. COMMERCIAL ___ SIZE ___
TYPE OF MATERIAL ___ NO. COMPARTMENTS two
WIDTH ___ LENGTH ___ GALLONS ___ DEPTH (TOTAL) ___ LIQ.CAP. ___

SECONDARY TREATMENT

DISPOSAL FIELD Leach Lines SOIL SW PERC. TEST 5min./in minimum used
TOTAL LENGTH OF TILE LINES 210' NUMBER OF LINES 4 DISTANCE BETWEEN LINES 14'+
ABSORB. AREA 630ft² TYPE OF TILE plastic TRENCH DEPTH 3-4' TRENCH WIDTH 3' GRADE <4"/100'
TYPE FILTER MATERIAL 30 lens, mixed rc. DEPTH 12" UNDER TILE 6" OVER TILE 2"
LEACHING PITS (NO.) ___ SOIL ___ PERC.TEST ___ LINING MATERIAL ___
CAPACITY SQ.FT. ___ DIAM ___ WORKING DEPTH ___
DISPOSAL BED LENGTH ___ WIDTH ___ DEPTH ___ TOTAL SQ.FT. ___



Acres ____

Water Supply ____

EL PASO COUNTY . CITY-COUNTY HEALTH DEPARTMENT
501 North Foote Avenue . Colorado Springs, Colorado - 471-3700

PERMIT

Receipt No. ____

TO CONSTRUCT, ALTER, REPAIR OR MODIFY AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Issued To Glenn Bert Jones 473-1165 Date January 14, 1975

Address of Property 3825 Vessey Road, Black Forest

(Permit valid at this address only)

Builder - Contractor - Owner Address Same Phone 473-1165 prev. home 473-1099

Sewage-Disposal System work to be performed by Same Phone ____

This Permit is issued in accordance with Regulation XII and Article 2 of Chapter 66, Colorado Revised Statutes 1963, as amended by the addition of a new Section 66-2-16. (H.B. 1205, 7-1-65). PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of six (6) months from date of issue - whichever occurs first - (unless work is in progress).

- This Permit does not denote approval of zoning and acreage requirements. -

Permit Fee ~~NO Fee~~ Extended to XXXX $50.00

June 14, 1975 Sept 14, 1975 pab
Date of Expiration

Charles K. Dawdina, M.D., M.P.H.
Director, City-County Health Department

Environmentalist

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION.

24-HOUR ADVANCE NOTICE REQUIRED

Septic tank 1500 gals. Field 313 Feet of trench ____ inches wide

OR- Field 209 Feet of trench 3' inches wide

Seepage bed ____ ft. long ____ ft. wide. Seepage pit ____ sq. ft. ____ diam. ____ w/d

The Health Officer shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable times for the purpose of making such inspections as are necessary to determine compliance with requirements of this regulation.

TESTING AND ENGINEERING SERVICES, INC.

3049 DELTA DRIVE

COLORADO SPRINGS, COLORADO 80910

(303) 392-6056

#5206000107
09/03/1975
6225 VESSEY RD

E

SOIL PERCOLATION DATA SHEET

Date Accepted: January 12, 1972 **Date Test Performed:** January 12, 1972

Client: Previous owner before House Mr. Charles Roberts completed **Address:** 312 Enchanted Circle West

City: Colorado Springs, **State:** Colorado **Zip Code:** 80917

Telephone: 597-6592 **Observer:** Milt G. Schreiber

Location of Test: ½ mile West on Vessey Road-Black Forest

PERCOLATION RATE MEASUREMENT RESULTS

TRIAL NO.	DEPTH START (Inches)	TIME START	DEPTH FINISH (Inches)	TIME FINISH	TOTAL DROP (Inches)	TOTAL DROP TIME	MINUTES /1" DROP
1	13"	10:50	20"	11:00	7"	10 min.	1.4

S.T. 1500 gal.
625A = 313' @ 24"
or 209' @ 36"

BORING AND SOIL CLASSIFICATION RESULTS

TRIAL NO.	DEPTH	SOIL CLASSIFICATION GROUP SYMBOL (S)	SOIL DESCRIPTION	DEPTH TO GROUND WATER
1	0-10'	SW	Well graded sand.	Unknown

Depth to Impervious Formation: Unknown **Saturation time:** 30 minutes

Distance from nearest well: Unknown **Depth of nearest well:** Unknown

MINIMUM SEWAGE-DISPOSAL SYSTEM REQUIREMENTS

SUBSURFACE ABSORPTION FIELD[1]	SEEPAGE PITS[2]
MINIMUM REQUIRED AREA:	MINIMUM WALL AREA REQUIRED:
125 SQ. FT./BEDROOM	N/A SQ. FT./BEDROOM

Request visual inspection of open trenches. Please notify.
accepted as stip Aug. '75

1. FHA Minimum Property Standards: 1103 - 7
Public Health Service Publication No. 526

2. FHA Minimum Property Standards: 1103 - 8

Keith Martin

Keith Martin, P.E.

TESTING AND ENGINEERING SERVICES, INC.

3049 DELTA DRIVE

COLORADO SPRINGS, COLORADO 80910

(303) 392-6050

SOIL PERCOLATION DATA SHEET

Date Accepted: January 12, 1973 Date Test Performed: January 12, 1973

Client: Mr. Charles Roberts Address: 312 Enchanted Circle West

City: Colorado Springs, State: Colorado Zip Code: 80917

Telephone: 597-6592 Observer: Milt G. Schreiber

Location of Test: ½ Mile West on Vessey Road-Black Forest

PERCOLATION RATE MEASUREMENT RESULTS

TRIAL NO.	DEPTH START (Inches)	TIME START	DEPTH FIN SH (Inches)	TIME FINISH	TOTAL DROP (Inches)	TOTAL DROP TIME	MINUTES PER DROP
1	13"	10:50	20"	11:00	7"	10 Min	0.7

BORING AND SOIL CLASSIFICATION RESULTS

TRIAL NO.	DEPTH	SOIL CLASSIFICATION GROUP & MECL(S)	SOIL DESCRIPTION	DEPTH TO GROUND WATER
1	0-10'	SW	Well graded sand	UNK

Depth to impervious formation: UNK Saturation time: 30 Min.

Distance from nearest well: UNK Depth of nearest well: UNK

MINIMUM SEWAGE-DISPOSAL SYSTEM REQUIREMENTS

SUBSURFACE ABSORPTION FIELD[1]	SEEPAGE PITS[2]
MINIMUM REQUIRED AREA:	MINIMUM WALL AREA REQUIRED
85 SQ. FT./BEDROOM	75 SQ. FT./BEDROOM

Not accepted for installation 3 Sep. '75

1. FHA Minimum Property Standards: 1103 - 7
Public Health Service Publication No. 526

2. FHA Minimum Property Standards: 1103 - 8

Keith Martin, P.E.

Acres _____

Water Supply 11

EL PASO COUNTY . CITY-COUNTY HEALTH DEPARTMENT
501 North Foote Avenue . Colorado Springs, Colorado . 471-3700

No. C2[illegible]

PERMIT

Receipt No. [illegible]

TO CONSTRUCT, ALTER, REPAIR OR MODIFY AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Issued To Mr. Charles Roberts Date January 12,1973

Address of Property 6225 Vossey Road, Black ½ mile west on Vossey Road, Black [illegible]
(Permit valid at this address only)

Builder - Contractor - Owner Address Same as above Phone _____

Sewage-Disposal System work to be performed by Al Gieger Phone _____

This Permit is issued in accordance with Regulation XII and Article 2 of Chapter 66, Colorado Revised Statutes 1963, as amended by the addition of a new Section 66-2-16. (H.B. 1205, 7-1-65). PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of six (6) months from date of issue - whichever occurs first - (unless work is in progress).

- This Permit does not denote approval of zoning and acreage requirements. -

Hal J. Doulott, M.D., M.P.H.
Director, City-County Health Department

Permit Fee $25.00

July 18,1973
Date of Expiration

[signature]
Environmentalist

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION.

24-HOUR ADVANCE NOTICE REQUIRED

Septic tank 1500 gals. Field 212 Feet of trench 36 inches wide
OR- Field 142 Feet of trench 36 inches wide

Seepage bed _____ ft. long _____ ft. wide. Seepage pit _____ sq. ft. _____ diam. _____ w/d

The Health Officer shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable times for the purpose of making such inspections as are necessary to determine compliance with requirements of this regulation.