Architecture
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ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

GEOLOGY AND SOILS STUDY

With Wastewater Study

Curtis Subdivison, Filing No. 1
Monument, Colorado

PREPARED FOR:

Barry Curtis
1920 E. Baptist Road
Monument, CO 80132

JOB NO. 172625

October 11, 2019
Revised December 9, 2019

Respectfully Submitted,

RMG – Rocky Mountain Group

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Reviewed by,

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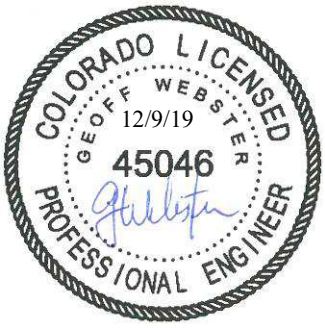


TABLE OF CONTENTS

FIGURES

APPENDIX A

Additional Reference Documents

APPENDIX B

Soils Report, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC, Job #19-0712, last dated August 16, 2019

APPENDIX C

Profile Pit Evaluation, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC, Job #19-0712, last dated August 16, 2019

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the south central portion of Section 21, Township 11 South, Range 66 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located on the northwest corner of the intersection of Baptist Road and Roller Coaster Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Project Description

The total calculated area involved in the project is 37.11 acres with a total buildable area of 32.37 acres. The proposed site development is to consist of subdividing the property into two lots. Lot 1 is to consist of 25.00 acres and will contain the existing residence, septic and well, which are to remain. Lot 2 is to consist of 8.01 acres and will utilize an individual well and on-site wastewater treatment system for the proposed new single family residence. The individual on-site wastewater treatment system and well permit is the responsibility of the property owners.

It is our understanding access to Lot 2 is to be provided by a private driveway extending from Roller Coaster Road to the west. Lot 2 shall not have direct access to Baptist Road per the Final Plat notes. The owner of Lot 2 is responsible for the construction of the private driveway and any drainage culverts that maybe required from Baptist Road or Roller Coaster Road.

Additionally, Tract A and Tract B consist of 4.099 acres and currently do not have development proposed. Both Tract A and Tract B are to be owned and maintained by El Paso County. Per the Final Plat, dated August 29, 2019 prepared by Barron Land, *"on condition that El Paso County comes to decision that a Roadway through Tract A and Tract B will not be constructed, ownership of Tract A shall be given to owner of Lot 1 and ownership of Tract B shall be given to the owner of Lot 2".* The proposed alignment of the Roadway is shown on Figure 2, Proposed Curtis Subdivision, Filing No. 1.

Two No Build areas located within Lot 2 and consist of 0.637 acres. The designated No Build areas shown on the Final Plat are due to slopes greater than 30 percent in these areas. No structures, or septic systems are to be constructed within these areas.

It is our understanding the two 10 to 60-foot electrical easements are to remain. The easement runs parallel to the eastern property line of Lot 2 just west of Roller Coaster Road.

2.0 QUALIFICATIONS OF PREPARERS

This Geology and Soils 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 Geoff Webster, P.E. Ms. Zigler is a Professional Geologist as defined by State Statute (C.R.S 34-1-201) with over 19 years of experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the

University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Geoff Webster, P.E. is a licensed Professional Engineer with 34 years of experience in the structural and geotechnical engineering fields. Mr. Webster holds a Master's degree from the University of Central Florida. Mr. Webster has supervised and performed numerous geological and geotechnical field investigation programs in Colorado and other states.

3.0 STUDY OVERVIEW

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

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

This report presents the findings of the study performed by RMG relating to the geotechnical and geologic conditions of the above-referenced site. Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

3.1 Scope and Objective

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

The objectives of our study are to:

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

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

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

3.2 Site Evaluation Techniques

The information included in this report has been compiled from:

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

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

3.3 Previous Studies and Field Investigation

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

1. *Soils Report, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC*, Job #19-0712, last dated August 16, 2019.
2. *Profile Pit Evaluation, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC*, Job #19-0712, last dated August 16, 2019.

3.4 Additional Documents

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

4.0 SITE CONDITIONS

4.1 Proposed Land Use and Zoning

The site currently consists of one parcel with a total calculated acreage of 37.11 acres. The included parcel has a Schedule No. of 6100000519 and is currently zoned *RR-5 – Residential Rural.* The zoning is to remain *Residential Rural*. It is our understanding the proposed site development is to consist of one single family residence with well with an onsite wastewater treatment system. Figure 1 presents the general boundaries of our investigation.

4.2 Topography

Based on our site observation on September 10, 2019 and the Development Plan, provided by Forsgren Association, Inc., dated April 11, 2019 the site topography is generally rolling hills and contains slopes less than 30 percent other than the designated No Build areas. The approximate elevation difference from the southern portion of the site to the center of the property slopes up approximately 35 feet forming a ridge through the center of the property. From the center of the property to the northern portion of the site the topography slopes down approximately 25 feet towards Roller Coaster Road.

4.3 Vegetation

The majority of the site consists of low lying native grasses and weeds. Deciduous trees are denser and heavily scattered along the central to southern portion of the site. The northern portion opens up to rolling hills and open fields with fewer scattered deciduous trees.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

5.1 Drilling

The subsurface conditions below the subject site were investigated in the referenced reports by Geoquest, LLC on August 16, 2019 as part of the site specific *Soils Report*. Geoquest test borings extended to depths of approximately 15 feet below the existing ground surface. The Soils Report is presented in Appendix A. The approximate locations of the Geoquest test borings locations are presented on the General Engineering and Geology Map, Figure 3.

5.2 Profile Pit Excavations

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

The two profile pits were located by Geoquest, LLC client, Aspen Gold General Contracting & Engineering. According to the Geoquest, LLC Profile Pit Evaluation (referenced above), the Profile Pits were excavated to approximately 4 feet where sandstone bedrock was encountered and the profile pits were terminated The approximate locations of the profile pits are presented in the Engineering and Geology Map, Figure 3.

5.3 OWTS Visual and Tactile Evaluation

A visual and tactile evaluation performed by Geoquest, LLC, is to be used in conjunction with this investigation. The soils were evaluated to determine the soils types and structure. Bedrock was encountered at depths of 2 to 3.5 feet below the existing surface in the profile pits. Restrictive layers were not encountered in the profile pits. Evidence of seasonal high groundwater was not observed in Profile Pits. Groundwater was not encountered in Profile Pit #1 at the time of Geoquest, LLC inspection, however, it was noted the soils were saturated in Profile Pit #1 at a depth of 3.5 feet. Groundwater and

permanent or seasonal water table was not encountered in Profile Pit #2 at a depth of 3.5 feet. The soil descriptions of the profile pit evaluation are presented in Appendix B.

5.4 Groundwater

Groundwater was reported as "not encountered" in the test borings during Geoquest, LLC field report, however "saturated" conditions were reported in both profile pits at depths of 3.5 feet. Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

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

6.1 Subsurface Soil Conditions

The subsurface soils encountered in the Geoquest, LLC drill holes and profile pit excavations were classified using the Unified Soil Classification System (USCS) and the United States Department of Agriculture (USDA). The laboratory testing performed by Geoquest, LLC revealed the onsite soils classified as sand, sandy loam and low plasticity claystone (CL).

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented in the Soils Report by Geoquest, LLC presented in Appendix A. The classifications shown on the logs are based upon the engineer's classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

6.2 Bedrock Conditions

Bedrock (as defined by USDA Soil Structure and Grade) was encountered in the profile 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 – facies unit five which consists of silty sandstone with interbedded layers of claystone. The Dawson formation is thick-bedded to massive, generally light colored arkose, pebbly, and pebble conglomerate. The sandstones are poorly sorted with high clay contents. The sandstone is generally permeable, well drained, and has good foundation characteristics. The claystone is generally well sorted with high sand contents. The claystone generally is less permeable than the sandstone and is generally not suitable for direct bearing of shallow foundations. The Dawson sandstone is generally not considered a restrictive layer for OWTS.

6.3 U.S. Soil Conservation Service

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

- 41 – Kettle gravelly loamy sand, 8 to 40 percent slopes. The Kettle gravelly loamy sand was mapped by the USDA to be located along the southern portion of the property. The Kettle gravelly loamy sand encompasses approximately 10.5 acres for a total of 27.9 percent of the property. Properties of the Kettle gravelly loamy sand include, somewhat excessively drained soil, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms are depressions.

- 68 – Peyton-Pring complex, 3 to 8 percent slopes. The Peyton-Pring complex was mapped by the USDA to encompass the majority of the northern portion of the property. The Peyton-Pring complex encompasses approximately 12.0 acres for a total of 31.8 percent of the property. Properties of the Peyton-Pring complex include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms include hills.

- 92 – Tomah-Crowfoot loamy sands, 3 to 8 percent slopes. The Kettle gravelly loamy sand was mapped by the USDA to be located throughout the center portion of the property. Tomah-Crowfoot loamy sands encompasses approximately 12.0 acres for a total of 31.8 percent of the property. Properties of the Tomah-Crowfoot loamy sands include, well-drained soil, 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 are alluvial fans and hills.

- 93 – Tomah-Crowfoot complex, 8 to 15 percent slopes. The Tomah-Crowfoot complex was mapped by the USDA to encompass the northwest corner of the property. The Tomah-Crowfoot complex encompasses approximately 3.1 acres for a total of 8.2 percent of the property. Properties of the Tomah-Crowfoot complex include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms include hills.

The USDA Soil Survey Map is presented in Figure 8.

6.4 General Geologic Conditions

Based on our field observations, the Geologic Map of the Monument Quadrangle and Reconnaissance Geologic Map of the Colorado Springs and Vicinity, an interpreted geologic map of significant surficial deposits and features was mapped for the site. The identified geologic conditions affecting the development are presented in the Engineering and Geology Map, Figure 3.

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

- *p Qs – Slocum alluvium (Pleistocene-Sangamon Interglaciation or Illinoian Glaciation)* – stratified gravel containing layers of clay, silt and sand which are poorly sorted and moderately compacted derived from the Dawson Formation. Thickness can range up to as much as 40 feet, permeability is high in the gravels and lower in the clayey, silty layers. The alluvium is generally resistant to erosion and foundation stability is good.

- *$Tkda_5$ – Dawson Formation, facies 5 (early to middle(?) Eocene)* – the facies is generally thick-bedded to massive and consists of poorly sorted friable sandstone with high clay content. Contains thin- to very thin interbedded claystone. Total thickness of the formation is 2,000 feet. The Dawson formation is generally resistant to erosion and foundation stability of the sandstone is good. The interbedded claystone is generally not suitable for direct bearing of shallow foundations.

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

6.5 Structural Features

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

6.6 Surficial (Unconsolidated) Deposits

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

6.7 Engineering Geology

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

- 2A – Stable alluvium, colluvium and bedrock on flat to gentle to moderate slopes (5 to 12%).
- 3B – Expansive and potentially expansive soil and bedrock on flat to moderate slopes (0-12%). However, isolated portions of the site do exceed 12 percent and generally fall within the areas that have been designated No Build areas.

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

6.8 Features of Special Significance

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

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

7.0 ECONOMIC MINERAL RESOURCES

Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction*, *Map 1* indicates portions of the site are

identified as stream terrace deposit comprised of sand, gravel, silt and clay preserved on benches or broad flat to sloping areas adjacent to streams. Extraction of the sand and gravel resources are not considered to be economical compared to materials available elsewhere within the county.

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

8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

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

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

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

8.1 Expansive Soils and Bedrock

Based on the Drill Logs and laboratory testing performed on the site by Geoquest, LLC, the fine to coarse grained sand with moderate clay content generally possesses low swell potential and the fine grained claystone generally possess moderate to high swell potential. Expansive claystone bedrock was encountered in Geoquest, LLC test borings at a depth of approximately 2 feet below the existing surface. Expansive bedrock is anticipated to be encountered beneath foundations and mitigation will be required.

Mitigation

The Soils Report by Geoquest, LLC recommended that if expansive soils/bedrock were encountered overexcavation and replacement with 4-feet of non-expansive structural fill would be required. Since

shallow claystone, described as moderately expansive, was encountered in Geoquest, LLC borings TH-1 and TH-2, overexcavation will likely be required.

Provided that the foundation systems are implemented as recommended in the Geoquest, LLC report, the presence of expansive soils/bedrock (if encountered) is not considered to pose a risk to the proposed structures.

8.2 Hydrocompactive Soils (Moisture Sensitive Soils)

The subsurface materials at the site generally fine to coarse grained sand with moderate clay content overlying the Dawson Formation. Based on the Drill Logs and Profile Pits performed on site by Geoquest, LLC, the fine to coarse grained sand with moderate clay content generally possess low swell potential. The fine grained claystone generally possesses moderate to high swell potential. It is anticipated that if these materials are encountered they can readily be mitigated with typical construction practices common to this region of El Paso County, Colorado.

Mitigation
A shallow foundation bearing directly on overexcavated, replaced and recompacted structural fill is anticipated for the proposed single family residence within this development. Foundation design and construction are typically adjusted for hydrocompactive soils. If loose sands are encountered, mitigation of hydrocompactive soils can be accomplished by overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the use of a geogrid reinforced fill.

8.3 Faults and Seismicity

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

Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith, which includes pull from minor movements along faults found in the Denver basin. It is our opinion that ground motions resulting from minor earthquakes may affect structures (and the surrounding area) at this site if minor shifting were to occur.

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

8.4 Radon

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

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

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

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

8.5 Flooding and Surface Drainage

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0285G effective December 7, 2018 and the online ArcGIS El Paso County Risk Map, the entire property lies outside the 100 or 500-year floodplain of West Cherry Creek.

Mitigation
Due to the size of Lot 2 within the proposed development, any localized drainage areas should and can be avoided by construction. Minor drainage swales can be regraded. Structures should not block the drainageways. Any site grading should be done in a manner to avoid ponding of water around the structure and treatment area. The treatment area is not to be located in the drainageways due to the potential for seasonally wet conditions and/or potential for periodic high perched water conditions.

8.6 Springs and High Groundwater

Based on the site observations, review of the Greenland & Monument Quadrangle and Google Earth images dating back to September 1999, springs do not appear to originate on the subject site. Groundwater was reportedly not encountered in the Profile Pits at the time of the observation during the excavations by Geoquest, LLC. However, it was noted saturated soils were observed at 3.5 feet below the ground surface. Groundwater was not encountered at the time of drilling for the Soils Report. The saturated soils observed by Geoquest, LLC were encountered near the sand, sandstone interface. It is our interpretation the saturated soils encountered is likely surficial water perched atop the harder sandstone material and is not indicative of a true groundwater table.

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

Mitigation
If groundwater (or perched water) conditions encountered at the time of foundation excavation result in either water flow into the excavation or destabilization of the foundation bearing soils, stabilization techniques should be implemented. Various stabilization methods can be employed and can be discussed at the time of construction. However, a method that affords potentially a reduced amount of overexcavation (versus other methods) and provides increased performance under moderately to severely unstable conditions is the use of a layered geogrid and structural fill system.

Additionally, dependent upon the rate of groundwater flow into the excavation, a geosynthetic vertical drain and an overexcavation perimeter drain may be required around the lower portions of the excavation to allow for installation of the layered geogrid and structural fill system.

In general, if groundwater was encountered within 4 to 6 feet of the proposed foundation slab elevation, an underslab drain should be anticipated in conjunction with the perimeter drain. Perimeter drains are anticipated for each individual lot to prevent the infiltration of water and to help control wetting of potentially expansive and hydrocompactive soils in the immediate vicinity of foundation elements. It must be understood that the drain is designed to intercept some types of subsurface moisture and not others. Therefore, the drain could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

8.7 Corrosive Minerals

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

Mitigation
Sulfate resistant cement will aid in the mitigation for corrosive (sulfate) minerals on concrete.

8.8 Erosion

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

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

8.9 Fill Soils

Fill soils were not described in the Geoquest, LLC reports, and fill is not anticipated with in the OWTS areas and/or excavation for the single-family residence. However, 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. If unsuitable soils are encountered during the Open Excavation Observations, they may require removal (overexcavation) and replacement with compacted structural fill.

Mitigation

If fill is encountered, it is considered unsuitable for support of foundations. If unsuitable fill soils are encountered during construction, they should be removed (overexcavated) and replaced with compacted structural fill. The onsite soils, once removed, replaced and recompacted are generally suitable as 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. Provided that this recommendation is implemented, the presence of fill is not considered to pose a risk to proposed structures.

8.10 Surface Grading and Drainage

Surface grading and drainage should follow the recommendations presented in the Soils Report by Geoquest, LLC as indicated below:

SURFACE DRAINAGE

After construction of foundation walls, the backfill material shall be well compacted to 80% Modified Proctor density, to reduce future settlement. Any areas that settle after construction shall be filled to eliminate ponding of water adjacent to the foundation walls. The finished grade shall have a positive slope away from the structure with an initial slope of 6 inch in the first 10 feet. If a 10 feet zone is not possible on the upslope site of the structure, then a well-defined swale should be created a minimum of 5 feet from the foundation and sloped parallel with the wall at a 2% grade to intercept the surface water and carry it around and away from the structure. Homeowners shall maintain the surface grading and drainage installed by the builder to prevent water directed in the wrong direction. All downspouts shall have splash blocks that will remove runoff to outside the foundation area and carried across backfill zones. No irrigation devices shall be placed within 10 feet of the foundation. Shrubs and plants requiring minimal watering shall be established in this area. Irrigated grass shall not be located within 5 feet of the foundation. Sprinklers shall not discharge water within 5 feet of the foundation. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of floor slab and foundation movement.

All exterior grading and location of downspouts and their performance shall be inspected by Geoquest, LLC. **The native low-plasticity clay (CL) material is not suitable and shall not be used as backfill material around the perimeter of the foundation.** It is the responsibility of the contractor to schedule all inspections. Also, the backfill material shall consist of road base material as described previously.

8.11 Proposed Grading, Cuts and Masses of Fill

A preliminary grading plan has not been prepared for the proposed new single-family residence that is to be constructed on Lot 2. It is assumed based on the soils information by Geoquest, LLC that the excavations will encounter the fine to coarse grained sand with moderate clay content overlying fine grained claystone.

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

Mitigation

We anticipate that the deepest excavation cuts for basement level construction will be approximately 6 to 8 feet below the existing ground surface. We believe the surficial soils will classify as Type C materials as defined by OSHA in 29CFR Part 1926, dated January 2, 1990. OSHA requires temporary slopes made in Type C materials be laid back at ratios no steeper than 1.5:1 (horizontal to vertical) unless the excavation is shored or braced. Long term cut slopes in the upper soil should be limited to no

steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that fill slopes be no steeper than 3:1 (horizontal to vertical).

9.0 ON-SITE WASTEWATER TREATMENT

It is our understanding an On-site Wastewater Treatment Systems (OWTS) is proposed. An individual well and septic system is proposed for each single family residence. The site was evaluated by Geoquest, LLC in general accordance with the El Paso Land Development Code, specifically sections 8.4.8. Two profile pits were performed within or near the probable OWTS location to obtain a general understanding of the soil and bedrock conditions. The Profile Pit Logs are presented in Appendix B.

9.1 Subsurface Materials

The subsurface materials encountered in the profile pit excavations evaluated by Geoquest, LLC 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:

- *Sand:*
  USDA Soil Texture: Sandy Loam
  USDA Soil Type: 2A
  USDA Structure Shape/Grade: Granular (1)
  Non-cemented

- *Sandstone:*
  USDA Soil Texture: Sandy Loam
  USDA Soil Type: 2A
  USDA Structure Shape/Grade: Massive (0)
  Moderately cemented

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented in Appendix B. The descriptions 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.

The soils on Lot 2 were identified as sandy loam as indicated by the USDA. According to Geoquest, LLC, limiting layers were not encountered in the profile pits. The long term acceptance rates (LTAR) associated with the soils observed in the profile pits was 0.50 gallons per day per square foot (gpd/sf) for the sandy loam (Soil Type 2A). Groundwater and indications of seasonally shallow groundwater were not observed in the profile pit excavations by Geoquest, LLC at the time of their field observation. However, it was noted saturated soils were observed at 3.5 feet below the existing ground surface.

9.2 Bedrock Conditions

Bedrock (as defined by USDA Soil Structure and Grade) was encountered in the profile pit excavations by Geoquest, LLC at depths reportedly ranging from 2 to 4 feet 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 – facies unit five which consists of silty sandstone. 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 and well drained. The Dawson sandstone is generally not 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, most recently amended 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 (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 drainages, floodplains, or ponded areas, and 25 feet from dry gulches.
- The new parcel, Lot 2 shall be laid out to insure that a minimum of 2 sites are appropriate for an OWTS and do not fall within any restricted areas, (e.g. utility easements, right of ways). Based on the profile pit observations performed by Geoquest, LLC, the parcel has a minimum of two locations for the OWTS as presented on the Engineering and Geology Map, Figure 3.

Contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to the El Paso County Guidelines and property maintained. Areas where OWTS sites are not recommended are also indicated on Figure 3.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations; however, groundwater (perched water) conditions may restrict the type of system that can be installed. It should be noted that the LTAR values stated above are for the profile pit locations performed for Geoquest, LLC report only. Geoquest, LLC has recommended a design base on an LTAR of 0.50 GPD/SF and an above grade uniformly pressure dosed soil treatment is required.

This does not constitute an OWTS design. The individual OWTS design should be performed based upon info by Geoquest, LLC for Lot 2.

10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in Section 8.0 of this report) were not found to be present at this site. Geologic constraints (also as described in section 8.0 of this report) such as: expansive and hydrocompactive soils, faults, seismicity, radon, and corrosive minerals, erosion were found on the site. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering and design contraction practices and avoidance when deemed necessary.

11.0 BURIED UTILITIES

Based upon the conditions encountered in the test borings, we anticipate that the soils encountered in the individual utility trench excavation will consist of fine to coarse grained sand with moderate clay content overlying fine grained claystone/sandstone. It is anticipated the fine to coarse grained sand with moderate clay content will be encountered at loose to medium dense relative densities, the fine grained claystone at very stiff to hard densities and sandstone (if encountered) at medium hard to hard relative densities. Bedrock conditions are anticipated within the utility trench.

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

12.0 PAVEMENTS

The proposed private driveway with in this development for Lot 2 is not anticipated to require a new pavement design prepared in accordance with the El Paso County regulations. No other roadways are proposed within the development at this time. If future roadways are proposed a new pavement design prepared in accordance with the El Paso County regulations may be required.

13.0 ANTICIPATED FOUNDATION SYSTEMS

Based on the information presented previously, a conventional shallow foundation system consisting of standard spread footings/stemwalls are anticipated to be suitable for the proposed residential structure. It is uncertain at the time if a basement or crawlspace excavation is proposed. For basement construction the anticipated cuts will be approximately 6 to 8 feet below the final ground surface not including overexcavation. For crawlspace construction the anticipated cuts will be approximately 3 to 4 feet below the final ground surface not including overexcavation.

Expansive claystone was encountered in the test borings performed by Geoquest, LLC for this study. If expansive soils are encountered near foundation or floor slab bearing levels, overexcavation and replacement with nonexpansive structural fill will be required. The recommended overexcavation depth was 4 feet for claystone bedrock which is to be confirmed at the time of the Open Excavation Observation for Lot 2 by Geoquest, LLC.

13.1 Subexcavation and Moisture-Conditioned Fill

Based upon the field exploration for this development and surrounding developments, subexcavation and replacement is not anticipated. However, prior to performing excavation and/or filling operations, vegetation, organic and deleterious material shall be cleared and disposed of in accordance with applicable requirements.

13.2 Uncontrolled Fill

Uncontrolled fill is not anticipated to be encountered in the excavation for the proposed single family residence. However, if undocumented fill is encountered during construction of the structure, it will be assumed that this fill was not moisture conditioned and compacted in a manner consistent with the **Structural Fill** recommendations contained within this report, unless appropriate documentation can be provided. If such fill is encountered, it is not considered suitable for support of shallow foundations. This unsuitable fill will require removal (overexcavation) and replacement with non-expansive, granular structural fill below foundation components and floor slabs. The structural fill should be observed and tested during placement as indicated under the **Structural Fill** section of this report, to ensure proper compaction.

Following completion of the overexcavation and moisture conditioning process, it is imperative that the "as-compacted" moisture content be maintained prior to construction.

13.3 Foundation Stabilization

Groundwater was not encountered in the test boring performed for this study. Based on a review of previous geotechnical engineering/geologic investigations in the area, it is anticipated the groundwater will have adequate separation from the bottom of the proposed basement foundation components and floor slabs. However, if moisture conditions encountered at the time of the foundation excavation result in water flow into the excavation and/or destabilization of the foundation bearing soils, stabilization techniques should be implemented. Various stabilization methods can be employed, and can be discussed at the time of construction. However, a method that affords potentially a reduced amount of overexcavation (versus other methods) and provides increased performance under moderately to severely unstable conditions is the use of a layered geogrid and structural fill system.

Additionally, if groundwater were to flow into the excavation, a geosynthetic vertical drain and an overexcavation perimeter drain may be required around the lower portions of the excavation to allow for installation of the layered geogrid and structural fill system.

13.4 Foundations Drains

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

Shallow groundwater conditions were not encountered in the test boring performed for this study. Depending on the conditions encountered during the Open Excavation Observation to be performed by Geoquest, LLC, additional subsurface drainage systems may be recommended.

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

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

13.5 Structural Fill

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

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

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

Materials used for structural fill should be approved by Geoquest, LLC prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

14.0 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 Soils Report and Profile Pit Evaluation have been prepared by Geoquest, LLC and all recommendation are to be followed for the proposed single family residence and the onsite wastewater system.

15.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. Except for the potential of expansive and hydrocompactive soils, faults, seismicity, radon, corrosive minerals and, erosion, the geologic conditions identified are considered usual for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and local construction practices.

Foundation selection and design should consider the potential for subsurface expansive soil-related movements. Mitigation techniques commonly used in the El Paso County area include overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the installation of deep foundation systems all of which are considered common construction practices for this area.

Typical construction in El Paso County is to provide isolation "slip joints" between the floor slabs and all utility components and framing components (typically steel columns) that penetrate through the slab. The intent of these "slip joints" is to allow the slab to experience the anticipated range of movement without damaging the utility or framing components.

Additionally, typical construction in El Paso County is to provide an isolation "slip joint" between the floor slab and the foundation walls. The intent of this "slip joint" is to allow the slab to experience the anticipated range of movement without damaging the foundation.

Finally, typical construction in El Paso County is to provide a void (typically a minimum of 1 1/2 inches thick) at the bottom of all interior non-load bearing partitions (commonly referred to as "floating wall" construction). The intent of this void is to allow the floor slab to experience heave or settlement without transmitting the vertical slab movement through the partition walls to the floor system above.

Alternative foundation/framing systems may be used to reduce or eliminate the need for overexcavation. These methods include (but are not limited to) post-tension slabs-on-grade, integral stiffened (ribbed) slab foundations, drilled pier (caisson) foundation with or without a structural floor, etc.

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. Flatter slopes will likely be necessary should groundwater conditions occur.

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

16.0 CLOSING

This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to, biological or toxicological issues, are

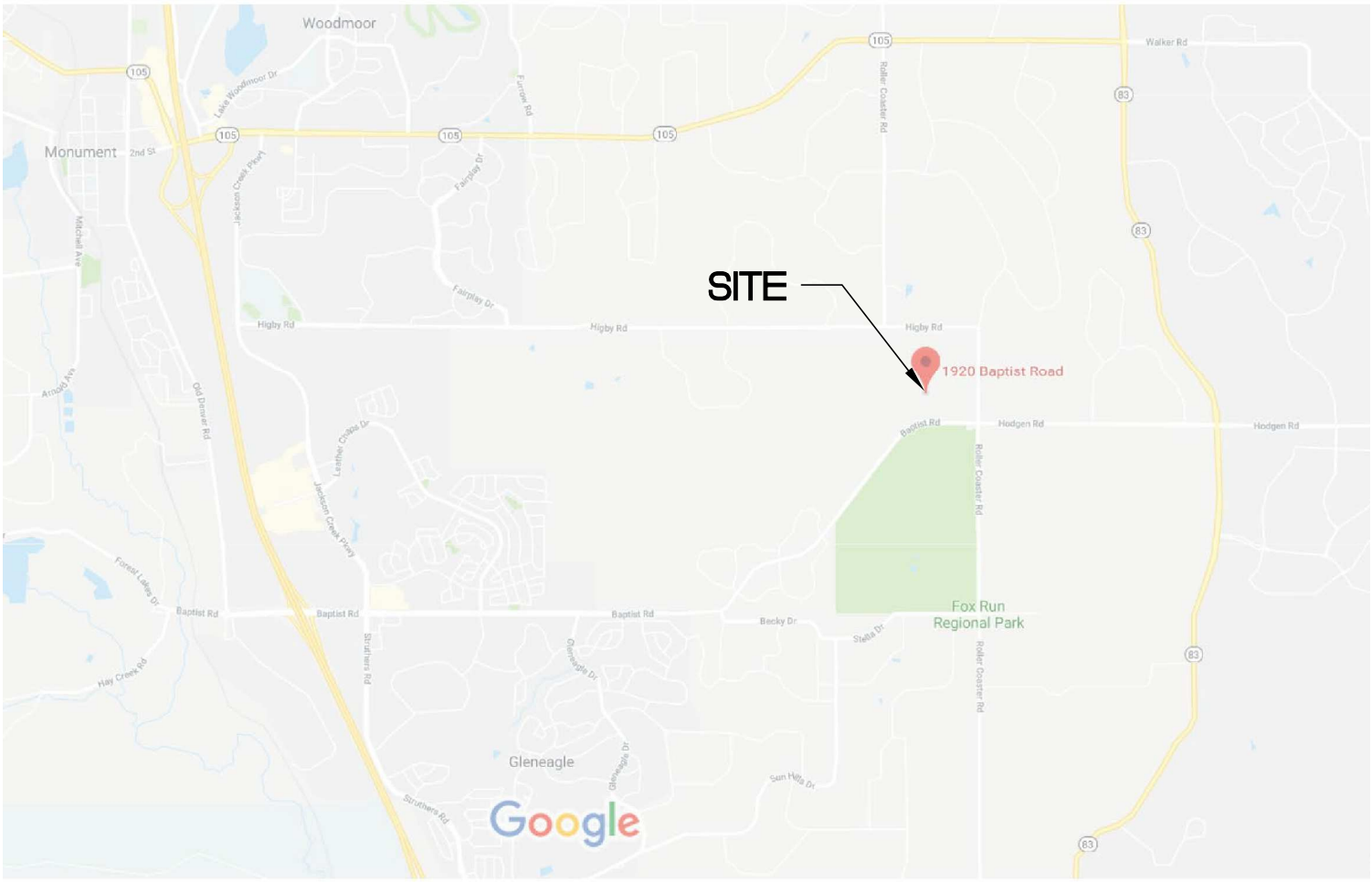
beyond the scope of this report. If the owner is concerned about the potential for such contamination or conditions, other studies should be undertaken.

This report has been prepared for **Barry Curtis** 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



REFERENCE
NOT TO SCALE

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80918
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Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

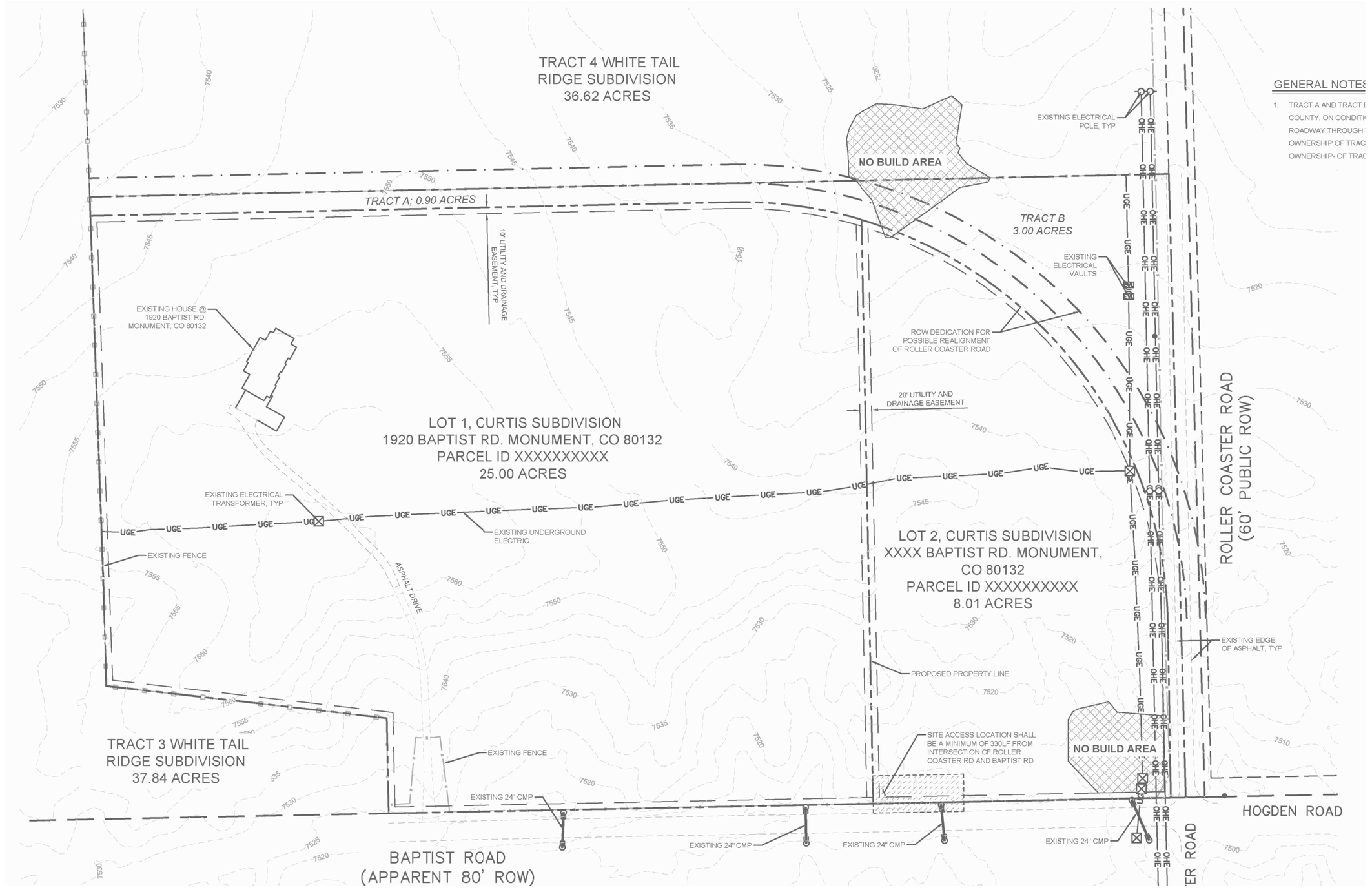
SITE VICINITY MAP

CURTIS SUBDIVISION
FILING NO. 1
EL PASO COUNTY, CO
BARRY CURTIS

JOB No. 172625

FIG No. 1

DATE 10-11-2019



NOT TO SCALE

BASE MAP PROVIDED BY: THOMAS AND THOMAS

JOB No. 172625

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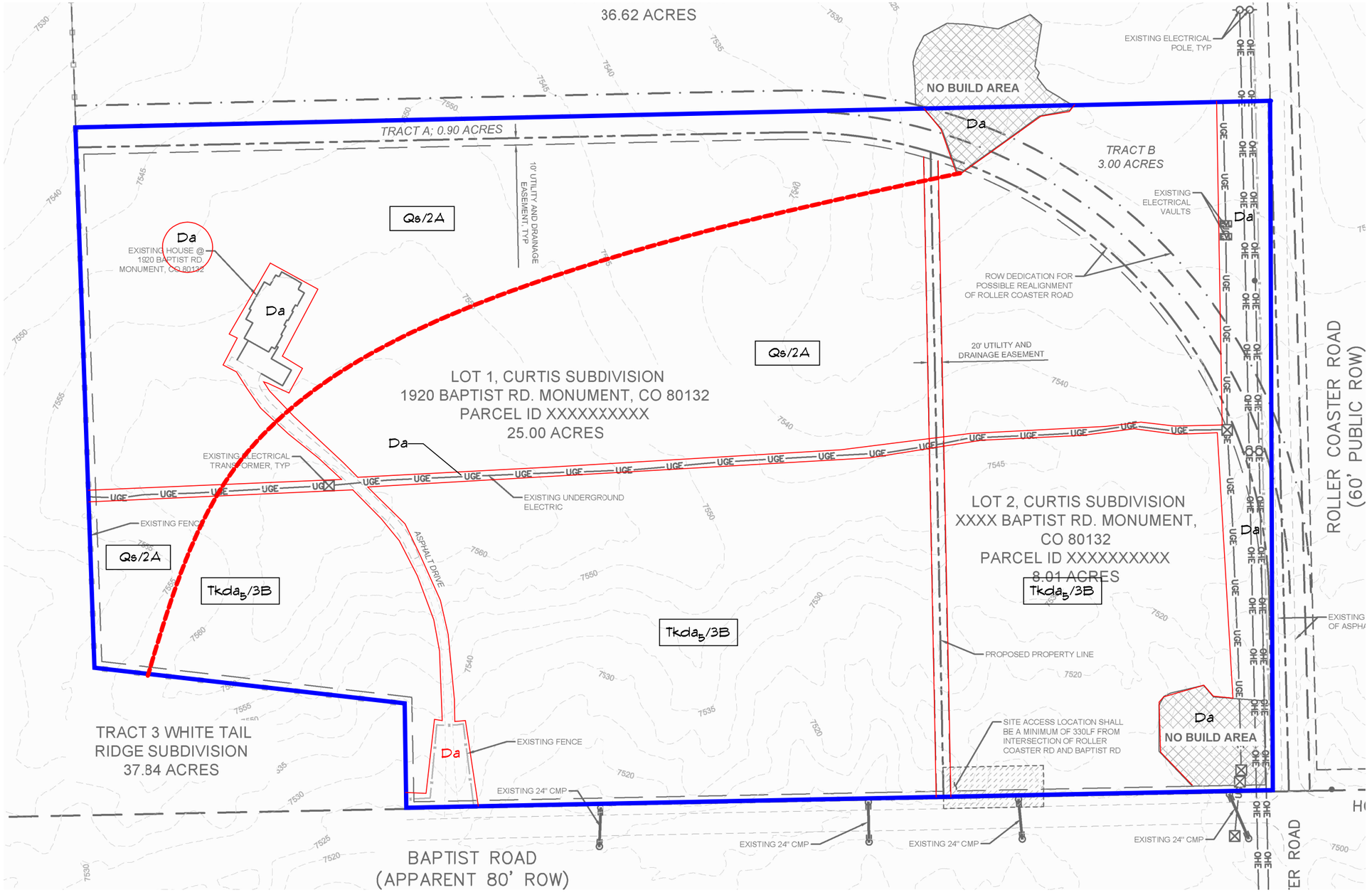
Woodland Park Office:
(719) 687-6077
Monument Office:
(719) 488-2145
Pueblo / Canon City:
(719) 544-7750

CURTIS SUBDIVISION FILING NO. 1
EL PASO COUNTY, CO
BARRY CURTIS

ENGINEER:	TPM
DRAWN BY:	KZ
CHECKED BY:	TPM
ISSUED:	10-1-2019
REVISION:	DATE: / JOB #:

PROPOSED CURTIS SUBDIVISION FILING NO. 1

SHEET No.
FIG-2



Geologic

Qs - Slocum alluvium - stratified gravel containing layers of clay, silt and sand derived from the Dawson Formation.

Tkda - Dawson Formation - poorly sorted friable sandstone with high clay content.

Da - disturbed areas - soils that have been removed and/or replaced for the existing driveway, existing residence, existing OWTS and utility easements

Engineering

2A - Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5 to 12%)

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

NOT TO SCALE

BASE MAP PROVIDED BY: FORSGREN ASSOCIATES, INC.

JOB No. 172625

ARCHITECTS RMG ENGINEERS
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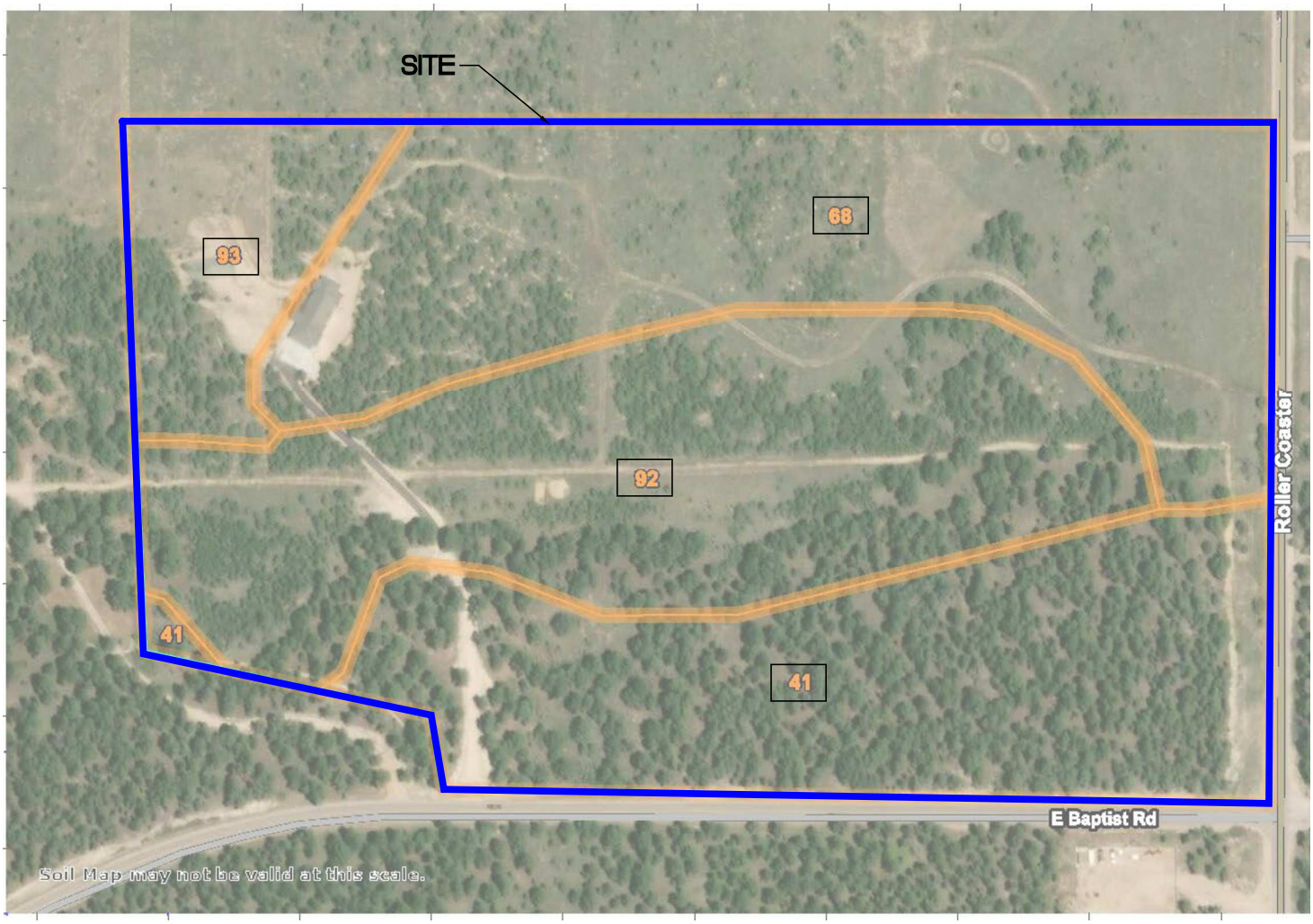
(719) 544-7750

CURTIS SUBDIVISION
FILING NO. 1
EL PASO COUNTY, CO
BARRY CURTIS

ENGINEER:	TPM
DRAWN BY:	KZ
CHECKED BY:	TPM
ISSUED:	10-11-2019
REVISION:	DATE:
	JOB #:

ENGINEERING AND GEOLOGY MAP

SHEET No.
FIG-3



41 - Kettle gravelly loamy sand with slopes of 8 to 40 percent. Slopes greater than 30 percent were not observed on the property

68 - Peyon-Pring complex with slopes of 3 to 8 percent

92- Tomah-Crowfoot loamy sands with slopes of 3 to 8 percent

93- Tomah-Crowfoot Complex with slopes of 8 to 15 percent

NOT TO SCALE
BASE MAP PROVIDED BY: USDA

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

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USDA SOILS SURVEY MAP

CURTIS SUBDIVISION
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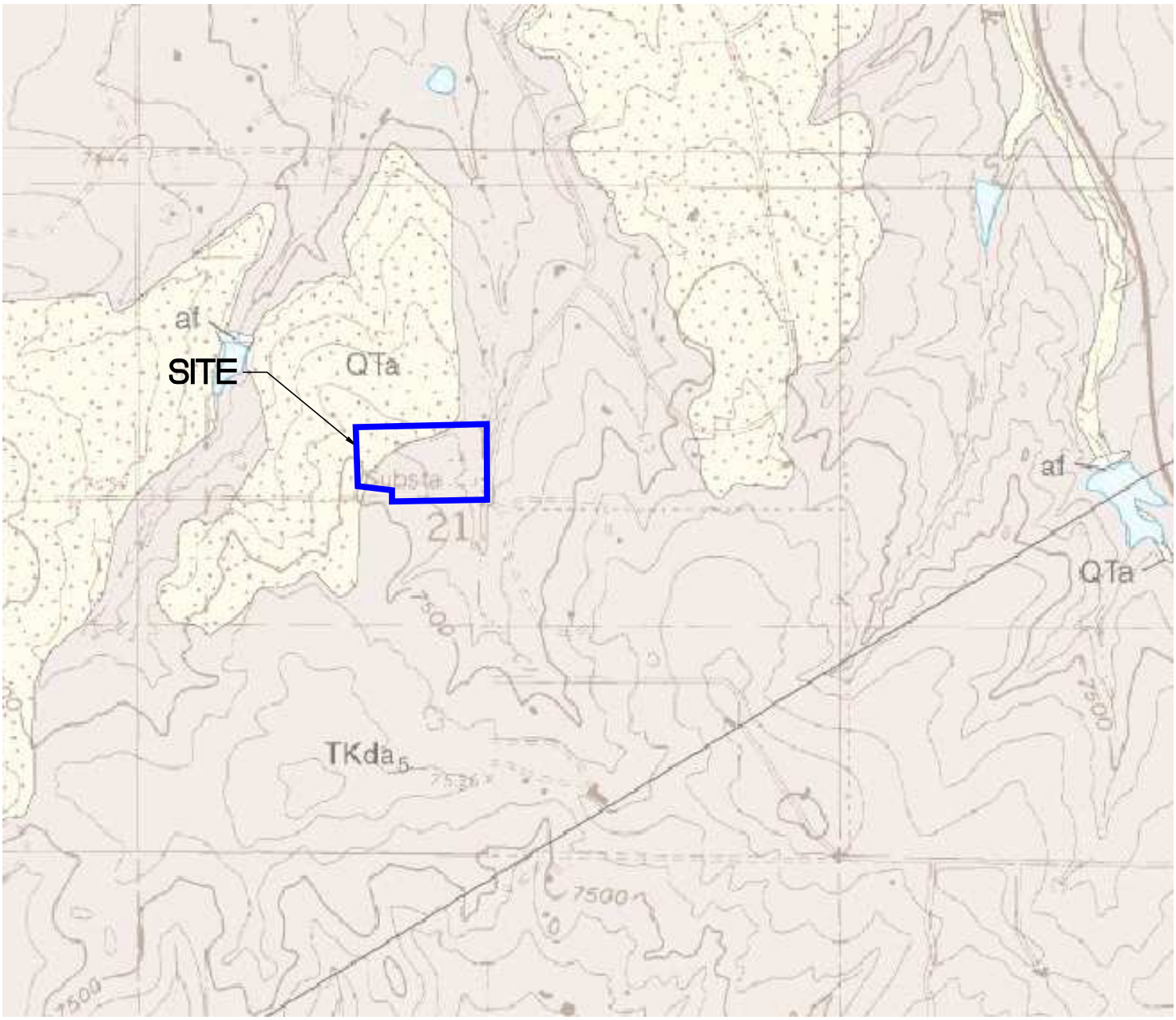
BARRY CURTIS

JOB No. 172625

FIG No. 4

DATE 10-11-2019



NOT TO SCALE
BASE MAP PROVIDED BY: CGS

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FOUNTAIN QUADRANGLE

CURTIS SUBDIVISION
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EL PASO COUNTY, CO
BARRY CURTIS

JOB No. 172625

FIG No. 5

DATE 10-11-2019

NOT TO SCALE

BASE MAP PROVIDED BY: FEMA

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

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(970) 330-1071

FEMA MAP

CURTIS SUBDIVISION
FILING NO. 1
EL PASO COUNTY, CO
BARRY CURTIS

JOB No. 172625

FIG No. 6

DATE 10-11-2019

APPENDIX A
Additional Reference Documents

1. *Final Plat, Curtis Subdivision, Filing No. 1*, *A Portion of the Southwest Quarter of Section 21, Township 11 South, Range 66 West of the 6th P.M. County of El Paso, State of Colorado*, prepared by Baron Land., Project No. 18-081, last dated August 29, 2019.
2. *Site Development Plans, 1920 E. Baptist Rd., Monument, CO 80132,* prepared by Forsgren Associates Inc., Project No. 04-18-0026, last dated April 11, 2019.
3. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 081041C0285G,* Federal Emergency Management Agency (FEMA), effective December 7, 2018.
4. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 081041C957F,* Federal Emergency Management Agency (FEMA), effective December 7, 2018, revised to reflect LOMR effective August 29, 2007.
5. *Geologic Map of the Monument Quadrangle, El Paso County, Colorado*, Jon P. Thorson and Richard F. Madole, Colorado Geological Survey 2003, Open-File Map 02-4.
6. *Greenland & Monument, Quadrangle, Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
7. *Greenland & Monument, Quadrangle, Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
8. *Reconnaissance Geologi Map of Colorado Springs and Vicinity, Colorado,* prepared by Glenn R. Scott and Reinhold A. Wobus, 1973.
9. *Pikes Peak Regional Building Department:* https://www.pprbd.org/.
10. El Paso County, Assessor, https://property.spatialest.com/co/elpaso/#/property/6100000519 Schedule No.: 6100000519.
11. *Colorado Geological Survey, USGS Geologic Map Viewer*: http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
12. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1947, 1952, 1953, 1960, 1969, 1999, 2005, 2009, 2011, 2013, and 2015.
13. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ Colorado Springs Quadrangles dated 1955, 1963, 1970, 1975, 1978, 1980, 1986, 2013 and 2016.
14. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2010, 2011, 2015, and 2017.

APPENDIX B

Soils Report, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC
Job #19-0712, last dated August 16, 2019

GEOQUEST, LLC
6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

14 August 2019

Aspen Gold General Contracting & Engineering, LLC
771 Long Timber Lane
Monument, Colorado 80132

RE: Soil Test Receipt, 2222 Baptist Road, Geoquest #19-0712

Dear Sir or Madam,

The attached soil test report provided by Geoquest, LLC, has a number of specific requirements for the design and construction of the foundation of a structure at the location noted on the report. Some of these requirements are placed on the homeowner of the property and may be outside of the builders' control. Accordingly, we are requiring both you as the builder and the homeowner to sign this letter indicating you have accepted a copy of the report, have read and understood the contents, and know you each have specific responsibilities. Failure to follow the recommendations and requirements of the report by any party can result in unsatisfactory performance of the foundation or building components.

Geoquest, LLC, will not provide any documentation for site inspections until we have received this letter with the required signatures. If the property is being developed as a speculative investment and no homeowner has been contracted to purchase the property, you can indicate that under the homeowner signature line. Upon the sale of the property the builder understands that both this letter and a copy of the Soils Report shall be provided to the buyer, and a homeowner signed copy returned to Geoquest.

If you have any questions, feel free to contact us at (719) 481-4560.

Sincerely,

Please sign and return this page after you have read the report. We need it back before inspections

Charles E. Milligan, P.E.
Civil Engineer

Builder Representatives

Homeowner(s)

_____ _____

_____ _____

GEOQUEST, LLC
6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

SOILS REPORT

FOR

ASPEN GOLD GENERAL CONTRACTING

& ENGINEERING, LLC

JOB #19-0712

2222 Baptist Road,
El Paso County,
Colorado

COLORADO REGISTERED
CHARLES E. MILLIGAN
34608
PROFESSIONAL ENGINEER
6/10/19

Sincerely,

Charles E. Milligan, P.E.
Civil Engineer

TABLE OF CONTENTS

INTRODUCTION

The owners must be made aware of the contents of this report. It is the responsibility of the contractor on this project to make subsequent homeowners aware of the contents of this report. This is to ensure that the recommendations and requirements of the report, especially regarding the surface drainage, are acknowledged and followed. This report is prepared for **Aspen Gold General Contracting & Engineering, LLC, builder, on 2222 Baptist Road, El Paso County, Colorado.** It is my understanding that a single-family residence is planned for this site. The site is currently vacant.

CONCLUSIONS

Additional drainage may be required during construction due to the high moisture content. If the bottom of the excavation becomes unstable, the use of 1' to 2' of 4" to 8" ballast rock may be required.

A satisfactory foundation for this structure is a properly designed shallow foundation system consisting of foundation components resting directly on over-excavated and replaced materials. This over-excavation and replaced materials scheme is necessary due to the moderately expansive on-site material. This over-excavation and replaced materials scheme will reduce, but not eliminate the potential for movement with moisture fluctuations in the unstable subgrade soils. Since those materials will remain in-place beneath the fill, a potential remains that moisture changes in these deeper unstable materials will cause some movement in the overlying fill and structure. **Vertical slab movement of one to three inches is considered normal of soils of moderate expansion potential and for compacted structural fill after the removal of the expansive soils. In some cases, vertical movement may exceed this range. If movement and associated damage to basement floors and finishes cannot be tolerated, a structural floor system shall be installed.** This material has a swell potential of approximately **1.3% expansion potential with a dead load of 2900 pounds per square foot. The over-excavated area shall extend to a minimum depth of 4 feet below the bottom of the foundation elevation and 4 feet laterally from the location of the foundation walls.** The material to be compacted in the excavation shall meet or exceed CDOT Class 6 Road Base Materials specifications. This material shall be compacted to a minimum of 95% of its modified Proctor density. **Proctor testing will be required on a sample of the replacement material to be used for this over-excavation scheme. A 5-gallon valid sample of the soil to be used, must be provided for testing (unless a previous proctor test can be provided) at least 7 days prior to the placement and compaction of the material.** The compressibility of the over-excavated and replaced material shall be taken to be low. A maximum allowable bearing capacity for the over-excavated and replaced material is a presumptive value of **1500 pounds per square foot.** This bearing capacity is calculated with a safety factor of three. The type of foundation configuration used depends on the building loads applied. The depth of foundation elements shall be determined by the foundation engineer but should be at least as deep as the minimum depth required by the governing building authority. **The laboratory testing revealed that the on-site soil is low-plasticity clay (U.S. Classification Symbol CL). The unit weight of equivalent fluid soil pressure of this material is 100 pounds per cubic foot. The owners shall be made aware that movement will definitely occur if surface or subsurface water is allowed to collect around or in the over-excavated area.**

GENERAL

The investigation was made to reveal important characteristics of the soils and of the site influencing the foundation design. Also evaluated during the investigation were subsurface conditions which affect the depth of the foundation and subsequent loading design, such as ground water levels, soil types, and other factors which affect the bearing capacity of the soils. Design loadings are based on soils characteristics and represent the maximum permissible loads for these conditions.

FIELD AND LABORATORY INVESTIGATION

Two exploratory holes were drilled on July 24, 2019, at the locations shown on the enclosed site map. The location of these test holes was determined by Aspen Gold General Contracting & Engineering, LLC. The test holes were drilled with a 3-inch diameter auger. At intervals anticipated to be the foundation depths, and as determined by the soils conditions, the drill tools were removed, and samples were taken by the use of a 2 inch "split barrel" sampler connected to a 140-pound drop-hammer. This hammer is dropped 30 inches to drive the penetration sampler into the soil **(ASTM D-1586).** The depths and descriptions of the materials encountered in each test boring at which the samples were taken are shown on the enclosed log sheets. All samples were classified both in the field and in the laboratory to evaluate the physical and mechanical properties of the materials encountered.

TOPOGRAPHY

The topography of this site is that of an incline sloping down towards the south at 8%.

WEATHER

The weather at the time of the soil examination consisted of clear skies with hot temperatures.

DESIGN AND CONSTRUCTION CONSIDERATIONS

Slabs-on-grade may move and crack. Vertical slab movement of one to three inches is considered normal for soils of low to moderate expansion potential and for compacted structural fill after removal of expansive soils. In some cases, vertical movement may exceed this range. If movement and associated damage to basement floors and finish cannot be tolerated, a structural floor system shall be installed. The native materials encountered during the exploratory testing are not suitable for the support of residential construction. If compaction is not performed, settlement may occur causing cracking of foundation walls and floors. Personnel of Geoquest, LLC, shall inspect the base of the over-excavation prior to any placement of any fill materials. All backfill material and over excavated and replaced material shall be properly tested by Geoquest LLC, at the time of installation of said material. Soil located beneath concrete walls and floors shall be compacted to at least 95% Modified Proctor density. Other backfill materials shall be compacted to at least 85% Modified Proctor density.

Special care is to be taken to re-compact the material above utility lines to a minimum of 90% Modified Proctor density. During construction, conditions that could cause settlement shall be eliminated. Interior non-bearing partition walls shall be constructed such that they do not transmit floor slab movement to the roof or overlying floor. The gap or void (1.5-inch min.) installed in these non-bearing partitions may require re-construction over the life of the structure to re-establish the gap or void to allow for vertical slab movement. Stairwells, doorways and sheeted walls should be designed for this movement. The following are general recommendations of on-grade slabs:

1. Slabs shall be placed on well-compacted, non-expansive materials, and all soft spots shall be thoroughly excavated and replaced with non-expansive fill materials as stated above. Exterior concrete shall slope away from the structure the same amount as requirements of soil.

2. The slab shall be separated from all foundation walls, load bearing members, and utility lines.

3. At intervals not to exceed 12 feet in each direction, provide control joints to reduce problems with shrinkage and curling as recommended by the American Concrete Institute (ACI). Moisten the ground beneath the slab prior to placement of concrete.

DESIGN AND CONSTRUCTION CONSIDERATIONS (CONTINUED)

4. All concrete placed must be cured properly as recommended by the American Concrete Institute (ACI). Separate load bearing members from slabs, as discussed above. Care must be exercised to prevent excess moisture from entering the soil under the structure, both during and after construction. Concrete shall be vibrated or rodded in forms to avoid segregation and cold joints.

5. Due to the exposure of exterior concrete to variations in moisture fluctuations, heaving and cracking of exterior slabs-on-grade should be expected. Placement of at least 3 feet of non-expansive fill beneath the slabs can help to reduce the impact of differential movement and cracking but may not eliminate movement.

6. **The low-plasticity clay (CL) has been tested for its expansion and/or consolidation potential. This material has a 1.3% expansion potential with a dead load of 2900 pounds per square foot.** Basement slabs, garage slabs, and all concrete floor slabs, exert a very low dead-load pressure on the soil. Since this soil contains a moderate amount of swell potential, slabs will crack and heave or settle if excess water is allowed to penetrate the subgrade. For example, column openings to pads below the placed slab, if exposed to precipitation during construction, will conduct water to the subgrade, possibly causing it to expand. Also, if the slab is placed with concrete too wet, expansion may occur. We recommend 3,000 psi concrete placed at a maximum slump of 4 inches.

RECOMMENDATION REMARKS

The recommendations provided in this report are based upon the observed soil parameters, anticipated foundation loads and accepted engineering procedures. The recommendations are intended to minimize differential movement resulting from the heaving of expansive soil or from the settlement induced by the application of loads. **It must be recognized that the foundation will undergo some movement on all soil types.** In addition, concrete floor slabs will move vertically, therefore, adherence to those recommendations which isolate floor slabs from columns, walls, partitions or other structural components is extremely important, if damage to the superstructure is to be minimized. Any subsequent owners should be apprised of the soil conditions and advised to maintain good practice in the future with regard to surface and subsurface drainage and partition framing, drywall and finish work above floor slabs.

Geoquest, LLC does not assure that the contractor or homeowner will comply with the recommendations provided in this report. Geoquest, LLC provides recommendations only and does not supervise, direct or control the implementation of the recommendations.

COLD TEMPERATURE CONSIDERATIONS

1. Concrete shall not be placed upon frozen soil.

2. Concrete shall be protected from freezing until it has been allowed to cure for at least 7 days after placement in forms.

3. Snow or other frozen water shall not be allowed in the forms during placement of concrete.

4. Concrete shall be cured in forms for at least 72 hours.

5. Concrete shall be vibrated or rodded in forms to avoid segregation and cold joints.

6. The site shall be kept well drained at all times.

SURFACE DRAINAGE

After construction of foundation walls, the backfill material shall be well compacted to 80% Modified Proctor density, to reduce future settlement. Any areas that settle after construction shall be filled to eliminate ponding of water adjacent to the foundation walls. The finished grade shall have a positive slope away from the structure with an initial slope of 6 inch in the first 10 feet. If a 10 feet zone is not possible on the upslope site of the structure, then a well-defined swale should be created a minimum of 5 feet from the foundation and sloped parallel with the wall at a 2% grade to intercept the surface water and carry it around and away from the structure. Homeowners shall maintain the surface grading and drainage installed by the builder to prevent water directed in the wrong direction. All downspouts shall have splash blocks that will remove runoff to outside the foundation area and carried across backfill zones. No irrigation devices shall be placed within 10 feet of the foundation. Shrubs and plants requiring minimal watering shall be established in this area. Irrigated grass shall not be located within 5 feet of the foundation. Sprinklers shall not discharge water within 5 feet of the foundation. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of floor slab and foundation movement.

All exterior grading and location of downspouts and their performance shall be inspected by Geoquest, LLC. **The native low-plasticity clay (CL) material is not suitable and shall not be used as backfill material around the perimeter of the foundation.** It is the responsibility of the contractor to schedule all inspections. Also, the backfill material shall consist of road base material as described previously.

SUBSURFACE DRAINAGE

The necessity for perimeter drains will be determined at the time of the Open Hole Observation.

REINFORCING

The concrete foundation walls shall be properly reinforced as per the specific design for this foundation by a **Colorado Registered Professional Engineer.** **Exact requirements are a function of the design of the structure. Questions concerning the specific design requirements shall be referred to the design engineer.**

FOOTING DESIGN

The design for footings for this structure is determined by applying the dead load and full live load to the foundation walls.

CONSTRUCTION DETAILS

It is necessary with any soils investigation to assume that the materials from the test holes are representative of the materials in the area. On occasion variations in the subsurface materials do occur, therefore, should such variations become apparent during construction, the owner is advised to contact this office for a determination as to whether these variations will affect the design of the structure's foundation. If anomalies are observed during the excavation for the dwelling, this office should be contacted to determine whether this may adversely affect the design.

MINIMUM MATERIALS SPECIFICATIONS

1. Minimum materials specifications of the concrete, reinforcing, etc., shall be determined by the Professional Engineer.

2. Compact beneath foundation walls a minimum of 95% Modified Proctor density to prevent settlement.

3. Compact all backfill material located around the perimeter of the foundation to 80% Modified Proctor density.

4. Concrete shall be vibrated or rodded in forms to avoid segregation and cold joints.

5. The site shall be kept well drained at all times.

OPEN HOLE OBSERVATION (added cost)

If anyone other than Geoquest, LLC, performs the Open Hole Observation and/or compaction testing, that person/company assumes liability for the soils, and any possible changes to the foundation design.

The owner, or a representative of the construction company shall contact **Geoquest, LLC.** a minimum of **24 hours** prior to excavating for the foundation. An Open Hole Observation must be performed on each individual structure prior to the placement of concrete, and preferably prior to the placement of forms in the excavated area. **The failure to request or obtain an Open Hole Observation prior to the placement of foundation components may result in this Soils Report being declared null and void.** This is to ensure that soft areas, anomalies, etc., are not present in the foundation region. At the time of the open hole observation the **foundation type recommendations, maximum allowable bearing capacity may be revised** according to soil conditions found at that time. If revisions are made to the Soils Report due to the soil conditions of the excavation, **the Foundation Design Engineer must be notified of all revisions.**

COMPACTION TESTING (added cost)

Geoquest, LLC shall perform compaction testing on the replaced material. Soil shall be compacted in maximum 6-inch lifts. Testing shall be performed at intervals not to exceed 18 inches (or as required by the design engineer).

The owner, or a representative of the construction, shall contact Geoquest, LLC, **24 hours (prior to excavating)** for the foundation.

FINAL OBSERVATIONS

The owner, or a representative of the construction company, shall contact Geoquest, LLC at the time final grading and landscaping procedures are completed. This is to ensure that sprinkler systems are not installed adjacent to the structure and that only shrubs or plants that require minimal watering are established in this area. All exterior grading as well as the location of downspouts and their performance shall be inspected by Geoquest, LLC. Any additional landscaping or grading changes performed by subsequent contractors and/or owners shall be inspected and approved. It is the responsible of the contractor and/or owner to schedule all these inspections at the appropriate times.

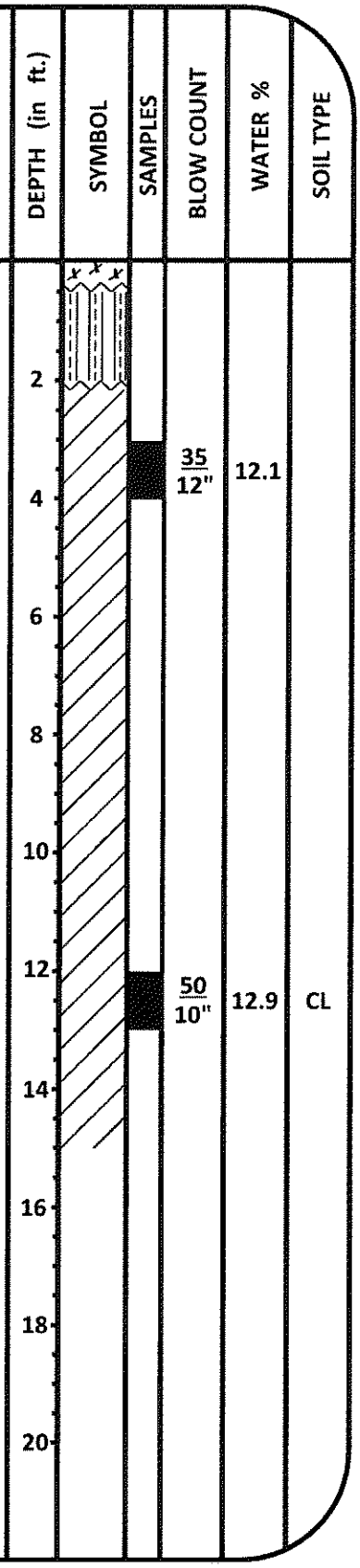
GEOQUEST, inc
481-4560

DRILL LOGS

JOB #: 19-0712

TEST BORING
NO.: TH-1

DATE: 7/24/2019



0"-4" Topsoil

4"-2' Sand

Fine-coarse grained
Moderate density
Moderate moisture content
Moderate clay content
Low plasticity
Brown color

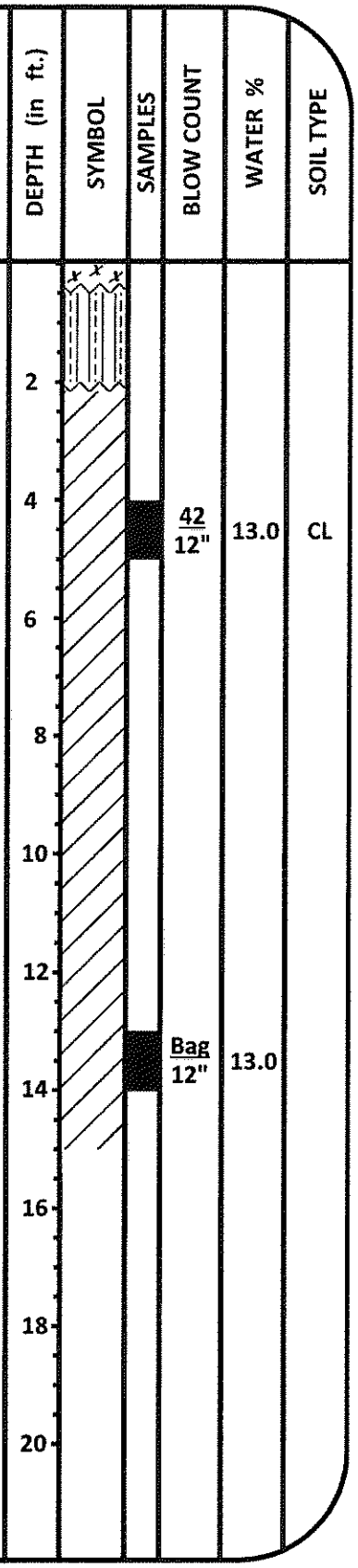
2'- 15' Claystone (CL)

Fine-coarse grained
High density
Moderate-high moisture content
Low-moderate sand content
Moderate-high plasticity
Greyish Brown color

JOB #: 19-0712

TEST BORING
NO.: TH-2

DATE: 7/24/2019



0"-4" Topsoil

4"-2' Sand

Fine-coarse grained
Moderate density
Moderate moisture content
Moderate clay content
Low plasticity
Brown color

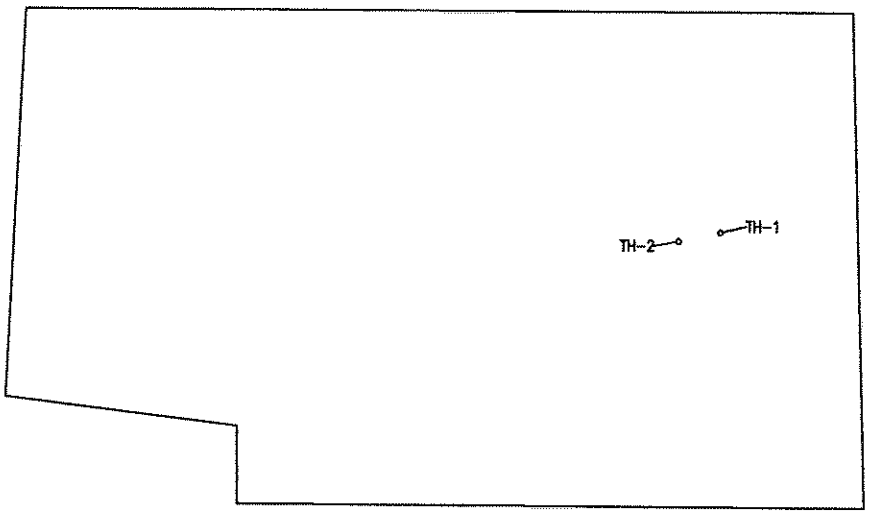
2'- 15' Claystone (CL)

Fine-coarse grained
High density
Moderate-high moisture content
Low-moderate sand content
Moderate-high plasticity
Greyish Brown color

GEOQUEST LLC

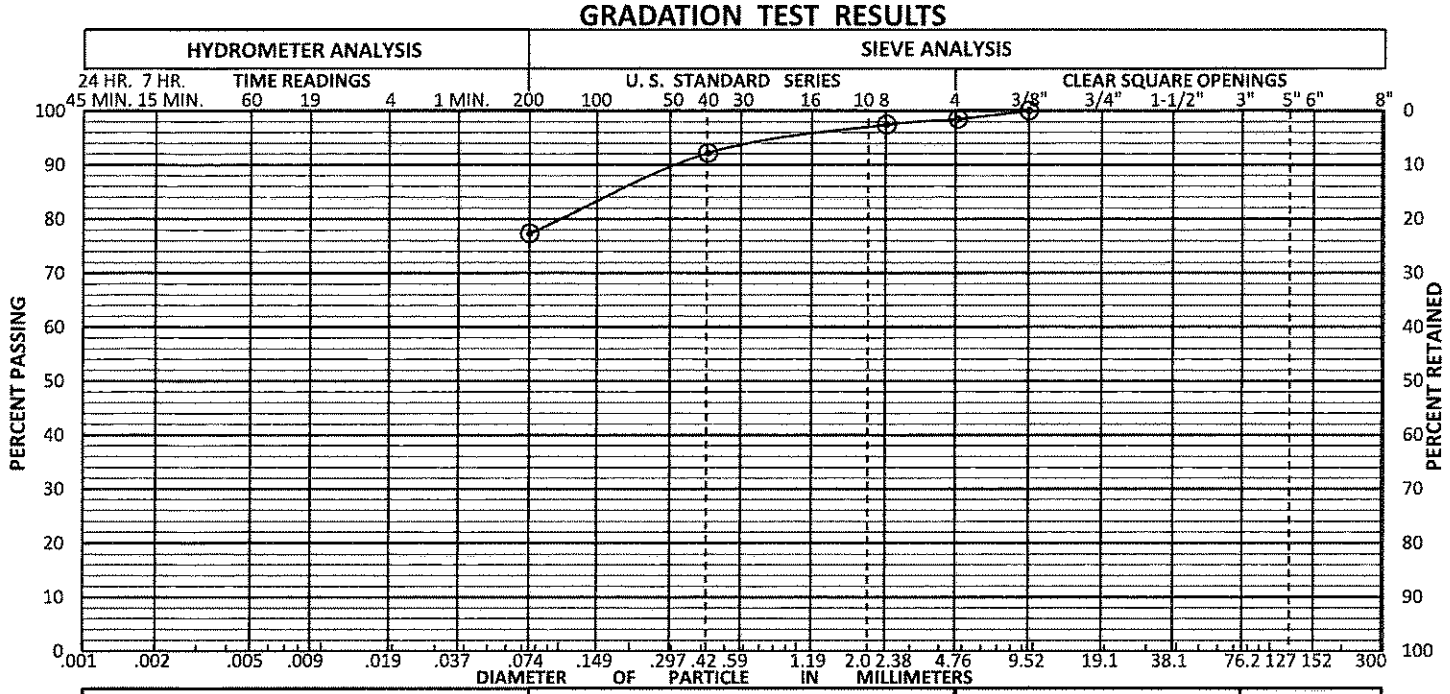
SITE MAP

2222 Baptist Rd
El Paso County
Colorado
Job #19-0712



0 100 200 300 400
GRAPHIC SCALE IN FEET
SCALE: 1" = 400'

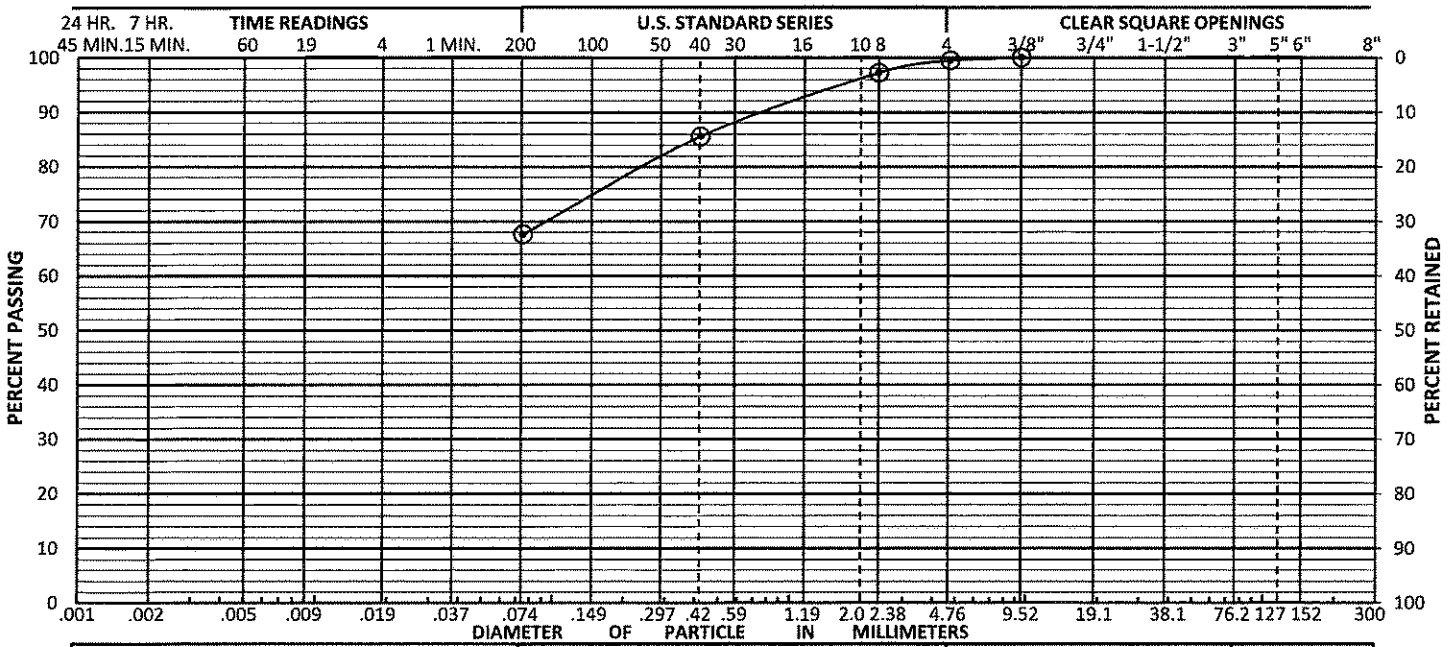
GEOQUEST LLC
GRADATION TEST RESULTS



CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL
GRAVEL 1.5 %
SAND 21.3 %
FINES 77.2 %
SAMPLE # 1 HOLE # TH-1 DEPTH 12 FEET

NOTES: 12.9 % Moisture Content
LL = 38.6
PL = 20.0
PI = 18.6



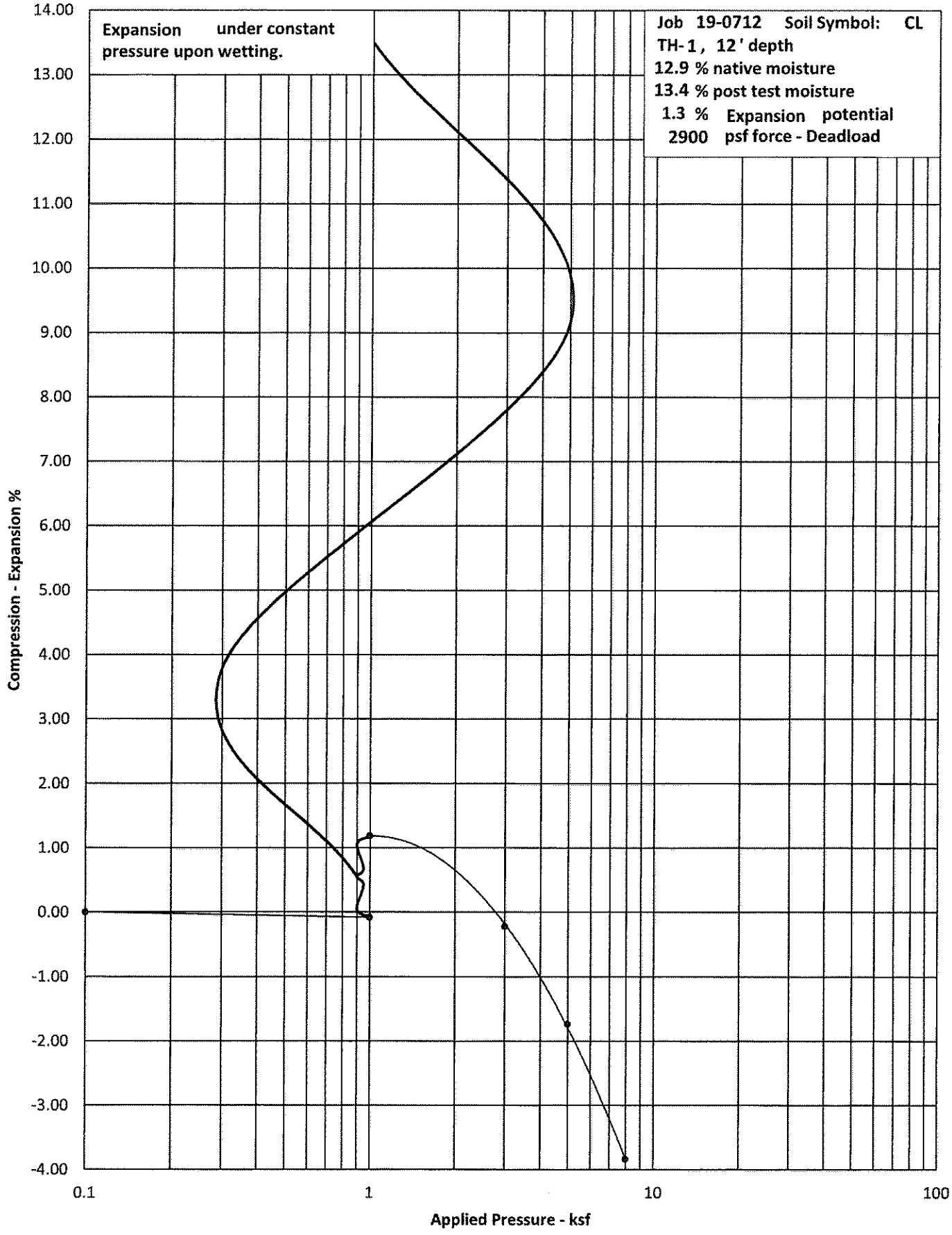
CLAY TO SILT	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

CLASSIFICATION CL
GRAVEL 0.5 %
SAND 31.9 %
FINES 67.6 %
SAMPLE # 1 HOLE # TH- 2 DEPTH 4 FEET

NOTES: 13.0 % Moisture Content
LL = 32.2
PL = 15.5
PI = 16.7
Job #: 19-0712 By: MJ 7/24/2019

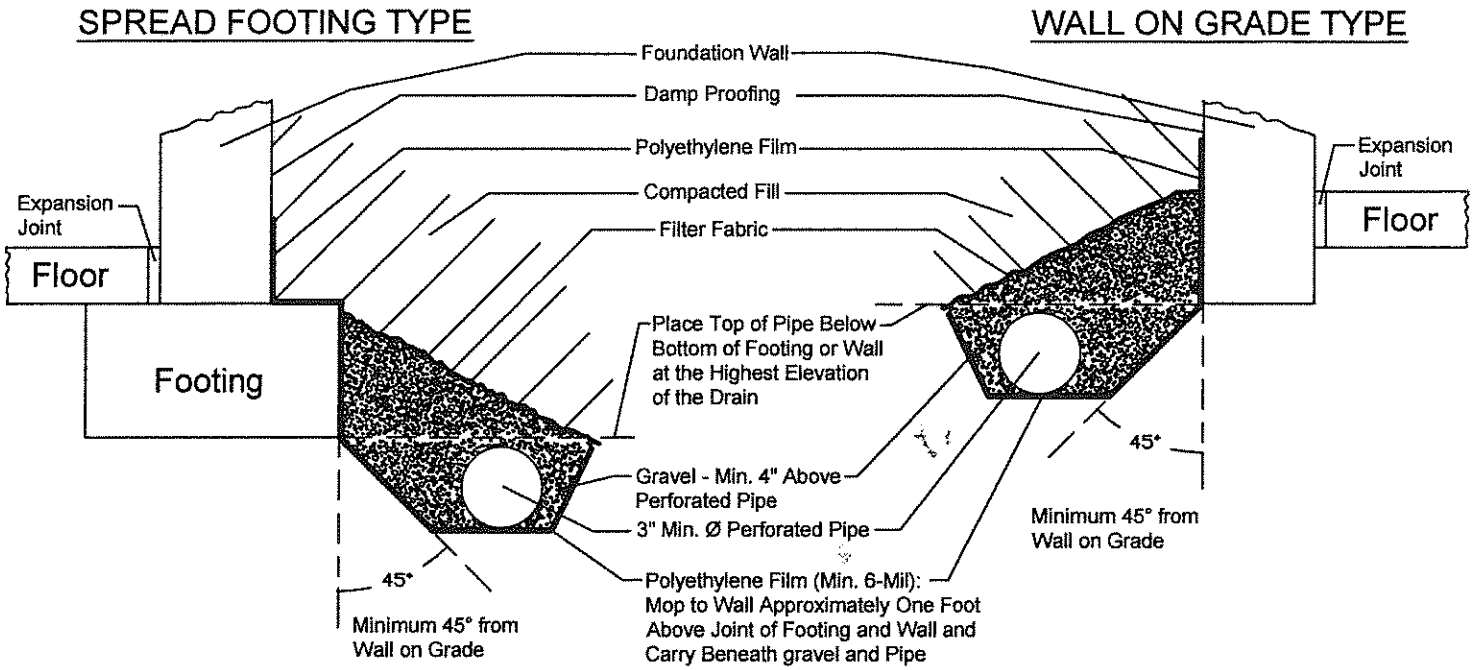
GEOQUEST LLC

SWELL-CONSOLIDATION TEST RESULTS



GEOQUEST, LLC
481-4560

EXTERIOR DRAIN DETAIL



1. Gravel to be Not More Than 1-1/2" and Not Less Than 1/2" Diameter.

2. Perforated Pipe Diameter Varies With Expected Seepage. 3"Ø and 4"Ø are Most Common. ABS and PVC are Most Common Materials for Pipe.

3. Pipe to be Laid out in a Minimum Slope of 1" in 10'.

4. Gravity Outfall is Desired if Possible. Portion of Pipe in Area Not Drained Shall be Non-Perforated. Daylight Must be Maintained Clear of Debris in Order to Function Properly.

5. If Gravity Outfall is Not Possible, Provide a Sump With Operational Pump. Pump May Not Connect to Any Sanitary or Storm Sewer.

6. Soil Backfill Should be Compacted to at Least 80% of the Modified Proctor Denisty in the Upper Three Feet of Fill.

7. Filter Fabric to be Mirafi 140s or Approved Equivalent. Roofing Felt and Sheet Plastic are Not Acceptable.

8. Drain Pipe Shall be Laid Below Protected Area, as Shown in The Detail Above.

9. Mop Polyethylene Film to Wall Approximately One Foot Above Joint of Footing and Wall (Do Not Pull Plastic Tight) and Carry Beneath Gravel and Pipe.

10. The Polyethylene Film Shall be Continued to the Edge of the Excavation.

LIMITATIONS

This report is issued based on the understanding that the owner or his representative will bring the information, data, and recommendations contained in this report to the attention of the project engineer and architect, in order that they may be incorporated into the plans for the structure. It is also the owner's responsibility to ensure that all contractors and sub-contractors carry out these recommendations during the construction phase.

This report was prepared in accordance with generally accepted professional geotechnical/engineering methods. However, Geoquest, LLC makes no other warranty, express or implied, as to the findings, data, specifications, or professional advice rendered hereunder.

This report is considered valid as of the present date. The owner acknowledges, however, that changes in the conditions of the property might occur with the passage of time, such as those caused by natural effects or man-made changes, both on this land and on abutting properties. Further, changes in acceptable tolerances or standards might arise as the result of new legislative actions, new engineering advances, or the broadening of geotechnical knowledge. Thus, certain developments beyond our control may invalidate this report, in whole or in part.

This report and its recommendations do not apply to any other site than the one described herein and are predicated on the assumption that the soil conditions do not deviate from those described. In the event that any variations or undesirable conditions should be detected during the construction phase or if the proposed construction varies from that planned as of this report date, the owner shall immediately notify Geoquest, LLC in order that supplemental recommendations can be provided, if so required.

APPENDIX C

Profile Pit Evaluation, 2222 Baptist Road, El Paso County, Colorado, Geoquest, LLC
Job #19-0712, last dated August 16, 2019

GEOQUEST, LLC
6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

To Whom It May Concern,

Attached are the results of the Profile Pit Evaluation performed for your site. **Completion of the report does NOT automatically place you in the queue to complete a design.** We require the following information is provided to us prior to placing a job in the queue. 1) Accurate number of bedrooms either proposed or existing in the house. Be sure to include all rooms with closets. 2) Designs for new construction also requires submittal of a site plan. This shall include at a minimum the following: lot lines, proposed construction of all buildings, well, driveway, and slope or topography lines. A surveyor's CADD file is preferred (.DWG or .DXF). It is your responsibility to provide correct information. Additional fees will be assessed if any information changes.

Please read the evaluation to determine if the system for your site shall be designed by a licensed engineer or if a conventional design is allowed. If a conventional system is allowed, a design document is still required by the health department, this may be provided by an engineer, installer, or builder familiar with On-Site Wastewater Treatment System (OWTS) regulations. OWTS Designs and Record Drawings are done at an additional cost. Please contact the office for pricing. If installing in El Paso County, an Engineer's Record Drawing (additional fee) is required for final acceptance by the health department. If installing in a different county please verify with the installer who will be completing the Record Drawing. We are happy to complete this for an additional fee.

Per county and state regulations, the Soil Treatment Area (STA), commonly referred to as the leach field, shall be installed adjacent to the test pit locations. **Any alteration or deviation from the tested locations will require additional testing at an additional cost.**

The homeowner shall be made aware of the responsibilities of owning a septic system. Please contact your local health department for homeowner responsibilities and Do's and Don'ts.

Geoquest, LLC provides no warranty for the evaluation or design (should this be completed). This evaluation and design have been prepared in compliance with the state and the local governing public health department's regulations. However, the test procedures are limited in determining soil absorption across the proposed STA. Many factors contribute to soil absorption outside of our control as well as unknown water usage. It is important to follow proper OWTS installation practices to minimize risk.

Please feel free to contact us at (719) 481-4560, if you have any questions.

GEOQUEST, LLC
6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

PROFILE PIT EVALUATION

FOR

ASPEN GOLD GENERAL CONTRACTING

& ENGINEERING, LLC

JOB #19-0712

2222 Baptist Road,
El Paso County,
Colorado

COLORADO REGISTERED PROFESSIONAL ENGINEER
CHARLES E. MILLIGAN
34608
6/6/19

Sincerely,

Charles E. Milligan, P.E.
Civil Engineer

PROFILE PIT FINDINGS

Enclosed are the results of the profile pit for the septic system to be installed at **2222 Baptist Road, El Paso County, Colorado.** The location of the test pit was determined by Aspen Gold General Contracting & Engineering, LLC. The residence will not be on a public water system. The number of bedrooms in the design for the residence is unknown. Due to the natural slope of the property, the entire system will feed to the southeast at approximately 10% at least 20 feet. All applicable portions of the El Paso County Health Department Onsite Wastewater Treatment System Regulations (OWTS) must be complied with for the installation of the treatment system.

The inspection was performed on July 24, 2019, in accordance with Table 10-1 of the **E.P.C.P.H. OWTS Regulations.**

Soil Profile #1:

0 to 6" - Topsoil - loam, organic composition.

6" to 25" - USDA soil texture sandy loam, soil type 2A, structure shape granular, structure grade 1, non-cemented, LTAR 0.50, yellowish brown in color, 10 YR 5/4.

25" to 4' - USDA soil texture sandy loam, soil type 2A, structure shape massive, structure grade 0, moderately cemented, LTAR 0.50, light yellowish brown in color, 2.5 Y 6/3, sandstone.

Soil Profile #2:

0 to 6" - Topsoil - loam, organic composition.

6" to 42" - USDA soil texture sandy loam, soil type 2A, structure shape granular, structure grade 1, non-cemented, LTAR 0.50, light brown in color, 7.5 YR 6/4.

42" to 4' - USDA soil texture sandy loam, soil type 2A, structure shape massive, structure grade 0, moderately cemented, LTAR 0.50, brownish yellow in color, 10 YR 6/6, saturated at 42 inches, sandstone.

Groundwater was not encountered during the inspection. Bedrock was encountered at the depth of 25 inches in Profile Pit #1 and 42 inches in Profile Pit #2 during the inspection. No known wells were observed within 100 feet of the proposed system. **All setbacks shall conform to county regulations.**

Due to encountering bedrock, the septic system to be installed on this site shall be designed by a Colorado Licensed Engineer. Based on the observed conditions, we feel a design based on an LTAR of 0.50 GPD/SF (USDA 2A, treatment soil, treatment level 1) is reasonable. An above grade uniformly pressure dosed soil treatment area is required.

If during construction of the field itself, subsurface conditions change considerably or if the location of the proposed field changes, this office shall be notified to determine whether the conditions are adequate for the system as designed or whether a new system needs to be designed.

Weather conditions at the time of the test consisted of clear skies with hot temperatures.

PROFILE PIT LOG - Profile Pit #1

JOB#: 19-0712
DATE EVALUATED: 24 Jul 2019
EQUIPMENT USED: MINI-EXCAVATOR

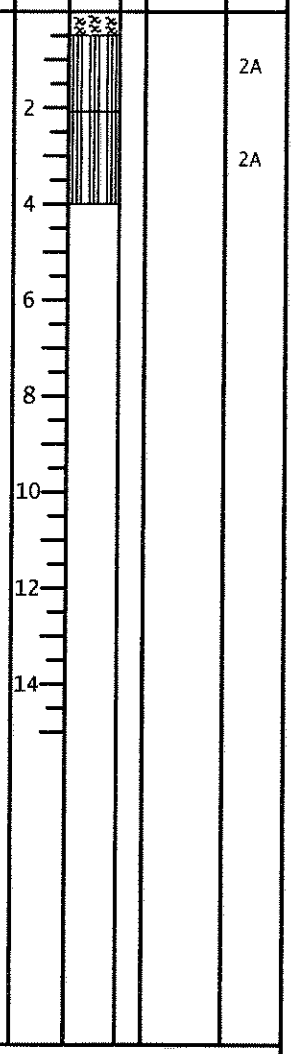
0"-6" **TOPSOIL**
Loam
Organic Composition

6"- 25" **Sand**
Fine-coarse Grained
Low-moderate Density
Moderate Moisture Content
Low-moderate Clay Content
Low-moderate Cohesion
Low-moderate Plasticity
Yellowish Brown Color
10YR 5/4

USDA Soil Texture: Sandy Loam
USDA Soil Type: 2A
USDA Structure Shape: Granular
USDA Structure Grade: 1
Cementation Class: Non-cemented
Long Term Acceptance Rate (LTAR, Treatment Level 1):0.50

25"- 4' **Sandstone**
Fine-coarse Grained
High Density
Low-moderate Moisture Content
Low-moderate Clay Content
Low Cohesion
Low Plasticity
Light Yellowish Brown Color
2.5Y 6/3

USDA Soil Texture: Sandy Loam
USDA Soil Type: 2A
USDA Structure Shape: Massive
USDA Structure Grade: 0
Cementation Class: Moderately
Long Term Acceptance Rate (LTAR, Treatment Level 1):0.50



LTAR to be Used for OWTS Sizing: **0.50GPD/SF (USDA Type 2A, Treatment soil, Treatment Level 1)**
Depth to Groundwater (Permanent or Seasonal): Not Encountered; Saturated @ 42" in Profile Pit #1
Depth to Bedrock and Type: Sandstone @ 25"
Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly pressure dosed STA)
Soil Treatment Area Slope and Direction: SE @ 10%

Note: See El Paso County Board of Health Regulation Chapter 8: On-Site Wastewater Treatments Systems (OWTS) Regulations for Additional Information. Refer to Table 10-1 for Corresponding LTAR if Treatment Level 2, 2N, 3, or 3N will be Implemented in the Design of the OWTS. System Sizing Depends on a Number of Factors (i.e. LTAR, # of Bedrooms, Type of Soil Treatment Area (STA), Method of Transfer to the STA (Gravity, Dosed, or Pressure Dosed), and Type of Storage / Distribution Media Used in the STA)

Project: 19-0712
Sheet: 1 of 2
Date: 07 Aug 2019
Scale: 1/4" = 1'
Drawn by: mtj
Checked by: cem

Project Name and Address

Aspen Gold

2222 Baptist Rd
Sch. No. 6100000519
El Paso County, Colorado

GEOQUEST, LLC.

6825 SILVER PONDS HEIGHTS
SUITE 101
COLORADO SPRINGS, CO
80908

OFFICE: (719) 481-4560
FAX: (719) 481-9204

PROFILE PIT LOG - Profile Pit #2

JOB#: 19-0712
DATE EVALUATED: 24 Jul 2019
EQUIPMENT USED: MINI-EXCAVATOR

0"-6" **TOPSOIL**
Loam
Organic Composition

6"- 42" **Sand**

Fine-coarse Grained	USDA Soil Texture: Sandy Loam
Low-moderate Density	USDA Soil Type: 2A
Moderate Moisture Content	USDA Structure Shape: Granular
Low-moderate Clay Content	USDA Structure Grade: 1
Low-moderate Cohesion	Cementation Class: Non-cemented
Low-moderate Plasticity	Long Term Acceptance Rate (LTAR, Treatment Level 1):0.50
Light Brown Color 7.5YR 6/4	

42"- 4' **Sandstone**

Fine-coarse Grained	USDA Soil Texture: Sandy Loam
High Density	USDA Soil Type: 2A
Low-moderate Moisture Content	USDA Structure Shape: Massive
Low-moderate Clay Content	USDA Structure Grade: 0
Low Cohesion	Cementation Class: Moderately
Low Plasticity	Long Term Acceptance Rate (LTAR, Treatment Level 1):0.50
Brownish Yellow Color 10YR 6/6	Saturated @ 42"

DEPTH (in ft.)	SYMBOL	SAMPLES	WATER %	SOIL TYPE
2				2A
4				2A
6				
8				
10				
12				
14				

LTAR to be Used for OWTS Sizing: **0.50GPD/SF (USDA Type 2A, Treatment soil, Treatment Level 1)**
Depth to Groundwater (Permanent or Seasonal): Saturated @ 42"
Depth to Bedrock and Type: Sandstone @ 42"
Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly pressure dosed STA)
Soil Treatment Area Slope and Direction: SE @ 10%

Note: See El Paso County Board of Health Regulation Chapter 8: On-Site Wastewater Treatments Systems (OWTS) Regulations for Additional Information. Refer to Table 10-1 for Corresponding LTAR if Treatment Level 2, 2N, 3, or 3N will be Implemented in the Design of the OWTS. System Sizing Depends on a Number of Factors (i.e. LTAR, # of Bedrooms, Type of Soil Treatment Area (STA), Method of Transfer to the STA (Gravity, Dosed, or Pressure Dosed), and Type of Storage / Distribution Media Used in the STA)

Project: 19-0712	Project Name and Address
Sheet: 2 of 2	Aspen Gold
Date: 07 Aug 2019	2222 Baptist Rd
	Sch. No. 6100000519
	El Paso County, Colorado
Scale: 1/4" = 1'	
Drawn by: mtj	
Checked by: cem	

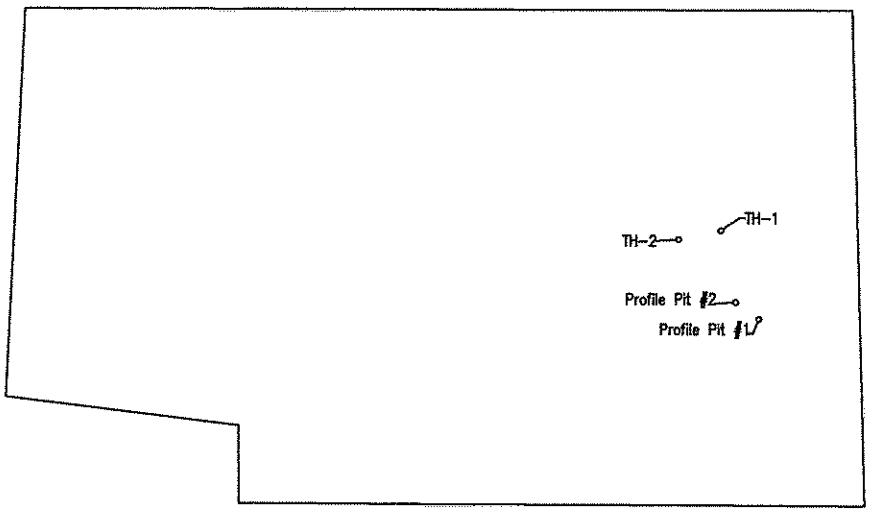
GEOQUEST, LLC.
6825 SILVER PONDS HEIGHTS
SUITE 101
COLORADO SPRINGS, CO
80908

OFFICE: (719) 481-4560
FAX: (719) 481-9204

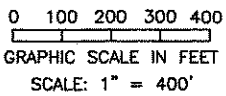
GEOQUEST LLC

SITE MAP

2222 Baptist Rd
El Paso County
Colorado
Job #19-0712



Location from Southeast Lot Corner to Profile Pit #1:
N. 29° W. – 440'
Location from Profile Pit #1 to Profile Pit #2:
N. 54° W. – 59'
GPS Coordinates:
Pit 1; N. 39° 04' 20.14" W. 104° 47' 09.75"
Pit 2; N. 39° 04' 19.36" W. 104° 47' 09.26"



SCALE: 1" = 400'