ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

SOIL, GEOLOGY, & GEOLOGIC HAZARD STUDY
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, COLORADO

Prepared for

TimberRidge Development Group, LLC
2138 Flying Horse Club Drive
Colorado Springs, Colorado 80921

Attn: Loren Moreland

June 10, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

COLORADO REGISTERED
JOSEPH COLLIN GOODE JR.
23725
PROFESSIONAL ENGINEER
6-13-2022

Reviewed by:

Joseph C. Goode, Jr., P.E.
President

LLL/am

Encl.

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TABLE OF CONTENTS

1.0 SUMMARY

Project Location

The project lies in portions of the SE¼ of Section 21, SW¼ of Section 22, NW¼ of Section 27, and NE¼ of Section 28, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately three miles northeast of Colorado Springs, Colorado.

Project Description

Total acreage involved for the Retreat at TimberRidge Filing 3 consists of 44.5 acres. Filing 3 consists of thirty-three single-family residential lots. Three 2.5+ acres rural residential lots (Lots 1 – 3), and thirty conventional residential lots (Lots 4 – 33) are proposed. Six tracts area also included in Filing 3 for open space, trails, and drainage areas. Lots 1 – 3 will be serviced by individual water wells and on-site wastewater treatment systems; Sterling Ranch Metropolitan District will provide sewer and water for Lots 4 – 33.

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of shallow bedrock, expansive soils, artificial fill, downslope creep, erosion, floodplain, ponded water, shallow groundwater, seasonal shallow groundwater and potentially seasonally shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the SE¼ of Section 21, SW¼ of Section 22, NW¼ of Section 27, and NE¼ of Section 28, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately three miles northeast of Colorado Springs, Colorado, at Vollmer Road and Arroya Lane. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually to moderately sloping to the south, with moderate to steep slopes along Sand Creek. The drainages on site flow in a southerly direction through the central portion of the site. Ponds are located on the site, overall TimberRidge, one north of Arroya Lane outside of the proposed residential development, and one located along the eastern side of Parcel C. Water was observed in Sand Creek and the ponds, other drainages on the site were dry at the time of the original investigation. The pond along the eastern side of Filing 3 was currently dry at the time of our recent site observations. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses, weeds, cacti, and yuccas, with areas of scattered trees along Sand Creek, and ponderosa pine trees located across the northwest portion of the site. Site photographs, taken May 6 and 9, 2022, are included in Appendix A.

Total acreage involved in Filing 3 is approximately 44.5 acres. Thirty-three single-family residential lots are proposed. The development will consist of three larger 2.5+ acre sized lots in the northwestern portion of the development and thirty ⅓ acre to 2.5 acre sized lots in the northeastern portions of the development to the east of Sand Creek. The ⅓ to 2.5 acre lots will be serviced by municipal sewer and water. The 2.5+ acre lots will have individual water wells and on-site wastewater treatment systems. Open space is proposed along Sand Creek. Overlot grading is anticipated to develop the smaller lots. Grading should be limited to the road areas on the larger 2.5 acre lots. The Development Plan is presented in Figure 3. At the time of our site observations the roadways had been cut, part of the utilities were installed, and some minor areas of grading started on the eastern side of Sand Creek. Additional grading is anticipated for the site.

3.0 SCOPE OF THE REPORT

The scope of the report will include the following:

- A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on May 6 and 9, 2022.

Three additional test borings were drilled on the site to determine general soil and bedrock characteristics. The locations of the test borings are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Test Boring Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

Previous site investigation performed by Entech consisted of thirteen test borings, and six test pits to evaluate the use of individual on-site wastewater treatment systems. The locations of the test borings and test pits are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Laboratory Testing Summary, Test Boring and Test Pit Logs are presented in Appendix D (Reference 1). Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis ASTM D-422, Atterberg Limits ASTM D-4318, volume change testing using FHA Swell and Swell/Consolidation test. Sulfate testing was performed on select samples to evaluate potential

for below grade concrete degradation due to sulfate attack. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately twelve miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northeasterly direction (Reference 2). The rocks in the area of the site are sedimentary in nature and typically Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of man-made, and alluvial soils of Quaternary Age. The alluvial soils were deposited by water on site and as stream terraces along Sand Creek and the drainages located on the site. Man-made soils exist as fill piles located in the southern portion of the site. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped three soil types on the site (Figure 4). In general, the soils classify as coarse sandy loam. The soils are described as follows:

Type	Description
71	Pring Coarse Sandy Loam, 3 to 8% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to have moderate to moderately rapid permeabilities. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards.

5.3 Site Stratigraphy

The Falcon NW Quadrangle Geology Map showing the site is presented in Figure 6 (Reference 5). The Geology Map prepared for the site is presented in Figure 6. Four mappable units were identified in Filing 3 on this site which are described as follows:

Qaf **Artificial Fill of Holocene Age:** These are recent deposits of man-made fill. They are associated with the three man-made dams located across the site.

Qal **Recent alluvium of Holocene Age:** These are recent deposits that have been deposited along Sand Creek and the other drainages on-site.

Qam **Middle alluvium of Holocene to Pleistocene Age:** These materials consist of lower stream terrace deposits. The alluvium typically consists of silty to clayey gravelly sands.

Tkd **Dawson Formation of Tertiary to Cretaceous Age:** The Dawson Formation typically consisted of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands and sandy clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon NW Quadrangle* distributed by the Colorado Geological Survey in 2003 (Reference 5), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6), and the *Geologic Map of the Denver 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 7). The Test Borings and Test Pits used in evaluating the site and are included in Appendices B and D. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

The soils encountered in the Test Borings can be grouped into four general soil types. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 silty to slightly silty sand and very clayey sand (SM-SW, SM, SC), encountered in all of Test Borings at the existing ground surface and extending to depths ranging from1 foot to 17 feet bgs. These soils were encountered at loose to dense states and at moist conditions. The majority of the soils were encountered and medium dense states. Samples tested had 9 to 41 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sand being non-plastic. Sulfate testing resulted in less than 0.01 to 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

Soil Type 2 sandy clay (CL), encountered in Test Boring Nos. 1, 2 and 7 at depths ranging from 2 to 14 feet bgs, and extending to depths ranging from 4 to 19 feet. These soils were encountered at very soft to stiff consistencies. Samples tested had 78 to 90 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 47 and aplastic index of 21. FHA Swell testing on samples of the sandy clay resulted in expansion pressures of 1520 to 1550 psf, indicating a moderate to high expansion potential. Sulfate testing resulted in less than 0.01 to 0.01 percent sulfate by weight indicating the clay exhibits negligible potential for below grade concrete degradation.

Soil Type 3 silty to slightly silty sandstone and clayey-silty sandstone (SM, SM-SW, SC-SM), encountered in all of Test Borings at depths ranging from surface to 19 feet bgs and extending to the termination of the test borings (16 to 20 feet). The sandstone was encountered at dense to very dense states and at moist conditions. Samples tested had 9 to 24 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sandstone being non-plastic. Sulfate testing resulted in less than 0.01 percent sulfate by weight indicating the sandstone exhibits negligible potential for below grade concrete degradation.

Soil Type 4 sandy to very sandy claystone (CL), encountered in Test Boring Nos. 4 and 5 at depths ranging from 7 to 9 feet bgs and extending to depths ranging from 16 to 19 feet bgs. The claystone was encountered at hard consistencies and at moist conditions. Samples tested had 56 to 64 percent passing the No. 200 Sieve. Swell/Consolidation Testing resulted in expansions of 1 to 3.3 percent, which indicates the claystone exhibits a low to high expansion potential. Atterberg Limits Testing resulted in a liquid limit of 44 and a plastic index of 20.

The Test Boring Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.5 Groundwater

Groundwater was encountered in one of the test borings located within Filing 3 at an approximate depth 14.5 feet, water was not encountered in the remaining borings which were drilled to depths of 16 to 20 feet. Areas of water, seasonal shallow groundwater water, and potential seasonal shallow groundwater have been mapped along the drainages on-site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time.

It should be noted that in the sandy materials on-site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

As mentioned previously, detailed mapping has been performed on this site to produce an Engineering Geology Map Figure 6. This map shows the location of various geologic conditions of which the developers should be cognizant during the planning, design and construction stages of the project. These hazards and the recommended mitigation techniques are as follows:

<u>Artificial Fill - constraint</u>

These are recent man-made fill deposits associated with the two dams located across the site. One of the dams is located north of Arroya Lane and is not within the proposed developed area. One dam is located on the eastern side of Filing 3. It is anticipated that this dam will be removed and filled during the site grading process. At the time of the investigation, the condition of the

dams was observed, and appeared to be in good condition. Additional areas of fill associated with temporary stockpiles are located east of Sand Creek, and along the southern side of Filing 3 located within Filing 2.

Mitigation: The earthen dams lie within defined drainages and should be avoided as building sites. Fill stockpiles will likely be removed during site grading. The fill on this site is considered uncontrolled for construction purposes. Any uncontrolled fill encountered beneath foundations will require removal and recompaction at a minimum of 95% of its maximum Modified Procter Dry Density, ASTM D-1557.

Collapsible Soils - constraint

The majority of the soils encountered on-site do not exhibit collapsible characteristics, however, areas of loose soils were encountered in the test borings drilled on site. Should loose or collapsible soils be encountered beneath foundations, recompaction and moisture conditioning of the upper 2 feet of soil at 95% of its maximum Modified Proctor Dry Density ASTM D-1557 will be required. Exterior flatwork and parking areas may also experience movement. Proofrolling and recompaction of soft areas should be performed during site work.

Expansive Soils - constraint

Expansive soils were encountered in the test borings drilled on site. These occurrences are typically sporadic; therefore, none have been indicated on the maps. The clays and claystone, if encountered at foundation grade, can cause differential movement in structures. These occurrences should be identified and dealt with on an individual basis.

Mitigation Should expansive soils be encountered beneath foundations, mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. The use of structural floors should be considered for basement construction on highly expansive clays. Final recommendations should be determined after additional investigation.

Areas of Erosion - constraint

These are areas that are undergoing erosion by water and sheetwash producing gullies and rill erosion.

Mitigation: Due to the nature of the soils on this site, virtually all the soils are subject to erosion by wind and water. Other minor areas of erosion were observed on site other than those mapped, particularly where some rill erosion has occurred. Areas of erosion can occur across the entire site, particularly if the soils are disturbed during construction. Vegetation reduces the potential for erosion. The areas identified where erosion is actually taking place may require check dams, regrading and revegetation using channel lining mats to anchor vegetation. Further recommendations for erosion control are discussed under Section 8.0 "Erosion Control" of this report. Recommendations pertaining to revegetation may require input from a qualified landscape architect and/or the Natural Resource Conservation Service (previously Soil Conservation Service).

Groundwater and Floodplain Areas - constraint

Areas within the drainages on-site have been identified as areas of seasonally wet and/or seasonally high groundwater areas. Water was observed in the three ponds on-site, and flowing in Sand Creek. The majority of the drainages across the site were dry. The site is mapped within floodplain zones according to the FEMA Map No. 08041CO535G, Figure 7 (Reference 8). The floodplain area is to consist of open space/ park for the development. These areas are discussed as follows:

Seasonal Shallow Groundwater Area - constraint

In these areas, we would anticipate periodic high subsurface moisture conditions and frost heave potential on a seasonal basis. Additional, highly organic soils could be encountered in these areas. These areas lie within defined drainages and it is anticipated they will be avoided by development. Any structures in or adjacent to these areas should follow the mitigation discussed below.

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 9. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Structures should not block drainages.

All organic material should be completely removed prior to any fill placement. Finished floor levels must be located a minimum of one foot above floodplain levels.

Potentially Seasonal Shallow Groundwater Area - constraint

In these areas, we would anticipate the potential for periodically high subsurface moisture conditions, frost heave potential and highly organic soils. The majority of these areas lie within defined drainages which can likely be avoided by the proposed development. The same mitigation recommendations for the seasonal shallow groundwater areas apply to the potentially seasonal shallow groundwater areas.

Areas of Ponded Water - constraint

These are areas of standing water behind earthen dams on site. We would not expect development in these areas. Either the dams can be avoided by construction or the areas may be completely regraded. Should complete regrading of the site be considered, all organic matter and soft, wet soils should be completely removed before filling. Any drainage into these areas should be rerouted in a non-erosive manner off of the site where it does not create areas of ponded water around proposed structures.

Downslope Creep Areas - hazard

These areas are acceptable as building sites, however, in areas identified with this hazard classification, we would anticipate accelerated lateral and vertical movement of the near surface soils in the downslope direction. It is anticipated that many of these areas will be mitigated by the overlot grading.

Mitigation: The design of foundations in these areas should account for the additional pressure on the uphill side of the structure due to the creep potential. The lateral pressure distribution for sloping conditions in downslope creep area is presented in Figure 10. Tie-beams, buttresses and counterforts may be necessary in some areas. Where possible, in areas of downslope creep, structures should be designed to be as compact and rigid as possible. This will help them better tolerate the vertical and lateral movements to which the foundation system may be subjected with minimal damage. Long, rambling, irregular structures should be avoided, as they are associated with much greater potential for damaging differential movement. Additionally, structures should be designed to step up the slope. Deep cuts in these areas should be avoided. Any retaining walls proposed in these areas should also be properly designed for by a

qualified professional engineer for the global slope stability. Proper control of drainage at both the surface and subsurface is important. Saturation of materials should be avoided that may create unstable conditions.

Potentially Unstable Slope Areas - hazard

These slopes are considered stable in their present condition; however, considerable care must be exercised in these areas not to create a condition which would tend to activate instability. These areas are primarily located along the banks of Sand Creek, which are proposed as open space.

Mitigation: Building should be avoided in these areas. Proper control of drainage at both the surface and the subsurface is extremely important. Areas of ponded water at the surface should be avoided. Utility trenches, basement excavations and other subsurface features should not be permitted to become water traps which may promote saturation of the subsurface materials. Drainage should not be permitted over the potentially unstable slope but directed in a non-erosive manner away from the slope. Irrigation above these slopes should be kept to a minimum to prevent saturation of the subsurface soils. The use of xeriscape landscaping utilizing native plantings is recommended to reduce the need for irrigation.

6.1 Relevance of Geologic Conditions to Land Use Planning

As mentioned earlier in this report, we understand that the development will be single family residential. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The most significant problems affecting development will be those associated with the major drainages on site that are mitigated by avoidance. The minor drainages are being mitigated by site grading, or will be avoided. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices.

The upper materials are typically at loose to dense states. The granular soils encountered in the upper soil profiles of the test borings should provide good support for foundations. Loose soils if encountered at foundation depth will require mitigation. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of expansive soils or loose soils. Excavation is anticipated to be moderate with rubber-tired equipment for the site sand materials, and will require track mounted equipment for the dense

sandstone. Expansive layers may also be encountered in the soil and bedrock on this site. Areas of expansive soils encountered on site are sporadic; therefore, none have been indicated on the maps. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of seasonal and potentially seasonal high groundwater areas and ponded water were encountered on site. The majority of these areas will likely be mitigated with site grading, or can be avoided by construction. Drains may be necessary for structures adjacent to these areas to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. The majority of the site does not lie within any floodplain zones according to the FEMA Map No. 08041CO535G, dated December 7, 2108 (Figure 7, Reference 8). A floodplain is mapped in the central portion of the site. Along this area is designated as open space and will be avoided by development. Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

Areas of fill were observed on site associated with dams. The dam located on the eastern side of Parcel C will be regraded and filled during site development. Any uncontrolled fill encountered beneath foundations should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. The larger embankment is located on Sand Creek. The existing embankment slopes generally appear to be in good condition. The spillway is an earth/vegetated channel on the west side of the embankment. Periodic observations of the embankment are recommended especially after large storm events.

Areas of erosion and gullying may require the construction of check dams and revegetation if construction encroaches on these areas. General recommendations for erosion control are discussed under Section 8.0 "Erosion Control".

Areas of downslope creep have been identified along the creek channel on this site. The majority of these areas are on the side of the lot boundaries. In areas of downslope creep, structures should be designed to be as compact and rigid as possible. Foundations may require tie-beams or additional reinforcement in these areas. Foundations should be designed to step up the slopes to avoid deep cuts. Deep cuts should be avoided on all steeper sloping areas of the site. Any retaining walls proposed should be designed for the global slope stability by a

qualified professional engineer. This includes cuts made for terracing in backyards. Proper control of drainage at both the surface and subsurface is important. Saturation of materials should be avoided that may create unstable conditions.

Potentially unstable slope areas were observed along portions of Sand Creek. Based on the preliminary development plans these areas will be avoided. These areas should be avoided by construction and considerable care must be exercised in these areas not to create a condition which would tend to activate instability.

In summary, development of the site can be achieved if the items mentioned above are mitigated. These items can be mitigated through proper design and construction or through avoidance. Investigation on each lot is recommended prior to construction.

7.0 ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 9), the area is not mapped with any aggregate deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 10), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 11), the area of the site has been mapped as "Fair" for industrial minerals. However, considering the silty nature of much of these materials and abundance of similar materials through the region and the close proximity to developed land, they would be considered to have little significance as an economic resource.

According to *the Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 11), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "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-site (Reference 11).

The site has been mapped as "Fair" for oil and gas resources (Reference 11). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant

resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

8.0 EROSION CONTROL

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils become increasingly less susceptible to water erosion. For the typical soils observed on-site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill

slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

9.0 ROADWAY AND EMBANKMENT CONSTRUCTION RECOMMENDATIONS

In general, the site soils are suitable for the proposed roadways and embankments. Groundwater should be expected to be encountered in deeper cuts and along drainages and low-lying areas. If excavations encroach on the groundwater level unstable soil conditions may be encountered. Excavation of saturated soils will be difficult with rubber-tired equipment. Stabilization using shot rock or geogrids may be necessary. Sandstone to be placed in roads or embankments will require processing and moisture conditioning.

Any areas to receive fill should have all topsoil, organic material or debris removed. Prior to fill placement Entech should observe the subgrade. Fill must be properly benched and compacted to minimize potentially unstable conditions in slope areas. Fill slopes should be 3:1. The subgrade should be scarified and moisture conditioned to within 2% of optimum moisture content and compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557, prior to placing new fill. Areas receiving fill may require stabilization with rock or fabric if shallow groundwater conditions are encountered.

New fill should be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. These materials should be placed at a moisture content conducive to compaction, usually 0 to ±2% of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech during construction. Entech should approve any import materials prior to placing or hauling them to the site. Additional investigation will be required for pavement designs once roadway grading is completed and all utilities are installed.

10.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. The majority of these conditions can be mitigated through proper engineering design and construction practices. The proposed development and use are consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for TimberRidge Development Group, LLC. for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

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10. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties.* Colorado Geological Survey. Special Publication 5-B.

11. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board.* Colorado Geological Survey. Open-File Report 03-07.

TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TIMBERRIDGE
PROJECT TIMBERRIDGE, FILING 3
JOB NO. 221106

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			11.4	NV	NP	<0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY
1	2	10			9.3						SM-SW	SANDSTONE, SLIGHTLY SILTY
1	3	5			22.6						SM	SANDSTONE, SILTY

TABLE 2: Summary of Depth of Bedrock and Groundwater

Test Boring No.	Depth of Bedrock (ft.)	Depth of Groundwater (ft.)
1	3	>20
2	3	>20
3	3	>20
Previous Job No. 170020		
8	1	>20
10	3	14.5
11	9	>20
12	7	>20

FIGURES

N

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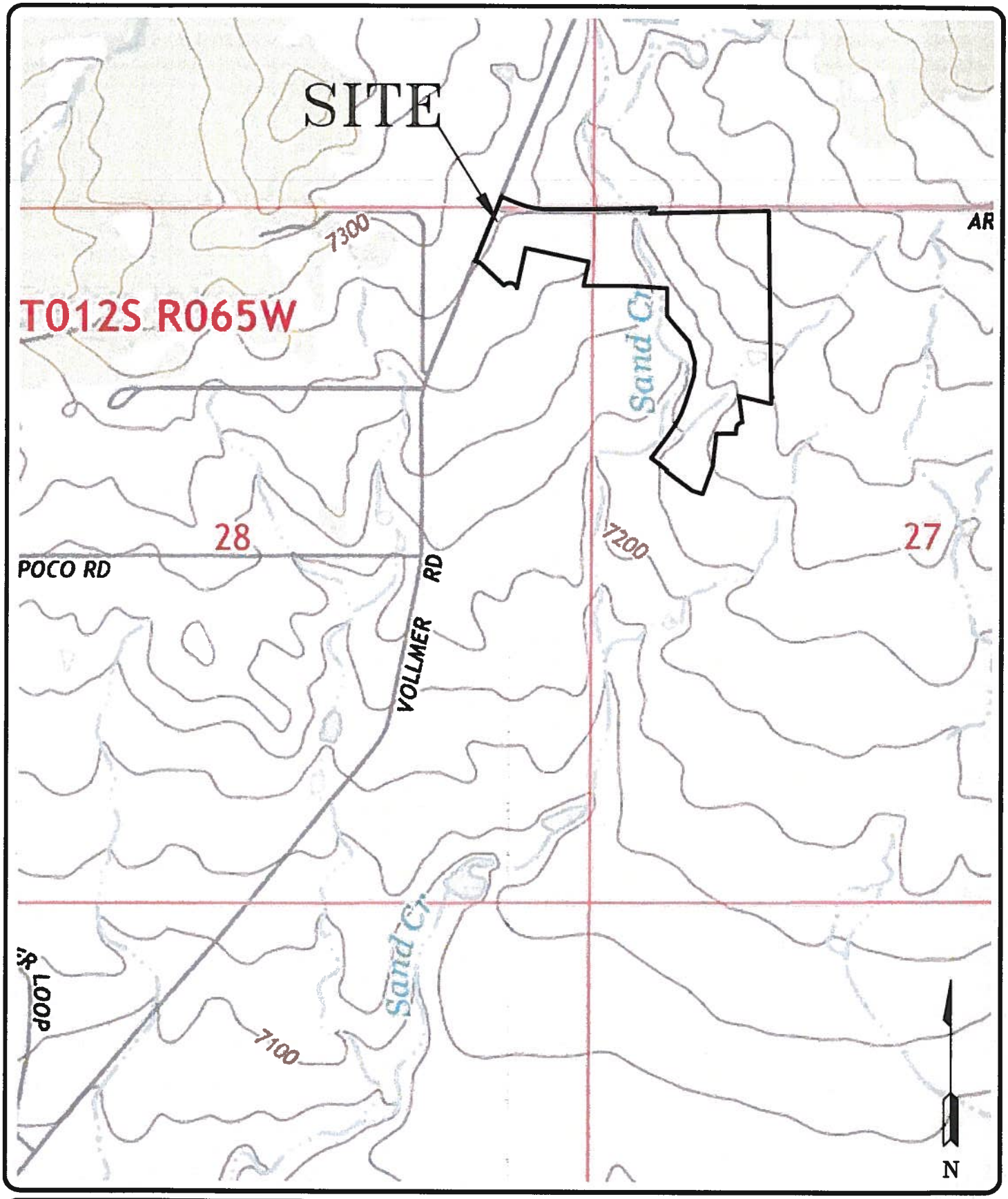
VICINITY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/7/22		

JOB NO.: 221106

FIG NO.: 1



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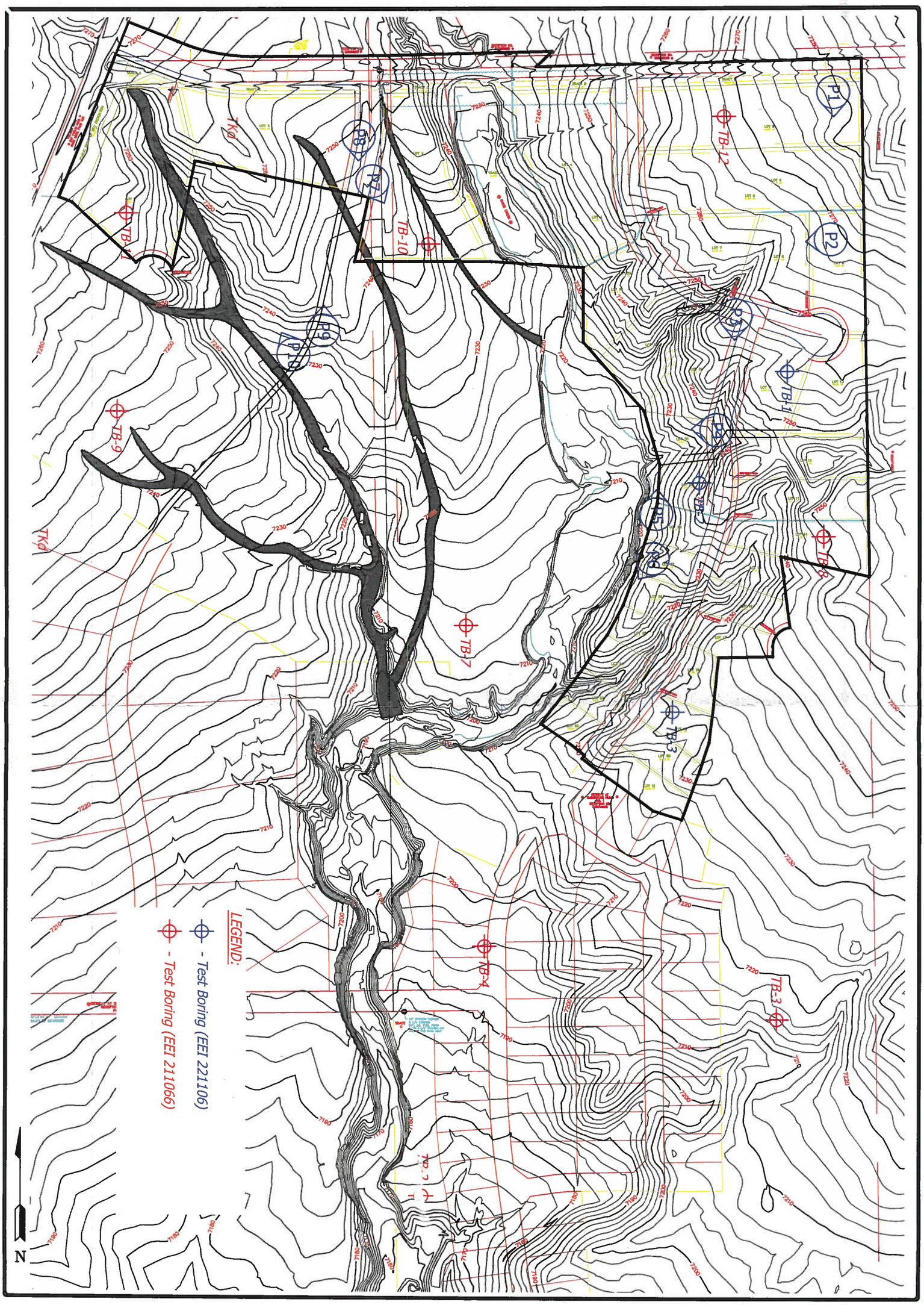
USGS MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/7/22		

JOB NO.: 221106

FIG NO.: 2



DRAWN	MAL
CHECKED	
DATE	6/17/22
SCALE	AS SHOWN
JOB NO.	221106
PROJECT No.	

3

SITE PLAN
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

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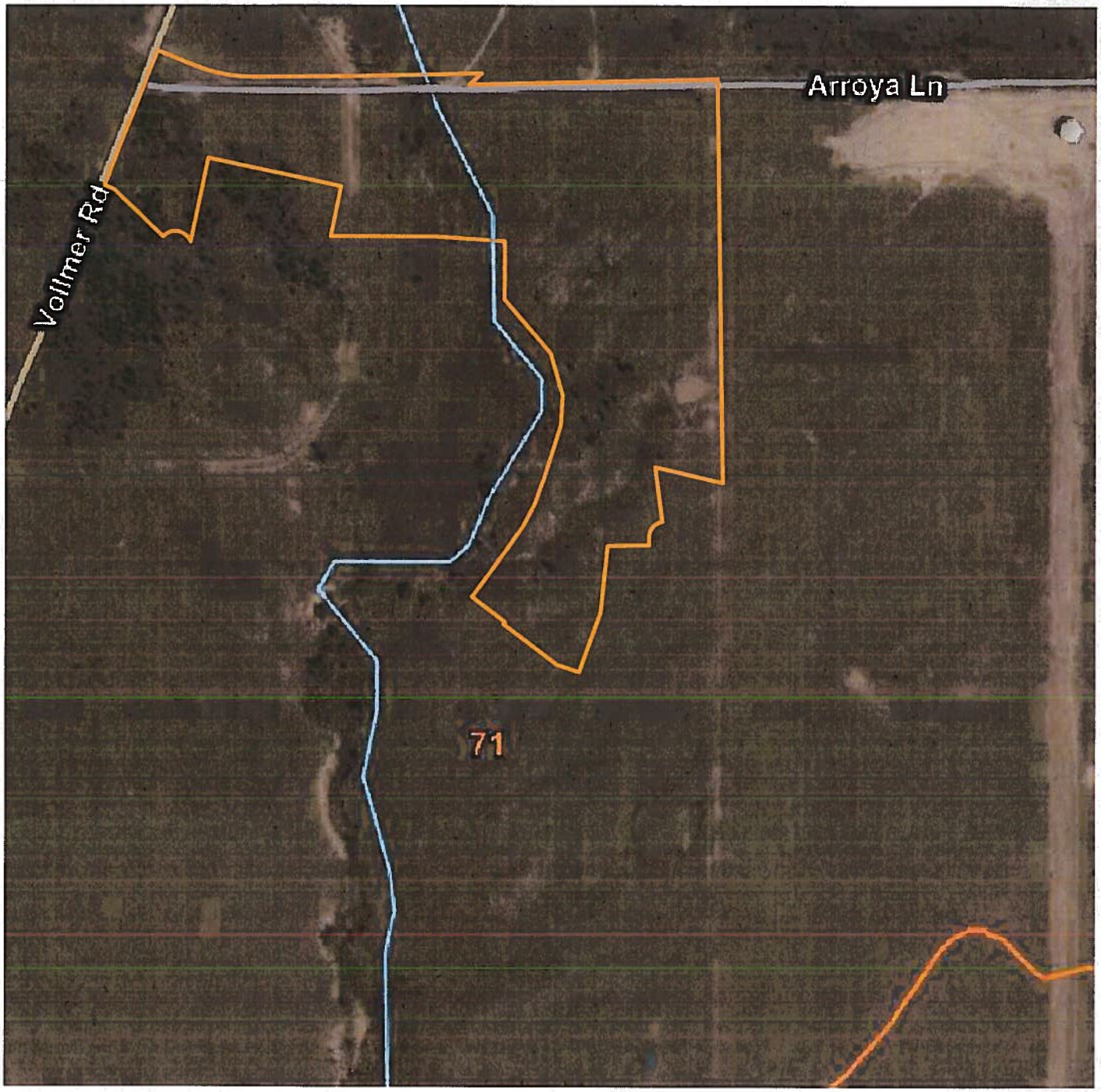
COLORADO SPRINGS, CO. 80907 (719) 531-5599

REVISION	BY



N

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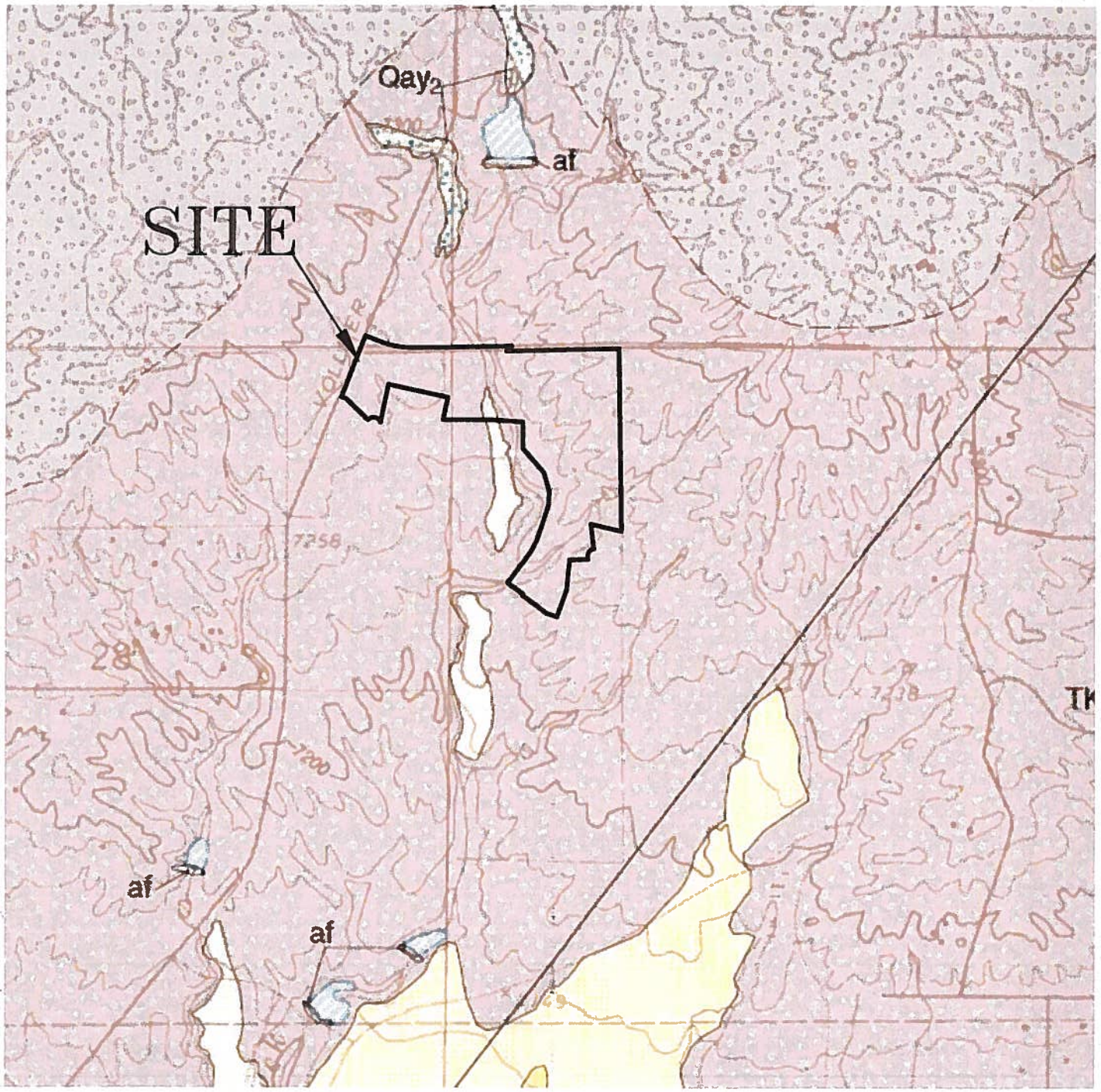
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/7/22		

JOB NO.: 221106

FIG NO.: 4



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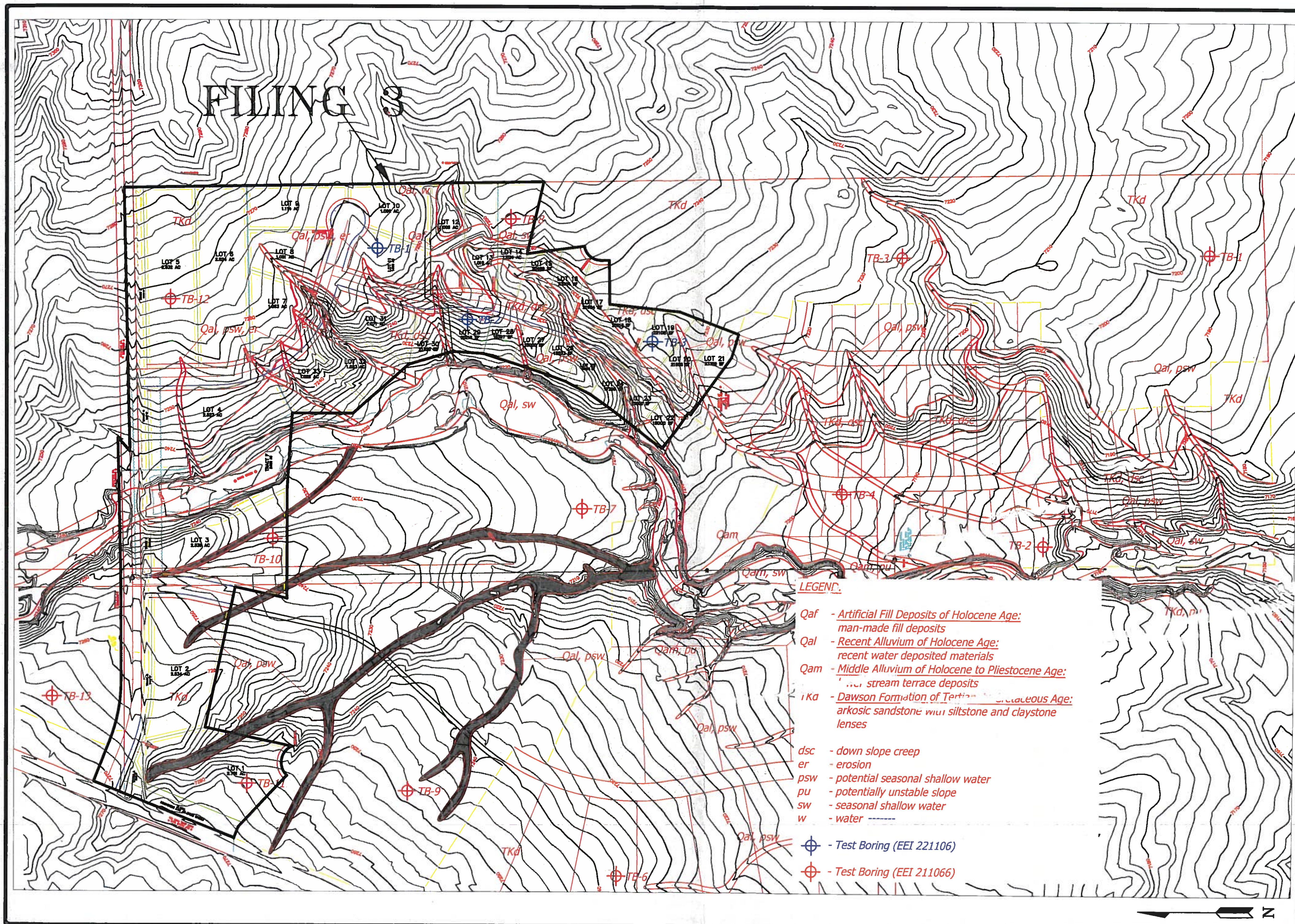
FALCON NW QUADRANGLE GEOLOGY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/7/22		

JOB NO.: 221106

FIG NO.: 5



REVISION	BY

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505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

GEOLOGY MAP/ENGINEERING GEOLOGY
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN LLL
CHECKED
DATE 6/7/22
SCALE AS SHOWN
JOB NO. 221106
FIGURE No. 6

N

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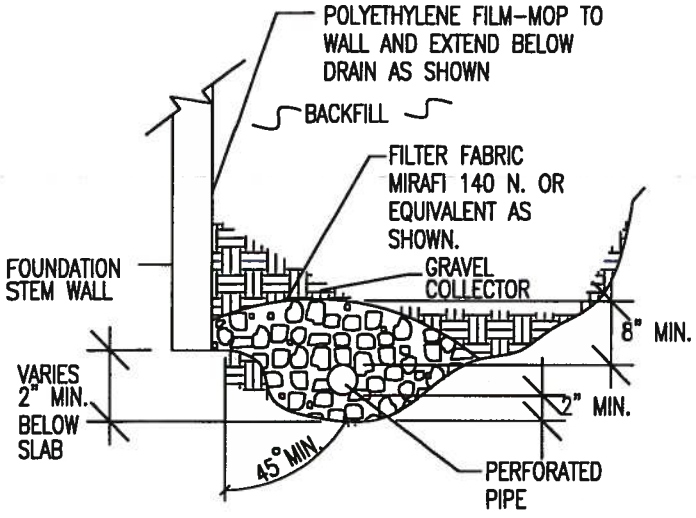
COLORADO SPRINGS, CO. 80907 (719) 531-5599

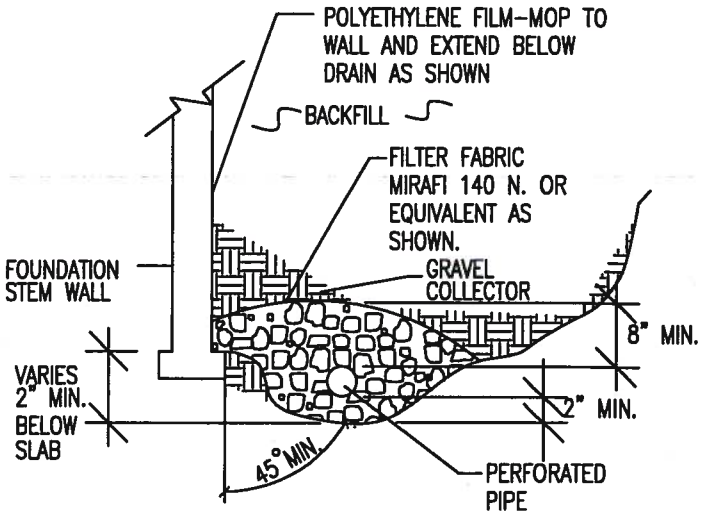
FLOODPLAIN MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	6/7/22		

JOB NO.: 221106

FIG NO.: 7





NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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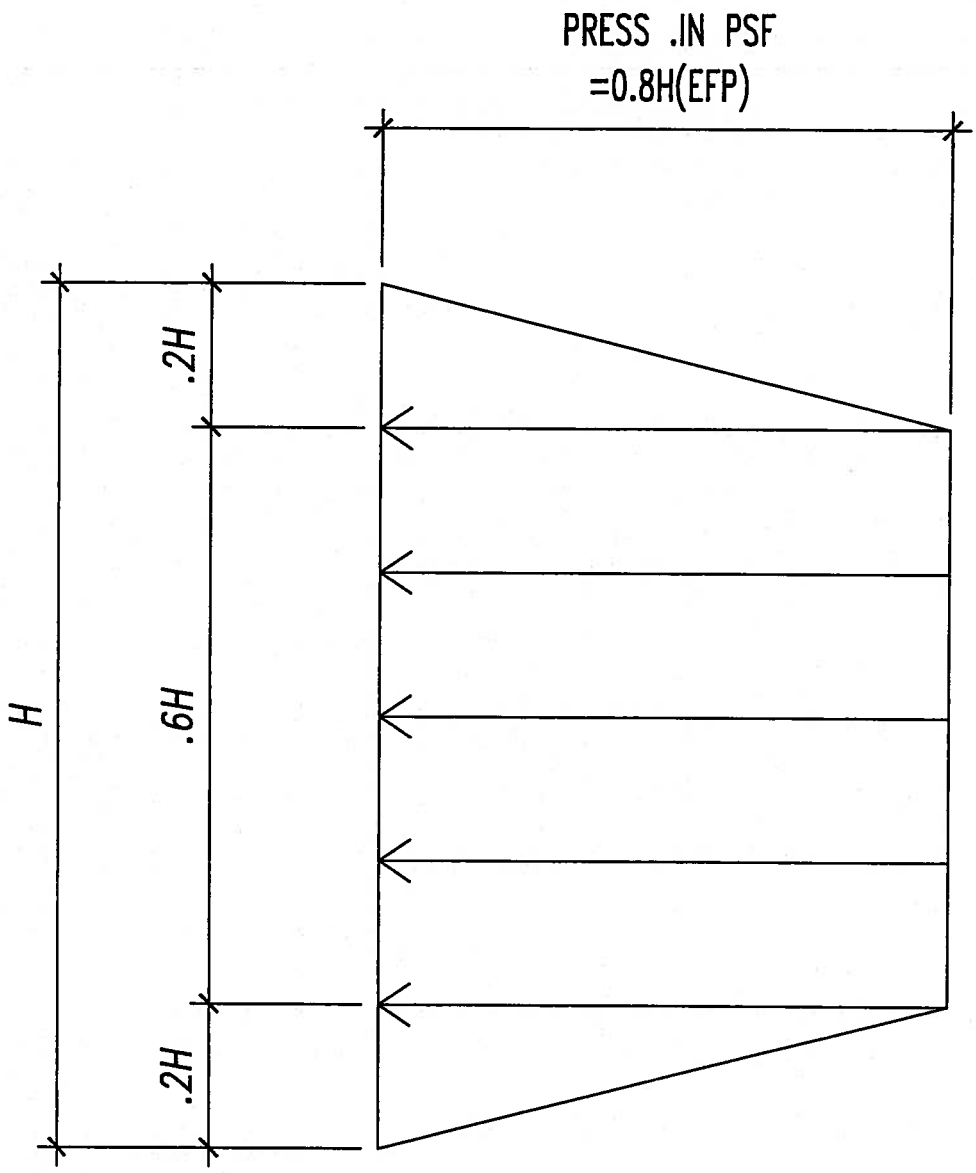
PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 221106

FIG NO.: 8



PRESSURE DISTRIBUTION

ENTECH
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505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

LATERAL PRESSURE DISTRIBUTION
AREA WITH CREEP

DRAWN BY:	DATE DRAWN:		
R. MCBRIDE	03/13/13		

JOB NO.: 221106

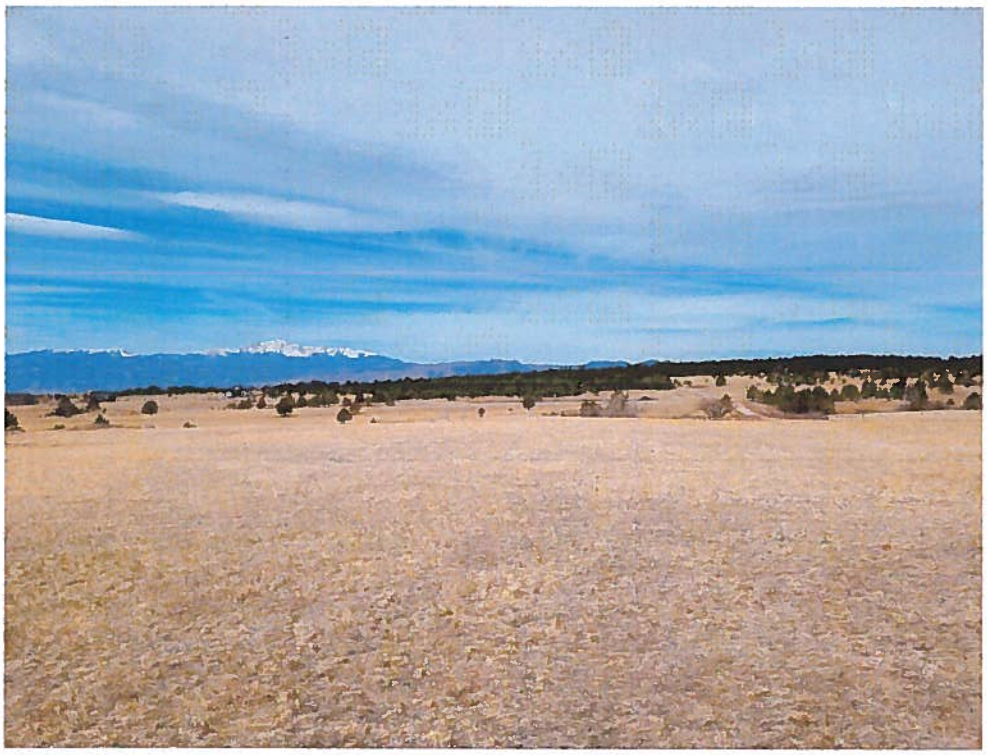
FIG. NO.: 9

APPENDIX A: Site Photographs

1

Looking south from the northeastern corner of the site.

May 6, 2022

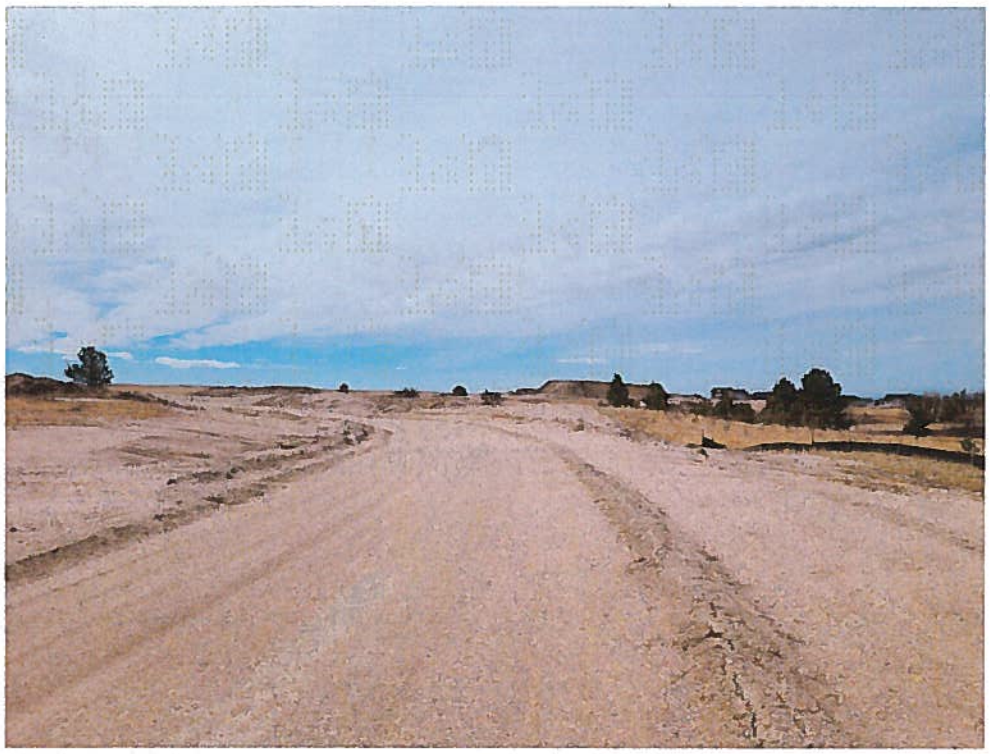


2

Looking west from the northeastern portion of the site.

May 6, 2022

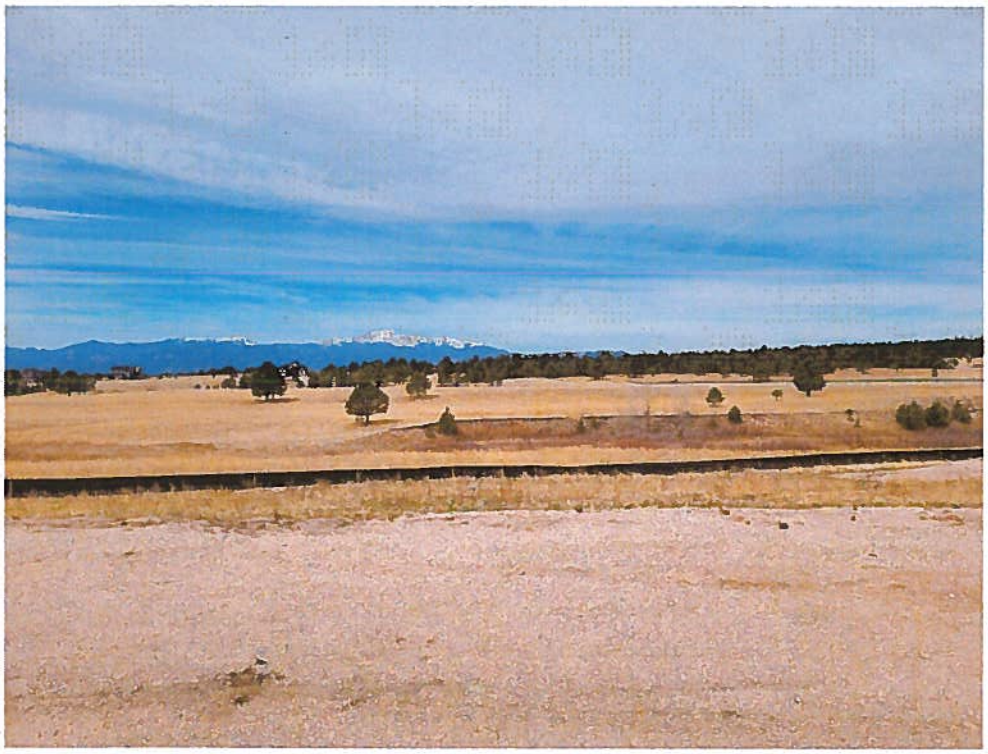
Job No. 221106



3

Looking south along Hawks Hill Court in the northeastern portion of the site.

May 6, 2022

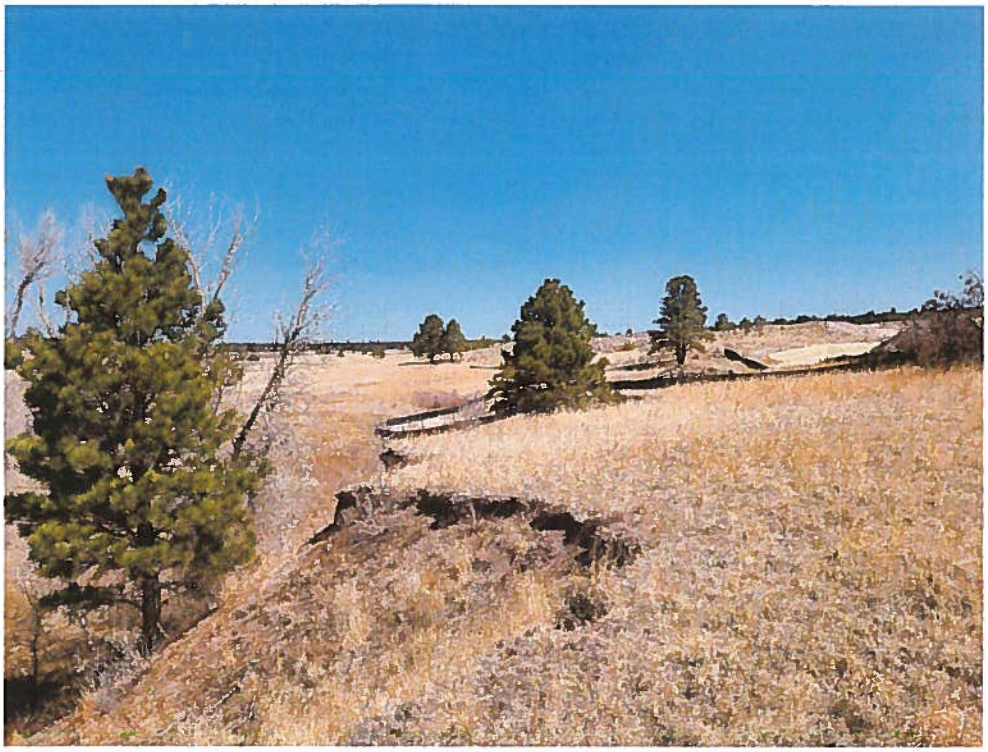


4

Looking west from Hawks Hill Court in the north-central portion of the site.

May 6, 2022

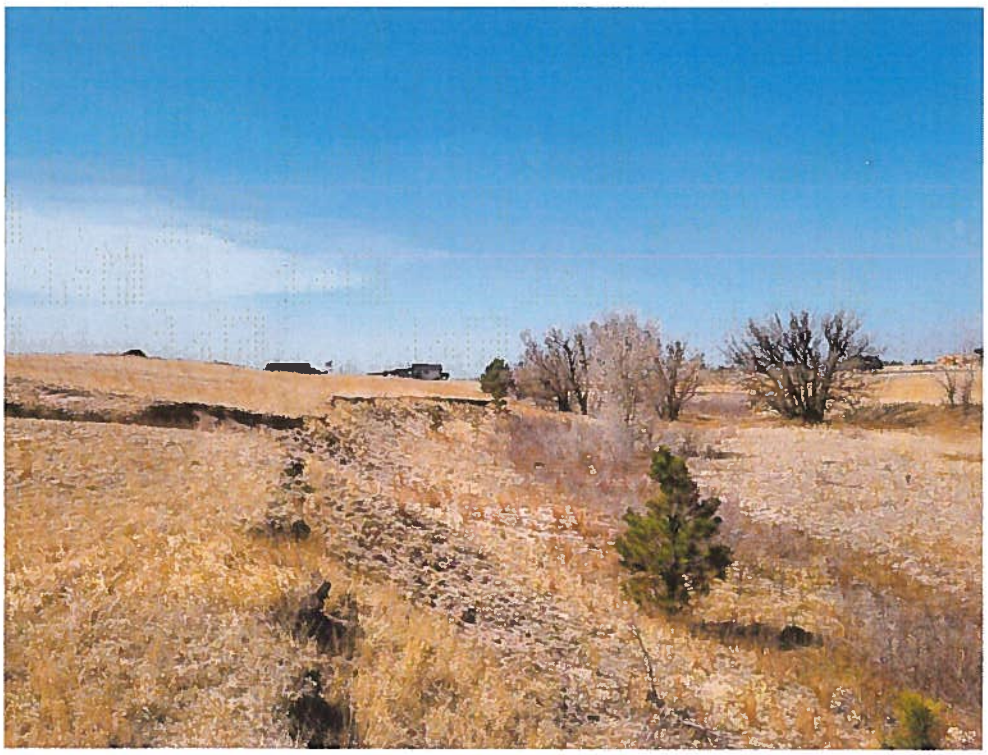
Job No. 221106



5

Looking north along the eastern side of Sand Creek.

May 9, 2022



6

Looking south along the eastern side of Sand Creek.

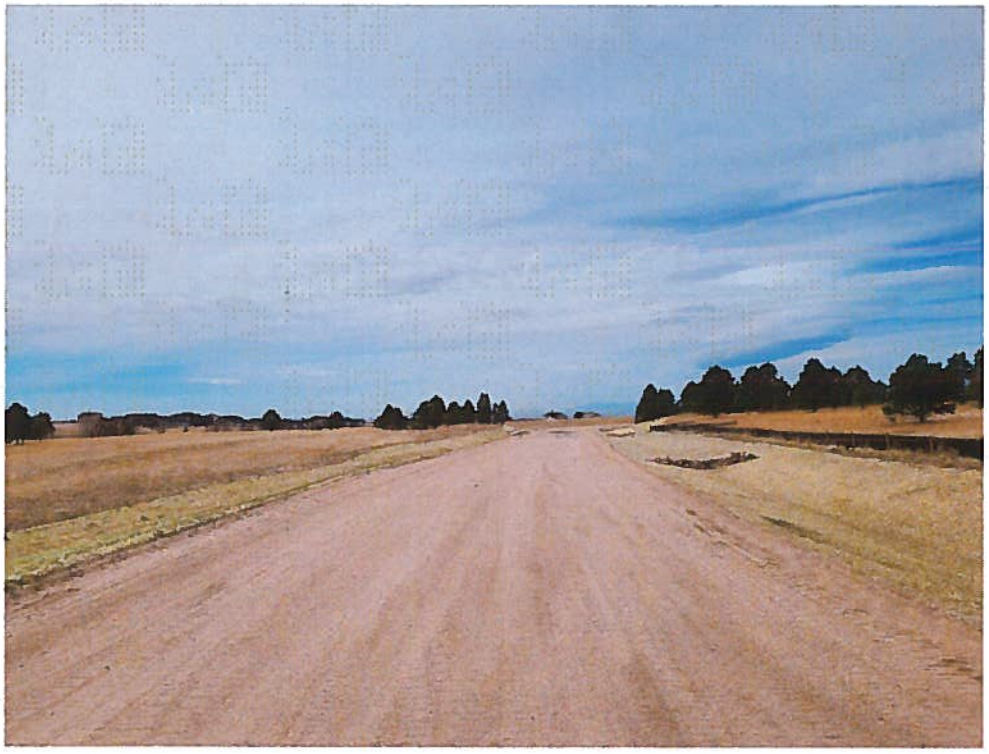
May 9, 2022

Job No. 221106

7

Looking southeast from Aspen Valley Road in the northwestern portion of the site.

May 6, 2022



8

Looking south along Aspen Valley Road in the northwestern portion of the site.

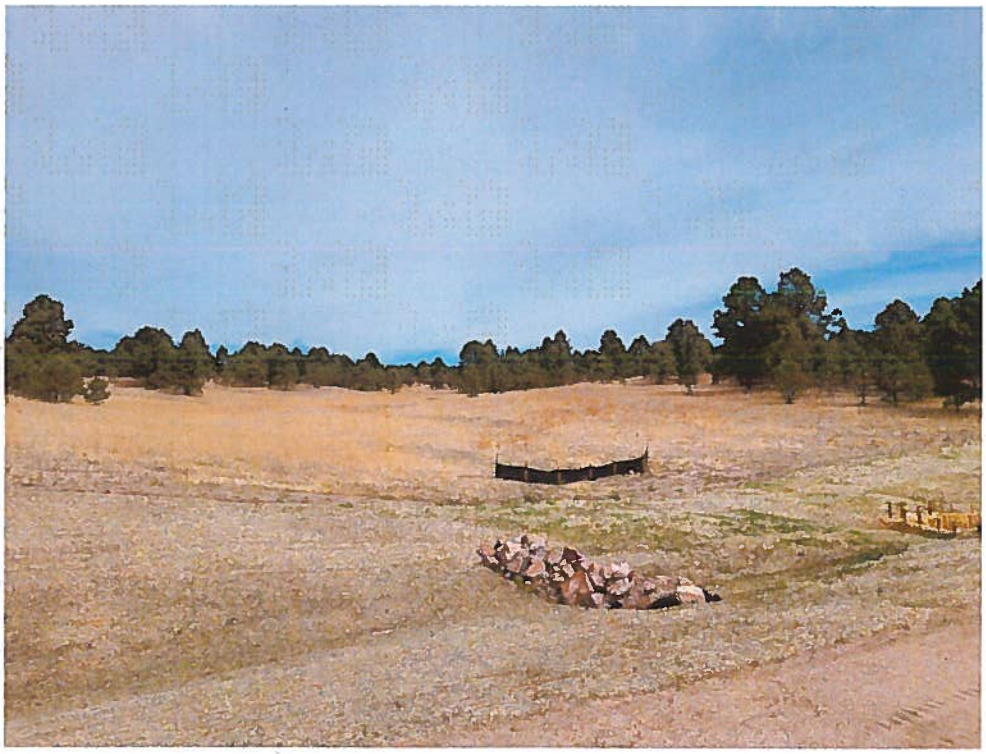
May 6, 2022

Job No. 221106

9

Looking north along Aspen Valley Road in the western portion of the site.

May 6, 2022



10

Looking northwest along minor drainage in the northwestern portion of the site.

May 6, 2022

Job No. 221106

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 5/13/2022
Job # 221106

REMARKS

DRY TO 16', 5/13/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			50 / 11"	2.7	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, DRY TO MOIST
5			50 / 6"	4.7	1	
10			50 / 5"	6.0	1	
15			50 / 3"	8.8	1	
						AUGER REFUSAL AT 16'
20						

TEST BORING NO. 2
DATE DRILLED 5/13/2022
CLIENT TIMBERRIDGE
LOCATION TIMBERRIDGE, FILING 3

REMARKS

DRY TO 20', 5/13/22

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			50 / 9"	7.5	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST
5			50 / 9"	9.0	1	
10			50 / 7"	7.6	1	
15			50 / 8"	8.5	1	
20			50 / 8"	12.1	1	

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.: 221106
FIG NO.: B-1

TEST BORING NO. 3
DATE DRILLED 5/13/2022
Job # 221106

TEST BORING NO.
DATE DRILLED
CLIENT TIMBERRIDGE
LOCATION TIMBERRIDGE, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 17', 5/13/22						
SAND, SILTY TO SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST				50/11"	6.3	1
	5			50/6"	7.2	1
	10			50/5"	7.2	1
	15			50/3"	9.4	1
AUGER REFUSAL AT 17'	20					

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	5					
	10					
	15					
	20					

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TEST BORING LOG

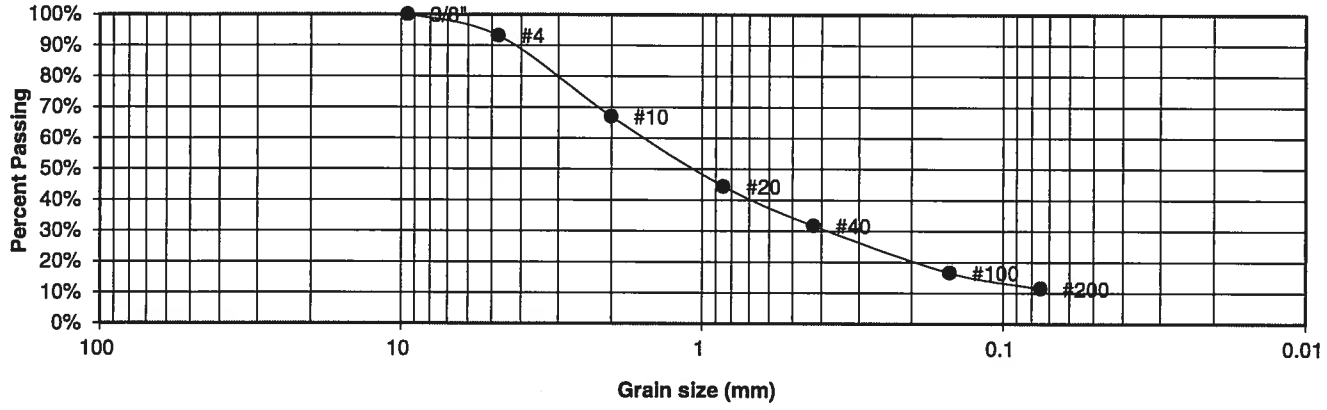
DRAWN:	DATE:	CHECKED: LLL	DATE: 6/6/22

JOB NO.: 221106
FIG NO.: B-2

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SM-SW	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	1	JOB NO.	221106
DEPTH (FT)	2-3	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.1%
10	67.0%
20	44.4%
40	31.7%
100	16.6%
200	11.4%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

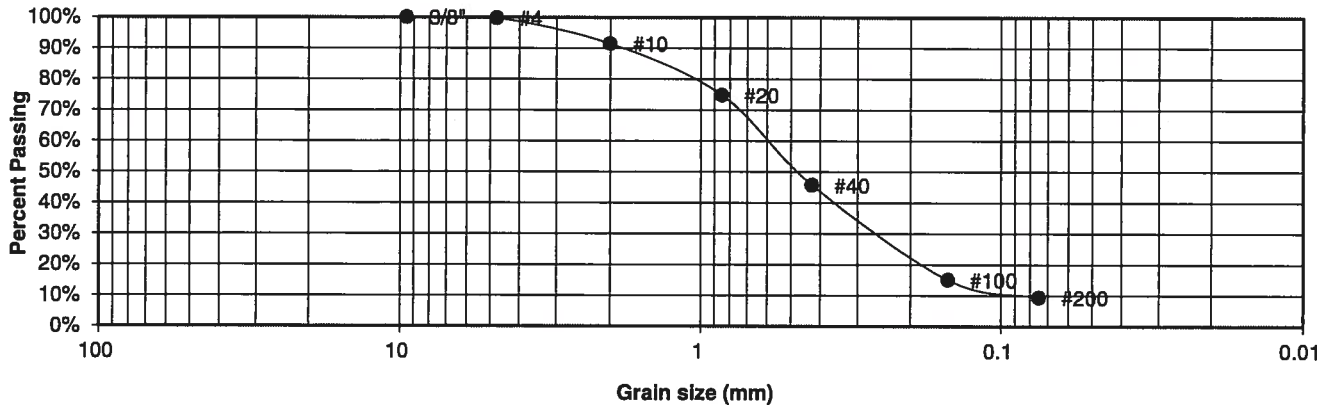
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.: 221106

FIG NO.: C-1

UNIFIED CLASSIFICATION	SM-SW	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	2	JOB NO.	221106
DEPTH (FT)	10	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	91.4%
20	74.8%
40	45.7%
100	15.1%
200	9.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

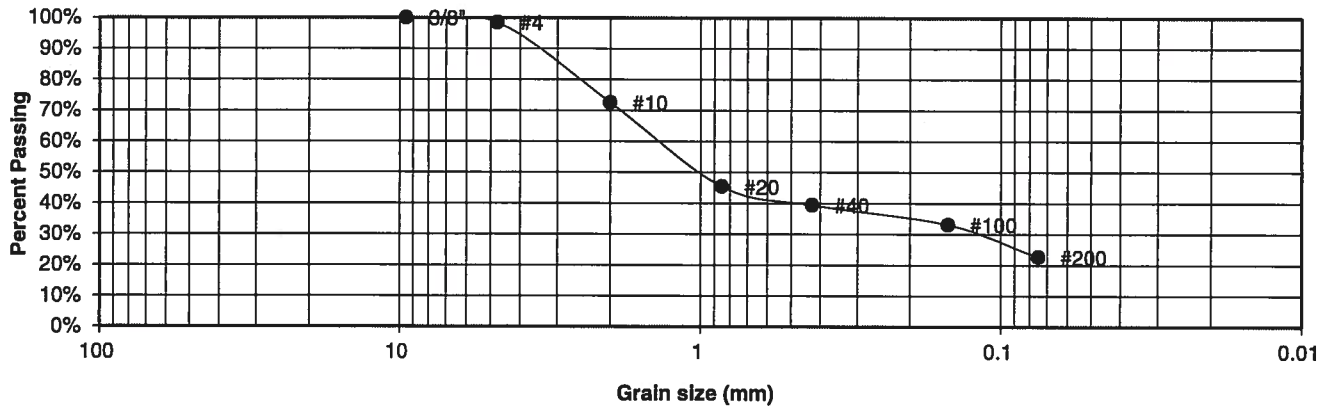
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.: 221106

FIG NO.: C-2

UNIFIED CLASSIFICATION	SM	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	3	JOB NO.	221106
DEPTH (FT)	5	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	72.5%
20	45.4%
40	39.4%
100	33.1%
200	22.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.: 221106

FIG NO.: C-3

CLIENT	TIMBERRIDGE	JOB NO.	221106
PROJECT	TIMBERRIDGE, FILING 3	DATE	5/18/2022
LOCATION	TIMBERRIDGE, FILING 3	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	1	SM-SW	<0.01

QC BLANK PASS

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.: 221106

FIG NO.: C-4

APPENDIX D: Laboratory Testing Summary and Test Boring and Test Pit Logs from Entech Job No. 211066

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TIMBERRIDGE DEVELOPMENT GROUP, LLC
PROJECT THE RETREAT AT TIMBERRIDGE, FILING 2
JOB NO. 211066

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	5	2-3			10.5						SM-SW	SAND, SLIGHTLY SILTY
1	6	5			41.3			0.01			SC	SAND, VERY CLAYEY
1	11	5			16.5						SM	SAND, SILTY
1	13	2-3			17.8						SM	SAND, SILTY
1	9	2-3			14.6	NV	NP				SM	SAND, SILTY
1	10	5			17.4			<0.01			SM	SAND, SILTY
1	2	10			9.2	NV	NP	<0.01			SM-SW	SAND, SLIGHTLY SILTY
2	1	2-3			77.5				1550		CL	CLAY, SANDY
2	2	4			86.1			0.01	1520		CL	CLAY, SANDY
3	1	10			9.3	NV	NP	<0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY
3	3	5			24.0						SM	SANDSTONE, SILTY
3	7	20			16.6						SM	SANDSTONE, SILTY
3	8	5			14.9						SM	SANDSTONE, SILTY
3	12	10			24.4						SC	SANDSTONE, CLAYEY
3	9	15			9.9	NV	NP				SM-SW	SANDSTONE, SILTY
4	4	15	19.9	109.5	63.9	44	20	<0.01		3.3	CL	CLAYSTONE, SANDY
4	5	10	17.8	111.3	55.7					1.0	CL	CLAYSTONE, VERY SANDY
4	7	15			89.5	47	21	<0.01			CL	CLAYSTONE, SANDY

Table 2: Summary of Percolation Test and Tactile Test Pit Results

Test Pit No.	USDA Soil Type Limiting Layer	LTAR Value	Depth to Bedrock (ft.)	Depth to Seasonal Groundwater (ft.)
1	2A	0.50	N/A	N/A
2	4A*	0.15	5	N/A
3	5*	0.10	7.5	7
4	2A	0.50	N/A	N/A
5	5*	0.10	7	7
6	4A*	0.15	7	N/A

*- Conditions that will require an engineered OWTS

TEST BORING NO. 7
DATE DRILLED 1/12/2017
Job # 211066

REMARKS

STAKE 3506

WATER @ 14.5', 1/23/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE, MOIST			5	4.5	1
5			5	6.0	1
10			9	5.9	1
CLAY, SANDY, DARK BROWN, VERY SOFT, VERY MOIST (▼) 15			2	22.9	2
SANDSTONE, SILTY, FINE GRAINED, DARK BROWN, VERY DENSE, MOIST 20			50/9"	11.8	3

TEST BORING NO. 8
DATE DRILLED 1/12/2017
CLIENT TIMBERRIDGE DEV. GROUP, LLC
LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS

STAKE 3507

DRY TO 18', 1/23/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
SAND, SILTY, TAN SANDSTONE, SILTY, FINE TO COARSE GRAINED, GREEN BROWN, VERY DENSE, MOIST			50/10"	6.2	3
5			50/9"	6.1	3
10			50/6"	6.5	3
15			50/7"	11.8	3
20			50/7"	6.0	3

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN	DATE	CHECKED	DATE
		LLL	3/28/17

JOB NO: 170020
FIG NO: B-4

TEST BORING NO. 9
DATE DRILLED 1/12/2017
Job # 211066

REMARKS

STAKE 3508

DRY TO 20',
1/23/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			32	8.8	1
5			50 11"	4.9	3
10			50	9.6	3
15			50 8"	7.6	3
20			50 6"	10.5	3

SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

TEST BORING NO. 10
DATE DRILLED 1/12/2017
CLIENT TIMBERRIDGE DEV. GROUP, LLC
LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS

STAKE 3509

WATER @ 14.5',
1/23/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			44	8.4	1
5			50 10"	9.4	3
10			50	10.5	3
15			50 11"	11.8	3
20			50 9"	12.0	3

SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/28/17

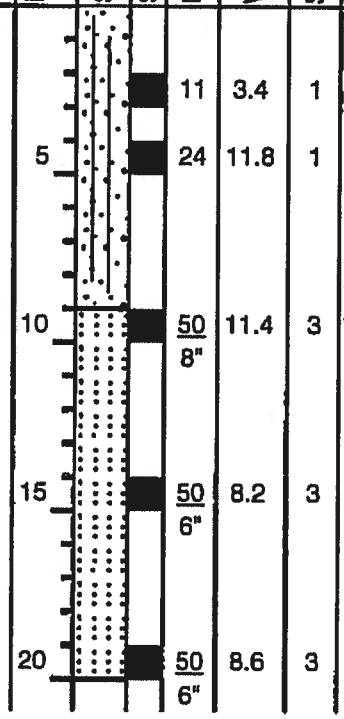
JOB NO.: 211066
FIG NO.: B-5

TEST BORING NO. 11
DATE DRILLED 1/12/2017
Job # 211066

REMARKS

STAKE 3510

DRY TO 19.5',
1/23/17

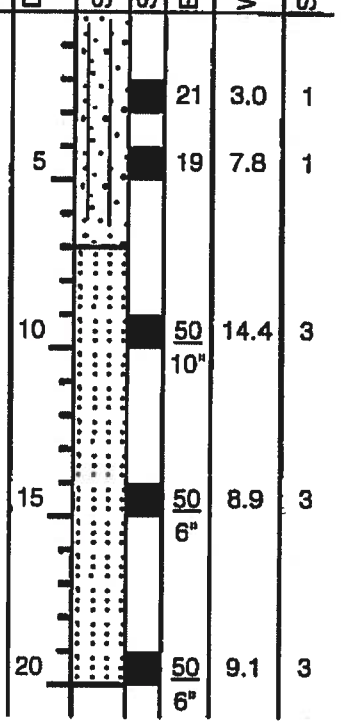


TEST BORING NO. 12
DATE DRILLED 1/12/2017
CLIENT TIMBERRIDGE DEV. GROUP, LLC
LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS

STAKE 3511

DRY TO 19',
1/23/17



ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED: LLL	DATE: 3/28/17

JOB NO. 211066
FIG NO. B-6

TEST PIT NO. 1
DATE EXCAVATED 11/13/2017
Job # 211066

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1			gr	w	2A
sandy loam, fine to coarse grained, light brown to tan	2			gr	w	2A
loamy sand, fine to coarse grained, tan	3			sg		1
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 2
DATE EXCAVATED 11/13/2017
CLIENT TIMBERRIDGE DEV. GROUP, LLC
LOCATION RETREAT AT TIMBERRIDGE, FILING 2

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1			gr	l	2A
interbedded sandy clay and loamy sand, tan to olive	2			gr	w	4A
	3					
	4					
	5					
formational silty sandstone, tan	6			ma		4A
	7					
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LL	11/20/17

JOB NO.: 211066
FIG NO.: B-8

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021