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

SOIL, GEOLOGY, & GEOLOGIC HAZARD STUDY
THE VILLAGES AT STERLING RANCH EAST
PRELIMINARY PLAN NO. 3 – PARCEL NOS. 14, 15, 20, & 21
EL PASO COUNTY, COLORADO

Prepared for

Classic SRJ
2138 Flying Horse Club Drive
Colorado Springs, Colorado 80921

Attn: Loren Moreland

April 13, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

COLORADO REGISTERED PROFESSIONAL ENGINEER
JOSEPH COLLIN GOODE JR.
4-13-2022
23725

Reviewed by:

Logan L. Langford, P.G.
Geologist

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

LLL/am

Encl.

Entech Job No. 220573
AAprojects/2022/220573 countysoil/geo

TABLE OF CONTENTS

1.0 SUMMARY 3

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION 4

3.0 SCOPE OF THE REPORT 5

4.0 FIELD INVESTIGATION 5

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY 6

- 5.1 General Geology 6
- 5.2 Soil Conservation Survey 6
- 5.3 Site Stratigraphy 7
- 5.4 Soil Conditions 7
- 5.5 Groundwater 9

6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS 9

- 6.1 Relevance of Geologic Conditions to Land Use Planning 12

7.0 ECONOMIC MINERAL RESOURCES 13

8.0 EROSION CONTROL 14

9.0 ROADWAY AND EMBANKMENT CONSTRUCTION RECOMMENDATIONS 14

10.0 CLOSURE 16

BIBLIOGRAPHY 17

TABLES
Table 1: Summary of Laboratory Test Results
Table 2: Depth to Bedrock and Groundwater

FIGURES
Figure 1: Vicinity Map
Figure 2: USGS Map
Figure 3: Preliminary Concept Plan
Figure 4: Development Plan/Test Boring Location Map
Figure 5: Soil Survey Map
Figure 6: Falcon NW Quadrangle Geology Map
Figure 7: Geology Map/Engineering Geology
Figure 8: Floodplain Map
Figure 9: Typical Perimeter Drain Details

APPENDIX A: Site Photographs
APPENDIX B: Test Boring and Test Pit Logs
APPENDIX C: Laboratory Test Results
APPENDIX D: Test Boring Logs from Entech Job No. 82556
APPENDIX E: Soil Survey Descriptions

1.0 SUMMARY

Project Location

The project lies in portions of the W½ of Section 34, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately one-mile northeast of Colorado Springs, Colorado.

Project Description

Total acreage involved The Villages at Sterling Ranch East is approximately 39.22 acres, and two hundred and forty-six (246) lots are proposed got the four parcels. The proposed development is to consist of single-family residential. The development will be serviced by Sterling Ranch Metropolitan District.

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 expansive soils, erosion, hydrocompaction, potentially unstable slopes, 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 W½ of Section 34, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately one-mile northeast of Colorado Springs, Colorado, at the southeast corner of future Briargate Parkway and Sterling Ranch Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually sloping to the south, with moderate to steep slopes along a cut slope in the western portion of the site. The western portion of the site has been used a borrow area for fill used in other portions of Sterling Ranch. Minor drainage swales and surface drainage on site flows in a southerly direction through the central portion of the site. Water was not observed in any of the drainage swales at the time of this investigation. Groundwater was observed to the south of the site in a stock pond, and to the west of the site at the southwest corner of future Briargate Parkway and Sterling Ranch Road. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included a fill borrow area, grazing and pasture land. The site contains primarily field grasses, cacti, yucca, and weeds. Site photographs, taken March 14, 2022, are included in Appendix A.

Total acreage involved in The Villages at Sterling Ranch East is approximately 39.22 acres. Two hundred and forty-six (246) single-family residential lots are proposed. Final grading plans were not available at the time of this report. The proposed housing has crawl spaces or garden level entry levels. The Development Plan is presented in Figure 3, and the Site Plan/Test Boring Location Map is presented in 4.

3.0 SCOPE OF THE REPORT

The scope of the report will include 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 March 14, 2022.

Geologic Hazard Studies were previously performed by Entech Engineering, Inc. for the entire Sterling Ranch development, October 31, 2006 (Reference 3) and January 20, 2009 (Reference 4). One of the test borings from the previous investigations was located on the subject site (Test Boring No. 16). The location of the test boring is indicated on Figure 4. The Test Boring Log is included in Appendix D. Information from these reports was used in evaluating the site.

Four additional Test Borings were drilled as part of this investigation to determine general soil and bedrock characteristics. The locations of the test borings are indicated on the Development Plan/Test Boring Location Map, Figure 4. The Test Boring Logs are presented in Appendix B. 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 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 12½ 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 1). 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 eolian 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 2), previously the Soil Conservation Service (Reference 3) 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
8	Blakeland Loamy Sand, 1 to 9% slopes
19	Columbine Gravelly Sandy Loam, 0 to 3% 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 moderate erosion hazards.

5.3 Site Stratigraphy

The Falcon NW Quadrangle Geology Map showing the site is presented in Figure 6 (Reference 4). The Geology Map prepared for the site is presented in Figure 7. Two mappable units were identified on this site which are described as follows:

Qes **Eolian Sand of Quaternary Age:** These deposits are fine to medium grained soil deposited on the site by the action of prevailing winds from the west and northwest. They typically occur as large dune deposits or narrow ridges. These soil types are typically tan to brown in color and tend to have very uniform or well-sorted gradation, and tend to have a relatively high permeability and low density.

Qao_1 **Old alluvium two of Holocene Age:** These materials consist of stream-deposited alluvium, typically classified as a silty to well-graded sand, brown to dark brown in color and of moderate density occurring as terrace deposits. Old Alluvium One is

The bedrock underlying the site consists of the Dawson Formation of Tertiary to Cretaceous Age. The Dawson Formation typically consists 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 4), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1978 (Reference 5), and the *Geologic Map of the Pueblo 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 6). The Test Borings were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 7.

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 slightly silty to silty sand (SM-SW, SM, SC), was encountered in all of Test Borings at depths ranging from the existing ground surface to 4 feet and extending to depths ranging from 12 to 19 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 13 percent of the soil sized particles passing the No. 200 Sieve. Sulfate testing resulted in 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

Soil Type 2 very sandy clay-silt (CL-ML), encountered in Test Boring No. 2 at the existing surface grade and extending to an approximate depth of 4 feet bgs. These soils were encountered at stiff consistencies and moist conditions. Samples tested had 54 percent of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 23 and aplastic index of 6. Swell/Consolidation Testing resulted in a volume change of 0.6 percent, indicated a low expansion potential. Sulfate testing resulted in 0.03 percent sulfate by weight indicating the clay-silt exhibits negligible potential for below grade concrete degradation.

Soil Type 3 silty sandstone (SM), encountered in Test Boring Nos. 3 and 4 at depths ranging from 14 to 19 feet bgs and extending to the termination of the test borings (20 feet). The sandstone was encountered at dense to very dense states and at moist conditions. Samples tested had 22 percent of the soil sized particles passing the No. 200 Sieve.

Soil Type 4 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 54 of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 29 and aplastic index of 11. Swell/Consolidation Testing resulted in a volume change of 0.6 percent, which indicates a low expansion potential. Highly expansive claystone is common in the area. Sulfate testing resulted in 0.03 percent sulfate by weight indicating the claystone exhibits negligible potential for below grade concrete degradation.

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 at a depth 10 feet, water was not encountered in the remaining borings which were drilled to 20 feet. Areas of water, seasonal shallow groundwater water, and potential seasonal shallow groundwater have been mapped along the minor drainage swale 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 7. 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>
No areas of artificial fill were observed on the site.

<u>Collapsible Soils - constraint</u>
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. Additionally, areas mapped as Qes (eolian sand) have the potential for hydrocompation.

Mitigation: 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 3 to 5 feet 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 of each building site.

Areas of Erosion - constraint

These are areas that are undergoing erosion by water and sheetwash producing gullies and rill erosion. The areas significant erosion observed on the site are located in the former borrow areas where most of the vegetation had been removed.

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

The site is not mapped within floodplain zones according to the FEMA Map No. 08041CO535G, Figure 8 (Reference 7). Areas within the minor drainage swales on-site have been identified as areas of potentially seasonal groundwater areas, but were dry at the time of our site observations. Standing water was observed in a pond to the south of the site, and to the west of the site at the northwest corner of future Briargate Parkway and Sterling Ranch Road. These areas are discussed as follows:

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. These areas lie within minor drainage swales which will likely be regraded during grading of the development.

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 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 cut slope of the former borrow area in the western portion of the site.

Mitigation: Building should be avoided in these areas unless properly mitigated. These areas will likely be regraded during the site development. Fill placed along these slopes should be properly benched into the slope as to not create unstable conditions.

Radon - hazard

Radon levels for the area have been reported by the Colorado Geologic Survey in the open file, Report No. 91-4 (Reference 9). Average Radon levels for the 80908-zip code is 3.40 pCi/l. The following is a table of radon levels in this area:

80908	
0 < 4 pCi/l	50.00%
4 < 10 pCi/l	50.00%
10 < 20 pCi/l	0.00%
> 20 pCi/l	0.00%

Mitigation:

The potential for high radon levels is present for the site. Build-up of radon gas can usually be mitigated by providing increased ventilation of basement and crawlspace and sealing joints. Specific requirements for mitigation should be based on site specific testing.

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 potentially unstable slopes on site that will primarily be mitigated by the site grading. The minor drainage swales will also be mitigated by site grading. Other hazards on site can 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 recompaction in areas of 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 potentially seasonal high groundwater were observed on site. These areas will likely be mitigated with site grading. Drains may be necessary for structures adjacent to these areas to help prevent the intrusion of water into areas below grade. The proposed structures do not have basements. Typical drain details are presented in Figure 9. The site does not lie within any floodplain zones according to the FEMA Map No. 08041CO535G, dated December 7, 2108 (Figure 8, Reference 8). Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

Areas of erosion and gullying may require the construction of check dams and revegetation of the site soils after construction. General recommendations for erosion control are discussed under Section 8.0 "Erosion Control".

Potentially unstable slope areas were observed in the western portion of the site along a cut of the former borrow area. Regrading of the slopes will be required in this area. Any fill placed along the slope should be properly benched into the slope. 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.

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 8), 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 9), areas of the site are not mapped with any resources. According to the

Evaluation of Mineral and Mineral Fuel Potential (Reference 10), 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 10), 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 10).

The site has been mapped as "Fair" for oil and gas resources (Reference 10). 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.

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 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 Classic SRJ. 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.

BIBLIOGRAPHY

1. Scott, Glen R., Taylor, Richard B., Epis, Rudy C., and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, North-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022.

2. Natural Resource Conservation *Service,* September 22, 2015. *Web Soil Survey.* United States Department Agriculture, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

3. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*

4. Entech Engineering, Inc. October 31, 2006. *Geologic Hazard/Land Use Study and Preliminary Subsurface Soil Investigation, Sterling Ranch. El Paso County, Colorado.* Entech Job No. 82556.

5. Entech Engineering, Inc. January 20, 2009. *Geologic Hazard Evaluation, Sterling Ranch Residential, El Paso County, Colorado.* Entech Job No. 30898.

6. Madole, Richard F., 2003. *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-8.

7. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado*. USGS, Map I-857-F.

8. Scott, Glen R., Taylor, Richard B., Epis, Rudy C., and Wobus, Reinhard A. 1978. *Geologic Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1022.

9. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas.* Map Number 08041CO533G.

10. Kirkman, Robert M. and Rogers, William P. 1981. *Earthquake Potential in Colorado*. Colorado Geological Survey. Bulletin 43.

11. Colorado Geological Survey. 1991. *Results of the 1987-88 EPA Supported Radon Study in Colorado*. Open-file Report 91-4.

12. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps.*

13. 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.

14. 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

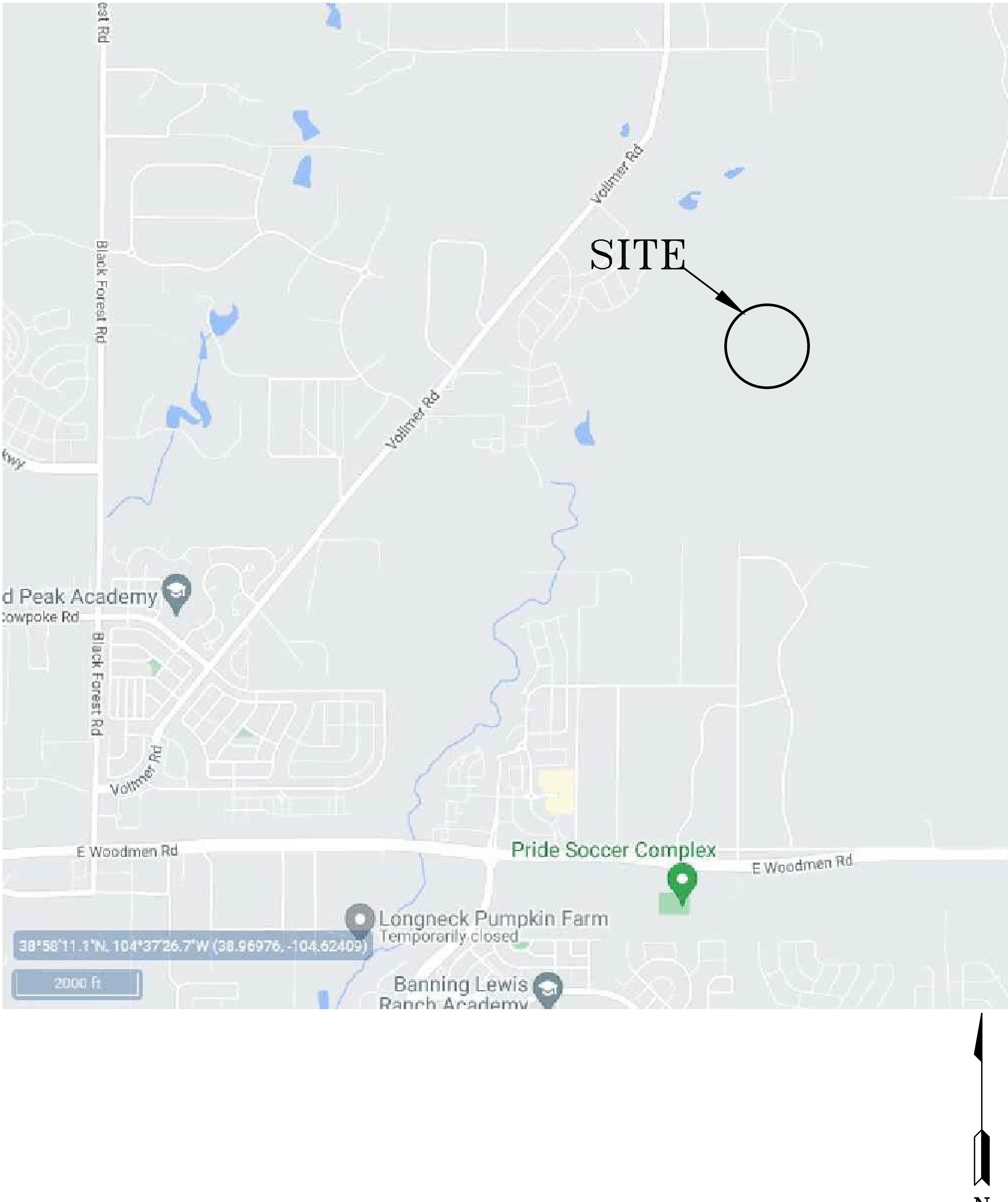
CLIENT CLASSIC SRJ
PROJECT STERLING RANCH, PLAN 3
JOB NO. 220573

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	5			9.2						SM-SW	SAND, SLIGHTLY SILTY
1	3	5			13.1			0.01			SM	SAND, SILTY
1	4	5			11.9						SM-SW	SAND, SLIGHTLY SILTY
2	2	2-3	12.5	113.4	53.8	23	6	0.03		0.6	CL-ML	CLAY-SILT, VERY SANDY
3	4	20			22.2						SM	SANDSTONE, SILTY
4	1	20	13.3	112.6	53.6	29	11	0.03		0.5	CL	CLAYSTONE, VERY SANDY

TABLE 2: Summary of Depth of Bedrock and Groundwater

Test Boring No.	Depth of Bedrock (ft.)	Depth of Groundwater (ft.)
1	12	10
2	>20	>20
3	19	>20
4	14	>20
Previous Job No. 82556		
16	15	>19

FIGURES



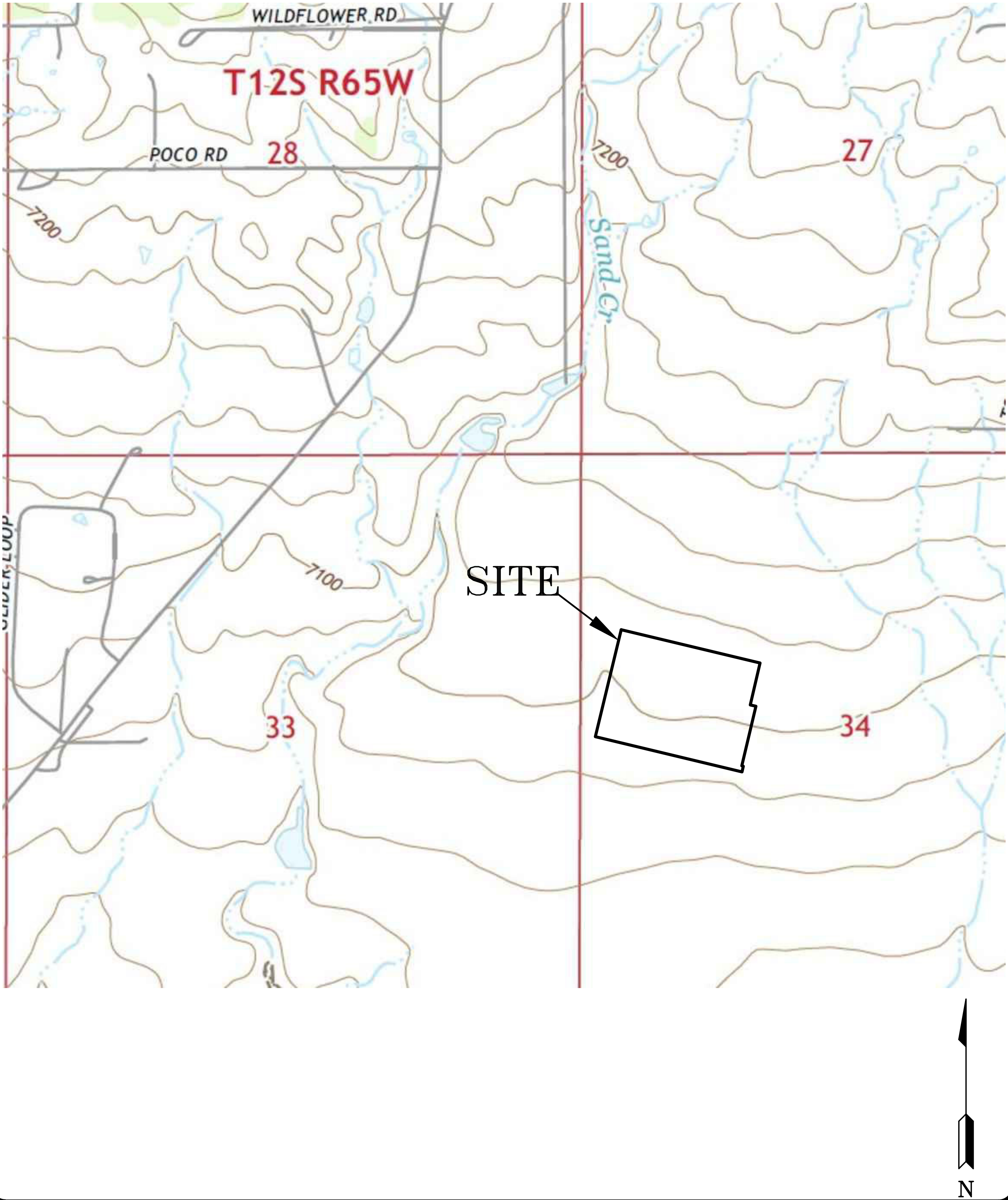
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/8/22		

JOB NO.: 220573

FIG NO.: 1



ENTECH ENGINEERING, INC.

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

USGS MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/8/22		

JOB NO.: 220573

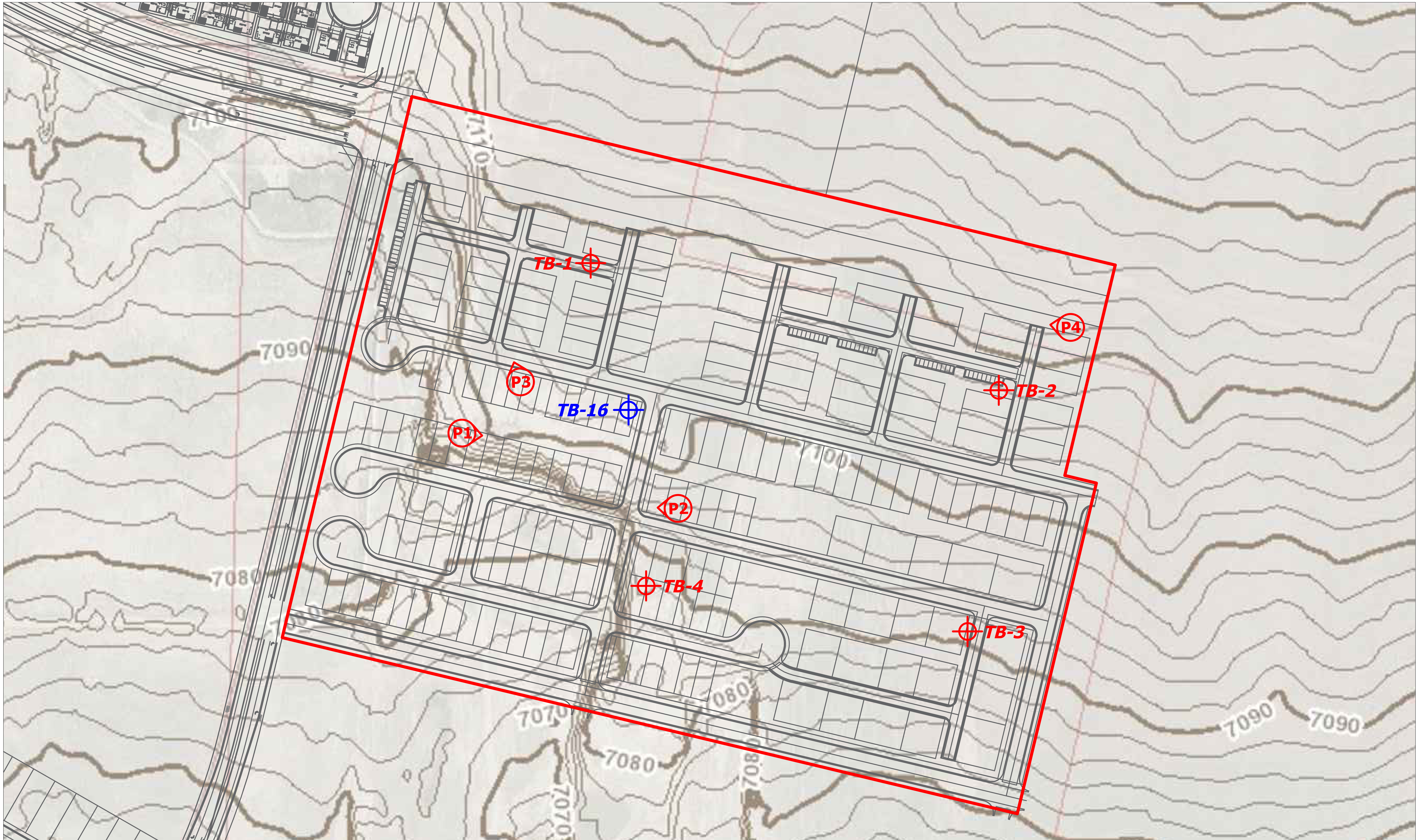
FIG NO.: 2

REVISION	BY

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

DEVELOPMENT PLAN
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN LLL
CHECKED
DATE 4/8/22
SCALE AS SHOWN
JOB NO. 220573
FIGURE No. 3



TB - APPROXIMATE TEST BORING LOCATION AND NUMBER

TB - APPROXIMATE TEST BORING LOCATION AND NUMBER FROM ENTECH JOB NO. 82556

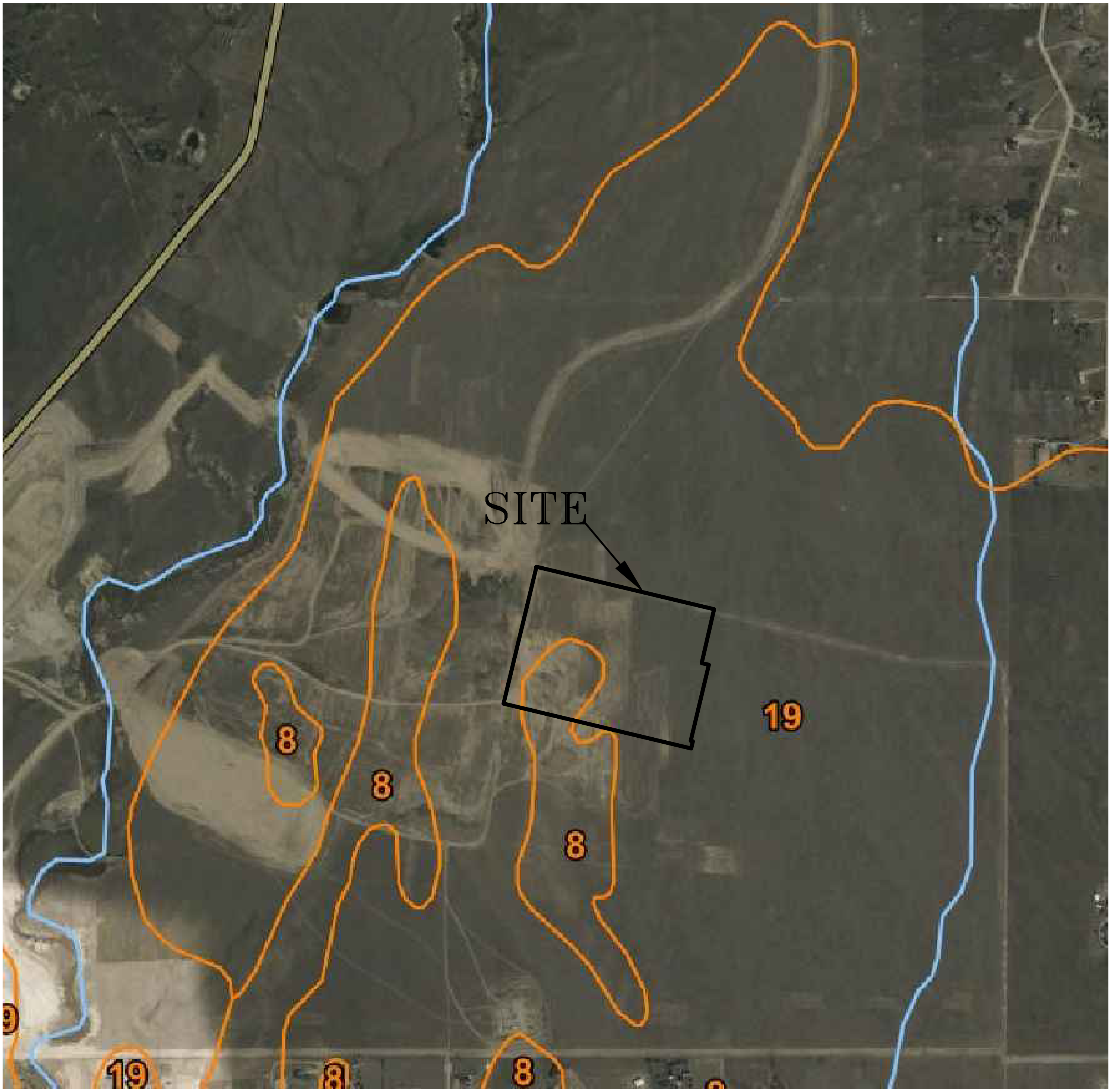
P2 - APPROXIMATE PHOTOGRAPH LOCATION AND DIRECTION

REVISION	BY

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

SITE PLAN/TEST BORING LOCATION MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN LLL
CHECKED
DATE 4/8/22
SCALE AS SHOWN
JOB NO. 220573
FIGURE No. 4



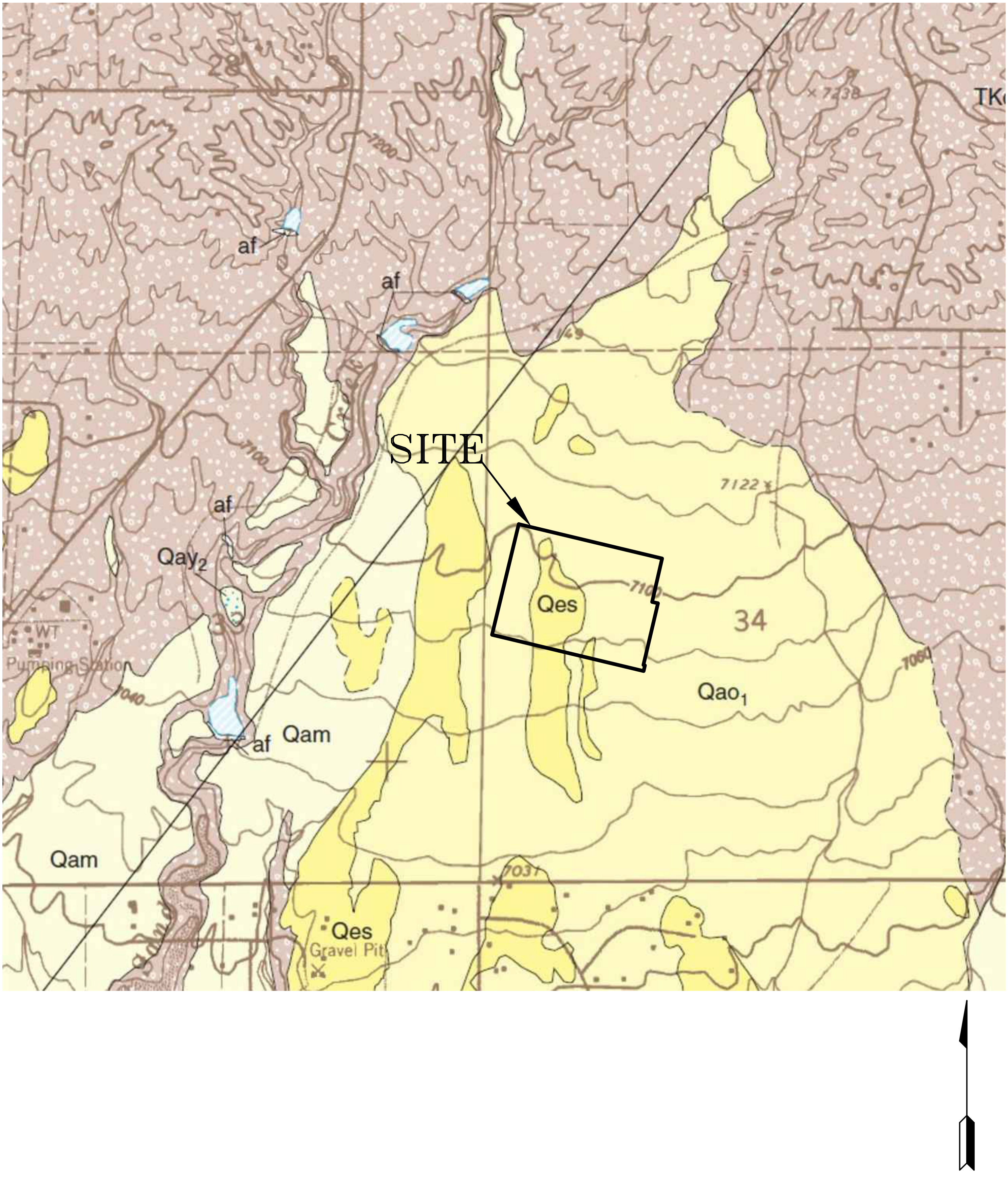
ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/8/22		

JOB NO.:
220573

FIG NO.:
5



ENTECH ENGINEERING, INC.

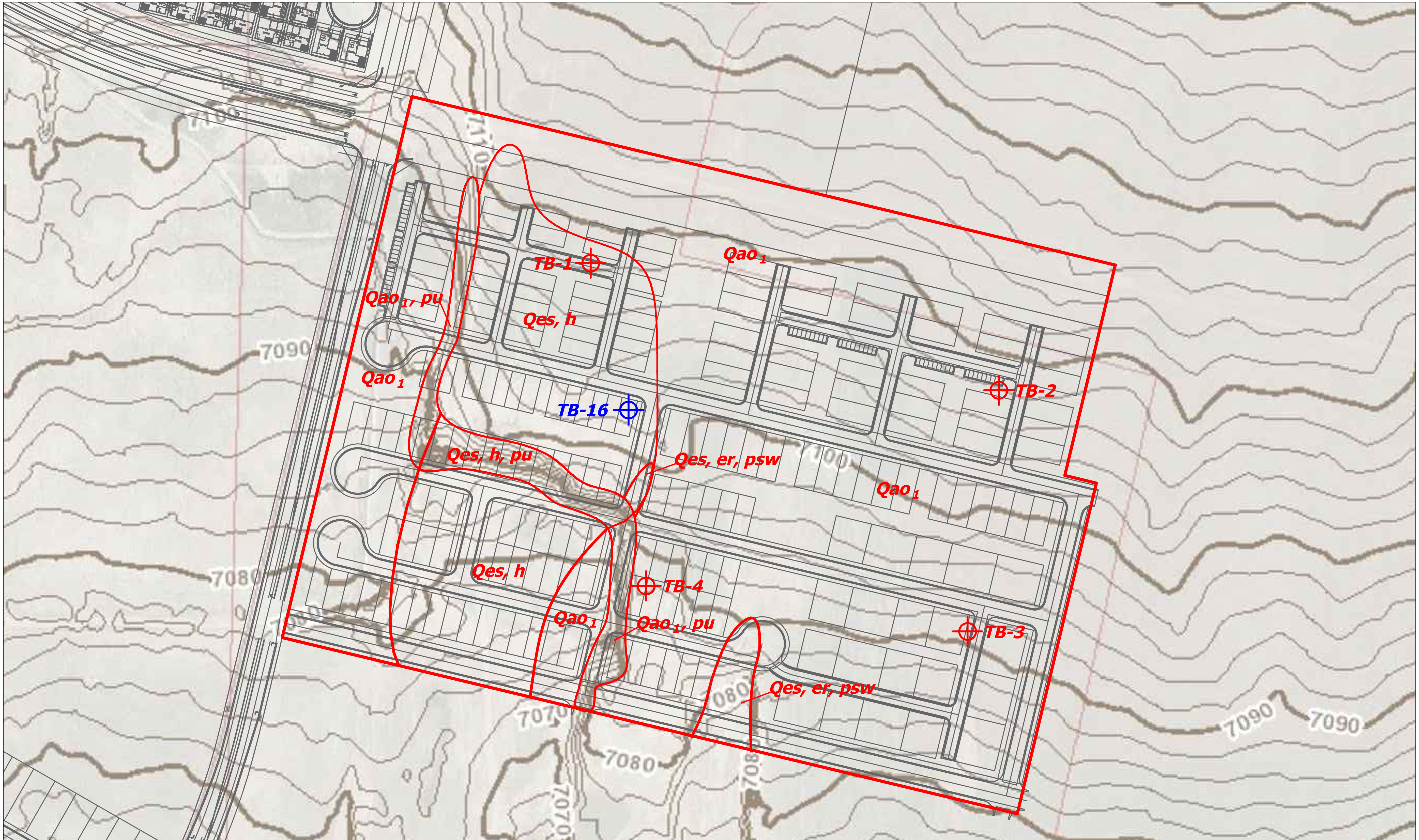
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

FALCON NW QUADRANGLE GEOLOGIC MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/8/22		

JOB NO.: 220573

FIG NO.: 6



LEGEND:

Qes - Eolian Sand of Holocene and Pleistocene? Age: wind deposited sands

Qao_1 - Old Alluvium one of late-middle Pleistocene Age: older terrace deposit

er - erosion

h - hydrocompaction

psw - potentially seasonal shallow groundwater area

pu - potentially unstable slope

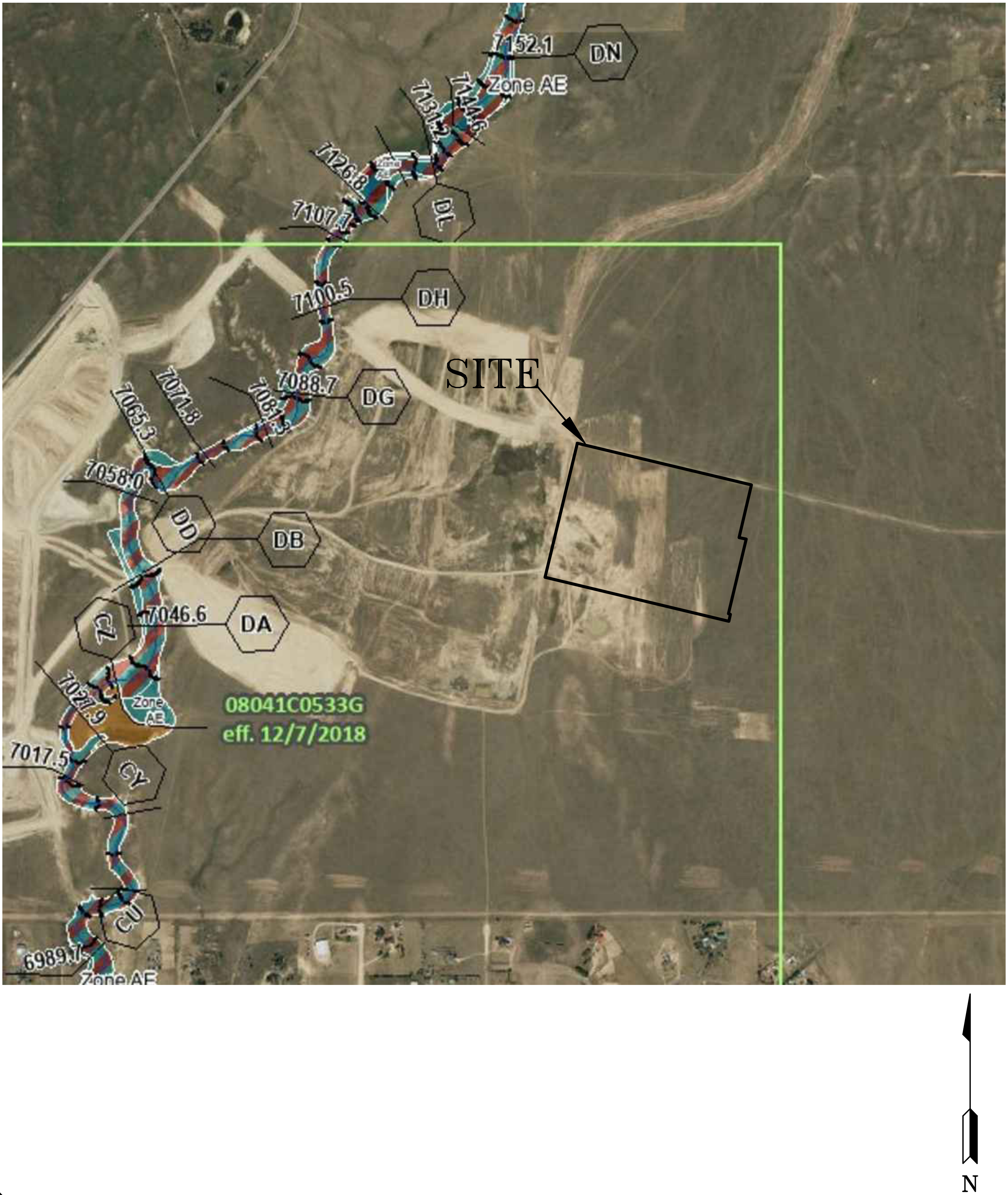
N

REVISION	BY

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

GEOLOGY/ENGINEERING GEOLOGY MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN LLL
CHECKED
DATE 4/8/22
SCALE AS SHOWN
JOB NO. 220573
FIGURE No. 7



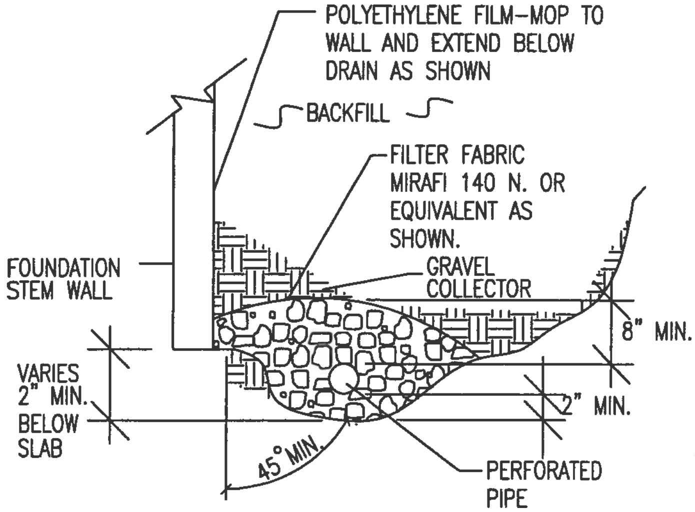
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

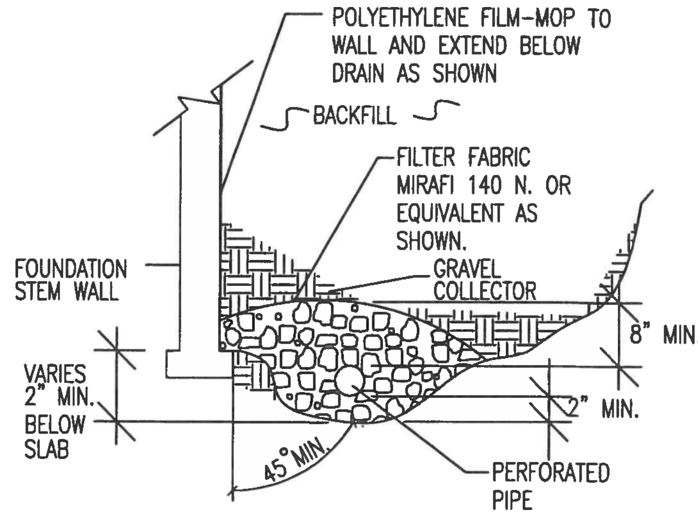
FLOODPLAIN MAP
STERLING RANCH EAST
PRELIMINARY PLAN NO. 3
COLORADO SPRINGS, CO.
FOR: CLASSIC SRJ

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/8/22		

JOB NO.: 220573

FIG NO.: 8





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.

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

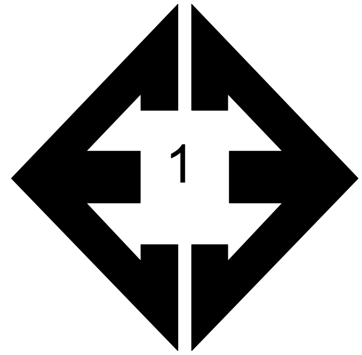
PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 220573

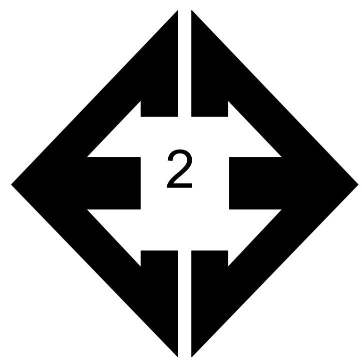
FIG NO.: 9

APPENDIX A: Site Photographs



Looking east from the western portion of the site.

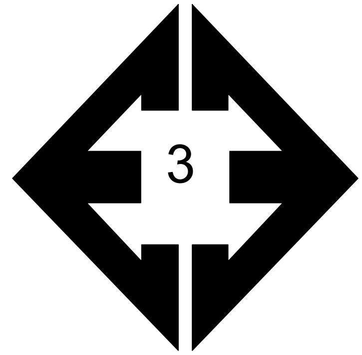
March 14, 2022



Looking west from the central portion of the site.

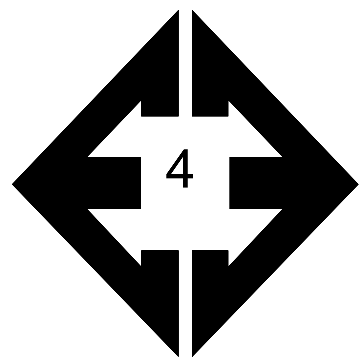
March 14, 2022

Job No. 220573



Looking north from the west-central portion of the site.

March 14, 2022



Looking west from the northeastern portion of the site.

March 14, 2022

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 3/22/2022
Job # 220573

REMARKS

WATER AT 10', 3/28/22

Remarks	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, LOOSE, MOIST				6	3.0	1
	5			6	4.0	1
BLACK ORGANIC LENS	10			27	11.7	1
CLAYSTONE, VERY SANDY, GRAY BROWN, HARD, MOIST						
	15			50/6"	9.9	4
	20			50/8"	15.6	4

TEST BORING NO. 2
DATE DRILLED 3/22/2022
CLIENT CLASSIC SRJ
LOCATION STERLING RANCH, PLAN 3

REMARKS

DRY TO 20', 3/28/22

Remarks	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
CLAY-SILT, VERY SANDY, TAN, STIFF, MOIST				19	5.2	2
SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO DENSE, MOIST	5			9	3.4	1
	10			11	4.2	1
	15			31	7.1	1
	20			27	9.7	1

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED: LLL	DATE: 4/8/22

JOB NO.: 220573
FIG NO.: B-1

TEST BORING NO. 3

DATE DRILLED 3/23/2022
Job # 220573

REMARKS

DRY TO 20', 3/28/22

Description	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				16	7.0	1
	5			19	3.9	1
	10			20	6.0	1
	15			28	3.3	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	20			50	12.9	3

TEST BORING NO. 4

DATE DRILLED 3/24/2022
CLIENT CLASSIC SRJ
LOCATION STERLING RANCH, PLAN 3

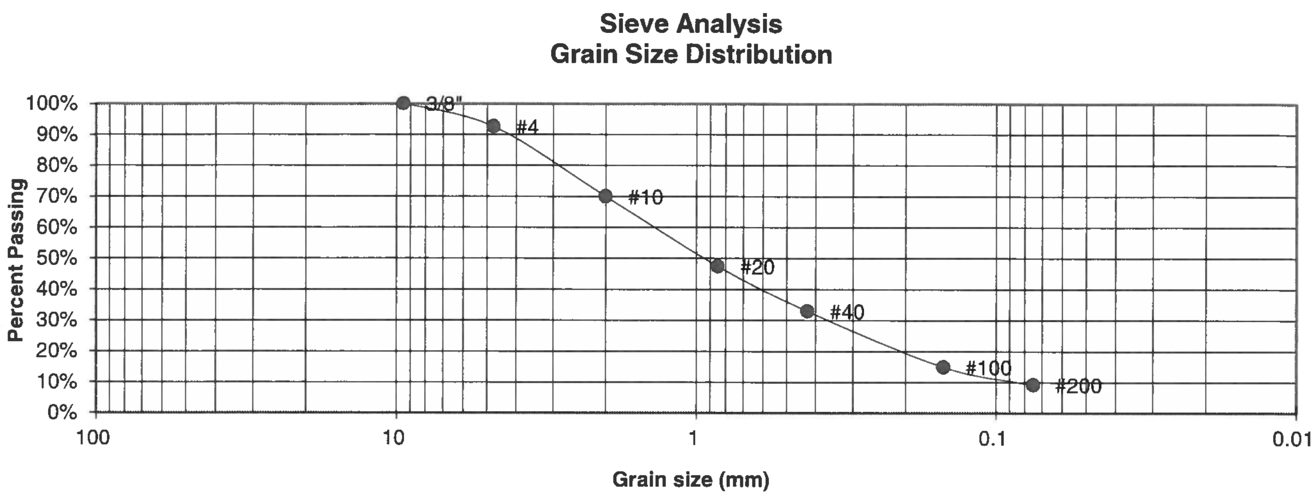
REMARKS

DRY TO 20', 3/28/22

Description	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				21	3.0	1
	5			28	6.1	1
	10			26	4.4	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	15			50/10"	9.4	3
	20			50/6"	8.2	3

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SM-SW	CLIENT	CLASSIC SRJ
SOIL TYPE #	1	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	1	JOB NO.	220573
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.5%
10	70.0%
20	47.4%
40	33.0%
100	14.9%
200	9.2%

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

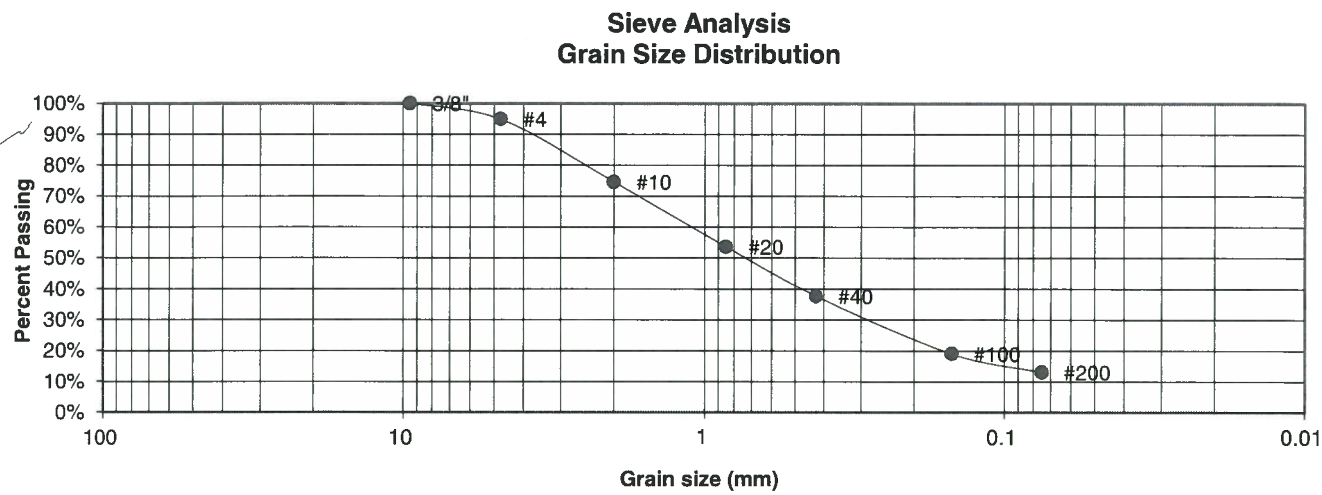
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573

FIG NO.: C-1

UNIFIED CLASSIFICATION	SM	CLIENT	CLASSIC SRJ
SOIL TYPE #	1	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	3	JOB NO.	220573
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.9%
10	74.6%
20	53.6%
40	37.7%
100	19.0%
200	13.1%

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

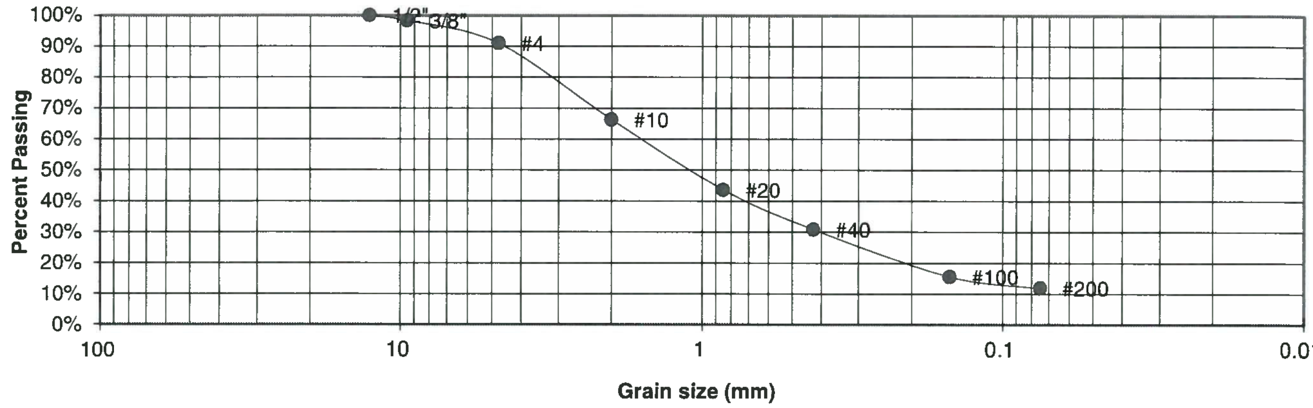
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573

FIG NO.: C-2

UNIFIED CLASSIFICATION	SM-SW	CLIENT	CLASSIC SRJ
SOIL TYPE #	1	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	4	JOB NO.	220573
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.3%
4	91.0%
10	66.3%
20	43.6%
40	30.8%
100	15.6%
200	11.9%

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

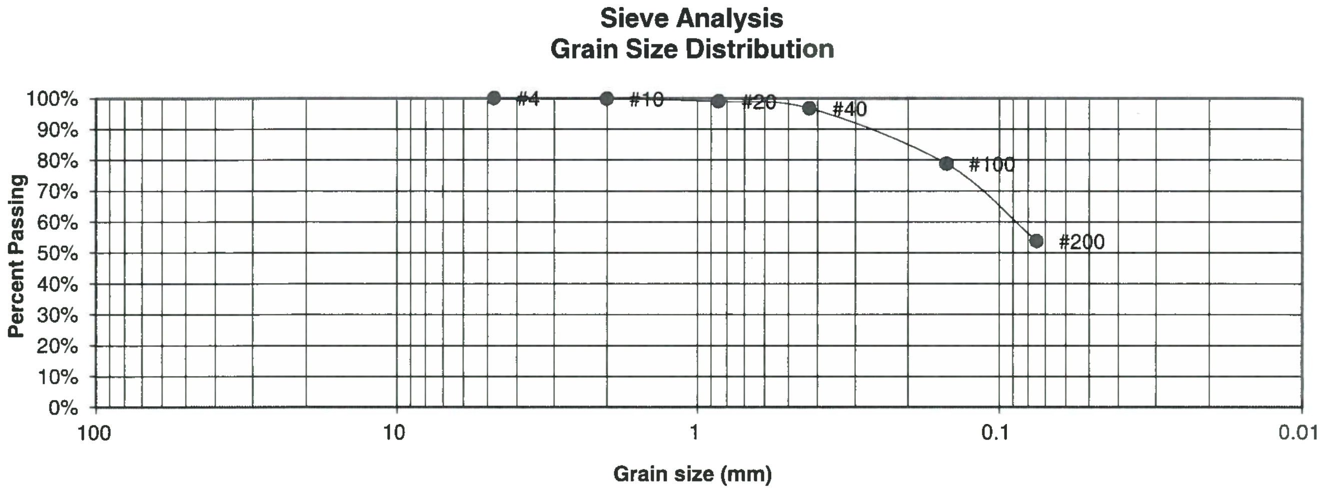
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573

FIG NO.: C-3

UNIFIED CLASSIFICATION	CL-ML	CLIENT	CLASSIC SRJ
SOIL TYPE #	2	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	2	JOB NO.	220573
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.8%
20	99.0%
40	96.7%
100	78.8%
200	53.8%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	23
Plastic Index	6

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

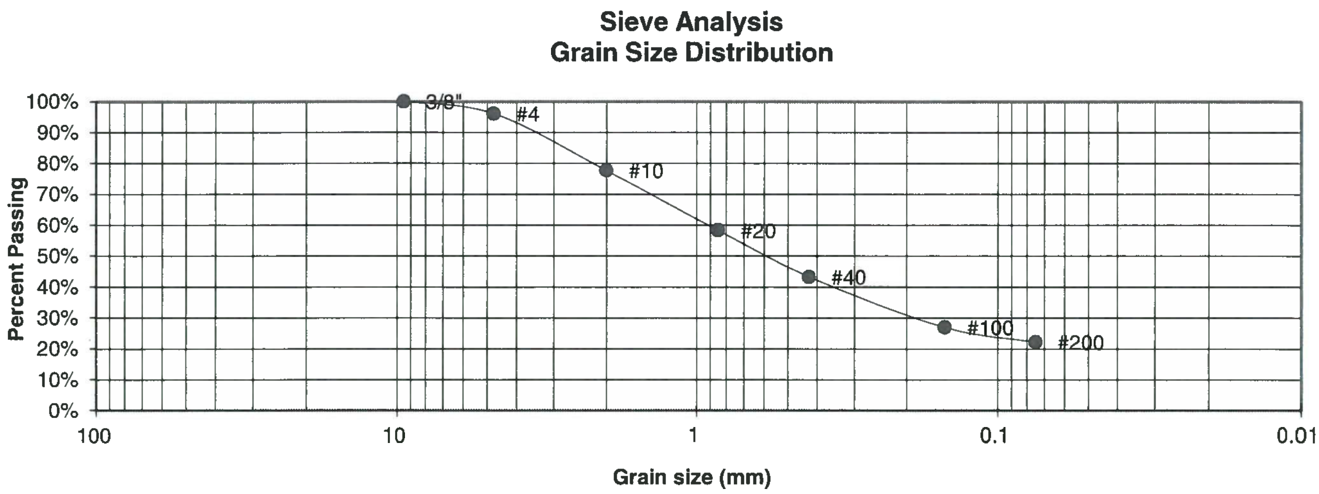
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573

FIG NO.: C-4

UNIFIED CLASSIFICATION	SM	CLIENT	CLASSIC SRJ
SOIL TYPE #	3	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	4	JOB NO.	220573
DEPTH (FT)	20	TEST BY	BL

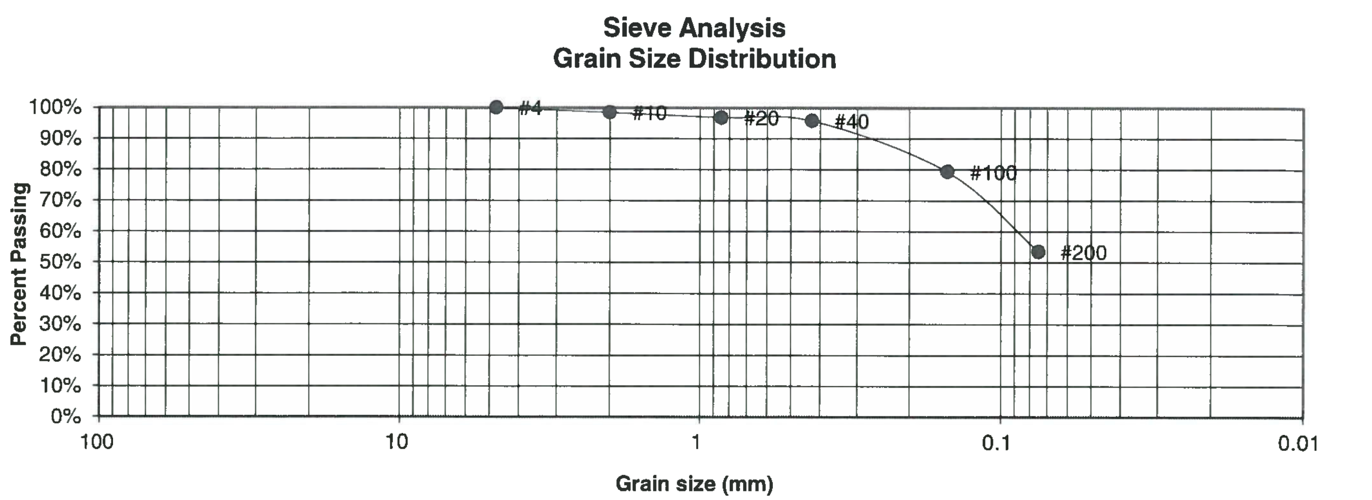


U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.1%
10	77.7%
20	58.4%
40	43.3%
100	27.0%
200	22.2%

Atterberg
Limits
Plastic Limit
Liquid Limit
Plastic Index

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

UNIFIED CLASSIFICATION	CL	CLIENT	CLASSIC SRJ
SOIL TYPE #	4	PROJECT	STERLING RANCH, PLAN 3
TEST BORING #	1	JOB NO.	220573
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.4%
20	96.8%
40	95.7%
100	79.3%
200	53.6%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	29
Plastic Index	11

Swell

Moisture at start

Moisture at finish

Moisture increase

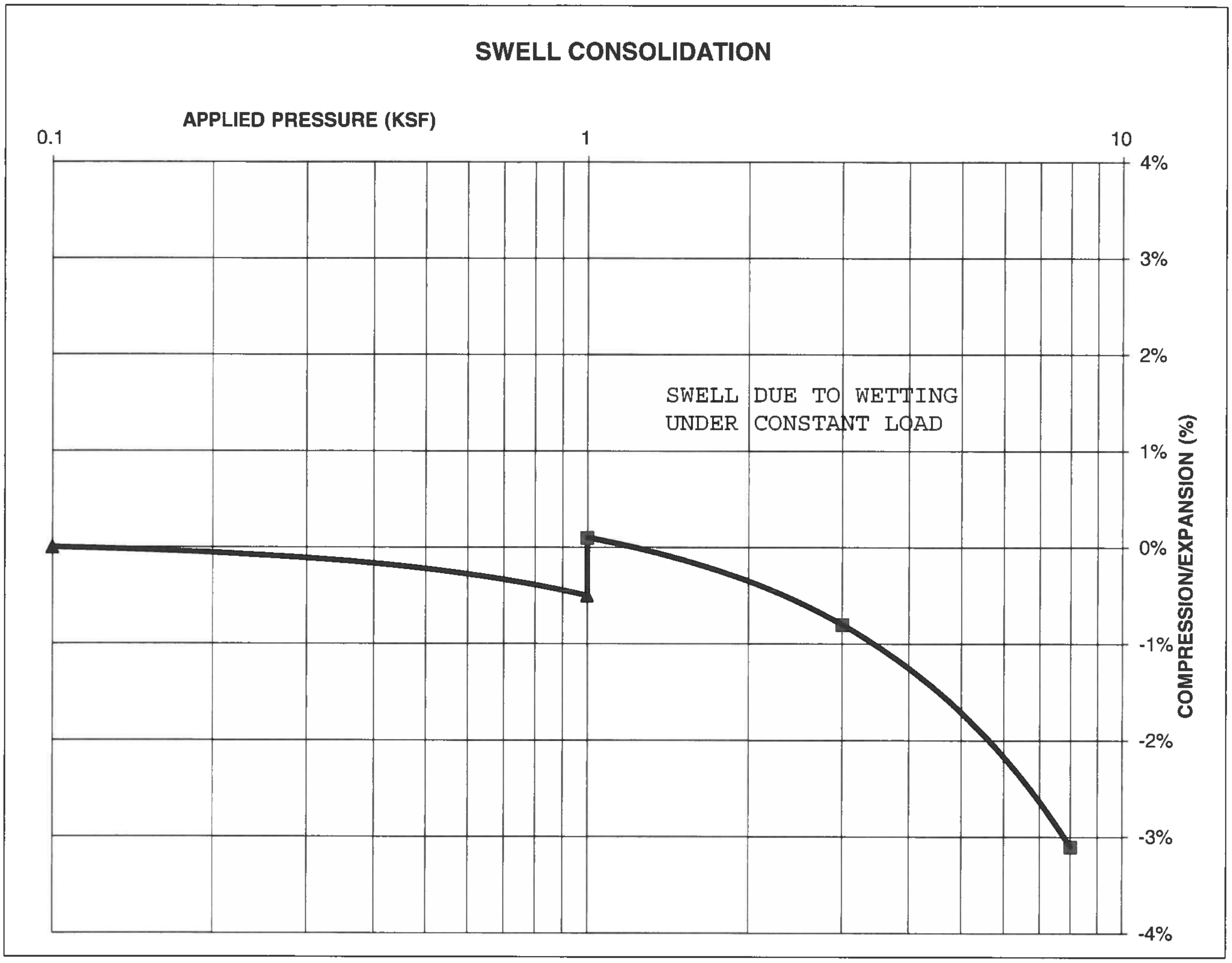
Initial dry density (pcf)

Swell (psf)

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	2-3
DESCRIPTION	CL-ML	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			113
NATURAL MOISTURE CONTENT			12.5%
SWELL/CONSOLIDATION (%)			0.6%

JOB NO. 220573
CLIENT CLASSIC SRJ
PROJECT STERLING RANCH, PLAN 3



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

SWELL CONSOLIDATION
TEST RESULTS

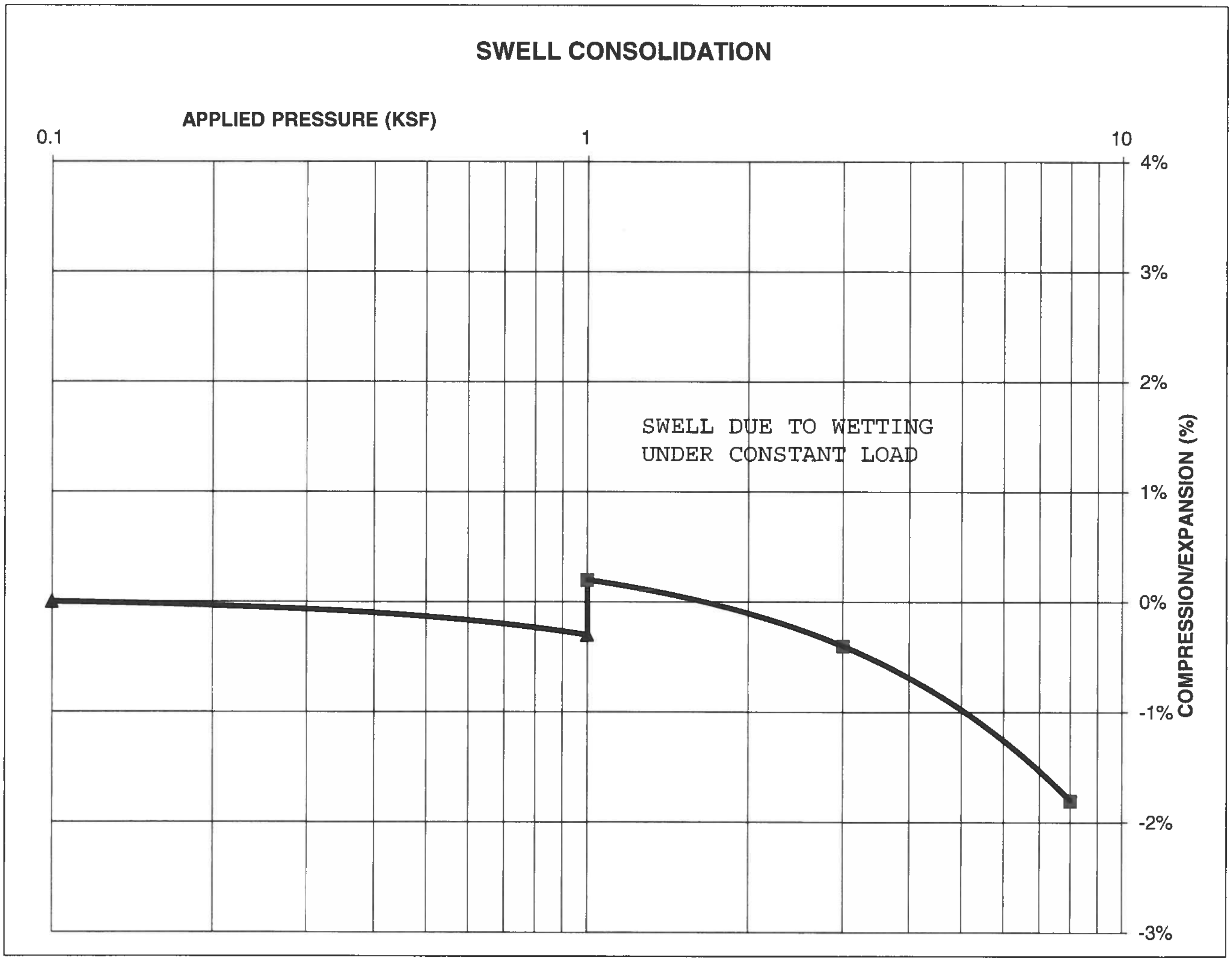
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573
FIG NO.: C-7

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	20
DESCRIPTION	CL	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			113
NATURAL MOISTURE CONTENT			13.3%
SWELL/CONSOLIDATION (%)			0.5%

JOB NO. 220573
CLIENT CLASSIC SRJ
PROJECT STERLING RANCH, PLAN 3



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

SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573
FIG NO.: C-8

CLIENT	CLASSIC SRJ	JOB NO.	220573
PROJECT	STERLING RANCH, PLAN 3	DATE	3/28/2022
LOCATION	STERLING RANCH, PLAN 3	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	20	4	CL	0.03
TB-2	2-3	2	CL-ML	0.03
TB-3	5	1	SM	0.01

QC BLANK PASS

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

LABORATORY TEST SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/8/22

JOB NO.: 220573

FIG NO.: C-9

APPENDIX D: Test Boring Logs from Entech Job No. 82556

TEST BORING NO. 15

DATE DRILLED 8/14/2006
Job # 82556

REMARKS
DRY TO 15',
8/16/06

Description	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				12	11.6	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, LIGHT GRAY TO BROWN, VERY DENSE, MOIST	5			50/9"	10.4	3
	10			50/5"	9.0	3
	15			50/4"	9.6	3
	20					

TEST BORING NO. 16

DATE DRILLED 8/9/2006
CLIENT MORLEY BENTLEY
LOCATION STERLING RANCH

REMARKS
DRY TO 20', 8/9/06
CAVED TO 19',
8/10/06, DRY

Description	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, MEDIUM DENSE TO DENSE, MOIST TO VERY MOIST				14	5.9	1
	5			15	9.3	1
	10			25	5.9	1
	15			31	13.5	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST	20			50/3"	6.7	3

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		RHm	9/5/06

JOB NO.: 82556
FIG NO.: B-1

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

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

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

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