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SOILS AND GEOLOGY STUDY
STERLING RANCH EAST – FILING NO. 3
EL PASO COUNTY, COLORADO

Prepared for:
Classic SRJ
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Attn: Loren Moreland

October 15, 2024

Respectfully Submitted,

ENTECH ENGINEERING, INC.

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Reviewed by:

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1 SUMMARY

Project Location

The project lies in portions of the SE¼ of Section 33, 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

Sterling Ranch East Filing No. 3 consist of 74.74 acres. The proposed development is to consist of single-family residential lots, an 11.86-acre tract for a school site, and a 5.16-acre regional detention basin in the southwest portion of the filing. One hundred and eighty-seven (187) lots are proposed. The filling 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 hydrocompaction, shallow bedrock, shallow groundwater and 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 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of SE¼ of Section 33, 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 Sterling Ranch Road and Sand Creek. 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 southwest. The west-central portion of the site has been used a borrow area for fill used in other portions of Sterling Ranch. Fill stock piles are also present across the filing. A minor drainage swale is located in the western portion of the site which was dry at the time of our initial site visit surface water was noted following precipitation events. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included a fill borrow stockpile area, and grazing and pasture land. The site contains primarily field grasses, cacti, yucca, and weeds. Site photographs, taken July 3, 2024, are included in Appendix A.

Sterling Ranch East Filing No. 3 consist of 74.74 acres. The proposed development is to consist of single-family residential lots, an 11.86-acre tract for a school site, and a 5.16-acre regional detention basin in the southwest portion of the filing. One hundred and eighty-seven (187) lots are proposed. Grading indicates areas of fill and cuts across the filing. Portions of the existing borrow area have been cut below proposed finished grades. The Site and Exploration Plan is presented in Figure 3.

3 SCOPE OF THE REPORT

The scope of the report will includes a general geologic analysis utilizing published geologic data. Detailed site-specific mapping was 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 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. during site observations conducted on July 3, 2024 through October 7, 2024.

Geologic Hazard Studies were previously performed by Entech Engineering, Inc. for the entire Sterling Ranch development, October 31, 2006 (Reference 3), January 20, 2009 (Reference 4), and January 28, 2021 (Reference 5). Twelve of the test borings from the previous investigations were located on or adjacent to the subject site (TB-3 and TB-4 Job No 82556, and TB-3 – TB-12 Job No. 202403). The location of the test borings is indicated on Figures 3 and 6. The Test Boring Logs are included in Appendix D. Information from these reports was used in evaluating the site.

Ten (10) additional Test Borings were drilled as part of this investigation to determine general soil and bedrock characteristics. In addition to the ten test borings, eleven (11) temporary piezometers were installed across the filing to determine and monitor groundwater elevations. Due to water levels additional borings were drilled adjacent to in P1 and P5 (P1A and P5A). The locations of the test borings and piezometers are indicated on the Site and Exploration Plan, Figure 3. The Test Boring Logs are presented in Appendix B, and Summarized on Table B-1. Results of this testing will be discussed later in this report.

Laboratory testing was also performed 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/Collapse testing. 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 C-1.

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 12¼ 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
71	Pring Coarse Sandy Loam, 3 to 8% slopes

Complete descriptions of each soil type are presented in Appendix E. The soils have generally been described to have moderate to moderately rapid permeability. 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 5 (Reference 4). The Geology Map prepared for the site is presented in Figure 6. Five mappable units were identified on this site which are described as follows:

Qaf **Artificial Fill of Quaternary Age:** These recent man-made deposits associated with a fill berm located in the southern portion of the site. The berm is currently located in the propose pond area and will likely be removed during site grading.

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.

Qam **Middle Alluvium of Pleistocene Age:** These materials consist of stream terrace deposits. The Middle Alluvium typically consists of silty to clayey gravelly sands. This deposit is usually highly stratified and may contain lenses of silt, clay or cobbles. This unit correlates to the Broadway Alluvium in the Denver area

Qao_1 **Old Alluvium One of Late-Middle Pleistocene Age:** This material is a water-deposited alluvium, typically classified as a silty to well-graded sand, brown to dark brown in color and of moderate density. The Old Alluvium One can sometimes be very highly stratified containing thing layers of very silty and clayey soil. This unit correlates to the Louviers Alluvium in the Denver area.

Tkd **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 and/or colluvial soils. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. The colluvial soils have been transported by the action of sheetwash and gravity. These soils consisted of silty to clayey sands and sandy clays

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 are variable layers of eolian sands, alluvial deposits, and 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 6.

5.4 Soil Conditions

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

Soil Type 1 sand with varying amounts of silt and clay (SW-SM, SM, SC), encountered in all of borings at the existing ground surface and extending to depths ranging from 3 to 12 feet bgs and to the termination of TB-7 and TB-8 (20 feet). These soils were encountered at loose to dense states and at dry to moist conditions. The majority of the soils were encountered and medium dense states. One-dimensional Swell/Consolidation Testing resulted in a consolidation of 3.4%, indicated a high consolidation potential.

Soil Type 2 sandy silt (ML), encountered in TB-2 at 4 feet bgs and extending to approximately 9 feet. The silt was encountered at very stiff consistencies and at moist conditions. One-dimensional Swell/Consolidation Testing resulted in a consolidation of 4%, indicated a high consolidation potential.

Soil Type 3 completely weathered to highly weathered silty to clayey sandstone, or silty to clayey sand when classified as a soil (SM, SC). The sandstone was encountered in eight of the test borings at depths ranging from 3 to 12 feet bgs and extending to 14 feet in TB-5 and to the termination the remaining borings (20 feet). The sandstone was encountered at dense to very dense states and at moist conditions.

Soil Type 4 sandy siltstone, or a clay with sand when classified as a soil (ML). The silstone was encountered in TB-5 at 14 feet bgs and extended to the termination of the boring (20 feet). The siltstone was encountered at hard consistencies and at moist conditions. Claystone and siltstone are commonly interbedded within the sandstone in the area, and have the potential for moderate to high expansion potentials.

5.5 Groundwater

Groundwater was encountered in three of the test boring (TB-2, TB-4, and T-6) at 2 to 18.5 feet bgs subsequent to drilling. The remaining borings were dry to depths of 20 feet. Temporary piezometers were installed in TB-2, TB-4, and TB-6. Additionally, seven (7) other piezometers were installed across the filing to evaluate the groundwater conditions and depths. Depth to groundwater is shown in the Test Boring Location Map, Figure 3, and on each test boring log. Areas of potentially seasonal and seasonal shallow groundwater have been mapped along the drainages and low-lying areas on the 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.

The piezometers will be measured periodically to obtain seasonal groundwater fluctuations across the site. Groundwater has been encountered in four of the eleven piezometers at depths ranging from 2 to 19 feet. The readings taken for the piezometers are shown on the table below, and will continued to be monitored during the development process. Additional test borings were recently drilled on the southern side of the site and adjacent to P1 and P5 to determine groundwater on the site. The recent borings adjacent to P1 and P5 showed dry conditions to 14 to 15 feet.

Temporary Piezometers – Sterling Ranch East Filing No. 3

Piezometer, and Total Depth (ft.) Date Installed	Groundwater Level (ft.) 7/8/24	Groundwater Level (ft.) 7/26/24	Groundwater Level (ft.) 10/7/24	Groundwater Level (ft.) 10/15/24
P1[(1)], 8' (7/3/24)	2.5	2.3	3.6	3.7
P1A[(1,2)], 15' (10/1524)				Dry
P2, 19' (7/3/24)	18.2	18.1	18.1	18.1
P3, 19' (7/3/24)	14.3	18.5	19	19
P4[(1)], 15' (7/17/24)		Dry	Dry	Dry
P5[(1,2)], 15' (7/17/24)		11.5	5.2	6.9
P5A[(1)], 14' (10/1524)				Dry
P6[(1)], 15' (7/17/24)		Dry	Dry	Dry
P7, 15' (7/17/24)		Dry	Dry	Dry
P8, 20' (9/27/24)			Dry	Dry
P9, 20' (9/27/24)			Dry	Dry
P10, 20' (9/27/24)			Dry	Dry
P11, 20' (9/27/24)			Dry	Dry

(1) – Fill will be required to achieve final grade at piezometer location.
(2) –P1A and P5A were drilled adjacent to P1 and P5.

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 issue as necessary at the time of construction.

6 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

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:

Artificial Fill – Constraint

These are recent man-made fill deposits associated with the earthen dam located in the eastern portion of the site. 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 dam was observed, and appeared to be in good condition.

Mitigation: The earthen dam lies within a defined drainage and should be avoided as building sites. 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. 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 not encountered in the test borings drilled on site. Expansive claystone and siltstone are commonly interbedded in the Dawson Formation in the area. 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 of each building site.

Shallow Bedrock – Constraint

Bedrock was encountered in all the test borings at depths ranging from 3 to 12 feet. A Summary of the Depth to Bedrock is included in Table 1B. Shallow bedrock will be encountered in some areas of this site. Where claystone or sandstone are encountered, excavation/grading may be difficult requiring track-mounted excavators. Bedrock will likely be encountered cuts for utility excavations.

Groundwater and Floodplain Areas – Constraint

The site is not mapped within floodplain zones according to the FEMA Map No. 08041CO533G, Figure 7 (Reference 7). A minor drainage swale is located in the western portion of the site and was dry at the time of our initial site visit, and Sand Creek is located along the western side of the filing. The minor drainage swales and portions of the borrow area have been identified as potentially seasonal and seasonal shallow groundwater areas. 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. The majority of these areas lie within defined drainages which can likely be avoided by the proposed development or filled during site grading. The same mitigation recommendations for the seasonal shallow groundwater areas apply to the potentially seasonal shallow groundwater areas.

Shallow and Seasonally 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 are associated with areas where shallow groundwater was encountered in the borrow area. The proposed grading plans indicate approximately 2 feet to 4 feet of fill in this area. A minimum separation of 3 feet between foundation components and groundwater levels are recommended. Entech will continue to

periodically monitor the groundwater level. Our latest reading was taken on October 15, 2024 as indicated on page 7.

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. Fill added to these areas further raise foundations above groundwater levels. Foundations should be kept as high as possible. Areas may experience higher groundwater levels during period of higher precipitation where water can flow through permeable sands on top of less permeable bedrock materials. Subsurface perimeter drains may be necessary to prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. Where shallow groundwater is encountered, underslab drains or interceptor drains may be necessary. Typical drain details are presented in Figures 9 and 10. It is anticipated that the shallow water areas will be mitigated with site grading and the installation of sewer underdrains. Specific recommendations should be made after additional investigation and site grading has been completed.

Radon – Hazard

Radon is a colorless, tasteless radioactive gas with a United States Environmental Protection Agency (EPA) specified action level of 4.0 picocuries per liter (pCi/L) of air. Radon gas has a very short half-life of 3.8 days. 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:

Average Radon Levels for the 80908 Zip Code	
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

The development will be single-family residential lots. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The constraints affecting development will be those associated with the artificial fill, hyrdocompactive soils, and the potentially and seasonally shallow groundwater areas on the site that 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 which will likely include recompaction. 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.

The site does not lie within any floodplain zones according to the FEMA Map No. 08041CO533G, dated December 7, 2108 (Figure 7, Reference 8). Exact locations of floodplain and specific drainage studies are beyond the scope of this report. A minor drainage swale is located in the western portion of the site and was dry at the time of our initial site visit, and Sand Creek is located along the western side of the filing. The minor drainage swales and portions of the borrow area have been identified as potentially seasonal and seasonal shallow groundwater areas. The potentially seasonal shallow groundwater areas will be either regraded or lie within the existing drainage tract.

Shallow water was encountered in the central portion of the site. The recent borings indicated dry conditions across the majority of the site. It appears that water areas of shallow water are perched on the sandstone in the central portion of the site. We anticipate that the water will be intercepted by sewer underdrains. In areas where shallow water is encountered in building pads interceptor and underslab drains will be recommended as needed. Additional drilling will be completed on the lots after site grading and utility installation to provide recommendations for construction. The proposed grading plans indicate approximately 2 feet to 4 feet of fill in the borrow area. A minimum

separation of 3 feet between foundation components and groundwater levels are recommended. Entech will continue to periodically monitor the groundwater level. Our latest reading was taken on October 15, 2024 indicates dry levels in the recent piezometers (15 to 20 feet). The shallow water measured in P1 and P5 appears to be perched water from the borrow area grading and runoff. Typical drain details are presented in Figures 9 and 10.

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 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 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 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 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.

11 REFERENCES

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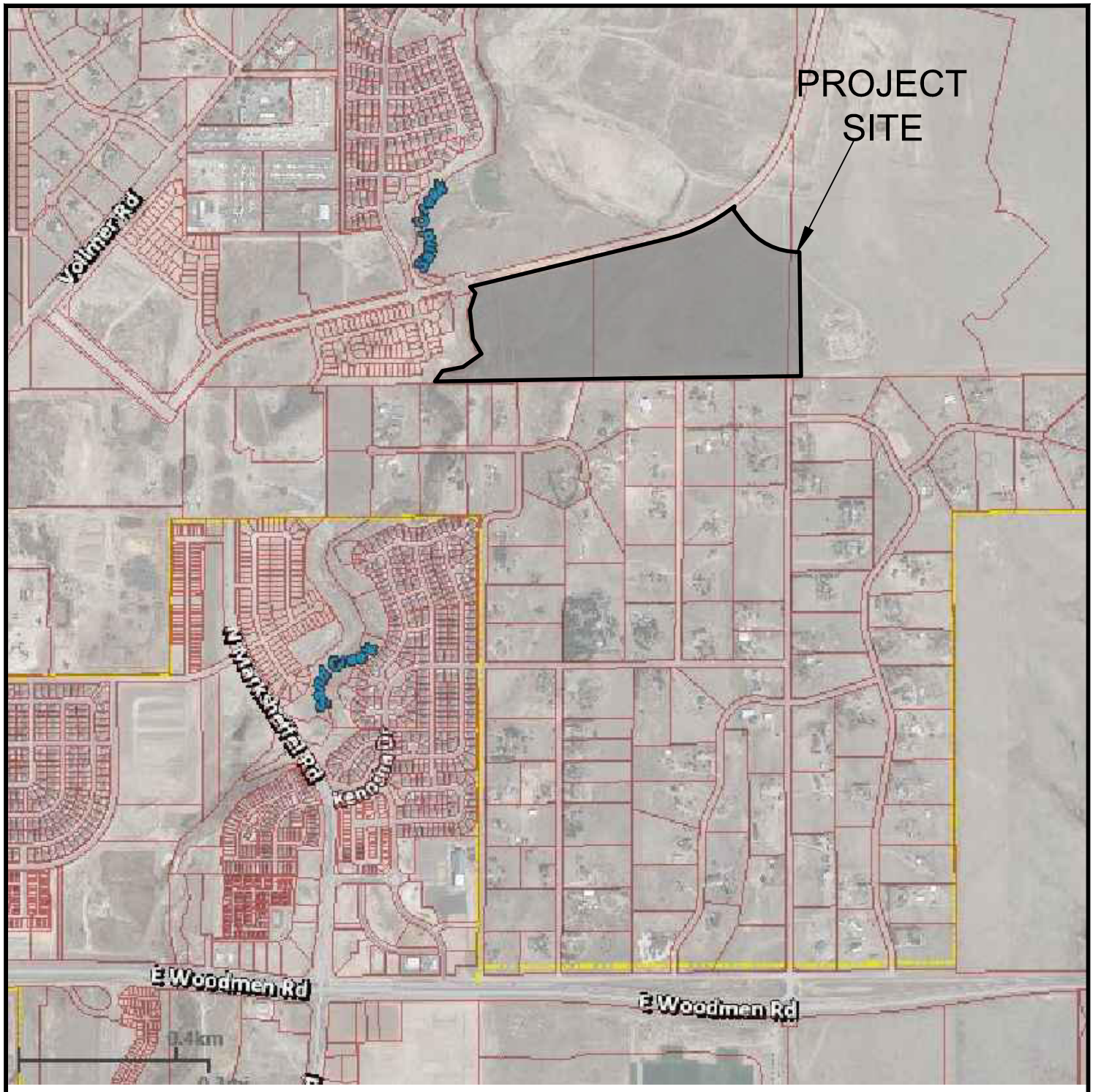
FIGURES



N

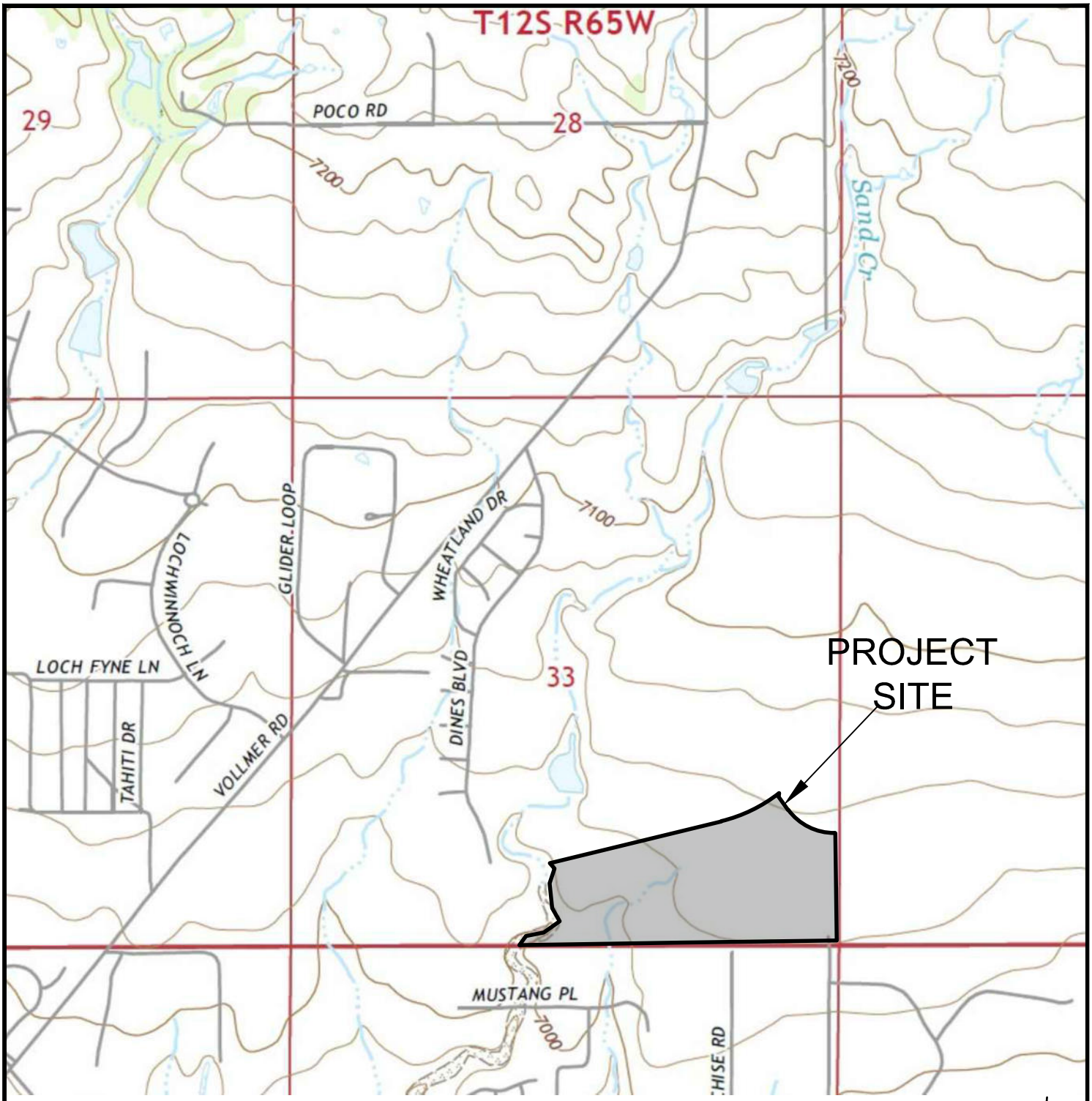
ENTECH ENGINEERING, INC.

VICINITY MAP

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO.
241088

FIG. 1



ENTECH ENGINEERING, INC.

USGS TOPOGRAPHY MAP

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO.
241088

FIG. 2

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

P- APPROXIMATE PIEZOMETER LOCATION AND NUMBER

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER (EEI JOB NO. 82556)

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER (EEI JOB NO. 202403)

P2 - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

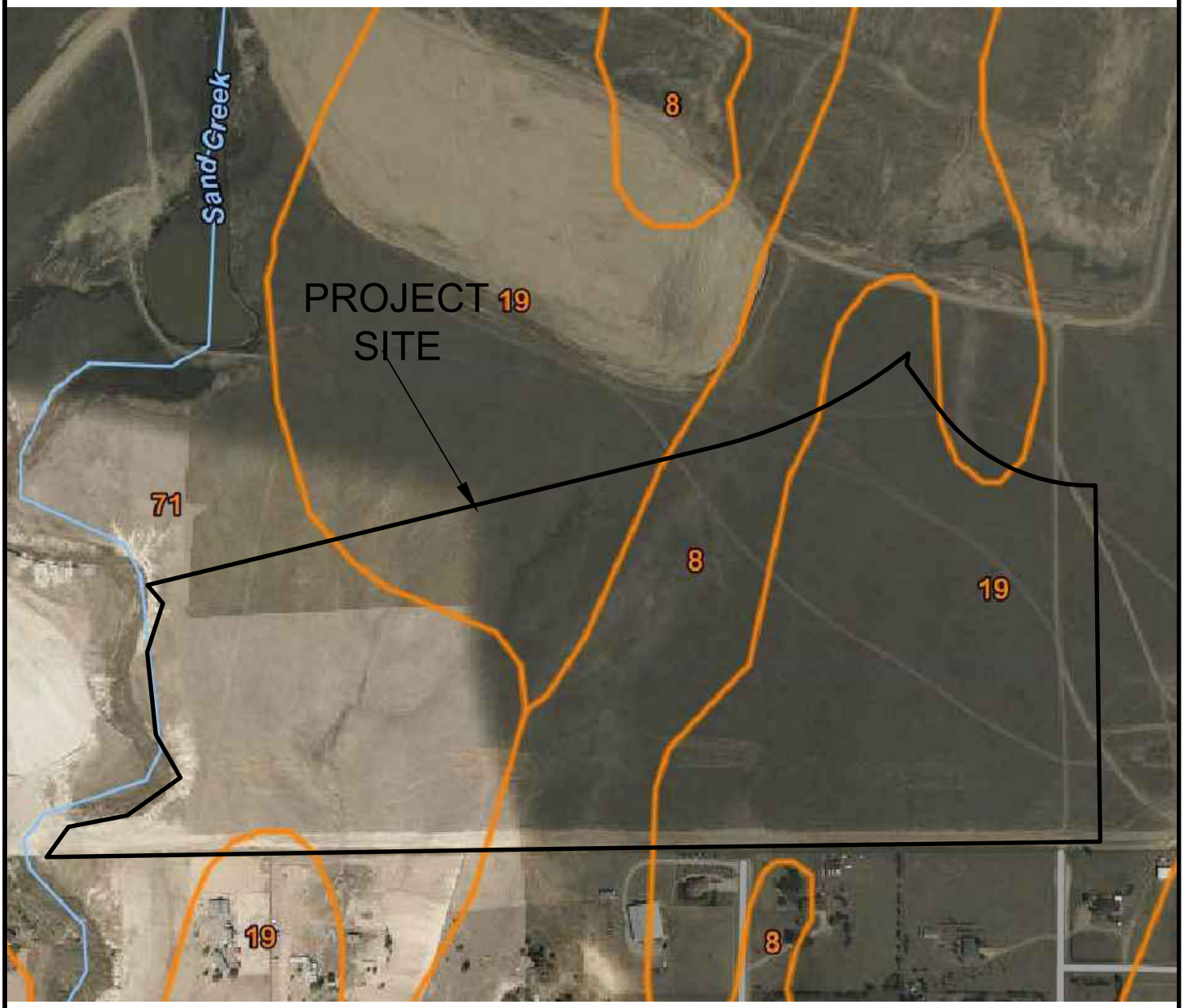
ENTECH ENGINEERING, INC.

SITE AND EXPLORATION PLAN

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO.
241088

FIG. 3



N

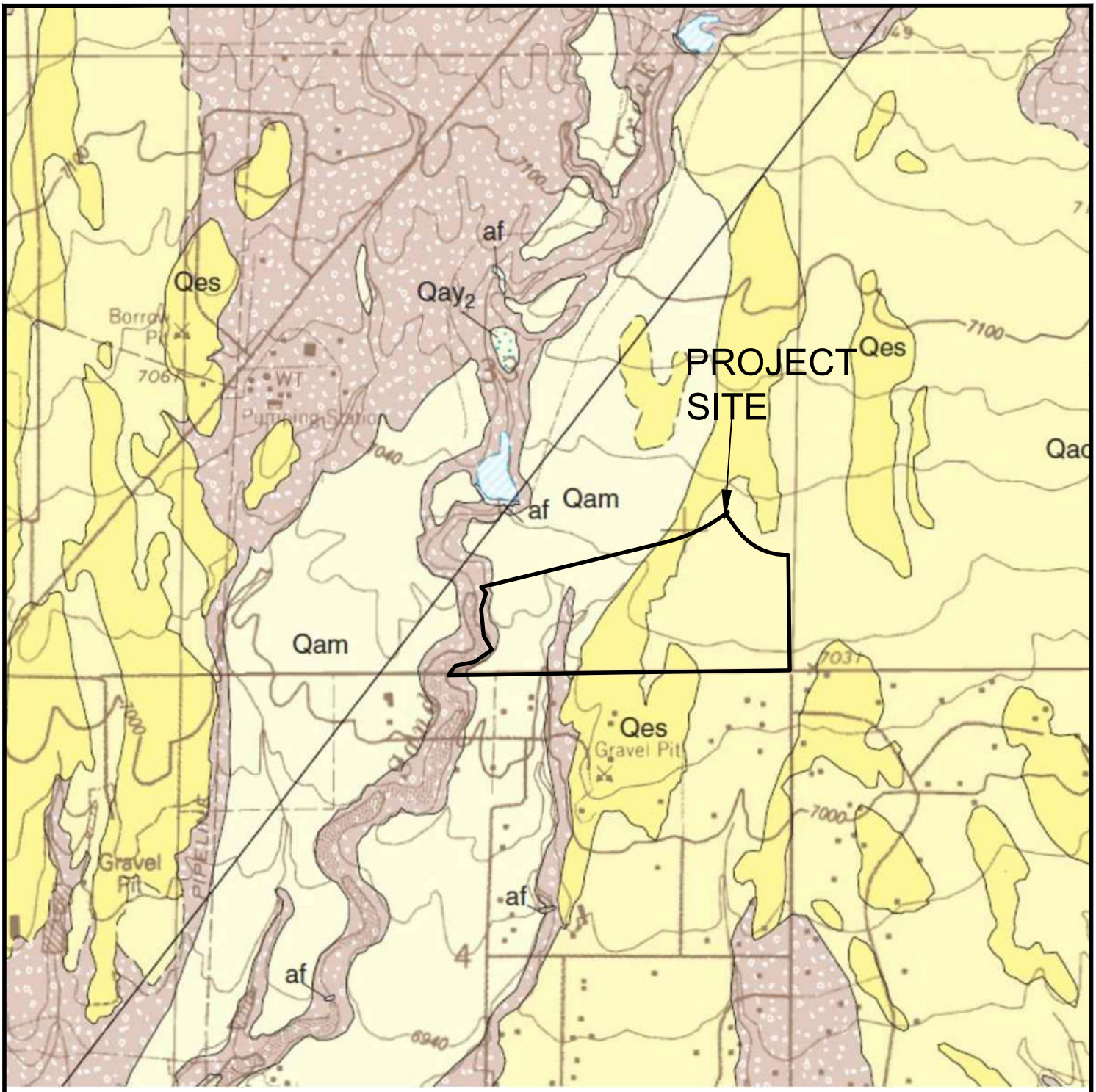
ENTECH ENGINEERING, INC.

USDA SOIL MAP

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO.
241088

FIG. 4



ENTECH ENGINEERING, INC.

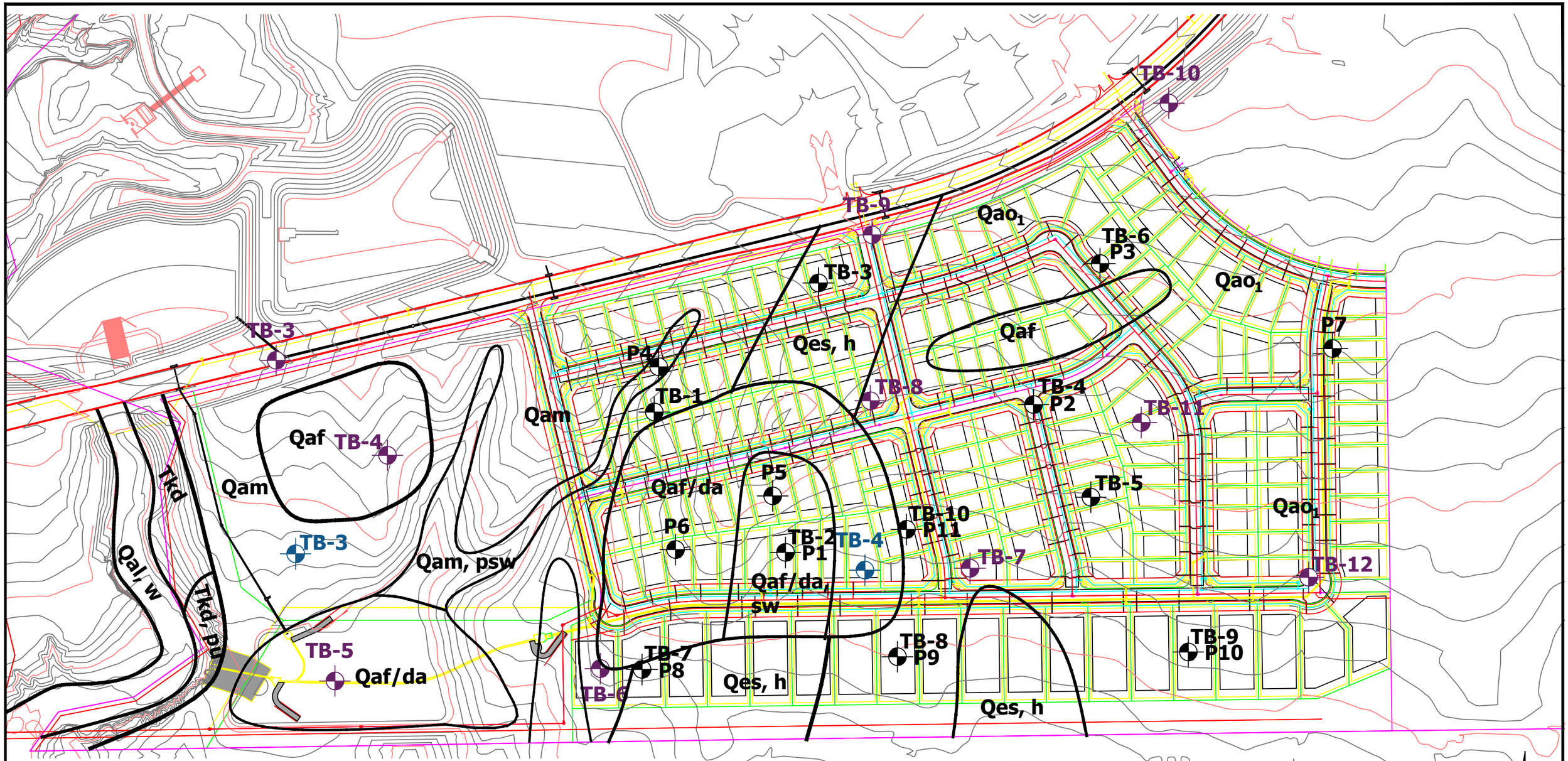
GEOLOGIC MAP OF THE FALCON NW QUADRANGLE

STERLING RANCH EAST FILING NO. 3

CLASSIC SRJ

JOB NO. 241088

FIG. 5



Legend:

Qaf -	Artificial Fill of Holocene Age: man-placed fill deposits associated existing stockpiles
Qes -	Eolian Sand of Quaternary Age: wind deposited sands
Qam	Middle Alluvium of late Pleistocene Age: terrace deposited sands
Qao_1 -	Old Alluvium one late-middle Pleistocene Age: terrace deposited sands and gravels
Tkd -	Dawson Formation of Tertiary to Cretaceous Age: arkosic sandstone with interbedded claystone and siltstone
da -	disturbed area
h -	hydrocompaction
psw -	potential seasonally shallow groundwater area

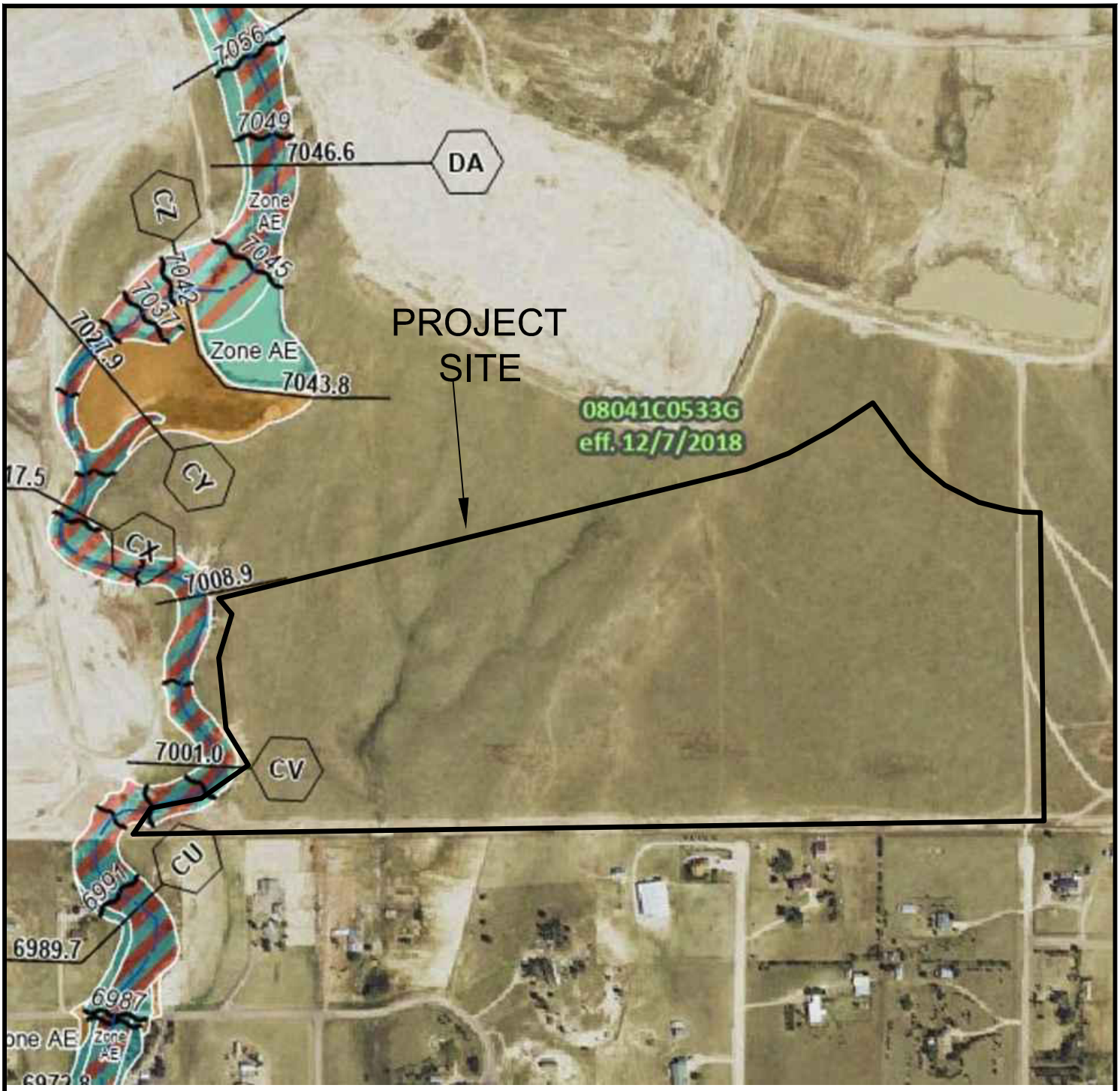
ENTECH ENGINEERING, INC.

GEOLOGY / ENGINEERING MAP

STERLING RANCH EAST FIL. NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. 6



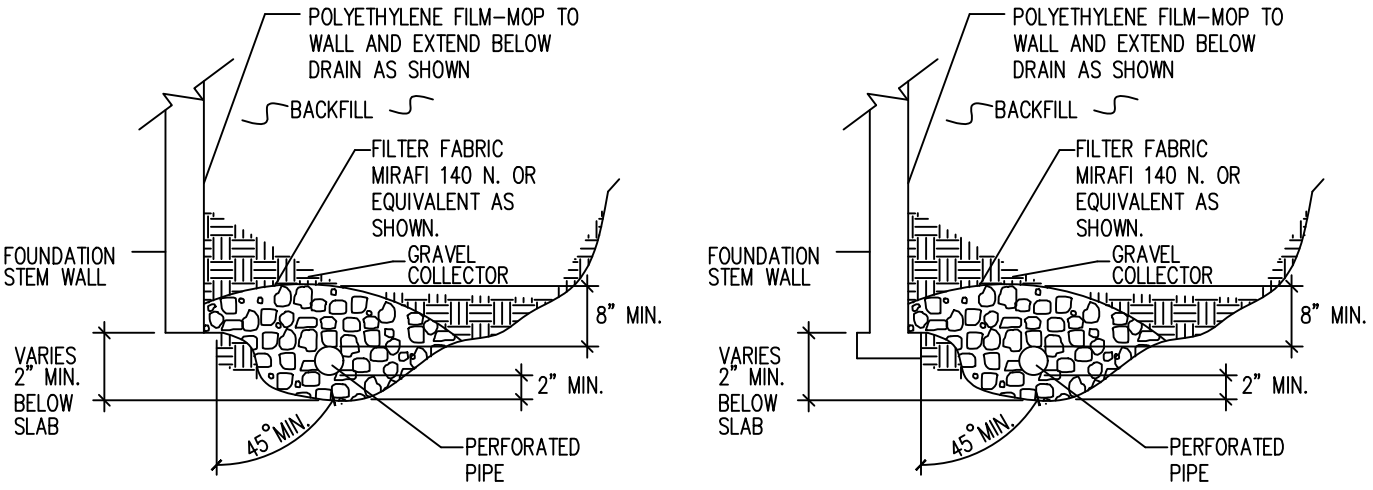
ENTECH ENGINEERING, INC.

FEMA FLOODPLAIN MAP

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. 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.

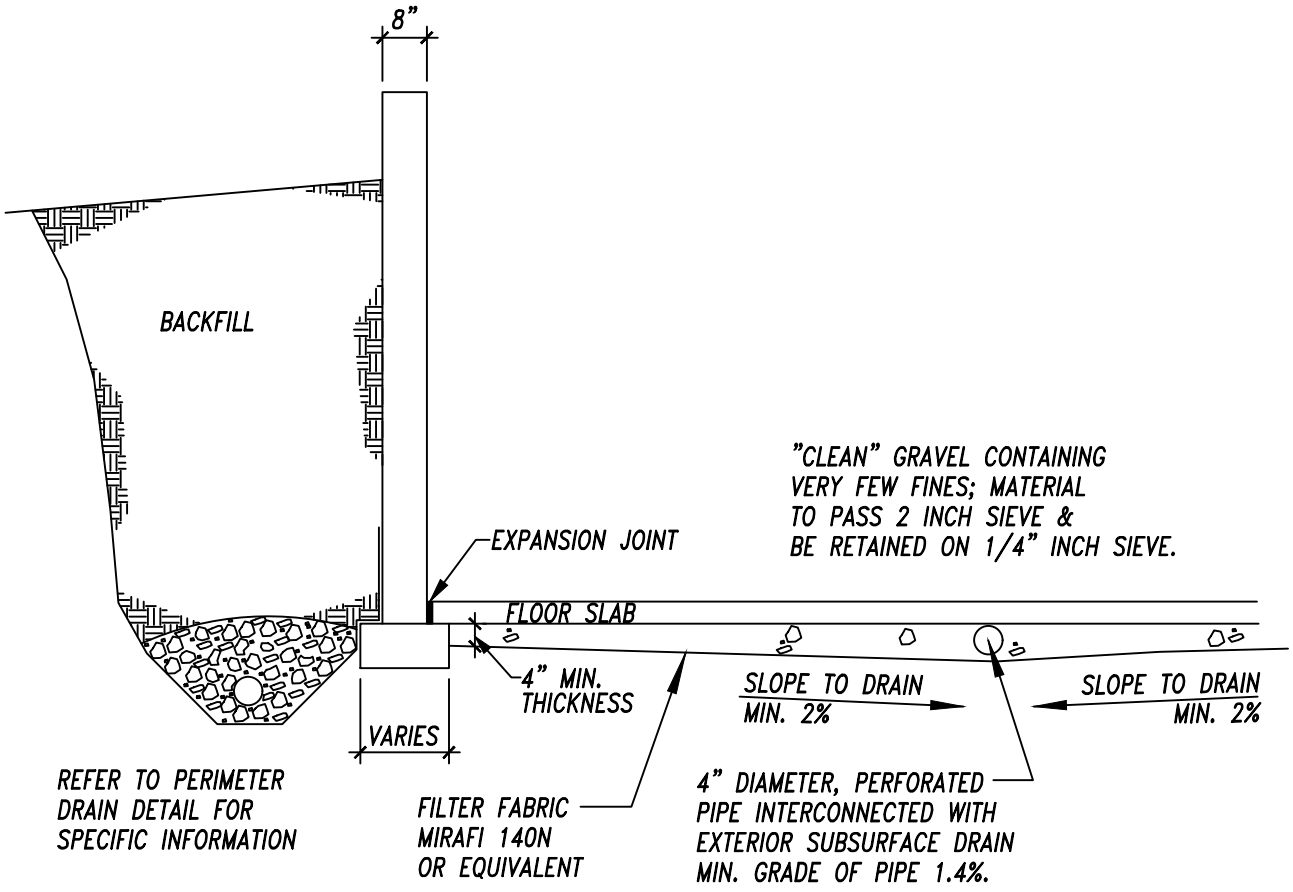
ENTECH ENGINEERING, INC.

PERIMETER DRAIN DETAIL

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. 8



ENTECH ENGINEERING, INC.

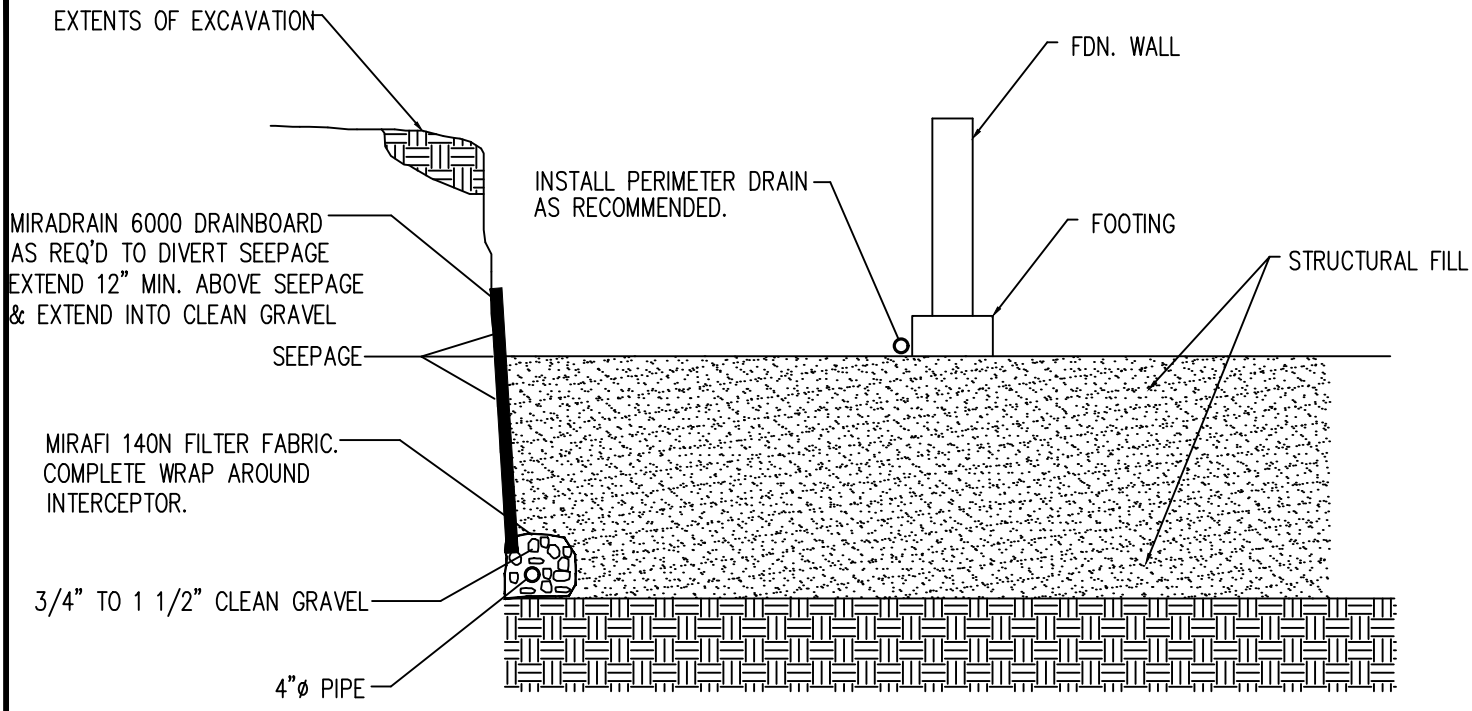
TYP. UNDERSLAB DRAINAGE LAYER (CAPILLARY BREAK)

STERLING RANCH EAST FILING NO. 3

CLASSIC SRJ

JOB NO. 241088

FIG. 9



NOTE:
EXTEND INTERCEPTOR DRAIN TO UNDERDRAIN OR TO SUMP.
BENCH DRAIN INTO NATIVE SOILS 12 INCHES MINIMUM.

INTERCEPTOR DRAIN DETAIL

N.T.S.

ENTECH ENGINEERING, INC.

INTERCEPTOR DRAIN DETAIL

STERLING RANCH EAST FILING NO. 3
CLASSIC SRJ

JOB NO.
241088

FIG. 10

APPENDIX A: Site Photographs

1

Looking west towards the existing drainage basin from the southwestern portion of the site.

July 3, 2024

2

Looking northwest from the southwestern portion of the site.

July 3, 2024

Job No. 241088

3

Looking east from the southwestern portion of the site.

July 3, 2024

4

Looking east from the northern portion of the site.

July 3, 2024

Job No. 241088

5

Looking southeast from the northern portion of the site.

July 3, 2024

6

Looking west from the central portion of the site Piezometer No. 1 right side of frame.

July 12, 2024

Job No. 241088

APPENDIX B: Test Boring Logs

TEST BORING 1
DATE DRILLED 6/24/2024

REMARKS

DRY TO 20', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, WITH SILT, OLIVE, DENSE to VERY DENSE, MOIST		32	6.9	1
5			50	8.2	1
	SANDSTONE, VERY WEAK, OLIVE, COMPLETELY WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)				
10			50/9"	10.1	3
15			50/11"	11.7	3
20			50/9"	9.1	3

TEST BORING 2
DATE DRILLED 6/24/2024

REMARKS

WATER @ 2.5', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, CLAYEY, OLIVE to BROWN, MEDIUM DENSE, MOIST ▼		16	12.6	1
5	SILT, SANDY, OLIVE, VERY STIFF, MOIST		26	11.9	2
10	SANDSTONE, VERY WEAK, BROWN to OLIVE, COMPLETELY WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)		50/11"	11.1	3
15			50/11"	10.2	3
20			50/9"	9.1	3

ENTECH ENGINEERING, INC.

TEST BORING LOGS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. B-1

TEST BORING 3
DATE DRILLED 6/24/2024

REMARKS

DRY TO 20', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			9	1.7	1
5			24	7.0	1
10			41	9.3	1
15			50/9"	7.1	3
20			50/8"	8.8	3

12" TOPSOIL

SAND, SILTY, OLIVE, LOOSE to MEDIUM DENSE, DRY to MOIST

SAND, CLAYEY, OLIVE, DENSE, MOIST

SANDSTONE, WEAK, OLIVE, COMPLETELY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)

TEST BORING 4
DATE DRILLED 7/1/2024

REMARKS

WATER @ 18.5', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			7	0.8	1
5			18	2.7	1
10			50/11"	7.7	3
15			44	10.0	3
20			50/9"	10.0	3

24" TOPSOIL

SAND, WITH SILT, BROWN to OLIVE, LOOSE to MEDIUM DENSE, DRY

SANDSTONE, VERY WEAK, OLIVE, COMPLETELY WEATHERED (SAND, SILTY, VERY DENSE to DENSE, MOIST)

ENTECH ENGINEERING, INC.

TEST BORING LOGS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. B-2

TEST BORING 5
DATE DRILLED 7/1/2024

REMARKS

DRY TO 20', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			13	0.8	1
5			13	1.7	1
10			38	6.8	1
					3
15			16	19.9	4
20			50	11.7	4

12" TOPSOIL
SAND, SILTY, BROWN to OLIVE, MEDIUM DENSE to DENSE, DRY to MOIST

SANDSTONE, WEAK, OLIVE, WEATHERED (SAND, CLAYEY, MOIST)
SILTSTONE, EXTREMELY WEAK, OLIVE, HIGHLY WEATHERED (SILT, SANDY, HARD, MOIST)

TEST BORING 6
DATE DRILLED 7/1/2024

REMARKS

WATER @ 18.5', 7/3/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			9	0.8	1
5			17	2.7	1
10			39	10.4	1
15			50/8"	8.3	3
20			50/8"	10.7	3

24" TOPSOIL
SAND, SILTY, BROWN to OLIVE, LOOSE to MEDIUM DENSE, DRY

SAND, CLAYEY, OLIVE, DENSE, MOIST

SANDSTONE, WEAK, OLIVE, COMPLETELY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)

ENTECH ENGINEERING, INC.

TEST BORING LOGS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. B-3

TEST BORING 7
DATE DRILLED 9/27/2024

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 9/27/24						
SAND, SILTY, OLIVE, MEDIUM DENSE, MOIST	5			19	6.1	1
	10			18	5.6	1
CLAYEY LENS	15			21	10.2	1
	20					

TEST BORING 8
DATE DRILLED 9/27/2024

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 9/27/24						
SAND, SILTY, OLIVE						1
SANDSTONE, VERY WEAK, OLIVE, COMPLETELY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)	5			50/11"	5.1	3
	10			50/8"	7.2	3
	15			50/10"	13.9	3
	20					

ENTECH ENGINEERING, INC.

TEST BORING LOGS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. B-4

TEST BORING 9
DATE DRILLED 9/27/2024

REMARKS

DRY TO 20', 9/27/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, SILTY, OLIVE to LIGHT BROWN, MEDIUM DENSE, DRY to MOIST				
5			18	1.8	1
10			19	3.7	1
15			22	2.8	1
20					

TEST BORING 10
DATE DRILLED 9/27/2024

REMARKS

DRY TO 20', 9/27/24

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, SILTY, GREEN-GRAY, MEDIUM DENSE to DENSE, MOIST				
5			19	21.9	1
10			39	15.0	1
15	SANDSTONE, WEAK, BROWN, HIGHLY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)		50/6"	9.4	3
20					

ENTECH ENGINEERING, INC.

TEST BORING LOGS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. B-5

TABLE B-1

DEPTH TO BEDROCK

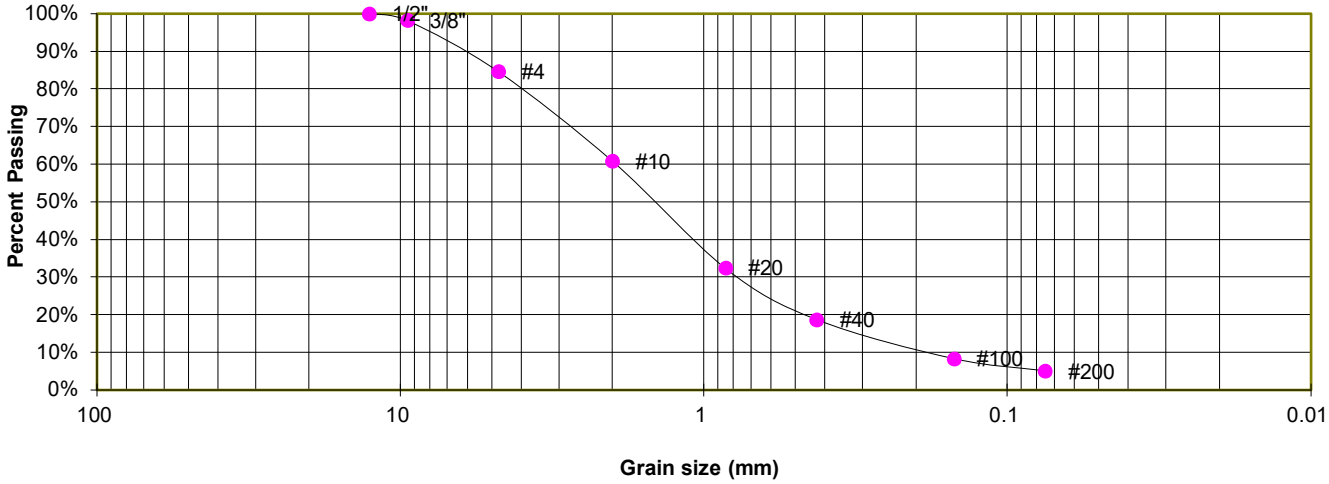
TEST BORING	DEPTH TO GROUNDWATER (ft.)	DEPTH TO BEDROCK (ft.)
1	>20	5
2	9	9
3	>20	11
4	>20	8
5	>20	11
6	>20	12
7	>20	>20
8	>20	3
9	>20	>20
10	>20	12

APPENDIX C: Laboratory Testing Results

TABLE C-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SWELL/ CONSOL (%)	USCS	SOIL DESCRIPTION
1	4	2-3			5.1					SM-SW	SAND, WITH SILT
1	6	10	12.7	108.2	41.8				-3.4	SC	SAND, CLAYEY
1	1	2-3			11.6	NV	NP	NP		SM-SW	SAND, WITH SILT
1	7	5			19.0	NV	NP	NP		SM	SAND, SILTY
1	9	10			12.8					SM	SAND, SILTY
1	10	5			15.8	30	24	6		SM	SAND, SILTY
2	2	5	12.5	101.6	51.2	30	25	5	-4.0	ML	SILT, SANDY
3	8	10			16.1	NV	NP	NP		SM	SANDSTONE (SAND, SILTY)
3	3	15			15.0	NV	NP	NP		SM	SANDSTONE (SAND, SILTY)
4	5	15			67.4	39	27	12		ML	SILTSTONE (CLAY, SANDY)

TEST BORING	4	SOIL DESCRIPTION	SAND, WITH SILT
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.2%
4	84.6%
10	60.8%
20	32.4%
40	18.7%
100	8.4%
200	5.1%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM-SW

ENTECH ENGINEERING, INC.

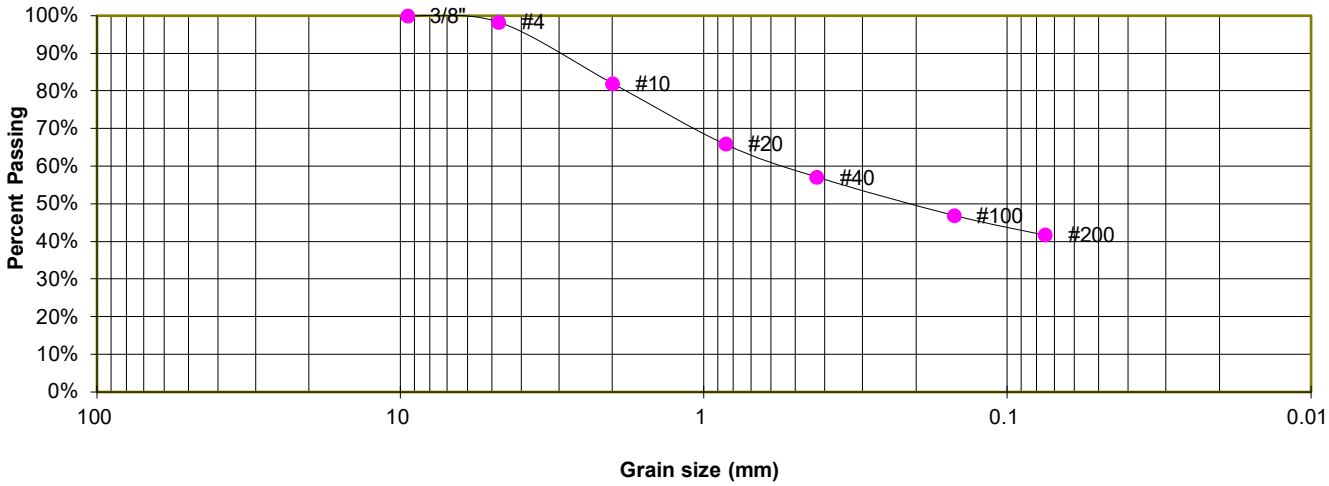
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-1

TEST BORING	6	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	10	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.3%
10	82.0%
20	65.9%
40	57.1%
100	46.9%
200	41.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

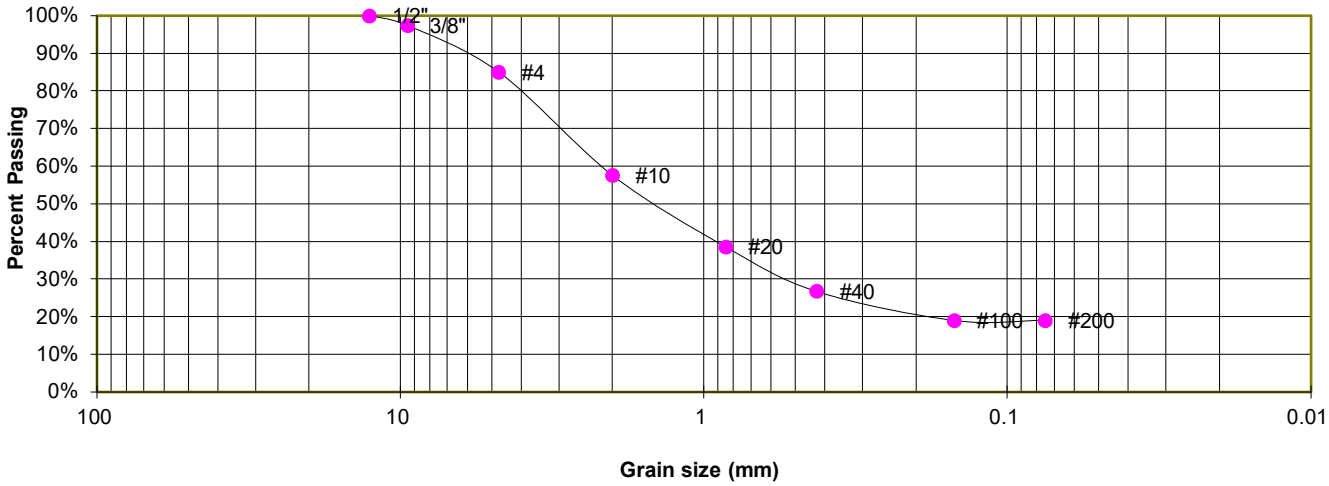
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-2

TEST BORING	7	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.5%
4	85.0%
10	57.6%
20	38.6%
40	26.8%
100	19.1%
200	19.0%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

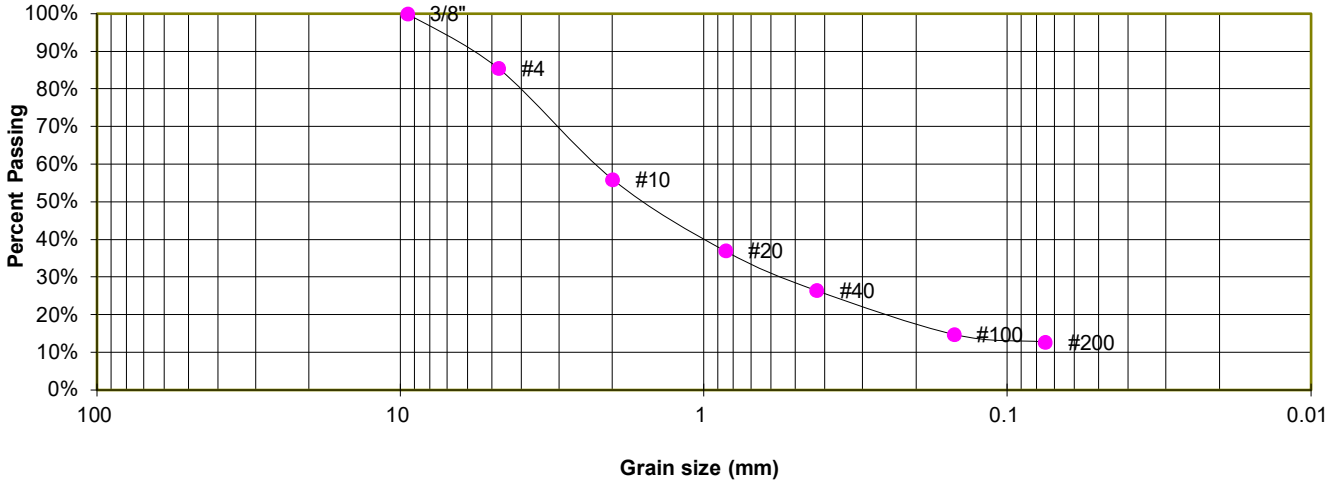
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-3

TEST BORING	9	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	10	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	85.5%
10	55.9%
20	37.0%
40	26.5%
100	14.8%
200	12.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

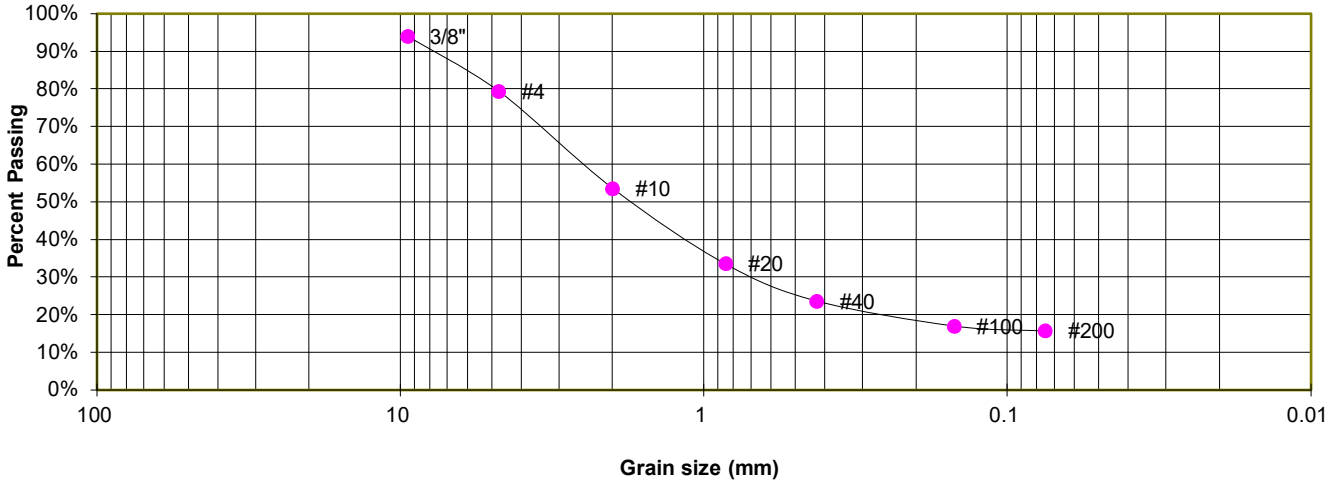
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-4

TEST BORING	10	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	94.0%
4	79.5%
10	53.6%
20	33.6%
40	23.6%
100	17.0%
200	15.8%

ATTERBERG LIMITS

Plastic Limit	24
Liquid Limit	30
Plastic Index	6

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

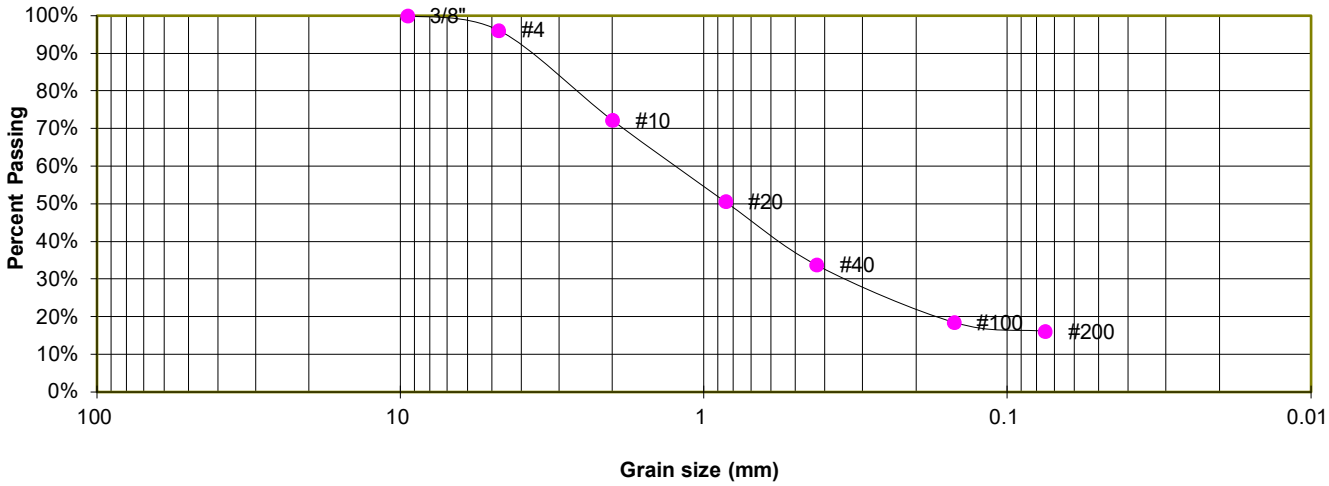
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-5

TEST BORING	8	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.1%
10	72.2%
20	50.6%
40	33.8%
100	18.5%
200	16.1%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

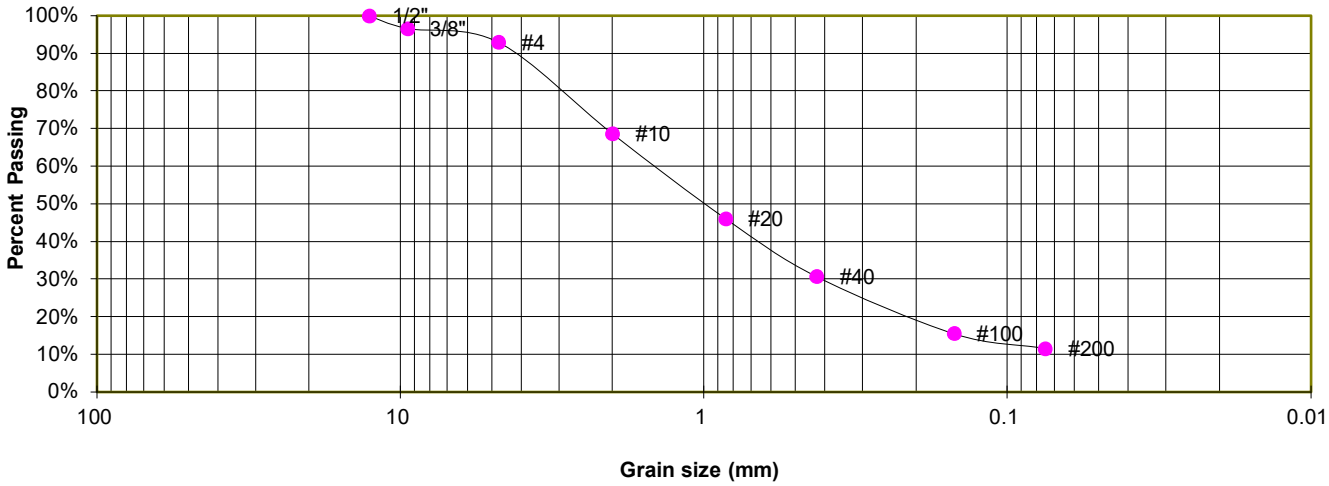
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-6

TEST BORING	1	SOIL DESCRIPTION	SAND, WITH SILT
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.6%
4	93.0%
10	68.6%
20	46.1%
40	30.7%
100	15.6%
200	11.6%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM-SW

ENTECH ENGINEERING, INC.

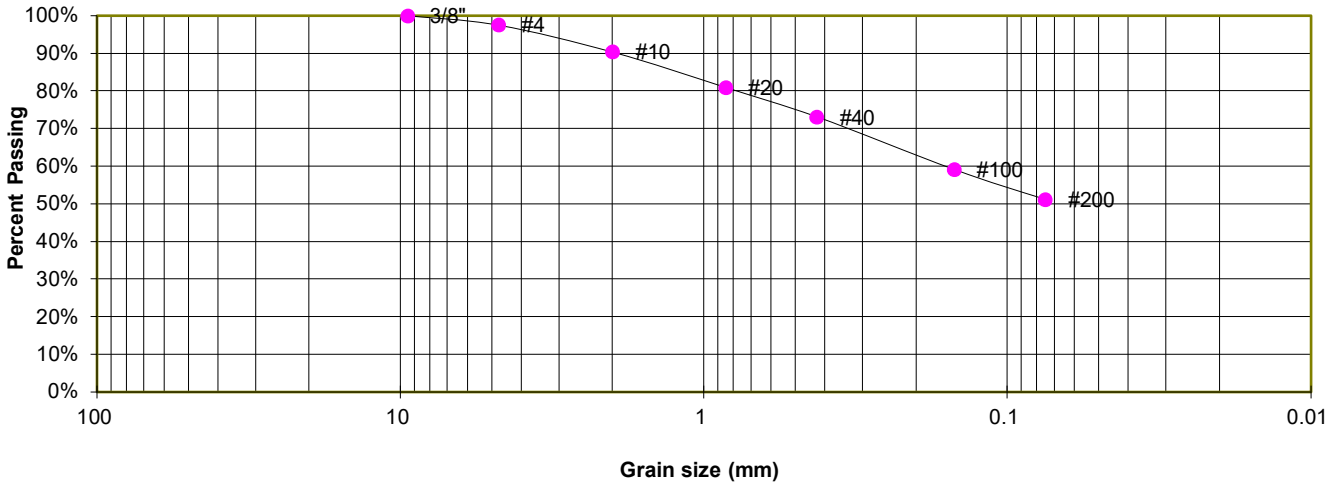
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-7

TEST BORING	2	SOIL DESCRIPTION	SILT, SANDY
DEPTH (FT)	5	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.6%
10	90.4%
20	81.0%
40	73.2%
100	59.2%
200	51.2%

ATTERBERG LIMITS

Plastic Limit	25
Liquid Limit	30
Plastic Index	5

SOIL CLASSIFICATION

USCS CLASSIFICATION: ML

ENTECH ENGINEERING, INC.

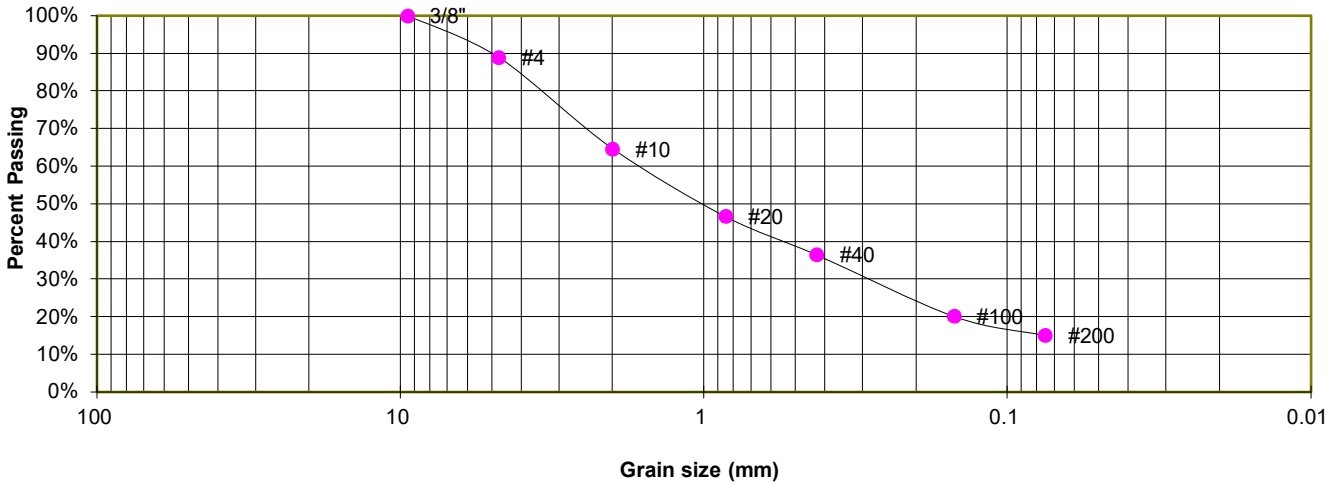
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-8

TEST BORING	3	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	15	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	88.9%
10	64.7%
20	46.7%
40	36.5%
100	20.2%
200	15.0%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

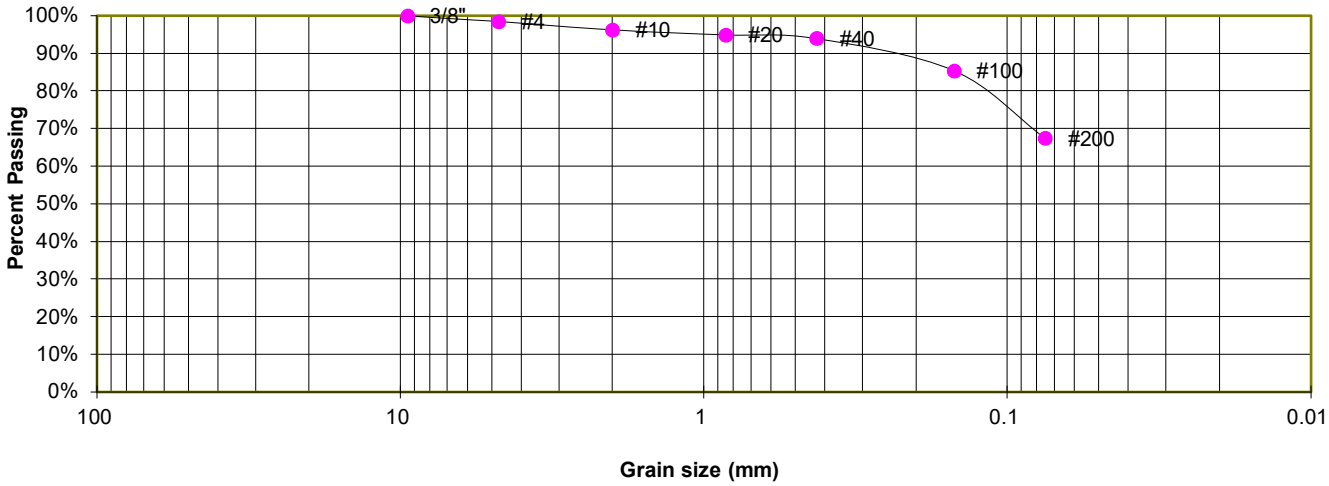
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-9

TEST BORING	5	SOIL DESCRIPTION	SILTSTONE (CLAY, SANDY)
DEPTH (FT)	15	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	96.3%
20	94.9%
40	94.0%
100	85.4%
200	67.4%

ATTERBERG LIMITS

Plastic Limit	27
Liquid Limit	39
Plastic Index	12

SOIL CLASSIFICATION

USCS CLASSIFICATION: ML

ENTECH ENGINEERING, INC.

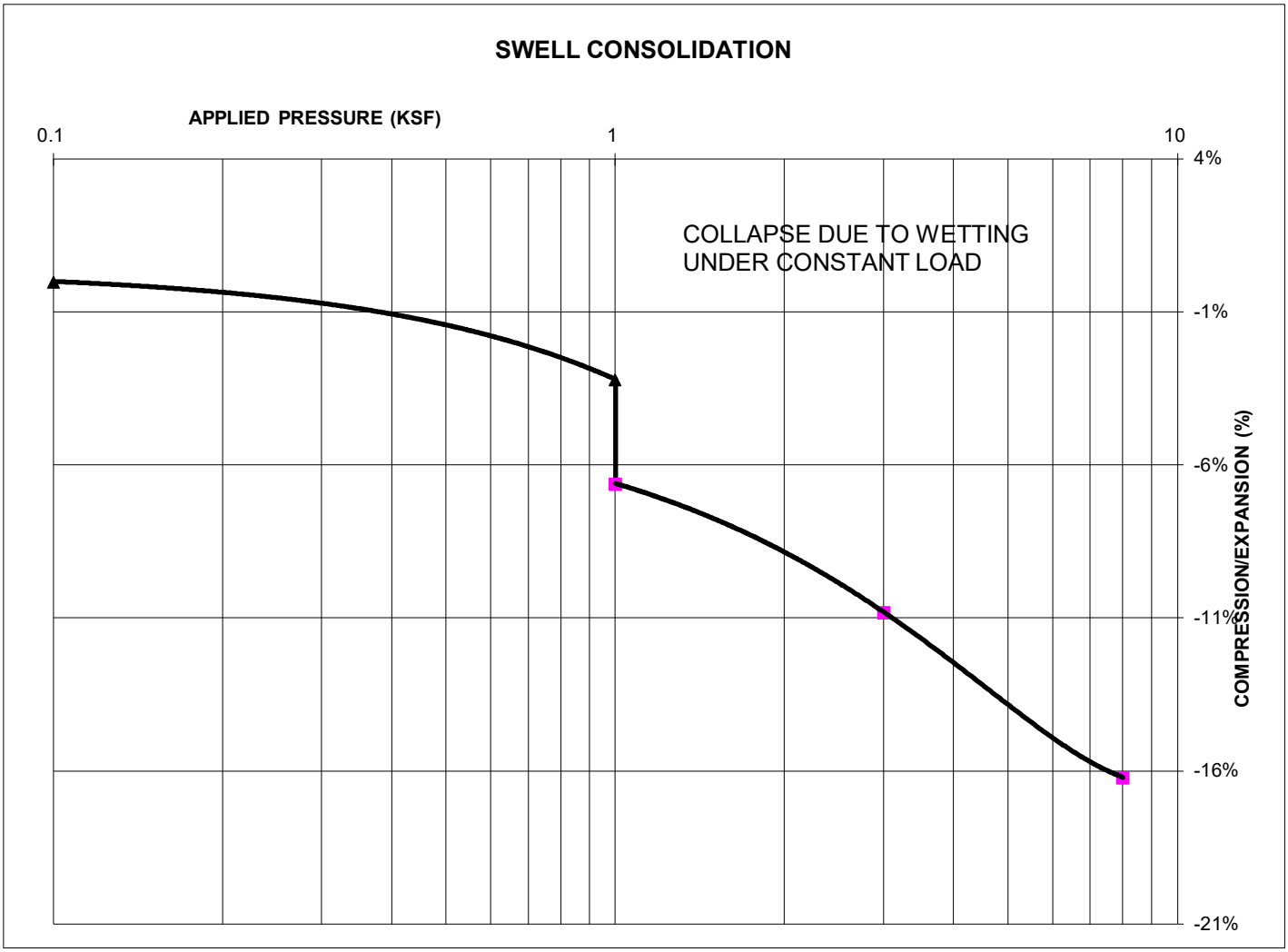
LABORATORY TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-10

TEST BORING	6	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	10	SOIL TYPE	1



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 108
NATURAL MOISTURE CONTENT: 12.7%
SWELL/COLLAPSE (%): -3.4%

ENTECH ENGINEERING, INC.

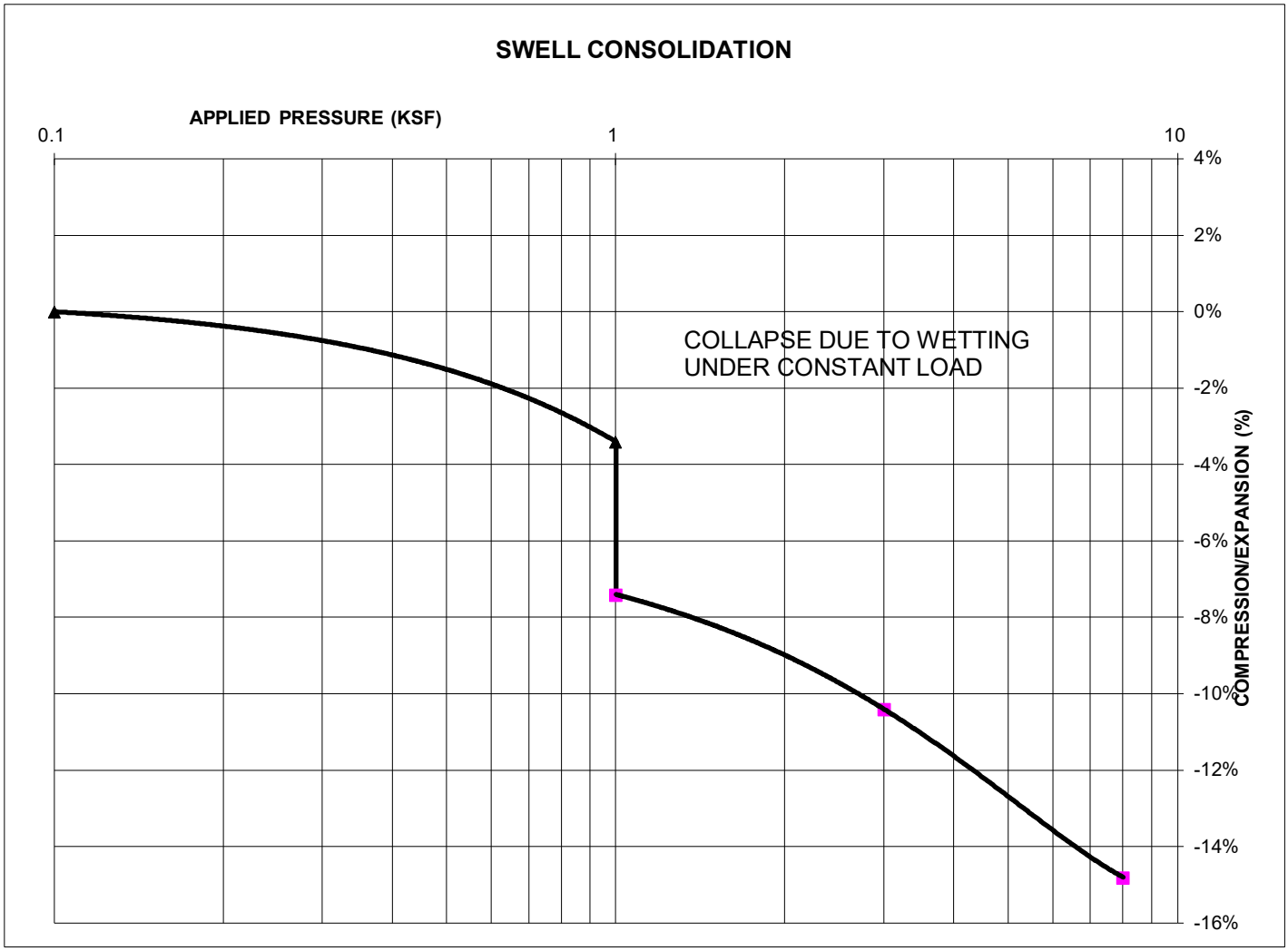
SWELL TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-11

TEST BORING	2	SOIL DESCRIPTION	SILT, SANDY
DEPTH (FT)	5	SOIL TYPE	2



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 102
NATURAL MOISTURE CONTENT: 12.5%
SWELL/COLLAPSE (%): -4.0%

ENTECH ENGINEERING, INC.

SWELL TEST RESULTS

STERLING RANCH EAST, FILING NO. 3
CLASSIC SRJ

JOB NO. 241088

FIG. C-12

ENTECH
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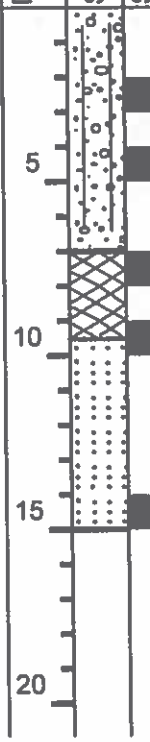
APPENDIX D: Previous Entech Test Borings, Job Nos. 82556, 202403

TEST BORING NO. 3
DATE DRILLED 8/4/2006
Job # 82556

REMARKS

DRY TO 15', 8/7/06



Blows per foot	Watercontent %	Soil Type
17	5.6	1
29	8.3	1
*	12.7	4
50/6"	10.5	3
50/4"	9.4	3

SAND, SILTY, GRAVELLY, FINE TO COARSE GRAINED, DARK BROWN TO RED BROWN, MEDIUM DENSE, MOIST

CLAYSTONE, VERY SANDY, BROWN, MOIST

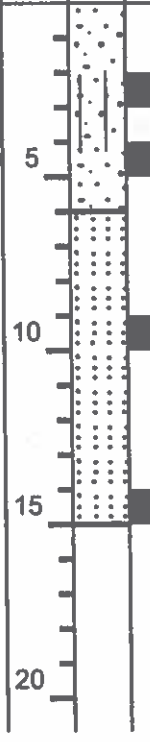
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, LIGHT BROWN, VERY DENSE, MOIST

* - BULK SAMPLE TAKEN

TEST BORING NO. 4
DATE DRILLED 8/4/2006
CLIENT MORLEY BENTLEY
LOCATION STERLING RANCH

REMARKS

DRY TO 15', 8/4/06
CAVED TO 14.5', 8/7/06, DRY



Blows per foot	Watercontent %	Soil Type
11	1.9	1
37	6.2	1
50/5"	8.0	3
50/4"	6.2	3

SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, DARK BROWN TO TAN, MEDIUM DENSE TO DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, LIGHT GRAY, VERY DENSE, MOIST

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

TEST BORING LOG

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

JOB NO.: 82556
FIG NO.: B-2

TEST BORING NO. 3
DATE DRILLED 11/5/2020
Job # 202403

REMARKS

DRY TO 19', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			9	1.1	1
5			12	0.4	1
10			50	7.4	3
15			50/7"	10.3	3
20			50/6"	11.4	3

SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, LOOSE TO MEDIUM DENSE, DRY

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

SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

TEST BORING NO. 4
DATE DRILLED 11/5/2020
CLIENT SR LAND, LLC
LOCATION STERLING RANCH & BRIARGATE

REMARKS

DRY TO 19.5', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			8	1.6	1
5			29	8.7	1
10			50/7"	9.8	3
15			50/8"	13.1	3
20			50/8"	11.9	3

SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, LOOSE TO MEDIUM DENSE, DRY TO MOIST

FINE GRAINED LENSES

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			11/12/20

JOB NO.: 202403
FIG NO.: B-2

TEST BORING NO. 5
DATE DRILLED 11/5/2020
Job # 202403

REMARKS

DRY TO 19', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			10	0.7	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY
5			39	8.4	3	WEATHERED SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE, MOIST
10			50/8"	6.5	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST
15			50/8"	12.7	3	
20			50/8"	13.7	3	

TEST BORING NO. 6
DATE DRILLED 11/5/2020
CLIENT SR LAND, LLC
LOCATION STERLING RANCH & BRIARGATE

REMARKS

DRY TO 19', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			16	1.2	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO DENSE, DRY TO MOIST
5			30	4.5	1	
10			50	10.5	3	SANDSTONE, CLAYEY TO VERY CLAYEY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST
15			50/9"	20.1	3	
20			50/9"	11.2	3	SANDSTONE, SILTY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			11/12/20

JOB NO.: 202403
FIG NO.: B-3

TEST BORING NO. 7
DATE DRILLED 11/5/2020
Job # 202403

REMARKS

DRY TO 18', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			15	1.1	1
5			28	3.2	1
10			50/11"	10.1	3
15			50/9"	9.6	3
20			50/7"	7.6	3

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

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

TEST BORING NO. 8
DATE DRILLED 11/5/2020
CLIENT SR LAND, LLC
LOCATION STERLING RANCH & BRIARGATE

REMARKS

DRY TO 19', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			16	1.1	1
5			26	3.2	1
10			50/9"	9.1	3
15			50/9"	9.0	3
20			50/6"	7.5	3

SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, DRY TO MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 11/12/20

JOB NO.: 202403
FIG NO.: B-4

TEST BORING NO. 9
DATE DRILLED 11/5/2020
Job # 202403

REMARKS

WATER @ 16', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			11	1.3	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, MEDIUM DENSE, MOIST
5			29	4.2	1	
			50/10"	8.4	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST
10						
15			50/10"	10.1	3	
20			50/8"	8.5	3	

TEST BORING NO. 10
DATE DRILLED 11/5/2020
CLIENT SR LAND, LLC
LOCATION STERLING RANCH & BRIARGATE

REMARKS

DRY TO 19.5', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			14	1.0	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, MEDIUM DENSE TO DENSE, DRY TO MOIST
5			24	2.9	1	
10			33	15.0	1	
						SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST
15			50/9"	8.5	3	
20			50/9"	10.3	3	

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			11/12/20

JOB NO. 202403
FIG NO. B-5

TEST BORING NO. 11
DATE DRILLED 11/6/2020
Job # 202403

REMARKS

DRY TO 20', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			11	0.7	1	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY
5			13	1.4	1	
10			39	17.3	3	WEATHERED TO FORMATIONAL SANDSTONE, CLAYEY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST
15			50/9"	12.8	3	
20			50/7"	13.1	3	

TEST BORING NO. 12
DATE DRILLED 11/6/2020
CLIENT SR LAND, LLC
LOCATION STERLING RANCH & BRIARGATE

REMARKS

DRY TO 20', 11/6/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			16	1.0	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO DENSE, DRY TO MOIST
5			23	8.8	1	
10			30	6.9	1	
15			50/8"	1.4	3	SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, DRY TO MOIST
20			50/7"	8.8	3	

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 11/12/20

JOB NO.: 202403
FIG NO.: B-6

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 21, Aug 24, 2023

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 21, Aug 24, 2023

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 21, Aug 24, 2023