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SOIL, GEOLOGY, GEOLOGIC HAZARD STUDY
FLYING HORSE NORTH
FILING NO. 2
EL PASO COUNTY, COLORADO

This should say Phase 2 (comment throughout)

Prepared for

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

Attn: Drew Balsick

March 8, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

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Geologist

Reviewed by:

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SP-22-_____

PUDSP234

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Encl.
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1.0 SUMMARY

Project Location

The project consists of Section 36, Township 11 South, Range 66 West and portions of Sections 30 and 31, Township 11 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 miles southeast of Monument, Colorado.

Project Description

Total acreage involved in Filing No. 1 the project is 912.5 acres. The proposed site development consists of single-family residential estate lots, low to high density lots, commercial golf club, hotel, fitness center, potential fire station, detention ponds, open space, parks and trail system. A total of 1,571 units are proposed. The development will utilize Cherokee Water and Sanitation will provide water and sewer.

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 seasonal and potentially seasonal shallow groundwater areas, drainage areas, areas of ponded water, floodplain, erosion, artificial fill, expansive soils, and areas of downslope creep. 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 consists of Section 36, Township 11 South, Range 66 West and portions of Sections 30 and 31, Township 11 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 miles southwest of Monument, Colorado, at the east end of Stagecoach Road between Highway 83 and Black Forest Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site varies from gently to moderately sloping generally to the northeast and southwest off a ridge line that bisects the site with some steeper slopes along drainages in the western portion of the site. The ridge line that bisects the site is associated with the Palmer Divide. The drainages on site flow in westerly and northerly directions through the property. No water was observed flowing in these the drainages at the time of this investigation, however, areas of ponded water were observed behind several earthen dams. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. Flying Horse North Filing No. 1 has been mostly developed and the golf course has been completed. The site contains primarily field grasses and weeds in the eastern portions of the site with areas of ponderosa pine tree coverage in the western portions of the site. Site photographs are included in Appendix A. The locations and directions of the photographs are indicated in Figure 3.

Total acreage involved in Filing No. 2 of the proposed development is 912.5 acres. Single-family residential estate lots, low to high density lots, commercial golf club, hotel, fitness center, potential fire station, detention ponds, open space, parks and trail system. The area will be serviced by Cherokee Water and Sanitation. The proposed Sketch Plan prepared by HRGreen is presented in Figure 4.

The site was previously investigated as a part of a Soil, Geology, Geologic Hazard and Wastewater Study by Entech Engineering, Inc., February 26, 2015 (Reference 1), and a Soil, Geology, Geologic Hazard and Wastewater Study by Entech Engineering, Inc., February 22, 2016 (Reference 2). Information from these reports were also used in evaluating the site.

3.0 SCOPE OF THE

The scope of the report will include a general geologic a
Detailed site-specific mapping will be conducted to obta
geographic and geologic features, geologic descriptions
the property in accordance with El Paso Land Developm

4.0 FIELD INVEST

Our field investigation consisted of the preparation of a g
significant surficial deposits. The Natural Resource Con
Soil Conservation Service (SCS) survey was also revie
mappable units within the subject property are show
procedures involved both field reconnaissance and mea
and interpretation. The same mapping procedures
Engineering Geology Map which identified pertinent ge
The field mapping was initially performed by personnel
21 and December 2, 2014. Field mapping was updated
31 and November 3, 2017. The site was revisited on
included in Appendix A.

Six (6) test borings were drilled and eighteen (18) test pits excavated across the site to determine the soils classification and engineering characteristics. The borings were drilled to depths of 20 feet using a truck-mounted, continuous flight auger drilling rig supplied and operated by Entech Engineering, Inc., and the test pits were excavated to depths ranging from 3 to 8 feet.

Frequency of Borings. The following represent the minimum number of borings that are required based on a typical improvements project. The number of borings may be increased based on the geotechnical engineer's recommendations or at the request of the ECM Administrator.
• A minimum of 2 borings for each project with public improvements shall be performed.

• A minimum 1 boring for each SCS (NRCS) soil type within a development shall be performed.

• A minimum of 1 boring shall be performed for each 10 acres of development up to 100 acres. One additional boring shall be performed for every 25 acres of development above the 100 acres.

C.Borings for Structures. The boring frequency for transportation structures shall satisfy AASHTO Bridge Design requirements and CDOT Materials Testing requirements.D.Depth of Borings. Borings shall be performed to a minimum depth of 20 feet. In areas where the cut depths are expected to exceed 8 feet, borings shall be extended to a minimum of 15 feet below proposed finished grade. Borings shall extend deeper if needed to determine if bedrock or high groundwater levels are design concerns. Samples for structures shall be taken to a minimum depth of 10 feet below the footing elevation. Additional depth may be required for piers or piles.
It should be noted that boring depths will ultimately be determined by the geotechnical engineer based on site conditions. However, when depths different than those presented is performed, documentation as to the difference must be presented in the submitted report.

Profile holes dont appear to meet depth requirements for required test borings across the entire development areas. Profile holes were 2-3ft to max10-15ft and not min 20ft.

The original field investigation consisted of fourteen (14) profile holes to determine general suitability of the site for construction. The location of the profile holes indicated on the Site Map/Testing Location Map, Figure 3. Additionally, fourteen (14) profile holes were performed on the entire Flying Horse North property in previous studies.

The locations of the Test Borings, Test Pits, and Test Pit Logs, and Profile Borings are indicated on the Development Plan/Test Location Map, Figure 3. The Test Boring Logs, Test Pit Logs, Laboratory Test Results, and Profile Hole Logs are presented in Appendices B, C, and D, respectively. Results of the testing will be discussed later in this report.

Laboratory testing was performed on the soils to classify and determine the soils engineering characteristics. Laboratory tests included moisture content testing, ASTM D-2216, grain-size analysis, ASTM D-422, and Atterberg Limits, ASTM D-4318. Swell testing included both FHA Swell Tests and Swell/Consolidation Tests. Results of the laboratory testing are included in Appendices C, and D. Summaries of Laboratory Test Results are presented in Tables 1, 2, and 3.

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 10 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 northerly direction (Reference 3). The rocks in the area of the site are sedimentary in nature, and typically Tertiary to Cretaceous in age. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of residual, colluvial, man-made, and alluvial soils of the Quaternary Age. The residual soils are produced by the in-situ action of weathering of the bedrock on site. Some colluvial soils exist which are deposited by gravity and sheetwash. The alluvial soils were deposited by water in the drainages

on site. Man-made soils exist as earthen dams and erosion berms. 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 4), previously the Soil Conservation Service (Reference 5) has mapped five soil types on the site (Figure 5). In general, they vary from sandy loam to loam and sandy loam with subsoils of clay loam. The soils are described as follows:

Type	Description
14	Brussett loam, 1-3% slopes
26	Elbeth sandy loam, 8-15% slopes
66	Peyton sandy loam, 1-5% slopes
67	Peyton sandy loam, 5-9% slopes
68	Peyton-Pring complex, 3-8% slopes

Complete descriptions of each soil type are presented in Appendix E. The soils have generally been described to have moderate to rapid permeabilities. Limitations on development include, limited ability to support a load, shrink swell potential, slopes and frost action potential.

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

Qaf **Artificial Fill of Quaternary Age:** These are man-made fill deposits associated with erosion berms and earthen dams on-site. Additionally, temporary stockpiles were observed on the site. Other areas of fill may exist on the site other than those mapped due to on-going construction.

Qal **Recent Alluvium of Quaternary Age:** These are recent stream deposits associated with the drainages on-site. These materials generally consist of silty to clayey sands and may contain clay lenses. Highly organic soils may be encountered in some of these areas.

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 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. Areas of colluvial soils may exist on some of the slopes on site. These materials are derived from the bedrock materials and have been re-deposited by the action of sheetwash and gravity.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Black Forest Quadrangle* distributed by the Colorado Geological Survey in 2003 (References 6), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 8), and the *Geologic Map of the Denver 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 9). The Test Borings and Test Pit Logs 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 six test borings drilled on the site can be grouped into three general soil and rock types. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 is a silty to slightly silty sand and very clayey sand (SM, SM-SW, SC), encountered in all of the test borings at depths ranging from the existing ground surface to 8 feet bgs and extending to depths ranging from 1 foot to the termination of the borings (20 feet). This material is associated with colluvial soils and residual soils of the Dawson Sandstone. These materials were encountered at medium dense to dense states and at moist conditions. Samples tested had 12 to 47 percent of the soil size particles passing the No. 200 Sieve. Atterberg limits testing resulted in non-plastic results. A swell pressure of 150 psf was measured in the FHA Swell Test, indicating low expansion potential.

Soil Type 2 is a sandy to very sandy clay (CL), encountered in two of the test borings at depths ranging from the existing ground surface to 3 feet bgs and extending to depths ranging from 4 to 8 feet. These materials were encountered at stiff to very stiff consistencies and at moist conditions. Samples tested had 52 to 83 percent of the soil size particles passing the No. 200 Sieve. Atterberg limits testing resulted in a liquid limit of 38 and a plastic index of 21. FHA Swell Testing resulted in expansion pressures of 270 and 930 psf, indicating a low expansion potential. Expansive clays are common in the area.

Soil Type 3 consists of silty to clayey sandstone (SM, SC). This material is associated with formational Dawson Sandstone. This material was encountered in four of the test borings at depths ranging from 1 to 18 feet bgs and extending to the termination of the borings (20 feet). The sandstone was encountered at very dense states and at moist conditions. The samples tested had 9 to 20 percent of the soil size particles passing the No. 200 sieve. Atterberg limits testing resulted in non-plastic results. The silty sandstone typically exhibits low expansive potential, however, expansive claystone and siltstone are common in the area.

The soils encountered in the profile holes of the percolation tests performed as a part of the original Soil, Geology, Geologic Hazard and Wastewater Study for the entire Flying Horse North Subdivision by Entech Engineering, Inc. (References 1 and 2) consisted of silty sands and sandy to very sandy clays overlying silty sandstone. The silty sands and sandstone exhibited low expansion potential. The clays were encountered in nine of the fourteen profile holes at depths ranging from the existing ground surface to 14 feet and extending to depths ranging from one foot to the termination of the borings (15 feet). A FHA Swell pressure of 1485 psf was measured on the clays. Swell/Consolidation Tests resulted in volume changes ranging from 0.3 to 2.7 percent. These results indicate the clays exhibit low to high expansion potential.

The Test Boring Logs and Laboratory Test results as a part of this investigation are included in Appendix B and summarized in Table 1. The Profile Holes and Laboratory Test Results from References 1 and 2 are included in Appendix D.

5.5 Groundwater

Groundwater was not encountered in any of the test borings which were drilled to 15 to 20 feet. Areas of seasonal, potentially seasonal shallow groundwater, and ponded water have been mapped in the drainages on-site. These areas are discussed in the following section. Fluctuation

Monitoring Programs. The monitoring program information shall:
• Describe the type, objectives, and location of all monitoring programs in the subject area; State the monitoring period, discuss seasonal wet areas findings through the test pits etc.

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 or clays. 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.

Include hazards. Only constraints discussed.

Geologic Interpretation. The report shall include interpretations and detailed descriptions of the following:1.Geologic Hazards. Geologic hazards include landslides, avalanche, rockfall, mudflows, debris flows, radioactivity, etc.

6.0 ENGINE LOGY – IDENTIFICATION AND OF GEOLOGIC HAZARDS

As mentioned previously, detailed mapping has been performed on this Engineering Geology Map (Figure 7). This map shows the location of various 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 areas of man-made fill associated with earthen dams and erosion berms on-site. Additionally, temporary stockpiles were observed on the site.

Mitigation: The earthen dams lie within defined drainages and should be avoided as building sites. Some dams are to be removed or reconstructed as a part of detention ponds. The erosion berms can either be avoided or penetrated by foundations. It is anticipated the temporary stockpiles would be removed prior to construction. 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.

Areas of Erosion – Constraint

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

Mitigation: Due to the nature of the soils on this site, virtually all the soils are subject to erosion by wind and water. Other minor areas of erosion were observed on site other than those mapped, particularly where some rill erosion has occurred. Areas of erosion can occur across the entire site, particularly if the soils are disturbed during construction. Vegetation reduces the potential for erosion. The areas identified where erosion is actually taking place may require check dams, regrading and revegetation using channel lining mats to anchor vegetation. Further recommendations for erosion control are discussed under Section 9.0 "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).

Expansive Soils – Constraint

The site is classified in an area of low to moderate swell potential according to *the Map of Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado* by Hart, 1974 (Reference 10). Expansive soils were encountered in some of the profile holes drilled on the site as a part of the entire Flying Horse North Subdivision (References 1 and 2). These occurrences are typically sporadic; therefore, none have been indicated on the maps. These clays, if encountered beneath foundations, can cause differential movement in the structure foundation. These occurrences should be identified and dealt with on an individual basis.

Mitigation: Should expansive soils be encountered beneath the foundation, 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. Another alternative in areas of highly expansive soils is the use of drilled pier foundation systems. Typical minimum pier depths are on the order of 25 feet or more and require penetration into the bedrock material a minimum of 4 to 6 feet, depending upon building loads. 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.

Seasonal Shallow Groundwater Area – Constraint

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

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 7. 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. Septic fields should not be located in areas where there is the potential for shallow groundwater. The area of the site located in Filing No. 1 does not lie within any floodplain zones according to the FEMA Map Nos. 08041CO305G, and 08041CO315G, dated December 7, 2018 (Figure 9, Reference 11). A floodplain is mapped in the extreme northwestern portion of the site. A detention pond is proposed in this area which will be located in an open space. Exact locations of floodplain and specific drainage studies are beyond the scope of this report. Finished floor levels must be located a minimum of one foot above floodplain levels.

Potentially Seasonal Shallow Groundwater Area – Constraint

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

Areas of Ponded Water – Constraint

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

Downslope Creep Areas – Constraint

These areas are acceptable as building sites, however, in areas identified with this hazard classification, we would anticipate accelerated lateral and vertical movement of the near surface soils in the downslope direction.

Mitigation: The design of foundations in these areas should account for the additional pressure on the uphill side of the structure due to the creep potential. The lateral pressure distribution for sloping conditions in downslope creep area is presented in Figure 9. Tie-beams, buttresses and counterforts may be necessary in some areas. Where possible, in areas of downslope creep, structures should be designed to be as compact and rigid as possible. This will help them better tolerate the vertical and lateral movements to which the foundation system may be subjected with minimal damage. Long, rambling, irregular structures should be avoided, as they are associated with much greater potential for damaging differential movement. Additionally, structures should be designed to step up the slope. Deep cuts in these areas should be avoided. Any retaining walls proposed in these areas should also be properly designed for by a qualified professional engineer for the global slope stability. Proper control of drainage at both the surface and subsurface is important. Saturation of materials should be avoided that may create unstable conditions.

6.1 Relevance of Geologic Conditions to Land Use Planning

As mentioned earlier in this report, we understand that the development will be primarily residential with some commercial parcels. 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 drainages on site that can be avoided. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices.

The upper residual soils are typically at medium to very dense states. The granular soils encountered in the upper soil profiles of the test borings should provide good support for foundations. Expansive soils were encountered on portions of the site that will require mitigation. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of expansive soils. Areas containing arkosic sandstone will have high allowable bearing conditions. Difficult excavation should be anticipated in areas of shallow bedrock. Expansive layers may also be encountered in the soil and bedrock on this site. Areas of expansive soils encountered on site are sporadic; therefore, none have been indicated on the maps. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of seasonal and potentially seasonal high groundwater areas and ponded water were encountered on site. Due to the size of the lots and the proposed development, these areas can be avoided by construction. Absorption fields are not recommended in these areas. Structures should not block drainages. Drains may be necessary for structures adjacent to these areas to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 7. The site does not lie within any floodplain zones according to FEMA Map Nos. 08041CO305G, and 08041CO315G, dated December 7, 2018 (Figure 9, Reference 11). A floodplain is mapped in the extreme northwestern portion of the site. A detention pond is proposed in this area which will be located in an open space. Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

Areas of fill were observed on site associated with dams and erosion control berms. It is anticipated the dams could be avoided by development. The erosion berms can be avoided or penetrated by foundations. Any uncontrolled fill encountered beneath foundations should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

Areas of erosion and gullying may require the construction of check dams and revegetation if construction encroaches on these areas. General recommendations for erosion control are discussed under Section 9.0 "Erosion Control".

Areas of downslope creep areas have been identified on this site. In areas of downslope creep, structures should be designed to be as compact and rigid as possible. Foundations may require tie-beams or additional reinforcement in these areas. Foundations should be designed to step up the slopes to avoid deep cuts. Deep cuts should be avoided on all steeper sloping areas of the site. Any retaining walls proposed should be designed for the global slope stability by a qualified professional engineer. This includes cuts made for terracing in backyards. Proper control of drainage at both the surface and subsurface is important. Saturation of materials should be avoided that may create unstable conditions.

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 also recommended prior to construction.

7.0 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 drainage 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,

Include a section in the GEOTECH report addressing the following sections of the Drainage Criteria manual.
11.2.2 Detention Facility Construction

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.

8.0 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 12), portions of the area are mapped as stream terrace and floodplain deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 13), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 14), the area of the site has been mapped as “Little or No Potential” for industrial minerals. It is possible sand materials on site could be an aggregate resource. However, considering the silty to clayey 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 14), 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 the site (Reference 14).

The site has been mapped as “Fair” for oil and gas resources (Reference 14). 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.

9.0 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 and weathered bedrock materials 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.

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 avoided by construction. Others can be mitigated through proper engineering design and construction practices. The proposed development and use is 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 and on-site wastewater treatment systems 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 Flying Horse Development, LLC for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

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

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TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT FLYING HORSE DEV.
PROJECT FLYING HORSE NORTH, F-2
JOB NO. 220404

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			20.0	NV	NP	0.01			SM	SAND, SILTY
1	5	2-3			11.6						SM-SW	SAND, SLIGHTLY SILTY
1	6	15			47.3						SC	SAND, VERY CLAYEY
2	3	5			82.8	38	21	<0.01	930		CL	CLAY, SANDY
2	6	2-3			52.1				270		CL	CLAY, VERY SANDY
3	5	20			16.7						SM	SANDSTONE, SILTY
3	6	20			9.1						SM-SW	SANDSTONE, SLIGHTLY SILTY
3	2	5			18.8	NV	NP	<0.01			SM	SANDSTONE, SILTY
3	4	10			20.0						SM	SANDSTONE, SILTY

TABLE 2

SUMMARY OF LABORATORY TEST RESULTS FROM TEST PITS

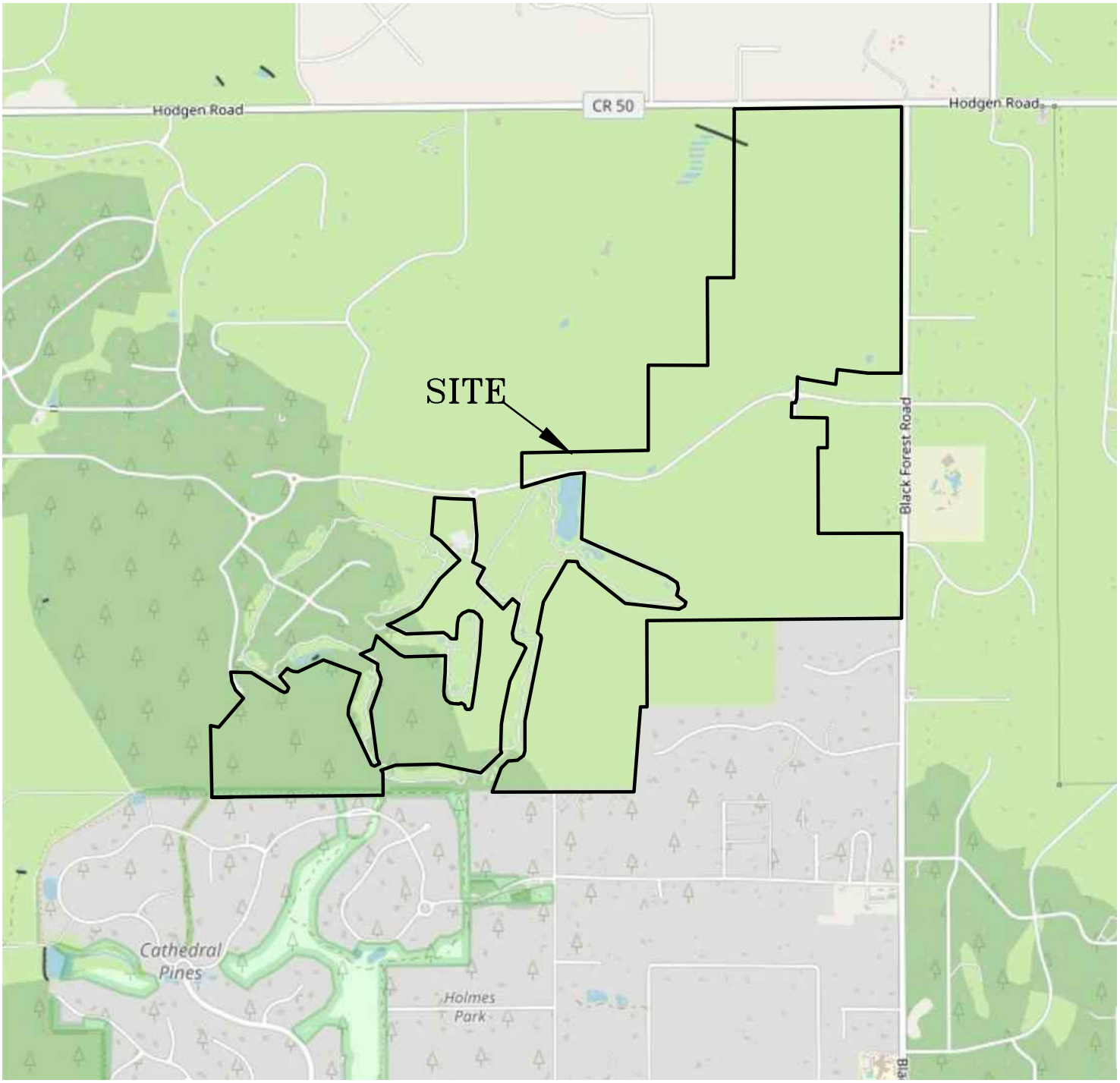
CLIENT FLYING HORSE DEVELOPMENT, LLC
PROJECT FLYING HORSE NORTH, FIL 2
JOB NO. 220404

USDA SOIL TYPE	TEST PIT 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
2	TP-1	2			41.6						SM	SANDY LOAM
2	TP-4	1			17.0						SM	SANDY LOAM
3	TP-4	5			28.1						SM	SANDY CLAY LOAM
3	TP-6	4			14.2						SM	SANDY CLAY LOAM
4	TP-2	3			68.3						CL	SANDY SILTY CLAY
4	TP-12	4			50.6						SC-CL	SANDY SILTY CLAY
4	TP-14	3			67.7						CL	SANDY SILTY CLAY
4	TP-16	2			52.5						CL	SANDY SILTY CLAY
4	TP-8	4			39.0						SC	SANDY CLAY
4	TP-10	4			44.1						SC	SANDY CLAY
4A	TP-5	3			31.8						SM	SANDSTONE, SILTY TO CLAYEY
4A	TP-7	4			16.1						SM	WEATHERED SANDSTONE, SILTY
4A	TP-7	6			15.8						SM	SANDSTONE, SILTY
4A	TP-9	6			22.6						SM	SANDSTONE, SILTY
4A	TP-18	3			50.8						SC-CL	SANDSTONE, CLAYEY

Table 3: Summary of Test Boring Results

Test Boring No.	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	>20	>20
2	1	>20
3	>20	>20
4	3	>20
5	18	>20
6	17	13

FIGURES



N

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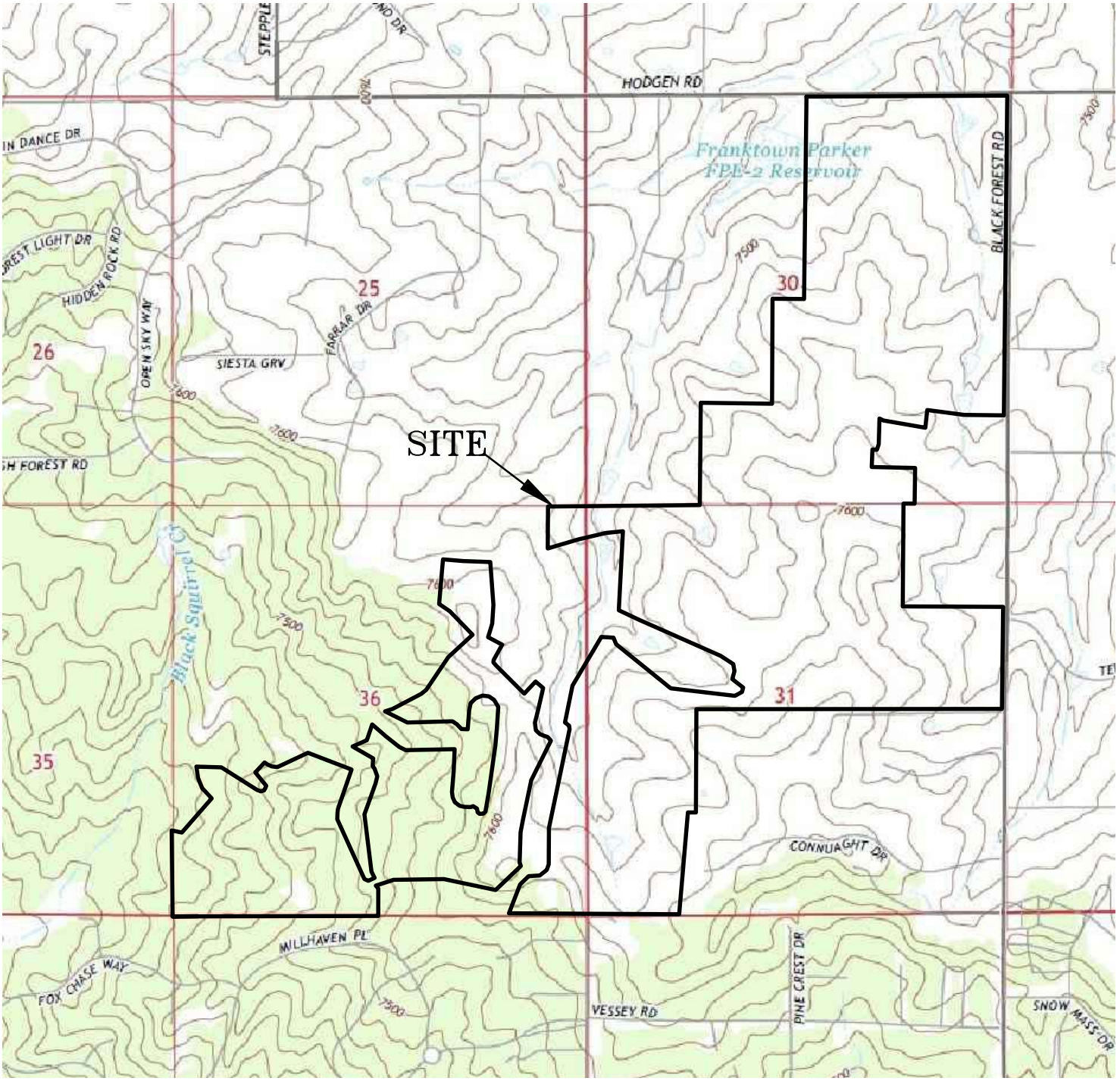
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	3/7/22		

JOB NO.: 220404

FIG NO.: 1



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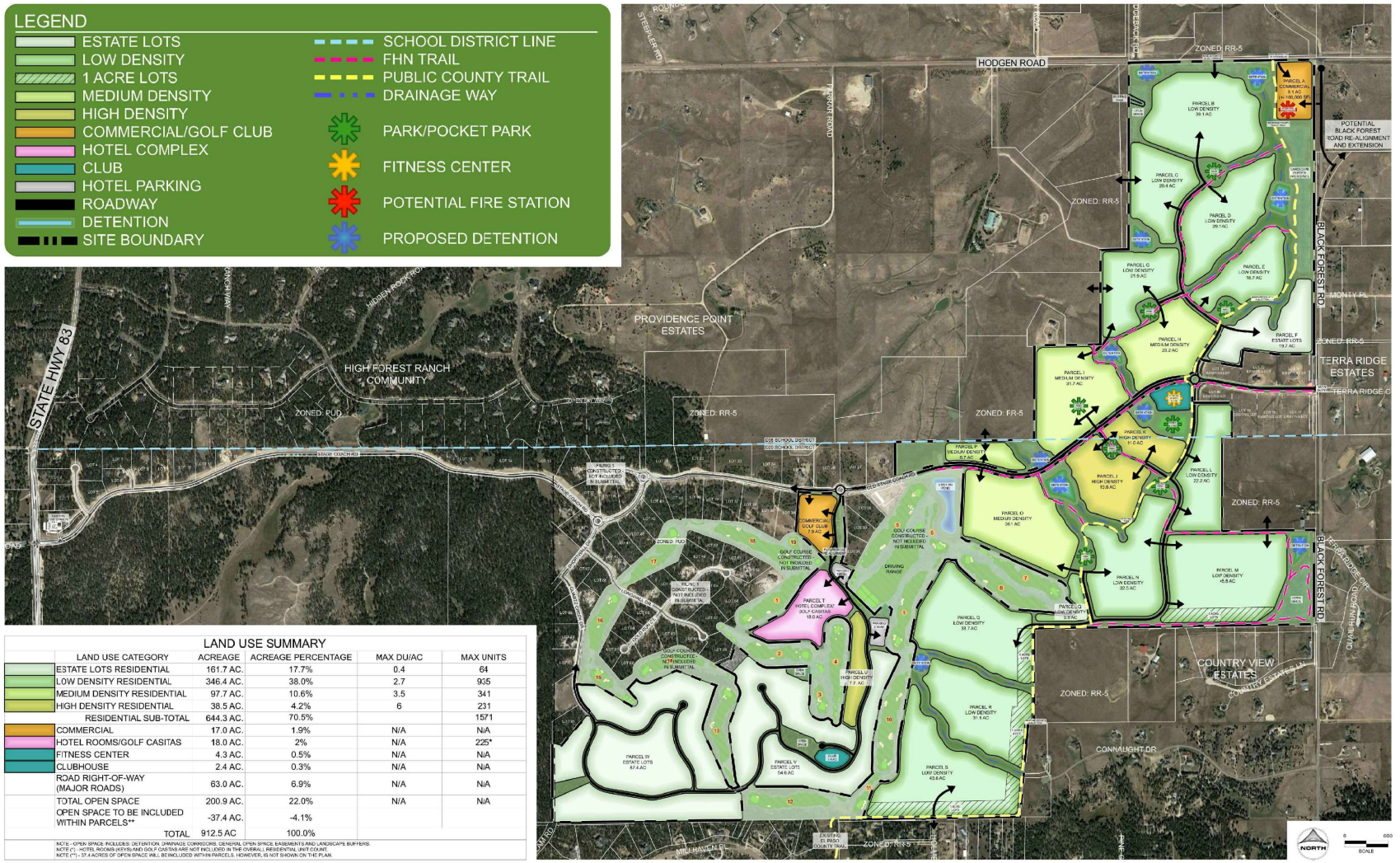
USGS TOPOGRAPHY MAP
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	3/7/22		

JOB NO.: 220404

FIG NO.: 2

FLYING HORSE NORTH SKETCH PLAN



LAND USE SUMMARY

LAND USE CATEGORY	ACREAGE	ACREAGE PERCENTAGE	MAX DU/AC	MAX UNITS
ESTATE LOTS RESIDENTIAL	161.7 AC.	17.7%	0.4	64
LOW DENSITY RESIDENTIAL	346.4 AC.	38.0%	2.7	935
MEDIUM DENSITY RESIDENTIAL	97.7 AC.	10.6%	3.5	341
HIGH DENSITY RESIDENTIAL	38.5 AC.	4.2%	6	231
RESIDENTIAL SUB-TOTAL	644.3 AC.	70.5%		1571
COMMERCIAL	17.0 AC.	1.9%	N/A	N/A
HOTEL ROOMS/GOLF CASITAS	18.0 AC.	2%	N/A	225*
FITNESS CENTER	4.3 AC.	0.5%	N/A	N/A
CLUBHOUSE	2.4 AC.	0.3%	N/A	N/A
ROAD RIGHT-OF-WAY (MAJOR ROADS)	63.0 AC.	6.9%	N/A	N/A
TOTAL OPEN SPACE	200.9 AC.	22.0%	N/A	N/A
OPEN SPACE TO BE INCLUDED WITHIN PARCELS**	-37.4 AC.	-4.1%		
TOTAL	912.5 AC	100.0%		

NOTE - OPEN SPACE INCLUDES: DETENTION, DRAINAGE CORRIDORS, GENERAL OPEN SPACE, EASEMENTS AND LANDSCAPE BUFFERS.
NOTE (*) - HOTEL ROOMS (KEYS) AND GOLF CASITAS ARE NOT INCLUDED IN THE OVERALL RESIDENTIAL UNIT COUNT.
NOTE (**) - 37.4 ACRES OF OPEN SPACE WILL BE INCLUDED WITHIN PARCELS, HOWEVER, IS NOT SHOWN ON THE PLAN.

DRAWN BY: JAG	JOB DATE: 2/25/2022	BAR IS ONE INCH ON ORIGINAL DRAWINGS. IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY	
APPROVED: PLS	JOB NUMBER: 211030		
CAD DATE: 2/25/2022			
CAD FILE: J:\2021\211130\CAD\Dwgs\C\Sketch-Plan\BUBBLE-PLAN			

NO.	DATE	BY	REVISION DESCRIPTION

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FLYING HORSE NORTH
DEVELOPMENT, LLC.
EL PASO COUNTY, COLORADO

FLYING HORSE NORTH SKETCH PLAN
SKETCH PLAN DRAWING

SHEET SP.2

2

REVISION	BY

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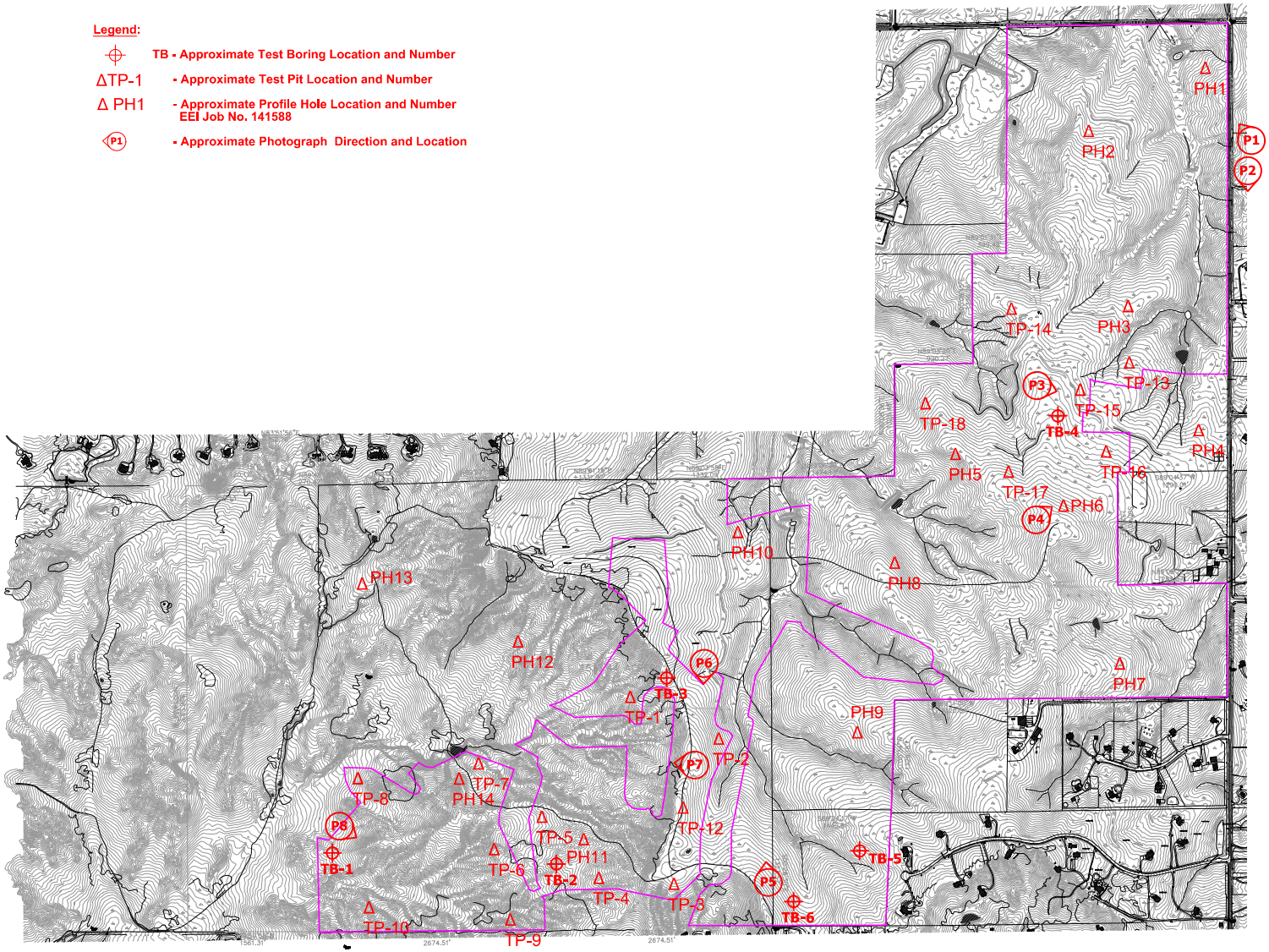
COLORADO SPRINGS, CO 80907

SKETCH PLAN
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

DRAWN LLL
CHECKED
DATE 3/7/22
SCALE AS SHOWN
JOB NO. 220404
FIGURE No. 4

Legend:

- TB - Approximate Test Boring Location and Number
- ΔTP-1 - Approximate Test Pit Location and Number
- Δ PH1 - Approximate Profile Hole Location and Number EEI Job No. 141588
- P1 - Approximate Photograph Direction and Location



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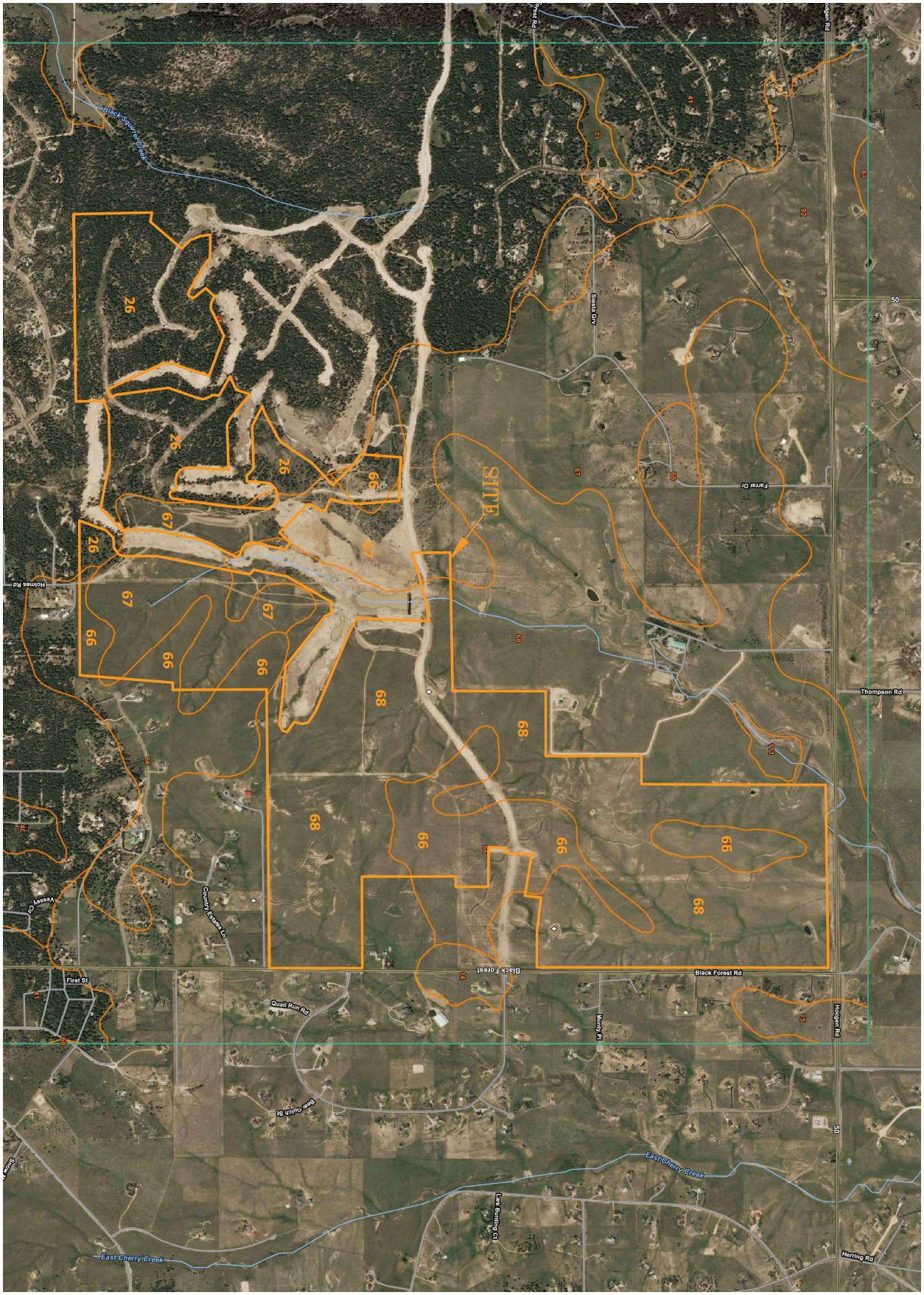
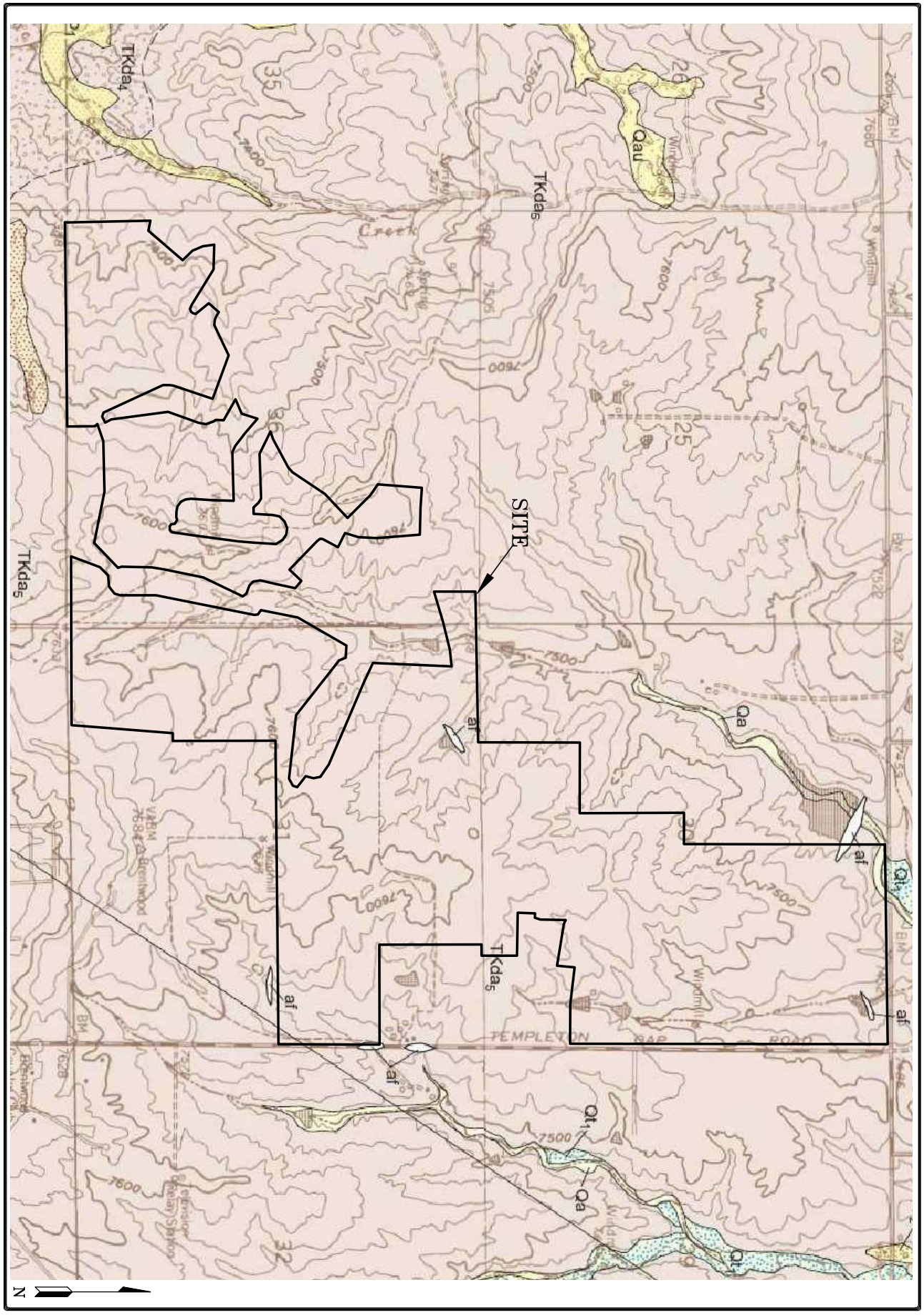
(719) 531-5599

SITE MAP/TESTING LOCATION MAP
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

DRAWN	LLL
CHECKED	
DATE	3/7/22
SCALE	AS SHOWN
JOB NO.	220404
FIGURE No.	3



3 OF 3	DRAWN: LLL CHECKED: DATE: 3/17/22 AS SHOWN SCALE: JOB NO. 220404 FB/PE No.	SOIL SURVEY MAP FLYING HORSE NORTH FILING NO. 2 EL PASO COUNTY, CO. FOR: FLYING HORSE DEVELOPMENT, LLC	ENTECH ENGINEERING, INC. 505 ELKTON DRIVE COLORADO SPRINGS, CO. 80907 (719) 531-5599	REVISION BY:



6	DRAWN: LLL CHECKED:	BLACK FOREST QUADRANGLE FLYING HORSE NORTH FILING NO. 2 EL PASO COUNTY, CO. FOR: FLYING HORSE DEVELOPMENT, LLC	ENTECH ENGINEERING, INC. 505 ELKTON DRIVE COLORADO SPRINGS, CO. 80907 (719) 531-5599
	DATE: 3/17/22 SCALE: AS SHOWN JOB NO. 220404 PCD/E No.		REVISION BY:

Legend:

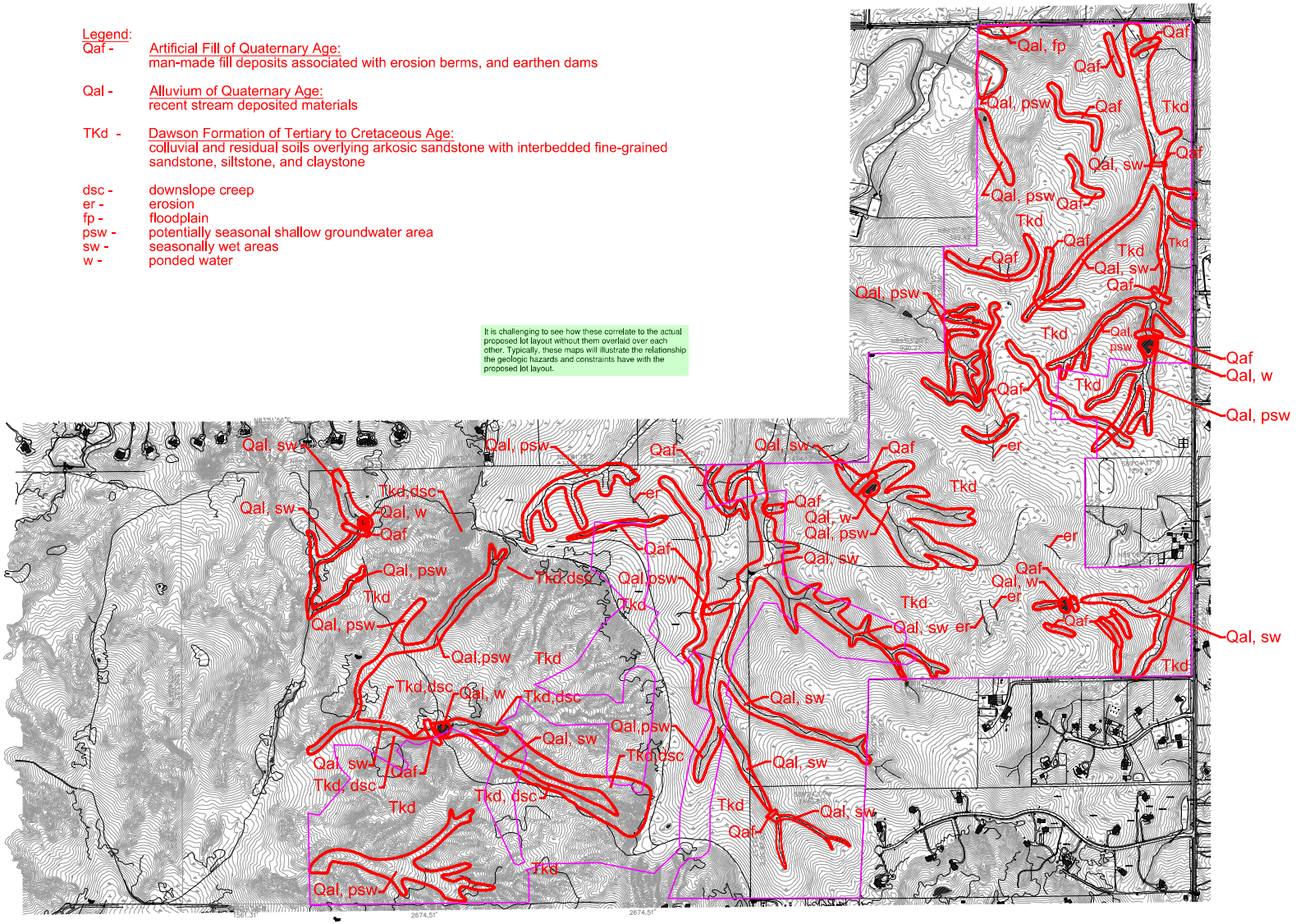
Qaf - Artificial Fill of Quaternary Age:
man-made fill deposits associated with erosion berms, and earthen dams

Qal - Alluvium of Quaternary Age:
recent stream deposited materials

TKd - Dawson Formation of Tertiary to Cretaceous Age:
colluvial and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone, and claystone

dsc - downslope creep
er - erosion
fp - floodplain
psw - potentially seasonal shallow groundwater area
sw - seasonally wet areas
w - ponded water

It is challenging to see how these correlate to the actual proposed lot layout without them overlaid over each other. Typically, these maps will illustrate the relationship the geologic hazards and constraints have with the proposed lot layout.



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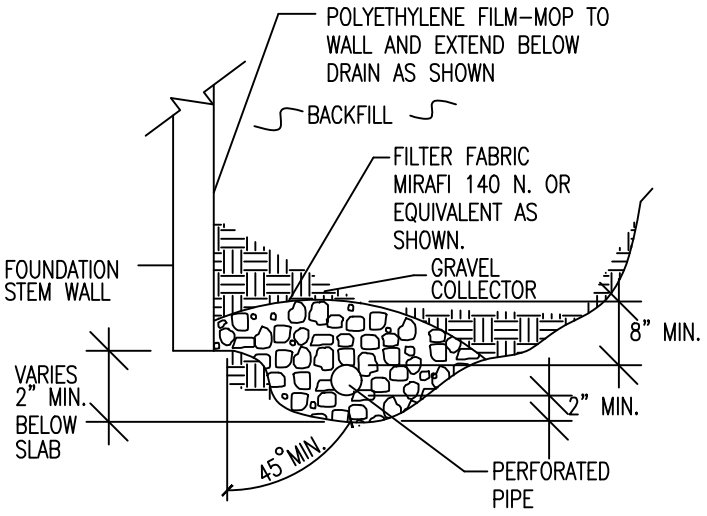
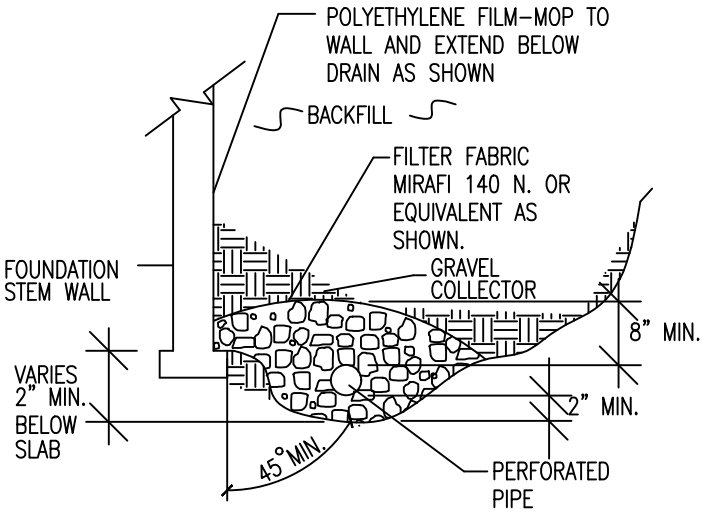
COLORADO SPRINGS, CO. 80907 (719) 531-5599

GEOLOGY/ENGINEERING GEOLOGY MAP
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

DRAWN LLL
CHECKED
DATE 3/7/22
SCALE AS SHOWN
JOB NO. 220404
FIGURE No. 7





NOTES:

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

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

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

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

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

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

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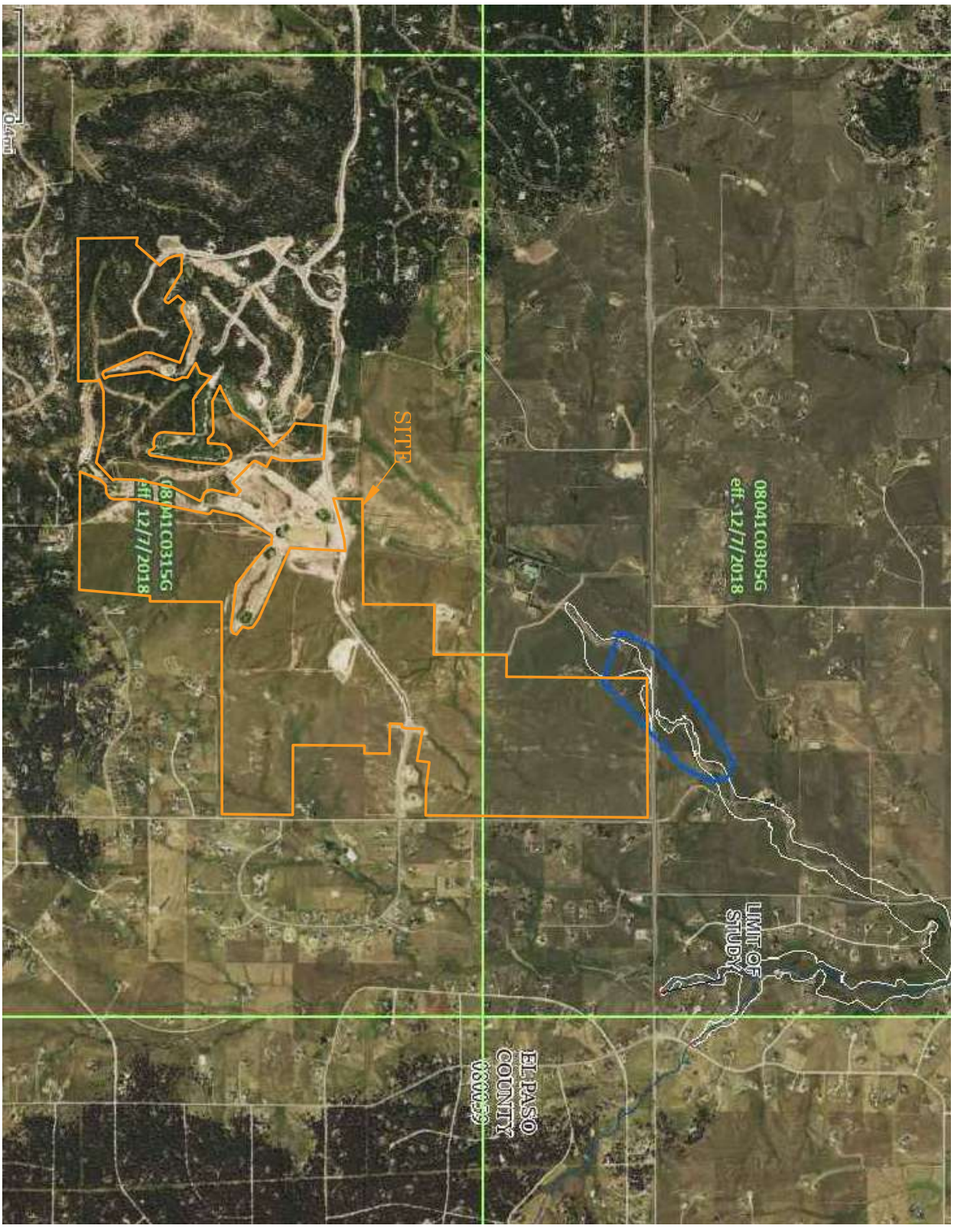
PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 220404

FIG NO.: 8



FLOODPLAIN MAP
FLYING HORSE NORTH FILING NO. 2
EL PASO COUNTY, CO.
FOR: FLYING HORSE DEVELOPMENT, LLC

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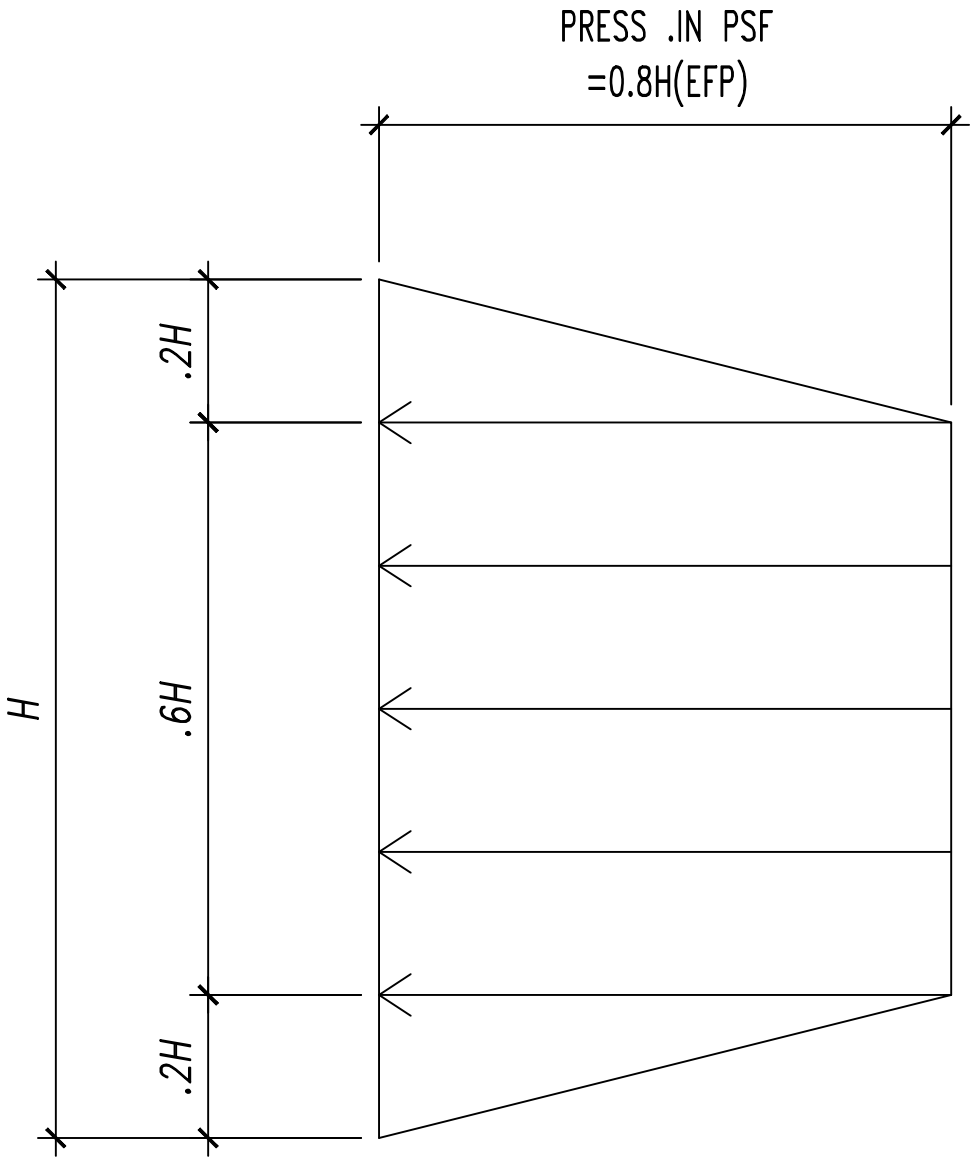
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

REVISION	BY

DRAWN: LLL
CHECKED:
DATE: 3/7/22
SCALE: AS SHOWN
JOB NO. 220404
FIGURE No. 9



PRESSURE DISTRIBUTION

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LATERAL PRESSURE DISTRIBUTION
AREA WITH CREEP

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

JOB NO.: 220404

FIG. NO.: 10

APPENDIX A: Site Photographs

1

Looking northwest from the northeastern side of the site along Black Forest Road.

February 24, 2022

2

Looking south from the northeastern side of the site along Black Forest Road.

February 24, 2022

Job No. 220404

3

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

February 24, 2022

4

Looking northeast from the central portion of the site.

February 24, 2022

Job No. 220404

5

Looking north from the southern portion of the site.

February 24, 2022

6

Looking south from the central portion of the site.

February 24, 2022

Job No. 220404

7

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

February 24, 2022

8

Looking east from the southwestern side of the site.

February 24, 2022

Job No. 220404

APPENDIX B: Test Boring and Test Pit Logs

TEST BORING NO. 1
DATE DRILLED 2/14/2018
Job # 220404

REMARKS

DRY TO 20', 2/14/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			10	4.1	1
5			12	6.8	1
10			13	14.1	1
15			10	3.6	1
20			14	10.6	1

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

THIN CLAYEY LENSES

TEST BORING NO. 2
DATE DRILLED 2/14/2018
CLIENT FLYING HORSE DEV.
LOCATION FLYING HORSE NORTH, F-2

REMARKS

DRY TO 20', 2/14/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50/10"	7.0	3
5			50	7.0	3
10			50/6"	12.1	3
15			50/7"	10.7	3
20			50/6"	9.8	3

SAND, SILTY, TAN SANDSTONE, SILTY TO CLAYEY, FINE TO COARSE GRAINED, RED BROWN, VERY DENSE, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404
FIG NO.: B-1

TEST BORING NO. 3
DATE DRILLED 2/14/2018
Job # 220404

REMARKS

DRY TO 20', 2/14/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	6.6	1
5			13	11.4	2
10			17	8.2	1
15			21	8.8	1
20			13	5.5	1

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

CLAY, SANDY, TAN, FIRM, MOIST

SAND, SILTY WITH CLAYEY LENSES, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

TEST BORING NO. 4
DATE DRILLED 2/14/2018
CLIENT FLYING HORSE DEV.
LOCATION FLYING HORSE NORTH, F-2

REMARKS

DRY TO 20', 2/14/18

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			17	5.2	1
5			50	5.4	3
10			50/9"	8.2	3
15			50/8"	14.9	3
20			50/9"	16.7	3

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

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

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LL	3/8/22

JOB NO.: 220404

FIG NO.: B-2

TEST BORING NO. 5
DATE DRILLED 3/4/2022
Job # 220404

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 3/4/22						
SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, DENSE,				42	5.1	1
	5			36	7.6	1
	10			36	6.4	1
	15			40	10.4	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	20			50/10"	10.4	3

TEST BORING NO. 6
DATE DRILLED 3/4/2022
CLIENT FLYING HORSE DEV.
LOCATION FLYING HORSE NORTH, F-2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 3/4/22						
CLAY, VERY SANDY, TAN, STIFF TO VERY STIFF, MOIST				16	8.3	2
	5			30	8.4	2
SAND, SILTY, FINE TO COARSE GRAINED, RED BROWN, MEDIUM DENSE, MOIST	10			21	8.4	1
SAND, VERY CLAYEY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST	15			41	12.6	1
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST	20			50/6"	6.2	3

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404
FIG NO.: B-3

TEST PIT NO. 1
DATE EXCAVATED 1/31/2018
Job # 220404

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 57.3" N 104° 43' 30.1" W						
sandy loam, tan	1			gr	m	2
	2					
weathered to formational silty sandstone, redish tan to tan	3			gr	ma	4A
	4					
*formational sandstone at 4.5 feet	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 2
DATE EXCAVATED 1/31/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 53.5" N 104° 43' 19.5" W						
topsoil, sandy clay loam, brown	1			bl	m	3
sandy silty clay, fine grained, tan	2			bl	m	4
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO. 220404
FIG NO. B-4

TEST PIT NO. 3
DATE EXCAVATED 1/31/2018
Job # 220404

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 36.2" N 104° 43' 23.8" W						
topsoil, sandy clay loam, brown	1			bl	m	3
sandy silty clay, fine grained, tan	2			bl	m	4
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 4
DATE EXCAVATED 1/31/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 37.3" N 104° 43' 38.8" W						
sandy loam, fine to coarse grained, tan	1			gr	m	2
sandy silty clay, tan	2			bl	m	4
sandy clay loam, fine to coarse grained, tan	3			gr	m	3
	4					
	5					
	6					
	7					
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404
FIG NO.: B-5

TEST PIT NO. 5
DATE EXCAVATED 1/31/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 02' 47.9" N
104° 43' 42.7" W

sandy loam, tan

weathered to formational silty to clayey sandstone, fine to coarse grained, olive tan

*formational sandstone at 2.5 feet

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
0			gr	m	2
1					
2			gr	ma	4A
3					
4					
5					
6					
7					
8					
9					
10					

TEST PIT NO. 6
DATE EXCAVATED 1/31/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 02' 41.3" N
104° 43' 51.0" W

sandy loam, fine to coarse grained, tan

alternating layers of loamy sand and sandy clay loam, fine to coarse grained, tan

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
0			gr	m	2
1					
2			gr	m	3
3					
4					
5					
6					
7					
8					
9					
10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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TEST PIT LOG

DRAWN:	DATE:	CHECKED: LLL	DATE: 3/8/22

JOB NO.: 220404
FIG NO.: B-6

TEST PIT NO. 7
DATE EXCAVATED 1/31/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 02' 50.3" N
104° 43' 56.1" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
sandy loam, fine to coarse grained, tan			gr	m	2
weathered to formational silty to clayey sandstone, fine to coarse grained, reddish tan to tan.			gr	ma	4A
*formational sandstone at 5 feet					

TEST PIT NO. 8
DATE EXCAVATED 1/31/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 02' 49.3" N
104° 44' 11.5" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
sandy loam, fine to coarse grained, tan			gr	m	2
sandy clay, fine to coarse grained, brown			gr	m	4
highly weathered clayey sandstone, fine to coarse grained, olive tan			gr	ma	4A

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404
FIG NO.: B-7

TEST PIT NO. 9
DATE EXCAVATED 2/1/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 02' 33.7" N
104° 43' 51.3" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
0					
	topsoil, sandy clay loam, brown				
1					
	sandy clay loam, fine to coarse grained light brown		bl	m	3
2					
3					
4					
5					
	weathered silty sandstone fine to coarse grained, reddish tan		gr	ma	4A
6					
7					
8					
9					
10					

TEST PIT NO. 10
DATE EXCAVATED 2/1/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 02' 33.1" N
104° 44' 07.6" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
0					
	sandy loam fine to coarse grained, tan		gr	m	2
1					
	sandy clay, fine to coarse grained, tan		gr	m	4
2					
3					
4					
5					
6					
7					
8					
9					
10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

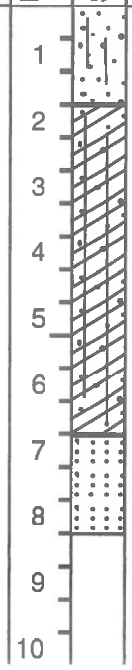
JOB NO.: 220404
FIG NO.: B-8

TEST PIT NO. 11
DATE EXCAVATED 2/1/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 02' 40.0" N
104° 44' 01.5" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
sandy loam, fine to coarse grained, tan			gr	m	2
sandy silty clay, fine grained, tan			bl	m	4
weathered silty sandstone, fine to coarse grained, tan			gr	ma	4A

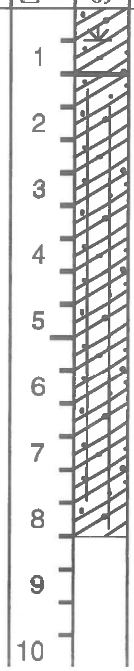


TEST PIT NO. 12
DATE EXCAVATED 2/1/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 02' 45.8" N
104° 43' 24.6" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown			bl	m	3
sandy silty clay, fine grained, tan			bl	m	4



Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

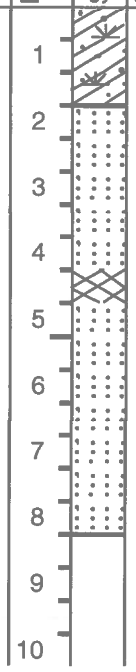
JOB NO.: 220404
FIG NO.: B-9

TEST PIT NO. 13
DATE EXCAVATED 2/1/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 03' 35.3" N
104° 42' 17.8" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown			bl	m	3
weathered very clayey sandstone, fine to coarse grained, reddish brown			gr	ma	4A
interbedded claystone layer					

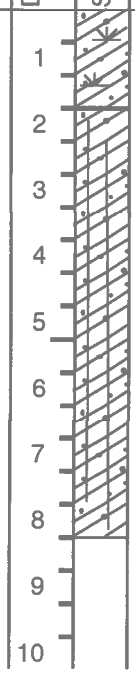


TEST PIT NO. 14
DATE EXCAVATED 2/1/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 03' 41.7" N
104° 42' 36.9" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown			bl	m	3
sandy silty clay, fine grained, tan			bl	m	4



Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
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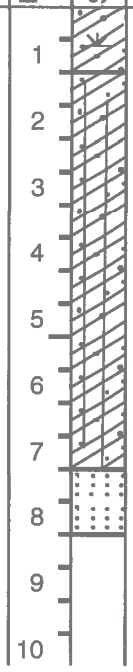
JOB NO.: 220404
FIG NO.: B-10

TEST PIT NO. 15
DATE EXCAVATED 2/1/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 03' 36.9" N
104° 42' 31.4" W

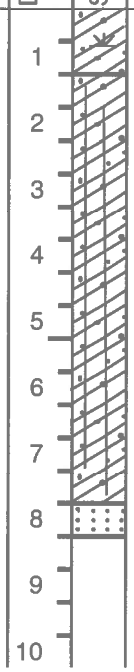


Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown		bl	m	3
sandy silty clay, fine grained, tan		bl	m	4
weathered very clayey sandstone, fine to coarse grained, reddish brown		gr	ma	4A

TEST PIT NO. 16
DATE EXCAVATED 2/1/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 03' 25.7" N
104° 42' 24.0" W



Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown		bl	m	3
sandy silty clay, fine grained, tan		bl	m	4
weathered very clayey sandstone, fine to coarse grained, reddish brown		gr	ma	4A

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

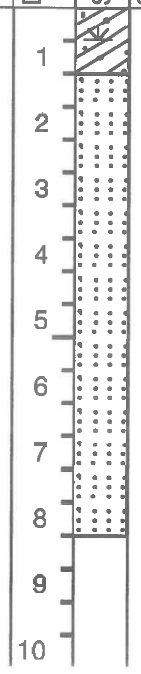
JOB NO.: 220404
FIG NO.: B-11

TEST PIT NO. 17
DATE EXCAVATED 2/1/2018
Job # 220404

REMARKS

Lot ?
GPS Location
39° 03' 23.1" N
104° 42' 36.0" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown			bl	m	3
weathered to formational silty to clayey sandstone, fine to coarse grained, brown to tan			gr	ma	4A
*formational sandstone at 5.5 feet					

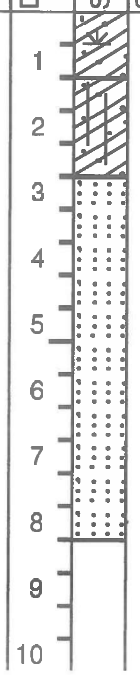


TEST PIT NO. 18
DATE EXCAVATED 2/1/2018
CLIENT FLYING HORSE DEVELOPMENT, LLC
LOCATION FLYING HORSE NORTH FIL 2

REMARKS

Lot ?
GPS Location
39° 03' 25.7" N
104° 42' 24.0" W

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy clay loam, brown			bl	m	3
sandy silty clay, fine grained, tan			bl	m	4
weathered to formational silty to clayey sandstone, fine to coarse grained, brown to tan			gr	ma	4A
*formational sandstone at 5 feet					



Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr

Soil Structure Grade
weak - w
moderate - m
strong - s
single grain - sg
massive - ma

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COLORADO SPRINGS, COLORADO 80907

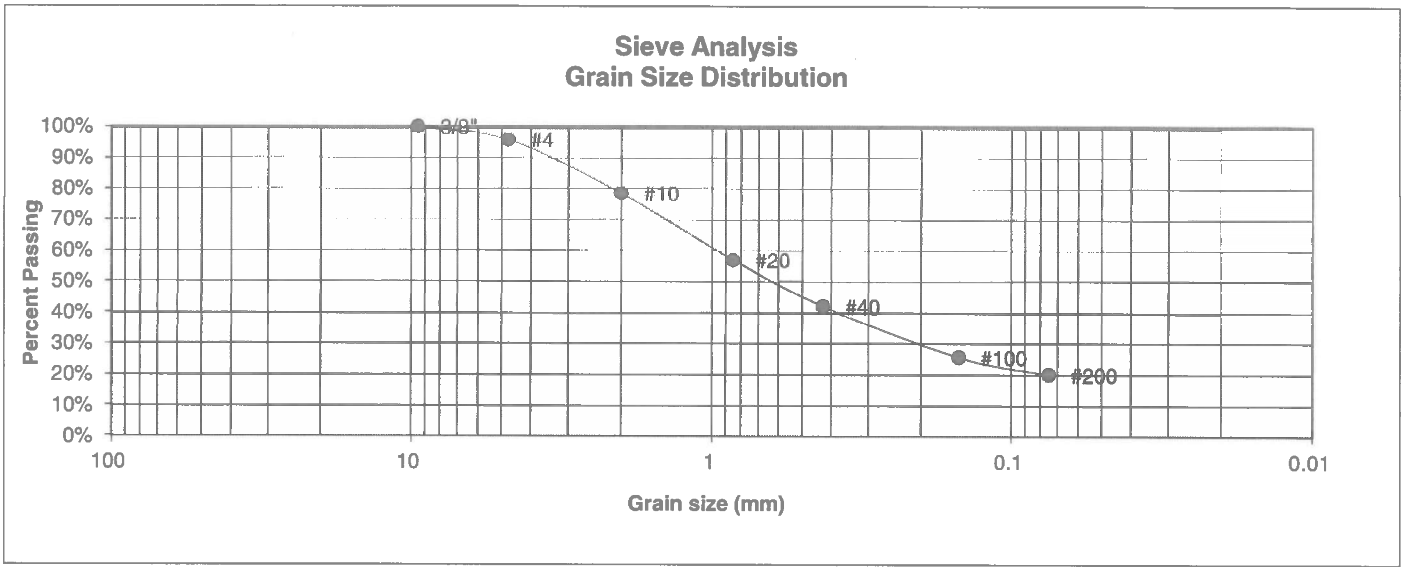
TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LL	3/8/22

JOB NO.: 220404
FIG NO.: B-12

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SM	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	1	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	1	JOB NO.	220404
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.9%
10	78.5%
20	57.0%
40	42.0%
100	25.6%
200	20.0%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

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

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COLORADO SPRINGS, COLORADO 80907

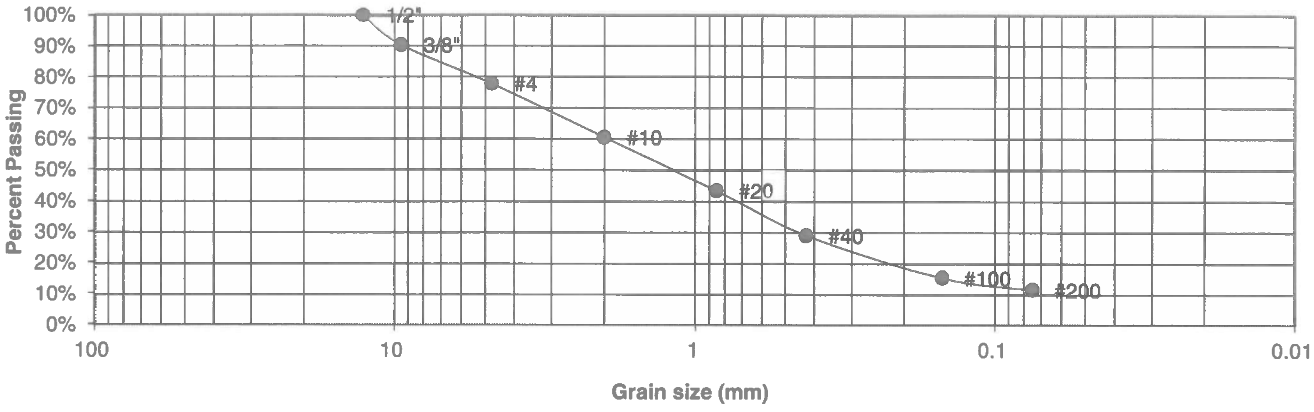
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-1

UNIFIED CLASSIFICATION	SM-SW	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	1	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	5	JOB NO.	220404
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	90.3%
4	77.8%
10	60.5%
20	43.5%
40	29.1%
100	15.4%
200	11.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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COLORADO SPRINGS, COLORADO 80907

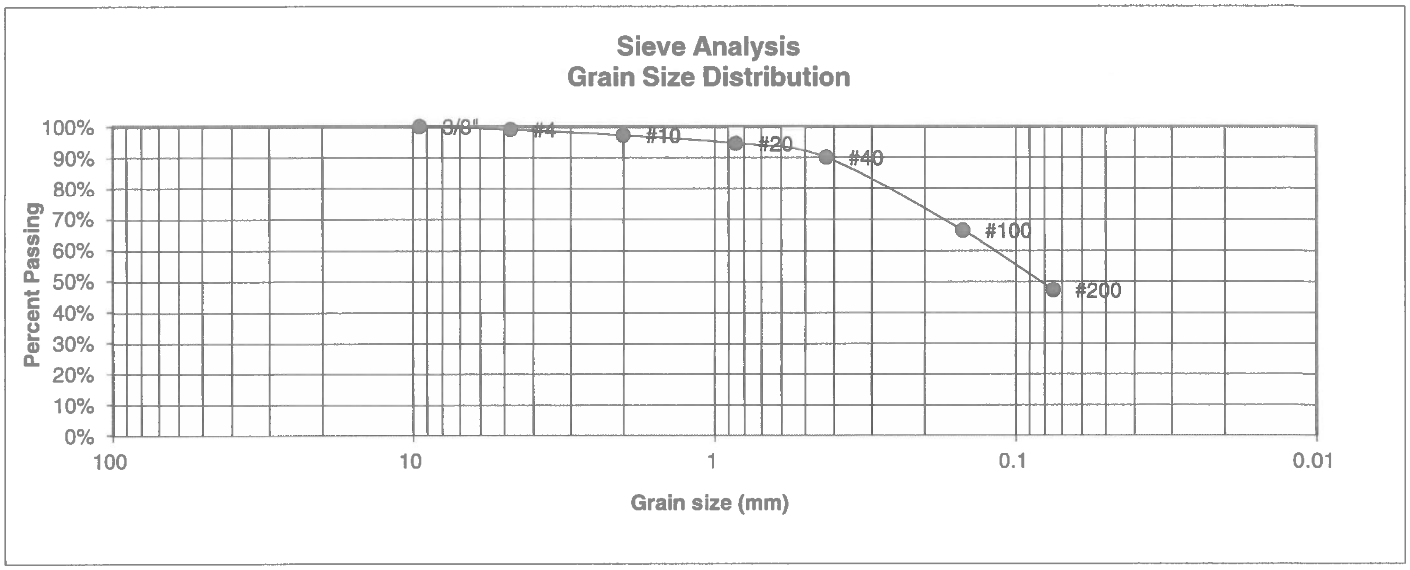
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-2

UNIFIED CLASSIFICATION	SC	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	1	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	6	JOB NO.	220404
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	97.2%
20	94.6%
40	90.0%
100	66.4%
200	47.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

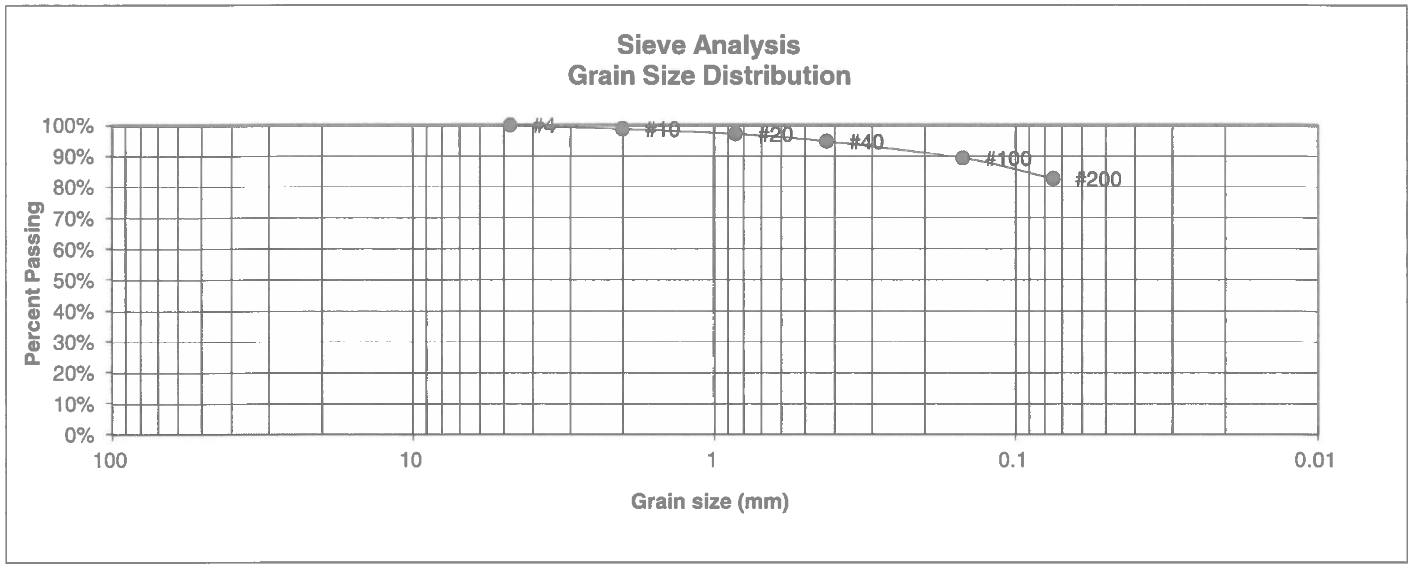
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-3

UNIFIED CLASSIFICATION	CL	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	2	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	3	JOB NO.	220404
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.8%
20	97.2%
40	94.9%
100	89.5%
200	82.8%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	38
Plastic Index	21

Swell	
Moisture at start	7.5%
Moisture at finish	18.5%
Moisture increase	11.1%
Initial dry density (pcf)	105
Swell (psf)	930

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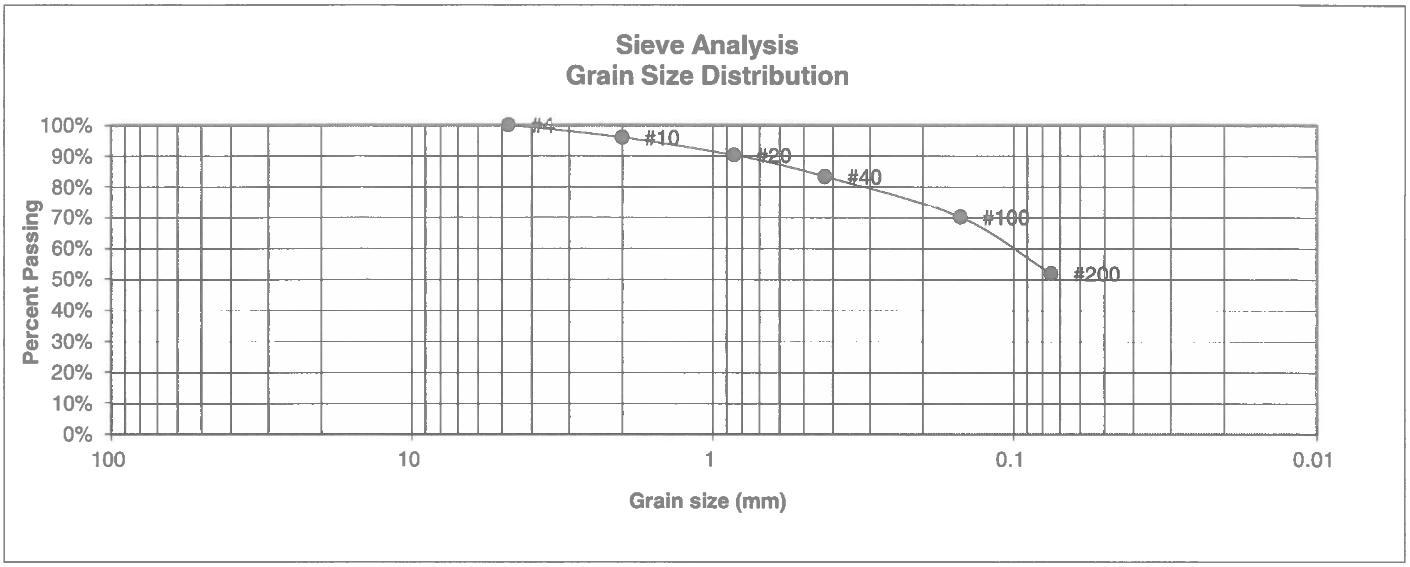
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-4

UNIFIED CLASSIFICATION	CL	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	2	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	6	JOB NO.	220404
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	96.0%
20	90.3%
40	83.4%
100	70.2%
200	52.1%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell

Moisture at start	11.5%
Moisture at finish	21.3%
Moisture increase	9.8%
Initial dry density (pcf)	101
Swell (psf)	270

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COLORADO SPRINGS, COLORADO 80907

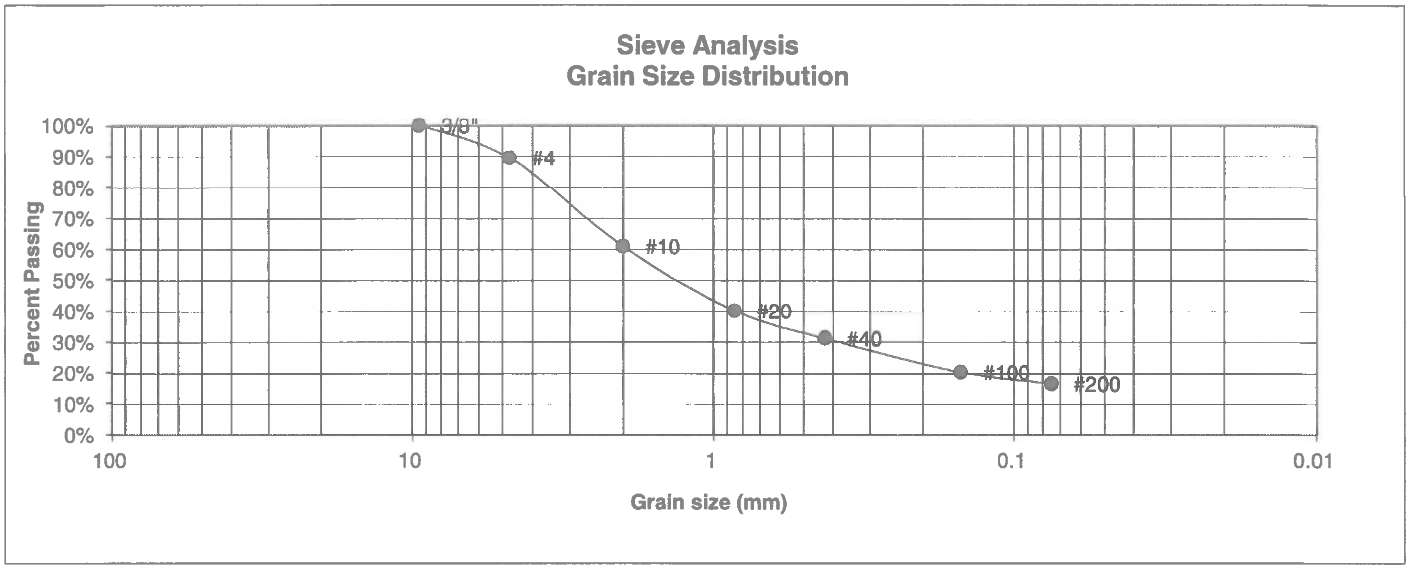
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-5

UNIFIED CLASSIFICATION	SM	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	3	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	5	JOB NO.	220404
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	89.7%
10	61.0%
20	40.3%
40	31.3%
100	20.5%
200	16.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

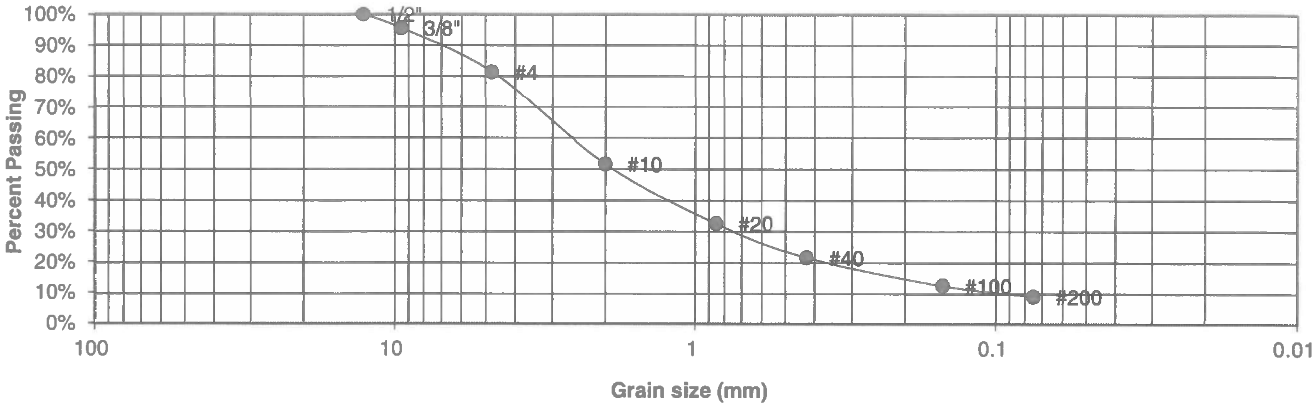
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-6

UNIFIED CLASSIFICATION	SM-SW	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	3	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	6	JOB NO.	220404
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	95.5%
4	81.4%
10	51.6%
20	32.5%
40	21.6%
100	12.6%
200	9.1%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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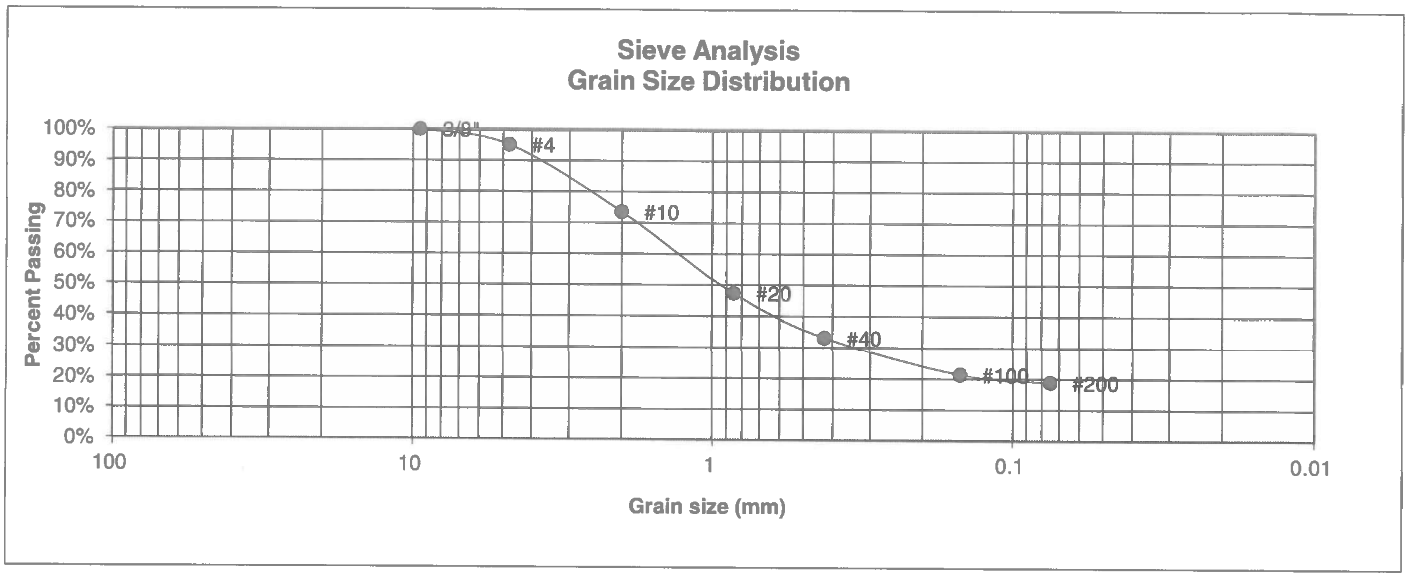
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-7

UNIFIED CLASSIFICATION	SM	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	3	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	2	JOB NO.	220404
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.1%
10	73.4%
20	47.3%
40	33.1%
100	21.3%
200	18.8%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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COLORADO SPRINGS, COLORADO 80907

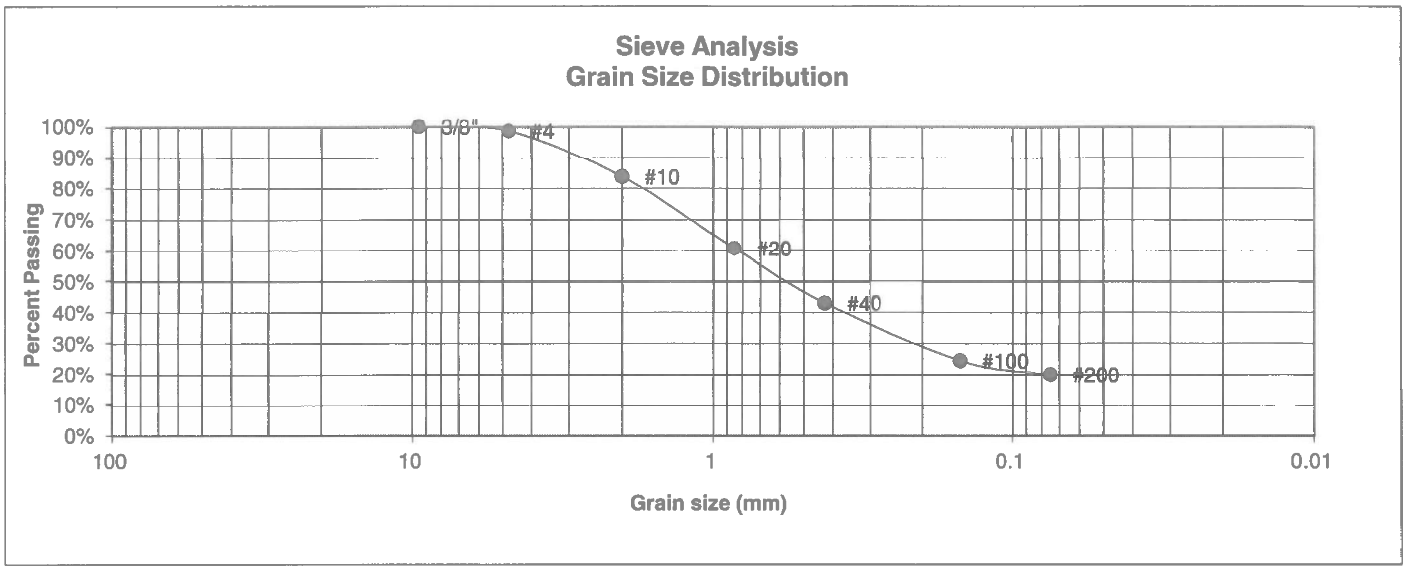
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-8

UNIFIED CLASSIFICATION	SM	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	3	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	4	JOB NO.	220404
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.6%
10	84.0%
20	60.7%
40	43.0%
100	24.5%
200	20.0%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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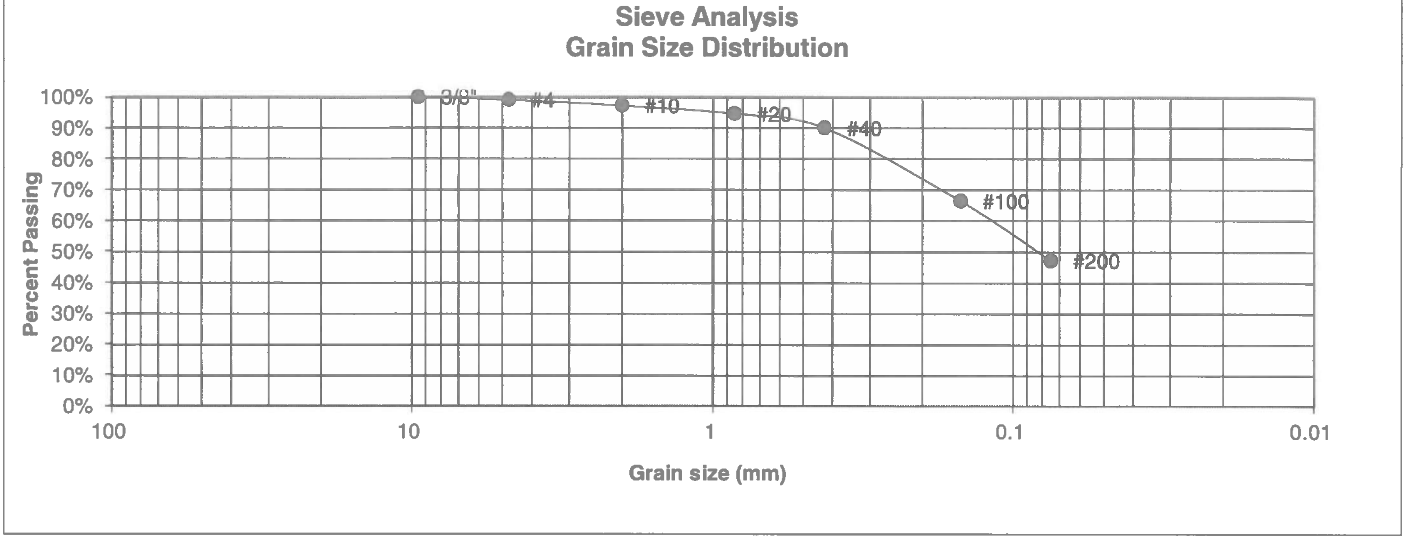
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE: 3/8/22

JOB NO.: 220404

FIG NO.: L-9

UNIFIED CLASSIFICATION	SC	CLIENT	FLYING HORSE DEV.
SOIL TYPE #	2	PROJECT	FLYING HORSE NORTH, F-2
TEST BORING #	6	JOB NO.	220404
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	97.2%
20	94.6%
40	90.0%
100	66.4%
200	47.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-10

CLIENT	FLYING HORSE DEV.	JOB NO.	220404
PROJECT	FLYING HORSE NORTH, F-2	DATE	3/8/2022
LOCATION	FLYING HORSE NORTH, F-2	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	1	SM	0.01
TB-3	5	2	CL	<0.01
TB-4	10	3	SM	<0.01

QC BLANK PASS

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LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	3/8/22

JOB NO.: 220404

FIG NO.: C-11

APPENDIX D: Profile Hole Logs and Laboratory Test Results
Entech Job No. 160118/141588

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT NES, INC.
PROJECT SHAMROCK RANCH
JOB NO. 141588

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			23.9						SM	SAND, SILTY
1	11	2-3			17.6	NV	NP	<0.01			SM	SAND, SILTY
1	14	2-3			30.8						SM	SAND, SILTY
1	5	2-3			22.3	22	3				SM	SAND, SILTY
1	9	10			19.8				152		SM	SAND, SILTY
1	12	10			36.5			0.01			SM	SAND, SILTY
2	8	10	10.8	111.7	55.5	36	12			0.3	CL	CLAY, VERY SANDY
2	2	5			61.4						CL	CLAY, VERY SANDY
2	3	2-3	11.1	116.2	84.8	32	13			0.7	CL	CLAY, SANDY
2	4	5			74.5				1485		CL	CLAY, SANDY
2	6	2-3	10.7	112.3	96.5	39	17			0.6	CL	CLAY, SANDY
2	10	5	14.3	113.6	62.5					2.7	CL	CLAY, SANDY
3	13	5			20.0						SM	SANDSTONE, SILTY
3	1	15			24.0						SM	SANDSTONE, SILTY
3	3	10			23.8	NV	NP				SM	SANDSTONE, SILTY
3	6	15			12.7						SM	SANDSTONE,S ILTY
3	7	10			26.3						SM	SANDSTONE, SILTY

Table 2: Summary of Profile Boring Test Results

Percolation Test No.	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	9/11*	>15
2	>15	>15
3	9/>15*	>15
4	>15	>15
5	3/>15*	>15
6	8/10*	>15
7	11/>15*	>15
8	>15	>15
9	14	>15
10	>15	>15
11	9/11*	>15
12	11	>15
13	1	>15
14	11	>15

* Weathered bedrock/Formational bedrock

PROFILE HOLE NO. 1
DATE DRILLED 1/23/2015
Job # 141588

REMARKS

DRY TO 15', 1/24/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
					2	CLAY, SANDY, BROWN
						SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST
			19	6.1	1	
5			21	4.7	1	
						WEATHERED SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE, MOIST
10			35	11.1	3	
						SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY, VERY DENSE, MOIST
15			50/10"	15.9	3	
20						

PROFILE HOLE NO. 2
DATE DRILLED 1/23/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS

DRY TO 15', 1/24/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
						CLAY, SANDY TO VERY SANDY, BROWN TO TAN, STIFF TO FIRM, MOIST
			25	7.2	2	
5			9	7.8	2	
						SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST
10			22	4.9	1	
15			29	5.8	1	
20						

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/12/15

JOB NO.: 141588
FIG NO.: B-1

PROFILE HOLE NO. 3
DATE DRILLED 1/23/2015
Job # 141588

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 15', 1/24/15						
CLAY, SANDY, BROWN, STIFF TO FIRM, MOIST				24	8.2	2
	5			13	6.8	2
SAND, SILTY, TAN						1
WEATHERED SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST	10			40	4.1	3
	15			42	8.3	3
	20					

PROFILE HOLE NO. 4
DATE DRILLED 1/23/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 15', 1/24/15						
CLAY, SANDY, TAN, STIFF, MOIST				16	8.6	2
	5			15	9.1	2
SAND, CLAYEY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST	10			18	8.8	1
CLAY, SANDY, BROWN, FIRM, MOIST	15			12	18.2	2
	20					

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/12/15

JOB NO.: 141588
FIG NO.: B-2

PROFILE HOLE NO. 5
DATE DRILLED 2/2/2015
Job # 141588

REMARKS

DRY TO 15', 2/3/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			16	2.7	1
5			42	11.5	3
10			42	14.3	3
15			45	4.4	3
20					

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

WEATHERED SANDSTONE, SILTY, CLAYEY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST

PROFILE HOLE NO. 6
DATE DRILLED 1/26/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS

DRY TO 15', 1/27/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	22.4	2
5			16	8.9	2
10			42	8.7	3
15			50/11"	4.9	3
20					

CLAY, SANDY, TAN, STIFF, MOIST

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

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

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/12/15

JOB NO.: 141588
FIG NO.: B-3

PROFILE HOLE NO. 7
DATE DRILLED 1/26/2015
Job # 141588

REMARKS

DRY TO 15', 1/27/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			12	6.6	2	CLAY, SANDY, TAN, FIRM, MOIST
5			44	7.3	2	SAND, CLAYEY, FINE TO COARSE GRAINED, BROWN, DENSE, MOIST
10			14	7.5	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST
						WEATHERED SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST
15			46	8.8	3	
20						

PROFILE HOLE NO. 8
DATE DRILLED 2/2/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS

DRY TO 15', 2/3/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			15	9.0	2	CLAY, SANDY TO VERY SANDY, TAN, STIFF, MOIST
5			28	9.2	2	
10			24	5.7	2	
15			29	6.9	2	
20						

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/12/15

JOB NO.: 141588
FIG NO.: B-4

PROFILE HOLE NO. 9
DATE DRILLED 2/3/2015
Job # 141588

REMARKS

DRY TO 15', 2/4/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY WITH CLAYEY LENSES, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO LOOSE, MOIST			24	5.6	1
5			18	6.2	1
10			6	8.9	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY, VERY DENSE, MOIST 15			50	11.2	3
20					

PROFILE HOLE NO. 10
DATE DRILLED 2/2/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS

DRY TO 15', 2/5/15

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST			32	3.8	1
CLAY, SANDY, TAN, VERY STIFF, MOIST 5			42	9.2	2
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO LOOSE, MOIST 10			17	3.7	1
15			6	3.3	1
20					

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		K	2/12/15

JOB NO.: 141588
FIG NO.: B-5

PROFILE HOLE NO. 11
DATE DRILLED 12/1/2014
Job # 141588

REMARKS

DRY TO 15', 12/2/14

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST			27	6.7	1
5			25	4.8	1
WEATHERED SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST					
10			32	7.8	3
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST					
15			50/6"	10.0	3
20					

PROFILE HOLE NO. 12
DATE DRILLED 12/1/2014
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS

DRY TO 15', 12/2/14

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO MEDIUM DENSE, MOIST			7	10.5	1
5			22	5.6	1
10			25	8.8	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST					
15			50/7"	7.7	3
20					

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		h	2/12/15

JOB NO.: 141588
FIG NO.: B-6

PROFILE HOLE NO. 13
DATE DRILLED 12/1/2014
Job # 141588

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 15', 12/2/14						
SAND, SILTY, TAN						1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST				50/10"	8.0	3
	5			50/10"	8.3	3
	10			50/6"	9.9	3
	15			50/4"	8.2	3
	20					

PROFILE HOLE NO. 14
DATE DRILLED 1/26/2015
CLIENT NES, INC.
LOCATION SHAMROCK RANCH

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 15', 12/2/14						
SAND, SILTY TO CLAYEY, FINE TO COARSE GRAINED, TAN, LOOSE, MOIST				4	12.2	1
CLAY, SANDY, TAN, FIRM, MOIST	5			9	15.2	2
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST						
	10			12	14.4	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE TO VERY DENSE, MOIST						
	15			50/6"	8.8	3
	20					

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PROFILE BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/12/15

JOB NO.: 141588
FIG NO.: B-7

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

14—Brussett loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367j
Elevation: 7,200 to 7,500 feet
Frost-free period: 115 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Brussett

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits

Typical profile

A - 0 to 8 inches: loam
BA - 8 to 12 inches: loam
Bt - 12 to 26 inches: clay loam
Bk - 26 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 3 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): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

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

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

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

El Paso County Area, Colorado

26—Elbeth sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 367y
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Elbeth

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 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: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions
Hydric soil rating: Yes

Other soils
Percent of map unit:
Hydric soil rating: No

Data Source Information

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

El Paso County Area, Colorado

66—Peyton sandy loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 369c
Elevation: 6,800 to 7,600 feet
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

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

Description of Peyton

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 5 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): Moderately high (0.20 to 0.60 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: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

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

El Paso County Area, Colorado

67—Peyton sandy loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369d
Elevation: 6,800 to 7,600 feet
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 115 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Peyton

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 and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 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: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

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

El Paso County Area, Colorado

68—Peyton-Pring complex, 3 to 8 percent slopes

Map Unit Setting

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

Map Unit Composition

Peyton and similar soils: 40 percent
Pring and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

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 and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 5 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): Moderately high (0.20 to 0.60 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: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

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

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
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