ENTECH
ENGINEERING, INC.

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

SOIL, GEOLOGY AND GEOLOGIC HAZARD STUDY BANNING LEWIS RANCH FREESTYLE NORTH COLORADO SPRINGS, COLORADO

Prepared for

Norwood Development
111 South Tejon Street, Suite 222
Colorado Springs, Colorado 80903

Attn: Greg Barbuto

December 14, 2021

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Stuart Wood
Geologist

Reviewed by:

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

SW/el

Encl.

Entech Job No. 213235
AAProjects/2021/213235 soils geo

Table of Contents

1.0 SUMMARY ***2***

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION ***2***

3.0 SCOPE OF THE REPORT ***3***

4.0 FIELD INVESTIGATION ***3***

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY ***4***

5.1 General Geology *4*

5.2 Soil Conservation Service *5*

5.3 Site Stratigraphy *5*

5.4 Soil Conditions *6*

5.5 Groundwater *8*

6.0 ENGINEERING GEOLOGY - IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS ***8***

7.0 EROSION CONTROL ***15***

8.0 ECONOMIC MINERAL RESOURCES ***16***

9.0 RELEVANCE OF GEOLOGIC AND SITE CONDITIONS TO LAND USE PLANNING ***17***

10.0 CLOSURE ***19***

11.0 BIBLIOGRAPHY ***20***

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

FIGURES
Figure 1: Vicinity Map
Figure 2: USGS Map
Figure 3: Test Boring Location Map
Figure 4: Master Plan
Figure 5: Soil Survey Map
Figure 6: Falcon NW Quadrangle Geology Map
Figure 7: Geology Map/Engineering Geology Map
Figure 8: Floodplain Map
Figure 9: Perimeter Drain Details
Figure 10: Typical Underslab Drainage Layer (Capillary Break)
Figure 11: Interceptor Drain Detail

APPENDICES
APPENDIX A: Site Photographs
APPENDIX B: Test Boring Logs
APPENDIX C: Laboratory Test Results
APPENDIX D: Soil Survey Descriptions

1.0 SUMMARY

Project Location:

The project lies in Section 21, Township 13 South, Range 65 West of the 6th Principal Meridian. The site is located north of the proposed Barnes Road extension and east of Marksheffel Road in the Freestyle North portion of the existing Banning Lewis Ranch Subdivision, in the eastern extent of Colorado Springs, Colorado.

Project Description:

Total acreage involved in the project is approximately 542 acres. The proposed development primarily consists of residential with some commercial areas, schools, parks, and open space/drainage areas.

Scope of Report:

The report presents the results of our geologic investigation and treatment of engineering geologic hazard study for the sketch plan submitted. This report presents the results of our geologic reconnaissance, a review of available maps, aerial photographs and our conclusions with respect to the impacts of the geologic conditions on development.

Land Use and Engineering Geology:

This site was found to be suitable for the proposed development. Geologic conditions will impose some constraints on development. These include areas of hydrocompaction, loose soils, potentially expansive soils, erosion, seasonal and potentially seasonal shallow groundwater areas, areas of ponded water, floodplains, and artificial fill. Site conditions will be discussed in greater detail in this report. All recommendations are subject to the limitations discussed in the report.

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The project lies in portions of Section 21, Township 13 South, Range 65 West of the 6th Principal Meridian. The site is located north of the Proposed Barnes Road Extension and east of Marksheffel Road, in the Freestyle North portion of the existing Banning Lewis Ranch Subdivision,

in the eastern extent of Colorado Springs, Colorado. The location of the site is shown on the Vicinity Map, Figure 1.

The topography of the site consists of low rolling hills generally gradually sloping to the south with some moderate to steep slopes along drainages that flow through the site. Drainages on-site flow in southerly directions. Water was observed in some of the drainages, ponds and other low areas on the site. The approximate boundaries of the site are indicated on the USGS Map, Figure 2. Previous site uses have included grazing and pasture land. Vegetation on site consists primarily of field grasses and weeds. Site photographs are included in Appendix A. The approximate locations and directions of the photographs are indicated on Figure 3.

The report presents the results of our geologic investigation and treatment of engineering geologic hazard study for the sketch plan submitted. The report includes the results of our geologic reconnaissance, a review of available maps, aerial photographs and our conclusions with respect to the impacts of the geologic conditions on development. The area will be serviced by central water and sewer. The proposed Concept Plan is presented in Figure 4. A grading plan was not available at the time of this report.

3.0 SCOPE OF THE REPORT

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

4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of 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 field reconnaissance, measurements and interpretation. The same mapping procedures have also been utilized to produce the Engineering Geology Map which identifies pertinent geologic conditions affecting development.

Ten (10) test borings were drilled as a part of the investigation to determine general soil and bedrock conditions. The borings were drilled with a power-driven continuous flight auger drill rig to depths of 20 feet. Samples were obtained during drilling using the Standard Penetration Test, ASTM D-1586, utilizing a 2-inch O.D. Split Barrel Sampler and a California Sampler. Results of the penetration tests are shown on the drilling logs to the right of the sampling point. The location of the test borings is shown on the Test Boring Location Map, Figure 3. The Test Boring Logs are included in Appendix B.

Laboratory testing was performed to classify and determine the soils engineering characteristic. Laboratory tests included moisture content, ASTM D-2216, grain size analysis, ASTM D-422, and Atterberg Limits, ASTM D-4318. Swell/Consolidation Testing, ASTM D-4546, was conducted on select samples to evaluate the expansive/compressive characteristics of the soils. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 13 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 southern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be gently dipping in a northerly direction (Reference 2). Bedrock in the area of the site is sedimentary in nature, and typically Tertiary to Cretaceous in age. The bedrock underlying the site itself is the Dawson Formation. Overlying the Dawson are unconsolidated deposits of artificial, residual, alluvial, and eolian soils. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Service

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped three soil types on the site (Figure 5). In general, the soils consist of loamy sand and gravelly sandy loam. Soils are described as follows:

Type	Description
8	Blakeland loamy sand, 1-9% slopes
10	Blendon sandy loam, 0-3% slopes
97	Truckton sandy loam, 3-9% slopes
12	Bressev sandy loam, 3-5% slopes

Complete descriptions of the soils are presented in Appendix E. The soils have generally been described to have rapid to very rapid permeabilities. The majority of the soils have been described by the Soil Conservation Service as good potential for urban development. Limitations include the hazard of flooding on some areas of Soil Type 8. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards. The soil blowing hazard is severe if vegetation is removed.

5.3 Site Stratigraphy

The Falcon Quadrangle Geology Maps showing the site is presented in Figure 6 (References 5 and 6). The Geology Map prepared for the site is presented in Figure 7. Five mappable units were identified on this site, which are identified as follows:

Qaf **Artificial Fill of Quaternary Age:** These are man-made fill deposits associated with earthen dams and erosion berms on-site.

Qal **Recent Alluvium of Quaternary Age:** These are recent stream deposits in the drainages that exist on-site. These materials consist of silty sands and may contain lenses of silt, clay or gravel. Areas of organic soils will also be encountered.

$Qay_{1,2}$ Young Alluvium Two of Holocene Age: These materials consist of water deposited alluvium, typically classified as a silty to well-graded sand, brown to dark brown in color and of moderate density. This deposit correlates with the Piney Creek Alluvium.

Qes Eolian Sand of Quaternary Age: These are deposits are fine to medium grained soil deposited by the action of the prevailing winds from the northwest. They typically occur as large dune deposits or narrow ridges. Additionally, low areas associated with blow-outs may be encountered in these areas. The eolian soil types are typically tan to brown in color and tend to have a very uniform or well-sorted gradation. These materials tend to have a relatively high permeability and low density.

TKda Dawson Arkose Formation of Tertiary to Cretaceous Age: The bedrock underlying the site is the Dawson Formation. This formation consists of arkosic sandstone with interbedded lenses on fine grained sandstone, claystone or siltstone. Typically, it is buff to light brown and light gray in color. Overlying the Dawson is a variable layer of residual soil derived from the in-situ weathering of the bedrock materials.

The soils listed above were mapped from the *Geologic Map of the Falcon NW and Falcon Quadrangles* by Madole in 2003 (Figure 6, References 5 and 6), the *Geologic Map of the Pueblo 1°x2° Quadrangle, South-Central* distributed by the US Geological Survey in 1978 (Reference 7) and site-specific mapping of the site. The test borings from this study and the preliminary subsurface investigation were also used in evaluating the site. The test boring logs are included in Appendices B and D of this report.

5.4 Soil Conditions

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

Soil Type 1 consists of slightly silty to silty to very silty and very clayey sand (SW-SM, SM, SC). The sands were encountered in the upper soil profile of 9 of the test borings at the surface and extending to depths ranging from 4 to 17 feet, and to the termination of the Test Boring Nos. 2, 5 and 6 (20 feet). Standard penetration testing on the sands resulted in N-values of 11 to 48 blows per foot (bpf), indicating medium dense to very dense states. Water content and grain size testing

resulted in water contents of 1 to 16 percent with approximately 6 to 45 percent of the soil size particles passing the No. 200 sieve. Atterberg limits testing on a sample of very clayey sand from Test boring no. 1 at a depth of 2 to 3 feet resulted in liquid limits of 31 percent and a plastic index of 14 percent.

Soil Type 2 consists of sandy clay and silty clay (CL, CH). The clay was encountered in Test Boring Nos. 2 and 3 at depths ranging from the existing surface to 4 feet (bgs) and extending to depths ranging from 7 to 12 feet (bgs). Standard Penetration Testing on the clay resulted in values of 22 to 50 bpf, indicating stiff to hard consistencies. Water content and grain size testing resulted in water contents of 7 to 16 percent with approximately 63 to 99 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in Liquid Limits of 33 to 71 and plastic indexes of 16 to 41. Swell/Consolidation Testing resulted in volume changes of 6.0 percent, indicating high to very high expansion potential.

Soil Type 3 consists of silty to clayey to very clayey sandstone bedrock (SM, SC). The sandstone was encountered in Test Boring Nos. 1, 3, and 7-10 at depths ranging from 4 to 17 feet and extending to the termination of the borings (20 feet). Standard penetration testing on the sandstone resulted in N-values of 50 bpf to greater than 50 bpf, indicating very dense states. Water content and grain size testing resulted in water contents of 5 to 14 percent with approximately 25 to 41 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in no values. Highly expansive claystone and siltstone is commonly interbedded in the sandstone in the area.

Soil Type 4 consists of sandy claystone and sandy siltstone (ML, CL). The claystone and siltstone were encountered in Test Boring Nos. 3 and 4 at depths ranging from 7 to 12 feet and extending to depths ranging from 11 to the termination of the borings (20 feet). Standard penetration testing on the claystone and siltstone resulted in N-values of greater than 50 bpf, indicating hard consistencies. Water content and grain size testing resulted in water contents of 10 to 13 percent with approximately 92 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in a liquid limit of 51 and plastic indexes of 21 percent. Swell/Consolidation Testing on a sample of sandy siltstone from Test Boring 4 at a depth of 15 feet resulted in volume change of 1.3, indicating low to moderate expansion potentials. The claystone typically has moderate to high swell potential.

A Summary of Laboratory Results is presented in Table 1. Laboratory results are included in Appendix C. A summary of the depth to bedrock is included in Table 2.

5.5 Groundwater

Groundwater was encountered in Test Boring no. 5 at a depth of 13 feet immediately after drilling. Groundwater was not encountered in the other test borings which were drilled to 20 feet. Areas of seasonal and potentially seasonal groundwater, flowing and ponded water have been mapped on the site and are discussed in the following section.

Fluctuation in groundwater conditions may occur due to seasonal variations in precipitation and other factors not readily apparent at this time. Isolated sand layers within the variable soil profile, sometimes only a few feet in thickness and width, can carry water in the subsurface. Water may also flow on top of the sandstone. Contractors should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site. Grading involving cuts in areas of shallow water should be minimized.

6.0 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 and planners should be cognizant during the planning, design and construction stages of the project. The hazards identified on this site include hydrocompaction, erosion, artificial fill, potentially expansive soils, seasonal and potentially seasonal shallow groundwater areas, springs, and areas of ponded water. The following hazards have been addressed as a part of this investigation:

Expansive Soils

While the majority of the soils encountered in the test borings drilled on-site have low to moderate expansion potential, highly expansive clays and claystone are common in the area and may be encountered. Grading may result in shallow depths to expansive claystone in some areas. The expansive soils are present across the site; therefore, none have been indicated on the map.

Expansive clays and claystone, 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 foundations; mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation which is common in the area. Drilled piers are another option that is used in areas where highly expansive soils are encountered. 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 on 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.

Subsidence Area

Based on a review of the *Mining Report for the Colorado Springs Coal Field* (Reference 8), a Subsidence Investigation Report for the Colorado Springs area by Dames and Moore, 1985 (Reference 9), and the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County* (Reference 10), the site is not undermined. The closest underground mines in the area are 8 miles to the west and southwest and the site is not mapped within any potential subsidence zones.

Slope Stability and Landslide Hazard

The slopes on-site are gently to moderately sloping and do not exhibit any past or potential unstable slopes or landslides. Grading plans were not available at the time of this investigation. Slopes should be no steeper than 3:1, if regraded unless specifically evaluated. Steep slopes along the drainages will be avoided with development. All topsoil and organics should be removed prior to any regrading or fill placement. All new fill should be properly benched into native slopes and compacted at a minimum of 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557.

Rockfall Hazards

Based on our site observation, no rock outcrops or areas of rockfall hazard were observed on this site.

Areas of Erosion

These are areas that are undergoing erosion by water and sheetwash producing gullies and rill erosion. Significant erosion has occurred in the drainages running through the site. These will be regraded during site development.

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).

Debris Fans

Based on site observations, debris fans were not observed in this area. Areas of recent sediment deposits were observed in some of the drainages on the site. The drainage areas are discussed below.

Groundwater and Drainage Areas

Groundwater was encountered in one of the test borings at a depth of 13 feet. Areas within the drainages on-site have been identified as seasonal and potentially seasonal shallow groundwater. Only minor areas with water flowing in the drainages were noted at the time of this investigation, however, areas of ponded and standing water were observed. Areas of the site have been mapped as floodplain zones according to the FEMA Map Nos. 08041CO545G and 08041CO561G, Figure 8 (Reference 11).

Groundwater areas are discussed as follows:

- *Seasonal and Potentially Seasonal Shallow Groundwater*

  In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and possible frost heave potential, depending on the soil conditions. The majority of the areas mapped with this designation lie within drainages designated as open space and will be avoided by development. Areas exist on the site where groundwater becomes perched within permeable sand materials on top of impermeable bedrock materials. Where structures encroach on, or lie within these areas, the following mitigation is recommended:

  Mitigation: In these locations, foundations in areas subject to severe frost heave potential should penetrate sufficient depth so as to discourage the formation of ice lenses beneath foundations. At this location and elevation, a foundation depth for frost protection of 30 inches is recommended. In areas where high subsurface moisture conditions are anticipated periodically, a subsurface perimeter drain will be necessary to help prevent the intrusion of water into areas located below grade. A typical perimeter drain detail is presented in Figure 9. Where shallow groundwater is encountered, additional drains, such as capillary breaks and/or interceptor drains may be necessary. Typical drain details are included in Figures 10 and 11. Unstable conditions should be expected where excavations approach the groundwater level. The use of shot rock or geo-grids may be necessary to stabilize excavations. Additionally, swales should be created to intercept surface runoff and carry it safely around and away from structures. It is anticipated that the drainages can be avoided or site grading will mitigate the drainages and raise foundations further above the groundwater level. The water table may be of sufficient depth to minimize the effects on buildings. Additional investigation is recommended after development and grading plans are finalized.

- *Areas of Ponded Water*

  These are areas where there is standing water observed in drainages or ponded water behind earthen dams. The majority of these areas lie within the drainages designated as open space and will be avoided by construction. Where construction is proposed, the following mitigation is recommended:

Mitigation: These areas are located in drainage ways across the site that are within areas designated as drainage easements or open space. Other areas where ponded water was observed are minor and can be avoided or regraded. All soft and organic soils should be removed prior to fill placement. Any drainage into these areas should be rerouted in a non-erosive manner where it does not create areas of ponded water around proposed structures. The same mitigation techniques for the seasonal shallow groundwater areas are recommended for these areas as well.

- *Floodplains*

  Areas of the site have been mapped as floodplain zone according to the FEMA Map Nos. 08041CO545G and 08041CO561G (Figure 8, Reference 11). According to the Concept Plan Figure 4, it appears these areas are designated as drainage/open space areas and will be avoided by development. Any development with the floodplain will require approval of the drainage plan. Finished floors must be a minimum of one foot above the floodplain level. Exact floodplain locations and drainage studies are beyond the scope of this report.

Artificial Fill

Areas of artificial fill were observed on the site. Much of the fill is associated with fill around the water tank. The majority of the erosion berms are shallow and may be penetrated by foundations or will likely be removed during site grading. Any uncontrolled fill should be removed and recompacted prior to or during site grading. Any uncontrolled fill encountered beneath foundations will require removal and recompaction at 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557.

Hydrocompaction

Areas in which hydrocompaction have been identified are acceptable as building sites. In areas identified for this hazard classification, however, we anticipate a potential for settlement upon saturation of these surficial soils. The low density, uniform grain sized, windblown sand deposits are particularly susceptible to this type of phenomenon.

Mitigation: The potential for settlement is directly related to saturation of the soils below the foundation areas. Therefore, good surface and subsurface drainage is extremely critical in these

areas in order to minimize the potential for saturation of these soils. The ground surface around all permanent structures should be positively sloped away from the structure to all points, and water must not be allowed to stand or pond anywhere on the site. We recommend that the ground surface within 10 feet of the structures be sloped away with a minimum gradient of five percent. If this is not possible on the upslope side of the structures, then a well-defined swale should be created to intercept the surface water and carry it quickly and safely around and away from the structures. Roof drains should be made to discharge well away from the structures and into areas of positive drainage. Where several structures are involved, the overall drainage design should be such that water directed away from one structure is not directed against an adjacent building. Planting and watering in the immediate vicinity of the structures, as well as general lawn irrigation, should be minimized.

Collapsible Soils

Areas of loose or potentially collapsible soils were encountered in some of the test borings drilled on-site. Should loose or collapsible soils be encountered beneath foundations, removal and recompaction with thorough moisture conditioning at 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557 will be necessary. Typically, the overexcavation extends to a depth of 2 to 3 feet. Specific recommendations should be made after additional investigation of each building site.

Faults

The closest fault is the Rampart Range Fault, located 13 miles to the west. No faults are mapped on the site itself. Previously Colorado was mapped entirely within Seismic Zone 1, a very low seismic risk. Additionally, the International Residential Code (IRC), 2003, currently places this area in Seismic Design Category B, also a low seismic risk. According to a report by the Colorado Geological Survey by Kirkman and Rogers, 1981, (Reference 12) this area should be designed for Zone 2 due to more recent data on the potential for movement in this area, and any resultant earthquakes.

Dipping Bedrock

The bedrock underlying the site is the Dawson Formation of Tertiary to Cretaceous Age. The Dawson in this area is gently dipping a northerly direction according to the *Geologic Structure Map of the Pueblo 1x2 Quadrangle*, *South-Central Colorado* (1978) (Reference 2). The bedrock

encountered in the test borings and observed on-site did not exhibit steeply dipping characteristics; therefore, mitigation is not necessary.

Shallow Bedrock

Bedrock was encountered in seven of the test borings at depths ranging from 4 to 17 feet. Bedrock was not encountered in the other borings which were drilled to 20 feet. Shallow bedrock (less than 10 feet) was encountered in Test Boring Nos. 1, 3, and 7. Shallow bedrock may be encountered in some areas of this site, particularly those mapped as TKda: Dawson Arkose Formation. Where shallow sandstone is encountered, higher allowable bearing capacities are anticipated. Shallow claystone may require mitigation for expansive soils. Excavations extending in the sandstone or claystone bedrock may be difficult requiring track excavators.

Radioactivity

Radon levels for the area have been reported by the Colorado Geologic Survey in the Open-File, Report No. 91-4 (Reference 13). Radon levels ranging from 0 to 20 pci/l have been measured in the area. The following is a table of radon levels in this area.

0<4 pci/l	50.00%
4<10 pci/l	50.00%
10<20 pci/l	0.00%
>20 pci/l	0.00%

Only two readings have been taken in the area. The minimal information from this report is not sufficient to determine if radon levels are higher for this site. An occurrence of radioactive minerals has been identified approximately 8 miles northwest of the site (Reference 14). This occurrence is associated with a limonite deposit in the Dawson Formation. No known occurrences exist on the site, however, radon gas originating in the bedrock underlying the site could migrate up into the upper soil profile.

Mitigation: The potential exists for radon gas to build up in areas of the site. Build-ups of radon gas can be mitigated by providing increased ventilation of basements and crawlspaces and sealing of joints. Specific requirements for mitigation should be based on-site specific testing after the site is constructed.

7.0 EROSION CONTROL

The soil types observed on the site are mildly to moderately 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 reestablished, 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 re-vegetate 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.

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 15), the area is mapped as upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 11), areas of the site are mapped as A3 – Alluvial fan: sand resource and E3/E4 – wind-deposited sand and probable aggregate resource. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 10), the area of the site has been mapped as "Good" for industrial minerals. The sands associated with the eolian and alluvial deposits are considered a sand resource. Considering the silty to clayey nature of much of these materials and abundance of similar materials through the region and 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. The *El Paso County Aggregate Resource Map* (Reference 15) has mapped coal resources in the Falcon area approximately ½ mile south of the site; however, the coal resources are estimated at 1,500 feet below the surface (Reference 10). At this depth, mining the coal would not be economical at this time. No metallic mineral resources have been mapped on the 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 would not be considered a significant resource. Hydraulic fracturing is a new method that is being used 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 RELEVANCE OF GEOLOGIC AND SITE CONDITIONS TO LAND USE PLANNING

We understand that the development will be primarily residential with schools, parks, and open space areas. 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 hazards associated with the site are those associated with the drainage areas and potential for seasonal shallow groundwater conditions. These can be satisfactorily mitigated by either avoidance, regrading, or through proper engineering design, construction and drainage systems. Constraints identified on the site such as hydrocompaction, collapsible soils, artificial fill, and expansive soils can also be mitigated through proper engineering design and construction.

The upper materials are typically at loose to dense states. The medium dense to dense granular soils encountered in the upper soil profiles of the test borings should provide good support for foundations. Loose soils, if encountered beneath foundations or slabs, will require removal and recompaction. Expansive soils, although sporadic, were encountered. Expansive clayey sandstone, siltstone and claystone are common in the Dawson Formation, and may require mitigation. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of expansive soils or loose soils. Areas of artificial fill, if encountered beneath foundations will require penetration or recompaction. Areas containing arkosic sandstone will have high allowable bearing conditions. Expansive layers may also be encountered in the soil and bedrock on this site. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of hydrocompation have been identified on this site where there is the potential for settlement movements upon saturation of the surficial soils. Good surface and subsurface drainage are critical in these areas and the ground surface should be positively sloped away from structures at all points. Roof drains should be made to discharge well away from structures and planting and watering in the immediate vicinity of structures should be minimized.

Areas of seasonal and potentially seasonal shallow groundwater, ponded water, and floodplains exist on this site. The floodplains and areas of ponded water are to be avoided by development and preserved as open space in drainage easements. According to the concept plan, some of the minor drainages can be avoided or filled, which will mitigate the hazard. Where drainages are

filled or truncated, groundwater still has the potential to follow old drainage paths underground. Interceptor drains may be necessary in these areas. Where structures encroach on areas of potential shallow groundwater or construction and regrading is proposed, drains may be necessary. Typical drain details are included in Figures 9 through 11. It appears the floodplain areas lie within designated drainage/open space areas and will be avoided by development. Finished floor levels must be a minimum of one foot above the floodplain level. Exact floodplain locations and drainage studies are beyond the scope of this report.

Areas of perched groundwater may be encountered on this site in areas other than those mapped. Permeable sands exist on the site that may carry water in the subsurface perched on less permeable bedrock. Groundwater was encountered at a depth of 13 feet in test boring number 5. Site grading, including cuts, in areas of shallow water should be kept to a minimum. Fluctuation in groundwater conditions may occur due to variations in rainfall, soil conditions and development of surrounding areas. Builders should be cognizant of the potential for the occurrence of subsurface water features during construction and deal with each individual problem as necessary at the time of construction. Subsurface drains and dewatering systems may be necessary in some areas where seepage and perched water occurs. Unstable conditions should be expected where excavations approach the groundwater level. Stabilization using geofabric or shot rock may be necessary.

In summary, development of the site can be achieved if the items discussed above are mitigated. These items can be mitigated through proper design and construction or by avoidance. Additional investigation is recommended as grading and development plans are prepared, prior to construction.

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 geologic hazards identified on the site can either be avoided by development or satisfactorily mitigated through proper engineering design and construction practices. The report was prepared for the proposed master plan. Additional soils investigation is recommended as the development and grading plans are prepared to provide more detailed information on soil, groundwater and bedrock.

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. Planning and design personnel should be made familiar with the contents of this report. Additional investigation is recommended as development and grading plans are prepared

This report has been prepared for Norwood Development 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 this report has provided you with all the information you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

11.0 BIBLIOGRAPHY

1. Entech Engineering, Inc. January 6, 2000. *Preliminary Subsurface Soil Investigation, Banning Lewis Ranch, Village B, Colorado Springs, Colorado*. Entech Job No. 191764.
2. Scott, Glen R.; Taylor, Richard B.; Epis, Rudy C. and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1x2 Quadrangle, South-Central Colorado.* U.S. Geologic Survey Map 1-1022
3. Natural Resource Conservation Service. September 23, 2016. *Web Soil Survey.* United States Department of Agriculture. http://websoilsurvey.sc.egov.usda.gov
4. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*
5. Madole, Richard F. 2003 *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-8
6. Morgan, Matthew L. and White, Jonathan L., 2012. *Geologic Map of the Falcon Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 12-05.
7. Scott, Glen R., Taylor, Richard B., Epis, Rudy C. and Wobus, Reinhard A. 1978. *Geologic Map of the Pueblo 1°x2° Quadrangle, South-Central, Colorado.* US Geological Survey. Map I-1022, Sheet 1.
8. City of Colorado Springs Planning Department, August 1967. *Mining Report, Colorado Springs Coal Field.*
9. Dames and Moore. 1985. *Colorado Springs Subsidence Investigation*. State of Colorado Division of Mined Land Reclamation.
10. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board*. Colorado Geological Survey. Open-File Report 03-07.
11. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO535G.
12. Kirkman, Robert M. and Rogers, William P. 1981. *Earthquake Potential in Colorado*. Colorado Geological Survey. Bulletin 43.
13. Colorado Geological Survey. 1991. *Results of the 1987-88 EPA Supported Radon Study in Colorado*. Open-file Report 91-4.
14. Nelson-Moore, James L.; Collins, Donna Bishop; and Hernbaker, Al. 1978. *Radioactive Mineral Occurrences of Colorado and Bibliography*. Colorado Geological Survey. Bulletin 40.
15. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation.*
16. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties*. Colorado Geological Survey. Special Publication 5-B.

TABLES

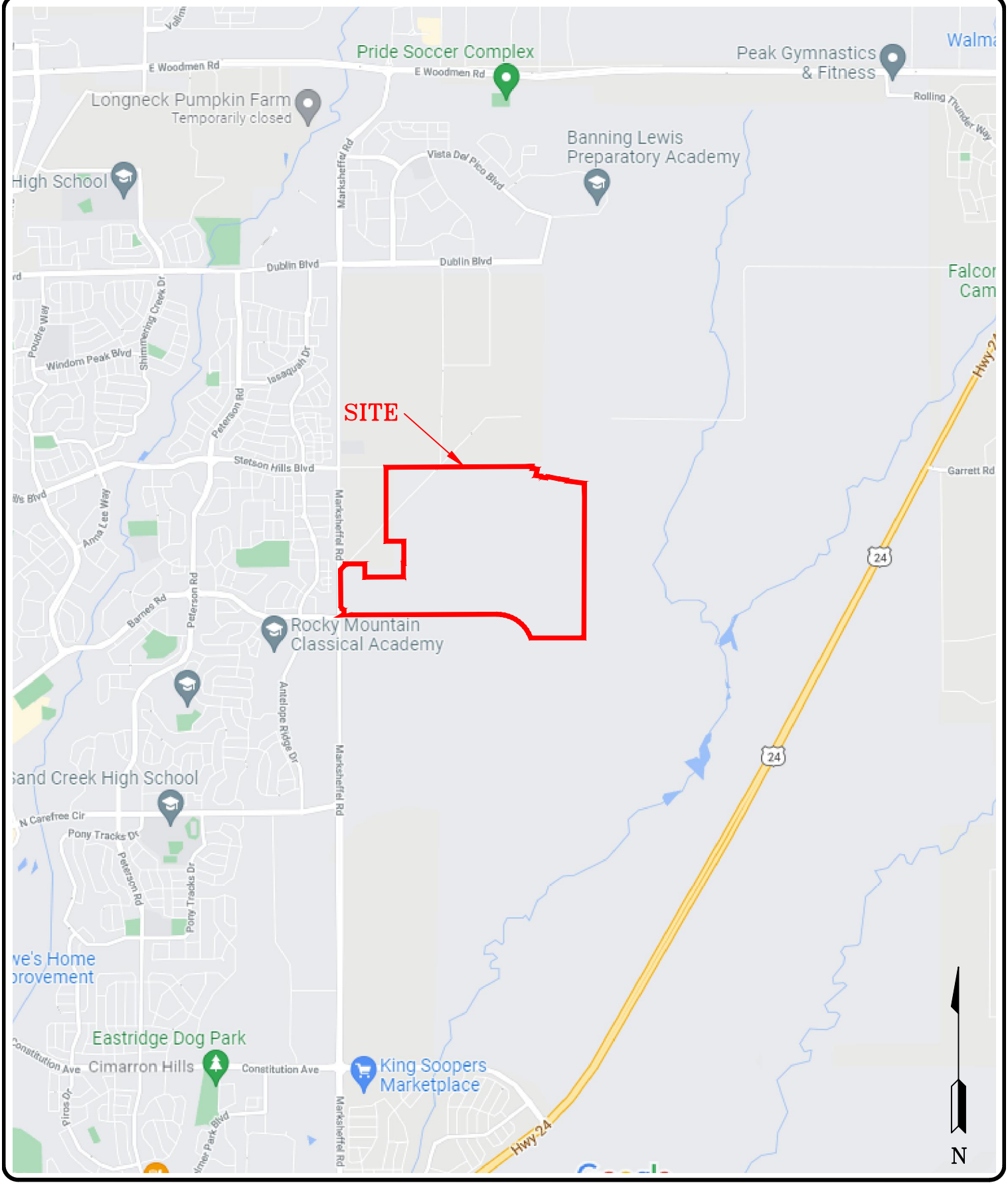
TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT NORWOOD DEVELOPMENT
PROJECT FREESTYLE NORTH
JOB NO. 213235

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			44.6	31	14	0.00			SC	SAND, VERY CLAYEY
1	5	5			5.6						SM-SW	SAND, SLIGHTLY SILTY
1	6	2-3			15.9						SM	SAND, SILTY
1	8	10			45.4						SM	SAND, VERY SILTY
1	10	5			21.1						SM	SAND, SILTY
2	2	10			63.2	33	16	<0.01			CL	CLAY, SANDY
2	3	5	20.7	103.9	99.0	71	41	<0.01		6.0	CH	CLAY, SILTY
3	7	15			25.1	NV	NP	<0.01			SM	SANDSTONE, SILTY
3	9	15			41.1						SC	SANDSTONE, VERY CLAYEY
4	4	15	21.9	102.0	92.3	51	21	<0.01		1.3	MH	SILTSTONE, SANDY

FIGURES



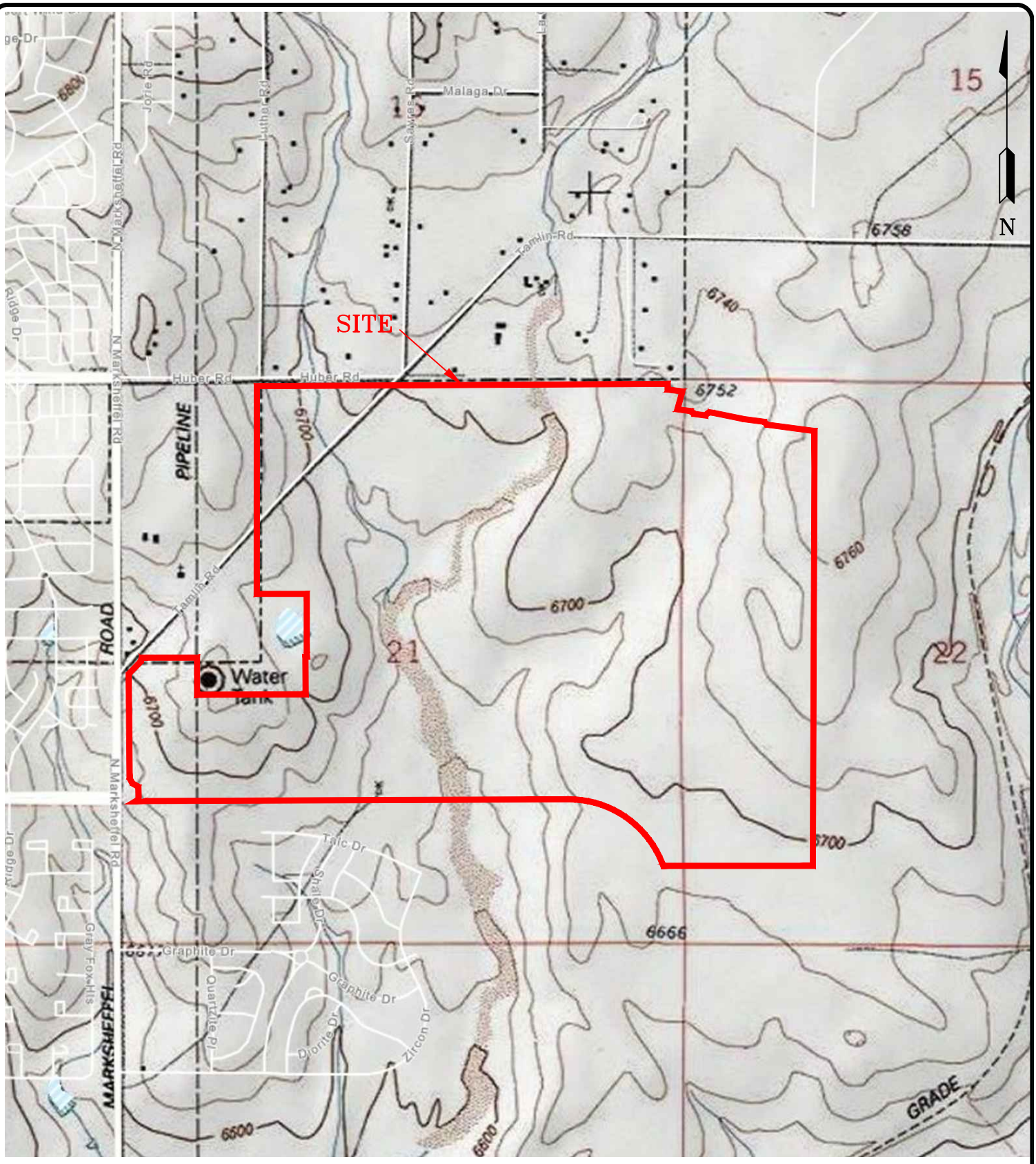
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN:	DATE:	CHECKED:	DATE:
JAC	12/14/21	DPS	

JOB NO.: 213235

FIG NO.: 1



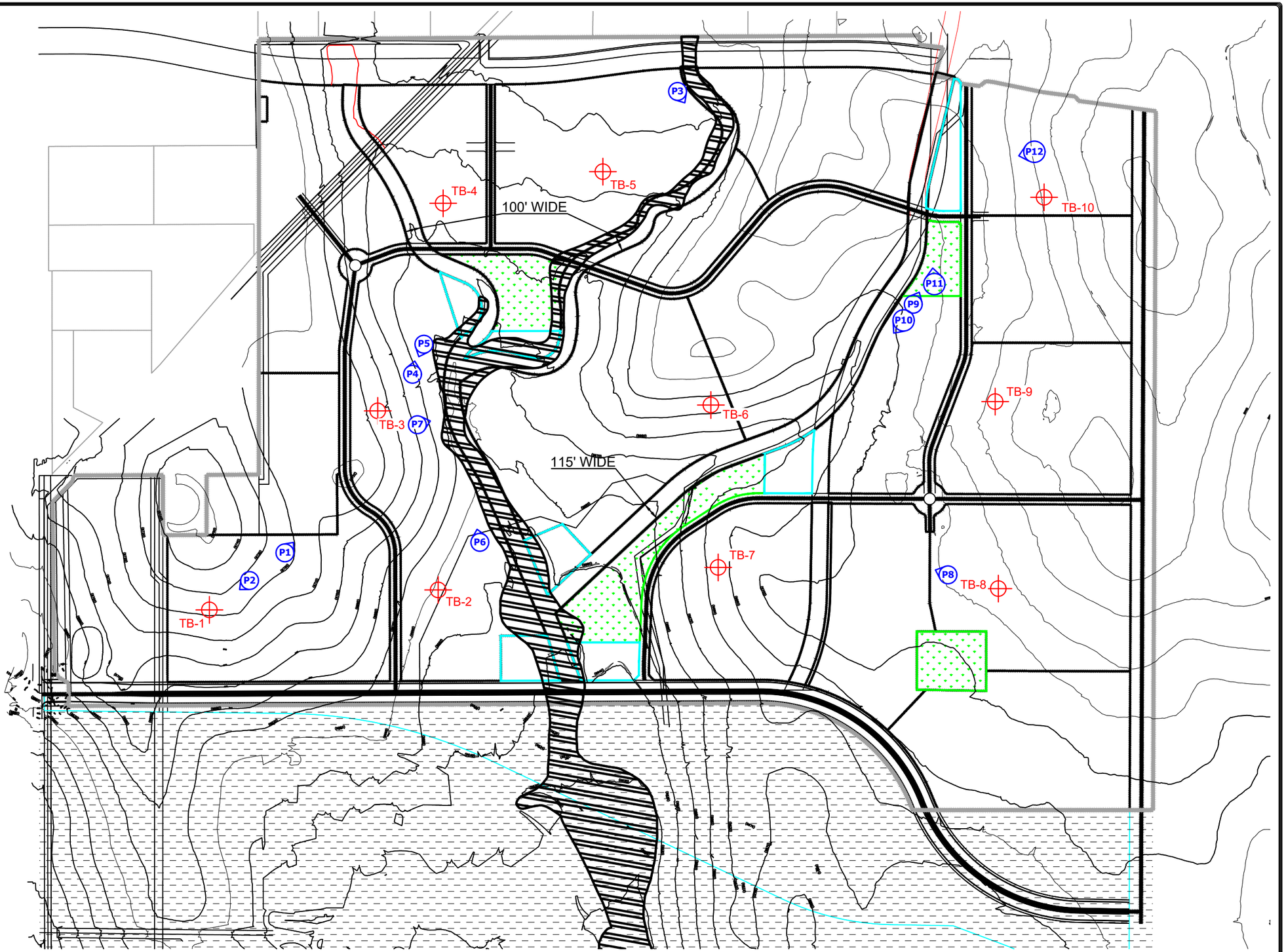
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

USGS MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN:	DATE:	CHECKED:	DATE:
JAC	12/14/21	DPS	

JOB NO.: 213235

FIG NO.: 2



TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

P2 - APPROXIMATE TEST PIT LOCATION AND NUMBER

REVISION	BY

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

TEST BORING LOCATION MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NORWOOD DEVELOPMENT

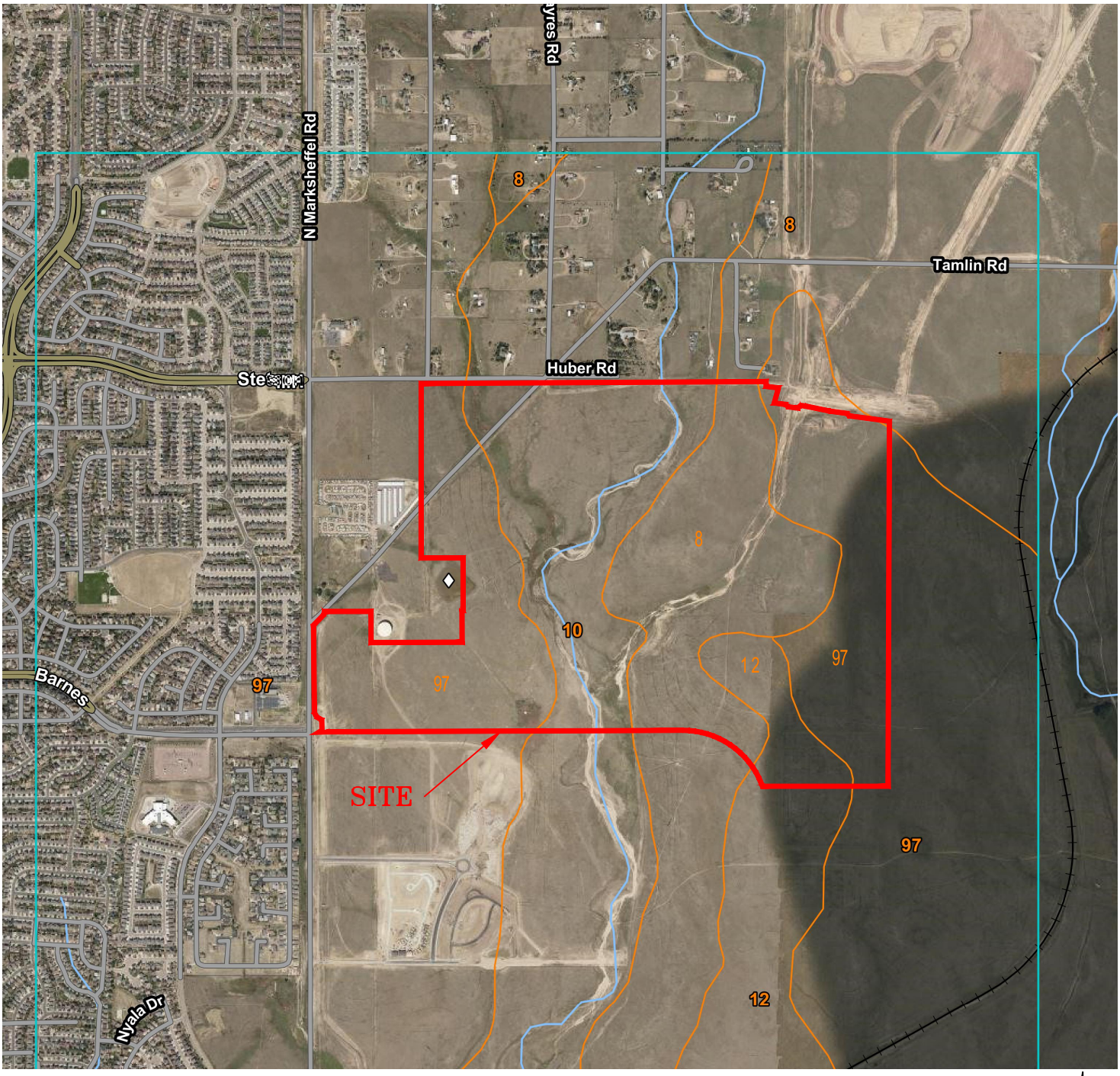
DRAWN	JAC
CHECKED	DPS
DATE	12/14/21
SCALE	AS SHOWN
JOB NO.	213235
FIGURE No.	3

REVISION	BY

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

MASTER/CONCEPT PLAN
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NORWOOD DEVELOPMENT

DRAWN	JAC
CHECKED	DPS
DATE	12/14/21
SCALE	AS SHOWN
JOB NO.	213235
FIGURE No.	4



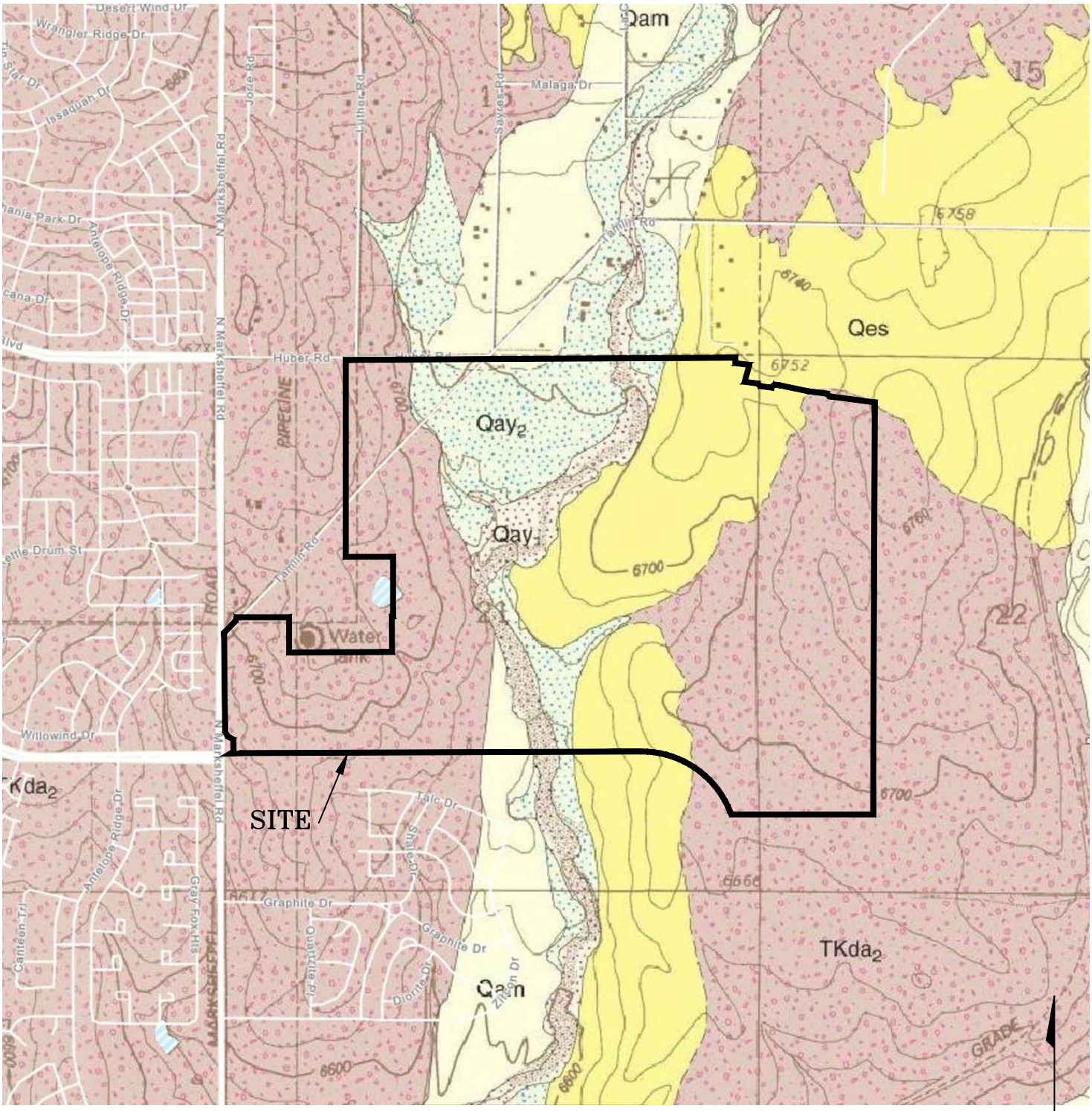
ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN:	DATE:	CHECKED:	DATE:
JAC	12/14/21	DPS	

JOB NO.: 213235

FIG NO.: 5



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

FALCON NW QUADRANGLES GEOLOGY MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN:	DATE:	CHECKED:	DATE:
JAC	12/14/21	DPS	

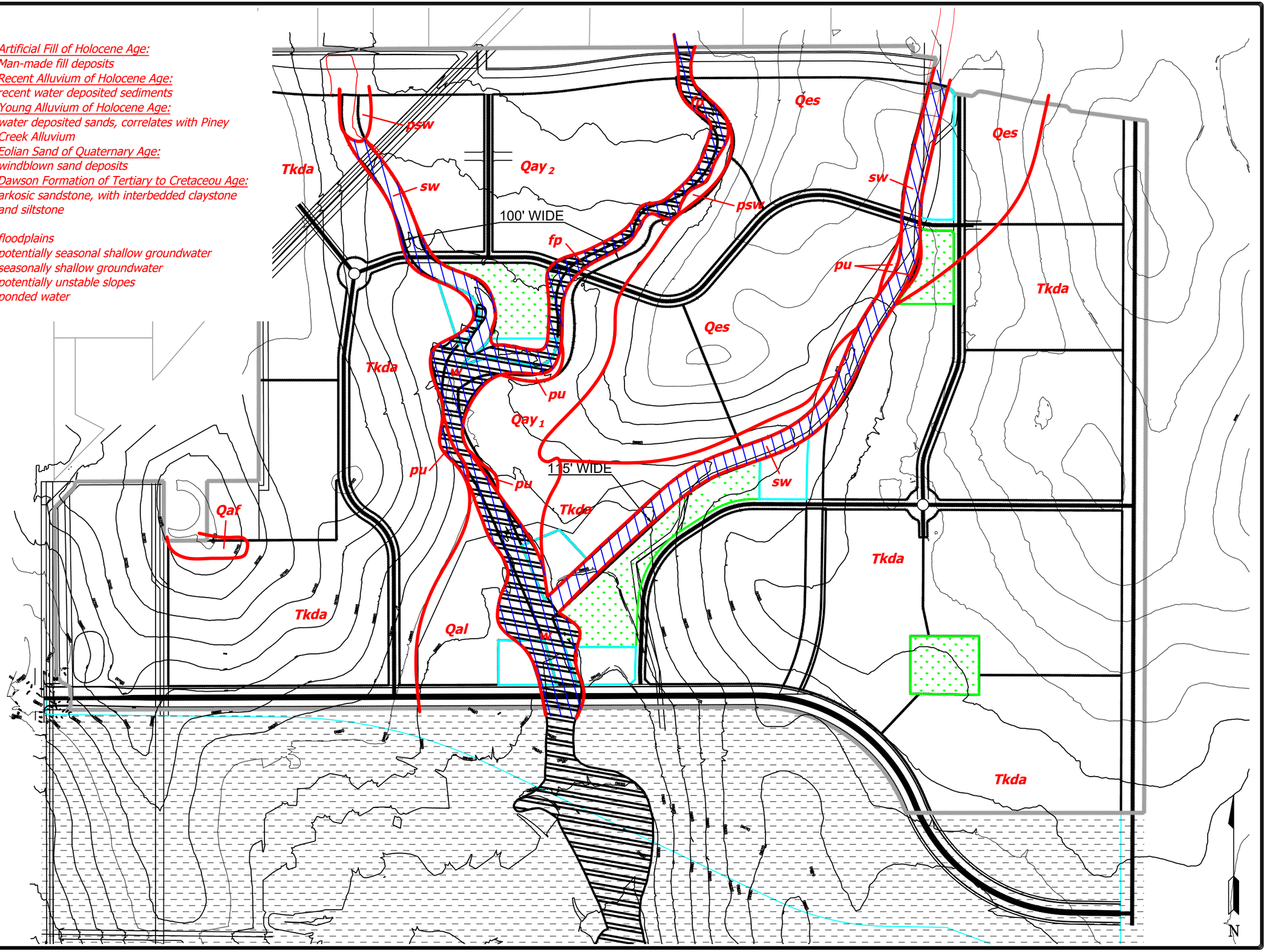
JOB NO.: 213235

FIG NO.: 6

Legend:

Qaf -	*Artificial Fill of Holocene Age:*	*Man-made fill deposits*
Qal -	*Recent Alluvium of Holocene Age:*	*recent water deposited sediments*
Qay_{1-2}-	*Young Alluvium of Holocene Age:*	*water deposited sands, correlates with Piney Creek Alluvium*
Qes -	*Eolian Sand of Quaternary Age:*	*windblown sand deposits*
Tkda -	*Dawson Formation of Tertiary to Cretaceou Age:*	*arkosic sandstone, with interbedded claystone and siltstone*

fp -	*floodplains*
psw -	*potentially seasonal shallow groundwater*
sw -	*seasonally shallow groundwater*
pu-	*potentially unstable slopes*
w -	*ponded water*

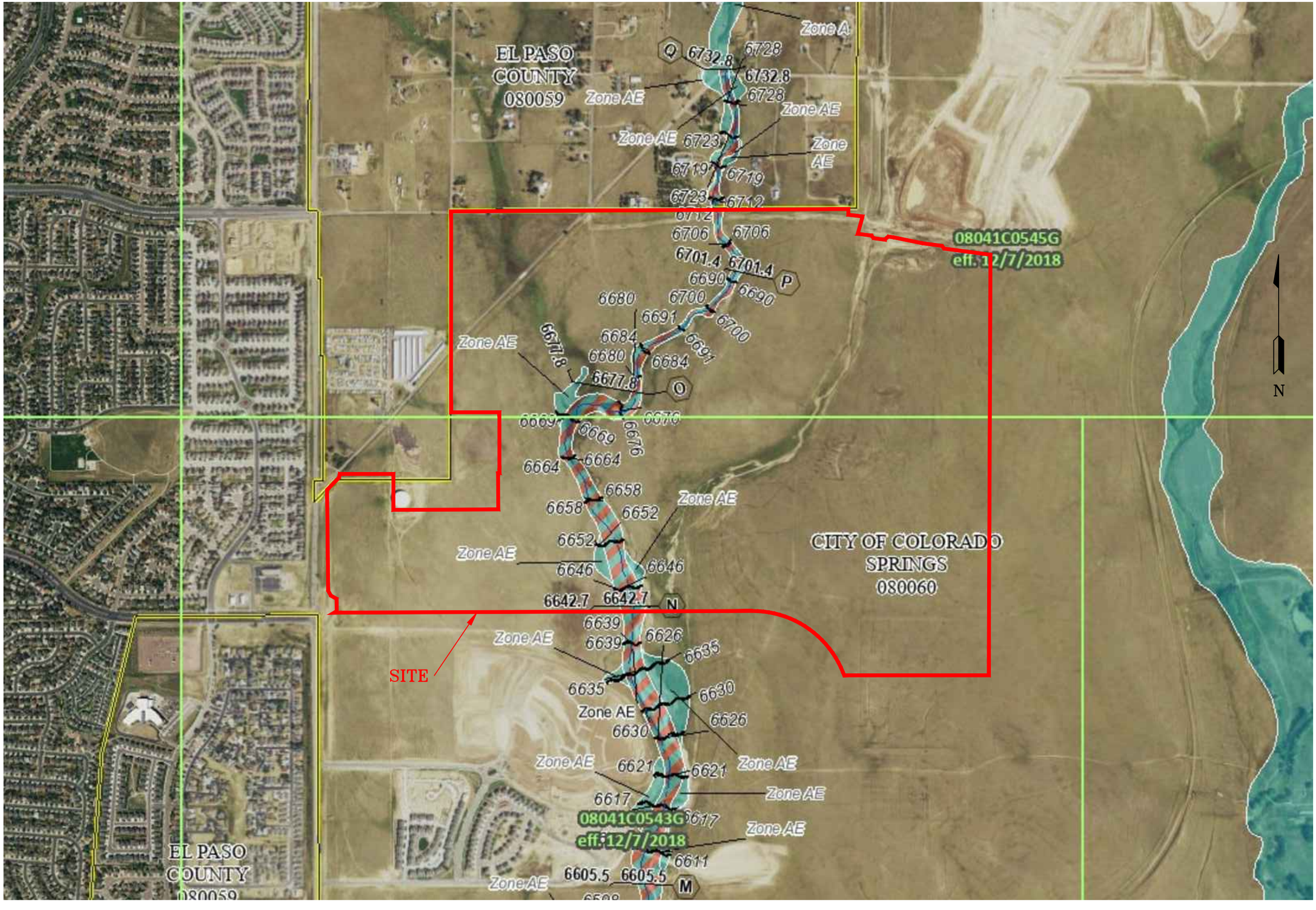


REVISION	BY

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

ENGINEERING GEOLOGY MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN	JAC
CHECKED	DPS
DATE	12/14/21
SCALE	AS SHOWN
JOB NO.	213235
FIGURE No.	7

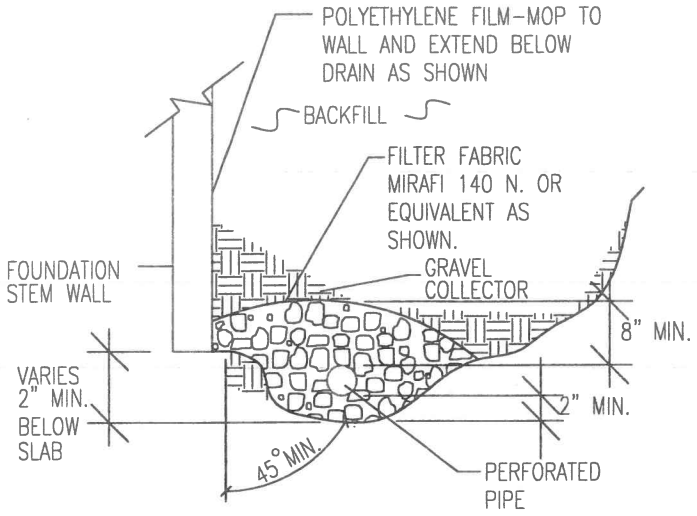


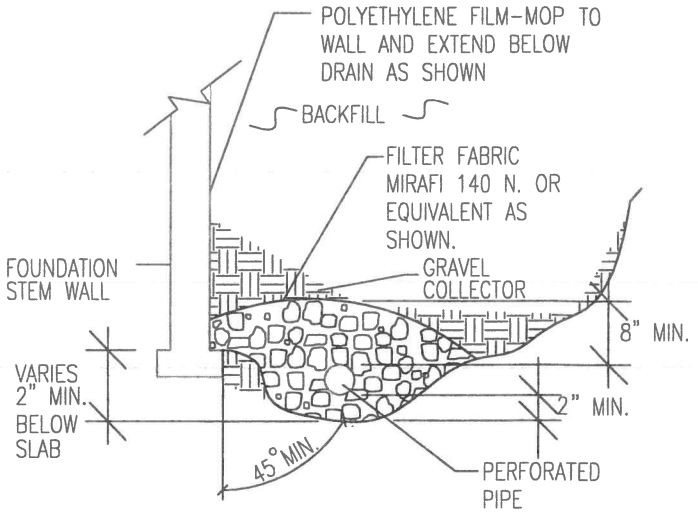
REVISION	BY

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

FLOODPLAIN MAP
FREESTYLE NORTH
BARNES ROAD & MARKSHEFFEL ROAD
COLORADO SPRINGS, CO
FOR: NOR'WOOD DEVELOPMENT

DRAWN	JAC
CHECKED	DPS
DATE	12/14/21
SCALE	AS SHOWN
JOB NO.	213235
FIGURE No.	8





NOTES:

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

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

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

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

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

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

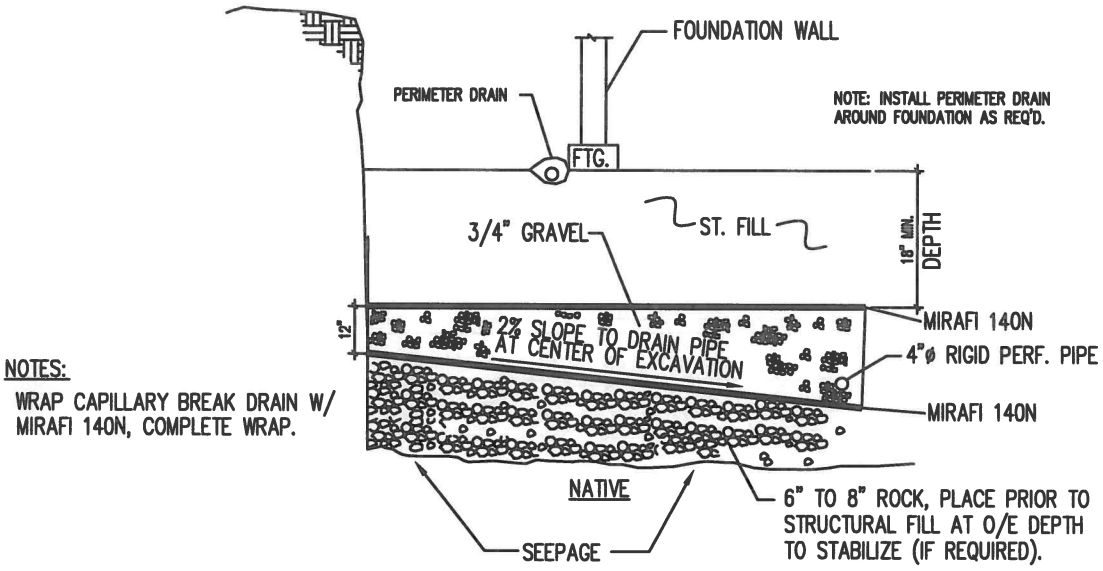
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 213235

FIG NO.: 9



NOTES:

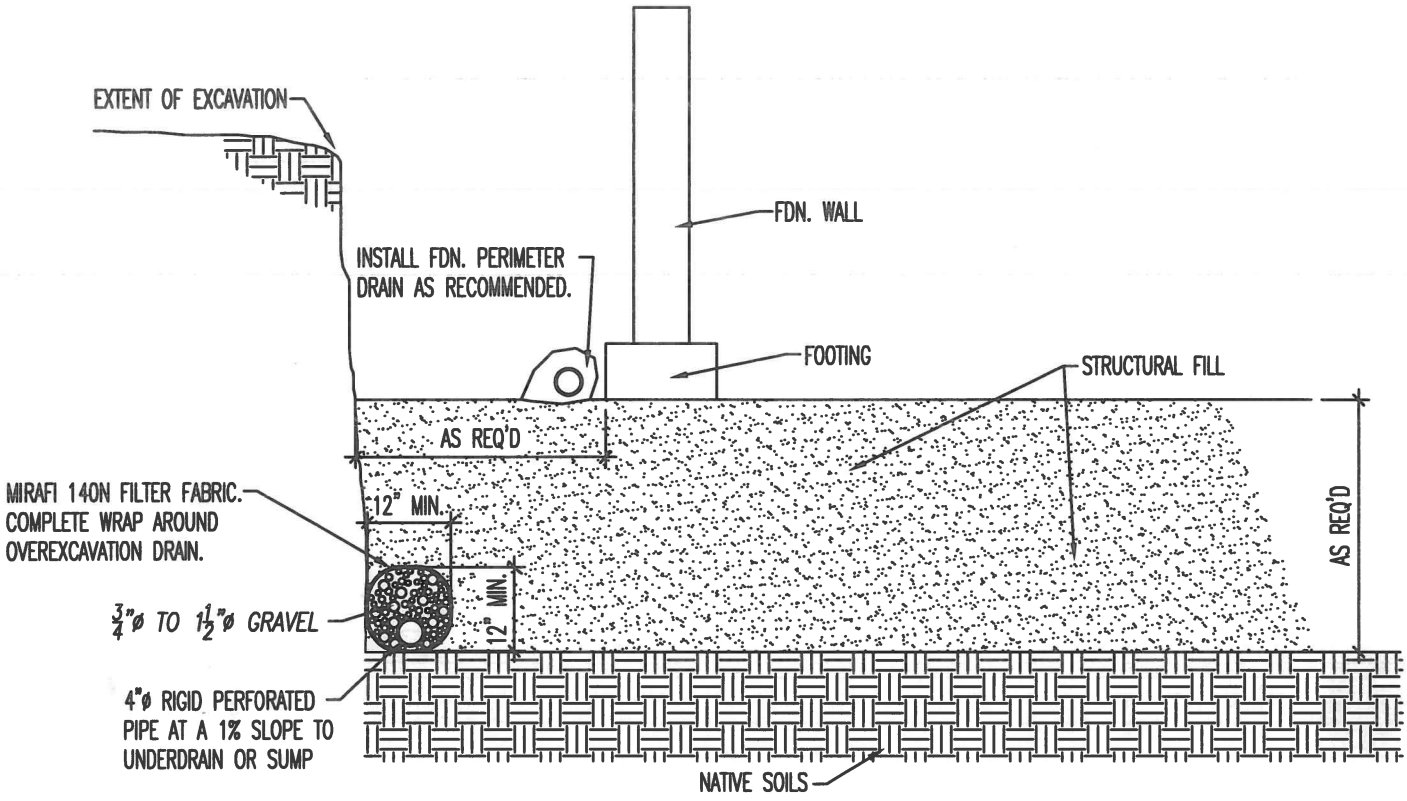
WRAP CAPILLARY BREAK DRAIN W/ MIRAFI 140N, COMPLETE WRAP.

DRAWN:	
CHECKED:	
DATE:	
SCALE:	
JOB NO.:	213235
FIG.	10

CAPILLIARY BREAK DRAIN DETAIL

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

REVISION	BY



OVEREXCAVATION DRAIN DETAIL

N.T.S.

NOTE:

EXTEND DRAIN TO SUMP AS REQ'D.

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

OVEREXCAVATION DRAIN DETAIL			
DRAWN:	DATE:	DESIGNED BY: D. STEGMAN	CHECKED:

JOB NO.: 213235

FIG. NO.: 11

APPENDIX A: Site Photographs

1

Looking northeast from southwest portion of the site near watertank.

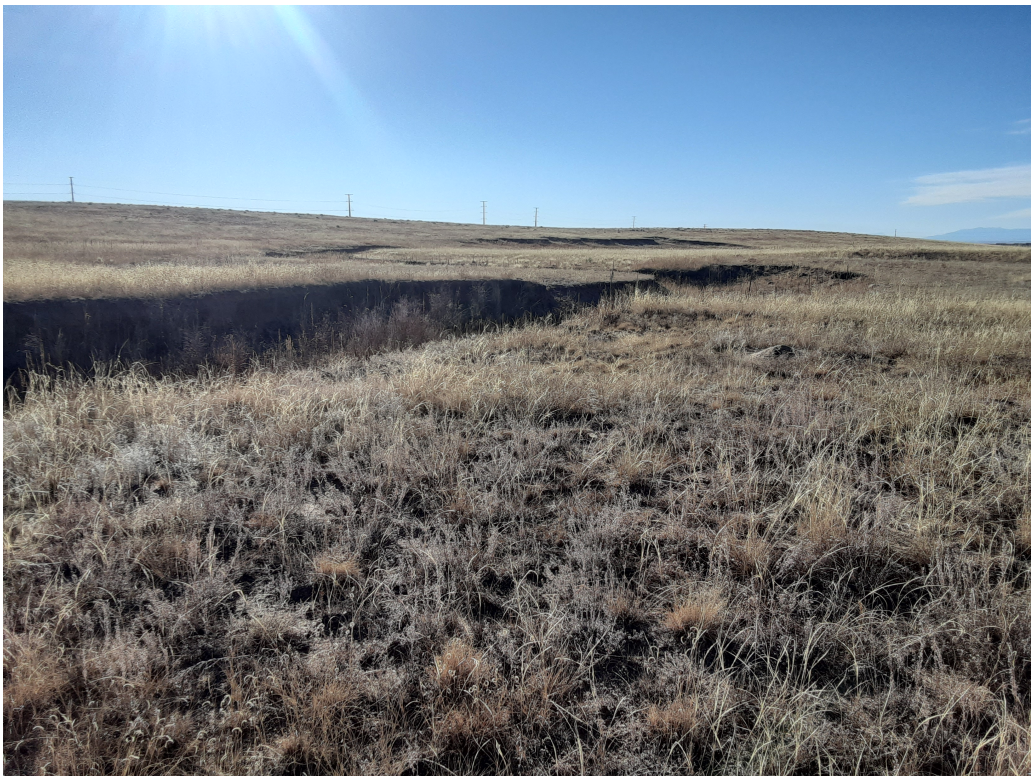
December 11,2021

2

Looking southwest from southwest portion of the site near watertank.

December 11,2021

Job No. 200393



3

Looking south from northcentral portion of the site.

December 11, 2021

4

Looking northeast from the west drainage near the central portion of the site.

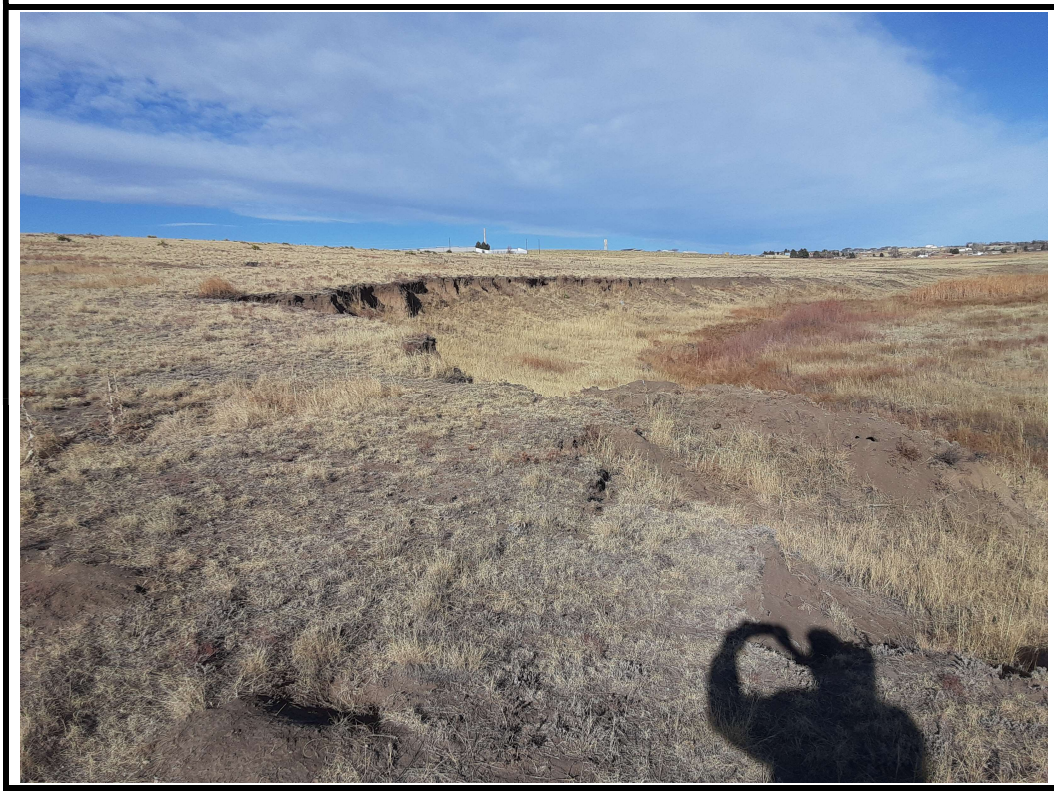
Job No. 200393

`

5

Looking southeast from the west drainage at central portion of the site.

December 11, 2021



6

Looking northeast from near the west drainage of the site.

December 11, 2021

Job No. 200393

`

7

Looking northeast towards the fork of the west drainage

December 11,2021

8

Looking west from the southeast portion of the site.

December 11, 2021

Job No. 200393

`

9

Looking northeast from the east drainage channel.

December 11,2021

10

Looking southwest from the east drainage channel

December 11, 2021

Job No. 200393

`

11

Looking north at an erosion channel along the east drainage.

December 11,2021

12

Looking west from the northeast portion of the site.

Job No. 200393

`

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 12/3/2021
Job # 213235

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			32	4.0	1	SAND, VERY CLAYEY, FINE GRAINED, TAN, DENSE, MOIST
5			50	5.8	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST
10			50/5"	10.7	3	
15			50/4"	7.2	3	
20			50/4"	14.1	3	

TEST BORING NO. 2
DATE DRILLED 12/3/2021
CLIENT NORWOOD DEVELOPMENT
LOCATION FREESTYLE NORTH

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			48	3.8	1	SAND, SILTY, FINE GRAINED, BROWN, DENSE, MOIST
5			50	6.7	2	CLAY, SANDY, TAN, HARD TO STIFF, MOIST
10			21	7.3	2	
15			15	3.2	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, MEDIUM DENSE, MOIST TO DRY
20			29	1.3	1	

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO: 213235
FIG NO: B-1

TEST BORING NO. 3
DATE DRILLED 12/3/2021
Job # 213235

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			22	15.7	2
5			31	16.4	2
10			50/6"	11.5	4
15			50/4"	9.6	3
20			50/4"	11.5	3

CLAY, SILTY, BROWN, STIFF TO VERY STIFF, MOIST

CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST

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

TEST BORING NO. 4
DATE DRILLED 12/3/2021
CLIENT NORWOOD DEVELOPMENT
LOCATION FREESTYLE NORTH

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			11	0.5	1
5			25	10.8	1
10			14	15.9	1
15			50/7"	10.2	4
20			50/9"	13.0	4

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

SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO. 213235
FIG NO. B-2

TEST BORING NO. 5
DATE DRILLED 12/3/2021
Job # 213235

REMARKS

WATER @ 13', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN TO RED BROWN, MEDIUM DENSE, DRY TO WET				
			21	1.5	1
5			12	1.7	1
	OXIDIZED				
10			27	8.1	1
	▼				
15			22	13.3	1
20			*	15.5	1

* - BULK SAMPLE TAKEN

TEST BORING NO. 6
DATE DRILLED 12/3/2021
CLIENT NORWOOD DEVELOPMENT
LOCATION FREESTYLE NORTH

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO MOIST				
			25	1.0	1
5			17	1.0	1
10			14	2.9	1
15			13	8.4	1
20			12	11.8	1

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

TEST BORING LOG

DRAWN:	DATE	CHECKED	DATE

JOB NO: 213235
FIG NO: B 3

TEST BORING NO. 7
DATE DRILLED 12/3/2021
Job # 213235

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			22	2.8	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO MOIST
5			17	4.9	1	
10			50/8"	4.7	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST
15			50/4"	4.6	3	
20			50/3"	10.1	3	

TEST BORING NO. 8
DATE DRILLED 12/3/2021
CLIENT NORWOOD DEVELOPMENT
LOCATION FREESTYLE NORTH

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			16	4.2	1	SAND, SILTY TO VERY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO DENSE, MOIST
5			25	3.6	1	
10			23	7.6	1	
15			32	7.2	1	
20			50/5"	5.8	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235
FIG NO.: B 4

TEST BORING NO. 9
DATE DRILLED 12/3/2021
Job # 213235

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			11	9.4	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, MEDIUM DENSE, MOIST
5			12	5.9	1	
10			20	13.3	1	
15			50/6"	4.7	3	SANDSTONE, VERY CLAYEY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST
20			50/5"	8.4	3	

TEST BORING NO. 10
DATE DRILLED 12/3/2021
CLIENT NORWOOD DEVELOPMENT
LOCATION FREESTYLE NORTH

REMARKS

DRY TO 20', 12/3/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			33	3.7	1	SAND, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, DENSE TO MEDIUM DENSE, DRY TO MOIST
5			19	1.4	1	
10			40	3.3	1	
15			32	5.2	1	
20			50/6"	14.0	3	SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST

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

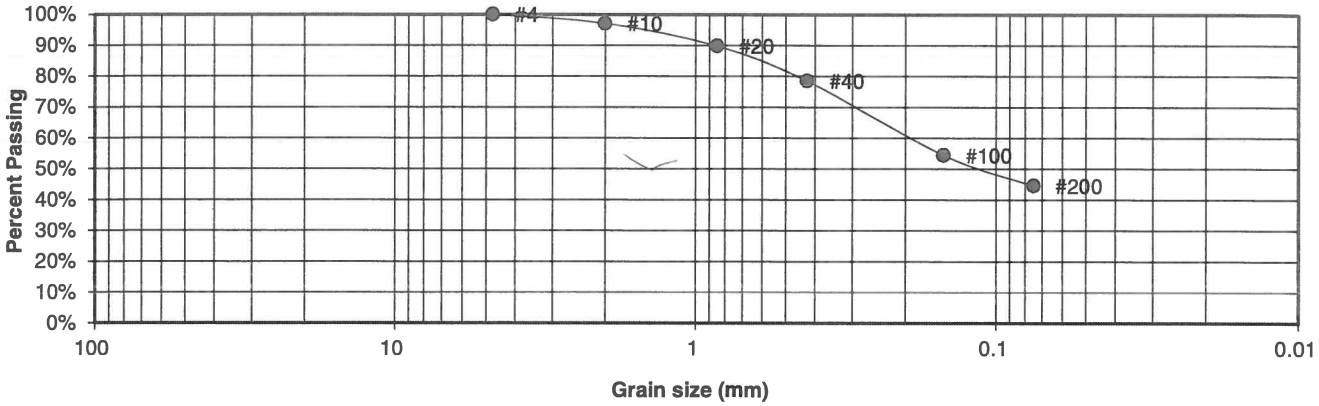
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO. 213235
FIG NO. B-5

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SC	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	1	PROJECT	FREESTYLE NORTH
TEST BORING #	1	JOB NO.	213235
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	97.2%
20	89.8%
40	78.5%
100	54.5%
200	44.6%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	31
Plastic Index	14

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

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

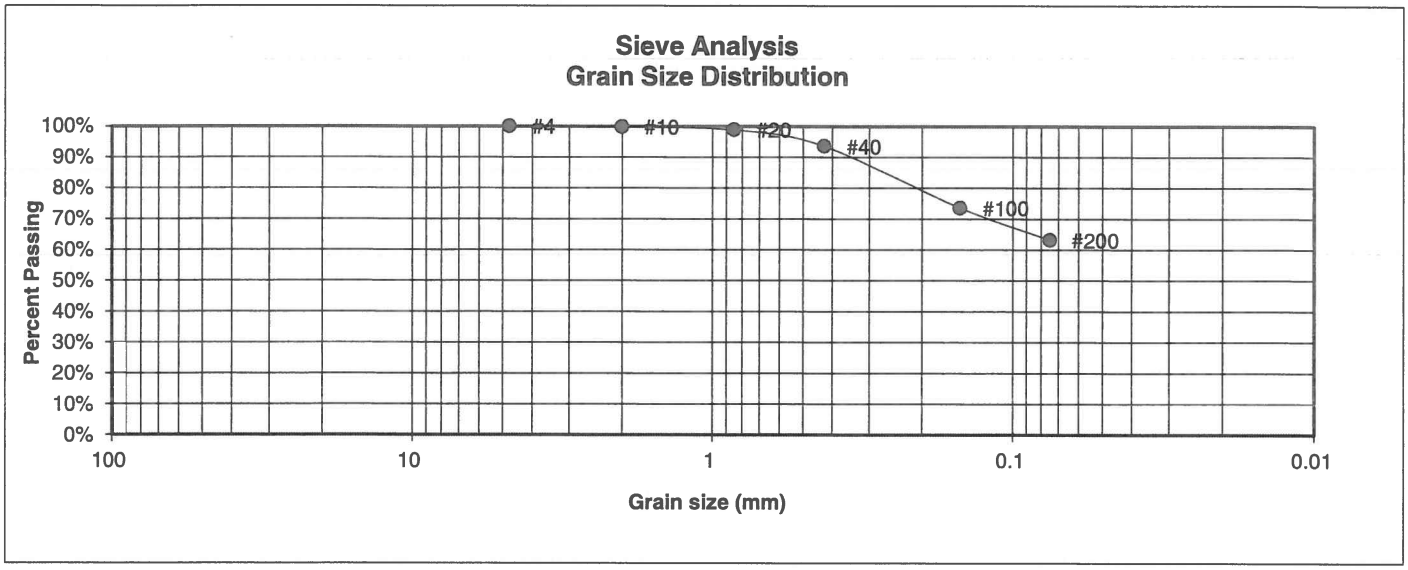
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C1

UNIFIED CLASSIFICATION	CL	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	2	PROJECT	FREESTYLE NORTH
TEST BORING #	2	JOB NO.	213235
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.9%
20	98.9%
40	93.5%
100	73.6%
200	63.2%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	33
Plastic Index	16

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

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

LABORATORY TEST RESULTS

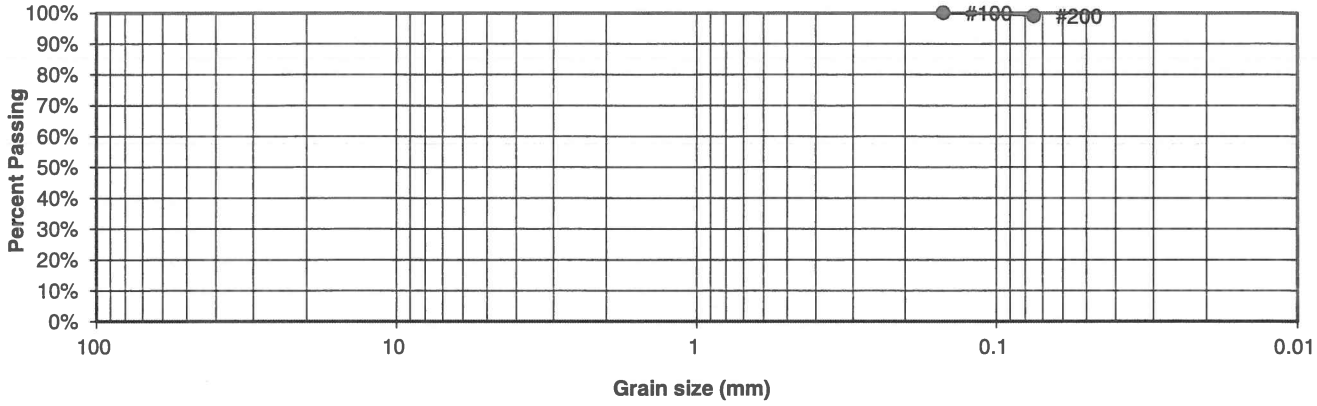
DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C2

UNIFIED CLASSIFICATION	CH	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	2	PROJECT	FREESTYLE NORTH
TEST BORING #	3	JOB NO.	213235
DEPTH (FT)	5	TEST BY	BL

Sieve Analysis
Grain Size Distribution



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

Atterberg Limits	
Plastic Limit	30
Liquid Limit	71
Plastic Index	41

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

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

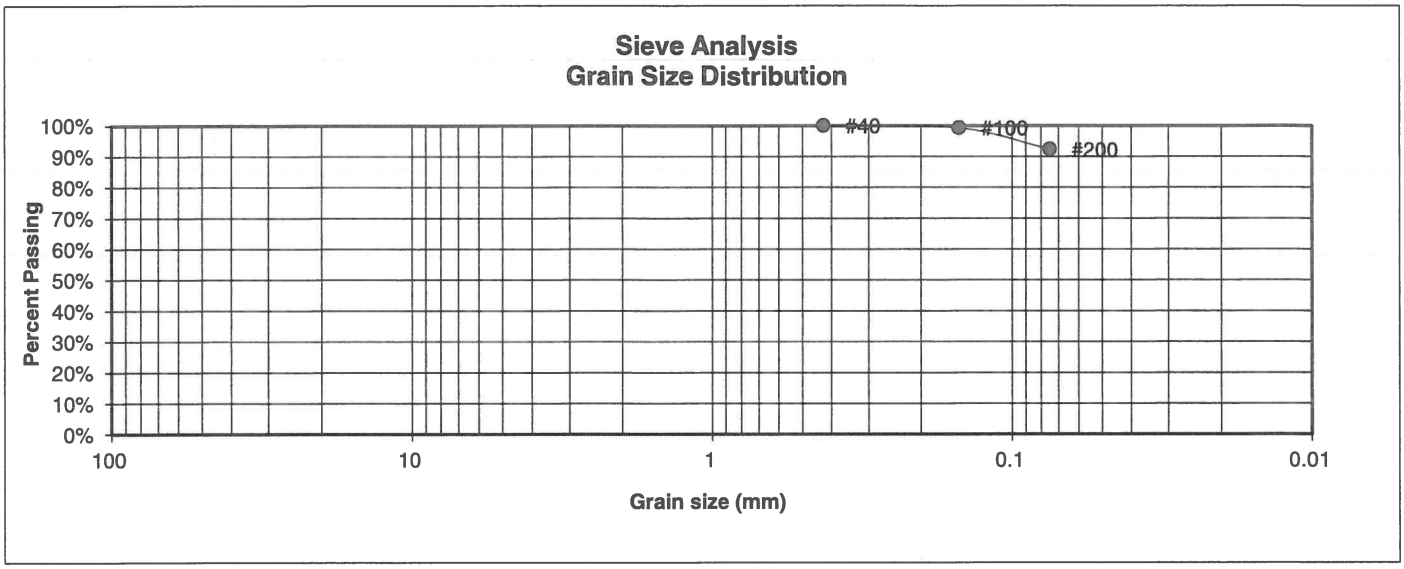
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C3

UNIFIED CLASSIFICATION	MH	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	4	PROJECT	FREESTYLE NORTH
TEST BORING #	4	JOB NO.	213235
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	
40	100.0%
100	99.3%
200	92.3%

Atterberg Limits	
Plastic Limit	30
Liquid Limit	51
Plastic Index	21

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

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

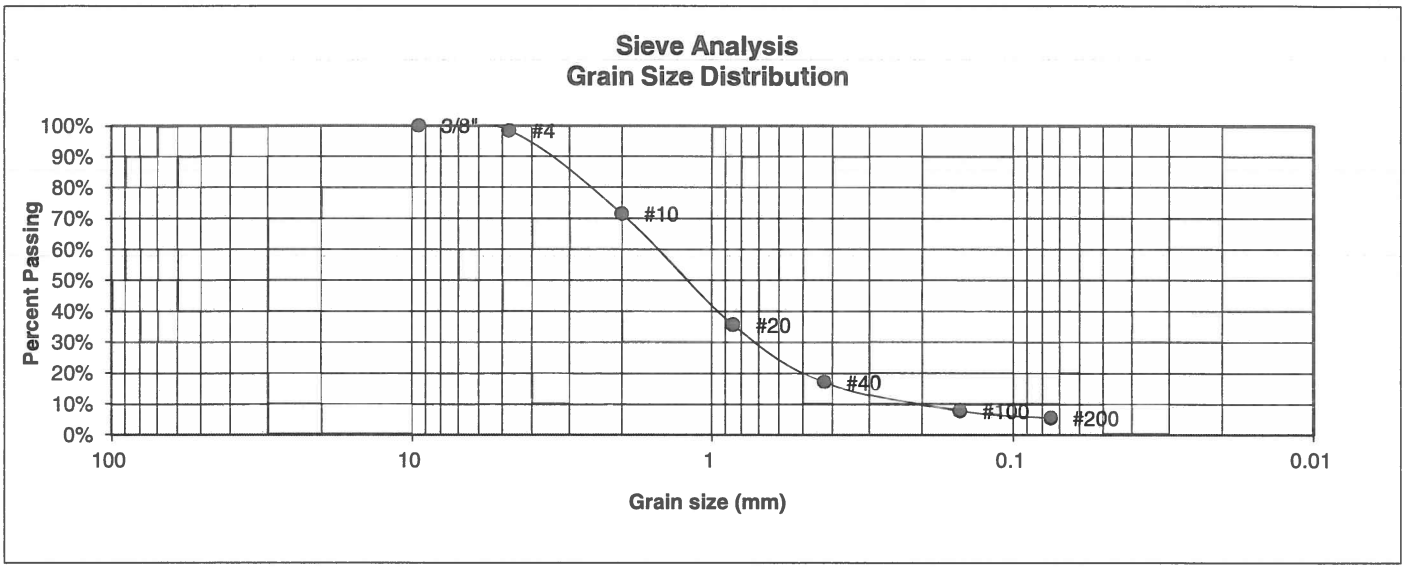
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C4

UNIFIED CLASSIFICATION	SM-SW	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	1	PROJECT	FREESTYLE NORTH
TEST BORING #	5	JOB NO.	213235
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	71.5%
20	35.6%
40	17.1%
100	7.9%
200	5.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

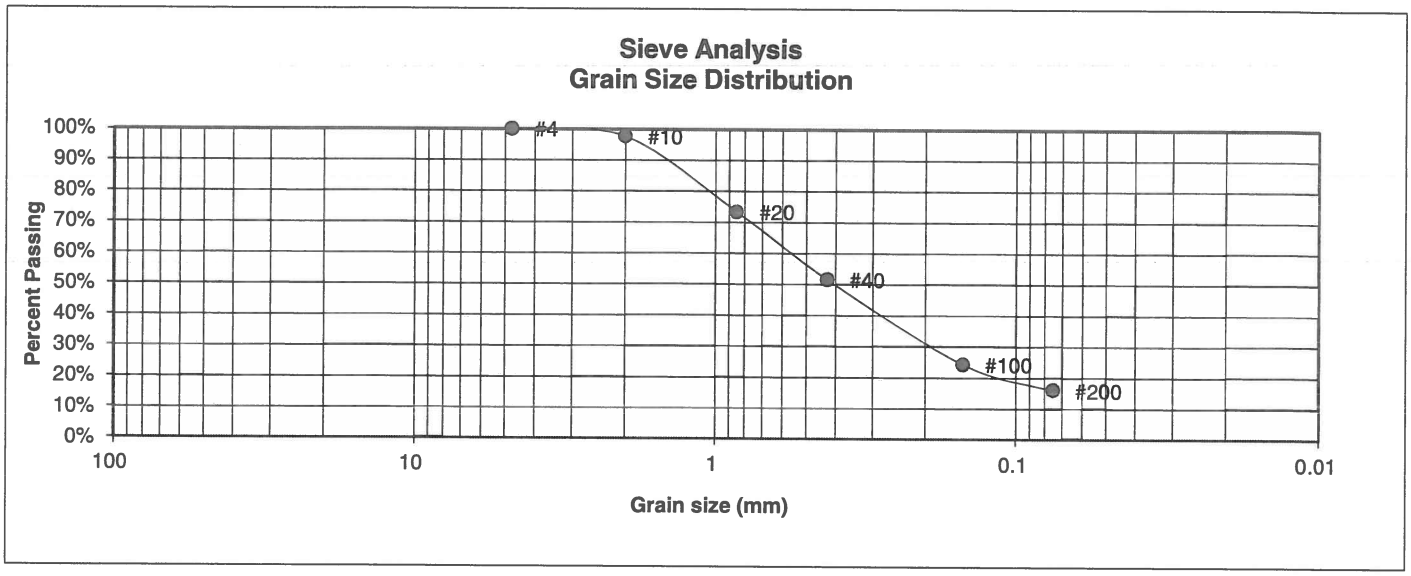
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C5

UNIFIED CLASSIFICATION	SM	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	1	PROJECT	FREESTYLE NORTH
TEST BORING #	6	JOB NO.	213235
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	97.7%
20	73.4%
40	51.5%
100	24.3%
200	15.9%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

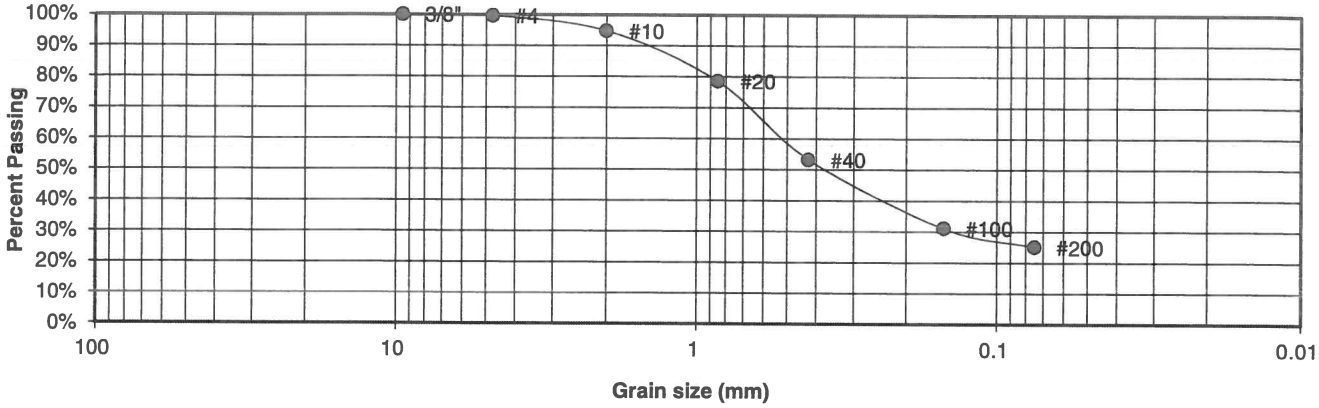
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C6

UNIFIED CLASSIFICATION	SM	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	3	PROJECT	FREESTYLE NORTH
TEST BORING #	7	JOB NO.	213235
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	94.7%
20	78.5%
40	53.3%
100	31.1%
200	25.1%

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)

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

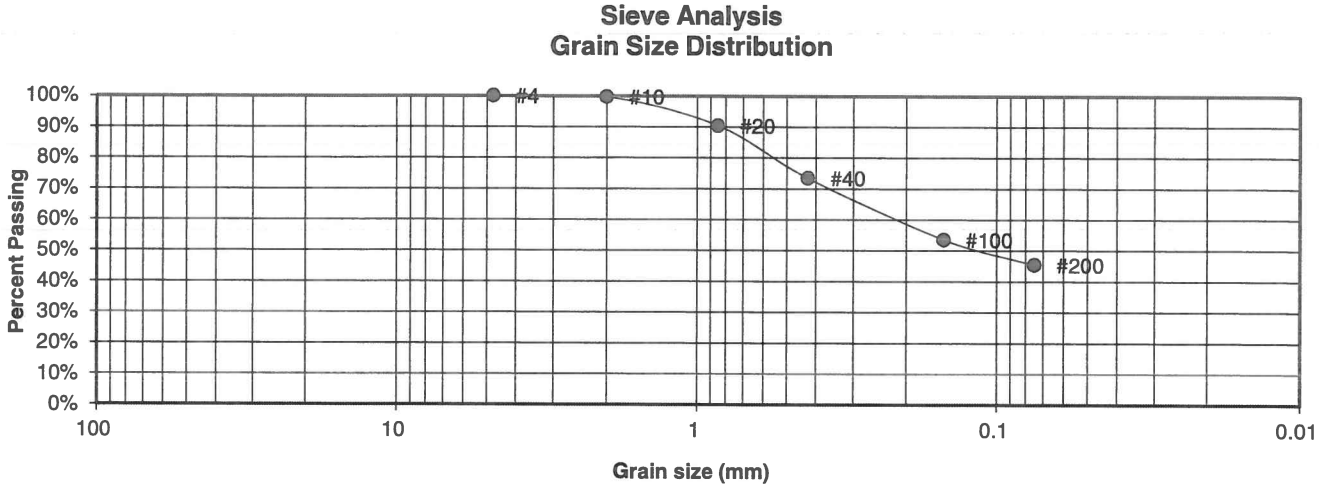
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C7

UNIFIED CLASSIFICATION	SM	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	1	PROJECT	FREESTYLE NORTH
TEST BORING #	8	JOB NO.	213235
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.7%
20	90.4%
40	73.4%
100	53.6%
200	45.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

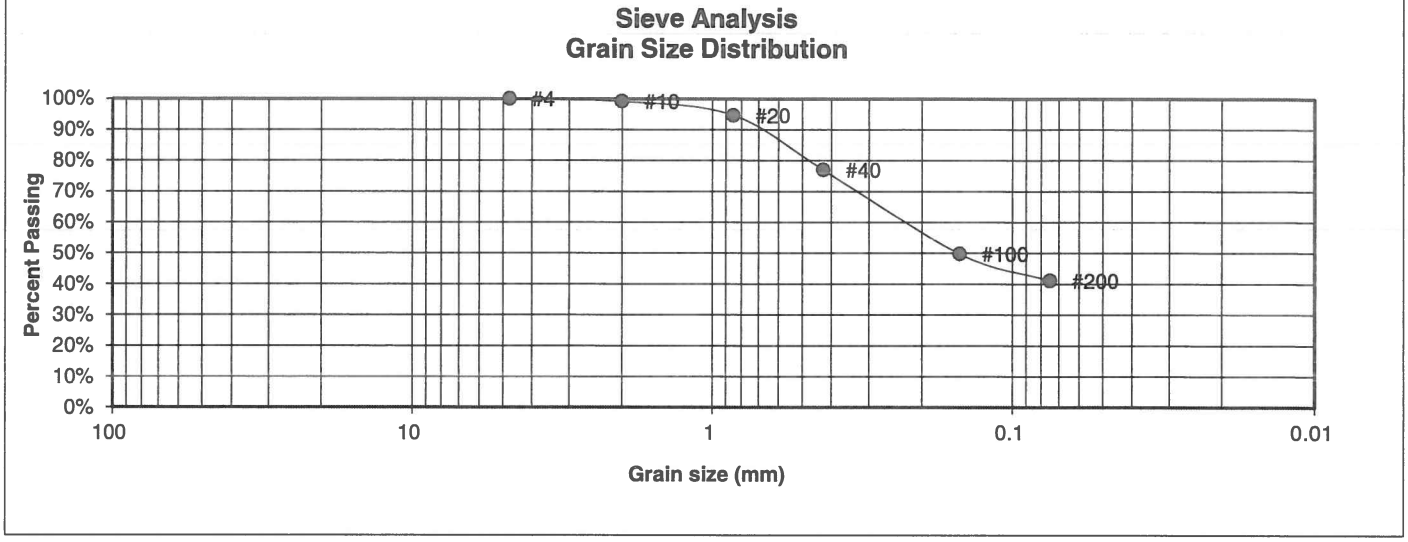
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C8

UNIFIED CLASSIFICATION	SC	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	3	PROJECT	FREESTYLE NORTH
TEST BORING #	9	JOB NO.	213235
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	94.7%
40	77.0%
100	49.8%
200	41.1%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

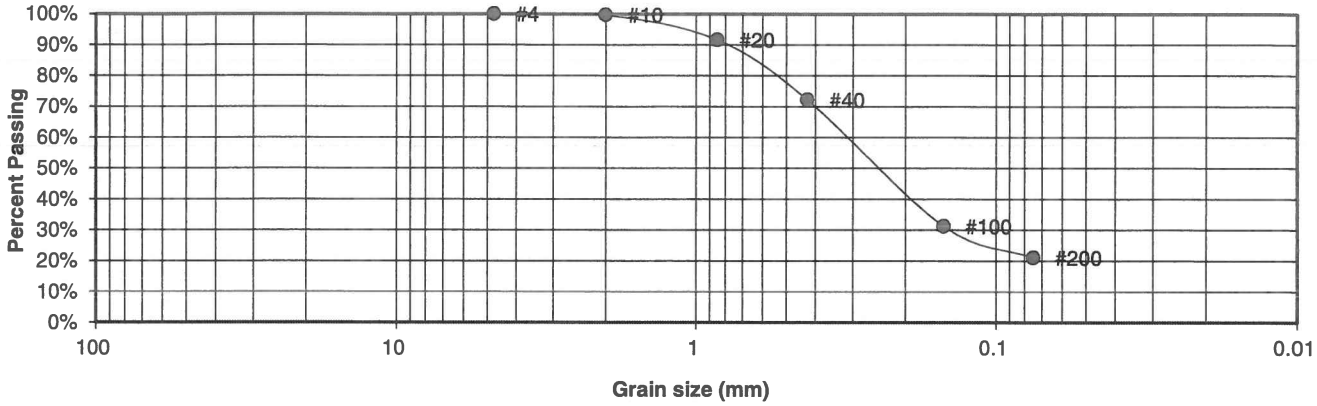
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C9

UNIFIED CLASSIFICATION	SM	CLIENT	NORWOOD DEVELOPMENT
SOIL TYPE #	1	PROJECT	FREESTYLE NORTH
TEST BORING #	10	JOB NO.	213235
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	99.7%
20	91.6%
40	72.2%
100	31.2%
200	21.1%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

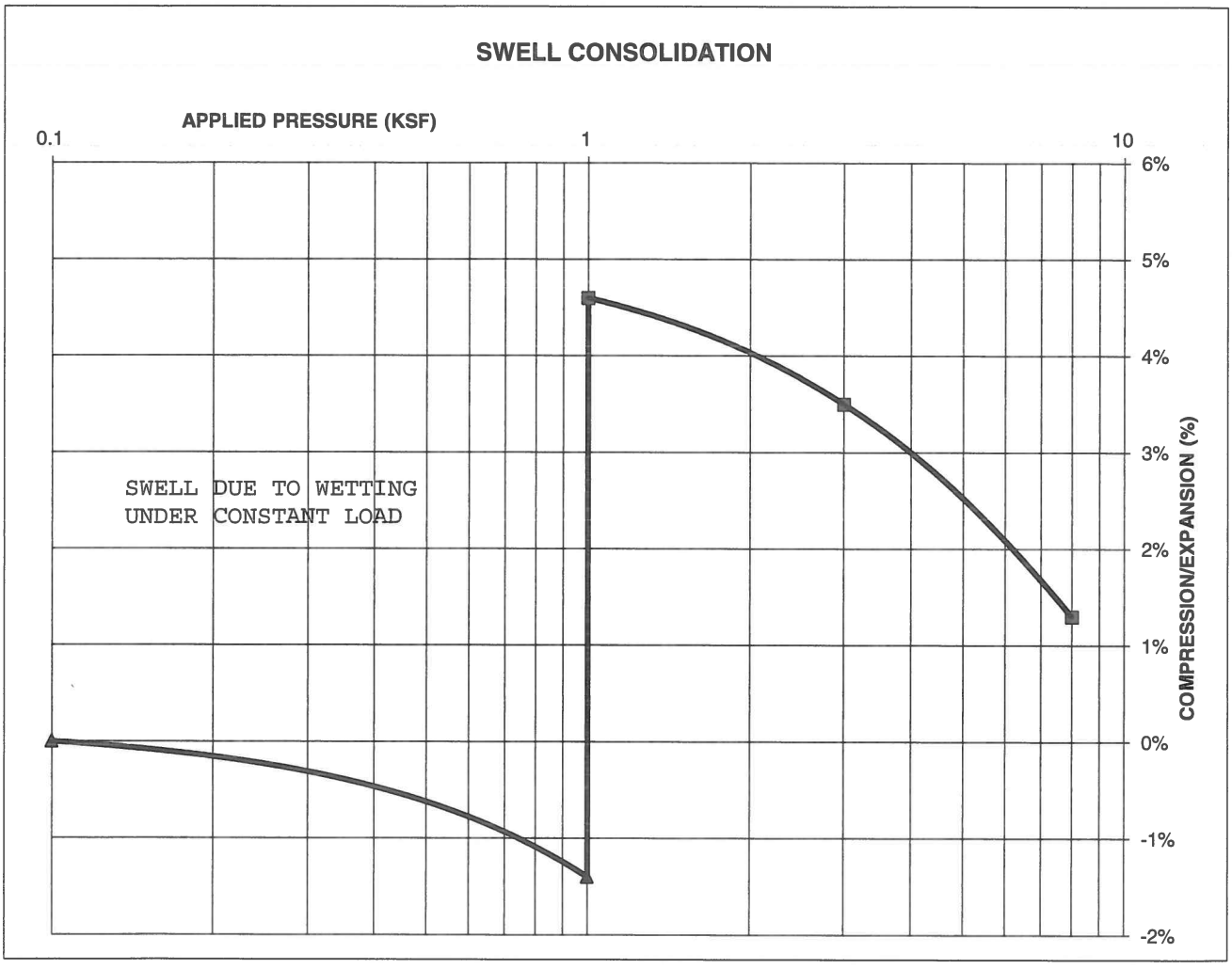
JOB NO.: 213235

FIG NO.: C10

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	5
DESCRIPTION	CH	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			104
NATURAL MOISTURE CONTENT			20.7%
SWELL/CONSOLIDATION (%)			6.0%

JOB NO. 213235
CLIENT NORWOOD DEVELOPMENT
PROJECT FREESTYLE NORTH



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

SWELL CONSOLIDATION
TEST RESULTS

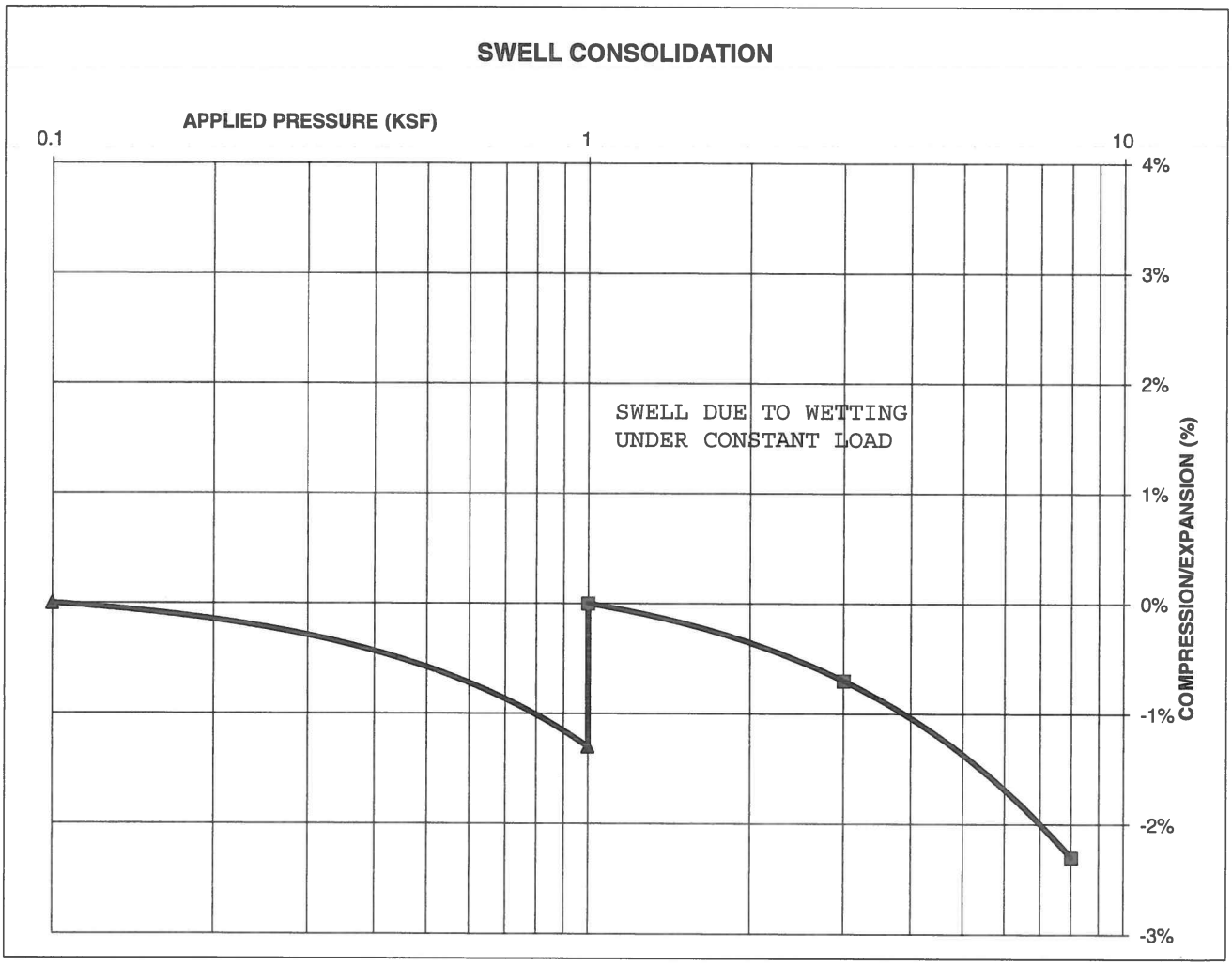
DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235
FIG NO.: C11

CONSOLIDATION TEST RESULTS

TEST BORING #	4	DEPTH(ft)	15
DESCRIPTION	MH	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			102
NATURAL MOISTURE CONTENT			21.9%
SWELL/CONSOLIDATION (%)			1.3%

JOB NO. 213235
CLIENT NORWOOD DEVELOPMENT
PROJECT FREESTYLE NORTH



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

SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235
FIG NO.: C12

CLIENT	NORWOOD DEVELOPMENT	JOB NO.	213235
PROJECT	FREESTYLE NORTH	DATE	12/8/2021
LOCATION	FREESTYLE NORTH	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	1	SC	0.00
TB-2	10	2	CL	<0.01
TB-3	5	2	CH	<0.01
TB-4	15	4	MH	<0.01
TB-7	15	3	SM	<0.01

QC BLANK PASS

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

LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 213235

FIG NO.: C13

APPENDIX D: Soil Survey Descriptions

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Blakeland

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Other soils

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

Pleasant

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

Data Source Information

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

El Paso County Area, Colorado

10—Blendon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3671
Elevation: 6,000 to 6,800 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

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

Description of Blendon

Setting

Landform: Terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 10 inches: sandy loam
Bw - 10 to 36 inches: sandy loam
C - 36 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 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 to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

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

Pleasant

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

Data Source Information

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

El Paso County Area, Colorado

12—Bresser sandy loam, cool, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlpd
Elevation: 6,300 to 6,800 feet
Mean annual precipitation: 13 to 19 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 140 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Bresser, cool, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser, Cool

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Tertiary aged alluvium derived from arkose

Typical profile

Ap - 0 to 5 inches: sandy loam
Bt1 - 5 to 8 inches: sandy loam
Bt2 - 8 to 27 inches: sandy clay loam
Bt3 - 27 to 36 inches: sandy loam
C - 36 to 80 inches: loamy coarse sand

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 to high (0.60 to 6.00 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 (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Truckton

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Yoder

Percent of map unit: 5 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XY214CO - Gravelly Foothill
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

97—Truckton sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2x0j2
Elevation: 5,300 to 6,850 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 85 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Truckton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Re-worked alluvium derived from arkose

Typical profile

A - 0 to 4 inches: sandy loam
Bt1 - 4 to 12 inches: sandy loam
Bt2 - 12 to 19 inches: sandy loam
C - 19 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 9 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
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Blakeland

Percent of map unit: 8 percent
Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Bresser

Percent of map unit: 7 percent
Landform: Interfluves, low hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Data Source Information

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