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SOIL, GEOLOGY, AND GEOLOGIC HAZARD STUDY
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYOR ROAD
PARCEL NO. 52260-00-001 & 52260-00-002
EL PASO COUNTY, COLORADO

Prepared for

PT Eagleview, LLC
1865 Woodmoor Drive, Suite 100
Monument, Colorado 80132

Attn: Joseph DesJardin

November 19, 2021

Respectfully Submitted,

ENTECH ENGINEERING, INC.

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Geologist

Reviewed by:

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11-19-2021
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Entech Job No. 212684
AAprojects/2021/212684 countysoil/geo

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1.0 SUMMARY

Project Location

The project site lies in portions of the NW¼ and SW¼ of Section 26, Township 12 South, Range 65 West of the 6th Principal Meridian in the northern portion of El Paso County, Colorado. The site is located approximately 14 miles southeast of Monument, Colorado, southwest of Burgess Road and Goodson Road.

Project Description

Total acreage involved in the subdivision is approximately 124 acres. The proposed development consists of thirty-eight rural residential lots. The development will utilize individual wells and on-site wastewater treatment systems.

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 seasonally shallow groundwater, potential seasonally shallow groundwater, drainage areas, artificial fill, expansive soils, and potentially unstable slopes along the main drainages on site. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

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

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the NW¼ and SW¼ of Section 26, Township 12 South, Range 65 West of the 6th Principal Meridian in the northern portion of El Paso County, Colorado. The site is located approximately 14 miles southeast of Monument, Colorado, southwest of Goodson Road and Burgess 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 south and southeast with some steeper slopes along the drainages on-site. The drainages on site flow in southeasterly and southerly directions through the property. No water was observed flowing in any of the drainages at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses, and weeds with areas of scattered pine trees and willow along the drainages. Site photographs are included in Appendix D. The approximate locations and directions of the photographs are indicated on Figure 3.

Total acreage involved in the proposed development is approximately 124 acres with thirty-eight rural residential lots. The proposed residential lots are approximately 2.5 to 4.2 acres each. The area will be serviced by individual wells and on-site wastewater treatment systems. The proposed Site Plan/Testing Location Map is presented in Figure 3.

The site was previously investigated as part of a Soil, Geology, and Wastewater Study, performed by Entech Job No. 80503 (Reference 1). Six (6) previously drilled test borings, and eight (8) percolation test were performed on the site to determine general suitability of the site for the use of on-site wastewater treatment systems. The previous report/investigation was utilized to evaluate the site as part of this investigation.

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 any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. for the previous report referenced above (Reference, 1) and verified on October 13, 2021.

Test borings from the Soil, Geology, and Wastewater Study, performed by Entech Job No. 80503, were used as part of the investigation. Six (6) test borings, and eight (8) percolation test were previously performed on the site to determine general suitability of the site for residential construction and the use of on-site wastewater treatment systems respectively. Eight (8) tactile test pits were recently excavated and evaluated by Entech Engineering, Inc. personnel due to the current on-site wastewater regulations. The locations of the test borings, and test pits are indicated on the Site Plan/Testing Location Map, Figure 3. The Test Pit and Test Boring Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis, ASTM D-422, and Atterberg Limits, ASTM D-4318. Results of the laboratory testing are included in Appendix C. A

Summary of Laboratory Test Results is presented in Table 1. A Summary of Laboratory Test Results, Test Boring Logs from the previous investigation are included in Appendix D.

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 southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in an easterly direction. The rocks in the area of the site are sedimentary in nature, and typically Tertiary to Upper 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 major drainages on site. Man-made soils exist as fill berms and earthen dams. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has mapped two soil types on the site (Figure 4). In general, they vary from coarse sandy loam to gravelly sandy loam. The soils are described as follows:

Type	Description
19	Columbine Gravely sandy loam, 0 to 3% slopes
71	Pring Coarse Sandy Loam, 3-8% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to typically have slow to rapid permeabilities. The majority of the soils have

moderate to rapid permeabilities. Limitations described for local soils include shrink-swell potential. Roads may need to be designed to minimize frost-heave potential. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation, erosion control blankets, and waddles. The majority of the soils have been described to have moderate erosion hazards.

5.3 Site Stratigraphy

The Falcon NW Quadrangle Geology Map is presented in Figure 5 (Reference 4). These maps in conjunction with site specific mapping were used to prepare the site Geology Map. The Geology Map prepared for the site is presented in Figure 6. Four 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 berms and small earth dam embankments on-site.

Qal **Recent Alluvium of Quaternary Age**: These are recent stream deposits in the channels of the main drainages on site.

Qao_1 **Old Alluvium one of late middle - Pleistocene Age:** These deposits are light brown silty sands which contain an abundance of gravels. They commonly occur as stream terrace deposits above the valley floors. Old alluvium one may correlate with the Louviers Alluvium in the Denver area.

Tkd **Dawson Arkose of Tertiary to Cretaceous Age:** The Dawson formation consists of arkosic sandstone with interbedded lenses of ***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 colluvial and residual soil. These materials consist of silty to clayey sands and gravels deposited by the action of sheetwash and gravity. Some residual soils derived from the in-situ weathering of the bedrock on site exist in this mapping. These soils are overlying the Dawson Formation in many places on this site.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the NW Falcon Quadrangle* distributed by the Colorado Geological Survey in 2012 (Reference 4), and the *Geologic Map of the Denver 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 5). The Test Pits and Test Borings were also used in evaluating the site and are included in Appendices B and D. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

The soils encountered in the test pits, test borings and the profile holes of the percolation tests can be grouped into three general soil types. The soils were classified using the Unified Soil Classification System (USCS). Several soil descriptors are results of the previously studied Soils, Geology, and Waste Water Study, performed by Entech Engineering, Inc. (Reference 1). Descriptions of the soil types are discussed as follows:

Soil Type 1: consists of slightly silty to silty and clayey sand (SW-SM, SC). The sands were encountered in the upper soil profile of nearly all of the profile holes and test borings. These soils were encountered at loose to dense states and moist conditions. The clayey sands are slightly to highly expansive. Swell pressures of 694 psf and 2233 psf were measured on the clayey sands. The slightly silty and silty sands are generally considered non-expansive.

Soil Type 2: is a sandy to silty clay soil (CL), encountered in the upper soil profile in Test Boring No. 2 and Profile Hole Nos. 2 and 4. The clays were encountered at soft to stiff consistencies and moist conditions. A swell pressure of 2060 psf was measured in the FHA Swell Test. This swell is in the high expansion range.

Soil Type 3: consists of silty to clayey sandstone bedrock (SC, SM-SC). The sandstone was encountered in all of the test borings and in Profile Hole Nos. 2, 3, 7 and 8 at depths ranging from the surface to 9 feet below the surface. The sandstone was encountered at very dense states and moist conditions. The clayey sandstone is slightly expansive. FHA Swell pressures of 425 psf and 447 psf were measured on the sandstone.

The Test Pit Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. Test Pit Boring Logs and Laboratory Test Results from the previous investigation are presented in Appendix D (Reference, 1).

5.5 Groundwater

Groundwater was not encountered in the test borings which were drilled to 10 to 15 feet. However, seasonally shallow groundwater evidence was encountered in Test Pit Nos. 3 and 6 at depths of 3 to 5 feet below ground surface. The remaining Test Pits which were excavated to 5 to 8 feet did not encounter water or signs of seasonally occurring groundwater. Areas of seasonal and potentially seasonal shallow groundwater have been mapped in low-lying areas and in the drainages on-site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time.

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

6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

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

psw *Potentially Seasonal High 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 minor drainage areas which can be avoided by the proposed development. Construction in any portions of these areas, if required, should follow these precautions.

Mitigation: In these locations, foundation in areas subject to severe frost heave potential should penetrate to a sufficient depth so as to discourage the formation of ice lenses beneath foundations. At this location and elevation, a foundation depth of 30 inches is recommended for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, a subsurface perimeter drain will be necessary to help prevent the seepage of water into areas located below grade. Any grading in these areas should be done in a manner that directs surface flow around construction to avoid areas of ponded water. Areas of organic material will require removal before any filling is done. Additionally, septic systems are not recommended in these areas unless analyzed for the hazard of high groundwater. Groundwater may be at sufficient depth as to not affect septic fields or foundations. Further investigation is recommended prior to construction in these areas to further delineate groundwater depths.

sw *Seasonal High Groundwater Area (Constraint)*

These are areas within the main drainages on site and behind earthen dams. Water was not observed flowing in these drainages at the time of this investigation, however, vegetation and soils observed indicate water is near or at the surface during periods of high moisture. Small areas of ponded water were observed in some of the drainages. These areas also contain frost heave potential and highly organic soils.

Mitigation: Because the majority of the areas mapped as seasonally wet lie within defined drainages, we do not recommend structures be built within these areas. Lots are of sufficient size that these areas can be avoided as building sites. Should foundations encroach on seasonal shallow groundwater areas, the recommendations for potentially seasonal shallow groundwater mitigation should be followed. Additionally, basements or septic fields would not be recommended in these areas. Septic fields should be located

a minimum of 25 feet away from the drainage areas. Any construction in these areas should be done in a manner that does not create ponded water. Where roadways or driveways cross drainages, adequately sized culverts should be installed. No areas of the site are mapped within any floodplain zones according to the FEMA Map No. 08041CO535G, Figure 10 (Reference 5). A 100-year floodplain along the main drainage on-site is indicated on Figures 3 and 9. Finished floors must be a minimum of one foot above the 100-year floodplain level. Specific floodplain locations and drainage studies are beyond the scope of this report.

ex *Expansive Soils (Constraint)*

Expansive soils were encountered in some of the test borings and profile holes of some of the percolation tests drilled on site. Additionally, the area of the site has been mapped as having moderate swell potential according to the *Map of Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado* distributed by the Colorado Geological Survey in 1974 (Reference 6). The expansive soils encountered on site are highly sporadic, therefore, none have been indicated on the map. The soils are slightly to highly expansive and can cause differential movement in the structure foundations.

Mitigation: Should expansive soils be encountered beneath the foundation, mitigation will be necessary. Mitigation of expansive soils may include overexcavation and replacement with non-expansive structural fill at 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. Drilled pier foundation systems are another option in areas of highly expansive soils. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement with compacted non-expansive soils has been successful in minimizing slab movements. Final recommendations should be determined after additional investigation of each building site.

pu *Potentially Unstable Slopes (Hazard)*

These are in areas of steep slopes due to erosion along some of the drainages on site. Due to lot sizes, these slopes can be avoided by construction. A minimum setback of 30 feet should be maintained between buildings and the crest of the slopes. In areas where

construction encroaches on potentially unstable slopes, regrading and erosion protection may be necessary. Erosion protection may also be necessary in areas where high water is actively cutting the toe of the slopes to prevent further erosion.

af *Artificial Fill (Constraint)*

These are areas of man-made fill associated with earthen dams on-site.

Mitigation: The earthen dams lie within defined drainages and should be avoided as building sites. Foundations may penetrate smaller berms on site. Should any uncontrolled fill be encountered in other portions of the site beneath foundations, removal and recompaction at 95% of its maximum Modified Procter Dry Density, ASTM D-1557 will be required.

6.1 Relevance of Geologic Conditions to Land Use Planning

The development will consist of rural residential lots. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The most significant problems affecting development will be those associated with the drainages on site that can be avoided or properly mitigated during construction on each lot. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices or avoidance.

The upper materials are typically at medium dense to dense states. Areas of loose soils were encountered that may require recompaction. The medium dense to dense granular soils encountered in the upper soil profiles of the test borings and test pits should provide good support for foundations. Loose soils, if encountered beneath foundations or slabs, will require removal of the upper 2 to 3 feet of loose material and recompaction. Expansive soils, although sporadic, were encountered. Shallow bedrock was encountered in portions of the site. Expansive clayey sandstone and claystone are common in the Dawson Formation, which may require mitigation.

Foundations anticipated for the site are standard spread footings being on granular site soils or sandstone. Overexcavation in areas of expansive soils or loose soils may be required. 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 seasonal shallow groundwater and potentially seasonal shallow groundwater were encountered on site. The site is not mapped in a floodplain zone (Figure 7, Reference 7). Areas of seasonal and potentially seasonal shallow groundwater were observed across the site. In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and frost heave potential. These areas lie within low-lying areas along the drainage in the central portion of the subdivision and in the low-lying areas and minor drainages across the site. Water was not observed in any of the minor drainages at the time of our site investigation. Due to the size of the lots and the proposed development, the majority of these areas can be avoided by construction on the lots. Regrading can also mitigate some minor drainage swales on some of the lots. Structures should not block drainages. Any site grading should be done in such a manner as to not create areas of ponded water around structures or septic fields. Finished floor levels must be a minimum of one foot above the floodplain level. Septic fields should not be located in drainage areas due to the potential for periodic high groundwater conditions. Specific floodplain locations and drainage studies are beyond the scope of this report.

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

7.0 ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 7), the area is mapped with floodplain, valley fill and upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 8), areas of the site are mapped with Alluvial Fan deposits: sand and probable aggregate resource (A3). According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 9), the area of the site has been mapped as "Good" for industrial minerals. However, considering the 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 9), 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 9).

The site has been mapped as "Fair" for oil and gas resources (Reference 9). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

8.0 EROSION CONTROL

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

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils 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.

9.0 EMBANKMENT CONSTRUCTION RECOMMENDATIONS

In general, the site soils are suitable for embankment construction. Groundwater may be encountered in cuts for the proposed detention ponds across the site. If excavations encroach on the groundwater level unstable soil conditions may be encountered.

Any areas to receive fill should have all topsoil, organic material or debris removed. Fill must be properly benched and compacted to minimize potentially unstable conditions in slope areas. Fill slopes should be 3:1 or flatter on the upstream faces or 2.5:1 or flatter on the downstream face. The subgrade should be scarified and moisture conditioned to within 2% of optimum moisture content and compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557, prior to placing new fill. Areas receiving fill may require stabilization with rock or fabric if shallow groundwater conditions are encountered.

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

10.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some minor 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 septic 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 PT Eagleview, 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 PT EAGLEVIEW
PROJECT ARROYA AND RAYGOR
JOB NO. 212684

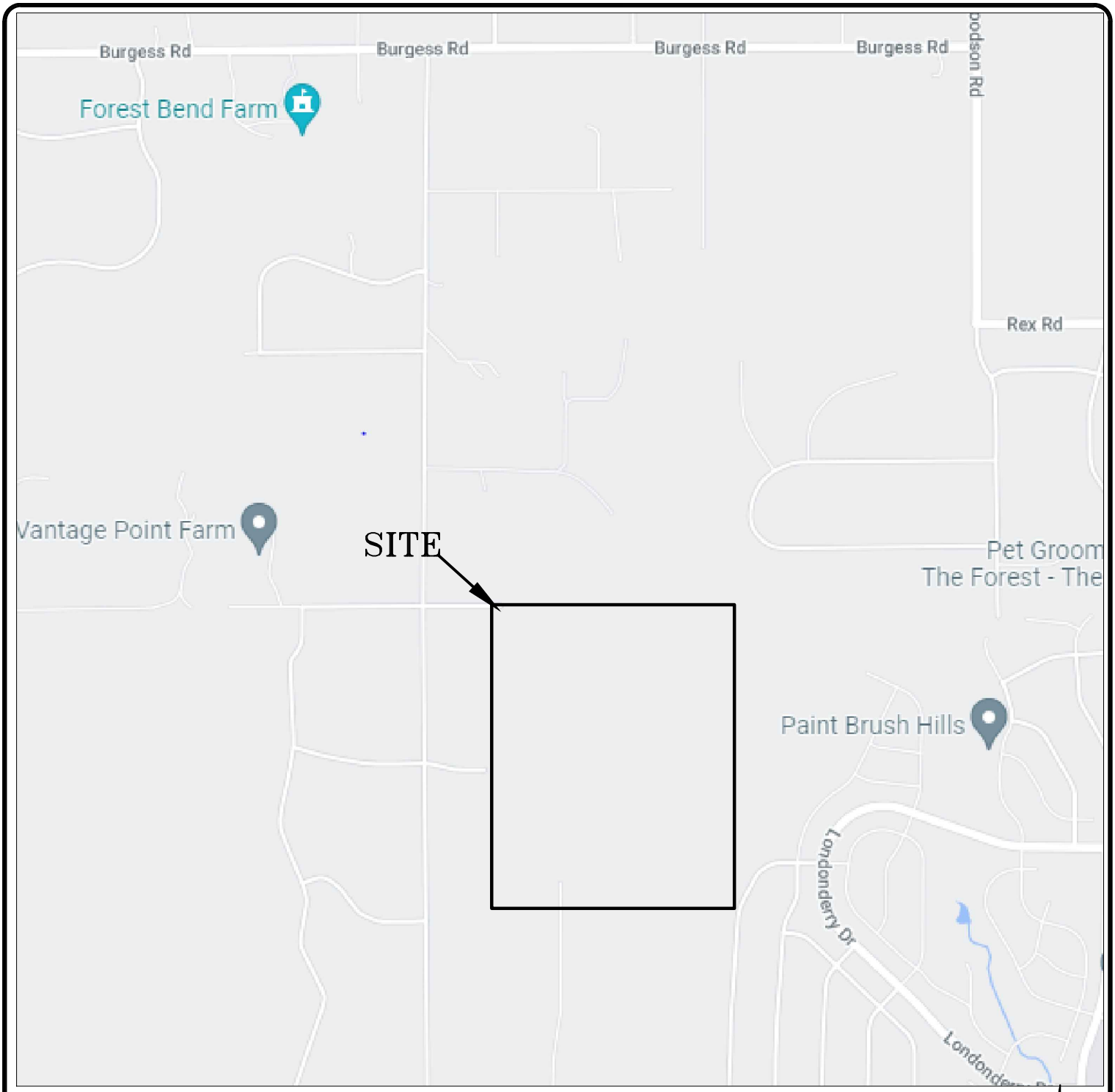
SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	TP-1	3			1.4						SW	SAND
1	TP-2	1-2			12.6						SM	SAND, SILTY
1	TP-4	3-4			11.2						SM-SW	SAND, SLIGHTLY SILTY
1	TP-5	1-2			10.5						SM-SW	SAND, SLIGHTLY SILTY
1	TP-5	3			7.3						SM-SW	SAND, SLIGHTLY SILTY
1	TP-6	1.5			35.1						SC	SAND, CLAYEY
1	TP-6	2.5			6.3						SM-SW	SAND, SLIGHTLY SILTY
1	TP-7	2			3.1						SW	SAND
1	TP-7	5			9.6						SM-SW	SAND, SLIGHTLY SILTY
1	TP-8	4			15.8						SM	SAND, SILTY
2	TP-3	2-3			78.3						CL	CLAY, SANDY

Table 2: Summary Test Boring Results

Test Boring No.	Depth to Bedrock (ft.)
1	7
2	9
3	0
4	5
5	1
6	4

Soils, Geology, and Wastewater Study prepared by Entech Job No. 80503

FIGURES



ENTECH ENGINEERING, INC.
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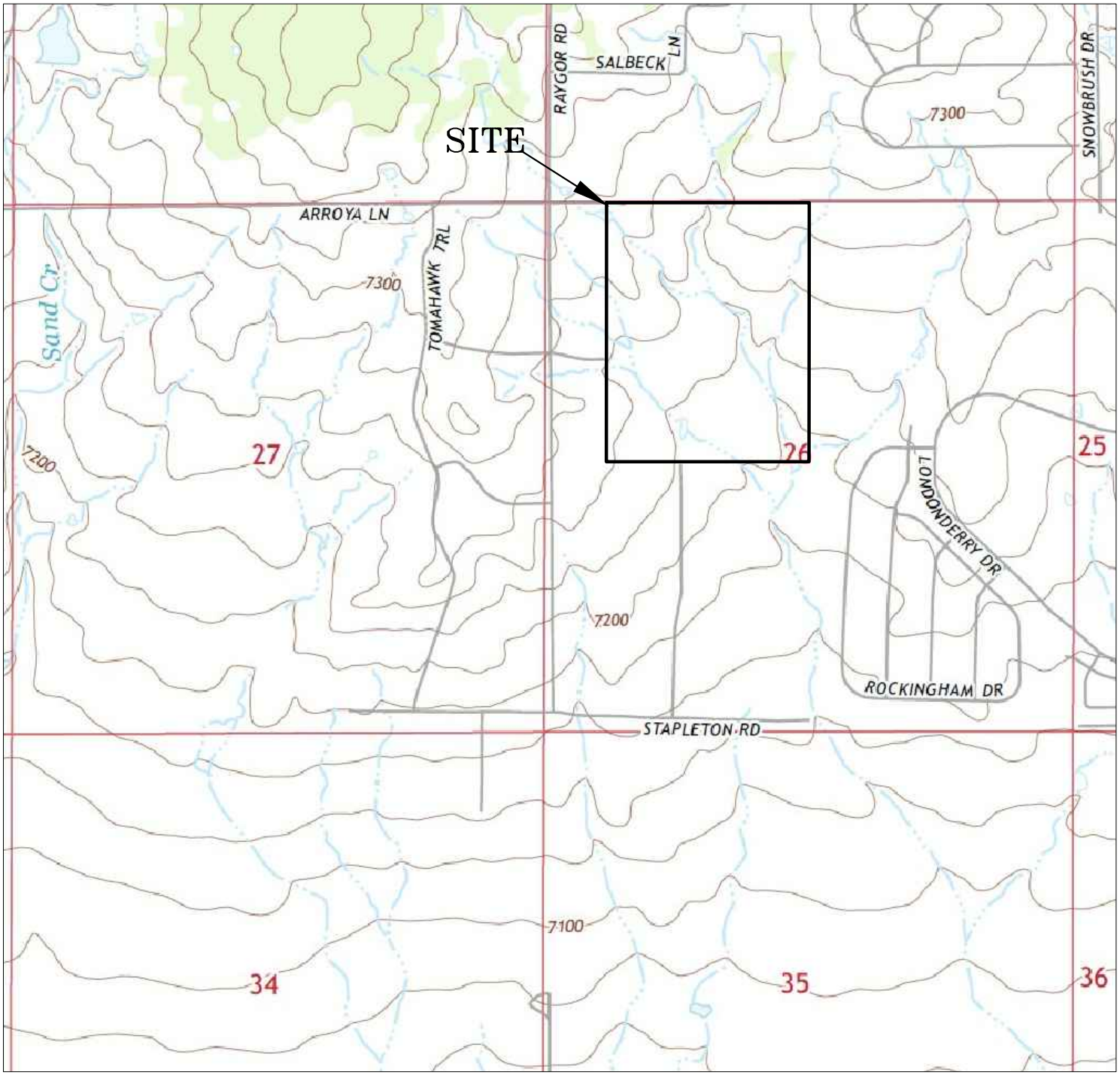
VICINITY MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN:	DATE:	CHECKED:	DATE:
JHR	11/8/21	LLL	

JOB NO.: 212684

FIG NO.: 1



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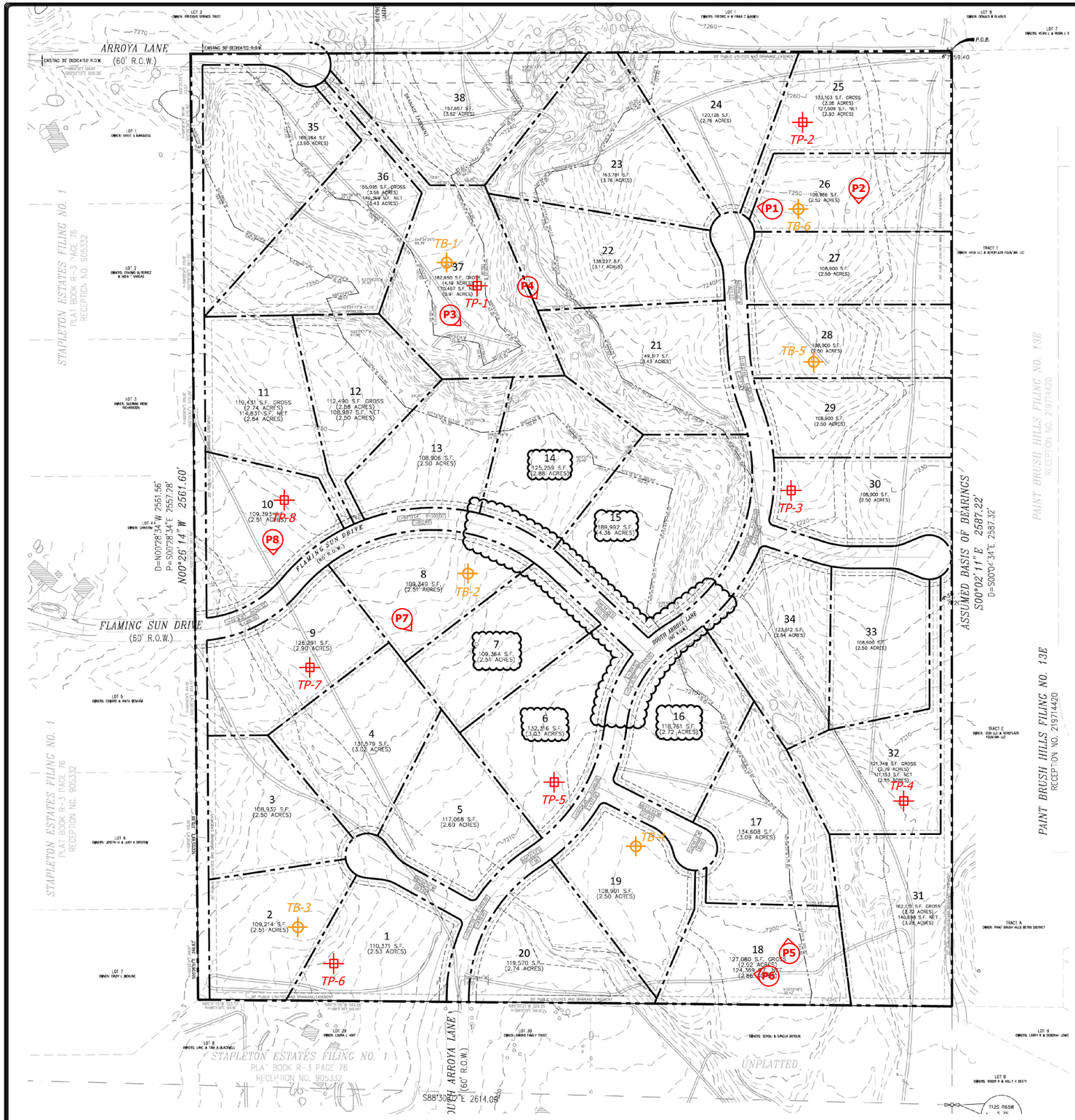
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

USGS MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN:	DATE:	CHECKED:	DATE:
JHR	11/8/21	LLL	

JOB NO.: 212684

FIG NO.: 2

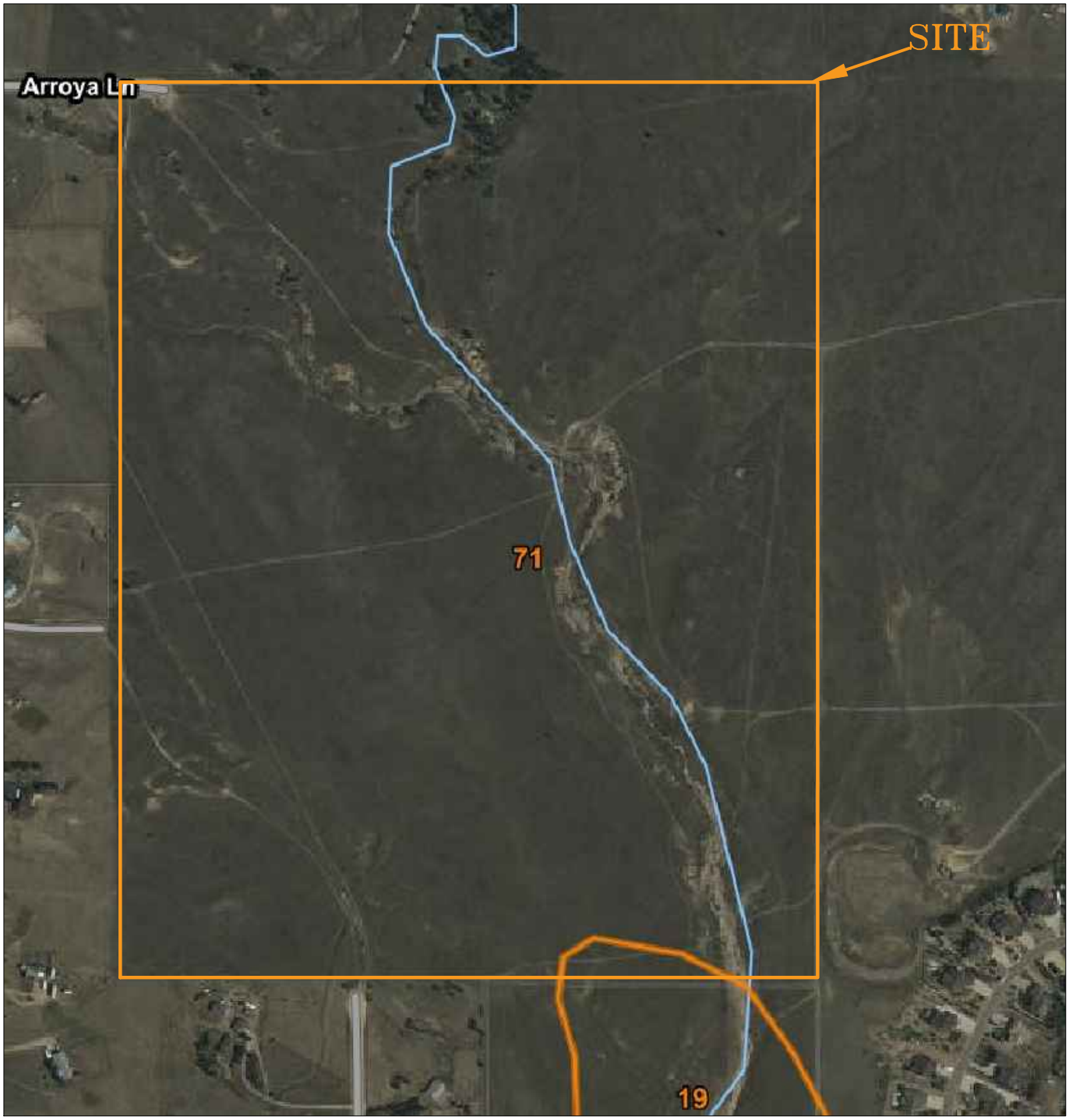


REVISION	BY

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

SITE PLAN/TEST BORING LOCATION MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN	JHR
CHECKED	LLL
DATE	11/4/21
SCALE	AS SHOWN
JOB NO.	212884
FIGURE No.	3



N

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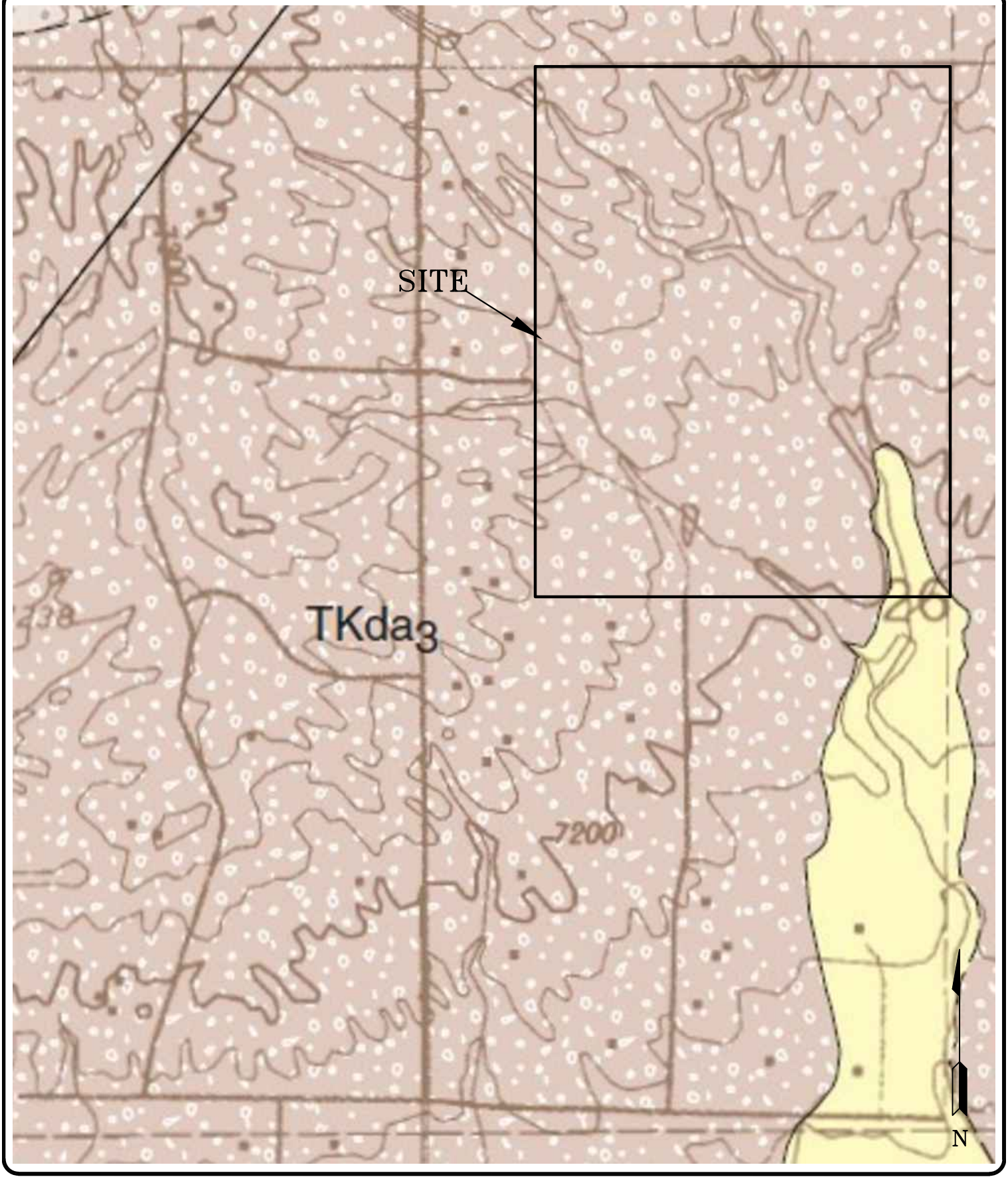
SOIL SURVEY MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN:	DATE:	CHECKED:	DATE:
JHR	11/8/21	LLL	

JOB NO.: 212684

FIG NO.: 4



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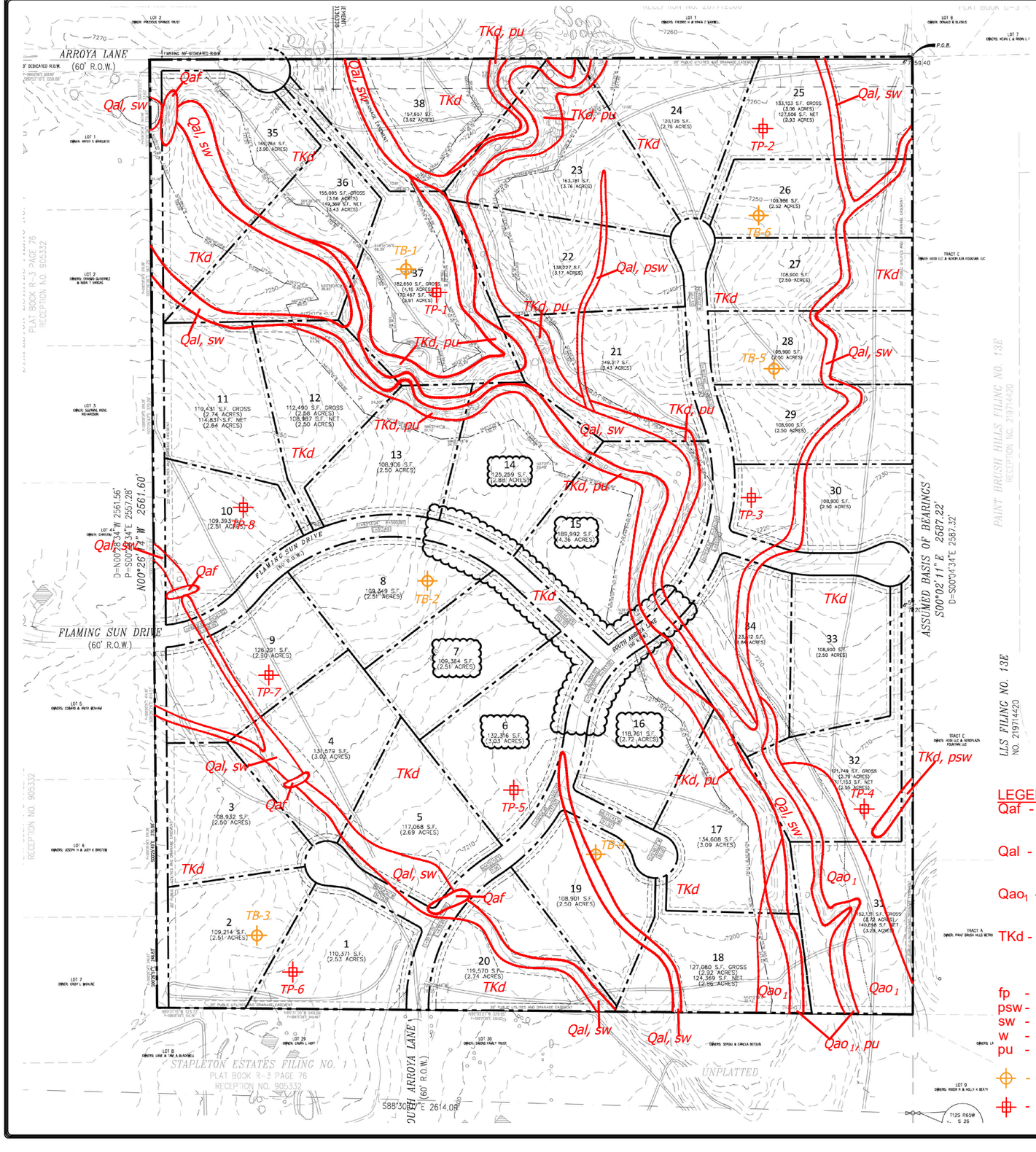
NW FALCON QUADRANGLE GEOLOGIC MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN:	DATE:	CHECKED:	DATE:
JHR	11/8/21	LLL	

JOB NO.: 212684

FIG NO.: 5



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COLORADO SPRINGS, CO. 80907

GEOLOGY/ENGINEERING GEOLOGY MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN	JHR
CHECKED	LLL
DATE	11/17/21
SCALE	AS SHOWN
JOB NO.	212684
FIGURE No.	6

N

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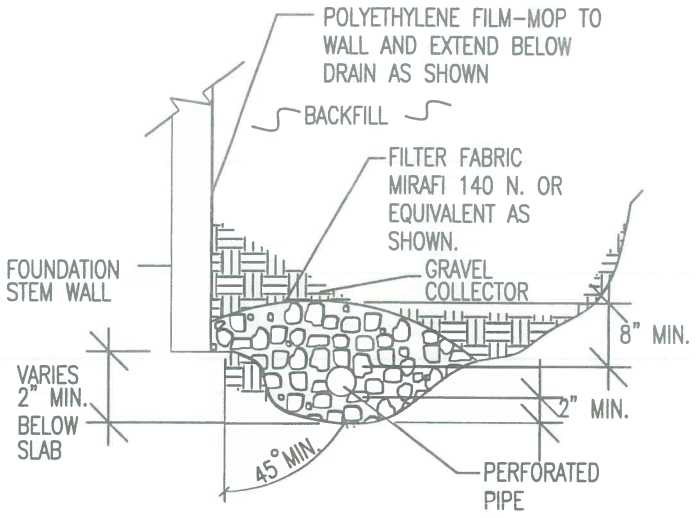
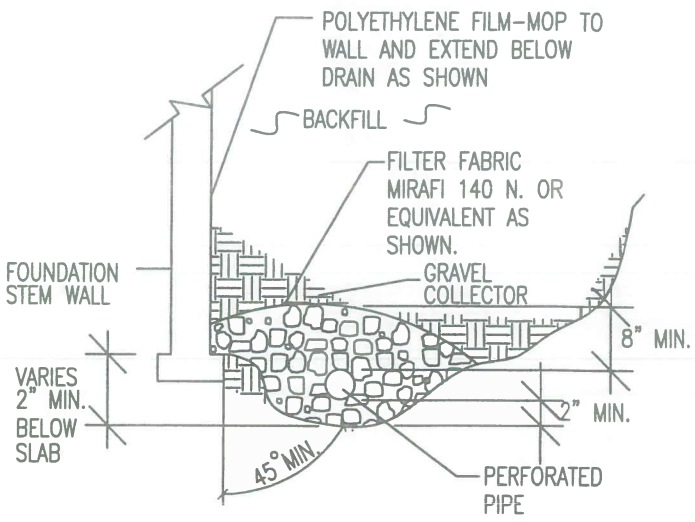
FLOODPLAIN MAP
EAGLEVIEW SUBDIVISION
ARROYA LANE & RAYGOR ROAD
EL PASO COUNTY, CO.
FOR: PT EAGLEVIEW, LLC

DRAWN:	DATE:	CHECKED:	DATE:
JHR	11/8/21	LLL	

JOB NO.: 212684

FIG NO.: 7





NOTES:

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

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

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

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

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

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

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PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 212684

FIG NO.: 8

APPENDIX A: Site Photographs

1

Looking west from the northeastern portion of the site.

October 12, 2021

2

Looking south from northeastern portion of the site.

October 12, 2021

Job No. 212684

3

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

October 12, 2021

4

Looking southeast along drainage with potentially unstable slopes.

October 12, 2021

Job No. 212684

5

Looking north from the southeastern portion of the site.

October 12, 2021

6

Looking west from the southeastern portion of the site.

October 12, 2021

Job No. 212684

7

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

October 12, 2021

8

Looking south from the western portion of the site.

October 12, 2021

Job No. 212684

APPENDIX B: Test Pit Logs

TEST PIT NO. 1
DATE EXCAVATED 10/13/2021
Job # 212684

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, 0-8 inches	1					
sandy clay, Fine to medium grained, brown, moist	2			bl	m	4
	3					
sandy loam, fine to coarse grained, brown, moist	4			gr	w	2A
	5					
	6					
sandy loam, fine to coarse grained, brown, moist	7			gr	s	2
	8					
	9					
	10					

TEST PIT NO. 2
DATE EXCAVATED 10/13/2021
CLIENT PT Eagle View
LOCATION Arroya Lane and Raygor Road

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Refusal @ 5 feet						
topsoil, 0-12 inches	1					
	2					
sandy loam,fine to coarse grained, brown, moist	3			gr	m	2
sandy clay loam, sandstone fine to coarse grained, brown moist	4			ma		3A
	5					
	6					
	7					
	8					
	9					
	10					

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

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

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COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LH	

JOB NO.: 212684
FIG NO.: B-1

TEST PIT NO. 3
DATE EXCAVATED 10/13/2021
Job # 212684

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil 0-6 inches						
sandy loam, fine to coarse grained, brown, moist	1–2			gr	m	2
sandy clay, fine to medium grained, brown, moist	3–4			ma		4A
sandy clay loam, fine to coarse grained, brown, moist	5–6			gr	m	3
Redoxomorphic Features @ ~4.5feet	7–10					

TEST PIT NO. 4
DATE EXCAVATED 10/13/2021
CLIENT PT Eagle View
LOCATION Arroya Lane and Raygor Road

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil 0-12 inches						
sandy loam, fine to coarse grained, brown, moist	1–3			gr	m	2
sandy clay loam, fine to coarse grained, brown, moist	4–6			ma		3A
	7–10					

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

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

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COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684
FIG NO.: B-2

TEST PIT NO. 5
DATE EXCAVATED 10/13/2021
Job # 212684

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil 0-18 inches	1					
	2					
sandy loam, fine to coarse grained, brown, moist	3			ma		2A
sandy loam, fine to coarse grained, brown, moist	4			gr	s	2
	5			gr	m	2
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 6
DATE EXCAVATED 10/13/2021
CLIENT PT Eagle View
LOCATION Arroya Lane and Raygor Road

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil 0-8 inches	1					
sandy clay, fine to medium grained, brown, moist	2			gr	s	4
sandy loam, fine to coarse grained, brown, moist	3			gr	m	2
sandy clay, fine to medium grained, brown, moist	4			bl	m	4
	5					
	6					
sandy clay, fine to medium grained, light brown, moist	7			ma		4A
Redoxomorphic Features @ ~3 feet	8					
	9					
	10					

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

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

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COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684
FIG NO.: B-3

TEST PIT NO. 7
DATE EXCAVATED 10/13/2021
Job # 212684

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

TEST PIT NO. 8
DATE EXCAVATED 10/13/2021
CLIENT PT Eagle View
LOCATION Arroya Lane and Raygor Road

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Refusal @ 7 feet						
topsoil 0-6 inches						
	1					
	2					
sandy loam, fine to coarse grained, brown, moist	3			gr	m	2
	4					
sandy clay, fine to medium grained, brown, moist	5			ma		4A
Bedrock @ 5 feet	6					
	7					
	8					
	9					
	10					

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

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

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COLORADO SPRINGS, COLORADO 80907

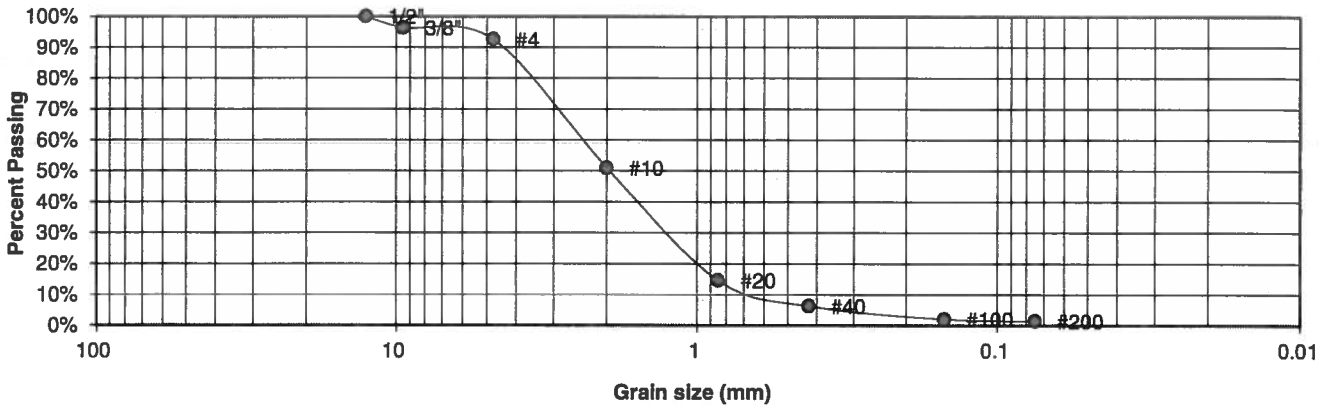
TEST PIT LOG

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684
FIG NO.: B-4

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-1	JOB NO.	212684
DEPTH (FT)	3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.3%
4	92.5%
10	51.0%
20	14.6%
40	6.3%
100	2.1%
200	1.4%

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

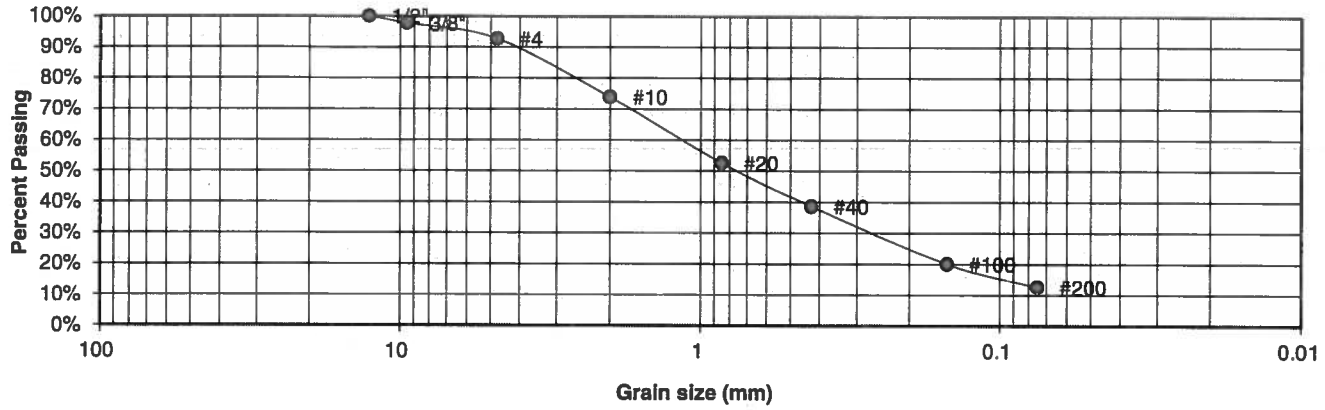
DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-1

UNIFIED CLASSIFICATION	SM	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-2	JOB NO.	212684
DEPTH (FT)	1-2	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.7%
4	92.7%
10	73.8%
20	52.6%
40	38.6%
100	20.0%
200	12.6%

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

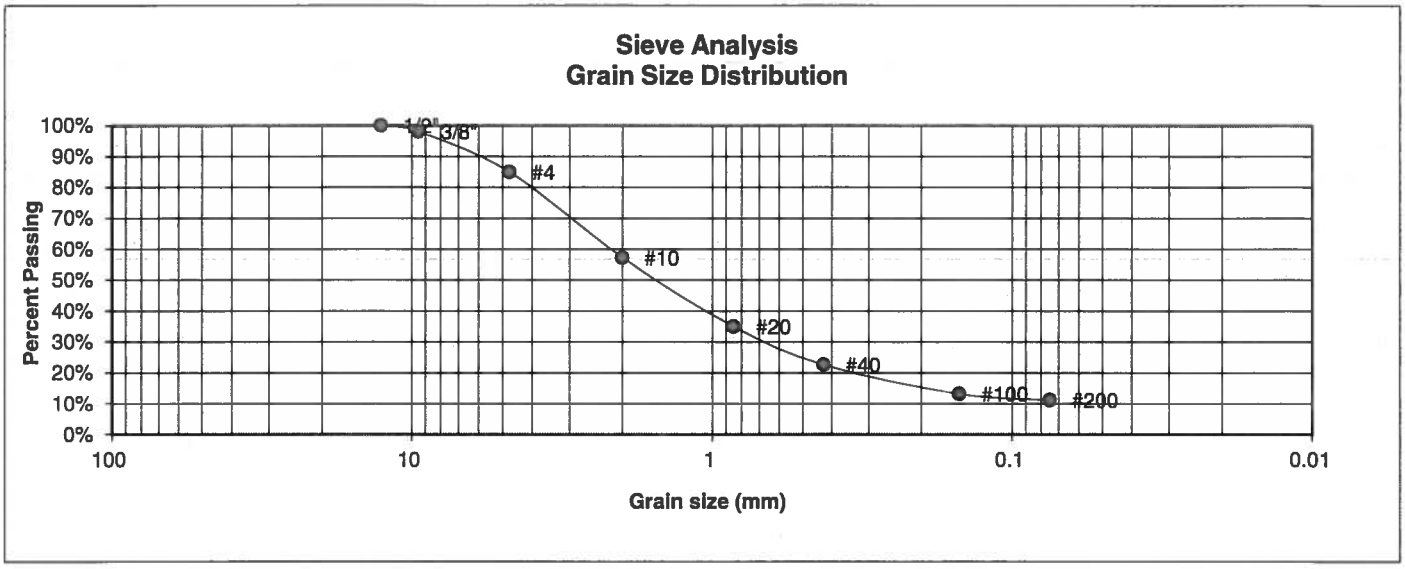
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-2

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-4	JOB NO.	212684
DEPTH (FT)	3-4	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.1%
4	85.0%
10	57.3%
20	35.0%
40	22.6%
100	13.2%
200	11.2%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

ENTECH ENGINEERING, INC.
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COLORADO SPRINGS, COLORADO 80907

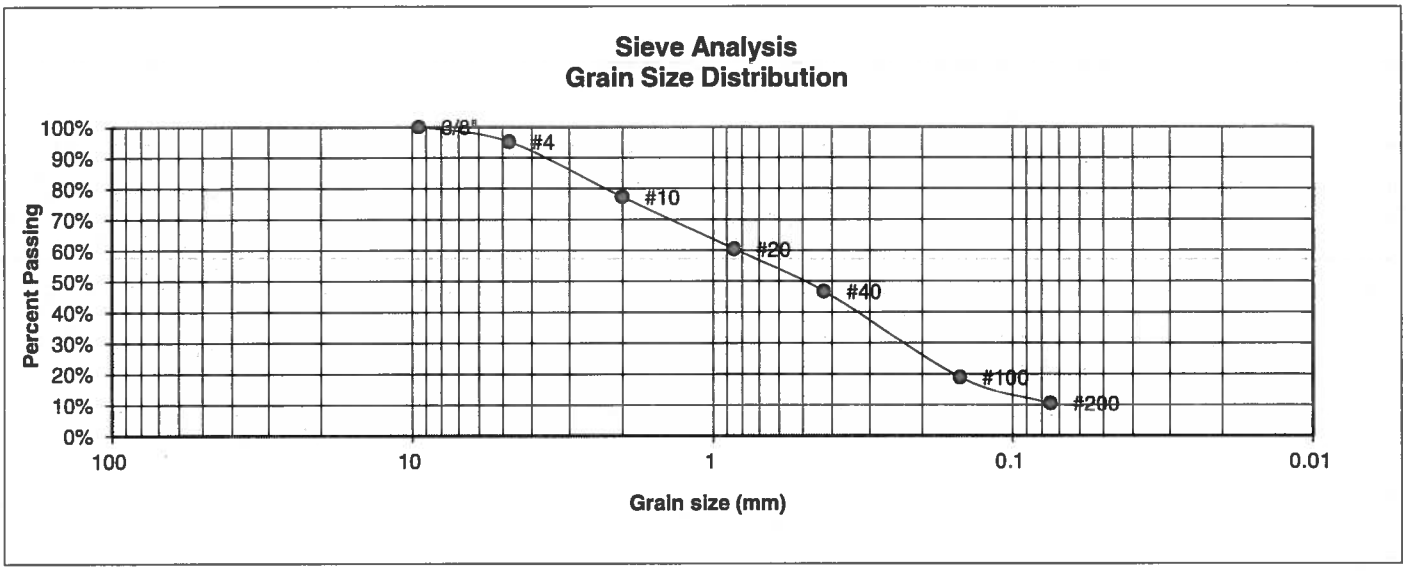
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-3

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-5	JOB NO.	212684
DEPTH (FT)	1-2	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.1%
10	77.2%
20	60.4%
40	46.7%
100	18.9%
200	10.5%

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

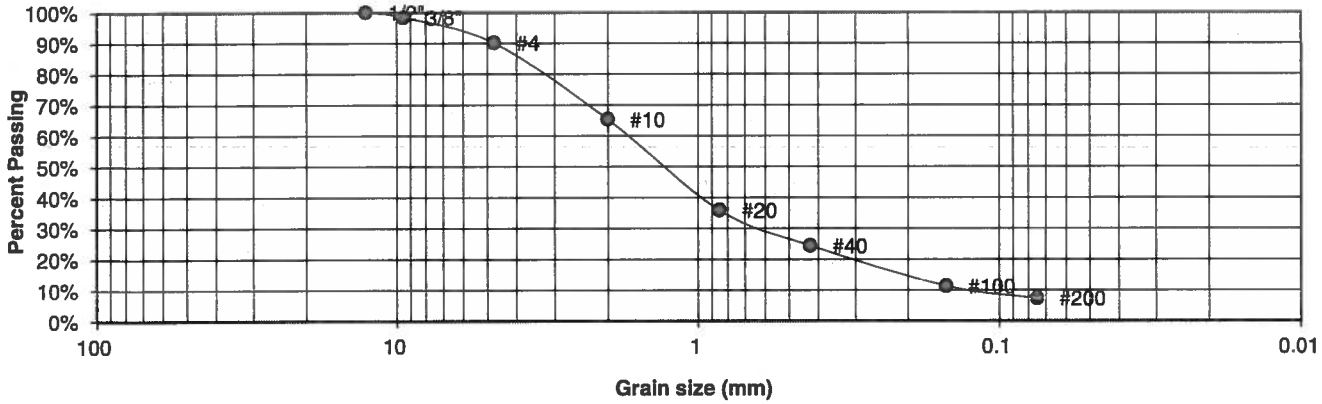
DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-4

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-5	JOB NO.	212684
DEPTH (FT)	3	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.4%
4	90.1%
10	65.3%
20	35.9%
40	24.4%
100	11.3%
200	7.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

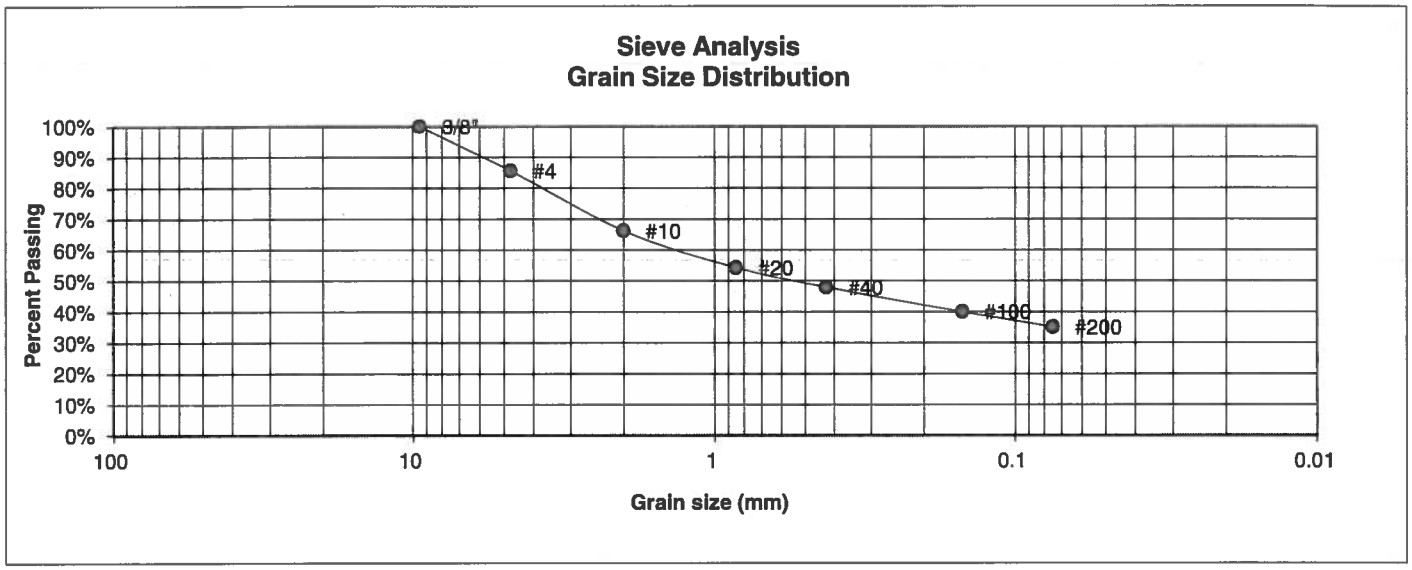
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-5

UNIFIED CLASSIFICATION	SC	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-6	JOB NO.	212684
DEPTH (FT)	1.5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	85.6%
10	66.2%
20	54.3%
40	47.9%
100	40.0%
200	35.1%

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

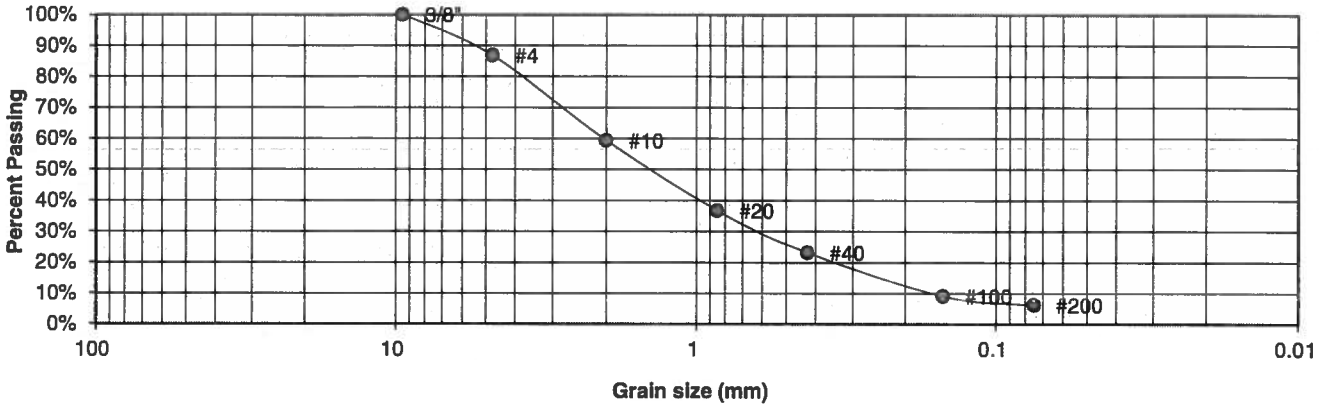
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-6

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-6	JOB NO.	212684
DEPTH (FT)	2.5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	86.8%
10	59.4%
20	36.7%
40	23.1%
100	9.1%
200	6.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

LABORATORY TEST RESULTS

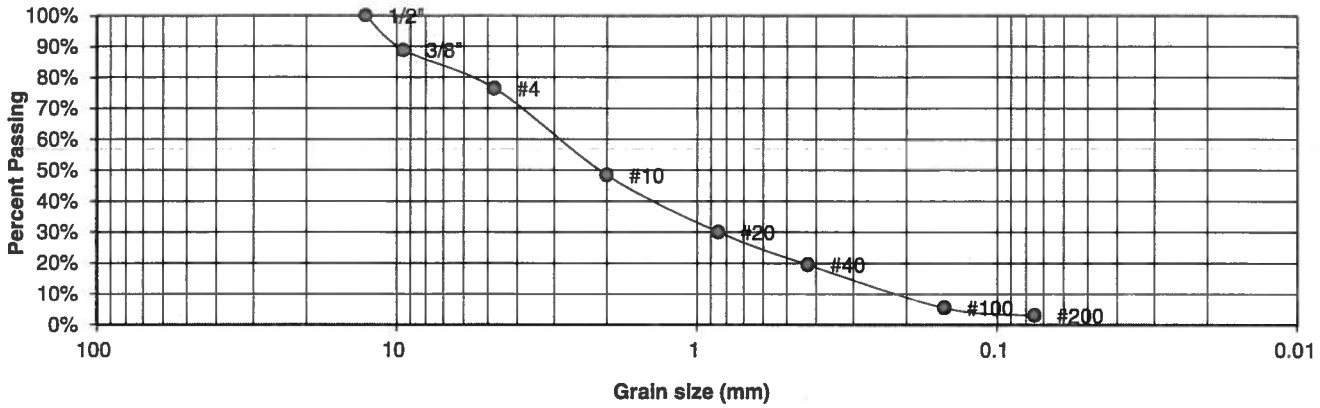
DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-7

UNIFIED CLASSIFICATION	SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-7	JOB NO.	212684
DEPTH (FT)	2	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	88.8%
4	76.4%
10	48.4%
20	30.0%
40	19.5%
100	5.6%
200	3.1%

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

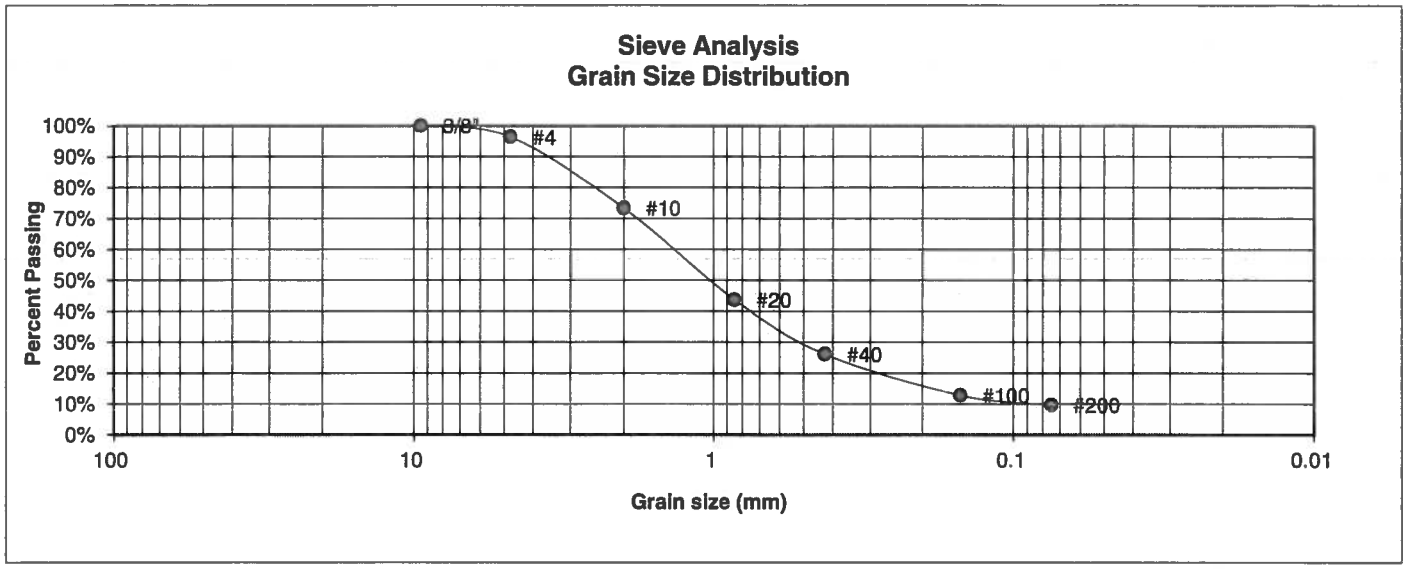
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LL	

JOB NO.: 212684

FIG NO.: C-8

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-7	JOB NO.	212684
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.3%
10	73.3%
20	43.7%
40	26.1%
100	12.8%
200	9.6%

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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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

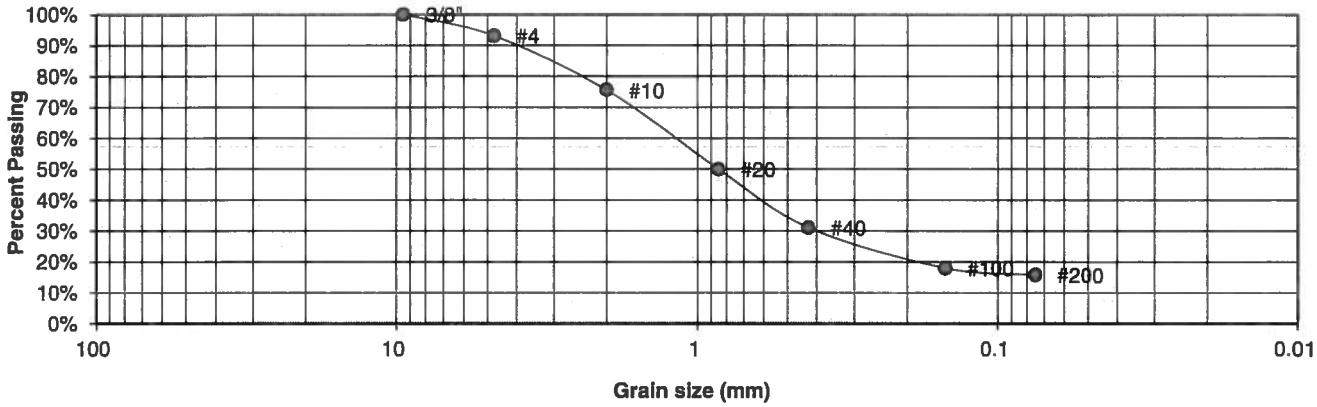
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-9

UNIFIED CLASSIFICATION	SM	CLIENT	PT EAGLEVIEW
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-8	JOB NO.	212684
DEPTH (FT)	4	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.1%
10	75.6%
20	49.9%
40	31.0%
100	18.0%
200	15.8%

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

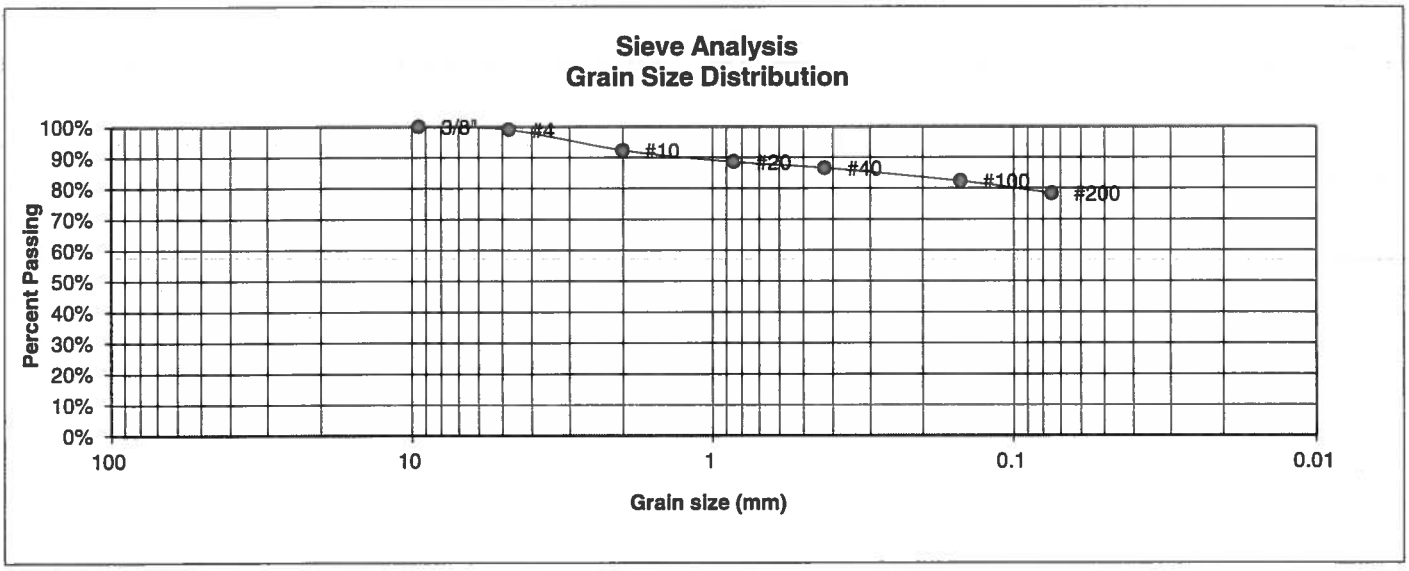
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: LLL	DATE:

JOB NO.: 212684

FIG NO.: C-10

UNIFIED CLASSIFICATION	CL	CLIENT	PT EAGLEVIEW
SOIL TYPE #	2	PROJECT	ARROYA AND RAYGOR
TEST BORING #	TP-3	JOB NO.	212684
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	99.0%
10	92.3%
20	88.6%
40	86.5%
100	82.3%
200	78.3%

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: CLL	DATE:

JOB NO.: 212684

FIG NO.: C-4

APPENDIX D: Test Boring Logs & Laboratory Test Results Previous Investigation Entech Job No. 80503

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT PROLAND GROUP, LLC
PROJECT ARROYA AND RAYGOR
JOB NO. 80503

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	PH-5	5			5.8						SM-SW	SAND, SLIGHTLY SILTY
1	PH-7	2-5			48.8	41	22		2230		SC	SAND, VERY CLAYEY
1	1	2-3			8.0						SM-SW	SAND, SLIGHTLY SILTY
1	4	2-5				28	14		690		SC	SAND, CLAYEY
2	PH-2	5			71.9	40	18				CL	CLAY, SANDY, VERY SILTY
2	2	3							2060		CL	CLAY
3	2	10			19.7				430		SC	SANDSTONE, CLAYEY
3	3	5-10				28	10				SC	SANDSTONE, CLAYEY
3	6	5			35.2				450		SC-SM	SANDSTONE, SILTY, CLAYEY

TEST BORING NO. 1
DATE DRILLED 9/12/2002
Job # 80503

REMARKS

DRY TO 10', 09/17/02

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
						SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN TO BROWN, DENSE TO MEDIUM DENSE, DRY TO MOIST
			32	2.7	1	
5			18	7.7	1	
						SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, OLIVE-TAN VERY DENSE, MOIST
10			50/8"	8.8	3	
15						
20						

TEST BORING NO. 2
DATE DRILLED 9/12/2002
CLIENT PROLAND GROUP, LLC
LOCATION ARROYA AND RAYGOR

REMARKS

DRY TO 15', 09/17/02

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
						SAND, SILTY, FINE GRAINED, BROWN, MEDIUM DENSE, MOIST
			11	6.8	1	
					2	CLAY LENSE
5			29	7.2	1	SAND, CLAYEY, FINE TO MEDIUM DENSE, TAN, MEDIUM DENSE, MOIST
10			50/11"	9.9	3	SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, OLIVE, VERY DENSE, MOIST
15			50/5"	10.5	3	SANDSTONE, SILTY, FINE GRAINED, TAN, VERY DENSE, MOIST
20						

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503
FIG NO.: D-1

TEST BORING NO. 3
DATE DRILLED 9/12/2002
Job # 80503

REMARKS

DRY TO 10', 09/17/02

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50/7"	5.7	3
5			50/5"	6.7	3
10			50/4"	7.2	3
15					
20					

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

TEST BORING NO. 4
DATE DRILLED 9/12/2002
CLIENT PROLAND GROUP, LLC
LOCATION ARROYA AND RAYGOR

REMARKS

DRY TO 10', 09/17/02

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			20	5.7	1
5			41	7.5	1
10			50/6"	8.6	3
15					
20					

SAND, CLAYEY, FINE TO MEDIUM GRAINED, OLIVE BLOWN, MEDIUM DENSE TO DENSE, MOIST

SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, TAN TO OLIVE, VERY DENSE, MOIST

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503
FIG NO.: D-2

TEST BORING NO. 5
DATE DRILLED 9/12/2002
Job # 80503

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 09/12/02						
SAND, SILTY, BROWN SANDSTONE, SLIGHTLY SILTY TO SLIGHTLY CLAYEY, FINE TO COARSE GRAINED, TAN TO OLIVE, VERY DENSE, MOIST				50/9"	5.4	3
	5			50/8"	10.1	3
	10			50/7"	10.1	3
	15					
	20					

TEST BORING NO. 6
DATE DRILLED 9/12/2002
CLIENT PROLAND GROUP, LLC
LOCATION ARROYA AND RAYGOR

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 10', 09/12/02						
SAND, VERY SILTY, FINE GRAINED, OLIVE-TAN, DENSE, MOIST				37	7.1	1
SANDSTONE, SILTY, CLAYEY, FINE GRAINED, OLIVE-TAN TO BROWN, VERY DENSE, MOIST	5			50/6"	14.5	3
	10			50/2"	11.4	3
	15					
	20					

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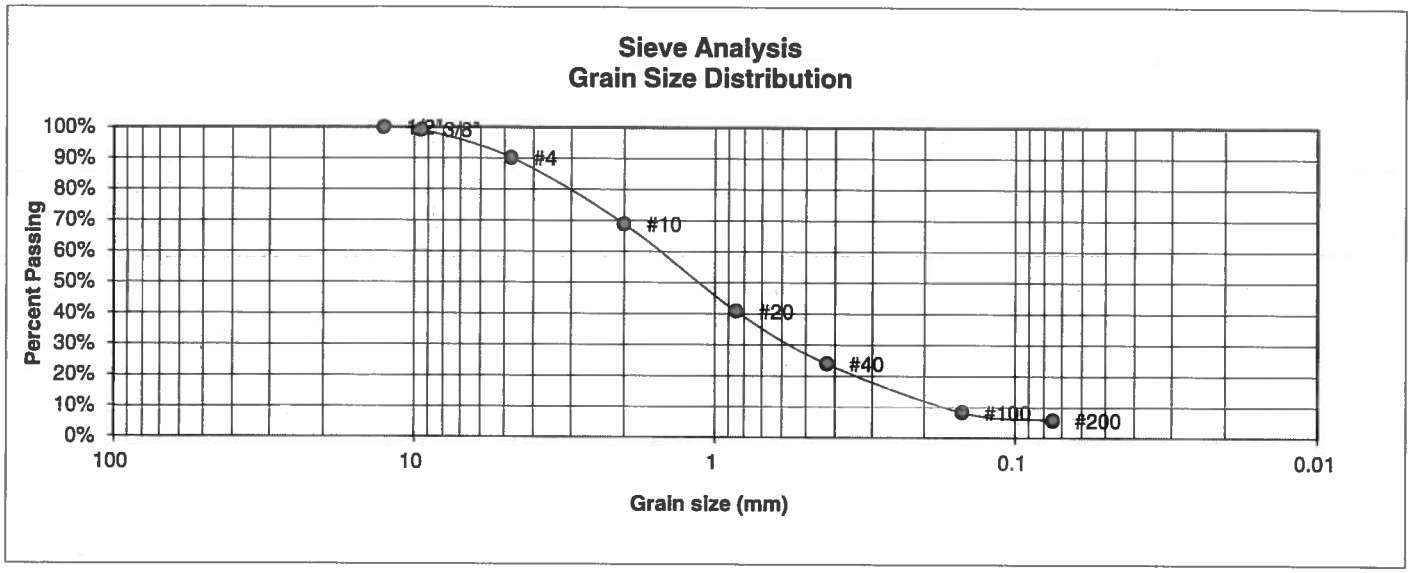
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503
FIG NO.: B-3

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	PH-5	JOB NO.	80503
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	99.2%
4	90.2%
10	68.9%
20	40.8%
40	23.9%
100	8.4%
200	5.8%

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
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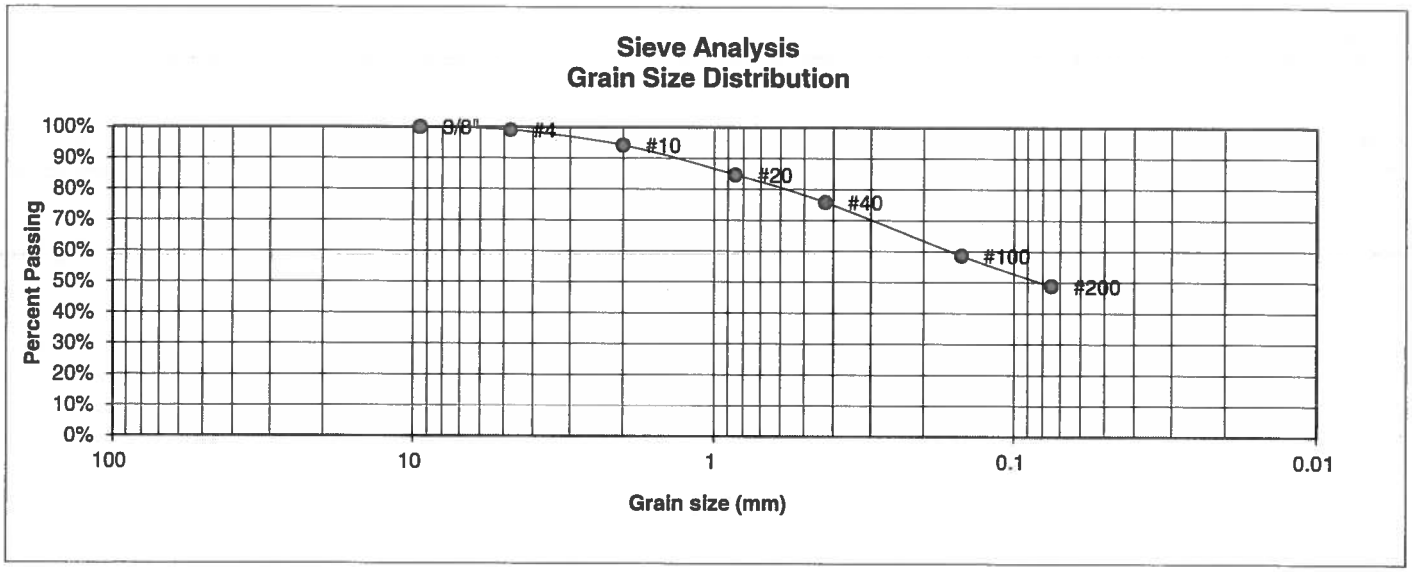
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-4

UNIFIED CLASSIFICATION	SC	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	PH-7	JOB NO.	80503
DEPTH (FT)	2-5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.1%
10	94.2%
20	84.7%
40	75.8%
100	58.6%
200	48.8%

Atterberg Limits

Plastic Limit	19
Liquid Limit	41
Plastic Index	22

Swell

Moisture at start	12.5%
Moisture at finish	20.8%
Moisture increase	8.3%
Initial dry density (pcf)	105
Swell (psf)	2230

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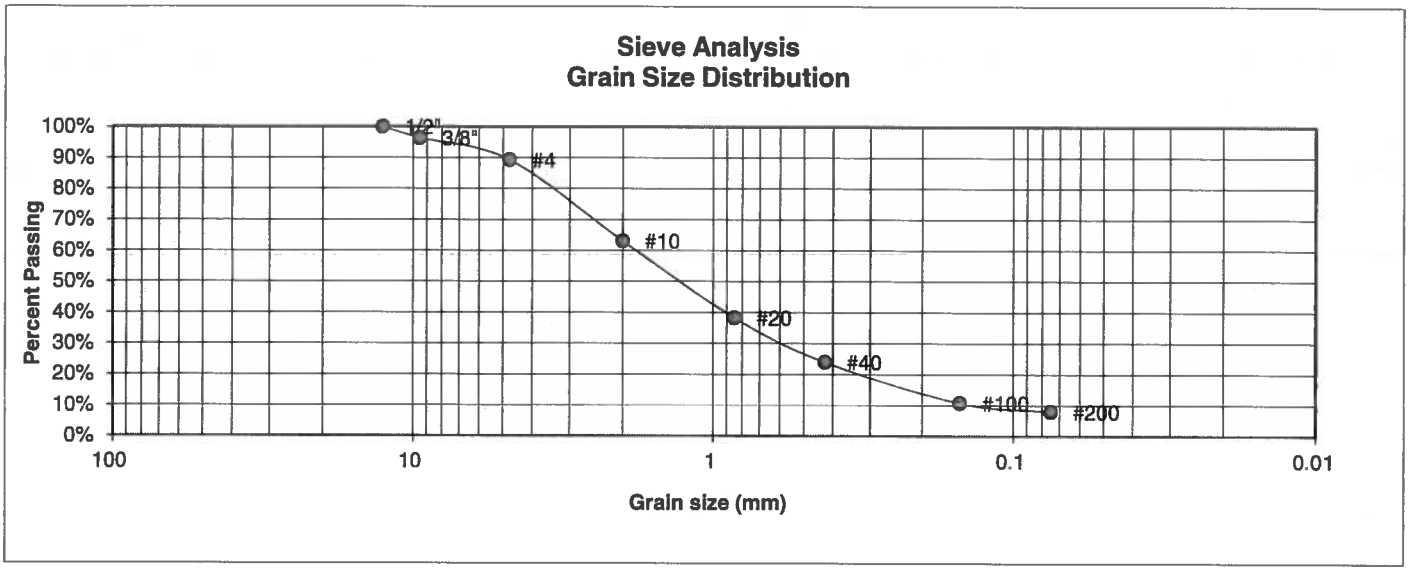
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-5

UNIFIED CLASSIFICATION	SM-SW	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	1	JOB NO.	80503
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.4%
4	89.3%
10	63.0%
20	38.3%
40	23.9%
100	10.8%
200	8.0%

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

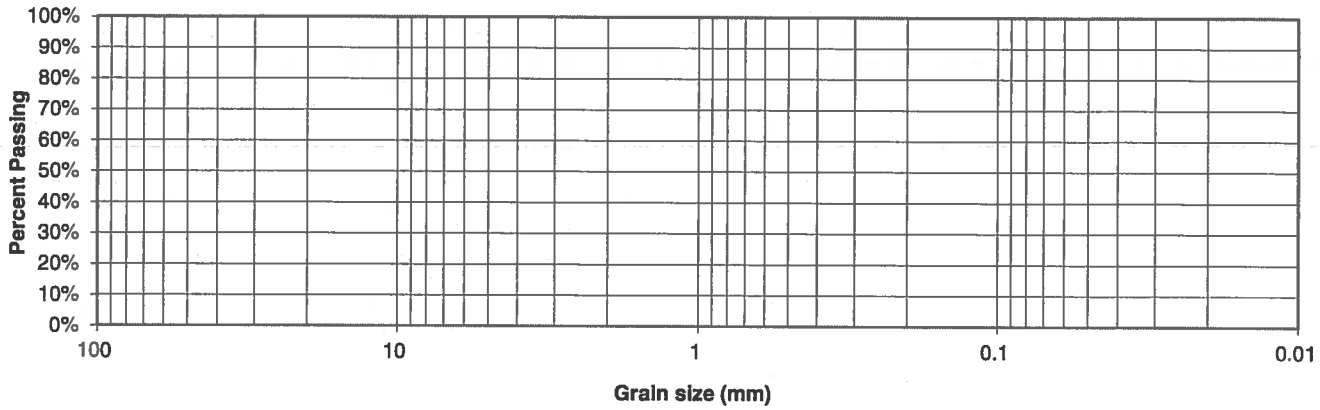
DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-6

UNIFIED CLASSIFICATION	SC	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	1	PROJECT	ARROYA AND RAYGOR
TEST BORING #	4	JOB NO.	80503
DEPTH (FT)	2-5	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	
200	

Atterberg Limits	
Plastic Limit	14
Liquid Limit	28
Plastic Index	14

Swell	
Moisture at start	6.7%
Moisture at finish	17.6%
Moisture increase	10.9%
Initial dry density (pcf)	106
Swell (psf)	690

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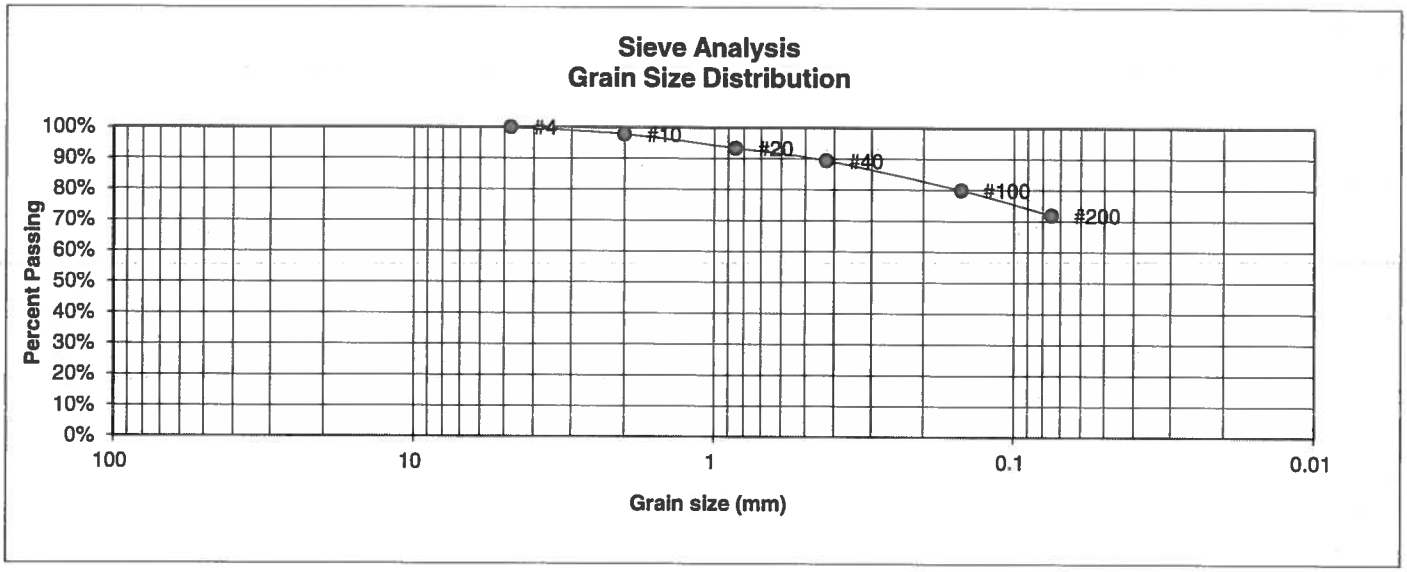
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-7

UNIFIED CLASSIFICATION	CL	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	2	PROJECT	ARROYA AND RAYGOR
TEST BORING #	PH-2	JOB NO.	80503
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	97.7%
20	93.4%
40	89.4%
100	80.0%
200	71.9%

Atterberg Limits	
Plastic Limit	22
Liquid Limit	40
Plastic Index	18

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

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LABORATORY TEST RESULTS

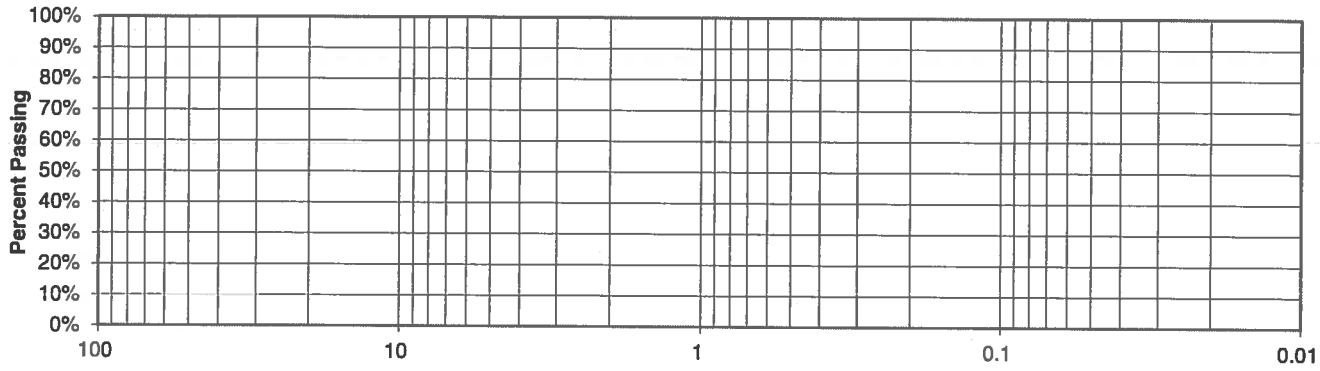
DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-8

UNIFIED CLASSIFICATION	CL	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	2	PROJECT	ARROYA AND RAYGOR
TEST BORING #	2	JOB NO.	80503
DEPTH (FT)	3	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	
200	

Atterberg Limits	
Plastic Limit	
Liquid Limit	
Plastic Index	
Swell	
Moisture at start	8.7%
Moisture at finish	19.2%
Moisture increase	10.6%
Initial dry density (pcf)	106
Swell (psf)	2060

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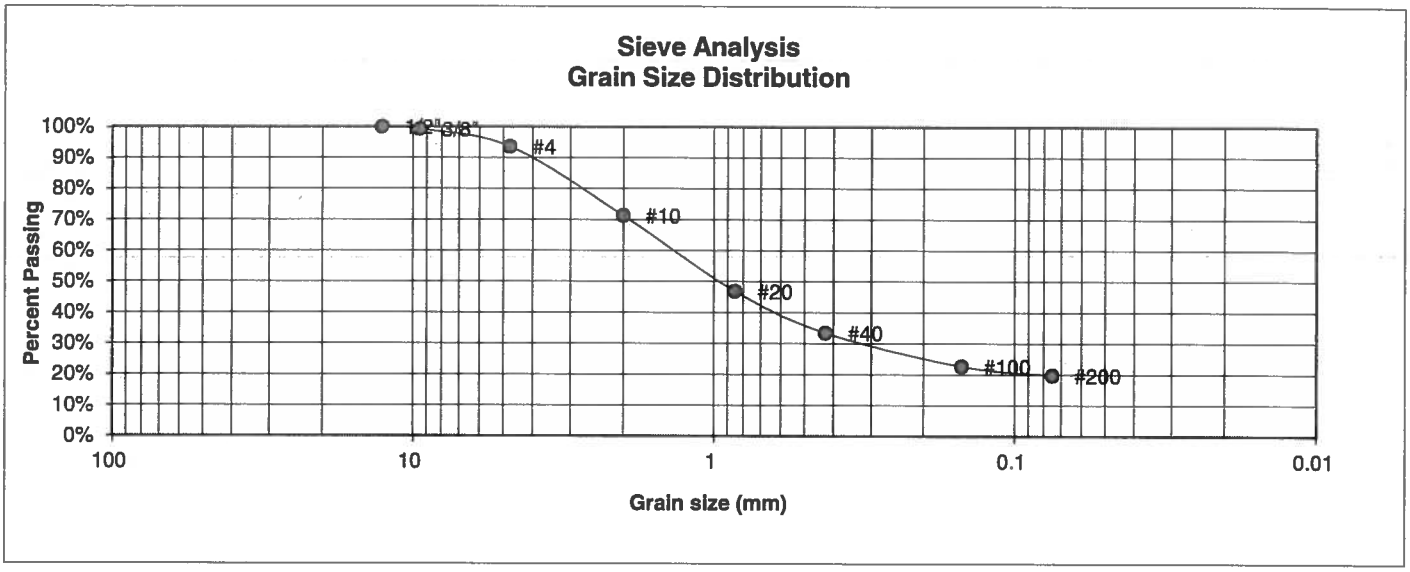
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-9

UNIFIED CLASSIFICATION	SC	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	3	PROJECT	ARROYA AND RAYGOR
TEST BORING #	2	JOB NO.	80503
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	99.2%
4	93.5%
10	71.2%
20	46.8%
40	33.4%
100	22.6%
200	19.7%

Atterberg Limits

Plastic Limit	
Liquid Limit	
Plastic Index	

Swell

Moisture at start	9.3%
Moisture at finish	18.3%
Moisture increase	9.0%
Initial dry density (pcf)	111
Swell (psf)	430

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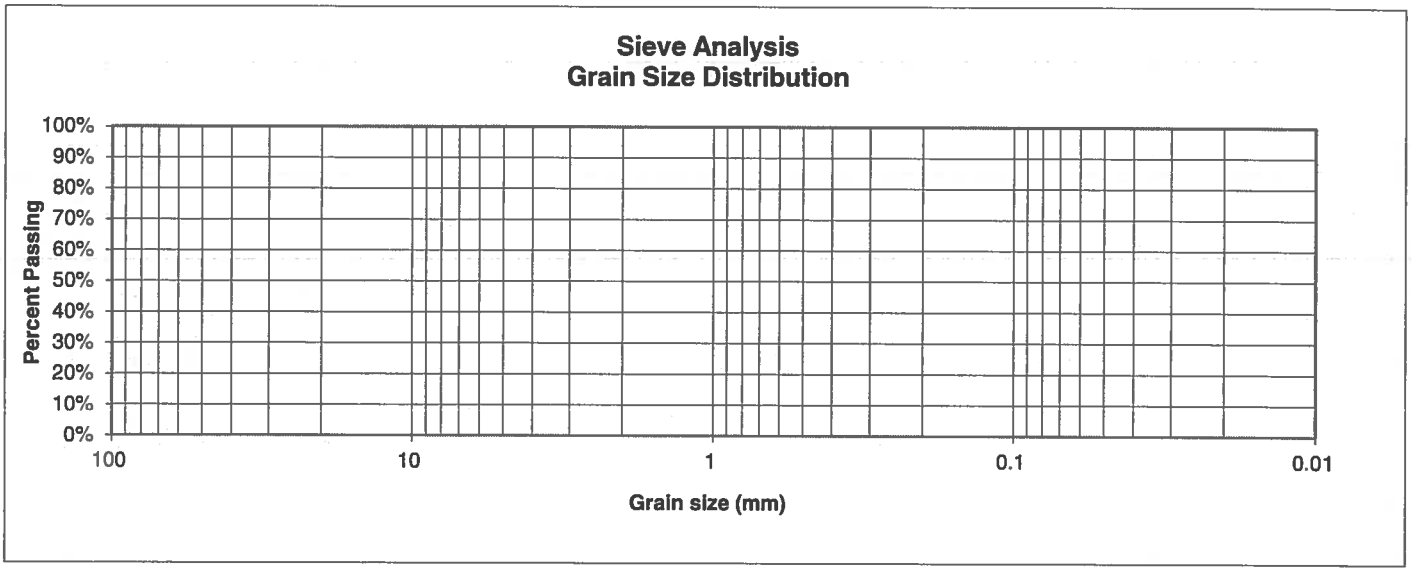
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-10

UNIFIED CLASSIFICATION	SC	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	3	PROJECT	ARROYA AND RAYGOR
TEST BORING #	3	JOB NO.	80503
DEPTH (FT)	5-10	TEST BY	BL



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

Atterberg Limits

Plastic Limit	18
Liquid Limit	28
Plastic Index	10

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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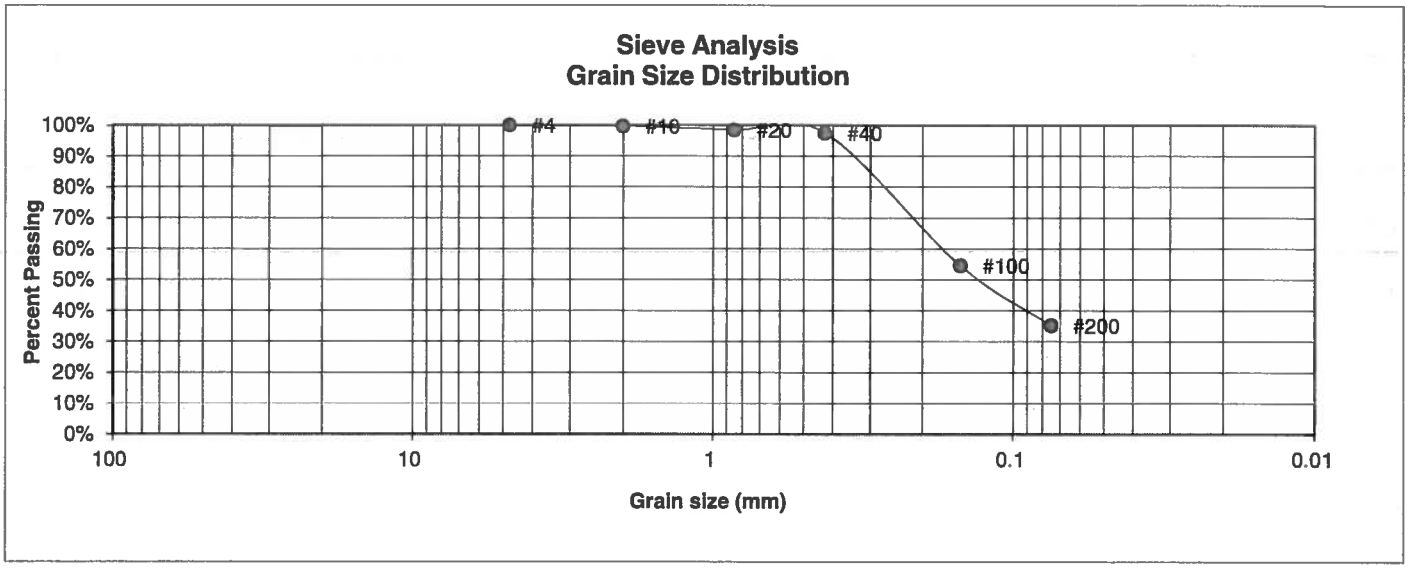
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-1

UNIFIED CLASSIFICATION	SC-SM	CLIENT	PROLAND GROUP, LLC
SOIL TYPE #	3	PROJECT	ARROYA AND RAYGOR
TEST BORING #	6	JOB NO.	80503
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	98.5%
40	97.4%
100	54.6%
200	35.2%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell

Moisture at start	18.9%
Moisture at finish	22.5%
Moisture increase	3.6%
Initial dry density (pcf)	102
Swell (psf)	450

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

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 80503

FIG NO.: D-12

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Columbine

Setting

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

Typical profile

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

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

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

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

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

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

Data Source Information

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

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Pring

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

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