



ENTECH
ENGINEERING, INC.

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

**SOIL, GEOLOGY, AND GEOLOGIC HAZARD STUDY
WINSOME SUBDIVISION – FILING NO. 2
A PORTION OF PARCEL NO. 51000-00-493
17480 MERIDIAN ROAD NORTH
EL PASO COUNTY, COLORADO**

Prepared for

Winsome, LLC
1864 Woodmoor Drive, Suite 100
Monument, Colorado 80132

Attn: Joe DesJardin

January 26, 2021

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Reviewed by:

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

LLL/nc

Encl.

Entech Job No. 202508
AAprojects/2020/202508 countysoil/geo/ww

PCD Fil No. _____

TABLE OF CONTENTS

1.0 SUMMARY	1
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 Survey	4
5.3 Site Stratigraphy	5
5.4 Soil Conditions	6
5.5 Groundwater	6
6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS	7
6.1 Relevance of Geologic Conditions to Land Use Planning	9
7.0 ECONOMIC MINERAL RESOURCES	11
8.0 EROSION CONTROL	12
9.0 CLOSURE	13
BIBLIOGRAPHY	14

Add a section addressing the permanent detention pond per DCM
Section 11.3.3. See snippet below

TABL
Table
Table

FIGURES

Figure 1: Vicinity Map

11.3.3 Embankment Structures

The width of the top of the embankment structure shall be a minimum of 12 feet for embankments less than 25 feet in height. Also, side slopes on embankment structures will vary with materials types used and shall be designed to produce a stable and easily maintained structure. A slope stability analysis shall be required on all Class 1 structures.

An allowance for settlement shall also be factored into the design for all embankment structures. Consideration shall also be given to limiting excessive seepage through the embankment and foundation that may lead to embankment erosion and structure instability for all Class 1 structures.

A geotechnical analysis and report prepared by a Colorado Professional Engineer with recommendations for the foundation preparation and embankment construction shall be submitted to the City/County Engineer with the complete design analysis for all permanent detention facilities.

11.4 Hydraulic Design Methods

1.0 SUMMARY

Project Location

The project site lies in portions of the NE¼, SE¼, and SW¼ of Section 24 and a portion of the W½ of Section 19, Township 11 South, Range 65 West of the 6th Principal Meridian in the northeastern portion of El Paso County, Colorado. The site is located approximately 12 miles east of Monument, Colorado, northwest of Hodgen Road and Meridian Road North.

Project Description

Total acreage involved in Filing No. 2 of the project is approximately 238 acres. The proposed site development consists of Sixty-one single-family rural residential lots, one commercial lot are proposed, and a full spectrum detention pond in the southeastern portion of the site. 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 potentially expansive soils, potentially seasonal shallow groundwater, and seasonal shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

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

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the NE¼, SE¼, and SW¼ of Section 24 and a portion of the W½ of Section 19, Township 11 South, Range 65 West of the 6th Principal Meridian in the northeastern portion of El Paso County, Colorado. The site is located approximately 12 miles east of Monument, Colorado, northwest of Hodgen Road and Meridian Road North. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site consists of rolling hills that vary from gradually to moderately sloping generally to the northwest, with moderately steep slopes located along portions of the drainages on site. West Kiowa Creek bisects the site and is located to the northwest and north of phase one of the proposed subdivision. A tributary to West Kiowa Creek is located in the eastern portion of Winsome Subdivision Filing No. 1. The drainages on site flow in a northerly and northeasterly directions through the central portion of the site. Water was observed in 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. Site photographs, taken December 4 and 9, 2020, are included in Appendix A.

Total acreage involved in the proposed development is approximately 238 acres. Sixty-one single-family rural residential lots, one commercial lot are proposed, and a full spectrum detention pond in the southeastern portion of the site. The proposed residential lots vary in sizes from approximately 2.5 to 5.5 acres. 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 Preliminary Soils, Geology, Geologic Hazard and Wastewater Study, Entech Job No. 181459 (Reference 1). Five (5) test borings, and ten (10) tactile test pits 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 used as part of this investigation. More specifically previous Test Boring Nos. (TB-2, TB-4, and TB-5) and Test Pit Nos. (TP-4, TP-5 and TP-6) were used as part of the Winsome Subdivision Filing No. 2 investigation.

3.0 SCOPE OF THE REPORT

The scope of the 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. on December 4 and 9, 2020.

Previous Test Boring Nos. (TB-2, TB-4, and TB-5) were used as part of the Winsome Subdivision Filing No. 2 investigation. Four (4) test borings, and ten (10) tactile test pits were performed on the site to determine general suitability of the site for the use of on-site wastewater treatment systems. The locations of the test borings, and test pits are indicated on the Site Plan/Testing Location Map, Figure 3. The Test Boring and Test Pit 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, north of the Palmer Divide. Approximately 16 miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northwesterly direction (Reference 1). 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 soils, 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. The alluvial soils were deposited by water in the major drainage on the site and as stream terrace deposits. Man-made soils exist as erosion berms. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

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

<u>Type</u>	<u>Description</u>
25	Elbeth Sandy Loam, 3 to 8% slopes
67	Peyton Sandy Loam, 5-9% slopes
68	Peyton-Pring Complex, 3-8% slopes
71	Pring Coarse Sandy Loam, 3 to 8% slopes
92	Tomah-Crowfoot Loamy Sands, 3 to 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 permeabilities. Limitations described for the soils include shrink-swell potential on Soil Type Nos. 25. 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. The majority of the soils have been described to have moderate erosion hazards.

5.3 Site Stratigraphy

The Eastonville Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 4). The Geology Map prepared for the site is presented in Figure 6. Four mappable units were identified on this site which are described as follows:

- Qp Piney Creek Alluvium (Alluvium One and Two) of Early Holocene Age:** These materials consist of low stream-terrace deposits above the current stream channel. The materials typically consist of silty to well graded sand.
- Qb Broadway Alluvium (Alluvium Three) of Late Pleistocene Age:** These materials consist of middle stream terrace deposits. The materials typically consist of silty to clayey gravelly sands.
- Qsw Sheetwash Deposits of Holocene to Late Pleistocene Age:** These materials consist of silty to clayey sands with some cobbles and boulders. The material was deposited by the action of sheetwash and gravity.
- Qc/Tkd Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:** The Dawson Formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands, sandy clays and sandy silts.

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

5.4 Soil Conditions

The soils encountered in the Test Borings can be grouped into three general soil and rock types. The Test Boring soils were classified using the Unified Soil Classification System (USCS). The soils encountered in the Test Pits can be grouped into three general soil types. The test pit soils were classified using the USDA Textural Soil Classification.

Soil Type 1 is a slightly silty to silty sand (SM-SW, SM). This material was encountered in all of the test borings. The sand was encountered at the existing surface and extended to depths ranging from 1 to 19 feet, and to the termination of Test Boring No. 3 from the previous investigation (20 feet). These soils were encountered at loose to dense states and at dry to moist conditions. Samples tested had 7 to 26 percent of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sand being non-plastic.

Soil Type 2 is a silty to clayey sandstone (SM, SM-SW, SC). This material was encountered in all of the recent test borings, and Test Boring No. 4 from the previous investigation. The sandstone was encountered at dense to very dense states and moist conditions. Samples tested had 10 to 29 percent of the soil sized particles passing the No. 200 sieve. Highly expansive clayey sandstone and claystone are commonly interbedded in the sandstone in the area.

Soil Type 3 is a sandy claystone (CL). This material was encountered Test Boring No. 1 at 14 feet bgs and extended to the termination of the boring (20 feet). The claystone was encountered at hard consistencies and moist conditions. Samples tested had 74 percent of the soil sized particles passing the No. 200 sieve. Swell/Consolidation Testing resulted in a volume change of 0.9 percent, indicating a low to moderate expansion potential, and a consolidation of 0.1 percent.

The Test Boring Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1. Laboratory Testing summary table, and Test Boring Logs from the original Soil Geology Study, Job No. 181495 are presented in Appendix D.

5.5 Groundwater

Groundwater was encountered in Test Boring Nos. 1 and 4 at 18 and 17 feet respectively. Groundwater was not encountered in the remaining test borings which were drilled to 12 to 20 feet. 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 an 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:

Artificial Fill

These are man-made fill deposits associated with erosion berms on-site.

Mitigation: The small erosion berms can easily be removed or penetrated by foundations. Should any uncontrolled fill be encountered beneath foundations, removal and recompaction at 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 will be required.

Loose or Collapsible Soils

Loose soils were encountered in one of the test borings. Any loose or collapsible soils encountered beneath foundations or floor slabs will require mitigation.

Mitigation: Any loose or collapsible soils encountered beneath foundations or floor slabs should be overexcavated 2 to 3 feet, moisture-conditioned and recompacted. The soils should be recompacted to 95 percent of the soils maximum Modified Proctor Dry Density ASTM D-1557 at ± 2 percent of optimum moisture content. The reconditioned soils on this site should be observed and tested to verify adequate compaction. Areas requiring recompaction should be determined during the excavation observation.

Expansive Soils

Expansive soils were encountered in the test borings drilled on-site. Expansive claystone is commonly encountered within the Dawson Formation. These occurrences are typically sporadic; therefore, none have been indicated on the maps. These expansive soils, if encountered beneath foundations, can cause differential movement in the structure foundation. These occurrences should be identified and mitigated on an individual basis.

Mitigation: Should expansive soils be encountered beneath the foundation; mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Another alternative in areas of highly expansive soils is the use of drilled pier foundation systems. Typical minimum pier depths are on the order of 25 feet or more and require penetration into the bedrock material a minimum of 4 to 6 feet, depending upon building loads. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. The use of structural floors should be considered for basement construction on highly expansive clays. Final recommendations should be determined after additional investigation of each building site.

Floodplain and Drainage Areas

Portions of the site associated with the West Kiowa Creek drainage are mapped within a floodplain zone according to the FEMA Map No. 08041CO350G, dated December 7, 2018 (Figure 7,

Reference 6). Water was observed flowing in West Kiowa Creek; however, water was not observed in the drainages located within Filing No. 2. The floodplain areas have been designated as open space/drainage easements and/or can be avoided by construction and is located outside of Filing No. 2 of the development. Additionally, 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 and eastern portions of Filing No. 2 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. These areas can likely be avoided or properly mitigated by development. The floodplain should be avoided by construction unless site-specific floodplain determination and drainage studies are performed. The potential exists for high groundwater levels during high moisture periods and should structures encroach on these areas the following precautions should be followed.

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. Some of the minor drainage swales can be avoided or regraded. The main drainage that bisects the site is designated as open space and will be avoided. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Finished floors must be located at least one foot above floodplain levels. Specific drainage studies and exact floodplain locations are beyond the scope of this report.

Add as plat note

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, and 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.

Show all areas as of seasonal groundwater as
no-build on plat.

Areas of seasonal shallow groundwater and potentially seasonal shallow groundwater were encountered on site. Additionally, areas northeast of the site have been mapped in a floodplain zone associated with West Kiowa Creek. The floodplain area is in the designated open space area and is located outside of Filing No. 2. The site is not mapped in the floodplain zone (Figure 7, Reference 7). The floodplain areas have been designated as open space/drainage easements and/or can be avoided by construction and is located outside of Filing No. 2 of the development. Additionally, 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 and eastern portions of Filing No. 2 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 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 upland and floodplain deposits: sand and probable aggregate resource (U3, U4 and F4). 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 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 Winsome, 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.

BIBLIOGRAPHY

1. Entech Engineering, Inc. revised date January 11, 2019. *Preliminary Soil, Geology, Geologic Hazard and Wastewater Study, Winsome Subdivision, Parcel No. 51000-00-493, El Paso County, Colorado*. Entech Job No. 181459.
2. Bryant, Bruce; McGrew, Laura W, and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1163.
3. Natural Resource Conservation Service, September 23, 2016. *Web Soil Survey*. United States Department Agriculture, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
4. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado*.
5. Morgan, Matthew L. and Barkmann, Peter E., 2012. *Geologic Map of the Eastonville Quadrangle, El Paso and Elbert Counties, Colorado*. Colorado Geological Survey. Open-File Report 12-03.
6. Bryant, Bruce; McGrew, Laura W. and Wobus, Reinhard A. 1981. *Geologic Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1163.
7. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO350G.
8. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps*.
9. 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.
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.

TABLES

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

CLIENT WINSOME, LLC
 PROJECT HODGEN AND MERIDIAN
 JOB NO. 202508

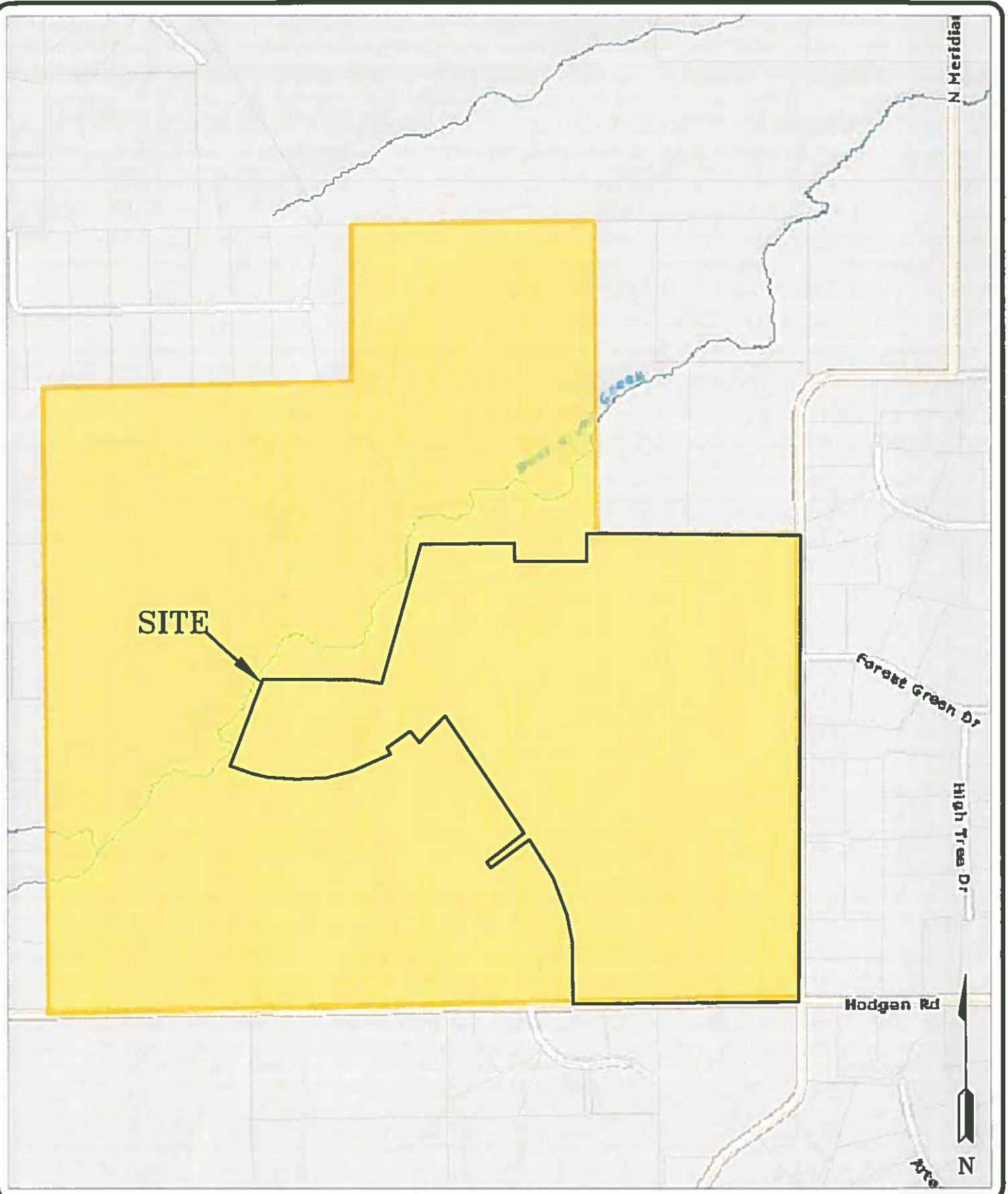
SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			12.5						SM	SAND, SILTY
1	4	5			15.9						SM	SAND, SILTY
2	1	15			23.9	NV	NP				SM	SANDSTONE, SILTY
2	3	2-3			29.0	NV	NP				SM	SANDSTONE, SILTY
3	2	5			89.1				850		CL	CLAYSTONE, SANDY
3	4	20	21.8	106.8	53.3	29	13			-0.1	CL	CLAYSTONE, VERY SANDY

Table 2: Summary Test Boring Results

Test Boring No.	Depth to Bedrock (ft.)	Depth to Seasonally Occurring Groundwater (ft.)
1	1	18
2	4	>10
3	1	>20
4	1	17
2*	>20	>20
4*	16	>20
5*	>20	>20

*- Preliminary Soils, Geology, and Wastewater Study prepared by Entech Job No. 181459

FIGURES



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

VICINITY MAP
WINSOME SUBDIVISION - FILING NO. 2
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:
LLL

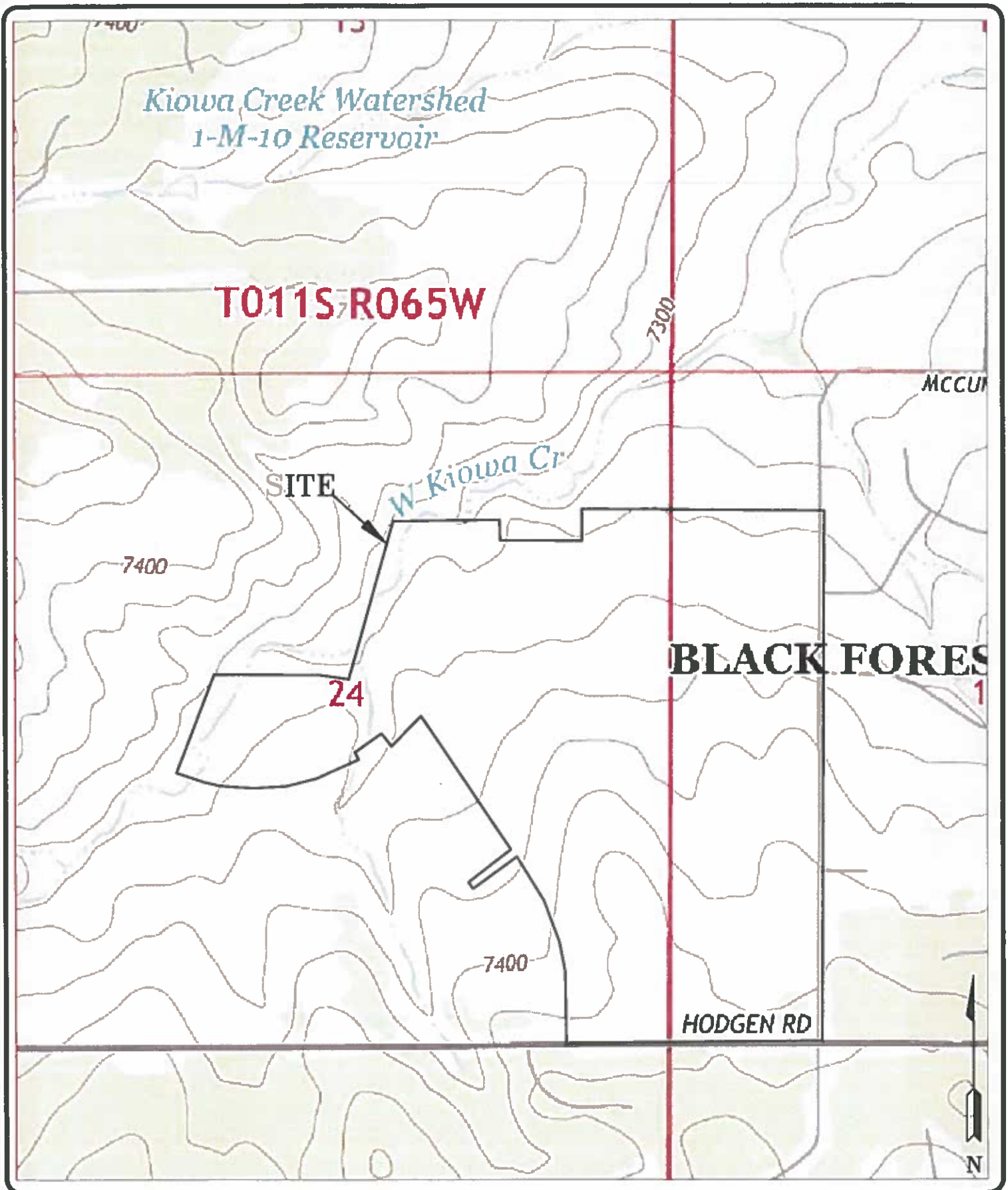
DATE:
1/18/21

CHECKED:

DATE:

JOB NO.:
202508

FIG NO.:
1



ENTECH
ENGINEERING, INC.
305 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5399

USGS MAP
WINSOME RANCH SUBDIVISION - FILING NO. 2
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:
LLL


DATE:
1/18/21

CHECKED:

DATE:

JOB NO.:
202508

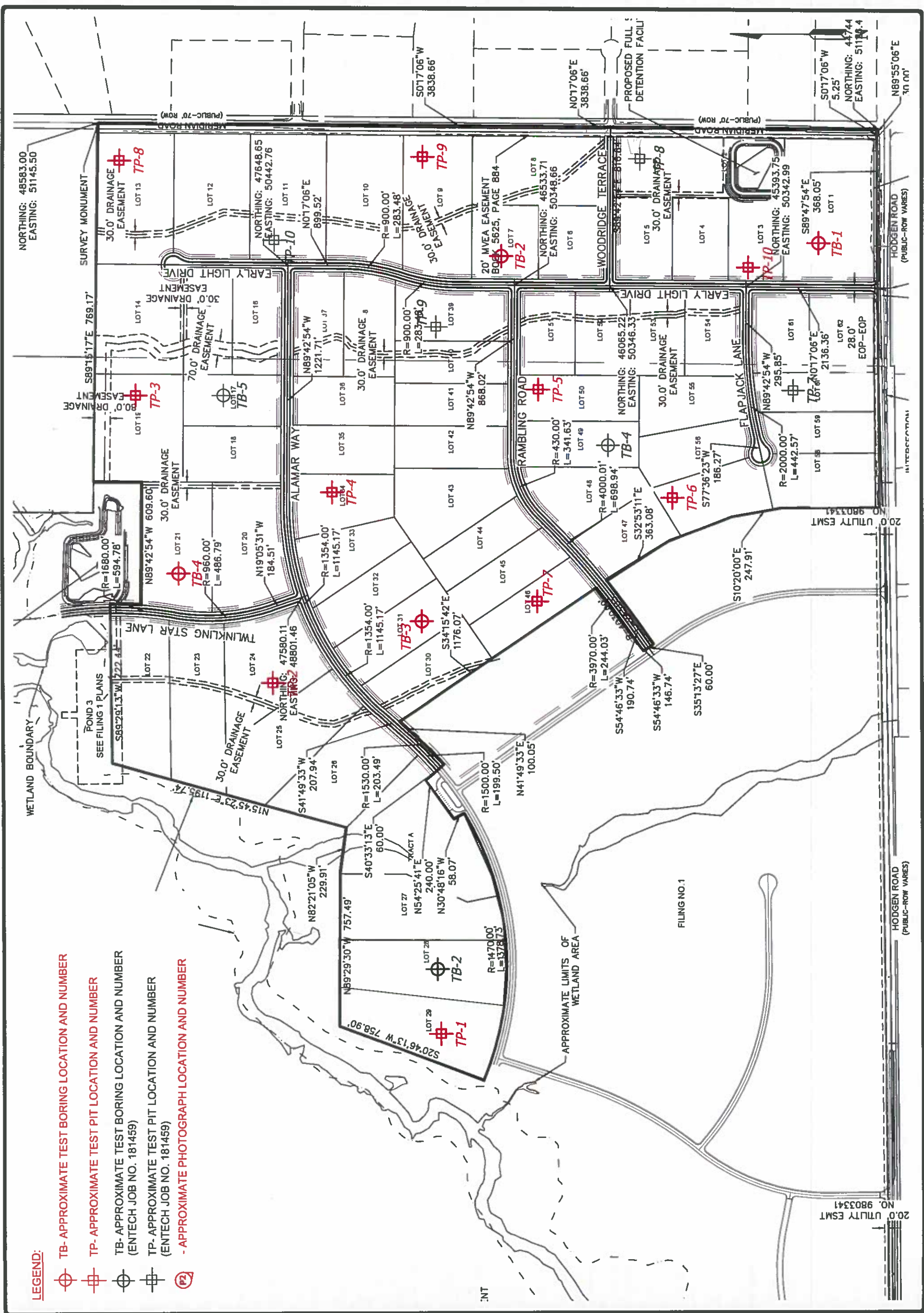
FIG NO.:
2

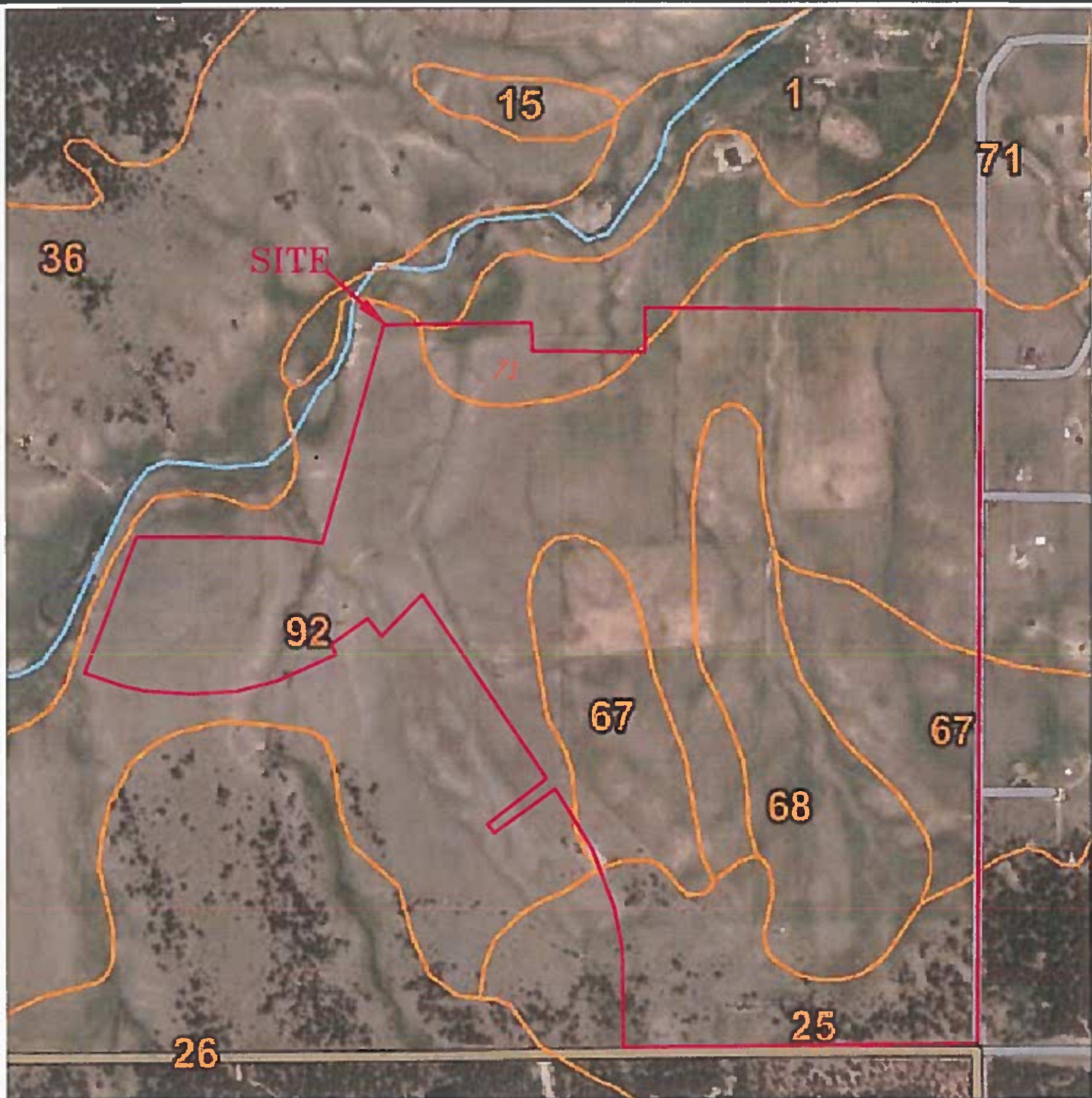
[illegible]

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

SITE PLAN/TEST BORING LOCATION MAP
WINSOME SUBDIVISION - FILING NO. 2
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DATE	1/18/21
TIME	
AS SHOWN	
JOB NO.	200932
FEELER No.	3
CHECKED	
ILL.	
CAUTION	





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

SOIL SURVEY MAP
WINSOME SUBDIVISION - FILING NO. 2
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:
LLL

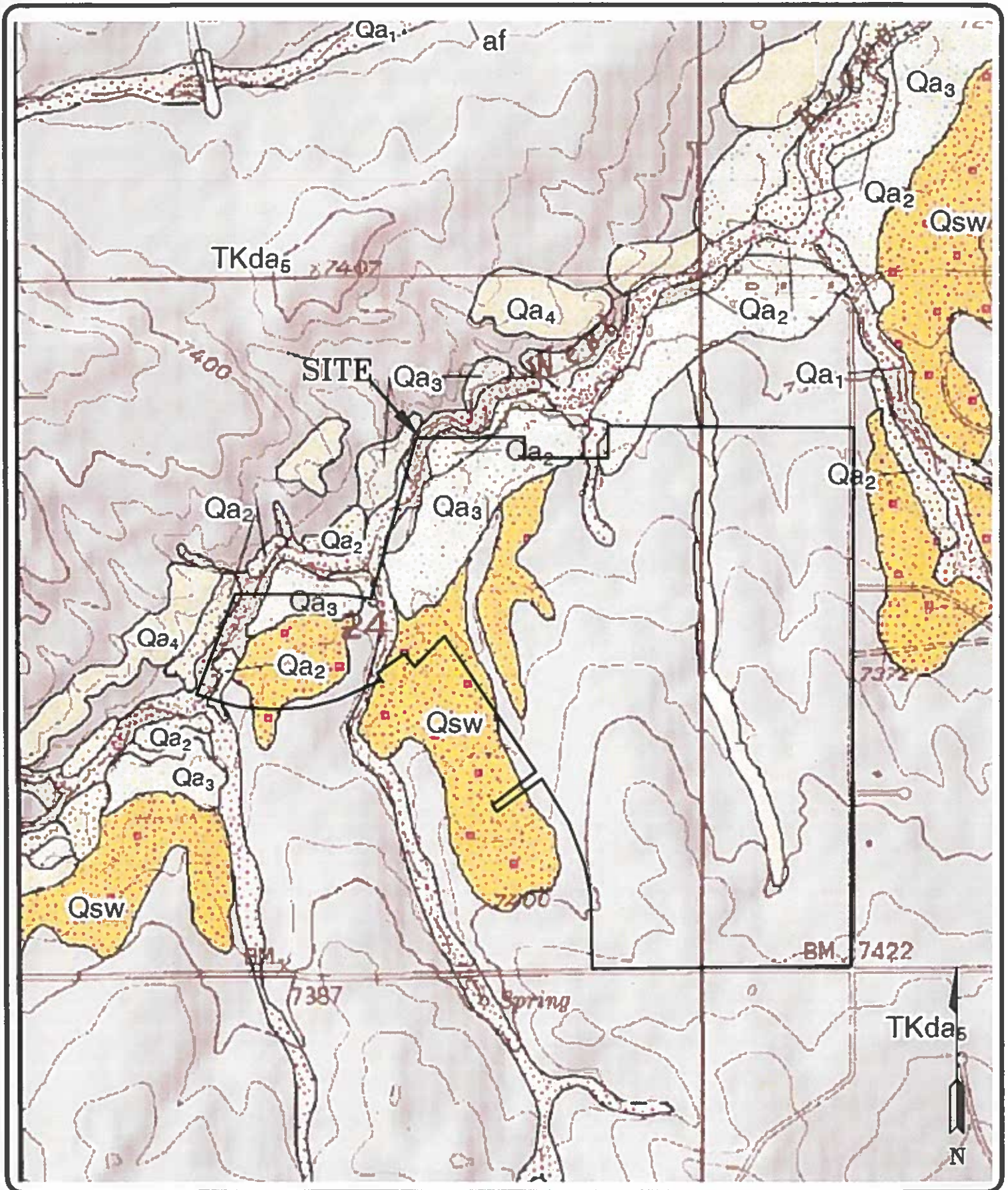
DATE:
1/18/21

CHECKED:

DATE:

JOB NO.:
202508

FIG NO.:
4



ENTECH
ENGINEERING, INC.
585 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5299

EASTONVILLE QUADRANGLE GEOLOGIC MAP
WINSOME SUBDIVISION - FILING NO. 2
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:
LLL

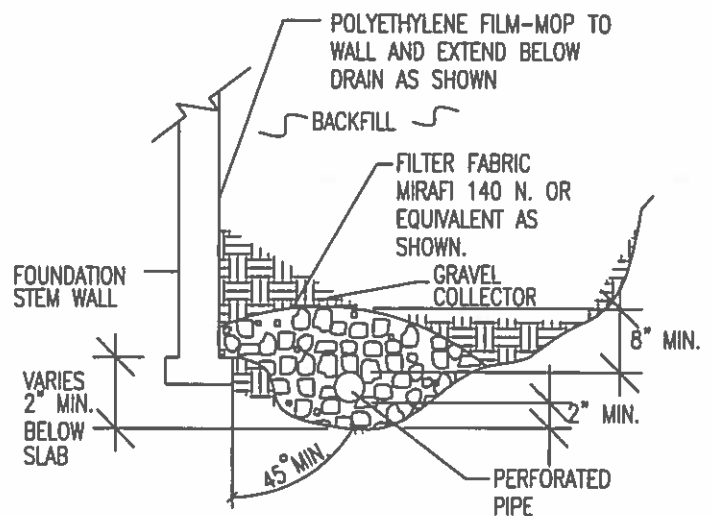
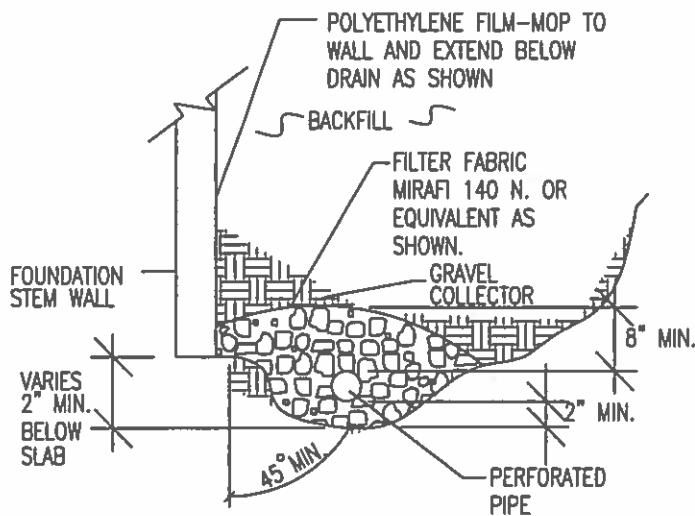
DATE:
1/18/21

CHECKED:

DATE:

JOB NO.:
202508

FIG NO.:
5



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:

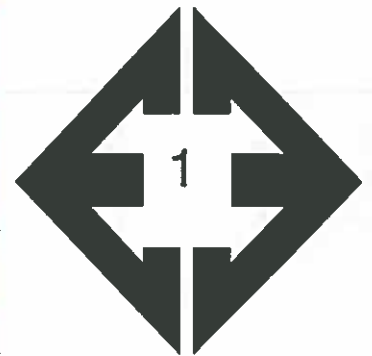
JOB NO.:

202508

FIG NO.:

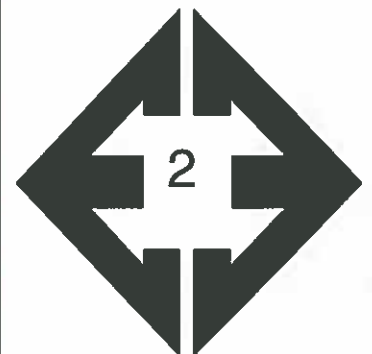
8

APPENDIX A: Site Photographs



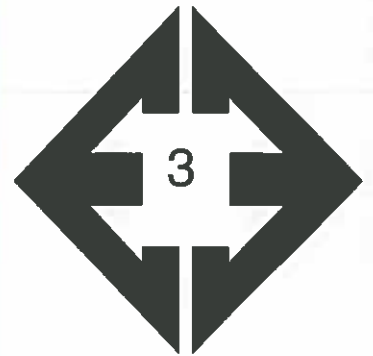
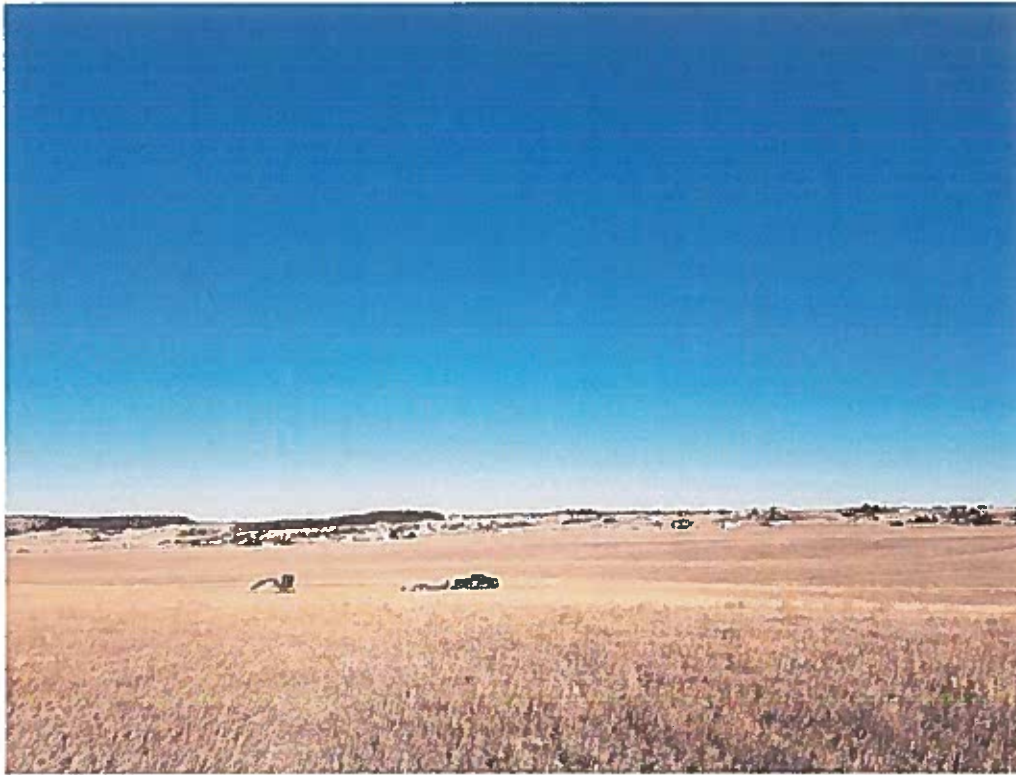
**Looking south from the
northwestern
portion of Filing No. 2.**

December 4, 2020



**Looking east from the
southwestern portion
of Filing No. 2.**

December 4, 2020



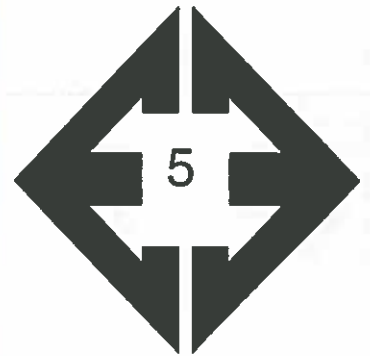
**Looking north from the
central portion of
Filing No. 2.**

December 9, 2020



**Looking northeast
from the central
portion of Filing No. 2.**

December 9, 2020



**Looking south from
the western side of
Filing No. 2.**

December 9, 2020



**Looking north from the
western side of Filing
No. 2.**

December 9, 2020

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
 DATE DRILLED 12/21/2020
 Job # 202508

TEST BORING NO. 2
 DATE DRILLED 12/21/2020
 CLIENT WINSOME, LLC
 LOCATION HODGEN AND MERIDIAN

REMARKS

WATER @ 18', 12/21/20

6" TOPSOIL, SAND, SILTY, TAN
 SANDSTONE, SILTY, FINE TO
 COARSE GRAINED, TAN, VERY
 DENSE, DRY TO MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50	2.0	3
			11"		
5			50	8.6	3
			10"		
10			50	9.3	3
			10"		
15			50	8.6	3
			7"		
20			50	14.9	3
			6"		



REMARKS

DRY TO 12', 12/21/20

6" TOPSOIL, SAND, SILTY, FINE
 TO COARSE GRAINED, TAN,
 VERY DENSE, DRY

CLAYSTONE, SANDY, TAN,
 HARD, MOIST

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

* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50	2.3	1
5			50	12.6	3
10			50	4.2	2
			9"		
			*	3.4	2
15					
20					



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE

LLC

1/13/21

JOB NO:
 202508

FIG NO:

B-1

TEST BORING NO. 3
 DATE DRILLED 12/22/2020
 Job # 202508

TEST BORING NO. 4
 DATE DRILLED 12/22/2020
 CLIENT WINSOME, LLC
 LOCATION HODGEN AND MERIDIAN

REMARKS

DRY TO 20', 12/22/20

6" TOPSOIL, SAND, SILTY, TAN
 SANDSTONE, SILTY, FINE TO
 COARSE GRAINED, TAN, VERY
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0	✱				1
1			50	2.1	2
2			9"		
3			50	3.7	2
4			6"		
5					
6					
7					
8					
9					
10			47	7.8	2
11					
12					
13					
14					
15			50	7.9	2
16			5"		
17					
18					
19					
20			50	6.3	2
21			6"		

REMARKS

WATER @ 17', 12/22/20

6" TOPSOIL, SAND, SILTY, TAN
 SANDSTONE, SILTY, FINE TO
 COARSE GRAINED, TAN, VERY
 DENSE, DRY TO WET

CLAYSTONE, VERY SANDY,
 BROWN, FIRM, WET



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0	✱				1
1					
2			50	2.0	2
3			10"		
4			50	2.9	2
5			11"		
6					
7					
8					
9					
10			50	2.7	2
11			11"		
12					
13					
14					
15			50	7.4	2
16			8"		
17					
18					
19					
20			9	22.3	3



ENTECH
 ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE

CHECKED:

LLL

DATE:

1/13/21

JOB NO.
 202508

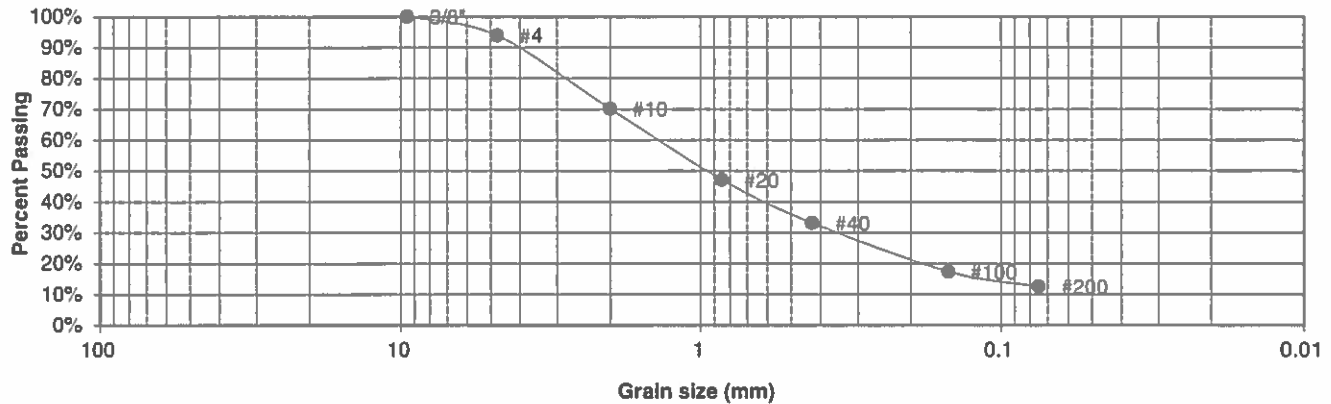
FIG NO.:

B-2

APPENDIX C: Laboratory Test Results

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	WINSOME, LLC
<u>SOIL TYPE #</u>	1	<u>PROJECT</u>	HODGEN AND MERIDIAN
<u>TEST BORING #</u>	1	<u>JOB NO.</u>	202508
<u>DEPTH (FT)</u>	2-3	<u>TEST BY</u>	BL

Sieve Analysis Grain Size Distribution



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.9%
10	70.1%
20	47.1%
40	33.1%
100	17.3%
200	12.5%

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:

DATE:

LLC

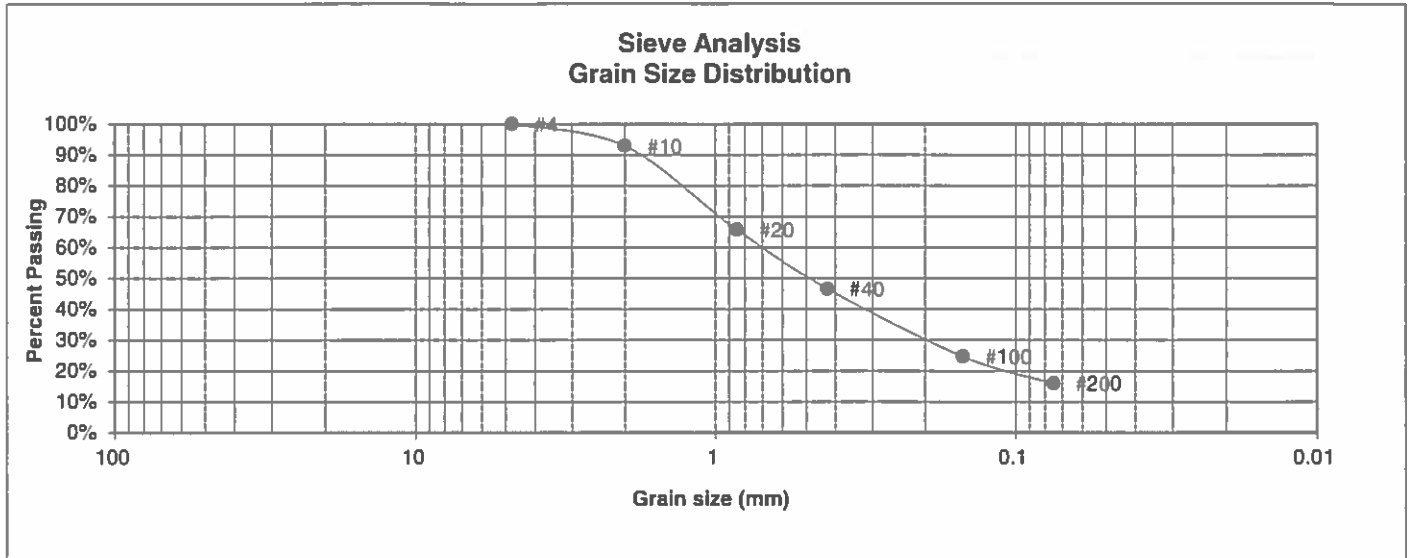
1/13/21

JOB NO.:
202508

FIG NO.:

C-1

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	WINSOME, LLC
<u>SOIL TYPE #</u>	1	<u>PROJECT</u>	HODGEN AND MERIDIAN
<u>TEST BORING #</u>	4	<u>JOB NO.</u>	202508
<u>DEPTH (FT)</u>	5	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	92.9%
20	65.7%
40	46.6%
100	24.7%
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:

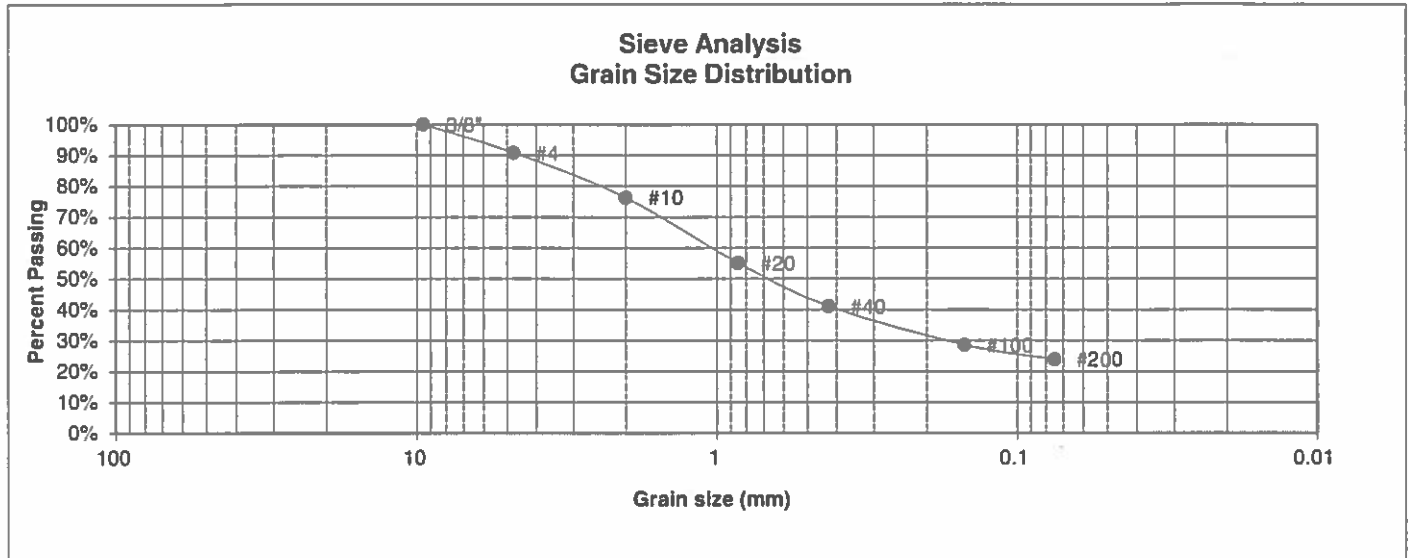
CHECKED:
LLL

DATE:
1/13/21

JOB NO.:
202508

FIG NO.:
C-2

UNIFIED CLASSIFICATION	SM	CLIENT	WINSOME, LLC
SOIL TYPE #	2	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	1	JOB NO.	202508
DEPTH (FT)	15	TEST BY	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	90.8%
10	76.2%
20	55.1%
40	41.1%
100	28.5%
200	23.9%

<u>Atterberg Limits</u>	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

<u>Swell</u>
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	1/13/21

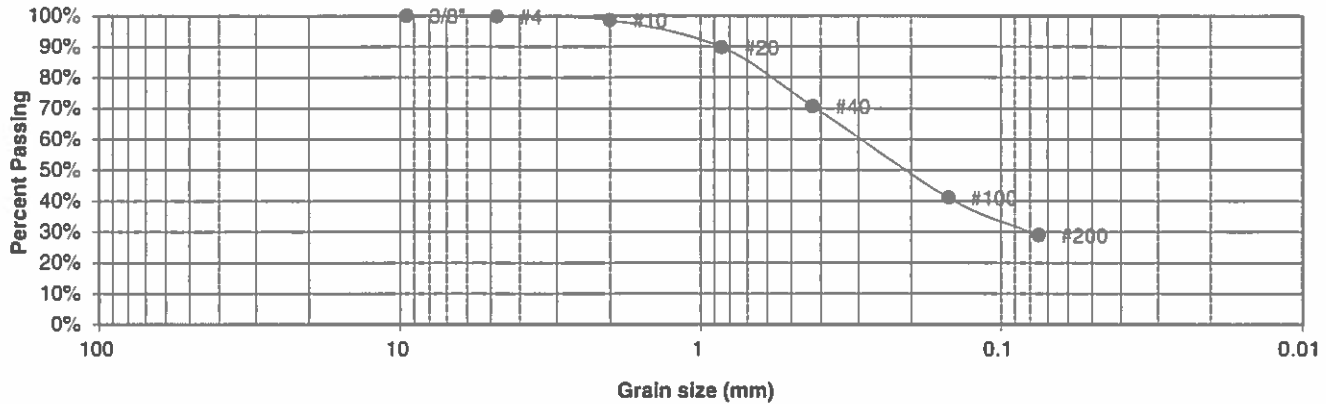
JOB NO.:
202508

FIG NO.:
C-3

UNIFIED CLASSIFICATION	SM
SOIL TYPE #	2
TEST BORING #	3
DEPTH (FT)	2-3

CLIENT	WINSOME, LLC
PROJECT	HODGEN AND MERIDIAN
JOB NO.	202508
TEST BY	BL

Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.8%
10	98.6%
20	89.7%
40	70.7%
100	41.0%
200	29.0%

**Atterberg
Limits**

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

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



**ENTECH
ENGINEERING, INC.**

505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

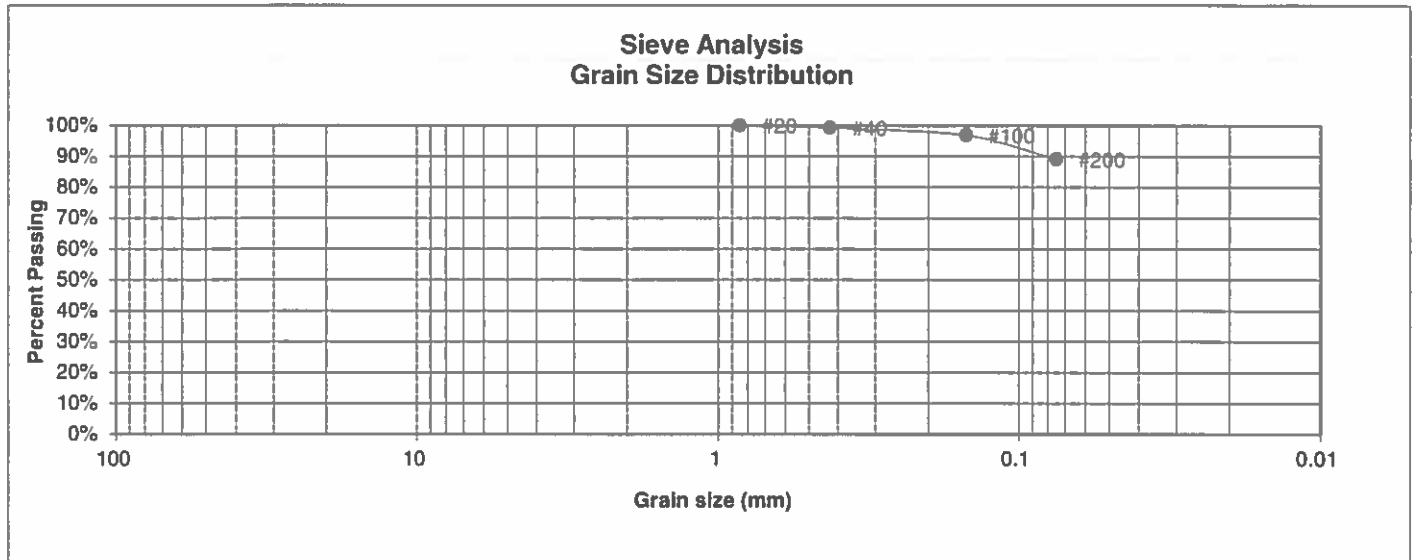
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	1/13/21

JOB NO.:
202508

FIG NO.:
C-4

<u>UNIFIED CLASSIFICATION</u>	CL	<u>CLIENT</u>	WINSOME, LLC
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	HODGEN AND MERIDIAN
<u>TEST BORING #</u>	2	<u>JOB NO.</u>	202508
<u>DEPTH (FT)</u>	5	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.2%
100	96.9%
200	89.1%

Atterberg
Limits
Plastic Limit
Liquid Limit
Plastic Index

<u>Swell</u>	
Moisture at start	13.8%
Moisture at finish	21.3%
Moisture increase	7.5%
Initial dry density (pcf)	104
Swell (psf)	850



**ENTECH
ENGINEERING, INC.**

505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

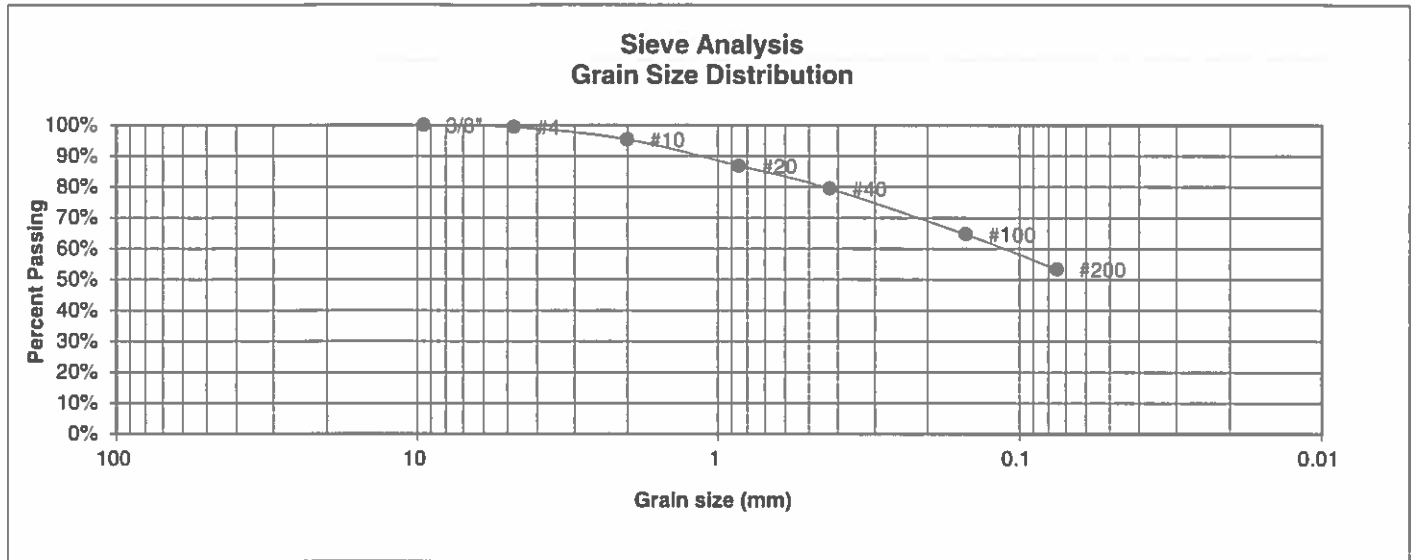
LABORATORY TEST RESULTS

<u>DRAWN:</u>	<u>DATE:</u>	<u>CHECKED:</u>	<u>DATE:</u>
		LL	1/13/21

JOB NO.:
202508

FIG NO.:
C-5

<u>UNIFIED CLASSIFICATION</u>	CL	<u>CLIENT</u>	WINSOME, LLC
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	HODGEN AND MERIDIAN
<u>TEST BORING #</u>	4	<u>JOB NO.</u>	202508
<u>DEPTH (FT)</u>	20	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	95.4%
20	86.8%
40	79.4%
100	64.7%
200	53.3%

<u>Atterberg Limits</u>	
Plastic Limit	16
Liquid Limit	29
Plastic Index	13

<u>Swell</u>	
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:

LL

DATE:

1/13/21

JOB NO.:
202508

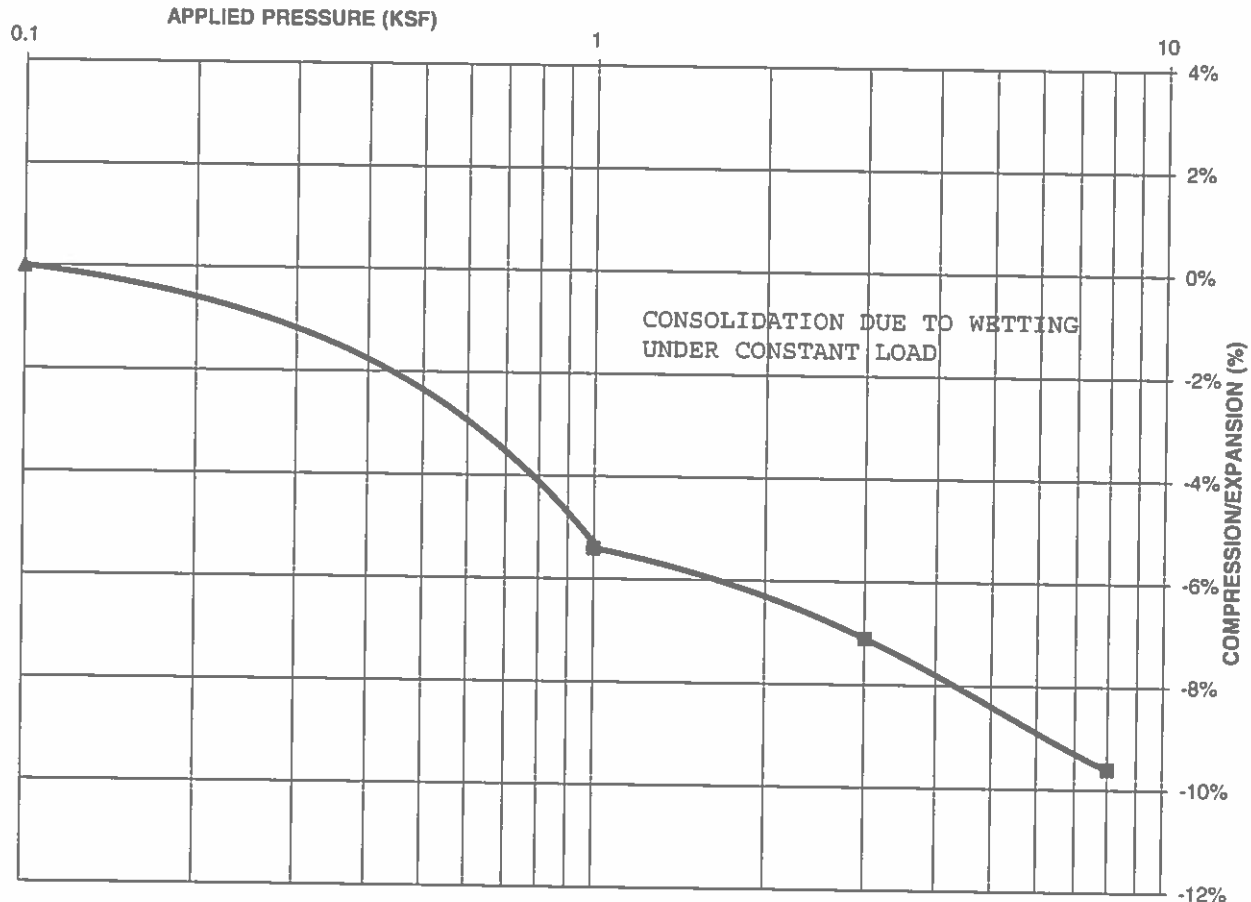
FIG NO.:
C-6

CONSOLIDATION TEST RESULTS

TEST BORING #	4	DEPTH(ft)	20
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)	107		
NATURAL MOISTURE CONTENT	21.8%		
SWELL/CONSOLIDATION (%)	-0.1%		

JOB NO. 202508
CLIENT WINSOME, LLC
PROJECT HODGEN AND MERIDIAN

SWELL CONSOLIDATION



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

SWELL CONSOLIDATION TEST RESULTS

DRAWN:

DATE:

CHECKED:

DATE:

LL

1/13/21

JOB NO.:
202508

FIG NO.:
C-7

APPENDIX D: Laboratory Testing Summary Table, Test Boring

Entech Job No. 181495

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

CLIENT PROTERRA PROPERTIES
PROJECT WINSOME SUBDIVISION
JOB NO. 181459

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	2	2-3			12.1	NV	NP				SM	SAND, SILTY
1	3	10			6.5			<0.01			SM-SW	SAND, SLIGHTLY SILTY
1	5	5			17.3						SM	SAND, SILTY
1	TP-3	2-3			23.7						SM	SAND, SILTY
1	TP-4	5-6			15.3						SM	SAND, SILTY
1	TP-5	2-3			19.2						SM	SAND, SILTY
1	TP-7	2-3			33.5						SM	SAND, SILTY
1	TP-9	5-6			21.3				30		SM	SAND, SILTY
1	TP-10	2-3			32.0						SM	SAND, SILTY
2	TP-1	5-6			74.8	30	10				CL	CLAY, SANDY
3	TP-2	5-6			14.0	30	9				SM	SANDSTONE, SILTY
3	TP-8	5-6			21.1	33	14				SC	SANDSTONE, CLAYEY
3	TP-6	5-6			54.2				350		CL-SC	SANDSTONE, VERY CLAYEY
3	4	20			18.6	21	7	<0.01			SC-SM	SANDSTONE, SILTY, CLAYEY
4	1	15	13.4	120.4	73.2	35	13	<0.01		2.5	CL	CLAYSTONE, SANDY

TEST BORING NO 1
 DATE DRILLED 9/18/2018
 Job # 181459

TEST BORING NO 2
 DATE DRILLED 9/18/2018
 CLIENT PROTERRA PROPERTIES
 LOCATION WINSOME SUBDIVISION

REMARKS

DRY TO 20', 9/19/18

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

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

CLAYSTONE, SANDY, TAN,
 HARD, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			29	3.7	1
5			17	4.7	1
10			15	11.1	1
15			50 11"	12.4	4
20			50 7"	12.8	4

REMARKS

DRY TO 17.5', 9/19/18

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

CLAY, SANDY, BROWN, FIRM,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			12	1.5	1
5			16	2.4	1
10			24	3.3	1
15			25	3.1	1
20			13	13.2	2



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE

CHECKED:
 LLL

DATE:
 1/7/19

JOB NO:
 181459

FIG NO:
 D-1

TEST BORING NO 3
DATE DRILLED 9/18/2018
Job # 181459

TEST BORING NO 4
DATE DRILLED 9/18/2018
CLIENT PROTERRA PROPERTIES
LOCATION WINSOME SUBDIVISION

REMARKS

WATER @ 16.5', 9/19/18

SAND, SILTY TO SLIGHTLY
SILTY, FINE TO COARSE
GRAINED, TAN, DENSE TO
MEDIUM DENSE, DRY TO WET

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			35	1.7	1
			16	3.0	1
10			28	3.9	1
15			24	3.6	1
20			17	10.7	1



REMARKS

DRY TO 20', 9/19/18

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

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			29	2.5	1
			26	5.0	1
10			16	3.7	1
15			27	6.9	1
20			50	6.2	3
			10"		



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

1/7/19

JOB NO:
181459

FIG NO:

02

TEST BORING NO. 5
 DATE DRILLED 9/18/2018
 Job # 181459

TEST BORING NO.
 DATE DRILLED
 CLIENT PROTERRA PROPERTIES
 LOCATION WINSOME SUBDIVISION

REMARKS

DRY TO 20', 9/19/18
 SAND, SILTY, FINE TO COARSE
 GRAINED, BROWN TO TAN,
 LOOSE TO MEDIUM DENSE,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			5	3.8	1
5			5	6.0	1
10			14	6.2	1
15			10	8.1	1
20			27	7.8	1

REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5					
10					
15					
20					



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

1/7/19

JOB NO.:
 181459

FIG NO.:

D-3

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

25—Elbeth sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367x

Elevation: 7,300 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam

E - 3 to 23 inches: loamy sand

Bt - 23 to 68 inches: sandy clay loam

C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

67—Peyton sandy loam, 5 to 9 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Peyton

Setting

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

Typical profile

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

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

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

Map Unit Setting

National map unit symbol: 369f

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 40 percent

Pring and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Arkosic alluvium derived from sedimentary rock
and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam

Bt - 12 to 25 inches: sandy clay loam

BC - 25 to 35 inches: sandy loam

C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

*Capacity of the most limiting layer to transmit water
(Ksat):* Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4c

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

Description of Pring

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High
(2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: 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
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 18, Jun 5, 2020

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 capacity: 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

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 18, Jun 5, 2020

El Paso County Area, Colorado

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 36b9

Elevation: 7,300 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Tomah and similar soils: 50 percent

Crowfoot and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Hills, alluvial fans

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand

E - 10 to 22 inches: coarse sand

C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high 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

Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Alluvial fans, hills

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand

E - 12 to 23 inches: sand

Bt - 23 to 36 inches: sandy clay loam

C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high 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

Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:

Hydric soil rating: No

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 18, Jun 5, 2020