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SOIL, GEOLOGY, AND GEOLOGIC HAZARD STUDY
WINSOME SUBDIVISION – FILING NO. 3
PORTIONS OF PARCEL NOS. 51000-00-497 & 51000-00-510
17480 MERIDIAN ROAD NORTH
EL PASO COUNTY, COLORADO

Prepared for

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

Add a section regarding the pond embankment per DCM 11.3.3

Attn: Joe DesJardin

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.

May 21, 2021

Logan L. Langford, P.G.
Geologist

Reviewed by:
Joseph C. Goode, Jr., P.E.
President

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PROFESSIONAL ENGINEER

LLL

Encl.

Entech Job No. 210539
AAprojects/2021/210539 countysoil/geo/ww

PCD Fil No. ____

SF229

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1.0 SUMMARY

Project Location

The project site lies in portions of the SE¼ of Section 13, and portions of the NE¼, SE¼, and SW¼ of Section 24, 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. 3 of the project is 349.47 acres. The proposed site development consists of Thirty-eight single-family rural residential lots, are proposed, and full spectrum detention ponds in the southeastern and southwestern portions 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, downslope creep, potentially unstable slopes, 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 SE¼ of Section 13, and portions of the NE¼, SE¼, and SW¼ of Section 24, 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 southeast, with moderately steep to 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 southern portion of Winsome Subdivision Filing No. 3. The drainages on site flow in a southerly, and northeasterly directions through the central portion of the site. Water was observed in the West Kiowa Creek drainage, and no water was observed in the minor 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 May 19, 2021, are included in Appendix A.

Total acreage involved in the proposed development is 349.47 acres. Thirty-eight single-family rural residential lots, and full spectrum detention ponds in the southeastern and southwestern portions of the site. The proposed residential lots vary in sizes from approximately 5 to 8 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 Pit Nos. (TP-1, TP-2 and TP-3) were used as part of the Winsome Subdivision Filing No. 3 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 April 1, 2021.

Six (6) test borings were drilled on the site to determine general suitability of the site for residential construction. The locations of the test borings are indicated on the Site Plan/Testing Location Map, Figure 3. The Test Boring 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 fill placed for temporary creek crossings, and fill associated with the embankment of detention Pond No. 3. 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 six soil types on the site (Figure 4). In general, they vary from loam, loamy sands, and sandy loam. The soils are described as follows:

Type	Description
1	Alamosa Loam, 1-3% slopes
15	Brussett Loam, 3 to 5% slopes
21	Cruckton Sandy Loam, 1 to 9% slopes
25	Elbeth Sandy Loam, 3 to 8% slopes
36	Holderness Loam, 8 to 15% 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. Six mappable units were identified on this site which are described as follows:

Qaf **Recent Artificial Fill of Holocene Age:** These are man-made fill deposits associated with temporary creek crossings, and the existing detention Pond No. 3 in the southeastern portion of Filing No. 3.

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 steam terrace deposits. The materials typically consist of silty to clayey gravelly sands.

Qlo **Louviers Alluvium (Alluvium Four) Late Middle Pleistocene Age:** These materials consist of upper stream terrace deposits. The materials typically consist of light brown silty sands which contain an abundance of gravels.

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 1^0 x 2^0 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).

Soil Type 1 is a sandy clay (CL). 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 4 feet, and to the termination of Test Boring No. 4 (20 feet). These soils were encountered at firm to very stiff consistencies and at moist conditions. Samples tested had 56 to 87 percent of the soil sized particles passing the No. 200 Sieve. Swell/Consolidation Testing resulted in a volume change of 2.9 percent, which indicates a moderate to high expansion potential.

Soil Type 2 is a silty to clayey sandstone (SM, SM-SW, SC). This material was encountered in five of the test borings at depths ranging from 2 to 8 feet extending to depths ranging from 15 to 20 feet. The sandstone was encountered at dense to very dense states and moist conditions. Samples tested had 23 to 48 percent of the soil sized particles passing the No. 200 sieve. Atterberg Limits Testing on samples of the sandstone resulted in a liquid limit of 25 and a plastic index of 10, and non-plastic results. Swell/Consolidation Testing resulted in a consolidation of 1.4 percent, indicating a low consolidation potential. Highly expansive clayey sandstone and claystone are commonly interbedded in the sandstone in the area. Sulfate testing on the

sandstone resulted in 0.00 to less than 0.01 percent soluble sulfate by weight, indicating negligible potential for below grade concrete degradation due to sulfate attack.

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 64 to 67 percent of the soil sized particles passing the No. 200 sieve. Atterberg Limits Testing resulted in a liquid limit of 32 and a plastic index of 15. FHA Swell Testing resulted in an expansion pressure of 430 psf. Swell/Consolidation Testing resulted in a volume change of 2.5 percent. These results indicated low, and moderate to high expansion potentials.

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 not encountered in test borings which were drilled to 15 to 20 feet. Areas of seasonal and potentially seasonal shallow groundwater have been mapped in low-lying areas and in the drainages on-site, and flowing water along West Kiowa Creek in the southern portion of Winsome Filing No. 3. 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:

Artificial Fill – Constraint

These are man-made fill deposits associated with fill placed for temporary creek crossing in the southeastern portion of Filing No. 3, and the embankment for detention Pond No. 3 also located in the southeastern portion of the site. Artificial fill was not observed in areas that would affect proposed construction on the lots in Filing No. 3.

Mitigation: 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 - Constraint

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 – Constraint

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.

Slope Stability and Landslide Hazards

The majority of the slopes in the building areas on site are gently to moderately sloping and do not exhibit any past or potential unstable slopes or landslides. However, the steeply sloping areas along the drainage in the central portion of the site have been identified as potentially unstable slopes. Additionally, areas of downslope creep have been mapped on the site. These areas are identified on the Geology/Engineering Geology Map, Figure 6. The recommendations for these areas are as follows:

- *Potentially Unstable Slope Area – Constraint*

  The area identified with this hazard is located along a portion of a minor drainage where cut banks have created potentially unstable slopes. Considerable care must be exercised in these areas not to create a condition which would tend to activate instability.

Mitigation: Building should be avoided in these areas. The lots most significantly affected by potentially unstable slopes are Lot 31 and 32. The structures on these lots should be set back a minimum of 30 feet from the crest of these slopes. The recommended setback lies within the proposed no build area. There is sufficient room on the lots to avoid this hazard. Proper control of drainage at both the surface above the slope and the subsurface is extremely important. Areas of ponded water at the surface should be avoided. Utility trenches, basement excavations and other subsurface features should not be permitted to become water traps which may promote saturation of the subsurface materials. Drainage should not be permitted over the potentially unstable slope but directed in a non-erosive manner away from the slope. Irrigation above these slopes should be kept to a minimum to prevent saturation of the subsurface soils. The use of xeriscape landscaping utilizing native plantings is recommended to reduce the need for irrigation.

- *Downslope Creep Area - Constraint*

The areas identified with this hazard includes some of the steeper slopes on site, particularly in the northwest portion of the site. In these areas, we would anticipate lateral and vertical movement of the near surface soils in the downslope direction. These areas are acceptable as building sites with the following constraints on construction.

Mitigation: Building is possible in these areas if the following engineering and construction mitigation steps are taken: This type of movement will increase lateral pressures against foundation walls on the uphill side of structures. The design of foundations in these areas should account for this additional pressure. Additionally, the foundation should be designed to withstand pressures where steeper areas slope away from the foundation. Tie beams and buttresses are recommended to stiffen the foundation system.

Floodplain and Drainage Areas – Constraint

Portions of the site associated with the West Kiowa Creek drainage are mapped within a floodplain zone according to the FEMA Map Nos. 08041CO310G and 08041CO350G, dated December 7, 2018 (Figure 7, Reference 6). Water was observed flowing in West Kiowa Creek; however, water was not observed in the minor drainages located within Filing No. 3. 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. 3 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 minor drainages across Filing No. 3. 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. Additional investigation is recommended for the proposed bridges for Alamar Way and Twinkling Star Lane once plans have been finalized.

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.

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. Shallow bedrock or very dense soils were encountered in all of the test borings. The medium dense to dense granular soils and shallow sandstone encountered in the upper soil profiles of the test borings will provide good support for foundations. Loose soils, if encountered beneath foundations or slabs, will require

removal 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/claystone will 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.

A potentially unstable slope exists along portions of the site where the drainages have eroded cut banks. A 30-foot building setback is recommended from the crest of the potentially unstable slope. Septic fields should not be located within the building setback as well. The slopes primarily affect Lot 31 and 32. It appears there is sufficient room on the lots to avoid the potentially unstable slopes. Additionally, minor areas of downslope creep have been mapped on the site. Many of these areas can be avoided by construction, however, Lot 8 may be affected. These areas are acceptable as building sites with mitigation for the sloping conditions taken into consideration. Additional reinforcement may be necessary in the foundation to account for additional pressures due to sloping conditions. Tie-beams and/or buttresses may be necessary, depending on site conditions and grading plans.

Areas of seasonal shallow groundwater and potentially seasonal shallow groundwater were encountered on site. Additionally, the southern portion of Filing No. 3 has been mapped in a floodplain zone associated with West Kiowa Creek. The floodplain area is in the designated open space area and will be avoided by construction. The area north of the creek is not mapped within 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. 3 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 minor drainages across the site north of West Kiowa Creek. 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 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.

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TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

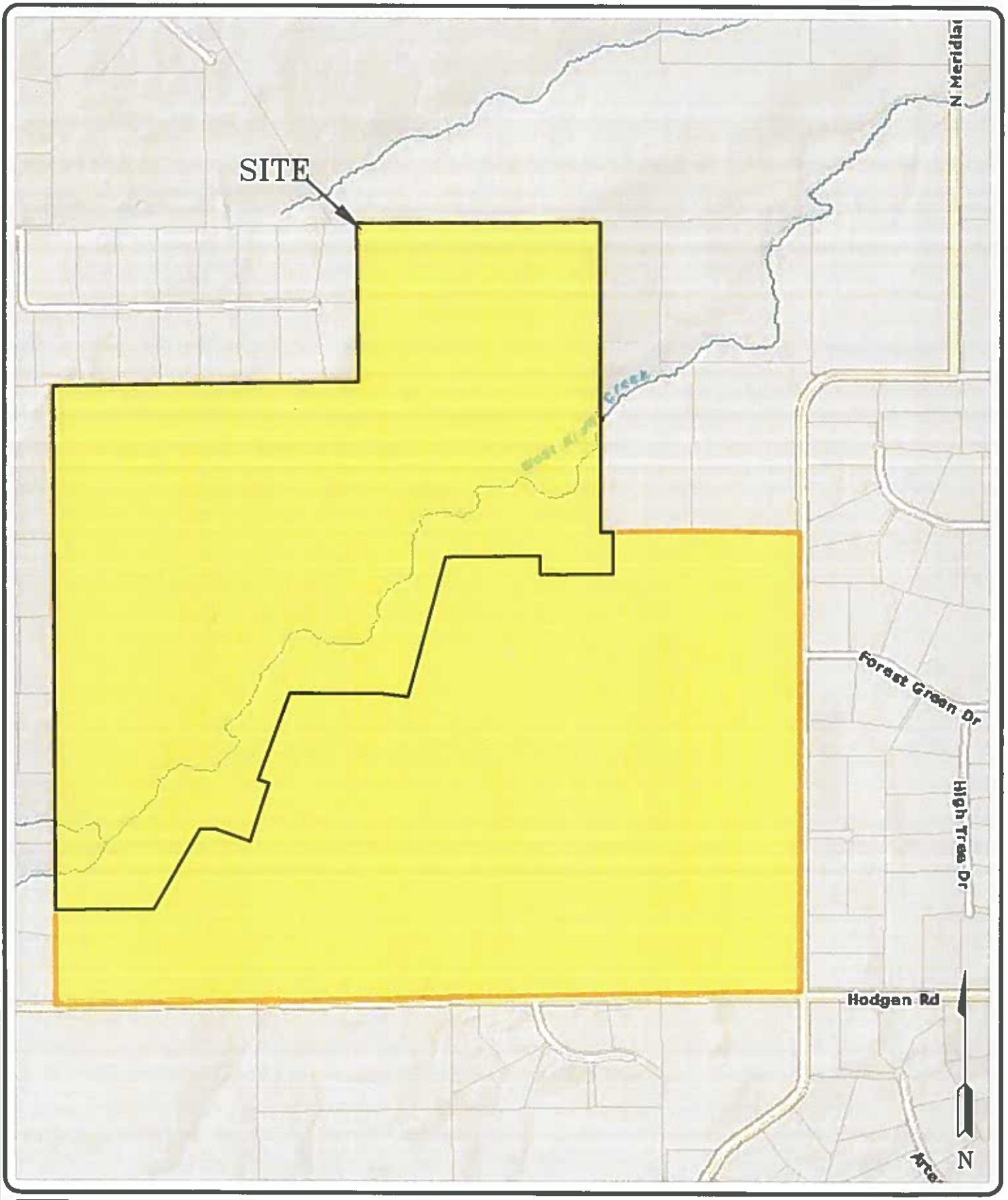
CLIENT WINSOME, LLC
PROJECT HODGEN AND MERIDIAN
JOB NO. 210539

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	4	10			56.1						CL	CLAY, VERY SANDY
1	6	2-3	9.7	107.6	86.7					2.9	CL	CLAY, SANDY
2	1	2-3	9.1	106.1	30.7	25	10	0.00		-1.4	SC	SANDSTONE, CLAYEY
2	1	5			23.1	NV	NP	<0.01			SM	SANDSTONE, SILTY
2	5	20			47.6						SC	SANDSTONE, VERY CLAYEY
3	2	10	10.4	126.3	67.3	32	15			2.5	CL	CLAYSTONE, SANDY
3	3	2-3			63.9				430		CL	CLAYSTONE, SANDY

Table 2: Summary Test Boring Results

Test Boring No.	Depth to Bedrock (ft.)	Depth to Seasonally Occurring Groundwater (ft.)
1	2	>15
2	2	>15
3	1	>15
4	>20	>20
5	2	>20
6	4	>15

FIGURES



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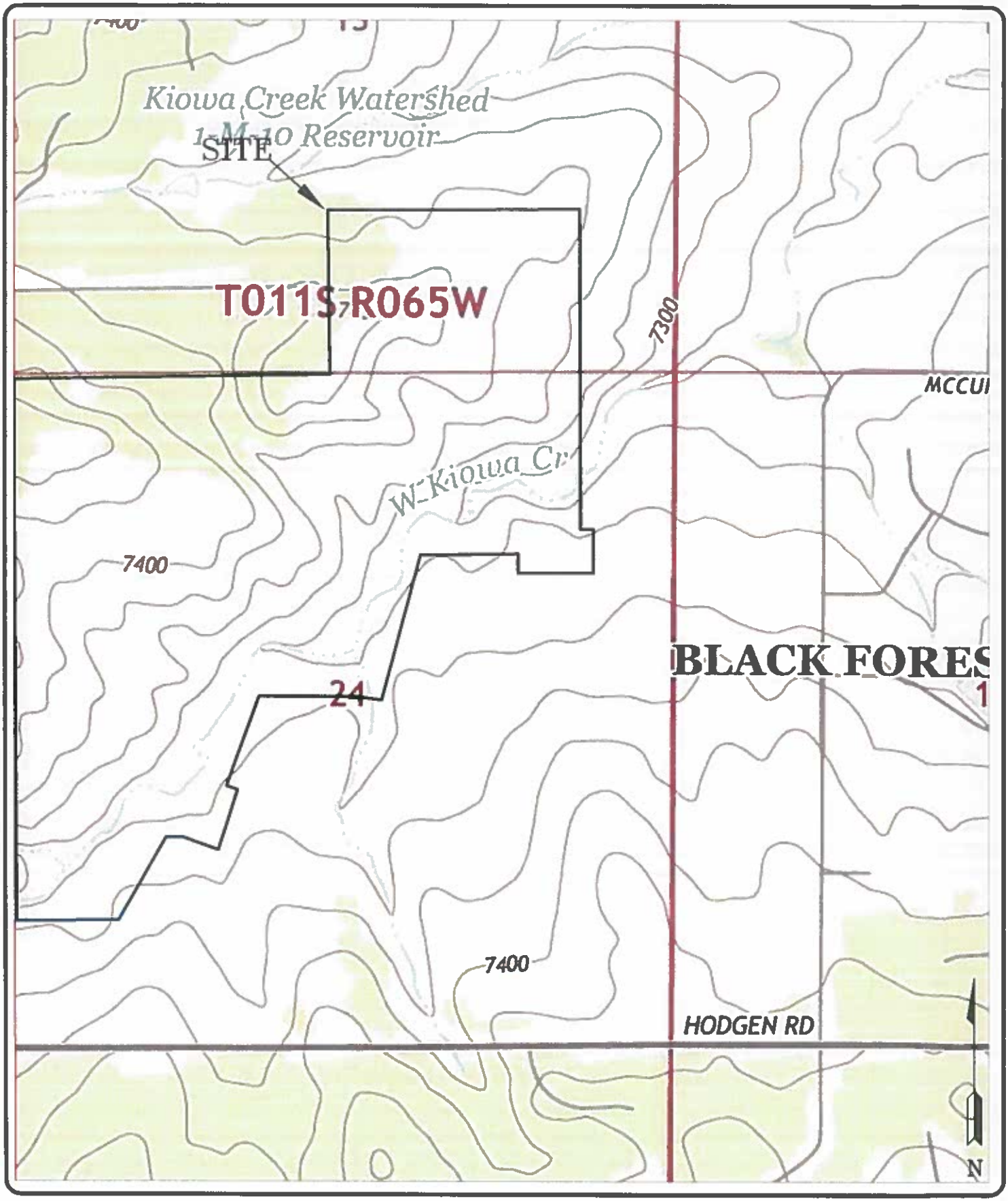
VICINITY MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	5/18/21		

JOB NO.: 210539

FIG NO.: 1



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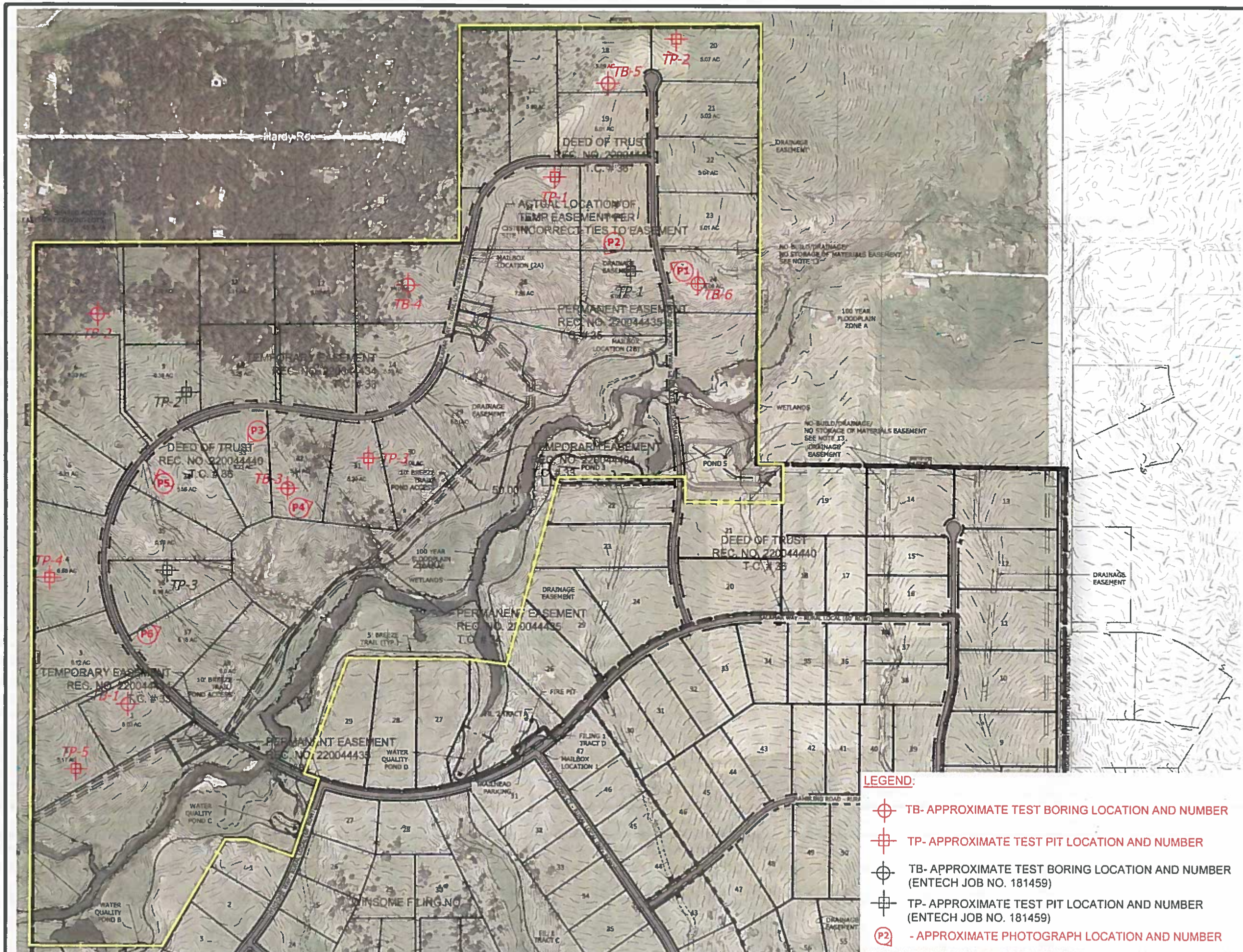
USGS MAP
WINSOME RANCH SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	5/18/21		

JOB NO.: 210539

FIG NO.: 2



LEGEND:

- TB- APPROXIMATE TEST BORING LOCATION AND NUMBER
- TP- APPROXIMATE TEST PIT LOCATION AND NUMBER
- TB- APPROXIMATE TEST BORING LOCATION AND NUMBER (ENTECH JOB NO. 181459)
- TP- APPROXIMATE TEST PIT LOCATION AND NUMBER (ENTECH JOB NO. 181459)
- P2 - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

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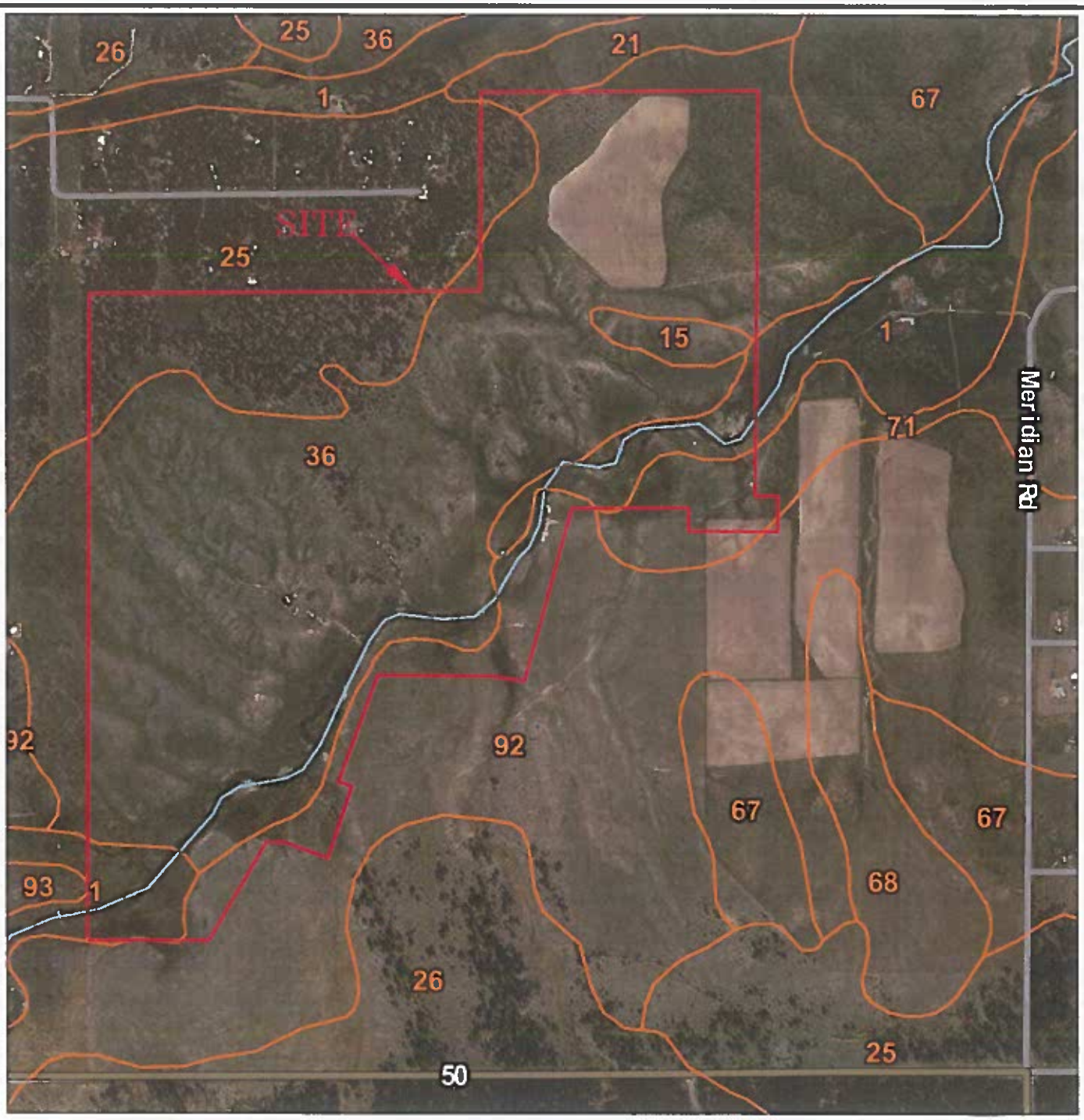
COLORADO SPRINGS, CO. 80907

SITE PLAN/TESTING LOCATION MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN	LLL
CHECKED	
DATE	5/16/21
SCALE	AS SHOWN
JOB NO.	210539
FIGURE No.	3



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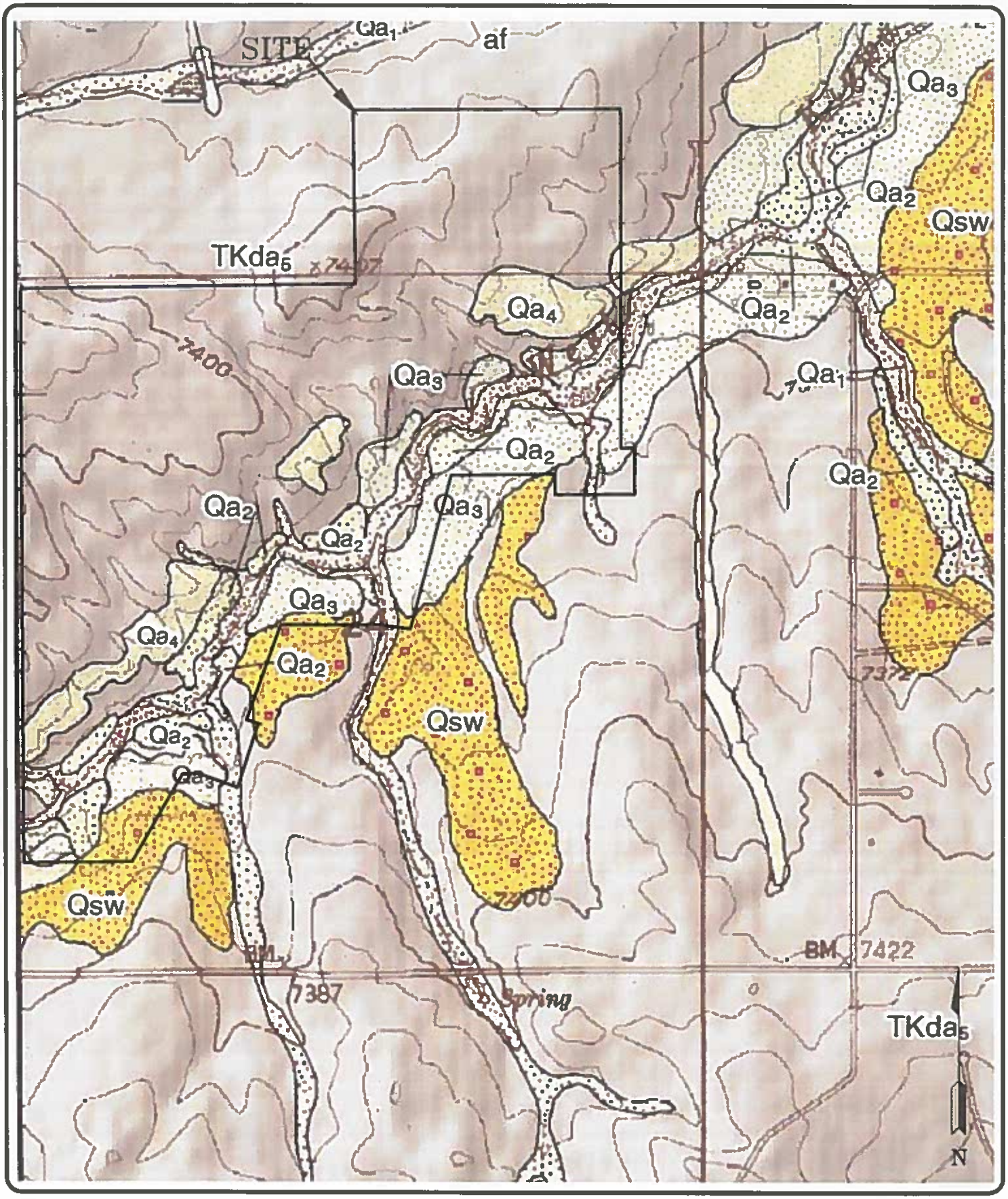
SOIL SURVEY MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	5/18/21		

JOB NO.: 210539

FIG NO.: 4



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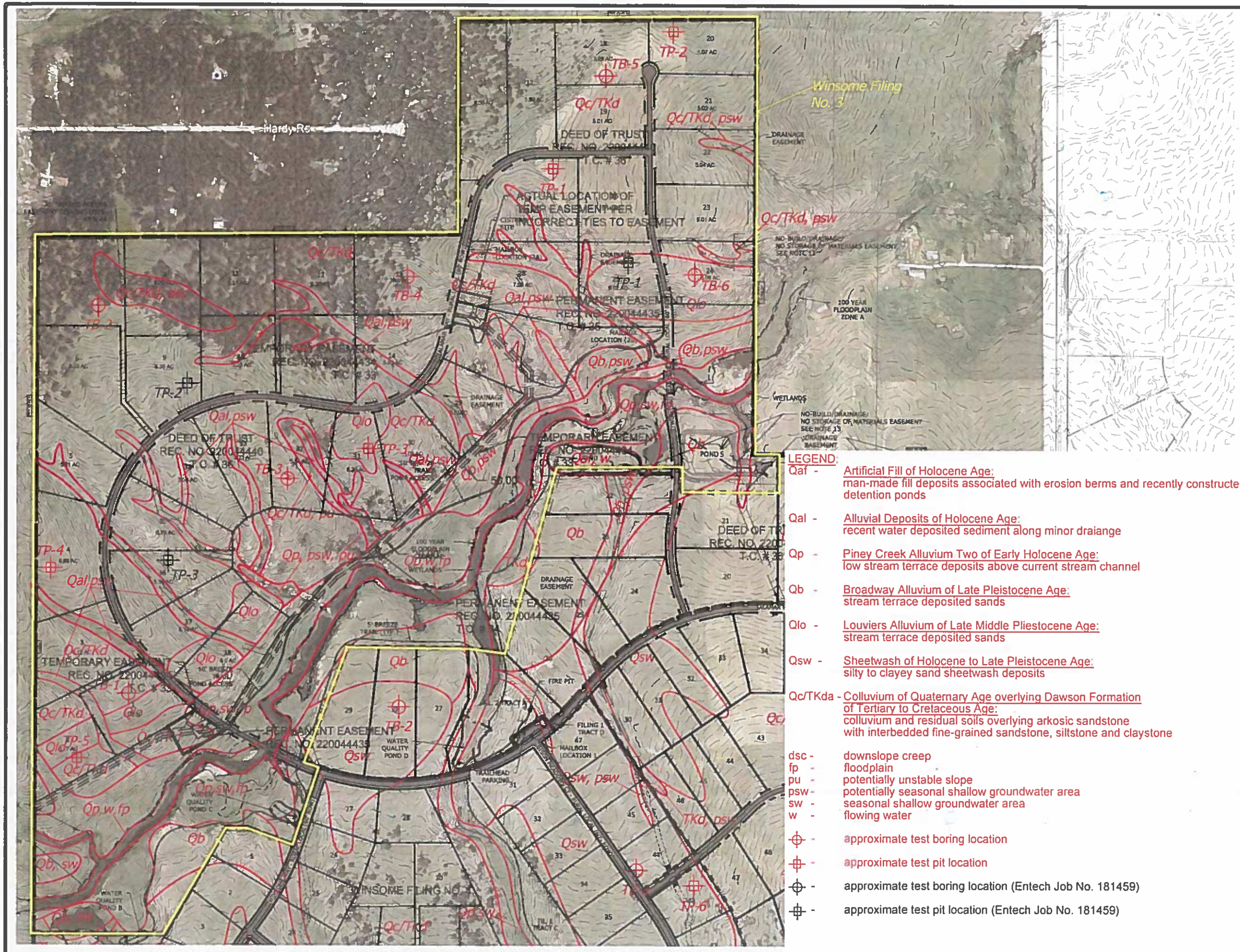
EASTONVILLE QUADRANGLE GEOLOGIC MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN:	DATE:	CHECKED:	DATE:
LLL	5/18/21		

JOB NO.: 210539

FIG NO.: 5



LEGEND:

Qaf - Artificial Fill of Holocene Age:
man-made fill deposits associated with erosion berms and recently constructed stormwater detention ponds

Qal - Alluvial Deposits of Holocene Age:
recent water deposited sediment along minor draiange

Qp - Piney Creek Alluvium Two of Early Holocene Age:
low stream terrace deposits above current stream channel

Qb - Broadway Alluvium of Late Pleistocene Age:
stream terrace deposited sands

Qlo - Louviers Alluvium of Late Middle Pliestocene Age:
stream terrace deposited sands

Qsw - Sheetwash of Holocene to Late Pleistocene Age:
silty to clayey sand sheetwash deposits

Qc/TKda - Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:
colluvium and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone

dsc - downslope creep
fp - floodplain
pu - potentially unstable slope
psw - potentially seasonal shallow groundwater area
sw - seasonal shallow groundwater area
w - flowing water

⊕ - approximate test boring location
⊞ - approximate test pit location
⊕ - approximate test boring location (Entech Job No. 181459)
⊞ - approximate test pit location (Entech Job No. 181459)

N

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GEOLOGY/ENGINEERING GEOLOGY MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN	LLL
CHECKED	
DATE	5/16/21
SCALE	AS SHOWN
JOB NO.	210539
FIGURE No.	6

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL. 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetic Vertical Datum of 1929

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4276000 m — 1000-meter Universal Transverse Mercator grid tick values, zone 4
- 600000 FT — 5000-foot grid tick values: Hawaii State Plane coordinate system, zone 3 (FIPSZONE 5103), Transverse Mercator projection
- DX5610 X — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M 2 — Coastal Mile marker

MAP REPOSITORY

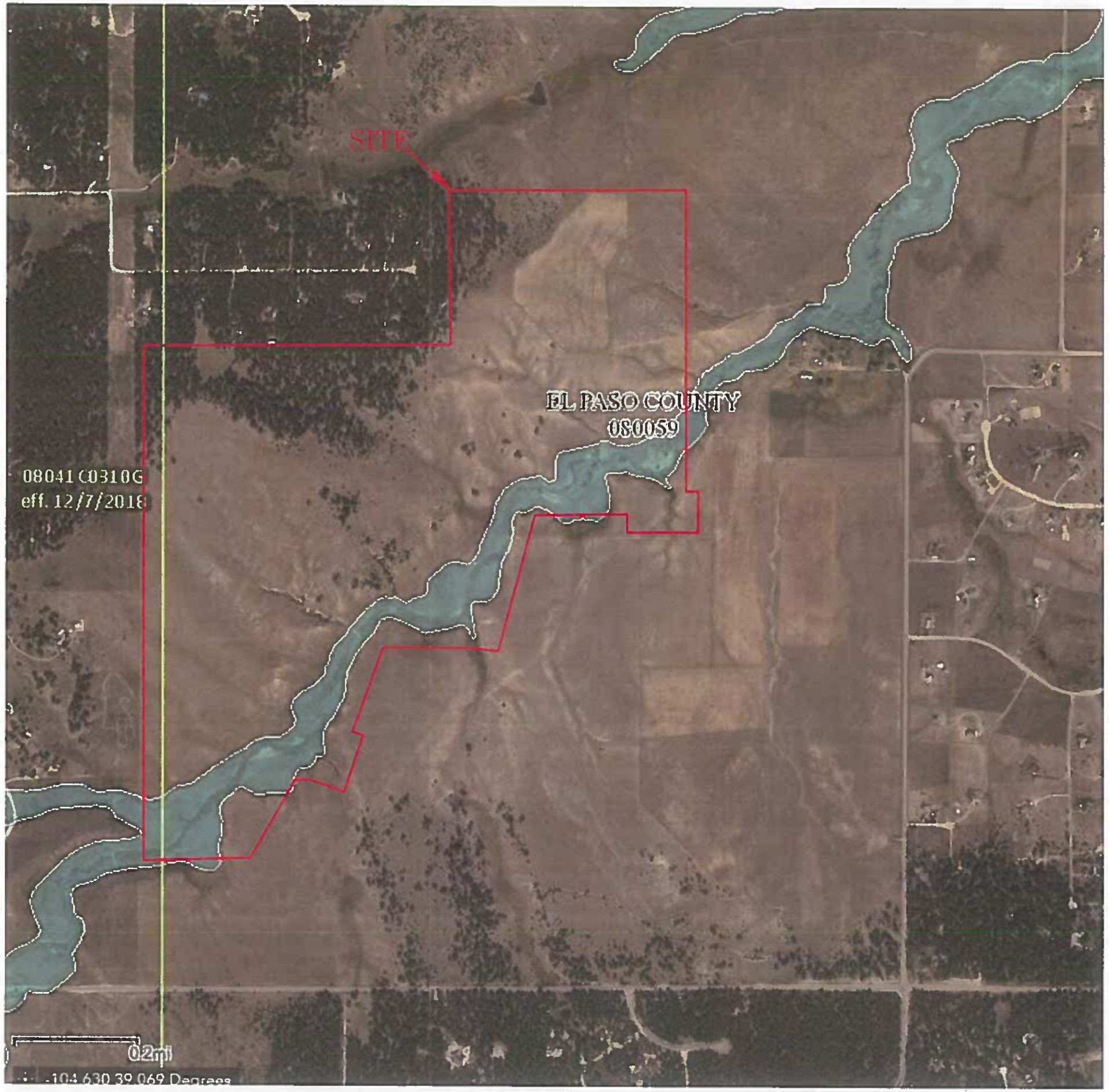
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

November 20, 2000

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 30, 2004 – to change Special Flood Hazard Areas, to update map format, to reflect revised shoreline and to incorporate previously issued Letters of Map Revision.



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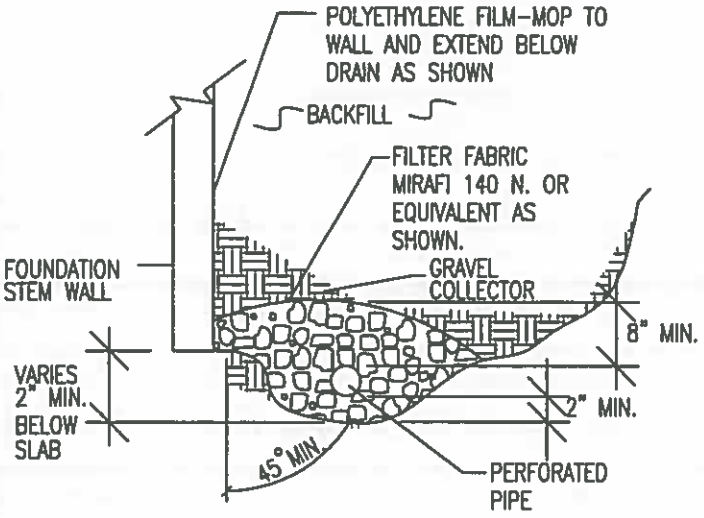
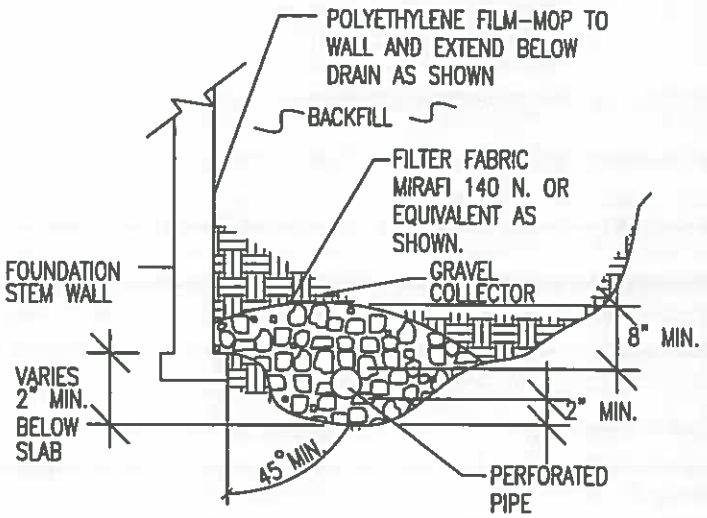
(719) 531-5599

FLOODPLAIN MAP
WINSOME SUBDIVISION – FILING NO. 3
HODGEN ROAD & MERIDIAN ROAD
EL PASO COUNTY, CO.
FOR: WINSOME, LLC

DRAWN	LLL
CHECKED	
DATE	5/16/21
SCALE	AS SHOWN
JOB NO.	202508
FIGURE No.	7





NOTES:

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

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

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

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

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

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

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PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:
		DS	LLL

JOB NO.: 210539

FIG NO.: 8

APPENDIX A: Site Photographs

1

Looking northwest from the eastern portion of Filing No. 2.

May 19, 2021

2

Looking west from the eastern portion of Filing No. 3.

May 19, 2021

Job No. 210539

3

Looking southwest from the west central portion of Filing No. 3.

May 19, 2021

4

Looking east from the central portion of Filing No. 3.

May 19, 2021

Job No. 210539

5

Looking north from the western side of Filing No. 3.

May 19, 2021

6

Looking east from the western side of Filing No. 3.

May 19, 2021

Job No. 210539

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 4/7/2021
Job # 210539

REMARKS

DRY TO 15', 4/8/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
					1	CLAY, SANDY, BROWN
			50/10"	6.8	2	SANDSTONE, CLAYEY, FINE TO MEDIUM GRAINED, BROWN, VERY DENSE, MOIST
5			50/7"	1.6	2	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST
10			50/10"	6.5	2	SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST
15			50/6"	8.6	2	
20						

TEST BORING NO. 2
DATE DRILLED 4/7/2021
CLIENT WINSOME, LLC
LOCATION HODGEN AND MERIDIAN

REMARKS

DRY TO 15', 4/8/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
					1	CLAY, SANDY, DARK BROWN
			50/10"	7.1	2	SANDSTONE, CLAYEY, FINE TO MEDIUM GRAINED, TAN, VERY DENSE, MOIST
5			50/10"	7.6	2	
10			48	10.7	3	CLAYSTONE, SANDY, BROWN, VERY STIFF, MOIST
15			50/5"	5.5	2	SANDSTONE, CLAYEY, FINE TO MEDIUM GRAINED, TAN, VERY DENSE, MOIST
20						

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED: LLL	DATE: 5/18/21

JOB NO.: 210539
FIG NO.: B-1

TEST BORING NO. 3
DATE DRILLED 4/7/2021
Job # 210539

REMARKS

DRY TO 15', 4/8/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50/7"	8.1	3
5			50/6"	5.0	2
10			50/6"	4.3	2
15			50/5"	6.1	2
20					

CLAY, SANDY, BROWN

CLAYSTONE, SANDY, BROWN, HARD, MOIST

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

TEST BORING NO. 4
DATE DRILLED 4/6/2021
CLIENT WINSOME, LLC
LOCATION HODGEN AND MERIDIAN

REMARKS

DRY TO 20', 4/8/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			50	4.0	1
5			50	7.2	1
10			43	6.1	1
15			43	6.7	1
20			50/6"	5.4	1

CLAY, VERY SANDY, TAN, HARD TO VERY STIFF, MOIST

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539
FIG NO.: B-2

TEST BORING NO. 5
DATE DRILLED 4/7/2021
Job # 210539

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 4/8/21						
CLAY, SANDY, BROWN						1
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST				50/8"	4.4	2
	5			50/10"	7.2	2
	10			50	8.7	2
CLAYSTONE, SANDY, BROWN, HARD, MOIST	15			50/6"	8.6	3
SANDSTONE, VERY CLAYEY, FINE TO MEDIUM GRAINED, GRAY BROWN, VERY DENSE, MOIST	20			50/5"	3.9	2

TEST BORING NO. 6
DATE DRILLED 4/7/2021
CLIENT WINSOME, LLC
LOCATION HODGEN AND MERIDIAN

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 15', 4/8/21						
CLAY, SANDY, DARK BROWN, STIFF, MOIST				19	7.9	1
CLAYSTONE, SANDY, BROWN, HARD, MOIST	5			50/10"	5.2	3
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST TO DRY	10			50/8"	5.5	2
	15			50/7"	2.1	2
	20					

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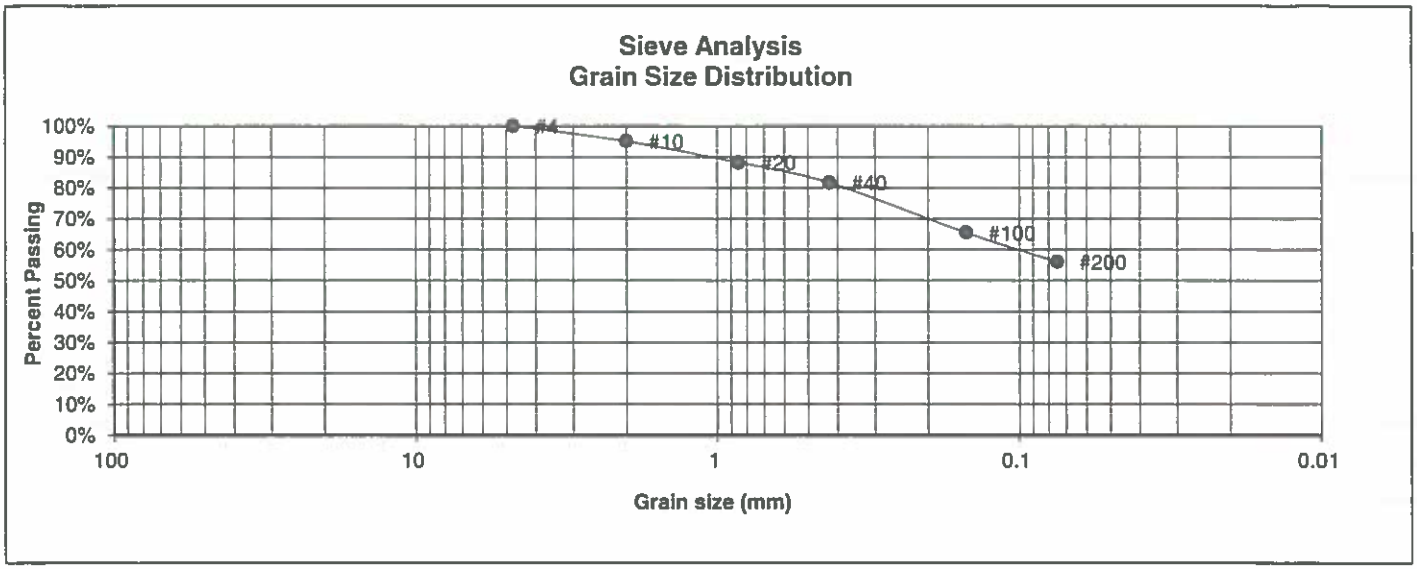
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLC	5/18/21

JOB NO. 210539
FIG NO. B-3

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	CL	CLIENT	WINSOME, LLC
SOIL TYPE #	1	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	4	JOB NO.	210539
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	95.1%
20	88.2%
40	81.7%
100	65.5%
200	56.1%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

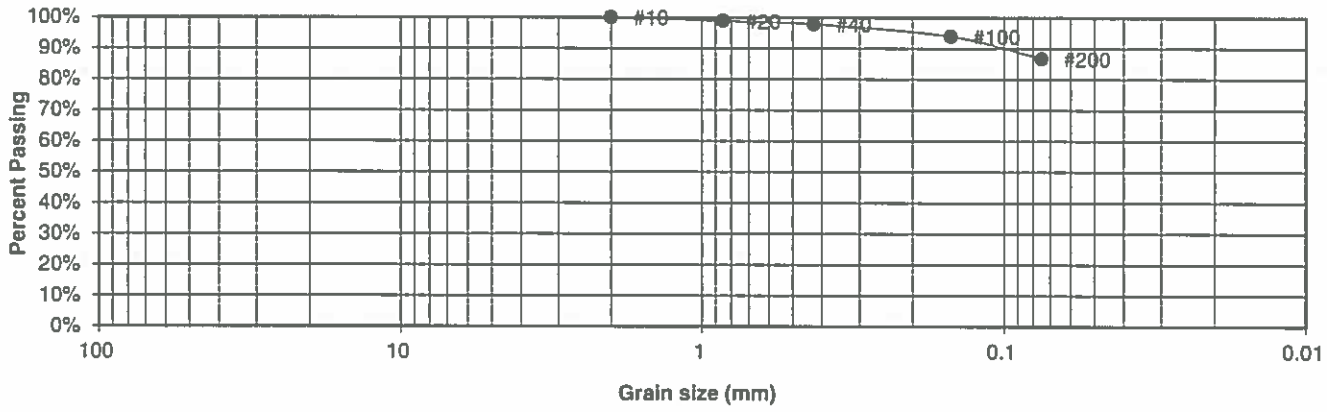
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539

FIG NO.: C-1

UNIFIED CLASSIFICATION	CL	CLIENT	WINSOME, LLC
SOIL TYPE #	1	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	6	JOB NO.	210539
DEPTH (FT)	2-3	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	100.0%
20	98.8%
40	97.8%
100	93.9%
200	86.7%

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

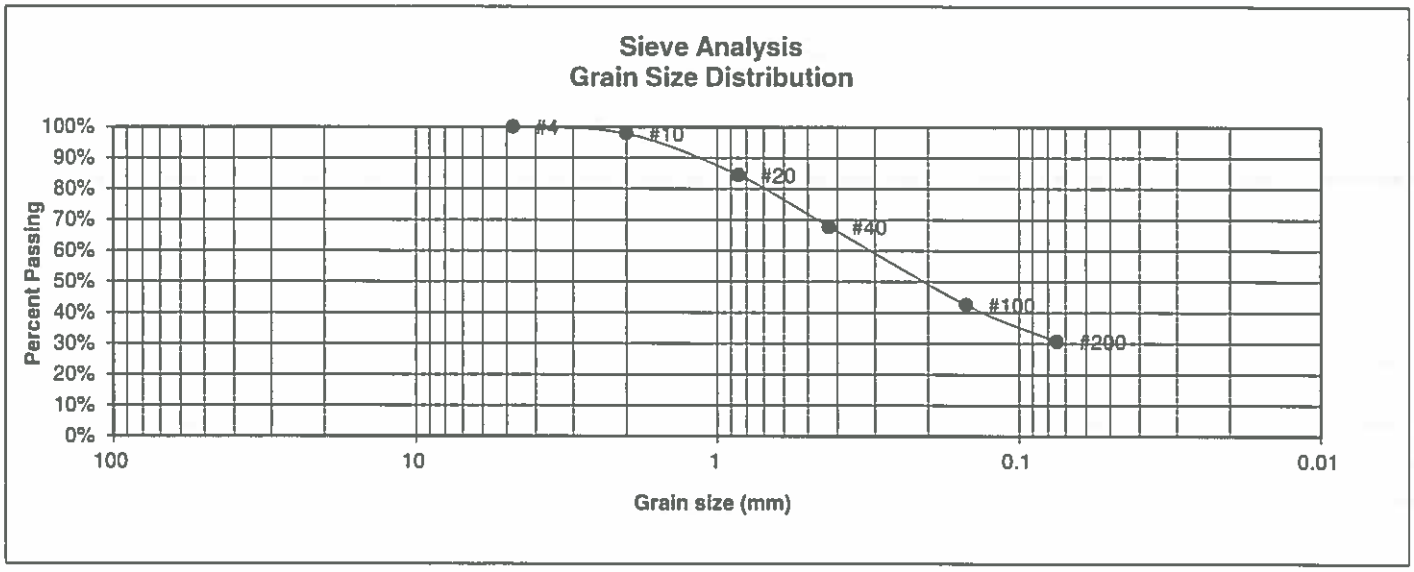
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539

FIG NO.: C-2

UNIFIED CLASSIFICATION	SC	CLIENT	WINSOME, LLC
SOIL TYPE #	2	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	1	JOB NO.	210539
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.9%
20	84.5%
40	67.7%
100	42.6%
200	30.7%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	25
Plastic Index	10

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

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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

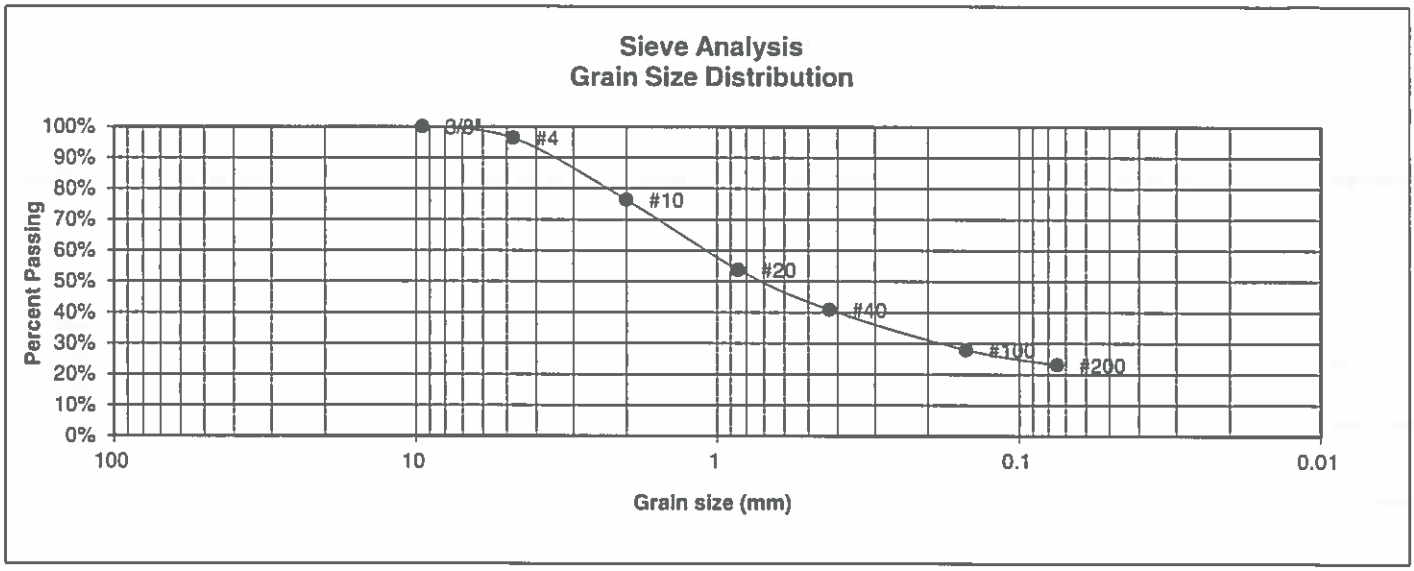
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO: 210539

FIG NO: C-3

UNIFIED CLASSIFICATION	SM	CLIENT	WINSOME, LLC
SOIL TYPE #	2	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	1	JOB NO.	210539
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.4%
10	76.4%
20	53.7%
40	40.8%
100	27.9%
200	23.1%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

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

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

LABORATORY TEST RESULTS

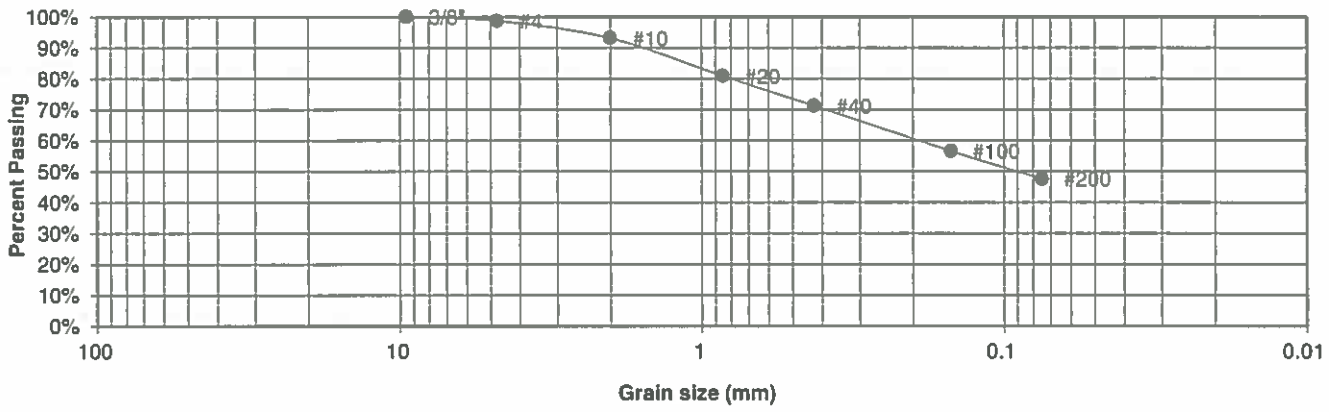
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539

FIG NO.: L-4

UNIFIED CLASSIFICATION	SC	CLIENT	WINSOME, LLC
SOIL TYPE #	2	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	5	JOB NO.	210539
DEPTH (FT)	20	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	98.7%
10	93.1%
20	80.9%
40	71.2%
100	56.6%
200	47.6%

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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LABORATORY TEST RESULTS

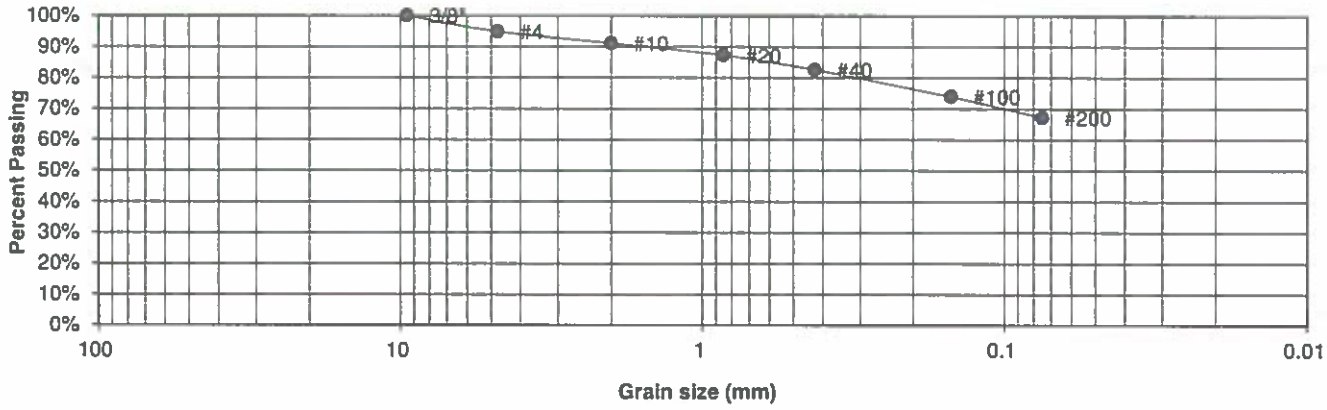
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO: 210539

FIG NO: C-5

UNIFIED CLASSIFICATION	CL	CLIENT	WINSOME, LLC
SOIL TYPE #	3	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	2	JOB NO.	210539
DEPTH (FT)	10	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	94.8%
10	91.1%
20	87.3%
40	82.6%
100	74.0%
200	67.3%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	32
Plastic Index	15

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

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LABORATORY TEST RESULTS

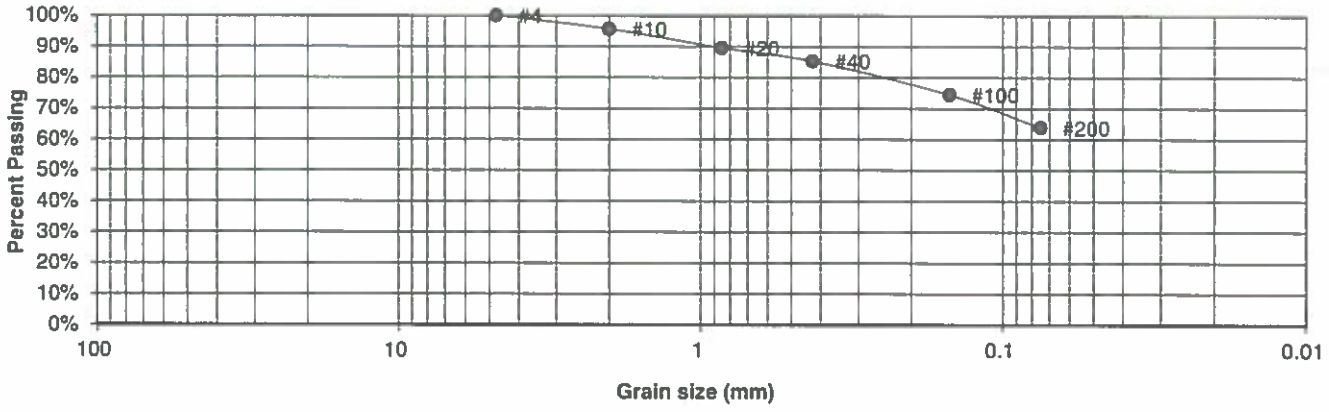
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539

FIG NO.: C-6

UNIFIED CLASSIFICATION	CL	CLIENT	WINSOME, LLC
SOIL TYPE #	3	PROJECT	HODGEN AND MERIDIAN
TEST BORING #	3	JOB NO.	210539
DEPTH (FT)	2-3	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	95.7%
20	89.6%
40	85.3%
100	74.5%
200	63.9%

Atterberg Limits	
Plastic Limit	
Liquid Limit	
Plastic Index	

Swell	
Moisture at start	12.7%
Moisture at finish	21.7%
Moisture increase	9.0%
Initial dry density (pcf)	102
Swell (psf)	430

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LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

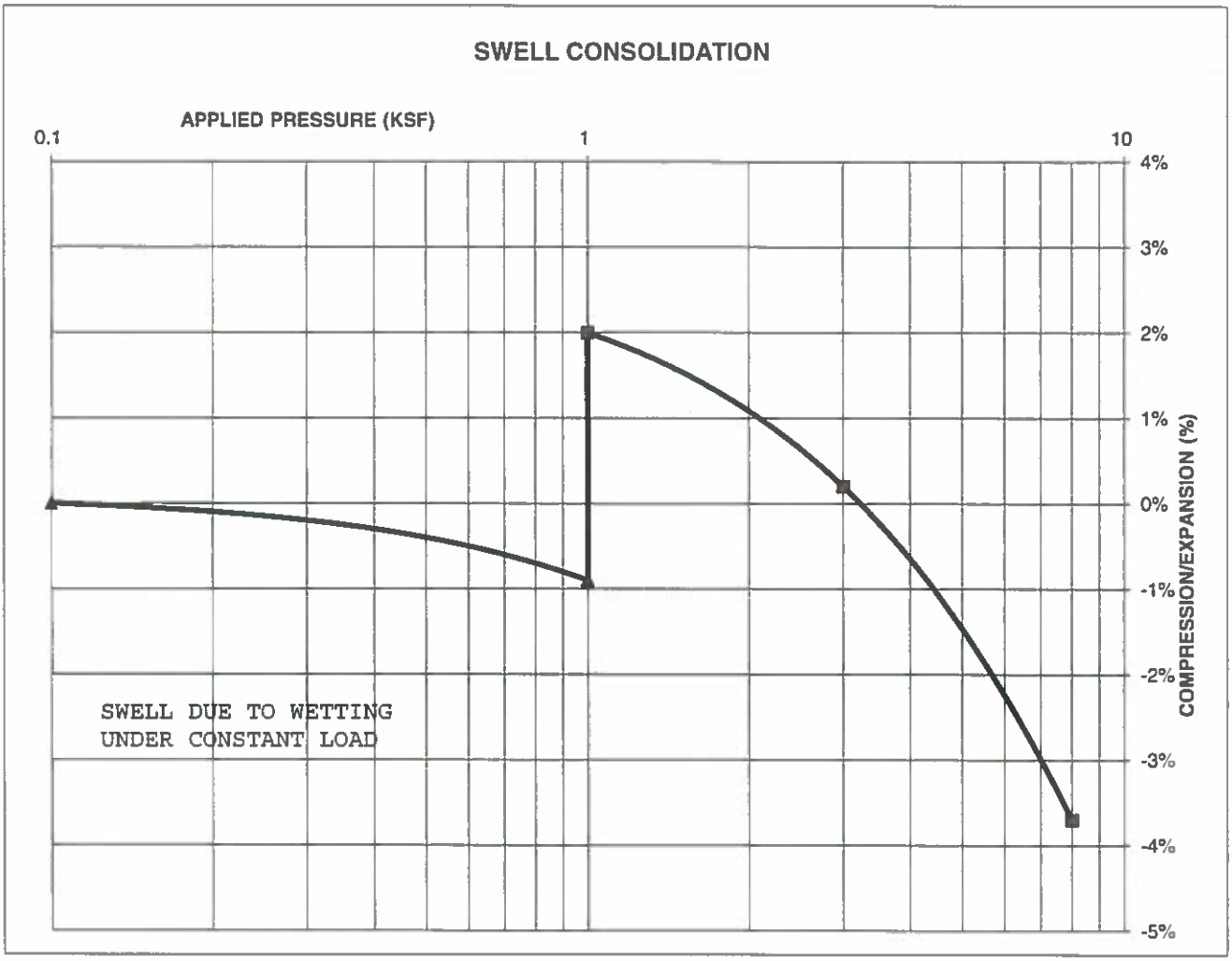
JOB NO.: 210539

FIG NO.: C-7

CONSOLIDATION TEST RESULTS

TEST BORING #	6	DEPTH(ft)	2-3
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			108
NATURAL MOISTURE CONTENT			9.7%
SWELL/CONSOLIDATION (%)			2.9%

JOB NO. 210539
CLIENT WINSOME, LLC
PROJECT HODGEN AND MERIDIAN



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SWELL CONSOLIDATION
TEST RESULTS

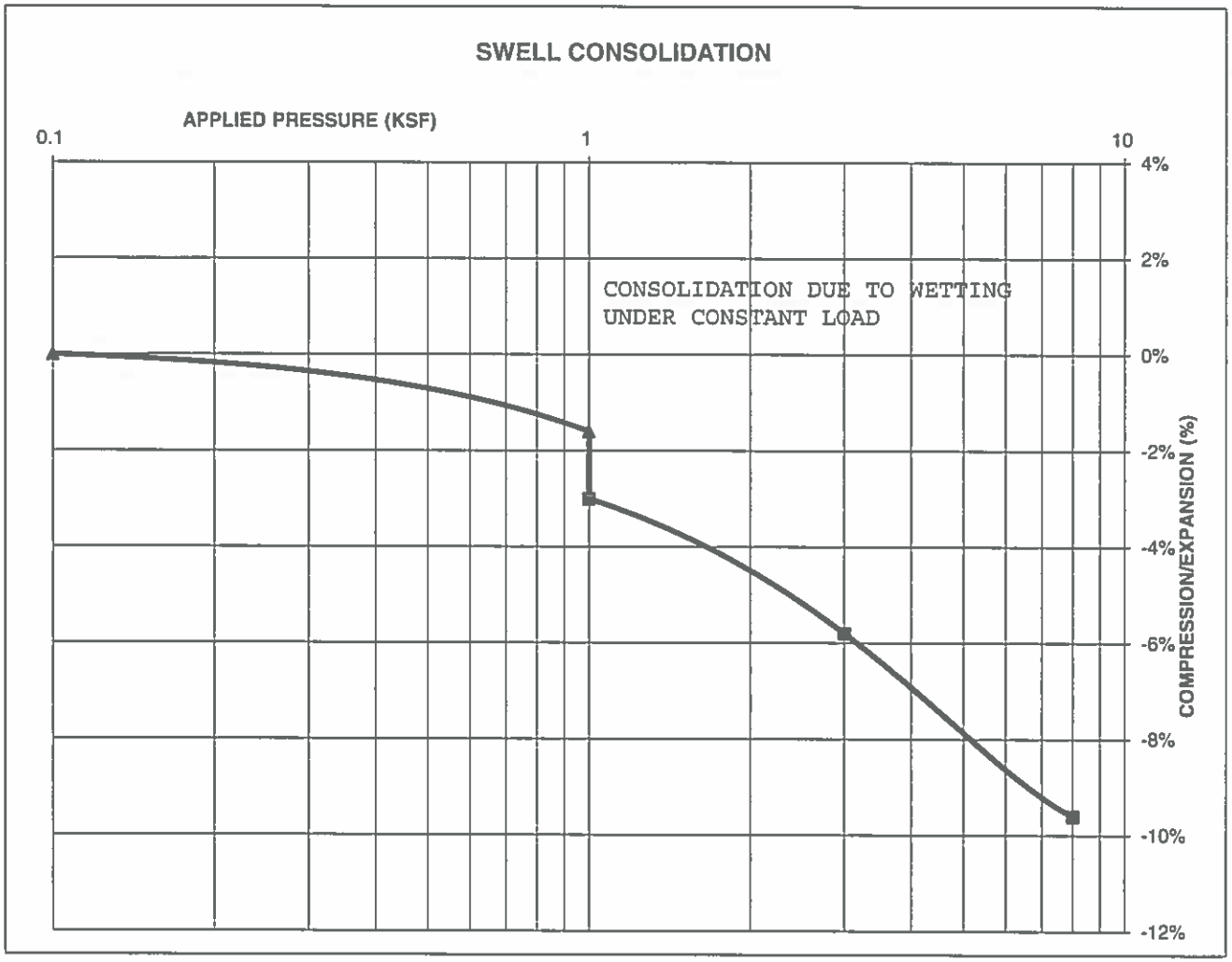
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539
FIG NO.: C-8

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	2-3
DESCRIPTION	SC	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			106
NATURAL MOISTURE CONTENT			9.1%
SWELL/CONSOLIDATION (%)			-1.4%

JOB NO. 210539
CLIENT WINSOME, LLC
PROJECT HODGEN AND MERIDIAN



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SWELL CONSOLIDATION
TEST RESULTS

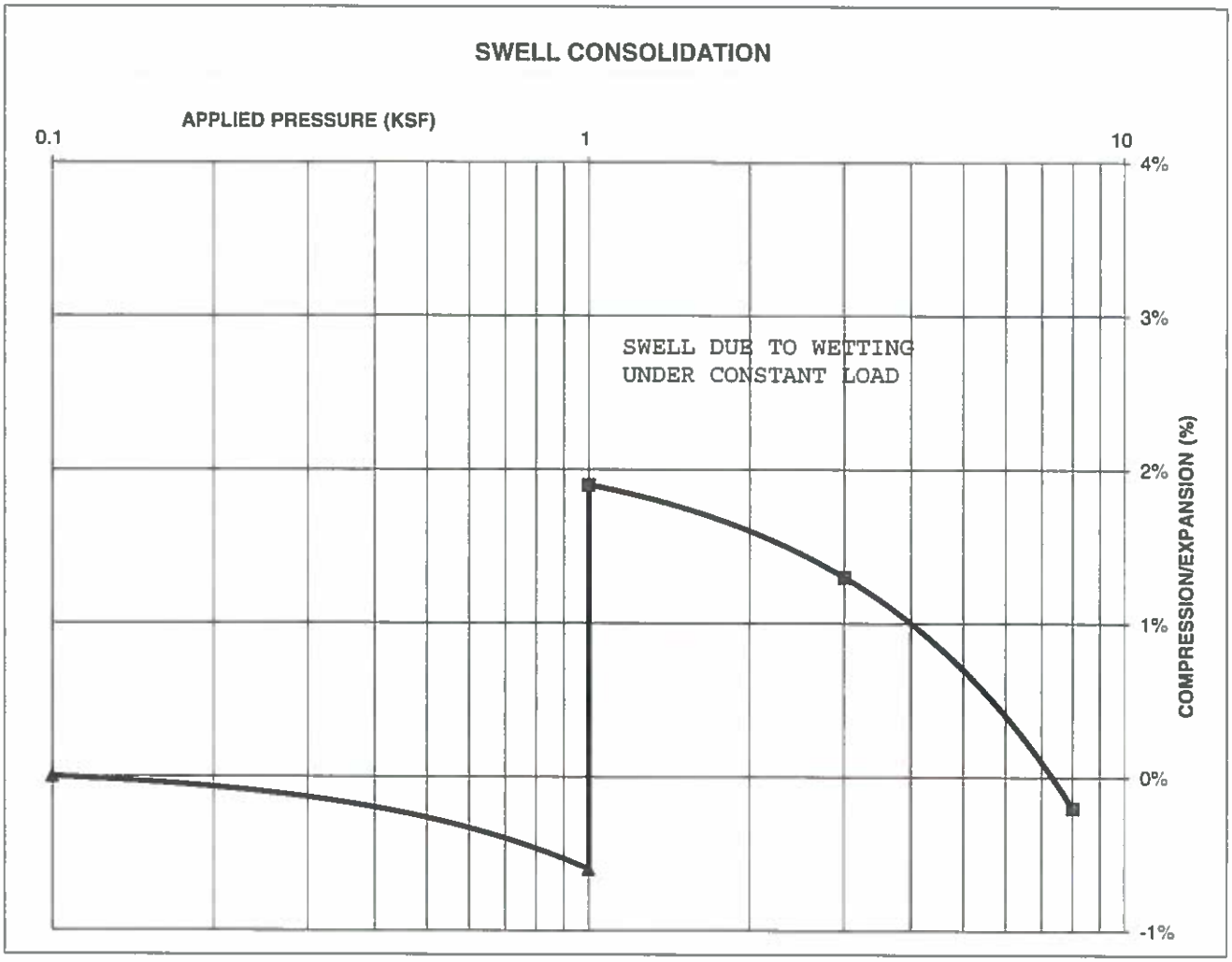
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539
FIG NO.: C-9

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			126
NATURAL MOISTURE CONTENT			10.4%
SWELL/CONSOLIDATION (%)			2.5%

JOB NO. 210539
CLIENT WINSOME, LLC
PROJECT HODGEN AND MERIDIAN



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539
FIG NO.: C-10

CLIENT	WINSOME, LLC	JOB NO.	210539
PROJECT	HODGEN AND MERIDIAN	DATE	4/13/2021
LOCATION	HODGEN AND MERIDIAN	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	2	SC	0.00
TB-1	5	2	SM	<0.01

QC BLANK PASS

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LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/18/21

JOB NO.: 210539

FIG NO.: C-11

APPENDIX D: Soil Survey Descriptions

El Paso County Area, Colorado

1—Alamosa loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3670
Elevation: 7,200 to 7,700 feet
Farmland classification: Prime farmland if irrigated and reclaimed of excess salts and sodium

Map Unit Composition

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

Description of Alamosa

Setting

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

Typical profile

A - 0 to 6 inches: loam
Bt - 6 to 14 inches: clay loam
Btk - 14 to 33 inches: clay loam
Cg1 - 33 to 53 inches: sandy clay loam
Cg2 - 53 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Available water capacity: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: R048AY241CO
Hydric soil rating: Yes

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

15—Brussett loam, 3 to 5 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Brussett

Setting

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

Typical profile

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

Properties and qualities

Slope: 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
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
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

21—Cruckton sandy loam, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 367s
Elevation: 7,200 to 7,600 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 42 to 46 degrees F
Frost-free period: 110 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Cruckton

Setting

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

Typical profile

A - 0 to 11 inches: sandy loam
Bt - 11 to 28 inches: sandy loam
C - 28 to 60 inches: loamy coarse sand

Properties and qualities

Slope: 1 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 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 5.9 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

Data Source Information

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

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

36—Holderness loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3689
Elevation: 7,200 to 7,400 feet
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Holderness

Setting

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

Typical profile

A - 0 to 9 inches: loam
Bt - 9 to 43 inches: clay loam
C - 43 to 60 inches: gravelly sandy clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R048AY222CO
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

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