



ENTECH
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**WASTEWATER STUDY
FLYING HORSE NORTH FILING NO. 3
EL PASO COUNTY, COLORADO**

Prepared for:

Flying Horse North, LLC
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Attn: Drew Balsick

August 23, 2023
Revised February 29, 2024

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Reviewed by:

Logan L. Langford, P.G.
Sr. Geologist



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

LLL

PCD No. SF2326

Table of Contents

1 SUMMARY..... 1

2 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION 1

3 SCOPE OF THE REPORT 2

4 FIELD INVESTIGATION 2

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY..... 3

 5.1 General Geology 3

 5.2 Soil Conservation Survey 4

 5.3 Site Stratigraphy 4

 5.4 Soil Conditions 5

 5.5 Groundwater 6

6 ON-SITE WASTEWATER TREATMENT 7

7 CLOSURE..... 8

8 REFERENCES..... 9

FIGURES

- Figure 1: Vicinity Map
- Figure 2: USGS Map
- Figure 3: Site Plan/Test Boring Location Map
- Figure 4: Soil Survey Map
- Figure 5: Black Forest Quadrangle Geology Map
- Figure 6: Geology Map/Engineering Geology
- Figure 7: Floodplain Map
- Figure 8: OWTS Susceptibility Map

- APPENDIX A: Site Photographs
- APPENDIX B: Test Pit Logs
- APPENDIX C: Laboratory Test Results
- APPENDIX D: EEI Laboratory Testing Summary and Test Pit Logs Job No. 220404
- APPENDIX E: Soil Survey Descriptions

1 SUMMARY

Project Location

The project is located in portions of the S½ and NE¼ of Section 36, Township 11 South, Range 66 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 miles southeast of Monument, Colorado.

Project Description

Flying Horse North Filing No. 3 Subdivision is 164.4 acres. Fifty (50) lots are proposed for the filing. The proposed development is to consist of 2.5 to 3.9-acre single-family residential estate lots, two drainage tracts, and other associated site improvements. The development will be serviced by individual water wells and on-site wastewater systems (OWTS).

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of seasonal and potentially seasonal shallow groundwater areas, drainage areas, areas of ponded water, floodplain, erosion, artificial fill, expansive soils, and areas of downslope creep. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

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

2 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site consists of Section 36, Township 11 South, Range 66 West and portions of Sections 30 and 31, Township 11 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 miles southwest of Monument, Colorado, at the east end of Stagecoach Road between Highway 83 and Black Forest Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site varies from gently to moderately sloping generally to the west and southwest with some steeper slopes along the drainages in portions of the site. The Palmer Divide is located along the northeastern portion of Filing No. 3. The drainages on site flow in westerly direction through the property. Water was observed flowing in the drainage in the southwestern portion of the site, and the remaining drainages were at the time of this investigation. Areas of ponded water were observed behind erosion berms in low-lying areas along the future roadway. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. Flying Horse North Filing Nos. 1 and 2 have been mostly developed and the golf course has been completed. The site contains primarily field grasses and weeds in with areas of ponderosa pine tree coverage across Filing No. 3. Site photographs are included in Appendix A. The locations and directions of the photographs are indicated in Figure 3.

Flying Horse North Filing No. 3 Subdivision is 164.4 acres. Fifty (50) lots are proposed for the filing. The proposed development is to consist of 2.5 to 3.9-acre single-family residential estate lots, two drainage tracts, and other associated site improvements. Grading is expected to be primarily associated with the construction of roads. The Development Plan/Test Boring Location Map is presented in Figure 3.

3 SCOPE OF THE REPORT

The scope of the report will include 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 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 Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was initially performed by personnel of Entech Engineering, Inc. on November 21 and December 2, 2014. Field mapping was updated by Entech Engineering, Inc., on October

31 and November 3, 2017 (References 1 and 2). The site was revisited and additional mapping completed on July 31 and August 2, 2023. Site photographs are included in Appendix A.

Six (6) test borings were drilled and four (4) test pits excavated across the site as part of this study to determine the soils classification and engineering characteristics. The borings were drilled to depths of 20 feet using a truck-mounted, continuous flight auger drilling rig supplied and operated by Entech Engineering, Inc., and the test pits were excavated to depths ranging from 6 to 8 feet.

The previous field investigation consisted of six (6) test borings and eighteen (18) test pits to determine general suitability of the site for construction (Reference 3). The location of the previous Test Borings and Test Pits indicated on the Site Map/Testing Location Map, Figure 3. Additionally, fourteen (14) profile holes were performed on the entire Flying Horse North property in previous studies.

Laboratory testing was performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included moisture content testing, ASTM D-2216, tests included grain-size analysis ASTM D-422. Results of the laboratory testing are included in Appendix C. Previous Laboratory Testing Summary and Test Pit Logs are included in Appendix D.

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 10 miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northerly direction (Reference 4). The rocks in the area of the site are sedimentary in nature, and typically Tertiary to Cretaceous in age. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of residual, colluvial, man-made, and alluvial soils of the Quaternary Age. The residual soils are produced by the in-situ action of weathering of the bedrock on site. Some colluvial soils exist which are deposited by gravity and sheetwash. The alluvial soils were deposited by water in the drainages on site.

Man-made soils exist as earthen dams and erosion berms. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 5), previously the Soil Conservation Service (Reference 6) has mapped two soil types on the site (Figure 4). In general, the soils classify as coarse sandy loam, and sandy loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
26	Elbeth – sandy loam, 8 to 15% slopes
67	Peyton –sandy loam, 5 to 9% slopes

Complete descriptions of each soil type are presented in Appendix E. The soils have generally been described to have moderate to rapid permeabilities. Limitations on development include, limited ability to support a load, shrink swell potential, slopes and frost action potential. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have moderate erosion hazards

5.3 Site Stratigraphy

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

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

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

Tkd Dawson Formation of Tertiary to Cretaceous Age: The Dawson formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils

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

The bedrock underlying the site consists of the 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 are variable layers of man placed fill deposits, alluvial deposits, and residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands and sandy clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Black Forest Quadrangle* distributed by the Colorado Geological Survey in 2003 (References 7), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 8), and the *Geologic Map of the Denver 1^o x 2^o Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 9). The Test Pit Logs used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 7.

5.4 Soil Conditions

The soils encountered in the Test Pits can be grouped into four general soil and rock types. The soils were classified using the USDA textural soil classification.

Sandy Loam (Soil Type 2 and 2A) The sandy loam was encountered in three of the test pits at the ground surface extending to depths ranging from 1.5 to 2 feet bgs. The sandy loam was encountered at loose to medium dense states.

Sandy Clay Loam (Soil Type 3 and 3A) The sandy clay loam was encountered in two of the test pits at the ground surface extending to depths of 2 to 3 feet. The sandy clay loam was encountered at medium stiff to very stiff consistencies.

Sandy Clay (Soil Type 4 and 4A) The sandy clay was encountered in three of the test pits at the ground surface to 2 feet bgs, and extending to depths of 4 feet 8 feet. The clay was encountered at medium stiff to very stiff consistencies. The sandstone was encountered at very dense states.

Sandstone (Soil Types 3A and 4A) The sandstone with silt to silty sandstone, and clayey sandstone were encountered in five of the test pits at depths of 2 to 4 feet, and extended to the

termination of the test pits (3 to 8 feet). The sandstone was encountered at dense to very dense states.

The Test Pit Logs are presented in Appendix B, and the depth to bedrock and groundwater are presented on Table B-1. Laboratory Test Results are presented in Appendix C, and a Summary of Laboratory Test Results is presented in Table C-1. Previous Laboratory Testing Summary and Test Pit Logs are included in Appendix D.

5.5 Groundwater

Groundwater was not encountered in any of the test borings which were drilled to 20 feet. Areas of seasonal, potentially seasonal shallow groundwater, and ponded water have been mapped in the drainages and low-lying areas on the 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.

Groundwater and Floodplain Areas – Constraint

Drainages are located in the northern and southern portions site, and several minor drainages are located across the site that generally flow in westerly directions. None of the drainages on the site have been mapped within floodplain zones according to the FEMA Map No. 08041CO315G, (Figure 7, Reference 11). Areas where potentially seasonal shallow, seasonal shallow, and ponded water have been indicated on the site geology/engineering geology map, Figure 6. OWTS soil treatment areas should not be located within areas mapped as seasonally shallow and potential seasonally shallow groundwater areas.

Seasonal Shallow and Potential Seasonally Shallow Groundwater – Constraint

In these areas, we would anticipate periodic high subsurface moisture conditions and frost heave potential on a seasonal basis. Additional, highly organic soils could be encountered in these areas. These areas lie within defined drainages and it is anticipated they will be avoided by development. Minor drainage swales in building areas should be properly diverted away from the

structures. Any structures in or adjacent to these areas should follow the mitigation discussed below.

Areas of Pondered Water – Constraint

These are areas of standing water behind temporary erosion berms on the site, and flowing water within the drainage in the southwestern corner of the site in the area of proposed drainage Tract B. Temporary erosion berms will be removed during the site grading; shallow groundwater may affect the construction of the proposed detention pond located on Tract B. Temporary dewatering during construction may be required. Should complete regrading of the site be considered, all organic matter and soft, wet soils should be completely removed before filling. Any drainage into these areas should be rerouted in a non-erosive manner off of the site where it does not create areas of ponded water around proposed structures.

6 ON-SITE WASTEWATER TREATMENT

The site was evaluated for individual on-site wastewater treatment systems in accordance with El Paso Land Development Code. Fourteen (14) tactile test pits were excavated across the site. The test pits were located in potential locations of future systems. The approximate locations of the Test Pits are indicated on Figure 3, and on the Septic Suitability Map, Figure 8. A table showing the results of the Tactile Test Pits is presented in Table B-1. Test Pit Logs are included in Appendix B, and Laboratory Test Results in Appendix C. Previous Laboratory Testing Summary and Test Pit Logs are included in Appendix D.

The Natural Resource Conservation Service (Reference 5), previously the Soil Conservation Service (Reference 6) has been mapped with two soil descriptions. The Soil Survey Map (Reference 5) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having slow to rapid percolation rates. The majority of the soils have been described with moderate permeabilities.

Soils encountered in the tactile test pits consisted of sandy loam, sandy clay loam, and sandy clay, sandstone with silt to silty sandstone and clayey sandstone. Signs of seasonal occurring groundwater were observed in TP-3 at 4 feet. The limiting layers encountered in the test pits are sandy loam (2A), sandy clay loam (Soil Types 3 and 3A), sandstone (sandy clay loam when classified as a soil) (Soil Type 2A), sandstone (sandy clay when classified as a soil) (Soil Type 4A), and claystone (sandy clay when classified as a soil). The soil types correspond to LTAR

values ranging from 0.50 to 0.15 gallons per day per square foot. Additional investigation may identify areas where suitable conventional systems could be used on the lots.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County and State Guidelines and properly maintained. Based on the testing performed as part of this investigation designed systems will likely be required for the majority of the lots. A Septic Suitability Map is presented in Figure 8. OWTS sites should not be located within defined drainages. Individual soil testing is required on the lots prior to construction. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any drainages, floodplains or ponded areas and 25 feet from dry gulches.

7 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. The majority of these conditions can be mitigated through proper engineering design and construction practices. The proposed development and use are 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 will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for Flying Horse Development, LLC for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

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

8 REFERENCES

1. Entech Engineering, Inc., February 26, 2015. *Soil, Geology, Geologic Hazard, and Wastewater Study, Shamrock Ranch, El Paso County, Colorado*. Entech Job No. 141588
2. Entech Engineering, Inc., February 22, 2016. *Soil, Geology, Geologic Hazard, and Wastewater Study, Flying Horse North, PUD Submittal, El Paso County, Colorado*. Entech Job No. 160118.
3. Entech Engineering, Inc., revised date May 2, 2022. *Soil, Geology, Geologic Hazard, and Wastewater Study, Flying Horse North, Sketch Plan, El Paso County, Colorado*. Entech Job No. 220404.
4. Bryant, Bruce; McGrew, Laura W. and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1163.
5. Natural Resource Conservation Service, June 20, 2007. *Web Soil Survey*. United States Department Agriculture, <http://web soil survey.nrcs.usda.gov>.
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8. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado*. USGS, Map I-857-F.
9. 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.
10. Hart, Stephen S. 1974. *Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado*. Colorado Springs-Castle Rock Map. Colorado Geological Survey. Environmental Geology 7.
11. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO315G.

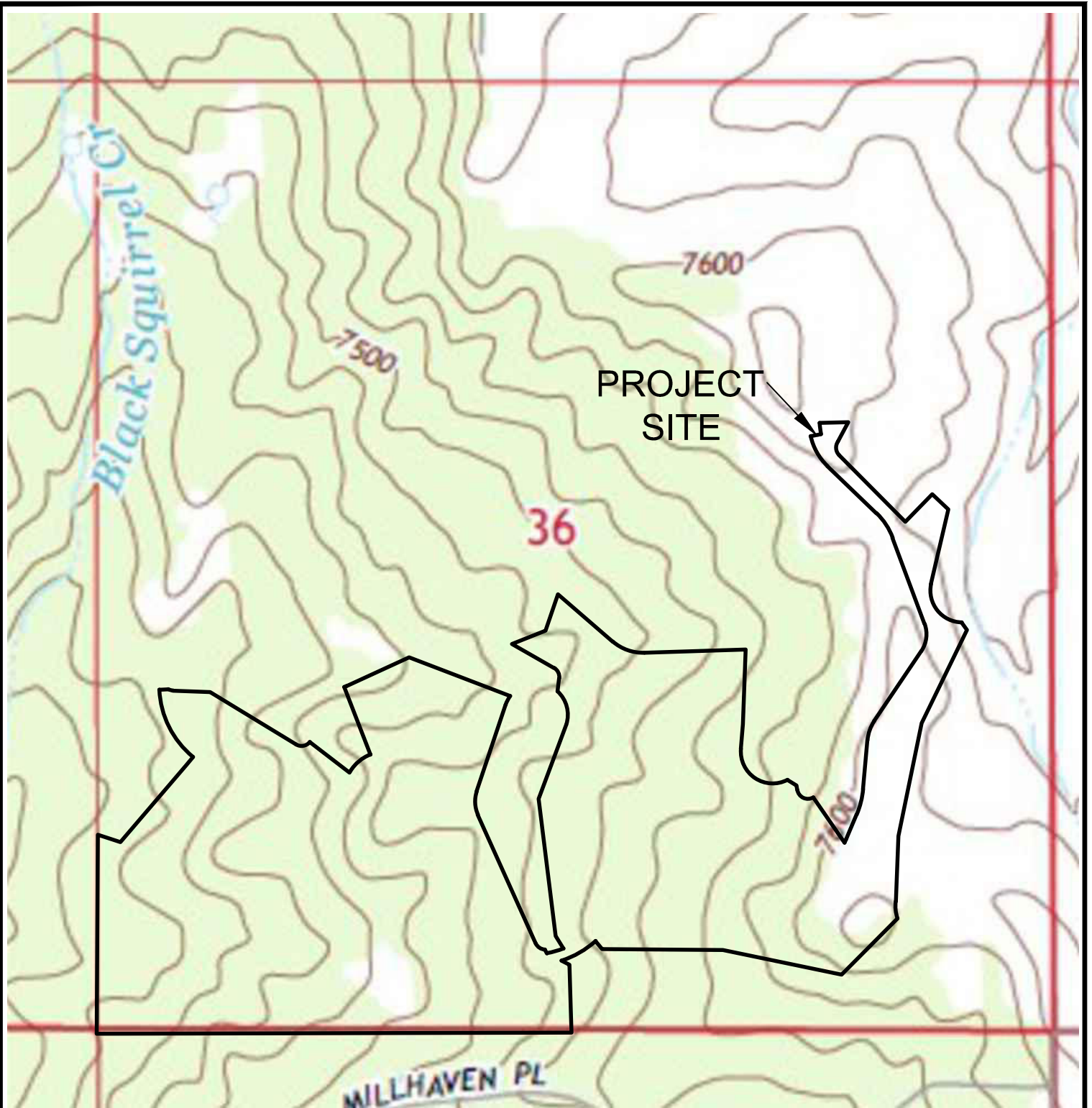
FIGURES



VICINITY MAP
FLYING HORSE NORTH FILING NO. 3
EL PASO COUNTY, COLORADO
FLYING HORSE NORTH, LLC

JOB NO.
231192

FIG. 1

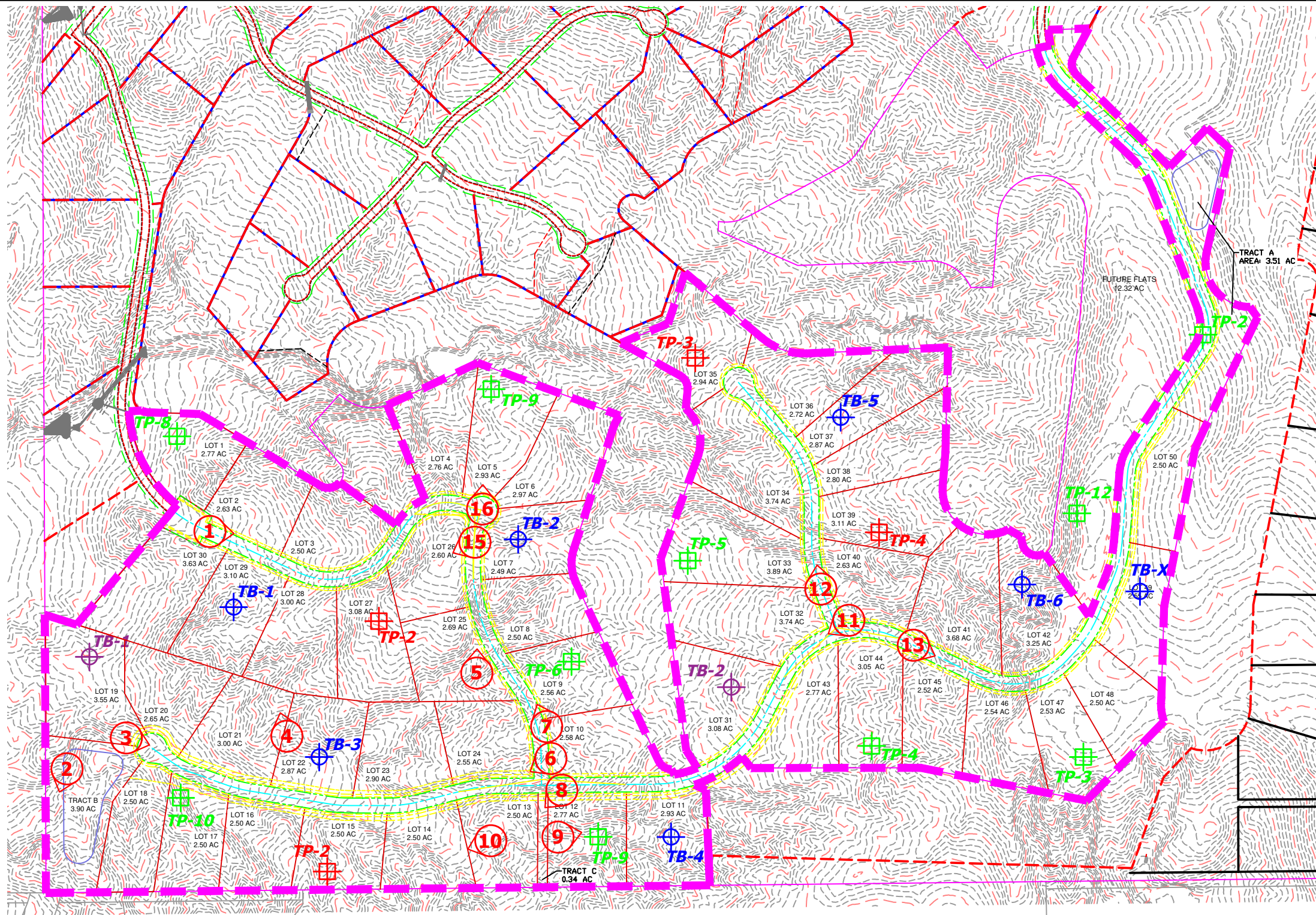


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USGS TOPOGRAPHY MAP
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EL PASO COUNTY, COLORADO
FLYING HORSE NORTH, LLC

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FIG. 2



- APPROXIMATE TEST PIT LOCATION AND NUMBER (OLD, NEW)
- APPROXIMATE TEST BORING LOCATION AND NUMBER (OLD, NEW)
- APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

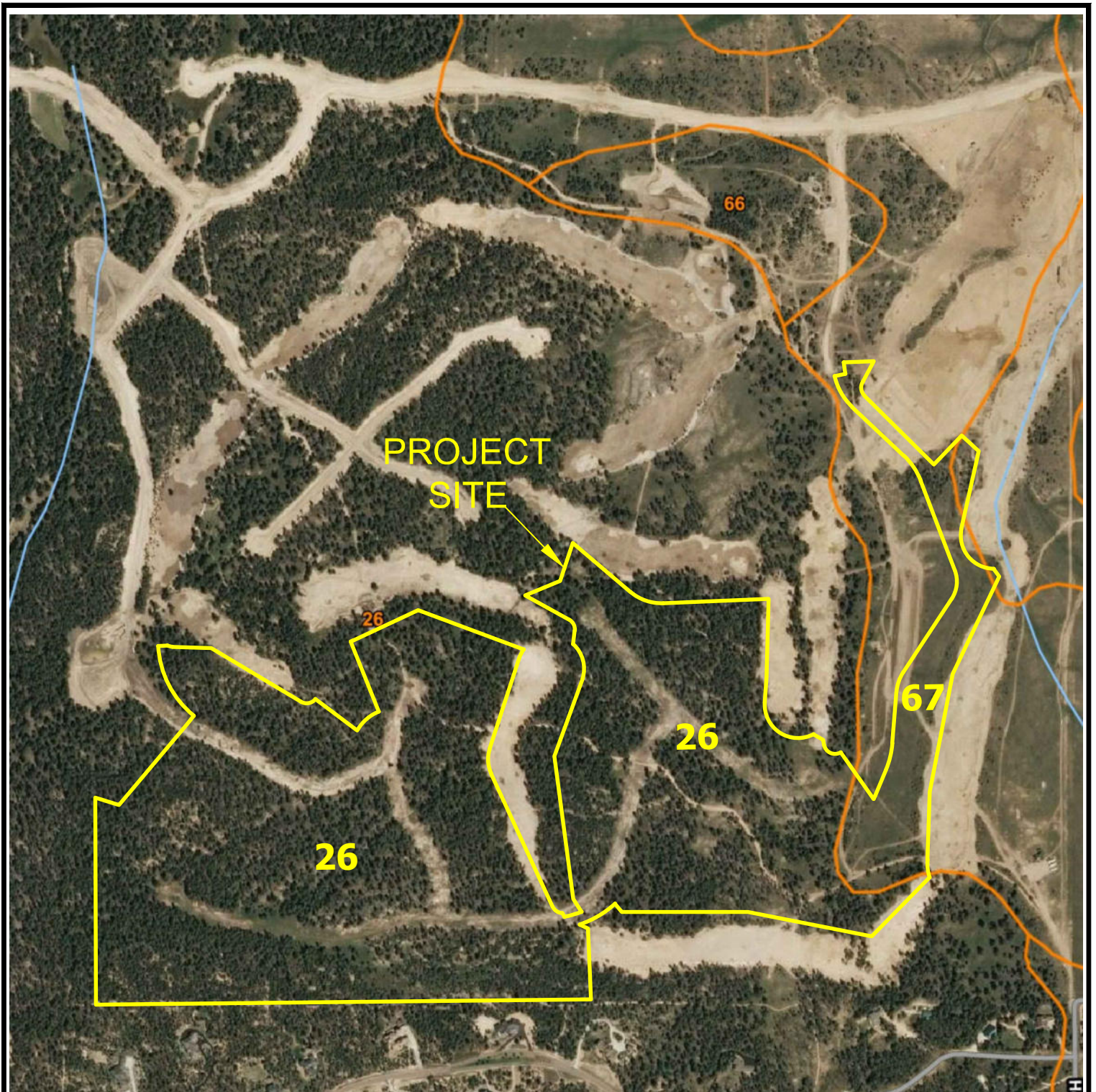
REVISION	BY



SITE PLANT/TESTING LOCATION MAP
 FLYING HORSE NORTH FILING NO. 3
 EL PASO COUNTY, COLORADO
 FLYING HORSE NORTH, LLC

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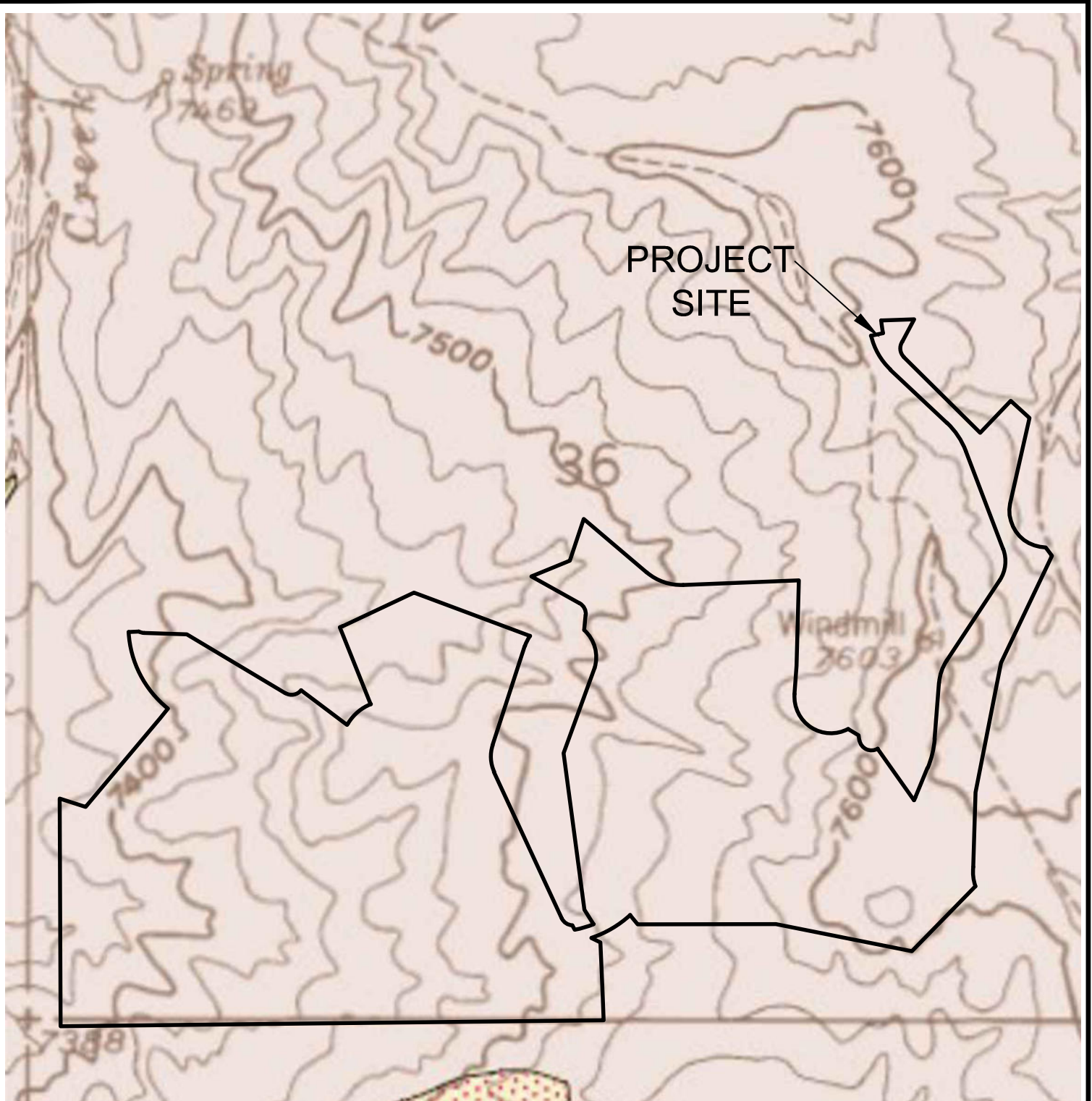
FIG. 3



SOIL SURVEY MAP
FLYING HORSE NORTH FILING NO. 3
EL PASO COUNTY, COLORADO
FLYING HORSE NORTH, LLC

JOB NO.
231192

FIG. 4



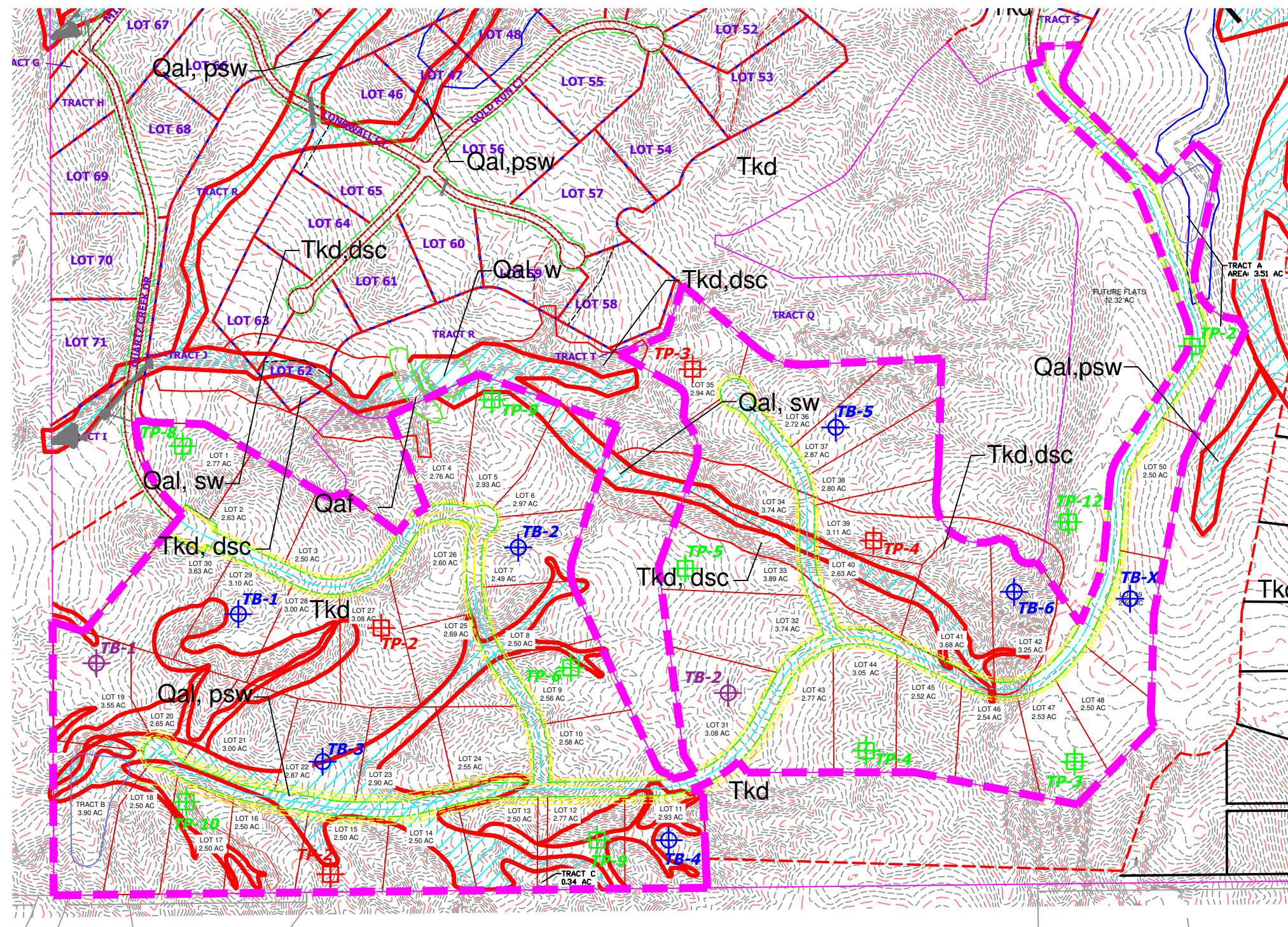
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**BLACKFOREST QUADRANGLE
GEOLOGIC MAP**

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EL PASO COUNTY, COLORADO
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FIG. 5



- Legend:**
- Qaf - **Artificial Fill of Quaternary Age:**
man-made fill deposits associated with erosion berms, and earthen dams
 - Qal - **Alluvium of Quaternary Age:**
recent stream deposited materials
 - TKd - **Dawson Formation of Tertiary to Cretaceous Age:**
colluvial and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone, and claystone
 - dsc - downslope creep
 - er - erosion
 - fp - floodplain
 - psw - potentially seasonal shallow groundwater area
 - sw - seasonally wet areas
 - w - ponded water

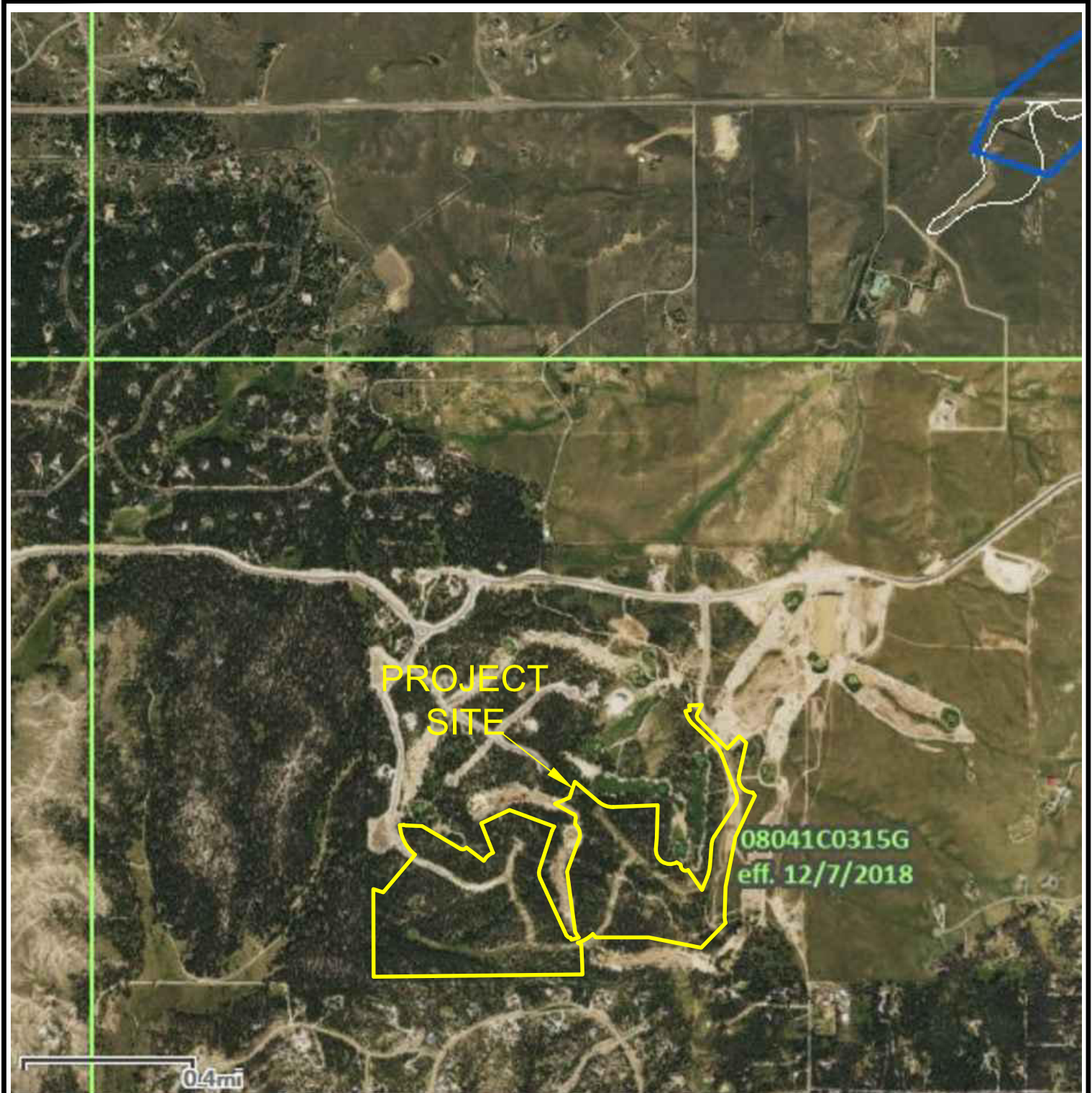
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GEOLOGY/ENGINEERING MAP
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 EL PASO COUNTY, COLORADO
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FIG. 6



FEMA FLOODPLAIN MAP
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EL PASO COUNTY, COLORADO
FLYING HORSE NORTH, LLC

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231192

FIG. 7

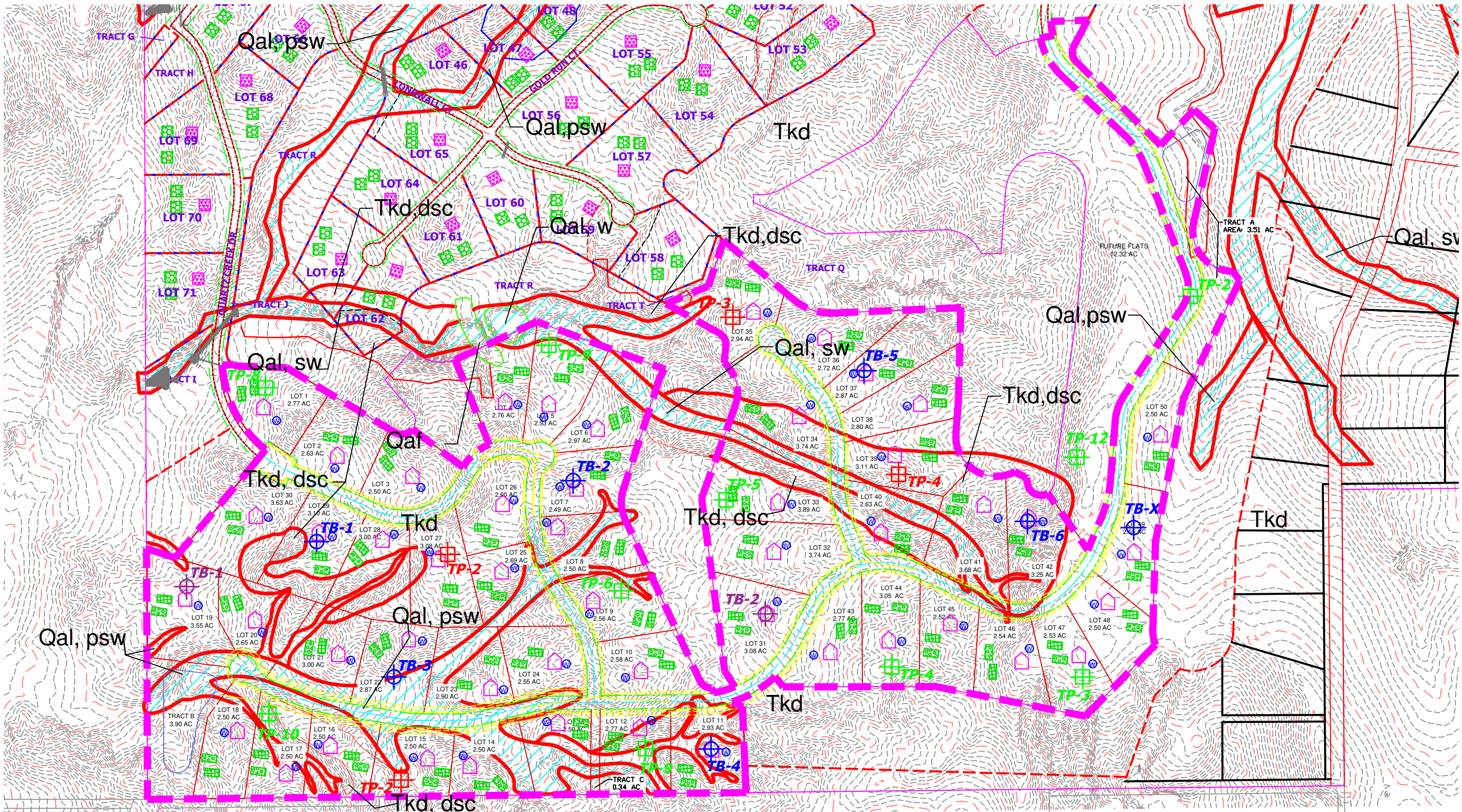
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OWTS SUITABILITY MAP
 FLYING HORSE NORTH FILING NO. 3
 EL PASO COUNTY, COLORADO
 FLYING HORSE NORTH, LLC

JOB NO.
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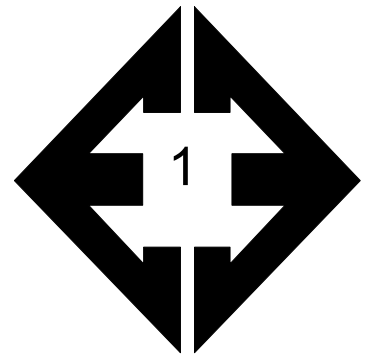
FIG. 8



- LEGEND:**
- POSSIBLE OWTS LOCATIONS
 - POSSIBLE OWTS ALTERNATE LOCATIONS
 - POSSIBLE HOUSE LOCATIONS
 - WATER WELLS MUST BE A MINIMUM OF 100 FT FROM OWTS ABSORPTION FIELDS
 - OWTS SHOULD NOT BE LOCATED WITHIN ANY DRAINAGES, DEFINED DRAINAGE SWALES

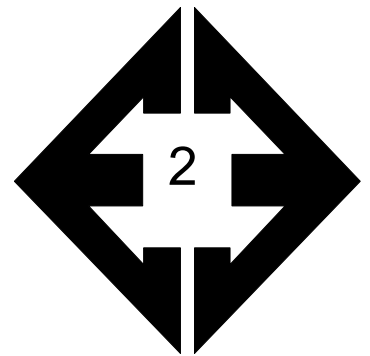


APPENDIX A: Site Photographs



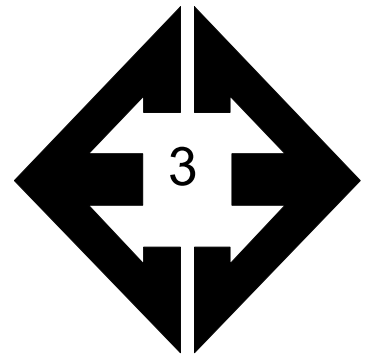
**Looking east from the
northwestern side of
the site.**

August 2, 2023



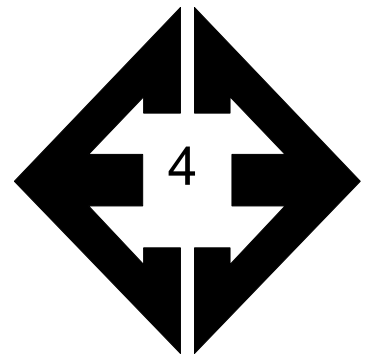
**Looking west from the
southwestern side of
the site in the area of
Proposed Detention
Pond A.**

August 2, 2023



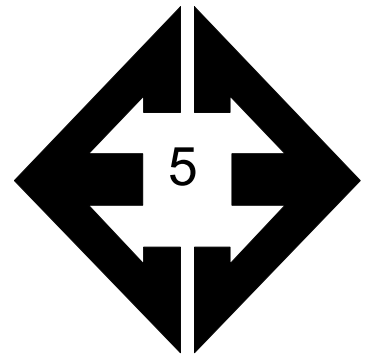
**Looking east from the
north-central portion
of the site.**

August 2, 2023



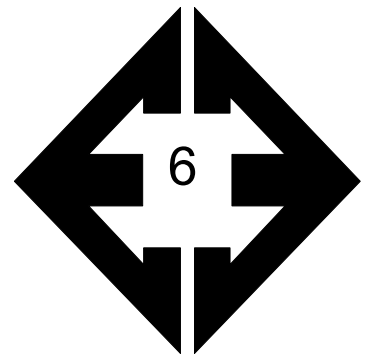
**Looking northeast
from the central
portion of the site.**

August 2, 2023



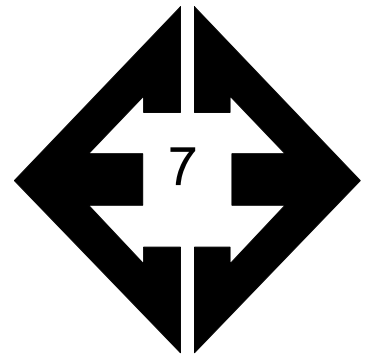
Looking north from the southern portion of the site.

August 2, 2023



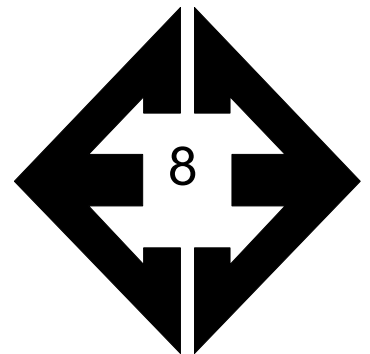
Looking south from the central portion of the site.

August 2, 2023



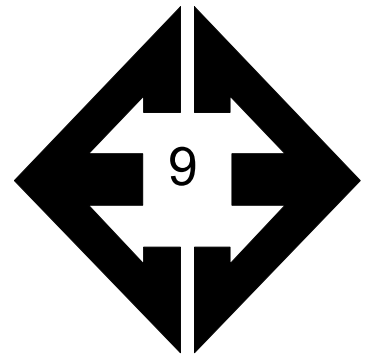
Looking west from the west-central portion of the site.

August 2, 2023



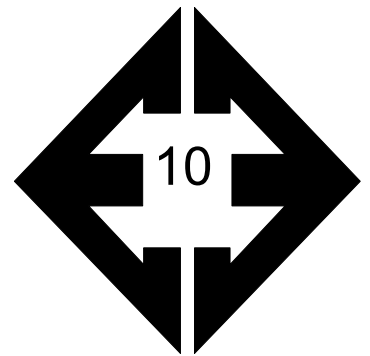
Looking east from the southwestern side of the site.

August 2, 2023



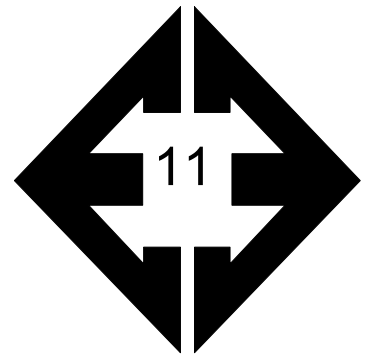
Looking west from the west-central portion of the site.

July 31, 2023



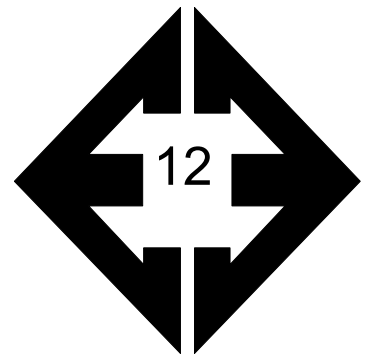
Looking east from the southwestern side of the site.

July 31, 2023



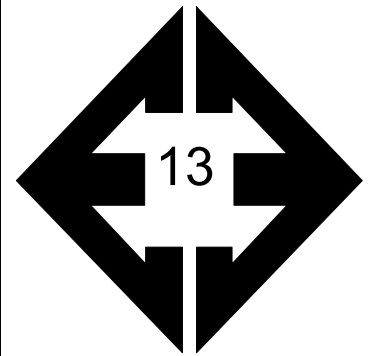
Looking west from the west-central portion of the site.

July 31, 2023



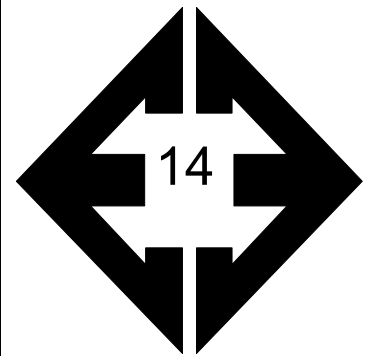
Looking east from the southwestern side of the site.

July 31, 2023



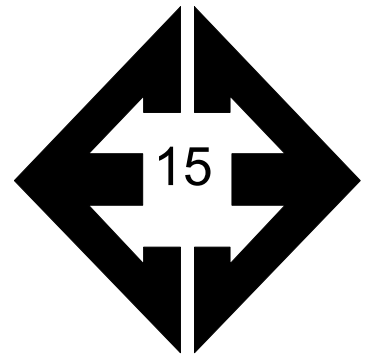
Looking west from the west-central portion of the site.

July 31, 2023



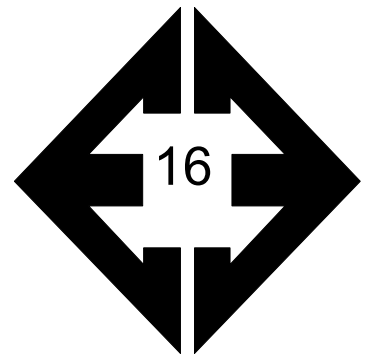
Looking east from the southwestern side of the site.

July 31, 2023



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

July 31, 2023



Looking east from the southwestern side of the site.

July 31, 2023



APPENDIX B: Test Boring and Piezometer Logs

TABLE B-1
TEST PIT RESULTS SUMMARY

TEST PIT NO.	DEPTH TO BEDROCK (ft.)	DEPTH TO SIGNS OF SEASONAL WATER (ft.)	USDA SOIL TYPE
1	4	>8	4A/R-1
2	3	>8	3A/R-1
3	4	4	4A
4	2	>6	4A/R-1

TEST PIT 1
 DATE EXCAVATED 8/2/2023
 REMARKS

TEST PIT 2
 DATE EXCAVATED 8/2/2023
 REMARKS

39.044680°, -104.733753°

TOPSOIL (0-6IN), SANDY LOAM,
 FINE to MEDIUM GRAINED, DARK
 BROWN

SANDY LOAM, FINE to MEDIUM
 GRAINED, TAN

SANDY CLAY, FINE to MEDIUM
 GRAINED, LIGHT BROWN

WEATHERED SILTY SANDSTONE
 (DAWSON FORMTATION), SANDY
 CLAY LOAM FINE TO COARSE
 GRAINED, REDDISH BROWN

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1			GR	W	2A
2			GR	W	4A
3			GR	MA	R-1
4			GR	MA	R-1
5			GR	MA	R-1
6			GR	MA	R-1
7			GR	MA	R-1
8			GR	MA	R-1
9					
10					

39.042463°, -104.734571°

TOPSOIL (0-6IN), SANDY LOAM,
 FINE to MEDIUM GRAINED, DARK
 BROWN

SANDY LOAM, FINE TO COARSE
 GRAINED, BROWN

SANDY CLAY LOAM, FINE to
 COARSE GRAINED, BROWN

WEATHERED SILTY to CLAYEY
 SANDSTONE (DAWSON
 FORMTATION), SANDY CLAY LOAM
 FINE TO COARSE GRAINED,
 REDDISH BROWN

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1			GR	M	2
2			GR	W	3A
3			GR	MA	3A
4			GR	MA	3A
5			GR	MA	R-1
6			GR	MA	R-1
7			GR	MA	R-1
8			GR	MA	R-1
9					
10					

Soil Structure Shape

granular - gr
 platy - pl
 blocky - bl
 prismatic - pr
 single grain - sg

Soil Structure Grade

weak - w
 moderate - m
 strong - s
 loose - l
 massive - ma



TEST PIT LOGS

FLYING HORSE NORTH FIL NO 3
 FLYING HORSE NORTH, LLC

JOB NO.
 231192

FIG. B-1

TEST PIT 3
 DATE EXCAVATED 8/2/2023

TEST PIT 4
 DATE EXCAVATED 8/2/2023

REMARKS

REMARKS

39.065483°, -104.537584°

39.067254°, -104.536395°

TOPSOIL (0-12IN), SANDY CLAY,
 FINE TO COARSE GRAINED, DARK
 BROWN

TOPSOIL (0-6IN), SANDY CLAY
 LOAM, FINE TO COARSE
 GRAINED, DARK BROWN

SANDY CLAY, FINE to MEDIUM
 GRAINED, OLIVE BROWN

SANDY CLAY LOAM, FINE TO
 COARSE GRAINED, BROWN

FORMATIONAL SITLY TO CLAYEY
 SANDSTONE (DAWSON
 FORMATION), SANDY CLAY LOAM
 to SANDY CLAY, FINE TO COARSE
 GRAINED, LIGHT BROWN TO

FORMATIONAL SITLY TO CLAYEY
 SANDSTONE (DAWSON
 FORMATION), SANDY CLAY LOAM
 to SANDY CLAY, FINE TO COARSE
 GRAINED, LIGHT BROWN TO

*-SIGNS OF SEASONAL GW AT 4FT

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1	[Symbol]				
2	[Symbol]		GR	W	4A
3	[Symbol]				
4	[Symbol]				
5	[Symbol]		GR	MA	4A
6	[Symbol]				
7	[Symbol]				
8	[Symbol]				
9	[Symbol]				
10	[Symbol]				

Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1	[Symbol]				
2	[Symbol]		GR	W	3A
3	[Symbol]		GR	MA	R-1
4	[Symbol]				
5	[Symbol]		GR	MA	4A
6	[Symbol]				
7	[Symbol]				
8	[Symbol]				
9	[Symbol]				
10	[Symbol]				

Soil Structure Shape

granular - gr
 platy - pl
 blocky - bl
 prismatic - pr
 single grain - sg

Soil Structure Grade

weak - w
 moderate - m
 strong - s
 loose - l
 massive - ma



TEST PIT LOGS

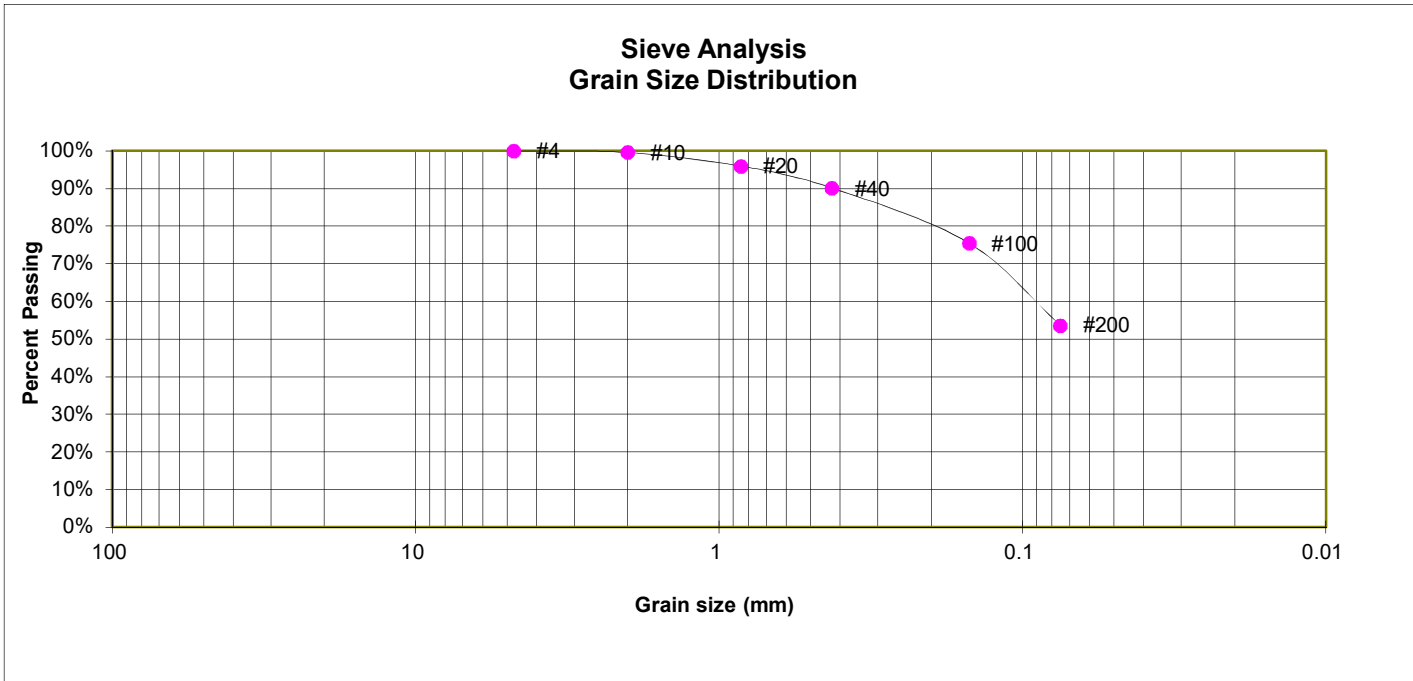
FLYING HORSE NORTH FIL NO 3
 FLYING HORSE NORTH, LLC

JOB NO.
 231192

FIG. B-2

APPENDIX C: Laboratory Testing Results

TEST PIT	TP-1	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	3		



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.6%
20	96.0%
40	90.1%
100	75.5%
200	53.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL



LABORATORY TEST RESULTS

FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

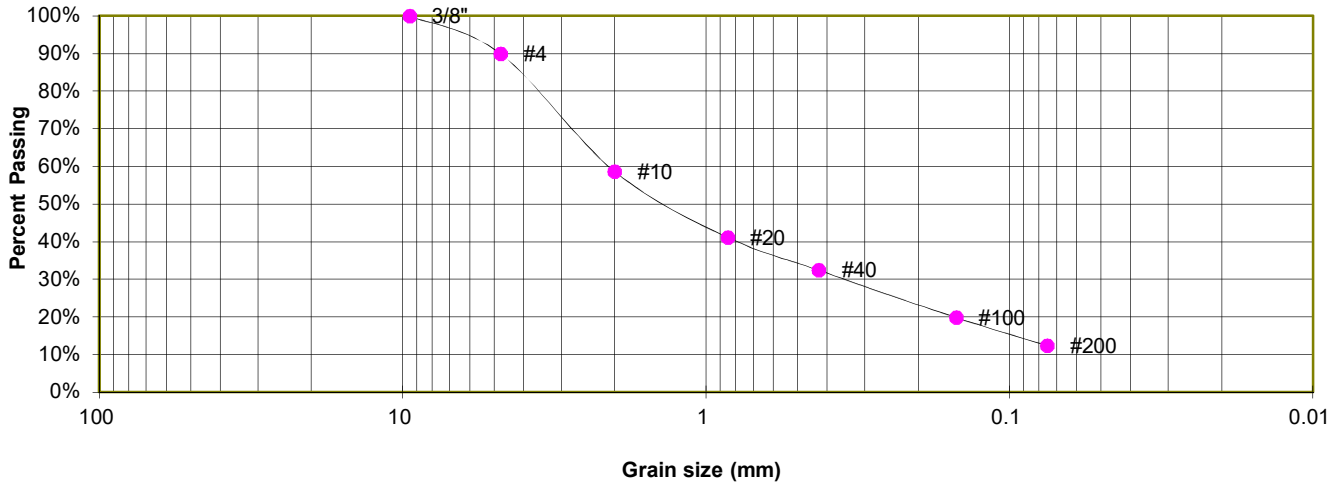
JOB NO.
231192

C-1

TEST PIT TP-1
DEPTH (FT) 5

SOIL DESCRIPTION SANDSTONE, SILTY

Sieve Analysis Grain Size Distribution



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	89.9%
10	58.6%
20	41.2%
40	32.4%
100	19.8%
200	12.4%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



LABORATORY TEST RESULTS

FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

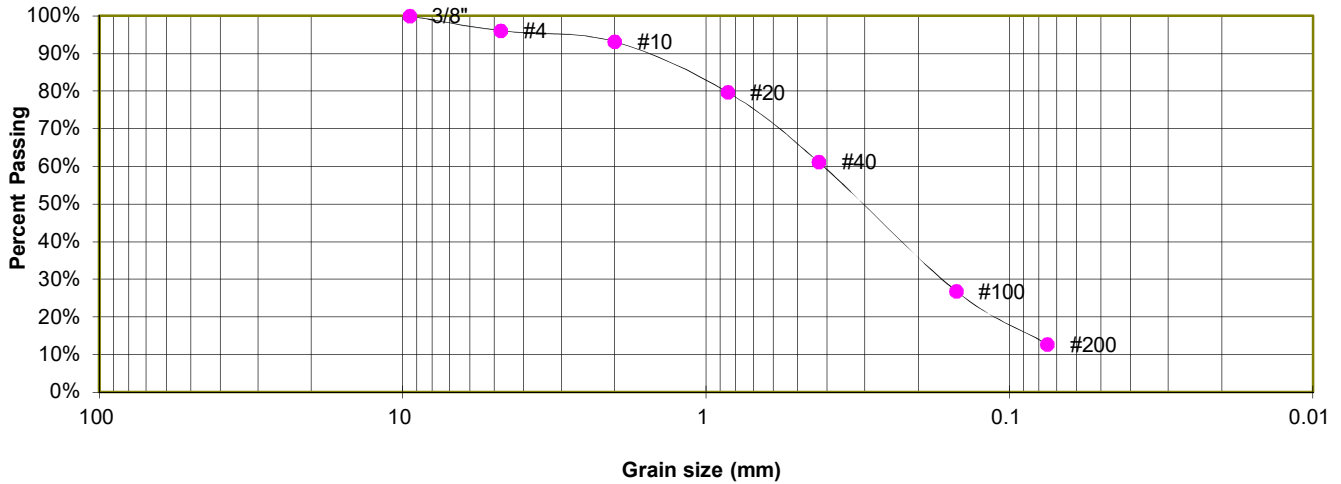
JOB NO.
231192

C-2

TEST PIT TP-2
DEPTH (FT) 4

SOIL DESCRIPTION SAND, SILTY

Sieve Analysis Grain Size Distribution



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.1%
10	93.2%
20	79.7%
40	61.1%
100	26.9%
200	12.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



LABORATORY TEST RESULTS

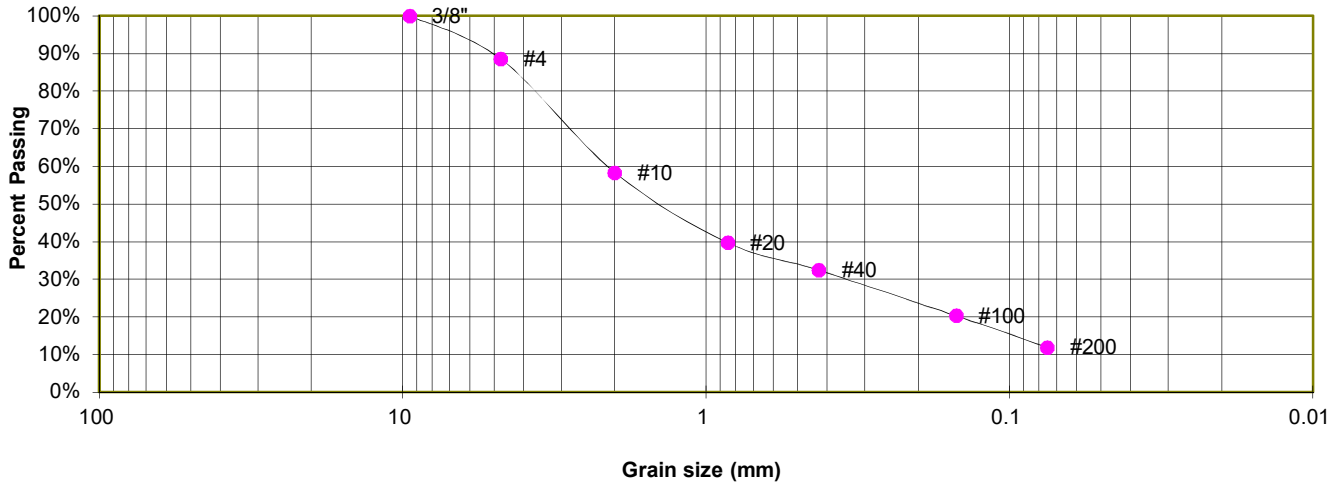
FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

JOB NO.
231192

C-3

TEST PIT	TP-2	SOIL DESCRIPTION SAND, WITH SILT
DEPTH (FT)	7	

**Sieve Analysis
Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	88.6%
10	58.4%
20	39.8%
40	32.4%
100	20.3%
200	11.9%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



LABORATORY TEST RESULTS

FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

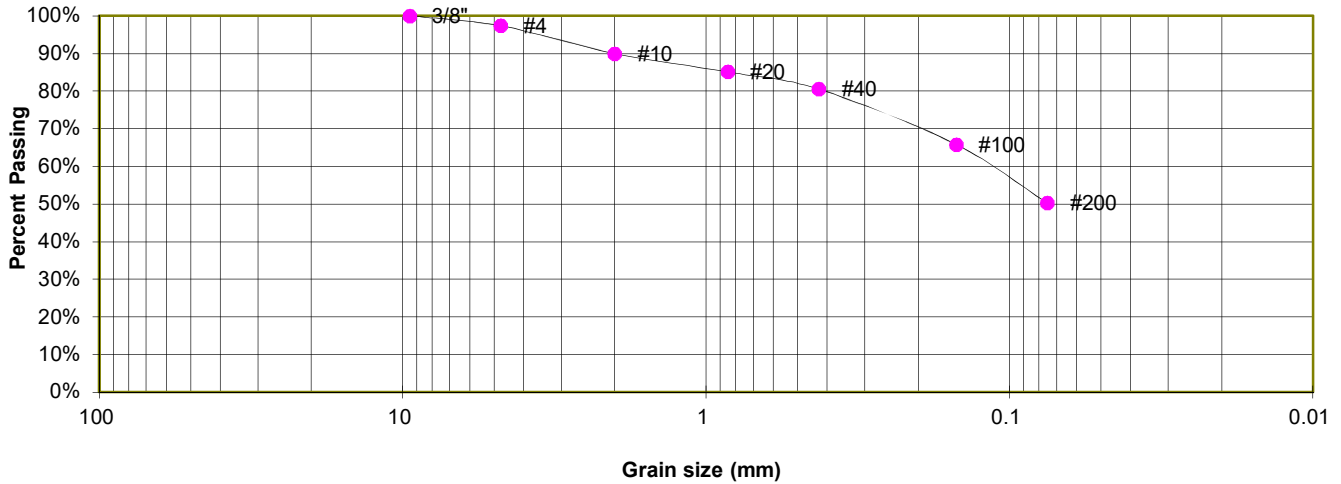
JOB NO.
231192

C-4

TEST PIT TP-3
 DEPTH (FT) 2

SOIL DESCRIPTION CLAY, SANDY

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.4%
10	90.0%
20	85.1%
40	80.5%
100	65.8%
200	50.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL



LABORATORY TEST RESULTS

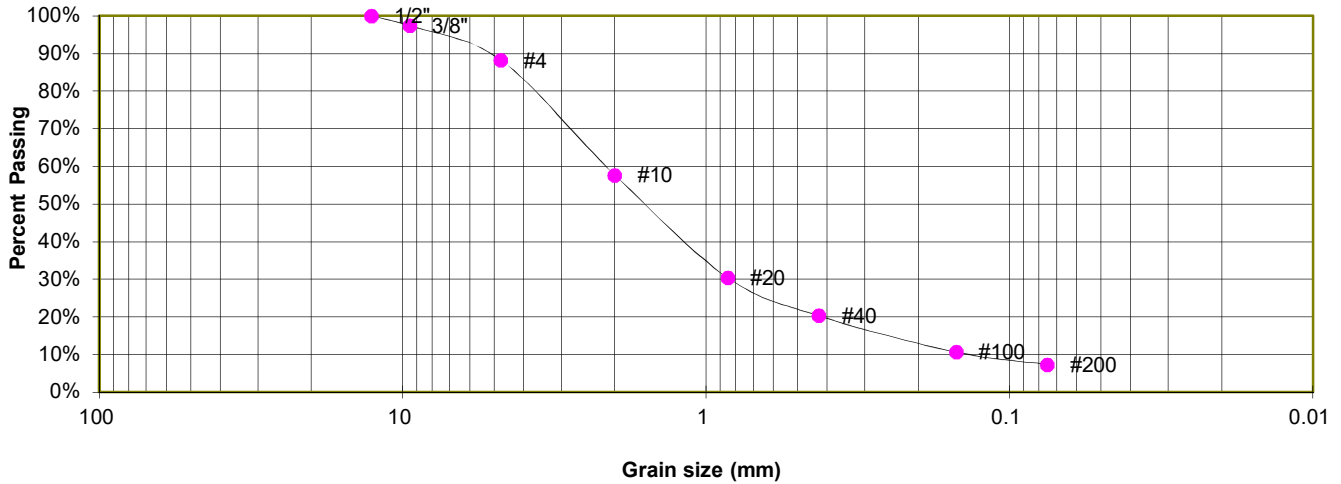
FLYING HORSE NORTH, FILING 3
 FLYING HORSE NORTH, LLC

JOB NO.
 231192

C-5

TEST PIT	TP-4	SOIL DESCRIPTION SAND, WITH SILT
DEPTH (FT)	3	

**Sieve Analysis
Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.4%
4	88.3%
10	57.7%
20	30.4%
40	20.3%
100	10.7%
200	7.4%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



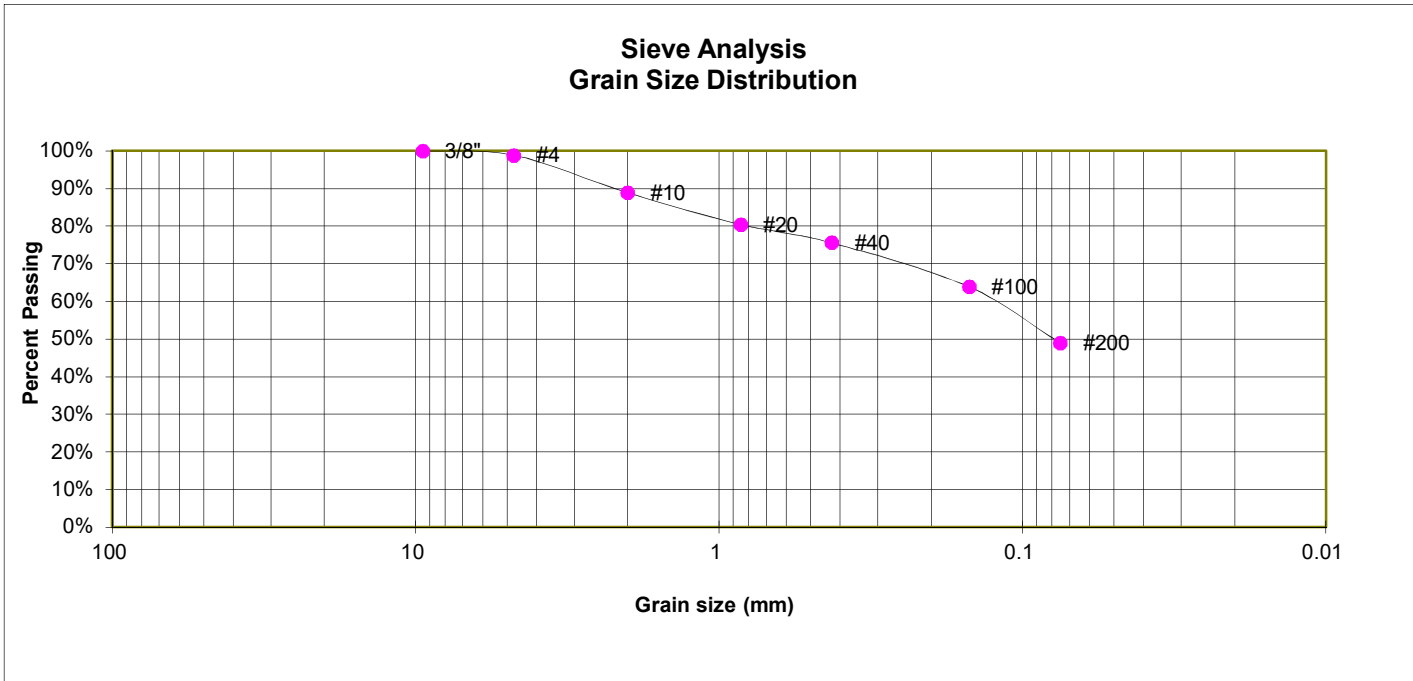
LABORATORY TEST RESULTS

FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

JOB NO.
231192

C-6

TEST PIT	TP-4	SOIL DESCRIPTION SAND, CLAYEY
DEPTH (FT)	5	



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.9%
10	88.9%
20	80.5%
40	75.6%
100	63.9%
200	48.9%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC



LABORATORY TEST RESULTS

FLYING HORSE NORTH, FILING 3
FLYING HORSE NORTH, LLC

JOB NO.
231192

C-7



**APPENDIX D: EEI Laboratory Testing Summary and
Test Pit Logs Job No. 220404**

TABLE 2

SUMMARY OF LABORATORY TEST RESULTS FROM TEST PITS

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

USDA SOIL TYPE	TEST PIT NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
2	TP-1	2			41.6						SM	SANDY LOAM
2	TP-4	1			17.0						SM	SANDY LOAM
3	TP-4	5			28.1						SM	SANDY CLAY LOAM
3	TP-6	4			14.2						SM	SANDY CLAY LOAM
4	TP-2	3			68.3						CL	SANDY SILTY CLAY
4	TP-12	4			50.6						SC-CL	SANDY SILTY CLAY
4	TP-14	3			67.7						CL	SANDY SILTY CLAY
4	TP-16	2			52.5						CL	SANDY SILTY CLAY
4	TP-8	4			39.0						SC	SANDY CLAY
4	TP-10	4			44.1						SC	SANDY CLAY
4A	TP-5	3			31.8						SM	SANDSTONE, SILTY TO CLAYEY
4A	TP-7	4			16.1						SM	WEATHERED SANDSTONE, SILTY
4A	TP-7	6			15.8						SM	SANDSTONE, SILTY
4A	TP-9	6			22.6						SM	SANDSTONE, SILTY
4A	TP-18	3			50.8						SC-CL	SANDSTONE, CLAYEY

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

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

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

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

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



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

CHECKED:
LL

DATE:
 3/8/22

JOB NO.:

220404

FIG NO.:

B-4

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

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

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 36.2" N 104° 43' 23.8" W							Lot ? GPS Location 39° 02' 37.3" N 104° 43' 38.8" W						
topsoil, sandy clay loam, brown	1			bl	m	3	sandy loam, fine to coarse grained, tan	1			gr	m	2
sandy silty clay, fine grained, tan	2			bl	m	4	sandy silty clay, tan	2			bl	m	4
	3						sandy clay loam, fine to coarse grained, tan	3			gr	m	3
	4							4					
	5							5					
	6							6					
	7							7					
	8							8					
	9							9					
	10							10					

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

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



**ENTECH
 ENGINEERING, INC.**

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

CHECKED:
LLL

DATE:
 3/8/22

JOB NO.:

220404

FIG NO.:

B-5

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

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

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 47.9" N 104° 43' 42.7" W sandy loam, tan				gr	m	2	Lot ? GPS Location 39° 02' 41.3" N 104° 43' 51.0" W sandy loam, fine to coarse grained, tan				gr	m	2
weathered to formational silty to clayey sandstone, fine to coarse grained, olive tan	1	[Symbol]		gr	ma	4A	alternating layers of loamy sand and sandy clay loam, fine to coarse grained, tan	1	[Symbol]		gr	m	3
	2	[Symbol]						2	[Symbol]				
	3	[Symbol]						3	[Symbol]				
	4	[Symbol]						4	[Symbol]				
*formational sandstone at 2.5 feet	5	[Symbol]						5	[Symbol]				
	6	[Symbol]						6	[Symbol]				
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

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

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



ENTECH ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

CHECKED:
LLV

DATE:
3/8/22

JOB NO.:

220404

FIG NO.:

B-6

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

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

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 50.3" N 104° 43' 56.1" W							Lot ? GPS Location 39° 02' 49.3" N 104° 44' 11.5" W						
sandy loam, fine to coarse grained, tan	1	[Symbol]		gr	m	2	sandy loam, fine to coarse grained, tan	1	[Symbol]		gr	m	2
weathered to formational silty to clayey sandstone, fine to coarse grained, reddish tan to tan.	2	[Symbol]		gr	ma	4A	sandy clay, fine to coarse grained, brown	2	[Symbol]		gr	m	4
	3	[Symbol]						3	[Symbol]				
	4	[Symbol]						4	[Symbol]				
	5	[Symbol]						5	[Symbol]				
*formational sandstone at 5 feet	6	[Symbol]						6	[Symbol]				
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]					highly weathered clayey sandstone, fine to coarse grained, olive tan	8	[Symbol]		gr	ma	4A
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

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

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



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505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG





















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

JOB NO.: 220404

FIG NO.: B-7

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

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

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 33.7" N 104° 43' 51.3" W							Lot ? GPS Location 39° 02' 33.1" N 104° 44' 07.6" W						
topsoil, sandy clay loam, brown	1						sandy loam fine to coarse grained, tan	1			gr	m	2
sandy clay loam, fine to coarse grained light brown	2			bl	m	3	sandy clay, fine to coarse grained, tan	2			gr	m	4
	3							3					
	4							4					
weathered silty sandstone fine to coarse grained, reddish tan	5			gr	ma	4A		5					
	6							6					
	7							7					
	8							8					
	9							9					
	10							10					

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

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



ENTECH ENGINEERING, INC.

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

3/8/22

JOB NO.:

220404

FIG NO.:

B-8

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

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

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
Lot ? GPS Location 39° 02' 40.0" N 104° 44' 01.5" W							Lot ? GPS Location 39° 02' 45.8" N 104° 43' 24.6" W						
sandy loam, fine to coarse grained, tan	1			gr	m	2	topsoil, sandy clay loam, brown	1			bl	m	3
sandy silty clay, fine grained, tan	2			bl	m	4	sandy silty clay, fine grained, tan	2			bl	m	4
	3							3					
	4							4					
	5							5					
	6							6					
weathered silty sandstone, fine to coarse grained, tan	7			gr	ma	4A		7					
	8							8					
	9							9					
	10							10					

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

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



**ENTECH
ENGINEERING, INC.**

505 ELKTON DRIVE
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

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

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



APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

26—Elbeth sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 367y

Elevation: 7,300 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent

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

Description of Elbeth

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam

E - 3 to 23 inches: loamy sand

Bt - 23 to 68 inches: sandy clay loam

C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

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

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: F048AY908CO - Mixed Conifer

Hydric soil rating: No

Minor Components

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 20, Sep 2, 2022

El Paso County Area, Colorado

67—Peyton sandy loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369d

Elevation: 6,800 to 7,600 feet

Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 115 to 125 days

Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 85 percent

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

Description of Peyton

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

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

Typical profile

A - 0 to 12 inches: sandy loam

Bt - 12 to 25 inches: sandy clay loam

BC - 25 to 35 inches: sandy loam

C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

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

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R049XY216CO - Sandy Divide

Hydric soil rating: No

Minor Components

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 20, Sep 2, 2022