

February 3, 2023



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907  
PHONE (719) 531-5599  
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The Renehan's  
604 Southpointe Drive, Suite 150  
Colorado Springs, CO 80906

Re: OWTS – Wastewater Study  
5740 Burgess Road  
Tax Schedule No. 62130-00-050  
El Paso County, Colorado

Dear Renehan's:

The project consists of subdividing 34.28-acres; three rural residential lots are proposed for the subdivision. The site is located northwest of the intersection of Burgess Road and South Holmes Road in the northern portion of El Paso County, Colorado.

#### **GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION**

The site is located in a portion of the SE¼ of Section 13 Township 12 South, Range 66 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located to the northwest of the intersection of Burgess Road and South Holmes Road in the northern portion of El Paso County, Colorado. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually to moderately sloping to the northwest, with steeper slopes along the head of a drainage located in the northwestern portion of the site. Kettle Creek is located west of the site and Burgess Creek to the north. The head of a drainage was observed in the northwestern portion of the site. The drainage on the site flows in a westerly direction and was dry at the time of our site investigation. The site boundaries are indicated on the USGS Map, Figure 2. The site is currently undeveloped with La Foret located to the north, and rural residential development to the east, south, and west. The site contains field grasses, weeds, kinnikinic, and Ponderosa Pines. Site photographs were taken and site mapping was completed on November 8, 2022. Photographs are included in appendix A. Test Borings were drilled on November 9, 2022, and the Test Pits were excavated on November 10, 2022.

Total acreage of the site is 34.28-acres. Three rural residential lots are proposed as part of the replat which vary in size from 8.62 to 17.06 acres. The new lots will be serviced by an individual wells and on-site wastewater treatment systems. The Site Plan with the proposed replat is presented in Figure 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 with regards to on-site wastewater treatment systems (OWTS).

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OWTS – Wastewater Study  
5740 Burgess Road  
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## FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements, and aerial 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 November 8, 2022.

Five test borings were drilled and four test pits were excavated on the site to evaluate general suitability of the soil characteristics for residential construction. The test borings were placed in the proposed building footprints, and one located in the proposed private driveway. The locations of the test borings and test pits are indicated on the Site Plan/Test Boring Location Map, Figure 3. The Test Pit Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

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

## SOIL AND GEOLOGIC CONDITIONS

### Soil Survey

The Natural Resource Conservation Service (NRCS) (Reference 1, Figure 4), previously the Soil Conservation Service (Reference 2) has mapped two soil types on the site. Complete description of the soil types is presented in Appendix D. In general, the soils consist of gravelly loamy sand. The soils are described as follows:

<u>Type</u>	<u>Description</u>
40	Kettle gravelly loamy sand, 3 – 8% Slopes
41	Kettle gravelly loamy sand, 8 – 40% Slopes

The soils have been described to have moderate to rapid permeabilities. The soils are described as well suited for use as homesites. Possible hazards with soils erosion are present on the site. The erosion potential can be controlled with vegetation. The soils have been described to have moderate erosion hazards (Reference 2).

### Soils

The soils encountered in the Test Borings and Test Pits can be grouped into two general soil types: Type 1: silty to slightly silty sand, clean sand, clayey sand (SM-SW, SM, SW, SC), and Type 2: silty sandstone (SM). Bedrock was encountered at depths ranging from 2 to 12 feet in the Test Borings and Test Pits, bedrock was not encountered in Test Pit Nos. 1 – 3. The soils were classified using the Unified Soil Classification System (USCS).

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Soil Type 1 is a silty to slightly silty sand (SM, SM-SW). Soil type one was encountered at the existing surface grade in all of the test borings and test pits extending to depths ranging from 1 to 12 feet. These soils were encountered at loose to medium dense states and dry to moist conditions. Samples tested had approximately 5 to 14 percent of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in non-plastic results. Sulfate testing resulted in less than 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

Soil Type 2 is a silty sandstone (SM). Soil type two was encountered in all of the test borings, at depths ranging from 2 to 12 feet bgs and extended to the termination of the test borings (15 to 20 feet). These soils were encountered at dense to very dense states and moist conditions. Samples tested had approximately 16 to 31 percent of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in non-plastic results. Sulfate testing resulted in less than 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

The Test Boring and Test Pit Logs are presented in Appendix B, and the Laboratory test results from the test pits are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

#### Groundwater

Groundwater was not encountered in any of the test borings which were drilled to depths of 15 to 20 feet. Signs of seasonally occurring groundwater was observed in three of the test pits at 4.5 to 5 feet. Groundwater is not anticipated to affect shallow foundations on the majority of the site. Water was not observed in the head of the drainage in the northwestern portion of the site or in any of the minor drainage swales. Fluctuations in groundwater conditions may occur due to variations in rainfall or other factors not readily apparent at this time. Isolated sand layers within the soil profile can carry water in the subsurface. Contractors should be cognizant of the potential for the occurrence of subsurface water features during construction.

#### Geology

Approximately 10 miles west of the site 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 a large structural feature known as the Denver Basin. Bedrock in the area is typically gently dipping in a northerly direction (Reference 3). The bedrock underlying the site consists of the Dawson Formation of Tertiary to Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers of expansive claystone and siltstone.

The geology of the site was evaluated using the *Geologic Map of the Black Forest Quadrangle*, by Thorson and Madole in 2003, (Reference 4, Figure 5). The Geology Map for the site is presented in Figure 6. Three mappable units were identified on this site which are described as follows:

**Qal**      **Recent Alluvium of Holocene Age:** These are recent stream deposits in the head of the drainage located in the northwest portion of site. Some areas have recent sand deposition, while others have highly organic soils.

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**Qc/Tkd Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:** The materials consist of colluvial or residual soils overlying the bedrock materials on-site. The colluvial soils were deposited by the action of sheetwash and gravity. The residual soils were derived from the in-situ weathering of the bedrock on site. These materials typically consist of silty to clayey sand with potential areas of sandy clays. The bedrock consists of the Dawson Formation. The Dawson Formation typically consists of coarse-grained, arkosic sandstone with interbedded lenses of fine-grained sandstone, siltstone and claystone.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Black Forest Quadrangle* distributed by the Colorado Geologic Survey in 2003, and the *Geologic Map of the Falcon NW Quadrangle*, by Madole in 2003, (References 4 and 5, Figure 5), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6), and the *Geologic Map of the Denver 1° x 2° Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 7). The test borings were used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

#### Drainage and Floodplain Areas

The site is not mapped within any floodplains according to the FEMA Map Nos. 08041CO315G, and 08041CO526G dated December 7, 2018 (Figure 8, Reference 8). The head of a drainage is located in the northwestern portion of the site on Lot 3 that has been identified as a seasonally wet area, and a low lying area above the drainage has been identified as a potentially seasonally wet area. These areas indicated on Geology/Engineering Geology Map (Figure 6). In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and frost heave potential. Water was not observed these areas at time of our site investigation. The seasonally wet area is located within a no-build area, and the potentially seasonal shallow groundwater area will be avoided by the proposed structure on Lot 3. In these areas the potential exists for high groundwater levels during high moisture periods and should structures encroach on these areas the following precautions should be followed. Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

#### Seasonally Wet Area – Constraint

The seasonally wet area has been mapped in the head of the drainage located in the northwestern portion of Lot 3. Construction is not recommended in this area and is located within a no-build area. Mitigation for seasonally wet areas is discussed in the following section.

#### Potentially Seasonally Wet Areas – Constraint

A low lying area above the head of the drainage located in the northwestern portion of Lot 3 was identified as a potentially seasonally wet area. Water was not observed in this area; however, this area has the potential for seasonal shallow groundwater, and is indicated on the Geology/Engineering Geology Map (Figure 6). Due to the size of the proposed lots these areas can either be avoided by the proposed structures or proposed soil treatment areas.

### **ON-SITE WASTEWATER TREATMENT**

The Natural Resource Conservation Service (Reference 1), previously the Soil Conservation Service (Reference 2) has been mapped with two soil descriptions. The Soil Survey Map (Reference 1) is presented in Figure 4, and the Soil Survey Descriptions (Reference 2) are

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presented in Appendix D. The soils are described as having moderate to rapid percolation rates. The existing conventional septic system is located on Lot 4 and will remain. Observations of the leach area indicated that the system is operating properly.

Soils encountered in the tactile test pits consisted of sandy clay loam, sandy clay, sandy loam, gravelly sandy loam, and very clayey sandstone/sandy claystone. The limiting layers encountered in the test pits are the clay, gravelly sandy loam the bedrock, which corresponds with USDA Soil Types 4A and R-1 with an LTAR values of 0.15 and 0.60 gallons per day per square foot, respectively. Bedrock was encountered at 3.5 feet in Test Pit No. 4, and signs of seasonally occurring groundwater were observed at 4.5 to 5 feet in three of the test pits. Absorption fields must be maintained a minimum of 4 feet above groundwater, bedrock, or confining layers. Should groundwater or bedrock be encountered within 6 feet of the surface, designed systems will be required. Designed systems are anticipated for the lots on this site.

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 designed systems will be required for lots. The Septic Suitability Map is presented in Figure 8. Proposed house locations, water wells, and two septic sites for the new lots are indicated. 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.

## CLOSURE

This report has been prepared for The Renehan's, 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.

Respectfully Submitted,

ENTECH ENGINEERING, INC.



Logan L. Langford, P.G.  
Geologist

LLL

Encl.

Entech Job No. 222084  
AAprojects/2022/222084 www

Reviewed by:



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



The Renehan's  
OWTS – Wastewater Study  
5740 Burgess Road  
Tax Schedule No. 62130-00-050  
El Paso County, Colorado

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1. Natural Resource Conservation *Service*, September 13, 2019. *Web Soil Survey*. United States Department Agriculture, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
2. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado*.
3. Scott, Glen R.; Taylor Richard B.; Epis, Rudy C; and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, South-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022, Sheet 2.
4. Thorson, Jon P. 2003. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-6.
5. Madole, Richard F., 2003. *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-08.
6. 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.
7. Scott, Glen R.; Taylor Richard B.; Epis, Rudy C; and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, South-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022.
8. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO315G.

## TABLES

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT    THE RENEHAN'S  
PROJECT   5740 BURGESS ROAD  
JOB NO.    222084

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			11.3	NV	NP	<0.01			SM-SW	SAND, SLIGHTLY SILTY
1	2	5			4.8						SW	SAND
1	4	2-3			13.5						SM	SAND, SILTY
2	3	5			31.3	NV	NP	<0.01			SM	SANDSTONE, SILTY
2	5	15			16.2						SM	SANDSTONE, SILTY

**Table 2: Summary Test Boring Results**

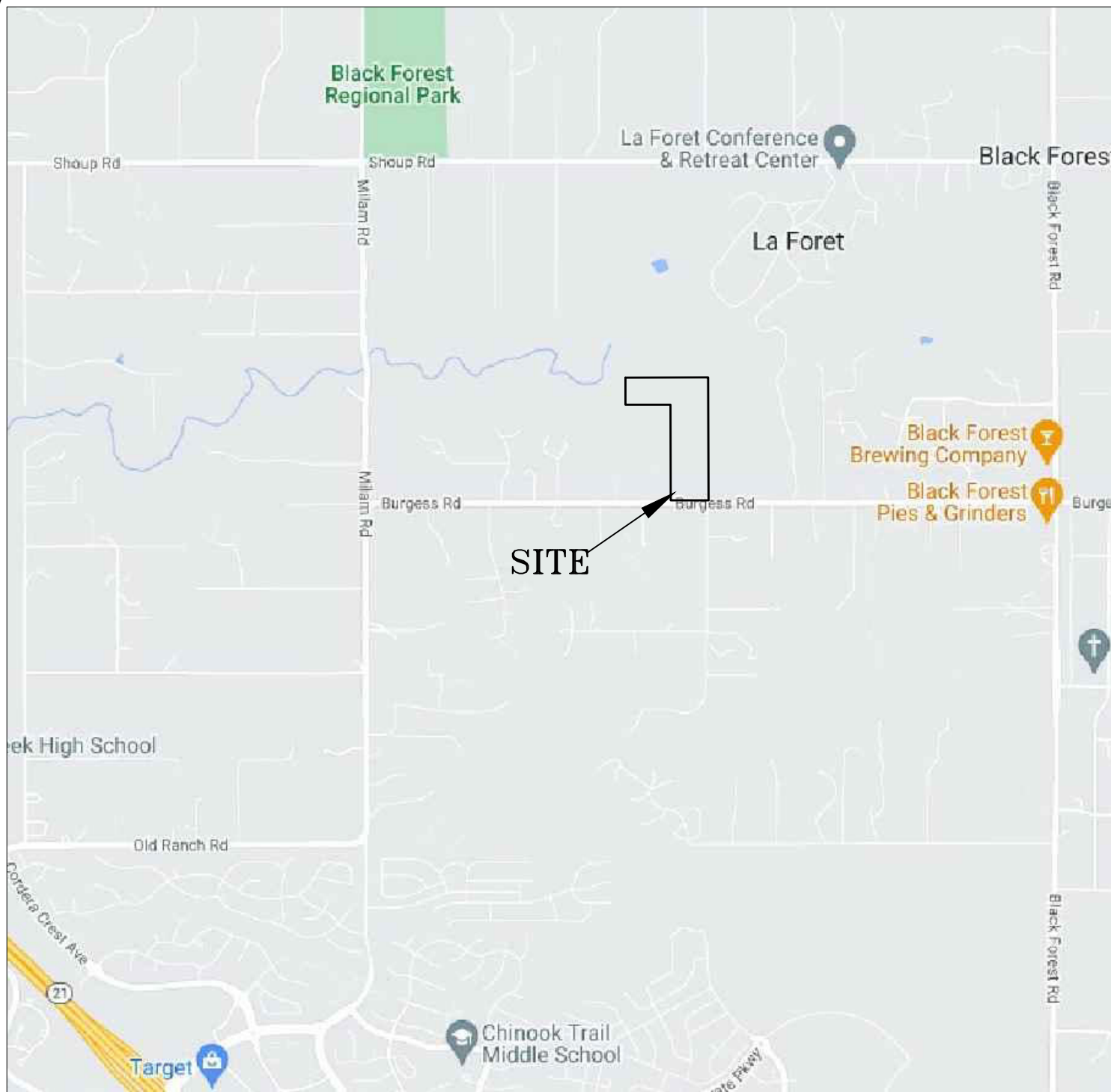
<b>Test Boring No.</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Groundwater (ft.)</b>
1	12	>20
2	7	>20
3	2	>15
4	3	>20
5	9	>20

**Table 3: Summary Tactile Test Pit Results**

<b>Test Pit No.</b>	<b>USDA Soil Type</b>	<b>LTAR Value</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Groundwater or Seasonally Occurring Groundwater (ft.)</b>
1	4A*	0.15	>8	4.5*
2	4A*	0.15	>8	5*
3	R-1*	0.5	>8	>8
4	4A*	0.15	3.5*	>4.5

\*- Conditions that will require an engineered OWTS

## FIGURES



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VICINITY MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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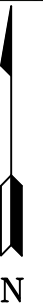
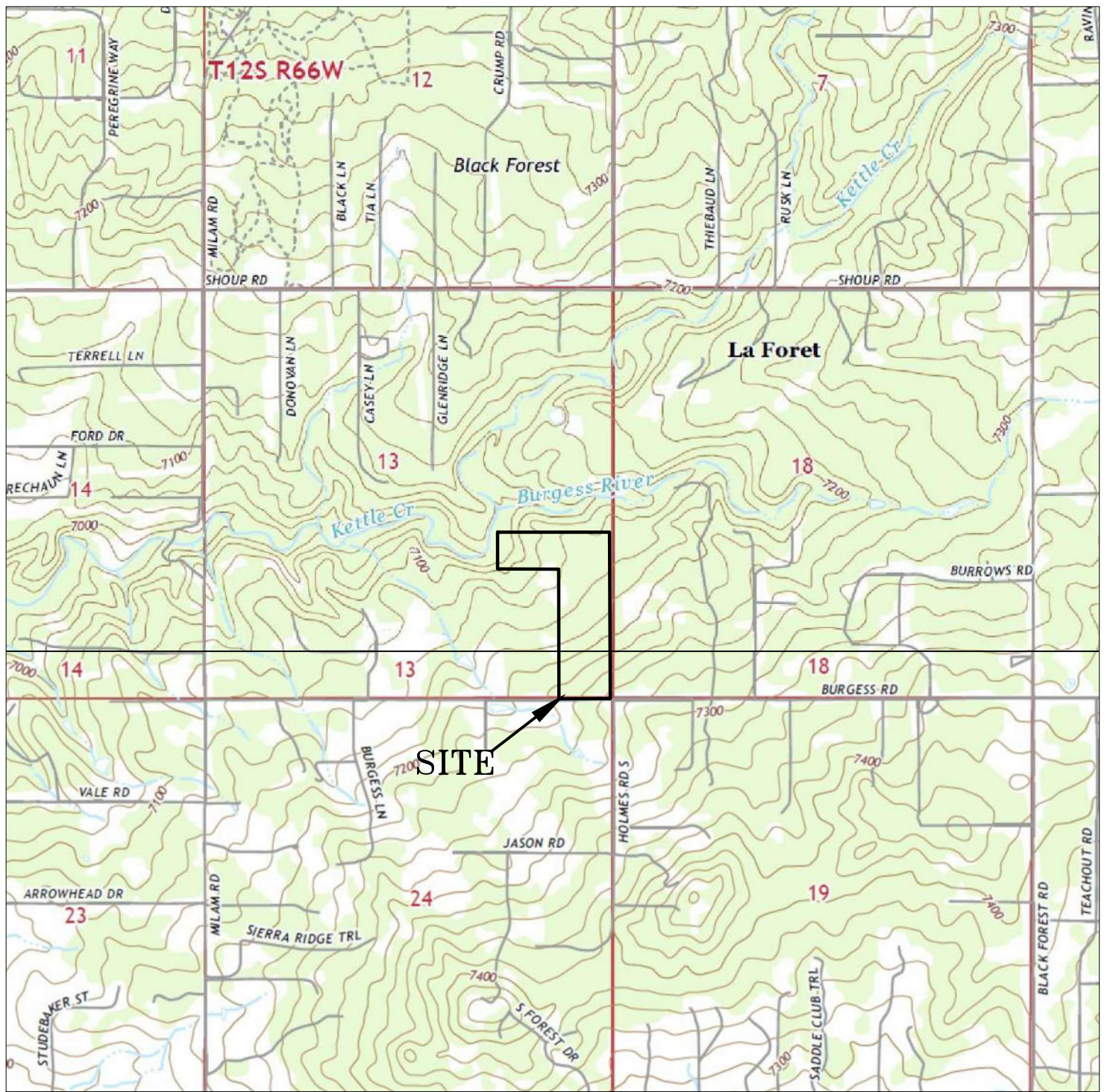
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DATE:

JOB NO.:  
222084

FIG NO.:  
1



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USGS MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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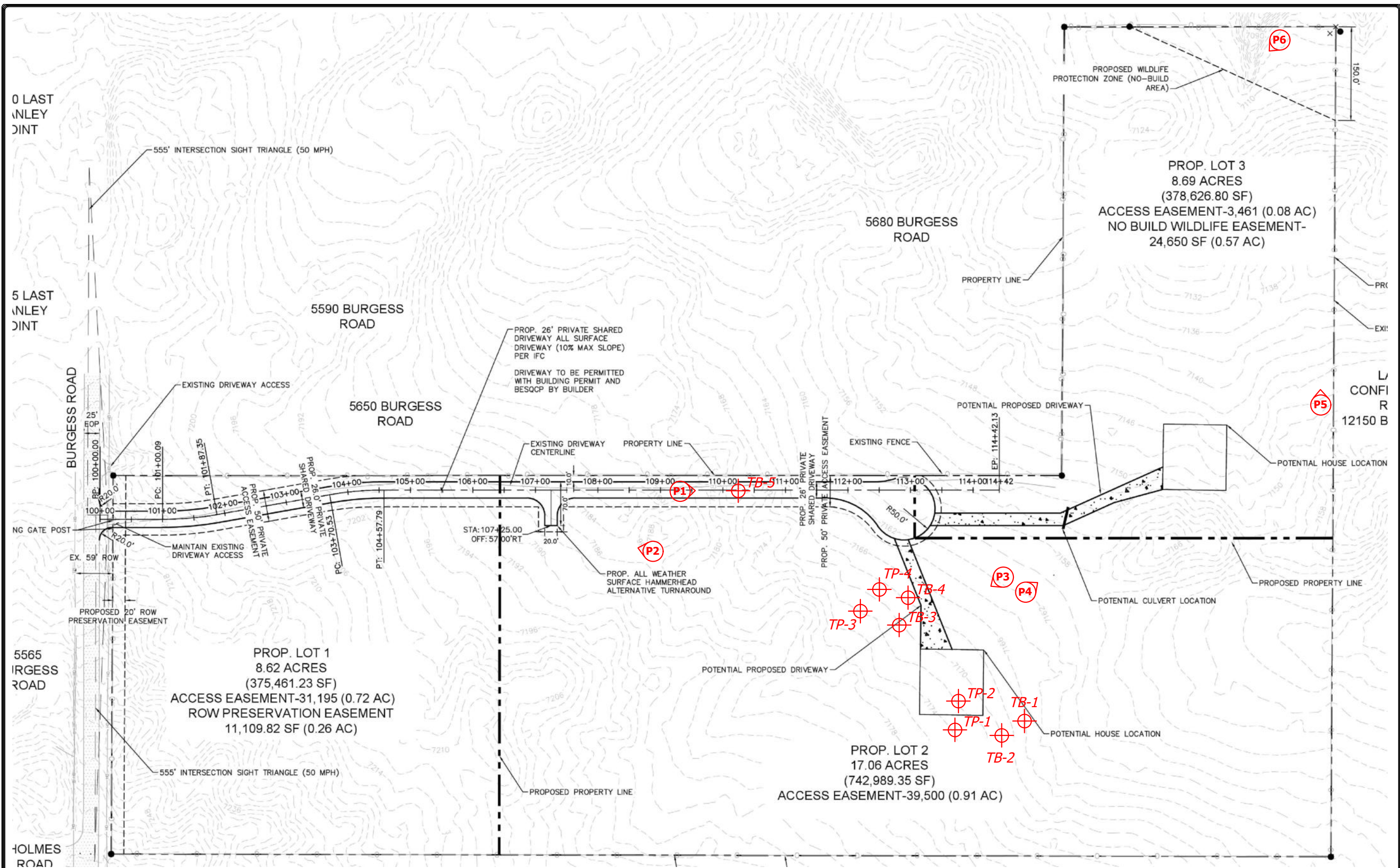
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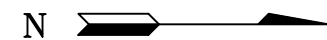
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222084

FIG NO.:  
2



Legend:

- TB - Approximate Test Boring Location and Number
- TP - Approximate Test Pit Location and Number
- Approximate Photograph Direction and Location



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SITE MAP/TESTING LOCATION MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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DATE 2/1/23
SCALE AS SHOWN
JOB NO. 222084
FIGURE No. 3



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SOIL SURVEY MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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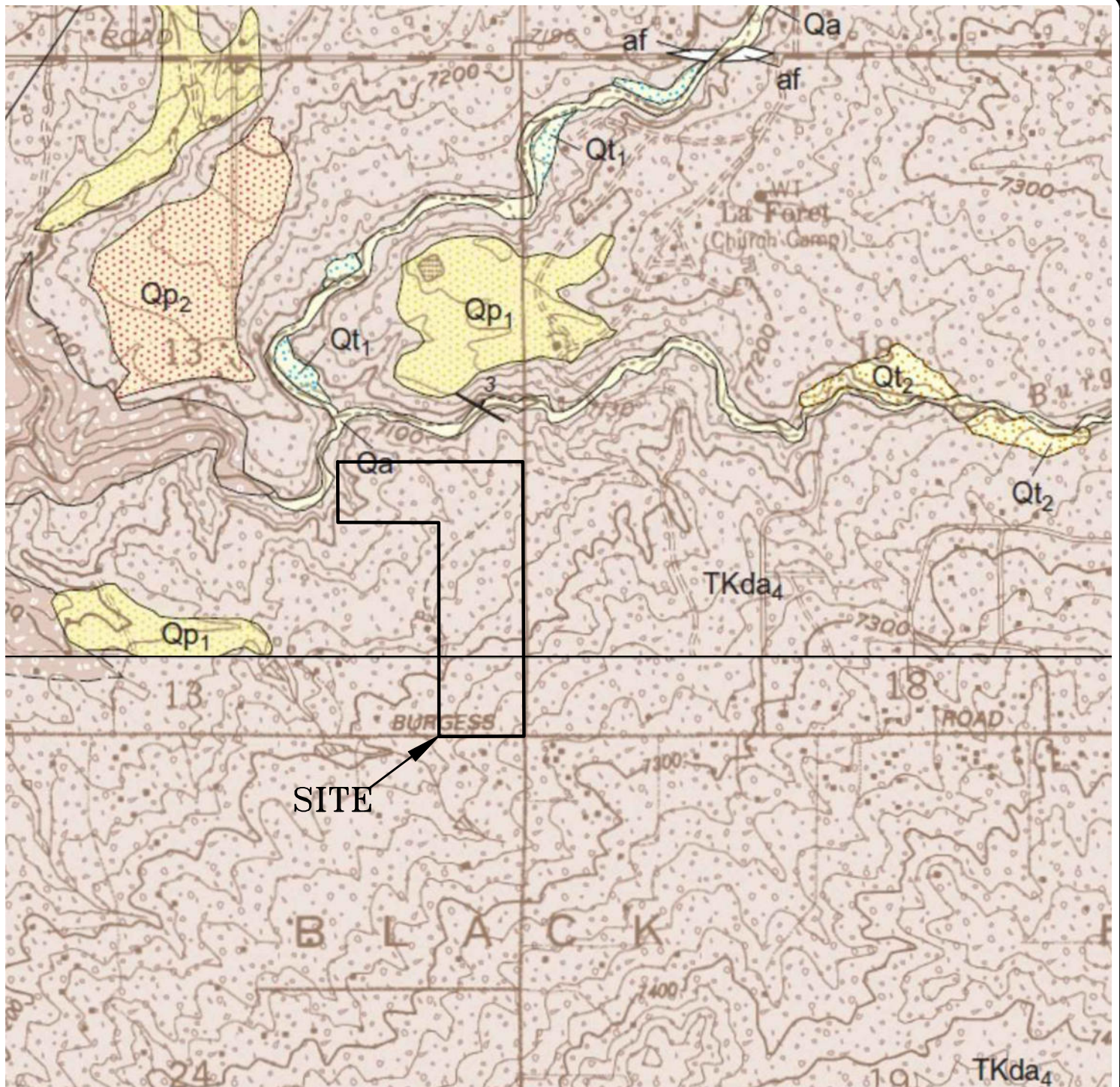
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FIG NO.:  
4



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BLACK FOREST/FALCON NW QUADRANGLES  
GEOLOGIC MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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DATE:  
11/23/22

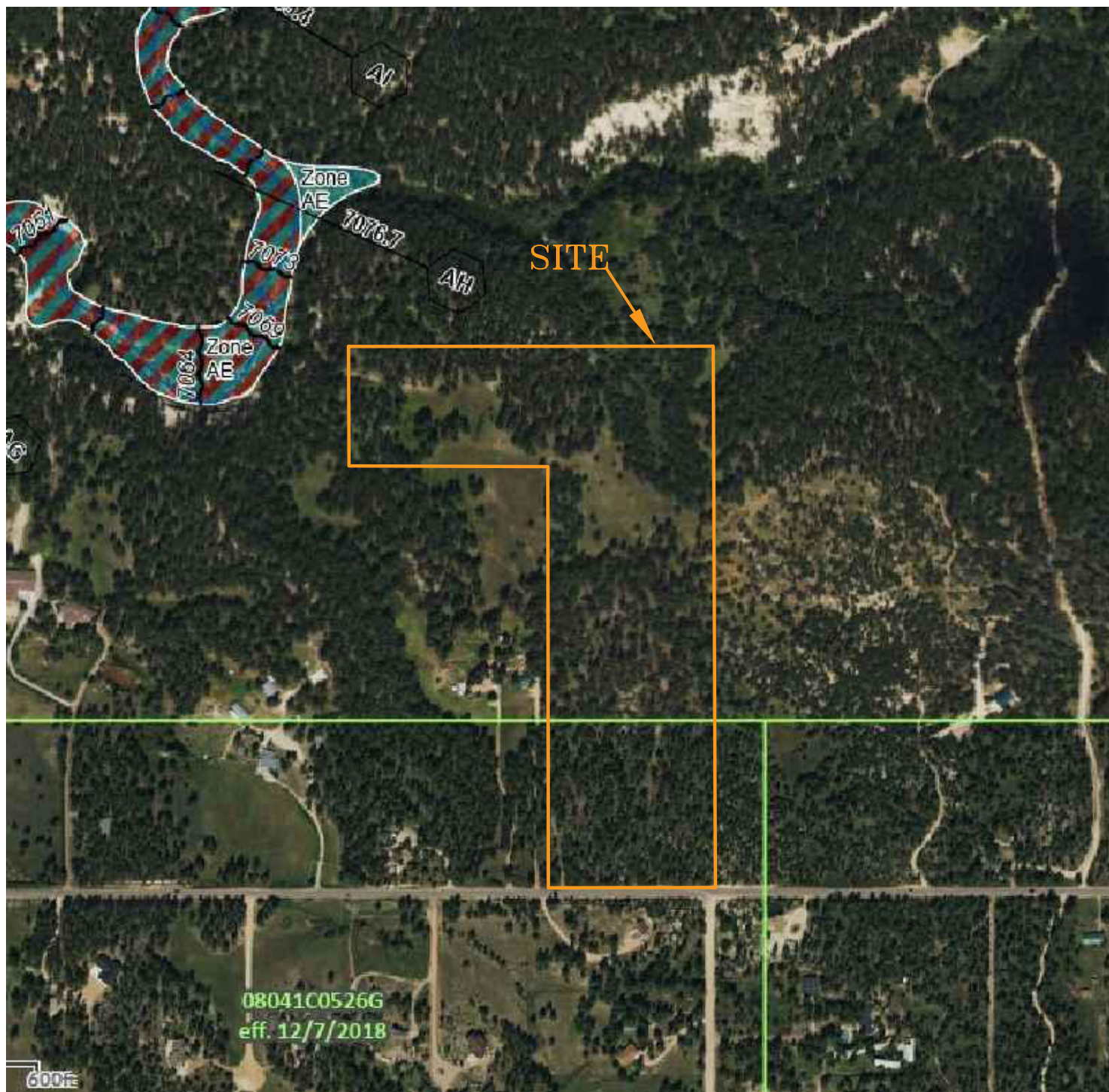
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222084

FIG NO.:  
5





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FEMA FLOODPLAIN MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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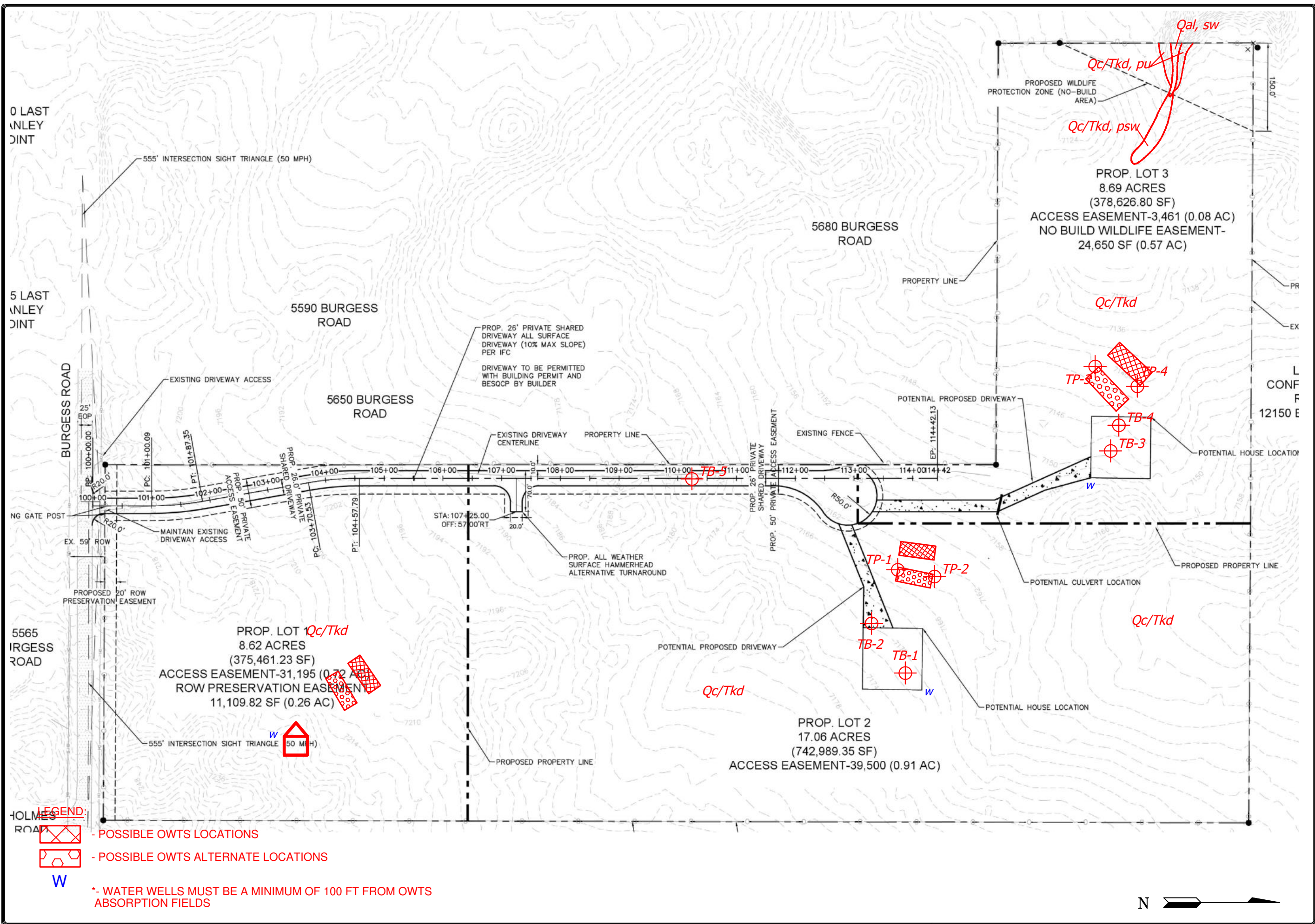
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JOB NO.:  
222084

FIG NO.:  
7



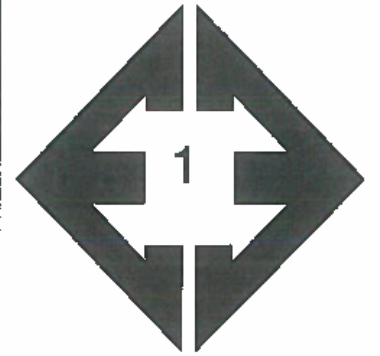
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OWTS SUTABILITY MAP  
5740 BURGESS ROAD  
EL PASO COUNTY, CO.  
FOR: THE RENEHAN'S

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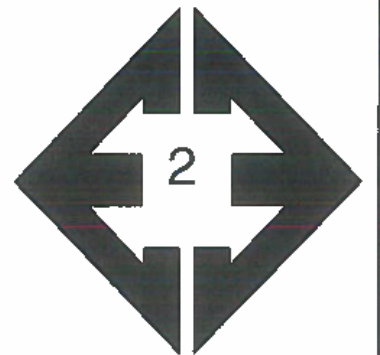

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DATE 2/1/23
SCALE AS SHOWN
JOB NO. 222084
FIGURE No. 8

## **APPENDIX A: Site Photographs**



**Looking north along  
the proposed driveway  
in the western side of  
the site.**

November 8, 2022



**Looking south from  
the southern portion of  
the site.**

November 8, 2022



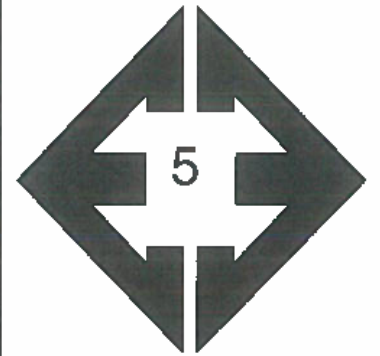
**Looking southeast  
from the northeastern  
portion of the site.**

November 8, 2022



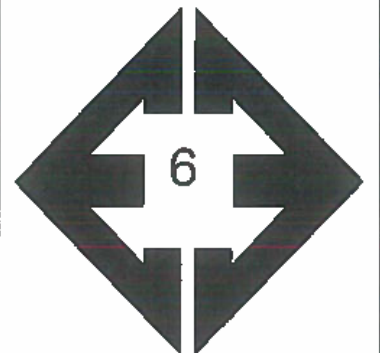
**Looking northwest  
from the northeastern  
portion of the site.**

November 8, 2022



**Looking west along  
the northern side of  
the site.**

November 8, 2022



**Looking east along the  
head of the drainage in  
the northwestern  
portion of Lot 3.**

November 8, 2022

## **APPENDIX B: Test Boring & Test Pit Logs**

TEST BORING NO. 1  
 DATE DRILLED 11/9/2022  
 Job # 222084

TEST BORING NO. 2  
 DATE DRILLED 11/9/2022  
 CLIENT THE RENEHAN'S  
 LOCATION 5740 BURGESS ROAD

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 11/10/22						
SAND, SLIGHTLY SILTY TO SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO DENSE, DRY TO MOIST	5			8	1.8	1
	5			7	3.9	1
	10			32	6.7	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	15			50 8"	10.3	2
	20			50 8"	8.4	2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 11/10/22						
SAND, CLEAN TO SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST	5			17	4.2	1
	5			13	4.4	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	10			50 8"	11.8	2
	15			50 7"	10.4	2
	20			50 8"	11.4	2



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 COLORADO SPRINGS, COLORADO 80907

### TEST BORING LOG

DRAWN:

DATE:

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DATE:

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11/18/22

JOB NO.:  
 222084

FIG NO.:  
 B- 1

TEST BORING NO. 3  
 DATE DRILLED 11/9/2022  
 Job # 222084

TEST BORING NO. 4  
 DATE DRILLED 11/9/2022  
 CLIENT THE RENEHAN'S  
 LOCATION 5740 BURGESS ROAD

REMARKS

DRY TO 15', 11/10/22

SAND, SILTY, BROWN

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
					2
5			50 11"	11.0	2
			50 7"	13.9	2
10			50	12.9	2
15			50 5"	6.0	2
20					

REMARKS

DRY TO 20', 11/10/22

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

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			30	2.2	1
5			50 7"	7.1	2
10			50 7"	13.4	2
15			50 7"	10.5	2
20			50 7"	15.9	2



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 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

11/18/22

JOB NO.:  
 222084

FIG NO.:  
 B- 2

TEST BORING NO. 5  
DATE DRILLED 11/9/2022  
Job # 222084

TEST BORING NO.  
DATE DRILLED  
CLIENT THE RENEHAN'S  
LOCATION 5740 BURGESS ROAD

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 11/10/22													
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO DENSE, DRY TO MOIST	5			23	2.3	1		5					
				27	3.0	1							
SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	10			50 8"	12.7	2		10					
	15			50 6"	9.8	2		15					
	20			50 9"	16.8	2		20					



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

### TEST BORING LOG

DRAWN:

DATE:

CHECKED:  
LLL











DATE:  
11/18/22

JOB NO.:  
222084

FIG NO.:  
B- 3

TEST PIT NO. 1  
DATE EXCAVATED 11/10/2022  
Job # 222084

TEST PIT NO. 2  
DATE EXCAVATED 11/10/2022  
CLIENT The Renehans  
LOCATION 5740 Burgess Road

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
<b>Redoximorphic Features @ 4-feet 6-inches</b>							<b>Redoximorphic Features @ 5-feet 0-inches</b>						
topsoil, sandy clay loam, brown, moist	1						topsoil, sandy clay loam, brown, moist	1					
sandy clay, fine to medium grained, grayish brown, moist	2			ma		4A		2					
sandy loam, fine to coarse grained, brown, moist	3			gr	m	2	sandy clay, fine to medium grained, grayish brown, moist	3			ma		4A
	4							4					
sandy loam, fine to coarse grained, brown, moist	5			gr	m	2	sandy loam, fine to coarse grained, brown, moist	5			gr	m	2
	6							6					
sandy clay, fine to medium grained, grayish brown, moist	7			ma		4A	sandy clay, fine to medium grained, grayish brown, moist	7			ma		4A
	8							8					
	9							9					
	10							10					

Soil Structure Shape

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

Soil Structure Grade

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



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:  
jhr

DATE:  
11/14/22

CHECKED:  
LL

DATE:  
11/22

JOB NO.:  
222084

FIG NO.:  
P-41

TEST PIT NO. 3  
 DATE EXCAVATED 11/10/2022  
 Job # 222084

TEST PIT NO. 4  
 DATE EXCAVATED 11/10/2022  
 CLIENT The Renehans  
 LOCATION 5740 Burgess Road

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
							Bedrock @ 3-feet 6-inches, Refusal @ 4-feet 6-inches						
topsoil, sandy clay loam, brown, moist	1						topsoil, sandy clay loam, brown, moist	1					
gravelly sandy clay loam, fine to very coarse grained, brown to grayish brown, moist	2			gr	s	R-1	sandy loam, fine to coarse grained, pale brown, moist	2			bl	s	2
	3							3					
	4			gr	s	R-1	clayey sandstone, fine to medium grained, brown, moist	4			ma		4A
	5							5					
gravelly sandy loam, fine to very coarse grained, brown, moist	6			gr	m	R-1		6					
	7							7					
	8							8					
	9							9					
	10							10					

#### Soil Structure Shape

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

#### Soil Structure Grade

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



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#### TEST PIT LOG

DRAWN:  
 jhr

DATE:  
 11/14/22

CHECKED:  
 LLL

DATE:  
 11/18/22

JOB NO.:  
 222084

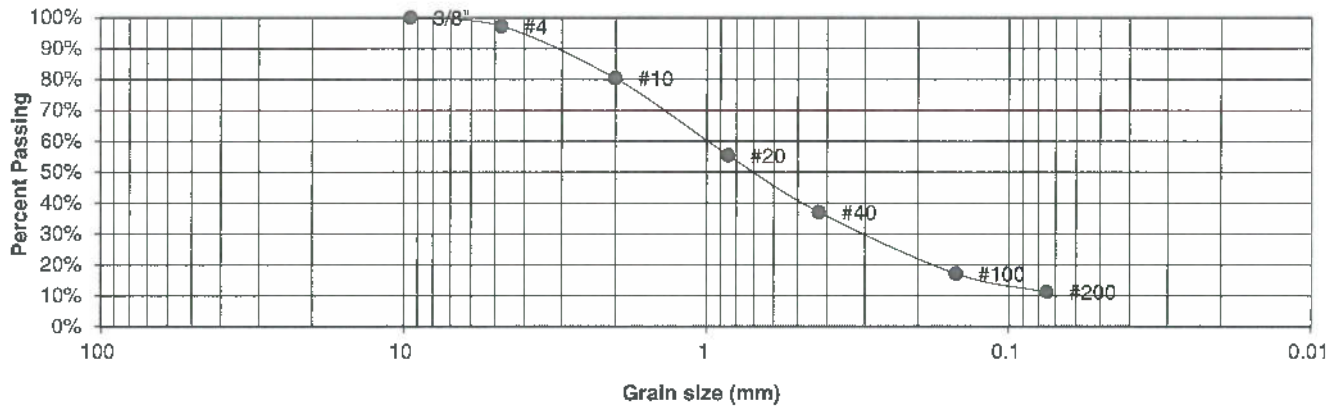
FIG NO.:  
 B-5

## **APPENDIX C: Laboratory Test Results**

UNIFIED CLASSIFICATION SM-SW  
 SOIL TYPE # 1  
 TEST BORING # 1  
 DEPTH (FT) 2-3

CLIENT THE RENEHAN'S  
 PROJECT 5740 BURGESS ROAD  
 JOB NO. 222084  
 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	97.2%
10	80.4%
20	55.4%
40	37.0%
100	17.1%
200	11.3%

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)



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 COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:

LLL

DATE:

11/18/22

JOB NO.:  
222084

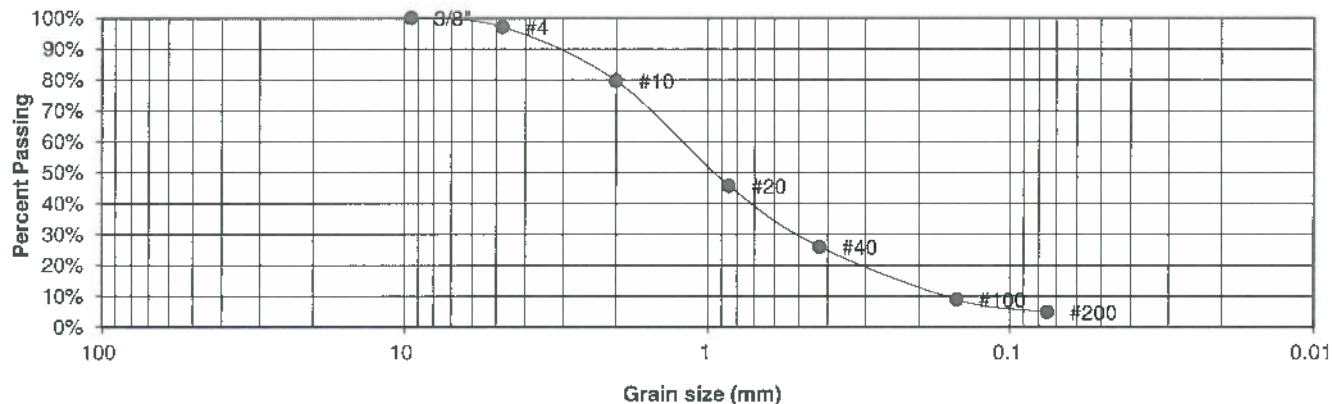
FIG NO.:

C-1

UNIFIED CLASSIFICATION	SW
SOIL TYPE #	1
TEST BORING #	2
DEPTH (FT)	5

CLIENT	THE RENEHAN'S
PROJECT	5740 BURGESS ROAD
JOB NO.	222084
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	97.2%
10	79.7%
20	45.7%
40	26.0%
100	8.9%
200	4.8%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

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DATE:

LL

11/18/22

JOB NO.:  
222084

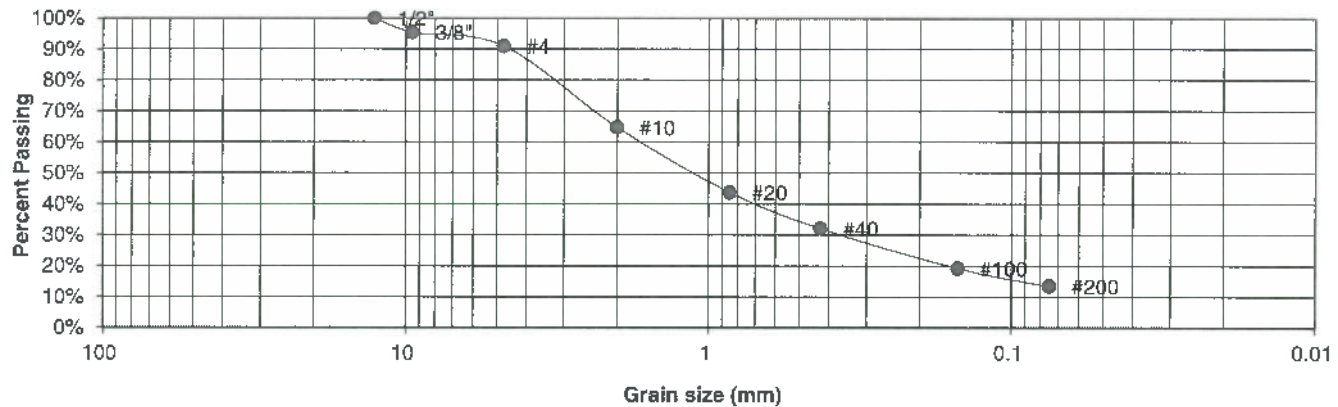
FIG NO.:

C-2

UNIFIED CLASSIFICATION	SM
SOIL TYPE #	1
TEST BORING #	4
DEPTH (FT)	2-3

CLIENT	THE RENEHAN'S
PROJECT	5740 BURGESS ROAD
JOB NO.	222084
TEST BY	BL

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	95.3%
4	90.9%
10	64.7%
20	43.7%
40	32.0%
100	19.2%
200	13.5%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

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DATE:

LLL

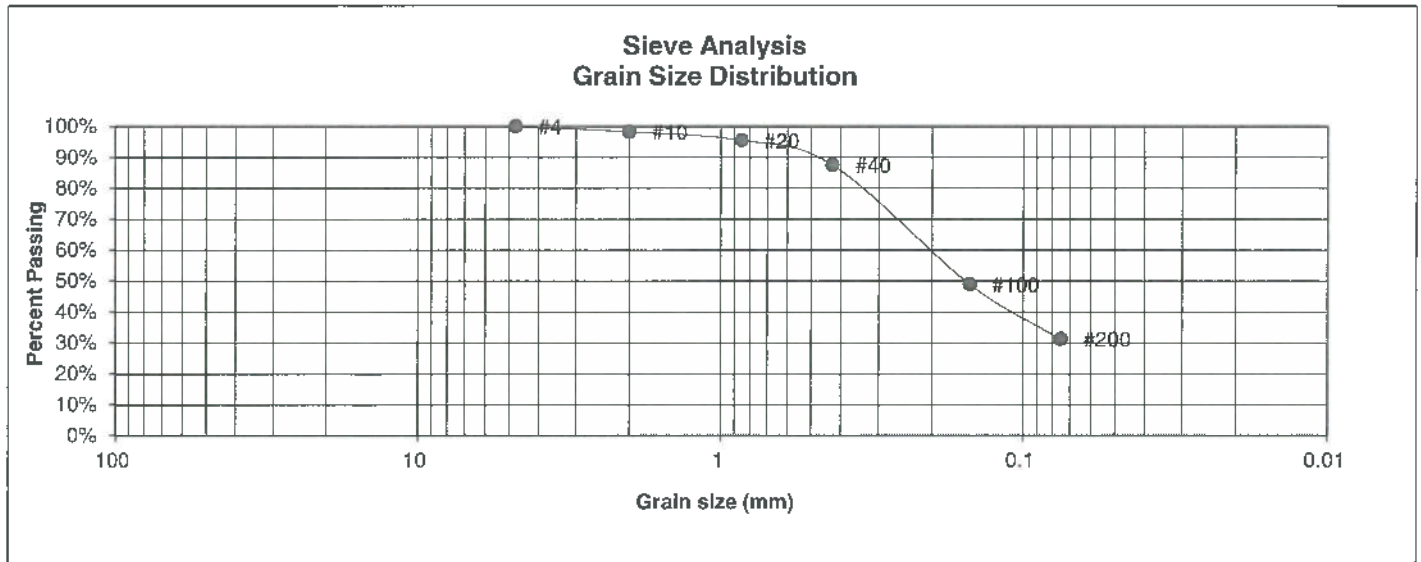
11/18/22

JOB NO.:  
222084

FIG NO.:

C-3

UNIFIED CLASSIFICATION	SM	CLIENT	THE RENEHAN'S
SOIL TYPE #	2	PROJECT	5740 BURGESS ROAD
TEST BORING #	3	JOB NO.	222084
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.3%
20	95.5%
40	87.5%
100	48.9%
200	31.3%

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)	



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COLORADO SPRINGS, COLORADO 80907

## LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		ELL	11/18/22

JOB NO.:  
222084

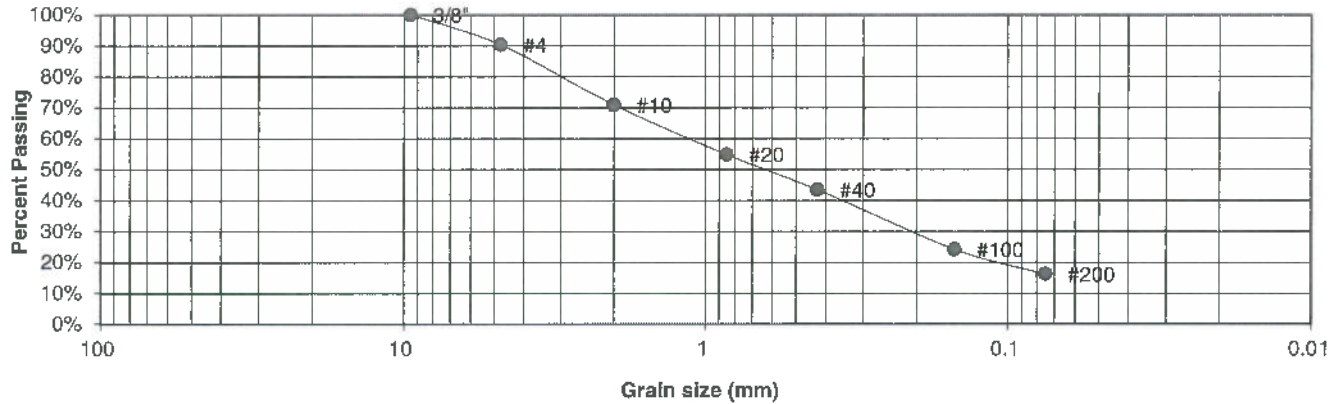
FIG NO.:

C-4

UNIFIED CLASSIFICATION SM  
 SOIL TYPE # 2  
 TEST BORING # 5  
 DEPTH (FT) 15

CLIENT THE RENEHAN'S  
 PROJECT 5740 BURGESS ROAD  
 JOB NO. 222084  
 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	90.3%
10	70.9%
20	54.9%
40	43.5%
100	24.2%
200	16.2%

Atterberg  
Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

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DATE:

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11/18/22

JOB NO.:  
222084

FIG NO.:

C-5



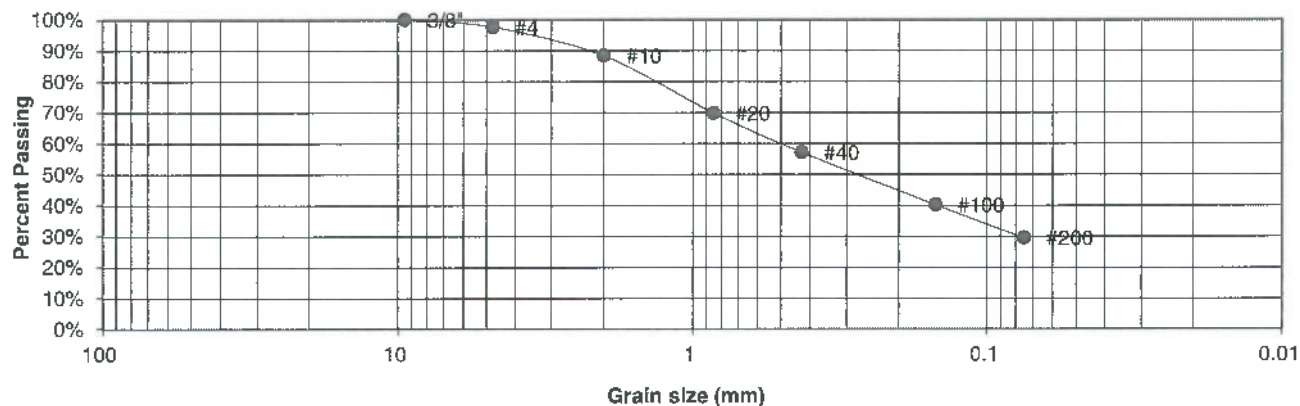
BORING NO. TP-1  
 DEPTH(ft) 2  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SC

TEST BY BL  
 JOB NO. 222084

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.7%
10	88.4%
20	69.8%
40	57.2%
100	40.2%
200	29.5%

Atterberg  
 Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:  
LL

DATE:

11/18/22

JOB NO.:  
222084

FIG NO.:

6-7

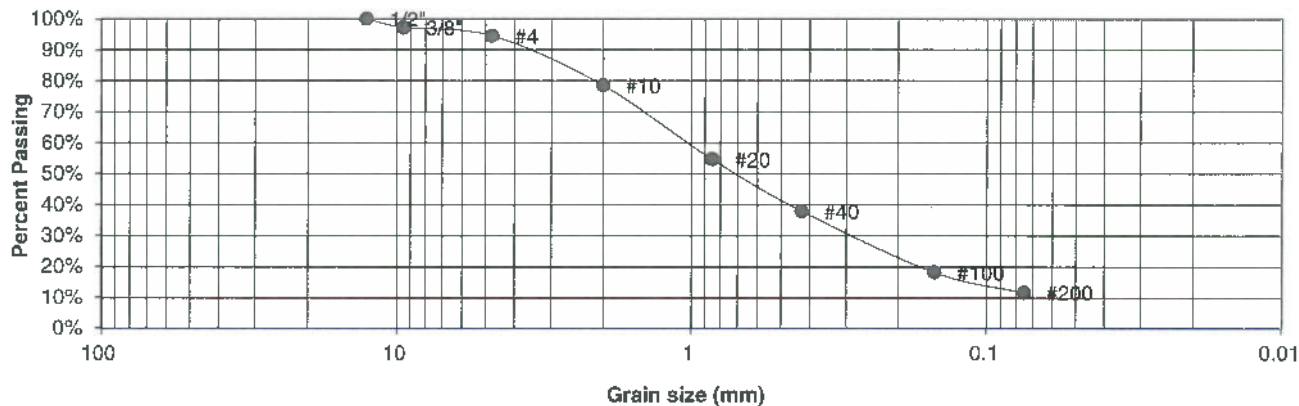
BORING NO. TP-1  
 DEPTH(ft) 5  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SM-SW

TEST BY BL  
 JOB NO. 222084

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.1%
4	94.4%
10	78.4%
20	54.6%
40	37.9%
100	18.2%
200	11.7%

Atterberg  
Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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505 ELKTON DRIVE  
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### LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:

DATE:

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JOB NO.:  
222084

FIG NO.:  
C-8

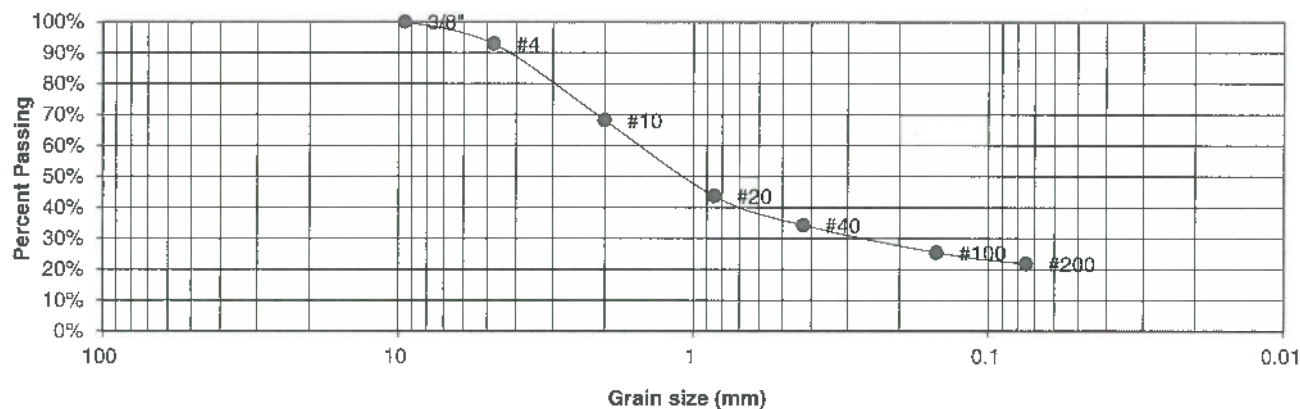
BORING NO. TP-2  
 DEPTH(ft) 3  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SM

TEST BY BL  
 JOB NO. 222084

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.8%
10	68.1%
20	43.7%
40	34.3%
100	25.4%
200	21.8%

Atterberg  
Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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### LABORATORY TEST RESULTS

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DATE:

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DATE:  
 11/15/22

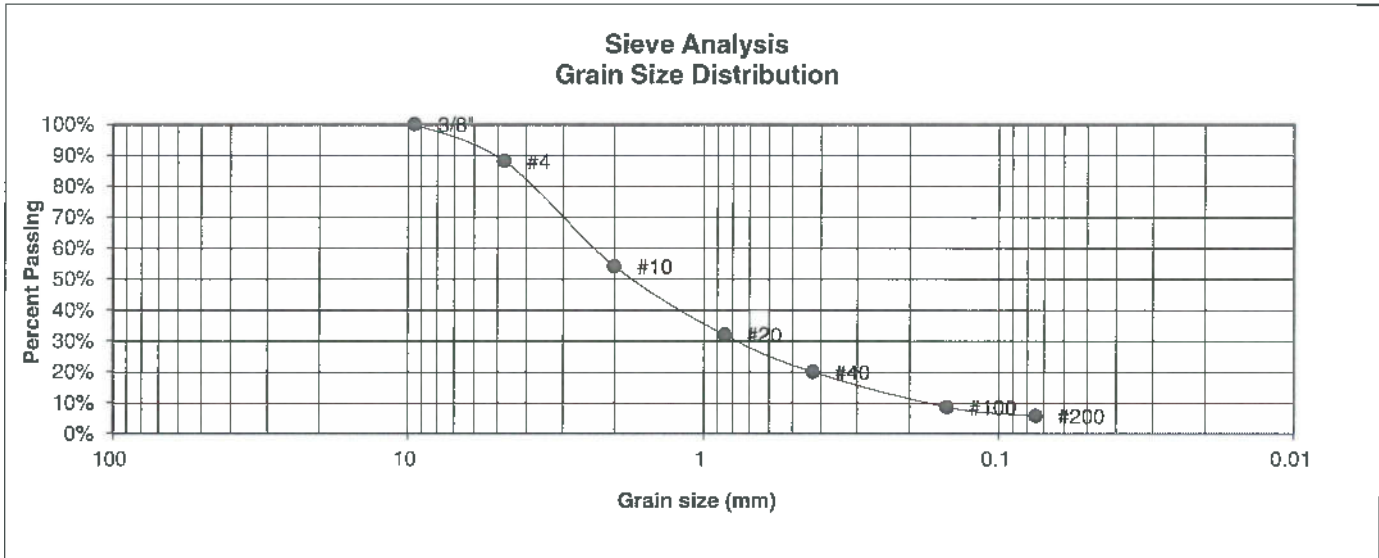
JOB NO.:  
 222084

FIG NO.:  
 C-9

BORING NO. TP-3  
 DEPTH(ft) 2  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SM-SW TEST BY BL  
 JOB NO. 222084



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	88.1%
10	54.2%
20	32.0%
40	20.1%
100	8.7%
200	5.9%

Atterberg  
 Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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505 ELKTON DRIVE  
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**LABORATORY TEST  
RESULTS**

DRAWN:

DATE:

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DATE:

664

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JOB NO.:  
222084

FIG NO.:

C-18

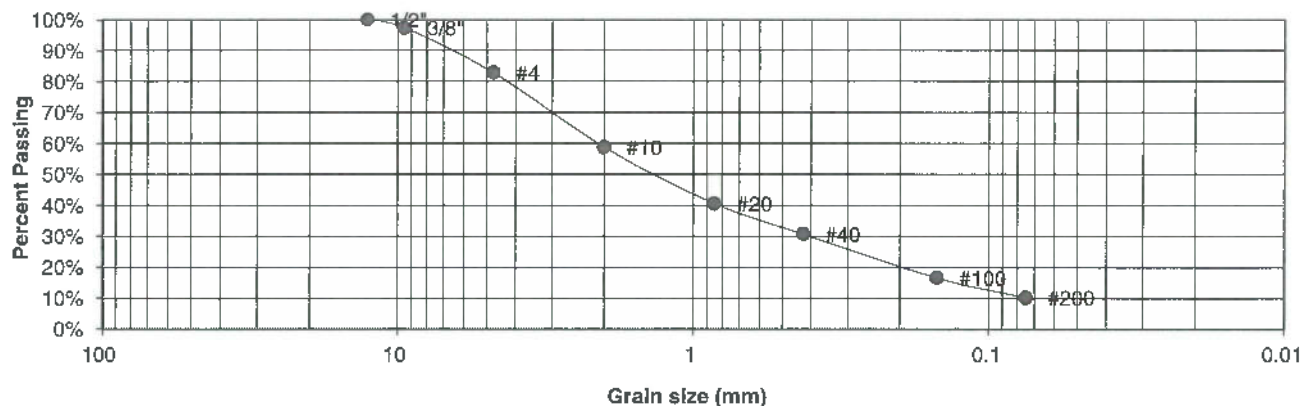
BORING NO. TP-3  
 DEPTH(ft) 4  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SM-SW

TEST BY BL  
 JOB NO. 222084

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.2%
4	82.8%
10	58.8%
20	40.6%
40	30.7%
100	16.6%
200	10.3%

Atterberg  
 Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



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505 ELKTON DRIVE  
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### LABORATORY TEST RESULTS

DRAWN:

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DATE:

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11/18/22

JOB NO.:  
222084

FIG NO.:  
C-11

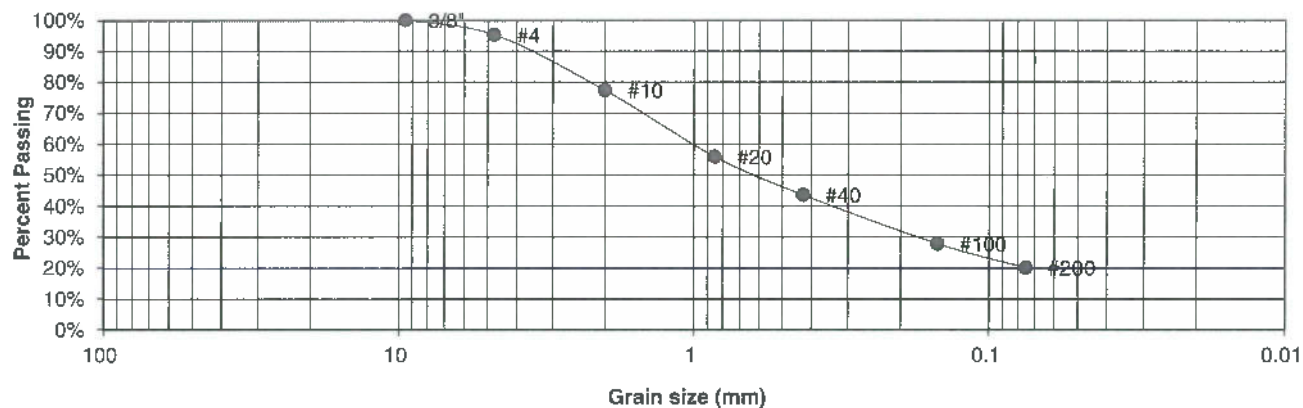
BORING NO. TP-4  
 DEPTH(ft) 2  
 CLIENT THE RENEHANS  
 PROJECT 5740 BURGESS ROAD

UNIFIED CLASSIFICATION  
 AASHTO CLASSIFICATION

SM

TEST BY BL  
 JOB NO. 222084

### Sieve Analysis Grain Size Distribution



U.S.  
Sieve #

Percent  
Finer

3"  
1 1/2"  
3/4"  
1/2"  
3/8"  
4  
10  
20  
40  
100  
200

100.0%  
95.3%  
77.4%  
55.9%  
43.6%  
27.8%  
20.1%

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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505 ELKTON DRIVE  
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### LABORATORY TEST RESULTS

DRAWN:

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JOB NO.:  
222084

FIG NO.:  
C-12

## **APPENDIX D: Soil Survey Descriptions**

## El Paso County Area, Colorado

### 40—Kettle gravelly loamy sand, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 368g

*Elevation:* 7,000 to 7,700 feet

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Kettle and similar soils:* 85 percent

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

#### Description of Kettle

##### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Sandy alluvium derived from arkose

##### Typical profile

*E - 0 to 16 inches:* gravelly loamy sand

*Bt - 16 to 40 inches:* gravelly sandy loam

*C - 40 to 60 inches:* extremely gravelly loamy sand

##### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* High  
(2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Low (about 3.4 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

### 41—Kettle gravelly loamy sand, 8 to 40 percent slopes

#### Map Unit Setting

*National map unit symbol:* 368h

*Elevation:* 7,000 to 7,700 feet

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Kettle and similar soils:* 85 percent

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

#### Description of Kettle

##### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Sandy alluvium derived from arkose

##### Typical profile

*E - 0 to 16 inches:* gravelly loamy sand

*Bt - 16 to 40 inches:* gravelly sandy loam

*C - 40 to 60 inches:* extremely gravelly loamy sand

##### Properties and qualities

*Slope:* 8 to 40 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* High  
(2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*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