

June 2, 2020
Revised April 27, 2021



ENTECH
ENGINEERING, INC.

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

William Guman & Associates, Ltd
731 North Weber Street
Colorado Springs, CO 80903

Attn: Bill Guman

Re: Wastewater Study
Mountain's Edge Subdivision
McClelland Road & Farmhouse Court
Parcel No. 32000-00-740
El Paso County, Colorado

Dear Mr. Guman:

As requested, personnel of Entech Engineering, Inc. performed a wastewater study for the 30.6-acre parcel to be replatted into five (5) rural residential lots to evaluate the conditions with respect to on-site wastewater treatment suitability.

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion N $\frac{1}{2}$ of the N $\frac{1}{2}$ of the SW $\frac{1}{4}$ of Section 13, Township 12 South, Range 63 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 $\frac{1}{4}$ miles southeast of Peyton, Colorado, northwest of McClelland Road and Scott Road in El Paso County, Colorado. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is gradually sloping generally to the southeast with gradual to moderate slopes along the small ridge that bisects the site in the eastern portion of the site. A drainage is located east of the proposed subdivision and flows in a southwesterly direction. A minor drainage is located in the central portion of the site located in portions of Lots 2 and 3. Water was not observed in the drainages at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included agricultural grazing and undeveloped land. The site contains primarily field grasses, weeds, cacti and yuccas. Site photographs, taken May 19, 2020, are included in Appendix A.

Total acreage involved in the proposed subdivision is 30.6-acres. Five rural residential lots are proposed as part of the replat. The proposed lot sizes range from approximately 5-acres to 6-acres. The lots will be serviced by individual water 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 the following:

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.

William Guman & Associates, Ltd
Wastewater Study
Mountain's Edge Subdivision
McClelland Road & Farmhouse Court
Parcel No. 32000-00-740
El Paso County, Colorado

PREVIOUS INVESTIGATION

A Geology and Soils Study was previously prepared for this site by Kumar and Associates, Inc., November 14, 2008 (Reference 1). Information from this report was used in our investigation of the site.

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 aerial photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on May 19, 2020.

Three test pits were excavated across the site on Lot Nos. 1, 2 and 4 to determine general suitability for the use of on-site wastewater treatment systems and general soil characteristics. The locations of the test pits are indicated on the Site Plan/Test Pit 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 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 2, Figure 4), previously the Soil Conservation Service (Reference 2) has mapped four soil types on the site. Complete descriptions of the soil types are presented in Appendix D. In general, the soils consist of sandy loam to gravelly loamy sand. The soils are described as follows:

<u>Type</u>	<u>Description</u>
8	Blakeland Loamy Sand, 1 – 9% Slopes
10	Blendon Sandy Loam, 0 – 3% Slopes
96	Truckton Sandy Loam, 0 – 3% Slopes
97	Truckton Sandy Loam, 3 – 9% 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).

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McClelland Road & Farmhouse Court
Parcel No. 32000-00-740
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Soils

The soils encountered in the test pits consisted of silty to clayey sand overlying weathered silty to clayey sandstone. Bedrock was not encountered in Test Pit Nos 1 and 2. Weathered bedrock was encountered in Test Pit No. 3 at a depth of 3.5 feet. The upper sands were encountered at loose to medium dense states and moderate moisture conditions, and the sandstone was encountered at dense states and moderate moisture conditions.

Groundwater

Groundwater was not encountered in the test pits, which were excavated to 7 to 8 feet. Signs of seasonally occurring groundwater were observed in Test Pit No. 2 (Lot 3) at 7.5 feet. Areas of potentially seasonal shallow and seasonal shallow groundwater have been mapped in drainages on the site that are discussed in the following sections. 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 27 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 4). The bedrock underlying the site consists of the Dawson Formation of Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers of claystone or siltstone.

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

- Qaf** **Artificial Fill of Holocene Age:** These consist of man-made fill deposits associated with erosion berm on Lot 2.
- Qal** **Alluvium of Quaternary Age:** These are recent deposits that have been deposited along the drainages and low-lying areas that exist on-site. These materials consist of silty to clayey sands. Some of these alluviums can contain highly organic soils.
- Qes** **Eolian Sands of Quaternary Age:** These are wind-blown sands deposited by the action of prevailing winds. The materials typically consist of silty sands and may contain sandy silt layers.
- 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

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Mountain's Edge Subdivision
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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 *Bedrock Geologic Map of the Denver Basin* distributed by the Colorado Geologic Survey in 2011 (Reference 4, Figure 5), the *Surficial Geologic Map of the Denver 1° x 2° Quadrangle*, distributed by the US Geological Survey in 2001 (Reference 5), and the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6). The test pits 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 Areas

Minor drainages exist on-site that flow in southeasterly directions. No water was observed flowing in these drainages at the time of the investigation. Areas of seasonal shallow groundwater have been mapped along the drainages on the site (Figure 6) located on Lots 2 and 3. In this area the potential for flooding, bank erosion and sedimentation exist. These areas are designated as no-build areas on Figure 3, and will be avoided by any future construction.

In these areas, we would anticipate the potential for periodically high subsurface moisture conditions, frost heave potential and highly organic soils. These areas lie within minor drainage areas which can be avoided by the proposed development. Due to the potential for seasonal high groundwater conditions, on-site wastewater treatment systems are not recommended in these areas. The eastern side of the site lies within any floodplain zones according to the FEMA Map No. 08041CO375G dated December 7, 2018 (Figure 7, Reference 7). Exact locations of floodplain and specific drainage studies are beyond the scope of this report. Individual wastewater treatment systems must be located a minimum of 25 feet from dry gulches and 50 feet from water courses or floodplains.

ON-SITE WASTEWATER TREATMENT

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has been mapped with two soil descriptions. The Soil Survey Map (Reference 1) is presented in Figure 4, and the Soil Survey Descriptions (Reference 3) are presented in Appendix D. The soils are described as having moderate to rapid percolation rates.

Soils encountered in the tactile test pits consisted of sandy loam, sandy clay loam and sand overlying weathered to formational silty sandstone. Weathered sandstone was only encountered in Test Pit No. 3. The limiting layers encountered in the test pits are the sandy loam, sandy clay loam and silty sandstone, which corresponds with USDA Soil Types 2A to 3A with LTAR values of 0.50 to 0.30 gallons per day per square foot. Weathered bedrock was encountered at approximately 3.5 feet in Test Pit No. 3. Signs of seasonally occurring groundwater were encountered in Test Pit No. 2 (Lot 3) at 7.5 feet. Absorption fields must be maintained a minimum of 4 feet above groundwater or bedrock, or confining layer. Should groundwater or bedrock be encountered within 6 feet of the surface, designed systems will be required. Designed systems

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are anticipated for Lot No. 1 (Test Pit No. 3), however, areas may be encountered on the lot where conventional systems would be suitable.

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. Entech Engineering, Inc. performed testing on Lot Nos. 1, 2, and 4. **Based on the testing performed designed systems would likely be required for Lot 1, and the remaining lots would likely be suitable for conventional systems provided shallow bedrock, restrictive clay soils or groundwater are not encountered in the soil treatment areas.** The Septic Suitability Map is presented in Figure 8. A possible house location, water well, and two septic sites for the lots are indicated on Figure 8. Areas that should be avoided by septic systems are indicated on the septic suitability map.

Individual soil testing is required for proposed construction on each lot prior to construction, lot specific OWTS recommendations were not part of this investigation. 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 William Guman & Associates, Ltd., 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/III


Encl.

Entech Job No. 200989
AAprojects/2020/200989 wws

Reviewed by:



Joseph C. Goode
President



William Guman & Associates, Ltd
Wastewater Study
Mountain's Edge Subdivision
McClelland Road & Farmhouse Court
Parcel No. 32000-00-740
El Paso County, Colorado

BIBLIOGRAPHY

1. Kumar & Associates, Inc. November 14, 2008. *Geology and Soils Study, Mountain's Edge Development, El Paso County, Colorado*. Kumar Project No. 082-222.
2. Natural Resource Conservation Service, September 13, 2019. *Web Soil Survey*. United States Department Agriculture, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
3. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado*.
4. Dechesne, Marieke, Reynolds, R.G., Barkman, P.E., and Johnson, K.R., 2011. *Bedrock Geologic Map of the Denver Basin, Between Greeley and Colorado Springs, Colorado*. Plate 1 of 13.
5. Moore, D.W., Straub, A.W., Berry, M.E., Baker, M.L. and Brandt, T.R., 2001. *Surficial Geologic Map of the Denver 1-degree X 2-degree Quadrangle, Colorado*. USGS MF-2347.
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. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO375G

TABLE

Table 1: Summary Tactile Test Pit Results

Test Pit No.	USDA Soil Type	LTAR Value	Depth to Bedrock (ft.)	Depth to Seasonally Occurring Groundwater (ft.)
1	2A	0.50	N/A	N/A
2	3	0.35	N/A	7.5
3	3A*	0.30	3.5*	N/A

*- Conditions that will require an engineered OWTS

FIGURES



ENTECH
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VICINITY MAP
MOUNTAIN'S EDGE SUBDIVISION
McCLELLAND ROAD & FARMHOUSE COURT
EL PASO COUNTY, CO.
FOR: WILLIAM GUMAN & ASSC. LTD

DRAWN:
LLL

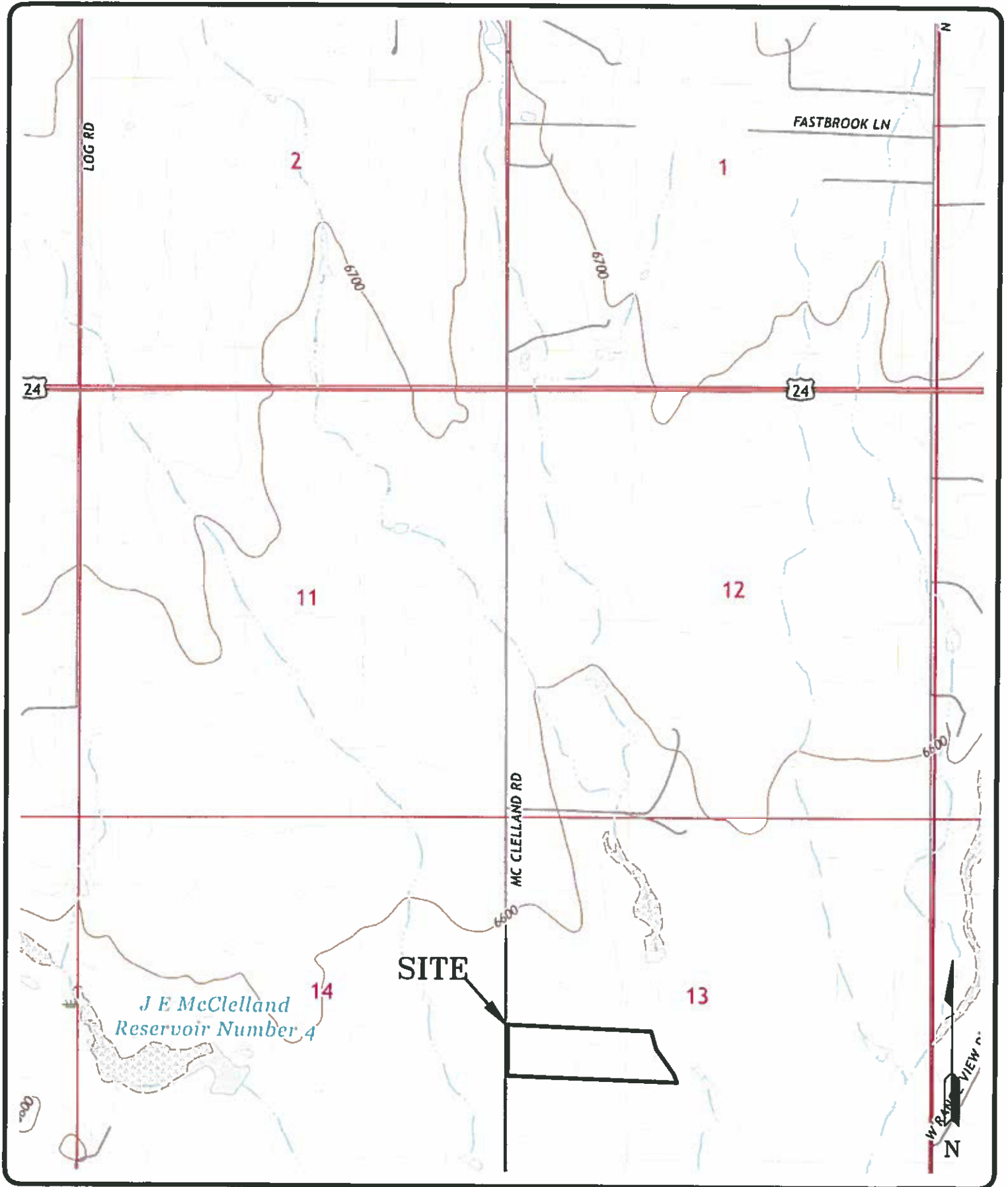
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JOB NO.:
200989

FIG NO.:
1



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USGS MAP
 MOUNTAIN'S EDGE SUBDIVISION
 McCLELLAND ROAD & FARMHOUSE COURT
 EL PASO COUNTY, CO.
 FOR: WILLIAM GUMAN & ASSC. LTD

DRAWN:
 LLL

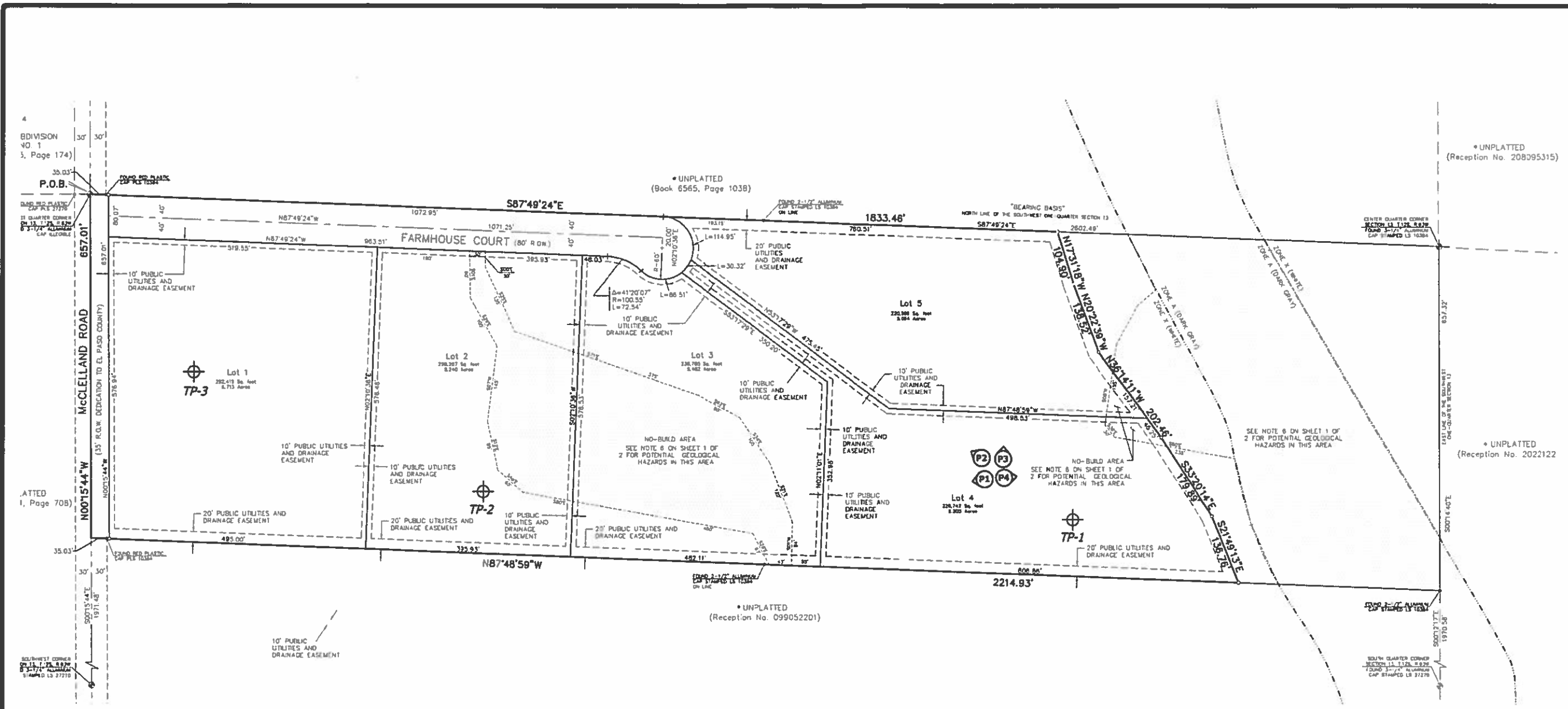
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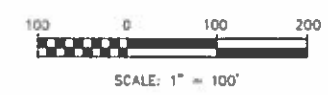
FIG NO.:
 2



LEGEND:

- - Indicates survey monument set with a #4 rebar with Surveyor's Cap, PLS #20681.
- - Indicates recovered survey monument as noted.
- * - Indicates not a part of this subdivision.
- - - - - Indicates FEMA flood hazard delineation line.
- - Indicates NO-BUILD area.

⊕ - approximate test pit location and number
 P1 - approximate photograph location and number



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SITE PLAN/TESTING LOCATION MAP
 MOUNTAIN'S EDGE SUBDIVISION
 McCLELLAND ROAD & FARMHOUSE COURT
 EL PASO COUNTY, CO.
 FOR: WILLIAM GUMAN & ASSC. LTD

DATE	6/1/20
SCALE	AS SHOWN
JOB NO.	200989
FIELD NO.	3



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SOIL SURVEY MAP
 DIDLEAU SUBDIVISION
 HERRING ROAD & FOREST HEIGHTS CIRCLE
 EL PASO COUNTY, CO.
 FOR: LDC, INC.

DRAWN:
 LLL

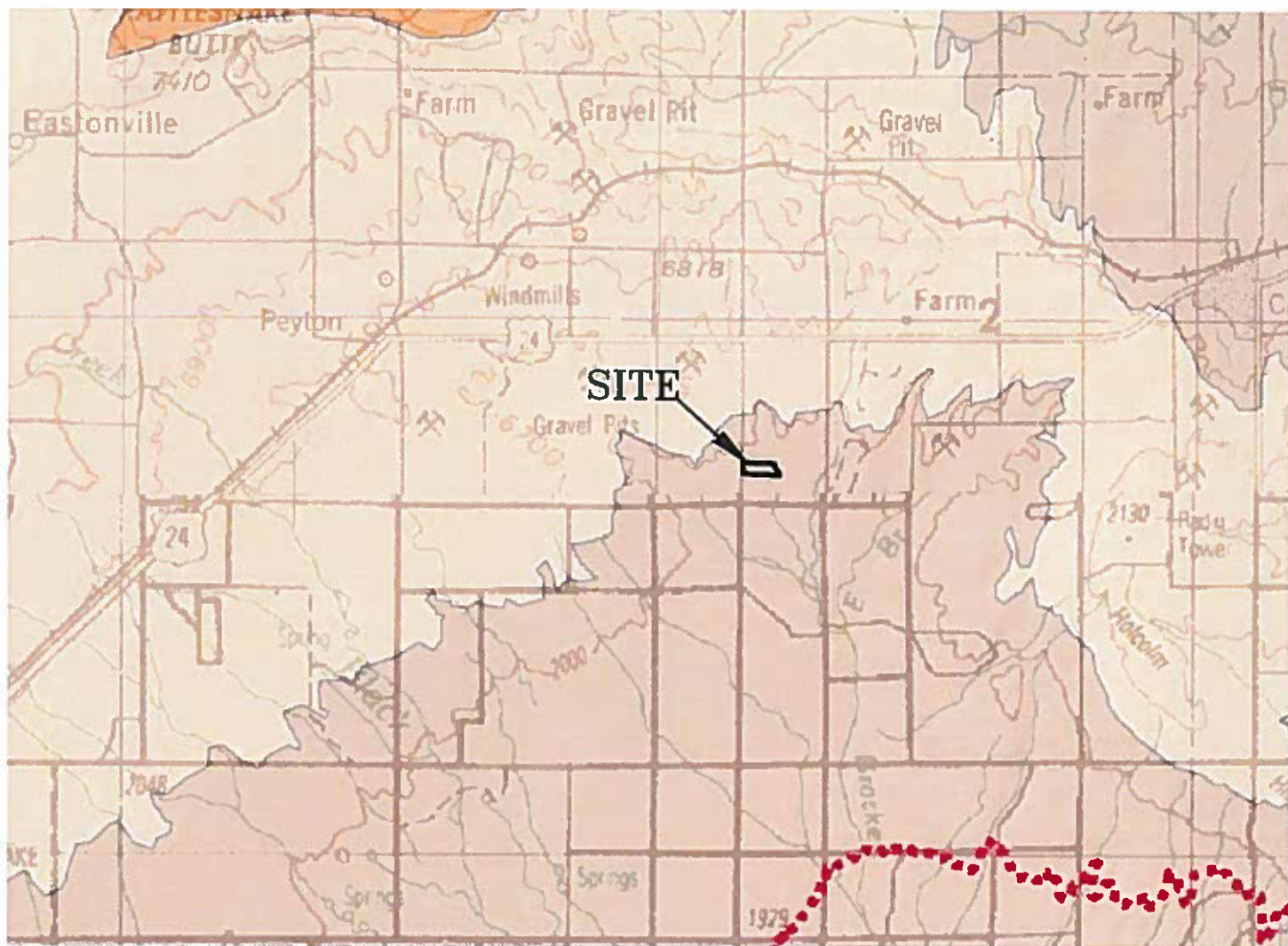
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 192115

FIG NO.:
 4



Explanation of Symbols

Geology

- Core Hole
- ★ K-T Boundary Site
- K-T Boundary

The K-T Boundary was modeled based on field sites and cores discovered and described by various colleagues of the NSF funded-DMNS Denver Basin Project. It is not shown on the western margin where it has not been discovered and structure is more complex.

Faults

Faults near or in the mountains were omitted from this map. For the Boulder - Weld Fault Zone, Twiss (1979) 1:500,000 faults were used.

— Fault

Geologic Units

- Undifferentiated younger Tertiary rocks
- Denver Basin Group D2 Sequence (Eocene)
Also known as Dawson Arkose or Dawson Formation
- Table Mountain Lava Flows (Paleocene)
- Denver Basin Group D1 Sequence (Cretaceous to Paleocene)
Also known as, or including, the Dawson Arkose, Dawson Fm., Denver Fm. or Arapahoe Fm.
- Larame Formation (Cretaceous)
- Fox Hills Sandstone (Cretaceous)
Base is modeled at a depth of 200 ft below the top
- Pierre Shale (Cretaceous)
- Undifferentiated Mesozoic and Paleozoic Rocks
- Undifferentiated Precambrian Crystalline Basement

Subdivisions mapped by J.P. Thorson (in press.)
Denver Formation (TKd), Pikeview Formation (Kpv), Jimmy Camp Formation (TKc), Black Squirrel Formation (TKbs), Dawson Arkose (Tda)



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DENVER BASIN GEOLOGIC MAP
MOUNTAIN'S EDGE SUBDIVISION
MCCLELLAND ROAD & FARMHOUSE COURT
EL PASO COUNTY, CO.
WILLIAM GUMAN & ASSC. LTD

DRAWN:
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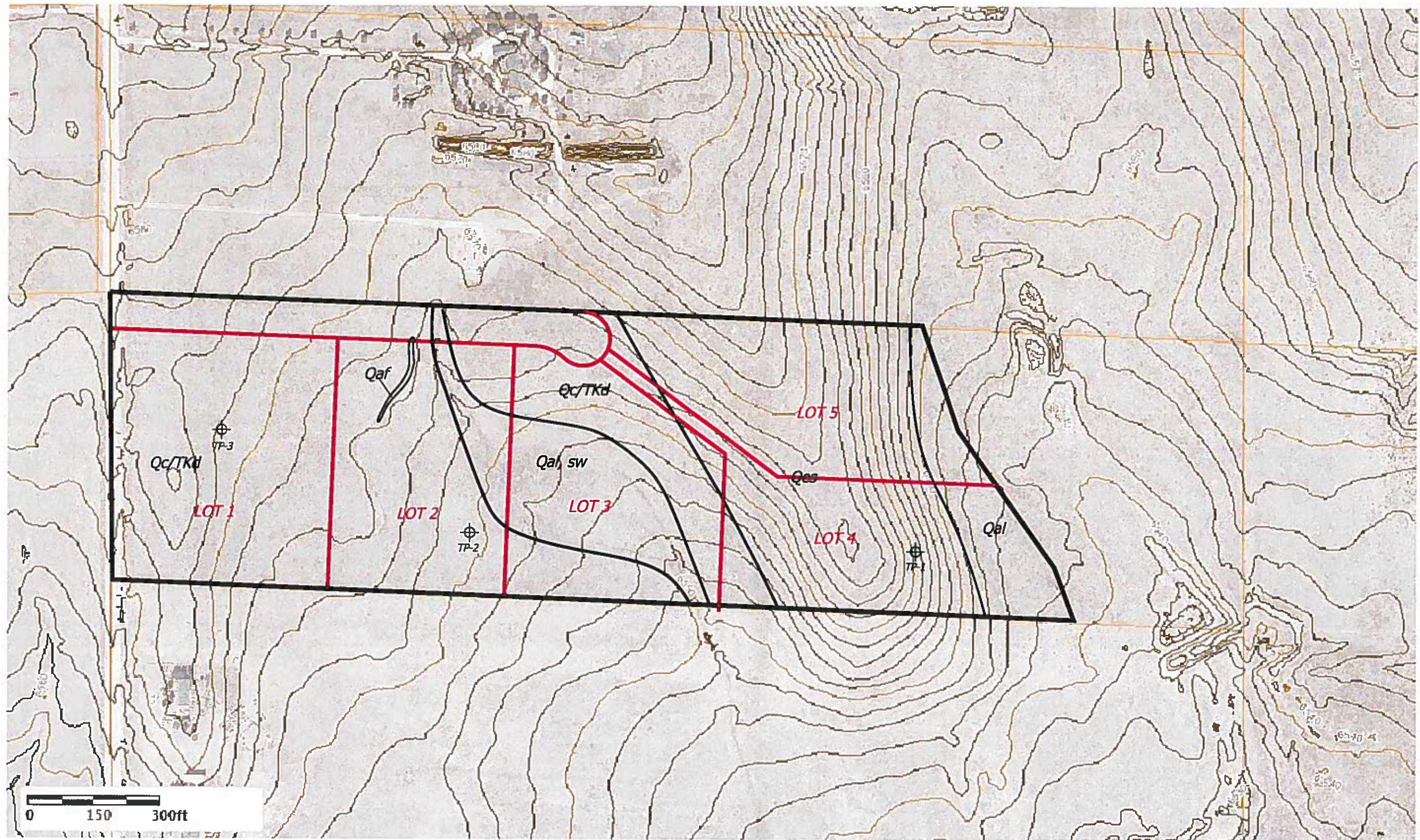
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FIG NO.:
5



- Legend:**
- Qaf - Artificial Fill of Holocene Age: man-made fill deposits
 - Qal - Alluvium of Quaternary Age: water deposited materials
 - Qes - Eolian Sands of Quaternary Age: wind blown sediments
 - QcTKd - Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age: colluvial and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone
 - sw - shallow groundwater area

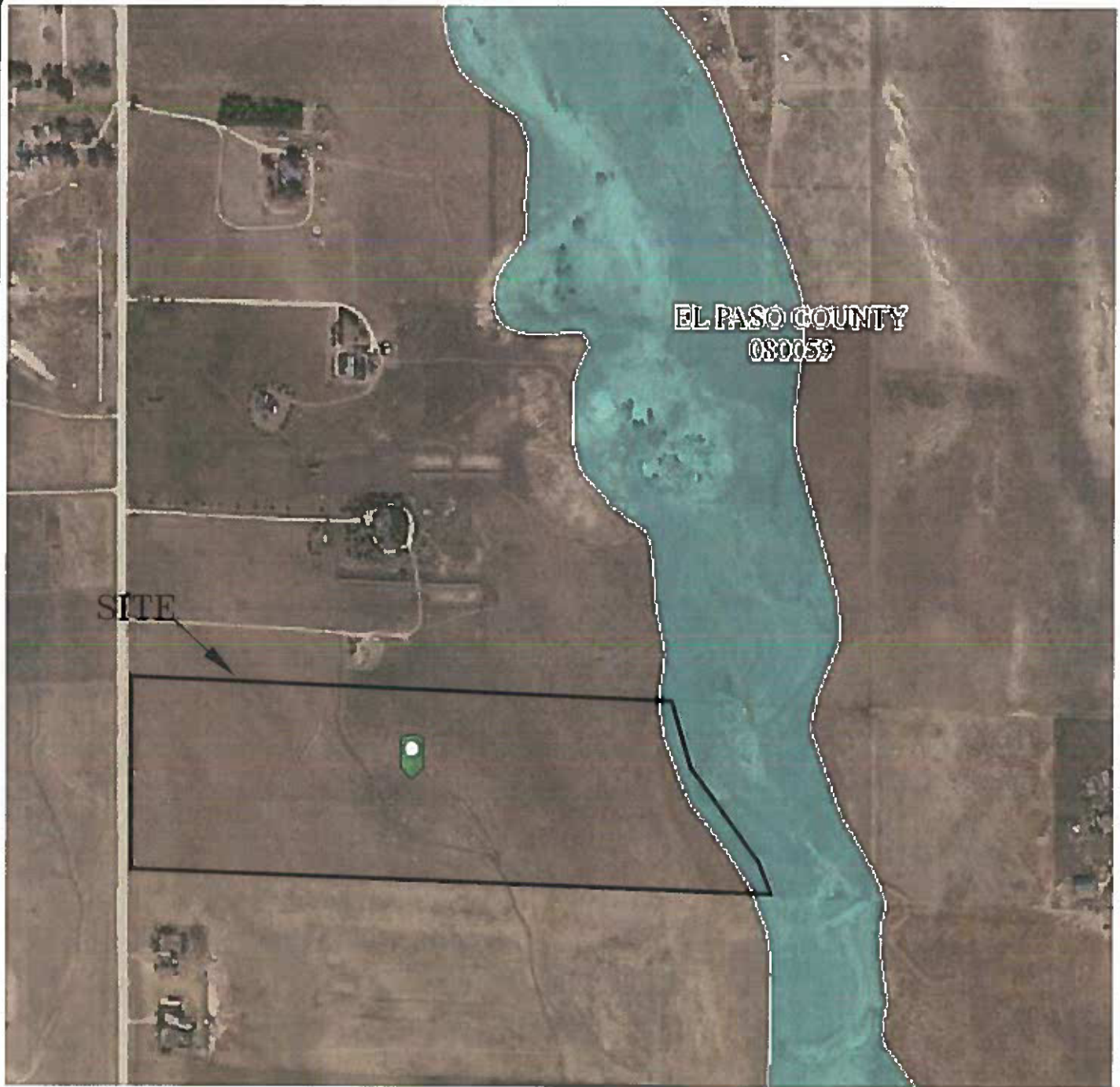
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GEOLOGY MAP
MOUNTAIN'S EDGE SUBDIVISION
McCLELLAND ROAD & FARMHOUSE COURT
EL PASO COUNTY, CO.
WILLIAM GUMAN & ASSC. LTD

DATE
07/1/20
SCALE
AS SHOWN
JOB NO.
200000
FIGURE NO.
6



EL PASO COUNTY
080059

SITE



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FEMA FLOODPLAIN MAP
MOUNTAIN'S EDGE SUBDIVISION
McCLELLAND ROAD & FARMHOUSE COURT
EL PASO COUNTY, CO.
FOR: WILLIAM GUMAN & ASSC. LTD

DRAWN:
LLL

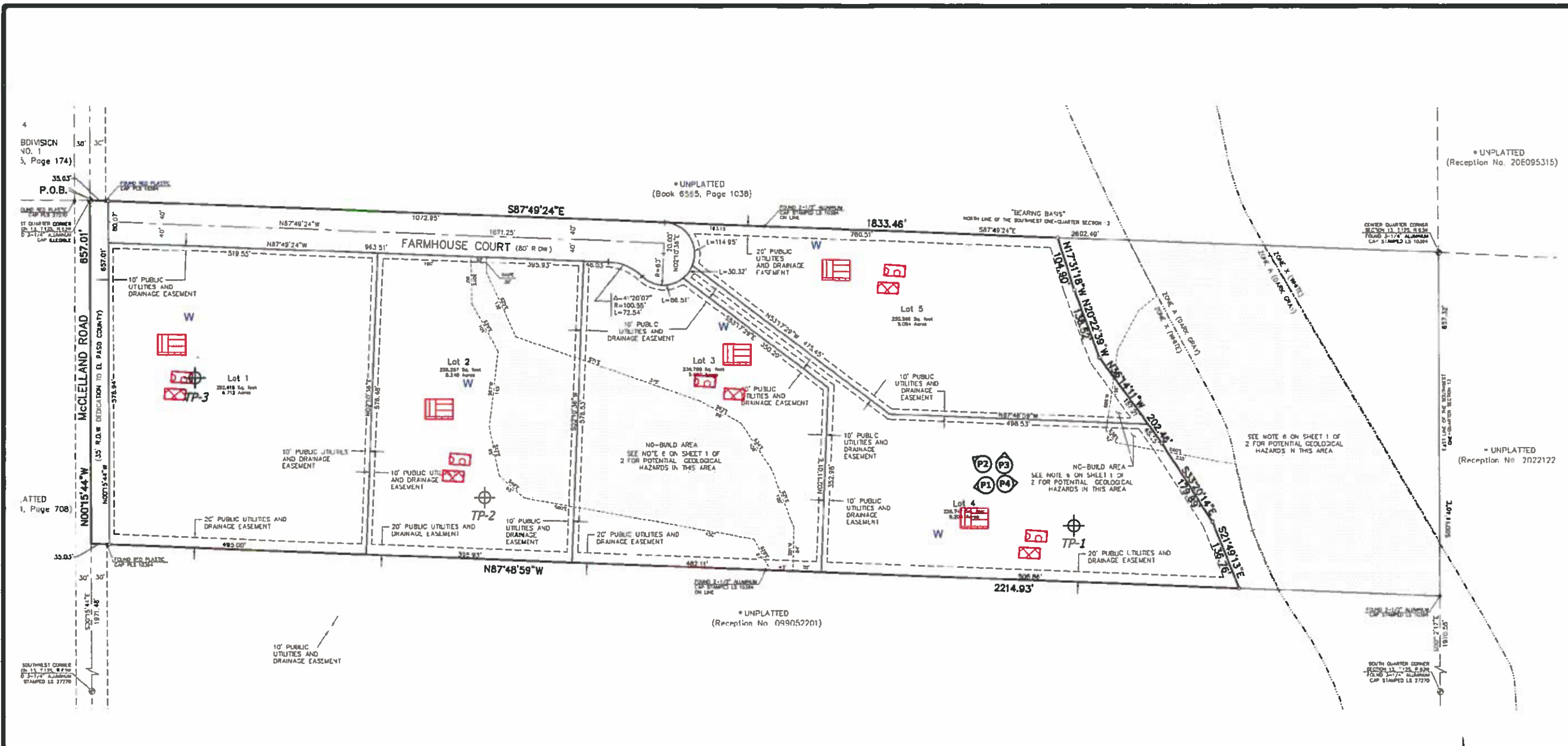
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JOB NO.:
200989

FIG NO.:
7



- LEGEND:**
- POSSIBLE OWTS LOCATIONS
 - POSSIBLE OWTS ALTERNATE LOCATIONS
 - POSSIBLE HOUSE LOCATIONS
 - AREAS WHERE OWTS ARE NOT RECOMMENDED
 - W** - WATER WELLS MUST BE A MINIMUM OF 100 FT FROM OWTS ABSORPTION FIELDS
 - SEASONAL GROUNDWATER AREAS ARE NOT SUITABLE FOR OWTS LOCATIONS

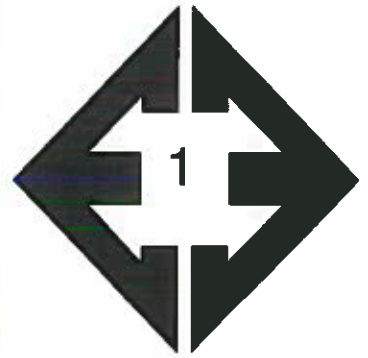
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OWTS SUTABILITY MAP
MOUNTAIN'S EDGE SUBDIVISION
MCCLELLAND ROAD & FARMHOUSE COURT
EL PASO COUNTY, CO.
WILLIAM GUMAN & ASSC. LTD

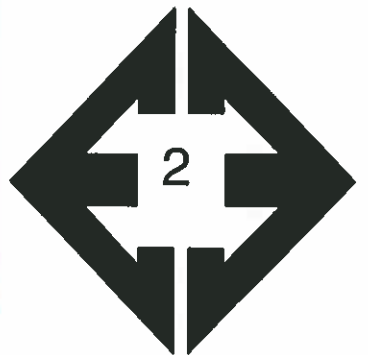
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FIGURE NO.	
	C

APPENDIX A: Photographs



**Looking west from the
central portion of Lot
4.**

May 19, 2020



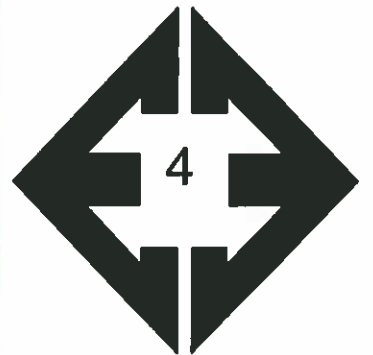
**Looking northwest
from the central
portion of Lot 4.**

May 19, 2020



**Looking north from the
central portion of Lot
4.**

May 19, 2020



**Looking east towards
drainage from the
eastern portion of the
site.**

May 19, 2020

APPENDIX B: Test Pit Logs

TEST PIT NO. 1
 DATE EXCAVATED 5/19/2020
 Job # 200989

TEST PIT NO. 2
 DATE EXCAVATED 5/19/2020
 CLIENT WILLIAM GUMAN & ASSC. LTD
 LOCATION McCLELLAND ROAD

REMARKS					REMARKS						
Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
1	*		gr	l	2A	1	*		gr	m	3
2						2					
3						3					
4			sg		1	4			gr	w	2A
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					

topsoil, sandy loam, brown

sandy loam, fine to coarse grained, tan

sand, fine to coarse grained, tan

topsoil, sandy clay loam, brown

gravelly, sandy clay loam, fine to coarse grained, light brown

gravelly sandy loam, fine to coarse grained, tan

*-signs of seasonally occurring groundwater at 7.5'

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:	DATE:	CHECKED:	DATE:
		LLL	6/1/20

JOB NO.:

200989

FIG NO.:

B-1

TEST PIT NO. 3
 DATE EXCAVATED 5/19/2020
 Job # 200989

CLIENT LOCATION
 WILLIAM GUMAN & ASSC. LTD
 McCLELLAND 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
topsoil, sandy clay loam, brown	1	*						1					
gravelly, sandy loam, fine to coarse grained, light brown	2			gr	w	2A		2					
	3							3					
weathered to formational silty sandstone, fine to coarse grained, light brown	4			ma		3A		4					
	5							5					
	6							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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 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

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DATE:
 6/1/20

JOB NO.:

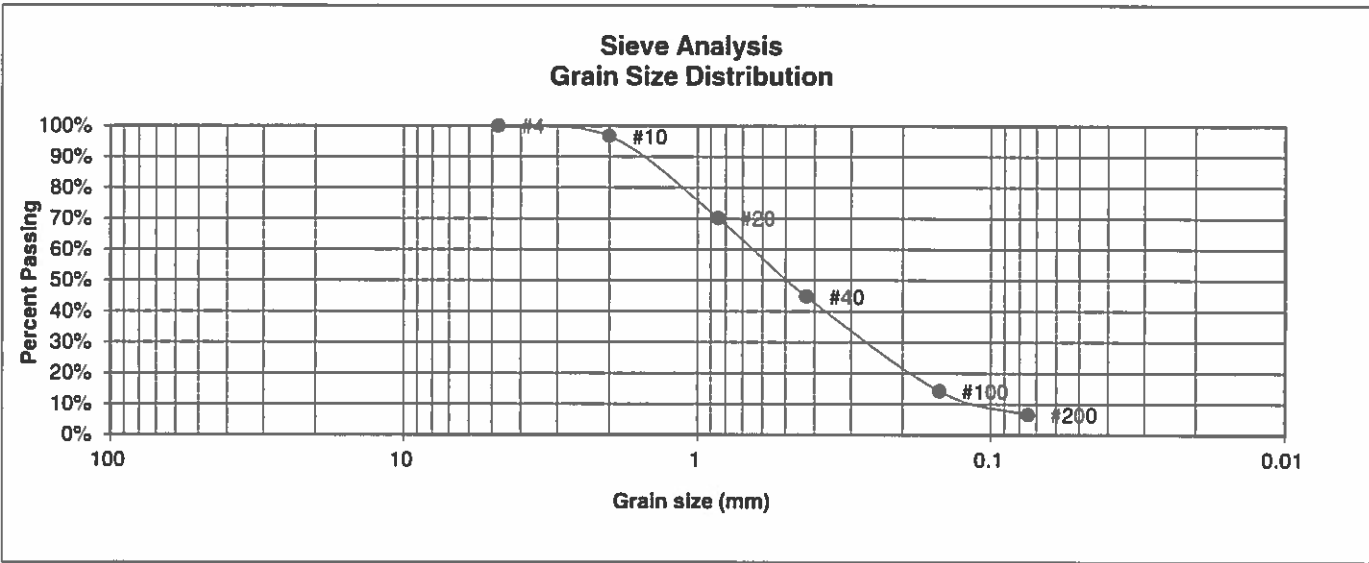
200989

FIG NO.:

B-2

APPENDIX C: Laboratory Test Results

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	SM-SP	<u>TEST BY</u>	BL
DEPTH(ft)	2-3	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	96.7%
20	70.1%
40	44.8%
100	14.2%
200	6.6%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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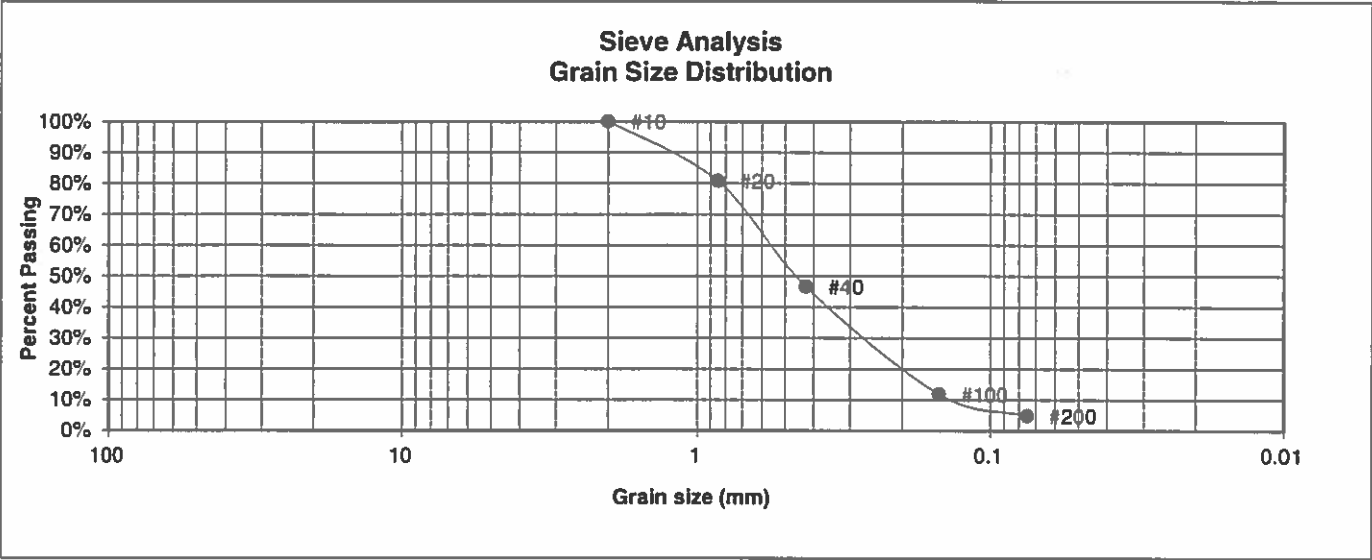
**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED: <i>LL</i>	DATE: <i>6/1/70</i>
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JOB NO.:
200989

FIG NO.:
C-1

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	SP	<u>TEST BY</u>	BL
DEPTH(ft)	6-8	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



<u>U.S. Sieve #</u>	<u>Percent Finer</u>	<u>Atterberg Limits</u>
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4		<u>Swell</u>
10	100.0%	Moisture at start
20	80.8%	Moisture at finish
40	46.7%	Moisture increase
100	11.9%	Initial dry density (pcf)
200	4.9%	Swell (psf)



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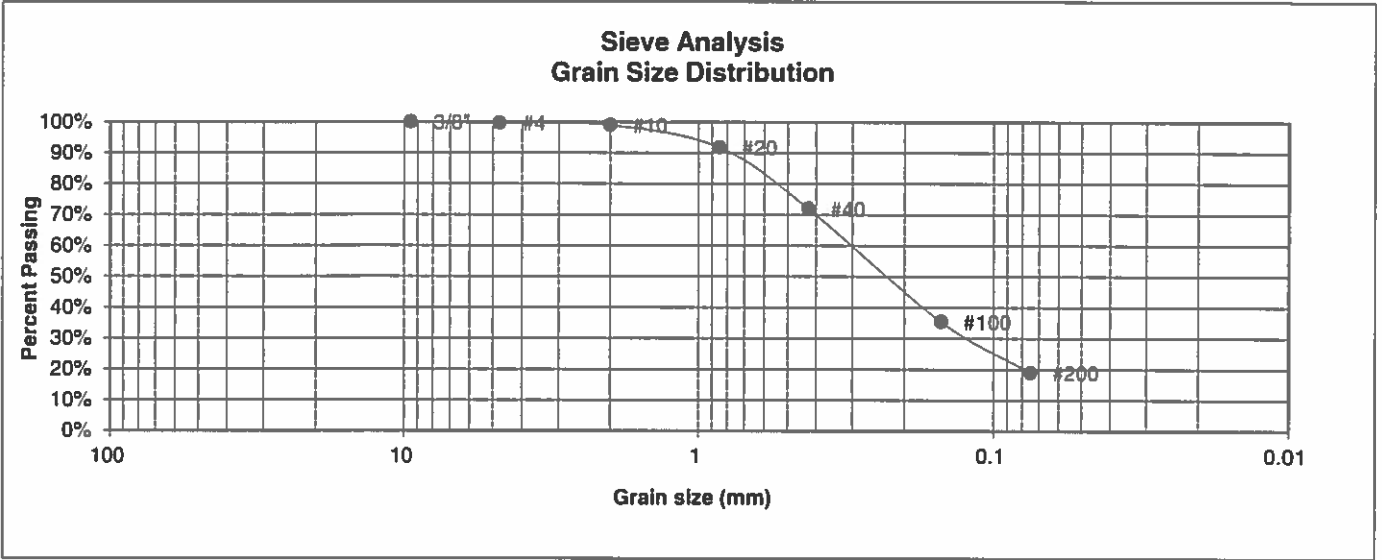
LABORATORY TEST RESULTS

DRAWN:	DATE	CHECKED: L L L	DATE: 6/1/20
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JOB NO.:
200989

FIG NO.:
C-2

BORING NO.	TP-2	UNIFIED CLASSIFICATION	SC	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	98.9%
20	91.8%
40	71.9%
100	35.4%
200	19.0%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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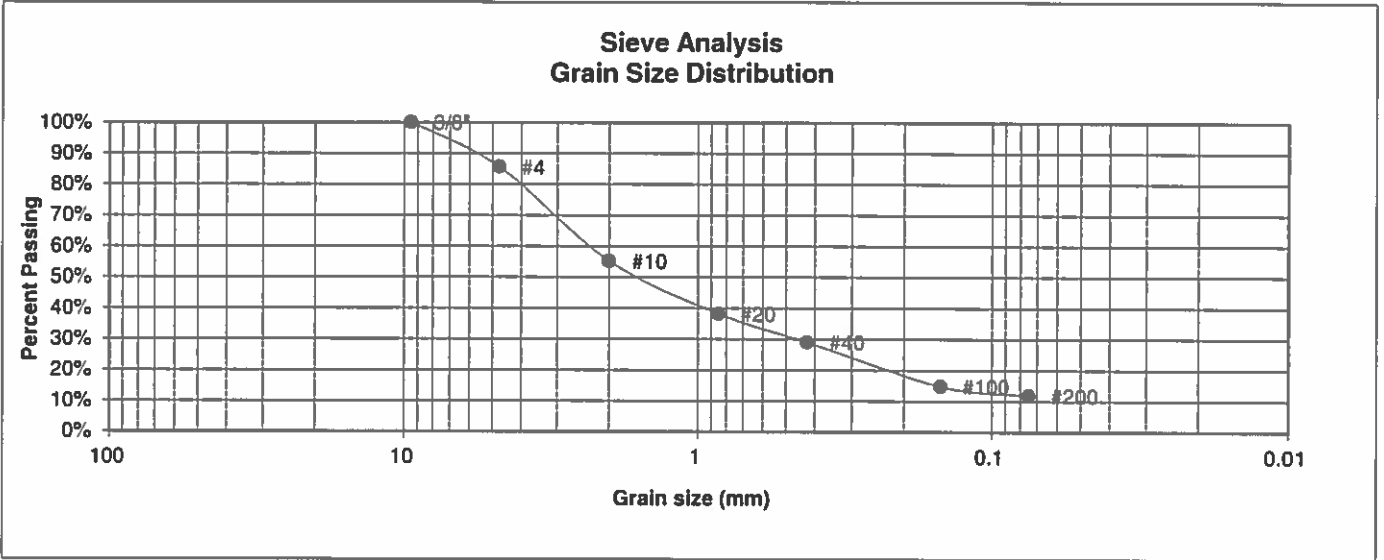
**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/1/20

JOB NO.:
200989

FIG NO.:
C-3

BORING NO.	TP-2	<u>UNIFIED CLASSIFICATION</u>	SM-SW	<u>TEST BY</u>	BL
DEPTH(ft)	5-7	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	85.6%
10	55.2%
20	38.2%
40	29.0%
100	14.8%
200	11.8%

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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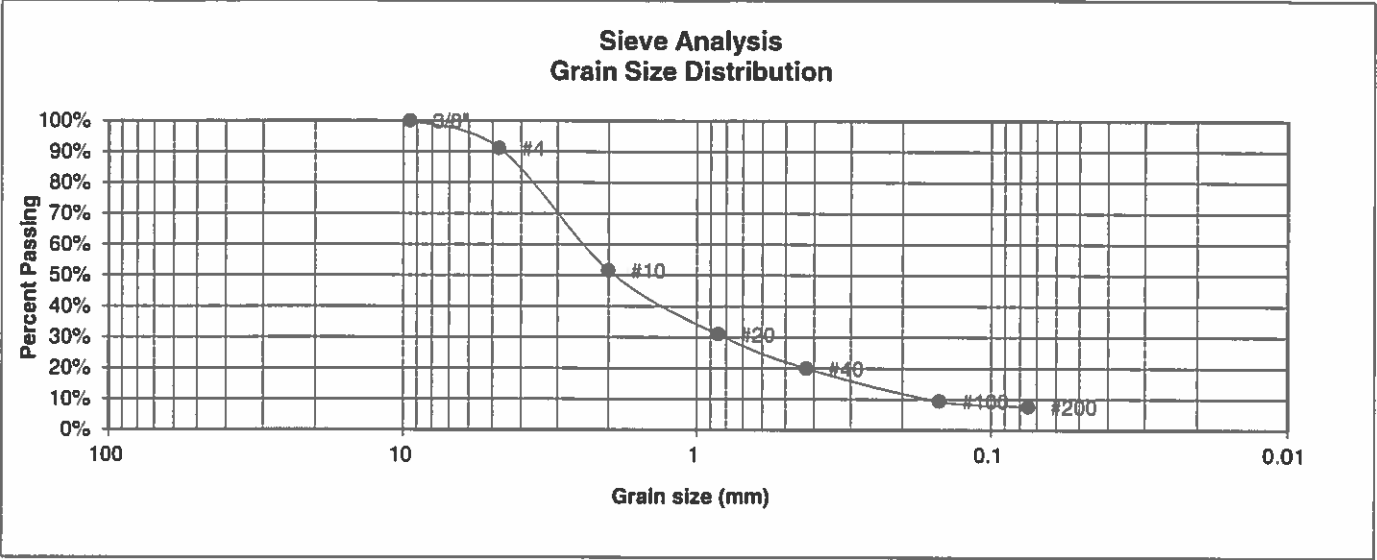
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/1/20

JOB NO.:
200989

FIG NO.:
C-4

BORING NO.	TP-3	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.1%
10	51.6%
20	31.0%
40	19.9%
100	9.4%
200	7.6%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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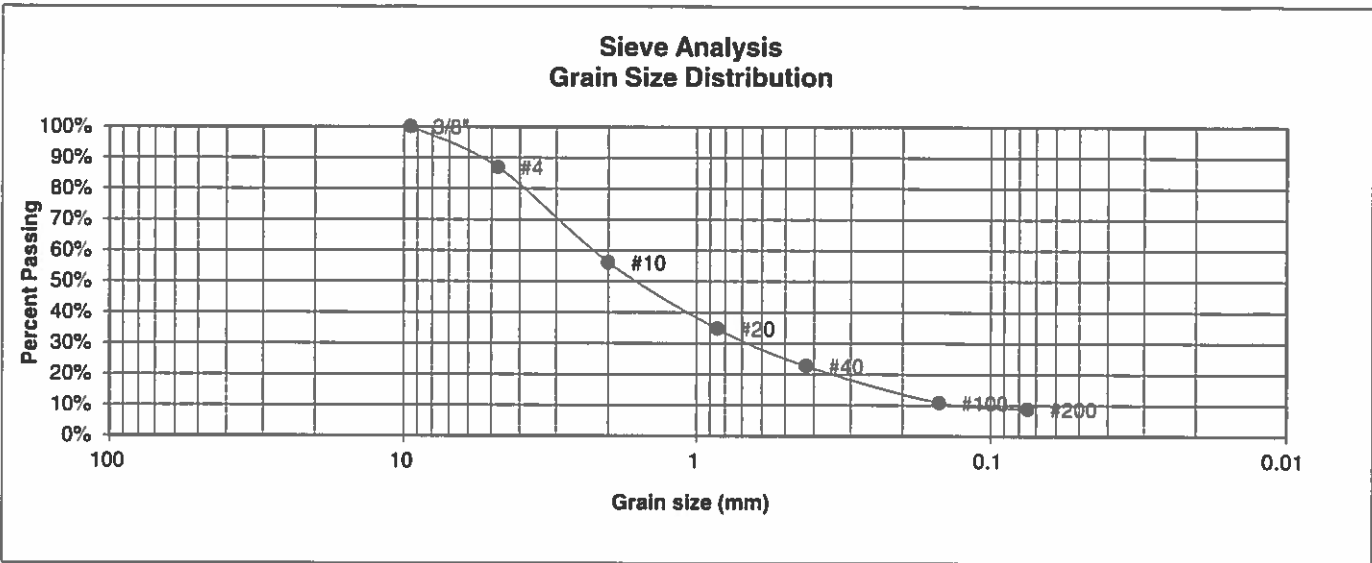
**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 6/1/20
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JOB NO.:
200989

FIG NO.:
C-5

BORING NO.	TP-3	<u>UNIFIED CLASSIFICATION</u>	SM-SW	<u>TEST BY</u>	BL
DEPTH(ft)	5-6	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	200989
CLIENT	WILLIAM GUMAN				
PROJECT	McCLELLAND ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	86.9%
10	56.1%
20	34.7%
40	22.7%
100	10.8%
200	8.8%

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**

DRAWN:	DATE:	CHECKED: <i>LLL</i>	DATE: <i>6/1/20</i>
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JOB NO.:
200989

FIG NO.:
C-6

APPENDIX D: Soil Survey Map & Descriptions

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 17, Sep 13, 2019

El Paso County Area, Colorado

10—Blendon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3671
Elevation: 6,000 to 6,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blendon and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blendon

Setting

Landform: Terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 10 inches: sandy loam
Bw - 10 to 36 inches: sandy loam
C - 36 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat):
Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Available water storage in profile: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 17, Sep 13, 2019

El Paso County Area, Colorado

96—Truckton sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 36bf

Elevation: 6,000 to 7,000 feet

Mean annual precipitation: 14 to 15 inches

Mean annual air temperature: 46 to 50 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Prime farmland if irrigated and the product of
I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Truckton and similar soils: 95 percent

Minor components: 5 percent

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

Description of Truckton

Setting

Landform: Flats

Landform position (three-dimensional): Talf

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 8 inches: sandy loam

Bt - 8 to 24 inches: sandy loam

C - 24 to 60 inches: coarse sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Very low

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

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Ecological site: Sandy Foothill (R049BY210CO)

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 17, Sep 13, 2019

El Paso County Area, Colorado

97—Truckton sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2x0j2
Elevation: 5,300 to 6,850 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 85 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Truckton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Re-worked alluvium derived from arkose

Typical profile

A - 0 to 4 inches: sandy loam
Bt1 - 4 to 12 inches: sandy loam
Bt2 - 12 to 19 inches: sandy loam
C - 19 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High
(2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline (0.1 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A

Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Blakeland

Percent of map unit: 8 percent
Landform: Interfluves, hillslopes
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Bresser

Percent of map unit: 7 percent
Landform: Interfluves, low hills
Landform position (two-dimensional): Foothill, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019