ENTECH
ENGINEERING, INC.

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

October 14, 2021

MVE, Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909

Attn: Chuck Crum

Re: Soil, Geology and Geologic Hazard Evaluation
Viewpoint Estates Filing No. 2
Highway 94 & Antelope Drive
Tax Schedule Nos. 34100-10-001 & 34100-09-001
El Paso County, Colorado

Dear Mr. Crum:

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION:

The site is located in the southern portion of Section 10, Township 14 South, Range 63 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 13 miles east of Colorado Springs, Colorado, east of Peyton Highway and Highway 95 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 to the south-southeast. Two minor drainage swales are located on portions of Lots 2 and 3, and Lots 6 and 7 within the designated drainage easement. The drainage swales flow in a southerly direction. 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, yucca and cacti. Site photographs, taken August 28, 2021, are included in Appendix A.

Total acreage involved in the proposed subdivision is 24.33-acres. Seven residential lots are proposed as part of the replat. The proposed lot sizes range from 2.5 to 4.7-acres. The lots will be serviced by individual on-site wastewater treatment systems and municipal water. The Site Plan is presented in Figure 3.

LAND USE AND ENGINEERING GEOLOGY:

This site was found to be suitable for the proposed development, which will consist of residential lots and associated site improvements. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of hydrocompactive soils, and potentially seasonal shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impacts 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.

SCOPE OF THE REPORT:

The scope of the report includes:

A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information with respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

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) (Reference 2), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site (Reference 3). The position of mappable units within the subject site are shown on the Geologic Map Figure, 6. Our mapping procedures involved both field reconnaissance and measurements, and aerial photo reconnaissance and interpretation. The field mapping was performed by personnel of Entech Engineering, Inc. on August 28, 2021.

Two test borings were drilled and four test pits were excavated on the site to determine general suitability of the soil characteristics for residential construction and on-site wastewater treatment systems. The locations of the test pits are indicated on the Site Plan/Test Boring Location Map, Figure 3. The Test Boring and Test Pit Logs are presented in Appendix B, and Laboratory Testing results 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 3) has mapped two soil types on the site. Complete descriptions of the soils are presented in Appendix D. In general, the soils consist of loamy sand and sandy loam. The soils are described as follows:

Type	Description
8	Blakeland Loamy Sand, 1 – 9% Slopes
96	Truckton Sandy Loam, 0 – 3% Slopes

The soils have been described to have moderate to rapid permeabilities. The soils are described as well suited for use as home sites. 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

One soil type and one bedrock type were encountered in the test borings and test pits on the site. Type 1: silty sand (SM), and Type 2: silty sandstone. Bedrock was encountered at 14 feet in Test Boring No. 1. Bedrock was not encountered in Test Boring No. 2 or the test pits. Each soil and bedrock type were classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

Soil Type 1 classified as silty sand (SM). The sand was encountered in all of the test borings and test pits at the existing ground surface extending to 14 feet bgs in Test Boring No. 1 and to the termination of Test Boring No. 2 (20 feet), and the test pits (8 feet). Standard Penetration Testing on the sand resulted in N-values of 12 to greater than 50 bpf indicating medium dense to dense states. The majority of the sands were encountered at medium dense states. Water content and grain size testing resulted in approximately 2 to 6 percent water content with 9 to 34 percent of the soil size particles passing the No. 200 sieve.

Soil Type 2 classified as silty sandstone (SM). The silty sandstone was encountered in Test Boring No. 1 at a depth of 14 feet and extended to termination of the test boring (20 feet bgs). Standard Penetration Testing on the silty sandstone resulted in an N-values of greater than 50 bpf indicating very dense states. Water content and grain size testing resulted in 5 to 8 percent water content and approximately 15 percent of the soil size particles passing the No. 200 sieve.

Soils encountered in the test pits excavated by Entech Engineering, Inc. consisted of sandy loam. Bedrock or signs of groundwater were not encountered in the test pits which were excavated to depths of 8 feet.

Groundwater

Groundwater was not encountered in the test borings, test pits or observed in the drainages at the time of our site investigation. It should be noted that fluctuation in groundwater levels could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas. 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 during construction.

Geology

Approximately 23 miles west of the site is the southern extent of 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). Overlying the Dawson Formation are deposits of man-made fill soils and alluvial deposited sands and clays.

The geology of the site was evaluated using the *Geologic Map of Pueblo 1-degree x 2degrees' quadrangle, South-Central Colorado,* by Scott, G.R., et.al. in 1976, (Reference 4). The Geology Map for the site is presented in Figure 6. One mappable unit was identified on this site which is described as follows:

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.

The soils listed above were mapped from site-specific mapping, the *Geologic map of the Pueblo 1-degree x 2-degrees' quadrangle, south-central Colorado* published by the U.S. Geologic Survey in 1976 (Reference 4). The test borings and 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.

ENGINEERING GEOLOGIC HAZARDS

Mapping has been performed on this site to identify areas where various geologic conditions exist of which developers should be cognizant during the planning, design and construction stages should new construction be proposed. The engineering geologic hazards identified on this site include hydrocompactive soils, and potentially seasonal shallow groundwater areas. These hazards and recommended mitigation techniques are discussed as follows:

Hydrocompaction and Collapsible Soils

Areas in which hydrocompaction have been mapped across the site mapped as Eolian Sands of Quaternary Age (Qes). In areas identified for this hazard classification, however, we anticipate a potential for settlement movements upon saturation of these surficial soils. The low density, uniform grain sized, windblown sand deposits are particularly susceptible to this type of phenomenon. Additionally, loose or collapsible soils may be encountered in other areas on this site.

Mitigation: The potential for settlement movement is directly related to saturation of the soils below the foundation areas. Therefore, good surface and subsurface drainage is extremely critical in these areas in order to minimize the potential for saturation of these soils. The ground surface around all permanent structures should be positively sloped away from the structure to all points, and water must not be allowed to stand or pond anywhere on the site. We recommend that the ground surface within 10 feet of the structures be sloped away with a minimum gradient of five percent. If this is not possible on the upslope side of the structures, then a well-defined swale should be created to intercept the surface water and carry it quickly and safely around and away from the structures. Roof drains should be made to discharge well away from the structures and into areas of positive drainage. Where several structures are involved, the overall drainage design should be such that water directed away from one structure is not directed against an adjacent building. Planting and watering in the immediate vicinity of the structures, as well as general lawn irrigation, should be minimized.

Should loose or collapsible soils be encountered beneath foundations, removal and recompaction of the upper 2 feet with thorough moisture conditioning and recompaction at 95% of Modified Proctor Dry Density, ASTM D-1557 will be necessary. **Specific recommendations should be made after additional investigation of each building site.**

Drainage Areas/Floodplains

Drainage areas located in portions of Lots 2 and 3 and Lots 6 and 7, and located within drainage easements/no-build areas. The drainages flow in a southerly direction, and water was not observed in the drainages at the time of this investigation. Portions of the drainage easement area have been mapped as potentially seasonal shallow groundwater areas. These areas are indicated in the Geology/Engineering Geology Map (Figure 6) and are discussed below. These areas are located within the no-build area and will be avoided. The proposed building areas are not affected by these areas.

The site does not lie within a mapped floodplain zone according to the FEMA Map Nos. 08041CO805G and 08041CO810G dated December 7, 2018 (Figure 7, Reference 6). Finished floor levels must be a minimum of one foot above the floodplain level. Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

Potentially Seasonal Shallow Groundwater Area

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 the drainage easement/no-build area and will be avoided by the proposed development. Construction in any portions of these areas, if required, or immediately adjacent to these areas should follow these precautions.

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. All organic material would be completely removed prior to any fill placement. **Specific drainage studies are beyond the scope of this report.**

RELEVANCE OF GEOLOGIC CONDITIONS TO LAND USE PLANNING:

The proposed development will consist of subdividing the parcels for rural residential lots, and associated site improvements. The existing geologic and engineering geologic conditions will impose constraints on development and construction. The geologic conditions on the site include hydrocompactive soils, and potentially seasonal shallow groundwater areas which can be satisfactorily mitigated through proper engineering design and construction practices, or avoided.

The upper granular soils in the borings drilled on the site were encountered at medium dense states. Loose or collapsible soils, if encountered beneath foundation or floor slabs, will require recompaction. Expansive layers may also be encountered in the soil on this site. Expansive soils, if encountered, will require mitigation/special foundation design. These soils will not prohibit development. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement.

Drainage easements are located on Lots 2 and 3, and Lots 6 and 7. The drainages flow in a southerly direction. Water was not observed in the drainages at the time of this investigation. Portions of the drainage easements have been mapped as potentially seasonal shallow groundwater areas. These areas are indicated in the Geology/Engineering Geology Map (Figure 6). These areas area located within no-build areas and will not affect proposed building areas.

In summary, the granular soils will likely provide suitable support for shallow foundations. The geologic conditions encountered on site can be mitigated with avoidance or proper engineering and construction practices. **Individual investigations for new building sites and septic systems will be required prior to construction.**

EROSION CONTROL

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils and weathered bedrock materials become increasingly less susceptible to water erosion. For the typical soils observed on site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

ECONOMIC MINERAL RESOURCES:

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 6), the area is mapped as upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 6), surrounding areas to the site are mapped as U – Upland Deposits: sand resource and E3 – Eolian Deposits: sand resource. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 7), the area of the site has been mapped as "Good" for industrial minerals. Generally, the Dawson formation does not contain significant industrial mineral resources. The sands associated with the eolian and alluvial deposits may be considered a sand resource. Considering the silty to clayey nature of much of these materials and abundance of similar materials through the region, they would be considered to have little significance as an economic resource.

According to *the Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 7), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "Poor" for coal resources. No active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site (Reference 7).

The site has been mapped as "Fair" for oil and gas resources (Reference 7). No oil or gas fields have been discovered in the area of the site. Two wells were previously drilled in the area to 537 feet in 1924 to an unknown formation, and to 6,514 feet deep to the Jurassic Morrison Formation in 1972. No oil or gas was reported and both wells were plugged. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it would not be considered a significant resource.

CLOSURE:

It should be pointed out that because of the nature of data obtained by random sampling of such variable nonhomogeneous 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. Any new construction considered on this site will require additional investigation. Construction and design personnel should be made familiar with the contents of this report. Specific construction and foundation recommendations will be provided when investigations are completed at each building site prior to new construction.

MVE, Inc.
Soil, Geology and Geologic Hazard Evaluation
Viewpoint Estates Filing No. 2
Highway 94 & Antelope Drive
Tax Schedule Nos. 34100-10-001 & 34100-09-001
El Paso County, Colorado

This report has been prepared for MVE, Inc. for application to the proposed development in accordance with generally accepted geologic, soil and engineering practices. No other warranty expresses or implied is made.

We trust that this report has provided you with all the information that you required. Should you have any questions or require additional information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Reviewed by:

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

COLORADO LICENSED
JOSEPH COLLIN GOODE
23725
10/14/20
PROFESSIONAL ENGINEER

LLL

Encl.

Entech Job No. 212316
AAprojects/2020/212316 sg&ghs

BIBLIOGRAPHY

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2. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*

3. Scott, G.R., Taylor R.B, Epis, R.C., and Wobus, R.A., 1976. Geologic map of the Pueblo 1-degree x 2-degrees' quadrangle, south-central Colorado. USGS, Map MF-775.

4. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado.* Map Numbers 08041CO805G & 08041CO810G.

5. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps.*

6. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties.* Colorado Geological Survey. Special Publication 5-B.

7. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board.* Colorado Geological Survey. Open-File Report 03-07.

TABLE

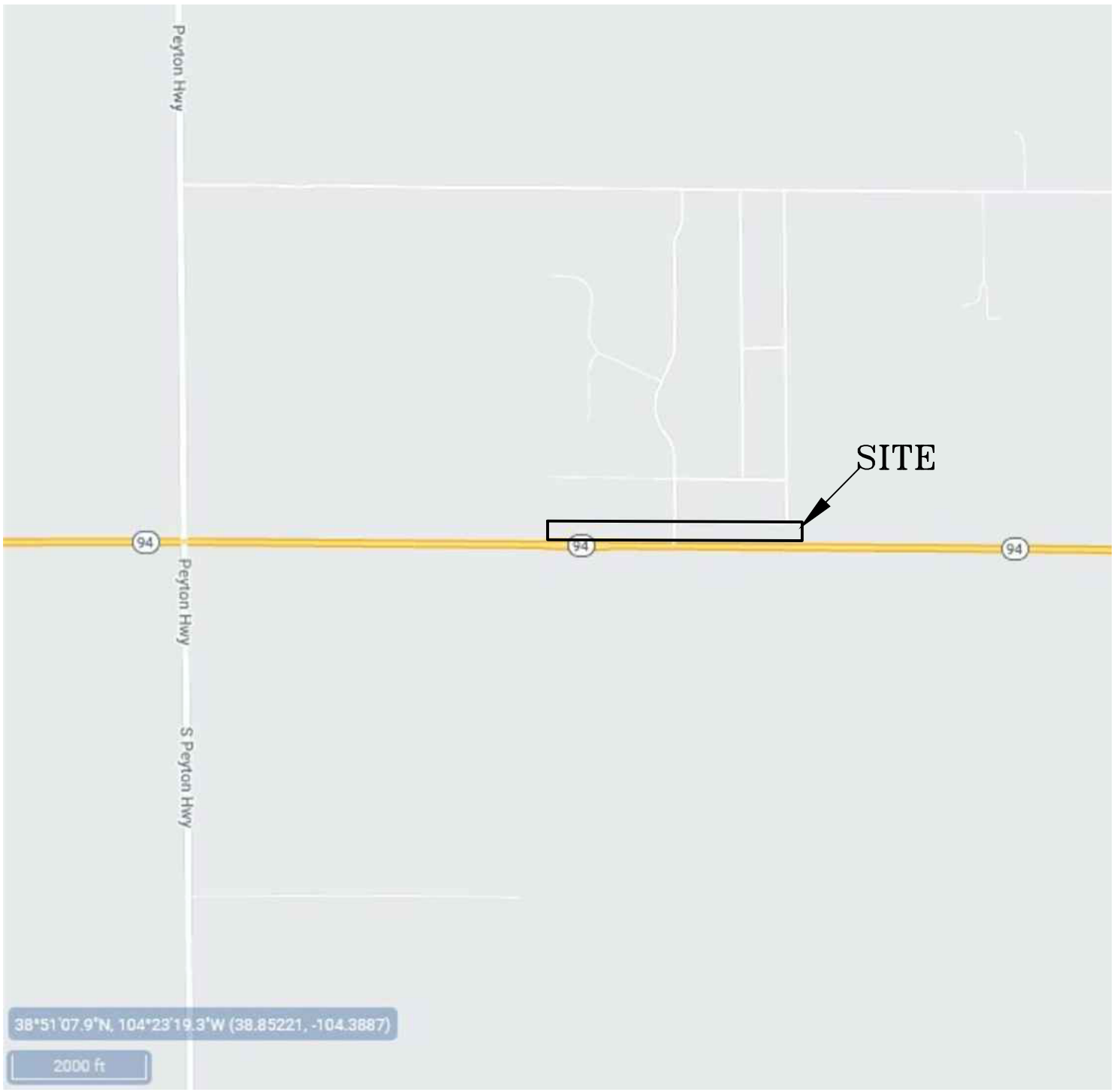
TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT MVE, INC
PROJECT HIGHWAY 94 & ANTELOPE DRIVE
JOB NO. 212316

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			14.7						SM	SAND, SILTY
1	2	5			34.4						SM	SAND, SILTY
2	1	15			12.6						SM	SANDSTONE, SILTY

FIGURES



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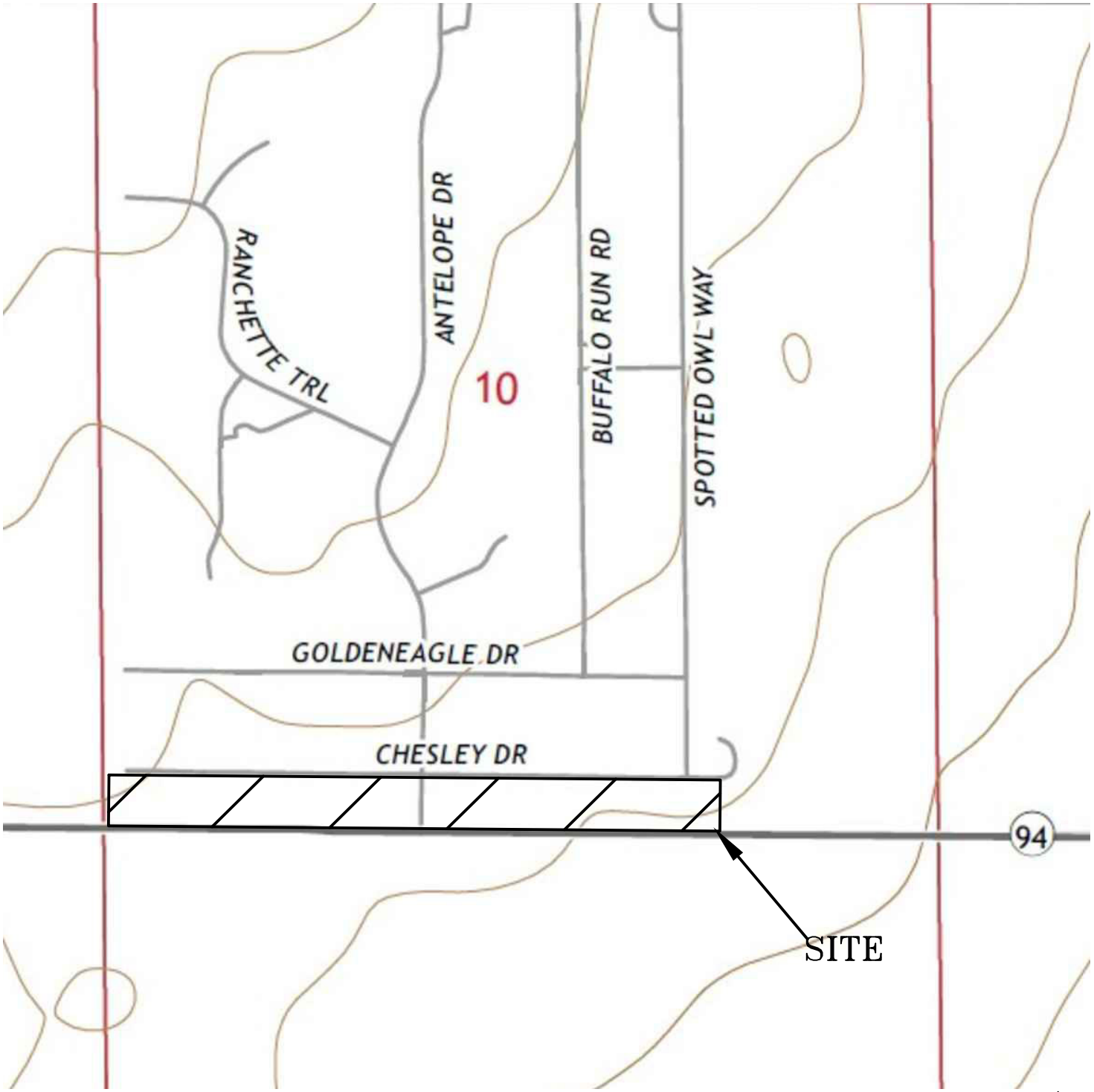
VICINITY MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	9/27/21		

JOB NO.: 212316

FIG NO.: 1



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USGS MAP TOPOGRAPHY MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

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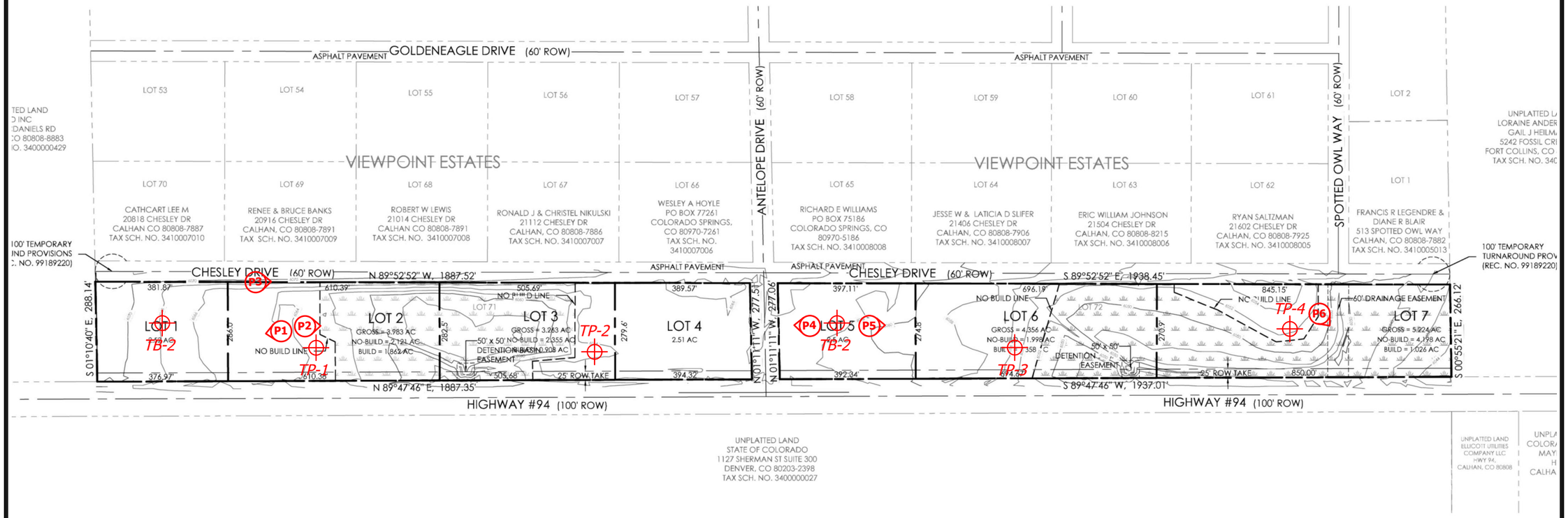
LLL	9/27/21		

JOB NO.: 212316

FIG NO.: 2

PRELIMINARY PLAN
FOR
VIEWPOINT ESTATES FILING NO. 2
PORTION OF SECTION 10, TOWNSHIP 14 SOUTH, RANGE 63 WEST OF THE 6TH PRINCIPAL MERIDIAN
EL PASO COUNTY, COLORADO



PRELIMINARY PLAN

⊕ - APPROXIMATE TEST PIT LOCATION

(P2) - APPROXIMATE PHOTOGRAPH LOCATION AND DIRECTION

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COLORADO SPRINGS, CO. 80907
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SITE PLAN/TESTING LOCATION MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

DRAWN	LLL
CHECKED	
DATE	9/27/21
SCALE	AS SHOWN
JOB NO.	212316
FIGURE No.	3

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SOIL SURVEY MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

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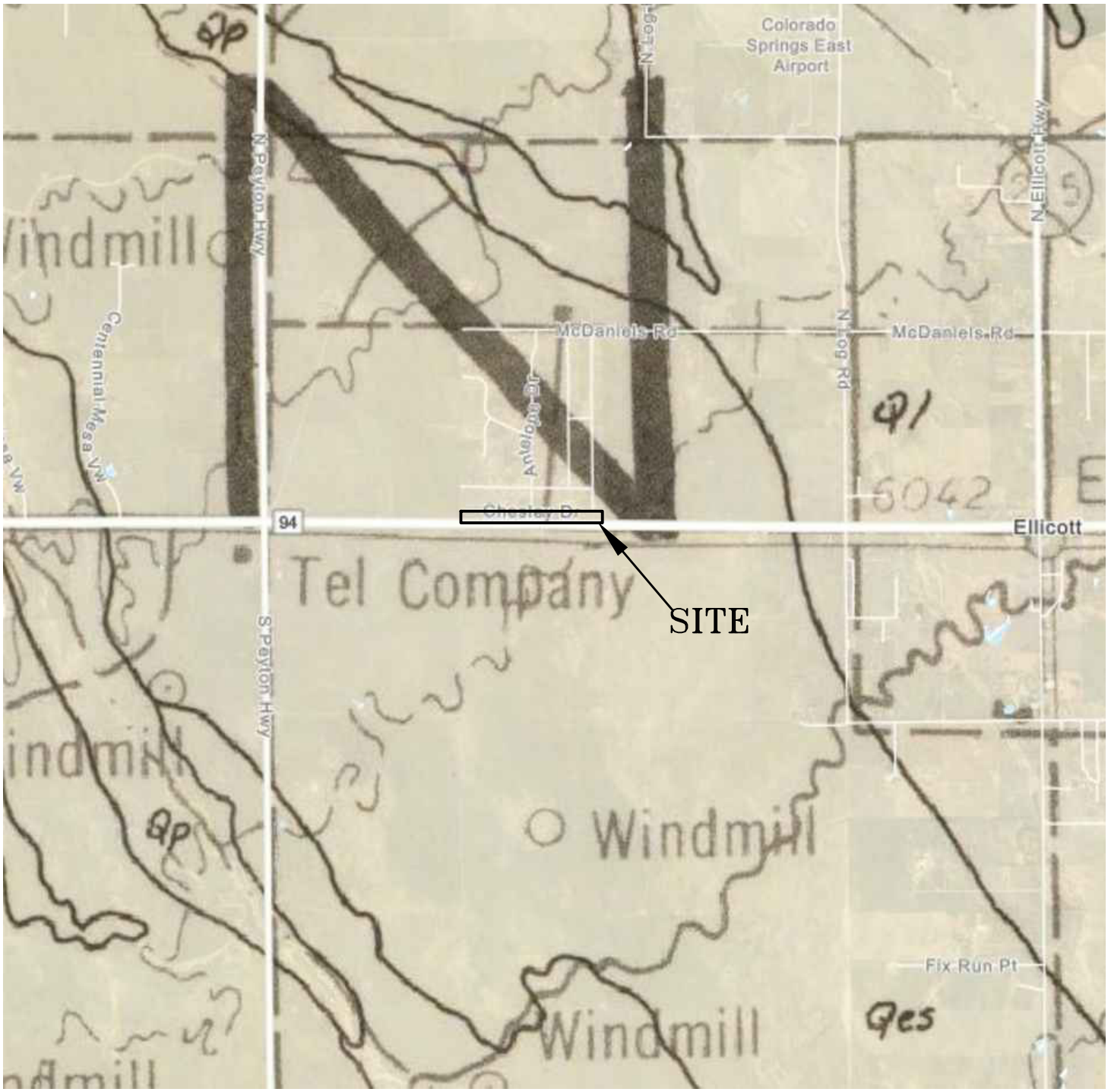
LLL	9/27/21		

JOB NO.: 212316

FIG NO.: 4



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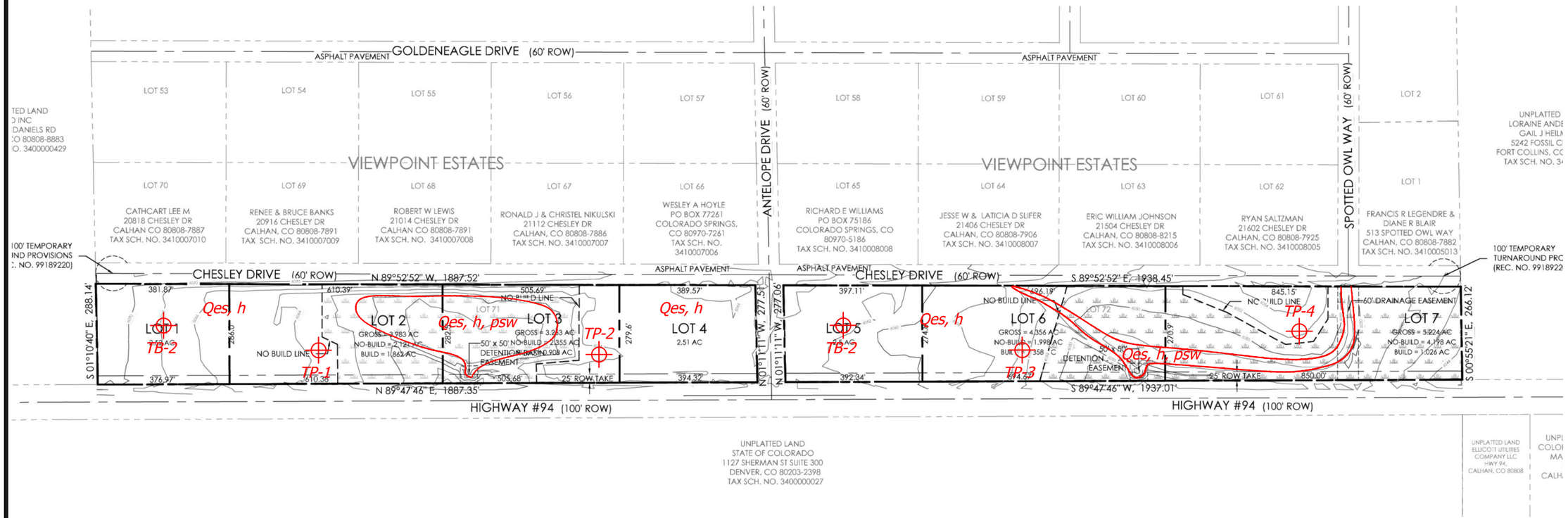
GEOLOGIC MAP OF THE PUEBLO 1° X 2° QUADRANGLE
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	9/27/21		

JOB NO.: 212316

FIG NO.: 5

PRELIMINARY PLAN
FOR
VIEWPOINT ESTATES FILING NO. 2
PORTION OF SECTION 10, TOWNSHIP 14 SOUTH, RANGE 63 WEST OF THE 6TH PRINCIPAL MERIDIAN
EL PASO COUNTY, COLORADO



PRELIMINARY PLAN

Legend:
Qes - Eolian Sands of Quaternary Age: wind blown sediments

psw - potentially seasonally wet
h - hydrocompactive soil

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ENGINEERING GEOLOGY/GEOLOGY MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

DRAWN	LLL
CHECKED	
DATE	9/27/21
SCALE	AS SHOWN
JOB NO.	212316
FIGURE No.	6

N

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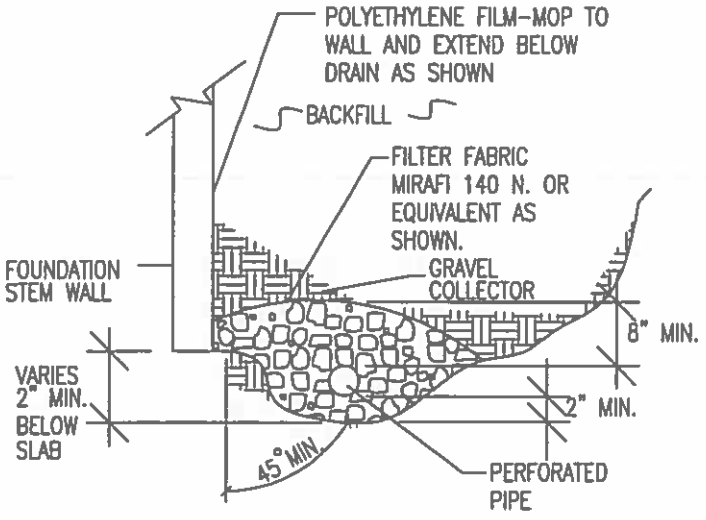
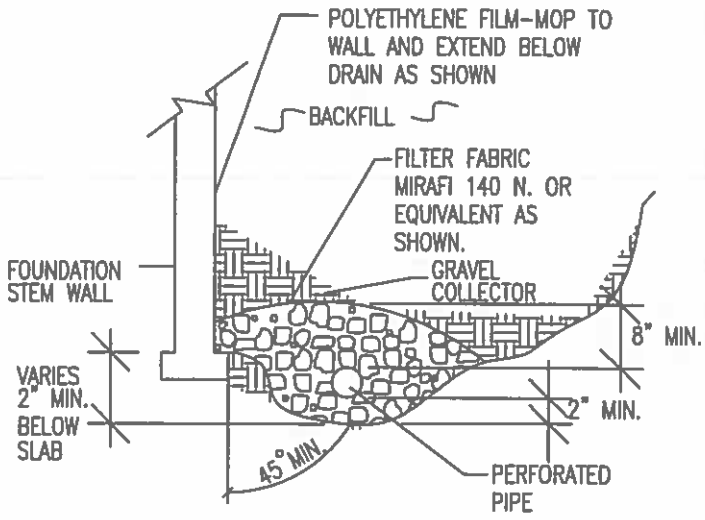
FEMA FLOODPLAIN MAP
VIEWPOINT ESTATES FILING NO. 2
HWY 94 & ANTELOPE DRIVE
EL PASO COUNTY, CO.
FOR: MVE, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	9/27/21		

JOB NO.: 212316

FIG NO.: 7





NOTES:

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

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

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

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

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

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

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COLORADO SPRINGS, CO. 80907 (719) 531-5599

PERIMETER DRAIN DETAIL

DRAWN:	DATE:	DESIGNED:	CHECKED:

JOB NO.: 212316

PIC NO.: 8

APPENDIX A: Site Photographs

1

Looking west from the central portion of Lot 2.

August 28, 2021

2

Looking east from the central portion of Lot 2.

August 28, 2021

Job No. 212316

3

Looking east along Chelsey Drive in the northwestern portion of the site.

August 28, 2021

4

Looking west from the central portion of Lot 5.

August 28, 2021

Job No. 212316

5

Looking east from the central portion of Lot 5.

August 28, 2021

6

Looking southeast towards minor drainage easement in the eastern portion of Lot 7.

August 28, 2021

Job No. 212316

APPENDIX B: Test Boring and Test Pit Logs

TEST BORING NO. 1
DATE DRILLED 9/1/2021
Job # 212316

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 9/1/21						
SAND, SILTY, FINE TO MEDIUM GRAINED, TAN, MEDIUM DENSE, MOIST				16	3.8	1
	5			12	3.8	1
	10			14	6.2	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	15			50/8"	5.2	2
	20			50/6"	7.7	2

TEST BORING NO. 2
DATE DRILLED 9/1/2021
CLIENT MVE, INC
LOCATION HIGHWAY 94 & ANTELOPE DRIVE

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 9/1/21						
SAND, SILTY, FINE TO MEDIUM GRAINED, TAN, MEDIUM DENSE, TO VERY DENSE, DRY				19	2.4	1
	5			24	1.7	1
	10			50/11"	4.4	1
	15			38	2.4	1
	20			37	1.7	1

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COLORADO SPRINGS, COLORADO 80907

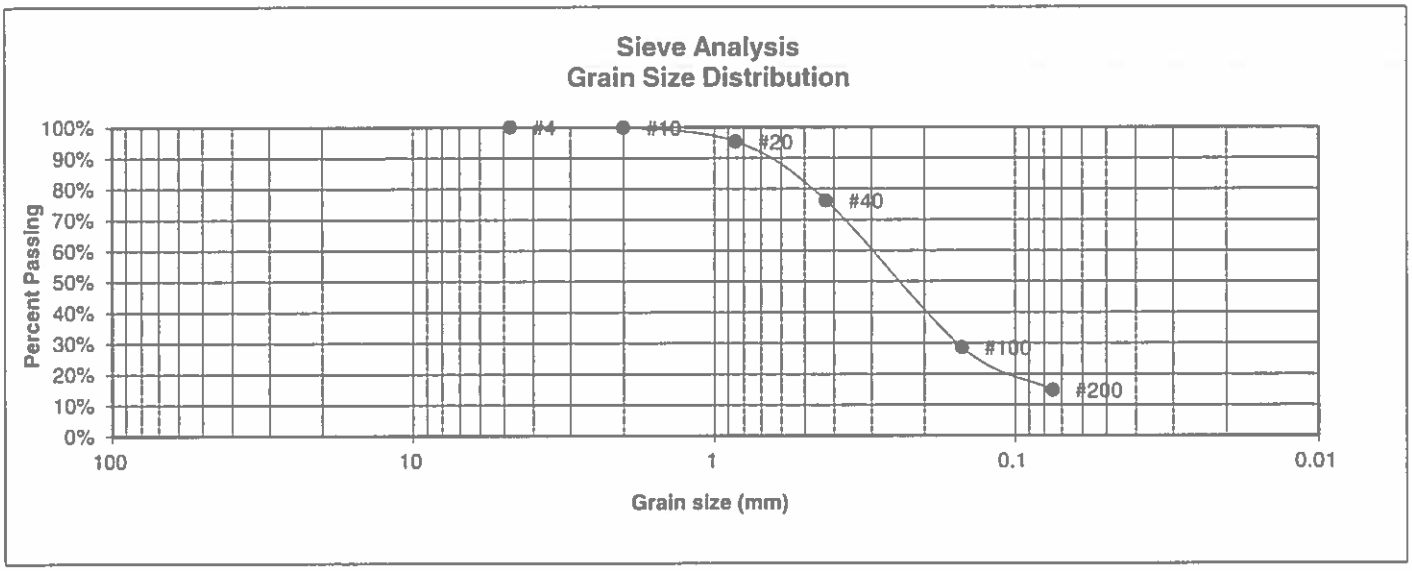
TEST BORING LOG

DRAWN	DATE	CHECKED: LLL	DATE: 9/25/21

JOB NO.: 212316
FIG NO.: A- 1

APPENDIX C: Laboratory Testing Results

UNIFIED CLASSIFICATION	SM	CLIENT	MVE, INC
SOIL TYPE #	1	PROJECT	HIGHWAY 94 & ANTELOPE DRIVE
TEST BORING #	1	JOB NO.	212316
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.8%
20	95.3%
40	76.2%
100	28.5%
200	14.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

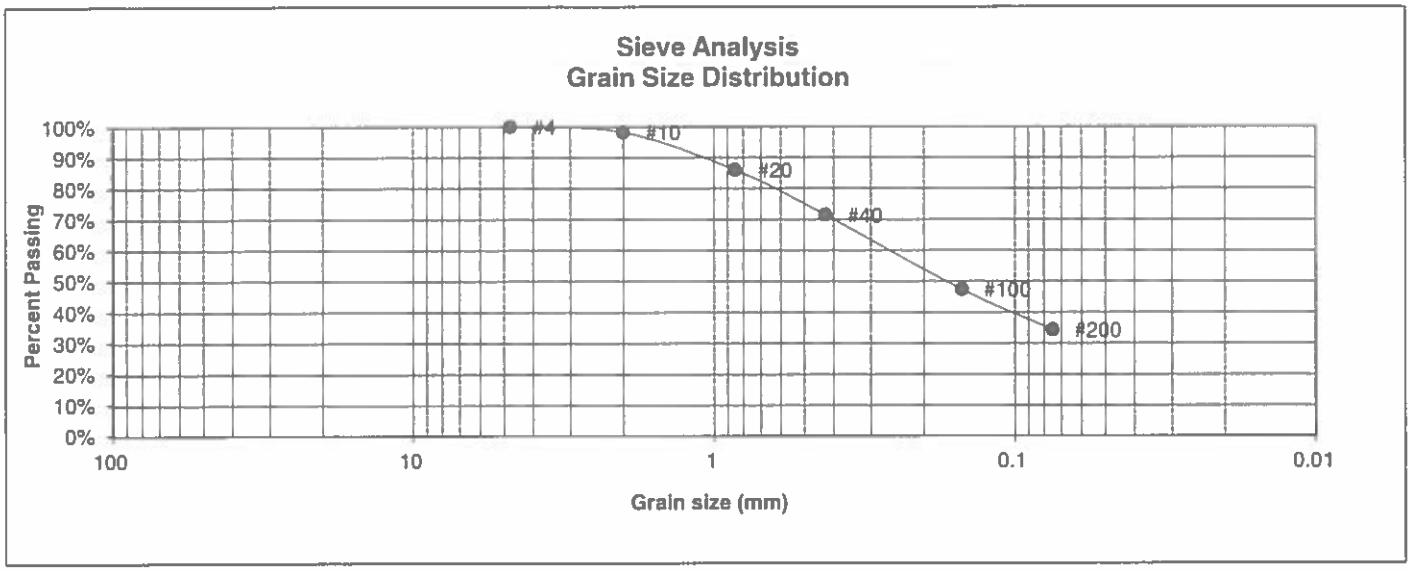
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	9/25/21

JOB NO. 212316

FIG NO. C-1

UNIFIED CLASSIFICATION	SM	CLIENT	MVE, INC
SOIL TYPE #	1	PROJECT	HIGHWAY 94 & ANTELOPE DRIVE
TEST BORING #	2	JOB NO.	212316
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	98.1%
20	86.0%
40	71.4%
100	47.4%
200	34.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

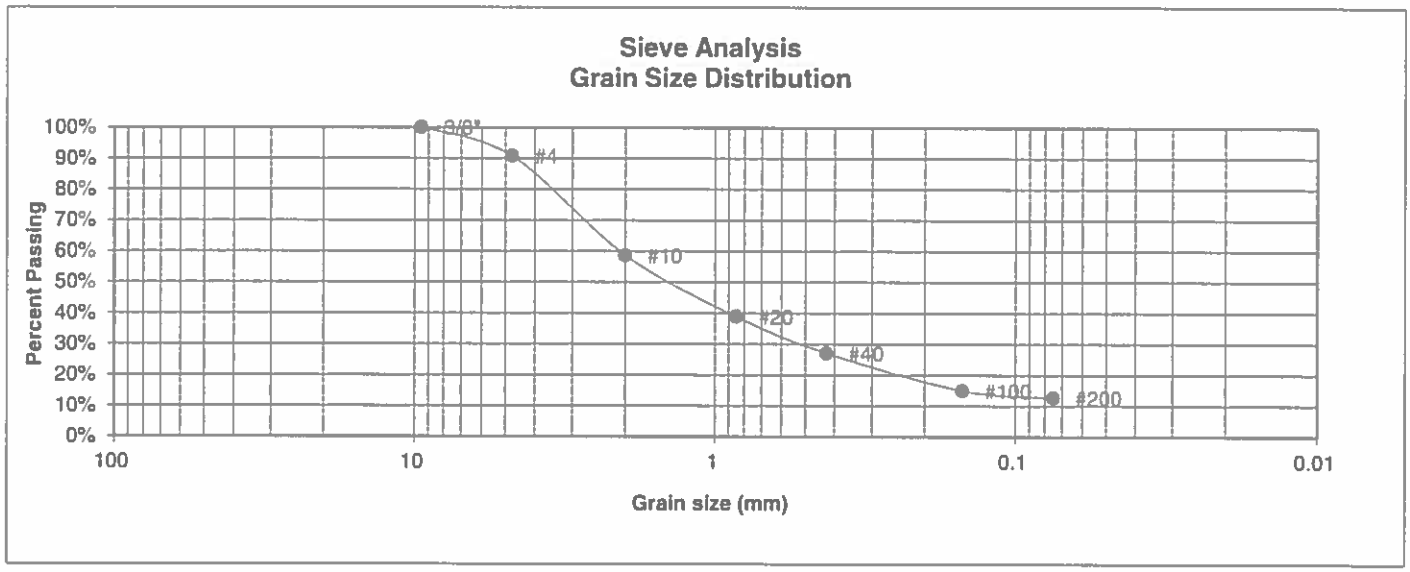
LABORATORY TEST RESULTS

DRAWN:	DATE	CHECKED:	DATE
		LLL	9/25/21

JOB NO. 212316

FIG NO. C-2

UNIFIED CLASSIFICATION	SM	CLIENT	MVE, INC
SOIL TYPE #	2	PROJECT	HIGHWAY 94 & ANTELOPE DRIVE
TEST BORING #	1	JOB NO.	212316
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	90.8%
10	58.7%
20	38.9%
40	27.1%
100	15.0%
200	12.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

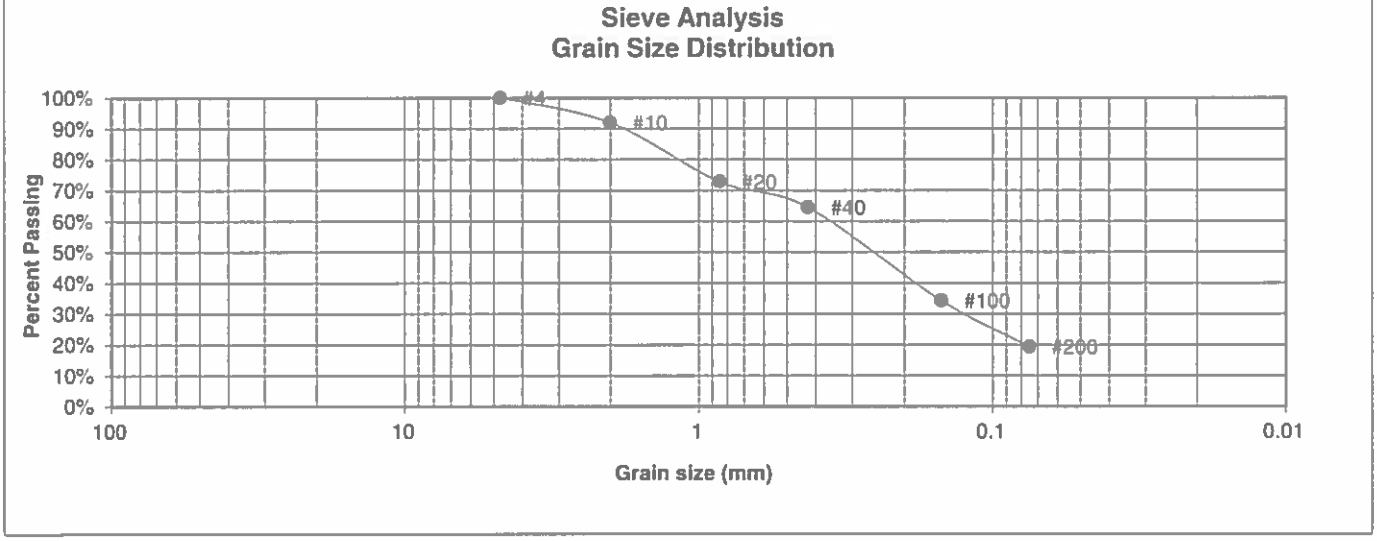
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	9/25/21

JOB NO.: 212316

FIG NO.: C-3

BORING NO.	TP-1, LOT 1	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	2.5	AASHTO CLASSIFICATION		JOB NO.	212316
CLIENT	MVE, INC				
PROJECT	HIGHWAY 94 & ANTELOPE DRIVE				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	92.0%
20	72.8%
40	64.5%
100	34.3%
200	19.4%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

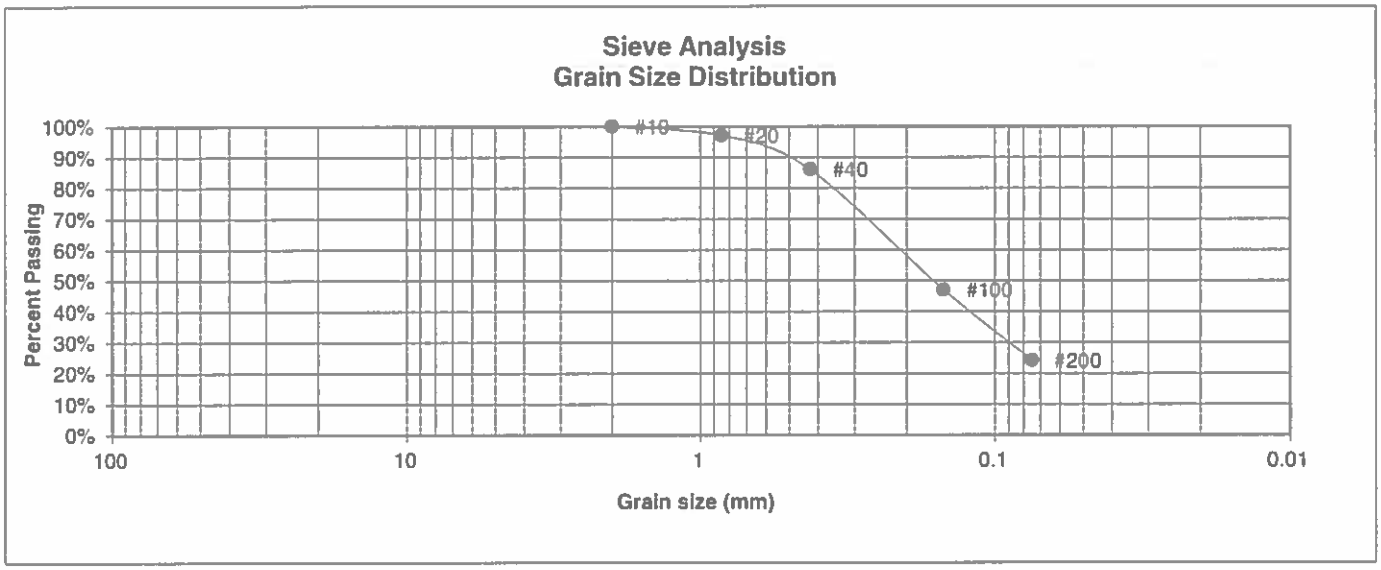
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	9/25/21

JOB NO.: 212316

FIG NO.: C-4

BORING NO.	TP-2, LOT 2	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	5	AASHTO CLASSIFICATION		JOB NO.	212316
CLIENT	MVE, INC				
PROJECT	HIGHWAY 94 & ANTELOPE DRIVE				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	97.1%
40	86.1%
100	47.1%
200	24.2%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

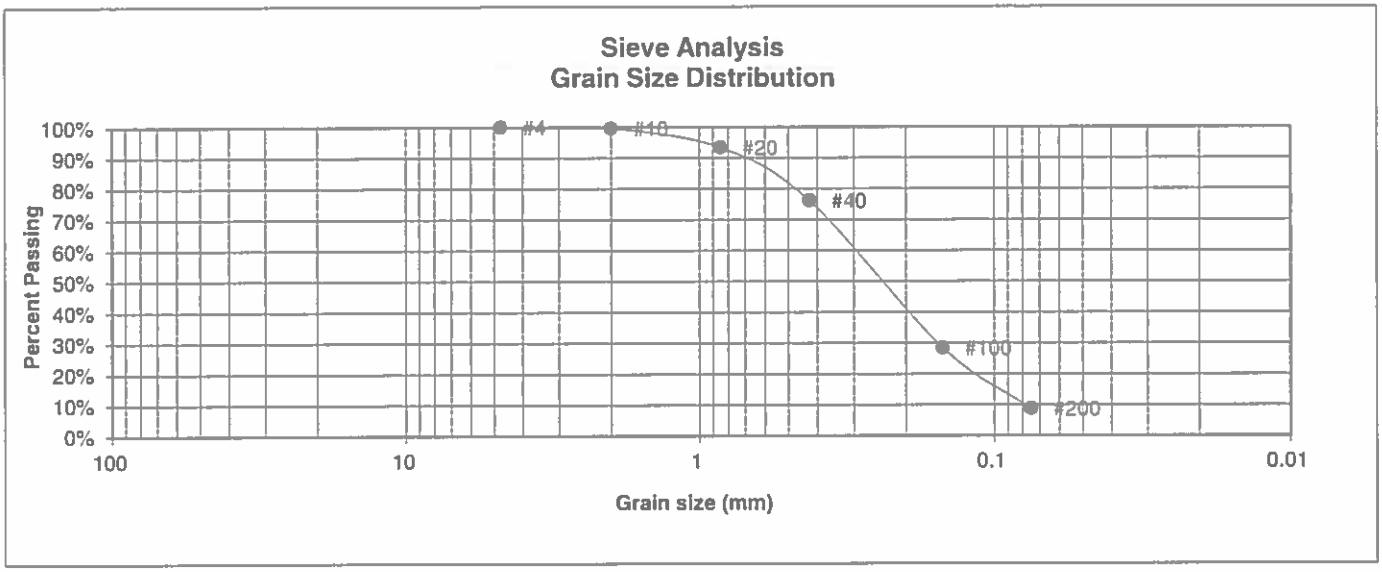
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	9/25/21

JOB NO. 212316

FIG NO. C-5

BORING NO.	TP-3, LOT 1	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	3	AASHTO CLASSIFICATION		JOB NO.	212316
CLIENT	MVE, INC				
PROJECT	HIGHWAY 94 & ANTELOPE DRIVE				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.6%
20	93.4%
40	76.2%
100	28.4%
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)

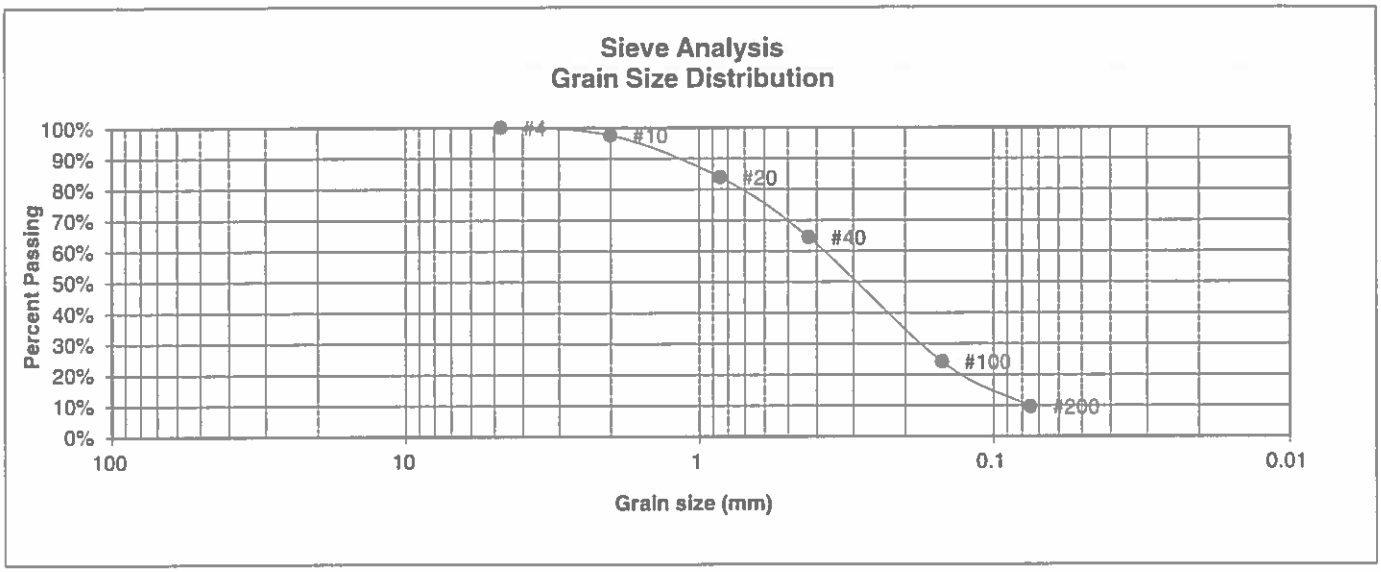
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

LABORATORY TEST RESULTS

DRAWN	DATE	CHECKED	DATE
		LLL	9/25/21

JOB NO. 212316
FIG NO. L-6

BORING NO.	TP-4, LOT 2	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	4	AASHTO CLASSIFICATION		JOB NO.	212316
CLIENT	MVE, INC				
PROJECT	HIGHWAY 94 & ANTELOPE DRIVE				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.6%
20	84.0%
40	64.5%
100	24.1%
200	9.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

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

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

LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LL	9/15/21

JOB NO 212316

FIG NO C-7

APPENDIX D: Soil Survey 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
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 content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Data Source Information

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

El Paso County Area, Colorado

96—Truckton sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2yvrd
Elevation: 5,400 to 7,000 feet
Mean annual precipitation: 14 to 23 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 90 to 155 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: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Interfluves, fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind 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: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very 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 content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Blakeland
Percent of map unit: 5 percent
Landform: Hills, interfluves
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: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Bresser
Percent of map unit: 5 percent
Landform: Interfluves, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Urban land
Percent of map unit: 2 percent
Hydric soil rating: No

Pleasant, frequently ponded
Percent of map unit: 2 percent
Landform: Closed depressions
Down-slope shape: Concave, linear
Across-slope shape: Concave
Ecological site: R067BY010CO - Closed Upland Depression
Hydric soil rating: Yes

Ellicott, occasionally flooded
Percent of map unit: 1 percent
Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: R067BY031CO - Sandy Bottomland
Hydric soil rating: No

Data Source Information

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