Huddleston-Berry
Engineering & Testing, LLC

GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION
19 ROAD IMPROVEMENTS
FRUITA, COLORADO
PROJECT#00207-0017

CITY OF FRUITA
325 E. ASPEN, SUITE 155
FRUITA, COLORADO 81521

FEBRUARY 8, 2024

Huddleston-Berry Engineering and Testing, LLC
2789 Riverside Parkway
Grand Junction, Colorado 81501

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A geologic hazards and geotechnical investigation was conducted for the 19 Road Improvements project in Fruita, Colorado. The project location is shown on Figure 1 – Site Location Map. The purpose of the investigation was to evaluate the surface and subsurface conditions at the site with respect to geologic hazards and pavement design for the proposed construction. This summary has been prepared to include the information required by civil engineers and contractors involved in the project.

Subsurface Conditions (p. 2)

The subsurface investigation consisted of six borings as shown on Figure 2 – Site Plan. The borings generally encountered 4.5 to 6.0-inches of asphalt pavement above undifferentiated base course, subbase course, and/or grading fill to a depth of 4.0 feet. The fill was underlain by brown, moist to wet, medium stiff to very soft / medium dense to very loose interbedded lean clay and poorly graded sand with silt soils to the bottoms of the borings. Groundwater was encountered at depths of between 8.0 and 14.0 feet at the time of the investigation. The native clay soils were indicated to be slightly plastic and slightly expansive. The native sand soils were indicated to be non-plastic and are anticipated to be slightly collapsible.

Geologic Hazards and Constraints (p. 3)

The primary geologic hazard and constraint at the site is the presence of moisture sensitive soils. However, soft soil conditions may also impact the construction.

Summary of Foundation Recommendations

- *Structural Fill* – Minimum of 24-inches below foundations. The native clay soils are not suitable for reuse as structural fill. Imported structural fill should consist of granular, non-expansive, ***non-free draining*** material with greater than 10% passing the #200 sieve and Liquid Limit of less than 30. However, all proposed imported structural fill materials should be approved by HBET.(p. 4)
- *Bearing Resistance for Strength Limit State* – q_{ult} = 450 * Effective Footing Width + 1,750 psf. (p. 4)
- *Resistance Factor* – 0.45. (p. 4)
- *Bearing Resistance for Service Limit State* – See Appendix D.

Summary of Pavement Recommendations (p. 5)

ALTERNATIVE	PAVEMENT SECTION (Inches)			
	Hot-Mix Asphalt Pavement	CDOT Class 6 Base Course	CDOT Class 3 Subbase Course	TOTAL
A	6.0	14.0	0.0	20.0
B	6.0	6.0	14.0	26.0

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Scope 1
1.2 Site Location and Description 1
1.3 Proposed Construction 1

2.0 GEOLOGIC SETTING 2

2.1 Soils 2
2.2 Geology 2
2.3 Groundwater 2

3.0 FIELD INVESTIGATION 2

3.1 Subsurface Investigation 2
3.2 Field Reconnaissance 2

4.0 LABORATORY TESTING 3

5.0 GEOLOGIC INTERPRETATION 3

5.1 Geologic Hazards 3
5.2 Geologic Constraints 3
5.3 Water Resources 3
5.4 Mineral Resources 3

6.0 CONCLUSIONS 3

7.0 RECOMMENDATIONS 4

7.1 Foundations 4
7.2 Corrosion of Concrete and Steel 4
7.3 Lateral Earth Pressures 5
7.4 Excavations 5
7.5 Pavements 5

8.0 GENERAL 6

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Plan

APPENDICES

Appendix A – UDSA NRCS Soil Survey Data
Appendix B – Typed Boring Logs
Appendix C – Laboratory Testing Results
Appendix D – Bearing Resistance for Service Limit State

1.0 INTRODUCTION

As part of the continued development in Western Colorado, the City of Fruita (City) proposes to improve 19 Road. As part of the development process, Huddleston-Berry Engineering and Testing, LLC (HBET) was retained by the City to conduct a geologic hazards and geotechnical investigation at the site.

1.1 Scope

As discussed above, a geologic hazards and geotechnical investigation was conducted for 19 Road in Fruita, Colorado. The scope of the investigation included the following components:

- Conducting a subsurface investigation to evaluate the subsurface conditions at the site.
- Collecting soil samples and conducting laboratory testing to determine the engineering properties of the soils at the site.
- Evaluating potential geologic hazards at the site.
- Developing recommendations for pavements.

The investigation and report were completed by a Colorado registered professional engineer in accordance with generally accepted geotechnical and geological engineering practices. This report has been prepared for the exclusive use of the City of Fruita.

1.2 Site Location and Description

The project area includes 19 Road between Highway 6 & 50 and J.2 Road in Fruita, Colorado. The project location is shown on Figure 1 – Site Location Map.

At the time of the investigation, the existing roadway appeared relatively intact with no obvious sign of significant failure. The roadway consisted of one lane in each direction with unpaved shoulders. Within the project area, 19 Road crosses the Independent Ranchman's Ditch and Palmer Ditch.

1.3 Proposed Construction

The proposed construction is anticipated to consist of widening of 19 Road in the project area. In addition, new sanitary sewer and storm sewer lines are proposed. A new box culvert is also proposed at the crossing of the Independent Ranchman's Ditch.

2.0 GEOLOGIC SETTING

2.1 Soils

Soils data was obtained from the USDA Natural Resource Conservation Service Web Soil Survey. The data indicates that the soils at the site consist of Sagers silty clay loam, 0 to 2 percent slopes and Sagers silty clay loam, saline, 0 to 2 percent slopes. Soil survey data, including descriptions of the soil units, is included in Appendix A.

2.2 Geology

According to the *Geologic Map of the Fruita Quadrangle, Mesa County, Colorado* (2009), the site is underlain by alluvial mudflow and fan valley fill deposits.

2.3 Groundwater

Groundwater was encountered in the subsurface at depths of between 8.0 and 14.0 feet below the existing ground surface at the time of the investigation.

3.0 FIELD INVESTIGATION

3.1 Subsurface Investigation

The subsurface investigation was conducted on December 6th, 2023 and consisted of six borings as shown on Figure 2 – Site Plan. The borings were drilled to a depth of 20.0 feet. Typed boring logs are included in Appendix B. Samples of the native soils were collected during Standard Penetration Testing (SPT) and by bulk sampling methods at the locations shown on the logs.

As indicated on the logs, the subsurface conditions at the site were slightly variable. However, the borings generally encountered 4.5 to 6.0-inches of asphalt pavement above undifferentiated base course, subbase course, and/or grading fill to a depth of 4.0 feet. The fill was underlain by brown, moist to wet, medium stiff to very soft / medium dense to very loose interbedded lean clay and poorly graded sand with silt soils to the bottoms of the borings. As discussed previously, groundwater was encountered at depths of between 8.0 and 14.0 feet at the time of the investigation.

3.2 Field Reconnaissance

The field reconnaissance included walking the site during the subsurface investigation. In general, the site was slightly sloping to the south and no evidence of active landslides, debris flows, rockfalls, etc. was observed.

4.0 LABORATORY TESTING

Selected native soil samples collected from the borings were tested in the Huddleston-Berry Engineering and Testing LLC geotechnical laboratory for natural moisture content determination, grain size analysis, Atterberg limits determination, maximum dry density and optimum moisture content (Proctor) determination, and California Bearing Ratio (CBR) determination. The laboratory testing results are included in Appendix C.

The laboratory testing results indicate that the native clay soils are slightly plastic. In addition, the CBR results indicate that the clay soils are slightly expansive with up to 1.6% expansion measured in the laboratory.

The native sand soils were indicated to be non-plastic. In general, based upon our experience with similar soils in the vicinity of the subject site, the native sand soils are anticipated to be slightly collapsible.

5.0 GEOLOGIC INTERPRETATION

5.1 Geologic Hazards

The primary geologic hazard at the site is the presence of moisture sensitive soils.

5.2 Geologic Constraints

The primary geologic constraint to construction at the site is the presence of moisture sensitive soils. However, shallow groundwater and associated soft/loose soil conditions may also impact the construction.

5.3 Water Resources

No water supply wells were observed on the property. As discussed previously, shallow groundwater was encountered at the site. However, with proper design and construction, the proposed construction is not anticipated to adversely impact surface water or groundwater.

5.4 Mineral Resources

Potential mineral resources in Western Colorado generally include gravel, uranium ore, and commercial rock products such as flagstone. In general, based upon the current land use, HBET does not believe that any economically recoverable mineral resources are economically recoverable at this site.

6.0 CONCLUSIONS

Based upon the available data sources, field investigation, and nature of the proposed construction, HBET does not believe that there are any geologic conditions which should preclude construction at the site.

7.0 RECOMMENDATIONS

7.1 Foundations

As discussed previously, a new box culvert is proposed to carry 19 Road across the Independent Ranchman's Ditch. In general, to provide a uniform bearing stratum, it is recommended that the foundations be constructed above a minimum of 24-inches of structural fill.

As discussed previously, the native clay soils have a slight potential for expansion when compacted and introduced to excess moisture. Therefore, the native clay soils are not suitable for reuse as structural fill. Imported structural fill should consist of a granular, non-expansive, ***non-free draining*** material with greater than 10% passing the #200 sieve and Liquid Limit of less than 30. However, all proposed imported structural fill materials should be approved by HBET.

Prior to placement of structural fill, it is recommended that the bottoms of the foundation excavations be scarified to a depth of 9 to 12-inches, moisture conditioned, and compacted to a minimum of 95% of the standard Proctor maximum dry density, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698. However, soft soil conditions may exist in the subgrade and it may be necessary to utilize geotextile and/or geogrid in conjunction with up to 30-inches of additional granular fill to stabilize the subgrade. HBET should be contacted to provide specific recommendations for subgrade stabilization based upon the actual conditions encountered during construction.

Structural fill should extend laterally beyond the edges of the foundation a distance equal to the thickness of structural fill. Structural fill should be moisture conditioned, placed in maximum 8-inch loose lifts, and compacted to a minimum of 95% of the standard Proctor maximum dry density for fine grained soils and modified Proctor maximum dry density for coarse grained soils, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698 and D1557, respectively.

In accordance with LRFD design methodology, for foundation preparation as recommended, a nominal bearing resistance for the strength limit state of q_{ult} = 450*Effective footing width + 1,750 psf may be used. A resistance factor of 0.45 is recommended. Nominal bearing resistance for the service limit state should be in accordance with the attached plot of Bearing Stress versus Effective Footing Width for a maximum total settlement of 1.0-inch included in Appendix D. Foundations subject to frost should be at least 24-inches below the finished grade.

7.2 Corrosion of Concrete and Steel

The USDA Soil Survey Data indicates that the site soils have a low to high potential for corrosion of concrete. Therefore, at a minimum, Type I-II sulfate resistant cement is recommended for construction at this site.

The Soil Survey Data also indicates that the site soils have a moderate to high potential for corrosion of uncoated steel. Therefore, buried steel utilities or other buried steel structural elements should consider corrosion in their design.

7.3 Lateral Earth Pressures

Any earth retaining structures should be designed to resist lateral earth pressures. HBET recommends that the structures be designed using the following earth pressure coefficients:

Native Lean Clay Soils

- $K_a = 0.39$
- $K_p = 2.56$

Class 1 Structural Backfill

- $K_a = 0.33$
- $K_p = 3.00$

The earth pressure coefficients above assume horizontal backslope and should be increased where the backslope is not level. Computed lateral earth pressures on the structures should consider surcharge loading from 19 Road.

7.4 Excavations

Excavations in the soils at the site may stand for short periods of time but should not be considered to be stable. Trenching and excavations should be sloped back, shored, or shielded for worker protection in accordance with applicable OSHA standards. The soils generally classify as Type C soil with regard to OSHA's *Construction Standards for Excavations*. For Type C soils, the maximum allowable slope in temporary cuts is 1.5H:1V.

7.5 Pavements

As discussed previously, 19 Road is proposed to be widened in the project are and this may include reconstruction of part or all of the roadway. The design CBR of the native soils was determined in the laboratory to be less than 2.0. Therefore, the minimum recommended Resilient Modulus of 3,000 psi was used for the seasonally low value for the subgrade soils.

Traffic data was taken from the City of Fruita GIS system. A design AADT of 5,817 was provided for 2020. Using a growth rate of 2%, HBET estimated a 2024 AADT of 6,297.

Based upon the subgrade conditions and estimated traffic loading, M-E asphalt pavement design was completed using the PerRoad design software package. The following table summarizes pavement section alternatives for new pavements.

ALTERNATIVE	PAVEMENT SECTION (Inches)			
	Hot-Mix Asphalt Pavement	CDOT Class 6 Base Course	CDOT Class 3 Subbase Course	TOTAL
A	6.0	14.0	0.0	20.0
B	6.0	6.0	14.0	26.0

Prior to pavement placement, it is recommended that the subgrade soils be scarified to a depth of 12-inches; moisture conditioned, and recompacted to a minimum of 95% of the standard Proctor maximum dry density, within 0 to -2% of optimum moisture content as determined by AASHTO T-99. However, as discussed previously, soft soils were encountered at the site and this may make compaction of the subgrade difficult. It may be necessary to utilize geotextile and/or geogrid in conjunction with additional granular material to stabilize the subgrade. HBET should be contacted to provide specific recommendations for subgrade stabilization based upon the actual conditions encountered during construction.

New aggregate base course and subbase course should be placed in maximum 9-inch loose lifts, moisture conditioned, and compacted to a minimum of 95% and 93% of the maximum dry density, respectively, at -2% to +3% of optimum moisture content as determined by AASHTO T-180. In addition to density testing, base course should be proofrolled to verify subgrade stability.

It is recommended that Hot-Mix Asphaltic (HMA) pavement conform to CDOT grading SX or S specifications and consist of an approved 100 gyration Superpave method mix design. HMA pavement should be compacted to between 92% and 96% of the maximum theoretical density. An end point stress of 50 psi should be used. In addition, pavements should conform to local specifications.

The long-term performance of the pavements is dependent on positive drainage away from the pavements. Ditches, culverts, and inlet structures in the vicinity of paved areas must be maintained to prevent ponding of water on the pavement.

8.0 GENERAL

The recommendations included above are based upon the results of the subsurface investigation and on our local experience. These conclusions and recommendations are valid only for the proposed construction.

As discussed previously, the subsurface conditions encountered in the borings were slightly variable. However, the precise nature and extent of any subsurface variability may not become evident until construction. As a result, it is recommended that HBET provide construction materials testing and engineering oversight during the entire construction process.

It is important to note that the recommendations herein are intended to reduce the risk of pavement movement and/or damage, to varying degrees, associated with volume change of the native soils. However, HBET cannot predict long-term changes in subsurface moisture conditions and/or the precise magnitude or extent of volume change. Where significant increases in shallow subsurface moisture occur due to poor grading, improper stormwater management, utility line failure, excess irrigation, or other cause, either during construction or the result of actions of the owner, several inches of movement are possible. In addition, any failure to comply with the recommendations in this report releases Huddleston-Berry Engineering & Testing, LLC of any liability with regard to the pavement and/or structure performance.

Huddleston-Berry Engineering and Testing, LLC is pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

FIGURES

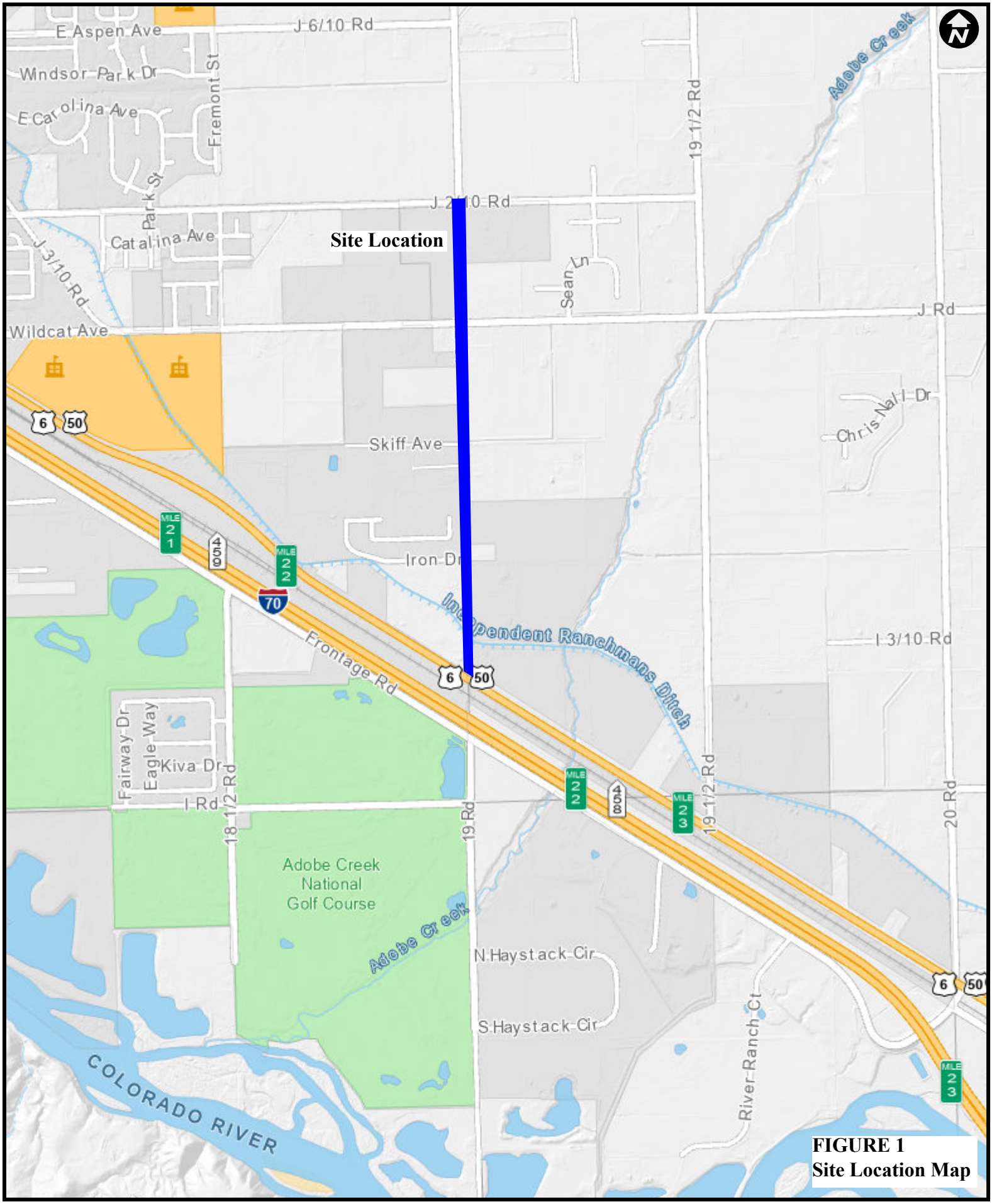


FIGURE 1
Site Location Map

Mesa County Map

0 0.125 0.25 0.5 mi
0 0.15 0.3 0.6 km

Print Date: December 28, 2023

Mesa County, Colorado
GIS/IT Department
gis.mesacounty.us

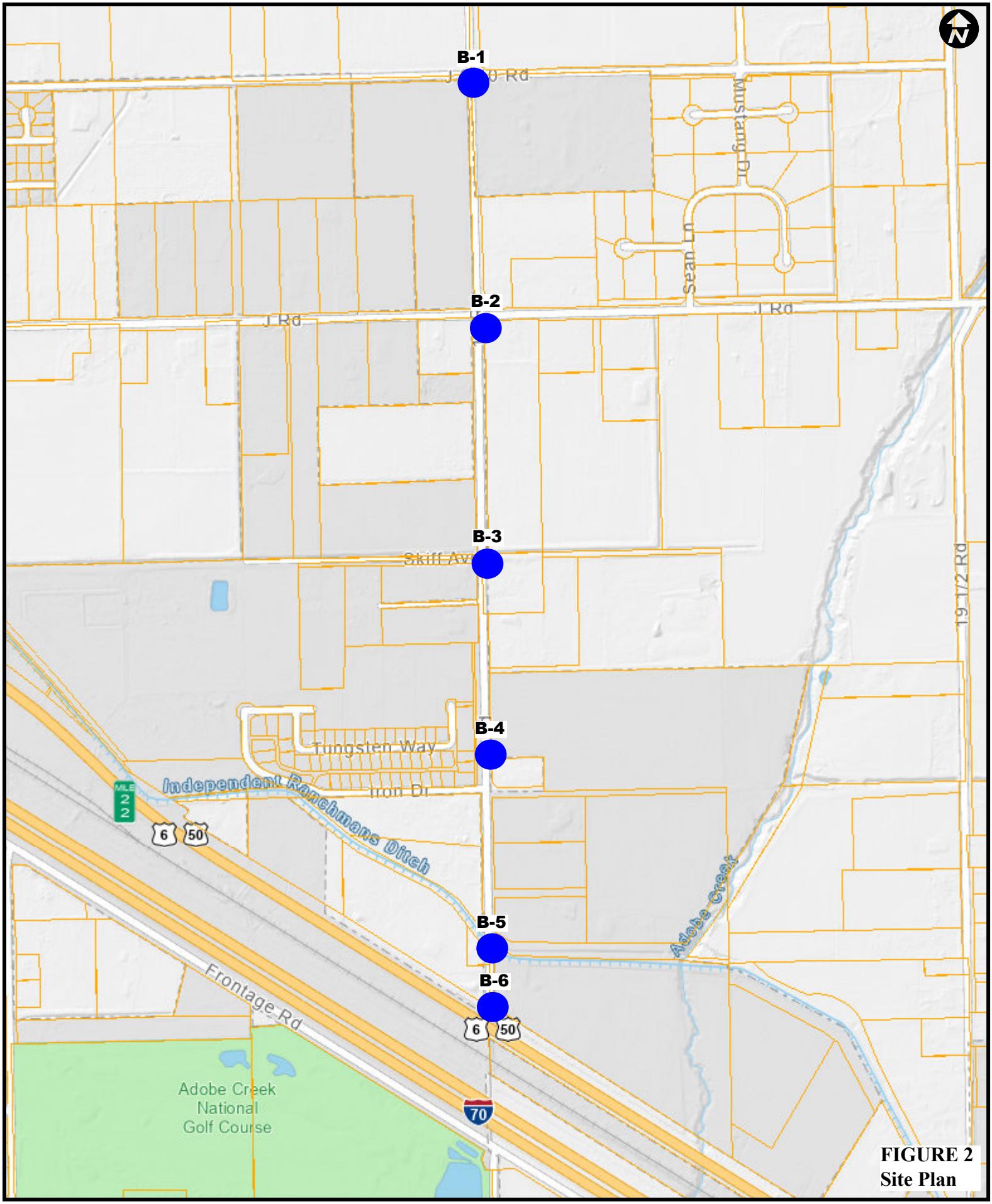


FIGURE 2
Site Plan

Mesa County Map

0 0.05 0.1 0.2 mi
0 0.075 0.15 0.3 km

Print Date: December 28, 2023

Mesa County, Colorado
GIS/IT Department
gis.mesacounty.us

APPENDIX A
Soil Survey Data

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Mesa County Area, Colorado

BaS—Massadona silty clay loam, saline surface, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k06p

Elevation: 4,490 to 4,920 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Massadona, saline surface, and similar soils: 70 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massadona, Saline Surface

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Cretaceous source alluvium derived from clayey shale

Typical profile

Apz - 0 to 2 inches: silty clay loam
Bwz - 2 to 12 inches: silty clay
Bkyz - 12 to 24 inches: silty clay
BCkyz1 - 24 to 48 inches: fine sandy loam
BCkyz2 - 48 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.07 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Strongly saline (16.0 to 40.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 7s
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R034BY103UT - Desert Clay (Castlevalley saltbush)
Hydric soil rating: No

Rc—Fruitland sandy clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k0d0
Elevation: 4,490 to 4,890 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Fruitland and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fruitland

Setting

Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Cretaceous source alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 8 inches: sandy clay loam
C1 - 8 to 30 inches: gravelly sandy loam
C2 - 30 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.71 to 2.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: R034BY115UT - Desert Sandy Loam (Indian Ricegrass)
Hydric soil rating: No

Tr—Turley clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k0d8
Elevation: 4,500 to 4,800 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Turley and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turley

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Cretaceous slope alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 10 inches: clay loam
C1 - 10 to 20 inches: fine sandy loam
C2 - 20 to 30 inches: clay loam
C3 - 30 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.21 to 0.71 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 4 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 5e
Hydrologic Soil Group: C
Ecological site: R034BY106UT - Desert Loam (Shadscale)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 14, Aug 22, 2023

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Report—Soil Features

Soil Features–Mesa County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
		In	*In*		*In*	*In*			
BaS—Massadona silty clay loam, saline surface, 0 to 2 percent slopes									
Massadona, saline surface		—	—		0	0	Low	High	High
Rc—Fruitland sandy clay loam, 0 to 2 percent slopes									
Fruitland		—	—		0	0	Moderate	Moderate	Low
Tr—Turley clay loam, 0 to 2 percent slopes									
Turley		—	—		0	0	Moderate	Moderate	Low

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 14, Aug 22, 2023


108° 42' 29" W
108° 41' 38" W
39° 9' 8" N
39° 8' 15" N
698100
698300
698500
698700
698900
699100
699300
4336200
4336000
4335800
4335600
4335400
4335200
4335000
4334800
4334600
J 2 Rd
Rich Ave
J Rd
Rc
19 Rd
Tr
BaS
Tr
Adobe Creek
6
70
Soil Map may not be valid at this scale.
Map Scale: 1:7,950 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 350 700 1400 2100
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 14, Aug 22, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 24, 2020—Jul 8, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaS	Massadona silty clay loam, saline surface, 0 to 2 percent slopes	1.1	12.6%
Rc	Fruitland sandy clay loam, 0 to 2 percent slopes	2.1	23.7%
Tr	Turley clay loam, 0 to 2 percent slopes	5.8	63.8%
Totals for Area of Interest		**9.1**	**100.0%**

APPENDIX B
Typed Boring Logs

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-1

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 11.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 11.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (4.5-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	100	5-5-6 (11)							
5		Interbedded Lean CLAY (cl) and Poorly Graded SAND with Silt (sp-sm), brown, moist to wet, soft to very soft / loose to very loose	SS 2	78	1-1-2 (3)							
10			SS 3	33	2-1-3 (4)							
15												
20			SS 4	100	1-0-1-1 (1)							
		Bottom of hole at 20.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-2

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 8.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 8.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (6.0-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	83	16-16-13 (29)							
5		Interbedded Lean CLAY (cl) and Poorly Graded SAND with Silt (SP-SM), brown, moist to wet, medium stiff to very soft / medium dense to very loose										
		SS-2: Lab Classified	SS 2	94	2-3-3 (6)			13	NP	NP	NP	11
10												
			SS 3	100	2-1-2 (3)							
15												
			SS 4	17	1-0-0-2 (0)							
20		Bottom of hole at 20.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-3

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 10.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 10.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (4.5-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	17	14-12-6 (18)							
5		Interbedded Lean CLAY (CL) and Poorly Graded SAND with Silt (sp-sm), brown, moist to wet, soft to very soft/loose to very loose										
		SS-2: Lab Classified	SS 2	100	0-1-1 (2)			31	28	19	9	91
10	▼											
			SS 3	83	2-1-2 (3)							
15												
			SS 4	83	1-1-1-2 (2)							
20		Bottom of hole at 20.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-4

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 11.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 11.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (4.5-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	39	12-9-5 (14)							
5		Interbedded Lean CLAY (cl) and Poorly Graded SAND with Silt (sp-sm), brown, moist to wet, medium stiff to very soft / medium dense to very loose	SS 2	78	2-2-2 (4)							
10			SS 3	100	2-3-3 (6)							
15												
20			SS 4	100	0-0-0-1 (0)							
		Bottom of hole at 20.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-5

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 11.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 11.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (4.5-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	89	6-6-6 (12)							
5		Interbedded Lean CLAY (cl) and Poorly Graded SAND with Silt (sp-sm), brown, moist to wet, soft to very soft / loose to very loose	SS 2	78	1-1-1 (2)							
10			SS 3	78	1-2-1 (3)							
15												
20			SS 4	100	1-1-1-1 (2)							
		Bottom of hole at 20.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-6

CLIENT City of Fruita
PROJECT NAME 19 Road Improvements
PROJECT NUMBER 00207-0017
PROJECT LOCATION Fruita, CO
DATE STARTED 12/6/23 **COMPLETED** 12/6/23
GROUND ELEVATION ---- **HOLE SIZE** 4-Inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Truck Rig
AT TIME OF DRILLING 14.0 ft
LOGGED BY TC **CHECKED BY** MAB
AT END OF DRILLING 14.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		ASPHALT (6.5-Inches)										
		Undifferentiated BASE COURSE, SUBBASE COURSE and/or GRADING FILL	SS 1	33	19-25-30 (55)							
5		Interbedded Lean CLAY (cl) and Poorly Graded SAND with Silt (sp-sm), brown, moist to wet, medium stiff to very soft / medium dense to very loose	SS 2	0	3-4-4 (8)							
10			SS 3	78	2-3-4 (7)							
15												
20			SS 4	42	2-1-1-2 (2)							
		Bottom of hole at 20.0 feet.										

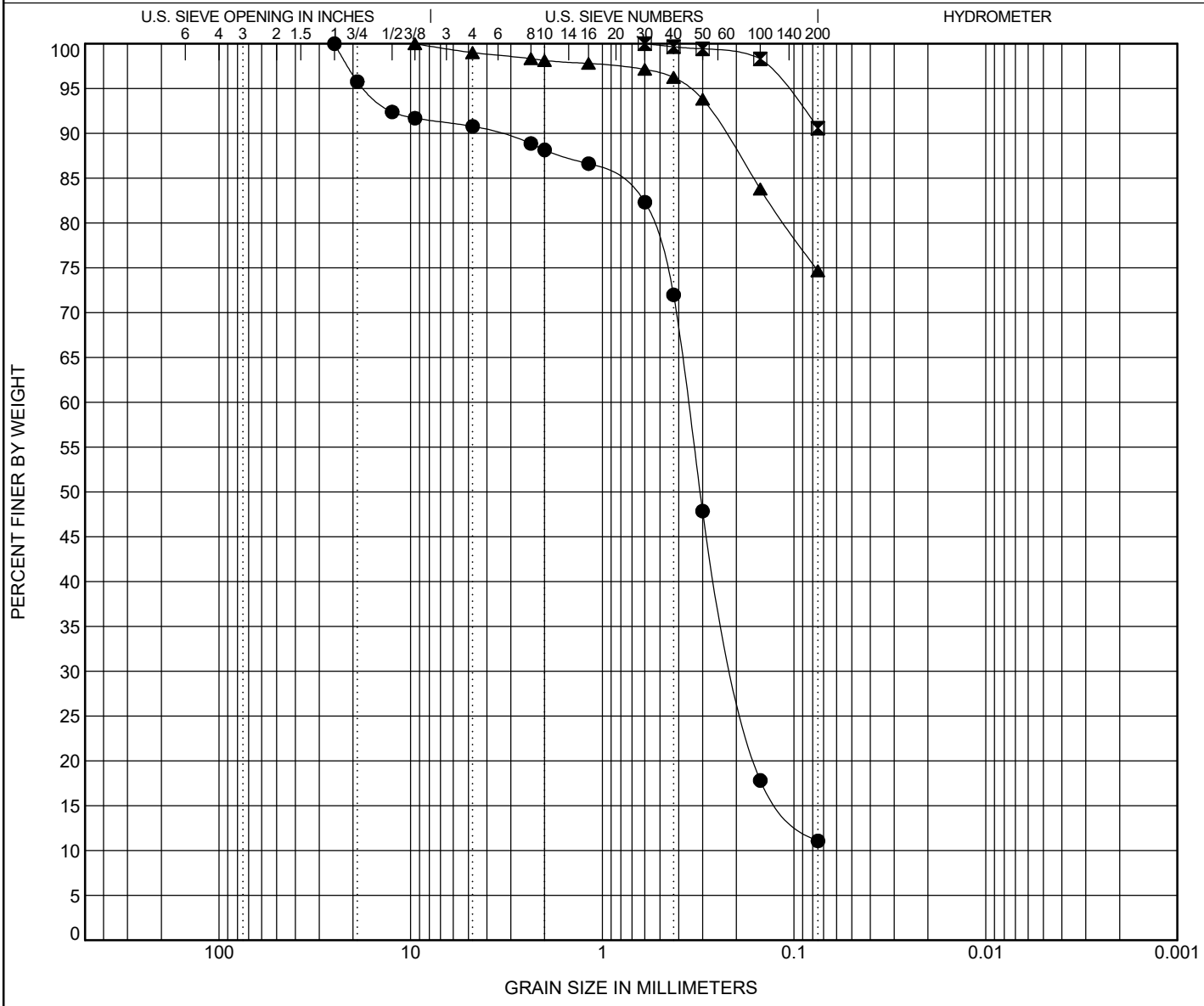
APPENDIX C
Laboratory Testing Results

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

GRAIN SIZE DISTRIBUTION

CLIENT City of Fruita **PROJECT NAME** 19 Road Improvements

PROJECT NUMBER 00207-0017 **PROJECT LOCATION** Fruita, CO



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-2, SS-2 12/6	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.64	5.32
⊠	B-3, SS-2 12/6	LEAN CLAY(CL)	28	19	9		
▲	COMPOSITE 12/6	LEAN CLAY with SAND(CL)	23	14	9		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-2, SS-2 12/6	25	0.357	0.199		9.2	79.7	11.1	
⊠	B-3, SS-2 12/6	0.6				0.0	9.4	90.6	
▲	COMPOSITE 12/6	9.5				1.0	24.3	74.7	

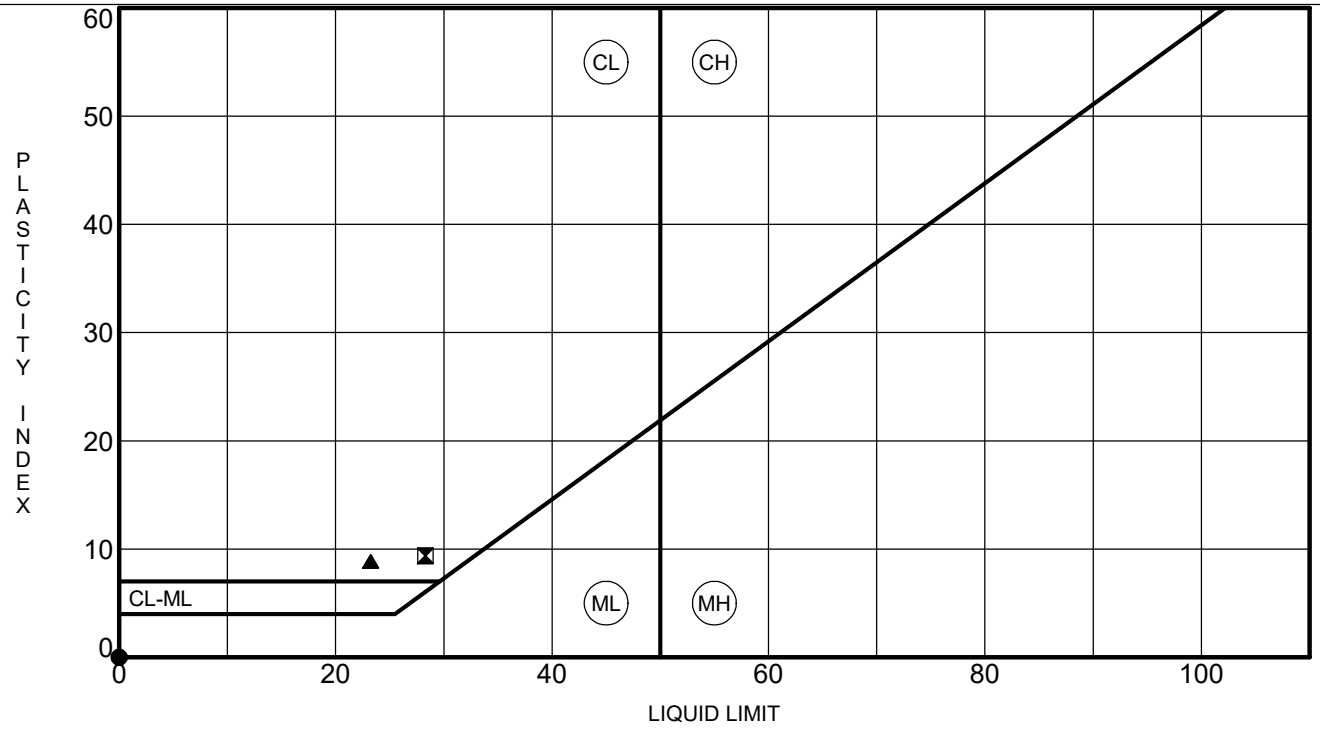
GRAIN SIZE 00207-0017 19 ROAD IMPROVEMENTS.GPJ GINT US LAB.GDT 12/28/23

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

ATTERBERG LIMITS' RESULTS

CLIENT City of Fruita **PROJECT NAME** 19 Road Improvements

PROJECT NUMBER 00207-0017 **PROJECT LOCATION** Fruita, CO



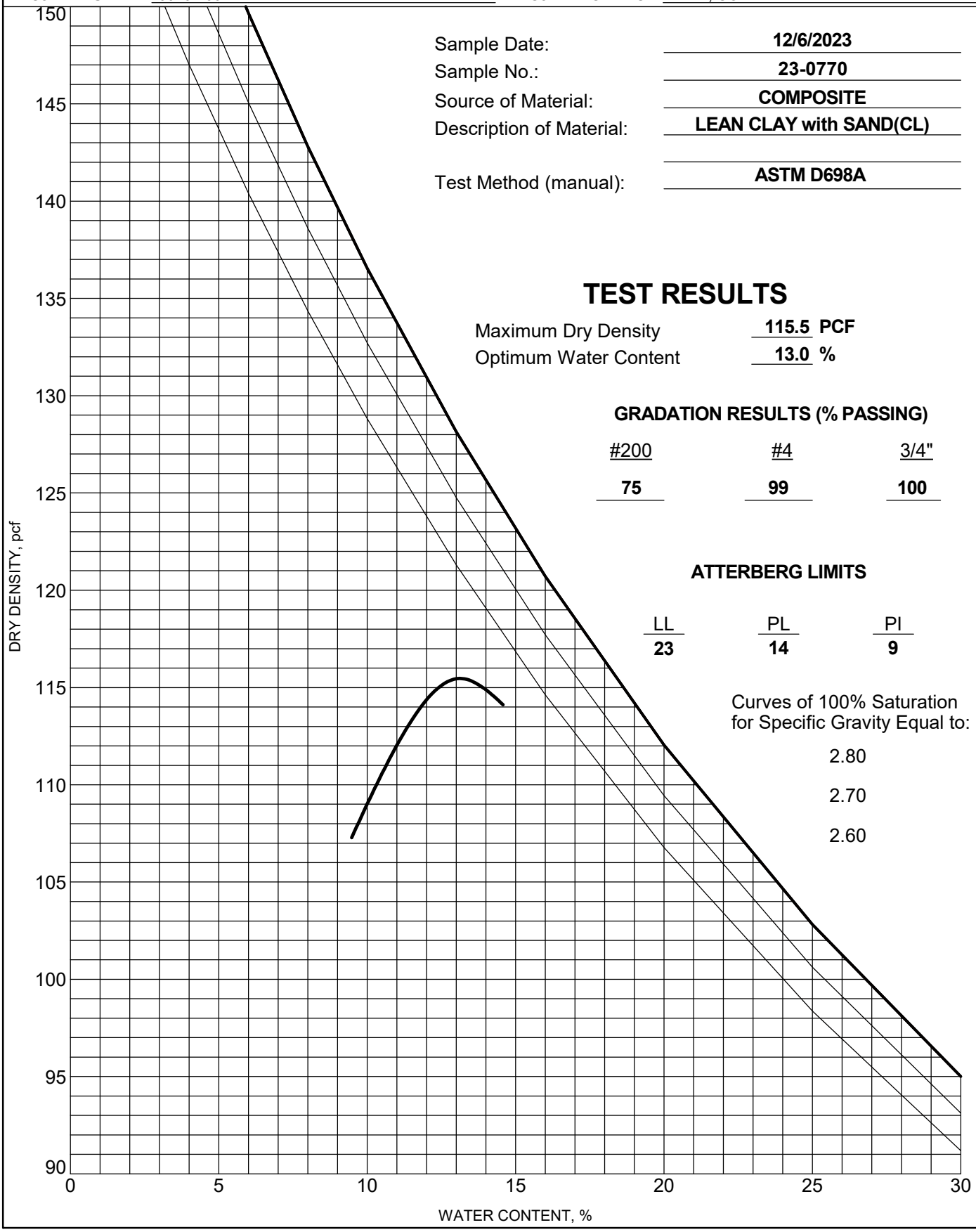
	Specimen Identification		LL	PL	PI	#200	Classification
●	B-2, SS-2	12/6	NP	NP	NP	11	POORLY GRADED SAND with SILT(SP-SM)
⧓	B-3, SS-2	12/6	28	19	9	91	LEAN CLAY(CL)
▲	COMPOSITE	12/6	23	14	9	75	LEAN CLAY with SAND(CL)

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Fruita **PROJECT NAME** 19 Road Improvements

PROJECT NUMBER 00207-0017 **PROJECT LOCATION** Fruita, CO



Sample Date: **12/6/2023**

Sample No.: **23-0770**

Source of Material: **COMPOSITE**

Description of Material: **LEAN CLAY with SAND(CL)**

Test Method (manual): **ASTM D698A**

TEST RESULTS

Maximum Dry Density **115.5** PCF

Optimum Water Content **13.0** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
75	99	100

ATTERBERG LIMITS

LL	PL	PI
23	14	9

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION 00207-0017 19 ROAD IMPROVEMENTS.GPJ GINT US LAB.GDT 12/28/23

Huddleston-Berry
Engineering & Testing, LLC

CALIFORNIA BEARING RATIO
ASTM D1883

Project No.:	00207-0017		**Authorized By:**	Client	**Date:** 12/06/23
Project Name:	19 Road Improvements		**Sampled By:**	TC	**Date:** 12/06/23
Client Name:	City of Fruita		**Submitted By:**	WDA	**Date:** 12/28/23
Sample Number:	23-0770	**Location:** COMPOSITE	**Reviewed By:**	MAB	**Date:** 02/05/24

Compaction Method ASTM D698, Method A

Maximum Dry Density (pcf): 115.5

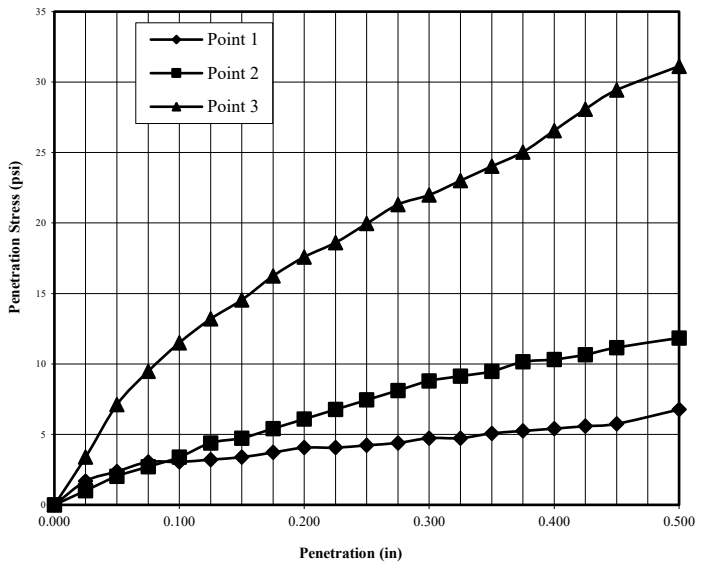
Opt. Moisture Content (%): 13.0

Sample Condition: Soaked

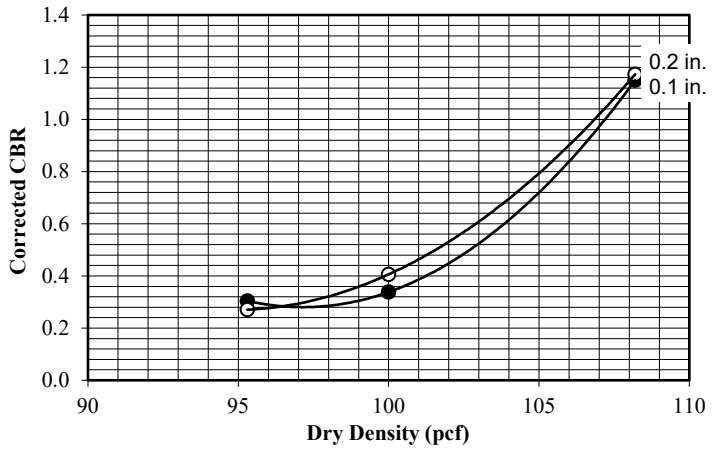
Remarks:

		Sample Data		
		Point 1	Point 2	Point 3
Blows per Compacted Lift:		15	25	56
Surcharge Weight (lbs):		10.0	10.0	10.0
Dry Density Before Soak (pcf):		95.3	100.0	108.2
Dry Density After Soak (pcf):		94.5	98.5	106.5
Moisture Content (%)	Bottom Pre-Test	12.2	12.4	12.7
	Top Pre-Test	11.8	11.9	12.0
	Top 1" After Test	24.0	23.3	21.0
	Average After Soak:	22.7	23.1	18.7
Percent Swell After Soak:		0.8	1.5	1.6

Load Pentration Curve(s)



Dry Density vs CBR



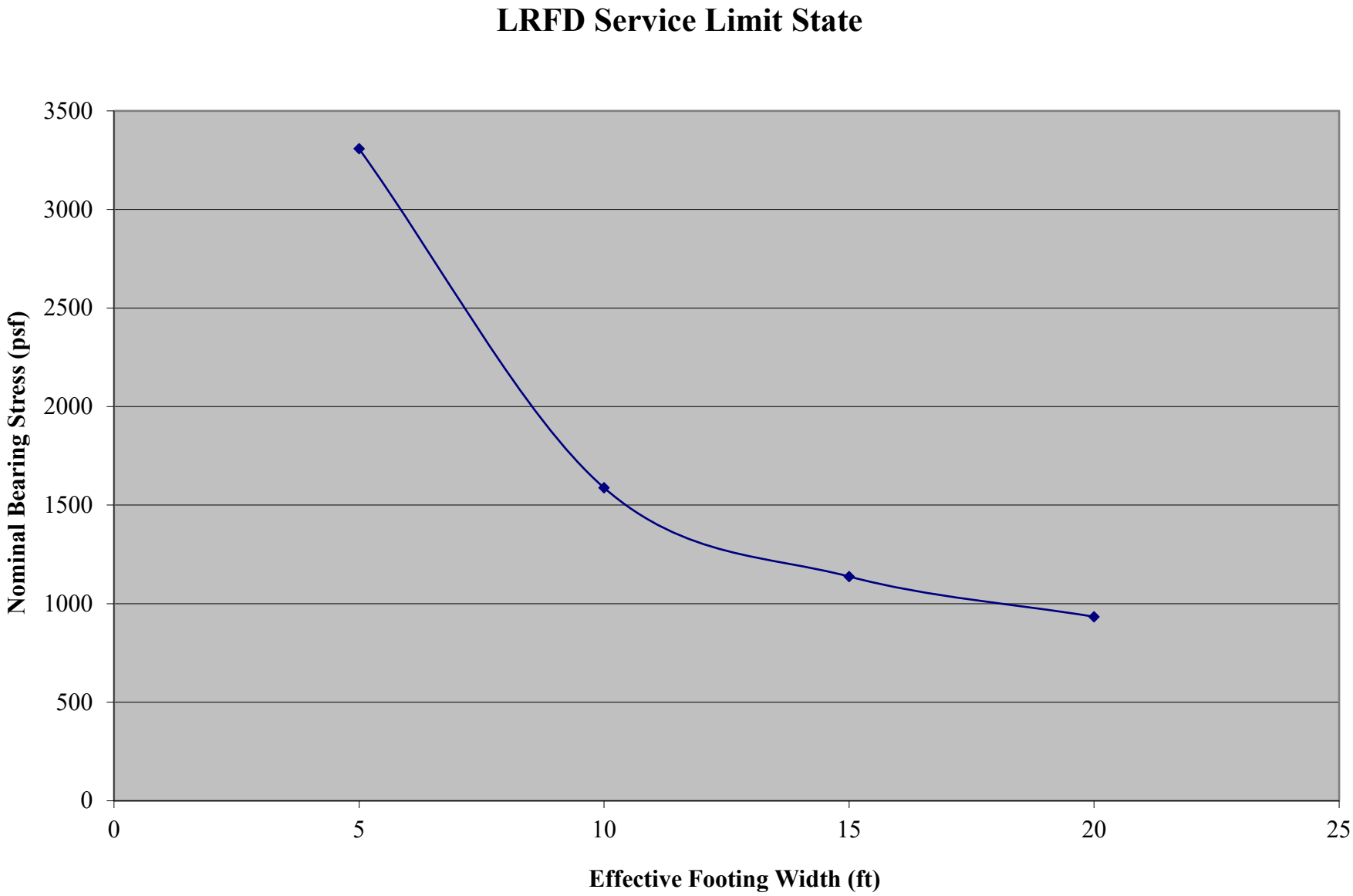
Penetration Data								
Point 1			Point 2			Point 3		
Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)
0.000	0	0	0.000	0	0	0.000	0	0
0.025	5	2	0.025	3	1	0.025	10	3
0.050	7	2	0.050	6	2	0.050	21	7
0.075	9	3	0.075	8	3	0.075	28	9
0.100	9	3	0.100	10	3	0.100	34	12
0.125	10	3	0.125	13	4	0.125	39	13
0.150	10	3	0.150	14	5	0.150	43	15
0.175	11	4	0.175	16	5	0.175	48	16
0.200	12	4	0.200	18	6	0.200	52	18
0.225	12	4	0.225	20	7	0.225	55	19
0.250	13	4	0.250	22	7	0.250	59	20
0.275	13	4	0.275	24	8	0.275	63	21
0.300	14	5	0.300	26	9	0.300	65	22
0.325	14	5	0.325	27	9	0.325	68	23
0.350	15	5	0.350	28	9	0.350	71	24
0.375	16	5	0.375	30	10	0.375	74	25
0.400	16	5	0.400	31	10	0.400	79	27
0.425	17	6	0.425	32	11	0.425	83	28
0.450	17	6	0.450	33	11	0.450	87	29
0.500	20	7	0.500	35	12	0.500	92	31

Corrected CBR @ 0.1"		
0.3	0.3	1.2
Corrected CBR @ 0.2"		
0.3	0.4	1.2

Penetration Distance Correction (in)		
0.000	0.000	0.000

Figure: _____

APPENDIX D
Bearing Resistance for Service Limit State


LRFD Service Limit State
Nominal Bearing Stress (psf)
3500
3000
2500
2000
1500
1000
500
0
0
5
10
15
20
25
Effective Footing Width (ft)