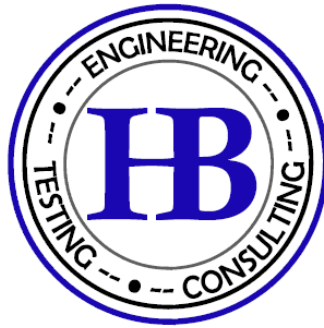




Huddlestone-Berry
Engineering & Testing, LLC

**GEOTECHNICAL AND GEOLOGIC HAZARDS
INVESTIGATION
SEWER IMPROVEMENTS
S. ELM ST. AND S. MAPLE ST.
FRUITA, COLORADO
PROJECT#00207-0018**

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

FEBRUARY 5, 2026

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

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Scope.....	1
1.2	Site Location	1
2.0	SUBSURFACE INVESTIGATION.....	1
3.0	LABORATORY TESTING.....	2
4.0	GEOLOGIC INTERPRETATION	2
4.1	Geologic Hazards.....	2
4.2	Geologic Constraints.....	2
5.0	RECOMMENDATIONS	2
5.1	Excavation.....	2
5.2	Open Trench Construction.....	3
5.3	Trench Backfill	3
5.4	Corrosion of Steel and Concrete.....	3
5.5	Engineering Properties of Soil	3
5.6	Pavements	4
6.0	GENERAL	4

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

1.0 INTRODUCTION

As part of continued improvements to infrastructure in Western Colorado, the City of Fruita proposes to improve portions of their sanitary sewer system in the vicinity of Reed Park. As part of the design development process, Huddleston-Berry Engineering and Testing, LLC (HBET) was retained by the City of Fruita 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 the 2026 Sewer Improvements project 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.
- Providing recommendations for trench excavation and stability.
- Providing recommendations for bedding and backfill.
- Evaluating potential geologic hazards at the site.

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

The site includes portions of S. Elm Street and S. Maple Street in Fruita. The project location is shown on Figure 1.

2.0 SUBSURFACE INVESTIGATION

The subsurface investigation was conducted on January 8, 2026, and consisted of six borings. The locations of the borings are shown on Figure 2.

Typed boring logs are included in Appendix B. Samples of the native soils were collected during Standard Penetration Testing (SPT) and using bulk sampling methods at the locations shown on the logs.

As shown on the logs, the subsurface conditions in the project were fairly consistent. The borings encountered 3.0 to 6.5-inches of asphalt pavement above granular base course to depths of between 1.5 and 2.0 feet. The pavement section was underlain by brown, moist to wet, very soft to stiff lean clay with sand soils. The clay soils extended to the bottoms of most of the borings. However, In B-1, the clay extended to a depth of 13.0 feet and was underlain by brown, moist, loose silty clayey sand soils to the bottom of the boring. Groundwater was encountered in two of the borings at depths of between 6.0 and 9.0 feet at the time of the investigation.

3.0 LABORATORY TESTING

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

The laboratory testing results indicate that the native clay soils are slightly plastic. These soils are anticipated to consolidate under loading at their existing density. However, the CBR results indicate that the clay soils are very slightly expansive when compacted and introduced to excess moisture.

4.0 GEOLOGIC INTERPRETATION

4.1 Geologic Hazards

The only geologic hazard identified at the site is the presence of shallow groundwater in some of the borings.

4.2 Geologic Constraints

In general, the primary geologic constraint to construction at the site is the presence of shallow groundwater. However, soft soil conditions may also impact the design and/or construction.

5.0 RECOMMENDATIONS

5.1 Excavation

Excavations in the soils at the site may stand for short periods of time but should not be considered to be stable. The native soils generally classify as Type C soil with regard to OSHA's *Construction Standards for Excavations*. In general, for Type C soils, the maximum allowable slope in temporary cuts is 1.5H:1V. However, due to the presence of sand lenses, the native soils will tend to slough near the water table. As a result, shoring will likely be required. In addition, depending on the depth of excavation, dewatering may also be required.

5.2 Open Trench Construction

As discussed previously, shallow groundwater was encountered at the site. As a result, dewatering may be required for excavations deeper than approximately 6.0 feet in some areas of the site. In addition, soft soils may exist in the bottoms of the trenches. It may be necessary to utilize geotextile and/or geogrid in conjunction with granular fill materials to stabilize the subgrade soils prior to pipe bedding with gravel or 1/4-inch minus fill. Typically, stabilization can be achieved using crushed stone, pit-run or other granular material in conjunction with geotextile and/or geogrid. However, HBET should be contacted to provide specific recommendations for subgrade stabilization based upon the actual conditions in the trenches.

In addition, close to the groundwater, the trench walls will tend to slough. It will likely be necessary to utilize trench boxes to facilitate the construction.

5.3 Trench Backfill

In general, the native clay and sand soils are suitable for reuse as trench backfill up to the bottom of base course elevation. Imported backfill should consist of material in accordance with CDOT Class 1 structural fill.

5.4 Corrosion of Steel and Concrete

Based upon our experience with similar soils in the vicinity of the subject site, the native clay soils are anticipated to be slightly to moderately corrosive to steel. The risk of corrosion may be increased where groundwater fluctuations result in periods of wetting and drying. Therefore, it is recommended that corrosion be considered for any buried steel structural elements included in the project.

Water soluble sulfates are common to the soils in Western Colorado. Therefore, at a minimum, cement adequate for Sulfate Exposure Class S1 is recommended for construction at this site.

5.5 Engineering Properties of Soil

HBET recommends the following engineering parameters be utilized for the native soils:

Clay

- $\phi' = 18^\circ$
- $c = 200 \text{ psf}$
- $\gamma = 110 \text{ pcf}$

Sand

- $\phi' = 28^\circ$
- $c = 0 \text{ psf}$
- $\gamma = 110 \text{ pcf}$

5.6 Pavements

The proposed construction will include pavements for trench patching and may include full replacement in some areas. As discussed previously, the pavement subgrade materials consist primarily of lean clay soils. The design California Bearing Ratio (CBR) was determined in the laboratory to be approximately 2.5. This corresponds to a Resilient Modulus of 3,750 psi.

As indicated previously, the existing pavement sections along S. Elm and S. Maple were variable. However, for trench patches, HBET recommends a minimum of 3.0-inches of asphalt pavement above 18.0-inches of CDOT Class 6 base course. Alternatively, patch pavements could be constructed to match the existing pavement section at the location of the patch.

Prior to pavement placement, it is recommended that the subgrade soils be scarified to a depth of 12-inches; moisture conditioned, and recompact 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. New aggregate base course should be placed in maximum 9-inch loose lifts, moisture conditioned, and compacted to a minimum of 95% of the maximum dry density, 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 75 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.

6.0 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 fairly consistent. However, the precise nature and extent of subsurface variability may not become evident until construction. Therefore, HBET should be retained to provide materials testing and engineering oversight during ALL phases of the construction to ensure conformance with the recommendations herein.

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

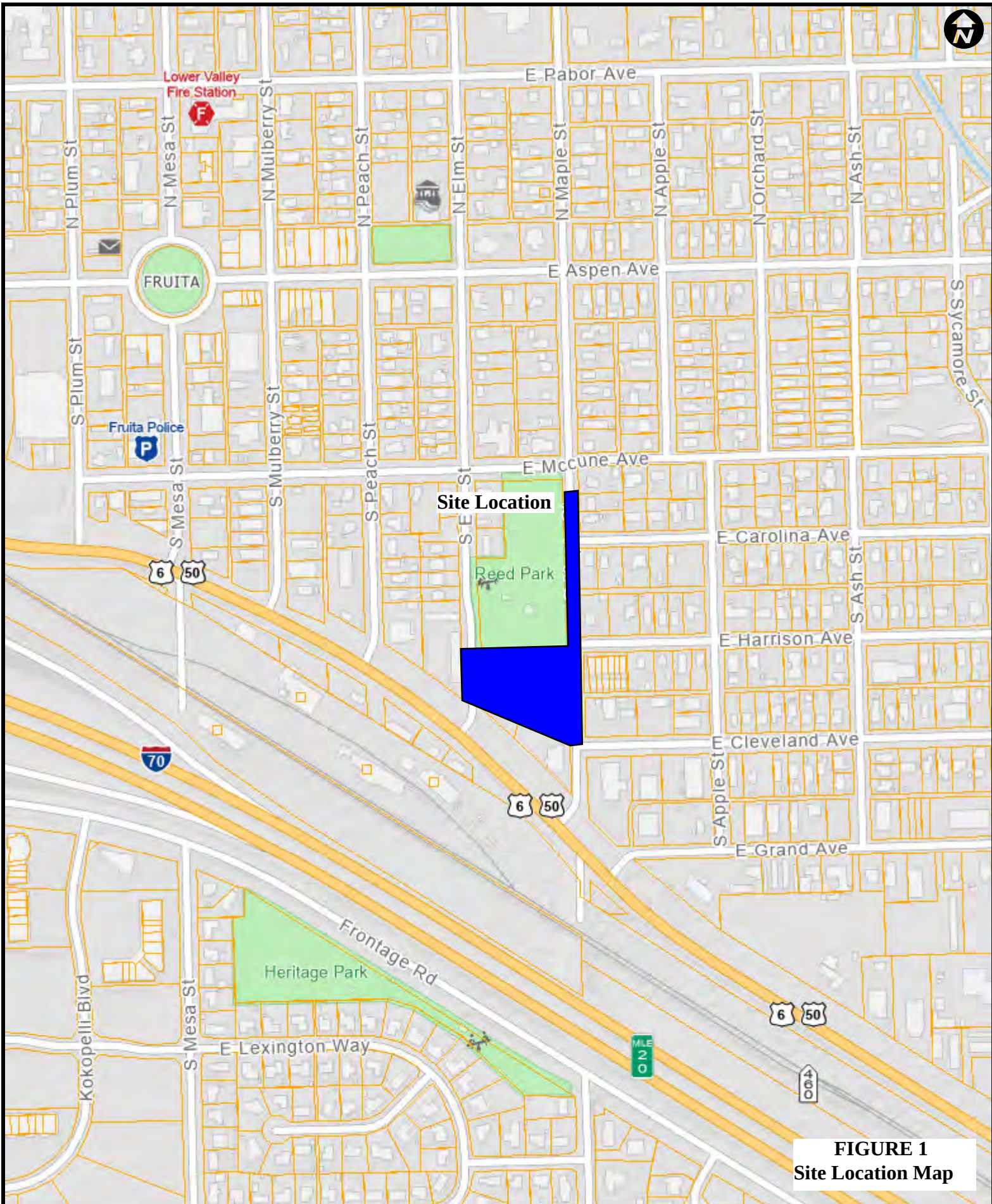
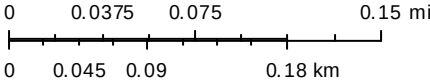


FIGURE 1
Site Location Map

Mesa County Map

The Geographic Information System (GIS) and its components are designed as a source of reference for answering inquiries, for planning and for modeling. GIS is not intended or does not replace legal description information in the chain of title and other information contained in official government records such as the County Clerk and Records office or the courts. In addition, the representations of location in this GIS cannot be substitute for actual legal surveys. The information contained herein is believed accurate and suitable for the limited uses, and subject to the limitations set forth above, Mesa County makes no warranty as to the accuracy or suitability of any information contained herein. Users assume all risk and responsibility for any and all damages, including consequential damages, which may flow from the user's use of this information.



1/7/2026



Mesa County, Colorado

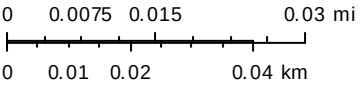
GIS/IT Department
gis.mesacounty.us



FIGURE 2
Site Plan

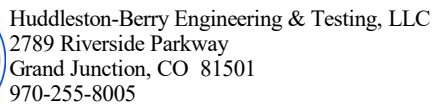
Mesa County Map

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1/7/2026

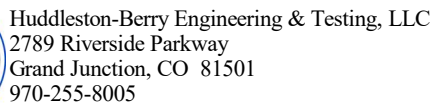
APPENDIX A
Typed Boring Logs



PAGE 1 OF 1

AFTER DRILLING ---

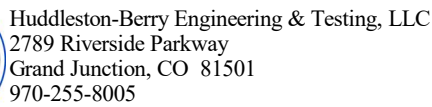
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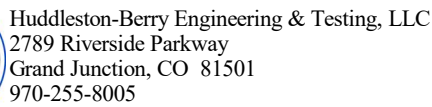
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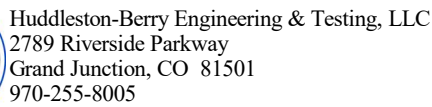
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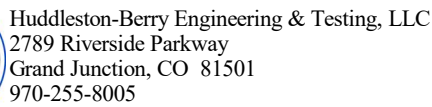
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PAGE 1 OF 1

AFTER DRILLING ---

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APPENDIX B
Laboratory Testing Results



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

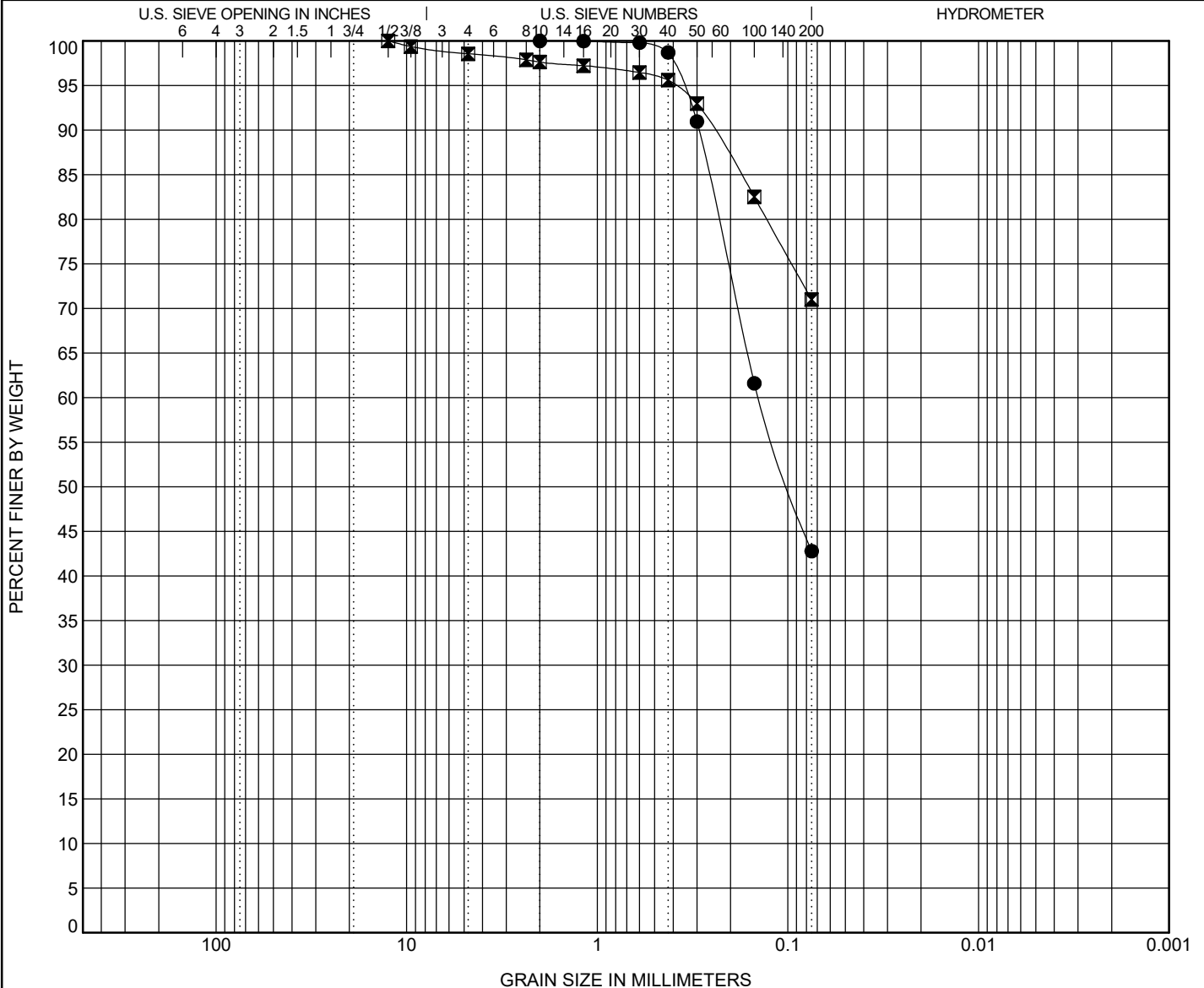
GRAIN SIZE DISTRIBUTION

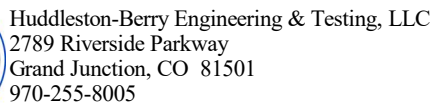
CLIENT City of Fruita

PROJECT NAME Sewer Improvements

PROJECT NUMBER 00207-0018

PROJECT LOCATION Fruita, CO







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

MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Fruita

PROJECT NAME Sewer Improvements

PROJECT NUMBER 00207-0018

PROJECT LOCATION Fruita, CO

Sample Date: 1/8/2026
Sample No.: 26-0012
Source of Material: Composite
Description of Material: LEAN CLAY with SAND(CL)
Test Method (manual): ASTM D698A

TEST RESULTS

Maximum Dry Density 116.5 PCF
Optimum Water Content 14.5 %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
<u>71</u>	<u>99</u>	<u>100</u>

ATTERBERG LIMITS

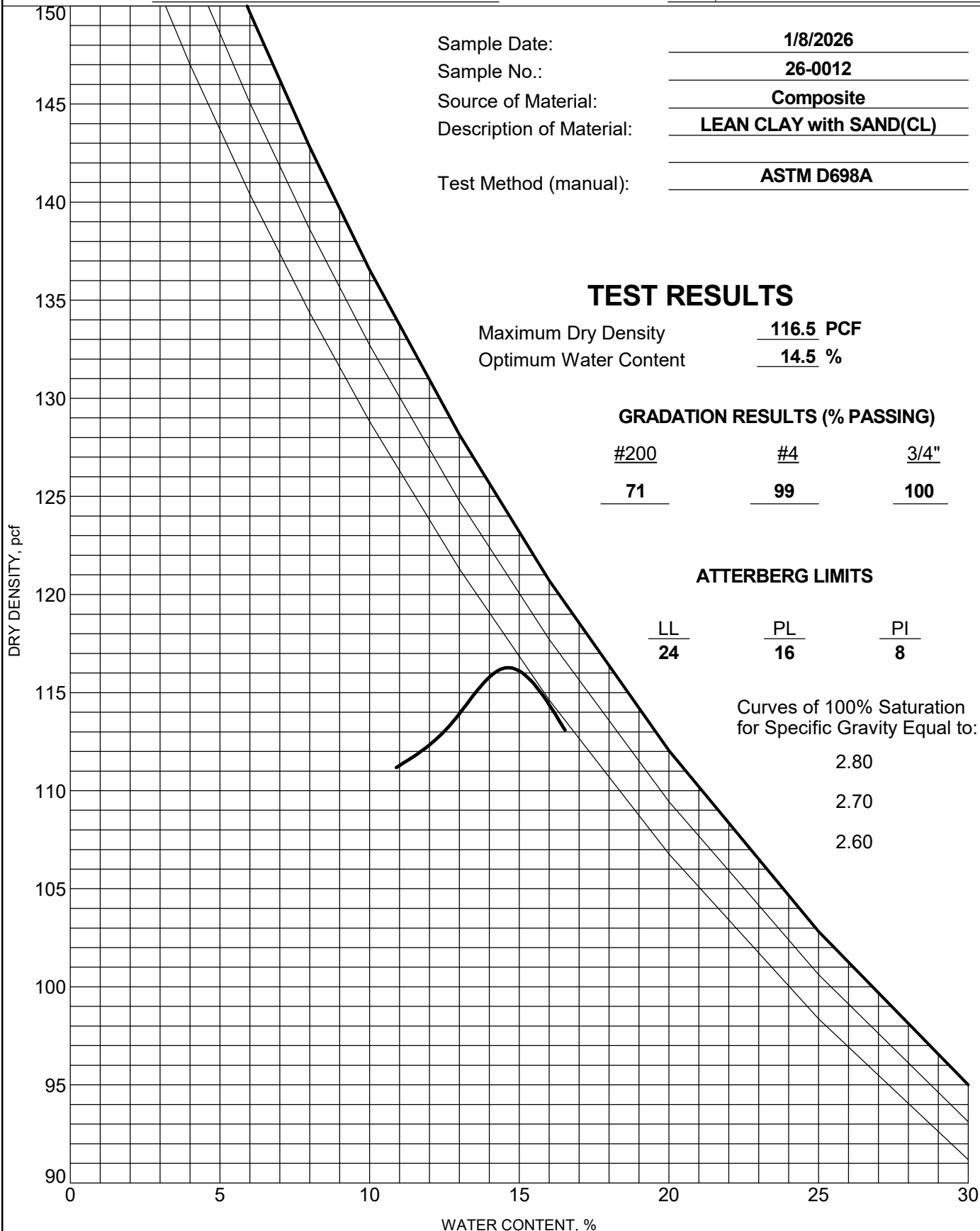
LL	PL	PI
<u>24</u>	<u>16</u>	<u>8</u>

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80

2.70

2.60





Project No.: 0207-0018
Project Name: Sewer Improvements
Client Name: City of Fruita
Sample Number: 26-0012 Location: Composite

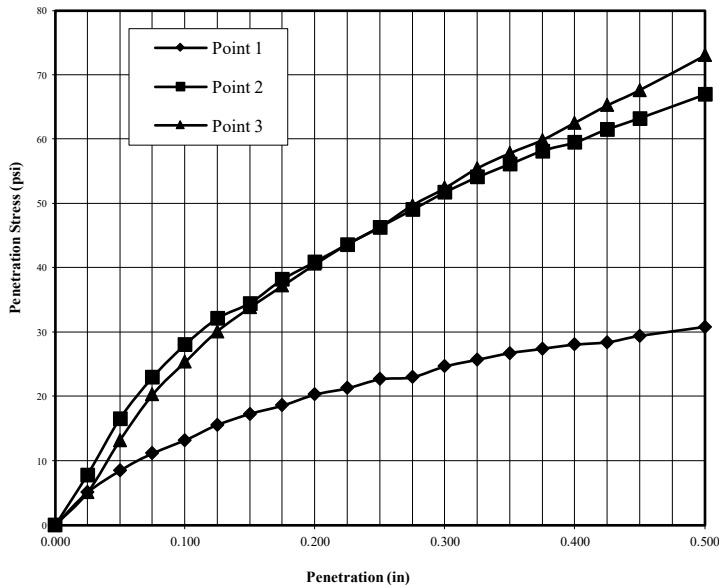
Authorized By: Client Date: 01/08/26
Sampled By: TC Date: 01/08/26
Submitted By: TC Date: 01/08/26
Reviewed By: MAB Date: 02/04/26

Compaction Method ASTM D698 Method A

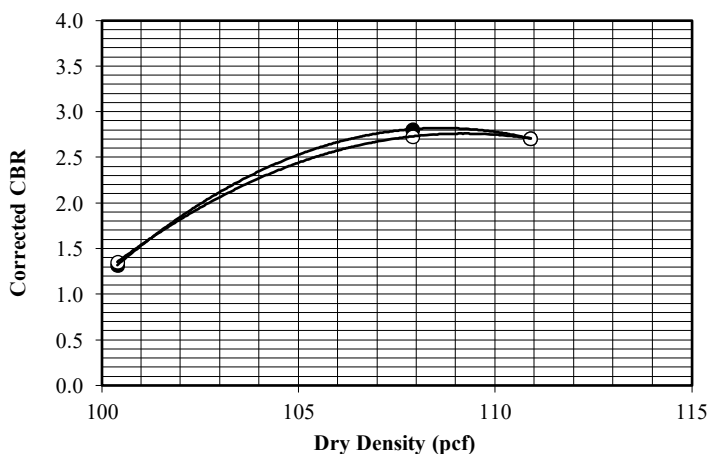
Maximum Dry Density (pcf): 116.5
Opt. Moisture Content (%): 14.5
Sample Condition: Soaked
Remarks:

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):	100.4	107.9	110.9
Dry Density After Soak (pcf):	100.0	107.7	110.6
Moisture Content (%)	Bottom Pre-Test	15.8	15.8
	Top Pre-Test	16.0	15.1
	Top 1" After Test	23.1	19.0
	Average After Soak:	19.6	18.3
Percent Swell After Soak:			
	0.4	0.2	0.3

Load Penetration 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	15	5	0.025	23	8	0.025	15	5
0.050	25	8	0.050	49	17	0.050	39	13
0.075	33	11	0.075	68	23	0.075	60	20
0.100	39	13	0.100	83	28	0.100	75	25
0.125	46	16	0.125	95	32	0.125	89	30
0.150	51	17	0.150	102	35	0.150	100	34
0.175	55	19	0.175	113	38	0.175	110	37
0.200	60	20	0.200	121	41	0.200	120	41
0.225	63	21	0.225	129	44	0.225	129	44
0.250	67	23	0.250	137	46	0.250	137	46
0.275	68	23	0.275	145	49	0.275	147	50
0.300	73	25	0.300	153	52	0.300	155	52
0.325	76	26	0.325	160	54	0.325	164	55
0.350	79	27	0.350	166	56	0.350	171	58
0.375	81	27	0.375	172	58	0.375	177	60
0.400	83	28	0.400	176	60	0.400	185	63
0.425	84	28	0.425	182	62	0.425	193	65
0.450	87	29	0.450	187	63	0.450	200	68
0.500	91	31	0.500	198	67	0.500	216	73

Corrected CBR @ 0.1"

1.3	2.8	2.7
Corrected CBR @ 0.2"		
1.4	2.7	2.7

Penetration Distance Correction (in)

0.000	0.000	0.000
-------	-------	-------

Figure: _____