THORNTON WATER PROJECT

SEGMENT F.1

PROJECT 12-777XF1

GEOTECHNICAL DOCUMENTS

ISSUED FOR BIDDING
NOT FOR CONSTRUCTION
(VOLUME 3 OF 5)

AUGUST 2026

PROVIDENCE INFRASTRUCTURE CONSULTANTS

TABLE OF CONTENTS

- Attachment 3.1 – Brierley Associates. (April 2026). Geotechnical Baseline Report, Thornton Water Project – Segment F.1, Thornton, Colorado.
- Attachment 3.2 – CMT Technical Services (August 6, 2026). Geotechnical Design Addendum, Thornton Water Project (TWP) – Segment F.1, Larimer County, Colorado.
- Attachment 3.3 – CMT Technical Services (July 15, 2026). Geotechnical Data Report, Thornton Water Project (TWP) – Segment F.1, Larimer County, Colorado.

Attachment 3.1 – Geotechnical Baseline Report

BRIERLEY ASSOCIATES

Creating Space Underground



Geotechnical Baseline Report
Thornton Water Project - Segment F.1
Thornton, Colorado
April 2026

April 17, 2026
File Number: 124202-000

Providence Infrastructure Consultants
300 Plaza Drive, Suite 320
Highlands Ranch, CO 80129

Attention: Mr. Trey Ahern, PE
Project Manager

Subject: Geotechnical Baseline Report
Thornton Water Project - Segment F.1
Thornton, Colorado

Mr. Ahern:

Submitted herewith is the geotechnical baseline report for the Thornton Segment F.1 project. This report was conducted in accordance with the contract between Brierley Associates (Brierley) and Providence Infrastructure Consultants.

We appreciate the opportunity to work with you on this project. Please contact us if we can be of further assistance, or if you have any questions regarding this project.

Sincerely,
BRIERLEY ASSOCIATES AND GOLDEN GEOTECHNICS



Kyle Friedman, PE
Brierley Associates
Rocky Mountain Trenchless Lead

Sean Sundermann, PG, CEG
Golden Geotechnics
Principal Geologist

TABLE OF CONTENTS

1 Introduction 1
1.1 Description and Purpose of GBR 1
2 Project description 2
2.1 Project Description 2
2.2 Previous Projects 4
3 Project-Specific Subsurface Investigations 4
4 Project Geology 5
4.1 Regional Geology 5
4.1.1 Richard Sandstone 8
4.2 Soil Stratigraphy 8
5 Subsurface Conditions 10
5.1 State Highway 1 Crossing 10
5.1.1 Fill 10
5.1.2 Eolian Deposits 10
5.1.3 Coarse Alluvium 12
5.1.4 Bedrock 13
5.2 Giddings Rd Crossing 17
5.2.1 Eolian Deposits 17
5.3 BNSF Crossing 19
5.3.1 Fill 19
5.3.2 Eolian Deposits 19
5.3.3 Composite Samples 21
5.4 Groundwater Conditions 22
5.5 Ground Characterization 22
5.5.1 Ground Behavior 22
5.5.2 Stickiness 22
5.5.3 Hydraulic Conductivity 23
6 Construction Considerations 25
6.1 Groundwater 25
6.2 State Highway 1 Crossing 26
6.2.1 Launching and Receiving Shafts 26
6.2.2 Trenchless Construction 27
6.3 Giddings Rd Crossing 28

6.3.1 Launching and Receiving Shafts....28
6.3.2 Trenchless Construction....29
6.4 BNSF Crossing....30
6.4.1 Launching and Receiving Shafts....30
6.4.2 Trenchless Construction....32
6.5 Trenchless Methods....32
6.5.1 Applicable Tunneling Methods....32
6.5.2 Methods Not Considered Applicable....33
7 Geotechnical Instrumentation and Monitoring....33
8 Spoils, Groundwater, and Gas Management....34
8.1 Spoils Management....34
8.2 Groundwater Management....34
8.3 Gas Management....34
9 Limitations....34
10 References....36

TABLES

Table 5-1 SH-1 Crossing Eolian Deposits Index Testing Summary....11
Table 5-2 SH-1 Crossing Eolian Deposits Strength Summary....12
Table 5-3 SH-1 Crossing Coarse Alluvium Index Testing Summary....12
Table 5-4 SH-1 Crossing Coarse Alluvium Strength Summary....13
Table 5-5 SH-1 Crossing Bedrock Index Testing Summary....14
Table 5-6 SH-1 Crossing Bedrock Density and Strength Summary....16
Table 5-7 Giddings Rd Crossing Index Testing Summary....18
Table 5-8 Giddings Rd Crossing Density and Strength Summary....19
Table 5-9 BNSF Crossing Index Testing Summary....20
Table 5-10 BNSF Crossing Density and Strength Summary....21
Table 5-11 Composite Sample Lab Results....21
Table 5-12 Baseline Ground Behavior....22
Table 5-13 Baseline Hydraulic Conductivity Values....24
Table 6-1 Baseline Percent of In-situ Volume of Material in the State Highway 1 Shafts....26
Table 6-2 Baseline Percent of In-situ Volume of Material in the SH-1 Crossing....27
Table 6-3 Feasible Trenchless Methods – State Highway 1....28
Table 6-4 Baseline Percent of In-situ Volume of Material in the Giddings Rd Shafts....28
Table 6-5 Baseline Percent of In-situ Volume of Material in the Giddings Rd Crossing....29
Table 6-6 Feasible Trenchless Methods – Giddings Rd....30
Table 6-7 Baseline Percent of In-situ Volume of Material in the BNSF Shafts....31
Table 6-8 Baseline Percent of In-situ Volume of Material in the BSNF Crossing....32
Table 6-9 Feasible Trenchless Methods - BNSF....32

FIGURES

Figure 1-1 Site Location Plan
Figure 4-1 Geologic Map
Figure 4-2 Outcrop of Richardson sandstone
Figure 5-1 SH-1 Crossing - Eolian Deposits Blow Counts N(1,60)
Figure 5-2 SH-1 Crossing – Coarse Alluvium Blow Counts N(1,60)
Figure 5-3 SH-1 Crossing – Rock Compressive Strength Classification
Figure 5-4 SH-1 Crossing – Rock Strength Classification with Depth
Figure 5-5 Giddings Rd Crossing - Eolian Deposits Blow Counts N(1,60)
Figure 5-6 BNSF Crossing - Eolian Deposits Blow Counts N(1,60)
Figure 5-7 Clogging Potential of the Eolian Deposits

APPENDIX A – Plates – Trenchless Crossing Geologic Profiles
APPENDIX B – Ground Characterization Table
APPENDIX C – Tunnelman's Classifications and Rock Mass Description

1 INTRODUCTION

1.1 Description and Purpose of GBR

This Geotechnical Baseline Report (GBR) was prepared for the proposed installation of three separate trenchless crossings consisting of a 54-inch steel casing and installation of a 42-inch welded steel carrier pipe. GBR preparation was performed in general accordance with an ASCE document entitled: “Geotechnical Baseline Reports, Suggested Guidelines”, dated 2022.

The project Owner is Thornton Water. Providence Infrastructure Consultants (PIC) is the prime design engineer, and Brierley Associates (Brierley) is the engineer of record for the trenchless installation, under contract to PIC.

This report has been developed specifically for trenchless construction techniques, which have been selected based on our experience and to mitigate the risks discussed in this GBR. Alternative trenchless methods may be offered by the Contractor providing that they address the risks and ground conditions described herein and meet the requirements of the Project Specifications (Specifications).

The purpose and applicability of this Geotechnical Baseline Report (GBR) is:

- To provide baseline subsurface conditions along the proposed trenchless alignment that the Contractor may rely upon for developing a bid for this project using industry accepted common construction practices for the specified trenchless procedures, as applicable to the conditions provided in this GBR.

- To provide a document that will be used as a measure to assess if a differing site condition occurs with respect to substantial material changes in subsurface conditions, while using industry accepted common practices for the specified shaft excavation or trenchless construction procedures.

This GBR is incorporated into the Contract Documents. The GBR presents baselines to assist bidders in evaluating construction activities necessary to accomplish the work; to assist the Contractor in planning the work and designing the temporary facilities; and to assist the Engineer and Construction Management team in reviewing and monitoring the Contractor’s submittals and operations. Discussions within the GBR represent the controlling characterization of ground conditions.

The geotechnical interpretations presented herein supersede all such interpretations presented in prior reports, test boring logs, memoranda, drafts, and other documents. Discussions within the GBR represent the controlling characterization of ground conditions for the purpose of differing site conditions as they relate to the specified construction. This GBR focuses on the proposed trenchless section and related excavations. This document is not applicable to open-cut construction methods or other portions of the project.

In the event of conflicting information within the Contract Documents, the following order of precedence shall be followed, as indicated in the General Conditions of the Contract:

1. General Conditions
2. Specifications
3. Contract Drawings
4. Geotechnical Baseline Report (GBR)
5. CMT Geotechnical Data Report, April 2026 (GDR)

Elevations in this report reference the Contract Drawings.

2 PROJECT DESCRIPTION

2.1 Project Description

The City of Thornton, Colorado is constructing a pipeline to convey water from the Water Supply and Storage Company system north of Fort Collins to Thornton for treatment and distribution to its customers. The City of Thornton has elected to install Segment F.1, consisting of 42-inch pipeline totaling approximately 31,500 linear ft, and associated appurtenances.

The trenchless crossing locations can be seen in Figure 1-1, and the overall alignment is presented in the Contract Drawings. Geologic profile Plates for the trenchless crossings are included in Appendix A. Segment F.1, as discussed in this GBR, contains three trenchless crossings: State Highway 1 (SH-1), North County Road 9 (aka Giddings Rd), and BNSF railroad.



0 2000 4000

SCALE IN FEET

BRIERLEY ASSOCIATES
Creating Space Underground
1482 COMMERCE DRIVE, UNIT A
LARAMIE, WY 82070
PH: 307.343.1148

GOLDEN GEOTECHNICS INC

CLIENT

PROVIDENCE INFRASTRUCTURE CONSULTANTS

PROVIDENCE
INFRASTRUCTURE
CONSULTANTS
300 PLAZA DR. SUITE 320
LITTLETON, CO. 80129

OWNER

CITY OF THORNTON
9500 CIVIC CENTER DRIVE
THORNTON, CO. 80229

PROJECT

THORNTON WATER
PROJECT

SEGMENT F.1

PROJECT NO	124202-000
DESIGNED BY	BB
CHECKED BY	KF
DRAWN BY	BB
APPROVED BY	N/A

SHEET TITLE

SITE LOCATION
PLAN

SHEET NUMBER

FIGURE:1-1

2.2 Previous Projects

Information from other constructed, trenchless projects in the area to use as an analog or lessons learned for ground behavior, groundwater or trenchless means & methods is very limited. A recent crossing of the BNSF tracks for the Newt 3 project was completed using a guided boring machine. The Newt 3 crossing of BNSF encountered higher groundwater than anticipated for the TWP Segment F.1 project, and dewatering was performed by the general contractor as part of the trenchless operations to implement the selected trenchless method.

3 PROJECT-SPECIFIC SUBSURFACE INVESTIGATIONS

The Brierley team was provided with a Geotechnical Data Report (GDR) submitted by CMT Technical Services (CMT) that includes a geotechnical report and the logs from eight test borings drilled across the three trenchless crossings. The trenchless test borings include the following:

- SH-1: TH-RRDI-3 (RRDI-3), TH-RRDI-4 (RRDI-4), TH-RRDI-4A (RRDI-4A), and TH-THOMPSON-1 (Thom-1).
- County Road 9: TH-KRAFT-3 (KRAFT-3) and TH-BARTLES-1 (Bartles-1).
- BNSF: TH-BARTLES-9 (Bartles-9) and TH-QTR D-1 (QTR-1)

Each trenchless crossing has a minimum of one monitoring well, which were constructed in RRDI-3, Thom-1, KRAFT-3, Bartles-1, and QTR-1.

Standard Penetration Test (SPT) and Modified California (ModCal) samples were staggered from near ground surface and across the tunnel horizon with samples collected for geotechnical testing. The penetration values reported on the test boring logs in the GDR are the field N-values, however, throughout this report, blow counts are corrected for the effects of rod length, borehole diameter, hammer energy, overburden, groundwater, and sampler type to calculate and use N(1,60) values.

The test boring logs and results of the laboratory testing program that were used to develop the geotechnical baselines and construction considerations included herein are provided in the Geotechnical Data Report (GDR).

4 PROJECT GEOLOGY

4.1 Regional Geology

The Brierley team referenced the Geologic Map of the Fort Collins quadrangle (Workman et al., 2018), Geologic map of the lower Cache La Poudre River Basin (Hershey and Schneider, 1972), historic aerial photographs and unpublished consultants' reports from the Brierley team's library to develop the regional geologic model. These references indicate that geologic conditions in the project area consist of alluvium and eolian deposits of the Colorado piedmont overlying members of the Pierre formation.

As mapped by Workman et al., the surficial deposits in the project area include Pleistocene-aged loess and Broadway alluvium. The loess, mapped as Qlo, drapes most of the project area, and consists of poorly graded, poorly bedded, wind-deposited, fine-grained sediments derived from paleofloodplains. The deposits mapped as loess by Workman et al. (2018) were encountered in the test borings as more clay than silt, and therefore the deposits are interchangeably referred to herein as eolian. The exposures of Broadway alluvium, mapped as Qb, were encountered in a few test borings as a strath terrace surface overlying the top of bedrock.

The existing BNSF track embankment and SH-1 embankment structure consists of artificial fill that was not investigated as part of the CMT site investigation.

Underlying the relatively-thin surficial deposits are formations of Cretaceous-aged (359 Ma to 323 Ma) bedrock that form the eastern margin of the Colorado Front Range. In the project area, the bedrock units consist of claystone, shale and sandstone members of the Pierre formation. The terrain is geomorphically controlled by bedrock members of differing resistance to erosion that form subtle bedrock hogbacks, draped in Quaternary eolian (windblown) deposits, formed during uplift of the Laramide Orogeny. Locally these bedrock members are folded in a series of compressional anticlines and synclines trending parallel to the front range and resulting from a regional stress field. This results in a gently rolling topography dipping to the east and incised by drainages flowing to the east.

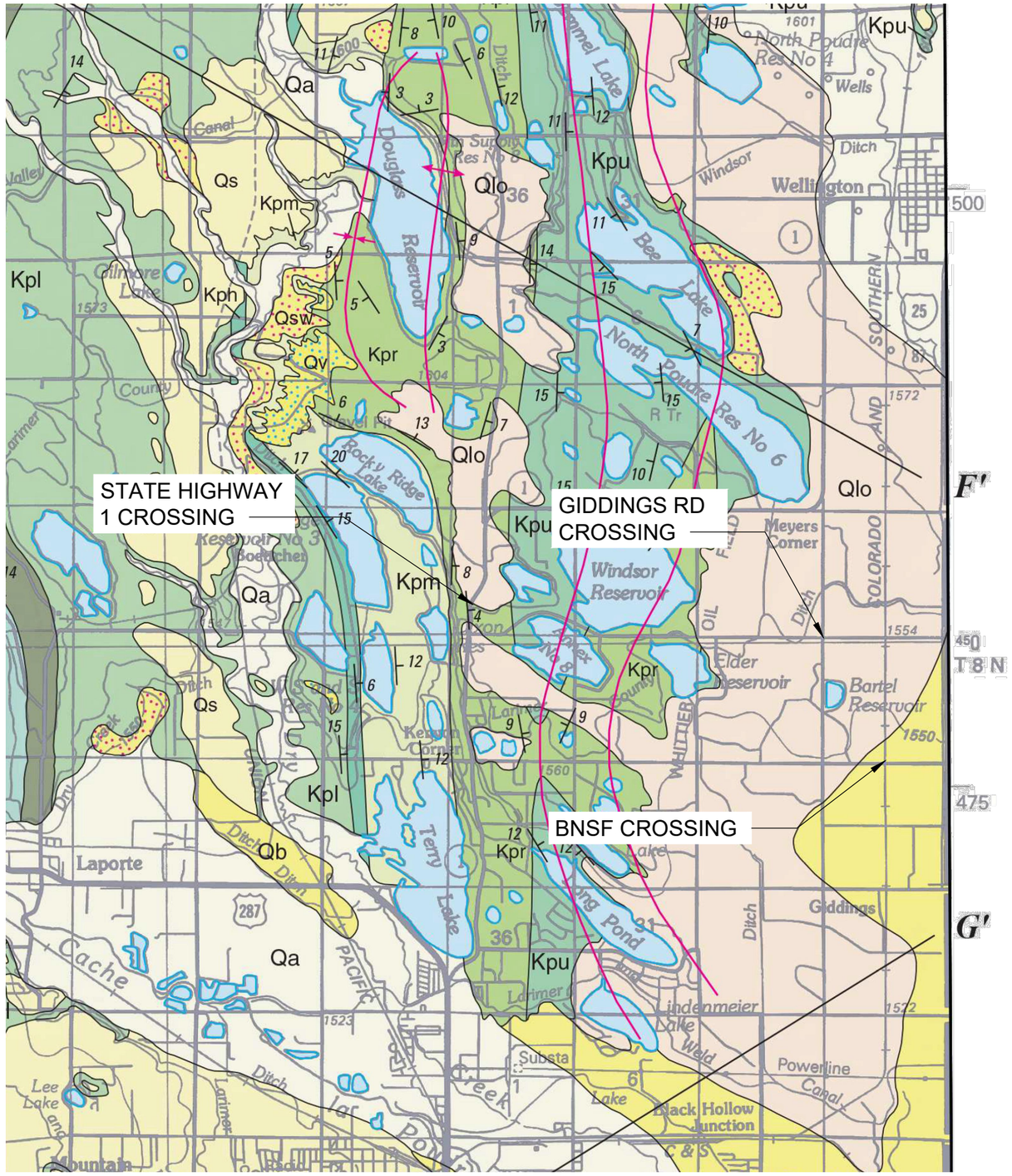
Bedrock units specific to the project area were deposited as part of the Western Interior Seaway in the Upper Cretaceous during a period of subsidence resulting from crustal flexure at the front of the Laramide Orogeny uplift. These consist, oldest to youngest, of the Pierre Middle Shale member (Kpm, Workman et al., 2018), the Richard sandstone member (Kpr, previously mapped as the Rocky Ridge sandstone) and the Upper Shale member (Kpu, Workman, 2018).

The Pierre Shale middle shale member (Kpm) includes claystone and sandy siltstone with a mapped intermember of calcareous sandstone near the center of the unit. The middle shale member is mapped by Workman et al. (2018) as 850 ft in thickness.

The Richard sandstone member is one of the regional hogback formers that can be traced striking roughly north-south with breaks resulting from local folding. An outcrop of the Richard sandstone standing roughly 10 ft was mapped 1,200 ft north of the SH-1 crossing along strike, as discussed in further detail below in section 4.1.1. The hogback can be seen in air photos extending north and creating the natural east buttress of Rocky Ridge Reservoir. The sandstone regionally dips 4 to 8 degrees to the east. Regionally, the sandstone is tan to yellowish gray, micaceous or glauconitic (dioctahedral clay mineral) with interbeds of gray shale. The Richard

sandstone is mapped by Workman et al. (2018) as 525 ft in thickness, or a maximum of 5,000 ft mapped width at an average dip of 6 degrees.

The Upper Shale member (Kpu) is mapped by Workman et al. (2018) to include friable sandstone, shaly sandstone, and silty shale with a thickness of 3,320 ft. The Upper Shale member underlies the alignment east of the SH-1 crossing.



N

LEGEND

Qlo - LOESS (EOLIAN DEPOSIT)

Qb - BROADWAY ALLUVIUM

Kpr - RICHARD SANDSTONE, LARIMER SANDSTONE, ROCKY RIDGE SANDSTONE (PRE-CENOZOIC SEDIMENTARY)

Kpu - UPPER SHALE (PRE-CENOZOIC SEDIMENTARY)

Kpm - MIDDLE SHALE (PRE-CENOZOIC SEDIMENTARY)

0 0.5 mile 1 mile
SCALE IN FEET

BRIERLEY ASSOCIATES
Creating Space Underground
750 W Hampden Ave Suite 101
Englewood, CO 80110
PH: 303.483.2890

GOLDEN GEOTECHNICS INC

CLIENT

PROVIDENCE INFRASTRUCTURE CONSULTANTS
PROVIDENCE INFRASTRUCTURE CONSULTANTS
300 PLAZA DR. SUITE 320
LITTLETON, CO. 80129

OWNER

CITY OF THORNTON
9500 CIVIC CENTER DRIVE
THORNTON, CO. 80229

PROJECT

THORNTON WATER PROJECT

SEGMENT F.1

PROJECT NO	124202-000
DESIGNED BY	BB
CHECKED BY	KF
DRAWN BY	BB
APPROVED BY	N/A

SHEET TITLE

GEOLOGIC MAP

SHEET NUMBER

FIGURE:4-1

4.1.1 Richard Sandstone

The crossing of SH-1 will encounter the Richard sandstone member of the Pierre formation. The Richard sandstone was encountered in several test borings between the West Larimer Canal crossing and the trenchless crossing of State Highway 1 (SH-1). An outcrop of the Richard sandstone standing roughly 10 ft as a small ridge former and approximately 100 ft in exposed length was mapped 1,200 ft north (bearing 327°) of the SH-1 crossing along strike. The rock at that location is fine grained, poorly graded with moderate quartz and plagioclase content, massive with some subhorizontal lenses expressing iron oxide staining.



Figure 4-2 Outcrop of Richardson sandstone approximately 1,200 ft north of the SH-1 crossing (Image 3477). The tape measure in foreground stands 3.3 ft. Figure 4-2B. Looking north toward the outcrop along exposed sandstone outcrops from a position 60 ft north of test boring RRDI-2 (Image 3482).

The rock is very bulbous, assumed to be a result of concentrated strong aCO3 cementation in the beach-deposit sandstone. Figure 4-2A shows the strong to very strong sandstone outcrop. The sandstone is subgrade or weathered trending south towards the crossing of SH-1, but outcrops of the unit exposed at ground surface were mapped in multiple locations prior to the crossing of SH-1. Figure 4-2B shows the line of outcrop tops visible in the ground trending towards the borings on the west side of SH-1.

4.2 Soil Stratigraphy

The recent test borings reveal the following general soil units in the project area:

- Fill of unknown origin and placement
- Pleistocene Eolian deposits
  - Lean Clay with sand to Sandy Lean Clay
- Coarse Alluvium
  - Poorly Graded Sand
  - Poorly Graded Sand with Silt

- Pierre Formation
  - Upper Shale member (east of SH-1)
  - Richard sandstone member (SH-1)
  - Lower Shale member (west of SH-1)

This sequence reflects the general descending order of occurrence of these units below ground surface across the site. One or more of these units may be absent at specific locations.
The anticipated soil conditions in the vicinity of the proposed trenchless alignment are shown on the profiles provided in Appendix A. The stratigraphic contacts shown are based on interpretation of regional geology and project-specific subsurface data. Note that the contacts in the soil units may be gradational and that each material may contain interbedding with variable clay, silt and sand content within the formations.

The following subsections provide material properties for the various soil units encountered based on the boring logs and laboratory results from the 2025 field investigation, empirical relationships, and local experience. For laboratory test results including moisture content, fines content, density, gradation, Atterberg limits, and unconfined compressive strength, please refer to the GDR. Where applicable to tunnel alignment, the descriptions below use blow counts and laboratory testing from the tunnel horizon, defined as the carrier pipe diameter (42 inches) plus one diameter above and below, for a total of 10.5 ft centered on carrier springline. As part of the analyses, field blow counts were corrected for the sampler and converted to N(1,60) to account for overburden, rod length, borehole diameter, sampler liners and groundwater table.

5 SUBSURFACE CONDITIONS

A Ground Characterization Table is presented in Appendix B at the end of the report that presents the ground characteristics for each material with physical baselines, geologic nomenclature, and ground behaviors.

5.1 State Highway 1 Crossing

5.1.1 Fill

Fill exists for four different purposes on the SH-1 crossing, represented as a single continuous unit on the SH-1 crossing profile (Appendix A). SH-1 sits on a fill prism embankment to an uninvestigated and assumed depth of 11.5 ft. An abandoned pipe sits on the ground surface with fill mounding to the northeast of the crossing. An 18-inch waterline within compacted fill is shown on the profile to an uninvestigated and assumed depth of 9.0 ft. An irrigation ditch is assumed to be constructed within a compacted fill prism on the west side of SH-1. Lastly, a fill berm exists near the location of the west shaft that will need to be removed for construction. Fill is a manmade deposit that may consist of engineered (controlled) structural material or a random assortment of uncontrolled materials. Fill material will not be encountered within this tunnel crossing.

5.1.2 Eolian Deposits

Eolian deposits are anticipated to be encountered from near ground surface for the crossing. The deposit extends to coarse alluvium or bedrock at depth above the tunnel horizon. The material consists of dry to moist, olive to dark brown, stiff to very stiff LEAN CLAY with sand. Limited laboratory indicates the lean clay has a liquid limit ranging from 39 to 43%, averaging 41% and the material has medium to high plasticity with a plasticity index value of 26 to 30%, averaging 28%. The clay was qualitatively observed to embody high soil toughness[1]. The clay is massive, weak presence of CaCO3, fibrous rootlets, and thin root casts infilled with gray silt. The content of very fine to fine grained sand is increasing to 20-30% toward the basal contact with the coarse alluvium of poorly graded sand below. The eolian deposits encountered in the site area are wind-blown originating from floodplain soils, therefore no in-situ gravel was encountered. No gravel greater than 3 inches in diameter and no more than 5% gravel in composition are baselined to be encountered in the deposit. A summary is provided in Table 5-1 below.

[1] Soil toughness is an indication of the shear strength at the plastic limit of the soil as it loses moisture. A low toughness soil is friable and loses shear strength and a soil with high toughness retains shear strength making it more resistant to deformation.

Table 5-1 SH-1 Crossing Eolian Deposits Index Testing Summary

			Gradation			Atterberg Limits				
Test Boring	**Top Depth (ft)**	**USCS (GGI)**	**Gravel (%)**	**Sand (%)**	**Fines (%)**	**Liquid Limit (%)**	**Plastic Limit (%)**	**Plasticity Index (%)**	**Natural Dry Density (pcf)**	**Moisture Content (%)**
THOM-1 (CL)	4	CL	--	--	--	--	--	--	101.7	24.1
	8	CL	--	27	73	43	13	30	112.3	21.6
RRDI-4	5	CL	--	40	60	39	13	26	110.7	15.1
		AVG	--	34	67	41	13	28	108.2	20.3
		MIN	--	27	60	39	13	26	101.7	15.1
		MAX	--	40	73	44	13	30	112.3	24.1

The Lean Clay ranges in consistency from medium stiff to very stiff. The material expressed weak HCl reaction to calcium carbonate content from secondary mineralization with no visible CaCO3 filaments. Figure 5-1 shows a histogram of the blow counts corrected to N(1,60) indicating the material is primarily stiff. As noted in table 5-1, N(1,60) blow counts ranged between 8 and 24 with an average of 14 (stiff).

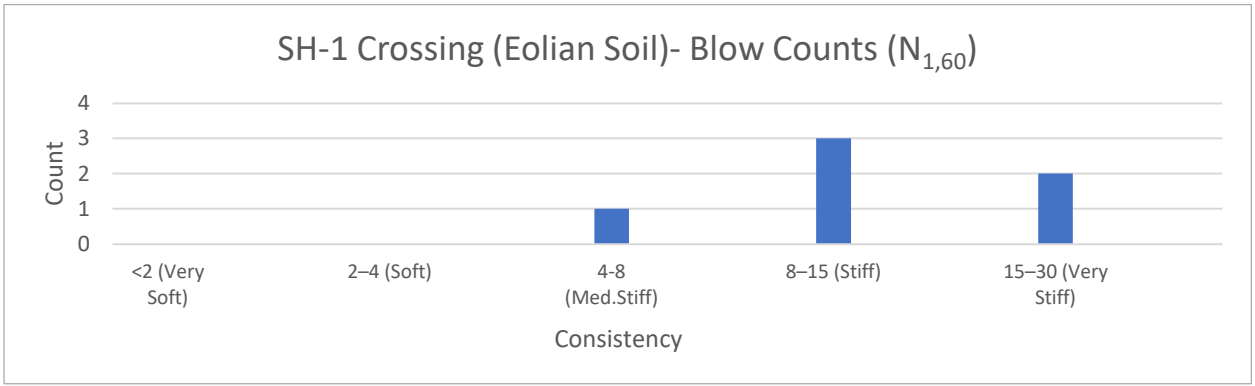


Figure 5-1 SH-1 Crossing - Eolian Deposits Blow Counts N(1,60)

Table 5-2 SH-1 Crossing Eolian Deposits Strength Summary

Test Boring	Sampler Type	Top Depth (ft)	Nvalue (Blows)	SPTn	N1,60[a]	Shear Strength (Su, kPa)[a]	Swell/Consol Vol Change (%)	Swell Pressure (psf)
THOM-1	ModCal	4	15	10	13	255	0.5	1,340
	SPT	6	17	17	24	433	--	--
	ModCal	8	13	8	9	204	--	--
	SPT	10	10	10	12	255	--	--
RRDI-4	SPT	3	14	14	20	206	--	--
	ModCal	5	9	6	8	88	--	--
		AVG	13	11	14	240	0.5	1340
		MIN	9	6	8	88	--	--
		MAX	17	17	24	433	--	--

a. Calculated by Geologismiki SPT Corr v.4.0.1.9. Ce = 1.0, Cn = Liao & Whitman, Cb = 1.0 (4" SSA), Cs = 1.0 (MC) or 1.1 (SPT), applied correction due to G.W.T. where applicable (THOM-1: GW@11ft / RDDI-4: GW@14ft). The soil unit weight averages used for eolian in borings THOM-1 and RDDI-4 were 16.81 and 15.1 kN/m3 respectively.

5.1.3 Coarse Alluvium

Coarse alluvium was encountered between the fine eolian deposits and the Richard sandstone on the east side of the crossing. The coarse alluvium thinned to the west or has been eroded away towards the Richard sandstone outcropping on the west side of the crossing. The material consists of damp to moist, light olive brown, medium dense to dense SILTY SAND (SM) grading to CLAYEY SAND (SC) towards the basal contact. Limited laboratory datum indicates the sand contains 15-20% fines but is non-plastic. The poorly graded, very fine to fine grained sand is massive, homogenous, moderately consolidated, with moderate quartz and plagioclase content. The material has weak cohesion, adhering to the solid stem drill augers. No gravel greater than 3 inches in diameter and no more than 10% gravel in composition are baselined to be encountered in the deposit. A summary of index testing is provided in Table 5-3 below.

Table 5-3 SH-1 Crossing Coarse Alluvium Index Testing Summary

			Gradation			Atterberg Limits				
Test Boring	Top Depth (ft)	USCS (GGI)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Natural Dry Density (pcf)	Moisture Content (%)
THOM-1	12	SM	--	81	19	NV	NP	NP	94.7	25.1

The very fine to fine sand ranges in density from medium dense to dense. The material expressed weak HCl reaction to calcium carbonate content from secondary mineralization with no visible CaCO3 filaments and weak to no cementation. Instead, the cohesion of the sand results from silt and glauconitic clay. Figure 5-2 shows a histogram of the blow counts corrected to N(1,60) indicating the material is medium dense to dense. As noted in table 5-4, N(1,60) blow counts ranged between 14 and 70 with an average of 42 (dense).

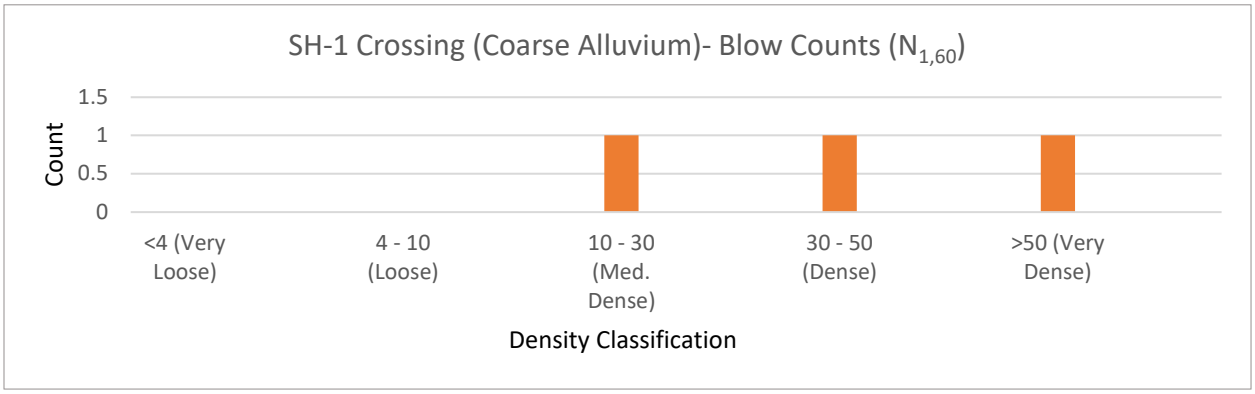


Figure 5-2 SH-1 Crossing – Coarse Alluvium Blow Counts N(1,60)

Table 5-4 SH-1 Crossing Coarse Alluvium Strength Summary

Test Boring	Sampler Type	Top Depth	Nvalue	SPTn	N1,60[a]	Shear Strength	Swell/Consol Vol Change	Swell Pressure
		(ft)	(Blows)			(Su, kPa)[a]	(%)	(psf)
THOM-1	ModCal	12	30	12	14	NA	-0.1	NA
	SPT	14	50/12	50	41	NA	--	--
RRDI-4	SPT	7	66/12	66	70	NA	--	--
		AVG	43	43	42	NA	-0.1	NA
		MIN	30	12	14	NA	--	--
		MAX	50	66	70	NA	--	--

a. Calculated by Geologismiki SPT Corr v.4.0.1.9. Ce = 1.0, Cn = Liao & Whitman, Cb = 1.0 (4" SSA), Cs = 1.0 (MC) or 1.1 (SPT), applied correction due to G.W.T. where applicable (THOM-1: GW@11ft / RDDI-4: GW@14ft). The soil unit weight averages used for coarse alluvium in borings THOM-1 and RDDI-4 14.90 kN/m3 respectively.

5.1.4 Bedrock

Richard sandstone was encountered in all four test borings for the SH-1 crossing but is not exposed at the surface. Based on the top of bedrock geometry established by the test boring program the bedrock is dipping to the east at a 4 to 5 degree apparent dip, which is consistent with regional mapping (Workman et al., 2018). Bedrock is a clayey SANDSTONE composed of poorly graded, light grey mottled olive grey, fine to medium grained sand with a range of fines content of 20 to 41%, averaging 31%., as shown in Table 5-5 below. The fines content is primarily glauconite clay. Atterberg limits indicate the material is nonplastic, but a composite sample collected from drill cutting measured a plasticity index of 16. The sandstone has a tested Equivalent Quartz Content of 20% and a remaining component of various minerals, primarily plagioclase.

Table 5-5 SH-1 Crossing Bedrock Index Testing Summary

			Gradation					Atterberg Limits	
Test Boring	Top Depth (ft)	Natural Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plasticity Index (%)
RRDI-3	8	10.4	--	--	20	--	--	--	--
	10	NA	0	74	26	9	17	--	--
	14	2.3	0	63	37	--	--	--	--
	10-15	NR	0	59	41	--	--	30	16
RRDI-4/4A	13	13.4	0	64	36	--	--	NV	NP
	18	12.8	--	--	--	--	--	--	--
	20	10.0	--	--	--	--	--	--	--
	23	9.8	--	--	--	--	--	--	--
	25.1	11.6	--	--	--	--	--	--	--
	29.3	1.4	--	--	--	--	--	--	--
THOM-1 (SM)	16	17.7	--	--	--	--	--	--	--
	AVG	6.35	0	65	31	9	17	15	8
	MIN	2.3	0	59	20	--	--	0	0
	MAX	10.4	0	74	41	--	--	30	16

At test boring RRDI-3, the heavy duty Diedrich D120 drill rig had difficulty advancing the 6-inch diameter hollow stem with squealing augers using bullet bits beginning at approximately 5 ft bgs. The driller eventually switched to 4-inch diameter solid stem augers at 10.5 ft depth bgs and was able to complete the test boring. At RRDI-4, the much smaller CME 45 drill rig was unable to advance solid stem augers beyond 15.6 ft depth where the sandstone refused advancement of the augers. The Diedrich D120 drill rig was successful in rock coring in the sandstone with NQ size wireline with minimal down pressure and light water pressure.

As discussed below, the sandstone has a weathering horizon developed in the upper 15 ft that results in a higher fracture density and variable loss of strength. Therefore, the sandstone is broken out into two separate units for baseline purposes, the Upper and Lower Sandstone. Because the sandstone is dipping to the east, the variability with depth of the sandstone's strength and fracture density, and the transition from upper to lower sandstone, will be encountered in the tunnel crossing and in the shafts as shown on the SH-1 profile (Appendix A).

Upper Sandstone

The upper sandstone bedrock is intensely fractured (USBR, 1998) in the upper 6 ft (very poor RQD), reducing to moderately fractured in the succeeding 4 ft (poor RQD), and reducing to slightly fractured from approximately 10 ft below the top of rock and below (excellent RQD). The fractures are subhorizontal, minor weathering halos on the surfaces, no infill between the joints, moderately rough joint surfaces with tight apertures. Overall, the sandstone is friable with no CaCO3 cementation as encountered in the test borings, in contrast to the outcrops of the unit

mapped to the north. The sandstone exhibits a change in color from light gray to an olive brown in the upper 13 ft, interpreted here as oxidation of the sandstone coincident with the more fractured upper sandstone that maintains the same fine-grained sand of primarily quartz and plagioclase.

The sandstone CERCHAR abrasivity index (CAI), corrected for the lab saw-cut surface for CAIs<4, was measured as low abrasiveness (ASTM D7625-22), with an average of 0.62. Given the moderate quartz content and the potential for cementation, the bedrock is baselined to be medium abrasive (ASTM D7625-22).

The sandstone is extremely weak (R0) to weak (R2) and globally slightly weathered (USBR, 1998). Unconfined compressive strength testing ranged between 1,580 and 1,677 psi with an average of 1,629 psi, removing one test of 25 psi from THOM-1 sampled at the bedrock contact called out in the CMT test boring log as “weathered sandstone”. As encountered in the test borings, the Richard sandstone at the SH-1 crossing did not express cementation with calcium carbonate as observed in the outcrop to the north, instead the sandstone is lithified with a higher glauconite content infilling the fine-grained sand pore space. The tested unconfined compressive strength values of the sandstone are interpreted to be representative of the unit at this crossing and is baselined to have a UCS between 900 and 2,000 psi.

Lower Sandstone

The light grey lower sandstone bedrock is slightly fractured (USBR, 1998) with excellent RQD and slightly weathered. The sandstone is friable with no CaCO3 cementation as encountered in the test borings. The lower sandstone maintains the same fine-grained sand of primarily quartz and plagioclase as the upper sandstone and is therefore similarly baselined to be medium abrasive (ASTM D7625-22).

The sandstone is moderately soft (USBR, 1998), and the compaction and strength have increased with depth to medium strong (R3). Unconfined compressive strength testing ranged between 976 and 4,169 psi with an average of 2,052 psi. Figure 5-3 summarizes the distribution of the test values, and Figure 5-4 illustrates the strength values with depth along test boring RRDI-4A, increasing to 4,169 psi near the bottom of the boring at tunnel depth. As encountered in the test borings, the Richard sandstone at the SH-1 crossing did not express cementation with calcium carbonate as observed in the outcrop to the north, instead the sandstone is lithified with a higher glauconite content infilling the fine-grained sand pore space. This variability of the sandstone bedrock’s strength and fracture density with depth will be encountered in the tunnel crossing and in the shafts. The unconfined compressive strength values of the lower sandstone is baselined to be between 4,000 and 5,000 psi.

Table 5-6 SH-1 Crossing Bedrock Density and Strength Summary

Boring	Depth (ft)	Natural Dry Density (pcf)	Unconfined Compressive Strength (psi)	Shear Strength (psi)	Saw-Cut CERCHAR Abrasivity CAI_s	CERCHAR Abrasivity Index CAI
RRDI-4/4A	13.0-13.5	99.1	--	--	--	--
	14.7–14.9	--	--	--	0.54	0.62
	18.0–18.4	121.9	1,677	839	--	--
	20.0–20.5	124	1,580	790	--	--
	22.5–23.0	--	--	--	0.63	0.72
	23.0–23.5	124.4	976	488	--	--
	25.1–25.6	123.3	1,013	506	--	--
	28.5–28.8	--	--	--	0.45	0.51
	29.3–29.8	158.4	4,169	2,084	--	--
THOM-1	16.0-16.5	110.3	25	13	--	--
	AVG	123.1	1883[a]	787	0.54	0.62
	MIN	99.1	976[a]	13	0.45	0.51
	MAX	158.4	4169	2084	0.63	0.72

a. UCS average and minimum calculated removing sample S-7 from THOM-1 sampled at the bedrock contact called out in the CMT test boring log as “weathered sandstone” and measured as 25 psi.

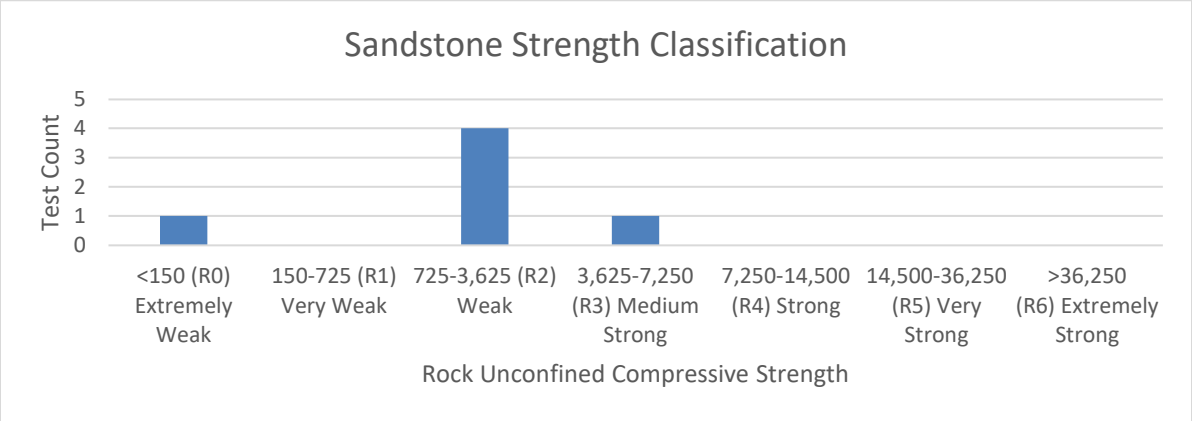


Figure 5-3 SH-1 Crossing – Rock Compressive Strength Classification

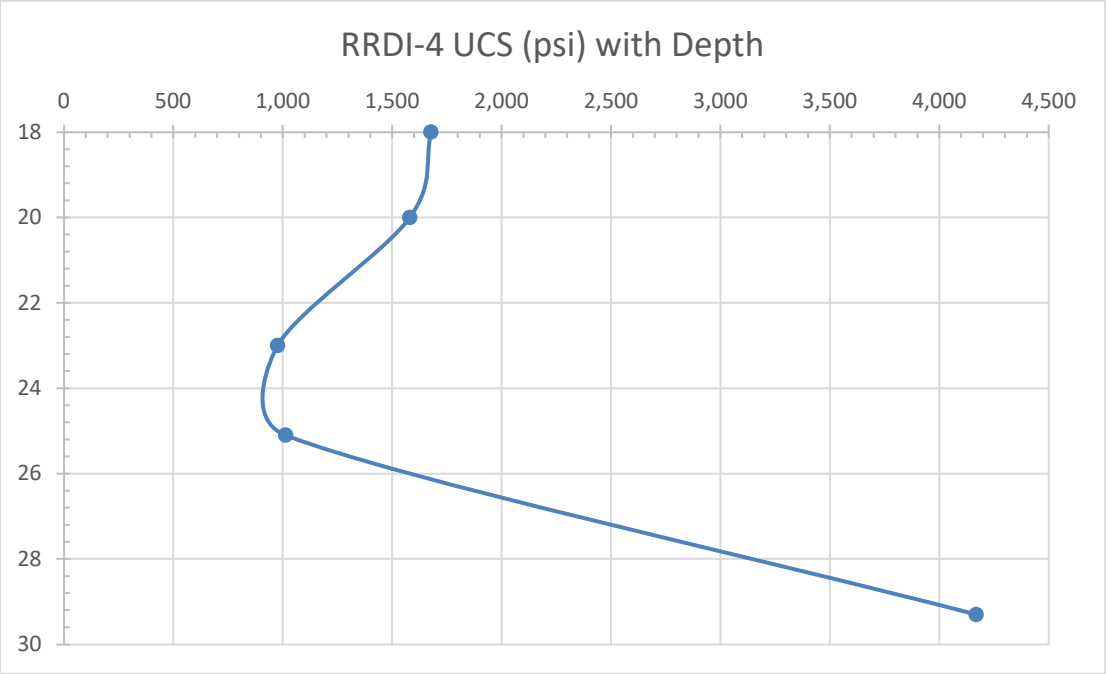


Figure 5-4 SH-1 Crossing – Rock Strength Classification with Depth

5.2 Giddings Rd Crossing

5.2.1 Eolian Deposits

Eolian deposits are anticipated to be encountered from near ground surface, beneath a veneer of fill and a plow zone of 2 to 3 ft. The deposit extends to either bedrock or coarse alluvium at depth below the tunnel horizon and shafts. The material consists of damp to wet, light olive brown to medium brown, soft to stiff LEAN CLAY with sand to Sandy LEAN CLAY (CL). Hydrometer testing indicates the material contains 26% up to 35% silt. The lean clay has a liquid limit ranging between 30 and 44, averaging 39. The material is medium to high plasticity with a plasticity index range between 17 and 29, averaging 25. The upper half of the tunnel horizon was qualitatively observed to embody medium to high soil toughness and low to moderate toughness in the lower half of the tunnel horizon. The eolian deposits encountered in the site area are wind-blown originating from paleofloodplain soils, therefore no in-situ gravel was encountered. No gravel greater than 3 inches in diameter and no more than 5% gravel in composition are baselined to be encountered in the deposit. Eolian deposits are limited in energy to carry only fine sand grains, which is reflected in the gradation curves with only 2% to 5% retained at the #100 screen, up to 10% retained in BA-1 at tunnel invert as the lean clay is increasing in sand content. Sand content is of varying mineralogy and origins, consisting of quartz, mica and plagioclase and mafic minerals. A summary of index testing within the tunnel horizon is provided in Table 5-7 below.

Table 5-7 Giddings Rd Crossing Index Testing Summary

			Gradation				Atterberg Limits			
Test Boring	Top Depth (ft)	USCS	Gravel (%)	Sand (%)	Fines or Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Dry Density (pcf)
Kraft-3	7	CL	--	--	--	--	--	--	--	98.0
	9	CL	--	--	85		42	15	27	
	11	CL	--				39	13	26	98.3
	13	CL	0	17	35	48	44	15	29	--
	15	CL	--	--	--	--	30	13	17	--
BA-1	8	CL	0	21	79	--	41	15	26	105.1
	10	CL	--	--	--	--	40	14	26	--
	12	CL	--	--	--	--	--	--	--	97.4
	14	CL	0	35	26	39	--	--	--	--
		AVG	0	24	78	44	39	14	25	99.7
		MIN	--	17	65	39	30	13	17	97.4
		MAX	--	35	85	48	44	15	29	105.1

The eolian Lean Clay ranges in consistency from soft to stiff. The material expressed moderate HCl reaction to calcium carbonate content from secondary mineralization with no visible CaCO3 filaments. Figure 5-5 shows a histogram of the blow counts corrected to N(1,60) and the relative consistency indicating the material is primarily medium stiff. As noted in table 5-8, N(1,60) blow counts ranged between 4 (soft) and 11(stiff) with an average of 7 (medium stiff).

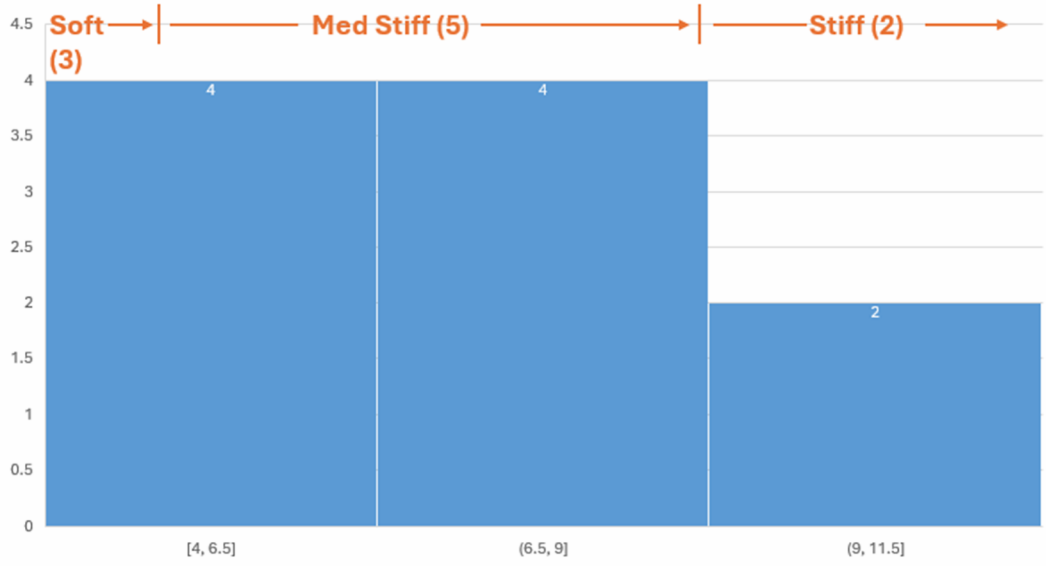


Figure 5-5 Giddings Rd Crossing - Eolian Deposits Blow Counts N(1,60)

Table 5-8 Giddings Rd Crossing Density and Strength Summary

Test Boring	Sampler Type	Top Depth (ft)	Nvalue	SPTn	N1,60 [a]	UCS (psf)	Shear Strength (Su, kPa)[a]	Swell/Consol Vol Change (%)	Swell Pressure (psf)
Kraft-3	ModCal	7	7	5	6	--	74	0	NA
	SPT	9	3	3	4	--	44	--	--
	ModCal	11	5	3	4	1,235	44	-0.2	NA
	SPT	13	5	5	8	--	74	--	--
	ModCal	15	8	5	7	--	74	--	--
BA-1	SPT	6	8	8	11	--	118	--	--
	ModCal	8	12	8	10	--	118	-0.1	NA
	SPT	10	5	5	7	--	74	--	--
	ModCal	12	5	3	4	1,270	44	--	--
	SPT	14	5	5	7	--	74	--	--
				AVG	7	1,253	74	-0.15	NA
				MIN	4	1,235	44	-0.2	--
				MAX	11	1,270	118	-0.1	--

a. Calculated by Geologismiki SPT Corr v.4.0.1.9. Ce = 1.0, Cn = Liao & Whitman, Cb = 1.0, Cs = 1.0 (MC) or 1.1 (SPT), Soil weight = 16.8 kN/m3, Corrected due to G.W.T.

5.3 BNSF Crossing

5.3.1 Fill

Railroad ballast only exists directly below the BNSF railroad tracks to an uninvestigated and assumed depth of 2.7 ft. Fill is a manmade deposit that may consist of engineered (controlled) structural material or a random assortment of uncontrolled materials. Fill material will not be encountered within this project.

5.3.2 Eolian Deposits

Eolian deposits are anticipated to be encountered from the ground surface, generally with a plow zone of 2 to 3 ft, extending to either bedrock or coarse alluvium. The material consists of dry to moist, light yellowish brown to dark yellowish brown, stiff to very stiff LEAN CLAY with sand to sandy LEAN CLAY (CL). The eolian deposits also contain 20% up to 40% silt. The lean clay has a slightly higher liquid limit than the Giddings Rd crossing ranging between 38 and 46, averaging 41. The material is medium to high plasticity with a plasticity index range between 21 and 31, with an average of 26. The tunnel horizon was qualitatively observed to embody high soil toughness with low to moderate toughness in the lower half of the tunnel horizon in test boring Bartlet-9. No in-situ gravel was encountered in the eolian deposits encountered. No gravel greater than 3 inches in diameter and no more than 5% gravel in composition are baselined to be encountered in the eolian deposits. Eolian deposits are limited in energy to carry only fine sand grains, which is reflected in the gradation curves with only 4% to 6% retained at the #100 screen, with up to 9% retained in QTR-1 at tunnel invert as the lean clay is increasing

in sand content. A summary of index testing within the tunnel horizon is provided in Table 5-9 below.

Table 5-9 BNSF Crossing Index Testing Summary

								Atterberg Limits		
Test Boring	Top Depth (ft)	USCS	Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plasticity Index (%)	Natural Dry Density (pcf)
QTR-1	5	CL	--	--		--	--	46	31	--
	7	CL	--	--		--	--	--	--	104.4
	9	CL	--	--		--	--	40	26	--
	11	CL	0	33	67	23	44	--	--	108.8
BA-9	8	CL	--	--		--	--	38	21	108.5
	10	CL	0	15	85	39	46	--	--	--
		AVG	0	24	76	31	45	41	26	107.2
		MIN	0	15	67	23	44	38	21	104.4
		MAX	0	33	85	39	46	46	31	108.8

The eolian Lean Clay ranges in consistency from stiff to hard. The material expressed moderate to strong HCl reaction to calcium carbonate content from secondary mineralization with Stage II carbonate development including visible CaCO3 filaments and nodule coatings. Figure 5-6 shows a histogram of the blow counts corrected to N(1,60) and the relative consistency indicating the material is primarily very stiff. As noted in table 5-10, N(1,60) blow counts ranged between 9 (stiff) and 33 (hard) with an average of 19 (very stiff).

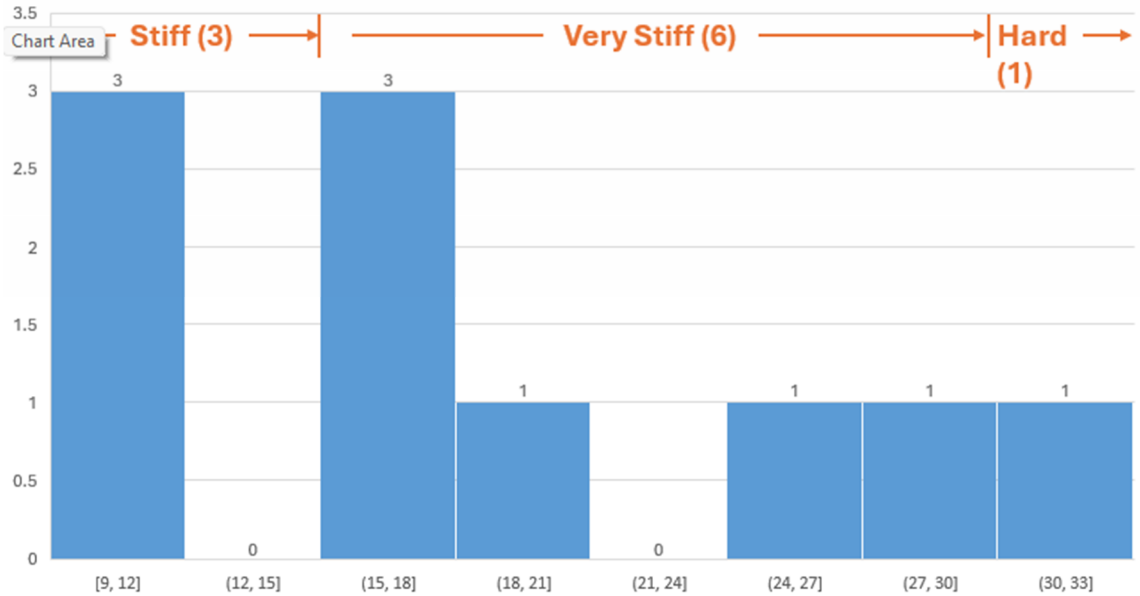


Figure 5-6 BNSF Crossing - Eolian Deposits Blow Counts N(1,60)

Table 5-10 BNSF Crossing Density and Strength Summary

Test Boring	Sampler Type	Top Depth (ft)	Nvalue	SPTn	N1,60 [a]	UCS (psf)	Shear Strength (Su, kPa)[a]	Swell/Consol Vol Change (%)	Swell Pressure (psf)
QTR-1	SPT	5	20	20	28	--	510	--	--
	ModCal	7	20	13	17	3,120	191	--	--
	SPT	9	25	25	31	--	368	--	--
	ModCal	11	28	18	19	--	264	-0.1	NA
	SPT	13	26	26	24	--	302	--	--
BA-9	ModCal	4	20	13	17	--	191	--	--
	SPT	6	11	11	15	--	162	--	--
	ModCal	8	12	8	9	6,040	118	0.1	1,100
	SPT	10	9	9	11	--	132	--	--
	ModCal	12	12	8	9	--	118	--	--
	AVG		18	15	18	4,580	236	-0.1	1,100
	MIN		9	8	9	3,120	118	-0.1	--
	MAX		28	26	31	6,040	510	0.1	--

a. Calculated by Geologismiki SPT Corr v.4.0.1.9. Ce = 1.0, Cn = Liao & Whitman, Cb = 1.0, Cs = 1.0 (MC) or 1.1 (SPT), Soil weight = 16.8 kN/m3, Corrected due to G.W.T.

5.3.3 Composite Samples

To evaluate the ground conditions across the cross-sectional face of the tunnel envelope at each of the crossings, laboratory testing was performed on “composite” samples. A sample mixed across the tunnel envelope provides a more accurate representation of the in-situ material encountered at the face of tunnel excavation and how that combination of soil deposits would behave as the material is excavated and removed as cuttings.

Table 5-11 Composite Sample Lab Results

			Gradation			Atterberg Limits		
Crossing	Boring	Depth	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
BNSF	BA-9	0 - 15	0	20	80	42	16	26
CO-9	KR-3	10 - 15	0	19	81	42	14	28
	BA-1	10 - 15	0	17	83	42	16	26
SH-1	RRDI-3	10 - 15	0	59	41	30	14	16

5.4 Groundwater Conditions

Groundwater was encountered in all borings and as shown within the Groundwater Elevation Table presented in the GDR. Fluctuations in groundwater levels will occur due to seasonal variations in precipitation, temperature, nearby irrigation levels, groundwater injection/extraction, site development, and other factors not evident at the time that these measurements were made. Baseline groundwater levels are shown on the geologic profiles for each crossing.

5.5 Ground Characterization

5.5.1 Ground Behavior

A modified version of the Tunnelman's Ground Classification, presented in Appendix B, was used to characterize anticipated ground behaviors and was used in the baselines of the soil descriptions. Terzaghi's Rock Mass Descriptions, also presented in Appendix B, was used to baseline the behavior of the encountered bedrock. Table 5-12 below presents the anticipated ground behavior and baseline conditions for the project soils.

Table 5-12 Baseline Ground Behavior

Material Type	Behavior	
	Above Groundwater	Below Groundwater
Eolian Deposits	Firm to Slow Raveling	Fast Raveling
Coarse Alluvium	Slow to Fast Raveling	Fast Raveling to Flowing
Bedrock	Intact Rock	Intact Rock

5.5.2 Stickiness

Research by Hollmann and Thewes (2013) has expanded the understanding of clay clogging behavior in mechanized tunneling. Their work introduces a universal classification diagram that evaluates clogging potential based on the relationship between a soil's plasticity index and its water content, specifically the differences between the natural water content and the plastic and liquid limits. This approach allows for a more nuanced assessment of clogging risk across all shield types, including slurry-supported, Earth Pressure Balance (EPB), and open-face tunnel boring machines (TBMs).

The diagram enables prediction of whether a soil's natural consistency is already within a critical range for clogging, or if it may be transformed into such a state due to the availability of free water during excavation. Soils with high plasticity indices and soft to stiff consistencies are particularly prone to clogging, especially when exposed to additional water from groundwater inflow or support slurry. Conversely, soils with low plasticity indices require more specific conditions to become sticky and are more likely to disperse fines into slurry systems.

Figure 5-1 presents the clogging potential for fine-grained soils encountered in the trenchless crossing borings. This figure illustrates the position of the soils relative to critical consistency fields and highlights the potential for clogging under varying water availability scenarios. The diagram also supports estimation of the water content changes necessary to transition soils into or out of clogging-prone states, which is particularly useful for planning soil conditioning strategies in EPB/MTBM operations.

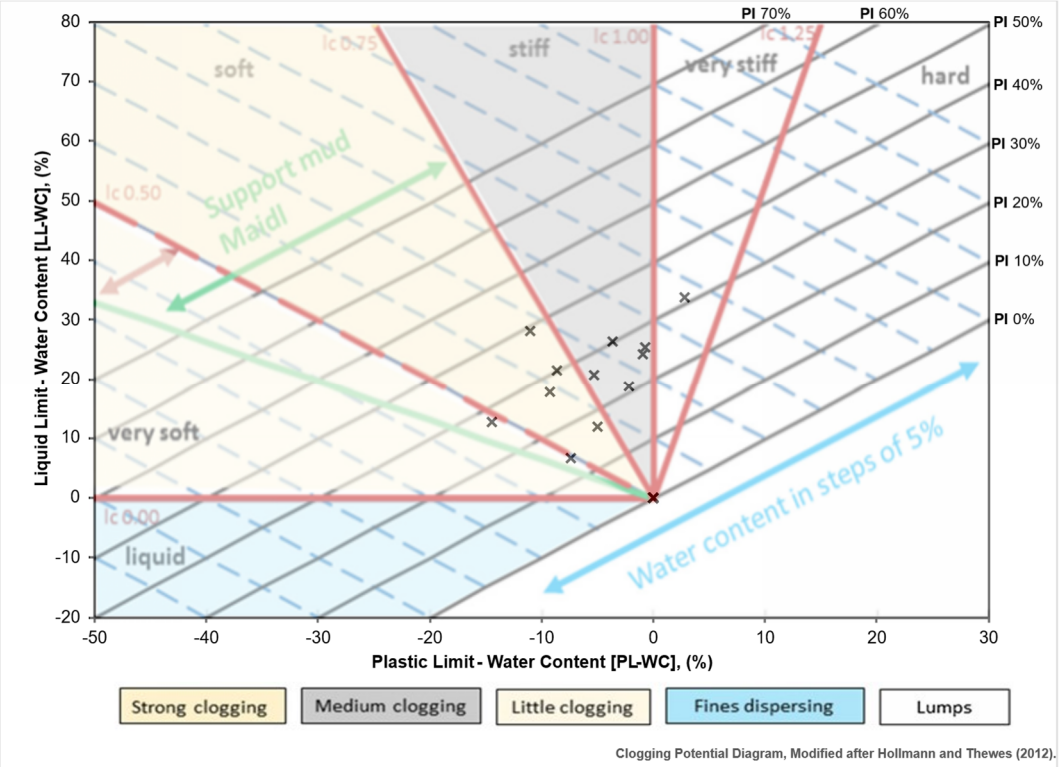


Figure 5-7 Clogging Potential of the Eolian Deposits

The eolian deposits are baselined to have a clogging potential as “medium” to “high” in its natural condition. The Contractor is advised to develop plans for managing the clogging potential during excavation. It is anticipated that 100 percent of the excavated eolian deposits volume for the trenchless crossings will exhibit a medium to high clogging potential with open face tunneling methods. There is no clogging potential baselined within the coarse alluvium or sandstone bedrock.

5.5.3 Hydraulic Conductivity

Ten slug tests were performed by CMT as part of the geotechnical investigation for the referenced project. Six of those slug tests were performed at the proposed trenchless crossing locations with the other four at the canal crossings. The slug tests were performed in wells that were screened with the eolian deposits and the bedrock. The baseline hydraulic conductivity values as shown in Table 5-13. Due to no slug tests performed within only a coarse alluvium material, a provisional baseline in line with a typical silty sand material is provided. Table 5-13, below, shows the baselined hydraulic conductivity values for the soil types that will be encountered within shafts and trenchless crossings.

Table 5-13 Baseline Hydraulic Conductivity Values

Material	Hydraulic Conductivity (cm/sec)				Permeability Description[a]
	Min	Max	Average	Baseline	
Eolian Deposits	$6.07x10^{-6}$	$2.32x10^{-4}$	$2.2x10^{-4}$	$2.25x10^{-4}$	Low to very low
Coarse Alluvium	N/a	N/a	N/a	$1.0x10^{-3}$	Low to moderate
Sandstone Bedrock	$2.08x10^{-5}$	$2.63x10^{-5}$	$2.3x10^{-5}$	$2.5x10^{-5}$	Dry

a. Permeability description is per Table 3.5 of Construction Dewatering and Groundwater (2007)

Variation of the hydraulic conductivity is expected to occur within each stratum, and reference should be made to specific conditions and descriptions indicated within the test boring logs when selecting a specific hydraulic conductivity. It should be anticipated that the hydraulic conductivity will be anisotropic, with horizontal hydraulic conductivity anticipated to be higher, sometimes by a factor of 10 or more, than vertical hydraulic conductivity, due to depositional nature and soil layering. Bedrock elevations at the SH-1 crossing will impact de-watering means and methods and/ or production within the coarse alluvium material.

6 CONSTRUCTION CONSIDERATIONS

The proposed trenchless crossing will remove confinement of the surrounding soils which may become unstable over relatively short periods of time (within an hour for granular material and within a day for cohesive material) unless supported. The proposed trenchless crossings are situated within Eolian Deposits, Coarse Alluvium, and bedrock materials. The selection of the means and methods for portal and crossing construction must take into consideration the full range of anticipated subsurface conditions.

The sections below summarize construction methods considered appropriate to ground conditions for the trenchless crossing. Within the limitations provided in the Project Specifications, the Contractor is responsible for selecting shaft excavation methods, jacking pipe design, shaft support systems, shaft construction methods, developing shaft designs, and groundwater control plans.

6.1 Groundwater

The shafts and tunnels for this project will extend below the prevailing groundwater level; thus, dewatering or impervious shaft support will be required for all trenchless crossings. Groundwater is anticipated to be within the eolian deposits and coarse alluvium for SH-1 and within the eolian deposits for Giddings Rd and the BNSF crossings.

If dewatering is used, it will be essential to temporarily lower the groundwater surface to the bedrock elevation to prevent adverse ground behavior for SH-1 or 2 feet below the bottom of shaft elevation for Giddings Rd and BNSF. Additionally, adverse impacts to the tunneling operations need to be considered during dewatering operations, including destabilizing the Microtunnel Boring Machine (MTBM) slurry balance (if utilized), and/or pulling soil into the machine overcut, resulting in increased jacking forces.

The Contractor is responsible for determining specific dewatering methods consistent with their selected excavation support and excavation methods. It is anticipated that the groundwater control at the SH-1 receiving shaft can be accomplished using well points and pump systems coupled with sumps placed inside the shafts, depending on location. The dip and dip direction of the sandstone bedrock should be taken into account for the location of well points.

For Giddings Rd and BNSF crossing locations, it is anticipated that groundwater control can be accomplished using well points coupled with sumps placed inside the shafts. The Contractor is responsible for groundwater discharge permitting and disposal locations and associated fees.

Based on available geotechnical data and construction experience in in the region, the proximity of bedrock can reduce the efficiency of dewatering systems due to restrictions on vertical flow and limited drawdown depth. Dewatering methods should be initiated with sufficient time in advance of excavation to allow for groundwater control at the shafts.

Dewatering design must also consider additional sources of water such as irrigation ditches or pivots, leaking utilities (including those that may become surcharged during wet weather), pervious backfill around the adjacent existing utilities, precipitation into shafts, and surface water runoff.

6.2 State Highway 1 Crossing

Due to the seasonally high groundwater level and location of a lined irrigation ditch in front of the proposed receiving shaft, the contractors shall consider limiting construction of the crossing to between November 1 through March 10 to mitigate the impact of groundwater on the crossing.

6.2.1 Launching and Receiving Shafts

It is anticipated that the SH-1 launch shaft will be located at the west end of the crossing alignment approximately between Sta 75+19 and Sta 75+59, and the receiving shaft at the east end of the crossing alignment approximately between Sta 77+20 and Sta 77+40. The overall shape, dimensions, method of support of excavation, and final shaft locations and orientations will be at the Contractor's discretion, subject to the approval of the engineer.

For determination of the baseline conditions, we assumed both shafts would have a bottom elevation of 2 ft below the casing invert or lower. The actual shaft depths will depend on the Contractor's means and methods. Table 6-1 below presents the anticipated baseline percentages of each soil type (by volume) for the SH-1 shaft excavations. These percentages are based on the approximate shaft depths indicated on the drawings and do not consider bulking.

Table 6-1 Baseline Percent of In-situ Volume of Material in the State Highway 1 Shafts

Material	Shaft (West)	Shaft (East)
Eolian Deposits	20%	45%
Coarse Alluvium	10%	25%
Upper Sandstone	40%	30%
Lower Sandstone	30%	0%

Pervious temporary excavation support systems that are anticipated to be technically feasible include soldier piles and lagging, slide rail, trench boxes, and liner plate systems. Pervious support systems will require a dewatering system that will lower the groundwater surface, improve soil behavior, and mitigate soil movement into the excavation. Care must be taken to ensure that dewatering does not induce settlement of SH-1.

Relatively impervious (watertight) temporary excavation support systems that are anticipated to be technically feasible include secant piles or secant jet grout columns. In the absence of dewatering, these systems would also require an impervious shaft bottom plug, which would work in conjunction with the shaft support system to provide sufficient stability to resist uplift and bottom stability under full groundwater pressure.

Ground support must be carefully designed due to the depths of the shafts and ground materials encountered. Shaft construction will need to resist loads from the soils such that movements of ground surface, roads, irrigation ditches, and existing utilities are kept within specified tolerances. The Contractor should account for potential shrinkage and bulking which are defined as the change in volume of the soil from its in-situ condition following excavation, moisture conditioning, placement, and compaction. Shaft installation will experience some ground loss during excavation with sloughing and caving into the excavation. The baseline ground behavior is slow to fast raveling for soils above the groundwater table and fast raveling below the

groundwater table. For rock materials, ground behavior is baselined as intact above and below the groundwater table. Appendix B presents the Tunnelman's Classification System (after Heuer, 1974) and Rock Mass Descriptions (after Terzaghi, 1946).

Initial launching of a machine out of a shaft into the ground (referred to as a "break-out") and reception of the machine into a shaft (referred to as "break-in") requires special measures to minimize ground loss, control groundwater, and/or to control MTBM slurry balance. Temporary ring seals will be required to control groundwater, soil, and slurry intrusion at break-out and break-in locations if MTBM methods are chosen. The seals must account for the MTBM dimensions, ground improvement methods (as applicable), anticipated range of slurry pressures, and excavation support systems.

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during shaft design. The contractor should be aware of the irrigation ditches close to State Highway 1 receiving shaft.

6.2.2 Trenchless Construction

The SH-1 trenchless crossing is between Sta. 75+59 and 77+20. Tunneling is shown uphill from west to east on the profile drawings in Appendix A.

The tunnel profile shown in PL-1 in Appendix A and Table 6-2 presents the anticipated baseline percentages of each soil type (by volume) for the SH-1 trenchless excavation. These percentages are based on the trenchless lengths indicated on the drawings and do not consider bulking.

Table 6-2 Baseline Percent of In-situ Volume of Material in the SH-1 Crossing

Material	Crossing
Upper Sandstone	80%
Lower Sandstone	20%

It is anticipated that the trenchless crossing will be excavated entirely through sandstone bedrock and the baselined classification for the trenchless section is "Intact" as identified in the Rock Mass Descriptions (after Terzaghi, 1946) presented in Appendix B. Cemented sandstone will not to be encountered. Man-made obstructions in the trenchless excavation will not be encountered.

Table 6-3 shows the anticipated feasible trenchless methods, indicated by an "X" based on the anticipated soil and groundwater and project characteristics for the crossing.

Table 6-3 Feasible Trenchless Methods – State Highway 1

Crossing	Tunnel Shield	TBM	MTBM	Guided Auger Boring	Guided Pipe Ramming
State Highway 1		X	X		

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during design. Known underground utilities include a waterline and a fiber optic line.

6.3 Giddings Rd Crossing

Due to the impact of the agricultural irrigation season on the potential for encountering groundwater in the crossing, contractors shall consider limiting construction of the crossing to between November 1 through March 10 to mitigate the risk of higher groundwater. More information is available in specification 01 41 10.

6.3.1 Launching and Receiving Shafts

It is anticipated that the Giddings Rd launch shaft will be located at the east end of the crossing alignment approximately between Sta 235+70 and Sta 236+10, and the receiving shaft at the west end of the crossing alignment approximately between Sta 234+62 and Sta 234+82 Tunneling will be uphill as shown on the crossing profile in Appendix A. The overall shape, dimensions, method of support of excavation, and final shaft locations and orientations will be at the Contractor's discretion, subject to the approval of the engineer.

For determination of baseline conditions, we assumed both shafts will have a bottom elevation of 2 ft below the casing invert or lower. The actual shaft depths will depend on the Contractor's means and methods. Table 6-4 below presents the anticipated baseline percentages of each soil type (by volume) for the Giddings Rd Shaft excavations. These percentages are based on the approximate shaft depths indicated on the drawings and do not consider bulking.

Table 6-4 Baseline Percent of In-situ Volume of Material in the Giddings Rd Shafts

Material	Shaft (West)	Shaft (East)
Eolian Deposits	100%	100%

An unlined irrigation ditch is located at Sta 235+00 near the location of the proposed receiving shaft that has affected groundwater readings. Groundwater elevations near this shaft location are anticipated to be higher between the months of April and November. Pervious shaft support with localized sumps is anticipated to be feasible for excavations within the eolian deposits.

Pervious temporary excavation support systems that are anticipated to be technically feasible include soldier piles and lagging, slide rail, trench boxes, sheet piles, and liner plate systems. Pervious support systems will require localized sumps to lower the groundwater surface to a minimum of 2 ft below the base of the excavation, improve soil behavior, and mitigate soil movement into the excavation.

Due to the high silt content within the eolian soils and the elevated groundwater table, the use of shaft construction methods that transmit vibrations into the ground—such as driven sheet piles, vibratory hammers, or other oscillatory equipment—is anticipated to mobilize excess free water into the excavation. The fine-grained nature of the eolian deposits makes them particularly susceptible to disturbance: vibration can break down the particle structure, reduce apparent cohesion, and induce a temporary increase in pore water pressures. When combined with the groundwater conditions, this can accelerate the release of free water into the excavation, reduce soil stability at the shaft walls, and increase the likelihood of sloughing, raveling, or localized piping. As a result, vibration-intensive methods may require additional groundwater control, more robust excavation support, or alternative, lower-vibration construction techniques to maintain stable working conditions and meet performance requirements for shaft construction.

Ground support must be carefully designed due to the depths of the shafts and ground materials encountered. Shaft construction will need to resist loads from the soils such that movements of ground surface, roads, irrigation ditches, and existing utilities are kept within specified tolerances. The Contractor should account for potential shrinkage and bulking which are defined as the change in volume of the soil from its in-situ condition following excavation, moisture conditioning, placement, and compaction. Shaft installation will experience some ground loss during excavation with sloughing and caving into the excavation. The baseline ground behavior is slow to fast raveling for soils above the groundwater table and fast raveling below the groundwater table. Appendix B presents the Tunnelman's Classification System (after Heuer, 1974).

Initial launching of a machine out of a shaft into the ground (referred to as a "break-out") and reception of the machine into a shaft (referred to as "break-in") requires special measures to minimize ground loss, control groundwater, and/or to control MTBM slurry balance. It is anticipated that temporary ring seals will be required to control groundwater, soil, and slurry intrusion at break-out and break-in locations if MTBM methods are chosen. The seals must account for the MTBM dimensions, ground improvement methods (as applicable), anticipated range of slurry pressures, and excavation support systems.

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during shaft design. The contractor should be aware of the irrigation ditches close to SH-1 receiving shaft.

6.3.2 Trenchless Construction

The Giddings Rd trenchless crossing is between Sta. 234+82 and 235+70. Table 6-5 presents the anticipated baseline percentages of each soil type (by volume) for the Giddings Rd trenchless excavation. These percentages are based on the trenchless lengths indicated on the drawings and do not consider bulking.

Table 6-5 Baseline Percent of In-situ Volume of Material in the Giddings Rd Crossing

Material	Crossing
Eolian Deposits	100%

The baseline ground behavior for the Eolian Deposits is slow to fast raveling above the groundwater table and fast raveling below the groundwater table. Appendix B presents the Tunnelman's Classification System (after Heuer, 1974).

No man-made obstructions in the trenchless excavation are anticipated.

Laboratory data included in the GDR suggest that soils encountered in the subject crossings may be classified as having "medium" to "high" clogging potential in its natural condition. It is anticipated that 100 percent of the excavated eolian deposits volume for the trenchless crossings will exhibit a medium to high clogging potential with open face tunneling methods. The Contractor is advised to develop plans for managing the clogging potential during excavation.

The groundwater surface is highly affected by irrigation occurring within the surrounding area and an irrigation ditch located on the west side of Giddings Rd near the receiving shaft. The Contractor shall anticipate the groundwater surface to be higher between the months of April and November.

Table 6-6 shows the anticipated feasible trenchless methods, indicated by an "X" based on the anticipated soil and groundwater and project characteristics for the crossing.

Table 6-6 Feasible Trenchless Methods – Giddings Rd

Crossing	Tunnel Shield	TBM	MTBM	Guided Auger Boring	Guided Pipe Ramming
Giddings Rd		X	X	X	

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during design. Known underground utilities include waterlines, fiber optic, and electric lines.

6.4 BNSF Crossing

Currently, there are no seasonal restrictions for the construction of the BNSF crossing. Due to the seasonally high groundwater level and groundwater impacts that were observed on a recent similar pipeline project that crossed the BNSF railroad in this general area, contractors shall consider limiting construction of the crossing to between November 1 through March 10 to mitigate the risk of higher groundwater.

6.4.1 Launching and Receiving Shafts

It is anticipated that the BNSF launch shaft will be located at the east end of the crossing alignment approximately between Sta 312+25 and Sta 312+65, and the receiving shaft at the west end of the crossing alignment approximately between Sta 310+42 and Sta 310+62. Final shaft locations and orientations will be at the Contractor's discretion.

For determination of baseline conditions, we assumed both shafts will have a bottom elevation of 2 ft below the casing invert or lower. The actual shaft depths will depend on the Contractor's means and methods. Table 6-7 below presents the anticipated baseline percentages of each

soil type (by volume) for the BNSF Shaft excavations. These percentages are based on the approximate shaft depths indicated on the drawings and do not consider bulking.

Table 6-7 Baseline Percent of In-situ Volume of Material in the BNSF Shafts

Material	Shaft (West)	Shaft (East)
Eolian Deposits	100%	100%

Pervious temporary excavation support systems that are anticipated to be technically feasible include soldier piles and lagging, slide rail, trench boxes, sheet piles, and liner plate systems. Pervious support systems will require localized sumps to lower the groundwater surface to a minimum of 2 ft below the base of the excavation, improve soil behavior, and mitigate soil movement into the excavation.

Due to the high silt content within the eolian soils and the elevated groundwater table, the use of shaft construction methods that transmit vibrations into the ground—such as driven sheet piles, vibratory hammers, or other oscillatory equipment—is anticipated to mobilize excess free water into the excavation. The fine-grained nature of the eolian deposits makes them particularly susceptible to disturbance: vibration can break down the particle structure, reduce apparent cohesion, and induce a temporary increase in pore water pressures. When combined with the groundwater conditions, this can accelerate the release of free water into the excavation, reduce soil stability at the shaft walls, and increase the likelihood of sloughing, raveling, or localized piping. As a result, vibration-intensive methods may require additional groundwater control, more robust excavation support, or alternative, lower-vibration construction techniques to maintain stable working conditions and meet performance requirements for shaft construction.

Ground support must be carefully designed due to the depths of the shafts and ground materials encountered. Shaft construction will need to resist loads from the soils such that movements of ground surface, roads, irrigation ditches, and existing utilities are kept within specified tolerances. The Contractor should account for potential shrinkage and bulking which are defined as the change in volume of the soil from its in-situ condition following excavation, moisture conditioning, placement, and compaction. Shaft installation will experience some ground loss during excavation with sloughing and caving into the excavation. The baseline ground behavior is slow to fast raveling for soils above the groundwater table and fast raveling below the groundwater table. Appendix B presents the Tunnelman's Classification System (after Heuer, 1974).

Initial launching of a machine out of a shaft into the ground (referred to as a "break-out") and reception of the machine into a shaft (referred to as "break-in") requires special measures to minimize ground loss, control groundwater, and/or to control MTBM slurry balance. It is anticipated that temporary ring seals will be required to control groundwater, soil, and slurry intrusion at break-out and break-in locations if MTBM methods are chosen. The seals must account for the MTBM dimensions, ground improvement methods (as applicable), anticipated range of slurry pressures, and excavation support systems.

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during shaft design.

6.4.2 Trenchless Construction

The BNSF trenchless crossing is between Sta. 310+62 and 312+25. Table 6-8 presents the anticipated baseline percentages of each soil type (by volume) for the BNSF trenchless excavation. These percentages are based on the trenchless lengths indicated on the drawings and do not consider bulking.

Table 6-8 Baseline Percent of In-situ Volume of Material in the BSNF Crossing

Material	Crossing
Eolian Deposits	100%

The baseline ground behavior for the Eolian Deposits is slow to fast raveling above the groundwater table and fast raveling below the groundwater table. Appendix B presents the Tunnelman's Classification System (after Heuer, 1974).

Laboratory data included in the GDR suggest that soils encountered in the subject crossings may be classified as having "medium" to "high" clogging potential in its natural condition. It is anticipated that 100 percent of the excavated eolian deposits volume for the trenchless crossings will exhibit a medium to high clogging potential with open face tunneling methods. The Contractor is advised to develop plans for managing the clogging potential during excavation.

No man-made obstructions in the trenchless excavation are anticipated.

Table 6-9 shows the anticipated feasible trenchless methods, indicated by an "X" based on the anticipated soil and groundwater and project characteristics for the crossing.

Table 6-9 Feasible Trenchless Methods - BNSF

Crossing	Tunnel Shield	TBM	MTBM	Guided Auger Boring	Guided Pipe Ramming
BNSF		X	X	X	

The Contractor should refer to the Contract Drawings for locations of known utilities and follow the contract requirements for identifying all utilities in the area. Locations of utilities should be considered during design.

6.5 Trenchless Methods

6.5.1 Applicable Tunneling Methods

6.5.1.1 Tunnel Boring Machine

Due to the diameters and ground conditions within the trenchless crossings, a tunnel boring machine (TBM) with a non-pressurized face is considered an applicable tunneling method.

In TBM's, wear can occur due to the interaction between abrasive soils/bedrock and cutters. Wear may also take place on the excavation chamber and the muck removal system as a result

of excavation and handling of the materials. The Contractor is advised to develop plans for managing abrasion during construction of the SH-1 crossing.

6.5.1.2 Microtunnel Boring Machine

Due to the diameters and ground conditions within the trenchless crossings, a microtunnel boring machine (MTBM) is considered an applicable tunneling method. A MTBM will provide constant face support which is designed handle the changes in ground behavior throughout the tunnel drives.

In microtunneling, wear can occur due to the interaction between abrasive soils/bedrock and cutters. Wear may also take place on the excavation chamber and the muck removal system as a result of excavation and handling of the materials. On a slurry microtunnel boring machine abrasion can have an adverse impact on the slurry discharge components, pipes, and pumps. The Contractor is advised to develop plans for managing abrasion during construction of the SH-1 crossing.

6.5.1.3 Guided Auger Boring

Due to the diameters and ground conditions within the trenchless crossings, Guided Auger boring is an applicable tunneling method for the Giddings Rd and BNSF crossing locations. Auger boring provides sufficient ground control for slow raveling ground conditions, provided that the casing is pushed close against the face of the tunnel excavation.

6.5.2 Methods Not Considered Applicable

If the Contractor proposes using a method different method from those specified for each crossing, it must be submitted to the engineer for review and approval.

6.5.2.1 Guided Pipe Ramming

Guided Pipe Ramming is not considered applicable for the trenchless crossings due to the sandstone bedrock encountered on the SH-1 crossing and the high silt content within the eolian soils and inability to dewater the tunnel alignment of the Giddings Rd and BNSF crossings. The percussive hammer of the pipe ramming operation will reduce cohesion of the soil and induce a temporary increase in pore water pressures. When combined with already high groundwater conditions, this can accelerate the release of free water into the tunnel, reduce soil stability at the tunnel face, and increase the likelihood of settlement, raveling, or localized piping.

Vibration from pipe ramming can also cause concerns for adjacent properties. Ground deformation may also occur if the plug at the front of the casing pipe fails and leads to ground loss and surface settlement.

6.5.2.2 Tunnel Shield

Due to the lengths associated with the trenchless crossings, shield tunneling is not considered an economically viable option for Segment F.1.

7 GEOTECHNICAL INSTRUMENTATION AND MONITORING

The Contractor is responsible for the installation, monitoring, and removal/abandonment of geotechnical instrumentation for monitoring ground movements within and around the trenchless crossing and portal excavations, as well as movement of existing utilities, structures,

roads, and BNSF rail adjacent to the trenchless crossing. The Contract Specifications dictate the requirements for monitoring of ground surface, structures, rail, and utilities.

It will be important that the Contractor closely monitor the launch and initial portion of the trenchless excavation out of the launch portal. This is very often where loss of ground into the shaft and over-excavation of ground occurs due to disturbance from portal construction, which can create surface settlement and/or sinkholes. If not controlled, the loosened ground can follow the trenchless excavation creating a settlement trough that extends above the trenchless crossing into areas where settlement control is critical. The Contract Drawings and the Project Specifications provide required details for settlement monitoring.

Should surface settlement occur there is a risk to the traveling public. The Contractor is required to develop tunneling plans and execute trenchless methods in a manner to control ground settlements to movements within allowable levels listed in the Project Specifications. If unacceptable settlement occurs, as specified in the Contract Documents, mitigation will be necessary.

8 SPOILS, GROUNDWATER, AND GAS MANAGEMENT

8.1 Spoils Management

During the geotechnical investigation for the trenchless crossings, contaminated soils were not encountered within the test borings. No environmental testing on the samples occurred for the project. It is provisionally baselined that the spoils associated with the shaft and tunnel construction of the trenchless crossings will not be contaminated and will not require special disposal.

8.2 Groundwater Management

Water quality sampling was completed on the monitoring wells for the project and are provided in the GDR. Groundwater management shall comply with the requirements of Specification 31 23 19.

8.3 Gas Management

The trenchless crossings are located within the existing native soils and bedrock materials. Based on the ground conditions and environmental conditions, the underground work has been classified as “potentially-gaseous.”

9 LIMITATIONS

This report has been prepared for specific application to the trenchless Crossings for Segment F.1 of the Thornton Water Project per agreement between Brierley Associates and Providence Infrastructure Consultants. This report was based on our understanding of the project elements and geometry at this time of this report and in accordance with generally accepted engineering practices common to the local area.

In the event that changes in the nature, design, depths, or locations of the planned construction are made, the conclusions and recommendations contained in this report are no longer

considered valid, unless the changes are reviewed by Brierley Associates and the conclusions of this report are modified or verified in writing.

Discussions of soil and groundwater conditions described in this GBR are based on subsurface information obtained from widely spaced test borings. Hence, prospective Contractors for this project should anticipate variation in ground conditions along the proposed tunnel alignment and variation in physical properties for the various geologic strata encountered during tunneling.

This GBR has been prepared to present on behalf of the Owner, the Engineer's informed interpretation of ground conditions for use by the Owner and the Contractor and this interpretation is binding upon both parties as part of the Contract Document. Both the Owner and the Contractor are also informed that baselines contained within this GBR do not constitute a warranty of subsurface conditions to be encountered during the project. Nor is this report intended to specify ground conditions, or more importantly ground behavior, to the extent that the Contractor is relieved of all responsibility for making his/her own interpretation of ground conditions and behavior. Different ground behavior than that described herein may occur depending upon the means and methods of construction, the workmanship adopted by the Contractor which are the responsibility of the Contractor, and the actual ground conditions encountered between the limited borings upon which this report is based.

It is highly recommended that the bidders have a geotechnical engineer or engineering geologist who is familiar with the topics discussed in this report carefully review and evaluate this information so that a complete understanding of subsurface conditions is available to the Contractor prior to bid submittal.

10 REFERENCES

American Society of Civil Engineers, Geotechnical Baseline Reports, Suggested Guidelines, 2022.

CMT, Geotechnical Data Report, Thornton Water Project – Segment F.1, Colorado, February 2026.

Hershey, L.A., and Schneider, P.A., 1972, Geologic map of the lower Cache La Poudre River basin, north-central Colorado: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-687, scale 1:62,500.

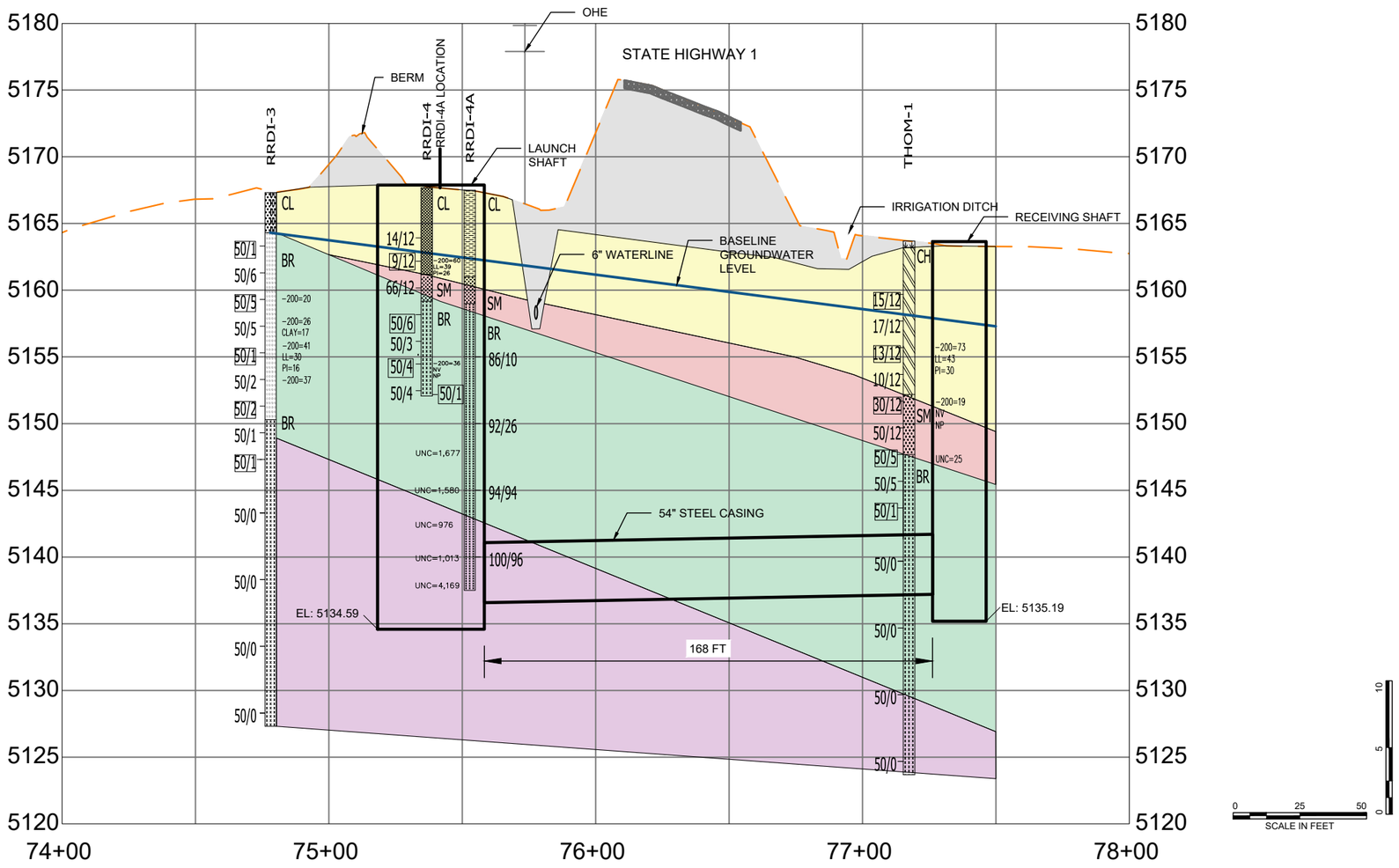
Hollman, F. S., & Thewes, M. (2013). Assessment method for clay clogging and disintegration of fines in mechanized tunneling. Tunneling and Underground Space Technology, v. 37, 96-106.

Thomas, P.J., Baker, J.C. and Zelazny, L.W., 2000, An Expansive Soil Index for Predicting Shrink–Swell Potential. Soil Science. Society of America, v. 64, 268-274.

Workman, J.B., Cole, J.C., Shroba, R.R., Kellogg, K.S., and Premo, W.R., 2018, Geologic map of the Fort Collins 30'×60' quadrangle, Larimer and Jackson Counties, Colorado, and Albany and Laramie Counties, Wyoming: U.S. Geological Survey Scientific Investigations Map SIM-3399, scale 1:100,000.

APPENDIX A

Plates – Trenchless Crossing Geologic Profiles



LEGEND

TEST BORING

50/6 SP

9 CL

9	1.5-IN I.D. STANDARD PENETRATION TEST BLOWS/12 INCHES (OR AS NOTED)
50/6	2-IN. I.D. MODIFIED CALIFORNIA SAMPLE BLOWS/12 INCHES (OR AS NOTED)
92/72	2.5-IN I.D. HQ3 WIRELINE CORING REC%/RQD%
SP	USCS CLASSIFICATION
LL	LIQUID LIMIT %
PI	PLASTICITY INDEX %
-200	FINES CONTENT %
UNC	UNCONFINED COMPRESSIVE STRENGTH (PSI)

- FILL
- EOLIAN DEPOSITS
- COARSE ALLUVIUM
- UPPER SANDSTONE
- LOWER SANDSTONE
- BASELINE GROUNDWATER LEVEL

NOTES:
1. BORING RRDI-4A WAS MOVED UP STATION FROM ITS DRILLED LOCATION IN THE PROFILE IN ORDER TO VISUALLY SEE THE STICK LOGS BETWEEN RRDI-4 AND RRDI-4A.

MONITORING WELL DATA

BORING	MIN DEPTH	MAX DEPTH	RECENT (3/23/26)
RRDI-3	9.0FT (7/22/25)	20.0FT* (4/10/25)	9.2FT
THOM-1	4.6FT (3/23/26)	11.0FT* (9/2/25)	4.6FT

*AT TIME OF DRILLING

BRIERLEY ASSOCIATES
Creating Space Underground
750 W Hampden Ave Suite 101
Englewood, CO 80110
PH: 303.483.2890

GOLDEN GEOTECHNICS INC

CLIENT

PROVIDENCE INFRASTRUCTURE CONSULTANTS
300 PLAZA DR. SUITE 320
LITTLETON, CO. 80129

OWNER

CITY OF THORNTON
9500 CIVIC CENTER DRIVE
THORNTON, CO. 80229

PROJECT

THORNTON WATER PROJECT

SEGMENT F.1

PROJECT NO	124202-000
DESIGNED BY	BB
CHECKED BY	KF
DRAWN BY	BB
APPROVED BY	N/A

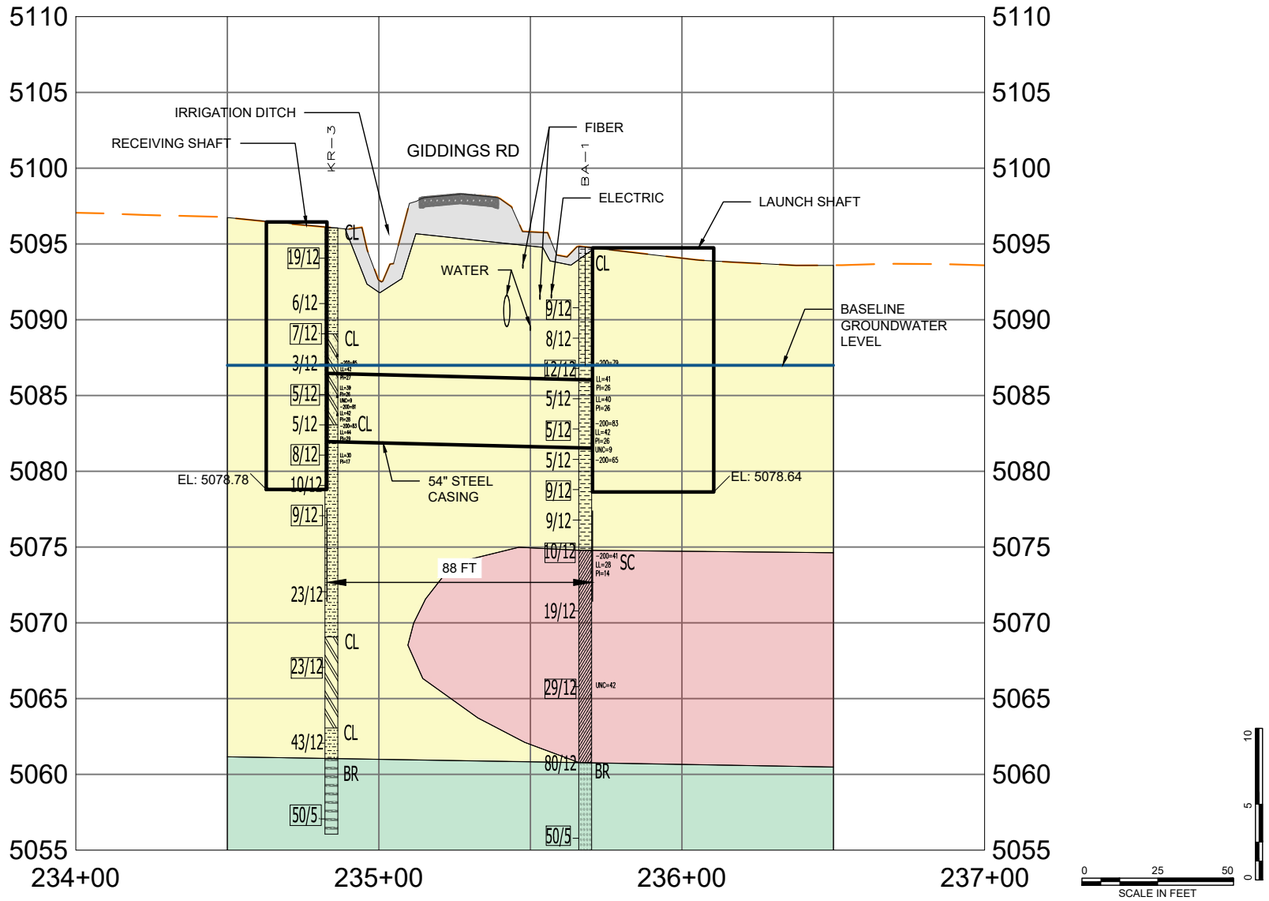
SHEET TITLE

STATE HIGHWAY 1 CROSSING

SHEET NUMBER

PL-1

01 OF 03



LEGEND

TEST BORING

50/6 SP

9 CL

9	1.5-IN I.D. STANDARD PENETRATION TEST BLOWS/12 INCHES (OR AS NOTED)
50/6	2-IN. I.D. MODIFIED CALIFORNIA SAMPLE BLOWS/12 INCHES (OR AS NOTED)
92/72	2.5-IN I.D. HQ3 WIRELINE CORING REC%/RQD%
SP	USCS CLASSIFICATION
LL	LIQUID LIMIT %
PI	PLASTICITY INDEX %
-200	FINES CONTENT %
UNC	UNCONFINED COMPRESSIVE STRENGTH (PSI)

- FILL
- EOLIAN DEPOSITS
- COARSE ALLUVIUM
- BEDROCK
- BASELINE GROUNDWATER LEVEL

MONITORING WELL DATA

BORING	MIN DEPTH	MAX DEPTH	RECENT (3/23/26)
KR-3	2.3FT (7/22/25)	16.5FT* (3/3/25)	12.7FT
BA-1	7.8FT (7/22/25)	20.0FT* (2/25/25)	15.9FT

*AT TIME OF DRILLING

BRIERLEY ASSOCIATES
Creating Space Underground
750 W Hampden Ave Suite 101
Englewood, CO 80110
PH: 303.483.2890

GOLDEN GEOTECHNICS INC

PROVIDENCE INFRASTRUCTURE CONSULTANTS
PROVIDENCE INFRASTRUCTURE CONSULTANTS
300 PLAZA DR. SUITE 320
LITTLETON, CO. 80129

OWNER

CITY OF THORNTON
9500 CIVIC CENTER DRIVE
THORNTON, CO. 80229

PROJECT

THORNTON WATER PROJECT

SEGEMENT F.1

PROJECT NO	124202-000
DESIGNED BY	BB
CHECKED BY	KF
DRAWN BY	BB
APPROVED BY	N/A

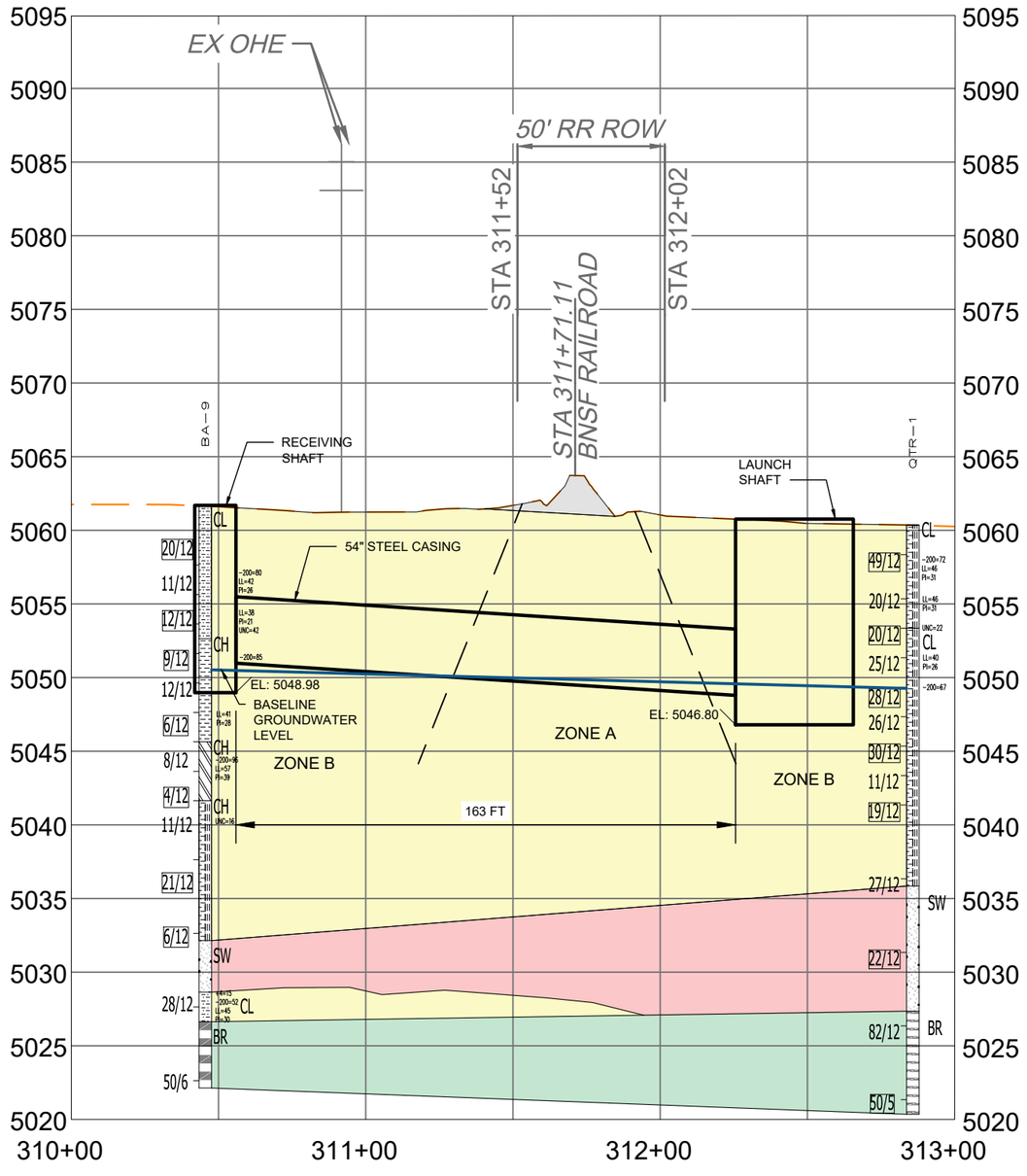
SHEET TITLE

GIDDING ROAD CROSSING

SHEET NUMBER

PL-2

02 OF 03



LEGEND

TEST BORING

50/6 SP

9 CL

9	1.5-IN I.D. STANDARD PENETRATION TEST BLOWS/12 INCHES (OR AS NOTED)
50/6	2-IN. I.D. MODIFIED CALIFORNIA SAMPLE BLOWS/12 INCHES (OR AS NOTED)
92/72	2.5-IN I.D. HQ3 WIRELINE CORING REC%/RQD%
SP	USCS CLASSIFICATION
LL	LIQUID LIMIT %
PI	PLASTICITY INDEX %
-200	FINES CONTENT %
UNC	UNCONFINED COMPRESSIVE STRENGTH (PSI)

- FILL
- EOLIAN DEPOSITS
- COARSE ALLUVIUM
- BEDROCK
- BASELINE GROUNDWATER LEVEL

MONITORING WELL DATA

BORING	MIN DEPTH	MAX DEPTH	RECENT (3/23/26)
BA-9	10.5FT* (2/20/25)	21.6FT (9/22/25)	14.9FT
QTR-1	11.1FT (3/6/25)	20.5FT (9/22/25)	16.7FT

*AT TIME OF DRILLING

BRIERLEY ASSOCIATES
Creating Space Underground
750 W Hampden Ave Suite 101
Englewood, CO 80110
PH: 303.483.2890

GOLDEN GEOTECHNICS INC

PROVIDENCE INFRASTRUCTURE CONSULTANTS
PROVIDENCE INFRASTRUCTURE CONSULTANTS
300 PLAZA DR. SUITE 320
LITTLETON, CO. 80129

LEGEND

OWNER

CITY OF THORNTON
9500 CIVIC CENTER DRIVE
THORNTON, CO. 80229

PROJECT

THORNTON WATER PROJECT

SEGEMENT F.1

PROJECT NO	124202-000
DESIGNED BY	BB
CHECKED BY	KF
DRAWN BY	BB
APPROVED BY	N/A

SHEET TITLE

BNSF CROSSING

SHEET NUMBER

PL-3

03 OF 03

APPENDIX B
Ground Characterization Table

Ground Characterization Table

Profile Color	Engineering Unit	USCS Classification	Description	Geotechnical Properties	Preferred Means & Methods of Excavation	Baseline Behavior of Material: Unpressurized Tunnel Crossing
	Eolian Deposits	CL, SC, CH	• Lean Clay • Sandy Clay • Fat Clay	• Olive, medium yellow brown, black, very dark brown • Liquid Limit: 30 to 46% • Plasticity index: 13 to 33% • Fines Content: 60 to 85% • Clay Content: 39 to 48% • Cobbles/Bouders: None	Guided Auger Boring	• Firm to slow raveling behavior above groundwater •Fast raveling soil behavior below groundwater • Medium to high clogging potential • Hydraulic Conductivity: 2.25x10E-4 cm/sec
	Coarse Alluvium	SM, SC, SW	• Silty Sand • Clayey Sand •Well Graded Sand	• Light olive brown • Grain size: Very fine to fine • Liquid Limit: NV to 28% • Plasticity index: NP to 14 • Fines Content: 15-20% • N160 Blows: 10 to 70 • Cobbles/Bouders: None	NA	• Slow to fast raveling behavior above groundwater •Fast raveling to flowing behavior below groundwater • Hydraulic Conductivity: 1.0x10E-3 cm/sec
	Upper Sandstone	NA	Richard Sandstone	• Light grey mottle olive grey • Weather profile developed, no cementation • Grain size: Fine •Bedding: Massive • Fines content: 20 to 41% •Clay content: 15 to 20% •Quartz content: 20 to 25% •Fracture density: 0-6ft below Tor: Intensely, RQD is Very poor; 6-10ft: Moderately, RQD is poor; >10ft below TOR: Slightly, RQD is excellent •Weathering: Slight	TBM	• Intensely fractured zone at top of bedrock. • UCS: 900 to 2,000 psi • Abrasivity: Medium • Hydraulic Conductivity: 2.5x10E-5 cm/sec • Intact rock behavior above and below the groundwater table
	Lower Sandstone	NA	Richard Sandstone	• Light grey • No cementation • Grain size: Fine • Bedding: Massive • Fines content: 20 to 41% • Clay content: 15 to 20% • Quartz content: 20 to 25% • Fracture density: Slightly fractured, RQD is excellent • Weathering: Slight	TBM	• UCS: 4,000 to 5,000 psi • Abrasivity: Medium • Hydraulic Conductivity: 2.5x10E-5 cm/sec •Intact rock behavior above and below groundwater table

APPENDIX C

Tunnelman's Classifications and Rock Mass Description

Tunnelmans Ground Classification for Soils
(after Heuer, 1974)

Classification		Behavior	Typical Soil Types
Firm		Heading can be advanced without initial support and final lining can be constructed before ground starts to move	Loess above water table; hard clay, marl, cemented sand, and gravel when not highly overstressed
Raveling	Slow Raveling	Chunks or flakes of material begin to drop out of the arch or walls sometime after the ground has been exposed, due to loosening or to overstress and "brittle" fracture (ground separates or breaks along distinct surfaces, opposed to squeezing ground). In fast raveling ground, the process starts within a few minutes, otherwise the ground is slow raveling	Residual soils or sand with small amounts of binder may be fast raveling below the water table; slow raveling above. Stiff fissured clays may be slow or fast raveling depending upon degree of overstress
	Fast Raveling		
Squeezing		Ground squeezes or extrudes plastically into tunnel, without visible fracturing or loss of continuity, and without perceptible increase in water content. Ductile, plastic yield and flow due to overstress	Ground with low frictional strength. Rate of squeeze depends on degree of overstress. Occurs at shallow to medium depth in clay of very soft to medium consistency. Stiff to hard clay under high cover may move in combination of raveling at execution surface and squeezing at depth behind surface
Running	Cohesive Running	Granular materials without cohesion are unstable at a slope greater than their angle of repose (approximately 30-35 degrees). When exposed at steeper slopes they run like granulated sugar or dune sand until the slope flattens to the angle of repose.	Clean, dry granular materials. Apparent cohesion in moist sand or weak cementation in any granular soil may allow the material to stand for a brief period of raveling before it breaks down and runs. Such behavior is cohesive-running.
	Running		
Flowing		A mixture of soil and water flows into the tunnel like a viscous fluid. The material can enter the tunnel from the invert as well as from the face, crown, and walls, and can flow for great distances completely filling the tunnel in some cases.	Below the water table in silt, sand, or gravel without enough clay content to give significant cohesion and plasticity. May also occur in highly sensitive clay when such material is disturbed.
Swelling		Ground absorbs water, increases in volume, and expands slowly into the tunnel.	Highly preconsolidated clay with plasticity index in excess of about 30, generally containing significant percentages of montmorillonite clay.

Terzaghi Rock Mass Descriptions

Classification	Behavior	Typical Rock Properties
Intact Rock	On account of the injury to the rock due to blasting, spalls may drop off roof several hours or days after blasting. This is known as *spalling* condition. Hard, intact rocks may also be encountered in the *popping* condition involving the spontaneous and violent detachment of rock slabs from sides or roofs.	Contains neither joints nor hair cracks. Hence, if it breaks, it breaks across sound rock.
Stratified Rock	In stratified rock, the spalling condition is quite common.	Consists of individual strata with little or no resistance against separation along the boundaries between strata. The strata may or may not be weakened by transverse joints.
Moderately Jointed Rock	Both the spalling and the popping condition may be encountered in rocks of this type.	Contains joints and hair cracks, but the blocks between the joints are locally grown together or so intimately interlocked that vertical walls do not require lateral support.
Blocky and Seamy Rock	Vertical walls may require support.	Consists of chemically intact or almost intact rock fragments that are entirely separated from each other and imperfectly interlocked.
Crushed Rock	If most or all of the fragments are as small as fine sand grains and no recementation has taken place, crushed rock below the water table exhibits the properties of water-bearing sand.	Crushed but chemically intact rock has the character of a crusher run.
Squeezing Rock	Rock slowly advances into the tunnel without perceptible volume increase.	Prerequisite for squeeze is a high percentage of microscopic and sub-microscopic particles of micaceous minerals or of clay minerals with a low swelling capacity.
Swelling Rock	Rock advances into the tunnel chiefly on account of expansion	The capacity for rock to swell seems to be limited to those rocks that contain clay minerals such as montmorillonite, with a high swelling capacity.

Attachment 3.2 – Geotechnical Design Addendum

August 6, 2026

Mr. Daniel Rice, P.E.
Providence Infrastructure Consultants
300 Plaza Drive, Suite 320
Littleton, CO 80129
drice@providenceic.com

Subject: Geotechnical Design Memorandum
Thornton Water Project (TWP) – Segment F.1
Larimer County, Colorado
Project No. 500653

Dear Mr. Rice:

CMT Technical Services - Colorado (CMT) issued a *Geotechnical Data Report, Thornton Water Project (TWP) – Segment F.1, Larimer County, Colorado*, dated July 15, 2026 (the "data report"). The geotechnical data report (GDR) was prepared to assist in the design of a 42 inch welded steel raw water pipeline to be installed along an alignment extending approximately 5.7 miles (30,100 feet) in length. The proposed pipeline will originate at the E-3 source water pump station on Hood Lane (or Launer Lane in the Google Map) located between Rocky Ridge Lake Reservoir No. 1 and Water Supply and Storage Reservoir (WSSC) No. 3, continue to the southeast across North Highway 1 (1.3 miles) to East County Road 56 (0.4 miles), proceed east on the County Road 56 to the intersection with the BNSF railroad (3.1 miles), then heads south along the western side of the BNSF railroad and terminates at East Douglas Road (1.0 mile).

Both trench and trenchless installation methods are anticipated. This letter provides geotechnical design recommendations for certain elements of trenched (open cut) installations only. The recommendations are based on the field and laboratory data presented in the data report and are subject to the limitations associated with conditions that may differ from those encountered at the boring locations selected by others. This letter is intended to serve as an addendum and should be used in conjunction with the referenced data report.

1. MANHOLE

According to the provided 75% Design drawings at the time of this study, the vaults considered as manholes are proposed (for combination air vault assemblies, manway vaults, and riser assemblies) to have a minimum depth ranging from approximately 8 feet to a maximum depth of approximately 10 feet.

- If encountered (not encountered in borings of this study), previously placed fill soil is undocumented and not considered suitable in its present condition to provide reliable support for manhole foundations and should be removed entirely and replaced with properly compacted structural fill. Previously placed fill was not encountered at possible manhole foundation elevations. However, if unsuitable fill is encountered and required to be removed and replaced, material satisfying the criteria in Table 4.2. Import Fill Specifications may be used. It should be noted other more granular materials may be

deemed suitable for use as fill; however, small diameter rock and the presence of fines presents a material more suitable to compaction verification testing. Alternative materials proposed as fill should be evaluated and approved by the geotechnical engineer and design team before use.

- Discontinuous zones of perched water may exist or develop within the overburden material and/or upper zones of the bedrock.
- Very moist soil may become unstable or pump under earthmoving equipment, especially nearer the groundwater table. Care should be taken to properly compact the foundation soil beneath the manhole.
- Claystone is not suitable for re-use for vaults or manhole backfill.
- The vaults or manhole foundations should be designed for maximum allowable soil bearing pressures as shown in Table 1.1.

TABLE 1.1. Maximum Bearing Capacities for Manholes Bearing on Native Onsite Material or Engineered Controlled Fill

Bearing Material Type	Maximum Allowable Soil Bearing Pressure (psf)
Previously placed fill (if encountered)	Remove and replace with properly compacted fill
Engineered controlled fill	2,500
Native overburden material with blow counts of 10/12 or harder/denser	2,500
Native overburden material with blow counts of between 6/12 and 10/12	1,500
Native overburden material with blow counts of 6/12 or softer/looser, within 3 feet below invert elevation	Remove and replace 3 feet of soft/loose material with properly compacted fill
Weathered bedrock and bedrock with blow counts softer than 50/12	2,500
Competent bedrock with blow counts of 50/12 or harder	Up to 12,500

Soil conditions at the nearest borings and elevations may be used to estimate maximum bearing capacities. While significant geologic changes are not anticipated between borings near manholes, boring location selections were made by others and deemed appropriate based on existing and as collected subsurface information. However, it is important that manhole excavations be observed by a CMT representative prior to concrete placement to determine if bearing conditions are consistent with those assumed in developing these recommendations. At or prior to the time of excavation observation, the CMT representative should be informed of the maximum allowable soil bearing pressure used for design. Soft or loose soil beneath structures should be re-densified in-place or removed and replaced with properly compacted structural fill. If locations, elevations, or subsurface conditions differ from the borings in the data report, CMT should be notified to review these recommendations.

2. LATERAL EARTH PRESSURES

Lateral pressures on walls depend on the type of structure, presence or absence of water around the structure, type of backfill material, and allowable structure movements. Where anticipated/permissible structure movements are greater than 0.5% of the structure height, lateral earth pressures can be estimated for an "active" condition. For rigid structures, where anticipated/permissible wall movement is less than approximately 0.5% of the structure height or structure movement is constrained, lateral earth pressures should be estimated for an "at rest" condition. Recommended lateral earth pressures for onsite material are provided in Table 2.1. It should be noted these are unfactored values and also include hydrostatic pressure. Appropriate factors of safety should be applied. The program for soils obtained and tested to produce the GDR did not include specific tests to precisely determine friction angles (e.g. direct shear testing). Therefore, these recommendations are considered appropriate for the intended design, and, if the design team believes these pressures are unduly impacting design, additional testing could be performed to justify using lower design pressures.

TABLE 2.1. Lateral Earth Pressures and Coefficients of Sliding Resistance for Onsite Material

Backfill Material Type	Equivalent Unit Weight with Hydrostatic Pressure (pcf)			Coefficient of Sliding Resistance
	Active	At Rest	Passive	
Native/Import structural fill	90	100	150	0.3
Native clay	90	100	150	0.3
Native sand and gravel	85	95	175	0.4
Sandstone	85	95	175	0.4

2.1 THRUST BLOCK LOADS

The subsurface conditions at the proposed water line locations consist of previously placed fill, native clay, native sand and gravels, weathered claystone, claystone, and sandstone.

- Thrust blocks placed within the fill, native clay, and weathered claystone should be designed for a maximum allowable lateral soil bearing pressure of 150 psf/ft of depth. For example, if the thrust block is placed 8 feet deep, then 150 (psf/ft) x 8 (ft) = 1,200 psf.
- Thrust blocks placed within the native sand and gravel should be designed for a maximum allowable lateral soil bearing pressure of 175 psf/ft of depth. For example, if the thrust block is placed 8 feet deep, then 175 (psf/ft) x 8 (ft) = 1,400 psf.
- Thrust blocks placed within the competent claystone and sandstone bedrock should be designed for a maximum allowable lateral soil bearing pressure of 175 psf/ft of depth. This value takes into consideration surface disturbance of bedrock during excavation. For example, if the thrust block is placed 8 feet deep, then 175 (psf/ft) x 8 (ft) = 1,400 psf.

3. EXCAVATIONS

Conventional earthmoving equipment should be adequate to excavate the majority of onsite soil and bedrock within the depth zones anticipated for the proposed pipeline. Excavations should be properly sloped and/or braced, and local and federal safety codes observed. Slopes and other areas void of

vegetation should be protected against erosion.

It is the contractor's responsibility to provide safe working conditions and comply with the regulations in OSHA Standards-Excavations, 29 CFR Part 1926. The following guidelines are provided for planning purposes. Sloping and shoring requirements must be evaluated at the time of construction by the contractor's competent person as defined by OSHA. The geotechnical engineer is NOT the contractor's "competent person" in any circumstance, including but not limited to, by way of default or delegation. OSHA classifications for various material types and the steepest allowable slope configuration corresponding to those classifications are shown in Table 3.1.

TABLE 3.1. Allowable Slope Configuration for Onsite Material

Material Type	OSHA Classification	Steepest Allowable Slope Configuration*
Native clay, weathered claystone, claystone, and sandstone	Type B	1:1
Fill and native sand and gravel	Type C	1-1/2:1

*Units horizontal to units vertical. The values shown apply to excavations less than 20 feet in height. Conditions can change and evaluation is the contractor's responsibility.

The preceding classifications and slope configurations assume excavations are above the groundwater table, there is no standing water in the excavations, and there is no seepage from the slope into the excavations, unless otherwise specified. The preceding classifications and slope configurations assume the material in the excavations is not fractured, adversely bedded, jointed, nor left open to desiccate, crack, or slough, and is protected from surface runoff. There are other considerations regarding allowable slope configurations the contractor is responsible for, including proximity of equipment, stockpiles, and other surcharge loads to the excavation. The contractor's formally designated competent person is responsible for decisions regarding slope configuration, bracing, shoring and safety conditions for excavations.

Excavations should not undermine existing foundation systems of structures or infrastructure, unless they are adequately protected. At a minimum, new excavations should not intersect a line drawn on a 45 degree angle down and away from the bottom edge of the existing foundation systems or bottom edge of infrastructure. If this condition cannot be met, shoring or staged excavations may be required. If shoring is required, a condition survey of the adjacent structures is recommended before construction starts and again upon completion of construction. In CMT's experience, condition surveys must include, but may not be limited to, photographs of preconstruction distress to adjacent and nearby structures.

Permanent cut or fill slopes should be no steeper than 3:1 and revegetated or otherwise protected from erosion.

Deeper utility trenches and manhole excavations may encounter very hard bedrock and may require aggressive tooling on the excavator, a jackhammer, or light blasting. Bearing material loosened by aggressive tooling, jackhammering, or blasting should be recompacted or removed.

Very moist soil may become unstable or pump soil under earthmoving equipment, especially nearer the groundwater table. Care should be taken to properly compact the foundation soil beneath the manhole.

4. ENGINEERED CONTROLLED FILL/BACKFILL SOIL

Where engineered controlled fill/backfill soil is necessary, the suitable onsite inorganic soil may be used. At this site, unsuitable material is defined as topsoil, organics, trash, ash, frozen material, hard lumps and clods, and particles larger than 3 inches. Existing onsite previously placed fill material can be reused for engineered controlled fill/backfill, provided it is free of unsuitable material. If unsuitable material is encountered in the existing previously placed fill, it must be removed before the existing fill can be reused as engineered controlled fill/backfill. Recommendations for engineered controlled fill/backfill placement are:

a) Clods, lumps, or claystone shall be broken down to a maximum size of 3 inches. Pieces larger than 3 inches shall be removed from the fill/backfill material.
b) Fill/backfill material should be placed in loose lifts and compacted in accordance with Table 4.1.
c) Maximum loose lift thickness shall be 6 inches, depending on the type of equipment used to apply compactive effort and shall be reduced if the specified compaction cannot be obtained with the equipment used. Thicker lift thicknesses may be considered if it can be demonstrated by testing that compaction requirements are being achieved for the full lift thickness.
d) Fill/backfill should not be placed if material is frozen or if the placement surface is frozen.
e) Fill/backfill material should be placed and spread in horizontal lifts of uniform thickness in a manner that avoids segregation.
f) Placement surface should be kept free of standing water, debris, and unsuitable material during placement and compaction of fill/backfill material.
g) Fill/backfill maximum allowable particle size is 3 inches. Do not incorporate oversize material in the fill/backfill incapable of being broken down by the equipment and methods being employed to process and compact the fill/backfill. Process and compact material in the lift, as necessary, to produce the specified fill/backfill characteristics. If oversize particles remain in the lift after processing and compacting, remove oversize material to produce a fill/backfill within specified requirements.
h) At a minimum, utility trench backfill should be tested in accordance with jurisdictional requirements.

TABLE 4.1. Compaction Specifications

Fill Location	Material Type (General)	ASTM Classification	Material Thickness (ft)	Moisture Content (%)	Relative Compaction (%)	Compaction Standard
Engineered controlled fill (includes overlot grading)	Granular material that is clean to silty	GW, GM, GC, SW, SM, SC	≤15*	±2% of OMC	≥95%*	Standard Proctor (ASTM D698)
					Minimum 70%	Relative Density (ASTM 4254)
	Fine-grained material and granular material with plastic fines	CL, MH, CH	≤15*	0% to +3% of OMC	≥95%*	Standard Proctor (ASTM D698)

* If fill thickness greater than 15 feet is planned, additional requirements may apply.

4.1 IMPORT FILL

Material imported for engineered controlled fill should be tested and approved for use onsite by the project geotechnical engineer prior to hauling to the site. Proctor, remolded swell, and classification tests should be conducted to determine if the fill meets required specifications. Fill material should be well graded, low permeable material meeting the specifications in Table 4.2.

TABLE 4.2. Import Fill Specifications

Soil Parameter	Specification
Maximum particle size	1 inch
Percent finer than No. 200 sieve	20% to 40%
Liquid limit	20% to 40%
Plasticity index	8% to 15%
Swell potential under anticipated loads	less than 1%*

* Upon inundation, when remolded to 97% maximum dry density at 1% below the optimum moisture content per ASTM D698 at a surcharge pressure of 100 psf.

It should be noted other more granular materials may be deemed suitable for use as fill in some instances; however, small diameter rock and the presence of fines presents a material more suitable to compaction verification testing. Alternative materials proposed as fill should be evaluated and approved by the geotechnical engineer and design team before use.

5. DEWATERING

During the field exploration, CMT installed 17 groundwater monitoring wells which have been monitored monthly. Groundwater was measured as shallow as 2.8 feet deep (Thompson-3 monitor well). Localized dewatering should be anticipated. More detailed evaluation of the groundwater may be required for dewatering system design, should it be necessary.

6. SOIL CHEMICAL TESTING

6.1 SULFATE EXPOSURE

Water soluble sulfate contents of 0.00% to 1.80% were measured on thirteen samples of overburden soil which was mostly clay from depths between 0 and 15 feet. Results are summarized in Appendix B. The PCA publication titled *Design and Control of Concrete Mixtures* 2002 and the ACI publication titled *Building Code Requirements for Structural Concrete and Commentary,* consider this range between S0 and S2 for water soluble sulfate exposure. Recommendations for concrete in contact with or within 6 inches of the clay are shown in Table 6.1.

TABLE 6.1 Information from ACI 318-08 - Table 4.3.1

Water Soluble Sulfates (%)	Exposure Class	Maximum (w/cm)*	Minimum *f'c*, (psi)	Cementitious materials† (types)			Calcium Chloride Admixture
				ASTM C150	ASTM C595	ASTM C1157	
<0.10	S0	N/A	2,500	No type restriction	No type restriction	No type restriction	No restriction
≤0.10 to <0.20	S1 Moderate	0.50	4,000	II‡	IP (MS) IS (<70) (MS)	MS	No restriction
≤0.20 to ≤2.00	S2 Severe	0.45	4,500	V§	IP (HS) IS (<70) (HS)	HS	Not permitted

*For lightweight concrete, see ACI 318-08 4.1.2.

†Alternative combinations of cementitious materials listed in Table 4.3.1 shall be permitted when tested for sulfate resistance and meeting the criteria in ACI 318-08 4.5.1.+

‡For seawater exposure, other types of Portland cements with tricalcium aluminate (C_3A) contents up to 10 percent are permitted if the w/cm does not exceed 0.40.

§Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C_3A contents are less than 8 or 5 percent, respectively.

Refer to ACI 318-08 R4.3.1 for further interpretation of this table.

6.2 SOIL CORROSIVITY

Soil corrosivity tests for the TWP Segment F.1 were performed and reported by the project corrosivity engineer, QualCorr. CMT recommends the design team consult with manufacturers of corrosion sensitive products prior to selection and installation of products that will be in contact with the onsite material.

Please contact CMT with comments or questions regarding this information.

Sincerely,
CMT TECHNICAL SERVICES - COLORADO



K. Craig Vaugh, P.E.
Senior Principal - Colorado

NTA/amw

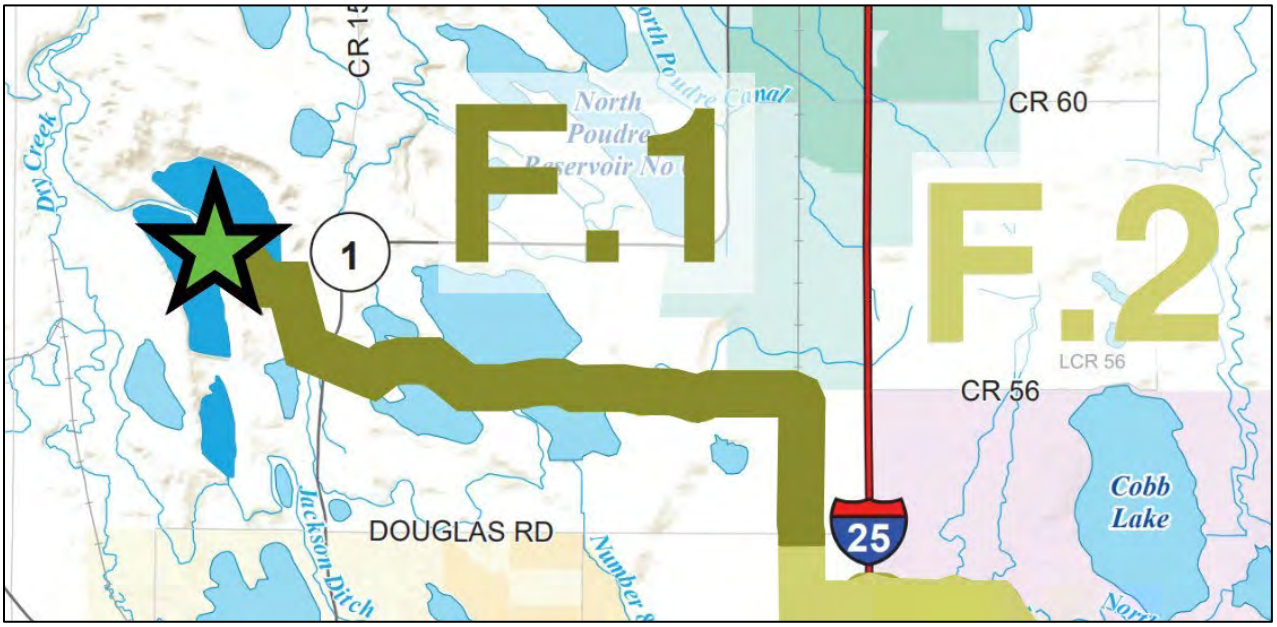
Attachment 3.3 – Geotechnical Data Report

CMT TECHNICAL SERVICES

GEOTECHNICAL DATA REPORT

Thornton Water Project (TWP) - Segment F.1

Larimer County, Colorado



Prepared for:

Mr. Daniel Rice, P.E.
Providence Infrastructure Consultants
300 Plaza Drive, Suite 320
Littleton, CO 80129

Project No. 500653.A
July 15, 2026

Colorado Regional Office: 7108 South Alton Way, Building B • Centennial, CO 80112
Arizona • Colorado • Idaho • Texas • Utah
Phone 303-220-0300 • www.cmttechnicalservices.com

GEOTECHNICAL DATA REPORT

Thornton Water Project (TWP) - Segment F.1

Larimer County, Colorado

Prepared for:

Mr. Daniel Rice, P.E.
Providence Infrastructure Consultants
300 Plaza Drive, Suite 320
Littleton, CO 80129

Project No. 500653.A
July 15, 2026

Reviewed by:



Noom T. Aksharadananda, P.E.
Project Engineer

TABLE OF CONTENTS

1. PURPOSE **1**
1.1 GENERAL 1
1.2 SCOPE OF SERVICES 1
2 SITE CONDITIONS **1**
3. GEOLOGIC CONDITIONS **2**
3.1 SURFICIAL DEPOSITS 2
3.2 BEDROCK 2
4. SUBSURFACE EXPLORATION **3**
5. LABORATORY TESTING **6**
6. SUBSURFACE CONDITIONS **6**
7. GROUNDWATER LEVEL MONITORING **8**
8. SOIL CHEMICAL TESTING **10**
8.1 SULFATE EXPOSURE 10
8.2 SOIL CORROSIVITY 11
9. GEOTECHNICAL RISK **11**
10. LIMITATIONS **11**

TABLES

TABLE 5.1. Laboratory Testing Performed **6**
TABLE 6.1. Summary of Soil(s) and Bedrock(s) **7**
TABLE 7.1. Groundwater Level Reading **9**
TABLE 8.1 Information from ACI 318-08 - Table 4.3.1 ..... **11**

FIGURES

VICINITY MAP ..... **FIGURE 1**
BORING LOCATIONS ..... **FIGURE 2**

APPENDICES

BORING LOGS ..... **APPENDIX A**
LABORATORY TESTING ..... **APPENDIX B**
GROUNDWATER MEASUREMENTS, SLUG TESTING, WATER QUALITY TESTING ..... **APPENDIX C**

COMMON ABBREVIATIONS AND ACRONYMS

AASHTO ..... **American Association of State Highway and Transportation Officials**
ABC ..... **aggregate base course**
ACI ..... **American Concrete Institute**
ADA ..... **Americans with Disabilities Act**
ADSC ..... **International Association of Foundation Drilling**
AI ..... **Asphalt Institute**
APM ..... **asphalt paving material**
ASCE ..... **American Society of Civil Engineers**
ASTM ..... **American Society for Testing and Materials**
AWWA ..... **American Water Works Association**
bgs ..... **below ground surface**
CDOT ..... **Colorado Department of Transportation**
CBR ..... **California Bearing Ratio**
CFR ..... **Code of Federal Regulations**
CGS ..... **Colorado Geological Survey**
CKD ..... **cement of kiln dust stabilized subgrade**
CMU ..... **concrete masonry unit**
CTB ..... **cement treated base course**
deg ..... **degree**
EDLA ..... **equivalent daily load application**
e_m ..... **edge moisture variation distance**
EPS ..... **expanded polystyrene**
ESAL ..... **equivalent single axle loads**
f'c ..... **specified compressive strength of concrete at the age of 28 days**
F_a ..... **seismic site coefficient**
FHWA ..... **Federal Highway Administration**
FS ..... **factor of safety**
F_V ..... **seismic site coefficient**
GSA ..... **global stability analysis**
GVW ..... **gross vehicle weight**
IBC ..... **International Building Code**
ICC-ES ..... **International Code Council Evaluation Services, Inc.**
IRC ..... **International Residential Code**
kip ..... **1,000 pounds-force**
km ..... **kilometer**
LTS ..... **lime treated subgrade**
MDD ..... **maximum dry density**
mg/L ..... **milligrams per liter**
MGPEC ..... **Metropolitan Government Pavement Engineers Council**
mm ..... **millimeter**
Mr ..... **resilient modulus**
MSE ..... **mechanically stabilized earth**
mV ..... **millivolts**
NAPA ..... **National Asphalt Pavement Association**
N_{DESIGN} ..... **design gyrations**
OMC ..... **optimum moisture content**
OSHA ..... **Occupational Safety and Health Administration**

OWTS ..... onsite wastewater treatment system
PCA..... Portland Cement Association
PCC..... Portland cement concrete
pcf ..... pounds per cubic foot
pci..... pounds per cubic inch
pH..... power of hydrogen
psf ..... pounds per square foot
psi..... pounds per square inch
PT ..... post-tension
RAP..... recycled asphalt pavement
S_s ..... mapped spectral accelerations for short periods
UBC ..... Uniform Building Code
USGS ..... United States Geological Survey

1. PURPOSE

1.1 GENERAL

CMT Technical Services - Colorado (CMT) performed a geotechnical study for the proposed Thornton Water Pipeline (TWP) Segment F.1 project located in Larimer County, Colorado. This study was made to characterize existing subsurface conditions at the site and provide information to assist in determining design criteria for planning, site development, and other pertinent geotechnical concerns. Information gathered during the field exploration, laboratory testing, and groundwater monitoring is summarized in Figures 1 and 2 and Appendices A through C. CMT's information presented in this report is based on data generated during this field exploration and associated laboratory testing.

1.2 SCOPE OF SERVICES

The scope of services performed is detailed in the Proposal Agreement No. F240805.A, *Proposed Geotechnical Evaluation, Thornton Water Project (TWP) – Segment F.1, Larimer County, Colorado*, which was delivered on March 25, 2025, and CMT was authorized by a Notice to Proceed from Providence Infrastructure Consultants on March 28, 2025.

2 SITE CONDITIONS

The project alignment is located in Larimer County, Colorado. A vicinity map showing the location of the proposed alignment is shown in Figure 1. The planned 5.7 mile water pipeline originates at the E-3 source water pump station on Hood Lane (or Launer Lane in the Google Map) located between Rocky Ridge Lake Reservoir No. 1 and Water Supply and Storage Reservoir (WSSC) No. 3 and continues to the southeast across North Highway 1 (1.3 miles) to East County Road 56 (0.4 miles), east on County Road 56 to the intersection with the BNSF railroad (3.1 miles), then heads south along the western side of the BNSF railroad and terminates at East Douglas Road (1.0 mile).

Three tunnels are planned for the project. They will pass under North Highway 1 (Terry Lake Road), Giddings Road, and the BNSF railroad at East Douglas Road. The remainder of the alignment is expected to be constructed by open-cut trench techniques. On the west and east of North Highway 1, the site consists of undeveloped/reserved lands with multiple reservoirs, including Rocky Ridge Lake Reservoir Nos. 1, WSSC No. 3, Mountain Supply Reservoir 10, Annex No. 8, Windsor Reservoir, and Elder Reservoir. The alignment continues to the east on County Road 56 and south along the BNSF railroad; the site is primarily undeveloped lands used for agriculture and some residences. The BNSF railroad track runs north to south between Giddings Road and I-25.

Topography of the site slopes gently to steeply with a grade change of about 65 feet uphill over approximately 1 mile from the pump station to Terry Lake Road, downhill about 85 feet over approximately 3.5 miles from Terry Lake Road or North Highway 1 to the BNSF railroad, and downhill about 30 feet over approximately 1 mile from the intersection to the southern end of the alignment at Douglas Road. Vegetation varies across the alignment but consists of native grasses, bushes, trees and agricultural/grazing grasses.

3. GEOLOGIC CONDITIONS

3.1 SURFICIAL DEPOSITS

The *Geologic map of the Fort Collins 30'×60' quadrangle, Larimer and Jackson Counties, Colorado, and Albany and Laramie Counties, Wyoming*, prepared for the USGS by Workman, J.B., Cole, J.C., Shroba, R.R., Kellogg, K.S., and Premo, W.R., dated 2018, as shown in Exhibit 1, indicates surficial deposits and bedrocks onsite likely consist of:

"SURFICIAL DEPOSITS

- *Qa – Valley -floor alluvium (Holocene)*
- *Qb – Broadway alluvium (late Pleistocene)*
- *Qlo – Loess (late and late middle Pleistocene)*

PRE-CENOZOIC SEDIMENTARY ROCKS

- *Kpl - Lower shale member*
- *Kpm – Middle shale member*
- *Kpr – Richard Sandstone Member, Larimer Sandstone Member, Rocky Ridge Sandstone Member, and two intervening unnamed shale members*
- *Kpu – Upper shale member"*

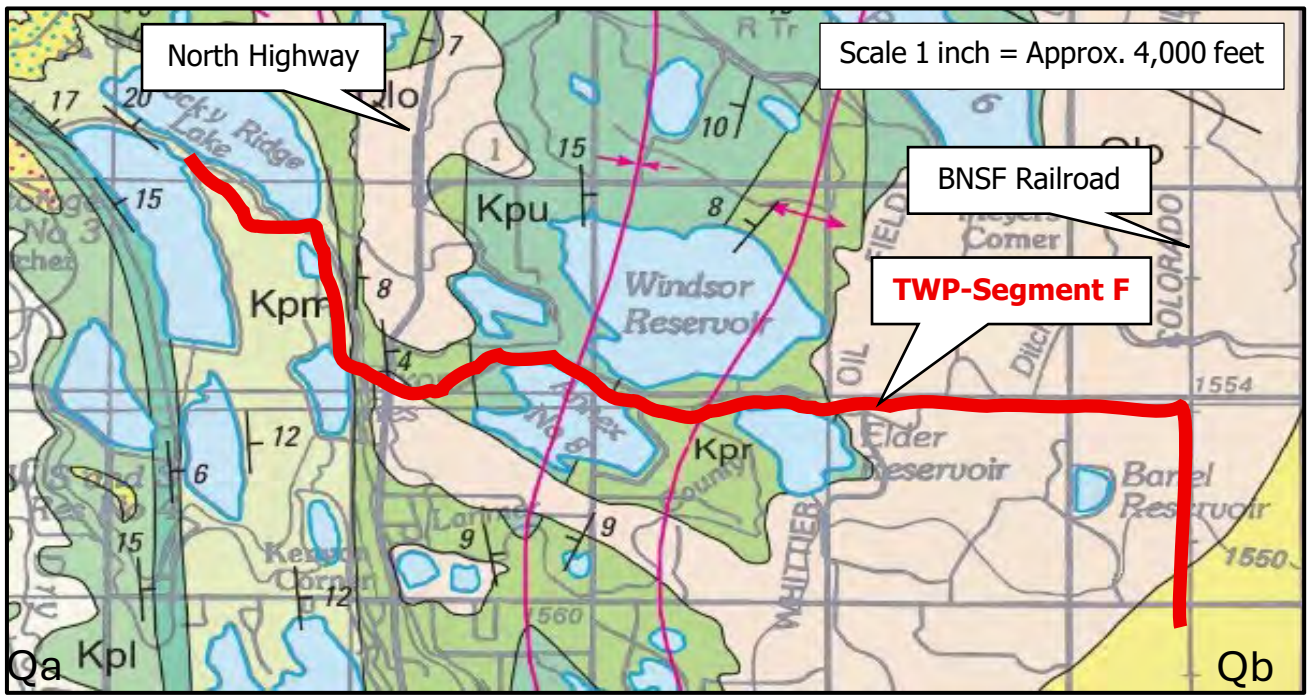


EXHIBIT 1. Portion of *Geologic map of the Fort Collins 30'×60' quadrangle, Larimer and Jackson Counties, Colorado, and Albany and Laramie Counties, Wyoming*, prepared for the USGS by Workman, J.B., Cole, J.C., Shroba, R.R., Kellogg, K.S., and Premo, W.R., dated 2018. The TWP-Segment F.1 is shown in the red line.

3.2 BEDROCK

The *Geologic map of Colorado*, prepared for the USGS by Tweto, Ogden, dated 1979, as shown in Exhibit 2, indicates the geology onsite likely consists of:

- *Kpu: PIERRE SHALE, Upper unit*
- *Kpm: PIERRE SHALE, Middle unit – In Boulder-Fort Collins area, contains Richard, Larimer, Rocky Terry, and Hygene Sandstone Members; elsewhere, shale between*

zones of Baculites reesidei and B. scotti

- *Qg: GRAVEL AND ALLUVIUMS (PINEDALE AND BULL LAKE AGE) – Includes Broadway and Louviers Alluviums.*
- *Qe: EOLIAN DEPOSITS – Includes dune sand and silt and Peoria Loess.*

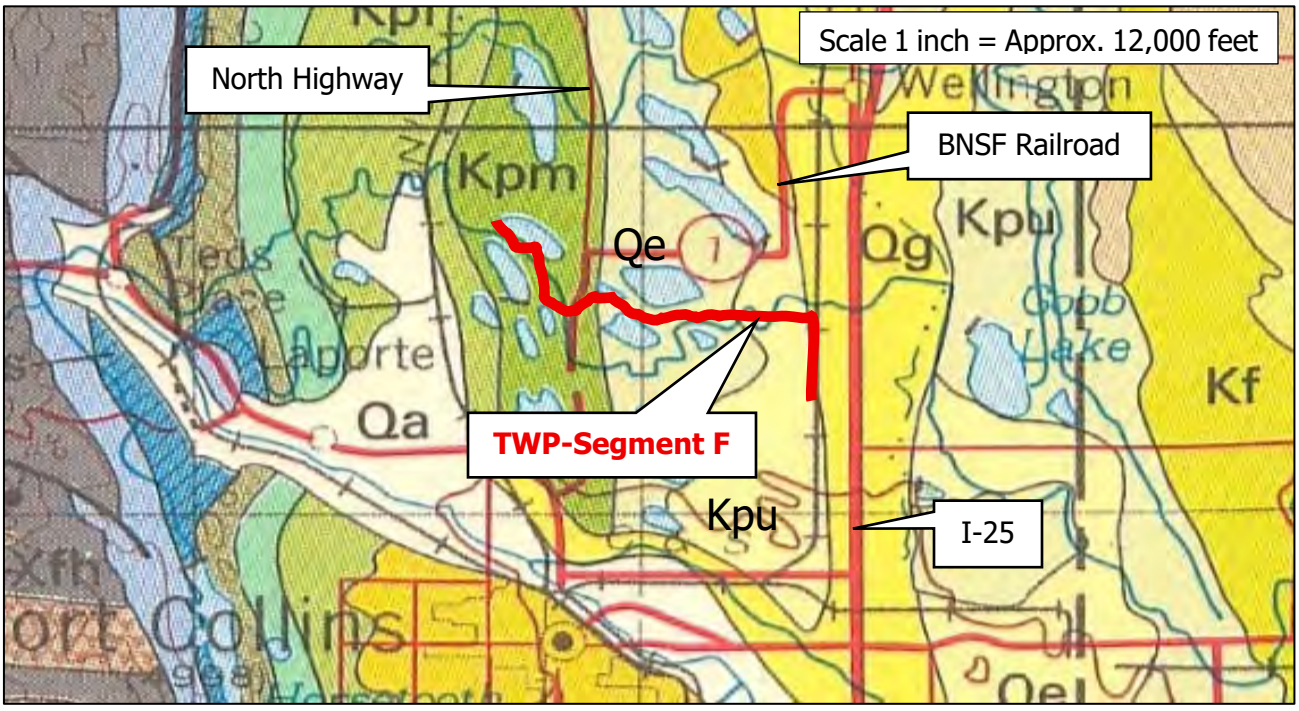


EXHIBIT 2. Portion of *Geologic map of Colorado*, prepared for the USGS by Tweto, Ogden, dated 1979. The TWP-Segment F.1 is shown in the red line.

4. SUBSURFACE EXPLORATION

Subsurface site work for the TWP-Segment F.1 pipeline took place between February and December 2025. A total of 43 borings were drilled at the locations indicated in Figure 2. Borings were advanced to depths varying from approximately 15 to 40 feet utilizing either solid stem auger, hollow stem auger or NX wireline coring methods. Thirty-two borings were drilled to a depth of approximately 15 feet to obtain information for the pipeline portions that will be constructed by open trench techniques. The other eleven borings were drilled to a depth of approximately 40 feet to obtain information to assist in determining criteria for tunnel design. Graphical logs of the subsurface conditions observed, locations of sampling, testing and further explanation of the exploration are presented in the boring logs contained in Appendix A.

Samples of the subsoil were obtained using Modified California and standard split spoon (split barrel) samplers. Modified California and standard split spoon samplers are advanced into the soil by dropping a 140 pound hammer through a free fall of 30 inches. The Modified California sampler measures 2-1/2 inch outside diameter by 2 inch inside diameter and is lined with brass cylinders which collect and retain the discreet soil or bedrock specimens. The standard split spoon sampler measures 2 inch outside diameter by 1-3/8 inch inside diameter. The procedure to drive these samplers into the soil and to record the number of blows required to drive the sampler into the soil is known as a penetration test. The samplers are typically advanced a total of 12 to 18 inches. The

number of hammer blows required to advance each 6 inch increment is recorded. The total of blows to advance the sampler the final 12 inches gives an indication of the relative stiffness of cohesive soil, the relative density of non-cohesive soil, and the relative hardness of sedimentary bedrock material encountered. Bulk samples were also collected from auger cuttings generated during drilling. One boring (RRDI-4A) was drilled and sampled utilizing NX wireline coring techniques. NX wireline coring advances a 1.875-inch inside diameter rock cutting head connected to a core retention barrel which is capable of collecting a continuous five foot length of rock core. The core retention barrel is extracted after each five foot advancement and the rock core retained is logged, labeled and boxed. Locations of sampling and penetration test results are presented on the boring logs contained in Appendix A.

CMT installed temporary groundwater monitoring wells in 18 borings: HOOD-2A, TIPS-2, RRDI-1, RRDI-3, THOM-1, THOM-3, JACK-1, JACK-2, LCROW-3, LCROW-4, LCROW-5, TH-1A, TH-3, TH-4, KR-3, BA-1, BA-9 and QTR-1.

The State of Colorado's Division of Water Resources (DWR) considers monitoring wells to be temporary for the initial period of 18 months. After 18 months DWR requires wells to be permitted and maintained as such or abandoned onsite (removed and/or plugged). If requested by Client, CMT can assist with well abandonment and/or the process of permitting when the 18 month period is coming to an end.

Prior to drilling and installing monitor wells, CMT filed the appropriate "Notice of Intent" forms (Form GWS-51) with DWR. After constructing the monitor wells, CMT filed the appropriate "Well Construction Reports" (Form GWS-31) with DWR.

The groundwater monitoring wells were constructed using a 2 inch diameter PVC pipe consisting of screened/slotted intervals and solid/riser intervals. The screen intervals were placed from the bottom of the boring up to the approximate water level with the solid portion continuing from there to the ground surface, in the case of flush mount wells, or to 2 to 3 feet above ground surface, in the case of stick up wells. 10/20 silica sand was placed around the screen portions of the pipe and to 1 to 2 feet above the screen portion. Bentonite pellets were placed on top of the silica sand to ground surface. The bentonite was "charged" by adding water to encourage expansion and sealing. Most of the monitor wells were constructed as stick up monuments where a steel protective cover is placed around the PVC pipe and a concrete pad is constructed at the ground surface around the cover, see Photo 1 below. Where necessary, other monitor wells were completed as flush mounts, where the PVC pipe is cut approximately 6 inches below ground surface and an 8 inch diameter steel can and cover is placed around and over the pipe. The flush mount is then surrounded by a concrete ring for added protection, see Photo 2 below. Graphical details of the monitor wells are presented on the boring logs contained in Appendix A.



Photo 1. View looking at steel stick up surface completion and concrete pad at Boring THOM-1



Photo 2. View looking at flush mount surface completion at boring LCROW-3

CMT collected water quality samples from each of the monitor wells. Water quality samples were collected using bailers and rope. The water collected was placed in glass and plastic jars in test-specific containers provided by an outside water testing laboratory. Water samples were placed on ice and delivered same day to the water laboratory for testing. Prior to collecting water samples CMT "developed" each monitor well by pumping or bailing a minimum of three well volumes of water from

each well. The results of the water quality laboratory testing and the associated Chain of Custody forms are contained in Appendix C.

CMT performed "slug" (rising/falling head) testing in the ten monitor wells installed at potential tunnel locations. Slug testing was performed using In-Situ Level Troll 700 data loggers connected to cables and placed inside and near the bottom of the monitor well pipe. Logs were started using a handheld device connected via Bluetooth to the data logger and cable inside the well. A 6 foot long, 1-1/2 inch diameter slug device was inserted into the well for recording measurements during water displacement (rising head), then later removed to record measurements during water return (falling head). Results of the slug testing performed is found in Appendix C.

5. LABORATORY TESTING

CMT personnel returned samples obtained during field exploration to its laboratory where professional staff visually classified them and assigned testing to selected samples to evaluate pertinent engineering properties. Laboratory tests performed are listed in Table 5.1. Further discussion of laboratory testing and the laboratory test results are summarized and presented in Appendix B.

TABLE 5.1. Laboratory Testing Performed

Laboratory Test	To Evaluate
Grain size analysis	Grain size distribution for classification purposes.
Atterberg limits	Soil plasticity for classification purposes.
Swell/consolidation	Effect of wetting and loading on the soil.
Water-soluble sulfate content	Potential corrosivity of the soil on cementitious materials.
pH, water-soluble chloride content, sulfide, and resistivity*	Potential corrosivity of the soil to metal.
Unconfined compressive strength	Undrained shear strength.
Equivalent Quartz Content (EQC) and X-Ray Diffraction**	Rock's abrasiveness, percentage of abrasive minerals, and relative hardness for tunneling design.
Cechar Abrasivity Index**	Abrasiveness of rock, and predictive of bit wear and tool life in tunneling.

*This chemical suite test is performed by QualCorr, the project corrosion engineer.
**This suite test is performed by the EMI Lab of Colorado School of Mines.

6. SUBSURFACE CONDITIONS

CMT's borings encountered:

- Top soils comprised of sandy clay and clayey sand from the surface to depths of 0.5 to 1 foot in eight borings (Borings HOOD-2A, THOM-1, THOM-3, JACK-1, JACK-2, JACK-3, LCROW-1, and LCROW-2).
- Native overburden soils consisting of clay to sandy clay and silty sand to clayey sand in each of the borings. The native overburden soils extended from the ground surface to depths as deep as approximately 39 feet.
    - Medium stiff to very stiff clay, lean to fat, with various amounts of sand, silty, encountered in most of the borings either from the ground surface, below 0.5 to 1 foot of top soils, or sand layers.

  - Surficial sand was encountered near North Highway 1 from the surface to 4.5 feet (Boring HOOD-3 and Borings RRDI-1 through RRDI-3).
- Bedrock, comprised of weathered claystone, claystone, and sandstone, was encountered in 22 of 43 borings, including 9 of 11 deep borings (30 to 40 feet) at depths as shallow as 2 feet in Boring RRDI-1 and as deep as 39 feet in Boring TH-4.
  - Weathered claystone and claystone were medium hard to very hard.
  - Very hard, cemented sandstone with a blow count of 50 blows for 0 inches of penetration at depths ranging between 3 and 39 feet below ground surface near the North Highway 1's right-of-way (Borings RRDI-2 through RRDI-4, Boring RRDI-4, and Boring THOM-1).
  - Very hard with a blow count of 50 blows per 1 to 2 inches, claystone was encountered in two tunnel borings (TIPS-2 and RRDI-1).

Table 6.1 summarizes the types of soil and bedrock and the depths of bedrock from the project.

TABLE 6.1. Summary of Soil(s) and Bedrock(s).

Official Boring ID	Boring ID*	Elevation at Ground Surface** (ft)	Boring Depth (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)	Type of Soils Encountered	Type of Bedrocks Encountered***
TH-WSSC-1	WSSC-1	5,144.6	14.9	7	5,137.6	Clay	Weathered Claystone, Claystone
TH-WSSC-2	WSSC-2	5,166.1	14.4	7	5,159.1	Clay	Weathered Claystone, Claystone
TH-HOOD-1	HOOD-1	5,126.2	15	NE	NE	Clay	NE
TH-HOOD-2	HOOD-2	5,113.8	14.9	9	5,104.8	Clay	Weathered Claystone, Claystone
TH-HOOD-2 (MW)	HOOD-2A	5,112.0	14.9	9	5,103.0	Topsoil, Clay	Weathered Claystone, Claystone
TH-HOOD-3	HOOD-3	5,121.7	15	NE	NE	Sand, Clay	NE
TH-TIPS-1	TIPS-1	5,123.1	15	NE	NE	Clay	NE
TH-TIPS-2 (MW)	TIPS-2	5,122.3	40.1	12	5,110.3	Clay	Claystone
TH-RRDI-1 (MW)	RRDI-1	5,134.7	39.1	2	5,132.7	Sand	Claystone, Sandstone
TH-RRDI-2	RRDI-2	5,142.0	14.1	3	5,139.0	Sand	Sandstone
TH-RRDI-3 (MW)	RRDI-3	5,167.5	39	3	5,164.5	Clay	Sandstone
TH-RRDI-4	RRDI-4	5,167.8	15.6	8.5	5,159.3	Clay	Sandstone
TH-RRDI-4A	RRDI-4A	5,167.5	30	8.5	5,159.0	Clay	Sandstone
TH-THOMPSON-1 (MW)	THOM-1	5,163.7	39	16	5,147.7	Topsoil, Clay	Weathered Sandstone, Sandstone
TH-THOMPSON-2	THOM-2	5,163.4	15	4	5,159.4	Sand	Sandstone
TH-THOMPSON-3 (MW)	THOM-3	5,152.5	15	NE	NE	Topsoil, Clay, Sand	NE
TH-JACKSON-1 (MW)	JACK-1	5,149.7	15	10	5,139.7	Topsoil, Clay	Claystone
TH-JACKSON-2 (MW)	JACK-2	5,151.6	15	7	5,144.6	Topsoil, Clay	Claystone
TH-JACKSON-3	JACK-3	5,157.6	15	7	5,150.6	Topsoil, Clay	Weathered Claystone, Claystone
TH-LCROW-1	LCROW-1	5,155.4	15	NE	NE	Topsoil, Clay	NE
TH-LCROW-2	LCROW-2	5,130.3	15	NE	NE	Topsoil, Clay	NE

Official Boring ID	Boring ID*	Elevation at Ground Surface** (ft)	Boring Depth (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)	Type of Soils Encountered	Type of Bedrocks Encountered***
TH-LCROW-3 (MW)	LCROW-3	5,122.0	15	NE	NE	Clay	NE
TH-LCROW-4 (MW)	LCROW-4	5,118.7	15	NE	NE	Clay	NE
TH-LCROW-5 (MW)	LCROW-5	5,118.6	15	NE	NE	Clay	NE
TH-THORNTON-1	TH-1	5,116.8	15	NE	NE	Clay	NE
TH-THORNTON-1 (MW)	TH-1A	5,112.0	15	NE	NE	Clay	NE
TH-THORNTON-2	TH-2	5,122.1	14.8	9.5	5,112.6	Clay	Weathered Claystone, Claystone
TH-THORNTON-3 (MW)	TH-3	5,116.3	40	NE	NE	Clay	NE
TH-THORNTON-4 (MW)	TH-4	5,110.8	40	39	5,071.8	Clay, Sand	Claystone
TH-THORNTON-5	TH-5	5,133.0	20	NE	NE	Fill: Clay	NE
TH-KRAFT-1	KR-1	5,106.8	15	NE	NE	Clay	NE
TH-KRAFT-2	KR-2	5,108.4	14.5	9.5	5,098.9	Sand, Clay	Claystone
TH-KRAFT-3 (MW)	KR-3	5,096.3	39.4	34.8	5,061.5	Clay	Weathered Claystone, Claystone
TH-BARTLES-1 (MW)	BA-1	5,095.1	39.4	34	5,061.1	Clay, Sand	Claystone
TH-BARTLES-2	BA-2	5,092.3	15	NE	NE	Clay	NE
TH-BARTLES-3	BA-3	5,090.1	15	NE	NE	Clay	NE
TH-BARTLES-4	BA-4	5,087.4	15	NE	NE	Clay	NE
TH-BARTLES-5	BA-5	5,079.1	15	NE	NE	Clay	NE
TH-BARTLES-6	BA-6	5,073.3	15	NE	NE	Clay	NE
TH-BARTLES-7	BA-7	5,069.5	15	NE	NE	Clay	NE
TH-BARTLES-8	BA-8	5,067.8	15	NE	NE	Clay	NE
TH-BARTLES-9 (MW)	BA-9	5,061.4	39.5	35	5,026.4	Clay, Sand	Claystone
TH-QTR D-1 (MW)	QTR-1	5,060.3	39.4	33	5,027.3	Clay, Sand	Claystone

*Boring IDs were set up by the facility name, county name, or landowner's last names, such as WSSC for Water Supply and Storage Reservoir; HOOD, TIPS, THOM, JACK, KR, and BA for the last names of the landowners (Hood, Tips, Thompson, Jackson, Kraft, and Bartles), LCROW for Larimer County Right-of-way, and TH for the City of Thornton.

**Boring elevations were provided by Providence; otherwise, they were recorded using a handheld GPS.

***NE = Not encountered

7. GROUNDWATER LEVEL MONITORING

As described in Section 4, 18 borings were converted to PVC monitoring wells, including the 10 deeper borings with depths of 39 to 40 feet for the tunneling study and design, and the other eight 15 foot borings for the trench construction design. Groundwater levels in the borings were recorded at the time of drilling and periodically (once a month) after drilling.

Groundwater measurements, along with the dates explored and groundwater elevations, are summarized in Table 7.1.

TABLE 7.1. Groundwater Level Reading

Boring ID	Date Drilled	Elevation at Ground Surface (ft)	Boring Depth (ft)	Groundwater Depth		Groundwater Elevation During Drilling (ft)	Anticipated Pipeline Construction Method
				At the Time of Drilling (ft)	After Drilling* (ft)		
WSSC-1	04/14/25	5,144.6	14.9	NE	-	NE	Trench
WSSC-2	04/14/25	5,166.1	14.4	NE	-	NE	Trench
HOOD-1	04/14/25	5,126.2	15	NE	-	NE	Trench
HOOD-2	04/14/25	5,113.8	14.9	NE	-	NE	Trench
HOOD-2A*	09/03/25	5,112.0	14.9	NE	Appendix C	NE	Trench
HOOD-3	04/14/25	5,121.7	15	NE	-	NE	Trench
TIPS-1	07/14/25	5,123.1	15	4	-	5,119.1	Trench
TIPS-2*	07/14/25	5,122.3	40.1	7	Appendix C	5,115.3	Tunnel
RRDI-1*	04/11/25	5,134.7	39.1	16.5	Appendix C	5,118.2	Tunnel
RRDI-2	04/10/25	5,142.0	14.1	NE	-	NE	Trench
RRDI-3*	04/10/25	5,167.5	39	20	Appendix C	5,147.5	Tunnel
RRDI-4	10/22/25	5,167.8	15.6	14	-	5,153.8	Trench
RRDI-4A	11/05/25	5,167.5	30	13	-	5,154.5	Tunnel
THOM-1*	09/02/25	5,163.7	40	11	Appendix C	5,152.7	Tunnel
THOM-2	09/02/25	5,163.4	15	5	-	5,158.4	Trench
THOM-3*	09/02/25	5,152.5	15	7	Appendix C	5,145.5	Trench
JACK-1*	09/03/25	5,149.7	15	14	Appendix C	5,135.7	Trench
JACK-2*	09/03/25	5,151.6	15	NE	Appendix C	NE	Trench
JACK-3	09/03/25	5,157.6	15	NE	-	NE	Trench
LCROW-1	08/06/25	5,155.4	15	NE	-	NE	Trench
LCROW-2	08/06/25	5,130.3	15	7	-	5,123.3	Trench
LCROW-3*	08/07/25	5,122.0	15	13.5	Appendix C	5,108.5	Trench
LCROW-4*	08/07/25	5,118.7	15	NE	Appendix C	NE	Trench
LCROW-5*	08/07/25	5,118.6	15	13	Appendix C	5,105.6	Trench
TH-1	02/24/25	5,116.8	15	NE	-	NE	Trench
TH-1A*	08/07/25	5,112.0	15	12	Appendix C	5,100.0	Trench
TH-2	02/24/25	5,122.1	14.8	NE	-	NE	Trench
TH-3*	02/27/25	5,116.3	40	18	Appendix C	5,098.3	Tunnel
TH-4*	02/28/25	5,110.8	40	13	Appendix C	5,097.8	Tunnel
TH-5	12/30/25	5,133.0	20	NE	-	NE	Trench
KR-1	02/24/25	5,106.8	15	9	-	5,097.8	Trench
KR-2	02/24/25	5,108.4	14.5	NE	-	NE	Trench
KR-3*	03/03/25	5,096.3	39.4	16.5	Appendix C	5,079.8	Tunnel
BA-1*	02/25/25	5,095.1	39.4	20	Appendix C	5,075.1	Tunnel
BA-2	02/24/25	5,092.3	15	NE	-	NE	Trench
BA-3	02/19/25	5,090.1	15	NE	-	NE	Trench
BA-4	02/19/25	5,087.4	15	NE	-	NE	Trench
BA-5	02/19/25	5,079.1	15	NE	-	NE	Trench
BA-6	02/19/25	5,073.3	15	NE	-	NE	Trench
BA-7	02/19/25	5,069.5	15	NE	-	NE	Trench
BA-8	02/19/25	5,067.8	15	NE	-	NE	Trench
BA-9*	02/20/25	5,061.4	39.5	10.5	Appendix C	5,050.9	Tunnel
QTR-1*	03/04/25	5,060.3	39.4	17.5	Appendix C	5,042.8	Tunnel

*18 monitoring wells were installed to observe groundwater for open trench construction and tunnel design. Groundwater readings are summarized and slug test results are attached in Appendix C. CMT continues to check the groundwater once a month and reports the readings separately. Additional borings, RRDI-4 and RRDI-4A, were drilled and cored to verify the depth and to obtain samples of sandstone.

A more complete description of the subsoil and groundwater conditions encountered is shown in Appendices A through C.



Photo 3. View looking at Boring RRDI-1 converted into a monitoring well.

These observations represent conditions at the time of field exploration and may not be indicative of other times or other locations. Groundwater can be expected to fluctuate and can be influenced by variations in seasons, weather, precipitation, drainage, vegetation, landscaping, irrigation, and leakage of water and/or wastewater systems, both onsite and offsite. Discontinuous zones of perched water may exist or develop within the overburden material and/or upper zones of the bedrock.

8. SOIL CHEMICAL TESTING

8.1 SULFATE EXPOSURE

Water soluble sulfate contents of 0.00% to 1.80% were measured on thirteen samples of overburden soil, which was mostly clay from depths between 0 and 15 feet. Results are summarized in Appendix B. The PCA publication titled *Design and Control of Concrete Mixtures* 2002 and the ACI publication titled *Building Code Requirements for Structural Concrete and Commentary,* consider this range between S0 and S2 for water soluble sulfate exposure. Recommendations for concrete that will be in contact with or within 6 inches of the clay are shown in Table 8.1.

TABLE 8.1 Information from ACI 318-08 - Table 4.3.1

Water Soluble Sulfates (%)	Exposure Class	Maximum (w/cm)*	Minimum f'c, (psi)	Cementitious materials† (types)			Calcium Chloride Admixture
				ASTM C150	ASTM C595	ASTM C1157	
<0.10	S0	N/A	2,500	No type restriction	No type restriction	No type restriction	No restriction
≥0.10 to <0.20	S1 Moderate	0.50	4,000	II‡	IP (MS) IS (<70) (MS)	MS	No restriction
≥0.20 to ≤2.00	S2 Severe	0.45	4,500	V§	IP (HS) IS (<70) (HS)	HS	Not permitted

*For lightweight concrete, see ACI 318-08 4.1.2. (w/cm: water cementitious materials ratio).
†Alternative combinations of cementitious materials listed in Table 4.3.1 shall be permitted when tested for sulfate resistance and meeting the criteria in ACI 318-08 4.5.1.
‡For seawater exposure, other types of Portland cements with tricalcium aluminate (C_3A) contents up to 10 percent are permitted if the w/cm does not exceed 0.40.
§Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C_3A contents are less than 8 or 5 percent, respectively.

Refer to ACI 318-08 R4.3.1 for further interpretation of this table.

8.2 SOIL CORROSIVITY

During drilling activities, CMT collected and bagged samples of auger cuttings which were then delivered to Qualcorr's laboratory in Castle Rock, Colorado. Soil corrosivity testing was performed and will be reported by the project corrosivity engineer, QualCorr. CMT recommends manufacturers be consulted by the design team prior to selection and installation of products that will be in contact with the onsite material.

9. GEOTECHNICAL RISK

The concept of risk is an important aspect of geotechnical reports. The primary reason for this is the analytical methods used by geotechnical engineers are typically empirical and must be tempered by engineering judgment and experience. The data, solutions or recommendations presented in a geotechnical report should not be considered risk free, and more importantly, are not a guarantee the interaction between the soil and the proposed construction will perform as predicted, desired, or intended.

10. LIMITATIONS

This document has been prepared as an instrument of service for the exclusive use of Providence Infrastructure Consultants for the specific application to the project as discussed herein and has been prepared in accordance with geotechnical engineering practices typically accepted in the state of Colorado at the date of its preparation. No warranties, either expressed or implied, are intended or made. This document should not be assumed to contain information for other parties or other purposes.

The findings of this data report are valid as of the date of its preparation. Changes in the conditions of a property can occur with the passage of time, whether due to natural processes or the works of people on this or adjacent properties. Standards of practice evolve in engineering and changes in

applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this data report may be invalidated wholly or partially by changes outside of CMT's control; therefore, this data report is subject to review and should not be relied upon without such review after a period of 3 years.

The exploration locations for this data report were selected to obtain a depiction of underground conditions for design purposes, and these locations are often modified based on accessibility and the presence of underground or overhead utility conflicts. Variations from the soil conditions encountered are possible.

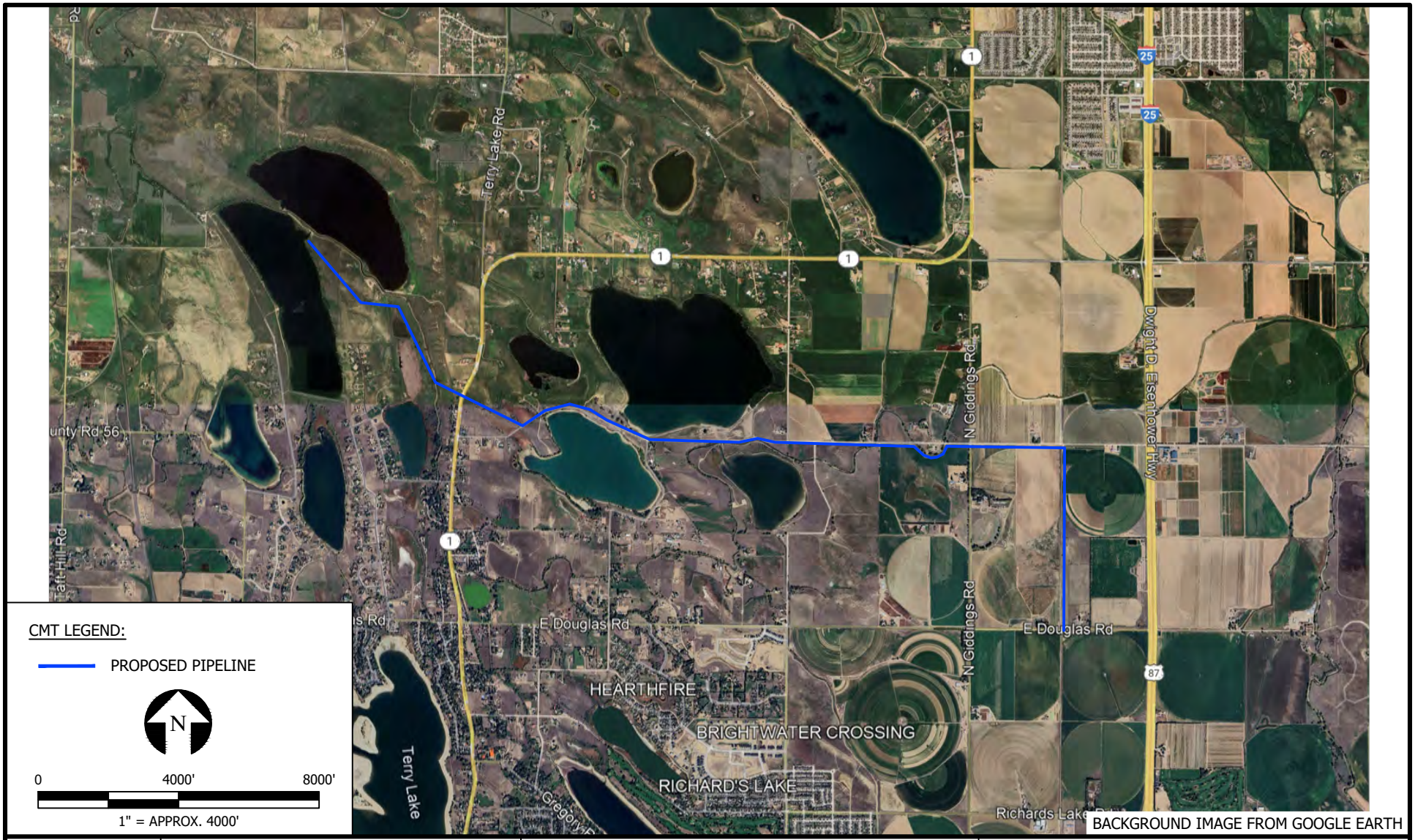
CMT's scope of services for this report did not include either specifically, or by implication, an environmental assessment of the site or identification of hazardous material or conditions.

CMT offers many other construction observations, materials engineering, and testing services and can be contacted to discuss further.

CMT TECHNICAL SERVICES

FIGURES

W:\2024\Frederick\500653 (24.3040.A) Thornton Water Project (TWP) Segment F\ACAD\24.3040 Thornton Water Project Phase F Figures.dwg 1/14/2026 3:54 PM

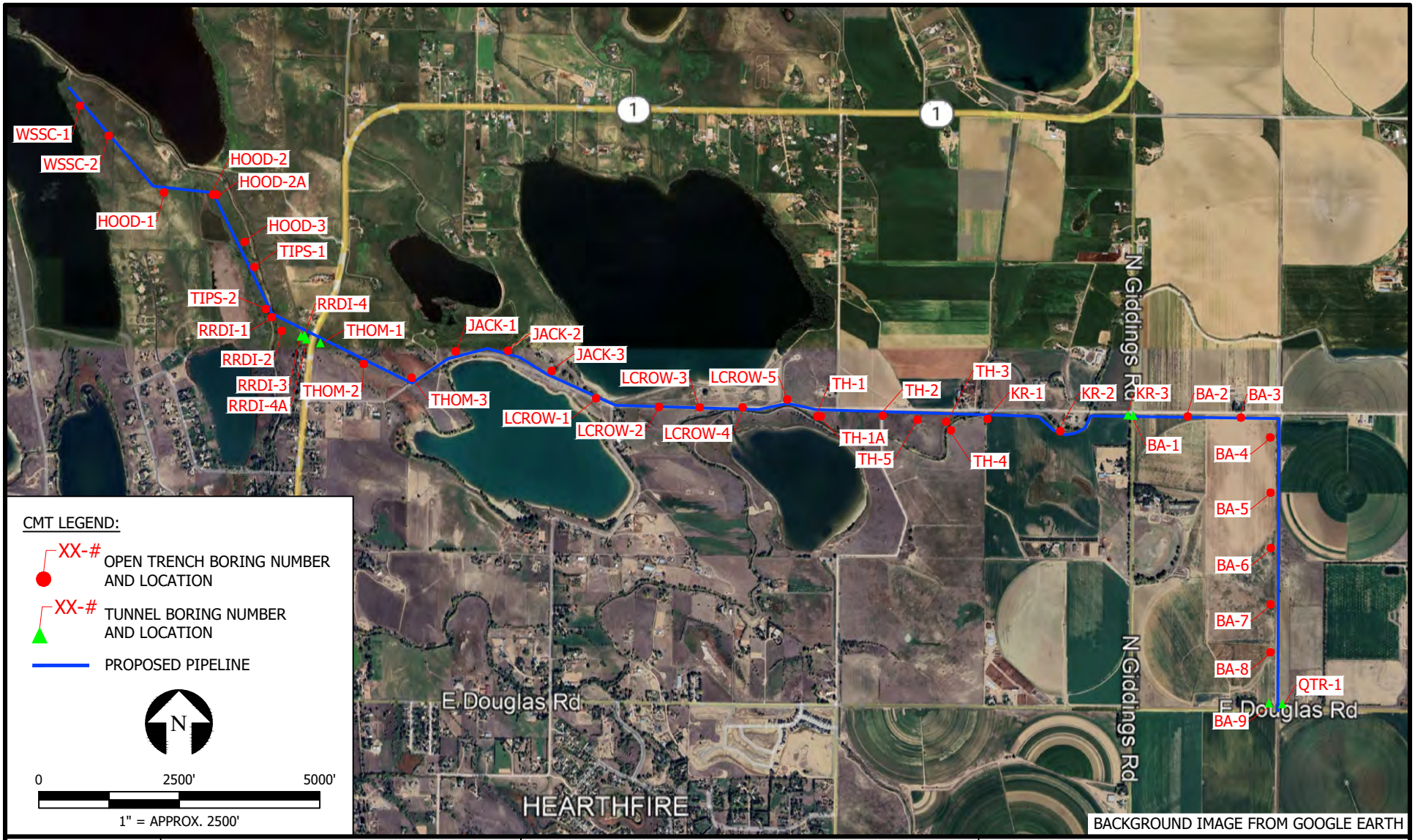


PROJECT NO:	500653 (24.3040)		
PROJECT NAME:	Thornton Water Project Segment F.1		
DRAWN BY:	MSR	CHECKED BY:	NTA
DWG DATE:	01.14.26	REV. DATE:	--

FIGURE 1
Vicinity Map

CMT TECHNICAL SERVICES

W:\2024\Frederick\500653 (24.3040.A) Thornton Water Project (TWP) Segment F\ACAD\24.3040 Thornton Water Project Phase F Figures.dwg 3/26/2026 1:54 PM



PROJECT NO:	500653 (24.3040)		
PROJECT NAME:	Thornton Water Project Segment F.1		
DRAWN BY:	MSR	CHECKED BY:	--
DWG DATE:	03.26.26	REV. DATE:	--

FIGURE 2
Site Plan and Boring Locations

CMT TECHNICAL SERVICES

CMT TECHNICAL SERVICES

APPENDIX A

Field Exploration

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**WSSC-1**	
BORING LOCATION	40.668617, -105.087150	BORING ELEVATION	5144.6 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/14/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/14/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	UNCONFINED COMPRESSIVE STRENGTH (psf)
			CLAY, lean, silty, sandy, fine to medium grained sand, very stiff to hard, dry, gray and light brown, calcareous.			27/12			6.8	100.5					
						31/12									
		5137.6		7	5										
			WEATHERED CLAYSTONE, silty, lean, fine to medium grained sand, firm, dry, gray and light brown.												
		5134.6	Shear Strength - 5,100 psf at 9 feet.	10		44/12			8.0	98.7					10,200
			CLAYSTONE, silty, sandy, fine grained sand, hard, brown, with iron oxide at 14', (CL, A-6).		10						-	36	64	38-13-25	
		5129.7		14.9		50/11									
			Boring terminated at 14.9 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**WSSC-2**	
BORING LOCATION	40.667150, -105.085300	BORING ELEVATION	5166.1 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/14/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/14/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, silty, sandy, cemented, fine to medium grained sand, very stiff, dry, gray and light brown, calcareous.			28/12					-	34	66	40-15-25	
						29/12									
		5159.1		7	5										
			WEATHERED CLAYSTONE, silty, lean, fine to medium grained sand, very stiff, dry, gray and light brown, (CL, A-6).			27/12			7.7	101.3	-	36	64	37-17-20	884/0.3/1,175
		5154.1		12	10										
			CLAYSTONE, lean, silty, very hard, dry, gray and light brown, (CL, A-6).												
		5151.7		14.4		50/5									
			Boring terminated at 14.4 feet												

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.664383, -105.081747	BORING ELEVATION	5126.2 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/14/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/14/2025

HOOD-1

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, with trace fine sand, hard to very stiff, moist, brown to light brown, calcareous.			50/12	■	▨								
	Shear strength - 5,000 psf at 4 feet.		5	27/12	■	▨	15.7	114.9						10,000
5120.2		6												
	CLAY, lean, silty, sandy, fine grained sand, very stiff to hard, slightly moist, brown, (CL, A-7-6).		10	15/12	■	▨	22.7	102.3	-	30	70	45-14-31	882/0.1/910	
						▨			-	27	73	47-14-33		
5111.2		15	15	46/12	■	▨								
	Boring terminated at 15 feet													

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- →#: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**HOOD-2**
BORING LOCATION	40.664258, -105.078536	BORING ELEVATION	5113.8 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/14/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/14/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
			CLAY, lean, sandy, fine to medium grained sand, medium stiff, moist, dark brown to brown, calcareous.			7/12	■	■					
						5/12	■	■					
		5104.8		9	5								
			WEATHERED CLAYSTONE, fat, very stiff, moist, dark brown, calcareous, (CH, A-7-6).			22/12	■	■	23.1	-	1	99	58-19-39
		5100.8		13	10								
			CLAYSTONE, lean to fat, hard, moist, dark brown with iron oxide.										
		5098.9		14.9		50/11	■	■					
			Boring terminated at 14.9 feet										

LEGEND

- ▼ WATER LEVEL AT TIME OF DRILLING
- ▽# WATER LEVEL # DAYS AFTER DRILLING
- →# DEPTH OF CAVE # DAYS AFTER DRILLING
- ↑ DEPTH OF REFUSAL
- ■ MODIFIED CALIFORNIA SAMPLER
- ■ BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**HOOD-2A**	
BORING LOCATION	40.66424, -105.07856	BORING ELEVATION	5112 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/3/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/3/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
		5111.5	TOPSOIL; CLAY, sandy, with grass.	0.5	Concrete pad with steel stickup											
			CLAY, lean, sandy, fine grained sand, medium stiff, very moist, brown, calcareous.		Bentonite chips		5/12			24.8	104.3					
					2" Dia. PVC	5										
		5103		9												
			WEATHERED CLAYSTONE, fat, firm, moist, brown.		2" Dia. PVC with 0.010" screen		26/12			22.9	101.9					
						10										
		5099		13	10/20 Silica sand											
			CLAYSTONE, fat, hard, slightly moist, brown, (CH, A-7-6).				50/11			18.5	114.1	-	1	99	63-20-43	1,403/2.7/10,600
		5097.1		14.9												
			Boring terminated at 14.9 feet													

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**HOOD-3**
BORING LOCATION	40.661967, -105.076581	BORING ELEVATION	5121.7 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/14/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/14/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
		5117.2	SAND, with lean clay, fine to medium grained sand, loose to medium dense, slightly moist to moist, brown, calcareous, (SC, A-6).	4.5		11/12	⧓	▨			-	56	44	32-16-16
						9/12	⧓	▨	17.9	107.1				
			CLAY, lean, silty, with trace fine sand, stiff to medium stiff, moist to very moist, brown.		5									
					10	13/12	⧓	▨						
		5106.7		15	15	7/12	⧓	▨						
			Boring terminated at 15 feet											

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- WATER LEVEL # DAYS AFTER DRILLING
- DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.66064, -105.07614	BORING ELEVATION	5123.1 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D50	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	7/14/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	7/14/2025

TIPS-1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
			CLAY, lean, sandy, fine to medium grained sand, medium stiff, moist to very moist, brown, calcareous, (CL, A-7-6).										
					5	4/12							
					10	7/12			25.0	1	34	65	39-15-24
		5108.1		15	15	6/12							
			Boring terminated at 15 feet										

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1		PROJECT NUMBER	500653 (24.3040)	**TIPS-2**
BORING LOCATION	40.65860, -105.07532		BORING ELEVATION	5122.3 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D50		CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA		DATE STARTED	7/14/2025	
HAMMER SYSTEM	Rope & Cathead		DATE COMPLETED	7/14/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
			CLAY, lean, with sand to sandy, fine grained sand, medium stiff to stiff, moist to wet, brown, calcareous.		Concrete pad with steel stickup		9/12										
					Bentonite chips		4/12			25.2		-	37	63	37-14-23		
					2" Dia. PVC		5/12			25.4	101.1					787/-0.1/NA	
							11/12										
		5110.3		12			50/10			13.8	118.0						9,350
			CLAYSTONE, lean, sandy, fine to medium grained sand, hard to very hard, moist, brown, calcareous, (CL, A-7-6). Shear Strength - 4,675 psf. 42% Silt, 39% Clay at 14 feet.				53/12			18.9		0	19	81	46-15-31		
							50/5								39-20-19		
							50/6										
			Shear Strength - 3,710 psf at 20 feet.				50/5			15.5	116.9	4	24	72	42-17-25		7,420
							50/4										
					2" Dia. PVC with 0.010" screen												
							50/3										
					10/20 Silica sand												
							50/6										
		5082.2		40.1			50/1										
			Boring terminated at 40.1 feet														

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- # WATER LEVEL # DAYS AFTER DRILLING
- # DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**RRDI-1**	
BORING LOCATION	40.658344, -105.074786	BORING ELEVATION	5134.7 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/11/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/11/2025	Page 1 of 1	

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
5132.7	SAND, clayey, lean, fine grained sand, medium dense to dense, slightly moist, brown, (SC, A-6).	2	Concrete pad with steel stickup											
	CLAYSTONE, lean to fat, sandy, fine grained sand, hard to very hard, slightly moist, brown and gray with orange at top, (CL, A-7-6).		Bentonite chips	5	50/11					1	64	35	29-15-14	
					71/12									
			2" Dia. PVC		50/9									
				10	74/12									
					79/9			15.3		-	34	66	42-20-22	
				15	77/12									
5118.2		16.5			50/7			25.8	97.1					1,595/0.7/4,390
	CLAYSTONE, fat, very hard, very moist to wet, light brown, (CH).				50/6			52.6		-	10	90	106-34-72	
5116.2		18.5		20	50/3									
	SANDSTONE, clayey, lean, fine grained sand, very hard, slightly moist, light brown.													
5111.7		23												
	CLAYSTONE, sandy, silty, lean to fat, fine grained sand, very hard, slightly moist, brown to black and gray.		10/20 Silica sand		50/6								45-17-28	
				25									48-15-33	
					50/2			9.5					41-19-22	
			2" Dia. PVC with 0.010" screen	30										
					50/3									
5095.6		39.1		35										
					50/2									
	Boring terminated at 39.1 feet													

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.657636, -105.074172	BORING ELEVATION	5142 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	4/10/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/10/2025

RRDI-2

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
		5139	SAND, clayey, fine to medium grained sand, medium dense, slightly moist, brown, calcareous, (SC, A-2-4).	3		17/12	■			1	68	31	28-20-8
			SANDSTONE, with clay to clayey, fine grained sand, hard to very hard, slightly moist, brown to gray to blue, calcareous, (SM, A-2-4).			50/10	■		14.0	16	65	19	34-25-9
					5								
						50/4	■						
					10								
		5127.9		14.1						-	59	41	30-14-16
			Boring terminated at 14.1 feet			50/1							

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	RRDI-3	
BORING LOCATION	40.657350, -105.072936	BORING ELEVATION	5167.5 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	4/10/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	4/10/2025	Page 1 of 1	

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	WELL DIAGRAM	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
		CLAY and SAND, poorly graded, silty, dense, slightly moist, brown.	Flush mount at surface									
5164.5	3											
		SANDSTONE, clayey, lean clay, fine to medium grained sand, moderately hard to hard[1], slightly moist to moist, brown to blueish gray, calcareous, (SC, A-6).	Bentonite chips	50/1			16.2	88.0				
	5			50/6								
				50/5			10.4				20	
	10	9% Silt, 17% Clay at 10 feet. Switch from 4 1/4" HSA to 4" SSA.	2" Dia. PVC	50/5					-	74	26	
				50/1					-	59	41	30-14-16
				50/2			2.3		-	63	37	
	15			50/2								
				50/1								
	20			50/1								
				50/0								
	25		10/20 Silica sand									
				50/0								
	30		2" Dia. PVC with 0.010" screen									
				50/0								
	35											
5128.5	39	Boring terminated at 39 feet		50/0								

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- # WATER LEVEL # DAYS AFTER DRILLING
- # DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

[1]Refer to Key To Symbols - Rock Descriptive Terms - Hardness

CMT TECHNICAL SERVICES

Z:\SHARED\PROJECTS\CO\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT FIGINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	RRDI-4
BORING LOCATION	40.657203, -105.072798	BORING ELEVATION	5167.8 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	J. Edwards	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	10/22/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	10/22/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE: DRIVE	SAMPLE: BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, stiff, moist, brown to dark brown, some mottling.			14/12									
					5	9/12			15.1	110.7	-	40	60	39-13-26	490/0.6/970
		5161.3		6.5											
			SAND, silty, with clay, very dense to hard, moist, brown.			66/12									
		5159.3		8.5											
			SANDSTONE, silty, with clay, fine grained sand, moderately hard to hard[1], moist to wet, brown.			50/6									
					10	50/3									
▼			Fine to medium grained sand and increased cementation at 13 feet.			50/4			13.4	99.1	-	64	36	NV-NV-NP	
		5152.2		15.6	15	50/4									
↑			Boring terminated at 15.6 feet			50/1									

LEGEND

[1]Refer to Key To Symbols - Rock Descriptive Terms - Hardness

▼ WATER LEVEL AT TIME OF DRILLING

▽# WATER LEVEL # DAYS AFTER DRILLING

→# DEPTH OF CAVE # DAYS AFTER DRILLING

↑ DEPTH OF REFUSAL

SPLIT SPOON

MODIFIED CALIFORNIA SAMPLER

CMT TECHNICAL SERVICES

Z:\SHARED\PROJECTS\CO2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	RRDI-4A
BORING LOCATION	40.657282, -105.072729	BORING ELEVATION	5167.5 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle	
DRILLING METHOD	4.3 in. Diameter HSA and NX Wireline Core	DATE STARTED	11/5/2025	
HAMMER SYSTEM		DATE COMPLETED	11/5/2025	Page 1 of 1

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	RECOVERY/RQD (%/%)
	CLAY, lean, sandy, fine grained sand, stiff, slightly moist to moist, brown.					
5161.5		6				
	SAND, silty, with clay, very dense to hard, moist, brown.					
5159		8.5				
	SANDSTONE, moderately hard[1], slightly weathered, massive bedding, tight, intensely fractured, fine to medium grained sand, subhorizontal, tight, rough, oxidized to brown to olive brown, weak to very weak, no cementation, friable, (Richard Sandstone).					86/10
	Cechar Abrasivity 0.54 at 14.7 feet to 14.9 feet.					
5149.5		18				96/26
	SANDSTONE, moderately hard to hard[1], slightly weathered, massive bedding, no fractures, fine to medium grained sand, brown to olive brown, weak to medium strong, no cementation, well lithified, (Richard Sandstone).		12.8	121.9	241,500	
	Core testing from 18 feet to 18.4 feet.		10.0	124.0	227,500	
	Core testing from 20 feet to 20.5 feet.					
	Light gray, loss of oxidation below 21.8 feet.					94/94
	Cechar Abrasivity 0.63 at 22.5 feet to 23 feet.					
	Core testing from 23 feet to 23.5 feet.		9.8	124.4	140,500	
	Core testing from 25.1 feet to 25.6 feet.		11.6	123.3	145,850	
	Cechar Abrasivity 0.45 at 28.5 feet to 28.8 feet.					100/96
5137.5	Core testing from 29.3 feet to 29.8 feet.	30	1.4	158.4	600,300	
	Boring terminated at 30 feet					

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- ROCK CORE
- BULK SAMPLE

[1]Refer to Key To Symbols - Rock Descriptive Terms - Hardness

CMT TECHNICAL SERVICES

Z:\SHARED\PROJECTS\CO2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**THOM-1**	
BORING LOCATION	40.65684, -105.07224	BORING ELEVATION	5163.7 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/2/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/2/2025	Page 1 of 1	

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM
5163.2	TOPSOIL; CLAY, sandy, with grass.	0.5	Concrete pad with steel stickup
	CLAY, lean, sandy, very stiff to stiff, moist, dark brown.		Bentonite chips
			2" Dia. PVC
5152.2	SAND, silty, fine to medium grained, firm to hard, moist, brown, (SM, A-2-4).	11.5	
5147.7	WEATHERED SANDSTONE, poorly graded, silty, clayey, moist, brown. Shear Strength: 1,830 psf at 16 feet.	16	
5145.2	SANDSTONE, poorly graded, fine to medium grained, moderately hard to hard[1], moist to very moist, brown to gray, no recovery below 24 feet.	18.5	2" Dia. PVC with 0.010" screen
			10/20 Silica sand
5124.7	Boring terminated at 39 feet	39	

DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
5	15/12	■		24.1	101.7					384/0.5/1,340	
	17/12	■									
10	13/12	■		21.6	112.3	-	27	73	43-13-30		
	10/12	■									
	30/12	■		25.1	94.7	-	81	19	NV-NP-NP	1,203/-0.1/NA	
15	50/12	■									
	50/5	■		17.7	110.3						3,660
	50/5	■									
20	50/1	■									
	50/0										
25											
	50/0										
30											
	50/0										
35											
	50/0										

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- ▽# WATER LEVEL # DAYS AFTER DRILLING
- →# DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

[1]Refer to Key To Symbols - Rock Descriptive Terms - Hardness

CMT TECHNICAL SERVICES

Z:\SHARED\PROJECTS\CO2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.655792, -105.068972	BORING ELEVATION	5163.4 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/2/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/2/2025

THOM-2

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
		5159.4	SAND, poorly graded, fine to medium grained, dense to hard, slightly moist, brown.	4												
▼			CLAYSTONE and SANDSTONE, lean, poorly graded, fine to medium grained, hard to very hard, slightly moist, brown.		5	50/9			13.8	119.6					385/0.4/1,050	
			Shear Strength: 2,633 psf at 9 feet.		10	50/5			13.2	105.5	-	49	51	38-22-16		5,265
		5149		14.4		50/5										
			Boring terminated at 14.4 feet													

LEGEND

- ▼ WATER LEVEL AT TIME OF DRILLING
- ▽# WATER LEVEL # DAYS AFTER DRILLING
- →# DEPTH OF CAVE # DAYS AFTER DRILLING
- ↑ DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**THOM-3**
BORING LOCATION	40.65495, -105.06649	BORING ELEVATION	5152.5 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/2/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/2/2025	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
		5152	TOPSOIL; CLAY, sandy, with grass, brown,	0.5	Flush mount at surface Bentonite chips							
			CLAY, lean, stiff to medium sitff, moist, brown.		2" Dia. PVC	5	11/12					
					2" Dia. PVC with 0.010" screen	10	7/12			23.7	103.3	877/0.1/945
		5140.5	SAND, poorly graded, with trace gravel, fine to medium grained sand, medium dense, moist, light brown.	12	10/20 Silica sand							
		5137.5		15		15	18/12					
			Boring terminated at 15 feet									

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.65632, -105.06371	BORING ELEVATION	5149.7 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/3/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/3/2025

JACK-1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
		5149.2	TOPSOIL; CLAY, sandy, with grass, brown.	0.5	Concrete pad with steel stickup											
			CLAY, lean. sandy, stiff, moist, brown, calcareous.		Bentonite chips		9/12			23.4	103.8					
					2" Dia. PVC	5										
		5139.7		10	2" Dia. PVC with 0.010" screen		14/12			20.7	104.9	1	24	75	45-14-31	872/0.2/1,150
			CLAYSTONE, fat, very hard, slightly moist, brown and gray.			10										
		5135.2		14.5	10/20 Silica sand		50/6									
			Boring terminated at 14.5 feet													

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.65640, -105.05984	BORING ELEVATION	5151.6 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/3/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/3/2025

JACK-2

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
		5151.1	TOPSOIL; CLAY, sandy, with grass.	0.5	Concrete pad with steel stickup												
			CLAY, fat, with trace fine sand, hard, slightly moist, brown, calcareous.		Bentonite chips		41/12										
					2" Dia. PVC	5											
		5144.6		7													
			CLAYSTONE, fat, with trace fine sand, very hard to hard, brown and gray, slightly moist, calcareous. Shear Strength: 7,215 psf at 9 feet.		2" Dia. PVC with 0.010" screen		50/7			12.9	119.8	-	21	79	40-16-24		14,430
						10											
		5136.9		14.7	10/20 Silica sand		50/8			16.9	115.4					1,398/1.1/6,400	

Boring terminated at 14.7 feet

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.65537, -105.05696	BORING ELEVATION	5157.6 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 65	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	9/3/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	9/3/2025

JACK-3

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
		5157.1	TOPSOIL; CLAY, sandy, with grass.	0.5										
			CLAY, lean, with trace fine sand, stiff, moist, brown, calcareous.			14/12								
		5150.6		7	5									
			WEATHERED CLAYSTONE, lean, sandy, fine to medium grained sand, hard, moist, light brown, (CL, A-6).			50/12			17.2	112.9	-	33	67	40-14-26
		5144.1		13.5	10									
			CLAYSTONE, fat, hard, slightly moist, brown.											
		5142.6		15	15	50/12								
			Boring terminated at 15 feet											

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	LCROW-1	
BORING LOCATION	40.65415, -105.05424	BORING ELEVATION	5155.4 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/6/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/6/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
		5154.4	TOPSOIL; FILL; SAND, gravelly to GRAVEL, sandy.	1												
			SAND, with lean clay, fine grained sand, medium dense or stiff, slightly moist to moist, brown, calcareous, (SC, A-6).			15/12			9.7		-	59	41	28-15-13		
					5	14/12										
			Shear strength - 3,335 psf at 9 feet.		10	20/12			17.3	110.7						6,670
		5140.4		15	15	11/12			20.5	106.2					1,397/-0.1/NA	
			Boring terminated at 15 feet													

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	LCROW-2
BORING LOCATION	40.65386, -105.05013	BORING ELEVATION	5130.3 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/6/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/6/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
		5129.3	TOPSOIL; FILL; SAND, gravelly to GRAVEL, sandy.	1									
			CLAY, lean, silty, with fine grained sand, stiff, slightly moist to moist, brown, calcareous.			13/12							
					5	15/12							
		5121.3		9									
			CLAY, with silt, with trace fine sand, medium stiff, moist to very moist, brown, (CL, A-6).		10	8/12			23.5	-	40	60	39-14-25
		5115.3		15		8/12							
			Boring terminated at 15 feet		15								

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	LCROW-3
BORING LOCATION	40.65382, -105.04746	BORING ELEVATION	5122 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/7/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/7/2025	Page 1 of 1

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, silty, with sand, fine to medium grained sand, very stiff, slightly moist, brown, calcareous.		Flush mount at surface		30/12	■	▨				
5119		3	Bentonite chips								
	CLAY, lean, with silt, with trace fine sand, stiff, slightly moist to very moist, brown, calcareous.		2" Dia. PVC	5	15/12	■	▨	12.6	112.4		
			2" Dia. PVC with 0.010" screen	10	11/12	■	▨	22.8	103.0	877/0.0/NA	
			10/20 Silica sand								
5107	Shear Strength - 470 psf at 14 feet.	15		15	9/12	■	▨	24.6	103.9		940
	Boring terminated at 15 feet										

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	LCROW-4
BORING LOCATION	40.65391, -105.04473	BORING ELEVATION	5118.7 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/7/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/7/2025	Page 1 of 1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI
			CLAY, lean, sandy, fine to coarse grained sand, very stiff, slightly moist, brown, calcareous.		Flush mount at surface Bentonite chips		27/12							
		5115.7		3										
			CLAY, lean, with silt, with trace fine sand, stiff, moist, brown, calcareous, (CL, A-7-6).		2" Dia. PVC		9/12			20.3	-	21	79	42-14-28
						5								
					2" Dia. PVC with 0.010" screen		8/12							
						10								
					10/20 Silica sand									
		5103.7		15			9/12							
			Boring terminated at 15 feet			15								

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.65417, -105.04193	BORING ELEVATION	5118.6 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/7/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/7/2025

LCROW-5

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
			CLAY, lean, sandy, very stiff, slightly moist, brown, calcareous.		Flush mount at surface Bentonite chips 2" Dia. PVC		26/12										
						5	26/12			9.6	92.3					385/-0.3/NA	
		5111.6		7													
			CLAY, lean to fat, with silt, with trace fine sand, stiff, moist to very moist, brown, calcareous, (CL, A-6). Shear Strength - 978 psf at 9 feet.		2" Dia. PVC with 0.010" screen 10/20 Silica sand												
						10	10/12			22.6	104.7						1,955
		5103.6		15													
						15	12/12			22.4		-	38	62	38-13-25		

Boring terminated at 15 feet

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

Z:\SHARED\PROJECTS\CO2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.653406, -105.039913	BORING ELEVATION	5116.8 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/24/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/24/2025

TH-1

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, very stiff, dry to moist, brown, fine to medium grained sand, calcareous.			24/12									
		5113.8		3											
			CLAY, lean, sandy, fine to medium grained sand, medium stiff to stiff, moist, brown, calcareous, (CL, A-6).		5	12/12									
					10	6/12			23.9	101.7	-	29	71	40-14-26	872/-0.1/NA
											-	31	69	40-14-26	
		5101.8		15	15	8/12									
			Boring terminated at 15 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**TH-1A**
BORING LOCATION	40.65338, -105.03996	BORING ELEVATION	5112 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	8/7/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	8/7/2025	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)
			CLAY, lean, sandy, fine to medium grained sand, very stiff to stiff, slightly moist, brown, calcareous.		Concrete pad with steel stickup; Bentonite chips; 2" Dia. PVC		17/12				
						5	8/12			13.8	100.4
		5105		7							
			CLAY, lean to fat, with silt, with trace fine sand, stiff, moist to very moist, brown.		2" Dia. PVC with 0.010" screen; 10/20 Silica sand	10	9/12				
		5097		15		15	9/12				
			Boring terminated at 15 feet								

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**TH-2**	
BORING LOCATION	40.653413, -105.035842	BORING ELEVATION	5122.1 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/24/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/24/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, very stiff to stiff, dry to moist, brown, fine to medium grained sand, calcareous, (CL, A-7-6).			21/12									
						10/12									
					5						-	30	70	46-18-28	
		5112.6		9.5		34/12									
			WEATHERED CLAYSTONE, lean, medium hard, dry to moist, brown.		10										
		5109.1		13											
			CLAYSTONE, fat, hard, dry to moist, brown, (CH, A-7-6).												
		5107.3		14.8		50/9			19.4	109.8	-	2	98	57-20-37	1,405/1.8/9,400
			Boring terminated at 14.8 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**TH-3**	
BORING LOCATION	40.653211, -105.031679	BORING ELEVATION	5116.3 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	2/27/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/27/2025	Page 1 of 1	

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, silty and sandy, very stiff to stiff, moist, brown, fine to coarse grained sand, calcareous, (CL, A-7-6).		Concrete pad with steel stickup												
			Bentonite chips	5	21/12										
					14/12					-	26	74	47-13-34		
5107.3		9			14/12			19.1	108.6						
	CLAY, lean, trace fine grained sand, medium stiff to stiff, slightly moist to very moist, brown, calcareous.			10	6/12										
					8/12										
			2" Dia. PVC	15	5/12										
					7/12			26.2	98.7					1,596/0.0/NA	
5097.3		19			5/12			27.7		-	25	75	40-14-26		
	CLAY, lean, trace fine to medium to coarse grained sand, medium stiff to stiff, moist to wet, brown, calcareous. Shear Strength - 863 psf at 20 feet			20	8/12			24.2	102.7				39-13-26		1,725
				25	5/12										
			10/20 Silica sand												
			2" Dia. PVC with 0.010" screen	30	10/12										
5083.3		33													
	CLAY, lean, sandy, stiff, wet, brown, fine to coarse grained sand, calcareous.			35	13/12										
5076.3		40		40	9/12										
	Boring terminated at 40 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- →#: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**TH-4**	
BORING LOCATION	40.652741, -105.031292	BORING ELEVATION	5110.8 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	2/28/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/28/2025		

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, sandy, fine to medium grained sand, hard, slightly moist, brown, calcareous.		Concrete pad with steel stickup		37/12			15.4	114.0						
5106.8		4	Bentonite chips												
	CLAY, lean, trace fine sand, very stiff to medium stiff, slightly moist to moist, brown, slightly calcareous.			5	27/12										
					18/12			21.8	105.3					684/0.7/3,000	
5100.8		10	2" Dia. PVC	10	7/12										
	CLAY, lean to fat, with sand to sandy, medium stiff to very stiff, moist to very moist, brown, (CH, A-7-6).				9/12			25.3	100.8				40-13-27		
										-	21	79	52-15-37		
	Calcareous below 13', Silt 26%, Clay 48% at 13 feet.				5/12			24.1		-	26	74			
	Shear Strength 848 psf at 15 feet.			15	6/12			23.4	105.1				35-13-22		1,695
	Silt 35%, Clay 46% at 17 feet.				8/12			24.2		-	19	81			
5088.8		22		20	9/12										
	CLAY, fat, trace fine to medium grained sand, stiff, very moist, brown, calcareous.		10/20 Silica sand	25	14/12										
			2" Dia. PVC with 0.010" screen	30	11/12										
5073.3		37.5		35	9/12										
5071.8	SAND, clayey, lean, fine to coarse grained sand, dense, very moist, brown, calcareous.	39													
5070.8	WEATHERED CLAYSTONE, lean, medium hard, moist, brown.	40		40	45/12										
	Boring terminated at 40 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**TH-5**
BORING LOCATION	40.65334, -105.03350	BORING ELEVATION	5133 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	J. Edwards	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	12/30/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	12/30/2025	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK
			CLAY, sandy, very stiff, moist, brown.					
						17/12		
					5	19/12		
					10	21/12		
					15	27/12		
		5112.5		20.5	20	19/12		
			Boring terminated at 20.5 feet					

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**KR-1**	
BORING LOCATION	40.653254, -105.028976	BORING ELEVATION	5106.8 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle		
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/24/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/24/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, stiff, dry to moist, brown, calcareous.			10/12									
		5103.8		3											
			CLAY, lean, sandy, soft to medium stiff, moist to wet, brown, calcareous, (CL, A-6).		5	4/12									
▼															
					10	4/12			27.4	98.7	-	23	77	38-14-24	873/-0.1/NA
											-	28	72	37-14-23	
		5091.8		15											
			Boring terminated at 15 feet		15	4/12									

LEGEND

- ▼ WATER LEVEL AT TIME OF DRILLING
- ▽# WATER LEVEL # DAYS AFTER DRILLING
- →# DEPTH OF CAVE # DAYS AFTER DRILLING
- ↑ DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	KR-2
BORING LOCATION	40.652580, -105.024242	BORING ELEVATION	5108.4 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/24/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/24/2025	Page 1 of 1

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
5104.4	SAND, silty, clayey, with trace fine gravel, medium dense, dry, light brown, fine to coarse grained, calcareous.	4		22/12									
5098.9	CLAY, lean, with trace sand, very stiff to hard, dry, light brown, (CL, A-7-6).	9.5	5	28/12					-	14	86	42-13-29	
5093.9	CLAYSTONE, lean to fat, very hard, dry to moist, light brown.	14.5	10	50/7									
	Boring terminated at 14.5 feet			50/6			15.9	115.5					1,403/1.2/6,300

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**KR-3**	
BORING LOCATION	40.653415, -105.019768	BORING ELEVATION	5096.3 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	3/3/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	3/3/2025	Page 1 of 1	

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, sandy, fine to medium grained, very stiff to medium stiff, dry to moist, brown, calcareous.		Concrete pad with steel stickup		19/12										
5089.3		7	Bentonite chips	5	6/12										
	CLAY, lean, with sand, soft to medium stiff, moist, brown, calcareous, (CL).				7/12			23.9	98.0					683/0.0/NA	
				10	3/12			24.3				85	42-15-27		
	Shear Strength: 618 psf at 11 feet.				5/12			26.4	98.3				39-13-26	1,107/-0.2/NA	1,235
5083.3		13								-	19	81	42-14-28		
	CLAY and SAND, lean, medium stiff to very stiff, very moist to wet, brown, calcareous. Silt 35%, Clay 48% at 13 feet.		2" Dia. PVC		5/12			23.8		-	35	83	44-15-29		
				15	8/12			18.0					30-13-17		
					10/12										
				20	9/12			20.6	112.4						
				25	23/12										
5069.3		27	10/20 Silica sand												
	CLAY, lean to fat, sandy, fine grained sand, very stiff, wet, brown, calcareous.			30	23/12										
			2" Dia. PVC with 0.010" screen												
5062.3		34													
5061.5	SAND, poorly graded, with fine gravel, fine to coarse grained sand, dense, very moist, reddish brown to tan	34.8		35	43/12										
5060.8		35.5													
	WEATHERED CLAYSTONE, lean, sandy, fine grained sand, very stiff to hard, wet, brown.														
5056.9	CLAYSTONE, fat, with silt and fine sand, very hard, brown.	39.4			50/5										
	Boring terminated at 39.4 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**BA-1**	
BORING LOCATION	40.653411, -105.019445	BORING ELEVATION	5095.1 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	2/25/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/25/2025	Page 1 of 1	

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, with trace fine grained sand, stiff to medium stiff, moist to very moist, brown, calcareous, (CL, A-7-6).		Concrete pad with steel stickup		9/12										
			Bentonite chips	5	8/12										
					12/12			20.3	105.1	-	21	79	41-15-26	787/-0.1/NA	
				10	5/12			15.9					40-14-26		
	Shear Strength: 635 psf at 12 feet.				5/12			29.5	97.4	-	17	83	42-16-26		1,270
	Silt 26%, Clay 39% at 14 feet.		2" Dia. PVC	15	5/12			15.7		-	35	65			
					9/12										
5075.1		20			9/12										
	SAND, clayey, lean, with trace fine gravel, medium dense to dense, slightly moist to very moist, brown, fine to coarse grained sand, calcareous, (SC, A-6).		10/20 Silica sand	20	10/12			21.4	108.1	-	59	41	28-14-14	1,985/-0.1/NA	
				25	19/12										
			2" Dia. PVC with 0.010" screen												
	CLAY lense with Shear Strength - 3055 psf at 29 feet.			30	29/12			14.8	118.8						6,110
5061.1		34													
	CLAYSTONE, lean, sandy, hard to very hard, slightly moist, light brown to gray, fine to medium grained sand, (CL, A-6).			35	80/12										
5055.7		39.4			50/5			15.9	115.0	-	31	69	40-18-22	3,879/0.1/4580	
	Boring terminated at 39.4 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.653411, -105.015836	BORING ELEVATION	5092.3 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/24/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/24/2025

BA-2

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy at top, stiff to very stiff, moist, brown, fine grained to medium grained sand, calcareous, (CL, A-7-6).			14/12									
					5	18/12									
					10	16/12					-	20	80	41-17-24	
		5077.3		15	15	13/12			19.4	105.5					1,397/-0.1/NA
			Boring terminated at 15 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.653311, -105.012372	BORING ELEVATION	5090.1 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025

BA-3

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, very stiff, moist, brown, calcareous, (CL, A-6).			29/12									
					5	19/12									
					10	29/12			26.7	99.4	-	28	72	40-23-17	880/-0.3/NA
		5075.1		15	15	18/12									
			Boring terminated at 15 feet												

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.652319, -105.010450	BORING ELEVATION	5087.4 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025

BA-4

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL/ VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, very stiff to stiff, dry to wet, brown, calcareous, (CL, A-6).			30/12									
					5	30/12			13.5	115.5	-	21	79	40-15-25	388/2.9/5,250
					10	21/12									
		5072.4		15	15	11/12									
			Boring terminated at 15 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.649569, -105.010483	BORING ELEVATION	5079.1 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025

BA-5

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, hard to very stiff, moist, brown, calcareous, (CL, A-7-6).			36/12									
					5	22/12									
					10	27/12									
		5064.1		15	15	23/12			22.1	104.2	1	21	78	46-16-30	1,405/-0.1/NA
			Boring terminated at 15 feet												

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.646831, -105.010519	BORING ELEVATION	5073.3 ft.
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025

BA-6

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, sandy, hard to very stiff, moist, brown, fine to medium grained sand, calcareous, (CL, A-7-6).			32/12									
					5	25/12									
					10	24/12			28.0	94.9	-	21	79	43-23-20	1,399/-0.5/NA
		5058.3		15	15	15/12									
			Boring terminated at 15 feet												

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.644069, -105.010556	BORING ELEVATION	5069.5 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025

BA-7

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, with sand, very stiff to stiff, moist, brown, fine to medium grained sand, calcareous, (CL, A-7-6).			15/12									
					5	29/12			13.5	122.9	-	16	84	41-17-24	397/3.2/5,580
					10	24/12									
		5054.5		15	15	11/12									
			Boring terminated at 15 feet												

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	**BA-8**
BORING LOCATION	40.641714, -105.010583	BORING ELEVATION	5067.8 ft.	
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle	
DRILLING METHOD	4 in. Diameter SSA	DATE STARTED	2/19/2025	
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/19/2025	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)
			CLAY, lean, with sand, very stiff, brown, fine to medium grained sand, calcareous, (CL, A-7-6).			22/12					
					5	26/12					
					10	25/12			18.6	109.9	878/0.2/1,280
		5052.8		15	15	22/12					
			Boring terminated at 15 feet								

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- #: WATER LEVEL # DAYS AFTER DRILLING
- #: DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)
BORING LOCATION	40.639164, -105.010727	BORING ELEVATION	5061.4 ft.
DRILLING COMPANY/RIG	Dakota Drilling/CME 55	CMT REP.	E. Castle
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	2/20/2025
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	2/20/2025

BA-9

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
	CLAY, lean, sandy, very stiff, dry to moist, brown, fine to medium grained sand, calcareous, (CL).		Concrete pad with steel stickup Bentonite chips 2" Dia. PVC	5	20/12										
					11/12					-	20	80	42-16-26		
5052.4	Shear Strength: 3,020 psf at 8 feet.	9			12/12			19.2	108.5				38-17-21	779/0.1/1,100	6,040
	CLAY, lean, stiff to medium stiff, moist, brown, calcareous, (CH). Silt 39%, Clay 46% at 10 feet.		2" Dia. PVC with 0.010" screen	10	9/12			16.7		-	15	85			
					12/12										
				15	6/12								41-13-28		
5045.4		16													
	CLAY, fat, medium stiff, moist to wet, gray and brown, calcareous, (CH, A-7-6).				8/12			29.0	97.1	-	4	96	57-18-39	1,598/0.0/NA	
5041.4		20			4/12										
	CLAY, lean, silty, stiff to very stiff, moist to wet, light brown to brown, slightly calcareous. Shear Strength: 1,170 psf at 20 feet.			20	11/12			16.9	113.7						2,340
	Lenses of clay and silty clay from 24' to 25.5'.		10/20 Silica sand	25	21/12										
5031.9		29.5													
	SAND, well graded, loose, wet, brown.			30	6/12										
5028.4		33													
	CLAY, lean, sandy, with gravel, very stiff, moist to wet, red brown, slightly calcareous, (CL, A-7-6).				28/12			18.6	104.0	15	33	52	45-15-30	3,418/-0.1/NA	
5026.4		35		35											
	CLAYSTONE, fat, very hard, moist, gray.														
5021.9		39.5			50/6										
	Boring terminated at 39.5 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- # WATER LEVEL # DAYS AFTER DRILLING
- # DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

PROJECT NAME	Thornton Water Project Segment F.1	PROJECT NUMBER	500653 (24.3040)	QTR-1	
BORING LOCATION	40.639191, -105.009896	BORING ELEVATION	5060.3 ft.		
DRILLING COMPANY/RIG	Dakota Drilling/D-120	CMT REP.	E. Castle		
DRILLING METHOD	4.3 in. Diameter HSA	DATE STARTED	3/4/2025		
HAMMER SYSTEM	Rope & Cathead	DATE COMPLETED	3/4/2025	Page 1 of 1	

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	DEPTH (ft)	BLOW COUNT	SAMPLE DRIVE	SAMPLE BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)
			CLAY, lean, silty, sandy, fine grained sand, hard to very stiff, dry to slightly moist, calcareous, (CL, A-7-6).		Concrete pad with steel stickup		49/12					-	28	72	46-15-31		
						5	20/12			12.2					46-15-31		
		5053.3		7	Bentonite chips		20/12			21.2	104.4						3,120
			CLAY, lean, silty, sandy, fine to medium grained sand, stiff to very stiff, moist to wet, brown with traces of gray, calcareous, cementation and iron staining. Shear Strength 1,560 psf at 7 feet. Silt 23%, Clay 44% at 11 feet.			10	25/12			14.7					40-14-26		
							28/12			19.8	108.8	-	33	67		1,107/-0.1/NA	
					2" Dia. PVC		26/12										
						15	30/12										
							11/12										
							19/12			22.4	105.4					1,895/-0.1/NA	
		5035.8		24.5		20											
			SAND, well graded, medium dense, wet, brown to gray. Lenses of lean CLAY.		10/20 Silica sand		27/12										
						25											
							22/12										
		5027.3		33	2" Dia. PVC with 0.010" screen	30											
			CLAYSTONE, lean, with trace fine sand, hard to very hard, moist, brown to gray, iron staining.				82/12										
		5020.9		39.4		35											
							50/5										
			Boring terminated at 39.4 feet														

LEGEND

- WATER LEVEL AT TIME OF DRILLING
- # WATER LEVEL # DAYS AFTER DRILLING
- →# DEPTH OF CAVE # DAYS AFTER DRILLING
- DEPTH OF REFUSAL
- MODIFIED CALIFORNIA SAMPLER
- STANDARD PENETRATION TEST
- BULK SAMPLE

CMT TECHNICAL SERVICES

W:\2024\FREDERICK\500653 (24.3040.A) THORNTON WATER PROJECT (TWP) SEGMENT F\GINT\24.3040 GINT LOGS.GPJ - (BH TYP LOG Template)

THORNTON WATER PROJECT SEGMENT F.1 Key to Symbols

DATE: 02.19.26
PROJECT NO: 500653 (24.3040)

WATER LEVEL & CAVE DEPTH (ft)	GRAPHIC LOG	ELEVATION	MATERIAL DESCRIPTION	DEPTH (ft)	WELL DIAGRAM	Depth(ft)	BLOW COUNT	SAMPLE: DRIVE	SAMPLE: BULK	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRAVEL (%)	SAND (%)	FINES (%)	LL-PL-PI	SURCHARGE PRESSURE (psf)/ SWELL-CONSOL VOL CHANGE (%)/ SWELL PRESSURE(psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	RECOVERY/RQD (%/%)

COLUMN DESCRIPTIONS

Water Level and Cave Depth: Refers to depth at which water or cave in is encountered. Attached numbers refer to days after drilling these conditions are encountered (see below right).

Graphic Log: Symbols depicting type of soil encountered (see below)

Elevation: Depth below ground surface associated with measured Elevation at surface level.

Material Description: Description of soils and/or bedrock encountered. May or may not include Unified Soil Classification Symbol (see below).

Well Diagram: Diagram depicting details of monitoring well or piezometer construction.

Depth (ft): Depth (feet) below the ground surface.

Blow Count: Left number is blows to drive sampler and right number is distance in inches the sampler was driven.

Sample: Type of soil sample collected; sampler symbols are explained below right.

Natural Moisture Content: Water content of a soil or bedrock specimen measured in the laboratory (percent of dry weight).

Natural Dry Density: The dry density of a soil or bedrock specimen measured in the laboratory (pounds per cubic foot).

Gravel: Percent of a sample (by weight) that is retained on a No. 4 standard sieve.

Sand: Percent of a sample (by weight) that passes a No. 4 standard sieve and is retained on a No. 200 standard sieve.

Fines: Percent of a sample (by weight) that passes a No. 200 standard sieve.

LL = Liquid Limit (%): Water content at which soil changes from plastic to liquid behavior.

PL = Plastic Limit (%): Water content at which soil changes from solid to plastic behavior.

PI = Plasticity Index (%): Range of water content at which soil exhibits plastic properties (= Liquid Limit - Plastic Limit).

Surcharge Pressure (psf): Total axial pressure applied to a cylindrical specimen prior to inundation with water (pounds per square foot).

Swell-Consol Volume Change (%): Change in specimen volume from initial volume after inundation (expressed as a percent).

Swell Pressure (psf): Pressure required after swelling to return a cylindrical specimen confined in a ring to the same height (i.e. volume) that existed prior to inundation with water (pounds per square foot) (a.k.a. load back swell pressure).

Unconfined Compressive Strength (psf): The load per unit area at which an unconfined prismatic or cylindrical specimen of material will fail in a simple compression test without lateral support (pounds per square foot).

Recovery (%): Ratio of length of sample or core recovered to the length drilled or sampled (expressed as a percent).

RQD (%): Denotes the percent of intact and sound rock (i.e. pieces equal to or greater than 4 inches long) retrieved from a borehole of any orientation divided by the total length of the core run.

Refusal: Depth at which advance of the auger was not possible or was reduced to less than 1 foot in 30 minutes.

STRATIFICATION	
Description	**Thickness**
Seam	Up to 1/2 inch
Lens	Up to 12 inches
Layer	Greater 12 inches
Occasional	1 or less per foot
Frequent	More than 1 per foot

MODIFIERS
Trace < 15%
With 15-29%
"y" > 30%

MOISTURE CONTENT
Slightly Moist: Absence of moisture, dusty, dry to the touch.
Moist to Very Moist: Damp/moist to the touch, but no visible water.
Wet: Visible water, usually soil below groundwater.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS SYMBOLS	TYPICAL SOIL DESCRIPTIONS
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 sieve size.	**GRAVELS** The coarse fraction retained on No. 4 sieve.	**CLEAN GRAVELS** (< 5% fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (≥ 12% fines)	GM	Silty Gravels, Gravel-Sand Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS The coarse fraction passing through No. 4 sieve.	**CLEAN SANDS** (< 5% fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (≥ 12% fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	**SILTS AND CLAYS** Liquid Limit < 50%		ML	Inorganic Silts and Very Fine Sands, Silty or Clayey Fine Sands or Clayey Silts with Slight
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
			OL	Organic Silts and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS Liquid Limit > 50%		MH	Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils with Plasticity (Elastic Soils)
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Silts and Organic Clays of Medium to High Plasticity
HIGHLY ORGANIC SOILS			PT	Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate boderline soil classifications (i.e. GP-GM, SC-SM, etc.).

Sampler Symbols

- Bulk Sample
- Modified California Sampler
- Standard Penetration Test
- Standard Split Spoon Sampler
- Shelby Tube
- Rock Core
- No Recovery

Bedrock Symbols

- Weathered Claystone
- Claystone bedrock
- High Plasticity Claystone bedrock
- Weathered Sandstone
- Sandstone bedrock

Water/Cave Symbol

- Water Level at time of Drilling
- # Water Level # days after Drilling
- # Depth of Cave # days after Drilling
- Depth of Refusal

1. The results of laboratory tests on the samples collected are shown on the logs at the respective sample depths.
2. The subsurface conditions represented on the logs are for the locations specified. Caution should be exercised in interpolating between or extrapolating beyond the exploration locations.
3. The information presented on each log is subject to the limitations, conclusions, and recommendations presented in this report.
4. The horizontal lines shown on the logs differentiate materials and represent the approximate boundary between materials. The transitions between materials may be gradual.

CMT TECHNICAL SERVICES

M:\Templates\Drafting\AutoCAD\ACAD Current Templates\Misc Templates\Boring Log Legend - Specifics.dwg 2/19/2026 4:18 PM

THORNTON WATER PROJECT SEGMENT F.1 Rock Descriptive Terms

DATE: 02.19.26
PROJECT NO: 500653 (24.3040)

Term		Defining Characteristics	
Hardness	Soft	Scratched by fingernail	
	Moderately Hard	Scratched easily by penknife	
	Hard	Difficult to scratch with a penknife	
	Very Hard	Cannot be scratched by penknife	
Weathering	Unweathered	Rock is unstained. May be fractured, but discontinuities are not stained.	
	Slightly	Rock is unstained. Discontinuities show some staining on the surfaces of rocks, but discoloration does not penetrate rock mass.	
	Moderate	Discontinuity surfaces are stained. Discoloration may extend into rock along discontinuity surfaces.	
	High	Individual rock fragments are thoroughly stained and may be crumbly.	
	Severe	Rock appears to consist of gravel-sized fragments in a "soil" matrix. Individual fragments are thoroughly discolored and can be broken with fingers.	
Bedding Planes	Laminated	< .04 in.	< 1 mm
	Parting	.04 in. - .24 in.	1 mm - 6 mm
	Banded	.24 in. - 1 in.	6 mm - 3 cm
	Thin	1 in. - 4 in.	3 cm - 9.1 cm
	Medium	4 in. - 12 in.	9.1 cm - 30.5 cm
	Thick	12 in. - 36 in.	30.5 cm - 1 m
	Massive	> 36 in.	> 1 m
Joints and Fracture Spacing	Very tight	< 2 in.	< 5.1 cm
	Tight	2 in. - 1 ft.	5.1 cm - 30.5 cm
	Moderately tight	1 ft. - 3 ft.	30.5 cm - 91.4 cm
	Wide	3 ft. - 10 ft.	91.4 cm - 3 m
	Very wide	> 10 ft.	> 3 m

1. The results of laboratory tests on the samples collected are shown on the logs at the respective sample depths.
2. The subsurface conditions represented on the logs are for the locations specified. Caution should be exercised in interpolating between or extrapolating beyond the exploration locations.
3. The information presented on each log is subject to the limitations, conclusions, and recommendations presented in this report.
4. The horizontal lines shown on the logs differentiate materials and represent the approximate boundary between materials. The transitions between materials may be gradual.

CMT TECHNICAL SERVICES

M:\Templates\Drafting\AutoCAD\ACAD Current Templates\Misc Templates\Boring Log Legend - Specifics.dwg 2/19/2026 4:14 PM

CMT TECHNICAL SERVICES

APPENDIX B

Laboratory Testing

LABORATORY TESTING

Swell/consolidation testing was performed on samples collected using a modified California sampler to evaluate the effect of wetting and loading on the soil. The samples were loaded to approximate overburden pressure, considering a unit weight of 100 psf, per foot of soil, and then inundated with water.

Unconfined compressive strength testing was performed to evaluate undrained shear strength of the soil. The testing was performed on extruded samples collected using a modified California sampler.

CMT TECHNICAL SERVICES

SUMMARY OF LABORATORY TEST RESULTS
Thornton Water Pipeline Segment F.1
Project No. 24.3040

Sample Location					Unconfined Compressive Strength		Gradation				Atterberg Limits			Swell/Consolidation						
Boring	Depth (feet)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Water Soluble Sulfates (%)	Unconfined Compressive Strength (psf)	Shear Strength (psf)	Gravel (%)	Sand (%)	Fine (%) or Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)	Equivalent Quartz Content (EQC)	X-ray Diffraction Bulk Only	Cechar Abrasivity Test	Material Type
WSSC-1	1	6.8	100.5																	CLAY, lean, sandy, light brown
WSSC-1	9	8.0	98.7		10,200	5,100														WEATHERED CLAYSTONE, lean, sandy, light brown
WSSC-1	10-15	NR					-	36	64		38	13	25							CLAYSTONE, sandy, brown, (CL, A-6)
WSSC-2	9	7.7	101.3				-	36	64		37	17	20	884	0.3	1,175				WEATHERED CLAYSTONE, lean, sandy, brown, (CL, A-6)
WSSC-2	0-5	NR					-	34	66		40	15	25							CLAY, lean, sandy, brown, (CL, A-6)
HOOD-1	4	15.7	114.9		10,000	5,000														CLAY, lean, with sand, brown
HOOD-1	9	22.7	102.3				-	30	70		45	14	31	882	0.1	910				CLAY, lean, sandy, brown, (CL, A-7-6)
HOOD-1	10-15	NR					-	27	73		47	14	33							CLAY, lean, with sand, brown, (CL, A-7-6)
HOOD-2	9	23.1					-	1	99		58	19	39							WEATHERED CLAYSTONE, fat, brown, (CH, A-7-6)
HOOD-2A	4	24.8	104.3																	CLAY, brown
HOOD-2A	9	22.9	101.9																	WEATHERED CLAYSTONE, dark brown
HOOD-2A	14	18.5	114.1				-	1	99		63	20	43	1,403	2.7	10,600				CLAYSTONE, dark brown, (CH, A-7-6)
HOOD-3	4	17.9	107.1	0.00																SAND, with lean clay, brown
HOOD-3	0-5	NR					-	56	44		32	16	16							SAND, clayey, brown, (SC, A-6)
TIPS-1	9	25.0					1	34	65		39	15	24							CLAY, sandy, brown, (CL, A-6)
TIPS-2	6	25.2					-	37	63		37	14	23							CLAY, sandy, brown, (CL, A-6)
TIPS-2	8	25.4	101.1											787	-0.1	NA				CLAY, sandy, brown
TIPS-2	12	13.8	118.0		9,350	4,675														CLAYSTONE, sandy, brown
TIPS-2	14	18.9					-	19	42	39	46	15	31							CLAYSTONE, sandy, brown, (CL, A-7-6)
TIPS-2	16	NA									39	20	19							CLAYSTONE, sandy, brown
TIPS-2	20	15.5	116.9		7,420	3,710	4	24	72		42	17	25							CLAYSTONE, sandy, brown, (CL, A-7-6)
RRDI-1	12	15.3					-	34	66		42	20	22							CLAYSTONE, lean, brown, (CL, A-7-6)
RRDI-1	16	25.8	97.1											1,595	0.7	4,390				CLAYSTONE, lean, brown
RRDI-1	18	52.6					-	10	90		106	34	72							CLAYSTONE, fat, tan, (CH, A-7-5)
RRDI-1	24	NA									45	17	28							CLAYSTONE, sandy, brown
RRDI-1	24.5	NA									48	15	33							CLAYSTONE, sandy, brown
RRDI-1	29	9.5									41	19	22							SHALE, silty, gray
RRDI-1	0-5	NR					1	64	35		29	15	14							SAND, clayey, light brown, (SC, A-6)
RRDI-2	4	14.0					16	65	19		34	25	9							SANDSTONE, with silt and gravel, brown, (SM, A-2-4)
RRDI-2	0-5	NR		0.36			1	68	31		28	20	8							SAND, clayey, light brown, (SC, A-2-4)
RRDI-3	4	16.2	88.0																	SANDSTONE, clayey, gray
RRDI-3	6																20% Quartz	Various minerals		See the attached test results by the EMI lab of CSM
RRDI-3	8	10.4			Not testable	Not testable			20											SANDSTONE, clayey, brown
RRDI-3	10	NA					-	74	9	17										SANDSTONE, clayey, brown
RRDI-3	14	2.3					-	63	37											SANDSTONE, clayey, brown
RRDI-3	10-15	NR					-	59	41		30	14	16							SANDSTONE, clayey, light brown, (SC, A-6)
RRDI-4	5	15.1	110.7				-	40	60		39	13	26	490	0.6	970				CLAY, sandy, brown, (CL, A-6)
RRDI-4	13	13.4	99.1				-	64	36		NV	NP	NP							SANDSTONE, silty, brown, (SM, A-4)
RRDI-4A	14.7-14.9																		0.54	SANDSTONE, brown
RRDI-4A	18-18.4	12.8	121.9		241,500	120,750														SANDSTONE, brown
RRDI-4A	20-20.5	10.0	124.0		227,500	113,750														SANDSTONE, brown
RRDI-4A	22.5-23.0																		0.63	SANDSTONE, brown
RRDI-4A	23-23.5	9.8	124.4		140,500	70,250														SANDSTONE, brown
RRDI-4A	25.1-25.6	11.6	123.3		145,850	72,925														SANDSTONE, brown
RRDI-4A	28.5-28.8																		0.45	SANDSTONE, brown

CMT TECHNICAL SERVICES

SUMMARY OF LABORATORY TEST RESULTS
Thornton Water Pipeline Segment F.1
Project No. 24.3040

Sample Location					Unconfined Compressive Strength		Gradation				Atterberg Limits			Swell/Consolidation						
Boring	Depth (feet)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Water Soluble Sulfates (%)	Unconfined Compressive Strength (psf)	Shear Strength (psf)	Gravel (%)	Sand (%)	Fine (%) or Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)	Equivalent Quartz Content (EQC)	X-ray Diffraction Bulk Only	Cechar Abrasivity Test	Material Type
RRDI-4A	29.3-29.8	1.4	158.4		600,300	300,150														SANDSTONE, brown
THOM-1	4	24.1	101.7											384	0.5	1,340				CLAY, sandy, dark brown
THOM-1	8	21.6	112.3				-	27	73		43	13	30							CLAY, sandy, brown, (CL, A-7-6)
THOM-1	12	25.1	94.7				-	81	19		NV	NP	NP	1,203	-0.1	NA				SAND, silty, brown, (SM, A-2-4)
THOM-1	16	17.7	110.3		3,660	1,830														WEATHERED SANDSTONE, brown
THOM-2	4	13.8	119.6											385	0.4	1,050				CLAYSTONE and SANDSTONE, brown, (CL, A-6)
THOM-2	9	13.2	105.5		5,265	2,633	-	49	51		38	22	16							CLAYSTONE and SANDSTONE, brown, (CL, A-6)
THOM-3	9	23.7	103.3											877	0.1	945				CLAY, sandy, brown
JACK-1	4	23.4	103.8	0.00																CLAY, sandy, brown
JACK-1	9	20.7	104.9				1	24	75		45	14	31	872	0.2	1,150				CLAY, sandy, brown, (CL, A-7-6)
JACK-2	9	12.9	119.8		14,430	7,215	-	21	79		40	16	24							CLAY, with sand, brown, (CL, A-6)
JACK-2	14	16.9	115.4											1,398	1.1	6,400				CLAYSTONE, black
JACK-3	9	17.2	112.9				-	33	67		40	14	26							CLAYSTONE, sandy, brown, (CL, A-6)
LCROW-1	1	9.7					-	59	41		28	15	13							SAND and CLAY, brown, (SC, A-6)
LCROW-1	9	17.3	110.7		6,670	3,335														CLAY, with sand, brown
LCROW-1	14	20.5	106.2											1,397	-0.1	NA				CLAY, sandy, brown
LCROW-2	4			0.51																CLAY, sandy, brown
LCROW-2	9	23.5					-	40	60		39	14	25							CLAY, sandy, brown, (CL, A-6)
LCROW-3	4	12.6	112.4																	CLAY, sandy, brown
LCROW-3	9	22.8	103.0											877	0.0	NA				CLAY, sandy, brown
LCROW-3	14	24.6	103.9		940	470														CLAY, brown
LCROW-4	4	20.3					-	21	79		42	14	28							CLAY, sandy, brown, (CL, A-7-6)
LCROW-5	4	9.6	92.3											385	-0.3	NA				CLAY, sandy, with gravel, brown
LCROW-5	9	22.6	104.7	1.18	1,955	978														CLAY, sandy, brown
LCROW-5	14	22.4					-	37	63		38	13	25							CLAY, sandy, brown, (CL, A-6)
TH-1	9	23.9	101.7				-	29	71		40	14	26	872	-0.1	NA				CLAY, sandy, brown, (CL, A-6), (Disturbed)
TH-1	10-15	NR					-	31	69		40	14	26							CLAY, lean, sandy, brown, (CL, A-6)
TH-1A	4	13.8	100.4																	CLAY, sandy, brown
TH-2	1			1.71																CLAY, sandy, calcareous, brown
TH-2	14	19.4	109.8				-	2	98		57	20	37	1,405	1.8	9,400				CLAYSTONE, fat, brown, (CH, A-7-6)
TH-2	5-10	NR					-	30	70		46	18	28							CLAY, lean, sandy, brown, (CL, A-7-6)
TH-3	8	19.1	108.6																	CLAY, sandy, brown
TH-3	16	26.2	98.7											1,596	0.0	NA				CLAY, with sand, brown
TH-3	18	27.7					-	25	75		40	14	26							CLAY, with sand, brown
TH-3	20	24.2	102.7		1,725	863					39	13	26							CLAY, sandy, brown
TH-3	5-10	NR		0.57			-	26	74		47	13	34							CLAY, lean, sandy, brown, (CL, A-7-6)
TH-4	2	15.4	114.0																	CLAY, sandy, calcareous, dark brown
TH-4	7	21.8	105.3											684	0.7	3,000				CLAY, with sand, brown
TH-4	11	25.3	100.8								40	13	27							CLAY, with sand, brown
TH-4	13	24.1					-	26	26	48										CLAY, sandy, brown
TH-4	15	23.4	105.1		1,695	848					35	13	22							CLAY, sandy, brown
TH-4	17	24.2					-	19	35	46										CLAY, with sand, brown
TH-4	10-15	NR		0.00				21	79		52	15	37							CLAY, fat, sandy, brown, (CH, A-7-6)
KR-1	9	27.4	98.7				-	23	77		38	14	24	873	-0.1	NA				CLAY, lean, sandy, brown, (CL, A-6)
KR-1	5-10	NR		0.31																CLAY, sandy, brown

CMT TECHNICAL SERVICES

SUMMARY OF LABORATORY TEST RESULTS
Thornton Water Pipeline Segment F.1
Project No. 24.3040

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Water Soluble Sulfates (%)	Unconfined Compressive Strength		Gradation				Atterberg Limits			Swell/Consolidation			Equivalent Quartz Content (EQC)	X-ray Diffraction Bulk Only	Cechar Abrasivity Test	Material Type
Boring	Depth (feet)				Unconfined Compressive Strength (psf)	Shear Strength (psf)	Gravel (%)	Sand (%)	Fine (%) or Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)				
KR-1	10-15	NR					-	28	72		37	14	23							CLAY, lean, sandy, brown, (CL, A-6)
KR-2	14	15.9	115.5											1,403	1.2	6,300				CLAYSTONE, brown
KR-2	5-10	NR					-	14	86		42	13	29							CLAY, brown, (CL, A-7-6)
KR-3	7	23.9	98.0											683	0.0	NA				CLAY, with sand, brown
KR-3	9	24.3							85		42	15	27							CLAY, with sand, brown
KR-3	11	26.4	98.3		1,235	618					39	13	26	1,107	-0.2	NA				CLAY, with sand, brown
KR-3	13	23.8		0.05			-	17	35	48	44	15	29							CLAY, with sand, brown, (CL, A-7-6)
KR-3	15	18.0									30	13	17							CLAY, sandy, brown
KR-3	19	20.6	112.4																	CLAY, sandy, brown
KR-3	10-15	NR					-	19	81		42	14	28							CLAY, lean, with sand, brown, (CL, A-7-6)
BA-1	8	20.3	105.1				-	21	79		41	15	26	787	-0.1	NA				CLAY, lean, with sand, brown, (CL, A-7-6)
BA-1	10	15.9		0.07							40	14	26							CLAY, lean, sandy, brown
BA-1	12	29.5	97.4		1,270	635														CLAY, lean, with sand, brown
BA-1	14	15.7					-	35	26	39										CLAY, sandy, brown
BA-1	20	21.4	108.1				-	59	41		28	14	14	1,985	-0.1	NA				SAND, clayey, brown, (SC, A-6)
BA-1	29	14.8	118.8		6,110	3,055														SAND, with clay, brown
BA-1	39	15.9	115.0				-	31	69		40	18	22	3,879	0.1	4,580				CLAYSTONE, lean, sandy, brown, (CL, A-6)
BA-1	10-15	NR					-	17	83		42	16	26							CLAY, with sand, brown, (CL, A-7-6)
BA-2	14	19.4	105.5											1,397	-0.1	NA				CLAY, sandy, brown
BA-2	10-15	NR					-	20	80		41	17	24							CLAY, with sand, brown, (CL, A-7-6)
BA-3	9	26.7	99.4				-	28	72		40	23	17	880	-0.3	NA				CLAY, sandy, brown, (CL, A-6)
BA-4	4	13.5	115.5				-	21	79		40	15	25	388	2.9	5,250				CLAY, lean, sandy, brown, calcareous, (CL, A-6)
BA-5	9			1.41																CLAY, lean, sandy, brown, calcareous
BA-5	14	22.1	104.2				1	21	78		46	16	30	1,405	-0.1	NA				CLAY, lean, sandy, brown, (CL, A-7-6)
BA-6	9	28.0	94.9				-	21	79		43	23	20	1,399	-0.5	NA				CLAY, lean, sandy, brown, (CL, A-7-6)
BA-7	4	13.5	122.9	1.80			-	16	84		41	17	24	397	3.2	5,580				CLAY, lean, with sand, brown, calcareous, (CL, A-7-6)
BA-8	9	18.6	109.9											878	0.2	1,280				CLAY, lean, with sand, brown, calcareous, (CL, A-7-6)
BA-9	8	19.2	108.5		6,040	3,020					38	17	21	779	0.1	1,100				CLAY, sandy, brown, calcareous,
BA-9	10	16.7					-	15	39	46										CLAY, lean, with sand, brown
BA-9	14										41	13	28							CLAY, lean, with sand, brown
BA-9	16	29.0	97.1				-	4	96		57	18	39	1,598	0.0	NA				CLAY, fat, tan, (CH, A-7-6)
BA-9	20	16.9	113.7		2,340	1,170														CLAY, sandy, brown
BA-9	34	18.6	104.0				15	33	52		45	15	30	3,418	-0.1	NA				CLAY, lean, sandy, with gravel, brown, (CL, A-7-6)
BA-9	0-15	NR					-	20	80		42	16	26							CLAY, lean, with sand, brown, (CL, A-7-6)
QTR-1	5	12.2									46	15	31							CLAY, sandy, brown
QTR-1	7	21.2	104.4		3,120	1,560														CLAY, with sand, calcareous, brown
QTR-1	9	14.7									40	14	26							CLAY, sandy, brown
QTR-1	11	19.8	108.8				-	33	23	44				1,107	-0.1	NA				CLAY, sandy, brown
QTR-1	19	22.4	105.4											1,895	-0.1	NA				CLAY, sandy, brown
QTR-1	0-5	NR					-	28	72		46	15	31							CLAY, lean, sandy, brown, (CL, A-7-6)

* Fine (%) = Silt (%) + Clay (%) where % clay is shown (by Hydrometer Test Results)
NA = not applicable
NP = non plastic
NV = no value
NR = not reported (bulk samples stored in cloth bags)

Updated February 16, 2026

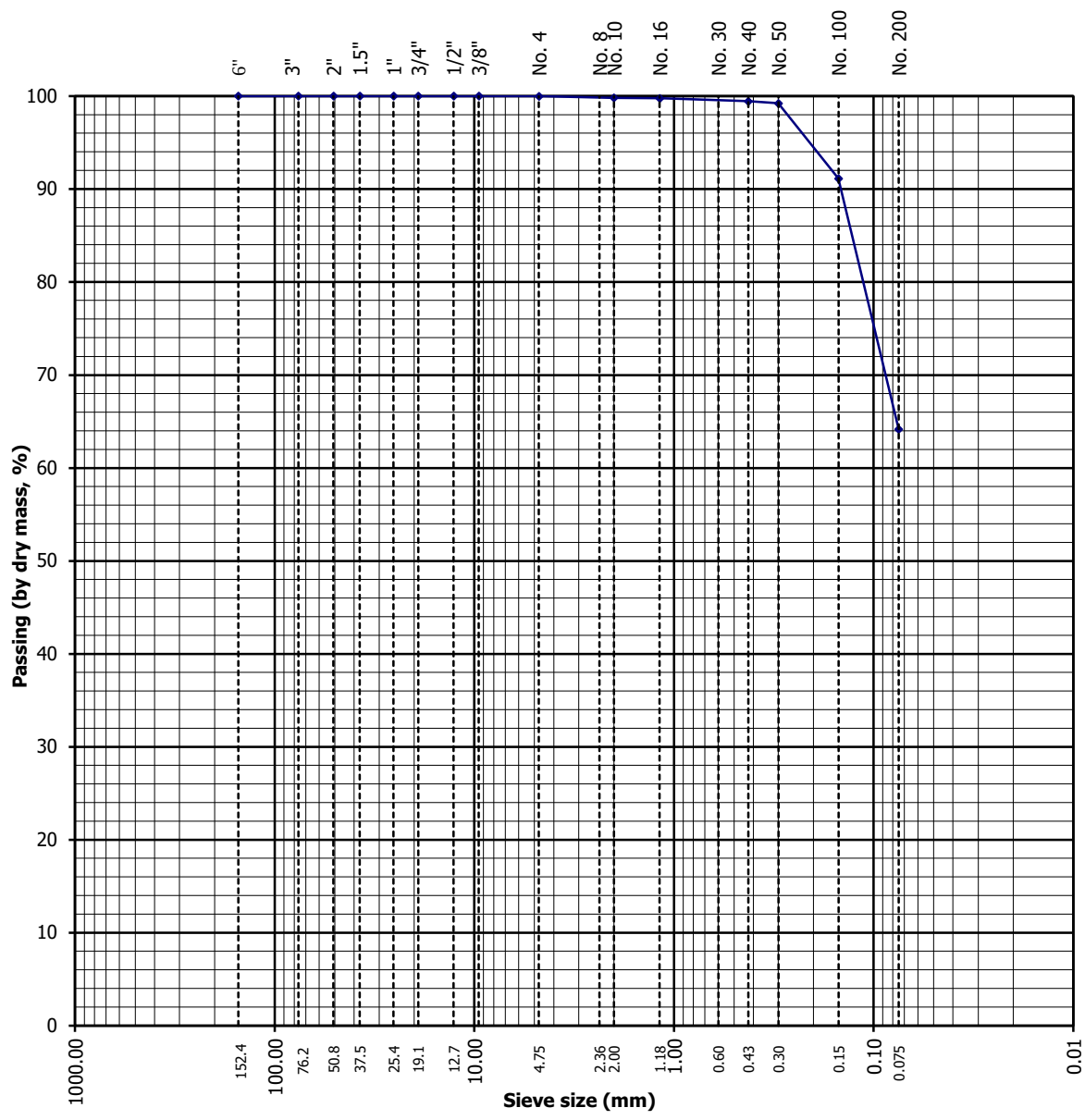
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252298	Reviewer	G. Hoyos
Sample location	WSSC-1 at 10 to 15 feet		
Visual description	CLAYSTONE, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**13**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	91
#200	64.2

Moisture (M) and Density (D)	
M (%)	9.3
D (pcf)	

LL	38
PL	13
PI	25

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

1. WSSC-1 at 10 to 15 feet, Classification: 252298

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	24.3040			Boring:	WSSC-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	April 30, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252297	Reviewer:	G. Hoyos	WEATHERED CLAYSTONE, sandy, brown	

Sample Data:

Diameter:	1.93	in.	Length:	3.91	in.
Diameter:	1.94	in.	Length:	3.90	in.
Diameter:	1.94	in.	Length:	3.88	in.
Avg. Dia.	***1.94***	in.	Avg. L.	***3.90***	in.
Aspect Ratio (L/Dia):	**2.01**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)			
0.010 (0:00)	0.3	50	2,436.2	0.350 (0:00)			
0.025 (0:00)	0.6	205	9,950.0	0.400 (0:00)			
0.050 (0:00)	1.3	165	7,956.8	0.450 (0:00)			
0.075 (0:00)	1.9	71	3,401.6	0.500 (0:00)			
0.100 (0:00)				0.550 (0:00)			
0.125 (0:00)				0.600 (0:00)			
0.150 (0:00)				0.650 (0:00)			
0.175 (0:00)				0.700 (0:00)			
0.200 (0:00)				0.750 (0:00)			
0.225 (0:00)				0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 10,200 psf

Shear Strength (S_u): 5,100 psf

Moisture Content & Density

dish ID	C
dish mass (g)	166.2
wet soil + dish (g)	345.8
dry soil + dish (g)	332.5
moisture content:	**8.0%**
sample mass (g)	321.5
sample moisture content %	8.0%
dry sample mass (g)	297.6
wet density (pcf)	106.6
in-situ dry density (pcf)	**98.7**

Sample Sketch:

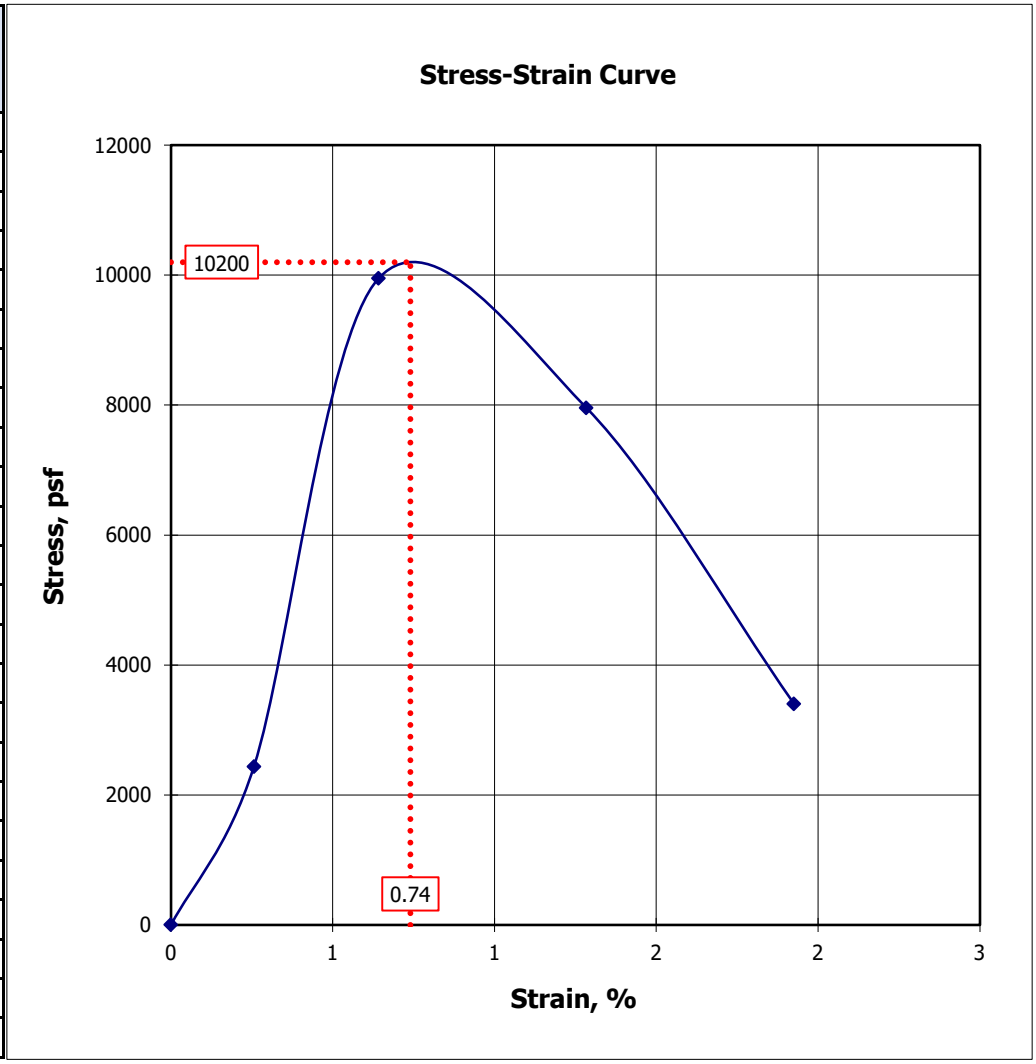
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	24.3040			Hole:	WSSC-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	April 30, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252297	Checked By:	G. Hoyos	WEATHERED CLAYSTONE, sandy, brown	

Unconfined Compressive Strength (q_u):	**10,200**	**psf**	**Density (pcf):**	98.7
Shear Strength (S_u):	**5,100**	**psf**	**Moisture:**	8.0

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	2436.2
0.6	9950.0
1.3	7956.8
1.9	3401.6



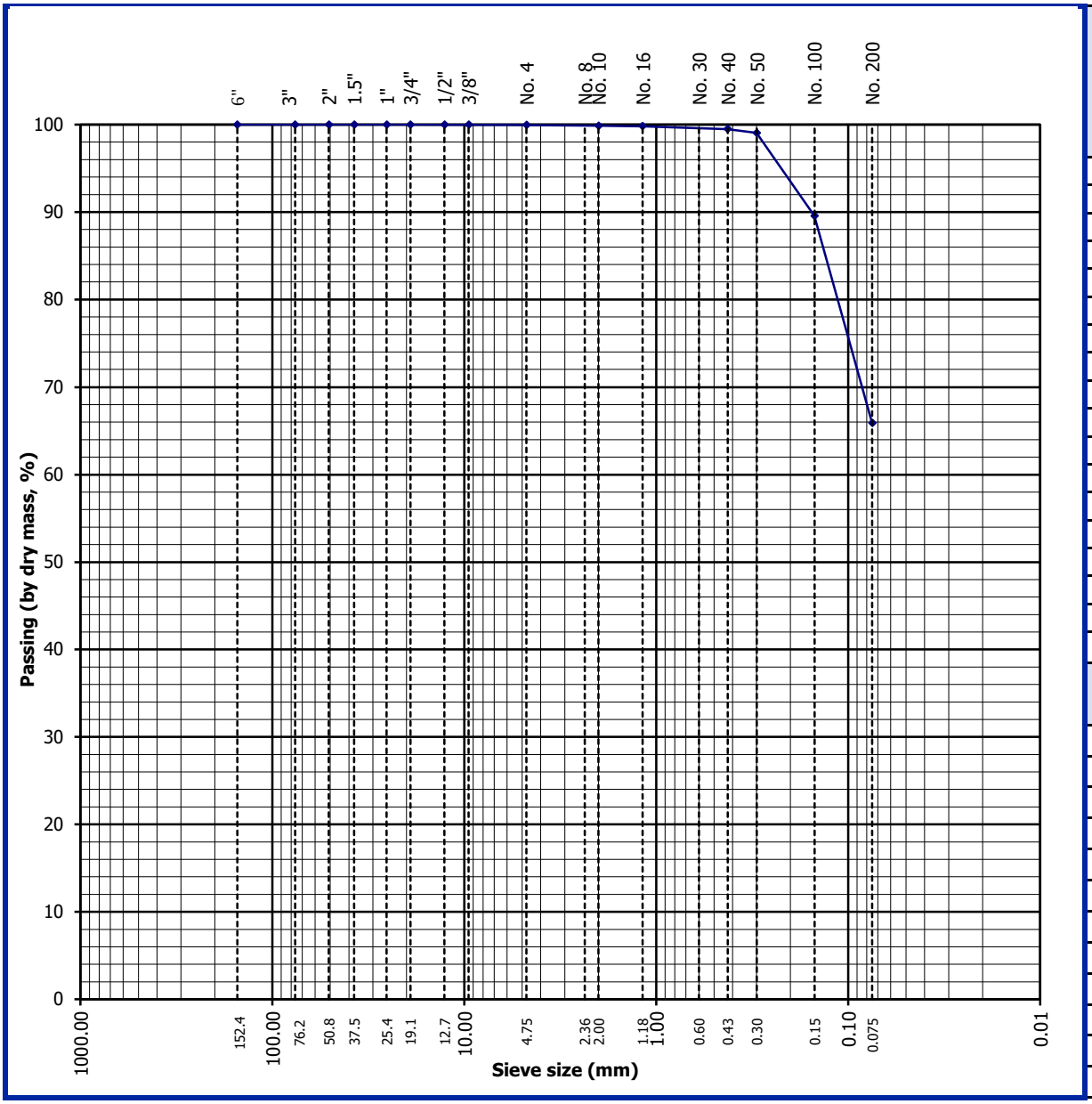
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252300	Reviewer	G. Hoyos
Sample location	WSSC-2 at 5 feet to 10 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**14**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**

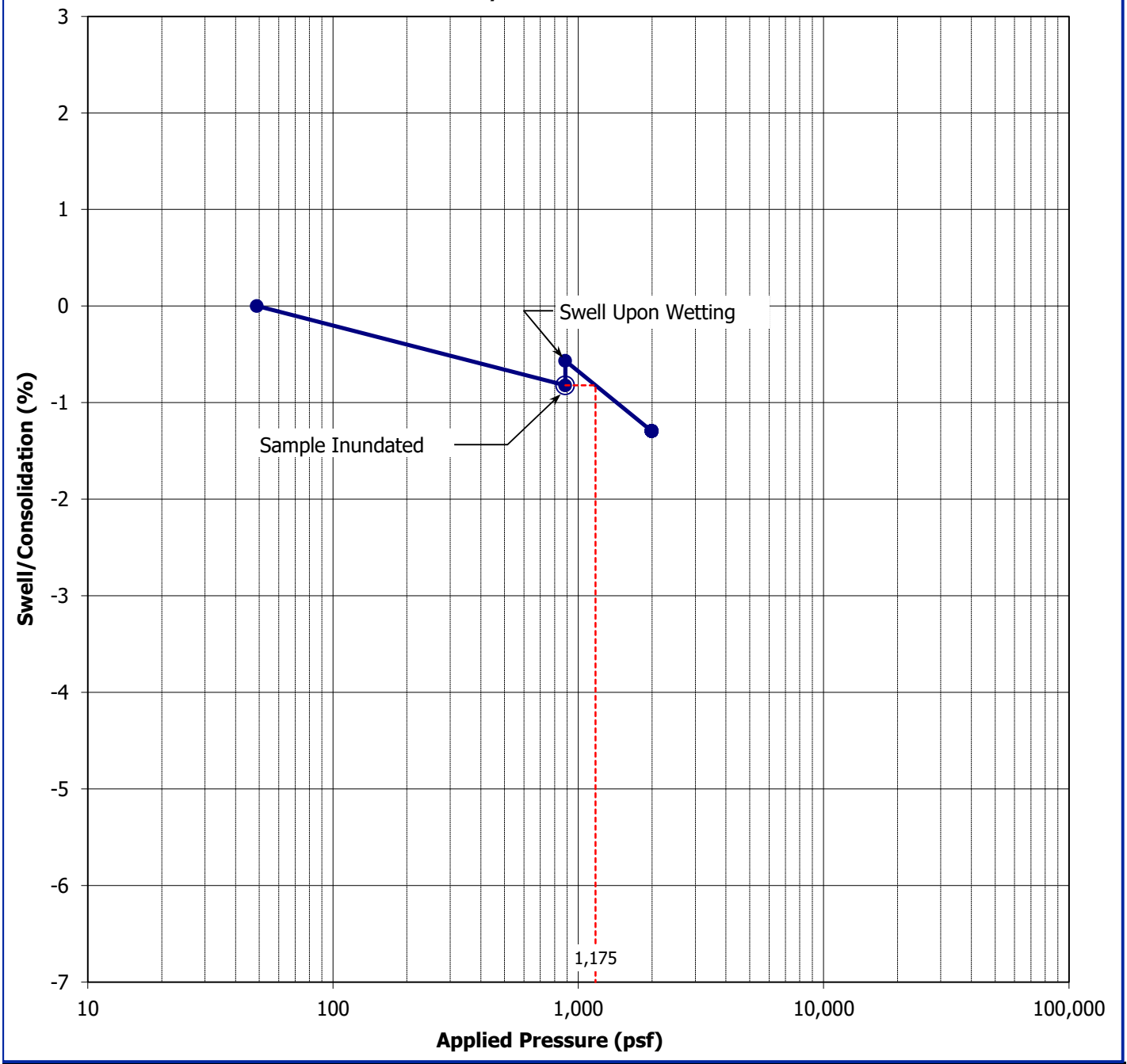


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	90
#200	65.9

Moisture (M) and Density (D)	
M (%)	3.7
D (pcf)	
LL	40
PL	15
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
WSSC-2	9	CLAYSTONE, with sand, light brown	101.3	7.7	884	0.3	1,175

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252299

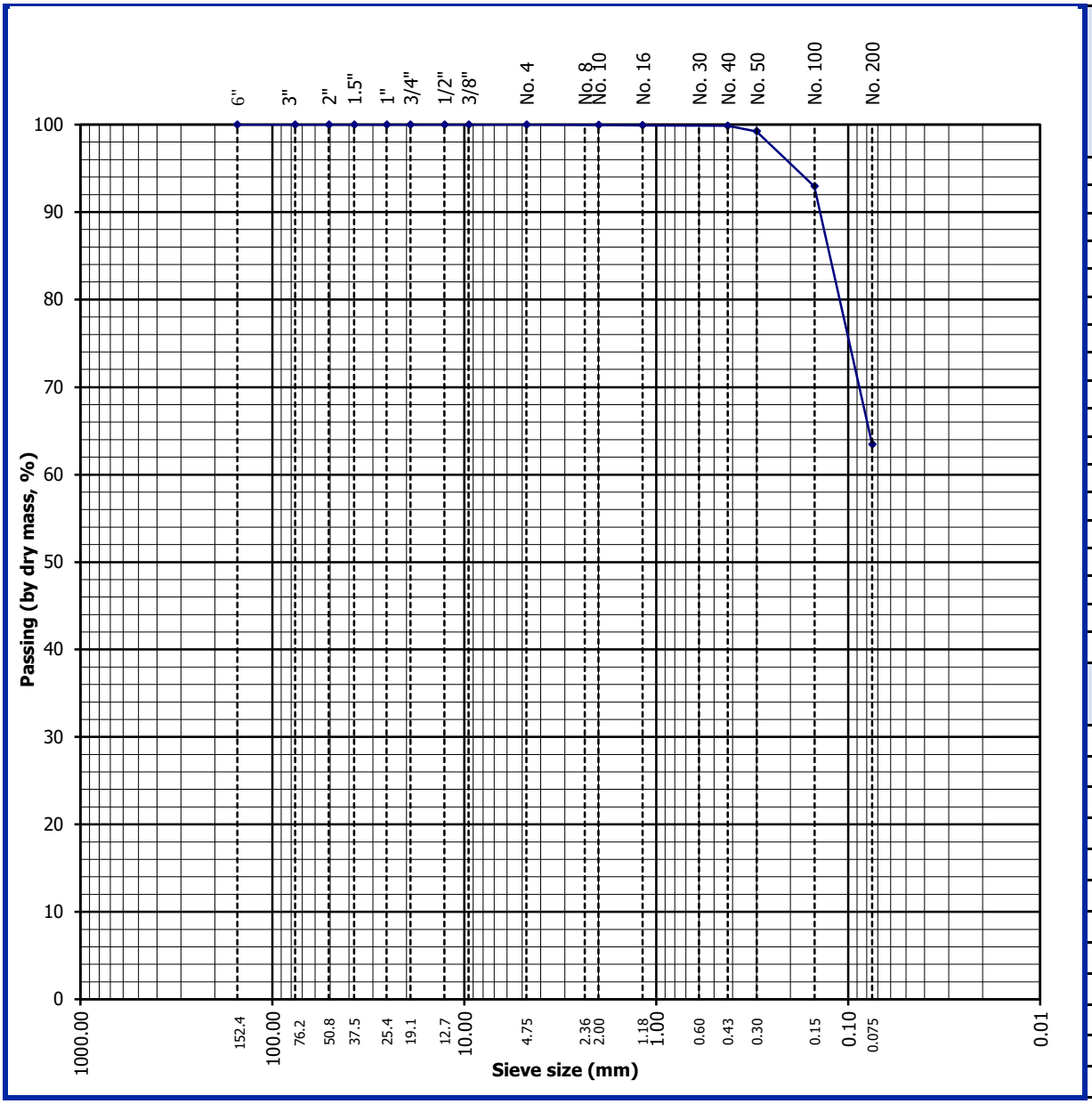
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 23, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252299	Reviewer	G. Hoyos
Sample location	WSSC-2 at 9 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**10**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	93
#200	63.5

Moisture (M) and Density (D)	
M (%)	7.7
D (pcf)	
LL	37
PL	17
PI	20
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

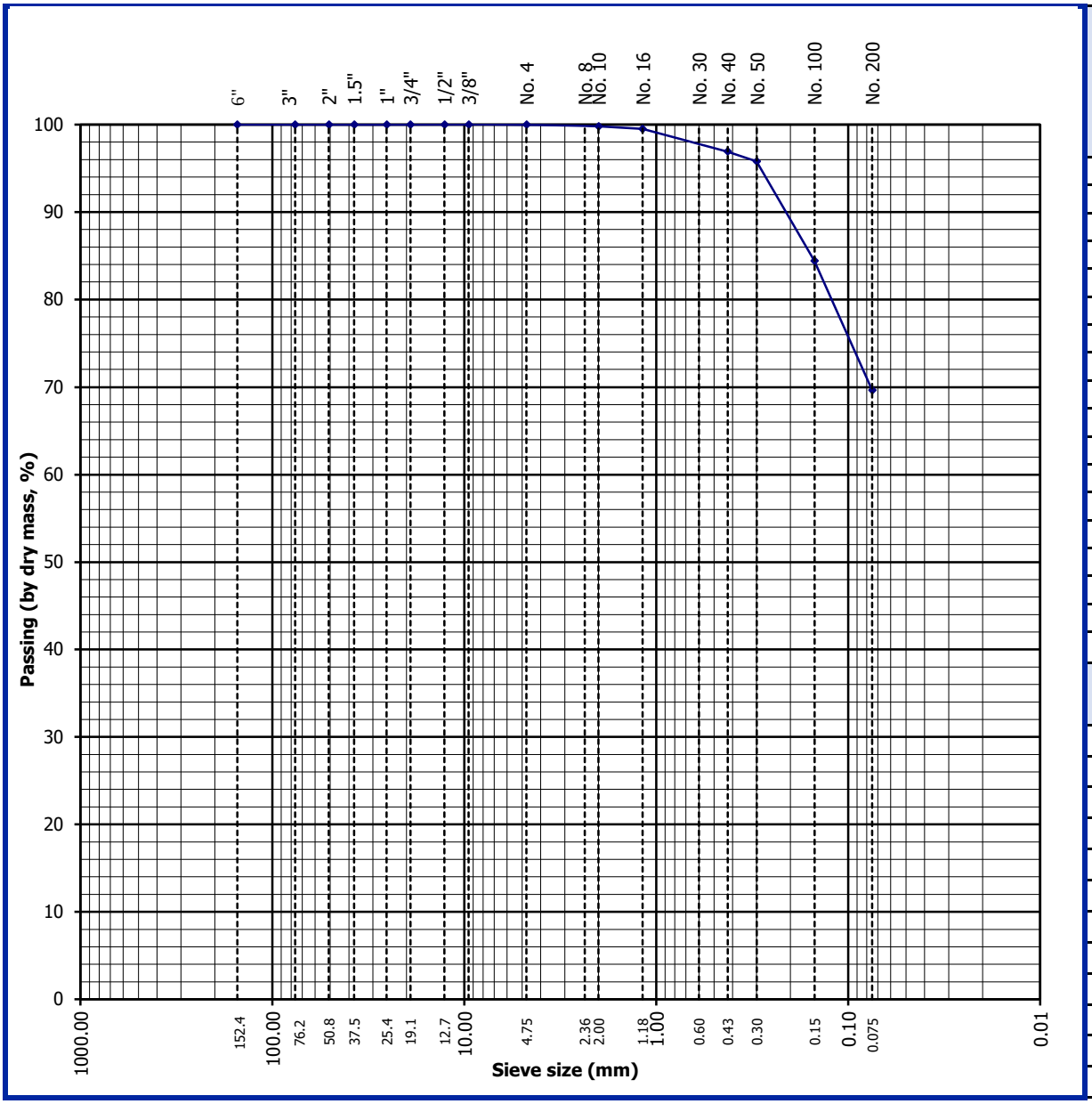
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 23, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252291	Reviewer	G. Hoyos
Sample location	HOOD-1 at 9 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**19**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	97
#50	96
#100	84
#200	69.6

Moisture (M) and Density (D)	
M (%)	23.0
D (pcf)	
LL	45
PL	14
PI	31
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

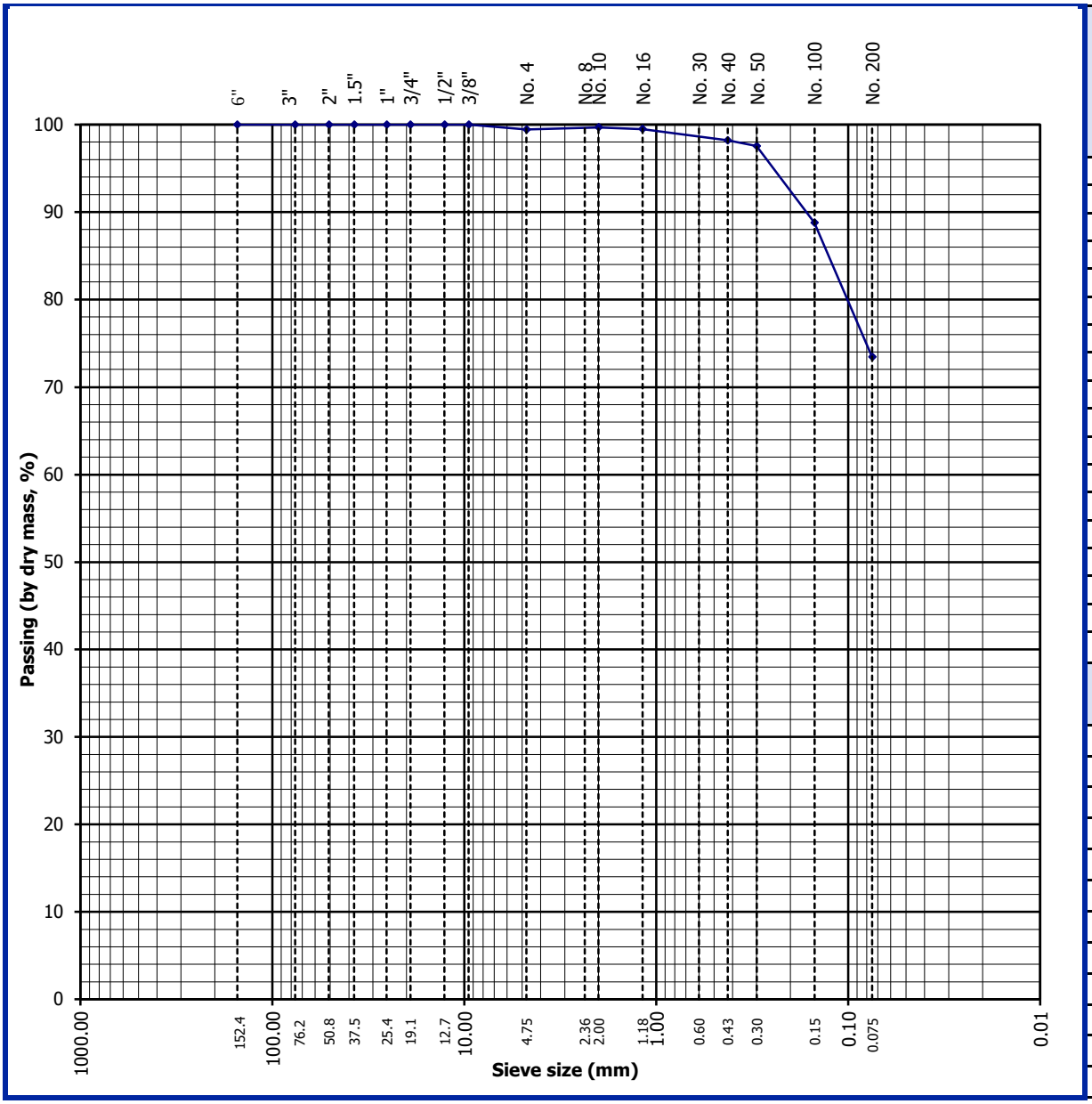
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 24, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Holiman
Lab ID number	252292	Reviewer	G. Hoyos
Sample location	HOOD-1 at 10 feet to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	22	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440

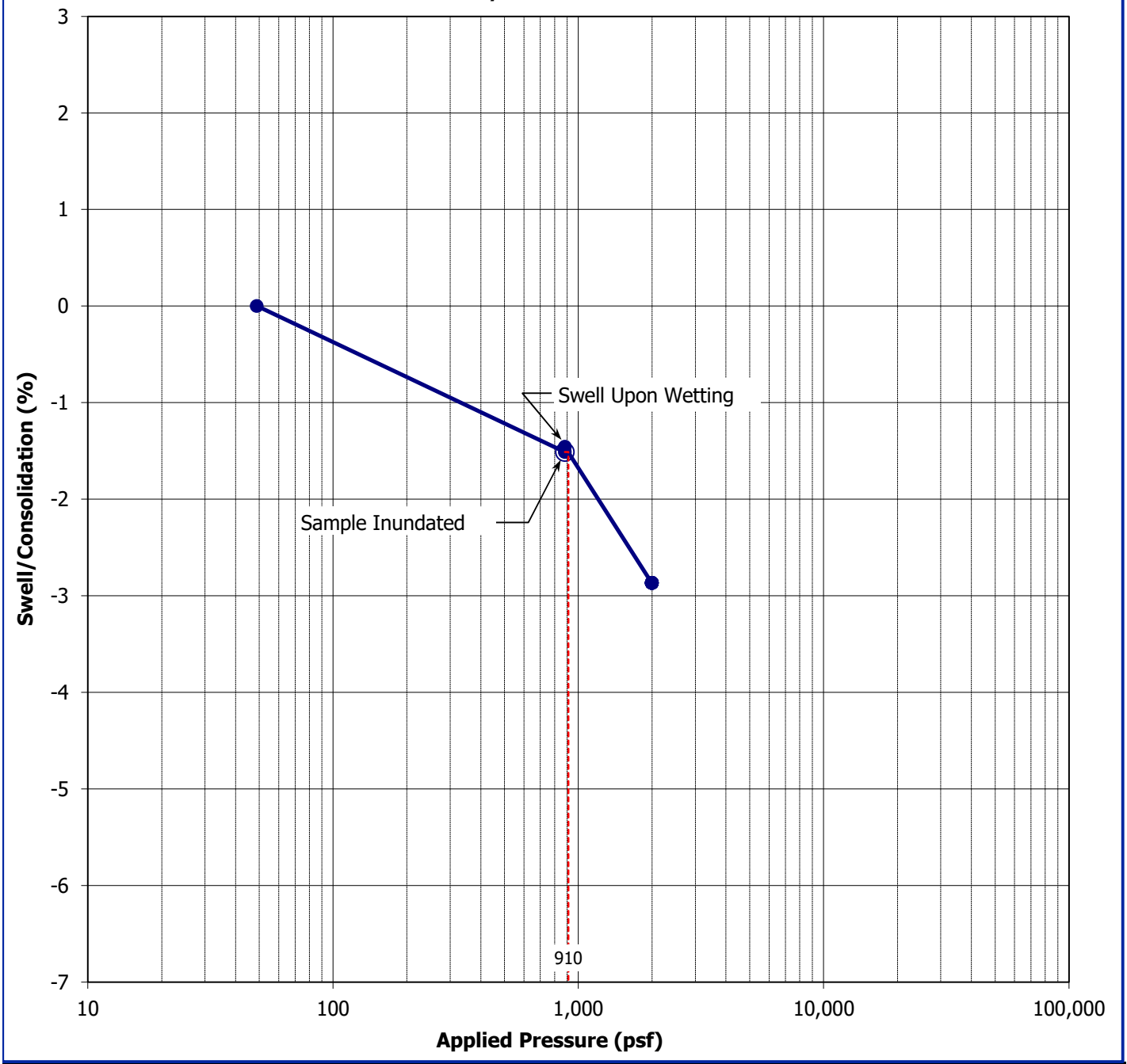


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	99
#8	
#10	100
#16	99
#30	
#40	98
#50	98
#100	89
#200	73.4

Moisture (M) and Density (D)	
M (%)	7.8
D (pcf)	
LL	47
PL	14
PI	33
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
HOOD-1	9	CLAY, sandy, brown	102.3	22.7	882	0.1	910

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252291

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	24.3040			Boring:	HOOD-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	4 feet
Date:	April 30, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252290	Reviewer:	G. Hoyos	CLAY, with sand, brown	

Sample Data:

Diameter:	1.93	in.	Length:	3.65	in.
Diameter:	1.94	in.	Length:	3.64	in.
Diameter:	1.94	in.	Length:	3.64	in.
Avg. Dia.	***1.94***	in.	Avg. L.	***3.65***	in.
Aspect Ratio (L/Dia):	**1.88**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	8.2	223	10,000.6
0.010 (0:00)	0.3	7	341.1	0.350 (0:00)	9.6	218	9,630.3
0.025 (0:00)	0.7	46	2,232.5	0.400 (0:00)	11.0	186	8,092.0
0.050 (0:00)	1.4	104	5,012.4	0.450 (0:00)	12.3	117	5,011.7
0.075 (0:00)	2.1	142	6,796.3	0.500 (0:00)			
0.100 (0:00)	2.7	168	7,984.4	0.550 (0:00)			
0.125 (0:00)	3.4	183	8,636.0	0.600 (0:00)			
0.150 (0:00)	4.1	196	9,183.8	0.650 (0:00)			
0.175 (0:00)	4.8	204	9,490.3	0.700 (0:00)			
0.200 (0:00)	5.5	209	9,652.9	0.750 (0:00)			
0.225 (0:00)	6.2	215	9,858.0	0.800 (0:00)			
0.250 (0:00)	6.9	219	9,968.0	0.850 (0:00)			
0.275 (0:00)	7.5	222	10,030.2	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 10,000 psf

Shear Strength (S_u): 5,000 psf

Moisture Content & Density	
dish ID	J
dish mass (g)	202.2
wet soil + dish (g)	389.4
dry soil + dish (g)	364.0
moisture content:	**15.7%**
sample mass (g)	374.9
sample moisture content %	15.7%
dry sample mass (g)	324.0
wet density (pcf)	132.9
in-situ dry density (pcf)	**114.9**

Sample Sketch:

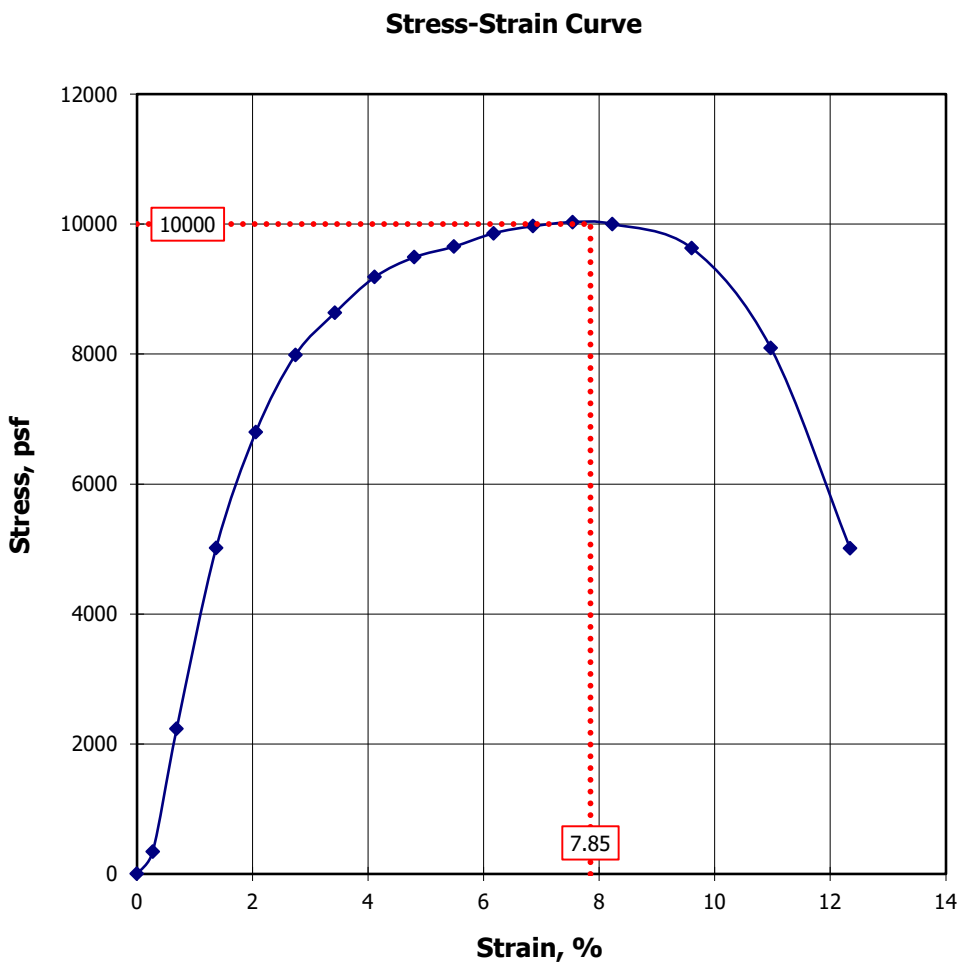
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	24.3040			Hole:	HOOD-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	4 feet
Date:	April 30, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252290	Checked By:	G. Hoyos	CLAY, with sand, brown	

Unconfined Compressive Strength (q_u):	**10,000**	**psf**	**Density (pcf):**	114.9
Shear Strength (S_u):	**5,000**	**psf**	**Moisture:**	15.7

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	341.1
0.7	2232.5
1.4	5012.4
2.1	6796.3
2.7	7984.4
3.4	8636.0
4.1	9183.8
4.8	9490.3
5.5	9652.9
6.2	9858.0
6.9	9968.0
7.5	10030.2
8.2	10000.6
9.6	9630.3
11.0	8092.0
12.3	5011.7



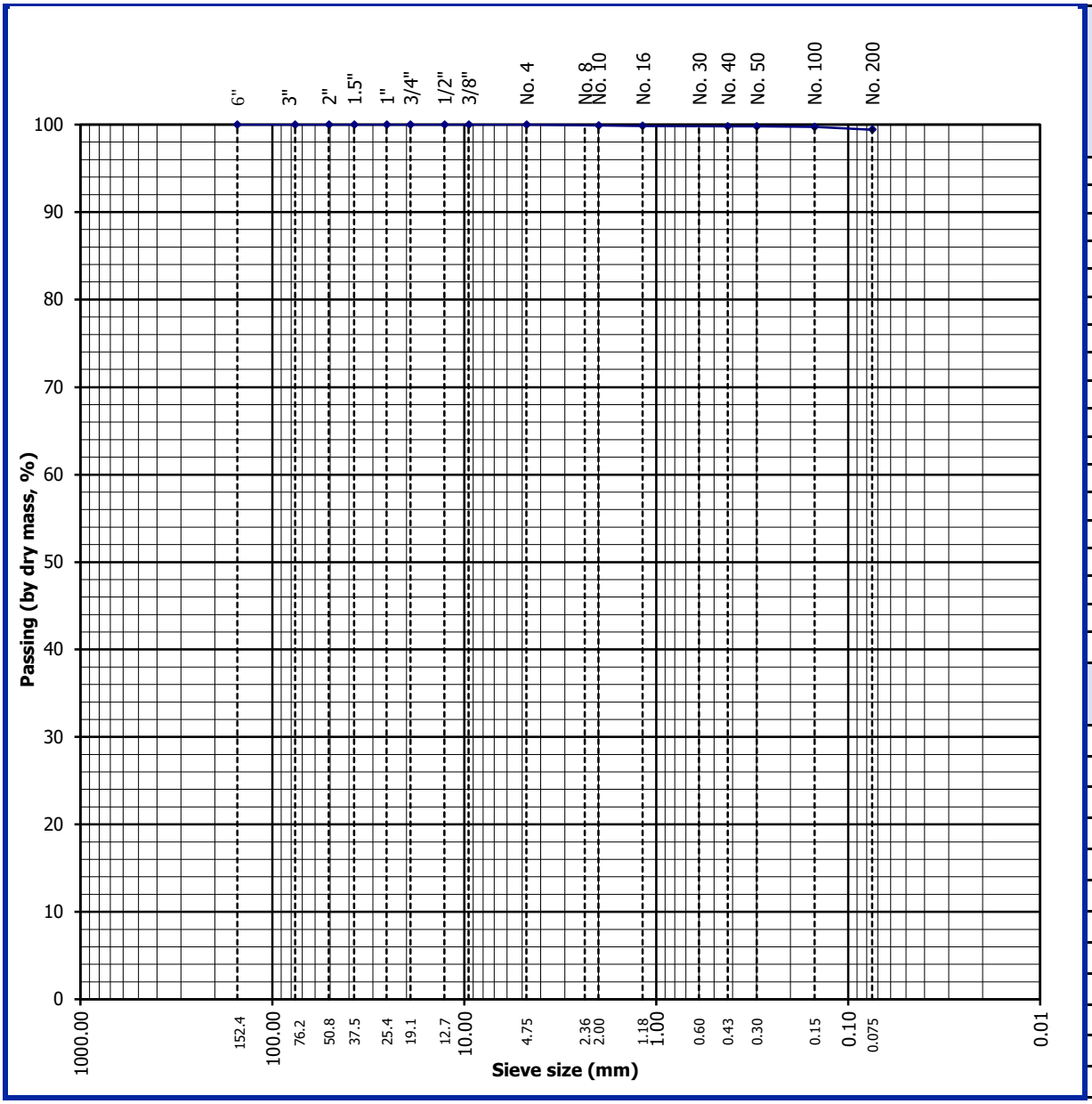
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 24, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252293	Reviewer	G. Hoyos
Sample location	HOOD-2 at 9 feet		
Visual description	CLAY, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	43	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CH)	Fat clay			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	100
#100	100
#200	99.4

Moisture (M) and Density (D)	
M (%)	23.1
D (pcf)	
LL	58
PL	19
PI	39
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

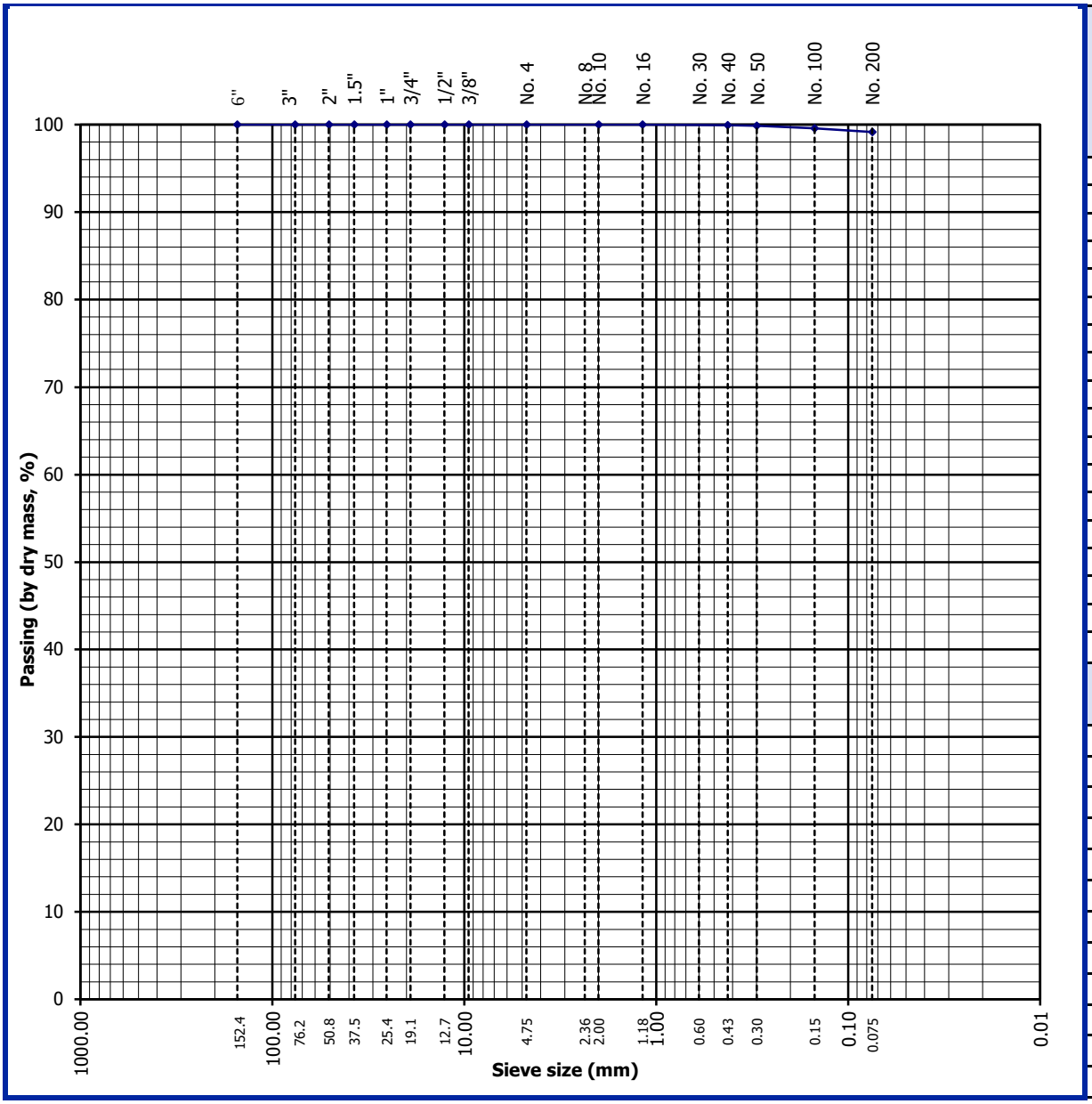
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 13, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252834	Reviewer	G. Hoyos
Sample location	HOOD-2A at 14 feet		
Visual description	CLAYSTONE, dark brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	48	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CH)	Fat clay			Specimen soaking time (min)	1,440

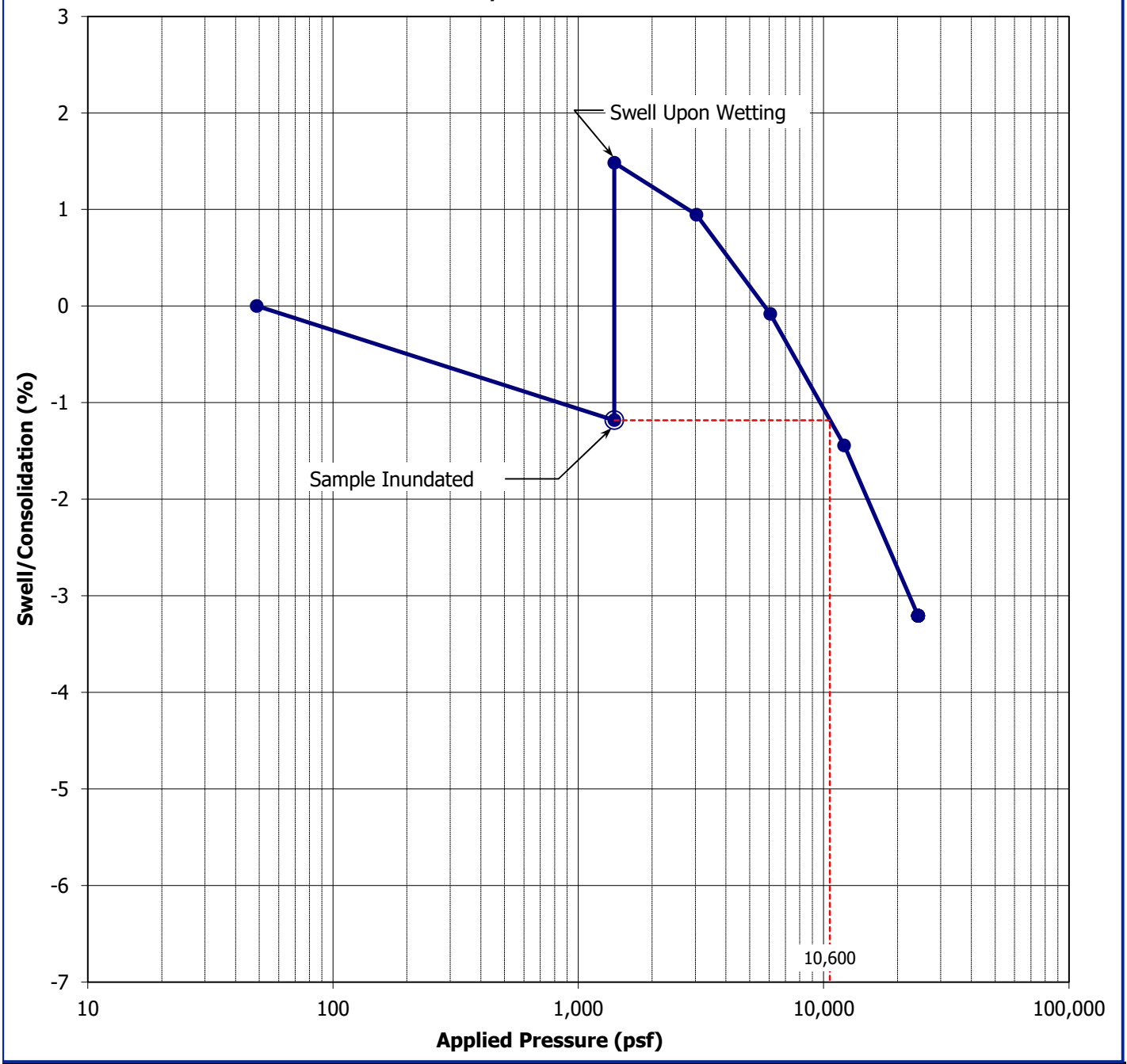


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	100
#100	100
#200	99.2

Moisture (M) and Density (D)	
M (%)	18.5
D (pcf)	
LL	63
PL	20
PI	43
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
HOOD-2A	14	CLAYSTONE, dark brown	114.1	18.5	1,403	2.7	10,600

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252834

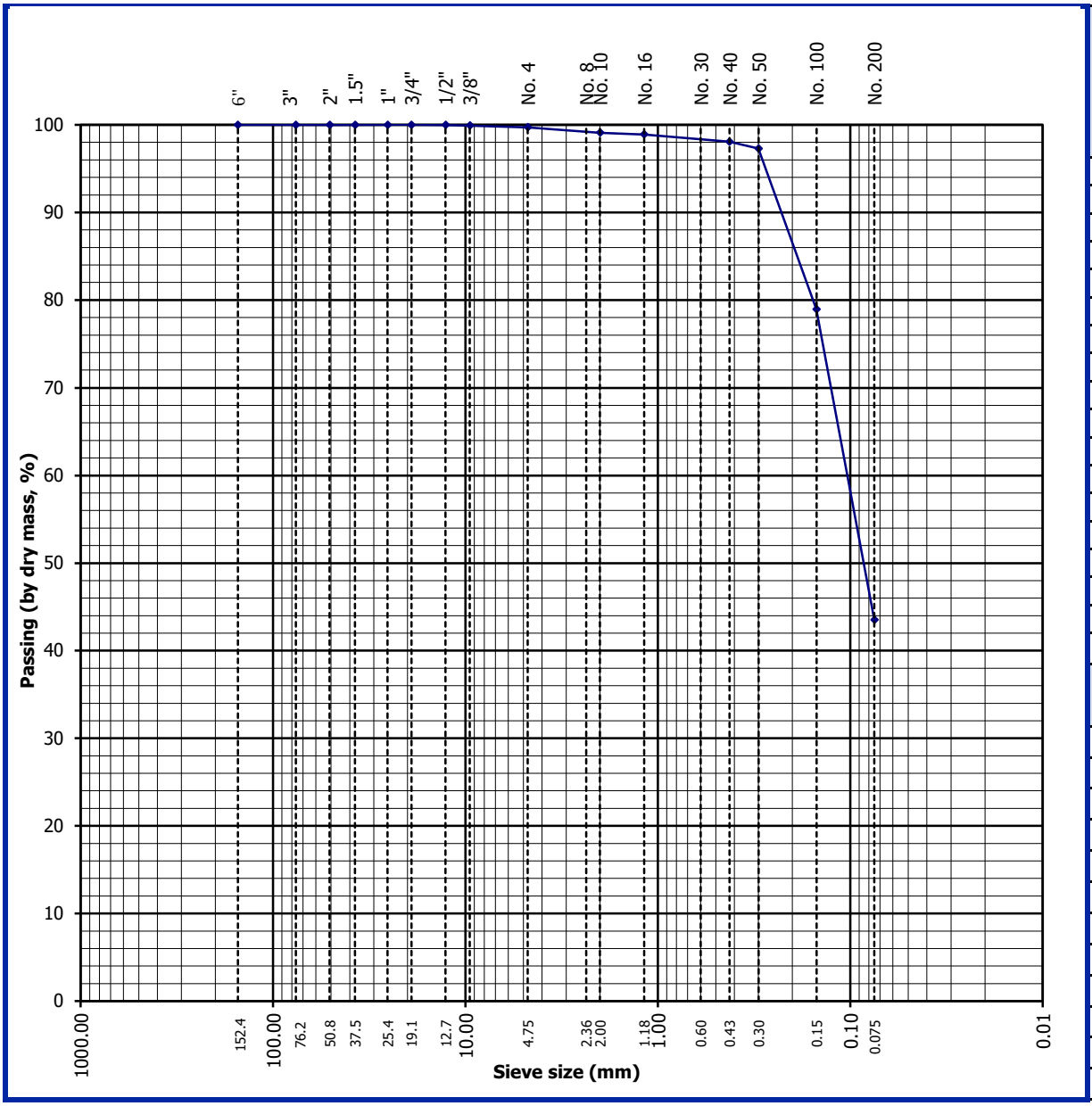
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252295	Reviewer	G. Hoyos
Sample location	HOOD-3 at 0 to 5 feet		
Visual description	SAND, clayey, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**3**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	100
#4	100
#8	
#10	99
#16	99
#30	
#40	98
#50	97
#100	79
#200	43.5

Moisture (M) and Density (D)	
M (%)	4.0
D (pcf)	
LL	32
PL	16
PI	16
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

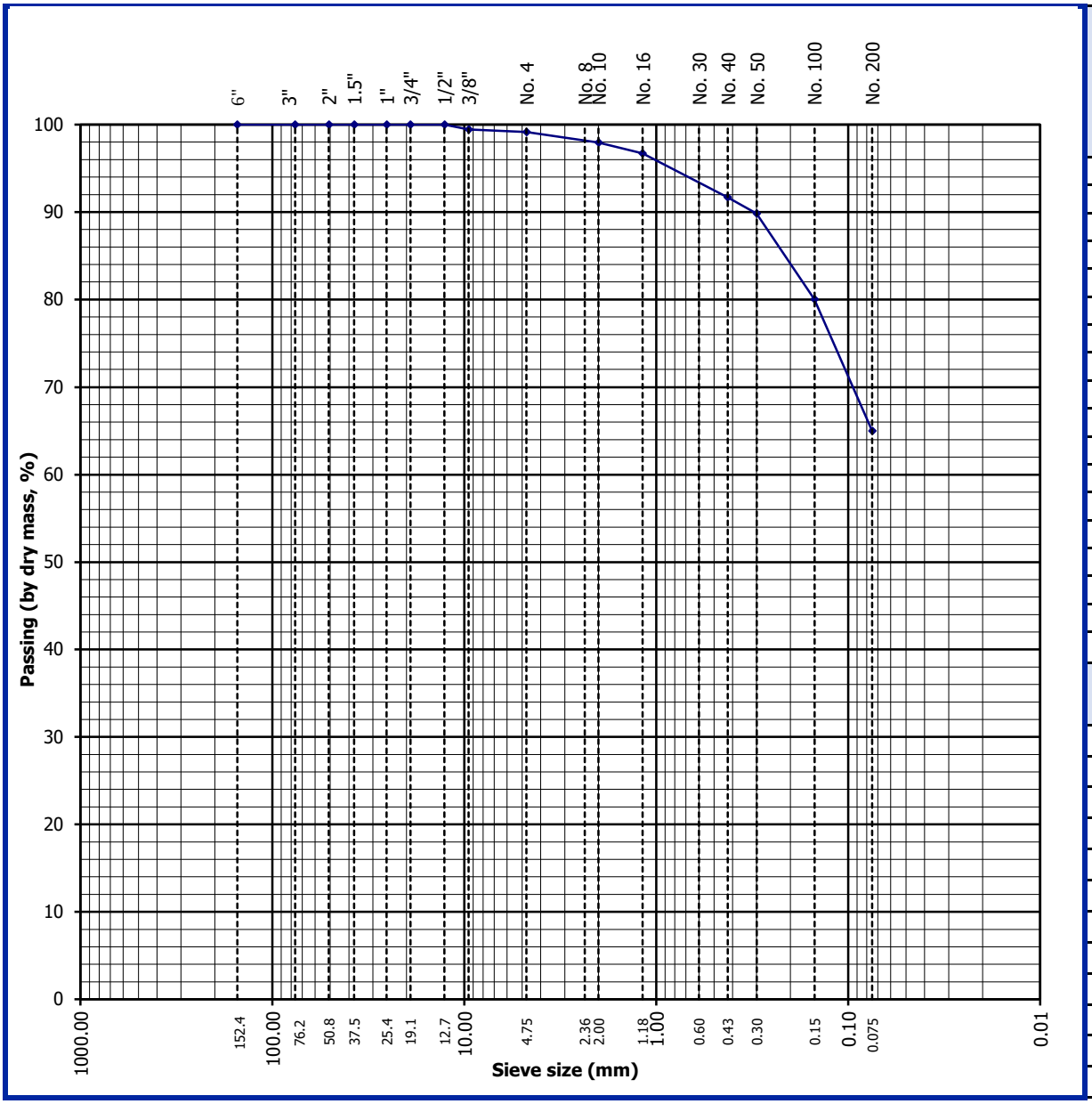
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	July 31, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252665	Reviewer	G. Hoyos
Sample location	TIPS-1 at 9 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**13**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	99
#4	99
#8	
#10	98
#16	97
#30	
#40	92
#50	90
#100	80
#200	65.0

Moisture (M) and Density (D)	
M (%)	25.0
D (pcf)	
LL	39
PL	15
PI	24
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

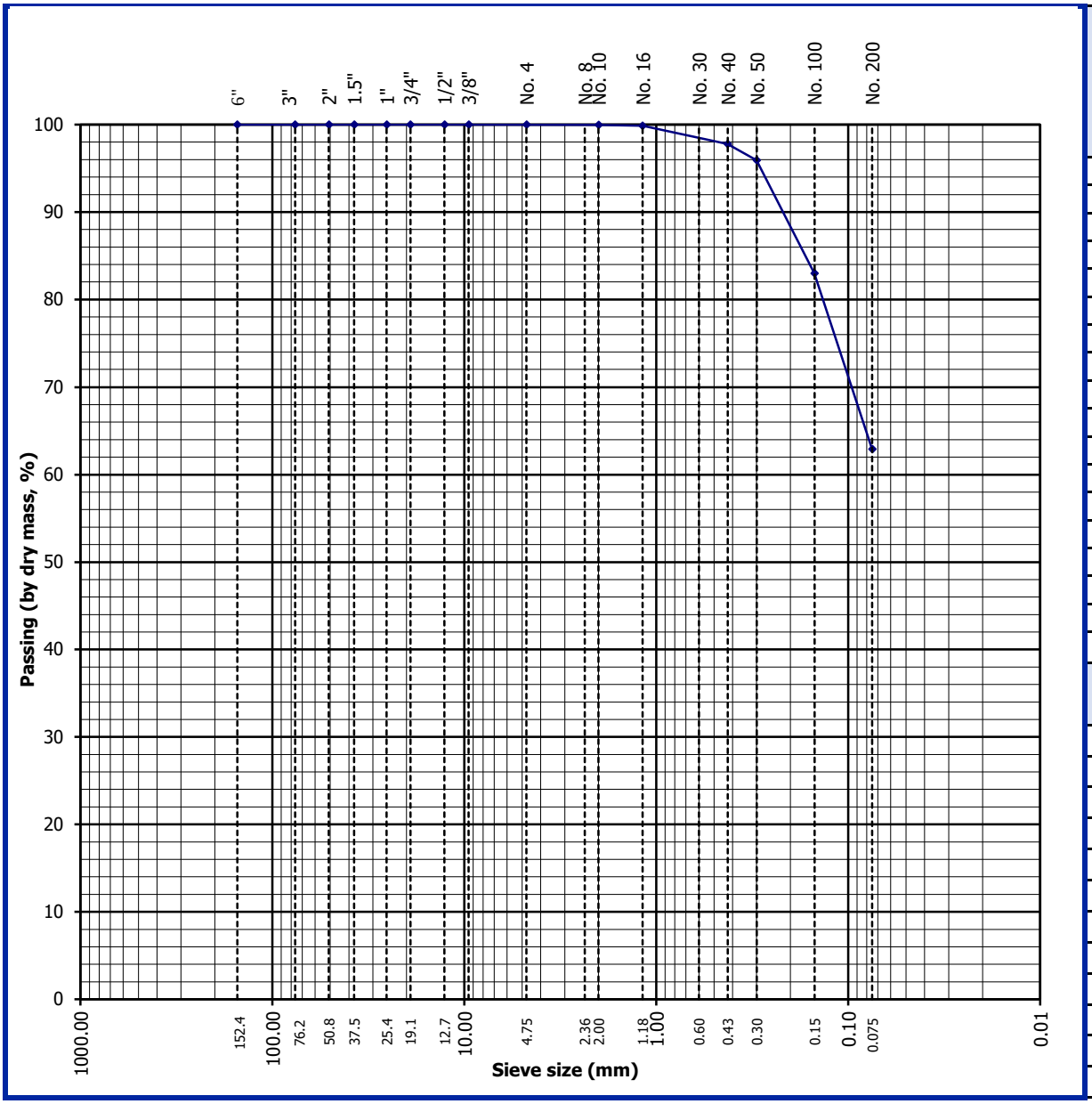
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	July 31, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252666	Reviewer	G. Hoyos
Sample location	TIPS-2 at 6 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**11**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	98
#50	96
#100	83
#200	62.9

Moisture (M) and Density (D)	
M (%)	25.2
D (pcf)	
LL	37
PL	14
PI	23
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

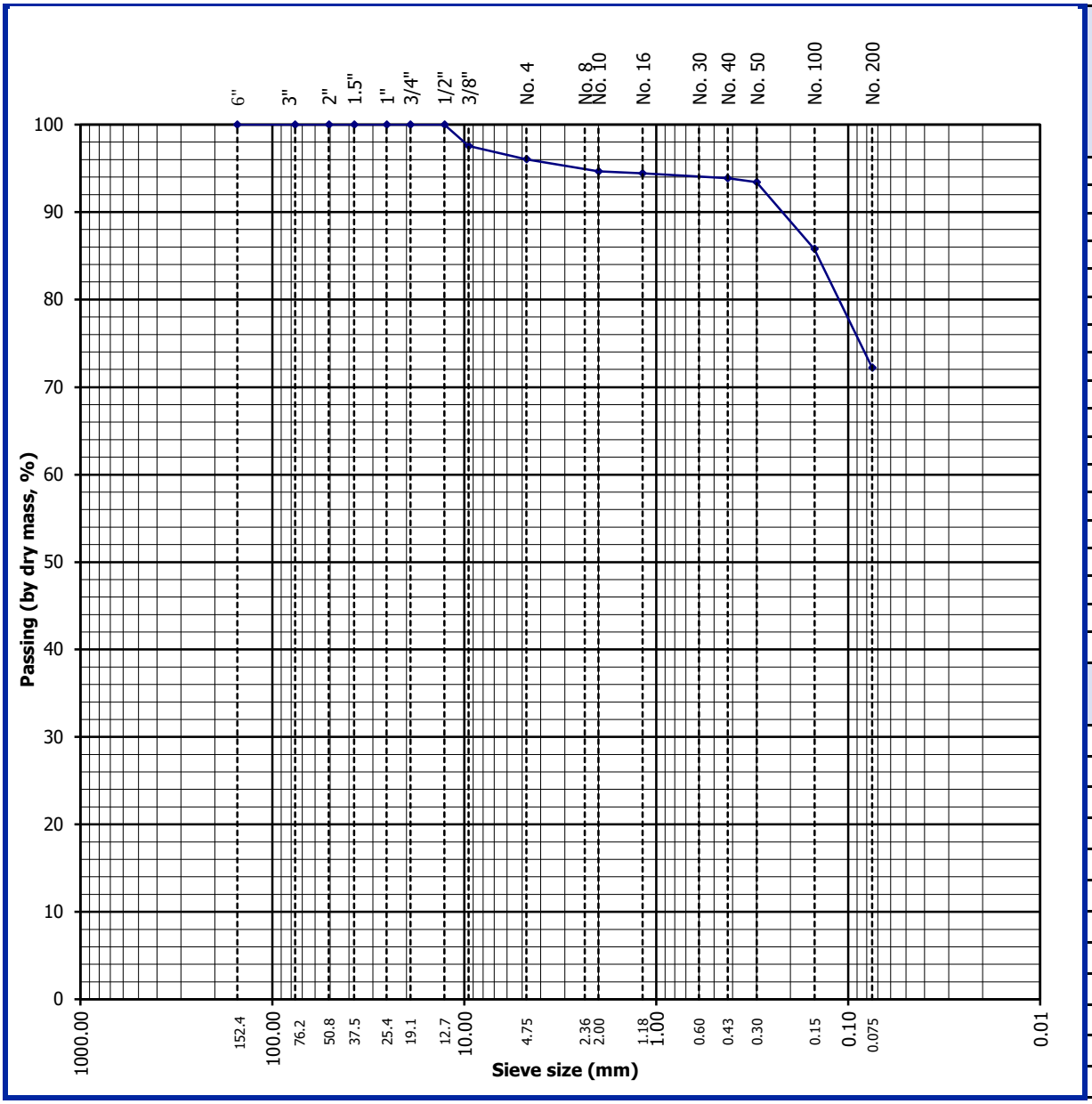
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	July 31, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252668	Reviewer	G. Hoyos
Sample location	TIPS-2 at 20 feet		
Visual description	CLAYSTONE, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	**Method**
Classification	**A-7-6**	**Group Index**	**16**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	98
#4	96
#8	
#10	95
#16	94
#30	
#40	94
#50	93
#100	86
#200	72.2

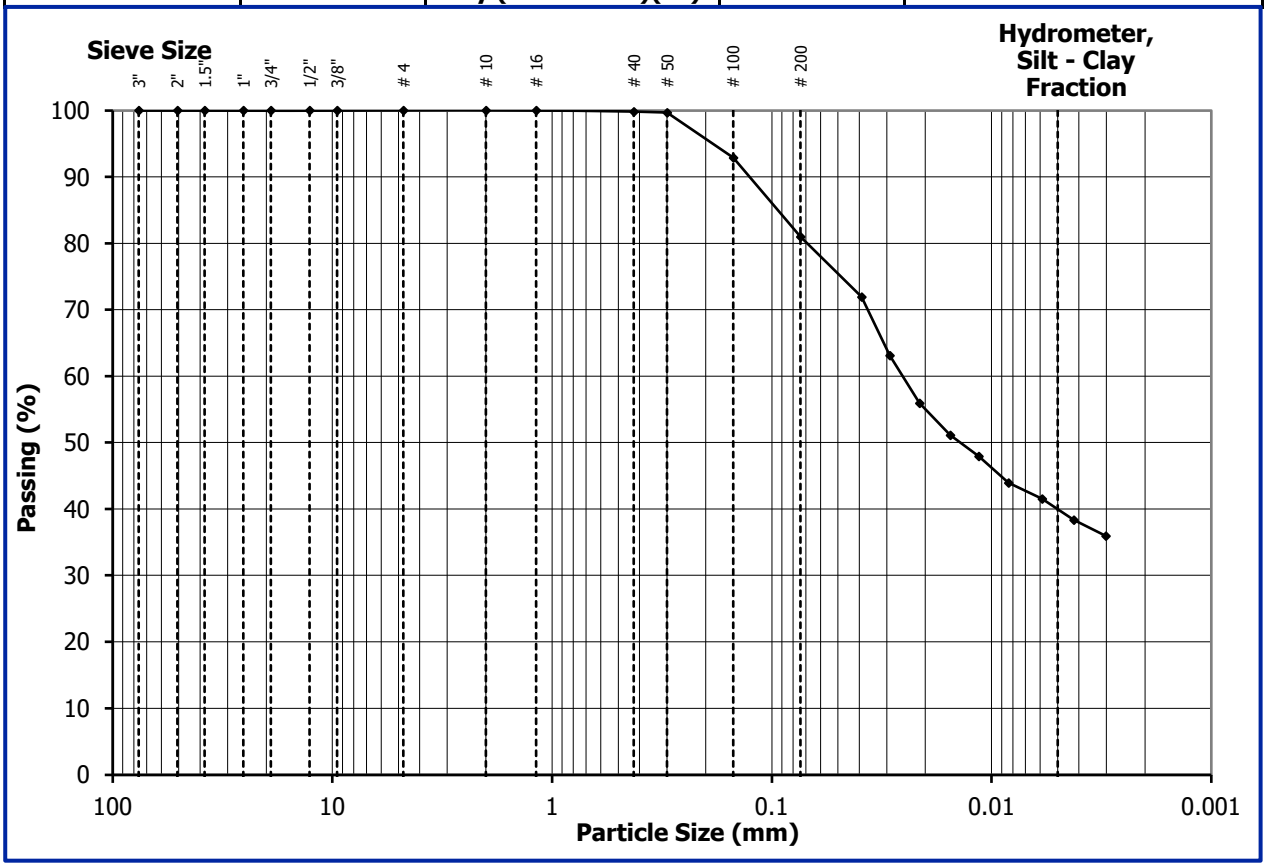
Moisture (M) and Density (D)	
M (%)	15.5
D (pcf)	
LL	42
PL	17
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D7928)

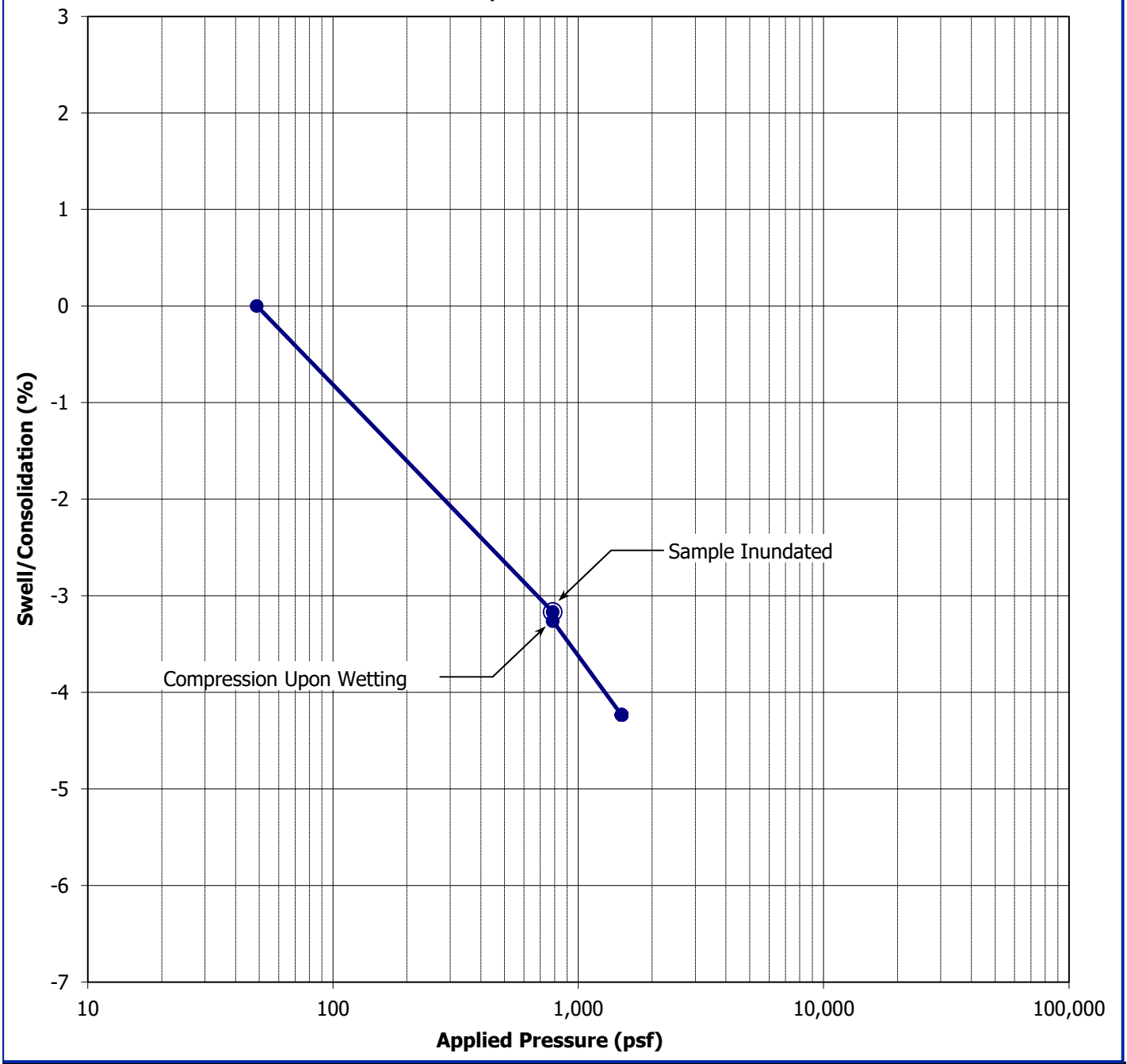
Project number:	500652 (24.3040)	Date	10/02/25
Project name:	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number:	252865	Reviewer	G. Hoyos
Sample location:	TIPS-2 at 14 feet		
Visual description:	CLAYSTONE, sandy, brown		
Soil classification (USCS):	**CL**	**Lean clay with sand**	

Sieve Size	% Passing	Hydrometer		Atterberg Limits	
3"	100	**Particle Size**	**% Passing**		
2"	100	39 Micron	72	**Liquid limit**	**46**
1-1/2"	100	29 Micron	63	**Plastic limit**	**15**
1"	100	21 Micron	56	**Plastic index**	**31**
3/4"	100	15 Micron	51	**Remarks**	
1/2"	100	11 Micron	48		
3/8"	100	8.4 Micron	44		
#4	100	5.9 Micron	42		
#10	100	4.2 Micron	38		
#16	100	3.0 Micron	36		
#40	100	**Gravel (%):**	**0**		
#50	100	**Sand (%):**	**19**		
#100	93	**Silt (%):**	**42**		
#200	81	**Clay (< 5 micron)(%):**	**39**		



CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
TIPS-2	8	CLAY, sandy, brown	101.1	25.4	787	-0.1	NA

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252667

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	TIPS-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	12 feet
Date:	October 5, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252864	Reviewer:	G. Hoyos	CLAYSTONE,sandy, brown	

Sample Data:

Diameter:	1.93	in.	Length:	4.07	in.
Diameter:	1.92	in.	Length:	4.06	in.
Diameter:	1.93	in.	Length:	4.04	in.
Avg. Dia.	***1.93***	in.	Avg. L.	***4.06***	in.
Aspect Ratio (L/Dia):	**2.11**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)			
0.010 (0:00)	0.2	1	49.3	0.350 (0:00)			
0.025 (0:00)	0.6	6	294.5	0.400 (0:00)			
0.050 (0:00)	1.2	18	878.1	0.450 (0:00)			
0.075 (0:00)	1.8	41	1,987.7	0.500 (0:00)			
0.100 (0:00)	2.5	75	3,613.2	0.550 (0:00)			
0.125 (0:00)	3.1	120	5,744.5	0.600 (0:00)			
0.150 (0:00)	3.7	170	8,086.4	0.650 (0:00)			
0.175 (0:00)	4.3	197	9,310.7	0.700 (0:00)			
0.200 (0:00)	4.9	180	8,452.5	0.750 (0:00)			
0.225 (0:00)	5.5	117	5,458.5	0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 9,350 psf

Shear Strength (S_u): 4,675 psf

Moisture Content & Density	
dish ID	RA
dish mass (g)	160.5
wet soil + dish (g)	575.3
dry soil + dish (g)	525.0
moisture content:	**13.8%**
sample mass (g)	417.0
sample moisture content %	13.8%
dry sample mass (g)	366.4
wet density (pcf)	134.3
in-situ dry density (pcf)	**118.0**

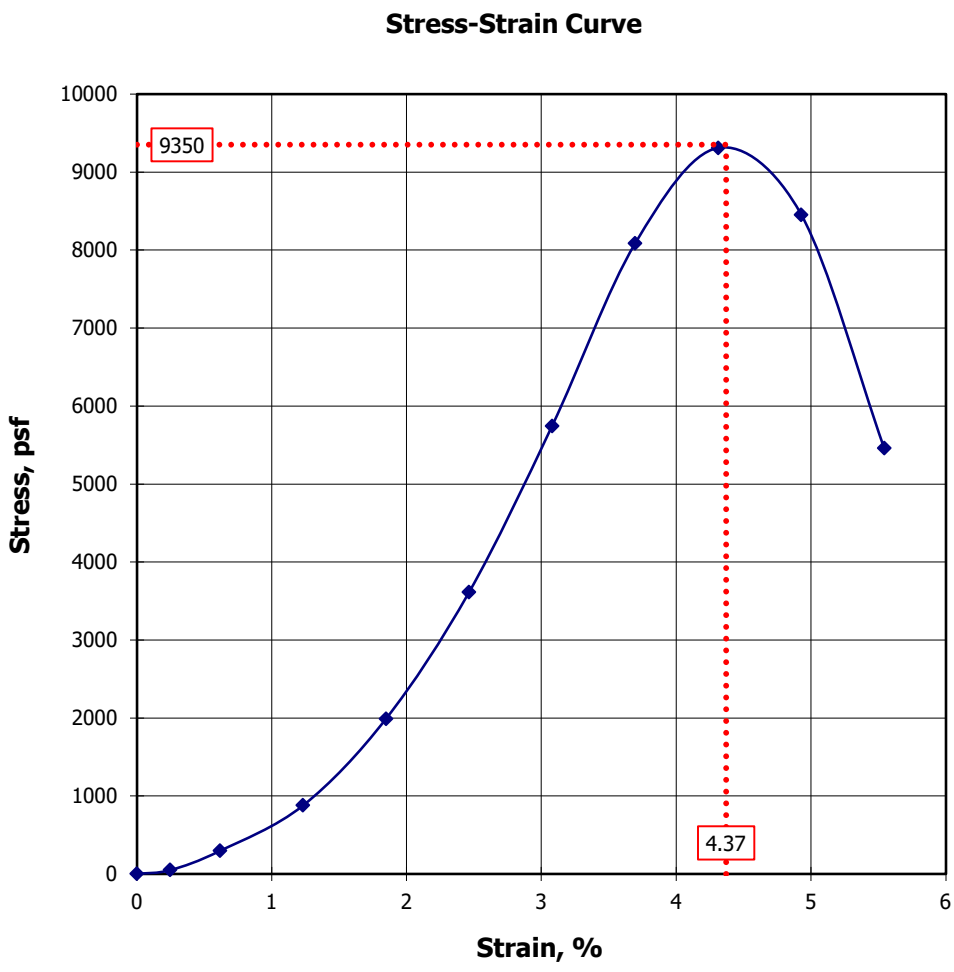
Sample Sketch:

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	TIPS-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	12 feet
Date:	October 5, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252864	Checked By:	G. Hoyos	CLAYSTONE,sandy, brown	

Unconfined Compressive Strength (q_u):	**9,350**	**psf**	**Density (pcf):**	118.0
Shear Strength (S_u):	**4,675**	**psf**	**Moisture:**	13.8

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.2	49.3
0.6	294.5
1.2	878.1
1.8	1987.7
2.5	3613.2
3.1	5744.5
3.7	8086.4
4.3	9310.7
4.9	8452.5
5.5	5458.5



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	TIPS-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	July 31, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252668	Reviewer:	G. Hoyos	CLAYSTONE, with sand, brown	

Sample Data:

Diameter:	1.93	in.	Length:	3.95	in.
Diameter:	1.94	in.	Length:	3.79	in.
Diameter:	1.94	in.	Length:	3.92	in.
Avg. Dia.	***1.94***	in.	Avg. L.	***3.89***	in.
Aspect Ratio (L/Dia):	**2.01**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)			
0.010 (0:16)	0.3	29	1,411.5	0.350 (0:00)			
0.025 (0:34)	0.6	48	2,327.3	0.400 (0:00)			
0.050 (1:03)	1.3	68	3,275.7	0.450 (0:00)			
0.075 (1:34)	1.9	97	4,642.2	0.500 (0:00)			
0.100 (2:05)	2.6	125	5,943.1	0.550 (0:00)			
0.125 (2:34)	3.2	145	6,848.4	0.600 (0:00)			
0.150 (2:54)	3.9	158	7,412.9	0.650 (0:00)			
0.175 (3:34)	4.5	154	7,176.9	0.700 (0:00)			
0.200 (3:54)	5.1	148	6,850.8	0.750 (0:00)			
0.225 (4:34)	5.8	138	6,344.6	0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 7,420 psf

Shear Strength (S_u): 3,710 psf

Moisture Content & Density	
dish ID	SI
dish mass (g)	169.7
wet soil + dish (g)	376.7
dry soil + dish (g)	349.0
moisture content:	**15.5%**
sample mass (g)	406.6
sample moisture content %	15.5%
dry sample mass (g)	352.0
wet density (pcf)	135.0
in-situ dry density (pcf)	**116.9**

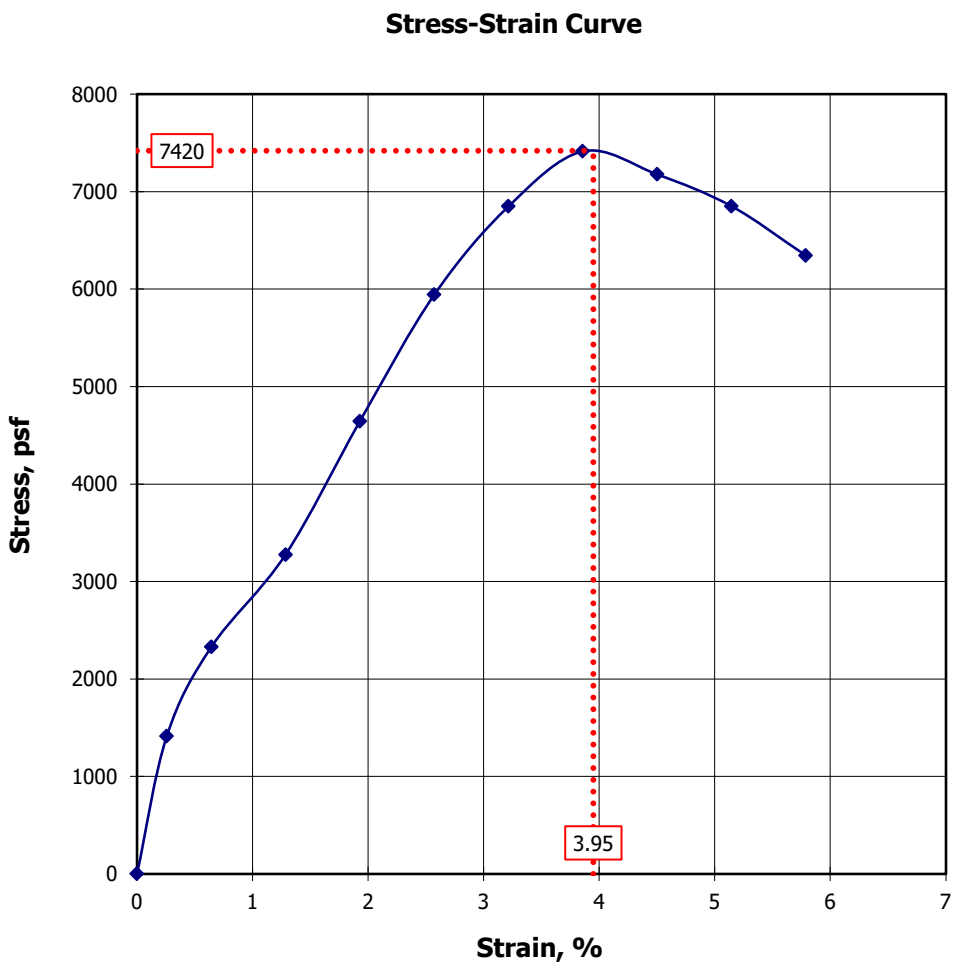
Sample Sketch:

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	TIPS-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	July 31, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252668	Checked By:	G. Hoyos	CLAYSTONE, with sand, brown	

Unconfined Compressive Strength (q_u):	**7,420**	**psf**	**Density (pcf):**	116.9
Shear Strength (S_u):	**3,710**	**psf**	**Moisture:**	15.5

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	1411.5
0.6	2327.3
1.3	3275.7
1.9	4642.2
2.6	5943.1
3.2	6848.4
3.9	7412.9
4.5	7176.9
5.1	6850.8
5.8	6344.6



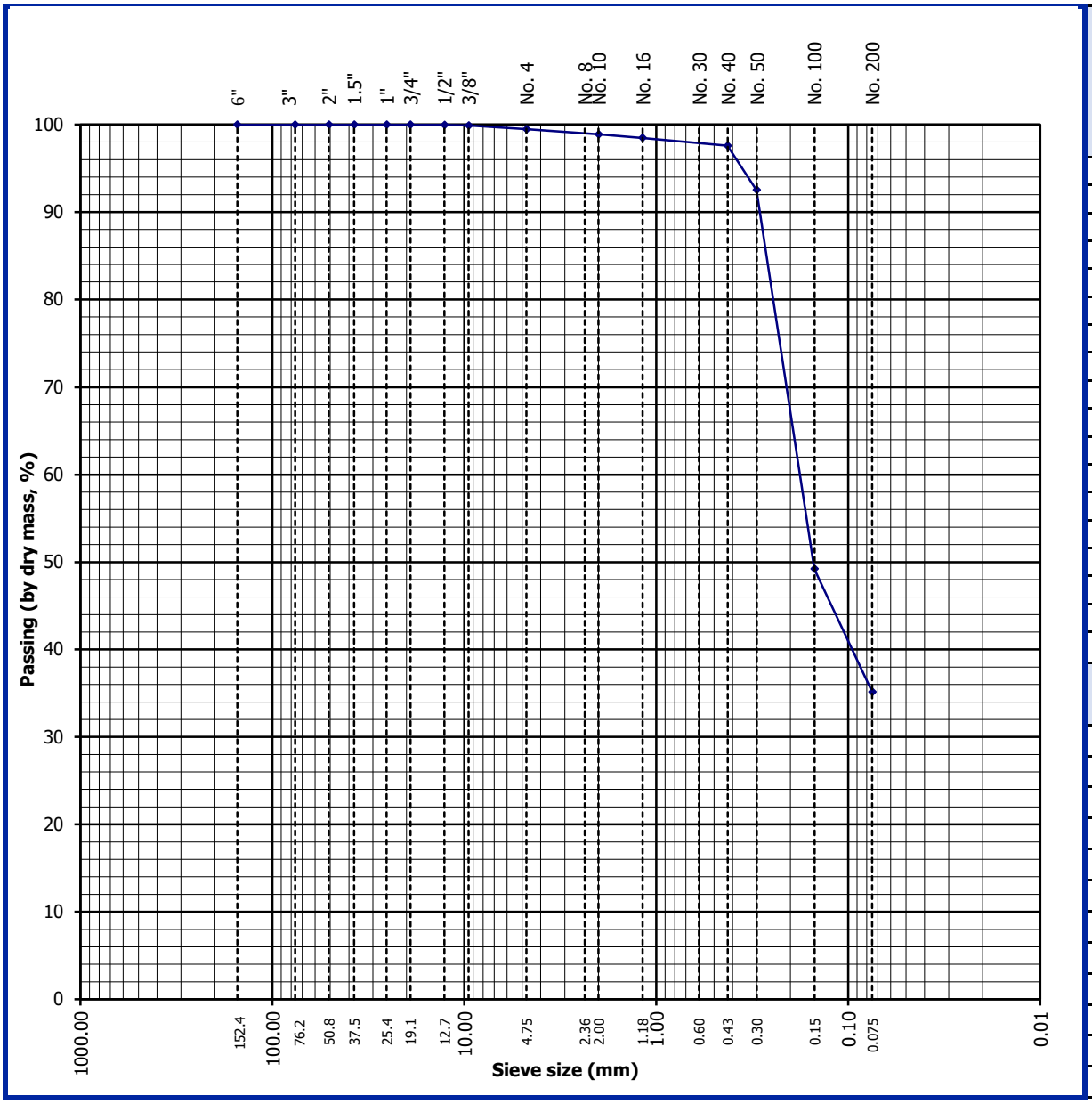
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 30, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252284	Reviewer	G. Hoyos
Sample location	RRDI-1 at 5 to 10 feet		
Visual description	SAND, clayey, light brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**1**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	100
1/2"	100
3/8"	100
#4	99
#8	
#10	99
#16	98
#30	
#40	98
#50	93
#100	49
#200	35.1

Moisture (M) and Density (D)	
M (%)	3.0
D (pcf)	
LL	29
PL	15
PI	14
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

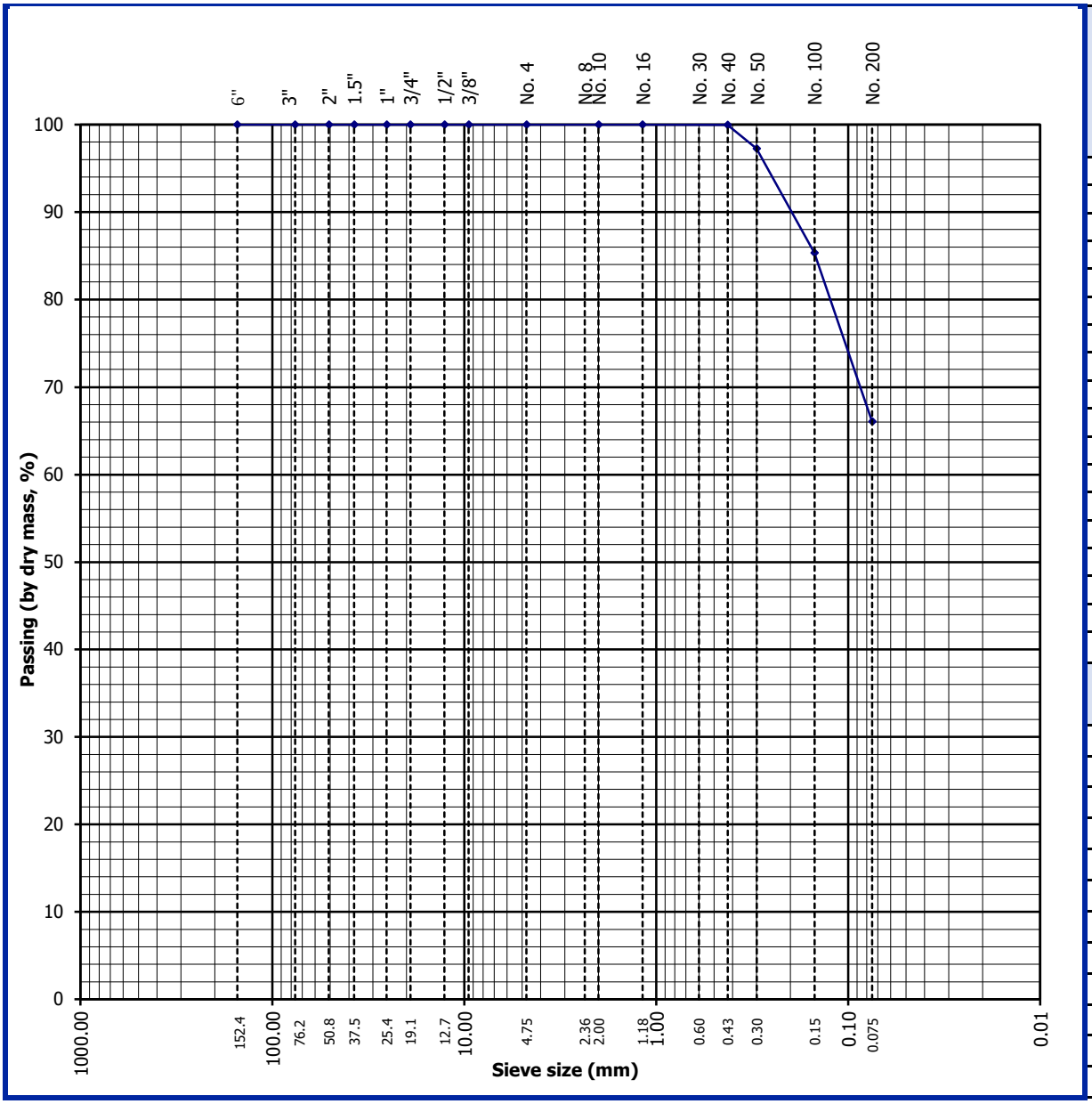
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252280	Reviewer	G. Hoyos
Sample location	RRDI-1 at 12 feet		
Visual description	CLAYSTONE, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**13**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	97
#100	85
#200	66.0

Moisture (M) and Density (D)	
M (%)	15.3
D (pcf)	
LL	42
PL	20
PI	22
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

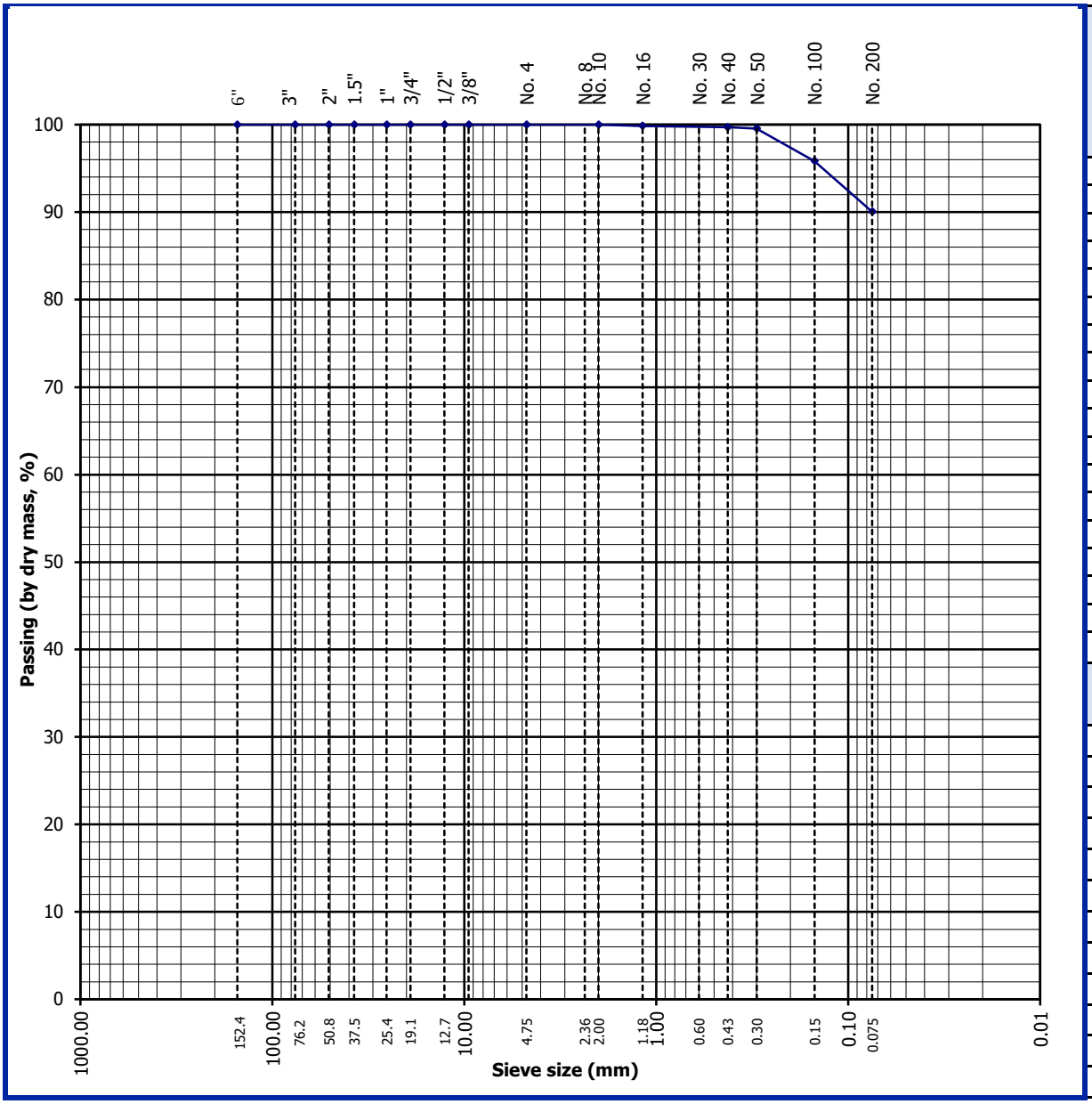
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 2, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252282	Reviewer	G. Hoyos
Sample location	RRDI-1 at 18 feet		
Visual description	CLAYSTONE, tan		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-5**	**Group Index**	**76**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CH)	**Fat clay**			Specimen soaking time (min)	**1,440**

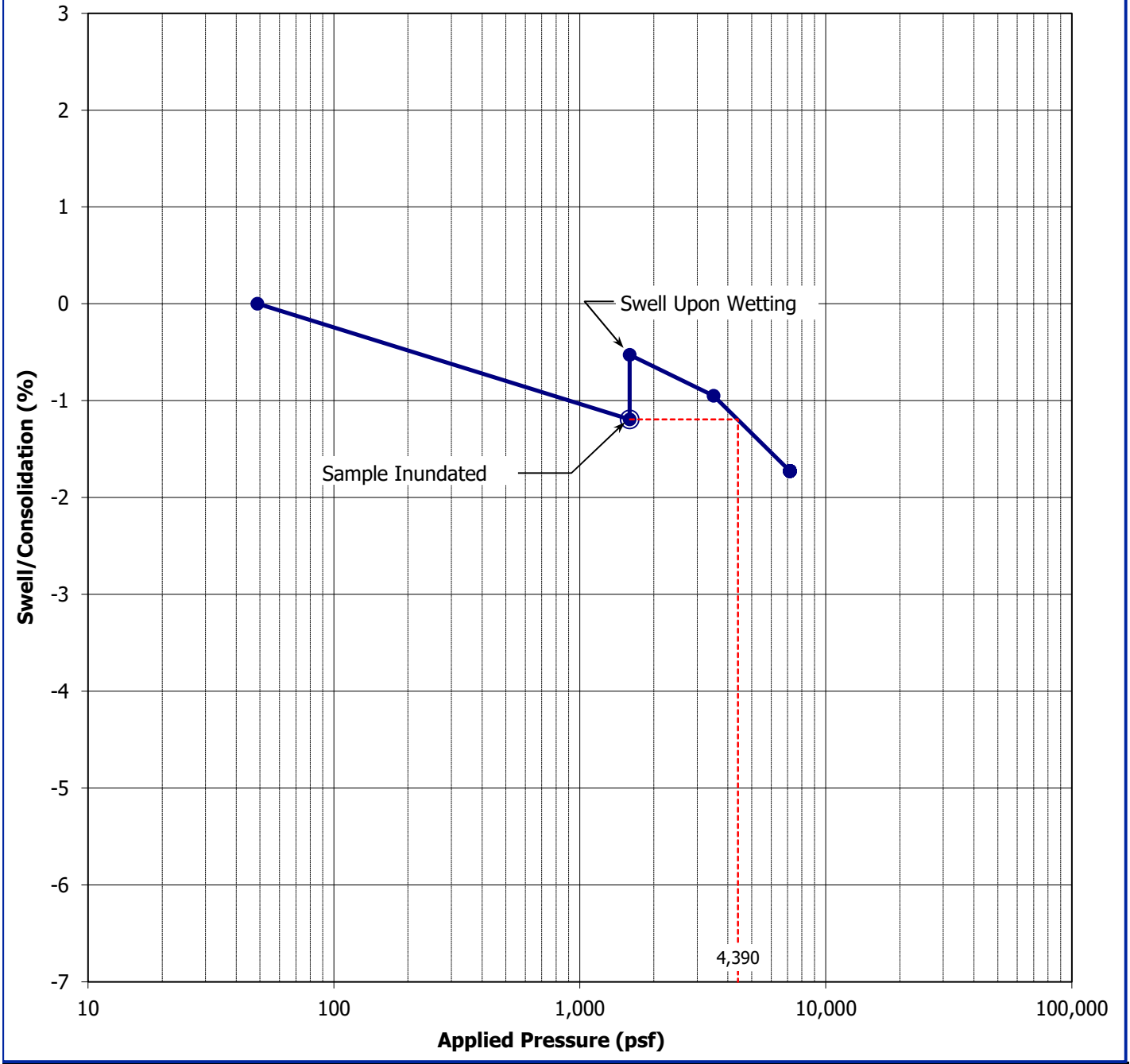


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	100
#50	100
#100	96
#200	90.1

Moisture (M) and Density (D)	
M (%)	52.6
D (pcf)	
LL	106
PL	34
PI	72
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
RRDI-1	16	CLAYSTONE, brown	97.1	25.8	1,595	0.7	4,390

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252281

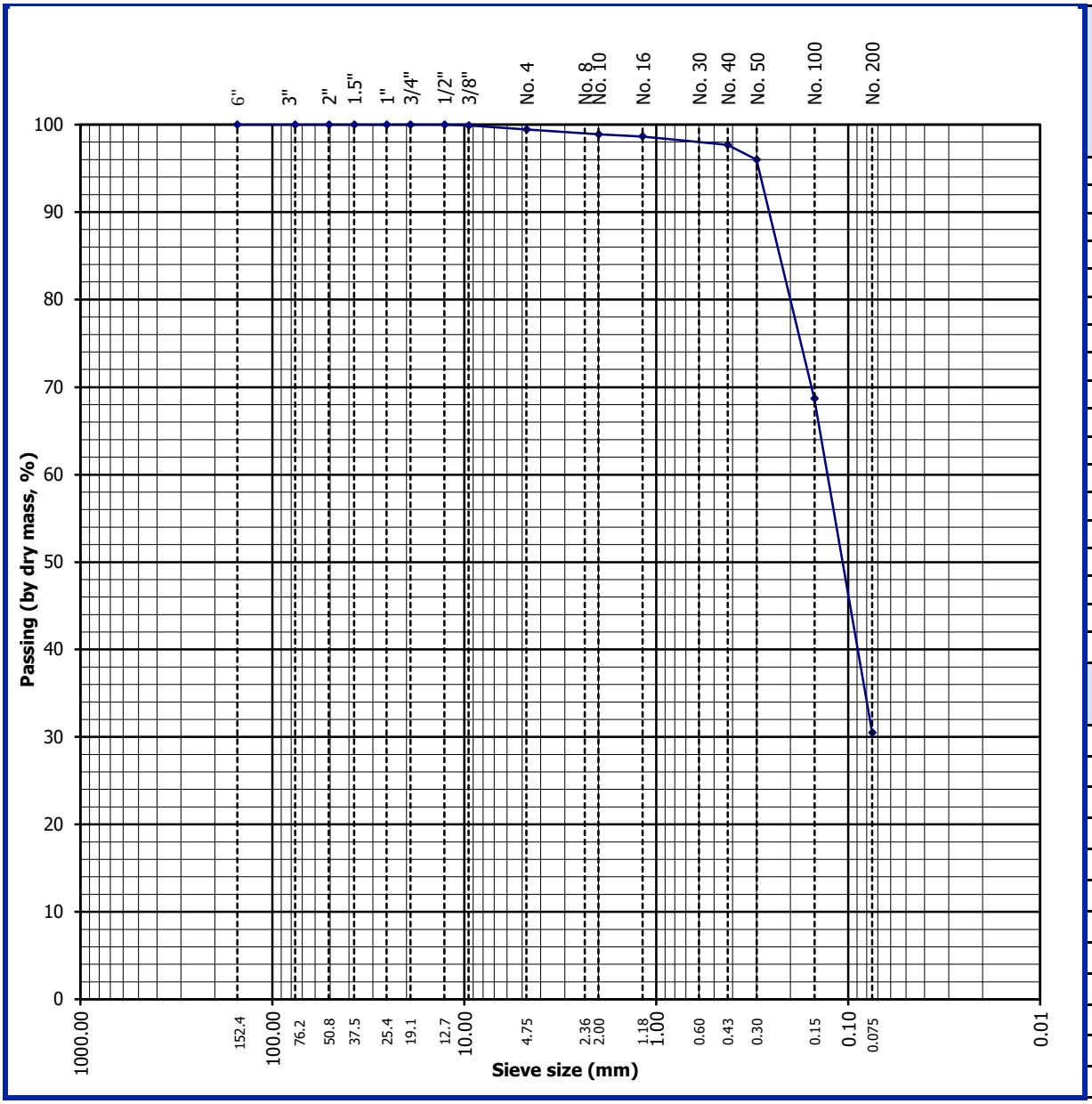
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252289	Reviewer	G. Hoyos
Sample location	RRDI-2 at 0 to 5 feet		
Visual description	SAND, clayey, light brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-2-4**	**Group Index**	**(0)**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	100
#4	99
#8	
#10	99
#16	99
#30	
#40	98
#50	96
#100	69
#200	30.5

Moisture (M) and Density (D)	
M (%)	2.6
D (pcf)	
LL	28
PL	20
PI	8
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

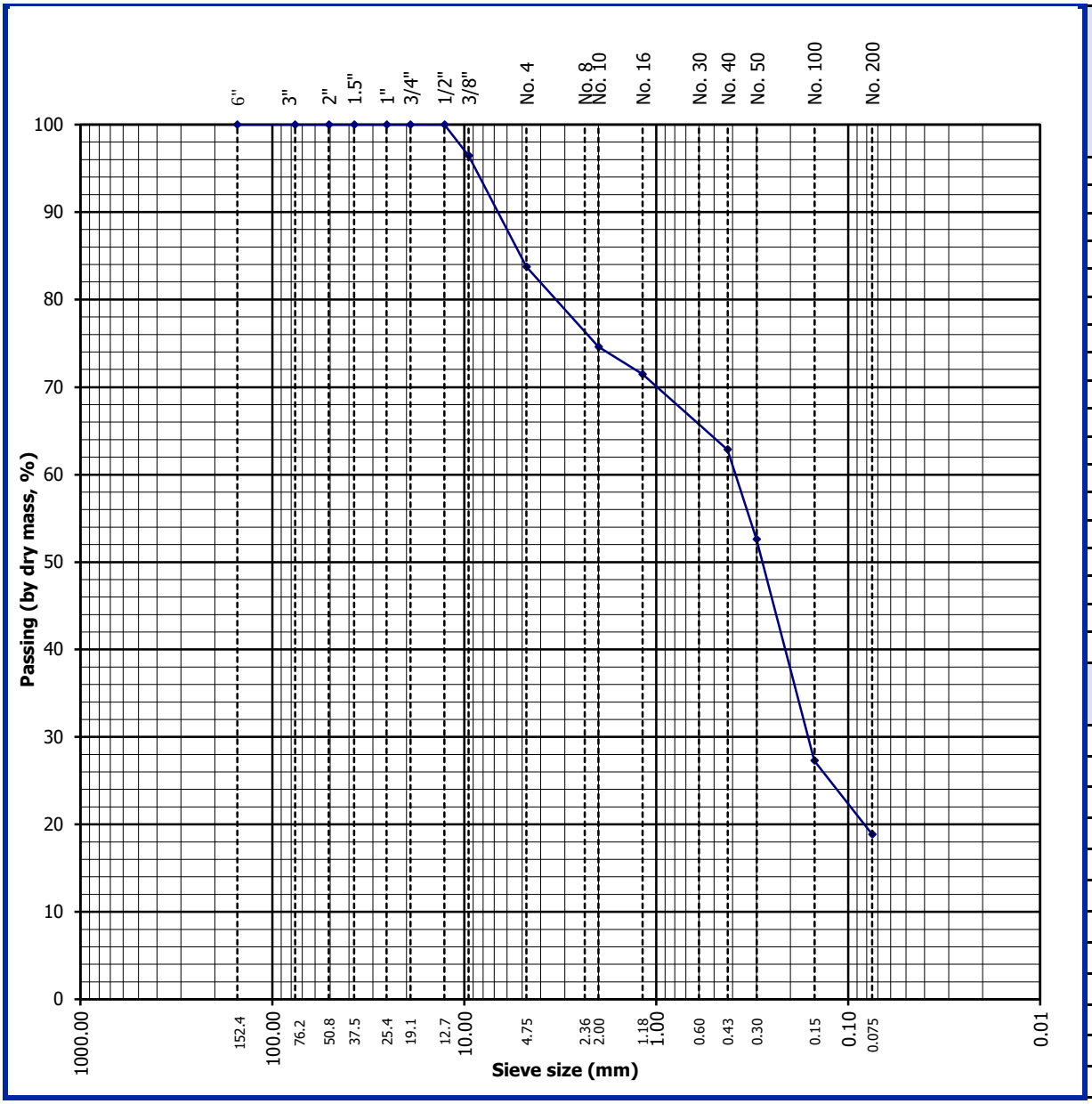
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	May 1, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252287	Reviewer	G. Hoyos
Sample location	RRDI-2 at 4 feet		
Visual description	SANDSTONE, with silt and gravel, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	**Method**
Classification	**A-2-4**	**Group Index**	**(0)**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SM)	**Silty sand with gravel**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	96
#4	84
#8	
#10	75
#16	71
#30	
#40	63
#50	53
#100	27
#200	18.9

Moisture (M) and Density (D)	
M (%)	14.0
D (pcf)	
LL	34
PL	25
PI	9
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

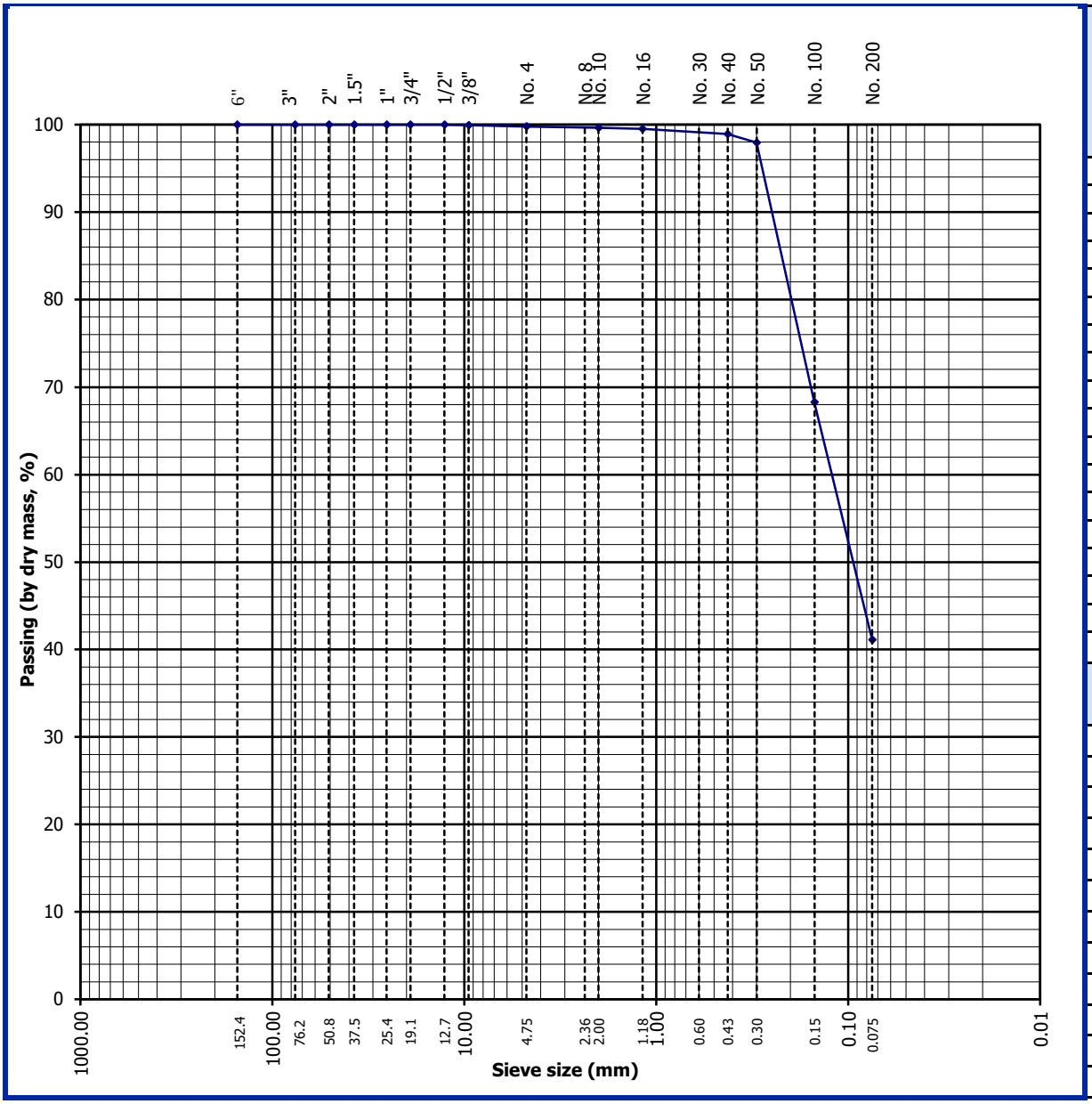
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	April 30, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252286	Reviewer	G. Hoyos
Sample location	RRDI-3 at 10 to 15 feet		
Visual description	SAND, clayey, light brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**2**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	100
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	98
#100	68
#200	41.1

Moisture (M) and Density (D)	
M (%)	3.8
D (pcf)	
LL	30
PL	14
PI	16
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

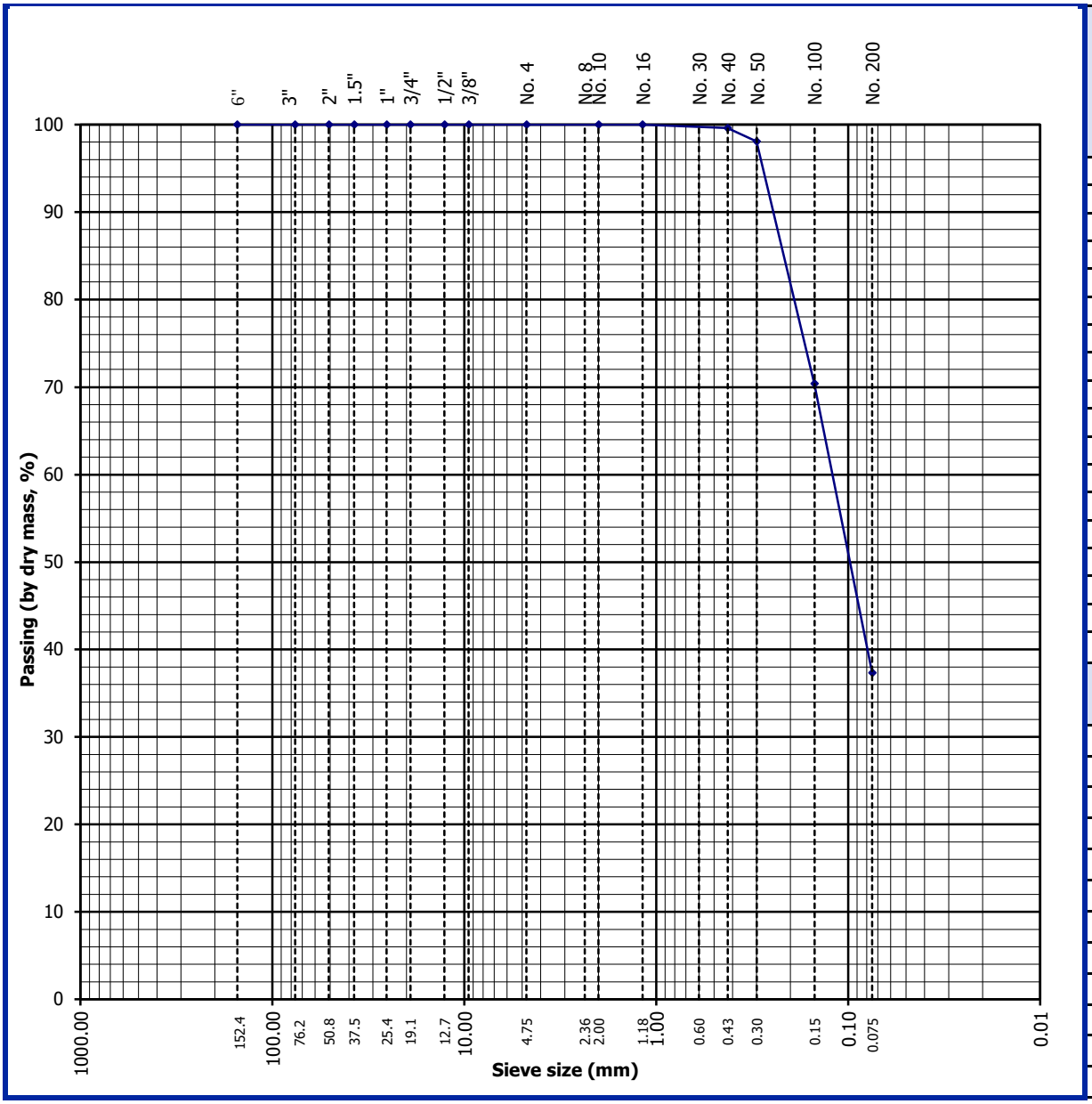
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	October 2, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252868	Reviewer	G. Hoyos
Sample location	RRDI-3 at 14 feet		
Visual description	SANDSTONE, clayey, brown		

AASHTO M145 Classification			Soaking Method	
			Procedure	**Method**
Classification		**Group Index**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)			ASTM D1140	**B**
()			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	98
#100	70
#200	37.3

Moisture (M) and Density (D)	
M (%)	2.3
D (pcf)	
LL	
PL	
PI	
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

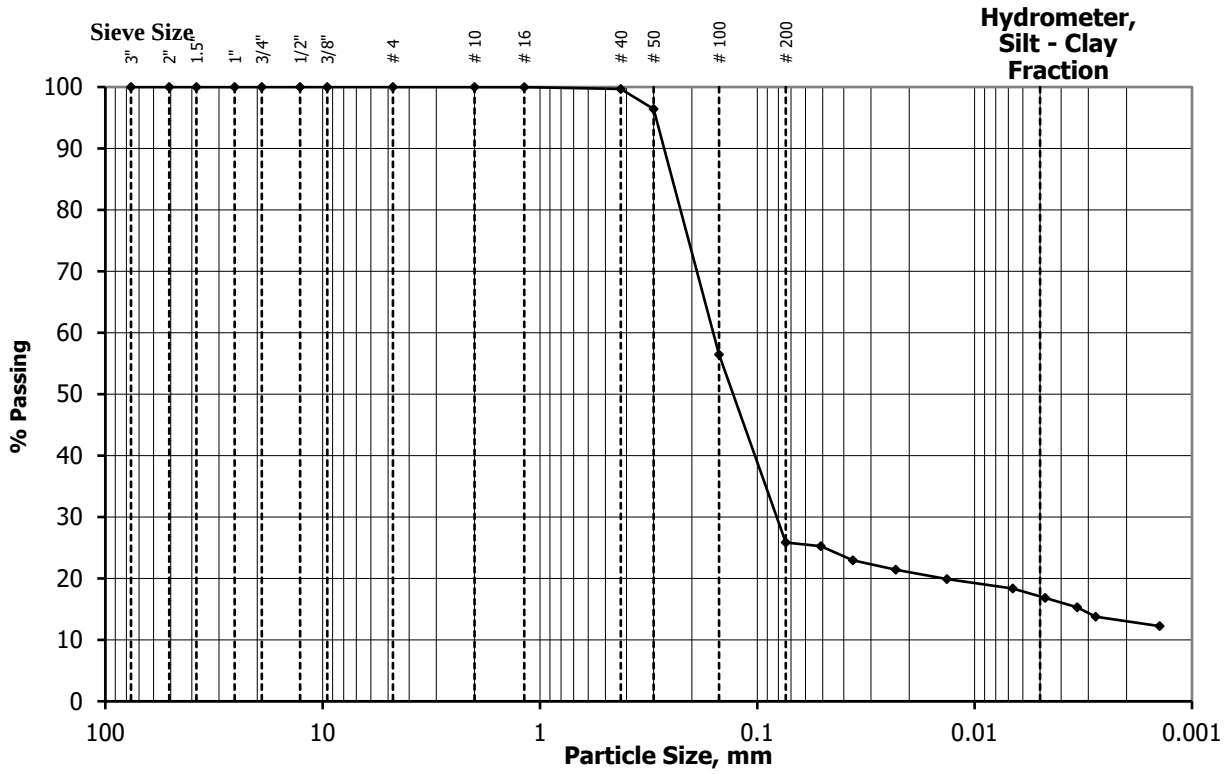
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653(24.3040)	Date:	08/07/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252677	Reviewer:	G. Hoyos
Sample Location:	RRDI-3 at 10 feet		
Visual Description:	SANDSTONE, clayey, brown		
Soil Classification (USCS):			

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	100
#50	96
#100	56
#200	26

Hydrometer	
Particle Size	**% Passing**
51 Micron	25
36 Micron	23
23 Micron	21
13 Micron	20
7 Micron	18
4.7 Micron	17
3.4 Micron	15
2.8 Micron	14
1.4 Micron	12
% Gravel:	**0**
% Sand:	**74**
% Silt:	**9**
% Clay (< 5 micron):	**17**



PROJECT: **X-RAY DIFFRACTION and EQC ANALYSIS: SAMPLE RRDI-3 at 6 feet**

ANALYST: **RICHARD F. WENDLANDT, KUN ZHANG**
DATE: **Oct. 10, 2025**

OBJECTIVE

One sample originating from Kun Zhang were delivered to R. Wendlandt (Department of Geology and Geological Engineering, Colorado School of Mines) for qualitative XRD characterization of quartz content. The sample is identified by the name RRDI-3 at 6 feet. The sample as received was damp and largely unconsolidated sand with occasional rock fragments up to 5 cm. No additional information about the sample was provided. This report describes XRD analytical work focused on characterizing the bulk mineralogy and quartz content of this sample.

ANALYTICAL METHODS

The sample was initially dried at 60ºC for 2 days and subsequently ground to a homogeneous fine powder using a SPEX tungsten carbide ball mill. A randomly oriented packed-powder mount of the resulting fine grained powder was then prepared and analyzed using a Scintag XDS-2000 Θ-Θ diffractometer. Instrumental conditions were 40 kV accelerating potential, 40 mA filament current, and 0.5 and 0.3 receiving slits. The scan rate was 1.0 degrees/minute. The resulting diffraction pattern was interpreted using Scintag's DMSNT software and mineral constituents were identified using International Centre for Data Diffraction (ICDD) reference patterns.

After bulk mineralogical characterization, the quartz proportion was estimated by adding a known amount (22 wt.%) of high purity quartz to a split of the sample, thoroughly mixing the spiked sample by grinding by hand in a ceramic mortar and pestle, rescanning the sample at the identical instrumental conditions, and then comparing quartz/plagioclase peak intensity ratios to those ratios observed for the unspiked sample. The change in the peak intensity ratios can be attributed to the known amount of added quartz enabling estimation of the quartz contents of the non-spiked samples. A repeat scan of the spiked sample indicated good precision (less than 5% variation) of both quartz and plagioclase peak intensities.

RESULTS

Mineral composition of sample RRDI-3 at 6 feet (CMT ID-252675):

Quartz is estimated to comprise ~20% of the sample.
Also present in significant amounts are plagioclase, potassium feldspar, mica, chlorite, and smectite (inferred based on diffraction peak appearance but not confirmed).

DISCUSSION

The estimation of quartz abundance in this sample presents certain challenges due to the relatively low peak intensities of plagioclase observed during analysis. As a result, the qualitative assessment of quartz abundance relies on a series of calculations involving the ratios of quartz to plagioclase peak intensities.

These calculations are carried out by comparing the intensity of the quartz peaks to those of the plagioclase peaks, allowing us to derive an estimate of the quartz content in the sample. The consistency of the results obtained from these calculations indicates a precision level of approximately ±5%. This means that repeated measurements would yield quartz abundance estimates that should fall within 5% of each other.

However, it is important to note that while this method provides a degree of precision, it does not allow for an evaluation of accuracy. The absence of a reliable standard or reference point means that we cannot definitively assess how close these estimates are to the true quartz abundance in the sample.

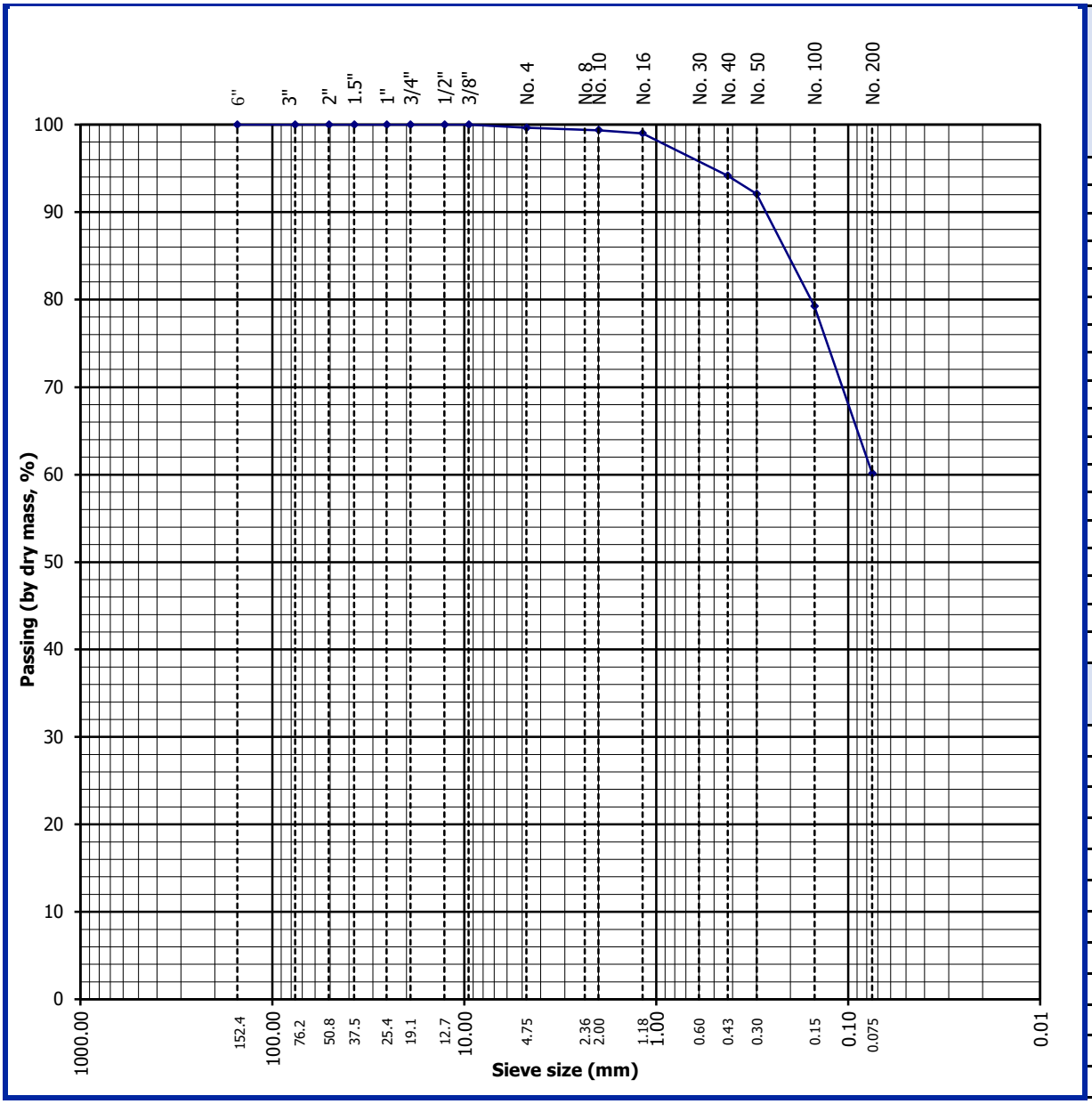
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653	Date	November 12, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252996	Reviewer	G. Hoyos
Sample location	RRDI-4 at 5 feet		
Visual description	Fill; CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**12**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	99
#16	99
#30	
#40	94
#50	92
#100	79
#200	60.1

Moisture (M) and Density (D)	
M (%)	15.1
D (pcf)	

LL	39
PL	13
PI	26

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

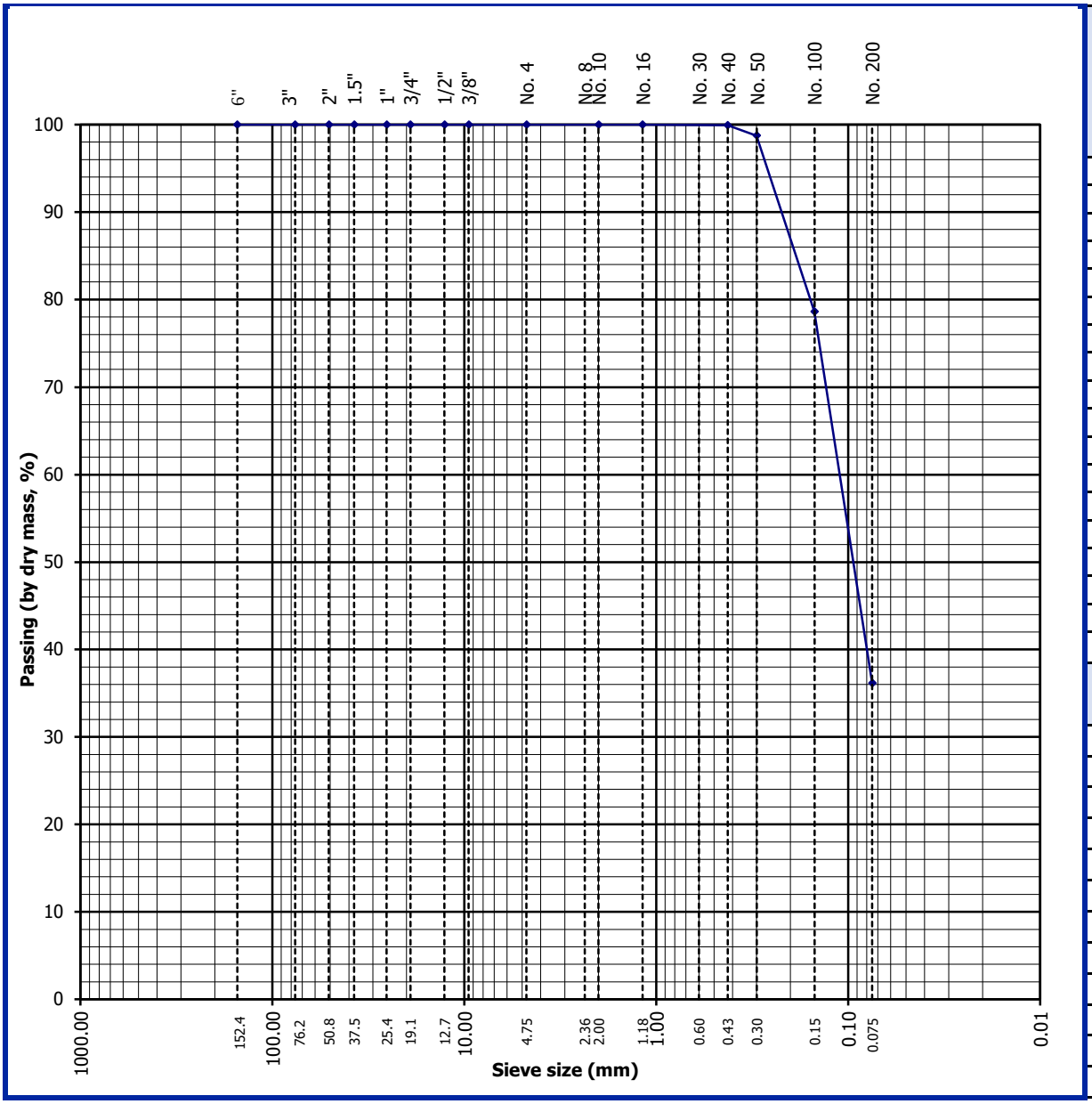
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653	Date	November 12, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252997	Reviewer	G. Hoyos
Sample location	RRDI-4 at 13 feet		
Visual description	SANDSTONE, silty, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-4**	**Group Index**	**0**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SM)	**Silty sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	99
#100	79
#200	36.2

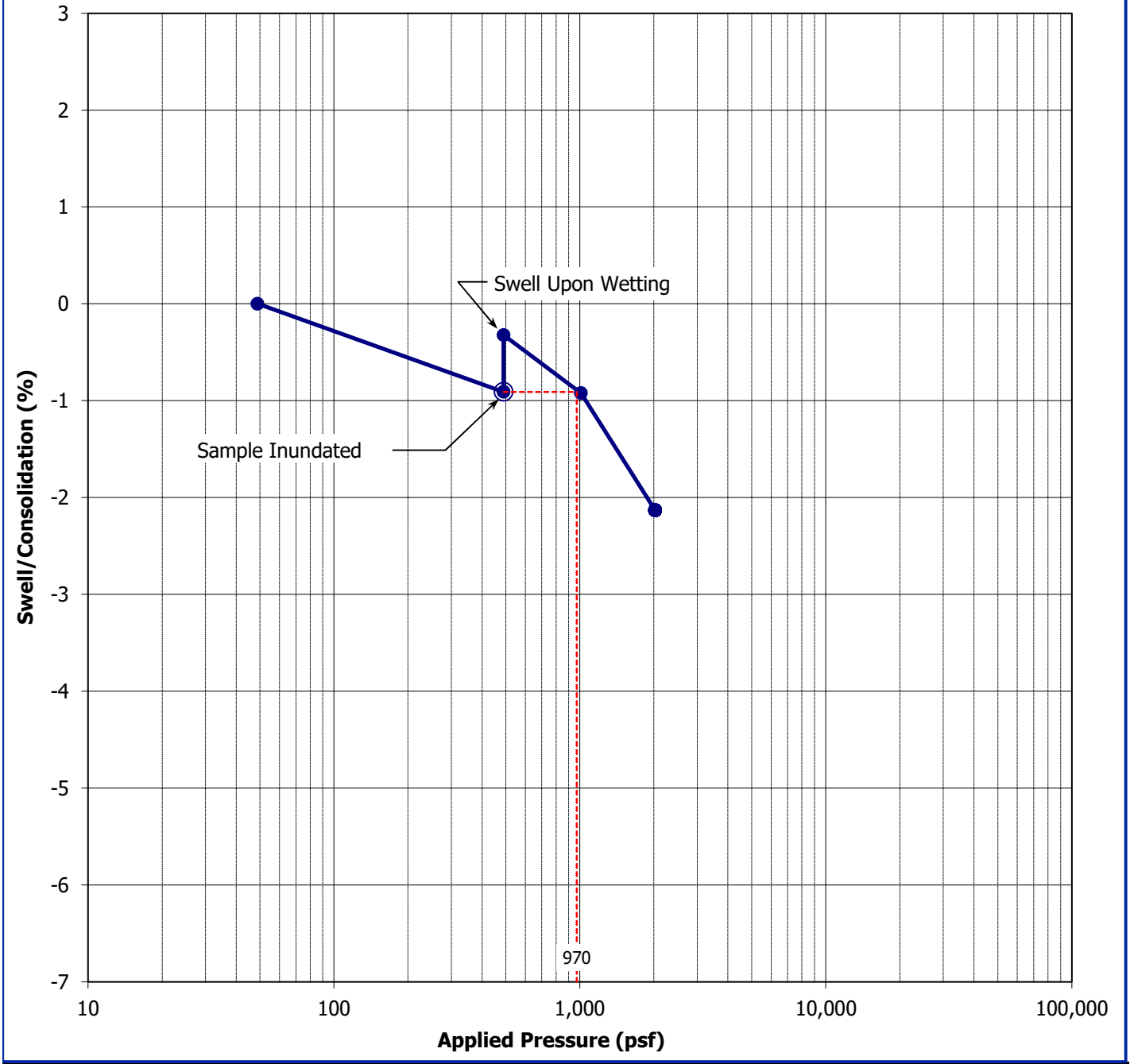
Moisture (M) and Density (D)	
M (%)	13.4
D (pcf)	99.1

LL	NV
PL	NP
PI	NP

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
RRDI-4	5 feet	Fill; CLAY, sandy, brown	110.7	15.1	490	0.6	970

Project Number	Project Name	Lab ID Number
500653	Thornton Water Pipeline Segment F.1	252996

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project Number:	500653 (24.3040)			Boring:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	18.0 to 18.4
Date:	December 15, 2025	Technician:	G. Hoyos	Visual Description of Sample:	
Lab ID Number:	2521090	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.87	in.	Length:	4.12	in.
Diameter:	1.87	in.	Length:	4.16	in.
Diameter:	1.87	in.	Length:	4.09	in.
Avg. Dia.	***1.87***	in.	Avg. L.	***4.12***	in.
Aspect Ratio (L/Dia):	**2.20**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes***

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	30	1,573.5	0.300 (0:00)			
0.010 (0:00)	0.2	580	30,347.1	0.350 (0:00)			
0.025 (0:00)	0.6	2070	107,912.6	0.400 (0:00)			
0.050 (0:00)	1.2	3890	201,554.8	0.450 (0:00)			
0.075 (0:00)	1.8	4610	237,394.0	0.500 (0:00)			
0.100 (0:00)	2.4	2300	117,707.8	0.550 (0:00)			
0.125 (0:00)				0.600 (0:00)			
0.150 (0:00)				0.650 (0:00)			
0.175 (0:00)				0.700 (0:00)			
0.200 (0:00)				0.750 (0:00)			
0.225 (0:00)				0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 241,500 psf

Shear Strength (S_u): 120,750 psf

Moisture Content & Density	
dish ID	LU
dish mass (g)	309.1
wet soil + dish (g)	690.3
dry soil + dish (g)	647.0
moisture content:	**12.8%**
sample mass (g)	408.4
sample moisture content %	12.8%
dry sample mass (g)	362.1
wet density (pcf)	137.5
in-situ dry density (pcf)	**121.9**

Sample Sketch:

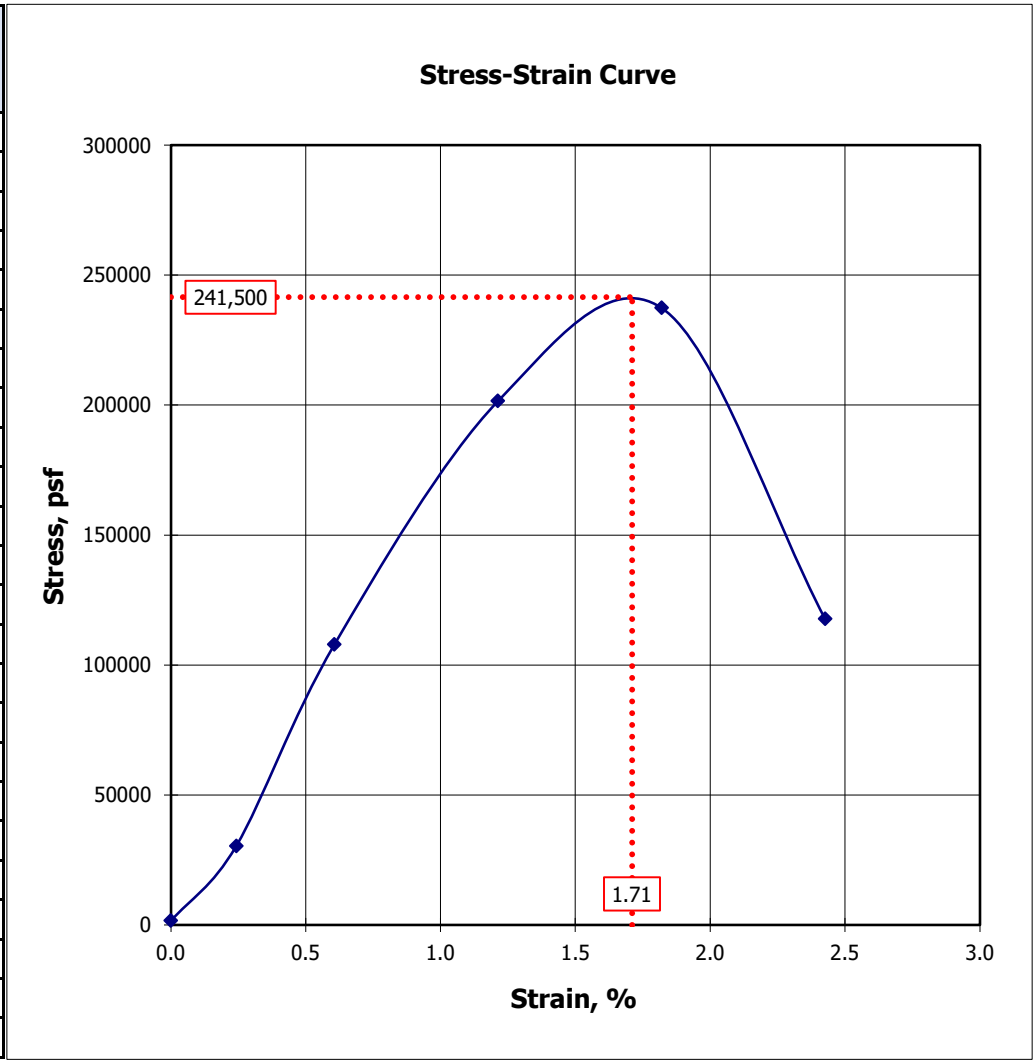
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project No.:	500653 (24.3040)			Hole:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	18.0 to 18.4
Date:	December 15, 2025	Lab Tech:	G. Hoyos	Visual Description of Sample:	
Lab ID:	2521090	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**241,500**	**psf**	**Density (pcf):**	121.9
Shear Strength (S_u):	**120,750**	**psf**	**Moisture:**	12.8

Axial Strain (%)	Axial Stress (psf)
0.0	1573.5
0.2	30347.1
0.6	107912.6
1.2	201554.8
1.8	237394.0
2.4	117707.8



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project Number:	500653 (24.3040)			Boring:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20.0 to 20.5
Date:	December 15, 2025	Technician:	G. Hoyos	Visual Description of Sample:	
Lab ID Number:	2521091	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.88	in.	Length:	4.74	in.
Diameter:	1.88	in.	Length:	4.75	in.
Diameter:	1.88	in.	Length:	4.75	in.
Avg. Dia.	***1.88***	in.	Avg. L.	***4.75***	in.
Aspect Ratio (L/Dia):	**2.53**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes***

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	20	1,040.4	0.300 (0:00)			
0.010 (0:00)	0.2	1250	64,890.9	0.350 (0:00)			
0.025 (0:00)	0.5	3030	156,797.3	0.400 (0:00)			
0.050 (0:00)	1.1	3780	194,572.6	0.450 (0:00)			
0.075 (0:00)	1.6	4370	223,744.8	0.500 (0:00)			
0.100 (0:00)	2.1	2150	109,491.2	0.550 (0:00)			
0.125 (0:00)				0.600 (0:00)			
0.150 (0:00)				0.650 (0:00)			
0.175 (0:00)				0.700 (0:00)			
0.200 (0:00)				0.750 (0:00)			
0.225 (0:00)				0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 227,500 psf

Shear Strength (S_u): 113,750 psf

Moisture Content & Density	
dish ID	BR
dish mass (g)	310.1
wet soil + dish (g)	766.1
dry soil + dish (g)	724.7
moisture content:	**10.0%**
sample mass (g)	470.2
sample moisture content %	10.0%
dry sample mass (g)	427.5
wet density (pcf)	136.4
in-situ dry density (pcf)	**124.0**

Sample Sketch:

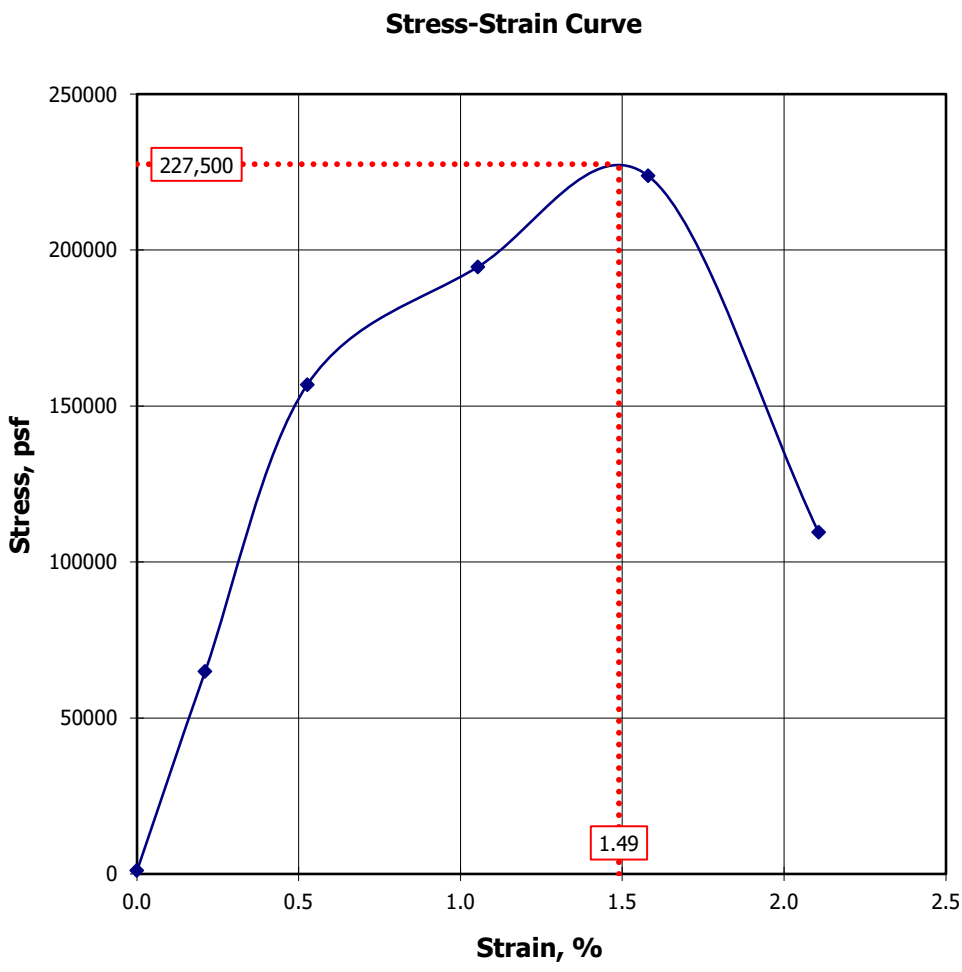
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project No.:	500653 (24.3040)			Hole:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20.0 to 20.5
Date:	December 15, 2025	Lab Tech:	G. Hoyos	Visual Description of Sample:	
Lab ID:	2521091	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**227,500**	**psf**	**Density (pcf):**	124.0
Shear Strength (S_u):	**113,750**	**psf**	**Moisture:**	10.0

Axial Strain (%)	Axial Stress (psf)
0.0	1040.4
0.2	64890.9
0.5	156797.3
1.1	194572.6
1.6	223744.8
2.1	109491.2



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project Number:	500653 (24.3040)			Boring:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	23.0 to 23.5 feet
Date:	December 15, 2025	Technician:	G. Hoyos	Visual Description of Sample:	
Lab ID Number:	2521093	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.88	in.	Length:	4.52	in.
Diameter:	1.87	in.	Length:	4.51	in.
Diameter:	1.88	in.	Length:	4.53	in.
Avg. Dia.	***1.87***	in.	Avg. L.	***4.52***	in.
Aspect Ratio (L/Dia):	**2.42**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes***

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	50	2,616.0	0.300 (0:00)			
0.010 (0:00)	0.2	250	13,050.9	0.350 (0:00)			
0.025 (0:00)	0.6	910	47,347.3	0.400 (0:00)			
0.050 (0:00)	1.1	2020	104,516.3	0.450 (0:00)			
0.075 (0:00)	1.7	2730	140,462.6	0.500 (0:00)			
0.100 (0:00)	2.2	1890	96,696.7	0.550 (0:00)			
0.125 (0:00)	2.8	1340	68,169.9	0.600 (0:00)			
0.150 (0:00)				0.650 (0:00)			
0.175 (0:00)				0.700 (0:00)			
0.200 (0:00)				0.750 (0:00)			
0.225 (0:00)				0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 140,500 psf

Shear Strength (S_u): 70,250 psf

Moisture Content & Density

dish ID	SI
dish mass (g)	317.4
wet soil + dish (g)	729.1
dry soil + dish (g)	692.2
moisture content:	**9.8%**
sample mass (g)	446.3
sample moisture content %	9.8%
dry sample mass (g)	406.5
wet density (pcf)	136.6
in-situ dry density (pcf)	**124.4**

Sample Sketch:

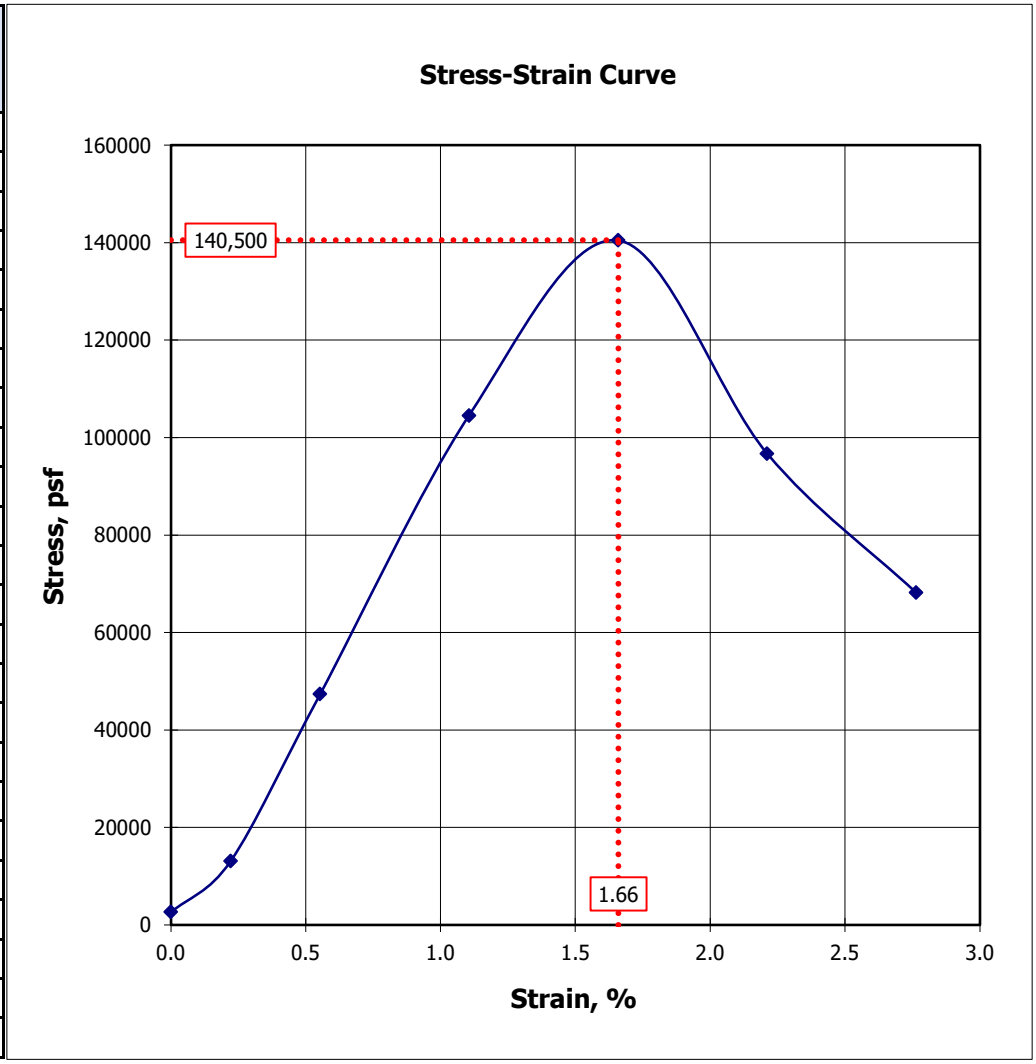
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project No.:	500653 (24.3040)			Hole:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	23.0 to 23.5 feet
Date:	December 15, 2025	Lab Tech:	G. Hoyos	Visual Description of Sample:	
Lab ID:	2521093	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**140,500**	**psf**	**Density (pcf):**	124.4
Shear Strength (S_u):	**70,250**	**psf**	**Moisture:**	9.8

Axial Strain (%)	Axial Stress (psf)
0.0	2616.0
0.2	13050.9
0.6	47347.3
1.1	104516.3
1.7	140462.6
2.2	96696.7
2.8	68169.9



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project Number:	500653 (24.3040)			Boring:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	25.1 to 25.6 feet
Date:	December 15, 2025	Technician:	G. Hoyos	Visual Description of Sample:	
Lab ID Number:	2521094	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.87	in.	Length:	4.85	in.
Diameter:	1.87	in.	Length:	4.82	in.
Diameter:	1.87	in.	Length:	4.82	in.
Avg. Dia.	***1.87***	in.	Avg. L.	***4.83***	in.
Aspect Ratio (L/Dia):	**2.58**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes***

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	120	6,280.5	0.300 (0:00)			
0.010 (0:00)	0.2	730	38,127.5	0.350 (0:00)			
0.025 (0:00)	0.5	1640	85,389.9	0.400 (0:00)			
0.050 (0:00)	1.0	2220	114,987.6	0.450 (0:00)			
0.075 (0:00)	1.6	2660	137,057.6	0.500 (0:00)			
0.100 (0:00)	2.1	2750	140,950.1	0.550 (0:00)			
0.125 (0:00)	2.6	1330	67,808.4	0.600 (0:00)			
0.150 (0:00)				0.650 (0:00)			
0.175 (0:00)				0.700 (0:00)			
0.200 (0:00)				0.750 (0:00)			
0.225 (0:00)				0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 145,850 psf

Shear Strength (S_u): 72,925 psf

Moisture Content & Density

dish ID	GR
dish mass (g)	322.7
wet soil + dish (g)	793.0
dry soil + dish (g)	744.3
moisture content:	**11.6%**
sample mass (g)	480.0
sample moisture content %	11.6%
dry sample mass (g)	430.1
wet density (pcf)	137.6
in-situ dry density (pcf)	**123.3**

Sample Sketch:

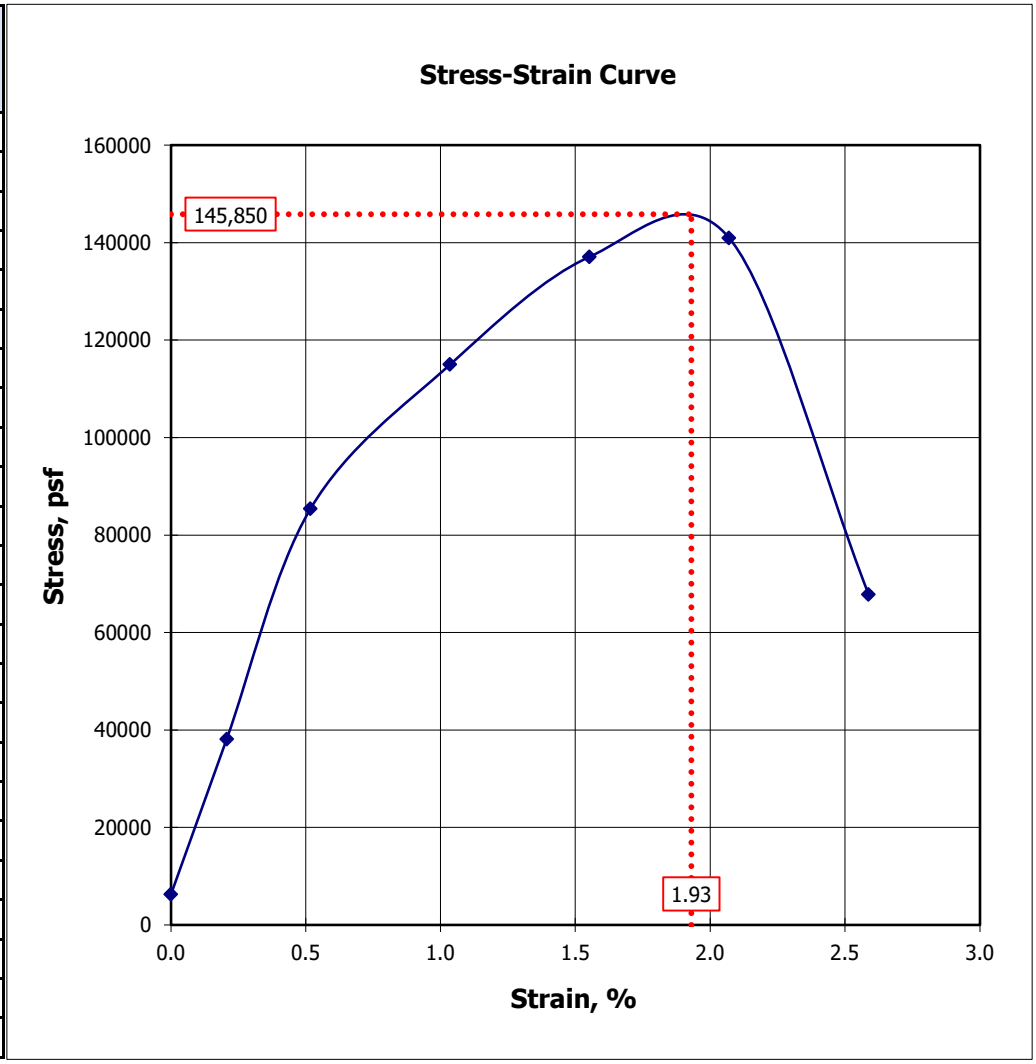
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project No.:	500653 (24.3040)			Hole:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	25.1 to 25.6 feet
Date:	December 15, 2025	Lab Tech:	G. Hoyos	Visual Description of Sample:	
Lab ID:	2521094	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**145,850**	**psf**	**Density (pcf):**	123.3
Shear Strength (S_u):	**72,925**	**psf**	**Moisture:**	11.6

Axial Strain (%)	Axial Stress (psf)
0.0	6280.5
0.2	38127.5
0.5	85389.9
1.0	114987.6
1.6	137057.6
2.1	140950.1
2.6	67808.4



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project Number:	500653 (24.3040)			Boring:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	29.3 to 29.8 feet
Date:	December 15, 2025	Technician:	G. Hoyos	Visual Description of Sample:	
Lab ID Number:	2521096	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.87	in.	Length:	4.48	in.
Diameter:	1.86	in.	Length:	4.55	in.
Diameter:	1.87	in.	Length:	4.52	in.
Avg. Dia.	***1.87***	in.	Avg. L.	***4.52***	in.
Aspect Ratio (L/Dia):	**2.42**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	30	1,578.6	0.300 (0:00)			
0.010 (0:00)	0.2	610	32,026.3	0.350 (0:00)			
0.025 (0:00)	0.6	2060	107,794.3	0.400 (0:00)			
0.050 (0:00)	1.1	4730	246,130.7	0.450 (0:00)			
0.075 (0:00)	1.7	6610	342,033.3	0.500 (0:00)			
0.100 (0:00)	2.2	8290	426,550.2	0.550 (0:00)			
0.125 (0:00)	2.8	10160	519,809.4	0.600 (0:00)			
0.150 (0:00)	3.3	11780	599,261.5	0.650 (0:00)			
0.175 (0:00)	3.9	10060	508,833.3	0.700 (0:00)			
0.200 (0:00)	4.4	9040	454,608.9	0.750 (0:00)			
0.225 (0:00)	5.0	7320	365,980.6	0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 600,300 psf

Shear Strength (S_u): 300,150 psf

Moisture Content & Density	
dish ID	CO
dish mass (g)	257.1
wet soil + dish (g)	777.6
dry soil + dish (g)	770.5
moisture content:	**1.4%**
sample mass (g)	521.0
sample moisture content %	1.4%
dry sample mass (g)	513.8
wet density (pcf)	160.6
in-situ dry density (pcf)	**158.4**

Sample Sketch:

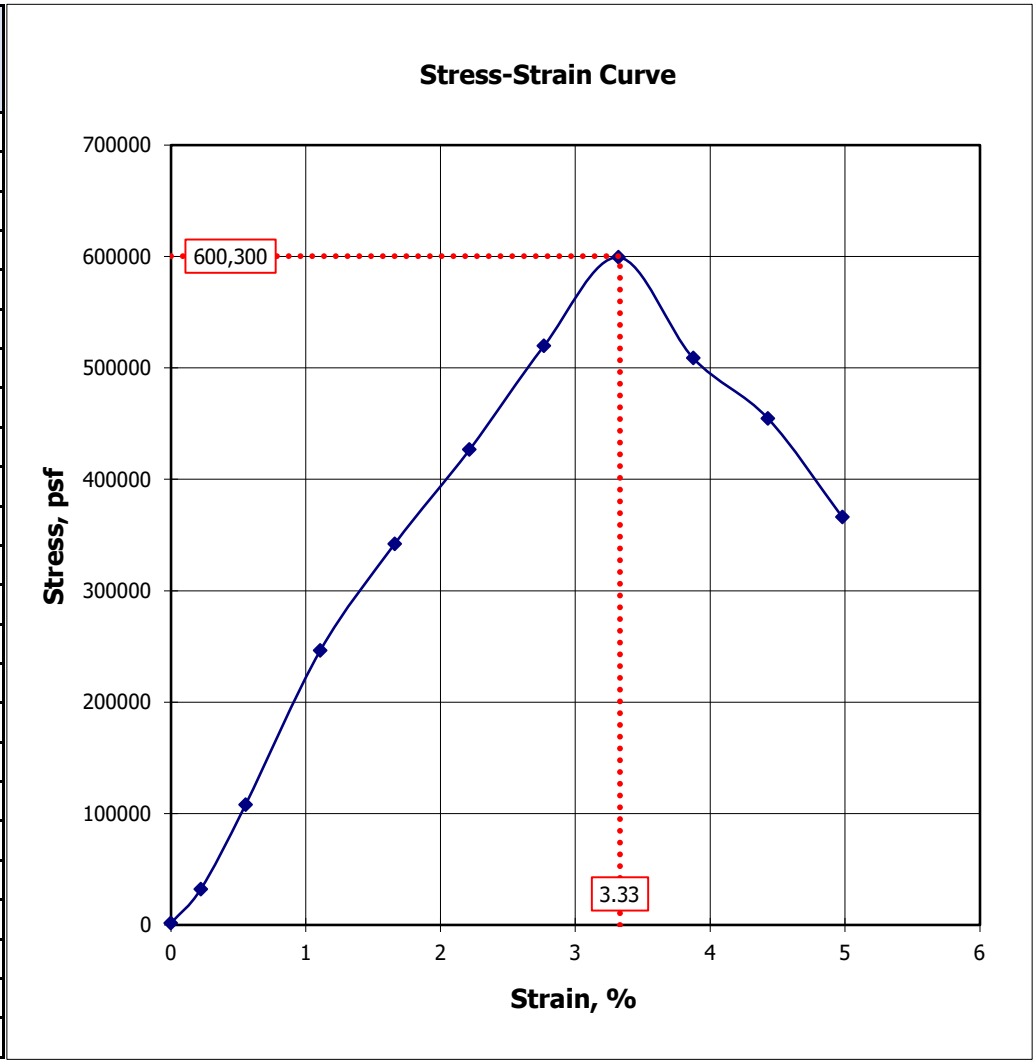
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D7012)

Project No.:	500653 (24.3040)			Hole:	RRDI-4A
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	29.3 to 29.8 feet
Date:	December 15, 2025	Lab Tech:	G. Hoyos	Visual Description of Sample:	
Lab ID:	2521096	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**600,300**	**psf**	**Density (pcf):**	158.4
Shear Strength (S_u):	**300,150**	**psf**	**Moisture:**	1.4

Axial Strain (%)	Axial Stress (psf)
0.0	1578.6
0.2	32026.3
0.6	107794.3
1.1	246130.7
1.7	342033.3
2.2	426550.2
2.8	519809.4
3.3	599261.5
3.9	508833.3
4.4	454608.9
5.0	365980.6



Earth Mechanics Institute

Client: CMT Technical Service

Project: TWP

Date: 12/22/2025

Colorado School of Mines

Mining Engineering Department

Cerchar Abrasivity Test

ASTM D7625

No.	Sample ID	Rock Type	Cerchar Abrasivity Index (CAIs)*
1	RRDI-4A at 14.7 to 14.9	Sedimentary	0.54
2	RRDI-4A at 22.5 to 23.0	Sedimentary	0.63
3	RRDI-4A at 28.5 to 28.8	Sedimentary	0.45

*** CERCHAR tests have been run on saw cut surface. No correction factor has been added to the results.**

Cerchar Abrasivity Index

Pictures of Sample Before and After

ASTM D7625

Client Name:	CMT Technical Services	**EMI#**	871
Project Name:	TWP	**Date:**	12/22/2025
Sample ID:	RRDI-4A at 14.7 to 14.9		



Before



After

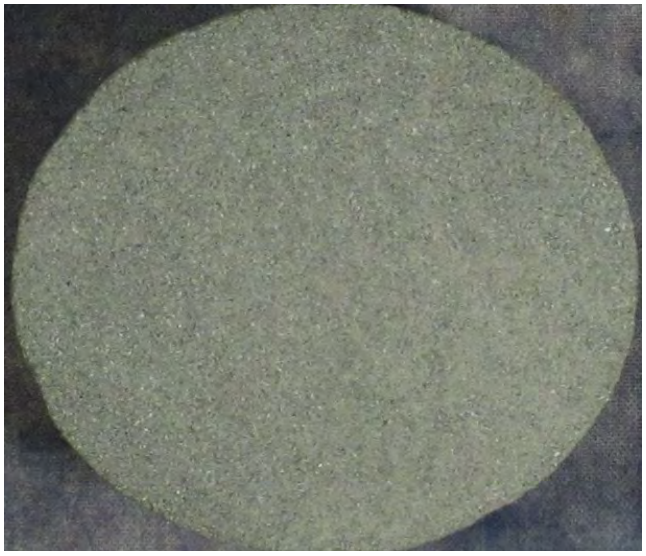
Operator:	**AM**	**Date:**	12/22/2025
Supervisor:	**KZ**	**Date:**	12/22/2025
Principle Investigator:	~	**Date:**	~

Cerchar Abrasivity Index

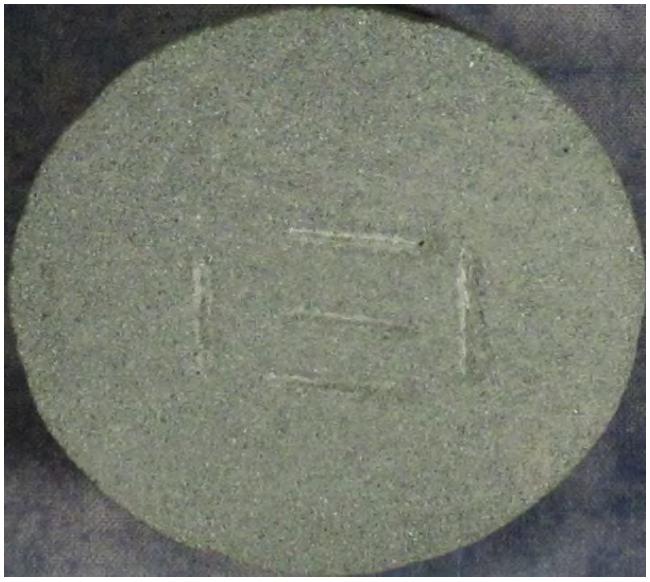
Pictures of Sample Before and After

ASTM D7625

Client Name:	CMT Technical Services	**EMI#**	871
Project Name:	TWP	**Date:**	12/22/2025
Sample ID:	RRDI-4A at 22.5 to 23.0		



Before



After

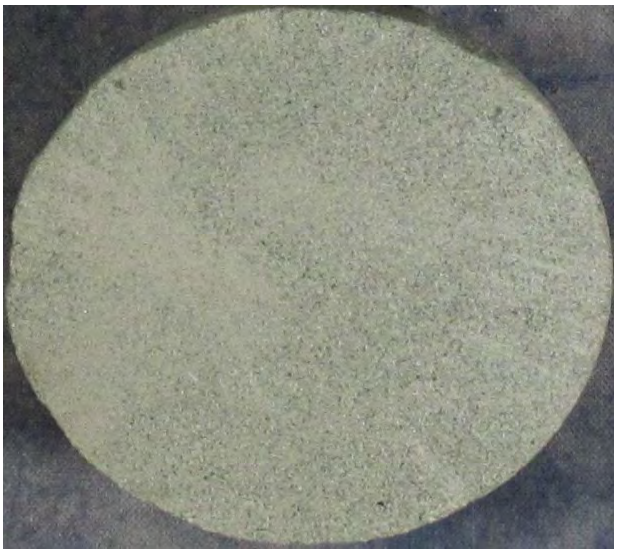
Operator:	**AM**	**Date:**	12/22/2025
Supervisor:	**KZ**	**Date:**	12/22/2025
Principle Investigator:	~	**Date:**	~

Cerchar Abrasivity Index

Pictures of Sample Before and After

ASTM D7625

Client Name:	CMT Technical Services	**EMI#**	871
Project Name:	TWP	**Date:**	12/22/2025
Sample ID:	RRDI-4A at 28.5 to 28.8		



Before



After

Operator:	**AM**	**Date:**	12/22/2025
Supervisor:	**KZ**	**Date:**	12/22/2025
Principle Investigator:	~	**Date:**	~

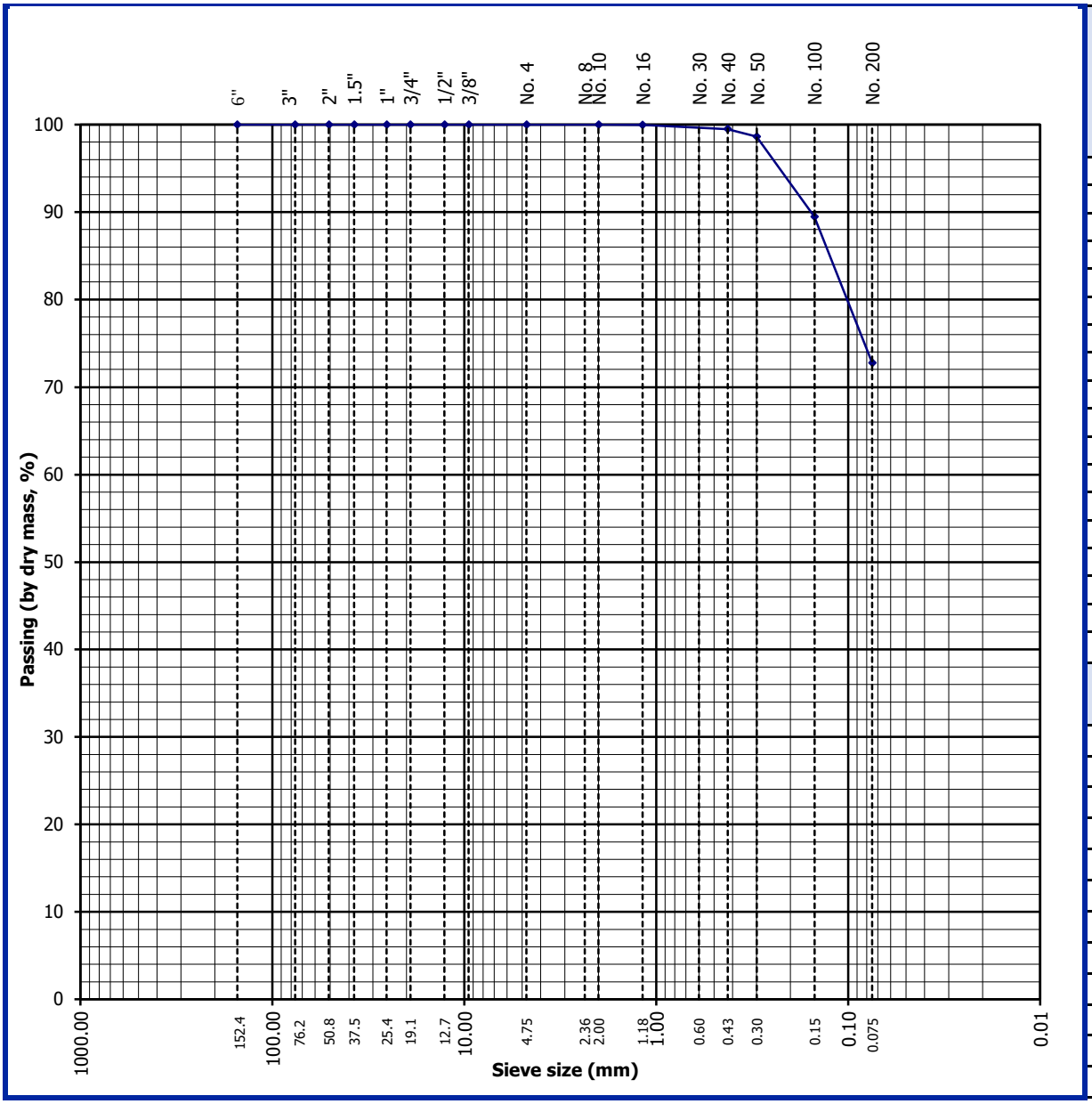
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 16, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252821	Reviewer	J. Holiman
Sample location	THOM-1 at 8 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	22	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	89
#200	72.8

Moisture (M) and Density (D)	
M (%)	21.6
D (pcf)	112.3

LL	46
PL	13
PI	33

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

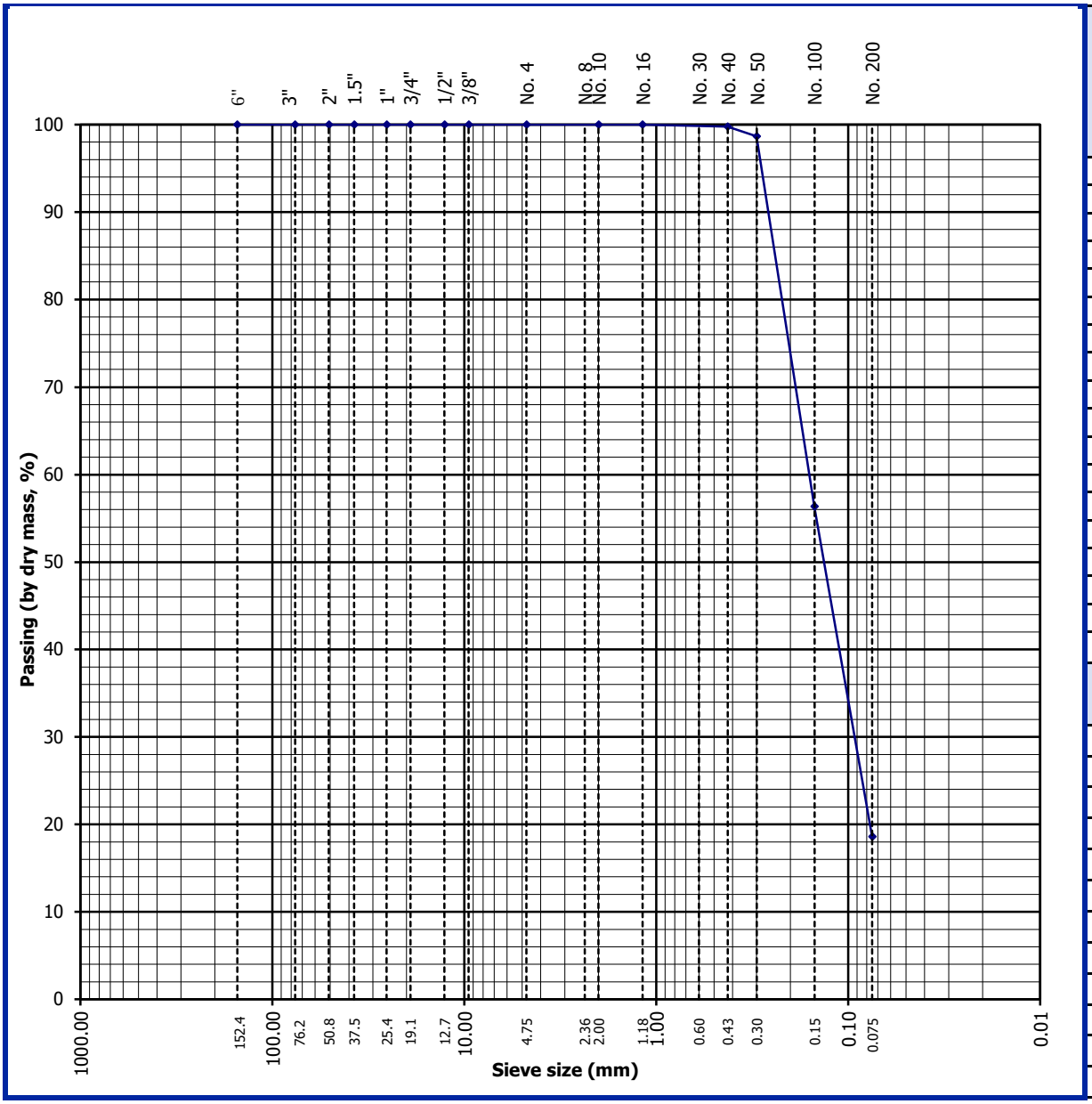
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 13, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252822	Reviewer	J. Holiman
Sample location	THOM-1 at 12 feet		
Visual description	SAND, silty, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-2-4**	**Group Index**	**0**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SM)	**Silty sand**			Specimen soaking time (min)	**1,440**

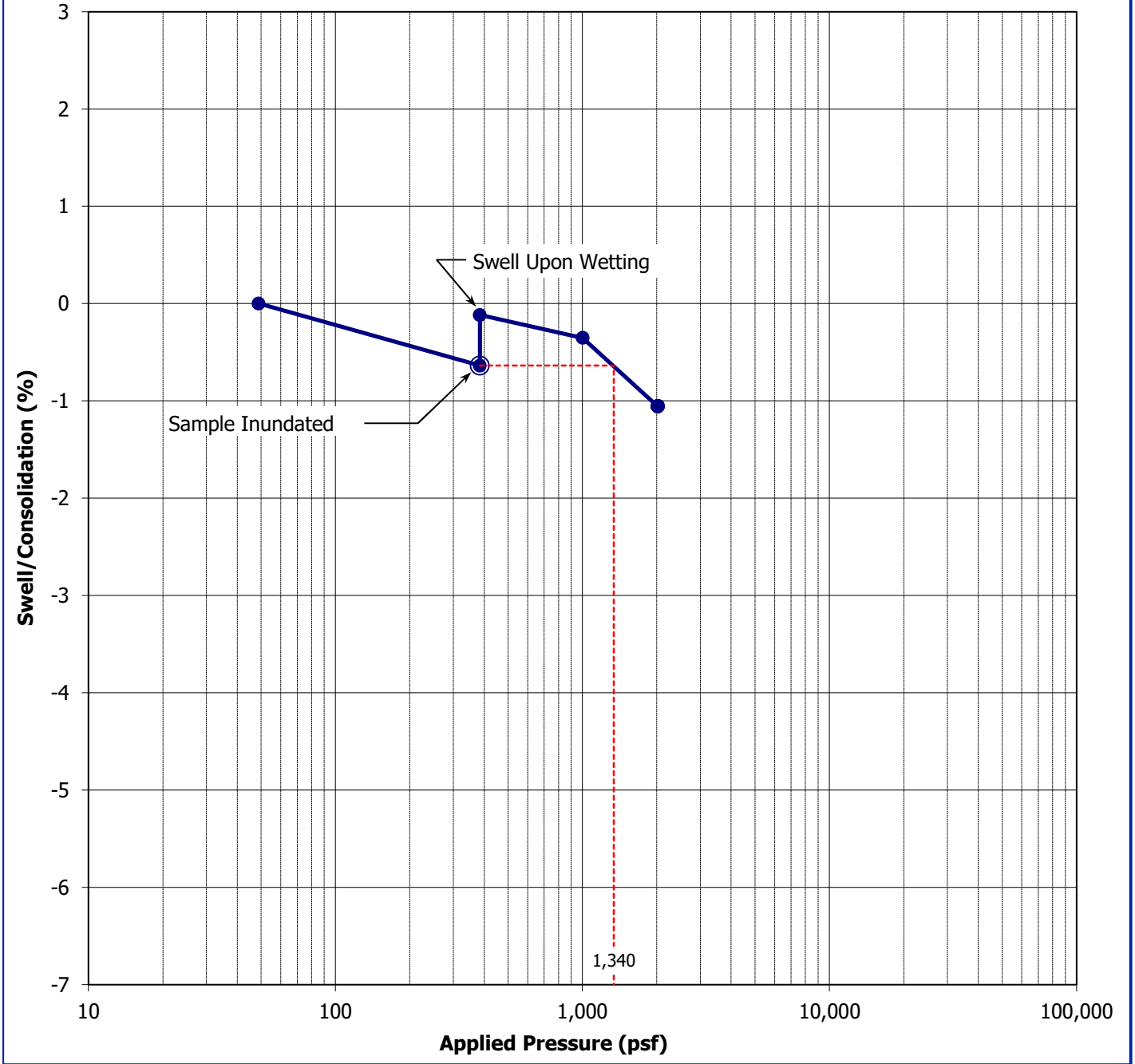


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	99
#100	56
#200	18.6

Moisture (M) and Density (D)	
M (%)	25.1
D (pcf)	
LL	NV
PL	NP
PI	NP
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

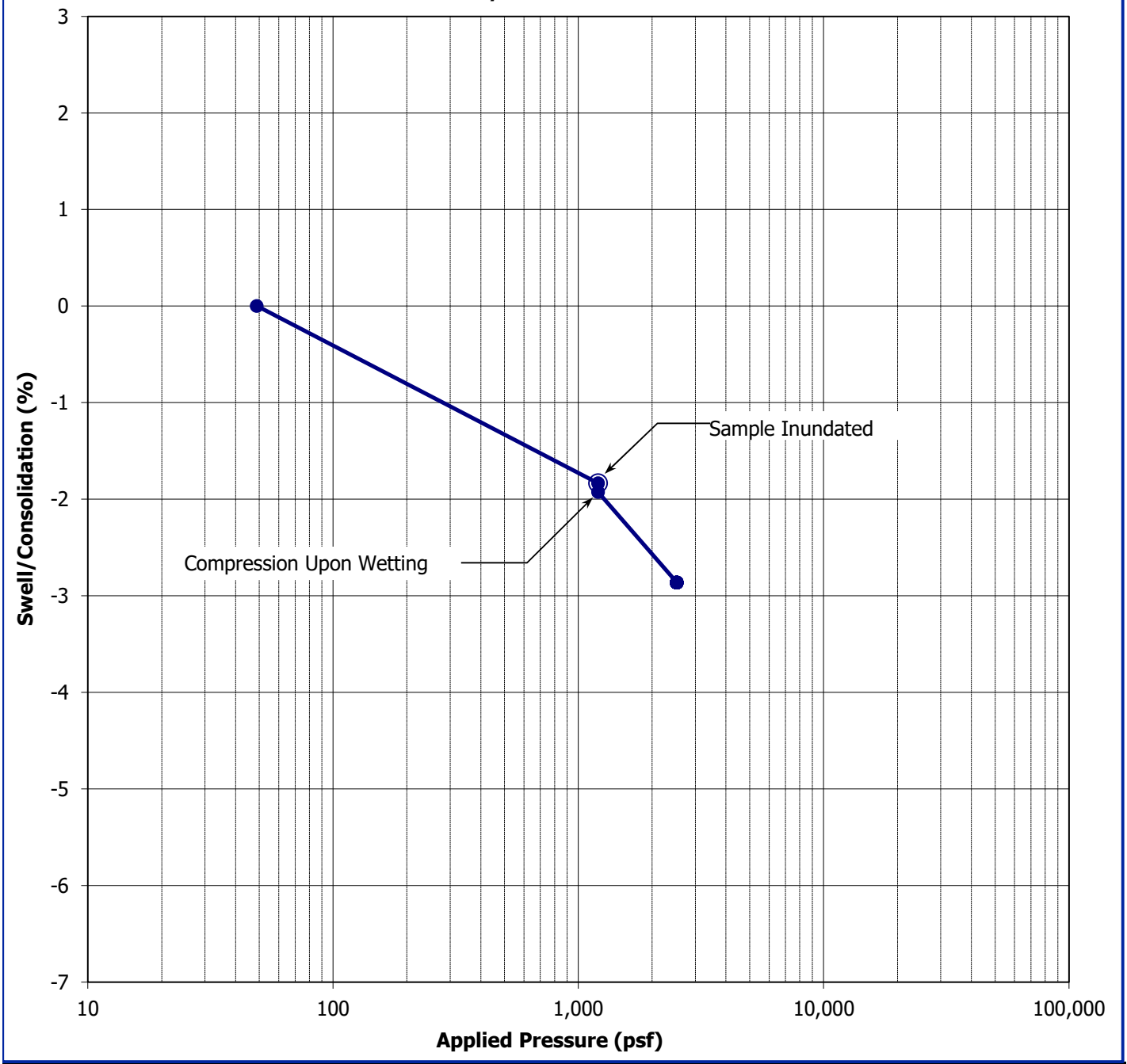


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
THOM-1	4	CLAY, sandy, dark brown	101.7	24.1	384	0.5	1,340

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252820

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
THOM-1	12	SAND, silty, brown	97.4	25.1	1,203	-0.1	NA

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252822

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	THOM-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	16 feet
Date:	September 16, 2025	Technician:	JLH	Visual Description of Sample:	
Lab ID Number:	252823	Reviewer:	G. Hoyos	SANDSTONE, brown	

Sample Data:

Diameter:	1.94	in.	Length:	3.75	in.
Diameter:	1.93	in.	Length:	3.79	in.
Diameter:	1.93	in.	Length:	3.76	in.
Avg. Dia.	***1.93***	in.	Avg. L.	***3.76***	in.
Aspect Ratio (L/Dia):	**1.95**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)			
0.010 (0:00)	0.3	0	19.6	0.350 (0:00)			
0.025 (0:00)	0.7	1	48.8	0.400 (0:00)			
0.050 (0:00)	1.3	5	242.4	0.450 (0:00)			
0.075 (0:00)	2.0	14	674.2	0.500 (0:00)			
0.100 (0:00)	2.7	29	1,387.1	0.550 (0:00)			
0.125 (0:00)	3.3	50	2,375.3	0.600 (0:00)			
0.150 (0:00)	4.0	69	3,255.3	0.650 (0:00)			
0.175 (0:00)	4.6	78	3,654.5	0.700 (0:00)			
0.200 (0:00)	5.3	70	3,256.8	0.750 (0:00)			
0.225 (0:00)	6.0	36	1,663.2	0.800 (0:00)			
0.250 (0:00)				0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 3,660 psf

Shear Strength (S_u): 1,830 psf

Moisture Content & Density	
dish ID	OL
dish mass (g)	174.3
wet soil + dish (g)	376.2
dry soil + dish (g)	345.9
moisture content:	**17.7%**
sample mass (g)	376.0
sample moisture content %	17.7%
dry sample mass (g)	319.5
wet density (pcf)	129.9
in-situ dry density (pcf)	**110.3**

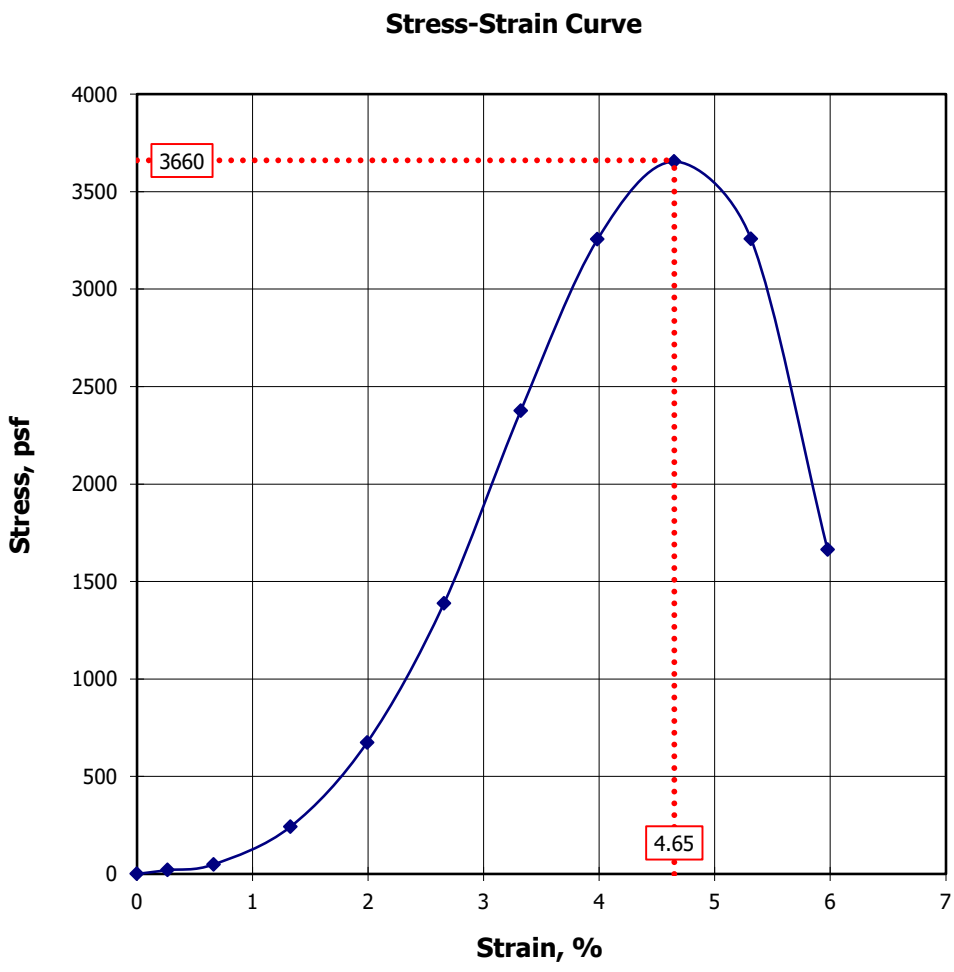
Sample Sketch:

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	THOM-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	16 feet
Date:	September 16, 2025	Lab Tech:	JLH	Visual Description of Sample:	
Lab ID:	252823	Checked By:	G. Hoyos	SANDSTONE, brown	

Unconfined Compressive Strength (q_u):	**3,660**	**psf**	**Density (pcf):**	110.3
Shear Strength (S_u):	**1,830**	**psf**	**Moisture:**	17.7

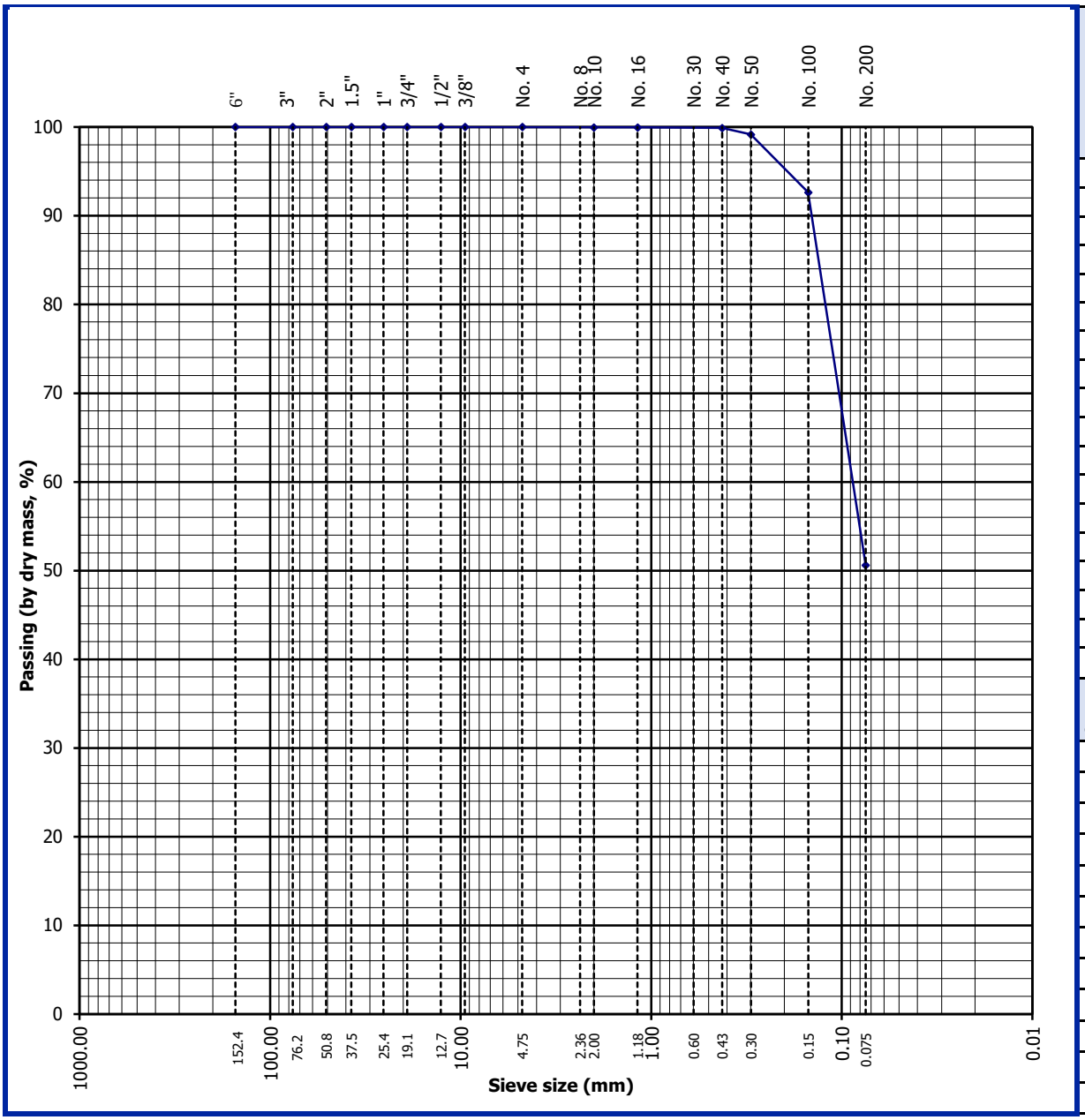
Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	19.6
0.7	48.8
1.3	242.4
2.0	674.2
2.7	1387.1
3.3	2375.3
4.0	3255.3
4.6	3654.5
5.3	3256.8
6.0	1663.2



GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 19, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252825	Reviewer	G. Hoyos
Sample location	THOM-2 at 9 feet		
Visual description	CLAYSTONE and SANDSTONE, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**5**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	93
#200	50.6

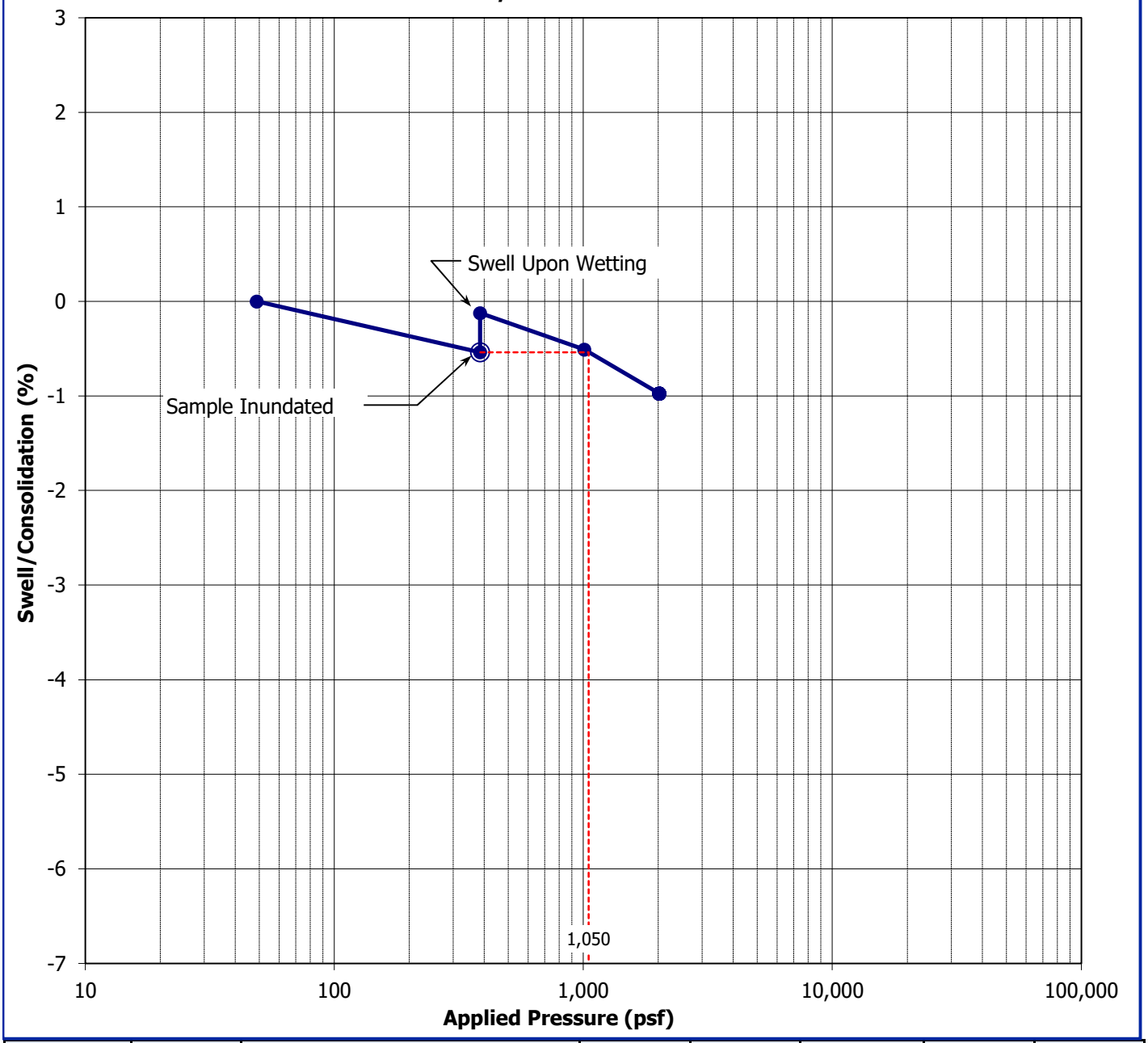
Moisture (M) and Density (D)	
M (%)	13.2
D (pcf)	

LL	38
PL	22
PI	16

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
THOM-2	4	CLAYSTONE and SANDSTONE, brown	119.6	13.8	385	0.4	1,050

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252824

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	THOM-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	September 16, 2025	Technician:	JLH	Visual Description of Sample:	
Lab ID Number:	252825	Reviewer:	G. Hoyos	CLAYSTONE and SANDSTONE, brown	

Sample Data:

Diameter:	1.94	in.	Length:	3.18	in.
Diameter:	1.94	in.	Length:	3.21	in.
Diameter:	1.94	in.	Length:	3.21	in.
Avg. Dia.	***1.94***	in.	Avg. L.	***3.20***	in.
Aspect Ratio (L/Dia):	**1.65**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) &	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)	9.4	66	2,914.7
0.010 (0:00)	0.3	0	19.4	0.350 (0:00)	10.9	94	4,079.7
0.025 (0:00)	0.8	1	48.4	0.400 (0:00)	12.5	98	4,178.6
0.050 (0:00)	1.6	2	95.9	0.450 (0:00)	14.1	117	4,899.6
0.075 (0:00)	2.3	4	190.4	0.500 (0:00)	15.6	126	5,180.6
0.100 (0:00)	3.1	7	330.5	0.550 (0:00)	17.2	84	3,389.7
0.125 (0:00)	3.9	13	608.8	0.600 (0:00)			
0.150 (0:00)	4.7	21	975.4	0.650 (0:00)			
0.175 (0:00)	5.5	28	1,289.9	0.700 (0:00)			
0.200 (0:00)	6.3	34	1,553.3	0.750 (0:00)			
0.225 (0:00)	7.0	40	1,812.2	0.800 (0:00)			
0.250 (0:00)	7.8	47	2,111.4	0.850 (0:00)			
0.275 (0:00)	8.6	56	2,494.4	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 5,265 psf

Shear Strength (S_u): 2,633 psf

Moisture Content & Density

dish ID	C3
dish mass (g)	187.7
wet soil + dish (g)	496.6
dry soil + dish (g)	460.5
moisture content:	**13.2%**
sample mass (g)	296.5
sample moisture content %	13.2%
dry sample mass (g)	261.9
wet density (pcf)	119.5
in-situ dry density (pcf)	**105.5**

Sample Sketch:

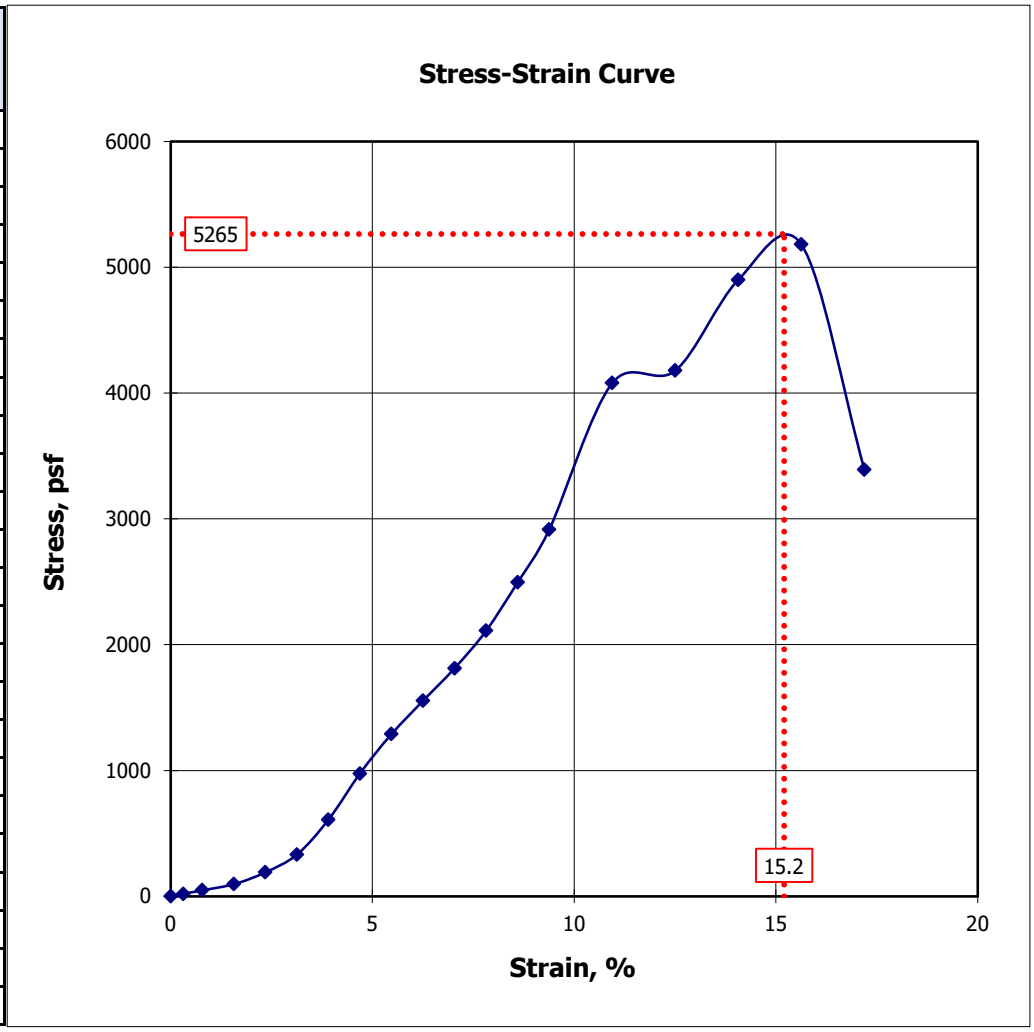
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	THOM-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	September 16, 2025	Lab Tech:	JLH	Visual Description of Sample:	
Lab ID:	252825	Checked By:	G. Hoyos	CLAYSTONE and SANDSTONE, brown	

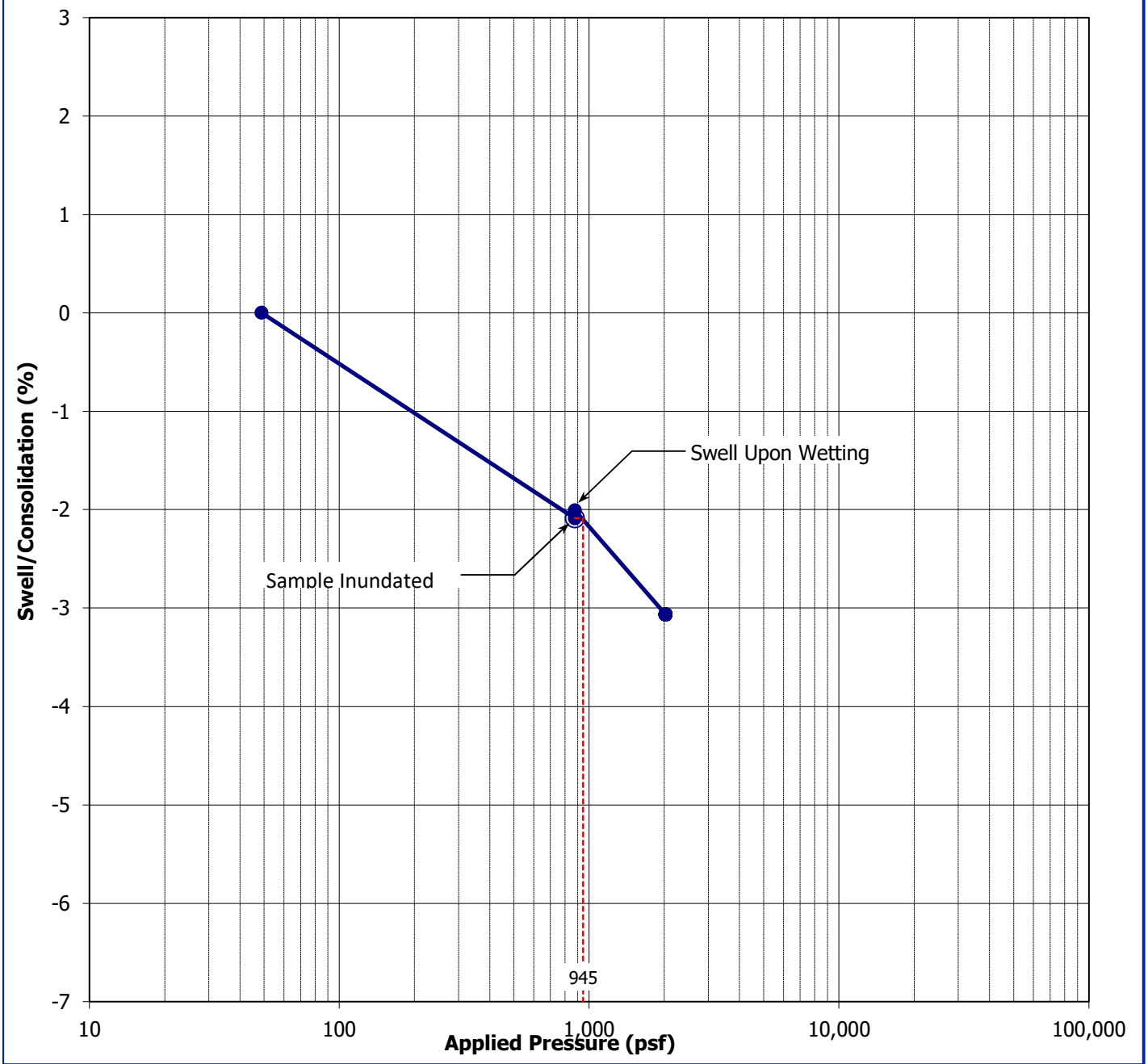
Unconfined Compressive Strength (q_u):	**5,265**	**psf**	**Density (pcf):**	105.5
Shear Strength (S_u):	**2,633**	**psf**	**Moisture:**	13.2

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	19.4
0.8	48.4
1.6	95.9
2.3	190.4
3.1	330.5
3.9	608.8
4.7	975.4
5.5	1289.9
6.3	1553.3
7.0	1812.2
7.8	2111.4
8.6	2494.4
9.4	2914.7
10.9	4079.7
12.5	4178.6
14.1	4899.6
15.6	5180.6
17.2	3389.7



CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
THOM-3	9	CLAY, sandy, brown	103.3	23.7	877	0.1	945

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252826

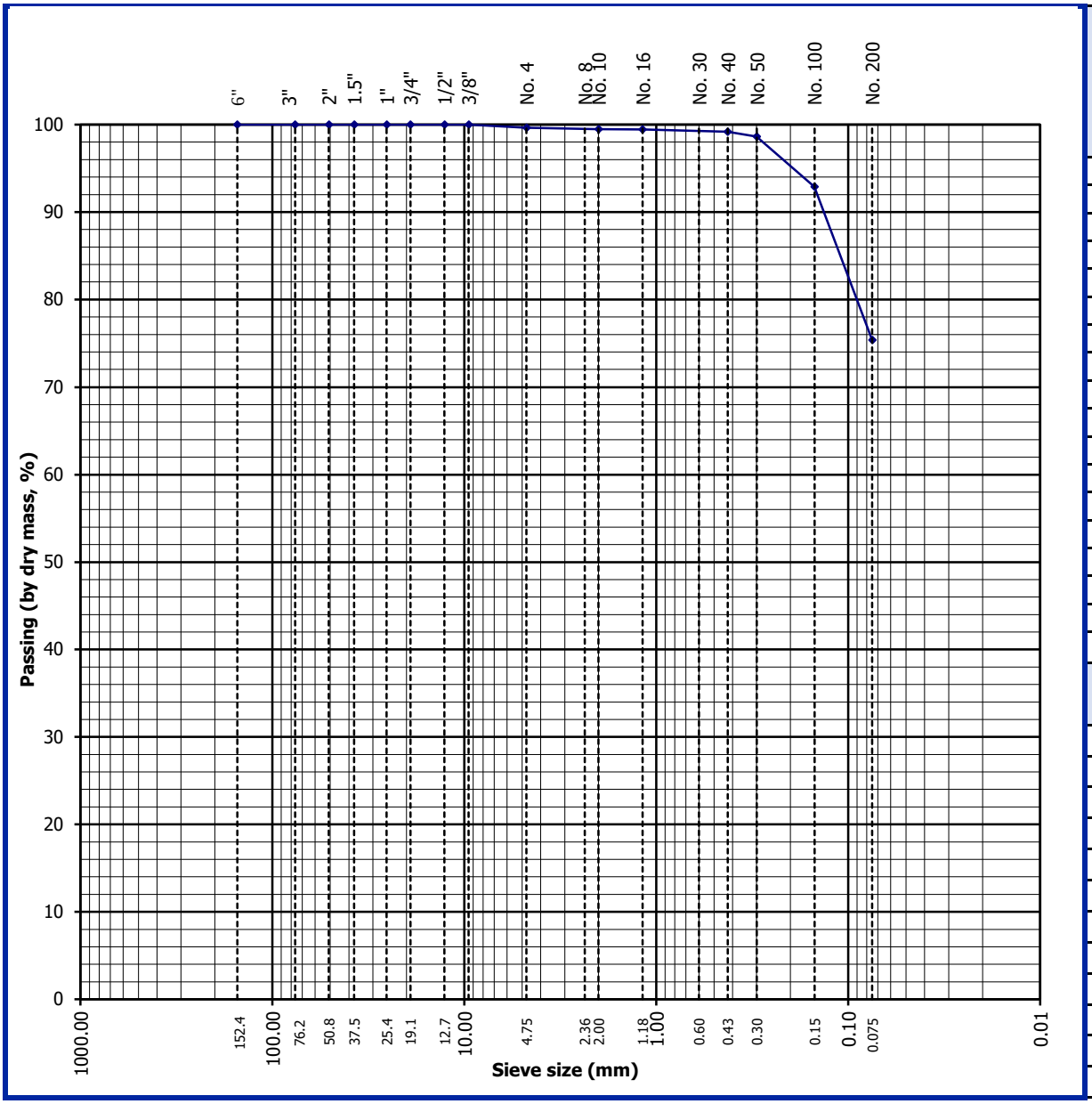
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 13, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252828	Reviewer	G. Hoyos
Sample location	JACK-1 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	22	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440

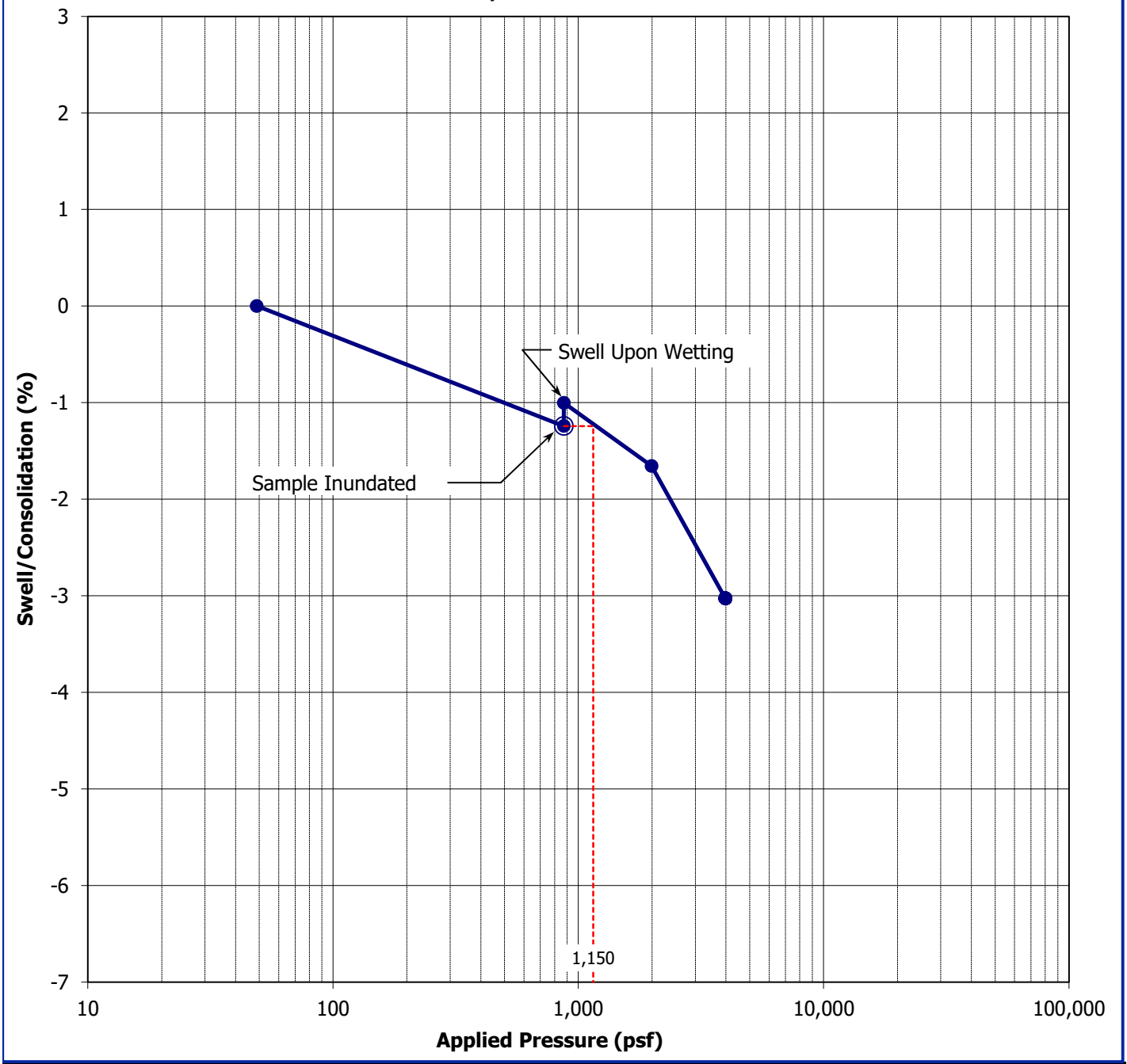


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	99
#16	99
#30	
#40	99
#50	99
#100	93
#200	75.4

Moisture (M) and Density (D)	
M (%)	20.7
D (pcf)	
LL	45
PL	14
PI	31
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
JACK-1	9	CLAY, with sand, brown	104.9	20.7	872	0.2	1,150

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252828

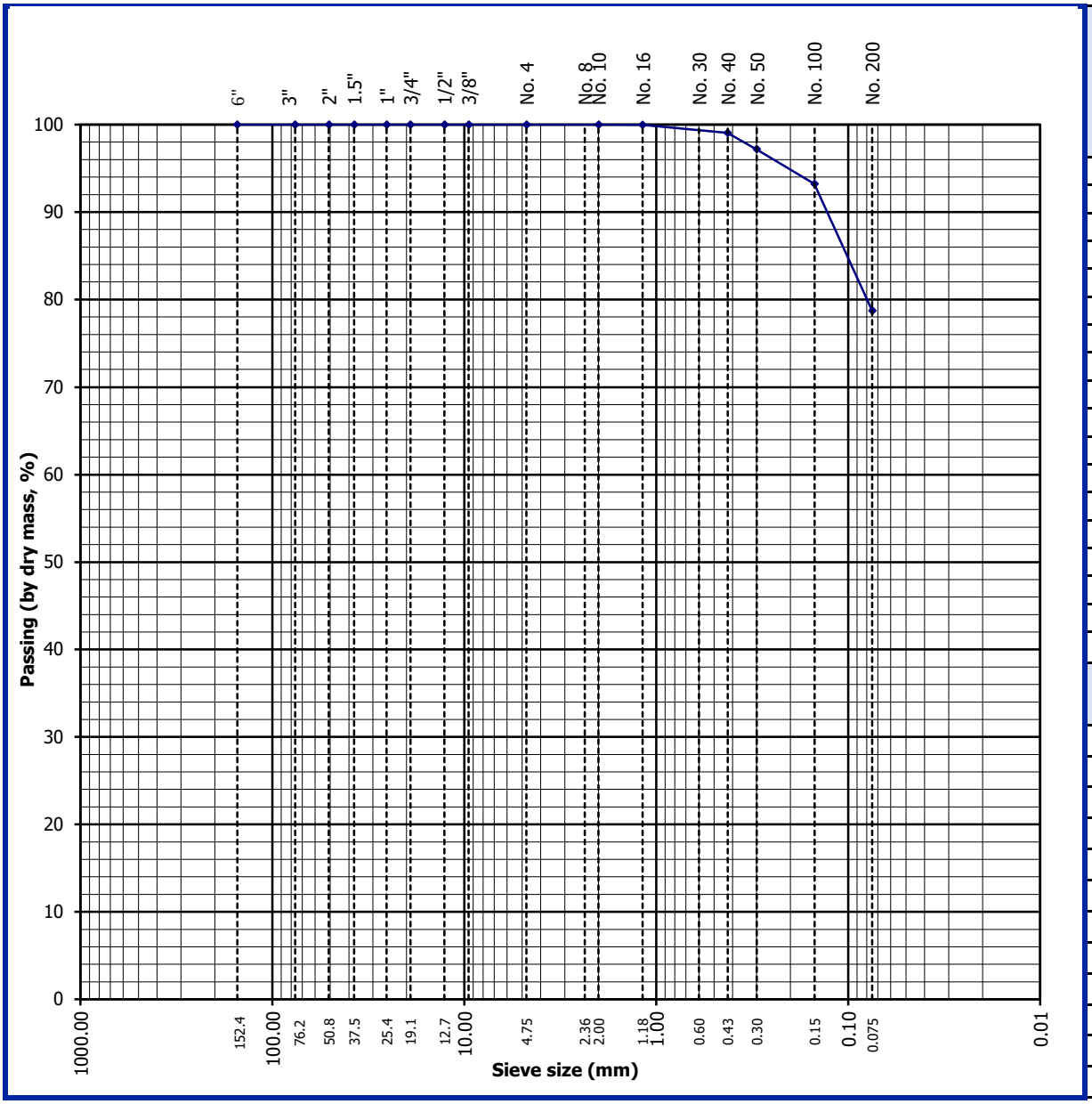
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 18, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252829	Reviewer	G. Hoyos
Sample location	JACK-2 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**18**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

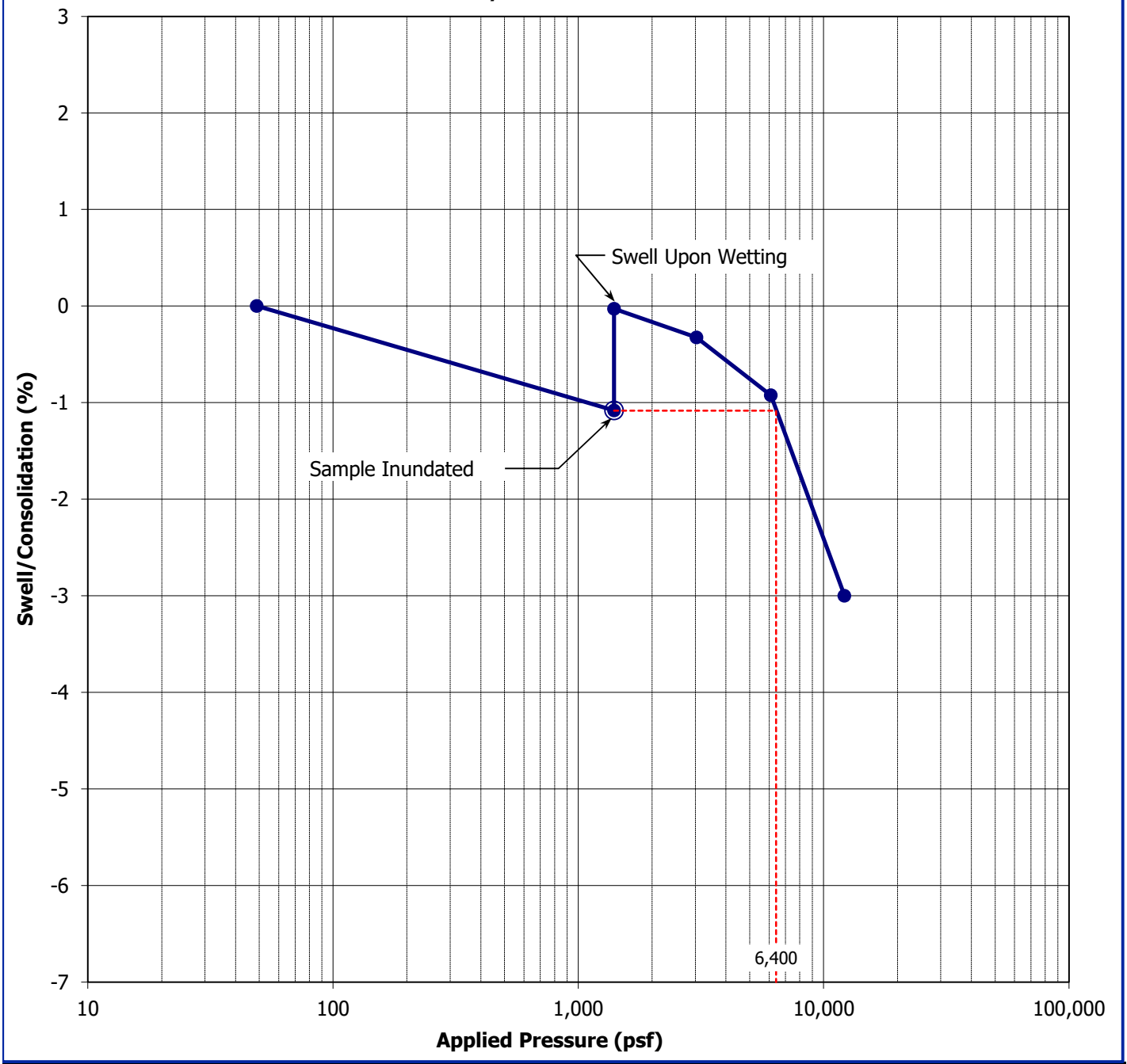


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	99
#50	97
#100	93
#200	78.7

Moisture (M) and Density (D)	
M (%)	12.9
D (pcf)	
LL	40
PL	16
PI	24
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
JACK-2	14	CLAYSTONE, black	115.4	16.9	1,398	1.1	6,400

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252830

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	JACK-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	September 16, 2025	Technician:	JLH	Visual Description of Sample:	
Lab ID Number:	252829	Reviewer:	G. Hoyos	CLAYSTONE, sandy, dark brown	

Sample Data:

Diameter:	1.93	in.	Length:	3.90	in.
Diameter:	1.95	in.	Length:	3.94	in.
Diameter:	1.95	in.	Length:	3.86	in.
Avg. Dia.	***1.94***	in.	Avg. L.	***3.90***	in.
Aspect Ratio (L/Dia):	**2.01**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)			
0.010 (0:00)	0.3	1	24.3	0.350 (0:00)			
0.025 (0:00)	0.6	3	145.2	0.400 (0:00)			
0.050 (0:00)	1.3	5	240.4	0.450 (0:00)			
0.075 (0:00)	1.9	13	620.9	0.500 (0:00)			
0.100 (0:00)	2.6	30	1,423.5	0.550 (0:00)			
0.125 (0:00)	3.2	73	3,441.1	0.600 (0:00)			
0.150 (0:00)	3.8	145	6,789.7	0.650 (0:00)			
0.175 (0:00)	4.5	229	10,651.5	0.700 (0:00)			
0.200 (0:00)	5.1	309	14,276.1	0.750 (0:00)			
0.225 (0:00)	5.8	293	13,445.4	0.800 (0:00)			
0.250 (0:00)	6.4	186	8,477.2	0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 14,430 psf

Shear Strength (S_u): 7,215 psf

Moisture Content & Density	
dish ID	MI
dish mass (g)	168.0
wet soil + dish (g)	539.6
dry soil + dish (g)	497.1
moisture content:	**12.9%**
sample mass (g)	409.3
sample moisture content %	12.9%
dry sample mass (g)	362.6
wet density (pcf)	135.3
in-situ dry density (pcf)	**119.8**

Sample Sketch:

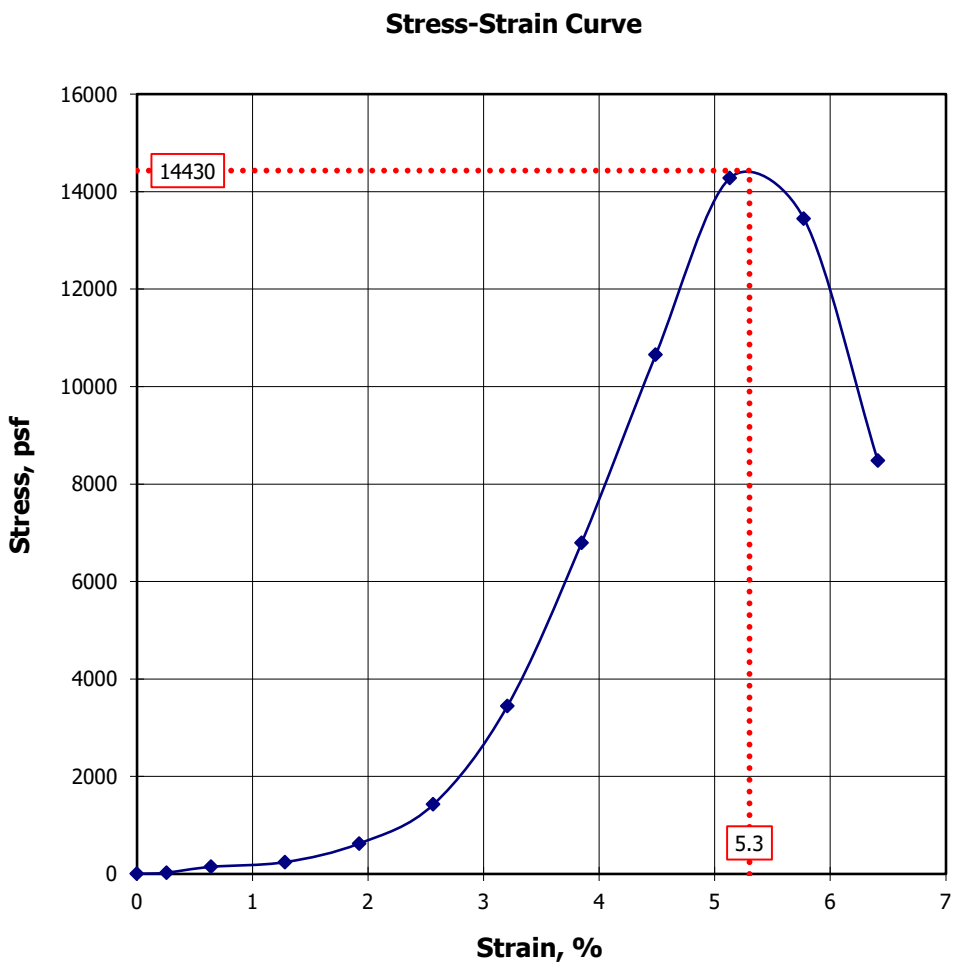
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	JACK-2
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	September 16, 2025	Lab Tech:	JLH	Visual Description of Sample:	
Lab ID:	252829	Checked By:	G. Hoyos	CLAYSTONE, sandy, dark brown	

Unconfined Compressive Strength (q_u):	**14,430**	**psf**	**Density (pcf):**	119.8
Shear Strength (S_u):	**7,215**	**psf**	**Moisture:**	12.9

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	24.3
0.6	145.2
1.3	240.4
1.9	620.9
2.6	1423.5
3.2	3441.1
3.8	6789.7
4.5	10651.5
5.1	14276.1
5.8	13445.4
6.4	8477.2



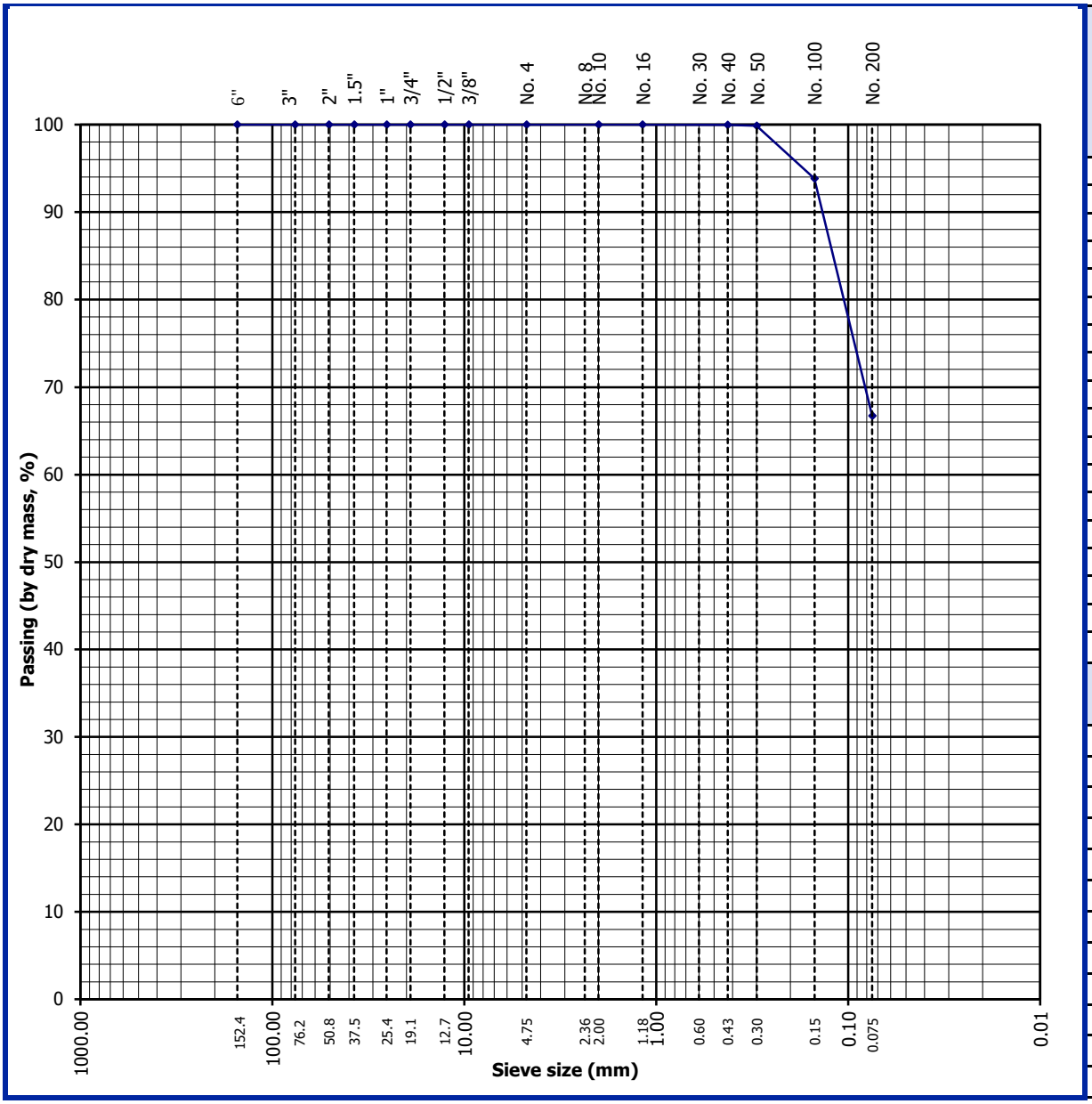
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	September 16, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252831	Reviewer	G. Hoyos
Sample location	JACK-3 at 9 feet		
Visual description	CLAYSTONE, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**15**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	100
#100	94
#200	66.7

Moisture (M) and Density (D)	
M (%)	17.2
D (pcf)	112.9

LL	40
PL	14
PI	26

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

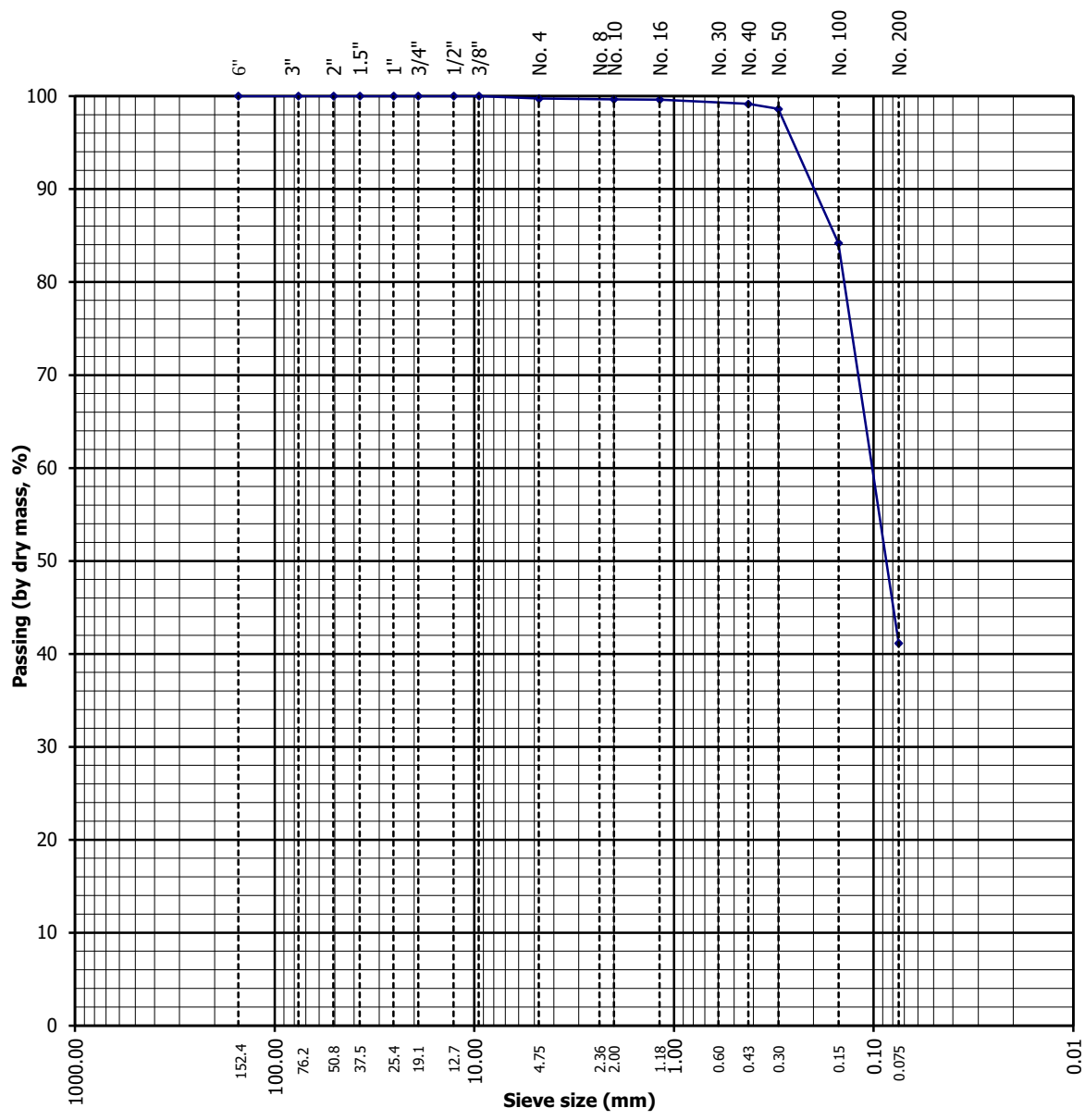
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653(24.3040)	Date	August 19, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne and K. McNally
Lab ID number	252732	Reviewer	G. Hoyos
Sample location	LCROW-1 at 1 foot		
Visual description	SAND and CLAY, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**2**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	84
#200	41.1

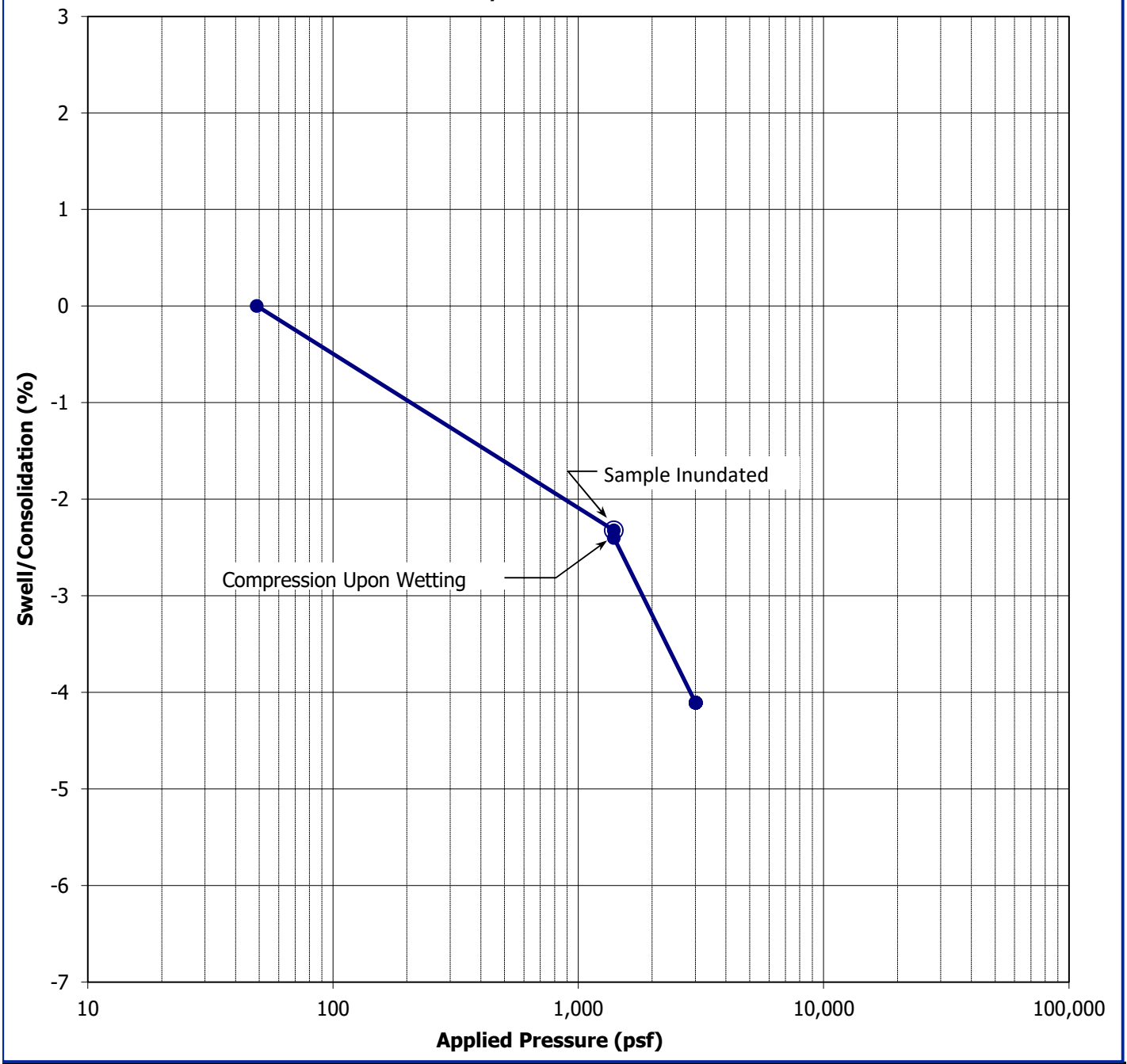
Moisture (M) and Density (D)	
M (%)	9.7
D (pcf)	

LL	28
PL	15
PI	13

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
LCROW-1	14	CLAY, sandy, brown	106.2	20.5	1,397	-0.1	NA

Project Number	Project Name	Lab ID Number
500653(24.3040)	Thornton Water Pipeline Segment F.1	252734

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	LCROW-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	August 20, 2025	Technician:	K. McNally	Visual Description of Sample:	
Lab ID Number:	252733	Reviewer:	G. Hoyos	CLAY, with sand, brown	

Sample Data:

Diameter:	1.92	in.	Length:	4.00	in.
Diameter:	1.93	in.	Length:	4.03	in.
Diameter:	1.93	in.	Length:	3.98	in.
Avg. Dia.	***1.93***	in.	Avg. L.	***4.00***	in.
Aspect Ratio (L/Dia):	**2.08**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)	7.5	137	6,266.0
0.010 (0:00)	0.2	1	34.5	0.350 (0:00)	8.7	144	6,497.3
0.025 (0:00)	0.6	6	294.8	0.400 (0:00)	10.0	149	6,630.8
0.050 (0:00)	1.2	20	976.5	0.450 (0:00)	11.2	152	6,670.4
0.075 (0:00)	1.9	42	2,037.7	0.500 (0:00)	12.5	151	6,533.3
0.100 (0:00)	2.5	63	3,037.1	0.550 (0:00)	13.7	139	5,928.2
0.125 (0:00)	3.1	81	3,879.9	0.600 (0:00)	15.0	114	4,791.6
0.150 (0:00)	3.7	95	4,521.1	0.650 (0:00)			
0.175 (0:00)	4.4	106	5,011.9	0.700 (0:00)			
0.200 (0:00)	5.0	114	5,354.9	0.750 (0:00)			
0.225 (0:00)	5.6	121	5,646.4	0.800 (0:00)			
0.250 (0:00)	6.2	127	5,887.1	0.850 (0:00)			
0.275 (0:00)	6.9	132	6,078.1	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 6,670 psf

Shear Strength (S_u): 3,335 psf

Moisture Content & Density	
dish ID	MA
dish mass (g)	212.8
wet soil + dish (g)	408.2
dry soil + dish (g)	379.4
moisture content:	**17.3%**
sample mass (g)	397.2
sample moisture content %	17.3%
dry sample mass (g)	338.6
wet density (pcf)	129.8
in-situ dry density (pcf)	**110.7**

Sample Sketch:

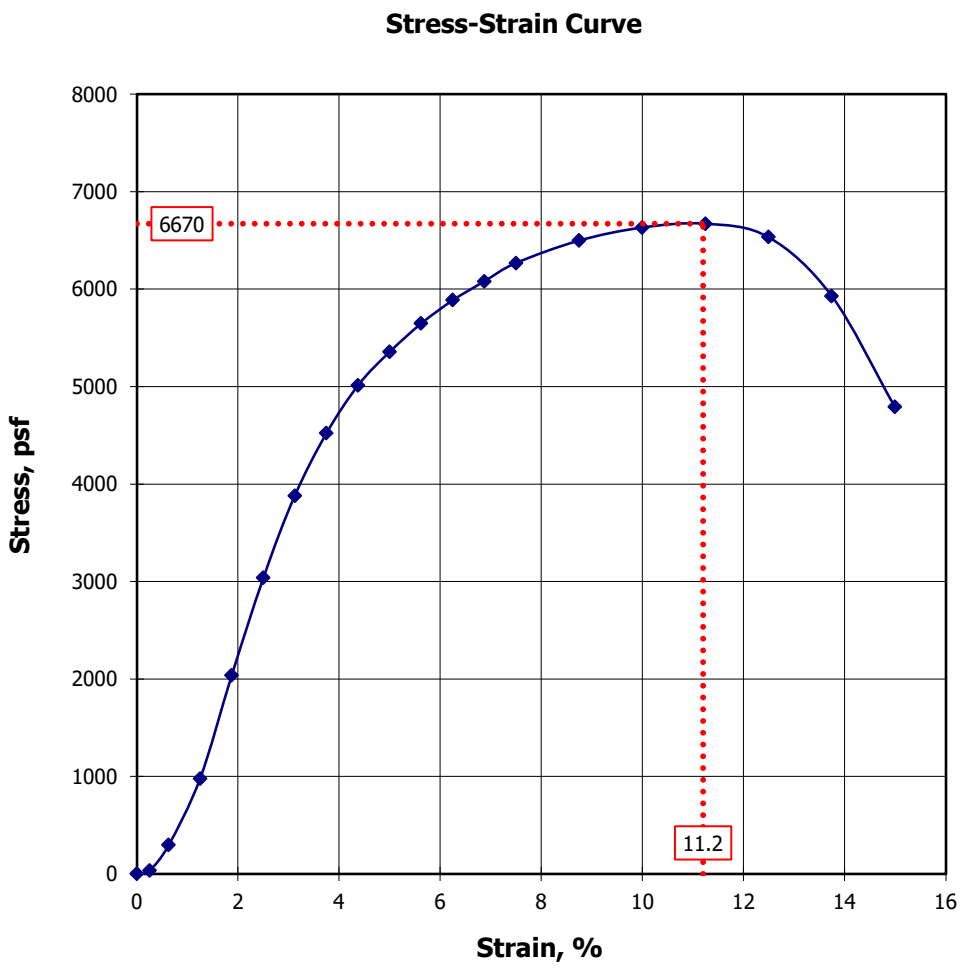
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	LCROW-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	August 20, 2025	Lab Tech:	K. McNally	Visual Description of Sample:	
Lab ID:	252733	Checked By:	G. Hoyos	CLAY, with sand, brown	

Unconfined Compressive Strength (q_u):	**6,670**	**psf**	**Density (pcf):**	110.7
Shear Strength (S_u):	**3,335**	**psf**	**Moisture:**	17.3

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.2	34.5
0.6	294.8
1.2	976.5
1.9	2037.7
2.5	3037.1
3.1	3879.9
3.7	4521.1
4.4	5011.9
5.0	5354.9
5.6	5646.4
6.2	5887.1
6.9	6078.1
7.5	6266.0
8.7	6497.3
10.0	6630.8
11.2	6670.4
12.5	6533.3
13.7	5928.2
15.0	4791.6



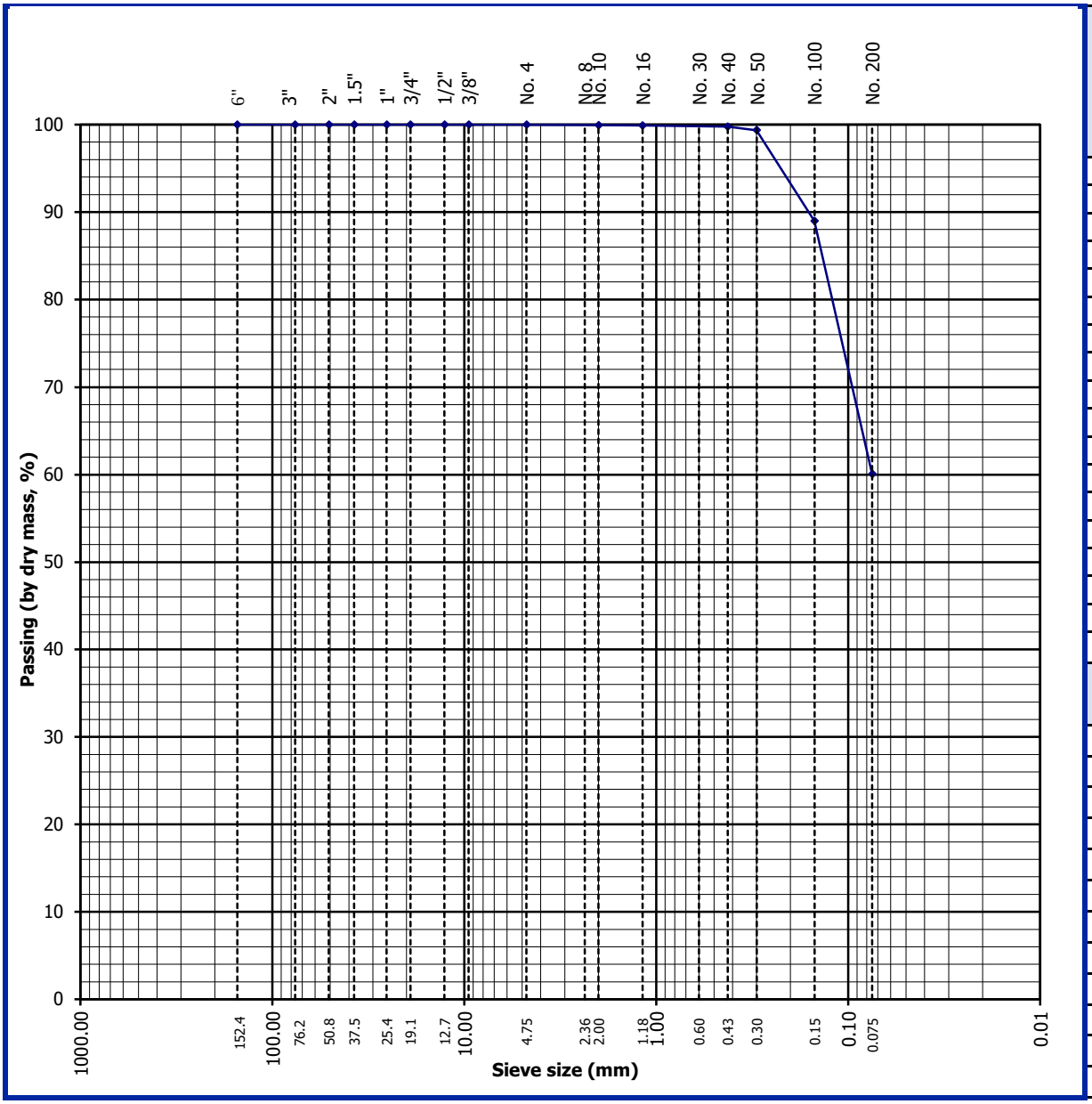
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653(24.3040)	Date	August 26, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252736	Reviewer	G. Hoyos
Sample location	LCROW-2 at 9 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**12**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**

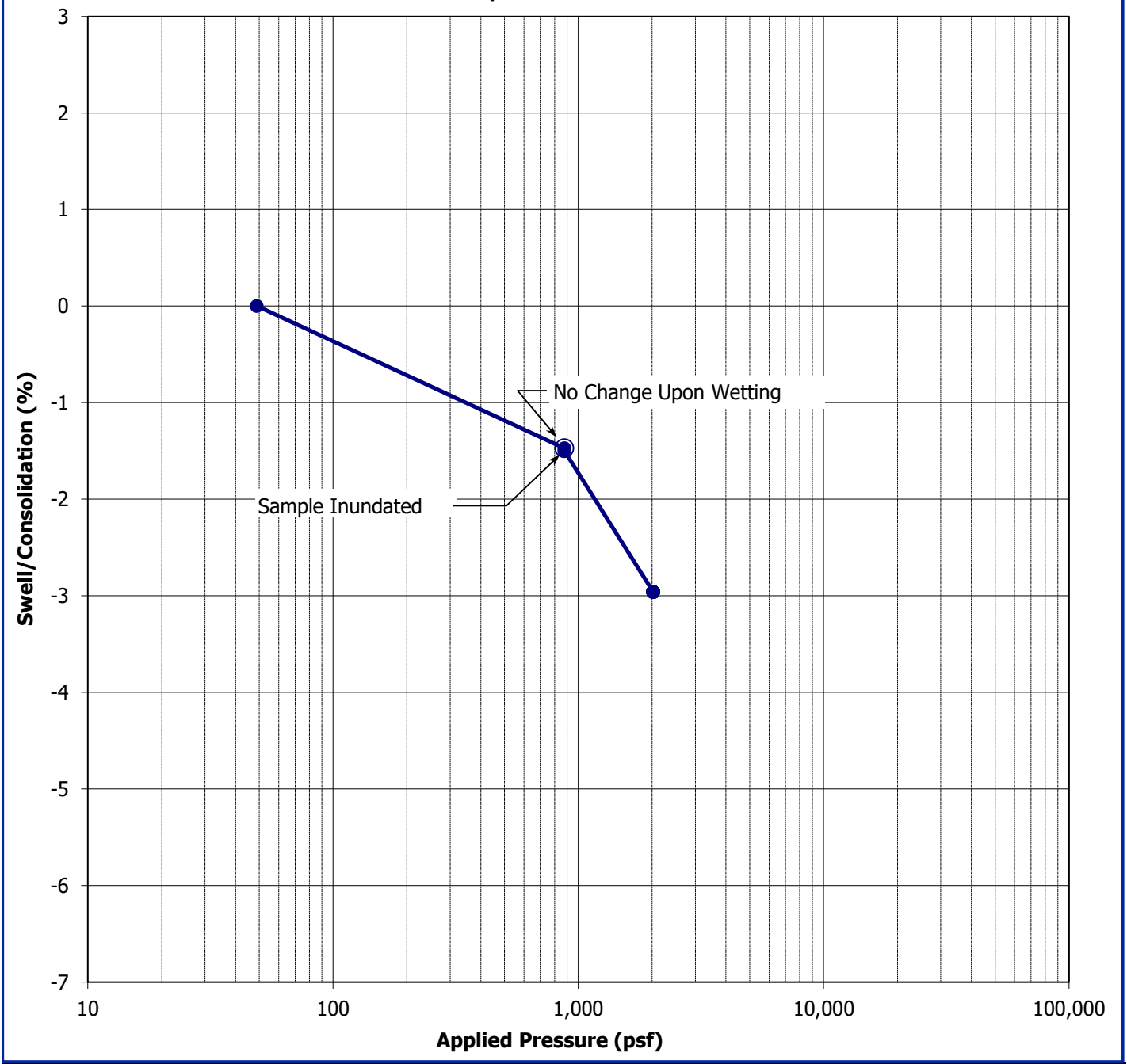


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	89
#200	60.0

Moisture (M) and Density (D)	
M (%)	23.5
D (pcf)	
LL	39
PL	14
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
LCROW-3	9	CLAY, sandy, brown	103.0	22.8	877	0.0	NA

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F.1	252738

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	LCROW-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	14 feet
Date:	August 20, 2025	Technician:	K. McNally	Visual Description of Sample:	
Lab ID Number:	252739	Reviewer:	G. Hoyos	CLAY, brown	

Sample Data:

Diameter:	1.88	in.	Length:	3.62	in.
Diameter:	1.90	in.	Length:	3.61	in.
Diameter:	1.90	in.	Length:	3.60	in.
Avg. Dia.	***1.89***	in.	Avg. L.	***3.61***	in.
Aspect Ratio (L/Dia):	**1.91**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	8.3	18	844.4
0.010 (0:00)	0.3	0	15.3	0.350 (0:00)	9.7	19	877.8
0.025 (0:00)	0.7	0	25.2	0.400 (0:00)	11.1	20	909.9
0.050 (0:00)	1.4	1	70.6	0.450 (0:00)	12.5	21	940.5
0.075 (0:00)	2.1	2	110.2	0.500 (0:00)	13.9	20	881.5
0.100 (0:00)	2.8	4	174.1	0.550 (0:00)	15.2	20	867.3
0.125 (0:00)	3.5	6	296.4	0.600 (0:00)	16.6	20	853.2
0.150 (0:00)	4.2	8	392.3	0.650 (0:00)			
0.175 (0:00)	4.8	9	438.2	0.700 (0:00)			
0.200 (0:00)	5.5	11	531.6	0.750 (0:00)			
0.225 (0:00)	6.2	13	623.7	0.800 (0:00)			
0.250 (0:00)	6.9	16	761.9	0.850 (0:00)			
0.275 (0:00)	7.6	17	803.5	0.900 (0:00)			

Unconfined Compressive Strength (q_u):	**940**	**psf**
Shear Strength (S_u):	**470**	**psf**

Moisture Content & Density	
dish ID	E
dish mass (g)	162.2
wet soil + dish (g)	505.8
dry soil + dish (g)	437.9
moisture content:	**24.6%**
sample mass (g)	345.3
sample moisture content %	24.6%
dry sample mass (g)	277.1
wet density (pcf)	129.5
in-situ dry density (pcf)	**103.9**

Sample Sketch:

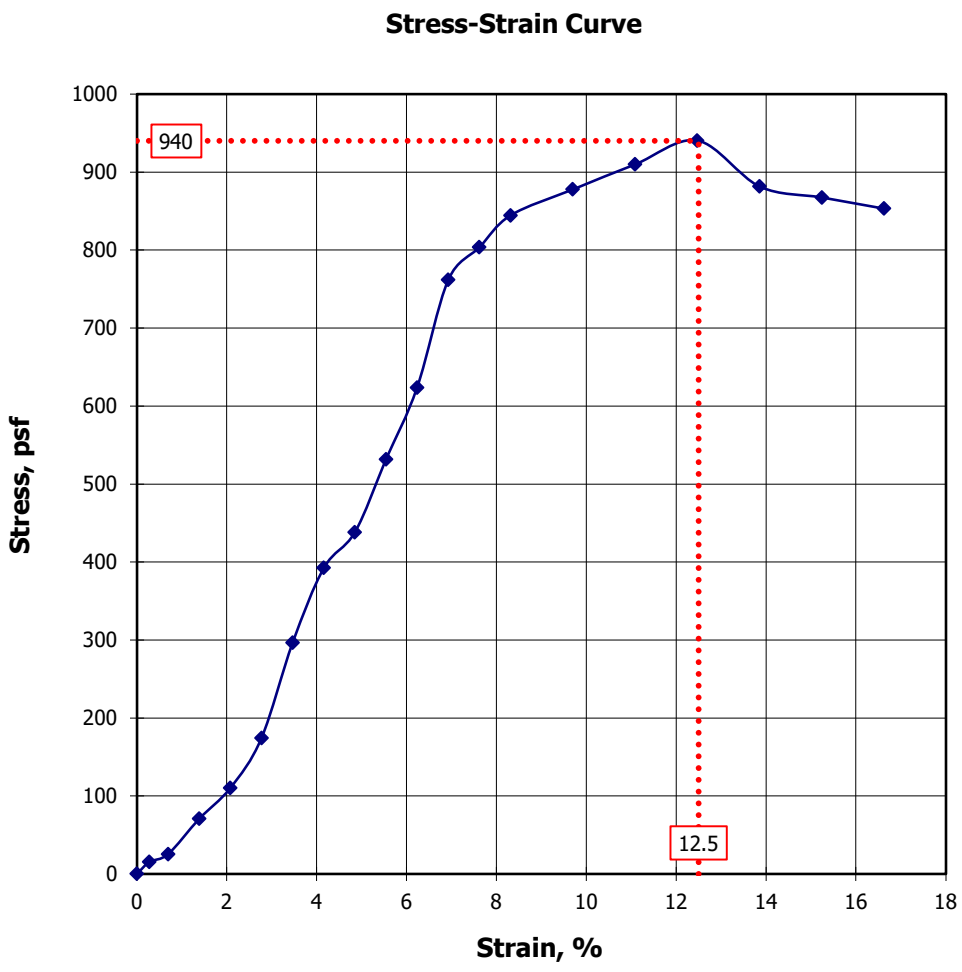
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	LCROW-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	14 feet
Date:	August 20, 2025	Lab Tech:	K. McNally	Visual Description of Sample:	
Lab ID:	252739	Checked By:	G. Hoyos	CLAY, brown	

Unconfined Compressive Strength (q_u):	**940**	**psf**	**Density (pcf):**	103.9
Shear Strength (S_u):	**470**	**psf**	**Moisture:**	24.6

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	15.3
0.7	25.2
1.4	70.6
2.1	110.2
2.8	174.1
3.5	296.4
4.2	392.3
4.8	438.2
5.5	531.6
6.2	623.7
6.9	761.9
7.6	803.5
8.3	844.4
9.7	877.8
11.1	909.9
12.5	940.5
13.9	881.5
15.2	867.3
16.6	853.2



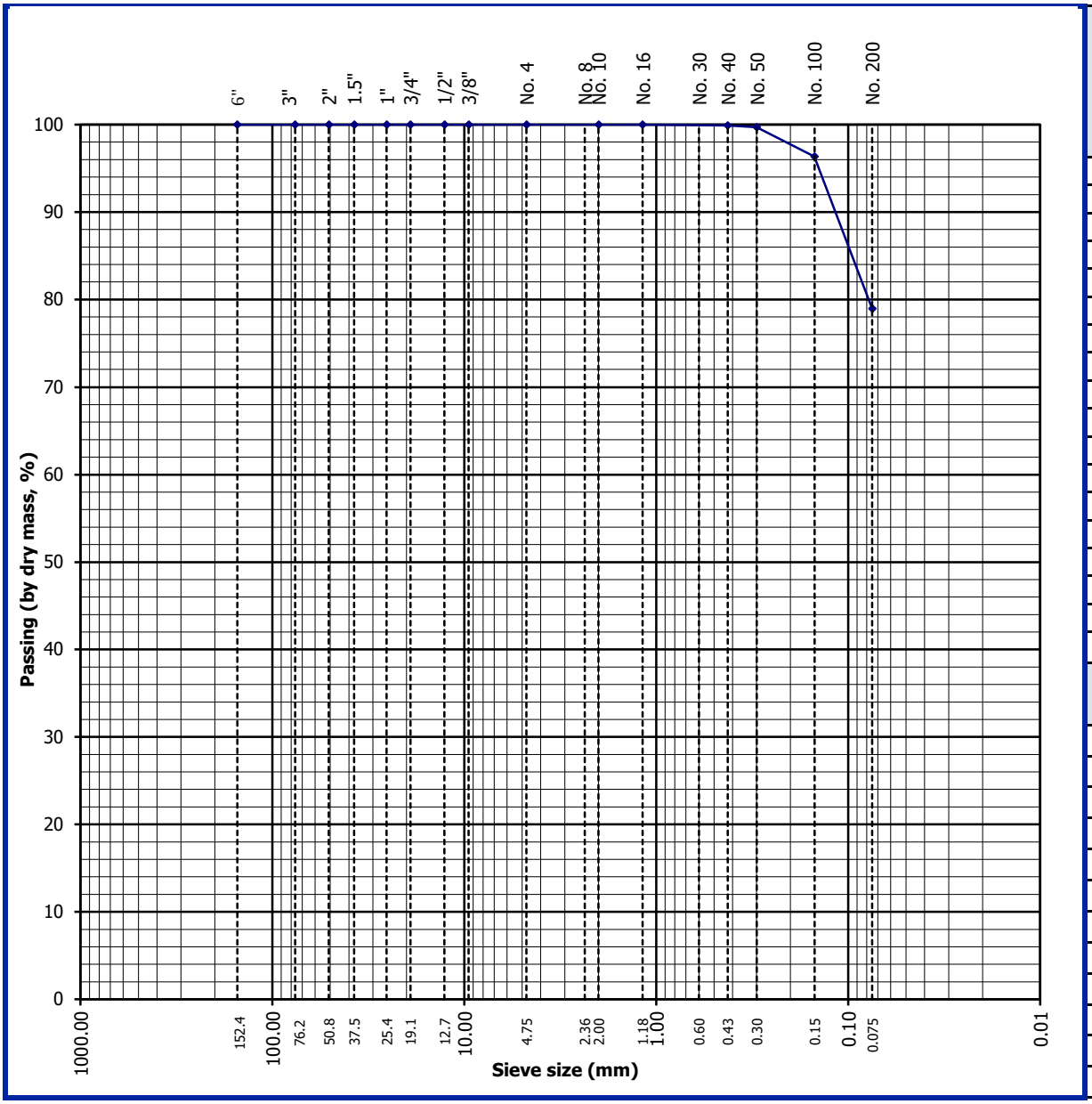
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653(24.3040)	Date	August 19, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne and K. McNally
Lab ID number	252740	Reviewer	G. Hoyos
Sample location	LCROW-4 at 4 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**21**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	100
#100	96
#200	79.0

Moisture (M) and Density (D)	
M (%)	20.3
D (pcf)	
LL	42
PL	14
PI	28
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

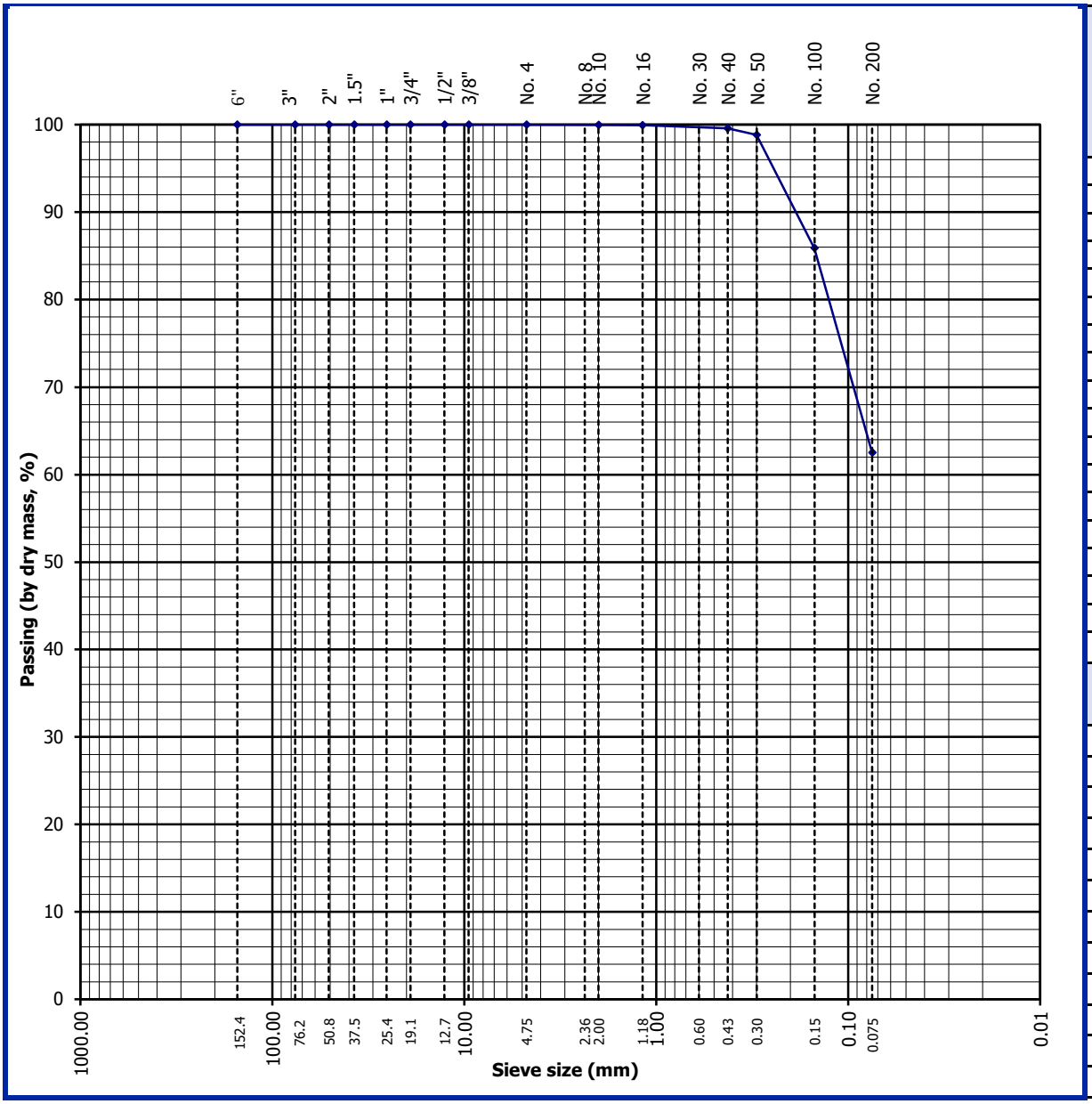
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653 (24.3040)	Date	August 19, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne and K. McNally
Lab ID number	252743	Reviewer	G. Hoyos
Sample location	LCROW-5 at 14 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**12**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**

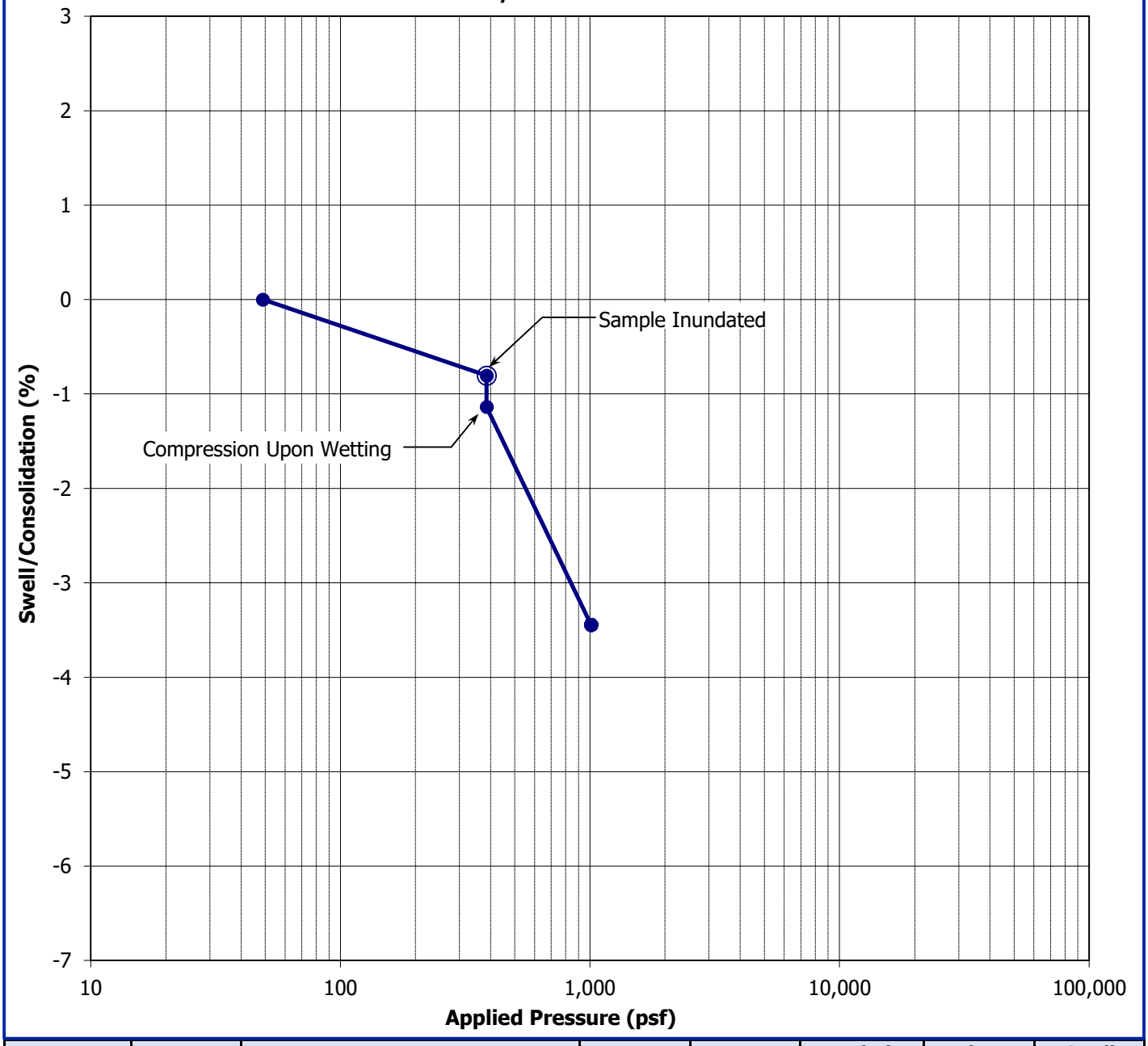


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	86
#200	62.5

Moisture (M) and Density (D)	
M (%)	22.4
D (pcf)	
LL	38
PL	13
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
LCROW-5	4	CLAY, sandy, with gravel, brown	92.3	9.6	385	-0.3	NA

Project Number	Project Name	Lab ID Number
500653 (24.3040)	Thornton Water Pipeline Segment F	252741.1

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	LCROW-5
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	August 20, 2025	Technician:	K. McNally	Visual Description of Sample:	
Lab ID Number:	252742	Reviewer:	G. Hoyos	CLAY, sandy, brown	

Sample Data:

Diameter:	1.91	in.	Length:	3.92	in.
Diameter:	1.92	in.	Length:	3.91	in.
Diameter:	1.92	in.	Length:	3.93	in.
Avg. Dia.	***1.92***	in.	Avg. L.	***3.92***	in.
Aspect Ratio (L/Dia):	**2.05**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	7.6	34	1,565.5
0.010 (0:00)	0.3	1	59.7	0.350 (0:00)	8.9	36	1,634.7
0.025 (0:00)	0.6	5	237.8	0.400 (0:00)	10.2	38	1,701.4
0.050 (0:00)	1.3	10	467.6	0.450 (0:00)	11.5	39	1,721.3
0.075 (0:00)	1.9	13	626.0	0.500 (0:00)	12.7	40	1,740.1
0.100 (0:00)	2.5	15	728.8	0.550 (0:00)	14.0	42	1,800.4
0.125 (0:00)	3.2	17	820.6	0.600 (0:00)	15.3	44	1,858.1
0.150 (0:00)	3.8	20	959.0	0.650 (0:00)	16.6	46	1,913.4
0.175 (0:00)	4.5	22	1,047.9	0.700 (0:00)	17.8	47	1,925.1
0.200 (0:00)	5.1	25	1,182.9	0.750 (0:00)	19.1	48	1,935.5
0.225 (0:00)	5.7	28	1,315.9	0.800 (0:00)	20.4	49	1,944.7
0.250 (0:00)	6.4	30	1,400.4	0.850 (0:00)	21.7	50	1,952.6
0.275 (0:00)	7.0	32	1,483.6	0.900 (0:00)	22.9	50	1,920.9

Unconfined Compressive Strength (q_u):	**1,955**	**psf**
Shear Strength (S_u):	**978**	**psf**

Moisture Content & Density	
dish ID	OJ
dish mass (g)	198.0
wet soil + dish (g)	319.9
dry soil + dish (g)	297.4
moisture content:	**22.6%**
sample mass (g)	381.7
sample moisture content %	22.6%
dry sample mass (g)	311.3
wet density (pcf)	128.4
in-situ dry density (pcf)	**104.7**

Sample Sketch:

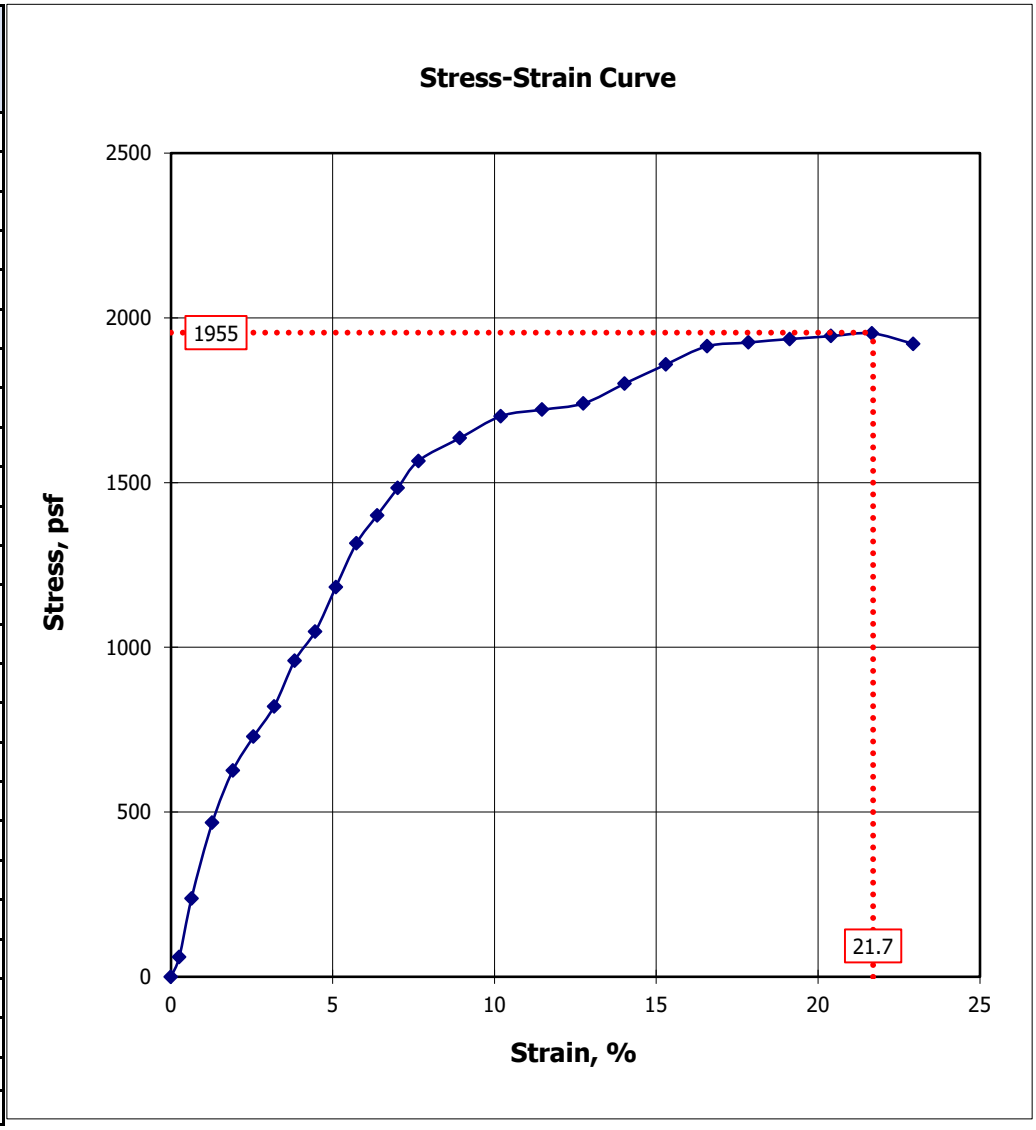
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	LCROW-5
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	9 feet
Date:	August 20, 2025	Lab Tech:	K. McNally	Visual Description of Sample:	
Lab ID:	252742	Checked By:	G. Hoyos	CLAY, sandy, brown	

Unconfined Compressive Strength (q_u):	**1,955**	**psf**	**Density (pcf):**	104.7
Shear Strength (S_u):	**978**	**psf**	**Moisture:**	22.6

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	59.7
0.6	237.8
1.3	467.6
1.9	626.0
2.5	728.8
3.2	820.6
3.8	959.0
4.5	1047.9
5.1	1182.9
5.7	1315.9
6.4	1400.4
7.0	1483.6
7.6	1565.5
8.9	1634.7
10.2	1701.4
11.5	1721.3
12.7	1740.1
14.0	1800.4
15.3	1858.1
16.6	1913.4
17.8	1925.1
19.1	1935.5
20.4	1944.7
21.7	1952.6
22.9	1920.9



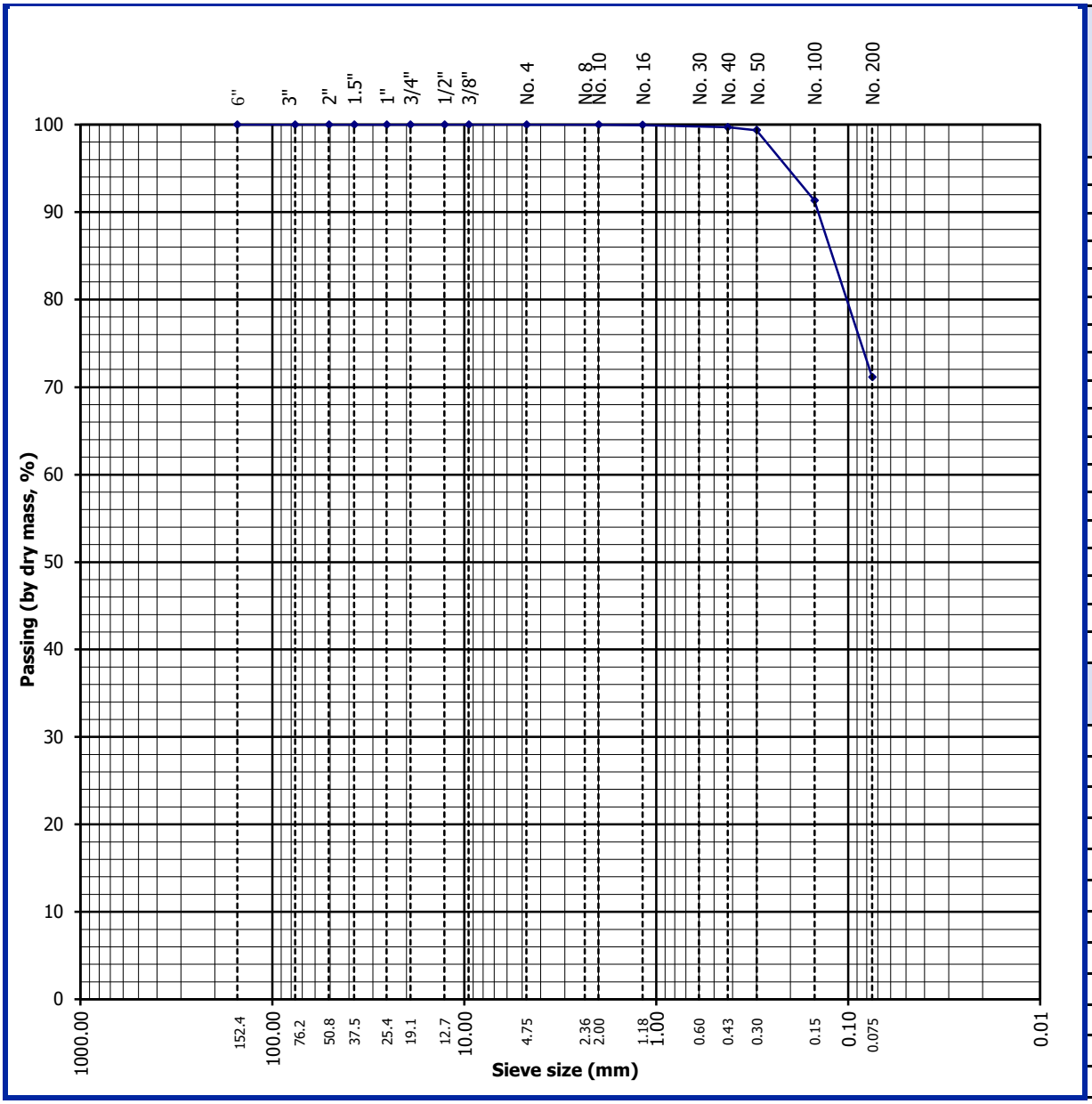
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 7, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252103	Reviewer	G. Hoyos
Sample location	TH-1 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**16**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	91
#200	71.1

Moisture (M) and Density (D)	
M (%)	23.9
D (pcf)	
LL	40
PL	14
PI	26
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

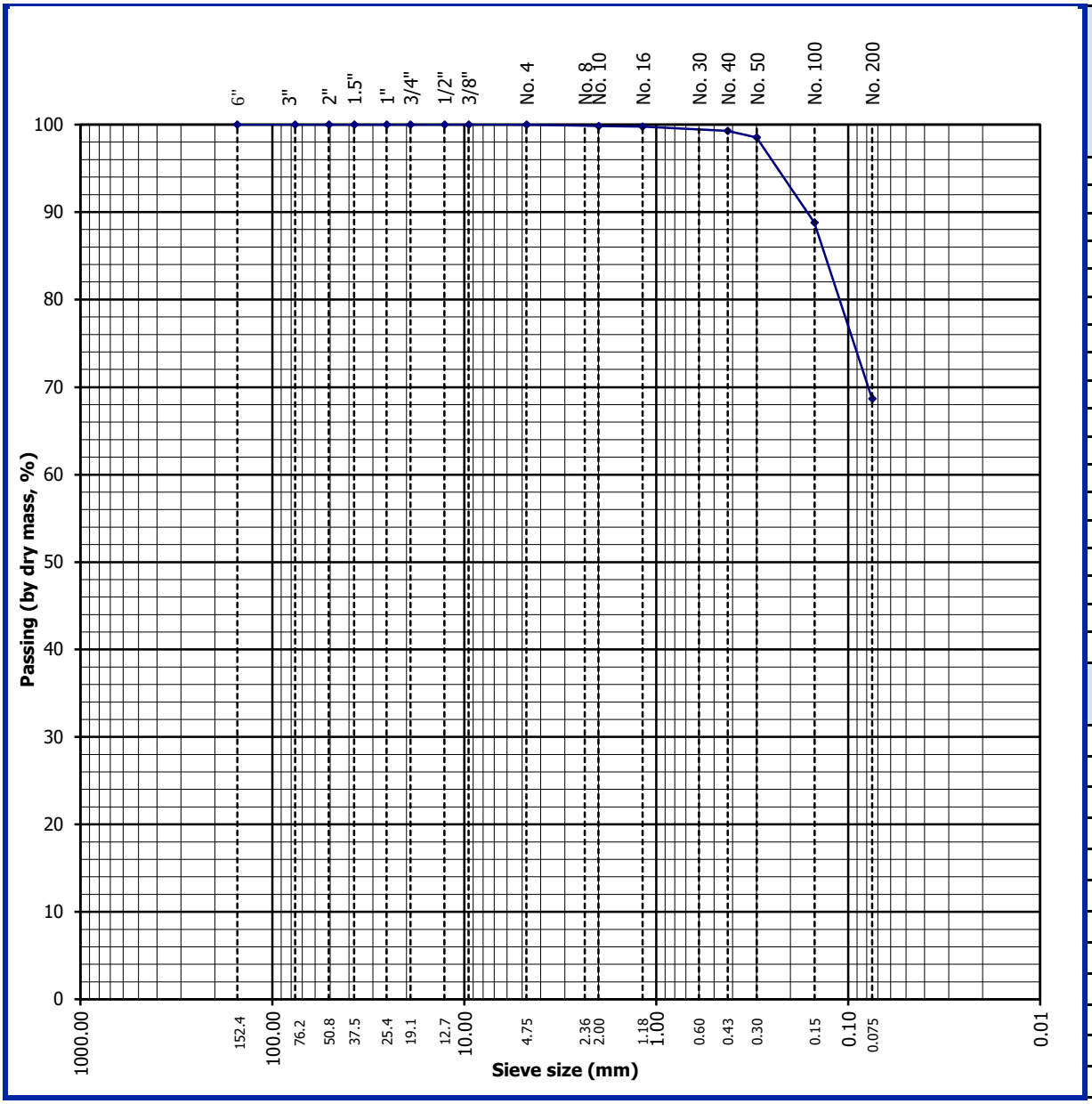
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 12, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252104	Reviewer	G. Hoyos
Sample location	TH-1 at 10 to 15 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**15**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**

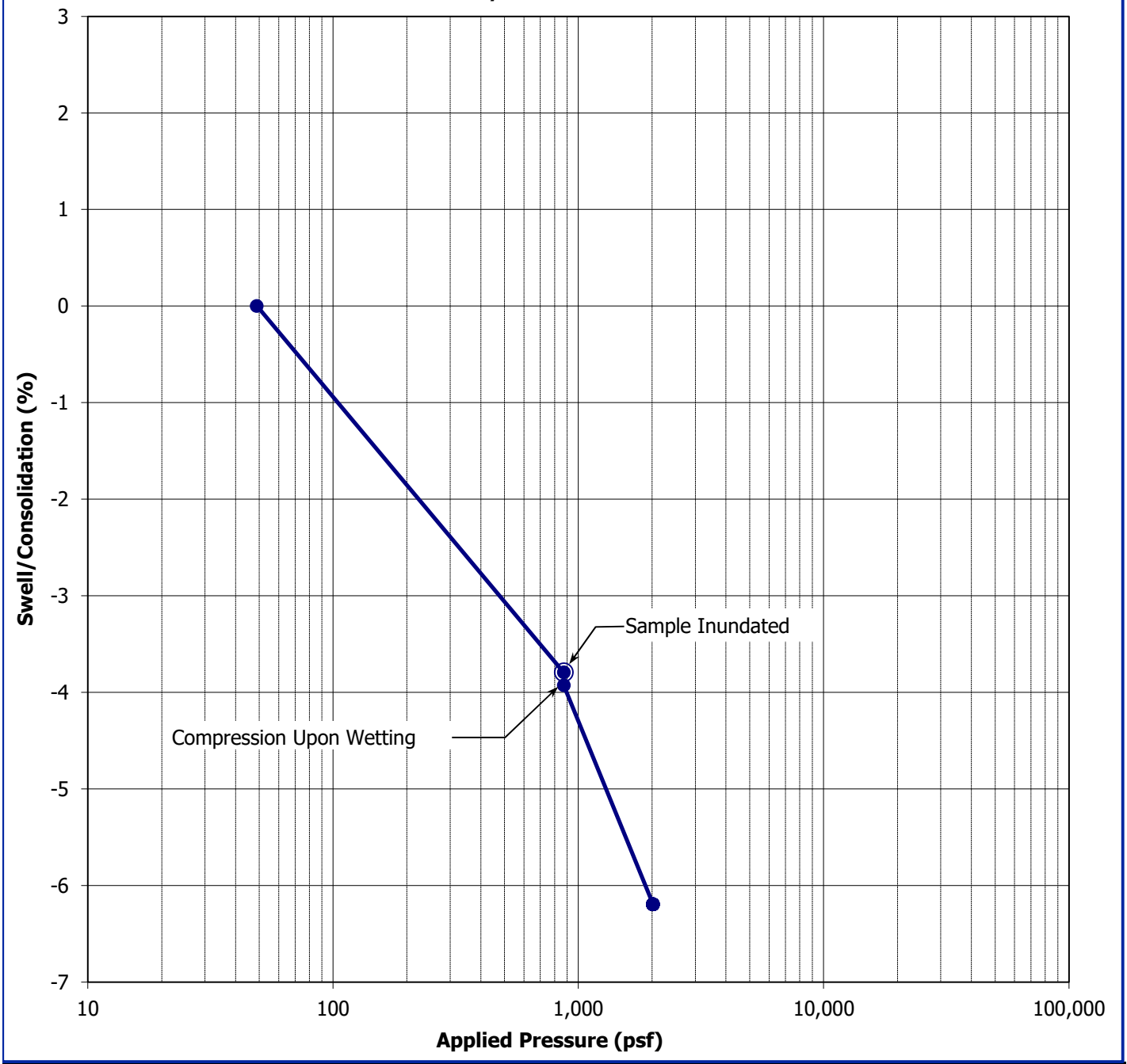


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	89
#200	68.6

Moisture (M) and Density (D)	
M (%)	3.4
D (pcf)	
LL	40
PL	14
PI	26
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
TH-1	9	CLAY, with sand, brown	101.7	23.9	872	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252103

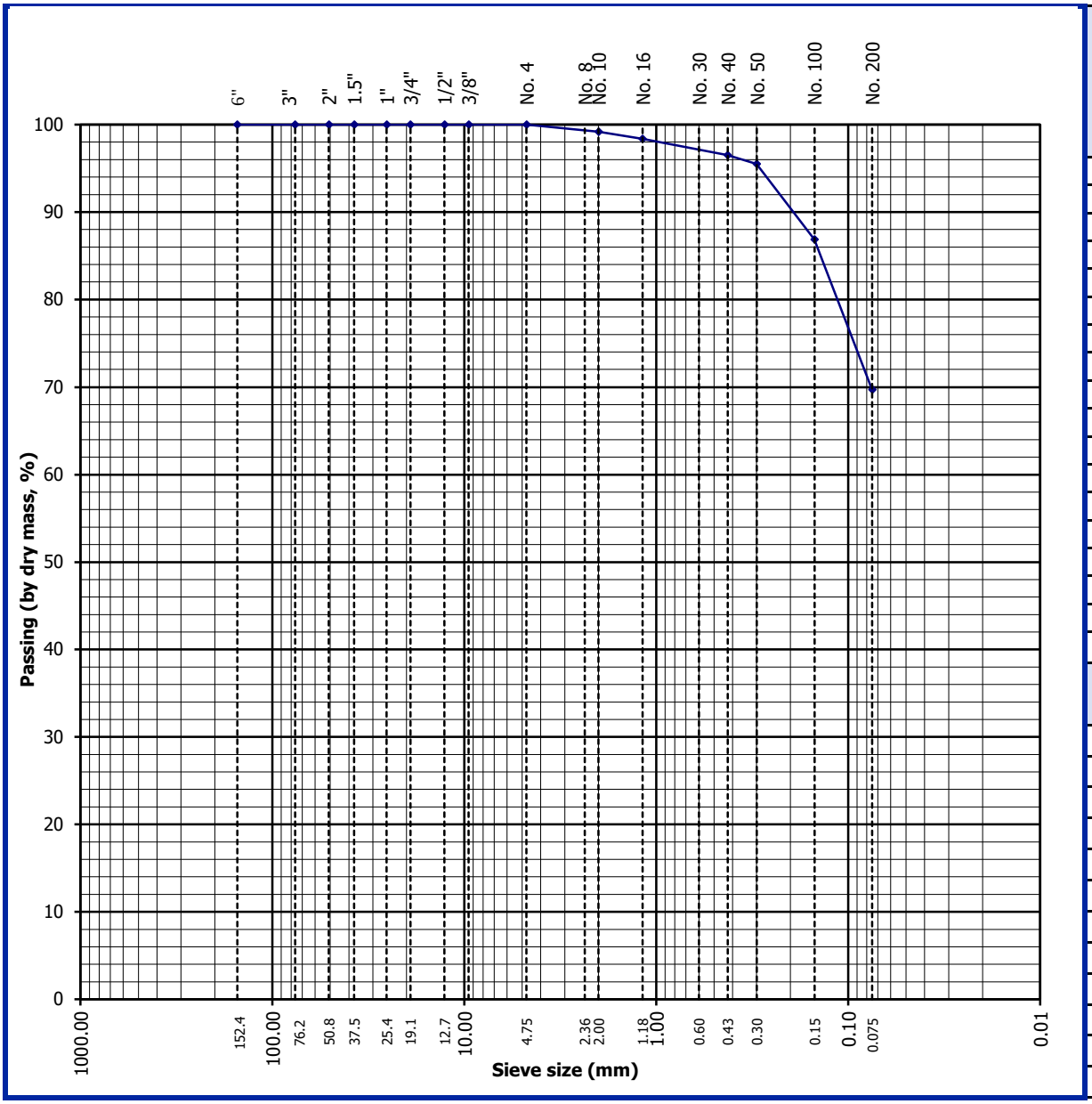
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 12, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252107	Reviewer	G. Hoyos
Sample location	TH-2 at 5 to 10 feet		
Visual description	CLAY, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**18**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	99
#16	98
#30	
#40	97
#50	95
#100	87
#200	69.7

Moisture (M) and Density (D)	
M (%)	3.3
D (pcf)	
LL	46
PL	18
PI	28
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

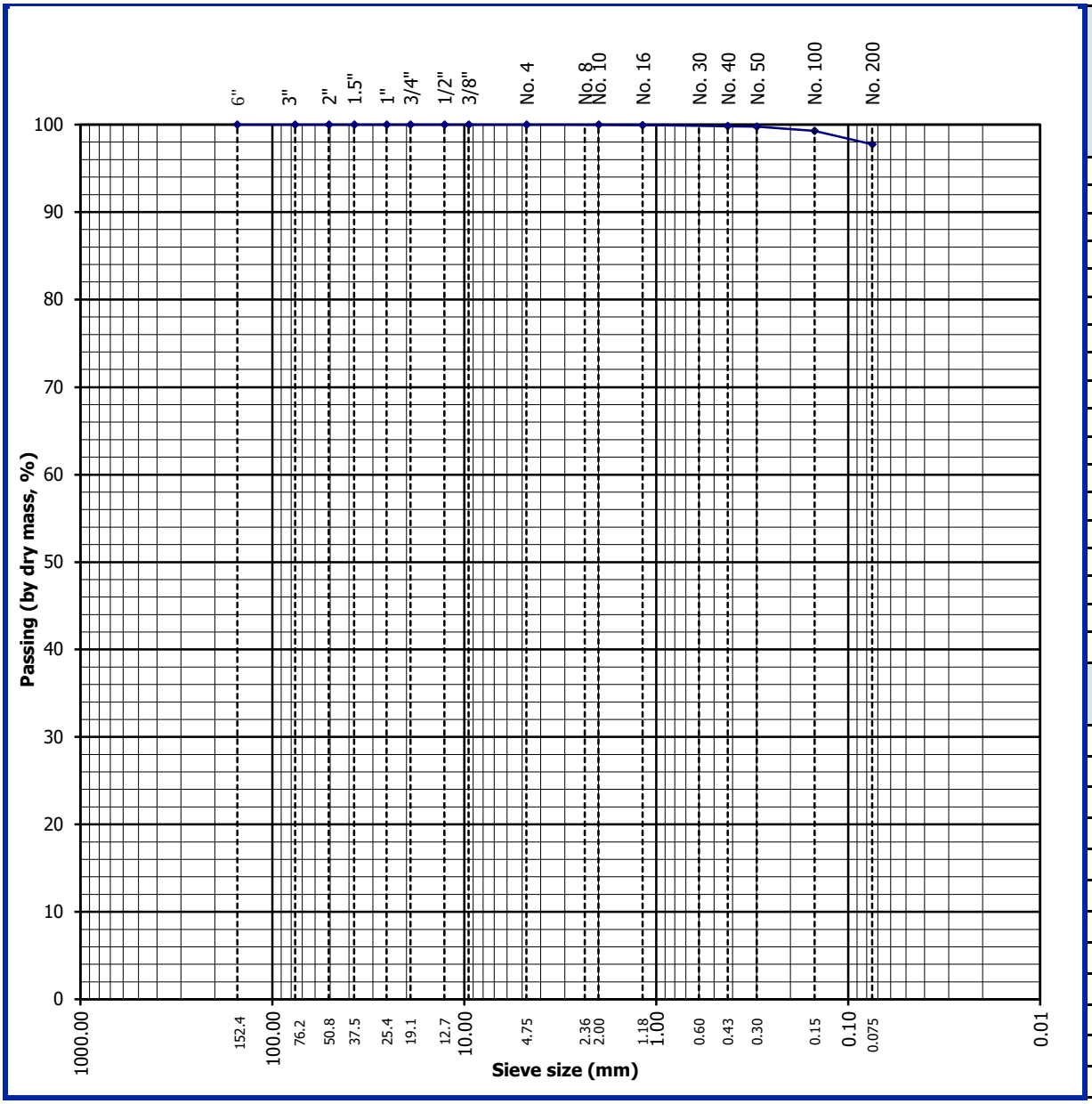
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 7, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252106	Reviewer	G. Hoyos
Sample location	TH-2 at 14 feet		
Visual description	CLAYSTONE, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**40**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CH)	**Fat clay**			Specimen soaking time (min)	**1,440**

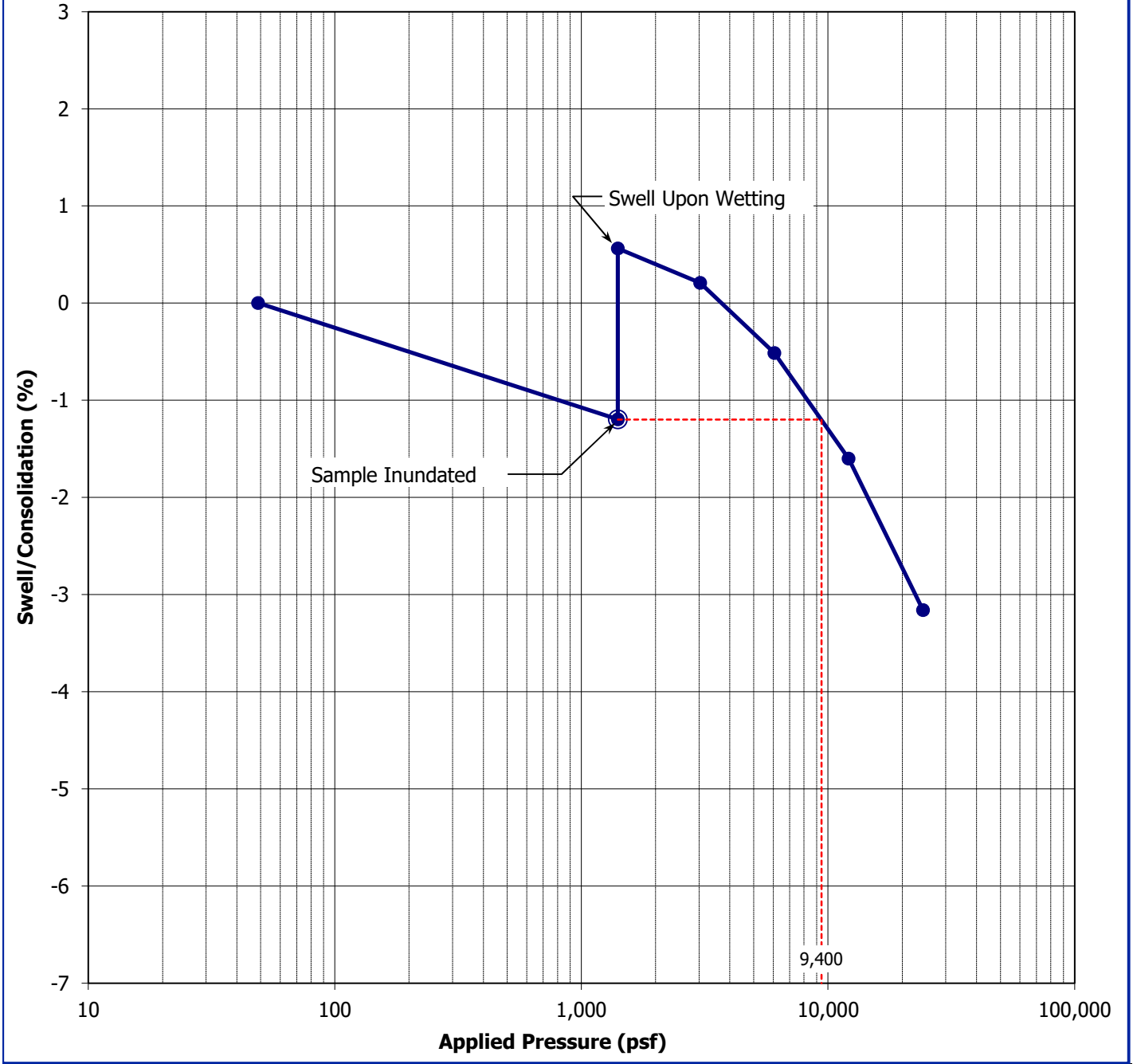


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	100
#50	100
#100	99
#200	97.8

Moisture (M) and Density (D)	
M (%)	19.4
D (pcf)	
LL	57
PL	20
PI	37
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

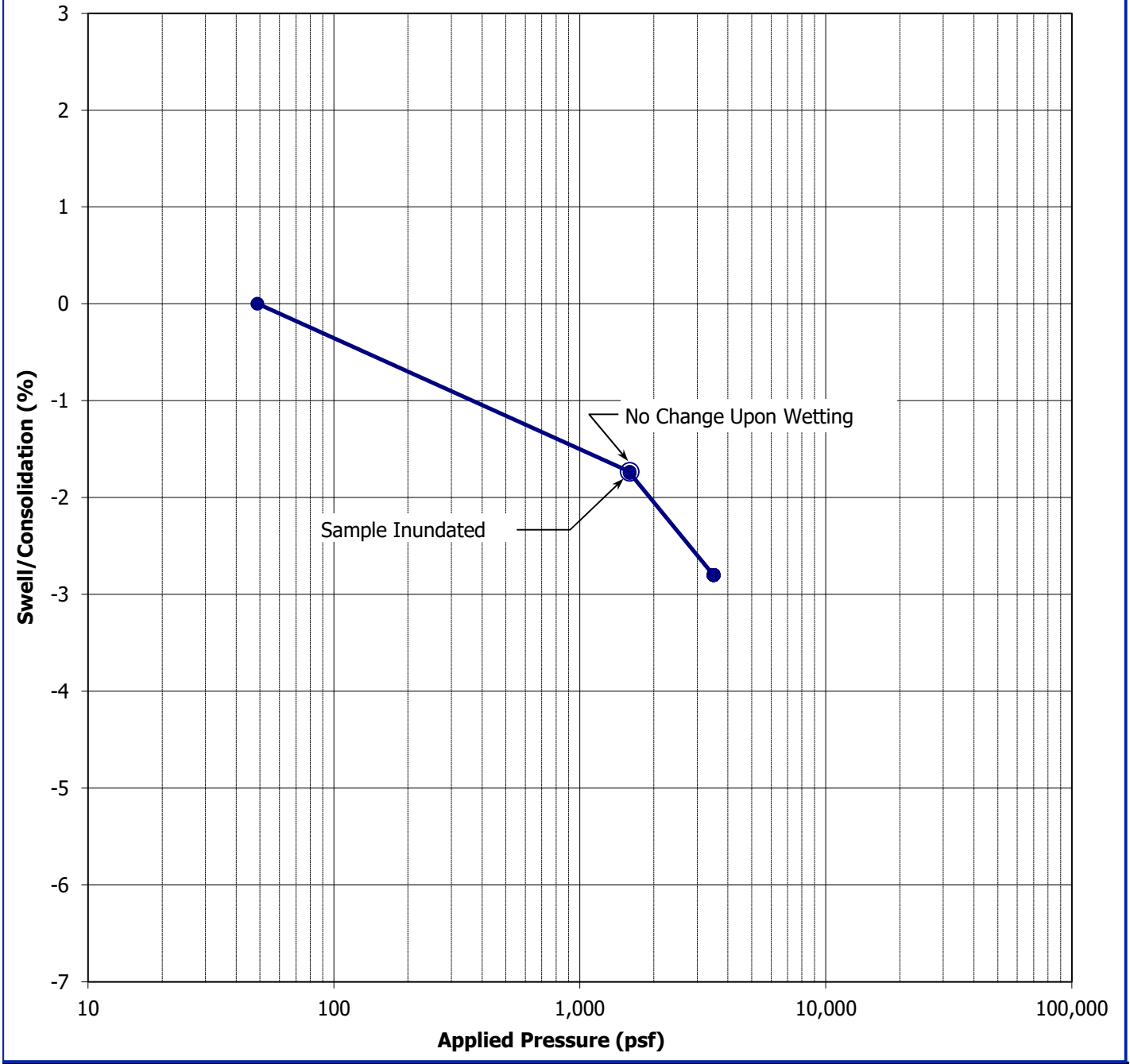


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
TH-2	14	CLAYSTONE, brown	109.8	19.4	1,405	1.8	9,400

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252106

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
TH-3	16	CLAY, with sand, brown	98.7	26.2	1,596	0.0	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252171

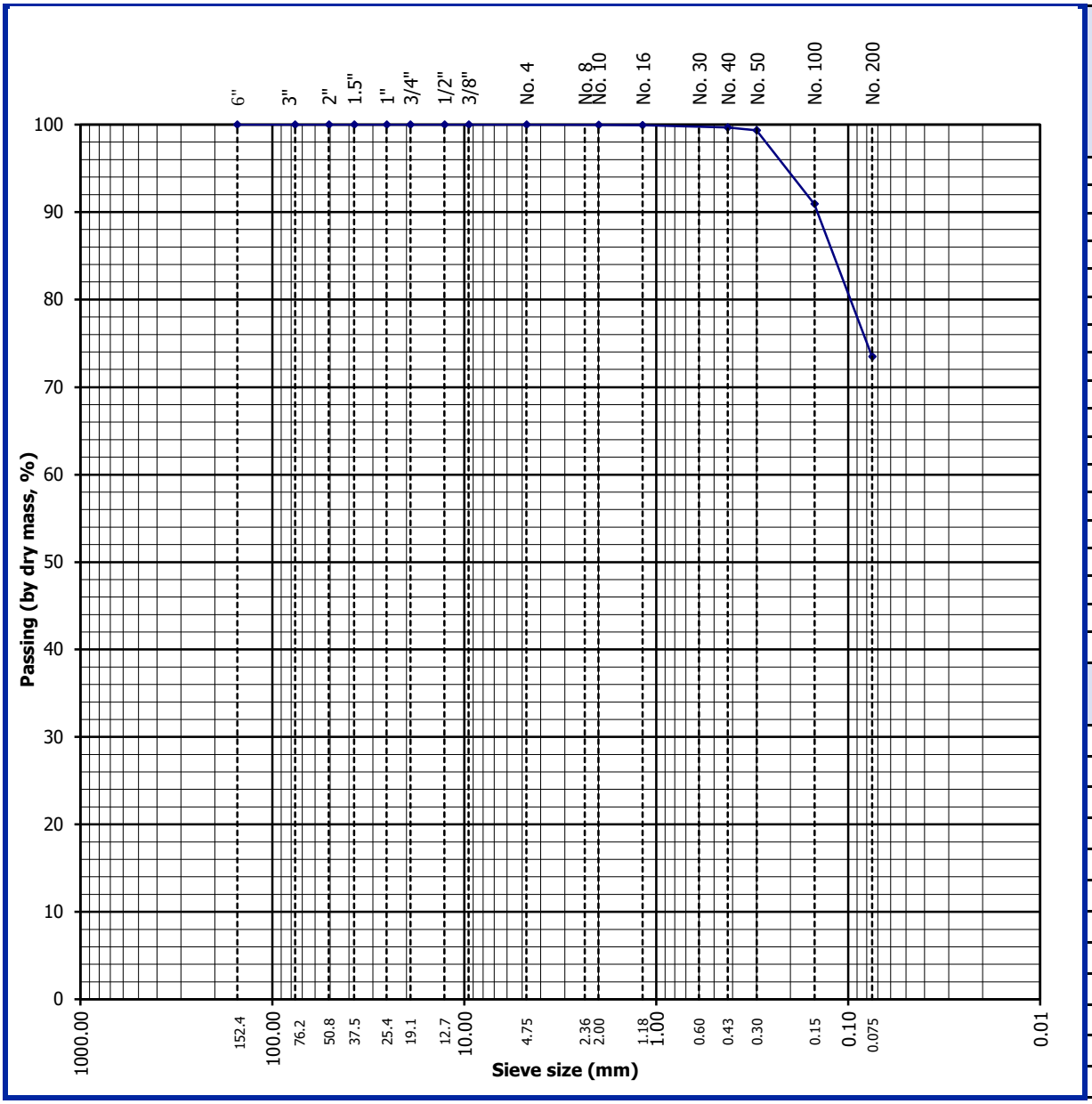
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 26, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252172	Reviewer	G. Hoyos
Sample location	TH-3 at 5 feet to 10 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**23**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	

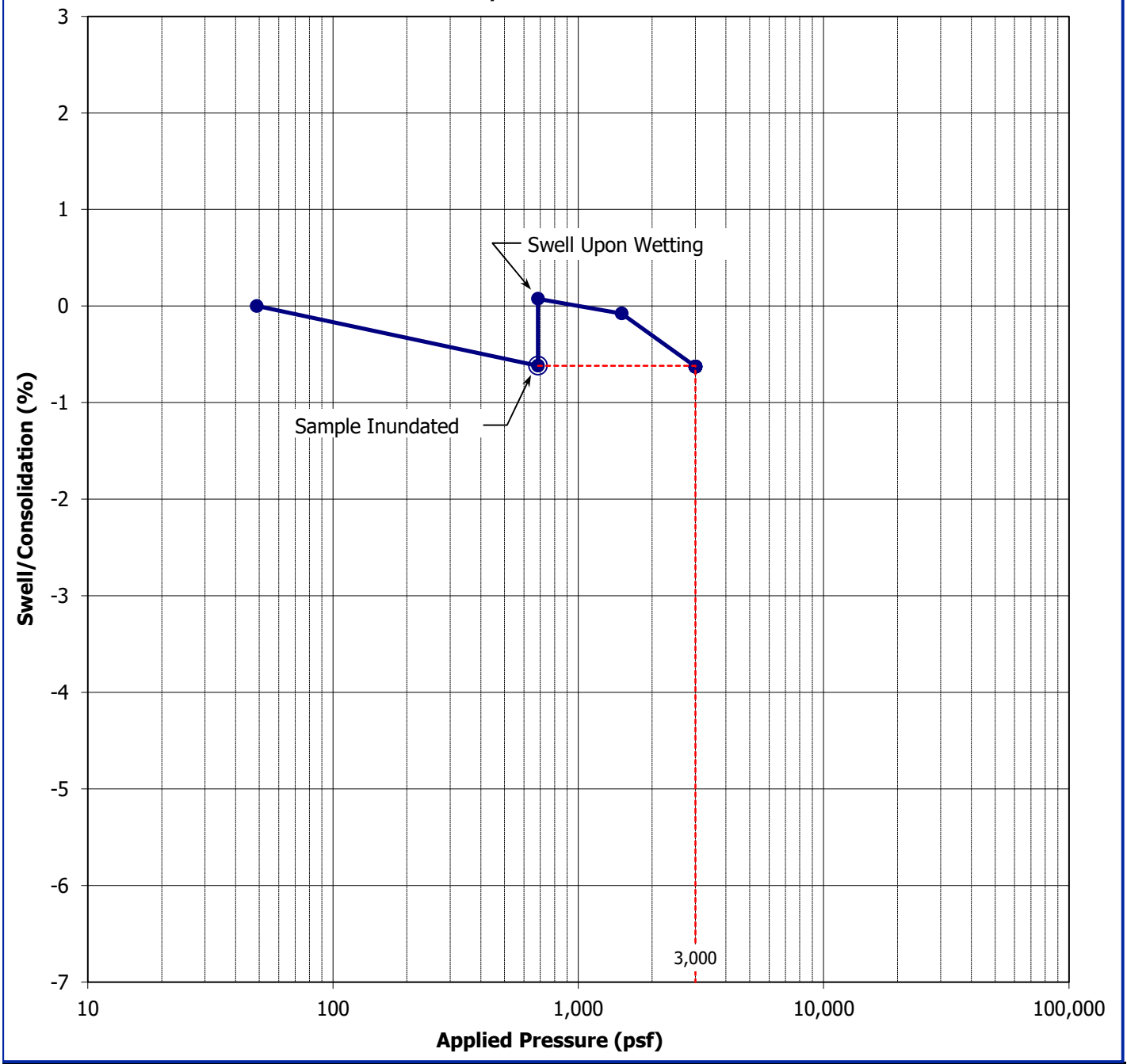


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	91
#200	73.5

Moisture (M) and Density (D)	
M (%)	5.1
D (pcf)	
LL	47
PL	13
PI	34
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
TH-4	7	CLAY, with sand, brown	105.3	21.8	684	0.7	3,000

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252174

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	Thornton-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	August 7, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252679	Reviewer:	G. Hoos	CLAY, sandy, brown	

Sample Data:

Diameter:	1.92	in.	Length:	3.88	in.
Diameter:	1.91	in.	Length:	3.87	in.
Diameter:	1.91	in.	Length:	3.88	in.
Avg. Dia.	***1.91***	in.	Avg. L.	***3.88***	in.
Aspect Ratio (L/Dia):	**2.02**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	1	50.0	0.300 (0:00)	7.7	36	1,661.7
0.010 (0:00)	0.3	8	399.2	0.350 (0:00)	9.0	37	1,684.0
0.025 (0:00)	0.6	13	646.2	0.400 (0:00)	10.3	38	1,704.9
0.050 (0:00)	1.3	16	790.2	0.450 (0:00)	11.6	39	1,724.6
0.075 (0:00)	1.9	18	883.1	0.500 (0:00)	12.9	39	1,699.5
0.100 (0:00)	2.6	21	1,023.5	0.550 (0:00)	14.2	39	1,674.3
0.125 (0:00)	3.2	24	1,162.0	0.600 (0:00)			
0.150 (0:00)	3.9	25	1,202.4	0.650 (0:00)			
0.175 (0:00)	4.5	27	1,289.8	0.700 (0:00)			
0.200 (0:00)	5.2	30	1,423.5	0.750 (0:00)			
0.225 (0:00)	5.8	33	1,555.2	0.800 (0:00)			
0.250 (0:00)	6.5	34	1,591.3	0.850 (0:00)			
0.275 (0:00)	7.1	35	1,626.8	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 1,725 psf

Shear Strength (S_u): 863 psf

Moisture Content & Density

dish ID	G
dish mass (g)	162.1
wet soil + dish (g)	334.6
dry soil + dish (g)	301.0
moisture content:	**24.2%**
sample mass (g)	373.4
sample moisture content %	24.2%
dry sample mass (g)	300.7
wet density (pcf)	127.5
in-situ dry density (pcf)	**102.7**

Sample Sketch:

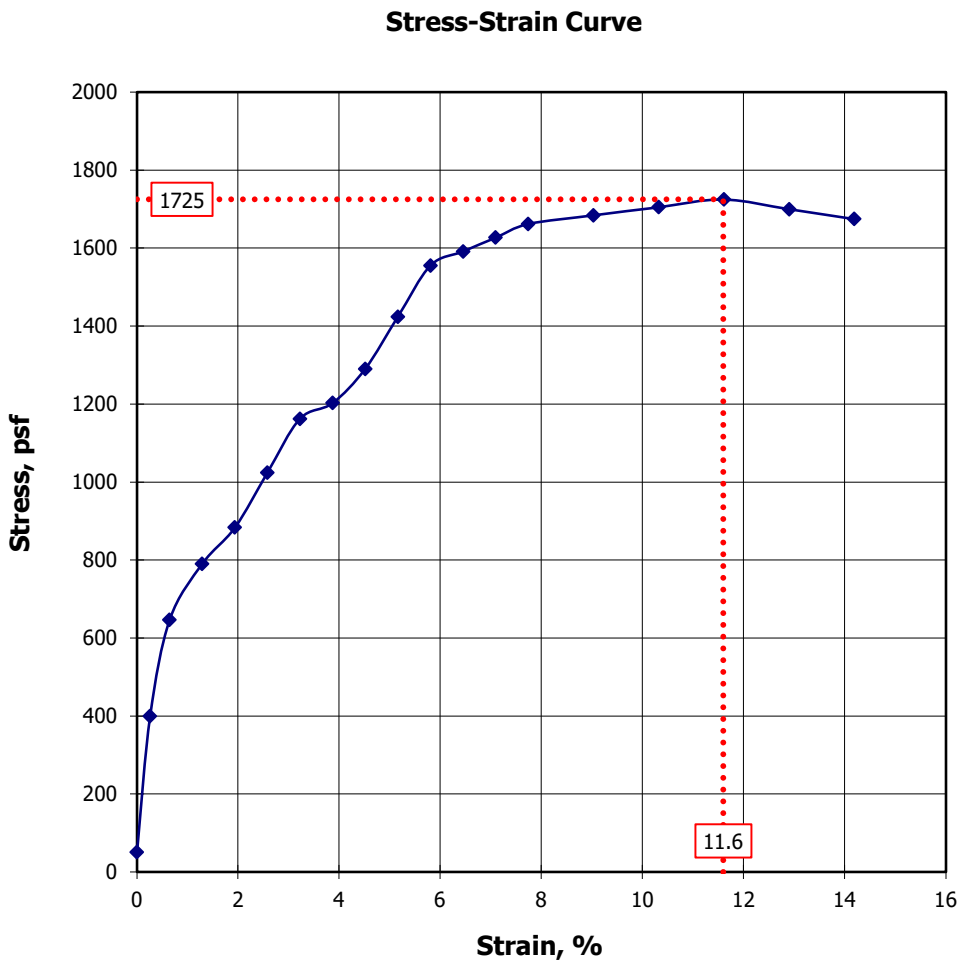
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	Thornton-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	August 7, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252679	Checked By:	G. Hoos	CLAY, sandy, brown	

Unconfined Compressive Strength (q_u):	**1,725**	**psf**	**Density (pcf):**	102.7
Shear Strength (S_u):	**863**	**psf**	**Moisture:**	24.2

Axial Strain (%)	Axial Stress (psf)
0.0	50.0
0.3	399.2
0.6	646.2
1.3	790.2
1.9	883.1
2.6	1023.5
3.2	1162.0
3.9	1202.4
4.5	1289.8
5.2	1423.5
5.8	1555.2
6.5	1591.3
7.1	1626.8
7.7	1661.7
9.0	1684.0
10.3	1704.9
11.6	1724.6
12.9	1699.5
14.2	1674.3



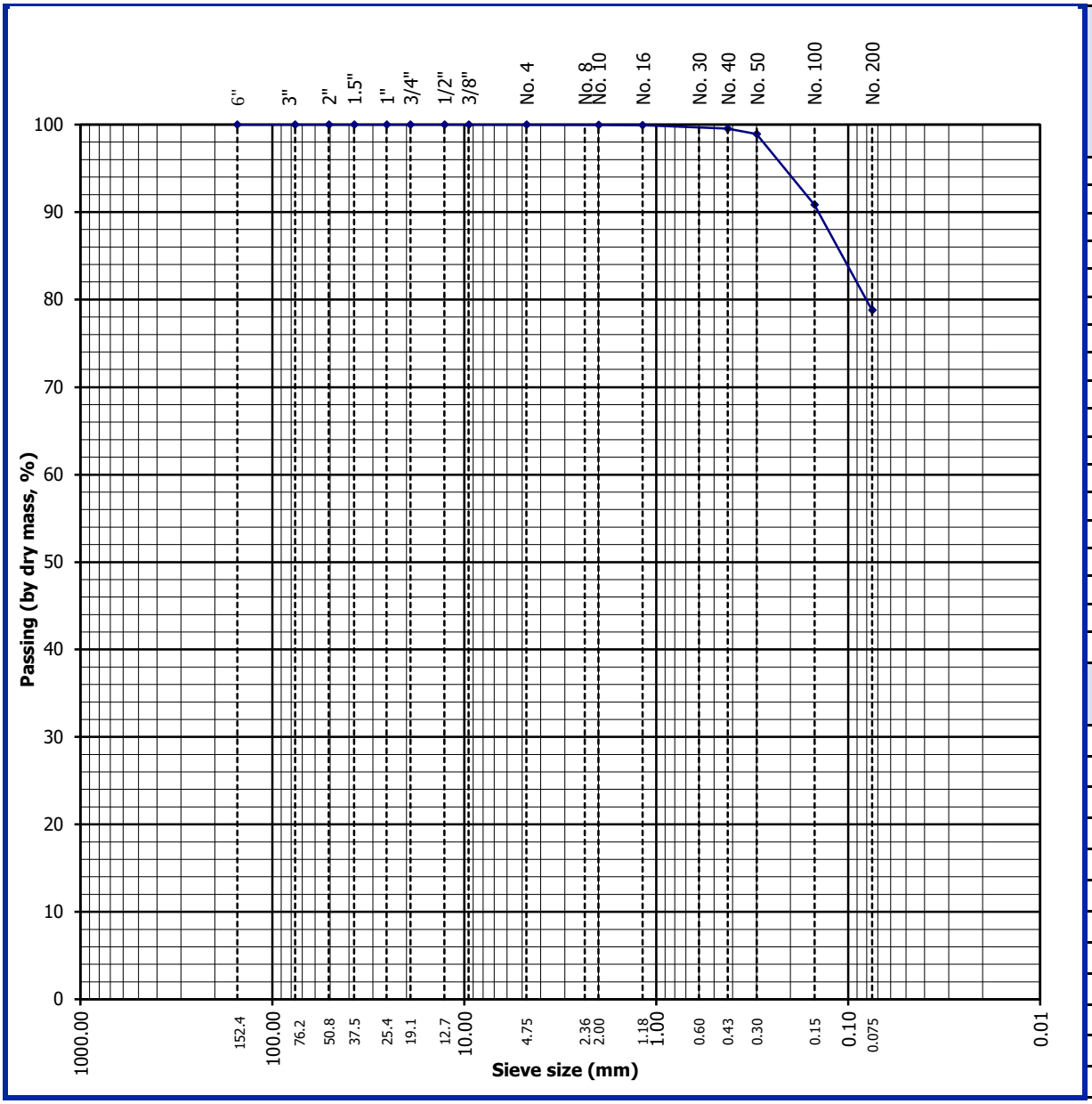
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 24, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252176	Reviewer	G. Hoyos
Sample location	TH-4 at 10 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	29	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CH)	Fat clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	91
#200	78.8

Moisture (M) and Density (D)	
M (%)	5.5
D (pcf)	
LL	52
PL	15
PI	37
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

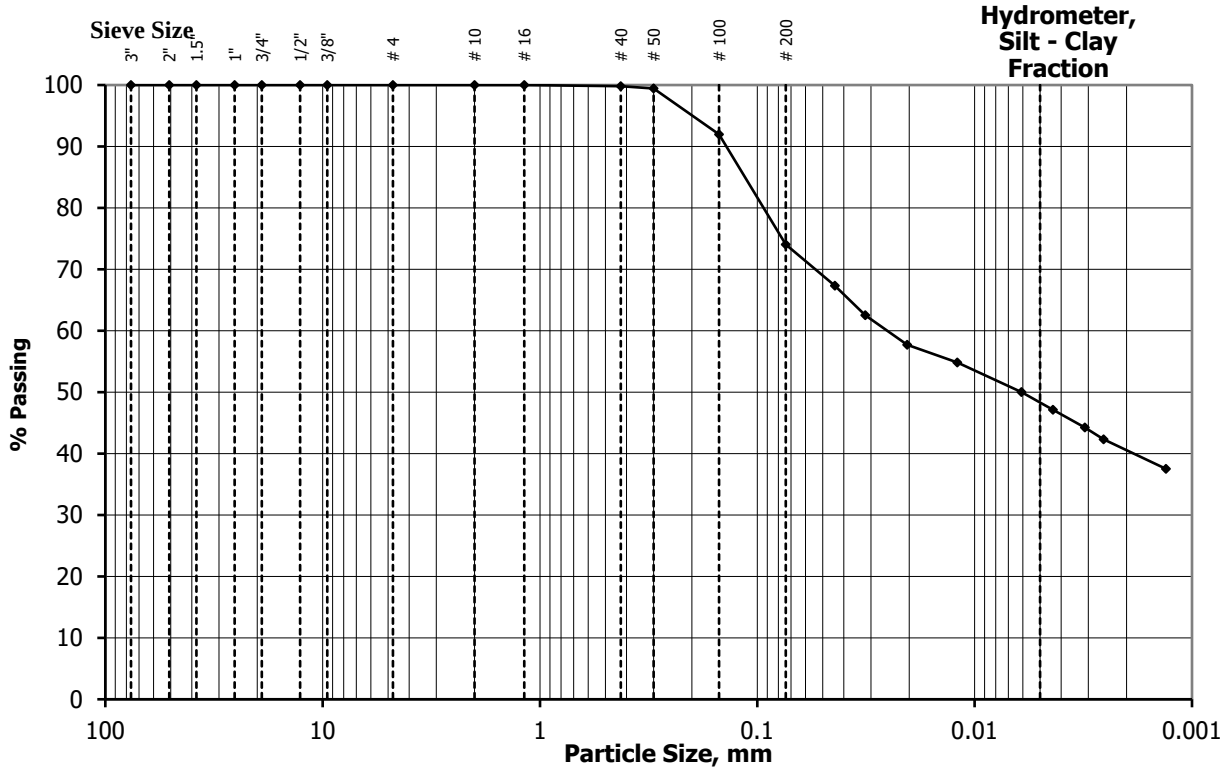
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653 (24.3040)	Date:	08/07/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252681	Reviewer:	G. Hoyos
Sample Location:	TH-4 at 13 feet		
Visual Description:	CLAY, with sand, brown		
Soil Classification (USCS):			

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	100
#50	99
#100	92
#200	74

Hydrometer	
Particle Size	**% Passing**
44 Micron	67
32 Micron	63
20 Micron	58
12 Micron	55
6 Micron	50
4.4 Micron	47
3.1 Micron	44
2.6 Micron	42
1.3 Micron	38
% Gravel:	**0**
% Sand:	**26**
% Silt:	**26**
% Clay (< 5 micron):	**48**



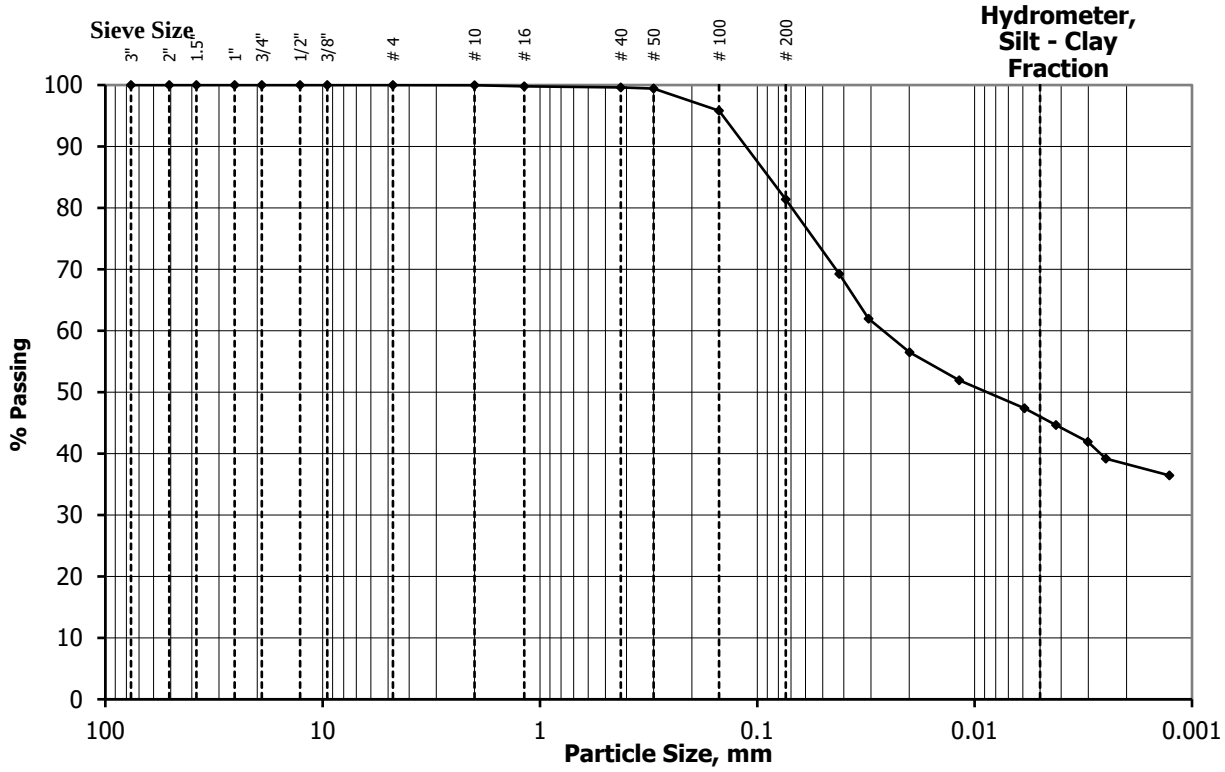
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653 (24.3040)	Date:	08/07/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252683	Reviewer:	G. Hoyos
Sample Location:	TH-4 at 17 feet		
Visual Description:	CLAY, with sand, brown		
Soil Classification (USCS):			

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	100
#50	99
#100	96
#200	81

Hydrometer	
Particle Size	**% Passing**
42 Micron	69
31 Micron	62
20 Micron	56
12 Micron	52
6 Micron	47
4.2 Micron	45
3.0 Micron	42
2.5 Micron	39
1.3 Micron	36
% Gravel:	**0**
% Sand:	**19**
% Silt:	**35**
% Clay (< 5 micron):	**46**



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	Thornton-4
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	15 feet
Date:	August 7, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252682	Reviewer:	G. Hoyos	CLAY, sandy, brown	

Sample Data:

Diameter:	1.92	in.	Length:	3.73	in.
Diameter:	1.92	in.	Length:	3.72	in.
Diameter:	1.93	in.	Length:	3.72	in.
Avg. Dia.	***1.92***	in.	Avg. L.	***3.72***	in.
Aspect Ratio (L/Dia):	**1.94**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	8.1	23	1,048.5
0.010 (0:00)	0.3	2	98.9	0.350 (0:00)	9.4	25	1,123.0
0.025 (0:00)	0.7	3	147.7	0.400 (0:00)	10.7	28	1,239.2
0.050 (0:00)	1.3	4	195.7	0.450 (0:00)	12.1	33	1,438.5
0.075 (0:00)	2.0	5	242.9	0.500 (0:00)	13.4	35	1,502.4
0.100 (0:00)	2.7	6	289.5	0.550 (0:00)	14.8	37	1,563.6
0.125 (0:00)	3.4	7	335.4	0.600 (0:00)	16.1	38	1,580.6
0.150 (0:00)	4.0	8	380.7	0.650 (0:00)	17.5	40	1,637.1
0.175 (0:00)	4.7	9	425.3	0.700 (0:00)	18.8	42	1,691.0
0.200 (0:00)	5.4	12	563.0	0.750 (0:00)	20.1	41	1,623.5
0.225 (0:00)	6.0	15	698.8	0.800 (0:00)	21.5	41	1,596.2
0.250 (0:00)	6.7	19	878.8	0.850 (0:00)			
0.275 (0:00)	7.4	22	1,010.2	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 1,695 psf

Shear Strength (S_u): 848 psf

Moisture Content & Density	
dish ID	W
dish mass (g)	166.2
wet soil + dish (g)	297.3
dry soil + dish (g)	272.4
moisture content:	**23.4%**
sample mass (g)	368.3
sample moisture content %	23.4%
dry sample mass (g)	298.5
wet density (pcf)	129.7
in-situ dry density (pcf)	**105.1**

Sample Sketch:

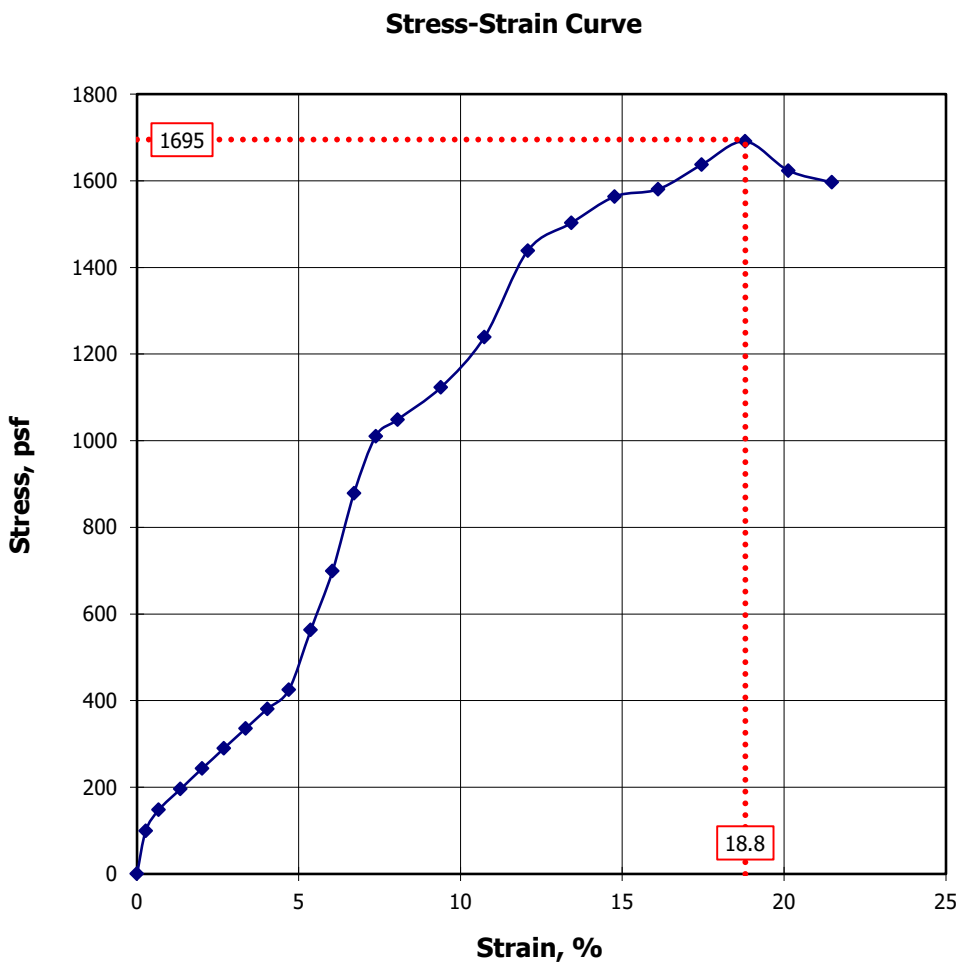
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	Thornton-4
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	15 feet
Date:	August 7, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252682	Checked By:	G. Hoyos	CLAY, sandy, brown	

Unconfined Compressive Strength (q_u):	**1,695**	**psf**	**Density (pcf):**	105.1
Shear Strength (S_u):	**848**	**psf**	**Moisture:**	23.4

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	98.9
0.7	147.7
1.3	195.7
2.0	242.9
2.7	289.5
3.4	335.4
4.0	380.7
4.7	425.3
5.4	563.0
6.0	698.8
6.7	878.8
7.4	1010.2
8.1	1048.5
9.4	1123.0
10.7	1239.2
12.1	1438.5
13.4	1502.4
14.8	1563.6
16.1	1580.6
17.5	1637.1
18.8	1691.0
20.1	1623.5
21.5	1596.2



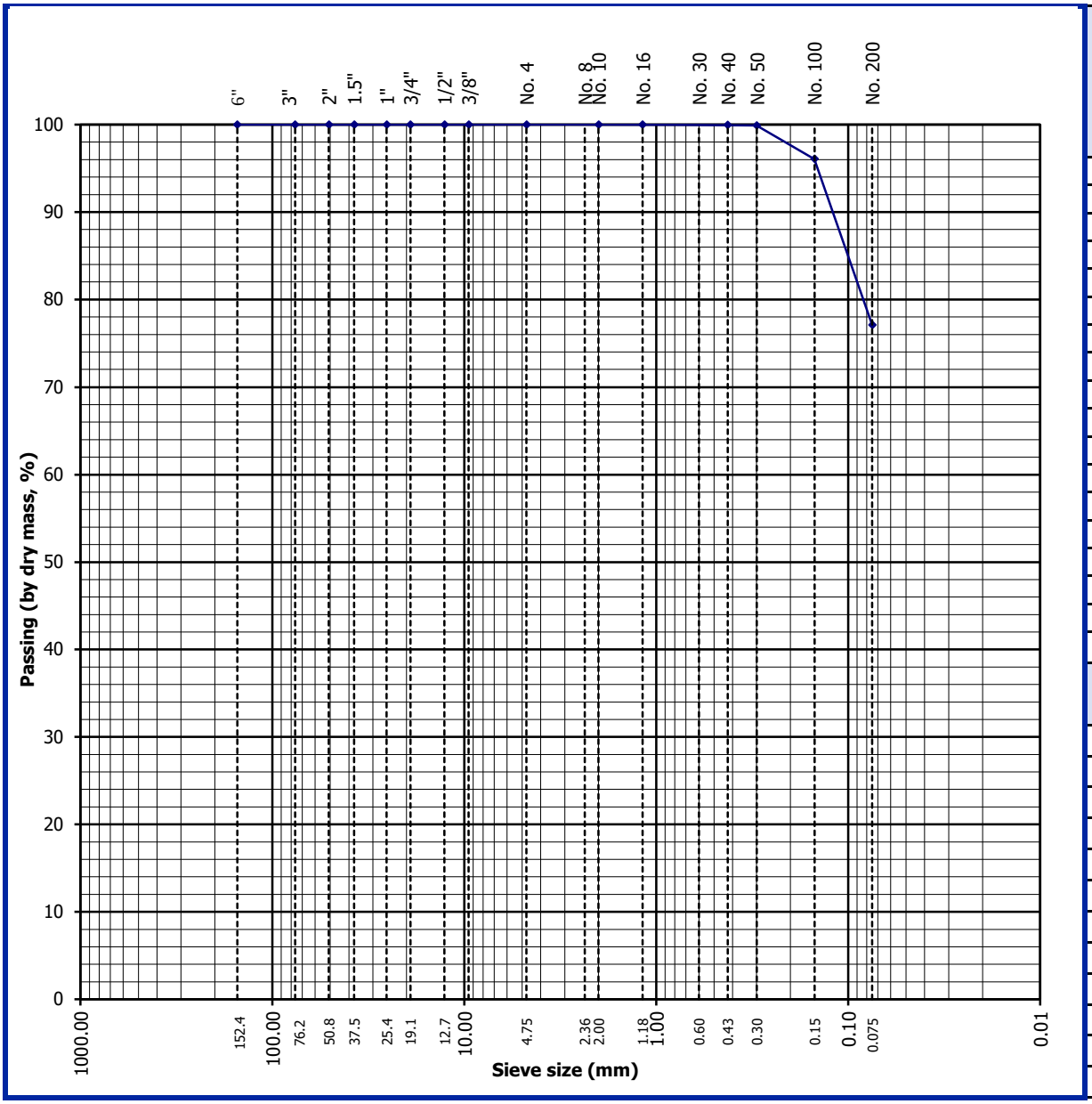
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 7, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252098	Reviewer	G. Hoyos
Sample location	KR-1 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**17**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	100
#100	96
#200	77.1

Moisture (M) and Density (D)	
M (%)	27.4
D (pcf)	
LL	38
PL	14
PI	24
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

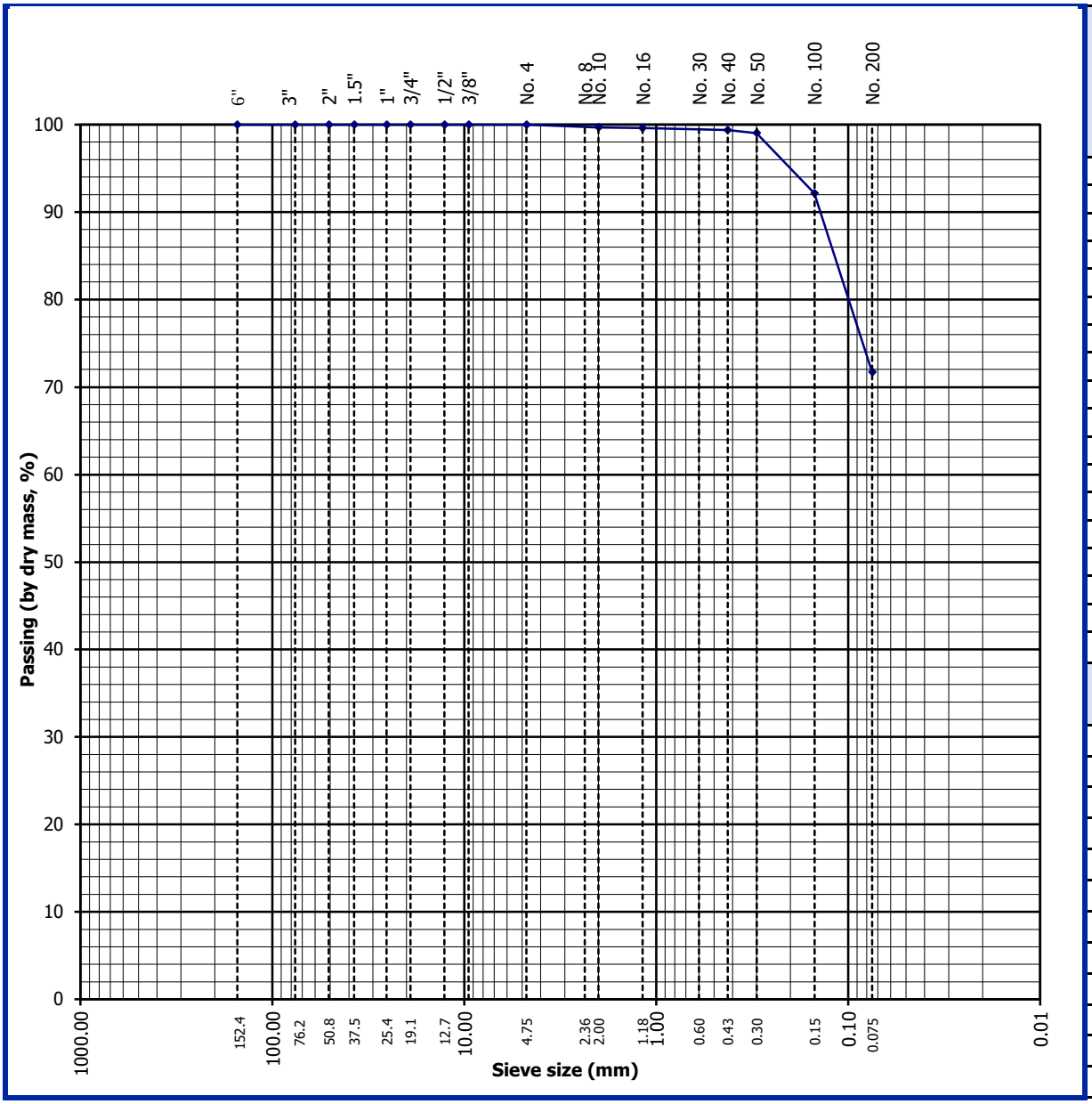
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 10, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252100	Reviewer	G. Hoyos
Sample location	KR-1 at 10 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**14**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

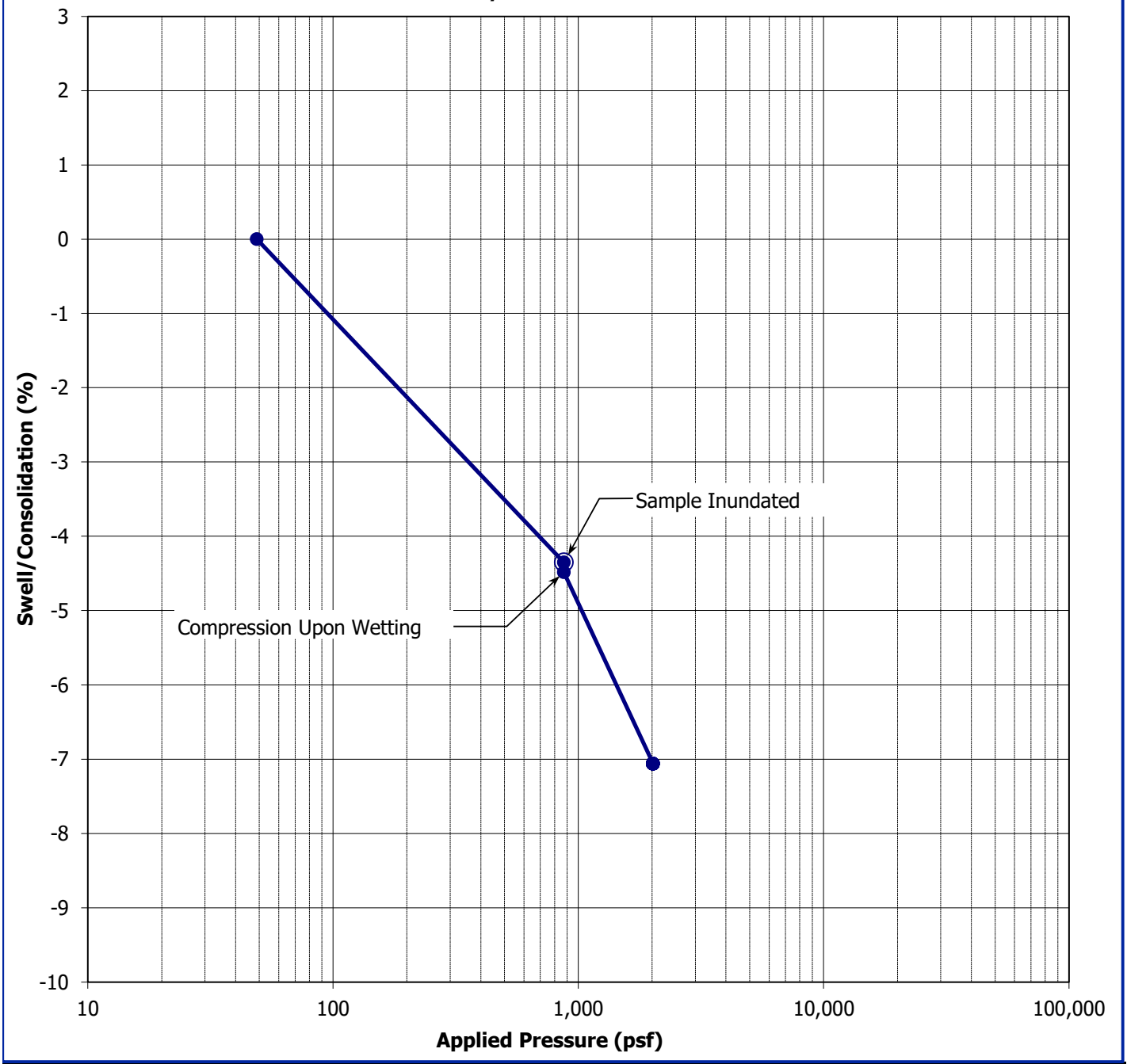


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	92
#200	71.7

Moisture (M) and Density (D)	
M (%)	5.2
D (pcf)	
LL	37
PL	14
PI	23
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
KR-1	9	CLAY, with sand, brown	98.7	27.4	873	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252098

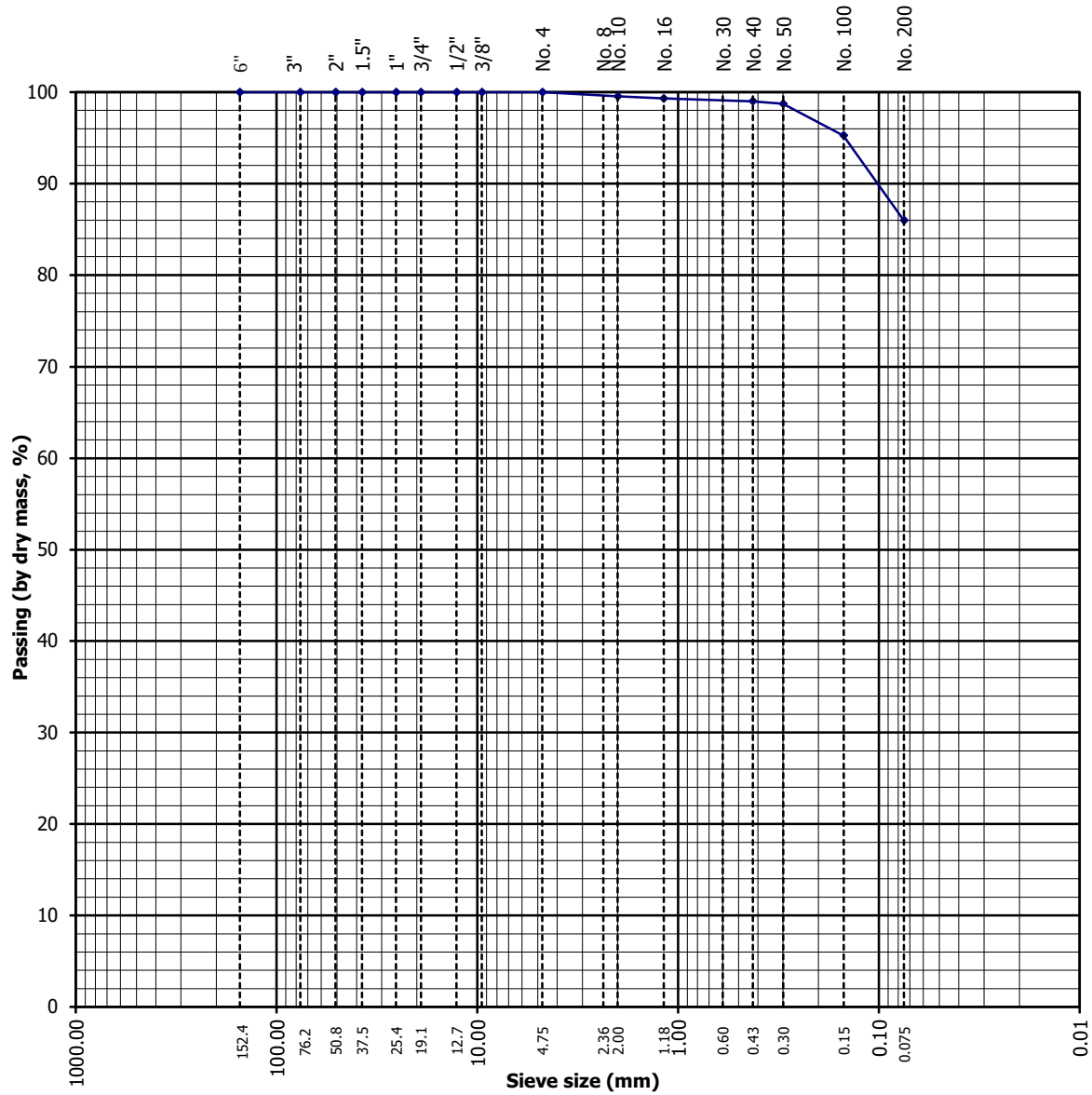
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 12, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252102	Reviewer	G. Hoyos
Sample location	KR-2 at 5 to 10 feet		
Visual description	CLAY, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	24	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay			Specimen soaking time (min)	1,440

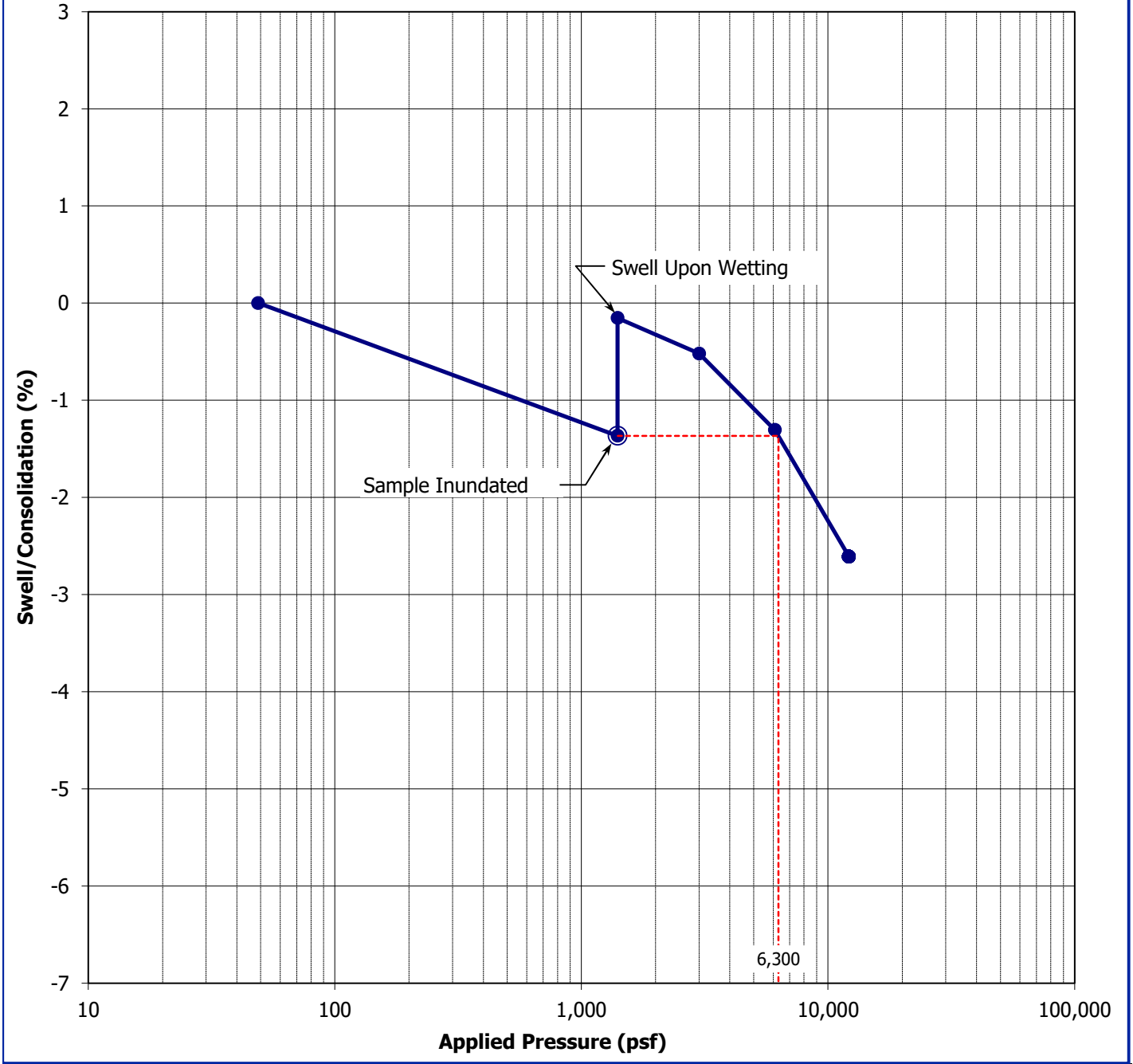


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	99
#30	
#40	99
#50	99
#100	95
#200	86.0

Moisture (M) and Density (D)	
M (%)	4.1
D (pcf)	
LL	42
PL	13
PI	29
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
KR-2	14	CLAYSTONE, brown	115.5	15.9	1,403	1.2	6,300

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252101

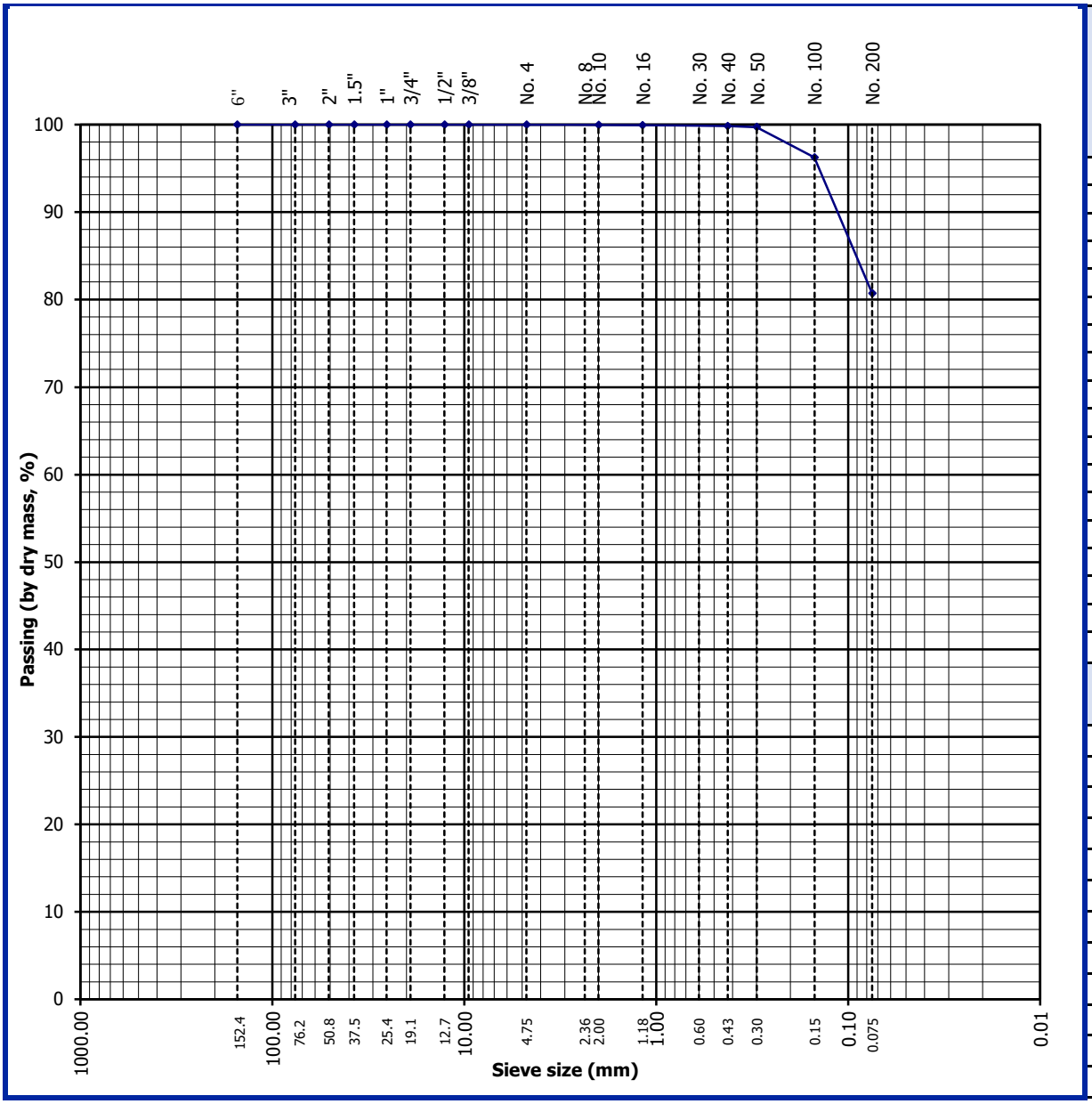
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 26, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J, Wayne
Lab ID number	252169	Reviewer	G. Hoyos
Sample location	KR-3 at 10 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	21	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	100
#100	96
#200	80.7

Moisture (M) and Density (D)	
M (%)	4.1
D (pcf)	
LL	42
PL	14
PI	28
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

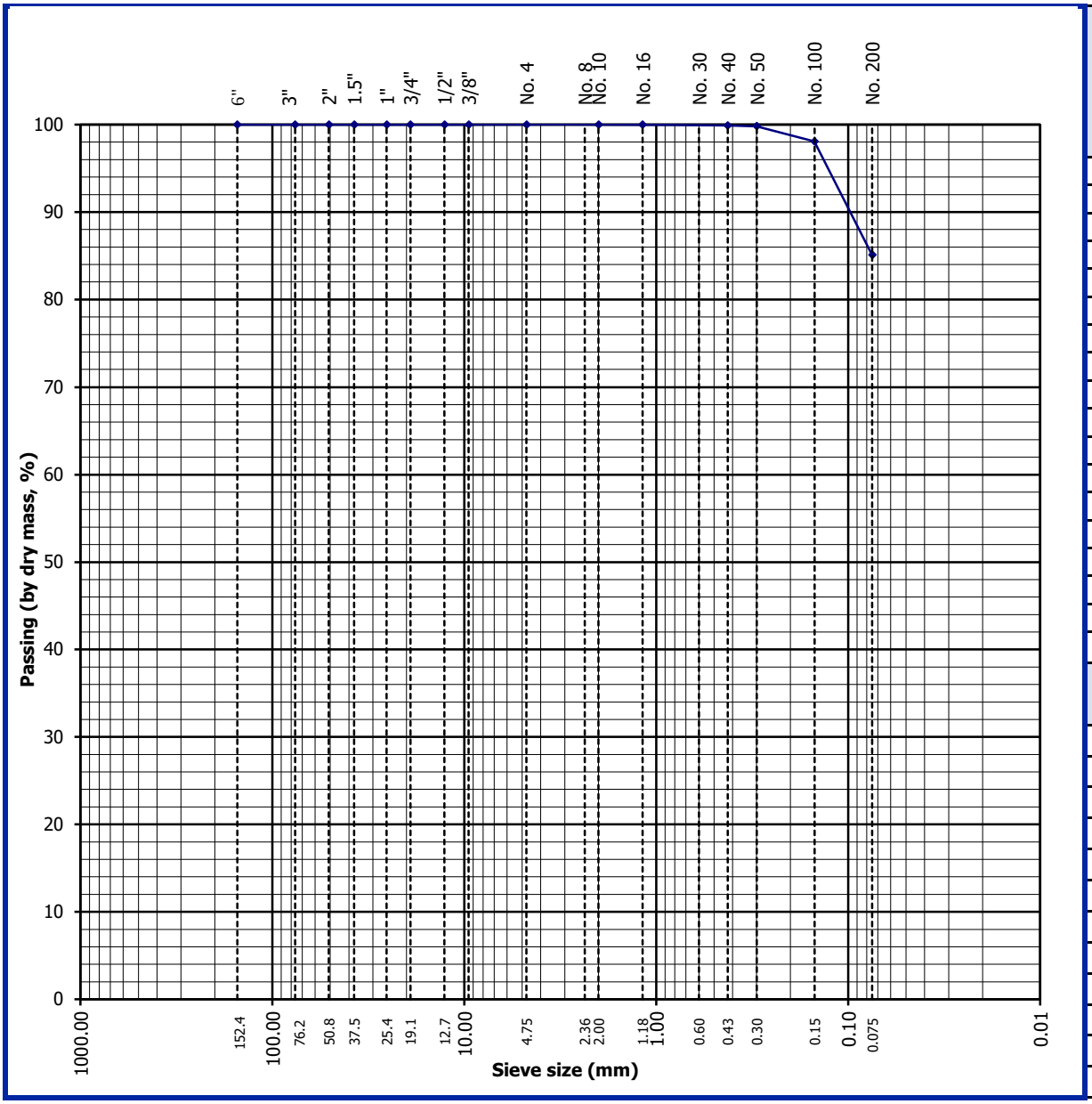
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	500653(24.3040)	Date	August 3, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252684	Reviewer	G. Hoyos
Sample location	Kraft-3 at 9 feet		
Visual description	CLAY, brown		

AASHTO M145 Classification			Soaking Method	
			Procedure	**Method**
Classification		**Group Index**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)			ASTM D1140	**B**
()			Specimen soaking time (min)	**1,440**

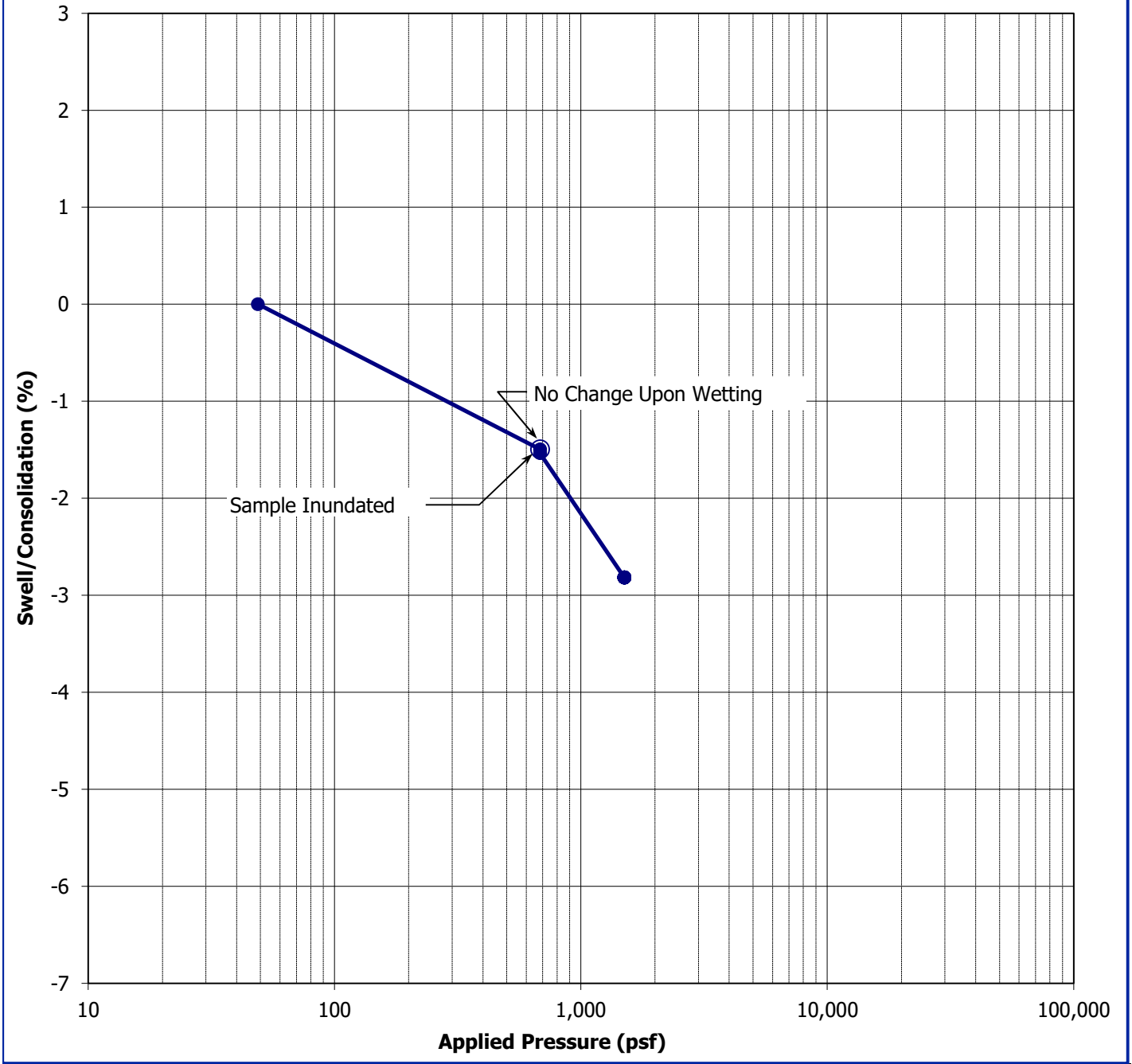


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	100
#50	100
#100	98
#200	85.1

Moisture (M) and Density (D)	
M (%)	24.3
D (pcf)	
LL	
PL	
PI	
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

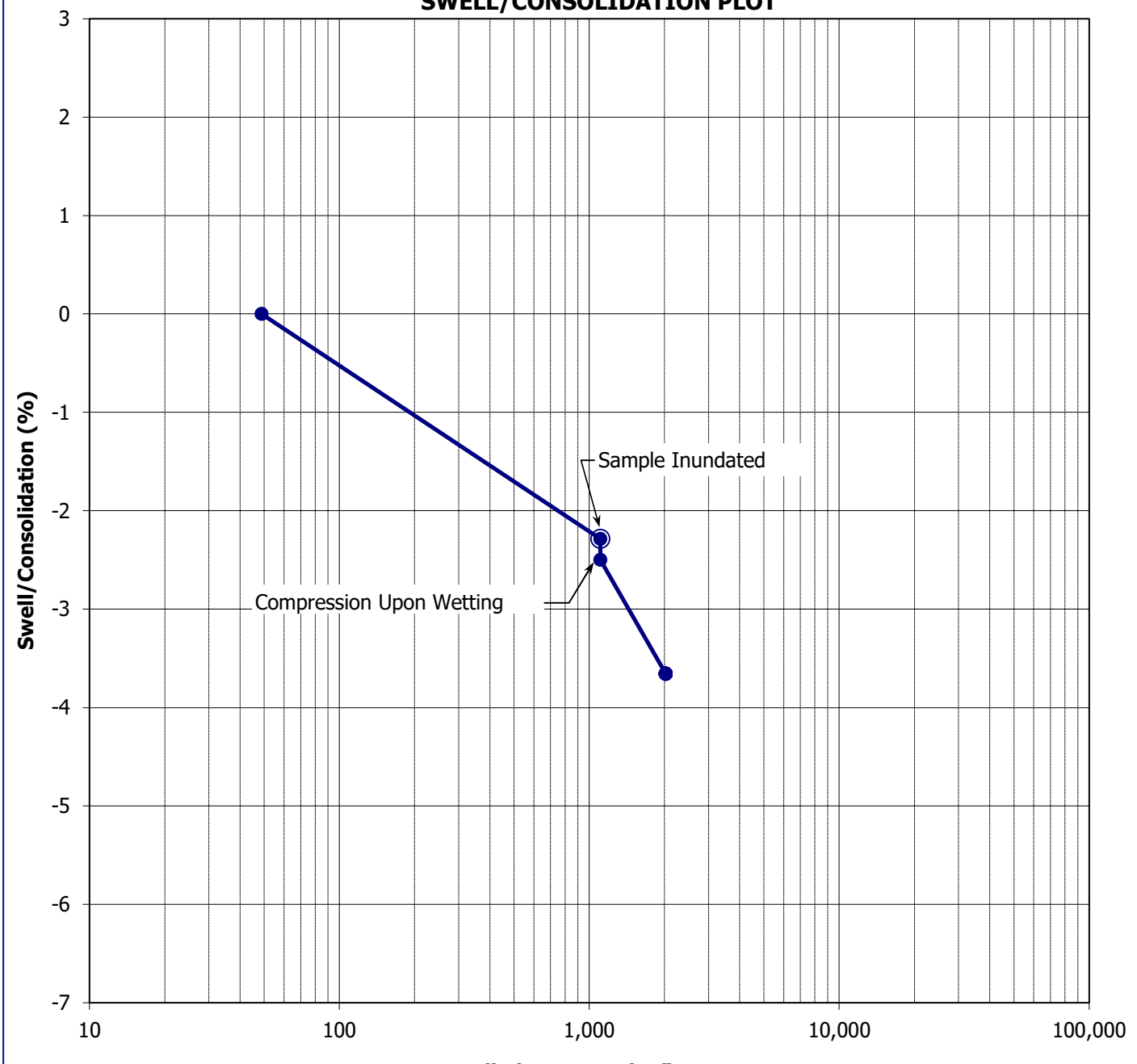


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
KR-3	7	CLAY, with sand, brown	98.0	23.9	683	0.0	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252165

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
KR-3	11	CLAY, with sand, brown	98.3	26.4	1,107	-0.2	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252166

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	Kraft-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	11 feet
Date:	August 14, 2025	Technician:	KJM	Visual Description of Sample:	
Lab ID Number:	252685	Reviewer:	G. Hoyos	CLAY, brown	

Sample Data:

Diameter:	1.94	in.	Length:	3.73	in.
Diameter:	1.90	in.	Length:	3.72	in.
Diameter:	1.92	in.	Length:	3.70	in.
Avg. Dia.	***1.92***	in.	Avg. L.	***3.72***	in.
Aspect Ratio (L/Dia):	**1.94**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	8.1	23	1,052.9
0.010 (0:00)	0.3	4	198.6	0.350 (0:00)	9.4	24	1,082.6
0.025 (0:00)	0.7	8	395.7	0.400 (0:00)	10.8	25	1,111.0
0.050 (0:00)	1.3	11	540.4	0.450 (0:00)	12.1	26	1,138.0
0.075 (0:00)	2.0	13	634.3	0.500 (0:00)	13.4	27	1,163.7
0.100 (0:00)	2.7	14	678.4	0.550 (0:00)	14.8	28	1,188.0
0.125 (0:00)	3.4	16	770.0	0.600 (0:00)	16.1	29	1,211.0
0.150 (0:00)	4.0	17	812.4	0.650 (0:00)	17.5	30	1,232.7
0.175 (0:00)	4.7	19	901.6	0.700 (0:00)	18.8	30	1,212.6
0.200 (0:00)	5.4	20	942.3	0.750 (0:00)	20.2	30	1,192.5
0.225 (0:00)	6.1	20	935.7	0.800 (0:00)	21.5	30	1,172.4
0.250 (0:00)	6.7	22	1,021.8	0.850 (0:00)	22.9	32	1,229.1
0.275 (0:00)	7.4	22	1,014.5	0.900 (0:00)	24.2	32	1,207.7

Unconfined Compressive Strength (q_u): 1,235 psf

Shear Strength (S_u): 618 psf

Moisture Content & Density	
dish ID	B4
dish mass (g)	158.2
wet soil + dish (g)	260.7
dry soil + dish (g)	240.4
moisture content:	**24.6%**
sample mass (g)	337.0
sample moisture content %	24.6%
dry sample mass (g)	270.5
wet density (pcf)	119.4
in-situ dry density (pcf)	**95.9**

Sample Sketch:

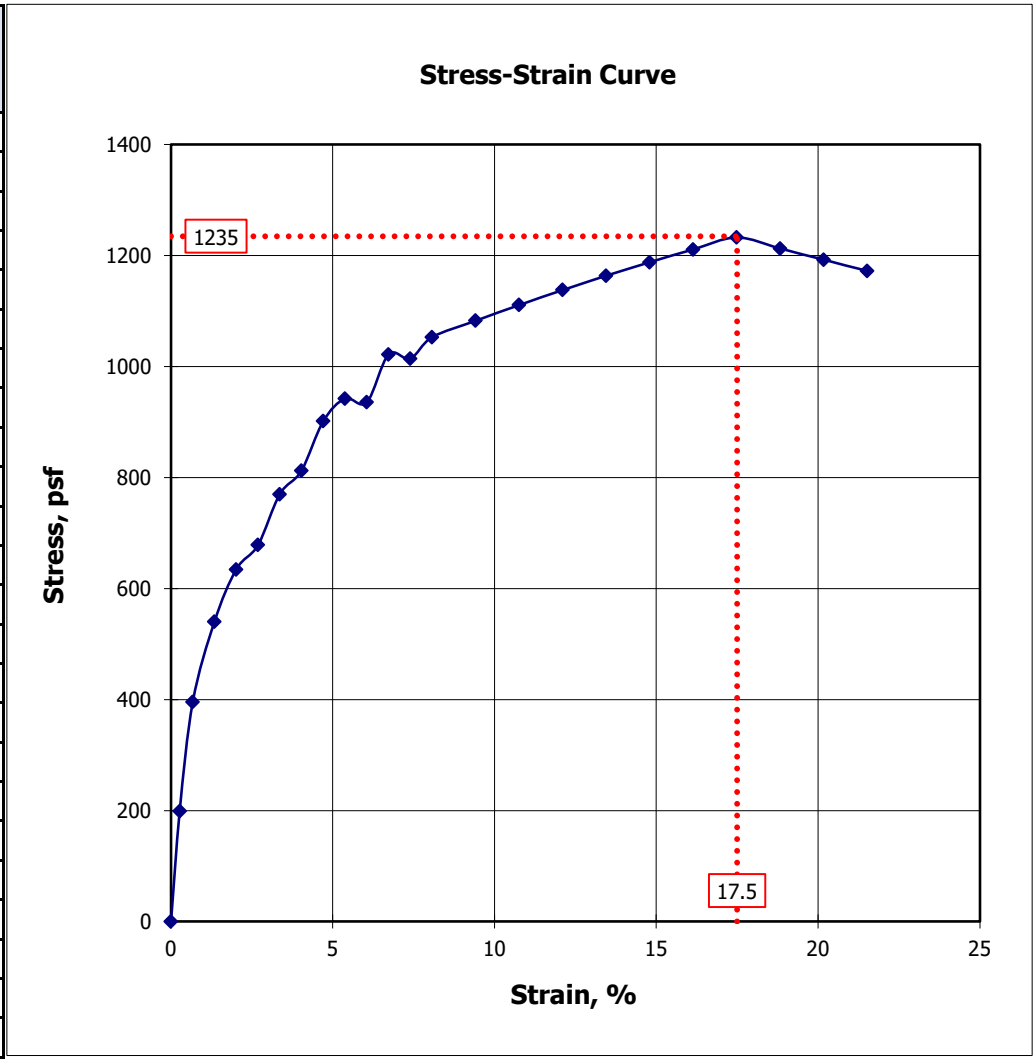
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	Kraft-3
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	11 feet
Date:	August 14, 2025	Lab Tech:	KJM	Visual Description of Sample:	
Lab ID:	252685	Checked By:	G. Hoyos	CLAY, brown	

Unconfined Compressive Strength (q_u):	**1,235**	**psf**	**Density (pcf):**	95.9
Shear Strength (S_u):	**618**	**psf**	**Moisture:**	24.6

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	198.6
0.7	395.7
1.3	540.4
2.0	634.3
2.7	678.4
3.4	770.0
4.0	812.4
4.7	901.6
5.4	942.3
6.1	935.7
6.7	1021.8
7.4	1014.5
8.1	1052.9
9.4	1082.6
10.8	1111.0
12.1	1138.0
13.4	1163.7
14.8	1188.0
16.1	1211.0
17.5	1232.7
18.8	1212.6
20.2	1192.5
21.5	1172.4



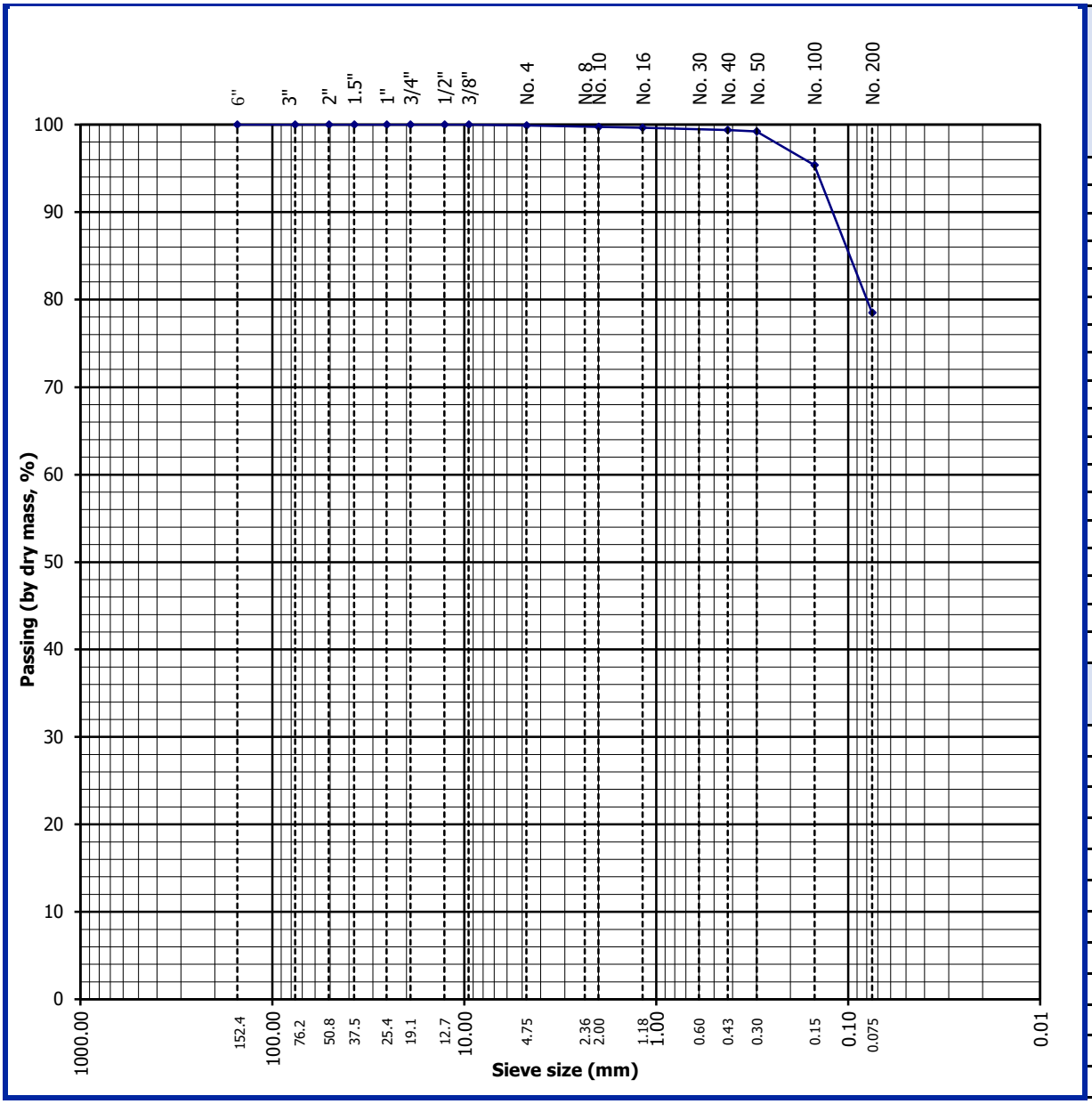
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252077	Reviewer	G. Hoyos
Sample location	BA-1 at 8 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	19	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	95
#200	78.5

Moisture (M) and Density (D)	
M (%)	20.3
D (pcf)	
LL	41
PL	15
PI	26
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

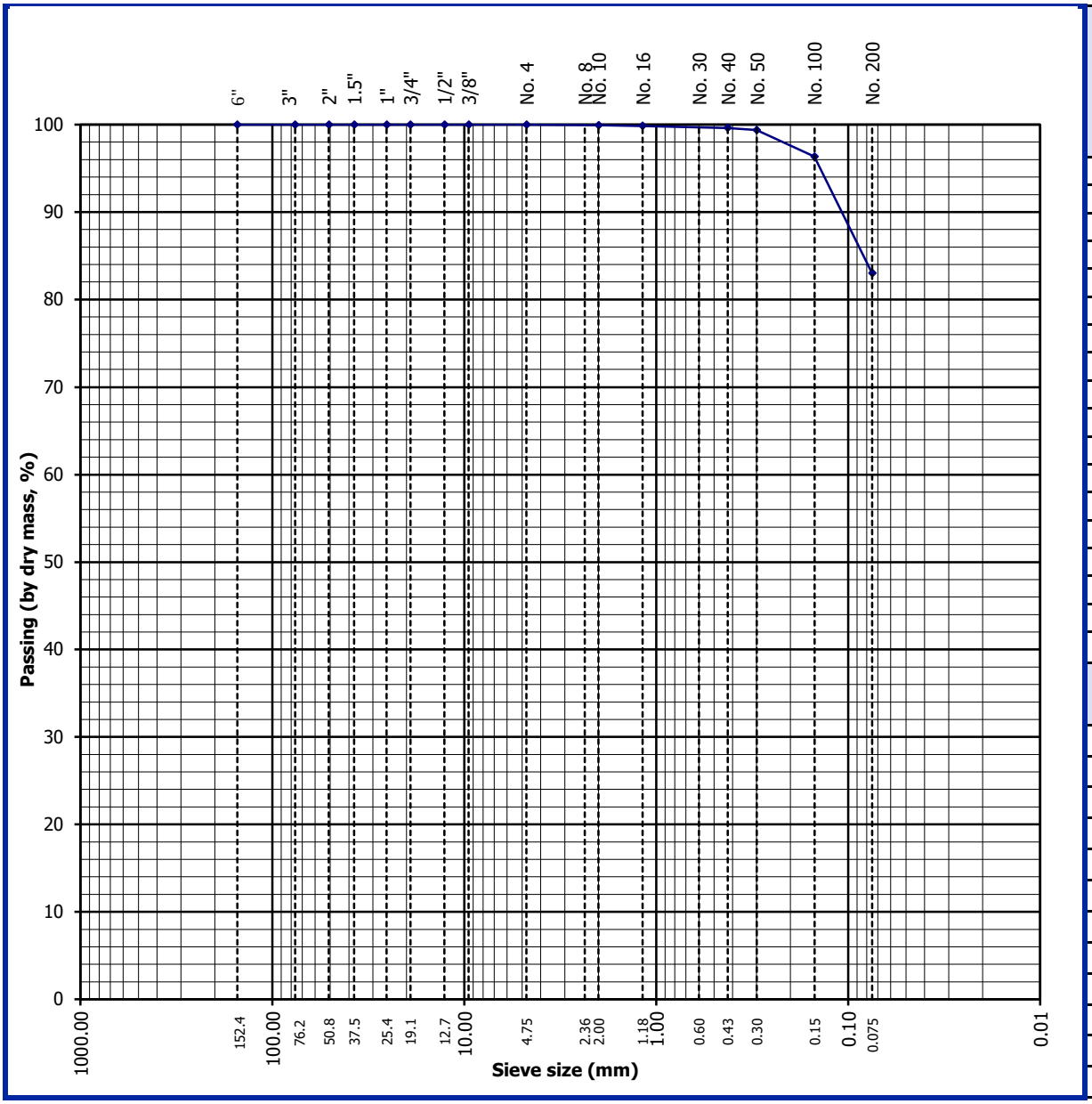
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 10, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252083	Reviewer	G. Hoyos
Sample location	BA-1 at 10 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	21	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	96
#200	83.0

Moisture (M) and Density (D)	
M (%)	2.4
D (pcf)	
LL	42
PL	16
PI	26
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

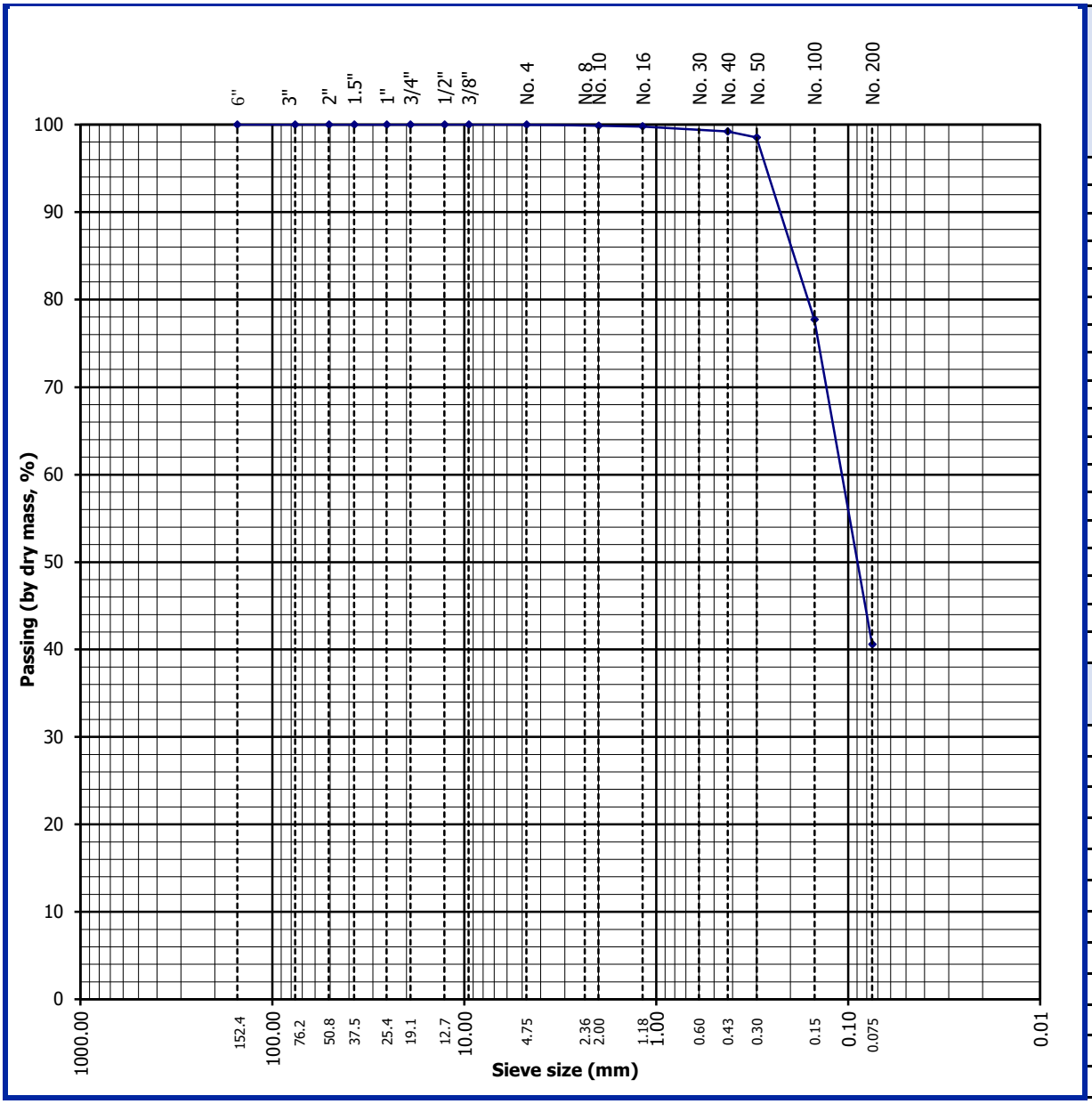
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252080	Reviewer	G. Hoyos
Sample location	BA-1 at 20 feet		
Visual description	SAND, clayey, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**2**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(SC)	**Clayey sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	78
#200	40.6

Moisture (M) and Density (D)	
M (%)	21.4
D (pcf)	
LL	28
PL	14
PI	14
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

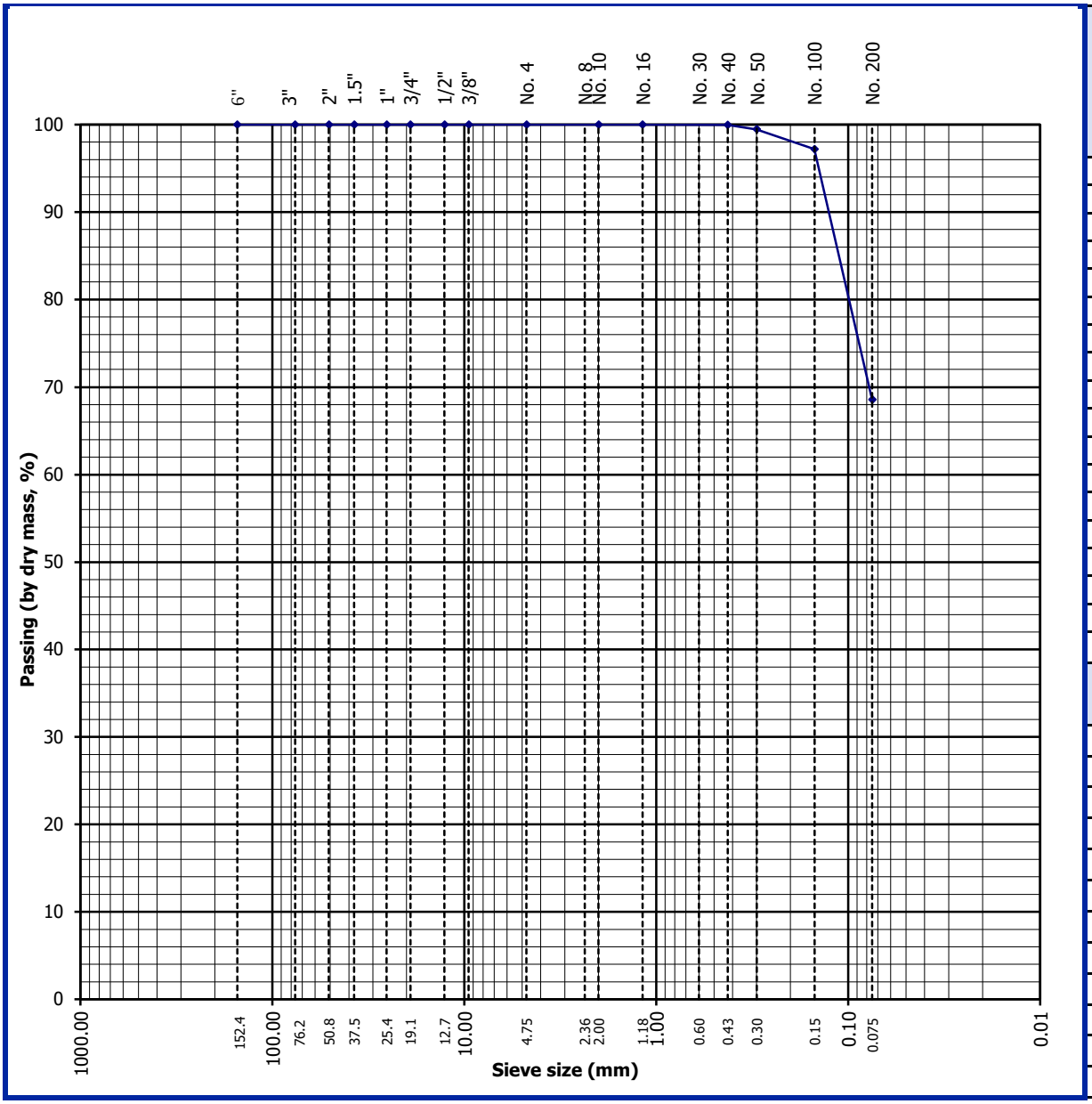
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252082	Reviewer	G. Hoyos
Sample location	BA-1 at 39 feet		
Visual description	CLAYSTONE, sandy, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**13**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	97
#200	68.5

Moisture (M) and Density (D)	
M (%)	15.9
D (pcf)	
LL	40
PL	18
PI	22
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

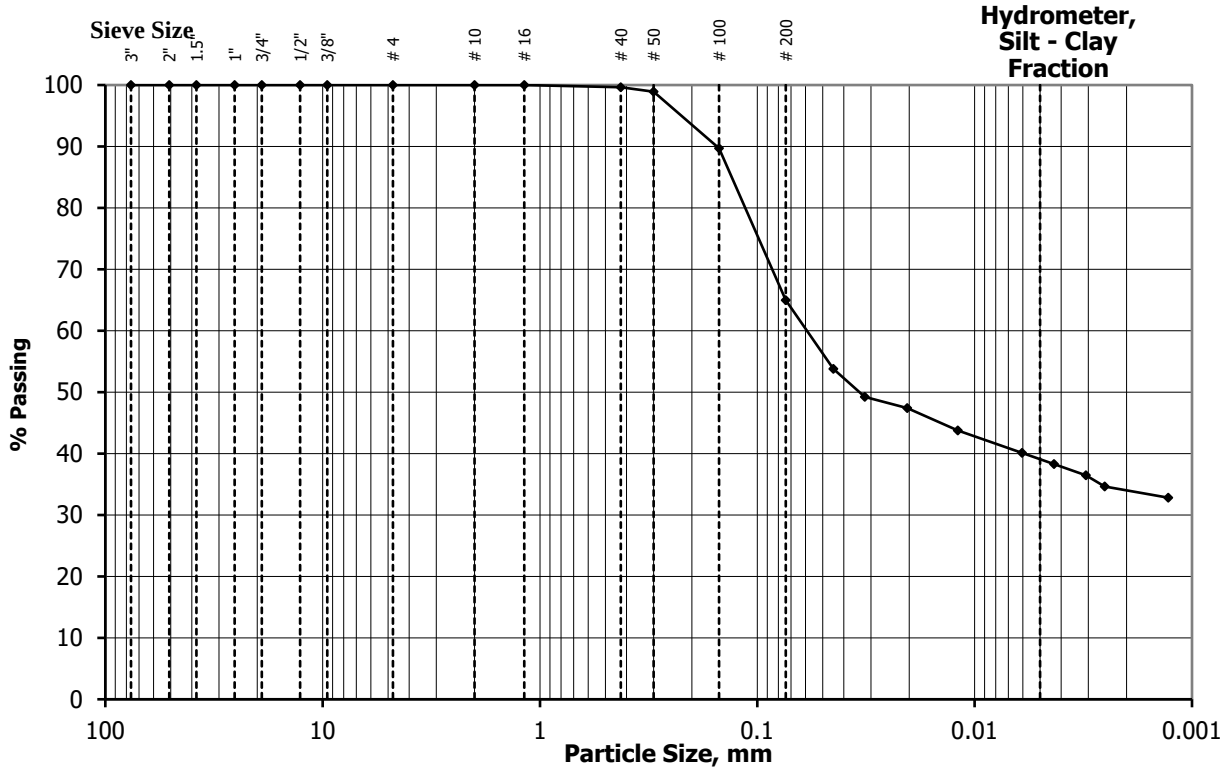
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653(24.3040)	Date:	08/07/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252689	Reviewer:	G. Hoyos
Sample Location:	BA-1 at 14 feet		
Visual Description:	CLAY, sandy, brown		
Soil Classification (USCS):			

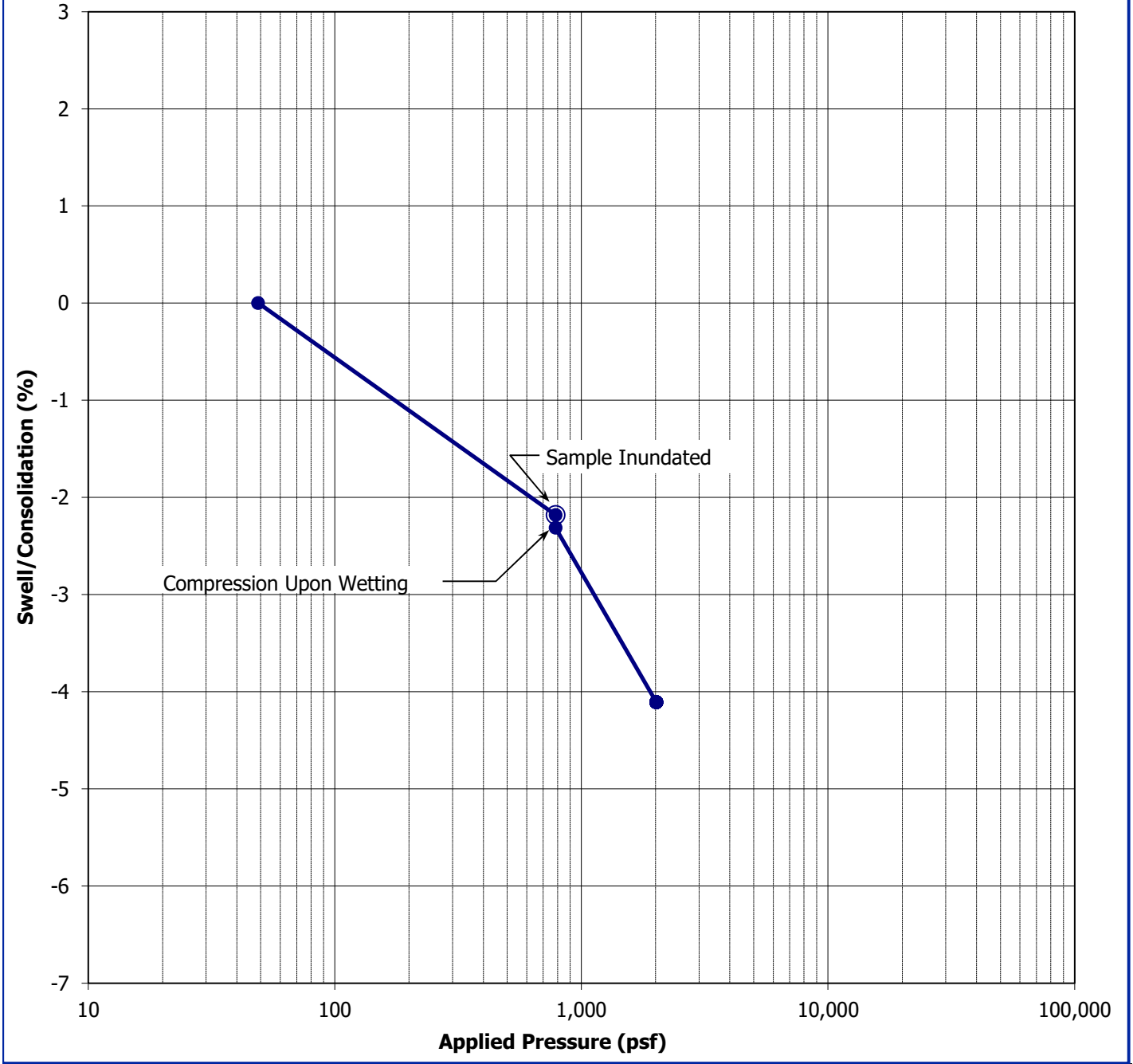
Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	100
#50	99
#100	90
#200	65

Hydrometer	
Particle Size	**% Passing**
45 Micron	54
32 Micron	49
20 Micron	47
12 Micron	44
6 Micron	40
4.3 Micron	38
3.1 Micron	36
2.5 Micron	35
1.3 Micron	33
% Gravel:	**0**
% Sand:	**35**
% Silt:	**26**
% Clay (< 5 micron):	**39**



CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

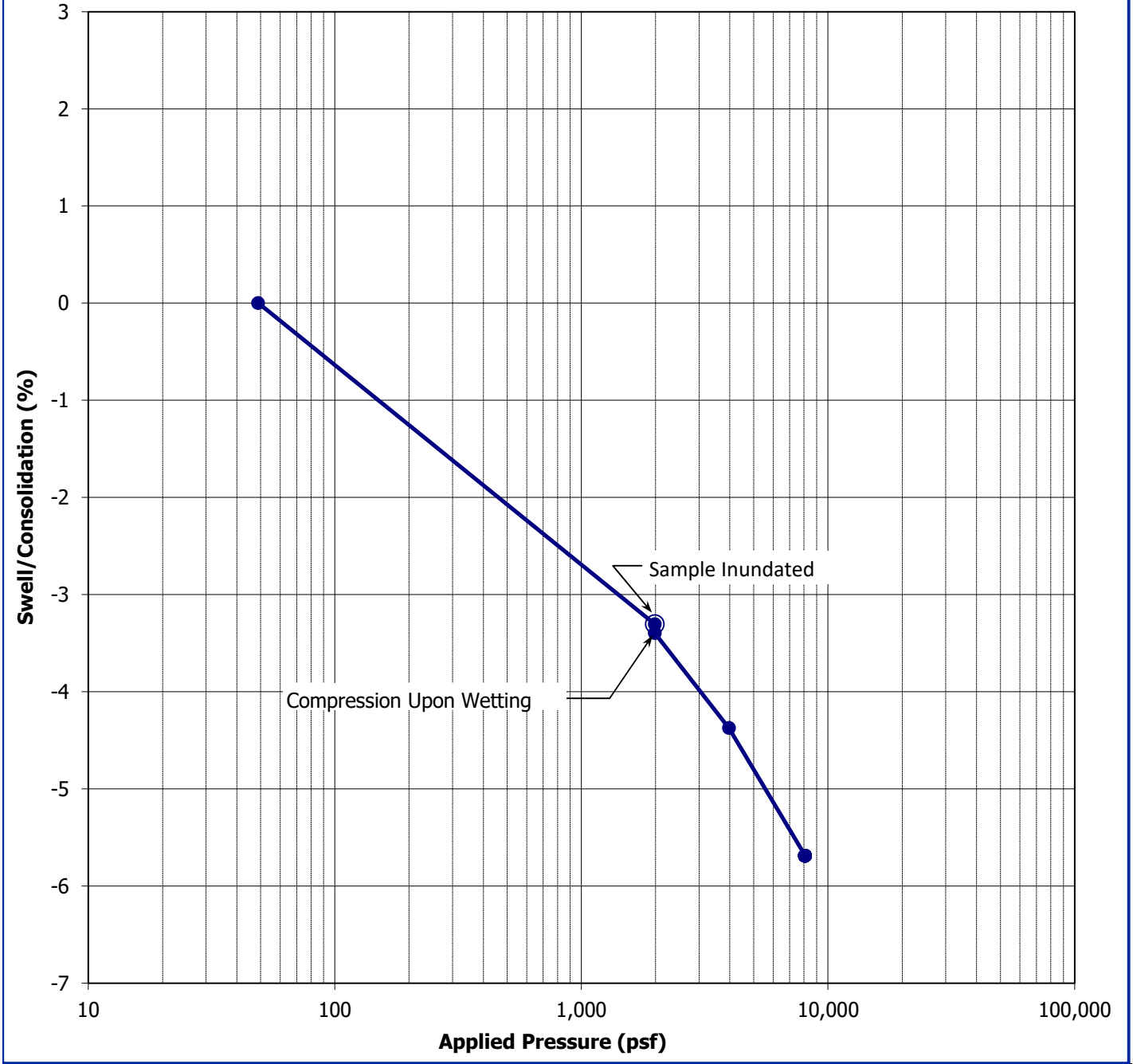


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-1	8	CLAY, with sand, brown	105.1	20.3	787	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252077

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

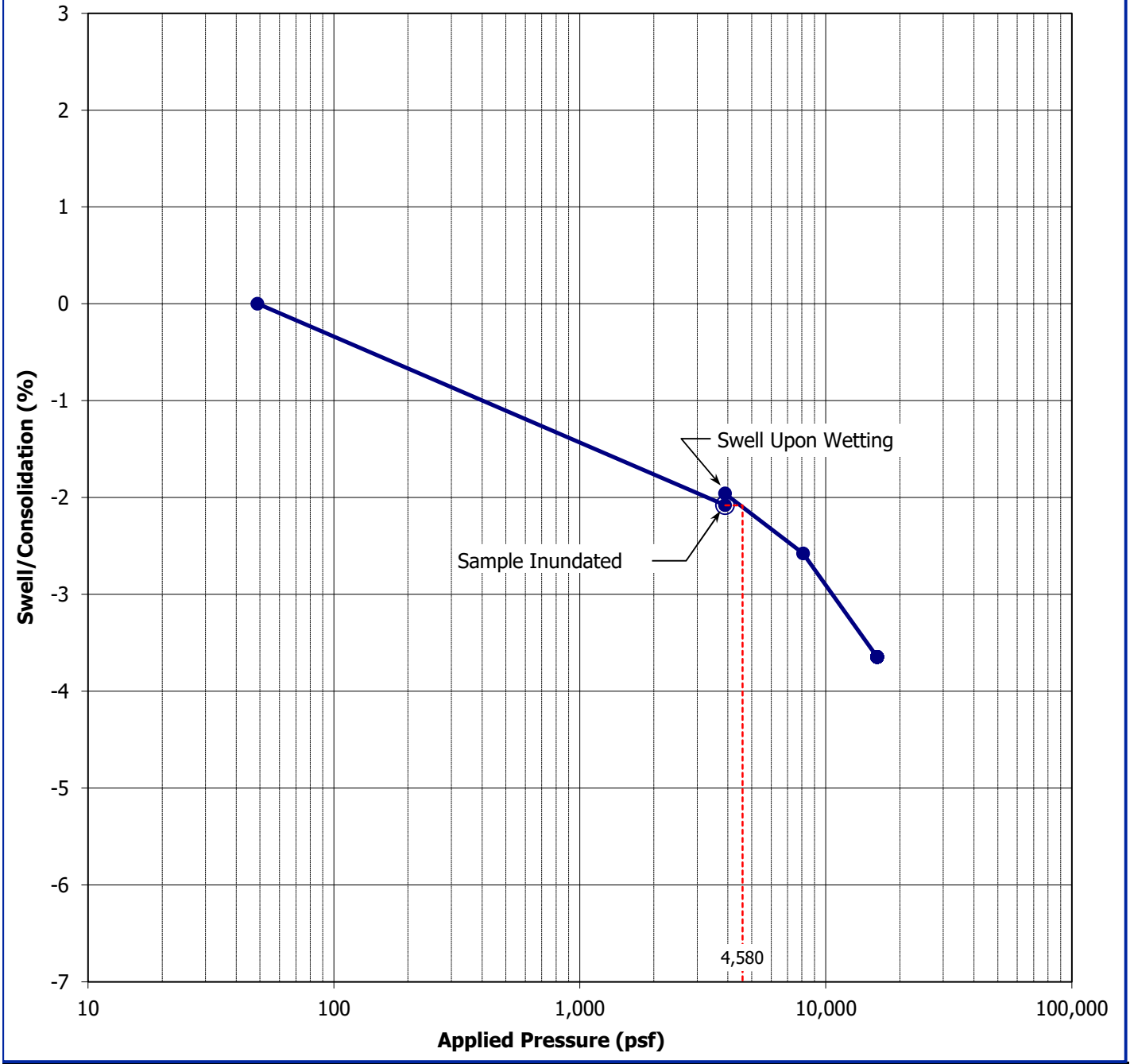


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-1	20	SAND, clayey, brown	108.1	21.4	1,985	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252080

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-1	39	CLAYSTONE, sandy, brown	115.0	15.9	3,897	0.1	4,580

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252082

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	BA-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	12 feet
Date:	August 14, 2025	Technician:	KJM	Visual Description of Sample:	
Lab ID Number:	252688	Reviewer:	G. Hoyos	CLAY, brown	

Sample Data:

Diameter:	1.89	in.	Length:	3.75	in.
Diameter:	1.90	in.	Length:	3.73	in.
Diameter:	1.89	in.	Length:	3.73	in.
Avg. Dia.	***1.89***	in.	Avg. L.	***3.74***	in.
Aspect Ratio (L/Dia):	**1.97**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	1	51.1	0.300 (0:00)	8.0	23	1,080.6
0.010 (0:00)	0.3	4	203.8	0.350 (0:00)	9.4	24	1,111.1
0.025 (0:00)	0.7	9	456.7	0.400 (0:00)	10.7	25	1,140.3
0.050 (0:00)	1.3	12	604.8	0.450 (0:00)	12.0	26	1,168.2
0.075 (0:00)	2.0	14	700.8	0.500 (0:00)	13.4	27	1,194.7
0.100 (0:00)	2.7	15	745.7	0.550 (0:00)	14.7	28	1,219.8
0.125 (0:00)	3.3	16	790.0	0.600 (0:00)	16.1	29	1,243.5
0.150 (0:00)	4.0	17	833.6	0.650 (0:00)	17.4	30	1,265.9
0.175 (0:00)	4.7	18	876.4	0.700 (0:00)	18.7	31	1,266.1
0.200 (0:00)	5.4	19	918.6	0.750 (0:00)	20.1	31	1,265.7
0.225 (0:00)	6.0	20	960.1	0.800 (0:00)	21.4	31	1,244.5
0.250 (0:00)	6.7	21	1,001.0	0.850 (0:00)	22.8	31	1,223.3
0.275 (0:00)	7.4	22	1,041.1	0.900 (0:00)	24.1	31	1,202.1

Unconfined Compressive Strength (q_u): 1,270 psf

Shear Strength (S_u): 635 psf

Moisture Content & Density	
dish ID	WT
dish mass (g)	166.2
wet soil + dish (g)	302.3
dry soil + dish (g)	274.1
moisture content:	**26.1%**
sample mass (g)	347.0
sample moisture content %	26.1%
dry sample mass (g)	275.2
wet density (pcf)	125.5
in-situ dry density (pcf)	**99.6**

Sample Sketch:

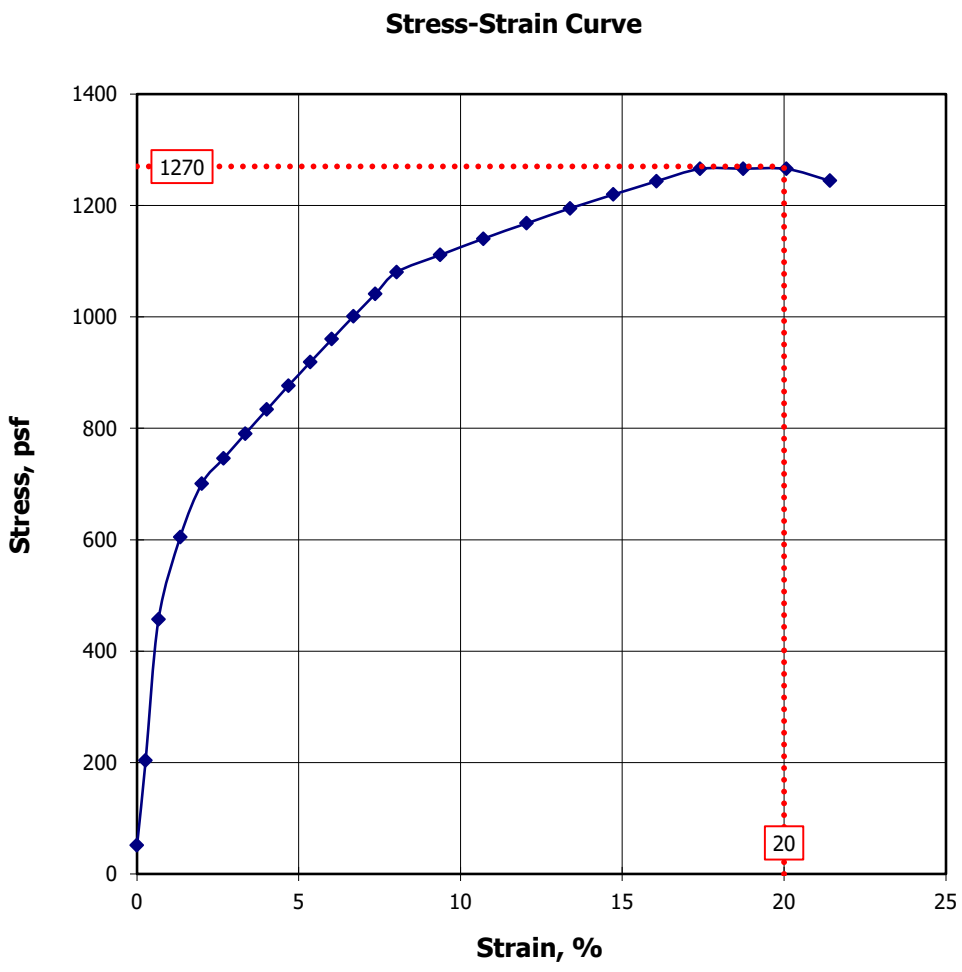
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	BA-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	12 feet
Date:	August 14, 2025	Lab Tech:	KJM	Visual Description of Sample:	
Lab ID:	252688	Checked By:	G. Hoyos	CLAY, brown	

Unconfined Compressive Strength (q_u):	**1,270**	**psf**	**Density (pcf):**	99.6
Shear Strength (S_u):	**635**	**psf**	**Moisture:**	26.1

Axial Strain (%)	Axial Stress (psf)
0.0	51.1
0.3	203.8
0.7	456.7
1.3	604.8
2.0	700.8
2.7	745.7
3.3	790.0
4.0	833.6
4.7	876.4
5.4	918.6
6.0	960.1
6.7	1001.0
7.4	1041.1
8.0	1080.6
9.4	1111.1
10.7	1140.3
12.0	1168.2
13.4	1194.7
14.7	1219.8
16.1	1243.5
17.4	1265.9
18.7	1266.1
20.1	1265.7
21.4	1244.5



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	24.3040			Boring:	BA-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	29 feet
Date:	March 14, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252081	Reviewer:	G. Hoyos	CLAY, with sand, brown	

Sample Data:

Diameter:	1.91	in.	Length:	3.91	in.
Diameter:	1.92	in.	Length:	3.92	in.
Diameter:	1.91	in.	Length:	3.92	in.
Avg. Dia.	***1.92***	in.	Avg. L.	***3.92***	in.
Aspect Ratio (L/Dia):	**2.04**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)	7.7	132	6,085.8
0.010 (0:00)	0.3	10	498.0	0.350 (0:00)	8.9	133	6,047.1
0.025 (0:00)	0.6	37	1,835.5	0.400 (0:00)	10.2	128	5,738.3
0.050 (0:00)	1.3	69	3,401.0	0.450 (0:00)			
0.075 (0:00)	1.9	87	4,260.5	0.500 (0:00)			
0.100 (0:00)	2.6	99	4,816.6	0.550 (0:00)			
0.125 (0:00)	3.2	107	5,171.7	0.600 (0:00)			
0.150 (0:00)	3.8	112	5,377.7	0.650 (0:00)			
0.175 (0:00)	4.5	118	5,628.2	0.700 (0:00)			
0.200 (0:00)	5.1	123	5,827.5	0.750 (0:00)			
0.225 (0:00)	5.7	126	5,929.5	0.800 (0:00)			
0.250 (0:00)	6.4	129	6,029.6	0.850 (0:00)			
0.275 (0:00)	7.0	131	6,081.4	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 6,110 psf

Shear Strength (S_u): 3,055 psf

Moisture Content & Density	
dish ID	JU
dish mass (g)	157.8
wet soil + dish (g)	352.4
dry soil + dish (g)	327.2
moisture content:	**14.8%**
sample mass (g)	404.7
sample moisture content %	14.8%
dry sample mass (g)	352.5
wet density (pcf)	136.4
in-situ dry density (pcf)	**118.8**

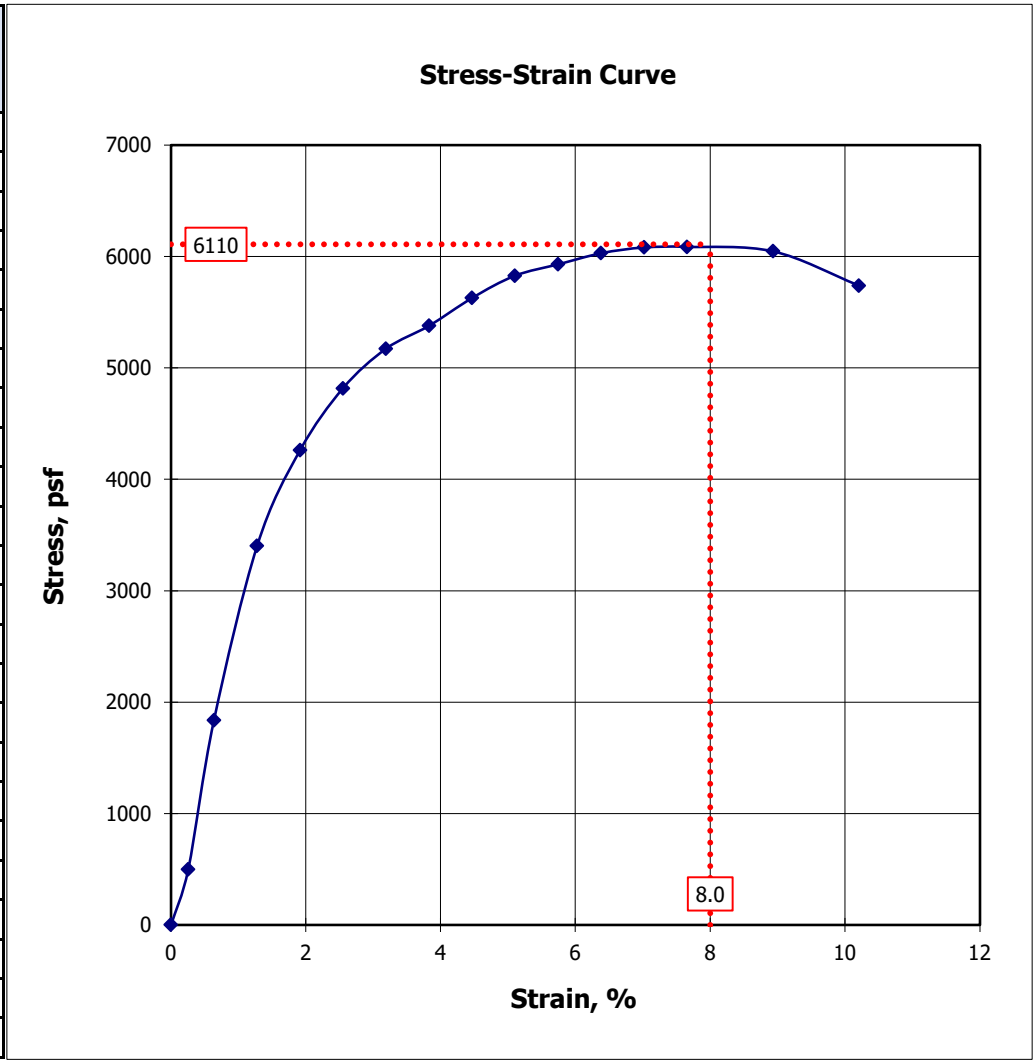
Sample Sketch:

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	24.3040			Hole:	BA-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	29 feet
Date:	March 14, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252081	Checked By:	G. Hoyos	CLAY, with sand, brown	

Unconfined Compressive Strength (q_u):	**6,110**	**psf**	**Density (pcf):**	118.8
Shear Strength (S_u):	**3,055**	**psf**	**Moisture:**	14.8

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	498.0
0.6	1835.5
1.3	3401.0
1.9	4260.5
2.6	4816.6
3.2	5171.7
3.8	5377.7
4.5	5628.2
5.1	5827.5
5.7	5929.5
6.4	6029.6
7.0	6081.4
7.7	6085.8
8.9	6047.1
10.2	5738.3



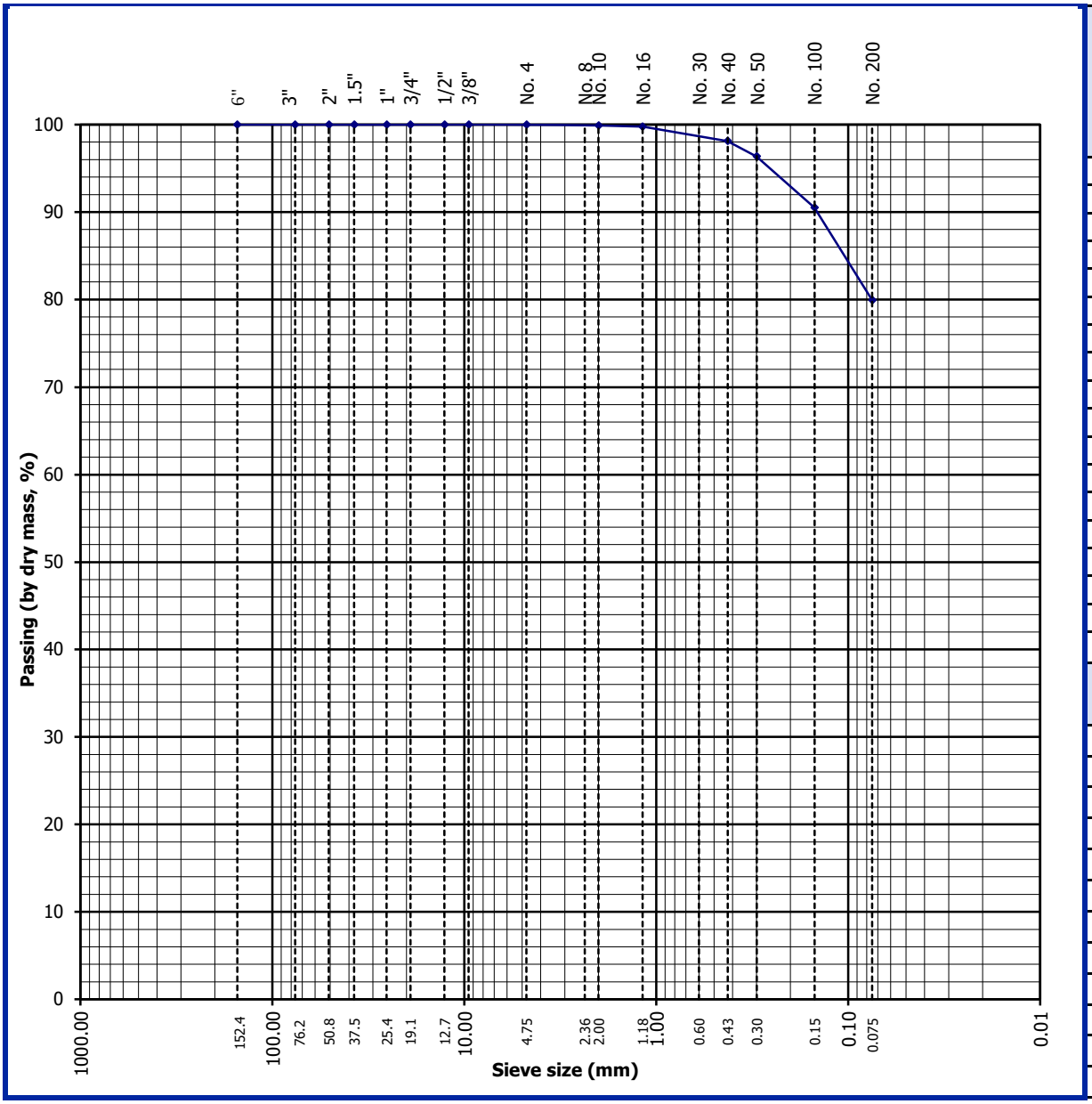
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 10, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252085	Reviewer	G. Hoyos
Sample location	BA-2 at 10 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**18**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

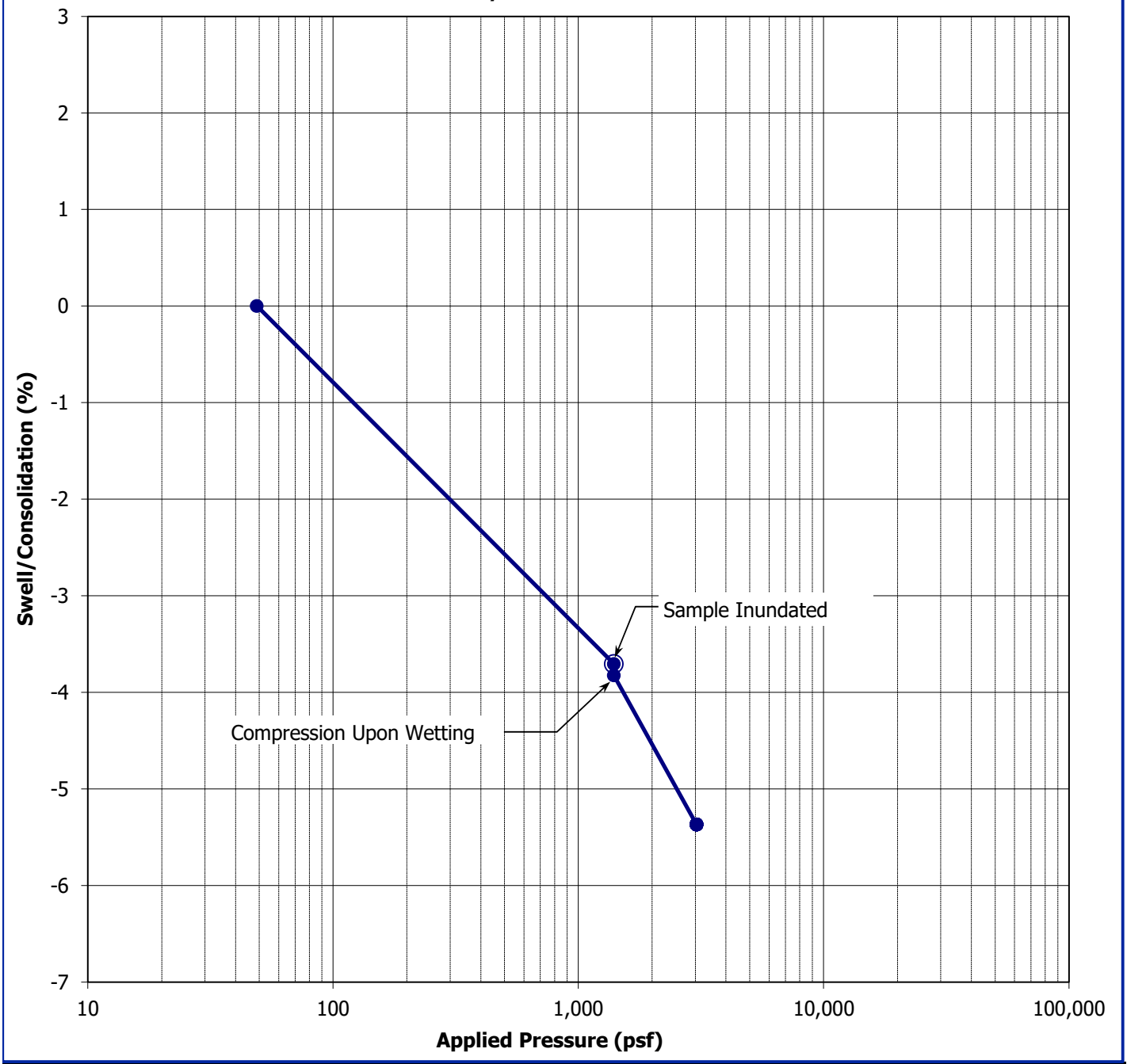


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	98
#50	96
#100	91
#200	79.9

Moisture (M) and Density (D)	
M (%)	6.5
D (pcf)	
LL	41
PL	17
PI	24
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-2	14	CLAY, sandy, brown	105.5	19.4	1,397	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252084

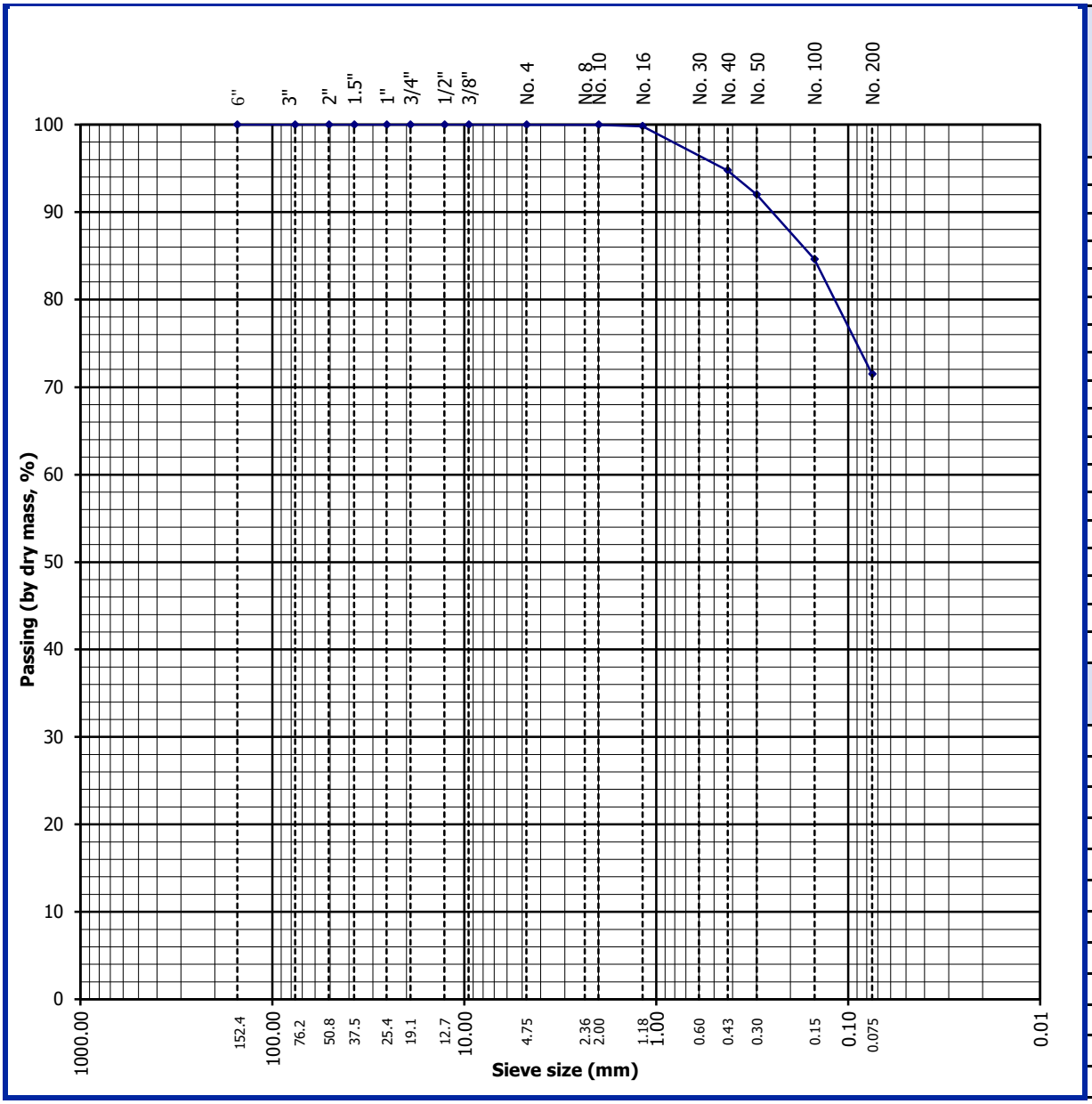
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252086	Reviewer	G. Hoyos
Sample location	BA-3 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**11**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

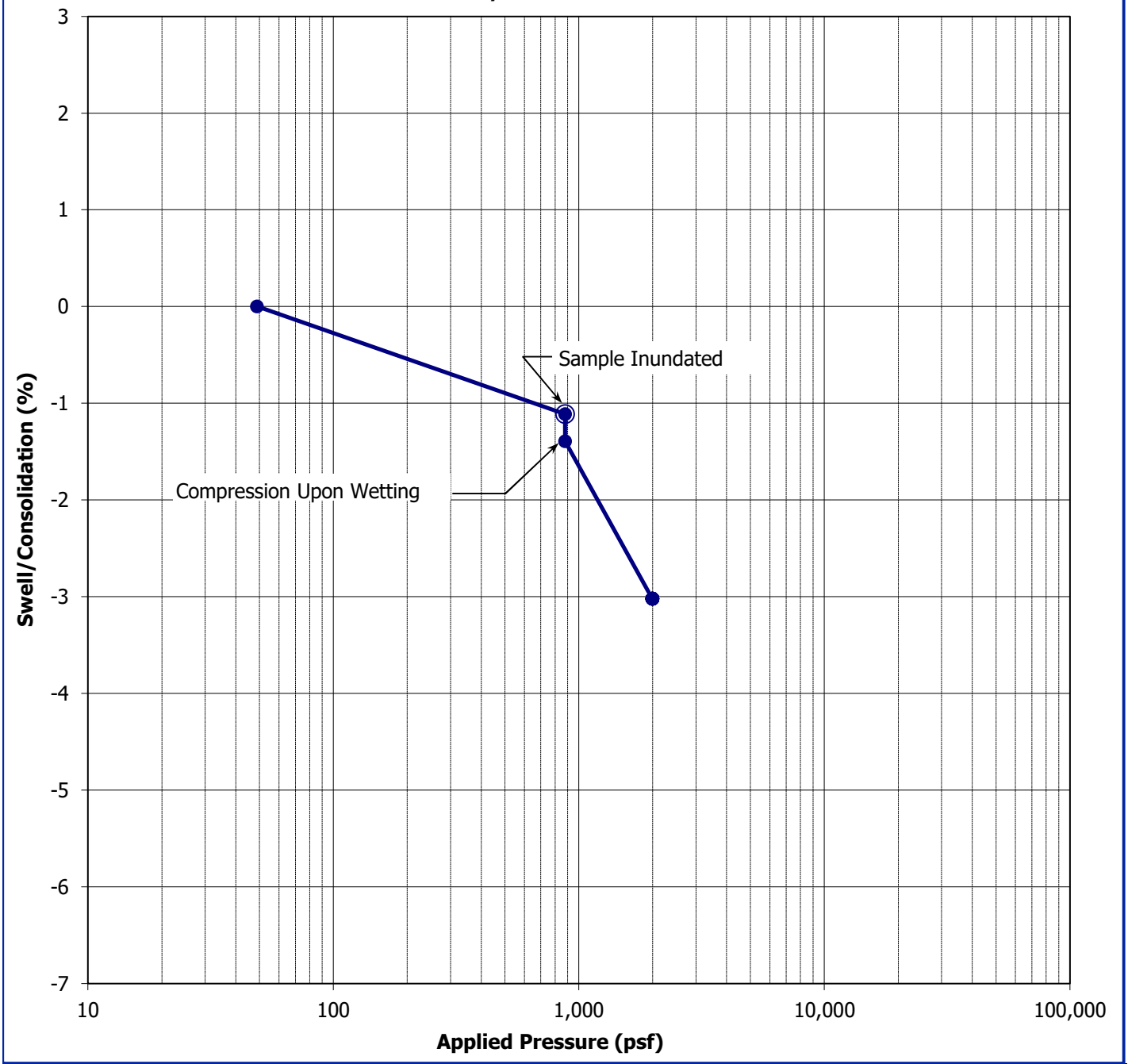


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	95
#50	92
#100	85
#200	71.5

Moisture (M) and Density (D)	
M (%)	26.7
D (pcf)	
LL	40
PL	23
PI	17
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-3	9	CLAY, with sand, brown	99.4	26.7	880	-0.3	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252086

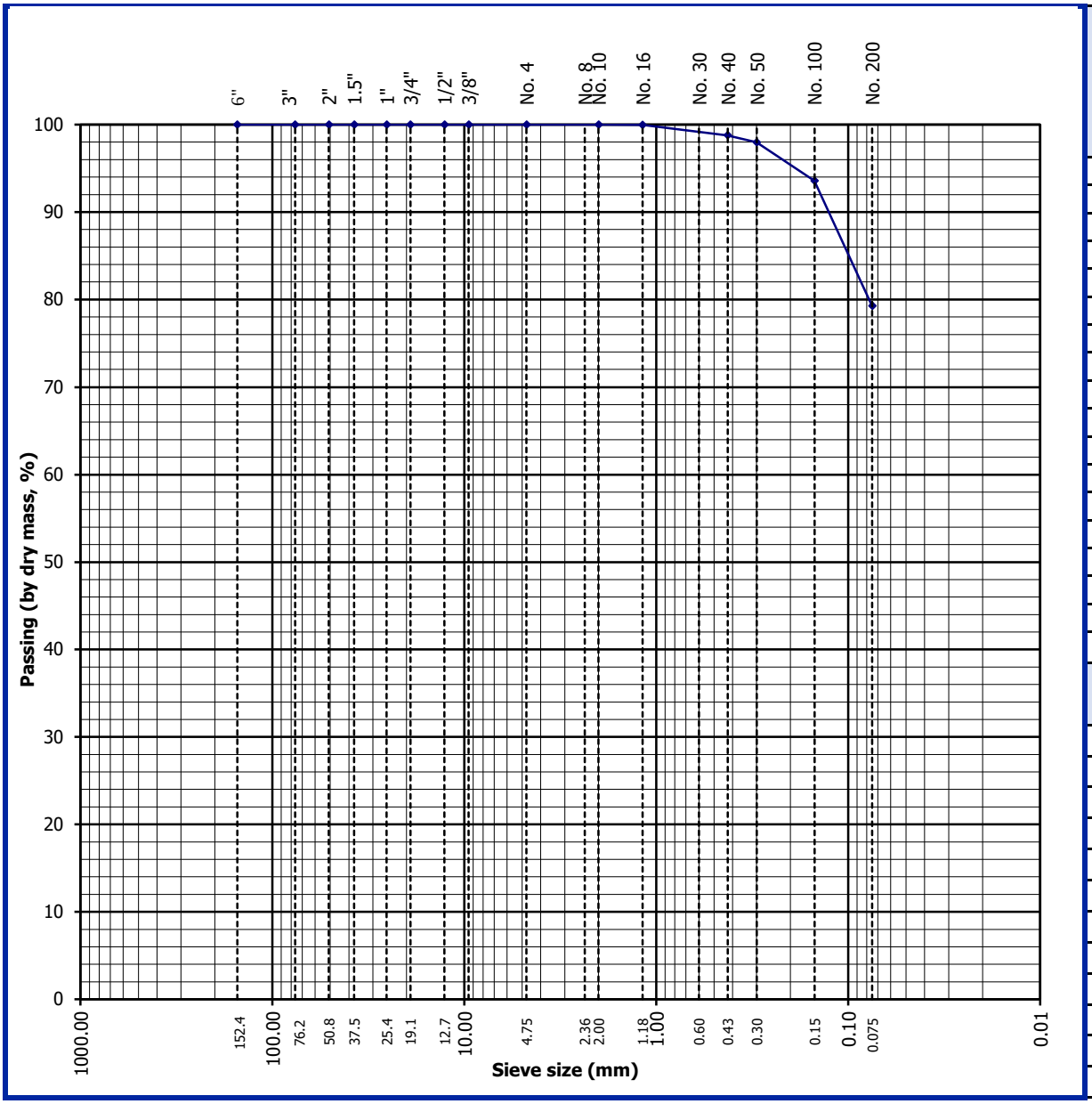
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252087	Reviewer	G. Hoyos
Sample location	BA-4 at 4 feet		
Visual description	CLAY, with sand, brown, calcareous		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-6**	**Group Index**	**18**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

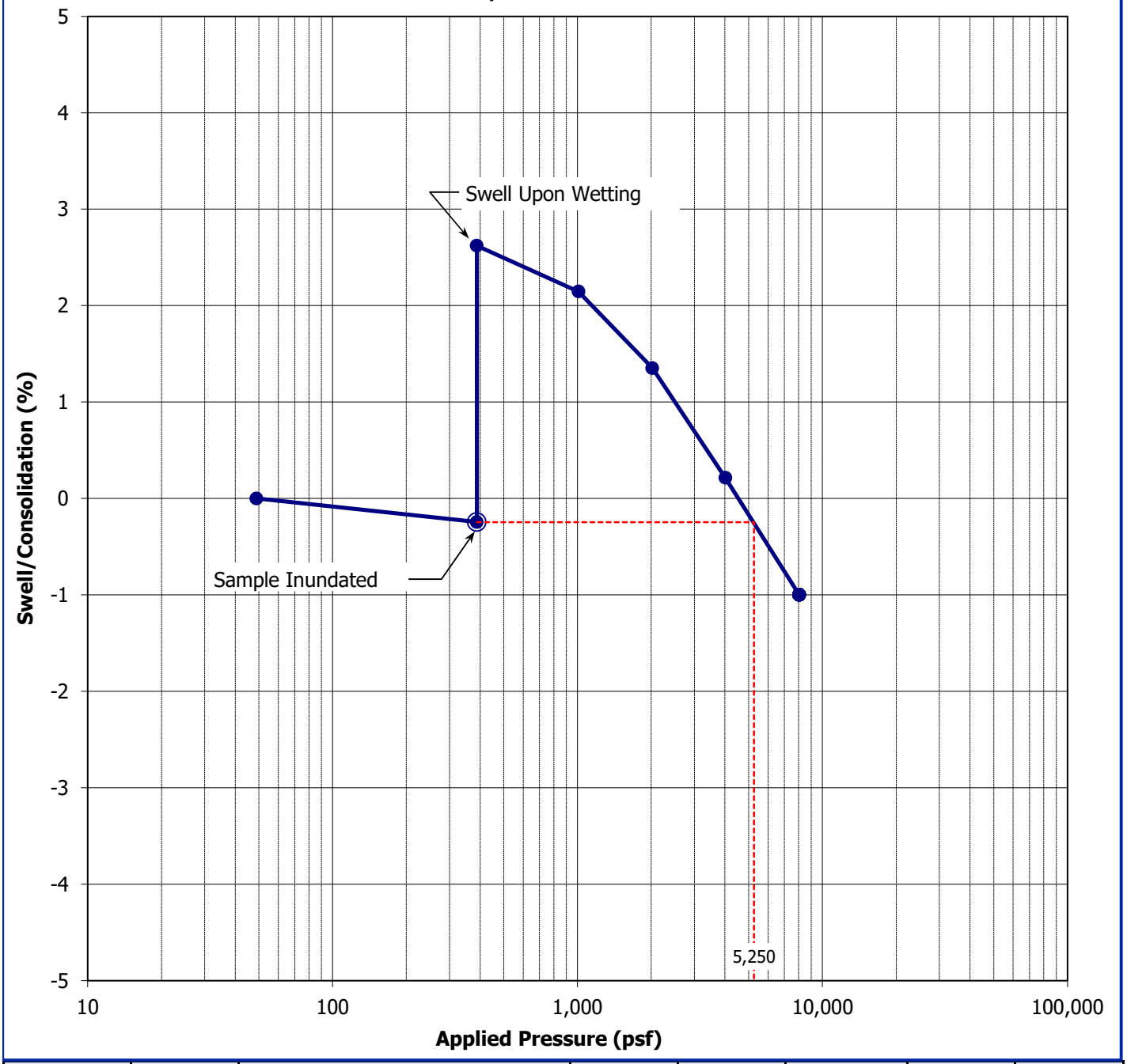


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	99
#50	98
#100	94
#200	79.3

Moisture (M) and Density (D)	
M (%)	13.5
D (pcf)	
LL	40
PL	15
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-4	4	CLAY, with sand, brown, calcareous	115.5	13.5	388	2.9	5,250

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252087

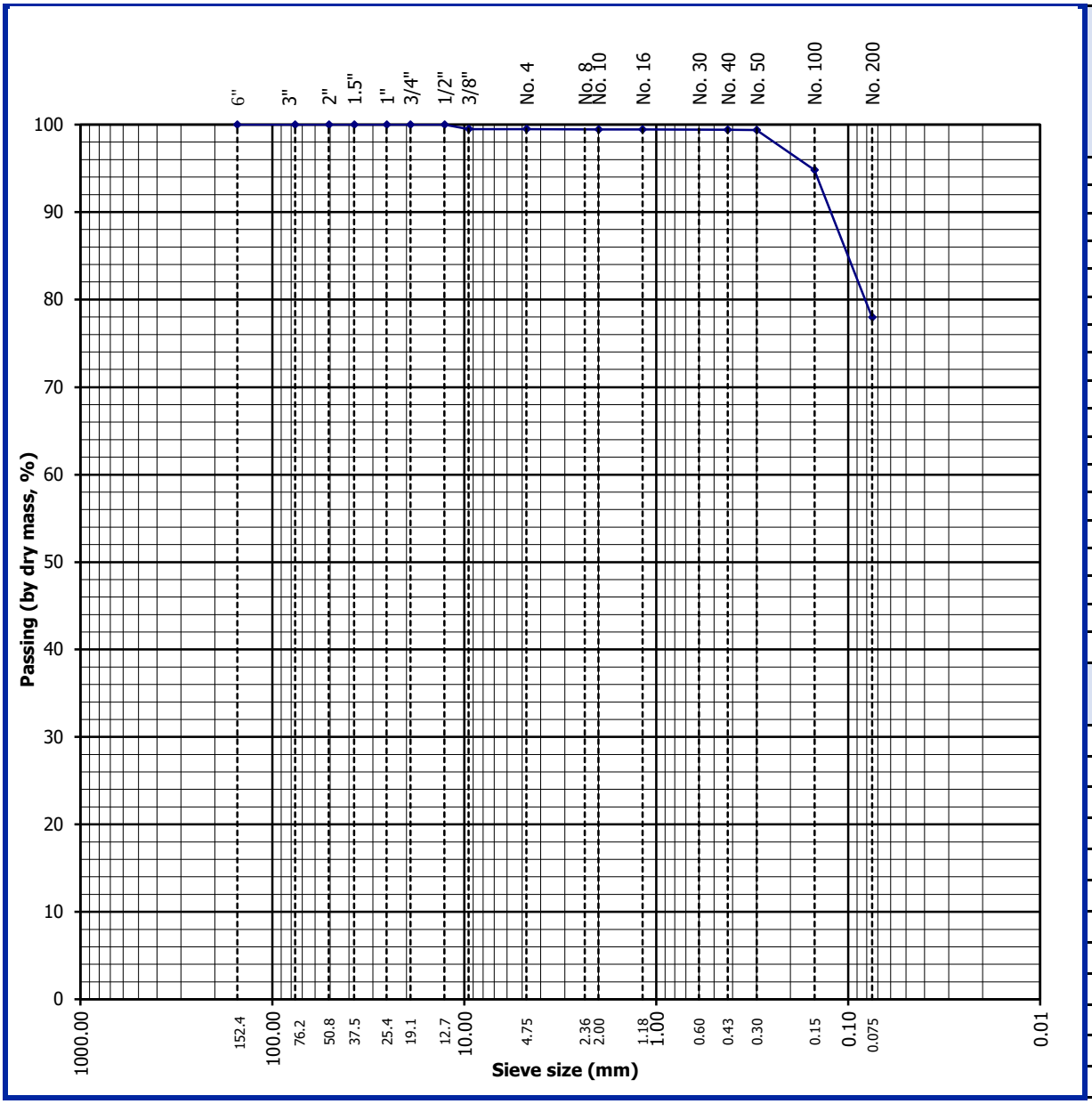
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252089	Reviewer	G. Hoyos
Sample location	BA-5 at 14 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	22	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440

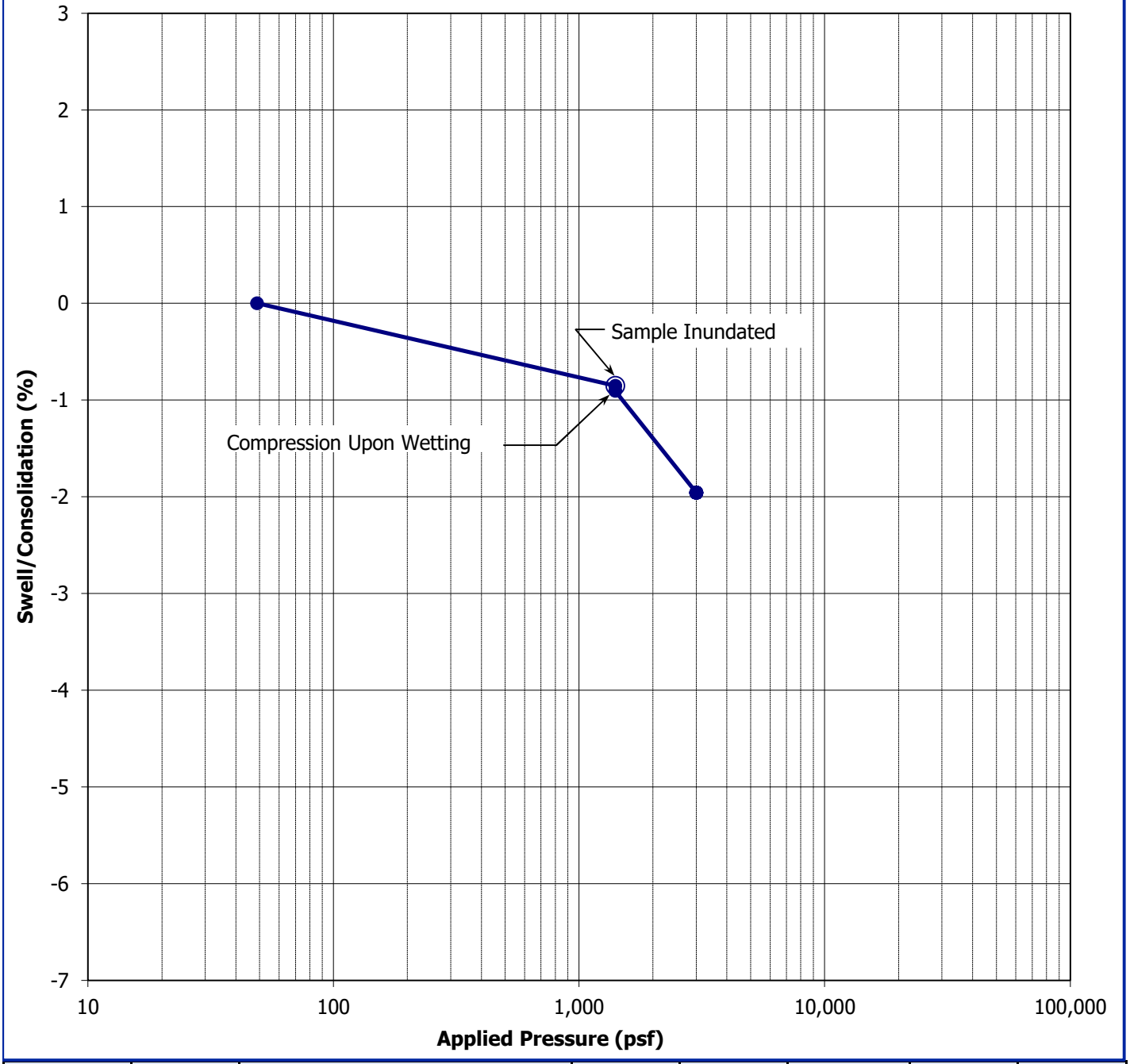


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	99
#4	99
#8	
#10	99
#16	99
#30	
#40	99
#50	99
#100	95
#200	78.0

Moisture (M) and Density (D)	
M (%)	22.1
D (pcf)	
LL	46
PL	16
PI	30
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-5	14	CLAY, with sand, brown	104.2	22.1	1,405	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252089

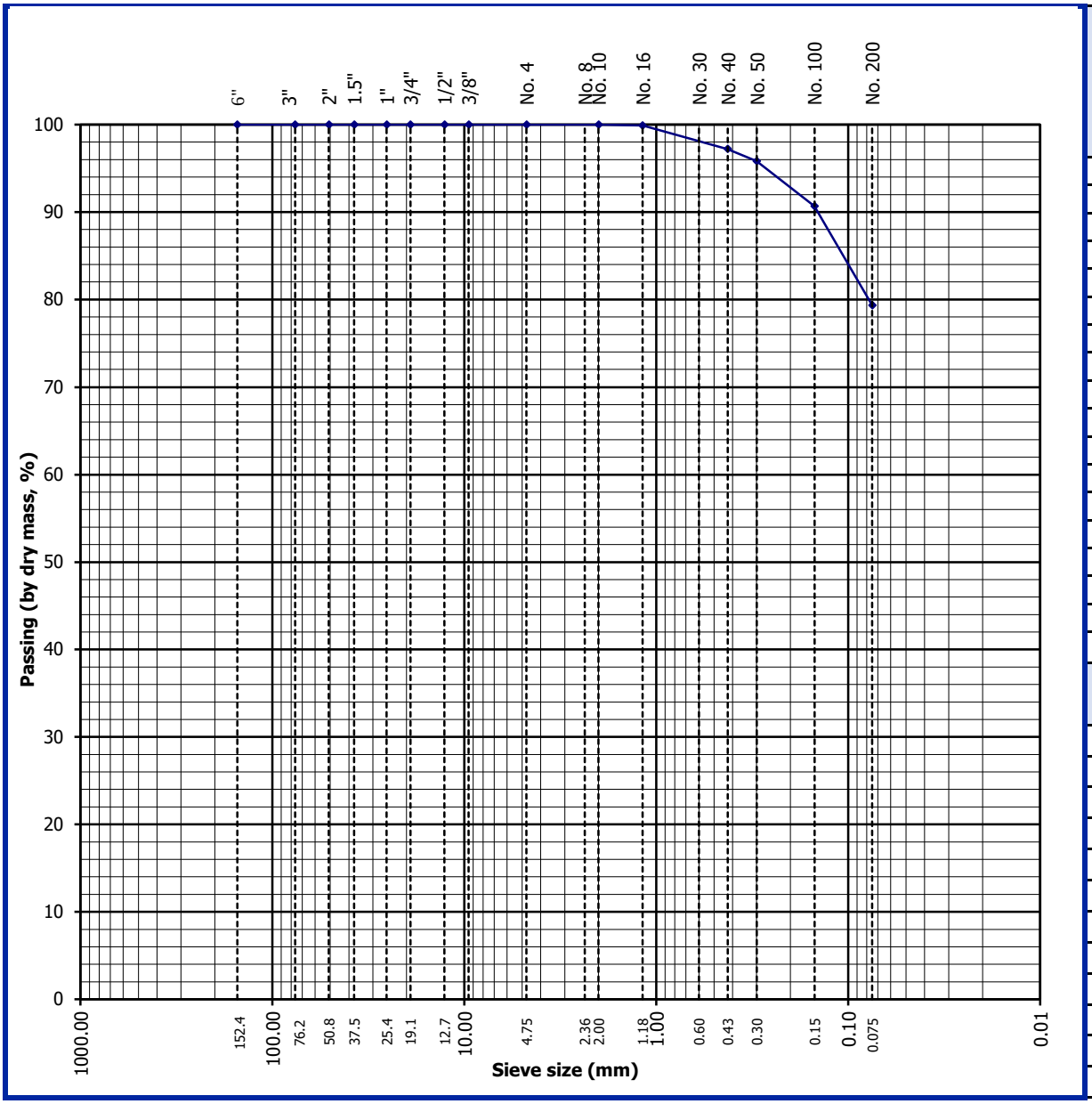
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252090	Reviewer	G. Hoyos
Sample location	BA-6 at 9 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**16**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

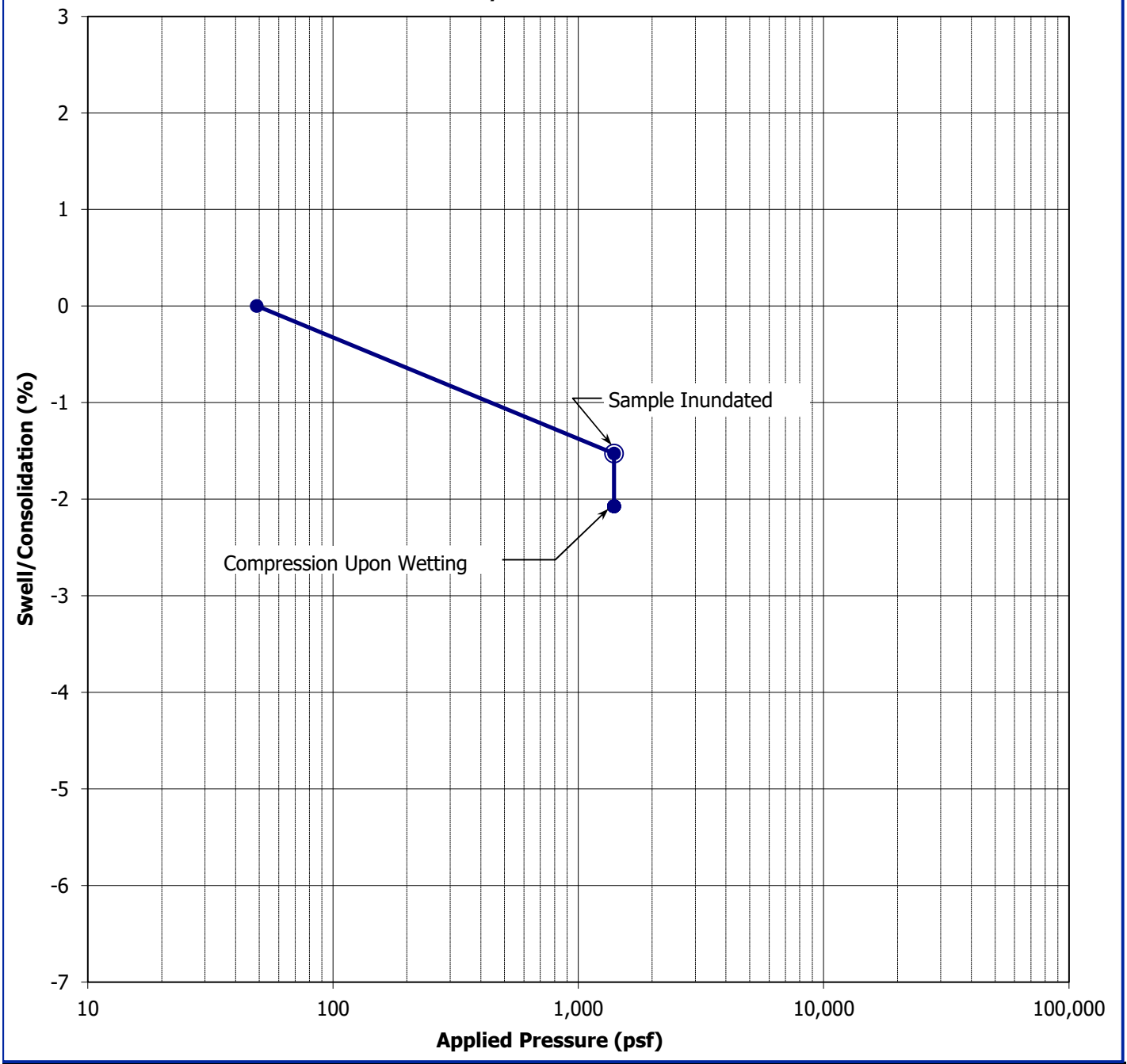


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	97
#50	96
#100	91
#200	79.3

Moisture (M) and Density (D)	
M (%)	28.0
D (pcf)	
LL	43
PL	23
PI	20
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-6	9	CLAY, with sand, brown	94.9	28.0	1,399	-0.5	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252090

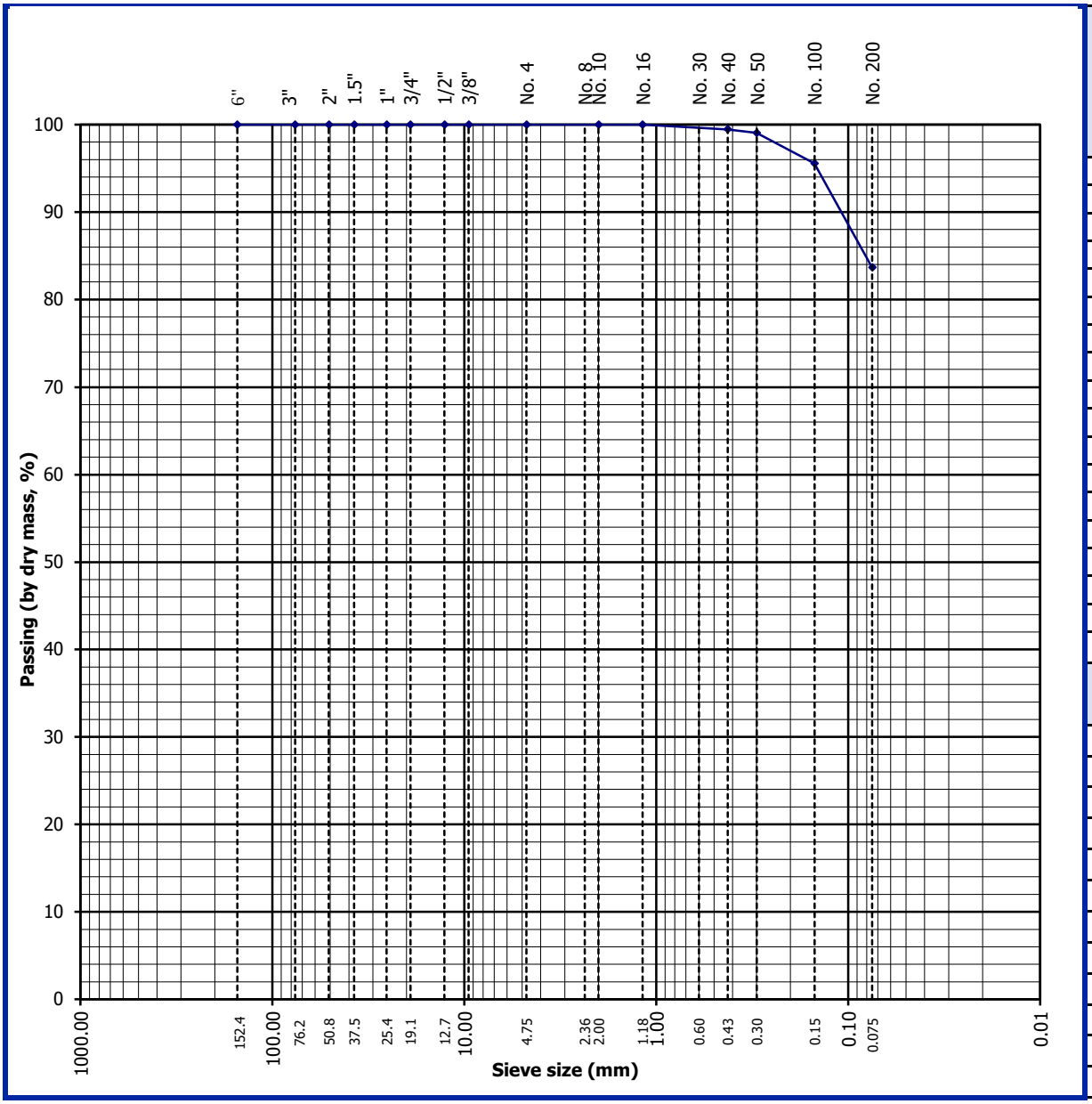
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252091	Reviewer	G. Hoyos
Sample location	BA-7 at 4 feet		
Visual description	CLAY, with sand, brown, calcareous		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**20**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

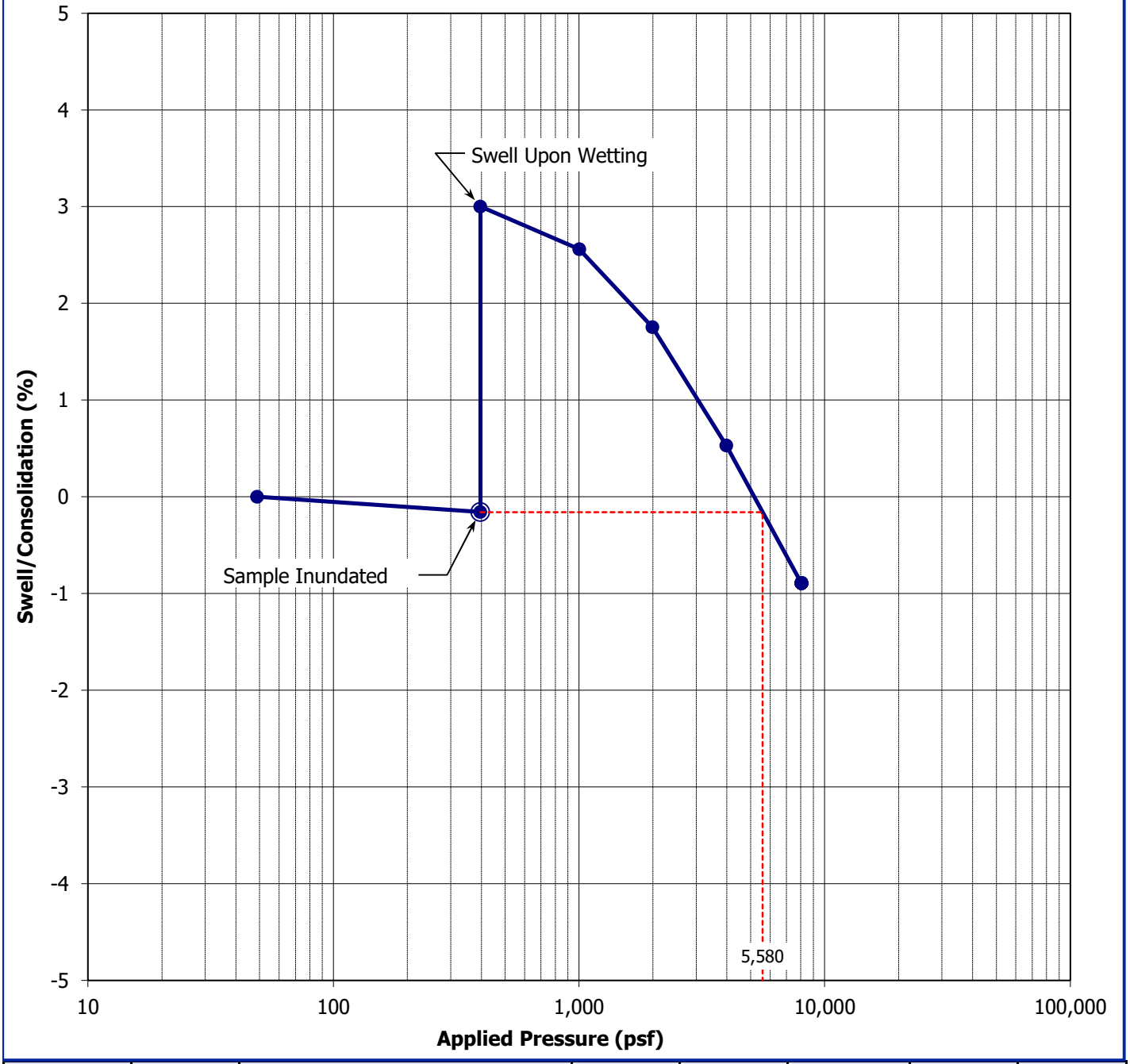


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	99
#50	99
#100	96
#200	83.7

Moisture (M) and Density (D)	
M (%)	13.5
D (pcf)	
LL	41
PL	17
PI	24
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-7	4	CLAY, with sand, brown, calcareous	112.9	13.5	397	3.2	5,580

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252091

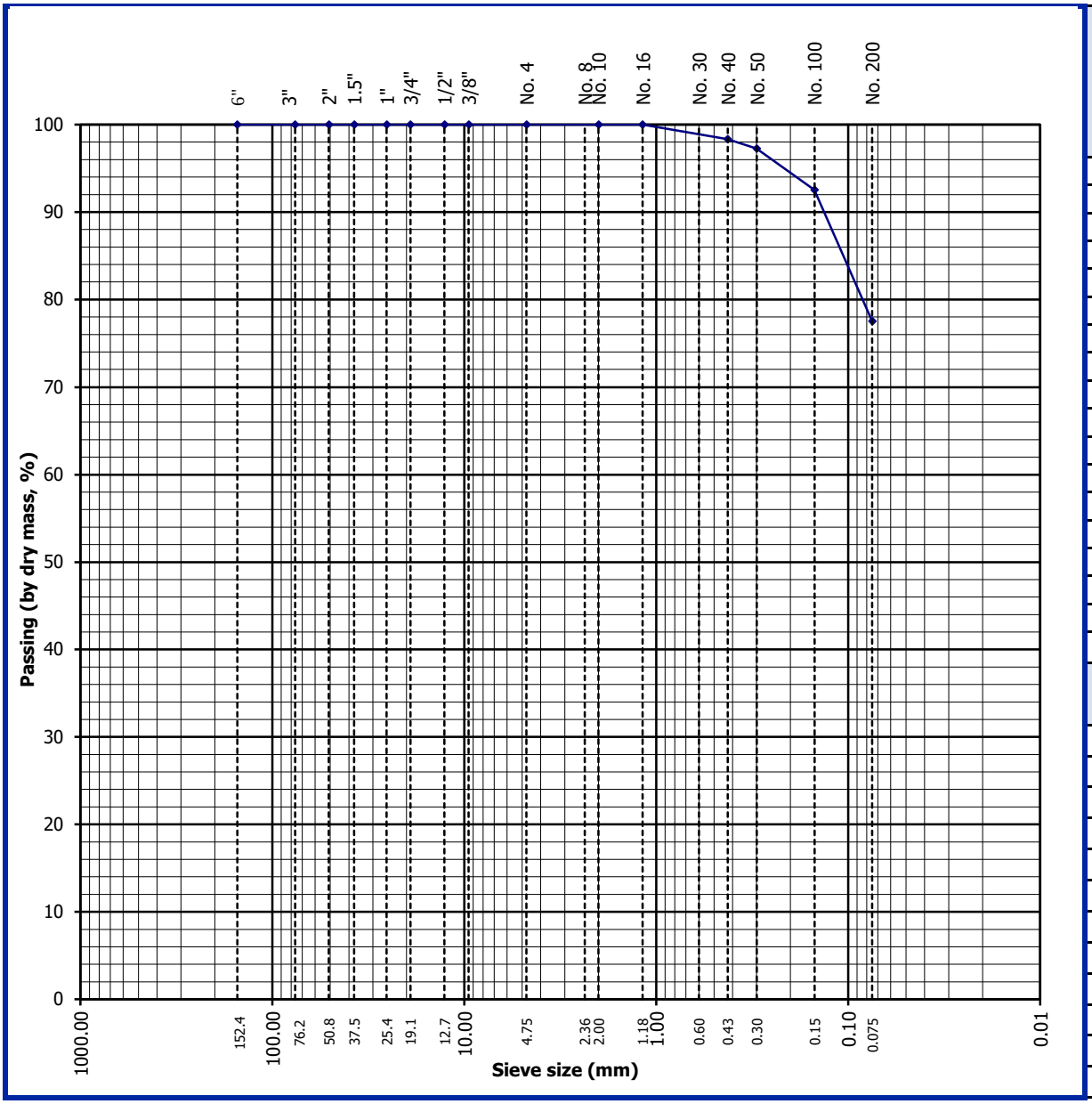
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252092	Reviewer	G. Hoyos
Sample location	BA-8 at 9 feet		
Visual description	CLAY, with sand, brown, calcareous		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**18**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**

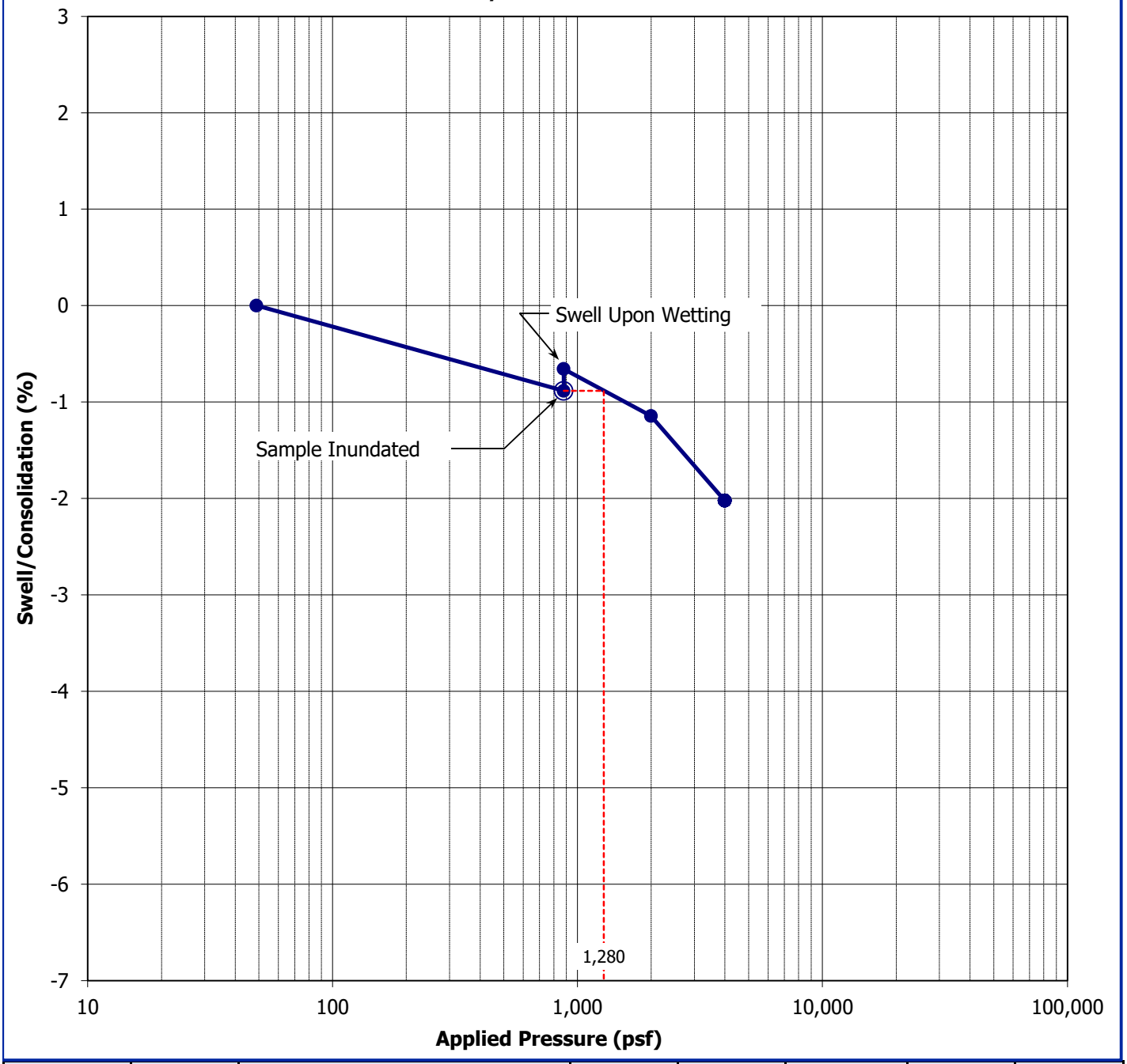


Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	100
#30	
#40	98
#50	97
#100	93
#200	77.5

Moisture (M) and Density (D)	
M (%)	18.6
D (pcf)	
LL	42
PL	17
PI	25
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-8	9	CLAY, with sand, brown, calcareous	109.9	18.6	878	0.2	1,280

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252092

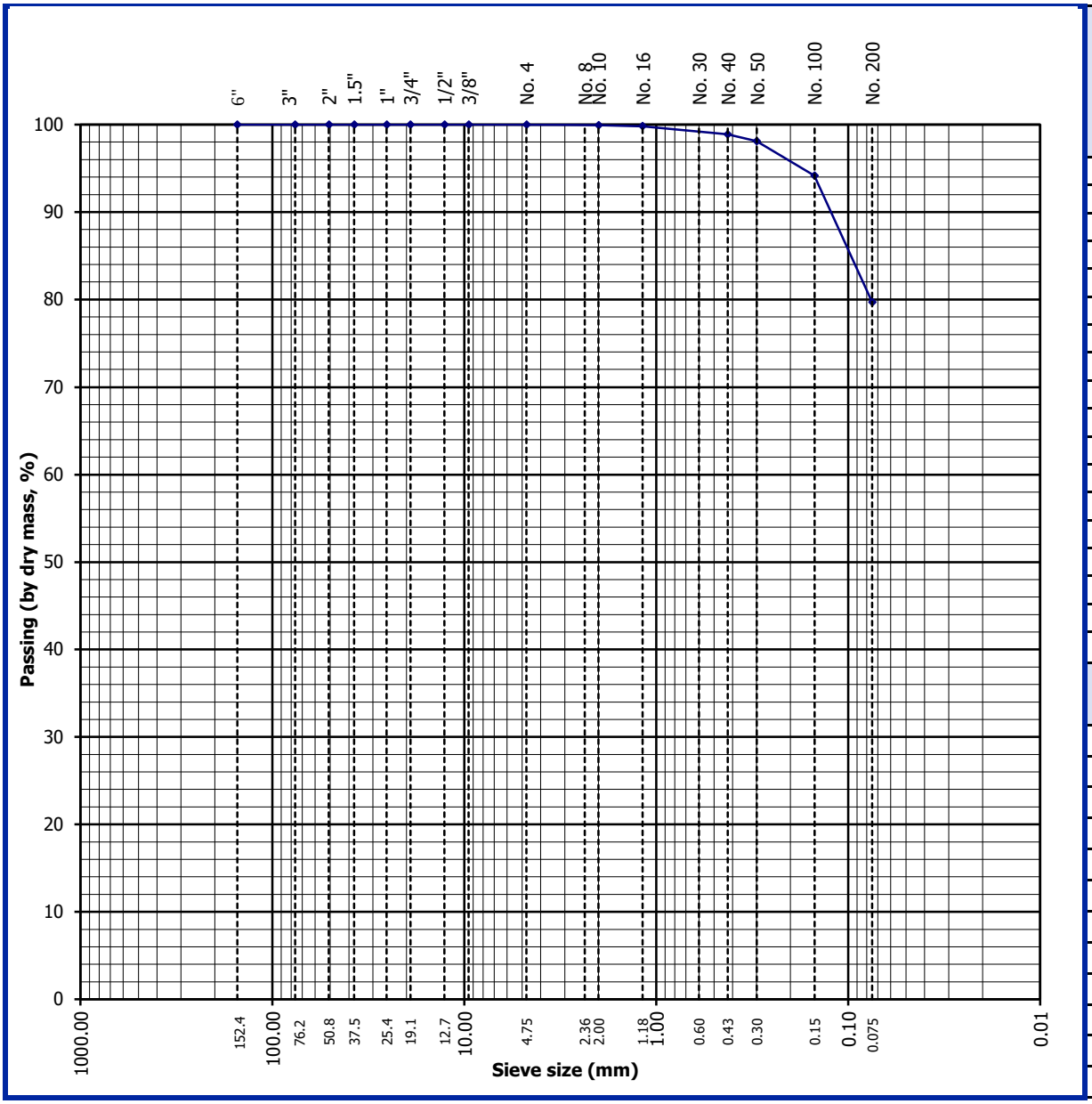
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 10, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	C. Zoetewey
Lab ID number	252097	Reviewer	G. Hoyos
Sample location	BA-9 at 0 to 15 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	A-7-6	Group Index	20	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	B
(CL)	Lean clay with sand			Specimen soaking time (min)	1,440



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	98
#100	94
#200	79.7

Moisture (M) and Density (D)	
M (%)	6.1
D (pcf)	
LL	42
PL	16
PI	26
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

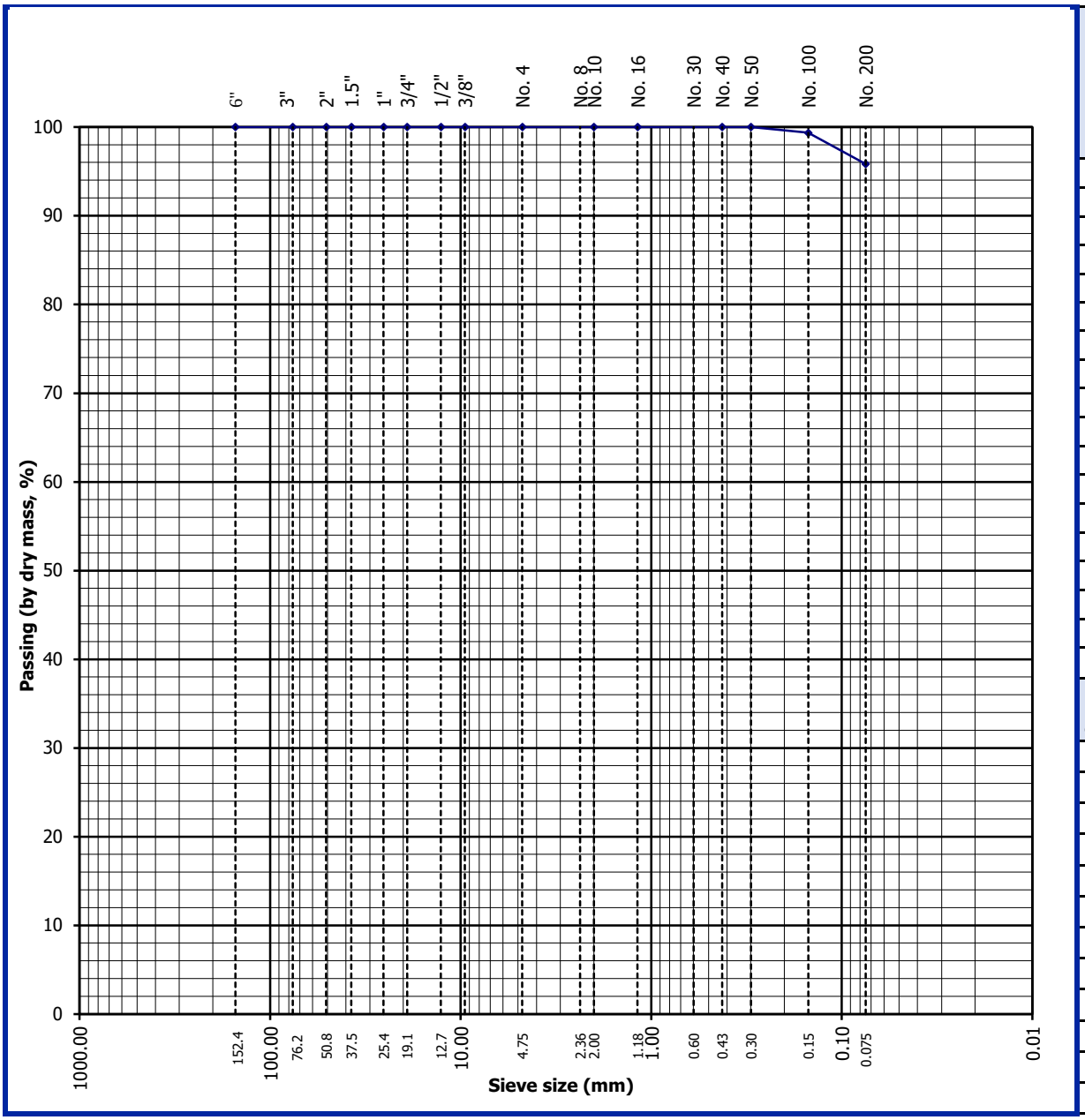
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 6, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252094	Reviewer	G. Hoyos
Sample location	BA-9 at 16 feet		
Visual description	CLAY, tan		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**41**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CH)	**Fat clay**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	
#16	
#30	
#40	100
#50	100
#100	99
#200	95.8

Moisture (M) and Density (D)	
M (%)	29.0
D (pcf)	

LL	57
PL	18
PI	39

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

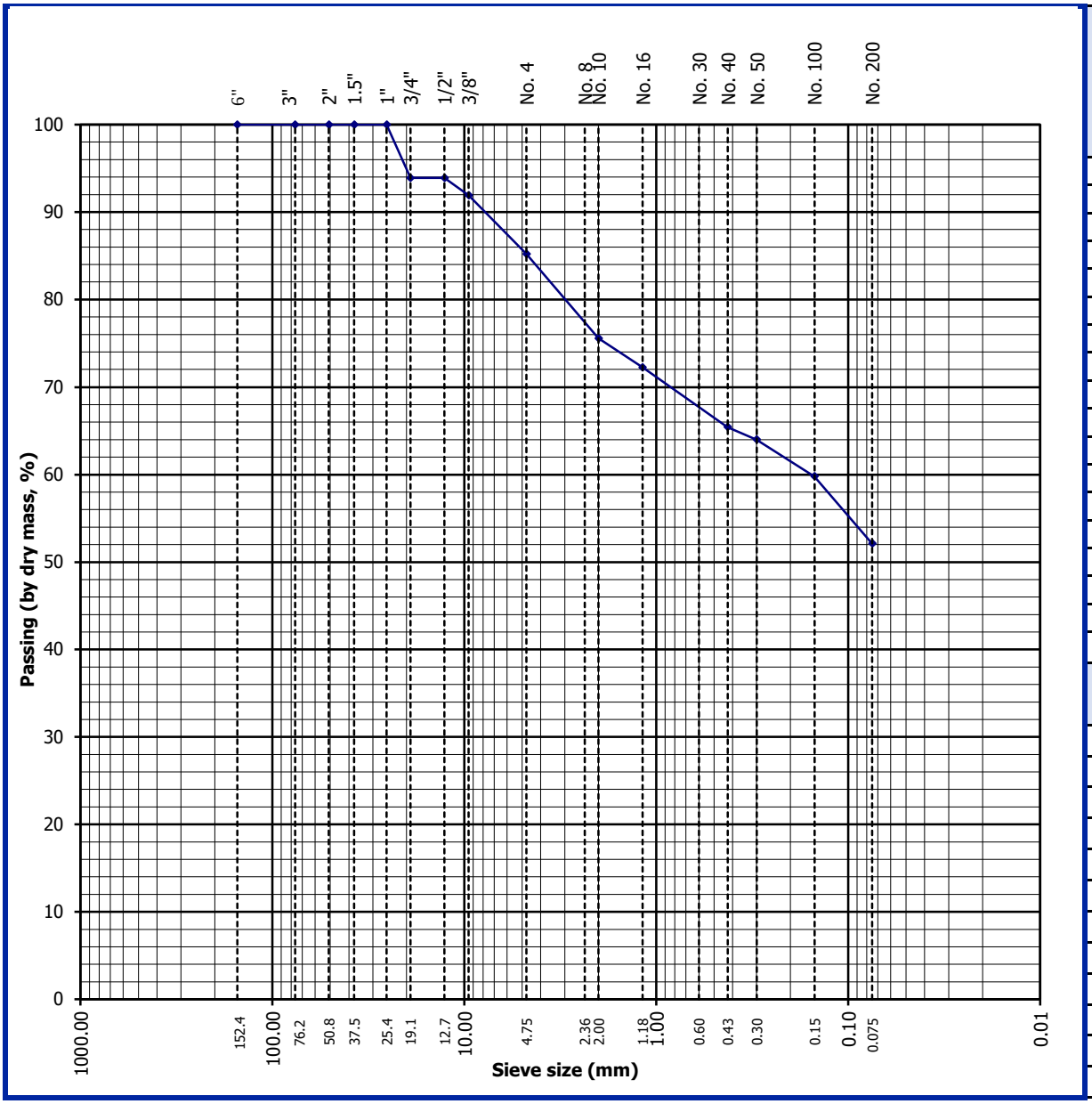
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 7, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252096	Reviewer	G. Hoyos
Sample location	BA-9 at 34 feet		
Visual description	CLAY, with sand and gravel, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**11**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Sandy lean clay with gravel**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	100
3/4"	94
1/2"	94
3/8"	92
#4	85
#8	
#10	76
#16	72
#30	
#40	65
#50	64
#100	60
#200	52.1

Moisture (M) and Density (D)	
M (%)	18.6
D (pcf)	
LL	45
PL	15
PI	30
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

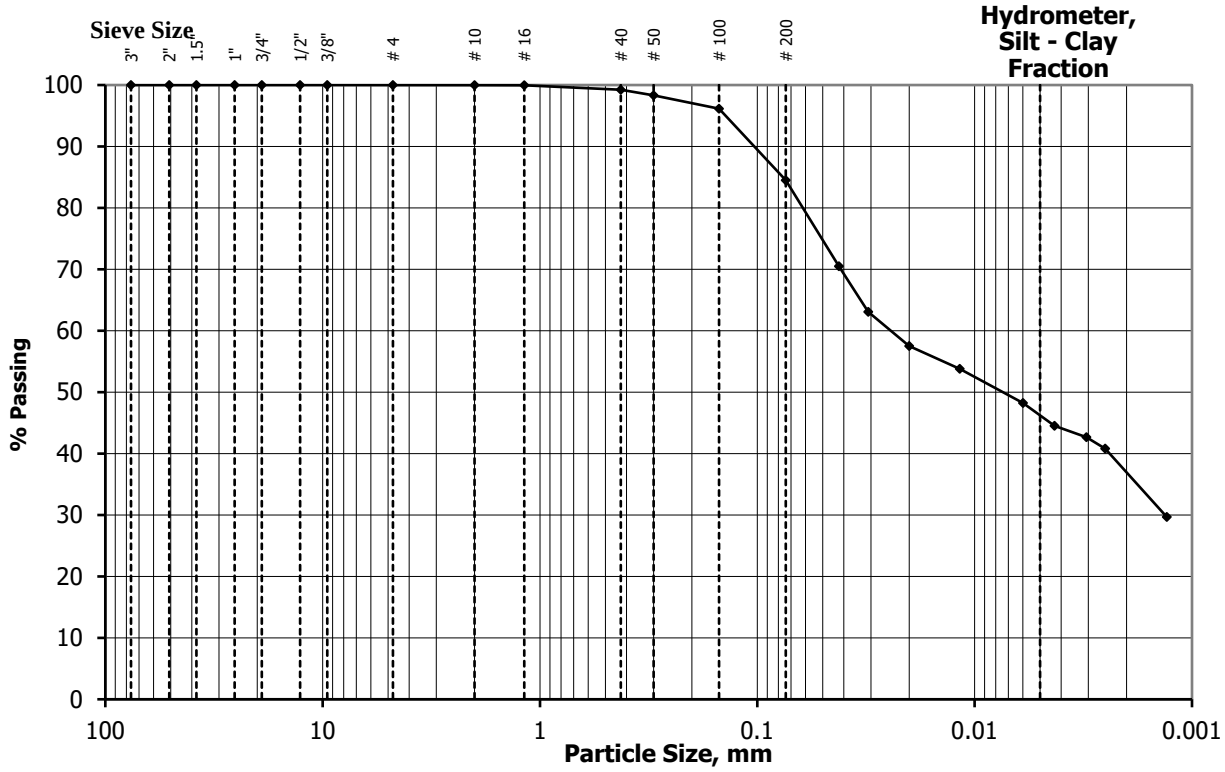
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653(24.3040)	Date:	08/12/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252691	Reviewer:	G. Hoyos
Sample Location:	BA-9 at 10 feet		
Visual Description:	CLAY, with sand, brown		
Soil Classification (USCS):	**CL**	**Lean clay with sand**	

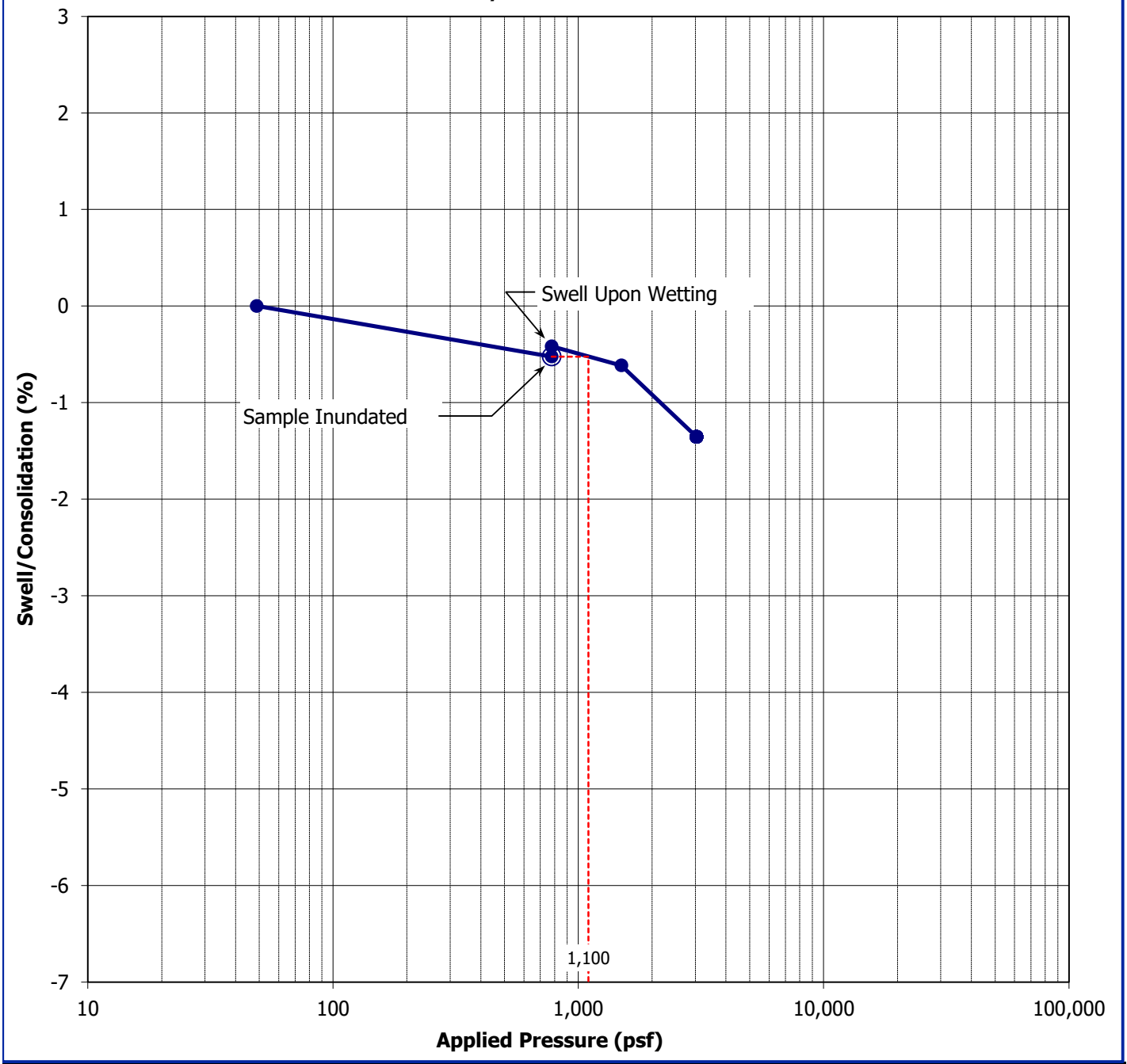
Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	99
#50	98
#100	96
#200	85

Hydrometer	
Particle Size	**% Passing**
42 Micron	70
31 Micron	63
20 Micron	58
12 Micron	54
6 Micron	48
4.3 Micron	45
3.1 Micron	43
2.5 Micron	41
1.3 Micron	30
% Gravel:	**0**
% Sand:	**15**
% Silt:	**39**
% Clay (< 5 micron):	**46**



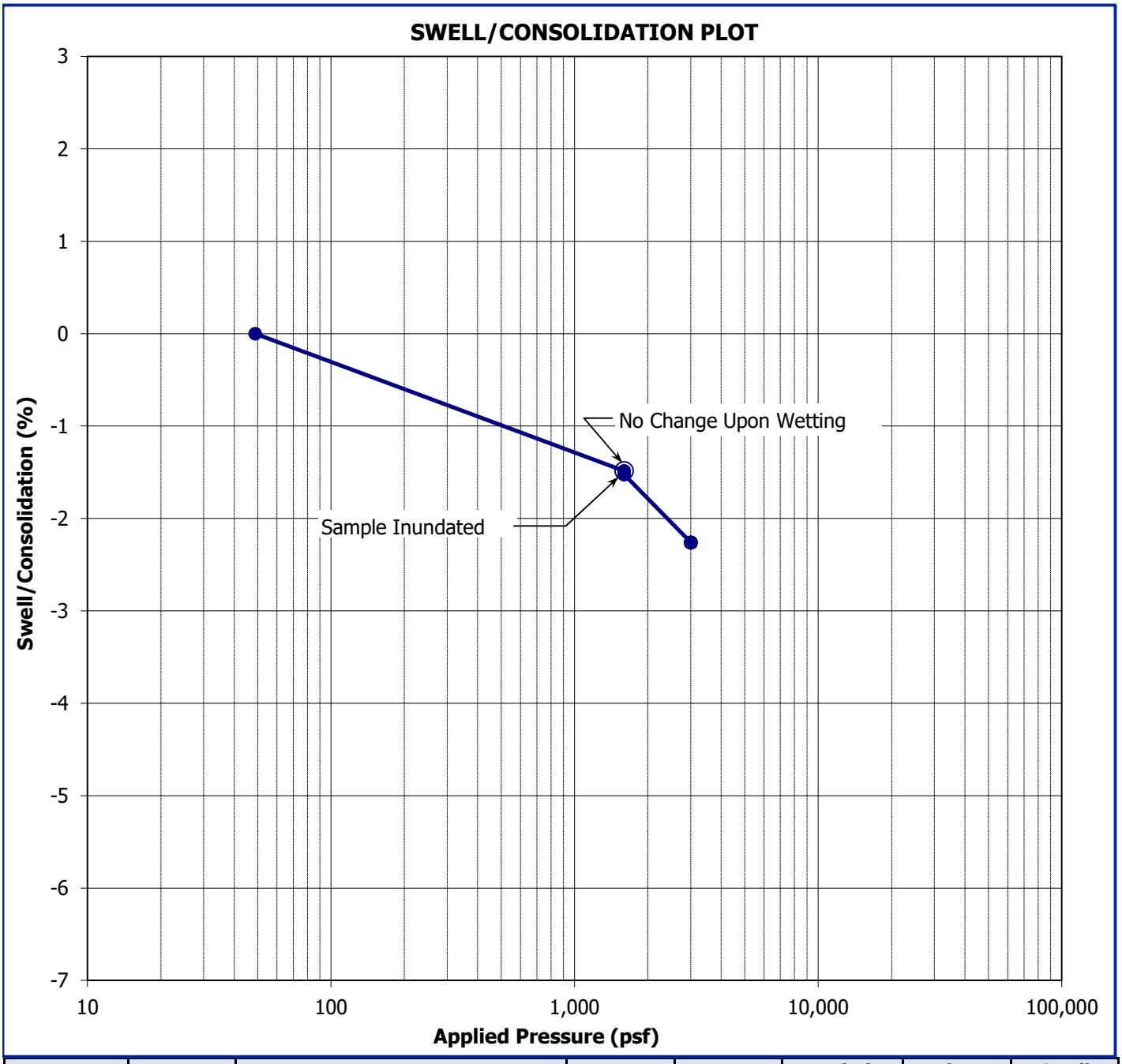
CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-9	8	CLAY, sandy, brown, calcareous	108.5	19.2	779	0.1	1,100

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252093

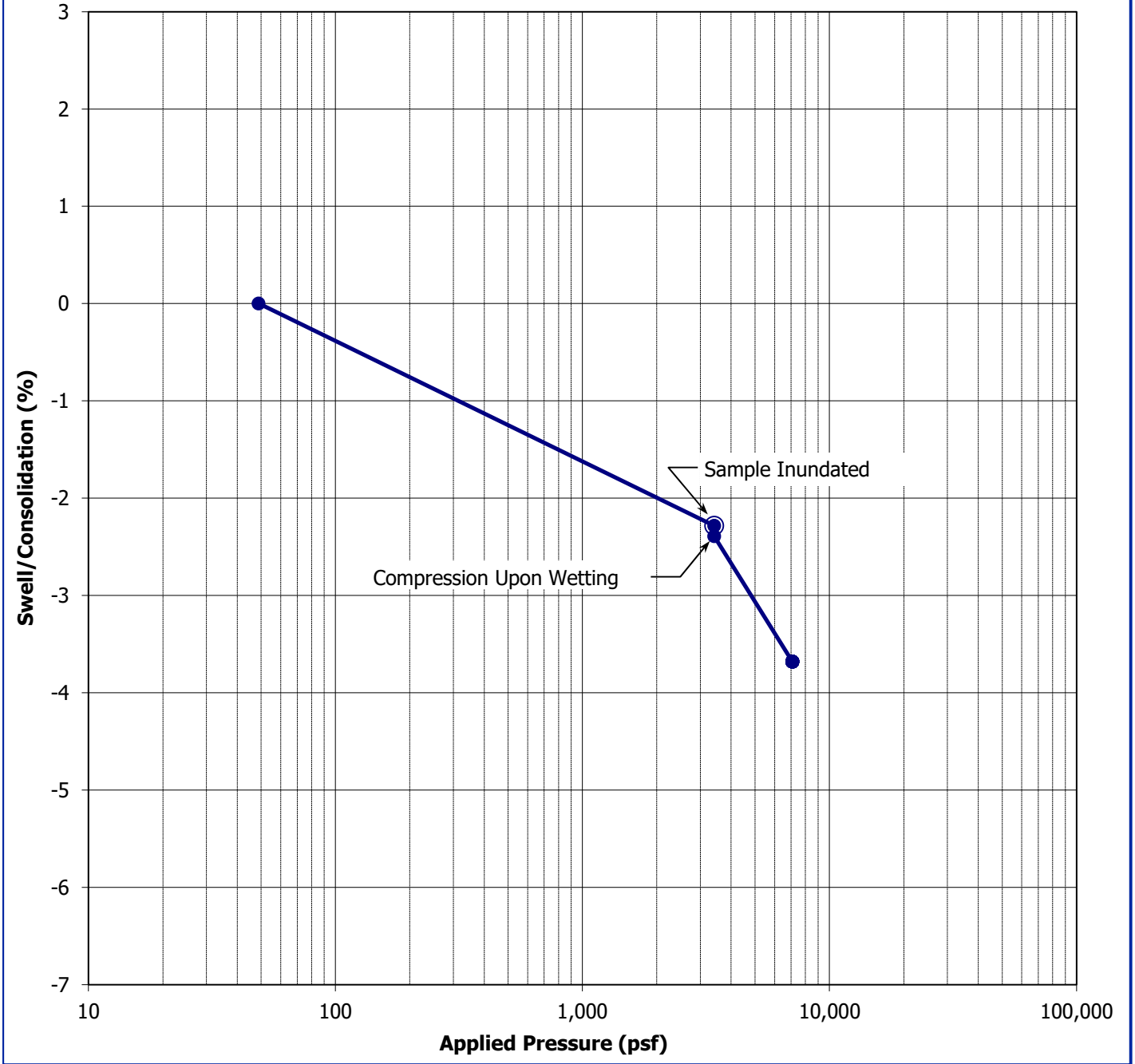


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-9	16	CLAY, tan	97.1	29.0	1,598	0.0	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252094

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
BA-9	34	CLAY, with sand and gravel, brown	104.0	18.6	3,418	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252096

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653 (24.3040)			Boring:	BA-9
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	8 feet
Date:	August 14, 2025	Technician:	KJM	Visual Description of Sample:	
Lab ID Number:	252690	Reviewer:	G. Hoyos	CLAY, sandy, brown	

Sample Data:

Diameter:	1.90	in.	Length:	2.97	in.
Diameter:	1.91	in.	Length:	2.96	in.
Diameter:	1.91	in.	Length:	2.98	in.
Avg. Dia.	***1.91***	in.	Avg. L.	***2.97***	in.
Aspect Ratio (L/Dia):	**1.56**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)	10.1	83	3,760.6
0.010 (0:00)	0.3	8	401.8	0.350 (0:00)	11.8	71	3,156.6
0.025 (0:00)	0.8	13	649.7	0.400 (0:00)	13.5	67	2,921.9
0.050 (0:00)	1.7	61	3,022.6	0.450 (0:00)			
0.075 (0:00)	2.5	90	4,421.3	0.500 (0:00)			
0.100 (0:00)	3.4	107	5,211.1	0.550 (0:00)			
0.125 (0:00)	4.2	118	5,696.8	0.600 (0:00)			
0.150 (0:00)	5.1	124	5,933.8	0.650 (0:00)			
0.175 (0:00)	5.9	127	6,023.5	0.700 (0:00)			
0.200 (0:00)	6.7	118	5,546.6	0.750 (0:00)			
0.225 (0:00)	7.6	116	5,403.4	0.800 (0:00)			
0.250 (0:00)	8.4	107	4,938.7	0.850 (0:00)			
0.275 (0:00)	9.3	95	4,344.6	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 6,040 psf

Shear Strength (S_u): 3,020 psf

Moisture Content & Density	
dish ID	X
dish mass (g)	212.4
wet soil + dish (g)	326.8
dry soil + dish (g)	310.3
moisture content:	**16.8%**
sample mass (g)	269.9
sample moisture content %	16.8%
dry sample mass (g)	231.1
wet density (pcf)	121.2
in-situ dry density (pcf)	**103.7**

Sample Sketch:

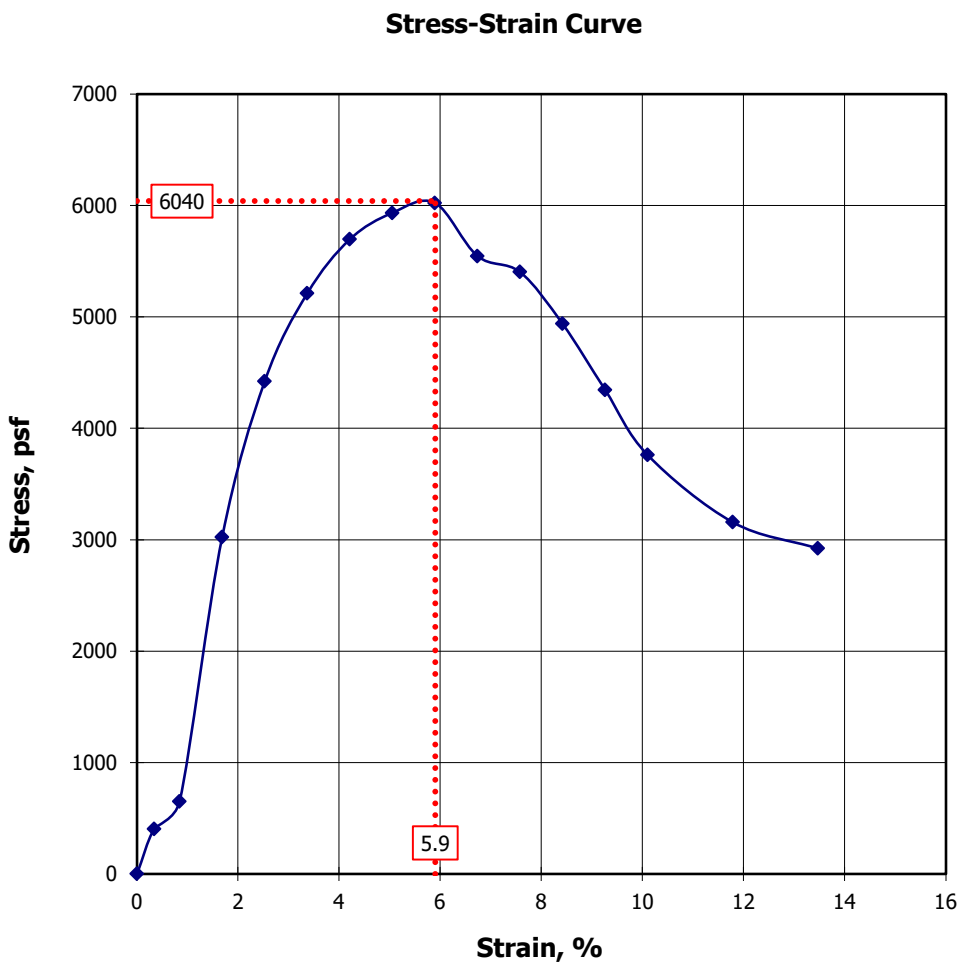
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653 (24.3040)			Hole:	BA-9
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	8 feet
Date:	August 14, 2025	Lab Tech:	KJM	Visual Description of Sample:	
Lab ID:	252690	Checked By:	G. Hoyos	CLAY, sandy, brown	

Unconfined Compressive Strength (q_u):	**6,040**	**psf**	**Density (pcf):**	103.7
Shear Strength (S_u):	**3,020**	**psf**	**Moisture:**	16.8

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	401.8
0.8	649.7
1.7	3022.6
2.5	4421.3
3.4	5211.1
4.2	5696.8
5.1	5933.8
5.9	6023.5
6.7	5546.6
7.6	5403.4
8.4	4938.7
9.3	4344.6
10.1	3760.6
11.8	3156.6
13.5	2921.9



CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	24.3040			Boring:	BA-9
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	March 14, 2025	Technician:	J. Holiman	Visual Description of Sample:	
Lab ID Number:	252095	Reviewer:	G. Hoyos	CLAY, sandy, brown	

Sample Data:

Diameter:	1.93	in.	Length:	3.93	in.
Diameter:	1.93	in.	Length:	3.87	in.
Diameter:	1.93	in.	Length:	3.90	in.
Avg. Dia.	***1.93***	in.	Avg. L.	***3.90***	in.
Aspect Ratio (L/Dia):	**2.02**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0		0.0	0.300 (0:00)	7.7	34	1,541.6
0.010 (0:00)	0.3	0	19.6	0.350 (0:00)	9.0	37	1,654.3
0.025 (0:00)	0.6	2	97.6	0.400 (0:00)	10.3	42	1,851.4
0.050 (0:00)	1.3	6	290.9	0.450 (0:00)	11.5	46	1,998.8
0.075 (0:00)	1.9	10	481.8	0.500 (0:00)	12.8	50	2,141.1
0.100 (0:00)	2.6	13	622.2	0.550 (0:00)	14.1	53	2,236.2
0.125 (0:00)	3.2	16	760.7	0.600 (0:00)	15.4	56	2,327.5
0.150 (0:00)	3.8	19	897.4	0.650 (0:00)	16.7	57	2,333.2
0.175 (0:00)	4.5	21	985.2	0.700 (0:00)	18.0	58	2,337.6
0.200 (0:00)	5.1	23	1,071.8	0.750 (0:00)	19.2	57	2,261.4
0.225 (0:00)	5.8	25	1,157.1	0.800 (0:00)	20.5	54	2,108.3
0.250 (0:00)	6.4	28	1,287.2	0.850 (0:00)			
0.275 (0:00)	7.1	30	1,369.7	0.900 (0:00)			

Unconfined Compressive Strength (q_u): 2,340 psf

Shear Strength (S_u): 1,170 psf

Moisture Content & Density	
dish ID	2
dish mass (g)	155.2
wet soil + dish (g)	330.1
dry soil + dish (g)	304.8
moisture content:	**16.9%**
sample mass (g)	399.0
sample moisture content %	16.9%
dry sample mass (g)	341.3
wet density (pcf)	133.0
in-situ dry density (pcf)	**113.7**

Sample Sketch:

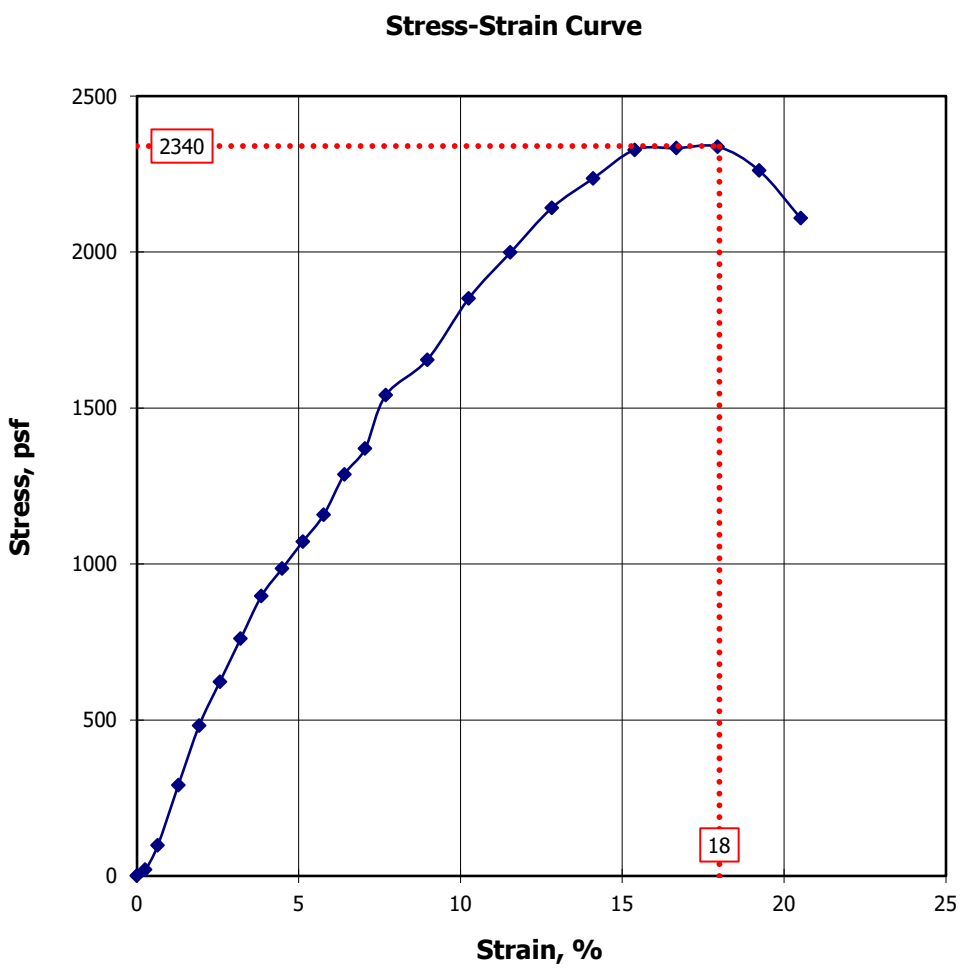
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	24.3040			Hole:	BA-9
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	20 feet
Date:	March 14, 2025	Lab Tech:	J. Holiman	Visual Description of Sample:	
Lab ID:	252095	Checked By:	G. Hoyos	CLAY, sandy, brown	

Unconfined Compressive Strength (q_u):	**2,340**	**psf**	**Density (pcf):**	113.7
Shear Strength (S_u):	**1,170**	**psf**	**Moisture:**	16.9

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	19.6
0.6	97.6
1.3	290.9
1.9	481.8
2.6	622.2
3.2	760.7
3.8	897.4
4.5	985.2
5.1	1071.8
5.8	1157.1
6.4	1287.2
7.1	1369.7
7.7	1541.6
9.0	1654.3
10.3	1851.4
11.5	1998.8
12.8	2141.1
14.1	2236.2
15.4	2327.5
16.7	2333.2
18.0	2337.6
19.2	2261.4
20.5	2108.3



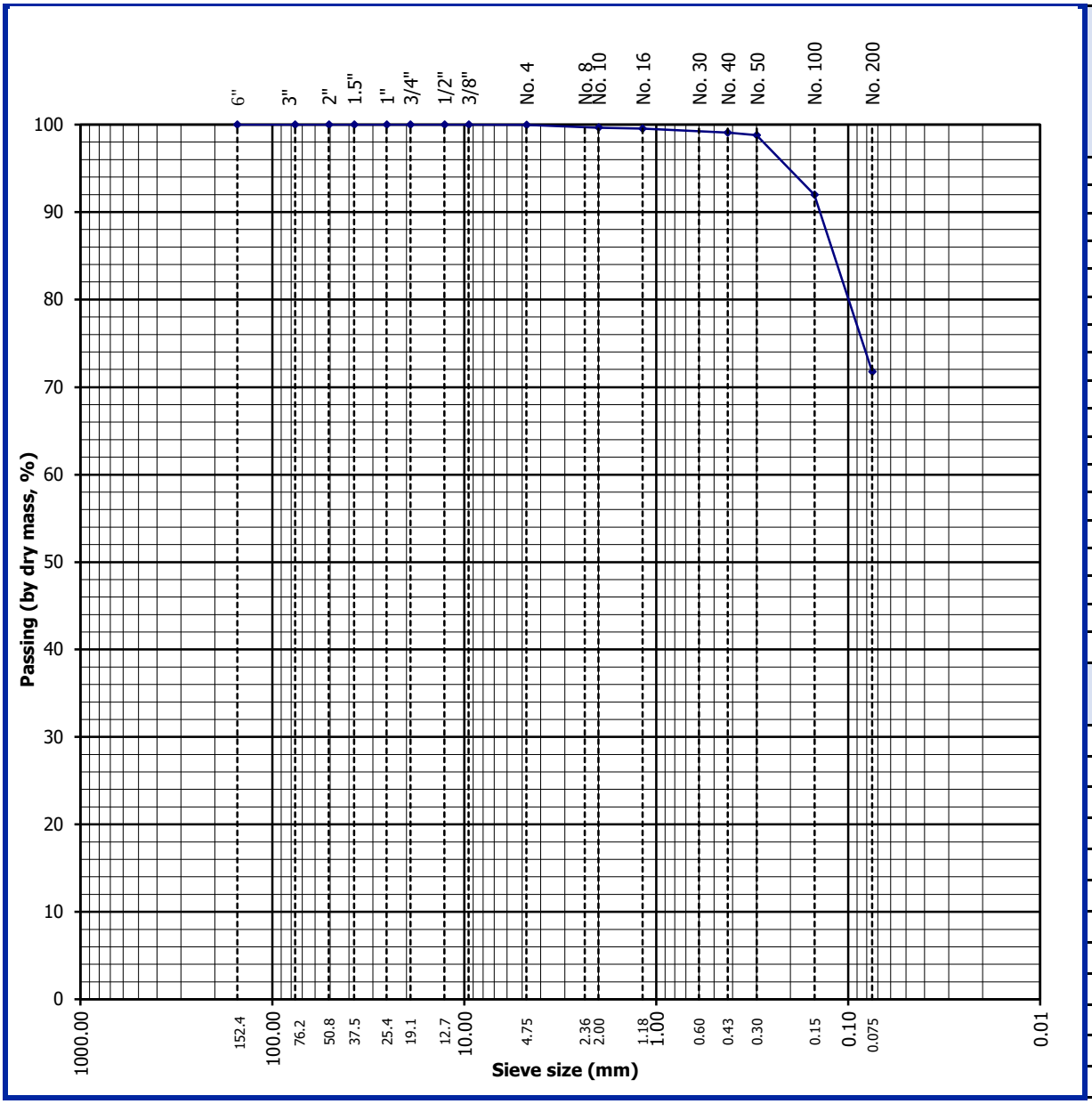
CMT TECHNICAL SERVICES

AASHTO ACCREDITED

GRADATION PLOT - SOIL AND AGGREGATE

Project number	24.3040	Date	March 26, 2025
Project name	Thornton Water Pipeline Segment F.1	Technician	J. Wayne
Lab ID number	252180	Reviewer	G. Hoyos
Sample location	QTR-1 at 0 to 5 feet		
Visual description	CLAY, with sand, brown		

AASHTO M145 Classification				Soaking Method	
				Procedure	Method
Classification	**A-7-6**	**Group Index**	**20**	AASHTO T11	
Unified Soil Classification System (ASTM D2487)				ASTM D1140	**B**
(CL)	**Lean clay with sand**			Specimen soaking time (min)	**1,440**



Sieve Size	Passing (%)
6"	
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	100
#8	
#10	100
#16	100
#30	
#40	99
#50	99
#100	92
#200	71.8

Moisture (M) and Density (D)	
M (%)	5.0
D (pcf)	
LL	46
PL	15
PI	31
D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

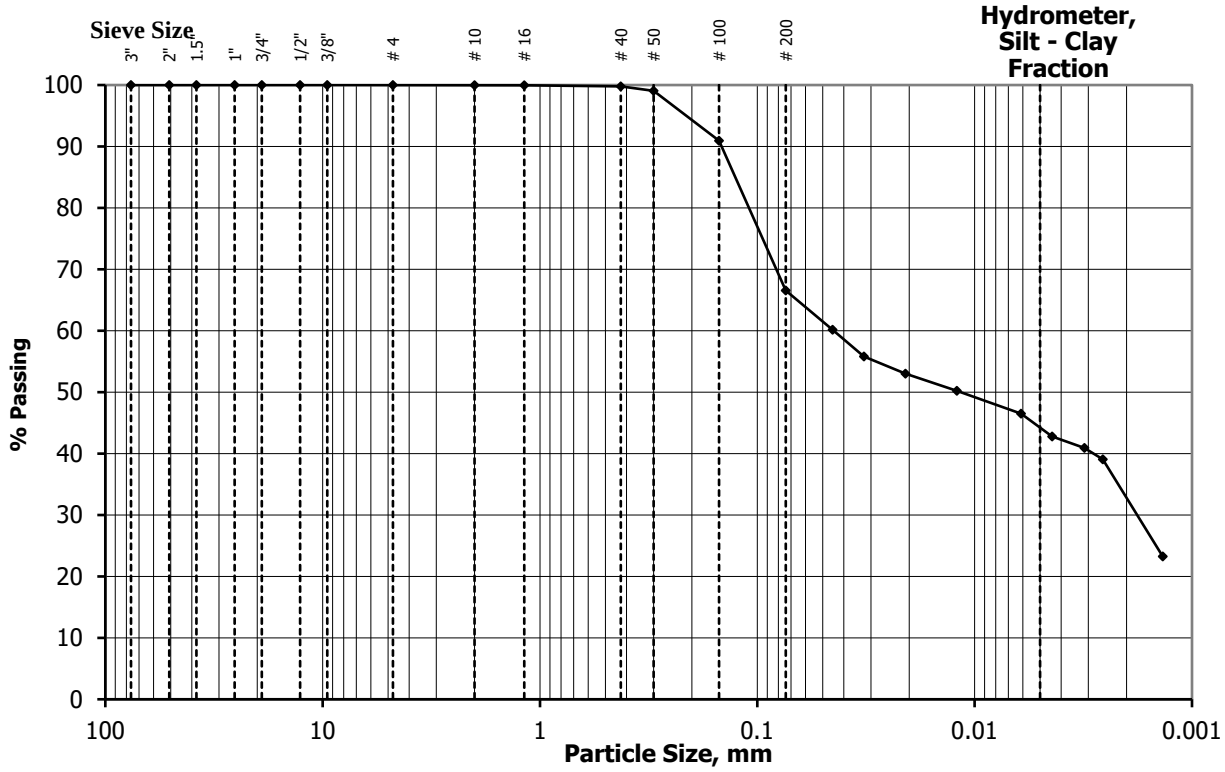
CMT TECHNICAL SERVICES

PARTICLE SIZE ANALYSIS (ASTM D422)

Project Number:	500653(24.3040)	Date:	08/12/25
Project Name:	Thornton Water Pipeline Segment F.1	Technician:	J. Wayne
Lab ID Number:	252695	Reviewer:	G. Hoyos
Sample Location:	QTR-1 at 11 feet		
Visual Description:	CLAY, sandy, brown		
Soil Classification (USCS):	**CL**	**Sandy lean clay**	

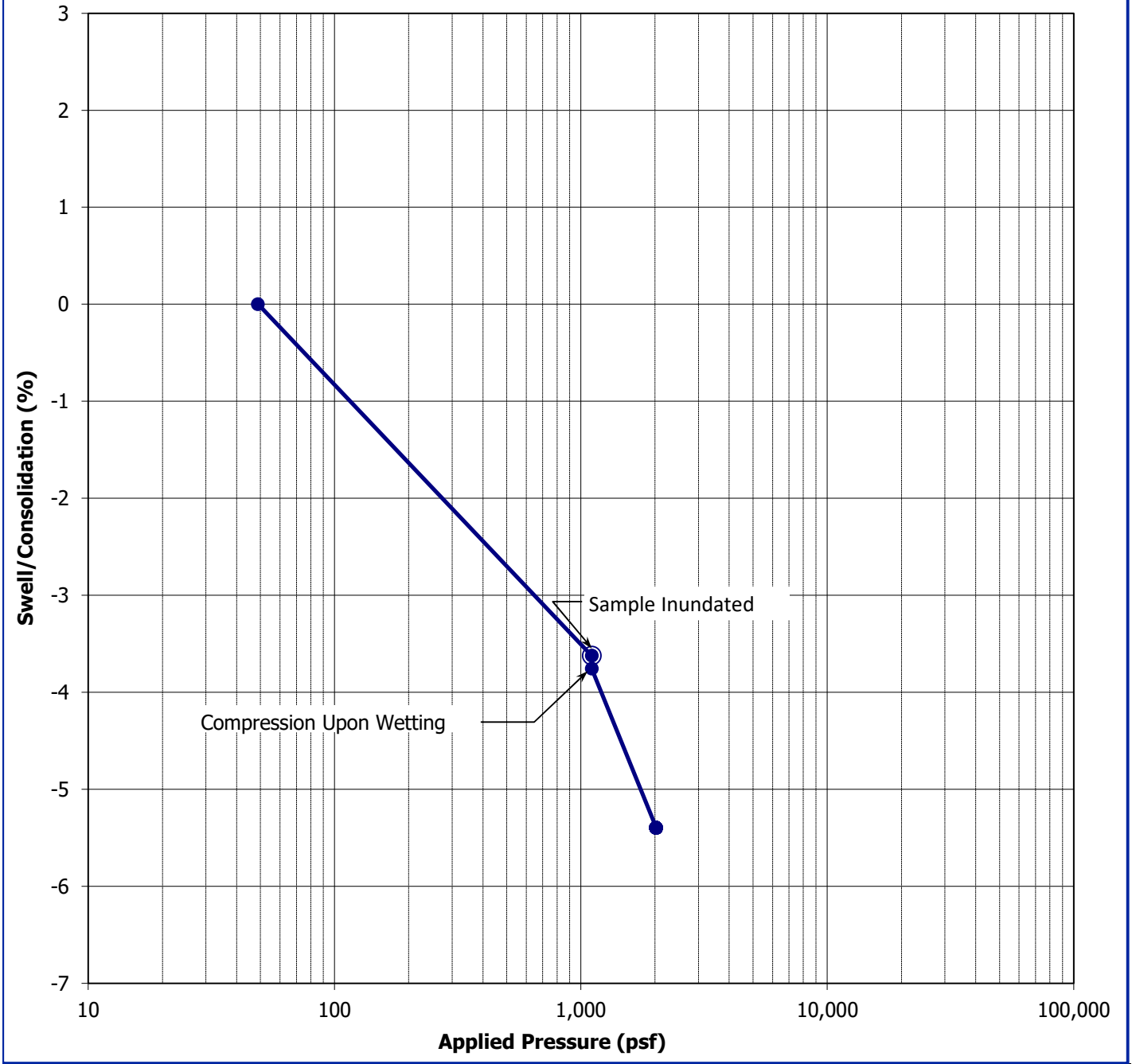
Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#40	100
#50	99
#100	91
#200	67

Hydrometer	
Particle Size	**% Passing**
45 Micron	60
32 Micron	56
21 Micron	53
12 Micron	50
6 Micron	47
4.4 Micron	43
3.1 Micron	41
2.6 Micron	39
1.4 Micron	23
% Gravel:	**0**
% Sand:	**33**
% Silt:	**23**
% Clay (< 5 micron):	**44**



CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT

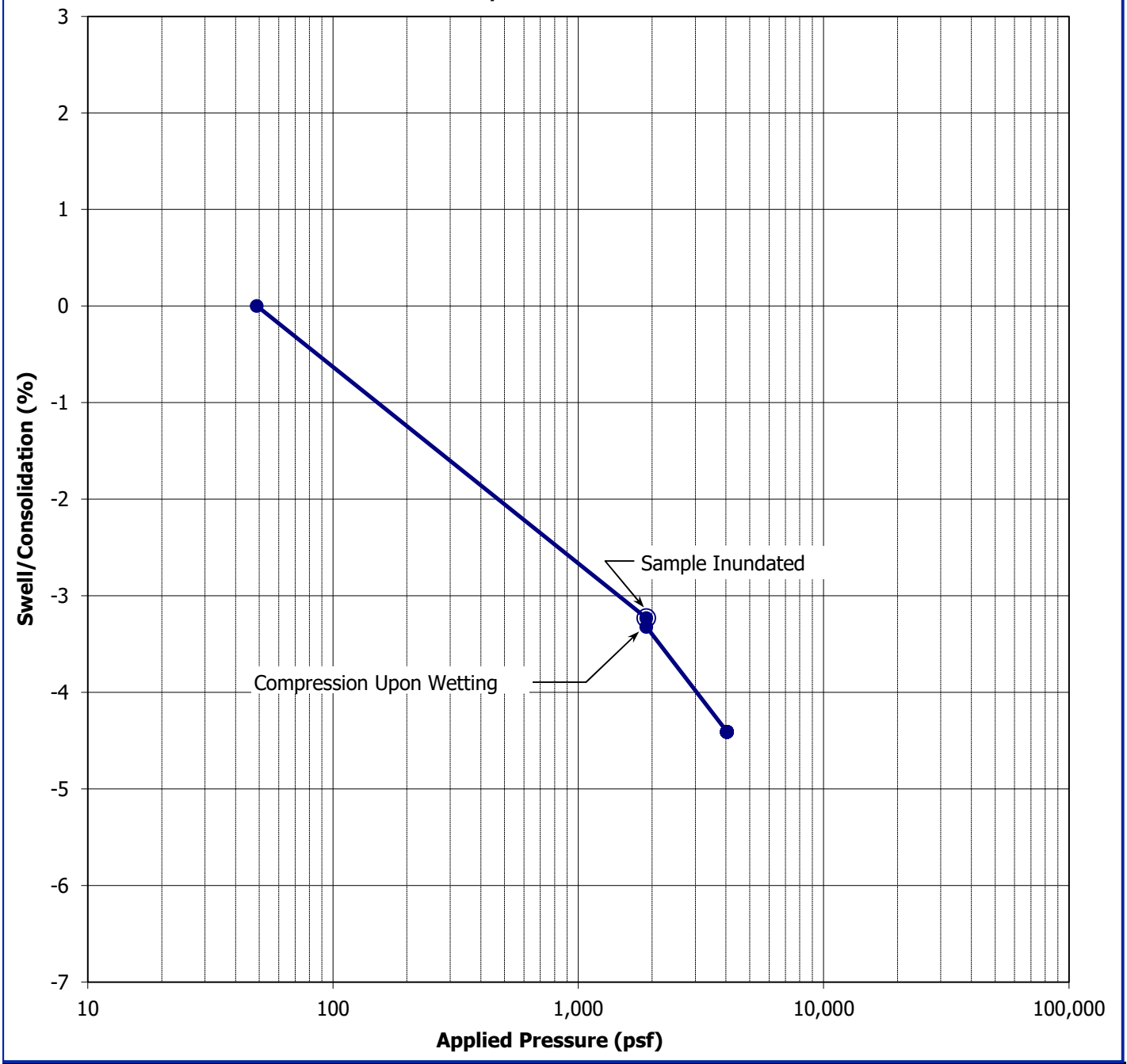


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
QTR-1	11	CLAY, with sand, brown	108.8	19.8	1,107	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252178

CMT TECHNICAL SERVICES

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
QTR-1	19	CLAY, with sand, brown	105.4	22.4	1,895	-0.1	NA

Project Number	Project Name	Lab ID Number
24.3040	Thornton Water Pipeline Segment F.1	252179

CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project Number:	500653(24.3040)			Boring:	QTR-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	7 feet
Date:	August 14, 2025	Technician:	KLM	Visual Description of Sample:	
Lab ID Number:	252693	Reviewer:	G. Hoyos	CLAY, with sand, brown	

Sample Data:

Diameter:	1.92	in.	Length:	3.77	in.
Diameter:	1.93	in.	Length:	3.82	in.
Diameter:	1.93	in.	Length:		in.
Avg. Dia.	***1.93***	in.	Avg. L.	***3.79***	in.
Aspect Ratio (L/Dia):	**1.97**		Axial Strain Rate:	0.05	in./per min.

L/Dia. Ratio Criteria: between 2:1 & 2.5:1 *Specimen Conforms?:* ***Yes*** ~~*No*~~

Test Results: *Note: record actual time at dial reading and associated axial load.*

Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)	Dial & Time Reading (in) & (min:sec)	Axial Strain (%)	Axial Load (lb)	Axial Stress (psf)
0.000 (0:00)	0.0	0	0.0	0.300 (0:00)			
0.010 (0:00)	0.3	10	493.5	0.350 (0:00)			
0.025 (0:00)	0.7	17	835.6	0.400 (0:00)			
0.050 (0:00)	1.3	34	1,660.1	0.450 (0:00)			
0.075 (0:00)	2.0	50	2,425.0	0.500 (0:00)			
0.100 (0:00)	2.6	58	2,794.1	0.550 (0:00)			
0.125 (0:00)	3.3	62	2,966.6	0.600 (0:00)			
0.150 (0:00)	4.0	65	3,088.9	0.650 (0:00)			
0.175 (0:00)	4.6	66	3,114.9	0.700 (0:00)			
0.200 (0:00)	5.3	65	3,046.6	0.750 (0:00)			
0.225 (0:00)	5.9	63	2,932.3	0.800 (0:00)			
0.250 (0:00)	6.6	61	2,819.3	0.850 (0:00)			
0.275 (0:00)				0.900 (0:00)			

Unconfined Compressive Strength (q_u): 3,120 psf

Shear Strength (S_u): 1,560 psf

Moisture Content & Density	
dish ID	MA
dish mass (g)	158.7
wet soil + dish (g)	305.6
dry soil + dish (g)	283.2
moisture content:	**18.0%**
sample mass (g)	342.0
sample moisture content %	18.0%
dry sample mass (g)	289.8
wet density (pcf)	118.0
in-situ dry density (pcf)	**100.0**

Sample Sketch:

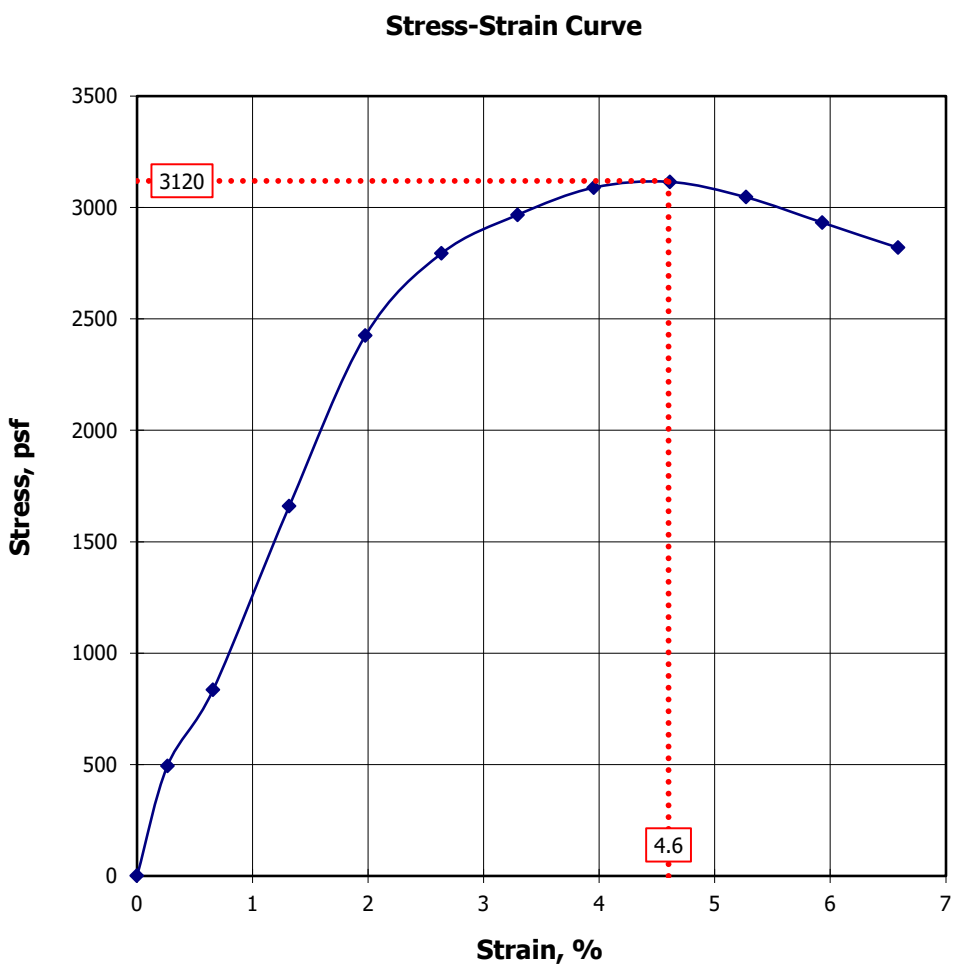
CMT TECHNICAL SERVICES

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL (ASTM D2166)

Project No.:	500653(24.3040)			Hole:	QTR-1
Project Name:	Thornton Water Pipeline Segment F.1			Depth:	7 feet
Date:	August 14, 2025	Lab Tech:	KLM	Visual Description of Sample:	
Lab ID:	252693	Checked By:	G. Hoyos	CLAY, with sand, brown	

Unconfined Compressive Strength (q_u):	**3,120**	**psf**	**Density (pcf):**	100.0
Shear Strength (S_u):	**1,560**	**psf**	**Moisture:**	18.0

Axial Strain (%)	Axial Stress (psf)
0.0	0.0
0.3	493.5
0.7	835.6
1.3	1660.1
2.0	2425.0
2.6	2794.1
3.3	2966.6
4.0	3088.9
4.6	3114.9
5.3	3046.6
5.9	2932.3
6.6	2819.3



CMT TECHNICAL SERVICES

APPENDIX C

Groundwater Monitoring, Slug Testing, and
Water Quality Testing

CMT TECHNICAL SERVICES

SUMMARY OF GROUNDWATER MEASUREMENTS

TWP Segment F.1

Project No. 500653 (24.3040)

Boring	Casing Height above Ground Surface (ft)	Water Check Date	Groundwater Depth from Top of Casing (ft)	Groundwater Depth from Ground Surface (ft)
Hood-2	3.2	09/03/25	n/a (time of drill)	dry
		09/11/25	tbd	13.3
		09/22/25	14.5	11.3
		10/24/25	11.9	8.7
		11/21/25	9.3	6.1
		12/22/25	8.4	5.2
		01/26/26	8.5	5.3
		02/23/26	8.4	5.2
		03/23/26	8.5	5.3
Tips-2	2.5	07/14/25	n/a (time of drill)	5.7
		07/22/25	8.3	5.8
		08/25/25	8.2	5.7
		09/22/25	13.1	10.6
		10/24/25	13.0	10.5
		11/21/25	15.2	12.7
		12/22/25	16.4	13.9
		01/26/26	17.2	14.7
		02/23/26	17.6	15.1
		03/23/26	18.0	15.5
RRDI-1	2.7	04/11/25	n/a (time of drill)	16.5
		04/28/25	14.0	11.3
		04/30/25	9.3	6.6
		07/22/25	14.1	11.4
		08/25/25	13.4	10.7
		09/22/25	14.1	11.4
		10/24/25	15.0	12.3
		11/21/25	16.2	13.5
		12/22/25	16.8	14.1
		01/26/26	16.9	14.2
		02/23/26	16.9	14.2
		03/23/26	17.4	14.7

CMT TECHNICAL SERVICES

SUMMARY OF GROUNDWATER MEASUREMENTS

TWP Segment F.1

Project No. 500653 (24.3040)

Boring	Casing Height above Ground Surface (ft)	Water Check Date	Groundwater Depth from Top of Casing (ft)	Groundwater Depth from Ground Surface (ft)
RRDI-3	-0.25	04/10/25	n/a (time of drill)	20.0
		04/28/25	9.1	9.1
		04/30/25	13.3	13.3
		07/22/25	9.0	9.0
		08/25/25	9.7	9.9
		09/22/25	9.5	9.7
		10/24/25	9.3	9.6
		11/21/25	9.3	9.6
		12/22/25	9.2	9.5
		01/26/26	9.2	9.5
		02/23/26	9.2	9.5
		03/23/26	8.9	9.2
Thompson-1	3.0	09/02/25	n/a (time of drill)	11.0
		09/11/25	8.6	5.6
		09/22/25	8.6	5.6
		10/24/25	8.2	5.2
		11/21/25	8.1	5.1
		12/22/25	8.1	5.1
		01/26/26	8.0	5.0
		02/23/26	8.1	5.1
		03/23/26	7.6	4.6
Thompson-3	-0.25	09/02/25	n/a (time of drill)	7.0
		09/11/25	3.4	3.6
		09/22/25	3.3	3.5
		10/24/25	2.5	2.8
		11/21/25	2.0	2.3
		12/22/25	1.9	2.2
		01/26/26	1.8	2.1
		02/23/26	1.8	2.1
		03/23/26	2.0	2.3
Jackson-1	3.0	09/03/25	n/a (time of drill)	14.0
		09/11/25	8.6	5.6
		09/22/25	9.1	6.1
		10/24/25	9.9	6.9
		11/21/25	9.1	6.1
		12/22/25	9.0	6.0
		01/26/26	9.0	6.0
		02/23/26	9.1	6.1
		03/23/26	9.4	6.4

CMT TECHNICAL SERVICES

SUMMARY OF GROUNDWATER MEASUREMENTS
TWP Segment F.1
Project No. 500653 (24.3040)

Boring	Casing Height above Ground Surface (ft)	Water Check Date	Groundwater Depth from Top of Casing (ft)	Groundwater Depth from Ground Surface (ft)
Jackson-2	3.0	09/03/25	n/a (time of drill)	dry
		09/11/25	13.3	10.3
		09/22/25	13.5	10.5
		10/24/25	14.6	11.6
		11/21/25	14.3	11.3
		12/22/25	14.7	11.7
		01/26/26	15.0	12.0
		02/23/26	15.3	12.3
		03/23/26	15.5	12.5
LCROW-3	-0.42	08/25/25	8.5	8.9
		09/22/25	10.5	10.9
		10/24/25	11.5	11.9
		11/21/25	11.9	12.3
		12/22/25	12.0	12.4
		01/26/26	11.9	12.3
		02/23/26	12.0	12.4
		03/23/26	12.1	12.5
LCROW-4	-0.42	08/25/25	11.5	11.9
		09/22/25	11.8	12.2
		10/24/25	12.5	12.9
		11/21/25	12.8	13.2
		12/22/25	12.6	13.0
		01/26/26	12.5	12.9
		02/23/26	12.4	12.8
		03/23/26	12.5	12.9
LCROW-5	-0.5	08/25/25	6.9	7.4
		09/22/25	8.4	8.9
		10/24/25	8.0	8.5
		11/21/25	9.2	9.7
		12/22/25	8.9	9.4
		01/26/26	8.8	9.3
		02/23/26	8.8	9.3
		03/23/26	8.9	9.4
Thornton-1	3.0	08/25/25	10.7	7.7
		09/22/25	12.0	9.0
		10/24/25	12.8	9.8
		11/21/25	13.0	10.0
		12/22/25	12.9	9.9
		01/26/26	12.6	9.6
		02/23/26	12.6	10.1
		03/23/26	12.9	10.4

CMT TECHNICAL SERVICES

SUMMARY OF GROUNDWATER MEASUREMENTS

TWP Segment F.1

Project No. 500653 (24.3040)

Boring	Casing Height above Ground Surface (ft)	Water Check Date	Groundwater Depth from Top of Casing (ft)	Groundwater Depth from Ground Surface (ft)
Thornton-3	2.5	02/27/25	n/a (time of drill)	18.0
		03/05/25	13.6	11.1
		04/30/25	12.9	10.4
		07/22/25	12.6	10.1
		08/25/25	12.8	10.3
		09/22/25	15.1	12.6
		10/24/25	15.8	13.3
		11/21/25	16.1	13.6
		12/22/25	16.2	13.7
		01/26/26	16.3	13.8
		02/23/26	16.4	13.9
		03/23/26	16.2	13.7
Thornton-4	2.6	02/28/25	n/a (time of drill)	13.5
		03/05/25	8.9	6.3
		04/29/25	8.2	5.6
		07/22/25	7.8	5.2
		08/25/25	8.0	5.4
		09/22/25	10.8	8.2
		10/24/25	11.0	8.4
		11/21/25	11.1	8.5
		12/22/25	11.3	8.7
		01/26/26	11.5	8.9
		02/23/26	11.5	8.9
		03/23/26	11.3	8.7
Kraft-3	2.5	03/03/25	n/a (time of drill)	16.5
		03/06/25	12.4	9.9
		04/29/25	10.3	7.8
		07/22/25	4.8	2.3
		08/25/25	5.5	3.0
		09/22/25	8.4	5.9
		10/24/25	10.8	8.3
		11/21/25	12.5	10.0
		12/22/25	13.6	11.1
		01/26/26	14.4	11.9
		02/23/26	14.4	11.9
		03/23/26	15.2	12.7

CMT TECHNICAL SERVICES

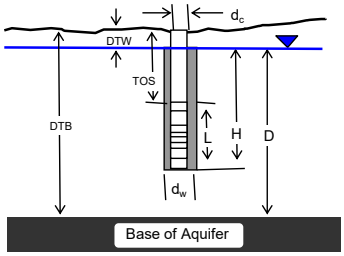
SUMMARY OF GROUNDWATER MEASUREMENTS

TWP Segment F.1

Project No. 500653 (24.3040)

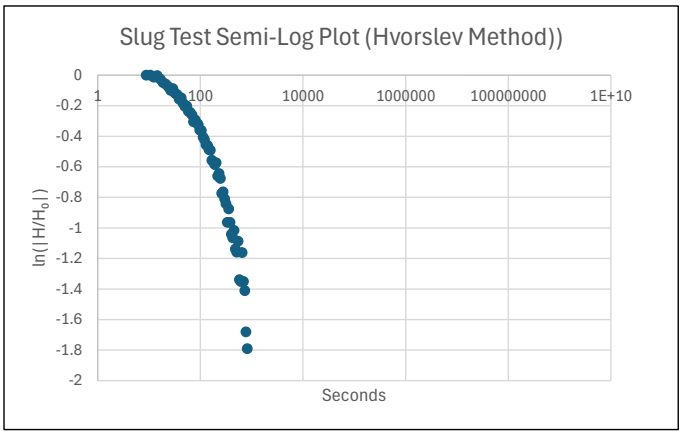
Boring	Casing Height above Ground Surface (ft)	Water Check Date	Groundwater Depth from Top of Casing (ft)	Groundwater Depth from Ground Surface (ft)
Bartles-1	2.5	02/25/25	n/a (time of drill)	20.0
		03/06/25	15.3	12.8
		04/29/25	14.1	11.6
		07/22/25	10.3	7.8
		08/25/25	11.2	8.7
		09/22/25	14.1	11.6
		10/24/25	15.7	13.2
		11/21/25	16.7	14.2
		12/22/25	17.3	14.8
		01/26/26	17.8	15.3
		02/23/26	18.1	15.6
		03/23/26	18.4	15.9
Bartles-9	3.8	02/20/25	n/a (time of drill)	10.5
		03/05/25	15.2	11.4
		04/29/25	15.3	11.5
		07/22/25	18.7	14.9
		08/25/25	24.2	20.4
		09/22/25	25.4	21.6
		10/24/25	22.5	18.7
		11/21/25	21.3	17.5
		12/22/25	20.3	16.5
		01/26/26	19.4	15.6
		02/23/26	19.0	15.2
		03/23/26	18.7	14.9
QTR-D-1	2.6	03/04/25	n/a (time of drill)	17.5
		03/06/25	13.7	11.1
		04/29/25	14.0	11.4
		07/22/25	20.1	17.5
		08/25/25	22.4	19.8
		09/22/25	23.1	20.5
		10/24/25	20.3	17.7
		11/21/25	19.1	16.5
		12/22/25	18.1	15.5
		01/26/26	17.2	14.6
		02/23/26	16.9	14.3
		03/23/26	16.7	14.1

500653 Thornton Water Project Segment F
Thornton, CO
TIPS 1
Wednesday, July 23, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	35
Saturated Thickness, b (ft)	26.1
Analysis Start (sec)	7.1
Analysis End (sec)	824.3
Equilibrium Start (sec)	1322.3
Equilibrium End (sec)	1820.3
Regression Start Row	54
Regression End Row	112
Slope (1/sec)	-0.00202
R^2	0.962279



Hydraulic Conductivity, K (ft/sec)	1.99E-07
Hydraulic Conductivity, K (ft/day)	0.017198
Hydraulic Conductivity, K (cm/sec)	6.07E-06

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 7 feet BSG.
Clay (0'-12.0') over Claystone (12.0'-40.0') and Shale (40.0'+).
Hydraulic Conductivity is consistant with Silty Clay.

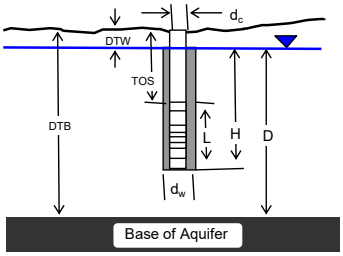


Well TIPS 2



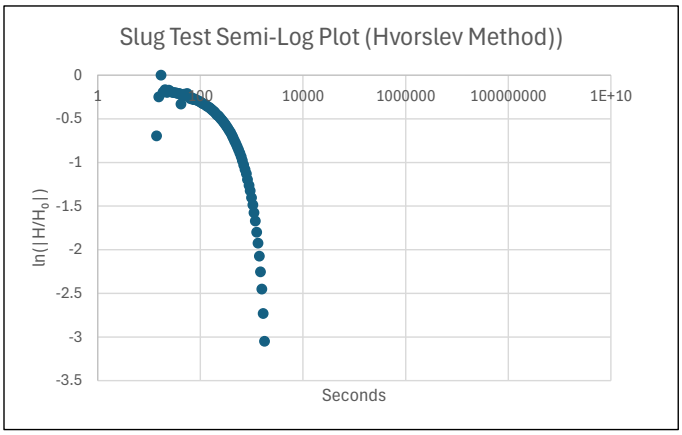
Well TIPS 2

500653 Thornton Water Project Segment F
Thornton, CO
RRDI-1
Wednesday, April 30, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	30
Saturated Thickness, b (ft)	25.9
Analysis Start (sec)	14.04
Analysis End (sec)	1884.719
Equilibrium Start (sec)	2036.188
Equilibrium End (sec)	2047.218
Regression Start Row	51
Regression End Row	125
Slope (1/sec)	-0.00138
R^2	0.975063



Hydraulic Conductivity, K (ft/sec)	1.58E-07
Hydraulic Conductivity, K (ft/day)	0.013675
Hydraulic Conductivity, K (cm/sec)	4.82E-06

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 11.5 feet BGS.
Sandstone (0'-15.0') over Claystone interbedded with Sandstone and Shale (15-0'-40.0')
Hydraulic Conductivity is consistant with Silt/Sandy Silt seen in Sandstone/Claystone.

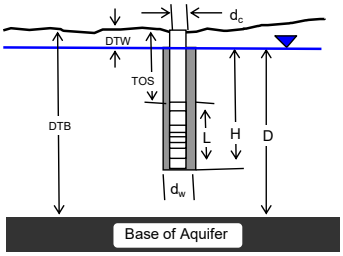


Well RRDI-1



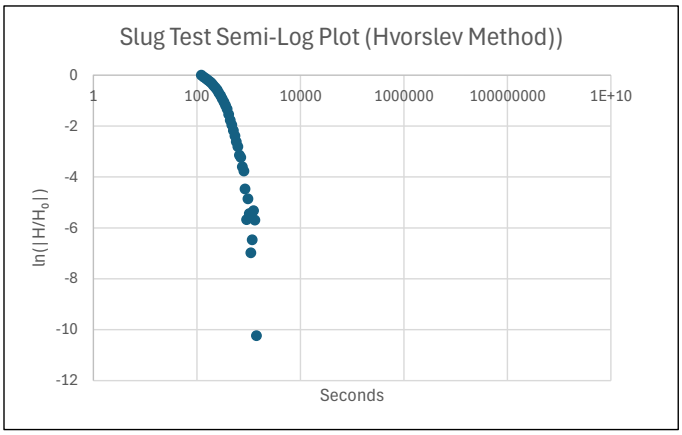
Water Level Check on Well RRDI-1

500653 Thornton Water Project Segment F
Thornton, CO
RRDI-3
Wednesday, April 30, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	25
Saturated Thickness, b (ft)	30.5
Analysis Start (sec)	119.4
Analysis End (sec)	1506
Equilibrium Start (sec)	1900
Equilibrium End (sec)	2076
Regression Start Row	88
Regression End Row	122
Slope (1/sec)	-0.00625
R^2	0.936221



Hydraulic Conductivity, K (ft/sec)	8.61E-07
Hydraulic Conductivity, K (ft/day)	0.074417
Hydraulic Conductivity, K (cm/sec)	2.63E-05

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table is at 20 feet BGS.
Sand (0-3.0') over Sandstone interbedded with Claystone (3.0'-40.0')
Hydraulic Conductivity is consistant with Sandy Silt.

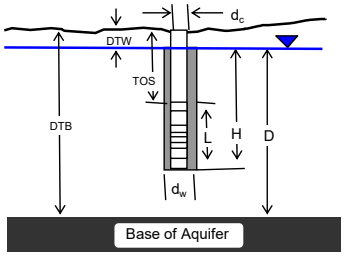


Well RRDI-3



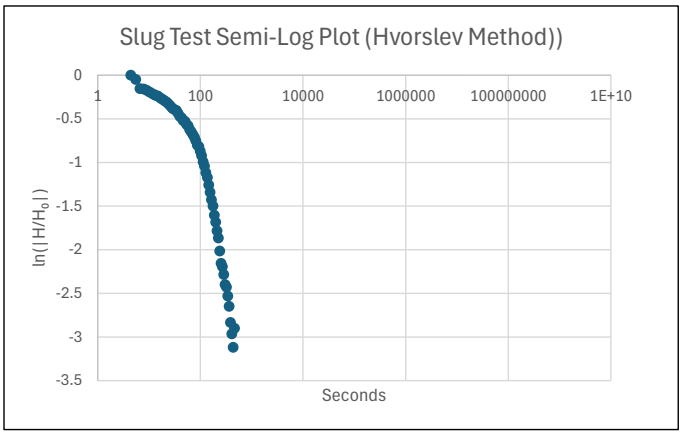
Water Level Check on RRDI-3

500653 Thornton Water Project Segment F
Thornton, CO
THOMPSON 1
Monday, September 22, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	35
Saturated Thickness, b (ft)	34.9
Analysis Start (sec)	4.4
Analysis End (sec)	553
Equilibrium Start (sec)	1054.6
Equilibrium End (sec)	2727.9
Regression Start Row	45
Regression End Row	102
Slope (1/sec)	-0.00695
R^2	0.987257



Hydraulic Conductivity, K (ft/sec)	6.84E-07
Hydraulic Conductivity, K (ft/day)	0.059083
Hydraulic Conductivity, K (cm/sec)	2.08E-05

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 11 feet BSG.
Interbeeded Clays and Sands (0'-16.0') over Sandstone (16.0'-40.0')
Hydraulic Conductivity is consistant with silty clay/sand.

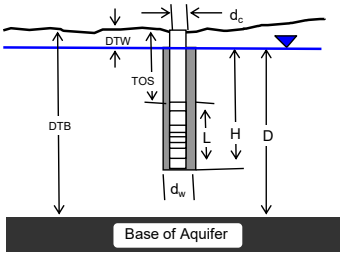


Water Level Check on Well THOM-1



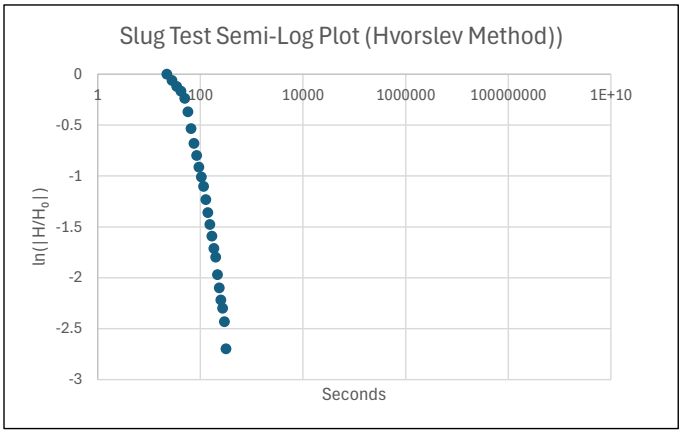
Well THOMPSON-1

500653 Thornton Water Project Segment F
Thornton, CO
TH-3
Wednesday, April 30, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	25
Saturated Thickness, b (ft)	26.3
Analysis Start (sec)	22.2
Analysis End (sec)	340.19
Equilibrium Start (sec)	2022.168
Equilibrium End (sec)	2050.047
Regression Start Row	76
Regression End Row	99
Slope (1/sec)	-0.00917
R^2	0.980518



Hydraulic Conductivity, K (ft/sec)	1.26E-06
Hydraulic Conductivity, K (ft/day)	0.109119
Hydraulic Conductivity, K (cm/sec)	3.85E-05

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 18 feet BSG.
Clay with some silt and sand (0-40.0')
Hydraulic Conductivity is consistant with Silt.

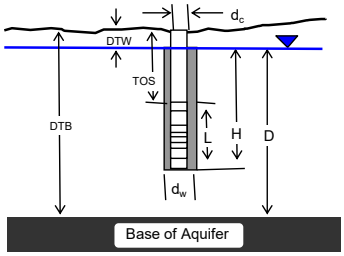


Well TH-3



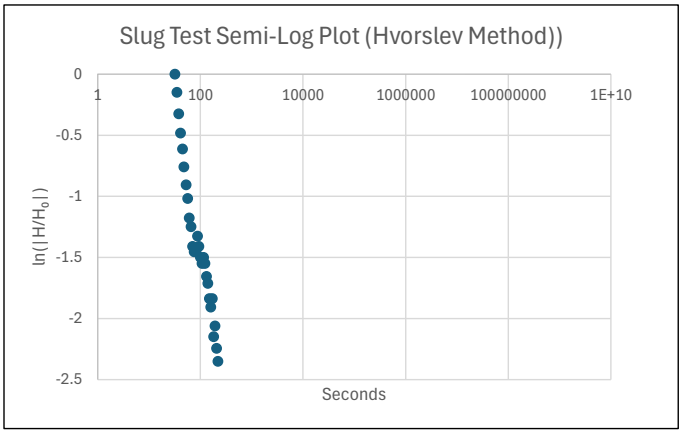
Water Level Check at Well TH-3

500653 Thornton Water Project Segment F
Thornton, CO
TH-4
Tuesday, April 29, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	30
Saturated Thickness, b (ft)	31.3
Analysis Start (sec)	30
Analysis End (sec)	225
Equilibrium Start (sec)	300
Equilibrium End (sec)	1851
Regression Start Row	63
Regression End Row	90
Slope (1/sec)	-0.01007
R^2	0.840797



Hydraulic Conductivity, K (ft/sec)	1.16E-06
Hydraulic Conductivity, K (ft/day)	0.099896
Hydraulic Conductivity, K (cm/sec)	3.52E-05

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	WARNING: POOR LINEARITY
K Validity	OK TO REPORT

NOTES
Water table at 13.5 feet BSG.
Sandy Clay (0'-39.75') over Claystone (39.75'-40.0').
Hydraulic Conductivity is consistant with Silt/Sandy Silt.

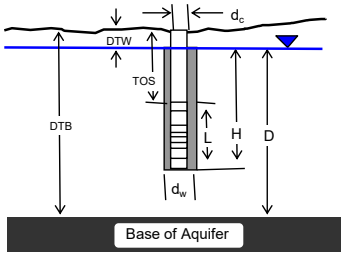


Well TH-4



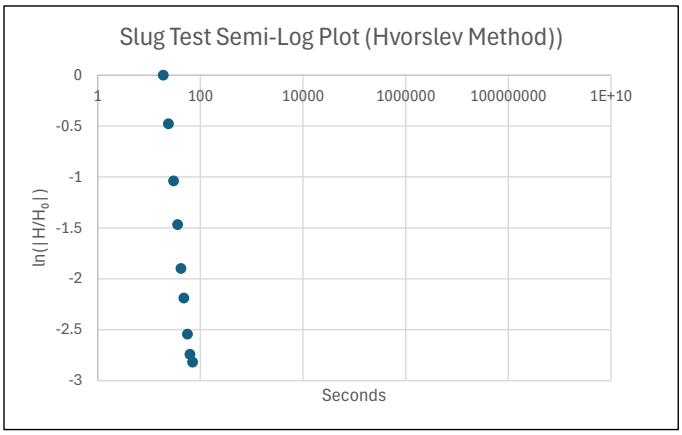
Water Level Check at Well TH-4

500653 Thornton Water Project Segment F
Thornton, CO
KR-3
Tuesday, April 29, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	25
Saturated Thickness, b (ft)	28.9
Analysis Start (sec)	19
Analysis End (sec)	80
Equilibrium Start (sec)	89
Equilibrium End (sec)	1839
Regression Start Row	73
Regression End Row	81
Slope (1/sec)	-0.05513
R^2	0.938734



Hydraulic Conductivity, K (ft/sec)	7.6E-06
Hydraulic Conductivity, K (ft/day)	0.656232
Hydraulic Conductivity, K (cm/sec)	0.000232

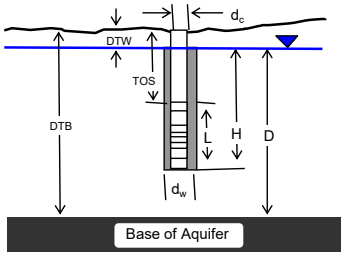
Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 16.5 feet BGS.
Sandy Clay (0'-35.0') over Claystone (35.0'-40.0')
Hydraulic Conductivity consistant with Silt/Sandy Silt.



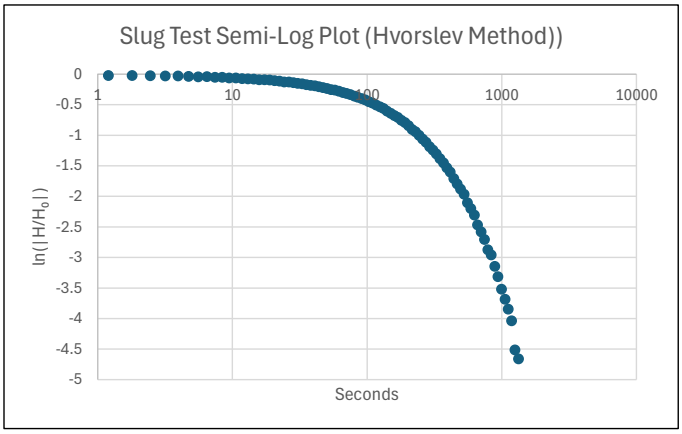


500653 Thornton Water Project Segment F
Thornton, CO
BA-1
Tuesday, April 29, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	35
Saturated Thickness, b (ft)	23
Analysis Start (sec)	-2.34
Analysis End (sec)	1334.519
Equilibrium Start (sec)	1412.519
Equilibrium End (sec)	2120.519
Regression Start Row	30
Regression End Row	120
Slope (1/sec)	-0.00351
R^2	0.997622



Hydraulic Conductivity, K (ft/sec)	3.45E-07
Hydraulic Conductivity, K (ft/day)	0.029833
Hydraulic Conductivity, K (cm/sec)	1.05E-05

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 20 feet BGS.
Clay with Sand (0'-35.5') over silty Sandstone (35.5'-40.0')
Hydraulic Conductivity consistant with Silty Clay as seen at 20 feet BGS.

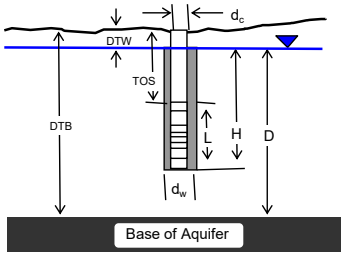


Well BA-1



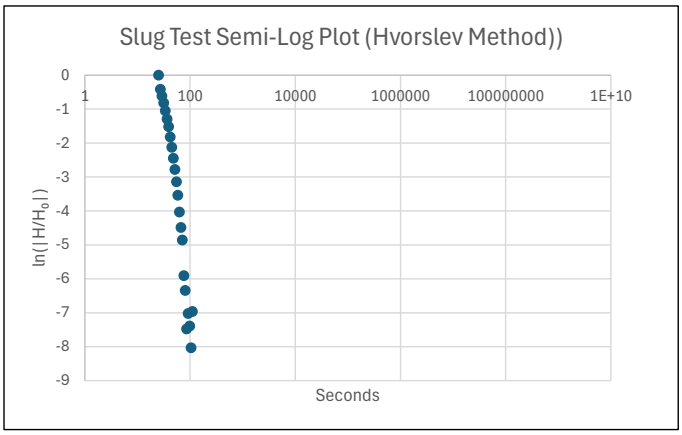
Site Photo

500653 Thornton Water Project Segment F
Thornton, CO
BA-9
Tuesday, April 29, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	35
Saturated Thickness, b (ft)	23.5
Analysis Start (sec)	25
Analysis End (sec)	200
Equilibrium Start (sec)	201
Equilibrium End (sec)	1977.805
Regression Start Row	56
Regression End Row	78
Slope (1/sec)	-0.09803
R^2	0.964673



Hydraulic Conductivity, K (ft/sec)	9.65E-06
Hydraulic Conductivity, K (ft/day)	0.833508
Hydraulic Conductivity, K (cm/sec)	0.000294

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water Table at 10.5 feet BGS.
Sandy Clay (0'-29.5') over Sand with Clay (29.5'-35.0') and Claystone (35.0'-39.5')
Hydraulic conductivity consistant with Sandy Silt present from 0-35.0' BGS

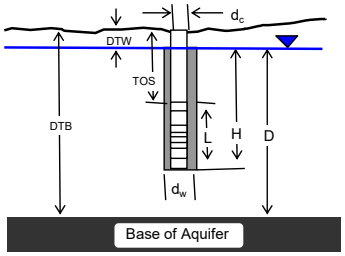


Well BA-9



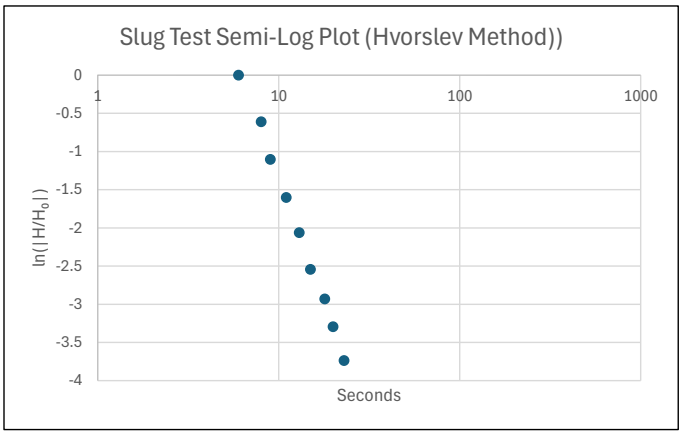
Well Instillation

500653 Thornton Water Project Segment F
Thornton, CO
QTR
Tuesday, April 29, 2025
JBE



Test Description Analysis done by the Hvorslev (1951) method.
Early-time inertial response excluded.
Linear interval selected manualy

Well Radius, r_w (ft)	0.083
Screen Length, L (ft)	25
Saturated Thickness, b (ft)	24.5
Analysis Start (sec)	6
Analysis End (sec)	25
Equilibrium Start (sec)	45
Equilibrium End (sec)	650
Regression Start Row	15
Regression End Row	23
Slope (1/sec)	-0.21481
R^2	0.970255



Hydraulic Conductivity, K (ft/sec)	2.96E-05
Hydraulic Conductivity, K (ft/day)	2.557138
Hydraulic Conductivity, K (cm/sec)	0.000902

Equilibrium Check	OK
H0 CHECK	OK
Linearity Check	OK
K Validity	OK TO REPORT

NOTES
Water table at 17.5 feet BGS.
Silty Sandy Clay (0-24.5') over Sand (24.5'-33.0') and Claystone (33.0'-40.0').
Hydraulic Conductivity is consistant with fine grained sand as shown from 24.5'-33.0'



Well QTR



Well Instillation

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250722141

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250722141
Client PO:
Client Project: TWP-F 500653

Date Received: 7/22/25
Date Reported: 7/29/25
Matrix: Water

Customer Sample ID Tips-2
Sample Date/Time: 7/22/25 1:15 PM
Lab Number: 250722141-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	7/25/25	QC83524	KRB
Chloride	**3.85 mg/L**	EPA 300.0	1.00	0.007	7/23/25	QC83557	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	7/24/25	QC83506	KRB
Dissolved Oxygen	**5.2 mg/L**	SM 4500-G	0.1	-	7/22/25	-	KJP
E-Coli	**ND mpn/100ml**	Colilert	1	1	7/23/25	-	NRP
Nitrate Nitrogen	**0.21 mg/L**	EPA 300.0	0.05	0.02	7/23/25	QC83558	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	7/23/25	QC83559	NRP
pH	**7.23 units**	SM 4500-H-B	0.01	0.01	7/22/25	-	KJP
Temperature	**20 °C**	SM 4500-H-B	1	-	7/22/25	-	KJP
Sulfate	**146 mg/L**	EPA 300.0	1.00	0.012	7/23/25	QC83561	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	7/23/25	QC83515	ARH
Total Dissolved Solids	**424 mg/L**	SM 2540-C	5	2	7/23/25	QC83476	ISG
Phosphorus - Total	**0.20 mg/L**	EPA 365.1	0.05	0.006	7/24/25	QC83502	TAB
Total Residual Chlorine	**0.10 mg/L**	SM 4500-CL-G	0.05	0.2	7/22/25	-	KJP
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	7/24/25	QC83510	NRP
Total							
Arsenic	**0.0034 mg/L**	EPA 200.8	0.0006	0.00006	7/24/25	QC83511	AMJ
Cadmium	**0.0001 mg/L**	EPA 200.8	0.0001	0.000006	7/24/25	QC83511	AMJ
Chromium	**0.0069 mg/L**	EPA 200.8	0.0015	0.00015	7/24/25	QC83511	AMJ
Copper	**0.0088 mg/L**	EPA 200.8	0.0008	0.00001	7/24/25	QC83511	AMJ
Lead	**0.0046 mg/L**	EPA 200.8	0.0001	0.000006	7/24/25	QC83511	AMJ
Manganese	**0.1391 mg/L**	EPA 200.8	0.0008	0.00001	7/24/25	QC83511	AMJ
Nickel	**0.0082 mg/L**	EPA 200.8	0.0009	0.00005	7/24/25	QC83511	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250722141

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250722141
Client PO:
Client Project: TWP-F 500653

Date Received: 7/22/25
Date Reported: 7/29/25
Matrix: Water

Customer Sample ID Tips-2
Sample Date/Time: 7/22/25 1:15 PM
Lab Number: 250722141-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0027 mg/L**	EPA 200.8	0.0008	0.00008	7/24/25	QC83511	AMJ
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	7/24/25	QC83511	AMJ
Uranium	**0.0071 mg/L**	EPA 200.8	0.0002	0.000002	7/24/25	QC83511	AMJ
Zinc	**0.100 mg/L**	EPA 200.8	0.001	0.00003	7/24/25	QC83511	AMJ
Boron	**ND mg/L**	EPA 200.7	0.05	0.01	7/25/25	QC83531	AMJ
Iron	**7.47 mg/L**	EPA 200.7	0.005	0.0005	7/25/25	QC83531	AMJ
Total Recoverable							
Chromium - Trivalent	**ND mg/L**	Calculation	0.02	0.01	7/25/25	-	JJA
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	7/24/25	QC83512	JJA
Arsenic	**0.0034 mg/L**	EPA 200.8	0.0006	0.00006	7/24/25	QC83511	AMJ
Cadmium	**0.0001 mg/L**	EPA 200.8	0.0001	0.000006	7/24/25	QC83511	AMJ
Chromium	**0.0069 mg/L**	EPA 200.8	0.0015	0.00015	7/24/25	QC83511	AMJ
Lead	**0.0046 mg/L**	EPA 200.8	0.0001	0.000006	7/24/25	QC83511	AMJ
Molybdenum	**0.0027 mg/L**	EPA 200.8	0.0005	0.00005	7/24/25	QC83511	AMJ
Nickel	**0.0078 mg/L**	EPA 200.8	0.0009	0.00005	7/24/25	QC83511	AMJ
Iron	**7.60 mg/L**	EPA 200.7	0.005	0.0005	7/25/25	QC83531	AMJ

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250722141

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 7/22/25
Project Name: TWP-F 500653

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC83524	Method Blank	ND	SM 4500-NH3-G	7/24/25
Chloride	QC83557	Blank	ND	EPA 300.0	7/23/25
Chromium - Hexavalent	QC83510	Blank	ND	SM 3500-Cr B	7/24/25
Cyanide-Total	QC83506	Blank	ND	EPA 335.4	7/24/25
Mercury	QC83512	Method Blank	ND	EPA 245.7	7/24/25
Arsenic	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Cadmium	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Chromium	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Copper	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Lead	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Manganese	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Molybdenum	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Nickel	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Selenium	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Silver	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Uranium	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Zinc	QC83511	Method Blank	ND	EPA 200.8	7/22/25
Boron	QC83531	Method Blank	ND	EPA 200.7	7/22/25
Iron	QC83531	Method Blank	ND	EPA 200.7	7/22/25
Nitrate Nitrogen	QC83558	Blank	ND	EPA 300.0	7/23/25
Nitrite Nitrogen	QC83559	Blank	ND	EPA 300.0	7/23/25
Sulfate	QC83561	Blank	ND	EPA 300.0	7/23/25
Sulfide as H2S	QC83515	Blank	ND	SM 4500-S2-G	7/24/25
Total Dissolved Solids	QC83476	Blank	ND	SM 2540-C	7/23/25
Phosphorus - Total	QC83502	Blank	ND	EPA 365.1	7/22/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC83524	Duplicate -250722101-01	0 - 20	-	3.1	SM 4500-NH3-G
		LCS	90 - 110	107.9	-	
		MS -250722009-01	75 - 125	86.6	-	
Chloride	QC83557	Duplicate -250722135-01	0 - 20	-	0.1	EPA 300.0
		LCS	90 - 110	103.4	-	
		MS -250722135-01	80 - 120	95.9	-	
Chromium - Hexavalent	QC83510	Duplicate -250717030-01	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	97.6	-	
Cyanide-Total	QC83506	Duplicate -250723066-03	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	96.9	-	
		MS -250722110-01A	90 - 110	96.0	-	
Mercury	QC83512	Duplicate -250718002-01	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	108.6	-	
		MS -250718002-01E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		MSD -250718002-01E	0 - 18	-	6.1	
Arsenic	QC83511	LCS	90 - 110	102.3	-	EPA 200.8
		MS -250722007-02C	70 - 130	108.5	-	
		MSD -250722007-02C	0 - 10	-	0.8	
Cadmium	QC83511	LCS	90 - 110	101.4	-	EPA 200.8
		MS -250722007-02C	70 - 130	101.0	-	
		MSD -250722007-02C	0 - 10	-	0.7	
Chromium	QC83511	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250722007-02C	70 - 130	101.8	-	
		MSD -250722007-02C	0 - 10	-	1.3	
Copper	QC83511	LCS	90 - 110	104.9	-	EPA 200.8
		MS -250722007-02C	70 - 130	101.9	-	
		MSD -250722007-02C	0 - 10	-	0.3	
Lead	QC83511	LCS	90 - 110	103.2	-	EPA 200.8
		MS -250722007-02C	70 - 130	95.9	-	
		MSD -250722007-02C	0 - 10	-	0.7	
Manganese	QC83511	LCS	90 - 110	104.4	-	EPA 200.8
		MS -250722007-02C	70 - 130	105.8	-	
		MSD -250722007-02C	0 - 10	-	0.4	
Molybdenum	QC83511	LCS	90 - 110	102.5	-	EPA 200.8
		MS -250722007-02C	70 - 130	101.0	-	
		MSD -250722007-02C	0 - 10	-	0.3	
Nickel	QC83511	LCS	90 - 110	104.6	-	EPA 200.8
		MS -250722007-02C	70 - 130	99.8	-	
		MSD -250722007-02C	0 - 10	-	3.6	
Selenium	QC83511	LCS	90 - 110	101.8	-	EPA 200.8
		MS -250722007-02C	70 - 130	109.2	-	
		MSD -250722007-02C	0 - 10	-	0.9	
Silver	QC83511	LCS	90 - 110	103.8	-	EPA 200.8
		MS -250722007-02C	70 - 130	93.7	-	
		MSD -250722007-02C	0 - 10	-	0.0	
Uranium	QC83511	LCS	90 - 110	100.2	-	EPA 200.8
		MS -250722007-02C	70 - 130	93.2	-	
		MSD -250722007-02C	0 - 10	-	1.9	
Zinc	QC83511	LCS	90 - 110	108.1	-	EPA 200.8
		MS -250722007-02C	70 - 130	104.6	-	
		MSD -250722007-02C	0 - 10	-	0.1	
Boron	QC83531	Duplicate -250722018-01	0 - 20	-	0.0	EPA 200.7
		LCS	90 - 110	105.9	-	
		MS -250722018-01A	75 - 125	107.2	-	
Iron	QC83531	Duplicate -250722018-01	0 - 20	-	0.0	EPA 200.7
		LCS	90 - 110	101.1	-	
		MS -250722018-01A	75 - 125	104.8	-	
Nitrate Nitrogen	QC83558	Duplicate -250722135-01	0 - 20	-	5.7	EPA 300.0
		LCS	90 - 110	102.5	-	
		MS -250722135-01	80 - 120	88.0	-	
Nitrite Nitrogen	QC83559	Duplicate -250722135-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	92.5	-	
		MS -250722135-01	80 - 120	91.1	-	
Sulfate	QC83561	Duplicate -250722135-01	0 - 20	-	0.8	EPA 300.0

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		LCS	90 - 110	101.2	-	
		MS -250722135-01	80 - 120	98.0	-	
Sulfide as H2S	QC83515	Duplicate -250717054-02	0 - 20	-	0.9	SM 4500-S2-G
		LCS	70 - 130	95.1	-	
Total Dissolved Solids	QC83476	Duplicate -250722174-01	0 - 10	-	4.5	SM 2540-C
		LCS	85 - 115	95.6	-	
Phosphorus - Total	QC83502	Duplicate -250722101-01	0 - 20	-	0.1	EPA 365.1
		LCS	90 - 110	94.2	-	
		MS -250722001-08	90 - 110	94.4	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.

Lauren Hevert
Laboratory Director

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name:	24.3040 / 500653 (old/new)
Contact Name: Jay Edwards	Contact Name:	TWP-F
Address: 7108 S Alton Way	Address:	Task Number (Lab Use Only): CAL Task 250722141 JAK
City Centennial State CO Zip 80112	City State Zip	
Phone: 720-413-7943	Phone:	
Email: Jay.Edwards@CMTTechnicalservices.com	Email:	
Sample Collector: E. Castle		
Sample Collector Phone: 720-594-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water ☐ (CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water ☐ (SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)**

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested: X See Order
7/22	1:15pm	Tips-2	9		

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: JK Date: 7/22/25

(4)

Instructions:

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice 4 Sample Pres. Yes ☑ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
[signature]	3:42 pm 7/22/25					[signature]	7/22/25 1542

CAL Task
250722141

JAK

Colorado Analytical Laboratories, Inc.

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 7/21/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
1	***100 ml sterile - Na2S2O3***
	E-Coli - Water
1	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
1	***250 ml Cylinder - Unpreserved***
	TDS - Water
1	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
1	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water - TR per quote. JK 7/22/25

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

CAL Task
250722141

JAK

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 7/21/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water – TR per quote. JK 7/22/25
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
1	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
1	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
1	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
1	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250429156

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250429156
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 4/29/25
Date Reported: 5/7/25
Matrix: Water

Customer Sample ID RRDI-1
Sample Date/Time: 4/29/25 2:45 PM
Lab Number: 250429156-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	5/2/25	QC81487	KRB
Chloride	**32.1 mg/L**	EPA 300.0	1.00	0.007	4/30/25	QC81512	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	5/1/25	QC81471	KRB
Dissolved Oxygen	**6.2 mg/L**	SM 4500-G	0.1	-	4/30/25	-	KJP
E-Coli	**ND mpn/100ml**	Colilert	1	1	4/30/25	-	DJL
Nitrate Nitrogen	**3.71 mg/L**	EPA 300.0	0.05	0.02	4/30/25	QC81513	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	4/30/25	QC81514	NRP
pH	**7.45 units**	SM 4500-H-B	0.01	0.01	4/30/25	-	KJP
Temperature	**20 °C**	SM 4500-H-B	1	-	4/30/25	-	KJP
Sulfate	**1310 mg/L**	EPA 300.0	1.00	0.012	4/30/25	QC81499	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	5/1/25	QC81479	ARH
Total Dissolved Solids	**2400 mg/L**	SM 2540-C	5	2	5/1/25	QC81483	ISG
Phosphorus - Total	**ND mg/L**	EPA 365.1	0.05	0.006	5/1/25	QC81463	TAB
Total Residual Chlorine	**0.35 mg/L**	SM 4500-CL-G	0.05	0.2	4/30/25	-	KJP
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	5/1/25	QC81477	NRP
Total							
Arsenic	**ND mg/L**	EPA 200.8	0.0006	0.00006	5/1/25	QC81478	AMJ
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Chromium	**ND mg/L**	EPA 200.8	0.0015	0.00015	5/1/25	QC81478	AMJ
Copper	**0.0011 mg/L**	EPA 200.8	0.0008	0.00001	5/1/25	QC81478	AMJ
Lead	**0.0002 mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Manganese	**0.0186 mg/L**	EPA 200.8	0.0008	0.00001	5/1/25	QC81478	AMJ
Nickel	**0.0017 mg/L**	EPA 200.8	0.0009	0.00005	5/1/25	QC81478	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250429156

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250429156
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 4/29/25
Date Reported: 5/7/25
Matrix: Water

Customer Sample ID RRDI-1
Sample Date/Time: 4/29/25 2:45 PM
Lab Number: 250429156-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0018 mg/L**	EPA 200.8	0.0008	0.00008	5/1/25	QC81478	AMJ
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	5/1/25	QC81478	AMJ
Uranium	**0.0261 mg/L**	EPA 200.8	0.0002	0.000002	5/1/25	QC81478	AMJ
Zinc	**0.005 mg/L**	EPA 200.8	0.001	0.00003	5/1/25	QC81478	AMJ
Boron	**0.81 mg/L**	EPA 200.7	0.05	0.01	5/1/25	QC81469	JJA
Iron	**0.485 mg/L**	EPA 200.7	0.005	0.0005	5/1/25	QC81469	JJA
Total Recoverable							
Chromium - Trivalent	**ND mg/L**	Calculation	0.02	0.01	5/2/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	5/1/25	QC81480	JJA
Arsenic	**ND mg/L**	EPA 200.8	0.0006	0.00006	5/1/25	QC81478	AMJ
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Chromium	**ND mg/L**	EPA 200.8	0.0015	0.00015	5/1/25	QC81478	AMJ
Lead	**0.0002 mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Molybdenum	**0.0016 mg/L**	EPA 200.8	0.0005	0.00005	5/1/25	QC81478	AMJ
Nickel	**0.0016 mg/L**	EPA 200.8	0.0009	0.00005	5/1/25	QC81478	AMJ
Iron	**0.485 mg/L**	EPA 200.7	0.005	0.0005	5/1/25	QC81469	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250429156

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250429156
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 4/29/25
Date Reported: 5/7/25
Matrix: Water

Customer Sample ID RRDI-3
Sample Date/Time: 4/29/25 3:15 PM
Lab Number: 250429156-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	5/2/25	QC81487	KRB
Chloride	**17.5 mg/L**	EPA 300.0	1.00	0.007	5/1/25	QC81512	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	5/1/25	QC81471	KRB
Dissolved Oxygen	**6.1 mg/L**	SM 4500-G	0.1	-	4/30/25	-	KJP
E-Coli	**ND mpn/100ml**	Colilert	1	1	4/30/25	-	DJL
Nitrate Nitrogen	**ND mg/L**	EPA 300.0	0.05	0.02	5/1/25	QC81513	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	5/1/25	QC81514	NRP
pH	**6.66 units**	SM 4500-H-B	0.01	0.01	4/30/25	-	KJP
Temperature	**20 °C**	SM 4500-H-B	1	-	4/30/25	-	KJP
Sulfate	**1640 mg/L**	EPA 300.0	1.00	0.012	5/1/25	QC81499	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	5/1/25	QC81479	ARH
Total Dissolved Solids	**2777 mg/L**	SM 2540-C	5	2	5/1/25	QC81483	ISG
Phosphorus - Total	**0.06 mg/L**	EPA 365.1	0.05	0.006	5/1/25	QC81463	TAB
Total Residual Chlorine	**0.09 mg/L**	SM 4500-CL-G	0.05	0.2	4/30/25	-	KJP
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	5/1/25	QC81477	NRP
Total							
Arsenic	**0.0007 mg/L**	EPA 200.8	0.0006	0.00006	5/1/25	QC81478	AMJ
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Chromium	**0.0020 mg/L**	EPA 200.8	0.0015	0.00015	5/1/25	QC81478	AMJ
Copper	**0.0021 mg/L**	EPA 200.8	0.0008	0.00001	5/1/25	QC81478	AMJ
Lead	**0.0010 mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Manganese	**0.0365 mg/L**	EPA 200.8	0.0008	0.00001	5/1/25	QC81478	AMJ
Nickel	**0.0025 mg/L**	EPA 200.8	0.0009	0.00005	5/1/25	QC81478	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250429156

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250429156
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 4/29/25
Date Reported: 5/7/25
Matrix: Water

Customer Sample ID RRDI-3
Sample Date/Time: 4/29/25 3:15 PM
Lab Number: 250429156-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0030 mg/L**	EPA 200.8	0.0008	0.00008	5/1/25	QC81478	AMJ
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	5/1/25	QC81478	AMJ
Uranium	**0.0077 mg/L**	EPA 200.8	0.0002	0.000002	5/1/25	QC81478	AMJ
Zinc	**0.018 mg/L**	EPA 200.8	0.001	0.00003	5/1/25	QC81478	AMJ
Boron	**0.14 mg/L**	EPA 200.7	0.05	0.01	5/1/25	QC81469	JJA
Iron	**1.07 mg/L**	EPA 200.7	0.005	0.0005	5/1/25	QC81469	JJA
Total Recoverable							
Chromium - Trivalent	**ND mg/L**	Calculation	0.02	0.01	5/2/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	5/1/25	QC81480	JJA
Arsenic	**0.0007 mg/L**	EPA 200.8	0.0006	0.00006	5/1/25	QC81478	AMJ
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Chromium	**0.0021 mg/L**	EPA 200.8	0.0015	0.00015	5/1/25	QC81478	AMJ
Lead	**0.0010 mg/L**	EPA 200.8	0.0001	0.000006	5/1/25	QC81478	AMJ
Molybdenum	**0.0006 mg/L**	EPA 200.8	0.0005	0.00005	5/1/25	QC81478	AMJ
Nickel	**0.0025 mg/L**	EPA 200.8	0.0009	0.00005	5/1/25	QC81478	AMJ
Iron	**1.06 mg/L**	EPA 200.7	0.005	0.0005	5/1/25	QC81469	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250429156

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 4/29/25
Project Name: Thornton SEG.F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC81487	Method Blank	ND	SM 4500-NH3-G	5/1/25
Chloride	QC81512	Blank	ND	EPA 300.0	4/30/25
Chromium - Hexavalent	QC81477	Blank	ND	SM 3500-Cr B	5/1/25
Cyanide-Total	QC81471	Blank	ND	EPA 335.4	5/1/25
Mercury	QC81480	Method Blank	ND	EPA 245.7	5/1/25
Arsenic	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Cadmium	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Chromium	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Copper	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Lead	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Manganese	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Molybdenum	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Nickel	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Selenium	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Silver	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Uranium	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Zinc	QC81478	Method Blank	ND	EPA 200.8	4/29/25
Boron	QC81469	Method Blank	ND	EPA 200.7	4/29/25
Iron	QC81469	Method Blank	ND	EPA 200.7	4/29/25
Nitrate Nitrogen	QC81513	Blank	ND	EPA 300.0	4/30/25
Nitrite Nitrogen	QC81514	Blank	ND	EPA 300.0	4/30/25
Sulfate	QC81499	Blank	ND	EPA 300.0	4/30/25
Sulfide as H2S	QC81479	Blank	ND	SM 4500-S2-G	5/1/25
Total Dissolved Solids	QC81483	Blank	ND	SM 2540-C	5/1/25
Phosphorus - Total	QC81463	Blank	ND	EPA 365.1	4/29/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC81487	Duplicate -250429072-01	0 - 20	-	1.0	SM 4500-NH3-G
		LCS	90 - 110	106.5	-	
		MS -250429017-08	75 - 125	106.3	-	
Chloride	QC81512	Duplicate -250429027-01	0 - 20	-	5.4	EPA 300.0
		LCS	90 - 110	103.0	-	
		MS -250429027-01A	80 - 120	94.9	-	
Chromium - Hexavalent	QC81477	Duplicate -250424015-01	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	95.4	-	
Cyanide-Total	QC81471	Duplicate -250428088-01	0 - 20	-	18.6	EPA 335.4
		LCS	90 - 110	96.8	-	
		MS -250428091-01B	90 - 110	96.0	-	
Mercury	QC81480	Duplicate -250424015-01	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	105.8	-	
		MS -250424015-01C	80 - 120	98.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC81478	LCS	90 - 110	101.9	-	EPA 200.8
		MS -250429021-01	70 - 130	128.6	-	
		MSD -250429021-01	0 - 10	-	2.4	
Cadmium	QC81478	LCS	90 - 110	98.8	-	EPA 200.8
		MS -250429021-01	70 - 130	112.0	-	
		MSD -250429021-01	0 - 10	-	2.2	
Chromium	QC81478	LCS	90 - 110	103.9	-	EPA 200.8
		MS -250429021-01	70 - 130	109.4	-	
		MSD -250429021-01	0 - 10	-	1.9	
Copper	QC81478	LCS	90 - 110	101.6	-	EPA 200.8
		MS -250429021-01	70 - 130	106.8	-	
		MSD -250429021-01	0 - 10	-	1.6	
Lead	QC81478	LCS	90 - 110	101.5	-	EPA 200.8
		MS -250429021-01	70 - 130	104.5	-	
		MSD -250429021-01	0 - 10	-	1.2	
Manganese	QC81478	LCS	90 - 110	105.3	-	EPA 200.8
		MS -250429021-01	70 - 130	128.1	-	
		MSD -250429021-01	0 - 10	-	2.2	
Molybdenum	QC81478	LCS	90 - 110	99.1	-	EPA 200.8
		MS -250429021-01	70 - 130	87.1	-	
		MSD -250429021-01	0 - 10	-	5.0	
Nickel	QC81478	LCS	90 - 110	106.9	-	EPA 200.8
		MS -250429021-01	70 - 130	101.1	-	
		MSD -250429021-01	0 - 10	-	1.9	
Selenium	QC81478	LCS	90 - 110	106.3	-	EPA 200.8
		MS -250429021-01	70 - 130	97.4	-	
		MSD -250429021-01	0 - 10	-	0.1	
Silver	QC81478	LCS	90 - 110	99.8	-	EPA 200.8
		MS -250429021-01	70 - 130	76.2	-	
		MSD -250429021-01	0 - 10	-	6.1	
Uranium	QC81478	LCS	90 - 110	98.2	-	EPA 200.8
		MS -250429021-01	70 - 130	79.1	-	
		MSD -250429021-01	0 - 10	-	0.5	
Zinc	QC81478	LCS	90 - 110	109.6	-	EPA 200.8
		MS -250429021-01	70 - 130	98.7	-	
		MSD -250429021-01	0 - 10	-	2.3	
Boron	QC81469	Duplicate -250429025-02	0 - 20	-	2.2	EPA 200.7
		LCS	90 - 110	95.7	-	
		MS -250429102-01	75 - 125	79.7	-	
Iron	QC81469	Duplicate -250429025-02	0 - 20	-	4.1	EPA 200.7
		LCS	90 - 110	96.8	-	
		MS -250429102-01	75 - 125	85.6	-	
Nitrate Nitrogen	QC81513	Duplicate -250429027-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	102.8	-	
		MS -250429027-01A	80 - 120	97.1	-	
Nitrite Nitrogen	QC81514	Duplicate -250429027-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	91.1	-	
		MS -250429027-01A	80 - 120	92.0	-	
Sulfate	QC81499	Duplicate -250429027-01	0 - 20	-	2.1	EPA 300.0
		LCS	90 - 110	96.4	-	
		MS -250429027-01A	80 - 120	107.4	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC81479	Duplicate -250429071-03	0 - 20	-	13.2	SM 4500-S2-G
		LCS	70 - 130	83.8	-	
Total Dissolved Solids	QC81483	Duplicate -250429148-01	0 - 10	-	7.2	SM 2540-C
		LCS	85 - 115	108.2	-	
Phosphorus - Total	QC81463	Duplicate -250429027-01	0 - 20	-	3.8	EPA 365.1
		LCS	90 - 110	105.7	-	
		MS -250429017-08	90 - 110	96.9	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.

DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Email → @ CMTTECHNICALSERVICES.COM

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name: "	243040
Contact Name: JAY Edwards	Contact Name: "	
Address: 7108 S. Alton Way	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250429156 JML
Phone: 720-413-7943	Phone:	
Email: JAY.EDWARDS@CMTTechnicalServices.com	Email:	
Sample Collector: Evan Castle		
Sample Collector Phone: 720-584-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water ☐ (CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water ☐ (SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)**

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested: See List
4/29	2:45p	RRDI-1	9		X
4/29	3:15	RRDI-3	9		X

18

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: ## Date: 4/29/25

Instructions: CR-TRI $MG-TR purgeable history-Hr

C/S Info:

Deliver Via: Hand C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☑ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
Evan Castle	4/29/25					LG	4/29/25 1701

CAL Task
250429156

JML

Colorado Analytical LABORATORIES, INC.

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody — Drinking Water: **0** Standard: **1**

Customer Needs By: 4/25/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
2	***100 ml sterile - Na2S2O3***
	E-Coli - Water
2	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
2	***250 ml Cylinder - Unpreserved***
	TDS - Water
2	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
2	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

CAL Task
250429156

JML

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 4/25/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
X 2	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
X 2	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
X 2	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
X 2	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Thompson 1
Sample Date/Time: 9/22/25 9:00 AM
Lab Number: 250922105-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.35 mg/L**	SM 4500-NH3-G	0.03	0.007	9/26/25	QC85134	KRB
Chloride	**39.4 mg/L**	EPA 300.0	1.00	0.007	9/23/25	QC85159	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	9/25/25	QC85122	KRB
Dissolved Oxygen	**4.4 mg/L**	SM 4500-G	0.1	-	9/22/25	-	JJA
E-Coli	**ND mpn/100ml**	Colilert	1	1	9/23/25	-	NRP
Nitrate Nitrogen	**ND mg/L**	EPA 300.0	0.05	0.02	9/23/25	QC85187	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	9/23/25	QC85157	NRP
pH	**7.15 units**	SM 4500-H-B	0.01	0.01	9/22/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	9/22/25	-	JJA
Sulfate	**647 mg/L**	EPA 300.0	1.00	0.012	9/23/25	QC85188	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	9/24/25	QC85090	ARH
Total Dissolved Solids	**1111 mg/L**	SM 2540-C	5	2	9/24/25	QC85058	ISG
Phosphorus - Total	**5.84 mg/L**	EPA 365.1	0.05	0.006	9/25/25	QC85102	TAB
Total Residual Chlorine	**0.07 mg/L**	SM 4500-CL-G	0.05	0.2	9/22/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	9/24/25	QC85070	NRP
Total							
Arsenic	**0.0251 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0007 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0399 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Copper	**0.0482 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Lead	**0.0435 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Manganese	**1.64 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Nickel	**0.1580 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Thompson 1
Sample Date/Time: 9/22/25 9:00 AM
Lab Number: 250922105-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0085 mg/L**	EPA 200.8	0.0008	0.00008	9/24/25	QC85071	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	9/24/25	QC85071	JJA
Uranium	**0.0160 mg/L**	EPA 200.8	0.0002	0.000002	9/24/25	QC85071	JJA
Zinc	**0.290 mg/L**	EPA 200.8	0.001	0.00003	9/24/25	QC85071	JJA
Boron	**0.12 mg/L**	EPA 200.7	0.05	0.01	9/24/25	QC85072	SMA
Iron	**132 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	9/29/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	9/25/25	QC85128	SMA
Arsenic	**0.0265 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0008 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0393 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Lead	**0.0439 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Molybdenum	**0.0164 mg/L**	EPA 200.8	0.0005	0.00005	9/24/25	QC85071	JJA
Nickel	**0.1527 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA
Iron	**132 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Thompson 3
Sample Date/Time: 9/22/25 10:40 AM
Lab Number: 250922105-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	9/26/25	QC85134	KRB
Chloride	**14.2 mg/L**	EPA 300.0	1.00	0.007	9/24/25	QC85159	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	9/25/25	QC85122	KRB
Dissolved Oxygen	**6.4 mg/L**	SM 4500-G	0.1	-	9/22/25	-	JJA
E-Coli	**ND mpn/100ml**	Colilert	1	1	9/23/25	-	NRP
Nitrate Nitrogen	**ND mg/L**	EPA 300.0	0.05	0.02	9/24/25	QC85187	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	9/24/25	QC85157	NRP
pH	**7.11 units**	SM 4500-H-B	0.01	0.01	9/22/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	9/22/25	-	JJA
Sulfate	**1040 mg/L**	EPA 300.0	1.00	0.012	9/24/25	QC85188	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	9/24/25	QC85090	ARH
Total Dissolved Solids	**1742 mg/L**	SM 2540-C	5	2	9/24/25	QC85058	ISG
Phosphorus - Total	**0.44 mg/L**	EPA 365.1	0.05	0.006	9/25/25	QC85102	TAB
Total Residual Chlorine	**0.12 mg/L**	SM 4500-CL-G	0.05	0.2	9/22/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	9/24/25	QC85070	NRP
Total							
Arsenic	**0.0244 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0401 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Copper	**0.0492 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Lead	**0.0408 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Manganese	**1.26 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Nickel	**0.1503 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Thompson 3
Sample Date/Time: 9/22/25 10:40 AM
Lab Number: 250922105-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0065 mg/L**	EPA 200.8	0.0008	0.00008	9/24/25	QC85071	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	9/24/25	QC85071	JJA
Uranium	**0.0231 mg/L**	EPA 200.8	0.0002	0.000002	9/24/25	QC85071	JJA
Zinc	**0.211 mg/L**	EPA 200.8	0.001	0.00003	9/24/25	QC85071	JJA
Boron	**0.31 mg/L**	EPA 200.7	0.05	0.01	9/24/25	QC85072	SMA
Iron	**61.6 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	9/29/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	9/25/25	QC85128	SMA
Arsenic	**0.0246 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0407 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Lead	**0.0396 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Molybdenum	**0.0050 mg/L**	EPA 200.8	0.0005	0.00005	9/24/25	QC85071	JJA
Nickel	**0.1511 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA
Iron	**62.0 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Jackson 1
Sample Date/Time: 9/22/25 10:55 AM
Lab Number: 250922105-03

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	9/26/25	QC85134	KRB
Chloride	**5.61 mg/L**	EPA 300.0	1.00	0.007	9/24/25	QC85159	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	9/25/25	QC85122	KRB
Dissolved Oxygen	**5.9 mg/L**	SM 4500-G	0.1	-	9/22/25	-	JJA
E-Coli	**ND mpn/100ml**	Colilert	1	1	9/23/25	-	NRP
Nitrate Nitrogen	**ND mg/L**	EPA 300.0	0.05	0.02	9/24/25	QC85187	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	9/24/25	QC85157	NRP
pH	**7.08 units**	SM 4500-H-B	0.01	0.01	9/22/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	9/22/25	-	JJA
Sulfate	**170 mg/L**	EPA 300.0	1.00	0.012	9/24/25	QC85188	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	9/24/25	QC85090	ARH
Total Dissolved Solids	**527 mg/L**	SM 2540-C	5	2	9/24/25	QC85058	ISG
Phosphorus - Total	**0.11 mg/L**	EPA 365.1	0.05	0.006	9/25/25	QC85102	TAB
Total Residual Chlorine	**0.12 mg/L**	SM 4500-CL-G	0.05	0.2	9/22/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	9/24/25	QC85070	NRP
Total							
Arsenic	**0.0014 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0463 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Copper	**0.0037 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Lead	**0.0018 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Manganese	**0.0646 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Nickel	**0.1454 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Jackson 1
Sample Date/Time: 9/22/25 10:55 AM
Lab Number: 250922105-03

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**ND mg/L**	EPA 200.8	0.0008	0.00008	9/24/25	QC85071	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	9/24/25	QC85071	JJA
Uranium	**0.0123 mg/L**	EPA 200.8	0.0002	0.000002	9/24/25	QC85071	JJA
Zinc	**0.027 mg/L**	EPA 200.8	0.001	0.00003	9/24/25	QC85071	JJA
Boron	**0.21 mg/L**	EPA 200.7	0.05	0.01	9/24/25	QC85072	SMA
Iron	**2.72 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA
Total Recoverable							
Chromium - Trivalent	**0.05 mg/L**	Calculation	0.02	0.01	9/29/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	9/25/25	QC85128	SMA
Arsenic	**0.0013 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0460 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Lead	**0.0017 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Molybdenum	**0.0086 mg/L**	EPA 200.8	0.0005	0.00005	9/24/25	QC85071	JJA
Nickel	**0.1454 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA
Iron	**2.75 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Jackson 2
Sample Date/Time: 9/22/25 11:20 AM
Lab Number: 250922105-04

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.10 mg/L**	SM 4500-NH3-G	0.03	0.007	9/26/25	QC85134	KRB
Chloride	**8.88 mg/L**	EPA 300.0	5.00	0.007	9/24/25	QC85159	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	9/25/25	QC85122	KRB
Dissolved Oxygen	**6.8 mg/L**	SM 4500-G	0.1	-	9/22/25	-	JJA
E-Coli	**ND mpn/100ml**	Colilert	1	1	9/23/25	-	NRP
Nitrate Nitrogen	**1.01 mg/L**	EPA 300.0	0.05	0.02	9/24/25	QC85187	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	9/24/25	QC85157	NRP
pH	**7.03 units**	SM 4500-H-B	0.01	0.01	9/22/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	9/22/25	-	JJA
Sulfate	**2000 mg/L**	EPA 300.0	5.00	0.012	9/24/25	QC85188	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	9/24/25	QC85090	ARH
Total Dissolved Solids	**3070 mg/L**	SM 2540-C	5	2	9/24/25	QC85058	ISG
Phosphorus - Total	**0.12 mg/L**	EPA 365.1	0.05	0.006	9/25/25	QC85102	TAB
Total Residual Chlorine	**0.11 mg/L**	SM 4500-CL-G	0.05	0.2	9/22/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	9/24/25	QC85070	NRP
Total							
Arsenic	**0.0090 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0003 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0398 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Copper	**0.0222 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Lead	**0.0133 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Manganese	**0.5230 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Nickel	**0.1444 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID Jackson 2
Sample Date/Time: 9/22/25 11:20 AM
Lab Number: 250922105-04

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0049 mg/L**	EPA 200.8	0.0008	0.00008	9/24/25	QC85071	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	9/24/25	QC85071	JJA
Uranium	**0.0422 mg/L**	EPA 200.8	0.0002	0.000002	9/24/25	QC85071	JJA
Zinc	**0.102 mg/L**	EPA 200.8	0.001	0.00003	9/24/25	QC85071	JJA
Boron	**0.72 mg/L**	EPA 200.7	0.05	0.01	9/24/25	QC85072	SMA
Iron	**20.6 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	9/29/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	9/25/25	QC85128	SMA
Arsenic	**0.0096 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**0.0003 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0371 mg/L**	EPA 200.8	0.0150	0.00015	9/24/25	QC85071	JJA
Lead	**0.0135 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Molybdenum	**0.0065 mg/L**	EPA 200.8	0.0005	0.00005	9/24/25	QC85071	JJA
Nickel	**0.1463 mg/L**	EPA 200.8	0.0090	0.00005	9/24/25	QC85071	JJA
Iron	**19.5 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID HOOD-2
Sample Date/Time: 9/22/25 1:00 PM
Lab Number: 250922105-05

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.06 mg/L**	SM 4500-NH3-G	0.03	0.007	9/26/25	QC85134	KRB
Chloride	**7.10 mg/L**	EPA 300.0	5.00	0.007	9/23/25	QC85159	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	9/25/25	QC85122	KRB
Dissolved Oxygen	**6.7 mg/L**	SM 4500-G	0.1	-	9/22/25	-	JJA
E-Coli	**ND mpn/100ml**	Colilert	1	1	9/23/25	-	NRP
Nitrate Nitrogen	**0.37 mg/L**	EPA 300.0	0.05	0.02	9/23/25	QC85187	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	9/23/25	QC85157	NRP
pH	**7.29 units**	SM 4500-H-B	0.01	0.01	9/22/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	9/22/25	-	JJA
Sulfate	**3340 mg/L**	EPA 300.0	5.00	0.012	9/23/25	QC85188	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	9/24/25	QC85090	ARH
Total Dissolved Solids	**4408 mg/L**	SM 2540-C	5	2	9/24/25	QC85058	ISG
Phosphorus - Total	**0.08 mg/L**	EPA 365.1	0.05	0.006	9/25/25	QC85102	TAB
Total Residual Chlorine	**0.08 mg/L**	SM 4500-CL-G	0.05	0.2	9/22/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	9/24/25	QC85070	NRP
Total							
Arsenic	**0.0013 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0060 mg/L**	EPA 200.8	0.0015	0.00015	9/24/25	QC85071	JJA
Copper	**0.0043 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Lead	**0.0011 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Manganese	**0.2337 mg/L**	EPA 200.8	0.0008	0.00001	9/24/25	QC85071	JJA
Nickel	**0.0172 mg/L**	EPA 200.8	0.0009	0.00005	9/24/25	QC85071	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250922105
Client PO: 24.3040/500653
Client Project: Thornton SEG.F 24.3040

Date Received: 9/22/25
Date Reported: 9/30/25
Matrix: Water

Customer Sample ID HOOD-2
Sample Date/Time: 9/22/25 1:00 PM
Lab Number: 250922105-05

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0031 mg/L**	EPA 200.8	0.0008	0.00008	9/24/25	QC85071	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	9/24/25	QC85071	JJA
Uranium	**0.0402 mg/L**	EPA 200.8	0.0002	0.000002	9/24/25	QC85071	JJA
Zinc	**0.012 mg/L**	EPA 200.8	0.001	0.00003	9/24/25	QC85071	JJA
Boron	**1.04 mg/L**	EPA 200.7	0.05	0.01	9/24/25	QC85072	SMA
Iron	**1.58 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA
Total Recoverable							
Chromium - Trivalent	**ND mg/L**	Calculation	0.02	0.01	9/29/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	9/25/25	QC85128	SMA
Arsenic	**0.0012 mg/L**	EPA 200.8	0.0006	0.00006	9/24/25	QC85071	JJA
Cadmium	**ND mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Chromium	**0.0062 mg/L**	EPA 200.8	0.0015	0.00015	9/24/25	QC85071	JJA
Lead	**0.0012 mg/L**	EPA 200.8	0.0001	0.000006	9/24/25	QC85071	JJA
Molybdenum	**0.0078 mg/L**	EPA 200.8	0.0005	0.00005	9/24/25	QC85071	JJA
Nickel	**0.0171 mg/L**	EPA 200.8	0.0009	0.00005	9/24/25	QC85071	JJA
Iron	**1.61 mg/L**	EPA 200.7	0.005	0.0005	9/24/25	QC85072	SMA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250922105

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 9/22/25
Project Name: Thornton SEG.F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC85134	Method Blank	ND	SM 4500-NH3-G	9/25/25
Chloride	QC85159	Blank	ND	EPA 300.0	9/23/25
Chromium - Hexavalent	QC85070	Blank	ND	SM 3500-Cr B	9/24/25
Cyanide-Total	QC85122	Blank	ND	EPA 335.4	9/25/25
Mercury	QC85128	Method Blank	ND	EPA 245.7	9/25/25
	QC85128	Method Blank	ND	EPA 245.7	9/25/25
Arsenic	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Cadmium	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Chromium	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Copper	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Lead	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Manganese	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Molybdenum	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Nickel	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Selenium	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Silver	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Uranium	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Zinc	QC85071	Method Blank	ND	EPA 200.8	9/22/25
Boron	QC85072	Method Blank	ND	EPA 200.7	9/22/25
Iron	QC85072	Method Blank	ND	EPA 200.7	9/22/25
Nitrate Nitrogen	QC85187	Blank	ND	EPA 300.0	9/23/25
Nitrite Nitrogen	QC85157	Blank	ND	EPA 300.0	9/23/25
Sulfate	QC85188	Blank	ND	EPA 300.0	9/23/25
Sulfide as H2S	QC85090	Blank	ND	SM 4500-S2-G	9/24/25
Total Dissolved Solids	QC85058	Blank	ND	SM 2540-C	9/23/25
Phosphorus - Total	QC85102	Blank	ND	EPA 365.1	9/24/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC85134	Duplicate -250922030-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	100.4	-	
		MS -250922002-08	75 - 125	112.1	-	
Chloride	QC85159	Duplicate -250922109-02	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	102.2	-	
		MS -250922109-02	80 - 120	107.9	-	
Chromium - Hexavalent	QC85070	Duplicate -250922081-01	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.2	-	
Cyanide-Total	QC85122	Duplicate -250923025-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	91.0	-	
		MS -250919103-02	90 - 110	94.0	-	
Mercury	QC85128	Duplicate -250917179-03	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	93.4	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		MS -250917179-03B	80 - 120	92.0	-	
		MSD -250917179-03B	0 - 18	-	4.4	
Arsenic	QC85071	LCS	90 - 110	105.0	-	EPA 200.8
		MS -250922002-09	70 - 130	104.5	-	
		MSD -250922002-09	0 - 10	-	3.3	
Cadmium	QC85071	LCS	90 - 110	103.2	-	EPA 200.8
		MS -250922002-09	70 - 130	95.8	-	
		MSD -250922002-09	0 - 10	-	2.2	
Chromium	QC85071	LCS	90 - 110	108.2	-	EPA 200.8
		MS -250922002-09	70 - 130	107.6	-	
		MSD -250922002-09	0 - 10	-	2.2	
Copper	QC85071	LCS	90 - 110	105.9	-	EPA 200.8
		MS -250922002-09	70 - 130	105.6	-	
		MSD -250922002-09	0 - 10	-	0.9	
Lead	QC85071	LCS	90 - 110	100.5	-	EPA 200.8
		MS -250922002-09	70 - 130	88.5	-	
		MSD -250922002-09	0 - 10	-	0.4	
Manganese	QC85071	LCS	90 - 110	106.0	-	EPA 200.8
		MS -250922002-09	70 - 130	111.8	-	
		MSD -250922002-09	0 - 10	-	0.7	
Molybdenum	QC85071	LCS	90 - 110	102.9	-	EPA 200.8
		MS -250922002-09	70 - 130	109.9	-	
		MSD -250922002-09	0 - 10	-	0.1	
Nickel	QC85071	LCS	90 - 110	108.1	-	EPA 200.8
		MS -250922002-09	70 - 130	100.2	-	
		MSD -250922002-09	0 - 10	-	1.0	
Selenium	QC85071	LCS	90 - 110	109.2	-	EPA 200.8
		MS -250922002-09	70 - 130	100.6	-	
		MSD -250922002-09	0 - 10	-	2.2	
Silver	QC85071	LCS	90 - 110	97.4	-	EPA 200.8
		MS -250922002-09	70 - 130	86.4	-	
		MSD -250922002-09	0 - 10	-	0.9	
Uranium	QC85071	LCS	90 - 110	97.6	-	EPA 200.8
		MS -250922002-09	70 - 130	93.3	-	
		MSD -250922002-09	0 - 10	-	1.0	
Zinc	QC85071	LCS	90 - 110	107.3	-	EPA 200.8
		MS -250922002-09	70 - 130	106.4	-	
		MSD -250922002-09	0 - 10	-	0.3	
Boron	QC85072	Duplicate -250922002-09	0 - 20	-	15.7	EPA 200.7
		LCS	90 - 110	100.3	-	
		MS -250922104-01B	75 - 125	108.6	-	
Iron	QC85072	Duplicate -250922002-09	0 - 20	-	6.9	EPA 200.7
		LCS	90 - 110	103.0	-	
		MS -250922104-01B	75 - 125	105.3	-	
Nitrate Nitrogen	QC85187	Duplicate -250922109-02	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	104.2	-	
		MS -250922109-02	80 - 120	94.5	-	
Nitrite Nitrogen	QC85157	Duplicate -250922105-05	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	100.0	-	
		MS -250922105-05	80 - 120	101.7	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfate	QC85188	Duplicate -250922109-02	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	100.5	-	
		MS -250922109-02	80 - 120	98.3	-	
Sulfide as H2S	QC85090	Duplicate -250923068-02	0 - 20	-	17.5	SM 4500-S2-G
		LCS	70 - 130	91.8	-	
		MS -250917061-02C	60 - 120	90.3	-	
		MSD -250917061-02C	0 - 10	-	9.6	
Total Dissolved Solids	QC85058	Duplicate -250923037-01	0 - 10	-	4.7	SM 2540-C
		LCS	85 - 115	95.6	-	
Phosphorus - Total	QC85102	Duplicate -250922030-01	0 - 20	-	1.0	EPA 365.1
		LCS	90 - 110	103.9	-	
		MS -250919030-04	90 - 110	93.5	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



Lauren Hevert
Laboratory Director

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT TECHNICAL SRVCS.	Company Name: SAME	TWP SEC. F *
Contact Name: JAY EDWARDS	Contact Name:	SC0653/24.3040
Address: 7108 S. ALTON WAY BLDG. B	Address:	Task Number (Lab Use Only)
City CENTENNIAL State CO Zip 80112	City State Zip	CAL Task 250922105
Phone: 720-413-7943	Phone:	
Email: JAY.EDWARDS@CMTTECHNICALSERVICES.COM	Email:	CJF
Sample Collector: JBE	24.3040/	
Sample Collector Phone: 720.413.7943	PO No.: SC0653	

* SEE ATTACHED AS PREVIOUS SAME TESTING FOR PROJECT

Sample Matrix (Select One Only)

Water ☒ (CWA / NPDES)	Drinking Water ☐ (SDWA)	Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)
Includes wastewater, non-potable samples not intended for drinking water use.	Includes finished drinking water, raw (untreated) water samples intended for human consumption.	

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	*
9/22	9:00	THOMPSON 1			
9/22	10:40	THOMPSON 3			
9/22	10:55	~~THOMPSON~~ JACKSON 1			
9/22	11:20	JACKSON 2			
9/22	13:00	HCOD-2 - HOOD per bottle labels. CF 9/22/25			

45

Tests Requested

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: C.F. Date: 9/22/25

Instructions: * Project per attachment. CF 9/22/25

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
JBE	3:41 PM					KA	9/22/25

B41

Colorado Analytical LABORATORIES, INC.

CAL Task
250922105

CJF

Bottle Order Test Detail

Order ID: QBO25080116

Date Created: 8/19/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Evan Castle

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 9/19/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
5	***100 ml sterile - Na2S2O3***
	E-Coli - Water
5	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
5	***250 ml Cylinder - Unpreserved***
	TDS - Water
5	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
5	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Logged per qrute QBO25080116. CF 9/22/25

Shipped By: _____
Date: _____
Checked By: _____

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

CAL Task
250922105

CJF

Attention: Evan Castle

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 9/19/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
5	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
5	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
5	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
5	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250825120

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250825120
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/25/25
Date Reported: 9/3/25
Matrix: Water

Customer Sample ID LCROW-4
Sample Date/Time: 8/25/25 11:30 AM
Lab Number: 250825120-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.09 mg/L**	SM 4500-NH3-G	0.03	0.007	8/29/25	QC84469	KRB
Chloride	**89.1 mg/L**	EPA 300.0	5.00	0.007	8/26/25	QC84402	TAB
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	8/28/25	QC84455	KRB
Dissolved Oxygen	**6.0 mg/L**	SM 4500-G	0.1	-	8/25/25	-	JDM
E-Coli	**ND mpn/100ml**	Colilert	1	1	8/26/25	-	NRP
Nitrate Nitrogen	**0.70 mg/L**	EPA 300.0	0.05	0.02	8/26/25	QC84404	TAB
Nitrite Nitrogen	**0.85 mg/L**	EPA 300.0	0.03	0.01	8/26/25	QC84405	TAB
pH	**7.04 units**	SM 4500-H-B	0.01	0.01	8/25/25	-	JDM
Temperature	**20 °C**	SM 4500-H-B	1	-	8/25/25	-	JDM
Sulfate	**2290 mg/L**	EPA 300.0	5.00	0.012	8/26/25	QC84406	TAB
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	8/27/25	QC84424	ARH
Total Dissolved Solids	**4098 mg/L**	SM 2540-C	5	2	8/27/25	QC84384	BP
Phosphorus - Total	**0.18 mg/L**	EPA 365.1	0.05	0.006	8/28/25	QC84438	TAB
Total Residual Chlorine	**ND mg/L**	SM 4500-CL-G	0.05	0.2	8/25/25	-	JDM
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	8/27/25	QC84417	NRP
Total							
Arsenic	**0.0033 mg/L**	EPA 200.8	0.0006	0.00006	8/27/25	QC84389	JJA
Cadmium	**0.0003 mg/L**	EPA 200.8	0.0001	0.000006	8/27/25	QC84389	JJA
Chromium	**0.0125 mg/L**	EPA 200.8	0.0015	0.00015	8/27/25	QC84389	JJA
Copper	**0.0076 mg/L**	EPA 200.8	0.0008	0.00001	8/27/25	QC84389	JJA
Lead	**0.0025 mg/L**	EPA 200.8	0.0001	0.000006	8/27/25	QC84389	JJA
Manganese	**0.3919 mg/L**	EPA 200.8	0.0008	0.00001	8/27/25	QC84389	JJA
Nickel	**0.0290 mg/L**	EPA 200.8	0.0009	0.00005	8/27/25	QC84389	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250825120

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250825120
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/25/25
Date Reported: 9/3/25
Matrix: Water

Customer Sample ID LCROW-4
Sample Date/Time: 8/25/25 11:30 AM
Lab Number: 250825120-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.1793 mg/L**	EPA 200.8	0.0008	0.00008	8/27/25	QC84389	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	8/27/25	QC84389	JJA
Uranium	**0.0917 mg/L**	EPA 200.8	0.0002	0.000002	8/27/25	QC84389	JJA
Zinc	**0.037 mg/L**	EPA 200.8	0.001	0.00003	8/27/25	QC84389	JJA
Boron	**0.70 mg/L**	EPA 200.7	0.05	0.01	8/27/25	QC84391	JJA
Iron	**2.61 mg/L**	EPA 200.7	0.005	0.0005	8/27/25	QC84391	JJA
Total Recoverable							
Chromium - Trivalent	**ND mg/L**	Calculation	0.02	0.01	8/28/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	8/28/25	QC84462	SMA
Arsenic	**0.0032 mg/L**	EPA 200.8	0.0006	0.00006	8/27/25	QC84389	JJA
Cadmium	**0.0004 mg/L**	EPA 200.8	0.0001	0.000006	8/27/25	QC84389	JJA
Chromium	**0.0126 mg/L**	EPA 200.8	0.0015	0.00015	8/27/25	QC84389	JJA
Lead	**0.0025 mg/L**	EPA 200.8	0.0001	0.000006	8/27/25	QC84389	JJA
Molybdenum	**0.0087 mg/L**	EPA 200.8	0.0005	0.00005	8/27/25	QC84389	JJA
Nickel	**0.0299 mg/L**	EPA 200.8	0.0009	0.00005	8/27/25	QC84389	JJA
Iron	**2.76 mg/L**	EPA 200.7	0.005	0.0005	8/27/25	QC84391	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250825120

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250825120
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/25/25
Date Reported: 9/3/25
Matrix: Water

Customer Sample ID LCROW-3
Sample Date/Time: 8/25/25 10:00 AM
Lab Number: 250825120-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
E-Coli	**1 mpn/100ml**	Colilert	1	1	8/26/25	-	NRP

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250825120

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 8/25/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC84469	Method Blank	ND	SM 4500-NH3-G	8/28/25
Chloride	QC84402	Blank	ND	EPA 300.0	8/25/25
Chromium - Hexavalent	QC84417	Blank	ND	SM 3500-Cr B	8/27/25
Cyanide-Total	QC84455	Blank	ND	EPA 335.4	8/28/25
Mercury	QC84462	Method Blank	ND	EPA 245.7	8/28/25
	QC84462	Method Blank	ND	EPA 245.7	8/28/25
Arsenic	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Cadmium	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Chromium	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Copper	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Lead	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Manganese	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Molybdenum	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Nickel	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Selenium	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Silver	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Uranium	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Zinc	QC84389	Method Blank	ND	EPA 200.8	8/22/25
Boron	QC84391	Method Blank	ND	EPA 200.7	8/22/25
Iron	QC84391	Method Blank	ND	EPA 200.7	8/22/25
Nitrate Nitrogen	QC84404	Blank	ND	EPA 300.0	8/25/25
Nitrite Nitrogen	QC84405	Blank	ND	EPA 300.0	8/25/25
Sulfate	QC84406	Blank	ND	EPA 300.0	8/25/25
Sulfide as H2S	QC84424	Blank	ND	SM 4500-S2-G	8/27/25
Total Dissolved Solids	QC84384	Blank	ND	SM 2540-C	8/26/25
Phosphorus - Total	QC84438	Blank	ND	EPA 365.1	8/27/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC84469	Duplicate -250825043-01	0 - 20	-	8.4	SM 4500-NH3-G
		LCS	90 - 110	107.0	-	
		MS -250825013-09	75 - 125	118.2	-	
Chloride	QC84402	Duplicate -250822082-05	0 - 20	-	1.0	EPA 300.0
		LCS	90 - 110	98.6	-	
		MS -250822082-05	80 - 120	86.0	-	
Chromium - Hexavalent	QC84417	Duplicate -250821141-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.1	-	
Cyanide-Total	QC84455	Duplicate -250825014-05	0 - 20	-	11.8	EPA 335.4
		LCS	90 - 110	104.9	-	
		MS -250822095-01	90 - 110	105.0	-	
Mercury	QC84462	Duplicate -250821120-01	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	96.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		MS -250821120-01B	80 - 120	98.0	-	
		MSD -250821120-01B	0 - 18	-	0.0	
Arsenic	QC84389	LCS	90 - 110	104.4	-	EPA 200.8
		MS -250822001-01A	70 - 130	108.7	-	
		MSD -250822001-01A	0 - 10	-	1.5	
Cadmium	QC84389	LCS	90 - 110	101.9	-	EPA 200.8
		MS -250822001-01A	70 - 130	97.9	-	
		MSD -250822001-01A	0 - 10	-	1.6	
Chromium	QC84389	LCS	90 - 110	106.1	-	EPA 200.8
		MS -250822001-01A	70 - 130	102.7	-	
		MSD -250822001-01A	0 - 10	-	0.3	
Copper	QC84389	LCS	90 - 110	106.1	-	EPA 200.8
		MS -250822001-01A	70 - 130	95.4	-	
		MSD -250822001-01A	0 - 10	-	1.4	
Lead	QC84389	LCS	90 - 110	101.9	-	EPA 200.8
		MS -250822001-01A	70 - 130	86.3	-	
		MSD -250822001-01A	0 - 10	-	4.4	
Manganese	QC84389	LCS	90 - 110	106.5	-	EPA 200.8
		MS -250822001-01A	70 - 130	95.5	-	
		MSD -250822001-01A	0 - 10	-	2.9	
Molybdenum	QC84389	LCS	90 - 110	103.4	-	EPA 200.8
		MS -250822001-01A	70 - 130	102.9	-	
		MSD -250822001-01A	0 - 10	-	2.4	
Nickel	QC84389	LCS	90 - 110	106.0	-	EPA 200.8
		MS -250822001-01A	70 - 130	99.7	-	
		MSD -250822001-01A	0 - 10	-	0.1	
Selenium	QC84389	LCS	90 - 110	105.3	-	EPA 200.8
		MS -250822001-01A	70 - 130	112.3	-	
		MSD -250822001-01A	0 - 10	-	1.8	
Silver	QC84389	LCS	90 - 110	104.1	-	EPA 200.8
		MS -250822001-01A	70 - 130	90.3	-	
		MSD -250822001-01A	0 - 10	-	3.5	
Uranium	QC84389	LCS	90 - 110	97.9	-	EPA 200.8
		MS -250822001-01A	70 - 130	94.7	-	
		MSD -250822001-01A	0 - 10	-	2.4	
Zinc	QC84389	LCS	90 - 110	110.0	-	EPA 200.8
		MS -250822001-01A	70 - 130	86.5	-	
		MSD -250822001-01A	0 - 10	-	4.7	
Boron	QC84391	Duplicate -250822078-01	0 - 20	-	6.0	EPA 200.7
		LCS	90 - 110	109.7	-	
		MS -250822093-01A	75 - 125	112.2	-	
Iron	QC84391	Duplicate -250822078-01	0 - 20	-	8.3	EPA 200.7
		LCS	90 - 110	107.7	-	
		MS -250822093-01A	75 - 125	104.5	-	
Nitrate Nitrogen	QC84404	Duplicate -250822082-05	0 - 20	-	1.1	EPA 300.0
		LCS	90 - 110	103.6	-	
		MS -250822082-05	80 - 120	83.6	-	
Nitrite Nitrogen	QC84405	Duplicate -250822082-05	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	103.9	-	
		MS -250822082-05	80 - 120	90.3	-	

Abbreviations/ References:

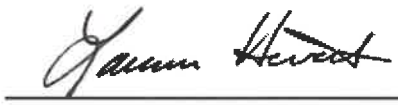
RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfate	QC84406	Duplicate -250822082-05	0 - 20	-	1.3	EPA 300.0
		LCS	90 - 110	98.6	-	
		MS -250822082-05	80 - 120	83.5	-	
Sulfide as H2S	QC84424	Duplicate -250826078-03	0 - 20	-	5.4	SM 4500-S2-G
		LCS	70 - 130	79.8	-	
		MS -250820047-02C	60 - 120	83.9	-	
		MSD -250820047-02C	0 - 10	-	1.9	
Total Dissolved Solids	QC84384	Duplicate -250825124-02	0 - 10	-	0.3	SM 2540-C
		LCS	85 - 115	94.8	-	
Phosphorus - Total	QC84438	Duplicate -250826015-01	0 - 20	-	3.5	EPA 365.1
		LCS	90 - 110	100.2	-	
		MS -250825002-08	90 - 110	95.5	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



Lauren Hevert
Laboratory Director

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT Tech. Services	Company Name: Same	Thornton Twp-F
Contact Name: Jay Edwards	Contact Name:	500653/24.3040 (new/old)
Address: 7108 S Alton Way, Blt B.	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250825120 SLM
Phone: 720-413-7943	Phone:	
Email: Jay.Edwards@CMTTechnicalServices.com	Email:	
Sample Collector: E. Cash		
Sample Collector Phone: 720-514-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water** ☒ **(CWA / NPDES)** — Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water** ☐ **(SDWA)** — Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge)** ☐ **(503 Regs / RCRA/ SW-846)**

Tests Requested

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	E-Coli	See Order Δ
8/25	10:00A	LCROW-3	1		X	
8/25	11:30A	LCROW-4	9			X

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: SM Date: 8/25/25

10

Instructions: #Test per history per sample collector - logged per quote QB0250801116 - SM 8/26/25

C/S Info: AR 8/25/25

Deliver Via: HAND

C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice 4

Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
[signature]	8/25 16:15					[signature]	8/25/25

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID TH-1A
Sample Date/Time: 8/20/25 1:15 PM
Lab Number: 250820173-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	8/22/25	QC84250	KRB
Chloride	**52.2 mg/L**	EPA 300.0	1.00	0.007	8/21/25	QC84339	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	8/26/25	QC84371	ACE
Dissolved Oxygen	**6.0 mg/L**	SM 4500-G	0.1	-	8/20/25	-	KJP
E-Coli	**ND mpn/100ml**	Colilert	1	1	8/21/25	-	DJL
Nitrate Nitrogen	**0.09 mg/L**	EPA 300.0	0.05	0.02	8/21/25	QC84341	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	8/21/25	QC84344	NRP
pH	**7.04 units**	SM 4500-H-B	0.01	0.01	8/20/25	-	KRI
Temperature	**20 °C**	SM 4500-H-B	1	-	8/20/25	-	KRI
Sulfate	**2370 mg/L**	EPA 300.0	5.00	0.012	8/21/25	QC84343	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	8/26/25	QC84424	ARH
Total Dissolved Solids	**3792 mg/L**	SM 2540-C	5	2	8/25/25	QC84305	ISG
Phosphorus - Total	**0.36 mg/L**	EPA 365.1	0.05	0.006	8/25/25	QC84346	TAB
Total Residual Chlorine	**0.06 mg/L**	SM 4500-CL-G	0.05	0.2	8/20/25	-	KRI
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	8/27/25	QC84417	NRP
Total							
Arsenic	**0.0088 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0003 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0216 mg/L**	EPA 200.8	0.0015	0.00015	8/22/25	QC84288	AMJ
Copper	**0.0146 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Lead	**0.0101 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Manganese	**1.42 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Nickel	**0.0348 mg/L**	EPA 200.8	0.0009	0.00005	8/22/25	QC84288	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID TH-1A
Sample Date/Time: 8/20/25 1:15 PM
Lab Number: 250820173-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0018 mg/L**	EPA 200.8	0.0008	0.00008	8/22/25	QC84288	AMJ
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	8/22/25	QC84288	AMJ
Uranium	**0.0399 mg/L**	EPA 200.8	0.0002	0.000002	8/22/25	QC84288	AMJ
Zinc	**0.068 mg/L**	EPA 200.8	0.001	0.00003	8/22/25	QC84288	AMJ
Boron	**1.05 mg/L**	EPA 200.7	0.05	0.01	8/22/25	QC84286	AMJ
Iron	**19.4 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ
Total Recoverable							
Chromium - Trivalent	**0.02 mg/L**	Calculation	0.02	0.01	8/27/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	8/21/25	QC84265	SMA
Arsenic	**0.0088 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0003 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0216 mg/L**	EPA 200.8	0.0015	0.00015	8/22/25	QC84288	AMJ
Lead	**0.0101 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Molybdenum	**0.0113 mg/L**	EPA 200.8	0.0005	0.00005	8/22/25	QC84288	AMJ
Nickel	**0.0349 mg/L**	EPA 200.8	0.0009	0.00005	8/22/25	QC84288	AMJ
Iron	**19.1 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID LCROW-5
Sample Date/Time: 8/20/25 1:45 PM
Lab Number: 250820173-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.06 mg/L**	SM 4500-NH3-G	0.03	0.007	8/22/25	QC84250	KRB
Chloride	**8.07 mg/L**	EPA 300.0	1.00	0.007	8/21/25	QC84339	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	8/26/25	QC84371	ACE
Dissolved Oxygen	**5.0 mg/L**	SM 4500-G	0.1	-	8/20/25	-	KJP
E-Coli	**2 mpn/100ml**	Colilert	1	1	8/21/25	-	DJL
Nitrate Nitrogen	**0.10 mg/L**	EPA 300.0	0.05	0.02	8/21/25	QC84341	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	8/21/25	QC84344	NRP
pH	**6.96 units**	SM 4500-H-B	0.01	0.01	8/20/25	-	KRI
Temperature	**20 °C**	SM 4500-H-B	1	-	8/20/25	-	KRI
Sulfate	**2510 mg/L**	EPA 300.0	5.00	0.012	8/21/25	QC84343	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	8/26/25	QC84424	ARH
Total Dissolved Solids	**4346 mg/L**	SM 2540-C	5	2	8/25/25	QC84305	ISG
Phosphorus - Total	**1.31 mg/L**	EPA 365.1	0.05	0.006	8/25/25	QC84346	TAB
Total Residual Chlorine	**0.21 mg/L**	SM 4500-CL-G	0.05	0.2	8/20/25	-	KRI
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	8/27/25	QC84417	NRP
Total							
Arsenic	**0.0258 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0009 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0795 mg/L**	EPA 200.8	0.0150	0.00015	8/22/25	QC84288	AMJ
Copper	**0.0459 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Lead	**0.0401 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Manganese	**1.70 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Nickel	**0.0979 mg/L**	EPA 200.8	0.0090	0.00005	8/22/25	QC84288	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID LCROW-5
Sample Date/Time: 8/20/25 1:45 PM
Lab Number: 250820173-02

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0052 mg/L**	EPA 200.8	0.0008	0.00008	8/22/25	QC84288	AMJ
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	8/22/25	QC84288	AMJ
Uranium	**0.0433 mg/L**	EPA 200.8	0.0002	0.000002	8/22/25	QC84288	AMJ
Zinc	**0.186 mg/L**	EPA 200.8	0.001	0.00003	8/22/25	QC84288	AMJ
Boron	**1.41 mg/L**	EPA 200.7	0.05	0.01	8/22/25	QC84286	AMJ
Iron	**52.8 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ
Total Recoverable							
Chromium - Trivalent	**0.08 mg/L**	Calculation	0.02	0.01	8/27/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	8/21/25	QC84265	SMA
Arsenic	**0.0255 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0008 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0785 mg/L**	EPA 200.8	0.0150	0.00015	8/22/25	QC84288	AMJ
Lead	**0.0393 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Molybdenum	**0.0068 mg/L**	EPA 200.8	0.0005	0.00005	8/22/25	QC84288	AMJ
Nickel	**0.0979 mg/L**	EPA 200.8	0.0090	0.00005	8/22/25	QC84288	AMJ
Iron	**53.1 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID LCROW-3
Sample Date/Time: 8/20/25 2:15 PM
Lab Number: 250820173-03

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.03 mg/L**	SM 4500-NH3-G	0.03	0.007	8/22/25	QC84250	KRB
Chloride	**8.91 mg/L**	EPA 300.0	1.00	0.007	8/21/25	QC84339	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	8/26/25	QC84371	ACE
Dissolved Oxygen	**6.6 mg/L**	SM 4500-G	0.1	-	8/20/25	-	KJP
Nitrate Nitrogen	**0.14 mg/L**	EPA 300.0	0.05	0.02	8/21/25	QC84341	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	8/21/25	QC84344	NRP
pH	**7.28 units**	SM 4500-H-B	0.01	0.01	8/20/25	-	KRI
Temperature	**20 °C**	SM 4500-H-B	1	-	8/20/25	-	KRI
Sulfate	**353 mg/L**	EPA 300.0	1.00	0.012	8/21/25	QC84343	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	8/26/25	QC84424	ARH
Total Dissolved Solids	**972 mg/L**	SM 2540-C	5	2	8/25/25	QC84305	ISG
Phosphorus - Total	**1.27 mg/L**	EPA 365.1	0.05	0.006	8/25/25	QC84346	TAB
Total Residual Chlorine	**0.06 mg/L**	SM 4500-CL-G	0.05	0.2	8/20/25	-	KRI
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	8/27/25	QC84417	NRP
Total							
Arsenic	**0.0168 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0730 mg/L**	EPA 200.8	0.0150	0.00015	8/22/25	QC84288	AMJ
Copper	**0.0353 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Lead	**0.0273 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Manganese	**0.6143 mg/L**	EPA 200.8	0.0008	0.00001	8/22/25	QC84288	AMJ
Nickel	**0.0798 mg/L**	EPA 200.8	0.0090	0.00005	8/22/25	QC84288	AMJ
Selenium	**0.0034 mg/L**	EPA 200.8	0.0008	0.00008	8/22/25	QC84288	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Accounts Payable
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250820173
Client PO:
Client Project: Thornton TWP-F 24.3040

Date Received: 8/20/25
Date Reported: 8/28/25
Matrix: Water

Customer Sample ID LCROW-3
Sample Date/Time: 8/20/25 2:15 PM
Lab Number: 250820173-03

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	8/22/25	QC84288	AMJ
Uranium	**0.0120 mg/L**	EPA 200.8	0.0002	0.000002	8/22/25	QC84288	AMJ
Zinc	**0.203 mg/L**	EPA 200.8	0.001	0.00003	8/22/25	QC84288	AMJ
Boron	**0.12 mg/L**	EPA 200.7	0.05	0.01	8/22/25	QC84286	AMJ
Iron	**44.6 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ
Total Recoverable							
Chromium - Trivalent	**0.07 mg/L**	Calculation	0.02	0.01	8/27/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	8/21/25	QC84265	SMA
Arsenic	**0.0168 mg/L**	EPA 200.8	0.0006	0.00006	8/22/25	QC84288	AMJ
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Chromium	**0.0720 mg/L**	EPA 200.8	0.0150	0.00015	8/22/25	QC84288	AMJ
Lead	**0.0275 mg/L**	EPA 200.8	0.0001	0.000006	8/22/25	QC84288	AMJ
Molybdenum	**0.0069 mg/L**	EPA 200.8	0.0005	0.00005	8/22/25	QC84288	AMJ
Nickel	**0.0774 mg/L**	EPA 200.8	0.0090	0.00005	8/22/25	QC84288	AMJ
Iron	**44.0 mg/L**	EPA 200.7	0.005	0.0005	8/22/25	QC84286	AMJ

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250820173

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 8/20/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC84250	Method Blank	ND	SM 4500-NH3-G	8/21/25
Chloride	QC84339	Blank	ND	EPA 300.0	8/21/25
Chromium - Hexavalent	QC84417	Blank	ND	SM 3500-Cr B	8/27/25
Cyanide-Total	QC84371	Blank	ND	EPA 335.4	8/26/25
Mercury	QC84265	Method Blank	ND	EPA 245.7	8/21/25
Arsenic	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Cadmium	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Chromium	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Copper	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Lead	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Manganese	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Molybdenum	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Nickel	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Selenium	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Silver	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Uranium	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Zinc	QC84288	Method Blank	ND	EPA 200.8	8/20/25
Boron	QC84286	Method Blank	ND	EPA 200.7	8/20/25
Iron	QC84286	Method Blank	ND	EPA 200.7	8/20/25
Nitrate Nitrogen	QC84341	Blank	ND	EPA 300.0	8/21/25
Nitrite Nitrogen	QC84344	Blank	ND	EPA 300.0	8/21/25
Sulfate	QC84343	Blank	ND	EPA 300.0	8/21/25
Sulfide as H2S	QC84424	Blank	ND	SM 4500-S2-G	8/27/25
Total Dissolved Solids	QC84305	Blank	ND	SM 2540-C	8/22/25
Phosphorus - Total	QC84346	Blank	ND	EPA 365.1	8/25/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC84250	Duplicate -250819056-01	0 - 20	-	1.6	SM 4500-NH3-G
		LCS	90 - 110	94.2	-	
		MS -250819014-08	75 - 125	87.2	-	
Chloride	QC84339	Duplicate -250820180-04	0 - 20	-	0.2	EPA 300.0
		LCS	90 - 110	103.3	-	
		MS -250820180-04	80 - 120	104.3	-	
Chromium - Hexavalent	QC84417	Duplicate -250821141-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.1	-	
Cyanide-Total	QC84371	Duplicate -250820115-04	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	94.1	-	
		MS -250822024-06	90 - 110	99.0	-	
Mercury	QC84265	Duplicate -250818053-01	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	97.8	-	
		MS -250818053-01B	80 - 120	114.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		MSD -250818053-01B	0 - 18	-	5.4	
Arsenic	QC84288	LCS	90 - 110	108.1	-	EPA 200.8
		MS -250820008-01	70 - 130	120.0	-	
		MSD -250820008-01	0 - 10	-	3.6	
Cadmium	QC84288	LCS	90 - 110	106.4	-	EPA 200.8
		MS -250820008-01	70 - 130	107.7	-	
		MSD -250820008-01	0 - 10	-	2.5	
Chromium	QC84288	LCS	90 - 110	107.5	-	EPA 200.8
		MS -250820008-01	70 - 130	103.8	-	
		MSD -250820008-01	0 - 10	-	1.3	
Copper	QC84288	LCS	90 - 110	104.4	-	EPA 200.8
		MS -250820008-01	70 - 130	86.8	-	
		MSD -250820008-01	0 - 10	-	0.9	
Lead	QC84288	LCS	90 - 110	100.6	-	EPA 200.8
		MS -250820008-01	70 - 130	88.1	-	
		MSD -250820008-01	0 - 10	-	1.6	
Manganese	QC84288	LCS	90 - 110	109.1	-	EPA 200.8
		MS -250820008-01	70 - 130	108.4	-	
		MSD -250820008-01	0 - 10	-	1.6	
Molybdenum	QC84288	LCS	90 - 110	106.3	-	EPA 200.8
		MS -250820008-01	70 - 130	102.6	-	
		MSD -250820008-01	0 - 10	-	0.8	
Nickel	QC84288	LCS	90 - 110	100.6	-	EPA 200.8
		MS -250820008-01	70 - 130	100.1	-	
		MSD -250820008-01	0 - 10	-	0.1	
Selenium	QC84288	LCS	90 - 110	108.6	-	EPA 200.8
		MS -250820008-01	70 - 130	124.7	-	
		MSD -250820008-01	0 - 10	-	0.4	
Silver	QC84288	LCS	90 - 110	92.1	-	EPA 200.8
		MS -250820008-01	70 - 130	91.5	-	
		MSD -250820008-01	0 - 10	-	0.5	
Uranium	QC84288	LCS	90 - 110	97.7	-	EPA 200.8
		MS -250820008-01	70 - 130	84.0	-	
		MSD -250820008-01	0 - 10	-	6.0	
Zinc	QC84288	LCS	90 - 110	100.6	-	EPA 200.8
		MS -250820008-01	70 - 130	106.1	-	
		MSD -250820008-01	0 - 10	-	1.7	
Boron	QC84286	Duplicate -250820005-05	0 - 20	-	11.2	EPA 200.7
		LCS	90 - 110	101.7	-	
		MS -250820005-05	75 - 125	113.2	-	
Iron	QC84286	Duplicate -250820005-05	0 - 20	-	2.5	EPA 200.7
		LCS	90 - 110	106.3	-	
		MS -250820005-05	75 - 125	109.6	-	
Nitrate Nitrogen	QC84341	Duplicate -250820180-04	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	100.2	-	
		MS -250820180-04	80 - 120	94.1	-	
Nitrite Nitrogen	QC84344	Duplicate -250820194-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	98.9	-	
		MS -250820194-01	80 - 120	89.8	-	
Sulfate	QC84343	Duplicate -250820180-04	0 - 20	-	0.2	EPA 300.0

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
		LCS	90 - 110	101.0	-	
		MS -250820180-04	80 - 120	104.3	-	
Sulfide as H2S	QC84424	Duplicate -250826078-03	0 - 20	-	5.4	SM 4500-S2-G
		LCS	70 - 130	79.8	-	
		MS -250820047-02C	70 - 130	83.9	-	
		MSD -250820047-02C	0 - 10	-	1.9	
Total Dissolved Solids	QC84305	Duplicate -250821084-01	0 - 10	-	1.4	SM 2540-C
		LCS	85 - 115	105.2	-	
Phosphorus - Total	QC84346	Duplicate -250822081-01	0 - 20	-	2.9	EPA 365.1
		LCS	90 - 110	100.3	-	
		MS -250820003-04	90 - 110	109.4	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.

Lauren Hevert
Laboratory Director

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT Tech. Services	Company Name: Same	Thornton TWP-F
Contact Name: Jay Edwards	Contact Name:	500653/24.3040 use whatever you have on record
Address: 7108 S. Alton Way, Bldg B	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250820173 SLM
Phone: 720-413-7943	Phone:	
Email: Jay.Edwards@CMTTechnicalServices.com	Email:	
Sample Collector: E. Cash		
Sample Collector Phone: 720-594-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water (CWA / NPDES)** ☒ — Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water (SDWA)** ☐ — Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) (503 Regs / RCRA/ SW-846)** ☐

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested: See order
8/20	1:15pm	TH-1A	9		X
8/20	1:45pm	LCROW-5	9		X
8/20	2:15pm	LCROW-3*	8		X

*Cr+Tri and Hg are TR per history-SM 8/20/25

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: SM Date: 8/20/25

20

Instructions: ~~Test~~ off recent bottle order per customer-AF 8/20/25
*LCROW3E-cali Sample recieved broken disregard test for SP-AF 8/20

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice y Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
Jay Edwards	8/20 4:10pm					AF	8/20/25 1604

Colorado Analytical LABORATORIES, INC.

CAL Task
250820173

SLM

Bottle Order Test Detail

Order ID: QBO25080116

Date Created: 8/19/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Evan Castle

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 8/20/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
4	***100 ml sterile - Na2S2O3***
	E-Coli - Water
4	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
4	***250 ml Cylinder - Unpreserved***
	TDS - Water
4	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
4	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

CAL Task
250820173
SLM

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Evan Castle

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 8/20/25
Ships From: Commerce City

Project:
Thornton SEG.F 24.3040

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
4	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
4	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
4	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
4	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306154

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306154
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Thornton TH-3
Sample Date/Time: 3/6/25 3:00 PM
Lab Number: 250306154-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.14 mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**7.71 mg/L**	EPA 300.0	1.00	0.007	3/7/25	QC80202	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**5.2 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/7/25	-	DJL
Nitrate Nitrogen	**0.08 mg/L**	EPA 300.0	0.05	0.02	3/7/25	QC80203	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/7/25	QC80206	NRP
pH	**7.36 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**236 mg/L**	EPA 300.0	1.00	0.012	3/7/25	QC80205	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**553 mg/L**	SM 2540-C	5	2	3/12/25	QC80243	ISG
Phosphorus - Total	**1.10 mg/L**	EPA 365.1	0.05	0.006	3/10/25	QC80217	TAB
Total Residual Chlorine	**0.28 mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0127 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0349 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Copper	**0.0234 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Lead	**0.0199 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Manganese	**0.7007 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Nickel	**0.0340 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306154

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306154
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Thornton TH-3
Sample Date/Time: 3/6/25 3:00 PM
Lab Number: 250306154-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0032 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80161	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80161	JJA
Uranium	**0.0182 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80161	JJA
Zinc	**0.098 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80161	JJA
Boron	**0.53 mg/L**	EPA 200.7	0.05	0.01	3/11/25	QC80229	JJA
Iron	**30.6 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0133 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0005 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0351 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Lead	**0.0197 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Molybdenum	**0.0164 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80161	JJA
Nickel	**0.0346 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA
Iron	**30.3 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250306154

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/6/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80202	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Cadmium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Chromium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Copper	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Lead	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Manganese	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Molybdenum	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Nickel	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Selenium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Silver	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Uranium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Zinc	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Boron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Iron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Nitrate Nitrogen	QC80203	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80206	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80205	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80243	Blank	ND	SM 2540-C	3/11/25
Phosphorus - Total	QC80217	Blank	ND	EPA 365.1	3/10/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80202	Duplicate -250306145-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	109.0	-	
		MS -250306145-01	80 - 120	101.9	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	116.2	-	
		MSD -250306007-01	0 - 10	-	1.3	
Cadmium	QC80161	LCS	90 - 110	96.1	-	EPA 200.8
		MS -250306007-01	70 - 130	107.3	-	
		MSD -250306007-01	0 - 10	-	0.6	
Chromium	QC80161	LCS	90 - 110	99.4	-	EPA 200.8
		MS -250306007-01	70 - 130	104.9	-	
		MSD -250306007-01	0 - 10	-	1.7	
Copper	QC80161	LCS	90 - 110	98.7	-	EPA 200.8
		MS -250306007-01	70 - 130	100.8	-	
		MSD -250306007-01	0 - 10	-	1.4	
Lead	QC80161	LCS	90 - 110	101.0	-	EPA 200.8
		MS -250306007-01	70 - 130	103.0	-	
		MSD -250306007-01	0 - 10	-	0.0	
Manganese	QC80161	LCS	90 - 110	99.1	-	EPA 200.8
		MS -250306007-01	70 - 130	106.0	-	
		MSD -250306007-01	0 - 10	-	0.1	
Molybdenum	QC80161	LCS	90 - 110	94.4	-	EPA 200.8
		MS -250306007-01	70 - 130	73.8	-	
		MSD -250306007-01	0 - 10	-	5.0	
Nickel	QC80161	LCS	90 - 110	102.2	-	EPA 200.8
		MS -250306007-01	70 - 130	103.4	-	
		MSD -250306007-01	0 - 10	-	1.5	
Selenium	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	121.8	-	
		MSD -250306007-01	0 - 10	-	2.0	
Silver	QC80161	LCS	90 - 110	106.4	-	EPA 200.8
		MS -250306007-01	70 - 130	83.0	-	
		MSD -250306007-01	0 - 10	-	3.3	
Uranium	QC80161	LCS	90 - 110	98.8	-	EPA 200.8
		MS -250306007-01	70 - 130	98.0	-	
		MSD -250306007-01	0 - 10	-	0.4	
Zinc	QC80161	LCS	90 - 110	108.4	-	EPA 200.8
		MS -250306007-01	70 - 130	115.1	-	
		MSD -250306007-01	0 - 10	-	1.0	
Boron	QC80229	Duplicate -250306085-01	0 - 20	-	3.4	EPA 200.7
		LCS	90 - 110	95.5	-	
		MS -250306050-02A	75 - 125	110.7	-	
Iron	QC80229	Duplicate -250306085-01	0 - 20	-	0.0	EPA 200.7
		LCS	90 - 110	96.4	-	
		MS -250306050-02A	75 - 125	108.9	-	
Nitrate Nitrogen	QC80203	Duplicate -250306145-01	0 - 20	-	2.7	EPA 300.0
		LCS	90 - 110	106.5	-	
		MS -250306145-01	80 - 120	109.3	-	
Nitrite Nitrogen	QC80206	Duplicate -250306153-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.2	-	
		MS -250306153-01	80 - 120	92.9	-	
Sulfate	QC80205	Duplicate -250306145-01	0 - 20	-	0.3	EPA 300.0
		LCS	90 - 110	104.7	-	
		MS -250306145-01	80 - 120	100.7	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80243	Duplicate -250306111-05	0 - 10	-	0.2	SM 2540-C
		LCS	85 - 115	96.4	-	
Phosphorus - Total	QC80217	Duplicate -250306003-01	0 - 20	-	2.1	EPA 365.1
		LCS	90 - 110	96.9	-	
		MS -250306039-03A	90 - 110	92.9	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name: SAME	249040 Thornton TWP-F
Contact Name: Jay Edwards	Contact Name:	
Address: 7108 S. Alton Way	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250306154 JML
Phone: 720-413-7943	Phone:	
Email: Jay.Edwards@CMTTechnicalservices.com	Email:	
Sample Collector: Evan Cosh		
Sample Collector Phone: 720-594-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water** ☒ **(CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water** ☐ **(SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge)** ☐ **(503 Regs / RCRA/ SW-846)**

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested
3/6/25	3:00	Thornton TH-3	9		See Attachment X

9

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: [illegible] Date: 3-6-25

Instructions:

C/S Info: Deliver Via: Hand C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. °C/Ice 4 Sample Pres. Yes ☑ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
Evan Cosh	3/6 5:15p					LL.	3/6/25 1715

CAL Task
250306154
JML

Colorado Analytical LABORATORIES, INC.

Bottle Order Test Detail

Order ID: QBO25020045
Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date:
Checked By:

CAL Task
250306154
JML

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date:
Checked By:

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306153

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306153
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Thornton TH-4
Sample Date/Time: 3/6/25 3:30 PM
Lab Number: 250306153-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.03 mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**9.14 mg/L**	EPA 300.0	1.00	0.007	3/7/25	QC80202	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**2.9 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/7/25	-	DJL
Nitrate Nitrogen	**ND mg/L**	EPA 300.0	0.05	0.02	3/7/25	QC80203	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/7/25	QC80206	NRP
pH	**7.19 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**221 mg/L**	EPA 300.0	1.00	0.012	3/7/25	QC80205	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**576 mg/L**	SM 2540-C	5	2	3/12/25	QC80243	ISG
Phosphorus - Total	**0.76 mg/L**	EPA 365.1	0.05	0.006	3/10/25	QC80217	TAB
Total Residual Chlorine	**ND mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0112 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0004 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0238 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Copper	**0.0192 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Lead	**0.0167 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Manganese	**0.8907 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Nickel	**0.0280 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306153

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306153
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Thornton TH-4
Sample Date/Time: 3/6/25 3:30 PM
Lab Number: 250306153-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0027 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80161	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80161	JJA
Uranium	**0.0151 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80161	JJA
Zinc	**0.081 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80161	JJA
Boron	**0.14 mg/L**	EPA 200.7	0.05	0.01	3/11/25	QC80229	JJA
Iron	**25.0 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA
Total Recoverable							
Chromium - Trivalent	**0.02 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0114 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0004 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0243 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Lead	**0.0170 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Molybdenum	**0.0120 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80161	JJA
Nickel	**0.0263 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA
Iron	**25.4 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250306153

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/6/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80202	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Cadmium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Chromium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Copper	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Lead	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Manganese	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Molybdenum	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Nickel	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Selenium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Silver	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Uranium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Zinc	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Boron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Iron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Nitrate Nitrogen	QC80203	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80206	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80205	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80243	Blank	ND	SM 2540-C	3/11/25
Phosphorus - Total	QC80217	Blank	ND	EPA 365.1	3/10/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80202	Duplicate -250306145-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	109.0	-	
		MS -250306145-01	80 - 120	101.9	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	116.2	-	
		MSD -250306007-01	0 - 10	-	1.3	
Cadmium	QC80161	LCS	90 - 110	96.1	-	EPA 200.8
		MS -250306007-01	70 - 130	107.3	-	
		MSD -250306007-01	0 - 10	-	0.6	
Chromium	QC80161	LCS	90 - 110	99.4	-	EPA 200.8
		MS -250306007-01	70 - 130	104.9	-	
		MSD -250306007-01	0 - 10	-	1.7	
Copper	QC80161	LCS	90 - 110	98.7	-	EPA 200.8
		MS -250306007-01	70 - 130	100.8	-	
		MSD -250306007-01	0 - 10	-	1.4	
Lead	QC80161	LCS	90 - 110	101.0	-	EPA 200.8
		MS -250306007-01	70 - 130	103.0	-	
		MSD -250306007-01	0 - 10	-	0.0	
Manganese	QC80161	LCS	90 - 110	99.1	-	EPA 200.8
		MS -250306007-01	70 - 130	106.0	-	
		MSD -250306007-01	0 - 10	-	0.1	
Molybdenum	QC80161	LCS	90 - 110	94.4	-	EPA 200.8
		MS -250306007-01	70 - 130	73.8	-	
		MSD -250306007-01	0 - 10	-	5.0	
Nickel	QC80161	LCS	90 - 110	102.2	-	EPA 200.8
		MS -250306007-01	70 - 130	103.4	-	
		MSD -250306007-01	0 - 10	-	1.5	
Selenium	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	121.8	-	
		MSD -250306007-01	0 - 10	-	2.0	
Silver	QC80161	LCS	90 - 110	106.4	-	EPA 200.8
		MS -250306007-01	70 - 130	83.0	-	
		MSD -250306007-01	0 - 10	-	3.3	
Uranium	QC80161	LCS	90 - 110	98.8	-	EPA 200.8
		MS -250306007-01	70 - 130	98.0	-	
		MSD -250306007-01	0 - 10	-	0.4	
Zinc	QC80161	LCS	90 - 110	108.4	-	EPA 200.8
		MS -250306007-01	70 - 130	115.1	-	
		MSD -250306007-01	0 - 10	-	1.0	
Boron	QC80229	Duplicate -250306085-01	0 - 20	-	3.4	EPA 200.7
		LCS	90 - 110	95.5	-	
		MS -250306050-02A	75 - 125	110.7	-	
Iron	QC80229	Duplicate -250306085-01	0 - 20	-	0.0	EPA 200.7
		LCS	90 - 110	96.4	-	
		MS -250306050-02A	75 - 125	108.9	-	
Nitrate Nitrogen	QC80203	Duplicate -250306145-01	0 - 20	-	2.7	EPA 300.0
		LCS	90 - 110	106.5	-	
		MS -250306145-01	80 - 120	109.3	-	
Nitrite Nitrogen	QC80206	Duplicate -250306153-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.2	-	
		MS -250306153-01	80 - 120	92.9	-	
Sulfate	QC80205	Duplicate -250306145-01	0 - 20	-	0.3	EPA 300.0
		LCS	90 - 110	104.7	-	
		MS -250306145-01	80 - 120	100.7	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80243	Duplicate -250306111-05	0 - 10	-	0.2	SM 2540-C
		LCS	85 - 115	96.4	-	
Phosphorus - Total	QC80217	Duplicate -250306003-01	0 - 20	-	2.1	EPA 365.1
		LCS	90 - 110	96.9	-	
		MS -250306039-03A	90 - 110	92.9	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name: SAME	221.3040
Contact Name: JAY EDwards	Contact Name:	Thornton TWP-F
Address: 7108 S. Alton Way	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250306153 JML
Phone: 720-413-7943	Phone:	
Email: JAY.EDwards@CMTTechnicalServices.com	Email:	
Sample Collector: Evan Cashe		
Sample Collector Phone: 720-594-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water ☒ (CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water ☐ (SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)**

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested: See Attachment
3/6/25	3:30	Thornton TH-4	9		X

(9)

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: [illegible] Date: 3-6-25

Instructions:

C/S Info:

Deliver Via: Hand C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☑ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
Evan Cashe	3/6 5:15p					LD.	3/6/25 17:15

CAL Task
250306153
JML

Colorado Analytical LABORATORIES, INC.

Bottle Order Test Detail

Order ID: QBO25020045
Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date:
Checked By:

CAL Task

250306153

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

JML

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date:
Checked By:

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250303179

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250303179
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/3/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Kraft 1
Sample Date/Time: 3/3/25 1:45 PM
Lab Number: 250303179-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.06 mg/L**	SM 4500-NH3-G	0.03	0.007	3/5/25	QC80048	KJP
Chloride	**7.42 mg/L**	EPA 300.0	1.00	0.007	3/5/25	QC80151	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/4/25	QC80061	ACE
Dissolved Oxygen	**4.6 mg/L**	SM 4500-G	0.1	-	3/3/25	-	JJA
Nitrate Nitrogen	**0.55 mg/L**	EPA 300.0	0.05	0.02	3/5/25	QC80148	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/5/25	QC80149	NRP
pH	**7.26 units**	SM 4500-H-B	0.01	0.01	3/3/25	-	JJA
Temperature	**20 °C**	SM 4500-H-B	1	-	3/3/25	-	JJA
Sulfate	**178 mg/L**	EPA 300.0	1.00	0.012	3/5/25	QC80153	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/5/25	QC80099	ARH
Total Dissolved Solids	**800 mg/L**	SM 2540-C	5	2	3/6/25	QC80105	ISG
Phosphorus - Total	**3.10 mg/L**	EPA 365.1	0.05	0.006	3/6/25	QC80116	TAB
Total Residual Chlorine	**0.15 mg/L**	SM 4500-CL-G	0.05	0.2	3/4/25	-	JJA
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/6/25	QC80129	NRP
Total							
Arsenic	**0.0357 mg/L**	EPA 200.8	0.0006	0.00006	3/5/25	QC80074	AMJ
Cadmium	**0.0054 mg/L**	EPA 200.8	0.0001	0.000006	3/5/25	QC80074	AMJ
Chromium	**0.1801 mg/L**	EPA 200.8	0.0300	0.00015	3/5/25	QC80074	AMJ
Copper	**0.1924 mg/L**	EPA 200.8	0.0008	0.00001	3/5/25	QC80074	AMJ
Lead	**0.2257 mg/L**	EPA 200.8	0.0001	0.000006	3/5/25	QC80074	AMJ
Manganese	**4.74 mg/L**	EPA 200.8	0.0008	0.00001	3/5/25	QC80074	AMJ
Nickel	**0.2828 mg/L**	EPA 200.8	0.0180	0.00005	3/5/25	QC80074	AMJ
Selenium	**0.0270 mg/L**	EPA 200.8	0.0008	0.00008	3/5/25	QC80074	AMJ

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250303179

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250303179
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/3/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Kraft 1
Sample Date/Time: 3/3/25 1:45 PM
Lab Number: 250303179-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Silver	**0.0012 mg/L**	EPA 200.8	0.0005	0.000003	3/5/25	QC80074	AMJ
Uranium	**0.0417 mg/L**	EPA 200.8	0.0002	0.000002	3/5/25	QC80074	AMJ
Zinc	**0.768 mg/L**	EPA 200.8	0.001	0.00003	3/5/25	QC80074	AMJ
Boron	**ND mg/L**	EPA 200.7	0.05	0.01	3/5/25	QC80086	MBN
Iron	**206 mg/L**	EPA 200.7	0.005	0.0005	3/5/25	QC80086	MBN
Total Recoverable							
Chromium - Trivalent	**0.18 mg/L**	Calculation	0.02	0.01	3/7/25	-	MBN
Mercury	**0.0003 mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0336 mg/L**	EPA 200.8	0.0006	0.00006	3/5/25	QC80074	AMJ
Cadmium	**0.0052 mg/L**	EPA 200.8	0.0001	0.000006	3/5/25	QC80074	AMJ
Chromium	**0.1793 mg/L**	EPA 200.8	0.0300	0.00015	3/5/25	QC80074	AMJ
Lead	**0.2261 mg/L**	EPA 200.8	0.0001	0.000006	3/5/25	QC80074	AMJ
Molybdenum	**0.0019 mg/L**	EPA 200.8	0.0005	0.00005	3/5/25	QC80074	AMJ
Nickel	**0.2734 mg/L**	EPA 200.8	0.0180	0.00005	3/5/25	QC80074	AMJ
Iron	**218 mg/L**	EPA 200.7	0.005	0.0005	3/5/25	QC80086	MBN

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250303179

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/3/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80048	Method Blank	ND	SM 4500-NH3-G	3/4/25
Chloride	QC80151	Blank	ND	EPA 300.0	3/4/25
Chromium - Hexavalent	QC80129	Blank	ND	SM 3500-Cr B	3/6/25
Cyanide-Total	QC80061	Blank	ND	EPA 335.4	3/4/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Cadmium	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Chromium	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Copper	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Lead	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Manganese	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Molybdenum	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Nickel	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Selenium	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Silver	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Uranium	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Zinc	QC80074	Method Blank	ND	EPA 200.8	3/3/25
Boron	QC80086	Method Blank	ND	EPA 200.7	3/3/25
Iron	QC80086	Method Blank	ND	EPA 200.7	3/3/25
Nitrate Nitrogen	QC80148	Blank	ND	EPA 300.0	3/4/25
Nitrite Nitrogen	QC80149	Blank	ND	EPA 300.0	3/4/25
Sulfate	QC80153	Blank	ND	EPA 300.0	3/4/25
Sulfide as H2S	QC80099	Blank	ND	SM 4500-S2-G	3/5/25
Total Dissolved Solids	QC80105	Blank	ND	SM 2540-C	3/5/25
Phosphorus - Total	QC80116	Blank	ND	EPA 365.1	3/4/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80048	Duplicate -250227041-01	0 - 20	-	1.3	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250227028-04	75 - 125	82.0	-	
Chloride	QC80151	Duplicate -250303093-01	0 - 20	-	0.3	EPA 300.0
		LCS	90 - 110	102.7	-	
		MS -250303093-01	80 - 120	104.9	-	
Chromium - Hexavalent	QC80129	Duplicate -250304069-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	99.5	-	
Cyanide-Total	QC80061	Duplicate -250228071-04	0 - 20	-	3.8	EPA 335.4
		LCS	90 - 110	95.3	-	
		MS -250303097-01	90 - 110	93.5	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80074	LCS	90 - 110	98.4	-	EPA 200.8
		MS -250303010-05	70 - 130	112.0	-	
		MSD -250303010-05	0 - 10	-	0.6	
Cadmium	QC80074	LCS	90 - 110	98.2	-	EPA 200.8
		MS -250303010-05	70 - 130	102.0	-	
		MSD -250303010-05	0 - 10	-	1.3	
Chromium	QC80074	LCS	90 - 110	99.6	-	EPA 200.8
		MS -250303010-05	70 - 130	103.3	-	
		MSD -250303010-05	0 - 10	-	3.1	
Copper	QC80074	LCS	90 - 110	102.1	-	EPA 200.8
		MS -250303010-05	70 - 130	101.7	-	
		MSD -250303010-05	0 - 10	-	2.0	
Lead	QC80074	LCS	90 - 110	106.7	-	EPA 200.8
		MS -250303010-05	70 - 130	100.4	-	
		MSD -250303010-05	0 - 10	-	1.2	
Manganese	QC80074	LCS	90 - 110	101.1	-	EPA 200.8
		MS -250303010-05	70 - 130	99.2	-	
		MSD -250303010-05	0 - 10	-	0.4	
Molybdenum	QC80074	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250303010-05	70 - 130	104.8	-	
		MSD -250303010-05	0 - 10	-	2.6	
Nickel	QC80074	LCS	90 - 110	101.9	-	EPA 200.8
		MS -250303010-05	70 - 130	97.0	-	
		MSD -250303010-05	0 - 10	-	1.2	
Selenium	QC80074	LCS	90 - 110	95.0	-	EPA 200.8
		MS -250303010-05	70 - 130	122.7	-	
		MSD -250303010-05	0 - 10	-	7.8	
Silver	QC80074	LCS	90 - 110	95.8	-	EPA 200.8
		MS -250303010-05	70 - 130	78.3	-	
		MSD -250303010-05	0 - 10	-	7.2	
Uranium	QC80074	LCS	90 - 110	103.9	-	EPA 200.8
		MS -250303010-05	70 - 130	100.4	-	
		MSD -250303010-05	0 - 10	-	1.5	
Zinc	QC80074	LCS	90 - 110	99.9	-	EPA 200.8
		MS -250303010-05	70 - 130	106.6	-	
		MSD -250303010-05	0 - 10	-	0.4	
Boron	QC80086	Duplicate -250303020-05	0 - 20	-	13.7	EPA 200.7
		LCS	90 - 110	100.3	-	
		MS -250303039-01	75 - 125	82.6	-	
Iron	QC80086	Duplicate -250303020-05	0 - 20	-	4.3	EPA 200.7
		LCS	90 - 110	106.1	-	
		MS -250303039-01	75 - 125	89.0	-	
Nitrate Nitrogen	QC80148	Duplicate -250303053-01	0 - 20	-	1.5	EPA 300.0
		LCS	90 - 110	100.5	-	
		MS -250303053-01	80 - 120	95.2	-	
Nitrite Nitrogen	QC80149	Duplicate -250303053-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	94.4	-	
		MS -250303053-01	80 - 120	93.1	-	
Sulfate	QC80153	Duplicate -250303093-01	0 - 20	-	0.5	EPA 300.0
		LCS	90 - 110	103.4	-	
		MS -250303093-01	80 - 120	104.9	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80099	Duplicate -250303054-03	0 - 20	-	16.8	SM 4500-S2-G
		LCS	70 - 130	106.0	-	
Total Dissolved Solids	QC80105	Duplicate -250303056-02	0 - 10	-	1.6	SM 2540-C
		LCS	85 - 115	99.9	-	
Phosphorus - Total	QC80116	Duplicate -250304070-02	0 - 20	-	1.6	EPA 365.1
		LCS	90 - 110	98.5	-	
		MS -250304019-05	90 - 110	103.7	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name: SAME	24.3040
Contact Name: Jay Edwards	Contact Name:	Thornton TWP-F
Address: 7108 S. Alton Way	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250303179 JML
Phone: 720-413-7943	Phone:	
Email: JAY.EDwards@CMTTechnicalServices.com	Email:	
Sample Collector: Jay Edwards		
Sample Collector Phone: 720-413-7943	PO No.:	

Sample Matrix (Select One Only)

- **Water ☒ (CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water ☐ (SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)**

Tests Requested

Date	Time	Sample ID	No. of Containers	Grab or Composite (Check One Only)	SEE ATTACHMENT
3/3/25	1:45pm	Kraft 1	9		X

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: N Date: 3-3-25

Instructions: Customer is resampling for e-coli

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
Evan Castle	3/3/25 3:30p						3/3/25 1627

Colorado Analytical LABORATORIES, INC.

CAL Task
250303179

JML

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
1	***100 ml sterile - Na2S2O3***
	~~E-Coli~~ - Water
1	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
1	***250 ml Cylinder - Unpreserved***
	TDS - Water
1	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
1	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

CAL Task
250303179
JML

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
1	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
1	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
1	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
1	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307096

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307096
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID KR-3
Sample Date/Time: 3/7/25 1:05 PM
Lab Number: 250307096-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.04 mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**18.5 mg/L**	EPA 300.0	1.00	0.007	3/8/25	QC80213	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**5.6 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/8/25	-	DJL
Nitrate Nitrogen	**0.56 mg/L**	EPA 300.0	0.05	0.02	3/8/25	QC80211	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/8/25	QC80212	NRP
pH	**7.35 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**572 mg/L**	EPA 300.0	1.00	0.012	3/8/25	QC80215	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**1088 mg/L**	SM 2540-C	5	2	3/13/25	QC80313	ISG
Phosphorus - Total	**1.09 mg/L**	EPA 365.1	0.05	0.006	3/13/25	QC80300	TAB
Total Residual Chlorine	**0.06 mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0149 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0006 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0379 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Copper	**0.0260 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Lead	**0.0237 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Manganese	**0.6166 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Nickel	**0.0350 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307096

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307096
Client PO: Paid CC
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID KR-3
Sample Date/Time: 3/7/25 1:05 PM
Lab Number: 250307096-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0056 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80225	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80225	JJA
Uranium	**0.0226 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80225	JJA
Zinc	**0.116 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80225	JJA
Boron	**0.22 mg/L**	EPA 200.7	0.05	0.01	3/12/25	QC80256	JJA
Iron	**37.4 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0148 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0006 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0382 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Lead	**0.0238 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Molybdenum	**0.0063 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80225	JJA
Nickel	**0.0332 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA
Iron	**40.3 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250307096

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/7/25
Project Name: Thornton SEG.F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80213	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Cadmium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Chromium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Copper	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Lead	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Manganese	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Molybdenum	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Nickel	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Selenium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Silver	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Uranium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Zinc	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Boron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Iron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Nitrate Nitrogen	QC80211	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80212	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80215	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80313	Blank	ND	SM 2540-C	3/13/25
Phosphorus - Total	QC80300	Blank	ND	EPA 365.1	3/11/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80213	Duplicate -250307080-01	0 - 20	-	0.1	EPA 300.0
		LCS	90 - 110	102.4	-	
		MS -250307080-01	80 - 120	98.7	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80225	LCS	90 - 110	100.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.9	-	
		MSD -250307003-02	0 - 10	-	0.2	
Cadmium	QC80225	LCS	90 - 110	100.0	-	EPA 200.8
		MS -250307003-02	70 - 130	94.3	-	
		MSD -250307003-02	0 - 10	-	3.9	
Chromium	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	100.6	-	
		MSD -250307003-02	0 - 10	-	0.8	
Copper	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	103.5	-	
		MSD -250307003-02	0 - 10	-	4.6	
Lead	QC80225	LCS	90 - 110	106.8	-	EPA 200.8
		MS -250307003-02	70 - 130	93.5	-	
		MSD -250307003-02	0 - 10	-	1.4	
Manganese	QC80225	LCS	90 - 110	106.2	-	EPA 200.8
		MS -250307003-02	70 - 130	108.4	-	
		MSD -250307003-02	0 - 10	-	5.1	
Molybdenum	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	102.8	-	
		MSD -250307003-02	0 - 10	-	3.2	
Nickel	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	95.9	-	
		MSD -250307003-02	0 - 10	-	1.5	
Selenium	QC80225	LCS	90 - 110	99.3	-	EPA 200.8
		MS -250307003-02	70 - 130	100.2	-	
		MSD -250307003-02	0 - 10	-	2.4	
Silver	QC80225	LCS	90 - 110	100.7	-	EPA 200.8
		MS -250307003-02	70 - 130	83.7	-	
		MSD -250307003-02	0 - 10	-	1.4	
Uranium	QC80225	LCS	90 - 110	104.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.0	-	
		MSD -250307003-02	0 - 10	-	2.2	
Zinc	QC80225	LCS	90 - 110	102.0	-	EPA 200.8
		MS -250307003-02	70 - 130	104.6	-	
		MSD -250307003-02	0 - 10	-	4.5	
Boron	QC80256	Duplicate -250307014-01	0 - 20	-	11.9	EPA 200.7
		LCS	90 - 110	102.7	-	
		MS -250307023-01A	75 - 125	98.3	-	
Iron	QC80256	Duplicate -250307014-01	0 - 20	-	13.3	EPA 200.7
		LCS	90 - 110	103.8	-	
		MS -250307023-01A	75 - 125	104.0	-	
Nitrate Nitrogen	QC80211	Duplicate -250307079-02	0 - 20	-	1.9	EPA 300.0
		LCS	90 - 110	100.1	-	
		MS -250307079-02A	80 - 120	104.9	-	
Nitrite Nitrogen	QC80212	Duplicate -250307079-02	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.5	-	
		MS -250307079-02A	80 - 120	93.4	-	
Sulfate	QC80215	Duplicate -250307080-01	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	102.3	-	
		MS -250307080-01	80 - 120	93.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80313	Duplicate -250310100-01	0 - 10	-	3.6	SM 2540-C
		LCS	85 - 115	96.9	-	
Phosphorus - Total	QC80300	Duplicate -250311078-02	0 - 20	-	2.2	EPA 365.1
		LCS	90 - 110	100.1	-	
		MS -250311013-04	90 - 110	98.8	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT TECHNICAL SRVCS	Company Name: SAME	TWP - SEC. F
Contact Name: JAY EDWARDS	Contact Name: ELLN ARNDT	24.3040
Address: 7108 S. ALTON WAY BLDG. B	Address:	Task Number (Lab Use Only)
City CENTENNIAL State CO Zip 80112	City State Zip	CAL Task 250307096
Phone: 720-413-7943	Phone:	LMG
Email: JAY.EDWARDS@CMTTECHNICAL SERVICES.COM	Email: ACCOUNTING@CESANDINC.COM	
Sample Collector: JBE		
Sample Collector Phone: 720 413 7943	PO No.: 24.3040	

Sample Matrix (Select One Only)

Water ☒ (CWA / NPDES)	Drinking Water ☐ (SDWA)	Solid (Sludge) ☐ (503 Regs / RCRA/ SW-846)
Includes wastewater, non-potable samples not intended for drinking water use.	Includes finished drinking water, raw (untreated) water samples intended for human consumption.	

Tests Requested

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	SEE ATTACHED SW 7
3/7/25	13:05	KR-3	9		

9

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days. LD. 3/7/25

Instructions:

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
JBE	3/7 3:40						3/7/25 1540

Colorado Analytical LABORATORIES, INC.

CAL Task
250307096

LMG

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

CAL Task
250307096

LMG

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307092

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307092
Client PO: 24.3040
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID BA-1
Sample Date/Time: 3/7/25 1:40 PM
Lab Number: 250307092-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**ND mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**12.5 mg/L**	EPA 300.0	1.00	0.007	3/8/25	QC80213	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**7.5 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/8/25	-	DJL
Nitrate Nitrogen	**0.26 mg/L**	EPA 300.0	0.05	0.02	3/8/25	QC80211	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/8/25	QC80212	NRP
pH	**7.34 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**510 mg/L**	EPA 300.0	1.00	0.012	3/8/25	QC80215	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**974 mg/L**	SM 2540-C	5	2	3/13/25	QC80313	ISG
Phosphorus - Total	**1.93 mg/L**	EPA 365.1	0.05	0.006	3/13/25	QC80300	TAB
Total Residual Chlorine	**0.05 mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0265 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0009 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0507 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Copper	**0.0388 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Lead	**0.0372 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Manganese	**1.40 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Nickel	**0.0457 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307092

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307092
Client PO: 24.3040
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID BA-1
Sample Date/Time: 3/7/25 1:40 PM
Lab Number: 250307092-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0267 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80225	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80225	JJA
Uranium	**0.0234 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80225	JJA
Zinc	**0.197 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80225	JJA
Boron	**0.24 mg/L**	EPA 200.7	0.05	0.01	3/12/25	QC80256	JJA
Iron	**62.6 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA
Total Recoverable							
Chromium - Trivalent	**0.05 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0242 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0008 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0500 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Lead	**0.0376 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Molybdenum	**0.0063 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80225	JJA
Nickel	**0.0451 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA
Iron	**63.9 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250307092

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/7/25
Project Name: Thornton SEG.F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80213	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Cadmium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Chromium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Copper	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Lead	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Manganese	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Molybdenum	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Nickel	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Selenium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Silver	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Uranium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Zinc	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Boron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Iron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Nitrate Nitrogen	QC80211	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80212	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80215	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80313	Blank	ND	SM 2540-C	3/13/25
Phosphorus - Total	QC80300	Blank	ND	EPA 365.1	3/11/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80213	Duplicate -250307080-01	0 - 20	-	0.1	EPA 300.0
		LCS	90 - 110	102.4	-	
		MS -250307080-01	80 - 120	98.7	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80225	LCS	90 - 110	100.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.9	-	
		MSD -250307003-02	0 - 10	-	0.2	
Cadmium	QC80225	LCS	90 - 110	100.0	-	EPA 200.8
		MS -250307003-02	70 - 130	94.3	-	
		MSD -250307003-02	0 - 10	-	3.9	
Chromium	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	100.6	-	
		MSD -250307003-02	0 - 10	-	0.8	
Copper	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	103.5	-	
		MSD -250307003-02	0 - 10	-	4.6	
Lead	QC80225	LCS	90 - 110	106.8	-	EPA 200.8
		MS -250307003-02	70 - 130	93.5	-	
		MSD -250307003-02	0 - 10	-	1.4	
Manganese	QC80225	LCS	90 - 110	106.2	-	EPA 200.8
		MS -250307003-02	70 - 130	108.4	-	
		MSD -250307003-02	0 - 10	-	5.1	
Molybdenum	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	102.8	-	
		MSD -250307003-02	0 - 10	-	3.2	
Nickel	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	95.9	-	
		MSD -250307003-02	0 - 10	-	1.5	
Selenium	QC80225	LCS	90 - 110	99.3	-	EPA 200.8
		MS -250307003-02	70 - 130	100.2	-	
		MSD -250307003-02	0 - 10	-	2.4	
Silver	QC80225	LCS	90 - 110	100.7	-	EPA 200.8
		MS -250307003-02	70 - 130	83.7	-	
		MSD -250307003-02	0 - 10	-	1.4	
Uranium	QC80225	LCS	90 - 110	104.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.0	-	
		MSD -250307003-02	0 - 10	-	2.2	
Zinc	QC80225	LCS	90 - 110	102.0	-	EPA 200.8
		MS -250307003-02	70 - 130	104.6	-	
		MSD -250307003-02	0 - 10	-	4.5	
Boron	QC80256	Duplicate -250307014-01	0 - 20	-	11.9	EPA 200.7
		LCS	90 - 110	102.7	-	
		MS -250307023-01A	75 - 125	98.3	-	
Iron	QC80256	Duplicate -250307014-01	0 - 20	-	13.3	EPA 200.7
		LCS	90 - 110	103.8	-	
		MS -250307023-01A	75 - 125	104.0	-	
Nitrate Nitrogen	QC80211	Duplicate -250307079-02	0 - 20	-	1.9	EPA 300.0
		LCS	90 - 110	100.1	-	
		MS -250307079-02A	80 - 120	104.9	-	
Nitrite Nitrogen	QC80212	Duplicate -250307079-02	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.5	-	
		MS -250307079-02A	80 - 120	93.4	-	
Sulfate	QC80215	Duplicate -250307080-01	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	102.3	-	
		MS -250307080-01	80 - 120	93.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80313	Duplicate -250310100-01	0 - 10	-	3.6	SM 2540-C
		LCS	85 - 115	96.9	-	
Phosphorus - Total	QC80300	Duplicate -250311078-02	0 - 20	-	2.2	EPA 365.1
		LCS	90 - 110	100.1	-	
		MS -250311013-04	90 - 110	98.8	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.

DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT TECH. SRVCS.	Company Name: SAME	TWP - SEC. F
Contact Name: JAY EDWARDS	Contact Name: ERIN ARNDT	24.3040
Address: 7108 S. ALTON WAY BLG. B	Address:	Task Number (Lab Use Only)
City CENTENNIAL State CO Zip 80112	City State Zip	CAL Task 250307092 JAK
Phone: 720-413-7943	Phone:	
Email: JAY.EDWARDS@CMTTECHNICALSERVICES.COM	Email: ACCOUNTING@CEGAREINC.COM	
Sample Collector: JBE		
Sample Collector Phone: 720-413-7943	PO No.: 24.3040	

Sample Matrix (Select One Only)

- **Water** ☒ **(CWA / NPDES)** — Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water** ☐ **(SDWA)** — Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge)** ☐ **(503 Regs / RCRA/ SW-846)**

Tests Requested

Date	Time	Sample ID	No. of Containers	Grab or Composite (Check One Only)	SEE ATTACH.
3/7/25	13:40	BA-2	9		
			(9)		

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: JK Date: 3/7/25

Page 6 of 8

Instructions:	C/S Info:	Seals Present Yes ☐ No ☐
	Deliver Via: HAND C/S Charge ☐	Temp. 1 °C/Ice Y Sample Pres. Y ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
JBE	3/7 3:42	–					3/7/25 1542

CAL Task
250307092

JAK

Colorado Analytical Laboratories, Inc.

Bottle Order Test Detail

Order ID: QBO25020045
Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water — TR per guide

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

CAL Task
250307092

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

JAK

Attention: Jay Edwards

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water – TR per quote
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306155

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306155
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Bartles BA-9
Sample Date/Time: 3/6/25 2:30 PM
Lab Number: 250306155-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.33 mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**27.2 mg/L**	EPA 300.0	5.00	0.007	3/7/25	QC80202	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**4.4 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/7/25	-	DJL
Nitrate Nitrogen	**10.7 mg/L**	EPA 300.0	0.05	0.02	3/7/25	QC80203	NRP
Nitrite Nitrogen	**0.47 mg/L**	EPA 300.0	0.03	0.01	3/7/25	QC80206	NRP
pH	**7.15 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**1370 mg/L**	EPA 300.0	5.00	0.012	3/7/25	QC80205	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**2137 mg/L**	SM 2540-C	5	2	3/12/25	QC80243	ISG
Phosphorus - Total	**1.32 mg/L**	EPA 365.1	0.05	0.006	3/10/25	QC80217	TAB
Total Residual Chlorine	**0.27 mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0205 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0010 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0412 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Copper	**0.0403 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Lead	**0.0289 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Manganese	**1.09 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80161	JJA
Nickel	**0.0530 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250306155

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250306155
Client PO: Paid CC
Client Project: Thornton TWP-F 24.3040

Date Received: 3/6/25
Date Reported: 3/14/25
Matrix: Water

Customer Sample ID Bartles BA-9
Sample Date/Time: 3/6/25 2:30 PM
Lab Number: 250306155-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0174 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80161	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80161	JJA
Uranium	**0.0358 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80161	JJA
Zinc	**0.145 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80161	JJA
Boron	**0.39 mg/L**	EPA 200.7	0.05	0.01	3/11/25	QC80229	JJA
Iron	**48.2 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0195 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80161	JJA
Cadmium	**0.0010 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Chromium	**0.0405 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80161	JJA
Lead	**0.0296 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80161	JJA
Molybdenum	**0.0088 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80161	JJA
Nickel	**0.0540 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80161	JJA
Iron	**43.2 mg/L**	EPA 200.7	0.005	0.0005	3/11/25	QC80229	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250306155

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/6/25
Project Name: Thornton TWP-F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80202	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Cadmium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Chromium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Copper	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Lead	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Manganese	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Molybdenum	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Nickel	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Selenium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Silver	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Uranium	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Zinc	QC80161	Method Blank	ND	EPA 200.8	3/6/25
Boron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Iron	QC80229	Method Blank	ND	EPA 200.7	3/6/25
Nitrate Nitrogen	QC80203	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80206	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80205	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80243	Blank	ND	SM 2540-C	3/11/25
Phosphorus - Total	QC80217	Blank	ND	EPA 365.1	3/10/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80202	Duplicate -250306145-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	109.0	-	
		MS -250306145-01	80 - 120	101.9	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	116.2	-	
		MSD -250306007-01	0 - 10	-	1.3	
Cadmium	QC80161	LCS	90 - 110	96.1	-	EPA 200.8
		MS -250306007-01	70 - 130	107.3	-	
		MSD -250306007-01	0 - 10	-	0.6	
Chromium	QC80161	LCS	90 - 110	99.4	-	EPA 200.8
		MS -250306007-01	70 - 130	104.9	-	
		MSD -250306007-01	0 - 10	-	1.7	
Copper	QC80161	LCS	90 - 110	98.7	-	EPA 200.8
		MS -250306007-01	70 - 130	100.8	-	
		MSD -250306007-01	0 - 10	-	1.4	
Lead	QC80161	LCS	90 - 110	101.0	-	EPA 200.8
		MS -250306007-01	70 - 130	103.0	-	
		MSD -250306007-01	0 - 10	-	0.0	
Manganese	QC80161	LCS	90 - 110	99.1	-	EPA 200.8
		MS -250306007-01	70 - 130	106.0	-	
		MSD -250306007-01	0 - 10	-	0.1	
Molybdenum	QC80161	LCS	90 - 110	94.4	-	EPA 200.8
		MS -250306007-01	70 - 130	73.8	-	
		MSD -250306007-01	0 - 10	-	5.0	
Nickel	QC80161	LCS	90 - 110	102.2	-	EPA 200.8
		MS -250306007-01	70 - 130	103.4	-	
		MSD -250306007-01	0 - 10	-	1.5	
Selenium	QC80161	LCS	90 - 110	96.3	-	EPA 200.8
		MS -250306007-01	70 - 130	121.8	-	
		MSD -250306007-01	0 - 10	-	2.0	
Silver	QC80161	LCS	90 - 110	106.4	-	EPA 200.8
		MS -250306007-01	70 - 130	83.0	-	
		MSD -250306007-01	0 - 10	-	3.3	
Uranium	QC80161	LCS	90 - 110	98.8	-	EPA 200.8
		MS -250306007-01	70 - 130	98.0	-	
		MSD -250306007-01	0 - 10	-	0.4	
Zinc	QC80161	LCS	90 - 110	108.4	-	EPA 200.8
		MS -250306007-01	70 - 130	115.1	-	
		MSD -250306007-01	0 - 10	-	1.0	
Boron	QC80229	Duplicate -250306085-01	0 - 20	-	3.4	EPA 200.7
		LCS	90 - 110	95.5	-	
		MS -250306050-02A	75 - 125	110.7	-	
Iron	QC80229	Duplicate -250306085-01	0 - 20	-	0.0	EPA 200.7
		LCS	90 - 110	96.4	-	
		MS -250306050-02A	75 - 125	108.9	-	
Nitrate Nitrogen	QC80203	Duplicate -250306145-01	0 - 20	-	2.7	EPA 300.0
		LCS	90 - 110	106.5	-	
		MS -250306145-01	80 - 120	109.3	-	
Nitrite Nitrogen	QC80206	Duplicate -250306153-01	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.2	-	
		MS -250306153-01	80 - 120	92.9	-	
Sulfate	QC80205	Duplicate -250306145-01	0 - 20	-	0.3	EPA 300.0
		LCS	90 - 110	104.7	-	
		MS -250306145-01	80 - 120	100.7	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80243	Duplicate -250306111-05	0 - 10	-	0.2	SM 2540-C
		LCS	85 - 115	96.4	-	
Phosphorus - Total	QC80217	Duplicate -250306003-01	0 - 20	-	2.1	EPA 365.1
		LCS	90 - 110	96.9	-	
		MS -250306039-03A	90 - 110	92.9	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.



DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 ml's = Most Probable Number Index/ 100 ml's
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT	Company Name: SAME	24.3040
Contact Name: Jay Edwards	Contact Name:	Thornton TWP-F
Address: 7108 S. Alton Way	Address:	Task Number (Lab Use Only)
City Centennial State CO Zip 80112	City State Zip	CAL Task 250306155 LMG
Phone: 720-413-7943	Phone:	
Email: JAY.EDWARDS@CMTTechnicalServices.com	Email:	
Sample Collector: Evan Castle		
Sample Collector Phone: 720-594-0757	PO No.:	

Sample Matrix (Select One Only)

- **Water** ☒ **(CWA / NPDES)** Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water** ☐ **(SDWA)** Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge)** ☐ **(503 Regs / RCRA/ SW-846)**

Date	Time	Sample ID	No. of Containers	Grab or (Check One Only) Composite	Tests Requested: See Attachment
3/6/25	2:30	Bartles BA-9	(9)		X

(9)

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days. LA. 3/6/25

Instructions:

C/S Info:

Deliver Via: Hand C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. | °C/Ice Y Sample Pres. Yes ☑ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
	3/6 5:15p					LA.	3/6/25 715

Colorado Analytical LABORATORIES, INC.

CAL Task
250306155

LMG

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: _____
Date: _____
Checked By: _____

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

CAL Task
250306155

Attention: Jay Edwards

LMG

Verify All Shipping Addresses*

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: **0**
Standard: **1**

Customer Needs By: 3/3/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By: ____
Date: ____
Checked By: ____

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307095

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307095
Client PO: 24.3040
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID QTR
Sample Date/Time: 3/7/25 2:10 PM
Lab Number: 250307095-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Ammonia Nitrogen	**0.17 mg/L**	SM 4500-NH3-G	0.03	0.007	3/12/25	QC80233	KJP
Chloride	**27.2 mg/L**	EPA 300.0	5.00	0.007	3/8/25	QC80213	NRP
Cyanide-Total	**ND mg/L**	EPA 335.4	0.005	0.0005	3/11/25	QC80239	ACE
Dissolved Oxygen	**6.1 mg/L**	SM 4500-G	0.1	-	3/7/25	-	ARH
E-Coli	**ND mpn/100ml**	Colilert	1	1	3/8/25	-	DJL
Nitrate Nitrogen	**10.8 mg/L**	EPA 300.0	0.05	0.02	3/8/25	QC80211	NRP
Nitrite Nitrogen	**ND mg/L**	EPA 300.0	0.03	0.01	3/8/25	QC80212	NRP
pH	**7.02 units**	SM 4500-H-B	0.01	0.01	3/7/25	-	ARH
Temperature	**20 °C**	SM 4500-H-B	1	-	3/7/25	-	ARH
Sulfate	**1280 mg/L**	EPA 300.0	5.00	0.012	3/8/25	QC80215	NRP
Sulfide as H2S	**ND mg/L**	SM 4500-S2-G	0.1	0.05	3/11/25	QC80316	ARH
Total Dissolved Solids	**2150 mg/L**	SM 2540-C	5	2	3/13/25	QC80313	ISG
Phosphorus - Total	**1.67 mg/L**	EPA 365.1	0.05	0.006	3/13/25	QC80300	TAB
Total Residual Chlorine	**0.09 mg/L**	SM 4500-CL-G	0.05	0.2	3/7/25	-	ARH
Dissolved							
Chromium - Hexavalent	**ND mg/L**	SM 3500-Cr B	0.02	0.01	3/14/25	QC80310	AMJ
Total							
Arsenic	**0.0154 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0008 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0442 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Copper	**0.0422 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Lead	**0.0298 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Manganese	**0.8915 mg/L**	EPA 200.8	0.0008	0.00001	3/11/25	QC80225	JJA
Nickel	**0.0496 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 250307095

Report To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Bill To: Jay Edwards
Company: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Task No.: 250307095
Client PO: 24.3040
Client Project: Thornton SEG.F 24.3040

Date Received: 3/7/25
Date Reported: 3/18/25
Matrix: Water

Customer Sample ID QTR
Sample Date/Time: 3/7/25 2:10 PM
Lab Number: 250307095-01

Test	Result / Units	Method	RL	MDL	Date Analyzed	QC Batch ID	Analyzed By
Total							
Selenium	**0.0175 mg/L**	EPA 200.8	0.0008	0.00008	3/11/25	QC80225	JJA
Silver	**ND mg/L**	EPA 200.8	0.0005	0.000003	3/11/25	QC80225	JJA
Uranium	**0.0424 mg/L**	EPA 200.8	0.0002	0.000002	3/11/25	QC80225	JJA
Zinc	**0.155 mg/L**	EPA 200.8	0.001	0.00003	3/11/25	QC80225	JJA
Boron	**0.43 mg/L**	EPA 200.7	0.05	0.01	3/12/25	QC80256	JJA
Iron	**42.6 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA
Total Recoverable							
Chromium - Trivalent	**0.04 mg/L**	Calculation	0.02	0.01	3/14/25	-	MBN
Mercury	**ND mg/L**	EPA 245.7	0.0002	0.00002	3/12/25	QC80284	MBN
Arsenic	**0.0162 mg/L**	EPA 200.8	0.0006	0.00006	3/11/25	QC80225	JJA
Cadmium	**0.0008 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Chromium	**0.0436 mg/L**	EPA 200.8	0.0150	0.00015	3/11/25	QC80225	JJA
Lead	**0.0301 mg/L**	EPA 200.8	0.0001	0.000006	3/11/25	QC80225	JJA
Molybdenum	**0.0083 mg/L**	EPA 200.8	0.0005	0.00005	3/11/25	QC80225	JJA
Nickel	**0.0520 mg/L**	EPA 200.8	0.0090	0.00005	3/11/25	QC80225	JJA
Iron	**39.9 mg/L**	EPA 200.7	0.005	0.0005	3/12/25	QC80256	JJA

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Colorado Analytical LABORATORIES, INC.

Analytical QC Summary

TASK NO: 250307095

Report To: Jay Edwards
Company: CMT Technical Services

Receive Date: 3/7/25
Project Name: Thornton SEG.F 24.3040

Test	QC Batch ID	QC Type	Result	Method	Prep Date
Ammonia Nitrogen	QC80233	Method Blank	ND	SM 4500-NH3-G	3/11/25
Chloride	QC80213	Blank	ND	EPA 300.0	3/7/25
Chromium - Hexavalent	QC80310	Blank	ND	SM 3500-Cr B	3/13/25
Cyanide-Total	QC80239	Blank	ND	EPA 335.4	3/11/25
Mercury	QC80284	Method Blank	ND	EPA 245.7	3/12/25
Arsenic	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Cadmium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Chromium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Copper	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Lead	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Manganese	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Molybdenum	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Nickel	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Selenium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Silver	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Uranium	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Zinc	QC80225	Method Blank	ND	EPA 200.8	3/7/25
Boron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Iron	QC80256	Method Blank	ND	EPA 200.7	3/7/25
Nitrate Nitrogen	QC80211	Blank	ND	EPA 300.0	3/7/25
Nitrite Nitrogen	QC80212	Blank	ND	EPA 300.0	3/7/25
Sulfate	QC80215	Blank	ND	EPA 300.0	3/7/25
Sulfide as H2S	QC80316	Blank	ND	SM 4500-S2-G	3/11/25
Total Dissolved Solids	QC80313	Blank	ND	SM 2540-C	3/13/25
Phosphorus - Total	QC80300	Blank	ND	EPA 365.1	3/11/25

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Ammonia Nitrogen	QC80233	Duplicate -250306052-01	0 - 20	-	0.4	SM 4500-NH3-G
		LCS	90 - 110	104.9	-	
		MS -250306042-04	75 - 125	84.0	-	
Chloride	QC80213	Duplicate -250307080-01	0 - 20	-	0.1	EPA 300.0
		LCS	90 - 110	102.4	-	
		MS -250307080-01	80 - 120	98.7	-	
Chromium - Hexavalent	QC80310	Duplicate -250306050-02	0 - 20	-	0.0	SM 3500-Cr B
		LCS	90 - 110	98.5	-	
Cyanide-Total	QC80239	Duplicate -250307095-01	0 - 20	-	0.0	EPA 335.4
		LCS	90 - 110	90.1	-	
		MS -250306064-08	90 - 110	95.0	-	
Mercury	QC80284	Duplicate -250228030-02	0 - 20	-	0.0	EPA 245.7
		LCS	90 - 110	109.1	-	
		MS -250228030-02E	80 - 120	100.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Arsenic	QC80225	LCS	90 - 110	100.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.9	-	
		MSD -250307003-02	0 - 10	-	0.2	
Cadmium	QC80225	LCS	90 - 110	100.0	-	EPA 200.8
		MS -250307003-02	70 - 130	94.3	-	
		MSD -250307003-02	0 - 10	-	3.9	
Chromium	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	100.6	-	
		MSD -250307003-02	0 - 10	-	0.8	
Copper	QC80225	LCS	90 - 110	103.5	-	EPA 200.8
		MS -250307003-02	70 - 130	103.5	-	
		MSD -250307003-02	0 - 10	-	4.6	
Lead	QC80225	LCS	90 - 110	106.8	-	EPA 200.8
		MS -250307003-02	70 - 130	93.5	-	
		MSD -250307003-02	0 - 10	-	1.4	
Manganese	QC80225	LCS	90 - 110	106.2	-	EPA 200.8
		MS -250307003-02	70 - 130	108.4	-	
		MSD -250307003-02	0 - 10	-	5.1	
Molybdenum	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	102.8	-	
		MSD -250307003-02	0 - 10	-	3.2	
Nickel	QC80225	LCS	90 - 110	100.8	-	EPA 200.8
		MS -250307003-02	70 - 130	95.9	-	
		MSD -250307003-02	0 - 10	-	1.5	
Selenium	QC80225	LCS	90 - 110	99.3	-	EPA 200.8
		MS -250307003-02	70 - 130	100.2	-	
		MSD -250307003-02	0 - 10	-	2.4	
Silver	QC80225	LCS	90 - 110	100.7	-	EPA 200.8
		MS -250307003-02	70 - 130	83.7	-	
		MSD -250307003-02	0 - 10	-	1.4	
Uranium	QC80225	LCS	90 - 110	104.9	-	EPA 200.8
		MS -250307003-02	70 - 130	98.0	-	
		MSD -250307003-02	0 - 10	-	2.2	
Zinc	QC80225	LCS	90 - 110	102.0	-	EPA 200.8
		MS -250307003-02	70 - 130	104.6	-	
		MSD -250307003-02	0 - 10	-	4.5	
Boron	QC80256	Duplicate -250307014-01	0 - 20	-	11.9	EPA 200.7
		LCS	90 - 110	102.7	-	
		MS -250307023-01A	75 - 125	98.3	-	
Iron	QC80256	Duplicate -250307014-01	0 - 20	-	13.3	EPA 200.7
		LCS	90 - 110	103.8	-	
		MS -250307023-01A	75 - 125	104.0	-	
Nitrate Nitrogen	QC80211	Duplicate -250307079-02	0 - 20	-	1.9	EPA 300.0
		LCS	90 - 110	100.1	-	
		MS -250307079-02A	80 - 120	104.9	-	
Nitrite Nitrogen	QC80212	Duplicate -250307079-02	0 - 20	-	0.0	EPA 300.0
		LCS	90 - 110	93.5	-	
		MS -250307079-02A	80 - 120	93.4	-	
Sulfate	QC80215	Duplicate -250307080-01	0 - 20	-	0.4	EPA 300.0
		LCS	90 - 110	102.3	-	
		MS -250307080-01	80 - 120	93.0	-	

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Test	QC Batch ID	QC Type	Limits	% Rec	RPD	Method
Sulfide as H2S	QC80316	Duplicate -250311140-02	0 - 20	-	9.0	SM 4500-S2-G
		LCS	70 - 130	99.2	-	
Total Dissolved Solids	QC80313	Duplicate -250310100-01	0 - 10	-	3.6	SM 2540-C
		LCS	85 - 115	96.9	-	
Phosphorus - Total	QC80300	Duplicate -250311078-02	0 - 20	-	2.2	EPA 365.1
		LCS	90 - 110	100.1	-	
		MS -250311013-04	90 - 110	98.8	-	

All analyses were performed in accordance with approved methods under the latest revision to 40 CFR Part 136 unless otherwise identified. Based on my inquiry of the person or persons directly responsible for analyzing samples and generating the report (s), the analyses, report, and information submitted are, to the best of my knowledge and belief, true, accurate, and complete.

DATA APPROVED FOR RELEASE BY

Abbreviations/ References:

RL = Reporting Limit = Minimum Level
MDL = Method Detection Limit
mg/L = Milligrams Per Liter or PPM
ug/L = Micrograms Per Liter or PPB
mpn/100 mls = Most Probable Number Index/ 100 mls
Date Analyzed = Date Test Completed

(d) RPD acceptable due to low duplicate and sample concentrations.
(s) The accuracy of the spike recovery value is reduced due to the analyte concentration in the sample being disproportionate to the spike level. The laboratory control sample recovery was acceptable

ND = Not Detected at Reporting Limit.

Chain of Custody Form

Colorado Analytical LABORATORIES, INC

Commerce City Lab
10411 Heinz Way
Commerce City CO 80640

Lakewood Service Center
610 Garrison Street, Unit E
Lakewood CO 80215

Phone: 303-659-2313

www.coloradolab.com

Report To Information	Bill To Information (If different from report to)	Project Name / Number
Company Name: CMT TECH. SRVCS	Company Name: SAME	TWP-SEC. F
Contact Name: JAY EDWARDS	Contact Name: ELN ARNDT	24.3040
Address: 7108 S. ALTON WAY BLDG. B,	Address:	Task Number (Lab Use Only)
City CENTENNIAL State CO Zip 80112	City State Zip	CAL Task 250307095 JML
Phone: 720-413-7943	Phone:	
Email: JAY.EDWARDS@CMTTECHNICALSERVICES.COM	Email: ACCOUNTING@CESAREINC.COM	
Sample Collector: JBE		
Sample Collector Phone: 720-413-7943	PO No.: 24.3040	

Sample Matrix (Select One Only)

- **Water (CWA / NPDES)** ☒ — Includes wastewater, non-potable samples not intended for drinking water use.
- **Drinking Water (SDWA)** ☐ — Includes finished drinking water, raw (untreated) water samples intended for human consumption.
- **Solid (Sludge) (503 Regs / RCRA/ SW-846)** ☐

Tests Requested

Date	Time	Sample ID	No. of Containers	Grab or Composite (Check One Only)	SEE ATTACHED
3/7/25	14:10	GTR	9		

Ammonium Sulfate buffer solution added upon arrival to laboratory to extend Hex-Cr hold time to 28 days.

Initials: W Date: 3-7-25

9

Instructions:

C/S Info:

Deliver Via: HAND C/S Charge ☐

Seals Present Yes ☐ No ☐

Temp. 1 °C/Ice Y Sample Pres. Yes ☐ No ☐

Relinquished By:	Date/Time:	Received By:	Date/Time:	Relinquished By:	Date/Time:	Received By:	Date/Time:
JBE	3/7 3:38					AF	3/7/25 1510

CAL Task
250307095

JML

Colorado Analytical
LABORATORIES, INC

Bottle Order Test Detail

Order ID: QBO25020045

Date Created: 2/7/25

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
3	***100 ml sterile - Na2S2O3***
	E-Coli - Water
3	***125 ml Amber - Unpreserved***
	Total Residual Chlorine - Water
3	***250 ml Cylinder - Unpreserved***
	TDS - Water
3	***500 ml Cylinder - H2SO4***
	Ammonia Nitrogen - Water
	Total Phosphorus - Water
3	***500 ml Cylinder - HNO3***
	Ag - Total - Water
	As - Total - Water
	As - TR - Water
	B - Total - Water
	Cd - Total - Water
	Cd - TR - Water
	Cr - Total - Water
	Cr - TR - Water
	Cr - Tri - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date: _____

Checked By: _____

CAL Task

250307095

JML

Ship To: CMT Technical Services
7108 S. Alton Way Bldg B
Centennial CO 80112

Attention: Jay Edwards

Verify All Shipping Addresses

Shipping Options:
Ship Via: Customer Pickup Cooler: Yes

Chain of Custody
Drinking Water: 0
Standard: 1

Customer Needs By: 3/7/25
Ships From: Commerce City

Project:
No Project Provided

Qty.	Bottle / Preservative / Test
	Cu - Total - Water
	Fe - Total - Water
	Fe - TR - Water
	Hg - Water
	Mn - Total - Water
	Mo - TR - Water
	Ni - Total - Water
	Ni - TR - Water
	Pb - Total - Water
	Pb - TR - Water
	Se - Total - Water
	U - Total - Water
	Zn - Total - Water
3	***500 ml Cylinder - NaOH***
	Cyanide-Total - Water
3	***500 ml Cylinder - NaOH/ Zn Acetate***
	Sulfide - Water
3	***500 ml Cylinder - Unpreserved***
	Chloride - Water
	Cr - Hex - Water
	Nitrate Nitrogen - Water
	Nitrite Nitrogen - Water
	pH/ Temp - Water
	Sulfate - Water
3	***Bod Bottle***
	Dissolved Oxygen - Water

****Samples should be shipped or hand delivered the same day they are collected. Orders that require sub-lab analysis should be delivered to the lab Monday thru Wednesday only.****

Internal Shipping Instructions:

Shipped By:
Date: _____
Checked By: _____