

Subsurface Investigation Report

Enbridge Line 5 Reroute

MP 19 HDD Crossing – Silver Creek

Location 42-1-C-1 and SC-1 , West of County Road C, South of WI-13

Location 43-1-C-1, East of Ryefield Road, South of WI-13

Location 44-1-C-1, 45-2-C, SC-2, SC-3 and S C-4 West of Marita Road,
South of WI-13

Town of Ashland, Ashland County, Wisconsin

Prepared for

Lake Superior Consulting

Professional Certification:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.



Joseph C. Butler, PE

Senior Engineer

License Number: E-43286-6

September 30, 2021



Project B2004465

Braun Intertec Corporation

September 30, 2021

Project B2104465

Mr. Scott McDonald
Lake Superior Consulting
130 West Superior Street, Suite 500
Duluth, MN 55802

Re: Subsurface Investigation
Enbridge Line 5 Reroute
Location 42-1-C-1 and SC-1 , West of County Road C, South of WI-13
Location 43-1-C-1, East of Ryefield Road, South of WI-13
Location 44-1-C-1, 45-2-C, SC-2, SC-3 and S C-4 West of Marita Road, South of WI-13
Town of Ashland, Ashland County, Wisconsin

Dear Mr. McDonald:

We are pleased to present this Subsurface Investigation Report for the Line 5 Reroute Project at the MP 19 HDD Crossing under Silver Creek in the Town of Ashland, Ashland County, Wisconsin.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact David Morrison (dmorrison@braunintertec.com) at 218.624.4967.

Sincerely,

BRAUN INTERTEC CORPORATION



David E. Morrison
Project Consultant



Joseph C. Butler, PE
Business Unit Manager / Senior Engineer

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Appendix

Soil Boring Location Sketches: (8 pages)

Log of Boring Sheets: 42-1-C-1, 43-1-C-1, 44-1-C-1, 45-2-C, SC-1 through SC-4

Photo Log of Cores: SC-2 (7 pages), SC-3 (5 pages), SC-4 (4 pages), 43-1-C-1 (4 pages)

HDD Alignment Profile

Descriptive Terminology of Soil

Descriptive Terminology of Rock

Geotechnical Testing Reports: 310567, 320970, 8441998, 8493787,

Sieve Analysis Test Reports: 310584 through 310591, 318263 through 318266, 318269, 318270, 318272, 318749, 318751 through 318754, 318756, 318758, 318760, 318762, 8441999, 8442001, 8442005, 8442007, 8442009, 8442012, 8494022.

Moisture Content Test Reports: 318263 through 318266, 318269, 318270, 318272, 318749, 318751 through 318754, 318756, 318758, 318760, 318762

Hydrometer with Sieve Analysis Test Reports: 310573, 320992, 320971, 320973, 8442014, 84402016, 8442017, 8494031,

Compressive Strength of Cores Test Reports: 43-1-C-1 (2 pages), SC-2 (2 pages), SC-3 (2 pages), and SC-4 (1 page)

A. Introduction

A.1. Project Description

Enbridge Energy plans to relocate Line 5 around the Bad River Indian Reservation, as part of that project, a geotechnical investigation and evaluation is being completed. We are providing subsurface investigation as part of this effort. This report addresses the HDD crossing under Silver Creek which is located at MP 19 in the proposed pipeline alignment in Ashland Town, Ashland County, Wisconsin.

We performed borings 42-1-C-1, 43-1-C-1, 44-1-C-1, and 45-2-C for the HDD Crossing under Silver Creek in the summer of 2020. Subsequently, a Subsurface Investigation Report for project B2001991, dated October 12, 2020, was provided. Additional geotechnical data has been requested for the crossing. We performed borings SC-1 through SC-4 in the summer of 2021. This report provides the factual data obtained in the initial investigation in 2020 (borings 42-1-C-1, 43-1-C-1, 44-1-C-1, and 45-2-C) as well as the additional borings in 2021 (SC-1 through SC-4).

Three of the borings performed in 2021 were performed approximately 10 feet from the borings performed in 2020. Borings SC-1, SC-2 and SC-3 were performed at boring locations 42-1-C-1, 44-1-C-1, and 45-2-C, respectively.

A.2. Purpose

The purpose of our subsurface investigation is to characterize subsurface geologic conditions at the selected exploration location.

A.3. Background Information and Reference Documents

We reviewed the following information:

- Wisconsin Geologic Map, "Soils of Wisconsin", prepared by F. D. Hole, M.T Beatty, C.J. Milfred, G.B. Lee, and A.J Klingelhoets, dated 1968.
- "Bedrock Geologic Map of Wisconsin", prepared by M.G. Mudrey, Jr., B.A. Brown, and J.K. Greenberg, dated 1982.

- “Rock Mechanics Properties of Typical Foundation Rock Types”, prepared by J.R. Brandon, dated July 1974.
- “Geological Summary of the Ashland 2-Degree Quadrangle” prepared by M.G. Mudrey, Jr. dated January 2, 1979.
- Aerial photos from Google Earth Pro®.

A.4. Scope of Services

We performed our scope of services for the 2020 portion of this project in accordance with our quote to Mr. Jonathan Underland of Enbridge Energy, under the terms of the Work Order (132013839) provided by Enbridge Energy.

The additional scope of services (2021 portion) for the project was performed in accordance with our proposal QTB132915 to Mr. Scott McDonald of Lake Superior Consulting dated, May 28, 2021 and authorized under the Subcontractor Agreement 00919600782 between Lake Superior Consulting and Braun Intertec, dated June 17, 2021. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Lake Superior Consulting selected and staked the boring locations, and we cleared the exploration location of underground utilities. The Soil Boring Location Sketch included in the Appendix shows the approximate location of the boring.
- Performing four (4) standard penetration test (SPT) boring/corings in 2020 denoted as 42-1-C-1, 43-1-C-1, 44-1-C-1, 45-2-C.
- Performing four (4) additional standard penetration test (SPT) boring/corings in 2021 denoted SC-1, SC-2, SC-3 and SC-4.
- Performing laboratory testing on select samples as selected by Lake Superior Consulting.

- Preparing this factual report containing a boring location sketch, exploration log, photo log of cores, laboratory tests, a summary of the geologic materials encountered and Estimated Soil Properties of the significant strata.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

B. Results

B.1. Geologic Overview

Soil borings encountered soil to depths ranging from 46 to 97.5 feet below the ground surface. The soils consisted of (proceeding down from the ground surface) 1 to 2 1/2 feet of silty sand topsoil or fill, underlain by alternating layers of lacustrine (lake deposited) and glacial deposits. Below the glacial deposits, the borings encountered bedrock consisting of conglomerate associated with the Freda Sandstone formation, occasional sandstone, siltstone and claystone layers were at depths ranging from approximately 112 to 165 feet.

Subsurface bedrock geology at the investigation area is within the Oronto Group, a group of sandstone and shale in Northern Wisconsin. The group is composed of conglomerate, sandstone and shale typically, red with bands, streaks and spots of greenish-white, no more than a few inches thick. The group is divided into the Copper Harbor Conglomerate, Freda Sandstone and Nonesuch Shale formations.

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Geologic Materials

B.2.a. Soil Encountered

The general geologic profile of the soils encountered in the 2021 investigation were consistent with the soils encountered in the 2020 investigation and consisted of (proceeding down from the ground surface)

1 to 2 1/2 feet of silty sand topsoil or fill, underlain by alternating layers of lacustrine (lake deposited) and glacial deposits. The soils contained in the layers consisted of silty sands, poorly graded sands, Sandy lean clay and silts to either refusal or the termination depth of each boring, the encountered soils contained variable amounts of gravel. Table 1 in section B.3 contains more information on each material encountered.

B.2.b. Sampler Refusal

B.2.b.1. 2020 Investigation

In borings 42-1-C-1, 43-1-C-1 and 45-2-C our augers were able to be advanced in the Freda Sandstone however, due to the very dense soils, containing cobbles and boulders, the sampler encountered refusal during sampling and no sample was able to be collected.

Our field crew discussed the refusal with onsite Lake Superior Consulting (LSC) personnel. It was decided to monitor the bit pressure as the drill tooling was advanced. In order to obtain samples, it was intended that after a period of monitoring bit pressure and rate of advancement, rock coring would be conducted. However, there was a misinterpretation of this intent in the field and no rock coring was performed. Based on the consistent rate of advancement and bit pressures, it is our option the rock was consistent with the rock that was cored in adjacent holes.

B.2.b.2. 2021 Investigation

In borings SC-2, SC-3 and SC-4 our augers encountered refusal at depths ranging from 46 to 105 feet below the ground surface. "Refusal" means that the auger could not be advanced further without excessive effort. Refusal can be caused by hardpan, boulders, detached rock pieces ("floats") as well as bedrock. Based on our cores, the refusal occurred on bedrock. Based on coring activities, the refusal occurred on bedrock consisting of conglomerate, sandstone, siltstone and claystone associated with the Freda Sandstone formation.

B.2.c. Bedrock

Below the glacial deposits, the borings encountered bedrock extending from an approximate elevation ranging between of 1016 to 966 feet. The bedrock generally slopes downward from 1016 on the north side of Silver Creek to an elevation near 986 feet at the creek bottom before sloping upward to approximately 1010 1/2 feet on the south side of the creek.

B.2.c.1. 2020 Investigation

The observed bedrock consisted of reddish brown with gray conglomerate associated with the Freda Sandstone, occasional sandstone layers were observed in boring 43-C-1 at depths ranging from approximately 124 to 144 feet. The bedrock was generally classified as “moderately fractured” to “intensely fractured”. The rock was deemed as “very soft” to “moderately hard” in terms of the rock hardness scale and ranged from “highly weathered” to “decomposed”.

B.2.c.2. 2021 Investigation

The observed bedrock consisted of a reddish brown with gray conglomerate associated with the Freda Sandstone formation, occasional sandstone, siltstone and claystone layers were at depths ranging from approximately 112 to 165 feet. The sandstone, siltstone and claystone were generally classified as “soft” to “moderately hard”. The conglomerate consisted of a Volcanic Clast within a matrix of sand, gravels and clays. The Clast sample size did not exceed 6 inches in length and generally was on the order of 2 to 4 inches in length. It should be noted that the sample may have been cored on the edge of a much larger aggregate, resulting in a smaller observed aggregate size than is actually present.

The Clast was deemed as “soft” to “very hard” in terms of the rock hardness scale. The matrix was deemed as “very soft” to “moderately hard”.

C. Estimated Soil Properties

Estimated soil properties for each significant strata change are presented below in Table 1.

Table 1: Estimated Soil Properties

Soil Strata and Elevations (ft)	Soil Type	Blow Count per foot Range (BPF)	Dry Unit Weight Range (pcf)	Undrained Unit Weight Range (pcf)	Drained Friction Angle Range (degrees)	Undrained Friction Angle Range (degrees)	Undrained Cohesion Range (ksf)	Drained Cohesion Range (ksf)	Modulus of Elasticity Range* (tsf)
Upper Soils (1105 1/2 to 1054 1/2)	Silty Sand (SM)	12 - 48	114 - 127	117 - 130	30 - 37	15 - 25	1.0 – 2.5	0.9 - 4.1+	69 - 336
	Poorly Graded Sand (SP)	14 - 52	101 - 125	117 - 127	33 - 40	33 - 36	0	0	98 - 374
	Poorly Graded Sand with Silt (SP-SM)	3 - 25	82 - 115	100 - 122	28 - 38	29 - 35	0	0	21 - 180
Middle Soils (1053 to 1010)	Silty, Clayey Sand (SC-SM)	10 - 53	105 - 115	117 - 130	30 - 37	15 - 25	1.0 – 2.5	0.9 – 4.1+	40 - 229
	Poorly Graded Sand with Silt (SP-SM)	20 – 50 blows per 2 inches of penetration	100 - 111	118 - 127	35 - 40	34 - 36	0	0	140 - 504
	Silty Sand (SM)	10 - 87 blows per 11 inches of penetration	98 - 109	117 - 130	30 - 37	15 - 25	1.0 – 2.5	0.9 - 4.1+	58 - 609
	Silty, Clayey Sand (SC-SM)	19 - 30	107 - 115	120 - 125	32 - 34	25	1.5 – 2.0	2.0 – 4.0	76 - 130
	Sandy Silt (ML)	9 - 18	93 - 108	112 - 120	28 - 30	29 - 30	0	0	36 - 78
	Lean Clay (CL)	50 blows per 5 inches	119 - 121	133 - 135	33 - 35	10	10	6.1+	240 - 346

Soil Strata and Elevations (ft)	Soil Type	Blow Count per foot Range (BPF)	Dry Unit Weight Range (pcf)	Undrained Unit Weight Range (pcf)	Drained Friction Angle Range (degrees)	Undrained Friction Angle (degrees)	Undrained Cohesion Range (ksf)	Drained Cohesion Range (ksf)	Modulus of Elasticity Range* (tsf)
		of penetration							
Lower Soils (1016 - 868)	Poorly Graded Sand with Silt (SP-SM)	35 - 50 blows per 2 inches of penetration	105 - 113	120 - 127	36 - 40	35 - 36	0	0	245 - 504
	Sandy Silt (ML)	92 - 50 blows per 4 inches of penetration	113 - 114	125 - 127	34 - 36	35	0	0	368 - 397
	Silty Sand (SM)	100 blows per 11 inches of penetration - 50 blows per 2 inches of penetration	111 - 115	125 - 130	35 - 37	25	2.5	4.1+	576 - 700
	Silty, Clayey Sand (SC-SM)	50 blows per 5 inches of penetration - 50 blows per 1 inches of penetration	105 - 125	125 - 130	35 - 37	25	2.5	4.1+	240 - 259
	Lean Clay (CL)	50 blows per 5 inches of penetration - 50 blows per 2 inches of penetration	115 - 123	133 - 135	33 - 35	10	10	6.1+	240 - 346

Soil Strata and Elevations (ft)	Soil Type	Blow Count per foot Range (BPF)	Dry Unit Weight Range (pcf)	Undrained Unit Weight Range (pcf)	Drained Friction Angle Range (degrees)	Undrained Friction Angle (degrees)	Undrained Cohesion Range (ksf)	Drained Cohesion Range (ksf)	Modulus of Elasticity Range* (tsf)
	Clayey Sand (SC)	50 blows per 3 inches of penetration - 100 blows per 1 inches of penetration	107 - 111	125 - 130	35 - 37	25	2.5	4.1+	240 - 346
Bedrock (679 1/2 to 651)	Sandstone	N/A	120 - 130	130 - 135	42 - 45	43	0	0	93,600 - 100,800

*Sustained Young's Modulus values

C.1. Groundwater

C.1.a. 2020 Investigation

We encountered groundwater at a depth of 12 feet below the ground surface in boring 43-1-C-1 while advancing the borings. The use of mud rotary drilling techniques prevents the observation of possible groundwater, while the borings were advanced. Groundwater is likely in the other boreholes.

C.1.b. 2021 Investigation

Hollow stem auger drilling techniques were generally terminated at depths ranging from 20 to 30 feet below the ground surface. Mud rotary drilling techniques were then utilized to the termination depth of the boring or refusal. The use of mud rotary drilling techniques prevents the observation of possible groundwater, while the borings were advanced.

Project planning should anticipate seasonal and annual fluctuations of groundwater. Mud-rotary drilling techniques were used to advance the borings, hindering the ability to observe groundwater.

C.2. Laboratory Test Results

We performed laboratory testing as selected by Lake Superior Consulting on soil and rock samples collected during the investigation. The boring logs show the results of the hydrometer with sieve

analysis, sieve analysis moisture testing, Atterberg limits, and unconfined compressive strength of soil that was requested. The Appendix contains the results of these tests.

Twelve (12) Unconfined Compressive Strength Tests (ASTM D422) were requested to be performed on rock coring samples from the 2021 investigation. Of those samples, five (5) samples were untestable and retesting was attempted. Ultimately 1 sample from SC-2 and 2 samples from SC-3 were untestable, as outlined in Table 2 below and the attached test results in the Appendix:

Table 2: Unconfined Compression Strength of Rock Test Summary:

Boring Number	Samples Requested	Samples Retested	Samples Reported
SC-1	0	0	0
SC-2	6	0	1
SC-3	5	5	3
SC-4	1	1	1

The Freda Sandstone Conglomerate, where Unconfined Compressive Strength testing (UCS testing) was selected and was untestable, consisted of hard volcanic clasts in a soft sand and gravel matrix. The soft sand and gravel matrix deteriorated during sample preparation for testing or did not have sufficient strength to allow for testing. Resulting in the samples being untestable.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with a floatation tire-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance to ASTM D1586. We collected thin-walled tube samples in general accordance with ASTM D1587 at selected depths. The boring logs show the actual sample intervals and corresponding depths.

D.2. Rock Cores

We performed rock cores with an NQ-3 core barrel. First, we lowered the bit and 4-inch casing to the bottom of the previously advanced borehole. Then we lowered the core barrel into the casing with a wire line, and locked into place. We advanced the bit and barrel by rotating the assembly while applying crowd pressure. We used bentonite-drilling mud to cool the bit and wash cuttings to the surface. Our drillers noted bit pressure, rate of advance, fluid pressure and fluid return as coring progressed. They also noted intervals with a rapid rate of advance, a sudden loss of fluid pressure or return and intervals with a loss of bit pressure.

Where core-hole stability was an issue, a 3-inch temporary steel casing was installed through the 4-inch casing and past the unstable portion of bedrock.

After completing each 5-foot core run, the drillers unlocked the core barrel from the bit and brought the barrel to the surface. They then extruded the split inner tube from the barrel and opened the tube to reveal the core sample. After field classification and logging, the drillers packed the core into a cardboard storage box, arranged into 2-foot long sections.

D.3. Exploration Logs

D.3.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements. The Appendix also includes a Fence Diagram intended to provide a summarized cross-sectional view of the soil profile across the site.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.3.b. Logs of Coring

Log of Coring sheets follow the logs of the penetration test borings through which we performed rock coring. The logs identify and describe rock lithology, weathering, hardness, bedding and fracture

characteristics, and other features. The logs also report the bit pressure, rate of advance, and water pressure and return (if applicable) recorded during the coring process. The percent recovery and rock quality designation (RQD) for each 5-foot core run is also shown.

We inferred strata boundaries from changes in lithology along the length of the core sample. Due to natural and mechanical fractures, destruction of the rock fabric during coring, and limited recovery, it is difficult to place the core sample in the geologic profile; the strata boundary depths in the rock are also approximate, and likely vary from the core locations.

D.3.c. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.4. Material Classification and Testing

D.4.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.4.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM or AASHTO procedures.

D.5. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

M:\Active\2019\19-08-029 (GTF) Enbridge - L5 Relocation Project\Drafting\Geo-tech Sweeps\Geo-Tech Sweep Maps 100.dwg 3/9/2020 7:40:43 AM



UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
ENGINEERING**
220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
www.hollandengineering.com

10 5 0 5 10 20
SCALE IN FEET

NOTES:
ALL LOCATING IS APPROXIMATE.
ALL DEPTHS MARKERS IN FIELD OR ON MAP ARE APPROXIMATE AND FOR DAY LIGHTING PURPOSES ONLY.
HEI ACCEPTS NO RESPONSIBILITY FOR ANY GROUND DISTURBANCE AT OR NEAR SHOWN FACILITY.
ALL FACILITIES WITHIN 5M OF GROUND DISTURBANCE MUST BE DAY LIGHTED.
THIS DRAWING IS FOR REFERENCE FOR THIS PROJECT ONLY.
ANY CHANGES IN THE SCOPE OF WORK WILL REQUIRE MORE LOCATING.
SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 02-27-2020
SWEEP CREW No.2 - DATE: 02-27-2020

LEGEND

— L5R —	PROPOSED L5R
— SWEEP LIMITS —	SWEEP LIMITS
— FO —	FIBER OPTIC
— P —	POWER LINE
— SWR —	SEWER LINE
— TC —	TELEPHONE LINE
— UNK —	UNKNOWN UTILITY
— WTR —	WATER LINE
— OIL —	PETROLEUM LINE
— EC —	UNDERGROUND ELECTRICAL
— X —	FENCE LINE
— . . . —	DRAIN LINE

APWA UNIFORM COLOR CODE

RED	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPD
0	ISSUED TO CLIENT	DRF	03/09/2020	JD	KEO

**PROPOSED
SOIL BORE 42-1-C-1
L5R PIPELINE - ROUTE 100
MILEPOST 18.63
TRACT WI-AS-173.000
ASHLAND COUNTY, WI**

DRAWING NUMBER	SHEET
L5R-GTSM-42-1-C-1	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

ACCESS ROAD NOTE:

ACCESS TO SITE IS FROM A DRIVEWAY ENTRANCE TO THE SOUTH OFF OF STATE HIGHWAY C AND THERE IS 1 OVERHEAD POWER CROSSING ALONG THE ACCESS ROAD.

CROSSING IS LOCATED 33 FEET WEST ALONG THE ACCESS ROAD FROM THE INTERSECTION OF ACCESS ROAD AND CENTERLINE OF STATE HIGHWAY C AND IS DISTRIBUTION (3 WIRES - 20 FEET ABOVE GRADE).

M:\Active\2019\19-08-029 (GTF) Enbridge - L5 Relocation Project\Drafting\Geo-tech Sweeps\Maps 100.dwg 3/16/2020 11:45:55 AM



UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
ENGINEERING**
220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
www.hollandengineering.com



NOTES:

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THIS DRAWING IS FOR REFERENCE FOR THIS PROJECT ONLY.

ANY CHANGES IN THE SCOPE OF WORK WILL REQUIRE MORE LOCATING.

SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 03-13-2020
SWEEP CREW No.2 - DATE 03-13-2020

LEGEND	
	PROPOSED L5R
	SWEEP LIMITS
	FIBER OPTIC
	POWER LINE
	SEWER LINE
	TELEPHONE LINE
	UNKNOWN UTILITY
	WATER LINE
	PETROLEUM LINE
	UNDERGROUND ELECTRICAL
	EXISTING PIPELINE
	FENCE LINE
	DRAIN LINE

APWA UNIFORM COLOR CODE	
	ELETRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
	GAS, OIL, STEAM, PETROLIUM OR GASEOUS MATERIALS
	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
	POTABLE WATER
	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPTD
0	ISSUED TO CLIENT	DRF	03/16/2020	JD	KEO

PROPOSED
SOIL BORE 43-1-C-1
L5R PIPELINE - ROUTE 100
MILEPOST 18.99
TRACT WI-AS-175.001
ASHLAND COUNTY, WI

ACCESS ROAD NOTE:

ACCESS TO SITE IS FROM A TRAIL ENTRANCE TO THE NORTH & WEST OFF OF RYEFIELD ROAD AND THERE ARE NO OVERHEAD POWER CROSSINGS ALONG THE ACCESS ROAD.

DRAWING NUMBER	SHEET
L5R-GTSM-43-1-C-1	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

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UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
ENGINEERING**
220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
www.hollandengineering.com



NOTES:
ALL LOCATING IS APPROXIMATE.
ALL DEPTHS MARKERS IN FIELD OR ON MAP ARE APPROXIMATE AND FOR DAY LIGHTING PURPOSES ONLY. HEI ACCEPTS NO RESPONSIBILITY FOR ANY GROUND DISTURBANCE AT OR NEAR SHOWN FACILITY.
ALL FACILITIES WITHIN 5M OF GROUND DISTURBANCE MUST BE DAY LIGHTED.
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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 03-17-2020
SWEEP CREW No.2 - DATE 03-24-2020

LEGEND	
	PROPOSED L5R
	SWEEP LIMITS
	FIBER OPTIC
	POWER LINE
	SEWER LINE
	TELEPHONE LINE
	UNKNOWN UTILITY
	WATER LINE
	PETROLEUM LINE
	UNDERGROUND ELECTRICAL
	EXISTING PIPELINE
	FENCE LINE
	DRAIN LINE

APWA UNIFORM COLOR CODE	
RED	ELETRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLIUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPTD
0	ISSUED TO CLIENT	DRF	03/25/2020	JD	KEO

**PROPOSED
SOIL BORE 44-1-C-1
L5R PIPELINE - ROUTE 100
MILEPOST 19.23
TRACT WI-AS-177.001
ASHLAND COUNTY, WI**

DRAWING NUMBER	SHEET
L5R-GTSM-44-1-C-1	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

ACCESS ROAD NOTE:

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UTILITY SWEEP MAP

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LIMITED PARTNERSHIP**

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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 03-17-2020
SWEEP CREW No.2 - DATE 03-24-2020

LEGEND	
	PROPOSED L5R
	SWEEP LIMITS
	FIBER OPTIC
	POWER LINE
	SEWER LINE
	TELEPHONE LINE
	UNKNOWN UTILITY
	WATER LINE
	PETROLEUM LINE
	UNDERGROUND ELECTRICAL
	EXISTING PIPELINE
	FENCE LINE
	DRAIN LINE

APWA UNIFORM COLOR CODE	
RED	ELETRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLIUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPTD
0	ISSUED TO CLIENT	DRF	03/25/2020	JD	KEO



**PROPOSED
SOIL BORE 45-2-C
L5R PIPELINE - ROUTE 100
MILEPOST 19.33
TRACT WI-AS-179.001
ASHLAND COUNTY, WI**

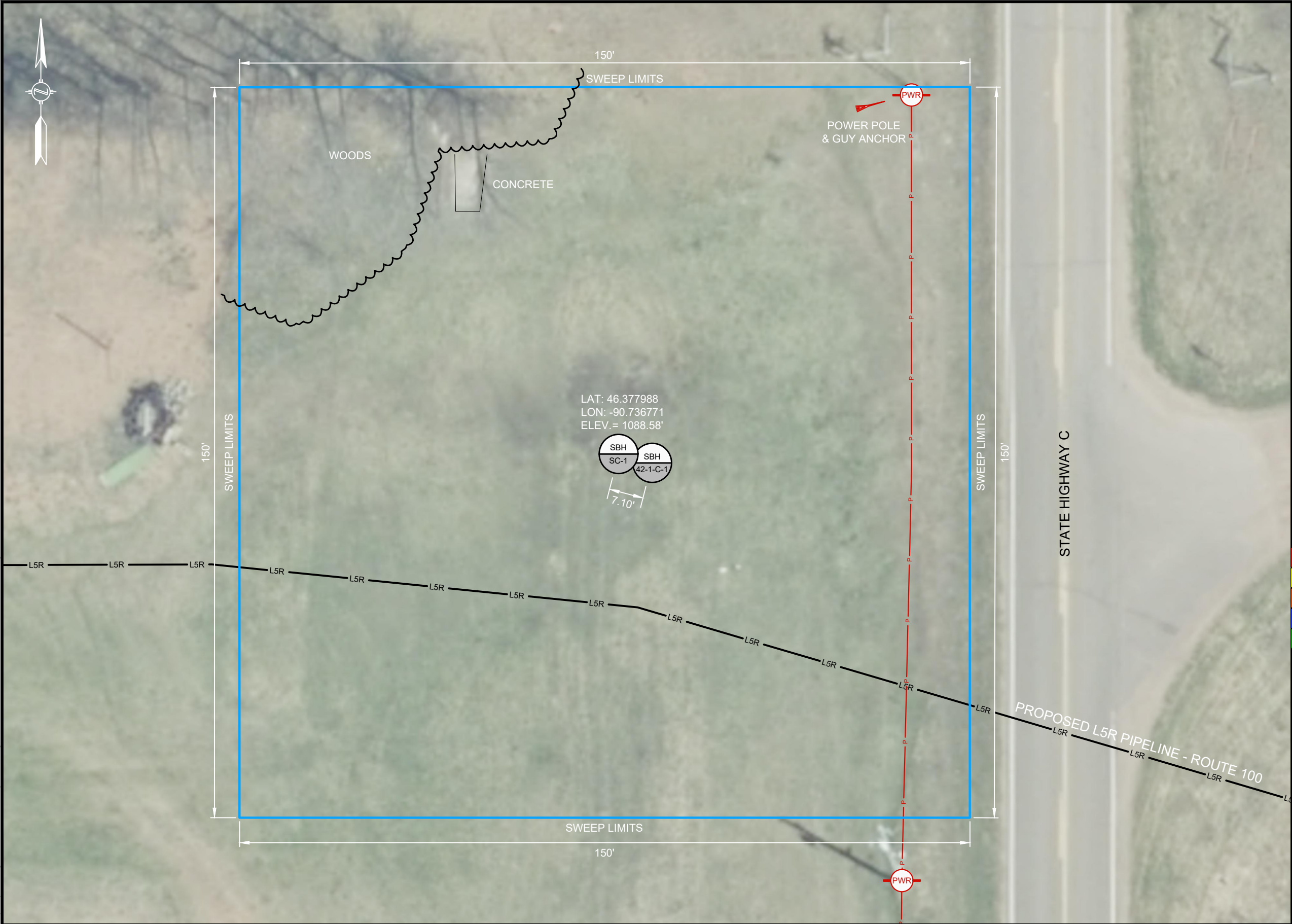
DRAWING NUMBER	SHEET
L5R-GTSM-45-2-C	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

ACCESS ROAD NOTE:

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UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
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www.hollandengineering.com

10 5 0 5 10 20
SCALE IN FEET

NOTES:
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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 05-26-2021
SWEEP CREW No.2 - DATE: 05-26-2021

LEGEND

— L5R —	PROPOSED L5R
— SWEEP LIMITS —	SWEEP LIMITS
— FO —	FIBER OPTIC
— P —	POWER LINE
— SWR —	SEWER LINE
— TC —	TELEPHONE LINE
— UNK —	UNKNOWN UTILITY
— WTR —	WATER LINE
— OIL —	PETROLEUM LINE
— EC —	UNDERGROUND ELECTRICAL
— X —	FENCE LINE
— . . . —	DRAIN LINE

APWA UNIFORM COLOR CODE

RED	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APTD
0	ISSUED TO CLIENT	DRF	05/28/2021	NJG	KEO
1	RE-ISSUED MOVED SC-1 TO ITS FINAL LOCATION	DRF	07/14/2021	NJG	KEO

**PROPOSED
SOIL BORE SC-1
L5R PIPELINE - ROUTE 100
MILEPOST 18.63
TRACT WI-AS-173.000
ASHLAND COUNTY, WI**

DRAWING NUMBER	SHEET
L5R-GTSM-SC-1	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

ACCESS ROAD NOTE:
ACCESS TO SITE IS FROM A DRIVEWAY ENTRANCE TO THE SOUTH OFF OF STATE HIGHWAY C AND THERE IS 1 OVERHEAD POWER CROSSING ALONG THE ACCESS ROAD.
CROSSING IS LOCATED 33 FEET WEST ALONG THE ACCESS ROAD FROM THE INTERSECTION OF ACCESS ROAD AND CENTERLINE OF STATE HIGHWAY C AND IS DISTRIBUTION (3 WIRES - 20 FEET ABOVE GRADE).

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UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
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220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
www.hollandengineering.com



NOTES:
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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 05-26-2021
SWEEP CREW No.2 - DATE: 05-28-2021

LEGEND

L5R	PROPOSED L5R
SWEEP LIMITS	SWEEP LIMITS
FO	FIBER OPTIC
P	POWER LINE
SWR	SEWER LINE
TC	TELEPHONE LINE
UNK	UNKNOWN UTILITY
WTR	WATER LINE
OIL	PETROLEUM LINE
EC	UNDERGROUND ELECTRICAL
X	EXISTING PIPELINE
FENCE LINE	FENCE LINE
DRAIN LINE	DRAIN LINE

APWA UNIFORM COLOR CODE

RED	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPD
0	ISSUED TO CLIENT	DRF	05/28/2020	NJG	KEO
1	RE-ISSUED MOVED SC-2 TO ITS FINAL LOCATION	DRF	07/14/2021	NJG	KEO

**PROPOSED
SOIL BORE SC-2
L5R PIPELINE - ROUTE 100
MILEPOST 19.23
TRACT WI-AS-177.001
ASHLAND COUNTY, WI**

DRAWING NUMBER

L5R-GTSM-SC-2

SHEET

1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

ACCESS ROAD NOTE:

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SURVEYOR'S NOTE:

LOCATION OF OLD SOIL BORE 44-1-C-1 IS APPROXIMATE, SOIL BORE WAS MOVED 2 FEET FROM THE STAKED LOCATION & SURVEY WAS NOT NOTIFIED OF THE NEW LOCATION, SOIL BORE IS STAKED WHERE GROUND WAS DISTURBED.

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UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
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220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
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NOTES:
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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 05-26-2021
SWEEP CREW No.2 - DATE: 05-28-2021

LEGEND

	PROPOSED L5R
	SWEEP LIMITS
	FIBER OPTIC
	POWER LINE
	SEWER LINE
	TELEPHONE LINE
	UNKNOWN UTILITY
	WATER LINE
	PETROLEUM LINE
	UNDERGROUND ELECTRICAL
	EXISTING PIPELINE
	FENCE LINE
	DRAIN LINE

APWA UNIFORM COLOR CODE

RED	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPT'D
0	ISSUED TO CLIENT	DRF	05/28/2021	NJG	KEO
1	RE-ISSUED MOVED SC-3 TO ITS FINAL LOCATION	DRF	07/21/2021	NJG	KEO

**PROPOSED
SOIL BORE SC-3
L5R PIPELINE - ROUTE 100
MILEPOST 19.33
TRACT WI-AS-179.001
ASHLAND COUNTY, WI**

DRAWING NUMBER

SHEET

L5R-GTSM-SC-3

1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

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ACCESS ROAD NOTE:
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UTILITY SWEEP MAP

PREPARED FOR:
**ENBRIDGE ENERGY,
LIMITED PARTNERSHIP**

PREPARED BY:
**HOLLAND
ENGINEERING**
220 Hoover Boulevard
Holland, Michigan 49423-3766
T 616-392-5938 F 616-392-2116
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105020

SCALE IN FEET

NOTES:
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SWEEP INFORMATION OBTAINED BY HOLLAND ENGINEERING, INC.
SWEEP CREW No.1 - DATE: 05-26-2021
SWEEP CREW No.2 - DATE: 05-28-2021

LEGEND

	PROPOSED L5R
	SWEEP LIMITS
	FIBER OPTIC
	POWER LINE
	SEWER LINE
	TELEPHONE LINE
	UNKNOWN UTILITY
	WATER LINE
	PETROLEUM LINE
	UNDERGROUND ELECTRICAL
	EXISTING PIPELINE
	FENCE LINE
	DRAIN LINE

APWA UNIFORM COLOR CODE

RED	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTNING CABLES
YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
BLUE	POTABLE WATER
GREEN	SEWERS AND DRAIN LINES

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APPD
0	ISSUED TO CLIENT	DRF	05/28/2021	NJG	KEO
1	RE-ISSUED MOVED SC-4 TO ITS FINAL LOCATION	DRF	07/21/2021	NJG	KEO

**PROPOSED
SOIL BORE SC-4
L5R PIPELINE - ROUTE 100
MILEPOST 19.44
TRACT WI-AS-179.001
ASHLAND COUNTY, WI**

DRAWING NUMBER	SHEET
L5R-GTSM-SC-4	1 of 1

PROPRIETARY AND CONFIDENTIAL-CRITICAL ENERGY INFRASTRUCTURE INFORMATION, NOT SUBJECT TO PUBLIC DISCLOSURE PURSUANT TO 18 CFR Part 388 AND/OR SUBJECT TO CONTRACTUAL CONFIDENTIALITY REQUIREMENT

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1086.0		SILTY SAND (SM), with roots, grass, brown, moist (TOPSOIL)					
2.0		SILTY SAND (SM), fine to medium-grained, with Gravel, trace roots, brown, moist (GLACIAL TILL)		3-6-6 (12) 14"			
			5	2-6-6 (12) 13"			
1081.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist, loose to medium dense (GLACIAL OUTWASH)		2-3-5 (8) 14"			
6.5			10	2-3-3 (6) 12"		6	Test results are in the attached lab report
				1-4-4 (8) 14"			
			15	1-3-4 (7) 14"			
			20	2-4-6 (10) 14"			
			25	7-8-9 (17) 14"		18	Test results are in the attached lab report
			30	10-11-14 (25) 13"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1053.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist, loose to medium dense (GLACIAL OUTWASH)		8-9-13 (22) 14"		11	Test results are in the attached lab report
35.0		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, with Gravel, brown, wet, medium dense to very dense (GLACIAL OUTWASH)	35				
			40	12-12-13 (25) 13"			
			45	42-50/2" (REF) 2"		Rock fragments	
			50	22-22-16 (38) 0"			No recovery
1033.0		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, stiff (GLACIAL TILL)	55	4-4-6 (10) 14"			
55.0			60	TW 12"		19	Thinwall Test results are in the attached lab report
1025.0		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)					
63.0							

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	65	18-24-27 (51) 15"			Test results are in the attached lab report
			70	20-26-25 (51) 15"			
1016.0		SILT (ML), with Cobbles, and Boulders, brown, moist, very dense, (POORLY DEVELOPED FREDASANDSTONE, CONGLOMERATE)	75	36-44-50/4" (REF) 12"		11	
72.0			80	36-44-48 (92) 15"			
			85	42-50/4" (REF) 10"			
			90	49-50/5" (REF) 9"			Test results are in the attached lab report
			95	44-50/4" (REF) 10"		11	
993.0		SILTY SAND with GRAVEL (SM), fine to medium-grained, with Cobbles, and Boulders, brown, moist, very dense, (FREDASANDSTONE, CONGLOMERATE)					
95.0							

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY SAND with GRAVEL (SM), fine to medium-grained, with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					
			100	30-50-50/5" (REF) 14"			
			105	50/3" (REF) 3"			
			110	50/2" (REF) 2"			
			115	49-50/3" (REF) 9"			
970.0							
118.0		SANDY LEAN CLAY with GRAVEL (CL), with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					
			120	46-50/4" (REF) 8"		10	Test results are in the attached lab report
			125	28-50/3" (REF) 10"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:	WEATHER: 40°, overcast	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SANDY LEAN CLAY with GRAVEL (CL), with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)	130	X 26-50/4" (REF) 10"			Test results are in the attached lab report
	135		X 36-50/4" (REF) 4"				
	140		= 50/2" (REF) 7"				
	145		X 30-50/2" (REF) 7"				
	150		X 50/5" (REF) 5"				
	155		= 50/2" (REF) 2"				
			X 50-50/1"				

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SANDY LEAN CLAY with GRAVEL (CL), with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)		(REF) 7"			
			165	50/5" (REF) 5"			
			170	50/2" (REF) 2"			
			175	50/2" (REF) 2"			
			180	50/3" (REF) 3"			
905.0							
183.0		CLAYEY SAND with GRAVEL (SC), fine to medium-grained, with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)	185	50/3" (REF) 3"		17	Test results are in the attached lab report
			190	50/2" (REF) 2"			

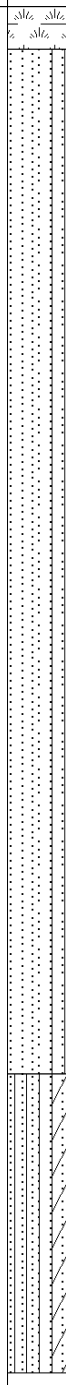
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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 42-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37798	LONGITUDE: -90.73674
DRILLER: M. Swenson		LOGGED BY: S. Sullivan		START DATE: 03/31/20	END DATE: 04/09/20	
SURFACE ELEVATION: 1088.0 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 40°, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		CLAYEY SAND with GRAVEL (SC), fine to medium-grained, with Cobbles, and Boulders, brown, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					
			195	50/2" (REF) 0"			No recovery
			200	100/1" (REF) 1"			
			205	100/1" (REF) 1"			
			210	100/1" (REF) 1"			
			215	100/1" (REF) 1"			
869.0 219.0		END OF BORING Boring then backfilled with cement/bentonite grout	220	100/1" (REF) 1"			Water not observed while drilling.

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 43-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37706	LONGITUDE: -90.73294
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20	END DATE: 06/06/20	
SURFACE ELEVATION: 1075.1 ft	RIG: 8502	METHOD: 4 1/4" HSA		SURFACING:	WEATHER: overcast, rain	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1074.1				2-2-3 (5) 13"			Test results are in the attached lab report
1.0				7-8-12 (20) 20"			
			5	3-4-4 (8) 14"			
				2-5-2 (7) 13"		7	
			10	3-5-4 (9) 15"			
				2-2-1 (3) 14"			
			15	1-2-2 (4) 20"		22	Test results are in the attached lab report
			20				No samples taken from 20-30 feet
1050.1			25				
25.0		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, trace Gravel, brown, wet, loose (LACUSTRINE)					
			30	2-2-8 (10) 6"			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 43-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37706	LONGITUDE: -90.73294
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20	END DATE: 06/06/20	
SURFACE ELEVATION: 1075.1 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, rain

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1042.6 32.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, trace Gravel, brown, wet, loose (LACUSTRINE) POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, moist, medium dense (GLACIAL TILL)	35	8-10-10 (20) 14"		14	Test results are in the attached lab report
			40	10-10-15 (25) 8"			
			45	8-9-12 (21) 10"		18	
1027.6 47.5		SILTY, CLAYEY SAND with GRAVEL (SC-SM), brown, moist, very stiff to hard (GLACIAL TILL)	50	7-11-16 (27) 18"			
			55	TW 20"		12	Thinwall Test results are in the attached lab report
1012.1 63.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, little Gravel, brown, moist to wet, dense to very dense (GLACIAL TILL)	60	7-10-14 (24) 6"			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 43-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37706	LONGITUDE: -90.73294
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20	END DATE: 06/06/20	
SURFACE ELEVATION: 1075.1 ft	RIG: 8502	METHOD: 4 1/4" HSA		SURFACING:	WEATHER: overcast, rain	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1001.1 74.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, little Gravel, brown, moist to wet, dense to very dense (GLACIAL TILL)	65	8-15-20 (35) 14"		14	Test results are in the attached lab report
			70	19-27-37 (64) 20"			
			75	50/5" (REF) 4"		11	
991.1 84.0		SANDY SILT (ML), with Cobbles, and Boulders, brown, wet, hard to very dense, (FREDA SANDSTONE, CONGLOMERATE)	80	50/4" (REF) 4"		12	Test results are in the attached lab report
			85	50/4" (REF) 4"			
			90	50/3" (REF) 3"			
		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, with rock fragments, with Cobbles and Boulders, brown, wet, very dense, (FREDA SANDSTONE, CONGLOMERATE)	95	50/3" (REF) 3"			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin						BORING: 43-1-C-1			
						LOCATION: See attached sketch			
						LATITUDE: 46.37706	LONGITUDE: -90.73294		
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20		END DATE: 06/06/20			
SURFACE ELEVATION: 1075.1 ft		RIG: 8502		METHOD: 4 1/4" HSA		SURFACING:		WEATHER: overcast, rain	
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks		
967.1 108.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, with rock fragments, with Cobbles and Boulders, brown, wet, very dense, (FREDA SANDSTONE, CONGLOMERATE)	100	50/3" (REF) 3"					
			105	50/2" (REF) 2"					
			110	50/2" (REF) 2"					
			115	50/2" (REF) 2"					
950.5 124.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to coarse-grained, massive, intensely fractured	120	50/2" (REF) 2"			Drilling method switched to rock coring at 124.6 feet		
			125	50/2" (REF) 2"	0	40			
Continued on next page			RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 43-1-C-1					
					LOCATION: See attached sketch					
					LATITUDE: 46.37706		LONGITUDE: -90.73294			
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20		END DATE: 06/06/20				
SURFACE ELEVATION: 1075.1 ft		RIG: 8502		METHOD: 4 1/4" HSA		SURFACING:		WEATHER: overcast, rain		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to coarse-grained, massive, intensely fractured	130	0	35	3	3260	20	100	Run 2 MOHs 2
			135	0	25	4	1860	100	100	Run 3 MOHs 2
				0	25	5	1860	100	100	Run 4 MOHs 2
			140	0	20	6	1860	120	100	Run 5 MOHs 2
930.5										
144.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to medium-grained, thick bedded, highly fractured <i>Test results are in the attached lab report</i>	145	30	80	5	2790	160	100	Run 6 MOHs 2
925.5										
149.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to coarse-grained, thick bedded, intensely fractured	150	0	100	7	3720	150	100	Run 7 MOHs 2
922.5										
152.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to coarse-grained, massive, intensely fractured		0	100	4	3720	150	100	Run 8 MOHs 2
919.5										
155.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to medium-grained, massive, intensely fractured	155	0	60	6	3720	150	100	Run 9 MOHs 2
915.5		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to medium-grained, thick bedded, intensely fractured		0	60	4	3720	300	100	Run 10 MOHs 2
159.6										
Continued on next page										

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin						BORING: 43-1-C-1					
						LOCATION: See attached sketch					
						LATITUDE: 46.37706			LONGITUDE: -90.73294		
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20		END DATE: 06/06/20					
SURFACE ELEVATION: 1075.1 ft		RIG: 8502		METHOD: 4 1/4" HSA		SURFACING:		WEATHER: overcast, rain			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks	
910.5		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, decomposed, very soft, fine-grained to medium-grained, thick bedded, intensely fractured		0	65	6	2790	150	80	Run 11 MOHs 2	
164.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, soft, fine-grained to coarse-grained, medium bedded, highly fractured <i>Test results are in the attached lab report</i>	165	35	100	5	2790	150	80	Run 12 MOHs 2	
905.5		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, soft, fine-grained to medium-grained, thick bedded, highly fractured	170	55	100	4	3720	200	80	Run 13 MOHs 2	
169.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, soft, fine-grained to coarse-grained, massive, highly fractured <i>Test results are in the attached lab report</i>	175	55	100	4	3720	200	80	Run 14 MOHs 3	
900.5		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, moderately hard, fine-grained to coarse-grained, massive, moderately fractured <i>Test results are in the attached lab report</i>	180	80	100	4	3720	180	80	Run 15 MOHs 3	
174.6		<i>Test results are in the attached lab report</i>	185	60	100	4	4180	130	90	Run 16 MOHs 3	
895.5		<i>Test results are in the attached lab report</i>	190							Run 17 MOHs 3	
179.6		Continued on next page									

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 43-1-C-1					
					LOCATION: See attached sketch					
					LATITUDE: 46.37706		LONGITUDE: -90.73294			
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/27/20		END DATE: 06/06/20				
SURFACE ELEVATION: 1075.1 ft		RIG: 8502		METHOD: 4 1/4" HSA		SURFACING:		WEATHER: overcast, rain		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, moderately hard, fine-grained to coarse-grained, massive, moderately fractured		60	100	5	4180	150	90	
		Test results are in the attached lab report	195							Run 18 MOHs 3
				90	100	4	4180	200	90	
			200							Run 19 MOHs 3
				80	100	4	4180	200	90	
870.5										
204.6		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, highly weathered, moderately hard, fine-grained to coarse-grained, massive, highly fractured	205							Run 20 MOHs 3
		Test results are in the attached lab report		85	100	4	4180	200	85	
867.1										
208.0		END OF CORING								Water observed at 12.0 feet while drilling.
		Boring then backfilled with cement/bentonite grout	210							
			215							
			220							

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1		
					LOCATION: See attached sketch		
					LATITUDE: 46.37603	LONGITUDE: -90.72790	
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20		
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny	
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1040.0	2.0	SILTY SAND (SM), fine to medium-grained, with Gravel, roots, brownish black, moist (TOPSOIL)	2-4-3 (7) 10"				
		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, dry, loose (GLACIAL OUTWASH)	3-4-4 (8) 13"				
			5 3-3-5 (8) 9"				
1035.0	7.0	SANDY SILT (ML), with Gravel, brown, moist to wet, loose to medium dense (LACUSTRINE)	4-6-8 (14) 14"			18	Test results are in the attached lab report
			10 5-5-8 (13) 12"				
			6-5-5 (10) 13"				
			15 5-4-5 (9) 13"				
			5-4-5 (9) 10"				
			20 4-5-4 (9) 12"			21	Test results are in the attached lab report
			25 0-9-9 (18) WOH/6" 13"				Drilling method switched to mud rotary at 25 feet
1014.0	28.0	LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)	30				
1010.0	32.0		TW 12"				
Continued on next page							

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37603	LONGITUDE: -90.72790
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20	
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY SAND (SM), fine to coarse-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)					
			35	X		12	Test results are in the attached lab report
			40	X		12	Test results are in the attached lab report
			45	X			
994.0							
48.0		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, with Gravel, brown, moist, very dense (GLACIAL OUTWASH)	50	X		12	Test results are in the attached lab report
987.4							
54.5		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)	55	X		13	Test results are in the attached lab report
986.0							
56.0		FREDA SANDSTONE, CONGLOMERATE FACIES <i>Borehole advanced with mud rotary without sampling to 175 feet</i>	60				Bit Pressure: min/ft 700 psi: 2:16 700 psi: 3:07 700 psi: 2:52 700 psi: 2:40 700 psi: 2:37 700 psi: 2:38 700 psi: 2:06 700 psi: 2:14 700 psi: 2:04

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37603	LONGITUDE: -90.72790
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20	
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		FREDA SANDSTONE, CONGLOMERATE FACIES	65				700 psi: 3:28
							700 psi: 2:20
							700 psi: 1:56
							700 psi: 2:00
							700 psi: 1:52
			70				700 psi: 2:14
							700 psi: 3:33
							700 psi: 2:26
							700 psi: 3:20
							700 psi: 2:40
			75				700 psi: 2:18
							700 psi: 2:14
							700 psi: 2:12
							700 psi: 2:21
							700 psi: 2:13
			80				700 psi: 6:23
							700 psi: 6:01
							700 psi: 2:52
							700 psi: 2:37
							700 psi: 2:47
			85				700 psi: 2:46
							700 psi: 3:20
							700 psi: 2:42
							700 psi: 3:28
							700 psi: 2:40
			90				700 psi: 2:21
							700 psi: 3:40
							700 psi: 2:30
							700 psi: 2:35
							700 psi: 2:50
			95				700 psi: 3:31
							700 psi: 3:29

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37603	LONGITUDE: -90.72790
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20	
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		FREDA SANDSTONE, CONGLOMERATE FACIES					700 psi: 9:11
							700 psi: 4:24
							700 psi: 2:32
							700 psi: 3:08
							700 psi: 2:05
							700 psi: 1:51
							700 psi: 1:35
							700 psi: 1:49
							700 psi: 1:33
							700 psi: 3:30
							500 psi: 2:47
							500 psi: 2:37
							500 psi: 2:36
							500 psi: 2:37
							500 psi: 7:57
							500 psi: 5:11
							500 psi: 5:00
							500 psi: 6:25
							500 psi: 6:02
							500 psi: 5:46
							500 psi: 3:54
							500 psi: 4:10
							500 psi: 4:19
							500 psi: 4:04
							500 psi: 7:32
							500 psi: 5:00
							500 psi: 4:38
							500 psi: 4:35
							500 psi: 4:22
							500 psi: 9:30
							500 psi: 3:34
							700 psi: 4:10

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37603	LONGITUDE: -90.72790
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20	
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		FREDA SANDSTONE, CONGLOMERATE FACIES					700 psi: 2:31
							700 psi: 2:54
							700 psi: 2:22
							700 psi: 2:38
							700 psi: 2:19
							700 psi: 3:00
							700 psi: 3:18
							700 psi: 3:25
							700 psi: 3:12
							700 psi: 3:23
							300 psi: 4:10
							300 psi: 2:10
							300 psi: 2:30
							300 psi: 1:58
							300 psi: 1:35
							700 psi: 2:10
							700 psi: 2:25
							700 psi: 2:30
							700 psi: 2:40
							700 psi: 2:40
							700 psi: 2:54
							700 psi: 2:55
							700 psi: 3:03
							700 psi: 2:25
							700 psi: 2:19
							700 psi: 2:28
							700 psi: 2:10
							700 psi: 2:10
							700 psi: 3:04
							700 psi: 2:48
							700 psi: 2:56
							700 psi: 3:17

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 44-1-C-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37603	LONGITUDE: -90.72790
DRILLER: C. Coffindaffer		LOGGED BY: K. Warmuth		START DATE: 05/07/20	END DATE: 05/14/20	
SURFACE ELEVATION: 1042.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		FREDA SANDSTONE, CONGLOMERATE FACIES					700 psi: 2:41
							700 psi: 2:34
							700 psi: 2:09
							700 psi: 2:36
			165				700 psi: 3:13
							700 psi: 2:58
							700 psi: 2:16
							700 psi: 2:20
			170				700 psi: 2:40
							700 psi: 2:21
							700 psi: 2:41
							700 psi: 2:18
							700 psi: 2:00
							700 psi: 2:15
867.0			175				700 psi: 2:12
175.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with cement/bentonite grout					
			180				
			185				
			190				

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1105.5		FILL: SILTY SAND (SM), fine to medium-grained, with roots, brown, moist		1-3-2 (5) 16"			
2.5		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)		5-7-7 (14) 18"			
			5	6-9-12 (21) 16"			
				8-7-10 (17) 15"			
			10	3-6-9 (15) 18"			
1096.0		POORLY GRADED SAND with GRAVEL (SP), fine to medium-grained, brown, moist, medium dense (GLACIAL OUTWASH)		5-6-11 (17) 14"		2	Test results are in the attached lab report
12.0			15	5-6-8 (14) 16"			
				6-10-14 (24) 16"			
			20	10-10-13 (23) 17"			
			25	11-10-11 (21) 13"			
			30	11-13-15 (28) 6"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1074.0		POORLY GRADED SAND with GRAVEL (SP), fine to medium-grained, brown, moist, medium dense (GLACIAL OUTWASH)					Test results are in the attached lab report
34.0		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	35	12-12-15 (27) 9"		12	
			40	39-27-21 (48) 4"			
1065.5		POORLY GRADED SAND with GRAVEL (SP), fine-grained, brownish black, moist, very dense (GLACIAL OUTWASH)	45	36-27-25 (52) 5"		16	
42.5							Test results are in the attached lab report
1060.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	50	25-26-27 (53) 17"			
47.5							
1054.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, very dense (GLACIAL TILL)	55	22-30-34 (64) 16"			
53.5							
			60	20-26-28 (54) 15"			
1045.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)					
62.5							

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	65	6-8-11 (19) 1"		9	Test results are in the attached lab report
	70		8-11-14 (25) 17"				
	75		12-13-16 (29) 18"				
	80		9-13-17 (30) 18"				
1025.5 82.5		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, dense to very dense (GLACIAL TILL)	85	10-15-18 (33) 17"			
			90	26-37-50/5" (REF)			
1014.0 94.0		SANDY LEAN CLAY with GRAVEL (CL), brown, moist, very dense (GLACIAL TILL)	95	34-50/4" (REF) 10"		12	Test results are in the attached lab report

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:	WEATHER: sunny, overcast	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1010.5		SANDY LEAN CLAY with GRAVEL (CL), brown, moist, very dense (GLACIAL TILL)					
97.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, with Cobbles, and Boulders, brownish gray, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					
			100	50/5" (REF) 4"			
			105	50/3" (REF) 2"			
			110	50/3" (REF) 2"			
			115	50/2" (REF) 1"			
			120	50/1" (REF) 0"			No recovery
			125	50/1" (REF)			

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:	WEATHER: sunny, overcast	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks	
		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, with Cobbles, and Boulders, brownish gray, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					500 psi: 3:45	
								500 psi: 3:47
								500 psi: 3:12
								500 psi: 3:23
								500 psi: 2:30
								500 psi: 3:50
								500 psi: 2:42
								600 psi: 2:33
								500 psi: 3:47
								500 psi: 4:41
								500 psi: 4:04
								500 psi: 3:30
								500 psi: 3:25
								500 psi: 3:00
								500 psi: 2:45
								500 psi: 3:07
								600 psi: 3:32
								700 psi: 9:07
								700 psi: 9:00
								700 psi: 6:00
								750 psi: 17:00
								750 psi: 9:00
								750 psi: 7:13
								750 psi: 5:37
							500 psi: 5:45	
							500 psi: 2:53	
							500 psi: 2:57	
							500 psi: 2:45	
							500 psi: 2:50	
							500 psi: 5:04	
							500 psi: 3:31	

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 45-2-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.37566	LONGITUDE: -90.72582
DRILLER: C. Coffindaffer		LOGGED BY: P. Moe		START DATE: 04/24/20	END DATE: 05/06/20	
SURFACE ELEVATION: 1108.0 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:	WEATHER: sunny, overcast	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks	
		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, with Cobbles, and Boulders, brownish gray, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)					500 psi: 3:55	
								500 psi: 3:34
								500 psi: 3:40
								400 psi: 4:10
								400 psi: 3:32
								500 psi: 3:40
								500 psi: 3:34
								500 psi: 3:15
								300 psi: 3:50
								400 psi: 2:52
								400 psi: 2:45
								600 psi: 3:00
								600 psi: 2:38
								500 psi: 3:10
								500 psi: 2:20
								500 psi: 2:27
								500 psi: 2:25
								500 psi: 2:30
								500 psi: 3:43
								500 psi: 2:12
								500 psi: 3:31
								500 psi: 2:37
								300 psi: 2:30
								300 psi: 3:08
							300 psi: 2:38	
							300 psi: 2:42	
							300 psi: 2:30	
							300 psi: 2:57	
							300 psi: 2:20	
							300 psi: 2:18	
							300 psi: 2:30	

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin						BORING:		45-2-C			
						LOCATION: See attached sketch					
						LATITUDE:	46.37566	LONGITUDE:	-90.72582		
DRILLER:		C. Coffindaffer	LOGGED BY:		P. Moe	START DATE:		04/24/20	END DATE:		05/06/20
SURFACE ELEVATION:		1108.0 ft	RIG:	8502	METHOD:	4 1/4" HSA	SURFACING:		WEATHER: sunny, overcast		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks				
		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, with Cobbles, and Boulders, brownish gray, moist, very dense, (FREDA SANDSTONE, CONGLOMERATE)	225				300 psi: 2:20				
							300 psi: 5:40				
							400 psi: 3:20				
							400 psi: 3:05				
							400 psi: 3:03				
			230				400 psi: 3:00				
							500 psi: 3:15				
							500 psi: 3:07				
							500 psi: 2:40				
							500 psi: 2:45				
			235				500 psi: 2:50				
							500 psi: 3:40				
							600 psi: 5:32				
							500 psi: 2:40				
							600 psi: 2:50				
868.0			240				500 psi: 2:30				
240.0		END OF BORING					Water not observed while drilling.				
		Boring then backfilled with cement/bentonite grout									
			245								
			250								
			255								

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37799	LONGITUDE: -90.73677
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/13/21	
SURFACE ELEVATION: 1088.6 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:	WEATHER: 60°, Rain	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1086.6		SILTY SAND (SM), with roots, grass, brown, moist (TOPSOIL)					
2.0		SILTY SAND (SM), fine to medium-grained, with Gravel, trace roots, brown, moist, medium dense (GLACIAL TILL)					
1082.1			5	7-6-7 (13) 12"			
6.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist, loose to medium dense (GLACIAL OUTWASH)					
			10	5-6-5 (11) 10"			
			15	3-4-5 (9) 10"			
			20	5-7-7 (14) 14"			
1066.1		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, with Gravel, brown, moist to wet (GLACIAL OUTWASH)					
22.5			25	6-6-6 (12) 12"			
			30	11-14-12 (26) 10"			
Continued on next page							

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37799	LONGITUDE: -90.73677
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/13/21	
SURFACE ELEVATION: 1088.6 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:	WEATHER: 60°, Rain	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, with Gravel, brown, moist to wet (GLACIAL OUTWASH)					Test results are in attached lab reports
			35	12-12-11 (23) 10"			
			40	11-13-15 (28) 8"			
			45	17-16-16 (32) 8"			
1038.1 50.5		SILTY CLAY (CL-ML), fine to medium-grained, trace Gravel, brown, wet, loose (GLACIAL TILL)					Test results are in attached lab reports
			50	12-12-12 (24) 8"			
			55	4-4-5 (9) 16"			
1031.1 57.5		SILTY SAND (SM), fine to medium-grained, brown, wet, dense to very dense (GLACIAL TILL)					
			60	19-27-28 (55) 12"			

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Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-1		
					LOCATION: See attached sketch		
					LATITUDE: 46.37799	LONGITUDE: -90.73677	
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/13/21		
SURFACE ELEVATION: 1088.6 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 60°, Rain	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY SAND (SM), fine to medium-grained, brown, wet, dense to very dense (GLACIAL TILL)	65	23-30-32 (62) 12"			Test results are in attached lab reports
			70	27-23-21 (44) 10"			
1016.1							
72.5		SILTY SAND (SM), fine-grained, with Cobbles, and Boulders, brown, moist, very dense, (POORLY DEVELOPED FRED A SANDSTONE, CONGLOMERATE)	75	50/5" (REF) 5"			
			80	36-50/4" (REF) 10"			
			85	45-50/5" (REF) 10"			
			90	34-46-50 (96) 14"			
996.1							
92.5		SILT with SAND (ML), with Gravel, with Cobbles, and Boulders, brown, moist, very dense, (POORLY DEVELOPED FRED A SANDSTONE, CONGLOMERATE)	95	50/5" (REF) 5"			

Continued on next page

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-1		
					LOCATION: See attached sketch		
					LATITUDE: 46.37799	LONGITUDE: -90.73677	
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/13/21		
SURFACE ELEVATION: 1088.6 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER: 60°, Rain	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILT with SAND (ML), with Gravel, with Cobbles, and Boulders, brown, moist, very dense, (POORLY DEVELOPED FREDASANDSTONE, CONGLOMERATE)					Test results are in attached lab reports
			100	X	41-50/4" (REF) 8"		
			105	X	50/4" (REF) 3"		
			110	X	50/2" (REF) 2"		
			115	X	50/5" (REF) 5"		
			120	X	50/3" (REF) 3"		
966.1							
122.5		Slightly weathered, reddish brown, moist, (FREDASANDSTONE, CONGLOMERATE)					
963.1			125	X	50/3" (REF) 3"		
125.5		Unweathered, reddish brown, moist, (FREDASANDSTONE, CLAYSTONE)					

Continued on next page

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-1	
					LOCATION: See attached sketch	
					LATITUDE: 46.37799	LONGITUDE: -90.73677
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/13/21	
SURFACE ELEVATION: 1088.6 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:	WEATHER: 60°, Rain	


Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		Unweathered, reddish brown, moist, (FREDA SANDSTONE, CLAYSTONE)					
			130	X	48-50/4" (REF) 8"		
			135	X	50/5" (REF)		
			140	X	50/3" (REF) 3"		
			145	X	50/3" (REF) 3"		
941.1							
147.5							
940.3		Slightly weathered, reddish brown, moist, (FREDA SANDSTONE, CONGLOMERATE)	X	50/3" (REF)			
148.3		END OF BORING		50/3" (REF) 2"			
		Boring then backfilled with cement/bentonite grout					
			150				
			155				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-2		
					LOCATION: See attached sketch		
					LATITUDE: 46.37604	LONGITUDE: -90.72791	
DRILLER: M. Takada		LOGGED BY: D. Morrison		START DATE: 07/07/21	END DATE: 07/15/21		
SURFACE ELEVATION: 1040.4 ft	RIG: 7507	METHOD: 3 1/4" HSA		SURFACING: Weeds	WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1038.4		SILTY SAND (SM), fine to medium-grained, with Gravel, roots, black, moist (TOPSOIL)					Test results are in attached lab reports
2.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist, loose (GLACIAL OUTWASH)	5	5-6-4 (10) 8"			
1032.9		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, loose (LACUSTRINE)	10	5-4-5 (9) 16"			
7.5			15	4-4-5 (9) 14"			
			20	5-5-4 (9) 7"			Test results are in attached lab reports
1017.9		LEAN CLAY (CL), trace Gravel, brown, moist to wet, very soft (GLACIAL TILL)	25	0-0-0 WOH/18" 18"			
22.5							Shelby Tube Test results are in attached lab reports
1012.9		FAT CLAY (CH), with Sand, trace Gravel, brown, wet, very soft (GLACIAL TILL)	30	SH			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-2					
					LOCATION: See attached sketch					
					LATITUDE: 46.37604		LONGITUDE: -90.72791			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/07/21		END DATE: 07/15/21			
SURFACE ELEVATION: 1040.4 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Weeds		WEATHER: Cloudy		
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks			
1007.9		 FAT CLAY (CH), with Sand, trace Gravel, brown, wet, very soft (GLACIAL TILL) SILTY SAND (SM), fine to medium-grained, with Gravel, brown, wet, very dense (GLACIAL TILL) CLAYEY SAND (SC), with Gravel, gray, wet, hard, (WEATHERED BEDROCK)		35-50/6" (REF) 14"			Test results are in attached lab reports Drilling method switched to rock coring at 46 feet			
32.5										
1006.4										
34.0										
994.4		FREDIA SANDSTONE, CONGLOMERATE, red and greenish brown, volcanic clast (hard), no matrix recovered, washout during coring FREDIA SANDSTONE, CONGLOMERATE, brownish red, volcanic clast (very hard), sandy clay matrix (soft), poorly cemented, matrix mostly washed away FREDIA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (very hard), sandy clay matrix (soft), moderately to well cemented		50/2" (REF) 0 4" 25	3	900	110	Run 1 MOHS Clast: 4 Run 2 Run 3 Run 4 Run 5 MOHS Clast: 8 Matrix: 1 Run 6 MOHS Clast: 8 Matrix: 1 Run 7		
46.0				0 25	2	700	60			
				0 25	3	900	110			
				0 25	5	700	60			
				0 17	4	350	160			
				0 50	5	520				
				0 50	3	500	180			
				0 83	1	750	180			
					7					
					3					
					2	400	160			
					2	500	190			
					8	700	200			
					6					
Continued on next page				RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-2					
					LOCATION: See attached sketch					
					LATITUDE: 46.37604		LONGITUDE: -90.72791			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/07/21		END DATE: 07/15/21			
SURFACE ELEVATION: 1040.4 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Weeds		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
975.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (very hard), sandy clay matrix (soft), moderately to well cemented	65	0	42	7	700	200		Run 8 MOHS Clast: 8 Matrix: 2
65.0		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (hard), well cemented		28	100	2	450	160		
						2				
						2				
970.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), poor to moderately cemented	70	39		2	420	190		Run 9 MOHS Clast: 8.5 Matrix: 2
70.0						2				Run 10
				78		6	500	190		
		<i>Test results are in attached lab reports</i>	75			2				Run 11 MOHS Clast: 8.5 Matrix: 2
				53	100	2	380	120		
						2				
						2				
960.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), poorly cemented	80	0	11	2	380	150		Run 12 MOHS Clast: 8.5 Matrix: 2
80.0						1				
						2				
						4				
955.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), moderately to well cemented	85	0	100	2	380	150		Run 13 Run 14 MOHS Clast: 8 Matrix: 2
85.0				32	100	2	320	150		
						3				
						5	700	190		
950.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), poorly cemented	90	38	100	6	320	160		Run 15 Run 16 MOHS Clast: 8.5 Matrix: 2
90.0				27	89	3	380	160		
						3				
						4				
			95	0	50	4	400	190		Run 17 Run 18
						3				

Continued on next page

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-2					
					LOCATION: See attached sketch					
					LATITUDE: 46.37604		LONGITUDE: -90.72791			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/07/21		END DATE: 07/15/21			
SURFACE ELEVATION: 1040.4 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Weeds		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
921.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), poorly cemented	100	0	100	2	350	170		MOHS Clast: 8.5 Matrix: 2
						2				
						3				
						12				
				0	100	3	350	170		Run 19 MOHS Clast: 8.5 Matrix: 2
						3				
						2				
						6				
				42	100	3	350	170		Run 20
						3				
				100	100	2	320	170		Run 21 MOHS Clast: 8.5 Matrix: 2
						2				
3										
4										
110	100	3	320	170		Run 22 MOHS Clast: 8.5 Matrix: 2				
		3								
		3								
		3								
0	100	2	380	170		Run 23				
		3								
115	100	3	320	180		Run 24 MOHS Clast: 8.5 Matrix: 2				
		3								
		3								
		6								
921.4		FREDA SANDSTONE, CONGLOMERATE, greenish gray and red, volcanic clast (hard), Sand, Gravel matrix (soft), well cemented	120	34	50	3	250	180		Run 25 MOHS Clast: 7 Matrix: 2 Run 26
						3				
				48	100	4	350	200		
						4				
915.4		FREDA SANDSTONE, CONGLOMERATE, green and reddish brown, volcanic clast (hard), Sand, Gravel matrix (soft), moderately to well cemented	125	57	100	3	350	180		Run 27 MOHS Clast: 6 Matrix: 2
						3				
						3				
						3				
Continued on next page										

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-2					
					LOCATION: See attached sketch					
					LATITUDE: 46.37604		LONGITUDE: -90.72791			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/07/21		END DATE: 07/15/21			
SURFACE ELEVATION: 1040.4 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Weeds		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
901.9 138.5		FREDIA SANDSTONE, CONGLOMERATE, green and reddish brown, volcanic clast (hard), Sand, Gravel matrix (soft), moderately to well cemented <i>Test results are in attached lab reports</i>	130	48	100	3	350	160		Run 28 MOHS Clast: 6 Matrix: 2
						4				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
893.4 147.0		FREDIA SANDSTONE, SILTSTONE, unweathered, moderately hard, fine-grained, thick bedded <i>Test results are in attached lab reports</i>	140	80	100	1	350	170		Run 29 MOHS Clast: 6 Matrix: 2
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
		FREDIA SANDSTONE, CONGLOMERATE, red and greenish brown, volcanic clast (hard), Sand, Gravel matrix (soft), very well cemented 1 foot layer of red SILTSTONE (hard) <i>Test results are in attached lab reports</i> 6 inch layer of red SILTSTONE (hard)	145	100	100	4	450	190		Run 30 MOHS: 3 Run 31 MOHS: 3
						4				
						4				
						4				
						4				
						4				
						4				
						4				
						4				
						4				
		FREDIA SANDSTONE, CONGLOMERATE, red and greenish brown, volcanic clast (hard), Sand, Gravel matrix (soft), very well cemented 1 foot layer of red SILTSTONE (hard) <i>Test results are in attached lab reports</i> 6 inch layer of red SILTSTONE (hard)	150	100	100	3	550	140		Run 32 MOHS Clast: 8 Matrix: 3
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
		FREDIA SANDSTONE, CONGLOMERATE, red and greenish brown, volcanic clast (hard), Sand, Gravel matrix (soft), very well cemented 1 foot layer of red SILTSTONE (hard) <i>Test results are in attached lab reports</i> 6 inch layer of red SILTSTONE (hard)	155	95	100	3	520	100		Run 33 MOHS: 3
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
		FREDIA SANDSTONE, CONGLOMERATE, red and greenish brown, volcanic clast (hard), Sand, Gravel matrix (soft), very well cemented 1 foot layer of red SILTSTONE (hard) <i>Test results are in attached lab reports</i> 6 inch layer of red SILTSTONE (hard)	160	95	100	3	520	100		Run 34 MOHS Clast: 8 Matrix: 3
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
						3				
Continued on next page										

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3		
					LOCATION: See attached sketch		
					LATITUDE: 46.37564	LONGITUDE: -90.72576	
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/14/21	END DATE: 07/27/21		
SURFACE ELEVATION: 1106.2 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER:	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1104.2		FILL: SILTY SAND (SM), fine to medium-grained, with roots, brown, moist					
2.0		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	5	6-11-11 (22) 8"			
1098.7		POORLY GRADED SAND (SP), fine to medium-grained, with Gravel, brown, moist to wet, loose to medium dense (GLACIAL OUTWASH)	10	4-6-7 (13) 12"			
7.5			15	4-6-6 (12) 10"			Test results are in attached lab reports
			20	8-8-10 (18) 12"			
			25	7-7-6 (13) 8"			Drilling method switched to mud rotary
			30	10-9-9 (18) 16"			

Continued on next page

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3		
					LOCATION: See attached sketch		
					LATITUDE: 46.37564	LONGITUDE: -90.72576	
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/14/21	END DATE: 07/27/21		
SURFACE ELEVATION: 1106.2 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER:	
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1073.7 32.5		POORLY GRADED SAND (SP), fine to medium-grained, with Gravel, brown, moist to wet, loose to medium dense (GLACIAL OUTWASH)					Test results are in attached lab reports
		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	35	10-11-11 (22) 10"			
			40	11-10-12 (22) 12"			
1063.7 42.5		SILTY SAND (SM), fine to medium-grained, with Gravel, dark brown, moist, medium dense (GLACIAL OUTWASH)	45	11-12-15 (27) 16"			
1058.7 47.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	50	22-30-32 (62) 12"			
			55	23-26-29 (55) 14"			
1048.7 57.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, medium dense (GLACIAL TILL)	60	19-15-10 (25) 10"			
1043.7 62.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)					

Continued on next page

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3		
					LOCATION: See attached sketch		
					LATITUDE: 46.37564	LONGITUDE: -90.72576	
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/14/21	END DATE: 07/27/21		
SURFACE ELEVATION: 1106.2 ft		RIG: 7505	METHOD: 3 1/4" HSA	SURFACING:		WEATHER:	
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, with Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)	65	3-5-6 (11) 14"			Test results are in attached lab reports
			70	3-5-7 (12) 16"			
			75	10-12-14 (26) 12"			
			80	11-7-9 (16) 8"			Test results are in attached lab reports
1023.7		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, dense (GLACIAL TILL)	85	15-17-28 (45) 6"			
82.5							
1018.7		LEAN CLAY (CL), with Gravel, and Cobbles, brown, moist, hard, (WEATHERED BEDROCK)	90	50/5" (REF) 5"			Test results are in attached lab reports
87.5			95	31-50/4" (REF) 10"			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3					
					LOCATION: See attached sketch					
					LATITUDE: 46.37564		LONGITUDE: -90.72576			
DRILLER: M. Heinzen		LOGGED BY: D. Morrison			START DATE: 07/14/21		END DATE: 07/27/21			
SURFACE ELEVATION: 1106.2 ft		RIG: 7505		METHOD: 3 1/4" HSA		SURFACING:		WEATHER:		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery		q _p tsf	MC %	Tests or Remarks		
1008.7		LEAN CLAY (CL), with Gravel, and Cobbles, brown, moist, hard, (WEATHERED BEDROCK)								
97.5		Slightly weathered, grayish brown, moist, FREDA SANDSTONE, CONGLOMERATE		50/3" (REF) 3"						
			100							
			105	50/1" (REF) 1"				Drilling method switched to rock coring at 108 feet		
998.2		FREDA SANDSTONE, CONGLOMERATE, gray, green and brown, volcanic clast (very hard), poorly to well cemented in a Sand, Gravel and Clay matrix (very soft)		70	83	3	500	60	Run 1 MOHS	
108.0			110						Clast: 8.5	
				0	17	22	400	90	Matrix: 1	
			115						Run 2 MOHS	
				0	44	32	400	60	Clast: 8.5	
									Matrix: 1	
			120						Run 3 MOHS	
				0	25	6	500	60	Clast: 8.5	
				0	0	7	500	60	Matrix: 1	
						10			Run 4	
				31	54	7	500	60	Run 5 - No recovery	
						5			Run 6 MOHS	
						6			Clast: 8.5	
			125						Matrix: 1	
				0	20	6	500	60	Run 7 MOHS	
						9			Clast: 8.5	
						11			Matrix: 1	
Continued on next page				RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3					
					LOCATION: See attached sketch					
					LATITUDE: 46.37564		LONGITUDE: -90.72576			
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/14/21		END DATE: 07/27/21				
SURFACE ELEVATION: 1106.2 ft		RIG: 7505		METHOD: 3 1/4" HSA		SURFACING:		WEATHER:		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
		FREDA SANDSTONE, CONGLOMERATE, gray, green and brown, volcanic clast (very hard), poorly to well cemented in a Sand, Gravel and Clay matrix (very soft)	130			5				
						6				
				77	100	4	500	60	100	Run 8 MOHS Clast: 8.5 Matrix: 1
						4				
						3				
						6				
			135			11				Run 9 MOHS Clast: 8.5 Matrix: 1
				0	10	5	500	60	100	
						3				
						3				
			140			4				
965.2						4				Run 10 MOHS: 1
141.0		FREDA SANDSTONE, SILTSTONE, unweathered, soft, very fine-grained, thick bedded		42	60	5	500	60	100	
963.2						4				MOHS Clast: 8 Matrix: 4
143.0		FREDA SANDSTONE, CONGLOMERATE, brown and gray, volcanic clast (very hard), well cemented Clay, Sand and Gravel matrix (soft)				4				
						3				
959.7						4				Run 11
146.5		FREDA SANDSTONE, SILTSTONE, unweathered, soft, very fine-grained, thick bedded		28	65	5	500	60	100	MOHS: 1
958.2						5				MOHS Clast: 8 Matrix: 4
148.0		FREDA SANDSTONE, CONGLOMERATE, brown and gray, volcanic clast (very hard), well cemented Clay, Sand and Gravel matrix (soft)				7				
956.2						14				
150.0		FREDA SANDSTONE, SILTSTONE, red and brown with interlocked conglomerate layers of gray Sand and Gravel, well cemented	150			4				Run 12 MOHS: 3
				93	100	4		60	100	
						4				
						3				
						3				
			155			6				Run 13 MOHS: 3
						6				
948.2		FREDA SANDSTONE, CONGLOMERATE, gray, green and brown, volcanic clast (very hard), poorly cemented with Sand, Gravel matrix (soft)		40	100	5				
158.0						5				
946.2						6				
160.0		Continued on next page								

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3					
					LOCATION: See attached sketch					
					LATITUDE: 46.37564		LONGITUDE: -90.72576			
DRILLER: M. Heinzen		LOGGED BY: D. Morrison			START DATE: 07/14/21		END DATE: 07/27/21			
SURFACE ELEVATION: 1106.2 ft		RIG: 7505		METHOD: 3 1/4" HSA		SURFACING:		WEATHER:		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
941.2		FREDA SANDSTONE, SANDSTONE, red and brown, slightly weathered, soft, fine-grained to medium-grained, massive		50	50	6 11 9 8 19	500	60	100	Run 14 MOHS: 3
165.0		FREDA SANDSTONE, CONGLOMERATE, brown, green and red, volcanic clast (very hard), poorly to well cemented in Sand and Gravel matrix (soft)	165	0	27	6 7 18 11 7	500	60	100	Run 15 MOHS Clast: 8 Matrix: 3
			170	21	87	4 4 4 5 12	500	100	100	Run 16 MOHS Clast: 8 Matrix: 3
928.7			175	20	100	6 4 10 3	500	100	100	Run 17
177.5		FREDA SANDSTONE, CONGLOMERATE, gray, brown and red, volcanic clast (hard), Sand and Gravel matrix (soft), moderately cemented	180	40	100	4 5 7	500	100	100	Run 18 MOHS Clast: 8.5 Matrix: 7
			185	0	83	13 9 7 10	500	100	100	Run 19 MOHS Clast: 8.5 Matrix: 7
			190	0	100	4 4 4 6 6	500	100	100	Run 20 Run 21 MOHS Clast: 8.5 Matrix: 7
				55	100		500	100	100	Run 22 MOHS Clast: 8.5 Matrix: 7

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-3						
					LOCATION: See attached sketch						
					LATITUDE: 46.37564		LONGITUDE: -90.72576				
DRILLER: M. Heinzen		LOGGED BY: D. Morrison		START DATE: 07/14/21		END DATE: 07/27/21					
SURFACE ELEVATION: 1106.2 ft		RIG: 7505		METHOD: 3 1/4" HSA		SURFACING:		WEATHER:			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks	
894.2 212.0		FRED A SANDSTONE, CONGLOMERATE, gray, brown and red, volcanic clast (hard), Sand and Gravel matrix (soft), moderately cemented		33	67	6	450	100	100	Run 23 MOHS Clast: 8.5 Matrix: 7	
						9					
						14					
				13	100	9	380	100	100		
						6					
						6					
						8					
				31	100	5	380	100	100		Run 24 MOHS Clast: 8.5 Matrix: 7
						6					
						7					
						17					
				100	92	6	380	100	100		Run 25
						10					
						5					
						12					
33	60	5	380	100	100	Run 26 MOHS Clast: 8.5 Matrix: 7					
		12									
		11									
		11									
58	100	4	380	100	100	Run 27					
		6									
64	100	4	380	100	100	Run 28 MOHS Clast: 8.5 Matrix: 7					
		4									
		7									
40	78	6	380	100	100	Run 29 MOHS Clast: 8.5 Matrix: 7					
		8									
		8									
		11									
88	100	4	380	100	100	Run 30 MOHS Clast: 8.5 Matrix: 8					
		4									
		5									
		5									
Continued on next page											

B2104465 Braun Intertec Corporation Print Date: 09/22/2021 SC-3 page 8 of 8

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-4		
					LOCATION: See attached sketch		
					LATITUDE: 46.37543	LONGITUDE: -90.72338	
DRILLER: M. Takada		LOGGED BY: D. Morrison		START DATE: 07/16/21	END DATE: 07/23/21		
SURFACE ELEVATION: 1092.5 ft		RIG: 7507	METHOD: 3 1/4" HSA	SURFACING: Mulch	WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1090.5		SILTY SAND (SM), fine to medium-grained, with roots, brown, moist (TOPSOIL)					Test results are in attached lab reports
2.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	5	9-5-7 (12) 12"			
			10	6-7-9 (16) 16"			
1080.0		SILT (ML), brown, moist, loose (GLACIAL OUTWASH)	15	2-2-4 (6) 12"			
12.5			20	10-10-11 (21) 12"			
1075.0		SILTY SAND (SM), fine-grained, brown, moist, medium dense to dense (GLACIAL TILL)	25	10-10-8 (18) 12"			
17.5			30	16-16-14 (30) 16"			

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-4		
					LOCATION: See attached sketch		
					LATITUDE: 46.37543	LONGITUDE: -90.72338	
DRILLER: M. Takada		LOGGED BY: D. Morrison		START DATE: 07/16/21	END DATE: 07/23/21		
SURFACE ELEVATION: 1092.5 ft	RIG: 7507	METHOD: 3 1/4" HSA		SURFACING: Mulch	WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1060.0 32.5		SILTY SAND (SM), fine-grained, brown, moist, medium dense to dense (GLACIAL TILL)					
		SILTY SAND (SM), fine to coarse-grained, with Gravel, brown, moist, medium dense (GLACIAL TILL)	35	9-9-9 (18) 13"			
1055.0 37.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist to wet, medium dense (GLACIAL TILL)	40	9-9-6 (15) 13"			Test results are in attached lab reports
			45	5-7-6 (13) 14"			
1045.0 47.5		SILTY, CLAYEY SAND (SC-SM), trace Gravel, brown, wet, very stiff (GLACIAL TILL)	50	5-7-11 (18) 16"			
1040.0 52.5		LEAN CLAY (CL), brown, wet, very stiff to hard (GLACIAL TILL)	55	19-21-35 (56) 18"			
			60	20-24-28 (52) 16"			Test results are in attached lab reports

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-4					
					LOCATION: See attached sketch					
					LATITUDE: 46.37543		LONGITUDE: -90.72338			
DRILLER: M. Takada		LOGGED BY: D. Morrison		START DATE: 07/16/21		END DATE: 07/23/21				
SURFACE ELEVATION: 1092.5 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Mulch		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks			
1020.0		LEAN CLAY (CL), brown, wet, very stiff to hard (GLACIAL TILL)	65	17-8-12 (20) 18"			Test results are in attached lab reports			
72.5			70	14-11-11 (22) 12"						
		SILTY SAND (SM), fine to medium-grained, brown, wet, very dense, (WEATHERED BEDROCK)	75	37-43-50/5" (REF) 10"						
			80	50/4" (REF) 8"						
1005.0			85	50/4" (REF) 6"			Drilling method switched to rock coring at 92 feet			
87.5		FREDA SANDSTONE, CONGLOMERATE, grayish brown, moist	90							
1000.5		FREDA SANDSTONE, CONGLOMERATE, brown, gray and red, volcanic clast (very hard), poorly cemented in a Clay, Sand and Gravel matrix (very soft)	95	50/2" (REF) 0 2" 42	3 6	380	130	Run 1 MOHS Clast: 7.5 Matrix: 1		
					2			Run 2		
Continued on next page				RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-4					
					LOCATION: See attached sketch					
					LATITUDE: 46.37543		LONGITUDE: -90.72338			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/16/21		END DATE: 07/23/21			
SURFACE ELEVATION: 1092.5 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Mulch		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
		FREDA SANDSTONE, CONGLOMERATE, brown, gray and red, volcanic clast (very hard), poorly cemented in a Clay, Sand and Gravel matrix (very soft)		15	100	2	350	140		MOHS Clast: 7.5 Matrix: 1
						2				
						4				
			100	26	96	2	200	140		Run 3 MOHS Clast: 7.5 Matrix: 1
						2				
						2				
						4				
989.5										
103.0		FREDA SANDSTONE, CONGLOMERATE, brown, gray and red, volcanic clast (very hard), well cemented in a Sandy Clay and Gravel matrix (very soft)		51	100	5	350	120		Run 4 MOHS Clast: 7.5 Matrix: 4.5
988.0						2				
104.5			105			3				Run 5 MOHS Clast: 7.5 Matrix: 1
		FREDA SANDSTONE, CONGLOMERATE, brown, gray and red, volcanic clast (very hard), poorly to well cemented in a Sandy Clay and Gravel matrix (very soft)		58	100	1	300	200		
						1				
						1				
			110			2				Run 6
						2				
980.8				61	100	1	320	200		MOHS: 3
111.8		FREDA SANDSTONE, SANDSTONE, reddish brown with gray, unweathered, moderately hard, fine-grained to medium-grained, thick bedded				2				
978.0						2				
114.5		FREDA SANDSTONE, CONGLOMERATE, gray and green, volcanic clast (very hard), well cemented in a Sand matrix (moderately hard)				2				Run 7 MOHS Clast: 8 Matrix: 2.5 MOHS: 3
977.5			115	92	100	1	250	200		
115.0		FREDA SANDSTONE, SANDSTONE, reddish brown interlayered with gray, unweathered, moderately hard, fine-grained to medium-grained, massive				1				
						1				
			120			1				Run 8 MOHS: 3
		Test sample untestable, see attached lab report				2				
		Test results are in attached lab reports		100	100	2	280	170		
						2				
968.0						2				
124.5		FREDA SANDSTONE, CONGLOMERATE, gray, green and brown, volcanic clast (very hard), poorly to well cemented in a Clay, Sand and Gravel matrix (moderately hard)	125	11	100	3	280	170		Run 9 MOHS Clast: 7.5 Matrix: 1
						2				
						3				
Continued on next page										

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2104465 Geotechnical Evaluation Enbridge Line 5 Silver Creek Various Locations Near Mellen, Wisconsin					BORING: SC-4					
					LOCATION: See attached sketch					
					LATITUDE: 46.37543		LONGITUDE: -90.72338			
DRILLER: M. Takada		LOGGED BY: D. Morrison			START DATE: 07/16/21		END DATE: 07/23/21			
SURFACE ELEVATION: 1092.5 ft		RIG: 7507		METHOD: 3 1/4" HSA		SURFACING: Mulch		WEATHER: Cloudy		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	RQD %	Recovery %	Drilling Rate (min/ft)	Bit Pressure (psi)	Water Pressure (psi)	Water Return %	Remarks
939.5 153.0		FREDA SANDSTONE, CONGLOMERATE, gray, green and brown, volcanic clast (very hard), poorly to well cemented in a Clay, Sand and Gravel matrix (moderately hard)		0	100	2	280	170		Run 10
						4				
						2				
						2				
						3				
						3				
						6				
						3				
						2				
						2				
						2				
						3				
						3				
						3				
						8				
						2				
						3				
3										
3										
3										
2										
2										
END OF CORING										
Boring then backfilled with cement/bentonite grout										



Photograph #1

SC-2, 46-63'

Project No. B2104465

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Photograph #2

SC-2, 63-73.5'

Project No. B2104465

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Photograph #3

SC-2, 73.5-80'

Project No. B2104465

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Photograph #4

SC-2, 80-85'

Project No. B2104465

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Photograph #5

SC-2, 85-94.5'

Project No. B2104465

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Photograph #6

SC-2, 94.5-104'

Project No. B2104465

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Photograph #7

SC-2, 104-113.5'

Project No. B2104465

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Photograph #8

SC-2, 113.5-120'

Project No. B2104465

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Photograph #7

SC-2, 120-130'

Project No. B2104465

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Photograph #8

SC-2, 130-140'

Project No. B2104465

BRAUN
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Photograph #7

SC-2, 140-150'

Project No. B2104465

BRAUN
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Photograph #8

SC-2, 150-160'

Project No. B2104465

BRAUN
INTERTEC



Photograph #7

SC-2, 160-170'

Project No. B2104465

BRAUN
INTERTEC



Photograph #8

SC-2, 170-180'

Project No. B2104465

BRAUN
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Photograph #1

SC-3, 108-130'

Project No. B2104465

BRAUN
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Photograph #2

SC-3, 130-150'

Project No. B2104465

BRAUN
INTERTEC



Photograph #3

SC-3, 150-160'

Project No. B2104465

BRAUN
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Photograph #4

SC-3, 160-177'

Project No. B2104465

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Photograph #5

SC-3, 177-187'

Project No. B2104465

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Photograph #6

SC-3, 187-199'

Project No. B2104465

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Photograph #7

SC-3, 199-210'

Project No. B2104465

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Photograph #8

SC-3, 210-220'

Project No. B2104465

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Photograph #7

SC-3, 220-240'

Project No. B2104465

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Photograph #1

SC-4, 92-103'

Project No. B2104465

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Photograph #2

SC-4, 103-109.5'

Project No. B2104465

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Photograph #3

SC-4, 109.5-119.5'

Project No. B2104465

BRAUN
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Photograph #4

SC-4, 119.5-129'

Project No. B2104465

BRAUN
INTERTEC



Photograph #5

SC-4, 129-135'

Project No. B2104465

BRAUN
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Photograph #6

SC-4, 135-145'

Project No. B2104465

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Photograph #7

SC-4, 145-153'

Project No. B2104465

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Photograph #1	43-1-C-1, 124.6 to 144.6 feet	Project No. B2001991
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Photograph #2	43-1-C-1, 155.6 to 169.6 feet	Project No. B2001991
		BRAUN INTERTEC



Photograph #3	43-1-C-1, 144.6 to 155.6 feet	Project No. B2001991
		BRAUN INTERTEC



Photograph #4	43-1-C-1, 169.6 to 174.6 feet	Project No. B2001991
		BRAUN INTERTEC



Photograph #5	43-1-C-1, 174.6 to 184.6 feet	Project No. B2001991
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Photograph #6	43-1-C-1, 184.6 to 204.6 feet (2 of 2)	Project No. B2001991
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Photograph #7

43-1-C-1, 184.6 to 204.6 feet (1 of 2)

Project No. B2001991

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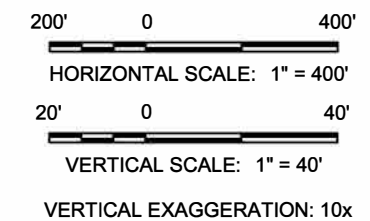


Photograph #8

43-1-C-1, 204.6 to 208.6 feet

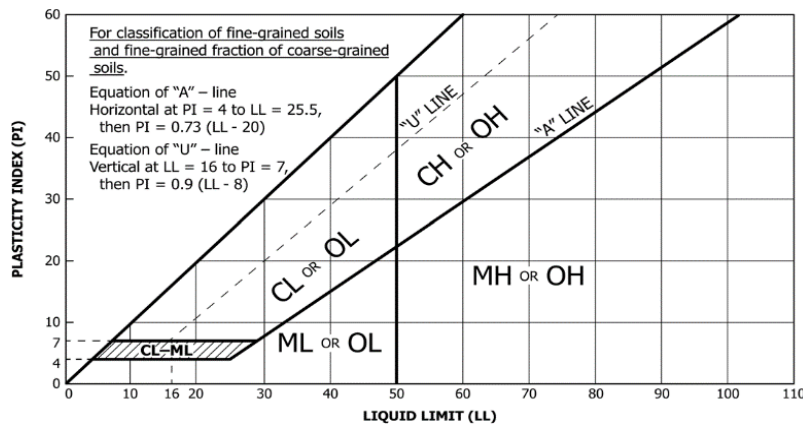
Project No. B2001991

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Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Group Symbol	Soil Classification
				Group Symbol	Group Name ^B
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines ^C)	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel ^E
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$) ^D	GP	Poorly graded gravel ^E
		Gravels with Fines (More than 12% fines ^C)	Fines classify as ML or MH	GM	Silty gravel ^{EFG}
			Fines Classify as CL or CH	GC	Clayey gravel ^{EFG}
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines ^H)	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand ^I
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$) ^D	SP	Poorly graded sand ^I
		Sands with Fines (More than 12% fines ^H)	Fines classify as ML or MH	SM	Silty sand ^{FGI}
			Fines classify as CL or CH	SC	Clayey sand ^{FGI}
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line ^J	CL	Lean clay ^{KLM}
			PI < 4 or plots below "A" line ^J	ML	Silt ^{KLM}
		Organic	Liquid Limit – oven dried Liquid Limit – not dried <0.75	OL	Organic clay ^{KLMN} Organic silt ^{KLMQ}
			PI plots on or above "A" line	CH	Fat clay ^{KLM}
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots below "A" line	MH	Elastic silt ^{KLM}
			Liquid Limit – oven dried Liquid Limit – not dried <0.75	OH	Organic clay ^{KLMP} Organic silt ^{KLMQ}
		Organic	Liquid Limit – oven dried Liquid Limit – not dried <0.75	OH	Organic clay ^{KLMP} Organic silt ^{KLMQ}
			Highly Organic Soils		Primarily organic matter, dark in color, and organic odor

- A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains $\geq 15\%$ sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
I. If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains $\geq 30\%$ plus No. 200 predominantly gravel, add "gravelly" to group name.
N. $PI \geq 4$ and plots on or above "A" line.
O. $PI < 4$ or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



DD Dry density, pcf
WD Wet density, pcf
P200 % Passing #200 sieve
MC Moisture content, %
OC Organic content, %

Laboratory Tests

q_p Pocket penetrometer strength, tsf
q_u Unconfined compression test, tsf
LL Liquid limit
PL Plastic limit
PI Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions^{L M}

trace..... 0 to 5%
little..... 6 to 14%
with..... $\geq 15\%$

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose 0 to 4 BPF
Loose 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils Blows Per Foot Approximate Unconfined Compressive Strength

Very soft..... 0 to 1 BPF..... < 0.25 tsf
Soft..... 2 to 4 BPF..... 0.25 to 0.5 tsf
Medium..... 5 to 8 BPF..... 0.5 to 1 tsf
Stiff..... 9 to 15 BPF..... 1 to 2 tsf
Very Stiff..... 16 to 30 BPF..... 2 to 4 tsf
Hard..... over 30 BPF..... > 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:




Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.









Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

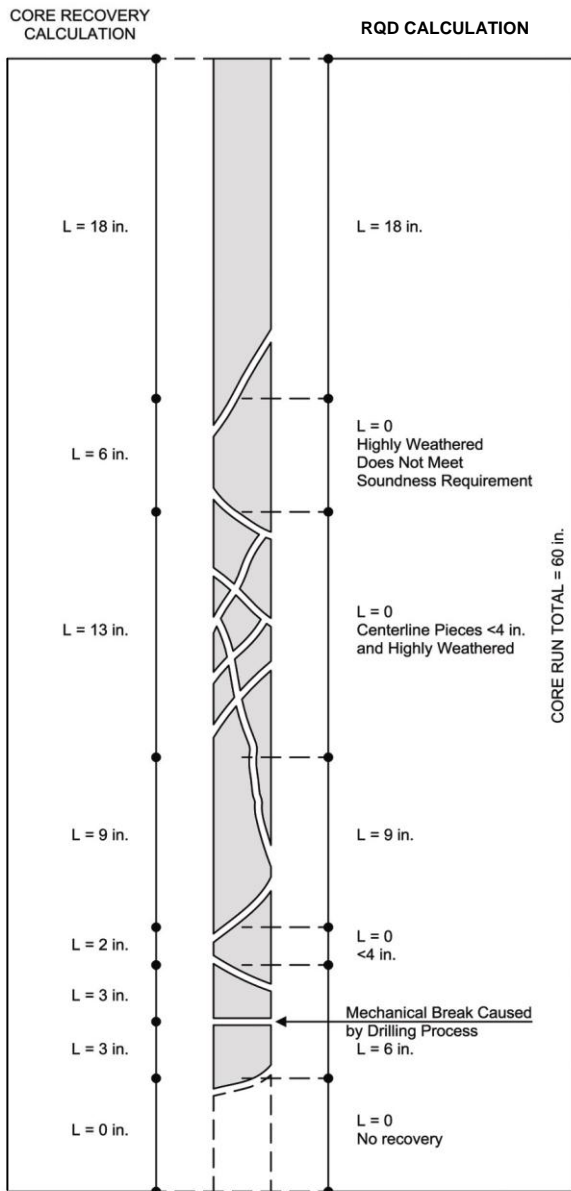
WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (, at the end of drilling (, or at some time after drilling ().

Sample Symbols

 Standard Penetration Test
 Modified California (MC)
 Auger
 Grab Sample
 Rock Core
 Thinwall (TW)/Shelby Tube (SH)
 Texas Cone Penetrometer
 Dynamic Cone Penetrometer



Example Calculations

Core Recovery, CR = $\frac{\text{Total length of rock recovered}}{\text{Total core run length}}$

$$\text{Example: CR} = \frac{(18 + 6 + 13 + 9 + 2 + 3 + 3)}{(60)}$$

$$\text{CR} = 90\%$$

RQD = $\frac{\text{Sum of sound pieces 4 inches or larger}}{\text{Total core run length}}$

RQD Percent	Rock Quality
< 25	very poor
25 < 50	poor
50 < 75	fair
75 < 90	good
90 < 100	excellent

$$\text{Example: RQD} = \frac{(18 + 9 + 6)}{(60)}$$

$$\text{RQD} = 55\%$$

Weathering

Unweathered: No evidence of chemical or mechanical alteration.

Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of rock volume altered.

Moderately Weathered: Discoloration evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering halos evident, 10% to 50% of the rock altered.

Highly Weathered: Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some mineral leached away.

Decomposed: Rock reduced to a soil consistency with relict rock texture, generally molded and crumbled by hand.

Hardness

<i>Very soft:</i>	Can be deformed by hand
<i>Soft:</i>	Can be scratched with a fingernail
<i>Moderately hard:</i>	Can be scratched easily with a knife
<i>Hard:</i>	Can be scratched with difficulty with a knife
<i>Very hard:</i>	Cannot be scratched with a knife

Texture

Sedimentary Rocks:	Grain Size
Coarse grained	2 – 5 mm
Medium grained	0.4 – 2 mm
Fine grained	0.1 – 0.4 mm
Very fine grained	< 0.1 mm

Igneous and Metamorphic Rocks:

Coarse grained	5 mm
Medium grained	1 – 5 mm
Fine grained	0.1 – 1 mm
Aphanitic	< 0.1 mm

Thickness of Bedding

<i>Massive:</i>	3 ft. thick or greater
<i>Thick bedded:</i>	1 to 3 ft. thick
<i>Medium bedded:</i>	4 in. to 1 ft. thick
<i>Thin bedded:</i>	4 in. thick or less

Degree of Fracturing (Jointing)

<i>Unfractured:</i>	Fracture spacing 6 ft. or more
<i>Slightly fractured:</i>	Fracture spacing 2 to 6 ft.
<i>Moderately fractured:</i>	Fracture spacing 8 in. to 2 ft.
<i>Highly fractured:</i>	Fracture spacing 2 in. to 8 in.
<i>Intensely fractured:</i>	Fracture spacing 2 in. or less

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Metafield ID: 310567

Completed Date: 05/29/2020

Prepared By: Streier, Jim

Laboratory Results Summary

Boring	Sample	Depth (ft)	MC (%)	Wash Loss (%)	LL	PL	PI	Organic Content %	Dry Density (pcf)	Resistivity (ohm-cm)	Q _u (tsf)	Specific Gravity
42-1-C-1	5-6	9.5	6.3									
42-1-C-1	9-10	25.0	18.1									
42-1-C-1	11-12	35.0	10.8									
42-1-C-1		60.0	19.3				NP		104.8			
42-1-C-1	19-20	75.0	11.4									
42-1-C-1	23-24	95.0	11.1									
42-1-C-1	28-29	120.0	9.8									
42-1-C-1	33-34	145.0	14.5									
42-1-C-1	41-42	185.0	16.5									

General

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Metafield ID: 320970

Sampled By: Drill Crew

Sample Date: 06/23/2020

Received Date: 07/09/2020

Lab: 11001 Hampshire Ave S, Bloomington, MN

Completed Date: 07/10/2020

Tested By: Streier, Jim

Laboratory Results Summary

Boring	Sample	Depth (ft)	MC (%)	Wash Loss (%)	LL	PL	PI	Organic Content %	Dry Density (pcf)	Resistivity (ohm-cm)	Q _u (tsf)	Specific Gravity
45-2-C		75.0	8.8		19	14	5					
45-2-C		95.0	12.2		24	14	10					
2-C-2		20.0	21.6		23	19	4		106.1			
2-C-2		40.0	26.4		42	16	26		99.3			
13-C-2		12.5	22.7		55	18	37					
13-C-2		30.0	29.9		50	18	32		93.8			
13-C-2		40.0	32.5		52	17	35		91.0			
20-C-1		30.0	21.6		29	16	13					
84-C-2		15.0	19.0		37	14	23					
84-C-2		35.0	20.2		30	15	15					
28-WB-1		15.0	40.8		74	21	53		81.3			
28-WB-1		35.0	54.4		65	21	44		69.6			
22-C		12.5	50.7		56	18	38		71.0			
22-C		45.0	26.1		34	14	20					
43-1-C-1		55.0	12.2		21	16	5		126.7			
17-C		15.0	42.8						78.9			
19-C		12.5	40.6						81.2			

General



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:

B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin
,

Sample Information

Metafield ID: 395886

Completed Date: 08/11/2021

Prepared By: Streier, Jim

Laboratory Results Summary

Boring	Sample	Depth (ft)	MC (%)	Wash Loss (%)	LL	PL	PI	Organic Content %	Dry Density (pcf)	Resistivity (ohm-cm)	Q _u (tsf)	Specific Gravity
SC-1	3	15.0	7.6									
SC-1	7	35.0	14.8									
SC-1	11	55.0	20.7		25	18	7					
SC-1	16	80.0	10.9									
SC-1	20	100.0	10.6									
SC-2	3	10.0	9.7									
SC-2	6	25.0	39.1		47	20	27					
SC-2	TW	30.0	43.1		50	19	31					
SC-2	9	40.0	7.3									

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:

B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

Sample Information

Metafield ID: 398014

Completed Date: 08/19/2021

Prepared By: Streier, Jim

Laboratory Results Summary

Boring	Sample	Depth (ft)	MC (%)	Wash Loss (%)	LL	PL	PI	Organic Content %	Dry Density (pcf)	Resistivity (ohm-cm)	Q _u (tsf)	Specific Gravity
SC-3	3	15.0	2.5	4.2								
SC-3	9	45.0	18.9	27								
SC-3	14	70.0	12.2		23	15	8					
SC-3	19	90.0	12.3	55								
SC-4	14	15.0	18.8	85								
SC-4	19	40.0	17.8	5.8								
SC-4	23	60.0	22.5									
SC-4	27	80.0	11.3	33								

General

Results: The test is for informational purposes.

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

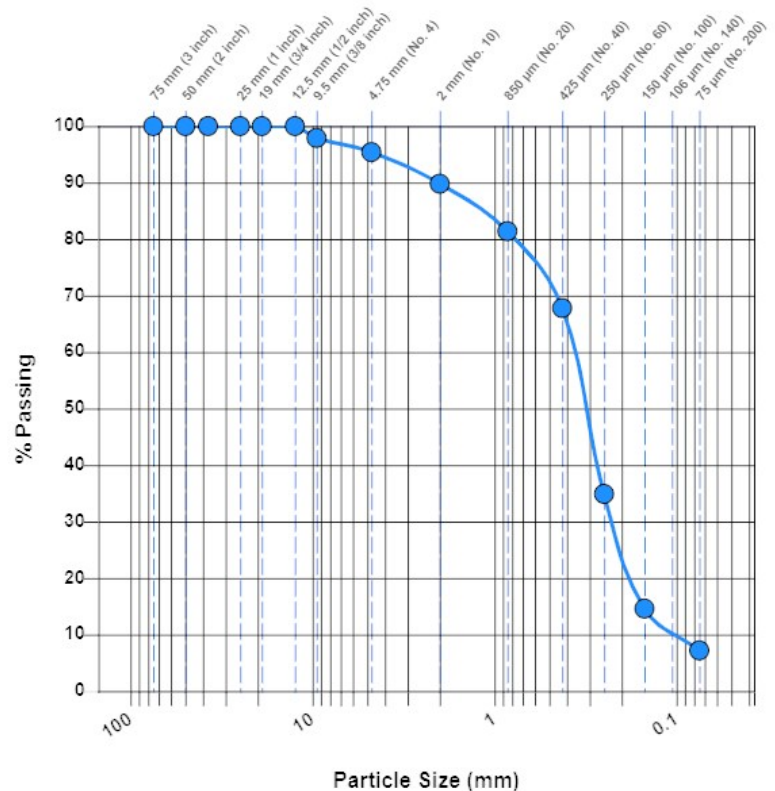
Sample Information

Sample Number:	310584	Depth (ft):	9.5-12
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	97.9	
4.75 mm (No. 4)	95.4	
2 mm (No. 10)	89.8	
850 µm (No. 20)	81.4	
425 µm (No. 40)	67.8	
250 µm (No. 60)	34.9	
150 µm (No. 100)	14.6	
75 µm (No. 200)	7.2	

Gravel (%)	Sand (%)	Silt & Clay (%)
4.6	88.2	7.2
D10	D30	D60
0.087	0.226	0.384
C_u	C_c	
4.41	1.53	



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	310585	Depth (ft):	25-30
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	98.7	
2 mm (No. 10)	95.4	
850 µm (No. 20)	88.7	
425 µm (No. 40)	58.6	
250 µm (No. 60)	24.3	
150 µm (No. 100)	11.6	
75 µm (No. 200)	7.2	

Gravel (%)
1.3

Sand (%)
91.5

Silt & Clay (%)
7.2

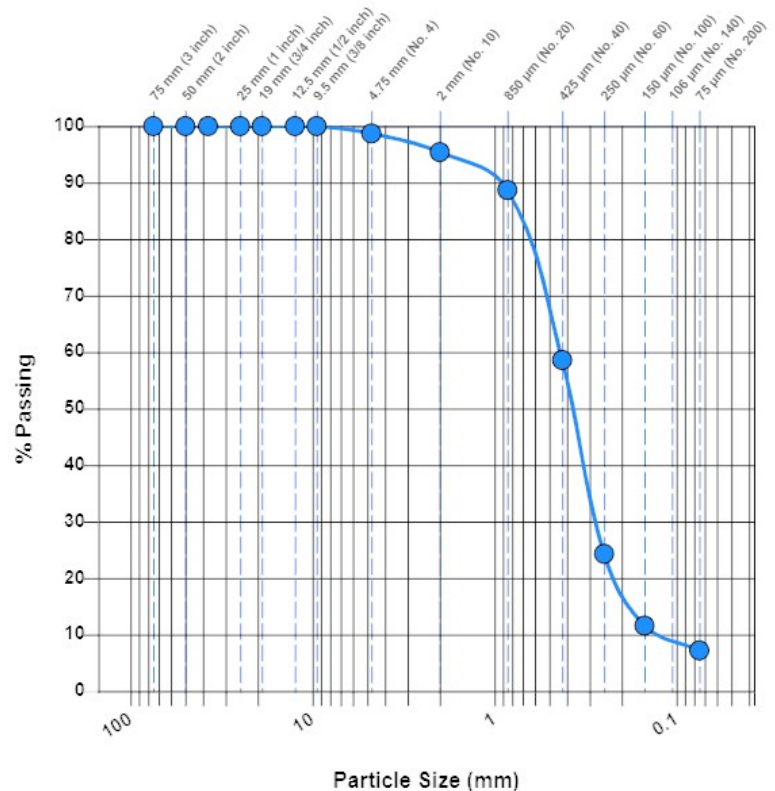
D10
0.095

D30
0.279

D60
0.445

C_u
4.68

C_c
1.84



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

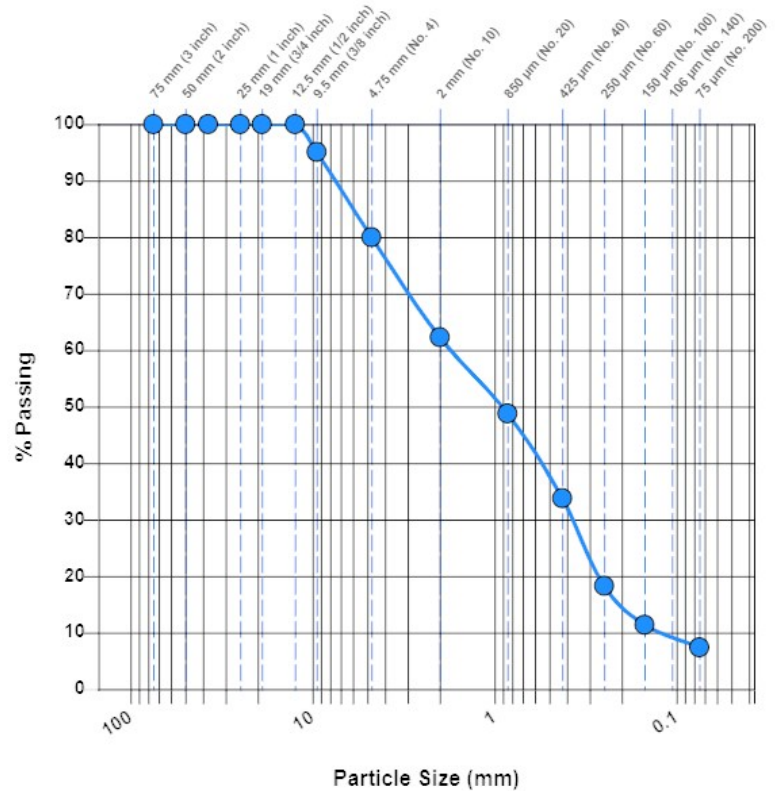
Sample Information

Sample Number:	310586	Depth (ft):	35-40
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	95.1	
4.75 mm (No. 4)	80.0	
2 mm (No. 10)	62.3	
850 µm (No. 20)	48.8	
425 µm (No. 40)	33.8	
250 µm (No. 60)	18.3	
150 µm (No. 100)	11.4	
75 µm (No. 200)	7.4	

Gravel (%)	Sand (%)	Silt & Clay (%)
20.0	72.6	7.4
D10	D30	D60
0.095	0.382	1.804
C_u	C_c	
18.99	0.85	



Classification: SP-SM Poorly graded sand with silt and gravel

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	310587	Depth (ft):	75-80
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

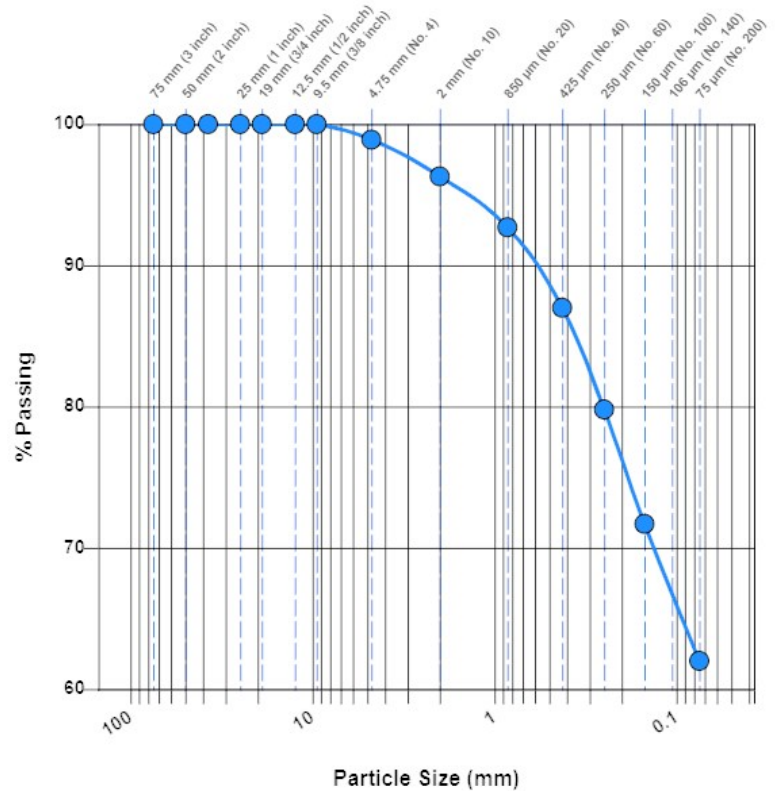
Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	98.9	
2 mm (No. 10)	96.3	
850 µm (No. 20)	92.7	
425 µm (No. 40)	87.0	
250 µm (No. 60)	79.8	
150 µm (No. 100)	71.7	
75 µm (No. 200)	62.0	

Gravel (%)
1.1

Sand (%)
36.9

Silt & Clay (%)
62.0



Classification: ML Sandy silt

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	310588	Depth (ft):	95-100
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

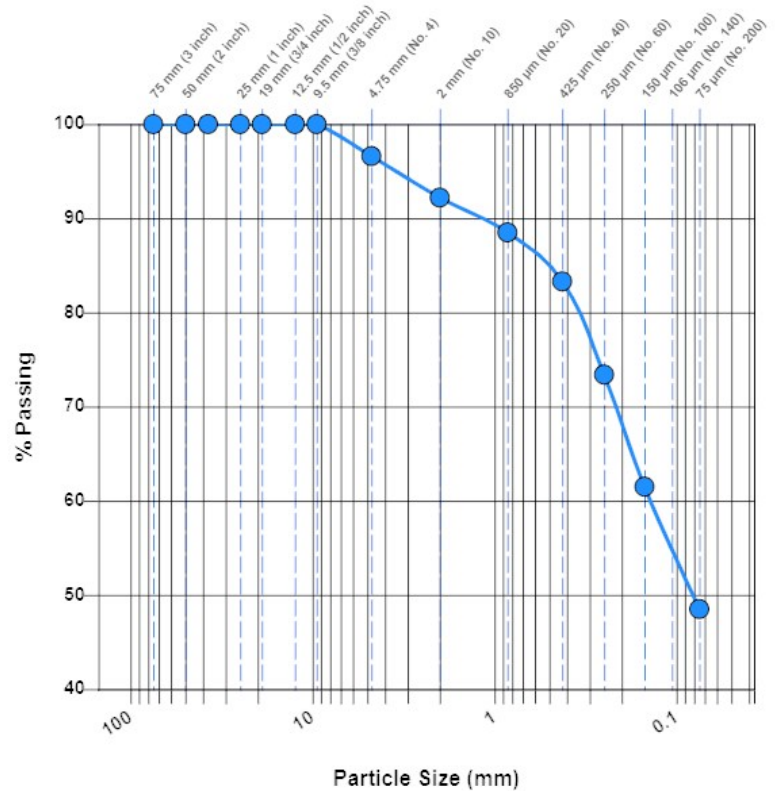
Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	96.6	
2 mm (No. 10)	92.2	
850 µm (No. 20)	88.5	
425 µm (No. 40)	83.3	
250 µm (No. 60)	73.4	
150 µm (No. 100)	61.5	
75 µm (No. 200)	48.5	

Gravel (%)
3.4

Sand (%)
48.1

Silt & Clay (%)
48.5

D60
0.102



Classification: SM Silty sand

General

Results: The test is for informational purposes.

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

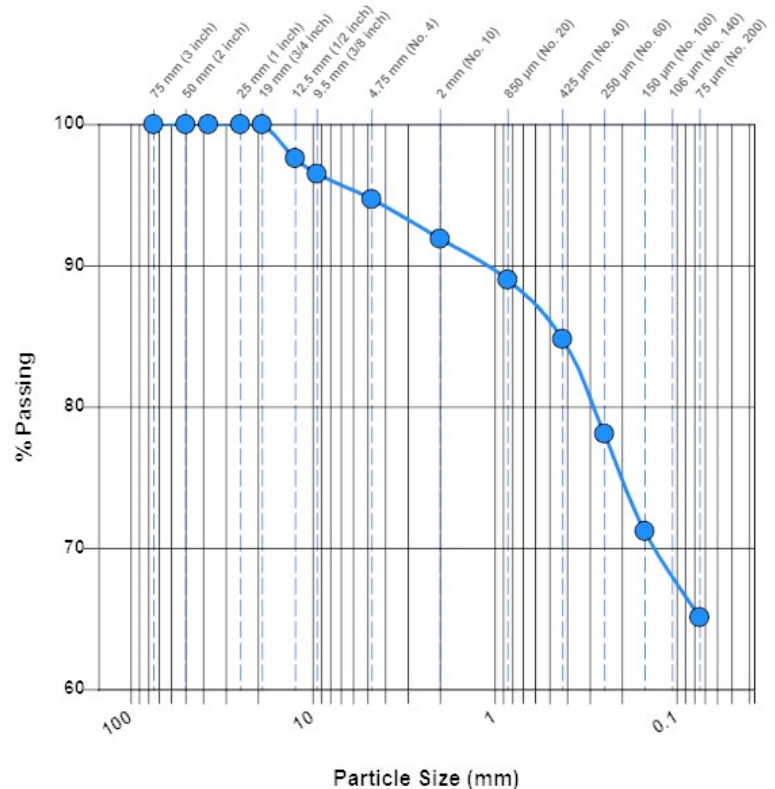
Sample Information

Sample Number:	310589	Depth (ft):	120-125
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	97.6	
9.5 mm (3/8 inch)	96.5	
4.75 mm (No. 4)	94.7	
2 mm (No. 10)	91.9	
850 µm (No. 20)	89.0	
425 µm (No. 40)	84.8	
250 µm (No. 60)	78.1	
150 µm (No. 100)	71.2	
75 µm (No. 200)	65.1	

Gravel (%)	Sand (%)	Silt & Clay (%)
5.3	29.6	65.1



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	310590	Depth (ft):	145-150
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

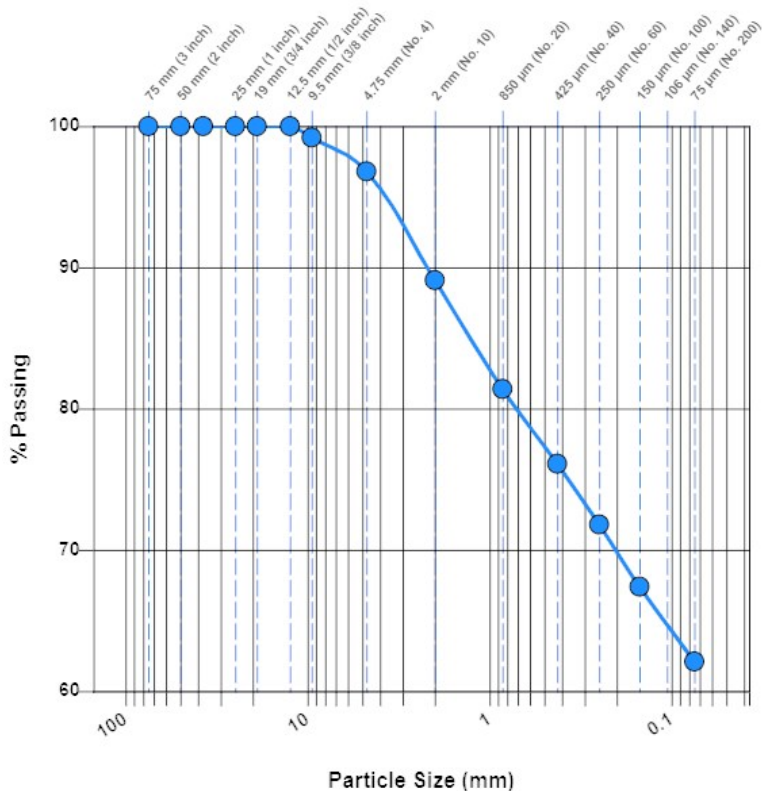
Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	99.2	
4.75 mm (No. 4)	96.8	
2 mm (No. 10)	89.1	
850 µm (No. 20)	81.4	
425 µm (No. 40)	76.1	
250 µm (No. 60)	71.8	
150 µm (No. 100)	67.4	
75 µm (No. 200)	62.1	

Gravel (%)
3.2

Sand (%)
34.7

Silt & Clay (%)
62.1



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	310591	Depth (ft):	185-190
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

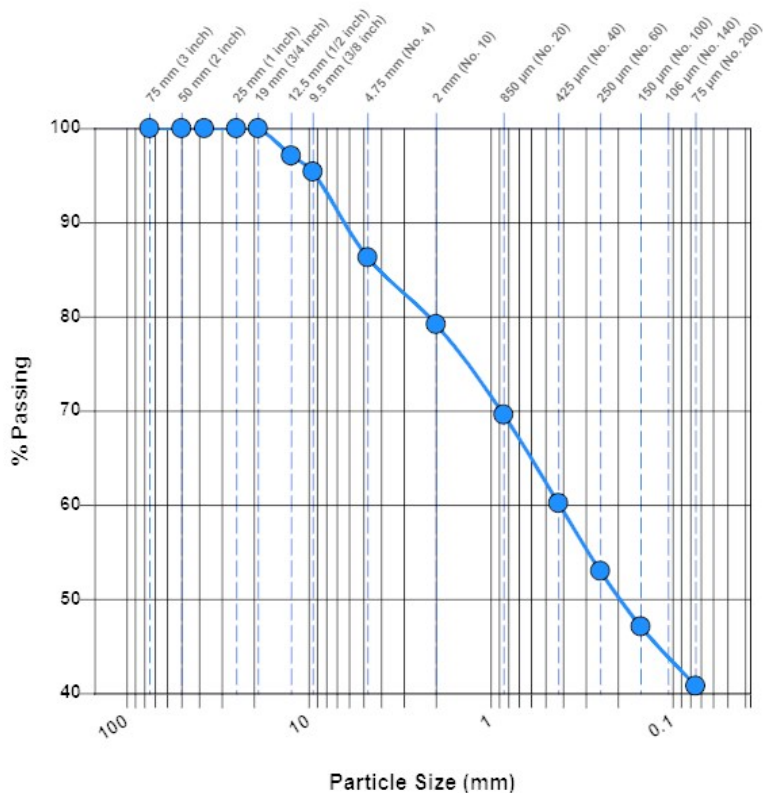
Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	97.1	
9.5 mm (3/8 inch)	95.4	
4.75 mm (No. 4)	86.3	
2 mm (No. 10)	79.2	
850 µm (No. 20)	69.6	
425 µm (No. 40)	60.2	
250 µm (No. 60)	53.0	
150 µm (No. 100)	47.1	
75 µm (No. 200)	40.8	

Gravel (%)
13.7

Sand (%)
45.5

Silt & Clay (%)
40.8

D60
0.420



Classification: SC Clayey sand

General

Results: The test is for informational purposes.

Streier, Jim

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318263	Alternate ID:	43-1-C-1 4 7.5'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	7.5
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 4 7.5		
Sample Date:	05/27/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100.0	
850 µm (No. 20)	99.5	
425 µm (No. 40)	71.6	
150 µm (No. 100)	7.9	
75 µm (No. 200)	5.4	

Gravel (%)
100.0

Silt & Clay (%)
5.4

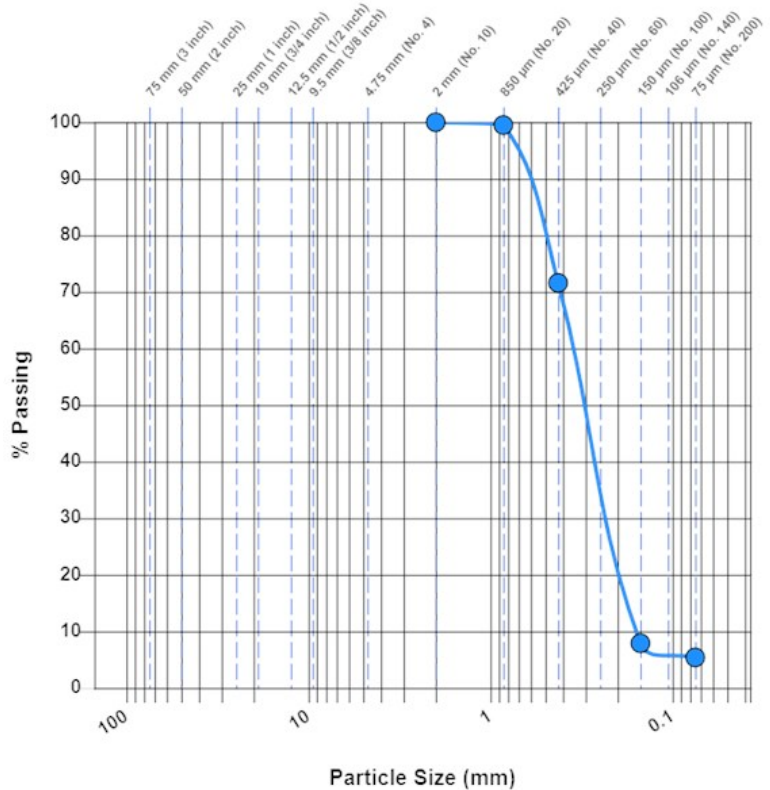
D10
0.153

D30
0.185

D60
0.232

C_u
1.52

C_c
0.96



Classification: SP-SM Poorly graded sand with silt

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318264	Alternate ID:	43-1-C-1 7 15'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	15
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 7 15'		
Sample Date:	05/27/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	100.0	
850 µm (No. 20)	99.0	
425 µm (No. 40)	62.4	
150 µm (No. 100)	8.4	
75 µm (No. 200)	5.3	

Sand (%)

94.7

Silt & Clay (%)

5.3

D10

0.153

D30

0.190

D60

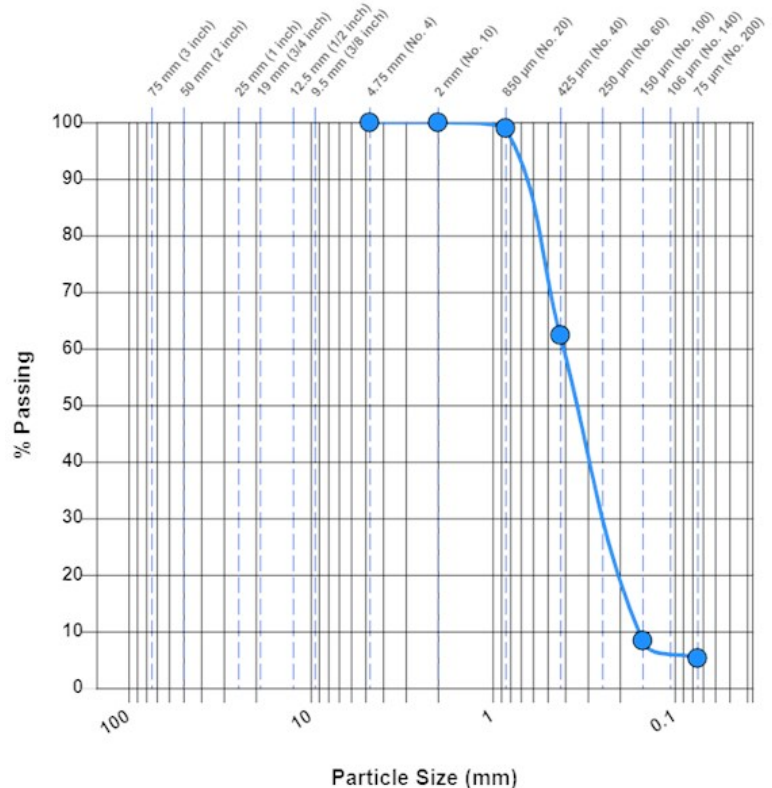
0.246

C_U

1.61

C_C

0.96



Classification: SP-SM Poorly graded sand with silt

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 191.6 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

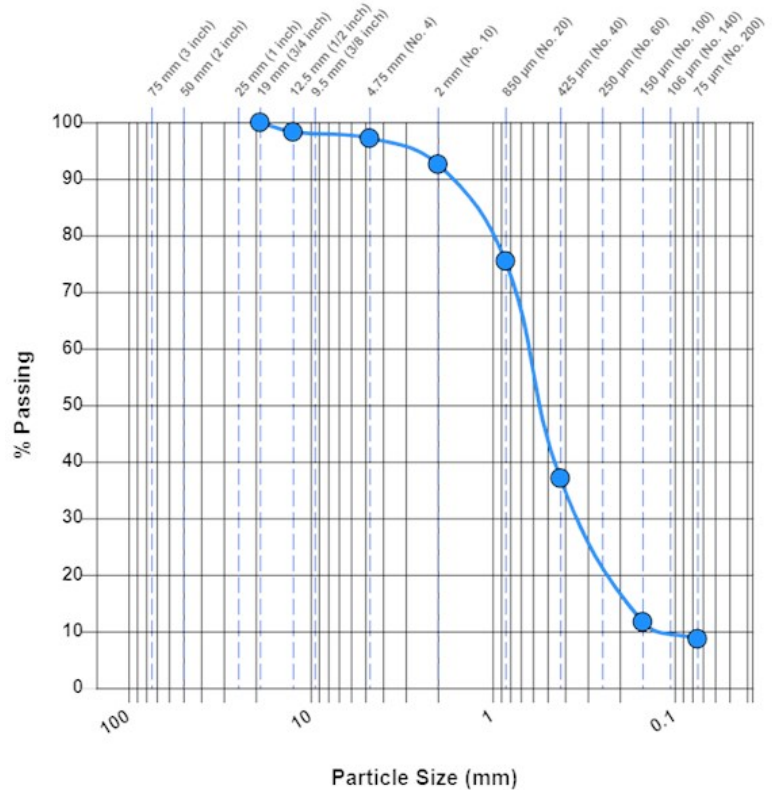
Sample Information

Sample Number:	318265	Alternate ID:	43-1-C-1 9 35'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	35
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 9 35'		
Sample Date:	05/27/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	98.3	
4.75 mm (No. 4)	97.2	
2 mm (No. 10)	92.6	
850 µm (No. 20)	75.5	
425 µm (No. 40)	37.1	
150 µm (No. 100)	11.7	
75 µm (No. 200)	8.7	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.8	88.5	8.7
D10	D30	D60
0.088	0.222	0.678
C_u	C_c	
7.70	0.83	



Classification: SP-SM Poorly graded sand with silt

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 290.9 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318266	Alternate ID:	43-1-C-1 11 45'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	45
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 11 45'		
Sample Date:	05/27/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	86.8	
9.5 mm (3/8 inch)	83.2	
4.75 mm (No. 4)	79.2	
2 mm (No. 10)	72.7	
850 µm (No. 20)	60.6	
425 µm (No. 40)	33.5	
150 µm (No. 100)	10.9	
75 µm (No. 200)	7.8	

Gravel (%)

20.8

Sand (%)

71.4

Silt & Clay (%)

7.8

D10

0.097

D30

0.235

D60

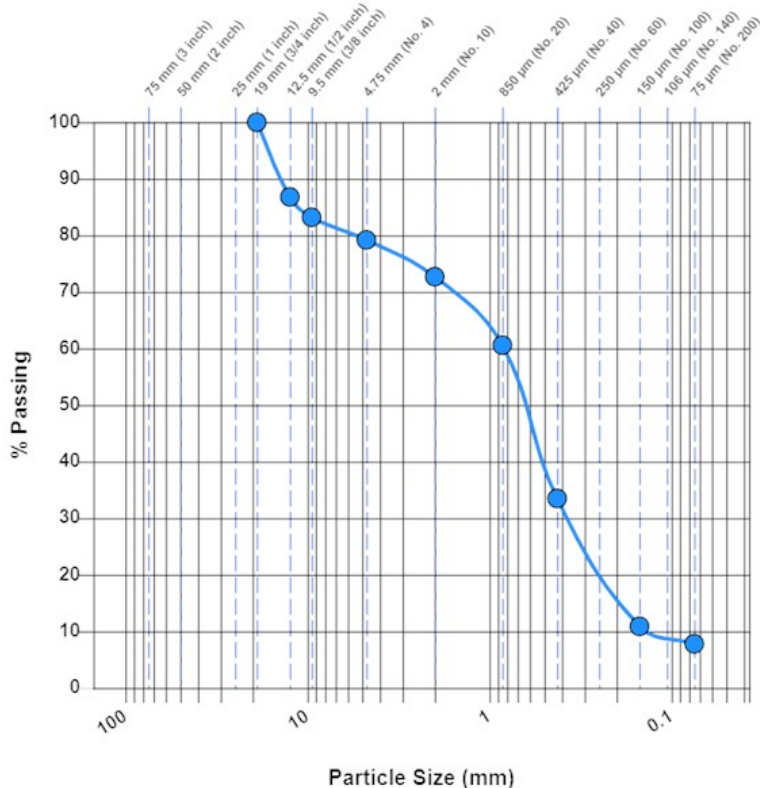
0.841

C_u

8.67

C_c

0.68



Classification: SP-SM Poorly graded sand with silt and gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 252.3 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

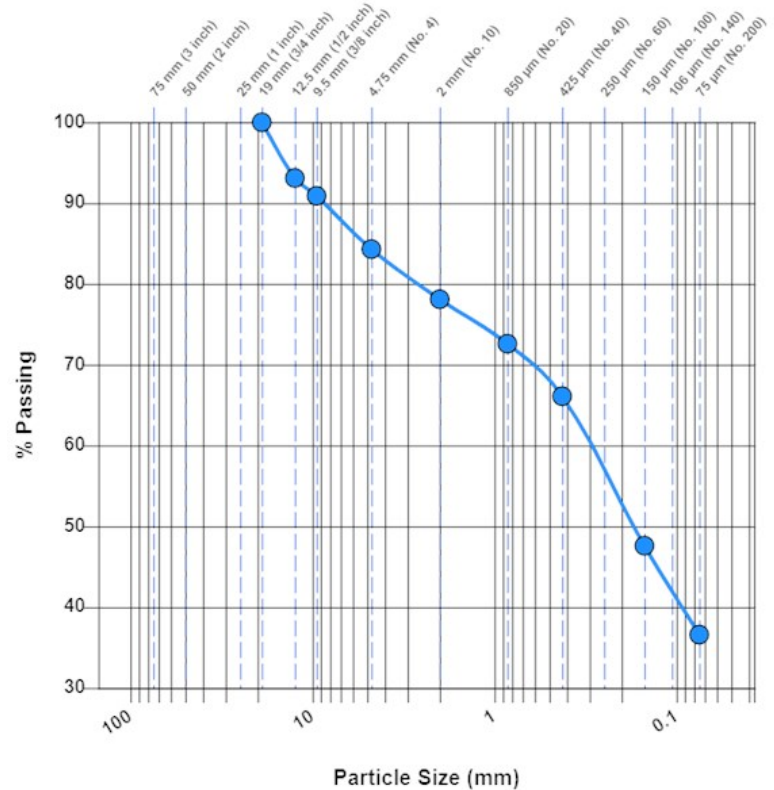
Sample Information

Sample Number:	318269	Alternate ID:	43-1-C-1 15 65'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	65
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 15 65'		
Sample Date:	05/28/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/26/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	93.1	
9.5 mm (3/8 inch)	90.9	
4.75 mm (No. 4)	84.3	
2 mm (No. 10)	78.1	
850 µm (No. 20)	72.6	
425 µm (No. 40)	66.1	
150 µm (No. 100)	47.6	
75 µm (No. 200)	36.6	

Gravel (%)	Sand (%)	Silt & Clay (%)
15.7	47.7	36.6
D60		
0.217		



Classification:	SP-SM Poorly graded sand with silt and gravel		
Specimen Obtained:	Oven Dry	Test Method:	Method A (Composite Sieving)
Dispersion Apparatus:	Shaking		

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 228.7

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

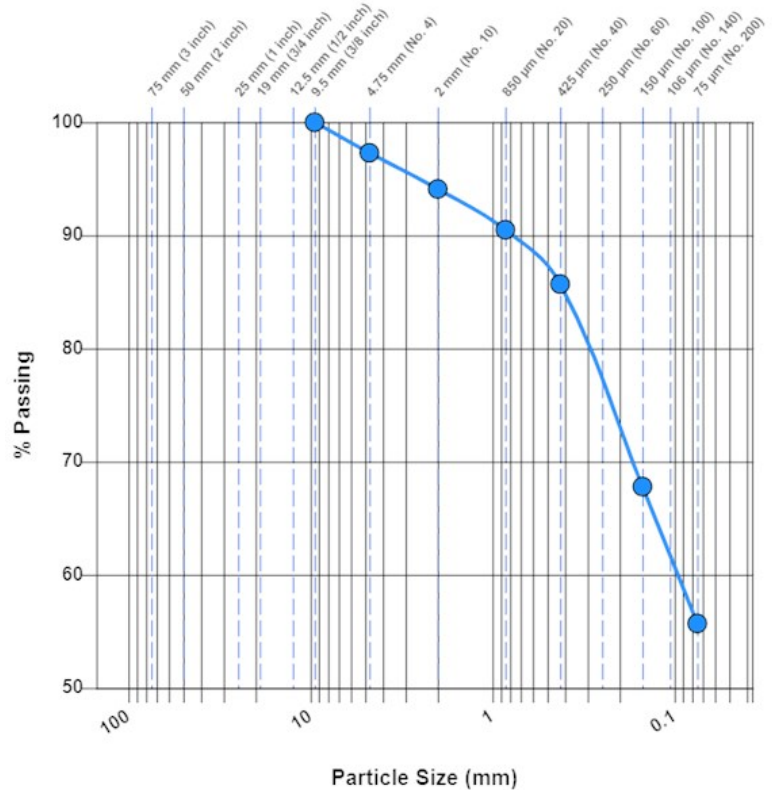
Sample Information

Sample Number:	318270	Alternate ID:	43-1-C-1 17 75'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	75
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 17 75'		
Sample Date:	05/28/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	97.3	
2 mm (No. 10)	94.1	
850 µm (No. 20)	90.5	
425 µm (No. 40)	85.7	
150 µm (No. 100)	67.8	
75 µm (No. 200)	55.7	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.7	41.6	55.7
D60		
0.086		



Classification: ML Sandy silt
Specimen Obtained: Oven Dry
Dispersion Apparatus: Shaking

Test Method: Method A (Composite Sieving)

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 246.6 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

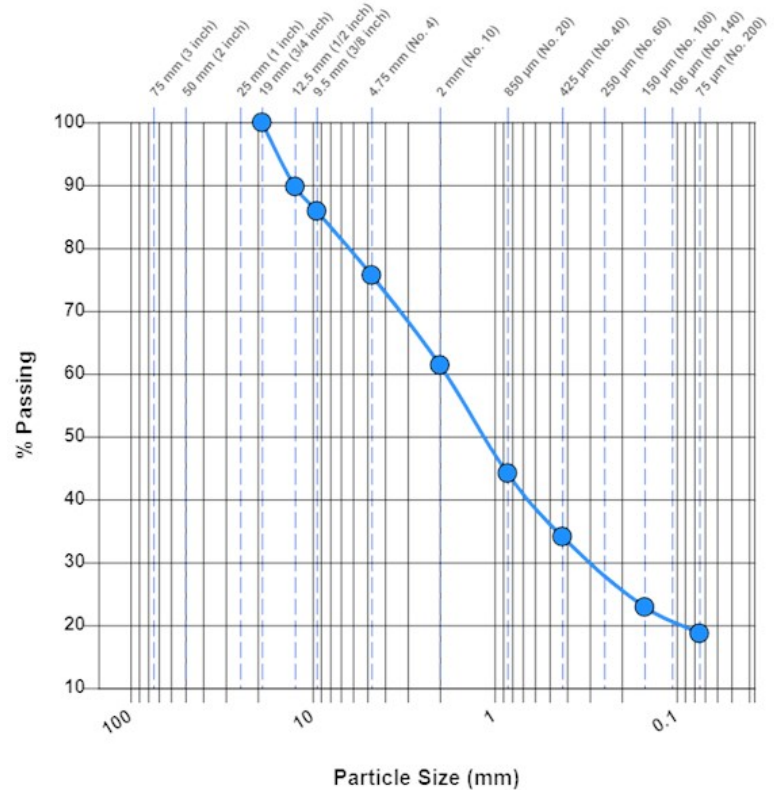
Sample Information

Sample Number:	318272	Alternate ID:	43-1-C-1 19 85'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	85
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 43-1-C-1 19 85'		
Sample Date:	06/02/2020		
Received Date:	06/25/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/29/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	89.8	
9.5 mm (3/8 inch)	85.9	
4.75 mm (No. 4)	75.7	
2 mm (No. 10)	61.4	
850 µm (No. 20)	44.2	
425 µm (No. 40)	34.1	
150 µm (No. 100)	22.9	
75 µm (No. 200)	18.7	

Gravel (%)	Sand (%)	Silt & Clay (%)
24.3	57.0	18.7
D30	D60	
0.213	1.906	



Classification:	SP-SM Poorly graded sand with silt and gravel		
Specimen Obtained:	Oven Dry	Test Method:	Method A (Composite Sieving)
Dispersion Apparatus:	Shaking		

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 327.3 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318749	Alternate ID:	44-1-C-1 4 7.5'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	7.5
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 4 7.5'		
Sample Date:	05/07/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

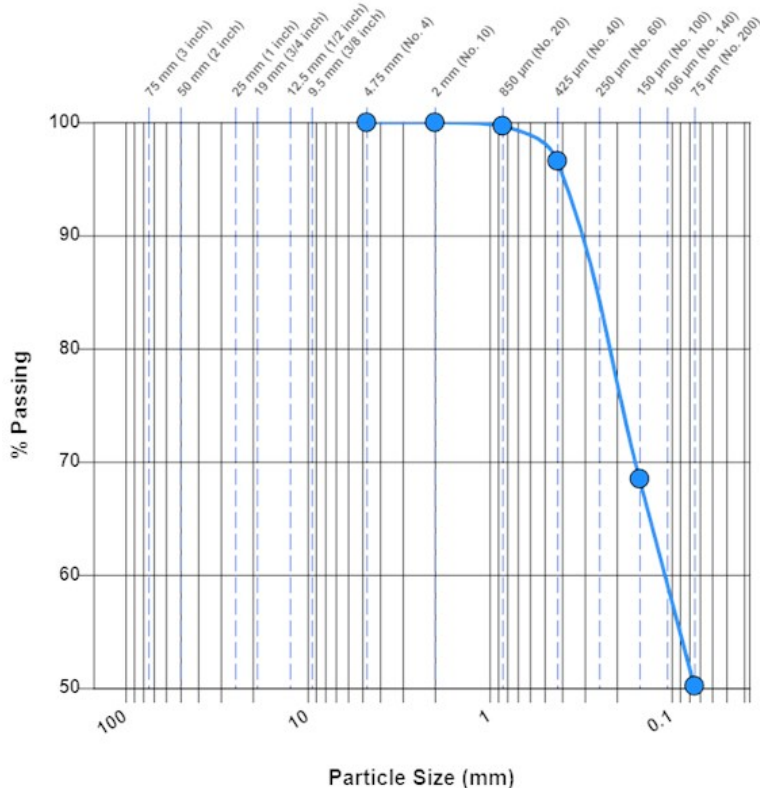
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	100.0	
850 µm (No. 20)	99.7	
425 µm (No. 40)	96.6	
150 µm (No. 100)	68.5	
75 µm (No. 200)	50.2	

Sand (%)
49.8

Silt & Clay (%)
50.2

D60
0.115



Classification: ML Sandy silt

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 283.5 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318751	Alternate ID:	44-1-C-1 9 20'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	20
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 9 20'		
Sample Date:	05/07/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

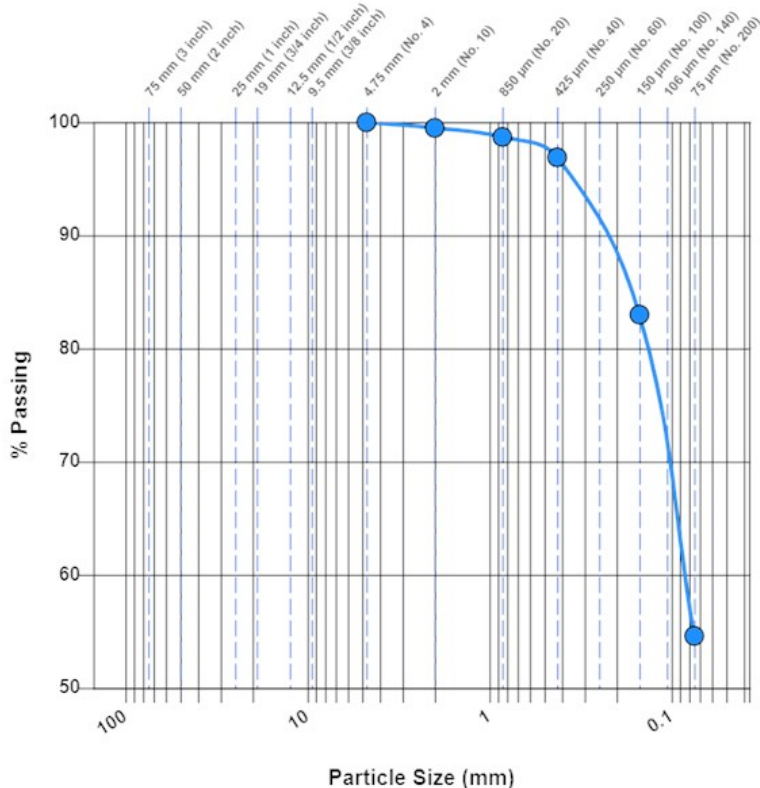
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	99.5	
850 µm (No. 20)	98.7	
425 µm (No. 40)	96.9	
150 µm (No. 100)	83.0	
75 µm (No. 200)	54.6	

Sand (%)
45.4

Silt & Clay (%)
54.6

D60
0.081



Classification: ML Sandy silt

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 257.5 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318752	Alternate ID:	44-1-C-1 12 35'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	35
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 12 35'		
Sample Date:	05/07/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

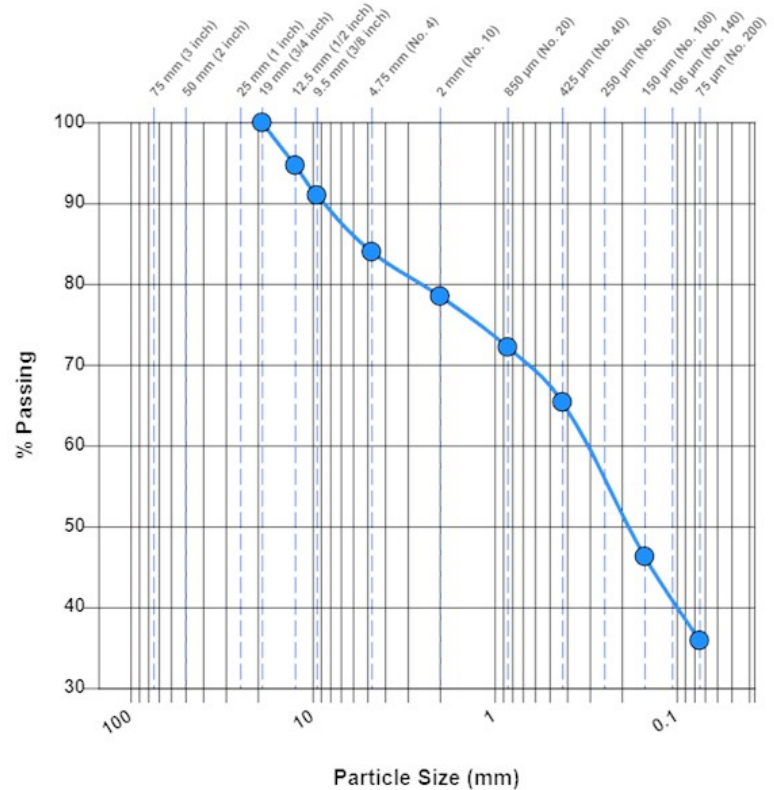
Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	94.7	
9.5 mm (3/8 inch)	91.0	
4.75 mm (No. 4)	84.0	
2 mm (No. 10)	78.5	
850 µm (No. 20)	72.2	
425 µm (No. 40)	65.4	
150 µm (No. 100)	46.3	
75 µm (No. 200)	35.9	

Gravel (%)
16.0

Sand (%)
48.1

Silt & Clay (%)
35.9

D60
0.347



Classification: SM Silty sand with gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 172.4 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

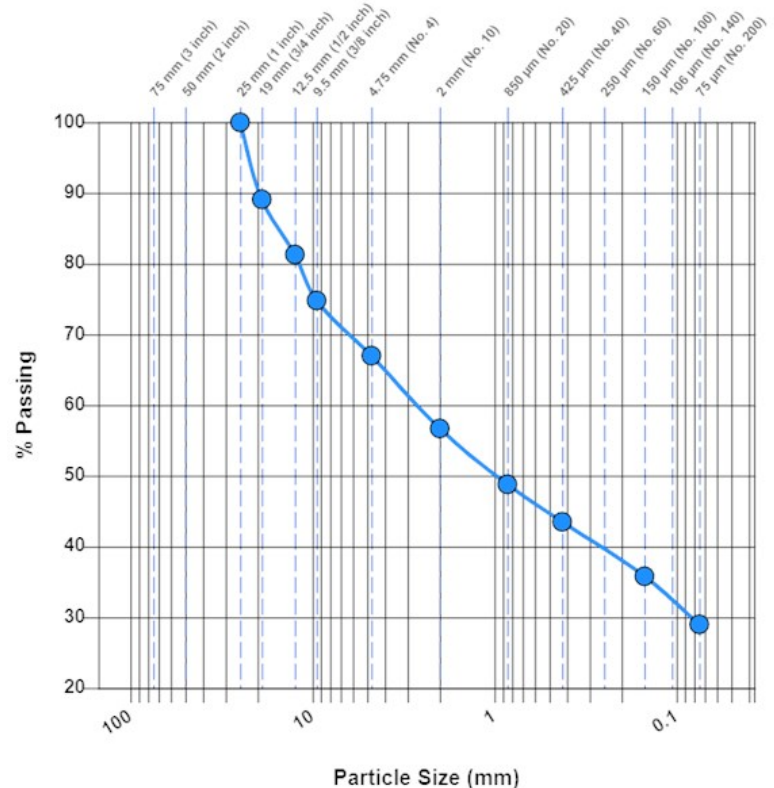
Sample Information

Sample Number:	318753	Alternate ID:	44-1-C-1 13 40'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	40
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 13 40'		
Sample Date:	05/11/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	89.1	
12.5 mm (1/2 inch)	81.3	
9.5 mm (3/8 inch)	74.8	
4.75 mm (No. 4)	67.0	
2 mm (No. 10)	56.7	
850 µm (No. 20)	48.8	
425 µm (No. 40)	43.5	
150 µm (No. 100)	35.8	
75 µm (No. 200)	29.0	

Gravel (%)	Sand (%)	Silt & Clay (%)
33.0	38.0	29.0
D30	D60	
0.080	2.881	



Classification: SM Silty sand with gravel
Specimen Obtained: Oven Dry
Dispersion Apparatus: Shaking

Test Method: Method A (Composite Sieving)

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 228.0 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318754	Alternate ID:	44-1-C-1 15 50'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	50
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 15 50'		
Sample Date:	05/11/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	88.3	
12.5 mm (1/2 inch)	79.5	
9.5 mm (3/8 inch)	75.2	
4.75 mm (No. 4)	69.4	
2 mm (No. 10)	58.6	
850 µm (No. 20)	37.2	
425 µm (No. 40)	24.3	
150 µm (No. 100)	17.0	
75 µm (No. 200)	14.2	

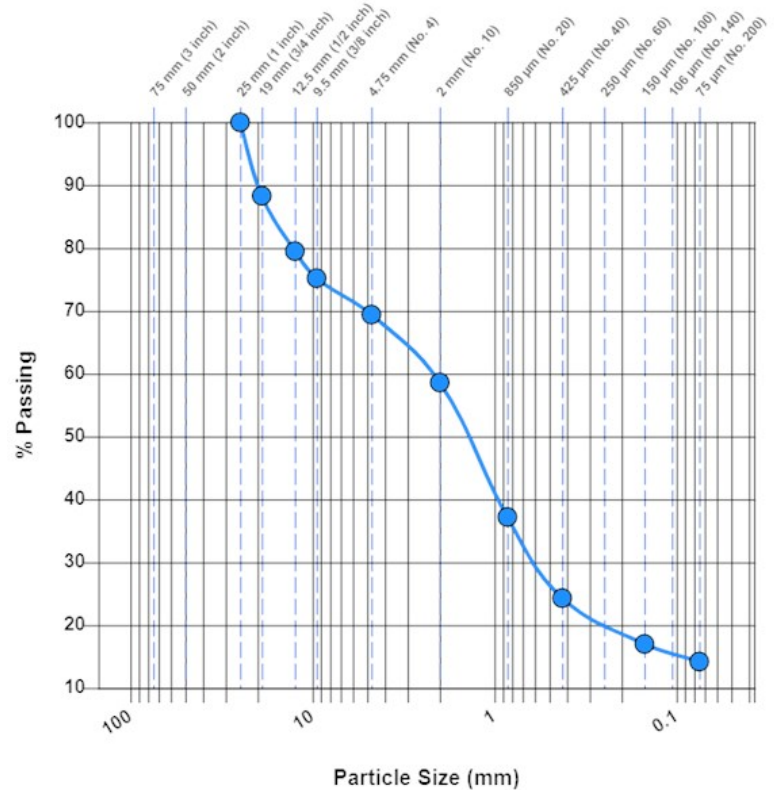
Gravel (%)
30.6

Sand (%)
55.2

Silt & Clay (%)
14.2

D30
0.613

D60
2.356



Classification: SP-SM Poorly graded sand with silt and gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 211.6 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318756	Alternate ID:	44-1-C-1 16 55'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	55
Boring Number:	44-1-C-1	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 44-1-C-1 Sample 16 55'		
Sample Date:	05/12/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	87.1	
12.5 mm (1/2 inch)	81.4	
9.5 mm (3/8 inch)	80.6	
4.75 mm (No. 4)	76.7	
2 mm (No. 10)	65.0	
850 µm (No. 20)	45.2	
425 µm (No. 40)	33.3	
150 µm (No. 100)	23.5	
75 µm (No. 200)	19.7	

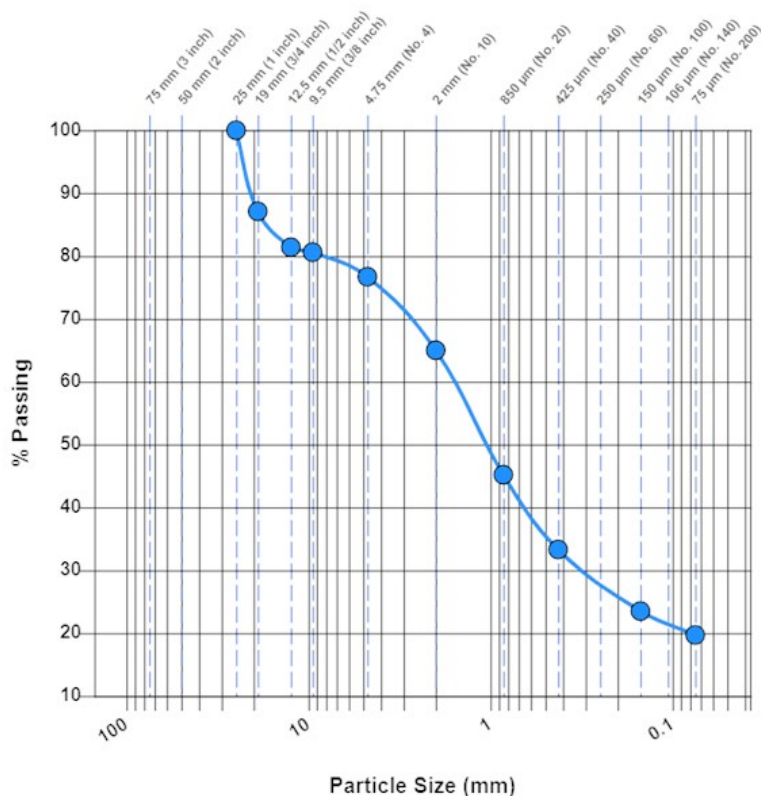
Gravel (%)
23.3

Sand (%)
57.0

Silt & Clay (%)
19.7

D30
0.332

D60
1.710



Classification: SM Silty sand with gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 259.5 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

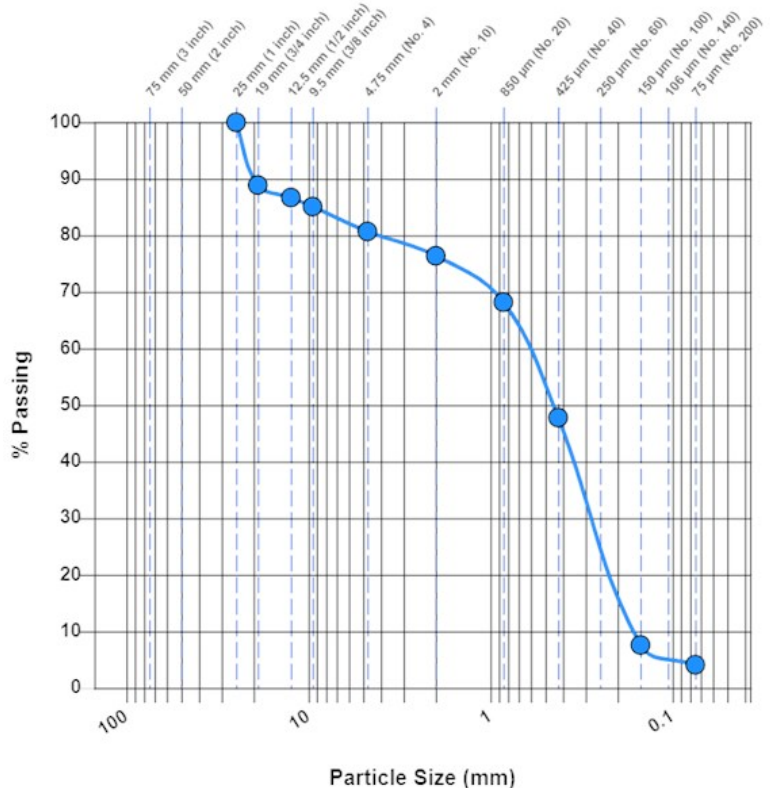
Sample Information

Sample Number:	318758	Alternate ID:	45-2-C 6 12.5'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	12.5
Boring Number:	45-2-C	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 45-2-C Sample 6 12.5'		
Sample Date:	04/23/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	88.9	
12.5 mm (1/2 inch)	86.7	
9.5 mm (3/8 inch)	85.1	
4.75 mm (No. 4)	80.7	
2 mm (No. 10)	76.4	
850 µm (No. 20)	68.2	
425 µm (No. 40)	47.8	
150 µm (No. 100)	7.6	
75 µm (No. 200)	4.1	

Gravel (%)	Sand (%)	Silt & Clay (%)
19.3	76.6	4.1
D10	D30	D60
0.156	0.206	0.679
C_u	C_c	
4.35	0.40	



Classification: SP Poorly graded sand with gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 329.0 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318760	Alternate ID:	45-2-C 12 35'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	35
Boring Number:	45-2-C	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 45-2-C Sample 12 35'		
Sample Date:	04/24/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	96.2	
12.5 mm (1/2 inch)	92.2	
9.5 mm (3/8 inch)	90.3	
4.75 mm (No. 4)	85.7	
2 mm (No. 10)	77.8	
850 µm (No. 20)	61.5	
425 µm (No. 40)	42.3	
150 µm (No. 100)	21.5	
75 µm (No. 200)	15.7	

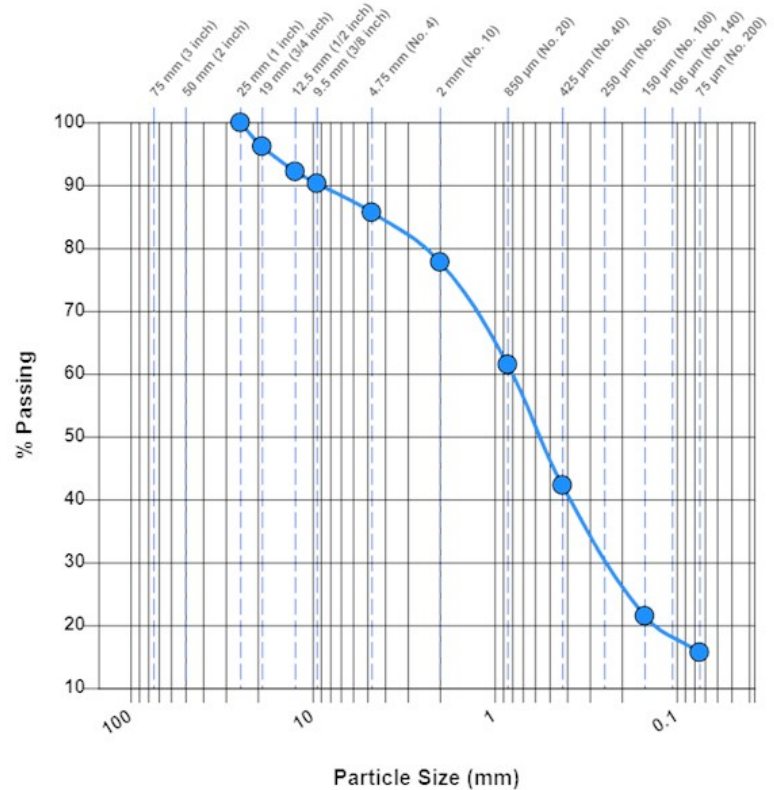
Gravel (%)
14.3

Sand (%)
70.0

Silt & Clay (%)
15.7

D30
0.262

D60
0.817



Classification: SM Silty sand

Specimen Obtained: Oven Dry

Dispersion Apparatus: Shaking

Test Method: Method A (Composite Sieving)

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 294.9 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number:	318762	Alternate ID:	45-2-C 14 45'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	45
Boring Number:	45-2-C	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 45-2-C Sample 14 45'		
Sample Date:	04/24/2020		
Received Date:	06/29/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	06/30/2020	Tested By:	Nelson, Brennan

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	84.2	
2 mm (No. 10)	35.6	
850 µm (No. 20)	14.6	
425 µm (No. 40)	9.2	
150 µm (No. 100)	5.2	
75 µm (No. 200)	4.2	

Gravel (%)

15.8

D10

0.488

C_u

6.93

Sand (%)

80.0

D30

1.693

C_c

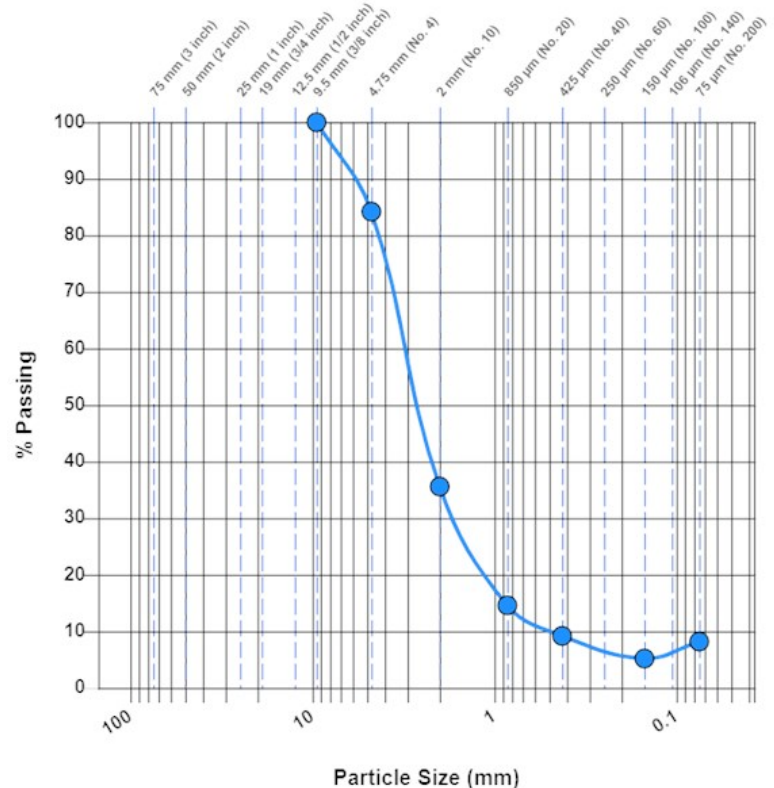
1.74

Silt & Clay (%)

4.2

D60

3.381



Classification: SP Poorly graded sand with gravel

Specimen Obtained: Oven Dry

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 220.8 grams

[Signature]

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

Sample Information

Sample Number:	395887	Depth (ft):	15
Boring Number:	SC-1	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	99.3	
2 mm (No. 10)	97.1	
850 µm (No. 20)	88.7	
425 µm (No. 40)	72.4	
250 µm (No. 60)	35.5	
150 µm (No. 100)	20.7	
75 µm (No. 200)	10.7	

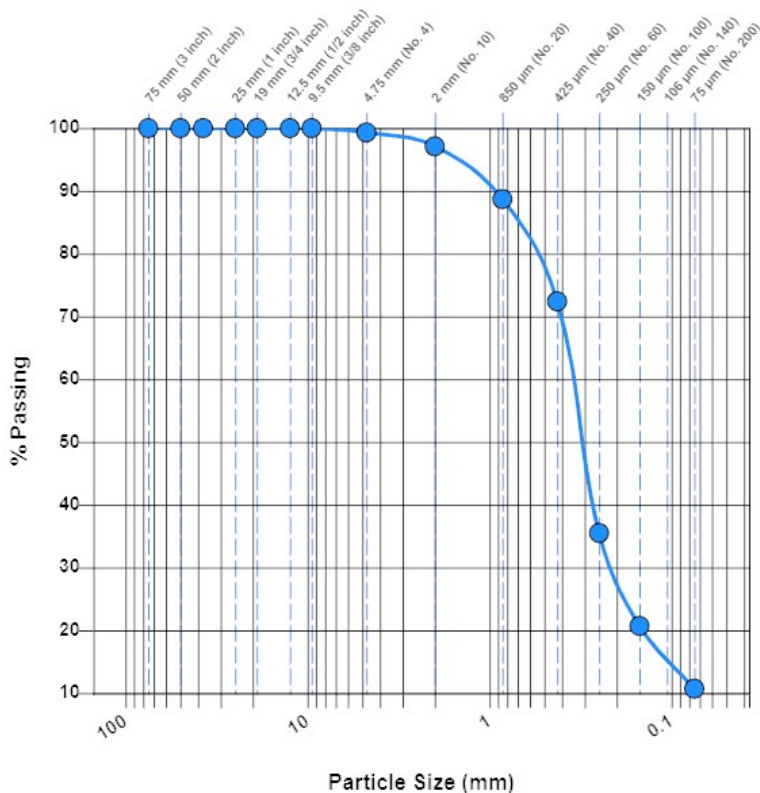
Gravel (%)
0.7

Sand (%)
88.6

Silt & Clay (%)
10.7

D30
0.213

D60
0.366



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

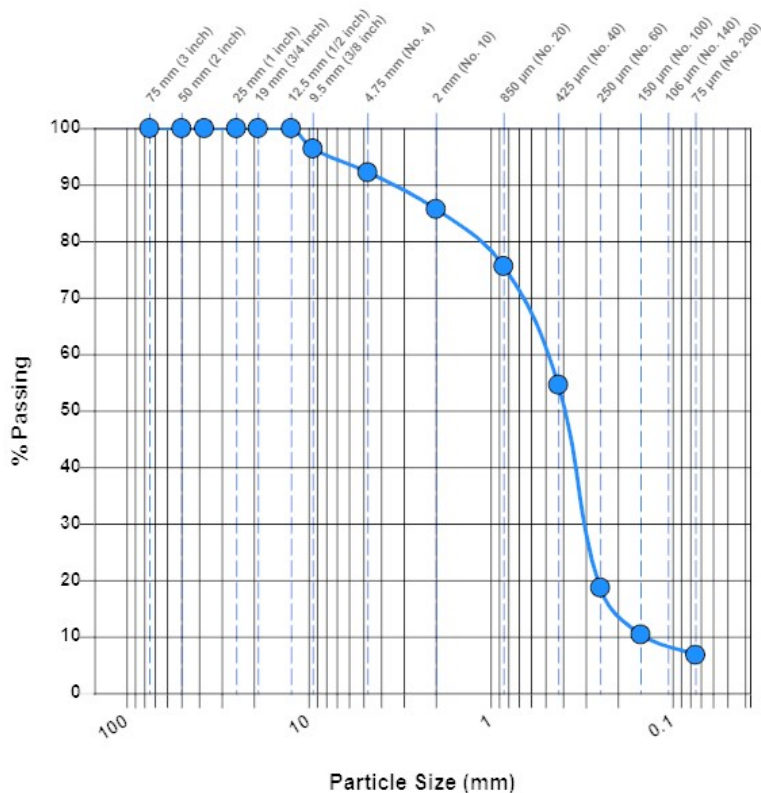
Sample Information

Sample Number:	395888	Depth (ft):	35
Boring Number:	SC-1	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	96.4	
4.75 mm (No. 4)	92.2	
2 mm (No. 10)	85.7	
850 µm (No. 20)	75.6	
425 µm (No. 40)	54.6	
250 µm (No. 60)	18.7	
150 µm (No. 100)	10.4	
75 µm (No. 200)	6.8	

Gravel (%)	Sand (%)	Silt & Clay (%)
7.8	85.4	6.8
D10	D30	D60
0.103	0.305	0.534
C_u	C_c	
5.18	1.69	



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

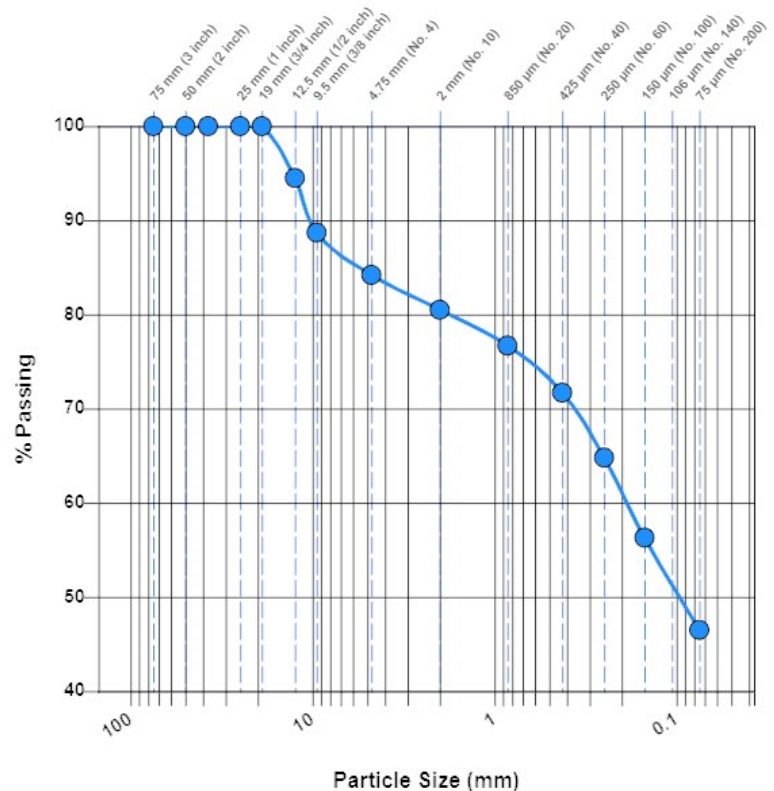
Sample Information

Sample Number:	395890	Depth (ft):	80
Boring Number:	SC-1	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	94.5	
9.5 mm (3/8 inch)	88.7	
4.75 mm (No. 4)	84.2	
2 mm (No. 10)	80.5	
850 µm (No. 20)	76.7	
425 µm (No. 40)	71.7	
250 µm (No. 60)	64.8	
150 µm (No. 100)	56.3	
75 µm (No. 200)	46.5	

Gravel (%)	Sand (%)	Silt & Clay (%)
15.8	37.7	46.5
D60		
0.194		



Classification: SC Clayey sand with gravel

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

Sample Information

Sample Number:	395891	Depth (ft):	100
Boring Number:	SC-1	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

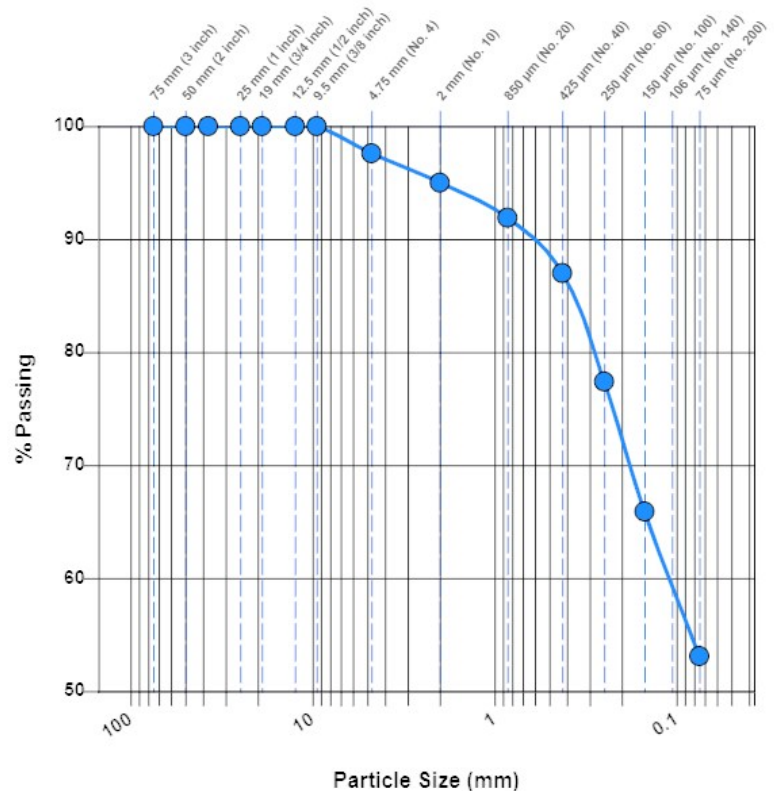
Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	97.6	
2 mm (No. 10)	95.0	
850 µm (No. 20)	91.9	
425 µm (No. 40)	87.0	
250 µm (No. 60)	77.4	
150 µm (No. 100)	65.9	
75 µm (No. 200)	53.1	

Gravel (%)
2.4

Sand (%)
44.5

Silt & Clay (%)
53.1

D60
0.092



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

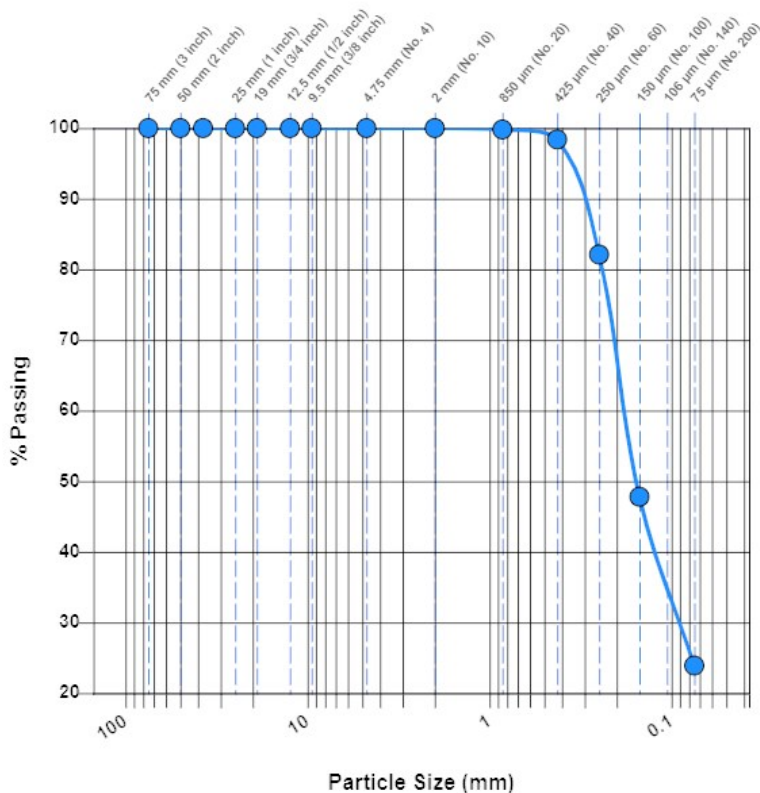
Sample Information

Sample Number:	395892	Depth (ft):	10
Boring Number:	SC-2	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
2 mm (No. 10)	100.0	
850 µm (No. 20)	99.8	
425 µm (No. 40)	98.4	
250 µm (No. 60)	82.1	
150 µm (No. 100)	47.8	
75 µm (No. 200)	23.9	

Sand (%)	Silt & Clay (%)
76.1	23.9
D30	D60
0.083	0.186



Classification: SM Silty sand

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

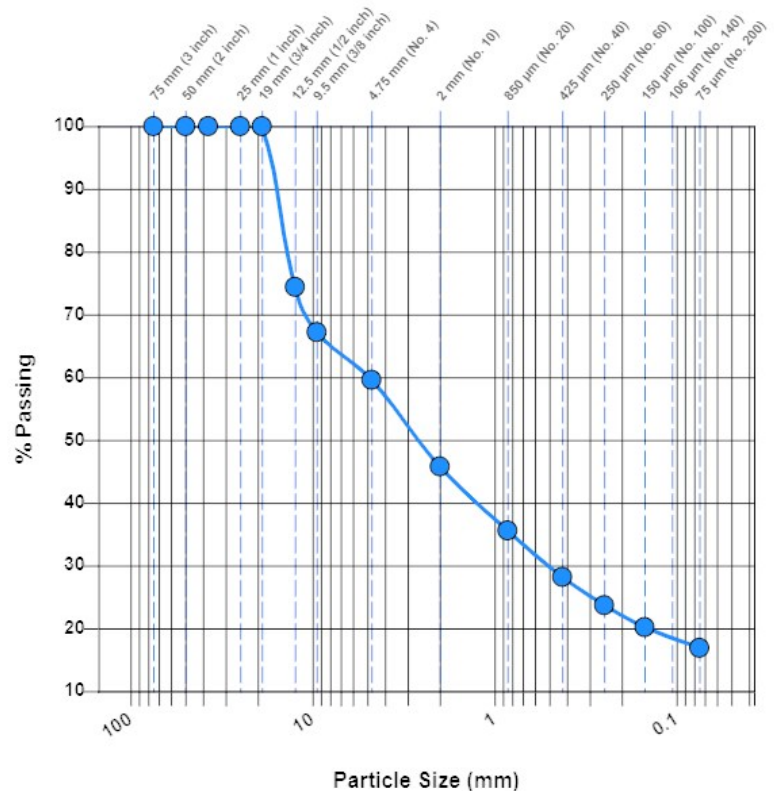
Sample Information

Sample Number:	395893	Depth (ft):	40
Boring Number:	SC-2	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	74.4	
9.5 mm (3/8 inch)	67.2	
4.75 mm (No. 4)	59.6	
2 mm (No. 10)	45.8	
850 µm (No. 20)	35.6	
425 µm (No. 40)	28.2	
250 µm (No. 60)	23.7	
150 µm (No. 100)	20.2	
75 µm (No. 200)	16.9	

Gravel (%)	Sand (%)	Silt & Clay (%)
40.4	42.7	16.9
D30	D60	
0.528	5.000	



Classification: SC Clayey sand with gravel

General

Results: The test is for informational purposes.

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:
Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

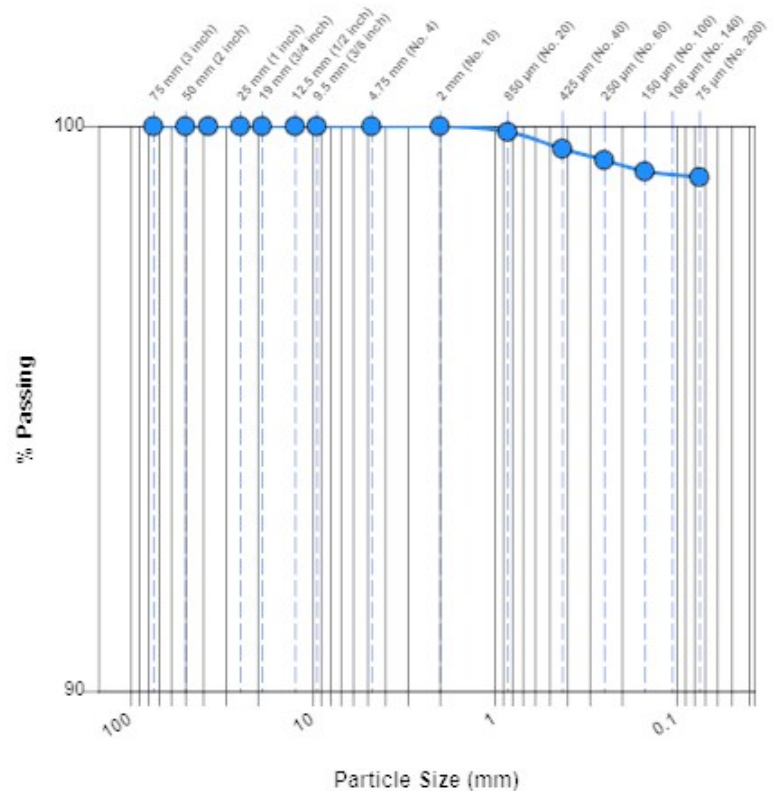
Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

Sample Information

Sample Number:	398015	Depth (ft):	60
Boring Number:	SC-4	Sampled By:	Drill Crew
Sample Date:	08/11/2021		
Received Date:	08/19/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/19/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
75 mm (3 inch)	100.0	
50 mm (2 inch)	100.0	
37.5 mm (1.5 inch)	100.0	
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	100.0	
850 µm (No. 20)	99.9	
425 µm (No. 40)	99.6	
250 µm (No. 60)	99.4	
150 µm (No. 100)	99.2	
75 µm (No. 200)	99.1	



Gravel (%)	Sand (%)	Silt & Clay (%)
0.0	0.9	99.1

D10	D30	D60
------------	------------	------------

C_u	C_c
----------------------	----------------------

Classification: ML Silt

General

Results: The test is for informational purposes.

Remarks:

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318263 **Alternate ID:** 43-1-C-1 4 7.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 4 7.5
Sample Date: 05/27/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	4	7.5	7.0

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318264 **Alternate ID:** 43-1-C-1 7 15'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 7 15'
Sample Date: 05/27/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	7	15.0	22.3

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318265 **Alternate ID:** 43-1-C-1 9 35'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 9 35'
Sample Date: 05/27/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	9	35.0	13.5

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318266 **Alternate ID:** 43-1-C-1 11 45'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 11 45'
Sample Date: 05/27/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	11	45.0	17.7

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318269 **Alternate ID:** 43-1-C-1 15 65'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 15 65'
Sample Date: 05/28/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/26/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	15	65.0	14.0

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318270 **Alternate ID:** 43-1-C-1 17 75'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 17 75'
Sample Date: 05/28/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	17	75.0	11.2

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318272 **Alternate ID:** 43-1-C-1 19 85'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 43-1-C-1 19 85'
Sample Date: 06/02/2020
Received Date: 06/25/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
43-1-C-1	19	85.0	12.0

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318749 **Alternate ID:** 44-1-C-1 4 7.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 4 7.5'
Sample Date: 05/07/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	4	7.5	17.5

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318751 **Alternate ID:** 44-1-C-1 9 20'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 9 20'
Sample Date: 05/07/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/29/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	9	20.0	20.6

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318752 **Alternate ID:** 44-1-C-1 12 35'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 12 35'
Sample Date: 05/07/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	12	35.0	11.7

General

Results: The test was not able to be completed.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318753 **Alternate ID:** 44-1-C-1 13 40'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 13 40'
Sample Date: 05/11/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	13	40.0	12.3

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318754 **Alternate ID:** 44-1-C-1 15 50'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 15 50'
Sample Date: 05/11/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	15	50.0	12.2

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318756 **Alternate ID:** 44-1-C-1 16 55'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 44-1-C-1 Sample 16 55'
Sample Date: 05/12/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
44-1-C-1	16	55.0	13.1

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318758 **Alternate ID:** 45-2-C 6 12.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 45-2-C Sample 6 12.5'
Sample Date: 04/23/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
45-2-C	6	12.5	2.1

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318760 **Alternate ID:** 45-2-C 12 35'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 45-2-C Sample 12 35'
Sample Date: 04/24/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
45-C-2	12	35.0	12.0

General

Results: The test is for informational purposes.



Moisture Content Of Soil

7/6/2020

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

ASTM D2216

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

Sample Information

Sample Number: 318762 **Alternate ID:** 45-2-C 14 45'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 45-2-C Sample 14 45'
Sample Date: 04/24/2020
Received Date: 06/29/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/30/2020 **Tested By:** Nelson, Brennan

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
45-2-C	14	45.0	16.2

General

Results: The test is for informational purposes.



11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

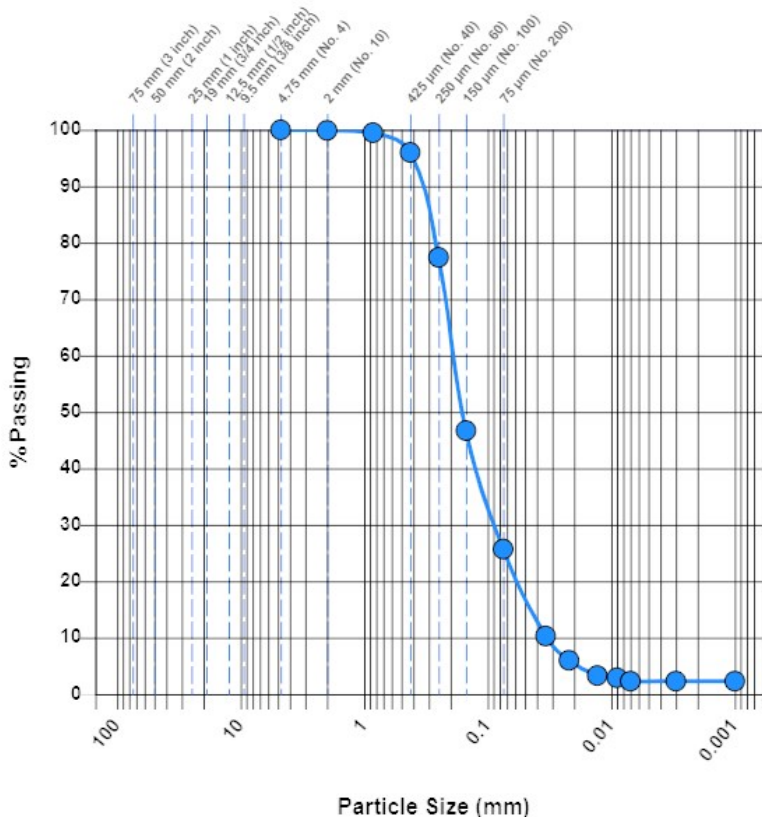
Sample Information

Sample Number:	310573	Depth (ft):	60
Boring Number:	42-1-C-1	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/29/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.9	-
850 µm (No. 20)	99.5	-
425 µm (No. 40)	96.0	-
250 µm (No. 60)	77.4	-
150 µm (No. 100)	46.7	-
75 µm (No. 200)	25.7	-
33.8 (µm)	10.3	-
22.1 (µm)	6.0	-
13.0 (µm)	3.3	-
9.2 (µm)	2.9	-
6.5 (µm)	2.3	-
3.2 (µm)	2.3	-
1.3 (µm)	2.3	-



Soil Classification: SM Silty sand

Gravel (%):	0.0	Sand (%):	74.3	Silt (%):	23.4	Clay (%):	2.3		
D₆₀ (µm):	193.3	D₃₀ (µm):	90.4	D₁₀ (µm):	33.2	C_u:	5.82	C_c:	1.27

General

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

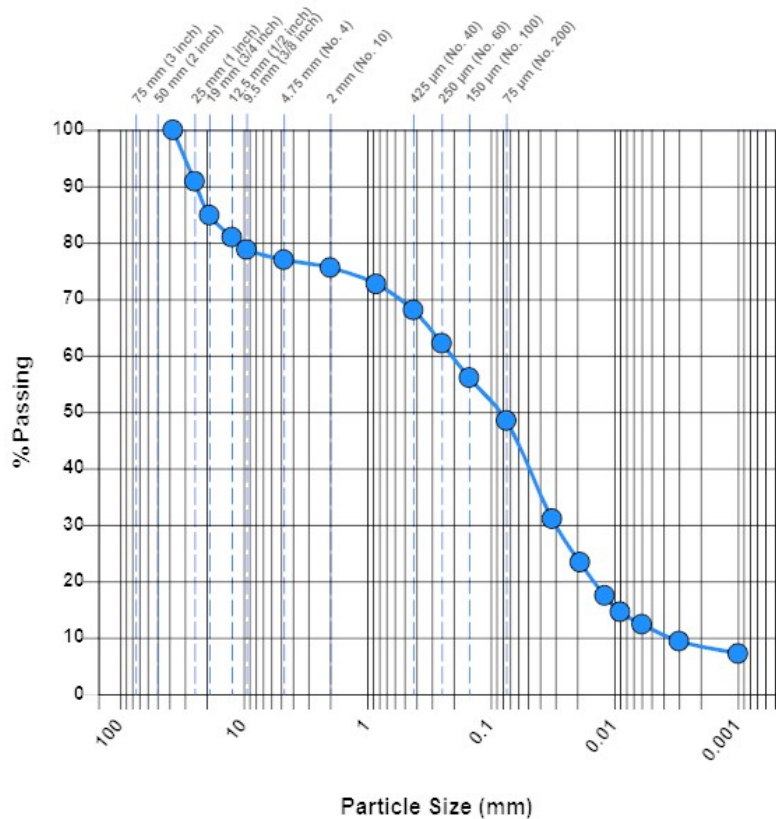
Sample Information

Sample Number:	320992	Depth (ft):	55
Boring Number:	43-1-C-1	Sampled By:	Drill Crew
Sample Date:	06/23/2020		
Received Date:	07/09/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/10/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
37.5 mm (1.5 inch)	100.0	-
25 mm (1 inch)	90.9	-
19 mm (3/4 inch)	84.9	-
12.5 mm (1/2 inch)	81.0	-
9.5 mm (3/8 inch)	78.8	-
4.75 mm (No. 4)	77.0	-
2 mm (No. 10)	75.6	-
850 µm (No. 20)	72.7	-
425 µm (No. 40)	68.1	-
250 µm (No. 60)	62.2	-
150 µm (No. 100)	56.1	-
75 µm (No. 200)	48.5	-
31.7 µm	31.1	-
19.0 µm	23.4	-
12.3 µm	17.5	-
8.8 µm	14.6	-
6.3 µm	12.4	-
3.1 µm	9.4	-
1.3 µm	7.2	-



Soil Classification: SC-SM Silty clayey sand with gravel

Gravel (%):	23.0	Sand (%):	28.5	Silt (%):	37.1	Clay (%):	11.4		
D₆₀ (µm):	213.9	D₃₀ (µm):	30.1	D₁₀ (µm):	3.6	C_u:	59.42	C_c:	1.18

General

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

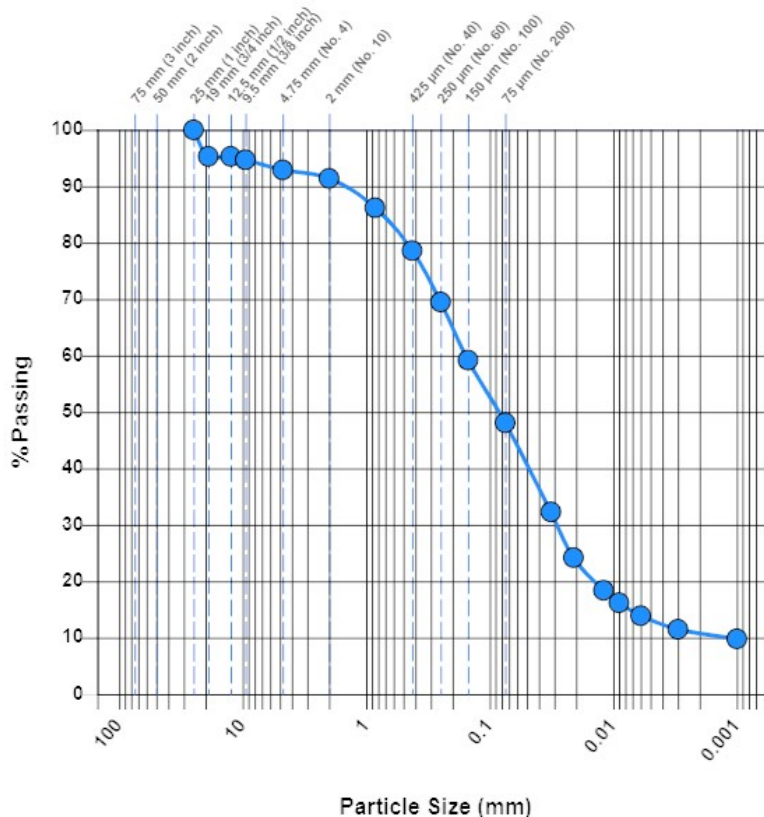
Sample Information

Sample Number:	320971	Depth (ft):	75
Boring Number:	45-2-C	Sampled By:	Drill Crew
Sample Date:	06/23/2020		
Received Date:	07/09/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/10/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
25 mm (1 inch)	100.0	-
19 mm (3/4 inch)	95.3	-
12.5 mm (1/2 inch)	95.3	-
9.5 mm (3/8 inch)	94.7	-
4.75 mm (No. 4)	92.9	-
2 mm (No. 10)	91.4	-
850 µm (No. 20)	86.2	-
425 µm (No. 40)	78.6	-
250 µm (No. 60)	69.5	-
150 µm (No. 100)	59.2	-
75 µm (No. 200)	48.1	-
32.2 (µm)	32.3	-
21.0 (µm)	24.2	-
12.4 (µm)	18.4	-
8.8 (µm)	16.2	-
6.3 (µm)	13.9	-
3.1 (µm)	11.5	-
1.4 (µm)	9.8	-



Soil Classification: SC-SM Silty clayey sand

Gravel (%):	7.1	Sand (%):	44.8	Silt (%):	35.0	Clay (%):	13.1		
D₆₀ (µm):	157.8	D₃₀ (µm):	28.9	D₁₀ (µm):	1.2	C_u:	131.50	C_c:	4.41

General

Streier, Jim

11001 Hampshire Avenue S
Minneapolis, MN 55438
Phone: 952-995-2000

Client:

Enbridge Energy, Limited Partnership
Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
near Mellen, WI

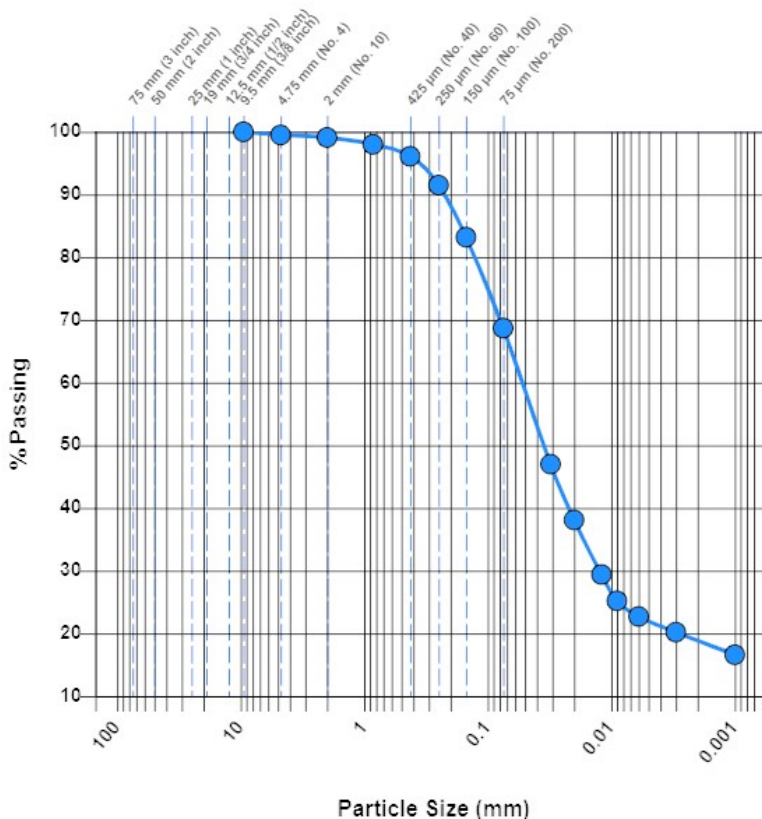
Sample Information

Sample Number:	320973	Depth (ft):	95
Boring Number:	45-2-C	Sampled By:	Drill Crew
Sample Date:	06/23/2020		
Received Date:	07/09/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/10/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.5	-
2 mm (No. 10)	99.1	-
850 µm (No. 20)	98.0	-
425 µm (No. 40)	96.1	-
250 µm (No. 60)	91.5	-
150 µm (No. 100)	83.2	-
75 µm (No. 200)	68.7	-
31.0 (µm)	47.0	-
20.3 (µm)	38.1	-
12.1 (µm)	29.4	-
8.6 (µm)	25.2	-
6.2 (µm)	22.7	-
3.0 (µm)	20.2	-
1.3 (µm)	16.6	-



Gravel (%):	0.5	Sand (%):	30.8	Silt (%):	46.8	Clay (%):	21.9
D₆₀ (µm):	57.4	D₃₀ (µm):	12.6				

General

Streier, Jim

4511 West First Street
Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

Lake Superior Consulting, LLC
130 West Superior Street
Suite 500
Duluth, MN 55802

Project:

B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

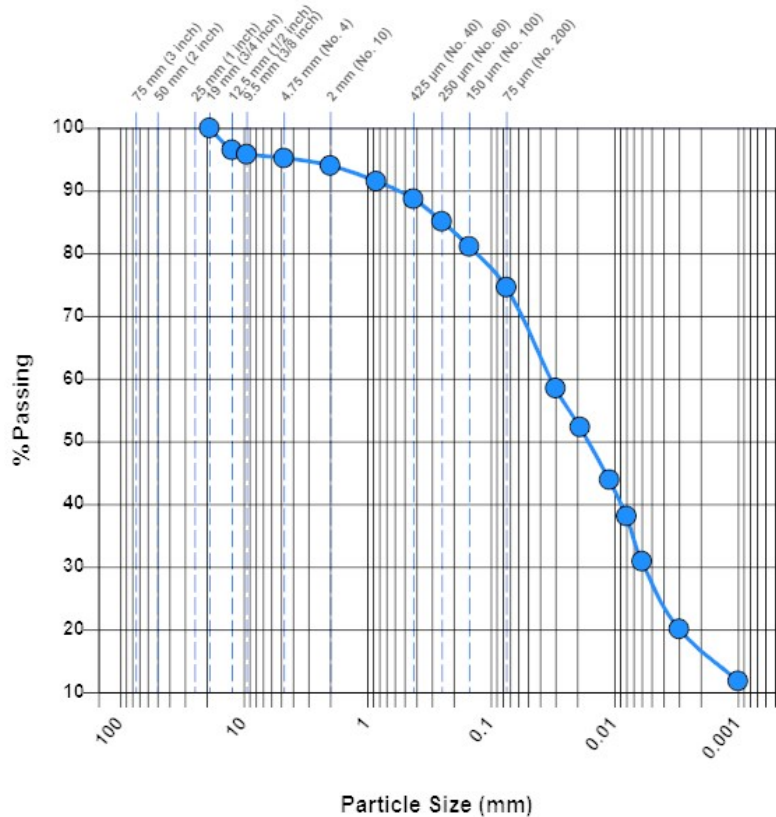
Sample Information

Sample Number:	395895	Depth (ft):	55
Boring Number:	SC-1	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
12.5 mm (1/2 inch)	96.5	-
9.5 mm (3/8 inch)	95.8	-
4.75 mm (No. 4)	95.2	-
2 mm (No. 10)	94.0	-
850 µm (No. 20)	91.5	-
425 µm (No. 40)	88.7	-
250 µm (No. 60)	85.1	-
150 µm (No. 100)	81.1	-
75 µm (No. 200)	74.6	-
29.6 (µm)	58.5	-
19.2 (µm)	52.3	-
11.4 (µm)	43.9	-
8.3 (µm)	38.1	-
6.0 (µm)	30.9	-
3.0 (µm)	20.1	-
1.3 (µm)	11.8	-



Soil Classification: CL-ML Silty clay with sand

Gravel (%):	4.8	Sand (%):	20.6	Silt (%):	47.3	Clay (%):	27.3
D₆₀ (µm):	34.2	D₃₀ (µm):	5.8				

General

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Duluth, MN 55807
Phone: 218-624-4967

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130 West Superior Street
Suite 500
Duluth, MN 55802

Project:

B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

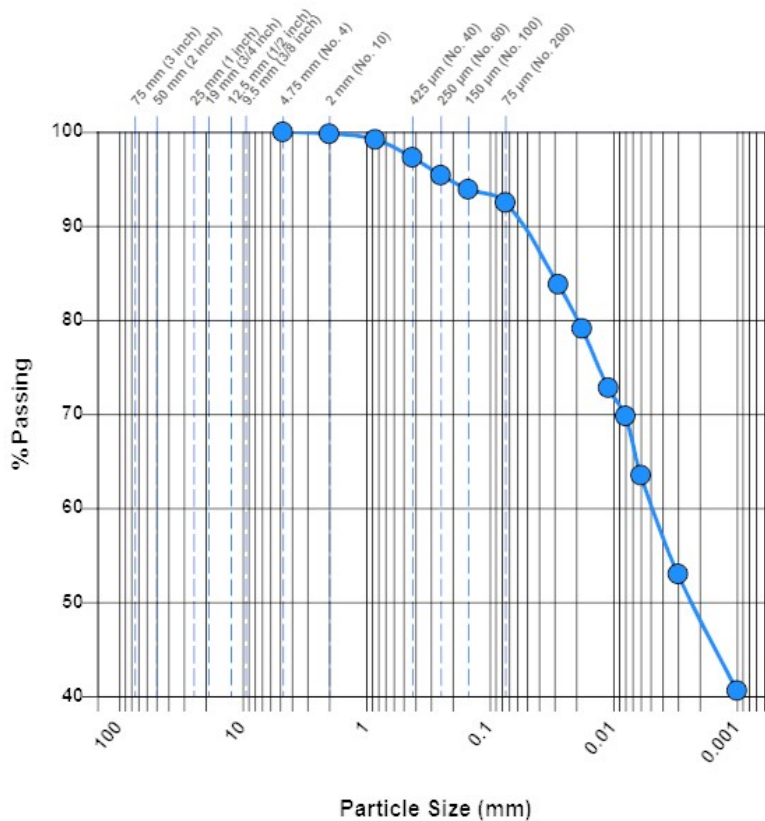
Sample Information

Sample Number:	395896	Depth (ft):	25
Boring Number:	SC-2	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.8	-
850 µm (No. 20)	99.2	-
425 µm (No. 40)	97.3	-
250 µm (No. 60)	95.4	-
150 µm (No. 100)	93.9	-
75 µm (No. 200)	92.5	-
28.2 (µm)	83.8	-
18.2 (µm)	79.1	-
10.7 (µm)	72.8	-
7.7 (µm)	69.8	-
5.5 (µm)	63.5	-
2.8 (µm)	53.0	-
1.2 (µm)	40.6	-



Soil Classification: CL Lean clay

Gravel (%):	0.0	Sand (%):	7.5	Silt (%):	32.5	Clay (%):	60.0
D₆₀ (µm):	5.0						

General

4511 West First Street
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Duluth, MN 55802

Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

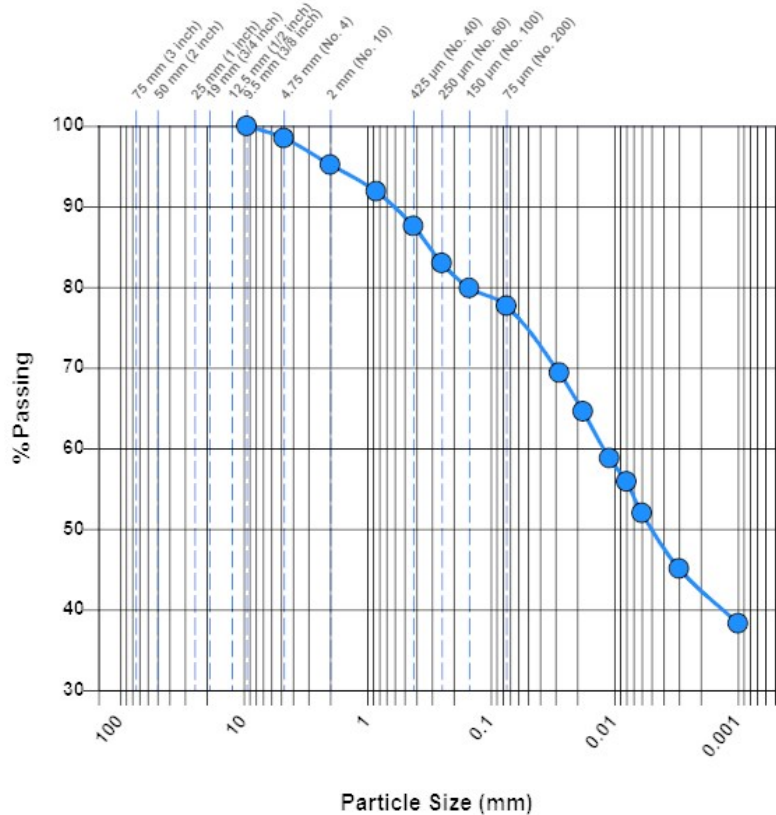
Sample Information

Sample Number:	395897	Depth (ft):	30
Boring Number:	SC-2	Sampled By:	Drill Crew
Sample Date:	07/27/2021		
Received Date:	08/11/2021	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	08/11/2021	Tested By:	Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	98.5	-
2 mm (No. 10)	95.2	-
850 µm (No. 20)	91.9	-
425 µm (No. 40)	87.6	-
250 µm (No. 60)	83.0	-
150 µm (No. 100)	79.9	-
75 µm (No. 200)	77.7	-
28.3 (µm)	69.4	-
18.3 (µm)	64.6	-
10.8 (µm)	58.8	-
7.7 (µm)	55.9	-
5.6 (µm)	52.0	-
2.8 (µm)	45.1	-
1.2 (µm)	38.3	-



Soil Classification: CH Fat clay with sand

Gravel (%):	1.5	Sand (%):	20.8	Silt (%):	28.0	Clay (%):	49.7
D₆₀ (µm):	12.4						

General

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Suite 4
Duluth, MN 55807
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Project:
B2104465
Enbridge Line 5 Silver Creek
Near Mellen, Wisconsin

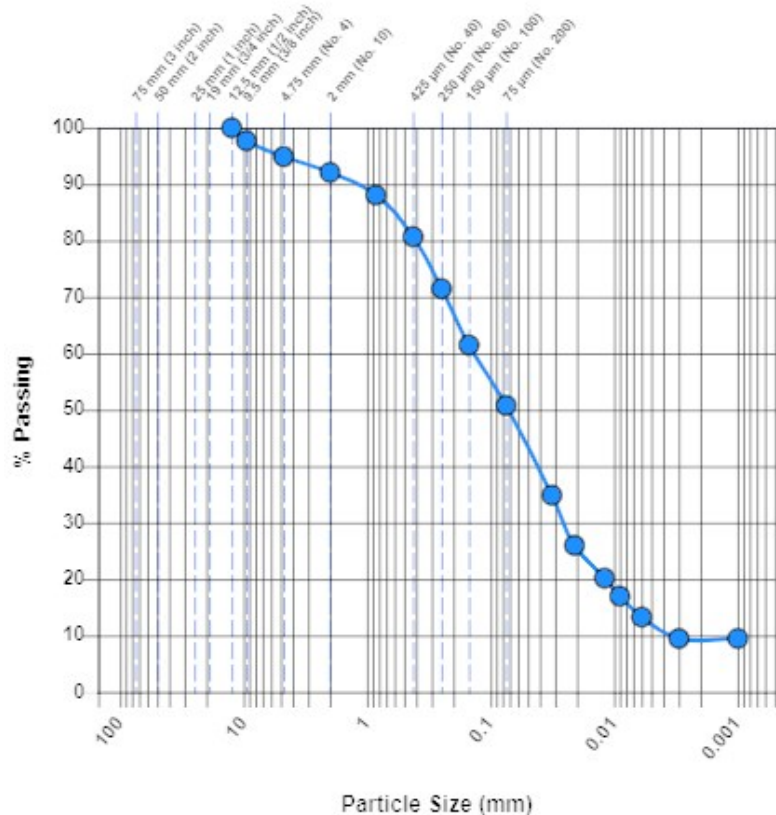
Sample Information

Sample Number: 398017	Depth (ft): 70
Boring Number: SC-3	Sampled By: Drill Crew
Sample Date: 8/11/2021	
Received Date: 8/19/2021	Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 8/19/2021	Tested By: Streier, Jim

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
12.5 mm (1/2 inch)	100.0	-
9.5 mm (3/8 inch)	97.7	-
4.75 mm (No. 4)	94.9	-
2 mm (No. 10)	92.1	-
850 µm (No. 20)	88.1	-
425 µm (No. 40)	80.7	-
250 µm (No. 60)	71.5	-
150 µm (No. 100)	61.5	-
75 µm (No. 200)	50.8	-
32.1 µm	34.9	-
21.0 µm	26.0	-
12.4 µm	20.2	-
8.8 µm	17.0	-
6.3 µm	13.3	-
3.0 µm	9.5	-
1.3 µm	9.5	-



Soil Classification: CL Sandy lean clay

Gravel (%): 5.1	Sand (%): 44.1	Silt (%): 38.8	Clay (%): 12.0
D₆₀ (µm): 139.5	D₃₀ (µm): 25.9	D₁₀ (µm): 3.4	C_u: 41.03 C_c: 1.41

General

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date:	June 26, 2020	Project Number:	B2001991
Client:	Accounts Payable Enbridge Energy, Limited Partnership 5400 Westheimer Ct Houston, TX 77056	Project Description:	Enbridge Line 5 Re-route

Sample Data

Date Sampled:	Not Given
Samples Obtained By:	Braun
Date Received:	6/17/2020
Sample Preparation:	Trim and Polished

Laboratory Data

ASTM D4543 Limits

Boring Number:	43-1-C-1	43-1-C-1	43-1-C-1	43-1-C-1	
Sample Depth (ft):	145-146	168-169	175-176	180-181	
Date Tested:					
Rock Type:				Sandstone	
Moisture Condition During Testing:				Dry	
Diameter (in.):				1.75	
Length (in.):				3.34	
Length-to-Diameter Ratio (L/D):				1.9	$2.0 \leq L/D \leq 2.5$
Side Tolerance, Maximum (in.)				≤ 0.020	≤ 0.020 in.
End Tolerance, Maximum (in.)				≤ 0.001 in	≤ 0.001 in.
Perpendicularity Deviation (°)				≤ 0.001 in	$\leq 0.250^\circ$
Parallelism Deviation (°)				≤ 0.001 in	$\leq 0.25^\circ$
Maximum Load (lbs):				11,177	
Area (in ²):				2.41	
Compressive Strength (psi):	Untestable	Untestable	Untestable	4,640	
Compressive Strength (MPa):				32	

Remarks:

Location 43-1-C-1
Sample 180-181 was sulfur capped for testing purposes

Reviewed By:
David Morrison



Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date:	June 26, 2020	Project Number:	B2001991
Client:	Accounts Payable Enbridge Energy, Limited Partnership 5400 Westheimer Ct Houston, TX 77056	Project Description:	Enbridge Line 5 Re-route

Sample Data

Date Sampled:	Not Given
Samples Obtained By:	Braun
Date Received:	6/17/2020
Sample Preparation:	Trim and Polished

Laboratory Data

ASTM D4543 Limits

Boring Number:	43-1-C-1	43-1-C-1	43-1-C-1	43-1-C-1
Sample Depth (ft):	185-186	189-190	195-196	206-207
Date Tested:				
Rock Type:	Sandstone			
Moisture Condition During Testing:	Dry			
Diameter (in.):	1.76			
Length (in.):	3.39			
Length-to-Diameter Ratio (L/D):	1.9			
Side Tolerance, Maximum (in.)	<u>≤ 0.020</u>			
End Tolerance, Maximum (in.)	<u>≤ 0.001 in</u>			
Perpendicularity Deviation (°)	<u>≤ 0.001 in</u>			
Parallelism Deviation (°)	<u>≤ 0.001 in</u>			
Maximum Load (lbs):	25,860			
Area (in ²):	2.43			
Compressive Strength (psi):	10,640	Untestable	Untestable	Untestable
Compressive Strength (MPa):	72			

2.0 ≤ L/D ≤ 2.5
≤ 0.020 in.
≤ 0.001 in.
≤ 0.250°
≤ 0.25°

Remarks:

Location 43-1-C-1

Reviewed By:
David Morrison



Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date: August 17, 2021

Project Number:

B2104465

Client: Scott McDonald
Lake Superior Consulting, LLC
130 West Superior Street
Duluth, MN 55802

Project Description:
Enbridge Line 5 Silver Creek

Sample Data

Date Sampled: 7/13/2021 - 7/15/2021
Samples Obtained By: Drill Crew
Date Received: 7/23/2021
Sample Preparation: Cut and Polished

Laboratory Data

Boring Number:	SC-2	SC-2	SC-2
Sample Depth (ft):	74.5	133.5	143.5
Date Tested:	7/30/2021	7/30/2021	7/30/2021
Rock Type:	Conglomerate	Conglomerate	Siltstone
Moisture Condition During Testing:	Dry	Dry	Dry
Diameter (in.):	1.76		1.76
Length (in.):	3.65		4.08
Length-to-Diameter Ratio (L/D):	2.1		2.3
Side Tolerance, Maximum (in.)	<u>< 0.020</u>		<u>< 0.020</u>
End Tolerance, Maximum (in.)	<u>< 0.001 in</u>		<u>< 0.001 in</u>
Perpendicularity Deviation (°)	<u>< 0.001 in</u>		<u>< 0.001 in</u>
Parallelism Deviation (°)	<u>< 0.001 in</u>		<u>< 0.001 in</u>
Maximum Load (lbs):	33,850		20,279
Area (in ²):	2.43		2.43
Compressive Strength (psi):	13,930	Unable to Test	8,350
Compressive Strength (MPa):	95		57

Remarks:

Reviewed By:



David Morrison
Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date: August 17, 2021

Project Number:

B2104465

Client: Scott McDonald
Lake Superior Consulting, LLC
130 West Superior Street
Duluth, MN 55802

Project Description:
Enbridge Line 5 Silver Creek

Sample Data

Date Sampled: 7/15/2021
Samples Obtained By: Drill Crew
Date Received: 7/23/2021
Sample Preparation: Cut and Polished

Laboratory Data

Boring Number:	SC-2	SC-2	SC-2
Sample Depth (ft):	153-154	163-164	173-174
Date Tested:	7/30/2021	7/30/2021	7/30/2021
Rock Type:	Conglomerate	Conglomerate	Conglomerate
Moisture Condition During Testing:	Dry	Dry	Dry
Diameter (in.):	1.76	1.77	1.77
Length (in.):	3.70	3.64	3.97
Length-to-Diameter Ratio (L/D):	2.1	2.1	2.2
Side Tolerance, Maximum (in.)	<u>< 0.020</u>	<u>< 0.020</u>	<u>< 0.020</u>
End Tolerance, Maximum (in.)	<u>< 0.001 in</u>	<u>< 0.001 in</u>	<u>< 0.001 in</u>
Perpendicularity Deviation (°)	<u>< 0.001 in</u>	<u>< 0.001 in</u>	<u>< 0.001 in</u>
Parallelism Deviation (°)	<u>< 0.001 in</u>	<u>< 0.001 in</u>	<u>< 0.001 in</u>
Maximum Load (lbs):	23,560	15,233	12,208
Area (in ²):	2.43	2.46	2.46
Compressive Strength (psi):	9,700	6,190	4,960
Compressive Strength (MPa):	66	42	34

Remarks:

Reviewed By:



David Morrison
Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date: September 15, 2021

Project Number:

B2104465

Client: Scott McDonald
Lake Superior Consulting, LLC
130 West Superior Street
Duluth, MN 55802

Project Description:
Enbridge Line 5 Silver Creek

Sample Data

Date Sampled: 7/23/2021 -7/26/2021
Samples Obtained By: Drill Crew
Date Received: 8/11/2021
Sample Preparation: Cut and Polished

Laboratory Data

Boring Number:	SC-3	SC-3	SC-3	SC-3	SC-3
Sample Depth (ft):	205	212	222	229	239
Date Tested:	8/20/2021	8/20/2021	8/20/2021	8/20/2021	8/20/2021
Rock Type:	Conglomerate	Conglomerate	Conglomerate	Conglomerate	Conglomerate
Moisture Condition During Testing:	Dry	Dry	Dry	Dry	Dry
Diameter (in.):				1.76	1.76
Length (in.):				4.40	4.33
Length-to-Diameter Ratio (L/D):				2.5	2.5
Side Tolerance, Maximum (in.)				< 0.020	< 0.020
End Tolerance, Maximum (in.)				< 0.001 in	< 0.001 in
Perpendicularity Deviation (°)				< 0.001 in	< 0.001 in
Parallelism Deviation (°)				< 0.001 in	< 0.001 in
Maximum Load (lbs):				10,427	10,607
Area (in ²):				2.43	2.43
Compressive Strength (psi):	Unable to Test	Unable to Test	Unable to Test	4,290	4,370
Compressive Strength (MPa):				29	30

Remarks:

Reviewed By:



David Morrison
Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date: September 15, 2021 **Project Number:** B2104465
Client: Scott McDonald **Project Description:**
Lake Superior Consulting, LLC
130 West Superior Street
Duluth, MN 55802
Enbridge Line 5 Silver Creek

Sample Data

Date Sampled: 7/23/2021 -7/26/2021
Samples Obtained By: Drill Crew
Date Received: 8/25/2021
Sample Preparation: Cut and Polished

Laboratory Data

Boring Number:	SC-3	SC-3	SC-3
Sample Depth (ft):	207	215	223
Date Tested:	9/14/2021	9/14/2021	9/14/2021
Rock Type:	Conglomerate	Conglomerate	Conglomerate
Moisture Condition During Testing:	Dry	Dry	Dry
Diameter (in.):			1.76
Length (in.):			4.40
Length-to-Diameter Ratio (L/D):			2.5
Side Tolerance, Maximum (in.)			<u>< 0.020</u>
End Tolerance, Maximum (in.)			<u>< 0.001 in</u>
Perpendicularity Deviation (°)			<u>< 0.001 in</u>
Parallelism Deviation (°)			<u>< 0.001 in</u>
Maximum Load (lbs):			2,717
Area (in ²):			2.43
Compressive Strength (psi):	Unable to Test	Unable ot Test	1,120
Compressive Strength (MPa):			8

Remarks:

Reviewed By:



David Morrison
Project Manager

**Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core
Specimens under Varying States of Stress and Temperatures (Method C)
ASTM D 7012**

Date: September 15, 2021

Project Number:

B2104465

Client: Scott McDonald
Lake Superior Consulting, LLC
130 West Superior Street
Duluth, MN 55802

Project Description:
Enbridge Line 5 Silver Creek

Sample Data

Date Sampled: 7/23/2021 -7/26/2021
Samples Obtained By: Drill Crew
Date Received: 8/25/2021
Sample Preparation: Cut and Polished

Laboratory Data

Boring Number:	SC-4	SC-4
Sample Depth (ft):	118.5	122
Date Tested:	8/20/2021	9/14/2021
Rock Type:	Sandstone	Sandstone
Moisture Condition During Testing:	Dry	Dry
Diameter (in.):		1.74
Length (in.):		3.78
Length-to-Diameter Ratio (L/D):		2.2
Side Tolerance, Maximum (in.)		<u>< 0.020</u>
End Tolerance, Maximum (in.)		<u>< 0.001 in</u>
Perpendicularity Deviation (°)		<u>< 0.001 in</u>
Parallelism Deviation (°)		<u>< 0.001 in</u>
Maximum Load (lbs):		4,064
Area (in ²):		2.38
Compressive Strength (psi):	Unable to Test	1,710
Compressive Strength (MPa):		12

Remarks:

Reviewed By:



David Morrison
Project Manager