

Subsurface Investigation Report

Enbridge Line 5 Reroute
MP 16 HDD Crossing – Trout Brook
Location 34-C, South of Highway 13, at N York Road
Location 37-C, East of N York Road, at Highway 13
Location 38-C, East of N York Road, at Highway 13
Location 40-C, South of Highway 13, at Section 5 Road
Ashland Town, Ashland County, Wisconsin

Prepared for

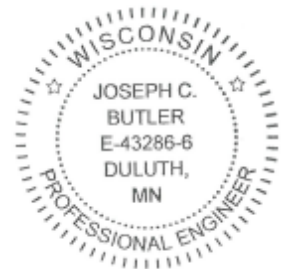
Enbridge Energy

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
Business Unit Manager / Senior Engineer
License Number: E-43286-6
June 19, 2020



Project B2001991

Braun Intertec Corporation

June 19, 2020

Project B2001991

Mr. Adam Erickson
Enbridge Energy, Limited Partnership
Manulife Place, 10180-101 Street
Edmonton, AB T5J 3S4

Re: Subsurface Investigation
Enbridge Line 5 Reroute
MP 16 HDD Crossing – Trout Brook
Location 34-C, South of Highway 13, at N York Road
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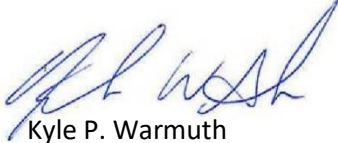
Dear Mr. Erickson:

We are pleased to present this Subsurface Investigation Report for the Line 5 Reroute Project at the MP 16 HDD Crossing under Trout Brook in Ashland Town, 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 Kyle Warmuth (kwarmuth@braunintertec.com) or David Morrison (dmorrison@braunintertec.com) at 218.624.4967.

Sincerely,


BRAUN INTERTEC CORPORATION



Kyle P. Warmuth
Staff Consultant



David E. Morrison
Project Consultant



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

Table of Contents

Description	Page
A. Introduction.....	1
A.1. Project Description	1
A.2. Purpose.....	1
A.3. Background Information and Reference Documents.....	1
A.4. Scope of Services	1
B. Results	2
B.1. Geologic Overview	2
B.2. Geologic Materials.....	2
B.2.a. Soils Encountered.....	2
B.3. Estimated Soil Properties	3
B.4. Groundwater	5
B.5. Laboratory Test Results.....	5
C. Procedures.....	5
C.1. Penetration Test Borings.....	5
C.2. Exploration Logs	6
C.2.a. Log of Boring Sheets.....	6
C.2.b. Geologic Origins	6
C.3. Material Classification and Testing	6
C.3.a. Visual and Manual Classification	6
C.3.b. Laboratory Testing	7
C.4. Groundwater Measurements.....	7
D. Qualifications.....	7
D.1. Variations in Subsurface Conditions.....	7
D.1.a. Material Strata	7
D.1.b. Groundwater Levels	7
D.2. Continuity of Professional Responsibility.....	8
D.2.a. Plan Review	8
D.2.b. Construction Observations and Testing	8
D.3. Use of Report.....	8
D.4. Standard of Care.....	8

Table of Contents (continued)

Appendix

Log of Boring Sheets 34-C, 37-C, 38-C, and 40-C

HDD Alignment Profile

Descriptive Terminology of Soil

Hydrometer & Sieve Analysis Reports 310569 through 310572,

Sieve Analysis Reports 307998 through 308005, 308008, 305407 through 305410, 305415, 305417, 305420, 305422, 310574, 310575, 310577 through 310583, 312856 through 312858, and 312860

Moisture Testing Reports 307998 through 308005, 308008, 305407, 305415, 305417, 305420, 305422, and 312856 through 312858

Geotechnical Reports 310564, 310566

Unconfined Compression Test Reports 34-C Sample 1

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 services as part of this effort.

This report provides a factual data obtained at Borehole Locations 34-C, 37-C, 38-C and 40-C for the HDD crossing under Highway 13 which is located at MP 15 in the proposed pipeline alignment in Ashland Town, Ashland County, Wisconsin.

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.
- Aerial photos from Google Earth Pro®.

A.4. Scope of Services

We performed our scope of services for the 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 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 location 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) borings, denoted as 34-C, 37-C, 38-C, and 40-C to nominal depths ranging from 120 to 175 feet below grade across the site.
- Performing laboratory testing on select samples as selected by Lake Superior Consulting.
- Preparing this report containing a boring location sketch, an exploration log, laboratory tests, a summary of the geologic materials encountered.

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

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. Soils Encountered

The general geologic profile of the soils encountered between the four (4) borings generally consisted (proceeding down from the ground surface) of 1 to 2 feet of topsoil over up to 8 feet of fill soils. The topsoil and fill is underlain by lacustrine (lake deposited) and glacial deposited fat clays, lean clays, silty clay, silts, silty sands, poorly graded sands and gravels to the termination depth of each boring, the encountered soils contained variable amounts of gravel, cobbles and boulders. Table 1 in section B.3 contains more information on each material encountered.

B.3. 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)	Wet Unit Weight Range (pcf)	Effective Friction Angle Range (degrees)	Undrained Friction Angle (degrees)	Effective Cohesion Range (ksf)	Modulus of Elasticity Range* (tsf)
Upper Soils (918 1/2 to 850 1/2)	Silt (ML)	5 - 47	105 - 127	26 - 36	27 - 35	0	104 - 112
	Lean Clay (CL)	13 - 30	122 - 132	27 - 32	5 - 10	0.9 – 6.0	86 - 124
	Fat Clay (CH)	4	110	20	0	0.35 -0.55	16 - 23
	CL-ML	11	112	22	0	0.6 – 1.0	44 - 63
	Silty Sand (SM)	41 - 50 blows for 3 inches of penetration	125 - 130	35 - 37	25	4.1+	288 - 350
Middle Soils (850 1/2 to 796 1/2)	Silty Sand (SM)	81 - 50 blows for 3 inches of penetration	125 - 130	35 - 37	25	4.1+	403 - 490
	Poorly Graded Gravel (GP)	8 - 50 blows for 2 inches of penetration	120 - 135	33 - 45	32 - 43	45 - 300	80 - 705
	Poorly Graded Sand (SP)	26 - 39	120 - 127	36 - 40	35 - 43	0	112 - 115
	Silty Sand (SM)	47 - 50 blows for	125 - 130	35 - 37	25	4.1+	288 - 350

Soil Strata and Elevations (ft)	Soil Type	Blow Count per foot Range (BPF)	Wet Unit Weight Range (pcf)	Effective Friction Angle Range (degrees)	Undrained Friction Angle (degrees)	Effective Cohesion Range (ksf)	Modulus of Elasticity Range* (tsf)
		3 inches of penetration					
	Clayey Sand (SC)	50 blows for 5 inches of penetration - 50 blows for 3 inches of penetration	133 - 135	33 - 35	10	6.1+	200 - 288
Lower Soils (796 1/2 to 747 1/2)	Poorly Graded Sand with Silt (SP-SM)	24 - 50 blows for 3 inches of penetration	122 - 127	38 - 40	36 - 43	0	168 - 360
	Silty Sand (SM)	91 blows for 5 inches of penetration - 50 blows for 1 inch of penetration	125 - 130	35 - 37	25	4.1+	288 - 360
	Poorly Graded Sand (SP)	26 - 30	120 - 122	36 - 38	35	0	196 - 202
	Poorly Graded Sand with Silt (SP-SM)	25 - 50 blows for 4 inches of penetration	120 - 127	36 - 40	35 - 43	0	175 - 350

*Sustained Young's Modulus values

B.4. Groundwater

We encountered groundwater with depths ranging between 5 to 33 between the four (4) borings while advancing them. Table 2 summarizes the depths where we observed groundwater.

Table 2. Groundwater Summary

Location	Measured or Estimated Depth to Groundwater (ft)
34-C	5
37-C	7 1/2
38-C	6
40-C	33

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

B.5. Laboratory Test Results

The boring logs show the results of the hydrometer with sieve analysis, moisture testing, soil density testing, and unconfined compressive strength of soil that was requested. The Appendix contains the results of these tests.

C. Procedures

C.1. Penetration Test Borings

We drilled the penetration test borings with a float 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. We also collected bulk samples of auger cuttings at selected locations for laboratory testing.

C.2. Exploration Logs

C.2.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.

C.2.b. 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.

C.3. Material Classification and Testing

C.3.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.

C.3.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.

C.4. 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.

D. Qualifications

D.1. Variations in Subsurface Conditions

D.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.

D.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.

D.2. Continuity of Professional Responsibility

D.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.

D.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.

D.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.

D.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

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 34-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.39115	LONGITUDE: -90.77768	
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/14/20	END DATE: 04/18/20		
SURFACE ELEVATION: 906.7 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, cold	
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
904.7		SILTY SAND (SM), with roots, brown, moist, loose (TOPSOIL)		3-3-5 (8) 13"			No recovery
2.0		LEAN CLAY (CL), trace roots, reddish brown, moist, stiff (LACUSTRINE)		3-6-8 (14) 15"			
			5	4-6-7 (13) 18"			
				0"			
897.7		SILT with SAND (ML), fine to medium-grained, brown, moist, medium dense to dense (LACUSTRINE)	10	4-10-20 (30) 18"			Thinwall
9.0				9-16-19 (35) 17"			
			15	8-20-26 (46) 17"			
				5-7-12 (19) 16"			
889.7		LEAN CLAY (CL), trace Gravel, reddish brown, moist, very stiff (LACUSTRINE)	20	15-13-17 (30) 18"			Thinwall
17.0			25	TW 20"			
879.2		SILTY CLAY with SAND (CL-ML), reddish brown, moist, stiff (LACUSTRINE)	30	4-5-6 (11) 14"			
27.5							

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 34-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.39115	LONGITUDE: -90.77768	
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/14/20	END DATE: 04/18/20		
SURFACE ELEVATION: 906.7 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, cold	
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
869.2		SILTY CLAY with SAND (CL-ML), reddish brown, moist, stiff (LACUSTRINE)	35	TW 10"			Thinwall
37.5		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, hard (GLACIAL TILL)	40	41-50/5" (REF) 12"			
			45	50/5" (REF) 7"			
859.2		SILTY SAND (SM), trace Gravel, brown, moist, dense to very dense (GLACIAL TILL)	50	50/5" (REF) 5"			
47.5			55	39-45-50/5" (REF) 16"			
			60	50/5" (REF) 5"			

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 34-C	
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SURFACE ELEVATION: 906.7 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, cold

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), trace Gravel, brown, moist, dense to very dense (GLACIAL TILL)	65	25-36-38 (74) 14"			
			70	21-20-27 (47) 12"			
			75	21-41-45 (86) 14"			
			80	21-40-42 (82) 14"			
			85	36-50/5" (REF) 8"			
			90	24-44-50/5" (REF) 18"			
			95	24-42-50/5" (REF) 18"			

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					LOCATION: See attached sketch	
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DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/14/20	END DATE: 04/18/20	
SURFACE ELEVATION: 906.7 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, cold

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
809.2		SILTY SAND (SM), trace Gravel, brown, moist, dense to very dense (GLACIAL TILL)					
97.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)					
			100	26-40-50/5" (REF) 16"			
			105	25-40-50/5" (REF) 16"			
799.2		SILTY SAND (SM), trace Gravel, brown, moist, very dense (GLACIAL TILL)					
107.5			110	26-41-50/5" (REF) 17"			
			115	25-43-50/5" (REF) 16"			
			120	50/5" (REF) 4"			
			125	50/5" (REF) 3"			

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 34-C		
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DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/14/20	END DATE: 04/18/20		
SURFACE ELEVATION: 906.7 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: overcast, cold	
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), trace Gravel, brown, moist, very dense (GLACIAL TILL)					
			130	50/5" (REF) 4"			
			135	50/5" (REF) 4"			
			140	50/5" (REF) 3"			
			145	50/5" (REF) 4"			
757.7							
149.0		POORLY GRADED SAND with SILT (SP-SM), trace Gravel, brown, moist, very dense (GLACIAL TILL)	150	50/5" (REF) 4"			
			155	50/4" (REF) 3"			
749.7				50/4" (REF) 3"			
157.0		END OF BORING					
		Boring then backfilled with cement/bentonite grout					Water observed at 5.0 feet while drilling.

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 37-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.39020	LONGITUDE: -90.77321
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 03/26/20	END DATE: 04/06/20	
SURFACE ELEVATION: 873.4 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cold

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
866.9		FILL: SILTY SAND (SM), fine to medium-grained Sand, brown, moist, very loose to loose	5	0-0-1 (1) WOH/12" 10" 4-4-4 (8) 18" 3-4-6 (10) 18"			
864.4		SILTY SAND (SM), fine to medium-grained Sand, with Gravel, brown, moist, medium dense to very dense (GLACIAL TILL)		25-13-16 (29) 12"			
863.4		POORLY GRADED GRAVEL (GP), fine-grained Gravel, brownish gray, moist, very dense (GLACIAL TILL)	10	50/2" (REF) 0"			
859.9		Boulder <i>Boulders/Cobble 10 to 13 1/2 feet</i>		50/2" (REF) 0"			Switched to coring, broke through two small pieces of rock. Loss continued on to 15 feet with 4 inch rock core.
856.4		POORLY GRADED GRAVEL with SAND (GP), fine-grained, brownish gray, wet, medium dense to dense (GLACIAL TILL)	15	4-4-4 (8) 6"			
		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brownish gray, wet, medium dense to dense (GLACIAL TILL)	20	11-17-17 (34) 6" 10-12-15 (27) 18"			Drilled to 20 feet to sample, lost hole.
			25	11-14-12 (26) 16"			
			30	18-21-18 (39) 18"			

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 37-C				
					LOCATION: See attached sketch				
					LATITUDE: 46.39020	LONGITUDE: -90.77321			
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 03/26/20		END DATE: 04/06/20			
SURFACE ELEVATION: 873.4 ft		RIG: 8502		METHOD: 4 1/4" HSA		SURFACING:		WEATHER: sunny, cold	

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 (SP), fine to medium-grained, trace Gravel, brownish gray, wet, medium dense to dense (GLACIAL TILL)					
			35	18-16-23 (39) 16"			
			40	23-21-15 (36) 18"			
			45	13-12-14 (26) 18"			
			50	14-17-21 (38) 16"			
			55	15-13-16 (29) 18"			
814.4							
59.0		POORLY GRADED SAND with GRAVEL (SP), fine to medium-grained, brownish gray, wet, medium dense (GLACIAL TILL)	60	9-14-12 (26) 16"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 37-C		
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SURFACE ELEVATION: 873.4 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cold	

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
805.4		POORLY GRADED SAND with GRAVEL (SP), fine to medium-grained, brownish gray, wet, medium dense (GLACIAL TILL)	65	12-16-14 (30) 3"			
68.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, wet, medium dense to dense (GLACIAL TILL)	70	10-15-15 (30) 5"			
			75	15-12-17 (29) 5"			
			80	10-12-12 (24) 2"			
			85	12-10-15 (25) 6"			
			90	9-13-11 (24) 6"			
			95	12-10-16 (26) 5"			

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 37-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.39020	LONGITUDE: -90.77321	
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 03/26/20	END DATE: 04/06/20		
SURFACE ELEVATION: 873.4 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cold	
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
774.4		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, wet, medium dense to dense (GLACIAL TILL)					
99.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, medium dense (GLACIAL TILL)	100	12-17-13 (30) 5"			
			105	11-14-14 (28) 5"			
			110	13-15-11 (26) 6"			
759.4		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, medium dense to dense (GLACIAL TILL)	115	11-10-15 (25) 6"			
753.4				10-13-19 (32) 6"			
120.0		END OF BORING	120				Water observed at 7.5 feet while drilling.
		Boring then backfilled with cement/bentonite grout					
			125				

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 38-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.39010	LONGITUDE: -90.77117	
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/07/20		END DATE: 04/10/20	
SURFACE ELEVATION: 909.3 ft		RIG: 8502	METHOD: 4 1/4" HSA		SURFACING:		WEATHER: sunny, cool

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
908.3	X	SILTY SAND (SM), fine to medium-grained, trace roots, brown, moist (TOPSOIL FILL) FILL: SILTY SAND (SM), fine to medium- grained Sand, brown, moist	X	2-3-4 (7) 18"			
1.0			X	3-7-11 (18) 18"			
			X				
			5				
901.3	X	SILT with SAND (ML), fine to medium-grained, trace Gravel, trace roots, brown, moist, loose (LACUSTRINE)	X	8-8-7 (15) 17"			
8.0			X	2-3-2 (5) 16"			
			X				
			10				
897.3	X	FAT CLAY (CH), reddish brown, moist, soft (LACUSTRINE)	X	0-1-3 (4) WOH/6" 18"			
12.0							
			15				
895.3	X	SILTY SAND (SM), fine to medium-grained Sand, with Gravel, rock fragments, brown, moist, dense (GLACIAL TILL)	X	15-19-22 (41) 16"			
14.0			X	26-26-23 (49) 18"			
			X				
			20				
891.3	X	SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	X	27-50/6" (REF) 15"			
18.0			X				
			X				
			25				
			30				
				50/5" (REF) 10"			
				30-34-47 (81) 17"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 38-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.39010	LONGITUDE: -90.77117
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/07/20	END DATE: 04/10/20	
SURFACE ELEVATION: 909.3 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cool

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)	35	28-36-47 (83) 16"			
			40	40-50/5" (REF) 8"			
			45	50/3" (REF) 1"			
			50	50/4" (REF) 3"			
			55	50/5" (REF) 3"			
850.3		LEAN CLAY (CL), trace Gravel, brown, moist, hard (GLACIAL TILL)	60	50/5" (REF) 5"			
59.0			65	50/4" (REF) 6"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 38-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.39010	LONGITUDE: -90.77117
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/07/20	END DATE: 04/10/20	
SURFACE ELEVATION: 909.3 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cool

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
834.3		LEAN CLAY (CL), trace Gravel, brown, moist, hard (GLACIAL TILL)	70	50/4" (REF) 5"			
75.0		SILTY SAND (SM), fine to medium-grained Sand, brown, moist, very dense (GLACIAL TILL)	75	50/3" (REF) 2"			
			80	50/4" (REF) 2"			
			85	50/5" (REF) 5"			
819.3		CLAYEY SAND (SC), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)	90	50/5" (REF) 3"			
90.0			95	50/3" (REF) 4"			
			100	50/5" (REF) 5"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 38-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.39010	LONGITUDE: -90.77117
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/07/20	END DATE: 04/10/20	
SURFACE ELEVATION: 909.3 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:	WEATHER: sunny, cool	

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 (SC), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)	105	50/4" (REF) 7"			
			110	50/3" (REF) 4"			
796.3							
113.0		SILTY SAND (SM), fine to medium-grained Sand, with Gravel, rock fragments, brown, moist to wet, very dense (GLACIAL TILL)	115	50/3" (REF) 4"			
			120	50/3" (REF) 4"			
786.3							
123.0		SILTY SAND (SM), fine to coarse-grained Sand, with Gravel, brown, wet to moist, very dense (GLACIAL TILL)	125	50/3" (REF) 4"			
			130	50/3" (REF) 4"			
			135	50/3" (REF) 4"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 38-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.39010	LONGITUDE: -90.77117	
DRILLER: C. Coffindaffer		LOGGED BY: S. Sullivan		START DATE: 04/07/20	END DATE: 04/10/20		
SURFACE ELEVATION: 909.3 ft		RIG: 8502	METHOD: 4 1/4" HSA	SURFACING:		WEATHER: sunny, cool	
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 Sand, with Gravel, brown, wet to moist, very dense (GLACIAL TILL)					
			140	50/1" (REF) 4"			
			145	50/2" (REF) 3"			
			150	50/2" (REF) 3"			
			155	50/2" (REF) 3"			
751.3		END OF BORING		50/2" (REF) 3"			Water observed at 20.0 feet while drilling.
158.0		Boring then backfilled with cement/bentonite grout					Water observed at 6.0 feet while drilling.
			165				

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.38946	LONGITUDE: -90.76801	
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20		END DATE: 04/22/20	
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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
920.3		SANDY FAT CLAY (CH), with organic, roots, brown, moist (TOPSOIL FILL)		0-0-1-1 (1) WOH/12" 6"			
2.0		FILL: SILTY SAND (SM), fine to medium-grained, trace roots, brown, moist		1-3-2-9 (5) 18"			
918.3		SILT (ML), fine to medium-grained, brown, moist, medium dense to dense (LACUSTRINE)	5	18-13-16-17 (29) 24"			
4.0				7-12-17-18 (29) 24"			
			10	3-7-3-9 (10) 20"			
				3-8-10-14 (18) 24"			
			15	4-6-9-15 (15) 18"			
			20	5-25-22-31 (47) 20"			Drilling method switched to mud rotary at 20 feet
898.8		SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)	25	22-45-50/4" (REF) 16"			
23.5							
			30				

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.38946	LONGITUDE: -90.76801
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20	END DATE: 04/22/20	
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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
	Σ	SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)					
			35	X	50-50/5" (REF) 11"		
			40	X	20-38-50/4" (REF) 16"		
			45	X	25-37-44-47 (81) 22"		
			50	X	26-33-49-50/ 5" (82) 20"		
			55	X	30-50/5" (REF) 11"		
			60	X	27-50/4" (REF) 10"		

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.38946	LONGITUDE: -90.76801
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20	END DATE: 04/22/20	
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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 SAND (SM), fine to medium-grained, with Gravel, brown, moist, very dense (GLACIAL TILL)	65	25-50/5" (REF) 10"			
848.8							
73.5		<i>Boulders/Cobble 73 1/2 to 77 1/2 feet</i>	75				Rock core sample - 4 inches recovery
844.8							
77.5		SILTY SAND (SM), fine to medium-grained, trace rock fragments, brown, moist, very dense (GLACIAL TILL)	80	38-50/3" (REF) 5"			
			85	50/5" (REF) 2"			
			90	50/4" (REF) 4"			
828.8							
93.5		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	95	50/4" (REF) 3"			

Continued on next page

Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C	
					LOCATION: See attached sketch	
					LATITUDE: 46.38946	LONGITUDE: -90.76801
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20	END DATE: 04/22/20	
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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
823.3		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)					
99.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	100	50/5" (REF) 3"			
			105	50/5" (REF) 4"			
			110	42-50/3" (REF) 6"			
			115	50/5" (REF) 5"			
			120	50/4" (REF) 3"			
			125	45-50/4" (REF) 7"			

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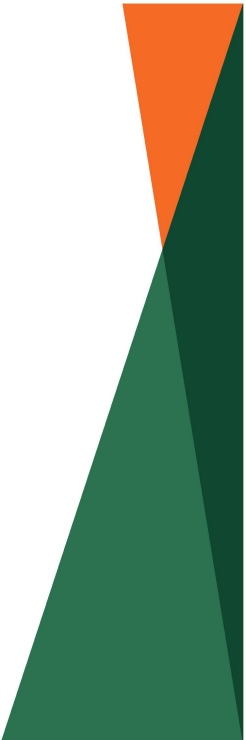
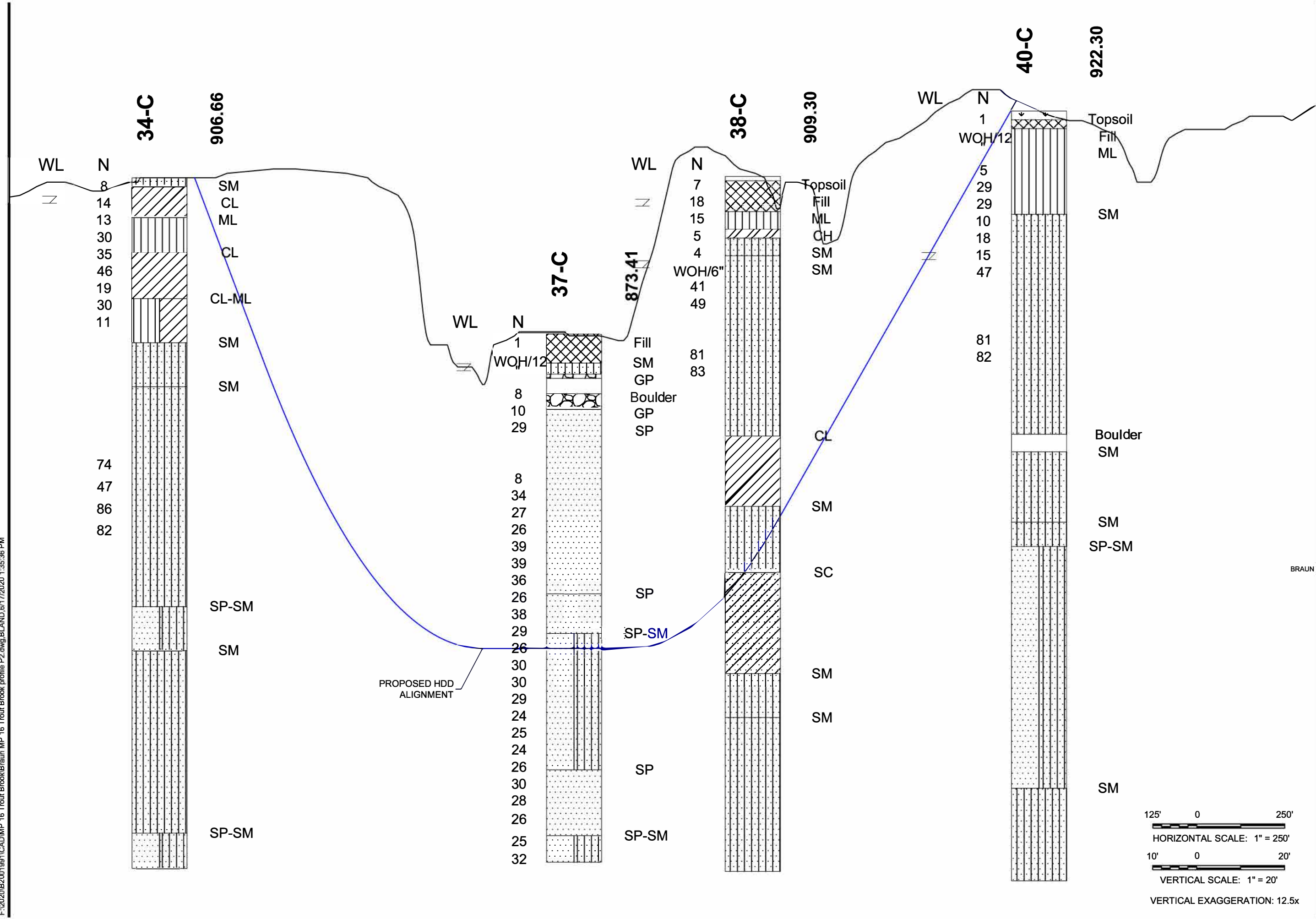
Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.38946	LONGITUDE: -90.76801	
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20	END DATE: 04/22/20		
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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
		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)					
			130	X	50/5" (REF) 4"		
			135	X	50/4" (REF) 3"		
			140	X	50/4" (REF) 0"		No recovery
			145	X	50/4" (REF) 3"		
			150	X	50/5" (REF) 3"		
768.3							
154.0		SILTY SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	155	X	50/5" (REF) 2"		

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Project Number B2001991 Geotechnical Evaluation Enbridge Line 5 Re-Route Various Locations Ashland and Iron Counties, Wisconsin					BORING: 40-C		
					LOCATION: See attached sketch		
					LATITUDE: 46.38946	LONGITUDE: -90.76801	
DRILLER: EPC		LOGGED BY: S. Sullivan		START DATE: 04/17/20	END DATE: 04/22/20		
SURFACE ELEVATION: 922.3 ft		RIG: Subcontractor	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 SAND (SM), fine to medium-grained, brown, moist, very dense (GLACIAL TILL)	×	48-50/3" (REF) 7"			
			165	×	50/5" (REF) 3"		
			170	×	50/4" (REF) 2"		
747.3			175	×	50/5" (REF) 3"		
175.0		END OF BORING					Water observed at 33.0 feet while drilling.
		Boring then backfilled with cement/bentonite grout					
			180				
			185				
			190				

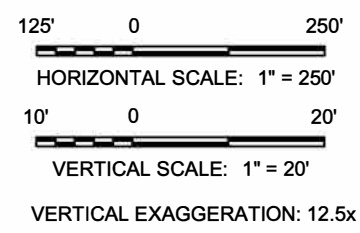
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Drawing Information	
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Drawing No:	MP 16 TROUT BROOK PROFILE P2
Drawn By:	BJB
Date Drawn:	6/17/20
Checked By:	DM
Last Modified:	6/17/20

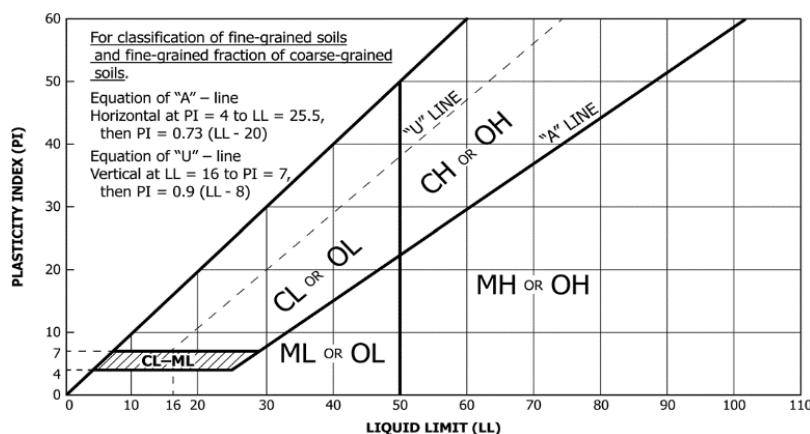
Enbridge Line 5 Re-route

MP 16 - Trout Brook



Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				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}
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{KLM}
			PI plots below "A" line	MH	Elastic silt ^{KLM}
		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		PT	Peat

- Based on the material passing the 3-inch (75-mm) sieve.
- If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- 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
- $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
- If soil contains $\geq 15\%$ sand, add "with sand" to group name.
- If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
- If fines are organic, add "with organic fines" to group name.
- 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
- If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
- If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
- If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
- If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
- If soil contains $\geq 30\%$ plus No. 200 predominantly gravel, add "gravelly" to group name.
- PI ≥ 4 and plots on or above "A" line.
- PI plots on or above "A" line.
- PI plots below "A" line.



DD Dry density, pcf
WD Wet density, pcf
P200 % Passing #200 sieve

Laboratory Tests
OC Organic content, %
q_p Pocket penetrometer strength, tsf
MC Moisture content, %
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 ().

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

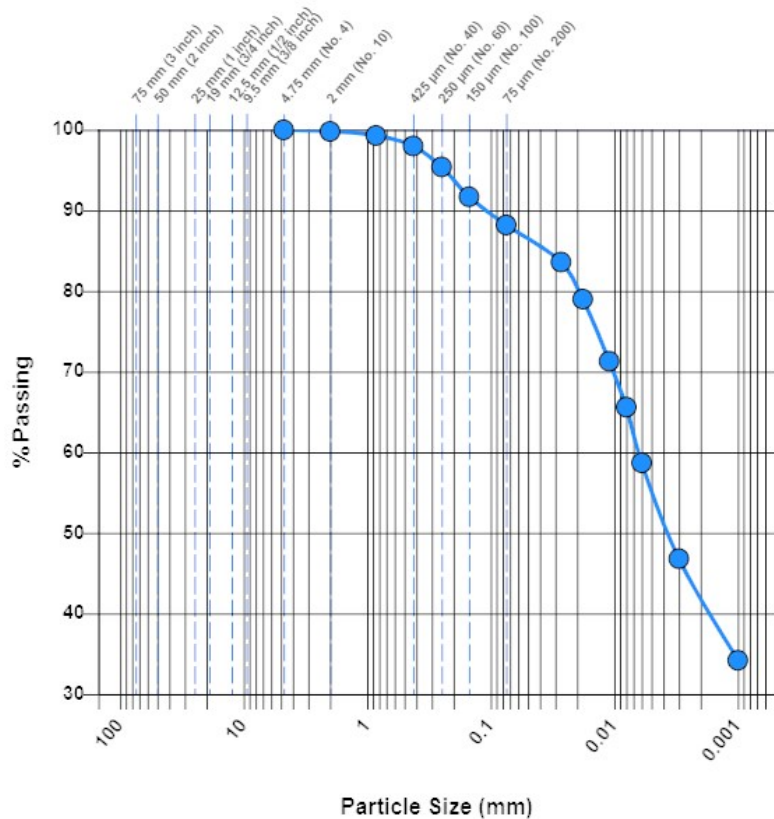
Sample Information

Sample Number:	310569	Depth (ft):	5
Boring Number:	34-C	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)	99.8	-
850 µm (No. 20)	99.3	-
425 µm (No. 40)	98.0	-
250 µm (No. 60)	95.4	-
150 µm (No. 100)	91.7	-
75 µm (No. 200)	88.2	-
27.4 (µm)	83.6	-
17.7 (µm)	79.0	-
10.5 (µm)	71.3	-
7.6 (µm)	65.6	-
5.5 (µm)	58.7	-
2.8 (µm)	46.8	-
1.2 (µm)	34.2	-



Gravel (%): 0.0 **Sand (%):** 11.8 **Silt (%):** 33.5 **Clay (%):** 54.7
D₆₀ (µm): 6.4

General

Streier, Jim

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Enbridge Line 5
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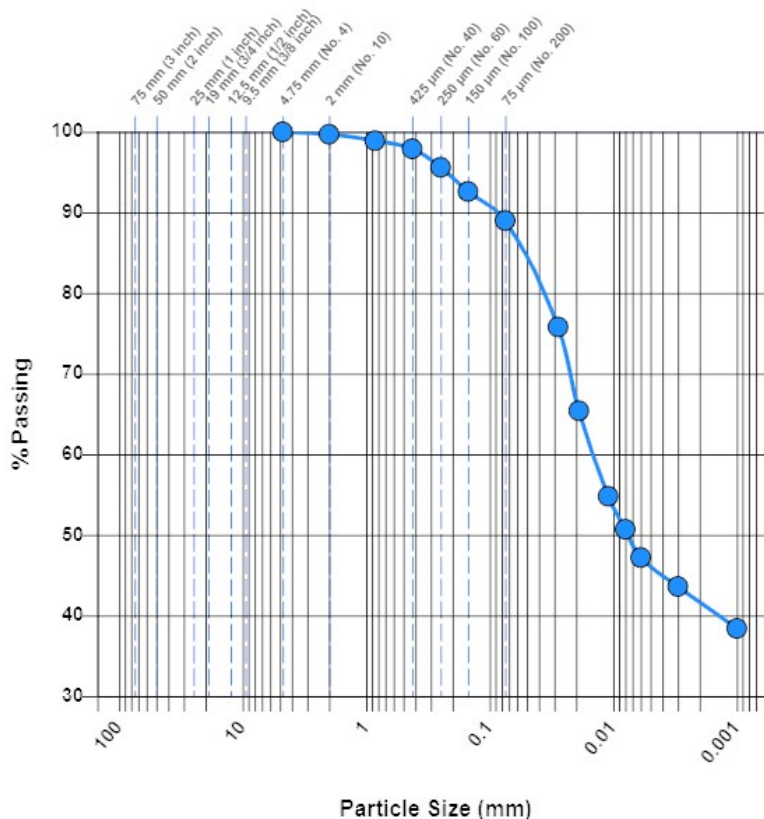
Sample Information

Sample Number:	310570	Depth (ft):	20
Boring Number:	34-C	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)	99.7	-
850 µm (No. 20)	98.9	-
425 µm (No. 40)	97.9	-
250 µm (No. 60)	95.6	-
150 µm (No. 100)	92.6	-
75 µm (No. 200)	89.0	-
28.0 (µm)	75.8	-
18.5 (µm)	65.4	-
11.1 (µm)	54.8	-
8.0 (µm)	50.7	-
5.7 (µm)	47.2	-
2.8 (µm)	43.6	-
1.2 (µm)	38.4	-



Soil Classification: CL Lean clay

Gravel (%):	0.0	Sand (%):	11.0	Silt (%):	43.0	Clay (%):	46.0
D₆₀ (µm):	14.9						

General

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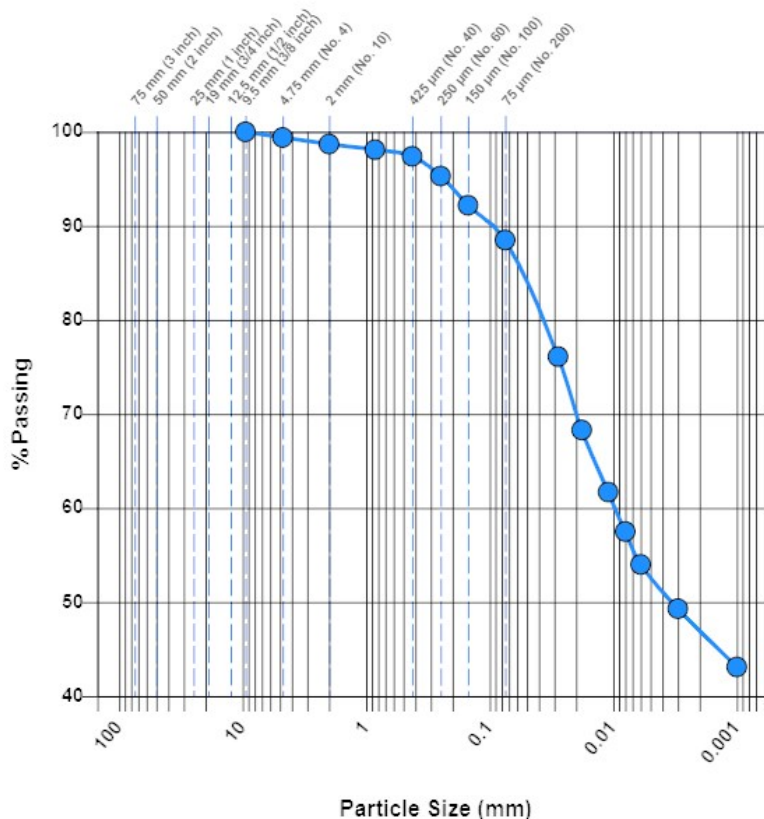
Sample Information

Sample Number:	310571	Depth (ft):	25
Boring Number:	34-C	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
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.4	-
2 mm (No. 10)	98.7	-
850 µm (No. 20)	98.1	-
425 µm (No. 40)	97.4	-
250 µm (No. 60)	95.3	-
150 µm (No. 100)	92.2	-
75 µm (No. 200)	88.5	-
28.1 (µm)	76.1	-
18.3 (µm)	68.3	-
10.9 (µm)	61.7	-
7.8 (µm)	57.5	-
5.6 (µm)	54.0	-
2.8 (µm)	49.3	-
1.2 (µm)	43.1	-



Soil Classification: CL Lean clay

Gravel (%):	0.6	Sand (%):	10.9	Silt (%):	36.1	Clay (%):	52.4
D₆₀ (µm):	9.8						

General

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Project:

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Enbridge Line 5
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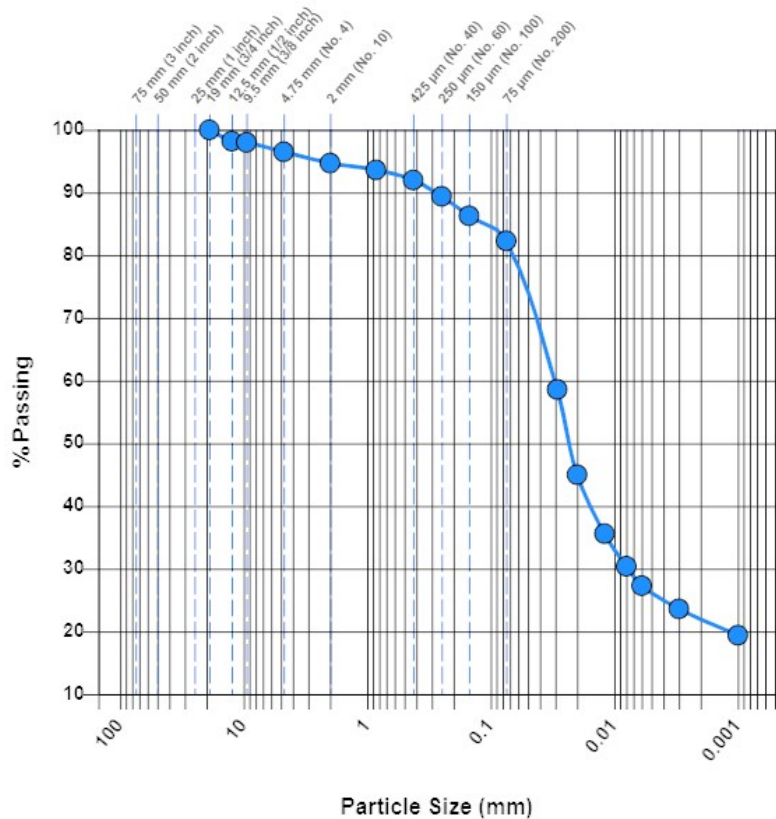
Sample Information

Sample Number:	310572	Depth (ft):	35
Boring Number:	34-C	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
19 mm (3/4 inch)	100.0	-
12.5 mm (1/2 inch)	98.2	-
9.5 mm (3/8 inch)	98.0	-
4.75 mm (No. 4)	96.5	-
2 mm (No. 10)	94.7	-
850 µm (No. 20)	93.6	-
425 µm (No. 40)	92.0	-
250 µm (No. 60)	89.4	-
150 µm (No. 100)	86.3	-
75 µm (No. 200)	82.3	-
29.2 (µm)	58.6	-
19.6 (µm)	45.0	-
11.7 (µm)	35.6	-
8.4 (µm)	30.4	-
6.0 (µm)	27.3	-
3.0 (µm)	23.6	-
1.3 (µm)	19.4	-



Soil Classification: CL-ML Silty clay with sand

Gravel (%):	3.5	Sand (%):	14.2	Silt (%):	56.2	Clay (%):	26.1
D₆₀ (µm):	31.7	D₃₀ (µm):	7.7				

General

Streier, Jim

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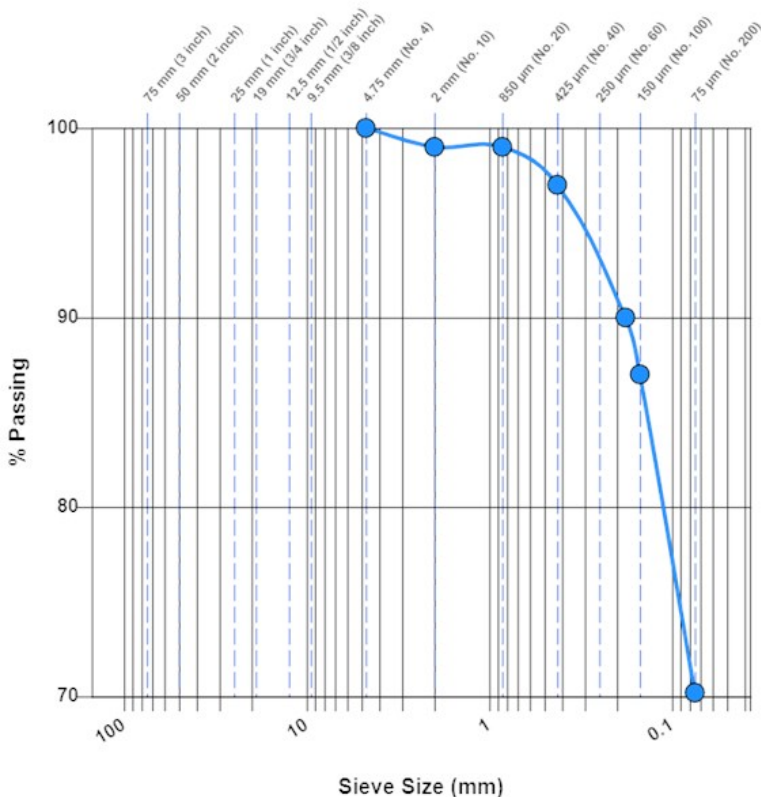
Sample Information

Sample Number:	307998	Alternate ID:	34-C 12.5'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	12.5'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 12.5'		
Sample Date:	04/17/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	99	
850 µm (No. 20)	99	
425 µm (No. 40)	97	
180 µm (No. 80)	90	
150 µm (No. 100)	87	
75 µm (No. 200)	70.2	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 225.5 grams

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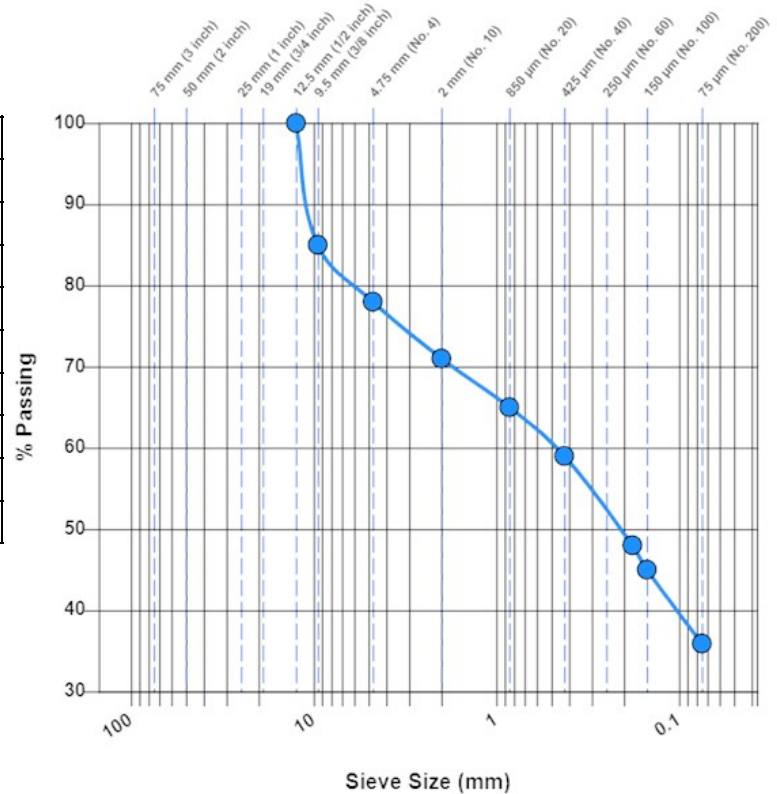
Sample Information

Sample Number: 307999 **Alternate ID:** 34-C 45'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 45'
Boring Number: 34-C **Sampled By:** Drill Crew
Location Details: Boring 34-C at 45'
Sample Date: 04/20/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	85	
4.75 mm (No. 4)	78	
2 mm (No. 10)	71	
850 µm (No. 20)	65	
425 µm (No. 40)	59	
180 µm (No. 80)	48	
150 µm (No. 100)	45	
75 µm (No. 200)	35.9	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand with gravel

General

Results: The test is for informational purposes.

Remarks: Total weight of dry sample 280.6 grams

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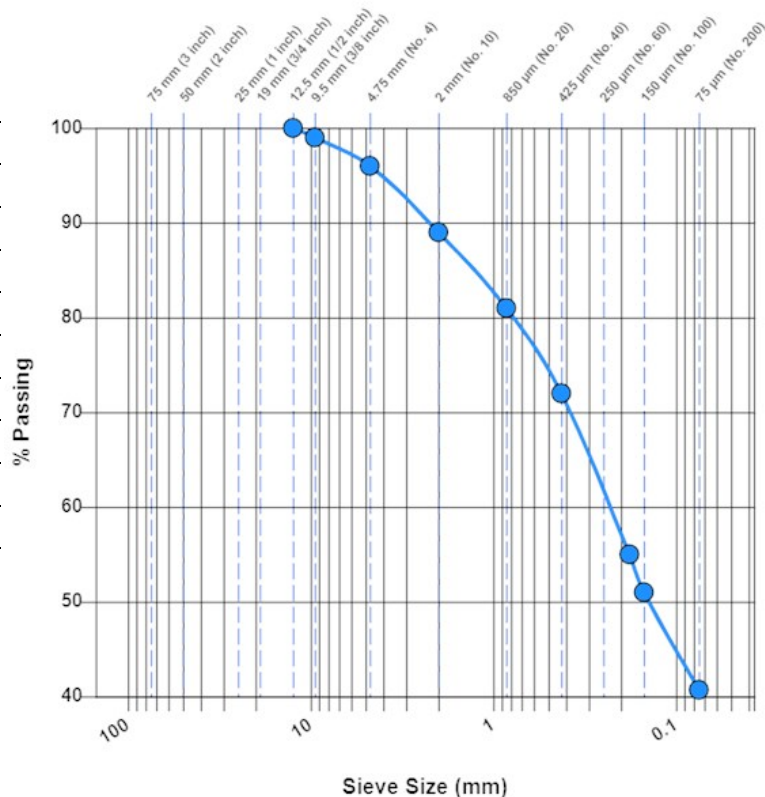
Sample Information

Sample Number:	308000	Alternate ID:	34-C 60'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	60'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 60'		
Sample Date:	04/20/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	99	
4.75 mm (No. 4)	96	
2 mm (No. 10)	89	
850 µm (No. 20)	81	
425 µm (No. 40)	72	
180 µm (No. 80)	55	
150 µm (No. 100)	51	
75 µm (No. 200)	40.7	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 241.2 grams

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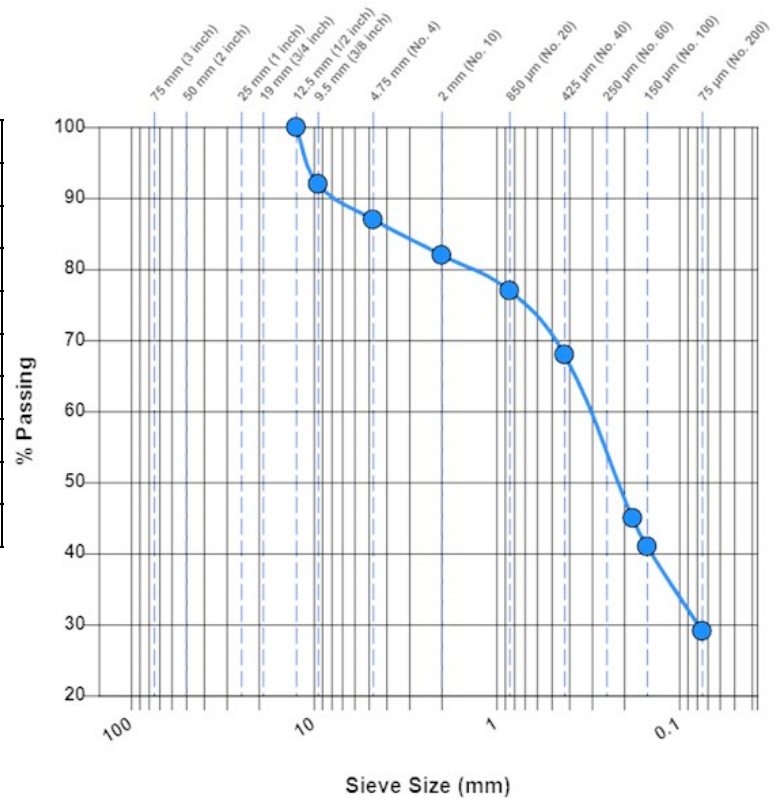
Sample Information

Sample Number:	308001	Alternate ID:	34-C 65'-75'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	65'-75'
Boring Number:	34-C	Sampled By:	Drill Crew
Location:	In-place		
Location Details:	Boring 34-C 65'-75'		
Sample Date:	04/20/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	92	
4.75 mm (No. 4)	87	
2 mm (No. 10)	82	
850 µm (No. 20)	77	
425 µm (No. 40)	68	
180 µm (No. 80)	45	
150 µm (No. 100)	41	
75 µm (No. 200)	29.1	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 588.4 grams

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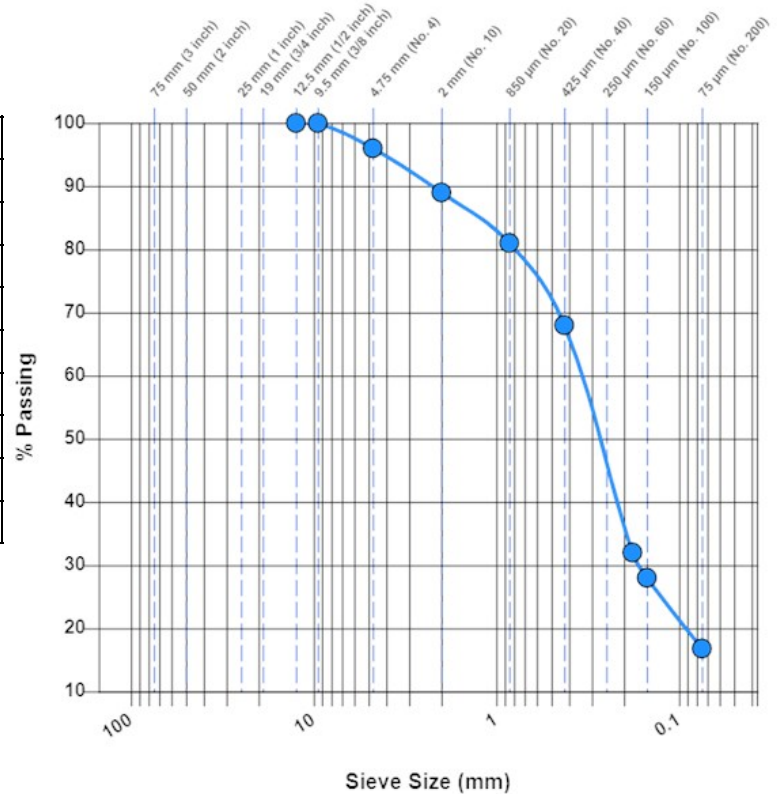
Sample Information

Sample Number:	308002	Alternate ID:	34-C 85'-90'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	85'-90'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 85'-90'		
Sample Date:	04/21/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	96	
2 mm (No. 10)	89	
850 µm (No. 20)	81	
425 µm (No. 40)	68	
180 µm (No. 80)	32	
150 µm (No. 100)	28	
75 µm (No. 200)	16.8	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 567.4 grams

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Sample Information

Sample Number:	308003	Alternate ID:	34-C 105'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	105'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 105'		
Sample Date:	04/21/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

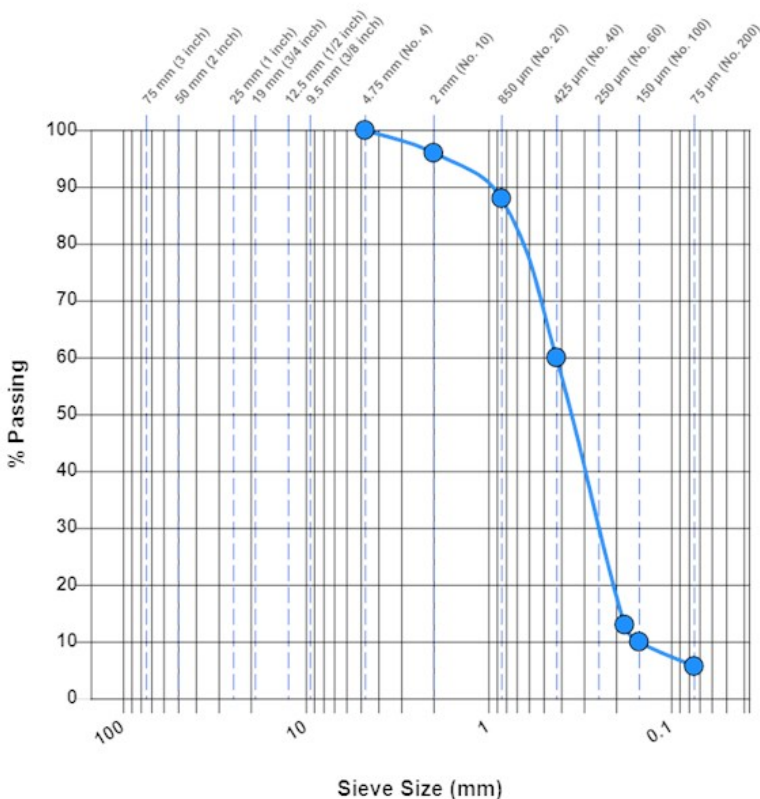
Laboratory Data

Sieve Size	% Passing	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	96	
850 µm (No. 20)	88	
425 µm (No. 40)	60	
180 µm (No. 80)	13	
150 µm (No. 100)	10	
75 µm (No. 200)	5.7	

Test Method: Method A (Composite Sieving)

Dispersion Apparatus: Shaking

Specimen Obtained: Moist



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

Remarks: Total weight of dry sample 314.4 grams

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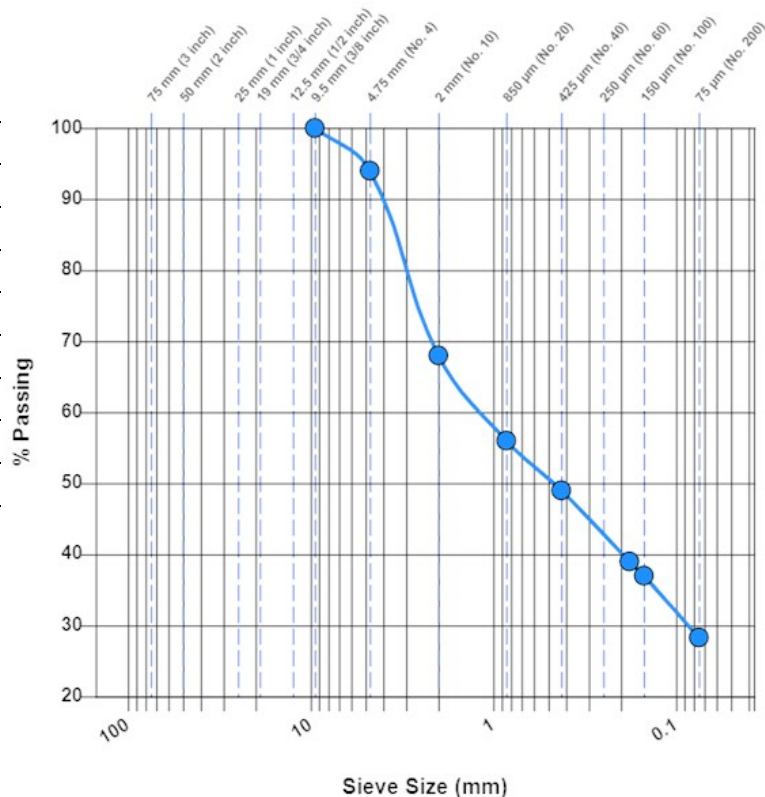
Sample Information

Sample Number:	308004	Alternate ID:	34-C 125'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	125'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 125'		
Sample Date:	04/21/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	94	
2 mm (No. 10)	68	
850 µm (No. 20)	56	
425 µm (No. 40)	49	
180 µm (No. 80)	39	
150 µm (No. 100)	37	
75 µm (No. 200)	28.3	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 161.2 grams

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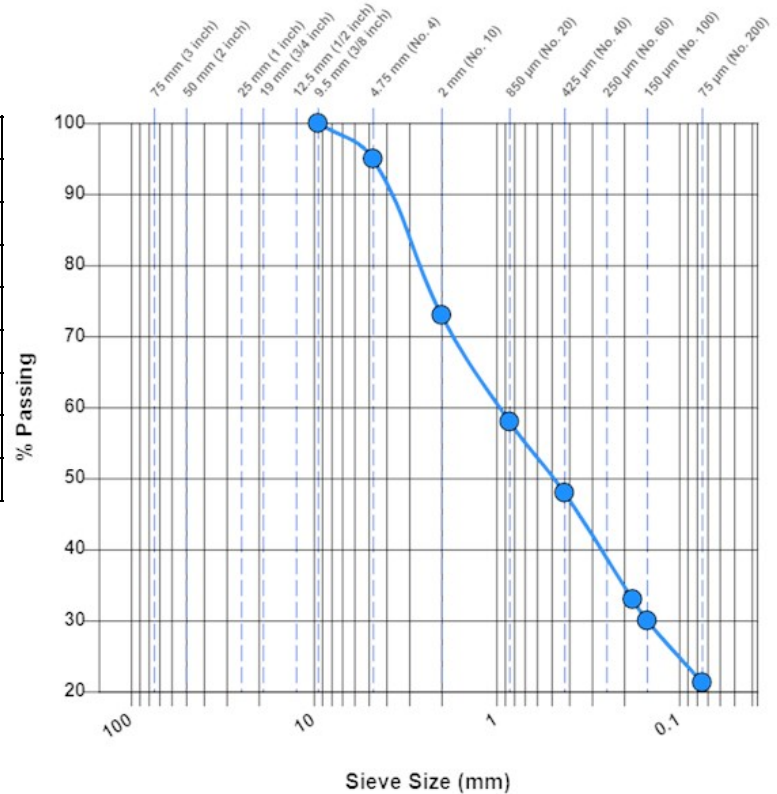
Sample Information

Sample Number:	308005	Alternate ID:	34-C 130'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	130'
Boring Number:	34-C	Sampled By:	Drill Crew
Location Details:	Boring 34-C 130'		
Sample Date:	04/21/2020		
Received Date:	05/13/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/15/2020		

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	95	
2 mm (No. 10)	73	
850 µm (No. 20)	58	
425 µm (No. 40)	48	
180 µm (No. 80)	33	
150 µm (No. 100)	30	
75 µm (No. 200)	21.3	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 189.9

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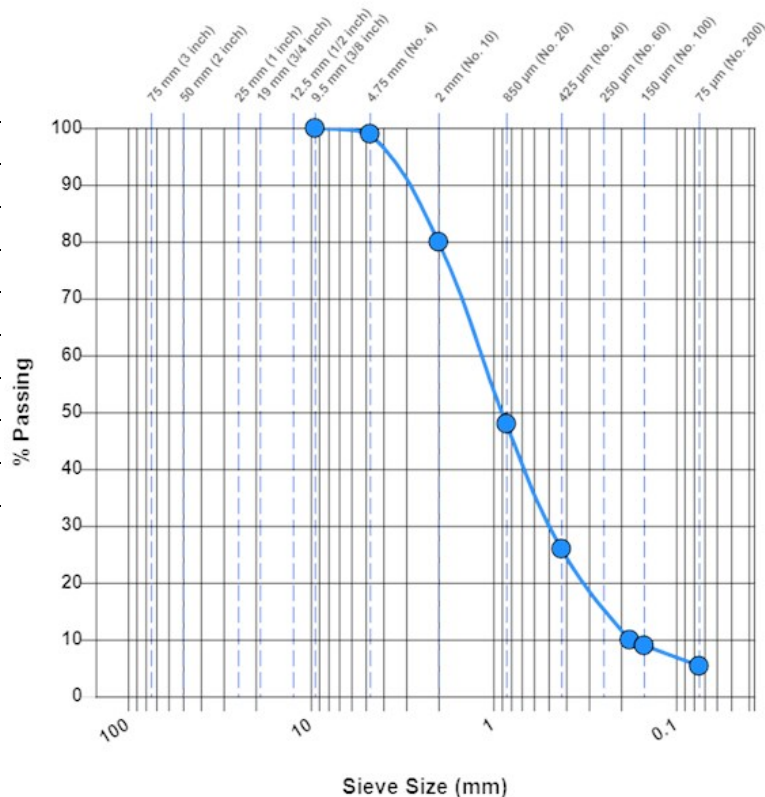
Sample Information

Sample Number: 308008 **Alternate ID:** 34-C 150'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 150'
Boring Number: 34-C **Sampled By:** Drill Crew
Location Details: Boring 34-C 150'
Sample Date: 04/22/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	80	
850 µm (No. 20)	48	
425 µm (No. 40)	26	
180 µm (No. 80)	10	
150 µm (No. 100)	9	
75 µm (No. 200)	5.4	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.
Remarks: Total weight of dry sample 201.8 grams

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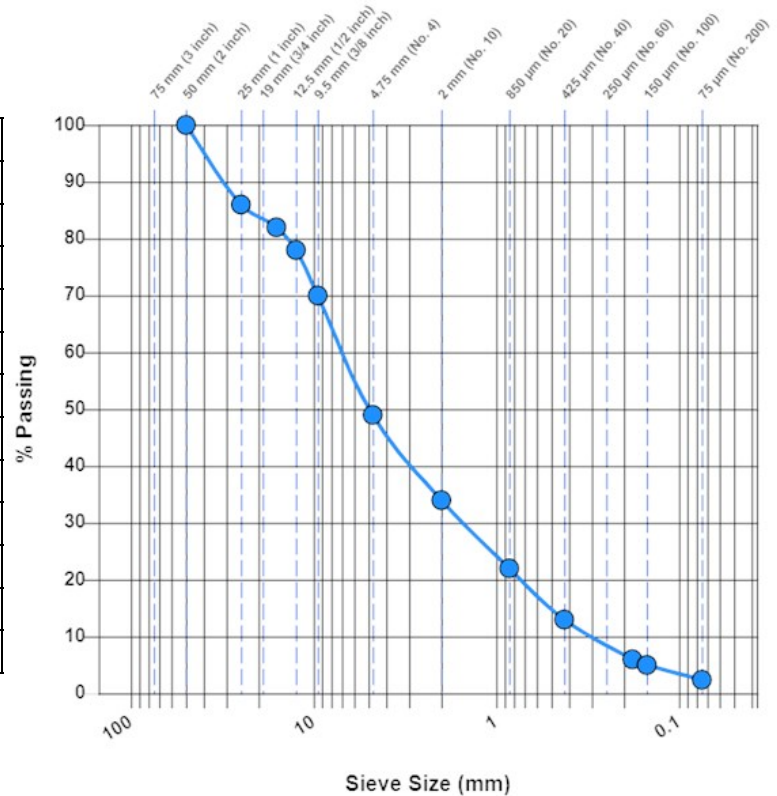
Sample Information

Sample Number: 305407 **Alternate ID:** 37C 15'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 15
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 15'
Sample Date: 03/31/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
50 mm (2 inch)	100	
25 mm (1 inch)	86	
16 mm (5/8 inch)	82	
12.5 mm (1/2 inch)	78	
9.5 mm (3/8 inch)	70	
4.75 mm (No. 4)	49	
2 mm (No. 10)	34	
850 µm (No. 20)	22	
425 µm (No. 40)	13	
180 µm (No. 80)	6	
150 µm (No. 100)	5	
75 µm (No. 200)	2.4	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist
Classification: GP Poorly graded gravel with sand



General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 266.7 grams

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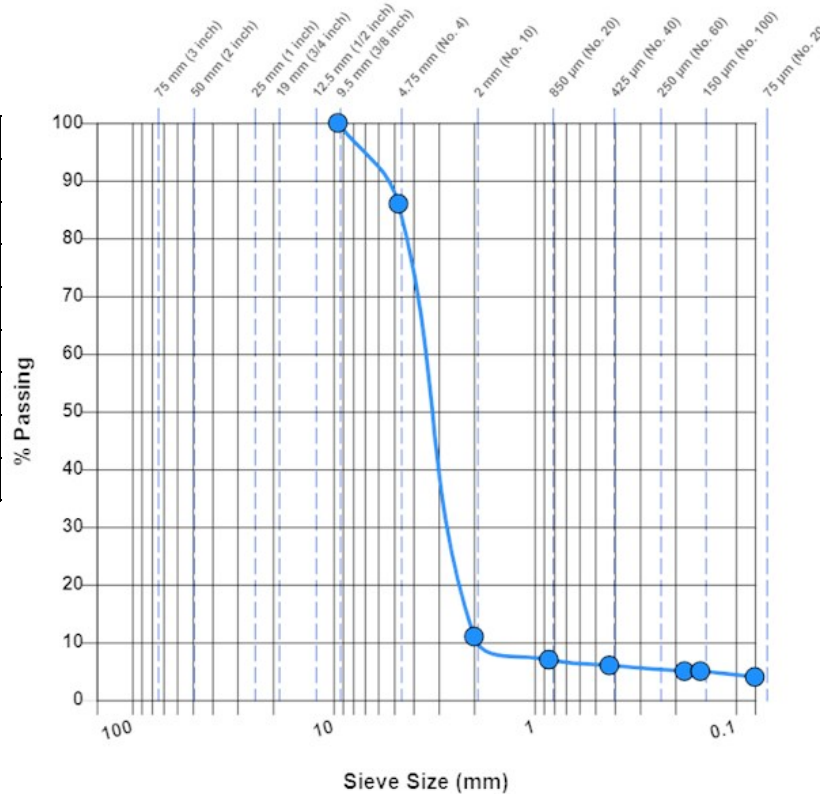
Sample Information

Sample Number: 305408 **Alternate ID:** 37C 20'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 20
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 20'
Sample Date: 03/31/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	86	
2 mm (No. 10)	11	
850 µm (No. 20)	7	
425 µm (No. 40)	6	
180 µm (No. 80)	5	
150 µm (No. 100)	5	
	4	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 232.0 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
<Blank>, <Blank>

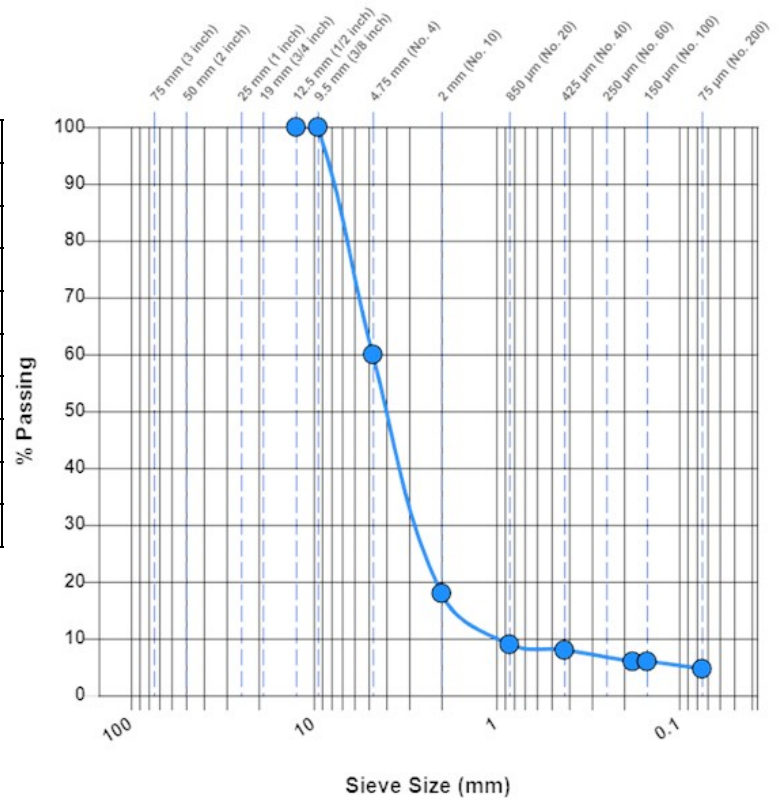
Sample Information

Sample Number:	305409	Alternate ID:	37C 30'
Sampling Method:	Auger Boring ASTM D1452	Depth (ft):	30
Boring Number:	37C	Sampled By:	Patterson, Gregg
Location:	In-place		
Location Details:	Boring 37C 30'		
Sample Date:	03/31/2020		
Received Date:	05/01/2020	Lab:	4511 West First Street, Suite 4, Duluth, MN
Tested Date:	05/05/2020		

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	60	
2 mm (No. 10)	18	
850 µm (No. 20)	9	
425 µm (No. 40)	8	
180 µm (No. 80)	6	
150 µm (No. 100)	6	
75 µm (No. 200)	4.7	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 491.6 grams

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Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
<Blank>, <Blank>

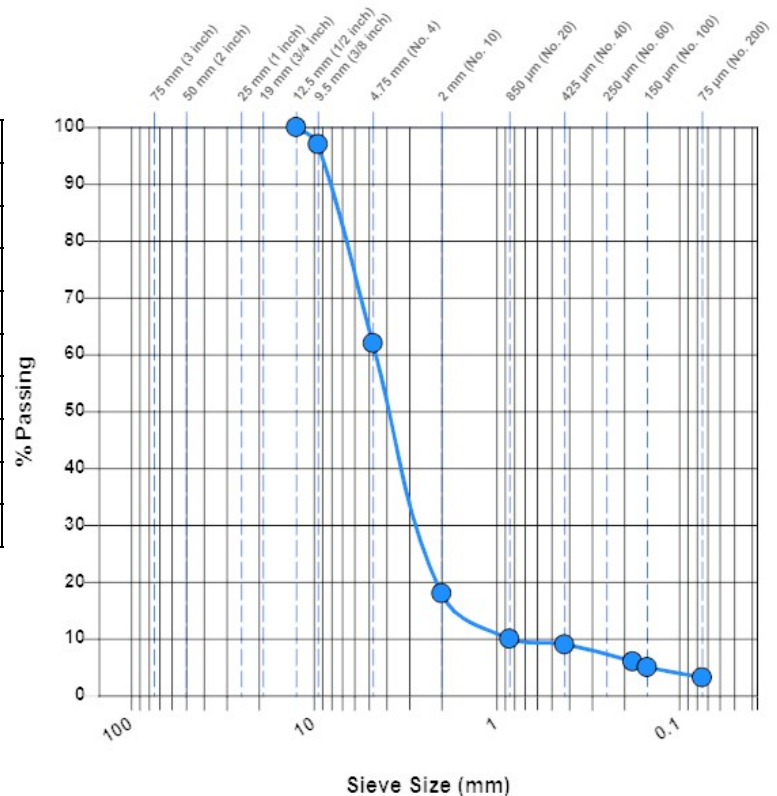
Sample Information

Sample Number: 305410 **Alternate ID:** 37C 60'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 60
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 60'
Sample Date: 03/31/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
12.5 mm (1/2 inch)	100	
9.5 mm (3/8 inch)	97	
4.75 mm (No. 4)	62	
2 mm (No. 10)	18	
850 µm (No. 20)	10	
425 µm (No. 40)	9	
180 µm (No. 80)	6	
150 µm (No. 100)	5	
75 µm (No. 200)	3.2	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP Poorly graded sand with gravel

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 346.0 grams

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Houston, TX 77056

Project:

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Enbridge Line 5 Re-route
Enbridge Line 5
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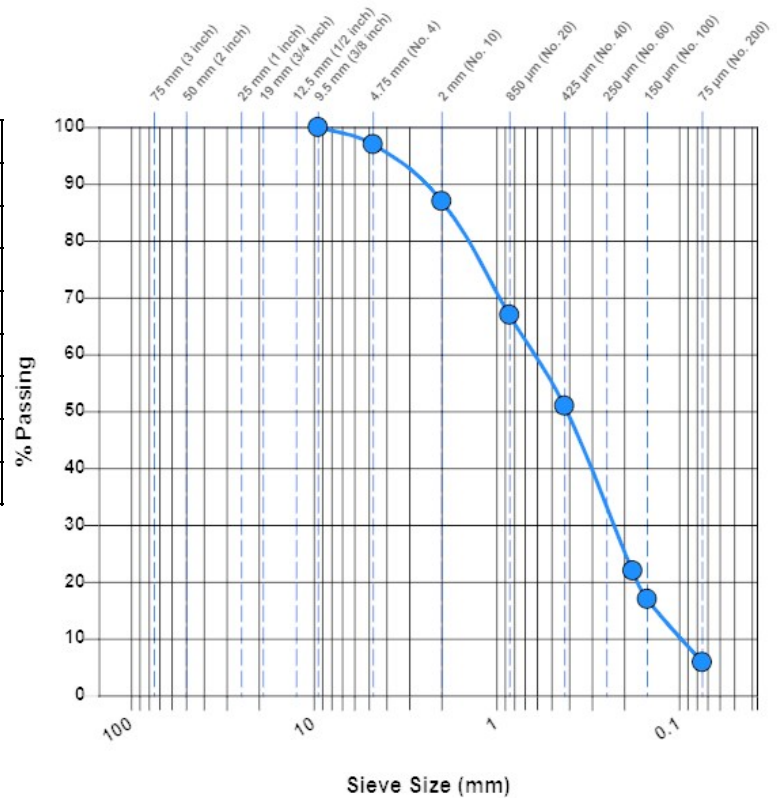
Sample Information

Sample Number: 305415 **Alternate ID:** 37C 75.5'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 75.5
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 75.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	97	
2 mm (No. 10)	87	
850 µm (No. 20)	67	
425 µm (No. 40)	51	
180 µm (No. 80)	22	
150 µm (No. 100)	17	
75 µm (No. 200)	5.9	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 286.0 grams

[Signature]

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Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
<Blank>, <Blank>

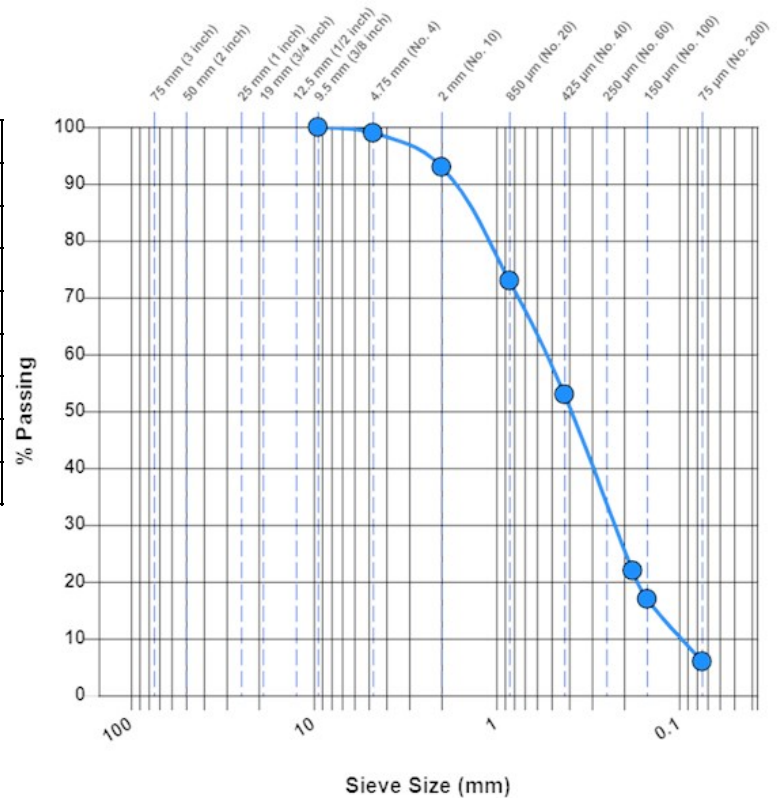
Sample Information

Sample Number: 305417 **Alternate ID:** 37C 89.5'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 89.5
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 89.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	93	
850 µm (No. 20)	73	
425 µm (No. 40)	53	
180 µm (No. 80)	22	
150 µm (No. 100)	17	
75 µm (No. 200)	6.0	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 324.9 grams

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Client:

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Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
<Blank>, <Blank>

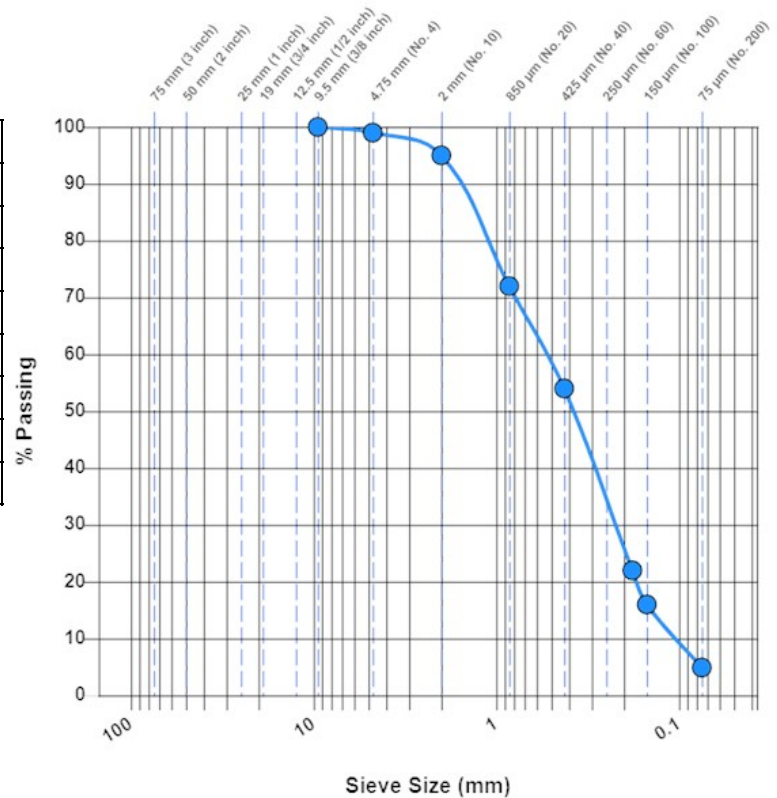
Sample Information

Sample Number: 305420 **Alternate ID:** 37C 99.5'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 99.5
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 99.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	95	
850 µm (No. 20)	72	
425 µm (No. 40)	54	
180 µm (No. 80)	22	
150 µm (No. 100)	16	
75 µm (No. 200)	4.9	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 245.9 grams

[Signature]

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Suite 4
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Phone: 218-624-4967

Client:

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Houston, TX 77056

Project:

B2001991
Enbridge Line 5 Re-route
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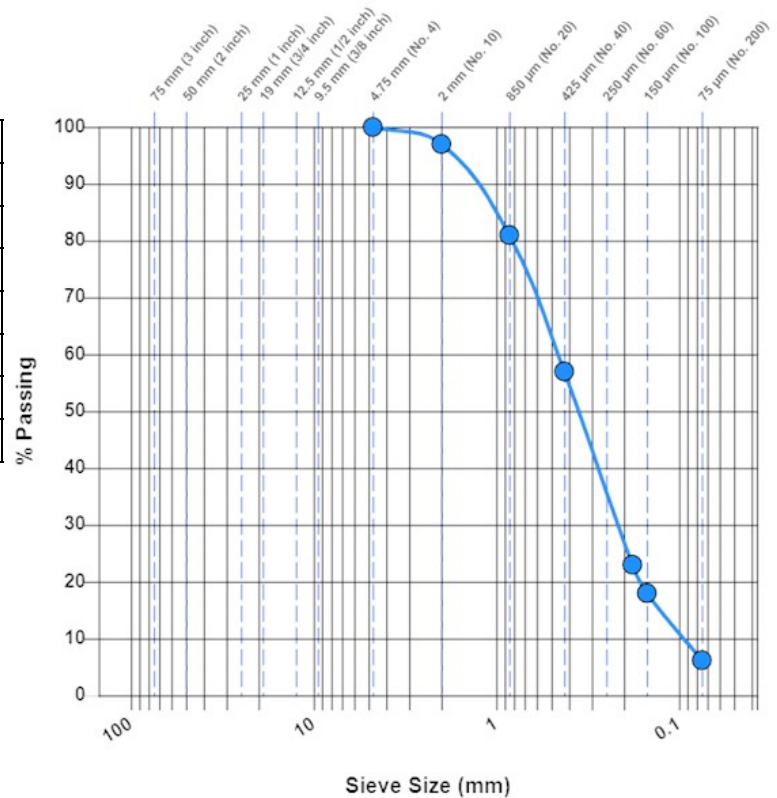
Sample Information

Sample Number: 305422 **Alternate ID:** 37C 114.5'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 114.5
Boring Number: 37C **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 114.5'
Sample Date: 04/06/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	97	
850 µm (No. 20)	81	
425 µm (No. 40)	57	
180 µm (No. 80)	23	
150 µm (No. 100)	18	
75 µm (No. 200)	6.2	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Moist



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 285.6 grams

[Signature]

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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

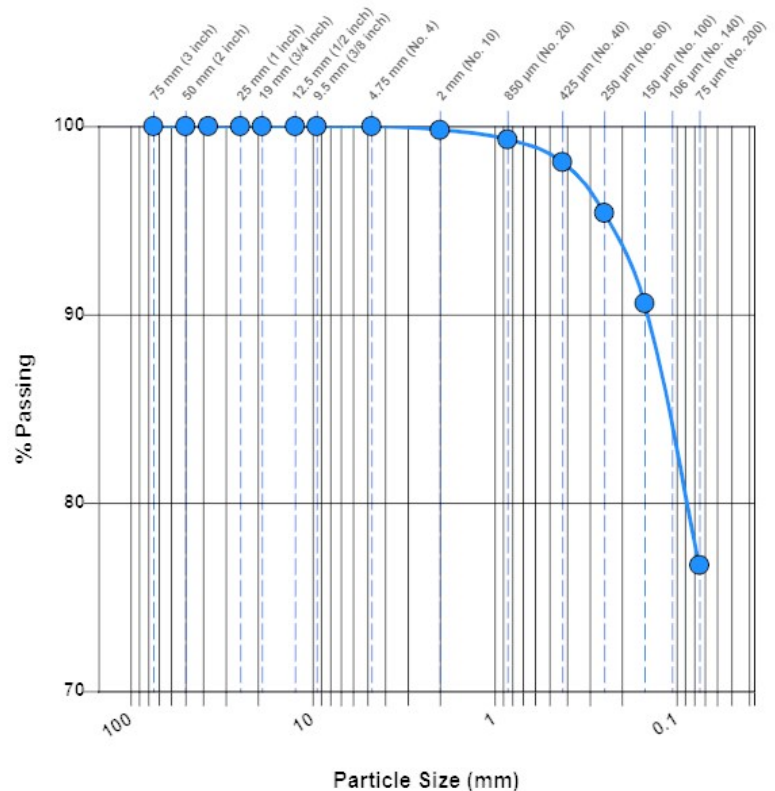
Sample Number:	310574	Depth (ft):	9.5
Boring Number:	38-C	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	99.8	
850 µm (No. 20)	99.3	
425 µm (No. 40)	98.1	
250 µm (No. 60)	95.4	
150 µm (No. 100)	90.6	
75 µm (No. 200)	76.7	

Sand (%)
23.3

Silt & Clay (%)
76.7



Classification: ML Silt with sand

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

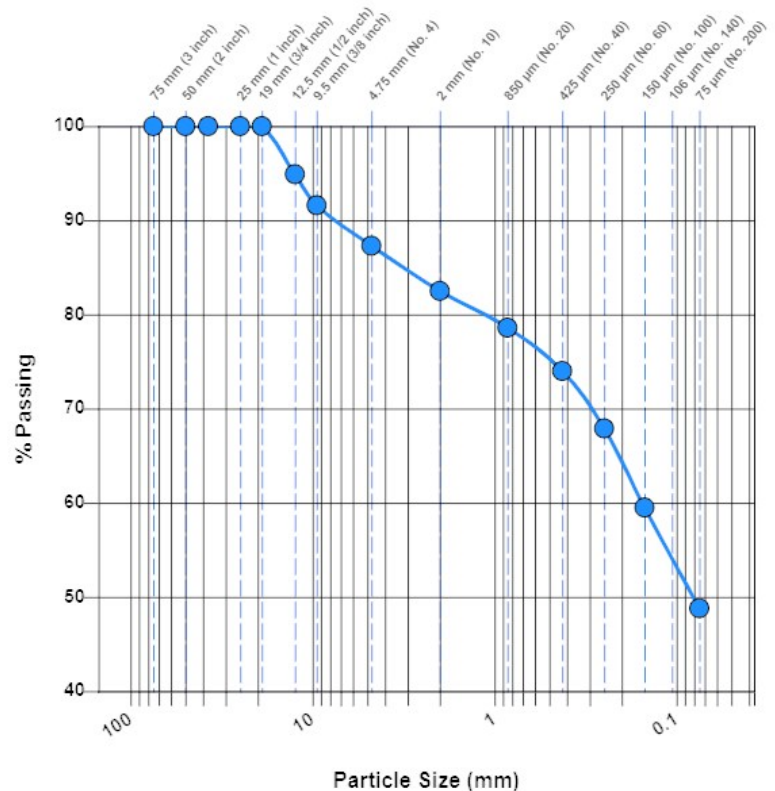
Sample Information

Sample Number:	310575	Depth (ft):	17
Boring Number:	38-C	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)	94.9	
9.5 mm (3/8 inch)	91.6	
4.75 mm (No. 4)	87.3	
2 mm (No. 10)	82.5	
850 µm (No. 20)	78.6	
425 µm (No. 40)	74.0	
250 µm (No. 60)	67.9	
150 µm (No. 100)	59.5	
75 µm (No. 200)	48.8	

Gravel (%)	Sand (%)	Silt & Clay (%)
12.7	38.5	48.8
D60		
0.156		



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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Phone: 952-995-2000

Client:

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Houston, TX 77056

Project:

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

Sample Information

Sample Number:	310577	Depth (ft):	30
Boring Number:	38-C	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

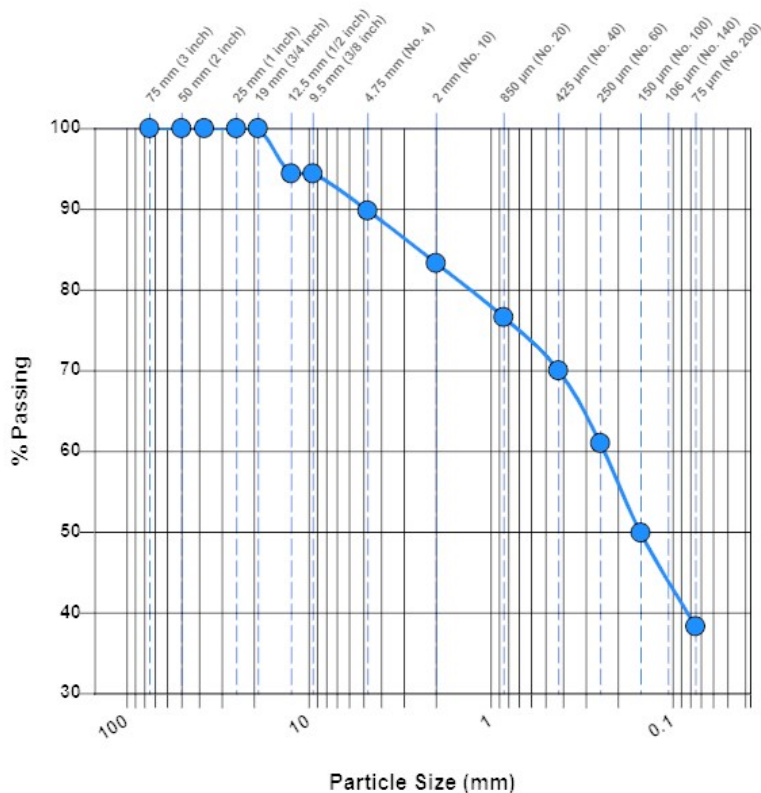
Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	94.4	
9.5 mm (3/8 inch)	94.4	
4.75 mm (No. 4)	89.8	
2 mm (No. 10)	83.3	
850 µm (No. 20)	76.6	
425 µm (No. 40)	70.0	
250 µm (No. 60)	61.0	
150 µm (No. 100)	49.9	
75 µm (No. 200)	38.3	

Gravel (%)
10.2

Sand (%)
51.5

Silt & Clay (%)
38.3

D60
0.241



Classification: SM Silty sand

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

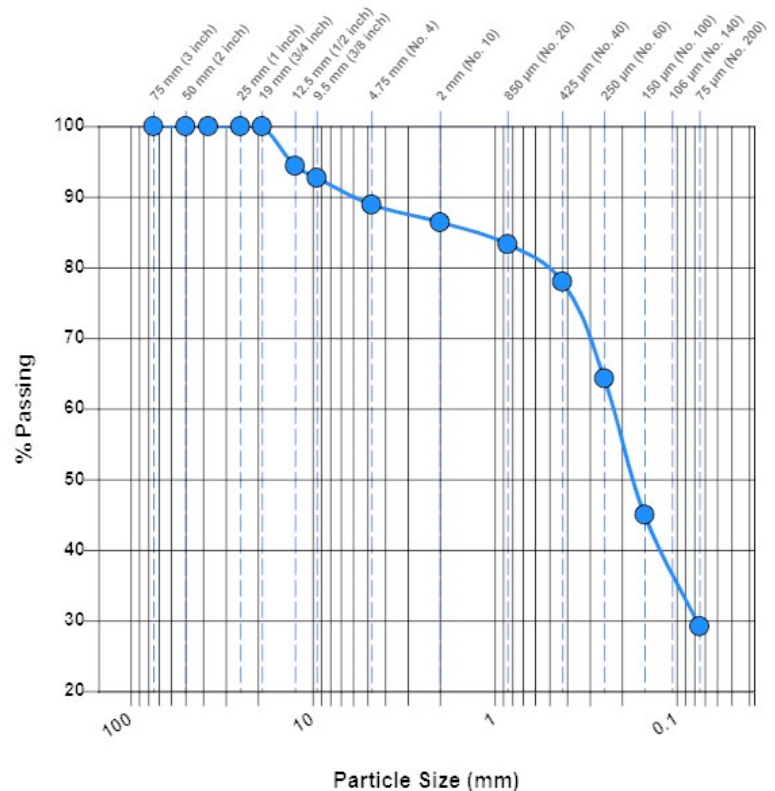
Sample Information

Sample Number:	310578	Depth (ft):	40-50
Boring Number:	38-C	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)	94.4	
9.5 mm (3/8 inch)	92.7	
4.75 mm (No. 4)	88.9	
2 mm (No. 10)	86.4	
850 µm (No. 20)	83.3	
425 µm (No. 40)	78.0	
250 µm (No. 60)	64.3	
150 µm (No. 100)	45.0	
75 µm (No. 200)	29.2	

Gravel (%)	Sand (%)	Silt & Clay (%)
11.1	59.7	29.2
D30	D60	
0.077	0.228	



Classification: SM Silty sand

General

Results: The test is for informational purposes.

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Client:

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Houston, TX 77056

Project:

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

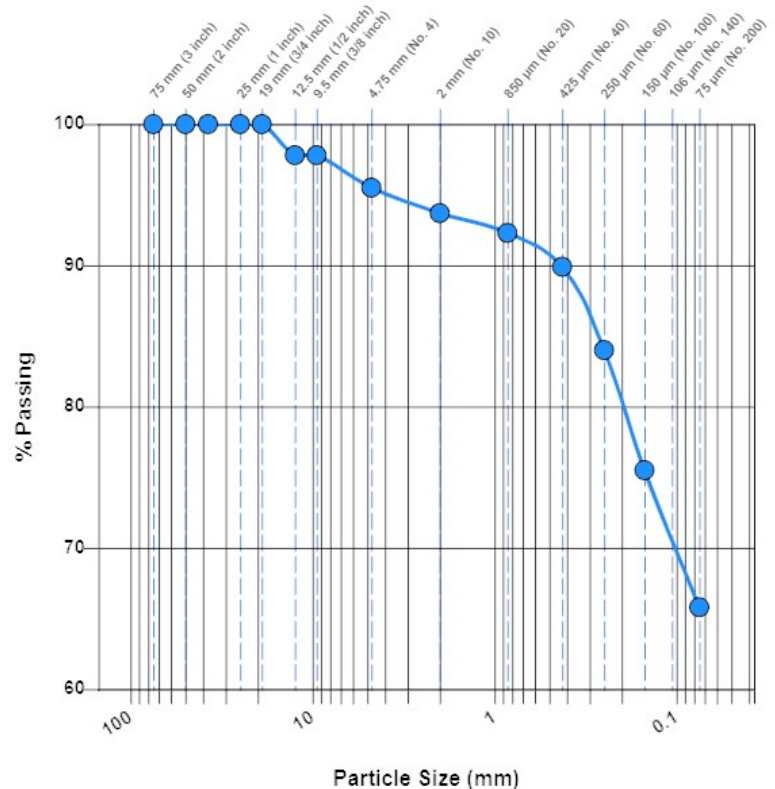
Sample Information

Sample Number:	310579	Depth (ft):	60-65
Boring Number:	38-C	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)	97.8	
9.5 mm (3/8 inch)	97.8	
4.75 mm (No. 4)	95.5	
2 mm (No. 10)	93.7	
850 µm (No. 20)	92.3	
425 µm (No. 40)	89.9	
250 µm (No. 60)	84.0	
150 µm (No. 100)	75.5	
75 µm (No. 200)	65.8	

Gravel (%)	Sand (%)	Silt & Clay (%)
4.5	29.7	65.8



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

Streier, Jim

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Client:

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Attn: Accounts Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

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

Sample Information

Sample Number:	310580	Depth (ft):	80-85
Boring Number:	38-C	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

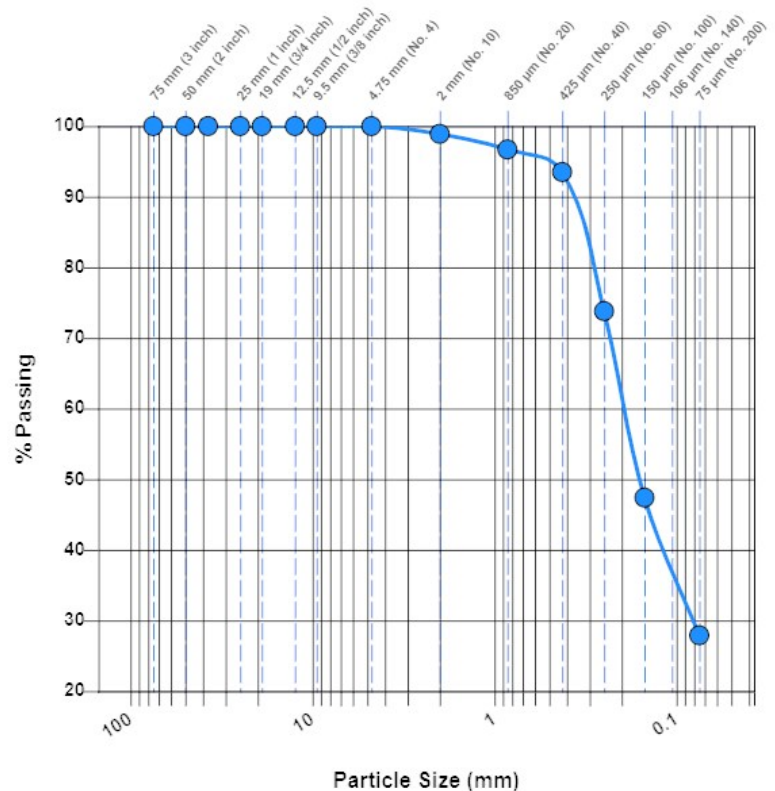
Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	98.9	
850 µm (No. 20)	96.7	
425 µm (No. 40)	93.5	
250 µm (No. 60)	73.8	
150 µm (No. 100)	47.4	
75 µm (No. 200)	27.9	

Sand (%)
72.1

Silt & Clay (%)
27.9

D30
0.078

D60
0.198



Classification: SM Silty sand

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:

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

Sample Information

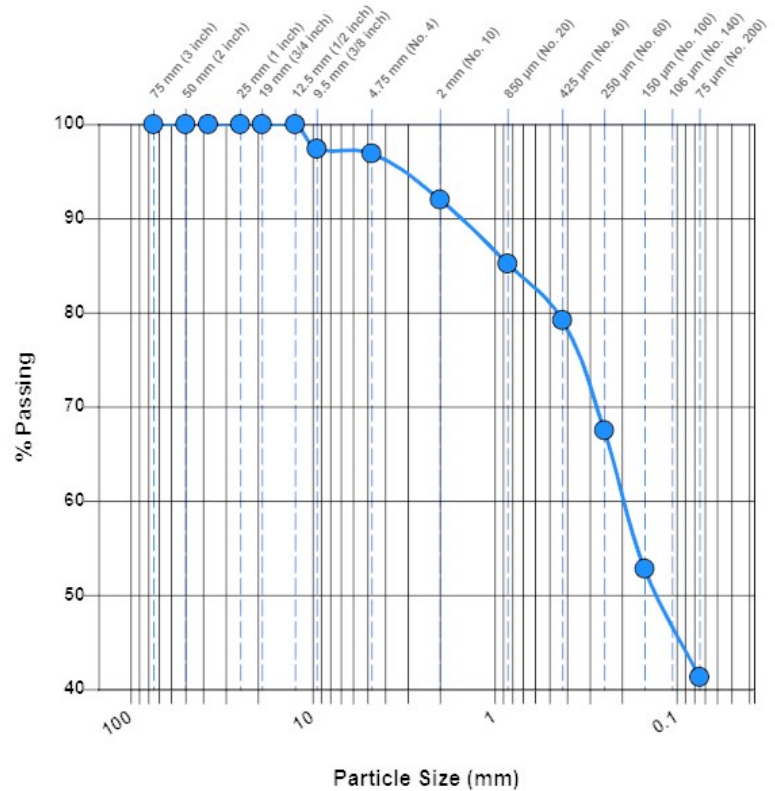
Sample Number:	310581	Depth (ft):	95-100
Boring Number:	38-C	Sampled By:	Drill Crew
Sample Date:	05/18/2020		
Received Date:	05/26/2020	Lab:	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	05/26/2020	Tested By:	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
12.5 mm (1/2 inch)	100.0	
9.5 mm (3/8 inch)	97.4	
4.75 mm (No. 4)	96.9	
2 mm (No. 10)	92.0	
850 µm (No. 20)	85.2	
425 µm (No. 40)	79.2	
250 µm (No. 60)	67.5	
150 µm (No. 100)	52.8	
75 µm (No. 200)	41.3	

Gravel (%) 3.1 **Sand (%)** 55.6 **Silt & Clay (%)** 41.3

D60
0.199



Classification: SC Clayey sand

General

Results: The test is for informational purposes.

Streier, Jim

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Minneapolis, MN 55438
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Client:

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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:	310582	Depth (ft):	115-120
Boring Number:	38-C	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)	98.2	
2 mm (No. 10)	93.5	
850 µm (No. 20)	84.3	
425 µm (No. 40)	69.6	
250 µm (No. 60)	49.8	
150 µm (No. 100)	32.2	
75 µm (No. 200)	20.0	

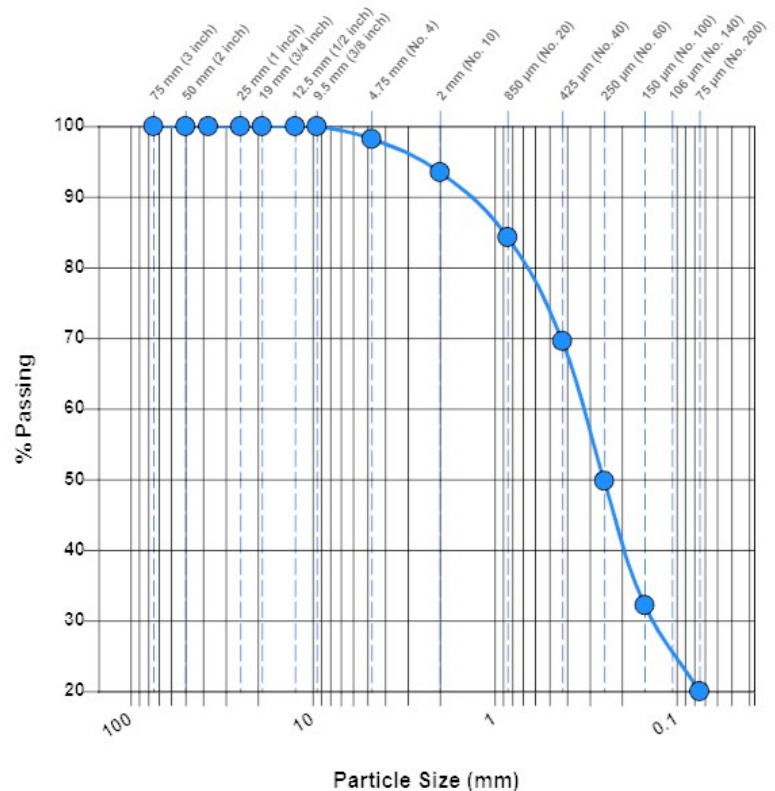
Gravel (%)
1.8

Sand (%)
78.2

Silt & Clay (%)
20.0

D30
0.100

D60
0.340



Classification: SM Silty sand

General

Results: The test is for informational purposes.

Streier, Jim

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Minneapolis, MN 55438
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Client:

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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:	310583	Depth (ft):	145-150
Boring Number:	38-C	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)	99.1	
2 mm (No. 10)	76.0	
850 µm (No. 20)	48.8	
425 µm (No. 40)	34.0	
250 µm (No. 60)	24.3	
150 µm (No. 100)	17.5	
75 µm (No. 200)	12.9	

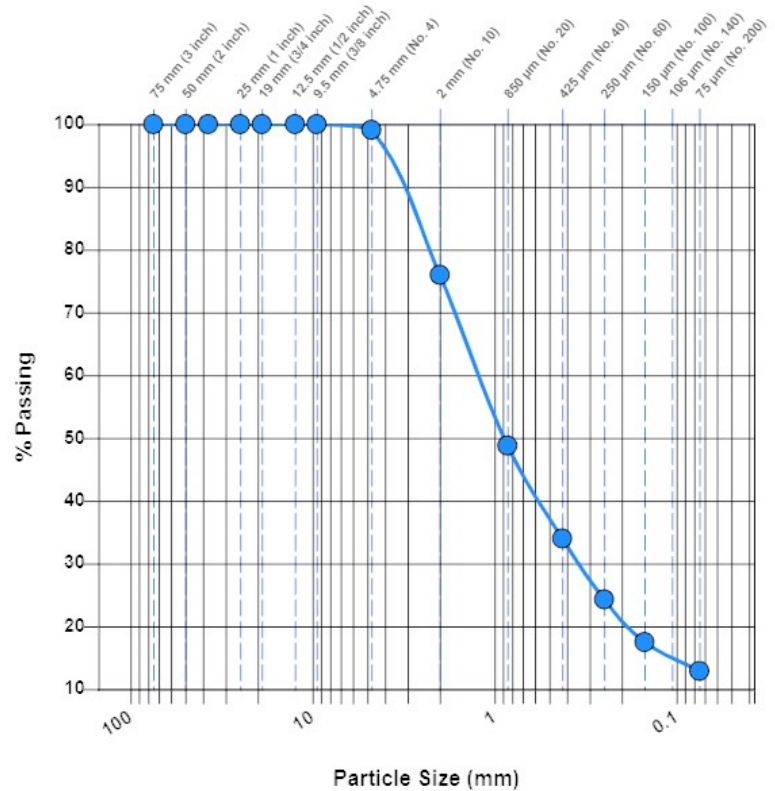
Gravel (%)
0.9

Sand (%)
86.2

Silt & Clay (%)
12.9

D30
0.353

D60
1.324



Classification: SM Silty sand

General

Results: The test is for informational purposes.

Streier, Jim

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Attn: Accounts Payable5400 Westheimer Ct
Houston, TX 77056

Project:

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Enbridge Line 5 Re-route
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near Mellen, WI

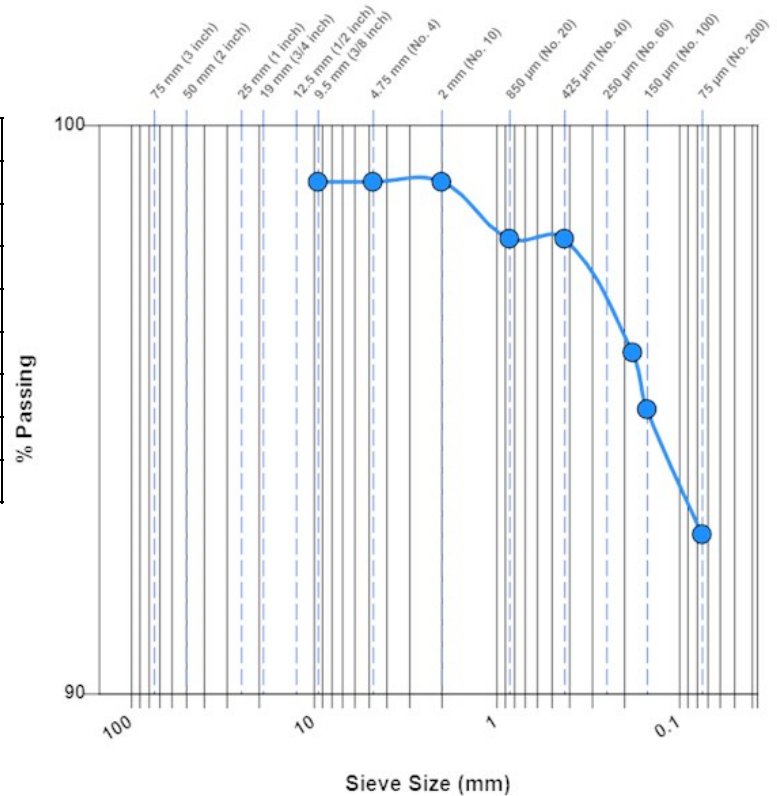
Sample Information

Sample Number: 312856 **Alternate ID:** 40-C 5 9.5'-11.5'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 9.5-11.5
Boring Number: 40-C **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 5 9.5'-11.5'
Sample Date: 04/16/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
9.5 mm (3/8 inch)	99	
4.75 mm (No. 4)	99	
2 mm (No. 10)	99	
850 µm (No. 20)	98	
425 µm (No. 40)	98	
180 µm (No. 80)	96	
150 µm (No. 100)	95	
75 µm (No. 200)	92.8	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Oven Dry



Classification: ML Silt

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 149.40 grams

[Signature]

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Suite 4
Duluth, MN 55807
Phone: 218-624-4967

Client:

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

Project:

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

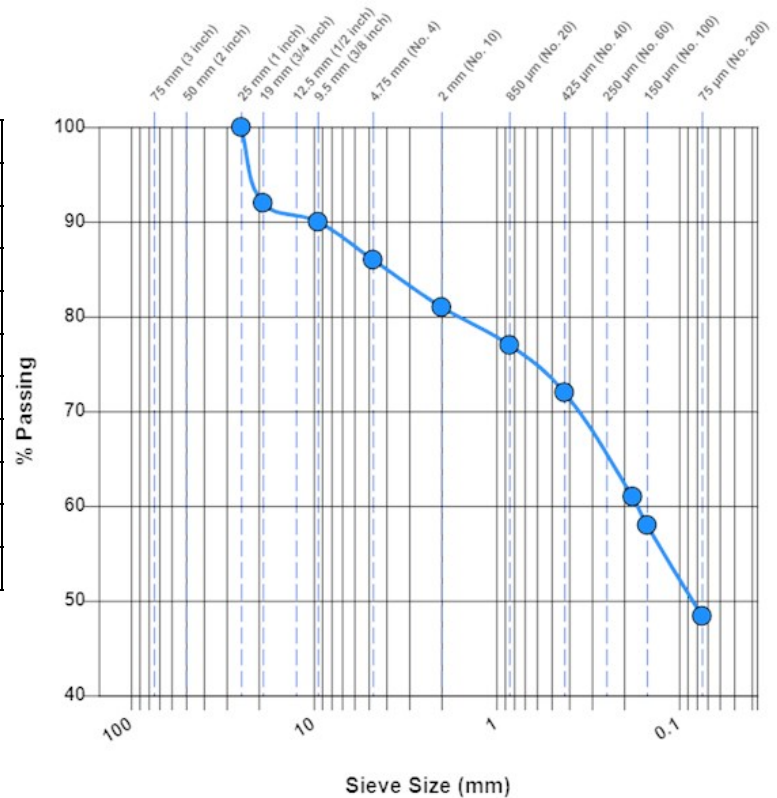
Sample Information

Sample Number: 312857 **Alternate ID:** 40-C 10 30'-32'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 30-32
Boring Number: 40-C **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 10 30'-32'
Sample Date: 04/16/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
25 mm (1 inch)	100	
19 mm (3/4 inch)	92	
9.5 mm (3/8 inch)	90	
4.75 mm (No. 4)	86	
2 mm (No. 10)	81	
850 µm (No. 20)	77	
425 µm (No. 40)	72	
180 µm (No. 80)	61	
150 µm (No. 100)	58	
75 µm (No. 200)	48.4	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Oven Dry



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 218.2 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

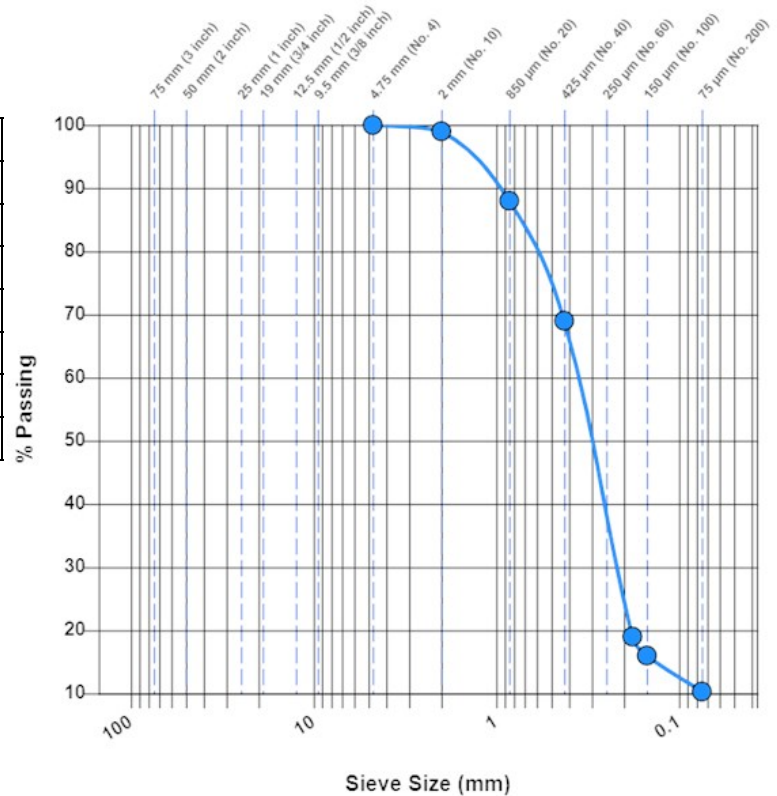
Sample Information

Sample Number: 312858 **Alternate ID:** 40-C 24 100'-105'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 100-105
Boring Number: 40-C **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 24 100'-105'
Sample Date: 04/21/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	99	
850 µm (No. 20)	88	
425 µm (No. 40)	69	
180 µm (No. 80)	19	
150 µm (No. 100)	16	
75 µm (No. 200)	10.3	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Oven Dry



Classification: SP-SM Poorly graded sand with silt

General

Results: The test is for informational purposes.

Remarks: Total dry weight of sample 263.89 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

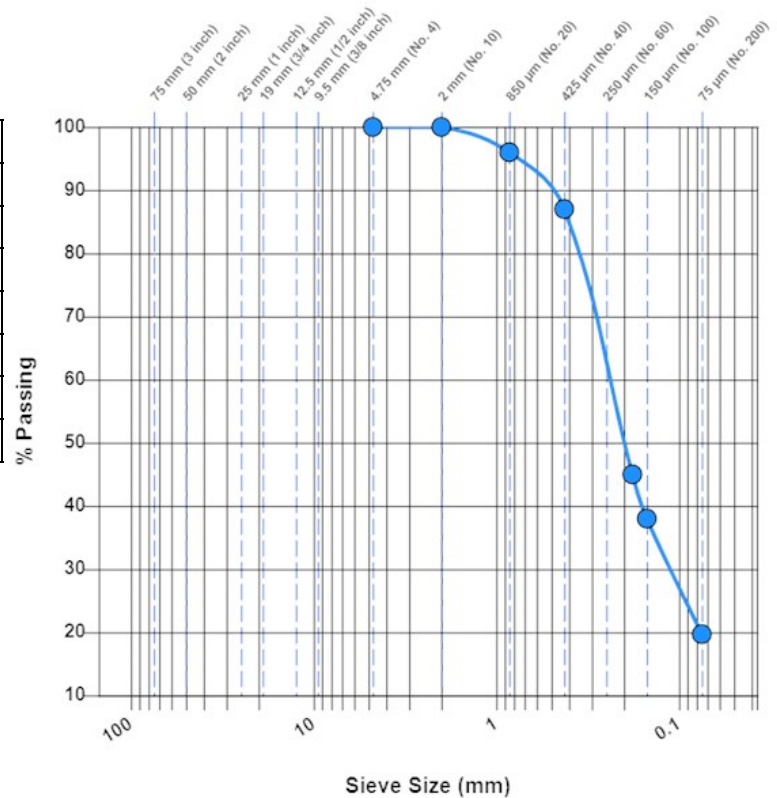
Sample Information

Sample Number: 312860 **Alternate ID:** 40-C 35 155'-160'
Sampling Method: Auger Boring ASTM D1452 **Depth (ft):** 155-160
Boring Number: 40-C **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 35 155'-160'
Sample Date: 04/21/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020

Laboratory Data

Sieve Size	% Passing	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	96	
425 µm (No. 40)	87	
180 µm (No. 80)	45	
150 µm (No. 100)	38	
75 µm (No. 200)	19.7	

Test Method: Method A (Composite Sieving)
Dispersion Apparatus: Shaking
Specimen Obtained: Oven Dry



Classification: SM Silty sand

General

Results: The test is for informational purposes.
Remarks: Total dry weight of sample 230.1 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
<Blank>, <Blank>

Sample Information

Sample Number: 307998 **Alternate ID:** 34-C 12.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 12.5'
Sample Date: 04/17/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	6	12.5	20.6

General



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
<Blank>, <Blank>

Sample Information

Sample Number: 307999 **Alternate ID:** 34-C 45'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C at 45'
Sample Date: 04/20/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	14	45.0	12.1

General



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Suite 4
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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
<Blank>, <Blank>

Sample Information

Sample Number: 308000 **Alternate ID:** 34-C 60'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 60'
Sample Date: 04/20/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	17	60.0	13.8

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
<Blank>, <Blank>

Sample Information

Sample Number: 308001 **Alternate ID:** 34-C 65'-75'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 34-C 65'-75'
Sample Date: 04/20/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	18 & 19	70.0	13.9

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
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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
<Blank>, <Blank>

Sample Information

Sample Number: 308002 **Alternate ID:** 34-C 85'-90'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 85'-90'
Sample Date: 04/21/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	21 & 23	85.0	15.1

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
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Client:

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

Project:

B2001991
Enbridge Line 5 Re-route
Enbridge Line 5
<Blank>, <Blank>

Sample Information

Sample Number: 308003 **Alternate ID:** 34-C 105'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 105'
Sample Date: 04/21/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	26	105.0	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
<Blank>, <Blank>

Sample Information

Sample Number: 308004 **Alternate ID:** 34-C 125'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 125'
Sample Date: 04/21/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	30	125.0	17.8

General



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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
<Blank>, <Blank>

Sample Information

Sample Number: 308005 **Alternate ID:** 34-C 130'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 130'
Sample Date: 04/21/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	31	130.0	21.3

General

Results: The test is for informational purposes.



4511 West First Street
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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
<Blank>, <Blank>

Sample Information

Sample Number: 308008 **Alternate ID:** 34-C 150'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location Details: Boring 34-C 150'
Sample Date: 04/22/2020
Received Date: 05/13/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/15/2020 **Tested By:** Taylor, Michael

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
34-C	35	150.0	17.7

General



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
<Blank>, <Blank>

Sample Information

Sample Number: 305407 **Alternate ID:** 37C 15'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 15'
Sample Date: 03/31/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/04/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
37-C	9	15.0	11.0

General

Results: The test is for informational purposes.



4511 West First Street
Suite 4
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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
<Blank>, <Blank>

Sample Information

Sample Number: 305415 **Alternate ID:** 37C 75.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 75.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/04/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
37C	22	75.0	24.1

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
<Blank>, <Blank>

Sample Information

Sample Number: 305417 **Alternate ID:** 37C 89.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 89.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/04/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
37C	25	90.0	20.9

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
<Blank>, <Blank>

Sample Information

Sample Number: 305420 **Alternate ID:** 37C 99.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 99.5'
Sample Date: 04/02/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/04/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
37C	27	100.0	20.5

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
<Blank>, <Blank>

Sample Information

Sample Number: 305422 **Alternate ID:** 37C 114.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Patterson, Gregg
Location: In-place
Location Details: Boring 37C 114.5'
Sample Date: 04/06/2020
Received Date: 05/01/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 05/04/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
37C	30	115.0	24.6

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: 312856 **Alternate ID:** 40-C 5 9.5'-11.5'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 5 9.5'-11.5'
Sample Date: 04/16/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
40-C	5	9.5	23.7

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: 312857 **Alternate ID:** 40-C 10 30'-32'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 10 30'-32'
Sample Date: 04/16/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
40-C	10	30.0	12.1

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: 312858 **Alternate ID:** 40-C 24 100'-105'
Sampling Method: Auger Boring ASTM D1452 **Sampled By:** Drill Crew
Location: In-place
Location Details: Boring 40-C Sample 24 100'-105'
Sample Date: 04/21/2020
Received Date: 06/05/2020 **Lab:** 4511 West First Street, Suite 4, Duluth, MN
Tested Date: 06/05/2020 **Tested By:** Patterson, Gregg

Laboratory Data

Boring #	Sample #	Depth (ft)	Moisture Content (%)
40-C	24 and 25	102.0	20.3

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 Payable 5400 Westheimer Ct
Houston, TX 77056

Project:

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

Sample Information

Metafield ID: 310564 **Sampled By:** Drill Crew
Sample Date: 05/18/2020
Received Date: 05/26/2020 **Lab:** 11001 Hampshire Ave S, Bloomington, MN
Completed Date: 05/29/2020 **Tested By:** Streier, Jim

Laboratory Results Summary

Boring	Sample	Depth (ft)	MC (%)	Wash Loss (%)	LL	PL	PI	Organic Content %	Wet Density (pcf)	Dry Density (pcf)	Resistivity (ohm-cm)	Q _u (tsf)
34-C	3	5.0	20.1		42	18	24					
34-C	9	20.0	19.4		41	16	25					
34-C	10	25.0	24.8		45	17	28		124.5	99.8		
34-C	12	35.0	18.3		24	18	6		133.2	112.6		

General

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: 310566

Completed Date: 05/27/2020

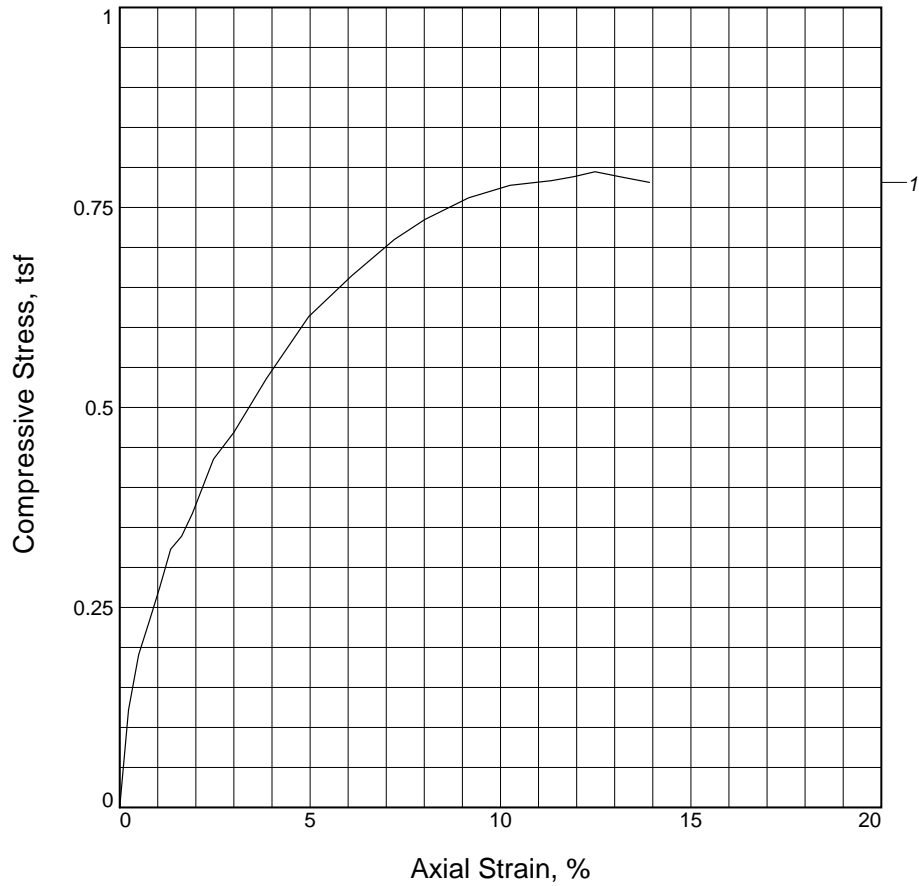
Prepared By: Streier, Jim

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
38-C	4	9.5	21.9									
38-C	7	17.0	8.5									
38-C	10	30.0	11.8									
38-C	12-14	40.0	12.4									
38-C	16-17	60.0	17.8									
38-C	20-21	80.0	17.5									
38-C	23-24	95.0	12.7									
38-C	27-28	115.0	23.1									
38-C	33-34	145.0	19.3									

General

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, tsf	0.7946			
Undrained shear strength, tsf	0.3973			
Failure strain, %	12.5			
Strain rate, %/min.	1.00			
Water content, %	24.8			
Wet density, pcf	118.6			
Dry density, pcf	95.0			
Saturation, %	86.6			
Void ratio	0.7738			
Specimen diameter, in.	2.816			
Specimen height, in.	5.600			
Height/diameter ratio	1.99			

Description: LEAN CLAY, brown (CL)

LL =	PL =	PI =	Assumed GS= 2.70	Type: Thinwall
------	------	------	------------------	----------------

Project No.: B2001991
Date Sampled: 04/14/2020
Remarks:
 ASTM D 2166

Client:

Project: Enbridge Line 5 Re-route
 Enbridge Line 5
Source of Sample: 34-C **Depth:** 25'
Sample Number: 10

BRAUNSM
 INTERTEC

Figure _____