



**STRUCTURE GEOTECHNICAL REPORT
RETAINING WALL at WB IL 38 to NB IL 83 RAMP
SN: 022-W001
Section 2020-000-BR
Project 62M69
Job No. D-91-376-20
OAKBROOK TERRACE
DUPAGE COUNTY, ILLINOIS**

Prepared on: 01/28/2021

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Appendix B – Laboratory Test Reports

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1.0 INTRODUCTION

Interra, Inc. (INTERRA) was tasked by Bowman Consulting Group Ltd. based in Lisle, Illinois to conduct subsurface soil investigation and prepare the Structural Geotechnical Report (SGR) for the new retaining wall proposed east of the ramp from WB IL 38 to NB IL 83. The proposed wall will retain the existing embankment material that will be encroached to realign the Salt Creek Reach 5 which flows adjacent to the ramp. The proposed wall height is anticipated to be a maximum of 14 feet at the front face of the wall with a proposed backslope of two percent. The proposed retaining wall is approximately 370 feet long from Stn. 32+80 to Stn. 36+50.

2.0 PROJECT DESCRIPTION AND SCOPE

The project section is located within incorporated Oakbrook Terrace, Dupage Township, Dupage County and defined as Section 14, 15, 22 and 23 T39N, R11E Third Meridian, Hinsdale Quadrangle. The subject area is located north and east of the intersection of IL 83 (Kingery Highway) and IL 38 (Roosevelt Road). The pavement surface elevation of the borehole locations varies between 664.00 feet and 669.00 feet. The proposed bottom of the retaining wall is at 656.27 feet.

INTERRA's scope of work included drilling six (6) geotechnical borings to a depth of 45.0 feet each from existing pavement surface of the ramp; performing associated laboratory tests on collected soil samples; preparation of Structure Geotechnical Report in accordance with IDOT Geotechnical Manual 2020.

3.0 FIELD EXPLORATION

Six (6) soil borings were planned along the ramp from WB IL 38 to NB IL 83, on the east shoulder, approximately 18 feet west of the proposed retaining wall. The borings are spaced approximately 75 feet apart in accordance with the IDOT Geotechnical manual guidelines. Prior to drilling, the drilling sub-contractor Geocon Professional Services (GEOCON) contacted the local one-call utility clearance service (JULIE) to clear underground utilities. Traffic control and protection was provided by traffic control sub-contractor ROADSAFE.

The borings were drilled with a track mounted drill rig Deidrich D-50 turbo. INTERRA's geologist was present during the drilling to collect and log the soil samples. The borings were drilled, and samples were collected in general accordance with the guidelines in the IDOT Geotechnical Manual. Soil sampling was performed per AASHTO T-206, "Penetration Test and Split Barrel Sampling of Soils". Soil sampling was performed at 2.5-foot intervals up to the exploration depth of 45.0 feet. The soil samples were taken in conjunction with the Standard Penetration Test where a driving resistance to a standard 2" split-spoon samples indicate relative density of granular materials and consistency of cohesive soils. Soil specimens from the borings were visually identified in accordance with the AASHTO and IDOT textural classification systems. Also, unconfined compressive strength tests were performed on cohesive samples using an Illinois modified RIMAC tester. In addition to the split spoon samples, one (1) Shelby tube sample was collected from each borehole. Water level readings were taken during drilling and immediately after the completion of drilling.

4.0 LABORATORY TESTING

All laboratory testing was performed in accordance with IDOT and/or AASHTO standard methods for testing. Moisture content tests were performed for all soil samples and Unconfined Compressive Strength tests, Grainsize analysis and Atterberg Limits were performed on the 6 Shelby tube samples.

Soil boring logs indicating the blow counts, moisture content and soil description have been prepared and included in Appendix A of this report. The boring logs include the results of the laboratory testing. Results of laboratory testing are presented in Appendix B.

5.0 SUBSURFACE CONDITIONS

Boring RW-01 was driven on the ramp outside shoulder at Stn. 32+80. The boring encountered 16 inches of asphalt grindings and sand fill followed by 6.7 feet of hard yellowish brown and gray clay loam fill to a depth of 8.0 feet. This is underlain by 7.5 feet of loose to very loose light gray sand with cobbles and boulders to 15.5 feet. Medium stiff to very stiff brownish gray and gray clay or clay loam extends to 33.0. Beyond this and up to the exploration depth of 45 feet, medium dense sands or sandy loam soils were encountered.

Boring RW-02 was drilled on the ramp outside shoulder at Stn. 33+60. The boring encountered 10 inches of asphalt underlain by 4 inches of asphalt grindings and sand fill followed by 6.7 feet of hard yellowish brown and gray clay loam fill to a depth of 8.0 feet. This is underlain by 15 feet of medium dense to very dense light gray sand with cobbles and boulders to 23.0 feet with a clay between 18.0 to 20.5 feet. Hard to very stiff gray clay or clay loam extends to 35.5. Beyond this and up to the exploration depth of 45 feet, medium dense to dense sands, sandy loams or silty loam soils were encountered.

Boring RW-03 was drilled on the ramp outside shoulder at stn. 34+40. The boring encountered 10 inches of asphalt followed by 4 inches of asphalt grindings and sand fill followed by 9.2 feet of hard yellowish brown and gray clay loam fill to a depth of 10.5 feet. This is underlain by dense, very dense or medium dense light gray sand with cobbles and boulders to 18.0. Very soft to hard black or gray clay or gray clay loam extends to 38.0. Beyond this and up to the exploration depth of 45 feet, medium dense silty loams, sands or sandy loam soils were encountered.

Boring RW-04 was drilled on the ramp outside shoulder at stn. 35+10. The boring encountered 11 inches of asphalt followed by 4.5 inches of asphalt grindings and sand fill, followed by 9.2 feet

of hard yellowish brown and gray clay loam fill to a depth of 10.5 feet. This is underlain by 12.5 feet of very dense to medium dense loose light gray sand with cobbles and boulders to 23.0 feet. Very stiff to hard brownish gray and gray clay or clay loam extends to 38.0. Beyond this and up to the exploration depth of 45 feet, medium dense sands or sandy loam soils were encountered.

Boring RW-05 was drilled on the ramp outside shoulder at Stn. 35+80. The boring encountered 10 inches of asphalt followed by 2 inches of asphalt grindings followed by 10.0 feet of hard to very stiff yellowish brown and gray clay loam fill to a depth of 12.0 feet. This is underlain by 8.5 feet of dense to medium dense light gray sand with cobbles and boulders to 20.5 feet. Very stiff to hard brownish gray and gray clay or clay loam extends to 39.5 feet. Beyond this and up to the exploration depth of 45 feet, medium dense silty loam, sands or sandy loam soils were encountered.

Boring RW-06 was drilled on the ramp outside shoulder at stn. 36+50. The boring encountered 11 inches of asphalt followed by 4 inches of asphalt grindings followed by 12.5 feet of very stiff to hard yellowish brown and gray clay loam fill to a depth of 13.8 feet. This is underlain by 6.8 feet of dense to very dense light gray sand with cobbles and boulders to 20.5 feet. Stiff to very stiff gray clay extends to 38.0. Beyond this and up to the exploration depth of 45 feet, medium dense silts, silty loam or sandy loam soils were encountered.

Groundwater Information

Groundwater elevations were recorded during drilling, and immediately after completion of drilling at all boring locations. Groundwater was noted between 8.0 feet and 14 feet during drilling and between 8.5 feet and 13.0 feet after the completion of drilling. The boreholes were backfilled with auger cuttings and bentonite chips immediately after completion of drilling. Since the boreholes were backfilled immediately after drilling, the water levels reported may not represent the long-term groundwater levels. Changes in water levels should be expected due to seasonal variations and precipitation.

6.0 ANALYSIS AND RECOMMENDATIONS

Six borings were performed for the retaining wall. Foundation soils, in general, consist of medium dense to dense granular soils and stiff to hard clayey soils, with possible cobbles between 8 and 23 feet. Groundwater was encountered at an approximate depth of 10 feet.

Several possible wall types such as concrete cantilever wall, Mechanically Stabilized Earth (MSE) retaining wall, steel sheet pile wall and soldier pile wall are considered. Of these, the steel sheet pile wall and the soldier pile walls are normally used in cut condition. Selection of a wall type depends on several factors such as soil conditions, feasibility, cost and control of top of wall deflections, susceptibility to hydraulic draw down from adjacent water bodies. In our opinion, a soldier pile wall with lagging will be more appropriate for this situation. Due to the presence of cobbles and boulders, we recommend pile shoes to the driven soldier piles. The driven soldier pile wall should be constructed in accordance with Section 522.08 IDOT Standard Specifications.

The retaining wall will be subjected to lateral earth pressures from the backfill as well as lateral pressures from live loads. While the soldier pile is considered a flexible wall and the lateral earth pressures causing movement are called active and those pressures resisting the movement are called passive pressure. Active pressures on the soldier piles above the bottom of the wall facing should be taken over an effective width equal to the center-to-center spacing of the soldier piles. Active pressures on the soldier piles below the bottom of the wall facing should be taken over an effective width equal to the element width of the soldier pile. The passive resistance offered by the soil below the bottom of wall facing should be taken over an effective width equal to three times the element width of the soldier pile. This width, however, shall not be greater than the center-to-center distance between piles. Coulomb's Passive resistance offered by the top 3.5 feet of soil in front of the wall should not be considered due soil disturbance, drainage system installation, weakening of soil due to cyclical frost-heave conditions. For a sloping final grade in front of the wall, the slope angle should be taken into consideration such that passive resistance offered by soil closer than 3.5 feet is ignored. Lagging should be designed for 100 percent of the lateral earth pressure. Live surcharge on the backfill soils should be considered in the design of

the lagging. We recommend that walls be designed based on AASHTO LRFD using long-term Coulomb active and passive earth pressures using the appropriate load and resistance factors. Recommended values of active and passive earth pressure coefficients for a backfill slope of 2% and a level ground in front of the wall and wall to soil interface friction angle (δ) of 11 degrees are included in Table 6-1.

Table 6-1 Lateral Earth Pressure Parameters for the Retaining Wall

Elevation	Soil Type	Total Unit Weight (pcf)	Active Earth Pressure Coeff, Ka	Passive Earth Pressure Coeff., Kp	Long-term Friction Angle, deg
669-656	Very Stiff to Hard Cohesive Soil	120	0.33	2.9	29
656-624	Med dense to dense granular soils	125	0.27	3.0	34

Traffic and other live surcharge loads on the surface of the backfill behind the wall should be considered at a minimum of 250 psf.

It will be necessary to perform a lateral load capacity analysis of the soldier pile wall to ensure that wall deflections are within design limits. The analysis and design of the soldier pile retaining wall can be accomplished with the use of software programs such as PYWALL. Table 6-2 contains the recommended soil input parameters for the PYWALL.

Table 6-2 Recommended Soil Input Parameters for Retaining Wall

Elevation	Soil Type	Saturated Weight (pcf)	Shear Strength (psf)		Friction Angle (deg)		Active Earth Pr. Coeff, Ka	At-Rest Earth Pr. Coeff, Ko	Passive Earth Pr. Coeff., Kp	Soil Modulus, k (pci)	Epsilon 50 Strain
			Undrained	Drained	Undrained	Drained					
669-656	V. Stiff Cohesive Soil	120	2000	100	0	29	0.33	0.51	2.9	1000	0.007
656-624	Med dense to dense granular soils	125	-	0	-	34	0.27	0.44	3.0	90	-

Stability Analyses

Global slope stability analyses were conducted for the critical cross-section assuming wall height of 15 feet and a level backfill. The LRFD resistance factor considered is 0.65, which is equivalent to slope stability factor of safety of 1.54. Slope stability analyses were conducted using SLIDE V7.0. Analyses indicated that the global slope stability factor of safety factor is 3.5 under short-term conditions and 1.9 under long term conditions exceeding the minimum required value of 1.54 for both short and long-term loading conditions. Appendix C contains the results of the slope stability analyses.

7.0 CONSTRUCTION CONSIDERATIONS

No cofferdams appear to be required for this construction. Stream diversion methods should be considered to allow for the construction of the proposed structure. The contractor can consider temporary ditches, sumps, granular drainage blankets and other methods to control surface water infiltration and ground water and provide a dry condition for construction.

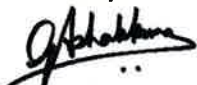
8.0 CLOSURE

The analysis and recommendations submitted in this report are based upon the data obtained from six (6) soil boreholes performed at the locations indicated on the Borehole Location Plan, project information provided to INTERRA and from any other information discussed in this report. This report does not reflect any variations that may occur between these boreholes. In performing subsurface explorations, specific information is obtained at specific locations at specific times. It is a well-known fact that variations in soil and rock conditions exist on most sites between borehole locations. Also, groundwater levels vary from time to time. The nature and extent of variations may not become evident until the course of construction. If project characteristics change or if variations in the subsurface conditions appear evident, it will be necessary for a re-evaluation of the recommendations of this report.

We appreciate the opportunity to be of service to you. Should you need additional information or clarifications, please call us at (630) 754-8700.

Yours truly,

INTERRA, INC.


Ashok Guntaka, EI

Project Engineer


02/24/21

Sanjeev Bandi, Ph.D., PE

Principal Engineer



REFERENCES

AASHTO 2020, LRFD Bridge Design Specifications, 9th Edition 2020, American Association of State Highway and Transportation Officials, Washington, DC.

IDOT 2020, Geotechnical Manual, Illinois Department of Transportation.

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U.S.G.S. 2014, National Seismic Hazard Maps. <http://earthquake.usgs.gov/research/hazmaps/>

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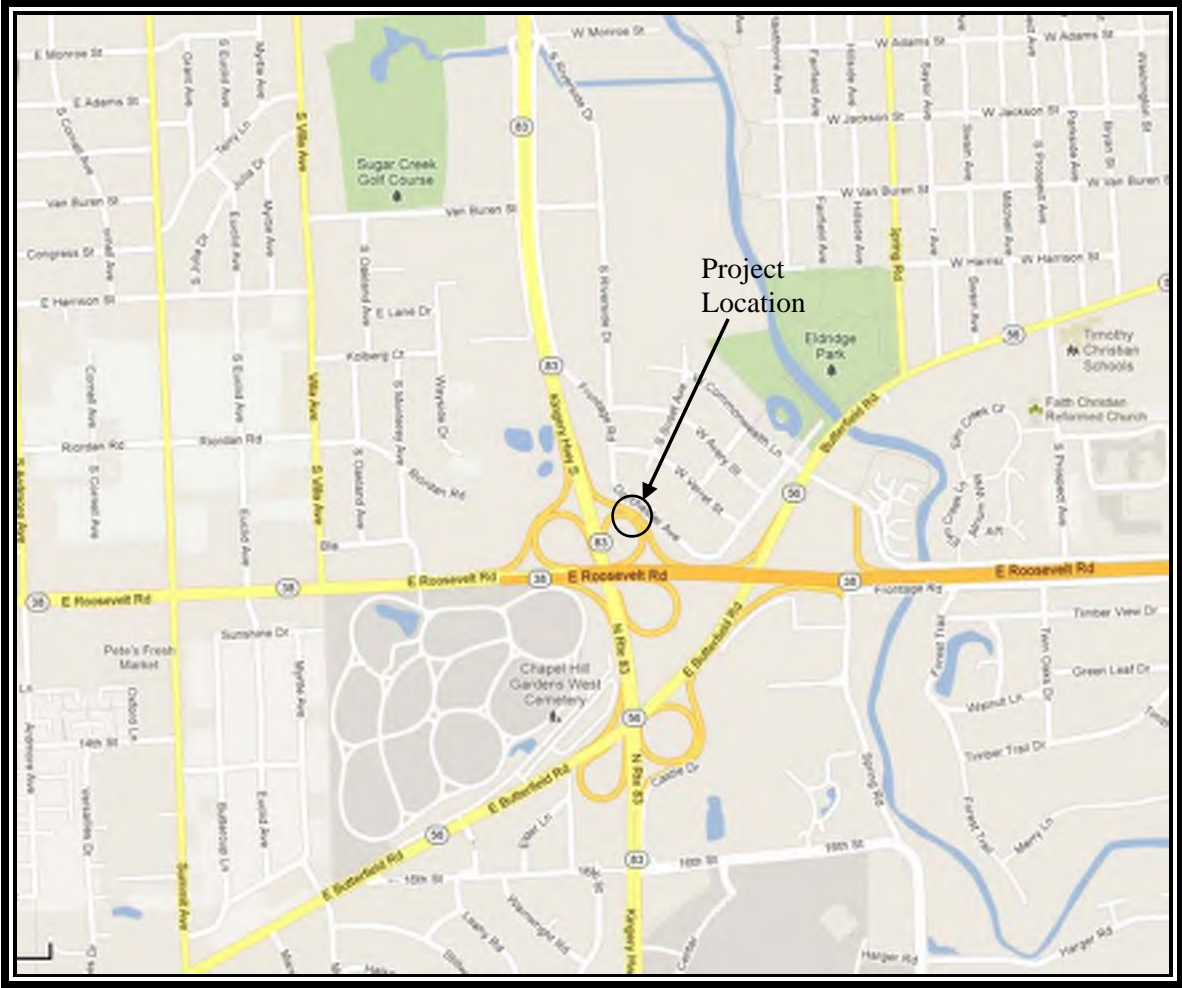
Appendix A

Site Location Map

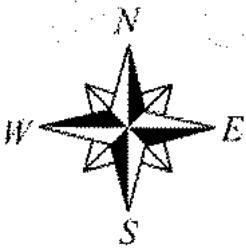
Borehole Location Plan

Soil Boring Logs

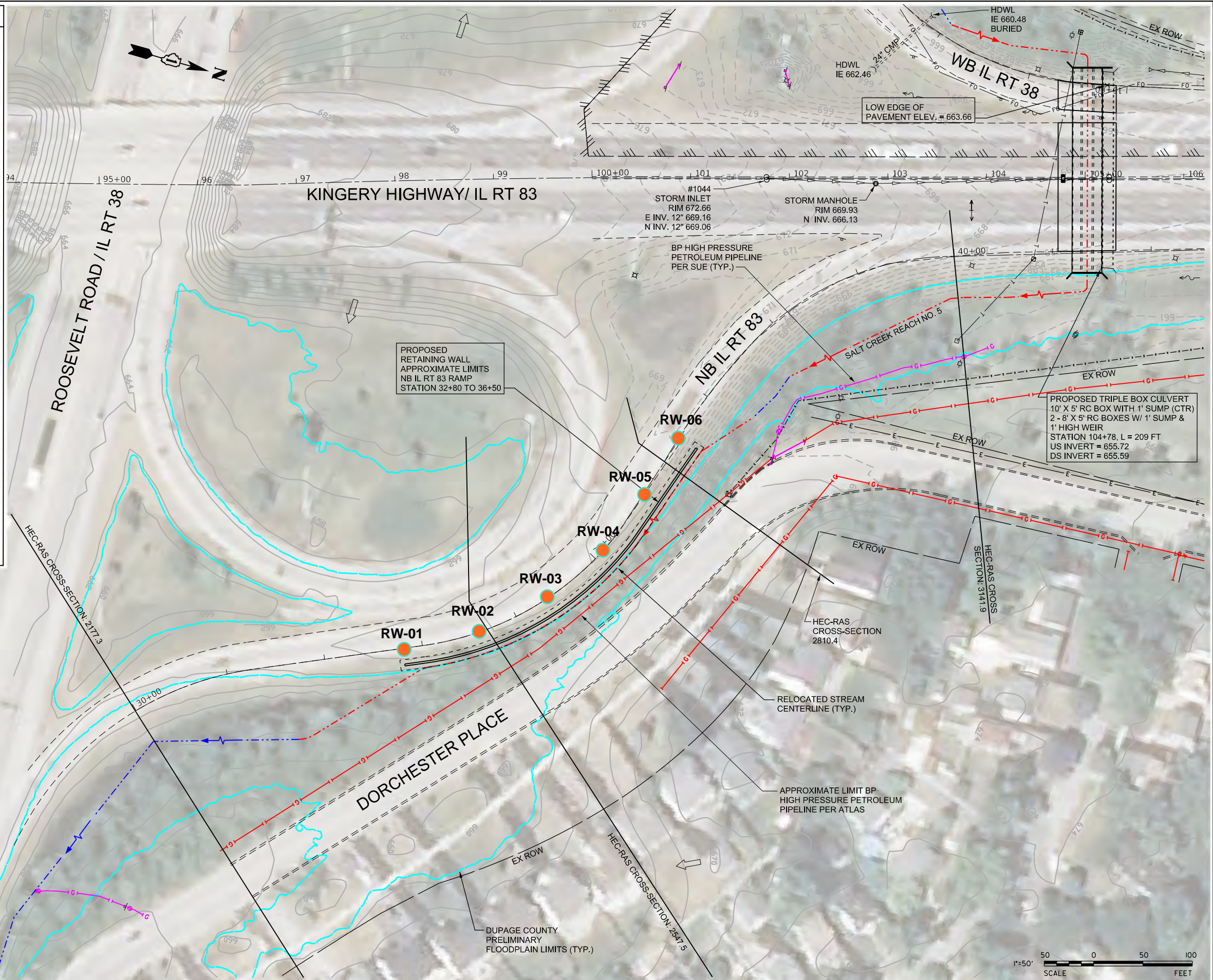
LOCATION MAP



RETAINING WALL at WB IL 38 to NB IL 83 RAMP
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Project 62M69
Job No. D-91-376-20
OAKBROOK TERRACE
DUPAGE COUNTY, ILLINOIS



LEGEND	
	ROADWAY CENTERLINE
	EXISTING RIGHT-OF-WAY
	OUTLET DRAINAGE AREA
	FLOODPLAIN BOUNDARY
	FLOODWAY BOUNDARY
	EX CULVERT
	PR CULVERT
	EX CREEK CENTERLINE
	PR CREEK CENTERLINE
	EX STORM SEWER
	PR STORM SEWER
	EX UNDERGROUND FIBER OPTIC
	EX AERIAL LINES
	EX UNDERGROUND CABLE TV
	EX UNDERGROUND ELECTRIC
	EX UNDERGROUND GAS LINE PER ATLAS
	EX UNDERGROUND GAS LINE PER SUBSURFACE INVESTIGATION
	EX DITCH
	EX SWALE
	SUMMIT
	EX SHEET FLOW
	EX OVERFLOW
	EX OUTLET
	CREEK FLOW DIRECTION
	EX SUBSURFACE INVESTIGATION TEST HOLE
	EX MANHOLE
	EX CATCH BASIN
	EX INLET
	EX END SECTION
	PR INLET BOX STRUCTURE
	EX HEADWALL
	PR HEADWALL



Retaining Wall Boring (45')

MODEL: Default
 FILE NAME: E:\320\41189\14189-07\Drawings\Main\CADD Exhibit\DWG\Sheet Files\EXH_P002_14189-07.dwg
 DATE: 9/17/2020



DRAWN - GAK	REVISED -	REVISED -
CHECKED - SB	REVISED -	REVISED -
DATE - 9/17/2020	REVISED -	REVISED -

IL 83 OVER SALT CREEK REACH NO. 5
 OAKBROOK TERRACE ILLINOIS

RETAINING WALL at WB IL 38 to NB IL 83 RAMP
 SN: 022-W001
 SCALE: 1" = 50'
 STA. 30+00 TO STA. 42+00

COUNTY	DUPAGE
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Interra, Inc.
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Bolingbrook, IL 60440
www.interraservices.com

SOIL BORING LOG

Date 8/17/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION sout, south of culvert edgeh side shoulder NB ramp to Rt 12

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
Station _____

BORING NO. RW-01
Station 32+80 RAMP
Offset 0.00ft

Ground Surface Elev. 664.00 ft

DEPTH (ft)	BLOW S (1/6")	UCS (tsf)	MOIST (%)	Surface Water Elev. ft	Stream Bed Elev. ft	DEPTH (ft)	BLOW S (1/6")	UCS (tsf)	MOIST (%)
662.70	5						3		23.1
	5		16.7			5	4.4		
	5	5.8				2	B		
	5			641.00		3			25.8
	5					5	3.4		
	4								
	5		16.4			4			15.4
-5	6	5.8				4	5.8		
				638.50					
	3								
	3		19.4			4			17.7
	9	4.6				6	3.4		
656.00									
	7								
	3		9.0			3			
	5					8			14.9
-10						10	3.4		
				633.50					
	5								
	9		8.8			8			
	10					7			13.9
				631.00		9	35.0		
							P		
	3								
	2		25.3			4			10.6
-15	2					4			
648.50						8			
	1								
	2		19.4			5			
	1	1.0				8			11.7
646.00						8			
				626.00					
		0.7	22.3						
						8			
						6			22.7
-20	3								
						9			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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SOIL BORING LOG

Date 8/17/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION sout, south of culvert edgeh side shoulder NB ramp to Rt 12

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001

Station _____

BORING NO. RW-01

Station 32+80 RAMP

Offset 0.00ft

Ground Surface Elev. 664.00 ft

DEPTH H S	B L O W S	U C S Qu	M O I S T (%)
(ft)	(/6")	(tsf)	
10			
8		25.3	
12			
9			
16		22.5	
18			
619.00 -45			
-50			
-55			
-60			

Surface Water Elev.	_____	ft
Stream Bed Elev.	_____	ft
Groundwater Elev.:		
First Encounter	<u>654.5</u>	ft ▼
Upon Completion	<u>654.5</u>	ft ▼
After _____ Hrs.	_____	ft

Medium Dense to Dense, Light Grayish Brown to Grayish Brown SAND, fine, Saturated (continued)

END OF BORING 45.0 feet
Backfill with soil cuttings

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



SOIL BORING LOG

Date 8/18/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-01

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
Station _____
BORING NO. RW-02
Station 33+60 RAMP
Offset 0.00ft
Ground Surface Elev. 665.00 ft

DEPTH (ft)	BLOW S (1/6")	UCS (tsf)	MOIST (%)	Surface Water Elev. ft	Stream Bed Elev. ft	DEPTH (ft)	BLOW S (1/6")	UCS (tsf)	MOIST (%)
664.17									
663.80	6						22		
	6		14.5				36		33.5
	7	5.8					50/1"		
				642.00					
	2						13		
	4		18.9				6		75.5
	-5	6.8					-25	7	
	3								
	4		17.4						14.2
	7	6.8						2.4	
				657.00				B	
							4		
	12						6		17.7
	10		6.2				8	3.4	
	-10	8					-30		B
	9						12		
	6		19.4				4		17.4
	5						6	2.9	
				632.00				B	
							7		
	18		17.4				8		11.8
	-15	50/1"					-35	9	5.8
									B
				629.50					
	13						8		
	7		12.1				9		12.7
	8						9		
				647.00					
	6						12		
	5		19.7				5		10.4
				627.00					
	4	1.9					7		
	-20						-40		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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 Bolingbrook, IL 60440
 www.interraservices.com

SOIL BORING LOG

Date 8/18/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-01

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
 Station _____

BORING NO. RW-02
 Station 33+60 RAMP
 Offset 0.00ft
 Ground Surface Elev. 665.00 ft

DEPTH (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
---------------	--------------------------------	--------------------------------	------------------------------

Surface Water Elev. _____ ft
 Stream Bed Elev. _____ ft
 Groundwater Elev.:
 First Encounter 656.2 ft ▼
 Upon Completion 656.2 ft ▼
 After _____ Hrs. _____ ft

624.50				
Medium Dense, Light Gray to 43', brown at 43' SAND, Fine, Saturated	5			
	6		21.2	
	6			
	19			
	20		16.5	
620.00	-45			
END OF BORING 45.0 feet Backfill with soil cutting, cap with asphalt				
	-50			
	-55			
	-60			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



SOIL BORING LOG

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-02

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
Station _____

BORING NO. RW-03
Station 34+40 RAMP
Offset 0.00ft
Ground Surface Elev. 667.00 ft

DEPTH (ft)	BLOW S (ft/6")	UCS (tsf)	MOIST (%)	Surface Water Elev. ft	Stream Bed Elev. ft	DEPTH (ft)	BLOW S (ft/6")	UCS (tsf)	MOIST (%)
666.17									
665.70	6								
	5		16.3					2.1	23.6
	5	4.4					4	B	
	3						6		22.3
	3		21.2		643.00		7	4.6	
	5	3.9					3	B	
					641.50		6	3.4	16.8
	3						6	B	
	3		22.5				5		16.5
	5	6.3					10	5.8	
					639.00			B	
	2						10		
	3		19.2				10		11.7
	8	3.9					13		
	9						4		
	16		6.3				4		13.8
	16						10		
654.00									
	6						4		
	5		20.9				6		12.7
	50/2"						9		
					631.50				
	3						11		
	4		26.1				9		15.4
	11						16		
649.00									
	0				629.00		6		
	1		40.7				9		10.1
	2	0.3					9		
647.00	-20						-40		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



SOIL BORING LOG

Date 8/18/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-02

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
 Station _____

BORING NO. RW-03
 Station 34+40 RAMP
 Offset 0.00ft
 Ground Surface Elev. 667.00 ft

DEPTH (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
---------------	--------------------------------	--------------------------------	------------------------------

Surface Water Elev. _____ ft
 Stream Bed Elev. _____ ft
 Groundwater Elev.:
 First Encounter 657.0 ft ▼
 Upon Completion 657.0 ft ▽
 After _____ Hrs. _____ ft

626.50				
Medium Dense Pale Brown SAND, course to fine, trace to little medium to fine gravel, Saturated	5			
	8		20.3	
	9			
	6			
	8		22.6	
622.00	-45	7		
END OF BORING 45.0 feet Backfill with soil cuttings, cap with asphalt				
	-50			
	-55			
	-60			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



SOIL BORING LOG

Date 8/18/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-03

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
Station _____
BORING NO. RW-04
Station 35+10 RAMP
Offset 0.00ft
Ground Surface Elev. 667.00 ft

DEPTH (ft)	BLOW S (ft/6")	UCS (tsf)	MOIST (%)	Surface Water Elev. ft	Stream Bed Elev. ft	DEPTH (ft)	BLOW S (ft/6")	UCS (tsf)	MOIST (%)
666.08									
665.70	4					50			
	5		14.4			50			13.6
	9	3.5 P				50			
				644.00					
	4					3			
	3		18.8			3			20.1
-5	6	6.1 B				4	2.5 P		
	2								23.6
	2		19.0				2.7 B		
	4	2.9 B				4			
	2					6			15.1
	2		17.7			6	5.3 B		
-10	3	3.9 B				4			
656.50						5			13.5
	10					10	5.8 B		
	50					4			
	50		10.2			5			18.2
	50					22	5.8 B		
				634.00					
	9					4			
	14		17.0			6			16.1
-15	25					8	4.1 B		
	20								
	25		24.4			3			
	24					4			12.6
				630.50		7	3.4 B		
	9								
	15		14.8			11			7.7
-20	12					8			
						9			
				629.00					

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



Interra, Inc.
 600 Territorial Drive, Suite G
 Bolingbrook, IL 60440
 www.interraservices.com

SOIL BORING LOG

Date 8/18/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-03

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
 Station _____

BORING NO. RW-04
 Station 35+10 RAMP
 Offset 0.00ft
 Ground Surface Elev. 667.00 ft

DEPTH (ft)	BLOWS (/6")	UCS (tsf)	MOIST (%)
---------------	----------------	--------------	--------------

Surface Water Elev. _____ ft
 Stream Bed Elev. _____ ft
 Groundwater Elev.:
 First Encounter 657.0 ft ▼
 Upon Completion 657.0 ft ▼
 After _____ Hrs. _____ ft

626.50				
Loose, pale Brown SAND, very fine, Saturated	3			
	6		25.0	
	4			
	10			
	9		19.6	
622.00	-45			
END OF BORING 45.0 feet Backfill boring with soil cuttings, cap with asphalt				
	-50			
	-55			
	-60			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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Bolingbrook, IL 60440
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SOIL BORING LOG

Date 8/19/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-04

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
Station _____

BORING NO. RW-05
Station 35+80 RAMP
Offset 0.00ft
Ground Surface Elev. 667.00 ft

DEPTH (ft)	BLOW S (/#")	UCS (tsf)	MOIST (%)	Surface Water Elev. ft	Stream Bed Elev. ft	DEPTH (ft)	BLOW S (/#")	UCS (tsf)	MOIST (%)
666.17						646.50			
665.80	4						13		
	4		13.6				6		18.0
	3	4.6					6	2.9	
		B						B	
	2							1.9	18.0
	3		16.7					B	
	3	2.5				-25	5		
		P					7		17.7
	4						11	2.9	
							3	B	
	5		16.0				5		21.2
	6	5.3					8	5.8	
		B						B	
	4						5		
	4		17.8				5		18.5
	5	4.9				-30	5	4.4	
		B						B	
	3						7		
	25		8.3				8		17.3
655.00	17	2.9					10	3.9	
		B						B	
	12						5		
	21		10.9				4		17.8
	24					-35	8	5.8	
								B	
	11						4		
	5		14.8				7		16.3
	8						9	3.4	
								B	
	19					629.00	5		
	14		10.5				7		10.0
	10						11		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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SOIL BORING LOG

Date 8/19/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-04

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
 Station _____

BORING NO. RW-05
 Station 35+80 RAMP
 Offset 0.00ft
 Ground Surface Elev. 667.00 ft

DEPTH (ft)	BLOWS (/6")	UCS (tsf)	MOIST (%)
---------------	----------------	--------------	--------------

Surface Water Elev. _____ ft
 Stream Bed Elev. _____ ft
 Groundwater Elev.:
 First Encounter 655.0 ft ▼
 Upon Completion 655.0 ft ▽
 After _____ Hrs. _____ ft

Medium Dense, Redish Brown
 SANDY LOAM, trace to little
 medium to fine gravel, Saturated
 scattered interbedded clay lenses
 41.8-41.9'

Gray at 43'

Gray SILTY LOAM 39.5-39.8'
 MC=18.2% (continued)

622.00 -45

4			
8			10.7
14			
9			
14			10.1
12			

END OF BORING 45.0 feet
 Backfill boring with soil cuttings,
 cap with asphalt

-50

-55

-60

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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Bolingbrook, IL 60440
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SOIL BORING LOG

Date 8/19/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-05

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO.	Station	DEPTH	BLOWS	UCS	MOIST	Surface Water Elev.	Stream Bed Elev.	DEPTH	BLOWS	UCS	MOIST
SN 022-W001		(ft)	(/6")	(tsf)	(%)	ft	ft	(ft)	(/6")	(tsf)	(%)
BORING NO.	Station					Groundwater Elev.:					
RW-06	36+50 RAMP					First Encounter					
	Offset					Upon Completion					
	0.00ft					After					
Ground Surface Elev.	669.00	ft									

DEPTH (ft)	BLOWS (/6")	UCS (tsf)	MOIST (%)	Soil Description	DEPTH (ft)	BLOWS (/6")	UCS (tsf)	MOIST (%)
648.50				ASPHALT	648.50			
668.07				Loose Asphalt Grindings FILL				
667.70	5			Hard to Very Stiff, Black, brown and gray CLAY LOAM FILL, trace to little medium to fine gravel, Moist		4		
	4		14.2			4		18.9
	5	4.5		Shelby Tube 22.5-24.5'		4	1.8	
		P					B	
	3			Color change to Yellowish Brown and Gray at 5.5'			1.8	18.0
	3		18.8				B	
	4	2.5		Color change to Brown at 8.0'	-25	3		
		P				5		16.9
	2			Color change to Brown and Gray at 10.5'		7	3.4	
	4		16.9			3	B	
	4	3.4				3	2.1	17.3
		B					B	
	3					3		
	3		17.4			5		20.6
	5	5.3			-30	7	2.4	
		B					B	
	3					5		
	4		16.3			5		16.8
	5	5.3				10	3.4	
		B					B	
655.20	18			Dense to Very Dense, Light Gray COBBLES, BOULDERS and SAND, Saturated at 13.8'		4		
	20		9.1			5		17.5
	11				-35	7	3.6	
							B	
	28					5		
	24		11.2			6		16.8
	17					8	2.4	
							B	
	20				631.00			
	35		11.4	Medium Dense, Gray SILT, trace fine gravel, Wet		8		
						6		18.5
						5		
					-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



SOIL BORING LOG

Date 8/19/20

ROUTE FAP 344/Illinois 83 DESCRIPTION Retaining Wall Boring LOGGED BY Eric D. Slusser

SECTION 2020-000-BR LOCATION 13' west of CL Ramp to NB IL 83 75' NW of RW-05

COUNTY DuPage County DRILLING METHOD Hollow Stem Auger HAMMER TYPE Automatic

STRUCT. NO. SN 022-W001
 Station _____

BORING NO. RW-06
 Station 36+50 RAMP
 Offset 0.00ft
 Ground Surface Elev. 669.00 ft

DEPTH H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
--------------------	--------------------------------	----------------------------	------------------------------

Surface Water Elev.	_____	ft
Stream Bed Elev.	_____	ft
Groundwater Elev.:		
First Encounter	<u>655.2</u>	ft ▼
Upon Completion	<u>656.0</u>	ft ▼
After _____ Hrs.	_____	ft

628.50				
Medium Dense Gray SANDY LOAM, trace to little medium to fine gravel, Saturated	3			
	4		10.7	
	6			
626.00				
Medium dense, Gray SITY LOAM, trace fine gravel, Wet	9			
	10		13.9	
	12			
624.00	-45			
END OF BORING 45.0 feet Backfill boring with soil cuttings, top with asphalt				
	-50			
	-55			
	-60			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)

Appendix B

Laboratory Test Reports

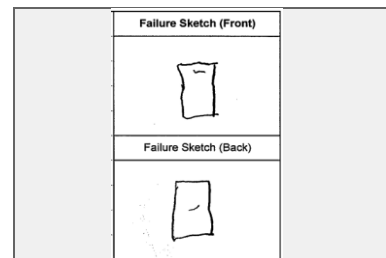


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

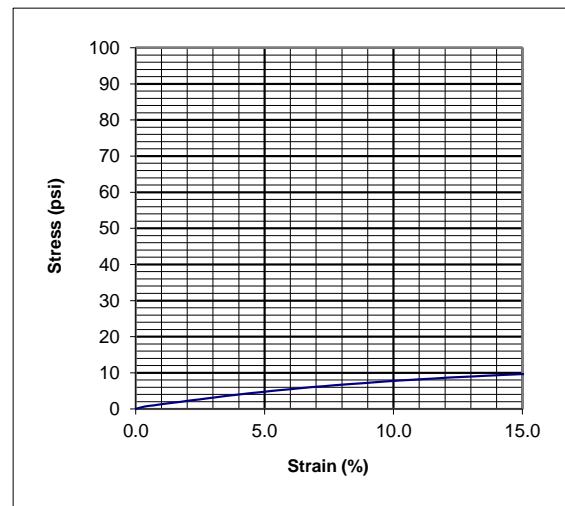
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW01-ST08	Date Tested	8/19/20	Tested By	BKP
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Brown lean clay with silt and gravel
Location	17.5-19.5'

Type of Sample	ST
Average Height =	14.63 cm
Average Diameter =	7.24 cm
Height/Diameter Ratio =	2.02
Wet Sample Weight=	1260.69 g
Wet Density =	2.09 g/cc
Moisture Content =	20.1 %
Dry Density =	1.74 g/cc
Strain Rate =	0.06 %/min



Failure Image



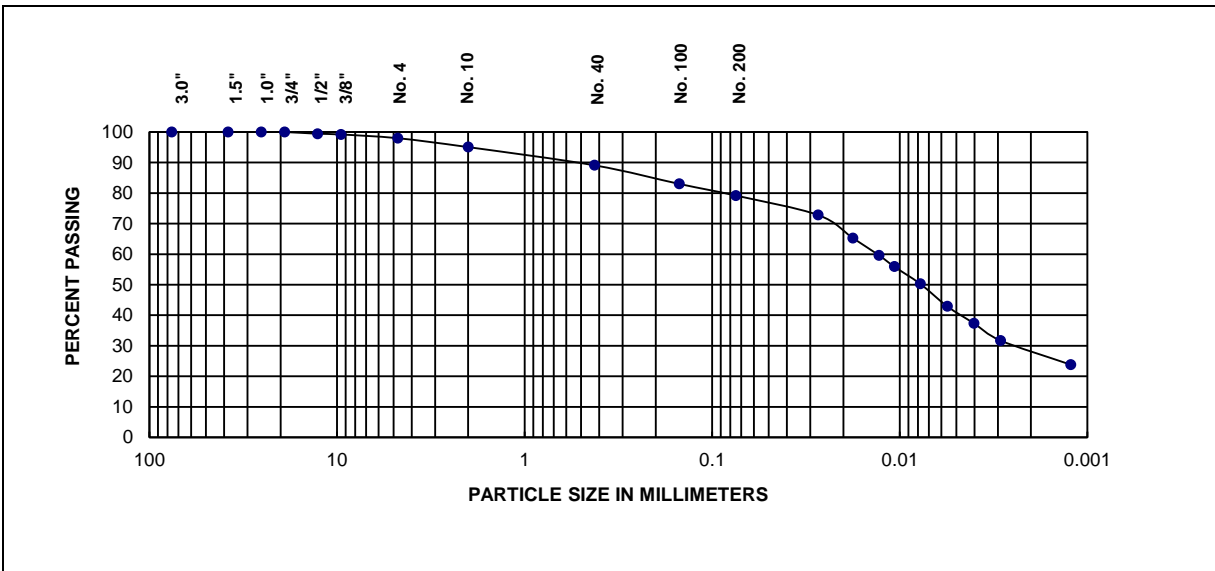
Unconfined Compressive Strength =	9.84 psi
	0.71 tsf
Shear Strength =	4.92 psi
	0.35 tsf
Strain at Failure =	15.6 %

Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW01-ST08	Date Tested	8/28/2020	Tested by	BKP
						Qc by	RC
Date Sample Received:	8/19/2020						
Sample Location	17.5-19.5'						
Sample Description	Lean clay with silt and sand, trace gravel						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	4.9	15.9	50.3	28.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	29	17	12
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification:		A-6(8)
1/2"	99.4	IDH Classification:		Silty Clay Loam
3/8"	99.2			
No. 4	98.0			
No. 10	95.1			
No. 40	89.1			
No. 100	83.0			
No. 200	79.2			

Remarks:	

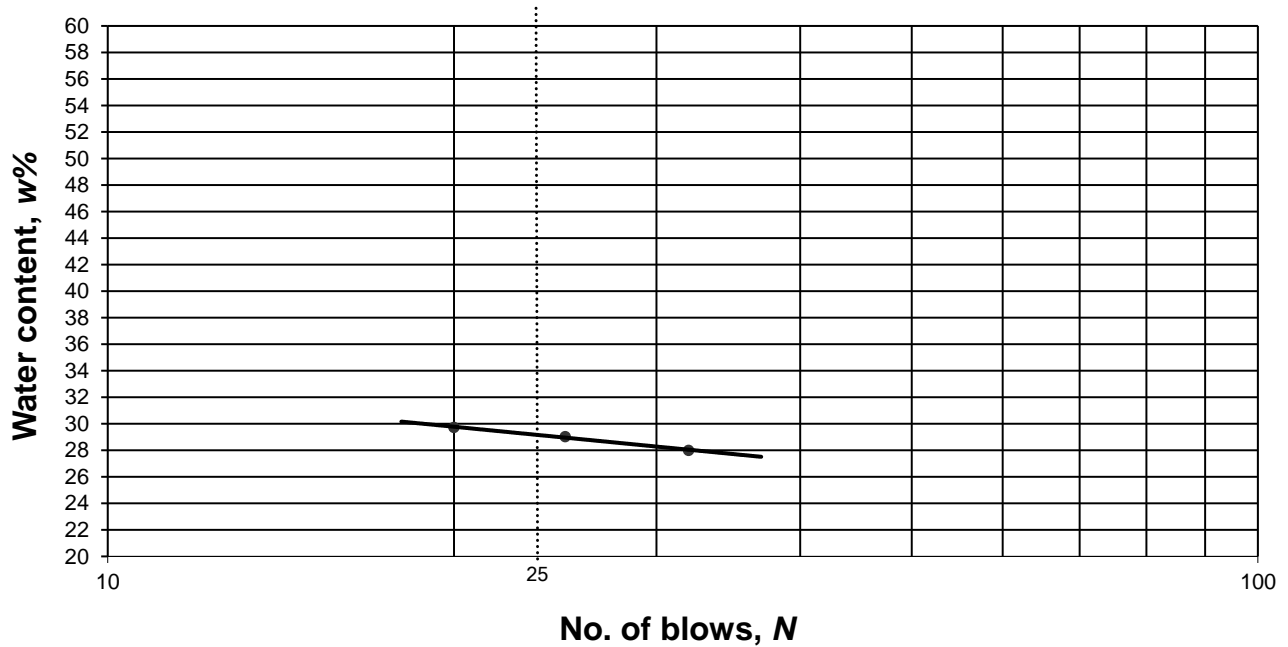


Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW01-ST08	Date Tested	8/26/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	17.5-19.5'
Sample Description	Lean clay with silt and sand, trace gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	29	Plastic Limit, PL	17	Plasticity Index, PI	12

Remarks	
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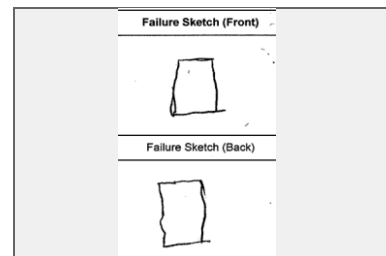


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

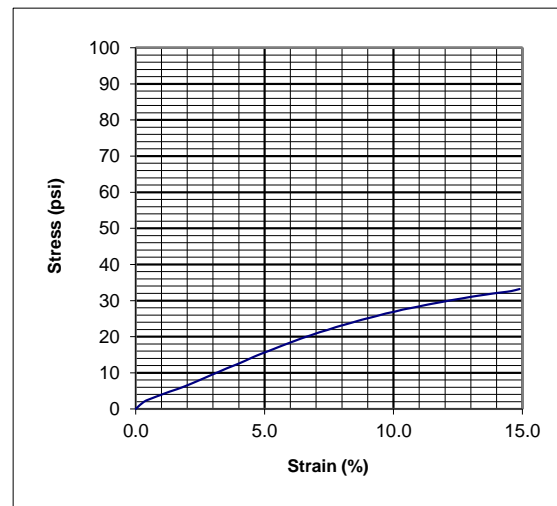
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW02-ST11	Date Tested	8/22/20	Tested By	BKP
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Gray soil with gravel
Location	26-28'

Type of Sample	SS
Average Height =	15.69 cm
Average Diameter =	7.19 cm
Height/Diameter Ratio =	2.18
Wet Sample Weight=	1359.70 g
Wet Density =	2.13 g/cc
Moisture Content =	15.5 %
Dry Density =	1.85 g/cc
Strain Rate =	0.06 %/min



Failure Image



Unconfined Compressive Strength =	32.63 psi
	2.35 tsf
Shear Strength =	16.32 psi
	1.17 tsf
Strain at Failure =	14.9 %

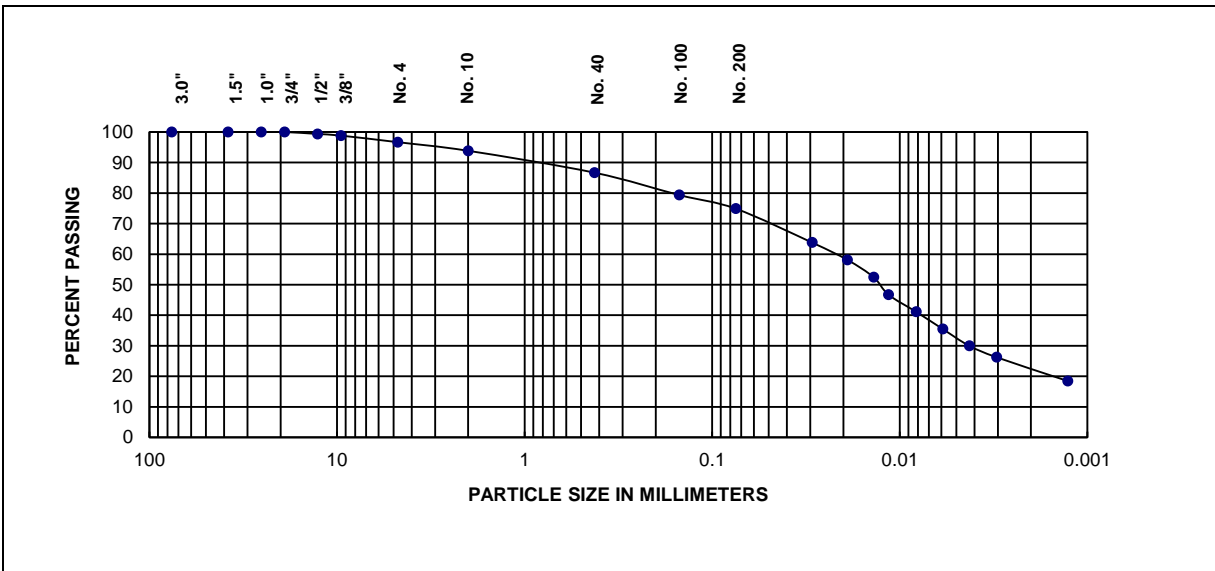
Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW02-ST11	Date Tested	8/28/2020	Tested by	BKP
						Qc by	RC

Date Sample Received:	8/19/2020
Sample Location	26-28'
Sample Description	Gray silty clay with sand, trace gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	6.1	19.0	52.0	22.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	25	15	10
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification:		A-4(5)
1/2"	99.4	IDH Classification:		Silty Clay Loam
3/8"	98.8			
No. 4	96.7			
No. 10	93.9			
No. 40	86.7			
No. 100	79.4			
No. 200	74.9			

Remarks:	

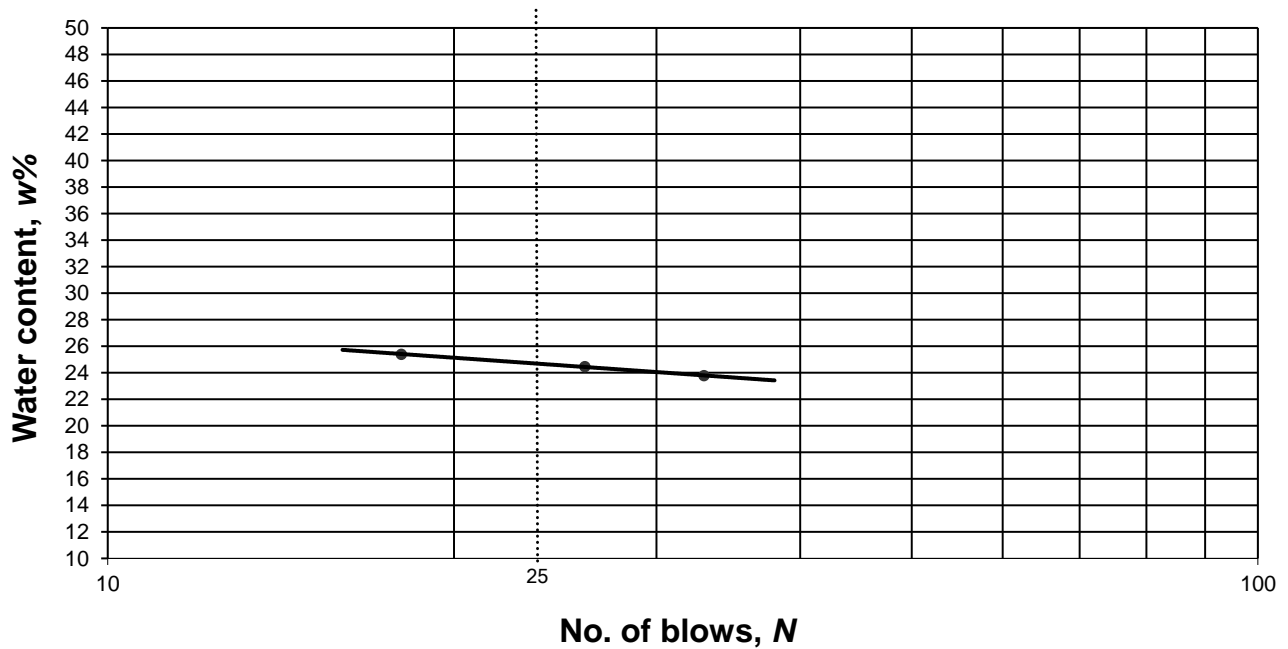


Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW02-ST11	Date Tested	8/26/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	26-28'
Sample Description	Gray silty clay with gravel, trace gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	25	Plastic Limit, PL	15	Plasticity Index, PI	10

Remarks	
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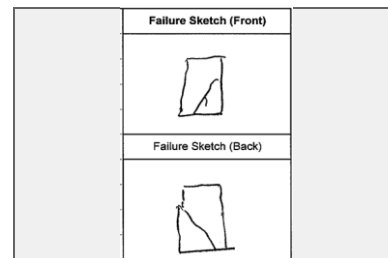


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

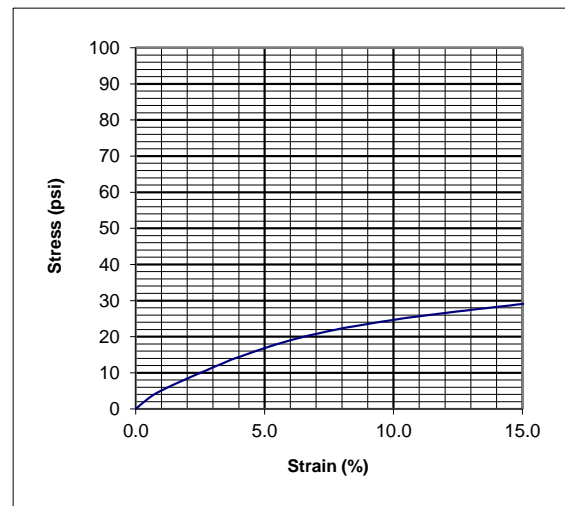
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW03-ST09	Date Tested	8/22/20	Tested By	BKP
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Gray soil with some gravel
Location	20.5-22.5'

Type of Sample	ST
Average Height =	15.04 cm
Average Diameter =	7.20 cm
Height/Diameter Ratio =	2.09
Wet Sample Weight=	1254.06 g
Wet Density =	2.05 g/cc
Moisture Content =	23.5 %
Dry Density =	1.66 g/cc
Strain Rate =	0.06 %/min



Failure Image



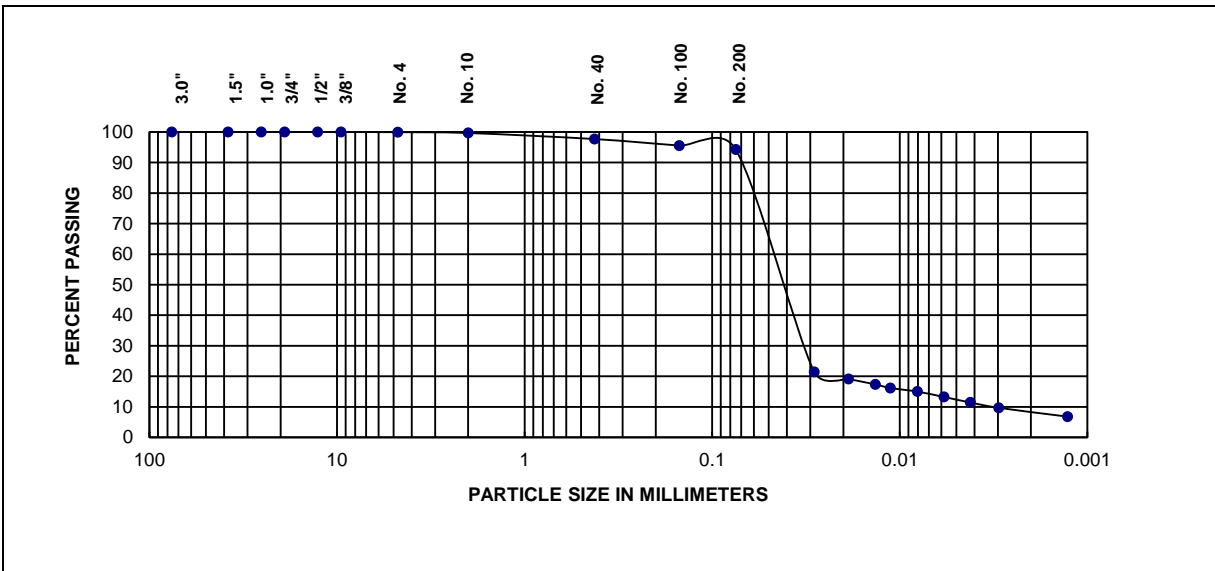
Unconfined Compressive Strength =	29.42 psi 2.12 tsf
Shear Strength =	14.71 psi 1.06 tsf
Strain at Failure =	15.5 %

Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW03-ST09	Date Tested	6/28/2020	Tested by	BKP
						Qc by	RC
Date Sample Received:	8/19/2020						
Sample Location	20.5-22.5'						
Sample Description	Gray silty clay						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	0.3	5.4	85.6	8.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	42	20	22
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification:		A-7-6(22)
1/2"	100.0	IDH Classification:		
3/8"	100.0			Silt
No. 4	99.9			
No. 10	99.7			
No. 40	97.7			
No. 100	95.6			
No. 200	94.3			

Remarks:	

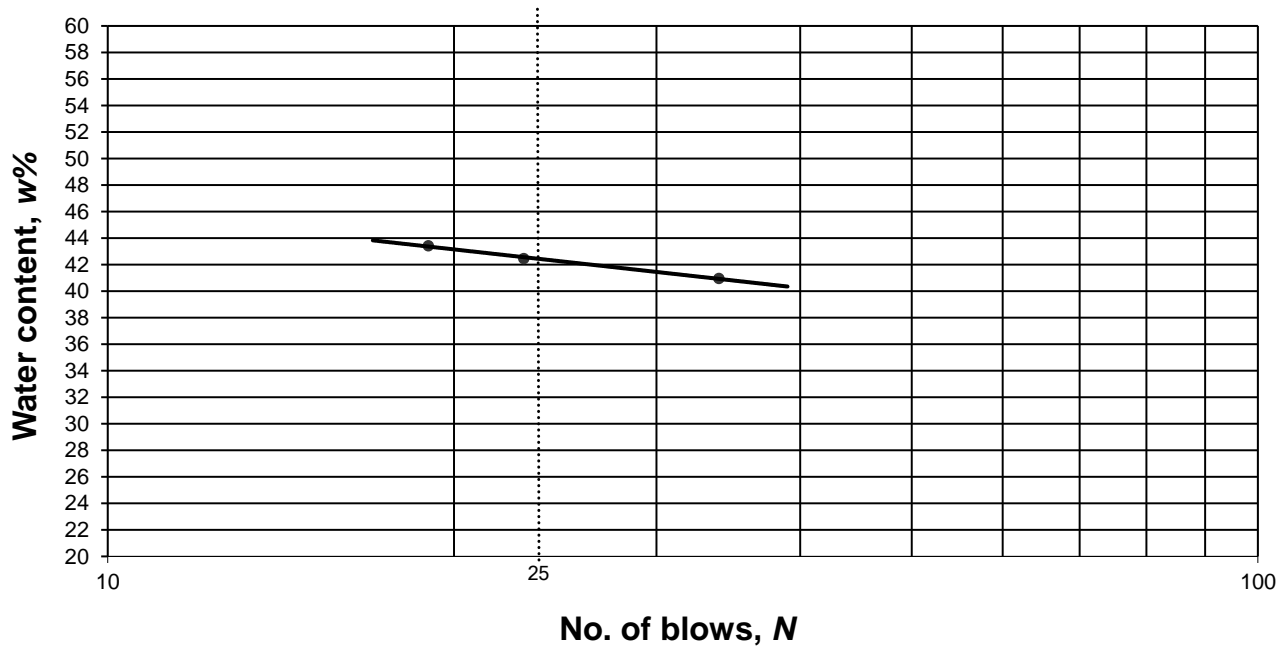


Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW03-ST09	Date Tested	8/27/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	20.5-22.5'
Sample Description	Gray silty clay

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	42	Plastic Limit, PL	20	Plasticity Index, PI	22

Remarks	
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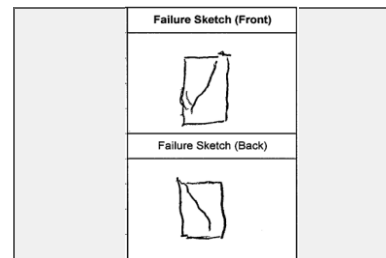


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

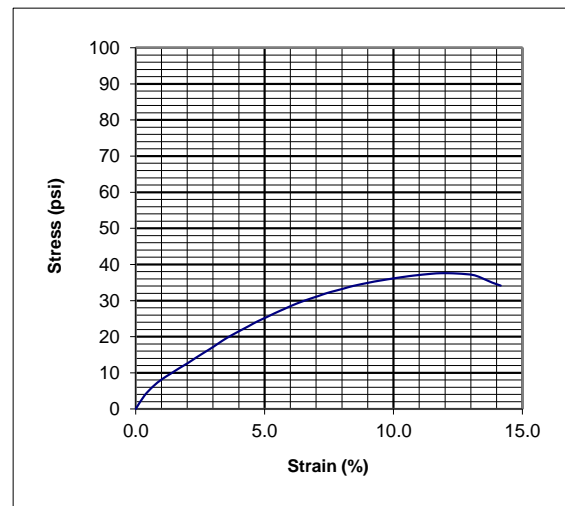
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW04-ST11	Date Tested	8/22/20	Tested By	BKP
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Brown soil with some gravel
Location	25.5-27.5'

Type of Sample	SS
Average Height =	15.07 cm
Average Diameter =	7.20 cm
Height/Diameter Ratio =	2.09
Wet Sample Weight=	1289.52 g
Wet Density =	2.10 g/cc
Moisture Content =	21.0 %
Dry Density =	1.74 g/cc
Strain Rate =	0.06 %/min



Failure Image



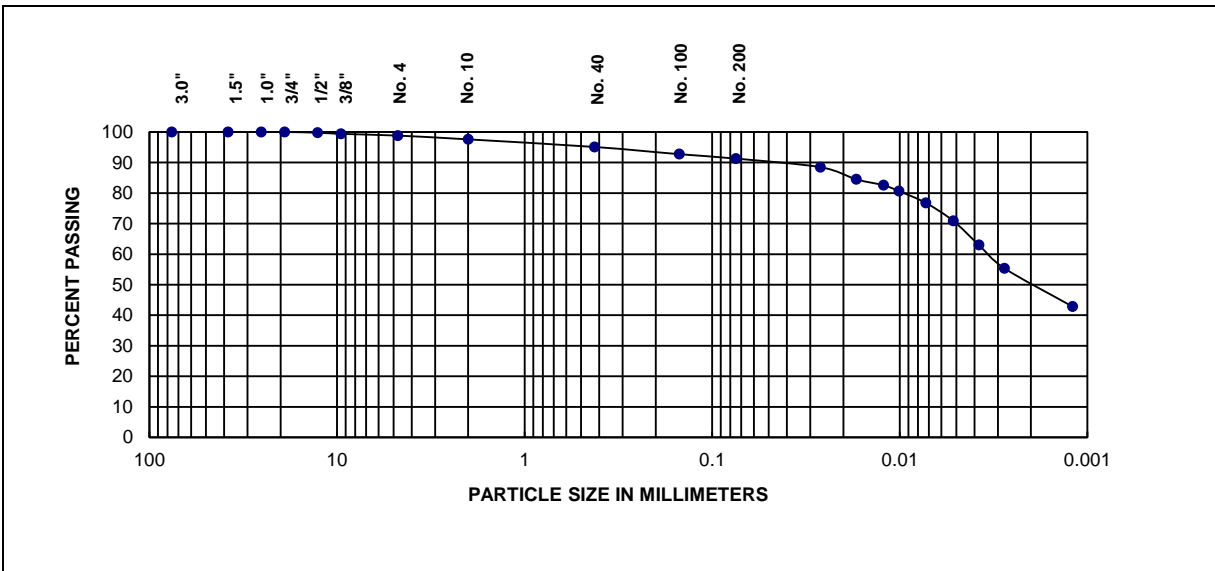
Unconfined Compressive Strength =	37.58 psi
	2.71 tsf
Shear Strength =	18.79 psi
	1.35 tsf
Strain at Failure =	12.1 %

Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW04-ST11	Date Tested	6/28/2020	Tested by	BKP
						Qc by	RC
Date Sample Received:	8/19/2020						
Sample Location	25.5-27.5'						
Sample Description	Brown silty clay						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	2.4	6.3	39.0	52.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	38	20	18
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification:		A-6(17)
1/2"	99.8	IDH Classification:		Clay
3/8"	99.4			
No. 4	98.8			
No. 10	97.6			
No. 40	95.1			
No. 100	92.7			
No. 200	91.3			

Remarks:	

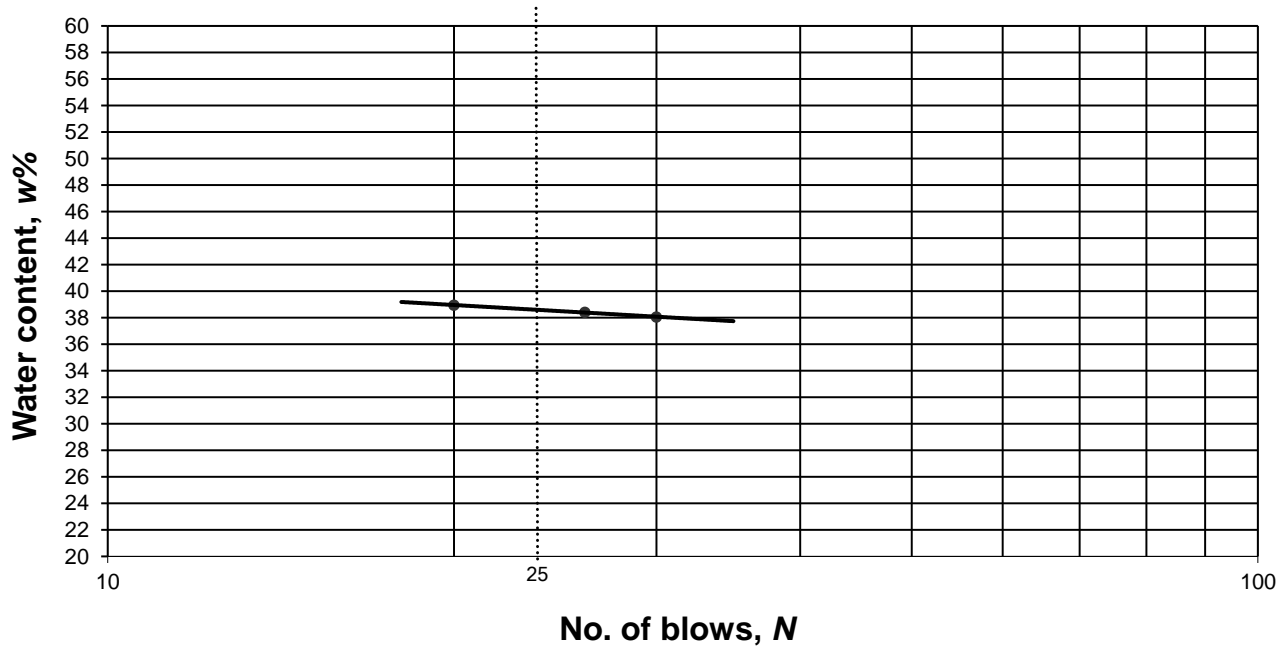


Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW04-ST11	Date Tested	8/27/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	25.5-27.5'
Sample Description	Brown silty clay

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	38	Plastic Limit, PL	20	Plasticity Index, PI	18

Remarks	
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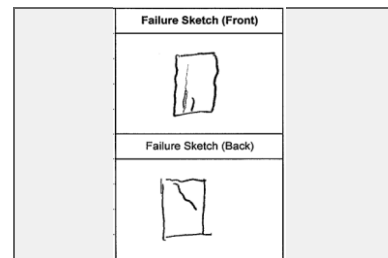


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

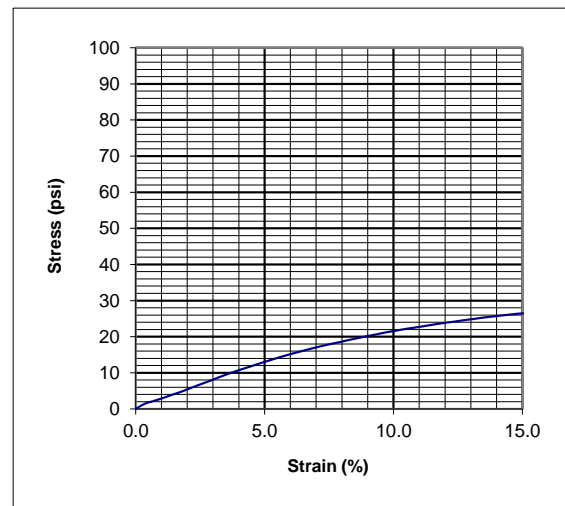
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW05-ST10	Date Tested	8/22/20	Tested By	BKP
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Brown soil with some gravel
Location	22.5-24.5'

Type of Sample	ST
Average Height =	14.72 cm
Average Diameter =	7.23 cm
Height/Diameter Ratio =	2.04
Wet Sample Weight=	1307.39 g
Wet Density =	2.16 g/cc
Moisture Content =	17.6 %
Dry Density =	1.84 g/cc
Strain Rate =	0.06 %/min



Failure Image



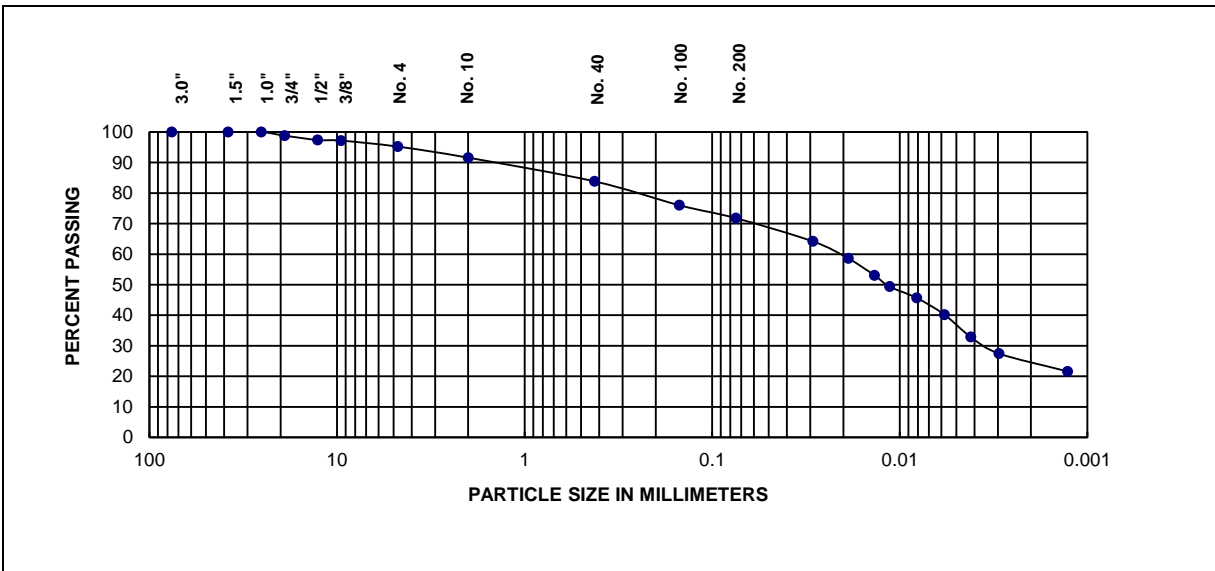
Unconfined Compressive Strength =	26.92 psi
	1.94 tsf
Shear Strength =	13.46 psi
	0.97 tsf
Strain at Failure =	15.5 %

Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW05-ST10	Date Tested	6/28/2020	Tested by	BKP
						Qc by	RC
Date Sample Received:	8/19/2020						
Sample Location	22.5-24.5'						
Sample Description	Brown silty clay with sand and gravel						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	8.4	19.8	45.9	25.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	27	17	10
1.5"	100.0			
1.0"	100.0			
3/4"	98.8	AASHTO Classification:		A-4(5)
1/2"	97.4	IDH Classification:		Clay Loam
3/8"	97.2			
No. 4	95.2			
No. 10	91.6			
No. 40	83.9			
No. 100	76.0			
No. 200	71.8			

Remarks:	



Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW05-ST10	Date Tested	8/27/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	22.5-24.5'
Sample Description	Brown silty clay with sand and gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	27	Plastic Limit, PL	17	Plasticity Index, PI	10

Remarks	
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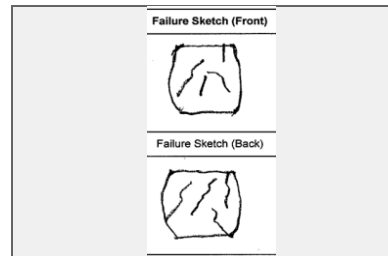


UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

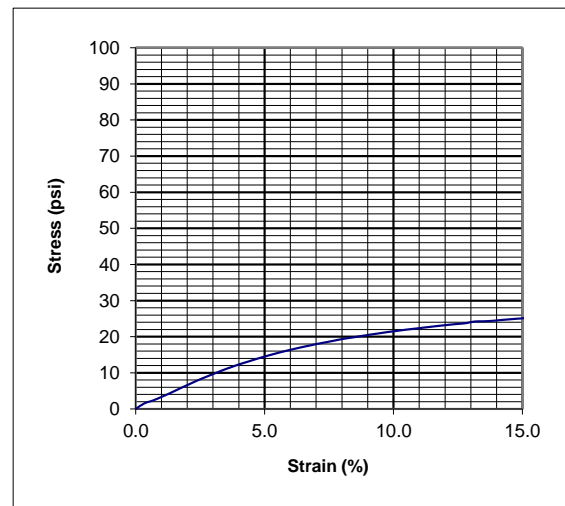
Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample No.	RW06-ST10	Date Tested	8/21/20	Tested By	DG
						QC By	RC

Date Sample Received	8/19/20
Description of Soil	Brown silty clay, trace gravel
Location	22.5-24.5'

Type of Sample	SS
Average Height =	15.08 cm
Average Diameter =	7.23 cm
Height/Diameter Ratio =	2.09
Wet Sample Weight=	1333.67 g
Wet Density =	2.15 g/cc
Moisture Content =	17.5 %
Dry Density =	1.83 g/cc
Strain Rate =	0.06 %/min



Failure Image



Unconfined Compressive Strength =	25.16 psi
	1.81 tsf
Shear Strength =	12.58 psi
	0.91 tsf
Strain at Failure =	15.2 %

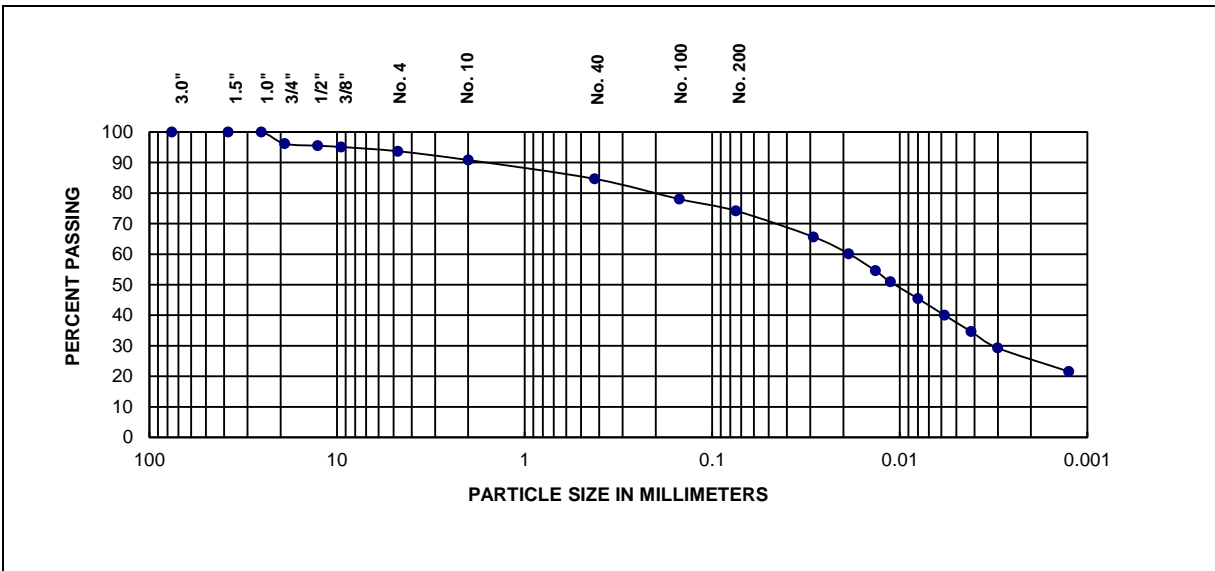
Remarks:



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW06-ST10	Date Tested	6/28/2020	Tested by	BKP
						Qc by	RC

Date Sample Received:	8/19/2020
Sample Location	22.5-24.5'
Sample Description	Brown silty clay with sand and gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	9.2	16.6	47.6	26.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing	Liquid Limit, L _L	Plastic Limit, PL	Plasticity Index, PI
3.0"	100.0	28	17	11
1.5"	100.0			
1.0"	100.0			
3/4"	96.2	AASHTO Classification:		A-6(7)
1/2"	95.5	IDH Classification:		Clay Loam
3/8"	95.1			
No. 4	93.7			
No. 10	90.8			
No. 40	84.7			
No. 100	78.0			
No. 200	74.2			

Remarks:	

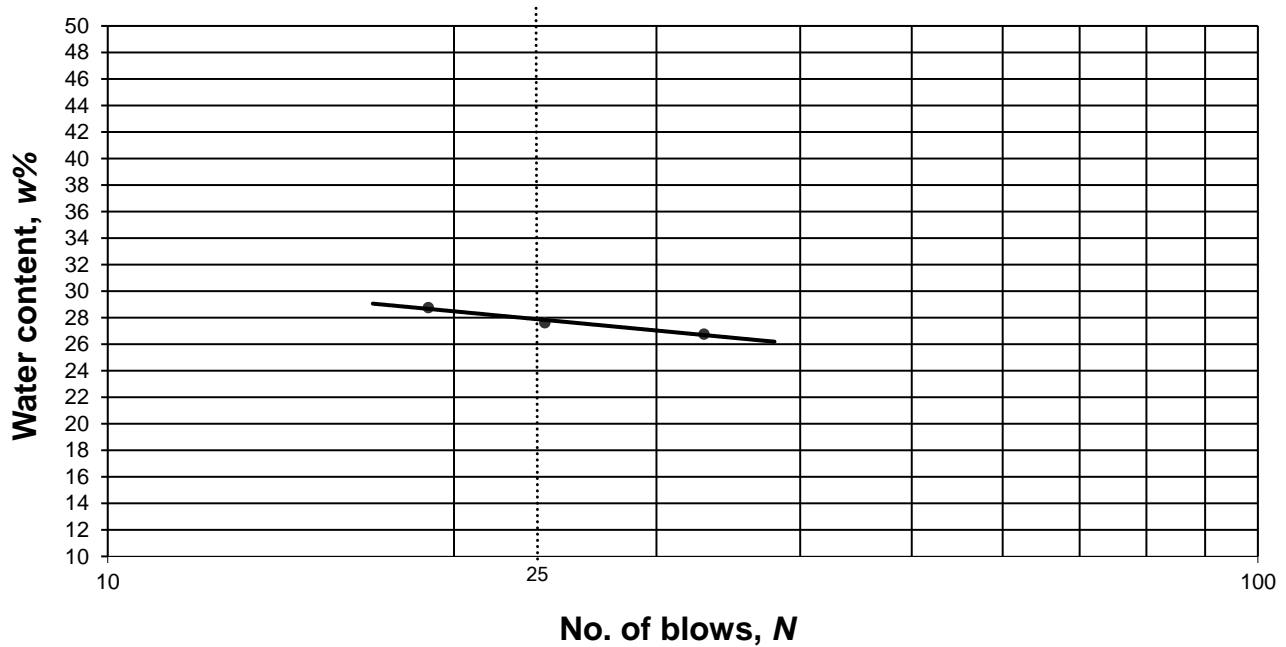


Atterberg Limits
AAASHTO T 89,90

Project	IL 83 at IL 38 Geotechnical for Box Culvert and Retaining Wall, Oakbrook Terrace, IL						
Client	Bowman Consulting, 1001 Warrenville Road, Ste. 110, Lisle, IL 60532						
File No.	8681	Sample #	RW06-ST10	Date Tested	8/27/2020	Tested By	BKP
						Qc By	RC

Date Sample Recd.	8/19/2020
Sample Location	22.5-24.5'
Sample Description	Brown silty clay with sand and gravel

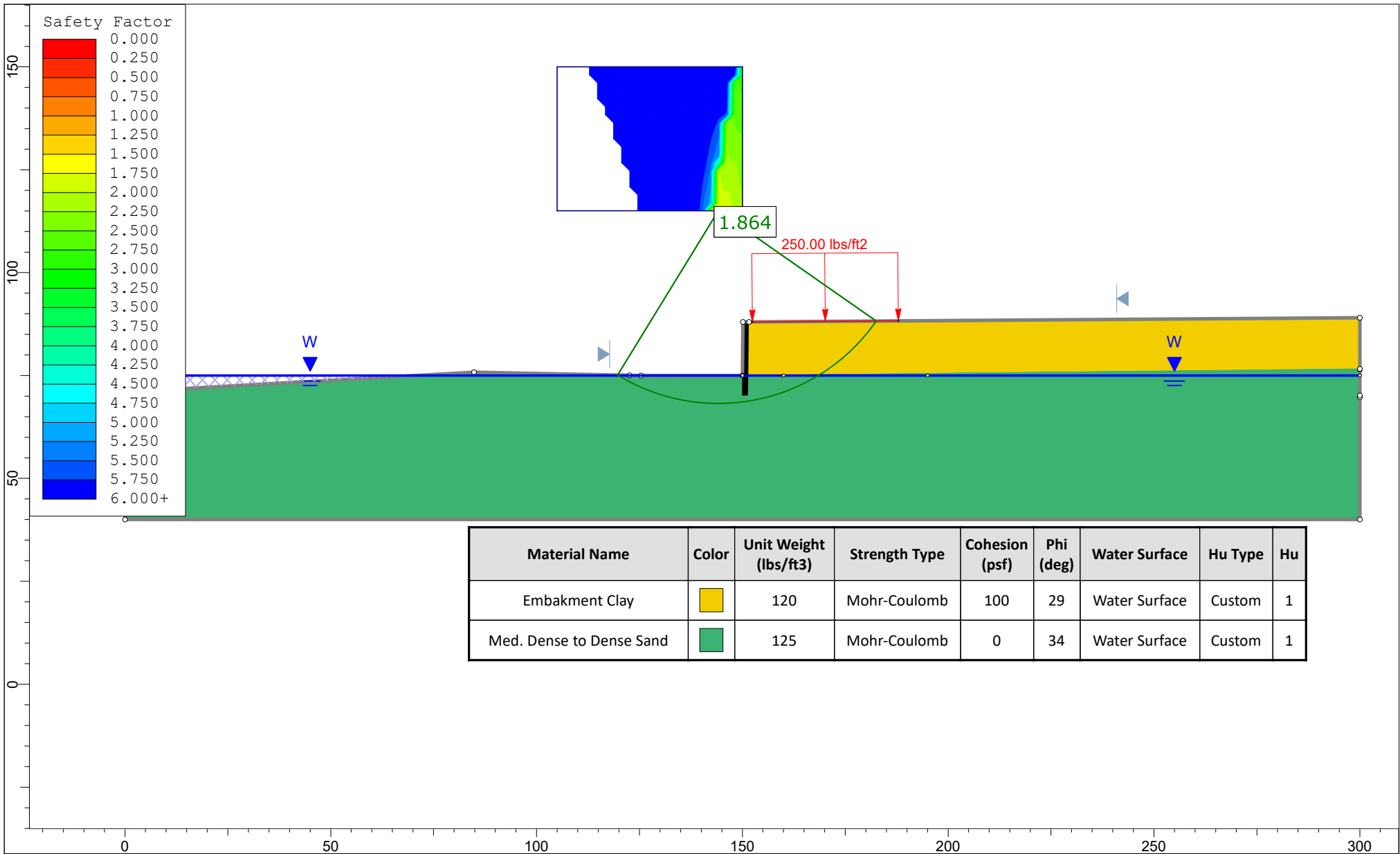
LIQUID LIMIT DETERMINATION





Results					
Liquid Limit, LL	28	Plastic Limit, PL	17	Plasticity Index, PI	11

Remarks	
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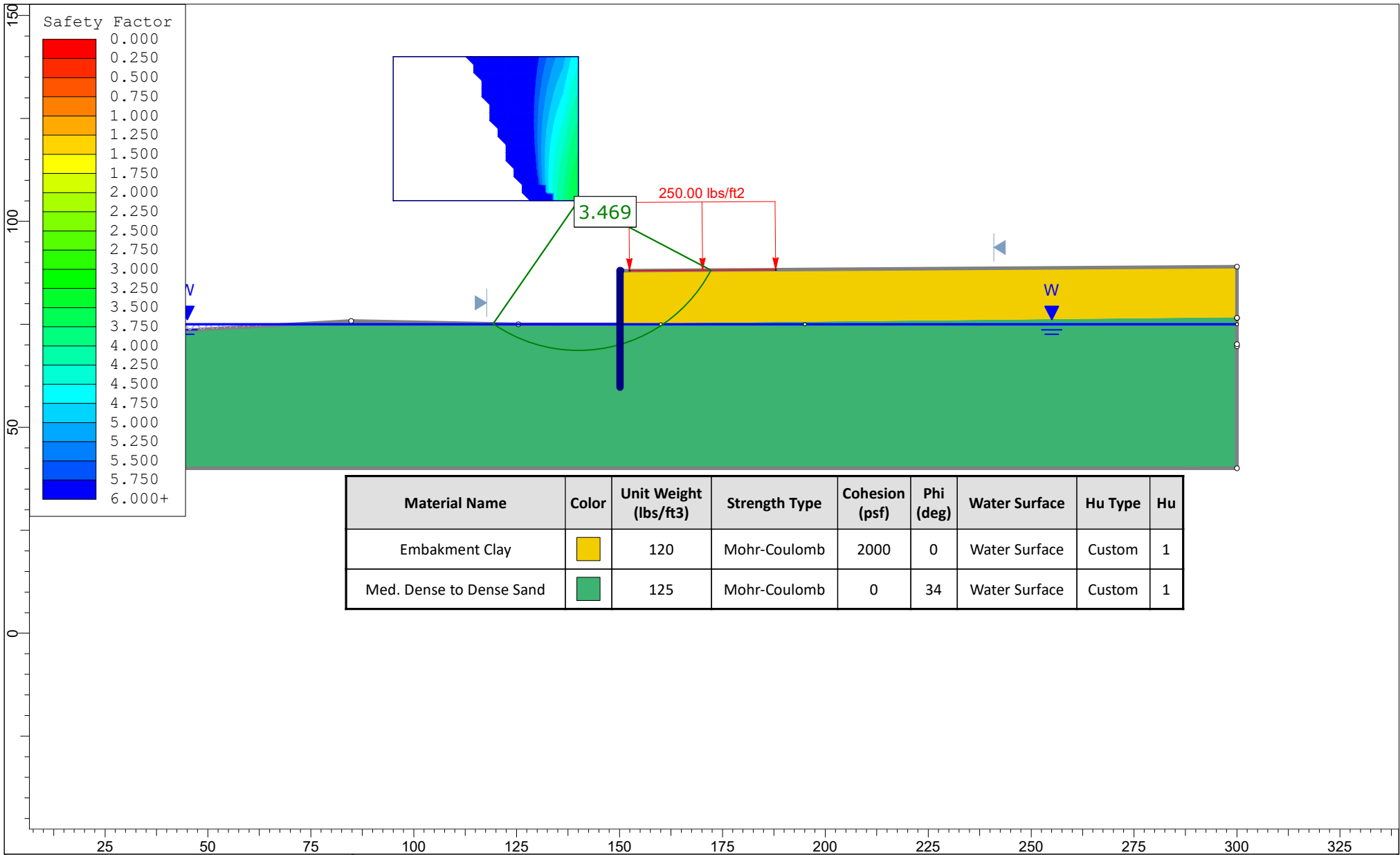
Appendix C
Slope Stability Analysis






Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Embakment Clay		120	Mohr-Coulomb	100	29	Water Surface	Custom	1
Med. Dense to Dense Sand		125	Mohr-Coulomb	0	34	Water Surface	Custom	1



Project		IL-38 to IL-83 North Bound Ramp Retaining Wall SN 022-W001	
Long-Term Drained Analysis			
Drawn By	SB	Company	INTERRA, INC.
Date	09/15/20	File Name	Retaining Wall Stability-Long Term



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Embakment Clay		120	Mohr-Coulomb	2000	0	Water Surface	Custom	1
Med. Dense to Dense Sand		125	Mohr-Coulomb	0	34	Water Surface	Custom	1

 <p>INTERRA Engineering • Inspection • Testing</p>	<i>Project</i> IL-38 to IL-83 North Bound Ramp Retaining Wall SN 022-W001	
	Short-Term Undrained Analysis	
	<i>Drawn By</i> SB	<i>Company</i> INTERRA, INC.
	<i>Date</i> 09/15/20	<i>File Name</i> Retaining Wall Stability-Short Term.slmd