ROADWAY GEOTECHNICAL REPORT
I-55 NORTH FRONTAGE ROAD AT SOUTH CASS AVENUE
CITY OF DARIEN, DUPAGE COUNTY, ILLINOIS
CONTRACT NO. 62R40

4/11/2023

Prepared for:

Illinois Department of Transportation

201 Center Ct.

Schaumburg, IL 60196

Prepared by:

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1.0 INTRODUCTION

On behalf of Illinois Department of Transportation (IDOT), Interra, Inc. (INTERRA) was tasked by Infrastructure Engineering, Inc. (IEI) based in Chicago, Illinois to conduct subsurface soil investigation and prepare the Roadway Geotechnical Report (RGR) for improvements on I-55 N Frontage Rd. at S. Cass Ave., in City of Darien, DuPage County, Illinois.

This roadway geotechnical report presents the results of INTERRA's subsurface investigation, laboratory testing, groundwater conditions and geotechnical evaluations performed, recommendations and construction considerations.

Project Description

The project site is located to the south-west side of Chicago in City of Darien, a community of about 22000 people. The project area station limits extend between Station 0+20.10 and Station 8+02.40.

The proposed work consists of improving a section of the I-55 North Frontage Road at Cass Avenue to correct the existing superelevation. The proposed improvements will include roadway widening, reconstruction, resurfacing and regrading of the roadway and the embankment slopes. Since there is an increase in the superelevation, fill is expected on the outer side of the curving roadway and cut is expected on the inside. There are no shoulders on the existing roadway. The proposed roadway section includes 4 feet of HMA shoulder on the superelevated side and 3 feet of aggregate shoulder on the other side. The roadway elevation will be lowered by approximately one to three feet between stations 1+00 and 5+00. The adjacent ramp is approximately 7 to 8 feet lower than the

elevation of the existing Frontage Road. The project location map is presented in Appendix A.

2.0 PROJECT SCOPE

INTERRA's scope of work included drilling a total of six (6) roadway geotechnical borings and three (3) full depth pavement cores. Four of the roadway borings were proposed to a depth of 10 feet each, and two to a depth of 20 feet each.

3.0 SITE DESCRIPTION

The project site is located on I-55 N Frontage Rd. at S. Cass Ave. The site is within Downers Grove Township, defined as S33 T38N R11E of the Third Principal Meridian. The approximate coordinates at the north end of the project are 41.734455N and 87.973804W and the south end are 41.732882N and 87.974764W. The ground surface elevation varies approximately from 700.4 feet to 709.8 feet.

4.0 FIELD INVESTIGATION

The locations of the borings are presented in the Borehole Location Plan in Appendix A. The Boreholes were marked in the field by IEI's surveying subconsultant. Prior to drilling, INTERRA's drilling sub-contractor Geocon Professional Services (GEOCON) contacted the local one-call utility clearance service (JULIE) to clear underground utilities.

Some of the boring locations were moved from the marked locations due to rig accessibility issues. Boring SGB-01 and SGB-05 were moved due to soft ground surface conditions. Boring SGB-02 and SGB-03 were moved due to the existing fence. Boring SGB-0-6 was moved due to the concrete drainage swale near the proposed location. As drilled borehole locations are presented in Appendix A.

The borings were drilled with a truck mounted drill rig Diedrich D-50. 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. 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 a RIMAC Spring Tester. Cohesive samples that could not be tested with a RIMAC tester were tested with a pocket penetrometer to estimate the unconfined compressive strength. Water level readings were taken during drilling and immediately after completion of drilling.

All split-spoon soil samples were placed in glass jars, labelled, and transported to INTERRA's laboratory for further testing. Field borehole logs as required are edited and presented in Appendix B.

5.0 LABORATORY TESTING

Laboratory testing included performing Moisture Content tests (AASHTO T265) on all recovered split-spoon soil samples. Grainsize Analysis (AASHTO T88) and Atterberg Limits (AASHTO T89, T90) were performed on selected soil samples based on moisture content and visual observations. Laboratory test reports are presented in Appendix C.

6.0 SUMMARY OF CLIMATIC CONDITIONS

The geotechnical exploration was performed in October 2022. Table 1 indicates the total precipitation in the month of drilling and preceding months of drilling along with historical average (normal) for the month for last 25 years. The observations were obtained from the National Weather Service website for Chicago O'Hare International Airport, IL.

Table 1: Precipitation Data

Month	Actual **Precipitation** (in.)	Normal **Precipitation** (in.)	Departure from Normal (+/-in.)
July	4.5	3.83	0.67
August	2.05	4.34	-2.29
September	2.20	3.19	-0.99
October	1.66	3.43	-1.77

Actual monthly precipitation is observed to be lower than historical average for August, September and October. This shows that the moisture of the surface soils and the ground water levels were lower during the drilling operation compared to the normal levels.

7.0 SUBSURFACE CONDITIONS

Table 2 summarizes the boring depth, groundwater depth and information of the type of soil encountered while drilling. Detailed description of soil stratification is provided in the boring logs (Appendix B).

Table 2 –Summary of Subsurface Conditions

Boring No.	Surface Elevation (feet)	Depth (feet)	Groundwater During Drilling (feet)	Groundwater Immediately After Drilling (feet)	Major Stratum Encountered from Top to Bottom
SGB-01	706.99	10.0	Dry	4.52	Gravel base course and asphalt grindings, hard sandy loam, very stiff clay, hard to very stiff clay
SGB-02	708.17	20.0	Dry	No	Asphalt, gravel base course, very stiff clay, very stiff silty clay, soft clay, very soft clay loam, very stiff clay, hard to very stiff clay, stiff silty clay
SGB-03	708.95	20.0	Dry	No	Asphalt, gravel base course, hard clay, very stiff to hard clay, stiff clay loam, stiff silty clay
SGB-04	709.40	10.0	Dry	No	Topsoil, gravel base course, loose gravel and sandy loam, hard clay, stiff silty clay loam, hard clay
SGB-05	701.05	10.0	Dry	No	Asphalt, gravel base course and

					asphalt grindings, very stiff clay loam, hard to very stiff clay
SGB-06	700.40	10.0	Dry	No	Gravel base course, clay fill, very stiff to hard clay, very stiff clay

Groundwater Conditions

Groundwater levels were recorded during drilling, and immediately after the completion of drilling, and the water levels are shown in Table 2. No groundwater was observed in any of the borings during drilling. SGB-01 encountered groundwater at elevation 702.5 upon completion of drilling. It should be noted that fluctuations in groundwater levels may occur due to seasonal variations, rainfall, or other climatic conditions. Hence, the water levels reported may not represent the long-term groundwater levels. Typical long term groundwater levels are identified by the changes in the color of the soils from brown to gray. This color change was not observed in any of the borings. Hence, we do not anticipate long term groundwater within a depth to cause frost susceptibility issues, although no frost susceptible soils were noted.

Pavement Cores

A total of three (3) pavement cores were recovered from I-55 North Frontage Road to determine the existing pavement thickness and condition. The pavement thickness varied between 9.3 inches and 12.6 inches. Pavement core photo logs are presented in Appendix D of this report.

8.0 CONCLUSIONS AND RECOMMENDATIONS

In general, below the topsoil/pavement, very stiff to hard clayey soils were encountered.

8.1 *Subgrade Preparation - General*

Subgrade preparation should be performed in accordance with Article 301 of the IDOT Standard Specifications for Road and Bridge Construction (SSRBC, 2022). All new pavements should be supported on 12 inches of improved subgrade, per the IDOT Bureau of Design and Environment (BDE) Aggregate Subgrade Improvement Special Provision (April 1, 2022). The top eight (8) inches of the subgrade should be disked, air

dried, and recompacted to achieve the required density and stability. After compaction, the subgrade should have a minimum dry density of 95 percent of standard laboratory dry density and a minimum IBV 3.0 as it is assumed that plans include 12 inches of improved subgrade. A minimum IBV of 8.0 should be achieved if the plans do not include 12 inches of improved subgrade.

Topsoil

Of the six roadway borings, one boring encountered topsoil with a thickness of 4 inches. We recommend topsoil removal thickness of six (6) inches for estimating purposes. Topsoil should be completely stripped and removed from the proposed pavement areas. The actual need for topsoil removal should be determined in the field. We recommend that all the topsoil that is stripped be sorted and reused for the proposed landscaping improvements.

8.2 *Removal and Replacement of Unstable Soils*

Based on the field investigation and laboratory test results, we do not anticipate any major undercuts in proposed new roadway areas. Moisture sensitive soils such as silts were not encountered in the proposed roadway areas in the upper 3 feet.

However, if unsuitable or unstable soils are encountered during construction, they should be removed and replaced with material meeting the requirements of the IDOT Bureau of Design and Environment (BDE) Aggregate Subgrade Improvement Special Provision (April 1, 2022). The actual need for removal and replacement with Aggregate Subgrade Improvement should be determined in the field at the time of construction by the Geotechnical Engineer or soils inspector.

Proofrolling should be performed in accordance with section 3.3 of IDOT Subgrade Stability Manual to identify unstable/unsuitable subgrade soils. All potentially unstable soils should be tested with a dynamic cone penetrometer and treated in accordance with Article 301.04 of the SSRBC and the undercut guidelines in the IDOT Subgrade Stability Manual.

We recommend including a plan quantity of Aggregate Subgrade Improvement (CU YD) equal to at least 25% of the planned full depth pavement area, assuming a thickness of 12 inches. This material should be used to replace any unsuitable soils below the bottom of the improved subgrade layer that are encountered in the field during construction.

We recommend placing geotextile fabric at the base of undercut areas where low strength subgrade soils are encountered. The 12 inches of improved subgrade is not considered an undercut, and we do not recommend using it below the proposed 12-inch improved subgrade layer unless it is determined to be necessary to achieve stability by the Geotechnical Engineer or soils inspector at the time of construction. Fabric should meet the requirements of Article 210, Fabric for Ground Stabilization, of the SSRBC. We recommend including a plan quantity of Geotechnical Fabric for Ground Stabilization (SQ YD) equal to at least 25% of the planned full depth pavement area.

8.3 *Pavement Design*

In the Pavement design, both Illinois Bearing Ratio (IBR) and Subgrade Support Rating (SSR) values should be taken into consideration. Based on the laboratory test results, we recommend using an SSR of POOR. Though IBR testing was not performed, based on the AASHTO Classification of the soils tested at the top 2.5 feet of the subgrade, we recommend using an IBR of 3.0.

Underdrains

To provide drainage for the proposed pavement areas, we recommend installing longitudinal pipe underdrains under the edge of new pavement in widening areas and both longitudinal and transverse drains in full width pavement reconstruction areas. The drains should also be installed in low areas and at the bottom of any undercuts. The underdrains should tie into the existing storm water drainage system. The underdrains should be installed per Article 601 of IDOT SSRBC and consist of Type 2 underdrains (Adopted January 1, 2022).

8.4 *Stability Analysis*

No embankments greater than 15 feet are proposed to be constructed. Hence, slope stability analyses were not performed.

8.5 Earthwork Quantity Calculations

A shrinkage factor of 15% should be used in calculating borrowed and furnished quantities.

9.0 CONSTRUCTION CONSIDERATIONS

- Temporary excavations should be sloped no greater than 1V:2H. Excavations steeper or deeper than 4 feet should be analyzed individually. Potential for ground movements due to excavation on open roadways and utilities should be considered. All excavations should be performed in accordance with local, state and federal regulations.
- Although the design plans do not show a need for temporary shoring, many of the borings encountered soils with unconfined compressive strengths in excess of 4.5 tons per square foot, which exceed the maximum values permitted for using temporary sheet piles per the IDOT design guide. Based on these conditions, temporary sheet piling should not be used for this project, and instead Temporary Soil Retention Systems (TSRS) should be used if needed. Soil parameters for the design of the TSRS will be provided if needed. TSRS is not planned for this project.
- Excavated materials free from debris can be reused upon approval by Engineer.
- After completion of drilling, groundwater was not observed in any of the boreholes except for SGB-01 within 5 feet of the existing grade. If any water is accumulated during construction, it can be removed using sump pump method. To facilitate dewatering, surface runoff and ditches should be directed away from excavations.
- If the project will need to apply for a NPDES storm water permit for construction site activities, Soil erosion factors (K factors) and erosion hazard ratings for each of the soil types within the project limits were obtained from NRCS website and presented in Appendix E.

10.0 CONSTRUCTION MONITORING

Construction monitoring shall be in accordance with IDOT Standard Specifications, Special Provisions and Contract Plans. Construction monitoring shall be performed by an experienced geotechnical engineer or soils technician to monitor earthwork operations, soils compaction, and suitability of subgrade soils, location and depths of undercuts and to advise Engineer of actual soil conditions that differ from those in the geotechnical investigation report. The analysis and recommendations submitted in this report are based upon the data for soil boreholes performed at the locations indicated on the location plan. This report does not reflect any variations that may occur between these boreholes. No special monitoring is anticipated.

11.0 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 location plan. 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 variations then appear evident, it will be necessary for a re-evaluation of the recommendations of this report after performing on-site observations during construction period and noting the characteristics of any variations.

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 Manager

Reshma Chirakkara, Ph.D.
Staff Engineer

Sanjeev Bandi, Ph.D., PE
Principal Engineer

Sudhakar Rao Doppalapudi, PE
QC Reviewer

REFERENCES

IDOT 2020. Geotechnical Manual, Illinois Department of Transportation.

IDOT 2022. Standard Specifications for Road and Bridge Construction. Illinois Department of Transportation.

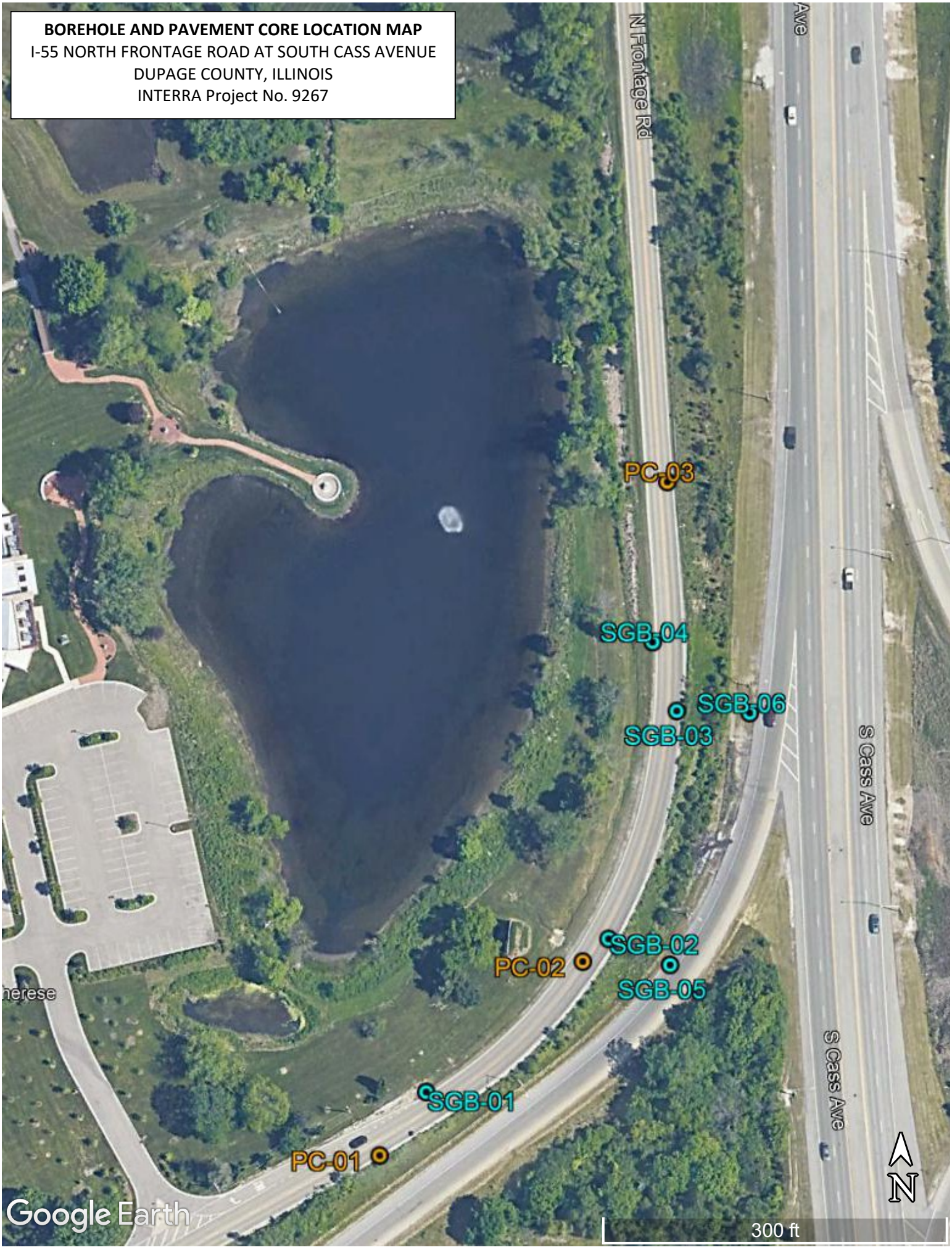
Appendix A

Site Location Map

Borehole and Pavement Core Location Plan

SITE LOCATION MAP
I-55 NORTH FRONTAGE ROAD AT
SOUTH CASS AVENUE
DUPAGE COUNTY, ILLINOIS
INTERRA Project No. 9267

BOREHOLE AND PAVEMENT CORE LOCATION MAP
I-55 NORTH FRONTAGE ROAD AT SOUTH CASS AVENUE
DUPAGE COUNTY, ILLINOIS
INTERRA Project No. 9267



Appendix B

Soil Boring Logs

Interra, Inc.
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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1845510.562,1082167.076 (offset 3' S, 8" higher)

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-01
Station 1+46.5
Offset 10.90ft
Ground Surface Elev. 706.99 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 702.5 ft ▽
After NA **Hrs.** Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				GRAVEL BASE COURSE and ASPHALT grindings (9") 706.19
	9			Hard, dark yellowish Brown (10YR 4/2) with black mottling SANDY LOAM, some gravel, medium plasticity, moist
	7 4	4.0 P	15.4	LL=32%, PI=16%
				703.99
	2			Very stiff, dark yellowish Orange (10YR 6/6) with green and gray mottling CLAY, medium plasticity, moist
-5	3 5	2.3 B	27.5	▽
	4			
	7 7	4.6 B	16.3	Hard, trace gravel
	5			
	6 9	2.9 B	16.6	Very stiff
-10				696.99
				End of boring at 10'.
-15				
-20				

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

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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1845642.252,1082339.111 (offset 6' NW, 12" higher)

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-02
Station 3+60.8
Offset 6.10ft R
Ground Surface Elev. 708.17 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After NA **Hrs.** Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT (12") 707.17			
GRAVEL BASE COURSE (3") 706.87	3		
Very stiff, moderate olive Brown (5Y 4/4) with black mottling CLAY, trace gravel, medium plasticity, moist 705.17	3 5	2.7 B	21.0
Very stiff, moderate yellowish Brown (10YR 5/4) with orange mottling SILTY CLAY, trace gravel, medium plasticity, moist	2 2 3	3.5 P	24.7
-5			
702.67			
Soft, dark yellowish Brown (10YR 4/2) with black and green mottling CLAY, trace gravel, medium plasticity, moist	1 1 2	0.3 P	27.5
700.17			
Very soft, grayish Olive (10Y 4/2) with black and gray mottling CLAY LOAM, little gravel, trace organics, medium plasticity, moist	2 2 2	<0.25 P	22.4
-10			
697.67			
Very stiff, grayish Olive (10Y 4/2) CLAY, moist LL=38%, PI=19%	2 2 2	3.0 P	27.3
695.17			
Hard, dark yellowish Orange (10YR 6/6) CLAY, trace gravel, medium plasticity, moist	6 8 10	4.4 S	15.8
-15			
	6		
Very stiff	9 9	2.2 B	18.4
690.17			
Stiff, pale yellowish Brown (10YR 6/2) SILTY CLAY, trace gravel, medium plasticity, moist	13 12		12.0
End of boring at 20'. 688.17 -20	12	1.9	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
		B	
-25			
-30			
-35			
-40			

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

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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1845839.725,1082392.712 (offset 7' W, 12" higher)

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-03
Station 5+70.1
Offset 6.00ft R
Ground Surface Elev. 708.95 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After NA **Hrs.** Filled ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				ASPHALT (13")
707.85				
707.55	7			GRAVEL BASE COURSE (4")
707.05	5		22.1	Hard, Black (N1) CLAY FILL, dry
	8	4.0 P		Hard, grayish Olive (10Y 4/2) CLAY, trace gravel, medium plasticity, moist
705.95				
	5			Very stiff, Black (N1) to grayish Olive (10Y 4/2) with black mottling CLAY, trace gravel, trace organics, moist
	5		24.2	
-5	5	2.5 S		
703.45				
	4			Very stiff, moderate yellowish Brown (10YR 5/4) with gray mottling CLAY, trace gravel, medium plasticity, moist
	7		15.8	
	8	2.6 S		
	5			
	10		17.2	Very stiff
-10	10	2.5 P		
	7			
	10		17.2	Hard, little sand
	16	6.5 S		
	5			
	7		16.4	Hard
-15	9	6.6 S		
693.45				
	6			Stiff, moderate yellowish Brown (10YR 5/4) CLAY LOAM, little gravel, moist LL=23%, PI=9%
	8		11.5	
	10	1.9 B		
690.95				
	50/1"			Stiff, moderate yellowish Brown (10YR 5/4) SILTY CLAY, little sand, trace gravel, medium plasticity, moist
688.95				
-20				

No recovery - refusal on gravel or cobble
End of boring at 20'.

-25
-30
-35
-40

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

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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1845899.996,1082363.141

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-04
Station 6+29.8
Offset 13.40ft L
Ground Surface Elev. 709.40 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After NA **Hrs.** Filled ft

DEPTH (ft)		BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL (4") 709.10				
GRAVEL BASE COURSE (4") 708.80				
Loose, grayish Orange (10YR 7/4) GRAVEL and SANDY LOAM, dry 708.00		6		
Hard, dark yellowish Brown (10YR 4/2) CLAY, trace gravel, moist, LL=35%, PI=18% 706.40		6 3	4.0 P	17.2
Stiff, moderate yellowish Brown (10YR 5/4) SILTY CLAY LOAM, medium plasticity, moist		4		
	-5	5 7	1.9 B	14.2
Hard, moderate yellowish Brown (10YR 5/4) CLAY, trace gravel, medium plasticity, moist 703.90		7		
		9 13	6.3 B	16.4
		5		
Hard 699.40	-10	8 16	6.9 B	16.9
End of boring at 10'.				
	-15			
	-20			

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

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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1845624.852,1082370.195 (offset 8' SE, 12" higher)

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-05
Station 3+64.5
Offset 64.30ft R
Ground Surface Elev. 701.05 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After NA **Hrs.** Filled ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT (6") 700.55				
GRAVEL BASE COURSE and ASPHALT grindings (6") 700.05		2		
Very stiff, pale Olive (10Y 6/2) with black mottling CLAY LOAM, little gravel, trace organics, moist, LL=38%, PI=20% 698.05		3 3	2.5 P	20.7
Hard, dark yellowish Orange (10YR 6/6) with gray mottling CLAY, trace gravel, medium plasticity, moist	-5	3 3 4 4	4.6 B	16.2
Hard		7 10	4.4 B	17.9
693.05				
Very stiff, moderate yellowish Brown (10YR 5/4) CLAY, trace gravel, medium plasticity, moist		11		
691.05	-10	12 14	3.4 S	16.2
End of boring at 10'.	-15			
	-20			

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

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SOIL BORING LOG

Date 10/12/22

ROUTE I-55 N Frontage Road **DESCRIPTION** I-55 N Frontage Road **LOGGED BY** Sponaugle

SECTION _____ **LOCATION** 1082426.179,1082426.179 (offset 20' E, 6" higher)

COUNTY DuPage **DRILLING METHOD** Solid Stem Auger **HAMMER TYPE** D50 Auto (89% efficiency)

STRUCT. NO. NA
Station NA

BORING NO. SGB-06
Station 5+68.5
Offset 70.50ft R
Ground Surface Elev. 700.40 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After NA **Hrs.** Filled ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
GRAVEL BASE COURSE (6") 699.90 CLAY FILL (4") 699.60				
Very stiff, dark yellowish Orange (10YR 6/6) with gray mottling CLAY, trace gravel, medium plasticity, moist LL=40%, PI=22%		4 3 4 5	2.8 B	19.4
Hard	-5	6 9	6.2 S	16.7
694.90				
Hard, moderate yellowish Brown (10YR 5/4) CLAY, trace gravel, medium plasticity, moist		5 8 10 6	4.4 S	16.6
Very stiff		9		14.9
690.40	-10	14	3.0 P	
End of boring at 10'.	-15 -20			

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

Appendix C

Laboratory Test Reports

Interra File No.: 9267

SOIL TEST RESULTS SUMMARY

PROJECT: Frontage Road at Cass Avenue

Route: Frontage Road
County: DuPage, Illinois

SAMPLE	SGB 01-SS01	SGB 04-SS01	SGB 05-SS01	SGB 06-SS01
BORING LOCATION	SGB-01	SGB-04	SGB-05	SGB-06
DEPTH	1'-2.5'	1'-2.5'	1'-2.5'	1'-2.5'
AASHTO CLASSIFICATION (AASHTO M 145)	A-6(3)	A-6(13)	A-6(12)	A-6(19)
ILLINOIS TEXTURAL CLASSIFICATION	Sandy Loam	Clay	Clay Loam	Clay
GRADATION-PASSING 1" SIEVE %	100	100	100	100
" 3/4" " %	95	100	94.6	100
" 1/2" " %	95	100	91.3	100
" NO. 4 " %	76.7	97.8	87.2	98.4
" NO. 10 " %	65.8	94.9	83.4	96.4
" NO. 40 " %	52.7	88.5	76.8	92.1
" NO. 100 " %	44.9	82.3	71.6	88.1
" NO. 200 " %	42.6	78.3	68.6	85.4
GRAVEL (AASHTO T88) %	34.2	5.1	16.6	3.6
SAND (AASHTO T88) %	23.2	16.6	14.8	11
SILT (AASHTO T88) %	26.3	44.8	38.9	45.6
CLAY (AASHTO T88) %	16.3	33.5	29.7	39.8
SILT+FINE SAND (AASHTO T88) %	36.4	55	47.1	52.3
LIQUID LIMIT (AASHTO T89) %	32	35	38	40
PLASTICITY INDEX (AASHTO T90) %	16	18	20	22
SUBGRADE SUPPORT RATING	POOR	FAIR	POOR	FAIR
IN SITU MOISTURE (AASHTO T 265)%	15.4	17.2	20.7	19.4
REMARKS				

Interra File No.: 9267

SOIL TEST RESULTS SUMMARY

PROJECT: Frontage Road at Cass Avenue

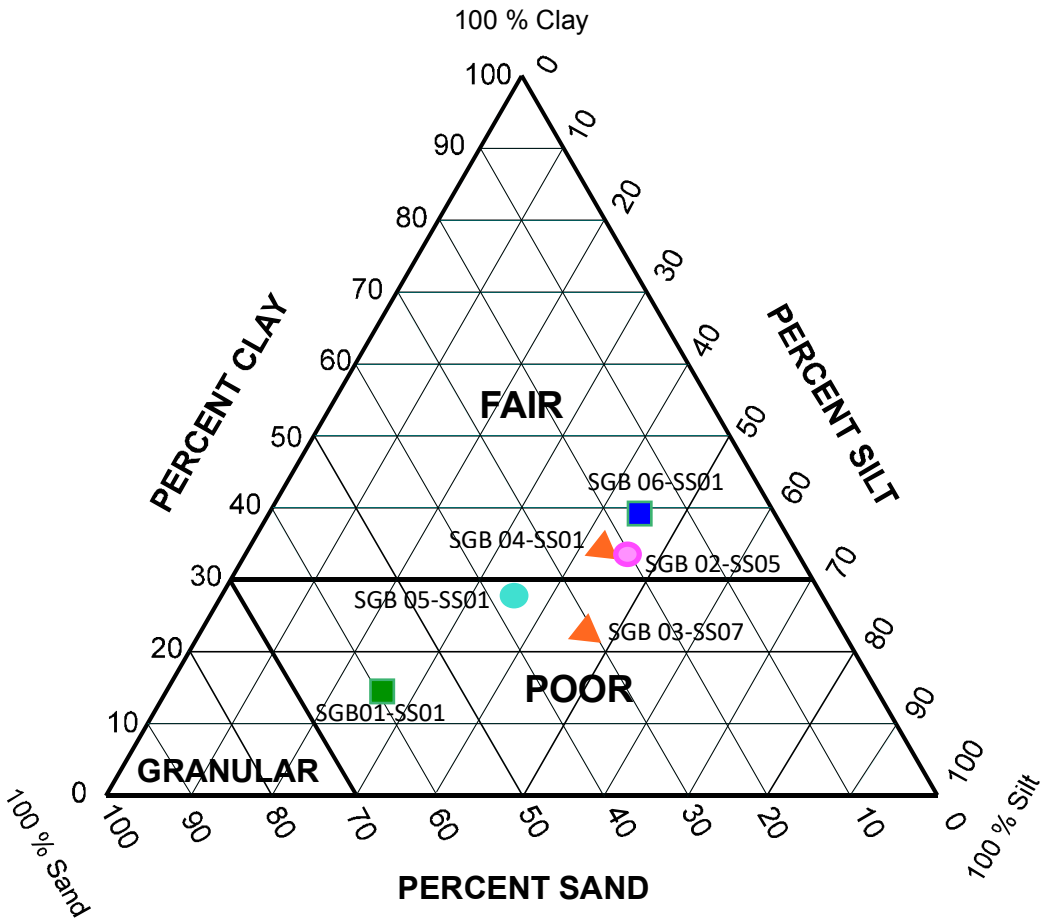
Route: Frontage Road
County: DuPage, Illinois

SAMPLE	**SGB 02-SS05**	**SGB 03-SS07**
BORING LOCATION	SGB-02	SGB-03
DEPTH	11'-12.5'	16'-17.5'
AASHTO CLASSIFICATION (AASHTO M 145)	A-6(15)	A-4(4)
ILLINOIS TEXTURAL CLASSIFICATION	Clay	Clay Loam
GRADATION-PASSING 1" SIEVE %	100	100
" 3/4" " %	100	100
" 1/2" " %	100	98.1
" NO. 4 " %	98.7	92.5
" NO. 10 " %	96.8	88.7
" NO. 40 " %	90.2	81.3
" NO. 100 " %	82.7	74.4
" NO. 200 " %	79.3	69.3
GRAVEL (AASHTO T88) %	3.2	11.3
SAND (AASHTO T88) %	17.5	19.4
SILT (AASHTO T88) %	45.1	48
CLAY (AASHTO T88) %	34.2	21.3
SILT+FINE SAND (AASHTO T88) %	56.1	59.9
LIQUID LIMIT (AASHTO T89) %	38	23
PLASTICITY INDEX (AASHTO T90) %	19	9
SUBGRADE SUPPORT RATING	FAIR	POOR
IN SITU MOISTURE (AASHTO T 265)%	27.3	11.5
REMARKS		

FRONTAGE ROAD AT CASS AVENUE

DUPAGE COUNTY, IL

INTERRA PROJ. NO. 9267



Subgrade Support Rating (SSR Chart)

INTERRA
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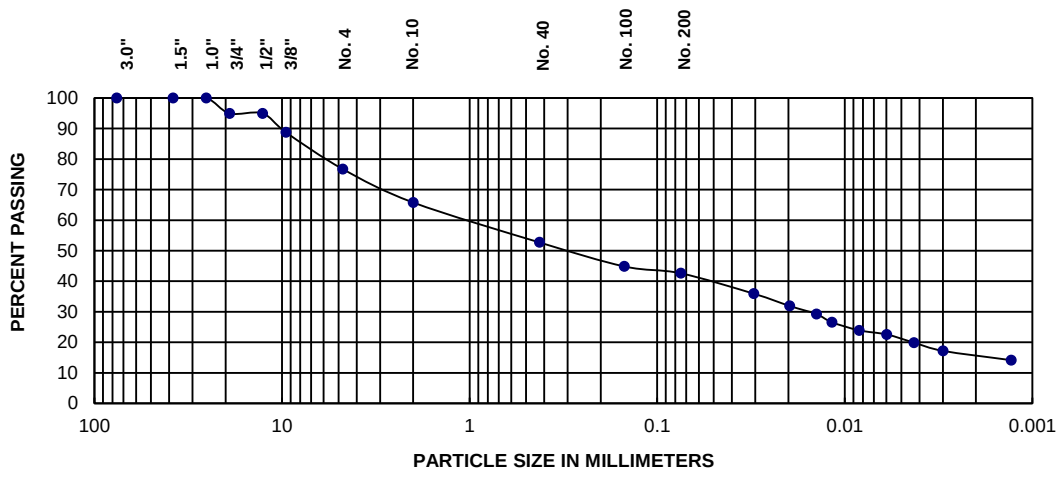
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 01-SS-01	**Date Tested**	10/25/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown sandy loam, some gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	34.2	23.2	26.3	16.3

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	95.0
1/2"	95.0
3/8"	88.7
No. 4	76.7
No. 10	65.8
No. 40	52.7
No. 100	44.9
No. 200	42.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
32	16	16

AASHTO Classification:	A-6(3)
IDH Classification:	Sandy Loam

Remarks:	
Silt + Fine Sand (%) =	36.4

Test ID	70211

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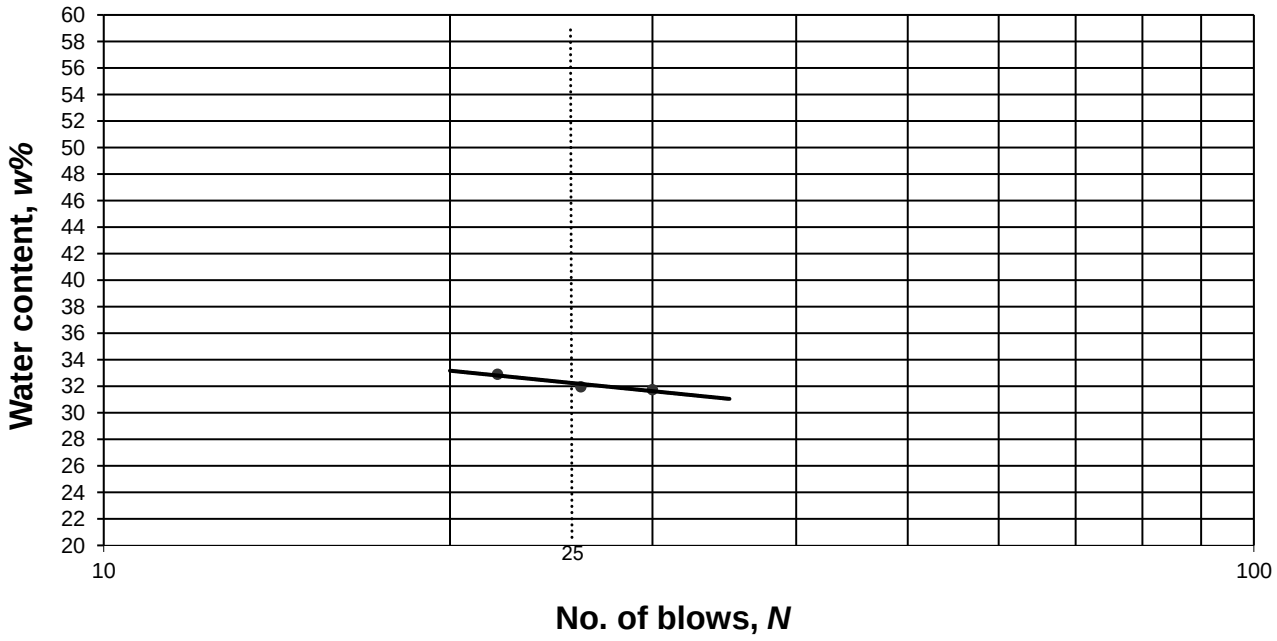
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 01-SS-01	**Date Tested**	10/24/2022	**Tested By**	BKP
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown sandy loam, some gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**16**	**Plasticity Index, PI**	**16**

Remarks

INTERRA
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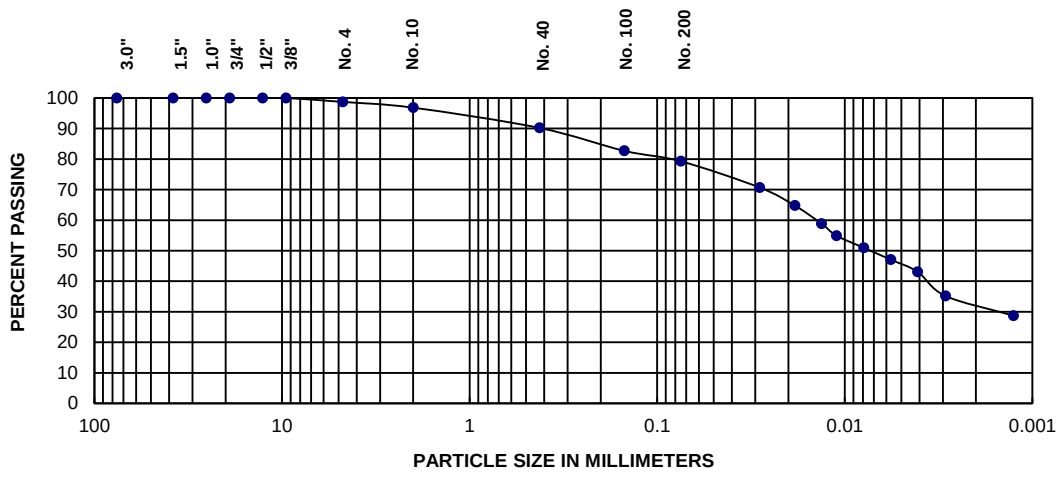
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 02-SS-05	**Date Tested**	10/25/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	11' - 12.5'
Sample Description	Grayish olive clay, trace gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	3.2	17.5	45.1	34.2

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	100.0
3/8"	100.0
No. 4	98.7
No. 10	96.8
No. 40	90.2
No. 100	82.7
No. 200	79.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
38	19	19

AASHTO Classification:	A-6(15)
IDH Classification:	Clay

Remarks:	
Silt + Fine Sand (%) =	56.1

Test ID	70213

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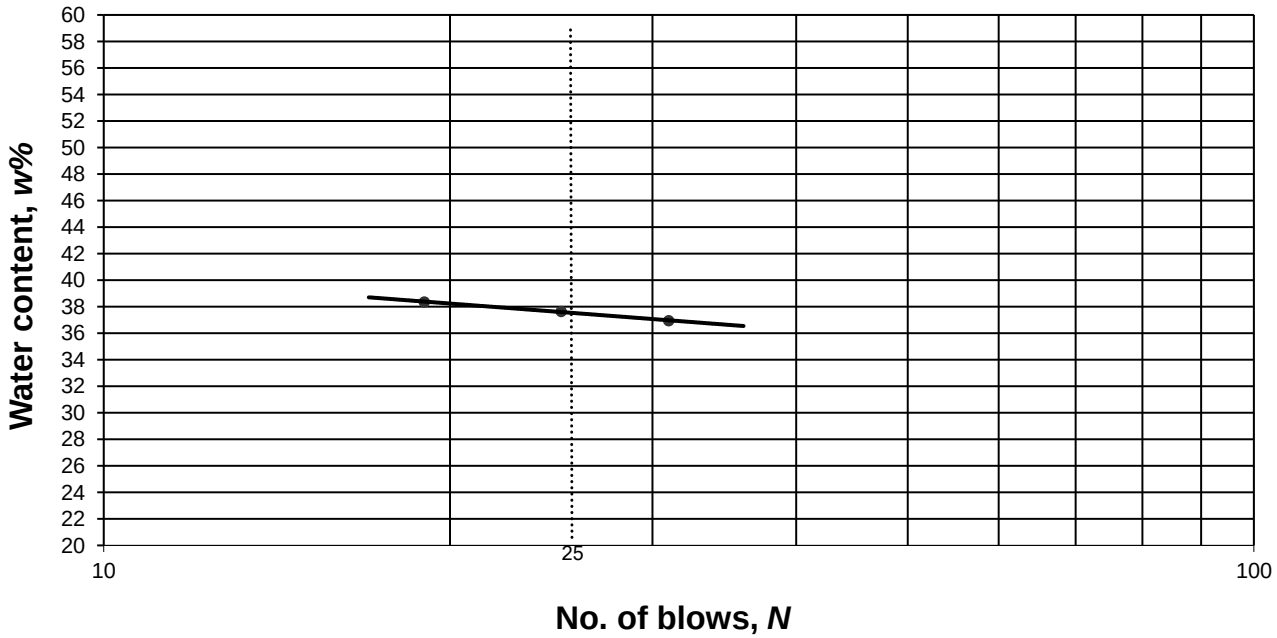
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 02-SS-05	**Date Tested**	10/24/2022	**Tested By**	DG
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	11' - 12.5'
Sample Description	Grayish olive clay, trace gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**38**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**19**

Remarks

INTERRA
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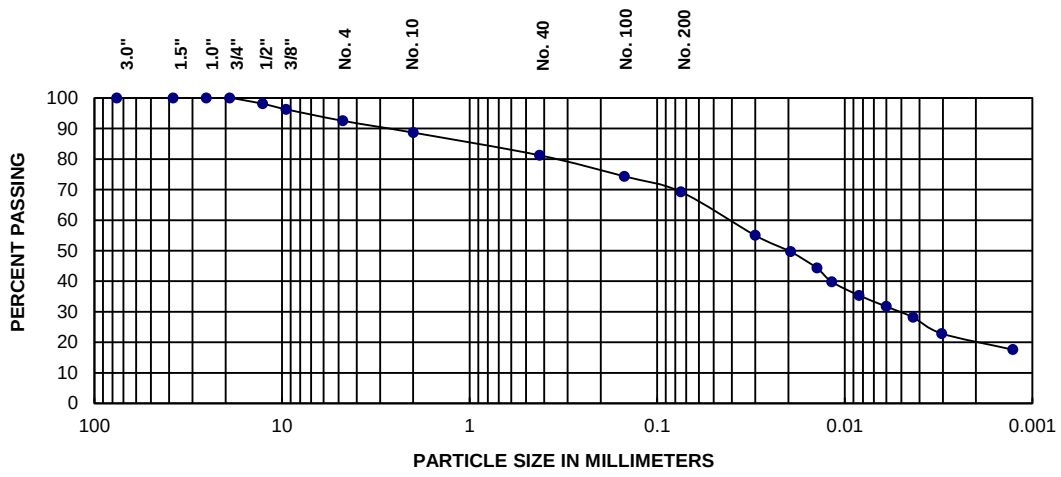
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 03-SS-07	**Date Tested**	10/24/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	16' - 17.5'
Sample Description	Yellowish brown clay loam, little gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.3	19.4	48.0	21.3

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.1
3/8"	96.3
No. 4	92.5
No. 10	88.7
No. 40	81.3
No. 100	74.4
No. 200	69.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
23	14	9

AASHTO Classification:	A-4(4)
IDH Classification:	Clay Loam

Remarks:	
Silt + Fine Sand (%) =	59.9

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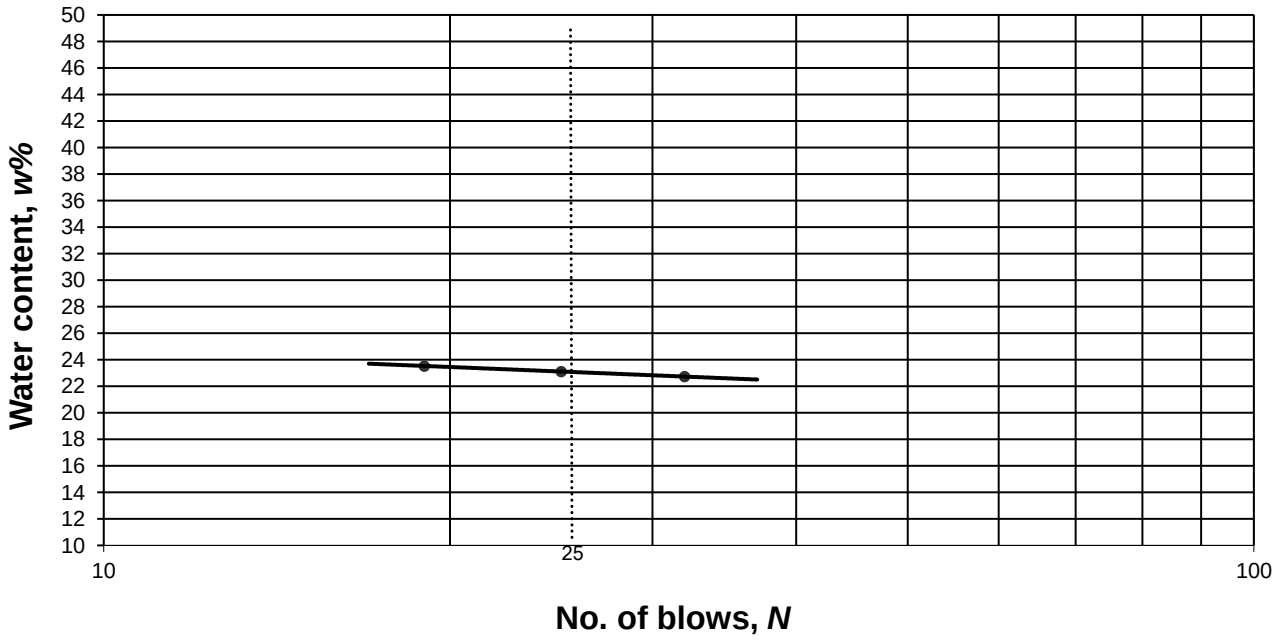
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 03-SS-07	**Date Tested**	10/24/2022	**Tested By**	DG
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	16' - 17.5'
Sample Description	Yellowish brown clay loam, little gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**23**	**Plastic Limit, PL**	**14**	**Plasticity Index, PI**	**9**

Remarks

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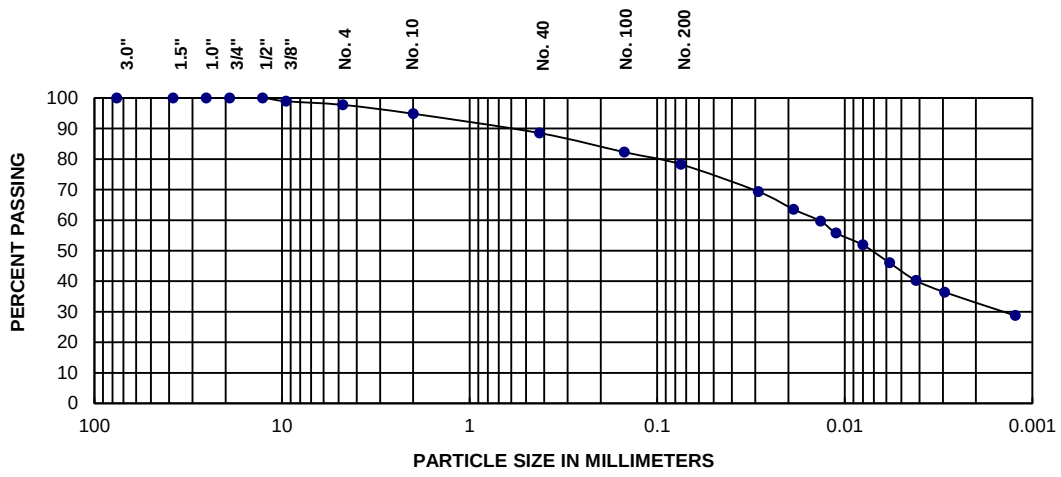
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 04-SS-01	**Date Tested**	10/24/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown clay, trace gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.1	16.6	44.8	33.5

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	100.0
3/8"	98.9
No. 4	97.8
No. 10	94.9
No. 40	88.5
No. 100	82.3
No. 200	78.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
35	17	18

AASHTO Classification:	A-6(13)
IDH Classification:	Clay

Remarks:	
Silt + Fine Sand (%) =	55.0

Test ID	70221

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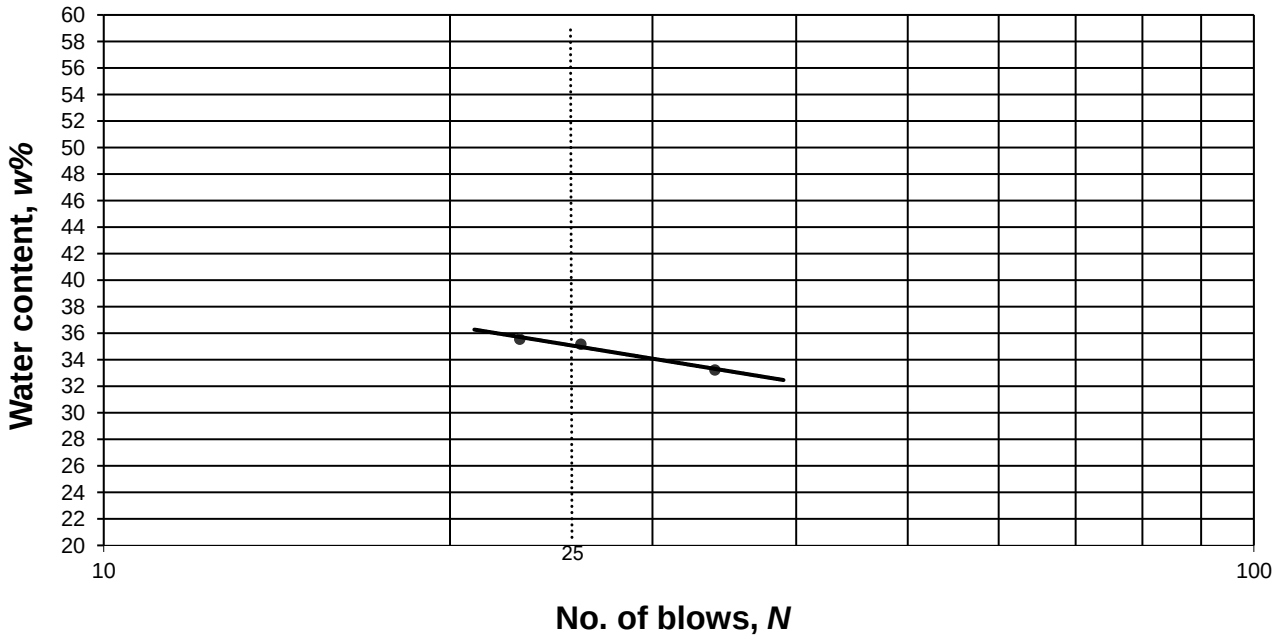
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 04-SS-01	**Date Tested**	10/24/2022	**Tested By**	DG
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown clay, trace gravel

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**35**	**Plastic Limit, PL**	**17**	**Plasticity Index, PI**	**18**

Remarks

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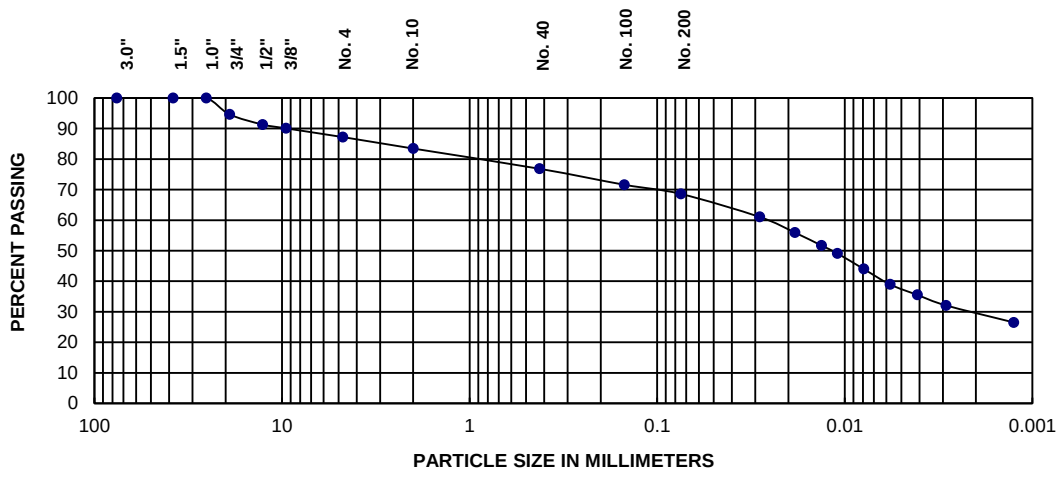
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 05-SS-01	**Date Tested**	10/25/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Pale olive clay loam, little gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.6	14.8	38.9	29.7

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	94.6
1/2"	91.3
3/8"	90.1
No. 4	87.2
No. 10	83.4
No. 40	76.8
No. 100	71.6
No. 200	68.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
38	18	20

AASHTO Classification:	A-6(12)
IDH Classification:	Clay Loam

Remarks:	
Silt + Fine Sand (%) = 47.1	

Test ID	70217

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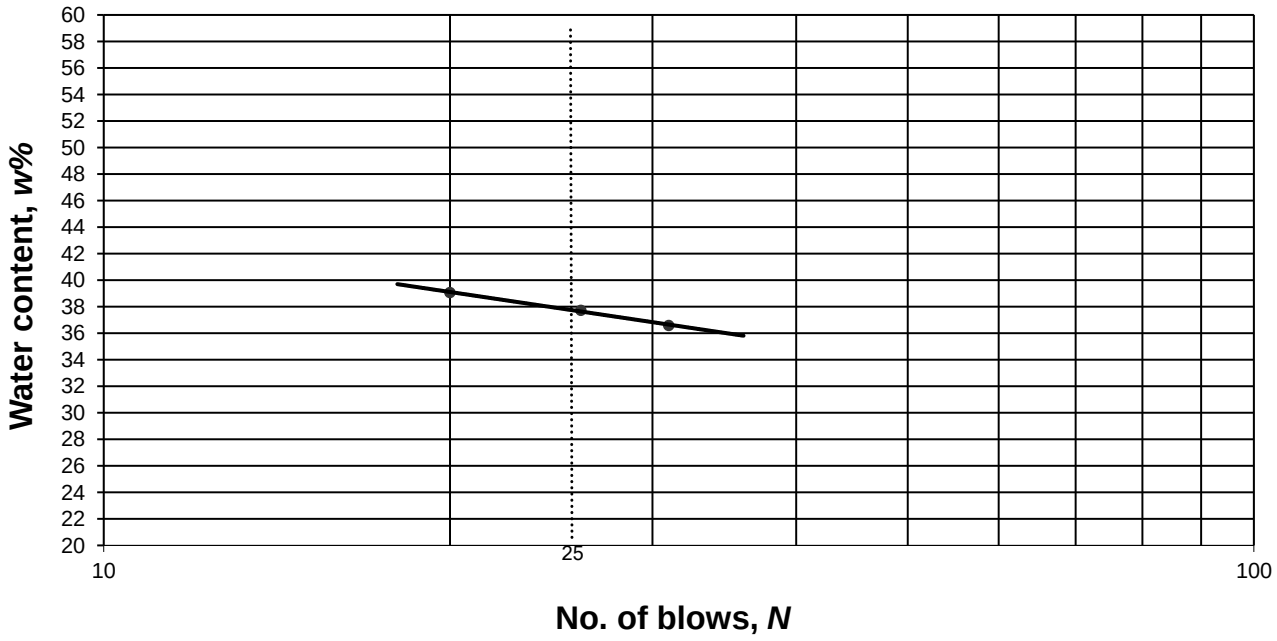
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 05-SS-01	**Date Tested**	10/24/2022	**Tested By**	DG
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Pale olive clay loam, little gravel

LIQUID LIMIT DETERMINATION



Results

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

Remarks

INTERRA
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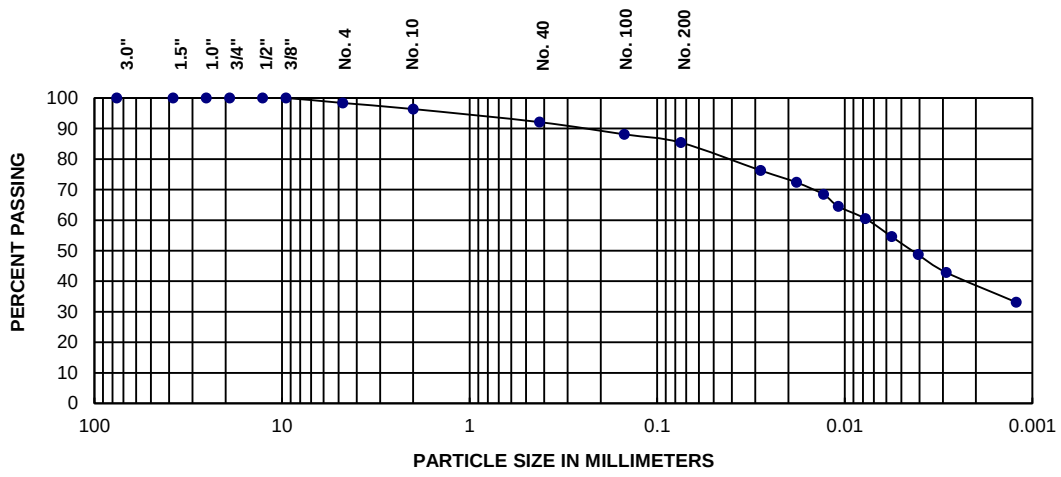
GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 06-SS-01	**Date Tested**	10/24/2022	**Tested by**	BKP
						Qc by	AB

Date Sample Received:	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown clay, trace gravel



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	3.6	11.0	45.6	39.8

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

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	100.0
3/8"	100.0
No. 4	98.4
No. 10	96.4
No. 40	92.1
No. 100	88.1
No. 200	85.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
40	18	22

AASHTO Classification:	A-6(19)
IDH Classification:	Clay

Remarks:
Silt + Fine Sand (%) = 52.3

Test ID	70219

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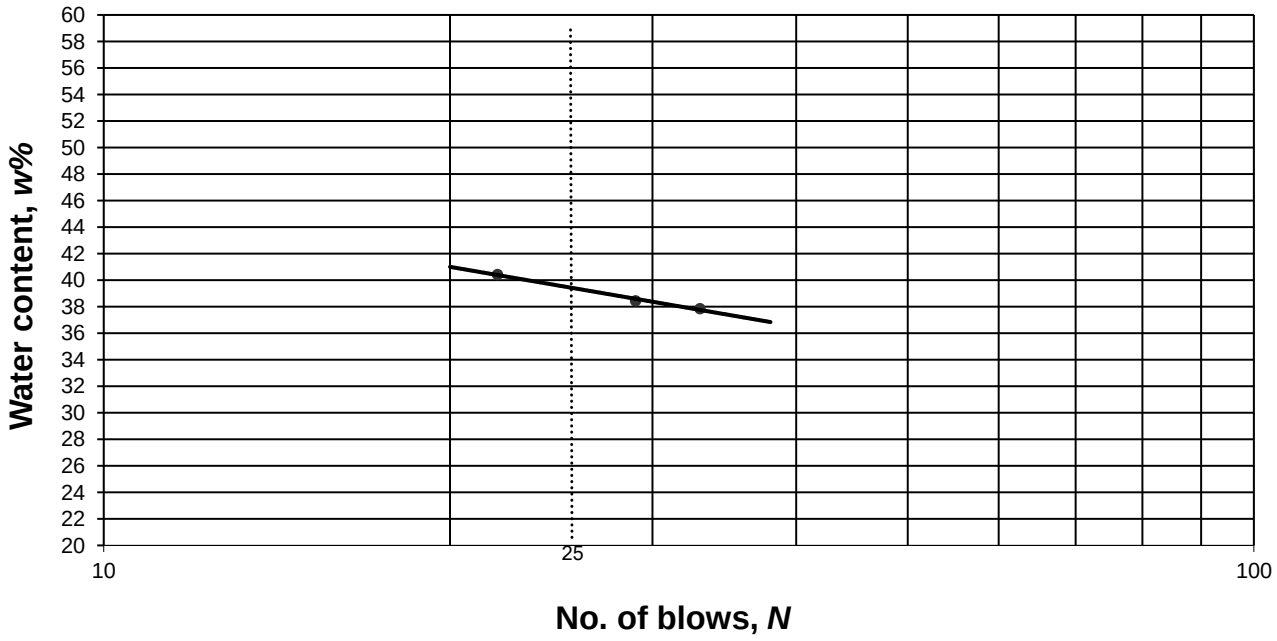
Atterberg Limits

AAASHTO T 89,90

Project	Geotech I-55 Frontage at Cass Ave. PTB 196-016-WO 30 Infrastructure						
Client	Infrastructure Engineering, Inc., 33 W.Monroe St.,Suite 1540, Chicago, IL 60603						
File No.	9267	**Sample #**	SGB 06-SS-01	**Date Tested**	10/24/2022	**Tested By**	BKP
						Qc By	AB

Date Sample Recd.	10/13/2022
Sample Location	1' - 2.5'
Sample Description	Dark yellowish brown clay, trace gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	**40**	**Plastic Limit, PL**	**18**	**Plasticity Index, PI**	**22**

Remarks

Appendix D

Pavement Core Logs

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600 Territorial Drive, Suite G
Bolingbrook, IL 60440
ph: 630-754-8700 web: www.interraservices.com

PAVEMENT CORE LOG

File No.:	9267	**Project Name:**	9267 - Geotech I-55 Frontage at Cass PTB 196-016 WO 30				
Client:	Infrastructure Engineering						
Core No.	PC-01	**Date Cored:**	10/12/2022	**Cored By:**	Geocon	**Measured By:**	Sponaugle
Core Location:	Sta # 0+85.3, 18.1' R. See Attached Location Map						
Core Diameter (in):	3.71	**Core Height (in):**	12.60	**Notes:**			

Asphalt Surface - 1.25"

Leveling Binder - 0.67"

Asphalt Surface - 2.10"

Asphalt Surface - 1.31"

Asphalt Binder - 1.61"

Leveling Binder - 0.85"

Asphalt Surface - 3.34"

Separation during recovery.

Asphalt Surface - 1.47"

Advanced split spoon following pavement core.
5" gravel base course

All measurements are average.

INTERRA
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600 Territorial Drive, Suite G
Bolingbrook, IL 60440
ph: 630-754-8700 web: www.interraservices.com

PAVEMENT CORE LOG

File No.:	9267	**Project Name:**	9267 - Geotech I-55 Frontage at Cass PTB 196-016 WO 30				
Client:	Infrastructure Engineering						
Core No.	PC-02	**Date Cored:**	10/12/2022	**Cored By:**	Geocon	**Measured By:**	Sponaugle
Core Location:	Sta # 3+30.1, 1.6' L. See Attached Location Map						
Core Diameter (in):	3.71	**Core Height (in):**	12.58	**Notes:**			

Asphalt Surface - 1.25"

Sand Mix Leveling Binder - 0.85"

Leveling Binder - 0.81"

Asphalt Surface - 1.51"

Asphalt Binder - 1.59"

Separation during recovery.

Asphalt Binder - 1.87"

Asphalt Surface - 1.82"

Separation during recovery.

Asphalt Surface - 1.83"

Asphalt Base Course - 1.05"

Advanced split spoon following pavement core.
14" gravel base course

All measurements are average.

INTERRA
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600 Territorial Drive, Suite G
Bolingbrook, IL 60440
ph: 630-754-8700 web: www.interraservices.com

PAVEMENT CORE LOG

File No.:	9267	**Project Name:**	9267 - Geotech I-55 Frontage at Cass PTB 196-016 WO 30				
Client:	Infrastructure Engineering						
Core No.	PC-03	**Date Cored:**	10/12/2022	**Cored By:**	Geocon	**Measured By:**	Sponaugle
Core Location:	Sta # 7+69.4, 9.3' R. See Attached Location Map						
Core Diameter (in):	3.71	**Core Height (in):**	9.29	**Notes:**			

Separation during recovery.

Asphalt Surface - 1.38"

Leveling Binder - 0.83"

Leveling Binder - 0.87"

Asphalt Binder - 1.88"

Asphalt Surface - 2.02"

Asphalt Surface - 2.31"

Advanced split spoon following pavement core.
8" gravel base course

All measurements are average.

Appendix E

Soil Erosion Factors and Hazard Ratings

Soil Types for Erosion Factors and Hazard Rating

Hazard Rating and Soil Erosion Factors

Map Unit Symbol	Map Unit Name	Soil Erosion Factor, k	Hazard Rating
805B	Orthents, clayey, undulating	0.32	Moderate