

**ROADWAY GEOTECHNICAL REPORT
CONTRACT 62B64
JOB NO. D-91-083-16
PTB 208/005-WO # 08
JOLIET ROAD AND BRAINARD AVENUE
COUNTRYSIDE, COOK COUNTY, ILLINOIS**

03/28/2024

Prepared for:

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1.0 INTRODUCTION

Interra, Inc. (INTERRA) was tasked by Michael Baker International, Inc., to conduct a subsurface soil investigation and to prepare the Roadway Geotechnical Report (RGR) for improvements at the intersection of Joliet Road and Brainard Avenue, in the City of Countryside, Cook County, Illinois.

This RGR presents the findings of INTERRA's subsurface soil exploration, groundwater conditions, results of laboratory testing, geotechnical evaluations performed, recommendations and construction considerations.

Project Description

The project site is identified as the intersection of Joliet Road and Brainard Avenue. The project area is located in City of Countryside, Cook County, Illinois. City of Countryside is a community of about 6,500. The project area is located south-west of Chicago. The project area station limits extend approximately between Station 171+00 and Station 179+50 on Joliet Road and between Station 45+00 and Station 52+80 on Brainard Avenue. The proposed work consists of pavement widening, turn lane additions, pavement resurfacing and traffic signal improvements. As per the information provided by the client, approximately 12 feet of widening is expected at the intersections.

2.0 PROJECT SCOPE

INTERRA's scope of work included locating and drilling eight (8) roadway geotechnical borings to a depth of 10.0 feet each, two (2) traffic signal borings to a depth of 30.0 feet each and collecting four (4) pavement cores. The soil borings were drilled primarily in the proposed widening areas and turning lanes. One pavement core was collected in



each leg of the intersection to determine the thickness of existing pavement layers. The scope also included evaluating the soil below subgrade elevation at the roadway widening areas.

3.0 SITE DESCRIPTION

The site is within Lyons Township, defined as S21 T38N R12E of the Third Principal Meridian. The approximate coordinates at the west end of the project are 41.773510N and 87.879475W, and the approximate coordinates at the east end are 41.774895N and 87.876324W. The approximate coordinates at the south end of the project are 41.772956N and 87.877549W, and the approximate coordinates at the north end are 41.775407N and 87.877791W. The ground surface elevation varied approximately between 685 feet and 698 feet at the borehole locations.

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 INTERRA. Prior to drilling, the drilling sub-contractor Geocon Professional Services (GEOCON) contacted the local one-call utility clearance service (JULIE) to clear underground utilities.

Boreholes were drilled on 01/08/2024 and 01/10/2024 with a Diedrich D-50 ATV mounted drill rig. 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.

Unconfined compressive strength tests were performed on cohesive samples using an



Illinois modified RIMAC 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. Boreholes were backfilled with a mixture of soil auger cuttings and bentonite chips in accordance with IDOT Geotechnical Manual guidelines.

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

5.0 LABORATORY TESTING

Laboratory testing included Moisture Content tests (AASHTO T 265) on all recovered split-spoon soil samples. Grainsize Analysis (AASHTO T 88), Atterberg Limits (AASHTO T 89, 90) and Organic Content tests (AASHTO T 194) were performed on selected 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 January 2024. Table 1 indicates the total precipitation in the 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.)
September, 2023	3.36	3.25	0.11
October, 2023	2.28	3.41	-1.13
November, 2023	0.86	2.08	-1.22
December, 2023	2.97	2.32	0.65



Actual monthly precipitation is observed to be close to the historical average during the preceding months of drilling. This shows that the moisture of the surface soils and the ground water levels noted during drilling are similar to the normal levels.

7.0 SUBSURFACE CONDITIONS

Table 2.0 summarizes the boring depth, groundwater depth and information on 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.	Station	Purpose	Surface Elevation (feet)	Depth (feet)	Groundwater During Drilling (feet)	Groundwater Immediately After Drilling (feet)	Major Stratum Encountered from Top to Bottom
B-01	171+25, 26.7'RT (Joliet Road)	Roadway	698.0	10	Dry	Dry	Asphalt, concrete, stiff clay loam, very stiff silty clay
B-02	173+90, 24.4'RT (Joliet Road)	Roadway	696.0	10	Dry	Dry	Asphalt, crushed aggregate base, very stiff and hard silty clay
B-03	177+03, 39.9'LT (Joliet Road)	Roadway	687.1	10	Dry	Dry	Topsoil, very stiff to hard clay, hard silty clay
B-04	177+68, 10.6'RT (Joliet Road)	Roadway	685.6	10	Dry	Dry	Asphalt, concrete, very stiff and hard silty clay
B-05	43+47, 3.2'LT (Brainard Avenue)	Roadway	689.1	10	Dry	Dry	Asphalt, stiff clay, very stiff, stiff and hard silty clay
B-06	46+09, 11.6'RT (Brainard Avenue)	Roadway	693.4	10	6.0	6.7	Asphalt, medium dense to loose sandy loam and gravel, hard silty clay
B-07	48+81, 21.7'LT (Brainard Avenue)	Roadway	691.4	10	Dry	Dry	Topsoil, very stiff silty clay loam, very stiff clay, hard silty clay
B-08	51+10, 8.8'LT (Brainard Avenue)	Roadway	690.1	10	Dry	Dry	Asphalt, concrete, crushed aggregate base, stiff to soft clay, very stiff to hard clay
TSB-01	175+70, 73'RT (Joliet Road)	Traffic Signal	692.2	30	Dry	Dry	Topsoil, very stiff, hard, and stiff silty clays, dense silt
TSB-02	175+34, 44.2'LT (Joliet Road)	Traffic Signal	692.1	30	Dry	Dry	Topsoil, very stiff, hard and stiff silty clay



Groundwater Conditions

Groundwater levels were recorded during drilling, and immediately after completion of drilling. The measured water levels are given in Table 2. 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 observed between 10.5 feet depth and 13.0 feet depth in TSB-01 and TSB-02.

Pavement Cores

A total of four (4) pavement cores were recovered to determine the existing pavement thickness and condition. The pavement thickness varied between 7.75 inches and 17.25 inches. Pavement core photo logs are presented in Appendix D of this report.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Traffic Signal Foundations

Two soil borings, were performed for traffic signals at intersection of Joliet Road and Brainard Avenue. The boreholes mostly encountered stiff to hard clayey soils up to the exploration depth. It is our opinion that the standard foundation details (for cohesive soils with Q_u values > 1 tsf) can be used for the traffic signals based on the average unconfined compressive strength. The standard shaft depths for traffic signal mast arm foundations are given in the design table of Highway Standard 878001.

8.2 Roadway Widening

8.2.1 Subgrade Preparation for Intersection Improvements - General

All the borings except TSB-02 were done on the pavement surface. As such, topsoil was not encountered in those borings. TSB-02 encountered 5.0 inches of topsoil at the surface. Hand auger samples were taken at an offset from the existing pavement to estimate the topsoil thickness. Based on that, a topsoil stripping depth of 6 inches is



recommended 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.

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 or complete reconstruction 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 recompact 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 the plans are expected include 12 inches of improved subgrade. The minimum IBV of 8.0 would have been required if the plans did not include 12 inches of improved subgrade.

8.2.2 Removal and Replacement of Unstable Soils

Based on the boreholes, in general, below the pavement/topsoil, stiff to hard clayey soils and loose to medium dense sandy soils were encountered. Soft clay was encountered at boring B-08 at a depth of 3.0 to 6.0 feet. The soft clay layer at B-08 do not have enough cover as explained in Section 4.0 of the IDOT Subgrade Stability Manual. It is recommended to remove the soft soil from this location. Please refer to Table 3 for the details of undercut.

Table 3: Subgrade Treatment Recommendations

Boring Location	Road	From	To	Lateral Limits	Vertical Extent of Treatment Depth¹ (in)	Reason for Treatment, Recommended Treatment Type
B-08	Brainard Avenue	Station 50+00	Station 52+80	Full width of widening	18.0	Stability, high moisture, undercut ¹

¹ Depth of undercut needs to be measured from the bottom of the 12-inch subgrade improvement layer.



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. Approximate quantity of Aggregate Subgrade Improvement for this purpose can be anticipated as 25% of the full depth pavement area, assuming a thickness of 12 inches.

Proof rolling 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 the undercut recommendations shall be per guidelines in the IDOT Subgrade Stability Manual. 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.

8.2.3 Pavement Design

In the Pavement design, both Illinois Bearing Ratio (IBR) and Subgrade Support Rating (SSR) values should be taken into consideration. We recommend using an SSR of POOR and an IBR value of 2.

Underdrains

To provide drainage for the proposed pavement areas, we recommend installing longitudinal pipe underdrains under the edge of new pavement in widening areas. However, we understand that the proposed widening areas at the intersections are very narrow, and the drainage structures are over 200 feet away and this may not be feasible



at some locations. Drains should also be installed in low areas and at the base of any undercuts. The underdrains should tie into the storm water drainage system and should be installed per Article 601 in the IDOT Standard Specifications (Adopted January 1, 2022) and consist of Type 2 underdrains.

8.2.4 Stability Analysis

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

8.2.5 Earthwork Quantity Calculations

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

9.0 CONSTRUCTION CONSIDERATIONS

- We do not anticipate any open excavations greater than 4 feet. If any temporary excavations are needed, they 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.
- Excavated materials free from debris can be reused upon approval by Engineer.
- 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 D.

10.0 CONSTRUCTION MONITORING

Construction monitoring shall be in accordance with IDOT Standard Specifications,



Special Provisions and Contract Plans. No special monitoring is anticipated. 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.

11.0 CLOSURE

The analysis and recommendations submitted in this report are based upon the data obtained from eleven (11) 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,

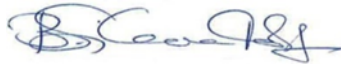
INTERRA, INC.



Reshma Chirakkara, Ph.D.
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Sudhakar "Rao" Doppalapudi, P.E.
QC/QA 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

Borehole and Pavement Core Location Plan and Profiles

BORING LOCATION PLANS AND SOIL PROFILES

JOLIET ROAD AT BRAINARD AVENUE

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PREPARED BY:

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600 TERRITORIAL DRIVE, SUITE G
BOLINGBROOK, IL 60440

FEBRUARY 19, 2024
INTERRA PROJECT 9611

LEGEND:



Soil Boring

Borehole Data

SGB-01
886.95 ft
124+58
43 ft RT

Borehole Number
Elevation
Station
Offset

N Qu



MC

Borehole Lithology

N - N Value, (blw/12 in)
Qu - UC Strength, (tsf)
MC - Moisture Content, (%)



Groundwater Elevation
at First Encounter



Groundwater Elevation
Upon Completion



Groundwater Elevation
After ___ Hours

Lithology Graphics



Topsoil



Organic silt or clay



Pavement



Clay



Concrete



Silty Clay,
Silty Clay Loam



Fill (made ground)



Clay Loam



Crushed stone



Loam



Sand, Sandy Loam



Silt, Silty Loam



Coarse Sand



Peat



Gravelly Sand,
Sandy Gravel



No Recovery

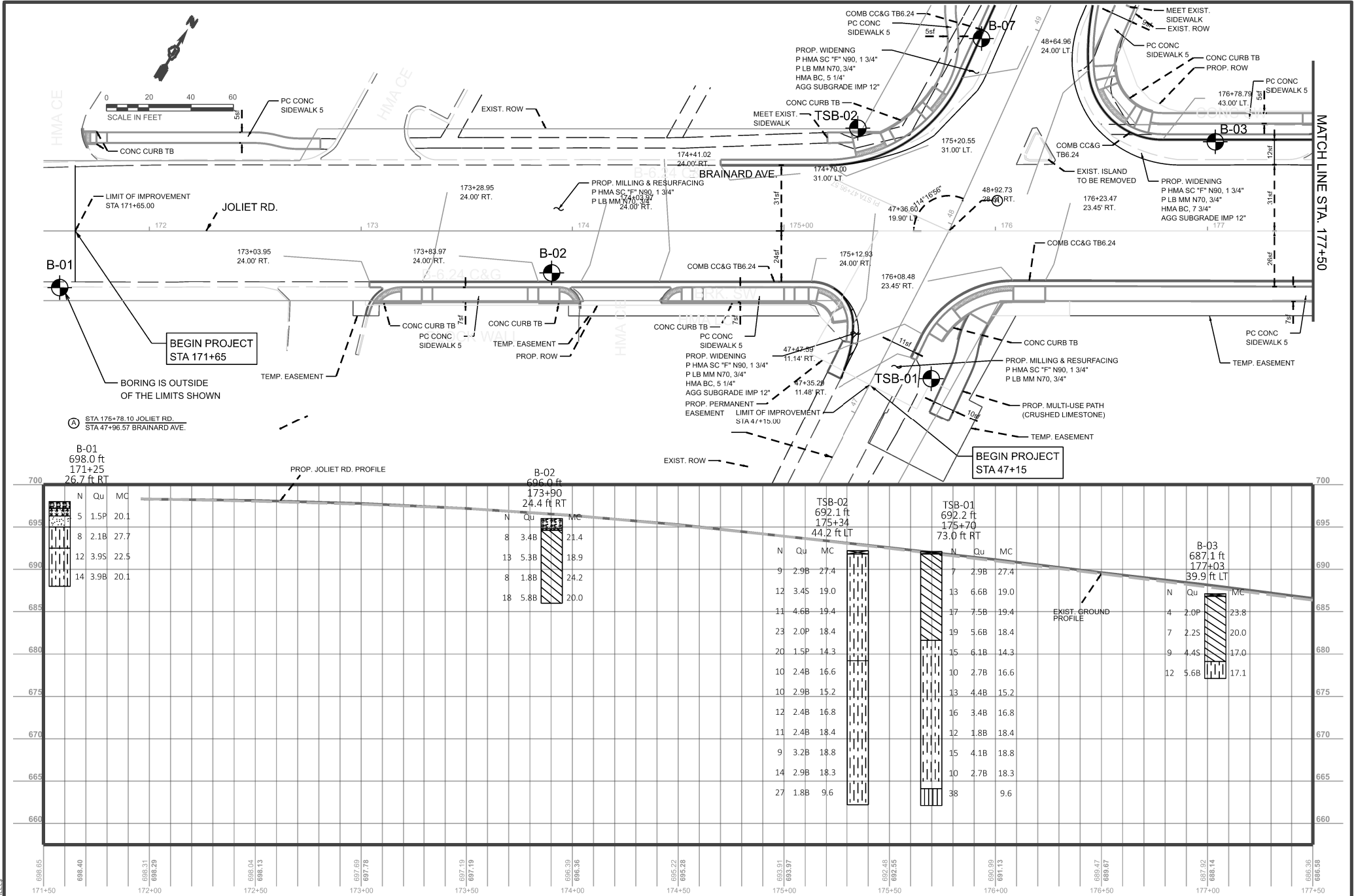


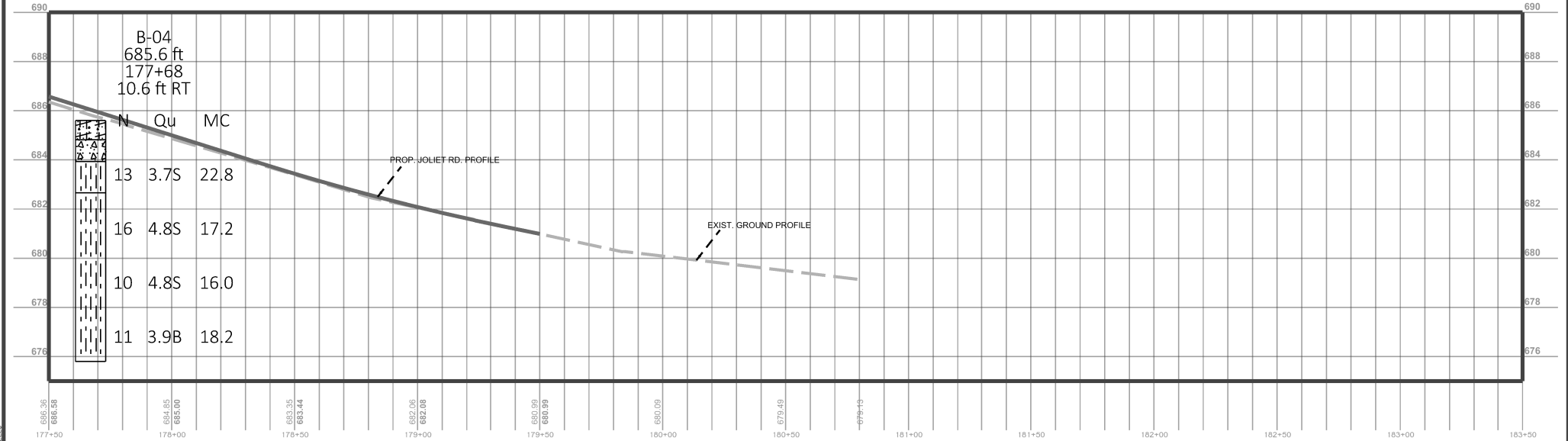
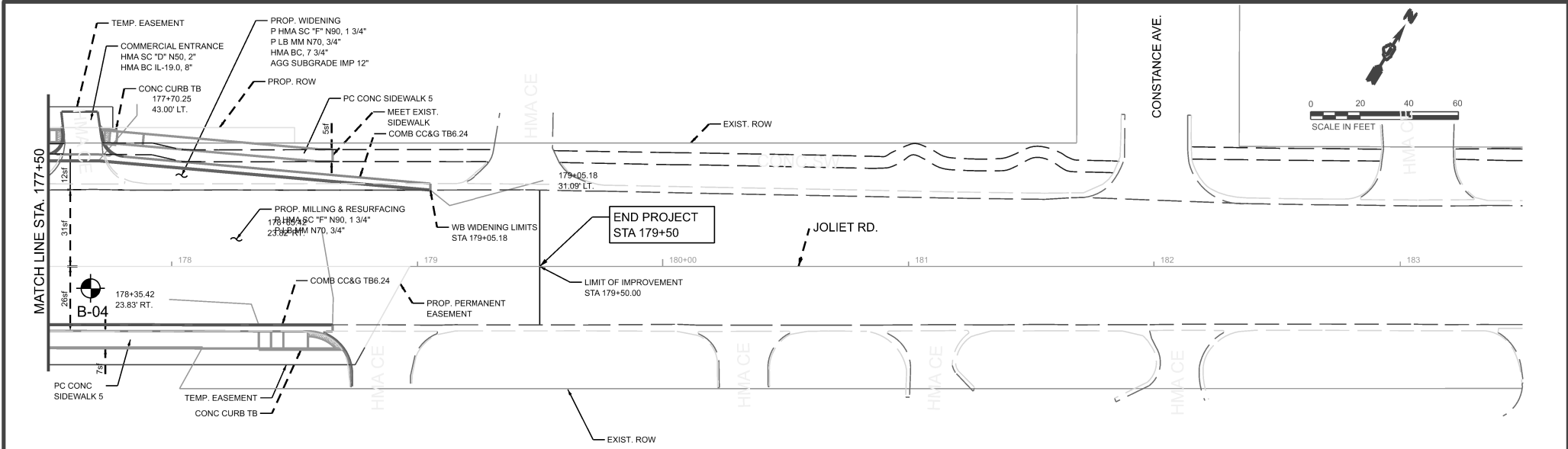
Gravel,
Rock Aggregate



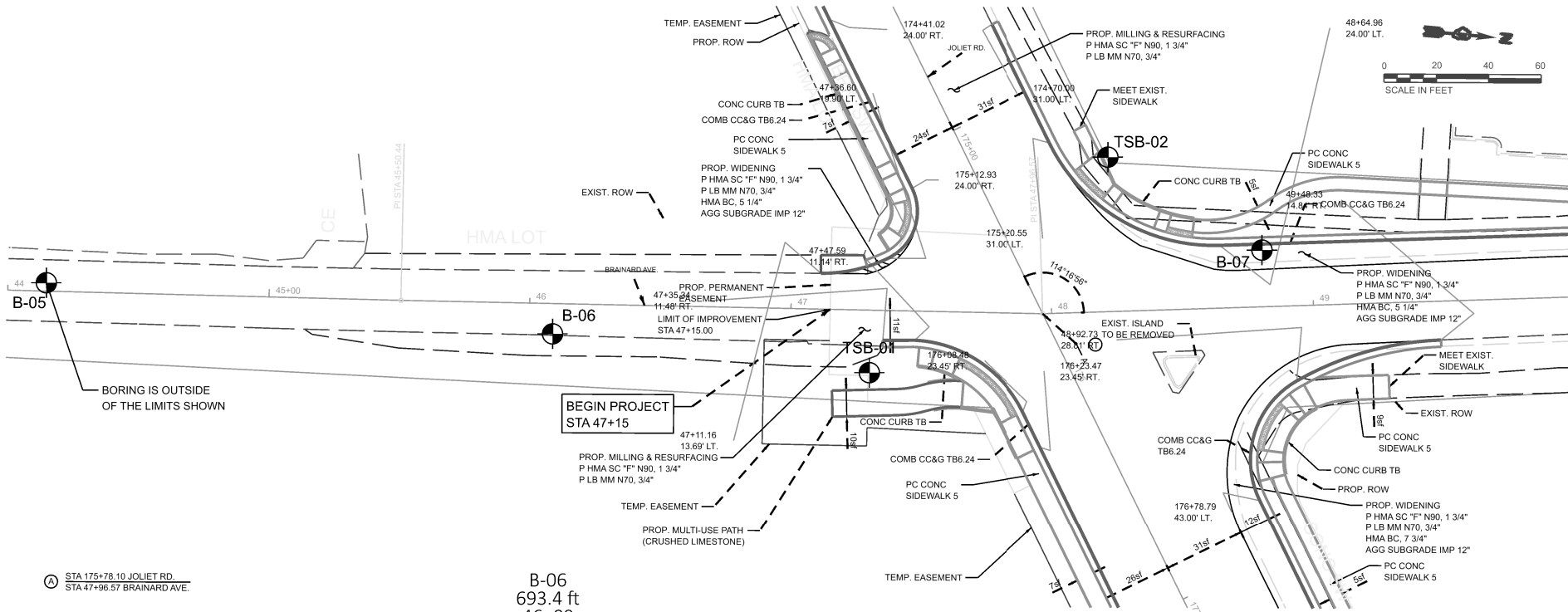
Rock Core

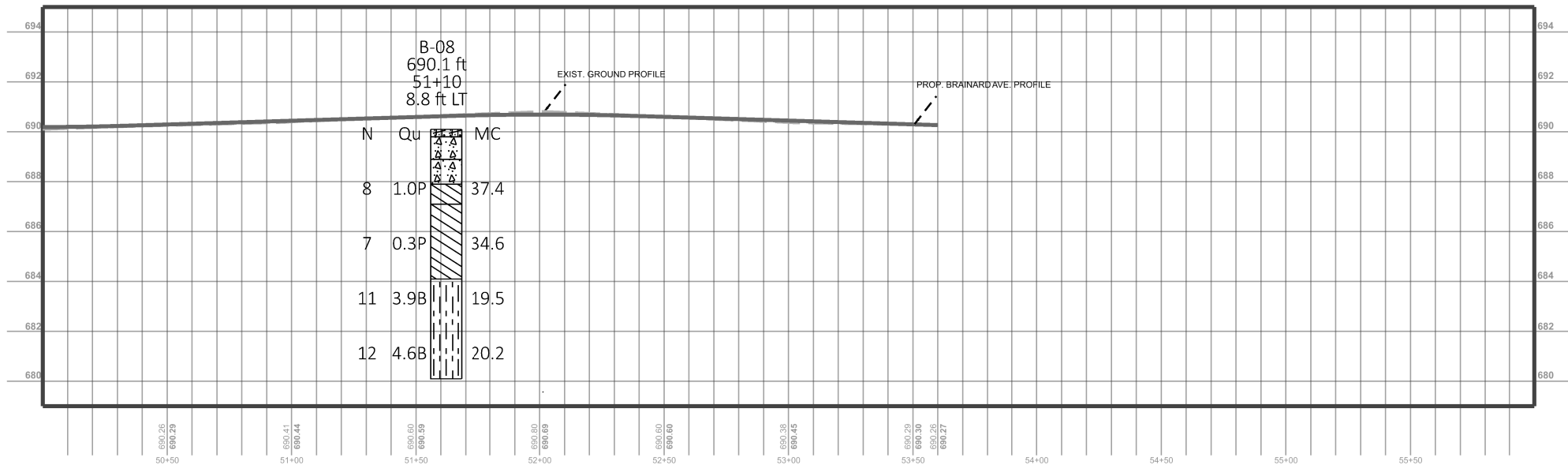
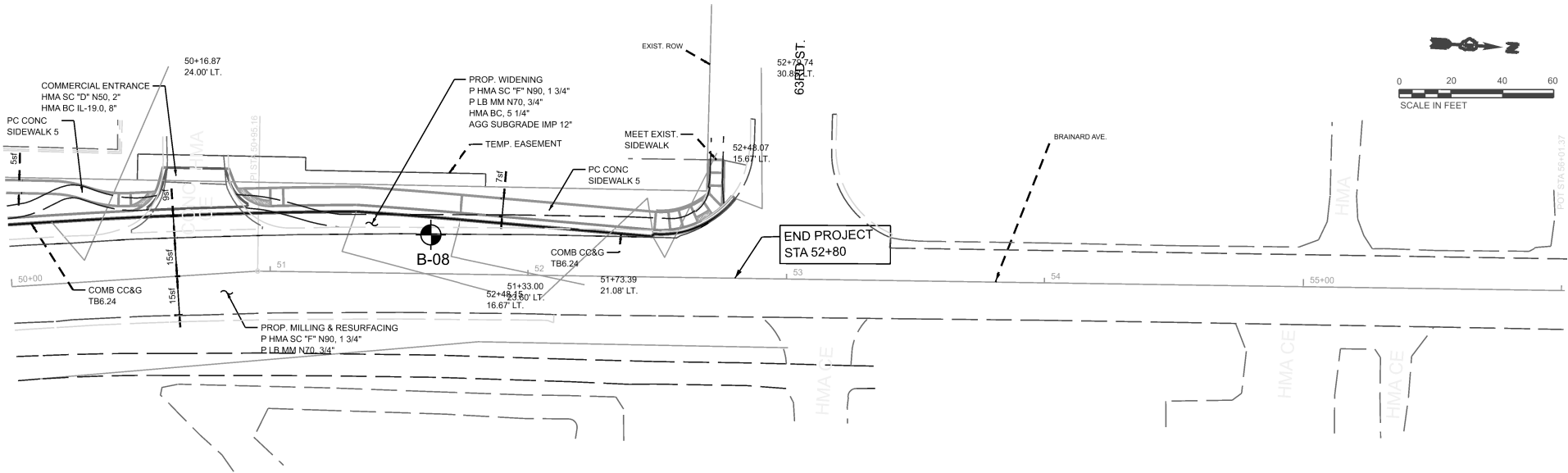
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FILE NAME: SHELLES





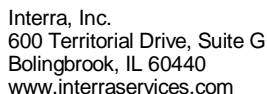
Michael Baker International 250 West Adams Street, Suite 1000, Chicago, IL 60606 Phone: (312) 707-8770 - MBAKERINTL.COM	USER NAME: + SUSER\$	DESIGNED: -	REVISED: -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	JOLIET ROAD AT BRAINARD AVENUE PLAN AND PROFILE	F.A.D. RTE: 3562	SECTION	COUNTY: COOK	TOTAL SHEETS: 35	SHEET NO.: 13
	PLOT SCALE: + \$Scales	CHECKED: -	REVISED: -			CONTRACT NO.				
	PLOT DATE: + \$DATES	DATE: -	REVISED: -			ILLINOIS FED AID PROJECT				
	SCALE: SHEET OF SHEETS STA. 171+50.00 TO STA. 177+50.00									





B-08		
690.1 ft		
51+10		
8.8 ft LT		
N	Qu	MC
8	1.0P	37.4
7	0.3P	34.6
11	3.9B	19.5
12	4.6B	20.2

Appendix B
Soil Boring Logs

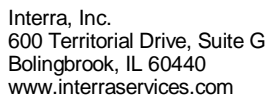


ROUTE	Joliet Road	DESCRIPTION	Roadway boring	LOGGED BY	Sponaugle
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SECTION Joliet Road and Brainard Avenue **LOCATION** E: 1108172.5; N: 1860421.9

COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
---------------	------	------------------------	------------------	--

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

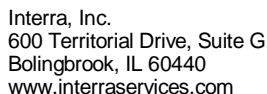


ROUTE	Joliet Road	DESCRIPTION	Roadway boring	LOGGED BY	Sponaugle
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SECTION Joliet Road and Brainard Avenue **LOCATION** E: 1108399.0; N: 1860560.5

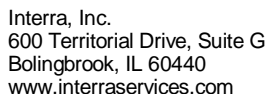
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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



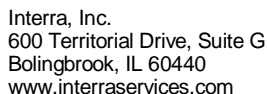
COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



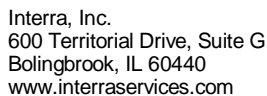
COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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BBS, from 137 (Rev. 8-99)



COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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BBS, from 137 (Rev. 8-99)

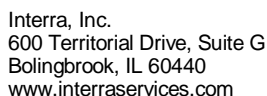


ROUTE	Joliet Road	DESCRIPTION	Roadway boring	LOGGED BY	Sponaugle
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SECTION Joliet Road and Brainard Avenue **LOCATION** E: 1108570.8: N: 1860491.8

COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)

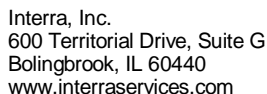


ROUTE	Joliet Road	DESCRIPTION	Roadway boring	LOGGED BY	Sponaugle
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SECTION Joliet Road and Brainard Avenue **LOCATION** E: 1108515.3: N: 1860760.4

COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



ROUTE	Joliet Road	DESCRIPTION	Roadway boring	LOGGED BY	Sponaugle
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SECTION Joliet Road and Brainard Avenue **LOCATION** E: 1108502.3: N: 1860987.0

COUNTY	Cook	DRILLING METHOD	Solid Stem Auger	HAMMER TYPE D50 Auto (96.8% efficiency)
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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)



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Page 1 of 1

SOIL BORING LOG

Date 1/10/24

ROUTE Joliet Road DESCRIPTION Roadway boring LOGGED BY Sponaugle

SECTION Joliet Road and Brainard Avenue LOCATION E: 1108578.3; N: 1860611.0

COUNTY Cook DRILLING METHOD Hollow Stem Auger HAMMER TYPE D50 Auto (96.8% efficiency)

STRUCT. NO. <u>NA</u>	D	B	U	M	Surface Water Elev. <u>NA</u> ft	D	B	U	M
Station <u>NA</u>	E	L	C	O	Stream Bed Elev. <u>NA</u> ft	E	L	C	O
BORING NO. <u>TSB-01</u>	P	O	S	I	Groundwater Elev.:	P	O	S	I
Station <u>175+70</u>	T	W	Qu	S	First Encounter <u>Dry</u> ft	H	S	Qu	T
Offset <u>73.00ft RT</u>	H	S		T	Upon Completion <u>Dry</u> ft				
Ground Surface Elev. <u>692.20</u> ft	(ft)	(/6")	(tsf)	(%)	After <u> </u> Hrs. <u>Filled</u> ft	(ft)	(/6")	(tsf)	(%)
TOPSOIL (4") <u>691.90</u>					Gray (10YR 5/1) SILTY CLAY, trace gravel, medium plasticity, moist (<i>continued</i>)			B	
Very stiff, light yellowish Brown (10YR 6/4) CLAY, trace gravel, medium plasticity, moist LL= 50%, PI=27%		2		27.4	Stiff		3		18.4
		3					5		
		4	2.9				7	1.8	
			B					B	
		4					3		
Hard, with gray mottling		6		19.0	Hard		6		18.8
	-5	7	6.6			-25	9	4.1	
			B					B	
		5					3		
trace gravel		7		19.4	Very stiff		4		18.3
		10	7.5				6	2.7	
			B					B	
		5				664.20			
		9		18.4	Dense, Gray (10YR 6/1) SILT, little gravel, low plasticity, dry		8		
	-10	10	5.6				18		9.6
			B			662.20	20		
Gray (10YR 5/1) SILTY CLAY, trace gravel, medium plasticity, moist	681.70				End of boring at 30'. Borehole backfilled with soil cuttings and bentonite.	-30			
Hard		6							
		7		14.3					
		8	6.1						
			B						
		4							
Very stiff		4		16.6					
	-15	6	2.7			-35			
			B						
		3							
Hard		5		15.2					
		8	4.4						
			B						
		4							
Very stiff		7		16.8					
	-20	9	3.4			-40			

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
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Page 1 of 1

SOIL BORING LOG

Date 1/10/24

ROUTE Joliet Road DESCRIPTION Roadway boring LOGGED BY Sponaugle

SECTION Joliet Road and Brainard Avenue LOCATION E: 1108487.4; N: 1860694.0

COUNTY Cook DRILLING METHOD Hollow Stem Auger HAMMER TYPE D50 Auto (96.8% efficiency)

STRUCT. NO. <u>NA</u>	D	B	U	M	Surface Water Elev. <u>NA</u> ft	D	B	U	M
Station <u>NA</u>	E	L	C	O	Stream Bed Elev. <u>NA</u> ft	E	L	C	O
BORING NO. <u>TSB-02</u>	P	O	S	I	Groundwater Elev.: <u></u>	P	O	S	I
Station <u>175+34</u>	T	W	Qu	S	First Encounter <u>Dry</u> ft	T	W	Qu	S
Offset <u>44.20ft LT</u>	H	S		T	Upon Completion <u>Dry</u> ft	H	S		T
Ground Surface Elev. <u>692.10</u> ft	(ft)	(/6")	(tsf)	(%)	After <u></u> Hrs. <u>Filled</u> ft	(ft)	(/6")	(tsf)	(%)
TOPSOIL (5") <u>691.70</u>					Very stiff, Gray (10YR 5/1) SILTY CLAY LOAM, trace gravel, medium plasticity, moist			B	
Very stiff, light yellowish Brown (10YR 6/4) with gray mottling		2			LL= 28%, PI= 11% (continued)		4		
SILTY CLAY, trace gravel, medium plasticity, moist		4		24.7			5		18.0
		5	2.9				6	2.4	
			B					B	
		5					3		
		5		18.6			3		18.3
	-5	7	3.4			-25	6	3.2	
			S					B	
		3					3		
Hard, trace gravel		5		18.8			6		18.0
		6	4.6				8	2.9	
			B					B	
		12					3		
Very stiff		11		16.9			11		18.6
	-10	12	2.0			662.10	16	1.8	
			P		End of boring at 30'. Borehole backfilled with soil cuttings and bentonite.	-30		B	
		7							
Stiff		10		19.3					
		10	1.5						
			P						
<u>679.10</u>									
Very stiff, Gray (10YR 5/1) SILTY CLAY LOAM, trace gravel, medium plasticity, moist		3							
LL= 28%, PI= 11%		4		16.0					
	-15	6	2.4			-35			
			B						
		4							
		4		14.6					
		6	2.9						
			B						
		4							
		5		16.1					
	-20	7	2.4			-40			

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

Appendix C
Laboratory Test Reports



Interra File No.: 9611

SOIL TEST RESULTS SUMMARY FOR SUBGRADE SOILS

PROJECT: Geotechnical Investigation -Joliet Rd. and Brainard Ave. Cook County, Illinois

Route: Joillet Rd. and Brainard Ave.

County: Cook, Illinois

SAMPLE	B01-SS-01	B02-SS-01	B03-SS-01
BORING LOCATION	B-01	B-02	B-03
DEPTH	1'-2.5'	1'-2.5'	1'-2.5'
AASHTO CLASSIFICATION (AASHTO M 145)	A-6(4)	A-7-5(19)	A-7-5(16)
ILLINOIS TEXTURAL CLASSIFICATION	Sandy Loam	Clay	Clay
GRADATION-PASSING 1" SIEVE %	100	100	100
" 3/4" " %	100	100	100
" 1/2" " %	95.7	100	100
" NO. 4 " %	85.1	98.8	98
" NO. 10 " %	77.1	98	95.7
" NO. 40 " %	62.4	95.2	91.6
" NO. 100 " %	53.9	91.5	84
" NO. 200 " %	49.4	89.3	79.9
GRAVEL (AASHTO T88) %	22.9	2	4.3
SAND (AASHTO T88) %	27.7	8.7	15.8
SILT (AASHTO T88) %	30.4	45.9	47.2
CLAY (AASHTO T88) %	19	43.4	32.7
SILT+FINE SAND (AASHTO T88) %	43.4	51.8	58.9
LIQUID LIMIT (AASHTO T89) %	31	41	41
PLASTICITY INDEX (AASHTO T90) %	15	20	20
SUBGRADE SUPPORT RATING	POOR	FAIR	FAIR
IN SITU MOISTURE (AASHTO T 265)%	20.1	21.4	23.8
REMARKS			



Interra File No.: 9611

SOIL TEST RESULTS SUMMARY FOR SUBGRADE SOILS

PROJECT: Geotechnical Investigation -Joliet Rd. and Brainard Ave. Cook County, Illinois

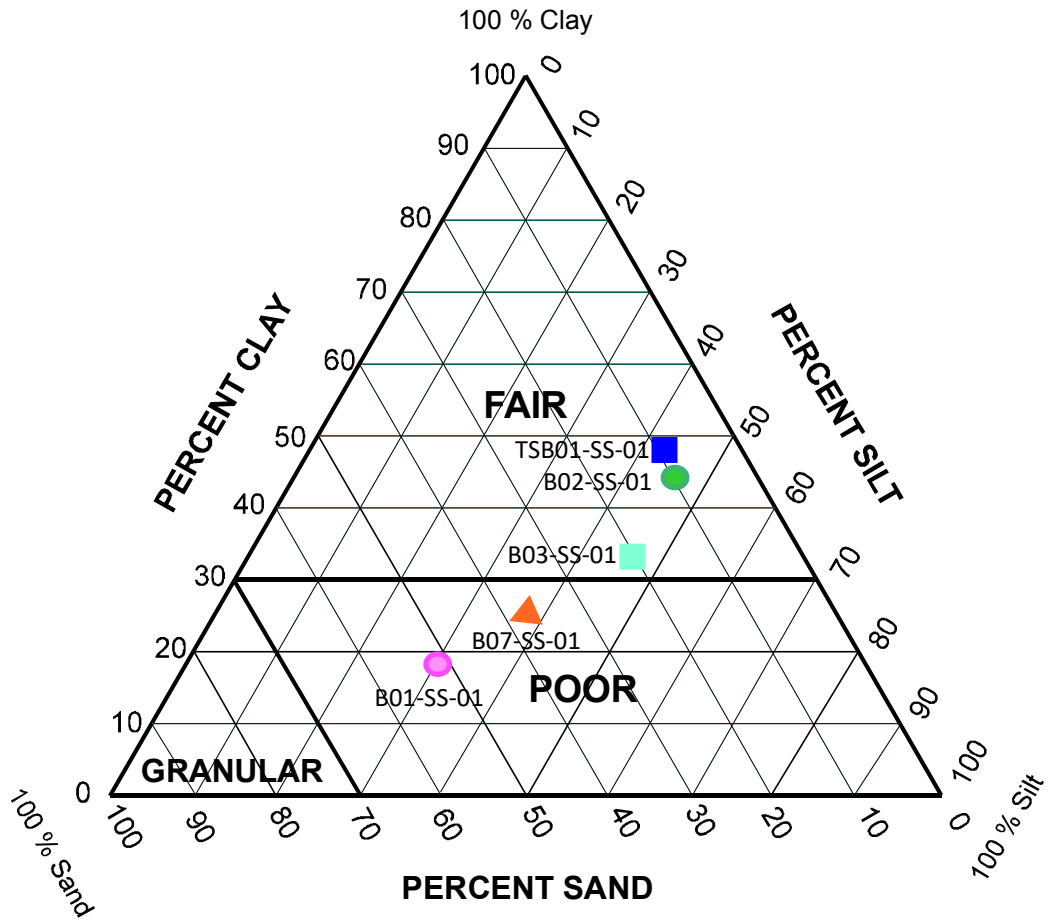
Route: Joiliet Rd. and Brainard Ave.

County: Cook, Illinois

SAMPLE	B07-SS-01	TSB01-SS01
BORING LOCATION	B-07	TSB 01
DEPTH	1'-2.5'	1'-2.5'
AASHTO CLASSIFICATION (AASHTO M 145)	A-6(10)	A-7-5(28)
ILLINOIS TEXTURAL CLASSIFICATION	Clay Loam	Clay
GRADATION-PASSING 1" SIEVE %	100	100
" 3/4" " %	100	100
" 1/2" " %	100	100
" NO. 4 " %	91.2	100
" NO. 10 " %	86.3	99.7
" NO. 40 " %	77.9	97.9
" NO. 100 " %	69.7	94.5
" NO. 200 " %	65.7	92.3
GRAVEL (AASHTO T88) %	13.7	0.3
SAND (AASHTO T88) %	20.6	7.4
SILT (AASHTO T88) %	39.7	42.5
CLAY (AASHTO T88) %	26	49.8
SILT+FINE SAND (AASHTO T88) %	51.9	48.1
LIQUID LIMIT (AASHTO T89) %	37	50
PLASTICITY INDEX (AASHTO T90) %	17	27
SUBGRADE SUPPORT RATING	POOR	FAIR
IN SITU MOISTURE (AASHTO T 265)%	18.9	27.4
REMARKS		

JOLIET ROAD AND BRAINARD AVENUE

COOK COUNTY, IL
INTERRA PROJ. NO. 9611

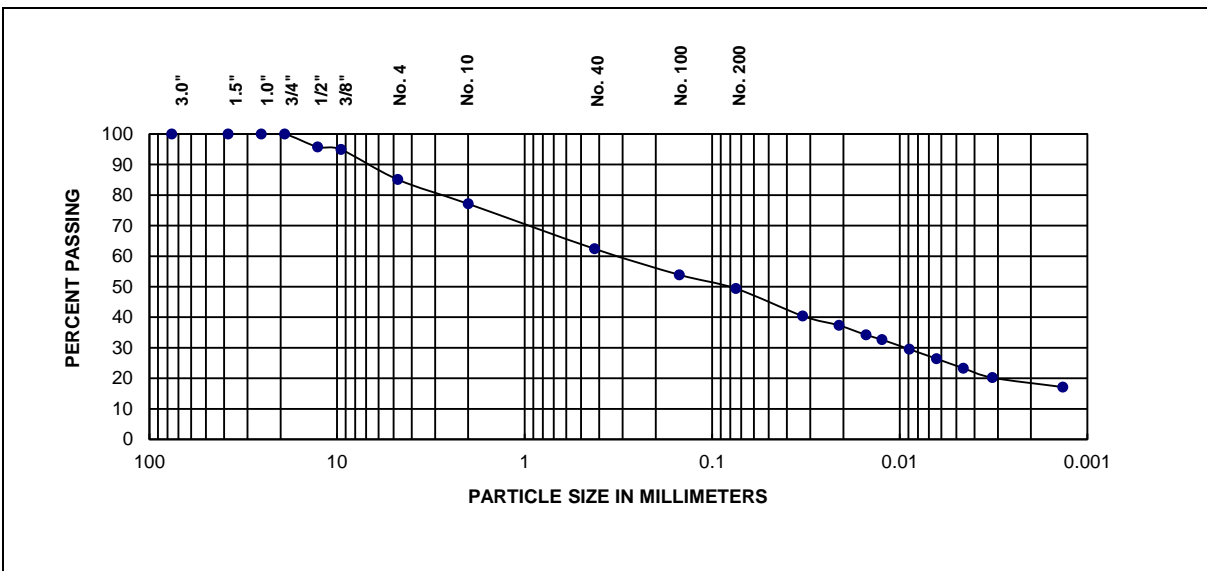


Subgrade Support Rating (SSR Chart)

	GRAIN SIZE ANALYSIS AASHTO T 88
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Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 01-SS-01	Date Tested	2/7/2024	Tested by	DG
						Qc by	AB

Date Sample Received:	1/8/2024
Sample Location	1-2.5
Sample Description	Dark greenish gray (GLEY-1 4/1) sandy loam, some gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	22.9	27.7	30.4	19.0

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	31	16	15
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification: A-6(4)		
1/2"	95.7			
3/8"	94.9	IDH Classification: Sandy Loam		
No. 4	85.1			
No. 10	77.1			
No. 40	62.4			
No. 100	53.9			
No. 200	49.4			

Remarks:	
Silt + Fine Sand (%) = 43.4	

www.interraservices.com	Test ID	73223
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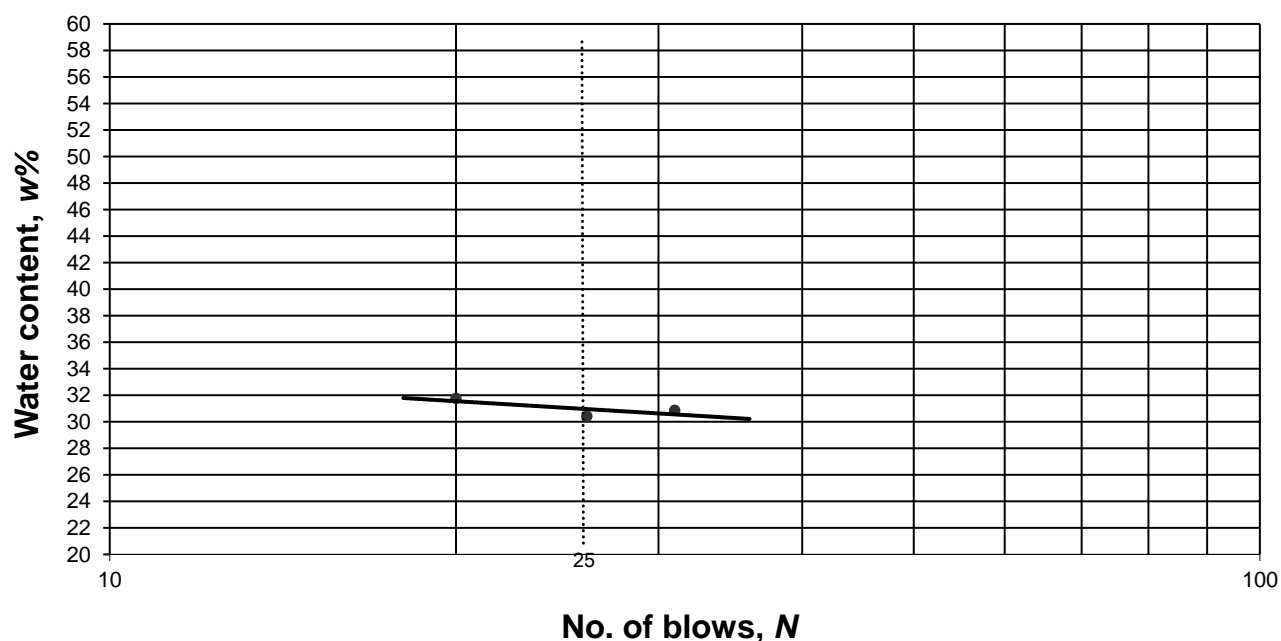


Atterberg Limits
AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 01-SS-01	Date Tested	2/7/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/8/2024
Sample Location	1-2.5
Sample Description	Dark greenish gray (GLEY-1 4/1) sandy loam, some gravel

LIQUID LIMIT DETERMINATION



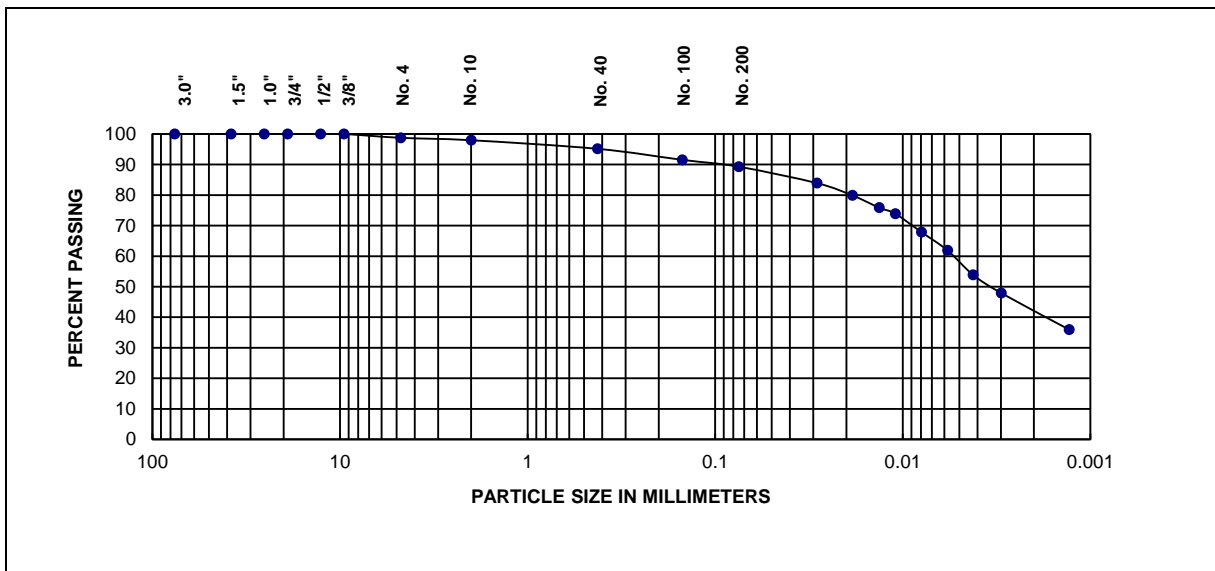
Results					
Liquid Limit, LL	31	Plastic Limit, PL	16	Plasticity Index, PI	15

Remarks					



GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 02-SS-01	Date Tested	2/13/2024	Tested by	DG
						Qc by	AB
Date Sample Received:	1/8/2024						
Sample Location	1-2.5						
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	2.0	8.7	45.9	43.4

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	41	21	20	
1.5"	100.0				
1.0"	100.0				
3/4"	100.0	AASHTO Classification:			A-7-5(19)
1/2"	100.0				
3/8"	100.0	IDH Classification:			Clay
No. 4	98.8				
No. 10	98.0				
No. 40	95.2				
No. 100	91.5				
No. 200	89.3				

Remarks:	
Silt + Fine Sand (%) =	51.8



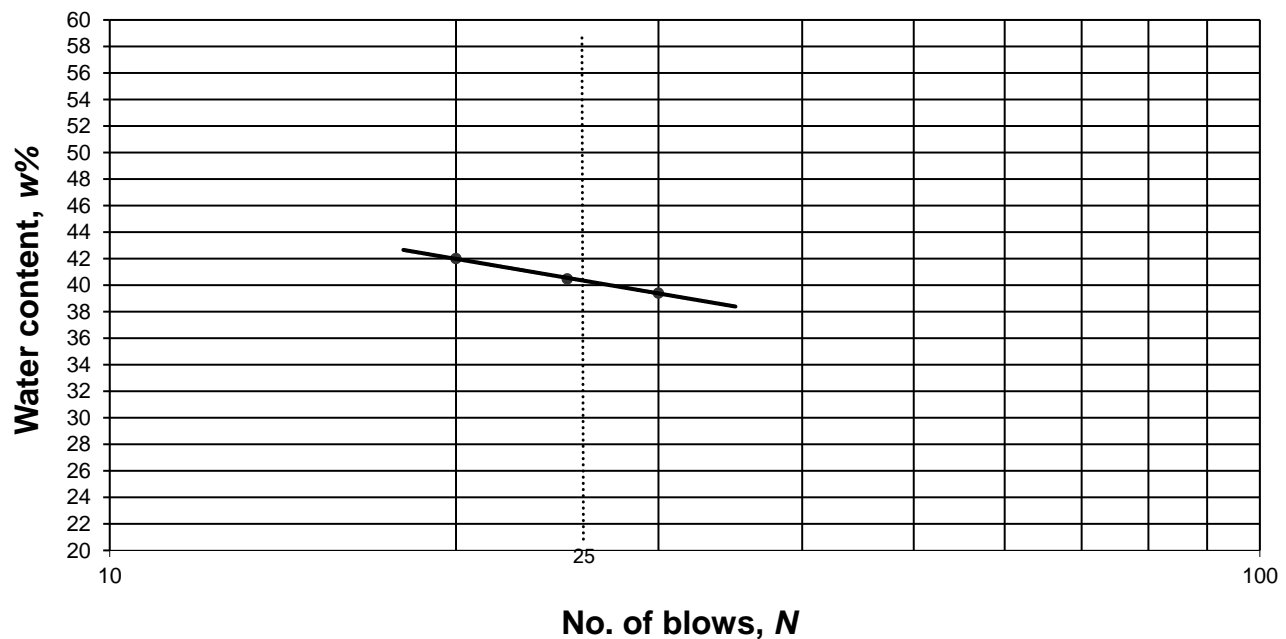
Atterberg Limits

AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 02-SS-01	Date Tested	2/13/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/8/2024
Sample Location	1-2.5
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	41	Plastic Limit, PL	21	Plasticity Index, PI	20

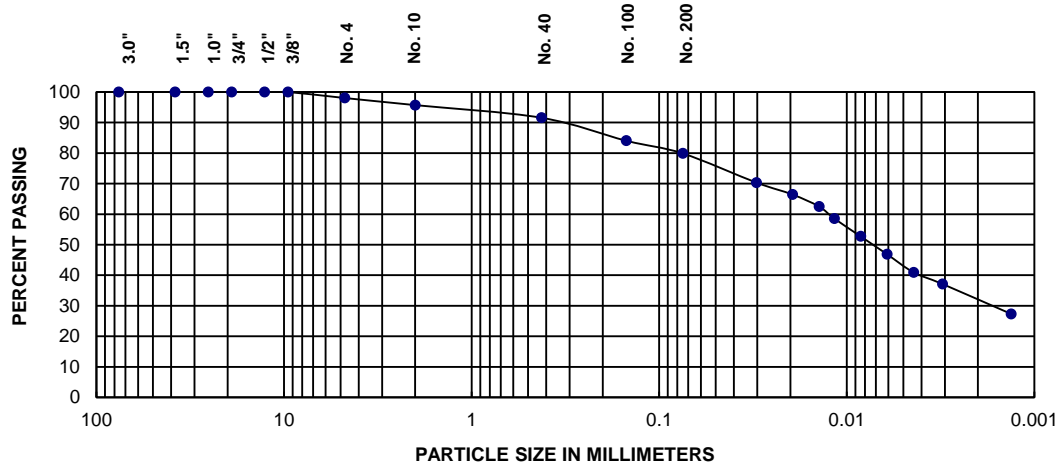
Remarks					



GRAIN SIZE ANALYSIS
AASHTO T 88

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 03-SS-01	Date Tested	2/13/2024	Tested by	DG
						Qc by	AB

Date Sample Received:	1/10/2024
Sample Location	1-2.5
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	4.3	15.8	47.2	32.7

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	41	21	20	
1.5"	100.0				
1.0"	100.0				
3/4"	100.0	AASHTO Classification:			A-7-5(16)
1/2"	100.0				
3/8"	100.0	IDH Classification:			Clay
No. 4	98.0				
No. 10	95.7				
No. 40	91.6				
No. 100	84.0				
No. 200	79.9				

Remarks:	
Silt + Fine Sand (%) =	58.9



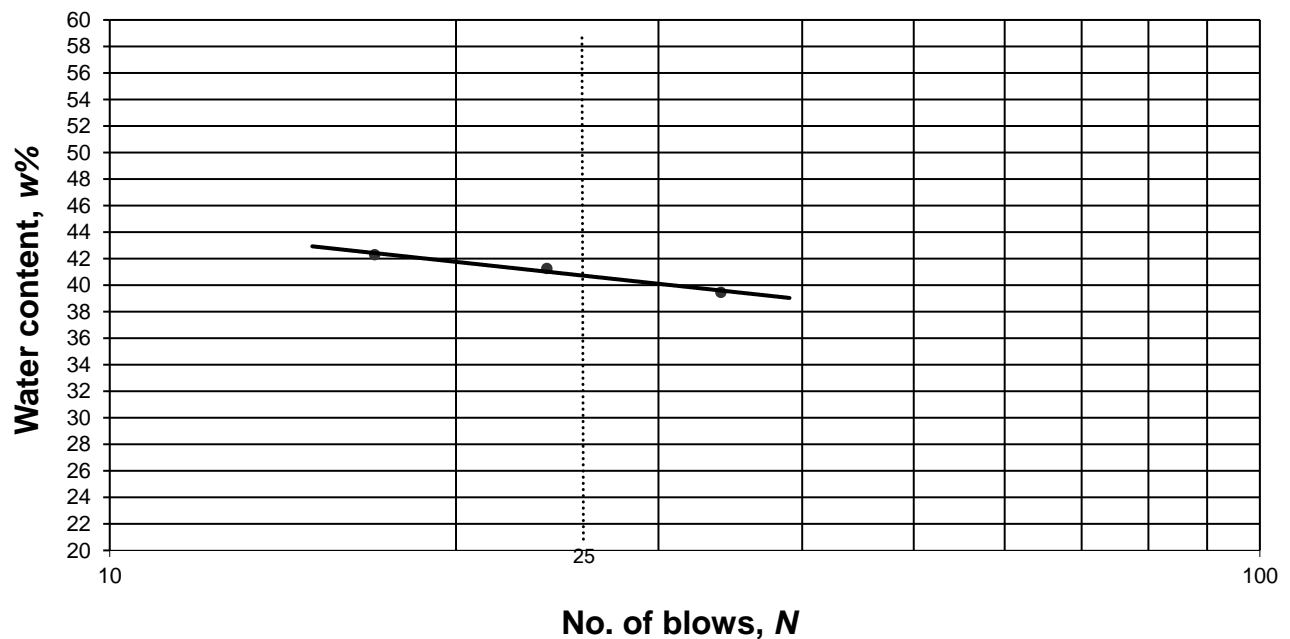
Atterberg Limits

AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 03-SS-01	Date Tested	2/13/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/10/2024
Sample Location	1-2.5
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	41	Plastic Limit, PL	21	Plasticity Index, PI	20

Remarks					



**Determination of Organic
Matter in Soils
by Wet Combustion
AASHTO T194-97**

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File #	9611	Date Tested	2/6/2024	Tested by:	DG	Checked by:	AB
Sample ID:	B 05-SS-01		Location	1-2.5'			
Date Recd.	1/8/2024		Description	Olive (5Y 5/4) clay			

Mass of the sample 0.852 g

Sample Titre 16.50 ml

Blank Titre 19.50 ml

Easily oxidised carbon, Percentage 0.57 %

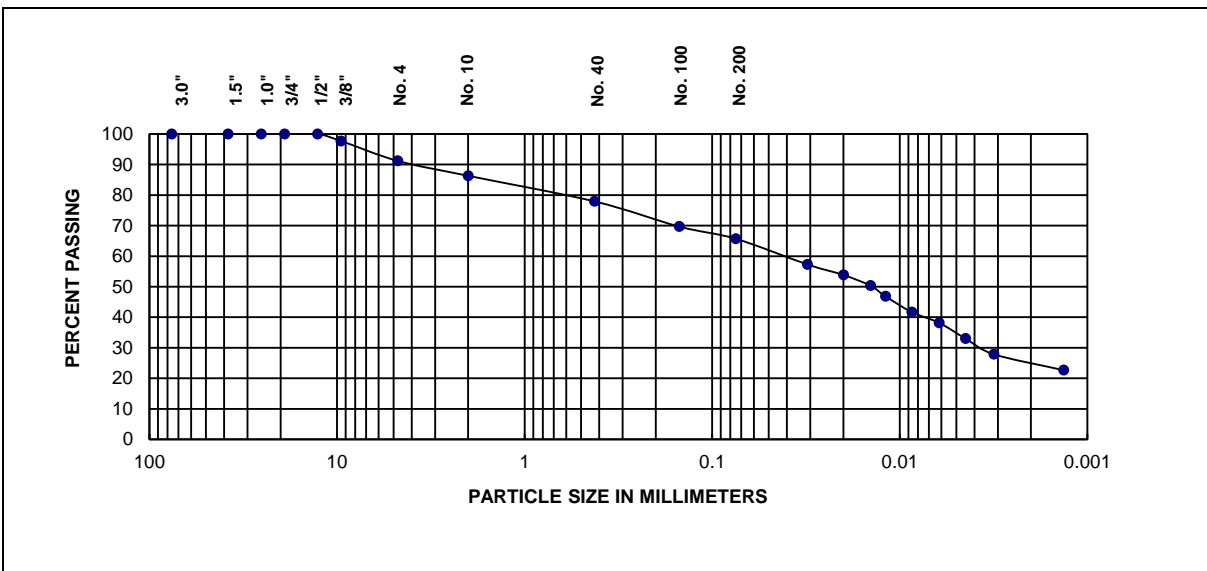
Organic Matter, Percent 1.27 %

Remarks:

	GRAIN SIZE ANALYSIS AASHTO T 88
---	--

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 07-SS-01	Date Tested	2/7/2024	Tested by	DG
						Qc by	AB

Date Sample Received:	1/10/2024
Sample Location	1-2.5
Sample Description	Very dark gray (10YR 3/1) clay loam, little gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	13.7	20.6	39.7	26.0

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	37	20	17
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification: A-6(10)		
1/2"	100.0			
3/8"	97.7	IDH Classification: Clay Loam		
No. 4	91.2			
No. 10	86.3			
No. 40	77.9			
No. 100	69.7			
No. 200	65.7			

Remarks:	
Silt + Fine Sand (%) =	51.9

www.interraservices.com	Test ID	73221
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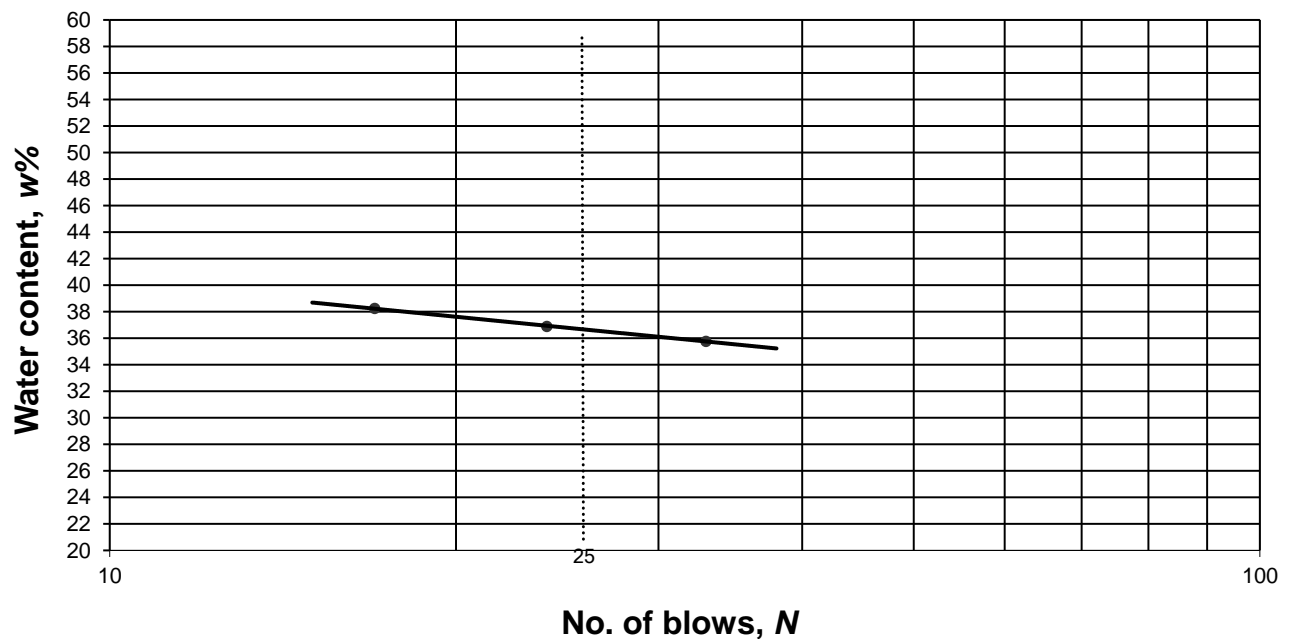


Atterberg Limits
AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	B 07-SS-01	Date Tested	2/7/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/10/2024
Sample Location	1-2.5
Sample Description	Very dark gray (10YR 3/1) clay loam, little gravel

LIQUID LIMIT DETERMINATION



Results					
Liquid Limit, LL	37	Plastic Limit, PL	20	Plasticity Index, PI	17

Remarks					



**Determination of Organic
Matter in Soils
by Wet Combustion
AASHTO T194-97**

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File #	9611	Date Tested	2/6/2024	Tested by:	DG	Checked by:	AB
Sample ID:	B 08-SS-01		Location	1-2.5'			
Date Recd.	1/8/2024		Description	Black (GLEY-1 2.5) clay			

Mass of the sample 0.845 g

Sample Titre 9.60 ml

Blank Titre 19.50 ml

Easily oxidised carbon, Percentage 1.89 %

Organic Matter, Percent 4.23 %

Remarks:



**Determination of Organic
Matter in Soils
by Wet Combustion
AASHTO T194-97**

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File #	9611	Date Tested	2/6/2024	Tested by:	DG	Checked by:	AB
Sample ID:	B 08-SS-02	Location	3.5-5'				
Date Recd.	1/8/2024	Description	Brown (10YR 4/3) clay				

Mass of the sample 0.874 g

Sample Titre 15.80 ml

Blank Titre 19.50 ml

Easily oxidised carbon, Percentage 0.68 %

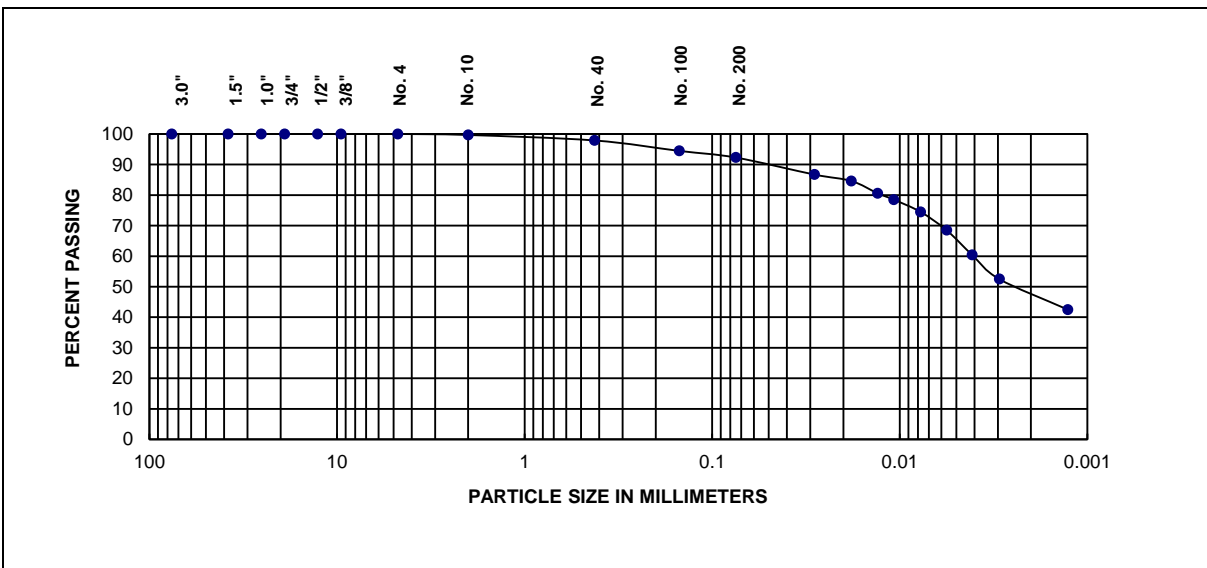
Organic Matter, Percent 1.53 %

Remarks:

	GRAIN SIZE ANALYSIS AASHTO T 88
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Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech					
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606					
File No.	9611	Sample #	TSB 01-SS-01	Date Tested	2/7/2024	Tested by DG
						Qc by AB

Date Sample Received:	1/10/2024
Sample Location	1-2.5
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	0.3	7.4	42.5	49.8

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	50	23	27
1.5"	100.0			
1.0"	100.0			
3/4"	100.0	AASHTO Classification:		
1/2"	100.0			
3/8"	100.0	IDH Classification:		
No. 4	100.0			
No. 10	99.7			
No. 40	97.9			
No. 100	94.5			
No. 200	92.3			

Remarks:	
Silt + Fine Sand (%) = 48.1	
Group index is greater than 20, soil is not suitable for subgrade	
www.interraservices.com	Test ID 73219

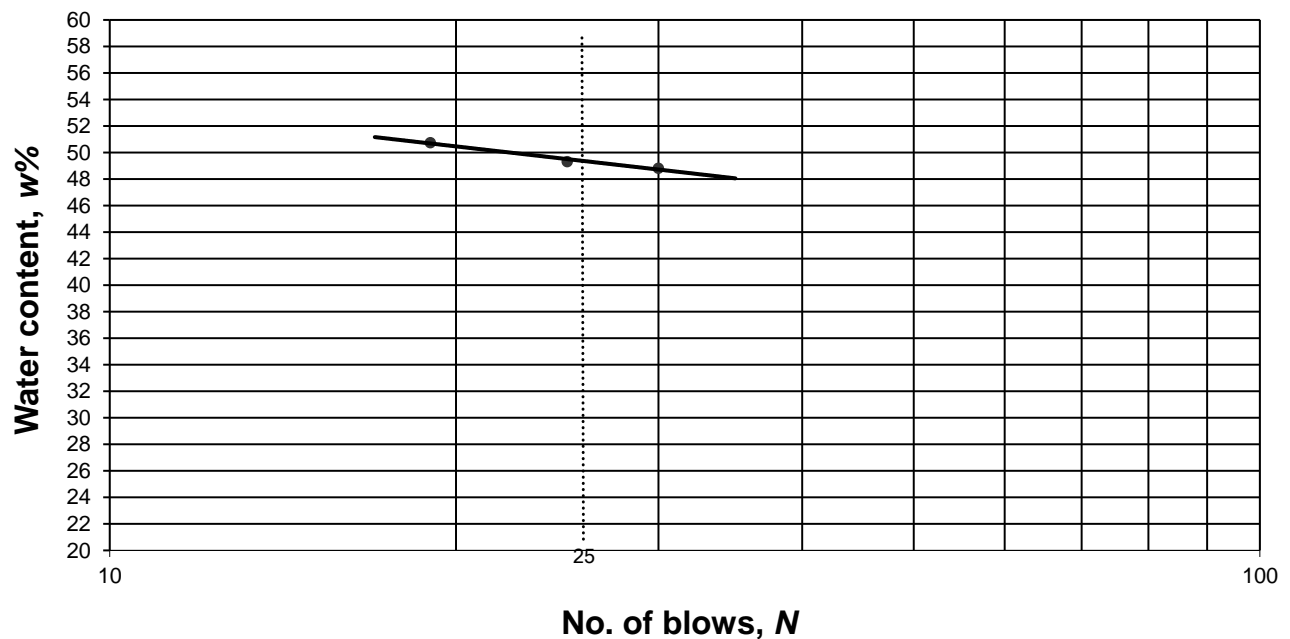


Atterberg Limits
AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	TSB 01-SS-01	Date Tested	2/7/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/10/2024
Sample Location	1-2.5
Sample Description	Light yellowish brown (10YR 6/4) clay, trace gravel

LIQUID LIMIT DETERMINATION



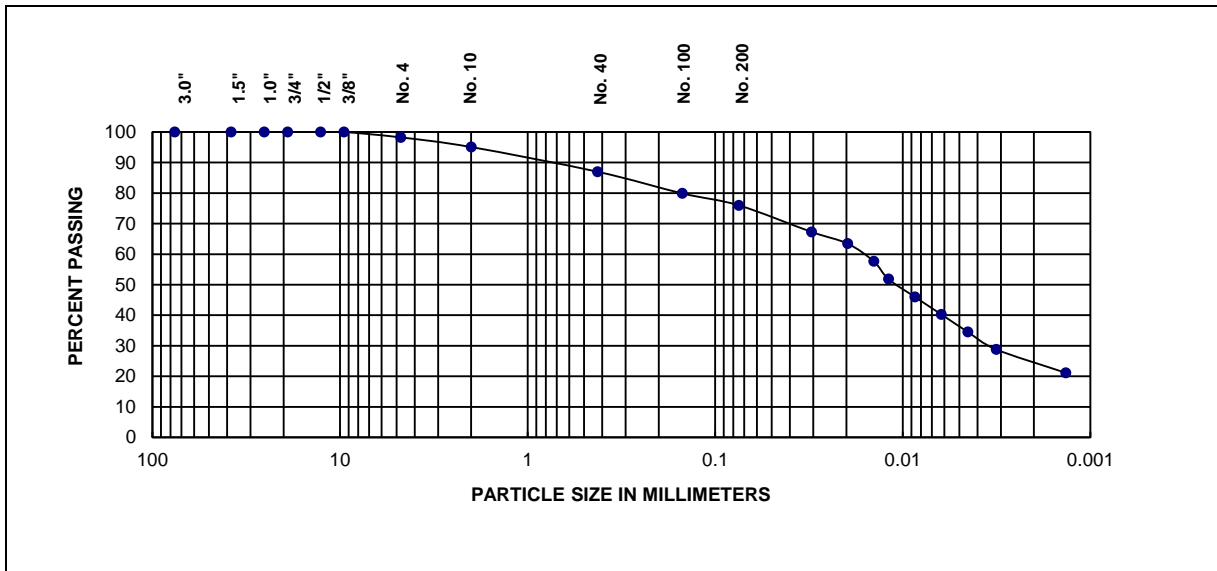
Results					
Liquid Limit, LL	50	Plastic Limit, PL	23	Plasticity Index, PI	27

Remarks					



**GRAIN SIZE ANALYSIS
AASHTO T 88**

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	TSB 02-SS-06	Date Tested	2/13/2024	Tested by	DG
						Qc by	AB
Date Sample Received:	1/10/2024						
Sample Location	13.5-15						
Sample Description	Gray (10YR 5/1) silty clay loam, trace gravel						



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	4.9	19.1	50.3	25.7

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	28	17	11	
1.5"	100.0				
1.0"	100.0				
3/4"	100.0	AASHTO Classification:			A-6(7)
1/2"	100.0				
3/8"	100.0	IDH Classification:			Silty Clay Loam
No. 4	98.2				
No. 10	95.1				
No. 40	87.0				
No. 100	79.9				
No. 200	76.0				

Remarks:	
Silt + Fine Sand (%) =	61.3

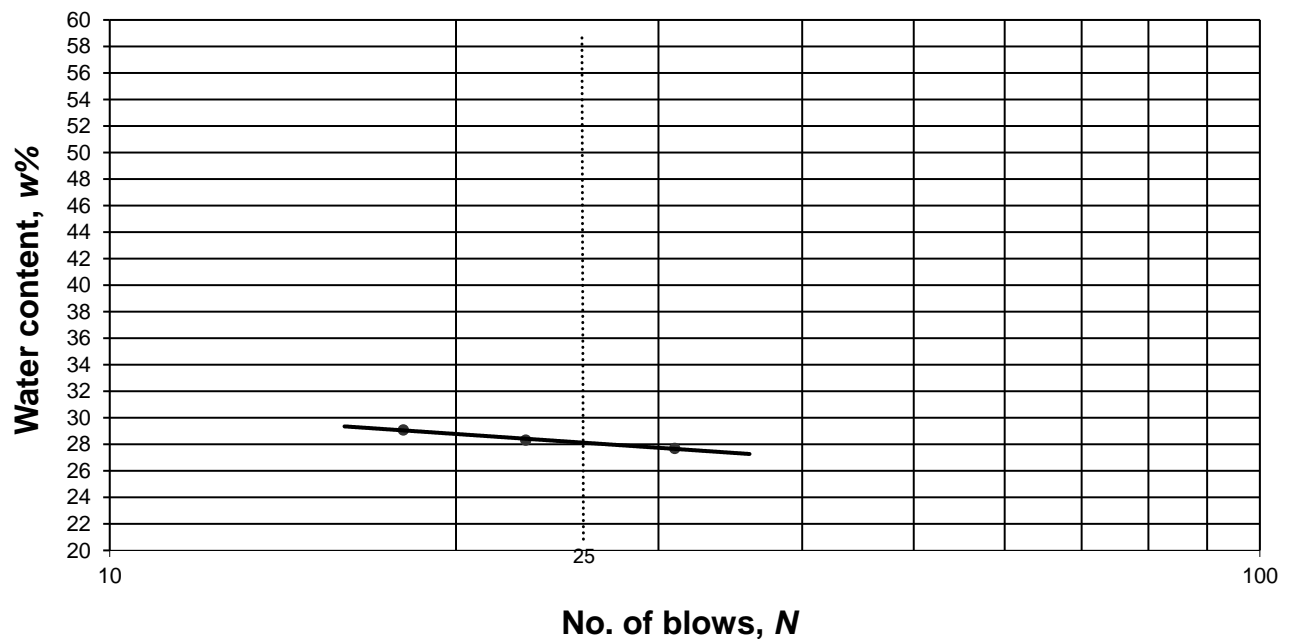


Atterberg Limits
AAASHTO T 89,90

Project	Joliet Road at Brainard PTB 208-005 WO 08 Geotech						
Client	Michael Baker International, 200 West Adams St., Suite 180, Chicago, IL 60606						
File No.	9611	Sample #	TSB 02-SS-06	Date Tested	2/13/2024	Tested By	DG
						Qc By	AB

Date Sample Recd.	1/10/2024
Sample Location	13.5-15
Sample Description	Gray (10YR 5/1) silty clay loam, trace gravel

LIQUID LIMIT DETERMINATION



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

Remarks					

Appendix D

Pavement Core Logs

File No.:	9611	Project Name:	Joliet Rd PTB 208-005 WO 08				
Client:	Michael Baker						
Core No.	PC-01	Date Cored:	1/8/24	Cored By:	Geocon	Measured By:	DG
Core Location:	eastbound Joliet Rd.						
Core Diameter (in):	3.7	Core Height (in):	17.25	Notes:			



Asphalt Surface - 1.75"

Asphalt Leveling Binder - 1"

Asphalt Binder - 1.25"

Asphalt Surface - 1.75"

Asphalt Binder - 2.5"

Concrete - 9"

Subgrade:
gray clay loam

File No.:	9611	Project Name:	Joliet Rd PTB 208-005 WO 08				
Client:	Michael Baker						
Core No.	PC-02	Date Cored:	1/8/24	Cored By:	Geocon	Measured By:	DG
Core Location:	westbound Joliet Rd.						
Core Diameter (in):	3.7	Core Height (in):	15.25	Notes:			



Asphalt Surface - 1.75"

Asphalt Leveling Binder - 1.25"

Asphalt Binder - 12.25"

Subgrade:
crushed aggregate

All measurements are average.

File No.:	9611	Project Name:	Joliet Rd PTB 208-005 WO 08				
Client:	Michael Baker						
Core No.	PC-03	Date Cored:	1/8/24	Cored By:	Geocon	Measured By:	DG
Core Location:	northbound Brainard Ave.						
Core Diameter (in):	3.7	Core Height (in):	7.75	Notes:			



Asphalt Surface - 1.25"

Asphalt Surface - 2"

Asphalt Surface - 2"

Asphalt Binder - 2.5"

Subgrade:
crushed aggregate

Separation/Debonding

All measurements are average.

File No.:	9611	Project Name:	Joliet Rd PTB 208-005 WO 08				
Client:	Michael Baker						
Core No.	PC-04	Date Cored:	1/8/24	Cored By:	Geocon	Measured By:	DG
Core Location:	southbound Brainard Ave.						
Core Diameter (in):	3.7	Core Height (in):	13.25	Notes:			

Separation/Debonding



Asphalt Surface - 1.25"

Asphalt Binder - 1.75"

Concrete - 10.25"

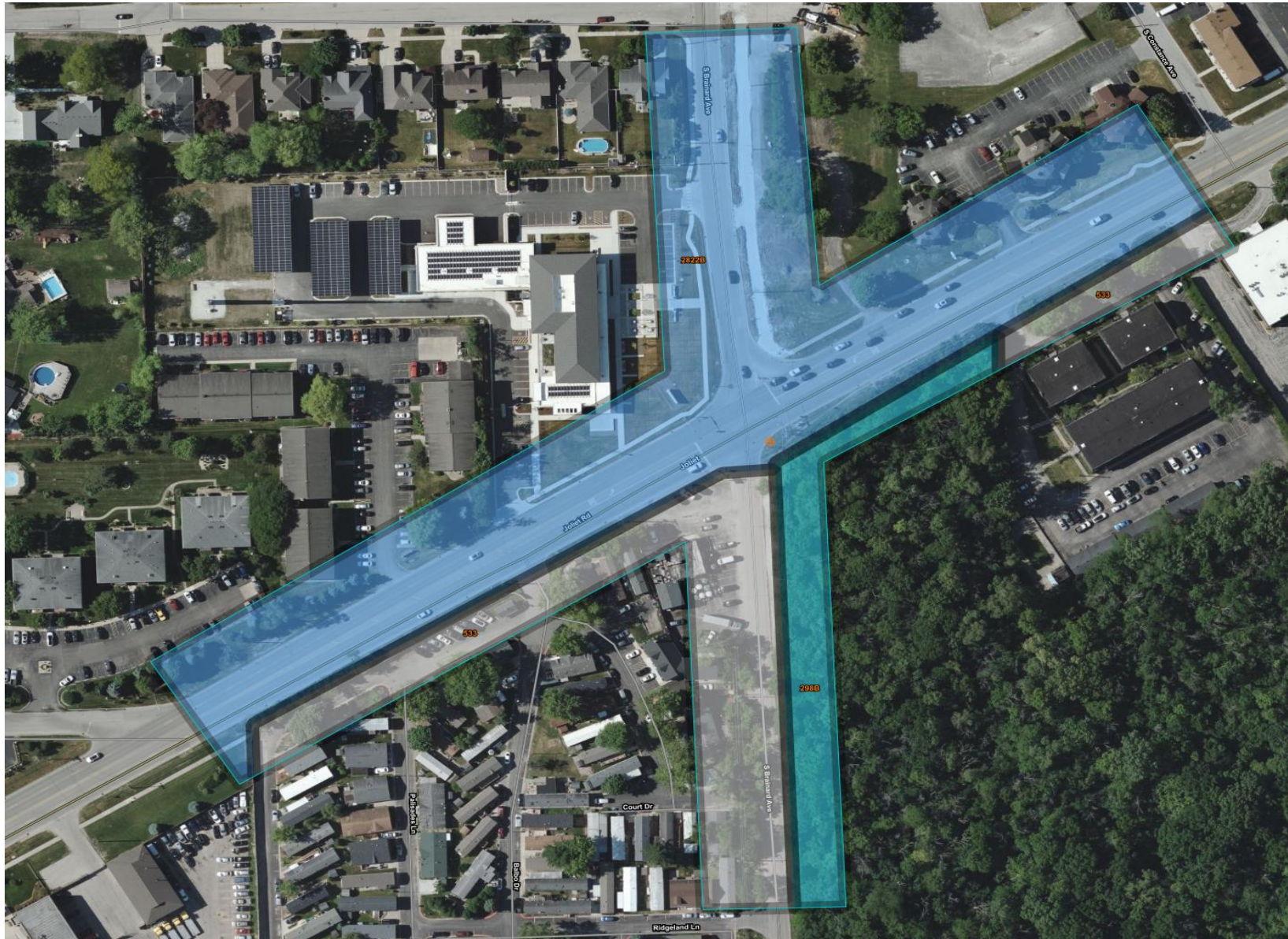
Subgrade:
crushed aggregate

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
298B	Beecher silt loam, 2 to 4 percent slopes	0.37	Moderate
533	Urban land		Not rated
2822B	Anthropotic Udorthents-Urban land-Elliott complex, 2 to	0.43	Moderate