STRUCTURE GEOTECHNICAL REPORT

Interstate 80 Bridge over Hickory Creek

Section 2013-008B & 2013-009B, Station 721+49.17

IDOT Job Number D-91-196-09 (PTB 152, Item 004)

SN 099-0062 (EB) & SN 099-0063 (WB)

Joliet, Will County, Illinois

Submitted to:

HBP Illinois Partners, JV
c/o HNTB
One South Wacker Drive
Suite 900
Chicago, Illinois 60606

Prepared by:

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GSI Job No. 13125

Revised: October 24, 2014
September 30, 2014
June 4, 2014

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm

Revised: October 24, 2014
September 30, 2014
June 4, 2014

HBP Illinois Partners, JV
c/o HNTB
One South Wacker Drive, Suite 900
Chicago, Illinois 60606

Attn: Ms. Amy Foster, P.E.
HNTB Corporation

Job No. 13125

Re: Structure Geotechnical Report
Interstate 80 Bridge over Hickory Creek
Section 2013-008B & 2013-009B, Station 721+49.17
SN 099-0062 (EB) and 099-0063 (WB)
Joliet, Will County, Illinois
IDOT Job Number: D-91-196-09 (PTB 152, Item 004)

Dear Ms. Foster:

The following report presents the geotechnical analysis and recommendations for the reconstruction and widening of the existing bridge structures carrying Interstate 80 Bridge over Hickory Creek. A total of eight (8) structural soil borings (BSB-17 through BSB-24) were completed. Copies of these boring logs, along with boring location plan and profile are included in this report.

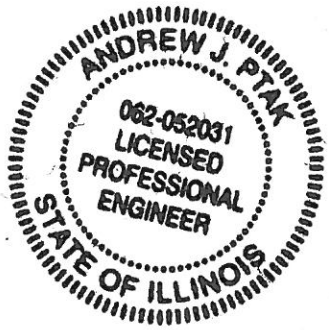
If there are any questions regarding the information submitted herein, please do not hesitate to contact us.

Very truly yours,

GEO SERVICES, Inc.

Richard Realeza
Staff Engineer

Andrew J. Ptak, P.E.
Office Manager



enc.

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SECTION 01: INTRODUCTION

This report presents the results of the geotechnical investigation for the bridge widening of the Interstate 80 Bridge over Hickory Creek, IDOT Job Number: D-91-196-09 (PTB 152, Item 004). The results of the eight (8) structure borings (BSB-17 through BSB-24) completed by Geo Services, along with plan and profile drawings, are included with this report.

Boring locations were selected by Geo Services, Inc. and were reviewed and approved by HBP Illinois Partners, JV (HBP), and the Illinois Department of Transportation (IDOT). Boring locations were located in the field by Geo Services, Inc. (GSI) personnel after review of accessibility and utility locations. Estimated elevations of the as-drilled borings were taken from the topographic and cross-section drawings provided by HBP. The as-drilled locations for the borings are shown on the Boring Location Diagram found in Appendix C section of the report.

This report includes a description of subsurface conditions, location diagram, profiles and boring logs, as well as recommendations pertaining to the design and construction of the new bridge foundations, earth embankment, and general construction considerations for the site.

SECTION 02: PROJECT DESCRIPTION

The existing bridges (SN 099-0062 EB and SN 099-0063 WB) were built in 1964 for F.A.I. Route 80, and were repaired in 1990, 1998, 2001, and 2011. The existing dual structures consist of three single-span reinforced concrete deck on W36 rolled steel beams supported by pile bent abutments and multi-column concrete piers founded on spread footings bearing on bedrock. Out to out deck width of the existing bridges is approximately 48’-0” to 54’-5-1/2” at the EB structure, and 51’-1” to 54’-11-1/4” at the WB structure.

It is intended to remove and replace the entire bridge superstructure. The existing bridges are proposed to be widened at each side of the median lanes/shoulder, which varies from 14’-0” to 24’-0” feet wide. Service loads for the foundation structures have been provided by HBP, and are tabulated in Table 4 of the report. The approximate bottom of bearing elevations is shown in Table 5 of the report.

SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES

The borings were performed during the month of March, 2014 with a truck-mounted drilling rig. Borings performed near the abutments (BSB-17, BSB-18, BSB-23 and BSB-24) were advanced by means of hollow stem augers and continued with rotary drilling techniques. The remainder of the borings (BSB-19 thru BSB-22) were performed from the top of the bridge deck down to ground surface along Interstate 80 (over Hickory Creek) using hollow stem augers and continued with rotary drilling techniques. Representative soil samples were obtained employing split spoon sampling procedures in accordance with AASHTO Method T-206. Bedrock cores were obtained in the bridge structure borings using an NX-size double tube core barrel with a diamond impregnated bit. Samples obtained in the field were returned to our laboratory for further examination and testing.

Split spoon sampling involves driving a 2.0-inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. Blow counts are recorded at 6" intervals and the blow counts are shown on the boring logs. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). The N value is an indication of the relative density of the soil.

SECTION 04: LAB TESTING PROGRAM

The test procedures were performed in accordance with test procedures discussed in the IDOT Geotechnical Manual. All split-spoon samples obtained from the drilling operation were visually classified in the field. Cohesive samples were tested for unconfined compressive strength using an IDOT modified RIMAC test device and/or calibrated penetrometer in the field.

The soil testing program included performing water content, density and either unconfined compression and/or calibrated penetrometer tests on the cohesive samples recovered. Water content tests were performed on the non-cohesive samples recovered. These tests were performed upon representative portions of the samples obtained in the field. In addition, unconfined compressive testing was performed on rock cores obtained from the field and are indicated on the rock core logs.

The results of the above testing, along with a visual classification of the material based upon both the Illinois textural classification and the AASHTO Soil Classification System, are indicated on the boring logs.

SECTION 05: SUBSURFACE CONDITIONS

Boring logs can be found in Appendix C. The stratification lines shown on the boring logs represent the approximate boundary between soil types, and the actual transition may be gradual.

For the borings performed at the existing abutments (taken along the roadway or shoulder areas of Interstate 80), surface conditions consisted of existing asphalt and/or concrete pavement to crushed stone to underlying clay to clay loam fill materials to approximate elevation of 525 feet. Beneath the pavement and fill soils, strata of medium dense to dense loam and sand soils were encountered prior to reaching the top of bedrock elevation at approximately 517 feet.

For the borings performed at the top of bridge deck down to ground surface along Interstate 80 (over Hickory Creek), surface conditions at the creek ground level encountered shallow bedrock, which varied from elevations 512 to 514 feet.

The fill soils had moisture contents within the range of 7% to 28% with an average of 19%. The granular soils had moisture contents within the range of 14% to 31% with an average of 22%.

The bedrock cores obtained indicated Silurian System, Niagaran Dolomite. A summary of the bedrock information obtained during our exploration is tabulated in Table 1.

Table 1 – Bedrock Information Summary

Boring	Station	Offset	Top of Bedrock Elevation (feet)	RQD	Compressive Strength (tsf)
BSB-17	Sta. 720+12	22.3’ Left	518.2	47.0%	1,299
BSB-18	Sta. 719+78	53.3’ Right	519.2	14.0%	1,002
BSB-19	Sta. 721+58	63.1’ Left	513.1	43.0%	1,025
BSB-20	Sta. 721+29	18.0’ Right	513.1	34.0%	695
BSB-21	Sta. 721+88	23.0’ Left	514.4	48.0%	1,233
BSB-22	Sta. 721+52	55.4’ Right	512.0	7.5%	1,212
BSB-23	Sta. 723+11	61.5’ Left	517.9	12.0%	831
BSB-24	Sta. 722+87	21.4’ Right	519.9	19.0%	868

SECTION 06: WATER TABLE CONDITIONS

Groundwater was only encountered at borings BSB-23 and BSB-24 at approximate elevation 554.5, and these readings are shown on the boring logs. Due to the nature of rotary-wash drilling, it was not possible to obtain accurate water levels below 10 feet of depth or after drilling. Existing water surface elevation of the creek was given by HBP, which was estimated to be at elevation 517 feet. Perched water levels may occur within granular layers above the rock or the upper zone of weathered and fractured rock. We estimate the long-term water table to be around the elevation of the streambed level or higher. Fluctuations in the amount of water accumulated and in the hydrostatic water table can be anticipated depending upon variations in precipitation, and surface runoff of the Hickory Creek.

SECTION 07: ANALYSIS

Mining Activity

According to readily available ISGS sources, there are no documented coal mining operations in near vicinity to the project site and seismic activity is noted to be very low.

Site Seismic Parameters

For LFRD design, according to the AASHTO LRFD Bridge Design Specification 2012 (with 2013 Interims), the project site has a horizontal Response Spectral Acceleration of 0.040 at a period of 1.0 second and 5% critical dampening (S_1). The site also has a horizontal Response Spectral Acceleration of 0.104 at a period of 0.2 seconds and 5% critical dampening (S_s). The following table shows recommended seismic design data in accordance to the AASHTO LRFD Bridge Design Specification 2012 (with 2013 Interims).

Table 2 – Seismic Design (Approximately 1000-Year Return Period)

Seismic Performance Zone (SPZ)	1
Spectral Acceleration at 1 second (S_{D1})	0.068
Design Spectral Acceleration at 0.2 seconds (S_{Ds})	0.125
Soil Site Class	C

The project site is considered to be in a low seismic area and is considered a non-extreme event. Liquefiable layers, scour and downdrag are not expected to impact the design of the new bridge.

Settlement

Based on the TS&L and old bridge plans (1961), the proposed bridge profile is to be similar to existing, and little or no fill is expected to be placed. No new settlement is expected to occur, and settlement and downdrag are not considered to affect the design of the new bridge.

Slope Stability

The abutments will be supported with the use of piles or drilled caissons. The proposed bridge core will match the existing 2H:1V slopes. Pier spread footings will be founded shallow bedrock. No slope stability issues are associated with the bridge structures founded on rock.

Scour

The design scour elevations have been determined for each substructure based on the calculated scour, Waterway Information Table (WIT), and bridge profile drawings provided by HBP, and provisions from IDOT Bridge Manual 2012. Due to presence of shallow bedrock encountered below in the streambed elevation, 100% reductions are made from the scour depths. At the abutments, where the footing cap elevations are higher than the natural HWE (at 100 and 500-year events), the footing cap are not affected by scour. The following table has been formulated to represent the design scour elevations computed in each area:

Table 3- Scour Design Table [1]

Design Scour Elevation (feet)	West Abutment	Pier 1	Pier 2	East Abutment
Q100	WB 554.62 EB 555.51	514.40	514.40	WB 546.78 EB 547.81
Q500	WB 554.62 EB 555.51	514.40	514.40	WB 546.78 EB 547.81

Notes: Design HWE is approximately 526.3 feet. Estimated WSE is approximately 517.2 feet.
1. The Design Scour Elevations for 100 and 500-year events are based from the streambed elevation minus the reduced scour depth per procedures stated in the Section 2, page 2-93 of the IDOT Bridge Manual 2012.

SECTION 08: RECOMMENDATIONS

Foundation Recommendations

Based on the results of the borings, type of structure, and estimated loading, feasible foundations for support include shallow spread footings for the piers, and a deep foundation system consisting of end-bearing driven Shell or H-piles or drilled caissons at both abutments section of the bridges. It should be noted that Metal Shell piles should not be driven to the IDOT maximum Nominal Required Bearing (NRB) or refusal to prevent damage to the piles, and driving needs to be limited to lower levels before it gets close to bedrock. A pile length limit of 10 feet above bedrock elevation is recommended for Metal Shell piles.

We recommend that an economic analysis for each foundation option presented below be considered before choosing a foundation system for the design. Based on the foundation loads for abutments provided by HBP, the total factored reactions at the top of foundation are shown on the following Table 4 below:

Table 4 –Factored Loads for the Substructures

Location	Maximum Service Loads [1]
West and East Abutments	100 kips/pile
Piers 1 and 2	5 ksf

Note: 1. Service Loads provided by HBP are based on Illinois Modified Group (1.15D+2.17L+I) per IDOT policy for evaluating piers for reuse.

Per HBP, the estimated substructure pile cap and footing elevations are assumed to be based on near the existing foundation elevations or a minimum of 3.5 feet below existing ground. For the proposed piers, we recommend the designer to note the following statement in the Final Plans per IDOT's direction:

The proposed footing elevations for all Piers should be located at the adjoining existing footing elevation or six inches below top of rock whichever is the lowest.

The estimated substructure elevations shown in Table 5 are recommended for design of the foundation substructure cap/footing elevations.

Table 5 – Estimated Substructure Elevations

Substructure	Estimated Bottom of Substructure Elevation
West Abutment (WB)	554.62 [1]
West Abutment (EB)	555.51 [1]
Pier 1 WB	512.60 [2]
Pier 1 EB	512.60 [2]
Pier 2 WB	513.90 [2]
Pier 2 EB	511.50 [2]
East Abutment (WB)	546.78 [1]
East Abutment (EB)	547.81 [1]

Notes: 1. Piles assumed to be embedded 1.0-ft into the pile cap.
2. Estimated bottom of substructure elevations at the piers are based from the top of the bedrock elevation recorded in the borings per substructure minus six inches below the top of bedrock.

Straight-Shaft Rock-Socketed Caissons Recommendations at the Abutments

The foundations at the abutment portions of the proposed bridges may be constructed using a foundation system of drilled straight-shaft rock-socketed caissons. A factored end-bearing resistance of 30 ksf is recommended for design for rock-socketed caissons, socketed 3 feet into sound bedrock. From the AASHTO LRFD Bridge Design Specifications Manual Table 10.4.6.4-1, the bedrock is considered poor to fair quality. The Carter and Kulhawy equation was used to compute the bearing and a resistance factor of Φb=0.50 was used. To the extent rock-socketing is provided, an allowable friction value (in addition to the end bearing) of 3.0 tsf/ft for side resistance can be used for rock-socketed caissons over the depth of the rock-socket to resist vertical and uplift loads. A minimum diameter of 24 inches for the rock-socket size is recommended.

For the unit skin friction at the upper strata of the borings, the medium dense to dense sand and gravel and clay to clay loam will have estimated factored resistances of 500 psf per foot (or can be ignored). Note that the factored skin friction values will need to be reduced since temporary casing or drilling will be used for caisson installation.

An experienced, geotechnical engineer should be present during excavation to check that suitable sound rock has been reached. The temporary casing should be extended beneath the granular strata to top of bedrock elevation at approximate elevation 517.

Based on the estimated bearing pressures and the magnitude of the loads expected, we estimate a maximum settlement of 0.40 inches or less for rock-socketed caisson foundations supported on bedrock as described above. Differential settlements would be dependent on the adjacent loads but is typically 1/2 to 2/3 of the total settlement. It

should be noted that these settlement values are for compression of the bearing materials only and that elastic compression of the caisson concrete should be added to these values.

Pile Recommendations at the Abutments

Based on the results of the borings and proposed foundation loadings, driven, end-bearing (to refusal) Shell or H-piles may be used for the support of the proposed abutments.

The selection of pile type should be determined by economic considerations if either pile types are feasible for the design of the bridge. Pile data for Shell and H-piles is included in Appendix E. Pile capacities and lengths were calculated to the piles' Maximum Nominal Required Bearing and Factored Resistance Available, based on a LRFD resistance factor of 0.55.

For the new driven piles at the abutment areas, it is estimated settlement of ¼ inch or less excluding the elastic shortening of the pile due to loading.

Tables and graphs for estimated pile lengths for various pile sizes and pile capacities at each substructure unit are summarized in the Appendix E.

Pile Foundations Considerations

As per the IDOT Design Guide AGMU Memo 10.2, dated August 2011, the Washington State DOT (WSDOT) formula has replaced the FHWA Gates Formula as the standard method of construction verification. A modified IDOT static method was used to develop the SGR pile design tables. Nominal required bearing was calculated from LRFD skin-friction (with pile type correction factors) and end-bearing calculations. A value of 1.04 is used for Bias Factor Ratio (I_G). A geotechnical resistance factor (Φ_G) of 0.55 was used in calculations for the factored resistance available (FRA). Pile lengths were picked with respect to the loadings and geometry of the proposed structures.

When Steel H-piles are used, the Steel H-piles shall be according to AASHTO M270 Grade 50.

The pile tables, provided in Appendix E, are estimates and test piles should be used for final pile length selections. We recommend that a minimum of one test pile be performed at each substructure unit. The piles should be driven until satisfactory driving resistance is developed in accordance with an appropriate pile driving formula. The test piles shall be driven to 110 percent of the Nominal Required Bearing indicated in the pile data information. The pile size and capacity selected should be based on economic considerations and the loads imposed on the structures.

Shallow Spread Footing Recommendations at the Piers

It is intended that the existing piers will be reused, and new pier extensions are proposed to match the existing pier footing elevations at the widening areas. Based on the information obtained from the borings and estimated loadings anticipated for the proposed structures, the widened bridge areas may be supported on shallow spread footing foundations bearing on bedrock at the elevations recommended in Table 5, and can be designed for a factored bearing resistance of 27 ksf. A resistance factor of 0.45 was used to calculate the factored bearing resistance at strength limit according to AASHTO LRFD Bridge Design Specifications (Article 10.5.5.2.2).

Note that the bedrock typically had numerous vertical and horizontal fractures and the transition from the fractured and/or weathered rock to the sound bedrock may not be pronounced. It is strongly recommended that an experienced geotechnical engineer be onsite during the foundation excavation to make the final determination on fractured and/or sound bedrock elevations during construction.

If materials with less than adequate bearing strength are noted at the foundation level during footing construction, the weaker material encountered at the base of the footings should be undercut to reach suitable rock, and the undercut area filled with regular concrete.

Considering the piers are located in the creek and after review of the boring and core logs, there is potential for water infiltration though the bedrock at isolated locations. The contractor will likely need to design and install a cofferdam system for stage construction at the pier sections of the bridge. See cofferdam recommendations in the Section 09 (General Construction Considerations) of this report.

Wingwalls Recommendations

The abutments will have associated wingwalls. The foundation recommendations presented for the abutments earlier in this report are valid for the wingwalls as well.

At the abutments, it is recommended that a lateral active earth pressure of 40 psf per foot of depth be used above the water table assuming a free-draining granular backfill is utilized. For non-yielding walls with granular backfill, a lateral at-rest pressure of 50 psf per foot should be used, assuming proper drainage. Allowances should be made for any surcharge loads adjacent to the retaining structure. Drainage should be provided behind any wingwalls.

Approach Slab Recommendations

The new approach slab will be supported on either new or existing embankment fill. We recommend using an assumed CBR of 2.0 for the compacted fill for the embankment. Shallow footings for the "sleeper" below the slab should be designed for a maximum factored bearing resistance of 3,000 psf situated on new embankment fill. The new fill should be compacted per IDOT specifications for earth embankment. Any organics or soft, yielding subgrade (if any) should be removed prior to new fill placement. A qualified geotechnical engineer should observe the subgrade prior to any base course is placed. Settlement of the approach slab is calculated on the order of less than 0.4 inches.

SECTION 09: GENERAL CONSTRUCTION CONSIDERATIONS

Traffic will be maintained utilizing staged construction. At the bridge abutments, IDOT Temporary Sheet Piling Design Charts may be used for stage construction. However, at the pier sections, the contractor will likely need to design and install a temporary cofferdam system with dewatering wells to keep the site in the dry.

Per temporary cofferdams criteria stated in the Section 2.3.6.4.2 of the IDOT Bridge Manual (2012) and GBSP No. 73 (Article 502.06b), a Type 1 cofferdam system will be required for construction since the location is less than 6 feet of water surface elevation above the bottom of footing excavation. However, if the water surface elevation above from the bottom of footing excavation is greater than 6 feet as determined at the time of construction or if water inflow cannot be controlled without a seat coat, then the use of Type 2 cofferdam with seal coat may be necessary. A minimum factor of safety of buoyancy of 1.2 is required by IDOT for seal coat construction. In addition, pump and pit procedures will also be needed to keep the site "in the dry" during construction at the piers.

All soils which become softened or loosened at the base of foundation excavation areas or subgrade areas should be carefully recompacted or removed prior to placement of foundation concrete or fill material. No foundation concrete or structural fill should be placed in areas of ponded water or frozen soil.

During excavation for the proposed improvements, movement of adjacent soils into the excavation should be prevented. All excavations should be performed in accordance with the latest Occupational Safety and Health Administration (OSHA) requirements. Allowances should be made for any surcharge loads adjacent to the retaining structures.

SECTION 10: GENERAL QUALIFICATIONS

The analysis and recommendations presented in this report are based upon the data obtained from the soil borings performed at the indicated locations and from any other information discussed in this report. This report does not reflect any variations that may occur between borings or across the site. In addition, the soil samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of the report. In addition, it is recommended that Geo Services, Inc. be retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are intended or made. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing by the geotechnical engineer. Also note that Geo Services, Inc. is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of the report's subsurface data or engineering analyses without the express written authorization of Geo Services, Inc.

APPENDIX A

GENERAL NOTES

GENERAL NOTES

CLASSIFICATION

American Association of State Highway & Transportation Officials (AASHTO) System used for soil classification.

Cohesionless Soils

Relative Density	No. of Blows per foot N
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	Over 50

TERMINOLOGY

Streaks are considered to be paper thick. **Lenses** are considered to be less than 2 inches thick. **Layers** are considered to be less than 6 inches thick. **Stratum** are considered to be greater than 6 inches thick.

Cohesive Soils

Consistency	Unconfined Compressive Strength - qu (tsf)
Very Soft	Less than 0.25
Soft	0.25 - 0.5
Medium Stiff	0.5 - 1.0
Stiff	1.0 - 2.0
Very Stiff	2.0 - 4.0
Hard	Over 4.0

DRILLING AND SAMPLING SYMBOLS

SS:	Split Spoon 1-3/8" I.D., 2" O.D.	HS:	Housel Sampler
ST:	Shelby Tube 2" O.D., except where noted	WS:	Wash Sample
AS:	Auger Sample	FT:	Fish Tail
DB:	Diamond Bit - NX: BX: AX	RB:	Rock Bit
CB:	Carboloy Bit - NX: BX: AX	WO:	Wash Out
OS:	Osterberg Sampler		

Standard "N" Penetration: Blows per foot of a 140 lb. hammer falling 30" on a 2" O.D. Split Spoon

WATER LEVEL MEASUREMENT SYMBOLS

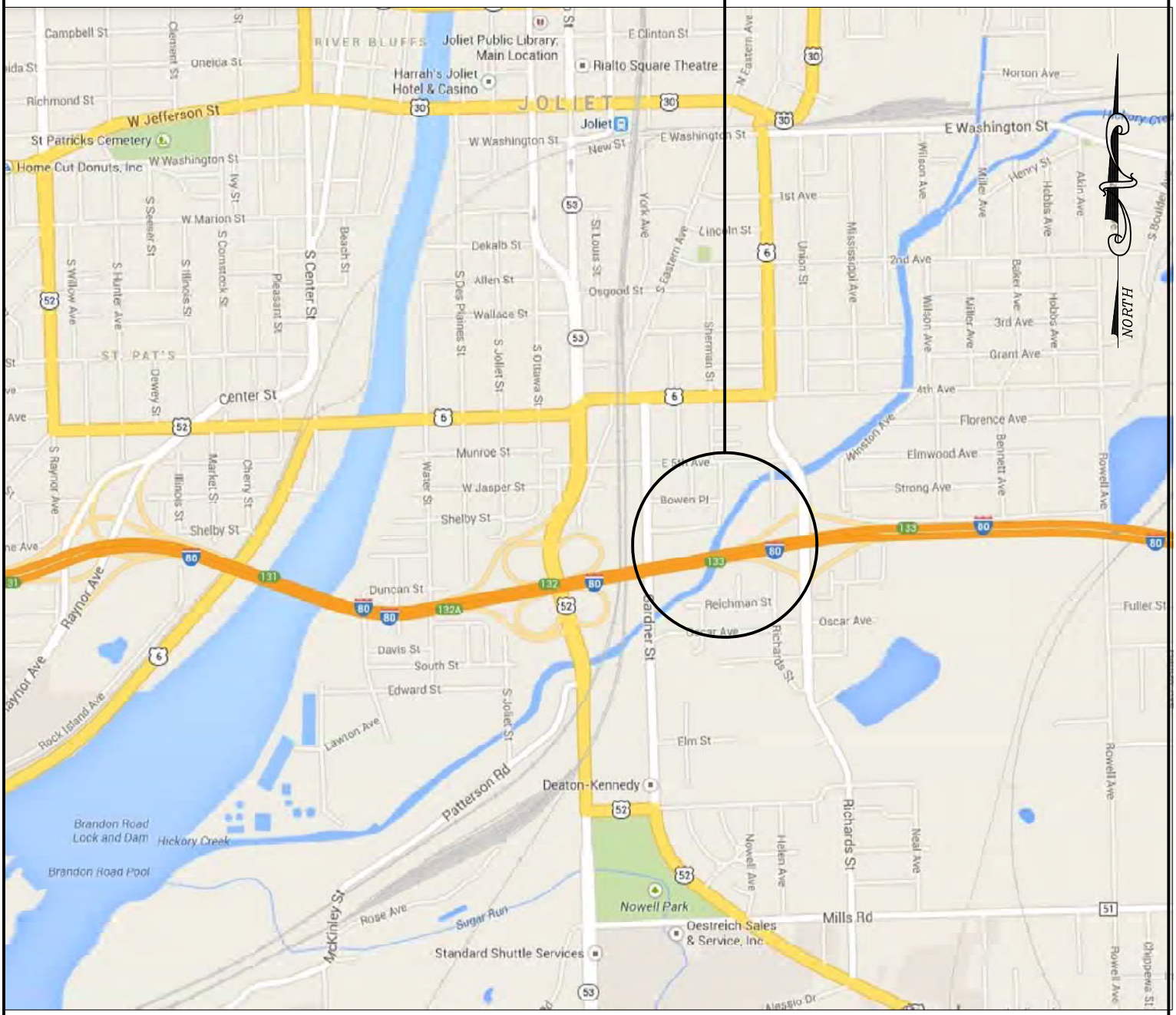
WL:	Water	WD:	While Drilling
WCI:	Wet Cave In	BCR:	Before Casing Removal
DCI:	Dry Cave In	ACR:	After Casing Removal
WS:	While sampling	AB:	After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

APPENDIX B

SITE LOCATION MAP

PROJECT SITE LOCATION



SITE LOCATION MAP			
Structural Geotechnical Report Interstate 80 Bridge over Hickory Creek Section 2013-008B & 2013-009B. Sta. 721+49.17 Existing SN 099-0062 (EB) & 099-0063 (WB) IDOT Job No. D-91-196-09 Joliet, Will County, Illinois	**Geo Services, Inc.** Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	DRAWN BY	RR
		APPROVED BY	AJP
		DATE	May 30, 2014
		GSI JOB No.	13125
		SCALE	NTS

APPENDIX C

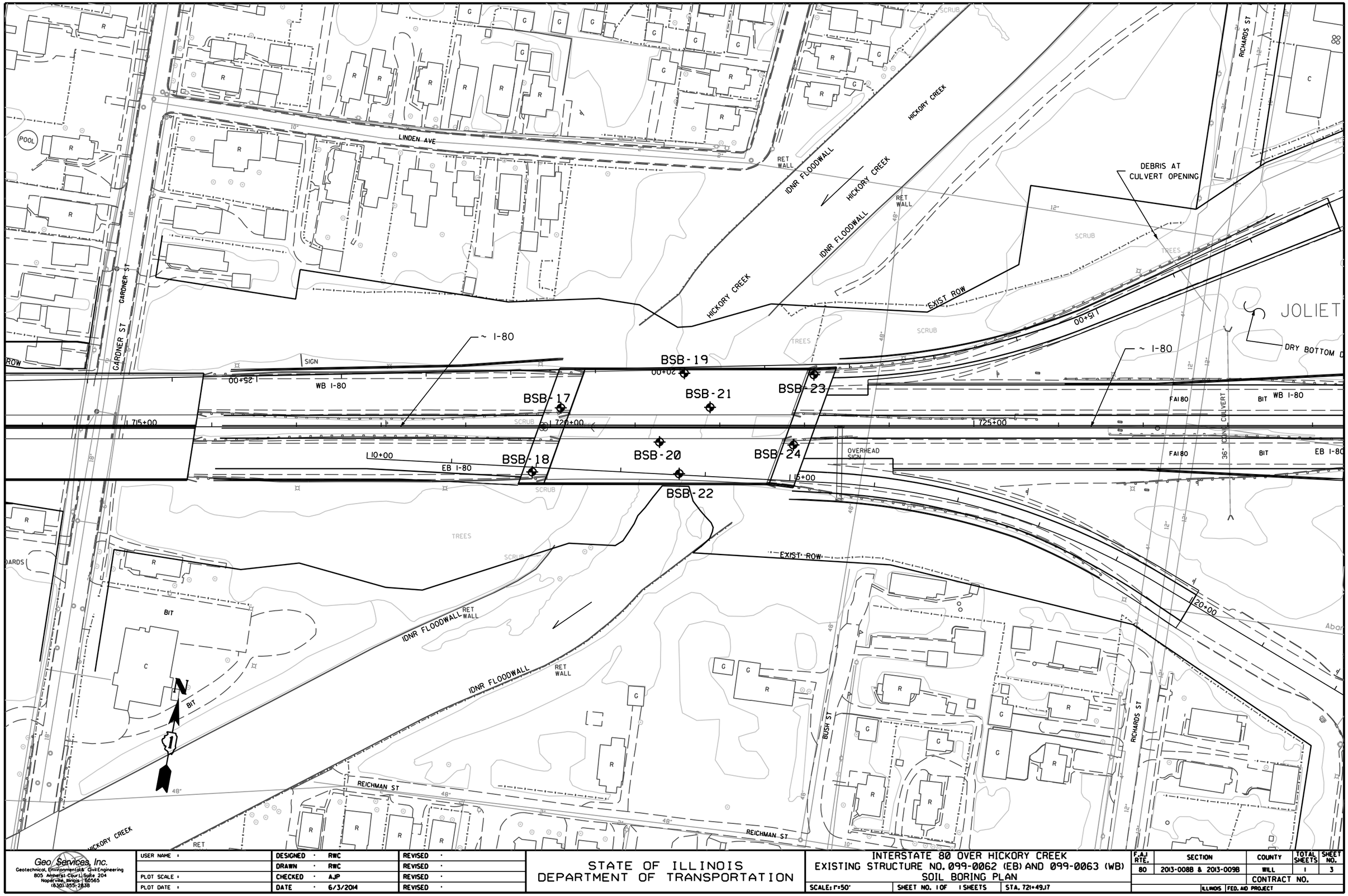
BORING LOCATION PLAN

PLAN	
	SURVEYED
	PLOTTED
	DRAWN
	ALIGNMENT CHECKED
	RT. OF WAY CHECKED
NOTE BOOK	CADD FILE NAME
NO.	

BY	DATE

PROFILE	
	SURVEYED
	PLOTTED
	DRAWN
	CHECKED
NOTE BOOK	B.M. NOTED
NO.	STRUCTURE NO'S/PK'S CKD

BY	DATE



Geo Services, Inc.					
Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	USER NAME =	DESIGNED · RWC	REVISED ·	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	INTERSTATE 80 OVER HICKORY CREEK EXISTING STRUCTURE NO. 099-0062 (EB) AND 099-0063 (WB) SOIL BORING PLAN
		DRAWN · RWC	REVISED ·		
	PLOT SCALE =	CHECKED · AJP	REVISED ·		
	PLOT DATE =	DATE · 6/3/2014	REVISED ·		SCALE: 1"=50' | SHEET NO. 1 OF 1 SHEETS | STA. 721+49.17

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-008B & 2013-009B	WILL	1	3
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

PLAN

SURVEYED	DATE
PLOTTED	
DRAWN	BY
ALIGNMENT CHECKED	
R.T. OF WAY CHECKED	
CADD FILE NAME	
NOTE BOOK	
NO.	

PROFILE

SURVEYED	DATE
PLOTTED	
DRAWN	BY
CROSS CHECKED	
BM. NOTED	
STRUCTURE NO.&PINS CHKD	
NOTE BOOK	
NO.	

EX I-80 WB PGL

EX I-80 EB PGL

PR PGL I-80

EXISTING GROUND LINE AT ~

GARDNER ST

BSB-17
720+12
22.3' Left
565.2

N Ou W%

PAVEMENT
7 2.5P 21
4 1.0P 19
11 3.0P 19
5 2.0P 31
15 1.3P 14
17 3.1B 15
19 2.8P 19
CLAY LOAM (FILL) 22 4.5P 19
20 3.5P 16
18 4.0P 19
23 3.8P 17
24 3.3P 17
22 2.8B 18
TOPSOIL 21 29
SILTY SAND 12 23
BEDROCK
EOB

BSB-19
721+58
63.1' Left
560.1

N Ou W%

BRIDGE DECK
VOID
BEDROCK
EOB

BSB-21
721+88
23.0' Left
560.4

N Ou W%

BRIDGE DECK
HICKORY CREEK
VOID
BEDROCK
EOB

BSB-23
723+11
61.5' Left
556.4

N Ou W%

PAVEMENT
2 9
5 15
10 2.8P 14
8 2.8P 22
12 1.9B 15
15 2.7B 16
CLAY LOAM (FILL) 9 2.2B 20
17 17
21 2.1B 16
17 2.8B 17
20 1.8B 15
24 4.5P 11
SILTY CLAY LOAM 5 0.6B 28
FRACTURED 2' ROCK
BEDROCK
EOB

714+00	715+00	716+00	717+00	718+00	719+00	720+00	721+00	722+00	723+00	724+00	725+00	726+00	727+00	728+00
533.74	533.78	533.17	533.83	556.64	574.35	572.57	571.33	570.82	569.38	568.11	566.28 567.99	565.31 566.59	563.89 565.19	546.18 563.79	523.92 562.43	514.38 561.21	517.98 560.12	540.88 559.16	555.02 558.34	555.14 557.65	553.97 557.10	553.28 556.69	552.68 556.41	552.13 556.26	552.20 556.25	551.85 556.38	552.74 556.60	552.16 556.82	552.92 557.04	553.28 557.27

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

USER NAME =	DESIGNED · RWC	REVISED ·	
	DRAWN · RWC	REVISED ·	
PLOT SCALE =	CHECKED · AJP	REVISED ·	
PLOT DATE =	DATE · 6/2/2014	REVISED ·	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

WB INTERSTATE 80 OVER HICKORY CREEK
EXISTING STRUCTURE NO. 099-0063 (WB)
SOIL BORING PROFILE

SCALE: 1"=50'H 1"=5'V | SHEET NO. 1 OF 1 SHEETS | STA. 721+49.17

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-008B & 2013-009B	WILL	3	3
		CONTRACT NO.		
		ILLINOIS FED. AID PROJECT		

PLAN

SURVEYED	DATE
PLOTTED	
DRAWN	
CHECKED	
R.T. OF WAY CHECKED	
CADD FILE NAME	
NOTE BOOK	
NO.	

BY

PROFILE

SURVEYED	DATE
PLOTTED	
DRAWN	
CHECKED	
BAL. NOTED	
STRUCTURE NO.	
TAPE CHKD	

NOTE BOOK
NO.

EX I-80 WB PGL
EX I-80 EB PGL
PR PGL I-80
EXISTING GROUND LINE AT

BSB-18
719+78
53.3' Right
566.2

BSB-20
721+29
18.0' Right
561.6

BSB-22
721+52
55.4' Right
560.5

BSB-24
722+87
21.4' Right
557.4

	BSB-18 N	BSB-18 Qu	BSB-18 W%	BSB-20 N	BSB-20 Qu	BSB-20 W%	BSB-22 N	BSB-22 Qu	BSB-22 W%	BSB-24 N	BSB-24 Qu	BSB-24 W%
PAVEMENT	19		7									
	11	4.0P	16									25
BRIDGE DECK												
	10	1.9B	21							4		21
	11	2.4B	18							18		20
	16	1.7B	21							13	3.8P	21
	18	1.2B	18							7	2.3P	28
CLAY LOAM (FILL)	21	1.8P	15							5	2.8P	22
	23	1.3B	20							13	3.5P	17
	22	2.5B	19							14	4.0P	13
	22	1.5B	22							19	2.8P	17
	25	3.1B	20							SILTY CLAY LOAM 22	4.5P	16
	22	2.7B	17							21		16
	27	3.0B	16							CLAY LOAM 30		15
CLAY LOAM W/ GRAVEL 1/2" (FILL)	50/2"		14									
										SILTY SAND 8		24
TOPSOIL	11	1.0P	31									
										FRACTURED ROCK		
BEDROCK										BEDROCK		
EOB										EOB		

VOID
VOID
HICKORY CREEK
BEDROCK
BEDROCK
BEDROCK
EOB
EOB
EOB

GARDNER ST

533.74	533.78	533.17	533.83	556.64	574.35	572.57	571.33	570.82	569.38	568.11	566.28	567.99	565.31	566.59	563.89	565.19	546.18	563.79	523.92	562.43	514.38	561.21	517.98	560.12	540.88	559.16	555.02	558.34	555.14	557.65	553.97	557.10	553.28	556.69	552.68	556.41	552.13	556.26	552.20	556.25	551.85	556.38	552.74	556.60	552.16	556.82	552.92	557.04	553.28	557.27
714+00			715+00			716+00			717+00			718+00			719+00			720+00			721+00			722+00			723+00			724+00			725+00			726+00			727+00			728+00								

Geo Services, Inc.	USER NAME =	DESIGNED · RWC	REVISED ·	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EB INTERSTATE 80 OVER HICKORY CREEK
Geotechnical, Environmental & Civil Engineering		DRAWN · RWC	REVISED ·		EXISTING STRUCTURE NO. 099-0062 (EB)
805 Amherst Court, Suite 204	PLOT SCALE =	CHECKED · AJP	REVISED ·		SOIL BORING PROFILE
Naperville, Illinois 60565	PLOT DATE =	DATE · 6/2/2014	REVISED ·		SCALE: 1"=50'H 1"=5'V · SHEET NO. 1 OF 1 SHEETS · STA. 721+49.17
(630) 355-2838					

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-008B & 2013-009B	WILL	2	3
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

APPENDIX D

BORING & ROCK CORE LOGS

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/17/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-17
Station 720+12
Offset 22.30ft Left
Ground Surface Elev. 565.20 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10.0' ft
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6.0" ASPHALT, 4.0" CONCRETE, 4.0" CRUSHED STONE 564.03			
CLAY to CLAY LOAM-brown & gray-stiff to hard (Fill)	3		
	3 4	2.5 P	21
	2		
-5	2 2	1.0 P	19
	3		
	5 6	3.0 P	19
	2		
-10	2 3	2.0 P	31
	3		
	8 7	1.3 P	14
	4		
-15	8 9	3.1 B	15
	6		
	8 11	2.8 P	19
	5		
-20	11 11	4.5 P	19
CLAY to CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*	4		
	7 13	3.5 P	16
	6		
-25	7 11	4.0 P	19
	6		
	9 14	3.8 P	17
	8		
-30	9 15	3.3 P	17
	8		
-35	9 13	2.8 B	18
527.20 SANDY LOAM-brown & gray-medium dense	5		
-40	6 15		29

Z:\PROJECTS\2013\13125 HNTB, I-80 PHASE II (NEAR TERM)\13125 BORING LOGS\13125_LOG.GPJ 6/2/14

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/17/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-17
Station 720+12
Offset 22.30ft Left
Ground Surface Elev. 565.20 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter Dry to 10.0' **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
524.70				
SILTY SAND-dark gray-medium dense				
	3			
	4		23	
-45	8			
518.20				
Drillers Observation: Apparent Bedrock				
517.20				
Borehole continued with rock coring.				
-50				
-55				
-60				

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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(630) 355-2838

ROCK CORE LOG

DATE 3/18/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-17**

Top of Rock Elev. 518.2

Station 720+12

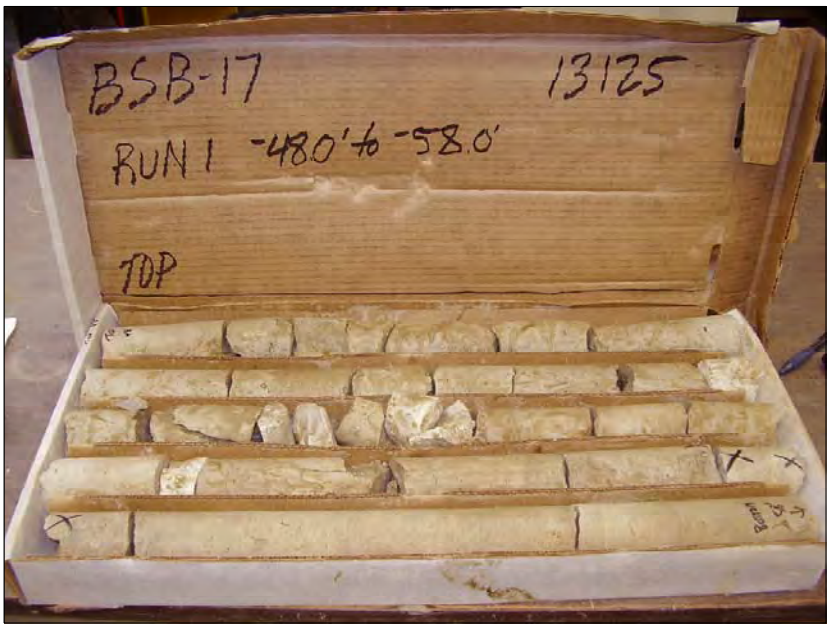
Begin Core Elev. 517.2

Offset 22.3' Left

Ground Surface Elev. 565.2

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	47.0	n/a	1299 @ -49.6'
-53					
-58					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-48.0' to -58.0')
Light gray with horizontal to wavy bedding. Porous with some chert nodules. Numerous horizontal fractures throughout.



Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/19/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-18
Station 719+78
Offset 53.30ft Right
Ground Surface Elev. 566.20 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter Dry to 10.0' ft
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4.0" ASPHALT, 8.0" GRAVEL			
565.20			
CLAY to CLAY LOAM-brown & gray-stiff to hard (Fill)	12		
	10		7
	9		
	5		
	3	4.0	16
-5	8	P	
	4		
	4	1.9	21
	6	B	
	5		
	5	2.4	18
-10	6	B	
	4		
	7	1.7	21
	9	B	
	7		
	8	1.2	18
-15	10	B	
	5		
	8	1.8	15
	13	P	
	17		
	9	1.3	20
-20	14	B	
CLAY to CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*	7		
	9	2.5	19
	13	B	
	9		
	11	1.5	22
-25	11	B	
	9		
	11	3.1	20
	14	B	
	14		
	11	2.7	17
-30	11	B	
	8		
	12	3.0	16
-35	15	B	
529.20			
CLAY LOAM with GRAVEL-dark brown, gray & black-very dense (Fill)	50/2"		
			14
-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

Z:\PROJECTS\2013\13125 HNTB, I-80 PHASE II (NEAR TERM)\13125 BORING LOGS\13125_LOG.GPJ 6/2/14

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/19/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-18
Station 719+78
Offset 53.30ft Right
Ground Surface Elev. 566.20 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter Dry to 10.0' **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CLAY LOAM with GRAVEL-dark brown, gray & black-very dense (Fill) *(continued)*				
523.20				
LOAM-gray-medium dense		5		
		5	1.0	31
	-45	6	P	
519.20				
Drillers Observation: Apparent Bedrock				
517.20				
Borehole continued with rock coring.	-50			
	-55			
	-60			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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ROCK CORE LOG

DATE 3/20/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-18**

Top of Rock Elev. 519.2

Station 719+78

Begin Core Elev. 517.2

Offset 53.3' Right

Ground Surface Elev. 566.2

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	14.0	n/a	1002 @ -52.8'
-54					
-59					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-49.0' to -59.0')
Light gray, porous & cherty with horizontal bedding. Highly fractured throughout with numerous intersecting horizontal & vertical fractures.

Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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SOIL BORING LOG

GSI Job No. 13125

Date 3/10/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JZ

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-19
Station 721+58
Offset 63.10ft Left
Ground Surface Elev. 560.10 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2.0" ASPHALT, 8.0" CONCRETE BRIDGE DECK 559.27				VOID *(continued)*			
VOID							
-5				-25			
-10				-30			
-15				-35			
-20				-40			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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Geotechnical, Environmental & Civil Engineering
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SOIL BORING LOG

GSI Job No. 13125

Date 3/10/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JZ

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-19
Station 721+58
Offset 63.10ft Left
Ground Surface Elev. 560.10 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
VOID *(continued)*				
-45				
513.10				
Borehole continued with rock coring.				
-50				
-55				
-60				

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

ROCK CORE LOG

DATE 3/10/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-19**

Top of Rock Elev. 513.1

Station 721+58

Begin Core Elev. 513.1

Offset 63.1' Left

Ground Surface Elev. 560.1

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	43.0	n/a	1025 @ -54.7'
-52					
-57					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-47.0' to -57.0')
Light gray to gray, fine grained with horizontal to wavy bedding. Porous with some weathering. Highly fractured & cherty to -49.8'. Numerous horizontal fractures throughout.

Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/26/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-20
Station 721+29
Offset 18.00ft Right
Ground Surface Elev. 561.60 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2.25" ASPHALT, 7.75" CONCRETE BRIDGE DECK 560.77				VOID *(continued)*			
VOID							
-5				-25			
-10				-30			
-15				-35			
-20				-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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Naperville, Illinois 60565
(630) 355-2838

SOIL BORING LOG

GSI Job No. 13125

Date 3/26/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-20
Station 721+29
Offset 18.00ft Right
Ground Surface Elev. 561.60 **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
VOID *(continued)*			
-45			
513.10			
Borehole continued with rock coring.			
-50			
-55			
-60			

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2838

ROCK CORE LOG

DATE 3/26/2014

LOGGED BY MD

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-20**

Top of Rock Elev. 513.1

Station 721+29

Begin Core Elev. 513.1

Offset 18.0' Right

Ground Surface Elev. 561.6

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	34.0	n/a	695 @ -50.8'

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE

RUN 1 (-48.5' to -58.5')

Light gray to gray with horizontal bedding. Slightly porous with some rust staining. Some large chert nodules. Highly fractured throughout with numerous intersecting horizontal & vertical fractures.

-53.5

-58.5

Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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SOIL BORING LOG

GSI Job No. 13125

Date 3/14/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-21
Station 721+88
Offset 23.00ft Left
Ground Surface Elev. 560.40 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2.0" ASPHALT, 8.0" CONCRETE BRIDGE DECK 559.57				VOID *(continued)*			
VOID							
-5				-25			
-10				-30			
-15				-35			
-20				-40			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 13125

Date 3/14/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** JB

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-21
Station 721+88
Offset 23.00ft Left
Ground Surface Elev. 560.40 **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
VOID *(continued)*			
-45			
514.40			
Borehole continued with rock coring.			
-50			
-55			
-60			

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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ROCK CORE LOG

DATE 3/15/20145

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-21**

Top of Rock Elev. 514.4

Station 721+88

Begin Core Elev. 514.4

Offset 23.0' Left

Ground Surface Elev. 560.4

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	98.0	48.0	n/a	1233 @ -48.7'
-51					
-56					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-46.0' to -56.0')
Light gray to gary with some rust staining. Porous with horizontal to wavy bedding. Numerous horizontal fractures throughout with some intersecting vertical fractures.

Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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SOIL BORING LOG

GSI Job No. 13125

Date 3/20/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-22
Station 721+52
Offset 55.40ft Right
Ground Surface Elev. 560.50 **ft**

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4.0" ASPHALT, 8.0" CONCRETE BRIDGE DECK 559.50				VOID *(continued)*			
VOID							
-5				-25			
-10				-30			
-15				-35			
-20				-40			

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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SOIL BORING LOG

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Mud Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-22
Station 721+52
Offset 55.40ft Right
Ground Surface Elev. 560.50 **ft**

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

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter n/a **ft**
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

VOID *(continued)*

-45

512.00

Borehole continued with rock coring.

-50

-55

-60

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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ROCK CORE LOG

DATE 3/20/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-22**

Top of Rock Elev. 512.0

Station 721+52

Begin Core Elev. 512.0

Offset 55.4' Right

Ground Surface Elev. 560.5

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	7.5	n/a	1212 @ -51.0'
-53.5					
-58.5					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-48.5' to -58.5')
Light gray & porous with horizontal bedding.Highly fractured throughout

Color pictures of the cores Yes Cores will be stored for examination for --

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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SOIL BORING LOG

GSI Job No. 13125

Date 1/15/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-23
Station 723+11
Offset 61.50ft Left
Ground Surface Elev. 556.40 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 554.4 ft ▼
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				4" ASPHALT, 12.0" CONCRETE
				555.07
	1			CLAY LOAM-brown & gray-stiff to hard (Fill) ▼
	1		9	
	1			
	2			
	2		15	
-5	3			
	3			
	5	2.8	14	
	5	P		
	2			
	3	2.8	22	
-10	5	P		
	4			
	5	1.9	15	
	7	B		
	4			
	6	2.7	16	
-15	9	B		
	5			
	5	2.2	20	
	4	B		
	3			
	5		17	
-20	12			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*
	6			
	9	2.1	16	
	12	B		
	4			
	7	2.8	17	
-25	10	B		
	9			
	10	1.8	15	
	10	B		
	14			
	12	4.5	11	
-30	12	P		
				524.40
				SILTY CLAY LOAM-dark brown & gray-loose
	2			
	2	0.6	28	
-35	3	B		
				517.90
	50/2"			Drillers Observation: Fractured Rock
				516.90
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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SOIL BORING LOG

GSI Job No. 13125

Date 1/15/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-23
Station 723+11
Offset 61.50ft Left
Ground Surface Elev. 556.40 **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
515.90			
-45			
-50			
-55			
-60			

Surface Water Elev. n/a **ft**
Stream Bed Elev. n/a **ft**

Groundwater Elev.:
First Encounter 554.4 **ft** ▼
Upon Completion n/a **ft**
After _____ **Hrs.** _____ **ft**

Drillers Observation: Apparent Bedrock *(continued)*

Borehole continued with rock coring.

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The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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ROCK CORE LOG

DATE 1/16/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE --

DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION --

LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will

CORING METHOD Rotary Wash

STRUCT. NO. --

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station --

Core Diameter 2.0 in

BORING NO. **BSB-23**

Top of Rock Elev. 517.9

Station 723+11

Begin Core Elev. 515.9

Offset 61.5' Left

Ground Surface Elev. 556.4

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	12.0	n/a	831 @ -43.1'
-45.5					
-50.5					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-40.5' to -50.5')
Light gray to gray with horizontal bedding. Weathered & porous. Highly fractured with numerous intersecting horizontal & vertical fractures.

Color pictures of the cores Yes Cores will be stored for examination for --

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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GSI Job No. 13125

SOIL BORING LOG

Page 1 **of** 1

Date 3/28/14

ROUTE F.A.I RTE. 80 **DESCRIPTION** I-80 Phase II (Near Term) **LOGGED BY** NW

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R10E, 3rd **PM**

COUNTY Will **DRILLING METHOD** Hollow Stem Auger/Rotary **HAMMER TYPE** CME Automatic

STRUCT. NO. _____
Station _____

BORING NO. BSB-24
Station 722+87
Offset 21.40ft Right
Ground Surface Elev. 557.40 ft

Surface Water Elev. n/a ft
Stream Bed Elev. n/a ft

Groundwater Elev.:
First Encounter 555.4 ft ▼
Upon Completion n/a ft
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6.0" ASPHALT, 18.0" CONCRETE			
555.40 ▼			25
CLAY LOAM-brown & gray-very stiff to hard (Fill)	2		
-5	2 2		21
	8		
	10 8		20
	3		
-10	5 8	3.8 P	21
	3		
	3 4	2.3 P	28
	2		
-15	2 3	2.8 P	22
	3		
	5 8	3.5 P	17
	5		
-20	7 7	4.0 P	13
CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*			
	7		
	9 10	2.8 P	17
534.40			
SILTY CLAY LOAM-gray-medium dense	6		
-25	9 13	4.5 P	16
531.90			
CLAY LOAM-gray-medium dense to dense	4		
	8 13		16
	8		
-30	13 17		15
525.40			
SILTY SAND with Gravel-dark brown-loose	2		
-35	3 5		24
520.90			
Drillers Observation-Weathered & fractured rock.			
519.90			
Drillers Observation-Apparent Bedrock			
518.90			
Borehole continued with rock coring.			
-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

DATE 3/20/2014

LOGGED BY JK

GSI JOB No. 13125

ROUTE -- DESCRIPTION I-80 Reconstruction (Near Term Phase 2)

SECTION -- LOCATION SEC 15, T35N, R10E, SW 1/4, 3rd PM

COUNTY Will CORING METHOD Rotary Wash

STRUCT. NO. -- CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

Station -- Core Diameter 2.0 in

BORING NO. **BSB-24** Top of Rock Elev. 519.9

Station 722+87 Begin Core Elev. 518.9

Offset 21.4' Right

Ground Surface Elev. 557.4

DEPTH (ft)	CORE RUN (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	1	100.0	19.0	n/a	868 @ -46.0'
-43.5					
-48.5					

SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE
RUN 1 (-38.5' to -48.5')
Light gray & weathered with horizontal to wavy bedding. Highly fractured throughout with numerous intersecting horizontal & vertical fractures & some thin clay partings.

Color pictures of the cores Yes Cores will be stored for examination for -

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

APPENDIX E

PILE LENGTH AND CAPACITY TABLES

Estimated Pile Lengths and Capacities for the West Abutments of the Proposed I-80 over Hickory Creek

Boring BSB-17 - West Abutment WB (Ground Surface Elevation against Pile during driving = 554.62 Pile Cutoff Elevation = 555.62												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Required Bearing NRB(Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
11	14	25	18	32	23	41	28	50	23	43	28	51
13	16	30	21	38	27	48	33	60	28	51	34	62
16	19	35	24	44	30	55	38	68	33	60	39	72
18	22	39	27	50	34	62	42	77	38	69	45	82
21	24	44	31	56	38	69	47	85	43	78	51	92
23	27	49	34	62	42	76	51	94	47	86	56	102
26	30	54	37	67	46	83	56	102	52	95	62	112
28	32	58	40	73	50	90	61	110	57 [3]	104 [3]	67 [3]	123 [3]
31	44	81	58	105	70	128	85	155				
33	40	73	51	93	64	117	80	145				
36	41	74	52	95	65	119	81	147				
38	59	108	73	133	88	160	108	197				
38.2	86	156	106	193	128	232	156	284				
38.7	113	205	140	254	167	304	204	371				
39.2	139	253	173	314	207	377	252	458				
39.7	157	286	184	335	230	419	300	545				
40							318	578				

Notes:
1. Metal Shell Pile 12" diameter with 0.179" walls
2. Metal Shell Pile 14" diameter with 0.250" walls
3. When driving Metal Shell piles, pile lengths should be limited to 10 feet above bedrock elevation to prevent damage to piles.
Top of rock elevation at BSB-17 is approximately 518.2 feet. Estimated Pile Length in BLUE denotes pile lengths at bedrock depth.

Boring BSB-18, West Abutment EB (Ground Surface Elevation against Pile during driving = 555.51 Pile Cutoff Elevation = 556.51)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
10	13	24	17	31	22	40	27	48	23	41	27	50
13	16	29	20	37	26	47	32	59	27	50	33	60
15	19	34	24	43	30	54	37	67	32	59	39	70
18	21	39	27	49	34	61	42	75	37	67	44	80
20	24	43	30	55	38	68	46	84	42	76	50	90
23	26	48	33	61	41	75	51	92	47	85	55	101
25	29	53	37	67	45	82	55	101	51	94	61	111
28	32	58	40	72	49	89	60	109	56 [3]	102 [3]	67 [3]	121 [3]
30	34	62	43	78	53	96	64	117				
33	37	67	46	84	57	103	69	126				
35	40	72	49	90	61	110	74	134				
37	65	119	81	147	97	176	119	217				
37.8	92	167	114	207	137	249	167	304				
38.3	119	216	147	268	177	321	215	391				
38.8	145	264	181	328	216	393	263	478				
39.3	157	286	184	335	230	419	318	578				

Notes:
1. Metal Shell Pile 12" diameter with 0.179" walls
2. Metal Shell Pile 14" diameter with 0.250" walls
3. When driving Metal Shell piles, pile lengths should be limited to 10 feet above bedrock elevation to prevent damage to piles.
Top of rock elevation at BSB-18 is approximately 519.2 feet. Estimated Pile Length in BLUE denotes pile lengths at bedrock depth.

Estimated Pile Lengths and Capacities for the East Abutments of the Proposed I-80 over Hickory Creek

Boring BSB-23 East Abutment WB (Ground Surface Elevation against Pile during driving = 546.78 Pile Cutoff Elevation = 547.78)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing NRB(Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
9	12	22	16	29	19	35	23	43	20	37	25	45
12	15	27	19	35	24	44	30	55	25	46	30	55
14	17	32	22	40	28	51	35	63	30	55	36	65
17	20	36	25	46	32	58	39	72	35	63	42	76
19	23	41	29	52	36	65	44	80	40 [3]	72 [3]	47 [3]	86 [3]
22	25	46	32	58	40	72	49	88				
24	27	48	33	60	40	74	49	89				
27	28	51	35	64	43	78	52	94				
30	51	93	63	115	76	138	94	171				
30.7	78	142	96	175	116	211	142	258				
31.2	105	190	130	236	156	283	190	345				
31.7	131	239	163	296	195	355	237	432				
32.2	157	286	184	335	230	419	285	519				
32.5							318	578				

Notes:
1. Metal Shell Pile 12" diameter with 0.179" walls
2. Metal Shell Pile 14" diameter with 0.250" walls
3. When driving Metal Shell piles, pile lengths should be limited to 10 feet above bedrock elevation to prevent damage to piles.
Top of rock elevation at BSB-23 is approximately 517.9 feet. Estimated Pile Length in BLUE denotes pile lengths at bedrock depth.

Boring BSB-24, East Abutment EB (Ground Surface Elevation against Pile during driving = 547.81 Pile Cutoff Elevation = 548.81)												
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
9	12	22	16	29	19	35	24	43	21	37	25	45
12	15	27	19	35	24	44	30	55	25	46	30	55
14	23	41	28	51	34	61	41	75	47	85	59	107
17	31	57	41	74	49	89	59	108	82	150	104	190
19	35	63	43	78	52	94	63	114	106 [3]	192 [3]	135 [3]	246 [3]
22	36	66	45	82	54	99	66	120				
24	30	54	38	69	47	86	58	106				
27	30	55	39	70	48	88	59	108				
28	47	86	58	106	70	127	87	158				
28.7	74	134	91	166	110	200	135	245				
29.2	101	183	125	227	149	272	182	332				
29.7	127	231	158	287	189	344	230	419				
30.2	154	280	184	335	230	419	278	505				
30.5	157	286					318	578				

Notes:
1. Metal Shell Pile 12" diameter with 0.179" walls
2. Metal Shell Pile 14" diameter with 0.250" walls
3. When driving Metal Shell piles, pile lengths should be limited to 10 feet above bedrock elevation to prevent damage to piles.
Top of rock elevation at BSB-24 is approximately 519.9 feet. Estimated Pile Length in BLUE denotes pile lengths at bedrock depth.

APPENDIX F

LAB TEST RESULTS

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE / DBE Firm

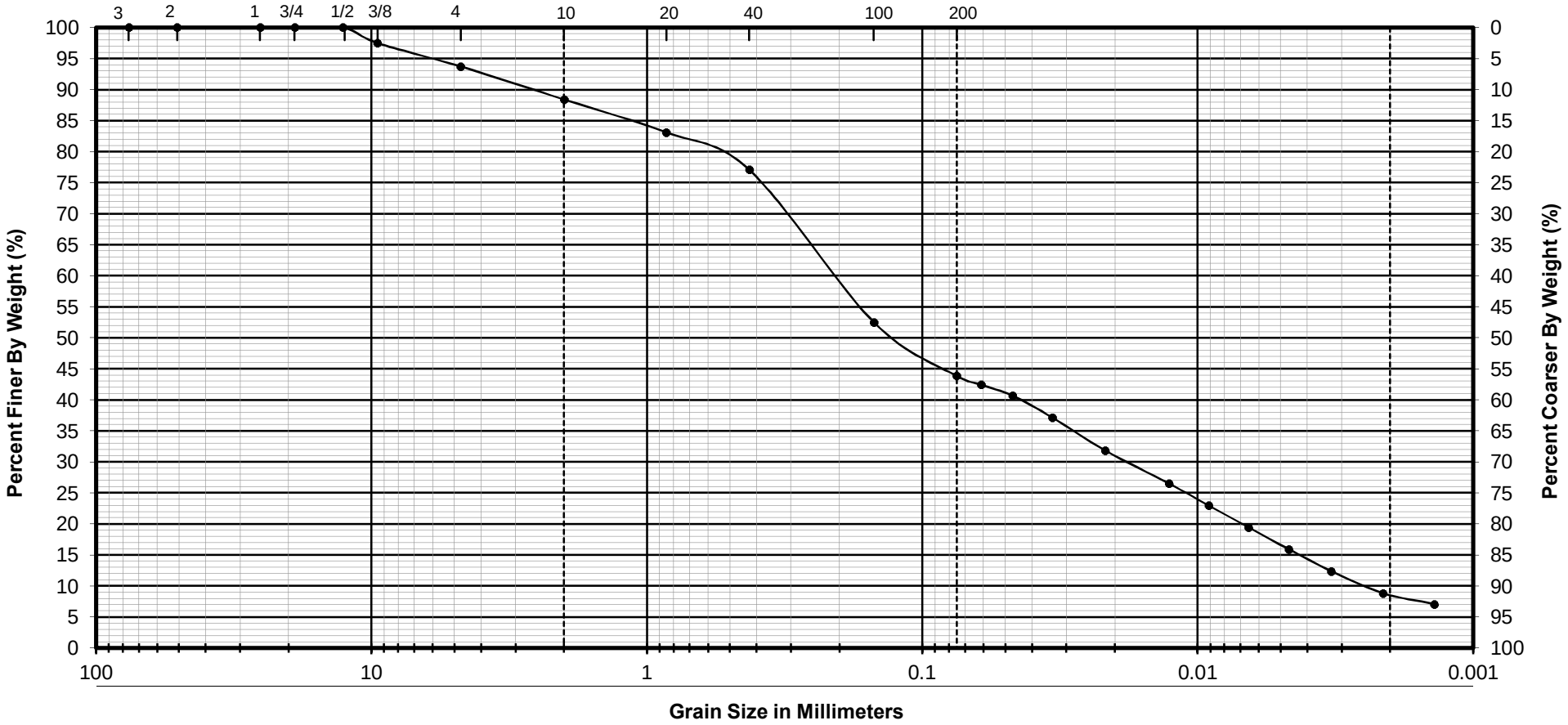
1235 E. Davis Street
Arlington Heights, Illinois 60005
Phone: (847) 253-3845 Fax: (847) 253-0482

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS - ASTM D 7012

I-80 Reconstruction (Near Term Phase 2)
Location Various
County Will
Sample Type Drilled Bedrock Core Sample

Date 11/7/13
Job No. 13125
Tested By: RWC

Sample No.	Depth (ft)	Length (in)	Diameter (in)	Weight (g)	Load (lbs)	Area (in^2)	Unit Weight ($lbs\ ft^3$)	Compressive Strength (tsf)	(psi)
BSB-17 Run 1	49.6	4.091	2.059	588.8	60090	3.33	164.6	1299	18047
BSB-18 Run 1	52.6	4.106	2.052	599.9	46040	3.31	168.2	1002	13922
BSB-19 Run 1	54.7	4.096	2.050	592.0	47010	3.30	166.7	1025	14243
BSB-20 Run 1	50.8	4.136	2.053	598.7	31940	3.31	166.5	695	9649
BSB-21 Run 1	48.7	4.094	2.057	593.8	56910	3.32	166.2	1233	17125
BSB-22 Run 1	51.0	4.091	2.018	574.8	53860	3.20	167.3	1212	16840
BSB-23 Run 1	43.1	4.559	2.123	670.4	40870	3.54	158.2	831	11547
BSB-24 Run 1	46.0	4.142	2.054	594.6	39950	3.31	165.0	868	12057



GRAVEL	SAND		SILT	CLAY
	COARSE	FINE		

Boring No.	BSB-17	CLASSIFICATION		PARTICLE SIZE ANALYSIS-AASHTO T88
Sample No.	15			
Depth	38.5'-40.0'	SANDY LOAM		I-80 Phase II
Liquid Limit	27	A-4		Will County, Illinois
Plastic Limit	19	brown & gray		
Plasticity Index	8	Group Index	0	
Test By	MT	% Gravel	11.6	
Date	5/22/14	% Sand	44.5	
Reviewed By	RR	% Silt	35.0	
Job No	13125	% Clay	8.8	

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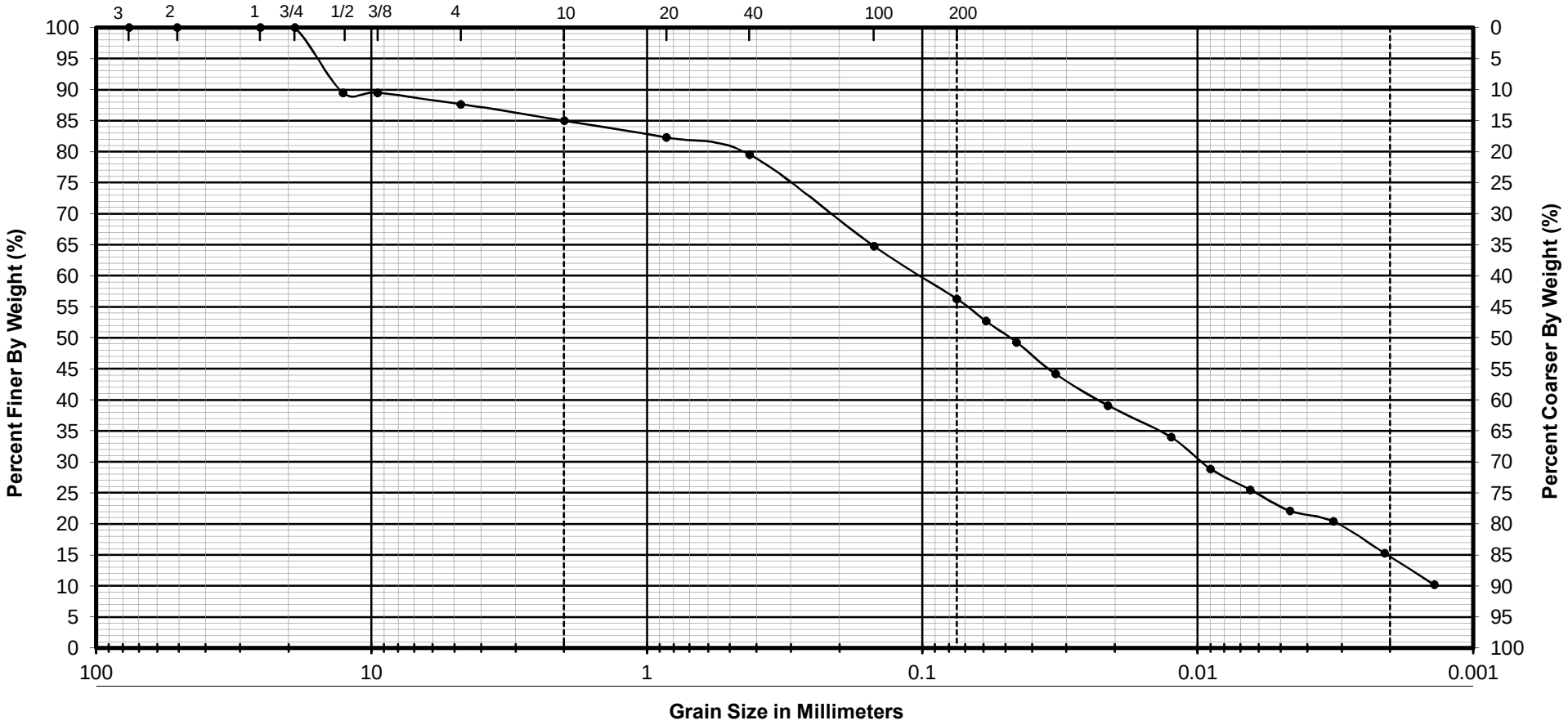

GRAVEL	SAND		SILT	CLAY
	COARSE	FINE		

Boring No.	BSB-18	CLASSIFICATION		PARTICLE SIZE ANALYSIS-AASHTO T88
Sample No.	16			
Depth	43.5'-45.0'	LOAM		I-80 Phase II
Liquid Limit	30	A-4		Will County, Illinois
Plastic Limit	20	gray		
Plasticity Index	10	Group Index	3	
Test By	MT	% Gravel	15.0	
Date	5/22/14	% Sand	28.7	
Reviewed By	RR	% Silt	41.0	
Job No	13125	% Clay	15.3	

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1235 East Davis Street, S
Arlington Heights, IL 600
(847) 253-3845

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
AASHTO T89/T90

Project Name I-80 Phase II Job No 13125

Location Will County, Illinois Date 5/22/14

SAMPLE NO.	BSB-17	BSB-18					
DEPTH	38.5'-40.0'	43.5'-45.0'					
LIQUID LIMIT (LL)	27	30					
PLASTIC LIMIT (PL)	19	20					
PLASTICITY INDEX (PI)	8	10					

Test by MT