STRUCTURAL GEOTECHNICAL REPORT

Richards Street Bridge Over Hickory Creek

Existing SN 099-0123

Superstructure Replacement and Widening

Contract No.: 62380

IDOT Job No. P-91-185-09 / PTB 194-09

Joliet, Will County, IL

Prepared for:

EXP US Services Inc.
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JOB NO. 20012

March 17th, 2022
Revised: June 6th, 2022

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

March 17, 2022
Revised: June 6, 2022

EXP US Services Inc.
205 North Michigan Avenue, Suite 3600
Chicago, Illinois 60601-5924

Attn: Mr. Thomas Hough, P.E.,
Email: Thomas.Hough@exp.com

Job No. 20012

Re: Structure Geotechnical Report
Richards Street Bridge over Hickory Creek
Existing SN 099-0123
Contract No.: 62380
Approximate Stationing: 64+86.52 to 66+39.47
IDOT Job Number P-91-185-09 / PTB 194-09
Joliet, Will County, Illinois

Dear Mr. Hough:

The following report presents the geotechnical analysis and recommendations for the proposed construction of the Richards Street Bridge over Hickory Creek between the on and off ramps to and from westbound (WB) Interstate 80 (I-80) and 5th Avenue in Will County, IL. The Richards Street Bridge (existing structure number is 099-0123) is a three (3) -span with a total length of 149.8-ft (back-to-back of abutment) and the width varies from 84.0-ft to 87.8-ft (out-to-out of the deck) on the northbound (eastside) of the bridge only. The superstructure is to be reconstructed and widened with same span configuration as the original while keeping the existing piers and piles. The eight (8) borings were completed at the site by Geo Services, Inc. (GEO). Copies of these boring logs, along with soil profiles, 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.

Samuel Plummer
Project Manager

Andrew J. Ptak, P.E.
Principal

expire 11/30/23

enc.

TABLE OF CONTENTS

SECTION 01: INTRODUCTION

This report presents the results of the geotechnical investigation for the Richards Street Bridge over Hickory Creek between the ramps to/from westbound Interstate 80 (WB I-80) and 5th Avenue in Joliet, Will County IL. The results of the eight (8) structure borings completed by Geo Services, Inc. (GEO) are included with this report. Two (2) soil borings at each pier (total four (4)); two (2) are located at each abutment (total four (4)). This report includes descriptions of soil and groundwater conditions, recommendations pertaining to the design and construction of foundations for the bridge abutments, general construction considerations for the site, site location map, boring location diagram and boring logs.

SECTION 02: PROJECT DESCRIPTION

The existing bridge (SN 099-0123) was built in 1966 and is a 3-span bridge with a total length (back-to-back abutment) of 149.8-ft and varies in width from 84.0-ft to 87.8-ft (out-to-out of the deck). The rehabilitated bridge (SN 099-0123) will consist of the same span configuration reusing the existing piles, piers, and abutments. The structure will have a total length of 152.4-ft (back-to-back abutment) and a variable width from 90.4-ft to 93.9-ft. In order to accommodate the wider cross section, the piers and abutments will be widened to the east. Most of the bridge will be supported on the existing piers and pile abutments. The abutment extensions will be supported on new piles. The pier extensions may be supported by the existing footing alone or by new footing extensions as determined in final design.

The bottom of abutment elevations are shown on the following **Table 1**:

TABLE 1 – EXISTING GRADE ELEVATION AT ABUTMENTS

Location	Existing Ground Surface for Abutments & Pier (Elevation)	Proposed Bottom of Abutment Elev. / Proposed Grade Elev. at Pier
Northwest Abutment	536.8	527.19
Northeast Abutment	538.4	
North Pier	538	516.71
South Pier	538.0	
Southwest Abutment	536.4	527.16
Southeast Abutment	538.3	

SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES

Boring locations were selected by GEO and were reviewed and approved by the EXP design team. Boring locations were laid out in the field by GEO personnel at the proposed locations. Elevations were taken using a survey grade GPS and can be seen on the boring logs.

The borings were performed between December 2021 through January 2022 with a truck-mounted drilling rig and were advanced by means of hollow stem augers and rotary drilling techniques. Representative soil samples were obtained employing split spoon sampling procedures in accordance with AASHTO Method T-206. Samples obtained in the field were returned to GEO laboratory for further examination and testing.

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

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.

Rock coring was performed by the dual tube method using NX size, 10-ft length core barrel seated approximately 2-ft into bedrock for all the eight (8) soil brings on either side of the bridges (east and west side) and near each of the bridge footings. The full length of the boring was cased using 3-in diameter casing which was seated approximately 6-in into bedrock to prevent cave-in of the boring while coring.

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. 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. Rock cores were analyzed for Rock Quality Designations (RQD), percent recovery and compressive strength, cores were photographed. All laboratory testing can be found in **Appendix E**.

SECTION 05: SUBSURFACE CONDITIONS

The following sections provide general descriptions of the typical soil profile encountered at the proposed bridge abutments for each of the bridges. Specific soil conditions can be found in the boring logs located in the **Appendix D** of this SGR.

5.1 Soil and Groundwater Conditions

Eight (8) structure borings were drill along the Richards Street Bridge to determine the subsoils in the project area for the bridge widening and reconstruction. Two (2) soil borings were drilled at each bridge pier and abutment. Four (4) soil borings (BSB-060 thru BSB-063) are drilled on and through the existing bridge deck on both sides of the bridge on the southbound and northbound outside lanes. There are four (4) soil borings at the abutments on the northside and southside of the Richards Street Bridge (soil borings BSB-059, BSB-058, BSB-064 and BSB-065).

The soils in the approach soil borings (BSB-059, BSB-058, BSB-064 and BSB-065) that were encountered included, at the surface, a foot of topsoil or 2-in to 2-ft of asphalt with a subbase of 13-in to 2-ft of concrete or stone. A stiff to very stiff clay loam to sandy clay loam with brick and gravel fill was underlying the asphalt, stone and concrete. This cohesive fill layer is 5-ft to 7.5-ft thick. Below the fill is a clay, clay loam to silty clay layer that is medium stiff and very stiff in consistency with a trace of gravel. This layer is 2.5-ft to 12-ft thick. The final soil layer above bedrock is a dense to very dense sandy loam or sand, gravel and fractured rock that is 2.5-ft to 9-ft in thickness.

There are layers of high moisture contents in two (2) of the borings BSB-058 & BSB-064 (south and north abutments, respectively, on the east side of the bridge). In BSB-058 from 10.5-ft to 13-ft (EL. 525.9 to EL 523.4) below grade is buried topsoil with a moisture of 36%. In BSB-064 from a depth of 11.5-ft to 15-ft (EL. 525.3 to EL 521.8) in the silty clay fill layer has reported moistures of 30% to 33%.

The other soil borings (BSB-060 thru BSB-063) drilled through the concrete bridge deck that was approximately 0.7-ft to 0.8-ft thick, with an average of 0.75-ft (or 9-in). The water surface of the creek is approximately 19.2-ft to 21.3-ft from the base of the bridge deck. Visible under the creek water below the bridge, is bedrock. No soil samples were obtained from these soil borings.

All soil borings terminated in bedrock. All bedrock was observed to be Silurian System, Niagaran Services Dolomite. A total rock core length of 15-ft was obtained from each soil borings. The first run was obtained as 10-ft run and the second run as a 5-ft run. All rock cores had a high percentage of recovery from 92% to 100%, with an average of

98.4%. The RQDs of the cores were high at 71% to 100%, with an average of 86.8% which is a designation of excellent by RQD standards. Below, **Table 2**, illustrates the percentage recovery, RQDs, and compressive strength of the cores from each soil boring location.

TABLE 2 – ROCK CORE SUMMARY

Boring(s)	Grade Elevation (ft)	Top of Bedrock Elevation (ft)	No. of Run	Top Depth of Run (ft)	Length of Core (ft)	Recovery (%)	RQD (%)	Compressive Strength (tsf)
BSB-058	536.4	518.4	1	18.5	10	98	75	724
			2	28.5	5	92	92	1,118
BSB-059	538.3	520.3	1	20.5	10	100	52	696
			2	30.5	5	100	96	761
Pier 1 - W BSB-060	536.5	515.5	1	22	10	99	77	763
			2	32	5	100	100	713
Pier 1 - E BSB-061	538.0	516.0	1	24	10	99	71	479
			2	34	5	100	92	828
Pier 2 - W BSB-062	536.6	515.6	1	21.5	10	100	86	639
			2	31.5	5	100	100	742
Pier 2 - E BSB-063	538.0	515.5	1	23.5	10	97	87	725
			2	33.5	5	100	100	693
BSB-064	536.8	519.3	1	18.5	10	98	83	719
			2	28.5	5	100	100	967
BSB-065	538.4	520.9	1	18.5	10	97	84	315
			2	28.5	5	94	94	675

For the borings on the bridge deck (BSB-60 thru BSB-063), Hickory Creek was encountered. The water surface of the creek was encountered at elevations 516.4 to 516.6, approximately 19.1-ft to 20.7-ft from the base of the bridge deck. The creek varies in depth (0.4-ft to 1.1-ft) with bedrock visible beneath the water surface. Based on the coloration change of the soils from brown and gray to gray, we estimate the long-term water table at elevations 537 to 517. The water level of the creek annually is approximately 11.0-ft. Fluctuations in the amount of water accumulated and in the

hydrostatic water table can be anticipated depending upon variations in precipitation, and surface runoff.

SECTION 06: ANALYSES

6.1 Seismic Analysis

The seismic parameters shown below were determined per AASHTO LRFD Bridge Design Specifications (2002). The existing substructure will be reused, therefore seismic data is provided according to the 2002 AASHTO Standard Specifications. The project site is considered to be in a low seismic area and liquefiable layers and scour are not expected to impact the design of the new structure. We recommend that Site Coefficient (S) of 1.0 be used for seismic design based on site specific SPT tests, RIMAC tests, and the laboratory shear strength measurements of recovered soil samples. **Table 3 – Seismic Design** contains a summary of the seismic data to be used for design.

TABLE 3
SEISMIC DESIGN (APPROXIMATELY 475-YEAR RETURN PERIOD)

Description	Type	Value
Seismic Performance Category (SPC)	-	A
Soil Profile Type	-	I
Horizontal Bedrock Acceleration Coefficient	A	0.040 g
Site Coefficient	S	1.0

AASHTO LRFD Bridge Design Specifications was used to determine the design coefficients for the project site. Liquefiable layers are not expected to impact the design of retaining wall structure.

6.2 Settlement Analysis

Using soil conditions which indicate stiff to very stiff clay loam fill in the borings BSB-058, BSB-059 and BSB-064 and BSB-065 (the north and south abutments), we calculate settlement up to be minimal on the approach slabs with settlements calculated to be under 0.5-in. The pier locations (with soil borings BSB-060 thru BSB-063) only have bedrock in their locations and the settlement is calculated to also be less than 0.5-inches.

6.3 Slope Stability Analysis

Based on the slope stability analyses, the FOS for both short-term (undrained) and long-term (drained) conditions at the abutments are greater than 1.5 and meet the FOS requirements for a fill embankment per IDOT requirements. There are no slope stability concerns for the middle piers of Richards Street Bridge over Hickory Creek.

Graphical outputs are shown in **Appendix F** of this report. The following **Table 4** shows the summary of the global stability factor of safety (FOS) calculated for the short-term and long-term soil conditions of the proposed abutments.

TABLE 4 – SUMMARY OF SLOPE STABILTY

Soil Boring Used for Slope Stability Analysis [1]	Location on Bridge	Factor of Safety (FOS) [2]	
		Undrained Condition	Drained Condition
BSB-058	SW Corner	2.73	1.69
BSB-059	SE Corner	3.11	1.56
BSB-064	NW Corner	2.13	1.63
BSB-065	NE Corner	2.89	1.74

Notes: 1. Boring used for Slope Stability Analysis was based on the apparent worst-case soil profile within the proposed roadway station limits.
2. STABL (v.3.0) – Bishop Method was used for Global Slope Stability analysis.

6.4 Bearing Capacity

Proposed footing elevations for the piers have been determined based on the progress drawings provided by EXP. See pile calculation tables and graphs in **Appendix G**. GEO assumes the abutment piles will be driven to the top of rock or refusal of the pile.

6.5 Scour Estimation at Bridge Foundation

The existing abutments are protected by retaining walls. Therefore, the Design Scour Elevations for the abutments are recommended to be the existing bottom of abutment elevations:

South Abutment: EL 527.16
North Abutment: EL 527.19

The existing piers have pier scour protection systems. The Design Scour Elevations for the piers is the bottom of the protection system which is EL 514.71 for both piers.

SECTION 07: RECOMMENDATIONS

7.1 Deep Foundation H-Pile Recommendations

Presently for the abutments, HP 10 x 42 steel piles are used and extend to refusal (approximately 14-ft below grade). Steel H-piles are still recommended option for the deep foundation system for the Richards Street Bridge to widen the structure. These steel H-piles should be according to AASHTO M270 Grade 50. Due to the presence of fractured rock below 13-ft to 15.5-ft depths, per the soil boring logs, pile shoes are recommended for pile driving. The results of the calculations for factored resistance available (FRA) and nominal required bearing (NRB) corresponding to various estimated pile lengths are shown in **Appendix G** of this report.

Considering so few piles will be required, test piles may be omitted if the provided pile lengths are 5-ft greater than what is required per this report. This will be reduce the material acquisition time during construction.

The pile size and capacity selected should be based on economic considerations and the loads imposed on the structures. No downdrag on the piles is anticipated.

Regarding pile spacing, the minimum pile spacing should be 3 times the pile diameter. The maximum pile spacing should be limited to 3.5 times the effective footing thickness plus 1-ft and not exceeding 8-ft. This range for pile spacing is according to the IDOT Bridge Manual (2012) section 3.10.1.11. For piles placed in accordance with the aforementioned pile spacing, group effect should be ignored.

7.2 Spread Footing Recommendation

The existing two (2) piers are reinforced concrete wall-type piers that have spread footings on rock with additional footing protection keyed into rock, which were added as part of the channel improvement in 2000. The existing footings have been placed at minimum depth 2-feet into the bedrock. The present spread footing is 4-ft wide. The existing maximum applied load on the pier footing per the original plans is 3-tsf.

If soils with less than adequate bearing strength are noted at the foundation level during footing construction, the weaker soils encountered at the base of the footings should be undercut to reach suitable bearing soils, and the undercut area filled with lean concrete or a suitable compacted crushed stone structural fill material. Suitable crushed stone fill materials include materials meeting the gradation requirements of IDOT CA-1, CA-6 and CA-7. Estimated settlement on properly prepared subgrade is calculated to be on the order of 1/2 inch. The horizontal limits of any undercuts should extend 2-ft beyond the footprints of the pier spread footing in the north, south and east directions. Undercutting is not needed beneath the existing pier spread footing.

7.3 Approach Slab Recommendations

The new approach slab will be supported on footings 10-in thick and level out to out per the IDOT Bridge Manual (2012) section 3.2.12. The recommended maximum factored bearing resistance for the approach slabs was calculated to be 3-tsf for the north approach slab and 6-tsf for the south abutment. The factored bearing resistance used for the calculations for the approach slab was 0.50 for footing on medium stiff to very stiff clay loam fill per AASHTO 4th Edition Article 10.5.5.2.2. For design of the approach slab footing ("sleeper slab") system, the bearing soils, may be considered to be the new embankment fill which should consist of an inorganic approved material, compacted to a minimum 95% of AASHTO T-99 (ASTM D-698), standard proctor method. Moisture levels for fill material should be maintained within a maximum +/- 3% of the optimal moisture content or as directed by the engineer. An experienced engineer should oversee the placement and compaction of embankment fill to ensure proper lift thickness, moisture content and densities are achieved in order to reduce the potential for settlement.

7.4 Embankment Recommendations

The majority of the subgrade consists of silty clay/clay loam soils interstratified with sand/sandy clay loam/silty loam/sand, gravel and fractured rock soils. The new fill is expected to consist of cohesive and non-cohesive material. We recommend a shrinkage factor of 15% for cohesive or granular soils.

Settlement for the north and south abutments was calculated to be 0.5-in or less.

Provided the construction schedule allows sufficient time for settlements to occur prior to paving, one option would be to place the embankment fill well in advance of the bridge construction and monitor settlements to confirm that 90% of the total settlement occurs before paving.

Prior to placing any borrow fill at the site, it is recommended that the exposed surface at or near grade be proof-rolled with the heaviest available equipment to determine if there are any localized deposits of soft or unsuitable materials. During the proof-rolling procedure, the exposed surface is rolled with the heaviest piece of construction equipment available at the site, such as a heavily loaded tandem axle dump truck having a gross weight of not less than 25-tons. Any such deposits, as observed by deflection of the subgrade under the wheels of the proof-rolling equipment, should be removed and replaced with an approved fill free of organic matter and debris. The silt and silty clay loam soils are sensitive to moisture changes and some softening/disturbance of the exposed soils should be expected following periods of precipitation. If any remediation is required at the time of construction, it may include undercutting and placement of a stabilization stone such as IDOT gradation CA-1 or PGEs materials or approved fill material.

In addition, borrow and excavation material should be in accordance with Section 6.2 of the IDOT Geotechnical Manual.

Fill materials placed at the site should consist of an inorganic approved material, compacted to a minimum 95% of AASHTO T-99 (ASTM D-698), standard proctor method. Moisture levels for fill material should be maintained within a maximum +/- 3% of the optimal moisture content or as directed by the engineer.

Construction of the proposed roadway improvements should be performed in accordance with the current Illinois Department of Transportation (IDOT) 2022 Standard Specifications for Road and Bridge Construction and 2015 Geotechnical Manual. In particular, refer to Section 202, “Earth and Rock Excavation”, Section 205, “Embankment” and Section 301, “Subgrade Preparation”.

7.5 Lateral Resistance Recommendations

For design of the lateral forces on the drilled shafts or piles, the following tables may be used for design of the deep foundation system or temporary earth retaining systems.

TABLE 5 – SOIL PARAMETERS FROM LATERAL EARTH PRESSURES/RESISTANCE
North Abutment (BSB-064 & BSB-065)

Material (Approx. Elevation, ft)	Unit Weight (pcf)	Undrained Friction Angle (°)	Undrained Cohesion (psf)	Drained Friction Angle (°)	Drained Cohesion (psf)	Lateral Modulus of Subgrade Reaction (pci) [1]	Strain	K_0	K_A	K_P
Asphalt & Concrete (537 to 535)			--		0		--			
Very Loose FILL Clay Loam & Stone to Clayey Gavel & Stone (535 to 533)	115	27	--	27	0	25	--	0.5	0.38	2.7
Medium Stiff to Stiff FILL Clay Loam to Silty Clay with Stone (533 to 520)	120	0	1,300	26	0	375	0.008	0.6	0.39	2.6
Very Stiff Silty Clay (520 to 517)	125	0	2,500	28	0	800	0.006	0.5	0.36	2.8
Medium Dense to Very Dense Sand & Gravel to Gravel to Fractured Rock (517 to 515)	130	30	--	30	0	150	--	0.5	0.33	3.0

Notes: 1. Values recommended for use in design from L-pile Software Manual.
2. Lateral earth pressure co-efficient as per AASHTO 3.11.5.8
3. Top of bedrock is observed to the EL. 520-ft

TABLE 6 – SOIL PARAMETERS FROM LATERAL EARTH PRESSURES/RESISTANCE
South Abutment (BSB-058 & BSB-069)

Material (Approx. Elevation, ft)	Unit Weight (pcf)	Undrained Friction Angle (°)	Undrained Cohesion (psf)	Drained Friction Angle (°)	Drained Cohesion (psf)	Lateral Modulus of Subgrade Reaction (pci) [1]	Strain	K_0	K_A	K_P
Stiff to Very Stiff FILL Clay to Clay Loam (537 to 528)	125	0	3,000	28	0	975	0.005	0.5	0.36	2.8
Stiff Silty Clay to Buried Topsoil (528 to 525)	120	0	1,700	27	0	600	0.006	0.5	0.37	2.7
Medium Dense to Very Dense Sandy Loam to Sand & Gravel & Fractured Rock (525 to 520)	130	30	--	30	0	150	--	0.5	0.33	3.0

Notes: 1. Values recommended for use in design from L-pile Software Manual.
2. Lateral earth pressure co-efficient as per AASHTO 3.11.5.8.
3. Top of bedrock is observed below EL. 519-ft.

SECTION 08: CONSTRUCTION CONSIDERATIONS

For safety reasons and construction purposes, a temporary, tradition cofferdam should be utilized. A Type 1 Cofferdam is recommended because the Estimated Water Surface Elevation (EWSE) is higher than the bottom elevation of the substructure by six feet or less (per IDOT Bridge Manual, January 2012). As the water surface elevation is approximately 518.6-ft, this project does fall in Type 1 category. This type of cofferdam can be constructed by sandbagging or with a fabric membrane and steel metal frame. A concrete seal coat should be considered for design in case the bedrock exposed is very fractured and porous. If a concrete seal coat is used, a Type 2 cofferdam will be used.

IDOT temporary sheet pile wall design tables may not be used for temporary soil retention, and the designer should inform the contractor for the need of a temporary soil retention system.

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.

We anticipate the groundwater level to be typically above the bottom of the pier footings, and that typically sump pump and pit procedures should keep the site in the dry; however, should Hickory Creek water surface elevation exceed 16-ft, the site may need more advanced means of dewatering as rainfall increases in wet weather seasons.

SECTION 09: 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

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

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.

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

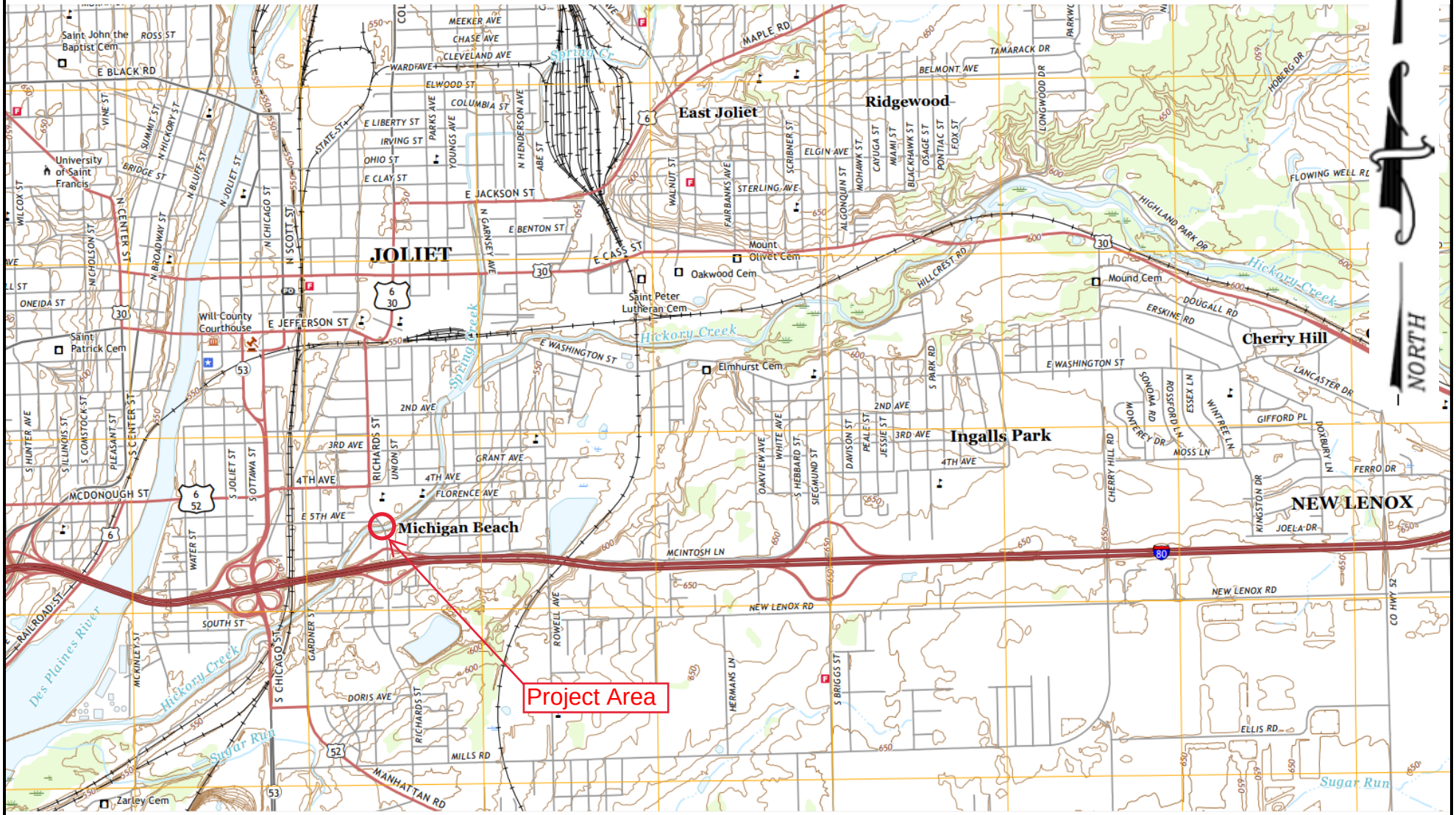
WATER LEVEL MEASUREMENT SYMBOLS

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

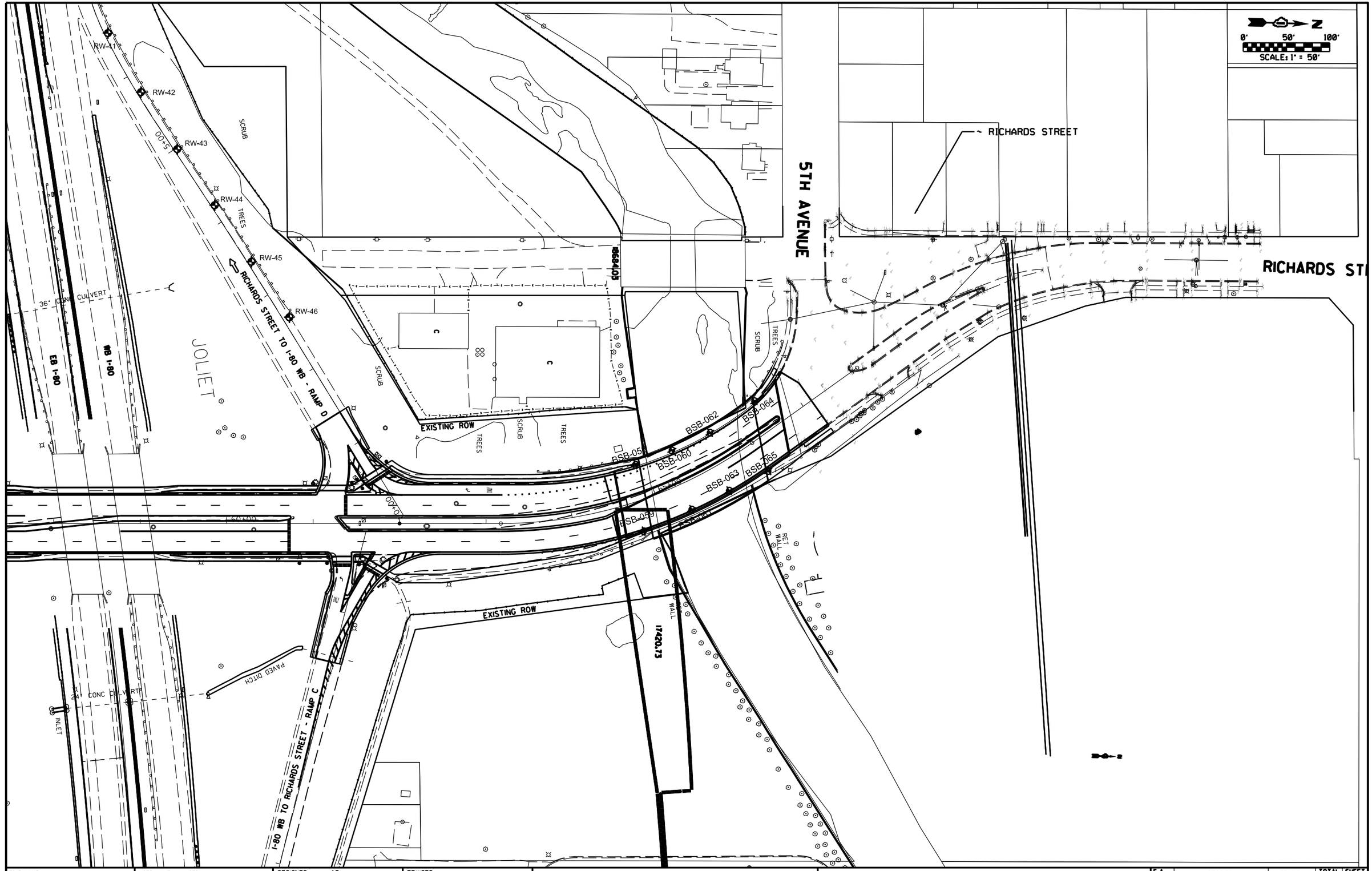
SITE LOCATION MAP



SITE LOCATION MAP **GEOTECHNICAL RECOMMENDATION** **Richard Street over Hickey Creek** **Improvements & Reconstruction** **Will County, Joliet, IL**	**Geo Services, Inc.** Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	DRAWN BY	AGW
		APPROVED BY	AJP
		DATE	December 17th, 2021
		GEO JOB No.	20012
		SCALE	NTS

APPENDIX C

BORING LOCATION PLAN & PROFILE



FILE NAME = $FILE$	USER NAME = $USER$	DESIGNED - AT	REVISED -
		DRAWN - RWC	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - AJP	REVISED -
	PLOT DATE = $DATE$	DATE - $DATE	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SOIL BORING PLAN
RICHARDS STREET (SN099-0123)

SCALE: 1" = 50' | SHEET 1 OF 1 | STA. 58+00 TO STA. 67+11

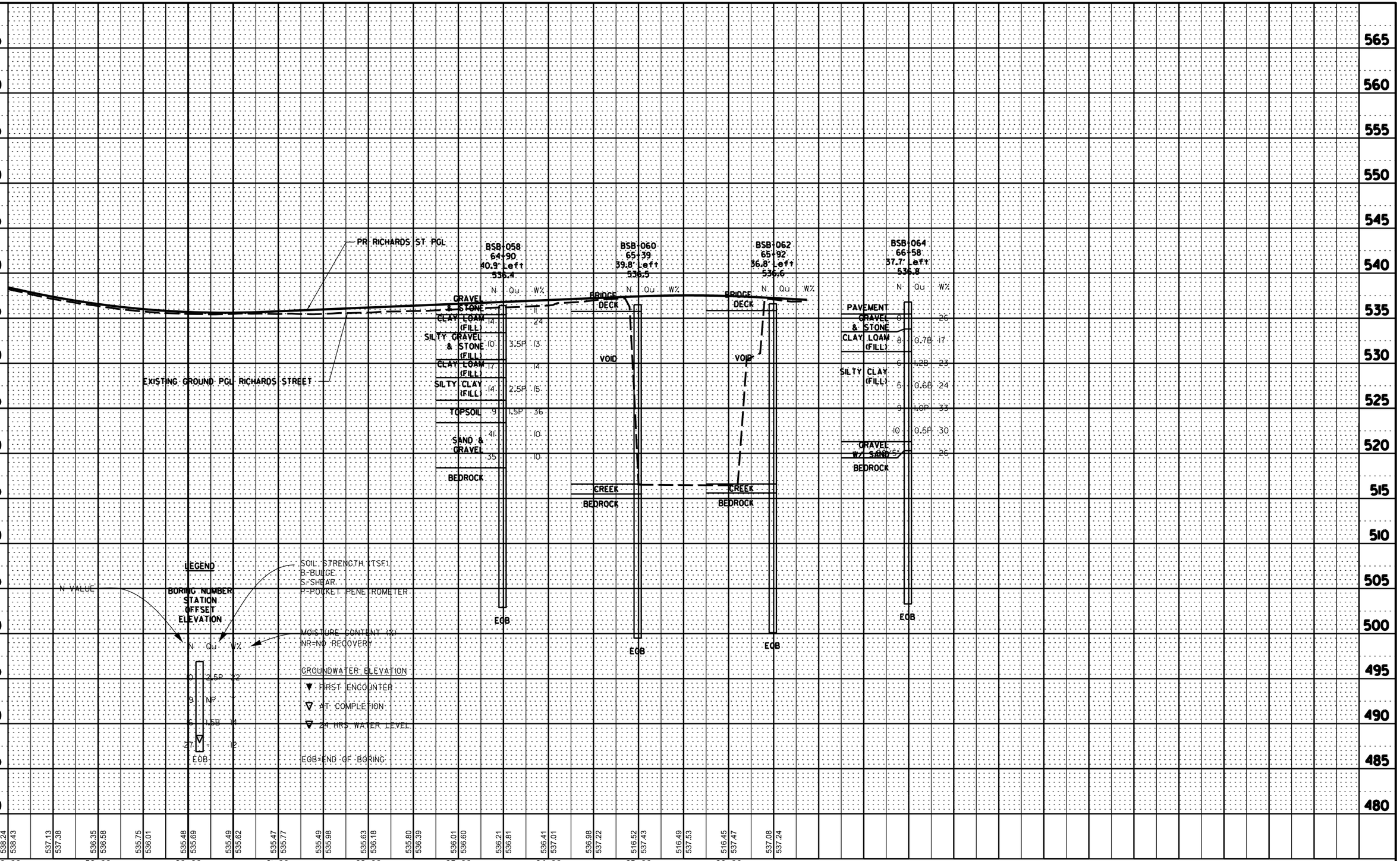
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	$TOT	$SHT-I
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

PLAN

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

PROFILE

DATE	BY	
		SURVEYED
		PLOTTED
		DRAWN / CHECKED
		QUANTITIES CHECKED
		B.M. NOTED
		STRUCTURE NOTATNS CHKD
		NOTE BOOK
		NO.



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		CHECKED - RWC	REVISED -
	PLOT SCALE = $SCALE$	DRAWN - AJP	REVISED -
	PLOT DATE = $DATE$	CHECKED - $DATE	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SOIL BORING PROFILE
SB RICHARDS STREET (SN 099-0123)

SCALE: 1" = 50' | SHEET 1 OF 1 | STA. 58+00 TO STA. 66+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	$TOT	$SHT-I
		CONTRACT NO.		
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		

PLAN
SURVEYED
PLOTTED
QUANTITY CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
CROSS SECS CHECKED
BM. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

PR RICHARDS ST PGL

EXISTING GROUND PGL RICHARDS STREET

BSB-059
64+74
55.1' Right
538.3

	N	Qu	W%
PAVEMENT	5		
GROUND STONE	9		
CLAY LOAM (FILL	16	2.0P	13
	24	4.0P	17
SILTY CLAY	6	2.0P	24
SANDY LOAM	7		17
SAND, GRAVEL & FRACTURED ROCK	90/5"		7
	16		12
BEDROCK	90/1"		8

EOB

BSB-061
65+31
31.9' Right
538.0

	N	Qu	W%
BRIDGE DECK			
VOID			
CREEK			
BEDROCK			

EOB

BSB-063
65+77
32.3' Right
538.0

	N	Qu	W%
BRIDGE DECK			
VOID			
CREEK			
BEDROCK			

EOB

BSB-065
66+24
37.3' Right
536.4

	N	Qu	W%
PAVEMENT	5		18
CLAY LOAM (FILL	10	3.0P	19
	18	2.5P	14
	8	1.5P	17
SILTY CLAY	13	2.5P	23
SAND & GRAVEL	22		9
FRACTURED ROCK	11		13
BEDROCK			

EOB

LEGEND

BORING NUMBER
STATION
OFFSET
ELEVATION

N VALUE

N Qu W%
0 2.5P 22
9 NP
6 1.5P 18
27 ▽ 12
EOB

SOIL STRENGTH (TSF)
B-BULGE
S-SHEAR
P-POCKET PENETROMETER

MOISTURE CONTENT (%)
NR=NO RECOVERY

GROUNDWATER ELEVATION
▼ FIRST ENCOUNTER
▽ AT COMPLETION
▽ 24 HRS. WATER LEVEL

EOB=END OF BORING

538.24	538.43	537.13	537.38	536.35	536.58	535.75	536.01	535.48	535.69	535.49	535.62	535.47	535.77	535.49	535.98	535.63	536.18	535.80	536.39	536.01	536.60	536.21	536.81	536.41	537.01	536.98	537.22	516.52	537.43	516.49	537.53	516.45	537.47	537.08	537.24
58+00			59+00				60+00				61+00				62+00				63+00				64+00				65+00				66+00					

FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED - AT	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	SOIL BORING PROFILE NB RICHARDS STREET (SN 099-0123)
		CHECKED - RWC	REVISED -		
	PLOT SCALE = $SCALE$	DRAWN - AJP	REVISED -		
	PLOT DATE = $DATE$	CHECKED - $DATE	REVISED -		

SCALE: 1" = 50' | SHEET 1 OF 1 | STA. 58+00 TO STA. 66+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	$TOT	$SHT-I
		CONTRACT NO.		
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		

APPENDIX D

BORING LOGS

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
805 Amherst Court, Suite 204
Naperville, Illinois 60565
(630) 355-2818

SOIL BORING LOG

GSI Job No. 20012

Page 1 **of** 1

Date 1/4/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-058
Northing 1765845
Easting 1055464
Ground Surface Elev. 536.4 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 (%)	DRY DENSITY (pcf)
CLAYEY GRAVEL & STONE-dark gray					
535.4				11	
CLAY LOAM-brown-very stiff (Fill)		4			
		10		24	
		4			
533.4					
SILTY SAND, GRAVEL & STONE-dark brown & black-medium dense (Fill)		4			
		5	3.50	13	
	-5	5	P		
530.4					
CLAY LOAM-brown & gray-very stiff (Fill)		7			
		11		14	
		6			
528.4					
SILTY CLAY with Stone-dark gray to black-stiff (Fill)		3			
		6	2.50	15	
	-10	8	P		
525.9					
TOPSOIL-black-loose		4			
		5	1.50	36	
		4	P		
523.4					
SAND & GRAVEL-brown & gray-dense		21			
		25		10	
	-15	16			
		16			
		20		10	
		15			
518.4					
Drillers Observation: Apparent Bedrock 517.9					
Borehole continued with rock coring.					
	-20				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

Geo Services, Inc.
Geotechnical, Environmental & Civil Engineering
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Naperville, Illinois 60565
(630) 355-2838

ROCK CORE LOG

GSI Job No. 20012

Page 1 **of** 1

Date 1/4/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-058
Northing 1765845
Easting 1055464
Ground Surface Elev. 536.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 518.38 **ft**
Begin Core Elev. 517.88 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-18.5' to -28.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray mottled gray & porous with horizontal bedding & rust staining to -24.0' becoming light gray & fined grained with some chert replacement nodules. Some horizontal fractures throughout.	517.9	-20	1	98	75		724.00
	507.9	-25					
RUN 2 (-28.5' to -33.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures throughout.		-30	2	92	92		1118.00
	502.9						
End Of Boring @ -33.5'. Boring backfilled with cuttings.		-35					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 1/4/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-058
Northing 1765845
Easting 1055464
Ground Surface Elev. 536.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 518.4 **ft**
Begin Core Elev. 517.9 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 1/4/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-058
Northing 1765845
Easting 1055464
Ground Surface Elev. 536.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 518.4 **ft**
Begin Core Elev. 517.9 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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. 20012

Page 1 **of** 1

Date 12/28/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-059
Northing 1765856
Easting 1055541
Ground Surface Elev. 538.3 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 (%)	DRY DENSITY (pcf)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)
1.25" ASPHALT, 14.75" CONCRETE					517.8				
537.0					Borehole continued with rock coring.				
CRUSHED STONE	3								
	2		9						
535.3	1								
CLAY LOAM with Stone-gray-very stiff to hard (Fill)	7								
	10	2.00	13						
-5	6	P			-25				
	6								
	8	4.00	17						
	16	P							
530.3									
SILTY CLAY-dark brown to black-very stiff	3								
	4	2.00	24						
-10	2	P			-30				
527.8									
SANDY LOAM-brown	3								
	3		17						
525.3	4								
SAND, GRAVEL & FRACTURED ROCK-brown	8								
	27		7						
-15	50/5"				-35				
	14								
	10		12						
	16								
520.3									
Drillers Observation: Apparent Bedrock	50/1"								
			8						
-20					-40				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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(630) 355-2838

ROCK CORE LOG

GSI Job No. 20012

Date 12/28/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT **CORING BARREL TYPE & SIZE** NX Double Swivel-10 ft

BORING NO. BSB-059
Northing 1765856
Easting 1055541
Ground Surface Elev. 538.3 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.31 **ft**
Begin Core Elev. 517.81 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-20.5' to -30.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Numerous horizontal & vertical fractures throughout.	517.8	1	100	52		696.00
	-25					
	-30					
RUN 2 (-30.5' to -35.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures throughout.	507.8	2	100	96		761.00
	-35					
End Of Boring @ -35.5'. Boring backfilled with cuttings.	502.8					
	-40					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Geo Services, Inc.
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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 12/28/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-059
Northing 1765856
Easting 1055541
Ground Surface Elev. 538.3 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.3 **ft**
Begin Core Elev. 517.8 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 12/28/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-059
Northing 1765856
Easting 1055541
Ground Surface Elev. 538.3 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.3 **ft**
Begin Core Elev. 517.8 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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. 20012

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-060
Northing 1765886
Easting 1055446
Ground Surface Elev. 536.5 ft

Surface Water Elev. 20.33 ft
Stream Bed Elev. 21.00 ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)	Description
0					CONCRETE BRIDGE DECK
535.7					VOID
-5					
-10					
-15					
516.6					CREEK *(continued)*
-20					
515.5					Drillers Observation: Apparent Bedrock
514.5					Borehole continued with rock coring.
-25					
-30					
-35					
-40					

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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(630) 355-2838

ROCK CORE LOG

GSI Job No. 20012

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-060
Northing 1765886
Easting 1055446
Ground Surface Elev. 536.5 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.48 **ft**
Begin Core Elev. 514.48 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-22.0' to -32.0') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures throughout.	514.5		1	99	77		763.00
		-25					
		-30					
	504.5						
RUN 2 (-32.0' to -37.0') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures & chert nodules throughout.			2	100	100		713.00
		-35					
	499.5						
End Of Boring @ -37.0'. Boring backfilled with cuttings.							
		-40					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-060
Northing 1765886
Easting 1055446
Ground Surface Elev. 536.5 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.5 **ft**
Begin Core Elev. 514.5 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-060
Northing 1765886
Easting 1055446
Ground Surface Elev. 536.5 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.5 **ft**
Begin Core Elev. 514.5 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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. 20012

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-061
Northing 1765911
Easting 1055514
Ground Surface Elev. 538.0 ft

Surface Water Elev. 21.33 ft
Stream Bed Elev. 22.00 ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)
CONCRETE BRIDGE DECK 537.3					VOID *(continued)*				
VOID					516.4 CREEK 516.0				
					Drillers Observation: Apparent Bedrock				
					514.0				
-5					Borehole continued with rock coring. -25				
-10					-30				
-15					-35				
-20					-40				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

GSI Job No. 20012

Page 1 **of** 1

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-061
Northing 1765911
Easting 1055514
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 516.02 **ft**
Begin Core Elev. 514.02 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-24.0' to -34.0') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures & chert nodules throughout.	514.0	-25	1	99	71		479.00
	504.0	-30					
RUN 2 (-34.0' to -39.0') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures & chert nodules throughout.		-35	2	100	92		828.00
	499.0						
End Of Boring @ -39.0'. Boring backfilled with cuttings.		-40					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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Naperville, Illinois 60565
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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/21/21

PROJECT

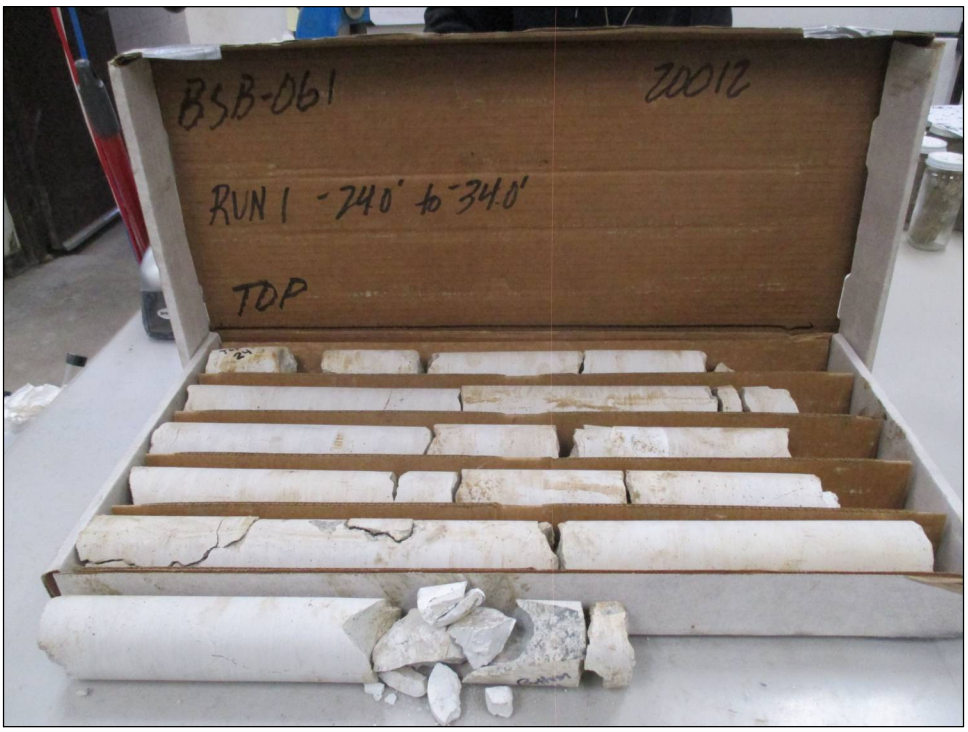
LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT **CORING BARREL TYPE & SIZE** NX Double Swivel-10 ft

BORING NO. BSB-061
Northing 1765911
Easting 1055514
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 516.0 **ft**
Begin Core Elev. 514.0 **ft**



Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Page 1 **of** 1

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-061
Northing 1765911
Easting 1055514
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 516.0 **ft**
Begin Core Elev. 514.0 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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GSI Job No. 20012

SOIL BORING LOG

Date 12/30/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-062
Northing 1765930
Easting 1055425
Ground Surface Elev. 536.6 ft

Surface Water Elev. 20.00 ft
Stream Bed Elev. 21.00 ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)
CONCRETE BRIDGE DECK 535.8					CREEK 515.6				
VOID					Drillers Observation: Apparent Bedrock 515.1				
					Borehole continued with rock coring.				
-5					-25				
-10					-30				
-15					-35				
516.6 -20					-40				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

GSI Job No. 20012

Date 12/30/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT **CORING BARREL TYPE & SIZE** NX Double Swivel-10 ft

BORING NO. BSB-062
Northing 1765930
Easting 1055425
Ground Surface Elev. 536.6 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.57 **ft**
Begin Core Elev. 515.07 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-21.5' to -31.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures throughout.	515.1		1	100	86		639.00
		-25					
		-30					
	505.1						
RUN 2 (-31.5' to -36.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures & chert nodules throughout.			2	100	100		742.00
		-35					
	500.1						
End Of Boring @ -37.0'. Boring backfilled with cuttings.							
		-40					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/30/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-062
Northing 1765930
Easting 1055425
Ground Surface Elev. 536.6 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.6 **ft**
Begin Core Elev. 515.1 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/30/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-062
Northing 1765930
Easting 1055425
Ground Surface Elev. 536.6 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.6 **ft**
Begin Core Elev. 515.1 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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GSI Job No. 20012

SOIL BORING LOG

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-063
Northing 1765954
Easting 1055491
Ground Surface Elev. 538.0 ft

Surface Water Elev. 22.00 ft
Stream Bed Elev. 22.50 ft

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DRY DENSITY (pcf)
CONCRETE BRIDGE DECK 537.3					VOID *(continued)*				
VOID					516.6 CREEK				
					515.5 Drillers Observation: Apparent Bedrock				
					514.5 Borehole continued with rock coring.				
-5					-25				
-10					-30				
-15					-35				
-20					-40				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

GSI Job No. 20012

Page 1 **of** 1

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-063
Northing 1765954
Easting 1055491
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.51 **ft**
Begin Core Elev. 514.51 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-23.5' to -33.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures throughout.	514.5		1	97	87		725.00
		-25					
		-30					
	504.5						
RUN 2 (-33.5' to -38.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding. Some horizontal fractures & chert nodules throughout.			2	100	100		693.00
		-35					
	499.5						
End Of Boring @ -38.5'. Boring backfilled with cuttings.							
		-40					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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

ROCK CORE PHOTO

GSI Job No. 20012

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-063
Northing 1765954
Easting 1055491
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.5 **ft**
Begin Core Elev. 514.5 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/21/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-063
Northing 1765954
Easting 1055491
Ground Surface Elev. 538.0 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 515.5 **ft**
Begin Core Elev. 514.5 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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. 20012

Page 1 **of** 1

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-064
Northing 1765980
Easting 1055387
Ground Surface Elev. 536.8 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 (%)	DRY DENSITY (pcf)
2.0" ASPHALT, 14.0" CONCRETE					
535.5		0			
CLAYEY GRAVEL & STONE-brown-very loose		0 0		26	
533.8					
CLAY LOAM-brown & gray-medium stiff (Fill)		1			
	-5	2 6	0.70 B	17	
531.3					
SILTY CLAY with Stone-dark brown & black-medium stiff to stiff (Fill)		4			
		2 4	1.20 B	23	
		4			
	-10	2 3	0.60 B	24	
		2			
		4 5	1.00 P	33	
		1			
	-15	2 8	0.50 P	30	
521.3					
GRAVEL with Sand-brown & gray-very dense		50/5"			
520.3					
Drillers Observation: Apparent Bedrock				26	
518.3					
Borehole continued with rock coring.					
	-20				

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/20/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

GSI Job No. 20012

Page 1 **of** 1

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-064
Northing 1765980
Easting 1055387
Ground Surface Elev. 536.8 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 519.32 **ft**
Begin Core Elev. 518.32 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-18.5' to -28.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray to gray with horizontal to wavy bedding. Weathered with rust staining. Highly fractured throughout with some chert nodules.	518.3		1	98	83		719.00
		-20					
		-25					
	508.3						
RUN 2 (-28.5' to -33.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray to gray with horizontal to wavy bedding. Weathered with rust staining to -57.0'. Highly fractured throughout with some chert nodules.			2	100	100		967.00
		-30					
	503.3						
End Of Boring @ -33.5'. Boring backfilled with cuttings.							
		-35					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-064
Northing 1765980
Easting 1055387
Ground Surface Elev. 536.8 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 519.3 **ft**
Begin Core Elev. 518.3 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 12/29/21

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-064
Northing 1765980
Easting 1055387
Ground Surface Elev. 536.8 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 519.3 **ft**
Begin Core Elev. 518.3 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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. 20012

Page 1 **of** 1

Date 1/18/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

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

CLIENT

BORING NO. BSB-065
Northing 1765998
Easting 1055467
Ground Surface Elev. 538.4 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 (%)	DRY DENSITY (pcf)	
2.25" ASPHALT, 13.25" CONCRETE					
537.1					
CLAY LOAM & STONE-gray-loose (Fill)	1				
	2 3		18		
535.4					
CLAY LOAM-brown & gray spotted black-stiff to very stiff (Fill)	4				
	4 6	3.00 P	19		
-5					
	4				
	9 9	2.50 P	14		
	2				
	3 5	1.50 P	17		
-10					
527.9					
SILTY CLAY-black-very stiff	3				
	5 8	2.50 P	23		
525.4					
SAND & GRAVEL-brown-medium dense	5				
	9 13		9		
-15					
522.9					
FRACTURED ROCK-brown-medium dense	7				
	5 6		13		
520.9					
Drillers Observation: Apparent Bedrock					
519.9					
Borehole continued with rock coring.					
-20					

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 1/28/22

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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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ROCK CORE LOG

GSI Job No. 20012

Page 1 **of** 1

Date 1/18/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-065
Northing 1765998
Easting 1055467
Ground Surface Elev. 538.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.89 **ft**
Begin Core Elev. 519.89 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
RUN 1 (-18.5' to -28.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray mottled gray & porous with horizontal bedding to -21.8' becoming fine grained with some chert replacement nodules. Some horizontal fractures throughout.	519.9 509.9	-20 -25	1	97	84		315.00
RUN 2 (-28.5' to -33.5') SILURIAN SYSTEM, NIAGARAN SERIES DOLOMITE Light gray & fine grained with horizontal bedding, some chert replacement nodules.	504.9	-30	2	94	94		675.00
End Of Boring @ -33.5'. Boring backfilled with cuttings.		-35					

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
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

ROCK CORE PHOTO

GSI Job No. 20012

Date 1/18/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-065
Northing 1765998
Easting 1055467
Ground Surface Elev. 538.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.9 **ft**
Begin Core Elev. 519.9 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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ROCK CORE PHOTO

GSI Job No. 20012

Date 1/18/22

PROJECT

LOCATION I-80 from Chicago Street to US Route 30

COUNTY Will **CORING METHOD** Rotary Wash

CLIENT

CORING BARREL TYPE & SIZE NX Double Swivel-10 ft

BORING NO. BSB-065
Northing 1765998
Easting 1055467
Ground Surface Elev. 538.4 **ft**

Core Diameter 2 **in**
Top of Rock Elev. 520.9 **ft**
Begin Core Elev. 519.9 **ft**

Color pictures of the cores Yes
Cores will be stored for examination until 5 yrs after const.
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

APPENDIX E

LABORATORY 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

Project Name: I-80 Phase 2
Location: Richard Street Bridge (SN 099-0123)
County: Will
Sample Type: Drilled Bedrock Core Sample

Date: 2/15/22
Job No.: 20012
Tested By: AGW

Sample No.	Depth (ft)	Length (in)	Diameter (in)	Weight (g)	Load (lbs)	Area (in^2)	Unit Weight ($lbs\ ft^3$)	Compressive Strength (tsf)	Compressive Strength (psi)
BSB-058 Run 1	19.1	4.084	2.046	578.3	33060	3.29	164.0	724	10055
BSB-058 Run 2	29.4	4.090	2.040	595.9	50770	3.27	169.7	1118	15533
BSB-059 Run 1	20.6	4.104	2.061	585.0	32240	3.34	162.7	696	9664
BSB-059 Run 2	33.9	4.108	2.056	599.3	35070	3.32	167.3	761	10563
BSB-060 Run 1	22.3	4.124	2.048	593.9	34890	3.29	166.5	763	10591
BSB-060 Run 2	32.5	4.127	2.045	594.0	32520	3.28	166.9	713	9901
BSB-061 Run 1	24.8	4.163	2.047	598.4	21890	3.29	166.3	479	6651
BSB-061 Run 2	34.1	4.099	2.049	542.1	37930	3.30	152.7	828	11503
BSB-062 Run 1	21.8	4.089	2.044	587.5	29120	3.28	166.7	639	8874
BSB-062 Run 2	31.9	4.083	2.045	577.6	33860	3.28	164.0	742	10309
BSB-063 Run 1	33.6	4.119	2.048	599.5	33150	3.29	168.2	725	10063
BSB-063 Run 2	34.4	4.105	2.044	599.3	31590	3.28	169.4	693	9627
BSB-064 Run 1	18.8	4.059	2.059	586.6	33270	3.33	165.3	719	9992
BSB-064 Run 2	28.6	4.088	2.057	605.2	44620	3.32	169.6	967	13427
BSB-065 Run 1	19.8	4.081	2.048	579.9	14410	3.29	164.2	315	4374
BSB-065 Run 2	29.1	4.084	2.043	588.1	30730	3.28	167.3	675	9374

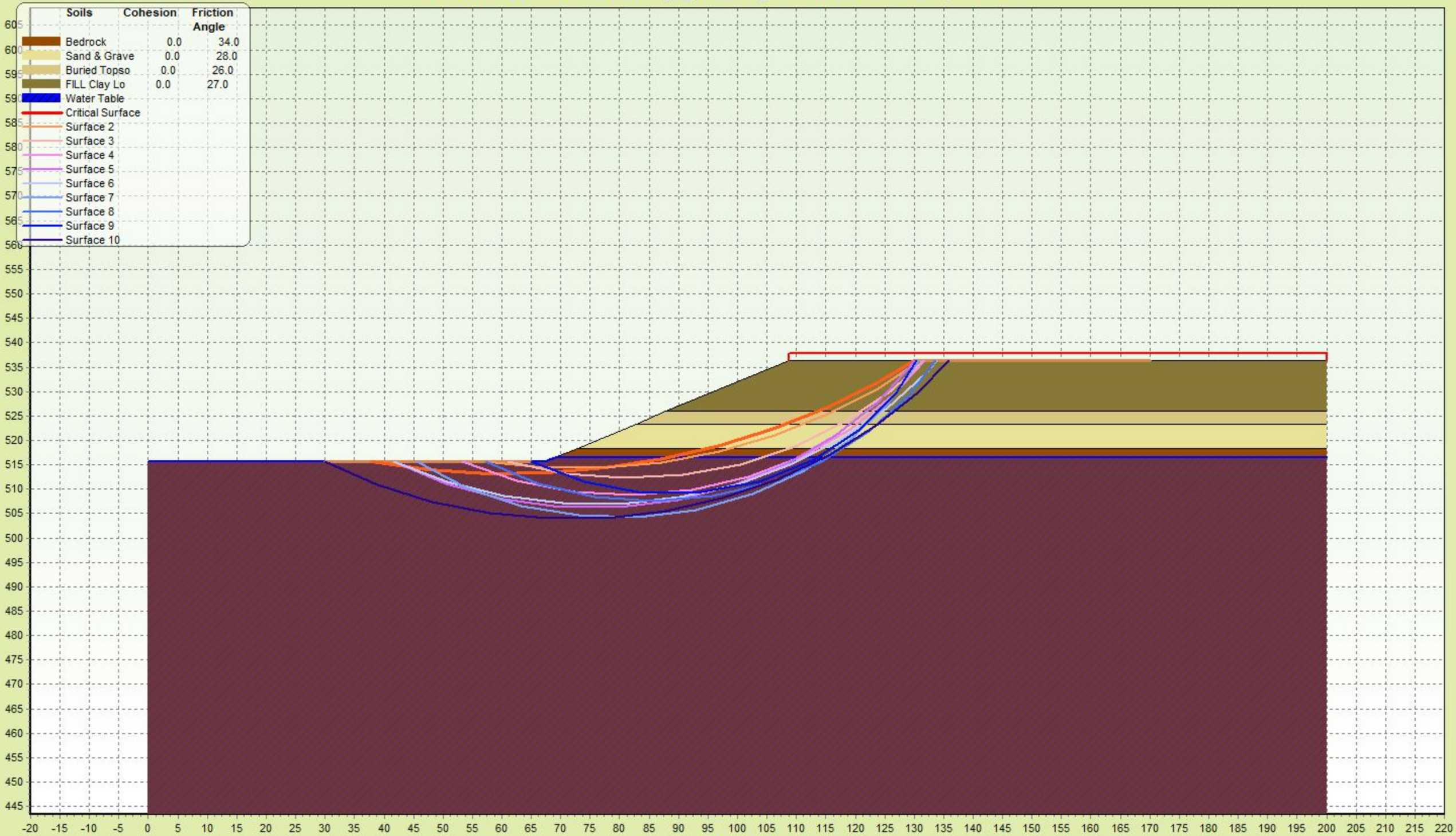
APPENDIX F

SLOPE STABILITY OUTPUT

(STABL)

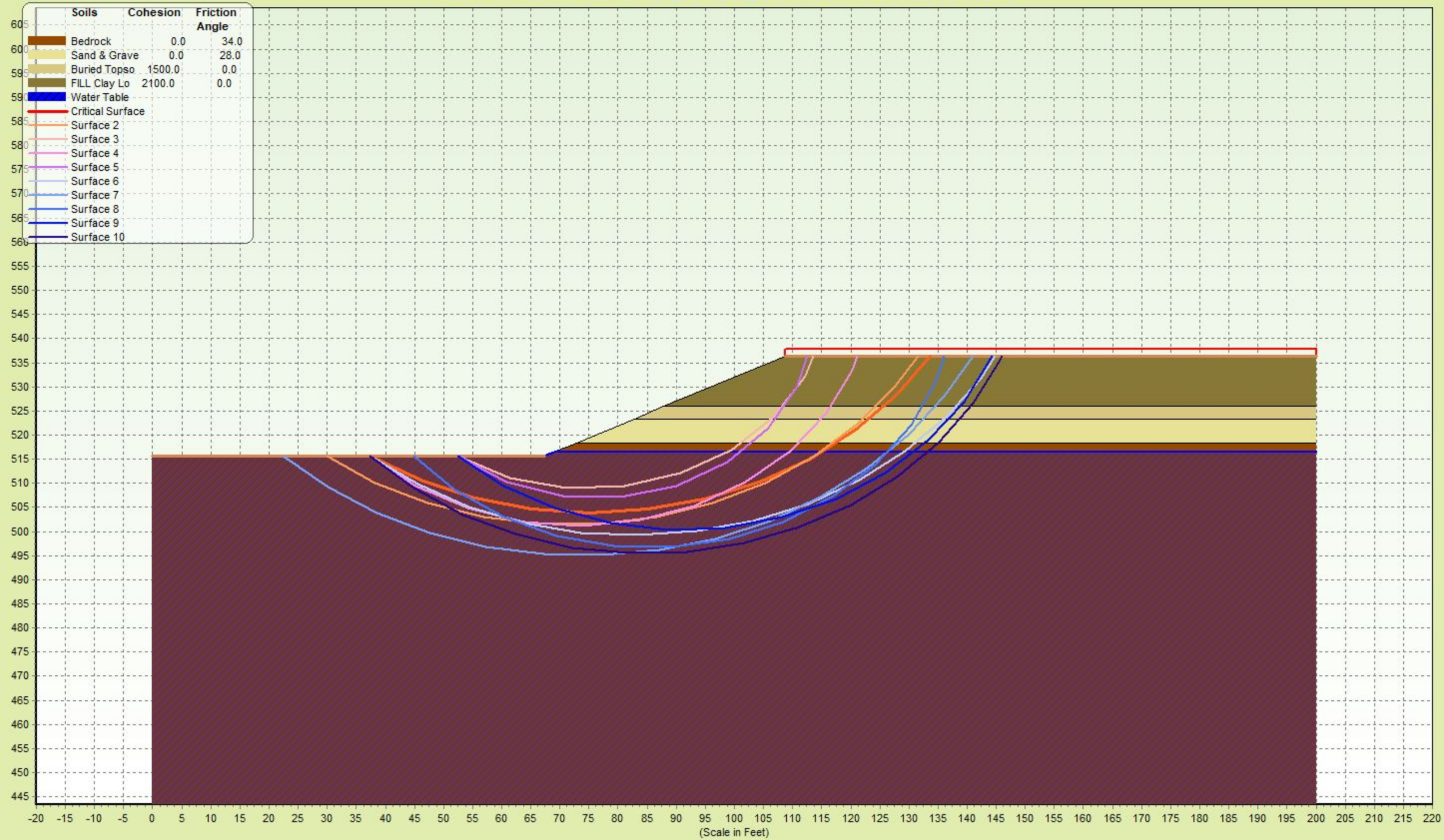
Problem: 20012 Richard St Bridge_BSB-058_Drained - FS Min- Bishop = 1.691

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Sand & Grave	0.0	28.0
Buried Topso	0.0	26.0
FILL Clay Lo	0.0	27.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



Problem: 20012 Richard St Bridge_BSB-058_Undrained - FS Min- Bishop = 2.727

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Sand & Grave	0.0	28.0
Buried Topso	1500.0	0.0
FILL Clay Lo	2100.0	0.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



Problem: 20012 Richard St Bridge_BSB-059_Drained - FS Min- Bishop = 1.555

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Sand, Gravel	0.0	29.0
Sandy Loam	0.0	27.0
Silty Clay	0.0	27.0
Fill CLay Lo	0.0	28.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		

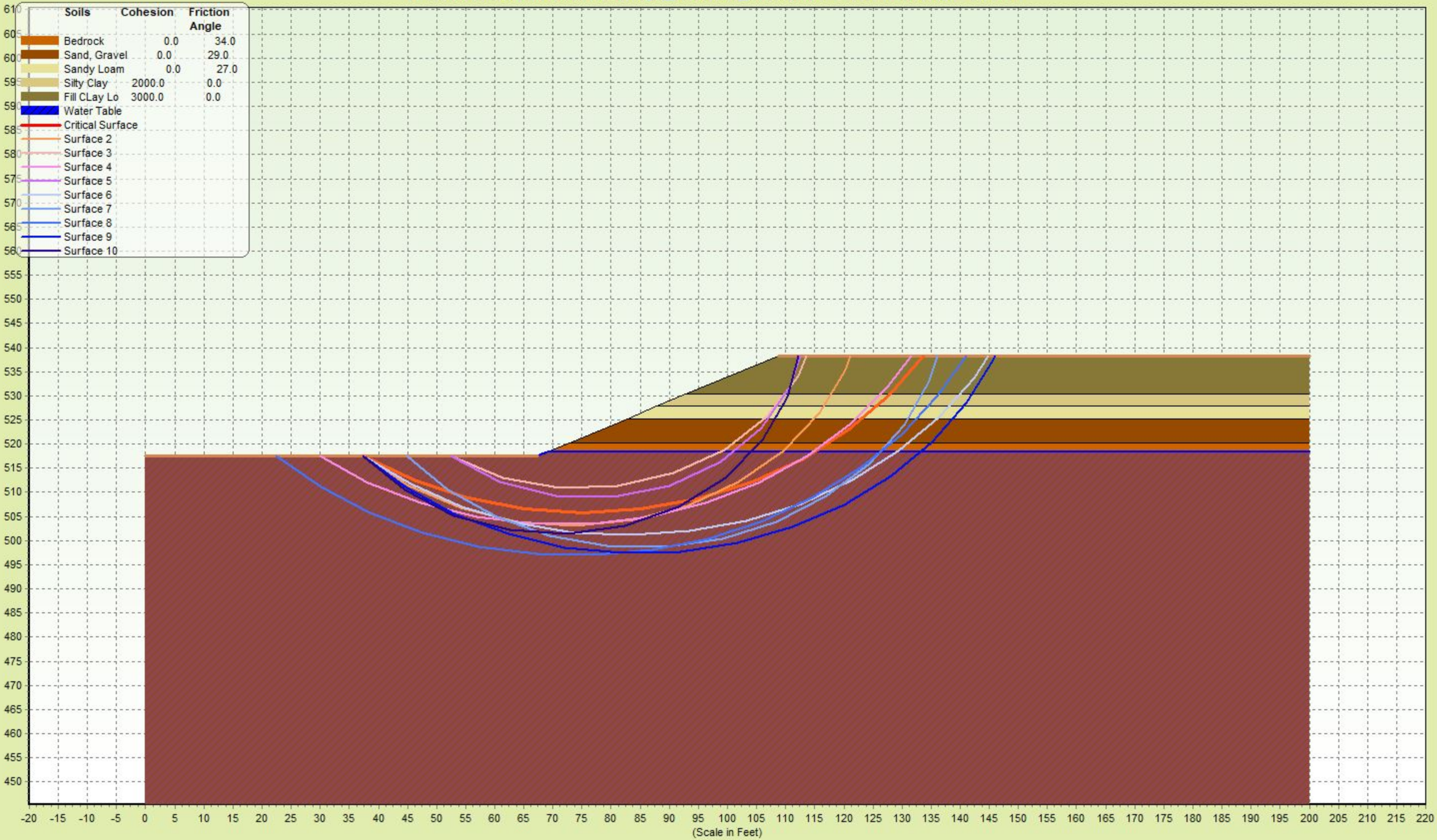
610 605 600 595 590 585 580 575 570 565 560 555 550 545 540 535 530 525 520 515 510 505 500 495 490 485 480 475 470 465 460 455 450

-20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220

(Scale in Feet)

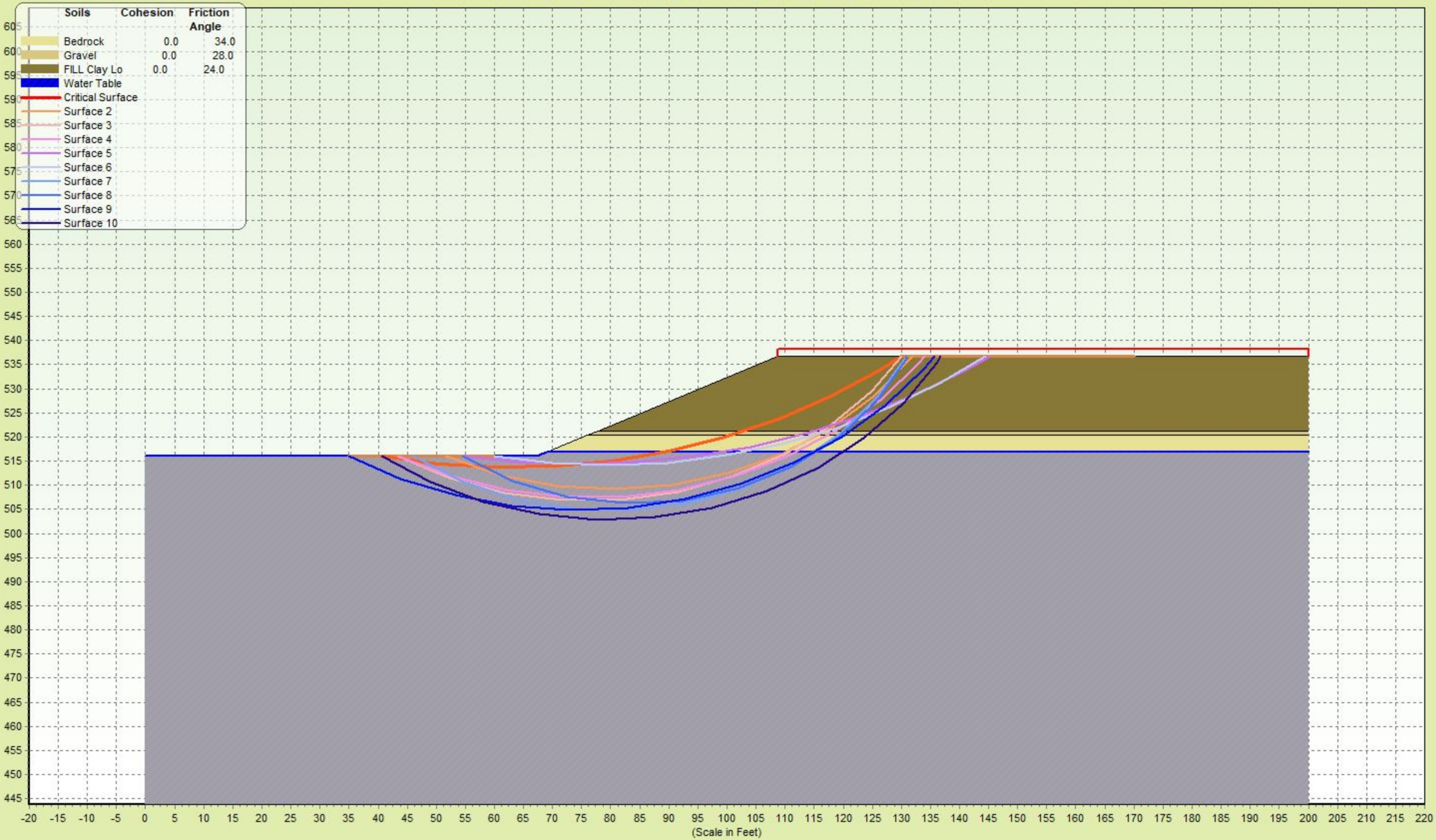
Problem: 20012 Richard St Bridge_BSB-059_Undrained - FS Min- Bishop = 3.114

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Sand, Gravel	0.0	29.0
Sandy Loam	0.0	27.0
Silty Clay	2000.0	0.0
Fill CLay Lo	3000.0	0.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



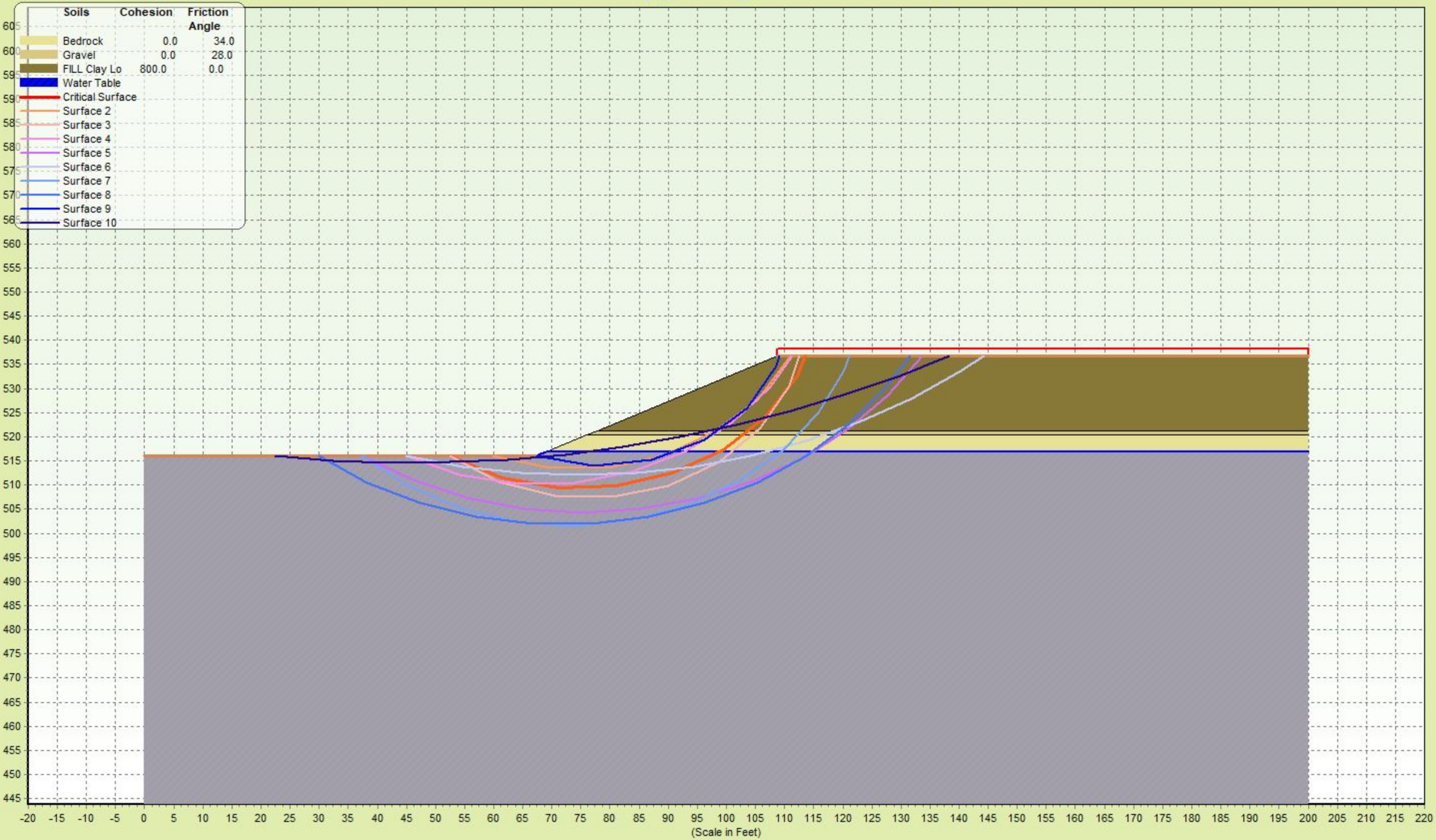
Problem: 20012 Richard St Bridge_BSB-064_Drained - FS Min- Bishop = 1.633

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Gravel	0.0	28.0
FILL Clay Lo	0.0	24.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		

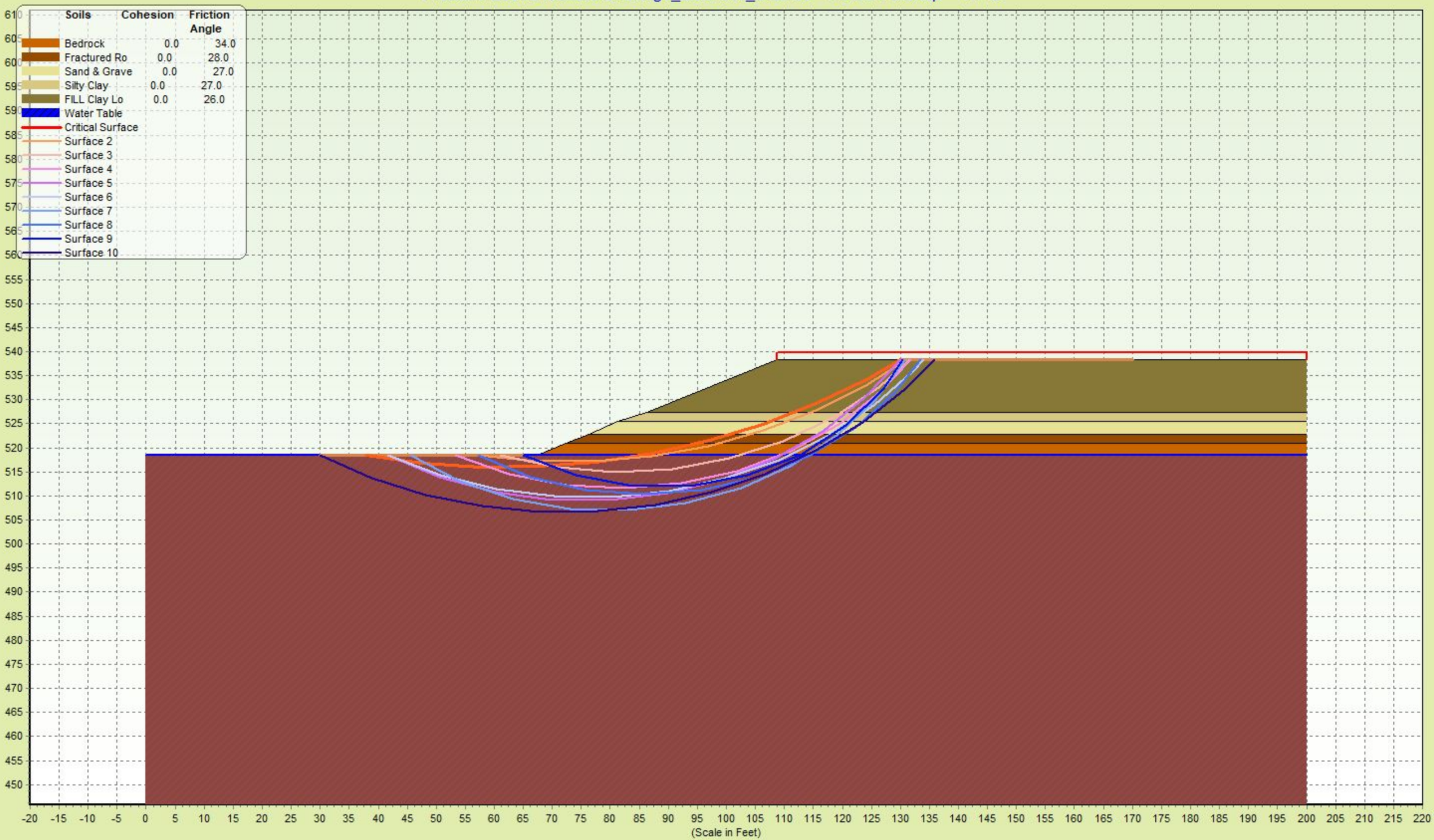


Problem: 20012 Richard St Bridge_BSB-064_Undrained - FS Min- Bishop = 2.127

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Gravel	0.0	28.0
FILL Clay Lo	800.0	0.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		

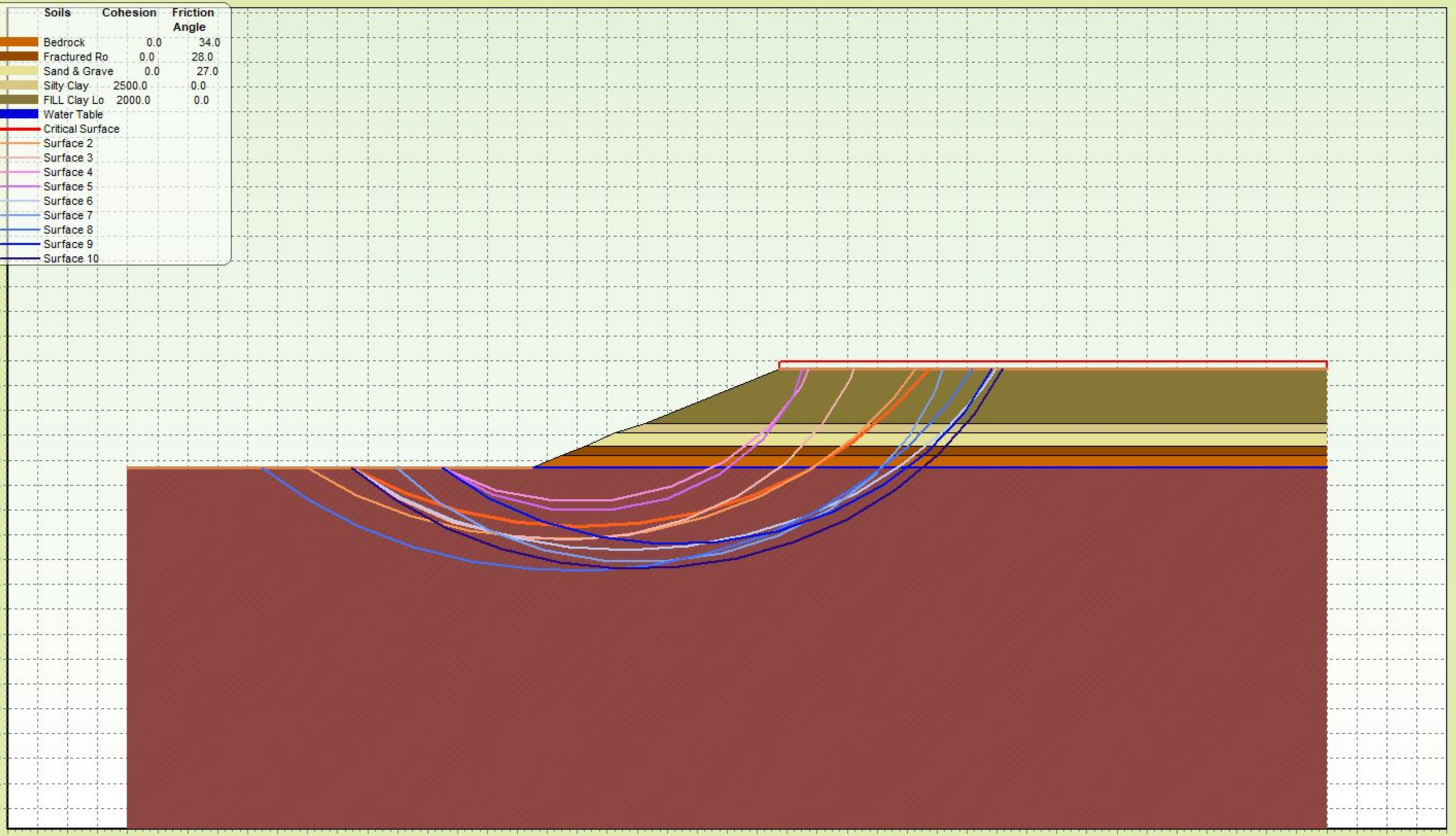


Problem: 20012 Richard St Bridge_BSB-065_Drained - FS Min- Bishop = 1.742



Problem: 20012 Richard St Bridge_BSB-065_Undrained - FS Min- Bishop = 2.892

Soils	Cohesion	Friction Angle
Bedrock	0.0	34.0
Fractured Ro	0.0	28.0
Sand & Grave	0.0	27.0
Silty Clay	2500.0	0.0
FILL Clay Lo	2000.0	0.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



APPENDIX G

PILE ANALYSIS TABLES & GRAPHS

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

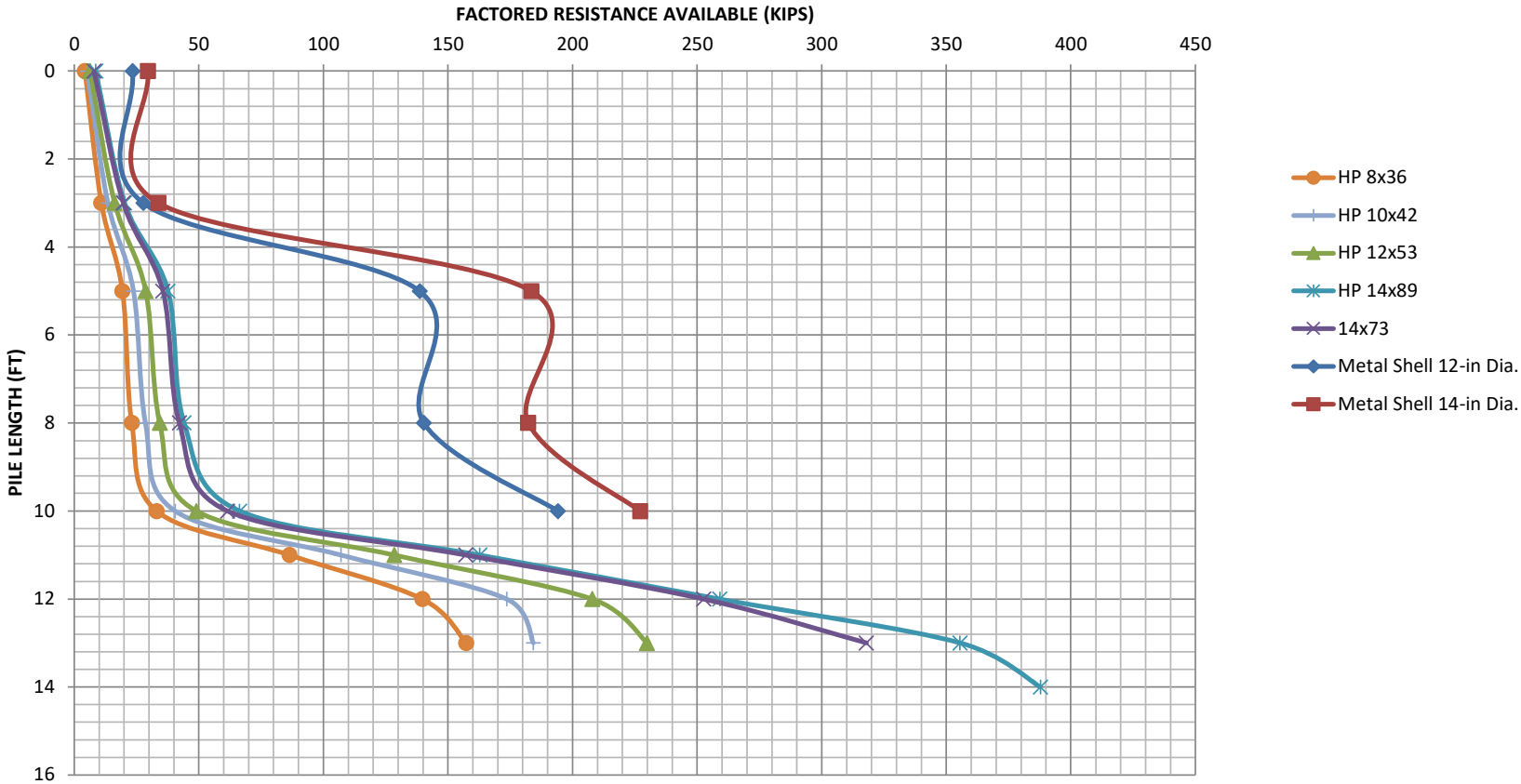
Estimated Pile Lengths and Capacities for 20012 BSB-58

Boring BSB-58 (Ground Surface Elevation against Pile during driving = 536.4, Pile Cutoff Elevation = 531.4)														
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		HP 14x89		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)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0	4	8	5	9	6	11	8	14	9	16	23	43	30	54
3	11	20	14	25	16	29	20	36	20	37	28	50	34	61
5	19	35	24	43	29	52	36	65	38	68	139	252	183	334
8	23	42	29	52	34	62	42	77	44	80	140	255	182	331
10	33	60	40	74	49	89	62	112	66	121	194	353	227	413
11	86	157	107	195	128	234	157	286	163	296				
12	140	254	174	316	208	378	253	459	259	471				
13	157	286	184	335	230	418	318	578	356	646				
14									388	705				

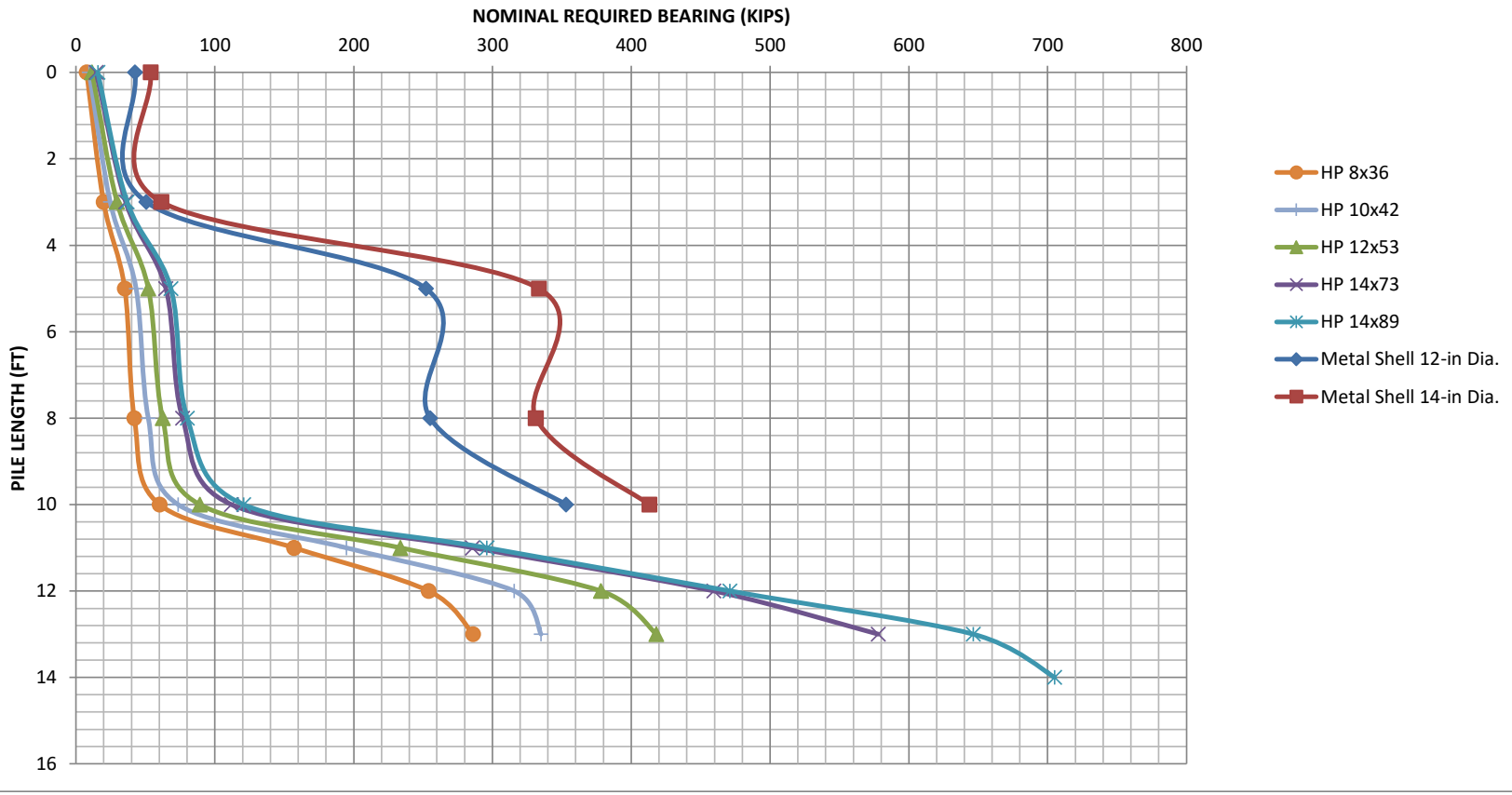
[1] Metal Shell Pile 12" diameter with 0.25" walls

[2] Metal Shell Pile 14" diameter with 0.250" walls

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH
Boring BSB-58



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH
Boring BSB-58



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

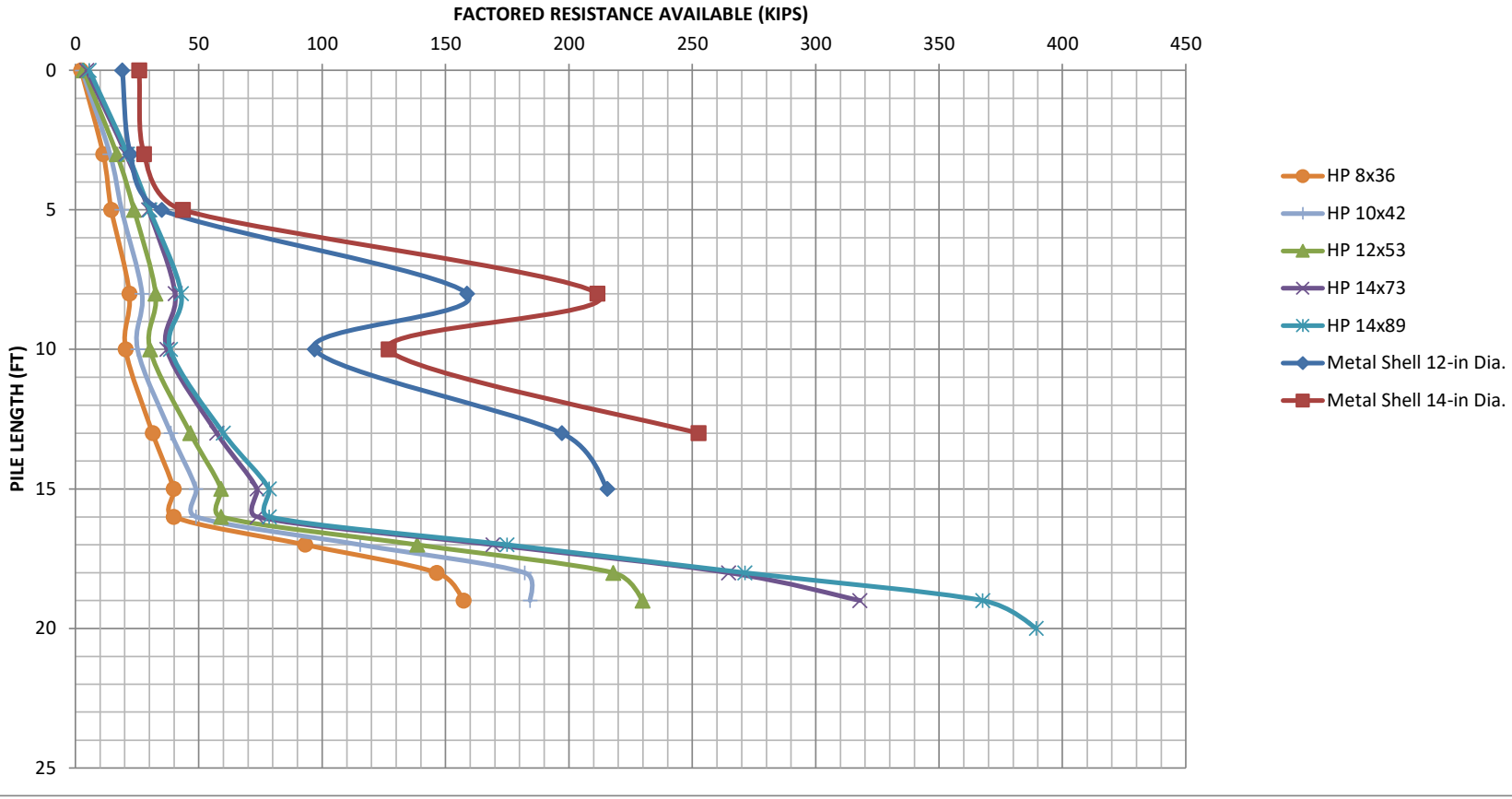
Estimated Pile Lengths and Capacities for 20012 BSB-59

Boring BSB-53 (Ground Surface Elevation against Pile during driving = 538.3, Pile Cutoff Elevation = 533.3)

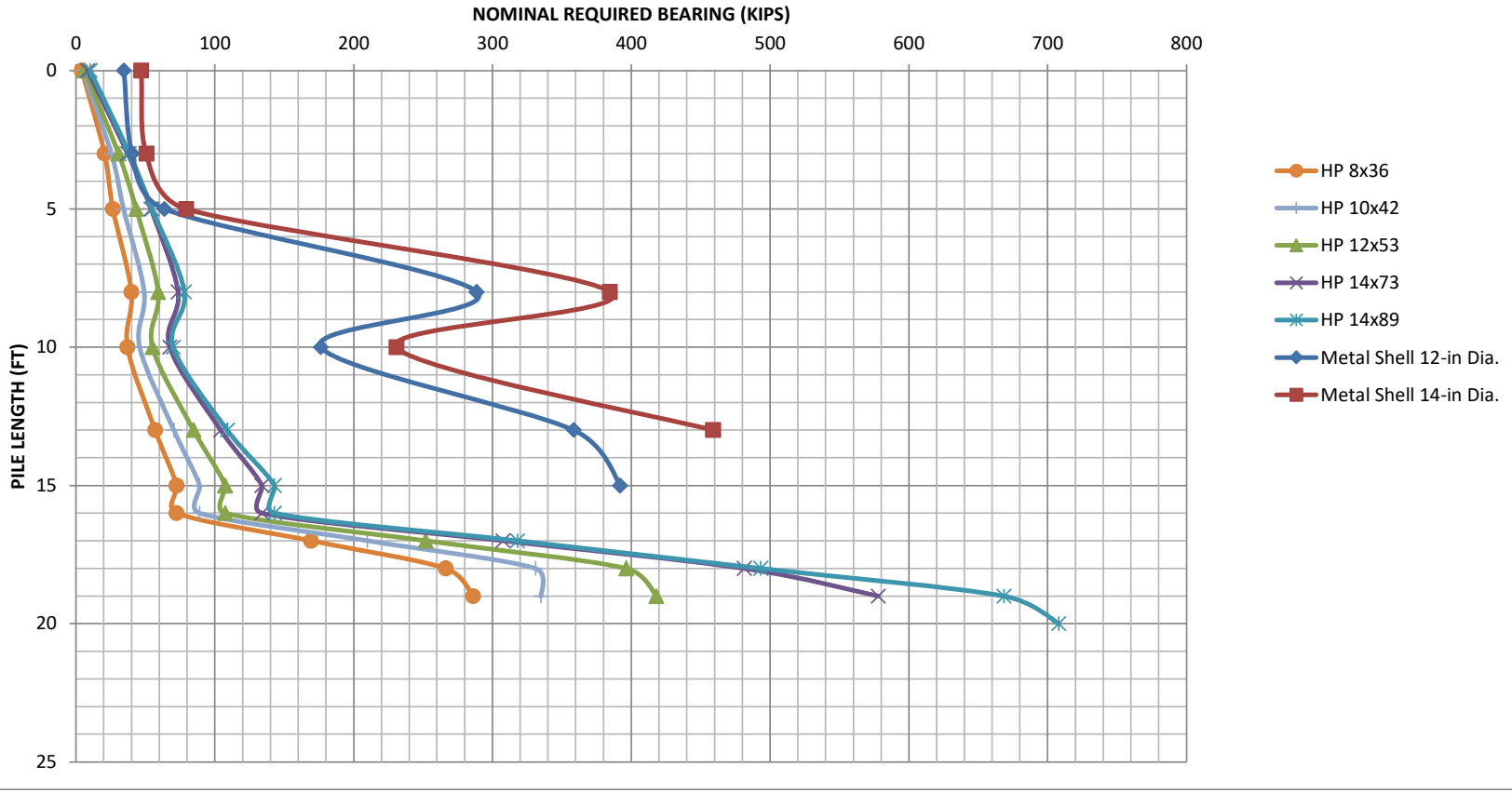
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		HP 14x89		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)	Factored Resistance Available, 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)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0	2	4	3	5	3	6	5	8	6	10	19	34	26	47
3	11	21	14	25	17	31	20	37	21	38	22	41	28	51
5	15	27	19	34	24	43	30	54	30	55	35	64	44	79
8	22	40	27	49	33	59	40	73	43	78	159	289	212	385
10	20	37	25	46	30	55	37	67	39	70	97	176	127	231
13	31	57	39	70	47	85	57	104	60	109	197	359	252	459
15	40	72	49	89	59	107	74	134	79	143	216	392		
16	40	72	49	89	59	107	74	134	79	143				
17	93	169	115	210	139	252	169	308	175	318				
18	146	266	182	331	218	396	265	481	271	493				
19	157	286	184	335	230	418	318	578	368	669				
20									389	708				

1 Metal Shell Pile 12" diameter with 0.25" walls
[2] Metal Shell Pile 14" diameter with 0.250" walls

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH
Boring BSB-59



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH
Boring BSB-59



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

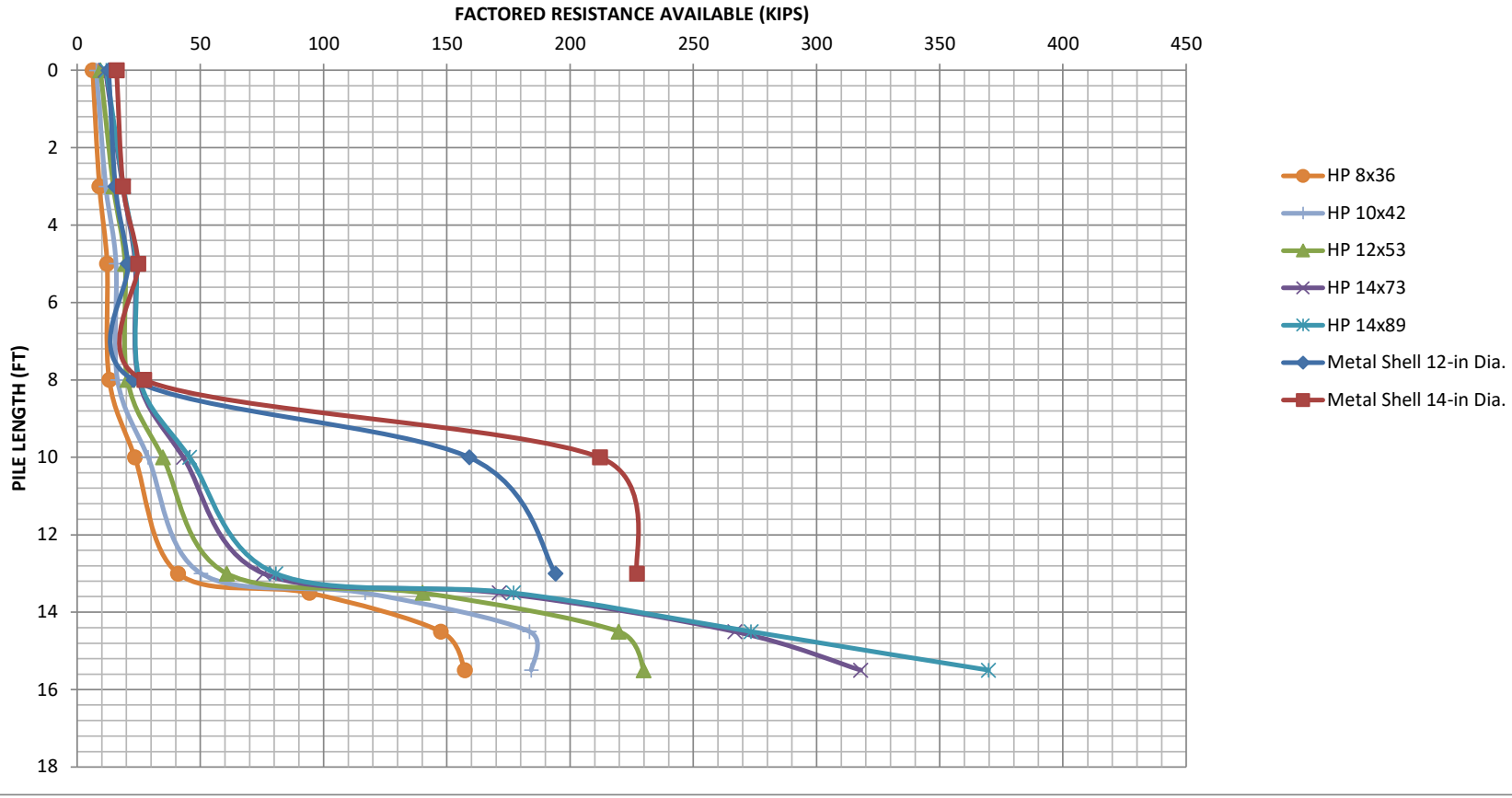
Estimated Pile Lengths and Capacities for 20012 BSB-64

Boring BSB-64 (Ground Surface Elevation against Pile during driving = 536.8, Pile Cutoff Elevation = 531.8)														
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		HP 14x89		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)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0	6	11	8	14	9	17	11	21	12	22	13	23	16	29
3	9	16	12	21	15	27	18	34	19	34	16	28	19	34
5	12	22	16	29	19	35	24	43	24	44	21	37	25	45
8	13	24	16	30	20	37	25	45	25	46	23	42	27	49
10	23	43	29	52	35	63	43	78	46	83	159	289	212	386
13	41	74	50	92	61	110	76	138	81	147	194	353	227	413
14	94	171	117	213	140	255	171	311	177	322				
15	148	268	183	334	220	399	267	485	273	497				
16	157	286	184	335	230	418	318	578	370	672				
									388	705				

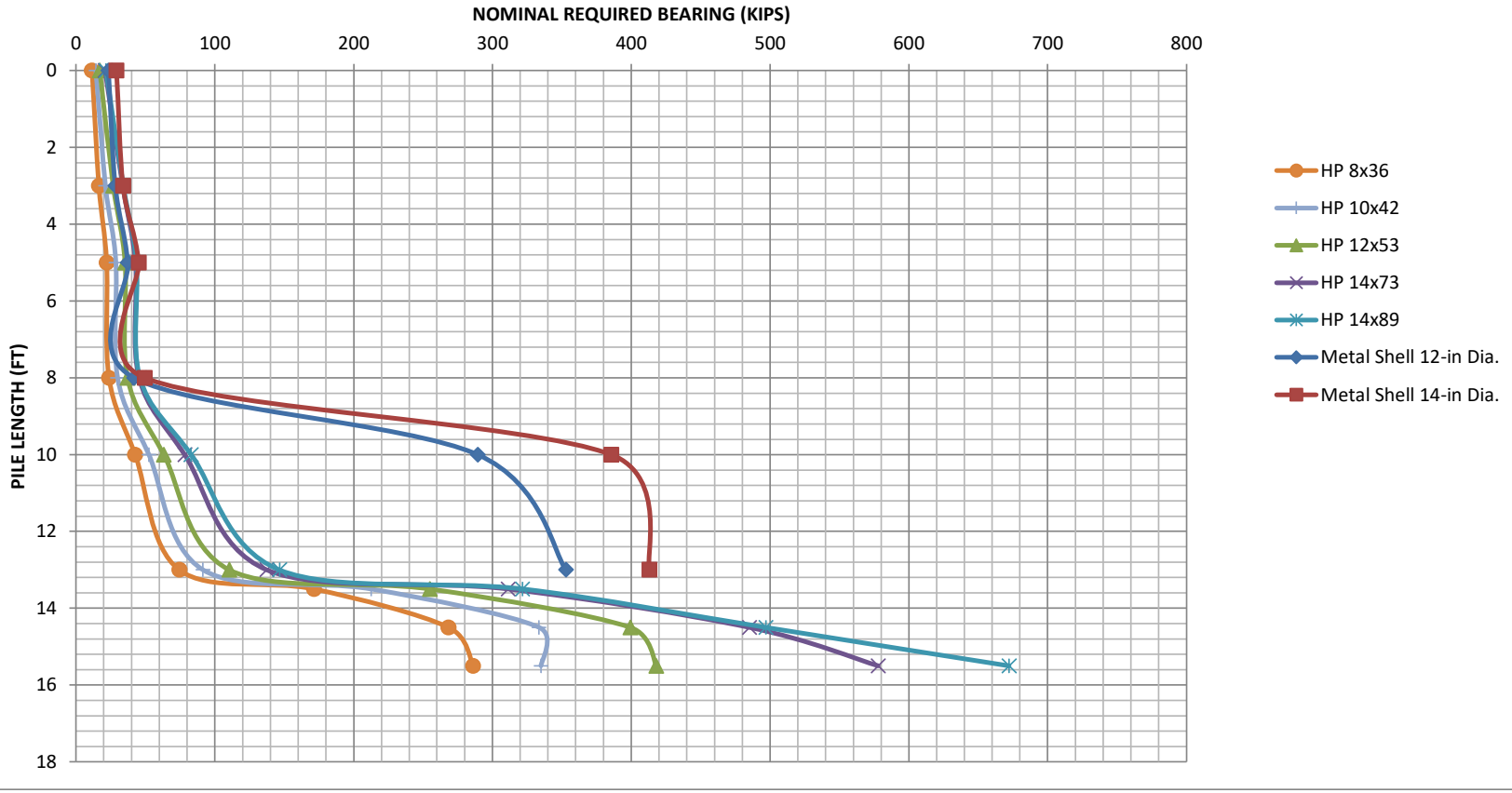
1 Metal Shell Pile 12" diameter with 0.25" walls

[2] Metal Shell Pile 14" diameter with 0.250" walls

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH
Boring BSB-64



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH
Boring BSB-64



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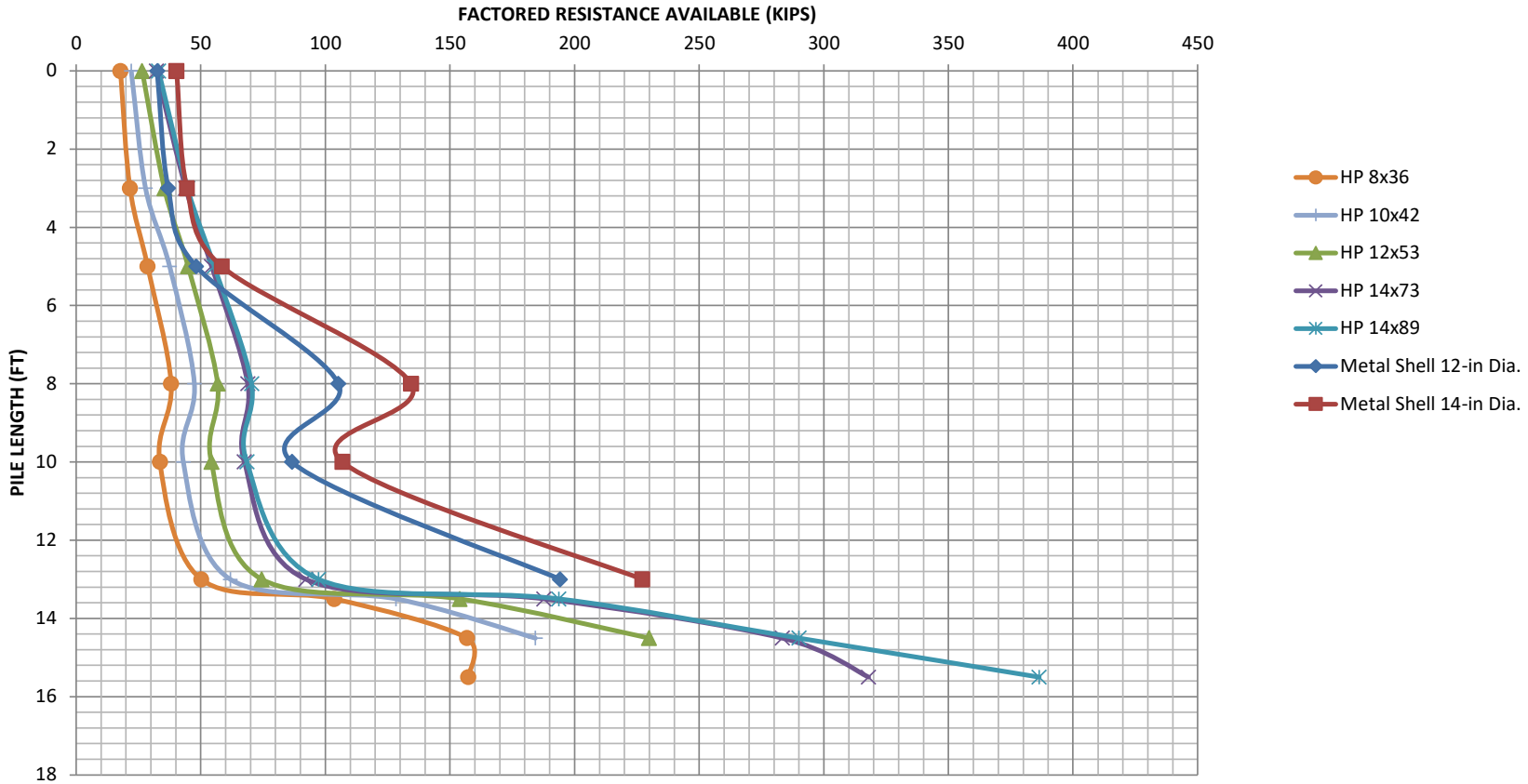
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm

Estimated Pile Lengths and Capacities for 20012 BSB-65

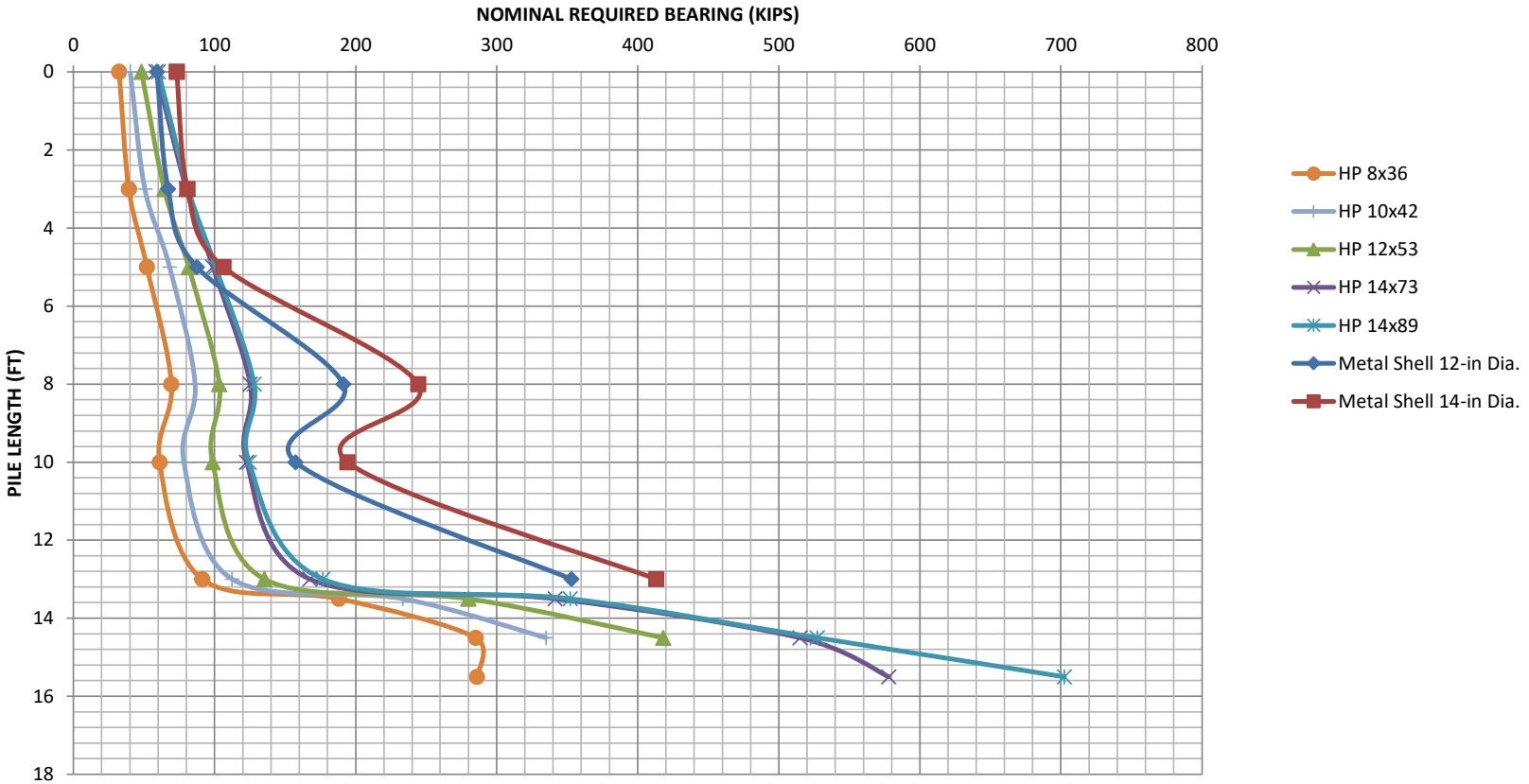
Boring BSB-65 (Ground Surface Elevation against Pile during driving = 538.4, Pile Cutoff Elevation = 533.4)														
Estimated Pile Length (ft.)	HP 8x36		HP 10x42		HP 12x53		HP 14x73		HP 14x89		Metal Shell 12" [1]		Metal Shell 14" [2]	
	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, 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)	Factored Resistance Available, FRA (Kips)	Nominal Requred Bearing, NRB (Kips)
0	18	32	22	40	26	48	32	59	33	60	33	59	40	73
3	22	39	28	51	35	64	44	80	45	81	37	67	44	81
5	29	52	37	68	45	82	54	99	55	101	48	88	58	106
8	38	69	47	86	57	103	69	125	70	128	105	191	134	244
10	34	61	43	78	54	99	68	123	68	124	87	157	107	194
13	50	91	62	112	74	135	92	168	97	177	194	353	227	413
14	103	188	128	233	154	280	188	341	194	352				
15	157	285	184	335	230	418	283	515	290	527				
16	157	286					318	578	386	703				
									388	705				

1 Metal Shell Pile 12" diameter with 0.25" walls
[2] Metal Shell Pile 14" diameter with 0.250" walls

PILE BEARING (FRA) VS. ESTIMATED PILE LENGTH
Boring BSB-55



PILE BEARING (NRB) VS. ESTIMATED PILE LENGTH
Boring BSB-55



APPENDIX H

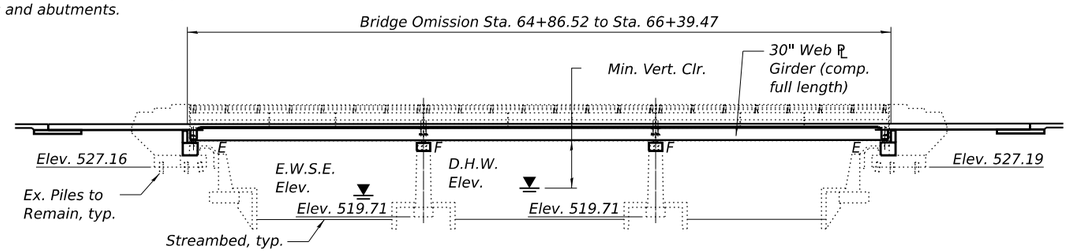
PROGRESS SET DRAWINGS

Benchmark:

Existing Structure: S.N. 099-0123 was built in 1966 under Project I-80-4(37)134, Section 99-4B-2. Three-span wide flange steel beam bridge with a composite reinforced concrete deck. Length is 149'-10⅛" and deck width varies from approximately 87'-8" to 84'-0". Reinforced concrete stub abutments with wingwalls are founded on steel piles. Reinforced concrete wall-type piers have spread footings founded on rock. Repairs in 1993 included a deck overlay, deck joint replacement, and repairs to the parapets, railings, floor drains. Hickory Creek improvements in 2000 included footing protection at piers and abutments.

Traffic Control:

No Salvage.



ELEVATION

WATERWAY INFORMATION

Drainage Area = -			Low Grade Elev. - @ Sta. -						
Flood	Freq. Yr.	Q C.F.S.	Opening Ft² Exist.	Opening Ft² Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10								
Design									
Base	100								
Overtopping									
Max. Calc.	500								

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.) -. Abut.	Pier -	Pier -	-. Abut.	Item 113
Q100					
Q200					
Design					
Check					

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi (Substructure)
f'c = 4,000 psi (Superstructure)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)

HIGHWAY CLASSIFICATION

F.A.U. Rte. 354 - Richards Street
Functional Class: Minor Arterial-Urban
ADT: (20); (20)
ADTT: (20); (20)
DHV:
Design Speed: 35 m.p.h.
Posted Speed: 30 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

LOADING HL-93

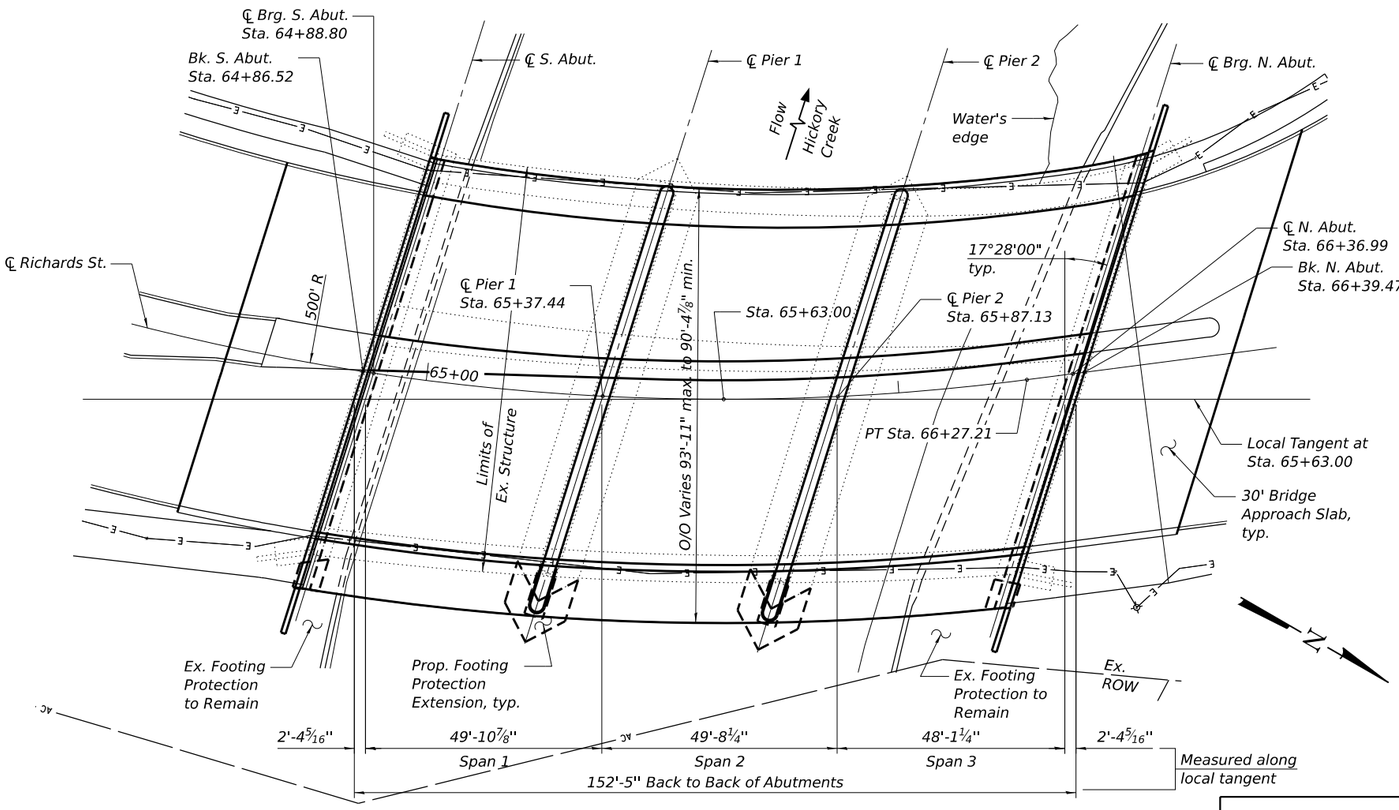
Allow 50#/sq. ft. for future wearing surface.

SEISMIC DATA

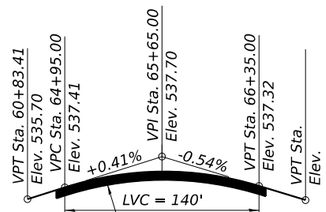
Seismic Performance Zone (SPZ) =
Design Spectral Acceleration at 1.0 sec. (SD1) =
Design Spectral Acceleration at 0.2 sec. (SDS) =
Soil Site Class =

LEGEND

- Soil Boring
- Ex. Underground Electric
- Ex. Light Pole



PLAN

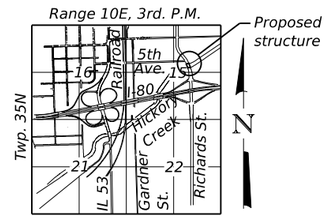


PROFILE GRADE

Along ℄ Richards St.

CURVE DATA

P.I. Sta. =
¬ =
D =
R =
T =
L =
E =
e =
T.R. =
S.E. Run =
P.C. Sta. =
P.T. Sta. =



LOCATION SKETCH

GENERAL PLAN & ELEVATION
RICHARDS ST. OVER HICKORY CREEK
F.A.U. ROUTE 354 - SEC.
WILL COUNTY
STA. 65+62.90
STRUCTURE NO. 099-0123

IN PROGRESS

USER NAME = ____	DESIGNED - ____	REVISED - ____	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
	CHECKED - ____	REVISED - ____	
PLOT SCALE = ____	DRAWN - ____	REVISED - ____	
PLOT DATE = ____	CHECKED - ____	REVISED - ____	

SHEET __ OF __ SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
__	_____	____	__	__
		CONTRACT NO. ___		
	ILLINOIS	FED. AID PROJECT		

MODEL: Sheet
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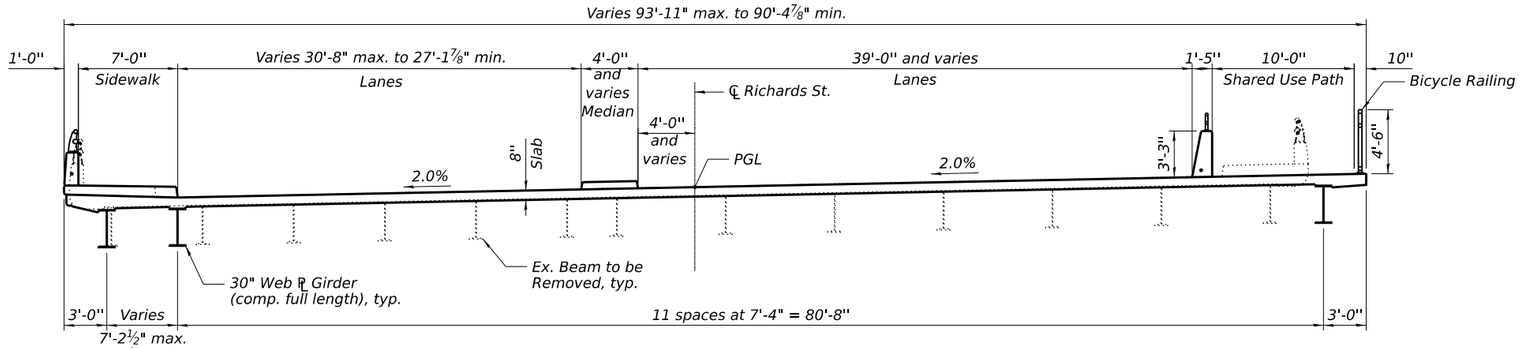
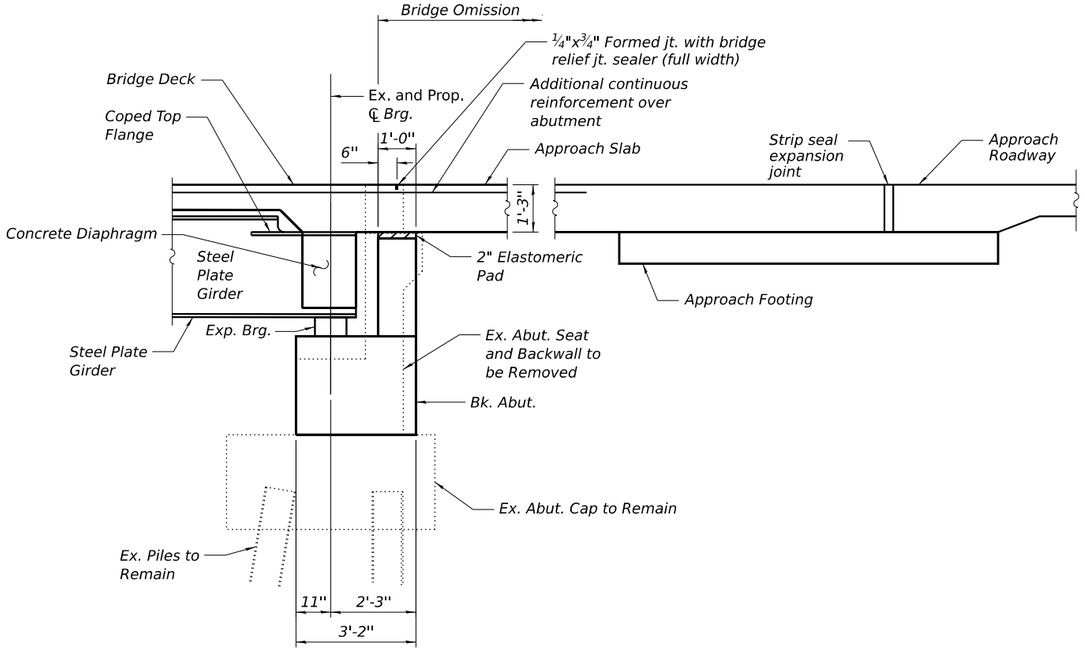
2/4/2022 11:57:26 AM



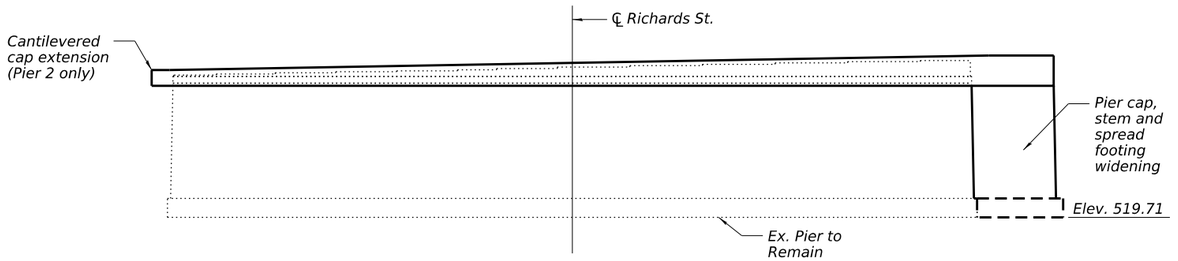
CROSS SECTION

(Looking South)



SECTION THRU N. ABUT.

(S. Abut. Similar)
(Horiz. dim. at Rt. ∠'s)



PIER 2 SKETCH

(Pier 1 Similar, u.n.o.)

IN PROGRESS

DETAILS
RICHARDS ST. OVER HICKORY CREEK
F.A.U. ROUTE 354 - SEC.
WILL COUNTY
STA. 65+62.90
STRUCTURE NO. 099-0123

MODEL: Sheet
FILE NAME: pw://transystems-pw.bentley.com:transystcorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/04-EXP/CAD/CR-04/04-Sheets/05-Structural/TSL/099012S-62380-TSL-002.dgn

2/4/2022 12:56:59 PM

USER NAME = ____	DESIGNED - ____	REVISED - ____	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
	CHECKED - ____	REVISED - ____	
PLOT SCALE = ____	DRAWN - ____	REVISED - ____	
PLOT DATE = ____	CHECKED - ____	REVISED - ____	

SHEET __ OF __ SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
__	_____	_____	__	__

CONTRACT NO. ___

ILLINOIS | FED. AID PROJECT