Structural Geotechnical Report

IDOT PTB 198-003
FAI-80 (I-80) over Des Plaines River Bridge
Proposed I-80 Eastbound and Westbound Bridges
over the Des Plaines River
SN: 099-8325, EB
SN: 099-8309, WB
Will County, Illinois

Prepared for

Illinois Department of Transportation
Contract Number: D-91-204-19

Project Design Engineer Team
WSP USA

Geotechnical Consultant
GSG Consultants, Inc.

GSG CONSULTANTS, INC.
Engineers. Scientists. Construction Managers
735 Remington Road, Schaumburg IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

April 19, 2023
Revised September 5, 2025

GSG CONSULTANTS, INC.

735 Remington Road
Schaumburg, IL 60173
Tel: 630.994.2600
www.gsg-consultants.com

September 5, 2025

David Skaleski, P.E.
Project Manager
WSP USA
30 N. LaSalle Street, Suite 4200
Chicago, Illinois 60602

Structural Geotechnical Report
PTB 198-003
FAI-80 (I-80) Eastbound and Westbound Bridges
over the Des Plaines River
Will County, IL

Dear Mr. Skaleski:

Attached is a copy of the Structural Geotechnical Report for the above-referenced project. The report provides a description of the site investigation, site conditions, and recommendations for the foundation types and construction. The site investigation at this stage for the proposed bridge construction included advancing forty-two (42) soil borings to depths ranging from 1 to 48.5 feet, including bedrock cores.

Should you have any questions or require additional information, please call us at 630-994-2600.

Sincerely,

Rachel Miller, P.E.
Sr. Project Engineer

Ala E Sassila, Ph.D., P.E.
Principal

TABLE OF CONTENTS

Exhibits

Tables

Appendices

1.0 INTRODUCTION

GSG Consultants, Inc. (GSG) completed a geotechnical investigation for the proposed I-80 mainline bridge replacement project over the Des Plaines River. The proposed structures will carry I-80 eastbound (EB) and westbound (WB) lanes over the Des Plaines River in the City of Joliet in Will County, Illinois. The purpose of the investigation was to explore the subsurface conditions, to determine engineering properties of the subsurface soil, and to develop design and construction recommendations for the proposed bridge. **Exhibit 1** shows the general project location.

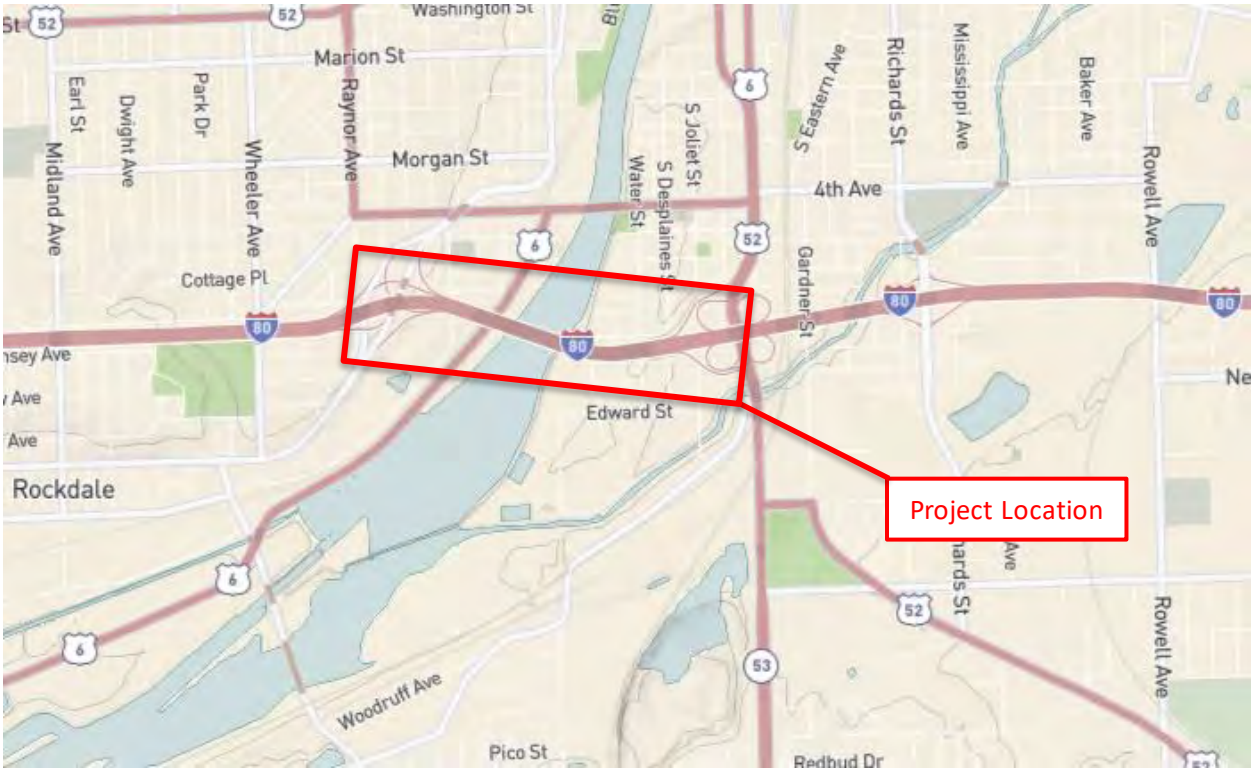


Exhibit 1 – Project Location Map
(Source: USGS Topographic Maps, usgs.gov)

1.1 Existing Bridge Information

The existing bridge structures are twin bridges, SN 099-0056 (EB) and SN 099-0057 (WB), carrying I-80 EB and WB over Des Plaines River in Joliet, respectively. They were first constructed in 1964 and reconstructed in 1998. The bridges have 27 spans and a total length of approximately 2,300

feet. The bridge structures are truss style bridges. Each bridge has 2 abutments, 2 piers within the river, 6 piers on the western shore and 18 piers on the eastern shore. The existing abutments are supported on piles and the piers are supported on spread footings. The twin bridges have a total of six (6) lanes, with three (3) traffic lanes on each bridge and minimal shoulders. Below each abutment, the side slopes from the Des Plaines River to the abutments are at an approximate 2.0H:1V slope.

On the west shoreline, the existing bridges span over US-6 and a CSX rail line that will remain. There are also significant utilities on both shorelines, including gas mains, water lines, electric lines, telephone lines, sewers, and fiber optic cables, that will remain in place along the US-6 right of way, and along Water Street in the vicinity of the proposed eastern abutment.

Exhibits 2a through 2e show the existing conditions of the bridge to be replaced. It is understood that the new bridge will be constructed on the north side/upstream of the existing bridges.

Exhibit 2a – Aerial View of Existing Bridge, Looking Northwest

Exhibit 2b – Existing Bridge, Looking Northwest on Top of Bridge Deck

Exhibit 2c – Existing Bridge, Piers in the River, Looking Southwest

Exhibit 2d – Existing Bridge, Piers on West Shore, Looking Southwest

Exhibit 2e – Existing Bridge, Piers on East Shore, Looking Southeast

1.2 Proposed Bridge Information

Based on the General Plan & Elevation (GPE) (**Appendix A**) dated June 30 2025, provided by WSP, two new bridges, SN 099-8325 (EB) and SN 099-8309 (WB), will be constructed for I-80 eastbound and westbound over the Des Plaines River to replace the existing bridges. The twin bridges are to be built on a new alignment which is offset to the north/upstream from the existing bridges. The proposed bridges will be continuous, multi-girder, steel structures for the main unit and steel multi-girder or PPC I-beams for the approach units. It is expected that traffic will continue to use the existing bridges while the new structures are being built. Traffic will be open on the proposed

WB structure once construction is completed in order to complete construction of the EB structure.

Based on the GPE, each of the new bridges will have 10 spans with a total length of 2,173 feet for EB and 2,147 feet for WB. The out-to-out width will range from 75 to 112 feet for EB and from 75 to 93 feet for WB. The longest span is 414 feet between piers 3 and 4 over the navigation channel. Piers 3 and 4 will be constructed in the river, and the remaining seven (7) piers (Pier 1, 2, and 5 through 9) on land. The bridges will have a 66°30'0" skew.

Based on the GPE, the embankments will be constructed with side slopes. The east and west abutments will be supported on steel H-piles and will be retained by an MSE wall with a 1V:2H concrete slope wall. Piers 2, and 6 through 9, for the piers on land, will be supported on spread footings bearing on bedrock. The river piers (3 and 4) will be supported on a group of drilled shafts socketed into bedrock. Pier 1 and Pier 5 will be supported on drilled shafts socketed into bedrock due to utility conflicts at the proposed pier locations.

2.0 SITE SUBSURFACE CONDITIONS

This section describes the subsurface exploration program and laboratory testing program completed as part of this project. The proposed locations and depths of the soil borings were selected in accordance with IDOT requirements and reviewed with WSP. The borings were completed in the field based on field conditions and accessibility.

2.1 Subsurface Exploration

The first phase of site subsurface exploration for the proposed bridges was conducted between October 18 and November 9, 2022. The investigation included advancing twenty-seven (27) borings to depths between 1 and 41.5 feet, including up to 40-foot rock cores at several locations. The borings included eleven (11) borings for the piers on the land, eight (8) borings for the river piers, and eight (8) interim borings to provide preliminary information in areas where the other land borings had not been drilled due to limited accessibility.

The second phase of the site exploration was conducted between March 14 and July 3, 2025. The investigation included advancing fifteen (15) borings to depths ranging from 6 to 48.5 feet, including up to 15-foot rock cores at multiple locations. The borings will be used for the design of the abutments and piers on land. An additional four (4) borings will be drilled when land acquisition is completed, and the locations are accessible for the proposed land piers. The locations of the soil borings were coordinated with WSP and IDOT and adjusted in the field as necessary based on utilities and accessibility. Elevations and as-drilled locations for the borings were gathered by GSG's field crew using GPS surveying equipment. The approximate as-drilled locations of the soil borings are shown on the Soil Boring Location Plan & Subsurface Profiles **(Appendix B)**. **Table 1** presents a summary of the borings used for the proposed bridge analyses.

Table 1 – Summary of Subsurface Exploration Borings Completed

Structure & Substructure		Boring ID	Station [1]	Offset (ft)/ Direction	Ground Surface Elevation (ft)	Boring Depth (ft)	Top of Bedrock Elevation[5] (ft)
I-80 Eastbound (EB) over Des Plaines River	West Abutment	BSB-01	37+88.08	95.13 RT	578.21	48.5[2]	544.7
		BSB-02[3]	38+43.37	1.19 LT	548.00	7.0	541.0
	Pier 1	BSB-04	39+81.30	77.89 RT	540.36	4.0	536.4
		BSB-05[3]	40+15.20	2.76 RT	541.00	22.0[2]	536.0
	Pier 2	BSB-07	41+30.61	83.27 RT	536.14	1.08	535.1
		BSB-109[4]	42+54.10	46.71 RT	533.95	13.5[2]	525.5
	Pier 3	BSB-205	44+78.72	25.27 RT	519.32	40.0[2]	509.3
		BSB-206	44+70.35	70.35 RT	519.72	41.0[2]	508.7
	Pier 4	BSB-207	48+91.48	23.20 RT	512.61	32.0[2]	511.1
		BSB-208	48+80.07	79.99 RT	512.89	33.5[2]	509.4
	Pier 5	BSB-13	51+85.54	7.08 RT	517.66	6.0	511.7
		BSB-14	51+81.12	81.00 RT	518.40	35.0[2]	498.4
		BSB-106[4]	52+48.70	160.41 RT	518.95	16.5[2]	513.0
	Pier 6	BSB-18	53+55.25	80.51 RT	521.26	23.0[2]	513.3
		BSB-107[4]	53+68.86	129.06 RT	518.40	8.5	509.9
	Pier 7	BSB-21	55+19.39	5.44 RT	522.20	6.5	515.7
		BSB-22	54+86.60	94.82 RT	519.88	29.0[2]	505.9
	Pier 8	BSB-25	56+27.19	68.00 RT	520.95	14.0	507.0
	Pier 9	BSB-27	58+33.46	19.51 RT	521.77	33.5[2]	503.3
		BSB-28	58+38.17	102.13 RT	522.97	25.5[2]	512.5
	East Abutment	BSB-30[3]	59+55.89	1.59 RT	521.62	8.5	513.3
		BSB-31	59+46.62	90.81 RT	523.33	27.0[2]	513.3
I-80 Westbound (WB) over Des Plaines River	West Abutment	BSB-02[3]	38+43.37	1.19 LT	548.00	7.0	541.0
		BSB-03	38+71.43	75.28 LT	548.48	20.0[2]	543.5
	Pier 1	BSB-05[3]	40+15.20	2.76 RT	541.00	22.0[2]	536.0
		BSB-06	40+53.51	84.05 LT	541.53	6.0	535.5
	Pier 2	BSB-08	41+65.07	77.12 LT	539.00	21.5[2]	533.5

Structure & Substructure		Boring ID	Station [1]	Offset (ft)/ Direction	Ground Surface Elevation (ft)	Boring Depth (ft)	Top of Bedrock Elevation[5] (ft)
		BSB-110[4]	43+00.92	52.51 LT	534.96	8.75	526.2
	Pier 3	BSB-201	45+2.33	70.72 LT	516.76	39.0[2]	507.8
		BSB-202	45+2.82	15.90 LT	516.91	36.75[2]	510.2
	Pier 4	BSB-203	49+21.08	73.79 LT	511.82	41.5[2]	510.3
		BSB-204	49+12.14	17.82 LT	512.54	31.5[2]	511.0
	Pier 5	BSB-12	51+7.08	110.23 LT	517.78	6.5	511.3
		BSB-103[4]	52+75.49	185.28 LT	522.12	9.0	513.1
	Pier 6	BSB-15	53+58.44	96.41 LT	519.63	18.0[2]	516.6
		BSB-16	53+63.41	9.32 LT	519.87	8.0	511.9
		BSB-104[4]	54+91.69	246.82 LT	520.03	26.5[2]	501.5
	Pier 7	BSB-19	55+46.73	83.23 LT	519.66	25.5[2]	509.2
		BSB-20	55+28.91	11.36 LT	522.43	24.0[2]	513.4
	Pier 8	BSB-23	56+50.39	82.55 LT	520.15	19.5[2]	515.7
		BSB-105[4]	56+54.33	281.66 LT	519.62	8.5	511.1
	Pier 9	BSB-26	58+21.42	88.12 LT	521.90	25.0[2]	511.9
		BSB-27[3]	58+33.46	19.51 RT	521.77	33.5[2]	503.3
		BSB-108[4]	58+63.22	98.95 LT	521.87	10.0	511.9
	East Abutment	BSB-29	59+68.11	100.33 LT	521.6	20.5[2]	516.1
		BSB-30[4]	59+55.89	1.59 RT	521.62	8.5	513.3

Notes:
1. Based on proposed I-80 centerline stationing
2. Includes a 5-foot to 40-foot deep rock core
3. Borings to be used for the EB and WB bridges
4. Interim Soil Borings
5. Top of Bedrock is where auger refusal is encountered

The soil borings were drilled using truck mounted Diedrich D-50 (hammer efficiency 95.5%, 97.7%, and 99.5%), B-57 Mobile (hammer efficiency 89% to 92.1%), Geoprobe (hammer efficiency 99%), and CME-75 (hammer efficiency 78.8% to 79.8%) drill rigs, each equipped with 3¼-inch I.D. hollow stem augers and an automatic hammer. Soil sampling was performed according to AASHTO T 206, "Penetration Test and Split Barrel Sampling of Soils." Soil samples were obtained at 2.5-foot intervals to the boring termination depths encountering auger refusal

on apparent bedrock. For the borings completed on land, water level measurements were made in each boring when evidence of free groundwater was detected on the drill rods or in the samples. The boreholes were also checked for free water immediately after auger removal, and before filling the open boreholes with soil cuttings and surface patching with concrete and asphalt where necessary to match the existing pavement, where applicable. Copies of the Soil Boring Logs are provided in **Appendix C**.

GSG's field representative inspected, visually classified, and logged the soil samples during the subsurface exploration activities and performed unconfined compressive strength tests on cohesive soil samples using a calibrated Rimac compression tester and a calibrated hand penetrometer in accordance with IDOT procedures and requirements. Representative soil samples were collected from each sample interval, placed in jars, and returned to the laboratory for further testing and evaluation.

GSG collected rock core runs from twenty-seven (27) of the soil boring locations with the use of a ten-foot and/or a five-foot diamond bit, NX-5 split core barrel during the investigation. The bedrock cores were evaluated in the field for texture, physical condition, recovery percentage, and Rock Quality Designation (RQD). The extracted samples were visually inspected and classified. The Rock Quality Designation (RQD) was determined according to ASTM D 6032, "Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core" by totaling all sections with a length in excess of four (4) inches and dividing it by the total length of the core run. The RQD is given a classification based upon the numeric value as indicated in **Table 2**.

Table 2 – Rock Quality Designation Summary

Rock Quality Designation	Descriptions
< 25%	Very Poor
25 – 50%	Poor
51 – 75%	Fair
76 – 90%	Good
91 – 100%	Excellent

2.2 Laboratory Testing Program

All samples were inspected in the laboratory to verify the field classifications. A laboratory testing program was undertaken to characterize and determine the engineering properties of the subsurface soils encountered for the proposed bridges.

The following laboratory tests were performed on representative soil and rock samples:

- Moisture content ASTM D2216 / AASHTO T-265
- Unconfined Compression Strength on Rock – ASTM D2938

The laboratory tests were performed in accordance with test procedures outlined in the most current IDOT Geotechnical Manual, and per ASTM and AASHTO requirements. Based on the laboratory test results, the soils encountered were classified according to the AASHTO and the Illinois Division of Highways (IDH) classification systems. The results of the laboratory testing program are included in the Laboratory Test Results **(Appendix D)** and are also shown along with the field test results in the Soil Boring Logs **(Appendix C)**.

2.3 Subsurface Soil Conditions

This section provides a brief description of the soils encountered in the borings performed in the vicinity of the proposed bridges. Variations in the general subsurface soil profile were noted during the drilling activities. Detailed descriptions of the subsurface soils are provided in the soil boring logs and are shown graphically in the Boring Location Plan & Subsurface Profiles. Subsurface profiles are included for the borings completed within Des Plaines River and along each shore.

The soil boring logs provide specific conditions encountered at each boring location and include soil descriptions, stratifications, penetration resistance, elevations, location of the samples, and laboratory test data. Unless otherwise noted, soil descriptions indicated on boring logs are visual identifications. The stratifications shown on the boring logs represent the conditions only at the actual boring locations and represent the approximate boundary between subsurface materials; however, the actual transition may be gradual.

2.3.1 East Shore

For the proposed foundations on the east shore, eighteen (18) borings were drilled at the proposed pier and abutment locations (see **Table 1**). Six (6) interim borings, BSB-103 through BSB-108, were drilled in the vicinity of the proposed pier locations to obtain general bedrock information where the proposed final boring locations were not originally accessible. The surface elevations of the borings ranged between 517.7 and 523.3 feet. Thirteen (13) borings (BSB-106, BSB-12 through BSB-16, BSB-18, BSB-20, BSB-21, BSB-23, BSB-28, BSB-30, and BSB-31) were

drilled in the landscape area off the road and residential areas and noted 1 to 12 inches of topsoil. Two borings (BSB-26 and BSB-29) noted 1 inch of surficial gravel. The remaining nine (9) borings were drilled on the street and noted 3 to 5 inches of asphalt followed by 7 to 8 inches of aggregate base.

Below the pavement section, gravel, or topsoil, borings BSB-26, BSB-29, BSB-31, BSB-104, and BSB-108 encountered silty clay fill to depths ranging between 2.5 and 6.0 feet (El. 520.4 to 516.5 feet). Several borings encountered sand fill and gravel fill to depths ranging between 2.5 and 7.5 feet (El. 519.5 to 512.4 ft). Under the fill layer, medium dense to extremely dense sand with gravel and/or weathered limestone was typically encountered before reaching auger refusal on bedrock. BSB-105 encountered bedrock under the fill. At boring locations BSB-12, BSB-13, BSB-18, and BSB-20, alternating layers of native silty clay, sand, and gravel were observed to auger refusal at depths of 6.0 to 9.0 feet (El. 513.4 to 511.3 ft). BSB-14, BSB-16, and BSB-21 encountered native sand, gravel, and cobbles to auger refusal at depths of 6.5 to 20.0 feet (El. 515.7 to 498.4 ft).

The native sand has SPT-N values ranging between 11 and 100 blows per foot (bpf). The gravel has SPT-N values ranging between 7 bpf and 50 blows per 2 inches. The native silty clay exhibits unconfined compressive strengths of 0.8 to 2.5 tsf. It is understood that a sanitary sewer is trenched up to approximately 10 feet below the top-of-rock in some areas along Duncan Street. The presence of fractured rock and lower top-of-rock elevations observed in borings BSB-14, BSB-22, BSB-25, BSB-27, and BSB-106 may be indicative of the presence of this trench.

Rock cores were collected at borings BSB-14, BSB-15, BSB-18, BSB-19, BSB-20, BSB-22, BSB-23, BSB-27, BSB-28, BSB-29, BSB-31, BSB-104, and BSB-106 after auger refusal was encountered at EL. 498.4 to 516.6 feet. The bedrock cores generally consisted of gray limestone, with slight to heavy weathering and fracturing. Cobbles and sand seams were noted within the severely weathered rock zone in boring BSB-106. Some vugs, small to medium sized cavities within rock, were observed. Unconfined compressive strength tests were completed on representative samples of the rock cores. **Table 3** provides the RQD values and unconfined compression strength values of the rock cores extracted during the site investigation. Photographs of the cores are included with each boring log in **Appendix C**. The RQD classifications ranged from very poor to excellent.

2.3.2 West Shore

For the proposed foundations on the west shore, eight (8) borings were drilled at the proposed pier and abutment locations (see **Table 1**) and two (2) interim borings, BSB-109 and BSB-110, were drilled in the vicinity of the proposed pier locations to obtain bedrock information where the final boring locations are currently not accessible (Ozinga property). The surface elevations of the borings ranged between 548.5 and 541.5 feet. Borings BSB-02 and BSB-03 were completed on an open lot and noted 3 inches of topsoil (BSB-02) and no surficial materials (BSB-03), respectively. Borings BSB-04 through BSB-06 were completed along US-6 and noted 3 to 5 inches of asphalt followed by 7 to 8 inches of concrete. Boring BSB-01 was drilled along the shoulder of I-80 and noted 18 inches of asphalt. Borings BSB-07, BSB-08, BSB-109, and BSB-110 were completed on the Ozinga property and noted 4 to 9 inches of concrete followed by 6 inches of aggregate base.

Below the pavement, BSB-01 encountered silty clay fill underlain by native silty clay and silty clay loam to auger refusal on bedrock at 33.5 feet (Elev. 544.5 feet). Below the topsoil, boring BSB-02 encountered alternating strata of silty clay and sand to auger refusal on bedrock at El. 541 feet. At the ground surface, BSB-03 encountered sand fill underlain by native gravel, which extended to auger refusal on rock at El. 543.5 feet. Below the pavement section, borings BSB-04 through BSB-06 encountered 4 feet of silty clay fill and sand fill before encountering auger refusal on bedrock at El. 536 to 537 feet. On the north side of the Ozinga property, BSB-07 encountered auger refusal at an elevation of 535 feet under the pavement section, and BSB-08 noted 5 feet of sand and loam before auger refusal at an elevation of 533.5 feet on bedrock. On the south side of the Ozinga property, BSB-109 and 110 noted 8.5 feet of silty clay fill, sand and gravel, and highly weathered limestone before encountering auger refusal at elevations 525 to 526 feet on bedrock.

The silty clay fill layers noted are 0.5 to 4.0 feet thick with unconfined compressive strengths ranging from 0.5 to 2.3 tons per square foot (tsf). The sand fill has SPT blow counts ranging from 13 to 100 bpf, and the native sand and gravel have SPT blow counts ranging from 10 bpf to 50 blows per 2 inches. The native silty clay/silty clay loam exhibited unconfined compressive strengths of 0.5 to 4.2 tsf.

Rock cores were collected at borings BSB-01, BSB-03, BSB-05, BSB-08, and BSB-109 after encountering auger refusal at elevations ranging from 525.5 to 544.5 feet. The bedrock cores generally consisted of gray limestone, with slight to heavy weathering and slight to heavy levels of fracturing. Some vugs were observed. Unconfined compressive strength tests were completed on representative samples of the rock cores. **Table 3** provides the RQD values and unconfined compression strength values of the rock cores extracted during the site investigation. Photographs of the cores are included with each boring log in **Appendix C**. The RQD classifications ranged from very poor to excellent.

2.3.3 Des Plaines River Borings

Soil Borings BSB-201 to BSB-208 were completed in the Des Plaines River using a temporary barge. Borings BSB-201, 202, 205 and 206 were drilled for Pier 3 on west side of the river and BSB-203, 204, 207 and 208 for Pier 4 on east side of the navigation channel. The streambed elevations ranged between 516.9 and 519.7 feet on the west side and between 511.8 and 512.9 feet on the east side.

At the streambed surface, all of the river borings encountered very soft to medium stiff dark gray silty clay soils at the base of the river, before encountering highly weathered bedrock and auger refusal on moderately weathered bedrock at elevations between 511.1 and 509.2 feet, with the exception of BSB-205 and 206, which noted a loose to very dense gravel layer between the clay and the bedrock. The silty clay had unconfined compressive strengths ranging from 0.0 to 0.8 tsf. The gravel had SPT-N values ranging between 6 and 50 blows per foot (bpf).

At each of the borings completed within the Des Plaines River, thirty to forty-foot rock cores were collected. The bedrock cores generally consisted of light gray limestone, with slight to moderate weathering and slight to heavy levels of fracturing. Some vugs were observed in several of the cores. Unconfined compressive strength tests were completed on representative samples of the rock cores. **Table 3** provides the RQD values and unconfined compression strength values of the rock cores extracted during the site investigation. Photographs of the cores are included with each boring log in **Appendix C**. The RQD classification of most of the rock cores are fair to good, with some cores at BSB-201 through 203 classified as poor.

Table 3 – Rock Core Summary and Classification

Boring Number	Core Run / Length (ft)	Core Depth (feet)	Type of Rock	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)
West Shore Borings						
BSB-01	1 / 5	33.5-38.5	Limestone	45.8	Poor	38.0 / 7,440
	2 / 10	38.5-48.5	Limestone	90.2	Good	44.0 / 12,266
BSB-03	1 / 10	5.0-15.0	Limestone	55.6	Fair	9.0 / 15,953
	2 / 5	15.0-20.0	Limestone	92.5	Excellent	18.0 / 17,948
BSB-05	1 / 10	5.0-15.0	Limestone	70.8	Fair	7.0 / 17,099
	2 / 7	15.0-22.0	Limestone	92.5	Excellent	N/A
BSB-08	1 / 7	5.5-12.5	Limestone	0.0	Very Poor	N/A
	2/9	12.5-21.5	Limestone	84.7	Good	16.5 / 11,381
BSB-109	1 / 5	8.5-13.5	Limestone	31.7	Poor	9.0 / 7,041
East Shore Borings						
BSB-14	1 / 7	20.0-27.0	Limestone	0.0	Very Poor	N/A
	2 / 8	27.0-35.0	Limestone	4.7	Very Poor	N/A
BSB-15	1 / 10	3.0-13.0	Limestone	64.6	Fair	6.0 / 8,529
	2 / 5	13.0-18.0	Limestone	60.0	Fair	14.0 / 11,523
BSB-18	1 / 10	8.0-18.0	Limestone	46.3	Poor	N/A
	2 / 5	18.0-23.0	Limestone	80.8	Good	22.0 / 10,265
BSB-19	1 / 9	10.5-19.5	Limestone	72.2	Good	13.5/17,233
	2 / 6	19.5-25.5	Limestone	70.1	Good	N/A
BSB-20	1 / 5	9.0-14.0	Limestone	45.8	Poor	9.0 / 16,387
	2 / 4	14.0-18.0	Limestone	8.3	Very Poor	N/A
	3 / 6	18.0-24.0	Limestone	35.8	Poor	21.0 / 6,367
BSB-22	1 / 5	14.0-19.0	Limestone	6.0	Very Poor	N/A
	2 / 10	19.0-29.0	Limestone	41.7	Poor	23.5 / 12,246
BSB-23	1 / 10	4.5-14.5	Limestone	47.3	Poor	13.5 / 5,989
	2 / 5	14.5-19.5	Limestone	87.5	Good	17.5 / 13,846
BSB-26	1 / 10	10.0-20.0	Limestone	69.2	Fair	13.0 / 14,031
	2 / 5	20.0-25.0	Limestone	95.0	Excellent	23.0 / 17,753
BSB-27	1 / 9	18.5-27.5	Limestone	70.8	Fair	25.0/ 13,002
	2 / 6	27.5-33.5	Limestone	56.6	Fair	N/A
BSB-28	1 / 5	10.5-15.5	Limestone	69.2	Fair	13.0 / 19,236
	2 / 10	15.5-25.5	Limestone	86.3	Good	18.0 / 8,703
BSB-29	1 / 10	5.5-15.5	Limestone	57.5	Fair	10.0 / 4,316
	2 / 5	15.5-20.5	Limestone	95.8	Excellent	15.5 / 20,408
BSB-31	1 / 10	10.0-20.0	Limestone	93.0	Excellent	13.0 / 18,637
	2 / 7	20.0-27.0	Limestone	93.0	Excellent	N/A

Boring Number	Core Run / Length (ft)	Core Depth (feet)	Type of Rock	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)
BSB-104	1 / 8	18.5-26.5	Limestone	70.0	Fair	21.5 / 14,275
BSB-106	1 / 5	6.0-11.0	Limestone	15	Very Poor	9.0 / 9,467
	2 / 6	19.5-25.5	Limestone	0	Very Poor	N/A
Des Plaines River Borings (to be used for Eastbound and Westbound structures)						
BSB-201	1 / 10	9.0-19.0	Limestone	70.8	Fair	13.0 / 15,615
	2 / 10	19.0-29.0	Limestone	76.6	Good	25.0 /14,996
	3 / 10	29.0-39.0	Limestone	65.0	Fair	35.0 / 13,903
BSB-202	1 / 10	6.75-16.75	Limestone	65.0	Fair	9.5 / 9,053
	2 / 10	16.75-26.75	Limestone	50.8	Fair	25.75 / 14,160
	3 / 10	26.75-36.75	Limestone	76.3	Good	32.75 / 16,491
BSB-203	1 / 10	1.5-11.5	Limestone	72.0	Fair	7.5 / 11,786
	2 / 10	11.5-21.5	Limestone	65.4	Fair	13.0 / 9,645
	3 / 10	21.5-31.5	Limestone	37.5	Poor	25.5 / 10,188
	4 / 10	31.5-41.5	Limestone	63.3	Fair	35.5 / 12,737
BSB-204	1 / 5	1.5-6.5	Limestone	90.0	Excellent	5.0 / 15,002
	2 / 5	6.5-11.5	Limestone	73.0	Fair	7.0 / 15,716
	3 / 10	11.5-21.5	Limestone	79.0	Good	12.0 / 9,866
	4 / 10	21.5-31.5	Limestone	67.5	Fair	28.0 / 9,400
BSB-205	1 / 10	10.0-20.0	Limestone	75.0	Fair	15.0 / 13,376
	2 / 10	20.0-30.0	Limestone	89.1	Good	24.0 /14,166
	3 / 10	30.0-40.0	Limestone	85.4	Good	39.0 /11,557
BSB-206	1 / 10	11.0-21.0	Limestone	72.0	Fair	17.0 / 7,281
	2 / 10	21.0-31.0	Limestone	74.5	Fair	27.5 /8,370
	3 / 10	31.0-41.0	Limestone	82.0	Good	39.0 / 6,839
BSB-207	1 / 10	2.0-12.0	Limestone	88.0	Good	8.0 / 15,016
	2 / 10	12.0-22.0	Limestone	87.5	Good	14.0 /12,675
	3 / 10	22.0-32.0	Limestone	81.0	Good	28.0 /7,611
BSB-208	1 / 10	3.5-13.5	Limestone	82.5	Good	12.5 / 15,621
	2 / 10	13.5-23.5	Limestone	87.5	Good	19.5 /12,216
	3 / 10	23.5-33.5	Limestone	84.0	Good	30.5 /13,666

2.4 Groundwater Conditions

Water levels were checked in each boring completed onshore to determine the general groundwater conditions present at the site, and were measured both while drilling and after each boring was completed. Groundwater was observed during drilling at boring location BSB-01 at 8.5 feet (El. 569.7 feet) and at BSB-22 at a depth of 13 feet (El. 506.9 feet). Groundwater was not

encountered during or immediately after drilling at the remaining soil boring locations on the land. None of the borings were left open after completing the drilling activities.

Based on the observed water levels and the water level of the Des Plaines River (about El. 539 feet), it is anticipated that the long-term groundwater level is near the top of bedrock at elevations of 525.5 to 543.5 feet at the west shore area and 501.5 to 516.6 feet at the east shore area. Perched water may also be present within the fill materials observed in the borings. Water level readings were taken in the boreholes at the times and under the conditions specified in the boring logs and stated in this report. However, it should be noted that fluctuations in groundwater level may occur due to variations in the rainfall, the river water level, other climatic conditions, or other factors not evident at the time measurements were made and reported herein.

3.0 GEOTECHNICAL ANALYSES

This section presents GSG's geotechnical analysis and recommendations for the proposed bridge design, based on the results of field exploration, laboratory testing, and geotechnical analysis. Subsurface conditions between borings may vary from those encountered at the boring locations. If structure locations, loadings, or elevations are changed, we request that GSG be contacted so that we may re-evaluate our recommendations.

3.1 Scour

The proposed bridge structures will carry I-80 over the Des Plaines River. Scour is anticipated to be a concern for the proposed Piers 3 and 4 in the river. According to the IDOT Bridge Manual (2023), it is understood that for bridge abutments set back from the edge of a waterway, scour typically results from multiple flood events over time. The proposed I-80 abutments and Piers 1, 2, and 5 through 9 will be constructed on the land and are protected by a floodwall; therefore, scour is not a concern for those locations.

Table 4 presents the bottom elevations for scour events as provided in the GPE (**Appendix A**). The scour elevations correspond to the top of bedrock or fall within the weathered limestone encountered over competent bedrock. Based on the granular weathered limestone and bedrock encountered along the river bottom at the scour elevations, scour reductions due to cohesive materials are not anticipated.

Table 4 – Design Scour Data for Des Plaines River Bridge

Event/Limit State	Design Scour Elevations (ft)				Item 113
	Pier 3WB	Pier 3EB	Pier 4WB	Pier 4EB	
Q100	510.7	509.2	510.8	509.4	5
Q200	510.7	509.2	510.8	509.4	
Design	510.7	509.2	510.8	509.4	
Check	510.7	509.2	510.8	509.4	

It is recommended that scour countermeasures be implemented as specified in the IDOT Bridge Manual and IDOT Drainage Manual, and as recommended in the final hydraulic report for this project.

3.2 Embankment Settlement

It is understood that the twin bridges will be built on a new alignment, which is offset north/upstream from the existing bridges. Based on the observed site grades and proposed final bridge and abutment elevations, it is assumed that between approximately 47 and 49 feet of new engineered fill will be necessary for construction of the MSE walls below the east abutment and to create the new east and west embankments, respectively, along the new alignment.

An analysis was performed to evaluate the anticipated total settlement of the underlying fill and native soils due to the new wall and embankment construction for the alignment. Immediate settlement for cohesionless soils can typically occur during filling operations, whereas consolidation settlement for cohesive soils generally occurs over a longer period. The maximum estimated total settlements within the existing fill soils and native soils below the new embankments were calculated as shown in **Table 5,** where 90% of the total settlement is estimated to be completed within 12 months. The settlement values provided in **Table 5** do not include any potential settlement of the newly constructed embankment materials as it is assumed the new embankment will be compacted and constructed per the IDOT Construction Manual (2021). Settlement estimates of the existing soils were calculated for the soil boring locations that were completed near the east and west bridge abutments.

Table 5 – Anticipated Abutment Fill Settlement –Calculations

Location	Nearest Borings	Fill Area		Assumed New Fill Height (feet)	Anticipated Total Settlement (inches)
		Assumed Width (feet)	Assumed Length (feet)		
East Abutment, WB	BSB-29, BSB-30	150	250	46.8 to 47.0	1.0
East Abutment, EB	BSB-30, BSB-31	150	250	45.2 to 46.8	1.2
West Abutment, WB	BSB-02, BSB-03	150	250	47.9 to 48.4	2.2
West Abutment, EB	BSB-01, BSB-02	150	250	17.7[1] to 47.9	3.0

Notes: 1. Within the area of the existing embankment

Based on the general nature of the lower-strength silty clay soils, underlain by sand and gravel, encountered in the area of soil borings BSB-01, BSB-02, BSB-04 through BSB-06, BSB-20, and BSB-31, the estimated settlement of the existing soils from the new embankment fill could be approximately 1.0 to 3.0 inches. Settlement of less than about 0.1 to 0.2 inches is anticipated in the area of borings BSB-03 and BSB-30, where granular fill and sand over shallow bedrock were encountered. Accordingly, downdrag should be anticipated to be an issue in areas where pile foundations are constructed within the east and west embankments. It is recommended that pile sleeves be included for the abutment piles to mitigate downdrag, where necessary. Alternatively, ground improvements may be installed below the MSE walls and new embankments to mitigate the anticipated settlement.

3.3 Roadway Fill Settlement Treatment and Recommendations

If the anticipated settlement is excessive for the proposed improvements, special design recommendations may be considered to mitigate the impact on bridge construction. Some areas of the subgrade soils beneath the new roadway fill may require in-situ ground improvement to mitigate the anticipated settlement after the filling operations. The recommended ground improvement techniques and their impact on the estimated settlement rate are discussed below. The selected treatment alternative must also consider the proposed bridge foundation construction schedule.

3.3.1 Staged Embankment Construction

For the construction of the embankments, the proposed alignments of I-80 Eastbound and I-80 Westbound may be partially constructed, allowing for consolidation settlement of the newly constructed embankment materials to occur and dissipate the excess pore water pressure before completion of the full fill placement. For the initial construction, allowing the partially filled embankment to remain in place for varying amounts of time before the final stage of construction will result in different amounts of settlement after construction. The longer the initial stage of construction remains in place as a surcharge over the underlying soils, the less settlement is anticipated to occur after construction.

Proper instrumentation, as outlined in IDOT Geotechnical Manual in Section 6.4.4.6-Instrumentation and Control of Embankment Construction, will be required to monitor the state

of stress in the soil during the loading period, to ensure that loading does not proceed so rapidly as to cause a shear failure.

3.3.2 Maintenance

A maintenance program will likely be necessary throughout the construction stage to account for the settlement of the new fill. This will require additional quantities of new fill materials to be placed during construction, which should be accounted for when estimating earthwork quantities.

3.4 Seismic Parameters

The seismic hazard for the site was evaluated in accordance with the IDOT Geotechnical Manual, IDOT Bridge Design Manual, and AASHTO LRFD Bridge Design Specifications. The Seismic Soil Site Class was determined per the requirements of All Geotechnical Manual Users (AGMU) Memo 9.1, Design Guide for Seismic Site Class Determination, and the "Seismic Site Class Determination" Excel spreadsheet provided by IDOT. A global Site Class Definition was determined for this project, and was found to be Soil Site Class D. The site class calculation sheet is presented in **Appendix E**. For structures with span lengths greater than 200 feet, the global Site Class Definition typically reflects the softest (weakest) individual Site Class Definition determined. The Seismic Performance Zone (SPZ) was determined using Figure 2.3.10-2 in the IDOT Bridge Manual and was found to be Seismic Performance Zone 1. It is understood that the twin bridges will be classified as "Critical" bridges, per AASHTO LRFD Section 3.10.5.

The AASHTO Seismic Design Parameters program was used to determine the peak ground acceleration coefficient (PGA), and the short (S_{DS}) and long (S_{D1}) period design spectral acceleration coefficients for the proposed structure. For this section of the project, the S_{DS} and the S_{D1} were determined using the 2020 AASHTO Guide Specifications, as shown in **Table 6**. Given the site location and materials encountered, the liquefaction potential is minimal.

Table 6 – Seismic Parameters

Building Code Reference	PGA	S_{DS}	S_{D1}
2020 AASHTO Guide for LRFD Seismic Bridge Design	0.049g	0.167g	0.095g

4.0 GEOTECHNICAL BRIDGE DESIGN RECOMMENDATIONS

The foundations for the proposed bridges must provide sufficient support to resist the dead and live loads, as well as seismic loading. The foundation design recommendations presented in this section were developed in accordance with the AASHTO LRFD 9th Edition (2020). Based on the bridge study and design, GSG understands that the bridges will be supported on several types of foundation systems, including driven piles, drilled shafts, and shallow foundations. Several foundation types are proposed for individual piers. The bridge loads provided by WSP for each foundation type are shown in **Tables 7a and 7b**.

Table 7a –Vertical Foundation Loads

Substructure	Pile Group - Factored Loads per Pile (kips)	Drilled Shafts - Factored Load per Shaft (kips)	Spread Footings – Factored Load (klf)
West Abutments	165.0	n/a	n/a
Pier 1	405.0	2,485	140.0
Pier 2	n/a	n/a	125.0
Pier 3	n/a	see Table 7b	n/a
Pier 4	n/a	see Table 7b	n/a
Pier 5	n/a	2,260	130.0
Pier 6	n/a	n/a	120.0
Pier 7	n/a	n/a	120.0
Pier 8	n/a	n/a	120.0
Pier 9	n/a	n/a	120.0
East Abutment	200.0	n/a	n/a

Table 7b –Foundation Loads – River Bridge Piers

Load Type	Strength I	Extreme II Longitudinal	Extreme II Trans.
Pier 3			
Factored Axial Load (kips)	3,180	3,135	2,390
Factored Lateral (kips)	91	607	551
Factored Overturning (k-ft)	1,024	8,987	7,535
Pier 4			
Factored Axial Load (kips)	2,960	2,850	2,375
Factored Lateral (kips)	70	585	556
Factored Overturning (k-ft)	797	7,952	7,612

4.1 Bridge Foundation Recommendations

GSG completed foundation evaluations and developed foundation recommendations based on the results of the subsurface investigation and included driven piles, drilled shafts and shallow foundations. The results of the evaluation for each of these foundation types are presented below.

4.1.1 Shallow Foundations

Based on the fill soils encountered in the existing embankments, the new span length and the anticipated loads, excessive settlement is anticipated for shallow foundations at the bridge abutments. Therefore, shallow foundations are not anticipated to be a feasible option for the proposed bridge abutments.

Due to the presence of shallow bedrock, onshore bridge piers 2, 6, 7, 8, and 9 will be supported on spread footings bearing on the shallow bedrock. Design recommendations for bridge pier shallow foundations are provided in *Section 4.2* of this report.

4.1.2 Drilled Shaft Foundations

Drilled shafts are considered a viable option for each of the bridge piers. It is understood that the bridge piers within the Des Plaines River, Piers 3 and 4, will be supported on drilled shafts socketed into bedrock. Piers 1 (EB and WB) and 5 (EB and WB), on either shore, will also be supported on drilled shafts socketed into bedrock, due to the proximity of the existing CSX

railroad and existing utilities that will remain in place below the new bridges. Design recommendations for drilled shafts are provided in *Section 4.3* of this report.

4.1.3 Driven Pile Foundations

It is understood that driven H-piles are being considered to support the bridge abutments. Concrete piles are not recommended for this site because the pile lengths cannot be readily adjusted to accommodate variability in soil conditions. Metal shell piles are not recommended for structures supported upon the bedrock, and they will not be further evaluated. H-piles are a viable option for constructing the abutments for the proposed bridge structures.

Driving shoes for the piles, in accordance with Section 1006.05 (e) of the IDOT Standard Specifications for Road and Bridge Construction (SSRBC), should be considered to guard against the very dense granular soils and relatively shallow bedrock. Design recommendations for driven piles are provided in *Section 4.4* of this report.

4.2 Shallow Foundations Recommendations

Based on the available design information and the site's soil conditions, it is anticipated that Piers 2, 6, 7, 8, and 9 of the bridge will be supported on shallow spread footings that bear on the underlying bedrock. The results of the evaluation are presented below.

4.2.1 Shallow Foundations Bearing Resistance

Bearing resistance for the pier spread footings shall be evaluated at the strength limit state using load factors and factored bearing resistance. The bearing resistance factor, ϕ_b, for shallow bedrock is 0.45 per AASHTO Table 10.5.5.2.2-1. Bearing on the underlying bedrock, the spread footings could be designed using a nominal bearing resistance of 130 kips per square foot (ksf) and factored resistance of 58 ksf. The nominal bearing resistance of the footings should not be greater than the compressive resistance of the footing concrete. The shallow footings should be designed such that the eccentricity of loading at the strength limit state should not exceed 0.45 of the footing width or length per AASHTO 10.6.3.3, Eccentric Load Limitations. No differential settlement is anticipated for footings bearing on bedrock. The footing should be supported upon competent bedrock, which is estimated to be present approximately 3 feet below the top of bedrock. Based on the most recent GP&E, the bearing elevation for Pier 2 is at elevation 529.5

feet on the west side of the river; Piers 6, 7, 8, and 9 are anticipated to bear at elevations between El. 513 and El. 506 feet on the east side of the river.

4.2.2 Shallow Foundation Lateral Resistance

The shallow foundations should be designed to resist both sliding and overturning due to lateral and/or eccentric bridge loading. Resistance to lateral loads can be developed by sliding friction between the bearing bedrock and the bottom of the footings. A nominal coefficient of sliding friction of 0.83 may be assumed between the bottom of the concrete footing and the bedrock, and a nominal coefficient of sliding friction of 0.57 may be assumed between the concrete footing and the new gravel fill. A resistance factor of 0.80 is recommended based on AASHTO Table 10.5.5.2.2-1. Sliding resistance due to passive pressure in front of the footing can be applied, given that the lower portion of the footing is keyed into bedrock. If the footing sliding resistance requires embedment in rock, the bottom of the footing elevation should be adjusted to ensure the necessary minimum embedment. The top 2 feet of the rock should be neglected from passive resistance due to disturbance during construction. A nominal passive resistance equivalent fluid pressure of 420 pounds per cubic foot (pcf) acting against the embedded portion of the footing may be used with a resistance factor of 0.50.

4.3 Drilled Shaft Foundation Design Recommendation

Drilled shafts are considered a feasible foundation option for the proposed bridge piers. Rock core data indicate limestone with variable joint conditions. Joints are typically spaced at intervals greater than 1 foot and are weathered to varying degrees. Occasionally, open joints filled with clay were encountered in some of the rock cores. Specific joint conditions are considered at each pier for the foundation evaluation.

The construction of the channel piers will require pile caps, cofferdams, and/or coffer cells; GSG understands that coffer cells are being considered for the design. Drilled shafts bearing on bedrock should have a straight shaft, with no bell, and should be placed on top of solid bedrock or socketed into bedrock. Based on the limestone strength and jointing conditions, base resistance was assumed to be the primary mode of axial resistance in rock. The IDOT design guide, Axial Capacity of Drilled Shafts in Rock (2016) was used to evaluate the rock socketed caisson tip resistance which is based on AASHTO 10.8.3.5.4 and the Geological Strength Index (GSI), RQD, and rock unconfined compressive strength. Factors such as the presence of clay

seams are incorporated in the RQD value and Joint Type within the IDOT spreadsheet and shown in the tables in **Appendix F**.

Rock core parameters are required for a depth of twice the socket diameter below the bottom of the shaft. For piers where there are insufficient lengths of rock core, the data was extended assuming the extended core has the same properties as the bottom core parameters. Based on the rock joint data, the range of GSI values were estimated. The lower bound of the GSI value was used in the nominal base resistance. All materials above rock are ignored in determining the geotechnical resistance, and no axial group effect was considered in rock. Side resistance within a rock socket will only be evaluated if the base resistance is insufficient to support the required loading. At some locations, the limestone strength is higher than the concrete compressive strength and the maximum nominal side resistance will be controlled by the concrete strength. The nominal side resistance for 4,000 psi and 5,000 psi compressive strength in concrete is 34.9 and 39.0 ksf, respectively (AASHTO 10.8.3.5.4b).

As per AASHTO Table 10.5.5.2.4.1, geotechnical resistance factors of 0.55 for side resistance and 0.50 base resistance were used in our analyses. The resistance factor may be increased to 0.7 if load testing is conducted at the location with the poorest quality rock. The end bearing drill shafts should be supported upon the component bedrock beneath the top weathered surface materials. Therefore, a minimum 3-foot-long rock socket will be required; however, the final socket length should be determined based on the actual loading condition and the lateral resistance required. The socket diameter should be 6 inches less than the shaft diameter above bedrock. **Table 8** provides a summary of the drilled shaft side and tip resistances of the bedrock at each pier location.

Table 8 – Drilled Shaft Side and End Bearing Parameters

Substructure	Top of Bedrock Elevation (feet)	Nominal Side Resistance (ksf)	Factored Side Resistance (ksf)	Nominal Unit Tip Resistance (ksf)	Factored Unit Tip Resistance (ksf)
Pier 1	536.0	87*	48*	368	184
Pier 3	510.0	31	17	413	206
Pier 4	510.0	87*	48*	411	205
Pier 5	512.0**	19	10	229	114

*Nominal side resistance at Piers 1 and 4 will be limited by the nominal concrete strength: 34.9 ksf for 4,000 psi concrete and 39.0 ksf for 5,000 psi concrete, respectively (AASHTO 10.8.3.5.4b).

** Deeper top of bedrock encountered at boring BSB-14 at elevation 498.4 ft.

No skin friction should be considered within the scour depth of drilled piers. If no protective casing is used, and new fill will be placed in the area of the drilled shafts, downdrag (negative skin friction) should be included in the drilled pier's resistance calculation. If new fill is not anticipated in the area of the drilled shafts, downdrag will not occur.

Based on the structural drawings, it is anticipated that the minimum rock socket shaft diameter of the piers on land will be 60 inches (5 feet) and the piers within the Des Plaines River will have rock sockets of 78 inches (6.5 feet) in diameter. Drilled shafts should be installed with a minimum center-to-center spacing of at least 4 shaft diameters (4D) for the vertical loads and 5D for the lateral load analyses, as drilling the shafts at close spacing can reduce the total capacity of the drilled shafts and the group effect must then be considered. Based on the FHWA's "Drilled Shafts: Construction Procedures and LRFD Design Methods' document, Chapter 14, if constructed poorly, closely spaced drilled shafts may cause soil loosening around previously installed shafts, reducing the shaft's lateral resistance. This effect on constructability is less significant in rock-socketed caissons. Based on the aforementioned FHWA standard, Section 14.4.3, the strength of bedrock is generally greater than the strength of the drilled shaft/rock interface; group effects within rock are usually insignificant and do not control the foundation design.

As it can be expected that the shafts will penetrate through very dense granular soils or bedrock, the contractor should be prepared for hard drilling and have techniques in place to properly clean the bottom of the shaft before any concrete is placed.

4.4 Driven Pile Foundation Design Recommendation

Depending on the construction sequence, driven piles for the abutments and approach bents, within the newly constructed embankments, may be subjected to downdrag effects. If the new I-80 Eastbound and Westbound embankments are constructed and preloaded to allow settlement to occur before the pile installations, there will be no downward movement of the soil relative to piles, and downdrag influence is eliminated. Pile design recommendations with no downdrag are provided in *Section 4.4.1*. If the piles are installed before the filling operations, downdrag effects should be considered in the pile design or should be mitigated. Pile design recommendations including the effect of downdrag are provided in *Section 4.4.2*. Once final grading plans are determined, GSG can review and revise these recommendations as necessary.

4.4.1 Pile Design with No Downdrag

The Modified IDOT static method Excel spreadsheet was used to estimate pile lengths at various axial geotechnical resistances for driven piles, as per IDOT AGMU Memo 10.2. The factored resistance includes a reduction of 0.55 for the geotechnical resistance for the pile installation. No geotechnical losses due to scour or liquefaction were included in the axial pile resistance calculations; it is anticipated that slope walls will be used to protect the abutment piles from scour.

Tables 9a and 9b summarize the estimated maximum pile lengths for representative pile sections along with the factored resistance available for several H-pile types driven to bedrock.

Due to the MSE wall construction below the exterior corners of the east abutments, the top of the pile foundations for the abutments would extend through new embankment materials, which will require the installation of corrugated steel pipes or pile sleeves within the wall's select backfill. The steel pipes may be filled to full depth with clean sand after the piles are driven. The ground elevation at the beginning of pile driving used in the east abutment pile analysis is assumed to be the bottom of the MSE wall levelling pad. The western abutment pile foundations will be installed after the embankment is constructed and are anticipated to include downdrag forces; further discussion is included in Section 4.4.2. The estimated pile lengths shown in **Tables 9a and 9b** include the length of pile within this pipe, as necessary.

The estimated pile lengths shown in **Tables 9a and 9b** are based on the pile cut-off estimated elevations and noted below each table. The actual pile length and resistance should be evaluated based on test piles installed in accordance with the specifications provided in Section 512.15 of IDOT Standard Specifications for Road and Bridge Construction. Per section 3.10.1.11 of the IDOT Bridge Manual, the minimum pile spacing should be 3 pile diameters.

Table 9a – I-80 Eastbound, East Abutment Pile Design (BSB-30, BSB-31)
No Downdrag

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP8x36 (Max. R_N = 286 Kips)	286	157	42.6
HP10x42 (Max. R_N = 335 Kips)	335	184	42.1
HP10x57 (Max. R_N = 454 Kips)	454	250	43.1
HP12x53 (Max. R_N = 418 Kips)	418	230	42.6
HP12x63 (Max. R_N = 497 Kips)	497	273	43.1
HP12x74 (Max. R_N = 589 Kips)	589	324	43.6
HP12x84 (Max. R_N = 664 Kips)	664	365	44.1
HP14x73 (Max. R_N = 578 Kips)	578	318	42.6
HP14x89 (Max. R_N = 705 Kips)	705	388	43.6
HP14x102 (Max. R_N = 810 Kips)	810	445	44.1
HP14x117 (Max. R_N = 929 Kips)	929	511	44.6

***** Estimated pile length is based on assuming the pile cut off elevation: 553.36 ft., and ground elevation at the beginning of pile driving: 539.9 ft.

Table 9b – I-80 Westbound, East Abutment Pile Design (BSB-29, BSB-30)

No Downdrag

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP8x36 (Max. R_N = 286 Kips)	286	157	42.6
HP10x42 (Max. R_N = 335 Kips)	335	184	42.1
HP10x57 (Max. R_N = 454 Kips)	454	250	43.1
HP12x53 (Max. R_N = 418 Kips)	418	230	42.1
HP12x63 (Max. R_N = 497 Kips)	497	273	42.6
HP12x74 (Max. R_N = 589 Kips)	589	324	43.6
HP12x84 (Max. R_N = 664 Kips)	664	365	43.6
HP14x73 (Max. R_N = 578 Kips)	578	318	42.6
HP14x89 (Max. R_N = 705 Kips)	705	388	43.6
HP14x102 (Max. R_N = 810 Kips)	810	445	44.1
HP14x117 (Max. R_N = 929 Kips)	929	511	44.6

***** Estimated pile length is based on assuming the pile cut off elevation: 553.36 ft., and ground elevation at the beginning of pile driving: 539.9 ft.

4.4.2 Pile Design with Downdrag

This section presents pile design recommendations, including the effect of downdrag induced due to the downward movement of the soil relative to the piles for the abutment foundations. According to AASHTO Section 3.11.8-Downdrag, the pile should be designed to resist the downdrag if the ground settlement is 0.4 inches or greater. Based on *Section 3.2 Settlement*, 1.0 to 3.0 inches of ground settlement could be anticipated in the area of the east and west abutments; therefore, downdrag needs to be considered if no mitigation of the existing soil is completed. The nominal geotechnical resistance available to resist the structure load plus the downdrag load is estimated by considering only the positive side resistance and tip resistance below the lowest layer contributing to the downdrag.

Tables 10a through 10d summarize the estimated maximum pile lengths for representative pile sections along with the factored resistance available for several H-pile types driven to bedrock.

Due to the MSE wall construction below the exterior corners of the abutments, the top of the pile foundations for the abutments would extend through new embankment materials, which will require the installation of corrugated steel pipes/pile sleeves within the wall select backfill. The steel pipes may be filled to full depth with clean sand after the piles are driven. The ground elevation at the beginning of pile driving for the eastern abutment is assumed to be the top of the MSE wall levelling pad. The ground elevation for pile driving for the west abutment is assumed to be the bottom of the abutment cap, after construction of the embankment. The estimated pile lengths shown in **Tables 10a through 10d** include the length of pile within this pipe, as necessary.

The estimated pile lengths shown in **Table 10a through 10d** are based on the estimated pile cut off elevations noted below the table. The actual pile length and resistance should be evaluated based on test piles installed in accordance with the specifications provided in Section 512.15 of IDOT Standard Specifications for Road and Bridge Construction. Per section 3.10.1.11 of the IDOT Bridge Manual, the minimum pile spacing should be 3 pile diameters.

Table 10a – I-80 Eastbound, East Abutment Pile Design (BSB-30, BSB-31) With Downdrag

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP8x36 (Max. R_N = 286 Kips)	286	120	45.4
HP10x42 (Max. R_N = 335 Kips)	335	138	44.9
HP10x57 (Max. R_N = 454 Kips)	454	202	45.9
HP12x53 (Max. R_N = 418 Kips)	418	174	45.4
HP12x63 (Max. R_N = 497 Kips)	497	217	45.9
HP12x74 (Max. R_N = 589 Kips)	589	267	46.4
HP12x84 (Max. R_N = 664 Kips)	664	308	46.9
HP14x73 (Max. R_N = 578 Kips)	578	252	45.4
HP14x89 (Max. R_N = 705 Kips)	705	321	46.4
HP14x102 (Max. R_N = 810 Kips)	810	378	46.9
HP14x117 (Max. R_N = 929 Kips)	929	443	47.4

***** Estimated pile length is based on assuming the pile cut off elevation: 556.19 ft., and ground elevation at the beginning of pile driving: 539.9 ft. Bottom of downdrag elevation 518 ft.

Table 10b – I-80 Westbound, East Abutment Pile Design (BSB-29, BSB-30) With Downdrag

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP8x36 (Max. R_N = 286 Kips)	286	121	42.6
HP10x42 (Max. R_N = 335 Kips)	335	140	42.1
HP10x57 (Max. R_N = 454 Kips)	454	204	43.1
HP12x53 (Max. R_N = 418 Kips)	418	177	42.1
HP12x63 (Max. R_N = 497 Kips)	497	219	42.6
HP12x74 (Max. R_N = 589 Kips)	589	269	43.6
HP12x84 (Max. R_N = 664 Kips)	664	310	43.6
HP14x73 (Max. R_N = 578 Kips)	578	254	42.6
HP14x89 (Max. R_N = 705 Kips)	705	324	43.6
HP14x102 (Max. R_N = 810 Kips)	810	381	44.1
HP14x117 (Max. R_N = 929 Kips)	929	445	44.6

***** Estimated pile length is based on assuming the pile cut off elevation: 553.36 ft., and ground elevation at the beginning of pile driving: 539.9 ft. Bottom of downdrag elevation 518 ft.

Table 10c –I-80 Eastbound, West Abutment Pile Design (BSB-01, BSB-02) With Downdrag**

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP12x63 (Max. R_N = 497 Kips)	424	138	44.0
HP12x74 (Max. R_N = 589 Kips)	579	222	45.0
HP12x84 (Max. R_N = 664 Kips)	661	266	45.5
HP14x73 (Max. R_N = 578 Kips)	502	164	44.0
HP14x89 (Max. R_N = 705 Kips)	689	266	45.0
HP14x102 (Max. R_N = 810 Kips)	786	318	45.5
HP14x117 (Max. R_N = 929 Kips)	929	395	46.5

***** Estimated pile length is based on assuming the pile cut off elevation: 583.0 ft., and ground elevation at the beginning of pile driving: 582.0 ft. Bottom of downdrag elevation 542 ft.

**Assuming existing soils will be replaced by granular engineered fill to elevation 545.2 ft.

Table 10d –I-80 Westbound, West Abutment Pile Design (BSB-02, BSB-03) With Downdrag

Pile Section	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (FT)*
HP8x36 (Max. R_N = 286 Kips)	280	87	45.8
HP10x42 (Max. R_N = 335 Kips)	288	76	45.3
HP10x57 (Max. R_N = 454 Kips)	454	166	46.8
HP12x53 (Max. R_N = 418 Kips)	417	131	45.8
HP12x63 (Max. R_N = 497 Kips)	427	136	45.8
HP12x74 (Max. R_N = 589 Kips)	589	223	47.3
HP12x84 (Max. R_N = 664 Kips)	664	264	47.8
HP14x73 (Max. R_N = 578 Kips)	506	162	45.8
HP14x89 (Max. R_N = 705 Kips)	705	270	47.3
HP14x102 (Max. R_N = 810 Kips)	810	326	47.8
HP14x117 (Max. R_N = 929 Kips)	929	391	48.3

***** Estimated pile length is based on assuming the pile cut off elevation: 584.8 ft., and ground elevation at the beginning of pile driving: 583.8 ft. Bottom of downdrag elevation 542 ft.
**Assuming existing soils will be replaced by granular engineered fill to elevation 545.5 ft.

4.5 Lateral Load Resistance

Lateral loadings applied to deep foundations are typically resisted by the soil/structure interaction, pile flexure, or a combination of these factors. Section 3.10.1.10 of the 2012 IDOT Bridge Manual requires performing detailed structure interaction analysis if the factored lateral loading per pile exceeds 3 kips. The analysis shall determine the actual pile moment and deflection to determine the selected pile adequacy for the existing loadings. Generalized soil parameters for the entire site, including recommended lateral soil modulus and soil strain

parameters that can be used for deep foundation analysis via the p-y curve method based on the encountered subsurface conditions, are included in **Appendix F**.

5.0 GEOTECHNICAL RETAINING WALL DESIGN RECOMMENDATIONS

This section will provide retaining wall design parameters for MSE walls below the east bridge abutment. Final recommendations for design and construction of the MSE walls will be included in a later version of this report, pending the completion of additional soil borings at those locations.

5.1 Retaining Wall Type Recommendations

It is anticipated that where the proposed alignment encroaches upon the existing embankment, this area will either be removed and replaced with the new embankment or the existing embankment will require ground improvements to support the new wall. New embankments will also be constructed for the eastern abutments. There are various types of retaining walls that could be utilized for retaining earth embankments in fill areas. This section discusses several earth retaining structures that could be used for the proposed project. Several typical wall types are described in the section below.

5.1.1 CIP Concrete Cantilever Walls

CIP concrete cantilever retaining walls are typically used in fill areas. They are constructed with a footing that extends laterally both in front of and behind the wall. They can be designed to resist horizontal loading with or without tiebacks by adjusting the foundation's geometry. The footing can also be supported on a deep foundation to minimize the settlement and resist horizontal loading. This type of wall typically requires that the area behind the wall be excavated to facilitate construction or be constructed where new fill embankments are necessary.

The advantages of a CIP wall include that it is a conventional system with well-established design procedures and performance characteristics; it is durable; and it has the ability to easily be formed, textured, or colored to meet aesthetic requirements. Disadvantages include a relatively long construction period due to undercutting, excavation, deep foundation construction, form work, steel placement, and curing of the concrete. This wall system is also sensitive to total and differential settlements.

5.1.2 Mechanically Stabilized Earth Walls

An MSE wall is typically associated with fill wall construction and consists of facing such as segmental precast units, dry block concrete, or CIP concrete facing units connected to horizontal

steel strips, bars, or geosynthetic to create a reinforced soil mass. The reinforcement is typically placed in horizontal layers between successive layers of granular backfill or light weight cellular concrete as backfill to reduce the wall loads. MSE walls can be used in cut situations as well. The additional cost of the excavations for an MSE wall is usually offset by the savings in construction costs and schedule as compared to a CIP wall on spread footings.

Advantages of the MSE wall include a relatively rapid construction schedule that does not require specialized labor or equipment, provided excavation for the reinforcement is not extensive. This type of retaining wall can accommodate relatively large total and differential settlements without significant distress to the wall system, and the reinforcement materials are light and easy to handle. Settlement of any anchor slabs, pavements or structures constructed at the top of the wall should also be considered. Facing panels can be designed for various architectural finishes.

The design of MSE walls for internal stability is the Contractor's responsibility and will need to be designed by a licensed Structural Engineer in the State of Illinois. The length of the reinforced soil mass from the outside face should be a minimum of 8 feet, but not less than 70% of the wall height. The length should be determined to satisfy eccentricity and sliding criteria and provide adequate length to prevent structural failure with respect to pullout and rupture of reinforcement. The MSE wall could be designed using a unit weight of 120 pcf and a friction angle of 34 degrees for the reinforced granular backfill soil.

5.1.3 Recommended Wall Type

Based on the existing site conditions, GSG concurs with WSP's design selection of an MSE wall for this project.

5.2 Retaining Wall Design Recommendations

The engineering analyses performed for evaluating the retaining wall options followed the current AASHTO Load and Resistance Factor Design (LRFD) Methodology, as required by IDOT. The LRFD methodology incorporates the use of load factors and resistance factors to account for uncertainty in both the applied loads and the load resistance of structural elements separately. The AASHTO LRFD Bridge Design Specifications outline load factors and combinations for various strength, extreme event, service, and fatigue limit states. Section 11, which outlines geotechnical criteria for retaining walls, of the AASHTO Specifications requires the evaluation of bearing

resistance failure, lateral sliding, and overturning at the strength limit state and excessive vertical displacement, excessive lateral displacement, and overall stability at the service limit state. The selected wall should also be evaluated with respect to the collision load. **Table 11** outlines the load factors used in evaluation of the retaining wall in accordance with AASHTO Specification Tables 3.4.1-1 and 3.4.1-2.

Table 11 - LRFD Load Factors for Retaining Wall Analyses

	Type of Load	Sliding and Eccentricity Strength	Bearing Resistance Strength I	Sliding and Eccentricity Extreme II	Bearing Resistance Extreme II	Settlement Service I
Load Factors for Vertical Loads	Dead Load of Structural Components (DC)	0.90	1.25	1.00	1.00	1.00
	Vertical Earth Pressure Load (EV)	1.00	1.35	1.00	1.00	1.00
	Earth Surcharge Load (ES)		1.50			
	Live Load Surcharge (LS)		1.75		0.50	1.00
Load Factors for Horizontal Loads	Horizontal Earth Pressure Load (EH) Active At-Rest AEP for anchored walls	1.50	 1.50 1.35 1.35	1.00	1.00	1.00
	Earth Surcharge (ES)	1.50	1.50			
	Live Load Surcharge (LS)	1.75	1.75	0.50	0.50	1.00
Load Factor for Vehicular Collision				1.00	1.00	

5.2.1 Lateral Earth Pressures and Loading

The walls should be designed to withstand the effects of earth and live lateral earth pressures. The lateral earth pressures on MSE walls should be determined in accordance with AASHTO 3.11.5.8. The earth loads of retained soils behind the MSE walls can be calculated using an active earth pressure coefficient, Ka, which is determined using the Rankine Theory. **Appendix F** presents soil design properties that may be used for designing the retaining walls at the abutment for the anticipated soil type at this site. Once the final borings are completed at the locations of the MSE walls, the soil design properties will be updated.

Traffic and other surcharge loads should be included in the retaining wall design as applicable. A live load surcharge shall be applied where vehicular load is expected to act on the surface of the

backfill within a distance equal to one-half the wall height behind the back face of the wall in accordance with AASHTO 3.11.6.4. The live load surcharge may be estimated as a uniform horizontal earth pressure due to an equivalent height (Heq) of soil. **Tables 12a and 12b** provide the equivalent heights of soil for vehicular loadings on retaining walls.

Table 12a - Equivalent Height of Soil for Vehicular Loading on Abutments Perpendicular to Traffic

Abutment Height (feet)	H_{eq} (feet)
5	**4.0**
10	3.0
≥20	2.0

Reference: AASHTO LRFD Table 3.11.6.4-1

Table 12b – Equivalent Height of Soil for Vehicular Loading on Retaining Walls Parallel to Traffic

Retaining Wall Height (ft)	H_{eq} Distance from Wall Back face to Edge of Traffic	
	0 feet	**1.0 feet or Further**
5	5.0 feet	2.0 feet
10	3.5 feet	2.0 feet
≥20	2.0 feet	2.0 feet

Reference: AASHTO LRFD Table 3.11.6.4-2

The retaining wall design should include drainage to allow movement of any water behind the wall and prevent the development of hydrostatic (seepage) pressures in the active soil wedge behind the wall. It is assumed that the soil behind the wall will be free-flowing.

Heavy compaction equipment should not be allowed to be positioned closer than five (5) feet to the retaining wall to prevent inducing high lateral earth pressures and causing wall yielding and/or other damage. The passive lateral earth pressure coefficient (Kp) from the upper 3.5 feet of level backfill at the toe of the wall should be neglected, unless the soil is confined or protected by a concrete slab or well drained pavement. The passive lateral earth pressure coefficient from the upper 3.5 feet of soil for a descending slope at the wall toe should also be neglected, regardless of any surface protection.

5.3 Bearing Resistance

Bearing resistance for the retaining walls founded on a granular fill leveling slab shall be evaluated at the strength limit state using load factors (see **Table 11**), and factored bearing resistances. The

bearing resistance factor, ϕ_b, for an MSE wall is 0.65 per AASHTO Table 11.5.7-1. The bearing resistance shall be checked for the extreme event limit state with a resistance factor of 1.0. **Tables 13a and 13b** present the proposed bearing elevations and recommended bearing resistances of suitable materials to support the wall systems.

Table 13a – Recommended Bearing Resistance East Abutment Wall

Soil Borings	Approx. Station Limits	Approximate Bearing Elevation (feet)	Nominal Resistance (ksf)	Factored Bearing Resistance (ksf)	Bearing Resistance for 1-inch Settlement Service Limit (ksf)	Bearing Resistance for 2-inch Settlement Service Limit (ksf)	Anticipated Bearing Soil
BSB-29	59+64.7 to 59+65.4	548.9 to 544.5	46.1	30.0	5.1	9.1	Granular Engineered Fill over Native Very Dense Gravel
BSB-30	59+65.4 to 59+92.7	539.9	40.8	26.5	8.5	15.5	Granular Engineered Fill over Native Very Dense Sand
BSB-31	59+92.7 to 60+19.4	551.5 to 539.9			8.2	14.9	Granular Engineered Fill over Native Extremely Dense Gravel

Table 13b – Recommended Bearing Resistance West Abutment Wall

Soil Borings	Approx. Station Limits	Approximate Bearing Elevation (feet)	Nominal Resistance (ksf)	Factored Bearing Resistance (ksf)	Bearing Resistance for 1-inch Settlement Service Limit (ksf)	Bearing Resistance for 2-inch Settlement Service Limit (ksf)	Anticipated Bearing Soil
BSB-01	37+51.0 to 37+89.1	576.8 to 566.5	41.4	26.9	4.8	8.5	Granular Engineered Fill over Weathered Limestone
BSB-02	37+89.1 to 38+41.4	566.5			8.2	14.8	Granular Engineered Fill over Very Dense Sand
BSB-03	38+41.4 to 38+55.5	579.8 to 566.5			4.2	7.4	Granular Engineered Fill over Very Dense Gravel

The minimum depth of the leveling pad should be 3.5 feet below the final exterior grade to alleviate the effects of frost. A MSE reinforcement width of 1.1H (34 feet) and 1.2H (36 feet) was used for the west and east abutment bearing and settlement calculations, respectively, based on the results of the slope stability analysis discussed in ***Section 4.5***.

5.3.1 Subgrade Undercut Areas

The subgrade soils at bearing grade should be evaluated in accordance with the guidelines provided in Section 8.9 of the IDOT Geotechnical Manual (2020) for suitability/workability before placing any portion of the proposed structures. According to Section 540 of the IDOT SSRBC (2022), a minimum of 6 inches of porous granular material should be provided as bedding material, serving as a working platform.

GSG recommends undercutting any existing silty clay fill soils along the wall alignment, as well as low-strength native clay and low-density granular soils. With the exception of the area of BSB-01, which was drilled at a higher elevation, undercuts to depths of up to 6.0 feet below existing site grades may be anticipated to reach the medium dense to extremely dense native sand and gravel. The undercut depth should be verified in the field during construction and backfilled with compacted granular engineered fill to support the proposed retaining wall. Anticipated undercut depths are presented in **Tables 14a and 14b**.

Table 14a – Recommended Undercuts East Abutment Wall

Soil Borings	Station Limits	Undercut Depth Below Existing Grade (Elevation, feet)	Approximate Bearing Elevation (feet)*	Comments
BSB-29	59+64.7 to 59+65.4	4.0 (517.6)	548.9 to 544.5	Existing unsuitable silty clay fill
BSB-30	59+65.4 to 59+92.7	3.5 (518.3)	539.9	Existing unsuitable fill Trace organics
BSB-31	59+92.7 to 60+19.4	6.0 (517.3)	551.5 to 539.9	Existing unsuitable fill Low strength 1.5 tsf

* Assumed bearing elevation at about El. 551.5 to El. 539.9 feet based on the GPE drawings

Table 14b – Recommended Undercuts West Abutment Wall

Soil Borings	Station Limits	Undercut Depth Below Existing Grade (Elevation, feet)	Approximate Bearing Elevation (feet)*	Comments
BSB-01	37+51.0 to 37+89.1	21.3** (545.2)	576.8 to 566.5	Existing unsuitable silty clay fill and native silty clay Low strength <1.5 tsf at several depths
BSB-02	37+89.1 to 38+41.4	5.5 (542.5)	566.5	Existing low-strength silty clay <1.5 tsf, loose sand
BSB-03	38+41.4 to 38+55.5	3.0 (545.5)	579.8 to 566.5	Existing low density sand fill

* Assumed bearing elevation at about El. 579.8 to El. 566.5 feet based on the GPE drawings

**BSB-01 was drilled atop the existing bridge. It is assumed that much of this earthwork/soil removal will be part of the bridge demolition.

Settlement generally depends on the foundation size and bearing resistance, as well as the strength and compressibility characteristics of the underlying bearing soil.

Undercut areas should be replaced with structural fill in accordance with IDOT Standard Specifications for Road and Bridge Construction. The lateral limit of the structural fill should extend a minimum of 1 foot beyond the edge of the MSE wall leveling pad, then an additional 1 foot laterally for every 2 feet of structural fill depth, as depicted in **Exhibit 3**. The structural fill should be placed and compacted to a minimum of 95% of the maximum dry density, as determined by AASHTO T-180: Standard Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures (ASTM D1557) in accordance with IDOT standard construction requirements.

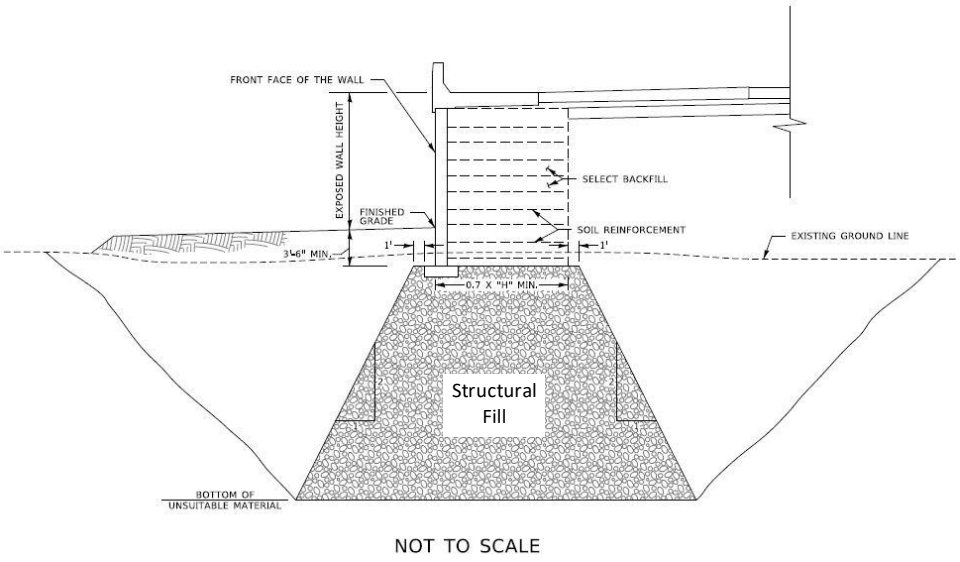


Exhibit 3 - Structural Fill Placement below MSE Wall

5.4 Sliding and Overturning Stability

The wall base width should be sufficient to resist sliding. The frictional resistance shall include the friction between granular backfill for the wall and supportive cohesive or granular soils, and the friction between the wall foundation and bearing soils.

The factored resistance against sliding should be calculated using equation 10.6.3.4-1 in the AASHTO LRFD manual. A sliding resistance factor, ϕ, of 1.0 (Table 11.5.7-1) shall be applied to the nominal sliding resistance of soil on soil beneath the MSE walls. A maximum nominal frictional coefficient of 0.53 (tan 28 degrees) could be used for determining the sliding resistance for the soil-to-soil infill interfaces. The width of the MSE wall (length of reinforcing) must be wide enough to resist overturning forces. The location of the resultant of the forces shall be within the middle two-thirds of the MSE base width.

5.5 Wall Settlement

Settlement of the MSE walls depends on the wall widths and bearing pressures, as well as the strength and compressibility characteristics of the underlying bearing soils. Assuming the embankments have been constructed as recommended in *Section 3.3.1*, settlement of the MSE walls could be on the order of 2 to 4 inches, based on the anticipated settlement of the proposed embankment. Differential settlement between two points 100 feet apart along the length of the

walls could be 1 to 2 inches due to the nonuniform soil conditions and the varied embankment height. AASHTO 11.10.4.1 provides guidelines regarding the maximum total and differential tolerable settlements for various facing of MSE walls. The allowable settlement of MSE walls shall be established based on the longitudinal deformability of the facing. It is recommended to provide vertical, full-height slip joints if large differential settlements are anticipated over short horizontal distances.

If these estimated settlements are considered to be too large to accommodate in design, the MSE walls may have to be constructed in stages so as to preload the embankment area, or the subgrade will need to be improved.

5.6 Overall Stability

The retaining walls should be designed to ensure both external stability of the wall system and internal stability behind the wall facing. The following parameters were used to evaluate the overall stability of the walls. Based on the design of the embankments, it is anticipated that large rock will be used as fill immediately below the MSE walls; a concrete slope wall will be constructed on the final slopes below the wall.

Table 15a – MSE Retaining Wall Description East Abutment

Maximum height of the retaining wall (H*)	29.3 feet
Assumed length of reinforcement 0.7xH	21 feet
Recommended length of reinforcement to reach FoS of 1.5	1.2H = 36 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of MSE wall backfill	120 pcf
Assumed elevation of new rock fill below MSE wall	El. 522 feet
Slope below MSE wall	1V:2H concrete slopewall

*H extends from top of the leveling pad to bridge deck

Table 15b – MSE Retaining Wall Description West Abutment

Maximum height of the retaining wall (H*)	30.8 feet
Assumed length of reinforcement 0.7xH	22 feet
Recommended length of reinforcement to reach FoS of 1.5	1.1H = 34 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of MSE wall backfill	120 pcf
Assumed elevation of new rock fill below MSE wall	El. 555 feet
Slope below MSE wall	1V:2H concrete slopewall

*H extends from top of the leveling pad to bridge deck

The actual wall width and total height of the walls should be based on structural analysis performed by a Licensed Structural Engineer in the State of Illinois.

5.7 Slope Stability Results

The Slide2 program was used to evaluate the global slope stability of the proposed east and west abutment MSE walls based on the limit equilibrium method. The proposed wall systems were analyzed based on the MSE wall drawings and the soils encountered at the site. Circular failure analyses were evaluated using the simplified Bishop analysis method for the proposed wall and slope geometries.

Circular failure analyses were evaluated for both short-term (undrained) and long-term (drained) conditions based on the proposed geometry for the retaining wall. The analyses were performed at the sections of the assumed maximum wall heights for each proposed abutment. The results of the analyses are shown in **Table 16.**

Table 16 – Stability Analyses Results

Cross Section	Soil Profile	Failure Type	Factor of Safety	Required Minimum Factor of Safety
East Abutment **0.7H**	Borings BSB-29, BSB-30, BSB-31	Circular – Short Term	1.3	1.5
		Circular – Long Term	1.2	1.5
East Abutment **1.2H**		Circular – Short Term	1.6	1.5
		Circular – Long Term	1.5	1.5
West Abutment **0.7H**	Borings BSB-01, BSB-02, BSB-03	Circular – Short Term	1.3	1.5
		Circular – Long Term	1.3	1.5
West Abutment **1.1H**		Circular – Short Term	1.5	1.5
		Circular – Long Term	1.5	1.5

Based on the analyses performed, the proposed retaining walls do not meet the minimum factor of safety of 1.5 using a reinforcement length of 0.7H. The west abutment wall meets the factor of safety of 1.5 using a minimum reinforcement length of 1.1H. The east abutment wall meets the factor of safety of 1.5 using a minimum reinforcement length of 1.2H. Copies of the Slope Stability analyses exhibits are included in **Appendix G**.

6.0 CONSTRUCTION CONSIDERATIONS

All work performed for the proposed project should conform to the requirements in the IDOT Standard Specifications for Road and Bridge Construction (2022). Any deviation from the requirements in the manuals above should be approved by the design engineer.

6.1 Existing Utilities and Structures and Site Preparation

Based on the existing site conditions, significant utilities are known to exist along the project corridor and within the vicinity of several of the proposed foundations. Before proceeding with construction, all existing underground utility lines or structures that will interfere with construction should be completely relocated from the proposed construction areas. Where possible, existing utility lines that are to be abandoned in place should be removed and/or plugged with a minimum of 2 feet of cement grout.

There are also significant commercial structures and residences in the vicinity of the proposed new bridge foundations. These structures should be demolished, and all foundations/ slabs/utilities removed where they will interfere with new construction.

All excavations resulting from underground utilities or structure removal activities should be cleaned of loose and disturbed materials, including all previously placed backfill, and backfilled with suitable fill materials in accordance with the requirements of this section. During clearing and stripping operations, positive surface drainage should be maintained to prevent water accumulation.

There are significant amounts of trees and heavy vegetation along the shorelines of the Des Plaines River and within the existing residential neighborhood. The trees and vegetation should be removed, and their root systems should be grubbed where they may interfere with new construction along the alignment.

6.2 Site Excavation

If borrow material is to be used for onsite construction, it should conform to Section 204 “Borrow and Furnished Excavation” of the IDOT Construction Manual (2021). The fill material should be free of organic matter and debris. Earth-moving operations should be avoided during excessively

cold or wet weather to avoid freezing of softening subgrade soils.

Structural fill shall consist of crushed limestone or recycled concrete consistent with IDOT CA-6 gradation or medium plasticity silty clays. Structural fill should be placed in lifts not to exceed 8 inches in loose thickness and compacted to a minimum of 95% of the material's standard proctor maximum dry density obtained according to the ASTM D698/AASHTO T 99 method. Once the additional borings are completed within the existing embankments for the abutments, the existing soils can be evaluated for potential reuse or removal.

Materials unsatisfactory for use as structural fill include soils classified as silt or organic silt (ML, MH, PT, OL, and OH) in the Unified Classification System (ASTM D2487). Soils with these classifications may be used for general purpose landscaping and in areas where uncontrolled settlement is acceptable.

Should fill be placed during cool, wet seasons, the use of granular fill may be necessary since weather conditions will make compaction of cohesive soils more difficult. If water seepage occurs during excavating and backfilling procedures, or when wet conditions are encountered that prevent the removal of water with conventional sump and pump procedures, GSG recommends placing open-grade stone, similar to IDOT CA-7, to stabilize the bottom of the excavation. The CA-7 stone should be placed 12 inches above the water level in 12-inch lifts and compacted using a heavy, smooth drum roller or a heavy vibratory plate compactor until it is stable. The remaining portion of the excavation should be backfilled using approved engineered fill.

GSG recommends that foundation excavations, subgrade preparation, and structural fill placement and compaction be inspected by a GSG geotechnical engineer to verify the type and strength of soil materials present at the site and their conformance with the geotechnical recommendations in this report.

6.3 Groundwater Management

The Des Plaines River elevation is anticipated to be influenced by seasonal rainfall or melting snow. A 10-year storm is anticipated to result in a river rise of about 6 inches. GSG anticipates that groundwater and river elevations will be an issue during construction activities due to the

extent of the proposed improvements and the anticipated timeframe for excavation construction. It is understood that float-in coffer cells, sealed to the drilled shafts, will be used for the construction of the piers within the Des Plaines River.

Based on the observed groundwater levels and water level of Des Plaines River (about El. 539 feet), it is anticipated that the long-term groundwater level is near the top of bedrock at elevations of 525.5 to 543.5 feet at the west shore area and 501.5 to 516.6 feet at the east shore area. Perched water is also likely to be present within the existing fill materials. If rainwater runoff or groundwater accumulates at the base of excavations, the contractor should remove the accumulated water using conventional sump pit and pump procedures and maintain a dry and stable excavation. The location of the sump should be determined by the contractor based on field conditions. During earthmoving activities at the site, grading should be performed to ensure that drainage is maintained throughout the construction period. Water should not be allowed to accumulate in the foundation area either during or after construction. Undercut and excavated areas should be sloped toward one corner to facilitate the removal of any collected rainwater or surface run-off. Grades should be sloped away from the excavations to minimize runoff from entering.

If water seepage occurs during excavations or where wet conditions are encountered such that the water cannot be removed with conventional sumping, we recommend placing open grade stone similar to IDOT CA-7 to stabilize the bottom of the excavation below the water table. The CA-7 stone should be placed 12 inches above the water table, in 12-inch lifts, and should be compacted with the use of a heavy smooth drum roller or heavy vibratory plate compactor until stable. The remaining portion of the excavation beneath the footings should be backfilled using approved structural fill.

6.4 Drilled Shafts Construction

Any drilled shaft construction should be completed in accordance with Section 516, Drilled Shafts, in the IDOT SSRBC (2022). One concern for caisson construction is that the very soft to medium-stiff clay and silty clay fill with high water content could squeeze into the caisson shafts. This material was encountered at depths ranging from 0 to 6.5 feet below existing grade (El. 538 to 509.4 feet) at Pier locations 1, 3, 4, and 5. If necessary, installing a temporary steel casing with a permanent corrugated liner casing will help to maintain the sides of the caisson excavations

through the very soft to medium stiff silty clay observed above the bedrock. It is anticipated that a permanent steel casing will be used for Piers 3 and 4. The bottom of the casing should be set at a minimum of 2 feet into the underlying sand and gravel. The outer space between the permanent and temporary casing should be grouted using lean cement grout. The casing will prevent caving of the granular fill materials and the squeezing of the soft clay soils into the caissons and help to control water infiltration.

6.5 Pile Installation

Based on the variance in top-of-rock elevations, particularly on each side of the river (between approximately 544.7 feet and 498.4 feet), it is recommended that test piles be used at the site. The test piles are installed based on the preliminary driving criteria in order to evaluate site conditions and are inspected in accordance with the IDOT Standard for Road and Bridge Construction. All test pile installation should be completed by the IDOT SSRBC Section 512.15.

6.6 Temporary Earth Structures

During construction of the abutments and associated MSE walls, fill may need to be removed and replaced. It is anticipated that a soil retention system may then be necessary before construction of the new embankments and east and west abutments. It is also expected that a TSRS system will be required for the excavation and construction of a new crash wall at Pier 1.

Based on the soil profile and the Temporary Sheet Pile Design Chart, a temporary sheet pile system is not feasible for the east and west abutments due to the presence of very dense granular soils and shallow bedrock, and a temporary soil retention system (TSRS) will be required. Temporary MSE walls may also be considered for temporary soil retention in areas with large fills near embankments and abutments.

The Temporary Soil Retention System shall be designed by an Illinois-licensed structural engineer in accordance with the IDOT Bridge Design Manual. The design of the Temporary Soil Retention System is the responsibility of the contractor. The contractor should submit the TSRS plans to the structural design team for review before commencing construction of the TSRS.

6.7 Cofferdam Recommendations

The GPE plan indicates the EWSE of the Des Plaines River is 538.22 feet. The IDOT Bridge Manual indicates that a cofferdam Type 1 is typically required where there is 6 feet or less between the Estimated Water Surface Elevation (EWSE) and the bottom of the excavation; Type 2 is required when the EWSE is greater than 6 feet from the bottom of the excavation. Coffer cells may also be considered for constructing the bridge piers. The EWSE should be adjusted for April, typically a high month for water surface levels. Pier 3 and Pier 4 are preliminarily anticipated to have rock-socketed drilled shafts that extend to about 20 feet below top-of-rock. In this scenario, the bottoms of the drilled shafts are expected to be about El. 491.1 to 487.8 feet. For the construction of Piers 3 and 4, Type 2 cofferdams may be utilized based on the pier locations and assumed bearing elevations. The type of cofferdam should be specified in the plans. This system may be constructed with the use of sheet piles or other systems as approved by the Bureau of Bridges and Structures and should be designed by a Structural Engineer licensed in the State of Illinois.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of the Illinois Department of Transportation (IDOT) and its Design Section Engineer consultant. The recommendations provided in the report are specific to the project described herein and are based on the information obtained at the soil boring locations within the proposed bridge area. The geotechnical analyses have been performed, and the recommendations provided in this report are based on subsurface conditions determined at the location of the borings. This report may not reflect all variations that may occur between boring locations or at some other time, the nature and extent of which may not become evident until the time of construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and review the recommendations presented herein.

APPENDIX A

GENERAL PLAN & ELEVATION

Benchmark: Magnetic nail in pavement, ℄ I-80 Sta. 38+10.02, Offset 504.24' Rt., Elev. 538.845.

Existing Structure: S.N. 099-0056 (EB) and S.N. 099-0057 (WB) were built in 1964 under Federal Aid Interstate Route 80 Project I-80-4(13)133 Section 99-3B, I-80-4(56)133 Section 99-3 F&E, I-UI-80-4(57)133 Section 99-3P, and I-UI-80-4(57)I33 Section 99-3D. The existing 27-span structures have total lengths of approximately 2,362'-6" (EB) and 2,300'-0" (WB). S.N. 099 0056 (EB) has an out to out width varying from 60'-0" to 48'-0" from the west abutment to span 6, and varying from 46'-7½" to 49'-6" from the truss span to the east abutment. S.N. 099-0057 (WB) has an out to out width varying from 74'-0" to 48'-0" from the west abutment to span 6, and varying from 46'-7½" to 65'-6" from the truss to the east abutment. The existing superstructures consist of a 3-span continuous, cantilever through truss over the Des Plaines River (Spans 7 through 9) and simple and continuous approach spans with steel beams and variable thickness deck (6 1/4" min.) and concrete overlay. The existing substructures consists of concrete abutments and multi-column or two column piers. Existing abutments are supported on steel piles and the piers are supported on spread footings. The existing structure is to be partially demolished where in conflict with the proposed structure in this contract and the remainder in a separate contract.

Traffic Control: The proposed dual structures will be built while traffic remains open on the existing structures. Shift WB Stage II traffic onto the proposed WB structure in order to complete the proposed EB structure.

No salvage. Existing bridge to be removed under separate contract, except for portions shown along the east and west spans.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

LOADING HL-93

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

SEISMIC DATA

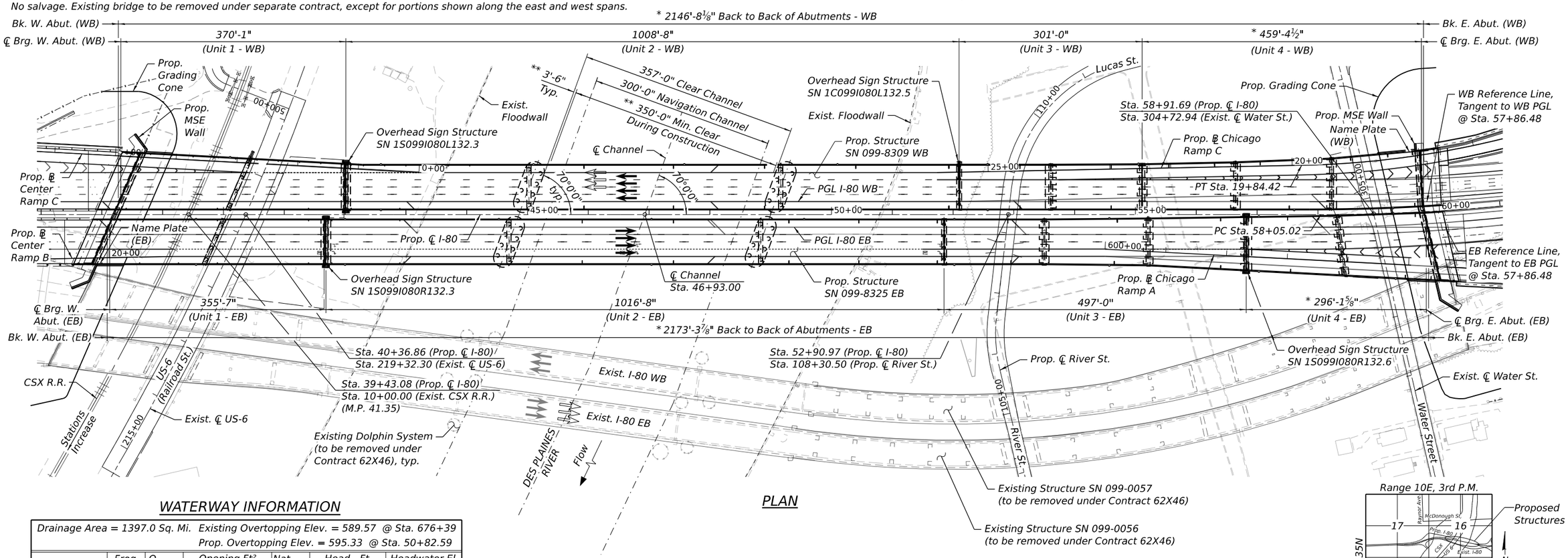
Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.095g
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.167g
Soil Site Class = D
Operational Classificiation = Critical

LEGEND:

- *Stage I Traffic: Proposed WB Construction and Partial EB Construction*
- *Stage II Traffic: Completion of Proposed EB Construction*
- *Proposed Traffic*

* *Dimension Measured Along Local Reference Line in Unit 4.*

** *Subject to USCG Approval.*



PLAN

WATERWAY INFORMATION

Drainage Area = 1397.0 Sq. Mi. Existing Overtopping Elev. = 589.57 @ Sta. 676+39
Prop. Overtopping Elev. = 595.33 @ Sta. 50+82.59

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	9600	11867	12423	538.71	0.01	0.01	538.72	538.72
Design	50	15600	12369	12922	539.53	0.01	0.01	539.54	539.54
Base	100	31100	12978	13527	540.50	0.05	0.02	540.55	540.52
Overtopping	>500								
Max. Calc.	500	35500	13001	13551	540.53	0.06	0.02	540.59	540.55

10-Yr. velocity through existing structure = 0.8 fps
10-Yr. velocity through proposed structure = 0.7 fps
All time H.W.E. & Date = 542 ft HA 89

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.) Pier 3WB	Pier 3EB	Pier 4WB	Pier 4EB	Item 113
Q100	510.7	509.2	510.8	509.4	5
Q200	510.7	509.2	510.8	509.4	
Design	510.7	509.2	510.8	509.4	
Check	510.7	509.2	510.8	509.4	

The scour elevations shown in this table correspond to estimated top of rock elevation.

STATE OF ILLINOIS
PATRICK J. LAUX
081-007655
CHICAGO, ILLINOIS
LICENSED STRUCTURAL ENGINEER

XX/XX/2025

Patrick J. Laux, P.E., S.E.
State of Illinois Lic. No. 081-007655
License Expires 11-30-2026.
This stamp applies to sheets S-1 thru S-333

DESIGN STRESSES

FIELD UNITS

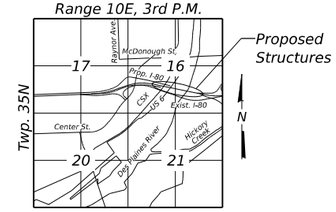
f_c' = 3,500 psi
f_c' = 4,000 psi (Superstructure)
f_c' = 5,000 psi (Pier 3 & 4 Drilled Shaft)
f_y = 60,000 psi (Reinforcement)
f_y = 50,000 psi (M270 Grade 50, Units 3 & 4)
f_y = 50,000 psi (M270 Grade 50W, Units 1 & 2)
f_y = 70,000 psi (M270 Grade HPS 70W, Unit 2 Flanges Over Piers 3 & 4 only)

PRECAST PRESTRESSED UNITS

f_c' = 8,500 psi
f_{ci}' = 6,500 psi
f_{pu} = 270,000 psi (0.6"∅ Low Relaxation Strands)
f_{pbt} = 202,500 psi (0.6"∅ Low Relaxation Strands)

NOTES:

1. *See sheet S-2 & S-3 for General Plan & Elevations.*
2. *See sheet S-4 for Index of Sheets.*



LOCATION SKETCH

KEY PLAN

I-80 OVER CSX, US-6 (RAILROAD ST.), DES PLAINES RIVER (PUBLIC WATER), RIVER ST. & WATER ST.
F.A.I. RTE. 80 - FAI 80 21 STRUCTURE 2
WILL COUNTY
STA. 46+93.00
STRUCTURE NO. 099-8309 WB
STRUCTURE NO. 099-8325 EB

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

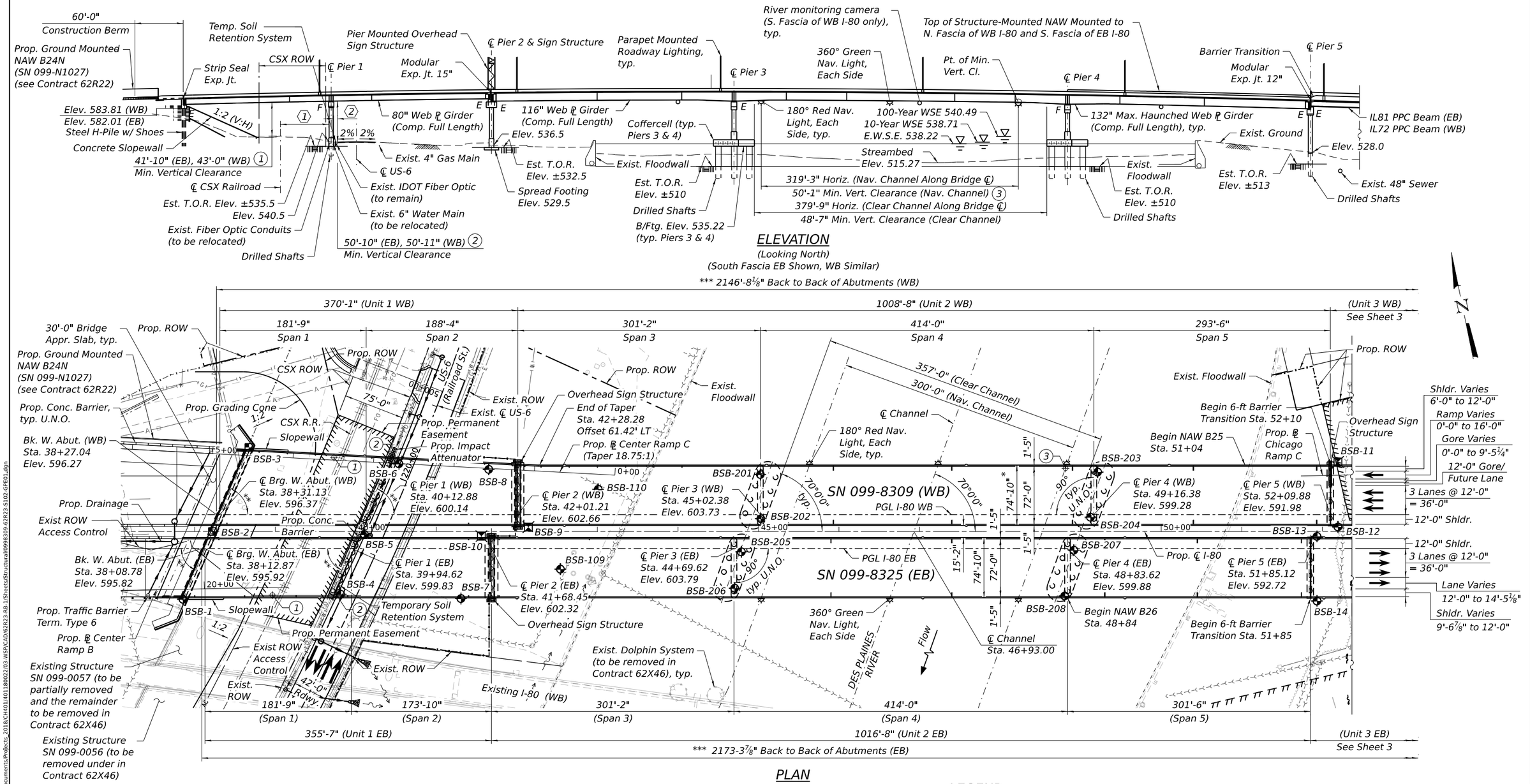
USER NAME = USSJ696614	DESIGNED - PSK	REVISED -
	CHECKED - PJL	REVISED -
PLOT SCALE = 166.667 ' / in.	DRAWN - PSK	REVISED -
PLOT DATE = 6/30/2025	CHECKED - PJL	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET S-1 OF S-333 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	1
		CONTRACT NO. 62R23		
	ILLINOIS	FED. AID PROJECT		

MODEL: Default
FILE NAME: pw:\\transystems-pw.bentley.com:transyscorp-pw1-hosted\Documents\Projects_2018\CH401\401180022\03-WSP\CAD\62R23-RB-1\Sheets\Structural\009983D9-62R23-S101-KEY.dgn



NOTES:

1. See sheet S-8 for Light Pole Locations tables.
2. See sheet S-10 thru S-12 for existing utilities & drainage.
3. See sheet S-189 for Scupper Locations table.
4. Up to 1/4" may be ground off the bridge deck and approach slabs.
5. No freefall deck drains will be permitted in the span over the tracks or within 10 ft. of cross arms of a railroad pole line.
6. Offsets are taken from Proposed ℄ I-80.
7. Contractor shall perform soil borings where indicated, see Special Provisions.

(1) 54'-10" at CSX R.R., measured perpendicular from ℄ track to west face of crashwall

(2) 3'-8¼" at US-6, measured perpendicular from edge of roadway to east face of crashwall

* Out-to-Out varies from 94'-3¼" at W. Abut. to 74'-10" at Sta. 42+28.42

** 66°30'0" Skew

*** Dimension measured along PGL or reference line in Unit 4

PLAN

LEGEND

◆	Indicates Boring Location	—W—	Existing Water Main
▣	Indicates Soil Borings by Contractor	—G—	Existing Gas Main
(1)	Location of Min. Horiz. Clearance	—FO—	Existing Fiber Optic
(1)	Location of Min. Vert. Clearance	———	Existing ROW
Est. T.O.R.	Estimated Top of Rock	—AC—	Existing ROW for Access Control
U.N.O.	Unless Noted Otherwise	- - - -	Proposed ROW
~~	Temporary Soil Retention System	//////	Permanent Easement
-›-›-›-	Existing Sewer		

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

USER NAME = USSJ696614		DESIGNED - PSK		REVISED -	
		CHECKED - PJL		REVISED -	
PLOT SCALE = 120.0000 ' / in.		DRAWN - PSK		REVISED -	
PLOT DATE = 6/30/2025		CHECKED - PJL		REVISED -	

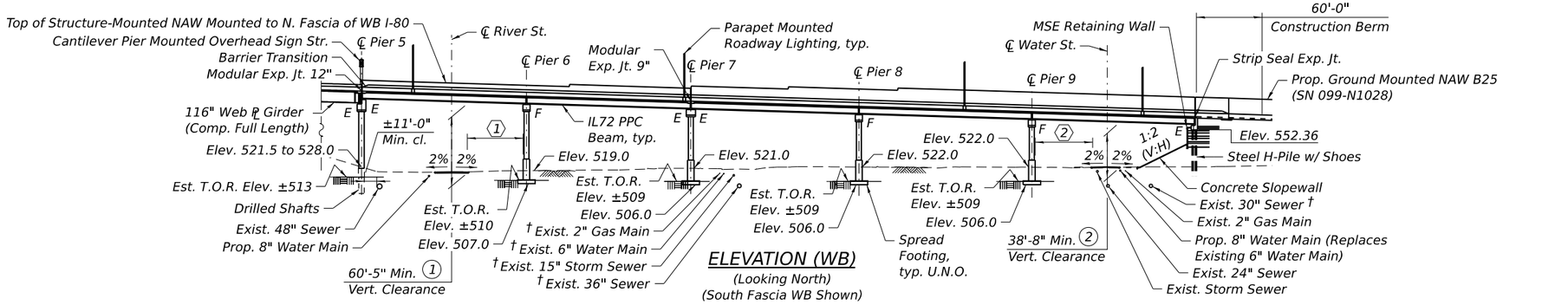
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

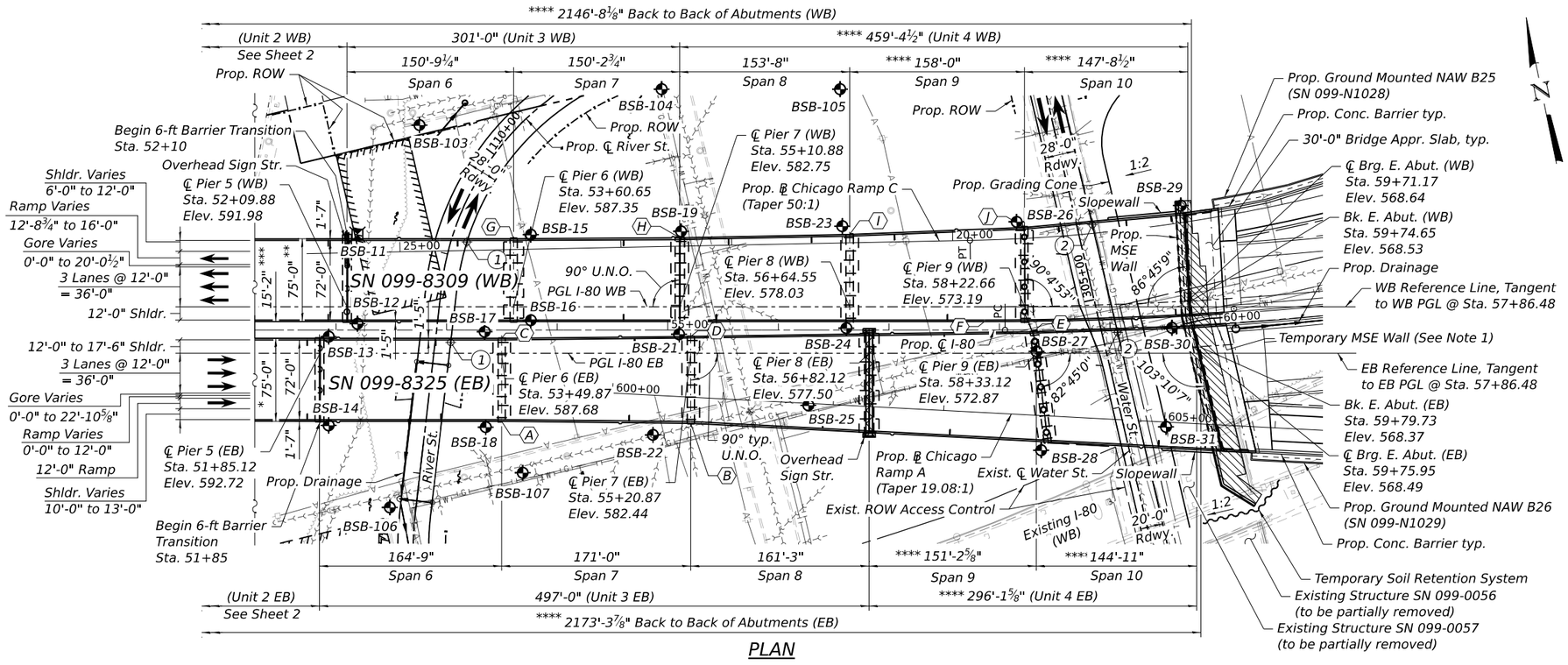
GENERAL PLAN AND ELEVATION - UNITS 1 & 2
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB

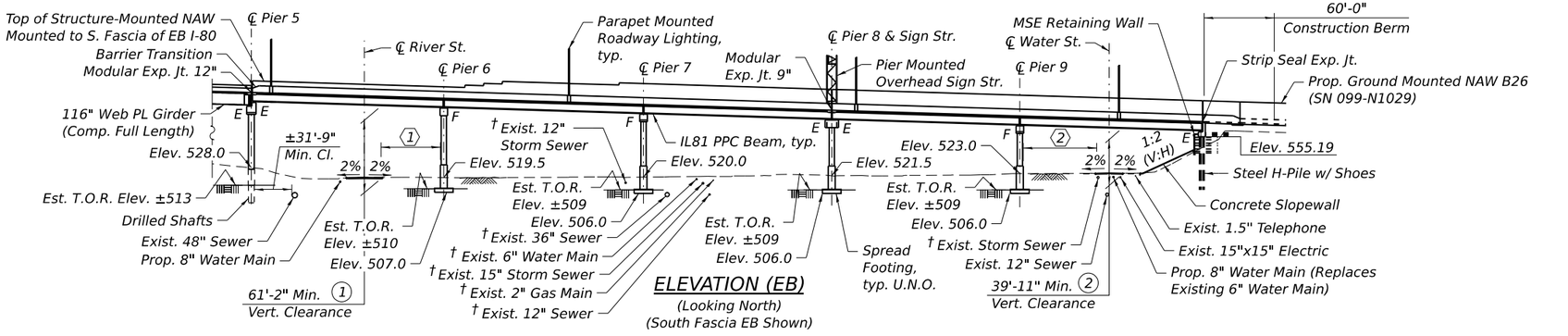
SHEET S-2 OF S-333 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	2
		CONTRACT NO. 62R23		
	ILLINOIS FED. AID PROJECT			

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transystemscorp-pw1-Hosted/Documents/Projects - 2018/CH401/401180022/03-WSP/CAD/62R23-RB-1/Sheets/Structural/099B309-62R23-S102-GPE01.dgn







* Out-to-Out varies from 75'-0" at Sta. 53+49.87 to 112'-1" at the East Abutment.

** Out-to-Out varies from 75'-0" at Sta. 53+60.65 to 93'-1¾" at the East Abutment.

*** Varies from Sta. 53+98.94 to end of bridge deck, 15'-2" Max. to 8'-7¼" Min. (clear between back face of parapets)

**** Dimension measured along local reference line in Unit 4.

† Indicates utility to be abandoned.

(1) 35'-8" at River St., measured perp. from edge of roadway

(2) 29'-3" at Water St., measured perp. from edge of roadway

DECK TAPER STATIONS & OFFSETS

Measured From Prop. ℄ I-80

(A)	Sta. 53+49.87 Offset 82.58' RT	(F)	Sta. 57+86.48 Offset 7.58' LT
(B)	Sta. 55+20.87 Offset 84.33' RT	(G)	Sta. 53+60.65 Offset 82.58' LT
(C)	Sta. 53+49.87 Offset 7.58' RT	(H)	Sta. 55+10.88 Offset 83.34' LT
(D)	Sta. 55+20.87 Offset 5.85' RT	(I)	Sta. 56+64.55 Offset 86.41' LT
(E)	Sta. 58+30.84 Offset 1.56' RT	(J)	Sta. 58+22.96 Offset 92.67' LT

LEGEND

	Indicates Boring Location		Temporary Soil Retention System
	Indicates Soil Borings by Contractor	W	Existing Water Main
(1)	Location of Min. Horiz. Clearance	G	Existing Gas Main
(1)	Location of Min. Vert. Clearance	E	Existing Underground Electric
(A)	Location of Deck Kink Pt.	T	Existing Telephone
U.N.O.	Unless Noted Otherwise	A	Existing Aerial
Est. T.O.R.	Estimated Top of Rock		Existing Drainage
	Approximate Limits of Reinforced Soil Mass		Proposed Drainage
			Existing ROW
		AC	Existing ROW for Access Control
			Proposed ROW
			Permanent Easement

NOTES:

1. MSE Wall to be built in stages. See sheet S-14 for items related to staged wall construction.
2. See sheet S-8 for Light Pole Locations tables.
3. See sheet S-10 thru S-12 for existing utilities & drainage.
4. See sheet S-189 for Drainage Scupper Locations tables.
5. See deck plans for varying shoulder, gore and ramp widths.
6. Up to 1/4" may be ground off the bridge deck and approach slabs.
7. Offsets are taken from Proposed ℄ I-80.
8. Contractor shall perform soil borings where indicated, see Special Provision.

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transys-corp-pw1-hosted/Documents/Projects_2018/CH401/401180022/03-WSP/CAD/62R23-RB-1/Sheets/Structural/099809-62R23-S103-GPE02.dgn

USER NAME = USSJ696614	DESIGNED - PSK	REVISED -	
	CHECKED - PJL	REVISED -	
PLOT SCALE = 120.000 ' / in.	DRAWN - PSK	REVISED -	
PLOT DATE = 6/30/2025	CHECKED - PJL	REVISED -	

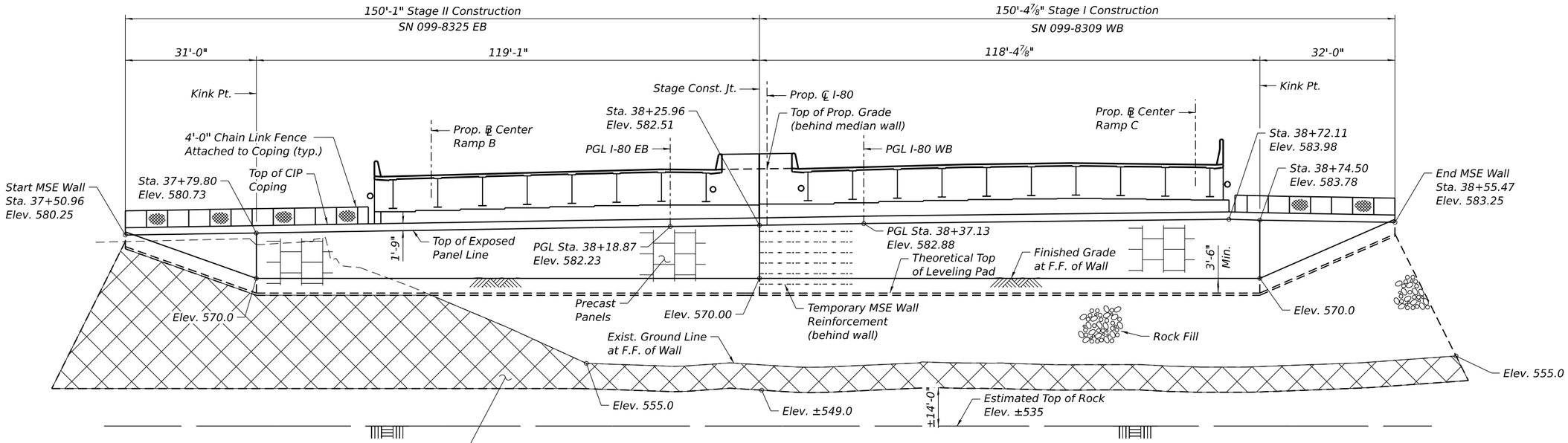
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION - UNITS 3 & 4
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB

SHEET S-3 OF S-333 SHEETS

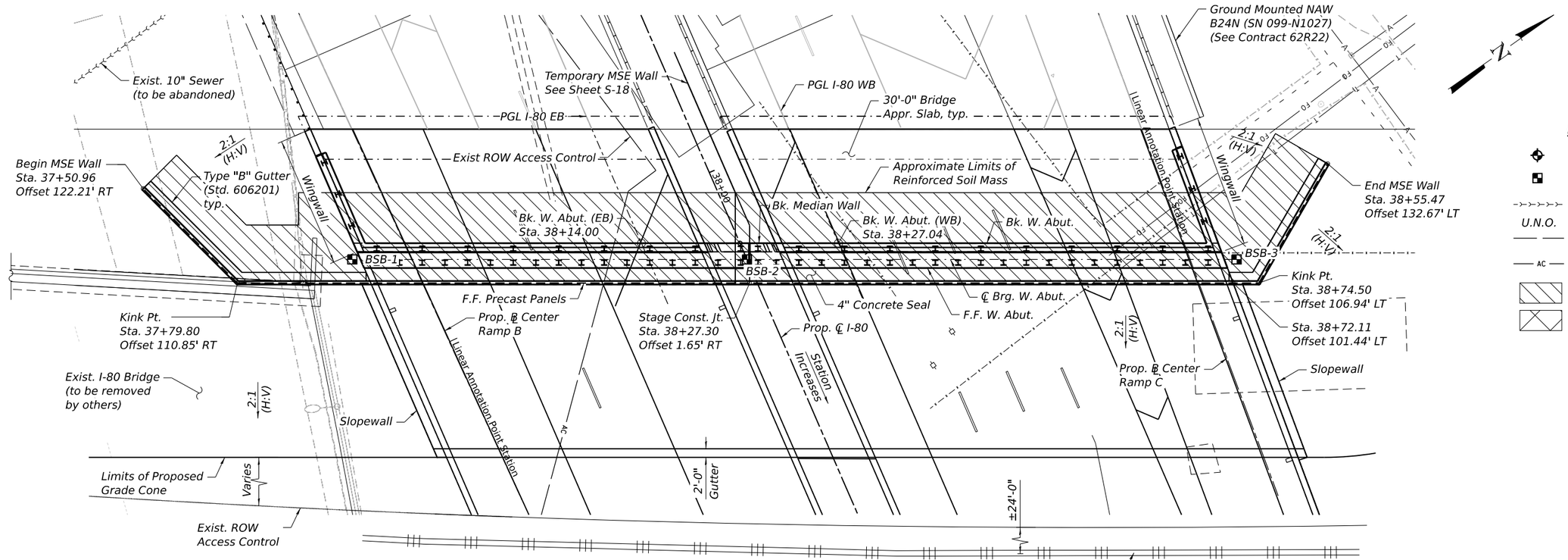
F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	3
		CONTRACT NO. 62R23		
	ILLINOIS	FED. AID PROJECT		

IN PROGRESS



ELEVATION - WEST ABUTMENT MSE WALL

(Looking at F.F. of Wall Unfolded)



PLAN - WEST ABUTMENT MSE WALL

LEGEND

- Indicates Boring Location
- Indicates Future Boring Location
- Existing Sewer
- U.N.O. Unless Noted Otherwise
- Existing ROW
- AC Existing ROW for Access Control
- Approximate Limits of Reinforced Soil Mass
- Approximate Limits of Exist. Fill Removal

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

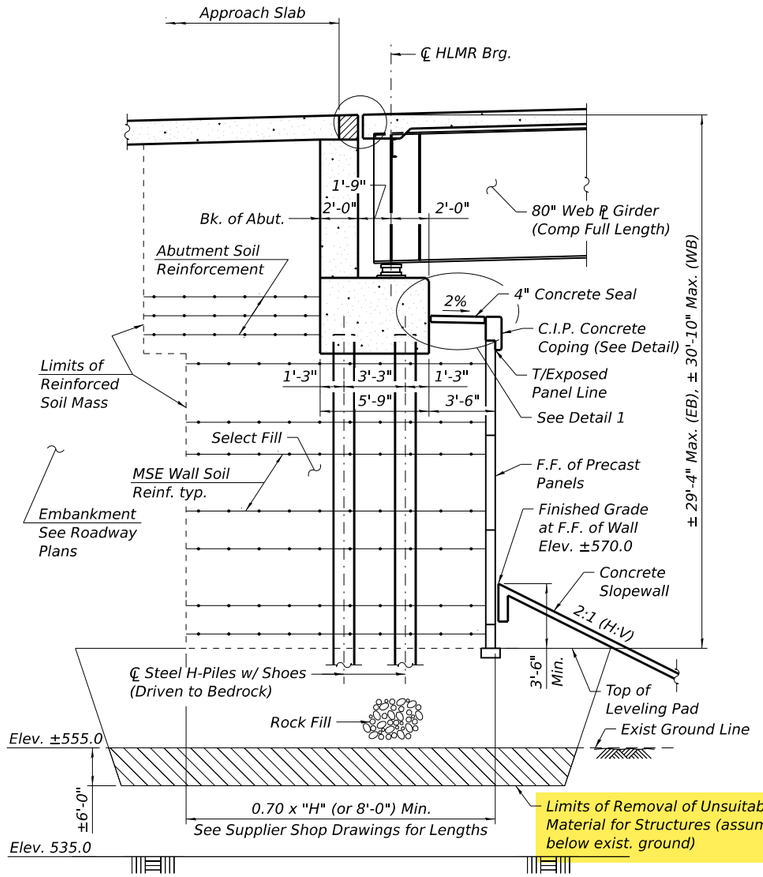
USER NAME = USSJ696614	DESIGNED - PSK	REVISED -	
	CHECKED - PJL	REVISED -	
PLOT SCALE = 26.667 ' / in.	DRAWN - PSK	REVISED -	
PLOT DATE = 6/30/2025	CHECKED - PJL	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

MSE WALL PLAN & ELEVATION - WEST ABUTMENT
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB

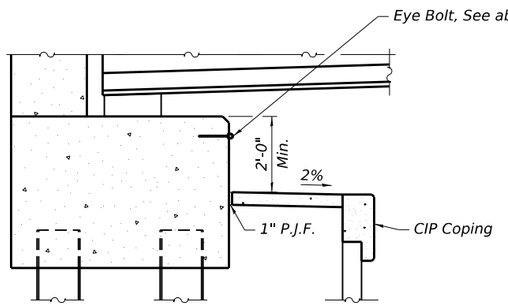
SHEET S-310 OF S-333 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	310
		CONTRACT NO. 62R23		
	ILLINOIS	FED. AID PROJECT		

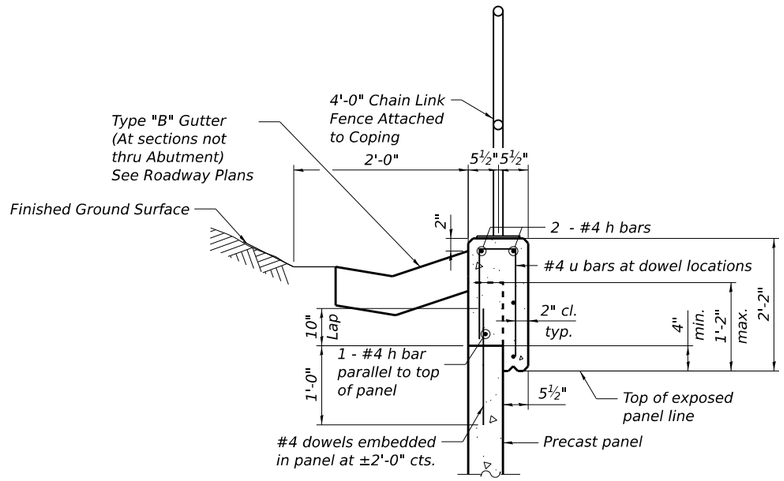


SECTION THRU WEST ABUTMENT

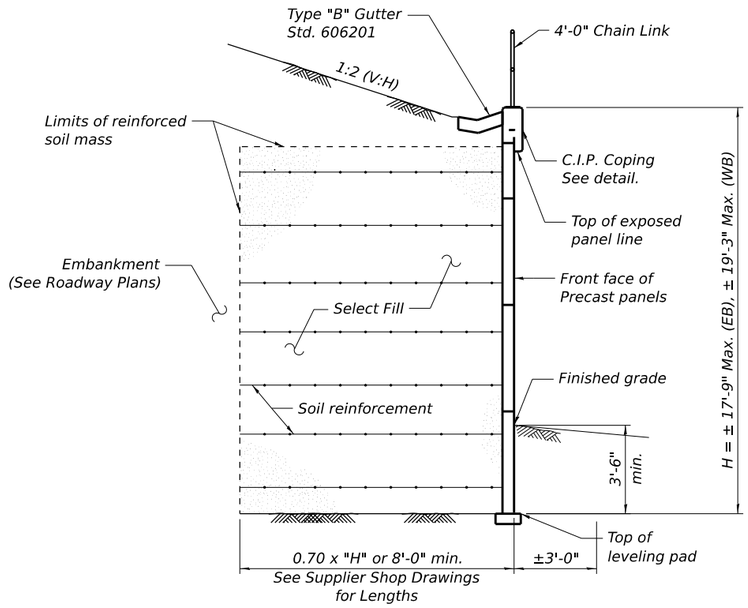
(Looking North)
(Horiz. Dims @ Rt. L's to ℄ Abutment)



DETAIL 1



CAST IN PLACE COPING FOR MSE WALL PANELS



SECTION THRU MSE WALL

(Horiz. dim. @ L's)

BILL OF MATERIAL - WB

Item	Unit	Quantity
Removal and Disposal of Unsuitable Material for Structures	Cu Yd	556
Mechanically Stabilized Earth Retaining Wall	Sq Ft	2,311
Chain Link Fence, 4' Attached to Structure	Foot	43
Rock Fill	Cu Yd	2,528

BILL OF MATERIAL - EB

Item	Unit	Quantity
Removal and Disposal of Unsuitable Material for Structures	Cu Yd	1,724
Mechanically Stabilized Earth Retaining Wall	Sq Ft	2,064
Chain Link Fence, 4' Attached to Structure	Foot	63
Rock Fill	Cu Yd	2,328

NOTES:

1. Bottom of abutment cap shall be poured against the top of plywood cap. Cut opening to match pile cap perimeter within ⅛". Support with bars tack welded to webs rated for 500 lbs. Seal gaps to keep concrete out.
2. The M.S.E. wall supplier shall design the abutment soil reinforcement to resist a horizontal forces of 5.67 kips/ft. of abutment.
2. Reinforcing for Cast in Place Coping shown for information only, cost included with Mechanically Stabilized Earth Retaining Wall.

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

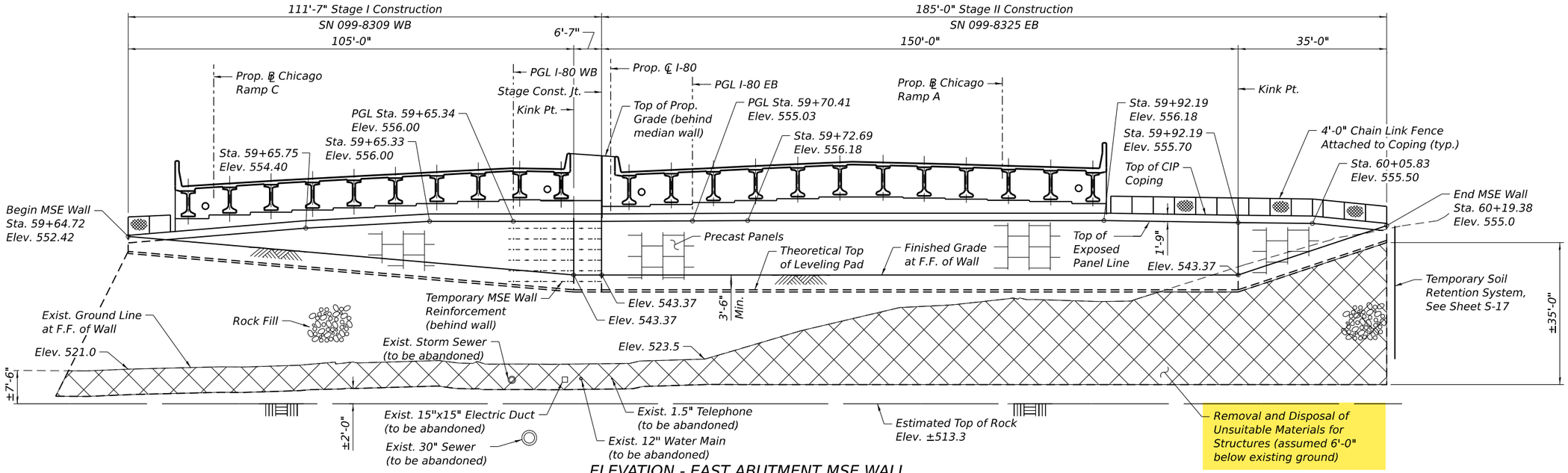
USER NAME	= USSJ696614	DESIGNED	- PP	REVISED	-
		CHECKED	- PJL	REVISED	-
PLOT SCALE	= 8.000 ' / in.	DRAWN	- PP	REVISED	-
PLOT DATE	= 6/30/2025	CHECKED	- PJL	REVISED	-

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

MSE WALL DETAILS - WEST ABUTMENT
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB

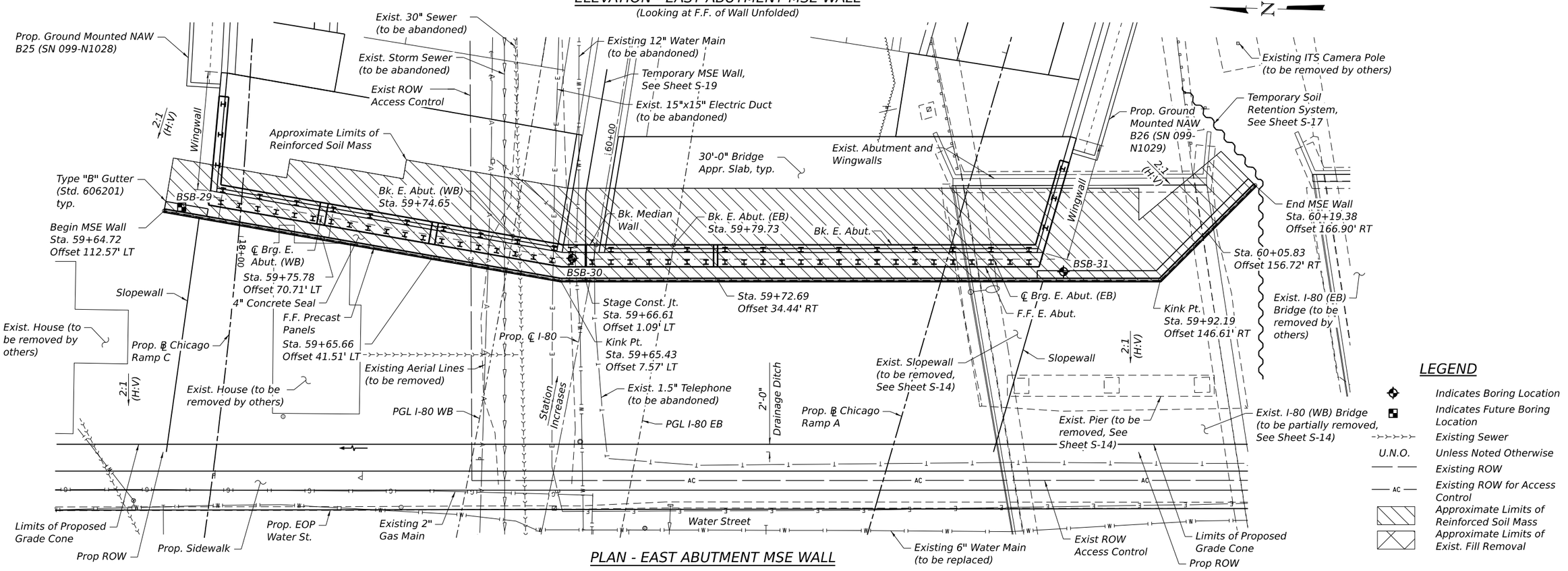
SHEET S-311 OF S-333 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	311
		CONTRACT NO. 62R23		
		ILLINOIS	FED. AID PROJECT	



ELEVATION - EAST ABUTMENT MSE WALL

(Looking at F.F. of Wall Unfolded)



PLAN - EAST ABUTMENT MSE WALL

LEGEND

- Indicates Boring Location
- Indicates Future Boring Location
- Existing Sewer
- U.N.O. — Unless Noted Otherwise
- Existing ROW
- AC — Existing ROW for Access Control
- Approximate Limits of Reinforced Soil Mass
- Approximate Limits of Exist. Fill Removal

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

USER NAME = USSJ696614	DESIGNED - PSK	REVISED -	
	CHECKED - PSK	REVISED -	
PLOT SCALE = 26.667 ' / in.	DRAWN - PP	REVISED -	
PLOT DATE = 6/30/2025	CHECKED - PJL	REVISED -	

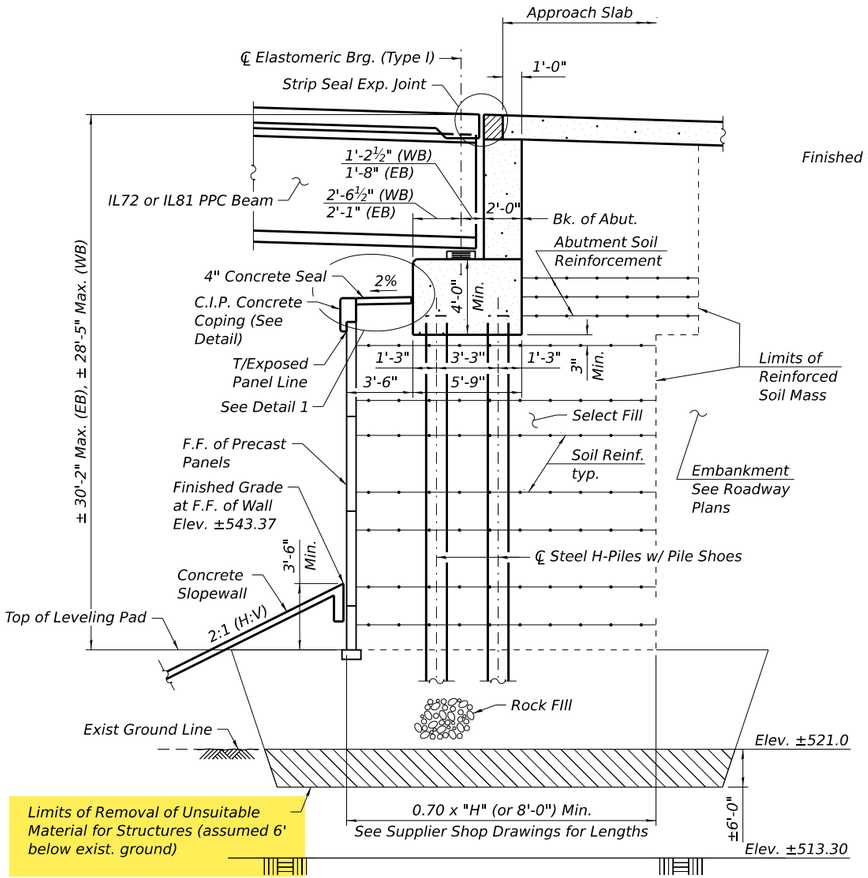
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EAST ABUTMENT MSE WALL PLAN AND ELEVATION
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB

SHEET S-312 OF S-333 SHEETS

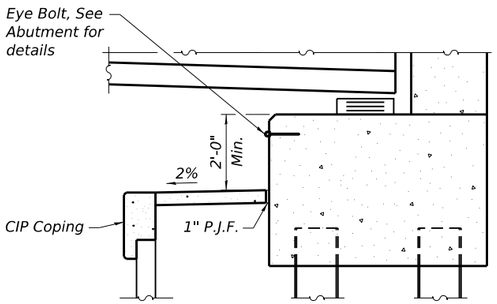
F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	312
		CONTRACT NO. 62R23		
		ILLINOIS	FED. AID PROJECT	

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transystcorp-pw1-hosted\Documents\Projects_2018\CH401\401160022\03-WSP\CAD\62R23-RB-1\Sheets\Structural\099809-62R23-S847-MSE03.dgn

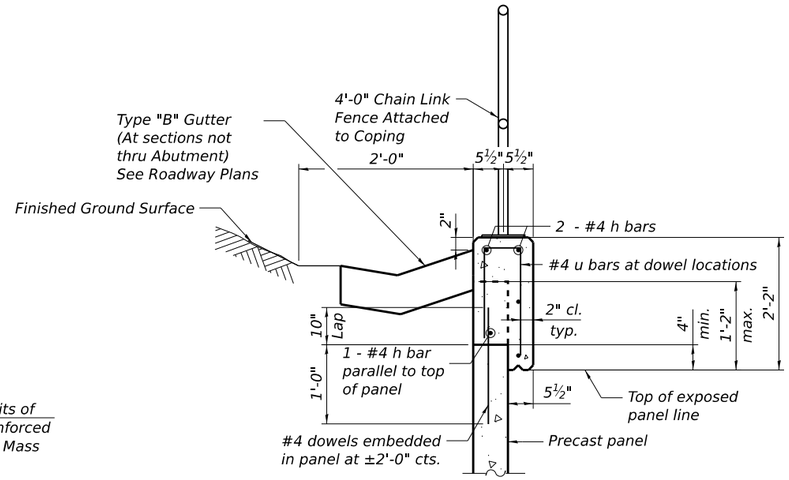


SECTION THRU EAST ABUTMENT

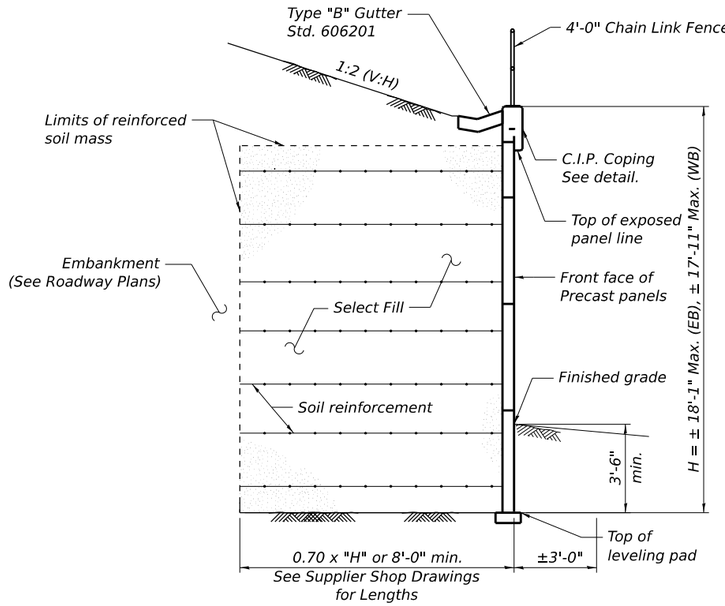
(Looking North)
(Horiz. Dims @ Rt. L's to ℄ Abutment)
Showing WB Abutment, EB Similar Except as Noted



DETAIL 1



CAST IN PLACE COPING FOR MSE WALL PANELS



SECTION THRU MSE WALL

(Horiz. dim. @ ℄'s)

BILL OF MATERIAL - WB

Item	Unit	Quantity
Removal and Disposal of Unsuitable Material for Structures	Cu Yd	390
Mechanically Stabilized Earth Retaining Wall	Sq Ft	1,170
Chain Link Fence, 4' Attached to Structure	Foot	10
Rock Fill	Cu Yd	3,443

BILL OF MATERIAL - EB

Item	Unit	Quantity
Removal and Disposal of Unsuitable Material for Structures	Cu Yd	3,387
Mechanically Stabilized Earth Retaining Wall	Sq Ft	2,867
Chain Link Fence, 4' Attached to Structure	Foot	70
Rock Fill	Cu Yd	4,581

NOTES:

1. Bottom of abutment cap shall be poured against the top of plywood cap. Cut opening to match pile cap perimeter within ⅛". Support with bars tack welded to webs rated for 500 lbs. Seal gaps to keep concrete out.
2. The M.S.E. wall supplier shall design the abutment soil reinforcement to resist a horizontal forces of 7.62 kips/ft. of abutment.
3. Reinforcing for Cast in Place Coping shown for information only, cost included with Mechanically Stabilized Earth Retaining Wall.

WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150
FAX: (312) 782-1684

USER NAME = USSJ696614	DESIGNED - PP	REVISED -	
	CHECKED - PJL	REVISED -	
PLOT SCALE = 8.000 ' / in.	DRAWN - PP	REVISED -	
PLOT DATE = 6/30/2025	CHECKED - PJL	REVISED -	

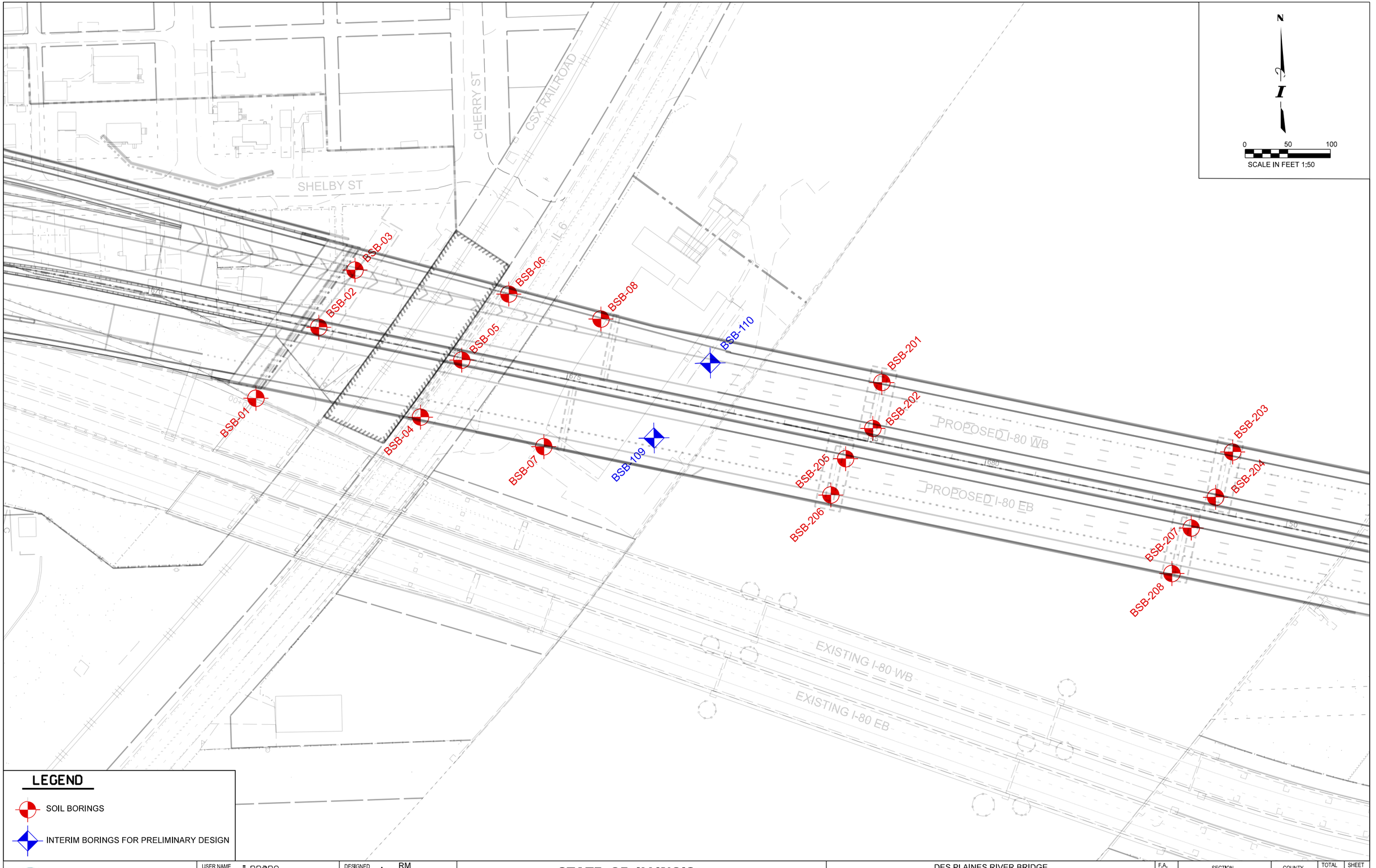
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

MSE WALL DETAILS - EAST ABUTMENT
STRUCTURE NUMBER 099-8309 WB AND 099-8325 EB
SHEET S-313 OF S-333 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 21 STRUCTURE 2	WILL	1077	313
		CONTRACT NO. 62R23		
	ILLINOIS	FED. AID PROJECT		

APPENDIX B

SOIL BORING LOCATION PLAN AND SUBSURFACE PROFILES



GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED	- RM
SHEET SIZE	= $SHEETSIZE$	DRAWN	- NN
PLOT SCALE	= $SCALE$	CHECKED	- DE
PLOT DATE	= 7/9/2025	DATE	- 03/15/2023

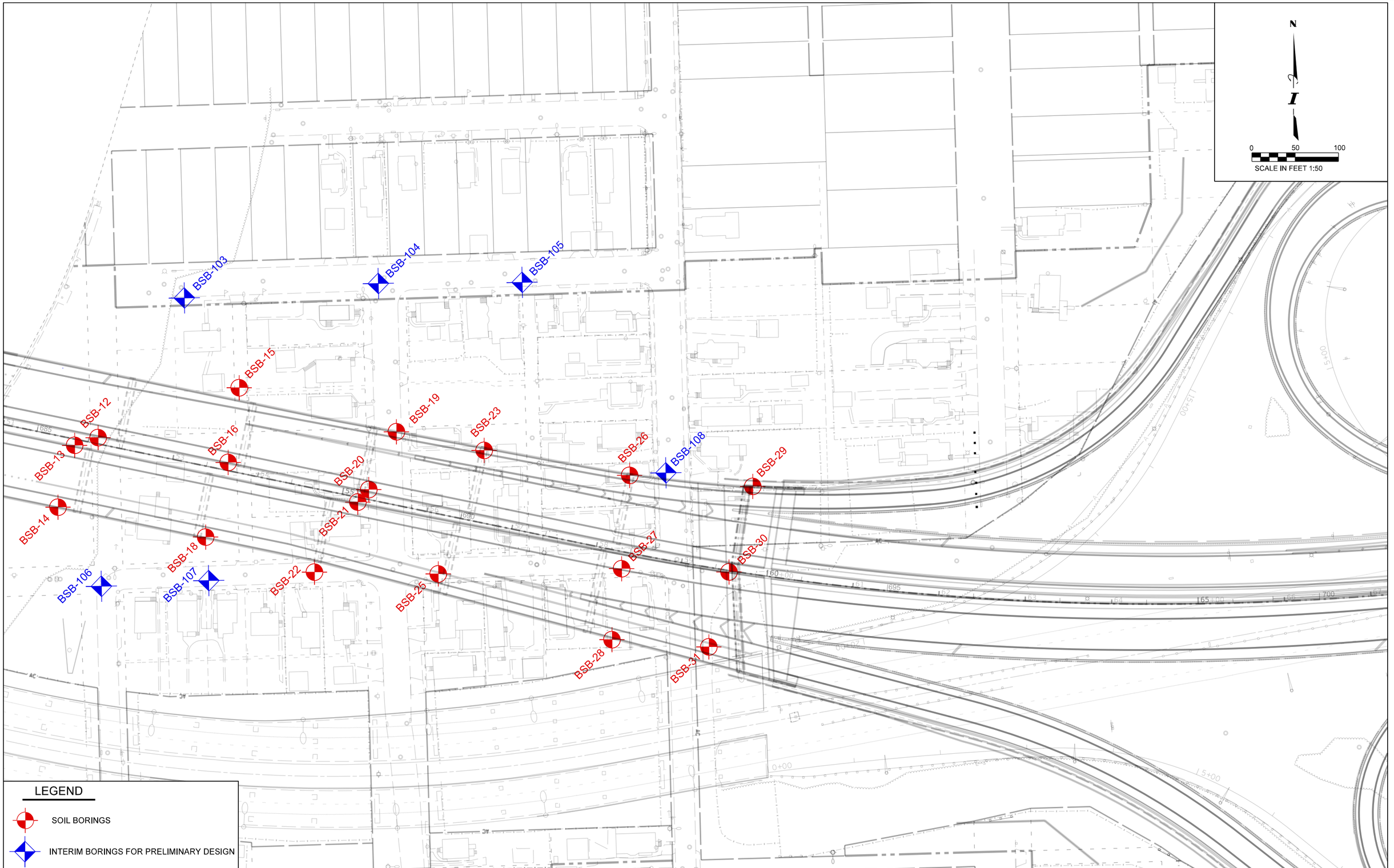
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SOIL BORING LOCATION PLAN
JOLIET, ILLINOIS

SCALE: 1:50 | SHEET 1 OF 2 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	1
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP_198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River WB&EB- Bridge - PL-01.dgn
PEN TABLE = $PENTABLE$
PEN WIDTHS = PDOT.tbl
TIME = 10:25:13 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
PLOT DATE = $DATE$
USER NAME = nnano



GSG CONSULTANTS, INC.
735 E. REMINGTON RD. SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 7/8/2025	DATE -	07/03/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SOIL BORING LOCATION PLAN
JOLIET, ILLINOIS

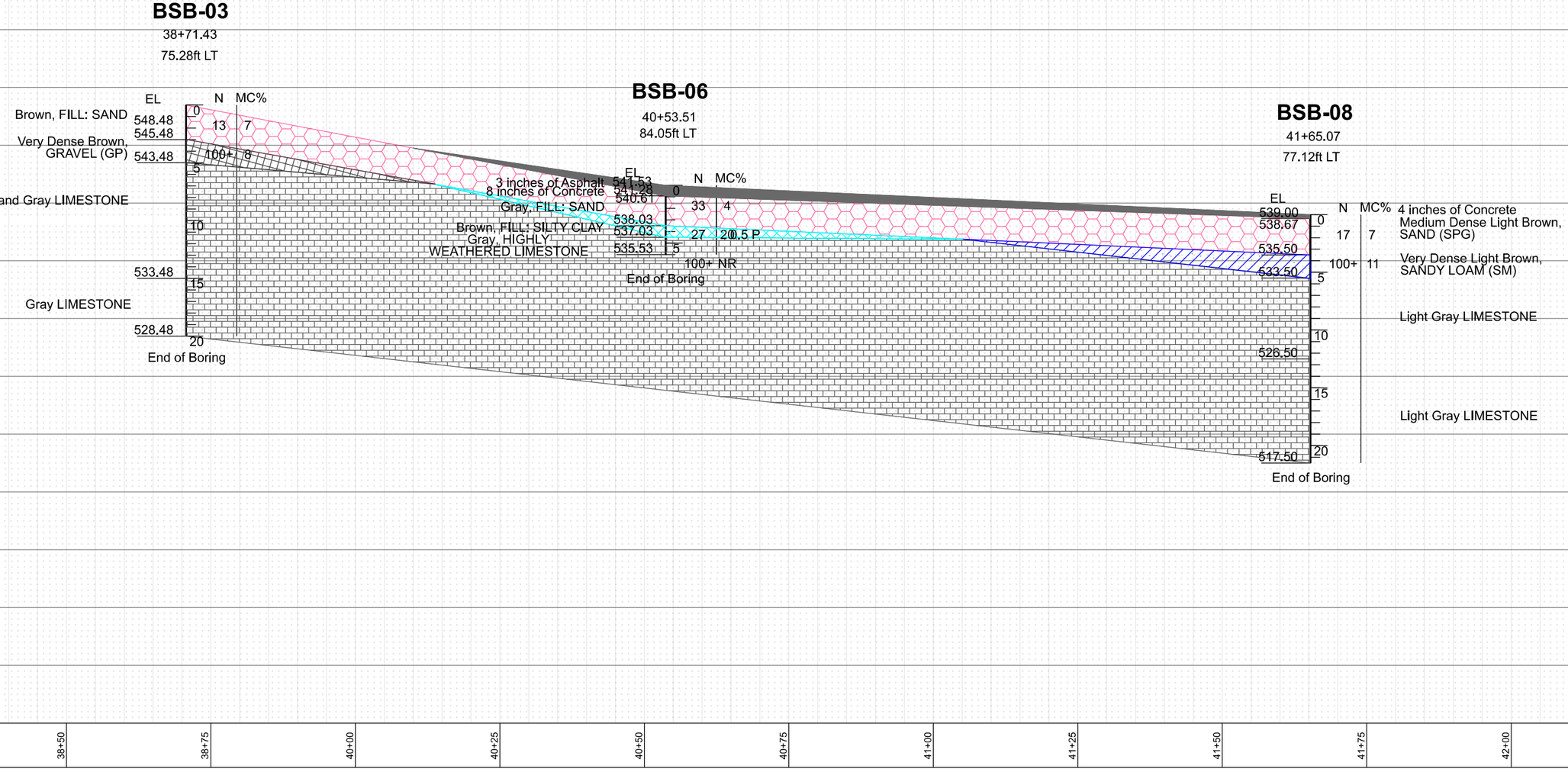
SCALE: 1:50 | SHEET 2 OF 2 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	2
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP_198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River WB&EB- Bridge - PL-B2.dgn
PEN TABLE = $PENTABLE$
PLOT DATE = 7/8/2025
TIME = 3:23:52 PM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = $USER$

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	GRAVEL
BASE COURSE	SILTY CLAY	SILTY SAND / SANDY LOAM	
TOPSOIL	SAND	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	



GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= pnano	DESIGNED	- RM
SHEET SIZE	= $SHEETSIZE$	DRAWN	- NN
PLOT SCALE	= $SCALE$	CHECKED	- DE
PLOT DATE	= 7/9/2025	DATE	- 07/03/2025

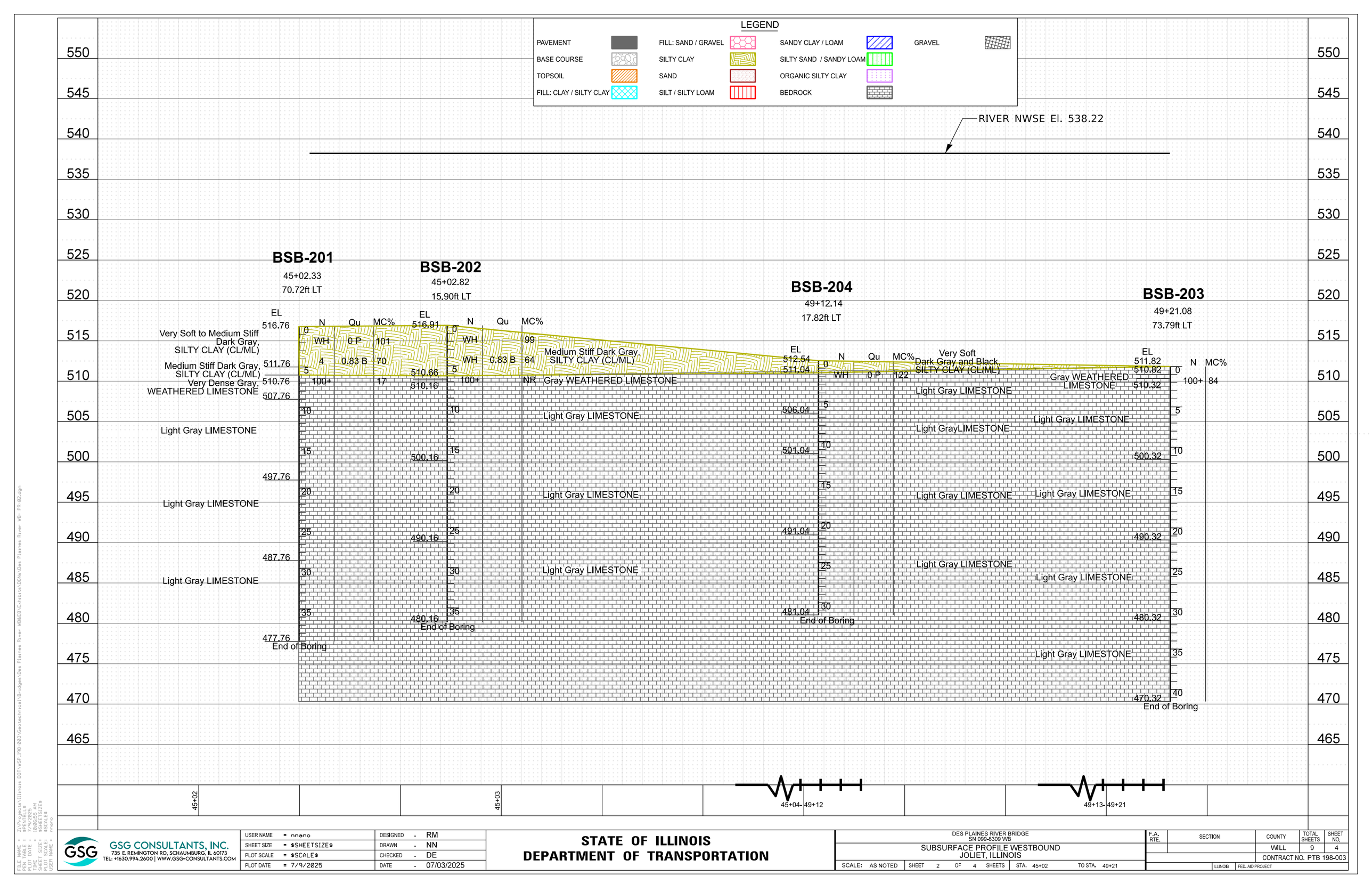
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SN: 099-8325 EB
SUBSURFACE PROFILE WESTBOUND
JOLIET, ILLINOIS

SCALE: AS NOTED | SHEET 1 OF 4 SHEETS | STA. 38+50 | TO STA. 42+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	3
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP.198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River WB- PR-01.dgn
PEN TABLE = $PENTBL$
PLOT DATE = 7/9/2025
TIME = 10:06:11 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = pnano



USER NAME = nnano	DESIGNED - RM	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	DES PLAINES RIVER BRIDGE SN 099-8309 WB SUBSURFACE PROFILE WESTBOUND JOLIET, ILLINOIS
SHEET SIZE = $SHEETSIZE$	DRAWN - NN		
PLOT SCALE = $SCALE$	CHECKED - DE		
PLOT DATE = 7/9/2025	DATE - 07/03/2025		SCALE: AS NOTED | SHEET 2 OF 4 SHEETS | STA. 45+02 | TO STA. 49+21

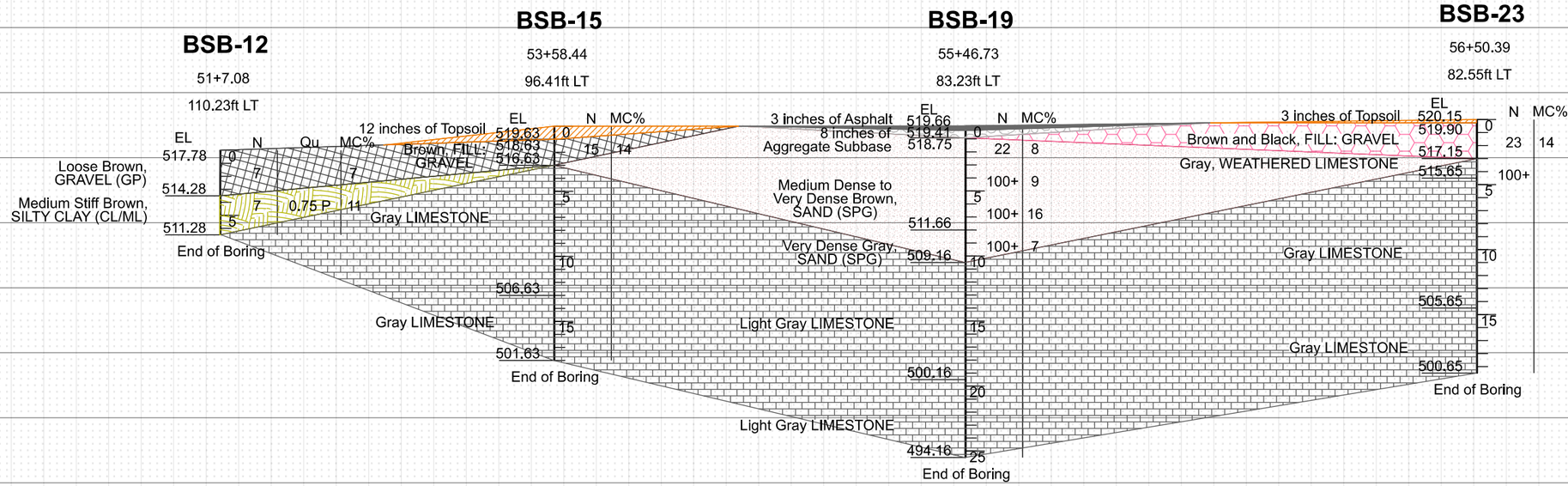
GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	4
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP_198-003\Geotechnical\Bridges\Des Plaines River WB\E&E\Exhibits\DGNs\Des Plaines River WB- PR-02.dgn
PEN TABLE = $PENTBL$
PLOT DATE = 7/9/2025
TIME = 10:06:05 AM
SHEET SIZE = $SHEETSIZE$
PLOTTER SCALE = $SCALE$
USER NAME = nnano

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	GRAVEL
BASE COURSE	SILTY CLAY	SILTY SAND / SANDY LOAM	
TOPSOIL	SAND	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	



GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= pnano	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 7/9/2025	DATE -	07/03/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SN: 099-8325 EB

SUBSURFACE PROFILE WESTBOUND
JOLIET, ILLINOIS

SCALE: AS NOTED | SHEET 3 OF 4 SHEETS | STA. 51+00 | TO STA. 56+75

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	5
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP-198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River WB- PR-B3.dgn
PEN TABLE = $PENTBL$
PLOT DATE = 7/9/2025
TIME = 10:07:26 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = pnano

LEGEND

PAVEMENT		FILL: SAND / GRAVEL		SANDY CLAY / LOAM		GRAVEL	
BASE COURSE		SILTY CLAY		SILTY SAND / SANDY LOAM			
TOPSOIL		SAND		ORGANIC SILTY CLAY			
FILL: CLAY / SILTY CLAY		SILT / SILTY LOAM		BEDROCK			

BSB-002

38+43.37

1.19ft LT

	EL	N	Qu	MC%
3 inches of Topsoil	548.00			
Stiff Dark Brown and Gray, SILTY CLAY (CL/ML)	547.75	0		
Loose Brown, SAND (SP)	546.50	10	1.0 P	42
Medium Stiff Brown, SILTY CLAY (CL/ML)	545.00	7	0.75 P	4
Very Dense Brown, SAND (SP)	542.50	5		
End of Boring	541.00	100+		

BSB-04

39+81.30

77.89ft RT

	EL	N	Qu	MC%
4 inches of Asphalt	540.36			
8 inches of Aggregate Subbase	540.03			
Black, FILL: SILTY CLAY	539.36	0		
Brown, FILL: SAND	538.36	32	1.5 P	12
Gray, HIGHLY WEATHERED LIMESTONE	536.86	100+		
End of Boring	536.36			

BSB-07

41+30.61

83.27ft RT

	EL	N	MC%
7 inches of Concrete	536.14		
6 inches of Aggregate Base Course	535.56	0	
End of Boring	535.06	11	

38+25 | 38+50 | 38+75–39+00 | 39+25 | 39+50 | 39+75 | 40+00 | 40+25–40+75 | 41+00 | 41+25 | 41+50

GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= pnano	DESIGNED	- RM
SHEET SIZE	= $SHEETSIZE$	DRAWN	- NN
PLOT SCALE	= $SCALE$	CHECKED	- DE
PLOT DATE	= 7/9/2025	DATE	- 07/03/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SN: 099-8325 EB

SUBSURFACE PROFILE EASTBOUND
JOLIET, ILLINOIS

SCALE: AS NOTED | SHEET 1 OF 3 SHEETS | STA. 38+25 | TO STA. 41+50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	7
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP.198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River EB - PR-01.dgn
PEN TABLE = $PENTBL$
PLOT DATE = 7/9/2025
TIME = 10:35:10 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = pnano

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	GRAVEL
BASE COURSE	SILTY CLAY	SILTY SAND / SANDY LOAM	
TOPSOIL	SAND	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	

RIVER NWSE EI. 538.22

BSB-206

44+70.35

70.35ft RT

EL 519.72

Soft Dark Gray, SILTY CLAY (CL/ML)

	N	Qu	MC%
0	18	0.42 B	98

516.22 Medium Dense Light Gray, GRAVEL (GP)

5	11		19

513.72 Loose to Very Dense Light Gray, GRAVEL (GPS)

10	6		24
15	100+		22

509.22 Gray WEATHERED LIMESTONE

508.72

20	100+		NR

Light Gray LIMESTONE

498.72

Light Gray LIMESTONE

488.72

Light Gray LIMESTONE

478.72

End of Boring

BSB-205

44+78.72

25.27ft RT

EL 519.32

Very Soft to Medium Stiff Dark Gray, SILTY CLAY (CL/ML)

	N	Qu	MC%
0	WH	0.2 P	103
5	6	0.83 B	78

514.32 Medium Dense to Very Dense Gray, GRAVEL (GP)

10	15		17
15	100+		12

509.32

Light Gray LIMESTONE

499.32

Light Gray LIMESTONE

489.32

Light Gray LIMESTONE

479.32

End of Boring

BSB-208

48+80.07

79.99ft RT

EL 512.89

Very Soft Dark Gray and Black, SILTY CLAY (CL/ML)

	N	Qu	MC%
0	WH	0 P	114
5	100+		NR

509.39

Light Gray LIMESTONE

499.39

Light Gray LIMESTONE

489.39

Light Gray LIMESTONE

479.39

End of Boring

BSB-207

48+91.48

23.20ft RT

EL 512.61

Very Soft Dark Gray and Black, SILTY CLAY (CL/ML)

	N	Qu	MC%
0	WH	0 P	106
5			

511.11

Light Gray LIMESTONE

500.61

Light Gray LIMESTONE

490.61

Light Gray LIMESTONE

480.61

End of Boring

44+70 | 44+71 - 44+78 | 44+79 - 48+79 | 48+80 | 48+81 - 48+91 | 48+92

GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 7/9/2025	DATE -	07/03/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SN: 099-8325 EB
SUBSURFACE PROFILE EASTBOUND
JOLIET, ILLINOIS

SCALE: AS NOTED | SHEET 2 OF 3 SHEETS | STA. 44+70 | TO STA. 48+92

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	8
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP-198-003\Geotechnical\Bridges\Des Plaines River W&EB\Exhibits\DGNs\Des Plaines River EB- PR-02.dgn
PEN TABLE = $PENTABLE$
PLOT DATE = 7/9/2025
TIME = 10:09:23 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = nnano

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	GRAVEL
BASE COURSE	SILTY CLAY	SILTY SAND / SANDY LOAM	
TOPSOIL	SAND	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	

BSB-013

51+85.54

7.08ft RT

	EL	N	Qu	MC%
4 inches of Topsoil	517.66			
Very Stiff Light Brown, SILTY CLAY (CL/ML)	517.33	0		
		48	2.5 P	8
Dense Light Brown, GRAVEL (GP)	514.16			
		42		13
	511.66	75		

End of Boring

BSB-018

53+55.25

80.51ft RT

	EL	N	Qu	MC%
6 inches of Topsoil	521.26			
Stiff Gray, SILTY CLAY (CL/ML)	520.76	0		
	519.76	12	1.5 P	25
Medium Dense to Dense Brown and Light Brown, GRAVEL (GP)		35		
	513.26	22		
Light Gray LIMESTONE				
	503.26			
Light Gray LIMESTONE				
	498.26			

End of Boring

BSB-021

55+19.39

5.44ft RT

	EL	N	Qu	MC%
4 inches of Topsoil	522.20			
	521.86	0		
Medium Dense Brown, GRAVEL (GP)	518.70	18		22
Very Dense Light Brown, GRAVEL (GP)	516.70	100+		5
Gray WEATHERED LIMESTONE	515.70	5		

End of Boring

BSB-028

58+38.17

102.13ft RT

	EL	N	MC%
1 inch of Topsoil	522.97		
Dark Gray, FILL: SAND	522.89	0	
	519.47	6	23
Dense Gray, SAND (SP)	517.47	48	18
HEAVILY WEATHERED LIMESTONE			
	512.47		
Gray LIMESTONE			
	507.47		
Gray LIMESTONE			
	497.47		

End of Boring

51+75 | 52+00 | 52+25–53+25 | 53+50 | 53+75 | 53+75–54+75 | 55+00 | 55+25–57+75 | 58+00 | 58+25 | 58+50

GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= pnene	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 7/9/2025	DATE -	07/03/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DES PLAINES RIVER BRIDGE
SN: 099-8325 EB

SUBSURFACE PROFILE EASTBOUND
JOLIET, ILLINOIS

SCALE: AS NOTED | SHEET 3 OF 3 SHEETS | STA. 51+75 | TO STA. 58+50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	9	9
		CONTRACT NO. PTB 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = Z:\Projects\Illinois DOT\WSP_198-003\Geotechnical\Bridges\Des Plaines River WB&EB\Exhibits\DGNs\Des Plaines River EB - PR-03.dgn
PEN TABLE = $PENTBL$
PLOT DATE = 7/9/2025
TIME = 10:08:22 AM
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = pnene

APPENDIX C

SOIL BORING LOGS

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 7/3/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** MP

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 92.1

STRUCT. NO. 099-8325
Station

BORING NO. BSB-001
Station 37+88.08
Offset 95.13ft RT
Ground Surface Elev. 578.21 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter 569.7 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
18 inches of Asphalt			
576.71	5		
Brown, Moist FILL: SILTY CLAY, with gravel	5	0.8	
	3	P	
	3		
	3	2.3	
-5	2	P	
572.71			
Medium Stiff to Stiff Brown and Gray, Moist SILTY CLAY, trace sand, trace gravel (CL/ML)	2		
	1	0.5	
	1	P	
▼	1		
	1	0.6	
-10	2	B	
	1		
	3	1.7	
	4	B	
	2		
	4	1.5	
-15	4	B	
562.71			
Stiff to Very Stiff Brown, Gray, and Black, Moist SILTY CLAY, trace sand, trace gravel (CL/ML)	2		
	2	1.5	
	3	B	
	2		
	2	1.0	
-20	2	B	
Stiff to Very Stiff Brown, Gray, and Black, Moist SILTY CLAY, trace sand, trace gravel (CL/ML) *(continued)*	0		
	2	1.5	
	4	B	
	2		
	5	2.1	
-25	7	B	
	2		
	4	1.5	
	8	B	
550.21			
Hard Dark Gray, Moist SILTY CLAY LOAM, some gravel (ML/CL)	4		
	50/6"	4.2	
-30 Cobbles at 29 to 31.5 feet		B	
547.71			
Medium Stiff Dark Brown and Gray, Moist SILTY CLAY, trace sand, trace gravel (CL/ML)	20		
	13	0.8	
	8	B	
545.21			
Gray, Moist WEATHERED LIMESTONE Auger refusal at 33.5 feet	544.71		
-35 Gray LIMESTONE, slightly moderately weathered, moderately to heavily fractured, trace clay at 34.5', trace chert			
Run 1: 33.5' - 38.5' Recovery: 96.7% RQD: 45.8% (Poor)			
539.71			
-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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 7/3/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** MP

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 92.1

STRUCT. NO. 099-8325
Station

BORING NO. BSB-001
Station 37+88.08
Offset 95.13ft RT
Ground Surface Elev. 578.21 **ft**

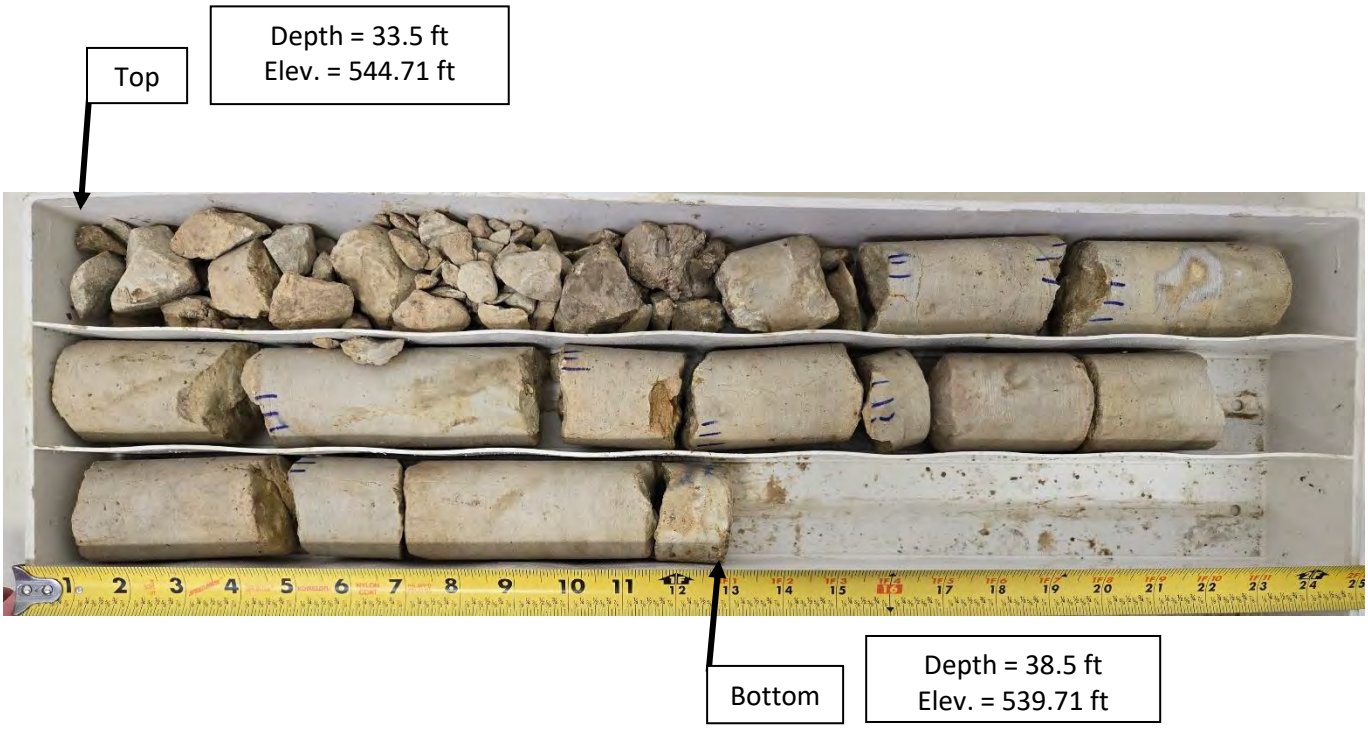
Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter 569.7 **ft** ▼
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
				Gray LIMESTONE, slightly weathered, slightly to moderately fractured, trace chert Run 2: 38.5' - 48.5' Recovery: 99.4% RQD: 90.2% (Good) *(continued)*
-45				
529.71				End of Boring
-50				
-55				
-60				

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)

I-80 EB over Des Plaines River
Boring Number: BSB-01
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-01	1	33.5'-38.5'	96.7	45.8	Poor	38/7,440	Gray Limestone Slightly to Moderately Weathered, Moderately to Heavily Fractured, Trace Clay at 34.5', Trace Chert

I-80 EB over Des Plaines River
Boring Number: BSB-01
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-01	2	38.5' – 48.5'	99.4	90.2	Good	44/12,266	Gray Limestone Slightly Weathered, Slightly to Moderately Fractured, Trace Chert

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/29/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** CME-75 **Latitude** , **Longitude**

DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 78.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-002
Station 38+43.37
Offset 1.19ft LT
Ground Surface Elev. 548.00 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil	547.75				
Stiff Dark Brown and Gray, Very Moist SILTY CLAY, trace sand, trace gravel (CL/ML)	546.50		3 5 5	1.0 P	42
Loose Brown, Wet SAND, with gravel (SP)	545.00		6		
Medium Stiff Brown, Dry SILTY CLAY, some sand, some gravel (CL/ML)		-5	3 4	0.8 P	4
Very Dense Brown, Moist SAND, with gravel (SP)	542.50 541.00		50/4"		
Auger refusal at 7 feet End of Boring		-10 -15 -20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/29/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Mobile B-57 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto
HAMMER EFF (%) 92.1

STRUCT. NO. 099-8309
Station

BORING NO. BSB-003
Station 38+71.43
Offset 75.28ft LT
Ground Surface Elev. 548.48 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown, Moist FILL: SAND, with gravel		3		
		6 7		7
	545.48			
Very Dense Brown, Moist GRAVEL, with sand (GP)		10		
		8 50/2"		8
	543.48 -5			
Auger refusal at 5 feet				
Brown and Gray LIMESTONE, slightly weathered, moderately fractured Run 1: 5' - 15' Recovery: 88.8% RQD: 55.6% (Fair)	-10			
	533.48 -15			
Gray LIMESTONE, slightly weathered, slightly fractured, trace shale Run 2: 15' - 20' Recovery: 100% RQD: 92.5% (Excellent)				
	528.48 -20			

End of Boring

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)

I-80 WB over Des Plaines River
Boring Number: BSB-03
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-03	1	5'-15'	88.8	55.6	Fair	9/15,953	Brown and Gray Limestone Slightly Weathered, Moderately Fractured

I-80 WB over Des Plaines River
Boring Number: BSB-03
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-03	2	15’ – 20’	100	92.5	Excellent	18/17,948	Gray Limestone Slightly Weathered, Slightly Fractured, Trace Shale

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/20/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51254634, **Longitude** -88.09360484

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-04
Station 39+81.30
Offset 77.89ft RT
Ground Surface Elev. 540.36 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Asphalt	540.03				
8 inches of Aggregate Subbase	539.36				
Black, Moist FILL: SILTY CLAY, trace gravel	538.36		5 8 24	1.5 P	12
Brown, Moist FILL: SAND, with gravel	536.86				
Gray, Moist HIGHLY WEATHERED LIMESTONE	536.36		50/0"		
Auger refusal at 4 feet End of Boring		-5 -10 -15 -20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/20/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5127292, **Longitude** -88.09342765

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-05
Station 40+15.20
Offset 2.76ft RT
Ground Surface Elev. 541.00 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				5 inches of Asphalt
540.58				7 inches of Concrete
540.00				Dark Gray, Moist
	8			FILL: SILTY CLAY, with gravel,
	10	1.5	23	trace organics
	8	P		
537.50				Very Dense
	50/4"			Light Gray, Dry
			5	SAND, with gravel (SPG)
536.00 -5				Auger refusal at 5 feet
				Light Gray
				LIMESTONE, moderately
				weathered, moderately fractured,
				some vugs
				Run 1: 5' - 15'
				Recovery: 91.7%
				RQD: 70.8% (Fair)
-10				
526.00 -15				Light Gray
				LIMESTONE, moderately
				weathered, slightly fractured,
				some vugs
				Run 2: 15' - 22'
				Recovery: 100%
				RQD: 92.5% (Excellent)
-20				

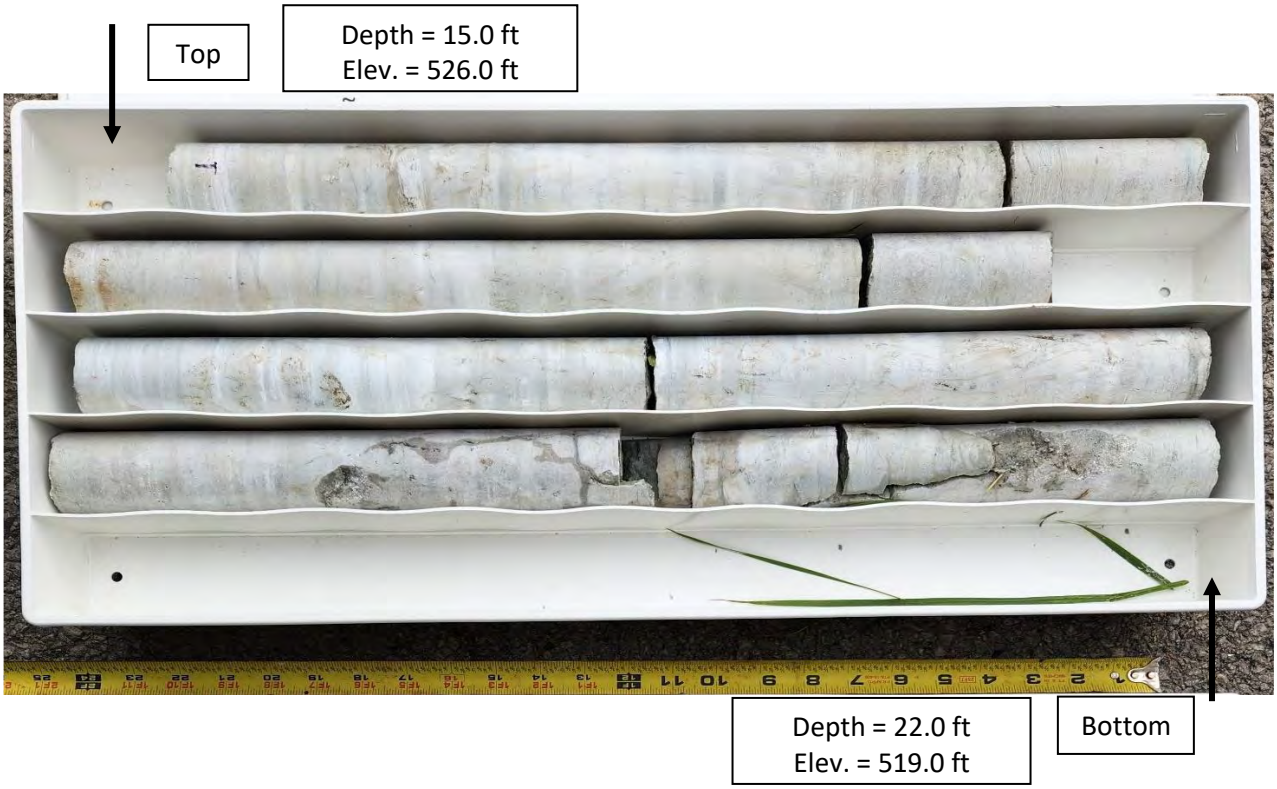
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
519.00				End of Boring
-25				
-30				
-35				
-40				

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)

I-80 EB over Des Plaines River
Boring Number: BSB-05
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-5	1	5.0’ – 15.0’	91.7	70.8	Fair	7.0 / 17,099	Light Gray Limestone Moderately Weathered, Moderately Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-05
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-5	2	15.0’ – 22.0’	100.0	92.5	Excellent	Light Gray Limestone Moderately Weathered, Slightly Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/20/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51294094, **Longitude** -88.09322597

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-06
Station 40+53.51
Offset 84.05ft LT
Ground Surface Elev. 541.53 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Asphalt	541.28				
8 inches of Concrete	540.61				
Gray, Dry			24		
FILL: SAND, with gravel			17		4
			16		
	538.03				
Brown, Moist			5		
FILL: SILTY CLAY, with sand, trace gravel	537.03		4	0.5	20
		-5	23	P	
Gray, Moist					
HIGHLY WEATHERED LIMESTONE	535.53				
			50/1"		
Auger refusal at 6 feet					
End of Boring					NR
		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/9/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5124502, **Longitude** -88.093078

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-07
Station 41+30.61
Offset 83.27ft RT
Ground Surface Elev. 536.14 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
7 inches of Concrete 6 inches of Aggregate Base Course	535.56 535.06				11
Auger refusal at 1.08 feet End of Boring					
		-5			
		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/11/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5128598, **Longitude** -88.0928322

COUNTY Will **DRILLING RIG** B-57 Mobile **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-8309
Station

BORING NO. BSB-08
Station 41+65.07
Offset 77.12ft LT
Ground Surface Elev. 539.00 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

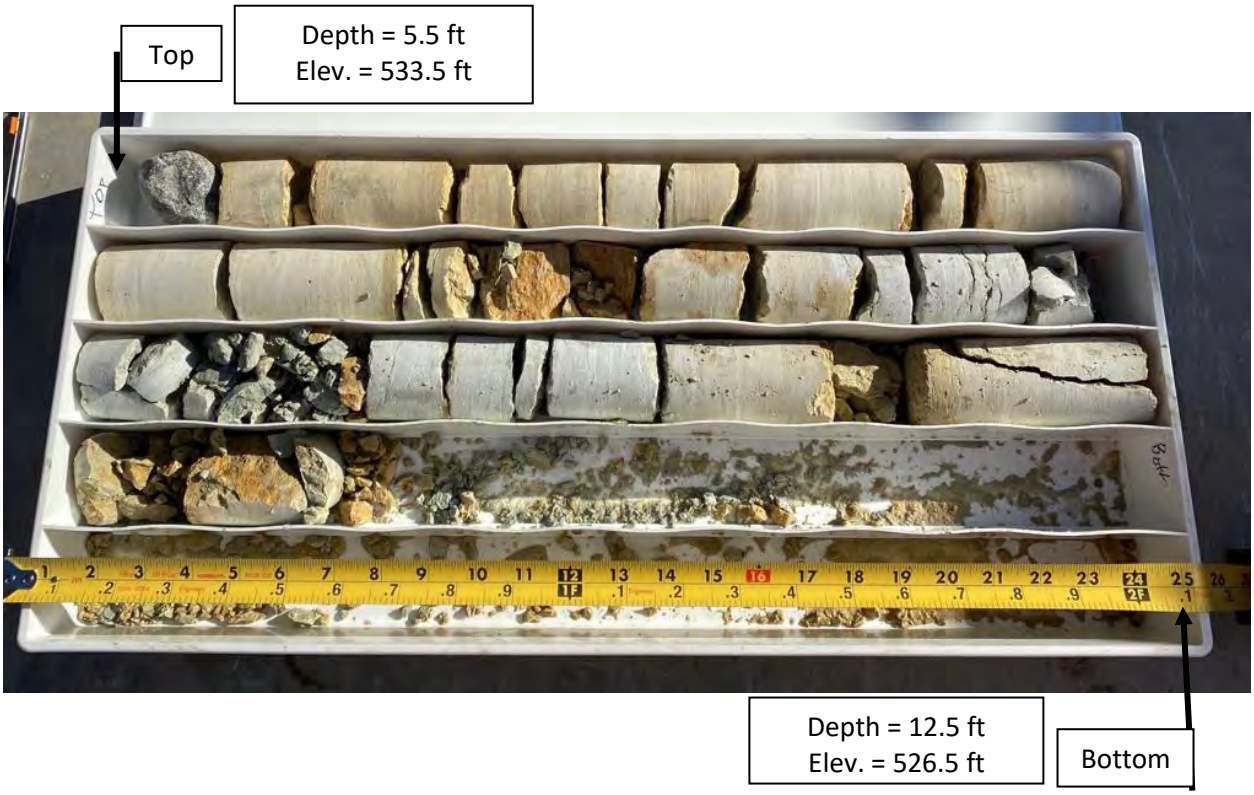
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				4 inches of Concrete 538.67
	7			Medium Dense Light Brown, Moist SAND, with gravel (SPG)
	11 6		7	
				535.50
	6			Very Dense Light Brown, Moist SANDY LOAM, with gravel (SM)
-5	8 50/3"		11	
				533.50 Auger refusal at 5.5 feet
				Light Gray LIMESTONE, moderately weathered, heavily fractured, some vertical fractures Run 1: 5.5' - 12.5' Recovery: 92.9% RQD: 0% (Very Poor)
-10				
				526.50
				Light Gray LIMESTONE, moderately weathered, heavily fractured Run 2: 12.5' - 21.5' Recovery: 97.2% RQD: 84.7% (Good)
-15				
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				517.50 End of Boring
-25				
-30				
-35				
-40				

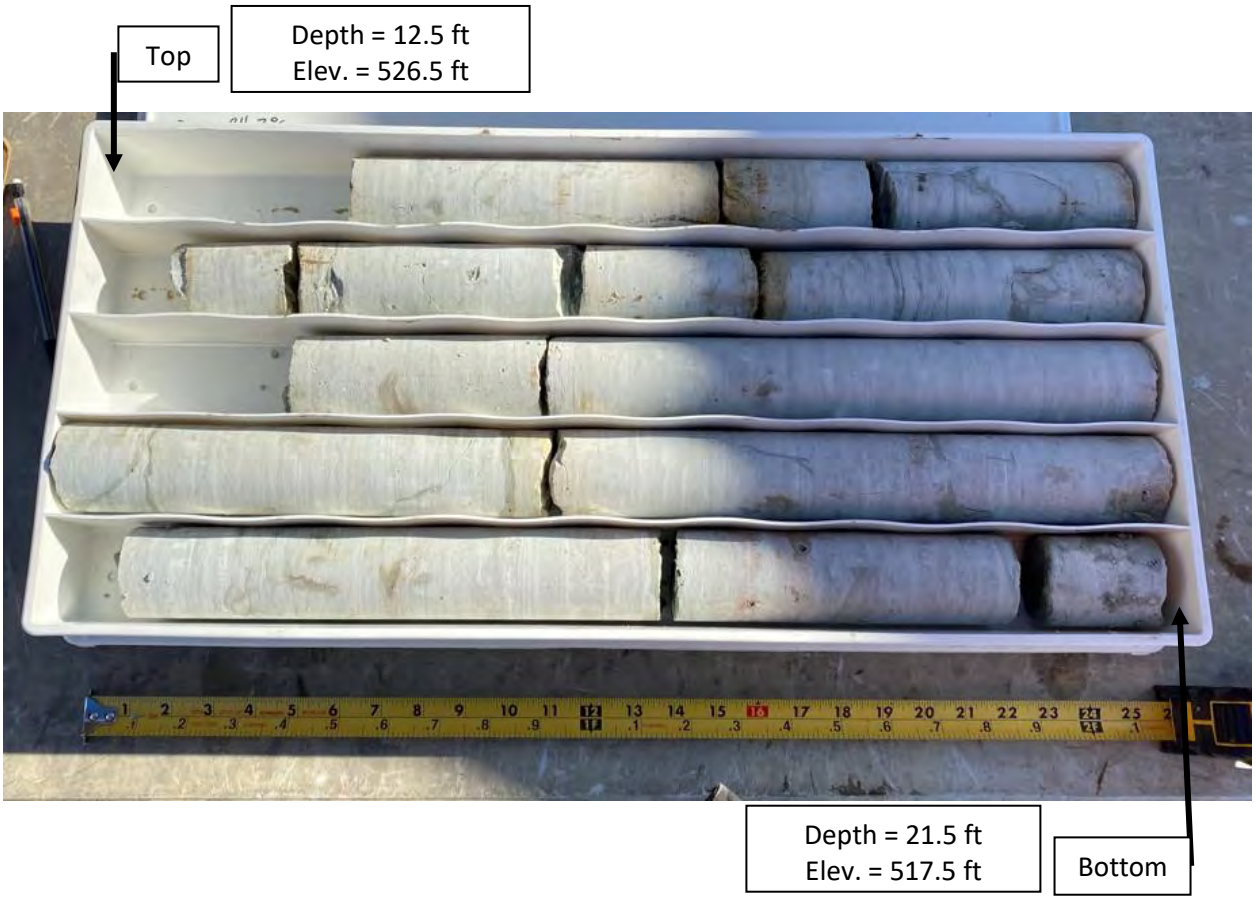
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 EB over Des Plaines River
Boring Number: BSB-08
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-08	1	5.5’-12.5’	92.9	0	Very Poor	Gray Limestone Moderately Weathered, Heavily Fractured, Some Vertical Fractures

I-80 EB over Des Plaines River
Boring Number: BSB-08
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-08	2	12.5' – 21.5'	97.2	84.7	Good	16.5 / 11,381	Gray Limestone Moderately Weathered, Lightly Fractured

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/30/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Geoprobe **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99

STRUCT. NO. 099-8309
Station

BORING NO. BSB-012
Station 51+7.08
Offset 110.23ft LT
Ground Surface Elev. 517.78 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
Loose Brown, Moist GRAVEL, with sand (GP)	6			
	4 3		7	
514.28				
Medium Stiff Brown, Moist SILTY CLAY, with sand, some gravel (CL/ML)	2			
-5	3 4	0.8 P	11	
511.28				
Auger refusal at 6.5 feet End of Boring				
-10				
-15				
-20				

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/22/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** CME- 75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-013
Station 51+85.54
Offset 7.08ft RT
Ground Surface Elev. 517.66 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Topsoil 517.33				
Very Stiff Light Brown, Moist SILTY CLAY, with sand, little gravel (CL/ML)		15 21 27	2.5 P	8
514.16				
Dense Light Brown, Moist GRAVEL, with sand, little clay (GP)	-5	10 19 23		13
Auger refusal at 6 feet 511.66				
End of Boring	-10			
	-15			
	-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/23/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5
Latitude , **Longitude**

STRUCT. NO. 099-8325
Station

BORING NO. BSB-014
Station 51+81.12
Offset 81.00ft RT
Ground Surface Elev. 518.40 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

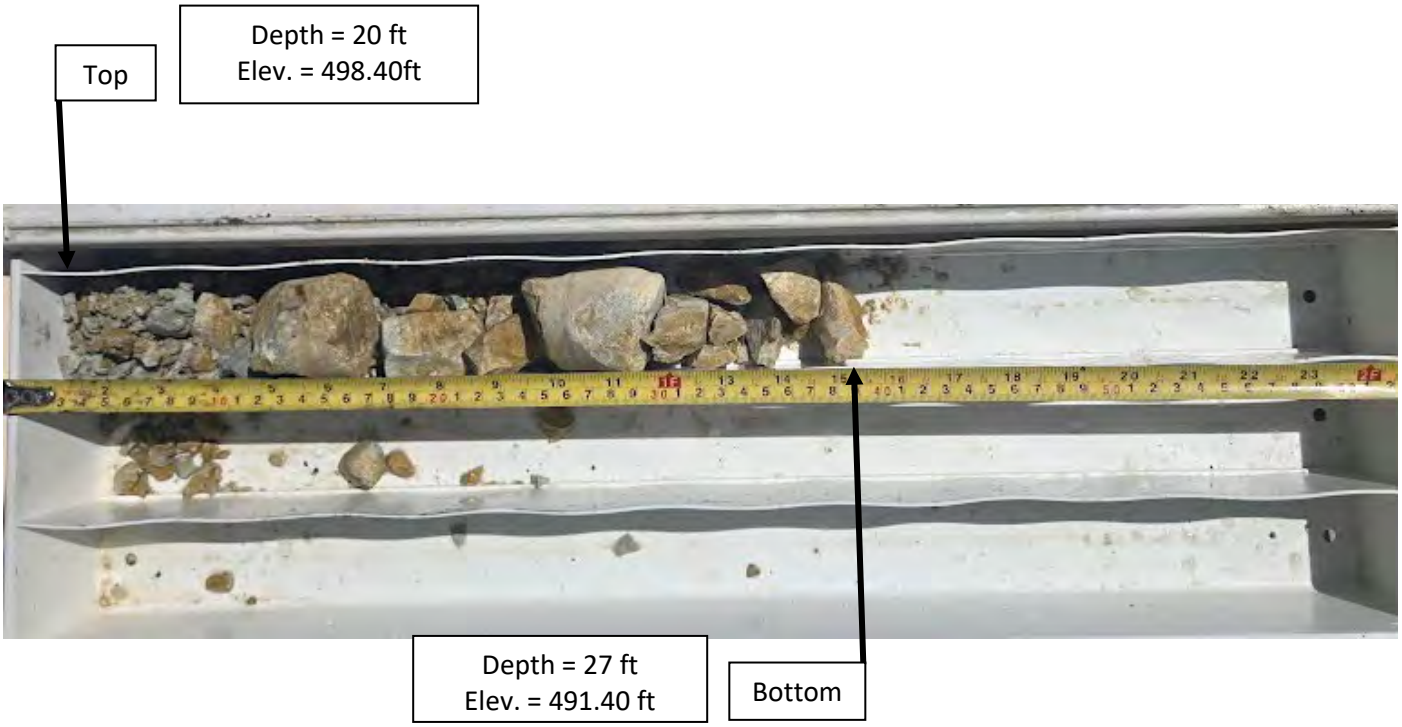
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Dense Brown, Moist SAND, with gravel/weathered limestone, trace clay (SP)
	12			
	10 9		7	
	7			
	7 8		7	
-5				
511.90				
				Brown, Moist GRAVEL/BOULDERS, little sand (GP) Rock coring attempted at 6.5 to 13.5 feet - boulders encountered
-10				
504.90				
	7			Loose Light Brown, Moist GRAVEL, little clay (GP)
	4 4		10	
-15				
502.40				
	30			Gray, Moist HIGHLY WEATHERED LIMESTONE
	41 50/5"		10	
	50/6"			
			13	
498.40 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Gray LIMESTONE, heavily weathered, heavily fractured Run 1: 20'- 27' Recovery: 14.3 % RQD: 0% (Very Poor)
-25				
491.40				
				Gray LIMESTONE, heavily weathered, heavily fractured Run 2: 27'-35' Recovery: 25.0% RQD: 4.7% (Very Poor)
-30				
483.40 -35				End of Boring
-40				

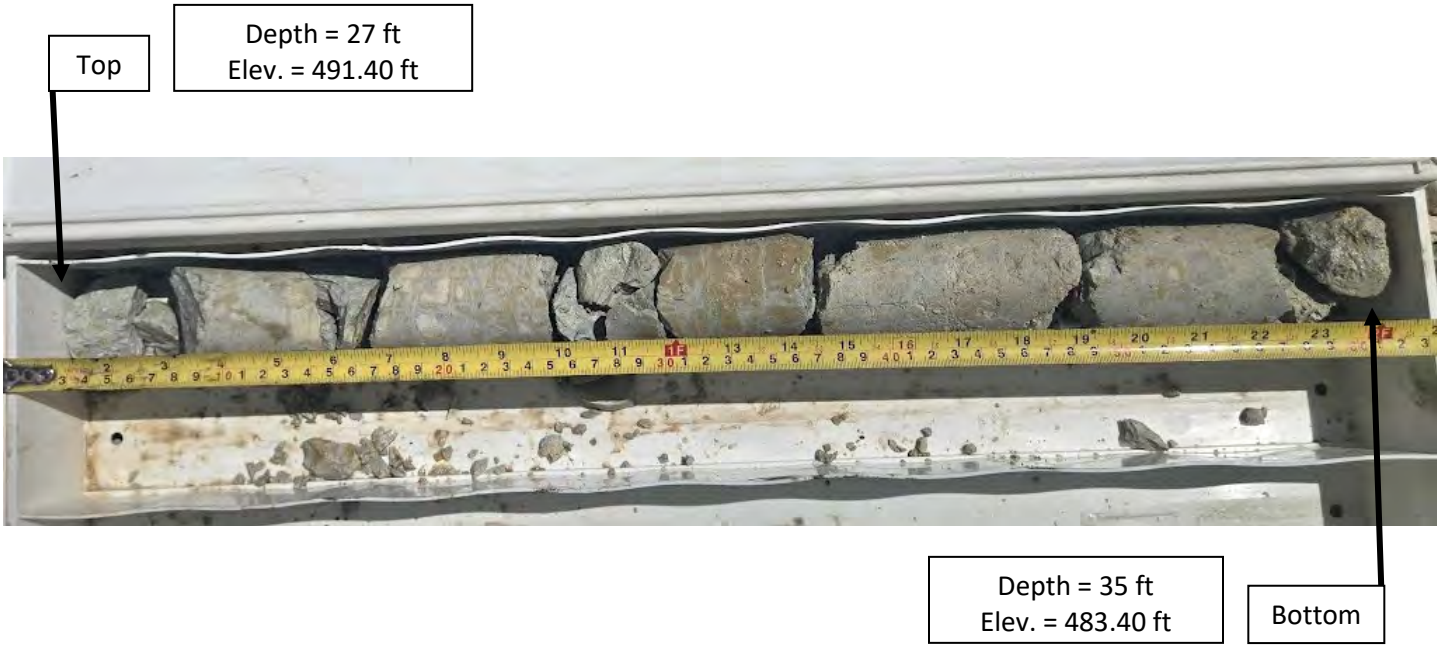
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 EB over Des Plaines River
Boring Number: BSB-14
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-14	1	20'-27'	14.3	0	Very Poor	Gray Limestone Heavily Weathered, Heavily Fractured

I-80 EB over Des Plaines River
Boring Number: BSB-14
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-14	2	27’ – 35’	25.0	4.7	Very Poor	Gray Limestone Heavily Weathered, Heavily Fractured

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/7/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-8309
Station

BORING NO. BSB-015
Station 53+58.44
Offset 96.41ft LT
Ground Surface Elev. 519.63 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

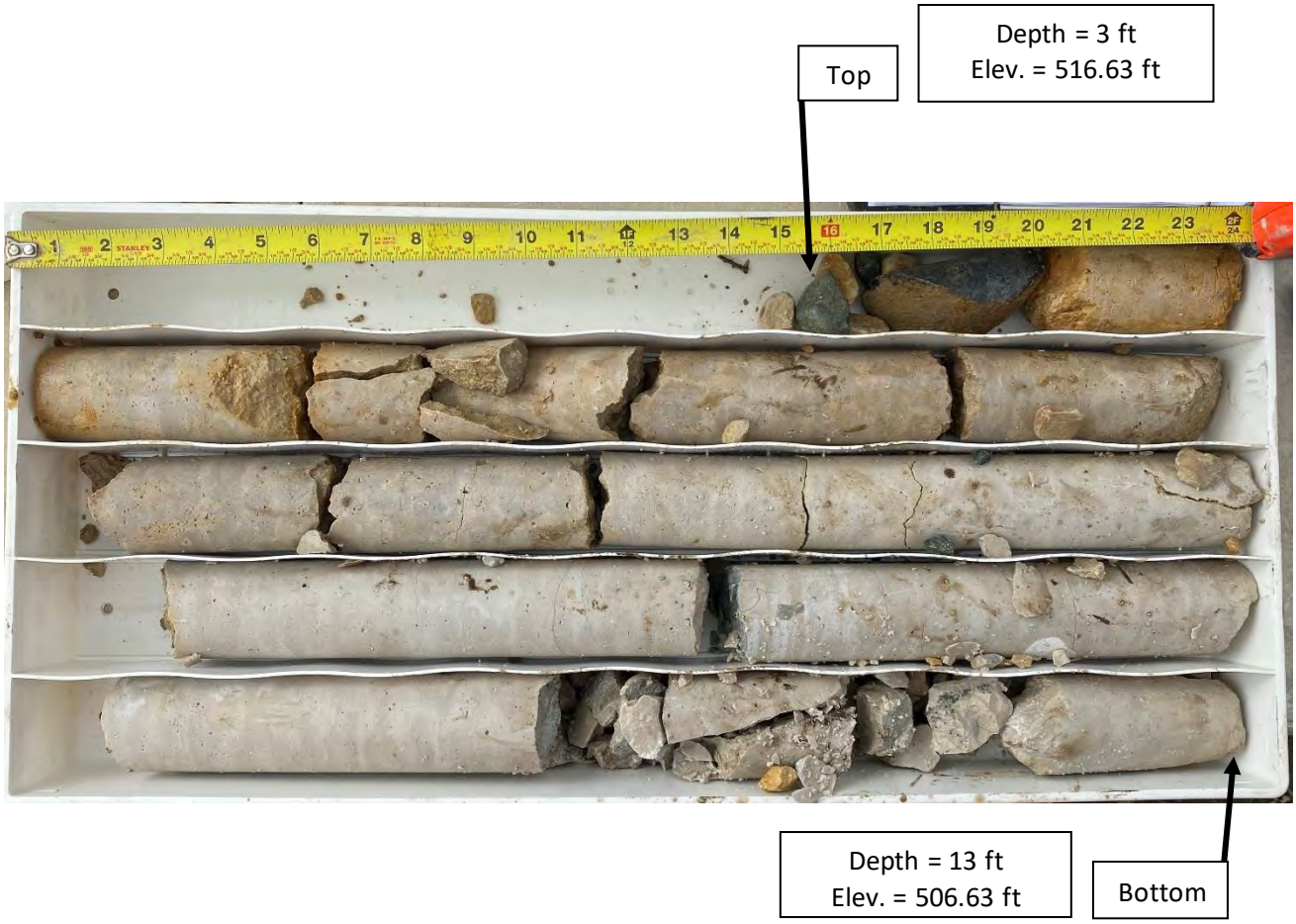
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12 inches of Topsoil				
518.63				
Brown, Moist		6		
FILL: GRAVEL, with sand, trace asphalt		7 8		14
516.63				
Auger refusal at 3 feet				
Gray LIMESTONE, slightly weathered, moderately to heavily fractured	-5			
Run 1: 3' - 13' Recovery: 82.5% RQD: 64.6% (Fair)				
	-10			
506.63				
Gray LIMESTONE, slightly weathered, moderately fractured, trace shale				
Run 2: 13' - 18' Recovery: 100% RQD: 60.0% (Fair)	-15			
501.63				
End of Boring				
	-20			

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)

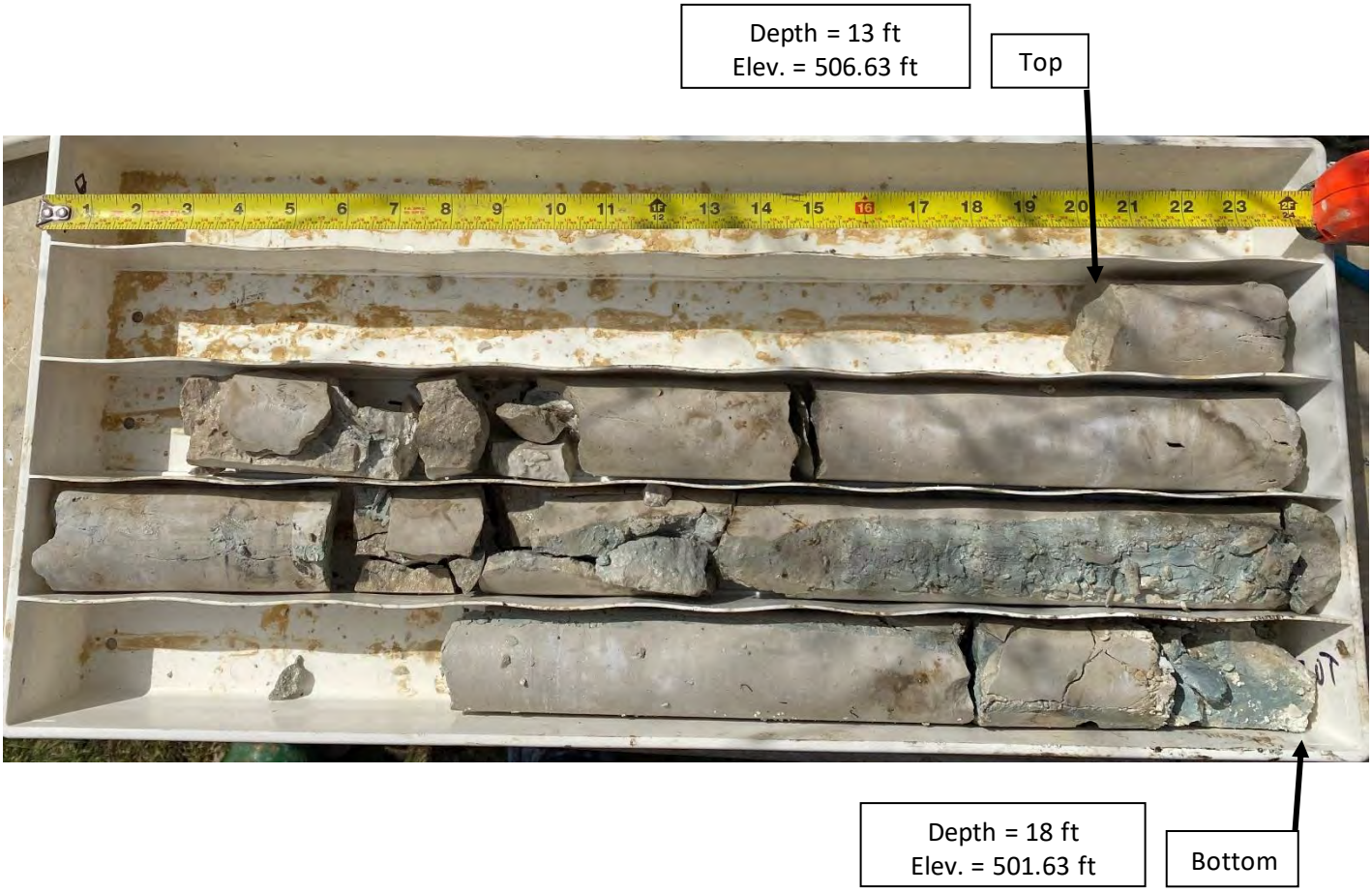
BBS, form 137 (Rev. 8-99)

I-80 WB over Des Plaines River
Boring Number: BSB-15
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-15	1	3'-13'	82.5	64.6	Fair	6/8,529	Brown and Gray Limestone Slightly Weathered, Moderately to Heavily Fractured

I-80 WB over Des Plaines River
Boring Number: BSB-15
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-15	2	13’ – 18’	100	60.0	Fair	14/11,523	Gray Limestone Slightly Weathered, Moderately Fractured, Trace Shale

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/18/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-8309
Station

BORING NO. BSB-016
Station 53+63.41
Offset 9.32ft LT
Ground Surface Elev. 519.87 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6 inches of Topsoil	519.37				
Medium Dense Brown, Moist to Wet GRAVEL, with sand, some clay (GP)			10		
			8 12		28
			8		
			11		15
		-5	10		
	513.87				
Very Dense Brown, Moist GRAVEL, with sand (GP)			7 15 50/4"		
	511.87				
Auger refusal at 8 feet End of Boring		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/18/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 97.7
Latitude , **Longitude**

STRUCT. NO. 099-8325
Station

BORING NO. BSB-018
Station 53+55.25
Offset 80.51ft RT
Ground Surface Elev. 521.26 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6 inches of Topsoil 520.76				Light Gray LIMESTONE, slightly weathered, moderately fractured, trace chert			
Stiff Gray, Moist SILTY CLAY (CL/ML) 519.76	3						
	6	1.5	25	Run 2: 18' - 23' Recovery: 100% RQD: 80.8% (Good) *(continued)* 498.26			
Medium Dense to Dense Brown and Light Brown, Moist to Wet GRAVEL, with sand, little clay (GP)	6	P		End of Boring			
	14						
-5	15 20			-25			
	8						
	10 12						
Auger refusal at 8 feet 513.26							
Light Gray LIMESTONE, slightly to moderately weathered, moderately to heavily fractured, trace chert							
-10				-30			
Run 1: 8' - 18' Recovery: 100% RQD: 46.3% (Poor)							
-15				-35			
503.26							
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-18
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-18	1	8'-18'	100	46.3	Poor	Light Gray Limestone Slightly to Moderately Weathered, Moderately to Heavily Fractured, Trace Chert

I-80 EB over Des Plaines River
Boring Number: BSB-18
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-18	2	18’ – 23’	100	80.8	Good	22/10,265	Light Gray Limestone Slightly Weathered, Moderately Fractured, Trace Chert

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/24/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51210162, **Longitude** -88.08788946

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-19
Station 55+46.73
Offset 83.23ft LT
Ground Surface Elev. 519.66 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

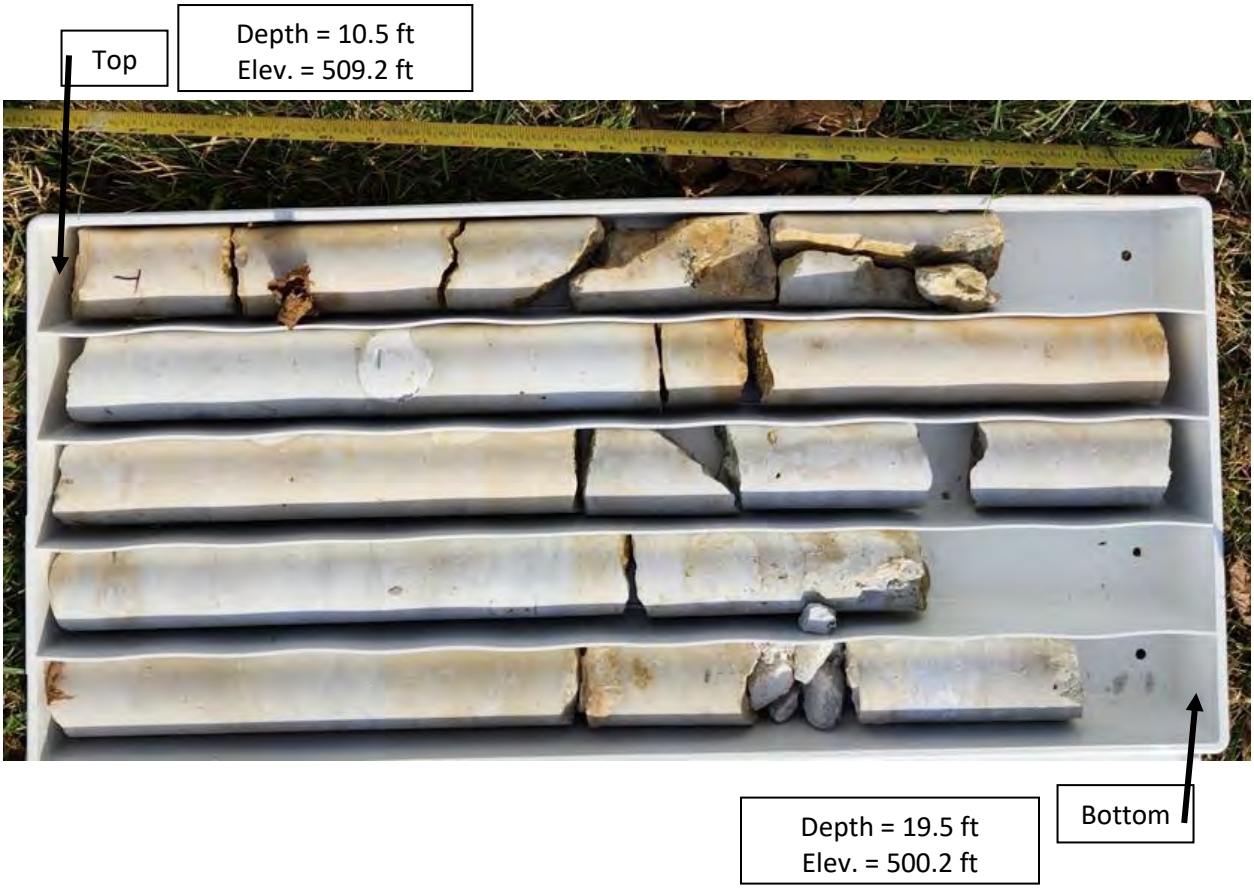
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				3 inches of Asphalt 519.41
				8 inches of Aggregate Subbase 518.75
	4			Medium Dense to Very Dense Brown, Moist to Wet SAND, with gravel (SPG)
	8		8	
	14			
	7			
	20		9	
-5	50/2"			
	8			
	19		16	
	50/2"			
				511.66
	50/4"			Very Dense Gray, Moist SAND, with gravel (SPG)
			7	
-10				
				Auger refusal at 10.5 feet 509.16
				Light Gray LIMESTONE, moderately weathered, moderately fractured
				Run 1: 10.5' - 19.5' Recovery: 99.1% RQD: 72.2% (Fair)
-15				
				500.16
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, moderately weathered, moderately fractured
				Run 2: 19.5' - 25.5' Recovery: 91.7% RQD: 70.1% (Fair) *(continued)*
-25				
				494.16
				End of Boring
-30				
-35				
-40				

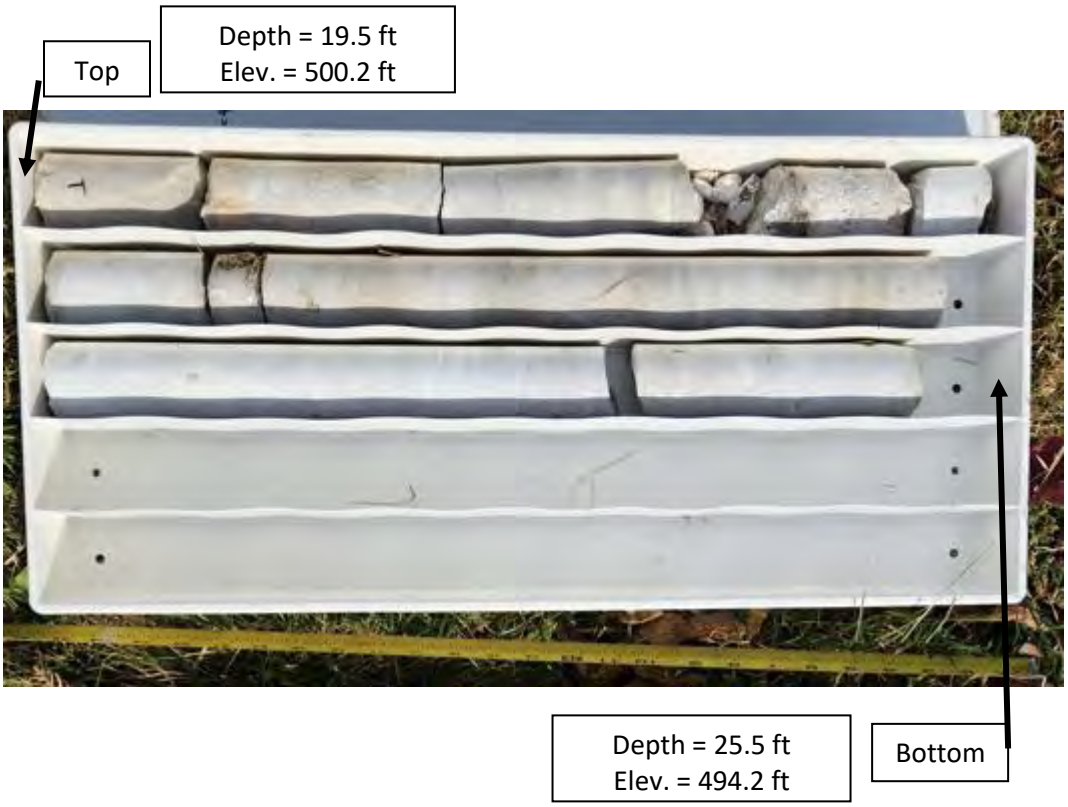
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-19
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-19	1	10.5’ – 19.5’	99.1	72.2	Good	13.5 / 17,233	Light Gray Limestone Moderately Weathered, Moderately Fractured, Some Chert, Trace Shale Seams

I-80 WB over Des Plaines River
Boring Number: BSB-19
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-19	2	19.5’ – 25.5’	91.7	70.1	Good	Light Gray Limestone Moderately Weathered, Moderately Fractured

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/14/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** B-57 Mobile **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 92.1

STRUCT. NO. 099-8309
Station

BORING NO. BSB-020
Station 55+28.91
Offset 11.36ft LT
Ground Surface Elev. 522.43 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

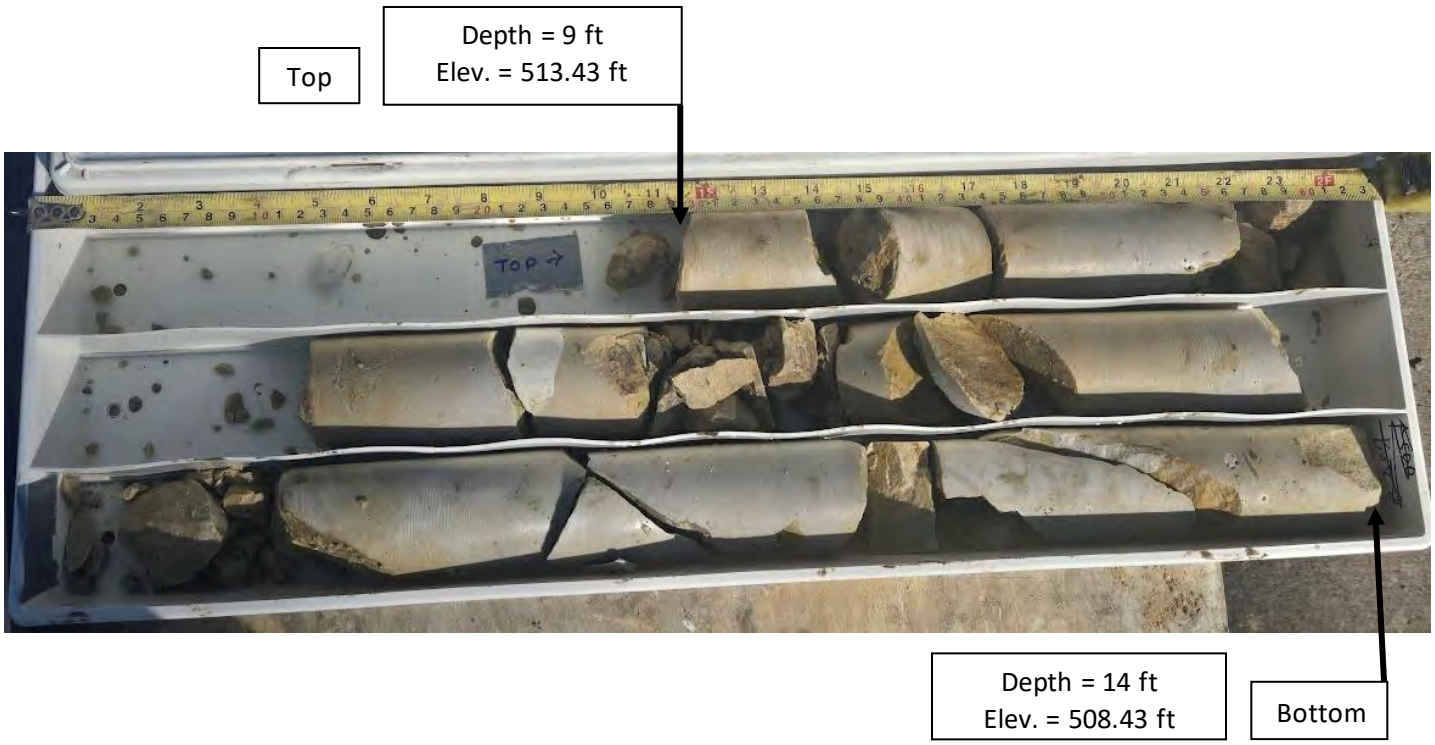
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				3 inches of Topsoil 522.18
	2			Medium Dense Brown, Wet GRAVEL, some sand, trace clay (GP)
	10 7		16	
				518.93
	4			Stiff Brown and Black, Moist SILTY CLAY, some gravel, little sand (CL/ML)
-5	8 5	1.0 S	22	
				516.43
	6			Brown, Moist WEATHERED LIMESTONE, some gravel, some sand
	19 16		9	
				513.43
	50/5"			Auger refusal at 9 feet
-10			5	Gray LIMESTONE, slightly weathered, heavily fractured, trace vugs Run 1: 9' - 14' Recovery: 91.7% RQD: 45.8% (Poor)
				508.43
-15				Gray and Brown LIMESTONE, moderately to heavily weathered, heavily fractured Run 2: 14' - 18' Recovery: 100% RQD: 8.3% (Very Poor)
				504.43
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, moderately weathered, moderately to heavily fractured Run 3: 18' - 24' Recovery: 92.0% RQD: 35.8% (Poor) *(continued)*
				498.43
-25				End of Boring
-30				
-35				
-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)

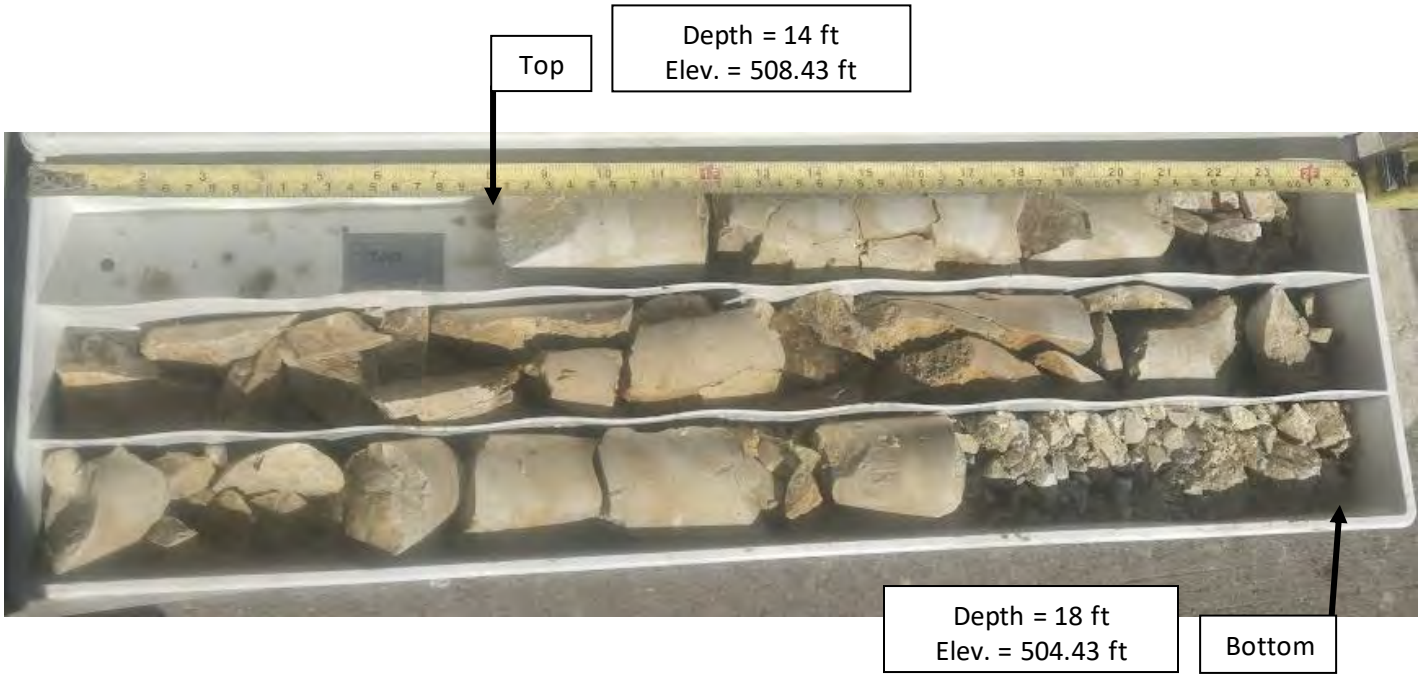
BBS, form 137 (Rev. 8-99)

I-80 WB over Des Plaines River
Boring Number: BSB-20
Will County, IL



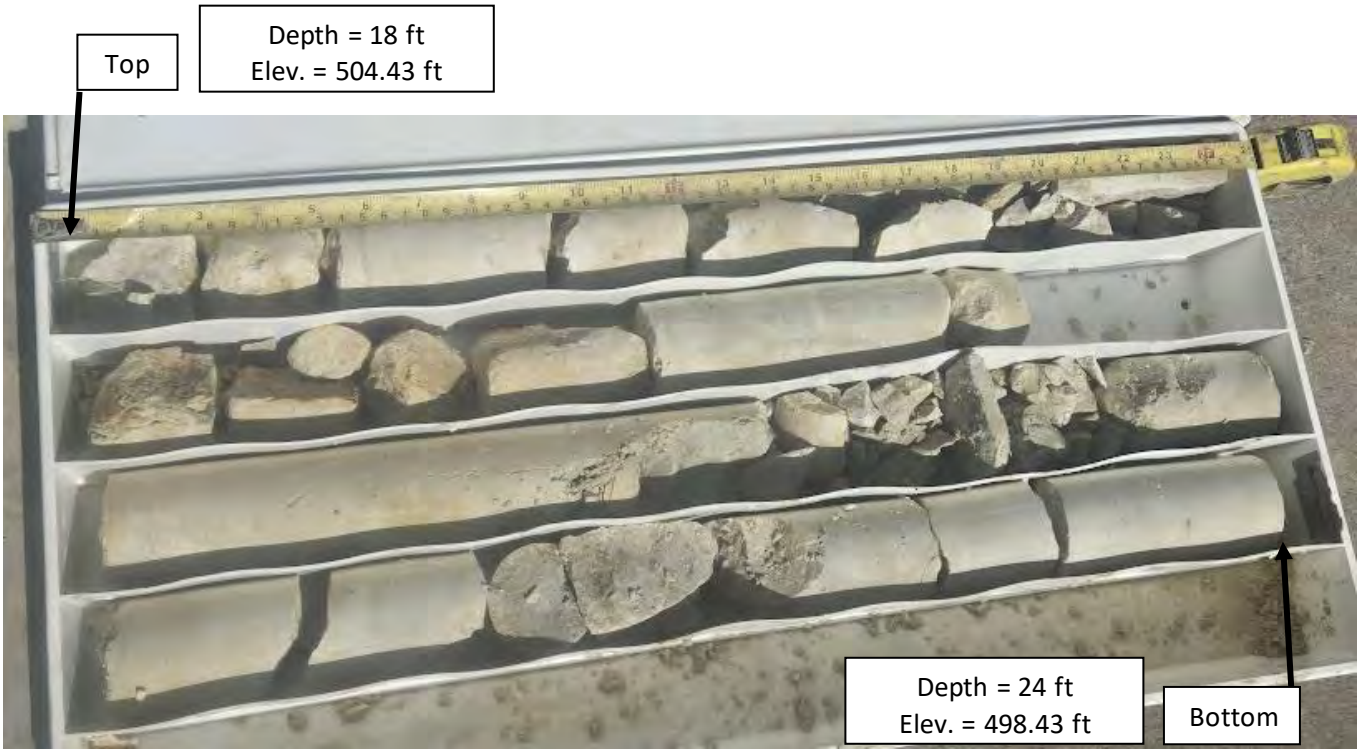
Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-20	1	9'-14'	91.7	45.8	Poor	9/16,387	Gray Limestone Slightly Weathered, Heavily Fractured, Trace Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-20
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-20	2	14’ – 18’	100	8.3	Very Poor	21/6,367	Gray and Brown Limestone Moderately to Heavily Weathered, Heavily Fractured

I-80 WB over Des Plaines River
Boring Number: BSB-20
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-20	3	18’ – 24’	92.0	35.8	Poor	Gray Limestone Moderately Weathered, Moderately to Heavily Fractured

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/14/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** B-57 Mobile **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 92.1

STRUCT. NO. 099-8325
Station

BORING NO. BSB-021
Station 55+19.39
Offset 5.44ft RT
Ground Surface Elev. 522.20 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Topsoil	521.86				
Medium Dense Brown, Wet GRAVEL, trace roots, trace clay (GP)			4 8 10		22
	518.70				
Very Dense Light Brown, Moist GRAVEL, some sand (GP)		-5	8 14 50/2"		5
Auger refusal at 5.5 feet	516.70				
Gray, Moist WEATHERED LIMESTONE	515.70				
End of Boring		-10 -15 -20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/18/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51165701, **Longitude** -88.08823718

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-22
Station 54+86.60
Offset 94.82ft RT
Ground Surface Elev. 519.88 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter 506.9 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
0				4 inches of Asphalt 519.55
	11			Brown, Black and Gray, Moist FILL: SAND AND GRAVEL, trace clay
	9 5		10	
	3			
-5	1 1		NR	
	7			
	19 29		8	512.38
	34			Very Dense Light Brown and Gray, Dry to Moist SAND, with gravel (SPG)
-10	50/3"		3	
	50/3"			
			5	507.38
	50/5"			Very Dense Brown, Moist GRAVEL, with sand (GPS) 505.88
			12	Auger refusal at 14 feet
-15				Light Gray LIMESTONE, moderately weathered, highly fractured, some vugs Run 1: 14' - 19' Recovery: 100% RQD: 6.6% (Very Poor)
				500.88
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, moderately weathered, moderately fractured, some vugs Run 2: 19' - 29' Recovery: 85.8% RQD: 41.7% (Poor) *(continued)*
-25				
				490.88
				End of Boring
-30				
-35				
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-22
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-22	1	14.0’ – 19.0’	100.0	6.6	Very Poor	Light Gray Limestone Moderately Weathered, Highly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-22
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-22	2	19.0' – 29.0'	85.8	41.7	Poor	23.5 / 12,246	Light Gray Limestone Moderately Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 6/3/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35N, **RNG.** 10E,

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 78.8

Latitude , **Longitude**

STRUCT. NO. 099-8309
Station

BORING NO. BSB-023
Station 56+50.39
Offset 82.55ft LT
Ground Surface Elev. 520.15 **ft**

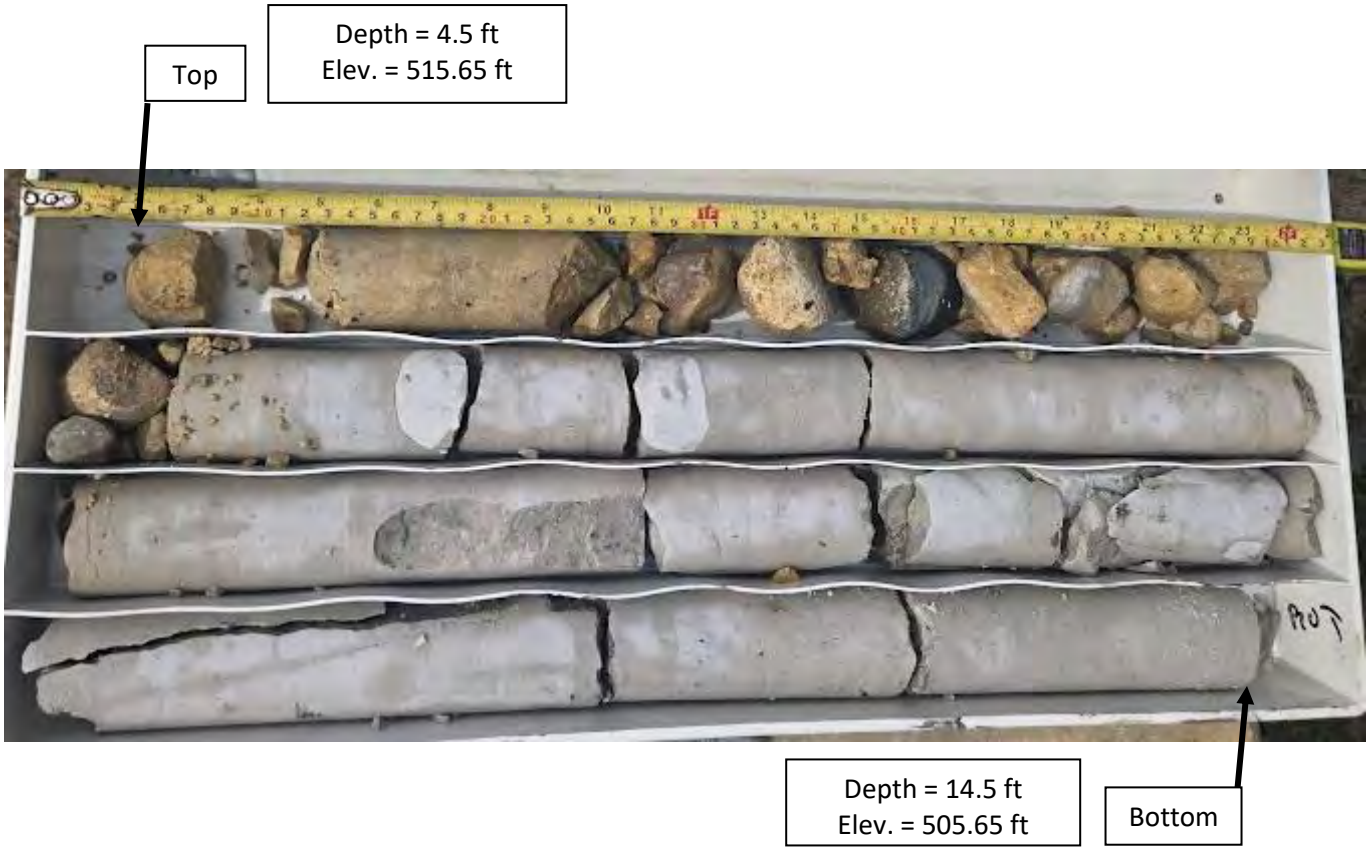
Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
3 inches of Topsoil 519.90				
Brown and Black, Moist FILL: GRAVEL, trace brick, trace clay	6			
	9 14		14	
517.15				
Gray, Moist WEATHERED LIMESTONE	50/6"			
515.65				
-5 Gray LIMESTONE, slightly to moderately weathered, moderately to heavily fractured, some vertical fractures, trace chert Run 1: 4.5' - 14.5' Recovery: 73.5% RQD: 47.3% (Poor)				
-10				
505.65				
-15 Gray LIMESTONE, slightly weathered, slightly fractured, some vertical fractures, trace chert Run 2: 14.5' - 19.5' Recovery: 100% RQD: 87.5% (Good)				
500.65				
-20 End of Boring				

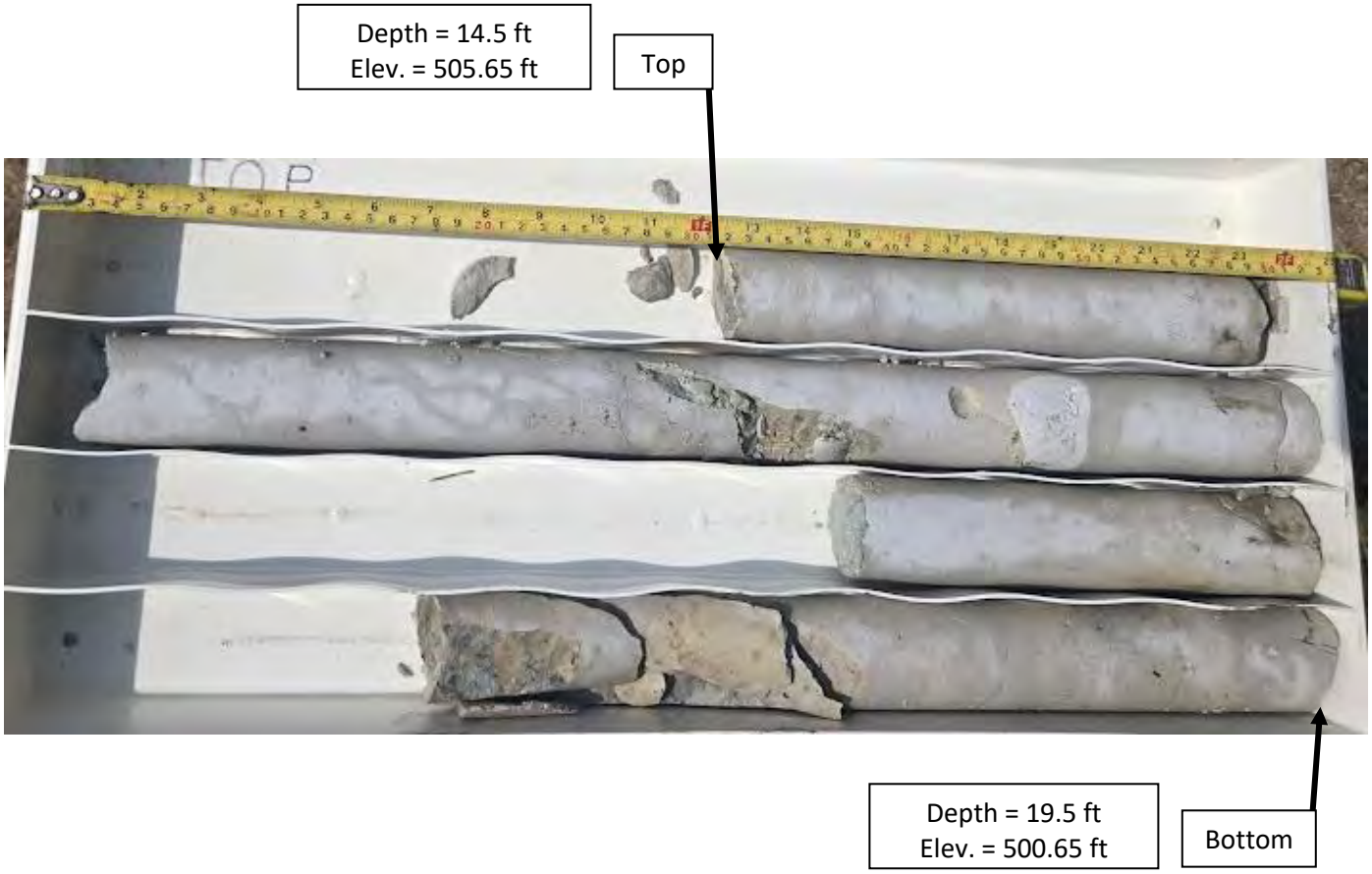
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-23
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-23	1	4.5'-14.5'	73.5	47.3	Poor	13.5/5,989	Gray Limestone Slightly to Moderately Weathered, Moderately to Heavily Fractured, Some Vertical Fractures, Trace Chert

I-80 WB over Des Plaines River
Boring Number: BSB-23
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-23	2	14.5' – 19.5'	100	87.5	Good	17.5/13,846	Gray Limestone Slightly Weathered, Slightly Fractured, Some Vertical Fractures, Trace Chert

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/17/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51165023, **Longitude** -88.08771466

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-25
Station 56+27.19
Offset 68.00ft RT
Ground Surface Elev. 520.95 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Asphalt 520.78				
Light Brown, Moist FILL: SAND AND GRAVEL 519.95	29			
Medium Dense to Very Dense Brown, Dry to Moist GRAVEL, with sand (GPS)	24 14		9	
	9			
	9		NR	
-5	9			
	50/6"			
			NR	
	12			
	50/4"		1	
-10				
	50/2"			
			NR	
Auger refusal at 14 feet 506.95	50/3"			
End of Boring			NR	
-15				
-20				

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/9/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-8309
Station

BORING NO. BSB-026
Station 58+21.42
Offset 88.12ft LT
Ground Surface Elev. 521.90 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

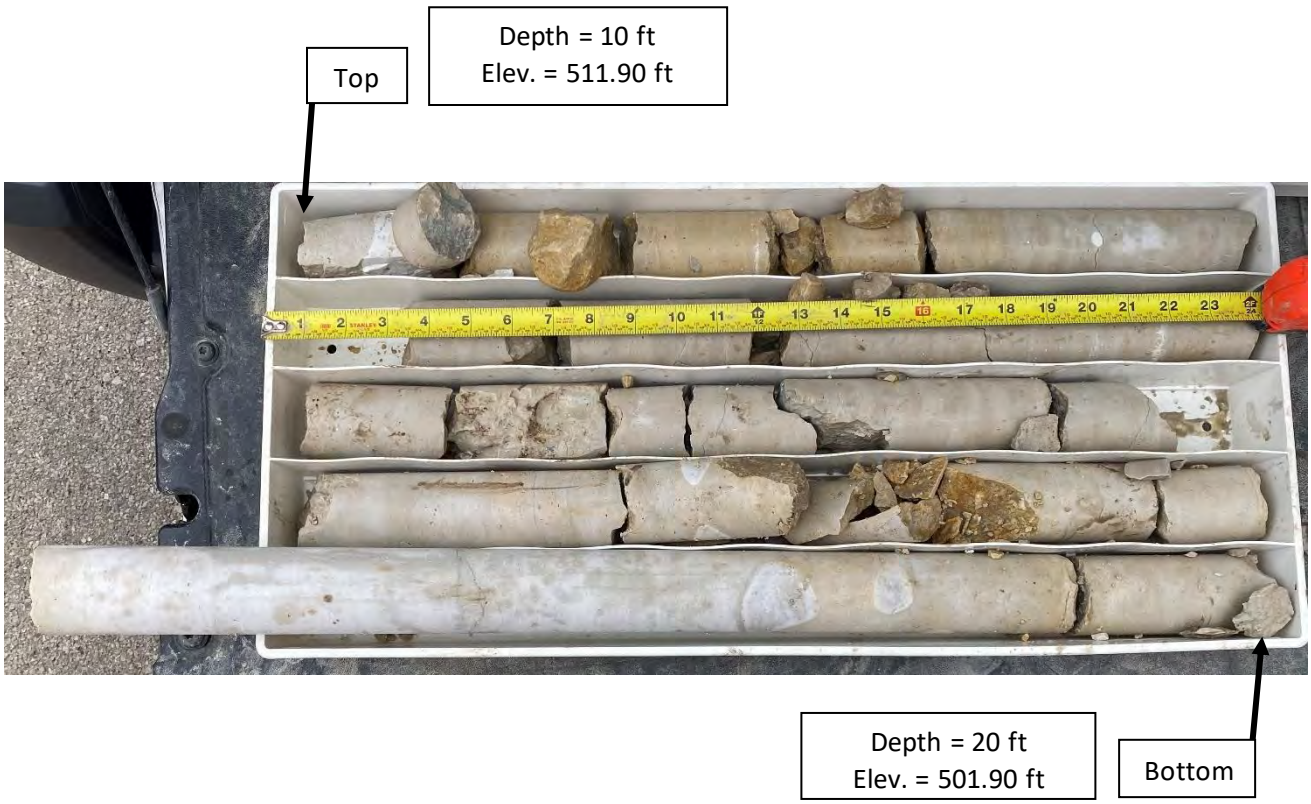
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
521.82				1 inch of Gravel
520.40	5			Dark Brown, Moist FILL: SILTY CLAY, with gravel
	9 7		7	Medium Dense to Dense Brown and Gray, Moist SAND, little gravel (SP)
	8			
-5	14 20		8	
	13			
	15 15		6	
513.40				
	25			Very Dense Gray, Moist GRAVEL, with rock fragments (GP)
511.90 -10	50/2"		8	Auger refusal at 10 feet
				Gray LIMESTONE, slightly weathered, slightly to moderately fractured, trace chert
				Run 1: 10' - 20' Recovery: 100% RQD: 69.2% (Fair)
-15				
501.90 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Gray LIMESTONE, slightly weathered, slightly fractured, trace chert
				Run 2: 20' - 25' Recovery: 95.0% RQD: 95.0% (Excellent)
496.90 -25				
				End of Boring
-30				
-35				
-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)

I-80 WB over Des Plaines River
Boring Number: BSB-26
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-26	1	10’-20’	100	69.2	Fair	13/14,031	Gray Limestone Slightly Weathered, Slightly to Moderately Fractured, Trace Chert

I-80 WB over Des Plaines River
Boring Number: BSB-26
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-26	2	20’ – 25’	95.0	95.0	Excellent	23/17,753	Gray Limestone Slightly Weathered, Slightly Fractured, Trace Chert

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/18/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51166508, **Longitude** -88.08694055

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-27
Station 58+33.46
Offset 19.51ft RT
Ground Surface Elev. 521.77 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

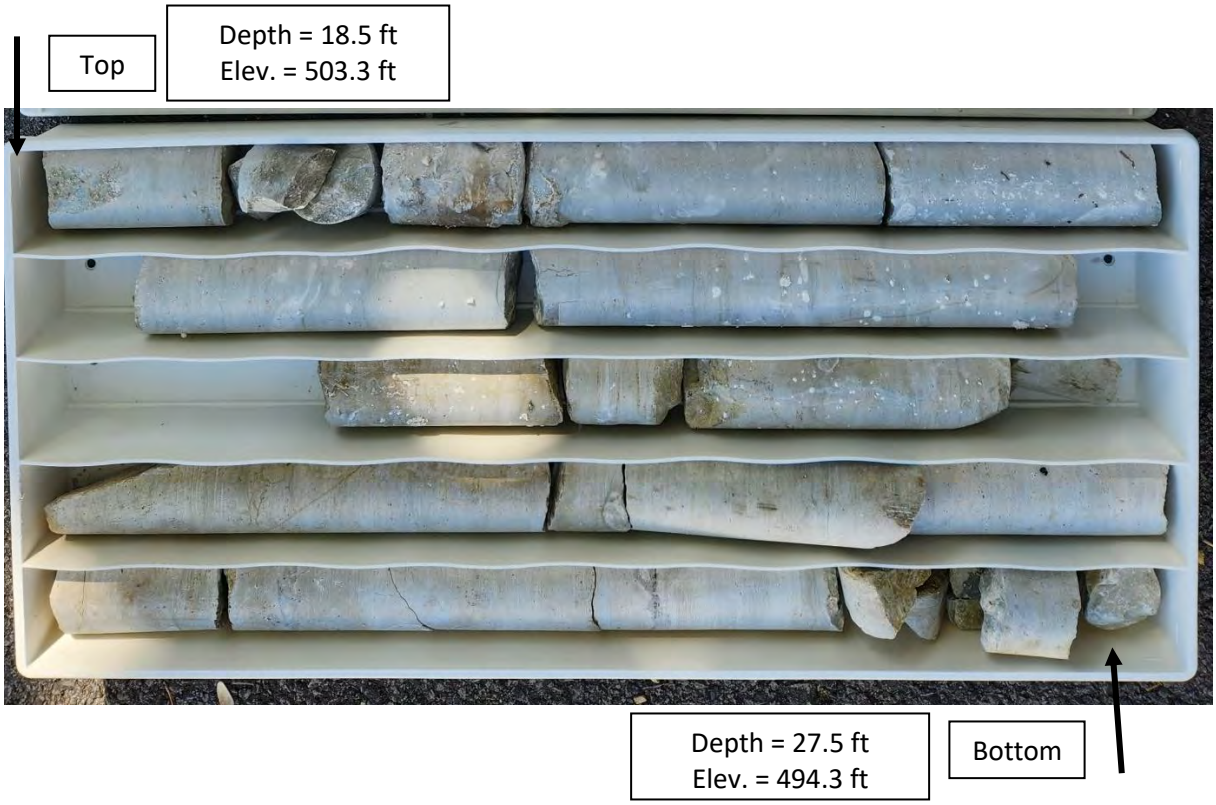
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				3 inches of Asphalt 521.52
				Light Gray, Moist FILL: SAND AND GRAVEL 520.77
	9			
	11		12	Brown, Moist FILL: SANDY CLAY LOAM, with gravel
	7			
				518.27
	2			Loose to Extremely Dense Brown and Light Brown, Dry to Wet SAND, with gravel (SPG)
	5		6	
-5	3			
	2			
	9		4	
	7			
	7			
	5		19	
-10	7			
	10			
	30		5	
	50/3"			
	24			
	37		3	
-15	50/4"			
	50/2"			
			NR	
				Auger refusal at 18.5 feet 503.27
	50/1"			
			NR	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs
				Run 1: 18.5' - 27.5' Recovery: 99.1% RQD: 70.8% (Fair) *(continued)*
-25				
				494.27
				Light Gray LIMESTONE, moderately weathered, moderately fractured, some vugs
-30				Run 2: 27.5' - 33.5' Recovery: 82.6% RQD: 56.9% (Fair)
				488.27
				End of Boring
-35				
-40				

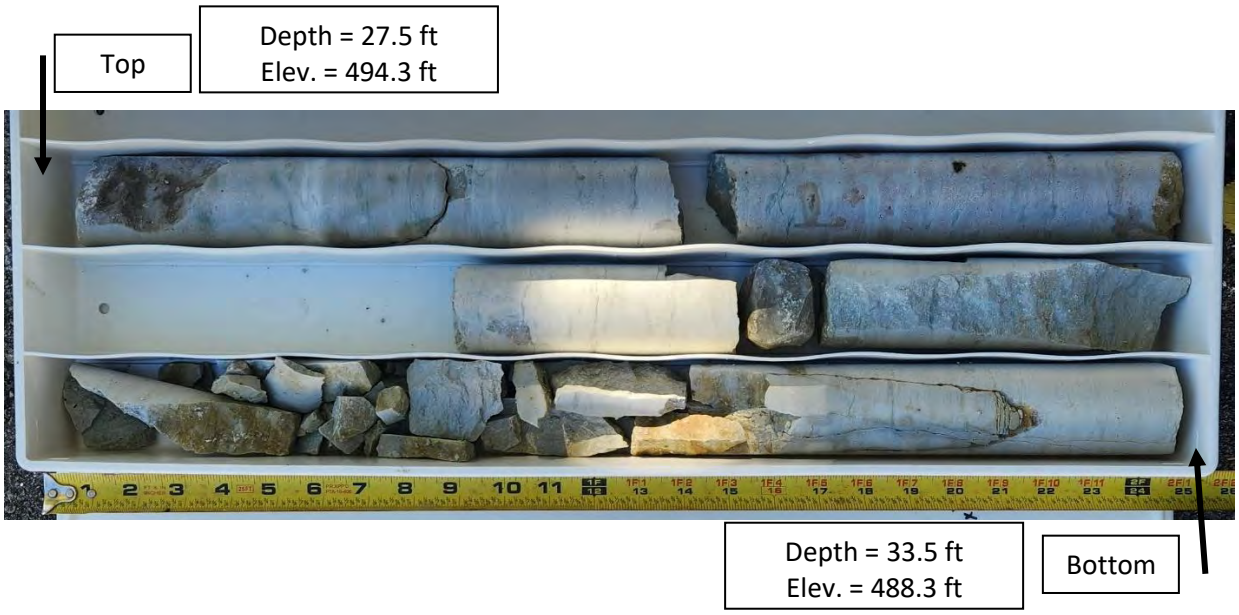
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 EB over Des Plaines River
Boring Number: BSB-27
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-27	1	18.5’ – 27.5’	99.1	70.8	Fair	25.0 / 13,002	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-27
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-27	2	27.5’ – 33.5	82.6	56.6	Fair	Light Gray Limestone Moderately Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/9/25

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
Latitude , **Longitude**
DRILLING METHOD HSA **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-8325
Station

BORING NO. BSB-028
Station 58+38.17
Offset 102.13ft RT
Ground Surface Elev. 522.97 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
522.89				1 inch of Topsoil
	2			Dark Gray, Wet FILL: SAND, with gravel, trace clay, trace brick
	3 3		23	
519.47				
	3			Dense Gray, Wet SAND, with gravel (SP)
	10 38		18	
-5				
517.47				Auger refusal at 5.5 feet
				HEAVILY WEATHERED LIMESTONE
-10				
512.47				Gray LIMESTONE, slightly weathered, slightly to moderately fractured Run 1: 10.5' - 15.5' Recovery: 94.2% RQD: 69.2% (Fair)
-15				
507.47				Gray LIMESTONE, slightly weathered, slightly fractured Run 2: 15.5' - 25.5' Recovery: 95.4% RQD: 86.3% (Good)
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Gray LIMESTONE, slightly weathered, slightly fractured Run 2: 15.5' - 25.5' Recovery: 95.4% RQD: 86.3% (Good) *(continued)*
-25				
497.47				End of Boring
-30				
-35				
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-28
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-28	1	10.5'-15.5'	94.2	69.2	Fair	13/19,236	Gray Limestone Slightly Weathered, Slightly to Moderately Fractured

I-80 EB over Des Plaines River
Boring Number: BSB-28
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-28	2	15.5' – 25.5'	95.4	86.3	Good	18/8,703	Gray Limestone Slightly Weathered, Slightly Fractured

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/9/25

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 97.7
Latitude , **Longitude**

STRUCT. NO. 099-8309
Station

BORING NO. BSB-029
Station 59+68.11
Offset 100.33ft LT
Ground Surface Elev. 521.59 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
521.51				1 inch of Gravel
	3			Dark Gray and Brown, Moist to Very Moist FILL: SILTY CLAY, with gravel
	6 7		26	
517.59	6			
-5	50/3"		12	Very Dense Brown, Moist GRAVEL, with sand (GP)
516.09				Auger refusal at 5.5 feet
				Gray LIMESTONE, slightly to moderately weathered, moderately fractured Run 1: 5.5' - 15.5' Recovery: 100% RQD: 57.5% (Fair)
-10				
-15				
506.09				Gray LIMESTONE, slightly weathered, slightly fractured, trace chert Run 2: 15.5' - 20.5' Recovery: 95.8% RQD: 95.8% (Excellent)
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
501.09				End of Boring
-25				
-30				
-35				
-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)

I-80 WB over Des Plaines River
Boring Number: BSB-29
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-29	1	5.5'-15.5'	100	57.5	Fair	10/4,316	Gray Limestone Slightly to Moderately Weathered, Moderately Fractured

I-80 WB over Des Plaines River
Boring Number: BSB-29
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-29	2	15.5' – 20.5'	95.8	95.8	Excellent	15.5/20,408	Gray Limestone Slightly Weathered, Slightly Fractured, Trace Chert

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/18/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51165387, **Longitude** -88.08648757

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-30
Station 59+55.89
Offset 1.59ft RT
Ground Surface Elev. 521.77 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6 inches of Topsoil	521.27				
Brown, Wet FILL: SANDY LOAM, with gravel, trace organics			6 6 10		23
	518.27				
Very Dense Light Brown, Dry SAND, with gravel (SPG)		-5	11 27 40		4
			50/2"		
					NR
Auger refusal at 8.5 feet	513.27				
End of Boring			50/1"		
		-10			NR
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/19/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51141626, **Longitude** -88.08657338

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-31
Station 59+46.62
Offset 90.81ft RT
Ground Surface Elev. 523.33 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
522.83				6 inches of Topsoil
	6			Dark Gray, Moist to Very Moist FILL: SILTY CLAY, with gravel
	8 7		15	
	4			
-5	3 3	1.5 P	39	
517.33	7			
	15 10		7	Medium Dense to Extremely Dense Light Brown, Moist GRAVEL, with sand, trace clay seams (GPS)
	15			
513.33 -10	33 50/3"		8	Auger refusal at 10 feet
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 1: 10' - 20' Recovery: 100% RQD: 93% (Excellent)
-15				
503.33 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 2: 20' - 27' Recovery: 100% RQD: 93% (Excellent)
-25				
496.33				End of Boring
-30				
-35				
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-31
Will County, IL

Top

Depth = 10.0 ft
Elev. = 513.3 ft

Depth = 20.0 ft
Elev. = 503.3 ft

Bottom

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-31	1	10.0' – 20.0'	100.0	93.0	Excellent	13.0 / 18,637	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-31
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-31	2	20.0’ – 27.0’	100.0	93.0	Excellent	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/19/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51252787, **Longitude** -88.08878281

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-103
Station 52+75.49
Offset 185.28ft LT
Ground Surface Elev. 522.12 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Asphalt	521.70				
7 inches of Aggregate Subbase	521.12				
Light Brown, Moist			6		
FILL: SAND, with gravel, trace clay			7 7		5
	518.62				
Medium Dense			11		
Dark Brown, Moist			7		10
SAND, trace gravel (SP)		-5	7		
	516.12				
Very Dense	515.62		50/2"		
Light Brown, Dry					2
SAND, trace gravel (SP)					
Gray, Moist					
HIGHLY WEATHERED LIMESTONE					
	513.12		50/0.5"		
Auger refusal at 9 feet					NR
End of Boring		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/24/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51257197, **Longitude** -88.08796413

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 99.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-104
Station 54+91.69
Offset 246.82ft LT
Ground Surface Elev. 520.03 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

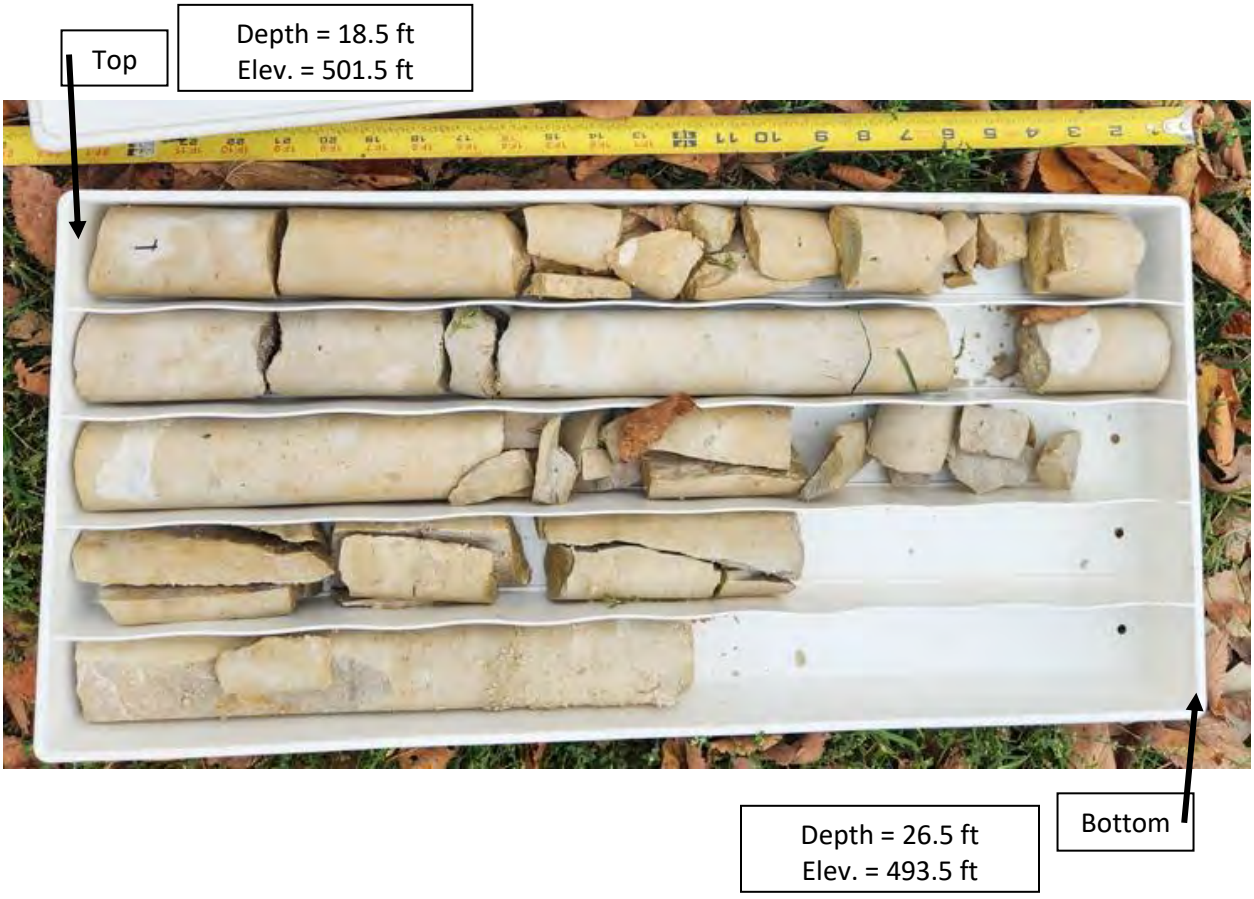
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				4 inches of Asphalt
				519.70
				8 inches of Aggregate Subbase
				519.03
	4			Dark Gray, Moist
	14		10	FILL: SILTY CLAY, with sand and
	40			gravel
				516.53
	7			Medium Dense to Very Dense
	10		6	Light Brown, Moist
-5	8			SAND, with gravel and cobbles
				(SPG)
	4			
	5		6	
	8			
	35			
	50/2"		NR	
-10				
	16			
	5		NR	
	12			
	20			
	17		5	
-15	17			
				504.03
	50/2"			Very Dense
			NR	Gray, Moist
				GRAVEL, with sand and cobbles
				(GPS)
				501.53
	50/2"			Auger refusal at 18.5 feet
			NR	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray
				LIMESTONE, moderately
				weathered, heavily fractured,
				some vugs
				Run 1: 18.5' - 26.5'
				Recovery: 100%
				RQD: 70% (Fair) *(continued)*
-25				
				493.53
				End of Boring
-30				
-35				
-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)

I-80 WB over Des Plaines River
Boring Number: BSB-104
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-104	1	18.5’ – 26.5’	100.0	70	Fair	21.5 / 14,275	Light Gray Limestone Moderately Weathered, Heavily Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/19/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51257437, **Longitude** -88.08735683

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-105
Station 56+54.33
Offset 281.66ft LT
Ground Surface Elev. 519.62 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Asphalt	519.21				
7 inches of Aggregate Subbase	518.62				
Gray, Moist to Wet			13		
FILL: SAND, with gravel			21		3
			10		
			11		
			11		5
		-5	4		
	513.62				
Clay seam at 6 feet			50/2"		
Gray, Moist					24
HIGHLY WEATHERED LIMESTONE					
Auger refusal at 8.5 feet	511.12				
End of Boring					
		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/18/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51161417, **Longitude** -88.08913642

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-106
Station 52+48.70
Offset 160.41ft RT
Ground Surface Elev. 518.95 **ft**

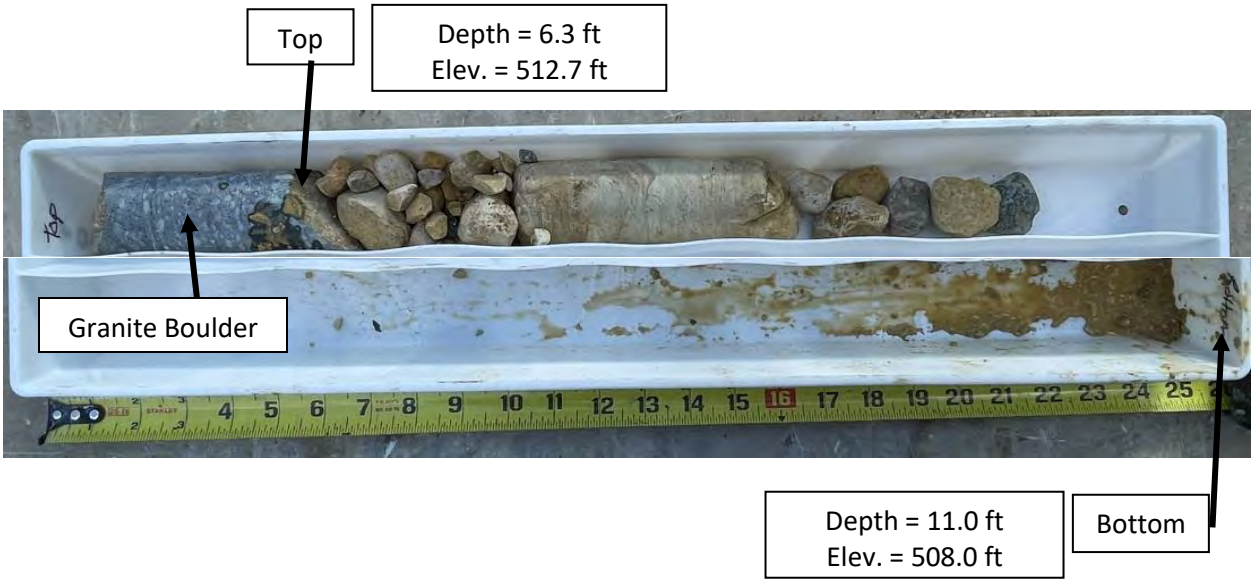
Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil 518.70				
Dark Brown, Moist FILL: SAND, with gravel, trace clay		10		
		15 18		11
516.45				
Medium Dense Light Brown and Brown, Dry to Moist SAND, with gravel (SPG)		8		
		10 19		5
	-5			
512.95				
Boulders and Cobbles 512.65		50/5"		
Light Gray LIMESTONE, heavily weathered, heavily fractured, some cobbles				5
Run 1: 6' - 11' Recovery: 30% RQD: 15% (Very Poor)	-10			
507.95				
Sand and gravel seam from 11 to 13 feet				
505.95				
Light Gray LIMESTONE, heavily weathered, heavily fractured, with cobbles				
Run 2: 13' - 16.5' Recovery: 14% RQD: 0% (Very Poor)	-15			
502.45				
End of Boring				
	-20			

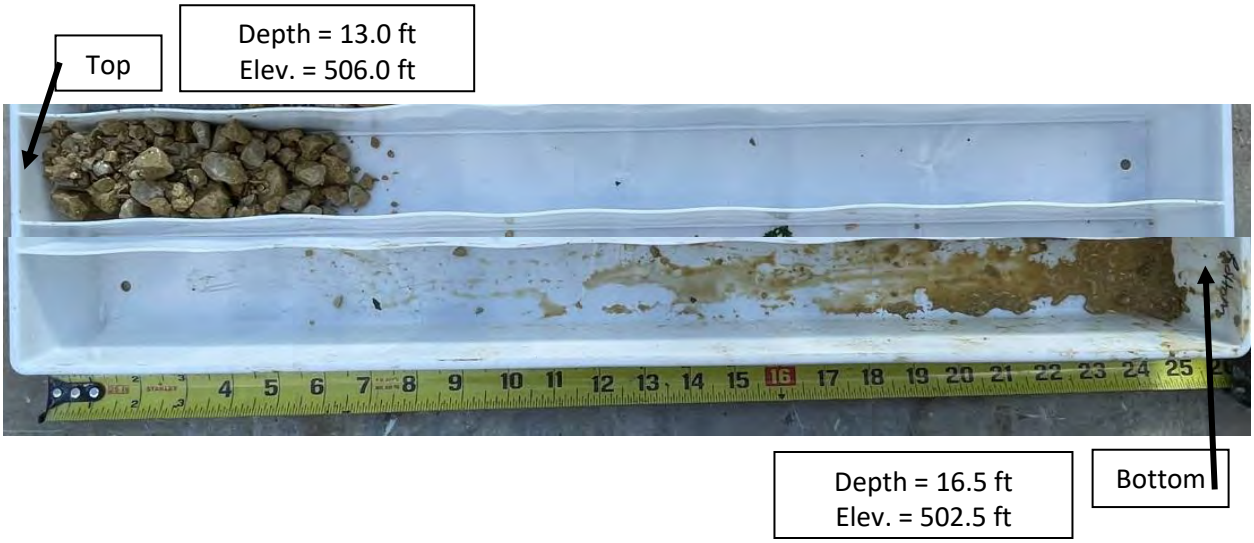
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-106
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) / Compressive Strength (psi)	Description
BSB-106	1	6.3' – 11.0'	25	9	Very Poor	9.0 / 9,467	Light Gray Limestone Heavily Weathered, Heavily Fractured, Some Cobbles

I-80 WB over Des Plaines River
Boring Number: BSB-106
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
BSB-106	2	13.0’ – 16.5’	14	0	Very Poor	Light Gray Limestone Heavily Weathered, Heavily Fractured, With Cobbles

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/20/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51163115, **Longitude** -88.08868351

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8325
Station

BORING NO. BSB-107
Station 53+68.86
Offset 129.06ft RT
Ground Surface Elev. 518.40 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Asphalt	518.07				
8 inches of Aggregate Subbase	517.40				
Brown, Moist			10		
FILL: SAND, with gravel			15		10
Clay seam at 1 foot			10		
	514.90				
Loose			10		
Brown, Dry			4		2
GRAVEL, with cobbles		-5	5		
			7		
			5		NR
			6		
Auger refusal at 8.5 feet	509.90				
End of Boring					
		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/19/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51196878, **Longitude** -88.08675258

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 95.5

STRUCT. NO. 099-8309
Station

BORING NO. BSB-108
Station 58+63.22
Offset 98.95ft LT
Ground Surface Elev. 521.87 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Asphalt	521.45				
7 inches of Aggregate Subbase	520.87				
Black, Very Moist			5		
FILL: SILTY CLAY, with gravel, trace sand			5 10	1.5 P	26
	518.37				
Medium Dense to Very Dense			11		
Brown, Moist			50/2"		6
SAND, with gravel		-5			
			9		
			6 5		9
			50/5"		
					10
Auger refusal at 10 feet	511.87	-10			
End of Boring					
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/11/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5124772, **Longitude** -88.0926067

COUNTY Will **DRILLING RIG** B-57 Mobile **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-8309
Station

BORING NO. BSB-109
Station 42+54.10
Offset 46.71ft RT
Ground Surface Elev. 533.95 ft

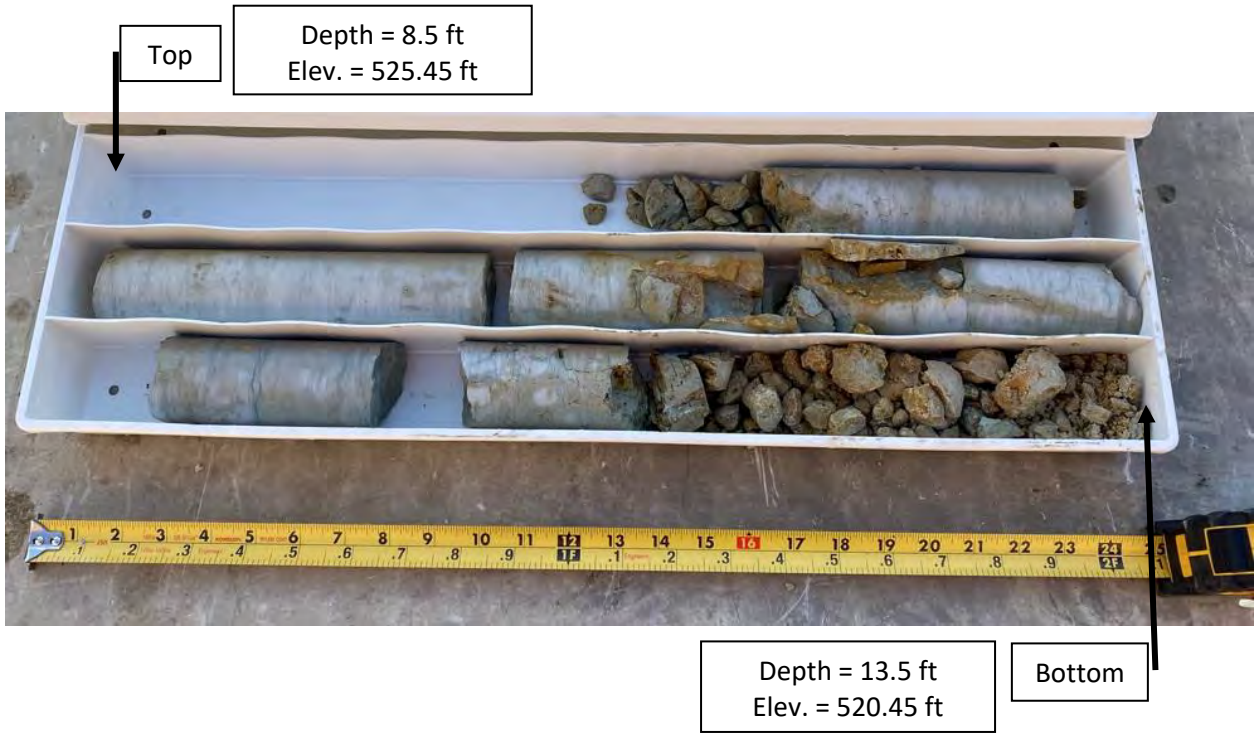
Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
7 inches of Concrete	533.37				
Dark Brown and Gray, Moist FILL: GRAVEL, with sand			9		
			12 7		8
	530.45				
Dark Brown and Gray, Very Moist FILL: SILTY CLAY, with sand and gravel			2		
			3 6	1.0 P	35
Cobbles at 3.5 feet	528.95	-5			
Very Dense Brown, Moist SAND, with gravel (SPG)			50/4"		
					9
	525.45				
Auger refusal at 8.5 feet			50/3"		
Light Gray LIMESTONE, heavily weathered, heavily fractured, some vertical fractures, some vugs		-10			6
Run 1: 8.5' - 13.5' Recovery: 100% RQD: 31.7% (Poor)					
	520.45				
End of Boring					
		-15			
		-20			

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)

I-80 EB over Des Plaines River
Boring Number: BSB-109
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-109	1	8.5’-13.5’	100	31.7	Poor	9.0 / 7,041	Light Gray Limestone Heavily Weathered, Heavily Fractured, Some Vertical Fractures, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/9/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5127175, **Longitude** -88.0923652

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-110
Station 43+00.92
Offset 52.51ft LT
Ground Surface Elev. 534.96 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
9 inches of Concrete	534.21				
6 inches of Aggregate Base Course	533.71		7		
Brown, Moist FILL: SILTY CLAY, trace gravel	~~533.54~~		10 8		19
Black and Dark Brown, Wet FILL: SILTY SAND, trace gravel, organics, and clay seams	530.96		5		
Dark Brown, Wet FILL: SILTY SAND, trace gravel, and metal fragments	530.14	-5	6 50/4"	0.5 P	24
Gray, Dry HIGHLY WEATHERED LIMESTONE			50/1"		NR
Auger refual at 8.75 feet	526.21		50/3"		2
End of Boring		-10			
		-15			
		-20			

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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/26/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51265354, **Longitude** -88.09163172

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8309
Station

BORING NO. BSB-201
Station 45+2.33
Offset 70.72ft LT
Ground Surface Elev. 516.76 ft

Surface Water Elev. 538.76 ft
Stream Bed Elev. 516.76 ft

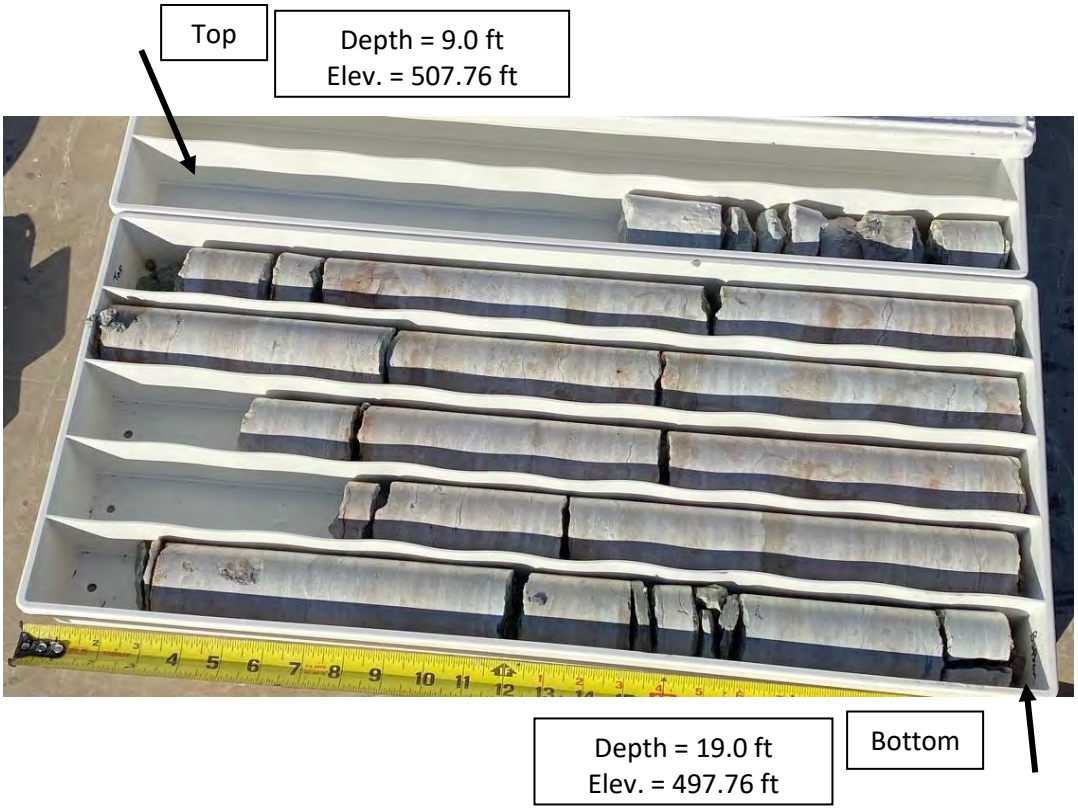
Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Soft to Medium Stiff Dark Gray, Very Moist SILTY CLAY (CL/ML)
	WH			
	WH WH	0.0 P	101	
	WH			
	WH 4	0.8 B	70	
511.76 -5				
				Medium Stiff Dark Gray, Very Moist SILTY CLAY, with gravel (CL/ML)
510.76	50/4"			
			17	Very Dense Gray, Wet WEATHERED LIMESTONE
507.76				
				Auger refusal at 9 feet
-10				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 1: 9' - 19' Recovery: 100% RQD: 70.8% (Fair) 1 inch clay seam at 9.5 feet
-15				
497.76				
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 2: 19' - 29' Recovery: 100% RQD: 76.6% (Good) *(continued)*
-25				
487.76				
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 3: 29' - 39' Recovery: 100% RQD: 65.0% (Fair)
-30				
-35				
477.76				
				End of Boring
-40				

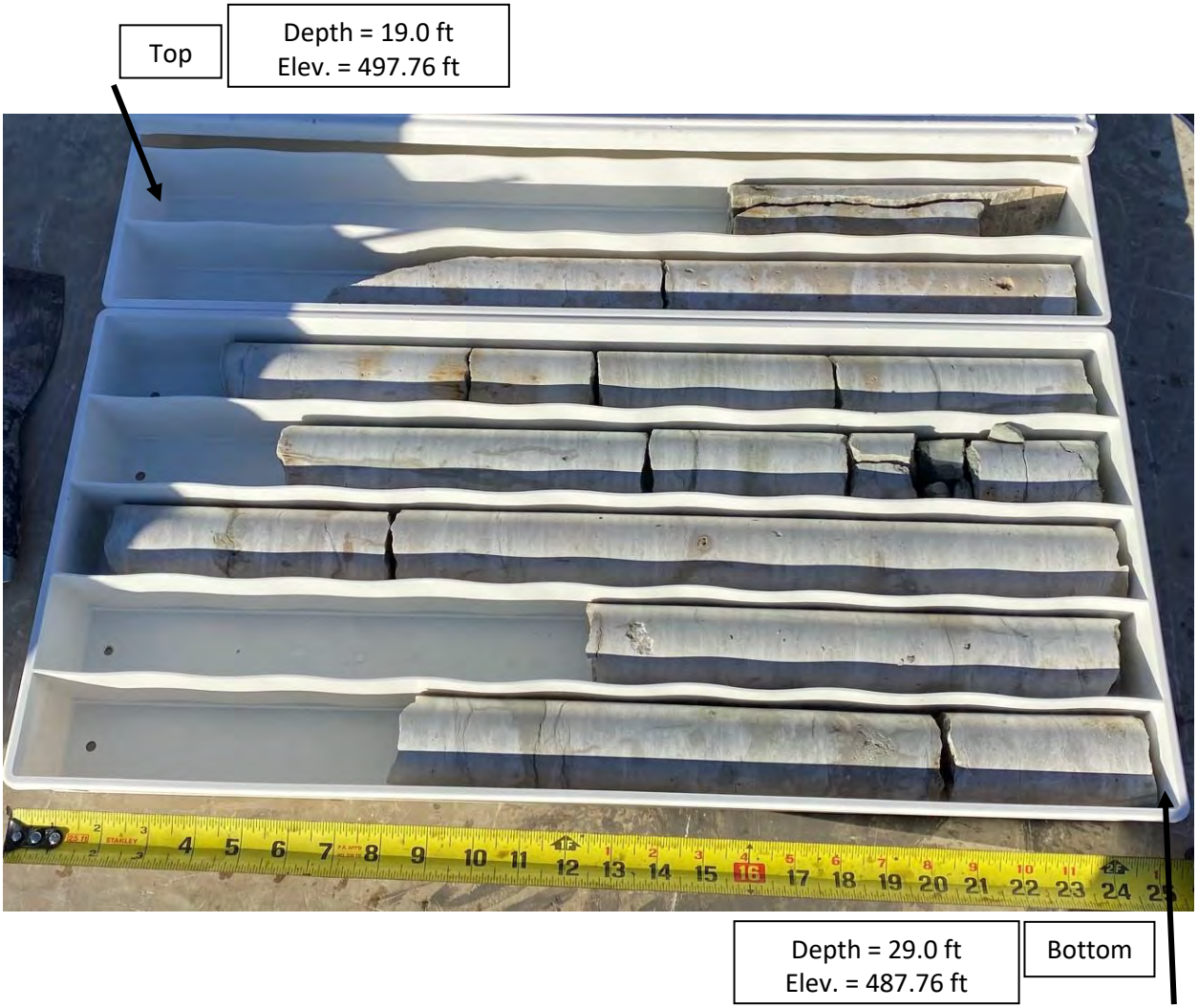
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-201
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-201	1	9’ – 19’	100	70.8	Fair	13.0/15,615	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-201
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-201	2	19’ – 29’	100	76.6	Good	25.0/14,996	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-201
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-201	3	29’ – 39’	100	65.0	Fair	35.0/13,903	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/27/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51250598, **Longitude** -88.09167086

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8309
Station

BORING NO. BSB-202
Station 45+2.82
Offset 15.90ft LT
Ground Surface Elev. 516.91 ft

Surface Water Elev. 538.66 ft
Stream Bed Elev. 516.91 ft

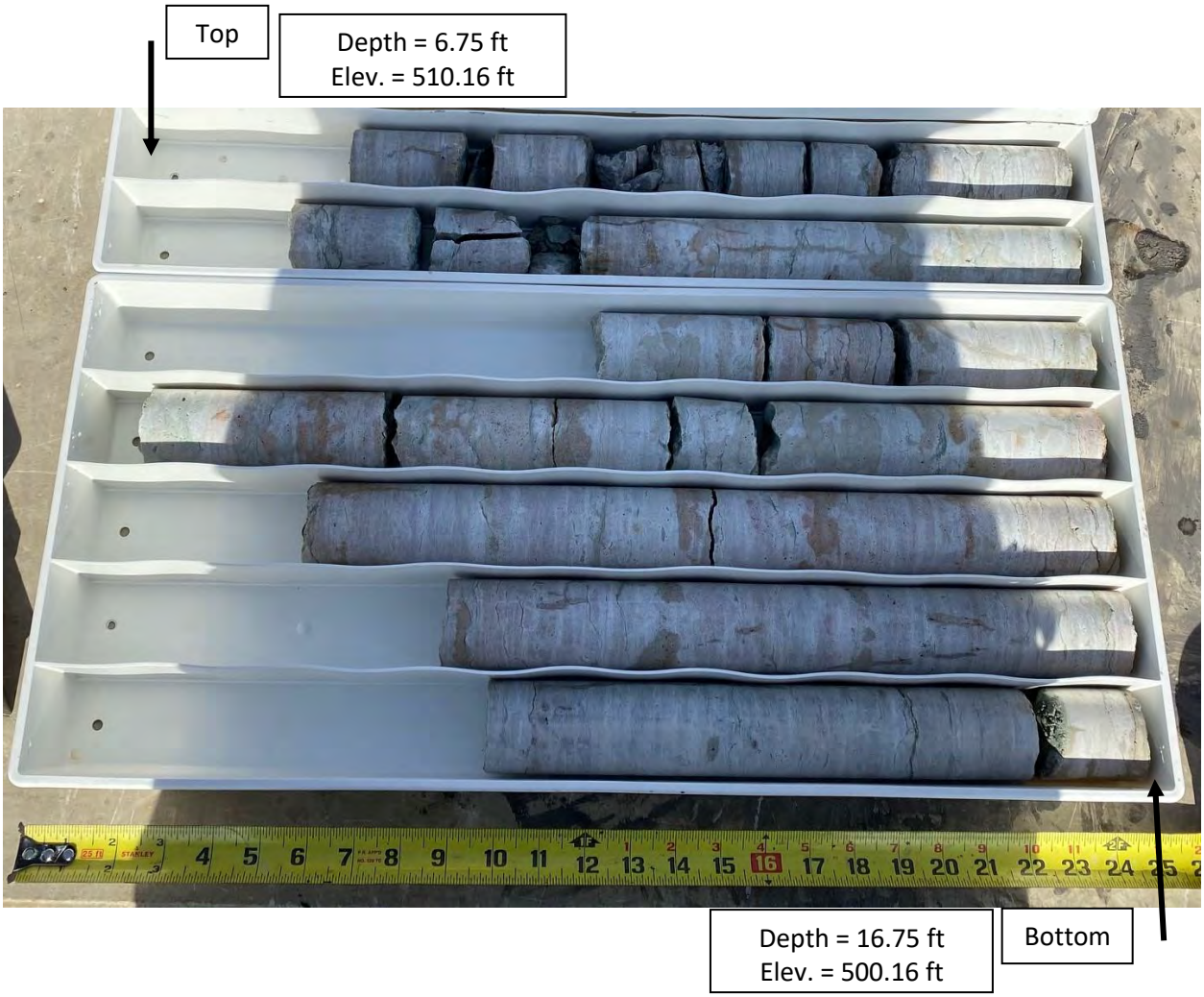
Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Stiff Dark Gray, Very Moist SILTY CLAY (CL/ML)
	WH			
	WH		99	
	WH			
	WH			
-5	WH	0.8	64	
	WH	B		
510.66	50/3"			
510.16			NR	Gray, Wet WEATHERED LIMESTONE Auger refusal at 6.75 feet
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 1: 6.75' - 16.75' Recovery: 100% RQD: 65% (Fair)
-10				
-15				
500.16				
				Light Gray LIMESTONE, moderately weathered, moderately fractured, some vugs Run 2: 16.75' - 26.75' Recovery: 95.8% RQD: 50.8% (Fair)
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Clay seam at 17.25 feet Light Gray LIMESTONE, moderately weathered, moderately fractured, some vugs Run 2: 16.75' - 26.75' Recovery: 95.8% RQD: 50.8% (Fair) *(continued)*
-25				
490.16				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 3: 26.75' - 36.75' Recovery: 100% RQD: 76.3% (Good)
-30				
-35				
480.16				End of Boring
-40				

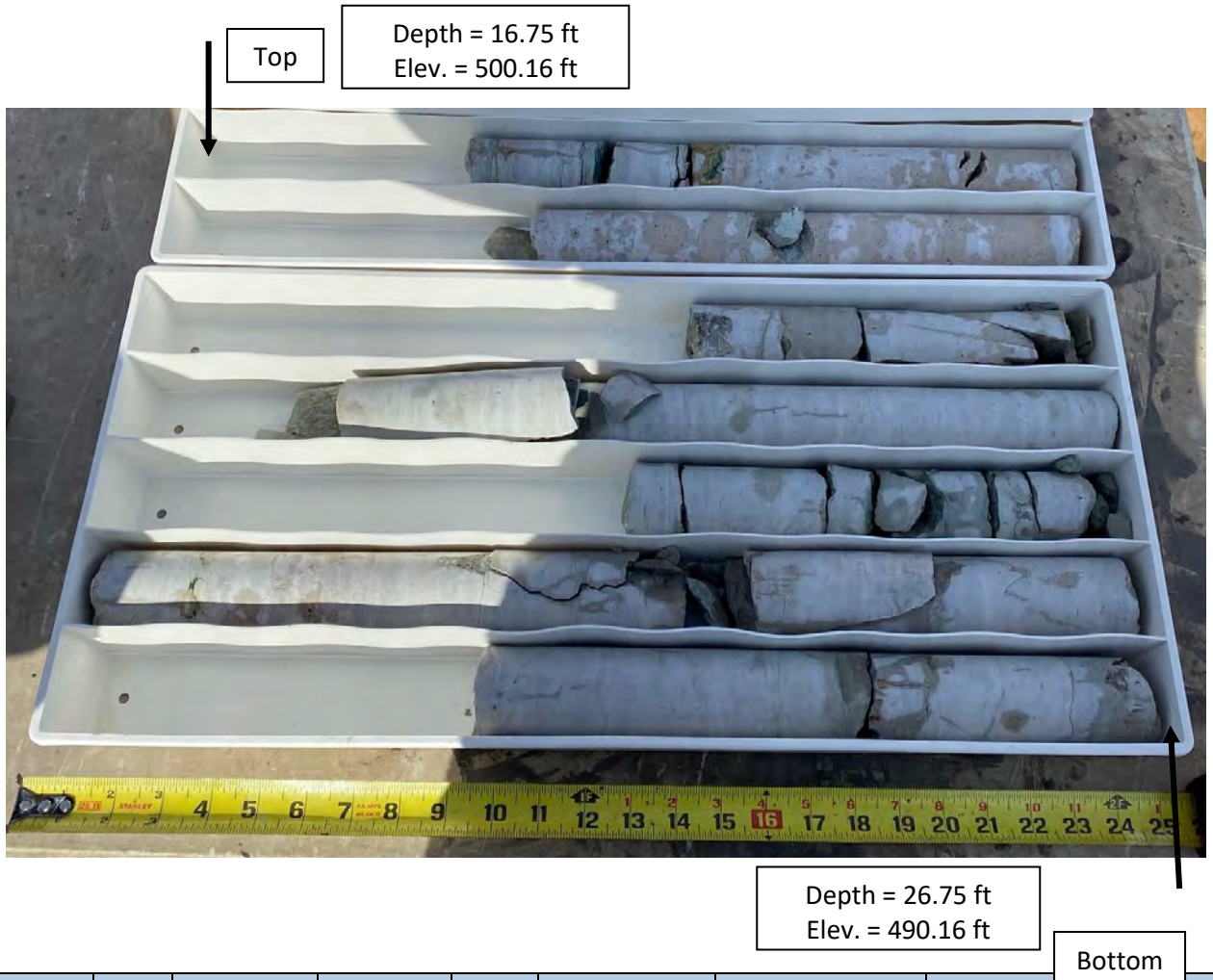
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-202
Will County, IL



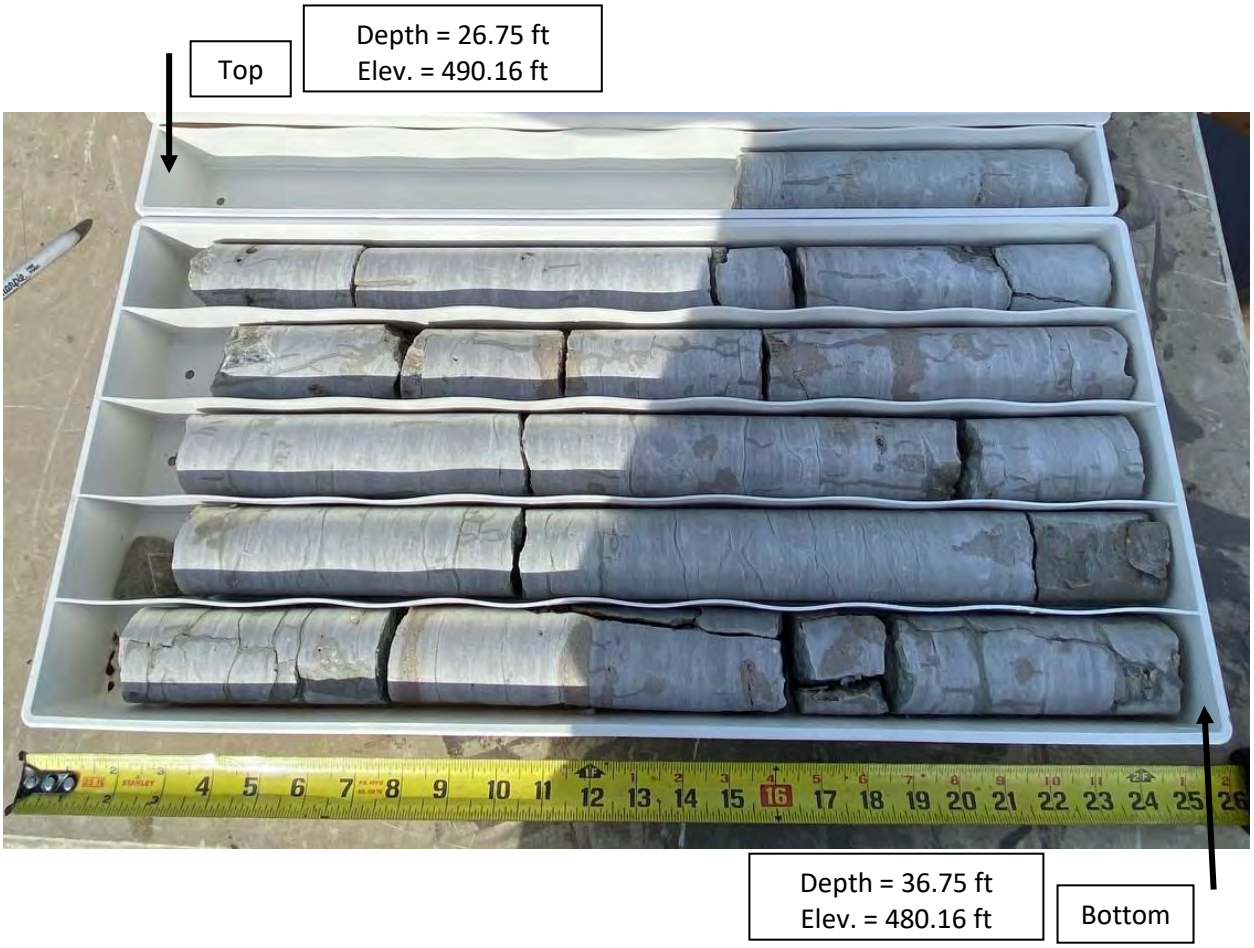
Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-202	1	6.75' – 16.75'	100.0	65.0	Fair	9.5/9,053	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-202
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-202	2	16.75'–26.75'	95.8	50.8	Fair	25.75/14,160	Light Gray Limestone Moderately Weathered, Moderately Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-202
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-202	3	26.75'–36.75'	100.0	76.3	Good	32.75/16,491	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/1/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51242703, **Longitude** -88.09013271

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8309
Station

BORING NO. BSB-203
Station 49+21.08
Offset 73.79ft LT
Ground Surface Elev. 511.82 ft

Surface Water Elev. 538.82 ft
Stream Bed Elev. 511.82 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
510.82				Dark Gray and Black, Very Moist SILTY CLAY, trace gravel (CL/ML)
510.32	50/2"			Gray, Wet WEATHERED LIMESTONE Auger refusal at 1.5 feet
			84	Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 1: 1.5' - 11.5' Recovery: 100% RQD: 72% (Fair)
-5				
-10				
500.32				Light Gray LIMESTONE, moderately weathered, heavily fractured, some vugs Run 2: 11.5' - 21.5' Recovery: 100% RQD: 65.4% (Fair)
-15				
-20				
490.32				Light Gray LIMESTONE, moderately weathered, heavily fractured, some vugs Run 3: 21.5' - 31.5' Recovery: 100% RQD: 37.5% (Poor)
-25				
-30				
480.32				Light Gray LIMESTONE, moderately weathered, heavily fractured, some vugs Run 4: 31.5' - 41.5' Recovery: 100% RQD: 63.3% (Fair)
-35				
-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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/1/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51242703, **Longitude** -88.09013271

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8309
Station

BORING NO. BSB-203
Station 49+21.08
Offset 73.79ft LT
Ground Surface Elev. 511.82 **ft**

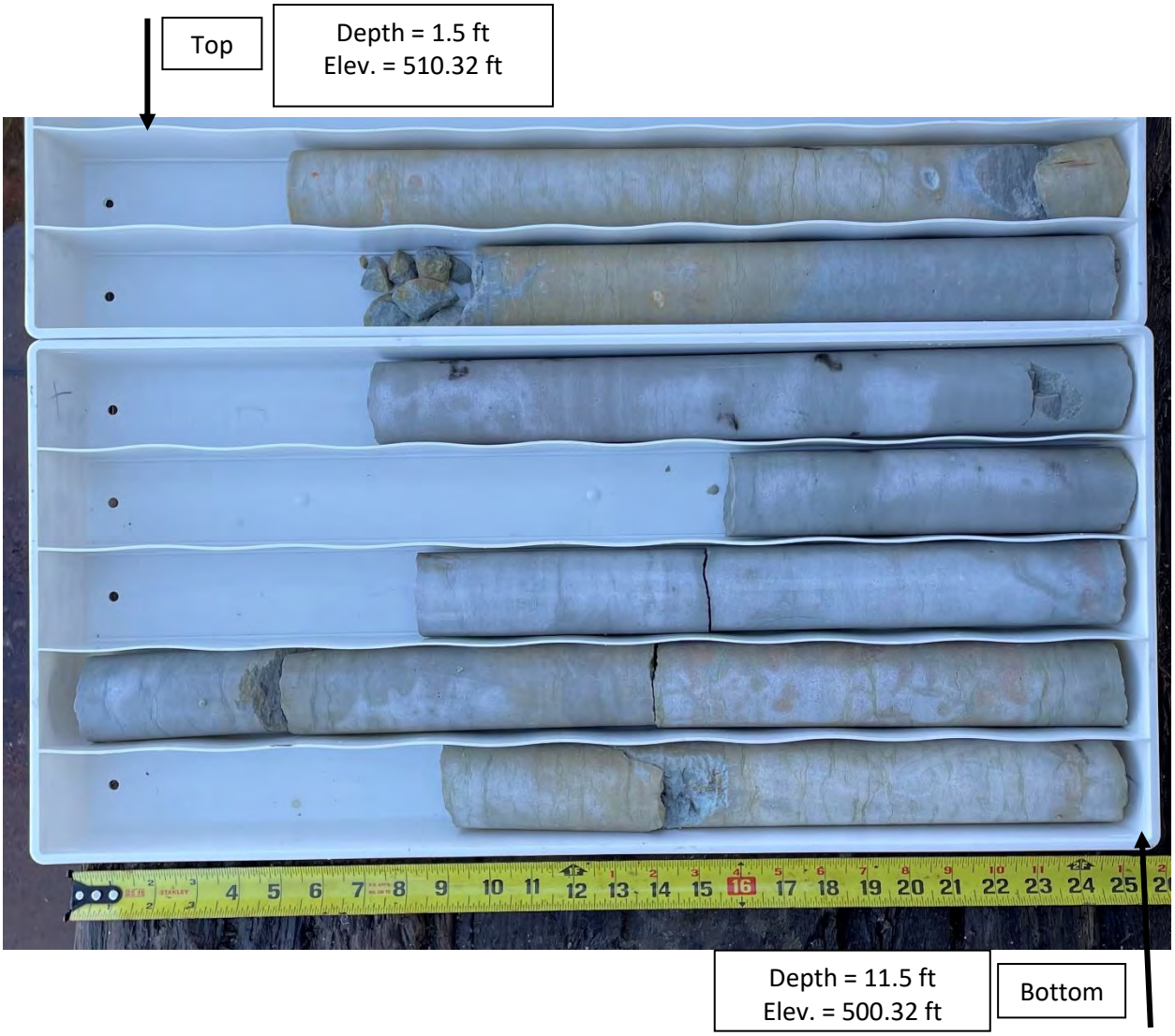
Surface Water Elev. 538.82 **ft**
Stream Bed Elev. 511.82 **ft**

Groundwater Elev.:
First Encounter N/A **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
470.32			
End of Boring			
-45			
-50			
-55			
-60			

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)

I-80 WB over Des Plaines River
Boring Number: BSB-203
Will County, IL

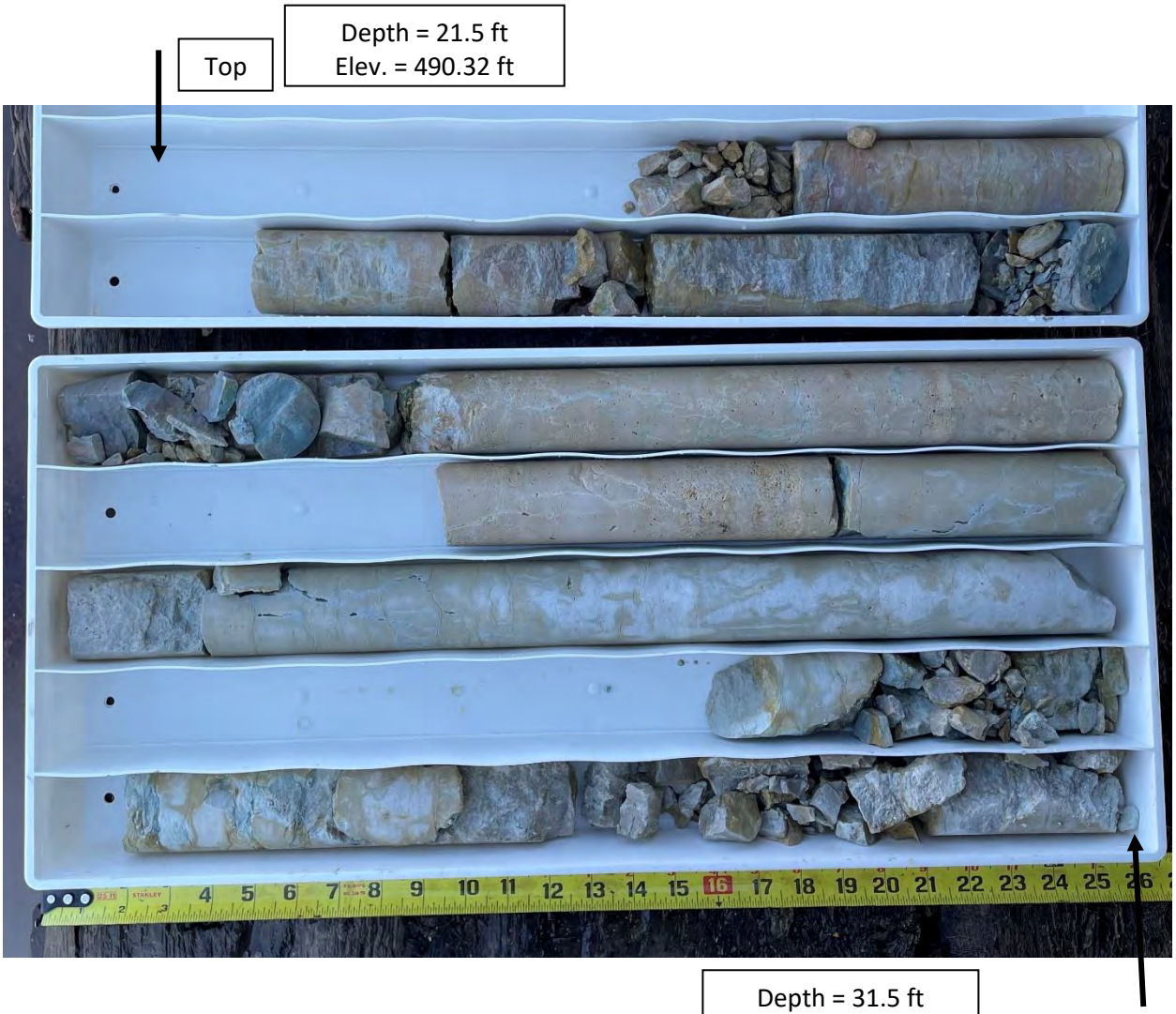


Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-203	1	1.5' – 11.5'	100.0	72.0	Fair	7.5/11,786	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-203
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-203	2	11.5'–21.5'	100.0	65.4	Fair	13.0/9,645	Light Gray Limestone Moderately Weathered, Heavily Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-203
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-203	3	21.5'–31.5'	100.0	37.5	Poor	25.5/10,188	Light Gray Limestone Moderately Weathered, Heavily Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-203
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-203	4	31.5'-41.5'	100.0	63.3	Fair	35.5/12,737	Light Gray Limestone Moderately Weathered, Heavily Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/3/22

ROUTE I-80 **DESCRIPTION** I-80 WB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51228169, **Longitude** -88.09020639

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8309
Station

BORING NO. BSB-204
Station 49+12.14
Offset 17.82ft LT
Ground Surface Elev. 512.54 ft

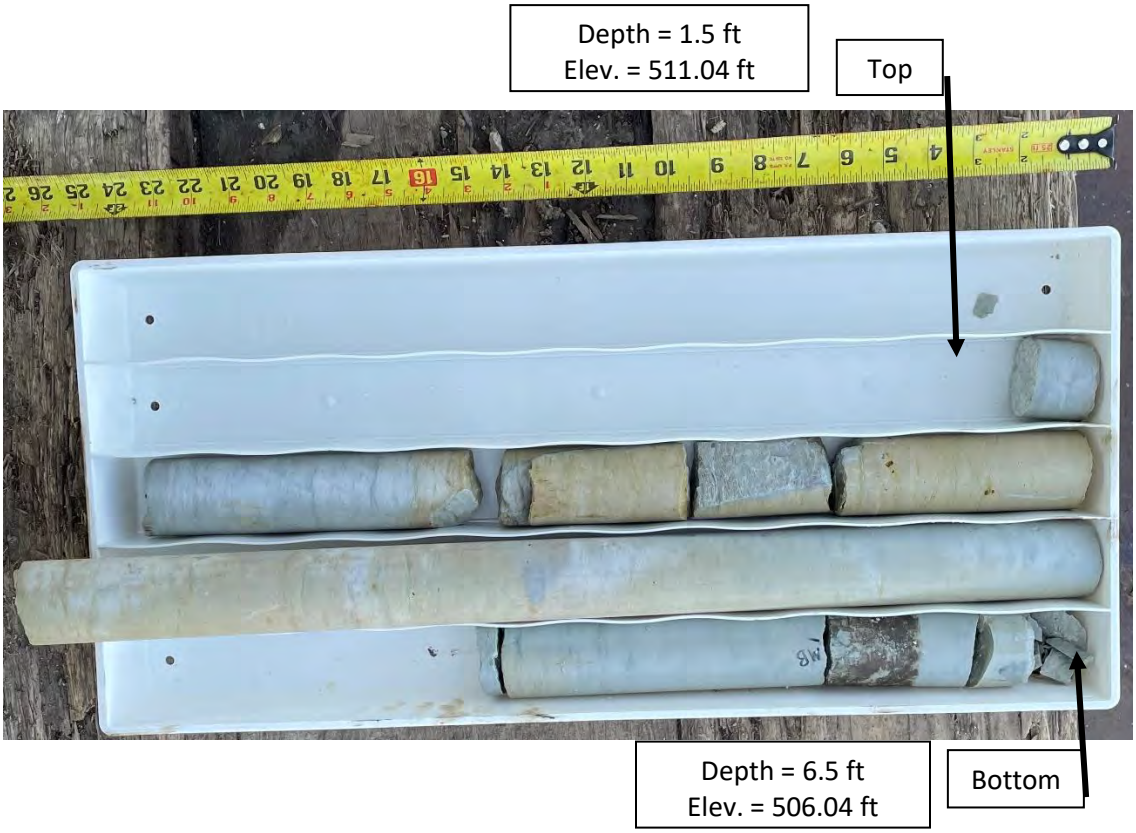
Surface Water Elev. 539.04 ft
Stream Bed Elev. 512.54 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Soft Dark Gray and Black, Very Moist SILTY CLAY (CL/ML)
511.04	WH			
	WH	0.0	122	Auger refusal at 1.5 feet
	WH	P		Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 1: 1.5' - 6.5' Recovery: 100% RQD: 90% (Excellent)
-5				
506.04				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 2: 6.5' - 11.5' Recovery: 85% RQD: 73% (Fair)
-10				
501.04				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 3: 11.5' - 21.5' Recovery: 100% RQD: 79% (Good)
-15				
-20				
491.04				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 4: 21.5' - 31.5' Recovery: 100% RQD: 67.5% (Fair)
-25				
-30				
481.04				End of Boring
-35				
-40				

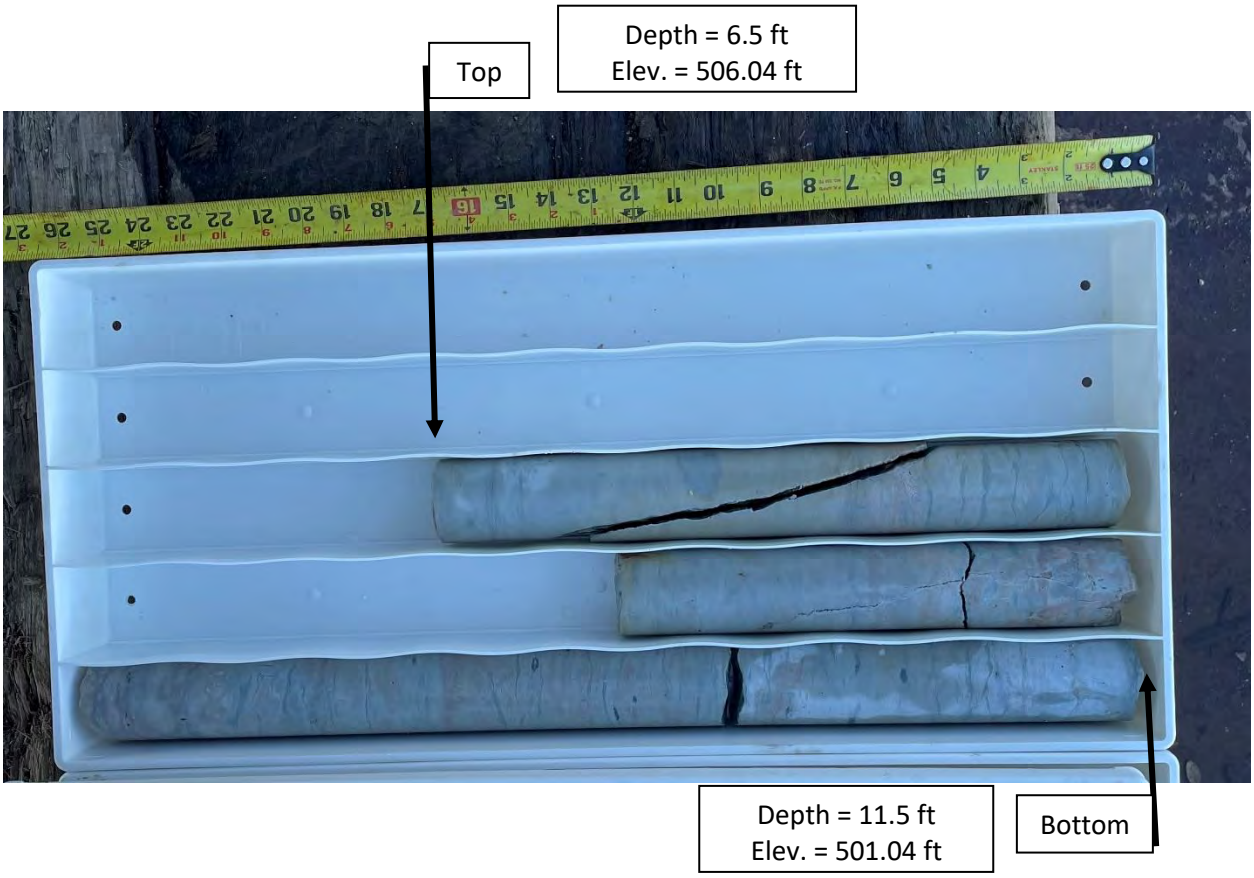
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

I-80 WB over Des Plaines River
Boring Number: BSB-204
Will County, IL



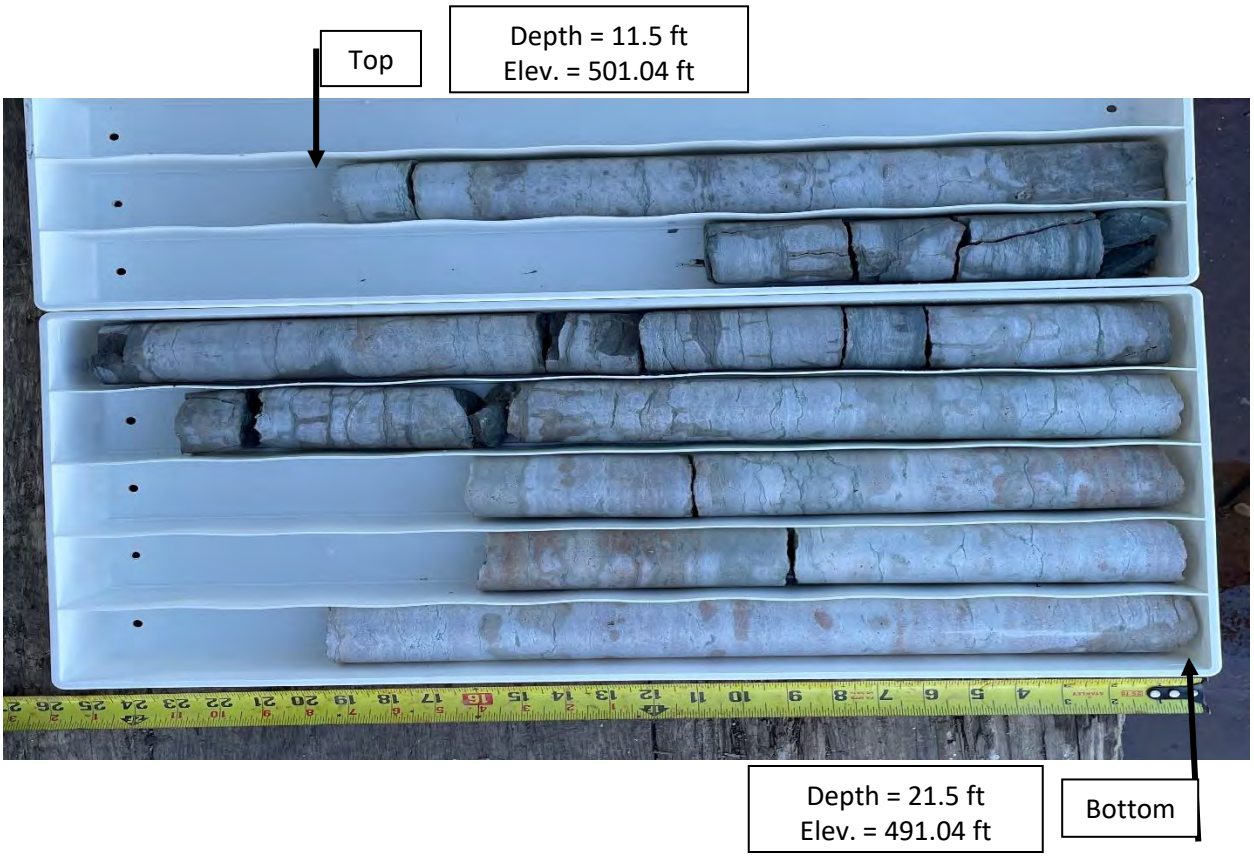
Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-204	1	1.5’ – 6.5’	100.0	90.0	Excellent	5.0/15,002	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-204
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-204	2	6.5’-11.5’	85.0	73.0	Fair	7.0/15,716	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-204
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft) /Compressive Strength (psi)	Description
BSB-204	3	11.5'–21.5'	100.0	79.0	Good	12.0/9,866	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 WB over Des Plaines River
Boring Number: BSB-204
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-204	4	21.5'-31.5'	100.0	67.5	Fair	28.0/9,400	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/28/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51240888, **Longitude** -88.09178768

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-205
Station 44+78.72
Offset 25.27ft RT
Ground Surface Elev. 519.32 ft

Surface Water Elev. 538.82 ft
Stream Bed Elev. 519.32 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

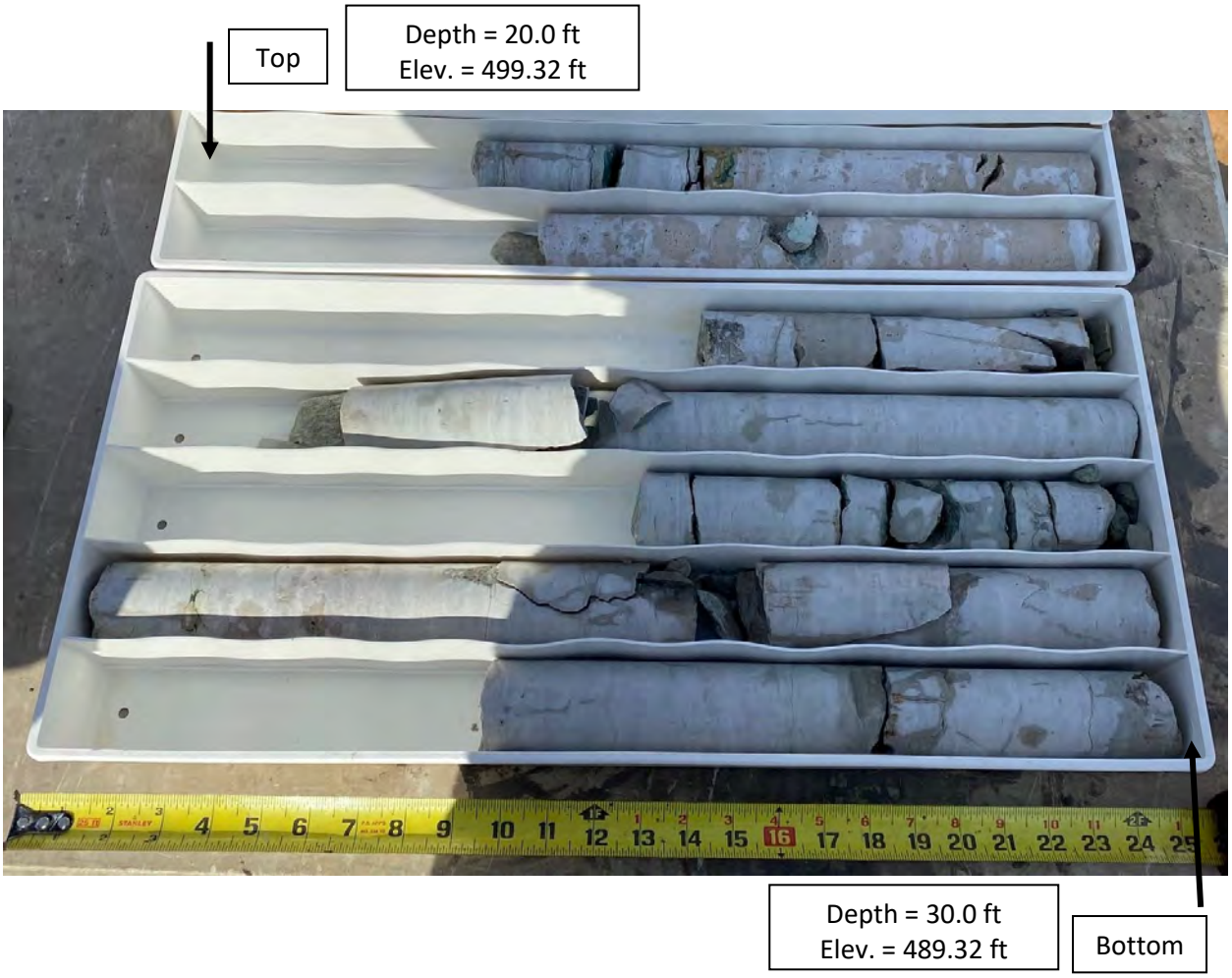
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Soft to Medium Stiff Dark Gray, Very Moist SILTY CLAY (CL/ML)
	WH			
	WH WH	0.2 P	103	
	WH			
	2 4	0.8 B	78	
514.32 -5				
				Medium Dense to Very Dense Gray, Moist to Wet GRAVEL, trace clay seams (GP)
	4			
	10 5		17	
	29			
	50/5"		12	
509.32 -10				
				Auger refusal at 10 feet
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs
				Run 1: 10' - 20' Recovery: 100% RQD: 75.0% (Fair)
-15				
				Clay seam at 19 feet
499.32 -20				
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
				Run 2: 20' - 30' Recovery: 100% RQD: 89.1% (Good)
-25				
489.32 -30				
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
				Run 3: 30' - 40' Recovery: 100% RQD: 85.4% (Good)
-35				
479.32 -40				
				End of Boring

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)

I-80 EB over Des Plaines River
Boring Number: BSB-205
Will County, IL

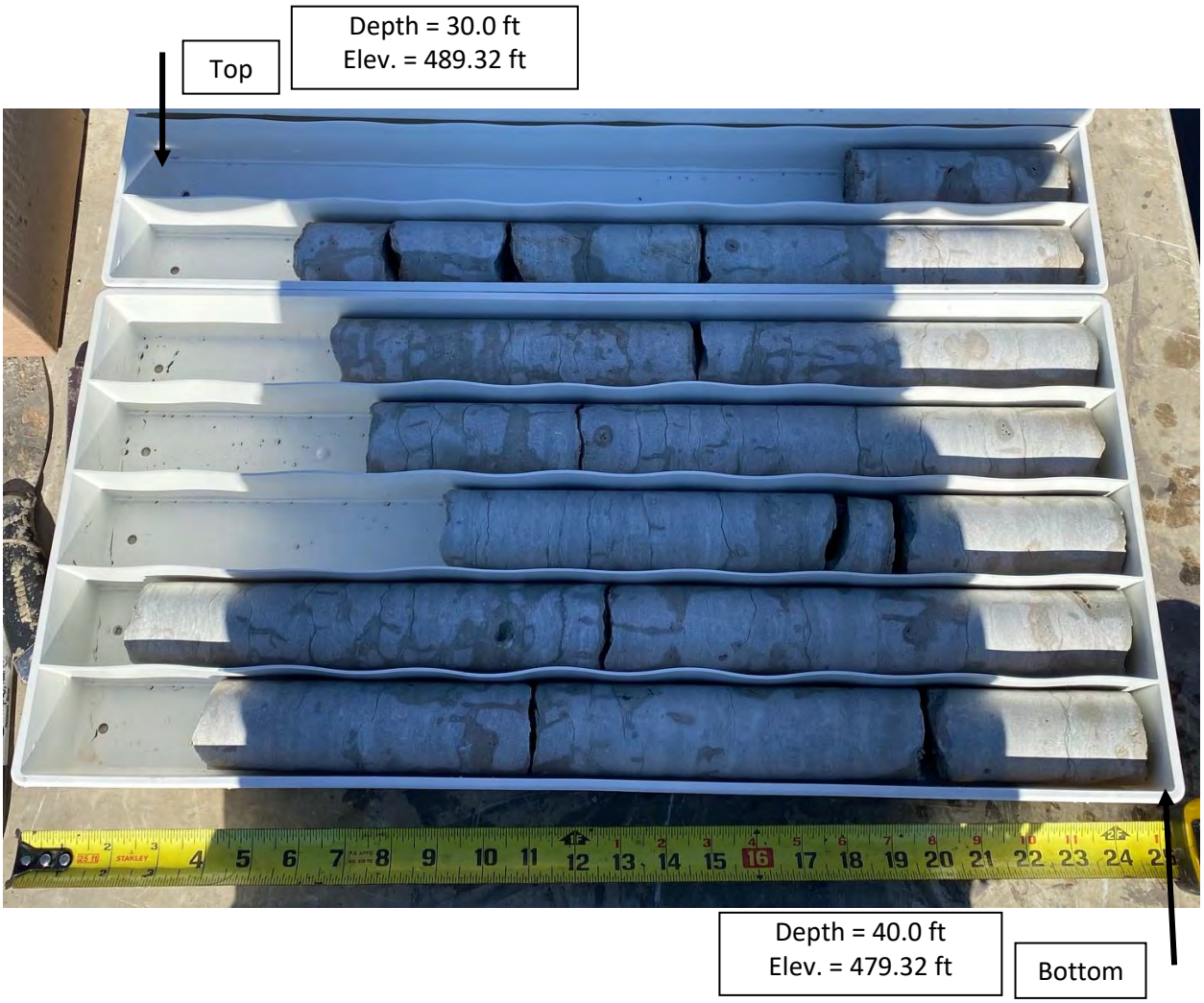
Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-205	1	10.0' – 20.0'	100.0	75.0	Fair	15.0/13,376	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-205
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-205	2	20.0'-30.0'	100.0	89.1	Good	24.0/14,166	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-205
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Depth (ft)/ Compressive Strength (psi)	Description
BSB-205	3	30.0'-40.0'	100.0	85.4	Good	39.0/11,557	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/31/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51229248, **Longitude** -88.09185124

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-206
Station 44+70.35
Offset 70.35ft RT
Ground Surface Elev. 519.72 ft

Surface Water Elev. 538.22 ft
Stream Bed Elev. 519.72 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Soft Dark Gray, Very Moist SILTY CLAY, trace debris (CL/ML)
	WH			
	11 7	0.4 B	98	
516.22				
	4			Medium Dense Light Gray, Wet GRAVEL (GP)
	5 6		19	
-5				
513.72				
	1			Loose to Very Dense Light Gray, Wet GRAVEL, with sand (GPS)
	3 3		24	
	3			
	50/5"		22	
-10				
509.22				
508.72				Gray, Wet WEATHERED LIMESTONE Auger refusal at 11 feet
	50/1"			
			NR	Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 1: 11' - 21' Recovery: 100% RQD: 72% (Fair)
-15				
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
498.72				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 2: 21' - 31' Recovery: 100% RQD: 74.5% (Fair)
-25				
-30				
488.72				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 3: 31' - 41' Recovery: 100% RQD: 82% (Good)
-35				
-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)

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 10/31/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51229248, **Longitude** -88.09185124

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-206
Station 44+70.35
Offset 70.35ft RT
Ground Surface Elev. 519.72 **ft**

Surface Water Elev. 538.22 **ft**
Stream Bed Elev. 519.72 **ft**

Groundwater Elev.:
First Encounter N/A **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
478.72			
End of Boring			
-45			
-50			
-55			
-60			

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)

I-80 EB over Des Plaines River
Boring Number: BSB-206
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-206	1	11.0' – 21.0'	100.0	72.0	Fair	17/7,281	Light Gray Limestone Slightly Weathered, Moderately Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-206
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-206	2	21.0'-31.0'	100.0	74.5	Fair	27.5/8,370	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-206
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-206	3	31.0'-41.0'	100.0	82.0	Good	39/6,839	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/4/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.51218307, **Longitude** -88.09031085

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-207
Station 48+91.48
Offset 23.20ft RT
Ground Surface Elev. 512.61 ft

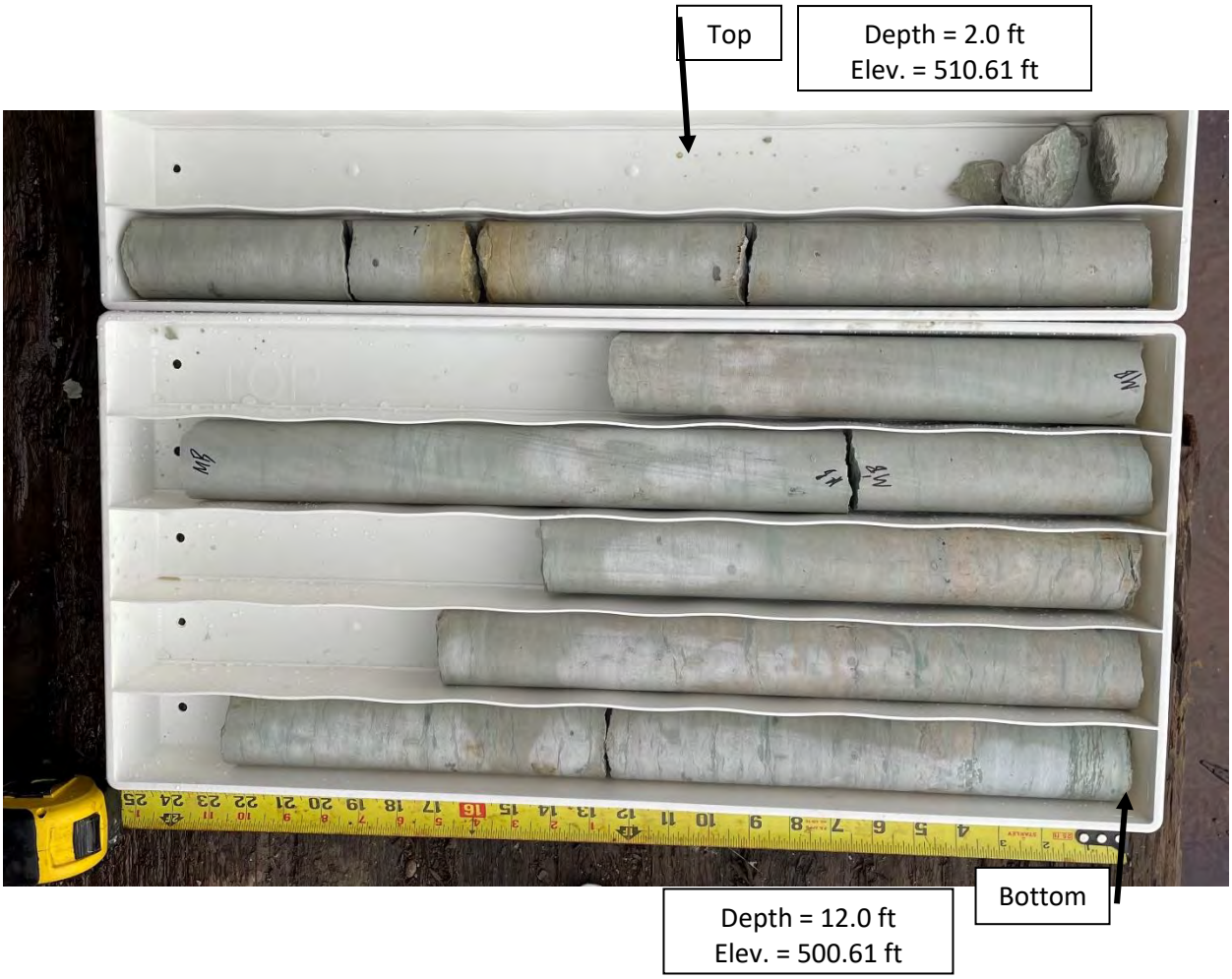
Surface Water Elev. 539.11 ft
Stream Bed Elev. 512.61 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Soft Dark Gray and Black, Very Moist SILTY CLAY (CL/ML)
	WH			
511.11				Auger refusal at 1.5 feet
	WH	0.0	106	
	WH	P		
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 1: 2' - 12' Recovery: 96% RQD: 88% (Good)
-5				
-10				
500.61				
				Light Gray LIMESTONE, slightly weathered, moderately fractured, some vugs Run 2: 12' - 22' Recovery: 100% RQD: 87.5% (Good)
-15				
-20				
490.61				
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs Run 3: 22' - 32' Recovery: 100% RQD: 81% (Good)
-25				
-30				
480.61				
				End of Boring
-35				
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-207
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-207	1	2.0'-12.0'	96.0	88.0	Good	8/15,016	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-207
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-207	2	12.0'-22.0'	100.0	87.5	Good	14/12,675	Light Gray Limestone Slightly Weathered, Moderatley Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-207
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-207	3	22.0'-32.0'	100.0	81.0	Good	28/7,611	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 11/2/22

ROUTE I-80 **DESCRIPTION** I-80 EB over Des Plaines River (CSX) **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude 41.5120369, **Longitude** -88.09039398

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 79.8

STRUCT. NO. 099-8325
Station

BORING NO. BSB-208
Station 48+80.07
Offset 79.99ft RT
Ground Surface Elev. 512.89 ft

Surface Water Elev. 538.89 ft
Stream Bed Elev. 512.89 ft

Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Soft Dark Gray and Black, Very Moist SILTY CLAY, trace organics (CL/ML)
	WH			
	WH	0.0	114	
	WH	P		
509.39				
	50/1"			Auger refusal at 3.5 feet
			NR	Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
-5				
				Run 1: 3.5' - 13.5' Recovery: 97.5% RQD: 82.5% (Good)
-10				
499.39				
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
-15				
				Run 2: 13.5' - 23.5' Recovery: 100% RQD: 87.5% (Good)
-20				

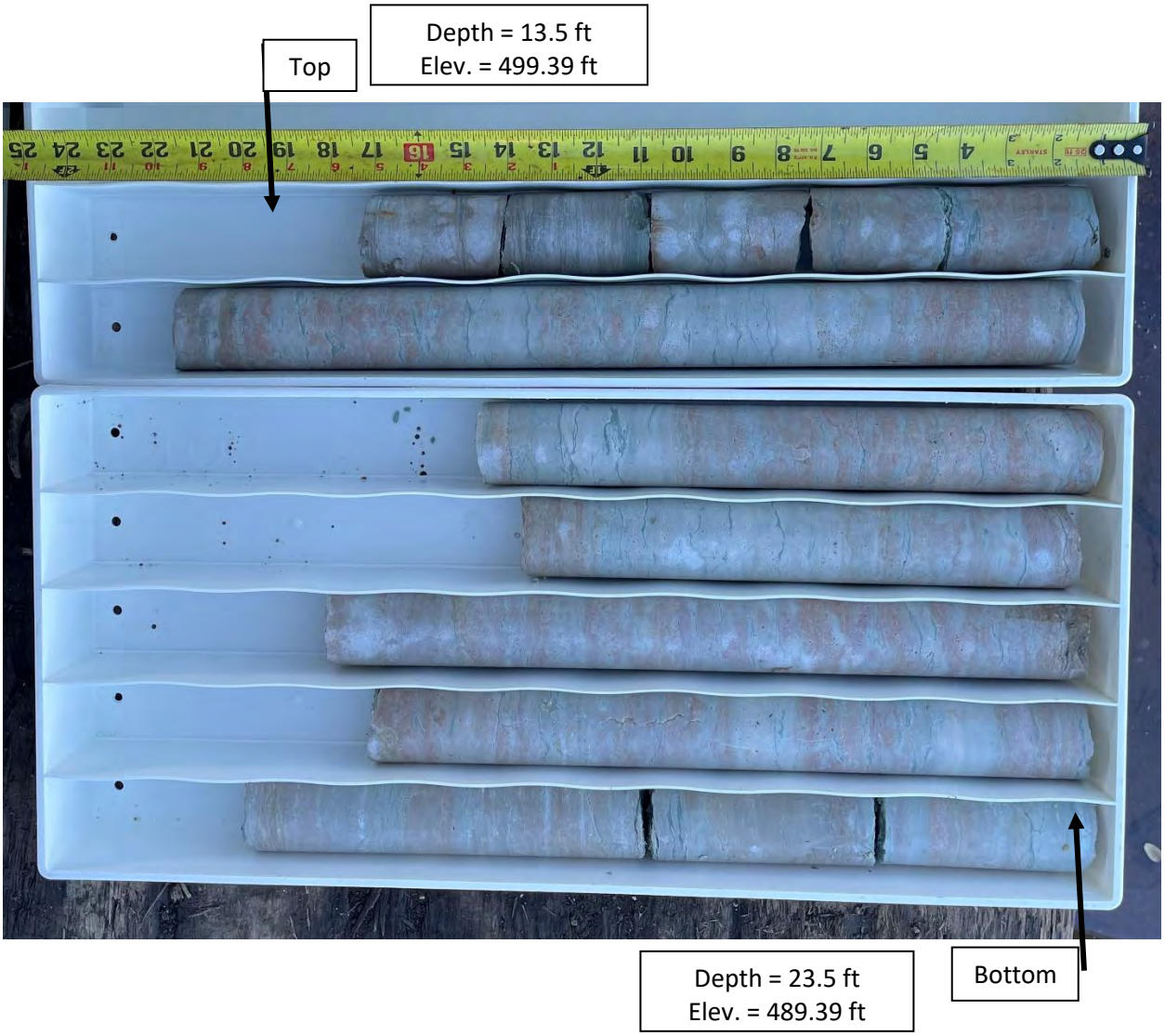
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
				Run 2: 13.5' - 23.5' Recovery: 100% RQD: 87.5% (Good) *(continued)*
489.39				
				Light Gray LIMESTONE, slightly weathered, slightly fractured, some vugs
-25				
				Run 3: 23.5' - 33.5' Recovery: 100% RQD: 84% (Good)
-30				
479.39				
				End of Boring
-35				
-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)

I-80 EB over Des Plaines River
Boring Number: BSB-208
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-208	1	3.5'-13.5'	97.5	82.5	Good	12.5/15,621	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-208
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-208	2	13.5'-23.5'	100.0	87.5	Good	19.5/12,216	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

I-80 EB over Des Plaines River
Boring Number: BSB-208
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
BSB-208	3	23.5'-33.5'	100.0	84.0	Good	30.5/13,666	Light Gray Limestone Slightly Weathered, Slightly Fractured, Some Vugs

APPENDIX D

LABORATORY TEST RESULTS

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-1		Bulk/Prep		MC/CS
Sample Depth (ft):	38		Tester:	TH	ID 2473
Lithological Description:	Limestone		Date:	07/08/25	Date: 07/08/25
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	3.4825	3.4680	3.4775	3.4760
Diameter, *in.*	1.9915	1.9990	1.9950	1.9952

Specimen Mass, *g*	481.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	168.8	1.74	

Moisture Condition - D2216

container, *g*	519.4
container + wet rock, *g*	994.7
container + dry soil, *g*	986.9
moisture content, *w%*	1.7

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

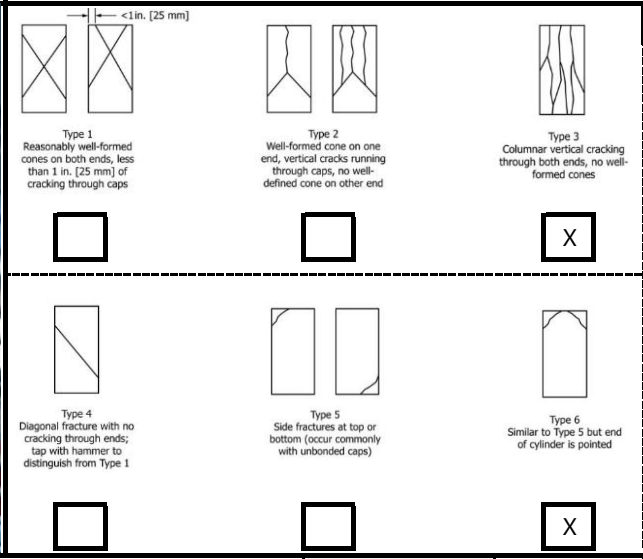
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 5 sec
Load @ Failure, *lbf*	23,262
Uniaxial Compressive Strength, *psi*	7,440

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ ☐ X

☐ ☐ X

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	Sam
Revision Date	8/25/2024	Review Date	10/29/24

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-1		Bulk/Prep		MC/CS
Sample Depth (ft):	44'		Tester:	TH	ID 2473
Lithological Description:	Limestone		Date:	07/08/25	Date: 07/08/25
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.6960	4.6760	4.6860	4.6860
Diameter, *in.*	2.0010	2.0045	2.0095	2.0050

Specimen Mass, *g*	648.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	167.1	2.34	

Moisture Condition - D2216

container, *g*	465.5
container + wet rock, *g*	1095.5
container + dry soil, *g*	1081.5
moisture content, *w%*	2.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

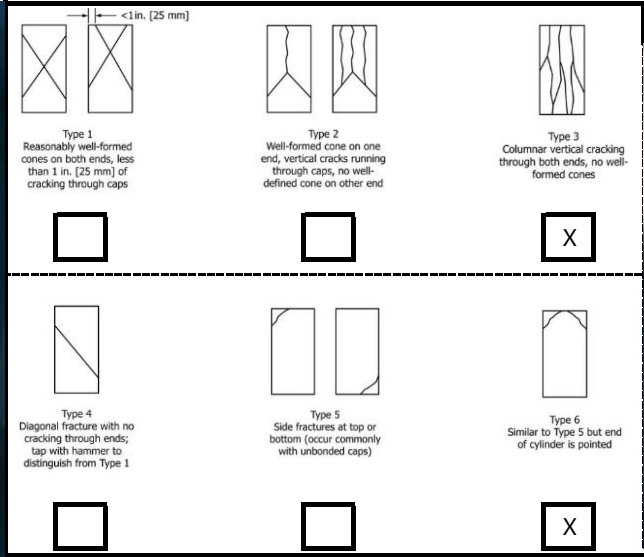
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 49 sec
Load @ Failure, *lbf*	38,727
Uniaxial Compressive Strength, *psi*	12,266

Remarks

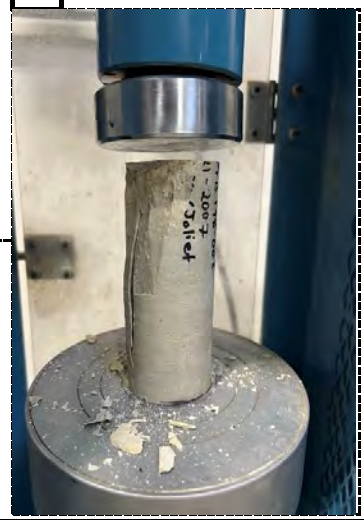
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	Sam
Revision Date	8/25/2024	Review Date	10/29/24

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-03		Bulk/Prep	MC/CS	
Sample Depth (ft):	9-10ft	Tester:	AR	ID	
Lithological Description:	Limestone	Date:	05/05/25	Date:	
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5730	4.5740	4.5760	4.574
Diameter, *in.*	1.7470	1.7590	1.7455	1.751

Specimen Mass, *g*	648.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	224.5	2.61	

Moisture Condition - D2216

container, *g*	468.5
container + wet rock, *g*	1036.5
container + dry soil, *g*	1035.5
moisture content, *w%*	0.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

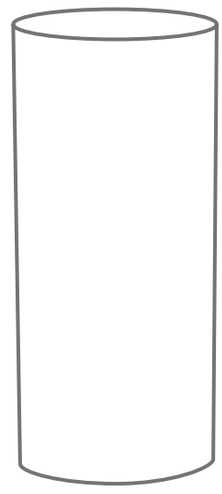
Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	
Time to Failure (2-15 min)	2 min 17 sec
Load @ Failure, *lbf*	38,393
Uniaxial Compressive Strength, *psi*	15,953

Remarks

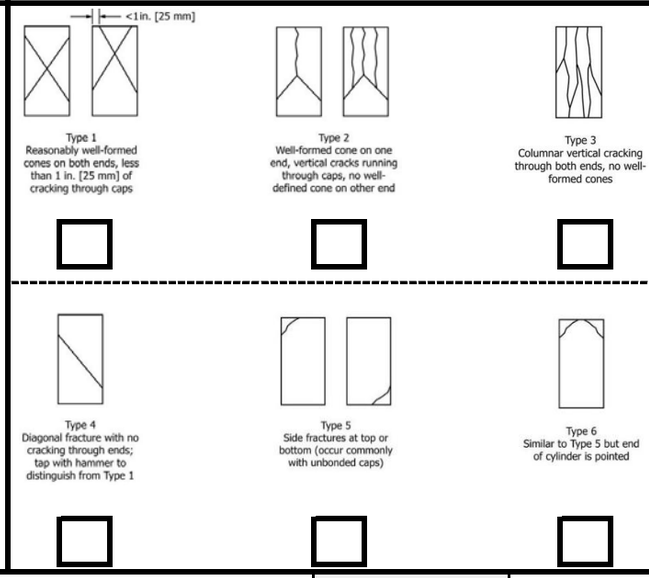
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

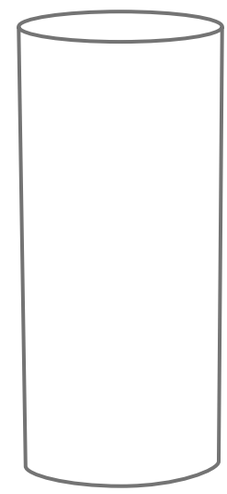
Sketch



After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-03		Bulk/Prep		MC/CS
Sample Depth (ft):	18-19		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.2740	4.2690	4.2550	4.266
Diameter, *in.*	1.7360	1.7340	1.7540	1.741

Specimen Mass, *g*	622.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	233.6	2.45	

Moisture Condition - D2216

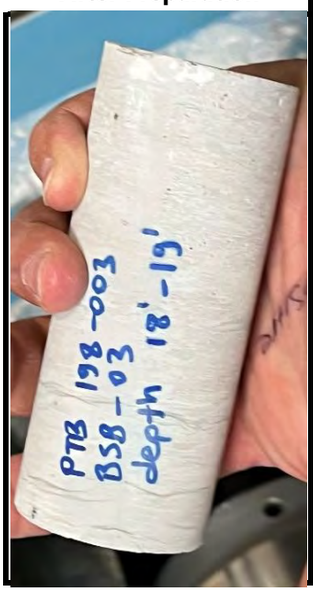
container, *g*	158.6
container + wet rock, *g*	492.3
container + dry soil, *g*	491.3
moisture content, *w%*	0.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

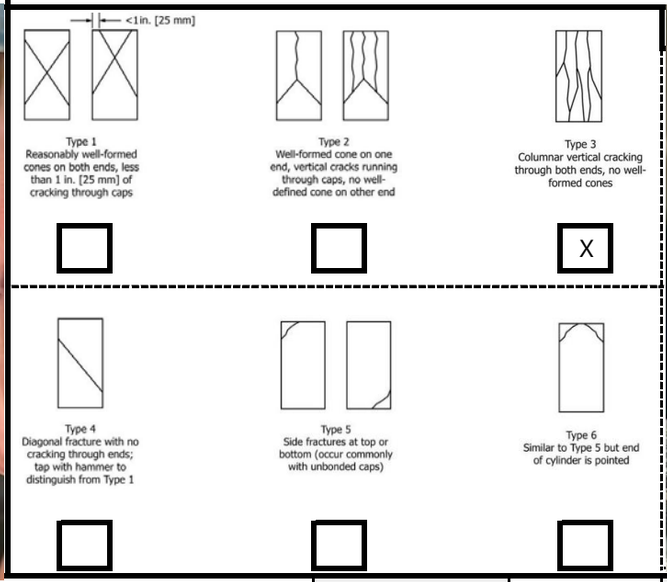
Axial Loading

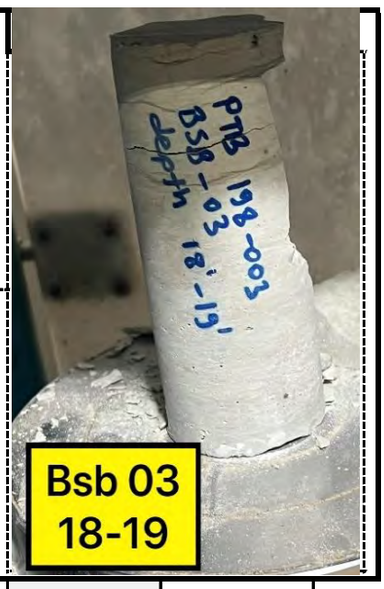
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)		
Time to Failure (2-15 min)	2 min 41 sec	
Load @ Failure, *lbf*	42,744	
Uniaxial Compressive Strength, *psi*	17,948	

After Preparation



After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Order # 940

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP 198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-5		Bulk/Prep		MC/CS
Sample Depth (ft):	7-7.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	10/25/22	Date: 10/25/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.6285	4.6400	4.6235	4.6307
Diameter, *in.*	1.9825	1.9760	1.9815	1.9800

Specimen Mass, *g*	633.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.2	2.34	

Moisture Condition - D2216

Container ID	SWEET
container, *g*	226.3
container + wet rock, *g*	684.1
container + dry soil, *g*	677.2
moisture content, *w%*	1.5

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?		X	Side Surface isn't Straight
Ends parallel to each other within 0.25 degrees?	X		

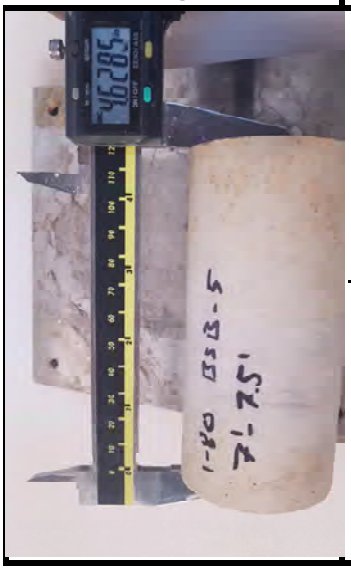
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 43 sec
Load @ Failure, *lbf*	52,650
Uniaxial Compressive Strength, *psi*	17,099

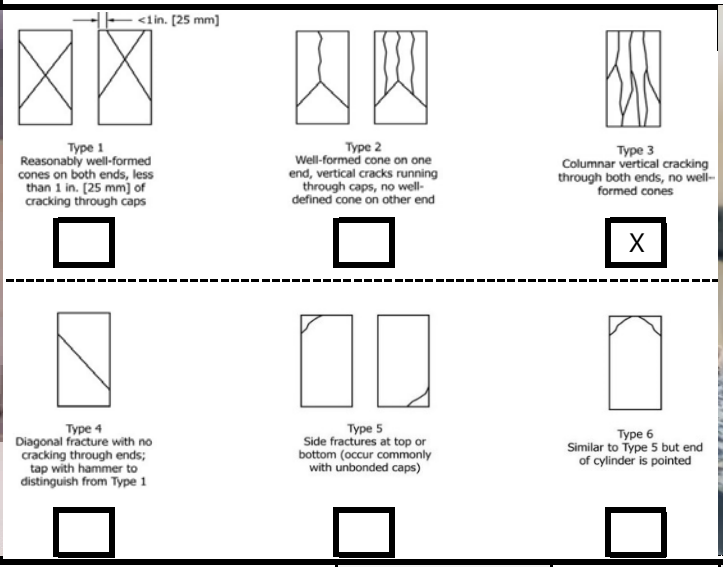
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-08		Bulk/Prep		MC/CS
Sample Depth (ft):	16.5-17.5	Tester:	AJ	Tester:	AJ
Lithological Description:	Limestone	Date:	11/14/22	Date:	11/14/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8595	4.8490	4.8475	4.8520
Diameter, *in.*	1.9870	1.9855	1.9845	1.9857

Specimen Mass, *g*	674.9	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.1	2.44	

Moisture Condition - D2216

Container ID	NERDS
container, *g*	226.2
container + wet rock, *g*	802.3
container + dry soil, *g*	793.7
moisture content, *w%*	1.5

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

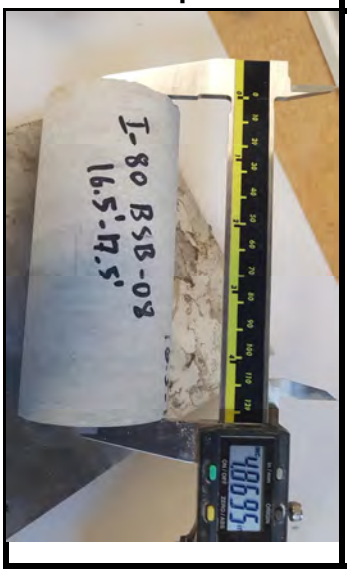
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 28 sec
Load @ Failure, *lbf*	35,245
Uniaxial Compressive Strength, *psi*	11,381

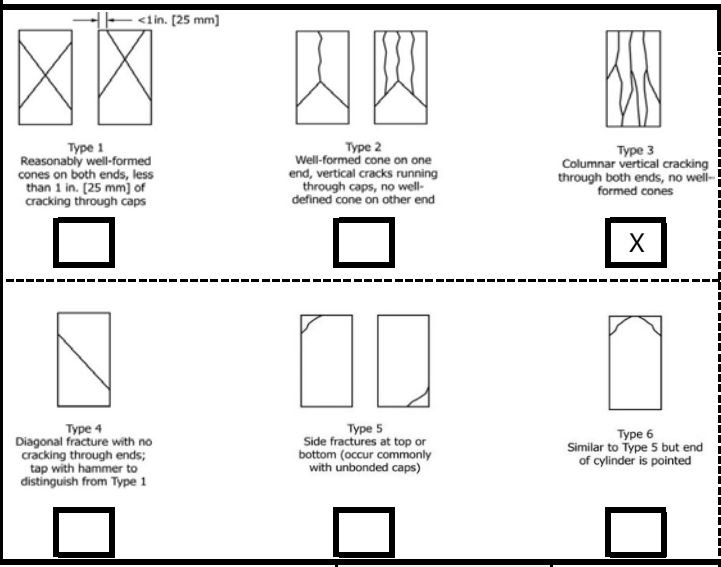
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	
Revision Date	10/21/2021	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	24-2019	
Boring ID:	BSB-15		Bulk/Prep		MC/CS
Sample Depth (ft):	6-7ft		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.4300	4.4200	4.4300	4.427
Diameter, *in.*	1.7200	1.1210	1.7215	1.521

Specimen Mass, *g*	628.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	297.8	2.91	

Moisture Condition - D2216

container, *g*	513.1
container + wet rock, *g*	1137.7
container + dry soil, *g*	1136.5
moisture content, *w%*	0.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	42
Time to Failure (2-15 min)	1 min 39 sec
Load @ Failure, *lbf*	15,493
Uniaxial Compressive Strength, *psi*	8,529

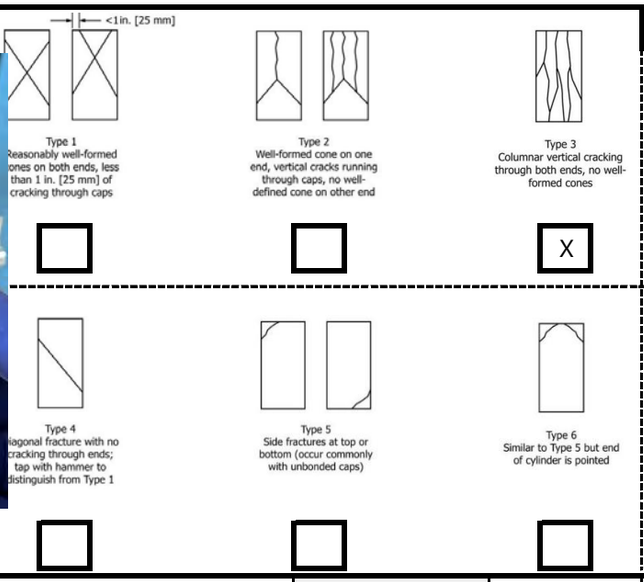
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

Sketch

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-15		Bulk/Prep		MC/CS
Sample Depth (ft):	14-15		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5230	4.4900	4.5300	4.514
Diameter, *in.*	1.7500	1.7220	1.7230	1.732

Specimen Mass, *g*	645.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	231.4	2.61	

Moisture Condition - D2216

container, *g*	513.6
container + wet rock, *g*	1131.7
container + dry soil, *g*	1131.0
moisture content, *w%*	0.1

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

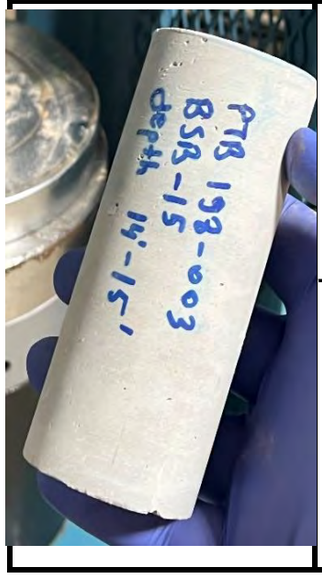
Axial Loading

Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	
Time to Failure (2-15 min)	1 min 24 sec
Load @ Failure, *lbf*	27,138
Uniaxial Compressive Strength, *psi*	11,523

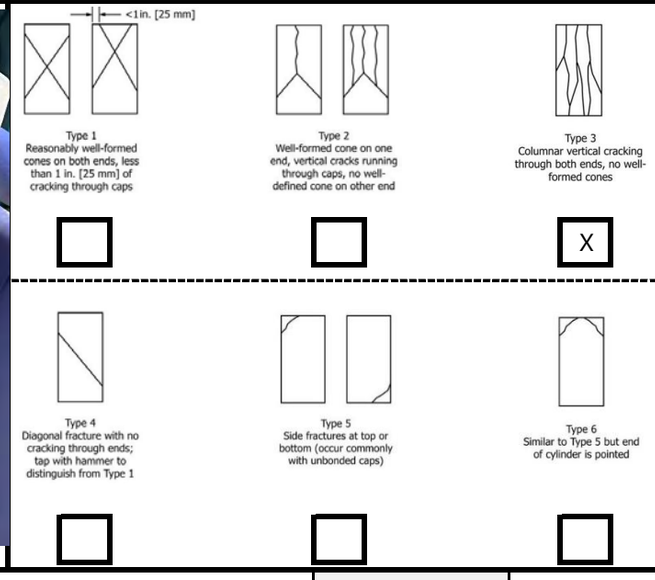
Remarks

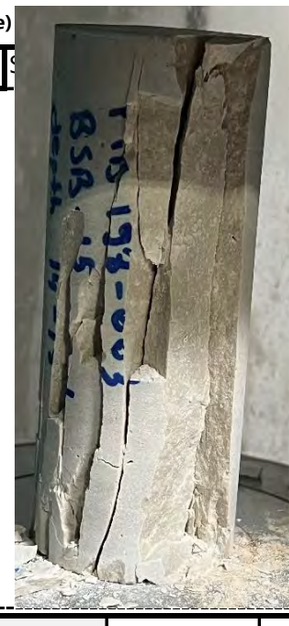
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-18		Bulk/Prep		MC/CS
Sample Depth (ft):	22-23		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	5.5210	5.5210	5.5310	5.524
Diameter, *in.*	1.7260	1.7270	1.7560	1.736

Specimen Mass, *g*	760.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	221.6	3.18	

Moisture Condition - D2216

container, *g*	515.0
container + wet rock, *g*	1243.0
container + dry soil, *g*	1241.2
moisture content, *w%*	0.2

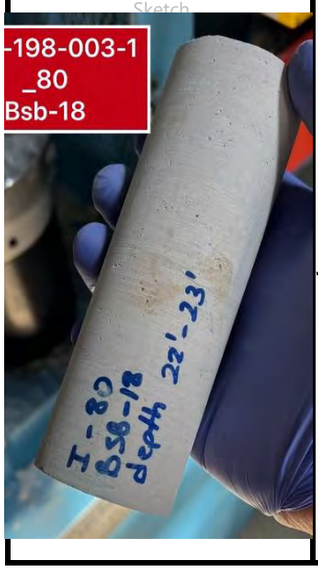
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

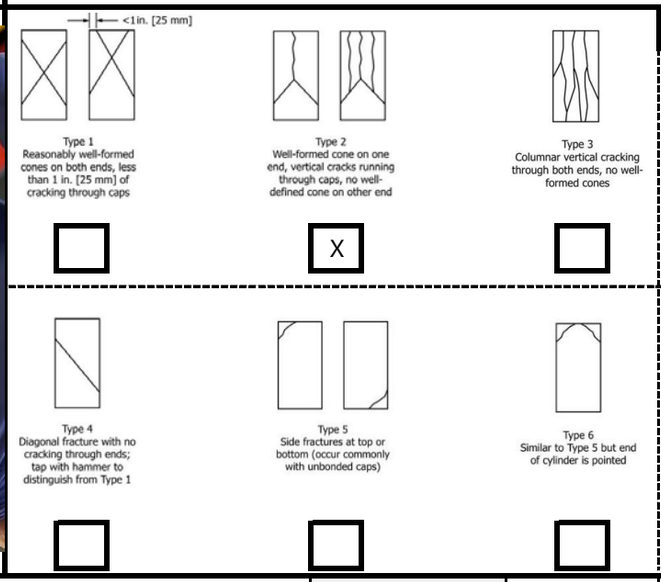
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	90	
Time to Failure (2-15 min)	1 min 15 sec	
Load @ Failure, *lbf*	24,305	
Uniaxial Compressive Strength, *psi*	10,265	

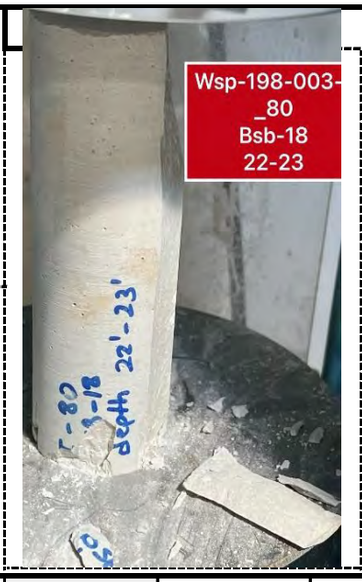
After Preparation

Sketch



After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP 198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-19		Bulk/Prep	MC/CS	
Sample Depth (ft):	13.5-14.5	Tester:	SM	Tester:	SM
Lithological Description:	Limestone	Date:	10/25/22	Date:	10/25/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9150	4.9165	4.9140	4.9152
Diameter, *in.*	1.9765	1.9795	1.9775	1.9778

Specimen Mass, *g*	678.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.2	2.49	

Moisture Condition - D2216

Container ID	M&M
container, *g*	225.9
container + wet rock, *g*	639.1
container + dry soil, *g*	633.9
moisture content, *w%*	1.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

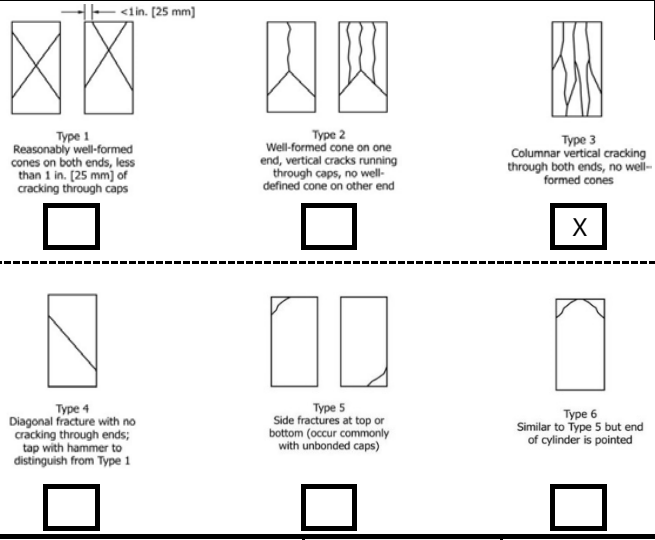
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 38 sec
Load @ Failure, *lbf*	52,945
Uniaxial Compressive Strength, *psi*	17,233

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-20		Bulk/Prep	MC/CS	
Sample Depth (ft):	9-10ft		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5290	4.5370	4.5260	4.531
Diameter, *in.*	1.7240	1.7260	1.7260	1.725

Specimen Mass, *g*	633.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	227.9	2.63	

Moisture Condition - D2216

container, *g*	470.2
container + wet rock, *g*	858.2
container + dry soil, *g*	857.7
moisture content, *w%*	0.1

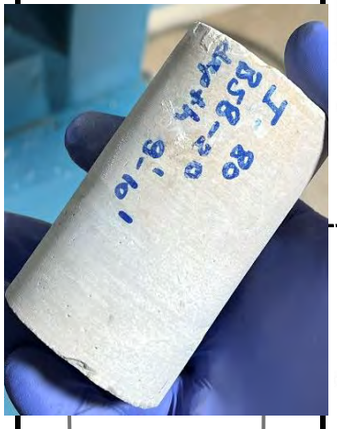
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

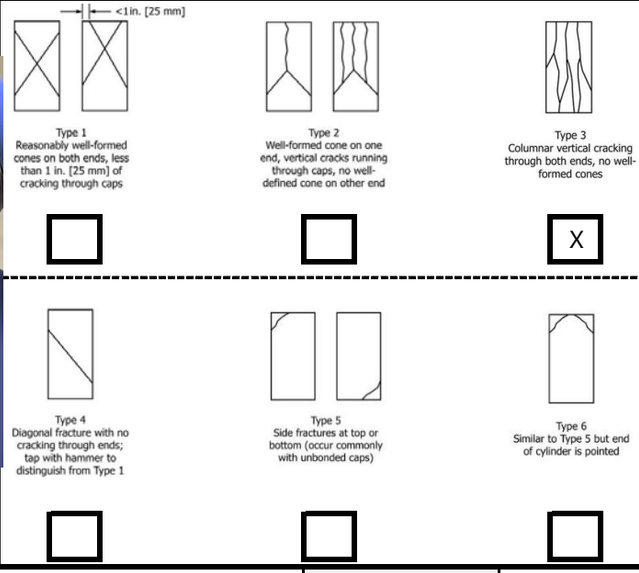
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	86	
Time to Failure (2-15 min)	2 min 20 sec	
Load @ Failure, *lbf*	38,313	
Uniaxial Compressive Strength, *psi*	16,387	

After Preparation

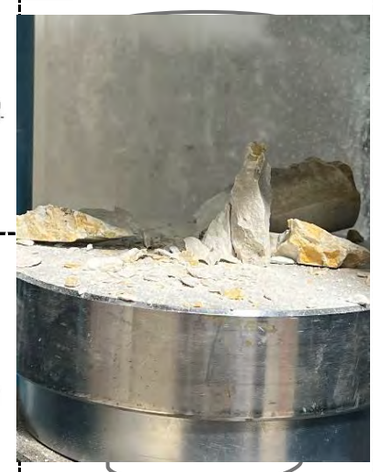
Sketch



After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-20		Bulk/Prep	MC/CS	
Sample Depth (ft):	21-22		Tester: AR	ID	
Lithological Description:	Limestone		Date: 05/05/25	Date:	
Formation Name:		Load Direction: Vertical		Angle Drilled: Vertical	

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	3.1230	3.1320	3.1660	3.140
Diameter, *in.*	1.7270	1.7310	1.7350	1.731

Specimen Mass, *g*	468.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	241.6	1.81	

Moisture Condition - D2216

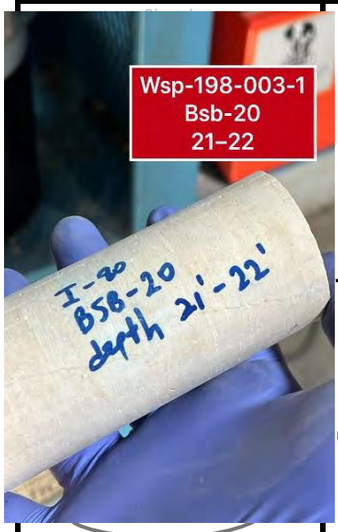
container, *g*	469.5
container + wet rock, *g*	1095.0
container + dry soil, *g*	1093.1
moisture content, *w%*	0.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

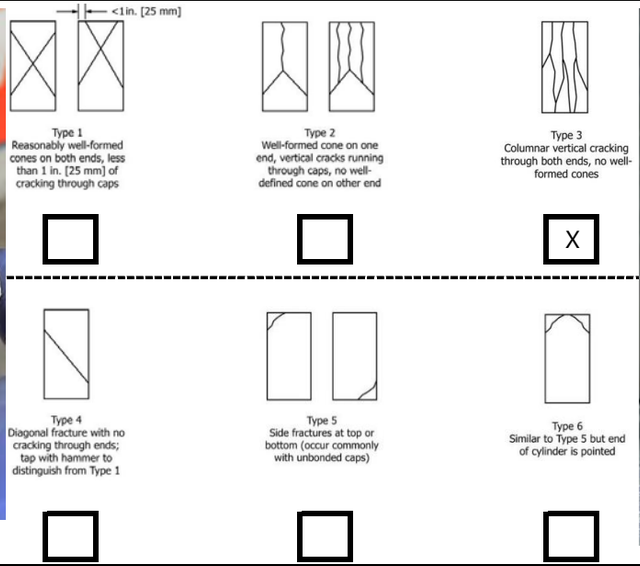
Axial Loading

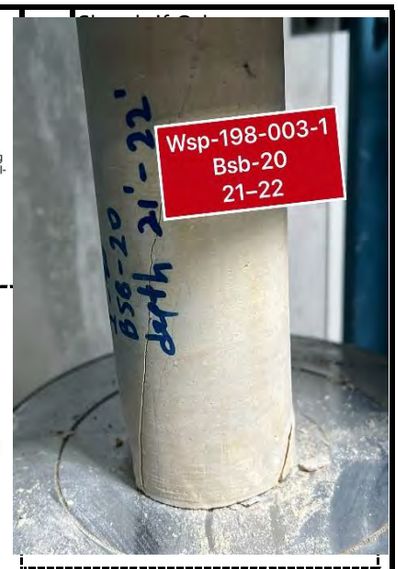
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	90	
Time to Failure (2-15 min)	0 min 29 sec	
Load @ Failure, *lbf*	14,984	
Uniaxial Compressive Strength, *psi*	6,367	

After Preparation



After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-22		Bulk/Prep	MC/CS	
Sample Depth (ft):	23.5-24		Tester:	Tester:	
Lithological Description:	Limestone		Date: 10/19/22	Date:	10/19/2022
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):	cracks				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7280	4.7245	4.7290	4.7272
Diameter, *in.*	1.9890	1.9875	1.9865	1.9877

Specimen Mass, *g*	653.2	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.7	2.38	

Moisture Condition - D2216

Container ID	TAFFY
container, *g*	226.7
container + wet rock, *g*	715.8
container + dry soil, *g*	708.3
moisture content, *w%*	1.6

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

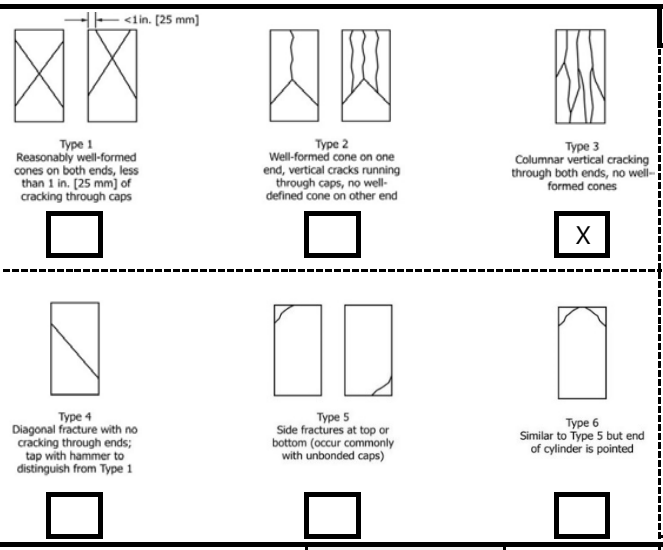
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 42 sec
Load @ Failure, *lbf*	38,000
Uniaxial Compressive Strength, *psi*	12,246

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-23		Bulk/Prep		MC/CS
Sample Depth (ft):	13.5		Tester:	TH	ID 2466
Lithological Description:	Limestone		Date:	07/01/25	Date: 07/01/25
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.1460	4.1480	4.1475	4.1472
Diameter, *in.*	2.0020	2.0025	1.9965	2.0003

Specimen Mass, *g*	575.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	168.1	2.07	

Moisture Condition - D2216

container, *g*	513.0
container + wet rock, *g*	1078.3
container + dry soil, *g*	1074.9
moisture content, *w%*	0.6

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

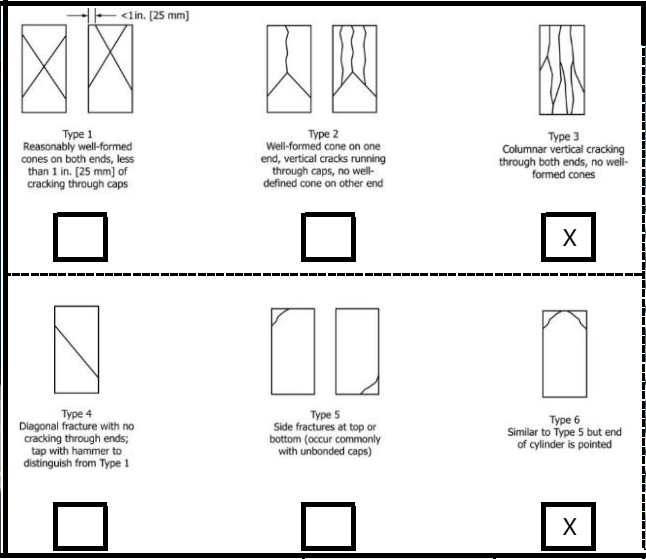
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	min 30 sec
Load @ Failure, *lbf*	18,820
Uniaxial Compressive Strength, *psi*	5,989

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Type 1	☐ Type 2	X Type 3	
☐ Type 4	☐ Type 5	X Type 6	

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	Sam
Revision Date	8/25/2024	Review Date	10/29/24

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-23		Bulk/Prep		MC/CS
Sample Depth (ft):	17.5		Tester:	TH	ID 2466
Lithological Description:	Limestone		Date:	07/01/25	Date: 07/01/25
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9290	4.9325	4.9505	4.9373
Diameter, *in.*	1.9975	2.0035	2.0020	2.0010

Specimen Mass, *g*	693.9	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.3	2.47	

Moisture Condition - D2216

container, *g*	467.4
container + wet rock, *g*	1108.2
container + dry soil, *g*	1105.1
moisture content, *w%*	0.5

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

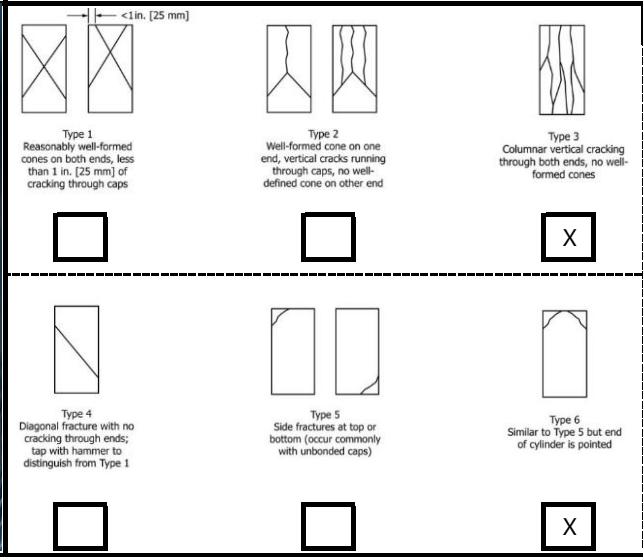
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 1 sec
Load @ Failure, *lbf*	43,542
Uniaxial Compressive Strength, *psi*	13,846

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	Sam
Revision Date	8/25/2024	Review Date	10/29/24

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-26		Bulk/Prep		MC/CS
Sample Depth (ft):	13-14		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.1310	4.1340	4.1340	4.133
Diameter, *in.*	1.7340	1.7350	1.7340	1.734

Specimen Mass, *g*	589.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	230.0	2.38	

Moisture Condition - D2216

container, *g*	470.4
container + wet rock, *g*	985.7
container + dry soil, *g*	985.2
moisture content, *w%*	0.1

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

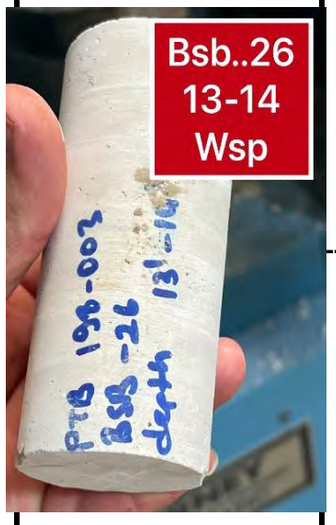
Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	
Time to Failure (2-15 min)	1 min 55 sec
Load @ Failure, *lbf*	33,146
Uniaxial Compressive Strength, *psi*	14,031

Remarks

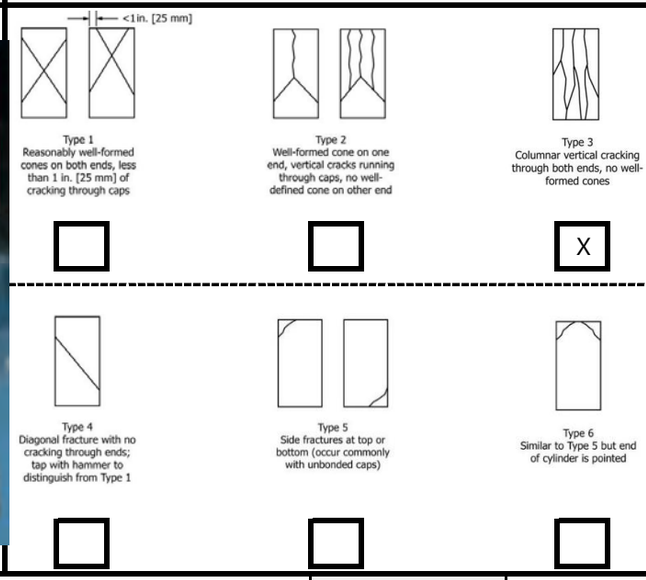
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

Sketch



After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-26		Bulk/Prep	MC/CS	
Sample Depth (ft):	23-24	Tester:	AR	ID	
Lithological Description:	Limestone	Date:	05/05/25	Date:	
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	5.1715	5.1781	5.2055	5.185
Diameter, *in.*	1.7500	1.7500	1.7390	1.746

Specimen Mass, *g*	731.2	Ratio (2.0-2.5)	
Bulk Density, *pcf*	224.3	2.97	

Moisture Condition - D2216

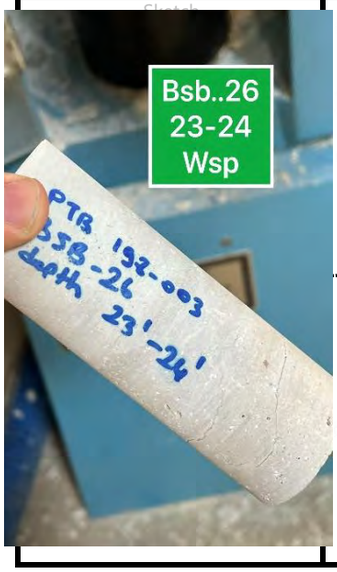
container, *g*	226.5
container + wet rock, *g*	954.5
container + dry soil, *g*	953.5
moisture content, *w%*	0.1

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

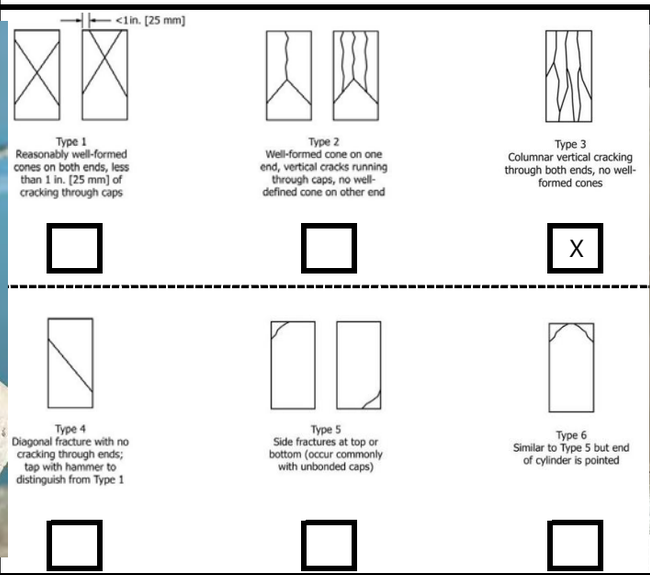
Axial Loading

		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)		
Time to Failure (2-15 min)	2 min 40 sec	
Load @ Failure, *lbf*	42,523	
Uniaxial Compressive Strength, *psi*	17,753	

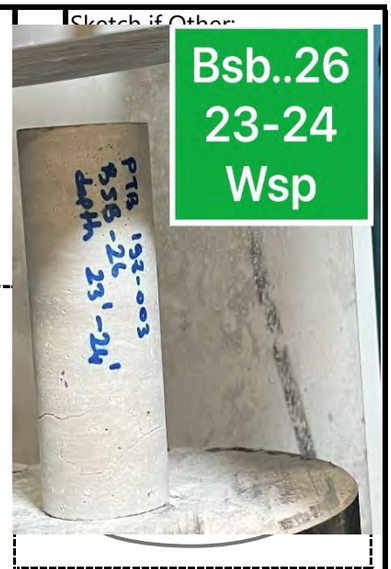
After Preparation



After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-27		Bulk/Prep		MC/CS
Sample Depth (ft):	25-25.5	Tester:	SM	Tester:	SM
Lithological Description:	Limestone	Date:	10/19/22	Date:	10/19/2022
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):	cracks				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7965	4.7960	4.7940	4.7955
Diameter, *in.*	1.9745	1.9735	1.9774	1.9751

Specimen Mass, *g*	668.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	173.3	2.43	

Moisture Condition - D2216

Container ID	MENTOS
container, *g*	226.7
container + wet rock, *g*	832.1
container + dry soil, *g*	820.4
moisture content, *w%*	2.0

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

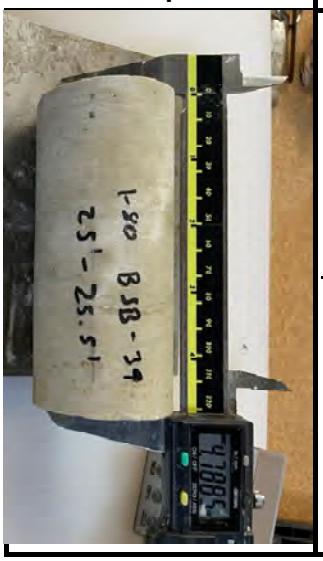
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 47 sec
Load @ Failure, *lbf*	39,838
Uniaxial Compressive Strength, *psi*	13,002

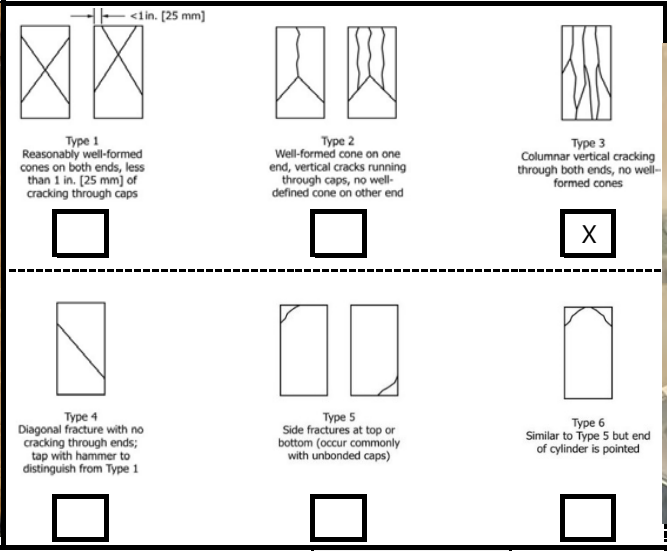
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

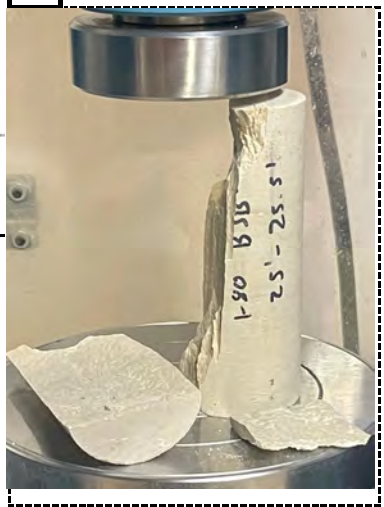
After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-28		Bulk/Prep		MC/CS
Sample Depth (ft):	13-14		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	5.0720	5.0600	5.0900	5.074
Diameter, *in.*	1.7130	1.7700	1.7400	1.741

Specimen Mass, *g*	720.2	Ratio (2.0-2.5)	
Bulk Density, *pcf*	227.2	2.91	

Moisture Condition - D2216

container, *g*	467.2
container + wet rock, *g*	1011.4
container + dry soil, *g*	1010.5
moisture content, *w%*	0.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

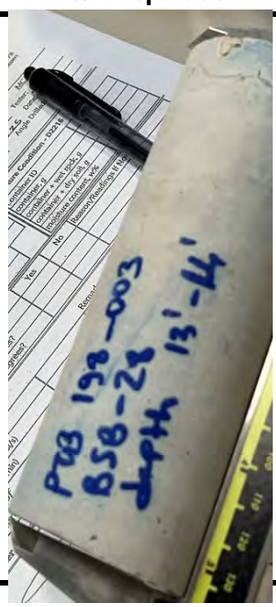
Axial Loading

Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	
Time to Failure (2-15 min)	3 min 11 sec
Load @ Failure, *lbf*	45,793
Uniaxial Compressive Strength, *psi*	19,236

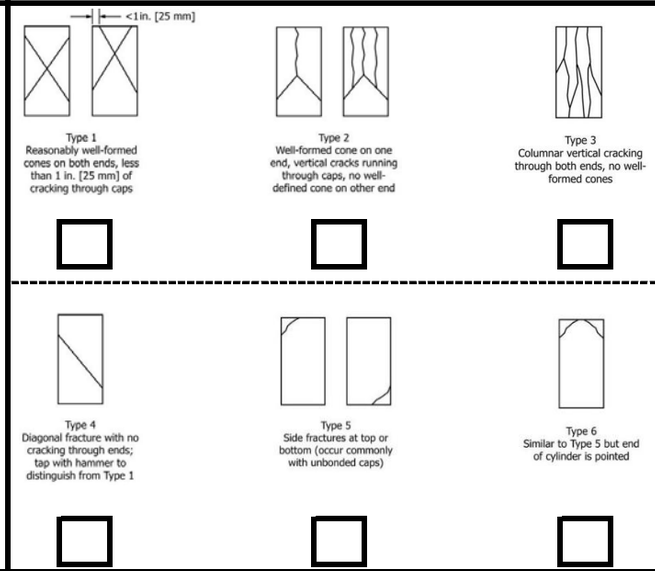
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

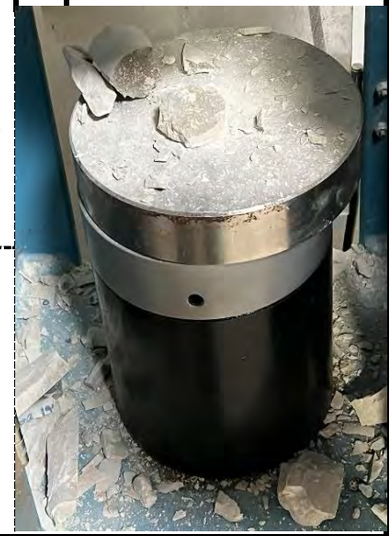
After Preparation



After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-28		Bulk/Prep		MC/CS
Sample Depth (ft):	18-19		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	5.4240	5.4210	5.4250	5.423
Diameter, *in.*	1.7500	1.7300	1.7470	1.742

Specimen Mass, *g*	763.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	225.0	3.11	

Moisture Condition - D2216

container, *g*	470.0
container + wet rock, *g*	1274.0
container + dry soil, *g*	1273.2
moisture content, *w%*	0.1

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

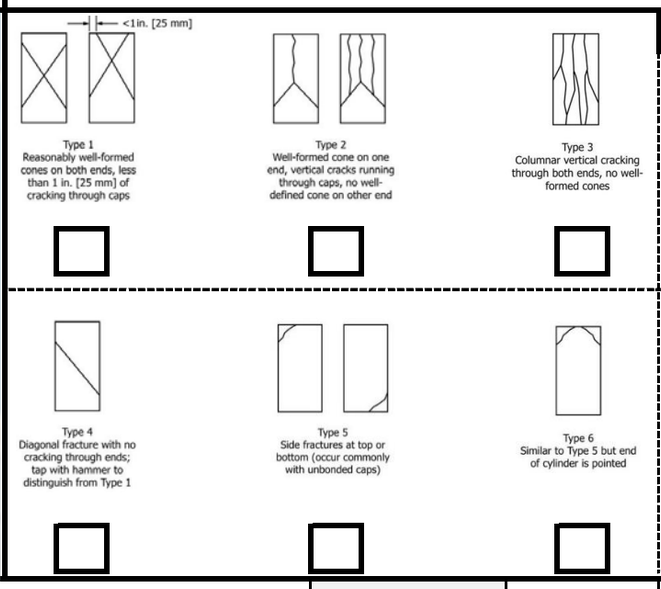
Seating Load (≤1000 psi)	
Rate of Loading (73-145 psi/s)	
Time to Failure (2-15 min)	1 min 10 sec
Load @ Failure, *lbf*	20,751
Uniaxial Compressive Strength, *psi*	8,703

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-29		Bulk/Prep		MC/CS
Sample Depth (ft):	10-11ft		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.6160	4.6510	4.7590	4.675
Diameter, *in.*	1.7690	1.7460	1.7370	1.751

Specimen Mass, *g*	650.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	220.3		2.67

Moisture Condition - D2216

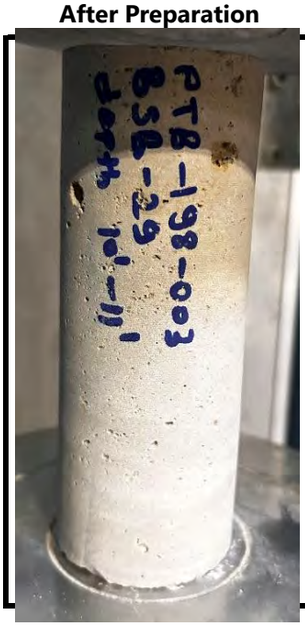
container, *g*	226.7
container + wet rock, *g*	787.2
container + dry soil, *g*	786.1
moisture content, *w%*	0.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

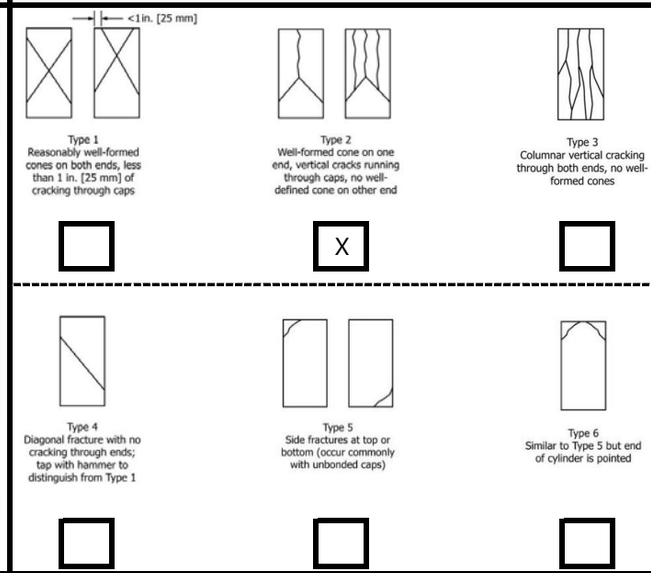
Axial Loading

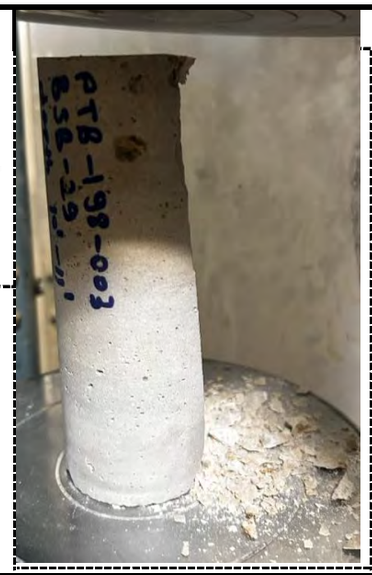
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)		
Time to Failure (2-15 min)	0 min 42 sec	
Load @ Failure, *lbf*	10,388	
Uniaxial Compressive Strength, *psi*	4,316	

After Preparation



After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP-198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-29		Bulk/Prep		MC/CS
Sample Depth (ft):	15.5-16.5		Tester:	AR	ID
Lithological Description:	Limestone		Date:	05/05/25	Date:
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	5.6200	5.5960	5.6800	5.632
Diameter, *in.*	1.7140	1.7200	1.7200	1.718

Specimen Mass, *g*	797.3	Ratio (2.0-2.5)	
Bulk Density, *pcf*	232.7	3.28	

Moisture Condition - D2216

container, *g*	463.0
container + wet rock, *g*	872.4
container + dry soil, *g*	871.3
moisture content, *w%*	0.3

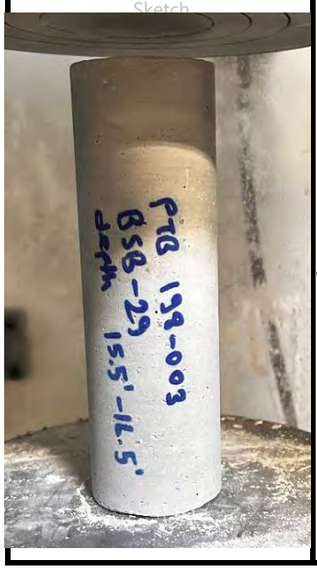
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?		X	
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

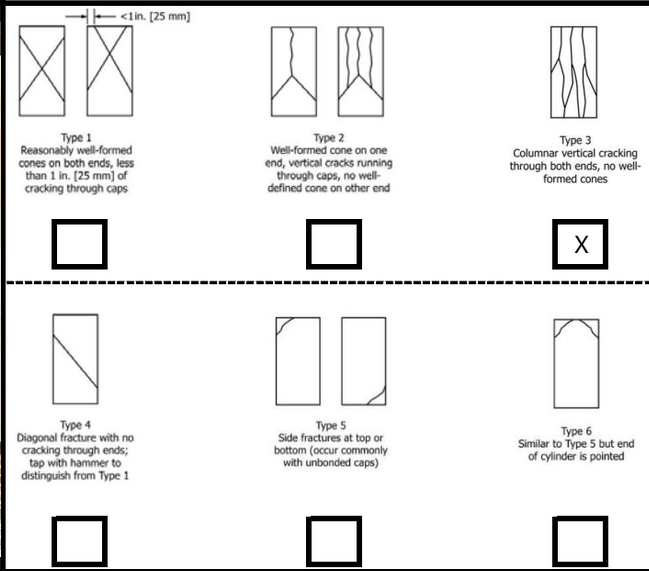
		Remarks
Seating Load (≤1000 psi)		Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)		
Time to Failure (2-15 min)	3 min 1 sec	
Load @ Failure, *lbf*	47,308	
Uniaxial Compressive Strength, *psi*	20,408	

After Preparation

Sketch



After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	
Revision Date	8/25/2024	Review Date	

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-31		Bulk/Prep		MC/CS
Sample Depth (ft):	13-14		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	10/20/22	Date: 10/20/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.0480	4.0560	4.0535	4.0525
Diameter, *in.*	1.9770	1.9805	1.9770	1.9782

Specimen Mass, *g*	553.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.3	2.05	

Moisture Condition - D2216

Container ID	
container, *g*	
container + wet rock, *g*	
container + dry soil, *g*	
moisture content, *w%*	

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

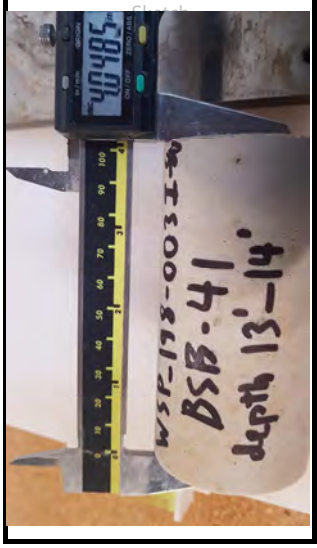
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	4 min 5 sec
Load @ Failure, *lbf*	57,277
Uniaxial Compressive Strength, *psi*	18,637

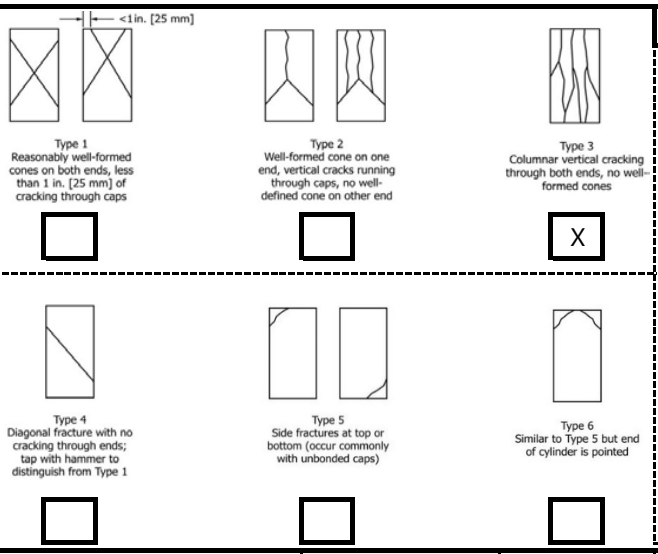
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Order # 940

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP 198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-104		Bulk/Prep		MC/CS
Sample Depth (ft):	21.5-22		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	10/25/22	Date: 10/25/22
Formation Name:		Load Direction:	Vertical		Angle Drilled: Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9080	4.9105	4.9190	4.9125
Diameter, *in.*	1.9820	1.9780	1.9750	1.9783

Specimen Mass, *g*	664.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	167.7	2.48	

Moisture Condition - D2216

Container ID	AIRHEAD
container, *g*	226.5
container + wet rock, *g*	862.3
container + dry soil, *g*	847.8
moisture content, *w%*	2.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?		X	Side surface isn't straight
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

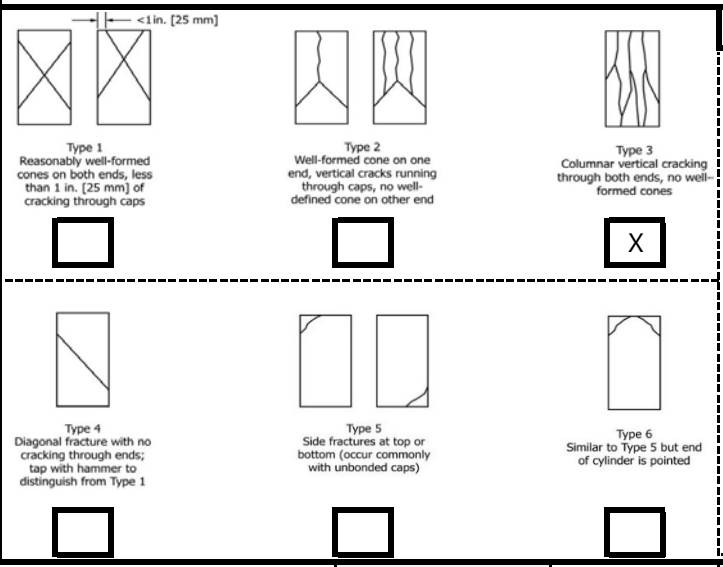
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 6 sec
Load @ Failure, *lbf*	43,881
Uniaxial Compressive Strength, *psi*	14,275

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-106		Bulk/Prep		MC/CS
Sample Depth (ft):	9-9.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	10/19/22	Date: 10/19/2022
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.1335	4.1345	4.1300	4.1327
Diameter, *in.*	1.9815	1.9845	1.9820	1.9827

Specimen Mass, *g*	545.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	162.8	2.08	

Moisture Condition - D2216

Container ID	KITKAT
container, *g*	226.7
container + wet rock, *g*	765.7
container + dry soil, *g*	746.4
moisture content, *w%*	3.7

Preparation Check

	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

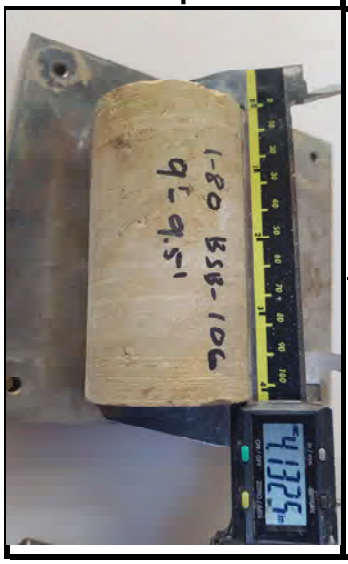
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 1 sec
Load @ Failure, *lbf*	29,229
Uniaxial Compressive Strength, *psi*	9,467

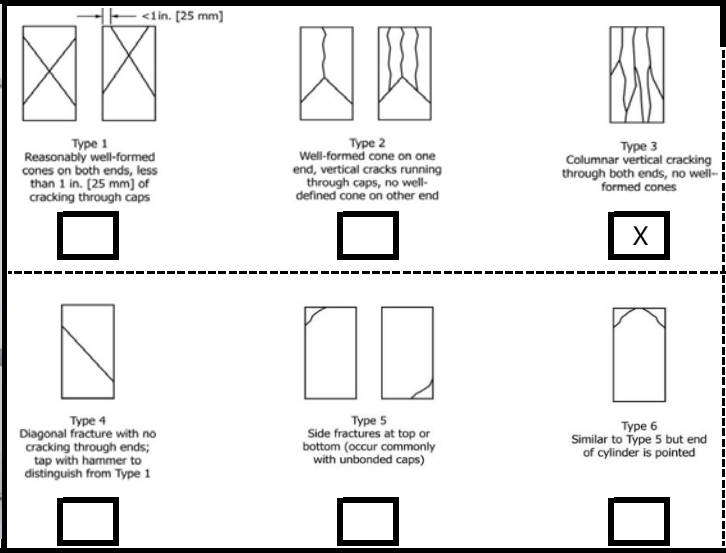
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

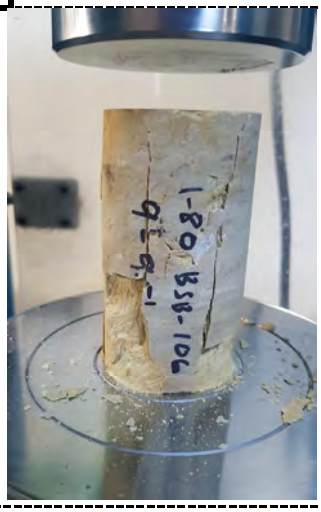
After Preparation



After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	10/31/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-109		Bulk/Prep	MC/CS	
Sample Depth (ft):	9-10	Tester:	SM	Tester:	SM/AJ
Lithological Description:	Limestone	Date:	11/14/22	Date:	11/14/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7575	4.7560	4.7630	4.7588
Diameter, *in.*	1.9840	1.9845	1.9820	1.9835

Specimen Mass, *g*	654.9	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.7	2.40	

Moisture Condition - D2216

Container ID	TAFFY
container, *g*	226.6
container + wet rock, *g*	863.0
container + dry soil, *g*	851.2
moisture content, *w%*	1.9

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

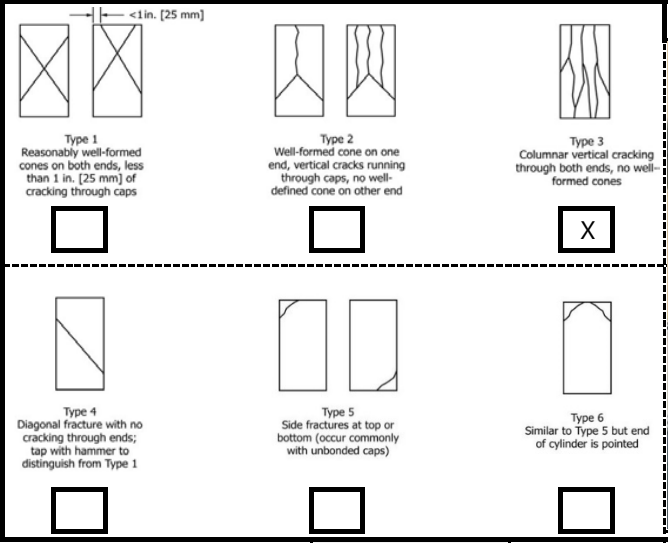
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 28 sec
Load @ Failure, *lbf*	21,758
Uniaxial Compressive Strength, *psi*	7,041

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	
Revision Date	10/21/2021	Review Date	

Order # 944

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP 198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-201		Bulk/Prep		MC/CS
Sample Depth (ft):	13-13.5		Tester:	SM	Tester: SM
Lithological Description:	Lime Stone		Date:	10/27/22	Date: 10/27/22
Formation Name:		Load Direction:	Vertical		Angle Drilled: Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5210	4.5215	4.5225	4.5217
Diameter, *in.*	1.9890	1.9880	1.9975	1.9915

Specimen Mass, *g*	638.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	172.8	2.27	

Moisture Condition - D2216

Container ID	
container, *g*	226.2
container + wet rock, *g*	803.5
container + dry soil, *g*	799.8
moisture content, *w%*	0.6

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

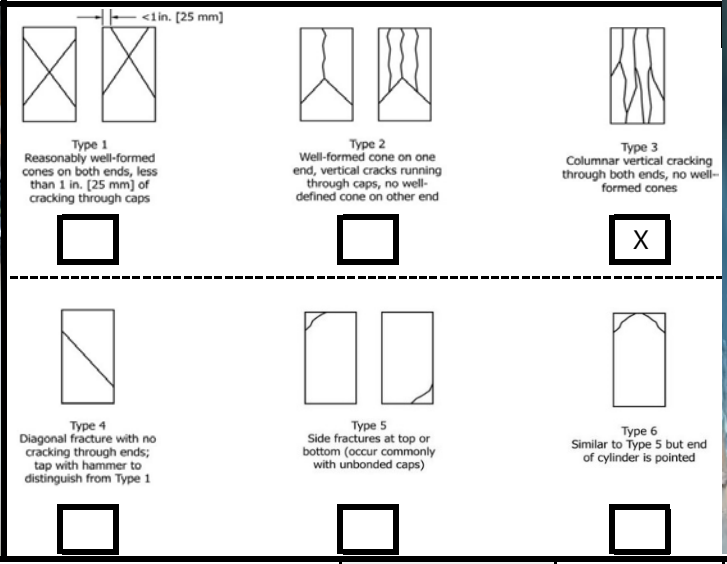
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 15 sec
Load @ Failure, *lbf*	48,640
Uniaxial Compressive Strength, *psi*	15,615

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/01/22

Order # 944

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP 198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-201		Bulk/Prep		MC/CS
Sample Depth (ft):	25-26		Tester:	AJ	Tester: AJ
Lithological Description:	LimeStone		Date:	10/27/22	Date: 10/27/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8155	4.8160	4.8155	4.8157
Diameter, *in.*	1.9900	1.9910	1.9920	1.9910

Specimen Mass, *g*	671.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.6	2.42	

Moisture Condition - D2216

Container ID	NERDS
container, *g*	226.3
container + wet rock, *g*	824.1
container + dry soil, *g*	816.1
moisture content, *w%*	1.4

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

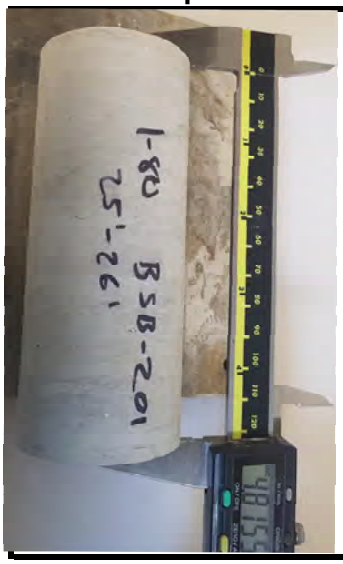
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 8 sec
Load @ Failure, *lbf*	46,688
Uniaxial Compressive Strength, *psi*	14,996

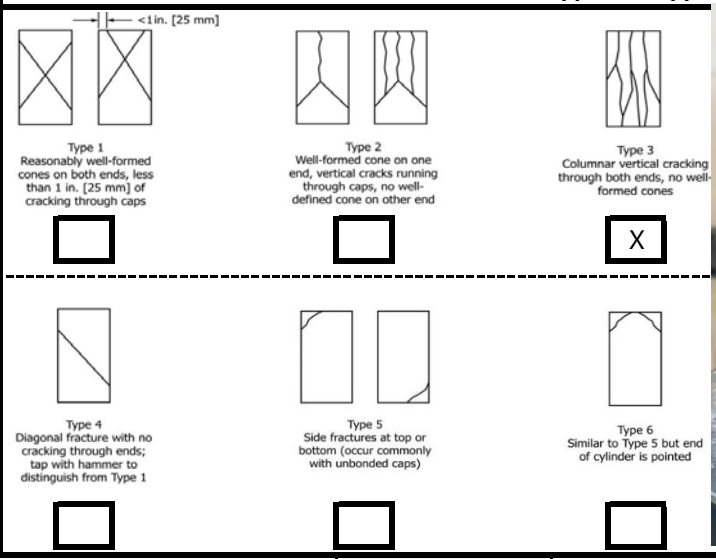
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/01/22

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-201		Bulk/Prep	MC/CS	
Sample Depth (ft):	35		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.3985	4.3985	4.3965	4.3978
Diameter, *in.*	1.9875	1.9880	1.9870	1.9875

Specimen Mass, *g*	616.6	Ratio (2.0-2.5)	
Bulk Density, *pcf*	172.2	2.21	

Moisture Condition - D2216

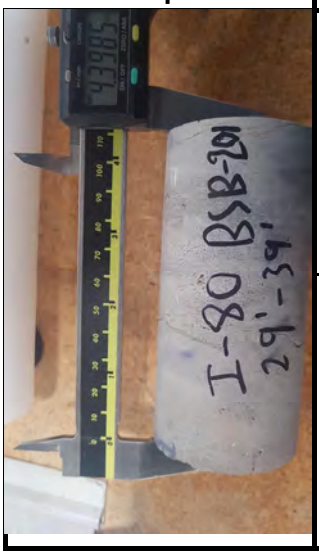
Container ID	MENTOS
container, *g*	226.7
container + wet rock, *g*	756.3
container + dry soil, *g*	754.2
moisture content, *w%*	0.4

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?		X	Side surface isn't straight
Ends parallel to each other within 0.25 degrees?	X		

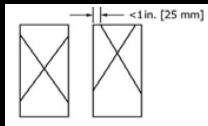
Axial Loading

		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	3 1 sec	
Load @ Failure, *lbf*	43,134	
Uniaxial Compressive Strength, *psi*	13,903	

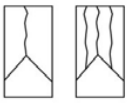
After Preparation



After Break (check applicable appearance)



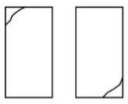
Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps
☐



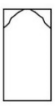
Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones
X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1
☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)
☐



Type 6
Similar to Type 5 but end of cylinder is pointed
☐

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-202			Bulk/Prep	MC/CS
Sample Depth (ft):	9.5-10		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5375	4.5400	4.5390	4.5388
Diameter, *in.*	1.9900	1.9870	1.9880	1.9883

Specimen Mass, *g*	620.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	167.7	2.28	

Moisture Condition - D2216

Container ID	SWEET
container, *g*	226.4
container + wet rock, *g*	844.8
container + dry soil, *g*	831.7
moisture content, *w%*	2.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

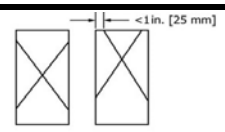
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 50 sec
Load @ Failure, *lbf*	28,111
Uniaxial Compressive Strength, *psi*	9,053

Remarks

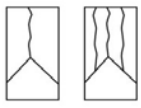
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



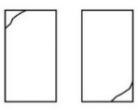
Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps
☐



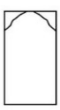
Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones
X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1
☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)
☐



Type 6
Similar to Type 5 but end of cylinder is pointed
☐

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/12/22

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-202			Bulk/Prep	MC/CS
Sample Depth (ft):	25.75		Tester:	SM	Tester: SM
Lithological Description:	Lime Stone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5230	4.5010	4.5210	4.5150
Diameter, *in.*	1.9925	1.9915	1.9915	1.9918

Specimen Mass, *g*	600.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	162.5	2.27	

Moisture Condition - D2216

Container ID	Khadijah
container, *g*	226.6
container + wet rock, *g*	824.9
container + dry soil, *g*	820.9
moisture content, *w%*	0.7

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

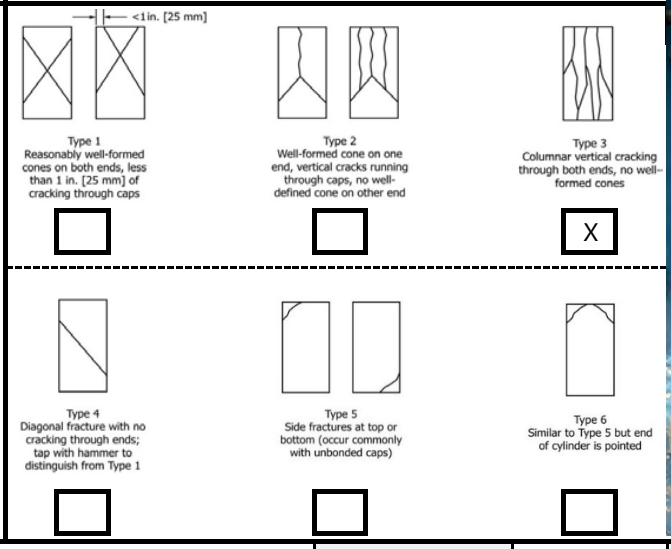
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 59 sec
Load @ Failure, *lbf*	44,122
Uniaxial Compressive Strength, *psi*	14,160

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-202		Bulk/Prep	MC/CS	
Sample Depth (ft):	32.75		Tester:	SM	Tester: SM
Lithological Description:	Lime Stone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5275	4.5340	4.5210	4.5275
Diameter, *in.*	1.9935	1.9920	1.9915	1.9923

Specimen Mass, *g*	628.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.6	2.27	

Moisture Condition - D2216

Container ID	Milk Dud
container, *g*	226.5
container + wet rock, *g*	752.8
container + dry soil, *g*	750.5
moisture content, *w%*	0.4

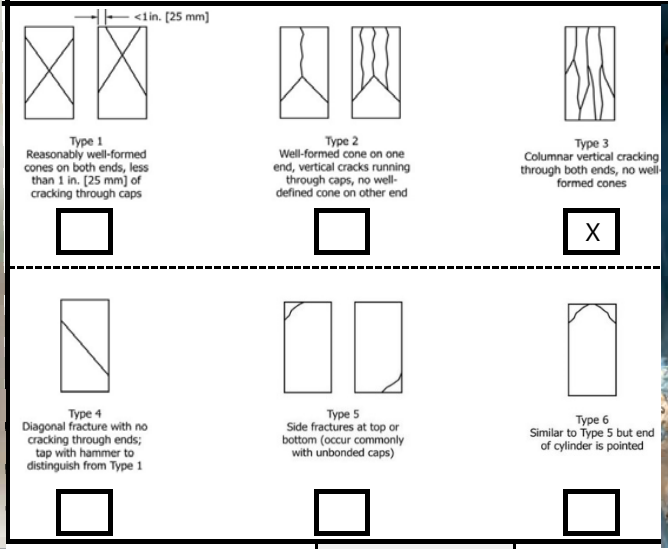
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	3 min 31 sec	
Load @ Failure, *lbf*	51,411	
Uniaxial Compressive Strength, *psi*	16,491	

After Preparation

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-203		Bulk/Prep		MC/CS
Sample Depth (ft):	7.5-8		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.3770	4.3730	4.3710	4.3737
Diameter, *in.*	1.9885	1.9890	1.9885	1.9887

Specimen Mass, *g*	606.7	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.2	2.20	

Moisture Condition - D2216

Container ID	Pez
container, *g*	226.7
container + wet rock, *g*	787.2
container + dry soil, *g*	780.8
moisture content, *w%*	1.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

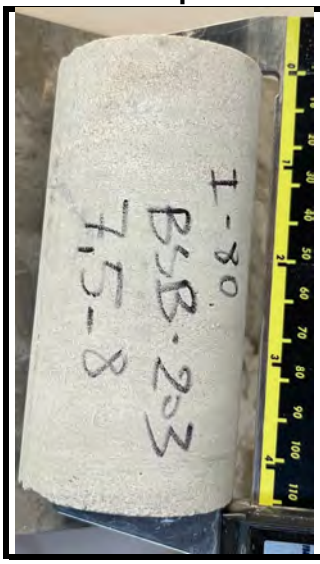
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 32 sec
Load @ Failure, *lbf*	36,607
Uniaxial Compressive Strength, *psi*	11,786

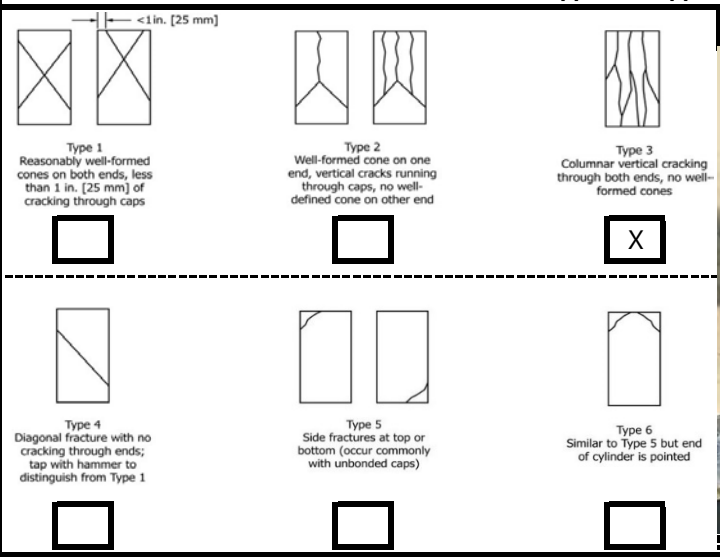
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/15/22

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-203		Bulk/Prep		MC/CS
Sample Depth (ft):	13'		Tester:	SM	Tester: SM
Lithological Description:	Lime Stone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7850	4.7850	4.7860	4.7853
Diameter, *in.*	1.9920	1.9935	1.9945	1.9933

Specimen Mass, *g*	665.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.7	2.40	

Moisture Condition - D2216

Container ID	Peepls
container, *g*	226.8
container + wet rock, *g*	838.9
container + dry soil, *g*	837.0
moisture content, *w%*	0.3

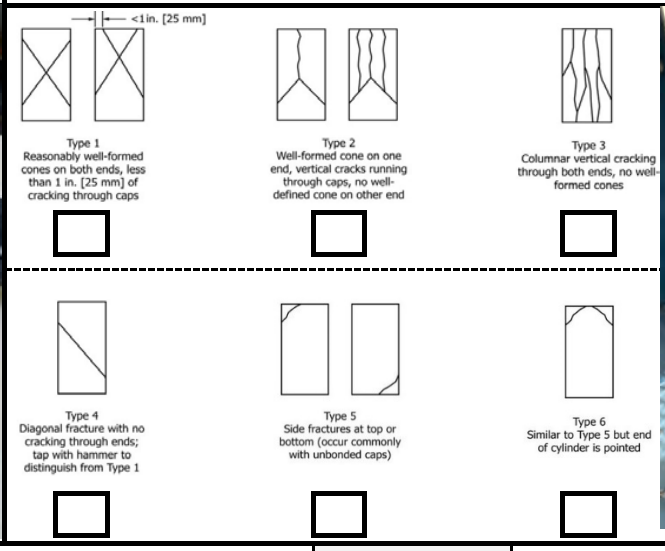
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

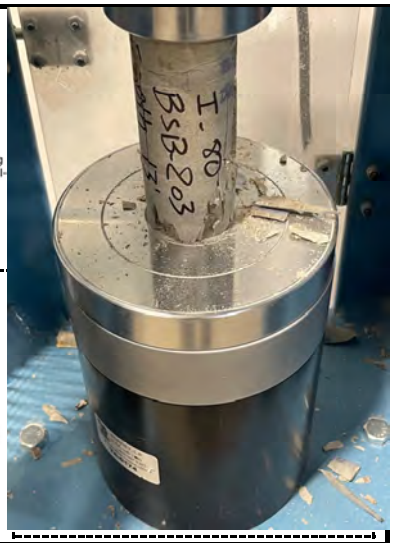
Axial Loading

		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	2 min 0 sec	
Load @ Failure, *lbf*	30,098	
Uniaxial Compressive Strength, *psi*	9,645	

After Preparation

After Break (check applicable appearance)





Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-203		Bulk/Prep	MC/CS	
Sample Depth (ft):	25.5	Tester:	AJ	Tester:	AJ
Lithological Description:	Limestone	Date:	01/05/23	Date:	01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8640	4.8565	4.8580	4.8595
Diameter, *in.*	1.9835	1.9840	1.9845	1.9840

Specimen Mass, *g*	665.9	Ratio (2.0-2.5)	2.45
Bulk Density, *pcf*	168.9		

Moisture Condition - D2216

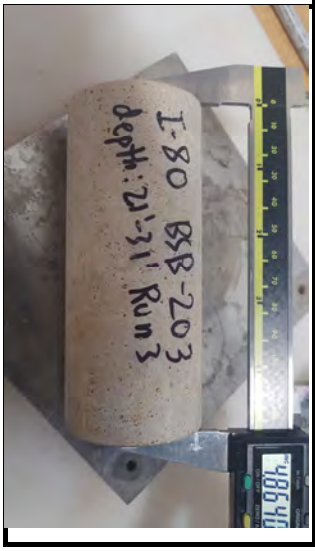
Container ID	16
container, *g*	470.3
container + wet rock, *g*	1108.9
container + dry soil, *g*	1104.2
moisture content, *w%*	0.7

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

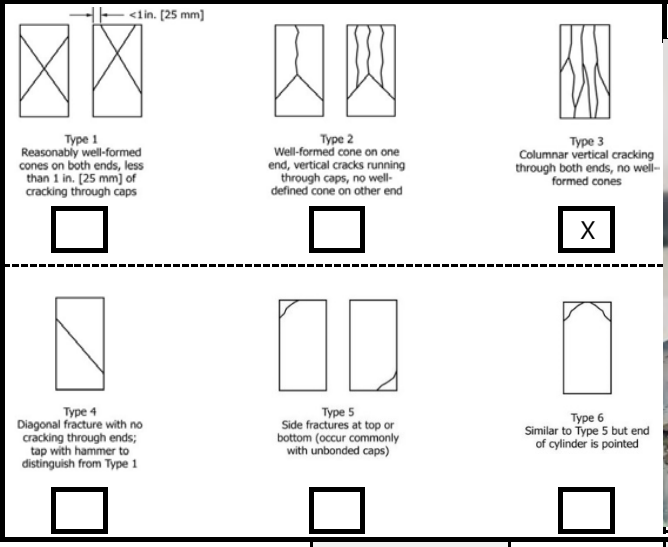
Axial Loading

		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	2 min 2 sec	
Load @ Failure, *lbf*	31,497	
Uniaxial Compressive Strength, *psi*	10,188	

After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-203		Bulk/Prep	MC/CS	
Sample Depth (ft):	35.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7005	4.6990	4.6890	4.6962
Diameter, *in.*	1.9840	1.9845	1.9885	1.9857

Specimen Mass, *g*	655.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.7	2.37	

Moisture Condition - D2216

Container ID	Φ5
container, *g*	518.6
container + wet rock, *g*	1043.0
container + dry soil, *g*	1042.0
moisture content, *w%*	0.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

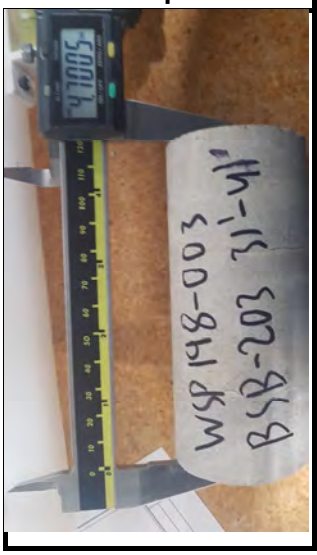
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 42 sec
Load @ Failure, *lbf*	39,442
Uniaxial Compressive Strength, *psi*	12,737

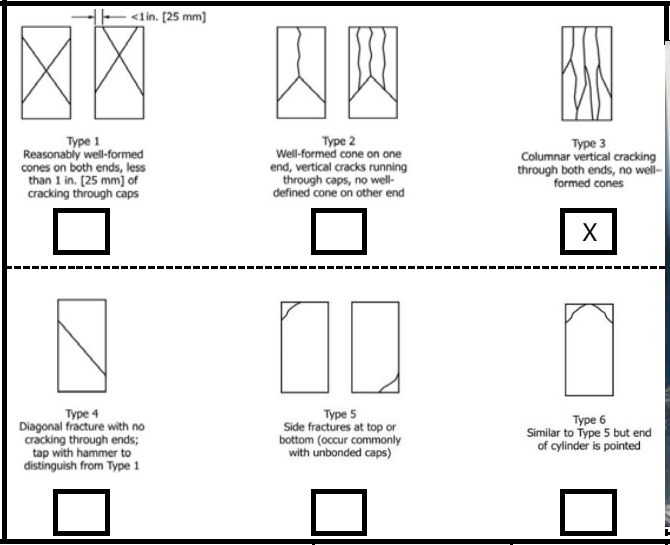
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

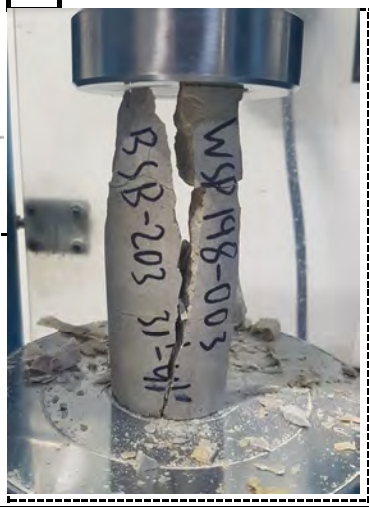
After Preparation



After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 963

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-204		Bulk/Prep		MC/CS
Sample Depth (ft):	5-6		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/04/22	Date: 11/04/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5805	4.5900	4.5785	4.5830
Diameter, *in.*	1.9860	1.9855	1.9865	1.9860

Specimen Mass, *g*	635.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.4	2.31	

Moisture Condition - D2216

Container ID	AUDREY
container, *g*	226.2
container + wet rock, *g*	817.4
container + dry soil, *g*	806.6
moisture content, *w%*	1.9

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

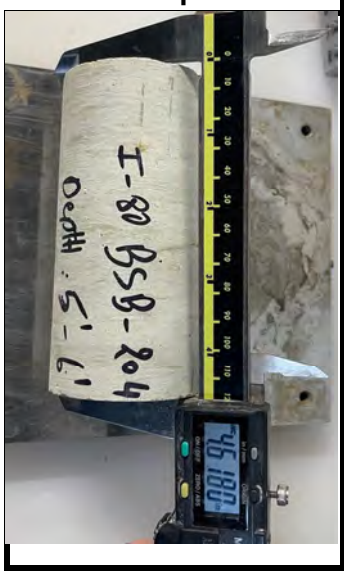
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 14 sec
Load @ Failure, *lbf*	46,472
Uniaxial Compressive Strength, *psi*	15,002

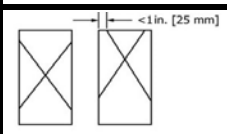
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

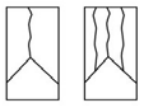
After Preparation



After Break (check applicable appearance)



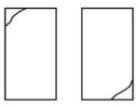
Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps
☐



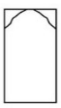
Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones
X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1
☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)
☐



Type 6
Similar to Type 5 but end of cylinder is pointed
☐

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/23/22

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-204		Bulk/Prep	MC/CS	
Sample Depth (ft):	7		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8505	4.8490	4.8525	4.8507
Diameter, *in.*	1.9875	1.9875	1.9880	1.9877

Specimen Mass, *g*	666.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	168.6	2.44	

Moisture Condition - D2216

Container ID	21
container, *g*	470.6
container + wet rock, *g*	987.5
container + dry soil, *g*	986.6
moisture content, *w%*	0.2

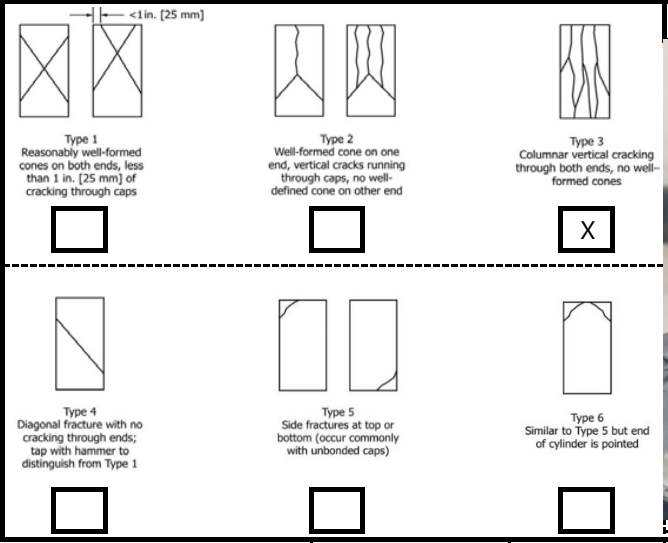
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

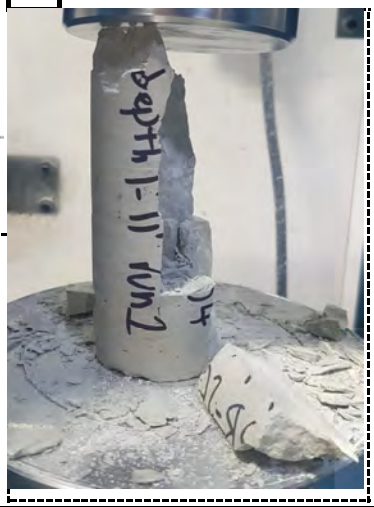
		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	4 min 15 sec	
Load @ Failure, *lbf*	48,765	
Uniaxial Compressive Strength, *psi*	15,716	

After Preparation

After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-204		Bulk/Prep	MC/CS	
Sample Depth (ft):	12- (11-12) Run 2		Tester:	SM	Tester: SM
Lithological Description:	Lime Stone		Date:	01/05/23	Date: 01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9155	4.9080	4.9128	4.9121
Diameter, *in.*	1.9935	1.9940	1.9920	1.9932

Specimen Mass, *g*	681.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	169.4	2.46	

Moisture Condition - D2216

Container ID	6
container, *g*	517.8
container + wet rock, *g*	1182.4
container + dry soil, *g*	1181.3
moisture content, *w%*	0.2

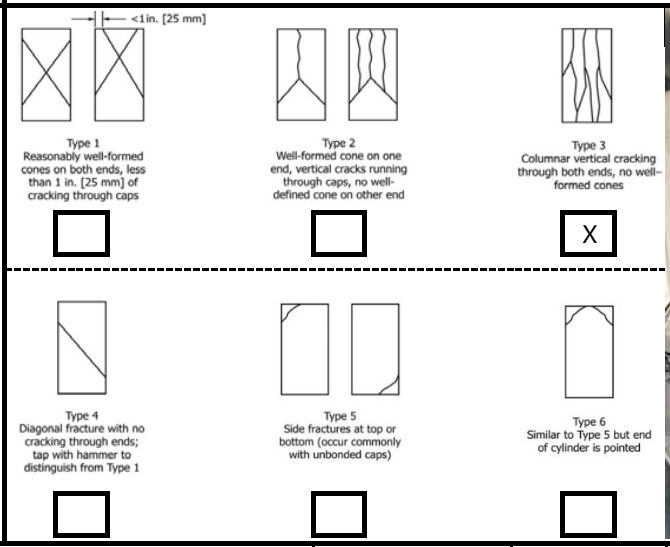
Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

		Remarks
Seating Load (≤1000 psi)	1000	Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.
Rate of Loading (73-145 psi/s)	75	
Time to Failure (2-15 min)	2 min 785 sec	
Load @ Failure, *lbf*	30,785	
Uniaxial Compressive Strength, *psi*	9,866	

After Preparation

After Break (check applicable appearance)



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 963

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-204		Bulk/Prep		MC/CS
Sample Depth (ft):	28-29		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/04/22	Date: 11/04/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.6870	4.6985	4.6875	4.6910
Diameter, *in.*	1.9870	1.9895	1.9885	1.9883

Specimen Mass, *g*	657.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	172.0	2.36	

Moisture Condition - D2216

Container ID	GUSHERS
container, *g*	226.4
container + wet rock, *g*	870.8
container + dry soil, *g*	862.1
moisture content, *w%*	1.4

Preparation Check

	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

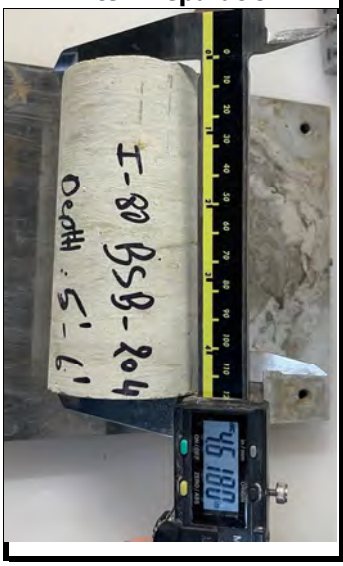
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 57 sec
Load @ Failure, *lbf*	29,188
Uniaxial Compressive Strength, *psi*	9,400

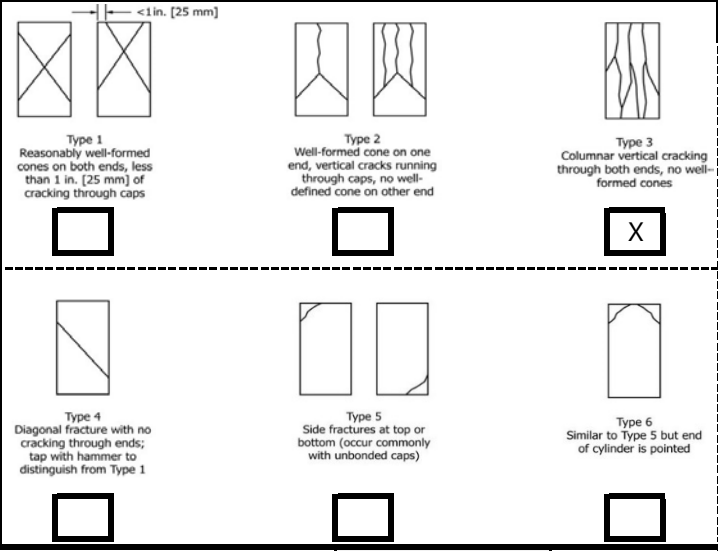
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/23/22

Order # 1032

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-205		Bulk/Prep		MC/CS
Sample Depth (ft):	15	Tester:	AJ	Tester:	AJ
Lithological Description:	Limestone	Date:	01/05/23	Date:	01/05/23
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):	cracks				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8815	4.8790	4.8750	4.8785
Diameter, *in.*	1.9880	1.9885	1.9880	1.9882

Specimen Mass, *g*	682.9	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.8	2.45	

Moisture Condition - D2216

Container ID	Φ8
container, *g*	516.6
container + wet rock, *g*	1199.3
container + dry soil, *g*	1197.2
moisture content, *w%*	0.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

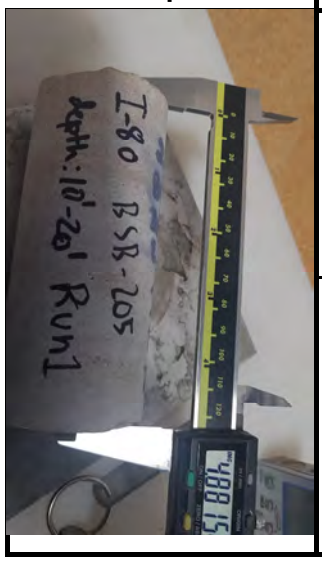
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 55 sec
Load @ Failure, *lbf*	41,527
Uniaxial Compressive Strength, *psi*	13,376

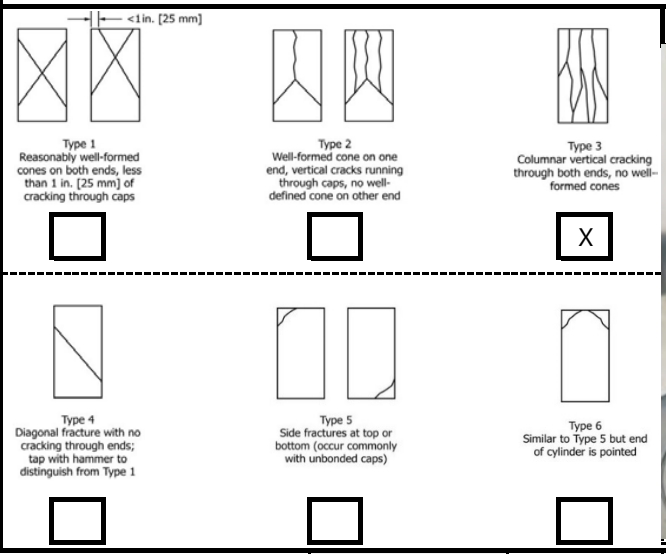
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

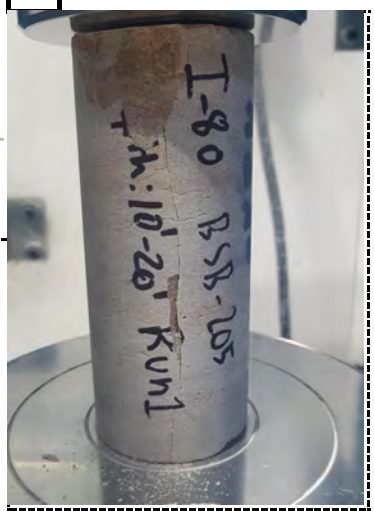
After Preparation



After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	01/06/23

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-205			Bulk/Prep	MC/CS
Sample Depth (ft):	24-25		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.7995	4.8125	4.7920	4.8013
Diameter, *in.*	1.9870	1.9875	1.9875	1.9873

Specimen Mass, *g*	670.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.5	2.42	

Moisture Condition - D2216

Container ID	Φ1
container, *g*	515.2
container + wet rock, *g*	1094.4
container + dry soil, *g*	1087.8
moisture content, *w%*	1.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

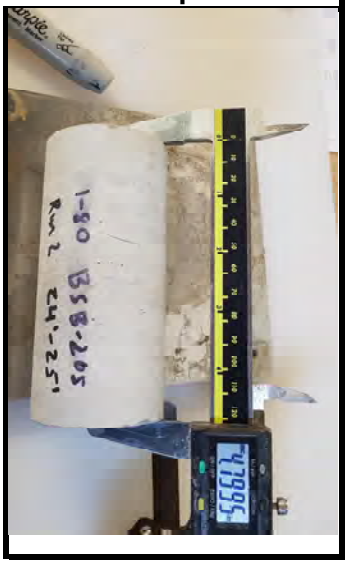
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 3 sec
Load @ Failure, *lbf*	43,941
Uniaxial Compressive Strength, *psi*	14,166

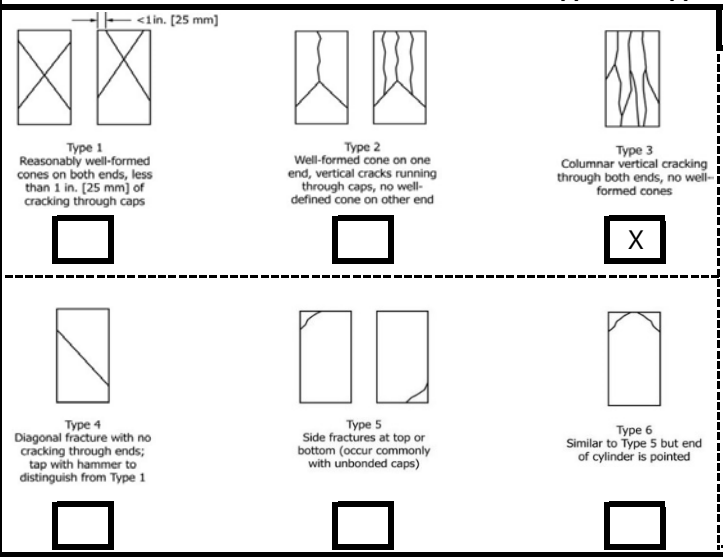
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/12/22

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-205		Bulk/Prep		MC/CS
Sample Depth (ft):	39-40		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.4225	4.4320	4.4320	4.4288
Diameter, *in.*	1.9870	1.9885	1.9890	1.9882

Specimen Mass, *g*	620.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.9	2.23	

Moisture Condition - D2216

Container ID	20
container, *g*	462.8
container + wet rock, *g*	1010.4
container + dry soil, *g*	1005.1
moisture content, *w%*	1.0

Preparation Check

	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

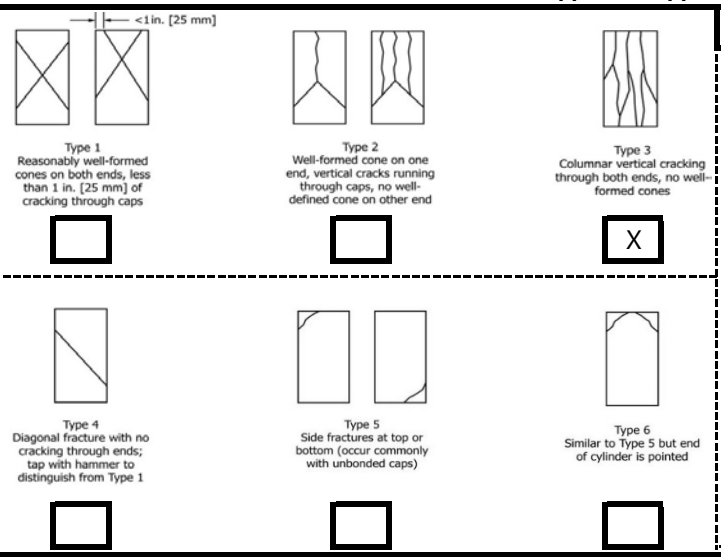
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 29 sec
Load @ Failure, *lbf*	35,880
Uniaxial Compressive Strength, *psi*	11,557

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/14/22

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-206		Bulk/Prep		MC/CS
Sample Depth (ft):	17-18	Tester:	SM	Tester:	SM
Lithological Description:	Limestone	Date:	11/02/22	Date:	11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.6740	4.6750	4.6770	4.6753
Diameter, *in.*	1.9945	1.9935	1.9925	1.9935

Specimen Mass, *g*		Ratio (2.0-2.5)	
Bulk Density, *pcf*	0.0		2.35

Moisture Condition - D2216

Container ID	13
container, *g*	468.1
container + wet rock, *g*	1110.6
container + dry soil, *g*	1106.5
moisture content, *w%*	0.6

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

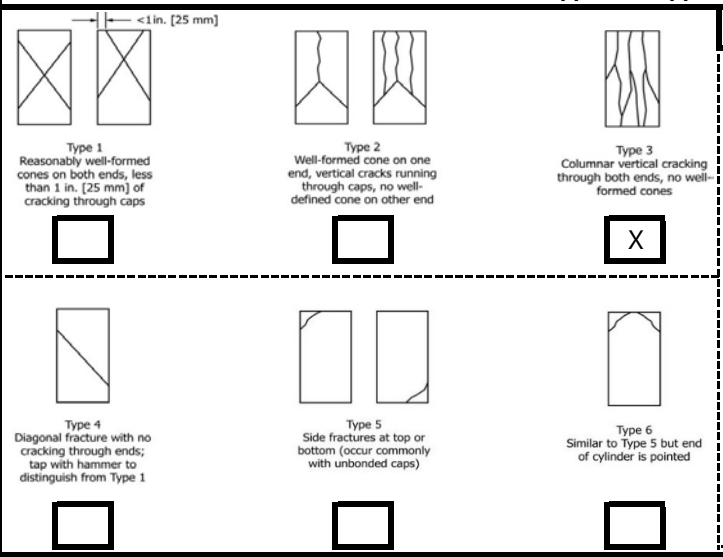
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 34 sec
Load @ Failure, *lbf*	22,725
Uniaxial Compressive Strength, *psi*	7,281

Remarks

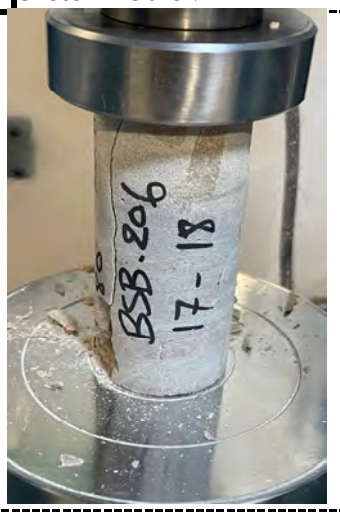
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/15/22

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-206		Bulk/Prep		MC/CS
Sample Depth (ft):	27.5-28.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8055	4.8035	4.8060	4.8050
Diameter, *in.*	1.9885	1.9885	1.9885	1.9885

Specimen Mass, *g*	668.7	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.7	2.42	

Moisture Condition - D2216

Container ID	16
container, *g*	470.4
container + wet rock, *g*	1049.3
container + dry soil, *g*	1041.9
moisture content, *w%*	1.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

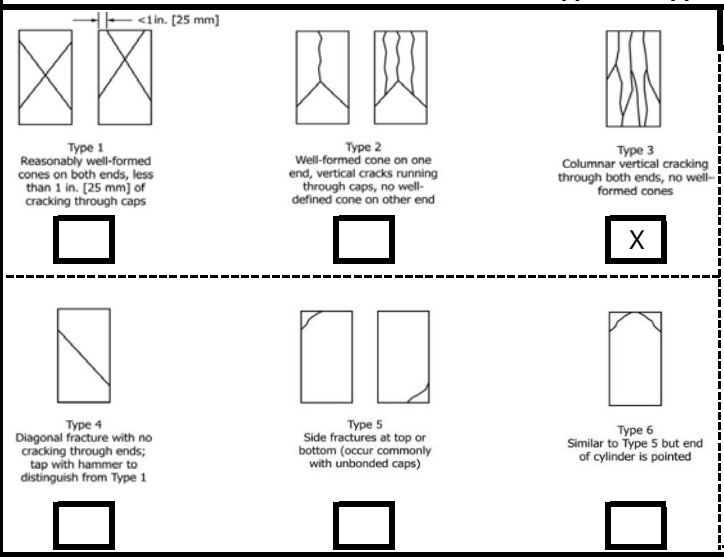
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 44 sec
Load @ Failure, *lbf*	25,994
Uniaxial Compressive Strength, *psi*	8,370

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/15/22

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-206			Bulk/Prep	MC/CS
Sample Depth (ft):	39-40		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical		Angle Drilled: Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.3275	4.3290	4.3260	4.3275
Diameter, *in.*	1.9920	1.9930	1.9935	1.9928

Specimen Mass, *g*	606.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.1	2.17	

Moisture Condition - D2216

Container ID	17
container, *g*	465.7
container + wet rock, *g*	1068.9
container + dry soil, *g*	1062.5
moisture content, *w%*	1.1

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

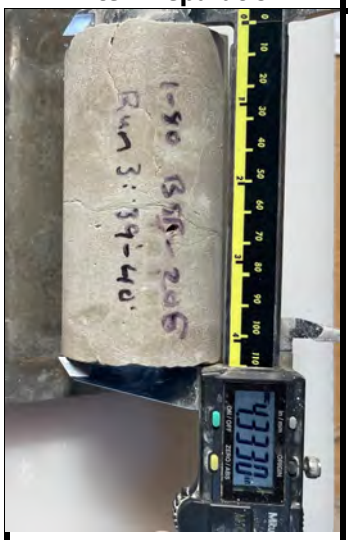
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 27 sec
Load @ Failure, *lbf*	21,333
Uniaxial Compressive Strength, *psi*	6,839

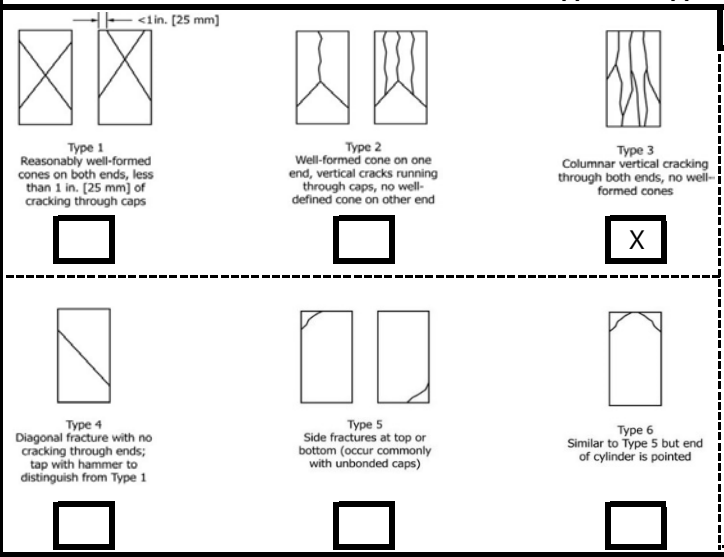
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/14/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-207		Bulk/Prep		MC/CS
Sample Depth (ft):	8-9		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/07/22	Date: 11/07/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9090	4.9130	4.9125	4.9115
Diameter, *in.*	1.9870	1.9875	1.9875	1.9873

Specimen Mass, *g*	686.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.6	2.47	

Moisture Condition - D2216

Container ID	15
container, *g*	469.9
container + wet rock, *g*	1098.1
container + dry soil, *g*	1089.8
moisture content, *w%*	1.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

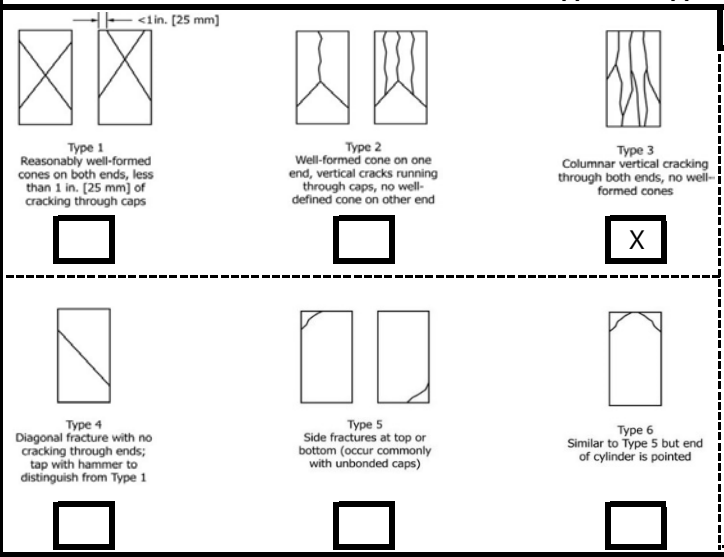
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 42 sec
Load @ Failure, *lbf*	46,578
Uniaxial Compressive Strength, *psi*	15,016

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/23/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-207		Bulk/Prep		MC/CS
Sample Depth (ft):	14-15		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/07/22	Date: 11/07/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9035	4.8980	4.9055	4.9023
Diameter, *in.*	1.9870	1.9860	1.9880	1.9870

Specimen Mass, *g*	694.8	Ratio (2.0-2.5)	
Bulk Density, *pcf*	174.2	2.47	

Moisture Condition - D2216

Container ID	TWIX
container, *g*	226.5
container + wet rock, *g*	825.4
container + dry soil, *g*	820.9
moisture content, *w%*	0.8

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

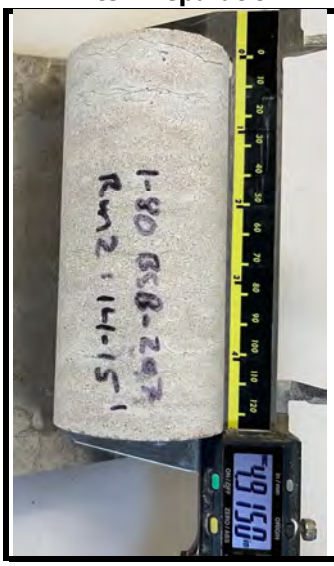
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 35 sec
Load @ Failure, *lbf*	39,304
Uniaxial Compressive Strength, *psi*	12,675

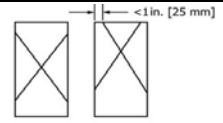
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

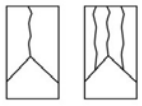
After Preparation



After Break (check applicable appearance)



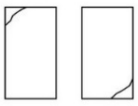
Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps
☐



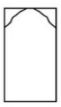
Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones
X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1
☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)
☐



Type 6
Similar to Type 5 but end of cylinder is pointed
☐

☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/23/22

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-207			Bulk/Prep	MC/CS
Sample Depth (ft):	28-29		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/07/22	Date: 11/07/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):	cracks, holes				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.9130	4.9125	4.9145	4.9133
Diameter, *in.*	1.9870	1.9875	1.9885	1.9877

Specimen Mass, *g*	684.3	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.0	2.47	

Moisture Condition - D2216

Container ID	MILK DUD
container, *g*	226.5
container + wet rock, *g*	901.1
container + dry soil, *g*	891.8
moisture content, *w%*	1.4

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

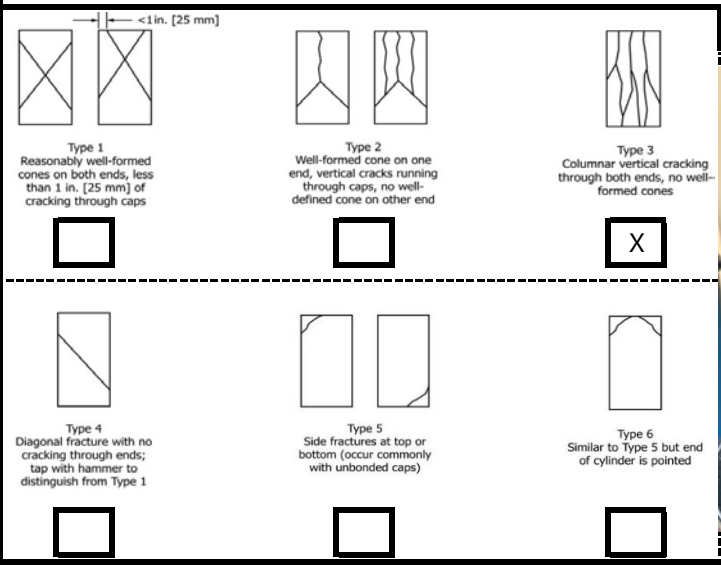
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 37 sec
Load @ Failure, *lbf*	23,618
Uniaxial Compressive Strength, *psi*	7,611

Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/23/22

Order # 958

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-208		Bulk/Prep		MC/CS
Sample Depth (ft):	12.5-13.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/03/22	Date: 11/03/22
Formation Name:		Load Direction:	Vertical		Angle Drilled: Vertical
Appearance (e.g. cracks, shearing, spalling):					

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.3820	4.3805	4.3860	4.3828
Diameter, *in.*	1.9890	1.9900	1.9900	1.9897

Specimen Mass, *g*	608.3	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.1	2.20	

Moisture Condition - D2216

Container ID	KITKAT
container, *g*	226.7
container + wet rock, *g*	821.6
container + dry soil, *g*	811.9
moisture content, *w%*	1.7

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

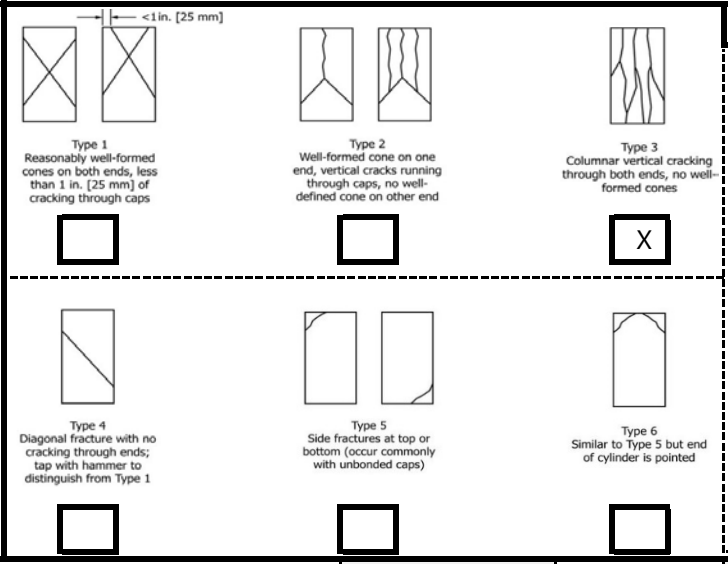
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 36 sec
Load @ Failure, *lbf*	48,569
Uniaxial Compressive Strength, *psi*	15,621

Remarks

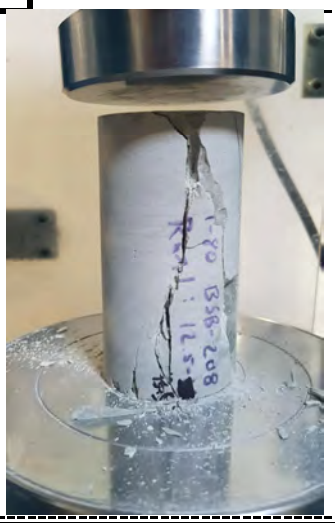
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/14/22

Order # 958

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-208		Bulk/Prep		MC/CS
Sample Depth (ft):	19.5-20		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	11/03/22	Date: 11/03/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.8930	4.9075	4.8935	4.8980
Diameter, *in.*	1.9935	1.9905	1.9905	1.9915

Specimen Mass, *g*	684.5	Ratio (2.0-2.5)	
Bulk Density, *pcf*	170.9	2.46	

Moisture Condition - D2216

Container ID	M&M
container, *g*	226.0
container + wet rock, *g*	794.5
container + dry soil, *g*	786.5
moisture content, *w%*	1.4

Preparation Check

	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?		X	Side surface isn't straight
Ends parallel to each other within 0.25 degrees?	X		

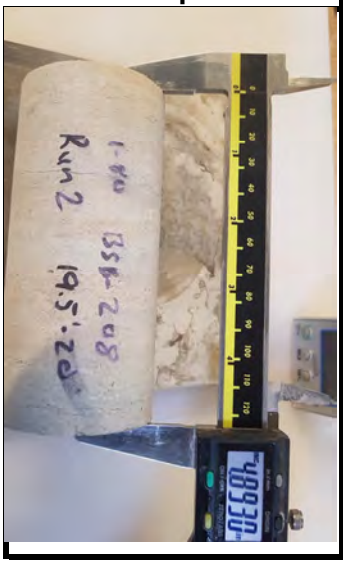
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 44 sec
Load @ Failure, *lbf*	38,053
Uniaxial Compressive Strength, *psi*	12,216

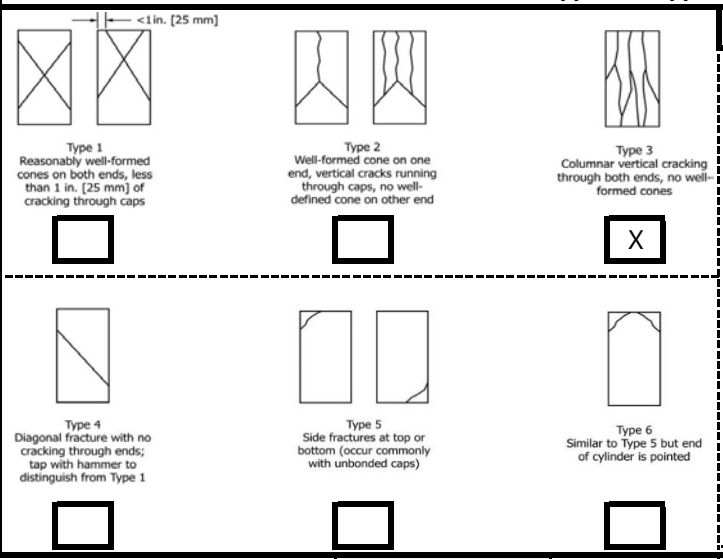
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/14/22

Order # 958

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	BSB-208		Bulk/Prep		MC/CS
Sample Depth (ft):	30.5-31		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/03/22	Date: 11/03/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5940	4.6045	4.5840	4.5942
Diameter, *in.*	1.9890	1.9875	1.9895	1.9887

Specimen Mass, *g*	641.4	Ratio (2.0-2.5)	
Bulk Density, *pcf*	171.3	2.31	

Moisture Condition - D2216

Container ID	MENTOS
container, *g*	226.7
container + wet rock, *g*	810.4
container + dry soil, *g*	803.0
moisture content, *w%*	1.3

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

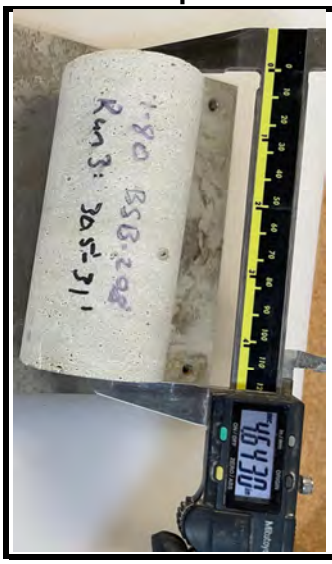
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 56 sec
Load @ Failure, *lbf*	42,448
Uniaxial Compressive Strength, *psi*	13,666

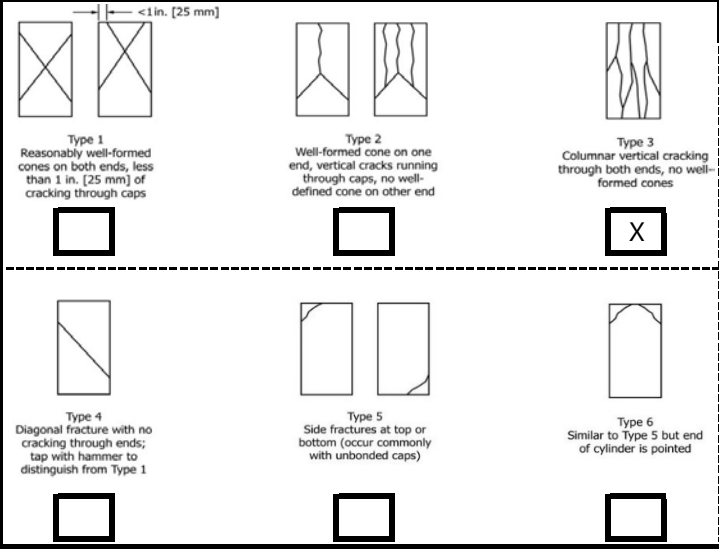
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Sketch if Other:

Form ID	TF-RCS	Reviewed By	SL
Revision Date	10/21/2021	Review Date	11/14/22

APPENDIX E

SEISMIC SITE CLASS DETERMINATION

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====Des Plaines River Bridge

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	518.27	ft.
Pile or Shaft Dia.	6	inches
Boring Number	BSB-27	
Top of Boring Elev.	521.77	ft.
Approximate Fixity Elev.	515.27	ft.

Individual Site Class Definition:

N (bar): 49 (Blows/ft.) Soil Site Class D <----Controls
N_{ch} (bar): 49 (Blows/ft.) Soil Site Class D
s_u (bar): (ksf) NA, H < 0.1*H (Soil)

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	519.3	2.50	18			
	516.8	2.50	8		B	
1.0	514.3	2.50	16			
3.5	511.8	2.50	12			
6.0	509.3	2.50	80		B	
100.0	415.3	94.00	50	5.00	R	

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	517.45	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-25	
Top of Boring Elev.	520.95	ft.
Approximate Fixity Elev.	517.45	ft.

Individual Site Class Definition:

N (bar): 34 (Blows/ft.) Soil Site Class D <----Controls
N_{ch} (bar): 34 (Blows/ft.) Soil Site Class D
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	518.5	2.50	38		B	
1.5	516.0	2.50	18			
4.0	513.5	2.50				
6.5	511.0	2.50	50			
9.0	508.5	2.50	50			
11.5	506.0	2.50	50		R	N & Qu

Substructure 3

Base of Substruct. Elev. (or ground surf for bents)	516.53	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-104	
Top of Boring Elev.	520.03	ft.
Approximate Fixity Elev.	516.53	ft.

Individual Site Class Definition:

N (bar): 30 (Blows/ft.) Soil Site Class D <----Controls
N_{ch} (bar): 30 (Blows/ft.) Soil Site Class D
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	517.5	2.50	54			
1.5	515.0	2.50	18		B	
4.0	512.5	2.50	13			
6.5	510.0	2.50	50			
9.0	507.5	2.50	17			
11.5	505.0	2.50	34			
14.0	502.5	2.50	50		R	N & Qu

Substructure 4

Base of Substruct. Elev. (or ground surf for bents)	509.39	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-208	
Top of Boring Elev.	512.89	ft.
Approximate Fixity Elev.	509.39	ft.

Individual Site Class Definition:

N (bar): 50 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	510.4	2.50	0		B	
1.5	507.9	2.50	50		R	N & Qu

Global Site Class Definition: Substructures 1 through 8

N (bar): 41 (Blows/ft.) Soil Site Class D
N_{ch} (bar): 45 (Blows/ft.) Soil Site Class D <----Controls
s_u (bar): (ksf) NA, H < 0.1*H (Total)

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====Des Plaines River Bridge

Substructure 5

Base of Substruct. Elev. (or ground surf for bents)	508.32	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-203	
Top of Boring Elev.	511.82	ft.
Approximate Fixity Elev.	508.32	ft.

Individual Site Class Definition:

N (bar): _____ (Blows/ft.) NA
N_{ch} (bar): _____ (Blows/ft.) NA
s_u (bar): _____ (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	509.3	2.50	50	3.00	R	

Substructure 6

Base of Substruct. Elev. (or ground surf for bents)	516.22	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-206	
Top of Boring Elev.	519.72	ft.
Approximate Fixity Elev.	516.22	ft.

Individual Site Class Definition:

N (bar): 21 (Blows/ft.) Soil Site Class D <----Controls
N_{ch} (bar): 21 (Blows/ft.) Soil Site Class D
s_u (bar): _____ (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	517.2	2.50	18	0.40	B	
1.5	514.7	2.50	11		B	
4.0	512.2	2.50	6			
6.5	509.7	2.50	50		R	N & Qu

Substructure 7

Base of Substruct. Elev. (or ground surf for bents)	537.5	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-05	
Top of Boring Elev.	541	ft.
Approximate Fixity Elev.	537.5	ft.

Individual Site Class Definition:

N (bar): 50 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): _____ (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	538.5	2.50	18		B	
1.5	536.0	2.50	50		R	N & Qu

Substructure 8

Base of Substruct. Elev. (or ground surf for bents)	531.46	ft.
Pile or Shaft Dia.		inches
Boring Number	BSB-110	
Top of Boring Elev.	534.96	ft.
Approximate Fixity Elev.	531.46	ft.

Individual Site Class Definition:

N (bar): 51 (Blows/ft.) Soil Site Class C <----Controls
N_{ch} (bar): 50 (Blows/ft.) Soil Site Class D
s_u (bar): _____ (ksf) NA, H < 0.1*H (Soil)

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary	
	532.5	2.50	18			
1.5	530.0	2.50	56	0.50	B	
4.0	527.5	2.50	50		B	
6.5	525.0	2.50	50		R	N & Qu

APPENDIX F

SOIL AND ROCK PARAMETERS

Table F-1 –Soil and Rock Parameters Table - West Abutment (BSB-01, 02, 03)

(B-SA) for Slope Stability Analysis and LPile Analysis - Soil

Elevation (feet)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained		Parameters for p-y Curve Method		
			Cohesion c (psf)	Friction Angle ϕ (°)	Cohesion c (psf)	Friction Angle ϕ (°)	p-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
596.1*-557	New Engineered Granular Fill	125	0	30	0	30	Sand	90	NA
557-547	Medium Stiff to Very Stiff Silty Clay	133	1,200	0	120	28	Stiff Clay w/o Free water	750	0.007
547-545	Loose to Medium Dense Sand/Sand Fill	134	0	30	0	30	Sand	20	NA
545-543	Medium Stiff Silty Clay	127	800	0	80	27	Soft Clay	100	0.01
543-542	Very Dense Sand/Gravel with Sand	149	0	45	0	45	Sand	225	NA

*This is the average surface elevation at the EB and WB west abutments based on GPE dated 2/7/2024.

(B-SA) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
542-537	(Sedimentary) Dolomites	165	11,700	9	0.17	35 - 50	$4{,}690 \times 10^3$
537-528			15,100				

* Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Table F-2 –Soil and Rock Parameters Table - East Abutment (BSB-29, 30, 31)

(B-NA) for Slope Stability Analysis and LPile Analysis - Soil

Elevation (feet)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained		Parameters for p-y Curve Method		
			Cohesion c (psf)	Friction Angle ϕ (°)	Cohesion c (psf)	Friction Angle ϕ (°)	p-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
568.6*-523.5	New Engineered Granular Fill	125	0	30	0	30	Sand	90	NA
568.6*-523.5	New Engineered Cohesive Fill	125	1,000	0	50	25	Stiff Clay w/o Free water	500	0.01
523.5-517.5	Stiff Silty Clay/Silty Clay Fill	120	1,500	0	150	28	Stiff Clay w/o Free water	750	0.007
517.5-514.5	Very Dense Sand and Gravel	130	0	45	0	45	Sand	225	NA

*This is the average surface elevation at the EB and WB abutments based on GPE dated 2/7/2024.

(B-NA) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
514.5-511.5	(Sedimentary) Dolomites	165	4,300	9	0.17	40 - 45	$5{,}052 \times 10^3$
511.5-508			18,600				
508-498.5			20,400				

* Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Table F-3 - Soil and Rock Parameters Table - Pier 1 (BSB-04, 05, 06)

(B-P1) for LPile Analysis - Soil

Elevation (feet)	Soil Description	Effective Unit Weight γ' (pcf)	Cohesion c (psf)	Friction Angle ϕ (°)	Parameters for p-y Curve Method		
					P-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
540.5*-537.5	Soft to Stiff Silty Clay	72.6	1,500	0	Soft Clay	750	0.007
537.5-536	Very Dense Sand	87.6	0	45	Sand	225	NA

*This is the surface elevation at the pier based on GPE dated 6/30/2025

(B-P1) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
536-526	(Sedimentary) Dolomites	165	17,000	9	0.17	30	$5{,}950 \times 10^3$
526-519							

* Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Bedrock Properties used for Drilled shaft Calculation Using IDOT Spreadsheet

Top of Bedrock Elevation (feet)	GSI	Rock Condition	Joint Type	Rock Intact
536	30 - 35	Normal	Closed	Yes

Notes: The unconfined compressive strength (qu) and RQD value in the rock core log are used in the calculation.
Joint Type based on review of rock core samples; representative of the average condition observed along the rock core.

Table F-4 Soil and Rock Parameters Table- Pier 3 (BSB-201, 202, 205, 206)

(B-P2) for LPile Analysis - Soil

	Elevation (feet)	Soil Description	Effective Unit Weight γ' (pcf)	Cohesion c (psf)	Friction Angle ϕ (°)	Parameters for p-y Curve Method		
						P-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
WB	516.5*-510.5	Soft to Stiff Silty Clay	58.6	500	0	Soft Clay	100	0.01
EB	519.5-514.5	Soft to Stiff Silty Clay	58.6	500	0	Soft Clay	100	0.01
EB	514.5-509	Medium Dense Gravel	52.6	0	33	Sand	20	NA

*This is the bottom of river elevation at the Pier 3

(B-P2) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
510-500	(Sedimentary) Dolomites	165	11,300	9	0.17	40	$4{,}247 \times 10^3$
500-490			12,900				
490-480			12,200				

* Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Bedrock Properties used for Drilled shaft Calculation Using IDOT Spreadsheet

Top of Bedrock Elevation (feet)	GSI	Rock Condition	Joint Type	Rock Intact
510	40 - 45	Normal	Closed	Yes

Notes: the unconfined compressive strength (qu) and RQD values in the rock core log are used in the calculation.
Joint Type based on review of rock core samples; representative of the average condition observed along the rock core.

Table F-5 Soil and Rock Parameters Table - Pier 4 (BSB-203, 204, 207, 208)

(B-P2) for LPile Analysis - Soil

Elevation (feet)	Soil Description	Effective Unit Weight γ' (pcf)	Cohesion c (psf)	Friction Angle ϕ (°)	Parameters for p-y Curve Method		
					P-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
512*-510	Soft to Stiff Silty Clay	58.6	500	0	Soft Clay	100	0.01

*This is the bottom of river elevation at the Pier 4

(B-P2) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
510-500	(Sedimentary) Dolomites	165	14,600	9	0.17	40	$4{,}252 \times 10^3$
500-490			11,100				
490-480			10,200				
480-470			12,700				

* Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Bedrock Properties used for Drilled shaft Calculation Using IDOT Spreadsheet

Top of Bedrock Elevation (feet)	GSI	Rock Condition	Joint Type	Rock Intact
510	40 - 45	Fractured	Open	No

Notes: the unconfined compressive strength (qu) and RQD values in the rock core log are used in the calculation.
Joint Type based on review of rock core samples; representative of the average condition observed along the rock core.

Table F-6 Soil and Rock Parameters Table - Pier 5 (*BSB-11 to 14*) (BSB-103, 106)

(B-P3) for LPile Analysis - Soil

	Elevation (feet)	Soil Description	Effective Unit Weight γ' (pcf)	Cohesion c (psf)	Friction Angle ϕ (°)	Parameters for p-y Curve Method		
						P-y Curve Type in LPile	Coefficient of Subgrade Modulus (k_{py}, pci)	Horizontal Strain Factor ε_{50}
WB	520-515	Loose to Medium Dense Sand/Gravel	52.6	0	30	Sand	20	NA
WB	515-511.5	Medium Stiff Silty Clay	58.6	500	0	Soft Clay	100	0.01
EB	518.5-512	Medium Dense to Dense Sand/Gravel	62.6	0	36	Sand	60	NA

(B-P3) for LPile Analysis – Rock, P-y Curve Massive Rock

Elevation (feet)	Selected Rock Type	Effective Unit Weight (pcf)	Uniaxial Compressive Strength (psi)	Hoek-Brown material index*, m_i	Poisson's Ratio	GSI	Intact Rock Modulus (psi)
512-508	(Sedimentary) Dolomites	165	9,500	9	0.17	30	$3{,}325 \times 10^3$
508-483.5							

***** Hoek-Brown material index, mi, is a dimensionless number depends on the type of rock used by LPile program.

Bedrock Properties used for Drilled shaft Calculation Using IDOT Spreadsheet

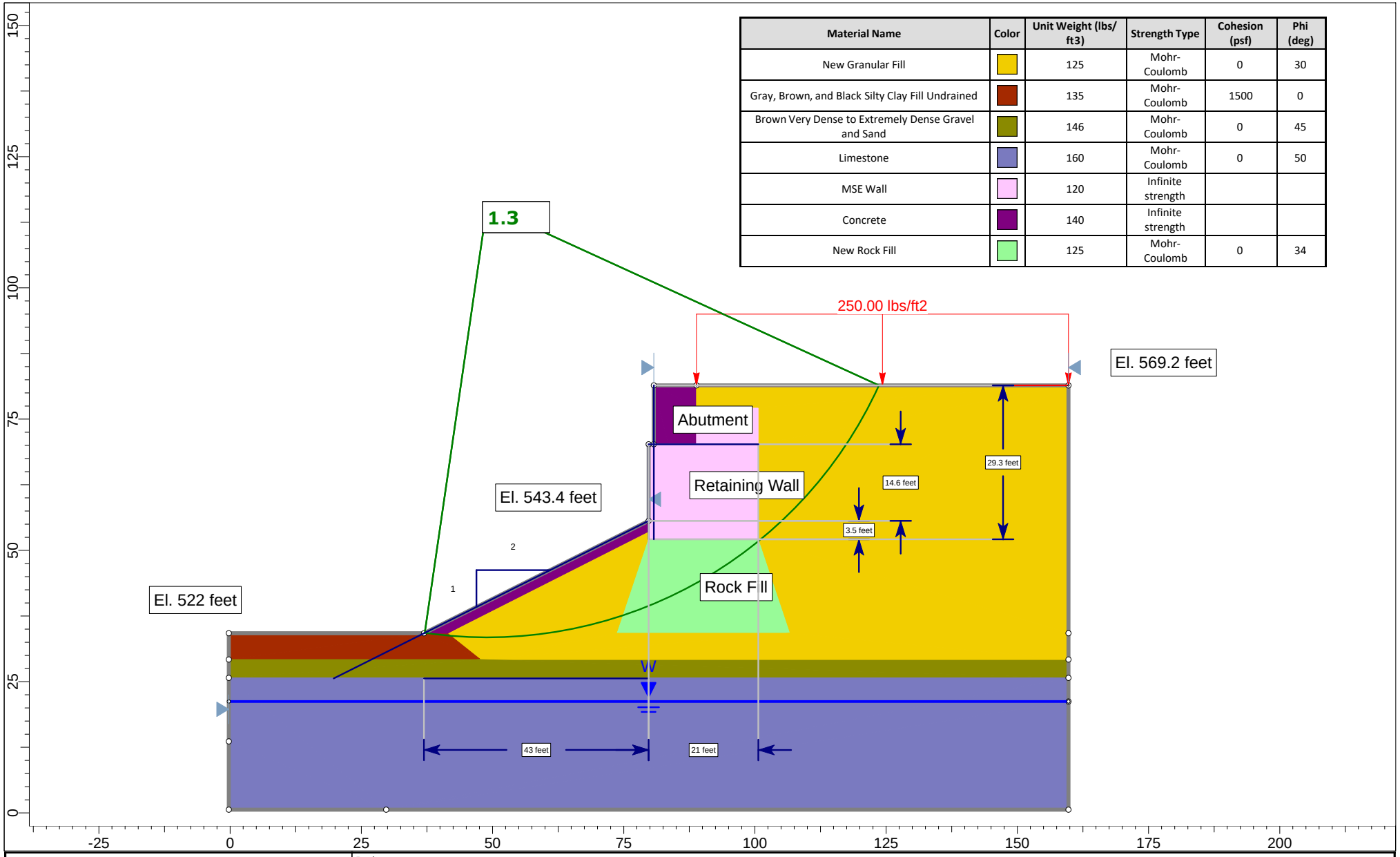
Top of Bedrock Elevation (feet)	GSI	Rock Condition	Joint Type	Rock Intact
512	30	Fractured	Open	No

Notes: the unconfined compressive strength (qu) and RQD values in the rock core log are used in the calculation.
Joint Type based on review of rock core samples; representative of the average condition observed along the rock core.

APPENDIX G

SLOPE STABILITY ANALYSIS EXHIBITS

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Gray, Brown, and Black Silty Clay Fill Undrained		135	Mohr-Coulomb	1500	0
Brown Very Dense to Extremely Dense Gravel and Sand		146	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

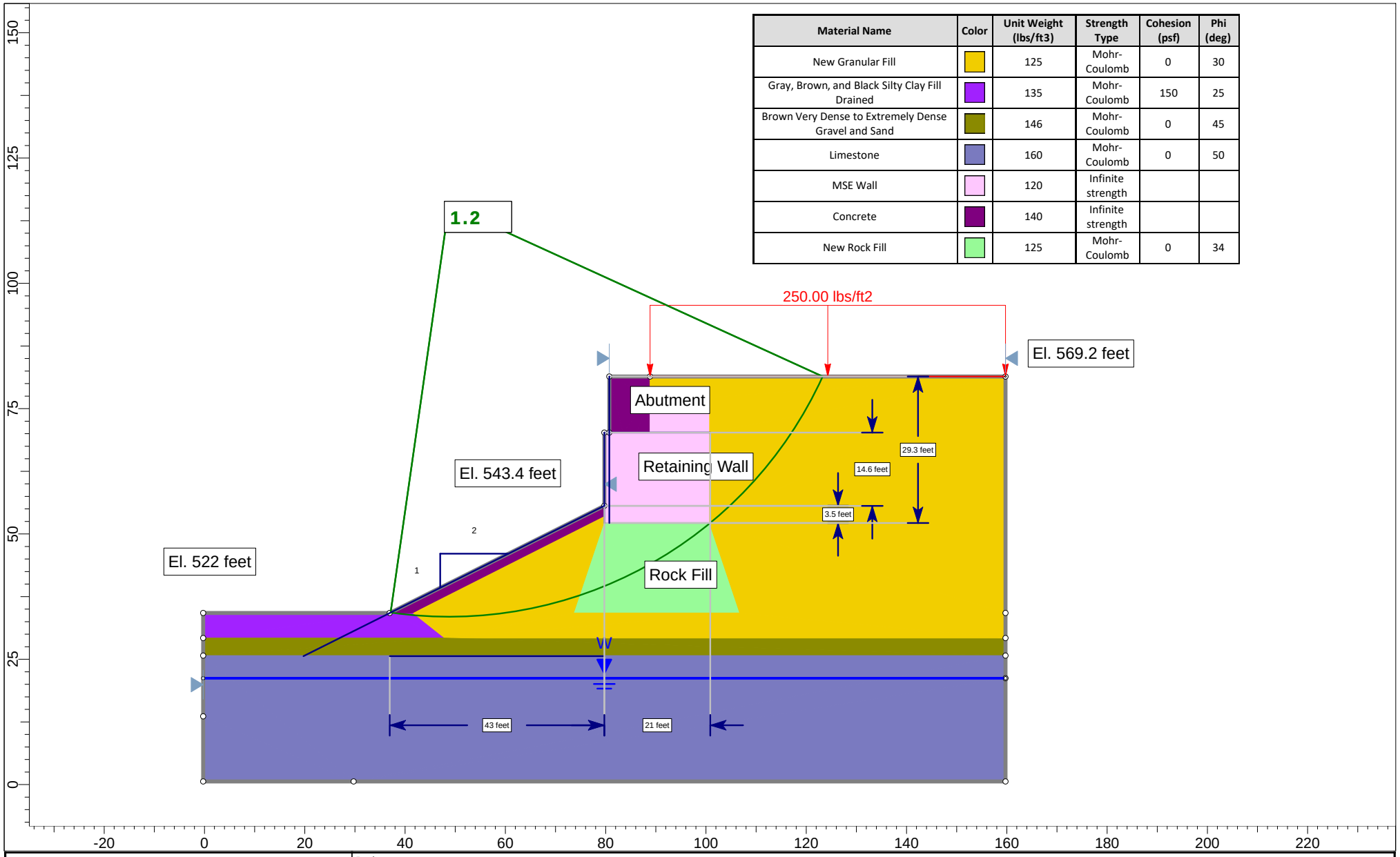


GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - East Abutment		
Group	0.7H	Scenario	Short Term Stability - Water El. 509 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	east BSB-29, 30, 31 with MSE wall.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Gray, Brown, and Black Silty Clay Fill Drained		135	Mohr-Coulomb	150	25
Brown Very Dense to Extremely Dense Gravel and Sand		146	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

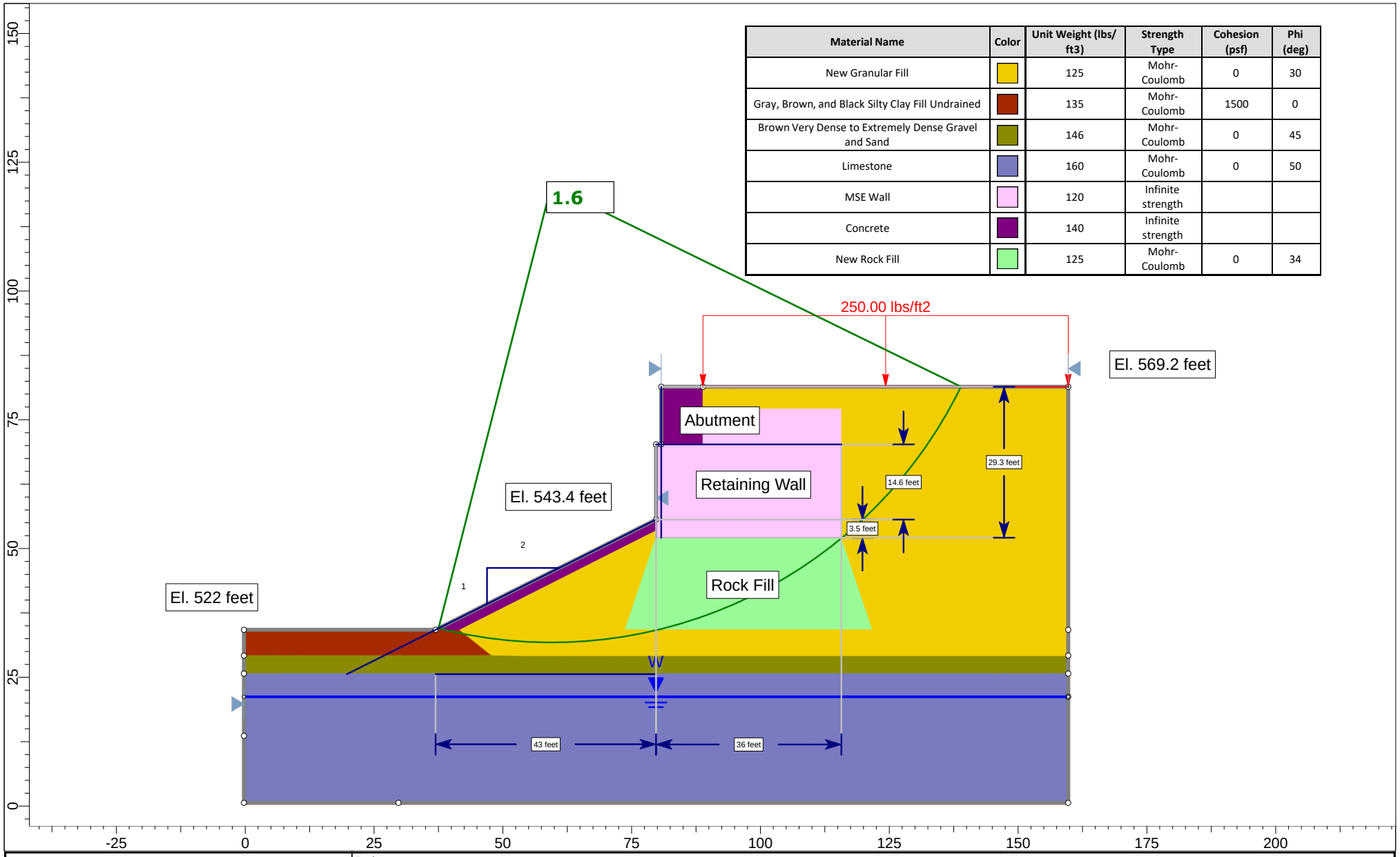


GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - East Abutment		
Group	0.7H	Scenario	Long Term Stability - Water El. 509 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	east BSB-29, 30, 31 with MSE wall.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Gray, Brown, and Black Silty Clay Fill Undrained		135	Mohr-Coulomb	1500	0
Brown Very Dense to Extremely Dense Gravel and Sand		146	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

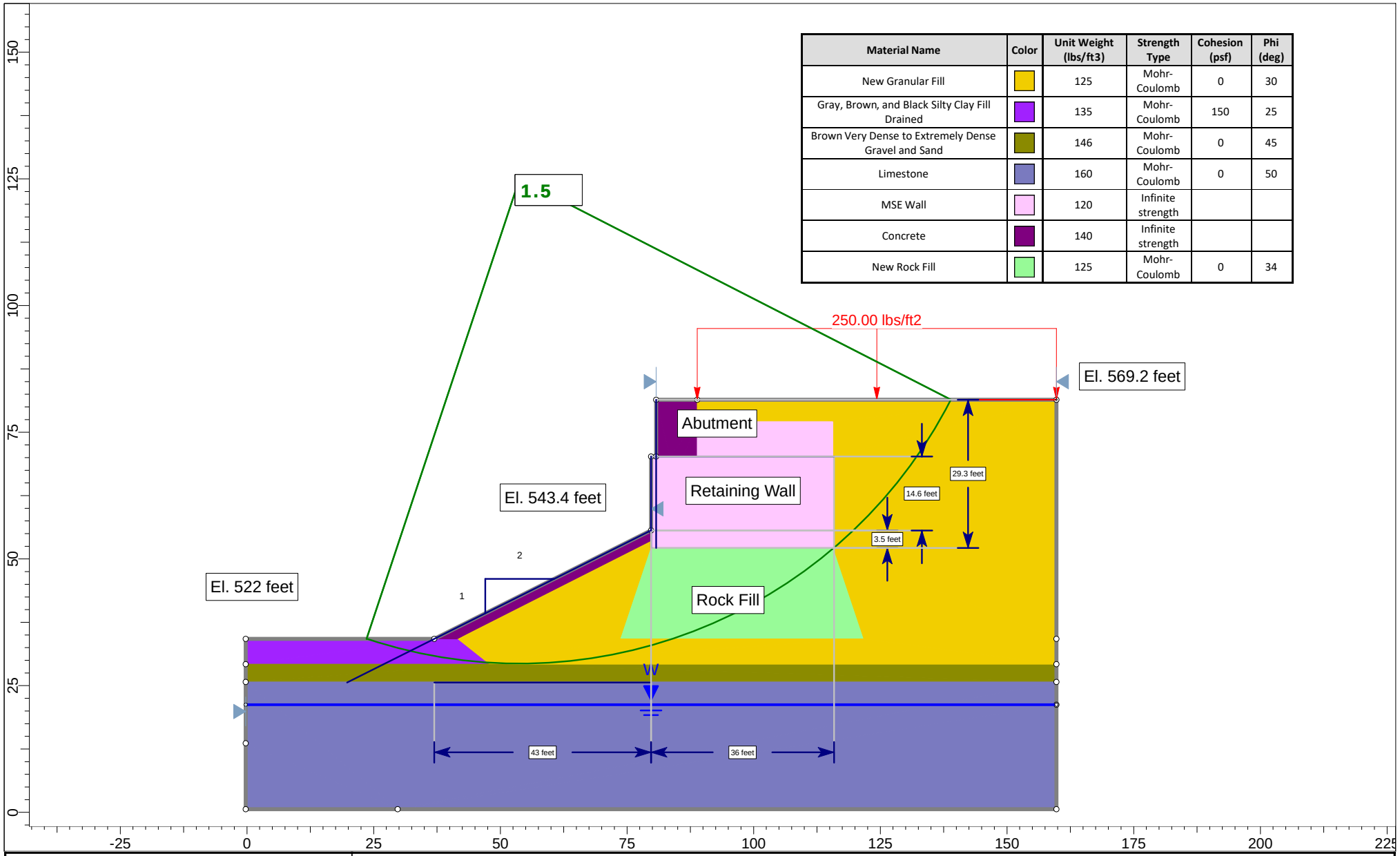


GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - East Abutment		
Group	1.2H	Scenario	Short Term Stability - Water El. 509 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	east BSB-29, 30, 31 with MSE wall.slmd

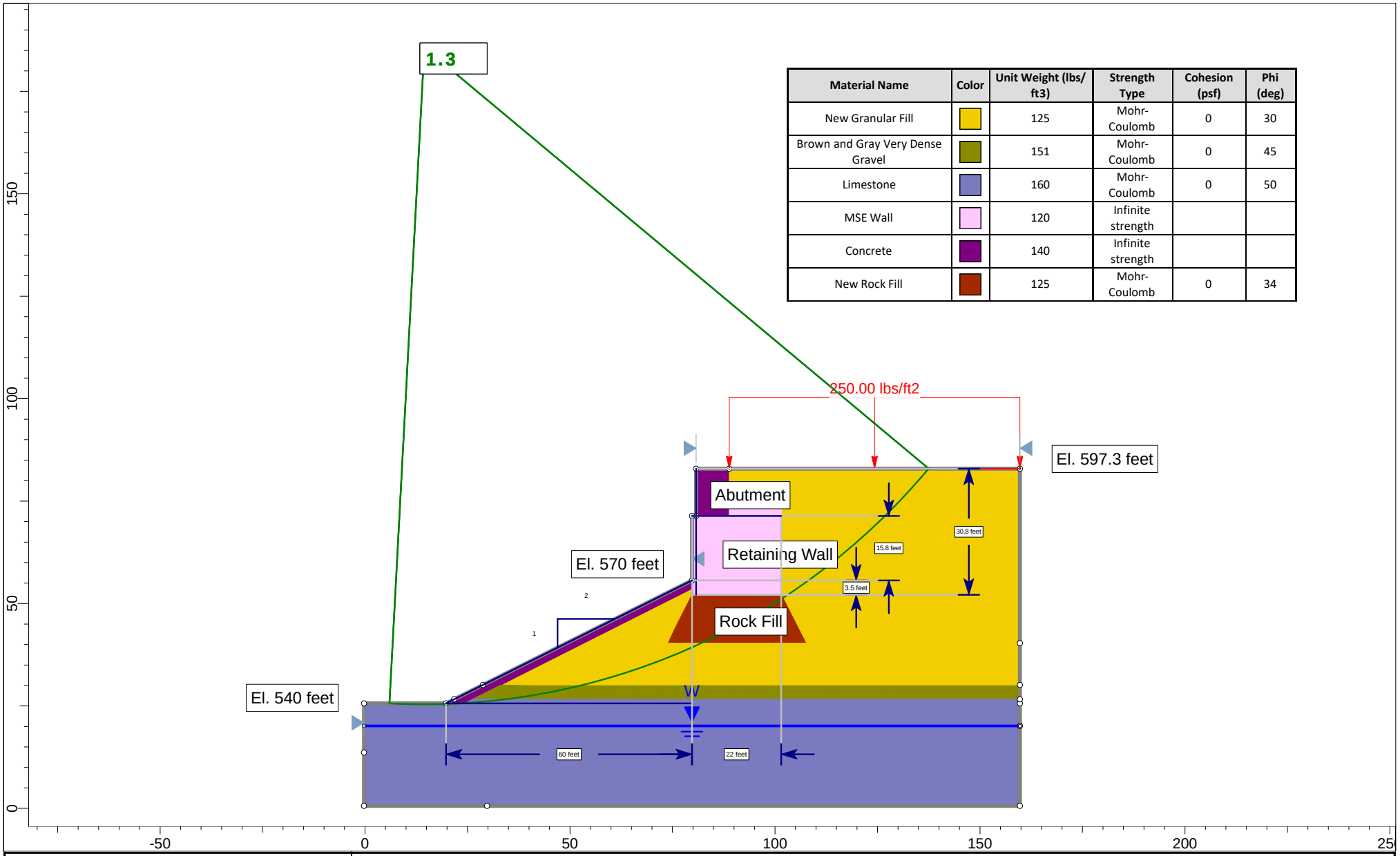
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Gray, Brown, and Black Silty Clay Fill Drained		135	Mohr-Coulomb	150	25
Brown Very Dense to Extremely Dense Gravel and Sand		146	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34



GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - East Abutment		
Group	1.2H	Scenario	Long Term Stability - Water El. 509 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	east BSB-29, 30, 31 with MSE wall.slmd

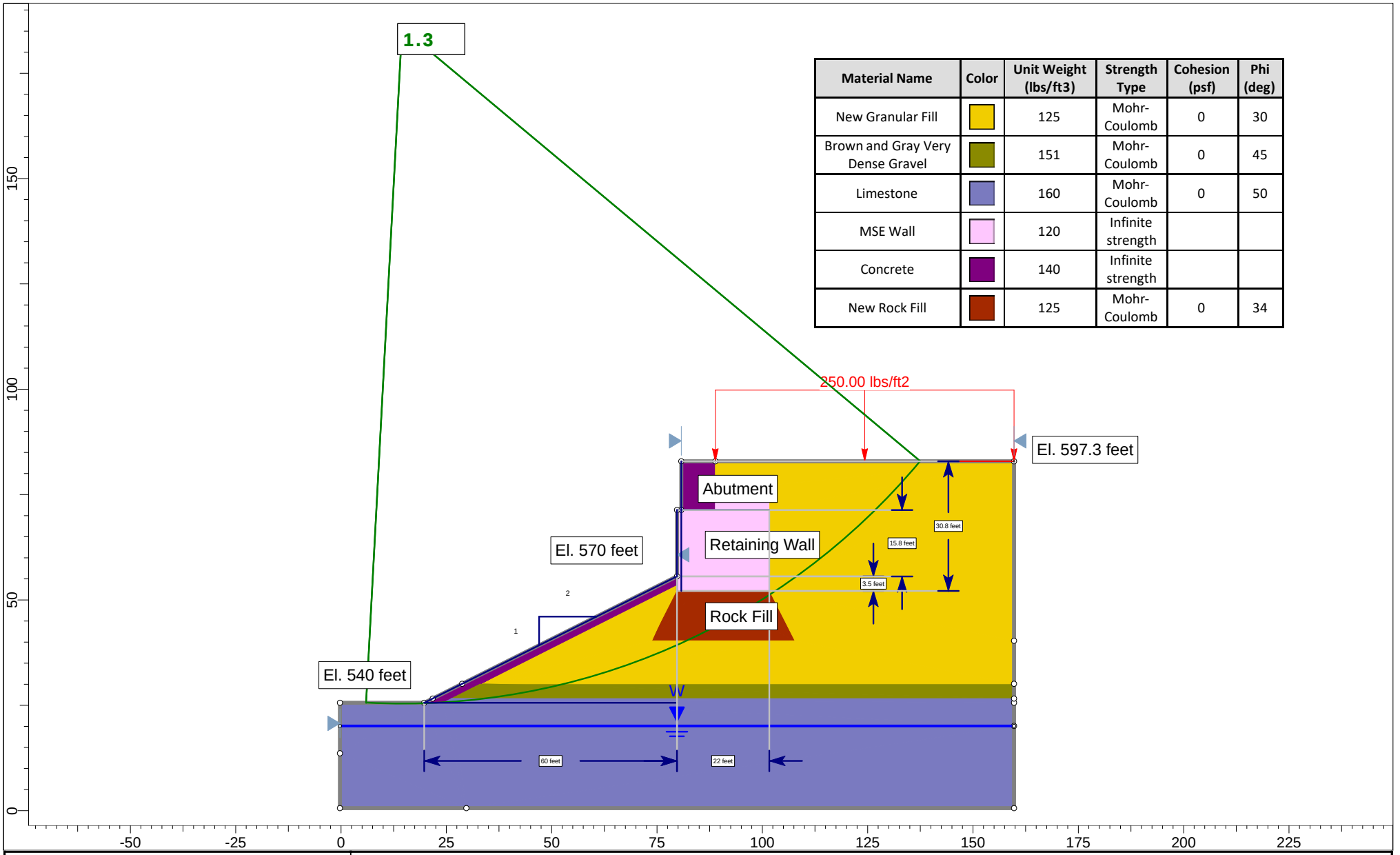


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Brown and Gray Very Dense Gravel		151	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - West Abutment		
Group	0.7H	Scenario	Short Term Stability - Water El. 534.5 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	west BSB-1, 2, 3 with MSE wall.slmd

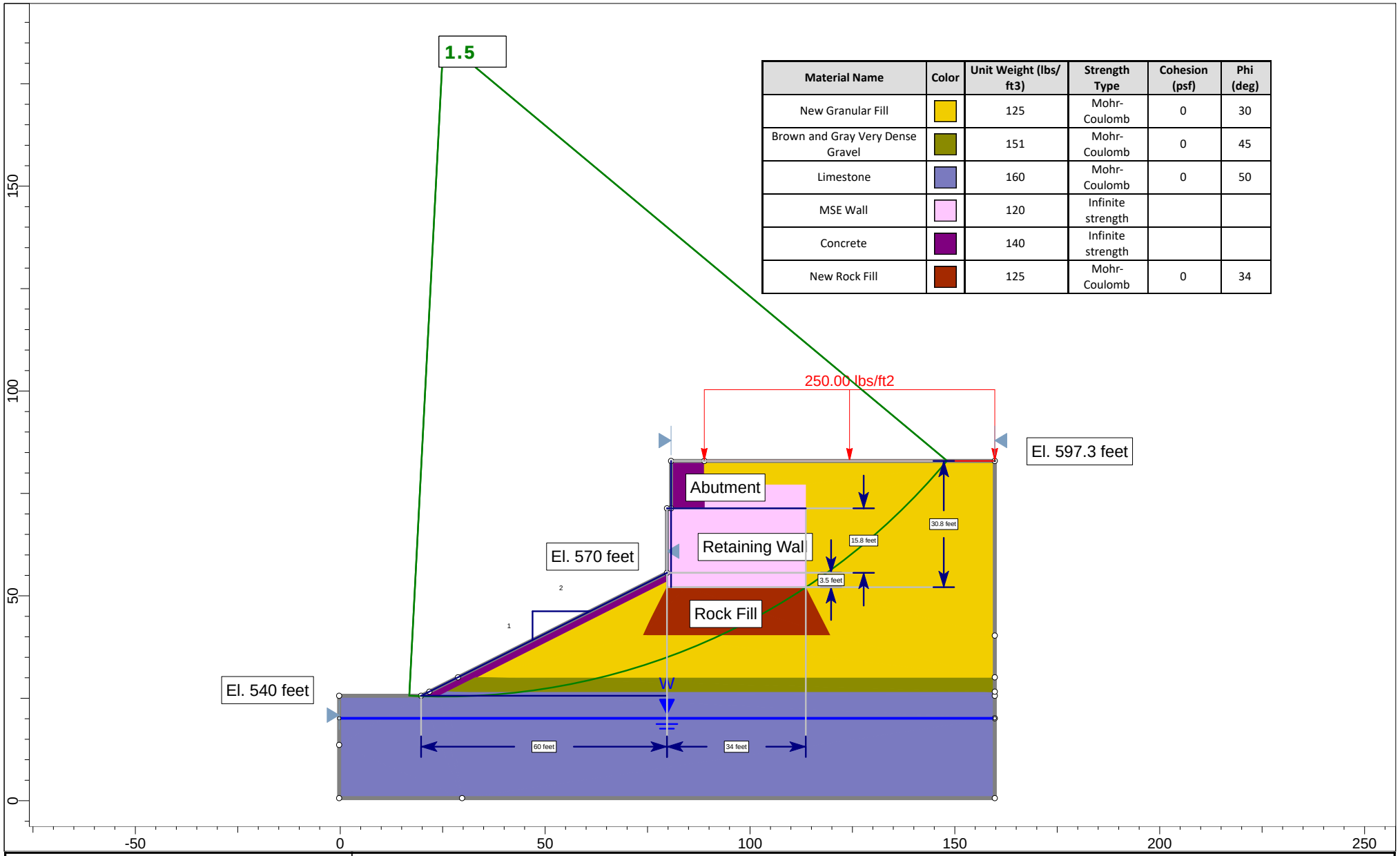


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Brown and Gray Very Dense Gravel		151	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - West Abutment		
Group	0.7H	Scenario	Long Term Stability - Water El. 534.5 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	west BSB-1, 2, 3 with MSE wall.slmd

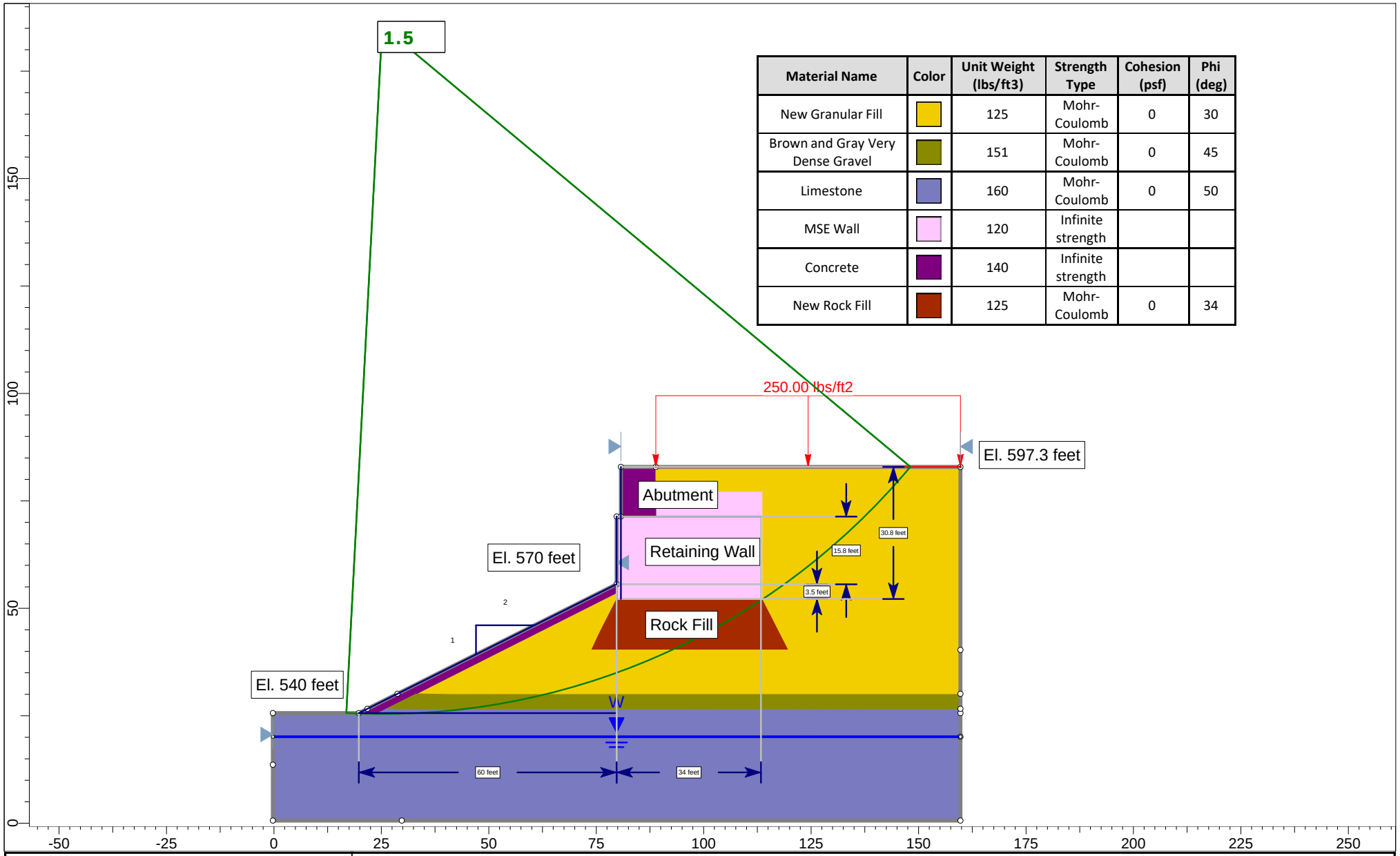


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Brown and Gray Very Dense Gravel		151	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - West Abutment		
Group	1.1H	*Scenario*	Short Term Stability - Water El. 534.5 feet
Drawn By	RM	*Company*	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	*File Name*	west BSB-1, 2, 3 with MSE wall.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Granular Fill		125	Mohr-Coulomb	0	30
Brown and Gray Very Dense Gravel		151	Mohr-Coulomb	0	45
Limestone		160	Mohr-Coulomb	0	50
MSE Wall		120	Infinite strength		
Concrete		140	Infinite strength		
New Rock Fill		125	Mohr-Coulomb	0	34

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

SLIDEINTERPRET 9.025

Project	I-80 over Des Plaines River - West Abutment		
Group	1.1H	Scenario	Long Term Stability - Water El. 534.5 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	west BSB-1, 2, 3 with MSE wall.slmd