Structural Geotechnical Report

Proposed Retaining Wall #1
SN: 099-W123
IDOT PTB 198-003
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.
Engineers. Scientists. Construction Managers
735 Remington Road, Schaumburg IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

December 9, 2022
Updated May 15, 2025

GSG CONSULTANTS, INC.

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

May 15, 2025

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

Structural Geotechnical Report
Proposed Retaining Wall #1
FAI-80 over Des Plaines River Bridge
Will County, IL
PTB 198-003

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 foundation and construction recommendations. The site investigation for the proposed retaining wall included advancing twenty-one (21) soil borings to depths between 14 and 24.25 feet.

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

Sincerely,

Matthew Heron, P.E.
Project Engineer

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

GSG

TABLE OF CONTENTS

Exhibits

Tables

Appendices

Structural Geotechnical Report
Proposed Retaining Wall #1
SN: 099-W123
Will County, Illinois
IDOT PTB 198-003

1.0 INTRODUCTION

GSG Consultants, Inc. (GSG) completed a geotechnical investigation for the proposed retaining wall #1 as part of the FAI-80 over Des Plaines project 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 develop design and construction recommendations for the proposed retaining wall. **Exhibit 1** shows the general project location.

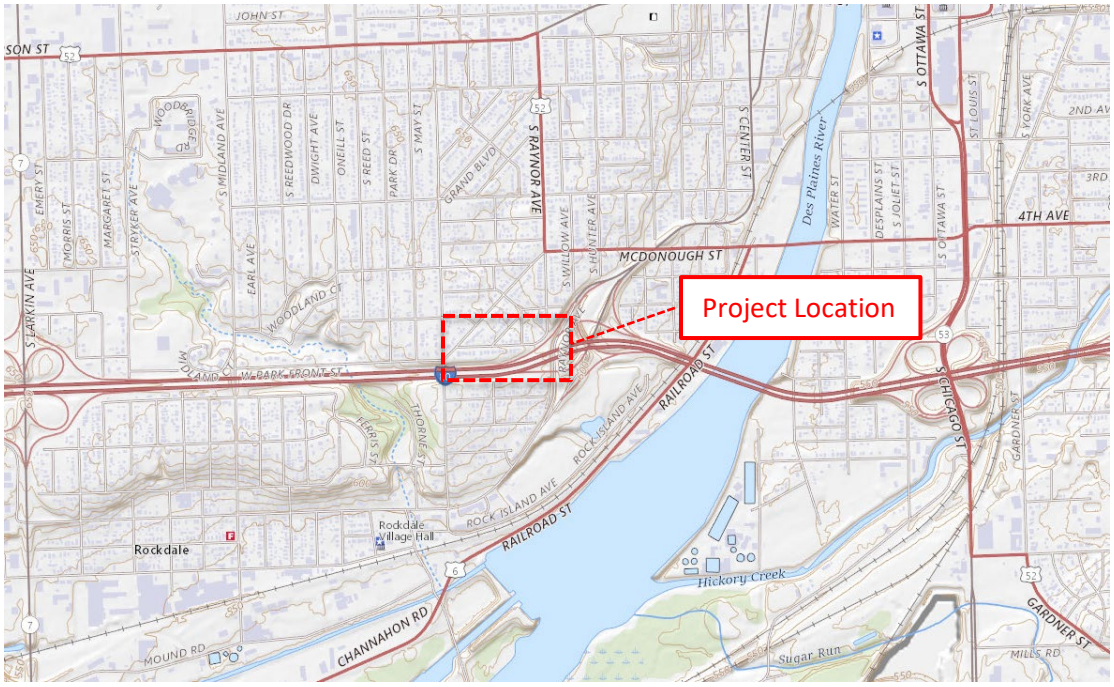


Exhibit 1 – Project Location Map
(Source: USGS Topographic Maps, usgs.gov)

1.1 Existing Conditions

The proposed improvements at this location will shift the existing Ramp D and I-80 westbound alignment to the north by approximately 25 to 30 feet between Center Street and Wheeler Avenue requiring the proposed retaining wall to separate the roadway from the adjacent residential area. According to the proposed Phase 1 plan drawings provided, the proposed retaining wall will primarily be a “cut” section of the existing project location. The area where the

proposed wall will be constructed is within the IDOT Right-of-Way, between I-80 and the neighboring residential area to the north. **Exhibits 2a, 2b and 2c** show the existing conditions where the proposed retaining wall will be constructed.

Exhibit 2a – Existing I-80 Westbound, Looking East

Exhibit 2b – Existing Ramp D, Looking Southwest

Exhibit 2c – Proposed Project Area, Aerial

1.2 Proposed Retaining Wall Information

Based on Phase I design information provided and a review of site topography, the proposed wall will be in a predominantly "cut" section along the new roadway alignment, with a maximum exposed wall height of up to approximately 13.2 feet, and maximum retained height of 15.2 feet. The proposed retaining wall will be approximately 934 feet in length. It is anticipated that the proposed structure will be a soldier pile wall. Current plans also show an 18-inch diameter new sewer to be installed near the front face of a section of the proposed wall between Station 14+00 and 20+09.19.

A retaining wall is proposed for this location as shown on the General Plan & Elevation (GPE) dated 5/20/24 (**Appendix A)**. **Table 1** presents a summary of the proposed structure.

Table 1 – Retaining Wall Summary

Wall Name	Wall Stations*	Approximate Length (ft)	Maximum Anticipated Exposed Wall Height (ft)
Retaining Wall #1	Sta. 10+53.73 LT to Sta. 20+03.46 LT	934.0	13.2

* Based on proposed I-80 Stationing

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 and Laboratory Testing

The site subsurface exploration for the proposed retaining wall structure was initially conducted between April 28 and May 2, 2022, with additional borings (RWB-01A, RWB-03A, RWB-07A, RWB-07B, RWB-09A, RWB-11A, RWB-11B and RWB-13A) conducted on November 8, 2022 and between June 20 and 21, 2023. The investigations included advancing twenty-one (21) borings along the proposed alignment to depths between 14.0 and 24.25 feet. Borings RWB-13, RWB-14 and RWB-16 were terminated upon encountering difficult drilling conditions and auger refusal prior to reaching the specified boring depth of 20 feet. Six borings included 10-foot bedrock cores to confirm the bedrock depth and condition. The locations of the soil borings were adjusted in the field as necessary based on utilities and access. 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 2** presents a summary of the borings used for the proposed retaining wall analysis.

Table 2 – Summary of Subsurface Exploration Borings

Boring ID	Station †	Offset (ft) †	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-03	643+59.69	77.69	1764872.249	1046935.340	20.0	617.38
RWB-03A	643+90.68	77.05	1764873.793	1046966.493	23.5**	617.50
RWB-04	644+34.46	78.60	1764876.134	1047010.014	20.0	618.10
RWB-05	10+75.66	81.61	1764883.409	1047086.760	20.0	618.29
RWB-06	11+54.81	80.47	1764889.128	1047162.907	20.0	618.30
RWB-07	12+34.12	78.55	1764896.728	1047239.118	20.0	618.53
RWB-07A	12+58.95	74.06	1764895.805	1047263.517	24.0**	618.50
RWB-07B	12+34.12	78.55	1764896.728	1047239.118	33.5*	618.95
RWB-08	13+7.78	72.61	1764902.047	1047310.396	20.0	618.60
RWB-09	13+85.31	63.93	1764907.777	1047385.911	20.0	618.48
RWB-09A	13+85.31	63.93	1764907.777	1047385.911	33.5*	618.26

Boring ID	Station †	Offset (ft) †	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-10	14+63.57	59.79	1764920.678	1047461.073	20.0	618.19
RWB-11	15+41.23	59.21	1764939.45	1047534.359	20.0	617.48
RWB-11A	15+41.23	59.21	1764939.450	1047534.359	23.5**	617.48
RWB-11B	15+41.23	59.21	1764939.45	1047534.359	32.5*	616.70
RWB-12	16+21.54	60.96	1764963.681	1047608.731	20.0	616.14
RWB-13	17+2.51	62.49	1764990.594	1047683.481	18.5**	614.34
RWB-13A	17+2.51	62.49	1764990.594	1047683.481	29.5*	614.34
RWB-14	17+81.19	71.19	1765024.682	1047754.921	17.5**	612.69
RWB-15	18+48.48	82.38	1765057.389	1047814.789	24.25*	611.29
RWB-16	19+27.13	101.22	1765101.049	1047882.862	14.0**	609.52
RWB-17	19+90.16	120.55	1765140.032	1047936.028	23.0*	608.27

* Depth includes Bedrock Core (10 feet)

** Terminated upon encountering practical auger refusal

† Based on proposed I-80 Stationing

Copies of the Soil Boring Logs are provided in **Appendix C**.

The soil borings were drilled using truck mounted Diedrich D-50 (hammer efficiency 96%), Mobile B-57 (hammer efficiency 89%), and CME-75 (hammer efficiency 91%, 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 or auger refusal on bedrock. 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 asphalt where necessary to match the existing pavement.

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 and were placed in jars and returned to the laboratory for further testing and evaluation.

Upon encountering auger refusal on bedrock, GSG collected rock cores from six (6) boring 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, and 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 on the numeric value as indicated in **Table 3**.

Table 3 – Rock Quality Designation Summary

Rock Quality Designation (RQD)	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 engineering properties of the subsurface soils encountered in the area. The following laboratory tests were performed on representative soil and rock samples:

- Moisture content – ASTM D2216 / AASHTO T-265
- Atterberg Limits – ASTM D4318 / AASHTO T-89 / AASHTO T-90
- 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 shown along with the field test results in the Soil Boring Logs **(Appendix C)** and in the Laboratory Results (**Appendix D)**.

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 retaining wall. 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. 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.

The surface elevations of the borings ranged between 608.3 and 619.0 feet. The borings initially encountered between 3 and 14 inches of asphalt pavement. Beneath the surficial pavement, brown and gray silty clay fill materials were generally encountered to depths of 1 to 8 feet. Beneath the silty clay fill, light brown sand and gravel fill materials were encountered in three of borings to depths of 8 to 10 feet. No fill materials were observed below the pavement in the remaining borings.

Beneath the fill materials, the borings encountered medium stiff to very hard silty clay. The clay was generally brown towards the eastern end of the retaining wall and gray towards the western end of the retaining wall. The clay was encountered to depths of 11 to 21 feet (elevations 595.7 to 604.8 feet). The borings generally encountered brown and light brown sand and gravel with limestone fragments until either top of bedrock (elevation 594.0 to 597.0 feet) or the boring termination depths of 20 feet. Bedrock was encountered upon encountering auger refusal in the borings at depths ranging from 13 to 24 feet (elevations 593.9 to 597.0 feet).

Overall, the native brown silty clay had unconfined compressive strengths between 0.5 tsf and 9.6 tsf with an average strength of 5.1 tsf. The native gray silty clay had unconfined compressive strengths between 0.5 tsf and 7.9 tsf with an average strength of 2.9 tsf. The native light brown sand with gravel had SPT blow count (N) values ranging from 24 blows per foot to 50 blows per 4 inches with an average value of 33 blows per foot.

Rock core samples were collected in six (6) of the boring locations. The bedrock cores generally consisted of light gray limestone, with heavy weathering and high levels of fracturing. Unconfined compressive strength tests were completed on representative samples of the rock cores in two (2) of the borings. **Table 4** provides the RQD values and unconfined compression strength values of the rock cores collected. Photographs of the cores are included with each boring log in **Appendix C**.

Table 4 – Rock Core Summary and Classification

Boring Number	Length (ft)	Core Depth (feet)	Type of Rock	RQD (%)	RQD Description	Depth (ft)/ Compressive Strength (psi)
RWB-07B	10	23.5 – 33.5	Limestone	26.0	Poor	n/a
RWB-09A	10	23.5 – 33.5	Limestone	36.0	Poor	n/a
RWB-11B	10	22.5 – 32.5	Limestone	15.0	Very Poor	n/a
RWB-13A	10	19.5 – 29.5	Limestone	16.0	Very Poor	n/a
RWB-15	10	14.25 – 24.25	Limestone	13.3	Very Poor	22.0/8,040
RWB-17	10	13.0 – 23.0	Limestone	22.0	Very Poor	21.5/8,713

2.4 Groundwater Conditions

Water levels were checked in each boring to determine the general groundwater conditions present at the site and were measured while drilling and after each boring was completed. Water was observed between elevations of 606.5 and 615.0 feet in borings RWB-02, RWB-03 RWB-7B and RWB-09, which appears to be perched water within the granular fill zones. Groundwater was not encountered during or immediately after drilling in the remaining borings. None of the borings were left open after leaving the site due to safety concerns.

Based on the observed water levels and soil color change from brown to gray, it is anticipated that the long-term groundwater level may be at an approximate elevation of 597.5 feet towards the eastern end of the retaining wall, to between elevations 605.0 and 612.5 feet towards the western end of the retaining wall. Perched water may also be present within the fill materials observed at the surface of the borings. Water level readings were made in the boreholes at times and under conditions shown on the boring logs and stated in the text of this report. However, it should be noted that fluctuations in groundwater level may occur due to variations in the rainfall,

other climatic conditions, or other factors not evident at the time measurements were made and reported herein.

3.0 GEOTECHNICAL ANALYSES

This section provides GSG's geotechnical analysis for the design of the proposed retaining wall and embankment based on the results of the 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 Settlement

Based on the GPE dated 5/20/24 (**Appendix A**), the retaining wall will be primarily a cut section. It is anticipated that minimal fill will be required to construct the proposed retaining wall. Therefore, there is no anticipated settlement due to new embankment fill.

3.2 Seismic Parameters

The seismic hazard for the site was analyzed per 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 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.

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 each of the proposed structures. For this section of the project, the S_{DS} and the S_{D1} were determined using 2020 AASHTO Guide Specifications as shown in **Table 5**. Given the site location and materials encountered, the potential for liquefaction is minimal.

Table 5 – 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 WALL DESIGN RECOMMENDATIONS

This section provides retaining wall design parameters including recommendations on foundation type, bearing capacity, settlement, and lateral earth pressures. The foundations for the proposed retaining walls must provide sufficient support to resist the dead and live loads, as well as seismic loading.

4.1 Retaining Wall Type Recommendations

It is anticipated that the proposed retaining wall will be constructed predominantly within a cut section. There are various types of retaining walls that could be utilized for retaining earthen pressures in cut areas. This section discusses several earth retaining structures that could be used for the proposed project. Based on the proposed grading, the proposed wall will be in a cut area, adjacent to the proposed roadway. Several typical wall types are described in the section below.

4.1.1 Sheet Pile Walls

Sheet pile walls are typically used in cut areas when continuous support must be provided to maintain existing structures or other adjacent facilities. This type of wall can also be covered with CIP panels for aesthetics. The installation of sheet pile walls requires the use of specialty equipment to drive the piles into the ground. As the retaining walls will predominately not be in excess of 15 feet in height, tie-backs will likely not be required for design.

4.1.2 Soldier Pile and Lagging Walls

Soldier pile and lagging walls are typically used in cut areas where the existing ground surface needs to be maintained during construction or when a near vertical excavation is needed. The wall may be constructed with driven steel piles or steel piles placed in drilled holes and backfilled with concrete. The depth of the soldier pile is normally estimated to be two times the wall exposed height.

4.1.3 Recommended Wall Type

Based on the GPE plans and location of the wall within a predominantly cut area, a soldier pile wall may be considered for this project. The Phase 1 design plans indicate that the wall location would require cutting into the base of the existing embankment along a portion of the alignment.

GSG evaluated the global and external stability, and settlement to determine the suitability of the retaining wall for this section of the project. The wall section should be analyzed to determine that adequate factors of safety relative to sliding and overturning failure.

4.2 Retaining Wall Design Recommendations

The engineering analyses performed for evaluation of the retaining wall options followed the current AASHTO Load and Resistance Factor Design (LRFD) Methodology as required by IDOT. LRFD methodology incorporates the use of load factors and resistance factors to account for uncertainty in applied loads and load resistance of structure 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 be evaluated with respect to the collision load. **Table 6** 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 6 - 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	

4.2.1 Lateral Earth Pressures and Loading

The wall should be designed to withstand earth and live lateral earth pressures. The lateral earth pressures on retaining walls depend on the type of wall (i.e. restrained or unrestrained), the type of backfill and the method of placement against the wall, and the magnitude of surcharge weight on the ground surface adjacent to the wall. The active earth pressure coefficient (Ka), and the passive earth pressure coefficient (Kp) were determined in accordance with AASHTO Section 3.11.5.3 and 3.11.5.4. **Table 7** presents the soil design properties for the retaining wall for the anticipated soil types at the site, and provide recommended lateral soil modulus and soil strain parameters that can be used for laterally loaded pile analysis via the p-y curve method based on the encountered subsurface conditions. Additional soil parameters for the site are included in **Appendix F.**

Table 7 – Lateral Soil Parameters

Depth Range (Elevation, feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
0.5 to 4.0 618.0 to 614.5	Brown and Gray Silty Clay Fill	0.41	2.46	0.58	1,000	0.005	Stiff Clay w/o free water (Reese)
4.0 to 13.0 614.5 to 605.5	Medium Stiff to Very Hard Brown Silty Clay	0.32	3.12	0.48	2,000	0.004	Stiff Clay w/o free water (Reese)
13.0 to 23.5 605.5 to 595.0	Medium Stiff to Hard Gray Silty Clay	0.32	3.12	0.48	1,000	0.005	Stiff Clay w/o free water (Reese)
3.5 to 8.5 615.0 to 610.0 (RWB-02, RWB-03 and RWB-09 only)	Light Brown and Brown Sand with Gravel Fill	0.20	5.04	0.33	60	N/A	Sand (Reese)
19.0 to 20.0 599.5 to 598.5 (RWB-01, RWB-02, RWB-12, RWB-13 and RWB-15 only)	Medium Dense to Very Dense Light Brown and Brown Sand with Gravel	0.20	5.04	0.33	225	N/A	Sand (Reese)

Depth Range (Elevation, feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade	Soil Strain (ε_{50})	Soil Type
18.5 to 20.0 600.0 to 598.5 RWB-04 only	Medium Dense Gray Silt	0.24	4.20	0.38	90	N/A	Sand (Reese)
21.0 to 24.0 597.5 to 594.5 (RWB-01A, RWB-03A, RWB-07A, RWB-11A only)	Loose to Extremely Dense Light Brown and Gray Sand with Silt	0.20	4.20	0.33	125	N/A	Sand (Reese)

*The initial p-y modulus, E_{py} , varies linearly with depth. To obtain E_{py} use the equation $E_{py} = k_{py} * z$, where k_{py} is the coefficient of lateral modulus of subgrade reaction given in the table and z is the distance from the surface to the center point of the layer in inches.

Although not anticipated, 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 (H_{eq}) of soil. **Table 8** provides the equivalent heights of soils for vehicular loadings on retaining walls.

Table 8 - 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 a drainage system to allow movement of any water behind the wall, and not allowing hydrostatic (seepage) pressures to develop in the active soil wedge behind the wall. This could be accomplished by placing a Geocomposite Wall Drain over the entire length of the back face of the wall connected to a perforated drainpipe and backfilling a minimum of 2 feet of free draining materials, Porous Granular Embankment, as measured laterally from the back of the wall. The backfill should be placed in accordance with the IDOT SSRBC.

Heavy compaction equipment should not be allowed 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.

4.3 Soldier Pile and Lagging

Soldier pile walls are generally constructed at 8 to 10-foot centers along the retaining wall alignment into the bearing stratum. The soldier piles could either be driven or drilled. Driving piles is normally less expensive but the designs are limited to H-pile and small W-sections. Drilled soldier piles can utilize larger W-sections, built up plate sections or multiple W-sections. For drilled piles, the pile will be placed into the hole and centered, and the annular space around each pile section will be filled with flowable grout. The lagging and piles should be designed based on structural analysis.

Resistance to lateral movement or overturning of the soldier pile is furnished by passive resistance of the soil below the depth of excavation. The design should include a structural evaluation of the pile section to meet applied shear and moment, and an evaluation of overturning to determine embedment depth and other design requirements. The walls shall be designed to withstand earth and live lateral earth pressures. The lateral earth pressures on retaining walls depend on the type of wall (i.e. restrained or unrestrained), the type of backfill and the method of placement against the wall, and the magnitude of surcharge weight on the ground surface adjacent to the wall. Soldier pile walls are considered flexible and such the earth loads may be calculated using active earth pressure for load above the design grade, and both active and passive earth pressures below the design grade. The active earth pressure coefficient (Ka), and the passive earth pressure coefficient (Kp) are shown in **Table 7**.

The simplified earth pressure distributions shown in Section 3.11.5.6 of the AASHTO Standard Specifications for Highway Bridges could be used for the wall design. **Table 7** also provides recommended lateral soil modulus and soil strain parameters that can be used for laterally loaded pile analysis via the p-y curve method based on the encountered subsurface conditions. The passive resistance in front of the wall should be ignored for the upper 3.5 feet due to

excavation activities and frost-heave conditions. Construction equipment surcharge loads should be added to the lateral earth pressure.

In order to limit wall deflections and provide additional resistance, the soldier pile and lagging retention system could be restrained with tie-back anchors. The soldier pile and lagging retention system restrained with tie-backs will be subjected to apparent earth pressure distributions as described in Section 3.11.5.7 of the AASHTO Standard Specifications for Highway Bridges. For tall retaining walls, the apparent earth pressure will result in greater lateral forces and moments compared to the cantilever design.

Soldier pile and lagging and sheet pile walls over 15 feet in height typically require additional lateral resistance to maintain stability and/or limit wall movements. This lateral resistance can be provided using ground anchors, buried deadmen or soil nails. For highway applications, anchored sheet pile walls are typically less than 33 feet in height due to excessive top of wall deflections, excessive sheet pile bending stresses, and high stresses at the wall-anchor connection. Anchor terminology, minimum anchor length and embedment guidelines are shown in AASHTO Figure 11.9.1-1. Anchor spacing is controlled by many factors including anchor (or deadmen) capacity, temporary (unsupported) cut slope stability, subsurface obstructions in the anchorage zone, and the structural capacity of lagging or facing elements. Performance or proof testing shall be performed on every production anchor in accordance with the requirements in AASHTO Section 11.9.8.1. Excavation shall not proceed more than 3.0 feet below the level of ground anchors until the ground anchors have been accepted by the Engineer. Where backfill is placed behind an anchored wall, either above or around the unbonded length, special designs and construction specifications shall be provided to prevent anchor damage.

4.4 Global Slope Stability

Based on the information provided by WSP, the retaining wall should be designed for external stability of the wall system. The geometry in **Table 9** was used to evaluate the proposed soldier pile wall.

Table 9 – Soldier Pile Wall Description at Station 15+45.83

*Based on drawings provided

Description	Value
Maximum total exposed height of retaining wall	13.2 feet
Assumed embedment length below bottom of concrete facing	13.2 feet
Pile tip elevation – estimated for analysis	599.54 feet

*Additional embedment may be required for lateral pressures and structural design of the wall system

It is understood that the current design has soldier piles extending into the limestone bedrock. Slope stability is not anticipated to be a concern for walls extending into and socketed into the bedrock. The actual wall height should be based on structural analysis performed by a Licensed Structural Engineer in the State of Illinois.

Slide2 is a comprehensive slope stability analysis software used to evaluate the proposed wall for the project based on the limit equilibrium method. The proposed wall was analyzed based on the grading and the soils encountered while drilling. Circular failure analyses were evaluated using the simplified Bishops analyses methods for the proposed wall geometries. Based on the proposed geometry and the soil borings, global stability analyses were performed.

4.4.1 Global Slope Stability Results

Circular failure analyses were evaluated for both a short term (undrained) and long term (drained) condition based on the proposed geometries (**Table 9**) for the proposed soldier pile retaining wall scenario. The analyses were performed at Station 15+45.83. The results of the analyses are shown in **Table 10**.

Table 10 – Retaining Wall Global Slope Stability Analyses Results

Analysis Exhibit	Location	Wall Type	Analysis Type	Factor of Safety	Minimum Factor of Safety
Exhibit 1	Station 15+45.83	Soldier Pile	Circular – Short Term	12.8	1.5
Exhibit 2			Circular – Long Term	4.6	1.5

Based on the analyses performed, the proposed retaining wall design meets the minimum factor of safety of 1.5. Copies of the slope stability analyses are included in the Slope Stability Analyses Exhibits (**Appendix E**).

4.5 Drainage Recommendations

The wall design should include a drainage system to prevent the buildup of hydrostatic forces behind the wall. This could be accomplished with the installation of drainage blankets, geocomposite drainage panels, or gravel drains behind the facing of the wall with outlet pipes below the facing to collect and remove surface water away from the face of the soldier pile wall. If weep holes are to be used, it is recommended that a geocomposite wall drain be placed over the interlocks and area of the weep holes. If drainage is not provided, hydrostatic pressure should be included in the wall design and the horizontal earth pressure should be determined in accordance with AASHTO Article 3.11.3.

5.0 CONSTRUCTION CONSIDERATIONS

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

5.1 Site Preparation

All trees, pavements, vegetation, landscaping, and surface topsoil should be cleared and removed from the vicinity of the proposed foundations. Where possible, the engineer may require proof-rolling of the subgrade with a 35-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the proof-rolling is to locate soft, weak, or excessively wet soils present at the time of construction. Proof-rolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. Any unsuitable materials observed during the evaluation and proof-rolling operations should be undercut and replaced with compacted structural fill and/or stabilized in-place. The possible need for, and extent of, undercutting and/or in-place stabilization required can best be determined by the geotechnical engineer at the time of construction. Once the site has been properly prepared, at grade construction may proceed.

Foundation aggregate fill should not be placed upon wet or frozen subgrade soils. If the subgrade or structural fill becomes frozen, desiccated, wet, disturbed, softened, or loose, the affected materials should be scarified, dried and moisture conditioned, and compacted to the full depth of the affected area or the soils should be removed. Rainfall and runoff can soften soils and affect the load bearing capacity of the soils. All water entering foundation excavation should be removed prior to placement backfill materials above the wall bottom.

5.2 Existing Utilities and Structures

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. 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 the clearing and stripping operations, positive surface drainage should be maintained to prevent the accumulation of water.

5.3 Site Excavation

Site excavations are expected to encounter various types of soils as described in the Subsurface Exploration section of this report. The contractor will be responsible to provide a safe excavation during the construction activities of the project. All excavations should be conducted in accordance with applicable federal, state, and local safety regulations, including, but not limited to the Occupational Safety and Health Administration (OSHA) excavation safety standards. Excavation stability and soil pressures on temporary shoring are dependent on soil conditions, depth of excavations, installation procedures, and the magnitude of any surcharge loads on the ground surface adjacent to the excavation. Excavation near existing structures and underground utilities should be performed with extreme care to avoid undermining existing structures. Excavations should not extend below the level of adjacent existing foundations or utilities unless underpinning or other support is installed. It is the responsibility of the contractor for field determinations of applicable conditions and providing adequate shoring (if needed) for all excavation activities.

5.4 Borrow Material and Compaction Requirements

If borrow material is to be used for onsite construction, it should conform to Section 204 "Borrow and Furnish Excavations" of the IDOT Construction Manual (2021). The fill material should be free of organic matter and debris and should be placed and compacted in accordance with the Construction Manual. Earth-moving operations should be avoided during excessively cold or wet weather to avoid freezing of softening subgrade soils.

5.5 Groundwater Management

Long term groundwater may be at elevations between 595.7 and 612.5 feet. GSG does not anticipate that groundwater related issues occur during construction activity, however, perched water may be encountered within the existing fill materials. If rainwater run-off or groundwater is accumulated at the base of excavations, the contractor should remove 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 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.

6.0 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 retaining wall area. The 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 during 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 and
Elevation

Benchmark: Chiseled "X" on top of SE bolt of Fire Hydrant at south ROW of Jasper St. (in front of 640 Jasper St. address), Elev. 585.86.

Existing Structure: None.

Traffic Control: Entrance ramp traffic from SB Center St. to WB I-80 will be detoured to the west at Larkin Ave.

Salvage: None.

DESIGN STRESSES

FIELD UNITS

f 'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50) Soldier Piles

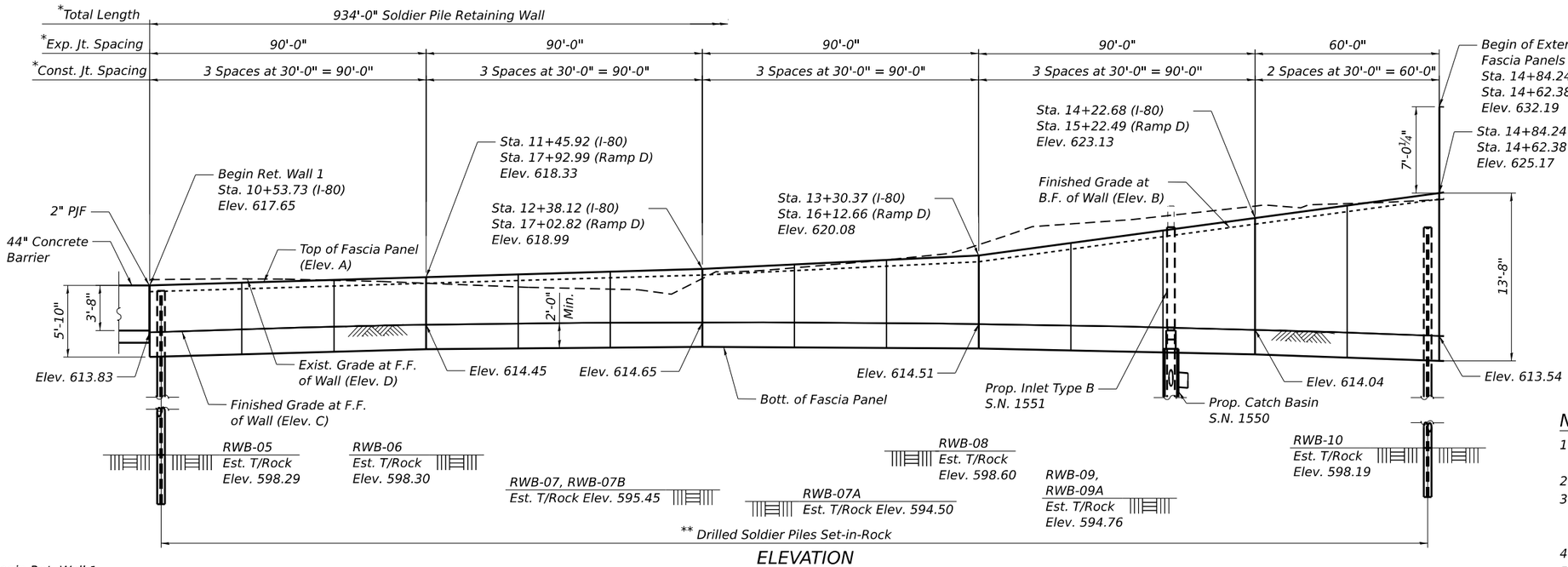
DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

HIGHWAY CLASSIFICATION

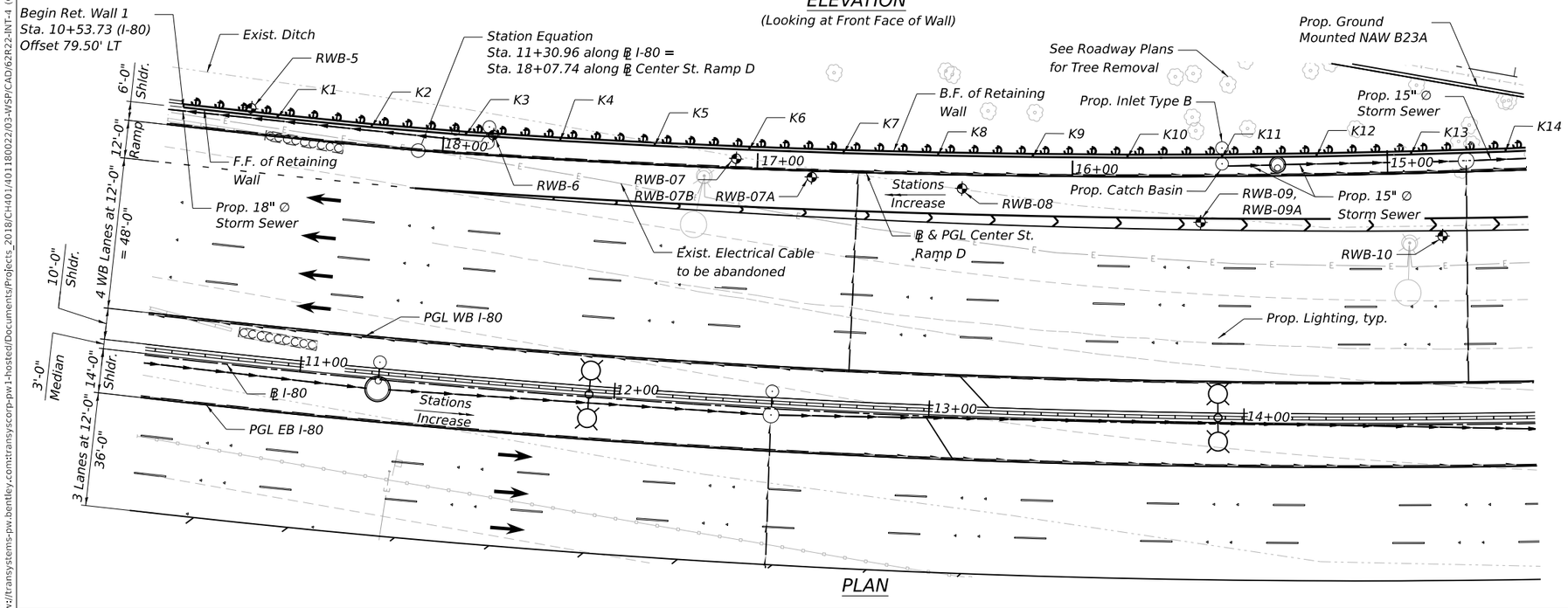
Center Street Ramp D
Functional Class: Interstate
ADT: 1,590 (2017); 2,800 (2040)
ADTT: 49(2017); 87(2040)
DHV: 308 (2040)
Design Speed: 50 m.p.h.
Posted Speed: 50 m.p.h.
1-Way Traffic

F.A.I. Rte. 80 - I-80
Functional Class: Interstate
ADT: 83,640 (2017); 118,200 (2040)
ADTT: 18,828 (2017); 26,607 (2040)
DHV: 13,002 (2032)
Design Speed: 70 m.p.h.
Posted Speed: 70 m.p.h.
2-Way Traffic
Direction Distribution: 50-50



ELEVATION

(Looking at Front Face of Wall)



PLAN

LEGEND

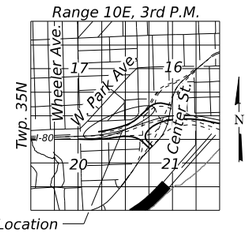
- Exist. Electrical Cable
- Exist. Gas line
- Exist. Aerial line
- Exist. Storm sewer
- Exist. Sanitary Sewer
- Guardrail
- EOP
- ROW
- Fence
- Prop. Storm Sewer
- Prop. Pipe underdrain
- Exist. Lighting
- Prop. Lighting
- Inlet / Catch Basin
- Boring
- Traffic Sign
- F.F. Front Face
- B.F. Back Face

* Measured along F.F. of Wall.

** Pile Section, spacing, tip elevation, shaft diameter and embedment into bedrock to be determined during final design.

NOTES:

1. Stations and offsets are measured from the ℄ I-80 and ℄ Center St. Ramp D to the front face of the cast-in-place concrete facing.
2. Wall to be built along straight chords between construction joints.
3. The Contractor shall exercise extreme caution during wall construction to make sure that construction activities will not have detrimental effects on the adjacent utilities and other facilities.
4. "K1" denotes wall Kink Point - Number 1, at the Front Face of wall.
5. Space soldier piles to miss Pipe underdrains. For Drainage Structures to Pipe Underdrain connection details, see Roadway Plans.
6. For Proposed Inlets Type B and Catch basins Details and quantities, see Roadway Plans.



LOCATION SKETCH

GENERAL PLAN & ELEVATION - I
RETAINING WALL 1
ALONG I-80 & CENTER ST. RAMP D
F.A.I. ROUTE 80
SECTION- FAI 80 21 INTERCHANGE
WILL COUNTY
STA. 10+53.73 TO STA. 14+84.24
STRUCTURE NO. 099-W123

HBM ENGINEERING GROUP, LLC

USER NAME =	DESIGNED - JMI	REVISED -
	CHECKED - MI	REVISED -
PLOT SCALE =	DRAWN - JMI	REVISED -
PLOT DATE =	CHECKED - MI	REVISED -

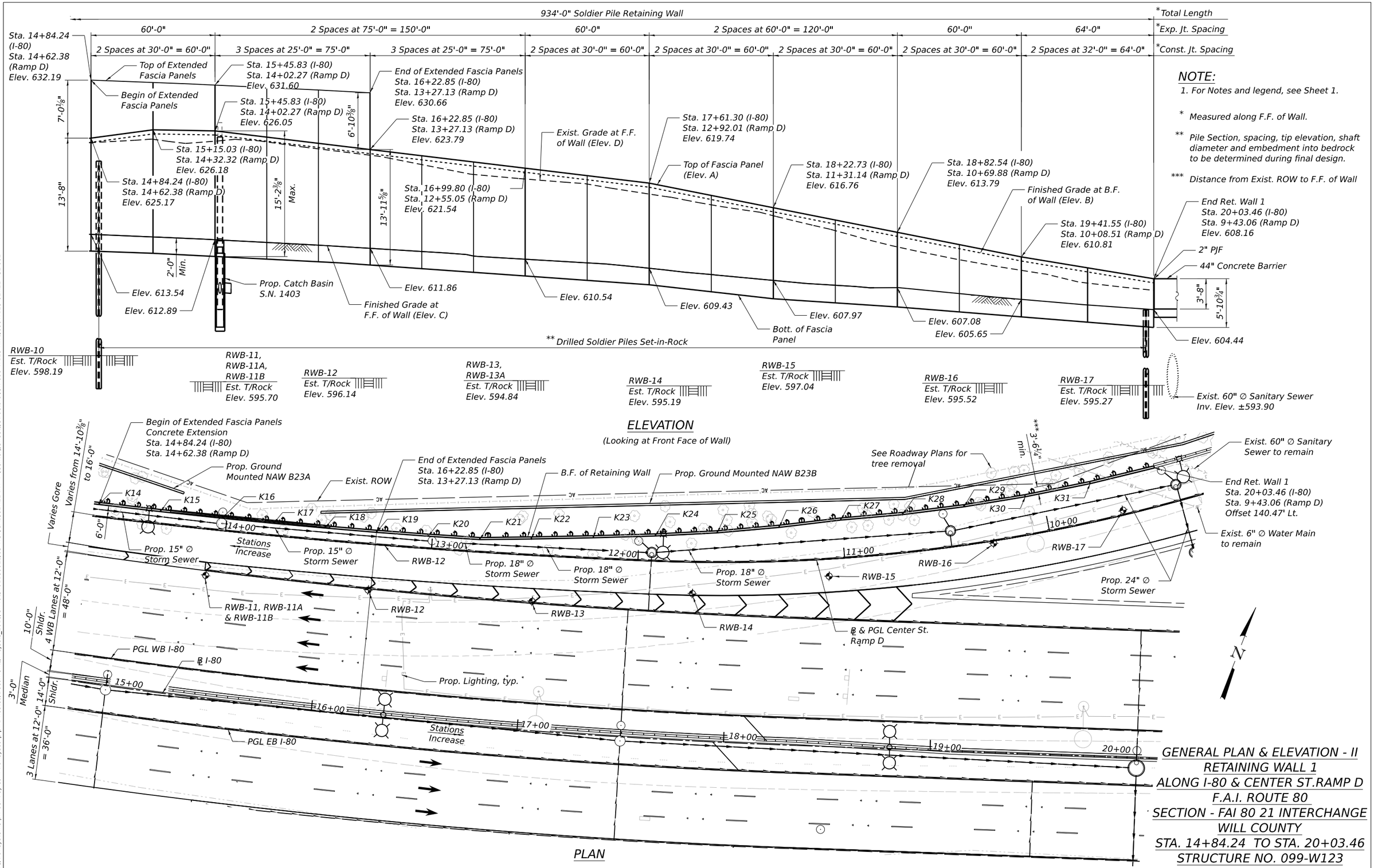
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 5 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	FAI 80 21 INTERCHANGE	WILL	5	1
		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		

MODEL: Default
FILE NAME: pw:\\transystems-pw.bentley.com:transyscorp-pw1-hosted\Documents\Projects_2018\CH401\401180022\03-WSP\CAD\62R22-INT-4 (Center)\Sheets\Structural\SN-099-W123-RW1\099W123-62R22-TSL-001

5/9/2024 1:59:42 PM



GENERAL PLAN & ELEVATION - II
RETAINING WALL 1
ALONG I-80 & CENTER ST.RAMP D
F.A.I. ROUTE 80
SECTION - FAI 80 21 INTERCHANGE
WILL COUNTY
STA. 14+84.24 TO STA. 20+03.46
STRUCTURE NO. 099-W123

HBM ENGINEERING GROUP, LLC

USER NAME =	DESIGNED - JMI	REVISED -
	CHECKED - MI	REVISED -
PLOT SCALE =	DRAWN - JMI	REVISED -
PLOT DATE =	CHECKED - MI	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 5 SHEETS

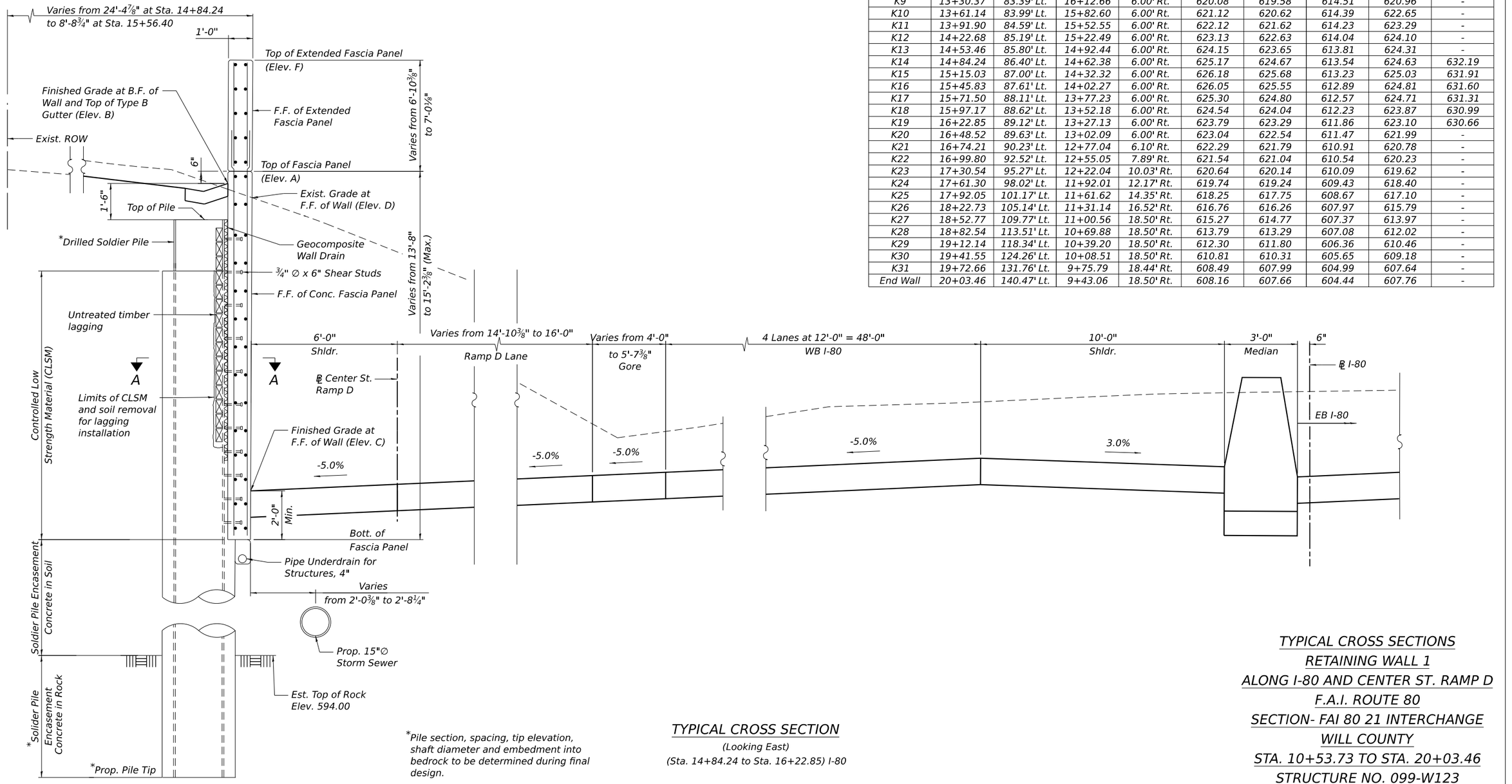
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	FAI 80 21 INTERCHANGE	WILL	5	2
		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/03-WSP/CAD/62R22-INT-4 (Center)/Sheets/Structural/SN-099-W123-RW1/099W123-62R22-TSL-002
5/9/2024 1:59:47 PM

Elevation A - Top of Fascia Panel
Elevation B - Finished Grade at B.F. of Wall
Elevation C - Finished Grade at F.F. of Wall
Elevation D - Exist. Grade at F.F. of Wall
Elevation F - Top of Extended Fascia Panels

TABLE 1 ELEVATIONS

Location	I-80		Ramp D		Elevation A	Elevation B	Elevation C	Elevation D	Elevation F
	Station	Offset	Station	Offset					
Begin Wall	10+53.73	79.50' Lt.	-	-	617.65	617.15	613.83	618.12	-
K1	10+84.46	79.50' Lt.	-	-	617.87	617.37	614.08	618.18	-
K2	11+15.19	79.50' Lt.	-	-	618.10	617.60	614.29	618.07	-
K3	11+45.92	79.79' Lt.	17+92.99	6.00' Rt.	618.33	617.83	614.45	617.83	-
K4	11+76.64	80.39' Lt.	17+62.93	6.00' Rt.	618.55	618.05	614.55	617.54	-
K5	12+07.38	80.99' Lt.	17+32.88	6.00' Rt.	618.77	618.27	614.62	617.36	-
K6	12+38.12	81.58' Lt.	17+02.82	6.00' Rt.	618.99	618.49	614.65	618.21	-
K7	12+68.86	82.18' Lt.	16+72.77	6.00' Rt.	619.36	618.86	614.64	619.08	-
K8	12+99.62	82.78' Lt.	16+42.71	6.00' Rt.	619.72	619.22	614.60	619.73	-
K9	13+30.37	83.39' Lt.	16+12.66	6.00' Rt.	620.08	619.58	614.51	620.96	-
K10	13+61.14	83.99' Lt.	15+82.60	6.00' Rt.	621.12	620.62	614.39	622.65	-
K11	13+91.90	84.59' Lt.	15+52.55	6.00' Rt.	622.12	621.62	614.23	623.29	-
K12	14+22.68	85.19' Lt.	15+22.49	6.00' Rt.	623.13	622.63	614.04	624.10	-
K13	14+53.46	85.80' Lt.	14+92.44	6.00' Rt.	624.15	623.65	613.81	624.31	-
K14	14+84.24	86.40' Lt.	14+62.38	6.00' Rt.	625.17	624.67	613.54	624.63	632.19
K15	15+15.03	87.00' Lt.	14+32.32	6.00' Rt.	626.18	625.68	613.23	625.03	631.91
K16	15+45.83	87.61' Lt.	14+02.27	6.00' Rt.	626.05	625.55	612.89	624.81	631.60
K17	15+71.50	88.11' Lt.	13+77.23	6.00' Rt.	625.30	624.80	612.57	624.71	631.31
K18	15+97.17	88.62' Lt.	13+52.18	6.00' Rt.	624.54	624.04	612.23	623.87	630.99
K19	16+22.85	89.12' Lt.	13+27.13	6.00' Rt.	623.79	623.29	611.86	623.10	630.66
K20	16+48.52	89.63' Lt.	13+02.09	6.00' Rt.	623.04	622.54	611.47	621.99	-
K21	16+74.21	90.23' Lt.	12+77.04	6.10' Rt.	622.29	621.79	610.91	620.78	-
K22	16+99.80	92.52' Lt.	12+55.05	7.89' Rt.	621.54	621.04	610.54	620.23	-
K23	17+30.54	95.27' Lt.	12+22.04	10.03' Rt.	620.64	620.14	610.09	619.62	-
K24	17+61.30	98.02' Lt.	11+92.01	12.17' Rt.	619.74	619.24	609.43	618.40	-
K25	17+92.05	101.17' Lt.	11+61.62	14.35' Rt.	618.25	617.75	608.67	617.10	-
K26	18+22.73	105.14' Lt.	11+31.14	16.52' Rt.	616.76	616.26	607.97	615.79	-
K27	18+52.77	109.77' Lt.	11+00.56	18.50' Rt.	615.27	614.77	607.37	613.97	-
K28	18+82.54	113.51' Lt.	10+69.88	18.50' Rt.	613.79	613.29	607.08	612.02	-
K29	19+12.14	118.34' Lt.	10+39.20	18.50' Rt.	612.30	611.80	606.36	610.46	-
K30	19+41.55	124.26' Lt.	10+08.51	18.50' Rt.	610.81	610.31	605.65	609.18	-
K31	19+72.66	131.76' Lt.	9+75.79	18.44' Rt.	608.49	607.99	604.99	607.64	-
End Wall	20+03.46	140.47' Lt.	9+43.06	18.50' Rt.	608.16	607.66	604.44	607.76	-



*Pile section, spacing, tip elevation, shaft diameter and embedment into bedrock to be determined during final design.

TYPICAL CROSS SECTION

(Looking East)
(Sta. 14+84.24 to Sta. 16+22.85) I-80

TYPICAL CROSS SECTIONS RETAINING WALL 1 ALONG I-80 AND CENTER ST. RAMP D F.A.I. ROUTE 80 SECTION- FAI 80 21 INTERCHANGE WILL COUNTY STA. 10+53.73 TO STA. 20+03.46 STRUCTURE NO. 099-W123

MODEL: Default
FILE NAME: pw:\transystems-pw.bentley.com:transyscorp-pw1-hosted\Documents\Projects_2018\CH401\401180022\03-WSP\CAD\62R22-INT-4 (Center)\Sheets\Structural\SN-099-W123-RW1\099W123-62R22-TSL-003
5/9/2024 1:59:50 PM

HBM ENGINEERING GROUP, LLC

USER NAME =	DESIGNED - JMI	REVISED -	
	CHECKED - MI	REVISED -	
PLOT SCALE =	DRAWN - JMI	REVISED -	
PLOT DATE =	CHECKED - MI	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 3 OF 5 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	FAI 80 21 INTERCHANGE	WILL	5	3
		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		

SOLIDER PILE RETAINING WALL SUGGESTED CONSTRUCTION SEQUENCE

1. Excavate for placement of Storm Sewer and Catch Basin.
2. Install the catch basins at the specified locations. Lay the connecting storm sewer pipe between the two catch basins ensuring it aligns to pass between designated soldier piles. Complete this before the soldier piles installation in this area.
3. Drill soldier piles to be socketed in rock.
4. Install timber lagging.
5. Place and compact backfill behind wingwall to top of timber lagging.
6. Install shear stud connectors.
7. Place reinforcement and form concrete wall face.

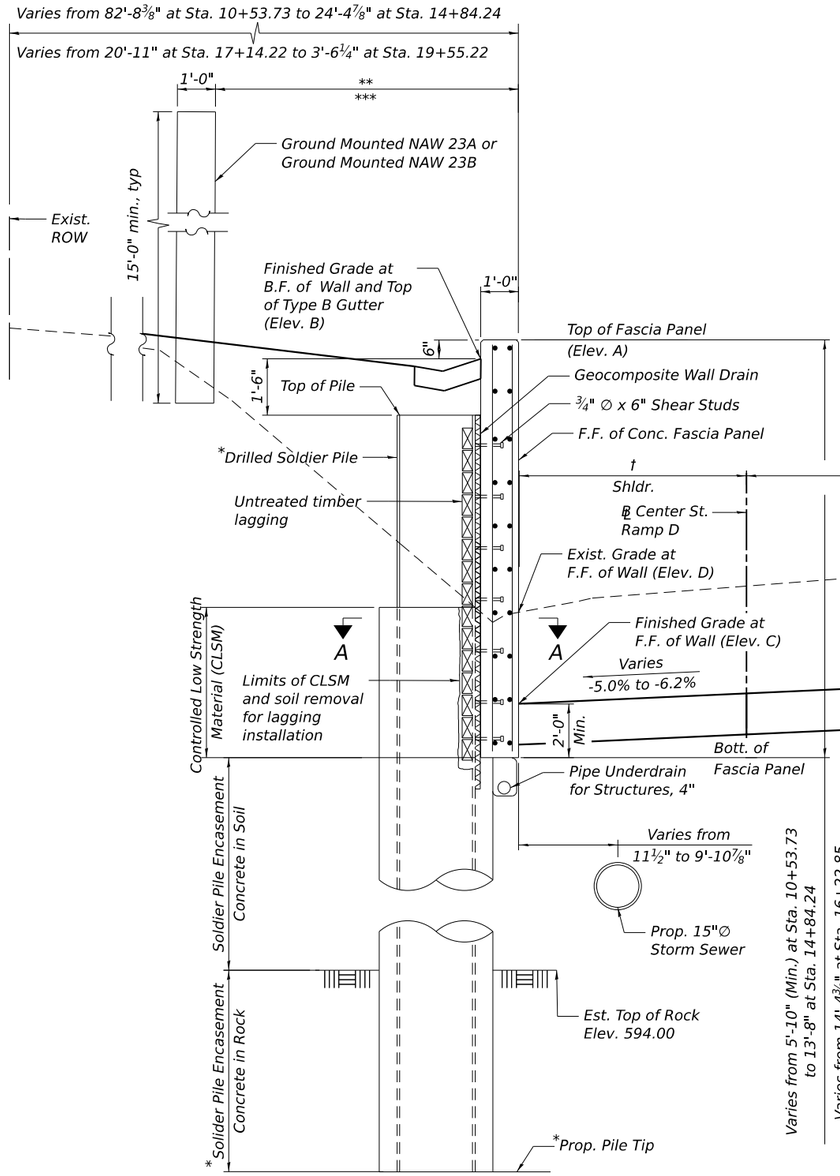
LEGEND

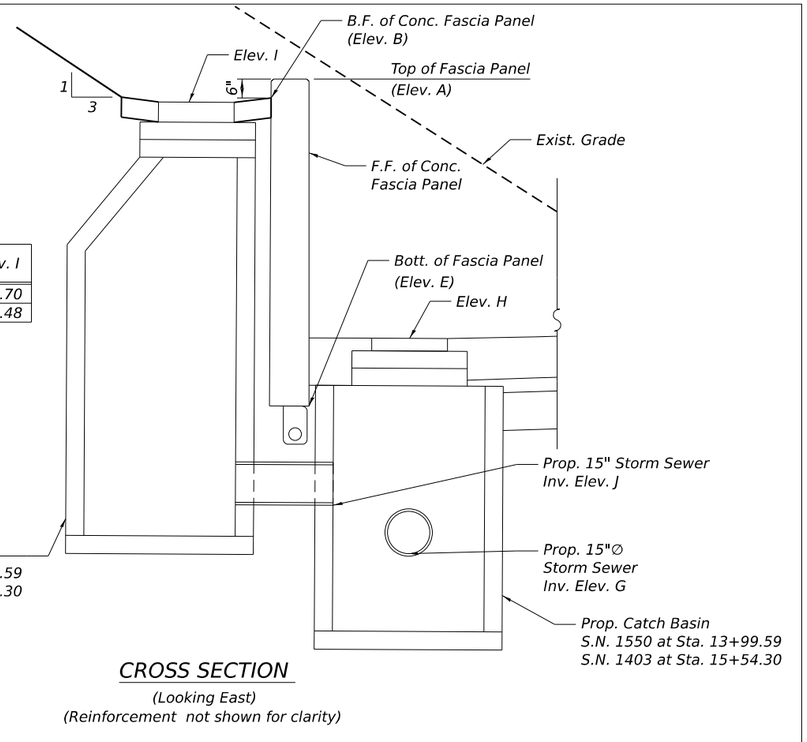
BF - Back Face
FF - Front Face
NAW - Noise Abatement Wall

NOTES:

1. For Section A-A and additional wall details, see Sheet 4 of 4.
2. Stations for approximate location of catch basins are given to Front Face of Retaining Wall #1 and along I-80. Locations will be adjusted in the final plans to miss piles.

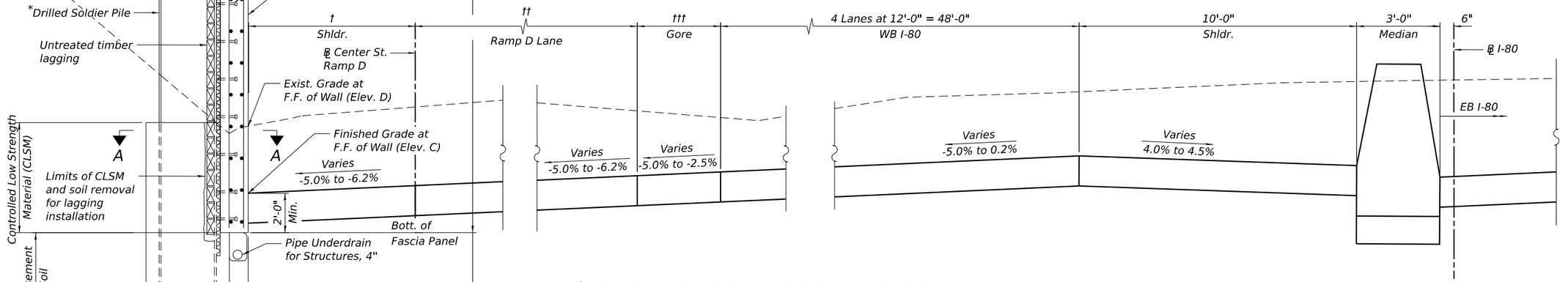
I-80 Sta.	Elev. J		Elev. G		Elev. H	Elev. I
	NORTH	SOUTH	WEST	EAST		
13+99.59	609.50	609.52	-	609.40	614.35	621.70
15+54.30	N/A	N/A	606.90	606.80	612.99	625.48





CROSS SECTION

(Looking East)
(Reinforcement not shown for clarity)



* Pile section, spacing, tip elevation, shaft diameter and embedment into bedrock to be determined during final design.

** Varies from 76'-8¼" at Sta. 10+53.73 to 11'-11⅜" at Sta. 14+84.24

*** Varies from 14'-7" at Sta. 16+74.21 to 7'-11⅛" at Sta. 18+83.51

	I-80 Sta. 10+53.73 to Sta. 14+84.24	I-80 Sta. 16+22.85 to Sta. 20+03.46
t	6'-0"	Varies from 6'-0" to 18'-6"
tt	Varies from 12'-0" to 14'-10⅜"	16'-0"
ttt	Varies from 0'-0" to 4'-0"	Varies from 5'-7⅜" to 42'-11⅝"

TYPICAL CROSS SECTION

(Looking East)
(Sta. 10+53.73 to Sta. 14+84.24) I-80
(Sta. 16+22.85 to Sta. 20+03.46) I-80

TYPICAL CROSS SECTIONS RETAINING WALL 1 ALONG I-80 AND CENTER ST. RAMP D

F.A.I. ROUTE 80
SECTION- FAI 80 21 INTERCHANGE
WILL COUNTY
STA. 10+53.73 TO STA. 20+03.46
STRUCTURE NO. 099-W123

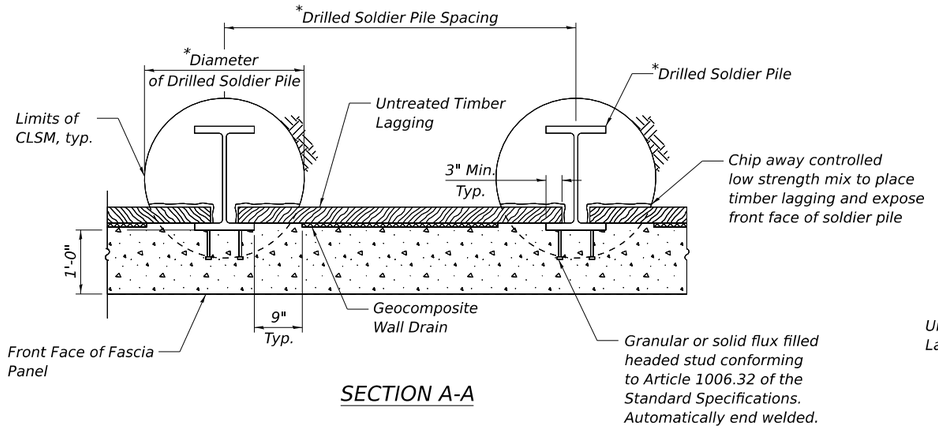
HBM ENGINEERING GROUP, LLC

USER NAME =	DESIGNED - JMI	REVISED -
	CHECKED - MI	REVISED -
PLOT SCALE =	DRAWN - JMI	REVISED -
PLOT DATE =	CHECKED - MI	REVISED -

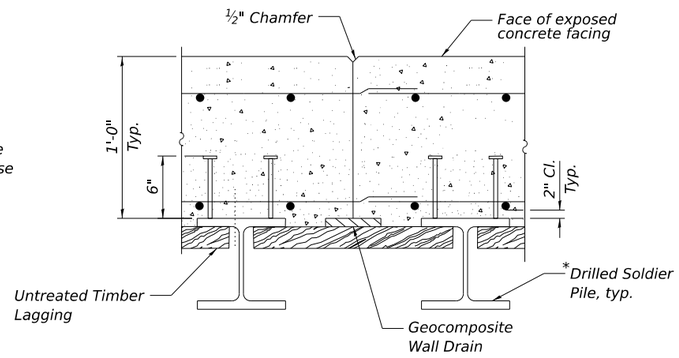
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 4 OF 5 SHEETS

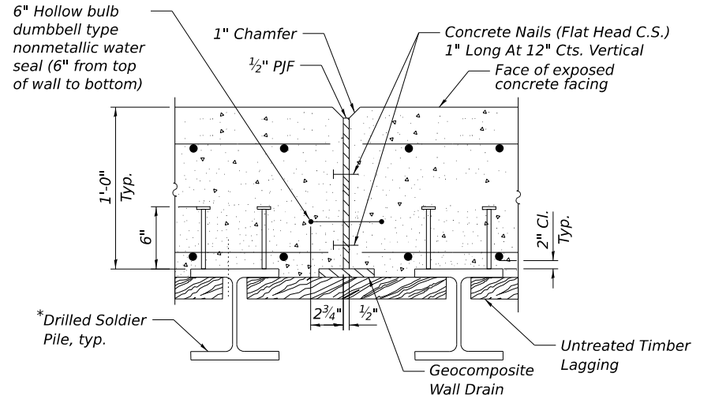
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	FAI 80 21 INTERCHANGE	WILL	5	4
		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		



SECTION A-A

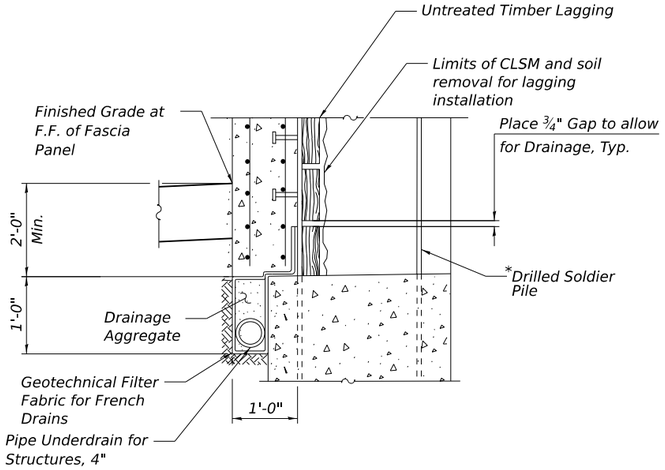


CONSTRUCTION JOINT DETAILS

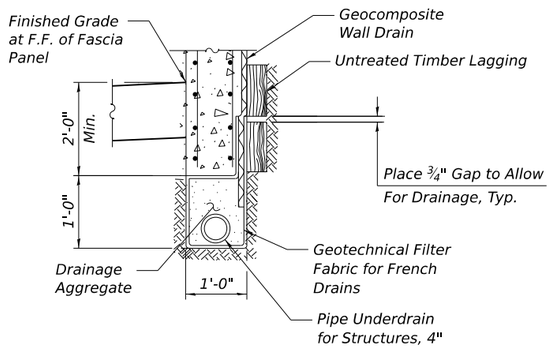


EXPANSION JOINT DETAILS

*Pile section, spacing, tip elevation, shaft diameter and embedment into bedrock to be determined during final design.



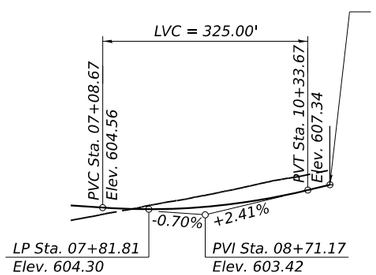
PIPE UNDERDRAIN DETAIL AT SOLDIER PILE



PIPE UNDERDRAIN DETAIL BETWEEN SOLDIER PILES

PR CURVE
CENTER - D-2

P.I. Sta. = 10+12.68
Δ = 24°50'39" (RT)
D = 06°51'42"
R = 835.00'
T = 183.92'
L = 362.07
E = 20.02'
e = 6.00%
T.R. = N/A
S.E. Run = 144'
P.C. Sta. = 8+28.76
P.T. Sta. = 11+90.83



CENTER ST. RAMP D PROFILE GRADE

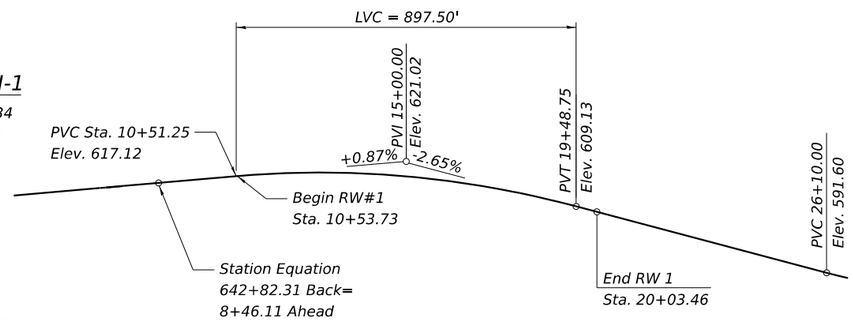
(Along ℄ Center St. Ramp D)

PR CURVE
CENTER - D-3

P.I. Sta. = 15+00.20
Δ = 10°49'33" (RT)
D = 01°45'17"
R = 3,265.00'
T = 309.38'
L = 616.91
E = 14.62'
e = 5.00%
T.R. = N/A
S.E. Run = 144'
P.C. Sta. = 11+90.83
P.T. Sta. = 18+07.74

PR CURVE
PR I-80 NORTH-1

P.I. Sta. = 13+44.34
Δ = 16°55'07" (LT)
D = 01°42'37"
R = 3,350.00'
T = 498.23'
L = 989.20
E = 36.85'
e = 5.00%
T.R. = 92.3'
S.E. Run = 375.0'
P.C. Sta. = 08+46.11
P.T. Sta. = 18+35.31



I-80 PROFILE GRADE

(Along ℄ I-80)

DRILLED SOLDIER PILE WALL DETAILS & PROFILES
RETAINING WALL 1
ALONG I-80 & CENTER ST. RAMP D
F.A.I. ROUTE 80
SECTION- FAI 80 21 INTERCHANGE
WILL COUNTY
STA. 10+53.73 TO STA. 20+03.46
STRUCTURE NO. 099-W123

HBM ENGINEERING GROUP, LLC

USER NAME =	DESIGNED - JMI	REVISED -
	CHECKED - MI	REVISED -
PLOT SCALE =	DRAWN - JMI	REVISED -
PLOT DATE =	CHECKED - MI	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 5 OF 5 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	FAI 80 21 INTERCHANGE	WILL	5	5
		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		

Appendix B

Soil Boring Location Plan and Subsurface Profile

FILE NAME = $FILE$
PEN TABLE = $PENTBL$
PLOT DATE = $DATE$
TIME = $TIME$
SHEET SIZE = $SHEETSIZE$
PLOT SCALE = $SCALE$
USER NAME = $USER$

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

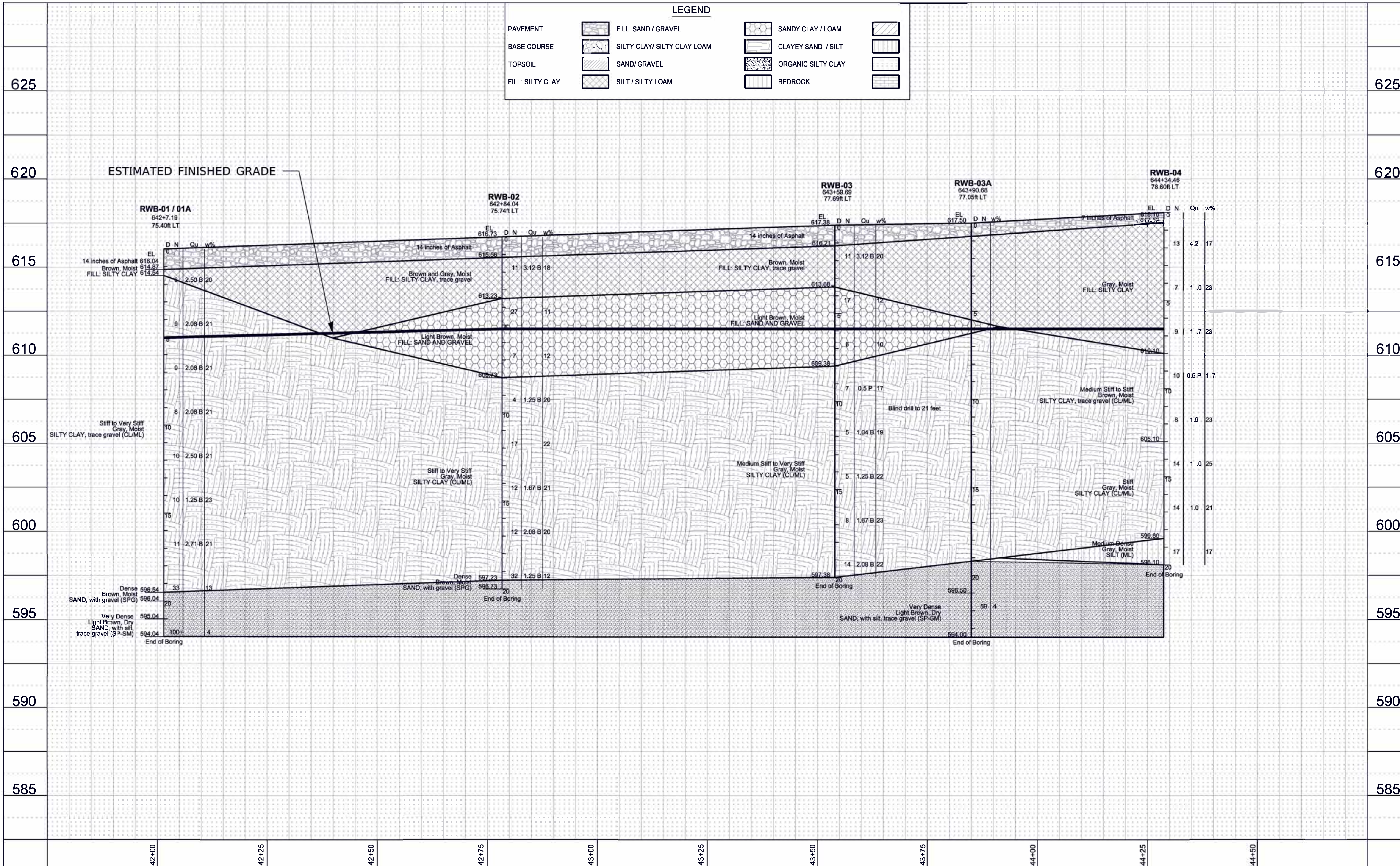
USER NAME	= $USER$	DESIGNED -	MH
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= $DATE$	DATE -	08/24/2022

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 1 - RAMP D
SOIL BORING LOCATION PLAN
JOLIET, ILLINOIS

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

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	1
		CONTRACT NO. PTB-198-003		
	ILLINOIS	FED. AID PROJECT		


LEGEND
PAVEMENT
BASE COURSE
TOPSOIL
FILL: SILTY CLAY
FILL: SAND / GRAVEL
SILTY CLAY/ SILTY CLAY LOAM
SAND/ GRAVEL
SILT / SILTY LOAM
SANDY CLAY / LOAM
CLAYEY SAND / SILT
ORGANIC SILTY CLAY
BEDROCK
ESTIMATED FINISHED GRADE
RWB-01 / 01A
642+7.19
75.40ft LT
RWB-02
642+84.04
75.74ft LT
RWB-03
643+59.69
77.69ft LT
RWB-03A
643+90.68
77.05ft LT
RWB-04
644+34.46
78.60ft LT
14 inches of Asphalt
Brown, Moist FILL: SILTY CLAY
Brown and Gray, Moist FILL: SILTY CLAY, trace gravel
Brown, Moist FILL: SILTY CLAY, trace gravel
Light Brown, Moist FILL: SAND AND GRAVEL
Gray, Moist FILL: SILTY CLAY
7 inches of Asphalt
Stiff to Very Stiff Gray, Moist SILTY CLAY, trace gravel (CL/ML)
Stiff to Very Stiff Gray, Moist SILTY CLAY (CL/ML)
Medium Stiff to Very Stiff Gray, Moist SILTY CLAY (CL/ML)
Medium Stiff to Stiff Brown, Moist SILTY CLAY, trace gravel (CL/ML)
Stiff Gray, Moist SILTY CLAY (CL/ML)
Medium Dense Gray, Moist SILT (ML)
Blind drill to 21 feet
Dense Brown, Moist SAND, with gravel (SPG)
Very Dense Light Brown, Dry SAND, with silt, trace gravel (SP-SM)
End of Boring
625
620
615
610
605
600
595
590
585
642+00
642+25
642+50
642+75
643+00
643+25
643+50
643+75
644+00
644+25
644+50

GSG CONSULTANTS, INC. 735 E. REMINGTON RD, SCHAUMBURG, IL 60173 TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM				
USER NAME = nnano	DESIGNED - MH	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	RETAINING WALL NO. 1 - RAMP D	
SHEET SIZE = 1.41667x0.916667 (ft.)	DRAWN - NN		SOIL BORING PROFILE	
PLOT SCALE = 1200:0.0000 ':" / ft.	CHECKED - DE		SCALE: AS NOTED SHEET 1 OF 5 SHEETS STA. 641+75 TO STA. 644+75	
PLOT DATE = 3/25/2024	DATE - 08/24/2022			

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	2
		CONTRACT NO. PTB-198-003		
	ILLINOIS	FED. AID PROJECT		

LEGEND

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

ESTIMATED FINISHED GRADE

RWB-05
10+75.66
81.61ft L i

RWB-06
11+54.81
80.47ft LT

RWB-07B
12+34.1223
78.55ft L T

RWB-07
12+34.12
8.55ft LT

RWB-07A
12+58.95
74.06ft LT

RWB-08
13+7.78
72.61ft LT

7 inches of Asphalt
Gray, Moist
FILL: SILTY CLAY, trace gravel
Stiff to Hard
Brown, Moist
SILTY CLAY (CL/ML)
Stiff to Very Stiff
Gray, Moist
SILTY CLAY (CL/ML)
End of Boring

6 inches of Asphalt
Very Stiff to Hard
Gray, Moist
SILTY CLAY, trace gravel (CL/ML)
End of Boring

12 inches of Asphalt
Stiff to Hard
Brown and Gray, Moist
SILTY CLAY, trace gravel (CL/ML)
Very Stiff to Hard
Gray, Moist
SILTY CLAY, trace gravel (CL/ML)
Medium Dense
Gray, Moist
SAND (SP)
End of Boring

14 inches of Asphalt
Brown, Moist
FILL: SILTY CLAY, trace gravel
Very Stiff
Brown, Moist
SILTY CLAY, trace gravel (CL/ML)
Very Stiff
Gray, Moist
SILTY CLAY, trace gravel (CL/ML)
Very Stiff
Gray, Moist
SILTY CLAY LOAM, trace gravel (CL/ML)
Gray
LIMESTONE, heavily weathered, heavily fractured
Run 1: 23.5' - 33.5'
Recovery: 100%
RQD: 25.8% (Poor)
End of Boring

Blind drill to 21 feet
Loose to Very Dense
Gray, Wet
SILTY SAND (SM)
End of Boring

3 inches of Asphalt
Very Stiff to Hard
Gray, Moist
SILTY CLAY, trace sand and gravel (CL/ML)
End of Boring

MATCH LINE STA.: 13+25

10+75 | 11+00 | 11+25 | 11+50 | 11+75 | 12+00 | 12+25 | 12+50 | 12+75 | 13+00 | 13+25

625 | 620 | 615 | 610 | 605 | 600 | 595 | 590 | 585

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

USER NAME = nnano		DESIGNED - MH	
SHEETSIZE = 1.41667x0.916667 (ft.)		DRAWN - NN	
PLOT SCALE = 1200:0.0000 ':" / ft.		CHECKED - DE	
PLOT DATE = 3/26/2024		DATE - 08/24/2022	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 1 - RAMP D
SOIL BORING PROFILE
SCALE: AS NOTED | SHEET 2 OF 5 SHEETS | STA. 10.50 | TO STA. 13+25

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	3
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = T:\Illinois DOT\WSP_198-003\Geotechnical\Retaining Walls\Retaining Wall No. 1 - Ramp D\Exhibits\DGNs\Retaining Wall No. 1 - Ramp D - PR-02.dgn
PEN TABLE = X:\Clients\Tollway\Work Space\tables\penlgng mono.tbl
PLOT DATE = 3/26/2024
TIME = 3:27:10 PM
SHEET SIZE = 1.41667x0.916667 (ft.)
PLOT SCALE = 1200:0.0000 ':" / ft.
USER NAME = nnano

LEGEND

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

ESTIMATED FINISHED GRADE

MATCH LINE STA.: 13+25

MATCH LINE STA.: 15+75

RWB-09
13+85.31
63.93ft LT

RWB-09A
13+85.3092
63.93ft LT

RWB-10
14+63.57
59.79ft LT

RWB-11B
15+41.2328
59.21ft LT

RWB-11/ 11A
15+41.23
59.21ft LT

12 inches of Asphalt

Brown, Moist
FILL: SILTY CLAY, with gravel

Brown, Moist to Wet
FILL: SAND, trace gravel

Very Stiff
Brown, Moist
SILTY CLAY, trace gravel (CL/ML)

Very Stiff to Hard
Gray, Moist
SILTY CLAY (CL/ML)

Hard
Gray, Moist
SILTY CLAY, trace gravel (CL/ML)

End of Boring

3 inches of Asphalt

Brown, Moist
FILL: SILTY CLAY, trace sand and gravel

Very Stiff to Hard
Brown, Moist
SILTY CLAY, trace sand and gravel (CL/ML)

Very Stiff to Hard
Gray, Moist
SILTY CLAY, trace gravel (CL/ML)

Medium Dense
Light Brown, Moist
SAND (SP)

Extremely Dense
Light Brown and Gray, Molst
SAND, with gravel (SPG)

Gray
LIMESTONE, heavily weathered, heavily fractured
Run 1: 23.5' - 33.5'
Recovery: 100%
RQD: 35.8% (Poor)

Hard
Brown, Moist
SILTY CLAY, trace gravel (CL/ML)

Gray
LIMESTONE, heavily weathered, heavily fractured
Run 1: 22.5' - 32.5'
Recovery: 100%
RQD: 15% (Very poor)

Dark Brown, Moist
FILL: SILTY CLAY, trace gravel

Very Stiff to Hard
Brown, Moist
SILTY CLAY, trace gravel (CL/ML)

Very Stiff to Hard
Gray, Moist
SILTY CLAY (CL/ML)

Extremely Dense
Light Brown, Moist

Gray
WEATHERED LIMESTONE

End of Boring

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

USER NAME = nnano		DESIGNED - MH	
SHEET SIZE = 1.41667x0.916667 (ft.)		DRAWN - NN	
PLOT SCALE = 1200:0.0000 ':" / ft.		CHECKED - DE	
PLOT DATE = 3/26/2024		DATE - 08/24/2022	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 1 - RAMP D

SOIL BORING PROFILE

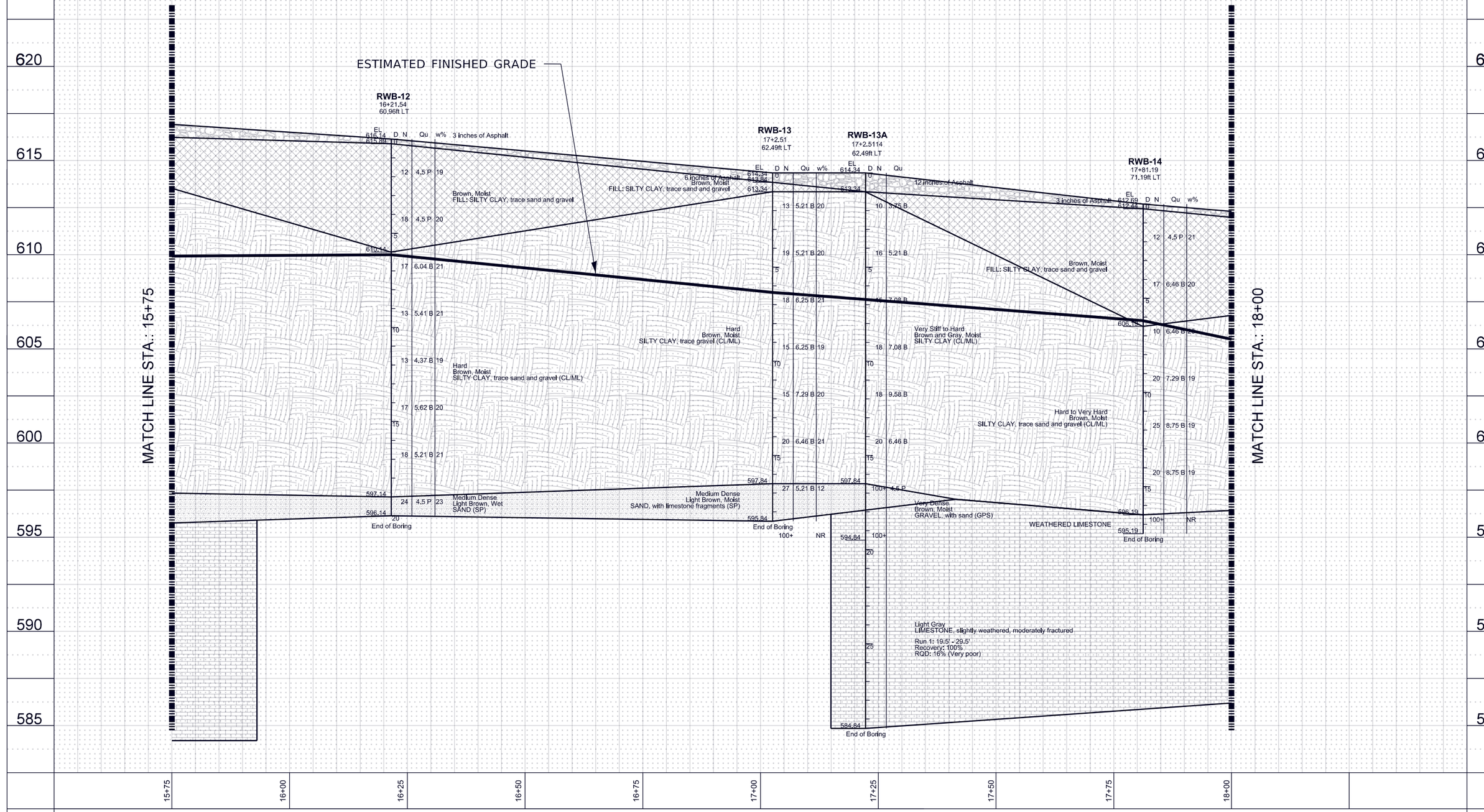
SCALE: AS NOTED | SHEET 3 OF 5 SHEETS | STA. 13+25 | TO STA. 15+75

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	4
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = T:\Illinois DOT\WSP_198-003\Geotechnical\Retaining Walls\Retaining Wall No. 1 - Ramp D\Exhibits\DGN\Retaining Wall No. 1 - Ramp D - PR-03.dgn
PEN TABLE = X:\Clients\To Keep\Work Space\tables per\gsg_mono.tbl
PLOT DATE = 3/26/24
TIME: 3:25:44 PM
SHEET SIZE = 1.41667x0.916667 (ft.)
PLOT SCALE = 1200:0.0000 ':" / ft.
USER NAME = nnano

LEGEND

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



FILE NAME = T:\Illinois DOT\WSP__198-2003\Geotechnical\Retaining Walls\Retaining Wall No. 1 - Ramp D\Exhibits\DGNs\Retaining Wall No. 1 - Ramp D - PR-04.dgn
PEN TABLE = X:\Clients\To Away\Work Space\tables\pen\gsg mono.tbl
PLOT DATE = 3/26/2024
TIME = 4:15:03 PM
SHEET SIZE = 1.41667x0.916667 (ft.)
PLOT SCALE = 1200:0.0000 ':" / ft.
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 - MH	
SHEET SIZE = 1.41667x0.916667 (ft.)		DRAWN - NN	
PLOT SCALE = 1200:0.0000 ':" / ft.		CHECKED - DE	
PLOT DATE = 3/26/2024		DATE - 08/24/2022	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 1 - RAMP D

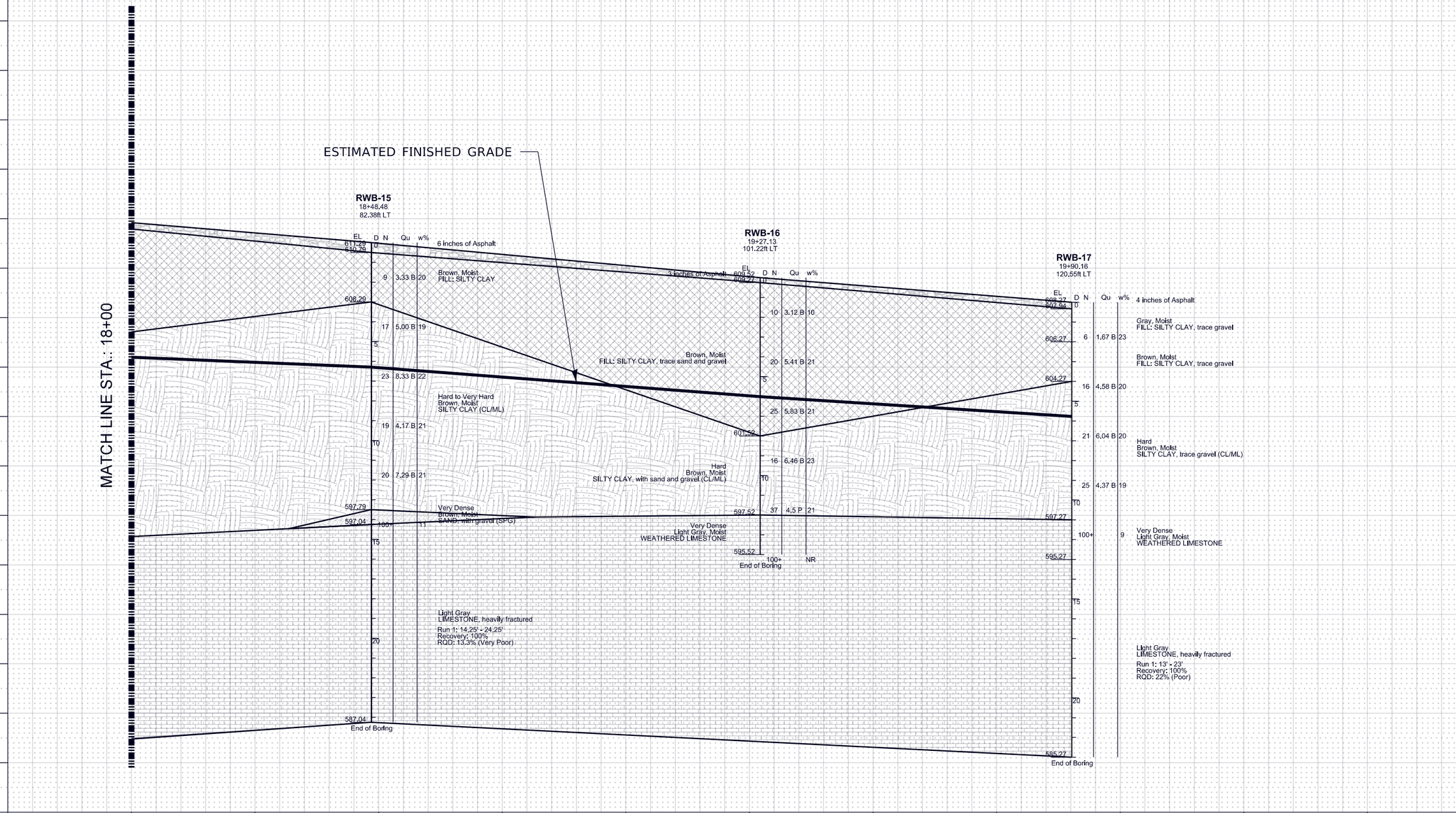
SOIL BORING PROFILE

SCALE: AS NOTED | SHEET 4 OF 5 SHEETS | STA. 15+75 | TO STA. 18+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	5
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

LEGEND

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



FILE NAME = T:\Illinois DOT\WSP_198-203\Geotechnical\Retaining Walls\Retaining Wall No. 1 - Ramp D\Exhibits\DGNs\Retaining Wall No. 1 - Ramp D - PR-05.dgn
PEN TABLE = X:\Clients\Tollway\Work Space\tables\per\gsg mono.tbl
PLOT DATE = 3/26/2024
TIME = 3:20:29 PM
SHEET SIZE = 1.41667x0.916667 (ft.)
PLOT SCALE = 1200:0.0000 ':" ft.
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	- MH
SHEET SIZE	= 1.41667x0.916667 (ft.)	DRAWN	- NN
PLOT SCALE	= 1200:0.0000 ':" / ft.	CHECKED	- DE
PLOT DATE	= 3/26/2024	DATE	- 08/24/2022

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 1 - RAMP D

SOIL BORING PROFILE

SCALE: AS NOTED | SHEET 5 OF 5 SHEETS | STA. 18+00 | TO STA. 20+75

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	6	5
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

Appendix C
Soil Boring Logs

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-01
Station 642+7.1918
Offset 75.40ft LT
Ground Surface Elev. 616.04 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 (%)
14 inches of Asphalt			
614.87			
Brown, Moist FILL: SILTY CLAY	4		
614.54			
Stiff to Very Stiff Gray, Moist SILTY CLAY, trace gravel (CL/ML)	4 4	2.5 B	20
	3		
-5	4 5	2.1 B	21
	3		
	4 5	2.1 B	21
	3		
-10	3 5	2.1 B	21
	2		
	4 6	2.5 B	21
	2		
-15	5 5	1.3 B	23
	3		
	5 6	2.7 B	21
	1		
596.54	11		13
Dense 596.04	22		
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown, Moist SAND, with gravel (SPG)			
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)

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

SOIL BORING LOG

Date 11/8/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-01A
Station 642+7.1918
Offset 75.40ft LT
Ground Surface Elev. 616.04 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 (%)
Blind drill to 21 feet				Blind drill to 21 feet *(continued)*			
				595.04			
				Very Dense	50/5.5"		
				Light Brown, Dry			4
				594.04			
				SAND, with silt, trace gravel (SP-SM)			
				Auger refusal at 22 feet			
				End of Boring			
-5				-25			
-10				-30			
-15				-35			
-20				-40			

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

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-02
Station 642+84.0416
Offset 75.74ft LT
Ground Surface Elev. 616.73 ft

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

Groundwater Elev.:
First Encounter 613.2 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
14 inches of Asphalt			
615.56	6		
Brown and Gray, Moist FILL: SILTY CLAY, trace gravel	6 5	3.1 B	18
613.23 ▼	7		
Light Brown, Moist FILL: SAND AND GRAVEL	15 12		11
-5	5		
	4 3		12
608.73	2		
Stiff to Very Stiff Gray, Moist SILTY CLAY (CL)	2 2	1.3 B	20
-10	5		
Cobbles at 11 feet	7 10		22
	4		
	5 7	1.7 B	21
-15	3		
	5 7	2.1 B	20
	3		
597.23	13 19	1.3 B	12
Dense 596.73			
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown, Moist SAND, with gravel (SPG)			
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)

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

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

DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-03
Station 643+59.6915
Offset 77.69ft LT
Ground Surface Elev. 617.38 ft

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

Groundwater Elev.:
First Encounter 613.9 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
14 inches of Asphalt			
616.21	3		
Brown, Moist FILL: SILTY CLAY, trace gravel	4 7	3.1 B	20
613.88 ▼	9		
Light Brown, Moist FILL: SAND AND GRAVEL	9 8		12
-5	5		
	3 3		10
609.38	3		
Medium Stiff to Very Stiff Gray, Moist SILTY CLAY (CL)	3 4	0.5 P	17
-10	2		
	2 3	1.0 B	19
	2		
	1 4	1.3 B	22
-15	3		
	3 5	1.7 B	23
	2		
	5 9	2.1 B	22
597.38 -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)

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

SOIL BORING LOG

Date 11/8/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-03A
Station 643+90.68
Offset 77.05ft LT
Ground Surface Elev. 617.50 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
				Blind drill to 21 feet
-5				
-10				
-15				
-20				
				Blind drill to 21 feet *(continued)*
				596.50
	9			Very Dense
	16		4	Light Brown, Dry
	43			SAND, with silt, trace gravel
				(SP-SM)
				594.00
-25	50/1"			Auger refusal at 23.5 feet
-30			NR	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)

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W123
Station

BORING NO. RWB-04
Station 644+34.4615
Offset 78.60ft LT
Ground Surface Elev. 618.10 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 Asphalt 617.52 Gray, Moist FILL: SILTY CLAY		7		
		6 7	4.2	17
		2		
	-5	3 4	1.0	23
		2		
		4 5	1.7	23
610.10 Medium Stiff to Stiff Brown, Moist SILTY CLAY, trace gravel (CL/ML)		2		
	-10	4 6	0.5 P	17
		2		
		2 6	1.9	23
605.10 Stiff Gray, Moist SILTY CLAY (CL/ML)		4		
	-15	6 8	1.0	25
		3		
		5 9	1.0	21
599.60 Medium Dense Gray, Moist SILT (ML)		4		
	-20	8 9		17
598.10 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)

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-05
Station 10+75.6639
Offset 81.61ft LT
Ground Surface Elev. 618.29 **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 Asphalt 617.70				
Gray, Moist FILL: SILTY CLAY, trace gravel		7		
		8 7	2.1 B	14
		2		
	-5	3 5	2.1 B	22
		2		
		2 6	2.1 B	21
610.29				
Stiff to Hard Brown, Moist SILTY CLAY (CL/ML)		1		
	-10	2 4	1.0 B	17
		2		
		5 10	4.2 B	17
605.29				
Stiff to Very Stiff Gray, Moist SILTY CLAY (CL/ML)		2		
	-15	5 8	2.1 B	21
		2		
		5 5	1.0 B	21
		4		
598.29	-20	8 10	2.1 B	23

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)

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

SOIL BORING LOG

Date 5/2/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W123
Station

BORING NO. RWB-06
Station 11+54.8112
Offset 80.47ft LT
Ground Surface Elev. 618.30 **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 Asphalt 617.80			
Very Stiff to Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)	5		
	7 7	5.2 B	19
	2		
-5	3 6	3.1 B	19
	3		
	3 7	2.1 B	21
	3		
-10	6 9	4.2 B	17
	2		
	7 6	3.1 B	21
	3		
-15	6 6	3.1 B	23
	3		
	5 7	3.3 B	23
	5		
598.30 -20	9 12	4.2 B	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)

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

SOIL BORING LOG

Date 4/29/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-07
Station 12+34.1223
Offset 78.55ft LT
Ground Surface Elev. 618.53 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 (%)
14 inches of Asphalt			
617.36			
Brown, Moist FILL: SILTY CLAY, trace gravel 617.03	7		
	5 5	3.8 B	19
Very Stiff Brown, Moist SILTY CLAY, trace gravel (CL/ML)			
	4		
	5 5	2.5 B	15
-5			
612.53			
Very Stiff to Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)	3		
	5 6	2.3 B	15
	3		
	6 8	2.9 B	16
-10			
	3		
	7 8	4.6 B	20
	2		
	6 7	4.2 B	20
-15			
	3		
	6 8	4.2 B	18
	3		
	6 8	4.2 B	20
598.53 -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)

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

SOIL BORING LOG

Date 11/8/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-07A
Station 12+58.947
Offset 74.06ft LT
Ground Surface Elev. 618.50 ft

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

Groundwater Elev.:
First Encounter 597.0 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
				Blind drill to 21 feet				
				Blind drill to 21 feet *(continued)*				
					597.50			
				Loose to Very Dense	▼	5		
				Gray, Wet		3		20
				SILTY SAND (SM)		5		
					594.50	50/4"		
				Auger refusal at 24 feet				19
-5				End of Boring	-25			
-10					-30			
-15					-35			
-20					-40			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 6/21/23

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-07B
Station 12+34.1223
Offset 78.55ft LT
Ground Surface Elev. 618.95 ft

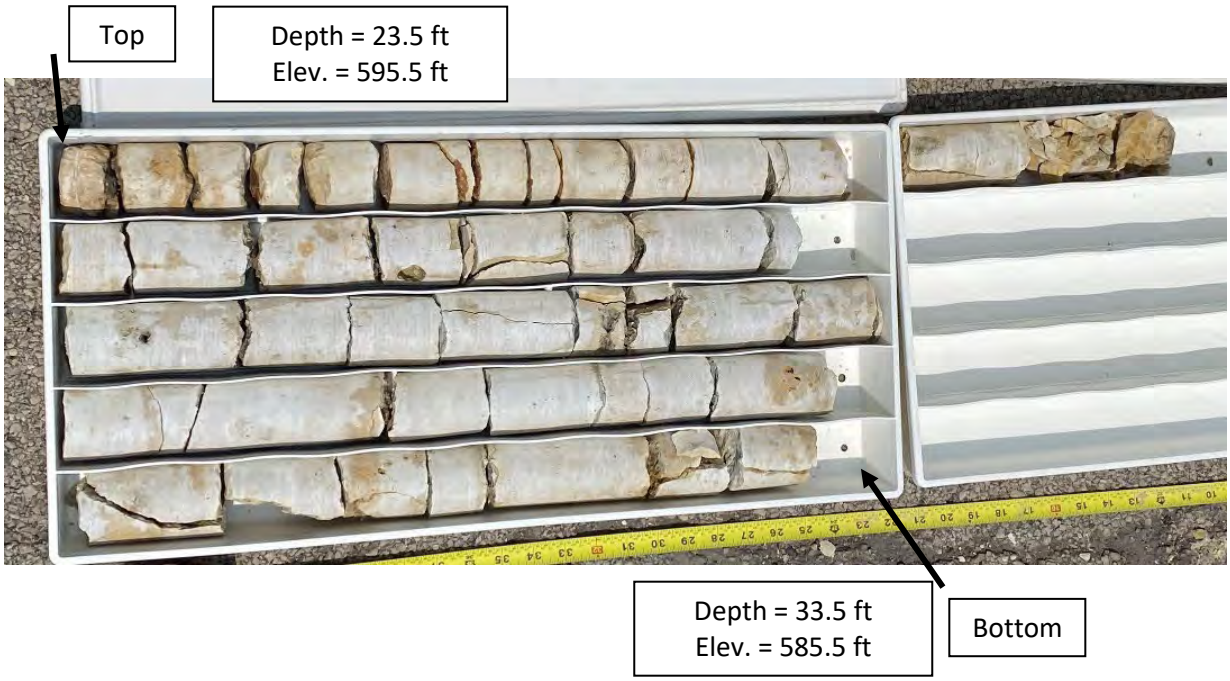
Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter 606.5 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				12 inches of Asphalt
				617.95
	4			Stiff to Hard Brown and Gray, Moist SILTY CLAY, trace gravel (CL/ML)
	5 7	6.9 B		
	3			
-5	4 6	4.2 B		
	3			
	5 8	6.3 B		
	3			
-10	4 7	5.2 B		
	3			
▼	5 8	5.2 B		
	4			
-15	6 9	1.8 P		
	3			
	5 8	4.6 B		
	3			
	599.45			
-20	6 10	5.0 B		
				Medium Dense Gray, Moist SAND (SP) *(continued)*
	597.45			
	3			Very Stiff Gray, Moist SILTY CLAY LOAM, trace gravel (CL/ML)
	3 50/3"	2.1 S		
	595.45			Auger refusal at 23.5 feet
-25				Gray LIMESTONE, heavily weathered, heavily fractured Run 1: 23.5' - 33.5' Recovery: 100% RQD: 25.8% (Poor)
-30				
	585.45			
				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)

Boring Number: RWB-7B, Run 1



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-7B	1	23.5'-33.5'	100.0	26.0	Poor	Light Gray Limestone Extremely Weathered, Heavily Fractured

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DM

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto
HAMMER EFF (%) 98

STRUCT. NO. 099-W123
Station

BORING NO. RWB-08
Station 13+7.7753
Offset 72.61ft LT
Ground Surface Elev. 618.60 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 618.35			
Very Stiff to Hard Gray, Moist SILTY CLAY, trace sand and gravel (CL/ML)	3		
	4 5	2.3 B	18
	2		
-5	4 4	2.9 B	21
	2		
	3 7	3.1 B	20
	2		
-10	3 3	2.7 B	22
	3		
	4 5	2.5 B	18
	3		
-15	4 5	2.9 B	19
	4		
	7 7	5.0 B	20
	4		
598.60 -20	5 8	4.0 B	21

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)

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

SOIL BORING LOG

Date 4/29/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-09
Station 13+85.3092
Offset 63.93ft LT
Ground Surface Elev. 618.48 ft

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

Groundwater Elev.:
First Encounter 615.0 ft ▼
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				12 inches of Asphalt
				617.48
	6			Brown, Moist
	5	2.9	13	FILL: SILTY CLAY, with gravel
	6	B		
				615.48
▼				Brown, Moist to Wet
	11			FILL: SAND, trace gravel
	14		14	
-5	14			
	6			
	13		20	
	17			
	6			
	11	4.5	15	
608.98				
-10	10	P		Very Stiff
				Brown, Moist
				SILTY CLAY, trace gravel
607.48				(CL/ML)
	4			Very Stiff to Hard
	5	2.5	14	Gray, Moist
	8	B		SILTY CLAY (CL/ML)
	3			
	7	3.8	22	
-15	8	B		
	2			
	5	2.5	23	
	7	B		
	3			
	7	4.2	22	
598.48	10	B		
-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)

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 6/21/23

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-09A
Station 13+85.3092
Offset 63.93ft LT
Ground Surface Elev. 618.26 ft

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

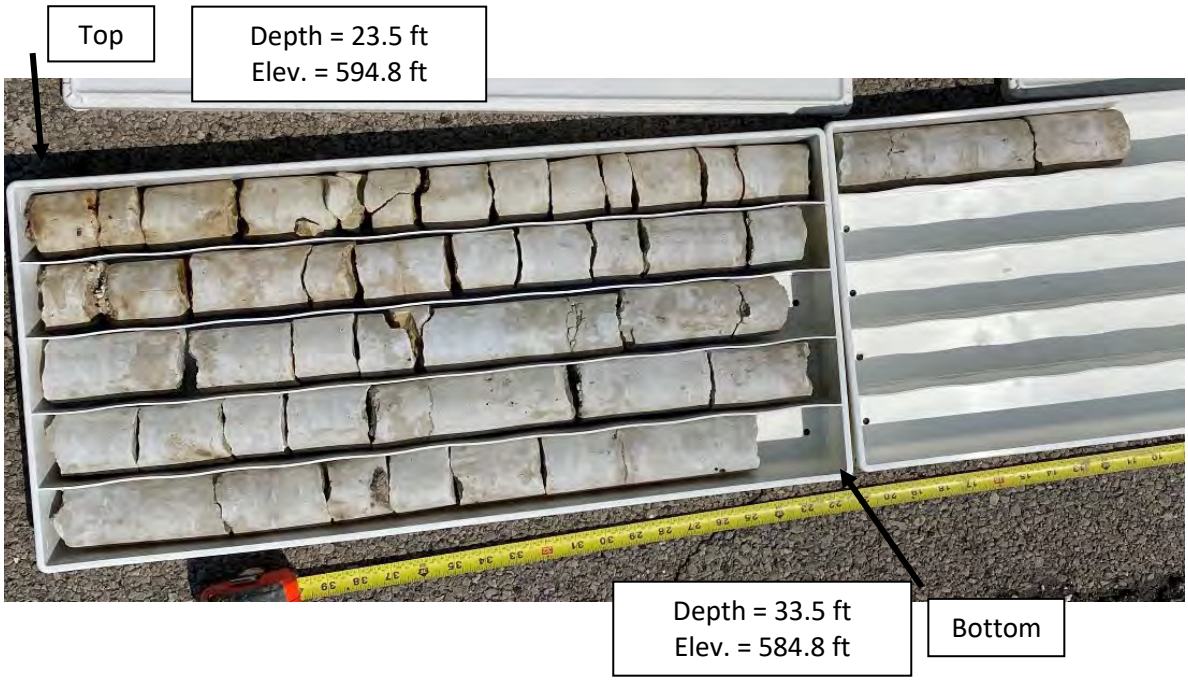
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12 inches of Asphalt			
617.26			
Hard Brown, Moist SILTY CLAY, trace gravel (CL/ML)	4		
	5 5	4.4 B	
	5		
-5	7 10	5.0 B	
	5		
	7 11	7.3 B	
	7		
	7 11	6.5 B	
-10			
	5		
	8 111	5.2 B	
604.76			
Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)	3		
	6 8	5.4 B	
-15			
	4		
	7 11	5.6 B	
	4		
598.76			
	7 16	4.6 B	
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense Light Brown, Moist SAND (SP) *(continued)*	11		
597.26			
Extremely Dense Light Brown and Gray, Moist SAND, with gravel (SPG)	37 50/2"		
Auger refusal at 23.5 feet			
594.76			
Gray LIMESTONE, heavily weathered, heavily fractured			
-25			
Run 1: 23.5' - 33.5' Recovery: 100% RQD: 35.8% (Poor)			
-30			
584.76			
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)

Boring Number: RWB-9A, Run 1



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-9A	1	23.5'-33.5'	100.0	36.0	Poor	Light Gray Limestone Extremely Weathered, Heavily Fractured

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DM

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto
HAMMER EFF (%) 98

STRUCT. NO. 099-W123
Station

BORING NO. RWB-10
Station 14+63.5688
Offset 59.79ft LT
Ground Surface Elev. 618.19 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 617.94				
Brown, Moist FILL: SILTY CLAY, trace sand and gravel		3		
		4 5	2.5 B	14
615.19				
Very Stiff to Hard Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)		4		
	-5	5 6	6.5 B	19
		4		
		6 7	4.6 B	15
		4		
	-10	5 6	3.5 B	15
		4		
		6 8	4.2 B	22
604.19		3		
Very Stiff to Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)	-15	7 7	4.6 B	24
		4		
		7 11	4.8 B	22
		3		
598.19	-20	6 7	3.1 B	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)

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

SOIL BORING LOG

Date 4/29/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-11
Station 15+41.2328
Offset 59.21ft LT
Ground Surface Elev. 617.48 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 (%)	Description
				12 inches of Asphalt
				616.48
	6			Dark Brown, Moist
				615.98 FILL: SILTY CLAY, trace gravel
	3	2.9	19	Very Stiff to Hard
	6	B		Brown, Moist
				SILTY CLAY, trace gravel
	6			(CL/ML)
	7	5.4	17	
-5	9	B		
	4			
	7	5.4	20	
	8	B		
	4			
	6	4.2	21	
-10	7	B		
	3			
	5	4.2	21	
	6	B		
	4			
				603.48
	6	7.9	21	Very Stiff to Hard
-15	11	B		Gray, Moist
	3			SILTY CLAY (CL/ML)
	6	5.0	20	
	9	B		
	4			
	6	3.1	22	
	8	B		
				597.48
-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)

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

SOIL BORING LOG

Date 11/8/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DF

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-11A
Station 15+41.2328
Offset 59.21ft LT
Ground Surface Elev. 617.48 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 (%)	Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
				Blind drill to 21 feet				
				Blind drill to 21 feet *(continued)*				
				596.48				
				Extremely Dense Light Brown, Moist SAND, with silt, trace gravel (SP-SM)		9 33 50/3"		11
				595.48				
				Gray WEATHERED LIMESTONE				
				593.98		50/1"		
				Auger refusal at 23.5 feet End of Boring				NR
-5					-25			
-10					-30			
-15					-35			
-20					-40			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 6/20/23

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-11B
Station 15+41.2328
Offset 59.21ft LT
Ground Surface Elev. 616.70 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
				12 inches of Asphalt
615.70				
	2			Hard
	3	4.8		Brown, Moist
	3	B		SILTY CLAY, trace gravel
				(CL/ML)
	6			
	6	6.3		
-5	8	B		
	6			
	7	7.1		
	10	B		
	4			
	6	5.6		
-10	9	B		
	3			
	5	4.8		
	8	B		
	3			
	5	4.4		
-15	8	B		
	3			
	6	6.3		
	10	B		
	5			
	20	4.4		
-20	19	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Auger refusal at 21 feet
595.70				
	50/1"			Gray
				LIMESTONE, heavily weathered, heavily fractured
				Run 1: 22.5' - 32.5'
				Recovery: 100%
				RQD: 15% (Very poor)
-25				
-30				
584.20				
				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)

Boring Number: RWB-11B, Run 1

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-7B	1	23.5'-33.5'	100.0	15.0	Poor	Light Gray Limestone Extremely Weathered, Heavily Fractured

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DM

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 98

STRUCT. NO. 099-W123
Station

BORING NO. RWB-12
Station 16+21.5354
Offset 60.96ft LT
Ground Surface Elev. 616.14 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 (%)	Description
				3 inches of Asphalt 615.89
	3			Brown, Moist FILL: SILTY CLAY, trace sand and gravel
	5 7	4.5 P	19	
	4			
-5	9 9	4.5 P	20	
				610.14
	6			Hard Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
	8 9	6.0 B	21	
	4			
-10	6 7	5.4 B	21	
	4			
	6 7	4.4 B	19	
	5			
-15	6 11	5.6 B	20	
	7			
	9 9	5.2 B	21	
	6			597.14
-20	12 12	4.5 P	23	Medium Dense Light Brown, Wet 596.14
-25				SAND (SP)
-30				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)

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

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

DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-13
Station 17+2.5114
Offset 62.49ft LT
Ground Surface Elev. 614.34 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 Asphalt 613.84				
Brown, Moist FILL: SILTY CLAY, trace sand and gravel 613.34		3		
		6 7	5.2 B	20
Hard Brown, Moist SILTY CLAY, trace gravel (CL/ML)		4		
	-5	8 11	5.2 B	20
		4		
		8 10	6.3 B	21
		4		
	-10	6 9	6.3 B	19
		3		
		7 8	7.3 B	20
		4		
	-15	9 11	6.5 B	21
		6		
597.84				
Medium Dense Light Brown, Moist SAND, with limestone fragments (SP)		7 20	5.2 B	12
595.84				
Auger refusal at 18.5 feet		50/2"		
End of Boring	-20			NR

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

SOIL BORING LOG

Date 6/20/23

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** EH

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

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

STRUCT. NO. 099-W123
Station

BORING NO. RWB-13A
Station 17+2.5114
Offset 62.49ft LT
Ground Surface Elev. 614.34 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 Asphalt			
613.34			
Very Stiff to Hard Brown and Gray, Moist SILTY CLAY (CL/ML)	3		
	4 6	3.8 B	
	4		
-5	6 10	5.2 B	
	3		
	6 9	7.1 B	
	4		
-10	7 11	7.1 B	
	3		
	7 11	9.6 B	
	4		
-15	8 12	6.5 B	
597.84	17		
Very Dense Brown, Moist GRAVEL, with sand (GPS)	50/2"	4.5 P	
	50/2"		
Auger refusal at 19.5 feet 594.84			
-20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Light Gray LIMESTONE, slightly weathered, moderately fractured Run 1: 19.5' - 29.5' Recovery: 100% RQD: 16% (Very poor) *(continued)*			
-25			
584.84			
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)

Boring Number: RWB-13A, Run 1

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-13A	1	19.5'-29.5'	100.0	16	Very Poor	Light Gray Limestone Extremely Weathered, Heavily Fractured

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DM

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 98

STRUCT. NO. 099-W123
Station

BORING NO. RWB-14
Station 17+81.1885
Offset 71.19ft LT
Ground Surface Elev. 612.69 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 612.44
	3			Brown, Moist FILL: SILTY CLAY, trace sand and gravel
	5 7	4.5 P	21	
	4			
	7 10	6.5 B	20	
-5	4			606.19
	4 6	6.5 B	20	Hard to Very Hard Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
	4			
	6 14	7.3 B	19	
-10	5			
	11 14	8.8 B	19	
	7			
	8 12	8.8 B	19	
-15	50/4"			596.19
			NR	WEATHERED LIMESTONE
				595.19
				Auger refusal at 17.5 feet 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)

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91
Latitude , **Longitude**

STRUCT. NO. 099-W123
Station

BORING NO. RWB-15
Station 18+48.4831
Offset 82.38ft LT
Ground Surface Elev. 611.29 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
0				6 inches of Asphalt 610.79
	3			Brown, Moist FILL: SILTY CLAY
	3 6	3.3 B	20	
				608.29
	3			Hard to Very Hard Brown, Moist SILTY CLAY (CL/ML)
-5	7 10	5.0 B	19	
	3			
	10 13	8.3 B	22	
	4			
-10	7 12	4.2 B	21	
	3			
	8 12	7.3 B	21	
				597.79
	7			Very Dense Brown, Moist 597.04 SAND, with gravel (SPG)
-15	50/4"		11	Auger refusal at 14.25 feet Light Gray LIMESTONE, heavily fractured Run 1: 14.25' - 24.25' Recovery: 100% RQD: 13.3% (Very Poor)
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, heavily fractured Run 1: 14.25' - 24.25' Recovery: 100% RQD: 13.3% (Very Poor) *(continued)*
				587.04
-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)

Boring Number: RWB-15, Run 1

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-15	1	14.25’ – 24.25’	100.0	13.3	Very Poor	Light Gray Limestone Slightly Weathered, Heavily Fractured, Some Vugs

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

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DM

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto
HAMMER EFF (%) 98

STRUCT. NO. 099-W123
Station

BORING NO. RWB-16
Station 19+27.1287
Offset 101.22ft LT
Ground Surface Elev. 609.52 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 609.27				
Brown, Moist FILL: SILTY CLAY, trace sand and gravel		4		
		4 6	3.1 B	10
		4		
		8 12	5.4 B	21
	-5			
		7		
		10 15	5.8 B	21
601.52				
Hard Brown, Moist SILTY CLAY, with sand and gravel (CL/ML)		3		
		6 10	6.5 B	23
	-10			
		11		
597.52		18 19	4.5 P	21
Very Dense Light Gray, Moist WEATHERED LIMESTONE				
595.52		50/1"		
Auger refusal at 14 feet 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, Inc.

SOIL BORING LOG

Date 4/28/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 1 - Ramp D **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W123
Station

BORING NO. RWB-17
Station 19+90.1585
Offset 120.55ft LT
Ground Surface Elev. 608.27 ft

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

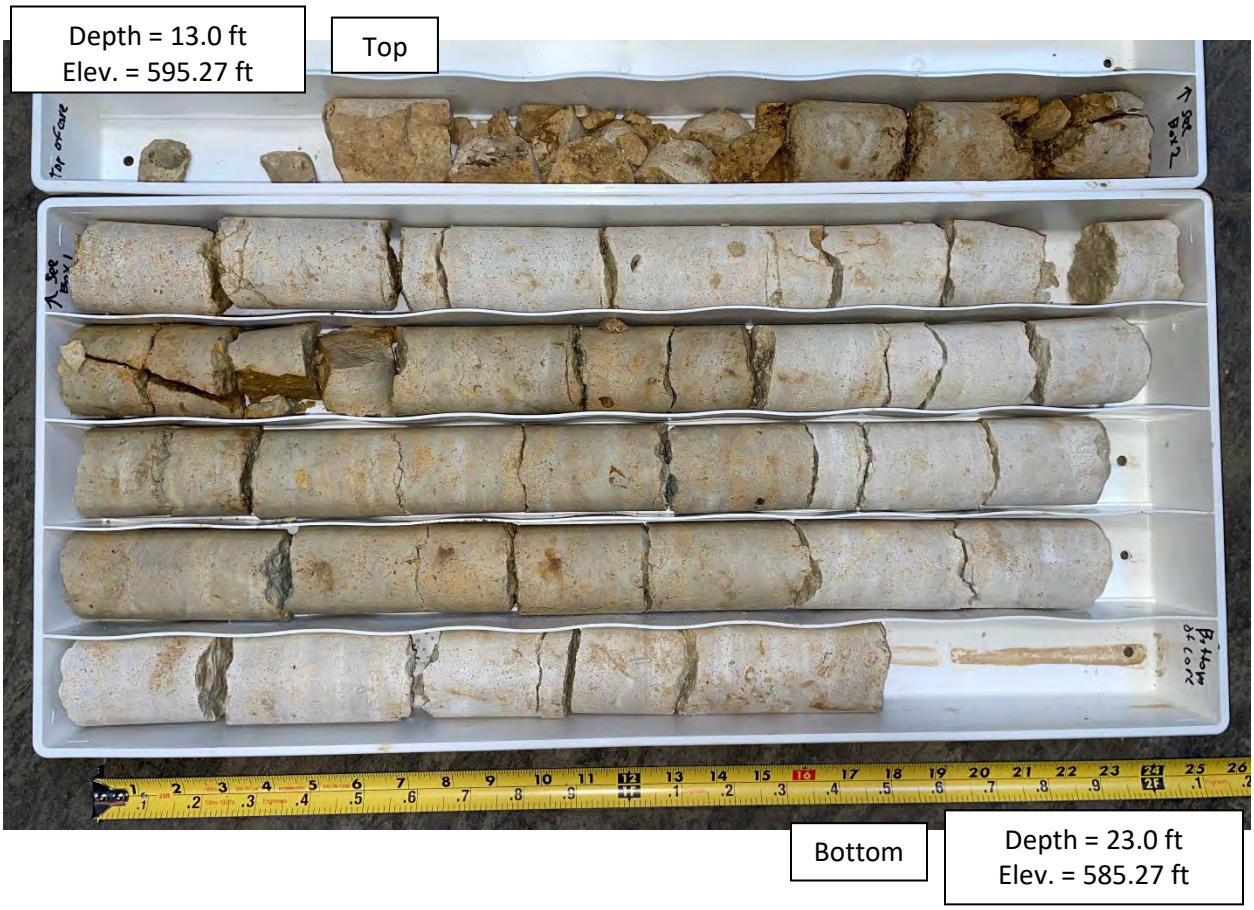
Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
607.94				4 inches of Asphalt
	3			Gray, Moist FILL: SILTY CLAY, trace gravel
606.27	3 3	1.7 B	23	
				Brown, Moist FILL: SILTY CLAY, trace gravel
604.27	3			
	7 9	4.6 B	20	Hard Brown, Moist SILTY CLAY, trace gravel (CL/ML)
-5	4			
	9 12	6.0 B	20	
	3			
	11 14	4.4 B	19	
-10				
597.27	50/1"			Very Dense Light Gray, Moist WEATHERED LIMESTONE
			9	
595.27				Light Gray LIMESTONE, heavily fractured Run 1: 13' - 23' Recovery: 100% RQD: 22% (Poor)
-15				
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Light Gray LIMESTONE, heavily fractured Run 1: 13' - 23' Recovery: 100% RQD: 22% (Poor) *(continued)*
585.27				End of Boring
-25				
-30				
-35				
-40				

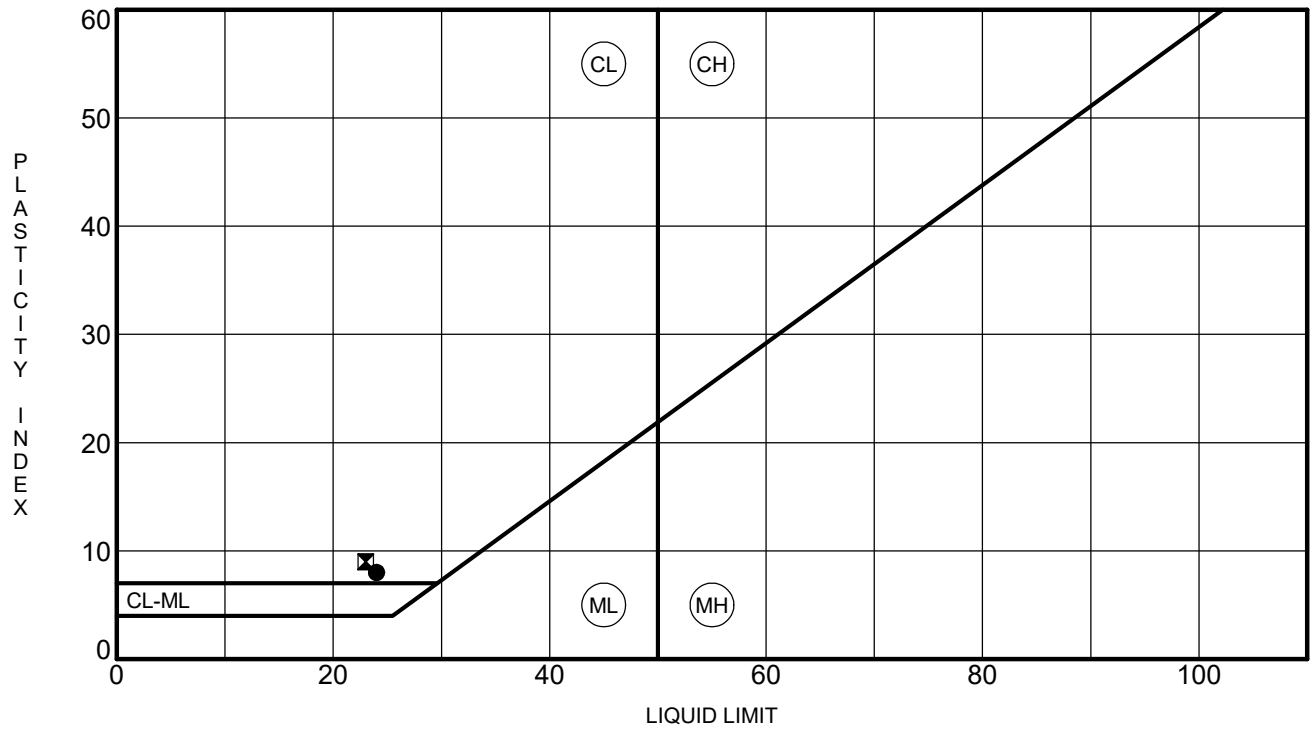
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Boring Number: RWB-17, Run 1



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-17	1	13.0’ – 23.0’	100.0	22.0	Poor	Light Gray Limestone Slightly Weathered, Heavily Fractured, Some Vugs

Appendix D
Laboratory Test Results



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**RWB-02**	**8.50**	**24.0**	**16.0**	**8.0**		
⊠	**RWB-03**	**8.50**	**23.0**	**14.0**	**9.0**		

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

ATTERBERG LIMITS' RESULTS

Route: I-80

Section: I-80 over Des Plaines River

County: Will

ATTERBERG_LIMITS 198-003 I-80.GPJ IL_DOT.GDT 8/31/22

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:	RWB-15			Bulk/Prep	MC/CS
Sample Depth (ft):	22-22.5		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	5/20/22	Date: 5/24/22
Formation Name:	Silurian, Undivided	Load Direction:	vertical	Angle Drilled:	vertical
Appearance (e.g. cracks, shearing, spalling):	~20% < 1mm vugs				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	3.7730	3.7780	3.7750	3.7753
Diameter, *in.*	1.9880	1.9900	1.9890	1.9890

Specimen Mass, *g*	490.1	Ratio (2.0-2.5)	
Bulk Density, *pcf*	159.2	1.90	

Moisture Condition - D2216

Container ID	08
container, *g*	516.8
container + wet rock, *g*	1005.0
container + dry soil, *g*	1004.2
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

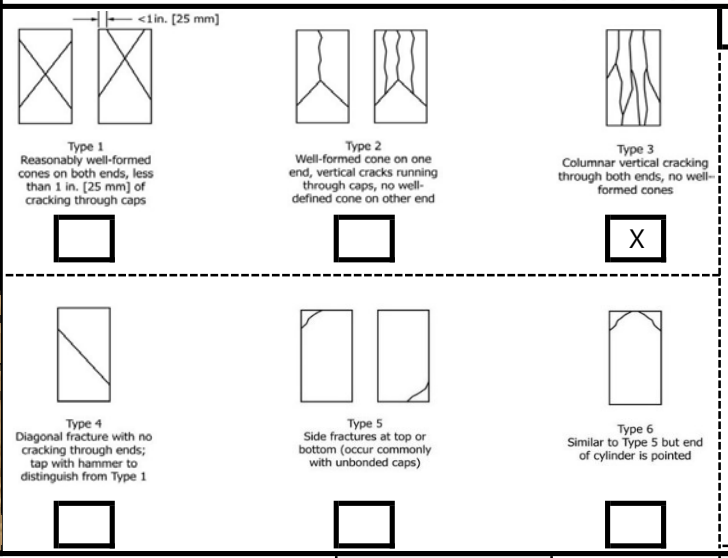
Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 0 sec
Load @ Failure, *lbf*	24,982
Uniaxial Compressive Strength, *psi*	8,040

Remarks

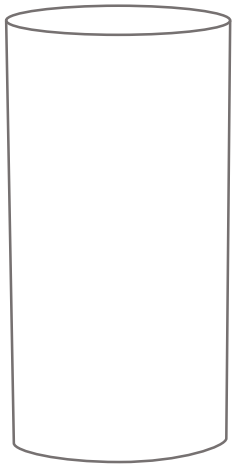
Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

After Break (check applicable appearance)



☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	DE
Revision Date	10/21/2021	Review Date	05/26/22

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:	RWB-17			Bulk/Prep	MC/CS
Sample Depth (ft):	21.5-22'		Tester:	AJ	Tester: AJ
Lithological Description:	Limestone		Date:	5/20/22	Date: 5/24/22
Formation Name:	Silurian, Undivided	Load Direction:	vertical	Angle Drilled:	vertical
Appearance (e.g. cracks, shearing, spalling):	~10% <1mm vugs				

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.1530	4.1510	4.1600	4.1547
Diameter, *in.*	1.9895	1.9900	1.9900	1.9898

Specimen Mass, *g*	649.2	Ratio (2.0-2.5)	
Bulk Density, *pcf*	191.5	2.09	

Moisture Condition - D2216

Container ID	19
container, *g*	467.1
container + wet rock, *g*	998.1
container + dry soil, *g*	997.6
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	60 degrees
Ends parallel to each other within 0.25 degrees?	X		

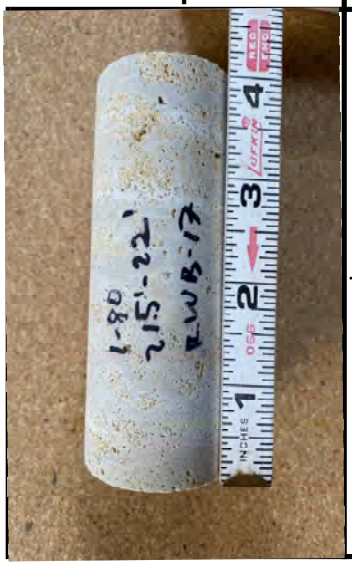
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	2 min 15 sec
Load @ Failure, *lbf*	27,093
Uniaxial Compressive Strength, *psi*	8,713

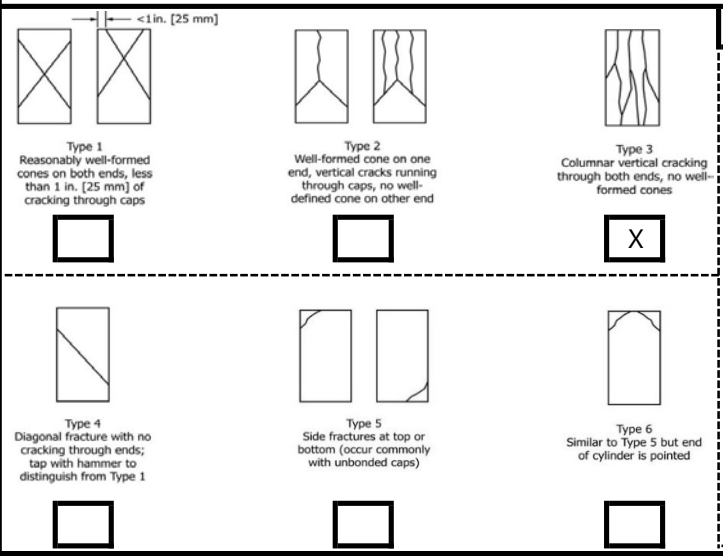
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

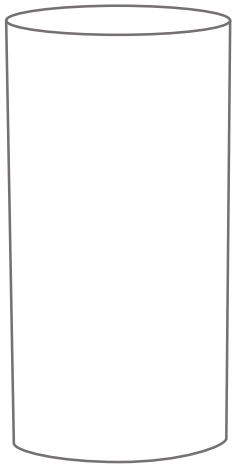
After Preparation



After Break (check applicable appearance)

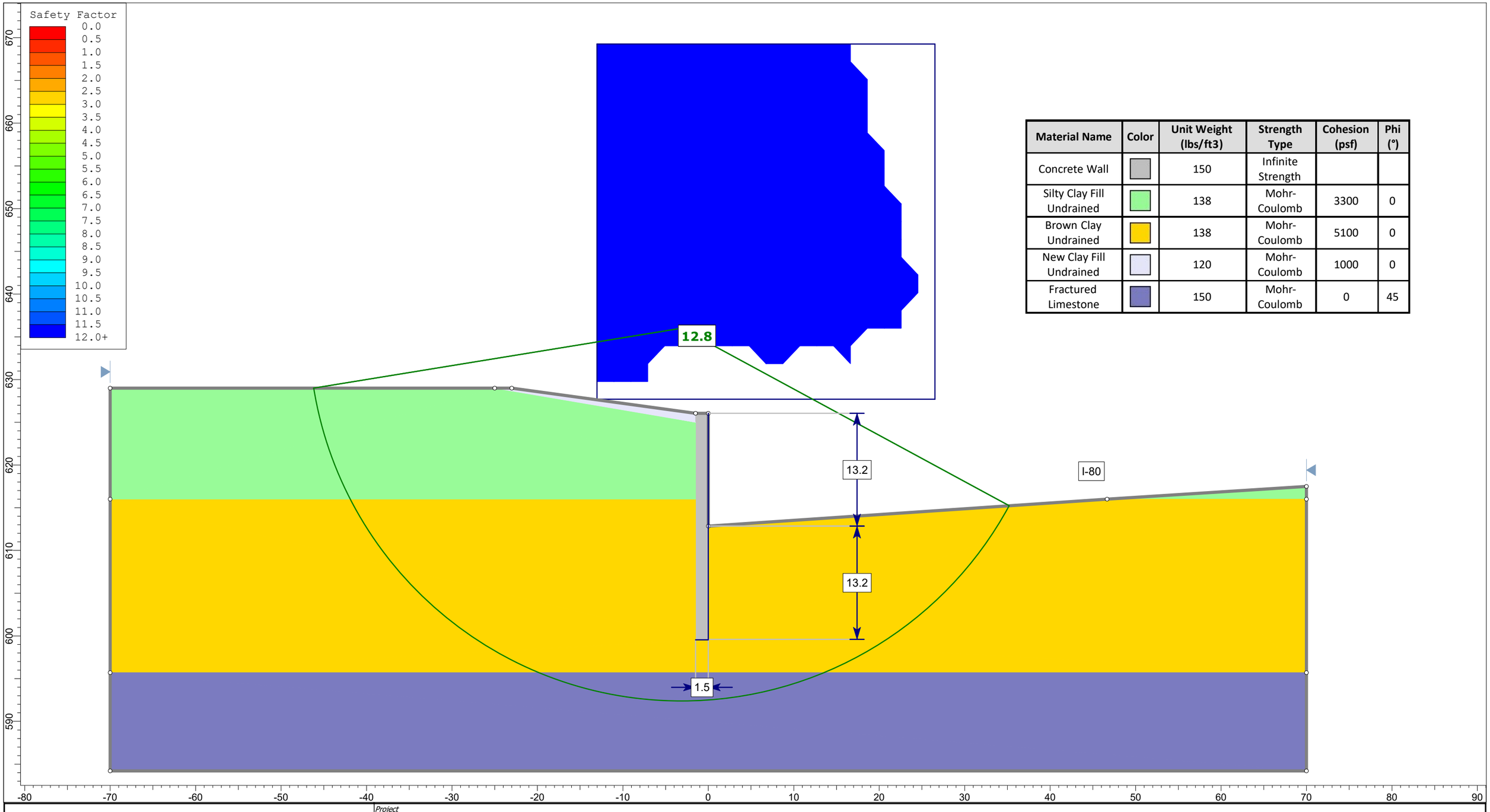


☐ Sketch if Other:



Form ID	TF-RCS	Reviewed By	DE
Revision Date	10/21/2021	Review Date	05/26/22

Appendix E
Slope Stability Analysis Exhibits

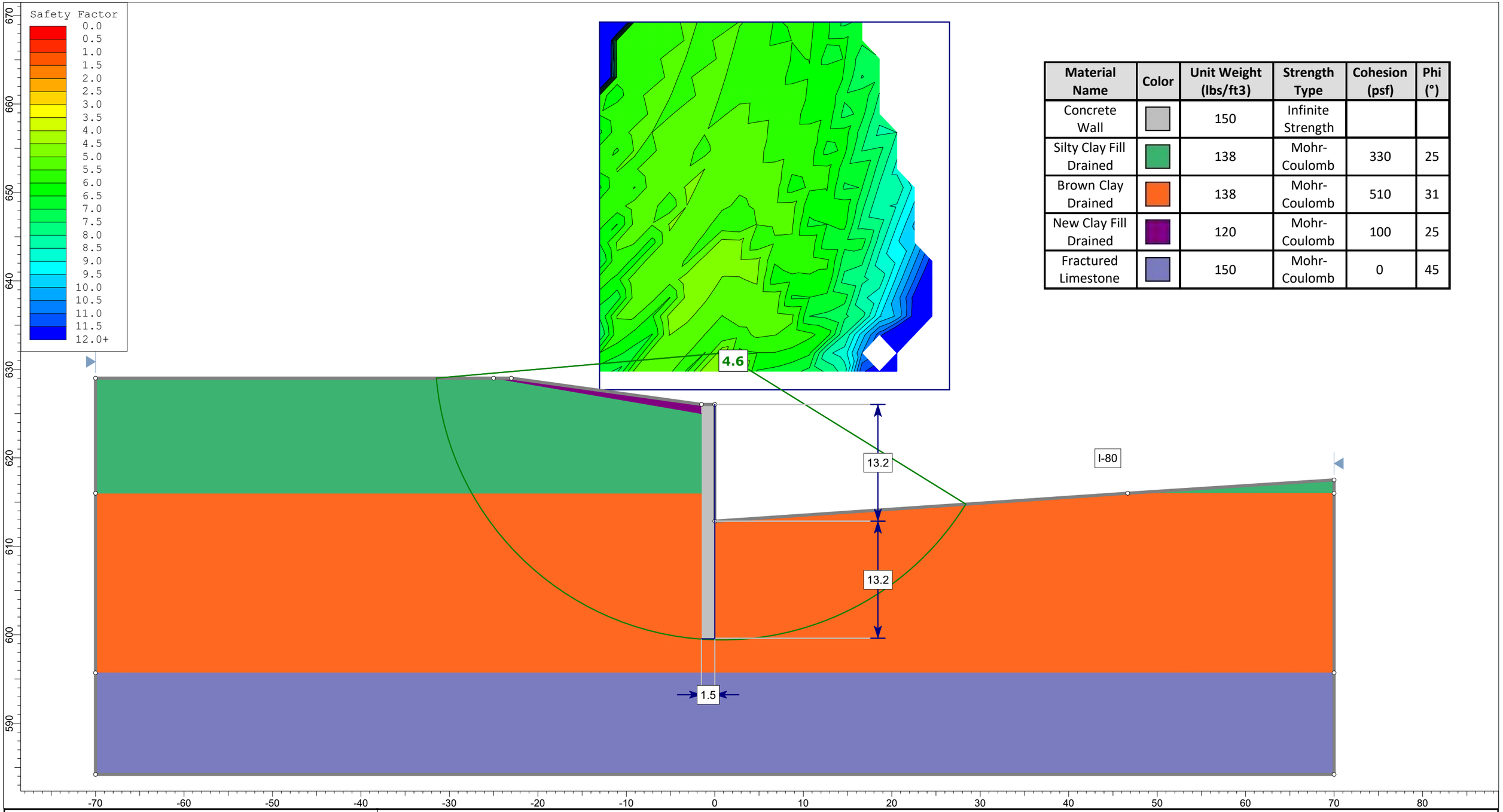


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Concrete Wall		150	Infinite Strength		
Silty Clay Fill Undrained		138	Mohr-Coulomb	3300	0
Brown Clay Undrained		138	Mohr-Coulomb	5100	0
New Clay Fill Undrained		120	Mohr-Coulomb	1000	0
Fractured Limestone		150	Mohr-Coulomb	0	45

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

SLIDEINTERPRET 9.031

Project	PTB 198-003 - Retaining Wall #1 - Soldier Pile Wall - Station 15+45.83		
Analysis Description	Exhibit 1 - Circular Failure Short Term		
Drawn By	MH	*Company*	GSG Consultants, Inc.
Date	8/31/2022, 1:49:39 PM	*File Name*	Soldier Pile 15+45.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Concrete Wall		150	Infinite Strength		
Silty Clay Fill Drained		138	Mohr-Coulomb	330	25
Brown Clay Drained		138	Mohr-Coulomb	510	31
New Clay Fill Drained		120	Mohr-Coulomb	100	25
Fractured Limestone		150	Mohr-Coulomb	0	45

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

SLIDEINTERPRET 9.031

Project	PTB 198-003 - Retaining Wall #1 - Soldier Pile Wall - Station 15+45.83		
Analysis Description	Exhibit 2 - Circular Failure Long Term		
Drawn By	MH	Company	GSG Consultants, Inc.
Date	8/31/2022, 1:49:39 PM	File Name	Soldier Pile 15+45.slmd

APPENDIX F

SOIL DESIGN PARAMETERS

Table F1 – Retaining Wall #1 Soil Parameters

Approximate Depth Range (Elevation, feet)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained					L-Pile Parameters		
			Cohesion c (psf)	Friction Angle ϕ (Degrees)	Cohesion c (psf)	Friction Angle ϕ (Degrees)	Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Horizontal Strain Factor E_{50}	Constant for Lateral Modulus of Subgrade Reaction* k_{py} (pci)	L Pile Soil Type
	New Engineered Clay Fill	120	1,000	0	50	25	0.41	2.46	0.58	0.01	500	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	120	0	34	0	34	0.33	3.00	0.50	N/A	90	Sand (Reese)
0.5 to 4.0 618.0 to 614.5	Brown and Gray Silty Clay Fill	138	3,300	0	330	26	0.41	2.46	0.58	0.005	1,000	Stiff Clay w/o free water (Reese)
4.0 to 13.0 614.5 to 605.5	Medium Stiff to Very Hard Brown Silty Clay	138	5,100	0	510	28	0.32	3.12	0.48	0.004	2,000	Stiff Clay w/o free water (Reese)
13.0 to 20.0 605.5 to 598.5	Medium Stiff to Hard Gray Silty Clay	138	2,850	0	285	28	0.32	3.12	0.48	0.005	1,000	Stiff Clay w/o free water (Reese)
3.5 to 8.5 615.0 to 610.0 (RWB-02, RWB-03 and RWB-09 only)	Light Brown and Brown Sand with Gravel Fill	129	0	42	0	42	0.20	5.04	0.33	N/A	60	Sand (Reese)
19.0 to 20.0 599.5 to 598.5 (RWB-01, RWB-02, RWB-12, RWB-13 and RWB-15 only)	Medium Dense to Very Dense Light Brown and Brown Sand with Gravel	134	0	42	0	42	0.20	5.04	0.33	N/A	225	Sand (Reese)
18.5 to 20.0 600.0 to 598.5 RWB-04 only	Medium Dense Gray Silt	128	0	38	0	38	0.24	4.20	0.38	N/A	90	Sand (Reese)
21.0 to 24.0 597.5 to 594.5 (RWB-01A, RWB-03A, RWB-07A, RWB-11A only)	Loose to Extremely Dense Light Brown and Gray Sand with Silt	137	0	42	0	42	0.20	4.20	0.33	N/A	125	Sand (Reese)

*The initial p-y modulus, E_{py} , varies linearly with depth. To obtain E_{py} use the equation $E_{py} = k_{py} * z$, where k_{py} is the subgrade modulus given in the table and z is the distance from the surface to the center point of the layer in inches.

Approximate Depth Range (Elevation, feet)	Soil Description	Moist Unit Weight γ (pcf)	Effective Unit Weight γ' (pcf)	Uniaxial Compressive Strength q_u (psi)	LPILE p-y Soil Model
24.0 to 34.0 594.5 to 584.5	Gray Heavily Fractured Limestone	165	102.6	8,375	Strong Rock (Vuggy Limestone)