STRUCTURAL GEOTECHNICAL REPORT

I-80 Phase II: Chicago Street to US 30

Proposed Retaining Wall #1

North of I-80 (W.B) & East of Gardner Street

PTB 194-009, IDOT Job No. D-91-205-19

IDOT Contract No. 60W35

Will County, Illinois

Prepared for:

EXP US Services Inc.
205 North Michigan Avenue
Suite 3600
Chicago, IL 60601

Prepared by:

Geo Services, Inc.
805 Amherst Court
Suite 204
Naperville, Illinois 60565
(630) 305-9186

JOB NO. 20012
June 3, 2021
Revised June 15, 2021
Revised June 18, 2021

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

June 2, 2021
Revised: June 15, 2021
Revised: June 18, 2021

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

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

GSI Project No. 20012

Re: Structure Geotechnical Report
Proposed Retaining Wall No.1
Located at N of Westbound Interstate 80 and East of Gardner Street
Will County, Illinois
IDOT Job Number: D-91-205-19, Contract 60W35(PTB 194, Item 009)

Dear Mr. Hough:

The following report presents the geotechnical analysis and recommendations for the construction of the proposed Retaining Wall No.1 to be constructed north of westbound Interstate 80 (WB I-80) and east of Gardner Street at. approximate Station 716+00 to Station 720+43.33. This geotechnical report has been prepared based upon information obtained in seven (7) soil borings (RW-32 to RW-38) were completed at the site by Geo Services Inc. (GSI) in April - May 2021 for Interstate 80 Phase II Project. Copies of the boring logs, boring location plan, soil profile along with a lab test results are included in this report.

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

Very truly yours,

GEO SERVICES, Inc.

ANDREW J. PTAK
062-052031
LICENSED PROFESSIONAL ENGINEER
STATE OF ILLINOIS

Alexandra Weatherwax
Project Engineer

Arun Tailor
Project Manager

Andrew J. Ptak, P.E.
Principal

11/30/21

enc.

TABLE OF CONTENTS

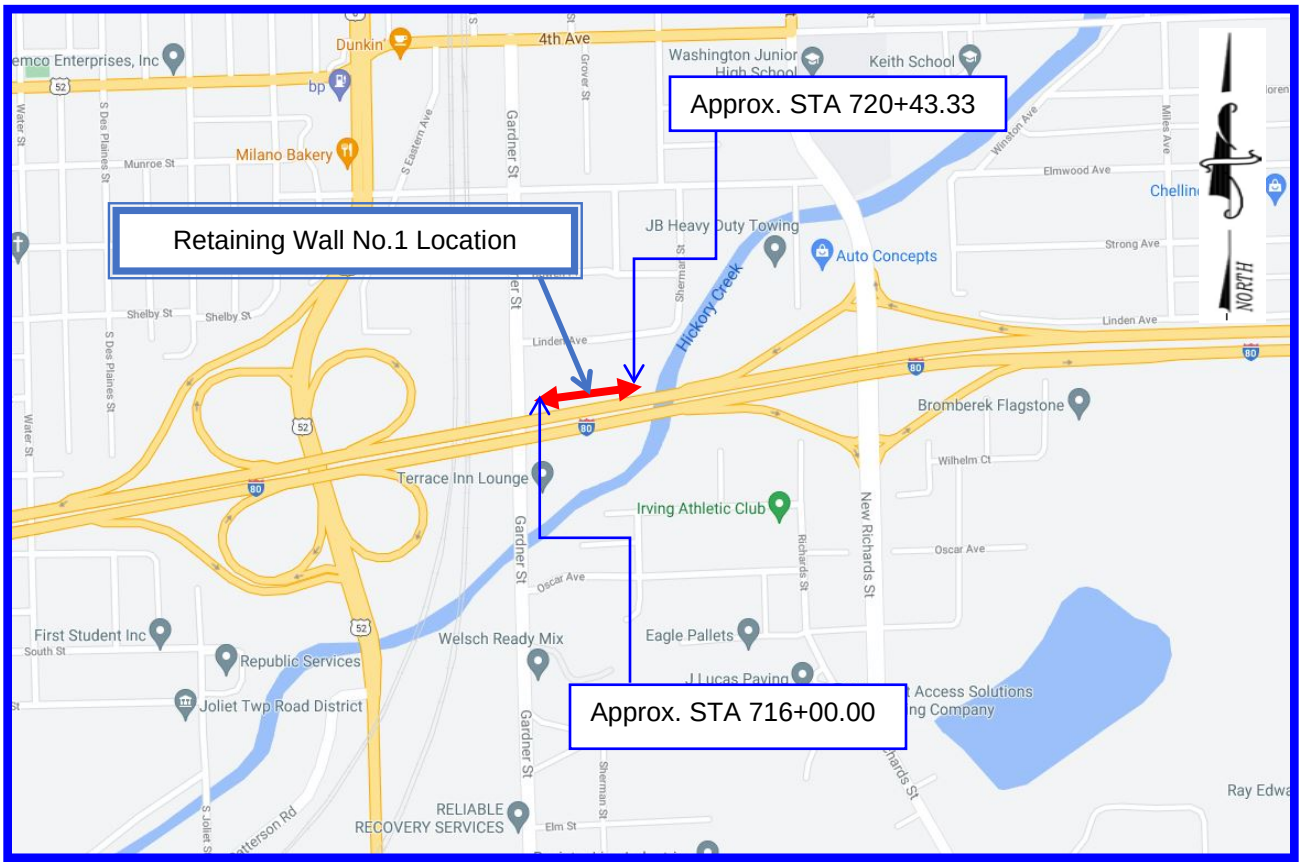
SECTION 01: INTRODUCTION ***2***
SECTION 02: PROJECT DESCRIPTION ***3***
Proposed Retaining Wall Information 3
SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES ***4***
SECTION 04: LAB TESTING PROGRAM ***5***
SECTION 05: SUBSURFACE CONDITIONS ***5***
SECTION 06: WATER TABLE CONDITIONS ***6***
SECTION 07: ANALYSES ***6***
7.1 Mining Activity 6
7.2 Site Seismic Parameters 6
7.3 Settlement 7
7.4 Slope Stability 7
SECTION 08: FOUNDATION RECOMMENDATIONS ***8***
8.1 Recommended Wall Type Options 8
8.2 Shallow Foundation Recommendations 8
8.3 Lateral Soil Resistance 11
SECTION 09: CONSTRUCTION CONSIDERATIONS ***13***
SECTION 10: GENERAL QUALIFICATIONS ***14***

APPENDIX A – General Notes
APPENDIX B – Site Location Map
APPENDIX C – Soil Boring Location Plan
APPENDIX D – Soil Boring Logs
APPENDIX E – Laboratory Test Results
APPENDIX F – Typical Section of Retaining Wall 1
APPENDIX G – Slope Stability Output Results (STABL)
APPENDIX H – ISGS Coal Mines and Underground Industrial Mines Map – Will County

SECTION 01: INTRODUCTION

Geo Services, Inc. (GSI) completed a geotechnical investigation for the construction of proposed Retaining Wall No.1 to be located to the north of westbound Interstate 80 (WB I-80) and east of Gardner Street in Joliet, Will County, Illinois. The purpose of the investigation was to explore and characterize the subsurface soil and groundwater conditions to determine engineering properties of the subsurface soil and develop design and construction recommendations for the Retaining Wall No.1.

The project is located in City of Joliet, Will County, Illinois with the following range/township information: T35N R10E, southwest quadrant of Section 15. The project location is shown on the site map and boring location map included in the Appendix. Figure 1 shows the project location map.



- Figure 1: Project Location Map, From Google Map

This report presents the results of the seven (7) soil borings (RW-32 through RW-38) completed by Geo Services, Inc (GSI), along with a site location map, boring location diagrams, boring logs, soil profile, lab test results as well as descriptions of soil and groundwater conditions, recommendations pertaining to the design and construction of the retaining wall and general construction considerations for the site.

Boring locations were selected by GSI and were reviewed and approved by EXP US Services Inc. Boring locations were located in the field by GSI personnel after review of accessibility and utility locations. The existing ground elevations of the as-drilled borings shown in the soil boring logs are based on GSI field representative were obtained using the handheld GPS after completion of the field work.

TABLE 1
SOIL BORING LOCATION INFORMATION

Boring No.	Northing	Easting	Depth of Boring (feet)	Approximate Ground Surface Elevation (feet)	Approximate Bottom Elevation of Boring (feet)
RW-32	1765024.9	1054110.4	40.0	574.6	534.6
RW-33	1765036.2	1054162.3	40.0	573.7	533.7
RW-34	1765051.9	1054234.2	40.0	572.3	532.3
RW-35	1765064.2	1054308.3	46.5	570.7	524.2
RW-36	1765078.2	1054379.3	43.0	568.8	525.8
RW-37	1765093.1	1054458.2	40.0	566.6	526.6
RW-38	1765105.6	1054525.3	39.5	564.6	525.1

SECTION 02: PROJECT DESCRIPTION

The scope of work consists of providing Phase II engineering services for the proposed improvements include reconstruction and widening of I-80 from Chicago Street to US Route 30. This section of roadway begins in Joliet, IL and runs through unincorporated Will County and ends in New Lenox, IL.

As part of the I-80 reconstruction and widening project, (Job No. D-91-205-19), improvements include proposed retaining and noise walls, and bridge reconstruction.

Proposed Retaining Wall Information

Based on the preliminary progress design plans that were provided by EXP US Services Inc, Retaining Wall No. 1 is proposed to support the widening of WB I-80 pavement between the I-80 Bridges over Gardner Street and Hickory Creek. A Noise Abatement Wall will be attached to the retaining wall barrier as part of a future contract. The retaining wall will be constructed under two (2) contracts: IDOT Contract 60W35 (Sta. 717+20.00 to Sta. 720+43.33) and a future contract (approximately Sta 716+00.00 to Sta. 717+20.00). The proposed retaining wall will have a total length of 443.33 feet extending from approximate Station 716+00.00 to 720+43.33.

Based on the in-progress plan and cross-section drawings provided by EXP US Services Inc., Retaining Wall No. 1 will be a fill wall, which will be proposed to retain the embankment of select fill materials to accommodate the roadway widening. In addition, the retaining walls shall be designed to safely support all earth pressures, surcharges and lateral loads from roadway pavement, noise abatement wall (NAW), a sign structure foundation, and light poles mounted to the retaining wall barrier. The retaining wall type is expected to be a Mechanically Stabilized Earth (MSE) wall. According to the draft IDOT ABD Memo for moment slabs with structure-mounted NAW, the MSE wall supplier shall consider internal and external stability design accounting for the moment slab's bearing pressure surcharge of 1.0 kips/sq ft and horizontal sliding of 2.4 kips/ft of wall.

The estimated top of leveling pad will range approximately between Elev. 560.6 to Elev. 570.6. The retaining wall will have a maximum exposed wall height of 8 feet. The following table presents a summary of the proposed Retaining Wall No.1 at this location.

TABLE 2
RETAINING WALL NO. 1 INFO.

Structure Designation	Location	Wall Station	Approximate Length (feet)	Maximum Exposed wall Height (feet)
Retaining Wall No. 1	Outside Shoulder WB I-80	Start Sta. 716+00 End Sta. 720+43.33	443.33	8.0

SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES

The borings were performed in April and May 2021 with a truck-mounted drilling rig and were advanced by means of hollow stem auger techniques to approximately 10-ft, then switched to rotary drilling to boring termination. Representative soil samples were obtained by using split spoon sampling procedures in accordance with AASHTO Method T-206. Samples obtained in the field were returned to our laboratory for further examination and testing.

Split spoon sampling involves driving a 2 inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. Blow counts are recorded at 6-inch intervals and the blow counts are shown on the boring logs. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). The N value is an indication of the relative density of the soil.

SECTION 04: LAB TESTING PROGRAM

The test procedures were performed in accordance with test procedures discussed in the IDOT Geotechnical Manual. All split-spoon samples obtained from the drilling operation were visually classified in the field.

The soil testing program included performing water content tests of the non-cohesive samples recovered. The test was performed upon representative portions of the samples obtained in the field.

In addition to the regular lab testing program, Atterberg Limits (AASHTO T-89/90), Particle Size Analysis (AASHTO T-88) or Grain Size Analysis (AASHTO T-311) tests were performed on select samples from the borings.

The results of the laboratory testing, along with visual classifications of the materials based upon both the Illinois textural classification and the AASHTO Soil Classification System, are indicated on the boring logs. All laboratory test results can be found in *Appendix E*.

SECTION 05: SUBSURFACE CONDITIONS

The subsurface soil conditions described in this section were developed based on the results of both the site investigation and laboratory results. Detailed descriptions of the subsurface soils, as well as the approximate ground surface elevations and laboratory test results are provided on the soil boring logs. Variations in the general subsurface soil profile were noted during the drilling activities. 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.

Specific soil conditions encountered in the borings are indicated on the soil boring logs included in the *Appendix D*. General descriptions of the soil profile encountered are provided below.

All the borings were completed at the front of the proposed retaining wall, on the existing roadway shoulders due to site conditions, such as side slopes, limitation to access, utility locations and other site conflicts.

The soil conditions encountered at the borings located on the WB I-80 outside shoulders consisted of a flexible bituminous layer over a Portland Cement Concrete (PCC) pavement, except for borings RW-33 and RW-38 where no PCC pavement was encountered. The approximate total composite pavement thickness ranges from 8 inches to 17.5 inches, having asphalt thickness ranges from 4 inches to 13 inches and PCC pavement thickness ranges from 6 inches to 13 inches. (Note: no subbase material was encountered except Boring RW-32 where 18 inches of crushed stone

subbase was encountered). Immediately below the pavement, clay loam/silty clay loam fill was encountered to termination depths of approximately 40 feet to 46.5 feet (Elev. 526.6 to Elev. 534.6) depth below the ground surface.

Fill material primarily consisting of clay loam/silty clay loam is characterized by SPT N values ranging from 4 to 50 blows/foot with an average of 15 blows/foot and moisture content (MC) value ranging from 11 to 23 %, with an average of 16 %. The fill layer has an unconfined compressive strength (Qu) range of 1.2-tsf to 4.5-tsf, with an average of 2.8-tsf.

Possible bedrock was encountered at borings RW-35, RW-36, and RW-38 at depths 44.5 feet, 43 feet, and 37.5 feet respectively, with an average of 41.7 feet (Elev. 526.2, Elev. 525.8, and Elev. 527.1 with an average of Elev. 528.5) respectively.

SECTION 06: WATER TABLE CONDITIONS

Borings were observed during and after the completion of drilling for the presence and level of water. Prior to switching to rotary drilling techniques at 10-ft below ground surface, groundwater was not observed in the borings at these times. Based on the coloration change of the soils from brown and gray to gray, we predict perched water at an approximate depth of 15 to 20 feet below the existing grade surface. We estimate the long-term water table at an approximate depth of 40 feet below the existing grade at the level of the nearest surface water feature, Hickory Creek which is at approximately Elev. 525. Fluctuations in the amount of water accumulated and in the hydrostatic water table can be anticipated depending on variations in precipitation and surface runoff.

SECTION 07: ANALYSES

7.1 Mining Activity

According to readily available ISGS sources, The Illinois Coal Mine Maps for Will County indicate that an underground industrial mine and surrounding buffer region have taken place approximately 0.3 miles southwest of the project site vicinity. It is assumed that potential undermining exists at the locations of the industrial mining operations. However, the proposed construction will take place at the top of the embankment approximately 40 feet above surrounding ground surface elevation therefore will likely not impact underground mining operations. The Illinois Coal Mine Maps for Will County can be found in *Appendix H*.

7.2 Site Seismic Parameters

The seismic parameters shown below were determined per AASHTO LRFD Bridge Design Specification Manual (2012). The project site is considered to be in a low seismic area and liquefiable layers and scour are not expected to impact the design of the new structure. We recommend that Site Classification D be used for seismic design based on site specific SPT tests, RIMAC tests, and the laboratory shear strength

measurements of recovered soil samples. **Table 3 – Seismic Design** contains a summary of the seismic data to be used for design.

TABLE 3
SEISMIC DESIGN (APPROXIMATELY 1000-YEAR RETURN PERIOD)

Description	Type	Value
Long Term Horizontal Response Spectral Acceleration Coefficient (1.0 second period)	S_1	0.069
Short Term Horizontal Response Spectral Acceleration Coefficient (0.2 second period)	S_s	0.137
Design seismic value at 1 second	S_{D1}	0.110 g
Design seismic value at 0.2 second	S_{Ds}	0.146 g
Seismic Performance Zone	-	1
Site Class	-	D

IDOT Seismic Site Class Determination spreadsheet (from IDOT B.B.S. Foundations and Geotechnical Unit) was used to determine the seismic site class for the project site. Liquefiable layers are not expected to impact the design of the new retaining wall structure.

7.3 Settlement

We understand that Retaining Wall No. 1 is proposed along the outside shoulder of WB I-80 to support the road widening. Based on the plans and cross-sections provided, we understand that the existing embankment slope surface will be either entirely or in part on a slope cut in bench to accommodate the select fill to embedded the soil reinforcement for the Mechanically Stabilized Earth (MSE) retaining wall.

Based on the soil conditions encountered at the wall alignment where shallow foundations are proposed, estimated settlements were calculated using the “Cohesive Soil Settlement Estimate” spreadsheet (used by IDOT B.B.S. Foundations and Geotechnical Unit in calculating estimated settlements). Short term and long-term settlement are calculated to be less than ½ inch using the soil conditions for the wall alignment based on a maximum wall height of 8 feet as worst-case scenario. No settlement concerns are anticipated for the proposed MSE retaining wall.

7.4 Slope Stability

For preliminary global slope stability calculations, a mechanically stabilized earth (MSE) retaining wall type with an exposed height of approximately 8-ft was used in our

analysis. The wall foundations are anticipated to be supported on stiff clay loam soils at a depth of at least 4 feet. A slope stability program (STABL V3.0) was used to calculate factors of safety (FOS) at a typical cross-section at approximate Station 716+00 along the proposed wall alignment. A traffic surcharge load of 300-psf was considered. We calculated a Factor of Safety (FOS) of 2.608 for undrained (short-term) condition and a FOS of 1.516 for the drained (long-term) conditions, which satisfies the requirement (FOS ≥ 1.5) per IDOT slope stability criteria. No slope stability issues were identified.

Reinforcement straps/layers having a minimum length of 0.7 times the wall height is recommended for MSE Wall system per AASHTO LRFD design.

All resultant FOS are greater than 1.5 for both short and long-term conditions, which satisfies the FOS requirement for a fill embankment.

SECTION 08: FOUNDATION RECOMMENDATIONS

8.1 Recommended Wall Type Options

Based on the proposed wall location and site geometry at the site, the proposed Retaining Wall No.1 is a fill wall. The feasible wall types include a T-type cantilever wall, cast-in-place (CIP) or precast concrete (gravity/ non-gravity type) walls and Mechanically Stabilized Earth (MSE) walls. Economic, construction and scheduling factors should be evaluated for the decision of retaining wall design.

The most appropriate retaining wall type will depend on factors such as site geometry (existing/proposed slopes, wall heights), existing site conditions, as well as cost-effectiveness, constructability, and schedule. The following provides a general discussion of soil conditions as they relate to the retaining wall construction.

8.2 Shallow Foundation Recommendations

Based on the preliminary plans and cross-sections available, we assumed the base of leveling pad for the MSE wall sections approximate elevation range from Elev. 566.0 to Elev. 556.0, which includes a minimum recommended 3.5 feet frost protection depth for MSE and 4 feet frost protection depth for other wall types. Boring logs along the retaining wall indicate the proposed leveling pad is expected to be supported on stiff clay loam fill materials comprising the existing embankment. A summary of the bearing analyses for the wall is provided in the following table.

TABLE 4
BEARING SUMMARY OF RETAINING WALL NO. 1

Boring(s)	Approximate Station	Approx. Max Retained Wall Height (feet)	Estimated Factored Bearing Resistance Required (psf)
RW-32 thru RW-38	716+00 to 720+43.33	8.0	3,800

Notes: 1. Factored Bearing Resistance is computed for a resistance factor of 0.65 assuming an MSE Wall is constructed. The factored bearing resistance indicated in the table is prior to remedial treatments.
2. Factored Bearing Resistance is computed for a resistance factor of 0.55 assuming a Cantilever or T-Wall is constructed. The factored bearing resistance indicated in the table is prior to remedial treatments.
3. Remedial treatment required due to unsuitable bearing and high moisture content soils.
4. Estimated Maximum Bearing Pressures needed are calculated based on LRFD Wall Bearing calculation per AASHTO Bridge Manual.

The subgrade soils are suitable for support of the retaining wall, we recommend that the T-type wall or a CIP type wall systems of the retaining wall be designed for a maximum factored bearing resistance of 3,800-psf (using a resistance factor of 0.55).

The recommended maximum factored bearing resistance for the MSE wall is 4,320-psf (using a resistance factor of 0.65). The factored net bearing resistance was calculated based on Section 10.6.2 of the LRFD AASHTO Manual.

The results of the boring logs indicate that majority of the bearing soils can support the retaining wall with exception to the areas indicated in Table 5 of this report.

TABLE 5
RECOMMENDED REMEDIAL TREATMENTS

Station (Boring)	Subgrade Description (water content %)	Unconfined Compressive Strength (tsf)	Approx. Height of Prop. Wall (feet)	Recommended Depth of Undercut (feet)	Reason for Remedial Treatment	Remedial Treatment
Sta. 716+00 to 716+30 (RW-32)	Loose Silty Clay Loam	1.0 to 1.3	8.0	3.0	Soft Clay FILL	Remove soft soils and replace with Approved Structural (Granular) Fill

Notes: 1. Soil conditions should be verified in the field at time of construction.
2. Improvements should extend a minimum of 6-inches beyond the proposed footing limits in addition to 0.5 feet in front and behind the wall footing for every 1-ft of undercut for length of MSE wall straps.

For the MSE wall founded on the stiff to very stiff clay loam fill soils and/or remediated areas (with compacted structural fill), please refer to our wall bearing recommendations shown in **Table 4 – Bearing Summary at Retaining Wall No. 1** The factored bearing resistance required was calculated based on Section 10.6.2 of the LRFD AASHTO Manual.

Significant undercuts are not anticipated at the foundation bearing elevations based on the soils encountered in the borings. However, since the soils encountered at the anticipated bearing elevation in all the six borings consisted of fill materials, we recommend assuming 1 feet to 3 feet depth undercut below the top of leveling pad for budgeting purposes to account for variability of fill and/or any unsuitable soils that do not meet the required bearing resistance in Table 4.

Subgrade soils at the foundation bearing elevations should be verified in the field at the time of construction by an experienced Geotechnical Engineer or their representative. If materials with less than adequate bearing strength are noted at the foundation level during footing construction, the weaker material encountered at the base of the footings should be undercut to reach suitable soil, and the undercut area filled with lean concrete.

Actual extents of any remedial treatments shall be determined at that time. Structural fill used to support footings shall be extended at least 12 inches beyond the proposed footing limits and then 1 feet horizontally for each 1 feet of fill placed below the base of the footing. Any new structural fill shall consist of inorganic material and free of debris. Suitable fill materials include crushed granular materials meeting the gradation requirements of IDOT CA-1, CA-6, or CA-7.

Structural fill shall be placed in loose lifts having a maximum of 8 inches in thickness. For IDOT CA-6 type fill, the material should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with modified Proctor method (ASTM D-1557). The moisture content of the fill shall be within +/-2% of the optimum moisture content. IDOT CA-1 and CA-7 type materials can be compacted by placing in lifts and rolling with a smooth drum vibratory compactor or thoroughly tamping with the bucket of a backhoe.

Embankment fill behind the retaining wall should be placed in compliance with Section 205 of the IDOT Standard Specifications for Road and Bridge Construction. Backfill behind the wall should consist of a compacted, free-draining granular material.

A proper drainage system should be designed and provided behind cantilever wall (or MSE and gravity wall, if used) design. The chosen retaining wall type should be designed by an Illinois licensed Structural Engineer.

8.3 Lateral Soil Resistance

The contractor will likely need to design and install a temporary soil retention system to facilitate the construction of the retaining wall. The soil parameters for lateral resistance shown in **Table 6** below may be used for design of the wall and temporary retention system.

TABLE 6
SOIL PARAMETERS FOR LATERAL RESISANCE

Material (Approx. Elevation, feet)	Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (°)	Undrained Cohesion (psf)	Undrained Friction Angle (°)	Lateral Modulus of Subgrade Reaction (pci) [1]	Strain [1]
Stiff to Hard - Clay Loam (FILL)	125	0	28	2,700	0	1,000	0.005

Note: 1. Values recommended for use in design from L-pile Software Manual.

Groundwater was not encountered within the upper 40 feet of embankment fill, the total boring depth, and soil moisture contents were within the upper-teens to mid-twenties. Groundwater is expected to be at the level of the nearest surface water feature, Hickory Creek, which is at approximately Elev. 525 and is within 100 feet of the east end of Retaining Wall No. 1.

Fill behind the retaining wall shall be placed in compliance with Section 205 of the IDOT Standard Specifications for Road and Bridge Construction. Backfill behind the wall shall consist of a compacted, free-draining granular material. A proper drainage system should be installed behind the wall to prevent the buildup of hydrostatic pressure.

Allowances should be made for any surcharge loads adjacent to the retaining structure, such as traffic loads and adjacent sloped embankment.

According to the AASHTO Standard Specifications for Highway Bridges (Table 5.5.2B), a value of 0.34 may be used for the coefficient of friction between the concrete base and drained cohesive soils (this assumes a concrete base on the stiff cohesive soils). Assuming granular fill, a friction angle of 28 degrees may be used for the concrete on granular fill, leading to a coefficient friction value of 0.53. We recommend a resistance factor against sliding of 0.8 for both cohesive and cohesionless soil to be used for cast-in-place concrete based on LRFD Manual procedures Section 10.6.3.4.

The active earth pressure for free-draining granular materials may be represented by a linearly increasing equivalent fluid pressure of 40-psf per foot of depth. For cohesive soils, an equivalent fluid pressure of 50-psf per foot should be used. Allowances should be made for any surcharge loads adjacent to the retaining structure. **Table 7 – Lateral Earth Pressure Coefficient** provides recommended earth pressure coefficients to resist lateral loadings against granular fill materials or cohesive fill (new or existing) soils. The illustration below in conjunction with **Table 7** may be used to determine lateral earth pressures.

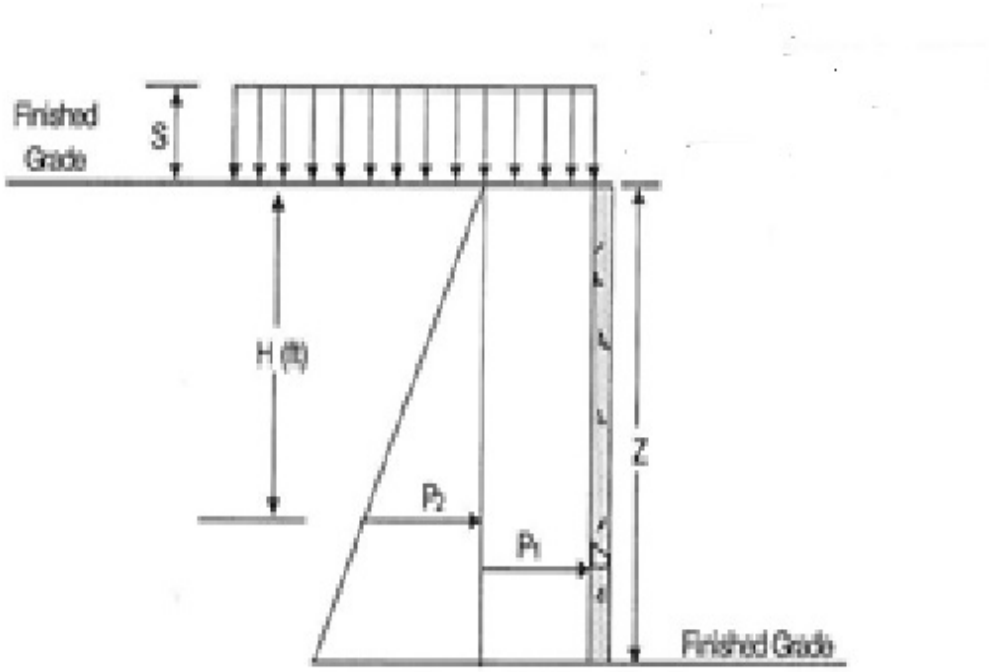


TABLE 7
LATERAL EARTH PRESSURE COEFFICIENT[1]

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Earth Pressure (pcf)	Surcharge Pressure, P_1 (psf)	Earth Pressure, P_2 (psf)
Active (K_a)	Granular Fill– 0.33 Clay Fill / Native – 0.42	40 50	0.33*S 0.42*S	40*H 50*H
At-Rest (K_o)[2]	Granular Fill– 0.46 Clay Fill / Native – 0.58	55 70	0.46*S 0.58*S	55*H 70*H
Passive (K_p)	Granular Fill– 3.0 Clay Fill / Native – 2.4	360 288	-- --	-- --

Notes: 1. Table assumes no groundwater is acting
2. For movement in the ¼-inch range in the passive direction, K_o should be used.

No earth resistance should be counted on in design in either at-rest or passive within the frost-depth zone. For limited movement (1/4-inch or less), the at-rest earth resistance should be used in lieu of the passive pressure.

SECTION 09: CONSTRUCTION CONSIDERATIONS

For the proposed retaining wall, the existing embankment will need to be temporarily retained. If excavation for the proposed improvements are in excess of 4 feet, we recommend slopes be in accordance with Occupational Safety and Health Administration (OSHA) safety standards and requirements for temporary side slopes. Movement of adjacent soils near the edge of and into excavation areas should be prevented.

The temporary soil retention system shall be designed by the Contractor (or as directed by the Engineer) as specified in IDOT Standard Specification, Section 522. All excavations should be performed in accordance with the latest OSHA requirements. Allowances should be made for any surcharge loads adjacent to the excavation areas. The information provided below should not be interpreted to mean that Geo Services, Inc. is assuming responsibility for construction site safety or the contractor's activities. Construction site safety is the sole responsibility of the contractor, who should also be solely responsible for the means, methods, and sequencing of construction operations.

The OSHA Standards-Excavations classify soils into three basic types (e.g. Type A, B, and C). Depending upon the soil type, OSHA requirements for temporary excavation slopes range from 3/4H to 1V (horizontal to vertical) for Type A soils, 1H to 1V for Type B soils, and 1-1/2H to 1V for Type C soils. Per OSHA, any excavation extending to a depth of more than 20 feet shall be designed by a licensed professional engineer. Based upon the subsurface conditions encountered at most boring locations, the excavations will extend through predominately stiff to very stiff cohesive soil (embankment fill) and into native medium stiff to very stiff cohesive soils. The cohesive fill material sampled in the borings typically exhibited unconfined compressive strengths in excess of 0.5-tsf. Cohesive soils having unconfined compressive strengths greater than 0.5-tsf but less than 1.5-tsf classify as Type B soils according to OSHA regulations. OSHA recommends a maximum slope inclination of 1H to 1V for temporary excavations in Type B cohesive soils. Considerations should be given to the allowable construction easement when developing the excavation plan. Particular caution should be exercised if excavations are performed near existing utility lines. Existing backfill for utility lines is often poorly compacted and the limits of the old excavation form a ready failure surface. The OSHA trench safety guidelines for adequate side slopes based on the soil types may not apply in these situations.

SECTION 10: GENERAL QUALIFICATIONS

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

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

APPENDIX A

GENERAL NOTES

GENERAL NOTES

CLASSIFICATION

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

Cohesionless Soils

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

Cohesive Soils

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

TERMINOLOGY

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

DRILLING AND SAMPLING SYMBOLS

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

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

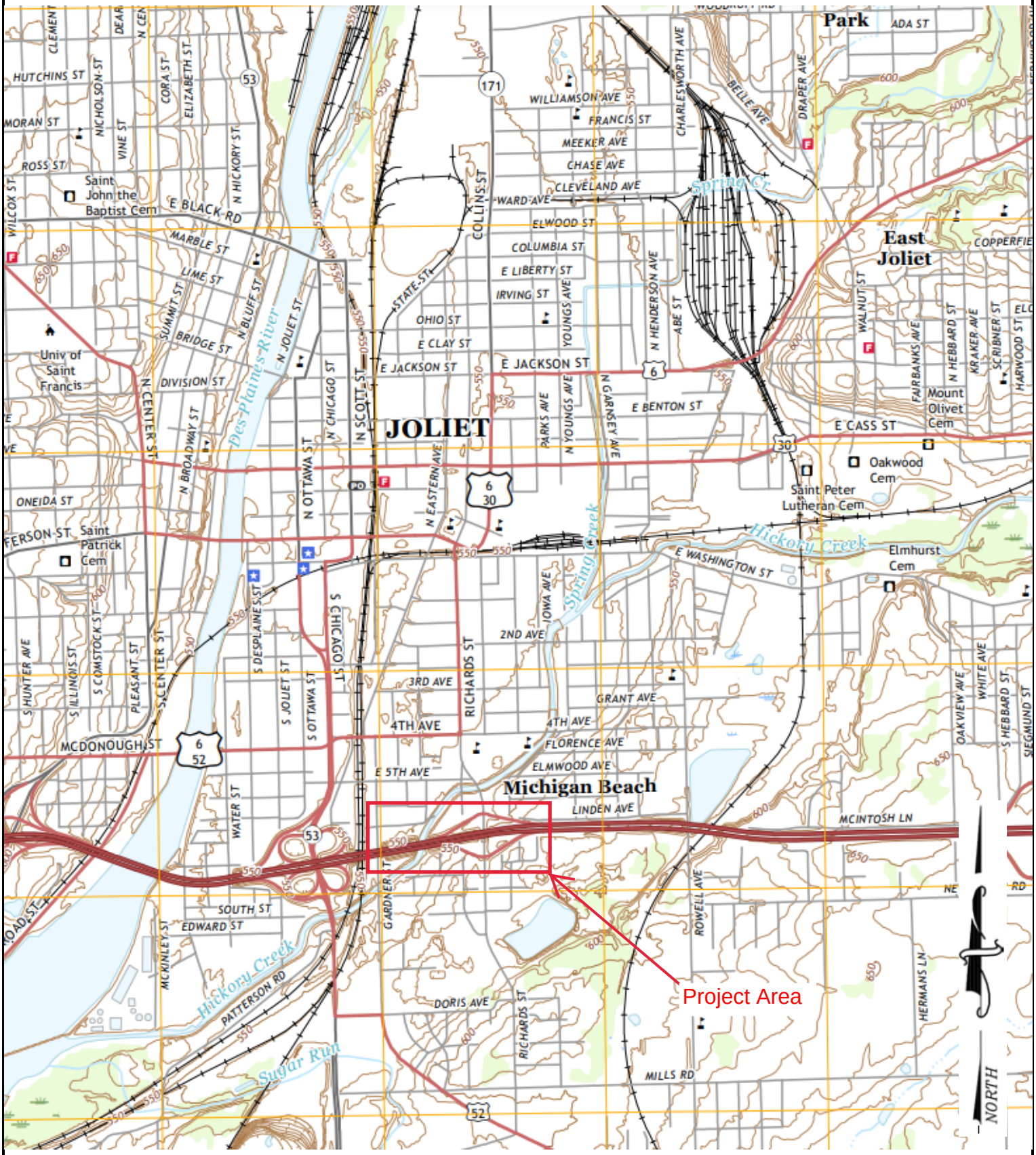
WATER LEVEL MEASUREMENT SYMBOLS

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

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

APPENDIX B

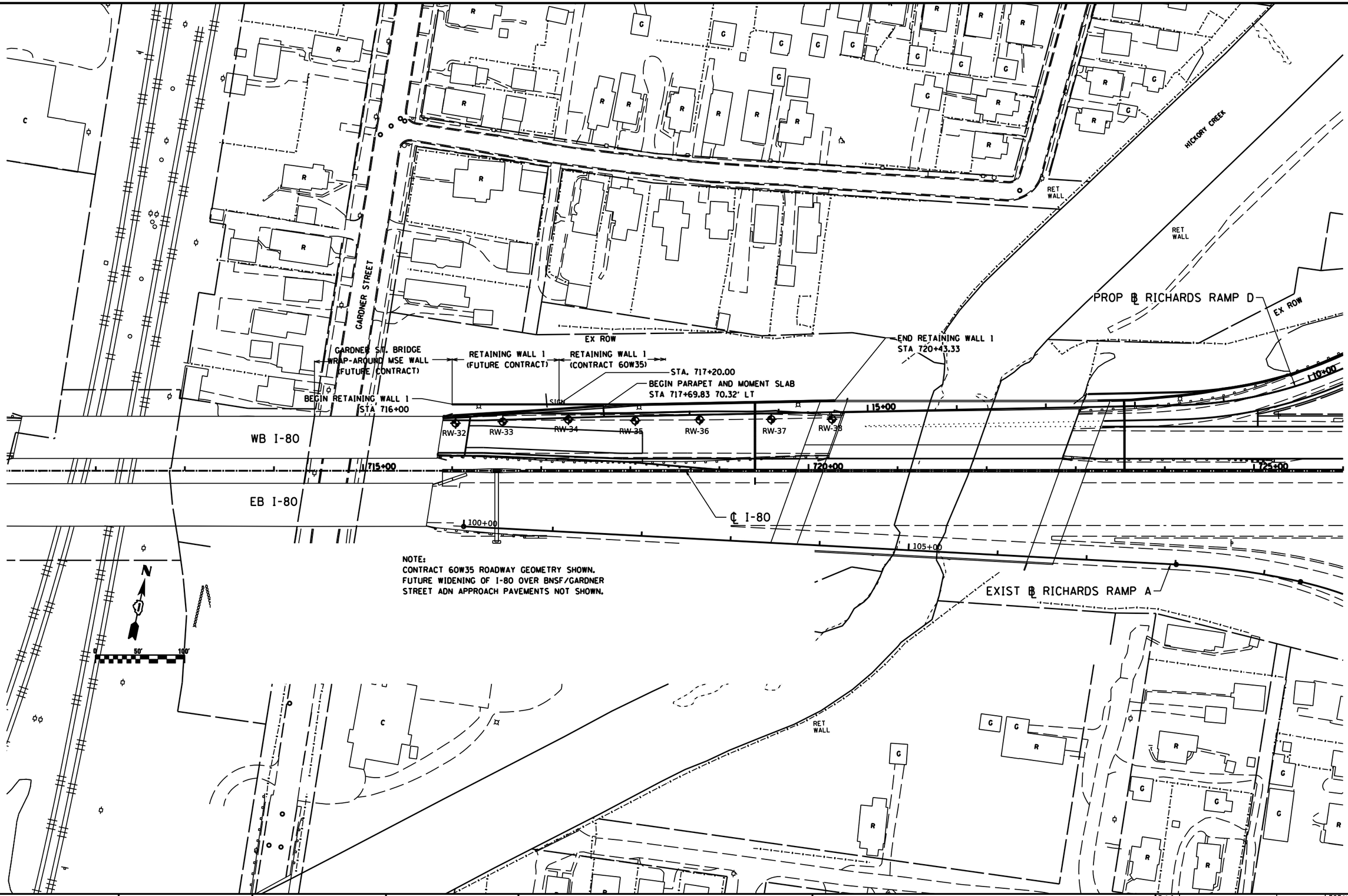
SITE LOCATION MAP



SITE LOCATION PLAN			
I-80 from Chicago Street to Route 30 PTB 194-9 Retaining Wall #3 Joliet, Will County, Illinois	**Geo Services, Inc.** Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	DRAWN BY	AGW
		APPROVED BY	AJP
		DATE	May 13, 2021
		GSI JOB No.	20012
		SCALE	NTS

APPENDIX C

BORING LOCATION PLAN & PROFILE



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

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

FILE NAME = $FILEL$

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

WB I-80 FROM GARDNER STREET TO ROWELL AVENUE
WALL 1 SOIL BORING PLAN

SCALE: 1" = 50' | SHEET · OF · SHEETS | STA. 716+00 | TO STA. 720+43.33

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-0098	WILL	$TOTW35	GT05C1
		CONTRACT NO. 60W35		
		ILLINOIS FED. AID PROJECT		

...\D160W35-sht-pln-Wall1.dgn 6/18/2021 10:51:09 AM

BEGIN PROJECT
STA 716+13.00
El. 574.32

TRANSITION TO EXISTING PAVEMENT SECTION
PROPOSED WB PGL
BEGIN PERMANENT PAVEMENT
STA. 718+13.66
WB PGL ELEV.: 570.4

RW-32
716+04
53.3' Left
574.6

RW-33
716+57
55.0' Left
573.7

RW-34
717+30
57.5' Left
572.3

RW-35
718+06
56.2' Left
570.7

RW-35
718+78
51.2' Left
568.8

PR WB I-80 PGL
RW-37
719+58
57.6' Left
566.6

RW-38
720+26
57.8' Left
564.6

EX I-80 WB PGL

EX I-80 EB PGL

HICKORY CREEK

PAVEMENT
CRUSHED STONE
CLAY LOAM (FILL)
SILTY CLAY LOAM (FILL)
CLAY LOAM (FILL)
SILTY CLAY LOAM (FILL)
SILTY LOAM (FILL)
SANDY CLAY LOAM (FILL)

EX GROUND LINE AT ℄

EOB
POSSIBLE BEDROCK

LEGEND

BORING NUMBER
STATION
OFFSET
ELEVATION

N-VALUE

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

MOISTURE CONTENT (%)
NR=NO RECOVERY

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

EOB=END OF BORING

711+00	712+00	713+00	714+00	715+00	716+00	717+00	718+00	719+00	720+00	721+00	722+00	723+00	724+00	725+00	726+00
576.85 / 577.28	552.40 / 550.28	548.76 / 548.46	548.98 / 547.84	534.06 / 533.65	533.96 / 533.74	533.97 / 533.78	533.06 / 533.17	533.48 / 533.83	555.28 / 556.84	574.50 / 574.46 / 574.35	573.93 / 573.57 / 573.86	573.13 / 572.77 / 573.05	572.08 / 571.83 / 570.82	572.02	570.79 / 570.78 / 569.38	570.78	569.39 / 569.64 / 568.11	569.39	567.99 / 568.36 / 566.28	567.99	566.59 / 566.56 / 565.31	566.59	565.19 / 565.81 / 563.89	565.19	563.79 / 549.47 / 546.18	563.79	562.39 / 551.36 / 523.92	562.39	561.05 / 554.38 / 514.38	561.05	559.85 / 516.76 / 517.98	559.84	558.79 / 537.81 / 540.88	558.77	557.87 / 555.87 / 555.02	557.84	557.10 / 555.94 / 555.14	557.05	556.46 / 555.02 / 553.97	556.39	555.97 / 554.42 / 553.28	555.88	555.62 / 554.68 / 552.78	555.50	555.41 / 553.84 / 552.13	555.25	555.35 / 554.01 / 552.20	555.15

PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
B.M. NOTED
STRUCTURE NOTATIONS CHKED
NOTE BOOK
NO.
BY
DATE

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

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

FILE NAME = $FILE$

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

WB I-80 FROM GARDNER STREET TO ROWELL AVENUE
WALL 1 SOIL BORING PROFILE

SCALE: 1" = 50' | SHEET · OF · SHEETS | STA. 716+00 | TO STA. 720+43.33

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-009B	WILL	>TOTW35<	GT05C1
		CONTRACT NO. 60W35		
		ILLINOIS FED. AID PROJECT		

...\D160W35-sht-prf-Wall1.dgn 6/18/2021 11:22:34 AM

SOIL BORING LOCATION PLAN	Geo Services, Inc. Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	DRAWN BY	AGW
GEOTECHNICAL INVESTIGATION **RETAINING WALL 1** **North of Interstate 80 and East of Gardner Street** **Will County, Joliet, Illinois**		APPROVED BY	AJP
		DATE	May 25, 2021
		GSI JOB No.	20012
		SCALE	NTS

APPENDIX D

BORING LOGS

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

GSI Job No. 20012

SOIL BORING LOG

Page 1 **of** 1

Date 5/12/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** ZP

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-32
Station 716+04
Offset 53.30ft Left
Ground Surface Elev. 574.62 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				4.5" ASPHALT, 13.0" CONCRETE
573.16	2			
	2		11	CRUSHED STONE-loose
	1			
571.62				
	4			CLAY LOAM-brown & gray-stiff (Fill)
	3	1.20	20	
-5	3	B		
569.12				
	3			SILTY CLAY LOAM-brown & gray-loose (Fill)
	4		16	
	3			
566.62				
	3			CLAY LOAM-brown & gray-stiff to hard (Fill)
	3	1.20	18	
-10	4	B		
	2			
	5	1.00	20	
	4	P		
	3			
	6	1.30	23	
-15	8	B		
	3			
	3	3.00	21	
	11	P		
	3			
	6	1.90	16	
-20	8	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*
	4			
	6	3.00	15	
	8	P		
	5			
	9	3.50	15	
-25	13	B		
	6			
	6	3.10	15	
	11	B		
	7			
	10	2.80	12	
-30	8	B		
	6			
	5	4.00	15	
-35	7	P		
	6			
	10	4.20	16	
-40	14	B		
534.62				End Of Boring @ -40.0'. Boring backfilled with cuttings.

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/12/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** ZP

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-33
Station 716+57
Offset 55.00ft Left
Ground Surface Elev. 573.73 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4.0" ASPHALT, 9.0" CONCRETE			
572.64			
CLAY LOAM-brown & gray-very stiff to hard (Fill)	3		
	5 5	3.00 P	15
	3		
-5	5 4	2.20 B	19
	4		
	8 8	3.50 B	17
	3		
-10	7 7	3.10 B	18
	5		
	5 5	3.00 P	18
	7		
-15	5 7	2.00 P	20
	3		
	4 4	2.40 B	19
	5		
-20	6 7	2.90 B	15
CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*	7		
	7 8	2.40 B	14
	7		
-25	10 9	2.10 B	12
	13		
	15 19		NR
	10		
-30	12 14	4.50 P	13
541.73			
SILTY CLAY LOAM-gray-hard (Apparent Fill)	5		
-35	8 11		11
	11		
End Of Boring @ -40.0'. Boring backfilled with cuttings.			
533.73 -40	12 16	4.50 P	16

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

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

GSI Job No. 20012

SOIL BORING LOG

Date 5/12/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** ZP

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-34
Station 717+30
Offset 57.50ft Left
Ground Surface Elev. 572.32 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
13.0" ASPHALT			
571.24			
CLAY LOAM-brown & gray-stiff to hard (Fill)	15		
	5 3	3.00 P	15
	2		
	3 3	3.00 P	20
-5			
	3		
	5 6	1.80 B	21
	3		
	8 9	4.00 B	15
-10			
	3		
	5 7	1.20 B	21
	4		
	7 9	2.70 B	19
-15			
	6		
	8 8	2.90 B	16
	3		
	5 6	1.80 B	17
-20			
CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*			
	5		
	4 6	3.50 P	17
	10		
	50/8"	3.50 B	13
-25			
	7		
	12 11	2.50 B	11
	7		
	10 12	2.50 B	15
-30			
	9		
	10 11	2.00 P	16
-35			
	7		
End Of Boring @ -40.0'. Boring backfilled with cuttings.	8 12	4.50 P	15
532.32 -40			

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/14/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-35
Station 718+06
Offset 56.20ft Left
Ground Surface Elev. 570.70 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5.0" ASPHALT, 6.0" CONCRETE 569.78			
CLAY LOAM-brown & gray-stiff to hard (Fill)	4		
	3 3	3.50 P	17
	2		
-5	1 3	1.75 P	20
	6		
	8 5	3.50 P	16
	4		
-10	7 10	4.00 P	17
	6		
	8 9	2.70 B	18
	4		
-15	5 7	1.20 B	23
	6		
	5 7	2.70 B	18
	6		
-20	6 7	1.30 B	16
CLAY LOAM-brown & gray-stiff to hard (Fill) *(continued)*	8		
	8 7	1.70 B	15
	4		
-25	5 6	1.30 B	16
545.20 SILTY CLAY LOAM-gray-hard (Fill)	17		
	19 19		NR
	11		
-30	13 15	3.50 P	13
538.70 CLAY LOAM-brown & gray-very stiff to hard (Fill)	11		
-35	13 18	4.50 P	15
	13		
-40	13 14	2.50 P	19

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

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/14/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-35
Station 718+06
Offset 56.20ft Left
Ground Surface Elev. 570.70 **ft**

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

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

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

CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*

526.20

Drillers Observation: Possible Bedrock

-45

524.20

End Of Boring @ -46.5'. Boring backfilled with cuttings.

-50

-55

-60

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/14/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-36
Station 718+78
Offset 57.20ft Left
Ground Surface Elev. 568.79 **ft**

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5.0" ASPHALT, 6.0" CONCRETE 567.87			
CLAY LOAM-brown & gray-very stiff to hard (Fill)	5		
	3 5	2.50 P	17
	1		
-5	6 5	2.75 P	19
	6		
	9 6	4.50 P	14
	4		
-10	6 10	2.10 B	15
	5		
	6 6	3.75 P	15
	5		
-15	7 7	2.50 B	18
	5		
	5 7	3.00 P	15
	3		
-20	5 7	3.50 P	17
CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*	4		
	4 4	3.00 P	17
	5		
-25	7 8	4.50 P	15
	8		
	9 50/2"	2.00 P	14
	7		
-30	7 12	2.50 P	18
	5		
-35	7 9	3.00 P	18
	5		
-40	8 6	2.50 P	17

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

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

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/14/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-36
Station 718+78
Offset 57.20ft Left
Ground Surface Elev. 568.79 **ft**

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

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

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

CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*

Auger Refusal @ -43.0'. Possible Bedrock. End Of Boring. Boring backfilled with cuttings. 525.79

-45
-50
-55
-60

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

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

SOIL BORING LOG

GSI Job No. 20012

Date 4/21/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-37
Station 719+58
Offset 57.60ft Left
Ground Surface Elev. 566.63 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5.0" ASPHALT, 7.0" CONCRETE			
565.63			
CLAY LOAM-brown & gray-stiff to very stiff (Fill)	4		
	4 4	3.00 P	15
	1		
-5	2 5	1.30 B	18
	6		
	10 11	4.40 B	16
	5		
-10	6 7	2.20 B	18
	4		
	6 7	2.00 P	18
	5		
-15	7 7	3.00 P	15
	5		
	3 8	3.00 P	14
	4		
-20	7 6	1.20 B	16
CLAY LOAM-brown & gray-stiff to very stiff (Fill) *(continued)*			
	4		
	3 6	2.50 P	16
	4		
-25	4 4	1.50 P	18
	3		
	3 3	1.00 P	19
	5		
-30	5 14	2.00 P	17
	5		
-35	7 5	2.20 B	20
529.63			
SANDY CLAY LOAM with Gravel-dark brown, gray & black-medium dense (Fill)	12		
End Of Boring @ -40.0'. Boring backfilled with cuttings.	6 14		16
526.63 -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), GP-Geoprobe Hand Auger
BBS, from 137 (Rev. 8-99)

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

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

SOIL BORING LOG

GSI Job No. 20012

Date 5/14/21

ROUTE FAI 80 **DESCRIPTION** I-80 Phase II **LOGGED BY** MM

SECTION _____ **LOCATION** SW 1/4, **SEC.** 15, **TWP.** T35N, **RNG.** R30E, 3rd **PM**

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

STRUCT. NO. _____
Station _____

BORING NO. RW-38
Station 720+26
Offset 57.80ft Left
Ground Surface Elev. 564.56 ft

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

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

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
8.0" ASPHALT 563.90			
CLAY LOAM & STONE-black-loose (Fill)	1		
	3 3	1.50 P	17
561.56			
SILTY CLAY LOAM-brown & gray-stiff to very stiff (Fill)	2		
	3 7	2.50 P	15
-5			
559.06			
SILTY LOAM-gray-medium dense (Fill)	7		
	7 9	2.50 P	16
556.56			
CLAY LOAM-brown & gray-very stiff to hard (Fill)	5		
	4 5	3.00 P	15
-10			
	7		
	6 8	2.70 B	15
	4		
	7 8	3.00 P	15
-15			
	6		
	6 5	4.00 P	16
	5		
	9 14	4.00 P	15
-20			
CLAY LOAM-brown & gray-very stiff to hard (Fill) *(continued)*	6		
	9 9	3.25 P	15
	6		
	7 14	2.75 P	13
-25			
	7		
	8 17	2.50 P	17
536.56			
SILTY CLAY LOAM-brown & gray-very stiff to hard (Fill)	6		
	9 12	3.75 P	11
-30			
	8		
	8 8	4.50 P	15
-35			
527.06			
Drillers Observation: Possible Bedrock			
End Of Boring @ -39.5'. Boring backfilled with cuttings. 525.06			
-40			

Z:\PROJECTS\2020\20012 EXP, I-80 FROM CHICAGO ST. TO RT 30, PTB 194-9\20012 BORING LOGS\20012_LOG.GPJ 6/1/21

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

APPENDIX E

LABORATORY TEST RESULTS

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

1235 East Davis Street, Suite 101
Arlington Heights, IL 60005
(847) 253-3845

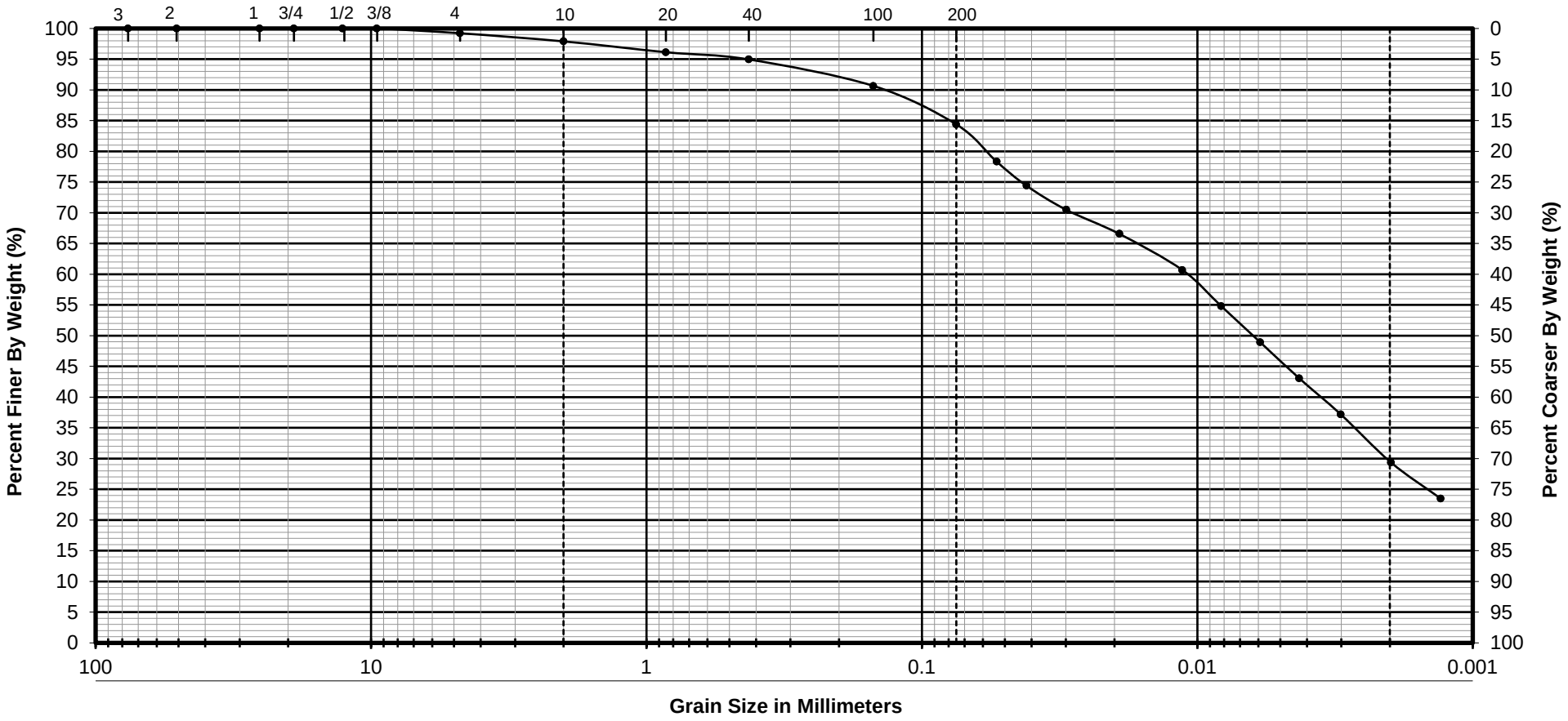
Liquid Limit, Plastic Limit, and Plasticity Index of Soils
AASHTO T89/T90

Project Name I-80 Phase II: Proposed Retaining Wall No. 1 Job No 20012

Location Will County, Illinois Date 5/19/21

SAMPLE NO.	RW-32	RW-35	RW-38				
DEPTH	6.0'-7.5'	8.5'-10.0'	6.0'-7.5'				
LIQUID LIMIT (LL)	35	27	31				
PLASTIC LIMIT (PL)	19	16	21				
PLASTICITY INDEX (PI)	16	11	10				

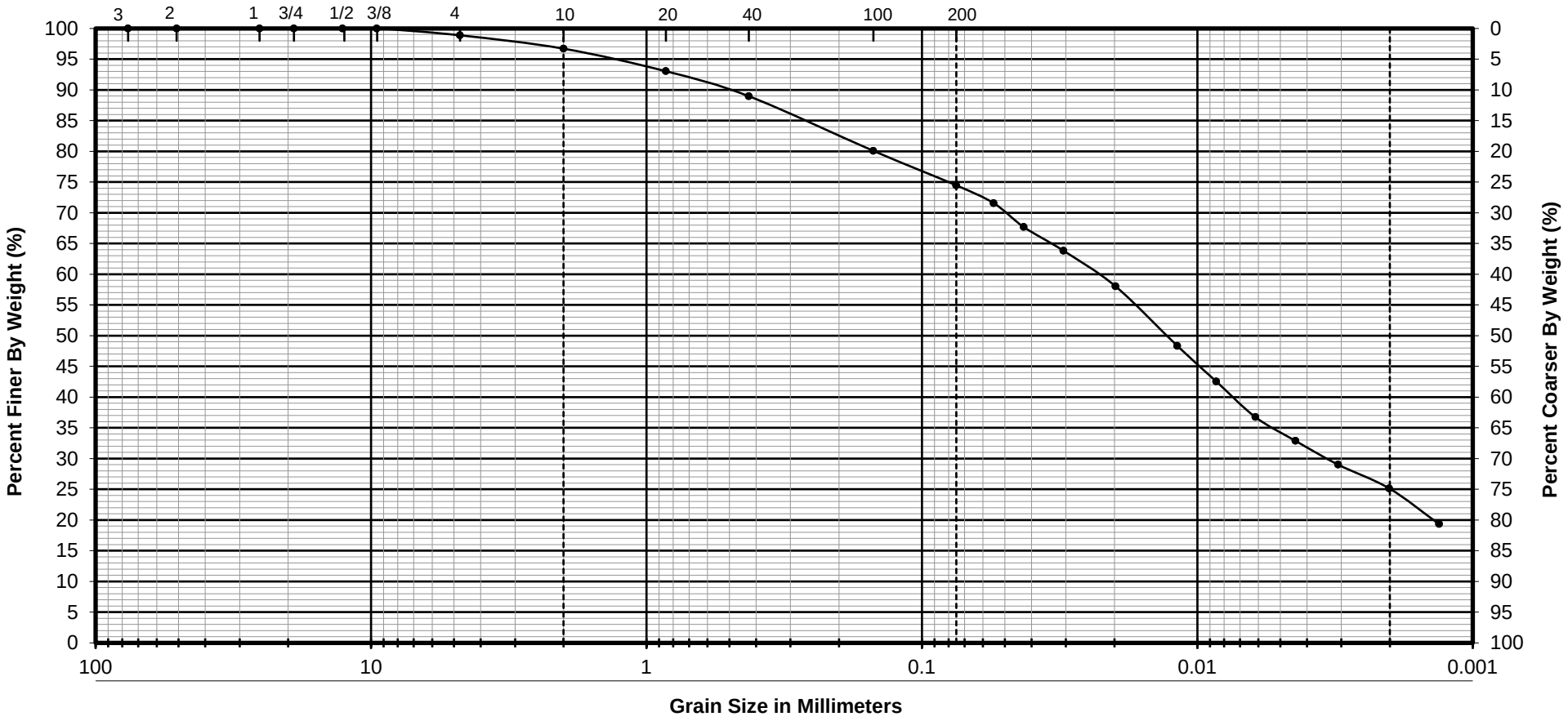
Test by MT



GRAVEL	SAND		SILT	CLAY
	COARSE	FINE		

Boring No.	RW-32	CLASSIFICATION		PARTICLE SIZE ANALYSIS-AASHTO T88
Sample No.	3			
Depth	6.0'-7.5'	SILTY CLAY LOAM		Proposed Retaining Wall No. 1
Liquid Limit	35	A-6		N of W.B I-80 and East of Gardner St
Plastic Limit	19	brown		Will County, Illinois
Plasticity Index	16	Group Index	13	
Test By	MT	% Gravel	2.1	
Date	5/19/21	% Sand	13.5	
Reviewed By	AT	% Silt	55.0	
Job No	20012	% Clay	29.4	

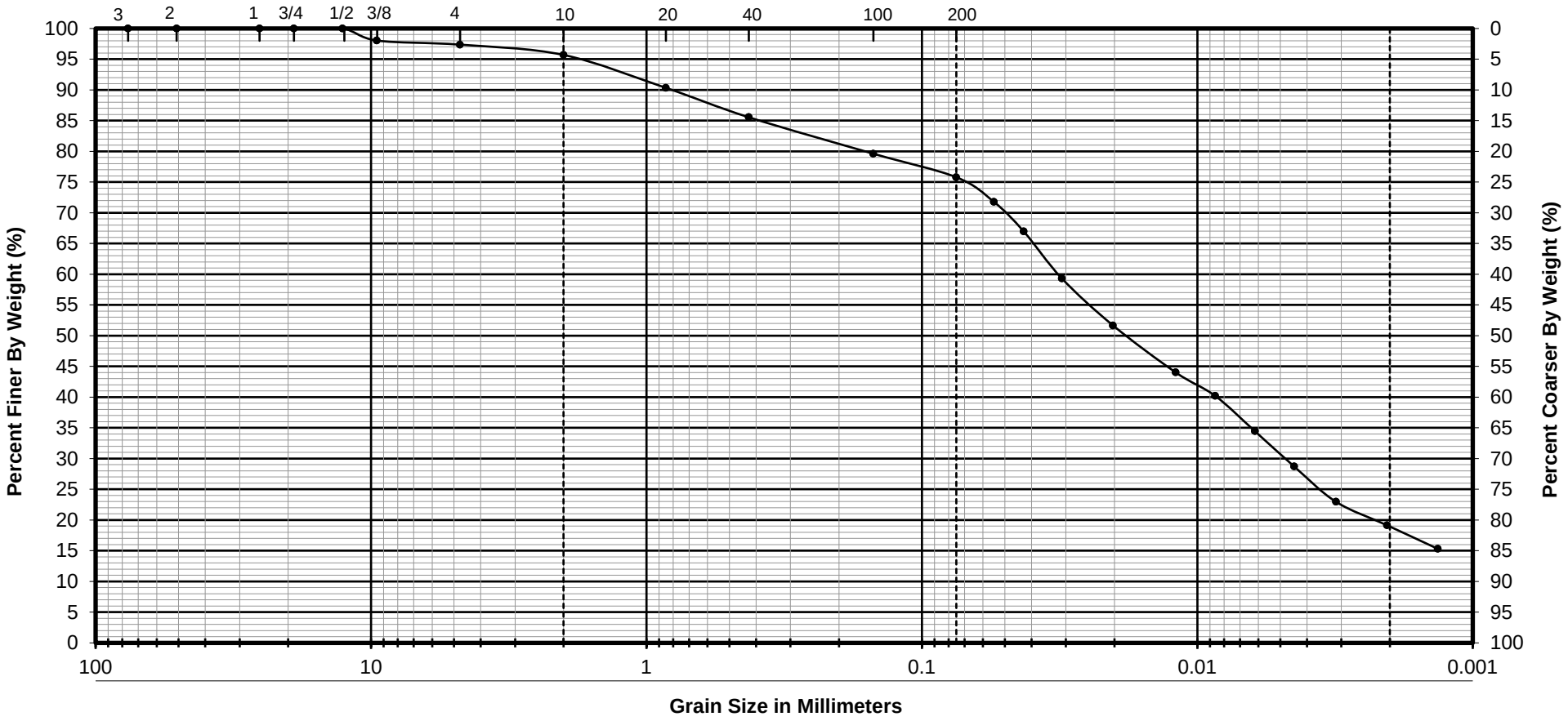
Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm
1235 E. Davis St., Arlington Heights, IL 60005
Phone 847-253-3845 • Fax 847-253-0482



GRAVEL	SAND		SILT	CLAY
	COARSE	FINE		

Boring No.	RW-35	CLASSIFICATION		PARTICLE SIZE ANALYSIS-AASHTO T88
Sample No.	4			
Depth	8.5'-10.0'	CLAY LOAM		Proposed Retaining Wall No. 1
Liquid Limit	27	A-6		N of W.B I-80 and East of Gardner St
Plastic Limit	16	brown		Will County, Illinois
Plasticity Index	11	Group Index	6	
Test By	MT	% Gravel	3.3	
Date	5/19/21	% Sand	22.2	
Reviewed By	AT	% Silt	49.3	
Job No	20012	% Clay	25.1	

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm
1235 E. Davis St., Arlington Heights, IL 60005
Phone 847-253-3845 ● Fax 847-253-0482



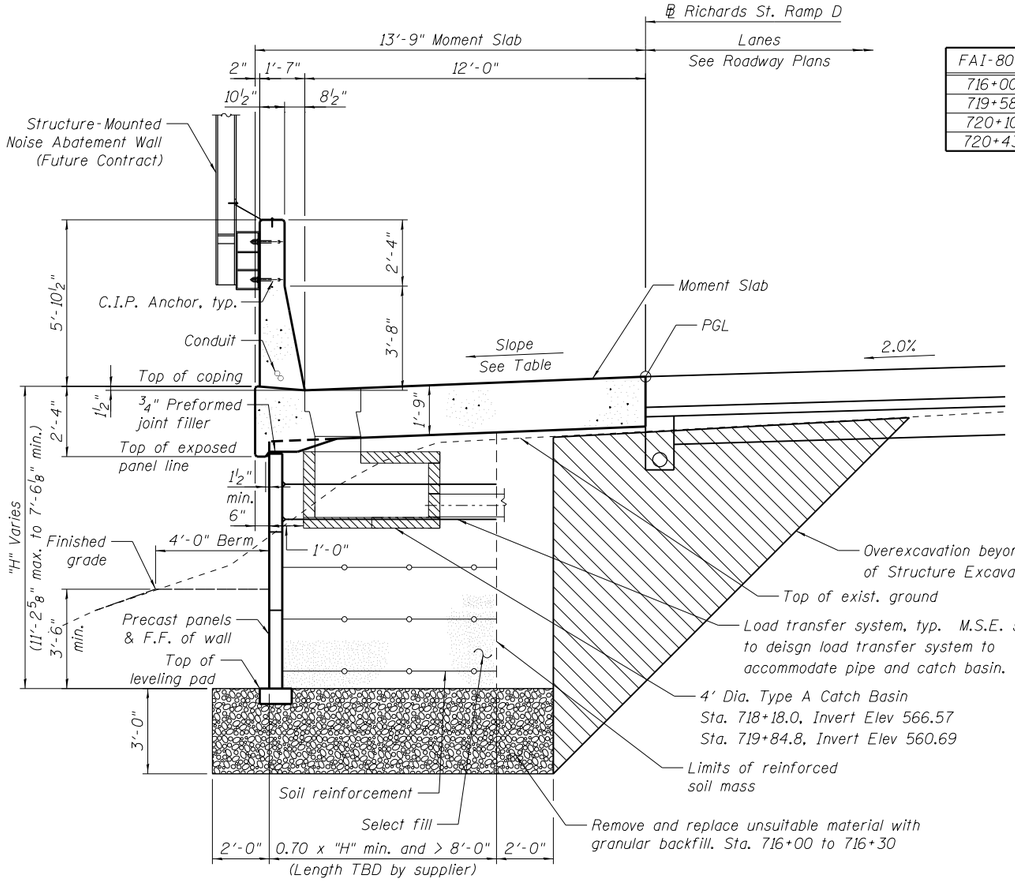
GRAVEL	SAND		SILT	CLAY
	COARSE	FINE		

Boring No.	RW-38	CLASSIFICATION		PARTICLE SIZE ANALYSIS-AASHTO T88
Sample No.	3			
Depth	6.0'-7.5'	SILTY LOAM		Proposed Retaining Wall No. 1
Liquid Limit	31	A-4		N of W.B I-80 and East of Gardner St
Plastic Limit	21	brown		Will County, Illinois
Plasticity Index	10	Group Index	6	
Test By	MT	% Gravel	4.3	
Date	5/19/21	% Sand	19.9	
Reviewed By	AT	% Silt	56.7	1235 E. Davis St., Arlington Heights, IL 60005
Job No	20012	% Clay	19.1	Phone 847-253-3845 ● Fax 847-253-0482

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

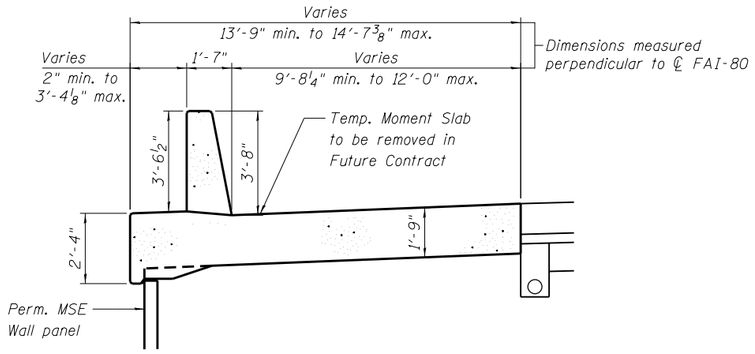
APPENDIX F

TYPICAL SECTION OF RETAINING WALL 1



SECTION THRU MSE WALL

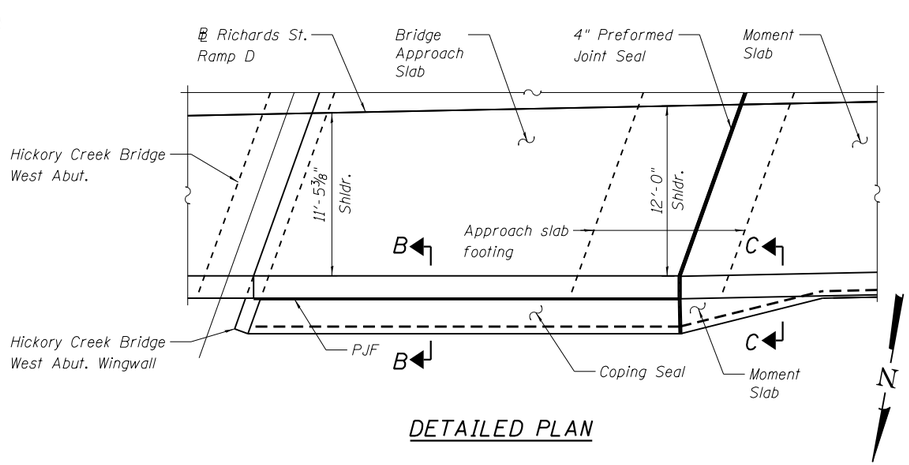
FAI-80 Sta.	Width	Slope
716+00.00	12'-0"	-4.00%
719+58.00	12'-0"	-4.00%
720+10.00	12'-0"	-2.00%
720+43.33	11'-4⅜"	-2.00%



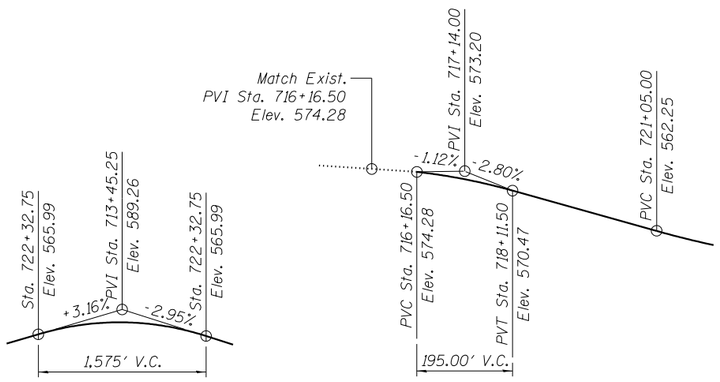
SECTION A-A

CONTROL POINTS

FAI-80 Sta.	T/Coping Elev.	Grade Elev. at F.F. of Wall	Offset
716+00.00	575.39	569.47	74.75' Lt.
716+33.42	574.70	569.41	74.75' Lt.
716+63.42	574.03	569.35	74.75' Lt.
716+93.42	573.31	569.30	74.75' Lt.
717+23.42	572.55	568.24	74.75' Lt.
717+53.42	571.74	566.90	74.75' Lt.
717+83.42	570.90	565.56	74.75' Lt.
718+13.40	570.06	564.59	74.75' Lt.
718+43.39	569.21	564.06	75.35' Lt.
718+73.39	568.36	563.54	75.95' Lt.
719+03.38	567.50	562.95	76.55' Lt.
719+33.37	566.65	561.86	77.15' Lt.
719+63.37	565.83	560.77	77.75' Lt.
719+93.36	565.11	559.68	78.35' Lt.
720+13.10	564.63	558.42	81.04' Lt.
720+43.33	563.79	556.07	81.04' Lt.

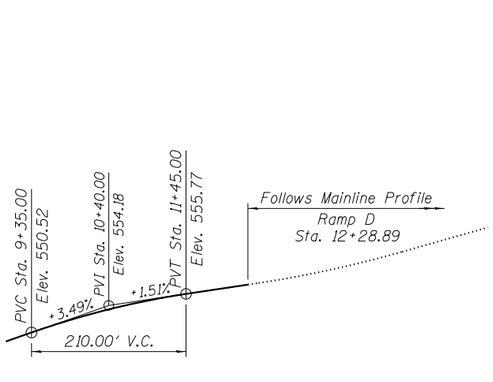


DETAILED PLAN

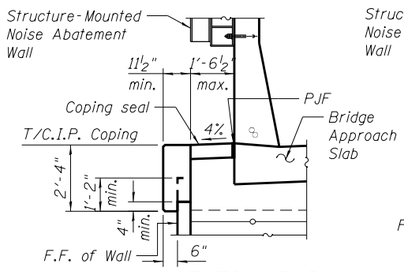


PROFILE GRADE
(Final condition along ℄ FAI-80)
(Future Contract)

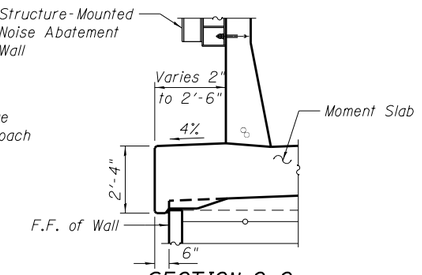
PROFILE GRADE
(Interim condition along ℄ FAI-80)
(Contract 60W35)



PROFILE GRADE
(Along ℄ Richards St. Ramp D)



SECTION B-B



SECTION C-C

MODEL: Default
FILE NAME: pw:\\exp-pw.bentley.com:exp-pw-01\Documents\Projects\CHI\00263426-A01800 CADD Design\811 Contract 60W35_WB\811.10 Structural\Wall 1-Hickory-Gardner\TSL\099XXXXX-60W35-TSL-002.dgn
6/25/2021 3:44:23 PM

exp.

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

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL 1
DETAILS AND SECTIONS
SHEET OF SHEETS

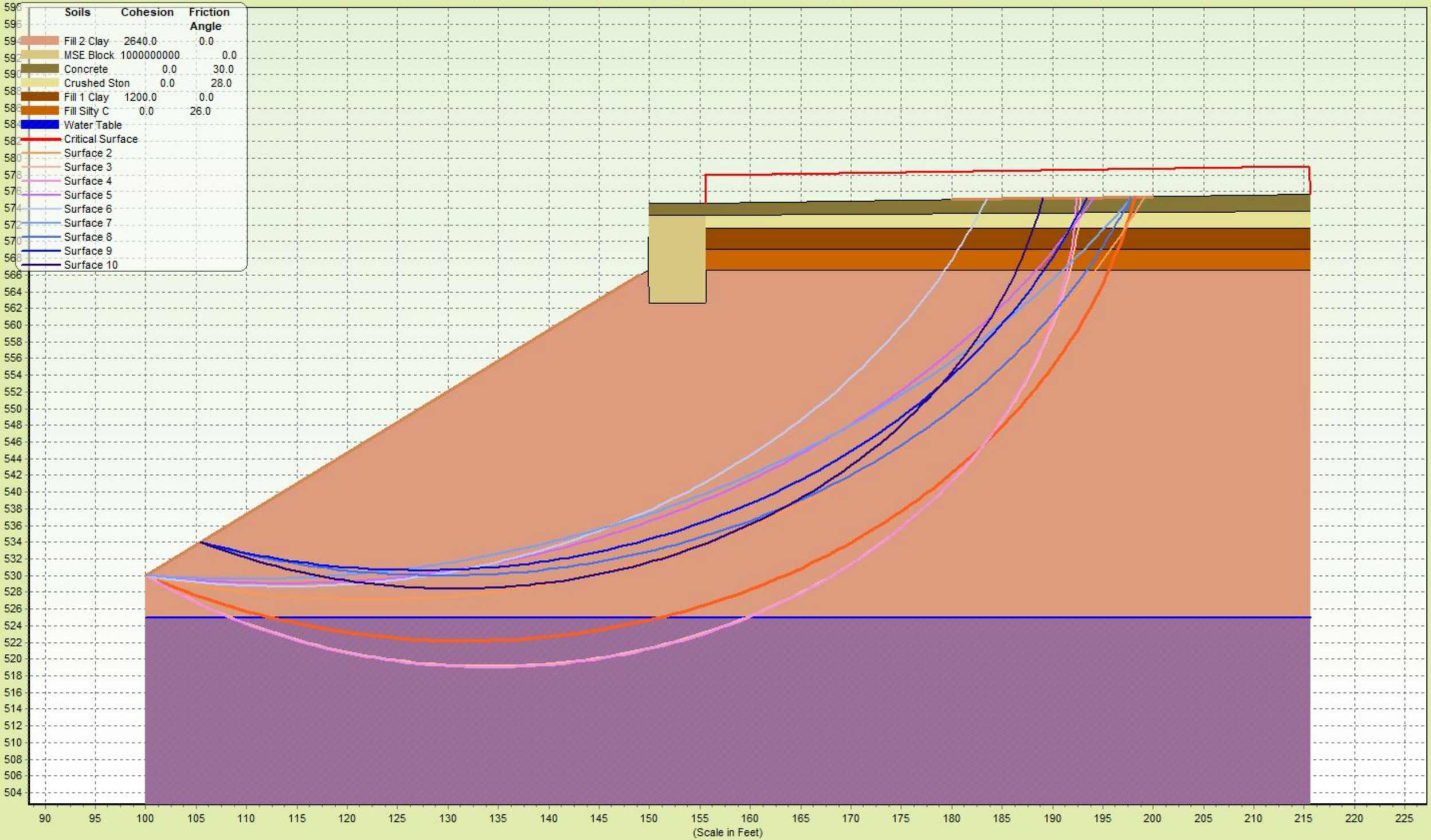
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2013-009B	WILL	2	2
		CONTRACT NO. 60W35		
	ILLINOIS FED. AID PROJECT			

APPENDIX G

SLOPE STABILITY OUPUT (STABL)

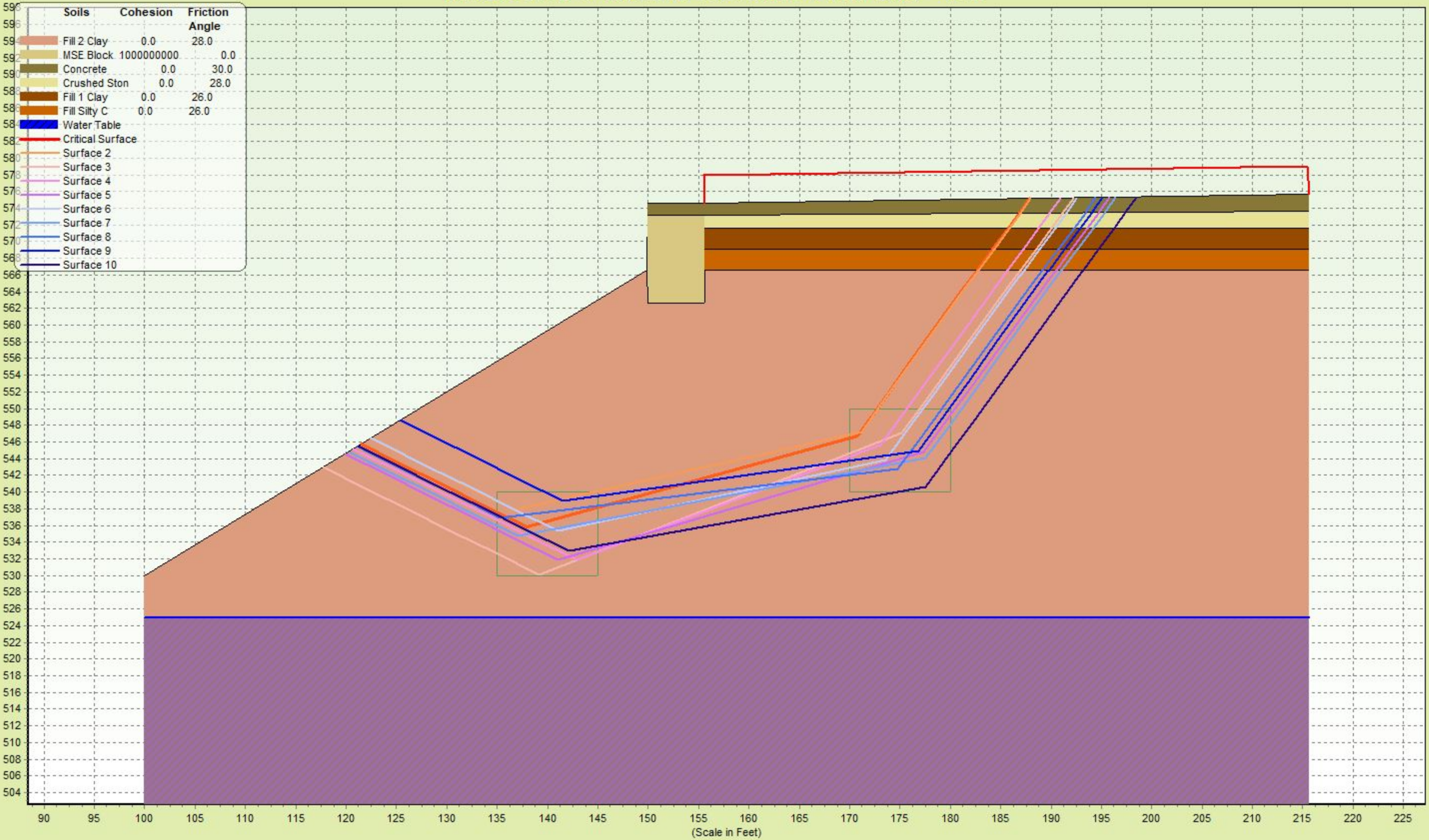
Problem: 20012_I-80 Wall #1_RW-32_UNDRAINED - FS Min- Bishop = 2.608

Soils	Cohesion	Friction Angle
Fill 2 Clay	2640.0	0.0
MSE Block	1000000000	0.0
Concrete	0.0	30.0
Crushed Ston	0.0	28.0
Fill 1 Clay	1200.0	0.0
Fill Silty C	0.0	26.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



Problem: 20012_I-80 Wall #1_RW-32_DRAINED - FS Min- Janbu = 1.516

Soils	Cohesion	Friction Angle
Fill 2 Clay	0.0	28.0
MSE Block	1000000000	0.0
Concrete	0.0	30.0
Crushed Ston	0.0	28.0
Fill 1 Clay	0.0	26.0
Fill Silty C	0.0	26.0
Water Table		
Critical Surface		
Surface 2		
Surface 3		
Surface 4		
Surface 5		
Surface 6		
Surface 7		
Surface 8		
Surface 9		
Surface 10		



APPENDIX H

ISGS COAL MINES AND UNDERGROUND INDUSTRIAL MINES MAP WILL COUNTY

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

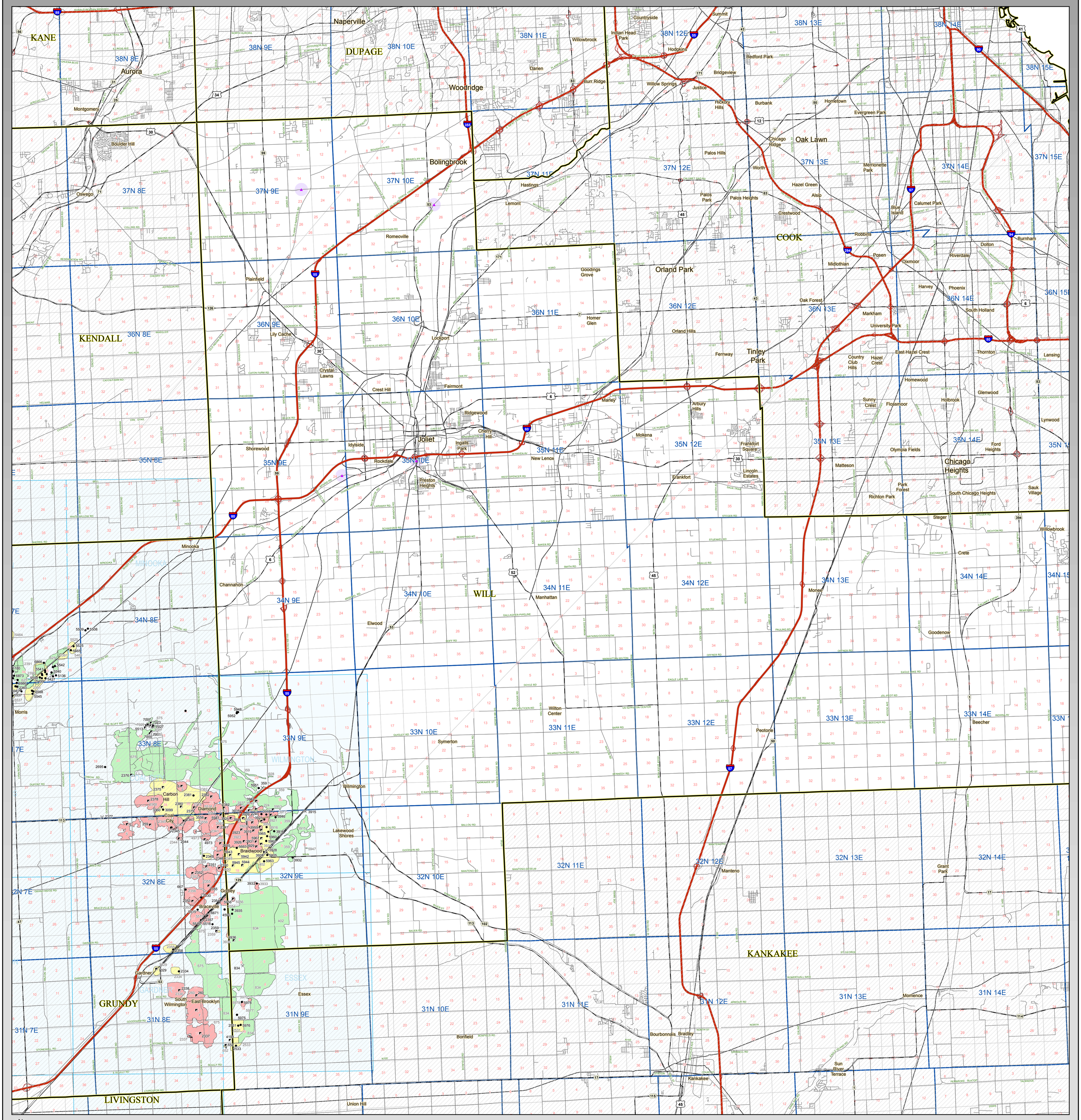
For further information contact:
Prairie Research Institute
Illinois State Geological Survey
University of Illinois at Urbana-Champaign
615 East Peabody Drive
Champaign, Illinois 61820-6964
(217) 333-4747
http://www.isgs.illinois.edu

Coal Mines and Underground Industrial Mines
WILL
County

County Coal Map Series
ISGS Coal Section
Map construction: July 20, 2011

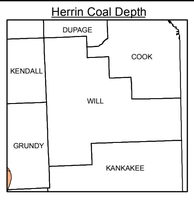
This product is under review and may not meet the standards of the Illinois State Geological Survey.

County coal maps and select quadrangle maps available as downloadable PDF files at:
http://www.isgs.illinois.edu/maps-data-pub/coal-maps/county-index.shtml



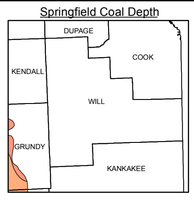
N
0 1:100,000 3
Miles

Herrin Coal Depth



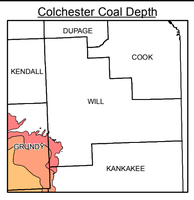
Herrin Coal Depth
0 to 100 ft
100 to 200 ft
200 to 300 ft
300 to 400 ft
400 to 500 ft
500 to 600 ft
600 to 700 ft
700 to 800 ft
800 to 900 ft
900 to 1000 ft
1000 to 1100 ft
1100 to 1200 ft
1200 to 1300 ft
Faults

Springfield Coal Depth



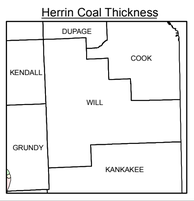
Springfield Depth
0 to 100 ft
100 to 200 ft
200 to 300 ft
300 to 400 ft
400 to 500 ft
500 to 600 ft
600 to 700 ft
700 to 800 ft
800 to 900 ft
900 to 1000 ft
1000 to 1100 ft
1100 to 1200 ft
1200 to 1300 ft
1300 to 1400 ft
Faults

Colchester Coal Depth



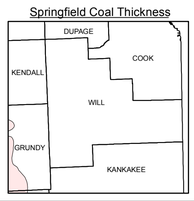
Colchester Depth
0 to 100 ft
100 to 200 ft
200 to 300 ft
300 to 400 ft
400 to 500 ft
500 to 600 ft
600 to 700 ft
700 to 800 ft
800 to 900 ft
900 to 1000 ft
1000 to 1100 ft
1100 to 1200 ft
1200 to 1300 ft
1300 to 1400 ft
1400 to 1500 ft

Herrin Coal Thickness



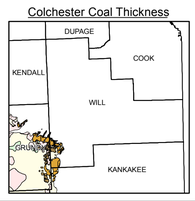
Herrin Thickness
Insufficient data
<28 inches
28 to 42 inches
42 to 66 inches
>66 inches
Channel
Split Coal
Underground Mine
Surface Mine

Springfield Coal Thickness



Springfield Thickness
Insufficient data
<28 inches
28 to 42 inches
42 to 66 inches
>66 inches
Channel
Split Coal
Underground Mine
Surface Mine

Colchester Coal Thickness



Colchester Thickness
Insufficient data
<28 inches
28 to 42 inches
42 to 66 inches
>66 inches
Channel
Split Coal
Underground Mine
Surface Mine

County
Township
Section
Quadrangle study (Available on Website)
Coal mine - active
Underground coal mine - abandoned
Surface coal mine - abandoned
Indefinite underground coal mine boundary - abandoned
Underground industrial mine and surrounding buffer region
951, 951 Coal mine index number (polygon label, point label)

Opening type unknown
Uncertain location
Active surface tipple
Abandoned surface tipple
Active shaft
Abandoned shaft
Active slope
Abandoned slope
Active drift
Abandoned drift
Underground industrial mine entrance or general location

Map Explanation

This map accompanies the coal mines directory for this county. Please consult the directory for an explanation of the coal mine information shown on this map. Buffer regions for industrial mineral mines were incorporated into this map due to limited information regarding these mines. The size of the buffer region is dependent on the uncertainty or inaccuracy of the mine location. For more information regarding industrial mineral mines please contact the ISGS Industrial Minerals Section.

The maps and digital files used for this study were compiled from data obtained from a variety of public and private sources and have varying degrees of completeness and accuracy. They present reasonable interpretations of the geology of the area and are based on available data. These data were compiled and digitized at a scale of 1:62,500. Locations of some features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors.

These data are not intended for use in site-specific screening or decision-making. Data included in this map are suitable for use at a scale of 1:100,000.

Disclaimer

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.