Roadway Geotechnical Report

FAP 351 (IL 7) at IL 53
IDOT PTB 201-004
Will County, Illinois

Prepared for

Illinois Department of Transportation (IDOT)
Contract Number: D-91-003-22

Project Design Engineer Team
WSP USA

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July 14, 2023

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Dear Mr. Mitchell:

Attached is a copy of the Roadway Geotechnical Report for the above referenced project. The report provides a description of the site investigation, site conditions and construction recommendations. The site investigation for the roadway reconstruction included advancing twenty (20) subgrade soil borings to depths of 10 feet each. Four (4) soil borings were also completed for the proposed traffic signal structures at the intersection of Renwick Road and IL 53, to depths of 25 feet each.

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

Sincerely,

Daniel DiMaggio

Dawn Edgell

Daniel DiMaggio, E.I.T.
Project Engineer

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Appendices

1.0 INTRODUCTION

GSG Consultants, Inc. (GSG) completed a geotechnical investigation for the roadway reconstruction project on IL Route 7 (Renwick Road) at IL 53 near the Village of Romeoville and Lockport Township in Will County, Illinois. The purpose of the investigation was to explore the subsurface conditions, to determine engineering properties of the subsurface soil, and to develop design and construction recommendations for the project. The general project limits are shown in **Exhibit 1**.

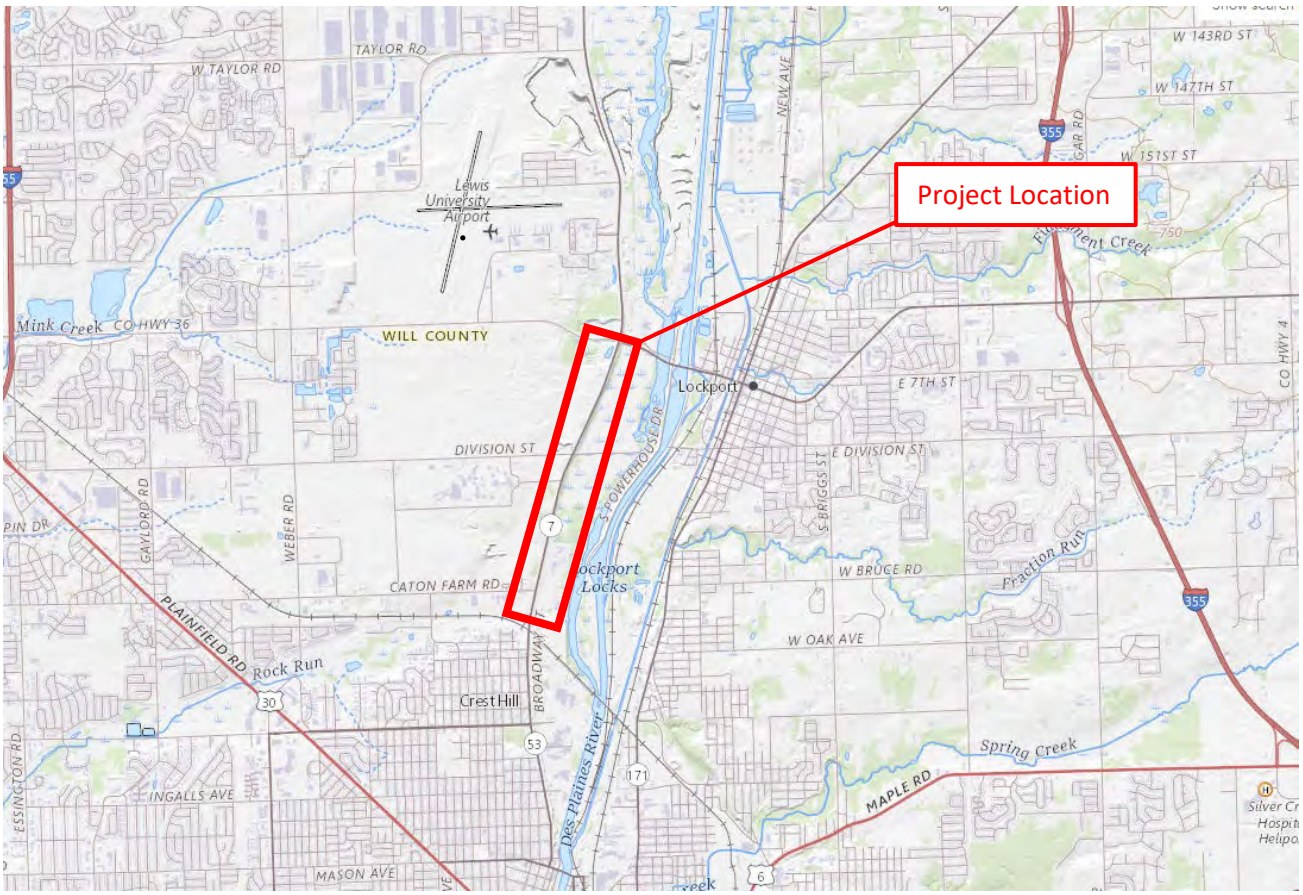

Exhibit 1 – Project Location Map
(Source: USGS Topographic Maps, usgs.gov)

1.1 Proposed Project Information

Based on the preliminary plans provided by the prime consultant WSP USA, the proposed project will include intersection improvements at IL 7 and IL 53. The improvements consist of an additional southbound left turn lane, northbound left turn lane relocation, eastbound median geometry

improvement, and westbound left turn lane storage increases. Additionally, shoulder widening and rumble strips are being proposed on IL 53 from IL 7 to Caton Farm Road.

Across the project limits, it is anticipated that the proposed profile will be relatively consistent with the existing roadway profile. It is anticipated that minimal cut and fill (less than 3 feet) would be required for the majority of the proposed widening of IL 7 / IL 53. It is anticipated that the proposed roadway drainage systems will consist of shallow ditches along the shoulders.

1.2 Regional Geology

GSG reviewed several published documents to determine the regional geological setting in the area. The site is in north-central Will County, in Lockport, Illinois. The surficial geologic deposits in this area are typically glacial drift deposited during the Wisconsin Glacial Age and sediments deposited by the various high-level states of the Des Plaines River. The subsurface profile in the area consists of deposits of silty clay, sand, silt, and gravel extending to approximately 25 to 40 feet below ground surface, at which point bedrock is encountered, consistent with the soil borings. The bedrock consists of the Silurian System, which consists of dolomite that varies from extremely argillaceous, silty, and cherty to exceptionally pure.

1.3 Climate Conditions

The geotechnical field exploration was performed between March 26 and April 5, 2023. The climate conditions for the months of January to April are summarized in **Table 1**. The data was obtained from the National Weather Service Forecast Office website for Chicago, Illinois and the surrounding area. The data was evaluated to determine any effects of temperature and precipitation on the water table level and soil moisture content that was encountered at the site at the time the borings were performed.

The average monthly temperatures were typically higher than average, except for December and March where the average temperatures were 2.3 and 2.6 degrees lower than normal, respectively. The monthly precipitation totals were typically about 0.5 to 2 inches higher than normal. However, the precipitation totals were about 1 to 2 inches lower than normal in November and April, and slightly less than normal in March. The monthly snowfall was average and higher than average from November through January and lower than average in February thru April; the net-snowfall during the period of this study is 2.24 inches below the average historic snowfall. Considering the net temperature, precipitation and snow averages, it can be expected that the moisture contents of the

surficial soils and water levels were higher than normal levels during the drilling events in the months of March and April.

Table 1 – Climate Conditions

Date (M-Y)	Temperature (F°)		Precipitation (in.)		Snowfall (in.)	
	Mean	Departure from Norm.	Total	Departure from Norm.	Total	Departure from Norm.
November - 2022	41.7	1.3	0.50	-1.96	0.3	0.00
December - 2022	27.1	-2.3	2.46	0.52	3.1	1.16
January – 2023	30.5	6.6	2.86	0.87	8.3	3.30
February - 2023	31.1	3.5	3.61	1.83	0.4	-5.80
March - 2022	35.5	-2.6	1.98	-0.29	1.3	-0.80
April - 2023	49.9	0.4	2.85	-1.08	0.0	-0.10

Note: All the field work was completed by April 5, 2023.

2.0 SITE SUBSURFACE EXPLORATION PROGRAM

This section describes the subsurface exploration program and laboratory testing program completed as part of this project. The subsurface exploration program was performed in accordance with applicable IDOT geotechnical manuals and procedures.

2.1 Subsurface Exploration Program

The roadway subsurface soil investigation was conducted between March 26 and April 5, 2023. Twenty (20) subgrade soil borings (SGB) were advanced to depths of 10 feet each or auger refusal. Four (4) borings were also completed to depths of 25 feet each for the proposed traffic signal structures at the intersection of IL 7 and IL 53. The borings were completed through the existing gravel and asphalt shoulder along IL 53. The soil boring locations were selected by GSG in coordination with WSP USA, then completed at locations based on field conditions and site accessibility. The coordinates and existing ground surface elevations shown on the soil boring logs were obtained by GSG using handheld surveying equipment. The as-drilled locations of the soil borings are shown on the Soil Boring Location Plan and Subsurface Profiles (**Appendix A**). **Table 2** presents a list of the borings completed along with their location information.

Table 2 – Summary of Subsurface Exploration

Boring ID	Station	Northing (ft)	Easting (ft)	Depth (ft)	Surface Elevation (ft)
SGB-01	994+86.92	1,794,304.704	1,054,647.873	10.0	618.46
SGB-02	989+80.85	1,793,798.093	1,054,566.522	10.0	618.33
SGB-03	984+95.07	1,793,362.334	1,054,340.122	10.0	618.93
SGB-04	979+38.54	1,792,864.172	1,054,227.502	10.0	616.12
SGB-05	975+24.27	1,792,462.287	1,053,983.865	10.0	614.54
SGB-06	970+12.91	1,791,972.056	1,053,826.453	10.0	611.73
SGB-07	965+40.23	1,791,568.665	1,053,572.023	10.0	613.34
SGB-08	960+35.34	1,791,078.958	1,053,428.816	10.0	612.93
SGB-09	955+45.26	1,790,667.137	1,053,150.986	10.0	609.20
SGB-10	950+68.81	1,790,203.624	1,053,018.883	10.0	608.12
SGB-11	945+79.42	1,789,787.405	1,052,751.323	10.0	607.48
SGB-12	940+75.38	1,789,295.146	1,052,625.574	10.0	608.76
SGB-13	936+0.70	1,788,856.966	1,052,433.361	10.0	608.11
SGB-14	931+8.47	1,788,362.72	1,052,383.443	10.0	603.30

Boring ID	Station	Northing (ft)	Easting (ft)	Depth (ft)	Surface Elevation (ft)
SGB-15	926+32.22	1,787,911.503	1,052,220.213	10.0	586.51
SGB-16	920+86.22	1,787,366.818	1,052,152.828	10.0	588.96
SGB-17	916+12.74	1,786,918.738	1,051,988.293	5.0*	589.26
SGB-18	910+41.77	1,786,348.552	1,051,920.425	6.5*	586.20
SGB-19	905+26.58	1,785,860.067	1,051,745.475	10.0	588.15
SGB-20	899+91.72	1,785,325.048	1,051,685.815	10.0	587.30
TSB-01	999+32.48	1,794,696.268	1,054,891.056	25.0	618.49
TSB-02	999+29.51	1,794,725.463	1,054,777.139	25.0	618.90
TSB-03	1000+62.88	1,794,852.351	1,054,811.165	25.0	618.63
TSB-04	1000+65.99	1,794,830.559	1,054,914.341	25.0	619.69

*Auger refusal encountered

The soil borings were drilled using a truck mounted Diedrich D-50 drill rig (efficiency 99.5%) and a truck mounted Mobile B-57 drill rig (efficiency 89%), 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. 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 applicable.

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.

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 samples:

- Moisture content ASTM D2216 / AASHTO T-265
- Atterberg Limits ASTM D 4318 / AASHTO T-89 / AASHTO T-90
- Organic Content ASTM D2974

The laboratory tests were performed in accordance with test procedures outlined in the IDOT Geotechnical Manual (2020), and per ASTM and AASHTO requirements. Based on the laboratory test results, the soils encountered were classified according to the AASHTO and the Illinois Division of Highways (IDH) classification systems. The results of the laboratory testing program are included in the Laboratory Test Results **(Appendix C)** and are also shown along with the field test results in the Soil Boring Logs **(Appendix B)**.

2.3 Subsurface Conditions

This section provides a brief description of the soils encountered in the borings performed in the vicinity of the proposed improvements. 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.

Subgrade Borings

Borings SGB-01 through SGB-20 were drilled along IL Route 53 where the majority of the borings were drilled in the gravel shoulder; borings SGB-01, SGB-09 and SGB-11 were drilled through the asphalt shoulder. The surface elevations of the borings ranged between elevations 586.2 feet on the south end of the project limits and 618.9 feet towards the north end of the project limits.

Borings SGB-01, SGB-09 and SGB-11 noted between 8 and 15 inches of asphalt. Boring SGB-10 initially encountered 3 inches of topsoil; the remainder of the borings initially encountered 2 inches of CA-6 gravel fill at the ground surface.

Beneath the surficial layers, most of the borings noted fill soils extending to depths between 1 and 6.5 feet below existing grade. The existing fill soils were primarily granular in nature, consisting of

brown and gray sand or gravel. Borings SGB-1 through SGB-3, SGB-5, SGB-7, SGB-9, SGB-11, and SGB-13 contained brown silty clay fill to depths of 1 to 5 feet below grade.

Beneath the fill soils, native medium dense to very dense brown sand, with gravel was encountered to the boring termination depths. Borings SGB-3 and SGB-7 encountered a layer of native stiff brown silty clay between depths of 1.5 and 5.5 feet below grade. Cobbles were noted at various depths in borings SGB-01, SGB-07, SGB-09, SGB-12 through SGB-15, and SGB-17 through SGB-20. Borings SGB-17 and 18 were terminated upon encountering auger refusal at depths of 5 and 6.5 feet, respectively.

The silty clay fill materials had unconfined compressive strengths between 0.5 and 2.9 tons per square foot (tsf), with an average of 1.6 tsf. The sandy fill materials had SPT blow count 'N' values ranging from 5 to 32 blows per foot (bpf), with an average of 12 bpf. The gravel fill materials had SPT blow count 'N' values ranging from 10 to 50 bpf, with an average of 30 bpf. The medium dense to very dense native brown gravel, with sand had SPT blow count 'N' values ranging from 11 to 77 bpf, with an average of 36 bpf. The native stiff brown silty clay had unconfined compressive strengths between 1.7 and 2.0 tsf with an average of 1.8 tsf.

Traffic Signal Borings

Borings TSB-01 through TSB-04 were drilled at each corner of the intersection of IL 7 and IL 53. The surface elevations of the borings ranged between elevations 618.5 and 619.7 feet. Borings TSB-01 and TSB-02 encountered 15 to 17 inches of asphalt, followed by 6 inches of aggregate base; borings TSB-03 and TSB-04 initially encountered 3 to 5 inches of asphalt, followed by 8 to 11 inches of concrete, followed by 6 to 12 inches of aggregate base.

Beneath the surface materials, the borings noted existing fill soils extending to depths of 5 to 7.5 feet below grade. The existing fill soils were primarily cohesive in nature, consisting of brown and gray silty clay. Boring TSB-04 noted a layer of gravel fill beneath the silty clay fill from a depth of 3.5 to 6 feet below grade.

Beneath the fill soils, the borings, with the exception of TSB-01, encountered native stiff to hard brown silty clay soils to a depth of 18.5 feet. Brown loose to very dense gravel, with sand was then encountered extending to the boring termination depths of 25 feet below the existing grade. Cobbles were noted in boring TSB-03 at 2.5 feet and in boring TSB-04 at 3.5 and 8.5 feet below grade.

The silty clay fill materials had unconfined compressive strengths between 0.3 and 2.9 tsf, with an average of 1.6 tsf. The gravel fill materials had an SPT blow count 'N' value of 50 bpf. The native stiff to hard brown silty clay had unconfined compressive strengths between 1.0 and 4.3 tsf, with an average of 2.3 tsf. The loose to very dense native brown gravel, with sand had SPT blow count 'N' values ranging from 9 to 72 bpf, with an average of 28 bpf.

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. Groundwater was not encountered during or immediately after drilling at any of the borings. None of the borings were left open after leaving the site due to safety concerns.

Based on the general lack of water levels and color change from brown to gray observed in the soil borings, it is anticipated that the long-term groundwater level may be below the depth of the borings. Perched water may be present within the fill observed in 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 and recommendations for the design of the proposed roadway improvements based on the results of the field exploration, laboratory testing, and geotechnical analysis.

3.1 Settlement

It is anticipated that the proposed profile will be relatively consistent with the existing roadway profile. It is anticipated that minimal cut and fill (less than 3 feet) would be required for the majority of the proposed widening of IL Route 7 / IL 53. The anticipated settlement caused by up to 3 feet of new fill material is expected to be negligible.

3.2 Slope Stability

IDOT requires that slope stability analysis be performed in areas where the cut or fill heights will exceed 15 feet in height. For the proposed widening, it is anticipated that the proposed grades will generally match the existing grades. Additionally, the proposed embankment side slopes for the widening are anticipated to be less than 15 feet; therefore, no slope stability analysis was required for this report.

3.3 Drainage Characteristics

The drainage characteristics of the site were evaluated per the IDOT Geotechnical Manual (2020), Section 6.3.4.1, based on the subgrade soil type and moisture condition, depth of water table, project topography, the anticipated profile grade line, and depth and grade of drainage ditch along the roadways. It is anticipated that the roadway reconstruction for IL Route 7 will be supported on subgrade soils consisting of existing silty clay fill materials or existing granular native materials.

Based on the preliminary plans and existing conditions, GSG anticipates that the proposed drainage will consist of an enclosed drainage system with curb and gutter and shallow ditches with slopes greater than 0.5%. GSG utilized Table 6.3.4.1-1, Drainage Classification in the IDOT Geotechnical Manual, to assign the drainage classes for the site. The drainage class should be taken as Fair along the roadways within the project limits.

3.4 Frost Susceptibility

The frost susceptibility of the subgrade soils was evaluated per Section 6.3.2.2.3 of the IDOT Geotechnical Manual. The maximum anticipated frost penetration depth below pavement in northern Illinois is 45 to 60 inches for extreme weather conditions. The frost susceptibility was

evaluated for the soils encountered that would be within the proposed roadway subgrade. The frost class for the subgrade soils in these areas was assigned using Table 6.3.2.2.3-1, Frost Susceptibility Classification of Soils, in the IDOT Geotechnical Manual. The subgrade soils along the proposed improvement area were found to have a Frost Class of F2 (low to medium frost susceptibility) for the native granular soils and a Frost Class of F4 (Very High) for the clay fill soils.

Perched water could be present in the upper soil layers, particularly in existing granular fill materials and any confined granular layers. Water trapped in the soil layers closer to the pavement section is susceptible to frost action and should be considered when designing the proposed roadway. Treatment measures, such as maintaining proper drainage of the subgrade soils through underdrains could be considered.

3.5 Subgrade Support Rating

The subgrade support rating (SSR) was determined based on the physical properties of in-situ soils present beneath the proposed pavement section. The SSR includes three categories (poor, fair, and granular), and are used to determine the depth of soil treatment to provide a stable working platform that is required to prevent excessive rutting and moisture related problems during construction activities. Granular soils have the highest rating and provide a stable working platform that may require less than a 12-inch improved subgrade layer, while poor subgrade may require more than 12 inches to provide stable subgrade during construction activities. The anticipated subgrade soils encountered in most of the borings at the proposed roadway grades were generally silty clay fill soils. These soils have a Subgrade Support Rating (SSR) of Fair. The granular sand and gravel soils encountered at the site have a SSR of Granular.

3.6 Illinois Bearing Ratio

The Illinois Bearing Ratio (IBR) is a measure of the support provided by the roadbed soils for the new pavement. On proposed pavements bearing on granular existing fill soils, it is recommended that an IBR value of ten (10) be used for the roadway pavement design where granular fill soils are present. It is recommended that an IBR value of three (3) be used for the roadway pavement design where clay fill soils are present.

3.7 Organic Content

Typically, soils with an organic content in excess of 10 percent are considered unsuitable to remain below proposed pavement areas. Soils were tested for suspected high organic contents when black soil with high moisture contents were encountered in the near surface materials. The results from

the organic content tests are displayed in **Table 4**. Highly organic materials were not encountered in any of the samples tested.

Table 4 – Summary of Organic Test Data

Boring ID	Depth (feet)	Soil Description	Organic Content (%)
SGB-07	1.0 – 2.5	Silty Clay Fill	5.2
SGB-13	1.0 – 2.5	Silty Clay Fill	4.9

4.0 GEOTECHNICAL ROADWAY DESIGN RECOMMENDATIONS

This section provides GSG's geotechnical recommendations for the design of the proposed roadway based on the results of the field exploration, laboratory testing, and geotechnical analysis. The proposed pavement section should be designed according to the IDOT Mechanistic Pavement Design (MPD). IDOT policy requires providing a minimum of 12 inches of improved subgrade beneath the pavement section to ensure a stable construction platform. Subgrade improvements including any undercuts or compaction of existing soils should be completed to the proposed elevations in the design plan and in accordance with the Subgrade Treatment and Recommendation Section of this report.

4.1 Subgrade Preparation

It is our understanding that the existing roadway is to be completely reconstructed as part of the widening. It is recommended that all existing pavement, base course, and topsoil be stripped within the limits of the proposed improvements. Based on the pavement thickness encountered at the locations, it is anticipated that pavement stripping depths will range from approximately 8 to 15 inches; an average stripping depth of 12 inches should be used for quantity estimates. Undercuts of the subgrade soils and backfilling should be based on the recommendations provided in this report, and field evaluation of the materials encountered during construction. Any unstable or unsuitable materials encountered during construction activities should be removed and replaced with compacted structural fill.

4.2 Subgrade Treatment and Recommendations

The suitability of the existing subgrade soils for the proposed reconstruction was evaluated in terms of frost susceptibly, stability, settlement, and drainage. The evaluation included determining the presence of unstable, compressible deposits, low-strength soils, high organic content soils, and soils with high-moisture content immediately below the proposed pavement section.

Treatment options for unsuitable subgrade soils generally include mechanical stabilization, chemical stabilization or soil modification. Mechanical stabilization includes methods such as removal and replacement with select materials or using geosynthetics (geotextiles and/or geogrids). Chemical stabilization or soil modification includes the use of additives to improve the engineering properties of the in-situ soils. The choice of a specific treatment option depends on several factors, including soil type; required treatment depth; construction variables (cost, availability, and time); project location; and treatment objective. Based on the subsurface conditions, mechanical stabilization and chemical modification methods can be used to remediate the unsuitable soils noted at the site.

Based on the project location near residential areas, GSG recommends mechanical stabilization as the preferred option; chemical treatment options should not be used near residential areas.

4.3 Subgrade Undercut Areas

IDOT recommends providing a minimum of 12 inches of improved subgrade beneath the pavement section to ensure a stable construction platform. Based on the existing site conditions, including high moisture content materials and low-strength materials, additional undercuts may be necessary along sections of the proposed improvements. The recommended undercuts and locations are summarized in **Table 5**. The depth, location, and extent of the proposed undercuts should be field verified during construction. All potentially unstable soils should be tested with a cone penetrometer and treated in accordance with Article 301.04 of the SSRBC and the undercut guidelines in the IDOT Subgrade Stability Manual.

Table 5 – Recommended Undercuts

Boring ID	Reason for Undercut	Comments	Recommended Depth of Undercut (feet)
SGB-03	High plasticity/ high moisture content	W = 32%	2.0
SGB-05	Low Strength Silty Clay Fill	Qu = 1.0 tsf	2.0

Based on the borings performed in the field exploration program, with the exceptions of borings SGB-03 and SGB-05, the site is generally suitable for support of the roadway. GSG recommends mechanical stabilization methods (undercuts) to remediate any unsuitable soils encountered during construction.

For areas where undercuts are required, approved fill includes IDOT Special Provision Section 303: Aggregate Subgrade Improvement, or suitable borrow materials, as specified in the Borrow Material and Compaction Requirements section of this report.

4.4 Drainage Recommendations

The drainage classification of Fair should be used for the project design. The overall groundwater depth is assumed deeper than the anticipated frost depth of 45 to 60 inches for the northern Illinois region. However, pavement systems could become saturated following periods of precipitation. The

proposed subgrade and pavement should have proper surface grading to prevent water from accumulating and ponding. GSG recommends installing lateral and longitudinal underdrain systems as recommended in Section 6.3.4.2 of the IDOT Geotechnical Manual to maintain the subgrade from deteriorating. The traverse underdrains should be installed at a spacing of 300 feet and low points and undercut areas. To provide drainage for the proposed pavement, we recommend installing longitudinal pipe underdrains below the pavement for the roadways. The underdrains should tie into the storm water drainage system and should be installed per Article 601 in the IDOT Standard Specifications.

4.5 Traffic Signals Foundations

GSG understands that new traffic signal structures will be installed at the intersection of IL 7 and IL 53. Based on estimated mast arm lengths, **Table 6** summarizes design requirements for the depth and diameter of foundations per the IDOT Highway Standard 878001-11 (**Appendix D**).

Table 6 – Proposed Traffic Signal Structure Summary

Mast Arm Length (feet)	Anticipated Foundation Depth	Anticipated Foundation Diameter
Less than 30.0 feet	10’ 0”	30”
Greater than or equal to 30.0 feet and less than 40.0 feet	13’ 6”	30”
	11- 0”	36”
Greater than or equal to 40.0 feet and less than 50.0 feet	13’ 0”	36”

[1] Estimated length
[2] Based on IDOT Highway Standard 878001-11.

Based on the soil exploration and testing program, the soils encountered near the anticipated foundation depths within the borings completed for each of the traffic signals are classified as cohesive in nature (silty clay and silty clay loams), with the exception of boring location TSB-01 which encountered granular soils from a depth of 6 feet to the boring termination depth; the lower soils in each of the borings (beneath 18.5 feet below grade) were classified as granular in nature (gravel, with sand). The above IDOT standard is based on the assumption that cohesive soil is present with unconfined compressive strengths (Qu) above 1.0 tsf. Therefore, the IDOT standard is valid for borings TSB-02 through TSB-04 and can be used for the design of the traffic signal foundations.

The soils at boring TSB-01 were granular in nature for the depth of the boring and have the potential

for caving in during drilled shaft construction. Based on the presence of granular soils at boring location TSB-01, the Bureau of Bridges and Structures should be contacted to verify that the proposed foundation details can be applied or provide a revised design. It is recommended that the drilled shafts in the vicinity of boring TSB-01 be installed using a temporary casing. Due to the granular fill observed near the surface of TSB-04, a temporary casing may also be required at that location.

Soils must be visually inspected at each location to match those identified in the boring logs; if different soils are encountered during construction, the engineer must be notified to provide a revised design. The lateral resistance of the upper 3.5 feet of soils in the frost penetration zone should be neglected in design.

4.5.1 Drilled Shaft Foundations

For traffic signal foundations to be designed in the vicinity of boring TSB-01, where typical design parameters of IDOT Highway Standard 878001-11 cannot be applied, the estimated drilled shafts suitable bearing elevations have been evaluated and provided in **Table 6.** The actual depth of drilled shafts should be based on structural analyses of the vertical and horizontal loads. Based on the nature of the subsurface soils, resistance factors of 0.40 and 0.45 were used for the tip resistance and side shaft resistance, respectively, for cohesive material. Resistance factors of 0.50 and 0.55 were used for the tip resistance and side shaft resistance, respectively, for granular material.

Drilled piers extending to these depths can be designed using the nominal bearing resistance and side resistances shown in **Table 6**

Table 6 – Drilled Shaft Design Parameters TSB-01

Boring Location	Soil Description	Depth. (feet)[1]	Assumed Shaft Diameter (feet)	End Bearing			Side Friction	
				Bearing Elevation (feet)	Nominal Tip Resistance (ksf)	Factored Tip Resistance (ksf)	Nominal Side Resistance (ksf)	Factored Side Resistance (ksf)
TSB-01	Silty Clay Fill	613.5-611.0	3.0	n/a	n/a	n/a	0.55	0.24
	Gravel, with sand	611.0-598.5	3.0	605.5	15.6	7.8	1.93	1.06

[1] Elevations estimated from surveyed boring log

4.5.2 Lateral Earth Pressures and Loading for Drilled Shafts Foundations

Drilled shafts for the proposed traffic signal structures are normally loaded laterally by wind forces. The ability of the shaft to resist the wind loads is dependent on the passive pressures that develop in the soils along the shaft and the shaft diameter. Lateral loads on the drilled shafts should be analyzed for the maximum moments and lateral deflections. Software such as L-Pile are normally used to determine the required shaft depth to resist the lateral loads, and the actual maximum moment and the anticipated shaft deflection. If the shaft deflection is excessive or if the embedment is inadequate to provide "fixity", the shaft embedment could be increased to help address these issues. The shaft diameter should be increased if the deflection or the maximum moment is higher than the shaft designed resistance. **Table 7** presents recommended soil parameters for use in the drilled shafts lateral load analysis.

Table 7 - Summary of Soil Parameters – Boring TSB-01

Depth / Elevation Range (CCD)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained		Parameters for p-y Curve Method		
			Cohesion c (psf)	Friction Angle ϕ (°)	Cohesion c (psf)	Friction Angle ϕ (°)	p-y Curve Type in LPile	Coefficient of Lateral Subgrade Modulus* (k_{py}, pci)	Soil Strain (ε_{50})
1.0 – 7.5 (617.5 – 611)	FILL: Brown Silty Clay	129	1,000	0	100	25	Stiff Clay w/o Free Water	500	0.07
7.5– 25 (611 – 593.5)	Light Brown Loose to Medium Dense Gravel, with sand	127	0	38	0	38	Sand	60	0

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) and the IDOT Subgrade Stability Manual (2005). Any deviation from the requirements in the manuals above should be approved by the design engineer.

5.1 Site Preparation

Any topsoil present within the improvement limits should be stripped and stockpiled as per Section 211.03 of the IDOT Standard Specifications for Road and Bridge Construction (SSRBC). The topsoil should be separated from other materials being stockpiled onsite for reuse or haul off. The topsoil stripping depth should be estimated at 6 inches. Base course aggregate, if any, encountered at the site should be evaluated to determine suitability for reuse as general fill. The contractor should not mix the existing base course materials with existing subgrade soils during the stripping and stockpiling activities.

5.2 Pavement Subgrade Preparation

The stability of the subgrade should be evaluated immediately after excavation and prior to placement of base aggregate in the field in accordance with the IDOT Subgrade Stability Manual (2005) to determine if additional treatment is required. The subgrade soils inspection should include visual inspection and performing a proof roll using heavy equipment or heavily loaded tandem axle dump truck with a minimum gross weight of 25 tons to check for deflection or rutting. Areas with excessive rutting and deflection shall be evaluated using a dynamic cone penetrometer (DCP) and static cone penetrometer (SCP) to determine the depth of required treatment in accordance with the IDOT Subgrade Stability Manual (2005) and IDOT SSRBC (2022), Section 301. The subgrade should be prepared in accordance with Section 301, Subgrade preparation, of the IDOT SSRBC (2022).

Treatment for unstable and unsuitable soils encountered during proofrolling and subgrade evaluation may include the use of a geotextile fabric, removal and replacement with approved structural fill for small areas. Subgrade improvements should be based on the recommendations in the Subgrade Treatment and Recommendations Section of this report or based on field evaluation of the materials during construction. Field evaluation of the subgrade soils should be conducted in accordance with the procedures outlined in the IDOT Geotechnical Manual and Subgrade Stability Manual, and under the supervision of a licensed geotechnical engineer.

5.3 Existing Utilities

Before proceeding with construction, all existing underground utility lines that will interfere with construction should be completely relocated from beneath the proposed construction areas. Where possible, existing utility lines that are to be abandoned in place should be removed and/or plugged with cement grout. All excavations resulting from underground utilities 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.

5.4 Site Excavations

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 for providing 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 for all excavation activities.

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

The fill material should be free of organic matter and debris and should be placed and compacted in accordance with Section 205, Embankment, of the IDOT SSRBC (2022). Earth-moving operations should be avoided during excessively cold or wet weather to avoid freezing of softening subgrade soils. Fill should be placed in lifts and compacted according to Section 205, Embankment (IDOT,

2022). Backfill materials for undercut areas should be placed in 8 inches loose lifts and should be compacted to 95% of the maximum dry density as determined by AASTHO T 99, Standard Proctor Method.

5.6 Groundwater Management

Based on the general lack of water levels and color change from brown to gray observed in the soil borings, it is anticipated that the long-term groundwater level is below the depth of the borings. Perched water may be encountered within the existing fill materials encountered across the project corridor. GSG does not anticipate groundwater related issues for the proposed improvements. 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 to 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.

5.7 Drilled Shaft Construction

Drilled shaft construction should be completed in accordance according to Section 516, Drilled Shafts, in the IDOT Standard Specification for Road and Bridge Construction. During dry construction of a drilled shaft, water should be removed from the base of the drilled shaft base prior to placing any concrete. The placement method of concrete for the drilled shaft foundation should be based on the amount of water present at the base of the shaft just prior to placing the concrete. Concrete may be placed using the free fall method, provided less than 2 inches of water is present at the base of the shaft at the time the concrete is being placed. If more than 2 inches of water is present, a tremie should be used in an effort to displace the water to the surface for removal. GSG recommends that the caisson concrete be ready on site as drilled shaft excavation is completed, so that the

concrete can be placed immediately after completing the drilled shaft excavation. This will reduce the potential of water accumulation in the bottom of the shaft. Bottom cleanliness of the drilled shaft excavation should be observed from the ground surface with the use of flood light or down-hole camera. Workers should not enter the shaft to manually clean the base of the shaft due to safety reasons.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of Illinois DOT (IDOT) and its Design Section Engineer. The recommendations provided in the report are specific to the project described herein and are based on the information obtained from the soil borings located within the project limits. The analyses performed and the recommendations provided in this report are based on subsurface conditions determined at the location of the borings. This report does 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

SOIL BORING LOCATION PLAN

AND SUBSURFACE PROFILES

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT WSP 201–004
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SOIL BORING LOCATION PLAN

SCALE: 1:100 | SHEET 1 OF 5 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	1
		CONTRACT NO. PTB 201-004		
	ILLINOIS FED. AID PROJECT			

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT WSP 201–004
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SOIL BORING LOCATION PLAN

SCALE: 1:100 | SHEET 2 OF 5 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	2
		CONTRACT NO. PTB 201-004		
	ILLINOIS	FED. AID PROJECT		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT WSP 201–004
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SOIL BORING LOCATION PLAN

SCALE: 1:100 | SHEET 3 OF 5 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	3
		CONTRACT NO. PTB 201-004		
		ILLINOIS	FED. AID PROJECT	

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	PLOT DATE = 7/13/2023	DATE - 05/08/2023	REVISED -	

IDOT WSP 201–004
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SOIL BORING LOCATION PLAN

SCALE: 1:100 | SHEET 4 OF 5 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	4
		CONTRACT NO. PTB 201-004		
	ILLINOIS	FED. AID PROJECT		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

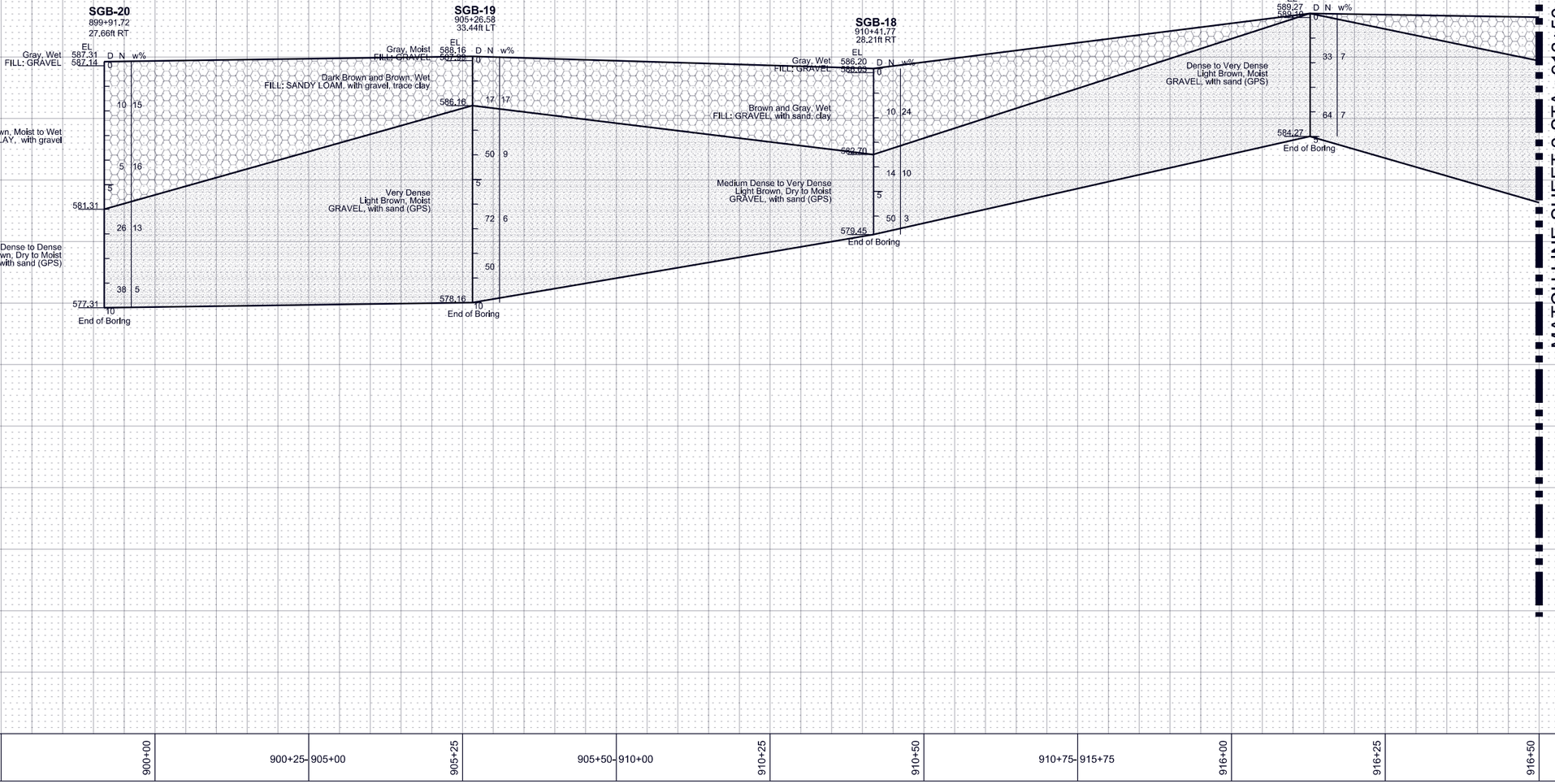
IDOT WSP 201–004
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SOIL BORING LOCATION PLAN

SCALE: 1:100 | SHEET 5 OF 5 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	5
		CONTRACT NO. PTB 201-004		
	ILLINOIS	FED. AID PROJECT		

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED
BASE COURSE	SILTY CLAY	CLAYEY SAND / SILT	
TOPSOIL	SAND/ GRAVEL	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	



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	DRAWN - NN	REVISED -			
PLOT SCALE = 240.0000 ' / ft.	CHECKED - DE	REVISED -		SCALE: AS NOTED | SHEET 1 OF 5 SHEETS | STA. 899+75 TO STA. 916+50	
PLOT DATE = 5/25/2023	DATE - 05/24/2023	REVISED -			

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	6
		CONTRACT NO. PTB-201-004		
		ILLINOIS | FED. AID PROJECT		

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED
BASE COURSE	SILTY CLAY	CLAYEY SAND / SILT	
TOPSOIL	SAND/ GRAVEL	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	

615 610 605 600 595 590 585 580 575

MATCH LINE SHEET 1 STA.: 916+50

MATCH LINE SHEET 3 STA.: 936+50

SGB-16
920+86.22
27.78ft RT

EL 588.97 | D | N | w%

Light Gray, Moist FILL: GRAVEL — 592.97 — 0

Dark Gray and Brown, Moist FILL: SANDY CLAY — 7 | 13

585.47

11 | 15

5

Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)

63 | 8

50 | 5

578.97 — 10 — End of Boring

SGB-15
926+32.22
27.95ft LT

EL 586.51 | D | N | w%

Gray, Moist FILL: GRAVEL — 588.34 — 0

7 | 14

Dark Brown, Moist to Wet FILL: SANDY CLAY, with gravel

5 | 20

5

580.51

50 | 8

Very Dense Light Brown, Moist GRAVEL, with sand (GPS)

50 | 7

576.51 — 10 — End of Boring

SGB-14
931+8.47
30.59ft RT

EL 603.31 | D | N | w%

Gray, Moist FILL: GRAVEL — 603.14 — 0

15 | 12

Gray and Brown, Moist FILL: SANDY CLAY, with gravel

12 | 10

5

598.81

35 | 5

Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)

26 | 6

593.31 — 10 — End of Boring

SGB-13
936+0.70
32.34ft LT

EL 608.11 | D | N | Qu | w%

Gray, Moist FILL: GRAVEL — 607.94 — 0

Dark Brown, Moist FILL: SILTY CLAY, with sand, gravel

9 | 2.0 P | 24

605.61

24 | 7

5

Medium Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)

26 | 5

18 | 4

598.11 — 10 — End of Boring

916+50 | 916+75 | 920+75 | 921+00 | 921+25 | 926+00 | 926+25 | 926+50 | 930+75 | 931+00 | 931+25 | 935+75 | 936+00 | 936+25 | 936+50

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT PTB 202–006
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SUBSURFACE PROFILE

SCALE: AS NOTED | SHEET 2 OF 5 SHEETS | STA. 916+50 | TO STA. 936+50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	7
		CONTRACT NO. PTB-201-004		
	ILLINOIS FED. AID PROJECT			

LEGEND

PAVEMENT		FILL: SAND / GRAVEL		SANDY CLAY / LOAM		APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED	
BASE COURSE		SILTY CLAY		CLAYEY SAND / SILT			
TOPSOIL		SAND/ GRAVEL		ORGANIC SILTY CLAY			
FILL: CLAY / SILTY CLAY		SILT / SILTY LOAM		BEDROCK			

635 630 625 620 615 610 605 600 595

MATCH LINE SHEET 2 STA.: 936+50

MATCH LINE SHEET 4 STA.: 955+75

SGB-12
940+75.38
27.43ft RT

EL
608.26
608.09
607.26
598.76

Light Gray, Moist
FILL: GRAVEL, with sand
Dark Gray, Moist
FILL: GRAVEL, with sand
Dense to Very Dense
Light Brown, Dry to Moist
GRAVEL, with sand (GPS)
End of Boring

D	N	w%
0		
31	14	
50	9	
5		
37	5	
32	4	
10		

SGB-11
945+79.42
35.08ft LT

EL
607.48
606.81
606.48
597.48

8 inches of Asphalt
Moist
FILL: SILTY CLAY, with gravel
Medium Dense to Dense
Light Brown, Dry to Moist
GRAVEL, with sand (GPS)
End of Boring

D	N	w%
0		
38	6	
42	5	
5		
39	7	
28	6	
10		

SGB-10
950+88.81
35.46ft RT

EL
608.12
607.97
603.62
598.12

3 inches of Topsoil
Brown and Gray, Moist
FILL: SANDY CLAY, with gravel
Medium Dense to Dense
Light Brown, Moist
GRAVEL, with sand (GPS)
End of Boring

D	N	w%
0		
6	15	
5		
26	6	
39	6	
10		

SGB-09
955+45.26
37.27ft LT

EL
609.20
608.45
607.70
599.20

9 inches of Asphalt
Brown and Gray, Very Moist
FILL: SILTY CLAY, with sand, gravel
Medium Dense to Dense
Light Brown, Moist
GRAVEL, with sand (GPS)
End of Boring

D	N	Qu	w%
0			
22	2.0 P		26
35			7
5			
36			8
22			8
10			

936+50 | 936+75 | 940+50 | 940+75 | 941+00 | 945+50 | 945+75 | 946+00 | 950+25 | 950+50 | 950+75 | 955+00 | 955+25 | 955+50 | 955+75

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PLOT DATE = 5/25/2023	DATE - 05/24/2023	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT PTB 202–006
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SUBSURFACE PROFILE

SCALE: AS NOTED | SHEET 3 OF 5 SHEETS | STA. 936+50 | TO STA. 955+75

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	8
		CONTRACT NO. PTB-201-004		
		ILLINOIS	FED. AID PROJECT	

LEGEND

PAVEMENT		FILL: SAND / GRAVEL		SANDY CLAY / LOAM		APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED
BASE COURSE		SILTY CLAY		CLAYEY SAND / SILT		
TOPSOIL		SAND/ GRAVEL		ORGANIC SILTY CLAY		
FILL: CLAY / SILTY CLAY		SILT / SILTY LOAM		BEDROCK		

635 630 625 620 615 610 605 600 595

MATCH LINE SHEET 3 STA.: 955+75

MATCH LINE SHEET 5 STA.: 975+50

SGB-08
960+35.34
44.02ft RT
EL 612.94
612.77 Light Gray, Moist FILL: GRAVEL
611.44 Dark Gray, Moist FILL: GRAVEL, with sand
Dense to Very Dense Light Brown, Dry to Moist GRAVEL with sand (GPS)
602.94 End of Boring

SGB-07
965+40.23
29.51ft LT
EL 613.35
613.18 Light Gray, Moist FILL: GRAVEL
611.85 Dark Brown, Very Moist FILL: SILTY CLAY, with gravel
607.85 Stiff Brown, Very Moist SILTY CLAY (CL/ML)
603.35 Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GPS)
End of Boring

SGB-06
970+12.91
34.01ft RT
EL 611.74
611.57 Light Gray, Moist FILL: GRAVEL
609.74 Gray and Brown, Wet FILL: SANDY CLAY, with gravel
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)
601.74 End of Boring

SGB-05
975+24.27
26.76ft LT
EL 614.55
614.38 Light Gray, Moist FILL: GRAVEL
612.55 Gray and Brown, Wet FILL: SILTY CLAY, with gravel
Medium Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GPS)
604.55 End of Boring

955+75 | 956+00 | 960+00 | 960+25 | 960+50 | 965+00 | 965+25 | 965+50 | 969+75 | 970+00 | 970+25 | 974+75 | 975+00 | 975+25 | 975+50

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DEPARTMENT OF TRANSPORTATION

IDOT PTB 202–006
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SUBSURFACE PROFILE

SCALE: AS NOTED | SHEET 4 OF 5 SHEETS | STA. 955+75 TO STA. 975+50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	9
		CONTRACT NO. PTB-201-004		
		ILLINOIS	FED. AID PROJECT	

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED
BASE COURSE	SILTY CLAY	CLAYEY SAND / SILT	
TOPSOIL	SAND/ GRAVEL	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	

635 630 625 620 615 610 605 600 595

MATCH LINE SHEET 4 STA.: 975+50

SGB-04
979+38.54
38.54ft RT
EL 616.13

Dark Gray, Moist FILL: GRAVEL 615.96
Dark Gray, Moist FILL: GRAVEL, with SAND 615.13
Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)
606.13 End of Boring

D	N	w%
0		
38	5	
47	5	
50	5	
19	6	
10		

SGB-03
984+95.07
33.20ft LT
EL 618.93

Light Gray, Moist FILL: GRAVEL 618.76
Light Brown and Gray, Very Moist FILL: SILTY CLAY, with sand 617.43
Stiff Light Brown, Very Moist CLAY (CH) 614.33
Medium Dense to Dense Light Brown, Moist GRAVEL, with Sand (GPS)
608.93 End of Boring

D	N	Qu	w%
0			
8	1.87	B	32
11	25		
5			
47	5		
25	5		
10			

SGB-02
989+80.85
40.43ft RT
EL 618.33

Gray, Moist FILL: GRAVEL 618.18
Dark Brown and Gray, Moist FILL: SILTY CLAY, trace gravel 613.93
Medium Dense to Dense Light Brown, Moist GRAVEL, with sand (GPS)
608.33 End of Boring

D	N	Qu	w%
0			
8	2.92	B	24
38	0.5	P	23
5			
31	7		
29	5		
10			

SGB-01
994+86.92
44.23ft LT
EL 618.47

15 inches of Asphalt 617.22
Brown, Moist FILL: SILTY CLAY, with sand, trace gravel 613.47
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)
608.47 End of Boring

D	N	Qu	w%
0			
6	1.5	P	18
6	1.5	P	20
5			
41	2		
19	5		
10			

975+50 | 975+75–979+25 | 979+25 | 979+50–984+50 | 984+75 | 985+00–989+50 | 989+75 | 989+75–994+50 | 994+75 | 995+00 | 995+25

MODEL: Default
FILE NAME: T:\Illinois DOT\WSP 201-004\Geotech\Excel\Exhibits\SGNs\IDOT WSP 201-004 -Profile-05.dgn

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

USER NAME = nnano	DESIGNED - DD	REVISED -	
	DRAWN - NN	REVISED -	
PLOT SCALE = 240.0000 ' / ft.	CHECKED - DE	REVISED -	
PLOT DATE = 7/3/2023	DATE - 05/24/2023	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT PTB 202–006
PROPOSED ROADWAY IL ROUTE 7 AT IL ROUTE 53
SUBSURFACE PROFILE

SCALE: AS NOTED | SHEET 5 OF 5 SHEETS | STA. 975+50 | TO STA. 995+25

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	10	10
		CONTRACT NO. PTB-201-004		
		ILLINOIS	FED. AID PROJECT	

APPENDIX B

SOIL BORING LOGS

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.59277181, **Longitude** -88.07597377

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-01
Station 994+86.92
Offset 44.23ft LT
Ground Surface Elev. 618.47 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
15 inches of Asphalt				
617.22		6		
Brown, Moist FILL: SILTY CLAY, with sand, trace gravel			1.5 P	18
		6		
Push Rock at 3.5 feet			1.5 P	20
613.47	-5			
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)		41		
				2
		19		
				5
608.47	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.59138214, **Longitude** -88.07627668

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-02
Station 989+80.85
Offset 40.43ft RT
Ground Surface Elev. 618.33 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 618.16				
Dark Brown and Gray, Moist FILL: SILTY CLAY, trace gravel	8			
		2.9 B	24	
	38			
613.83		0.5 P	23	
-5 Medium Dense to Dense Light Brown, Moist GRAVEL, with sand (GPS)	31			
			7	
	29			
			5	
608.33 -10				
End of Boring				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.59018811, **Longitude** -88.07710906

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-03
Station 984+95.07
Offset 33.20ft LT
Ground Surface Elev. 618.93 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2 inches of Crushed Aggregate 618.76				
Light Brown and Gray, Very Moist FILL: SILTY CLAY, with sand 617.43		8		
Stiff Light Brown, Very Moist CLAY (CH)			1.9 B	32
614.93		11		
Medium Dense to Dense Light Brown, Moist GRAVEL, with Sand (GPS)	-5			25
		47		
				5
		25		
608.93	-10			5
End of Boring	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58882188, **Longitude** -88.07752615

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-04
Station 979+38.54
Offset 38.54ft RT
Ground Surface Elev. 616.13 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2 inches of Crushed Aggregate 615.96				
Dark Gray, Moist FILL: GRAVEL, with SAND 615.13		38		
Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)				5
		47		
	-5			5
		50		
				5
		19		
606.13	-10			6
End of Boring				
	-15			
	-20			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58772093, **Longitude** -88.07842111

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-05
Station 975+24.27
Offset 26.76ft LT
Ground Surface Elev. 614.55 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2 inches of Crushed Aggregate 614.38				
Gray and Brown, Wet FILL: SILTY CLAY, with gravel		27		
612.55			1.0 P	22
Medium Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GPS)		45		
	-5			10
		55		
				11
		20		
				6
604.55	-10			
End of Boring	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58637683, **Longitude** -88.0790018

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-06
Station 970+12.91
Offset 34.01ft RT
Ground Surface Elev. 611.74 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 611.57				
Gray and Brown, Wet FILL: SANDY CLAY, with gravel	32			
609.74			19	
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)	28			
-5			6	
	33			
			4	
	21			
601.74 -10			6	
End of Boring				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58527182, **Longitude** -88.07993617

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-07
Station 965+40.23
Offset 29.51ft LT
Ground Surface Elev. 613.35 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
613.18				2 inches of Crushed Aggregate
	6			Dark Brown, Very Moist FILL: SILTY CLAY, with gravel
611.85				
		2.0 P	27	Stiff Brown, Very Moist SILTY CLAY (CL/ML)
	6			
-5		1.7 B	39	
607.85				
	31			Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GPS)
			13	
	50		9	Push Rock at 8.5 feet
603.35 -10				End of Boring
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58392903, **Longitude** -88.08046489

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-08
Station 960+35.34
Offset 44.02ft RT
Ground Surface Elev. 612.94 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Light Gray, Moist FILL: GRAVEL, with sand				
611.44		50		
Dense to Very Dense Light Brown, Dry to Moist GRAVEL with sand (GPS)				10
		38		
	-5			5
		35		
				6
		36		
				4
602.94	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58280107, **Longitude** -88.08148482

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-09
Station 955+45.26
Offset 37.27ft LT
Ground Surface Elev. 609.20 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
9 inches of Asphalt				
608.45				
Brown and Gray, Very Moist FILL: SILTY CLAY, with sand, gravel		22		
607.70			2.0 P	26
Medium Dense to Dense Light Brown, Moist GRAVEL, with sand (GPS)		35		
	-5			7
Push Rock at 6 feet		36		
				8
		22		
				8
599.20	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58153007, **Longitude** -88.08197261

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-10
Station 950+68.81
Offset 35.46ft RT
Ground Surface Elev. 608.12 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil 607.87				
Brown and Gray, Moist FILL: SANDY CLAY, with gravel		6		
				15
		20		
603.62				11
Medium Dense to Dense Light Brown, Moist GRAVEL, with sand (GPS)	-5	26		
				6
		39		
598.12	-10			6
End of Boring	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 27, **TWP.** 36N, **RNG.** 10E,
Latitude 41.58038994, **Longitude** -88.08295499

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-11
Station 945+79.42
Offset 35.08ft LT
Ground Surface Elev. 607.48 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
8 inches of Asphalt				
606.81				
Moist 606.48 FILL: SILTY CLAY, with gravel		38		
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)				6
		42		
	-5			5
		39		
				7
		28		
				6
597.48	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 27, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57903999, **Longitude** -88.08341981

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-12
Station 940+75.38
Offset 27.43ft RT
Ground Surface Elev. 608.76 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Light Gray, Moist FILL: GRAVEL, with sand				
607.26		31		
Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)				14
Push Rock at 3.5 feet		50		
	-5			9
		37		
				5
		32		
				4
598.76	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57783898, **Longitude** -88.08412697

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-13
Station 936+0.70
Offset 32.34ft LT
Ground Surface Elev. 608.11 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 607.94				
Dark Brown, Moist FILL: SILTY CLAY, with sand, gravel	9			
		2.0 P	24	
605.61				
Medium Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)	24			
			7	
-5				
	26			
			5	
Push Rock at 8.5 feet	18			
			4	
598.11 -10				
End of Boring				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57648297, **Longitude** -88.08431463

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-14
Station 931+8.47
Offset 30.59ft RT
Ground Surface Elev. 603.31 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 603.14				
Gray and Brown, Moist FILL: SANDY CLAY, with gravel	15			
			12	
Push Rock at 3.5 feet	12			
			10	
-5				
596.81	35			
Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)			5	
	26			
			6	
593.31 -10				
End of Boring				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57524595, **Longitude** -88.08491595

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-15
Station 926+32.22
Offset 27.95ft LT
Ground Surface Elev. 586.51 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
0				2 inches of Crushed Aggregate 586.34
	7			Dark Brown, Moist to Wet FILL: SANDY CLAY, with gravel
			14	
	5			
			20	
-5				
	50			580.51 Very Dense Light Brown, Moist GRAVEL, with sand (GPS) Push Rock at 6.5 feet
			8	
	50		7	Push Rock at 8.5 feet
-10				576.51
				End of Boring
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57375165, **Longitude** -88.08516795

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. _____
Station _____

BORING NO. SGB-16
Station 920+86.22
Offset 27.78ft RT
Ground Surface Elev. 588.97 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
0				2 inches of Crushed Aggregate 588.80
	7			Dark Gray and Brown, Moist FILL: SANDY CLAY
			13	
				585.47
	11			Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)
-5			15	
	63			
			8	
	50		5	
-10				578.97
				End of Boring
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57252325, **Longitude** -88.08577397

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-17
Station 916+12.74
Offset 32.73ft LT
Ground Surface Elev. 589.27 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 589.10				
Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GPS)	33		7	
Push Rock at 3.5 feet	64		7	
584.27 -5				
Auger Refusal at 5 feet End of Boring				
-10				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.57095897, **Longitude** -88.08602797

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-18
Station 910+41.77
Offset 28.21ft RT
Ground Surface Elev. 586.20 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2 inches of Crushed Aggregate 586.03			
Brown and Gray, Wet FILL: GRAVEL, with sand, clay	10		24
582.70			
Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)	14		10
-5			
	50		3
Auger Refusal at 6.5 feet 579.45			
End of Boring			
-10			
-15			
-20			

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 4/5/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.56961975, **Longitude** -88.08667243

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-19
Station 905+26.58
Offset 33.44ft LT
Ground Surface Elev. 588.16 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
2 inches of Crushed Aggregate 587.99				
Dark Brown and Brown, Wet FILL: SANDY LOAM, with gravel, trace clay		17		
Push Rock at 1 foot 586.16				17
Very Dense Light Brown, Moist GRAVEL, with sand (GPS)		50		
Push Rock at 4 feet				9
	-5	72		
				6
Push Rock at 8.5 feet		50		
578.16	-10			
End of Boring				
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

Date 4/4/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Roadway Subgrade Boring **LOGGED BY** DD

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 28, **TWP.** 36N, **RNG.** 10E,
Latitude 41.56815192, **Longitude** -88.08689603

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. SGB-20
Station 899+91.72
Offset 27.66ft RT
Ground Surface Elev. 587.31 **ft**

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

Groundwater Elev.:
First Encounter None **ft**
Upon Completion N/A **ft**
After N/A **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
2 inches of Crushed Aggregate 587.14				
Brown, Moist to Wet FILL: SANDY CLAY, with gravel Push Rock at 1 foot	10			
			15	
	5			
-5			16	
581.31				
Medium Dense to Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS) Push Rock at 6 feet	26			
			13	
	38			
577.31 -10			5	
End of Boring				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 3/26/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Traffic Signal Boring **LOGGED BY** DF

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.5938444, **Longitude** -88.0750805

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. TSB-01
Station 999+32.48
Offset 65.47ft RT
Ground Surface Elev. 618.50 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				15 inches of Asphalt 6 inches of Aggregate Base
617.25	4			
616.75		1.0 P	17	Brown, Moist to Wet FILL: SILTY CLAY, with gravel
	6			
-5		0.8 B	26	
	4			
611.00		1.3 P	27	
	17			Medium Dense Dark Brown and Light Brown, Moist GRAVEL, with sand, trace clay (GPS)
-10			12	
607.50	15			Loose to Medium Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)
			5	
	14			
-15			6	
	9			
			3	
	18			
-20			4	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	22			Loose to Medium Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS) *(continued)*
			4	
	22			
593.50 -25			5	
				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)

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 3/28/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Traffic Signal Boring **LOGGED BY** DF

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.5939255, **Longitude** -88.0754966

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. TSB-02
Station 999+29.51
Offset 53.00ft LT
Ground Surface Elev. 618.90 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
0				17 inches of Asphalt 6 inches of Aggregate Base Course
617.48	8			
616.98		2.8 P	15	Brown, Moist FILL: SILTY CLAY, trace gravel
	8			
		2.3 B	20	
613.90 -5				Stiff Dark Brown, Moist SILTY CLAY, trace gravel (CL/ML)
	9			
		1.3 P	18	
610.40				Medium Dense Brown, Moist SILTY LOAM, trace gravel (ML)
	12			
-10			16	
607.90				Very Stiff Brown, Moist SILTY CLAY, trace gravel (CL/ML)
	22			
		2.5 B	16	
	17			
		4.0 P	15	
-15				
	12			
		3.5 P	18	
600.40				Dense to Very Dense Light Brown, Dry GRAVEL, with sand (GPS)
	38			
		2.0 P	5	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				Dense to Very Dense Light Brown, Dry GRAVEL, with sand (GPS) *(continued)*
	45			
			5	
	57			
			5	
593.90 -25				End of Boring
-30				
-35				
-40				

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

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 3/26/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Traffic Signal Boring **LOGGED BY** DF

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.5942734, **Longitude** -88.0753708

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. TSB-03
Station 1000+62.88
Offset 51.48ft LT
Ground Surface Elev. 618.63 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Asphalt 618.21 8 inches of Concrete 12 inches of Agrregate Base 617.55		9		
616.55				21
Brown, Moist FILL: SILTY CLAY, trace gravel Push Rock at 2.5 feet		5		
	-5		0.3 P	20
612.63		7		
Stiff to Hard Brown, Moist SILTY CLAY, with sand, trace gravel (CL/ML)			1.7 B	21
		12		
	-10		4.3 P	15
		11		
			3.8 P	18
		14		
	-15		1.9 B	14
		24		
			1.3 B	19
600.13		72		
Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS)	-20			6

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense to Very Dense Light Brown, Dry to Moist GRAVEL, with sand (GPS) *(continued)*		34		
				7
		17		
				4
593.63	-25			
End of Boring	-30			
	-35			
	-40			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
GSG

SOIL BORING LOG

Date 3/26/23

ROUTE FAP 351 (IL 7) at IL 53 **DESCRIPTION** Traffic Signal Boring **LOGGED BY** DF

SECTION P-91-056-19 **LOCATION** Lockport, IL, **SEC.** 22, **TWP.** 36N, **RNG.** 10E,
Latitude 41.5942128, **Longitude** -88.0749939

COUNTY WILL **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO.
Station

BORING NO. TSB-04
Station 1000+65.99
Offset 53.93ft RT
Ground Surface Elev. 619.69 ft

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

Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				3 inches of Asphalt 619.44 11 inches of Concrete 6 inches of Aggregate Base 618.52
	24			618.02
		2.9 B	19	Dark Brown and Gray, Moist FILL: SILTY CLAY, trace gravel
				616.19
	50		16	Gray and Brown, Wet FILL: GRAVEL, with clay Push Rock at 3.5 feet
-5				
				613.69
	6			Stiff to Very Stiff Dark Brown, Moist to Very Moist SILTY CLAY, with gravel, sand (CL/ML)
		2.3 P	28	
	7			Push Rock at 8.5 feet
		1.5 P	23	
-10				
	10			
		1.8 P	24	
	8			
		2.0 P	25	
-15				
	22			
		1.0 P	14	
				601.19
	19			Medium Dense Light Brown, Moist GRAVEL, with sand (GPS)
			5	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Medium Dense Light Brown, Moist GRAVEL, with sand (GPS) *(continued)*
	27			
			5	
	27			
			6	
-25				594.69
				End of Boring
-30				
-35				
-40				

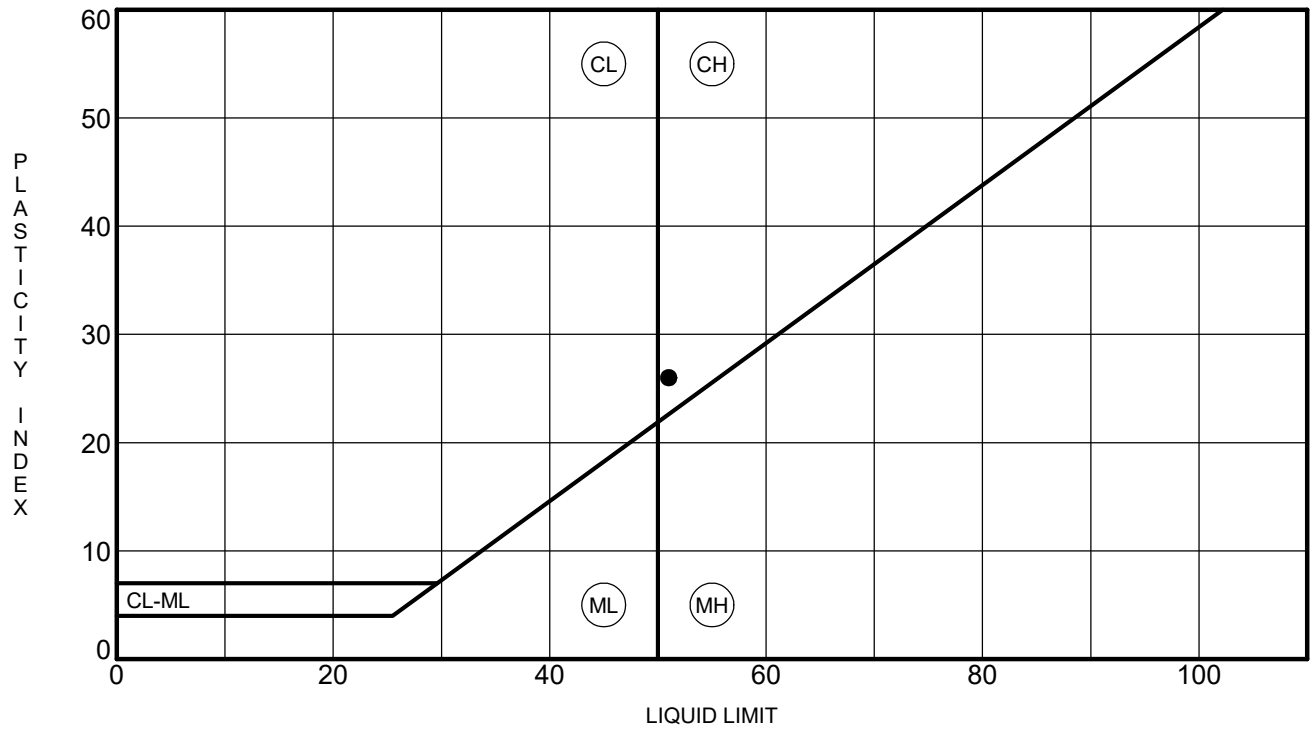
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, form 137 (Rev. 8-99)

APPENDIX C

LABORATORY TEST

RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**SGB-03**	**1.00**	**51.0**	**25.0**	**26.0**		

Illinois Department of Transportation
Division of Highways
GSG

ATTERBERG LIMITS' RESULTS

Route: FAP 351 (IL 7) at IL 53

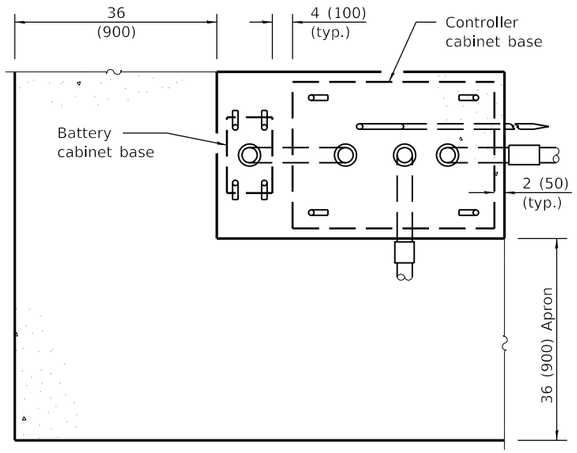
Section: P-91-056-19

County: WILL

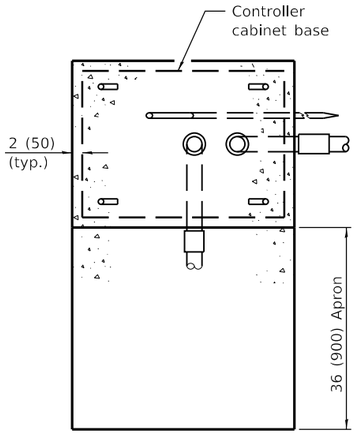
ATTERBERG_LIMITS PTB 201-004.GPJ IL_DOT.GDT 5/22/23

APPENDIX D

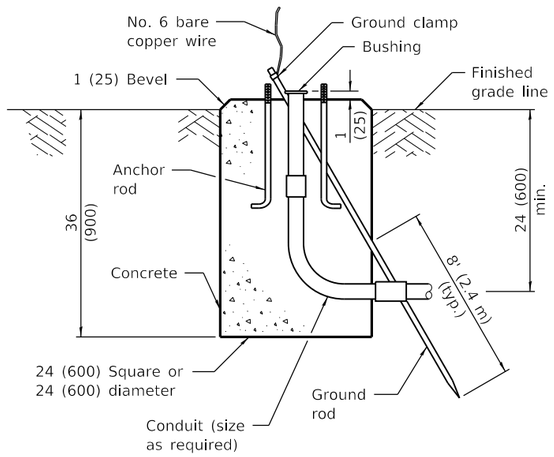
IDOT HIGHWAY STANDARD 878001-11



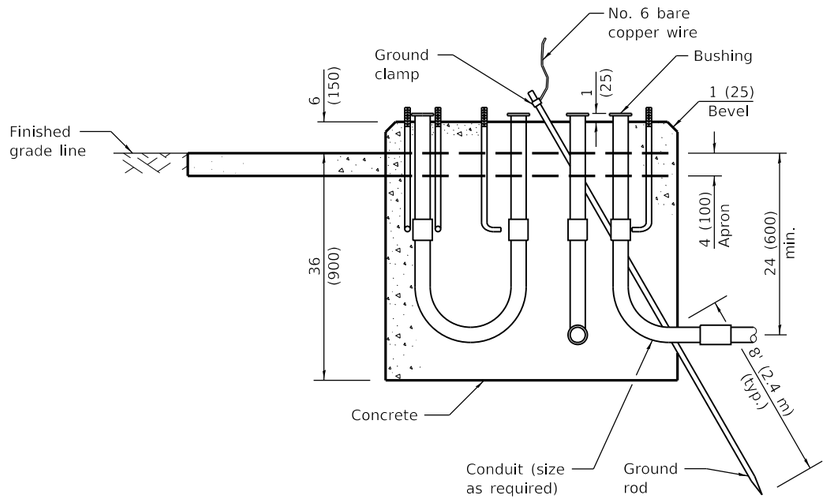
TOP VIEW



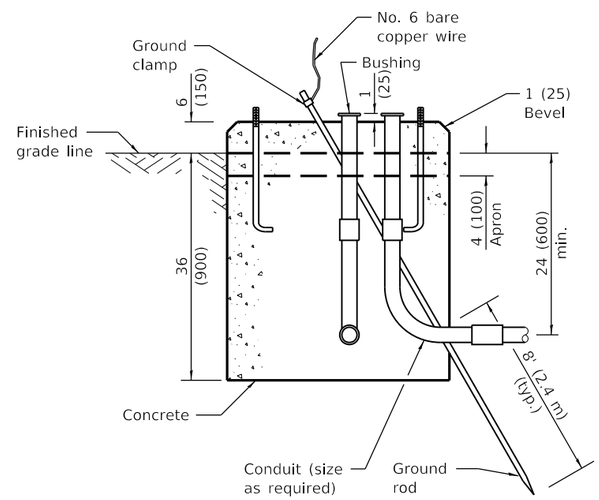
TOP VIEW



TYPE A



TYPE C
FOR GROUND MOUNTED
CONTROLLER CABINET
AND UPS BATTERY CABINET



TYPE D
FOR GROUND MOUNTED
CONTROLLER CABINET

All dimensions are in inches (millimeters)
unless otherwise shown.

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF OPERATIONS

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

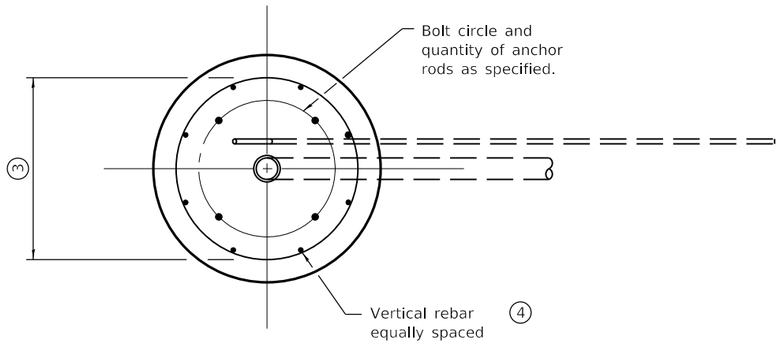
ISSUED 1-1-02

DATE	REVISIONS
1-1-21	Revised anchor rod end in
	Type E detail.
1-1-15	Revised TYPE E detail.

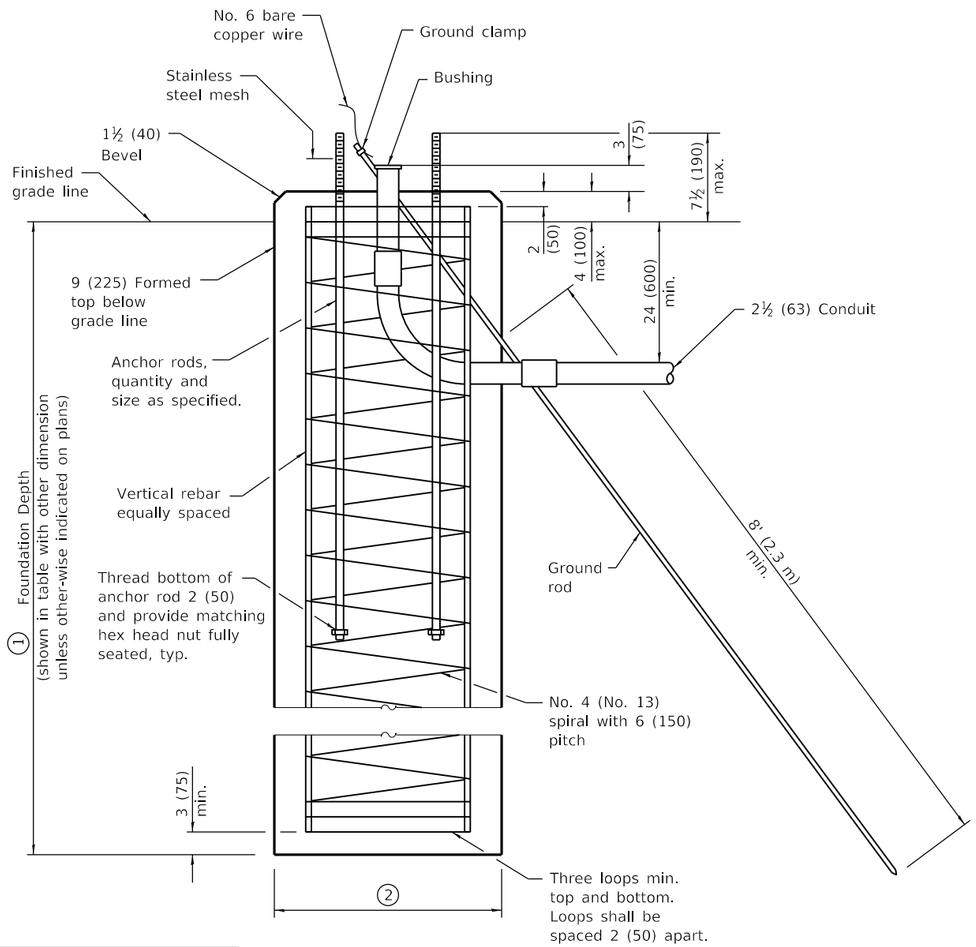
CONCRETE FOUNDATION DETAILS

(Sheet 1 of 2)

STANDARD 878001-11



TOP VIEW



TYPE E

Mast Arm Length	1 Foundation Depth *	2 Foundation Diameter	3 Spiral Diameter	4 Quantity of Rebars	Size of Rebars
Less than 30' (9.1 m)	10'-0" (3.0 m)	30 (750)	24 (600)	8	6 (19)
Greater than or equal to 30' (9.1 m) and less than 40' (12.2 m)	13'-6" (4.1 m)	30 (750)	24 (600)	8	6 (19)
	11'-0" (3.4 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 40' (12.2 m) and less than 50' (15.2 m)	13'-0" (4.0 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 50' (15.2 m) and up to 55' (16.8 m)	15'-0" (4.6 m)	36 (900)	30 (750)	12	7 (22)
Greater than or equal to 56' (16.8 m) and less than 65' (19.8 m)	21'-0" (6.4 m)	42 (1060)	36 (900)	16	8 (25)
Greater than or equal to 65' (19.8 m) and up to 75' (22.9 m)	25'-0" (7.6 m)	42 (1060)	36 (900)	16	8 (25)

* For standard and combination mast arm assemblies. Foundation depths for standard dual mast arms with the longest arm length upto and including 55' (16.8 m) shall be increased by 1' (0.3 m) of that shown in the table, based on the longer of the two arms.

These foundation depths are for sites which have cohesive soils (clayey silt, sandy clay, etc.) along the length of the shaft, with an average Unconfined Compressive Strength (Qu) > 1.0 tsf (100 kpa). This strength shall be verified by boring data prior to construction or with testing by the Engineer during foundation drilling. The Bureau of Bridges & Structures should be contacted for a revised design if other conditions are encountered.

Illinois Department of Transportation

PASSED January 1, 2021
ENGINEER OF OPERATIONS

APPROVED January 1, 2021
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-02

CONCRETE FOUNDATION DETAILS

(Sheet 2 of 2)

STANDARD 878001-11