Structural Geotechnical Report

Proposed Retaining Wall
Structure No. 016-2310
IDOT PTB 163-017
IL 171 and 95th Street
Willow Springs, Illinois

Prepared for

Illinois Department of Transportation
Contract Number: 60R94

Project Design Engineer Team
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April 25, 2024

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Proposed Retaining Wall
Structure No. 016-2310
IL 171 and 95th Street, Willow Springs, IL
IDOT PTB 163-017

Dear Mr. Regis:

Attached is a copy of the Structural Geotechnical Report for the above referenced project. This report provides a brief description of the site investigation, site conditions, foundation, and construction recommendations. The site investigation included advancing twenty-seven (27) soil borings to depths between 14 and 40 feet.

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

Sincerely,

Thomas E. Kasang, P.E.
Project Engineer

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

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1.0 INTRODUCTION

GSG Consultants, Inc. (GSG) completed a geotechnical investigation for the design of a retaining wall (SN 016-2310) along IL 171 at the intersection with 95th Street in Willow Springs, Illinois. The purpose of this site investigation was to explore the subsurface conditions along the proposed structure location, to determine engineering properties of the subsurface soil, and to develop design and construction recommendations for the proposed retaining wall. **Exhibit 1** shows the general project location.

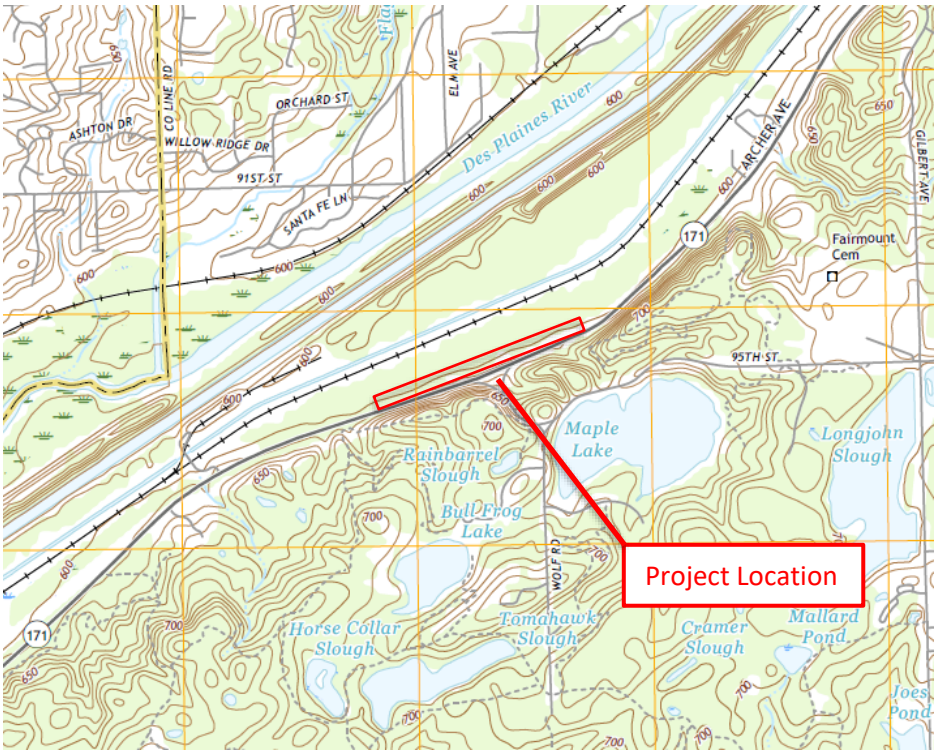


Exhibit 1 – Project Location Map
(Source: USGS Topographic Maps, usgs.gov)

The general scope of the overall project is to raise the grade of IL 171 for a new intersection with 95th Street. A retaining wall will be required along the northern right-of-way of IL 171 due to limited right-of-way available for slope reconfiguration. The project will also include constructing

one (1) new culvert at Sta. 326+89.13, traffic signals, and roadway improvements including new embankment construction and realigning the IL 171 and 95th Street intersection. The proposed culvert, traffic signs, and roadway improvements are discussed in separate reports.

1.1 Existing Site Conditions

The proposed improvements will include raising the profile grade of existing IL 171 for a new intersection with 95th Street. The proposed wall will be constructed along the northern right-of-way of IL 171 which is heavily wooded and vegetated. **Exhibit 2** generally shows the existing conditions where the proposed retaining wall will be constructed.

Exhibit 2 – Existing Site Conditions at Proposed Wall Location, Looking west along IL 171

1.2 Proposed Retaining Wall Information

Based on drawings (dated March 22, 2024) (**Appendix A**) provided by Collins Engineers, Inc. (Collins), the base of the proposed wall will be cut into the existing ground surface, however, the majority of the proposed retaining wall will be in a "fill" section for the newly constructed embankment, with a maximum wall height of up to approximately 19 feet. The proposed retaining wall will be approximately 1,548 feet in length. A Mechanically Stabilized Earth (MSE) wall is the current selection for the design of the wall. **Table 1** presents a summary of the proposed retaining wall and its location.

Table 1 –Retaining Wall Summary

Wall Name	Wall Stations*	Proposed Wall Type	Approximate Length (ft)	Maximum Anticipated Wall Height (ft)*
SN 016-2310	Sta. 317+80.13 to Sta. 333+27.91	MSE	1,548	19

*Estimated based on preliminary drawings provided by Collins (dated March 22, 2024). Maximum wall height located at Sta 326+00.73, and measured as height between top of moment slab (629.51 ft) to top of leveling pad elevation (610.94 ft).

2.0 SITE SUBSURFACE EXPLORATION PROGRAM

This section describes the subsurface exploration program and laboratory testing program completed as part of this project. The proposed locations and depths of the soil borings were selected in accordance with IDOT requirements and review with Ames Engineering, Inc. (Ames) for available design information at the time of the field activities. The borings were completed in the field based on field conditions and accessibility.

2.1 Subsurface Exploration Program

The subsurface exploration was completed between June 9 and June 17, 2021. The exploration program included advancing twenty-seven (27) standard penetration test (SPT) borings at locations spaced approximately 75 feet apart along the length of the proposed wall. The as-drilled locations of the soil borings are shown on the Soil Boring Location Plan and Subsurface Profile (**Appendix B**). **Table 2** presents a list of the borings used for the proposed retaining wall analysis.

Table 2 – Summary of Subsurface Exploration Borings

Boring ID	Station*	Offset*	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-01	316+01.26	43.32 RT	1839443.234	1102341.754	20.0	611.6
RWB-02	316+84.34	43.02 RT	1839469.640	1102420.528	20.0	611.5
RWB-03	317+44.00	43.11 RT	1839488.306	1102477.187	20.0	612.0
RWB-04	318+08.19	42.74 RT	1839508.831	1102538.006	14.0**	612.0
RWB-05	318+80.90	38.55 RT	1839535.671	1102605.716	19.0**	612.4
RWB-06	319+63.02	29.88 RT	1839569.708	1102680.946	17.5**	612.0
RWB-07	320+28.98	29.59 RT	1839590.722	1102743.476	29.0	612.5
RWB-08	321+11.99	36.09 RT	1839611.032	1102824.576	25.0	613.0
RWB-09	321+80.29	39.38 RT	1839630.595	1102890.575	20.5**	613.3
RWB-10	322+42.24	42.24 RT	1839653.739	1102962.597	30.0	613.4
RWB-11	323+30.65	41.78 RT	1839681.051	1103033.379	32.0**	613.6
RWB-12	324+04.38	39.86 RT	1839710.073	1103101.778	40.0	613.4
RWB-13	324+53.54	38.61 RT	1839729.882	1103147.158	35.0**	613.4
RWB-14	325+28.22	36.74 RT	1839760.709	1103215.753	40.0	612.4
RWB-15	326+03.57	34.52 RT	1839793.032	1103284.381	35.0	611.9

Boring ID	Station*	Offset*	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-16	326+75.53	36.03 RT	1839820.826	1103350.769	35.0	612.1
RWB-17	327+37.52	33.68 RT	1839848.100	1103406.487	26.5**	611.5
RWB-18	328+14.34	34.07 RT	1839878.888	1103476.869	22.5**	611.0
RWB-19	328+84.22	35.55 RT	1839905.862	1103541.354	25.0	610.6
RWB-20	329+60.01	35.99 RT	1839936.188	1103610.814	20.0	610.3
RWB-21	330+34.08	36.40 RT	1839965.836	1103678.685	20.0	610.0
RWB-22	331+11.20	36.05 RT	1839997.416	1103749.049	20.0	609.9
RWB-23	331+80.73	36.47 RT	1840025.219	1103812.782	20.0	609.6
RWB-24	332+52.64	36.43 RT	1840054.406	1103878.494	19.0	609.2
RWB-25	333+26.85	36.39 RT	1840084.529	1103946.322	20.0	608.9
RWB-26	333+92.54	38.85 RT	1840108.906	1104007.369	20.0	608.8
RWB-27	334+79.35	37.63 RT	1840145.215	1104086.231	20.0	608.9

* Based on drawings provided by Collins (dated March 22, 2024)

** Borings terminated upon encountering practical auger refusal

The soil borings were drilled using truck-mounted Diedrich D-50 (hammer efficiency 92%) and CME-75 (hammer efficiency 91%) drill rigs using 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 depths of 30 feet below grade in borings RWB-13 through RWB-16, and then at 5-foot intervals thereafter to the respective termination depths. In the remaining borings, soil samples were obtained at 2.5-foot intervals to the boring termination depths or upon encountering auger refusal. 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.

Bedrock coring was attempted upon encountering auger refusal in borings RWB-12 and RWB-19 at depths of 11.5 and 32 feet, respectively. The borings were subsequently drilled to the planned termination depths, and no bedrock cores were taken.

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 collected from each sample interval, were placed in jars and were 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 of the proposed retaining wall. The following laboratory tests were performed on representative soil samples:

- Moisture content ASTM D2216 / AASHTO T-265
- Atterberg Limits ASTM D4318 / AASHTO T-89 / AASHTO T-90
- Dry Unit Weight ASTM D7263
- Particle Size Analysis ASTM D422 / AASHTO T-88

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 **Appendix D Laboratory Test Results** and are also shown along with the field test results in **Appendix C Soil Boring Logs**.

2.3 Subsurface Soil Conditions

This section provides a brief description of the soils encountered in the borings performed in the vicinity of the proposed retaining wall. Variations in the general subsurface soil profile were noted during the drilling activities. Detailed descriptions of the subsurface soils are provided in the Soil Boring Logs (**Appendix C**). The soil boring logs provide specific conditions encountered at each boring location, including soil descriptions, stratifications, penetration resistance, elevations, location of the samples, water levels (when encountered), and laboratory test data. 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.

RWB-01 through RWB-06

The surface elevations of these borings ranged between 611.5 and 612.4 feet. Borings RWB-01 through RWB-04 initially noted between 3 and 6 inches of topsoil. Beneath the topsoil and from the ground surface in borings RWB-05 and RWB-06, loose brown granular soils (sand, silty sand, and sandy clay loam) were encountered to a depth of 3.5 feet below grade. Following these soils, the borings encountered stiff to hard brown clay soils (silty clay, silty clay loam, and clay loam) with gravel and cobbles to depths between 6 and 13.5 feet in borings RWB-01, RWB-02, and RWB-03. Borings RWB-04, RWB-05, and RWB-06 were terminated in these materials upon encountering auger refusal at depths of 14, 19 and 17.5 feet, respectively. The silty clay in boring RWB-04 had a liquid limit of 22.9 percent, a plastic limit of 17.3 percent, and an in-situ unit weight of 140.7 pounds per cubic foot (pcf). Beneath the clay soils in borings RWB-01 through RWB-03, loose to dense interbedded layers of cohesionless soils (silt, sand, and gravel) with gravel and cobbles were encountered to the boring termination depths.

The unconfined compressive strength of the upper brown clay soils ranged between 1.0 and 4.5 tsf. The SPT blow counts 'N' values of the upper sand soils ranged between 6 and 19 blows per foot (bpf). The SPT blow counts 'N' values for the lower cohesionless soils (silt, sand, and gravel) ranged between 9 bpf and 13 blows for 1 inch.

RWB-07 through RWB-12

The surface elevations of these borings ranged between 612.5 and 613.6 feet. Borings RWB-10 through RWB-12 initially noted 6 inches of topsoil. Beneath the topsoil and from the ground surface in borings RWB-07, RWB-08, and RWB-09, stiff to very stiff brown clay soils (silty clay and clay loam) with gravel and cobbles were encountered to depths between 6 and 11 feet below grade. The silty clay in boring RWB-09 had an in-situ unit weight of 136.9 pcf. Beneath these soils, stiff to very hard brown and gray clay soils (silty clay and silty clay loam) with gravel and cobbles were noted to depths between 11 and 18.5 feet below grade. Following these soils, loose to extremely dense interbedded layers of cohesionless soils (sand, sandy clay loam, gravel, and silt) with gravel and cobbles were encountered to depths between 16 and 26 feet below grade in borings RWB-07 through RWB-10, and to the termination depth of 40 feet in RWB-12. Boring RWB-11 encountered auger refusal at a depth of 32 feet in the gravel soils. Beneath these soils,

gray silty clay loam was encountered to a depth of 28.5 feet below grade in RWB-07, and to the boring termination depths in RWB-08 through RWB-10. Extremely dense brown and gray sand with gravel was then encountered to the termination depth in RWB-07.

The unconfined compressive strength of the stiff to very stiff brown clay soils ranged between 1.0 and 3.0 tsf. The unconfined compressive strength of the stiff to very hard brown and gray clay soils ranged between 1.0 and 10.0 tsf, with most values between 4.5 and 6.25 tsf. The unconfined compressive strength of the gray silty clay soils ranged between 3.33 and 5.83 tsf. The SPT blow counts 'N' values for the lower cohesionless soils (sand, sandy clay loam, gravel, and silt) ranged between 4 bpf and 50 blows for 2 inches.

RWB-13 through RWB-18

The surface elevations of these borings ranged between 611.0 and 613.4 feet. Borings RWB-13 through RWB-15 initially noted between 4 and 6 inches of topsoil. Beneath the topsoil and from the ground surface in borings RWB-16, RWB17, and RWB-18, stiff to very stiff brown and black silty clay was generally encountered to depths between 3.5 and 8.5 feet below grade. The borings then noted loose to extremely dense interbedded layers of cohesionless soils (sand, sandy clay loam, silty sand, and gravel) with gravel and cobbles to depths between 16 and 21 feet below grade. Borings RWB-17 and RWB-18 was terminated within these soils upon encountering auger refusal at depths of 26.5 feet and 22.5 feet, respectively. Beneath these soils, soft to hard brown and gray clay soils (silty clay, clay, and clay loam) were then generally noted to depths between 21 and 26 feet below grade. These soils extended to the auger refusal depth of 35 feet below grade in RWB-13. The clay in boring RWB-15 at a depth of 16 feet below grade had a liquid limit of 73.2 percent, a plastic limit of 24.9 percent, and an in-situ unit weight of 110.0 pcf. Medium dense to extremely dense sand, silty sand, sandy clay loam with gravel and cobbles were then noted to the boring termination depths in the remaining borings.

The unconfined compressive strength of the upper brown clay soils ranged between 1.0 and 2.5 tsf. The unconfined compressive strength of the lower brown clay soils ranged between 0.25 and 4.5 tsf, with most values between 0.25 and 2.0 tsf. The SPT blow counts 'N' values of the upper cohesionless soils (sand, sandy clay loam, silty sand, and gravel) ranged between 8 bpf and 50 blows for 3 inches. The SPT blow counts 'N' values for the lower cohesionless soils (sand, silty sand, sandy clay loam) ranged between 12 bpf and 50 blows for 3 inches.

RWB-19 through RWB-25

The surface elevations of these borings ranged between 608.9 and 610.6 feet. Borings RWB-20 through RWB-25 initially noted between 6 and 18 inches of topsoil. Beneath the surficial layers, loose brown sand and silty sand was encountered to depths between 3.5 and 5 feet below grade. Following these soils, the borings encountered medium dense to extremely dense interbedded layers of cohesionless soils (sand, silty sand, gravel, and silt) with gravel and cobbles extending to the boring termination depths. Layers of silty clay were noted within the granular soils in boring RWB-23. The SPT blow counts 'N' values of the upper sand soils ranged between 4 and 16 blows per foot (bpf). The SPT blow counts 'N' values for the lower cohesionless soils (sand, silty sand, gravel, and silt) ranged between 11 bpf and 50 blows for 2 inches.

RWB-26 and RWB-27

The surface elevations of these borings ranged between 608.8 and 608.9 feet. Boring RWB-26 initially noted 6 inches of asphalt over 6 inches of concrete, and boring RWB-27 initially noted 4 inches of topsoil. Beneath the surficial layers, the borings noted soft to very stiff brown silty clay and clay to the boring termination depths. The clay in boring RWB-26 at a depth of 16 feet below grade had a liquid limit of 52.2 percent and a plastic limit of 22.2 percent. Cobbles were noted at various depths within the borings. The unconfined compressive strength of these soils ranged between 0.25 and 2.5 tsf, with most values greater than 1.5 tsf.

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 noted in boring RWB-01 at a depth of 8.5 feet (603.1 feet), RWB-03 at a depth of 11 feet (601.0 feet), RWB-10 at a depth of 28.5 feet (584.9 feet), and RWB-14 at a depth of 33.5 feet (578.9 feet). No delayed groundwater readings were obtained as the borings were backfilled immediately upon completion.

Based on the color change from brown and gray to gray and moisture contents of the samples, it is anticipated that the long-term groundwater level is below the bottom of the borings for the majority of the project corridor. In borings RWB-01 through RWB-10, the long-term groundwater level could range between elevations 586.0 to 598.0 feet. Perched water may also be present within any confined granular layers throughout 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 rainfall, other climatic conditions, or other factors not evident at the time measurements were made and reported herein.

3.0 GEOTECHNICAL WALL DESIGN RECOMMENDATIONS

This section provides GSG's geotechnical recommendations for the design of the proposed retaining wall based on the results of the field exploration, laboratory testing, and geotechnical analyses, and information provided by the designer. If there are any significant changes to the project characteristics or if significantly different subsurface conditions are encountered during construction, GSG should be consulted so that the recommendations of this report can be reviewed.

3.1 Retaining Wall Type Recommendations

There are several types of retaining walls that could be utilized for retaining earth embankments in fill areas or excavation slopes in cut areas. Based on the proposed grading, it appears that the proposed wall is located within a "fill" area for the new raised embankment. Possible wall types may include cast-in-place concrete cantilever, Mechanically Stabilized Earth (MSE), prefabricated modular gravity, and soldier-pile and lagging.

The wall type should be selected based on soil conditions, construction schedule, and cost. The following provides a brief description of each type of wall that could be considered at this location.

A. CIP Concrete Cantilever Walls

CIP concrete cantilever retaining walls are typically used in fill areas. They are constructed with a footing that extends laterally both in front of and behind the wall. They can be designed to resist horizontal loading with or without tie-backs by changing the geometry of the foundation. This type of wall typically requires that the area behind the wall be excavated to facilitate construction or are constructed where new fill embankments are necessary.

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

B. Mechanically Stabilized Earth Walls

An MSE wall is typically associated with fill wall construction and consists of facing such as segmental precast units, dry block concrete or CIP concrete facing units connected to horizontal steel strips, bars or geosynthetic to create a reinforced soil mass. The reinforcement is typically placed in horizontal layers between successive layers of granular backfill. A free draining backfill is required to provide adequate performance of the wall. MSE walls can be used in cut situations as well. The additional cost of the excavations for an MSE wall is usually offset by the savings in construction costs and schedule as compared to a CIP wall on spread footings.

Advantages of the MSE wall include a relatively rapid construction schedule that does not require specialized labor or equipment, provided excavation for the reinforcement is not extensive. This type of retaining wall can accommodate relatively large total and differential settlements without distress, and the reinforcement materials are light and easy to handle. Facing panels can be designed for various architectural finishes.

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

C. Prefabricated Modular Gravity Walls

This type of wall typically consists of interlocking soil or rock-filled concrete, steel, or wire modules or bins (such as gabions). The combined weight of the wall materials resists the lateral loads from the soil embankment being retained. This type of wall may be used where conventional reinforced concrete walls are also being considered but are typically selected when the overall wall height will be less than 25 feet.

The advantage of this type of wall is that less select fill is required for the backfill behind the wall and the construction is relatively more economical compared to other wall types; however, this type of wall may require additional soil excavation for placement of the modules. The additional

cost of the excavations could be offset by the savings in construction costs and schedule as compared to other walls.

D. Soldier Pile and Lagging Walls

Soldier pile and lagging walls are typically used in cut areas where the existing ground surface needs to be maintained during construction or when a near vertical excavation is needed. These walls can also be used in fill areas where the new embankment is constructed behind the lagging. The wall may be constructed with driven steel piles or steel piles placed in drilled holes and backfilled with concrete. The depth of the soldier pile is normally estimated to be two times the wall exposed height. Soldier piles are typically spaced at 8 to 10 foot on center and are faced with cast-in-place or precast concrete. Tie backs may be used to provide additional lateral resistance, if required. The installation of soldier pile walls requires the use of specialty equipment to drive the piles into the ground. To provide lateral resistance against the retained soil, the walls can be designed to act as a cantilever or can use tie backs behind the wall. The walls maintain the existing site conditions with minimal disturbance to existing structures and can be installed relatively quickly in most situations.

E. Recommended Wall Type

GSG concurs with Ames's design selection of an MSE wall for this project. The retaining wall is considered a "fill" wall. GSG evaluated the global and external stability and movement to determine the suitability of the retaining wall for this section of the project. The wall section should be analyzed to determine that adequate factors of safety relative to overturning failure.

3.2 Retaining Wall Design Recommendations

The engineering analyses performed for evaluation of the retaining wall options followed the current AASHTO Load and Resistance Factor Design (LRFD) Methodology as required by IDOT. LRFD methodology incorporates the use of load factors and resistance factors to account for uncertainty in applied loads and load resistance of structure elements separately. The AASHTO LRFD Bridge Design Specifications outline load factors and combinations for various strength, extreme event, service, and fatigue limit states. Section 11, which outlines geotechnical criteria for retaining walls, of the AASHTO specifications requires the evaluation of bearing resistance failure, lateral sliding, and overturning at the strength limit state and excessive vertical displacement, excessive lateral displacement, and overall stability at the service limit state. The selected wall should be also evaluated with respect to the collision load. **Table 3** outlines the

load factors used in evaluation of the retaining wall in accordance with AASHTO Specification Tables 3.4.1-1 and 3.4.1-2.

Table 3 - LRFD Load Factors for Retaining Wall Analyses

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

3.2.1 Lateral Earth Pressures and Loading

The wall should be designed to withstand earth and live lateral earth pressures. The lateral earth pressures on retaining walls depend on the type of wall (i.e. restrained or unrestrained), the type of backfill and the method of placement against the wall, and the magnitude of surcharge weight on the ground surface adjacent to the wall. The active earth pressure coefficient (Ka), and the passive earth pressure coefficient (Kp) were determined in accordance with AASHTO Section 3.11.5.3 and 3.11.5.4. **Tables 4a through 4e** present soil design properties for the retaining walls for the anticipated soil types at the site and provide recommended lateral soil modulus and soil strain parameters that can be used for laterally loaded pile analysis via the p-y curve method based on the encountered subsurface conditions. Additional soil parameters for the site are included in **Appendix F**.

Table 4a – Lateral Soil Parameters - RWB-01 through RWB-06

Elevation Range (feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade Reaction (k_{py}, pci)	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
0.5 to 3.5 (611.5 to 608.5)	Loose Brown Sand / Silty Sand / Sandy Clay Loam	0.26	3.85	0.41	25	N/A	Sand (Reese)
3.5 to 8.5 (608.5 to 603.5)	Stiff to Very Stiff Brown Silty Clay	0.36	2.77	0.53	500	0.007	Stiff Clay w/o free water (Reese)
8.5 to 20.0 (603.5 to 592.0)	Stiff to Hard Brown Silty Clay / Clay Loam	0.36	2.77	0.53	1,000	0.005	Stiff Clay w/o free water (Reese)
8.5 to 20.0 (603.5 to 592.5) *RWB-01, RWB-02, & RWB-03 only*	Medium Dense to Dense Brown and Gray Sand / Gravel	0.25	4.02	0.40	60	N/A	Sand (Reese)
8.5 to 11.0 (603.5 to 601.0) *RWB-01 & RWB-02 only)*	Medium Dense to Dense Brown Silt	0.27	3.69	0.43	90	N/A	Silt
18.5 to 20.0 (593.5 to 592.0) *RWB-02 & RWB-03 only*	Dense Gray Silt	0.27	3.69	0.43	60	N/A	Silt

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

Table 4b – Lateral Soil Parameters - RWB-07 through RWB-12

Elevation Range (feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade Reaction (k_{py}, pci)	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
0.5 to 7.0 (612.5 to 606.0)	Stiff to Very Stiff Brown and Gray Silty Clay / Clay Loam	0.36	2.77	0.53	500	0.007	Stiff Clay w/o free water (Reese)
7.0 to 13.5 (606.0 to 599.5)	Very Stiff to Hard Brown and Gray Silty Clay	0.36	2.77	0.53	2,000	0.004	Stiff Clay w/o free water (Reese)
13.5 to 23.5 (599.5 to 589.5)	Medium Dense to Extremely Dense Brown and Gray Sand / Sandy Clay Loam / Silty Sand / Gravel	0.20	5.04	0.33	125	N/A	Sand (Reese)
23.5 to 30.0 (589.5 to 583.0)	Very Stiff to Hard Gray Silty Clay Loam	0.36	2.77	0.53	2,000	0.004	Stiff Clay w/o free water (Reese)
6.0 to 13.5 (607.0 to 599.5) *RWB-11 & RWB-12 only*	Medium Dense to Dense Brown and Gray Sand with gravel	0.20	5.04	0.33	60	N/A	Sand (Reese)
16.0 to 20.0 (597.0 to 593.0) *RWB-09 only)*	Hard Brown and Gray Silty Clay Loam	0.36	2.77	0.53	2,000	0.004	Stiff Clay w/o free water (Reese)
23.5 to 40.0 (589.5 to 573.0) *RWB-11 & RWB-12 only*	Medium Dense to Extremely Dense Sand / Gravel	0.20	5.04	0.33	125	N/A	Sand (Reese)

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

Table 4c – Lateral Soil Parameters - RWB-13 through RWB-18

Elevation Range (feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade Reaction (k_{py}, pci)	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
0.5 to 6.0 (611.5 to 606.0)	Stiff to Hard Brown and Black Silty Clay	0.36	2.77	0.53	500	0.007	Stiff Clay w/o free water (Reese)
6.0 to 18.5 (606.0 to 593.5)	Medium Dense to Extremely Dense Silty Sand / Sand / Gravel	0.20	5.04	0.33	90	N/A	Sand (Reese)
18.5 to 25.0 (593.5 to 587.0)	Soft to Stiff Brown Silty Clay / Clay / Clay Loam	0.45	2.20	0.63	100	0.01	Soft Clay (Matlock)
25.0 to 40.0 (587.0 to 572.0)	Medium Dense to Extremely Dense Sand / Silty Sand / Sandy Clay Loam	0.20	5.04	0.33	60	N/A	Sand (Reese)
0.5 to 3.5 (611.5 to 608.5) *RWB-16 & RWB-17 only*	Loose Gray Sand / Gravel	0.32	3.12	0.49	25	N/A	Sand (Reese)
10.0 to 18.5 (602.0 to 593.5) *RWB-14 & RWB-15 only)	Stiff Brown Silty Clay	0.36	2.77	0.53	500	0.007	Stiff Clay w/o free water (Reese)

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

Table 4d – Lateral Soil Parameters - RWB-19 through RWB-25

Elevation Range (feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade Reaction (k_{py}, pci)	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
1.0 to 5.0 (609.0 to 605.0)	Loose Brown Sand / Silty Sand	0.26	3.85	0.41	25	N/A	Sand (Reese)
5.0 to 25.0 (605.0 to 585.0)	Medium Dense to Extremely Dense Sand / Silty Sand / Gravel	0.20	5.04	0.33	125	N/A	Sand (Reese)
1.5 to 13.0 (608.5 to 597.0) *RWB-23 only*	Very Stiff to Hard Brown and Gray Silty Clay	0.36	2.77	0.53	1,000	0.005	Stiff Clay w/o free water (Reese)
5.0 to 11.0 (605.0 to 599.0) *RWB-21 only)*	Medium Dense to Dense Brown Silt	0.20	5.04	0.33	225	N/A	Silt
15.0 to 20.0 (595.0 to 590.0) *RWB-21 & RWB-23 only*	Medium Dense to Dense Brown and Gray Silt	0.23	4.40	0.37	90	N/A	Silt

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

Table 4e – Lateral Soil Parameters - RWB-26 and RWB-27

Elevation Range (feet)	Soil Description	Long-term/Drained			Soil Parameters used in L-Pile		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)	Coefficient of Lateral Modulus of Subgrade Reaction (k_{py}, pci)	Soil Strain (ε_{50})	Soil Type
	New Engineered Clay Fill	0.41	2.46	0.58	500	0.01	Stiff Clay w/o free water (Reese)
	New Engineered Granular Fill	0.33	3.00	0.50	90	N/A	Sand (Reese)
1.0 to 20.0 (608.0 to 589.0.0)	Stiff to Very Stiff Brown Silty Clay / Silty Clay Loam	0.36	2.77	0.53	1,000	0.005	Stiff Clay w/o free water (Reese)
11.0 to 18.5 (598.0 to 590.5) *RWB-26 only*	Soft to Stiff Brown Clay	0.42	2.37	0.59	100	0.01	Soft Clay (Matlock)

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

Traffic and other surcharge loads should be included in the retaining wall design as applicable. A live load surcharge shall be applied where vehicular load is expected to act on the surface of the backfill within a distance equal to one-half the wall height behind the back face of the wall in accordance with AASHTO 3.11.6.4.

The retaining wall design should include a drainage system to allow movement of any water behind the wall, and not allowing hydrostatic (seepage) pressures to develop in the active soil wedge behind the wall. This could be accomplished by placing a Geocomposite Wall Drain over the entire length of the back face of the wall connected to 6-inch diameter perforated drain pipe and backfilling a minimum of 2 feet of free draining materials, Porous Granular Embankment, as measured laterally from the back of the wall. The backfill should be placed in accordance with the IDOT SSRBC. Heavy compaction equipment should not be allowed closer than five (5) feet to the retaining wall to prevent inducing high lateral earth pressures and causing wall yielding and/or other damage. The passive lateral earth pressure coefficient (Kp) from the upper 3.5 feet of level backfill at the toe of the wall should be neglected, unless the soil is confined or protected by a concrete slab or well drained pavement. The passive lateral earth pressure coefficient from the upper 3.5 feet of soil for a descending slope at the wall toe should also be neglected, regardless of any surface protection.

3.3 MSE Wall Bearing Resistance

It is anticipated that the MSE walls will bear on new engineered fill, native silty clay, and native sand. Bearing resistance for the retaining wall shall be evaluated at the strength limit state using load factors (see **Table 3**), and factored bearing resistances. The bearing resistance factor, ϕ_b, for a MSE wall is 0.65 per AASHTO Table 11.5.7-1. The bearing resistance shall be checked for the extreme limit state with a resistance factor of 1.0. **Table 5** presents the recommended bearing resistances to support the MSE wall system.

Table 5 – Recommended Bearing Resistance for MSE Retaining Wall

Boring IDs / Wall Station*	Elevation* (feet)	Nominal Resistance (ksf)	Factored Bearing Resistance (ksf)	Anticipated Bearing Soil
RWB-03 thru RWB-13 / Sta. 317+80.13 to Sta. 324+75	610.3 to 611.9	7.0	4.5	Stiff to Very Stiff Silty Clay / Loose to Medium Dense Sand / New Engineered Fill**
RWB-14 thru RWB-16 Sta. 324+75 to Sta. 327+25	610.4 to 611.0	4.7	3.0	Stiff Silty Clay / New Engineered Fill** /
RWB-17 thru RWB-25 / Sta. 327+25 to Sta. 333+27.91	608.4 to 610.6	10.8	7.0	Loose to Medium Dense Sand / Very Stiff Silty Clay / New Engineered Fill**

* Wall stations and elevations estimated based on drawings provided by Collins (dated 03/22/24)

** Assumed properties of new engineered clay fill: cohesion = 2,000 psf, unit weight = 125 pcf

Low strength, high plasticity and moisture content clays were encountered in borings RWB-14 through RWB-16. Based on the anticipated loading for an MSE wall with a wall height of 19 feet, the soils at these locations may provide insufficient bearing and may be subject to large settlements. Additional ground improvement measures should be considered at this location and are discussed further in Section 3.9.

The proposed top of leveling pad elevation is assumed to be at a minimum depth of 3.5 feet below the final exterior grade to alleviate the effects of frost. The boring logs indicate that soils at the bearing elevation of the proposed walls are generally considered suitable material for support of the walls, with the exception of the remedial limits and poor soil conditions provided in **Table 6**. Removal and replacement of unsuitable materials (undercuts) will be necessary in order to provide stable support of the proposed MSE wall. Limits for estimated potential undercuts are provided in the following section.

3.4 Subgrade Undercut Areas

Based on the soil conditions in the vicinity of the proposed MSE walls, it is anticipated that low strength materials and loose cohesionless material be encountered near the bearing elevations along sections of the proposed wall alignment. These soils are not generally considered suitable for foundation bearing and may cause excessive settlement. Where the wall heights are greater

than 10 feet, cohesive materials exhibiting unconfined compressive strengths less than 2.0 tsf should be removed and cohesionless soils with an SPT blow count 'N' value less than 7 bpf should be removed or scarified and recompacted during construction. Where the wall heights are 10 feet or less, cohesive materials exhibiting unconfined compressive strengths less than 1.0 tsf should be removed. Anticipated undercut depths are summarized in **Table 6** and shown on the soil profile sheets in **Appendix B**. The depth, location, and extent of the proposed undercuts should be field verified during construction.

Table 6 – Potential Remedial Treatment Summary for MSE Retaining Wall

Boring IDs / Wall Station	Soil Description	Remedial Undercut/Scarify and Recompact		Comments	OSHA Soil Type
		Remediate to Elevation (feet)	Depth* (feet)		Max Exc. Slope
RWB-09 / Sta. 321+45 to Sta. 322+10	Stiff Gray Silty Clay	610.0	2.0	q_u < 2.0 tsf	B 1H:1V
RWB-14 & RWB-15 / Sta. 324+90 to Sta. 326+35**	Stiff Brown Silty Clay & Loose Brown Silt	606.5 at RWB-14 & 604.0 at RWB-15	4.5 to 6.5	q_u < 2.0 tsf & 'N' value <7 bpf	C 1.5H:1V
RWB-20 & RWB-21 / Sta. 329+20 to Sta. 330+70	Loose Brown Sand & Silty Sand, Loose Dark Brown Silt	605.0 at RWB-20 & 606.0 at RWB-21	2.5 to 4.0	'N' value <7 bpf	C 1.5H:1V

* Depth below MSE wall leveling pad

** Undercut may not be required if ground improvement measures used as discussed in Section 4.10

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

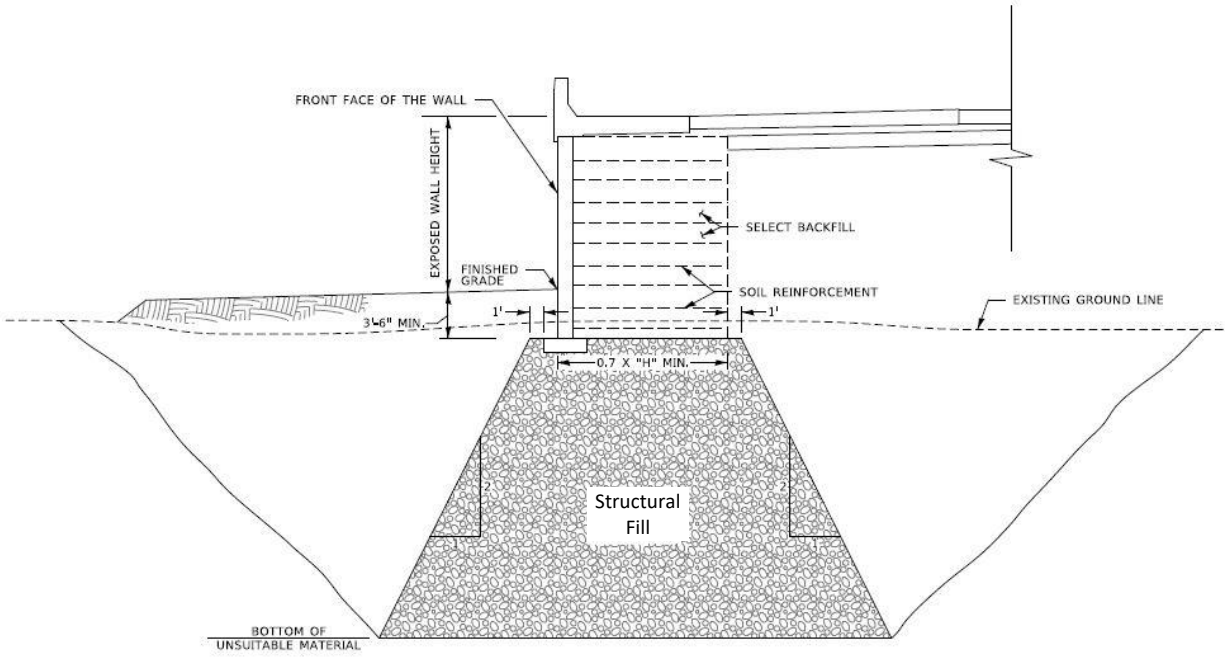


Exhibit 3 - Structural Fill Placement below MSE Wall

3.5 Sliding and Overturning Stability

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

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

3.6 Wall and Embankment Settlement

Settlement for the proposed wall and embankment system depends on the wall type selected, wall widths and bearing pressures, as well as the strength and compressibility characteristics of the underlying bearing soils. AASHTO 11.10.4.1 provides guidelines regarding the maximum total

and differential tolerable settlements for various facing of MSE walls. The allowable settlement of MSE walls shall be established based on the longitudinal deformability of the facing. It is recommended to provide a vertical full-height slip joints if large differential settlements over short horizontal distances are anticipated.

Based on information provided by Ames, the proposed retaining wall will be installed in a fill area. According to the preliminary profile of the proposed wall, up to 18 feet of new fill is anticipated behind the wall. Settlement analysis was performed beginning from the anticipated MSE wall bearing depth estimated from the plans and drawings provided by Collins (dated March 2024). The total primary settlement beneath the MSE wall was calculated based on anticipated loading conditions from the proposed embankment and MSE wall. Based on the variable soil conditions across the length of the embankment at the maximum fill height, the analysis was broken into several sections to evaluate the anticipated amount of primary settlement. Due to the predominantly granular nature of the site soils, significant long term consolidation settlement is not anticipated; however, the low strength, high plasticity and moisture content clays encountered in borings RWB-14 through RWB-16 may be subject to high settlements. The maximum estimated total settlements were calculated as shown in **Table 7.** For the MSE wall, the maximum total anticipated settlement may be up to 5 inches, with differential settlement between 2.1 to 3.0 inches per 75 feet.

Table 7 – Anticipated MSE Wall and Embankment Settlement

Boring ID	Wall Station*	Service Bearing Pressure (psf)*	Embankment Height*	Anticipated Total Primary Settlement (inches)
RWB-12	324+20.15	2,553.4	16.2	< 1.0
RWB-13	324+52.65	2,559.1	16.4	1.4
RWB-14	325+27.43	2,567.4	17.4	2.7
RWB-15	326+00.73	2,595.6	17.6	4.8
RWB-16	326+89.13	2,449.8	16.0	1.8
RWB-17	326+89.13	2,449.8	15.2	< 1.0

*Based on wall design information provided by Collins on 03/27/2024

Based on experience with similar soils, 90% of the primary consolidation will occur within approximately 9 to 12 months from the date of loading. It is recommended that settlement plates be installed near the intersection of IL 171 and 95th Street in the area of the greatest wall height

and midpoints of the wall to monitor settlement and help the design section engineer determine when acceptable settlement rates and settlement amounts have been achieved.

If these estimated settlements are considered to be too large to accommodate in design, the overall construction of the MSE wall and embankment may have to be constructed in stages so as to preload the embankment area or the subgrade will be to be improved with remediation methods as discussed in Section 3.9.

3.7 Global Slope Stability

The parameters in **Table 8a through 8c** were used to evaluate the proposed MSE wall types.

Table 8a – MSE Wall Description at Station 320+58.87
*Based on design information provided by Collins on 03/27/24

Description	Value
Maximum total retained height of retaining wall (H)*	10.0 feet
Length of reinforcement (minimum 0.7XH)	8.0 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of the reinforced soil mass	120 pcf

*Measured from top of wall leveling pad to top of moment slab

Table 8b – MSE Wall Description at Station 326+00.73
*Based on design information provided by Collins on 03/27/24

Description	Value
Maximum total retained height of retaining wall (H)	18.6 feet
Length of reinforcement (minimum 0.7XH)	13.0 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of the reinforced soil mass	120 pcf

*Measured from top of wall leveling pad to top of moment slab

Table 8c – MSE Wall Description at Station 328+70.73
*Based on design information provided by Collins on 03/27/24

Description	Value
Maximum total retained height of retaining wall (H)	13.9 feet
Length of reinforcement (minimum 0.7XH)	9.7 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of the reinforced soil mass	120 pcf

*Measured from top of wall leveling pad to top of moment slab

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

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

3.7.1 Global Slope Stability Results

Circular failure analyses were evaluated for both a short term (undrained) and long term (drained) condition based on the proposed geometries (**Tables 8a through 8c**) for the proposed MSE retaining wall scenarios. The analyses were performed at Station 320+58.87, 326+00.73, and 328+70.73. The results of the analyses are shown in **Table 9**.

Table 9 – Retaining Wall Global Slope Stability Analyses Results

Analysis Exhibit	Location	Wall Type	Analysis Type	Factor of Safety	Minimum Factor of Safety
Exhibit 1	Station 320+58.87	MSE	Circular – Short Term	6.9	1.5
Exhibit 2			Circular – Long Term	3.6	1.5
Exhibit 3	Station 326+00.73	MSE	Circular – Short Term	2.4	1.5
Exhibit 4			Circular – Long Term	2.0	1.5
Exhibit 5	Station 328+70.73	MSE	Circular – Short Term	4.2	1.5
Exhibit 6			Circular – Long Term	2.8	1.5

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

3.8 Drainage Recommendations

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

3.9 Ground Improvement Recommendations

It is anticipated that the proposed MSE wall and embankment height of 18 feet in this area will impose a loading on the soils greater than the recommended bearing resistance provided in **Table 5** for the on-site soils. Based on the anticipated settlements noted in **Table 7** for the wall in the vicinity of borings RWB-13 to RWB-17, additional ground modification should also be considered. The installation of rammed aggregate piers, stone columns or rigid inclusions below the MSE wall could be considered to stabilize the site, minimize long term settlement and provide a higher allowable bearing capacity for support of the proposed wall structure. Additional ground

improvement would be necessary for only a portion of the wall where additional bearing resistance is necessary and excessive settlement is anticipated. Based on the engineering analysis, the ground improvements are recommended between Stations 324+75 and 327+25.

Aggregate columns can also act as wick drains in accelerating drainage at the site, and decrease the time frame for consolidation settlement. Typical column diameters range from 18 to 36 inches and, in general, are most economical for sites requiring column lengths less than 35 feet deep and preferably about 20 feet deep below the surface, such as this site.

Rigid inclusions (RIs) are columns of grout used to reinforce the ground to increase bearing resistance and reduce settlement of a structure or embankment. Rigid Inclusions are constructed with an auger displacement tool or vibrated pipe tool that displaces soil laterally, producing very little spoils. Grout mixes for rigid inclusions shall consist of Portland cement, sand, and water, and may also contain coarse aggregate, a mineral admixture and/or approved fluidifier. Geogrid or geotextile and reinforcing steel can also be used to increase the strength of the inclusions. Typical inclusion diameters range from 12 to 18 inches. The rigid inclusions reinforce the soil rather than function as distinct structural elements or piles. The improved ground has increased stiffness and therefore improved settlement and bearing characteristics.

In addition to the stone columns or rigid inclusions, a load transfer layer consisting of compacted material with geogrid reinforcement would be necessary to transfer the embankment load to the columns. The embankment construction and fill placement could then be completed after the installation of the columns and the load transfer layer.

This site improvement technique would provide a stable platform for construction of the embankment by transferring the embankment and MSE wall loads to the lower medium dense to extremely dense granular materials and limit the influence on the compressible materials. Based on the subsurface conditions the stone columns should be designed to bear within the medium dense to extremely dense granular soils approximately 26 feet below the existing native grade, in accordance with *GBSP 71-Aggregate Column Ground Improvement* provided within the IDOT guidelines.

The installation of this ground improvement method could have significant initial costs for the project; however, there would be limited impacted on the construction schedule, and little to no long-term maintenance costs.

4.0 CONSTRUCTION CONSIDERATIONS

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

4.1 Site Preparation

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

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

4.2 Existing Utilities

Based on the existing site conditions, significant utilities may exist along the project corridor that will interfere with construction of the proposed embankment construction and the retaining wall construction. Before proceeding with construction, any existing utility lines that are to be abandoned and 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 a minimum of 2 feet of cement grout. All excavations resulting from underground utility 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.

4.3 Site Excavation

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

4.4 Borrow Material and Compaction Requirements

If borrow material is to be used for onsite construction, it should conform to Section 204 “Borrow and Furnish Excavations” of the IDOT Construction Manual (2022). 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 Construction Manual. Should fill be placed during cool, wet seasons, the use of granular fill may be necessary since weather conditions will make compaction of cohesive soils more difficult. If water seepage while excavating and backfilling procedures, or where wet conditions are encountered such that the water cannot be removed with conventional sump and pump procedures, GSG recommends placing open grade stone similar to IDOT CA-7 to stabilize the bottom of the excavation. The CA-7 stone should be placed to 12 inches above the water level, 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 should be backfilled using approved engineered fill.

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

4.5 Groundwater Management

It is anticipated that the long-term groundwater level is below the bottom of the borings for the majority of the project corridor. In borings RWB-01 through RWB-10, the long-term groundwater level could range between elevations 586.0 to 598.0 feet. GSG does not anticipate significant groundwater related issues during construction activity, however perched water may be encountered in any confined granular layers. If rainwater run-off or perched water is accumulated at the base of excavation, 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.

5.0 LIMITATIONS

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

APPENDIX A

GENERAL PLANS, ELEVATIONS, AND DETAILS

Bench Mark: A 2" metal disk in concrete located in grass median at 95th Street and IL Route 171 lying 36' south of south pavement edge along IL Route 171 and 29' northwest of west pavement edge along east leg for 95th Street. Elev. 608.57.

Existing Structure: None

Traffic to be detoured during construction.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

FIELD UNITS

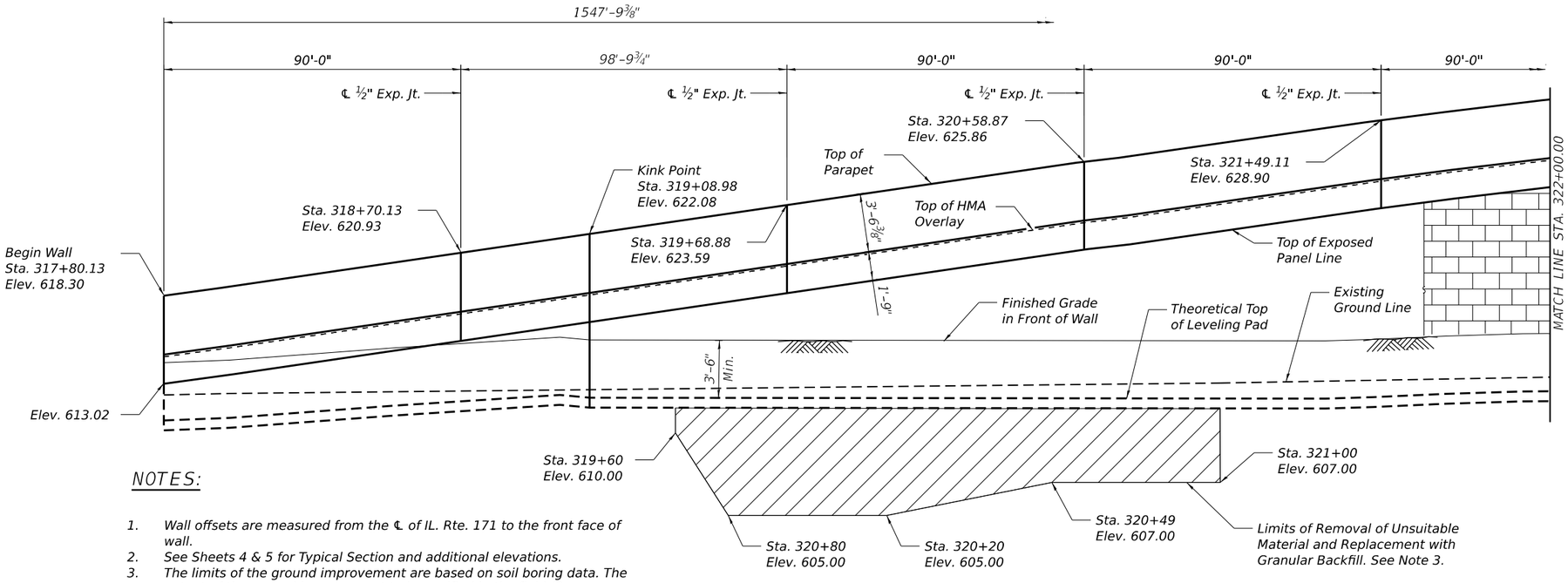
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

PRECAST UNITS

f'c = 4,500 psi (precast panels)

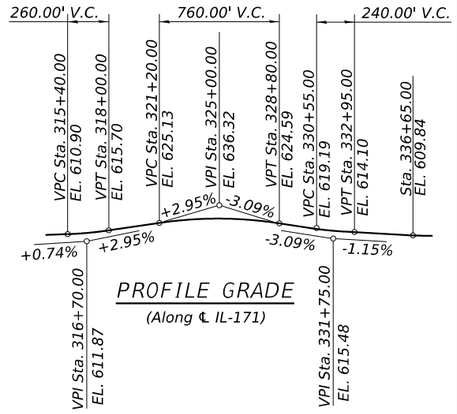
HIGHWAY CLASSIFICATION

F.A.U. 3565 - IL Rte. 171
Functional Class: Minor Arterial
ADT: 13,000 (2021); 17,200 (2038)
ADTT: 780 (2021); 1,030 (2038)
DHV: 1,720 (2038)
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
2-Way Traffic
Directional Distribution: 50/50



ELEVATION

(Looking Northwest at Front Face of Wall)



PROFILE GRADE

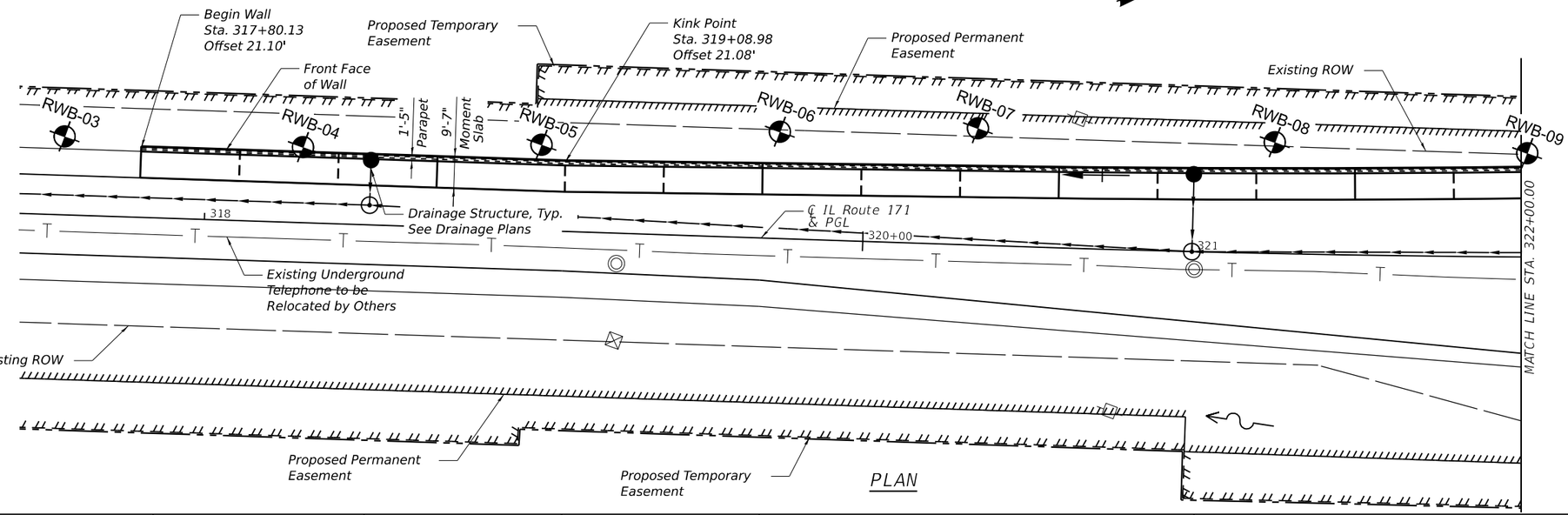
(Along ℄ IL-171)

NOTES:

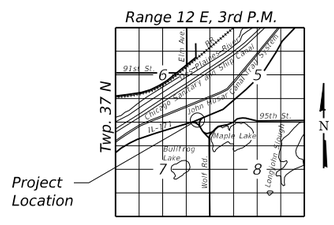
1. *Wall offsets are measured from the ℄ of IL. Rte. 171 to the front face of wall.*
2. *See Sheets 4 & 5 for Typical Section and additional elevations.*
3. *The limits of the ground improvement are based on soil boring data. The extent of the ground improvement to be verified in the field (See Roadway Plans and SGR).*

CURVE DATA

P.I. Sta. = 323+29.13
Δ = 5° 35' 37" (LT)
D = 1° 01' 23"
R = 5,600.00
T = 273.57'
L = 546.70'
E = 6.68'
P.C. Sta. = 320+55.56
P.T. Sta. = 326+02.26



PLAN



LOCATION SKETCH

GENERAL PLAN AND ELEVATION I RETAINING WALL NO. 1 ALONG ILLINOIS ROUTE 171 (ARCHER AVE.) F.A.U. RTE. 3565 - SEC U-1-N COOK COUNTY STA. 317+80.13 STA. 333+27.91 STRUCTURE NO. 016-2310

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COLLINS ENGINEERS INC.

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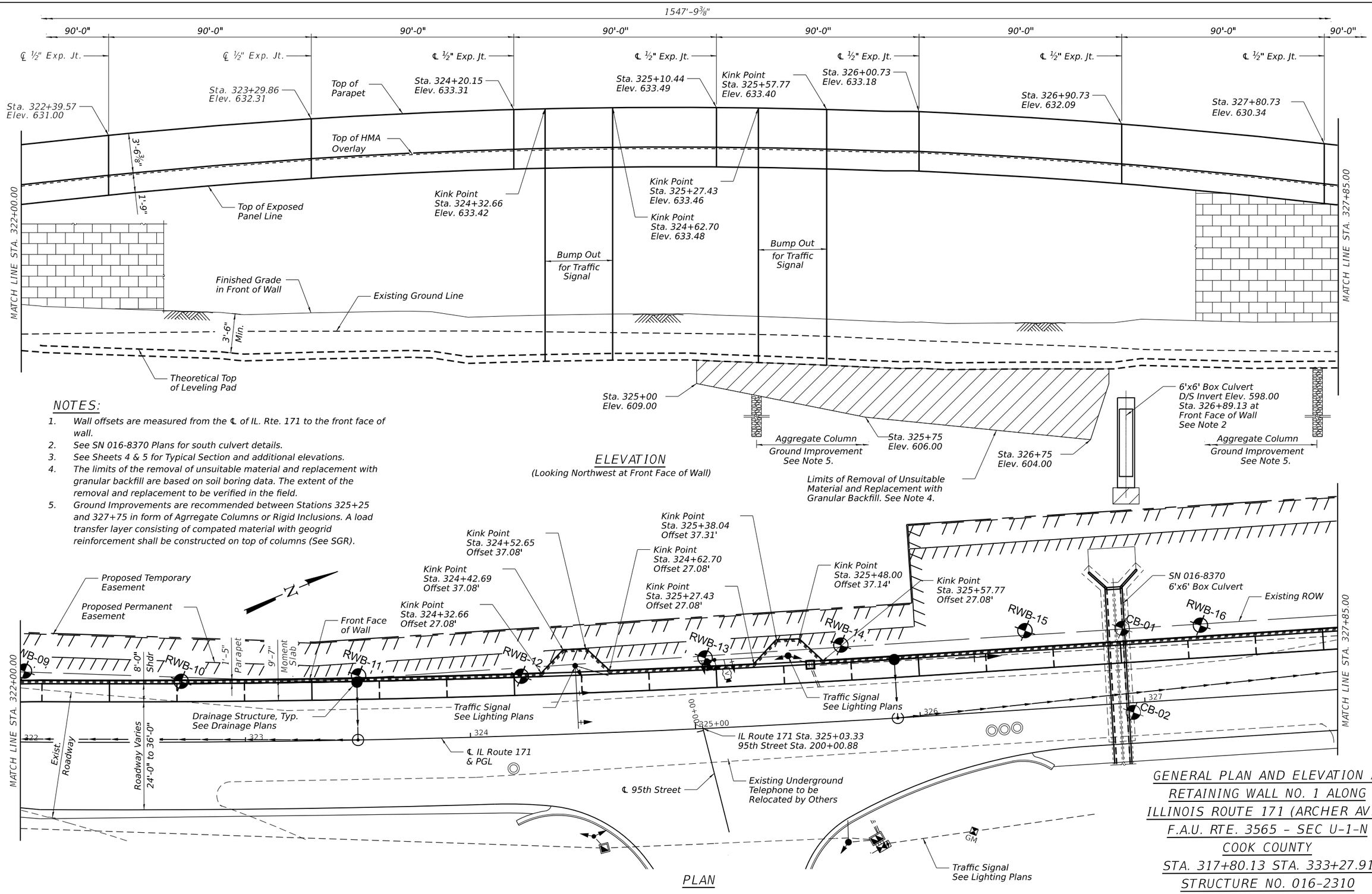
	CHECKED - EKM	REVISED -	
PLOT SCALE =	DRAWN - DR	REVISED -	
PLOT DATE =	CHECKED - EKM	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 016-2310
SHEET 1 OF 5 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3565	U-1-N	COOK	5	1
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	



NOTES:

1. Wall offsets are measured from the ℄ of IL. Rte. 171 to the front face of wall.
2. See SN 016-8370 Plans for south culvert details.
3. See Sheets 4 & 5 for Typical Section and additional elevations.
4. The limits of the removal of unsuitable material and replacement with granular backfill are based on soil boring data. The extent of the removal and replacement to be verified in the field.
5. Ground Improvements are recommended between Stations 325+25 and 327+75 in form of Agrregate Columns or Rigid Inclusions. A load transfer layer consisting of compated material with geogrid reinforcement shall be constructed on top of columns (See SGR).

GENERAL PLAN AND ELEVATION II
RETAINING WALL NO. 1 ALONG
ILLINOIS ROUTE 171 (ARCHER AVE.)
F.A.U. RTE. 3565 - SEC U-1-N
COOK COUNTY
STA. 317+80.13 STA. 333+27.91
STRUCTURE NO. 016-2310

COLLINS ENGINEERS INC.

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PLOT SCALE = ____	DRAWN - DR	REVISED - ____	
PLOT DATE = ____	CHECKED - EKM	REVISED - ____	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 016-2310
SHEET 2 OF 5 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3565	U-1-N	COOK	5	2
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

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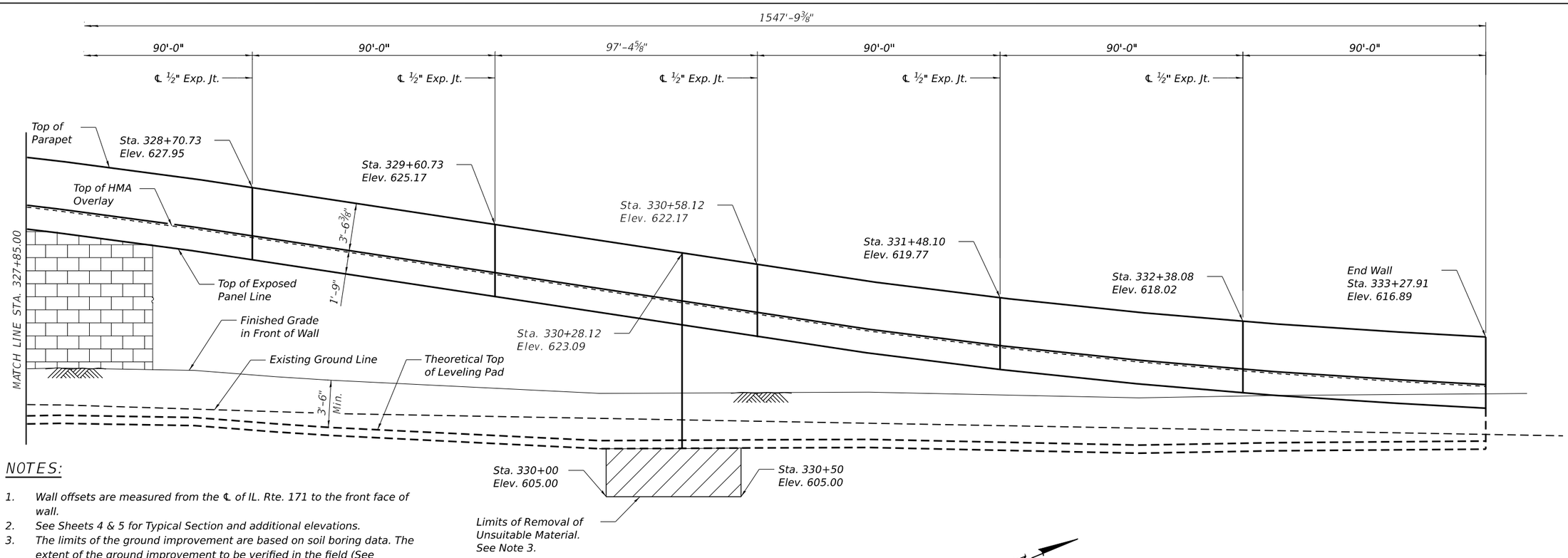
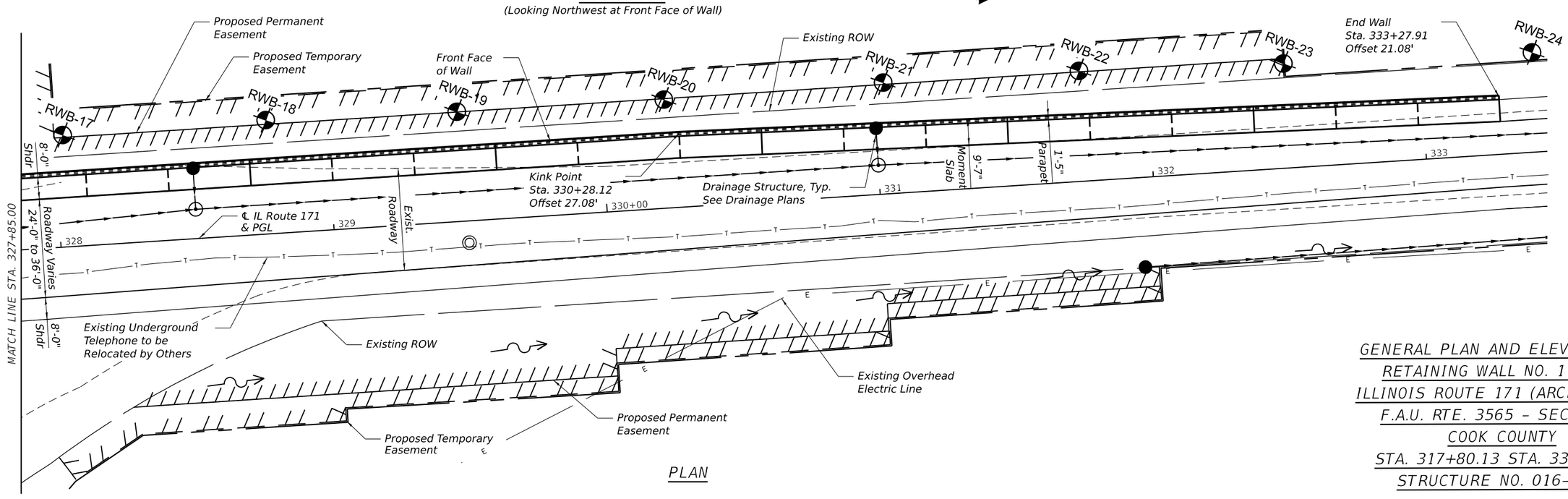


NOTES:

1. Wall offsets are measured from the ℄ of IL. Rte. 171 to the front face of wall.
2. See Sheets 4 & 5 for Typical Section and additional elevations.
3. The limits of the ground improvement are based on soil boring data. The extent of the ground improvement to be verified in the field (See Roadway Plans and SGR).

ELEVATION

(Looking Northwest at Front Face of Wall)



PLAN

GENERAL PLAN AND ELEVATION III
RETAINING WALL NO. 1 ALONG
ILLINOIS ROUTE 171 (ARCHER AVE.)
F.A.U. RTE. 3565 - SEC U-1-N
COOK COUNTY
STA. 317+80.13 STA. 333+27.91
STRUCTURE NO. 016-2310

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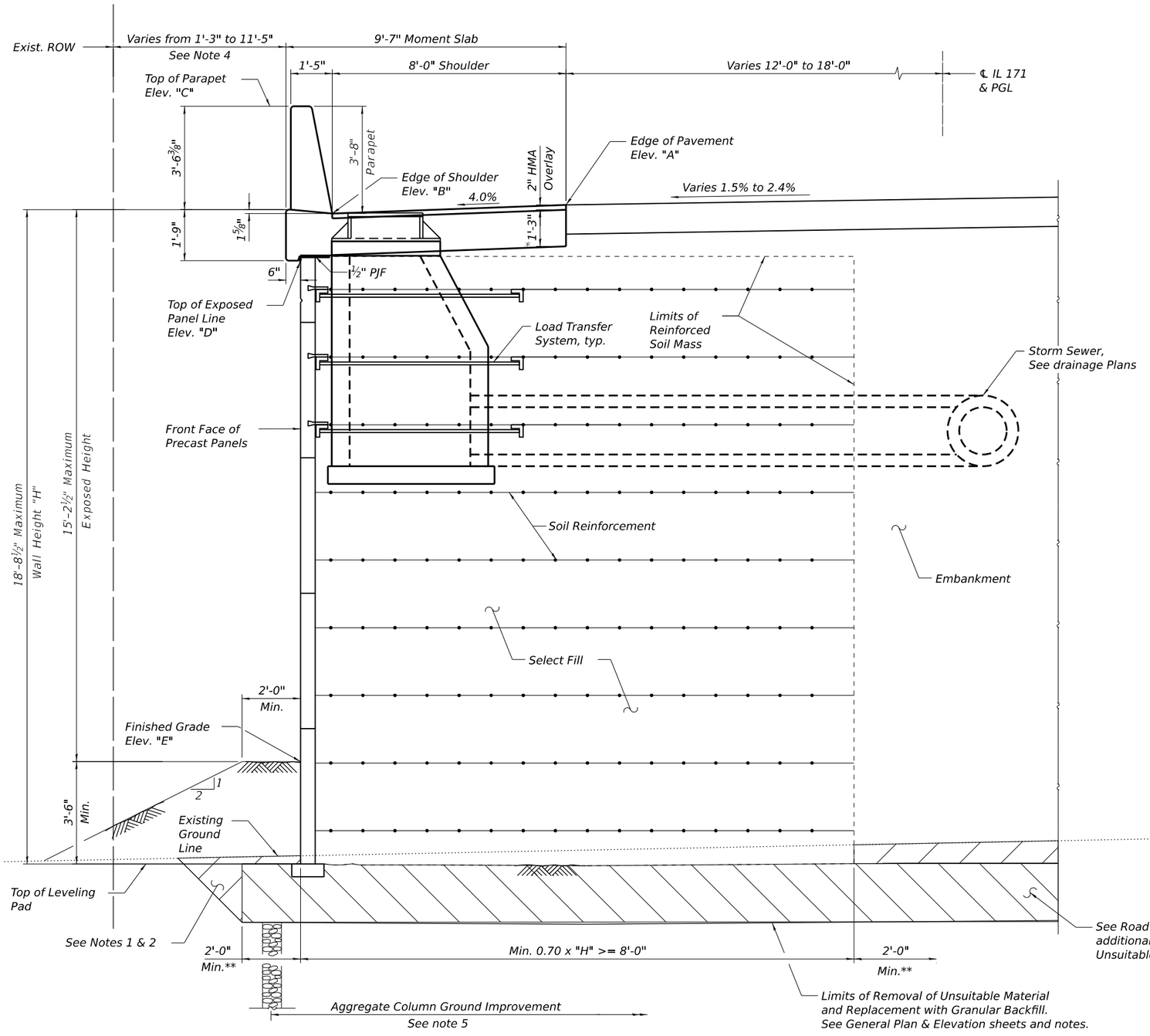
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 016-2310
SHEET 3 OF 5 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3565	U-1-N	COOK	5	3
		CONTRACT NO. 60R94		
	ILLINOIS	FED. AID PROJECT		



TYPICAL SECTION

* Slab thickness to be refined in final design.
**Removal of Unsuitable Material Limits vary depending on the removal depth and will be refined in Final Design.

Station	LOCATION "A"		LOCATION "B"		Location "C"	Location "D"		Location "E"
	OFFSET	ELEV.	OFFSET	ELEV.	ELEV.	OFFSET	ELEV.	ELEV.
317+80.13	12.00	614.95	20.00	614.63	618.30	21.08	613.02	614.26
318+70.13	12.00	617.59	20.00	617.27	620.93	21.08	615.65	615.39
319+08.98	12.00	618.73	20.00	618.41	622.08	21.08	616.80	615.81
319+68.88	13.20	620.24	21.20	619.92	623.59	22.28	618.31	615.81
320+58.87	15.00	622.52	23.00	622.20	625.86	24.08	620.58	615.67
321+49.11	16.83	625.55	24.83	625.23	628.90	25.91	623.62	615.79
322+39.57	18.00	627.65	26.00	627.33	631.00	27.08	625.72	615.66
323+29.86	18.00	629.13	26.00	628.81	632.48	27.08	627.20	615.05
324+20.15	18.00	629.96	26.00	629.64	633.31	27.08	628.03	614.95
324+32.66	18.00	630.03	26.00	629.71	633.37	27.08	628.09	614.98
324+42.69	18.00	630.07	26.00	629.75	633.42	37.08	628.13	615.01
324+52.65	18.00	630.10	26.00	629.78	633.45	37.08	628.17	615.04
324+62.70	18.00	630.13	26.00	629.81	633.48	27.08	628.19	615.07
325+10.44	18.00	630.15	26.00	629.83	633.49	27.08	628.21	615.09
325+27.43	18.00	630.11	26.00	629.79	633.46	27.08	628.17	614.97
325+38.04	18.00	630.07	26.00	629.75	633.42	37.31	628.14	614.89
325+48.00	18.00	630.03	26.00	629.71	633.38	37.14	628.10	614.82
325+57.77	18.00	629.98	26.00	629.66	633.33	27.08	628.05	614.75
326+00.73	18.00	629.83	26.00	629.51	633.18	27.08	627.90	614.44
326+89.13	18.00	628.77	26.00	628.45	632.11	27.08	626.83	614.67
326+90.73	18.00	628.74	26.00	628.42	632.09	27.08	626.81	614.68
327+80.73	18.00	626.99	26.00	626.67	630.34	27.08	625.06	614.56
328+70.73	18.00	624.60	26.00	624.28	627.95	27.08	622.67	613.88
329+60.73	18.00	621.83	26.00	621.51	625.17	27.08	619.89	613.03
330+28.12	18.00	619.75	26.00	619.43	623.09	27.08	617.81	612.68
330+58.12	17.40	618.83	25.40	618.51	622.18	26.81	616.90	612.71
331+48.10	15.60	616.43	23.60	616.11	619.77	24.68	614.49	612.54
332+38.08	13.80	614.68	21.80	614.36	618.03	22.88	612.74	612.41
333+27.91	12.00	613.54	20.00	613.22	616.89	21.08	611.61	612.55

NOTES:

1. Overexcavation beyond Structure Excavation and Removal of Unsuitable Material is not measured for payment.
2. Backfill overexcavation with same material as used for select fill in MSE wall.
3. The MSE wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1.0 ksf and horizontal bearing pressure of 0.5kips/ft of wall.
4. The limits of the removal and replacement of unsuitable material are based on soil boring data and to be verified in the field.
5. Ground Improvements are recommended between Stations 325+25 and 327+75 in form of Aggregate Columns or Rigid Inclusions. A load transfer layer consisting of compacted material with geogrid reinforcement shall be constructed on top of columns. Size, depth, and spacing of Agrregate Column Ground Improvement to be determined in design phase.
6. For Proposed Temporary and Permanent Easement, see General Plan and Elevation Sheets.

TYPICAL SECTION
RETAINING WALL NO. 1 ALONG
ILLINOIS ROUTE 171 (ARCHER AVE.)
F.A.U. RTE. 3565 – SEC U-1-N
COOK COUNTY
STA. 317+80.13 STA. 333+27.91
STRUCTURE NO. 016-2310

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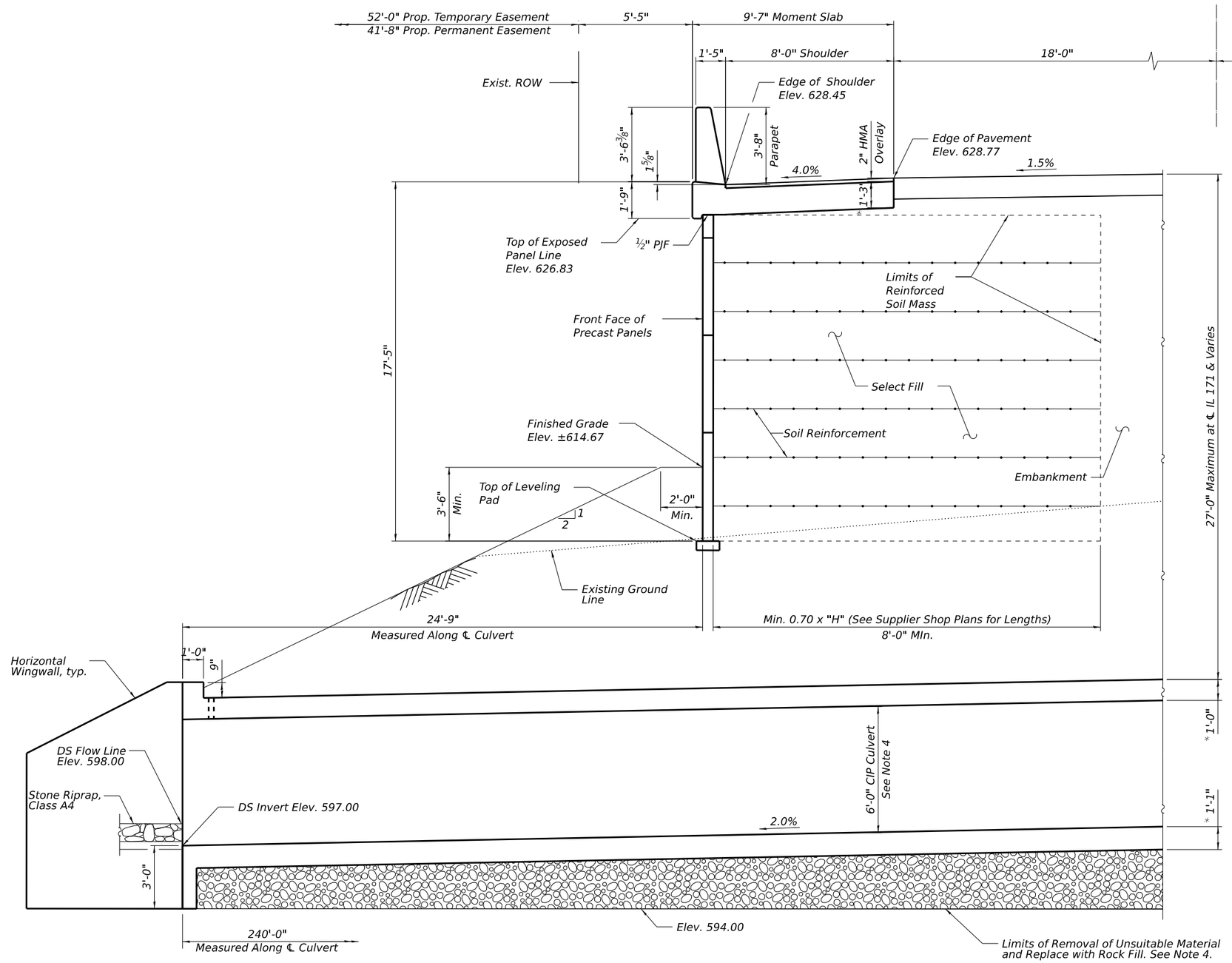
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL SECTIONS I
STRUCTURE NO. 016-2310
SHEET 4 OF 5 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3565	U-1-N	COOK	5	4
		CONTRACT NO. 60R94		
	ILLINOIS	FED. AID PROJECT		



SECTION AT SOUTH CULVERT

*Slab thickness may be refined in final design

NOTES:

1. Overexcavation beyond Structure Excavation and Removal of Unsuitable Material is not measured for payment.
2. Backfill overexcavation with same material as used for select fill in MSE wall.
3. The MSE wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1.0 ksf and horizontal bearing pressure of 0.5kips/ft of wall.
4. The limits of the ground improvement are based on soil boring data. The extent of the ground improvement to be verified in the field (See SGR).

SECTION AT CULVERT
RETAINING WALL NO. 1 ALONG
ILLINOIS ROUTE 171 (ARCHER AVE.)
F.A.U. RTE. 3565 – SEC U-1-N
COOK COUNTY
STA. 317+80.13 TO STA. 333+27.91
STRUCTURE NO. 016-2310

COLLINS ENGINEERS INC.

USER NAME =	DESIGNED - AMS	REVISED -
	CHECKED - EKM	REVISED -
PLOT SCALE =	DRAWN - DR	REVISED -
PLOT DATE =	CHECKED - EKM	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL SECTIONS II
STRUCTURE NO. 016-2310
SHEET 5 OF 5 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3565	U-1-N	COOK	5	5
		CONTRACT NO. 60R94		
	ILLINOIS	FED. AID PROJECT		

at top of leveling pad

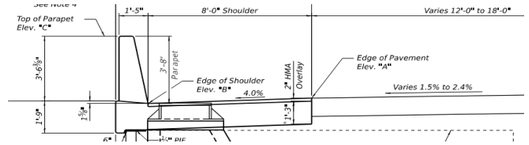
	Station	OFFSET	Top of Mom Slab	FINISHED GRADE	Top of Leveling Pad	Wall Height	Wall Strap length	DC	EV	LS = 240	Service brg pressure	Factored brg pressure
			ELEV.	ELEV.	ELEV.	Ft	ft	psf	psf	psf	psf	psf
	317+80.13	21.08	614.63	614.26	610.76	3.87	8.00	344.0	306.5	240.0	890.5	1,263.7
	318+70.13	21.08	617.27	615.39	611.89	5.37	8.00	344.0	494.7	240.0	1,078.7	1,517.9
	319+08.98	21.08	618.41	615.81	612.31	6.10	8.00	344.0	585.5	240.0	1,169.5	1,640.4
	319+68.88	22.28	619.92	615.81	612.31	7.61	8.00	344.0	774.5	240.0	1,358.5	1,895.6
kink	320+58.87	24.08	622.20	615.67	612.17	10.03	8.00	344.0	1076.2	240.0	1,660.2	2,302.9
	321+49.11	25.91	625.23	615.79	612.29	12.94	9.06	303.9	1440.3	240.0	1,984.1	2,744.2
	322+39.57	27.08	627.33	615.66	612.16	15.17	10.62	259.2	1718.9	240.0	2,218.1	3,064.5
	323+29.86	27.08	628.81	615.05	611.55	17.26	12.08	227.8	1980.3	240.0	2,448.1	3,378.1
	324+20.15	27.08	629.64	614.95	611.45	18.20	12.74	216.1	2097.3	240.0	2,553.4	3,521.5
	324+32.66	27.08	629.71	614.98	611.48	18.22	12.76	215.7	2101.0	240.0	2,556.7	3,526.0
	324+42.69	37.08	629.75	615.01	611.51	18.24	12.77	215.6	2102.8	240.0	2,558.3	3,528.2
kink	324+52.65	37.08	629.78	615.04	611.54	18.25	12.77	215.5	2103.6	240.0	2,559.1	3,529.2
kink	324+62.70	27.08	629.81	615.07	611.57	18.24	12.77	215.5	2103.4	240.0	2,558.9	3,528.9
kink	325+10.44	27.08	629.83	615.09	611.59	18.23	12.76	215.6	2102.0	240.0	2,557.6	3,527.2
kink	325+27.43	27.08	629.79	614.97	611.47	18.32	12.82	214.6	2112.8	240.0	2,567.4	3,540.5
	325+38.04	37.31	629.75	614.89	611.39	18.36	12.85	214.1	2118.1	240.0	2,572.2	3,547.0
kink	325+48.00	37.14	629.71	614.82	611.32	18.39	12.88	213.7	2122.0	240.0	2,575.8	3,551.9
kink	325+57.77	27.08	629.66	614.75	611.25	18.42	12.89	213.5	2124.9	240.0	2,578.4	3,555.5
kink	326+00.73	27.08	629.51	614.44	610.94	18.57	13.00	211.7	2143.9	240.0	2,595.6	3,578.9
kink	326+89.13	27.08	628.45	614.67	611.17	17.27	12.09	227.6	1982.2	240.0	2,449.8	3,380.5
	326+90.73	27.08	628.42	614.68	611.18	17.25	12.07	228.0	1978.5	240.0	2,446.5	3,376.0
culvert	327+80.73	27.08	626.67	614.56	611.06	15.61	10.93	251.8	1774.2	240.0	2,266.1	3,130.0
	328+70.73	27.08	624.28	613.88	610.38	13.90	9.73	282.8	1560.8	240.0	2,083.6	2,880.6
	329+60.73	27.08	621.51	613.03	609.53	11.97	8.38	328.3	1319.8	240.0	1,888.1	2,612.1
	330+28.12	27.08	619.43	612.68	609.18	10.25	8.00	344.0	1103.6	240.0	1,687.6	2,339.8
	330+58.12	26.81	618.51	612.71	609.21	9.31	8.00	344.0	986.2	240.0	1,570.2	2,181.4
kink	331+48.10	24.68	616.11	612.54	609.04	7.07	8.00	344.0	706.1	240.0	1,290.1	1,803.2
	332+38.08	22.88	614.36	612.41	608.91	5.44	8.00	344.0	503.5	240.0	1,087.5	1,529.8
	333+27.91	21.08	613.22	612.55	609.05	4.17	8.00	344.0	344.4	240.0	928.4	1,314.9

Table 3 - LRFD Load Factors for Retaining Wall Analyses

	Type of Load	Sliding and Eccentricity Strength	Bearing Resistance Strength I	Sliding and Eccentricity Extreme II	Bearing Resistance Extreme II	Settlement Service I
Load Factors for Vertical Loads	Dead Load of Structural Components (DC)	0.90	1.25	1.00	1.00	1.00
	Vertical Earth Pressure Load (EV)	1.00	1.35	1.00	1.00	1.00
	Earth Surcharge Load (ES)		1.50			
	Live Load Surcharge (LS)		1.75		0.50	1.00

DC 1.25
EV 1.35
LS 1.75

unit weight of concrete = 150 pcf
unit weight of soil = 125 pcf



	Thickness	Width	per 1 ft		
Moment slab weight =	1.4167	9.583	1	2036.39	lbs / ft
Weight of parapet=	1.416667	3.666667	1	779.17	lbs / ft
0.5 x	-0.70833	3.666667	1	-194.79	lbs / ft
coping	0.5	1.75	1	131.25	lbs / ft
			total weight =	2752.01	lbs / ft / wall strap length

EV = (wall height-slab thickness) x unit weight of soil (lb/sf)

0.22439

APPENDIX B

SOIL BORING LOCATION PLAN

AND SUBSURFACE PROFILES

N

0 60 120 180

SCALE IN FEET

RWB-01
RWB-02
RWB-03
RWB-04
RWB-05
RWB-06
RWB-07
RWB-08
RWB-09
RWB-10
RWB-11
RWB-12
RWB-13
RWB-14
RWB-15
RWB-16
RWB-17
RWB-18
RWB-19
RWB-20
RWB-21
RWB-22
RWB-23
RWB-24
RWB-25
RWB-26
RWB-27

IL 171/ ARCHER AVE

95TH ST

LEGEND

RETAINING WALL BORINGS

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

USER NAME = nnano	DESIGNED - TK	REVISED -	
	DRAWN - NN	REVISED -	
PLOT SCALE = 1440.0000 ' / ft.	CHECKED - DE	REVISED -	
PLOT DATE = 10/3/2022	DATE - 10/03/2022	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163–017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PLAN

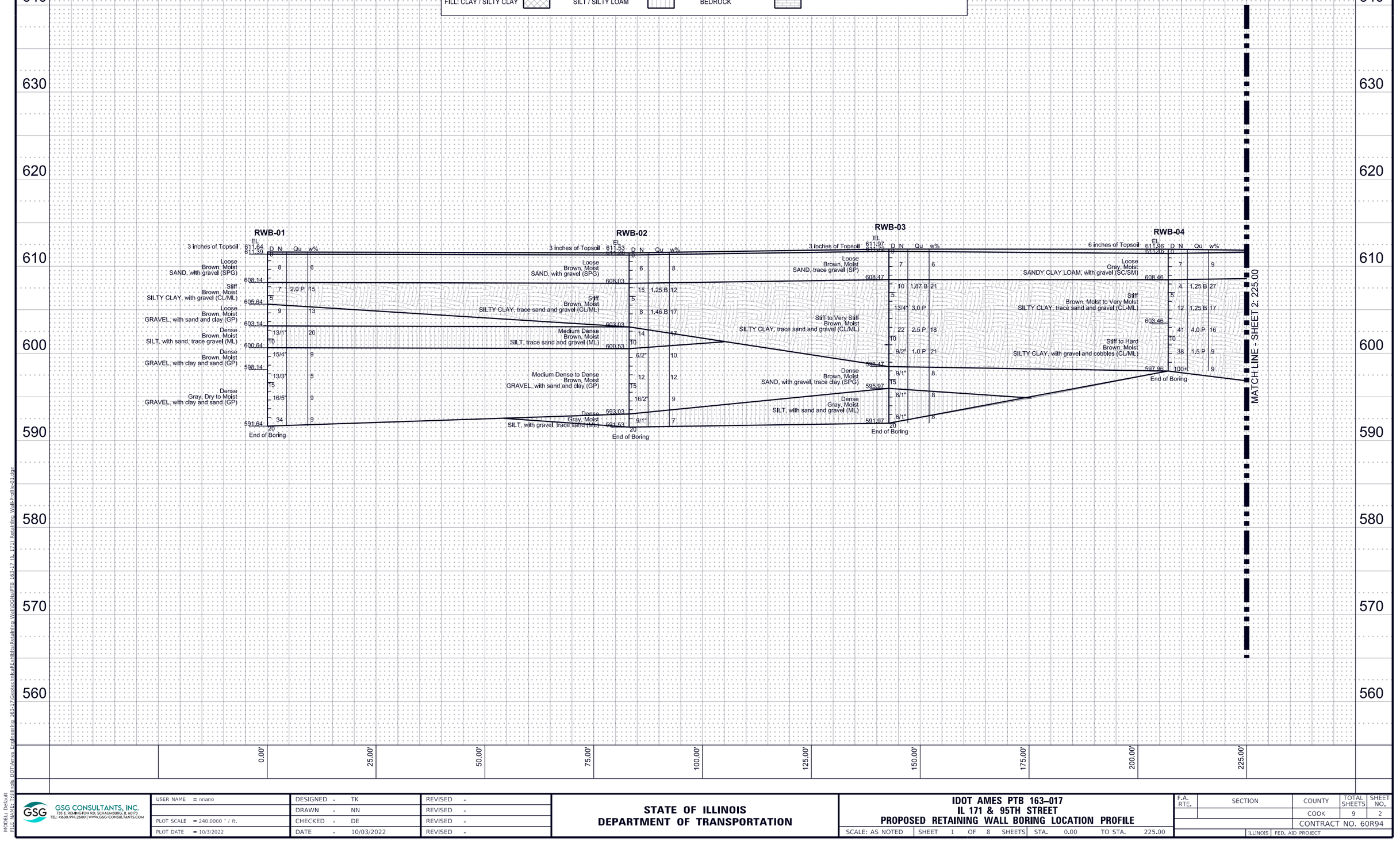
SCALE: 1:60 | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	1	9
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

LEGEND

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

APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED



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USER NAME = nnano	DESIGNED - TK	REVISED -	
	DRAWN - NN	REVISED -	
PLOT SCALE = 240.0000 ' / ft.	CHECKED - DE	REVISED -	
PLOT DATE = 10/3/2022	DATE - 10/03/2022	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163-017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 1 OF 8 SHEETS | STA. 0.00 | TO STA. 225.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	2
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

LEGEND

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

640 630 620 610 600 590 580 570 560

MATCH LINE - SHEET 1: 225.00

MATCH LINE - SHEET 3: 475.00

RWB-05

EL. 612.42

	D	N	Qu	w%
Medium Dense Gray, Moist SANDY CLAY LOAM, with gravel (SC/SM)	0	14		7
608.92				
Stiff Gray and Brown, Moist SILTY CLAY, with sand and gravel (CL/ML)	5	7	1.0 P	20
606.42		19	2.5 P	15
Stiff to Hard Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)	10	18	1.5 P	18
		27	4.5 P	15
598.92		85	3.0 P	11
Stiff to Very Stiff Brown, Dry to Moist CLAY LOAM, with gravel and cobbles (CL-S)	15	100+	1.0 P	12
593.42		100+		5
End of Boring				

RWB-06

EL. 611.98

	D	N	Qu	w%
Medium Dense Gray, Moist SILTY SAND, with gravel (SM)	0	19		5
608.48				
Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)	5	8	1.0 P	14
		18	1.5 P	15
	10	18	1.0 P	20
		14	1.5 P	16
598.48		71	4.5 P	7
Very Stiff to Hard Brown, Moist CLAY LOAM, with gravel (CL-S)	15	59	3.0 P	13
594.48				
End of Boring				

RWB-07

EL. 612.49

	D	N	Qu	w%
	0	13	1.5 P	10
Stiff Brown, Moist CLAY LOAM, with gravel (CL-S)	5	5	1.0 P	17
		14	2.0 P	16
603.99		16	2.5 B	17
Very Stiff to Hard Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)	10	22	4.5+ P	18
598.99		17	6.25 B	17
Hard Gray, Moist SILTY CLAY, trace sand and gravel (CL/ML)	15			
596.49		37	1.0 P	16
Stiff Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)				
593.99		30		14
Dense Brown, Moist SAND, trace gravel (SP)	20			
591.49		26		13
Medium Dense to Very Dense Brown, Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM)	25	61		9
586.49				
Hard Gray, Moist SILTY CLAY LOAM, with gravel (ML/CL)		41	4.5+ P	11
583.99				
Extremly Dense Brown and Gray, Moist SAND, with gravel (SPG)		100+		10
583.49				
End of Boring				

225.00' 250.00' 275.00' 300.00' 325.00' 350.00' 375.00' 400.00' 425.00' 450.00' 475.00'

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

USER NAME = nnano	DESIGNED - TK	REVISED -	
	DRAWN - NN	REVISED -	
PLOT SCALE = 240.0000 ' / ft.	CHECKED - DE	REVISED -	
PLOT DATE = 4/10/2024	DATE - 10/03/2022	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163–017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 2 OF 8 SHEETS | STA. 225.00 | TO STA. 475.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	3
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

LEGEND

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

APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED

640 630 620 610 600 590 580 570 560

MATCH LINE - SHEET 2, 475.00

MATCH LINE - SHEET 4, 725.00

RWB-08

EL	D	N	Qu	w%
613.01	0			
Stiff Brown and Gray, Moist SILTY CLAY, with gravel (CL/ML)	5	10		14
609.51	10			
	15	18	2.5 P	20
Stiff to Very Stiff Brown and Gray, Moist CLAY LOAM, trace gravel (CL-S)	20	21	3.0 P	20
	25	39	1.0 P	22
602.01	T0			
Hard Gray, Moist SILTY CLAY, trace sand (CL/ML)	30	26	4.5 P	18
598.51	35	34		16
Dense Brown, Wet SILTY SAND (SM)	40	50		12
597.01	45			
Very Dense to Extremely Dense Gray, Moist SANDY CLAY LOAM with gravel and cobbles (SC/SM)	50	100+		12
	55	52		10
Very Stiff Gray, Moist SILTY CLAY LOAM with gravel and cobbles (ML/CL)	60	69	3.33 B	9
588.01	65			
End of Boring				

RWB-09

EL	D	N	Qu	w%
613.33	0			
Stiff to Very Stiff Gray, Moist SILTY LOAM, with gravel, trace sand (CL/ML)	5	13	1.0 P	19
	10	17	3.0 P	20
607.33	15	21	2.5 P	17
Very Stiff Brown, Moist SILTY CLAY LOAM, trace sand (ML/CL)	20			
604.83	25	13	5.0 B	20
Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)	T0			
602.33	30	23		20
Medium Dense to Dense Brown, Wet SANDY CLAY LOAM (SC/SM)	35	42		20
597.33	40	27	5.83 B	14
Hard Brown, Moist SILTY CLAY LOAM (ML/CL)	45			
594.83	50	27	5.0 B	12
Hard Gray, Moist SILTY CLAY LOAM, trace gravel (ML/CL)	55			
592.83	60			
End of Boring				

RWB-10

EL	D	N	Qu	w%
613.40	0			
Stiff to Very Stiff Brown and Gray, Moist SILTY LOAM, with gravel, trace sand (CL/ML)	5	11		
612.90	10			
Medium Dense Brown and Gray, Moist SANDY CLAY LOAM, with gravel (SC/SM)	15	12		10
608.90	20			
Very Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)	25	8	2.5 B	16
607.40	30	22	4.5 P	21
Very Stiff Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)	35	34	10.0 B	14
602.40	T0			
Hard Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)	40	42	5.83 B	15
599.90	45	49		15
Dense Gray, Moist SILT, trace sand and gravel (ML)	T5			
597.40	50	16		21
Medium Dense Brown, Wet SAND (SP)	55	20		18
592.40	60	25		21
Dense Gray, Wet SAND (SP)	65	32	3.5 P	15
588.90	70	35	4.0 P	12
Very Stiff to Hard Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)	75	36	5.0 B	12
583.40	80			
End of Boring				

475.00' 500.00' 525.00' 550.00' 575.00' 600.00' 625.00' 650.00' 675.00' 700.00' 725.00'

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735 E. RED GIGTON RD, SCHAUMBURG, IL 60173
TEL: +630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME = nnano		DESIGNED - TK		REVISED -	
		DRAWN - NN		REVISED -	
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PLOT DATE = 4/10/2024		DATE - 10/03/2022		REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

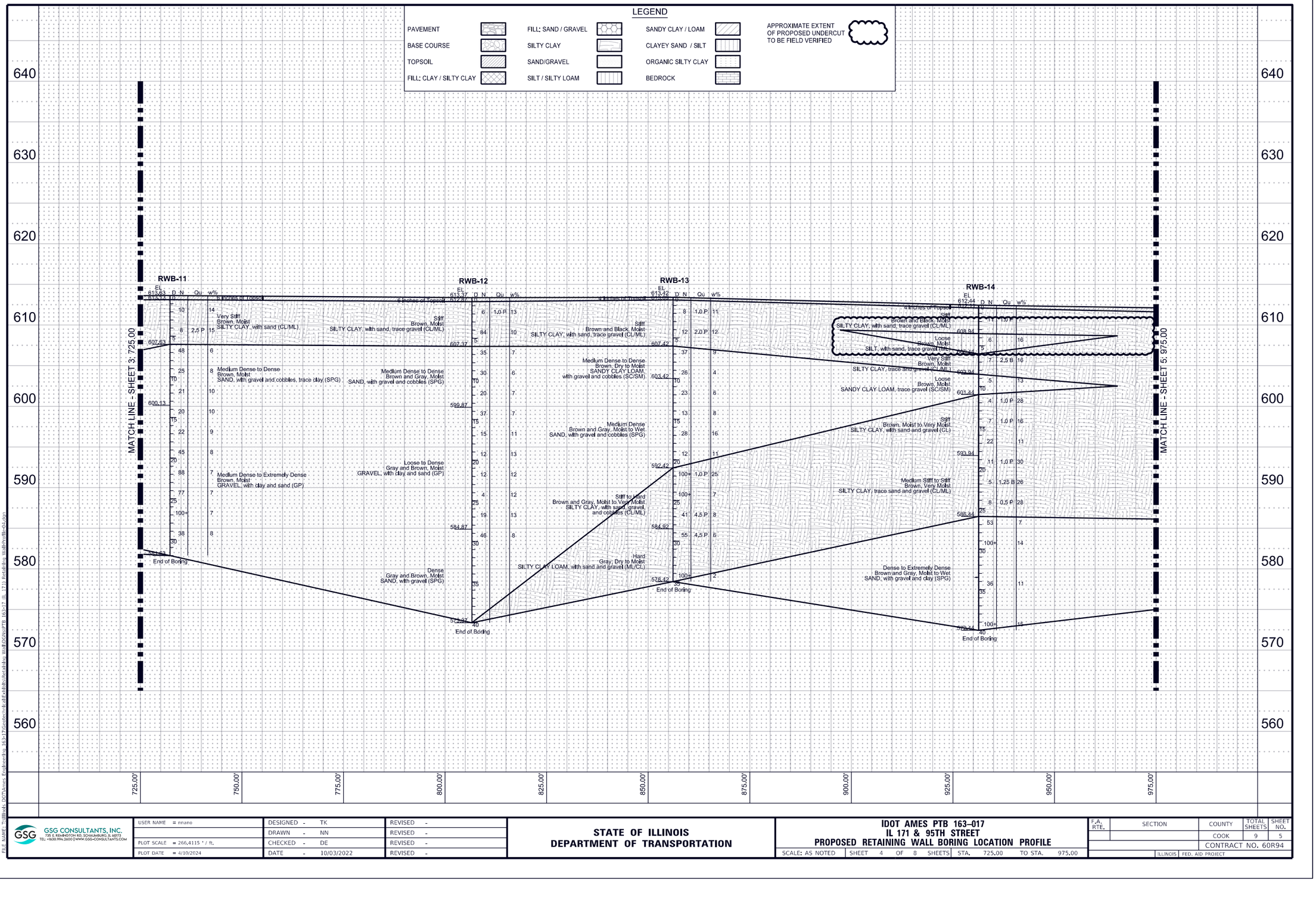
IDOT AMES PTB 163–017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 3 OF 8 SHEETS | STA. 475.00 | TO STA. 725.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	4
		CONTRACT NO. 60R94		
		ILLINOIS FED. AID PROJECT		

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED
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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PLOT DATE = 4/10/2024	DATE - 10/03/2022	REVISED -	

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

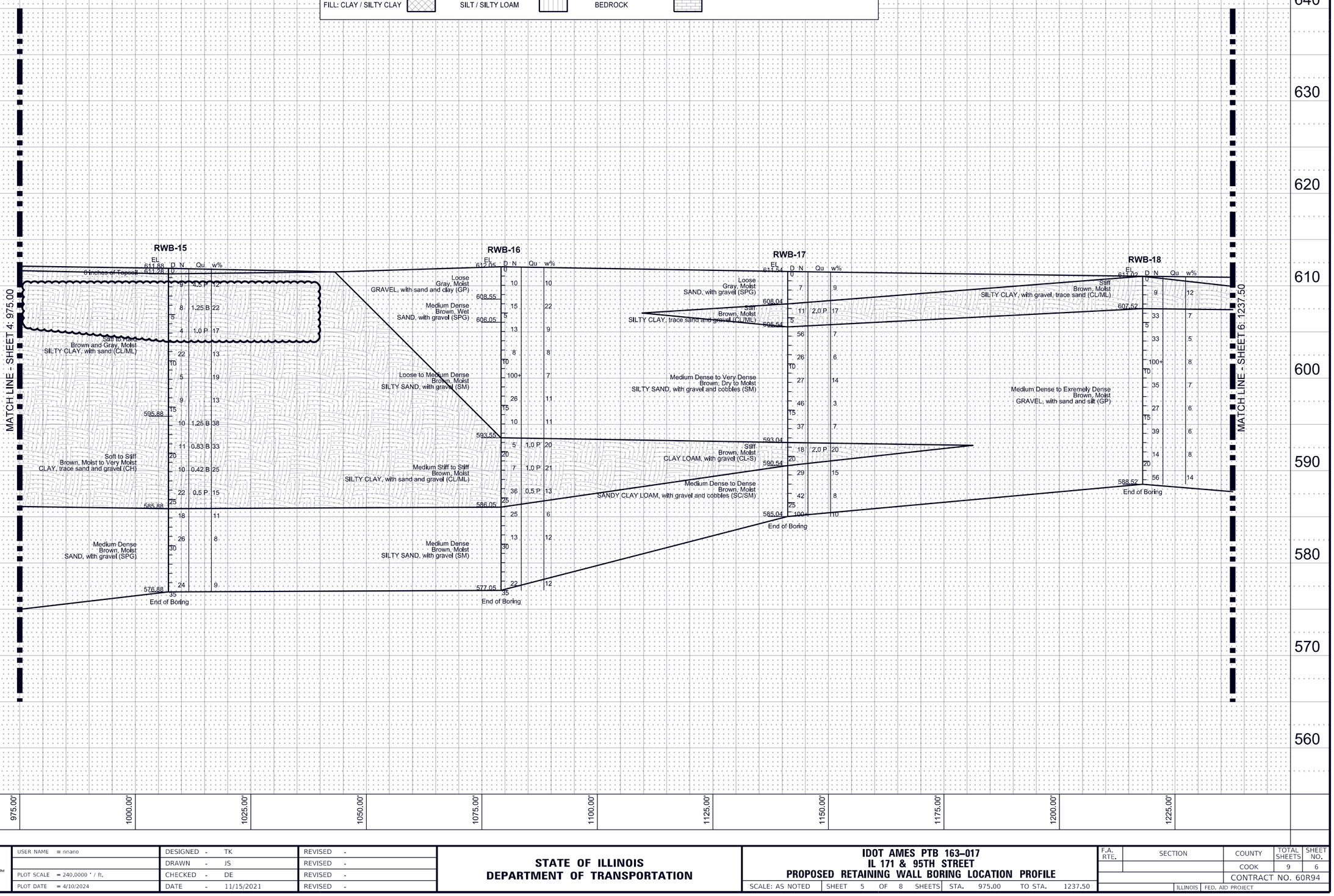
IDOT AMES PTB 163-017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 4 OF 8 SHEETS | STA. 725.00 TO STA. 975.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	5
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED
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 - JS	REVISED -
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	PLOT DATE = 4/10/2024	DATE - 11/15/2021	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

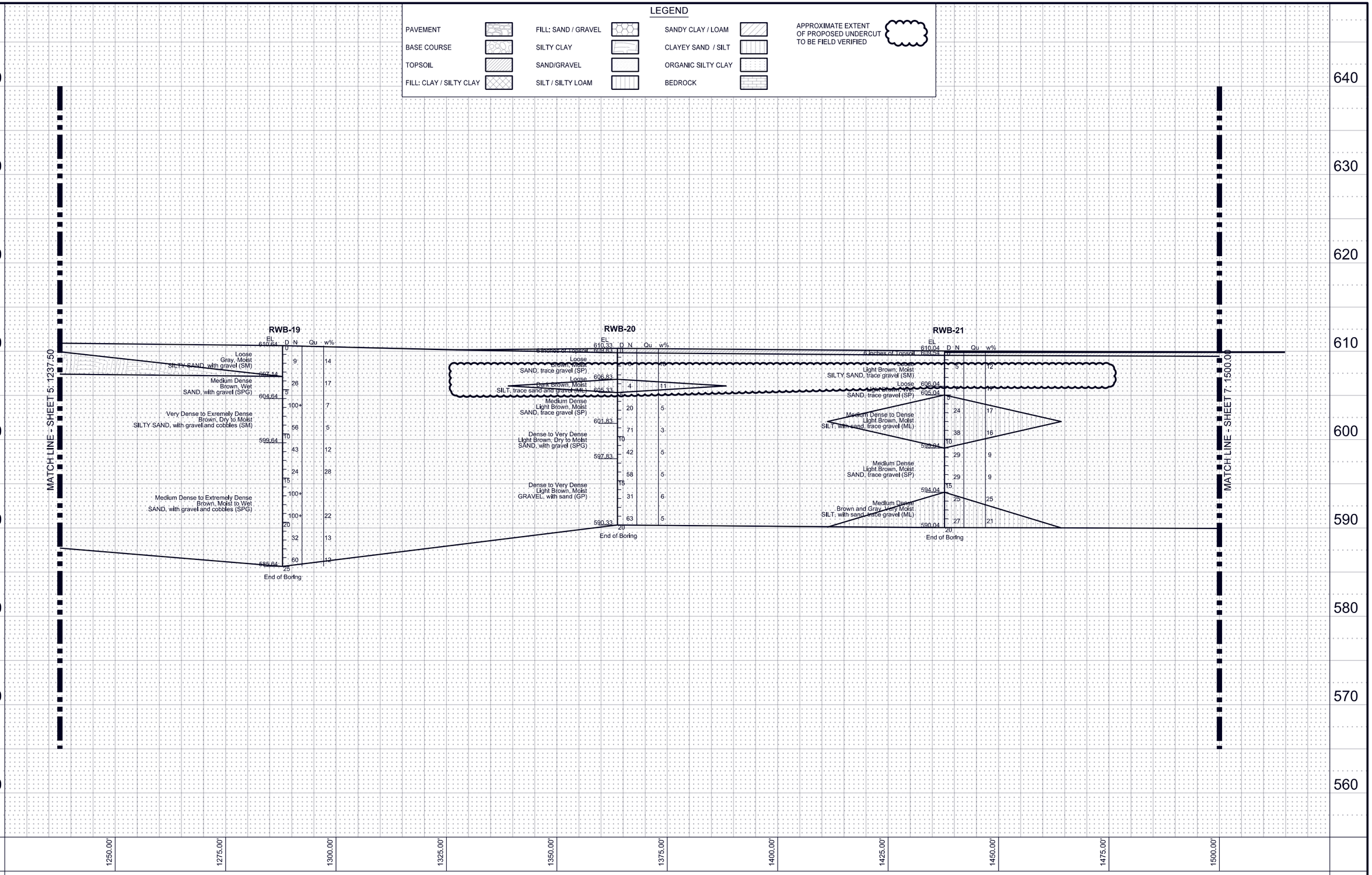
IDOT AMES PTB 163-017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 5 OF 8 SHEETS | STA. 975.00 | TO STA. 1237.50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	6
		CONTRACT NO. 60R94		
	ILLINOIS FED. AID PROJECT			

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED
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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USER NAME = nnano	DESIGNED - TK	REVISED -
	DRAWN - NN	REVISED -
PLOT SCALE = 240.0000 ' / ft.	CHECKED - DE	REVISED -
PLOT DATE = 4/11/2024	DATE - 10/03/2022	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163–017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

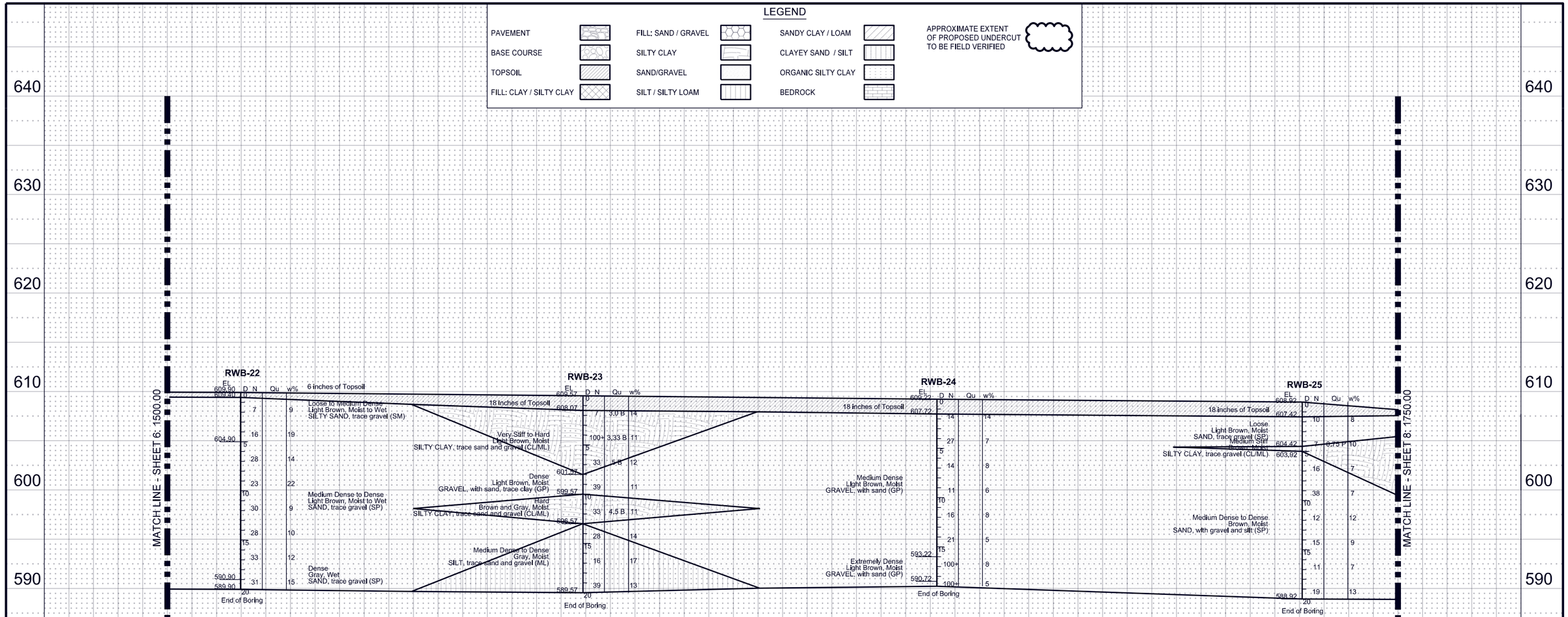
SCALE: AS NOTED | SHEET 6 OF 8 SHEETS | STA. 1237.50 | TO STA. 1500.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	7
		CONTRACT NO. 60R94		
		ILLINOIS	FED. AID PROJECT	

LEGEND

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

APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFIED



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USER NAME	= nnano	DESIGNED -	TK	REVISED -	
		DRAWN -	NN	REVISED -	
PLOT SCALE	= 240.0000 ' / ft.	CHECKED -	DE	REVISED -	
PLOT DATE	= 4/10/2024	DATE -	10/03/2022	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163-017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 7 OF 8 SHEETS | STA. 1500.00 | TO STA. 1750.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	8
		CONTRACT NO. 60R94		
	ILLINOIS	FED. AID PROJECT		

LEGEND

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

MATCH LINE - SHEET 7: 1750.00

RWB-26

	EL	D	N	Qu	w%
6 inches of Asphalt	608.78				
6 Inches of Concrete	608.28				
	607.78				
		0	9		NR
Stiff, Brown, Moist, SILTY CLAY, trace sand and gravel (CL/ML)		5	8	2.0 P	19
			17		19
		T0	8		20
	597.78		9	0.83 B	43
Soft to Stiff, Brown, Very Moist, CLAY, trace sand and gravel (CH)			13	1.67 B	32
		15			
			7	0.25 P	39
	590.28				
Stiff, Brown, Moist, SILTY CLAY, trace sand and gravel (CL/ML)	588.78		29	1.5 P	15
		20			

End of Boring

RWB-27

	EL	D	N	Qu	w%
4 Inches of Topsoil	608.86				
	608.53	0			
Stiff, Brown, Moist, SILTY CLAY, with sand (CL/ML)			11	2.0 P	11
	605.36				
			6	2.08 B	26
		5			
Very Stiff, Brown, Moist to Very Moist, SILTY CLAY, trace sand and gravel (CL/ML)			22	2.5 P	16
			41	2.0 P	16
		T0			
			18	2.5 B	19
	595.36				
			21	2.5 P	21
		15			
Very Stiff, Brown, Moist, SILTY CLAY LOAM, trace sand and gravel (ML/CL)			30	2.0 P	17
			32	2.5 P	8
	588.86	20			

End of Boring

640 630 620 610 600 590 580 570 560

1750.00' 1775.00' 1800.00' 1825.00' 1850.00' 1875.00' 1900.00' 1925.00' 1950.00' 1975.00' 2000.00'

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TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED -	TK	REVISED -	
		DRAWN -	NN	REVISED -	
PLOT SCALE	= 240.0000 ' / ft.	CHECKED -	DE	REVISED -	
PLOT DATE	= 10/3/2022	DATE -	10/03/2022	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IDOT AMES PTB 163-017
IL 171 & 95TH STREET
PROPOSED RETAINING WALL BORING LOCATION PROFILE

SCALE: AS NOTED | SHEET 8 OF 8 SHEETS | STA. 1750.00 | TO STA. 2000

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		COOK	9	9
		CONTRACT NO. 60R94		
	ILLINOIS FED. AID PROJECT			

APPENDIX C

SOIL BORING LOGS

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

SOIL BORING LOG

Date 6/17/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** JB

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7161228, **Longitude** -87.900791

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-01
Station 316+1.26
Offset 43.32ft RT
Ground Surface Elev. 611.64 ft

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

Groundwater Elev.:
First Encounter 603.1 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 611.39				
Loose Brown, Moist SAND, with gravel (SPG)		8		
		5 3		6
608.14				
Stiff Brown, Moist SILTY CLAY, with gravel (CL/ML)		3		
	-5	3 4	2.0 P	15
605.64				
Loose Brown, Moist GRAVEL, with sand and clay (GP)		6		
		5 4		13
603.14 ▼				
Dense Brown, Moist SILT, with sand, trace gravel (ML)		11		
		13/1"		20
	-10			
600.64				
Dense Brown, Moist GRAVEL, with clay and sand (GP)		11		
		15/4"		9
598.14				
Dense Gray, Dry to Moist GRAVEL, with clay and sand (GP)		13		
		13/3"		5
	-15			
		16/5"		
				9
		15		
		16 18		9
591.64	-20			

End of Boring

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

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

SOIL BORING LOG

Date 6/17/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** JB

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7161942, **Longitude** -87.900502

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-02
Station 316+84.34
Offset 43.02ft RT
Ground Surface Elev. 611.53 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
611.28				3 inches of Topsoil
	6			Loose Brown, Moist SAND, with gravel (SPG)
	3 3		8	
608.03	5			Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
-5	8 7	1.3 B	12	
	2			
	3 5	1.5 B	17	
603.03	7			Medium Dense Brown, Moist SILT, trace sand and gravel (ML)
-10	8 6		17	
600.53	13			Medium Dense to Dense Brown, Moist GRAVEL, with sand and clay (GP)
	13 6/2"		10	
	11			
-15	6 6		12	
	16/2"			
			9	
593.03	18			Dense Gray, Moist SILT, with gravel, trace sand (ML)
591.53 -20	9/1"		7	

End of Boring

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

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

SOIL BORING LOG

Date 6/17/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** JB

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7162446, **Longitude** -87.9002941

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-03
Station 317+44.00
Offset 43.11ft RT
Ground Surface Elev. 611.97 ft

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

Groundwater Elev.:
First Encounter 601.0 ft ▼
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				3 inches of Topsoil 611.72
	4			Loose Brown, Moist SAND, trace gravel (SP)
	4 3		6	
				608.47
	4			Stiff to Very Stiff Brown, Moist
	5 5	1.9 B	21	SILTY CLAY, trace sand and gravel (CL/ML)
-5				
	13/4"			Little recovery at 6-7.5 feet
		3.0 P		
	12			
	12 10	2.5 P	18	
-10				
▼	8			
	11 9/2"	1.0 P	21	
				598.47
	18			Dense Brown, Moist
	28 9/1"		8	SAND, with gravel, trace clay (SPG)
-15				
				595.97
	6			Dense Gray, Moist
	20 6/1"		8	SILT, with sand and gravel (ML)
	23			
	25 6/1"		8	
591.97 -20				End of Boring

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

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

SOIL BORING LOG

Date 6/17/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7163001, **Longitude** -87.900071

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-04
Station 318+8.19
Offset 42.74ft RT
Ground Surface Elev. 611.96 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 (%)
6 inches of Topsoil 611.46				
Loose Gray, Moist SANDY CLAY LOAM, with gravel (SC/SM)		3 2 5		9
608.46		1		
Stiff Brown, Moist to Very Moist SILTY CLAY, trace sand and gravel (CL-ML)	-5	2 2	1.3 B	27
		3		
		5 7	1.3 B	17
603.46		9		
Stiff to Hard Brown, Moist SILTY CLAY, with gravel and cobbles (CL/ML)	-10	16 25	4.0 P	16
		8		
		15 23	1.5 P	9
Auger refusal at 14 feet 597.96		50/3"		9
End of Boring	-15			
	-20			

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

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

SOIL BORING LOG

Date 6/17/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7163728, **Longitude** -87.8998225

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-05
Station 318+80.90
Offset 38.55ft RT
Ground Surface Elev. 612.42 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 (%)
Medium Dense Gray, Moist SANDY CLAY LOAM, with gravel (SC/SM)		7		
		5 9		7
608.92		3		
Stiff Gray and Brown, Moist SILTY CLAY, with sand and gravel (CL/ML)		3 4	1.0 P	20
606.42	-5	5		
Stiff to Hard Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)		8 11	2.5 P	15
		5		
		8 10	1.5 P	18
	-10	7		
		13 14	4.5 P	15
598.92		12		
Stiff to Very Stiff Brown, Dry to Moist CLAY LOAM, with gravel and cobbles (CL-S)		48 37	3.0 P	11
	-15	11		
		50/5"	1.0 P	12
Split-spoon refusal at 19 feet 593.42		50/4"		5
End of Boring	-20			

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

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

SOIL BORING LOG

Date 6/16/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7164652, **Longitude** -87.8995463

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-06
Station 319+63.02
Offset 29.88ft RT
Ground Surface Elev. 611.98 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
	7			Medium Dense Gray, Moist SILTY SAND, with gravel (SM)
	9 10		5	
	3			608.48 Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
-5	4 4	1.0 P	14	
	7			
	10 8	1.5 P	15	
	4			
-10	5 13	1.0 P	20	
	7			
	7 7	1.5 P	16	
	8			598.48 Very Stiff to Hard Brown, Moist CLAY LOAM, with gravel (CL-S)
-15	42 29	4.5 P	7	
	6			
	17 42	3.0 P	13	
				594.48 Auger refusal at 17.5 feet End of Boring
-20				

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

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

SOIL BORING LOG

Date 6/16/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.716522, **Longitude** -87.8993169

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-07
Station 320+28.98
Offset 29.59ft RT
Ground Surface Elev. 612.49 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
				Stiff Brown, Moist CLAY LOAM, with gravel (CL-S)
	6			
	7 6	1.5 P	10	
	2			
-5	2 3	1.0 P	17	
	5			
	7 7	2.0 P	16	
603.99				
	4			Very Stiff to Hard Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)
-10	7 9	2.5 B	17	
	6			
	10 12	4.5 P	18	
598.99				
	4			Hard Gray, Moist SILTY CLAY, trace sand and gravel (CL/ML)
-15	7 10	6.3 B	17	
596.49				
	12			Stiff Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)
	19 18	1.0 P	16	
593.99				
	14			Dense Brown, Moist SAND, trace gravel (SP)
-20	15 15		14	
591.49				
	12			Medium Dense to Very Dense Brown, Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM)
	13 13		13	
	12			
-25	33 28		9	
586.49				
	10			Hard Gray, Moist SILTY CLAY LOAM, with gravel (ML/CL)
	15 26	4.5 P	11	
583.99				
583.49	50/6"		10	Extremely Dense Brown and Gray, Moist SAND, with gravel (SPG) Split-spoon refusal at 29 feet
-30				End of Boring
-35				
-40				

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

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7165766, **Longitude** -87.8990195

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-08
Station 321+11.99
Offset 36.09ft RT
Ground Surface Elev. 613.01 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
	9			Stiff Brown and Gray, Moist SILTY CLAY, with gravel (CL/ML)
	6 4		14	
609.51				
	4			Stiff to Very Stiff Brown and Gray, Moist CLAY LOAM, trace gravel (CL-S)
	8 10	2.5 P	20	
-5				
	5			
	10 11	3.0 P	20	
	28			
	18 21	1.0 P	22	
-10				
602.01				
	15			Hard Gray, Moist SILTY CLAY, trace sand (CL/ML)
	14 12	4.5 P	18	
	10			
	16 18		16	
598.51				
-15				Dense Brown, Wet SILTY SAND (SM)
597.01				
	12			Very Dense to Extremely Dense Gray, Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM)
	20 30		12	
	30			
	50/2"		12	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
	27			Very Dense to Extremely Dense Gray, Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM) *(continued)*
	24 28		10	
589.51				
	14			Very Stiff Gray, Moist SILTY CLAY LOAM, with gravel and cobbles (ML/CL)
	34 35	3.3 B	9	
588.01 -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 Consultants, Inc.

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7166294, **Longitude** -87.8987774

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-09
Station 321+80.29
Offset 39.38ft RT
Ground Surface Elev. 613.33 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 (%)	Description
				Stiff to Very Stiff Gray, Moist SILTY CLAY, with gravel, trace sand (CL/ML)
	8			
	7 6	1.0 P	19	
	6			
	7 10	3.0 P	20	
-5				
607.33				
	6			Very Stiff Brown, Moist SILTY CLAY LOAM, trace sand (ML/CL)
	9 12	2.5 P	17	
604.83				
	3			Hard Gray, Moist SILTY CLAY, trace gravel (CL/ML)
	5 8	5.0 B	20	
-10				
602.33				
	6			Medium Dense to Dense Brown, Wet SANDY CLAY LOAM (SC/SM)
	10 13		20	
	4			
	10 32		20	Cobbles at 13.5-15 feet
-15				
597.33				
	13			Hard Brown, Moist SILTY CLAY LOAM (ML/CL)
	11 16	5.8 B	14	
594.83				
	10			
	13 14	5.0 B	12	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
592.83				Hard Gray, Moist SILTY CLAY LOAM, trace gravel (ML/CL) *(continued)* Auger refusal at 20.5 feet End of Boring
-25				
-30				
-35				
-40				

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

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

SOIL BORING LOG

Date 6/16/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7166919, **Longitude** -87.8985132

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-10
Station 322+42.24
Offset 42.24ft RT
Ground Surface Elev. 613.40 ft

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

Groundwater Elev.:
First Encounter 584.9 ft ▼
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
612.90				6 inches of Topsoil
	5			Medium Dense Brown and Gray, Moist SANDY CLAY LOAM, with gravel (SC/SM)
	6 6		10	
609.90				
	2			Very Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
	4 4	2.5 B	16	
-5				
607.40				
	5			Hard to Very Hard Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)
	9 13	4.5 P	21	
	6			
	12 22	10.0 B	14	
-10				
602.40				
	9			Hard Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)
	17 25	5.8 B	15	
599.90				
	12			Dense Gray, Moist SILT, trace sand and gravel (ML)
	21 28		15	
-15				
597.40				
	6			Medium Dense Brown, Wet SAND (SP)
	8 8		21	
	8			
	8 12		18	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
592.40				
	8			Dense Gray, Wet SAND (SP)
	10 15		21	
589.90				
	7			Very Stiff to Hard Gray, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)
	8 24	3.5 P	15	
-25				
	12			
	16 19	4.0 P	12	
▼				
	8			
	13 23	5.0 B	12	
583.40 -30				End of Boring
-35				
-40				

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

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

SOIL BORING LOG

Date 6/15/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7167659, **Longitude** -87.8982534

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-11
Station 323+30.65
Offset 41.78ft RT
Ground Surface Elev. 613.63 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 (%)	Description
				6 inches of Topsoil 613.13
	9			Very Stiff Brown, Moist SILTY CLAY, with sand (CL/ML)
	5 5		14	
	3			
	3 5	2.5 P	15	
-5				607.63
	11			Medium Dense to Dense Brown, Moist SAND, with gravel and cobbles, trace clay (SPG)
	24 24		6	
	10			
	14 11		8	
-10				
	8			
	10 11		10	
	9			600.13 Medium Dense to Extremely Dense Brown, Moist GRAVEL, with clay and sand (GP)
	11 9		10	
-15				
	13			
	12 10		9	
	16			
	23 22		8	
-20				
	16			Medium Dense to Extremely Dense Brown, Moist GRAVEL, with clay and sand (GP) *(continued)*
	42 46		7	
	15			
	43 34		7	
-25				
	21			
	50/5"		7	
	19			
	25 13		8	
-30				
				Auger refusal at 32 feet 581.63
				End of Boring
-35				
-40				

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

Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 6/21/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7168446, **Longitude** -87.8980023

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-12
Station 324+4.38
Offset 39.86ft RT
Ground Surface Elev. 613.37 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
				6 inches of Topsoil 612.87
	4			Stiff Brown, Moist SILTY CLAY, with sand, trace gravel (CL/ML)
	3 3	1.0 P	13	
	42			Cobbles at 3.5-5 feet
	46 38		10	
-5				
				607.37
	17			Medium Dense to Dense Brown and Gray, Moist SAND, with gravel and cobbles (SPG)
	17 18		7	
	17			
	18 12		6	
-10				
	10			
	11 9		7	
				599.87
	10			Loose to Dense Gray and Brown, Moist GRAVEL, with clay and sand (GP)
	28 9		7	
-15				
	6			
	7 8		11	
	2			
	6 6		13	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	6			Loose to Dense Gray and Brown, Moist GRAVEL, with clay and sand (GP) *(continued)*
	6 6		12	
	2			
	3 1		12	
-25				
	4			
	6 13		13	
				584.87
	15			Dense Gray and Brown, Moist SAND, with gravel (SPG)
	22 24		8	
-30				
-35				Blind drill from 32 to 40 feet. Auger refusal at 32 feet on 06/12/2021. Attempted rock core on 06/21/2021, was able to blind drill to full depth of 40 feet.
				573.37
-40				End of Boring

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

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

SOIL BORING LOG

Date 6/14/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7168983, **Longitude** -87.8978358

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-13
Station 324+53.54
Offset 38.61ft RT
Ground Surface Elev. 613.42 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				4 inches of Topsoil 613.09
	5			Stiff Brown and Black, Moist SILTY CLAY, with sand, trace gravel (CL/ML)
	2 6	1.0 P	11	
	4			
-5	6 6	2.0 P	12	
	12			607.42 Medium Dense to Dense Brown, Dry to Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM)
	17 20		9	
	18			
-10	16 10		4	603.42 Medium Dense Brown and Gray, Moist to Wet SAND, with gravel and cobbles (SPG)
	6			
	9 14		6	
	6			
-15	6 7		8	
	14			
	10 18		16	
	8			
-20	7 5		11	
				592.42
	2			Stiff to Hard Brown and Gray, Moist to Very Moist SILTY CLAY, with sand, gravel, and cobbles (CL/ML)
	3 50/5"	1.0 P	25	
	50/4"			
-25			7	
	20			
	15 26	4.5 P	8	
	12			584.92 Hard Gray, Dry to Moist SILTY CLAY LOAM, with sand and gravel (ML/CL)
-30	23 32	4.5 P	6	
	50/3"			
-35			2	Auger refusal at 35 feet 578.42
				End of Boring
-40				

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

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

SOIL BORING LOG

Date 6/14/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7169819, **Longitude** -87.8975839

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-14
Station 325+28.22
Offset 36.74ft RT
Ground Surface Elev. 612.44 ft

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

Groundwater Elev.:
First Encounter 578.9 ft ▼
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				4 inches of Topsoil 612.11
	5			Stiff Brown and Black, Moist SILTY CLAY, with sand, trace gravel (CL/ML)
	4 7	1.0 P	7	
				608.94
	2			Loose Brown, Moist SILT, with sand, trace gravel (ML)
-5	2 4		16	
				606.44
	2			Very Stiff Brown, Moist SILTY CLAY, trace and gravel (CL/ML)
	2 5	2.5 B	16	
				603.94
	4			Loose Brown, Moist SANDY CLAY LOAM, trace gravel (SC/SM)
	3		13	
-10	2			
				601.44
	1			Stiff Brown, Moist to Very Moist SILTY CLAY, with sand and gravel (CL)
	1 3	1.0 P	28	
	5			
	5	1.0	16	
-15	2	P		
	4			Cobbles at 16-17.5 feet
	3 19		11	
				593.94
	1			
	5	1.0	30	
-20	6	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2			Medium Stiff to Stiff Brown, Very Moist SILTY CLAY, trace sand and gravel (CL/ML) *(continued)*
	3 2	1.3 B	26	
	3			
-25	3 5	0.5 P	28	
				586.44
	35			Dense to Extremely Dense Brown and Gray, Moist to Wet SAND, with gravel and clay (SPG)
	23 30		7	
	19			
	50/5"		14	
-30				
▼	11			
	24		11	
-35	12			
	50/3"			
			15	
-40				

572.44

End of Boring

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

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

SOIL BORING LOG

Date 6/10/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7170697, **Longitude** -87.897332

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-15
Station 326+3.57
Offset 34.52ft RT
Ground Surface Elev. 611.88 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
				6 inches of Topsoil 611.28
	5			Stiff to Hard Brown and Gray, Moist SILTY CLAY, with sand (CL/ML)
	4 5	4.5 P	12	
	2			
-5	2 6	1.3 B	22	
	3			
	2 2	1.0 P	17	
	9			Cobbles at 8.5-10 feet
-10	17 5		13	
	2			Cobbles at 11-12.5 feet
	3 2		19	
	10			Cobbles at 13.5-15 feet
-15	4 5		13	
				595.88
	2			Soft to Stiff Brown, Moist to Very Moist CLAY, trace sand and gravel (CH)
	5 5	1.3 B	38	
	6			
-20	4 7	0.8 B	33	
	WOH			Soft to Stiff Brown, Moist to Very Moist CLAY, trace sand and gravel (CH) *(continued)*
	1 9	0.4 B	25	
	3			Cobbles at 23.5-25 feet
-25	12 10	0.5 P	15	
				585.88
	5			Medium Dense Brown, Moist SAND, with gravel (SPG)
	6 12		11	
	28			
-30	16 10		8	
	13			
-35	10 14		9	
				576.88
				End of Boring
-40				

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

BBS, form 137 (Rev. 8-99)

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.717145, **Longitude** -87.8970883

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-16
Station 326+75.53
Offset 36.03ft RT
Ground Surface Elev. 612.05 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
				Loose Gray, Moist GRAVEL, with sand and clay (GP)
	4			
	5		10	
	5			
608.55				
	7			Medium Dense Brown, Wet SAND, with gravel (SPG)
	9		22	
-5	6			
606.05				
	6			Loose to Medium Dense Brown, Moist SILTY SAND, with gravel (SM)
	5		9	
	8			
	5			
	4		8	
-10	4			
	50/4"			Cobbles at 11-12.5
			7	
	6			
	13		11	
-15	13			
	5			Cobbles at 16-17.5
	5		11	
	5			
593.55				
	1			
	2	1.0	20	
-20	3	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Stiff to Stiff Brown, Moist SILTY CLAY, with sand and gravel (CL/ML) *(continued)*
	2			
	3	1.0	21	
	4	P		
	15			Cobbles at 23.5-25 feet
	21	0.5	13	
-25	15	P		
586.05				
	10			Medium Dense Brown, Moist SILTY SAND, with gravel (SM)
	12		6	
	13			
	6			
	5		12	
-30	8			
	6			
	10		12	
577.05 -35	12			
				End of Boring
-40				

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

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7172191, **Longitude** -87.8968837

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-17
Station 327+37.52
Offset 33.68ft RT
Ground Surface Elev. 611.54 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
				Loose Gray, Moist SAND, with gravel (SPG)
	4			
	4		9	
	3			
				608.04
	3			Stiff Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)
	3	2.0	17	
-5	8	P		
				605.54
	10			Medium Dense to Very Dense Brown, Dry to Moist SILTY SAND, with gravel and cobbles (SM) Boulder at 6-7.5 feet
	26		7	
	30			
	9			
	13		6	
-10	13			
	8			
	9		14	
	18			
	24			
	23		3	
-15	23			
	16			
	15		7	
	22			
				593.04
	1			Stiff Brown, Moist CLAY LOAM, with gravel (CL-S)
	3	2.0	20	
-20	15	P		
				590.54
	8			Medium Dense to Dense Brown, Moist SANDY CLAY LOAM, with gravel and cobbles (SC/SM)
	13		15	
	16			
	13			
	28		8	
-25	14			
				585.04
	50/4"		10	Auger refusal at 26.5 feet 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 Consultants, Inc.

SOIL BORING LOG

Date 6/10/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7173026, **Longitude** -87.8966253

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-18
Station 328+14.34
Offset 34.07ft RT
Ground Surface Elev. 611.02 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
				Stiff Brown, Moist SILTY CLAY, with gravel, trace sand (CL/ML)
	2			
	5 4		12	
607.52				
	12			Medium Dense to Exremely Dense Brown, Moist GRAVEL, with sand and silt (GP)
	13 20		7	
-5				
	16			
	20 13		5	
	17			
	50/3"		8	
-10				
	37			
	21 14		7	
	15			
	15 12		6	
-15				
	37			
	24 15		6	
	9			
	8 6		8	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	10			Medium Dense to Exremely Dense Brown, Moist GRAVEL, with sand and silt (GP) *(continued)*
	33 23		14	
588.52				Auger Refusal at 22.5 feet
				End of Boring
-25				
-30				
-35				
-40				

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

BBS, form 137 (Rev. 8-99)

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

SOIL BORING LOG

Date 6/21/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7173758, **Longitude** -87.8963887

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-19
Station 328+84.22
Offset 35.55ft RT
Ground Surface Elev. 610.64 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
				Loose Gray, Moist SILTY SAND, with gravel (SM)
	6			
	4 5		14	
607.14				
	5			Medium Dense Brown, Wet SAND, with gravel (SPG)
	10 16		17	
-5				
604.64				
	20			Very Dense to Exremely Dense Brown, Dry to Moist SILTY SAND, with gravel and cobbles (SM)
	50/2"		7	
	15			
	18 38		5	
-10				
599.64				
	14			Medium Dense to Extremely Dense Brown, Moist to Wet SAND, with gravel and cobbles (SPG)
	15 28		12	
	5			
	12 12		28	
-15				
	50/5"			Auger refusal at 11.5 feet on 06/09/2021 and 06/10/2021. Attempted rock core on 06/21/2021 and boring was completed to full depth of 25 feet. Little recovery at 16-17.5 feet
	50/6"			
			22	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Dense to Extremely Dense Brown, Moist to Wet SAND, with gravel and cobbles (SPG) *(continued)*
	7			
	12 20		13	
	15			
	32 28		12	
585.64 -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 Consultants, Inc.

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.717458, **Longitude** -87.8961337

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-20
Station 329+60.01
Offset 35.99ft RT
Ground Surface Elev. 610.33 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 (%)
6 inches of Topsoil 609.83				
Loose Brown, Moist SAND, trace gravel (SP)		4		
		2 4		10
606.83				
Loose Dark Brown, Moist SILT, trace sand and gravel (ML)		3		
605.33	-5	2 2		11
Medium Dense Light Brown, Moist SAND, trace gravel (SP)		7		
		8 12		5
601.83				
Dense to Very Dense Light Brown, Dry to Moist SAND, with gravel (SPG)		14		
		35 36		3
	-10			
		18		
		17 25		5
597.83				
Dense to Very Dense Light Brown, Moist GRAVEL, with sand (GP)		13		
		18 40		5
	-15			
		19		
		18 13		6
		18		
		28 35		5
590.33	-20			

End of Boring

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

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7175384, **Longitude** -87.8958845

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-21
Station 330+34.08
Offset 36.40ft RT
Ground Surface Elev. 610.04 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 (%)
6 inches of Topsoil 609.54				
Loose Light Brown, Moist SILTY SAND, trace gravel (SM)		4 3 2		12
606.04		5		
Loose Light Brown, Wet SAND, trace gravel (SP) 605.04	-5	3 4		17
Medium Dense to Dense Light Brown, Moist SILT, with sand, trace gravel (ML)		6 10 14		17
		6		
	-10	17 21		16
599.04		11		
Medium Dense Light Brown, Moist SAND, trace gravel (SP)		14 15		9
		9		
	-15	14 15		9
594.04		10		
Medium Dense Brown and Gray, Very Moist SILT, with sand, trace gravel (ML)		12 13		25
		10		
590.04	-20	14 13		21

End of Boring

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

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7176241, **Longitude** -87.8956262

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-22
Station 331+11.20
Offset 36.05ft RT
Ground Surface Elev. 609.90 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 (%)	Description
609.40				6 inches of Topsoil
	6			Loose to Medium Dense Light Brown, Moist to Wet SILTY SAND, trace gravel (SM)
	4 3		9	
	5			
	8 8		19	
604.90 -5				
	10			Medium Dense to Dense Light Brown, Moist to Wet SAND, trace gravel (SP)
	14 14		14	
	7			
	9 14		22	
-10				
	12			
	15 15		9	
	10			
	14 14		10	
-15				
	13			
	17 16		12	
	14			
590.90				
	15 16		15	Dense Gray, Wet
589.90 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND, trace gravel (SP) End of Boring
-25				
-30				
-35				
-40				

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

BBS, form 137 (Rev. 8-99)

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7176995, **Longitude** -87.8953923

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-23
Station 331+80.73
Offset 36.47ft RT
Ground Surface Elev. 609.57 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 (%)
18 inches of Topsoil				
608.07		3		
Very Stiff to Hard Light Brown, Moist SILTY CLAY, trace sand and gravel (CL/ML)		2 5	3.0 B	14
Cobbles at 3.5-5 feet		50/4"		
	-5		3.3 B	11
		11		
		13 20	5.0 B	12
601.57				
Dense Light Brown, Moist GRAVEL, with sand, trace clay (GP)		14		
599.57	-10	22 17		11
Hard Brown and Gray, Moist SILTY CLAY, trace sand and gravel (CL/ML)		9		
		16 17	4.5 B	11
596.57				
Medium Dense to Dense Gray, Moist SILT, trace sand and gravel (ML)		10		
		14 14		14
	-15	6		
		6 10		17
		12		
		19 20		13
589.57	-20			

End of Boring

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

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

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7177787, **Longitude** -87.895151

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-24
Station 332+52.64
Offset 36.43ft RT
Ground Surface Elev. 609.22 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 (%)
18 inches of Topsoil				
607.72		3		
Medium Dense Light Brown, Moist GRAVEL, with sand (GP)		4 10		14
		5		
	-5	12 15		7
		12		
		8 6		8
		6		
	-10	4 7		6
		9		
		9 7		8
		20		
	-15	12 9		5
593.22		10		
Extremely Dense Light Brown, Moist GRAVEL, with sand (GP) Cobbles at 16-17 feet		50/3"		8
590.72		50/6"		5
Auger refusal at 19 feet End of Boring	-20			

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

Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Date 6/9/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** DM

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7178604, **Longitude** -87.894902

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

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-25
Station 333+26.85
Offset 36.39ft RT
Ground Surface Elev. 608.92 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
				18 inches of Topsoil
	5			607.42
	7		8	Loose
	3			Light Brown, Moist
				SAND, trace gravel (SP)
	5			
	5	0.8	10	604.42
-5	2	P		Medium Stiff
				603.92
				Brown, Moist
				SILTY CLAY, trace gravel
	8			(CL/ML)
	8		7	Medium Dense to Dense
	8			Brown, Moist
				SAND, with gravel and silt (SP)
	5			
	18		7	
-10	20			
	9			
	7		12	
	5			
	8			
	7		9	
-15	8			
	6			
	6		7	
	5			
	3			
	7		13	
-20	12			588.92

End of Boring

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

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

SOIL BORING LOG

Date 6/10/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.7179265, **Longitude** -87.894678

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-26
Station 333+92.54
Offset 38.85ft RT
Ground Surface Elev. 608.78 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
608.28				6 inches of Asphalt
607.78				6 inches of Concrete
	10			Stiff
	5		NR	Brown, Moist
	4			SILTY CLAY, trace sand and gravel (CL/ML)
	4			
	4	2.0	19	
-5	4	P		
	8			Cobbles at 6-7.5 feet
	10		19	
	7			
	3			Cobbles at 8.5-10 feet
	3		20	
-10	5			
597.78				
	3			Soft to Stiff
	5	0.8	43	Brown, Very Moist
	4	B		CLAY, trace sand and gravel (CH)
	8			
	7	1.7	32	
-15	6	B		
	3			Cobbles at 16-17.5 feet
	3	0.3	39	
	4	P		
590.28				
	4			Stiff
	12	1.5	15	Brown, Moist
	17	P		SILTY CLAY, trace sand and
588.78 -20				gravel (CL/ML)
				End of Boring
-25				
-30				
-35				
-40				

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

BBS, form 137 (Rev. 8-99)

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

SOIL BORING LOG

Date 6/10/21

ROUTE 95th Street **DESCRIPTION** Retaining Wall Boring **LOGGED BY** EH

SECTION IL 171 & 95th Street **LOCATION** IL 171, **SEC.** 22, **TWP.** 37N, **RNG.** 12E,
Latitude 41.718025, **Longitude** -87.8943884

COUNTY COOK **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** AUTO
DRILLING METHOD HSA **HAMMER EFF (%)** 92

STRUCT. NO. SN 016-2310
Station Sta. 317+80.13 to 333+27.91

BORING NO. RWB-27
Station 334+79.35
Offset 37.63ft RT
Ground Surface Elev. 608.86 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

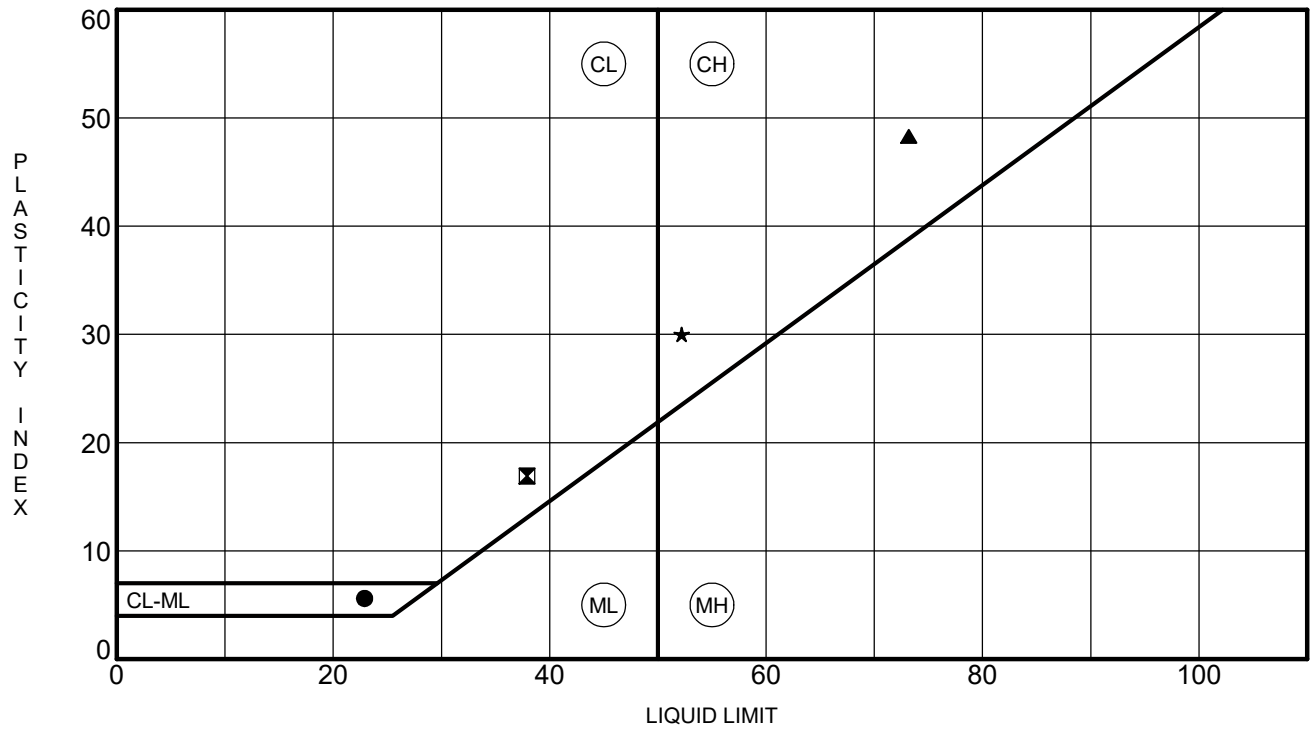
	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Topsoil 608.53				
Stiff Brown, Moist SILTY CLAY, with sand (CL/ML)		2		
		3 8	2.0 P	11
605.36				
Very Stiff Brown, Moist to Very Moist SILTY CLAY, trace sand and gravel (CL/ML)		5		
		2 4	2.1 B	26
	-5			
		19		
		14 8	2.5 P	16
		8		
Cobbles at 8.5-10 feet		20 21	2.0 P	16
	-10			
		17		
		12 6	2.5 B	19
595.36				
Very Stiff Brown, Moist SILTY CLAY LOAM, trace sand and gravel (ML/CL)		14		
		10 11	2.5 P	21
	-15			
		10		
		20 10	2.0 P	17
		14		
		12 20	2.5 P	8
588.86	-20			

End of Boring

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

APPENDIX D

LABORATORY TEST RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**RWB-04**	**6.00**	**22.9**	**17.3**	**5.6**		
⊠	**RWB-14**	**11.00**	**37.9**	**21.0**	**16.9**		
▲	**RWB-15**	**16.00**	**73.2**	**24.9**	**48.3**		
★	**RWB-26**	**16.00**	**52.2**	**22.2**	**30.0**		

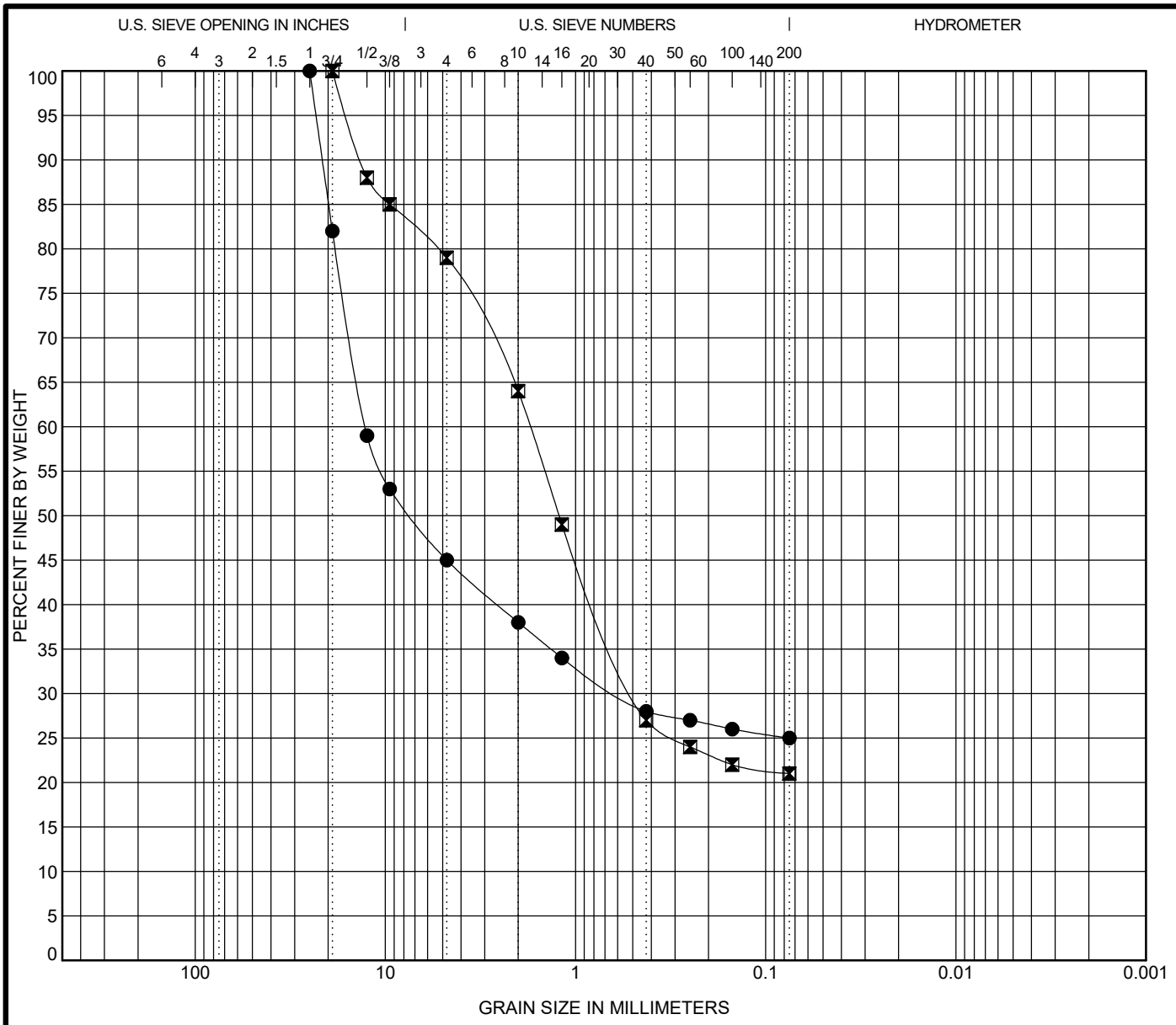
GSG Consultants, Inc
735 Remington Road
Schaumburg, IL 60173
(630) 994-2600
Fax: (312) 733-5612

ATTERBERG LIMITS RESULTS

Route: IL 171

Section: IL 171 & 95th Street

County: COOK



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**RWB-18**	**18.50**						
⊠	**RWB-25**	**11.00**						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RWB-18**	**18.50**	**25**	**12.73**	**0.597**		**55.0**	**20.0**	**25.0**	
⊠	**RWB-25**	**11.00**	**19**	**1.737**	**0.489**		**21.0**	**58.0**	**21.0**	

GSG Consultants, Inc
735 Remington Road
Schaumburg, IL 60173
(630) 994-2600
Fax: (312) 733-5612

GRAIN SIZE DISTRIBUTION

Route: IL 171

Section: IL 171 & 95th Street

County: COOK

GRAIN SIZE PTB 163-17.GPJ IL DOT.GDT 7/20/21

GSG CONSULTANTS, INC.

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

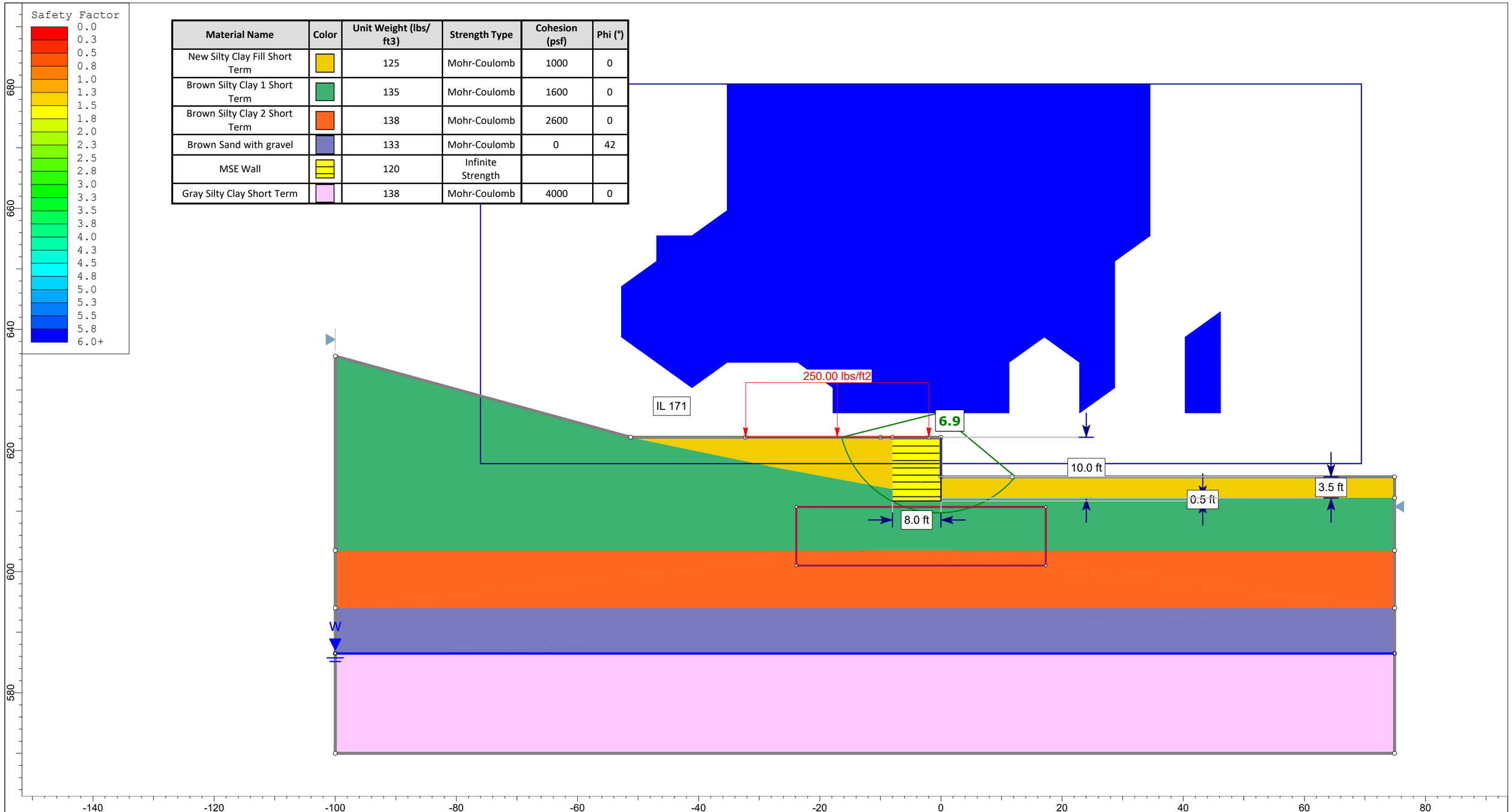
Table D1 – PTB 163-17 Test Results – Dry Unit Weight

Boring ID	Sample Depth (ft)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Soil Classification
RWB-04	6-7.5	120.3	140.7	CL/ML
RWB-09	3.5-5	112.3	136.9	CL/ML
RWB-14	11-12.5	93.3	124.1	CL
RWB-15	16-17.5	81.2	110.0	CH

APPENDIX E

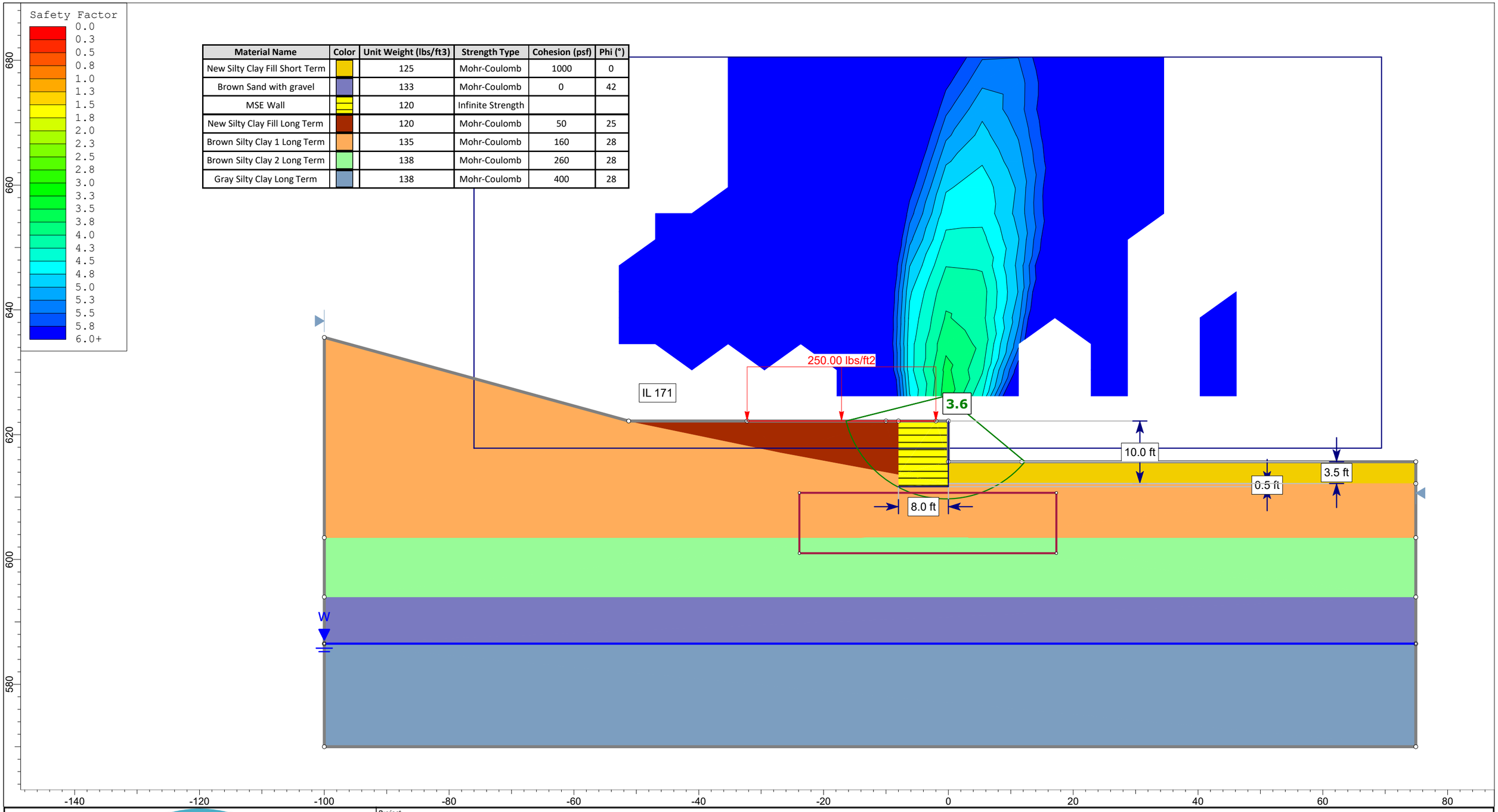
SLOPE STABILITY ANALYSES EXHIBITS

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
New Silty Clay Fill Short Term		125	Mohr-Coulomb	1000	0
Brown Silty Clay 1 Short Term		135	Mohr-Coulomb	1600	0
Brown Silty Clay 2 Short Term		138	Mohr-Coulomb	2600	0
Brown Sand with gravel		133	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		
Gray Silty Clay Short Term		138	Mohr-Coulomb	4000	0



	Project: IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall		
	Analysis Description: Exhibit 1 - MSE Retaining Wall at Station 320+58.87 - Circular Failure Short Term		
SLIDEINTERPRET 9.033	Drawn By: TEK	Company: GSG Consultants, Inc.	
	Date: 4/13/2024, 1:26:26 PM	File Name: RWB-7 MSE wall - 4-13-24.slmd	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
New Silty Clay Fill Short Term		125	Mohr-Coulomb	1000	0
Brown Sand with gravel		133	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		
New Silty Clay Fill Long Term		120	Mohr-Coulomb	50	25
Brown Silty Clay 1 Long Term		135	Mohr-Coulomb	160	28
Brown Silty Clay 2 Long Term		138	Mohr-Coulomb	260	28
Gray Silty Clay Long Term		138	Mohr-Coulomb	400	28



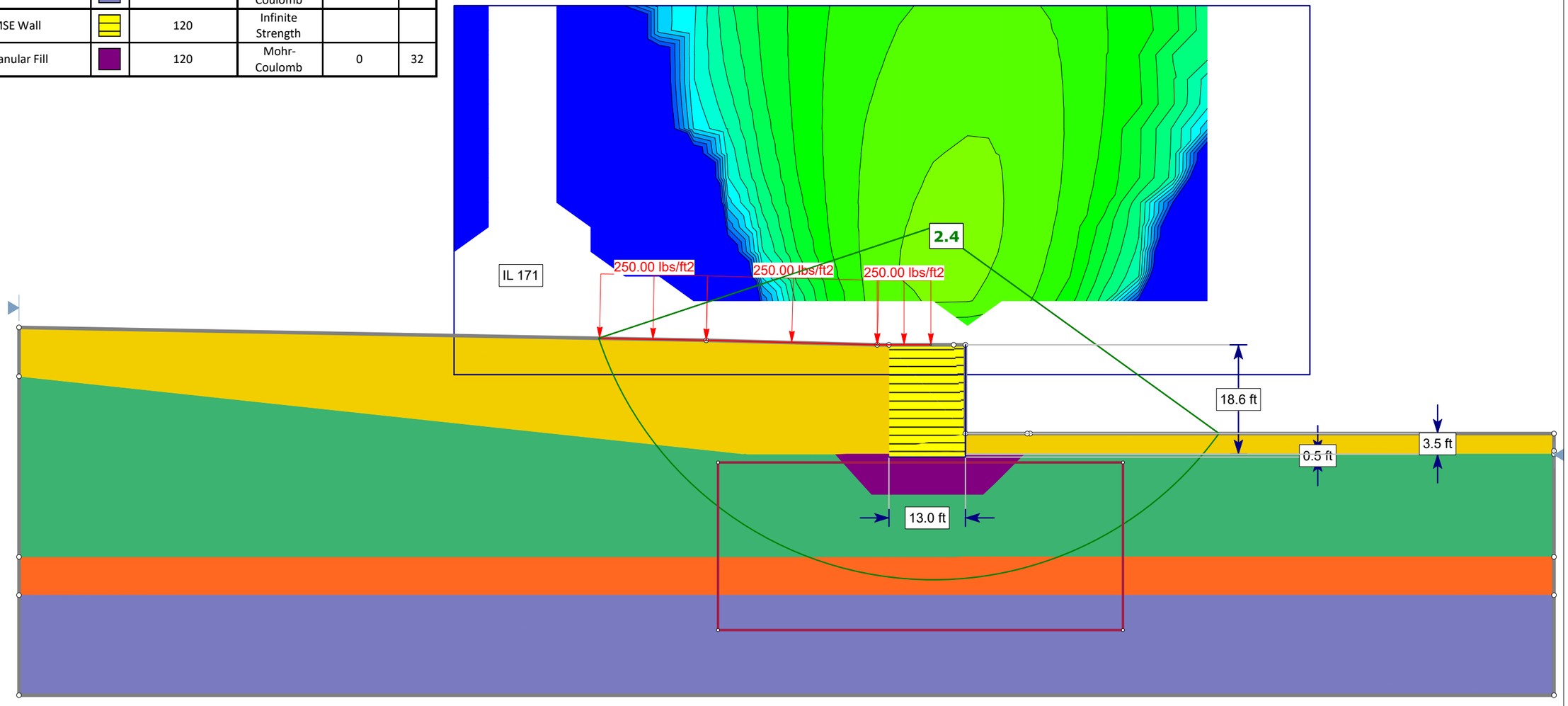
	Project: IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall		
	Analysis Description: Exhibit 2 - MSE Retaining Wall at Station 320+58.87 - Circular Failure Long Term		
	Drawn By: TEK	Company: GSG Consultants, Inc.	
	Date: 4/13/2024, 1:27:38 PM	File Name: RWB-7 MSE wall - 4-13-24.slmd	

SLIDEINTERPRET 9.033

Safety Factor

0.0
0.3
0.5
0.8
1.0
1.3
1.5
1.8
2.0
2.3
2.5
2.8
3.0
3.3
3.5
3.8
4.0
4.3
4.5
4.8
5.0
5.3
5.5
5.8
6.0+

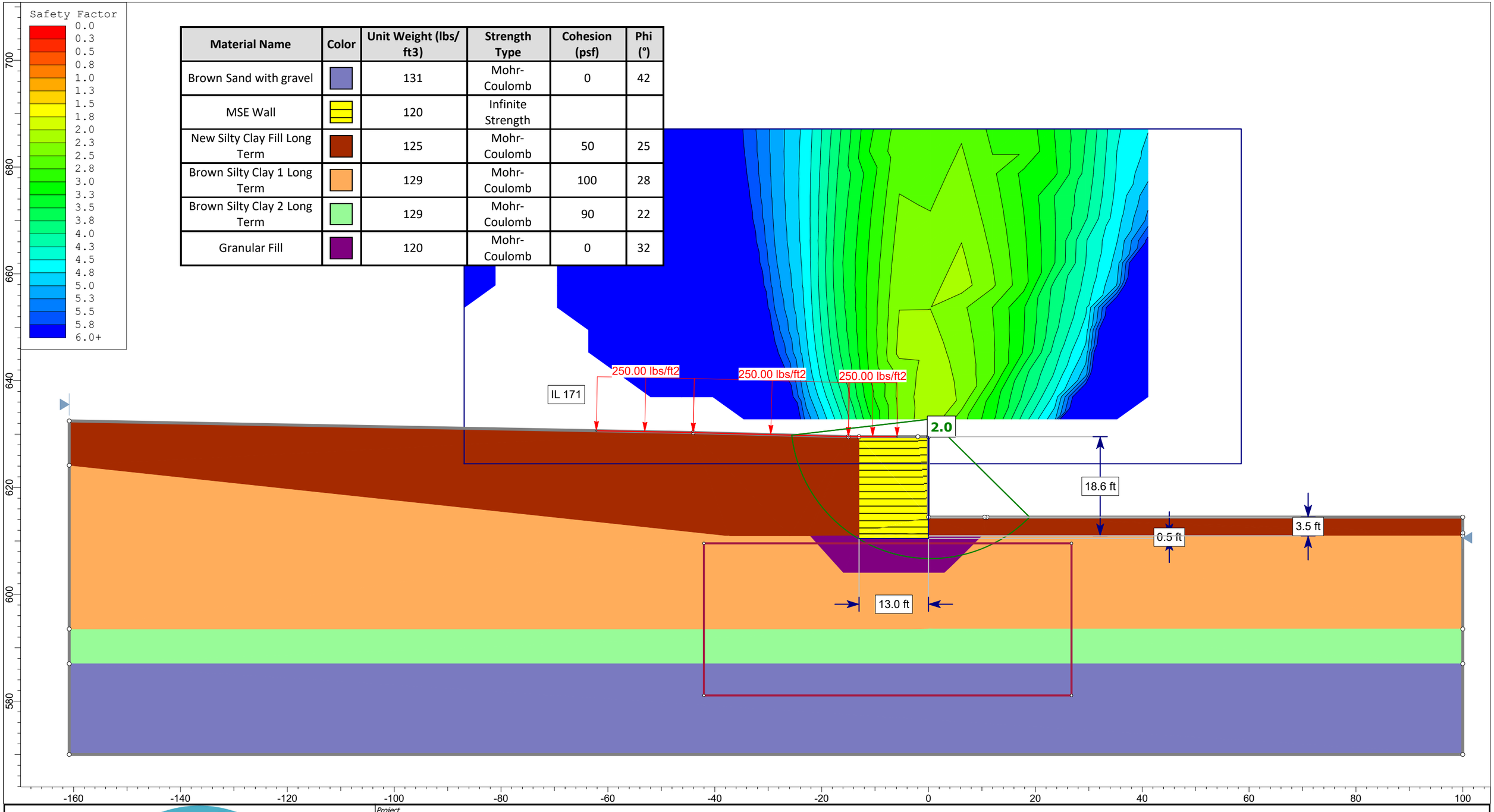
Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
New Silty Clay Fill Short Term		125	Mohr-Coulomb	1000	0
Brown Silty Clay 1 Short Term		129	Mohr-Coulomb	1000	0
Brown Silty Clay 2 Short Term		129	Mohr-Coulomb	900	0
Brown Sand with gravel		131	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		
Granular Fill		120	Mohr-Coulomb	0	32



Project	IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall		
Analysis Description	Exhibit 3 - MSE Retaining Wall at Station 326+00.73 - Circular Failure Short Term		
Drawn By	TEK	Company	GSG Consultants, Inc.
Date	4/13/2024, 2:00:13 PM	File Name	RWB-15 MSE wall - 4-13-24.slmd

SLIDEINTERPRET 9.033

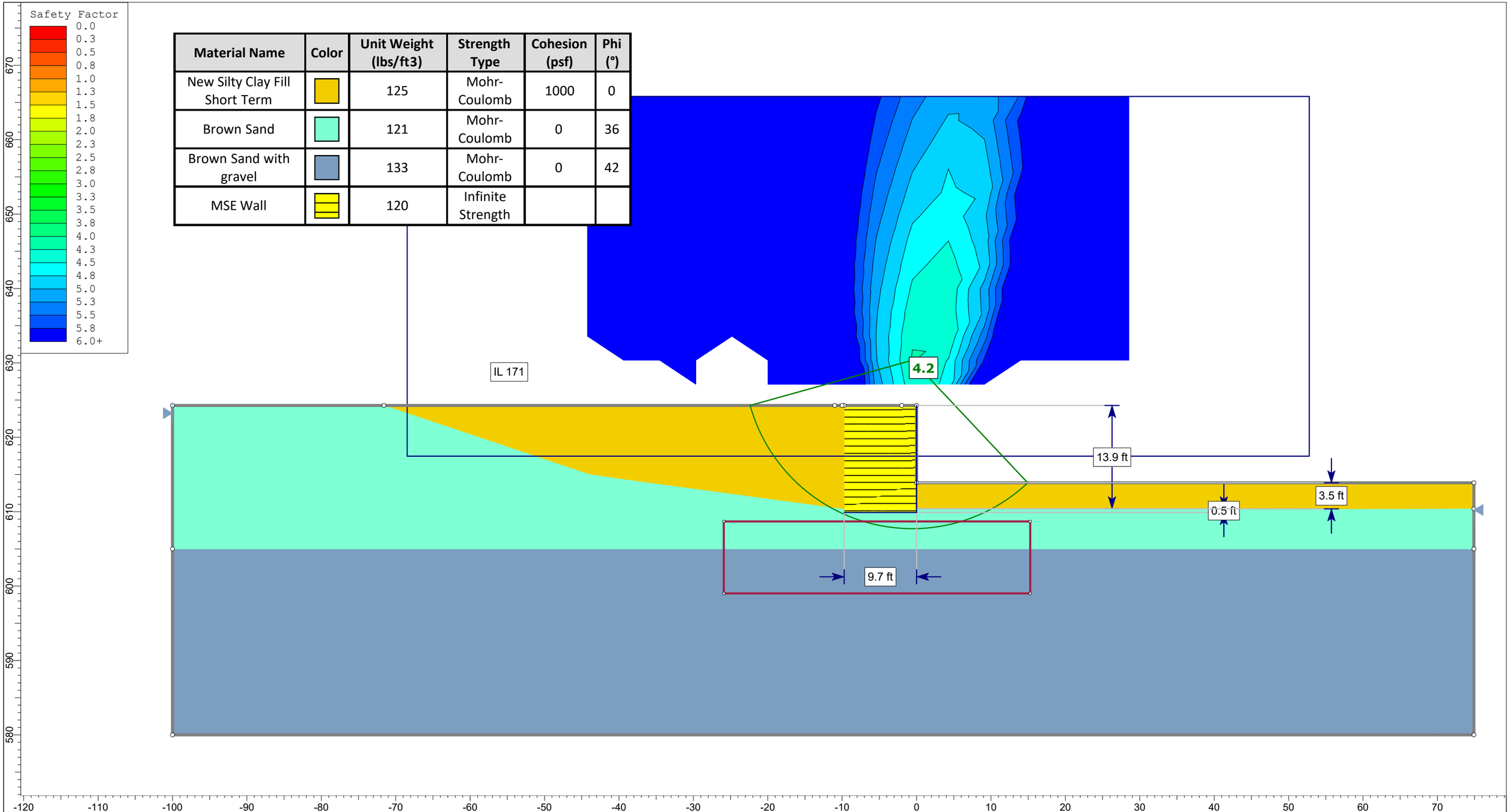
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Brown Sand with gravel		131	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		
New Silty Clay Fill Long Term		125	Mohr-Coulomb	50	25
Brown Silty Clay 1 Long Term		129	Mohr-Coulomb	100	28
Brown Silty Clay 2 Long Term		129	Mohr-Coulomb	90	22
Granular Fill		120	Mohr-Coulomb	0	32



Project	IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall		
Analysis Description	Exhibit 4 - MSE Retaining Wall at Station 326+00.73 - Circular Failure Long Term		
Drawn By	TEK	Company	GSG Consultants, Inc.
Date	4/13/2024, 2:41:38 PM	File Name	RWB-15 MSE wall - 4-13-24.slmd

SLIDEINTERPRET 9.033

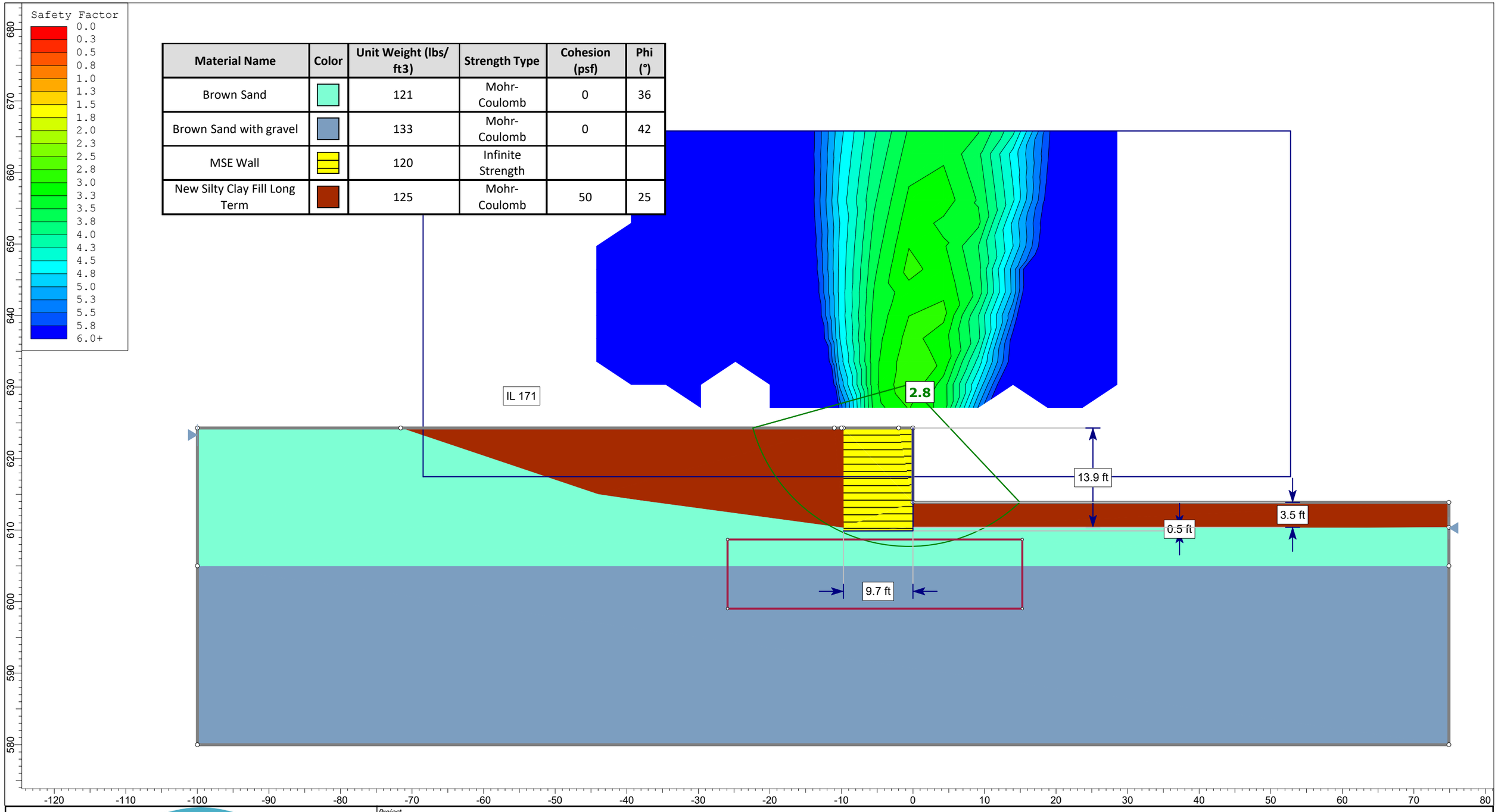
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
New Silty Clay Fill Short Term		125	Mohr-Coulomb	1000	0
Brown Sand		121	Mohr-Coulomb	0	36
Brown Sand with gravel		133	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		



	Project: IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall		
	Analysis Description: Exhibit 5 - MSE Retaining Wall at Station 328+70.73 - Circular Failure Short Term		
	Drawn By: TEK	Company: GSG Consultants, Inc.	
	Date: 4/13/2024, 2:37:20 PM	File Name: RWB-19 MSE wall - 4-13-24.slmd	

SLIDEINTERPRET 9.033

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
Brown Sand		121	Mohr-Coulomb	0	36
Brown Sand with gravel		133	Mohr-Coulomb	0	42
MSE Wall		120	Infinite Strength		
New Silty Clay Fill Long Term		125	Mohr-Coulomb	50	25



	Project	IDOT PTB 163-17: IL 171 at 95th Street Retaining Wall	
	Analysis Description	Exhibit 6 - MSE Retaining Wall at Station 328+70.73 - Circular Failure Long Term	
SLIDEINTERPRET 9.033	Drawn By	TEK	Company: GSG Consultants, Inc.
	Date	4/13/2024, 2:38:56 PM	File Name: RWB-19 MSE wall - 4-13-24.slmd